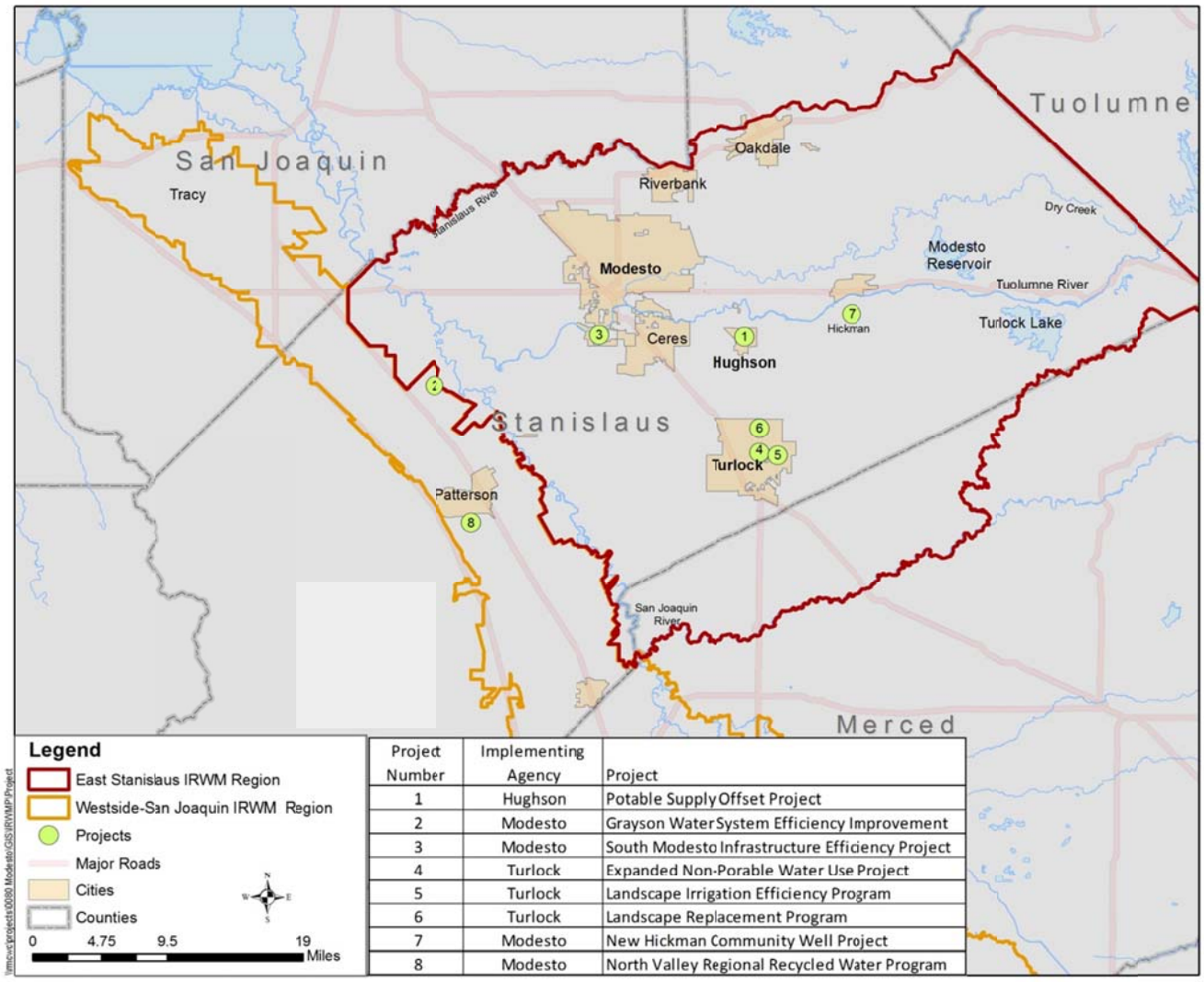
ATTACHMENT 3. PROJECT JUSTIFICATION

The purpose of this attachment is to summarize the proposed projects included in the East Stanislaus Region grant application, describe how the projects included herein meet the needs created by the drought, and address the physical benefits achieved by the projects.

This grant application includes 7 projects in the East Stanislaus IRWM Region and one inter-regional project (the North Valley Regional Recycled Water Program), located in both the East Stanislaus and Westside-San Joaquin IRWM Regions. The project locations are shown in Figure 3-1.

All of the projects achieve at least one Drought Project Element and one IRWM Project Element as shown in the Project Summary Table (Table 3-1).

Figure 3-1: East Stanislaus Grant Application Regional Map



Project Number	Implementing Agency	Project
1	Hughson	Potable Supply Offset Project
2	Modesto	Grayson Water System Efficiency Improvement
3	Modesto	South Modesto Infrastructure Efficiency Project
4	Turlock	Expanded Non-Porable Water Use Project
5	Turlock	Landscape Irrigation Efficiency Program
6	Turlock	Landscape Replacement Program
7	Modesto	New Hickman Community Well Project
8	Modesto	North Valley Regional Recycled Water Program

Data Sources:
Disadvantaged Communities -United States Census Bureau
City Boundaries - Caltrans Office of GIS Data Library
IRWM Region Boundary - California Department of Water Resources
Roads - Caltrans Office of GIS Data Library
Groundwater Basin Boundary - California Department of Water Resources

Project Summary Table

Table 3-1 below (which is Table 4 from the PSP) documents that each of the eight projects included in this application meets at least one drought project element and one IRWM project element identified in the PSP.

Table 3-1: Drought and IRWM Project Elements by Project (Table 4 from PSP)

		New Hickman Community Well	Grayson Water System Efficiency Improvements	South Modesto Infrastructure Efficiency Project	Turlock Expanded Non-Potable Water Use	Turlock Landscape Irrigation Efficiency	Turlock Landscape Replacement Program	Hughson Potable Supply Offset	North Valley Regional Recycled Water Project
	Drought Project Element								
D.1	Provide immediate regional drought preparedness	X	X	X	X	X	X	X	X
D.2	Increase local water supply reliability and the delivery of safe drinking water	X	X	X	X	X	X	X	
D.3	Assist water supplier and regions to implement conservation programs and measures that are not locally cost-effective					X	X		
D.4	Reduce water quality conflicts or ecosystem conflicts created by the drought				X			X	X
	IRWM Project Element								
IR.1	Water Supply reliability, water conservation, and water use efficiency	X	X	X	X	X	X	X	X
IR.2	Stormwater capture, storage, clean-up, treatment, and management								

		New Hickman Community Well	Grayson Water System Efficiency Improvements	South Modesto Infrastructure Efficiency Project	Turlock Expanded Non-Potable Water Use	Turlock Landscape Irrigation Efficiency	Turlock Landscape Replacement Program	Hughson Potable Supply Offset	North Valley Regional Recycled Water Project
IR.3	Removal of invasive non-native species, the creation and enhancement of wetlands, and the acquisition, protection, and restoration of open space and watershed lands								
IR.4	Non-point source pollution reduction, management, monitoring								
IR.5	Groundwater recharge and management				X	X	X	X	
IR.6	Contaminant and salt removal through reclamation, desalting, and other treatment technologies and conveyance of reclaimed water for distribution to users								X
IR.7	Water banking, exchange, reclamation, and improvement of water quality				X				X
IR.8	Planning and implementation of multipurpose flood management programs							X	
IR.9	Watershed protection and management					X			
IR.10	Drinking water treatment and distribution		X						
IR.11	Ecosystem and fisheries restoration and protection								X

New Hickman Community Well (Modesto)

(25 words or less)

The **New Hickman Community Well Project** will construct a deeper well to provide adequate supply and offset drought impacts on the community's existing water supply.

Project Description

The **New Hickman Community Well Project** will help to alleviate drought impacts for the Community of Hickman, located south of Waterford and to the east of South Modesto. The community of Hickman, currently served by the City of Modesto, relies solely on two relatively shallow groundwater wells for its municipal supply to that community. Groundwater levels have declined by 15 feet over the past 10 years, but 33% of that drop, or 5 feet, has occurred in the last year alone due to the drought. Hickman water demands and therefore pumping volumes have not increased in the past year, so it is apparent that the drought has reduced recharge to the shallow aquifers. Additionally, agricultural interests have installed wells to augment their reduced supply from Tuolumne Irrigation District further impacting groundwater levels in the Hickman area. Continuing to rely on the two existing wells for its potable water supply threatens Hickman's water supply reliability and quality due to a declining quantity of available water and an increased likelihood of mobilizing contaminants impacting water quality.

The **New Hickman Community Well Project** includes the installation of a new, deeper well which will address the water quantity and quality impacts of the drought by providing a more secure water supply. The new well will be less sensitive to multi-year groundwater level fluctuations and less susceptible to contaminant mobilization. This project will help ensure that the City of Modesto can meet drinking water demands even if the other wells in the area become unusable during a continued, extended drought.

Expedited funding is critical for this project because without its implementation, the residents of Hickman could lose access to clean, affordable, and accessible water. Implementing this project assists in meeting the Human Right to Water Policy. The Hickman water system has no redundancy. Per the *City of Modesto's 2010 Water System Engineer's Report, Evaluation of Existing and Buildout Water System for the Hickman Outlying Service Area* (WYA, 2010), the reliable pumping capacity is not sufficient to meet peak hour or maximum day demands and an additional water supply is required.

The **New Hickman Community Well Project** provides both immediate regional drought preparedness and increases local water supply reliability and delivery of safe drinking water. This project immediately provides a water supply benefit to Hickman, thus maximizing the water supply benefit and helping to prepare the East Stanislaus Region against drought. This project also increases local water supply reliability by providing a layer of redundancy in the Hickman water supply and is a key component to delivering safe drinking water in the system.

Project Map

Project maps for the **New Hickman Community Well Project** are included as Figure 3-2 and Figure 3-3. They show the location of the project, work boundaries, and facilities required for project implementation. The well and associated facilities will have monitoring incorporated into their design. Groundwater resources are shown on the figure included in Attachment 1; this project draws water from the Turlock Subbasin.

Figure 3-2: New Hickman Community Well Site Location Map

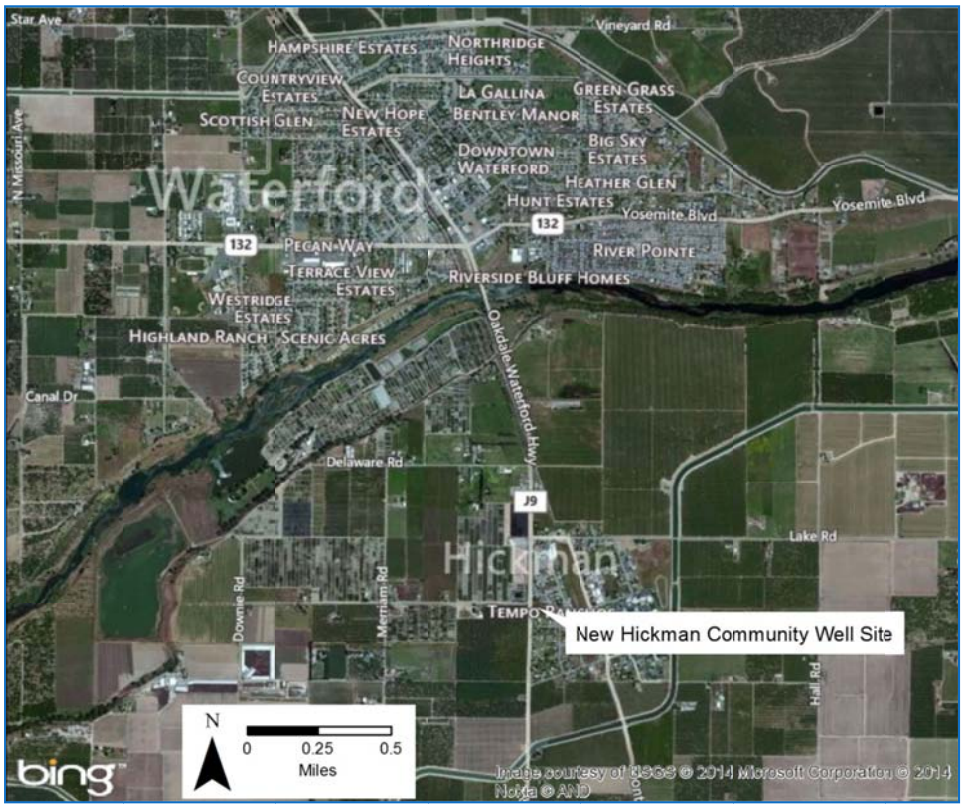
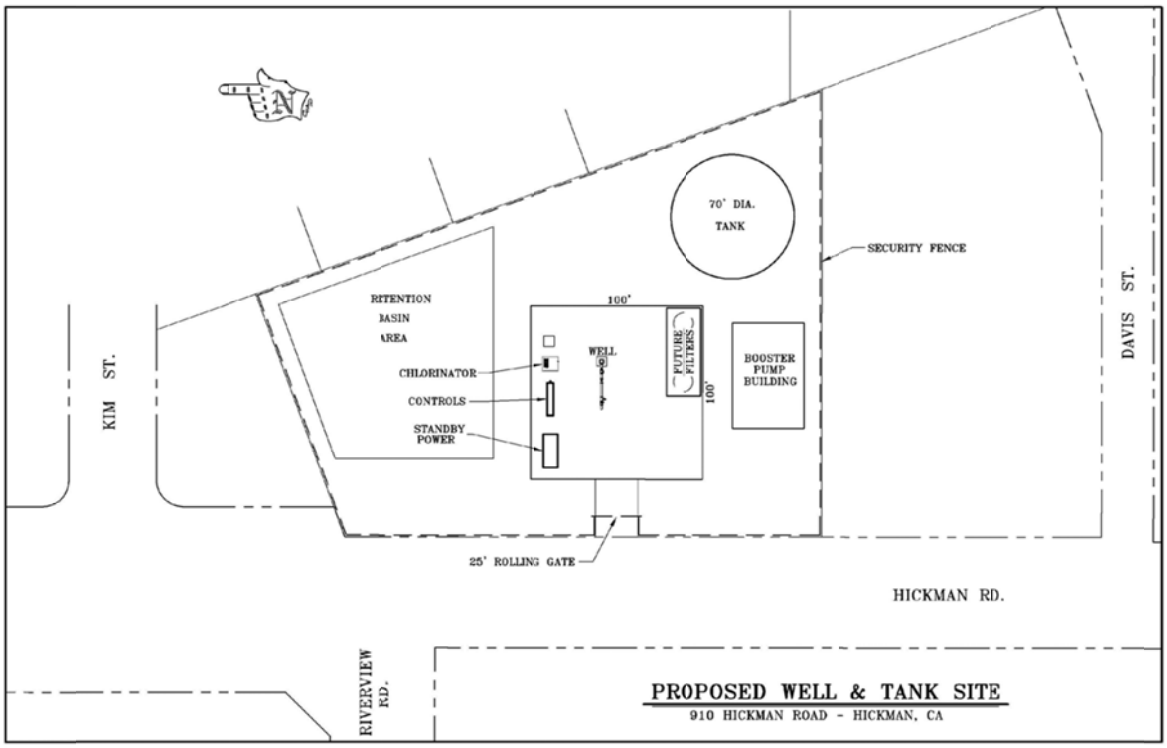


Figure 3-3: New Hickman Community Well Facilities Map



Note: Tank, booster pumps, and filters are in future phases of this project and are not part of this grant application.

Project Physical Benefits

The primary physical benefit of the **New Hickman Community Well Project** is development of a new, clean, reliable water supply. The secondary physical benefit is drought preparedness.

Table 3-2: New Hickman Community Well Physical Benefits

Project Name: City of Modesto New Hickman Community Well Project		
Project Physical Benefit	**Quantification of Benefit**	**Technical Basis for Benefit**
Reliable potable water supply	600 gpm of municipal water supply	• City of Modesto's 2010 Water System *Engineer's Report Evaluation of Existing and Buildout Water System for the Hickman Outlying Service Area* (WYA, March 2010) – See pages 2, 3, and 7 through 13 • Hickman Test Well Technical Memorandum No. 1: Test Well Report (B&C, September 2012) – See page 6
Drought preparedness	600 gpm of municipal water supply	• City of Modesto's *2010 Water System Engineer's Report, Evaluation of Existing and Buildout Water System for the Hickman Outlying Service Area* (WYA, March 2010) – See pages 2, 3, and 7 through 13 • Hickman Test Well Technical Memorandum No. 1: Test Well Report (B&C, September 2012) – See page 6

The tables below quantify the primary and secondary annual physical benefits of the **New Hickman Community Well Project**.

Table 3-3: New Hickman Community Well Reliable Water Supply Benefit

Table 5 – Annual Project Physical Benefits (from PSP)			
Project Name: New Hickman Community Well Project			
Type of Benefit Claimed: Reliable potable water supply			
Units of the Benefit Claimed: Gallons per minute (gpm)			
Additional Information About the Benefit: The new well will supply Hickman 600 gpm of high quality, reliable drinking water supply. Without the new well, the water supply available to the Hickman community could be eliminated should the existing wells not be able to pump high quality water meeting drinking water standards. Even with just one well out of service the system is not sustainable. Benefits claimed in this table assume that the existing wells are unable to provide necessary supplies.			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2014	0	0 (Design)	0
2015	0	0 (Design and Bidding)	0
2016	0	0 (Construction)	0
2017 – 2065	0	600 (each year)	600 (each year)
Comments: Source of values – City of Modesto's *2010 Water System Engineer's Report Evaluation of Existing and Buildout Water System for the Hickman Outlying Service Area* (WYA, 2010) – See pages 2, 3, and 7 through 13; *Hickman Test Well Technical Memorandum No. 1: Test Well Report* (B&C, 2012) – See page 6			

Table 3-4: New Hickman Community Well Drought Preparedness Benefit

Table 5 – Annual Project Physical Benefits (from PSP)			
Project Name: New Hickman Community Well Project			
Type of Benefit Claimed: Drought preparedness			
Units of the Benefit Claimed: Gallons per minute (gpm)			
Additional Information About the Benefit: The new well provide Hickman drought preparedness with the installation of a 600 gpm well. Without the new well, the water supply available to the Hickman community could be eliminated should this drought or future droughts continue to lower the groundwater table or mobilize contaminants. Even with just one well out of service the system is not sustainable. Benefits claimed in this table assume that the existing wells are unable to provide necessary supplies.			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2014	0	0 (Design)	0
2015	0	0 (Design and Bidding)	0
2016	0	0 (Construction)	0
2017 – 2065	0	600 (each year)	600 (each year)
Comments: Source of values – City of Modesto's *2010 Water System Engineer's Report Evaluation of Existing and Buildout Water System for the Hickman Outlying Service Area* (WYA, 2010) – See pages 2, 3, and 7 through 13; *Hickman Test Well Technical Memorandum No. 1: Test Well Report* (B&C, 2012) – See page 6			

Technical Analysis of Physical Benefits Claimed

Technical Basis for Project

The **New Hickman Community Well Project** is based on sound technical analyses. Supporting documentation includes the following. These files are provided in Appendix 3.1. Specific page numbers are identified in Table 3-2.

- City of Modesto's *2010 Water System Engineer's Report, Evaluation of Existing and Buildout Water System for the Hickman Outlying Service Area* (WYA, 2010)
- Hickman Test Well Technical Memorandum No. 1: Test Well Report (B&C, 2012)
- City of Modesto groundwater elevation records for Hickman wells

Recent and Historical Conditions that Provide Background for Benefits

Groundwater elevation records document declining groundwater levels in the Hickman area. In the past 10 years, groundwater levels have dropped approximately 15 feet. This declining groundwater level is a major concern for the Hickman community since they rely solely on the groundwater pumped from two shallow groundwater supply wells. Over the past year, groundwater level monitoring shows that the groundwater elevation has dropped by 5 feet in a single year (one third of the total decline over the last decade). The Turlock Groundwater Subbasin

in this area is particularly susceptible to the influence of drought – both from the resulting reduced groundwater recharge from precipitation and the associated increase use of groundwater when surface water supplies are not available. The current drought has reduced recharge to the underlying aquifers and the reduction in surface water supply deliveries has driven local agricultural to increased reliance on groundwater to meet their irrigation demands. This has put additional pressure on the groundwater system as the farmers have started developing their own well systems to provide water to their properties.

Hickman currently relies on two groundwater wells, Well No. 272 and 309. Well No. 272 was built in 1961 with a rated pump capacity of 360 gpm at 60 psi at a depth of 332 feet below ground surface. This well was only able to produce at 56% of its rated capacity during a well pump test. This is likely due to encrustation of the well screens, integrity of the well casing, and other age-related matters. It is likely that production from this well will continue to drop over time. Well No. 309 was built in 1994 and is working well (producing at nearly full capacity of 450 gpm at 60 psi), but is only 160 feet deep.

Estimates of Without-Project Conditions

Without implementation of the **New Hickman Community Well Project**, the Hickman water system would continue to rely on its two existing shallow water supply wells. If groundwater levels continue to drop as they have in the last year and over the last decade, Well no. 309 will likely be the first to become inoperable. With the loss of this higher production well, the water system ceases to be a sustainable supply.

In addition to falling groundwater levels, the other major concern for the without-project condition is water quality. Base on City of Modesto staff knowledge, as groundwater levels drop, new constituents and contaminants could be mobilized within the aquifer and shallow groundwater of poor quality will be drawn down into deeper better-quality water-bearing zones. At present, water from both wells is treated with chlorine at the wellhead. Granulated activated carbon is used for hydrogen sulfide treatment at Well 309. Should contaminants be present at levels harmful to health and untreatable with the existing systems (i.e. chlorine and granulated activated carbon treatment) then the wells would need to be shut down. Installation of treatment systems would take a considerable amount of time and would leave the Hickman community without a municipal water supply in the meantime.

Description of Methods Used to Estimate Physical Benefits

The reliable water supply and drought preparedness physical benefits are based on the needs of the water system to meet current and buildout demands. The requirements of the engineered well system are based on an analysis of pumping capacity and H2ONET hydraulic modeling, as described in the *2010 Water System Engineer's Report Evaluation of Existing and Buildout Water System for the Hickman Outlying Service Area* (WAY, 2010). The 600 gpm design flow rate is the minimum needed to maintain the water delivery system in the event of a prolonged drought or other service interruption. The test well completed by the City of Modesto and summarized in the *Hickman Test Well Technical Memorandum No. 1 Test Well Report* (B&C, 2012) concludes that a high capacity well with no treatment required could be established at the proposed site (see Appendix 3.1 for both reports referenced).

New Facilities, Policies, and Actions Required to Obtain Physical Benefits

The *2010 Water System Engineer's Report, Evaluation of Existing and Buildout Water System for the Hickman Outlying Service Area* (WAY, 2010) identifies the need for several water system improvements. Not all of these improvements are directly relevant to reliable water supply and drought preparedness. This project includes only the facilities required to provide immediate water supply reliability and drought preparedness for Hickman and are as follows.

- 484 foot deep well;
- Pump;
- Electrical system and controls;
- Backup generator;
- Chlorination facility;
- Piping and valves to connect to existing distribution system; and
- Site security measures.

No new policies are required to implement this project. Actions remaining to implement the **New Hickman Community Well Project** are final design of the facility, obtaining permits from Stanislaus County and California Department of Public Health, and construction and start-up.

Potential Adverse Physical Effects

Adverse physical effects are anticipated to be limited to temporary or construction-related impacts. These impacts have been studied and mitigations identified in the completed *2010 Water System Engineer's Report Final Program Environmental Impact Report* (ICF International, 2010) and subsequent *Finding of Conformance for Hickman Tank and Well to Water System Engineer's Report Program EIR* (City of Modesto, 2011) for the **New Hickman Community Well Project**. These files are both included in Appendix 3.1.

Cost Effectiveness Analysis

The following questions are from Table 6 – Cost Effectiveness Analysis of the 2014 Drought Grant PSP.

Q1: Types of benefits provided as shown in Table 5.

The **New Hickman Community Well Project** will provide the following types of benefits:

- Potable water supply reliability
- Drought Preparedness

Q2: Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? If no, why? If yes, list the methods (including the proposed project) and estimated costs.

Yes. Two versions of the **New Hickman Community Well Project** have been analyzed, but both included the well and wellhead facilities described in this application at a cost of approximately $1.5 million. Differences between the two versions are related to subsequent phases of the project. The City of Modesto plans to build a storage tank and other related facilities in future phases of the proposed project.

The City of Modesto also considered reconstructing an existing well to be deeper. The City of Modesto believes that, based on the construction type and age of the existing wells, the cost would have been approximately the same as the proposed project (approximately $1.5 million).

Q3: If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods.

Please see the following table for a summary of why the City of Modesto is implementing the **New Hickman Community Well Project** instead of one of the alternative projects.

Table 3-5: New Hickman Community Well Alternatives Analysis

Alternative Description	Reason(s) for Selection/Rejection
New Hickman Community Well Project (Proposed Project) • Phase 1 – New well, wellhead, and related facilities • Phase 2 – New tank and other facilities	This alternative is proposed because it provides a reliable potable water supply and drought preparedness benefits. Future phases will help the City meet other water demands and service standards.
Alternative to Proposed Project • Phase 1 – New well, wellhead, and related facilities • Phase 2 – Connection to City of Waterford water system and other facilities	Phase 1 of this alternative is the same as Phase 1 of the proposed project. However, this alternative is not the preferred alternative because it does not maintain a separate water system from the City of Waterford. The interconnection of two cities' water systems would be complicated and expensive given the presence of the Tuolumne River between the two systems; significant permits may be required such that this project alternative would take an extended period of time to implement.
Deepen Existing Well to Match Depth of Proposed Project Well	This alternative was not selected because: • The Hickman community requires both existing wells to be in operation to meet water demands. Taking one well out of service for construction would disrupt water delivery service. • This alternative would ultimately lead to only two wells in service which does not provide the additional redundancy required for a reliable water supply should one of the existing wells have to be taken out of service.

Grayson Water System Efficiency Improvement Project (Modesto)

(25 words or less)

This project will replace old and leaking steel water mains in a disadvantaged community to reduce water loss and improve drinking water supply reliability.

Project Description

The community of Grayson is located approximately 14 miles west of the City of Modesto. As shown in Figure 3-4, Grayson is immediately adjacent to the East Stanislaus IRWM Region and not within the regional boundary. The Grayson water system is owned and operated by the City of Modesto, and relies entirely on groundwater supply from two water wells. The City of Modesto's service area includes one large contiguous area and several outlying, non-contiguous areas. The contiguous portion of the service area consists of the City's current sphere of influence (SOI), Salida, North Ceres and some unincorporated Stanislaus County areas. The non-contiguous portion of the service area includes Grayson, Hickman, Del Rio, Waterford, a part of north Ceres, and portions of Turlock. Because the City of Modesto serves the City of Grayson and is the implementing agency of the Grayson Water System Efficiency Improvement Project, it is included in the East Stanislaus grant application. Grayson has been an active participant in the East Stanislaus IRWM planning process since it receives water service from the City of Modesto.

Groundwater from both of Grayson's wells is pumped through an ion exchange nitrate treatment system at great expense, and then stored in a tank before distribution to the system. This DAC does not have access to any other sources of water and with regionally declining groundwater levels, this supply source is unreliable. If the drought continues, groundwater levels in the Delta-Mendota Groundwater Subbasin would drop, impacting both the quantity and quality of the water supply. Increased contaminants will drive up the costs of treatment, which impacts ratepayers. Drilling deeper wells is also costly and does not appear to provide a better quality of water. With a new water supply not immediately feasible, reducing demand for water is the solution to preserving what supply is available for potable uses and reducing the amount of groundwater that must be extracted and treated.

The **Grayson Water System Efficiency Improvements Project** will replace 9,000 linear feet of 8-inch diameter pipeline resulting in a reduction of water losses, which are quite high due to old and undersized steel water mains. Previous leak detection/repairs and water metering in this community have resulted in a large reduction in required water production; however, system-wide pipe leakage still contributes to a significant loss of potable water for this small community as indicated by the difference between metered demand and water production. A more efficient water distribution system would offset the short-term drought impacts in regard to a reduced water supply and the resulting potential increase in contaminants and provide the DAC with a more reliable water supply.

The project will provide immediate regional drought preparedness and increase local water supply reliability and the delivery of safe drinking water by installing the new pipeline infrastructure, saving approximately 9 AFY. This project will reduce system losses, decrease potential for major pipe blowouts which initiate emergency pipe replacement measures in a DAC that has no additional available water supply, and reduce well pumping demands in the area, thus reducing impacts to the underlying groundwater basin.

Expedited funding is necessary for the project in order to provide an immediate benefit to Grayson's potable water supply and to help offset project costs and retain water rates at levels that are affordable to this DAC. At present, the City is in Stage 1 of mandatory water restrictions, which

includes limitations on outdoor water use. Should the drought deepen, the City may declare a Stage 2 or 3 situation, further limiting potable water use. This project will help the City avoid the economic impacts associated with increasing water restrictions. Implementing this project assists in meeting the Human Right to Water Policy by providing the DAC with access to clean, affordable, and accessible water.

Project Map

Figure 3-4: Grayson Water System Efficiency Improvements Location Map

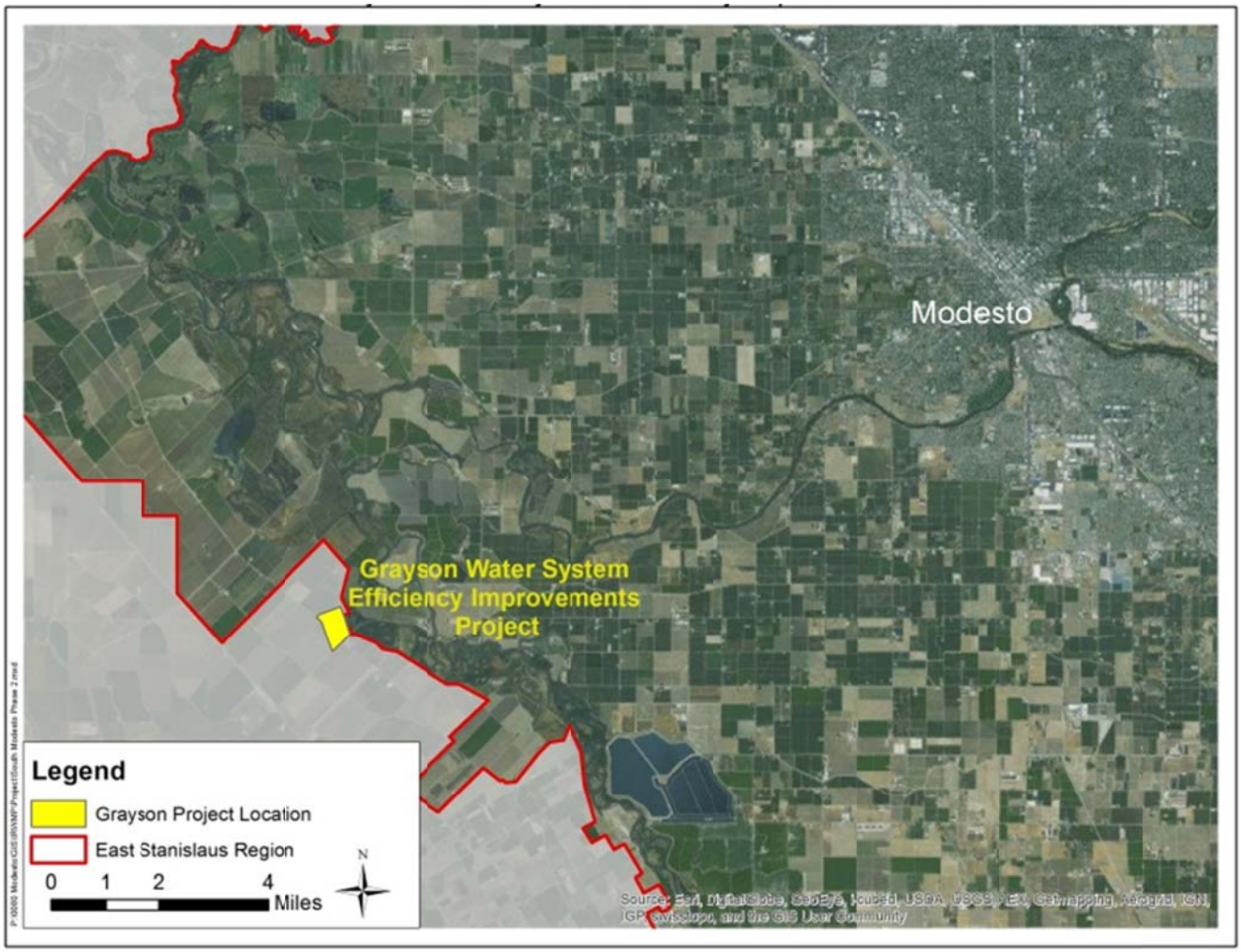
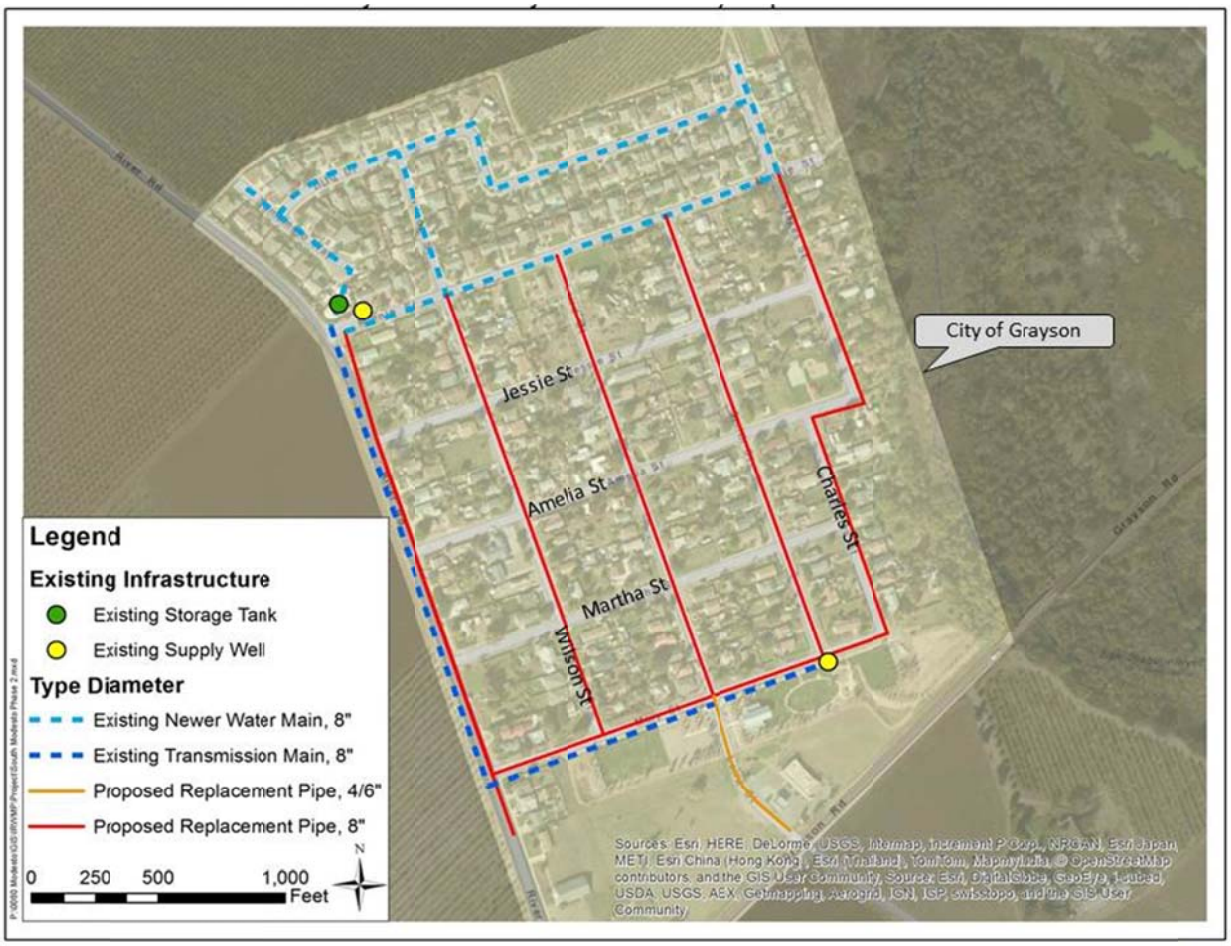


Figure 3-5: Grayson Water System Efficiency Improvements Facilities Map



Project Physical Benefits

The primary physical benefit of the proposed project is a significant reduction in water loss resulting from the replacement of old leaking steel water mains that convey potable water in the system. Replacement of 9,000 linear feet of leaking pipeline will not only improve Grayson's water supply reliability, but will reduce demand of valuable potable groundwater supplies. The secondary benefit is reduced energy usage from the reduced groundwater pumping which also equates to avoided greenhouse gas emissions, measured as pounds of CO2 emissions per year.

Table 3-6: Grayson Water System Efficiency Improvement Physical Benefits

Project Name: City of Modesto Grayson Water System Efficiency Improvement Project		
Project Physical Benefit	**Quantification of Benefit**	**Technical Basis for Benefit**
Reduced demand on potable groundwater supplies and increased water supply reliability	Potable water savings of 9 AFY	• *City of Modesto's 2008 Water System Engineer's Report Evaluation of the Existing and Buildout Water System for the Grayson Outlying Service Area* WAY, 2010) - see page 6. • Metering records for community system and staff analysis – see spreadsheet • Groundwater elevations – see graphic printout
Energy savings from reduced groundwater pumping	Electrical savings of 15 MWh/year (on average)	• Calculated electricity use for Grayson wells use per SCADA well operation records and pump sizes – see spreadsheet
GHG emissions reduction from reduced groundwater pumping lifts	Avoided CO_2 emissions per acre-foot of groundwater pumped	• Estimates of electrical savings and associated emission factors from *Greenhouse Gas Emission Factors: Guidance for PG&E Customers* (PG&E, 4/2013) – pages 2 and 3

Table 3-7: Grayson Water System Efficiency Water Loss Reductions Benefit

Table 5 – Annual Project Physical Benefits (from PSP)			
Project Name: Modesto Grayson Water System Efficiency Improvement Project			
Type of Benefit Claimed: Water savings			
Units of the Benefit Claimed: acre-feet per year (AFY)			
Additional Information About the Benefit: The water saved from reducing water system losses through water main replacement translates into an equivalent reduction in groundwater pumping.			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2014	0	0 - Construction	0
2015 - 2045	0	9 (each year)	9 (each year)
Comments: Source of values - Numbers were generated from a comparison of annual water production to annual metered demand and how much the difference correlates to typical system losses. A 5% water loss savings or about 9 AFY was deemed possible which amounts to about 8,000 gpd annual average. This is consistent with page 6 of the *City of Modesto's 2008 Water System Engineer's Report Evaluation of the Existing and Buildout Water System for the Grayson Outlying Service Area* (WYA, 2010) (see Appendix 3.2).			

Table 3-8: Grayson Water System Efficiency Improvements Energy Savings Benefit

Table 5 – Annual Project Physical Benefits (from PSP)			
Project Name: Modesto Grayson Water System Efficiency Improvement Project			
Type of Benefit Claimed: Energy savings			
Units of the Benefit Claimed: MWh per year (MWh/yr)			
Additional Information About the Benefit: , Reducing water loss in the system results in reduced groundwater pumping which has an associated energy savings and avoided greenhouse gas emissions. Energy savings from reduced groundwater pumping reduces the load on the regional power system.			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year of Project Life	Without Project	With Project	Change Resulting from Project (b) – (c)
2014	0	0	0
2015 - 2045	0	15 (each year)	15 (each year)
Comments: Sources of data are electricity meter (SCADA) data for average groundwater pumping for Grayson's wells			

Table 3-9: Grayson Water System Efficiency Improvement Avoided GHG Emissions Benefit

Table 5 – Annual Project Physical Benefits (from PSP)			
Project Name: Modesto Grayson Water System Efficiency Improvement Project			
Type of Benefit Claimed: Avoided greenhouse gas emissions			
Units of the Benefit Claimed: Lbs CO_2 per year			
Additional Information About the Benefit: Water savings results in reduced groundwater pumping which has an associated energy savings and avoided GHG emissions. This improves regional air quality, quality of life for residents, and contributes to climate change mitigation.			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year of Project Life	Without Project	With Project	Change Resulting from Project (b) – (c)
2014	0	0 - Design	0
2015	0	0 - Construction	0
2016	0	5,602	5,602
2017	0	5,284	5,284
2018	0	4,966	4,966
2019	0	4,648	4,648
2020 - 2045	0	4,391 (each year)	4,391 (each year)
Comments: Benefit based on reduced power multiplied by emission factor (*Greenhouse Gas Emission Factors: Guidance for PG&E Customers* (PG&E, 4/2013)).			

Technical Analysis of Physical Benefits Claimed

Technical Basis for Project

The project is based on sound technical analyses. Supporting documentation includes the following. These files are provided in Appendix 3.2. Specific page references are identified in Table 3-6.

- *City of Modesto's 2008 Water System Engineer's Report Evaluation of the Existing and Buildout Water System for the Grayson Outlying Service Area* (WYA, 2010)
- *Greenhouse Gas Emission Factors: Guidance for PG&E Customers* (PG&E, 4/2013) pages 2 and 3 were also a basis for quantification of the benefits.
- Water Use Metering records for community system and staff analysis – see spreadsheet
- Groundwater elevations – see graphic printout

Recent and Historical Conditions that Provide Background for Benefits

The current drought within the East Stanislaus IRWM Region is resulting in decreasing groundwater elevations, potentially creating overdraft conditions in the Delta-Mendota Subbasin, and resulting in water quality degradation as poorer quality shallow groundwater is drawn downward into the higher-quality groundwater-bearing zones. Without this project, the City of

Modesto would be utilizing more groundwater supplies, increasing stress on the underlying groundwater basin.

Past similar projects in the City areas with heavy water losses have resulted in measured, significant improvements in water system efficiency in terms of increased water pressures and reduced well pumping requirements. This project will replace pipes that have recorded significant water losses as a result of the City's water system leakage and repair frequency reports.

Estimates of Without-Project Conditions

If the project is not undertaken and the water mains are not replaced, the town of Grayson will continue to lose 9 AFY of potable water supply to leakage, with increased chances of emergency repairs. If drought conditions deepen and groundwater levels continue to decline, the City may be forced to initiate emergency pipe replacement measures if there is a major blowout and/or issue Stage 2 and/or 3 mandatory restrictions on water use.

Description of Methods Used to Estimate Physical Benefits

To determine the amount of anticipated savings, the City of Modesto generated numbers from a comparison of annual potable well water production to annual metered demand. The difference of the two values correlates to the typical system losses of 9 AFY. A 5% water loss savings (or about 9 AFY) is the goal the City has set for unaccounted for water loss reduction based on past experience with water savings from infrastructure improvements in Grayson, which amounts to approximately 8,000 gallons per day averaged annually. This average calculated volume is the basis for the expected water savings from replacing Grayson's potable water mains. This is consistent with the *City of Modesto's 2008 Water System Engineer's Report Evaluation of the Existing and Buildout Water System for the Grayson Outlying Service Area (*WYA, 2010). As shown on page 6, of the report unaccounted for water in the Grayson system as of 2010 was estimated to be 15% and the City's goal was to achieve between 8% and 10%. This equates to a reduction by 5% in unaccounted for water (33% of the total unaccounted water) which is primarily a result of leakage from aging water mains. Therefore, the implementation of the Grayson Water System Efficiency Improvement Project will result in a water savings of 5%, or approximately 9 AFY. Reduced groundwater pumping will be equivalent to water savings (9 AFY) and have an associated energy savings of 15 MWh/year based on SCADA records for well operations in Grayson, the pump size and an assumed pump efficiency of 75%. The reduction in energy use will result in avoided GHG emissions. This was estimated using the emission factors (in pounds of CO2 per MWh) shown on pages 2 and 3 of the *Greenhouse Gas Emission Factors: Guidance for PG&E Customers* (PG&E, 4/2013)

New Facilities Required to Obtain Physical Benefits

The proposed project will not require new facilities, but instead will replace 9,000 linear feet of existing potable water main.

Potential Adverse Physical Effects

Because the project involves infrastructure replacement and rehabilitation, there will be no significant impacts resulting from the project. Therefore, a Categorical Exemption is anticipated for CEQA compliance. The project will be categorically exempt under Class 2, Replacement or Reconstruction, Section (c) for replacement or reconstruction of existing utility systems and/or facilities involving negligible or no expansion of capacity. Replacement of the leaking pipeline may have minor, temporary adverse impacts related to project construction, but no long-term adverse impacts are expected to result from project implementation.

Cost Effectiveness Analysis

The following questions are from Table 6 – Cost Effectiveness Analysis of the 2014 Drought Grant PSP.

Q1: Types of benefits provided as shown in Table 5.

The City of Modesto's **Grayson Water System Efficiency Improvement Project** will provide the following types of benefits:

- Water savings
- Energy savings
- Avoided GHG emissions

Q2: Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? If no, why? If yes, list the methods (including the proposed project) and estimated costs.

Yes, alternative methods were evaluated. In order to improve water supply reliability to Grayson, a regional concept was reviewed in which Grayson would share a new well with Westley, a nearby small community. However, the timeline for implementation does not allow the project benefits to be achieved in the near future and the construction of new conveyance structures required would be cost prohibitive. Additionally, the well would be located in Delta-Mendota Groundwater Subbasin which has groundwater supply and quality issues associated with groundwater extraction and is under increased pressure from agricultural pumping in the area (please see groundwater elevations records from Grayson wells in Appendix 3.2).

A new Grayson well was also considered, but historical test holes have proved unfavorable due to nitrates and brackish water. A new well would also have higher combined capital and O&M costs compared to the lifecycle cost of the Grayson Water System Efficiency Improvement Project and would take longer to design and construct.

There are no projects other than the Grayson Water System Efficiency Project that would achieve water savings and allow for immediate implementation.

Q3: If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods.

The proposed project is the least cost alternative that will result in water savings, energy savings, and avoided GHG emissions.

South Modesto Infrastructure Efficiency Project (Modesto)

(25 words or less)

The **South Modesto Infrastructure Efficiency Project** will reduce significant water losses by replacing almost three miles of old mains in the DAC of Bret Harte.

Project Description

South Modesto (south of the Tuolumne River), which includes the Bret Harte community, is largely a DAC which relies on water conveyed from North Modesto (north of the Tuolumne River) to sustain its water needs. South Modesto does not have adequate groundwater pumping facilities to meet those demands. Recently, several South Modesto wells in the Bret Harte area had to be shut down and abandoned due to uranium, gross alpha, and nitrates contamination. Four of the remaining active wells rely on blending from North Modesto surface and groundwater supplies to maintain potable standards. The drought has forced the Modesto Irrigation District (MID) which lies north of Tuolumne River and supplies 30 million gallons per day (mgd) of surface water to the City of Modesto, to reduce surface water deliveries by about 43% starting in May 2014. With this severe reduction in surface water deliveries to Modesto's customers north of the river, Modesto has had to increase pumping in North Modesto and rush every available well that has been down for maintenance back into service for availability to meet the peak and maximum-day demands of the entire City through the summer. Modesto has very little pumping reserve capacity south of the river and cannot easily bring South Modesto offline wells back on line due to existing contaminant issues for which treatment requires a blending source. Without water supplies conveyed from North Modesto, including those needed to keep existing South Modesto blending supplies to potable standards, South Modesto cannot meet its drinking water demands, including those for fire flow. This situation will worsen if the drought continues into 2015.

The **South Modesto Infrastructure Efficiency Project** will reduce system-wide demands south of the Tuolumne River by replacing almost three miles (approximately 15,000 linear feet) of old steel water mains ranging in diameter from 8 inches to 16 inches in the South Modesto disadvantaged community of Bret Harte to eliminate system losses. This project will result in a more efficient water distribution system that would save water, offsetting the water supply-related drought impacts.

Expedited funding is necessary for the **South Modesto Infrastructure Efficiency Project** in order to provide an immediate benefit to South Modesto's potable water supply and to help offset project costs and retain water rates at levels that are affordable to this DAC. At present, the City is in Stage 1 of mandatory water restrictions, which includes limitations on outdoor water use. Should the drought continue, the City may declare a Stage 2 or 3 situation, further limiting potable water use. This project will help the City avoid the economic impacts associated with increasing water restrictions. Additionally, implementing this project assists in meeting the Human Right to Water Policy by improving water supply reliability and ensuring the DAC have access to clean, affordable, and accessible water.

Project Map

The **South Modesto Infrastructure Efficiency Project** will replace approximately 15,000 linear feet of steel pipeline in two general locations in South Modesto. The following maps show the locations of pipelines to be replaced.

Figure 3-6: South Modesto Infrastructure Efficiency Project Location Map

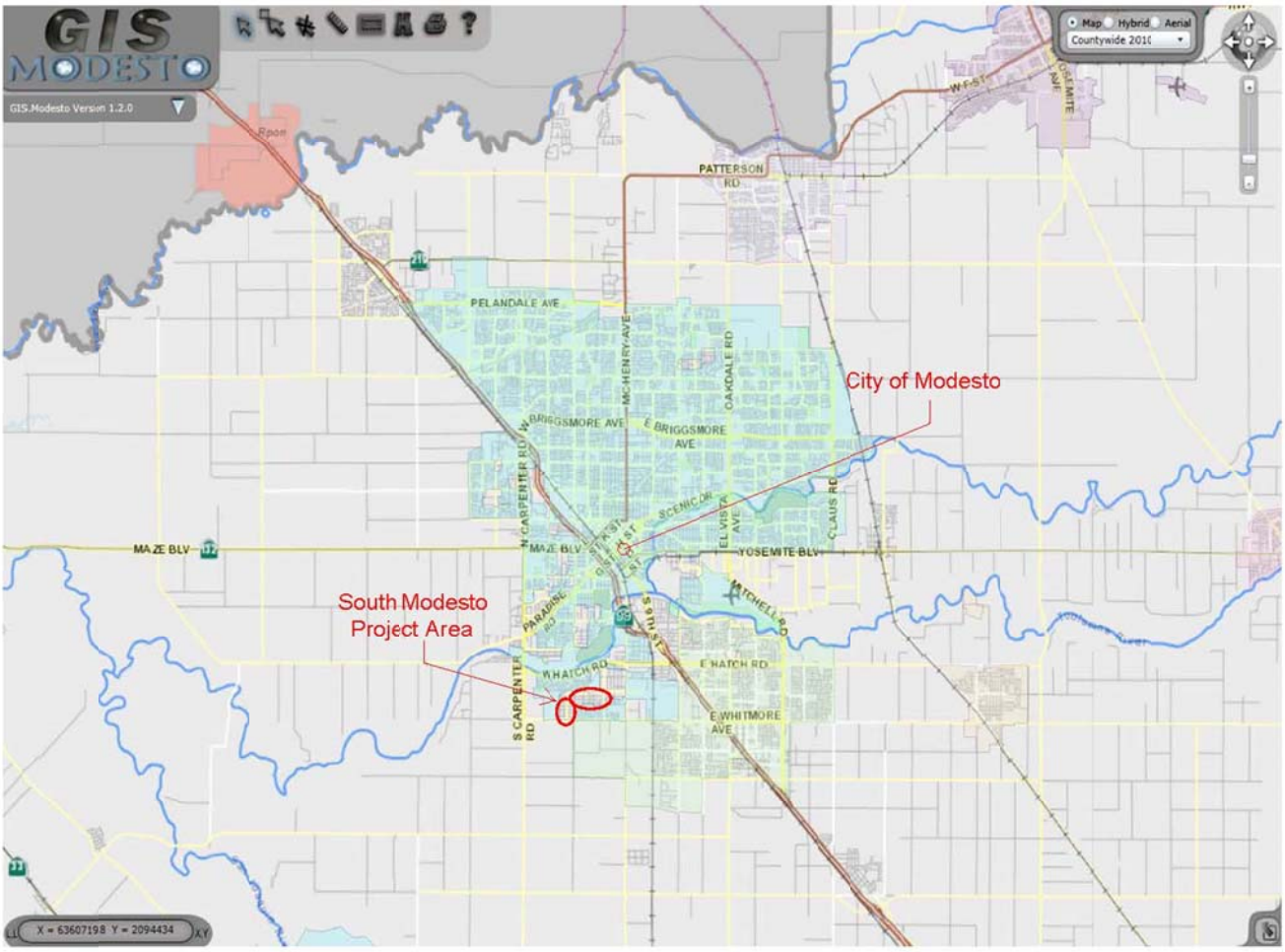
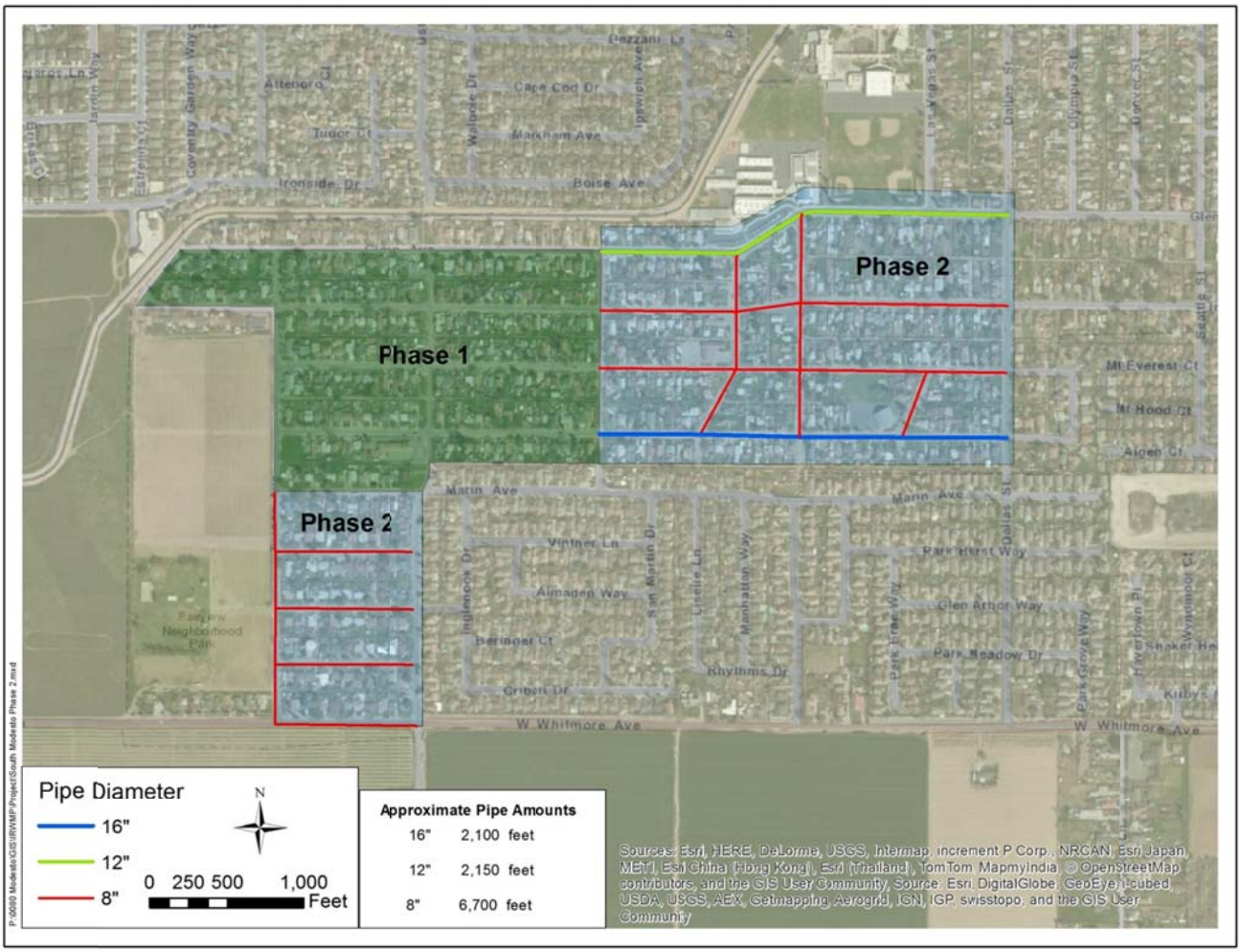


Figure 3-7: South Modesto Infrastructure Efficiency Project Facility Map



Note: The South Modesto Infrastructure Efficiency Project was phased by the City of ease of implementation. Phase 2 is the project proposed herein.

Project Physical Benefits

The primary physical benefit of the proposed project is to reduce significant water system losses from the South Modesto potable water system by replacing almost three miles of leaking steel water mains. Saving water reduces the amount of groundwater that needs to be pumped to meet water demands in the community resulting in the secondary benefit of reducing energy usage. This will also have an associated avoidance of GHG emissions. These benefits are quantified in the following tables. Reduced groundwater pumping will also benefit the underlying Turlock Subbasin by preventing groundwater overdraft and maintaining and improvement water quality.

Table 3-10: South Modesto Infrastructure Efficiency Project Physical Benefits

Project Name: City of Modesto South Modesto Infrastructure Efficiency Project		
Project Physical Benefit	**Quantification of Benefit**	**Technical Basis for Benefit**
Water Savings	Approximately 15 AF of water will be saved each year by replacing leaking water mains	• Water system leakage and repair frequency reports • Water pipe material and age inventory • Metering data for a comparative water system (age and construction) for estimation of water savings
Energy savings from reduced groundwater pumping	7,770 kWh (on average) per acre-foot of groundwater pumped	• Measured electricity use per acre-foot of groundwater pumped based on eight years of electrical records for 24 potable supply wells operated by the City of Turlock. See Turlock Potable Groundwater Use – Energy Usage page 1
Avoided GHG emissions	68,878 pounds of CO^2 emissions over the life of the project	• Estimates of electrical savings and associated emission factors from *Greenhouse Gas Emission Factors: Guidance for PG&E Customers* (PG&E, 4/2013) – pages 2 and 3

Table 3-11: South Modesto Infrastructure Efficiency Project Water Savings Benefit

Table 5 – Annual Project Physical Benefits (from PSP)			
Project Name: City of Modesto, South Modesto Infrastructure Efficiency Project			
Type of Benefit Claimed: Water Savings			
Units of the Benefit Claimed: acre-feet per year (AFY)			
Additional Information About the Benefit: Water will be saved by replacing aging pipeline, reducing water losses in the system.			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2014	0	0	0
2015	0	10	10
2016 - 2045	0	15 (each year)	15 (each year)
Comments: Source of values – Estimated from studies, including *2010 Water System Engineer's Report* (WYA, May 2010), water system leakage and repair frequency reports, water pipe material and age inventory, and water loss data from comparative delivery systems elsewhere in the Modesto service area. Note: project construction is expected to run from September 2014 through April 2015, so a partial benefit was provided for 2015.			

Table 3-12: South Modesto Infrastructure Efficiency Project Energy Savings Benefit

Table 5 – Annual Project Physical Benefits (from PSP)			
Project Name: City of Modesto South Modesto Infrastructure Efficiency Project			
Type of Benefit Claimed: Energy savings			
Units of the Benefit Claimed: kWh per year (kWh/yr)			
Additional Information About the Benefit: Reducing water losses in the system translates into an equivalent reduction in groundwater pumping, which in turn results in a reduction in electricity use.			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year of Project Life	Without Project	With Project	Change Resulting from Project (b) – (c)
2014	0	0	0
2015	0	5,180	5,180
2016 - 2045	0	7,770 (each year)	7,770 (each year)
Comments: The City of Modesto's South Modesto (Bret Harte) potable supply wells pump from the same aquifer (groundwater subbasins and approximate depths) as the City of Turlock wells. Further, South Modesto is located immediately adjacent to the City of Turlock and is serviced by the same PG&E-owned electrical service. Therefore, the estimated average electricity use of 518 kWh per acre-foot of groundwater pumped from the deeper potable aquifer estimated from Turlock metering data was applied to the City's South Modesto wells. Note: project construction is expected to run from September 2014 through April 2015, so a partial benefit was provided for 2015.			

Table 3-13: South Modesto Infrastructure Efficiency Project Reduced GHG Emissions Benefit

Table 5 – Annual Project Physical Benefits (from PSP)			
Project Name: City of Modesto South Modesto Infrastructure Efficiency Project			
Type of Benefit Claimed: Avoided greenhouse gas emissions			
Units of the Benefit Claimed: Lbs CO_2 per year			
Additional Information About the Benefit: Reduced water losses in the system result in reduced groundwater pumping which has an associated energy savings and avoided GHG emissions. This improves regional air quality, quality of life for residents, and contributes to climate change mitigation.			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year of Project Life	Without Project	With Project	Change Resulting from Project (b) – (c)
2014	0	0	0
2015	0	2,025	2,025
2016	0	2,875	2,875
2017	0	2,712	2,712
2018	0	2,548	2,548
2019	0	2,385	2,385
2020 - 2045	0	2,253 (each year)	2,253 (each year)
Comments: Benefit based on reduced power multiplied by emission factor (*Greenhouse Gas Emission Factors: Guidance for PG&E Customers* (PG&E, 4/2013)). Note: project construction is expected to run from September 2014 through April 2015, so a partial benefit was provided for 2015. Note: project construction is expected to run from September 2014 through April 2015, so a partial benefit was provided for 2015.			

Technical Analysis of Physical Benefits Claimed

Technical Basis for Project

Studies in support of the project including the following. These are provided in Appendix 3.3. Specific page numbers are identified in Table 3-10.

- *2010 Water System Engineer's Report* (May 2010)
- Water system leakage and repair frequency reports
- Water pipe material and age inventory
- Per linear foot water loss estimates based on data from a comparative water delivery system within the City of Modesto service area (Grayson)
- *Greenhouse Gas Emission Factors: Guidance for PG&E Customers* (PG&E, 4/2013)

Recent and Historical Conditions that Provide Background for Benefits

The current drought within the East Stanislaus IRWM Region is resulting in decreasing groundwater elevations, exacerbating existing overdraft conditions in the Turlock Subbasin, and resulting in water quality degradation as poorer quality shallow groundwater is drawn downward into the higher-quality groundwater-bearing zones. Without this project, the City of Modesto would be utilizing more groundwater supplies, increasing stress on the underlying groundwater basin.

Past similar projects in the City areas with heavy water losses have resulted in measured, significant improvements in water system efficiency in terms of increased water pressures and reduced well pumping requirements. This project will replace pipes that have recorded significant water losses as a result of the City's water system leakage and repair frequency reports.

Estimates of Without-Project Conditions

If the project is not implemented, water system losses will continue to increase as pipes continue to age and leaks worsen. Additionally, without pipeline replacement there will be an increased risk of major pipe blowouts which could result in critical water shortages and require emergency repairs. If drought conditions deepen and groundwater levels continue to decline, the City's pumping and treatment infrastructure south of the Tuolumne River will be further strained, and may require the City to issue Stage 2 and/or 3 mandatory restrictions on water use and could potentially lead to emergency pipe replacement measures to address a major blowout.

Description of Methods Used to Estimate Physical Benefits

The South Modesto service area is a high priority for the City based on the large number of repair callouts; a quick review of the City's GIS system identified at least a dozen known leaks. The City recently completed repairs on a portion of the South Modesto delivery system (identified as Phase 1 in Figure 3-7), which has helped reduce south of the river demands to some extent.

Based on the City's water pipe material and age inventory, the South Modesto water delivery system is comparative in age and pipe material (welded steel) to that serving the community of Grayson. In addition, this area has been identified as being problematic in terms of pipe failures and was called out in the *2010 Water System Engineer's Report* (WYA, May 2010) for its hydraulic inefficiency. The subdivision map for this area dates to the late 1940's, further documenting the age of the system (it is older than the Grayson system), and as it was owned by the same company as the Grayson system before Modesto acquisition, it can be assumed that the South Modesto system was installed and maintained in a manner equivalent to the Grayson system.

The physical benefits to be provided by this project are therefore based on a review of repair records for the area, records of conveyance interruptions, repair man-hours per linear foot of pipelines, the Hydraulic Analysis Report, and metering data analyses for the Grayson system (please see the prior project information for details). In summary, as the Grayson system is estimated to save 9 AFY of potable water by replacing 9,000 linear feet of pipeline, it was assumed that, on average, 1 AFY of potable water would be saved in South Modesto for each 1,000 linear feet of pipeline replaced. And as this Project will replace approximately 15,000 linear feet of pipeline, a physical benefit of saving 15 AFY of water will be achieved.

New Facilities Required to Obtain Physical Benefits

The proposed project will not install any new facilities, but rather will replace almost three miles (15,000 linear feet) of leaking steel water main with an equivalent, newer, non-leaking material.

Potential Adverse Physical Effects

Because the project involves infrastructure replacement and rehabilitation, there will be no significant impacts resulting from the project. Therefore, a Categorical Exemption is anticipated for

CEQA compliance. The project will be categorically exempt under Class 2, Replacement or Reconstruction, Section (c) for replacement or reconstruction of existing utility systems and/or facilities involving negligible or no expansion of capacity. Replacement of the leaking pipeline may have minor, temporary adverse impacts related to project construction, but no long-term adverse impacts are expected to result from project implementation.

Cost Effectiveness Analysis

The following questions are from Table 6 – Cost Effectiveness Analysis of the 2014 Drought Grant PSP.

Q1: Types of benefits provided as shown in Table 5.

The **South Modesto Infrastructure Efficiency Project** will provide the following types of benefits:

- Water savings
- Energy savings
- Avoided GHG emissions

Q2: Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? If no, why? If yes, list the methods (including the proposed project) and estimated costs.

Yes, alternatives to improve water supply reliability in South Modesto were evaluated in the *2010 Water System Engineer's Report* (WYA, May 2010), but detailed analyses were not conducted for the South Modesto area nor were costs were not developed as it is hydraulically difficult to isolate this part of the City's delivery system. A new groundwater supply was considered as an alternative to this project and was estimated to cost around $10M ($2M for a new well, including land and construction; and $8M for a new storage tank, including land, design, pump and appurtances). However, due to groundwater quality issues in the South Modesto area, and based on recent experiences of well abandonment in the area due to water quality considerations, this alternative was eliminated. Additional groundwater pumping north of the Tuolumne River, with conveyance of this additional supply to South Modesto, was also considered but eliminated due to the cost of constructing a new river crossing for water conveyance infrastructure. Per the West Yost EIR (Figure 5 and Table B2 of Appendix K), a new river crossing would run somewhere between $1M and $3.3M in capital costs and would take at least four years to design and construct. Therefore, the proposed project was a better alternative project both from the standpoint of cost and based on the speed by which it could be implemented.

There are no projects other than the South Modesto Infrastructure Efficiency Project that would achieve water savings and allow for immediate implementation.

Q3: If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods.

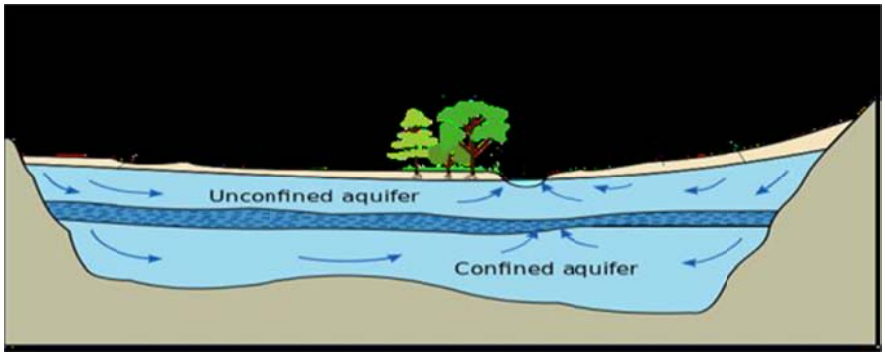
The proposed project is the least cost alternative that will result in water savings, energy savings, and avoided GHG emissions.

Expanded Non-Potable Water Use Program (Turlock)

Turlock's **Expanded Non-Potable Use Project** will reduce potable water consumption by replacing potable water irrigation of City landscaping with non-potable groundwater.

Project Description

This project consists of installing six shallow groundwater wells at depths less than or equal to 150 feet below ground surface in order to extract groundwater of poorer quality than the deeper, potable wells currently used by the City for irrigation of parks and landscape within City limits. The City's potable wells are at depths between 250 feet and 600 feet. The City uses some non-potable supply wells for landscape irrigation and intends to expand non-potable use. The non-potable and potable water supply wells are separated by the Corcoran Clay layer, which acts as a barrier, separating the poorer quality groundwater in the shallow aquifer from the higher quality groundwater in the deeper aquifer. By replacing potable groundwater supplies with non-potable groundwater for approximately 70 acres of Turlock parks and landscape areas, the project will reduce groundwater pumping in the deeper aquifer of Turlock Subbasin. The project will offset approximately 280 acre-feet of potable water use annually. This, in turn, will reduce demands on higher-quality deeper groundwater, preserving this supply for potable use, improving drinking water supply reliability. This project promotes water use efficient by matching quality to water demand needs, improves potable water supply reliability, and contributes to efficient groundwater basin management.



The Corcoran Clay layer separates shallow groundwater of poorer quality from deeper groundwater used for potable water supplies by the City of Turlock.

The **Expanded Non-Potable Use Project**'s six new wells will add immediate relief on potable water supplies, securing water for human consumption and health and safety concerns. It will also continue to provide quality of life through vibrant parks and recreation areas that would otherwise be reduced without water. This project will allow the City of Turlock to match water quality with appropriate use and reduce stress on the deeper, potable water-bearing zones of the Turlock Subbasin.

Expedited funding is necessary for the **Expanded Non-Potable Use Project** in order to provide an immediate benefit to Turlock's potable water supply and to help offset project costs and retain water rates at levels that are affordable to all socio-economic levels in the City. At present, the City is in Stage 1 of mandatory water restrictions, which includes limitations on residential landscape watering. Should the drought deepen, the City may declare a Stage 2 or 3 situation, further limiting potable water use. This project will help the City avoid the economic impacts associated with increasing water restrictions.

Project Map

In the **Expanded Non-Potable Use Project**, the City's non-potable water supply system will be expanded to connect to approximately 70 acres of additional City parks and landscape areas. The following maps show these locations within the City of Turlock.

Figure 3-8: Expanded Non-Potable Use Project Location Map

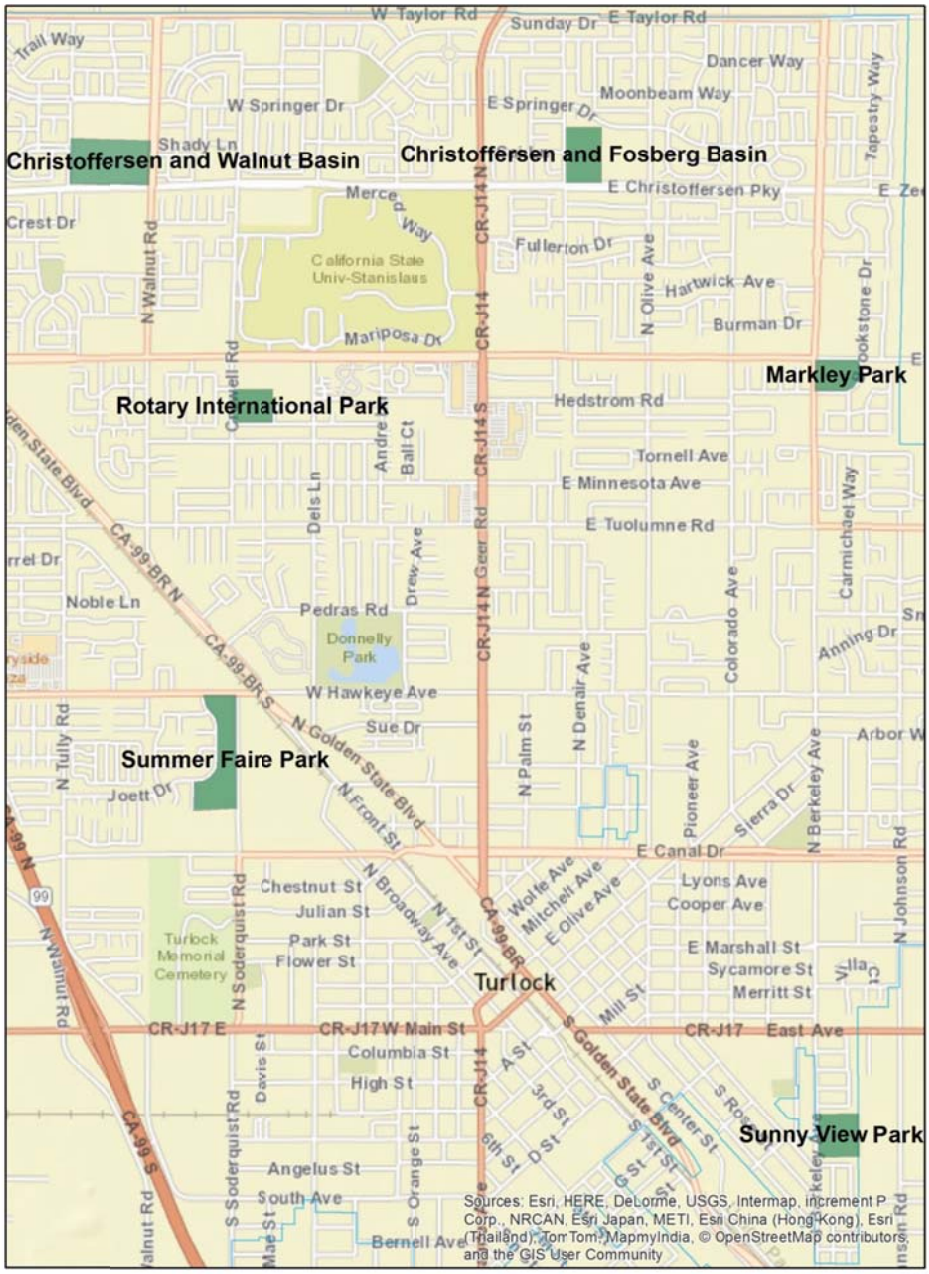


Figure 3-9: Christoffersen & Fosberg Basin Location Map

Figure 3-10: Markley Park Location Map

Figure 3-11: Christoffersen & Walnut Basin Location Map

Figure 3-12: Rotary International Park Location Map

Figure 3-13: Summer Faire Park Location Map

Figure 3-14: Sunny View Park Location Map

Project Physical Benefits

The primary physical benefit of the project is to offset potable water supplies by replacing potable water irrigation at parks and landscape with non-potable groundwater. Construction of six new shallow wells will not only add to the City's sources of water supply but will reduce demand of valuable potable groundwater supplies. Secondary benefits of the project include:

- Energy savings from reduced pumping requirements (pumping shallower, non-potable groundwater in place of deeper, higher-quality groundwater, thereby reducing the pumping lift and associated energy requirements).
- Avoided GHG emissions

Additionally, the project will improve water use efficiency by matching quality to use. The project also allows the City to further expand the non-potable system in the future, possibly enabling other future non-potable connections and uses.

Table 3-14: Turlock Expanded Non-Potable Use Project Physical Benefits

Project Name: City of Turlock Expanded Non-Potable Use Project		
Project Physical Benefit	**Quantification of Benefit**	**Technical Basis for Benefit**
Direct potable water supply offset	Up to 280 AFY of potable groundwater supplies will be offset	• Based on estimated annual average consumption of parks – see page 1 of the City of Turlock Expanded Non-Potable Use Project – Water Demands
Energy savings from reduced groundwater pumping lifts	109 MWh will be saved annually	• Measured electricity use per acre-foot of groundwater pumped based on eight years of electrical records for 24 potable supply wells and adjusted for a smaller lift. See Turlock Potable Groundwater Use – Energy Usage page 1 and Turlock GW Energy Requirements for Change in Lift using the equation from *Energy Price and Groundwater Extraction for Agriculture: Exploring the Energy-Water-Food Nexus at the Global Basin* Levels (Tingju Zhu, Claudia Ringler and Ximing Cai) - page 4
Avoided GHG emissions	808,716 lbs of CO_2 emissions will be avoided over life of the project	• Estimates of electrical savings and associated emission factors from *Greenhouse Gas Emission Factors: Guidance for PG&E Customers* (PG&E, 4/2013) – pages 2 and 3

Table 3-15: Turlock Expanded Non-Potable Use Project Direct Potable Supply Offset Benefit

Table 5 – Annual Project Physical Benefits (from PSP)			
Project Name: Turlock Expanded Non-Potable Use Project			
Type of Benefit Claimed: Direct Potable Supply Offset			
Units of the Benefit Claimed: acre-feet per year (AFY)			
Additional Information About the Benefit: Six shallow non-potable irrigation wells to supply water to parks and landscape areas will offset potable groundwater supplies currently used for irrigation.			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2014	0	0	0
2015	0	0	0
2016 - 2046	0	280 (each year)	280 (each year)
Comments: Source of values - Average annual meter consumption for park sites			

Table 3-16: Turlock Expanded Non-Potable Use Project Energy Savings Benefit

Table 5 – Annual Project Physical Benefits (from PSP)			
Project Name: City of Turlock Expanded Non-Potable Use Project			
Type of Benefit Claimed: Energy savings			
Units of the Benefit Claimed: kWh per year (kWh/yr)			
Additional Information About the Benefit: Pumping from shallower wells will require less power, resulting in energy savings.			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year of Project Life	Without Project	With Project	Change Resulting from Project (b) – (c)
2014	145,040	145,040	0
2015	145,040	145,040	0
2016 - 2040	145,040 (each year)	36,400 (each year)	108,640 (each year)
Comments: Sources of data are electricity meter readings for groundwater pumping, averaged for 24 wells over 8 years to determine an average electrical usage per acre-foot of groundwater pumped from the deep aquifer (518 kWh/AF). This value was adjusted for a reduced lift (150 feet below the ground surface versus 600 feet below the ground surface) resulting in an average electric usage of 130 kWh/AF of water pumped from the shallow aquifer.			

Table 3-17: Turlock Expanded Non-Potable Use Project Reduced GHG Emissions Benefit

Table 5 – Annual Project Physical Benefits (from PSP)			
Project Name: City of Turlock Expanded Non-Potable Use Project			
Type of Benefit Claimed: Avoided greenhouse gas emissions			
Units of the Benefit Claimed: Lbs CO_2 per year			
Additional Information About the Benefit: Pumping from shallower groundwater wells will require less energy, resulting in avoided GHG emissions. This will improve regional air quality and quality of life for residents, and contribute to climate change mitigation.			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year of Project Life	Without Project	With Project	Change Resulting from Project (b) – (c)
2014	0	0	0
2015	0	0	0
2016	0	40,197	40,197
2017	0	37,915	37,915
2018	0	35,634	35,634
2019	0	33,353	33,353
2020 - 2040	0	31,506 (each year)	31,506 (each year)
Comments: Benefit based on reduced power multiplied by emission factor from the *Greenhouse Gas Emission Factors: Guidance for PG&E Customers* (PG&E, 4/2013) – pages 2 and 3.			

Technical Analysis of Physical Benefits Claimed

Technical Basis for Project

Studies that provide technical basis for the project are included in Appendix 3.4 and listed below. Specific page numbers related to project physical benefits are identified in Table 3-14.

- *California's Groundwater,* Bulletin 118, Turlock Subbasin basin description
- *Turlock Groundwater Basin Draft Groundwater Management Plan*
- *City of Turlock 2010 Urban Water Management Plan* – page 17
- Turlock Potable Groundwater Use – Energy Usage
- Turlock Groundwater Energy Requirements for Change in Lift
- *Energy Price and Groundwater Extraction for Agriculture: Exploring the Energy-Water-Food Nexus at the Global Basin* Levels (Tingju Zhu, Claudia Ringler and Ximing Cai) - page 4
- *Greenhouse Gas Emission Factors: Guidance for PG&E Customers* (PG&E, 4/2013)

Recent and Historical Conditions that Provide Background for Benefits

The current drought within the East Stanislaus IRWM Region is resulting in decreasing groundwater elevations, exacerbating existing overdraft conditions and resulting in water quality degradation within the groundwater aquifer as poorer quality shallow groundwater is drawn

downward into the higher-quality groundwater-bearing zones. As described on page 17 in the City's 2010 UWMP, the lower quality shallow groundwater could be used for landscape irrigation of parks and landscape. With this in mind, the City of Turlock would be matching quality to use by utilizing easily accessible shallow groundwater for landscape irrigation, leaving higher quality water for drinking and municipal supply.

Estimates of Without-Project Conditions

If the project is not undertaken and the wells are not constructed, the 70 acres of park and landscape will continue to be irrigated using valuable potable water supply. If drought conditions deepen and groundwater levels continue to decline, the City may be forced to let park vegetation die in order to preserve limited potable water supplies. This results in recreation impacts to residents in the City of Modesto, as well as environmental impacts from the reduction of green and open space.

Description of Methods Used to Estimate Physical Benefits

The City of Turlock uses dedicated irrigation water meters to capture water consumption used for parks and landscape irrigation presently served by potable water. To determine the amount of anticipated savings, the City performed an analysis of all dedicated irrigation meters. Consumption for the year of 2013 was divided by the total irrigable area to find the average acre-foot of water consumed per acre. This average calculated volume is the basis for the expected water savings from removing landscape areas from potable sources. The spreadsheets are included in Appendix 3.4.

Electricity savings resulting from the Project (as a result of pumping from a depth of 150 feet versus 600 feet) was estimated by using electricity data for groundwater pumping, averaged for 24 wells over 8 years, to determine an average electrical usage per acre-foot of groundwater pumped from the deep aquifer (518 kWh/AF). The electricity demand for pumping from a depth of 600 feet was adjusted for a reduced lift (150 feet below the ground surface) using a standard calculation as presented in *Energy Price and Groundwater Extraction for Agriculture: Exploring the Energy-Water-Food Nexus at the Global Basin* Levels (Tingju Zhu, Claudia Ringler and Ximing, Cai, page 4). This resulted in an average electric usage of 130 kWh/AF of water pumped from the shallow aquifer.

GHG emissions reduction estimates were calculated using data from *Greenhouse Gas Emission Factors: Guidance for PG&E Customers* (PG&E, 4/2013, pages 2 and 3).

New Facilities Required to Obtain Physical Benefits

The proposed project includes construction of six new shallow groundwater wells at six parks within the City boundaries. A total of eight areas will receive the non-potable groundwater - six parks and two adjacent landscape sites. New infrastructure (piping, meters and controllers) will be installed to connect the adjacent landscape areas to the nearby park to supply the non-potable water. The existing potable connection for all eight areas will be removed so the separation is permanent. New signage will be posted, and all cross-connection control procedures followed to ensure that no contamination of potable supplies occurs.

The City of Turlock has existing non-potable customers and policies, therefore, no new policies or actions will be required to implement the project.

Potential Adverse Physical Effects

Construction of the new wells and associated appurtenances will have temporary adverse impacts related to project construction, but no long-term adverse impacts are expected from the project. Any adverse impacts identified in the CEQA analysis will be fully mitigated.

Cost Effectiveness Analysis

The following questions are from Table 6 – Cost Effectiveness Analysis of the 2014 Drought Grant PSP.

Q1: Types of benefits provided as shown in Table 5.

The City of Turlock's **Expanded Non-Potable Use Project** will provide the following types of benefits as quantified in the previous tables:

- Direct potable water supply offset
- Energy savings
- Avoided GHG emissions

Q2: Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? If no, why? If yes, list the methods (including the proposed project) and estimated costs.

Yes. The City considered an alternative to install a new potable well to supply additional drinking water. This alternative project is estimated to cost $1,000,000 which is more costly than the **Expanded Non-Potable Use Project**. The cost for the alternative is based on the cost incurred by the City to install a new potable well, previously completed by the City. Installing a potable water supply well also requires more regulatory oversight than a non-potable well and can contribute to groundwater overdraft, reduced groundwater levels and would not provide the same types or amounts of benefits that the project does.

Q3: If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods.

The proposed project is the least cost alternative.

Landscape Irrigation Efficiency Program (Turlock)

Turlock's **Landscape Irrigation Efficiency Program** will reduce potable water consumption through the installation of automatic rain sensor controllers to improve irrigation efficiency in City parks.

Project Description

In the City of Turlock, most parks are irrigated with potable water originating from the underlying Turlock Groundwater Subbasin. The older parks have manual controllers that are responsible for ensuring that landscaping is watered on a routine basis regardless of weather, often times resulting in the parks being watered during rain events or when the soil may have retained sufficient moisture due to the winter climate. New parks are required to install and be controlled by automatic rain sensor controllers. These systems sense precipitation and turn off the irrigation in areas not requiring irrigation. In addition, these new controllers are part of a networked system that can be remotely managed by staff, eliminating the need for manual shut-off, reducing demands on staff and reducing O&M costs. These new controllers will be installed in areas where potable water is used to irrigate landscape.

The City's **Landscape Irrigation Efficiency Program** will increase water use efficiency by installing additional automatic rain sensor controllers in older parks, resulting in more efficient use of the irrigation system and reducing the amount of groundwater pumping required to meet demands. As a result of implementing this project, approximately 76 AFY of potable water will be saved. This project directly addresses drought impacts by promoting water conservation, improving landscape irrigation efficiency, and reducing the need for groundwater pumping, which, in turn, reduces stress on the underlying Turlock Groundwater Subbasin. By reducing the need for groundwater pumping, the **Landscape Irrigation Efficiency Program** will:

- Aid in reducing groundwater level declines;
- Minimize the potential for groundwater overdraft;
- Promote efficient groundwater basin management; and
- Preserve high quality groundwater supplies for potable use.

Expedited funding is necessary for the **Landscape Irrigation Efficiency Program** in order to provide an immediate benefit to Turlock's potable water supply and to help offset project costs and retain water rates at levels that are affordable to all socio-economic levels in the City.

Project Map

In the **Landscape Irrigation Efficiency Program**, automatic rain sensor controllers will be installed in seven City parks. The following maps show the parks locations within the City of Turlock.

Figure 3-15: Landscape Irrigation Efficiency Program Location Map

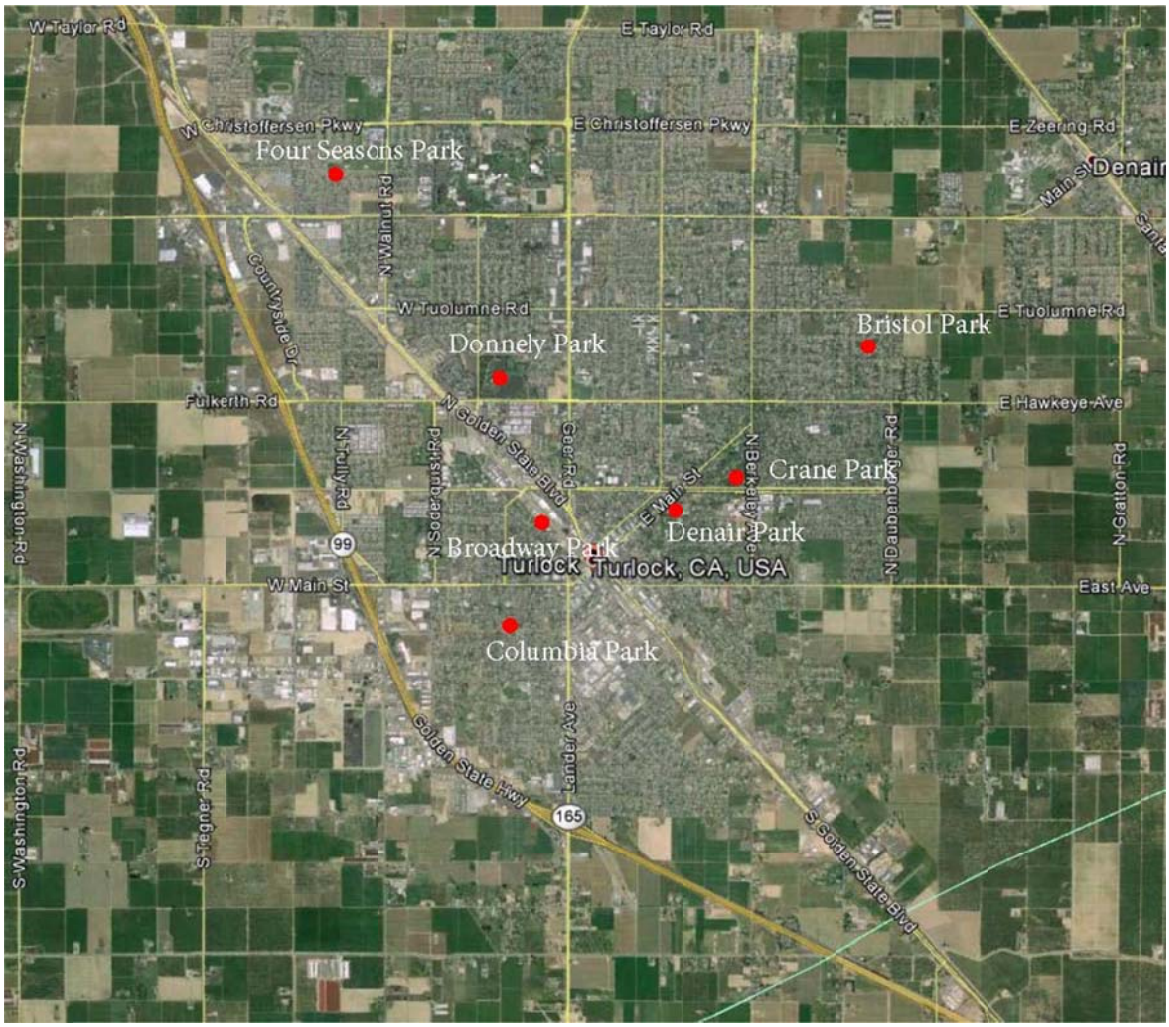


Figure 16: Bristol Park Location Map

Figure 3-17: Broadway Park Location Map

Figure 3-19: Columbia Park Location Map

Figure 3-18: Crane Park Location Map

Figure 3-20: Denair Park Location Map

Figure 3-21: Donnely Park Location Map

Figure 3-22: Four Seasons Park Location Map

Project Physical Benefits

The primary physical benefit of the proposed project is a water savings from improved irrigation efficiency. Installation of additional irrigation controllers will not only add to the City's sources of water supply but will reduce demand of valuable potable groundwater supplies. Saving water will reduce the amount of groundwater pumped for irrigation in the City, resulting in an energy savings and associated avoided GHG emissions. The energy savings and avoided GHG emissions are the secondary benefits of the City of Turlock's **Landscape Irrigation Efficiency Program.**

Table 3-18: Landscape Irrigation Efficiency Program Physical Benefits

Project Name: City of Turlock Landscape Irrigation Efficiency Program		
Project Physical Benefit	**Quantification of Benefit**	**Technical Basis for Benefit**
Water savings from improved irrigation efficiency	76 AFY	• Measured savings from similar rain sensors/irrigation controllers installed at Donnely and Pedretti Parks. See page 1 of the City of Turlock Landscape Irrigation Efficiency Program – Water Savings.
Energy savings from reduced groundwater pumping	39,368 kWh/yr	• Measured electricity use per acre-foot of groundwater pumped based on eight years of electrical records for 24 potable supply wells. See Turlock Potable Groundwater Use – Energy Usage page 1
Avoided GHG emissions from reduced groundwater pumping	Up to 15,393 pounds of CO_2 emissions per year	• Estimates of electrical savings and associated emission factors from *Greenhouse Gas Emission Factors: Guidance for PG&E Customers* (PG&E, 4/2013) – pages 2 and 3

Table 3-19: Landscape Irrigation Efficiency Program Water Savings Benefit

Table 5 – Annual Project Physical Benefits (from PSP)			
Project Name: City of Turlock Landscape Irrigation Efficiency Program			
Type of Benefit Claimed: Water savings			
Units of the Benefit Claimed: acre-feet per year (AFY)			
Additional Information About the Benefit: The water savings will result in reduced groundwater pumping, which will provide energy savings and reduce GHG emissions.			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year of Project Life	Without Project	With Project	Change Resulting from Project (b) – (c)
2014	0		0
2015 - 2035	0	76 (each year)	76 (each year)
Comments: Sources of data are measurements collected by the City of Turlock following installation of similar controllers in Donnely and Pedretti Park. Savings are estimated as gallons per acres and scaled accordingly to the size of the parks included in this application to estimate the overall anticipated water savings.			

Table 3-20: Landscape Irrigation Efficiency Program Energy Savings Benefit

Table 5 – Annual Project Physical Benefits (from PSP)			
Project Name: City of Turlock Landscape Irrigation Efficiency Program			
Type of Benefit Claimed: Energy savings			
Units of the Benefit Claimed: kWh per year (kWh/yr)			
Additional Information About the Benefit: Energy savings from reduced groundwater pumping reduces the load on the regional power system.			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year of Project Life	Without Project	With Project	Change Resulting from Project (b) – (c)
2014	0		0
2015 - 2035	0	39,368 (each year)	39,368 (each year)
Comments: Sources of data are electricity meter readings for groundwater pumping, averaged for 24 wells over 8 years to determine an average electrical usage per acre-foot of groundwater pumped (518 kWh/AF of water pumped).			

Table 3-21: Landscape Irrigation Efficiency Program Reduced GHG Emissions Benefit

Table 5 – Annual Project Physical Benefits (from PSP)			
Project Name: City of Turlock Landscape Irrigation Efficiency Program			
Type of Benefit Claimed: Avoided greenhouse gas emissions			
Units of the Benefit Claimed: Lbs CO_2 per year			
Additional Information About the Benefit: Reduced GHG emissions from reduced groundwater pumping improve regional air quality and quality of life for residents, and contribute to climate change mitigation.			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year of Project Life	Without Project	With Project	Change Resulting from Project (b) – (c)
2014	0	0	0
2015	0	15,393	15,393
2016	0	14,566	14,566
2017	0	13,739	13,739
2018	0	12,913	12,913
2019	0	12,086	12,086
2020 - 2035	0	11,417 (each year)	11,417 (each year)
Comments: Benefit based on reduced power multiplied by emission factor (*Greenhouse Gas Emission Factors: Guidance for PG&E Customers* (PG&E, 4/2013)) – pages 2 and 3.			

Technical Analysis of Physical Benefits Claimed

Technical Basis for Project

The following supporting documentation for the project is provided in Appendix 3.5. Specific page numbers are identified in Table 3-18.

- City of Turlock Landscape Irrigation Efficiency Program – Water Savings
- Turlock Potable Groundwater Use – Energy Usage
- *Greenhouse Gas Emission Factors: Guidance for PG&E Customers* (PG&E, 4/2013)

Recent and Historical Conditions that Provide Background for Benefits

The City of Turlock has been actively working over the past several years to reduce its potable water demands; past installation of automatic rain sensors in two of its irrigated parks demonstrates the City's commitment to continually working towards reducing its water use footprint. This project has been on the City's radar in recent years due to the dry conditions, but with the declining groundwater levels associated with the 2014 drought, projects that reduce groundwater pumping demand have become essential to both mitigating immediate drought impacts and to plan for a situation where the drought continues into 2015 and groundwater conditions continue to degrade. This project can be implemented quickly and will provide immediate drought relief.

Irrigation water meter data for the two City parks with automatic rain sensors have demonstrated the effectiveness of this project and have provided necessary data allowing for the estimation of groundwater savings resulting from this project. Similarly, electrical usage data associated with groundwater pumping have shown that an average of 518 kWh of electricity is used for each acre-foot of water pumped; therefore, this project will save an average of 39,368 kWh of electricity each year.

Estimates of Without-Project Conditions

Without the project, landscape irrigation would continue as normal, using 76 AFY of potable drinking water for landscape irrigation. If drought conditions deepen and groundwater levels continue to decline, the City may be forced to let park vegetation die in order to preserve limited potable water supplies resulting in recreation and environmental impacts.

Description of Methods Used to Estimate Physical Benefits

The City installed similar automatic rain sensors/irrigation controllers in two of its parks (Donnely Park and Pedretti Park). The physical benefits for the **Landscape Irrigation Efficiency Program** were estimated based on City records from the similar installations. The City collected irrigation water meter data before and after installation of the sensors/controllers in these parks, and has been able to estimate water savings on a gallon per acre basis using those metering records. Water savings were estimated on a gallon savings per irrigated acre, and applied to the parks in the proposed project to estimate the amount of irrigation that would be used per day, multiplied by the average number of rain days in a given year based on City precipitation records.

The City estimated the average energy required to pump an acre-foot of groundwater based on electrical metering records for each of its 24 wells from the past eight years. This average energy usage per acre-foot was used to estimate the energy savings from reduced groundwater pumping resulting from project implementation. The reduction in energy usage has an associated avoidance of GHG emissions. GHG emissions factors from the *Greenhouse Gas Emission Factors: Guidance for PG&E Customers* were applied to the energy savings calculated for the project.

New Facilities Required to Obtain Physical Benefits

New automatic rain sensors/irrigation controllers will be required to obtain the anticipated physical benefits.

Potential Adverse Physical Effects

There are no potential adverse physical effects from the proposed project.

Cost Effectiveness Analysis

The following questions are from Table 6 – Cost Effectiveness Analysis of the 2014 Drought Grant PSP.

Q1: Types of benefits provided as shown in Table 5.

The City of Turlock's **Landscape Irrigation Efficiency Program** will provide the following types of benefits:

- Water savings
- Energy savings
- Avoided GHG emissions

Q2: Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? If no, why? If yes, list the methods (including the proposed project) and estimated costs.

The City has evaluated using non-potable water for irrigation in place of potable supplies. It was determined that a combination of non-potable water use and irrigation efficiency were the appropriate combination for meeting park irrigation demand. The City has included a second project in this grant application for expanding non-potable water use in the City. In order to provide non-potable water to these parks, new irrigation wells and/or non-potable piping would be required. Based on common industry knowledge and professional experience regarding the cost of installing a new well and/or designing and installing a separate non-potable water distribution system, both of these alternatives will cost more than an automatic rain sensor/irrigation controller, making this project the lowest cost alternative.

Q3: If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods.

See explanation above.

Landscape Replacement Program (Turlock)

Turlock's **Landscape Replacement Program** will reduce potable water consumption through the replacement of turf in two large median alignments with drought-resistant landscaping.

Project Description

In the City of Turlock, the medians of Christoffersen Parkway and Monte Vista Avenue are landscaped with turf and watered on a routine basis, requiring approximately 17 AFY of potable water supplies. The project will remove existing turf-based landscaping for approximately 4.3 acres of medians and install drought-resistant plants and natural bark to reduce the amount of landscape irrigation water used for these areas. It is estimated the City would free up an additional new supply of drinking water of approximately 17 acre-feet of water annually. This project promotes water conservation, improves landscape irrigation efficiency, achieves long-term reduction of water use, and efficient groundwater basin management through reduced groundwater pumping. Furthermore, in addition to replacing water-thirsty turf with drought-resistant plants to reduce potable water demands, the **Landscape Replacement Program** will create new habitat for, and attract, California native species such as butterflies, hummingbirds, bees and other insects with the re-landscaped areas, and will act as a demonstration project for City residents looking to reduce their water consumption through landscape modifications.

This project directly addresses drought impacts by promoting water conservation through landscaping, acting as a demonstration project for City residents, and reducing the need for groundwater pumping, which, in turn, reduces stress on the underlying Turlock Groundwater Subbasin. By reducing the need for groundwater pumping, the **Landscape Replacement Program** will:

- Aid in reducing groundwater level declines;
- Minimize the potential for groundwater overdraft;
- Promote efficient groundwater basin management; and
- Preserve high quality groundwater supplies for potable use.

Expedited funding is necessary for the **Landscape Replacement Program** in order to provide an immediate benefit to Turlock's potable water supply and to help offset project costs and retain water rates at levels that are affordable to all socio-economic levels in the City.

Project Map

The **Landscape Replacement Program** will remove existing landscaping in approximately 4.3 acres of median landscaping and install drought-resistant landscaping and natural bark to reduce the amount of landscape irrigation water used for these areas The following maps show the locations within the City of Turlock where this project will occur.

Figure 3-23: Landscape Replacement Program Location Map

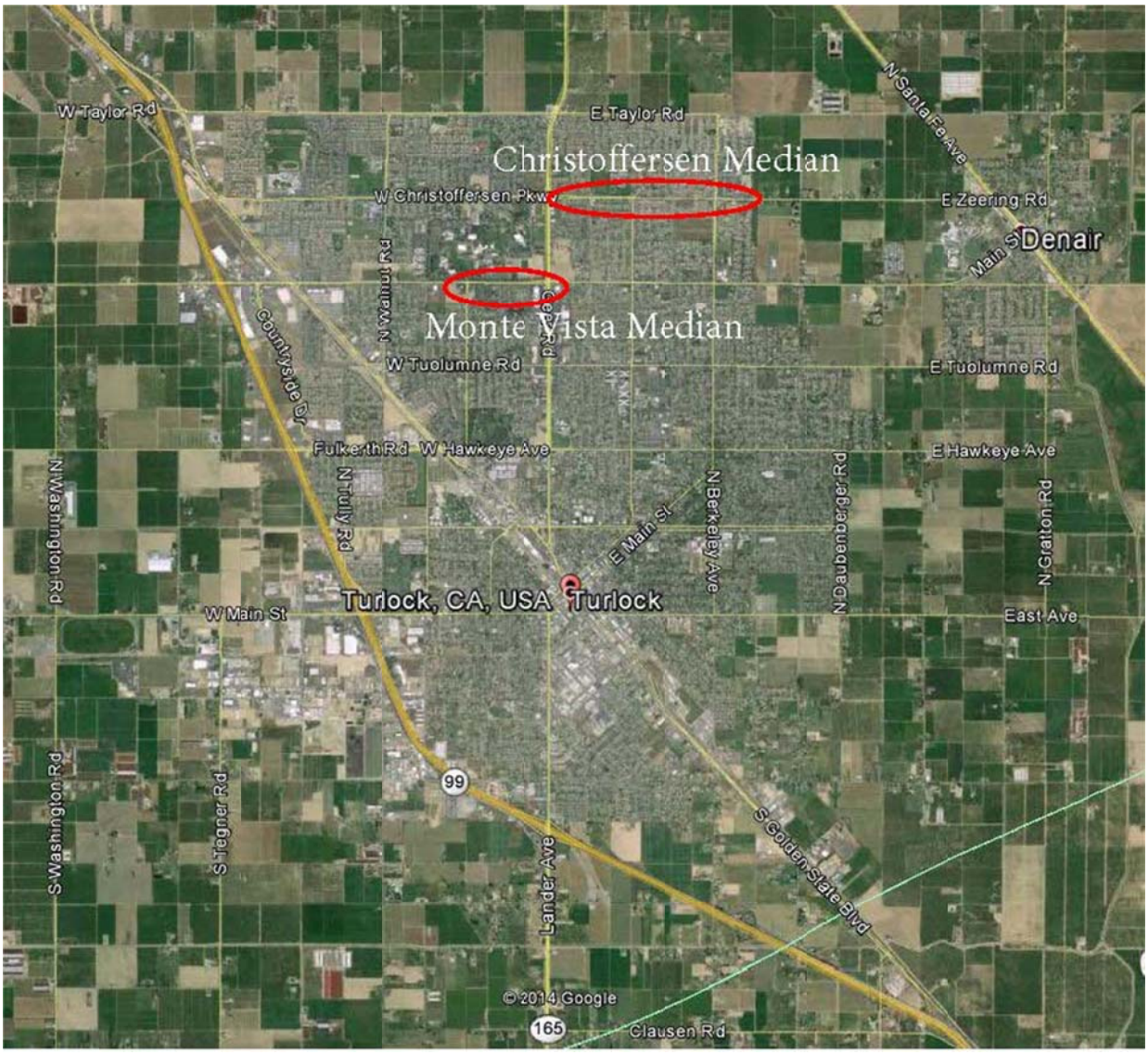
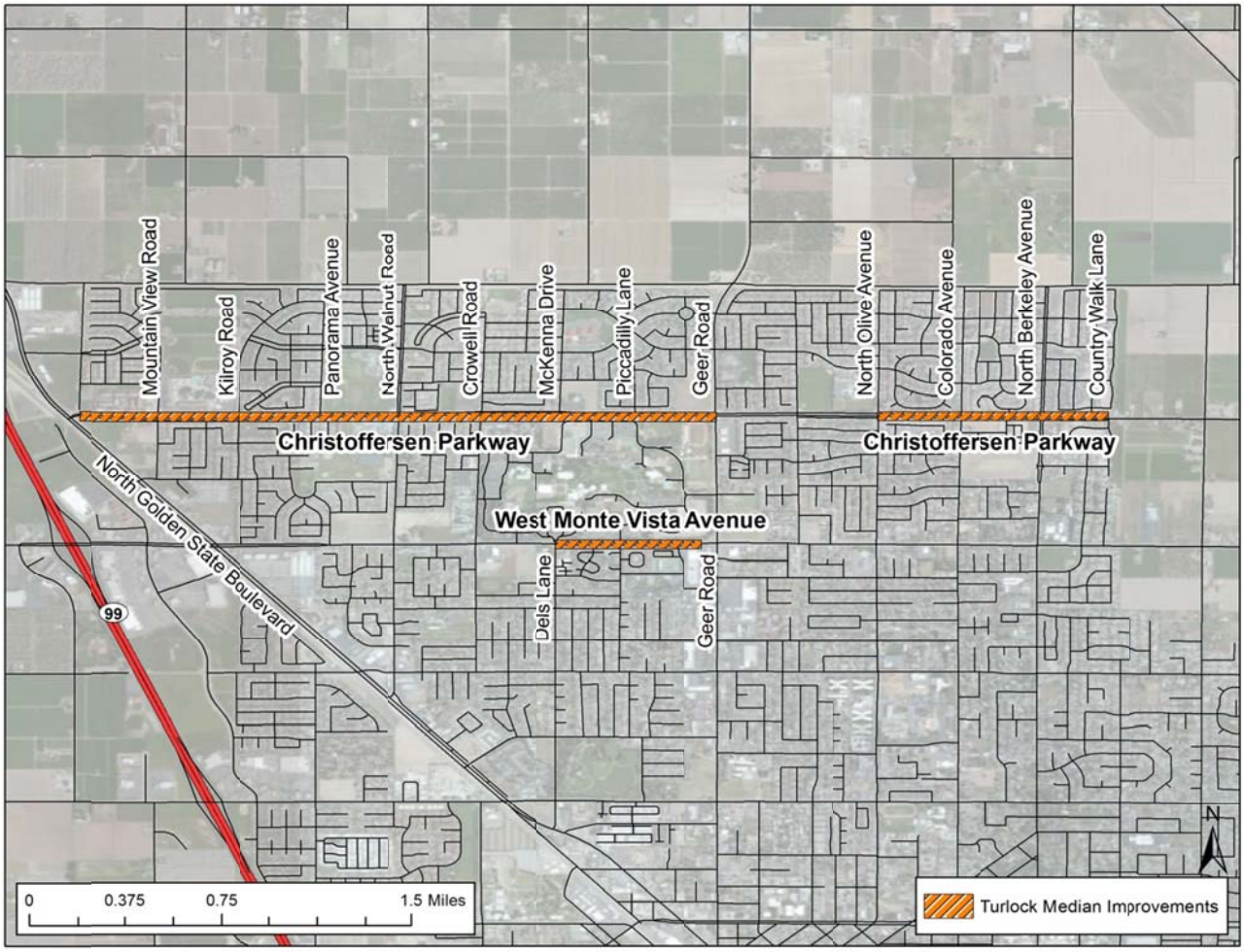


Figure 3-24: Landscape Replacement Program Zoomed in Location Map



Project Physical Benefits

The primary physical benefit of the proposed project is a water savings from reduced irrigation through turf conversion. Replacement of turf with drought-resistant landscaping will add to the City's sources of water supply and will reduce demand of valuable potable groundwater supplies. Reducing irrigation demand will reduce groundwater pumping resulting in energy savings and associated avoided GHG emissions.

Table 3-22: Landscape Replacement Program Physical Benefits

Project Name: City of Turlock Landscape Replacement Program		
Project Physical Benefit	**Quantification of Benefit**	**Technical Basis for Benefit**
Potable water savings from improved landscape efficiency	Up to 17 AFY of new potable water supply	• Estimated from amount of irrigation used per day for proposed landscape pallet multiplied by the average number of irrigation days in a year (based on City records).
Energy savings from reduced groundwater pumping	8,806 kWh/yr	• Measured electricity use per acre-foot of groundwater pumped based on eight years of electrical records for 24 wells. See Turlock Potable Groundwater Use – Energy Usage page 1.
Avoided GHG emissions	Up to 3,443 lbs of CO2 emissions	• Estimates of electrical savings and associated emission factors from *Greenhouse Gas Emission Factors: Guidance for PG&E Customers* (PG&E, 4/2013) – pages 2 and 3

Table 3-23: Landscape Replacement Program Water Savings Benefit

Table 5 – Annual Project Physical Benefits (from PSP)			
Project Name: City of Turlock Landscape Replacement Program			
Type of Benefit Claimed: Water savings			
Units of the Benefit Claimed: acre-feet per year (AFY)			
Additional Information About the Benefit: The water savings will result in reduced groundwater pumping, which will provide energy savings and reduce GHG emissions.			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year of Project Life	Without Project	With Project	Change Resulting from Project (b) – (c)
2014	0	0	0
2015 - 2040	0	17 (each year)	17 (each year)
Comments: Water savings estimated based on preliminary replacement landscape pallet			

Table 3-24: Landscape Replacement Program Energy Savings Benefit

Table 5 – Annual Project Physical Benefits (from PSP)			
Project Name: City of Turlock Landscape Replacement Program			
Type of Benefit Claimed: Energy savings			
Units of the Benefit Claimed: kWh per year (kWh/yr)			
Additional Information About the Benefit: Energy savings from reduced groundwater pumping reduces the load on the regional power system.			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year of Project Life	Without Project	With Project	Change Resulting from Project (b) – (c)
2014	0	0	0
2015 - 2040	0	8,806 (each year)	8,806 (each year)
Comments: Sources of data are electricity meter readings for groundwater pumping, averaged for 24 wells over 8 years to determine an average electrical usage per acre-foot of groundwater pumped (518 kWh/AF of water pumped). See Turlock Potable Groundwater Use – Energy Usage.			

Table 3-25: Landscape Replacement Program Reduced GHG Emissions Benefit

Table 5 – Annual Project Physical Benefits (from PSP)			
Project Name: City of Turlock Landscape Replacement Program			
Type of Benefit Claimed: Avoided greenhouse gas emissions			
Units of the Benefit Claimed: Lbs CO_2 per year			
Additional Information About the Benefit: Reduced GHG emissions from reduced groundwater pumping improve regional air quality, quality of life for residents, and contribute to climate change mitigation.			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year of Project Life	Without Project	With Project	Change Resulting from Project (b) – (c)
2014	0	0	0
2015	0	3,443	3,443
2016	0	3,258	3,258
2017	0	3,073	3,073
2018	0	2,888	2,888
2019	0	2,703	2,703
2020 - 2040	0	2,554 (each year)	2,554 (each year)
Comments: Benefit based on reduced power multiplied by emission factor (*Greenhouse Gas Emission Factors: Guidance for PG&E Customers* (PG&E, 4/2013)) – pages 2 and 3.			

Technical Analysis of Physical Benefits Claimed

Technical Basis for Project

The following supporting documentation for the project is provided in Appendix 3.6. Specific page numbers are identified in Table 3-22.

- City of Turlock Landscape Irrigation Efficiency Program – Water Savings
- Turlock Potable Groundwater Use – Energy Usage
- *Greenhouse Gas Emission Factors: Guidance for PG&E Customers* (PG&E, 4/2013)

Recent and Historical Conditions that Provide Background for Benefits

The City of Turlock has been actively working over the past several years to reduce its potable water demands. This project was conceived as a result of dry conditions over the past several years, but with declining groundwater levels associated with the 2014 drought, projects that reduce groundwater pumping demand have become essential to both mitigating immediate drought impacts and to plan for a situation where the drought continues into 2015 and groundwater conditions continue to degrade. This project can be implemented quickly and will provide immediate drought relief.

Irrigation water meter data for the two median areas to be relandscaped provide the basis for the anticipated benefits (water savings). Electrical usage data associated with groundwater pumping have shown that an average of 518 kWh of electricity is used for each acre-foot of water pumped; therefore, this project will save an average of 8,806 kWh of electricity each year.

Estimates of Without-Project Conditions

Without the project, current landscape irrigation practices will continue using 17 AFY of potable drinking water each year. If drought conditions deepen and groundwater levels continue to decline, the City may be forced to let current landscaping in the medians die in order to preserve limited potable water supplies.

Description of Methods Used to Estimate Physical Benefits

Metering data and observations collected by the City after similar installations in other parts of the City (such as other medians and at the Transportation Center) were relied upon for quantification of benefits. Water savings were estimated by multiplying the amount of irrigation used per day for the proposed landscape pallet by the average number of irrigation days in a year (based on City records).

The City estimated the average energy required to pump an acre-foot of groundwater based on electrical metering records for each of its 24 wells from the past eight years. Energy savings was calculated by multiplying the average energy usage per acre-foot by the water savings.

GHG emissions factors from the *Greenhouse Gas Emission Factors: Guidance for PG&E Customers* (PG&E, 4/2013) were multiplied by the energy savings to calculate avoided GHG emissions each year.

Water savings were estimated on a gallon savings per irrigated area multiplied by the average number of irrigation days in a year.

New Facilities Required to Obtain Physical Benefits

No new facilities, actions or policies will be required to obtain the physical benefits, only new landscaping.

Potential Adverse Physical Effects

There are no potential adverse physical effects from the proposed project.

Cost Effectiveness Analysis

The following questions are from Table 6 – Cost Effectiveness Analysis of the 2014 Drought Grant PSP.

Q1: Types of benefits provided as shown in Table 5.

The City of Turlock's **Landscape Replacement Program** will provide the following types of benefits:

- Water savings
- Energy savings
- Avoided GHG emissions

Q2: Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? If no, why? If yes, list the methods (including the proposed project) and estimated costs.

The City has evaluated replacing existing turf landscaping solely with bark. While this is a less expensive alternative to the proposed project, it does not provide the same types and amounts of benefits as the proposed project.

Q3: If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods.

The proposed project provides additional benefits than alternatives, such as education and the creations of new habitat, which the lower cost alternative (replacing turf landscaping with bark only) does not provide.

Potable Supply Offset (Hughson)

(25 words or less)

Hughson's **Potable Supply Offset Project** will reduce potable water consumption by replacing potable water irrigation of City landscaping with non-potable groundwater.

Project Description

Hughson's **Potable Supply Offset Project** involves the conjunctive use of potable and non-potable groundwater in order to supply the highest quality water for drinking purposes. The intent is to use lower quality groundwater for park and landscape irrigation and conserve higher quality potable water for human use. In doing so, this project provides additional drinking water supply for human consumption. The project will conserve approximately 81 acre-feet (AF) of potable water annually and provide non-potable groundwater that is not suitable for drinking water purposes for irrigation. Conserving potable water will help alleviate drought impacts because the drought has caused increases in groundwater pumping throughout the San Joaquin Valley Groundwater Basin.

The **Potable Supply Offset Project** consists of expanding the City's non-potable water system by utilizing two water wells that have been deemed non-potable due to increased contaminant levels. The City will install 4,729 linear feet (LF) of non-potable pipeline and related infrastructure to reach the three City-maintained parks currently being irrigated with potable water, two schools, and a number of landscaped areas. This pipeline will also serve as the backbone of the non-potable water system, allowing the City to provide non-potable water for future users.

At present, the City of Hughson is calling for voluntary conservation measures. The City has been proactively working to build its non-potable water system when funds have been available to decrease demand on potable supplies. To date, these efforts have afforded the community with enough available water supplies to fulfill needs for this year. However, if the drought continues, the City may have to discontinue service for landscaping and call for mandatory restrictions to preserve potable supplies. Without financial assistance, only a small portion of the **Potable Supply Offset Project** could move forward or the project may not be implemented at all. Grant funding will help expedite project construction. Additionally, the increased non-potable water infrastructure will provide for more opportunities to connect customers in subsequent years (including 2015) and therefore reduce the strain on potable water supplies.

Project Map

The **Hughson Potable Supply Offset Project** will install 4,729 LF of non-potable pipeline and related infrastructure. Project maps for the project are included in the figures below. They show the project location and landscaping areas within the City of Hughson.

Figure 3-25: Potable Supply Offset Project Location Map

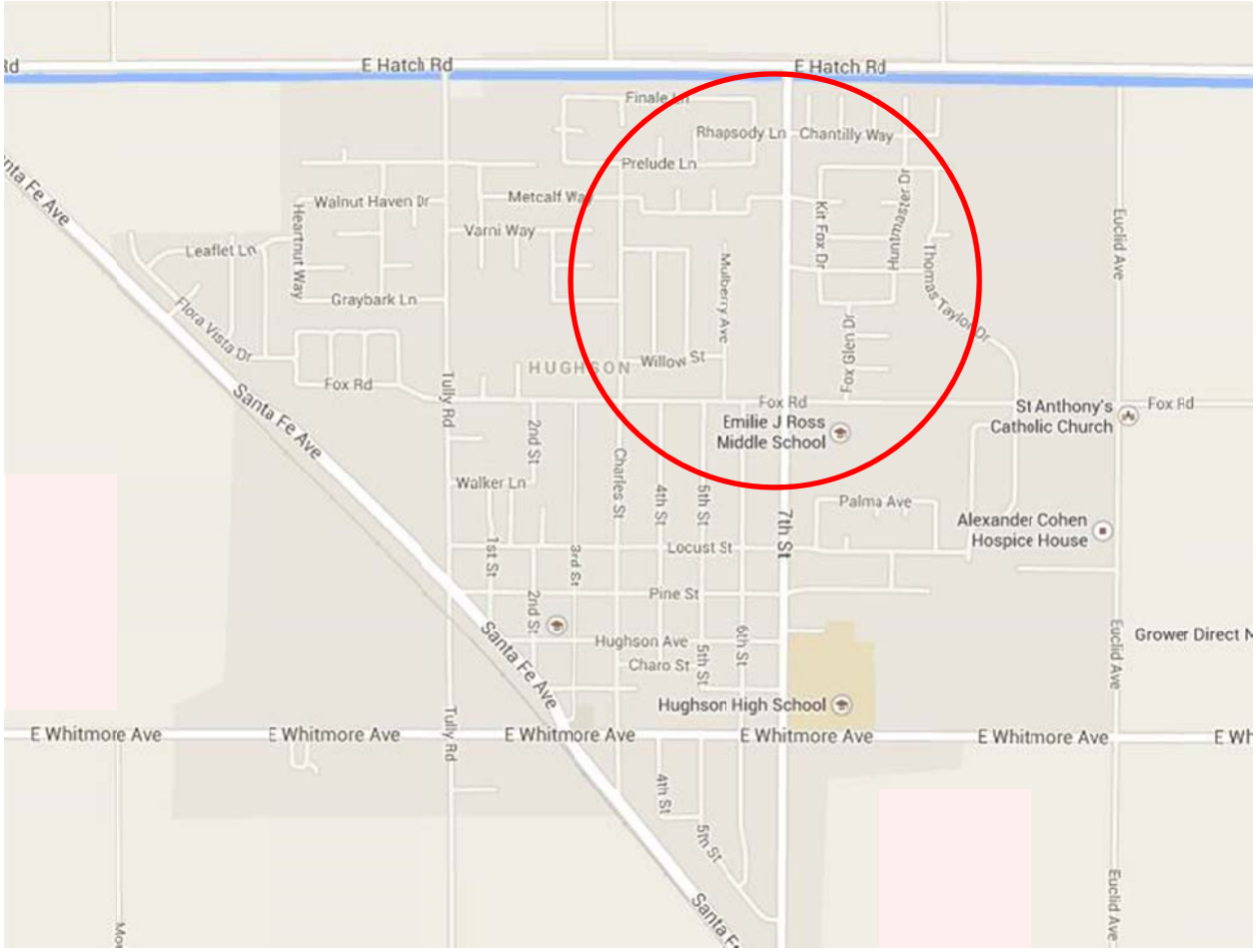
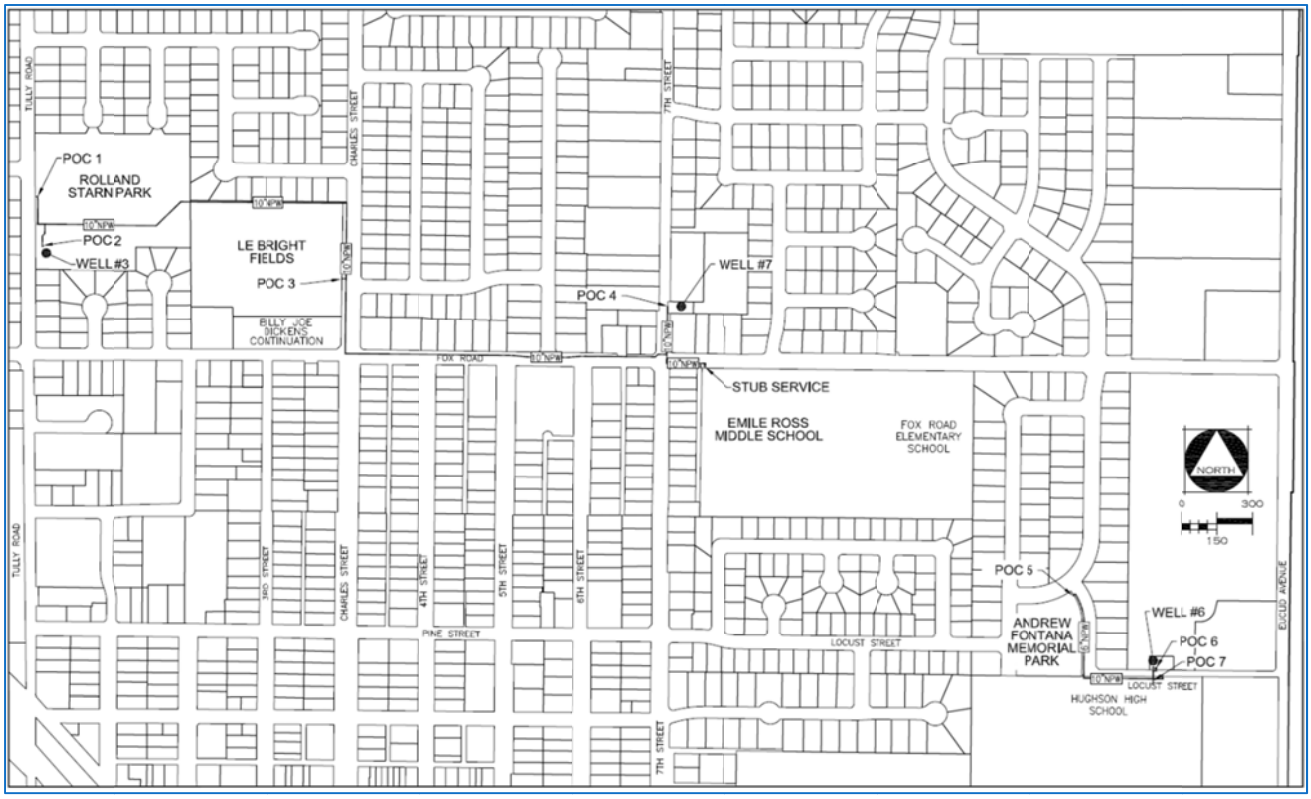


Figure 3-26: Potable Supply Offset Project Landscaping Areas for Non-Potable Irrigation

Figure 3-27: Potable Supply Offset Project New Non-Potable Pipeline



Project Physical Benefits

The primary physical benefit of the **Potable Supply Offset Project** is the direct potable supply offset and water savings resulting from reducing demand on the potable groundwater supplies through replacement of landscape irrigation with non-potable groundwater supplies. Pumping from shallower groundwater wells will require less energy resulting in energy savings and associated avoided GHG emissions. Energy savings and avoided GHG emissions are the project's secondary benefits.

The benefit of improved water use efficiency by matching water quality with water demand type was not quantified as the City of Hughson does not currently treat deeper higher-quality groundwater used for potable supplies and will not be treating the shallower non-potable water supplies that will be used as a result of this project. As such, the primary benefit of the **Potable Supply Offset Project** is potable water offset, and this benefit was quantified above.

Table 3-26: Potable Supply Offset Project Physical Benefits

Project Name: City of Hughson Potable Supply Offset Project		
Project Physical Benefit	**Quantification of Benefit**	**Technical Basis for Benefit**
Direct potable supply offset through landscape and park conversion to non-potable water system with two recently deemed non-potable wells	81 AFY	• Based on current average consumption per acre of landscaped areas.
Energy savings from reduced groundwater pumping lifts	31,425 kWh will be saved annually	• Measured electricity use per acre-foot of groundwater pumped based on eight years of electrical records for 24 potable supply wells and adjusted for a smaller lift. See Turlock Potable Groundwater Use – Energy Usage page 1 and Turlock GW Energy Requirements for Change in Lift using the equation from *Energy Price and Groundwater Extraction for Agriculture: Exploring the Energy-Water-Food Nexus at the Global Basin* Levels (Tingju Zhu, Claudia Ringler and Ximing Cai) - page 4
Avoided GHG emissions	233,950 lbs of CO_2 emissions will be avoided over life of the project	• Estimates of electrical savings and associated emission factors from *Greenhouse Gas Emission Factors: Guidance for PG&E Customers* (PG&E, 4/2013) – pages 2 and 3

Table 3-27: Potable Supply Offset Project Potable Supply Offset Benefit

Table 5 – Annual Project Physical Benefits (from PSP)			
Project Name: City of Hughson Potable Supply Offset Project			
Type of Benefit Claimed: Direct Potable Supply Offset			
Units of the Benefit Claimed: acre-feet per year (AFY)			
Additional Information About the Benefit: Utilizing two existing non-potable wells for landscape irrigation.			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2014	0	0	0
2015	0	0	0
2016 - 2046	0	81 (each year)	81 (each year)
Comments: Source of values - Average annual meter consumption for park and landscape sites.			

Table 3-28: Potable Supply Offset Project Energy Savings Benefit

Table 5 – Annual Project Physical Benefits (from PSP)			
Project Name: City of Hughson Potable Supply Offset Project			
Type of Benefit Claimed: Energy savings			
Units of the Benefit Claimed: kWh per year (kWh/yr)			
Additional Information About the Benefit: Energy savings results from shorter pumping lift by switching from deeper potable groundwater use to shallower non-potable groundwater use. Energy savings reduces the load on the regional power system.			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year of Project Life	Without Project	With Project	Change Resulting from Project (b) – (c)
2014	41,958	41,958	0
2015	41,958	41,958	0
2016 - 2040	41,958	10,530 (each year)	31,428 (each year)
Comments: The City of Hughson's potable supply wells pump from the same aquifers (groundwater subbasins and approximate depths) as the City of Turlock wells. Further, the City of Hughson is located immediately adjacent to the City of Turlock and is serviced by the same PG&E-owned electrical service. Therefore, the estimated average electricity use of 518 kWh per acre-foot of groundwater pumped from the deep aquifer and 130 kWh per acre-foot of groundwater pumped from the shallow aquifer estimated from Turlock metering data was applied to the City of Hughson wells.			

Table 3-29: Potable Supply Offset Project Reduced GHG Emissions Benefit

Table 5 – Annual Project Physical Benefits (from PSP)			
Project Name: City of Hughson Potable Supply Offset Project			
Type of Benefit Claimed: Avoided greenhouse gas emissions			
Units of the Benefit Claimed: Lbs CO_2 per year			
Additional Information About the Benefit: Energy savings results in avoided GHG emissions. This improves regional air quality and quality of life for residents, and contributes to climate change mitigation.			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year of Project Life	Without Project	With Project	Change Resulting from Project (b) – (c)
2014	0	0	0
2015	0	0	0
2016	0	11,628	11,628
2017	0	10,968	10,968
2018	0	10,308	10,308
2019	0	9,648	9,648
2020 - 2040	0	9,114 (each year)	9,114 (each year)
Comments: Benefit based on reduced power multiplied by emission factor (*Greenhouse Gas Emission Factors: Guidance for PG&E Customers* (PG&E, 4/2013)) pages 2 and 3.			

Technical Analysis of Physical Benefits Claimed

Technical Basis for Project

The technical basis for this project is local knowledge of the area, water quality data from existing shallow non-potable wells and numerous hydrogeological studies describing the hydrostratigraphy and groundwater quality of the Turlock Subbasin of the San Joaquin Valley Groundwater Basin. No project-specific technical analyses were completed for this Project as this is simply an extension of an existing project (see below). Technical references included the following and are provided in Appendix 3.7:

- *California's Groundwater,* Bulletin 118, Turlock Subbasin basin description
- *Turlock Groundwater Basin Draft Groundwater Management Plan* – page 39
- *Greenhouse Gas Emission Factors: Guidance for PG&E Customers* (PG&E, 4/2013) – pages 2 and 3
- Turlock Potable Groundwater Use – Energy Usage
- Turlock Groundwater Energy Requirements for Change in Lift
- *Energy Price and Groundwater Extraction for Agriculture: Exploring the Energy-Water-Food Nexus at the Global Basin* Levels (Tingju Zhu, Claudia Ringler and Ximing Cai) - page 4

This Project is a continuation of a larger project that began four years ago. In 2011, the City began to reevaluate the need for an alternate source of water when demands were beginning to approach the City's potable water system capacity. The City decided to utilize a non-potable well for irrigation of a local park, and the experience was hugely successful. Because of the City's positive experience using this non-potable well for irrigation, the larger project has continued to grow as funds become available, and demonstrates the feasibility and value of this type of project. Therefore, no project-specific technical analyses were conducted for this Project.

Recent and Historical Conditions that Provide Background for Benefits

The City of Hughson recently shut down two potable wells due to elevated contaminant concentrations and is presently looking to utilize these wells for non-potable irrigation of landscape areas. The wells will be connected to the City's existing non-potable system to expand the distribution system to reach future users. Utilizing the wells for irrigation, along with the conversion of irrigation sites from the potable supply system to the non-potable water system, matches the available water quality to with the water quality needed and offsets potable supply. This, in turn, helps to alleviate stresses to the Turlock Subbasin resulting from increased pumping to make up shortfalls in surface and Central Valley Project (CVP) water deliveries.

Estimates of Without-Project Conditions

If the project is not undertaken, the landscape areas will continue to be served using potable water supplies. The two arsenic contaminated wells will be unusable for potable consumption and will need to be abandoned. The City may need to consider constructing new wells to meet water supply and/or, if drought conditions deepen and groundwater levels continue to decline, the City may be forced to discontinue service to landscaped areas in order to preserve limited potable water supplies and consider mandatory water conservation measures.

Description of Methods Used to Estimate Physical Benefits

The City of Hughson uses dedicated irrigation water meters to capture water consumption used for parks and landscapes served by potable water. To determine the amount of anticipated savings, the City analyzed data from all dedicated irrigation meters. Consumption for the year of 2013 was divided by the total irrigable area to find the average acre-foot of water consumed per acre. This average calculated amount is the basis for the expected water savings from removing landscape areas from potable sources.

Electricity savings resulting from the Project (as a result of pumping from a depth of 150 feet versus 600 feet) was estimated by using electricity data for groundwater pumping by the City of Turlock, averaged for 24 wells over 8 years, to determine an average electrical usage per acre-foot of groundwater pumped from the deep aquifer (518 kWh/AF). The use of this data for the City of Hughson project is considered valid as Hughson's potable supply wells pump from the same aquifers (groundwater subbasins and approximate depths) as the City of Turlock wells. Further, the City of Hughson is located immediately adjacent to the City of Turlock and is serviced by the same PG&E-owned electrical service. The electricity demand for pumping from a depth of 600 feet was adjusted for a reduced lift (150 feet below the ground surface) using standard calculation as presented in *Energy Price and Groundwater Extraction for Agriculture: Exploring the Energy-Water-Food Nexus at the Global Basin* Levels (Tingju Zhu, Claudia Ringler and Ximing, Cai, page 4). This resulted in an average electric usage of 130 kWh/AF of water pumped from the shallow aquifer.

GHG emissions reduction estimates were calculated using data from *Greenhouse Gas Emission Factors: Guidance for PG&E Customers* (PG&E, 4/2013, pages 2 and 3).

New Facilities Required to Obtain Physical Benefits

The **Potable Supply Offset Project** would connect two existing non-potable water wells and construct 4,729 LF of non-potable distribution piping to deliver non-potable water. The landscaped areas to be irrigated by the system expansion will be converted to the non-potable supply system; potable water meters will be removed, non-potable meters installed, and new signage posted. All cross-connection control procedures will be followed to ensure that no contamination of potable supplies occurs.

The City of Hughson has existing non-potable customers with appropriate policies in place; therefore, no new policies or actions will be required with the addition of the new customers to the non-potable water system.

Potential Adverse Physical Effects

Because the project involves construction of a new pipeline, there will be no significant impacts resulting from the project. Therefore, a Categorical Exemption is anticipated for this project. The project will be categorically exempt under Class 3, New Construction or Conversion of Small Structures (d) Water main, sewage, electrical, gas, and other utility extensions, including street improvements, of reasonable length to serve such construction. Construction of the pipeline will have minor, temporary adverse impacts related to project construction, but no long-term adverse effects are expected from project implementation.

Cost Effectiveness Analysis

The following questions are from Table 6 – Cost Effectiveness Analysis of the 2014 Drought Grant PSP.

Q1: Types of benefits provided as shown in Table 5.

The City of Hughson's **Potable Supply Offset Project** will provide the following types of benefits:

- Direct Potable Supply Offset
- Energy savings
- Avoided GHG emissions

Q2: Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? If no, why? If yes, list the methods (including the proposed project) and estimated costs.

No. The City of Hughson is currently using non-potable groundwater that uses shallow groundwater from two wells to irrigate all but three of its parks. The success of the current non-potable system is indicative of the cost-effectiveness of the project and its ability to achieve projected benefits. Additionally, this project can be implemented quickly to immediately offset drought impacts related to limited potable supplies.

Q3: If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods.

Based on the City's experience with its existing non-potable water system, this system expansion is the least cost alternative to quickly offset drought impacts to potable supplies.

North Valley Regional Recycled Water Program (Modesto/Inter-Regional)

(25 words or less)

The North Valley Regional Recycled Water Program (NVRRWP), being implemented by DPWD and the Cities of Modesto and Turlock, delivers recycled water produced by the cities to agricultural customers for irrigation.

Project Description

The NVRRWP provides immediate regional drought relief and future drought preparedness through the application of recycled water and therefore is an eligible project type. It will address the drought impacts described in Attachment 2 by creating a regional solution to address south of the Sacramento-San Joaquin River Delta (Delta) water supply shortages and reliability concerns by utilizing recycled water produced by the Cities of Modesto and Turlock for beneficial use by augmenting surface water supplies and reducing groundwater pumping in the DPWD service area. The project will deliver recycled water produced by the cities to DPWD, a CVP agricultural water contractor that has seen significant shortages and decreased reliability in the quantity of water it receives annually under the terms of its federal water service contract and who is presently receiving 0% of its CVP contracted allocation. A portion of the supply will also be delivered to state and federal south of the Delta wildlife refuges that are not presently receiving water supplies necessary to meet the refuge's objectives for wildlife management.

With the development of conveyance capability, the Cities of Modesto and Turlock could provide 30,000 AFY of recycled water upon start-up, and up to 59,000 AFY of tertiary-treated recycled water, produced from wastewater collected from the Cities of Ceres, Turlock, and Modesto, to DPWD lands to supplement their CVP supplies, and to the U.S. Bureau of Reclamation to supplement water supplies to wildlife refuges. Utilizing a new water supply – recycled water, DPWD's dependence on highly unreliable CVP supplies will be reduced, its supply resiliency improved with a resultant reduction in groundwater pumping. The NVRRWP will:

- Provide local and regional economic sustainability by improving non-potable water supply reliability to agricultural water users and disadvantaged communities (DACs) in the DPWD service area.
- Provide an incremental water source to meet the environmental needs of south of the Delta wildlife refuges.
- Optimize use of recycled water, a valuable resource produced by the Cities of Turlock and Modesto.
- Promote regional economic growth through sustained and/or increased annual agricultural production.
- Contribute toward the State Water Resources Control Board's objective of increasing the beneficial use of recycled water.
- Contribute a local solution toward solving California's ever increasing water crisis.
- Utilize local water resources to their highest and best use, and reduce dependence on imported water supplies that flow through the Delta.

Recycled water is highly drought resistant and provides a high degree of protection against drought conditions, and can be considered a firm water supply to DPWD growers. In order to improve water supply reliability and alleviate drought-related impacts currently being experienced by DPWD

growers and DACs within the service area, and to restore the economy in the area that has been impacted by CVP and other water supply shortages, expedited funding is needed so the NVRRWP can begin delivering recycled water to users in a timely manner. The DACs need a reliable water supply to continue to grow and manage the highly-productive agricultural crops, prevent crop damage and loss, and maintain jobs to help sustain the economy in the DPWD service area, the counties, and the region. Without funding, the project could be implemented if other grant and/or low-interest loan sources are identified and secured; if not, implementing the project would impact an area already burdened by drought-related economic impacts and an associated lack of reliable water.

Project Map

The NVRRWP is an inter-regional project between the East Stanislaus and Westside-San Joaquin IRWM regions; the regions boundaries and the NVRRWP location is provided as Figure 3-28. A project map for the NVRRWP is provided as Figure 3-29. The maps show the location of the City of Modesto and Turlock wastewater treatment facilities that will produce the recycled water. The recycled water will be conveyed via the pipelines shown in the figures and the Delta-Mendota Canal (DMC) to DPWD users for irrigation and to the wildlife refuges shown for habitat management.

Figure 3-28: North Valley Regional Recycled Water Program Inter-Regional Location Map

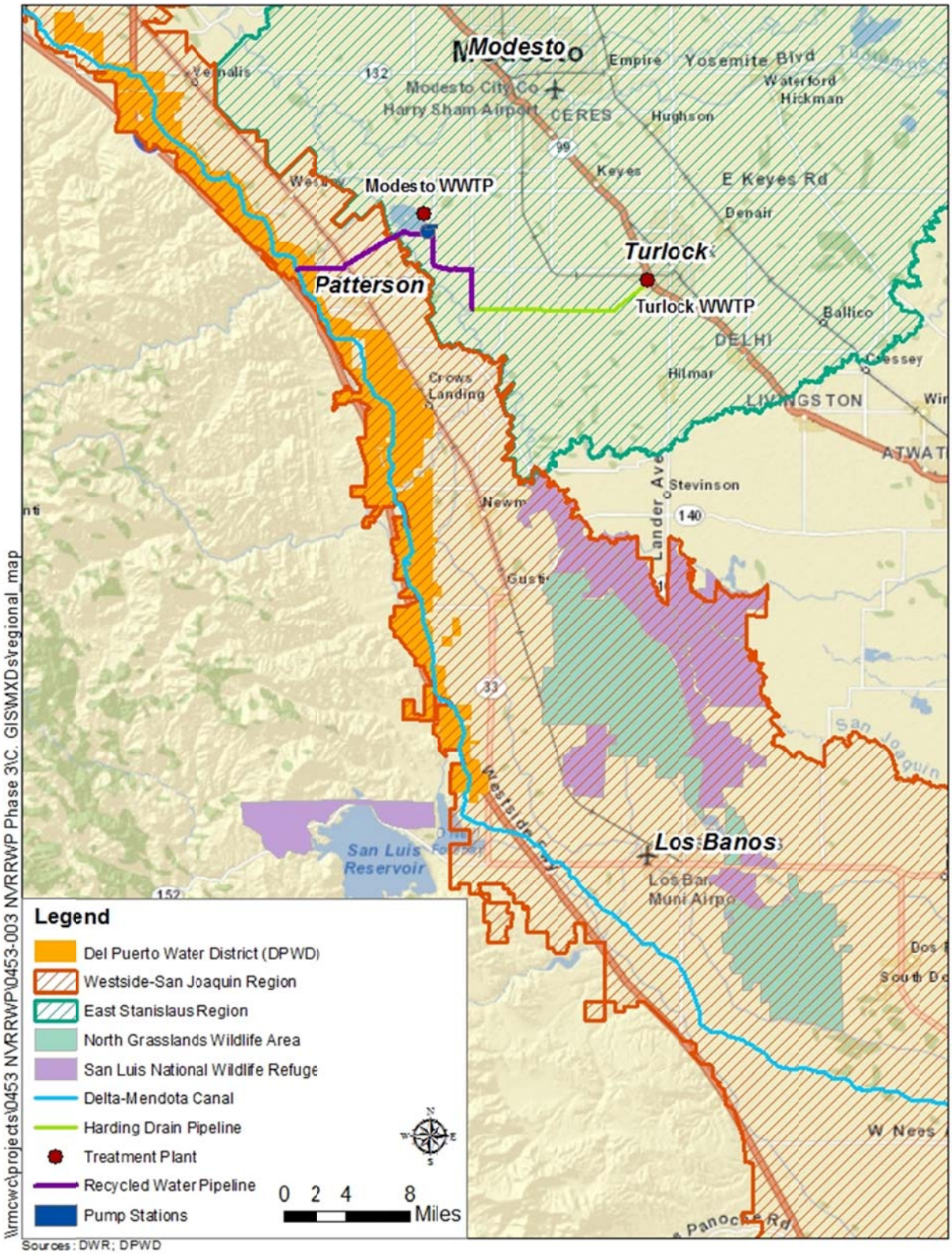
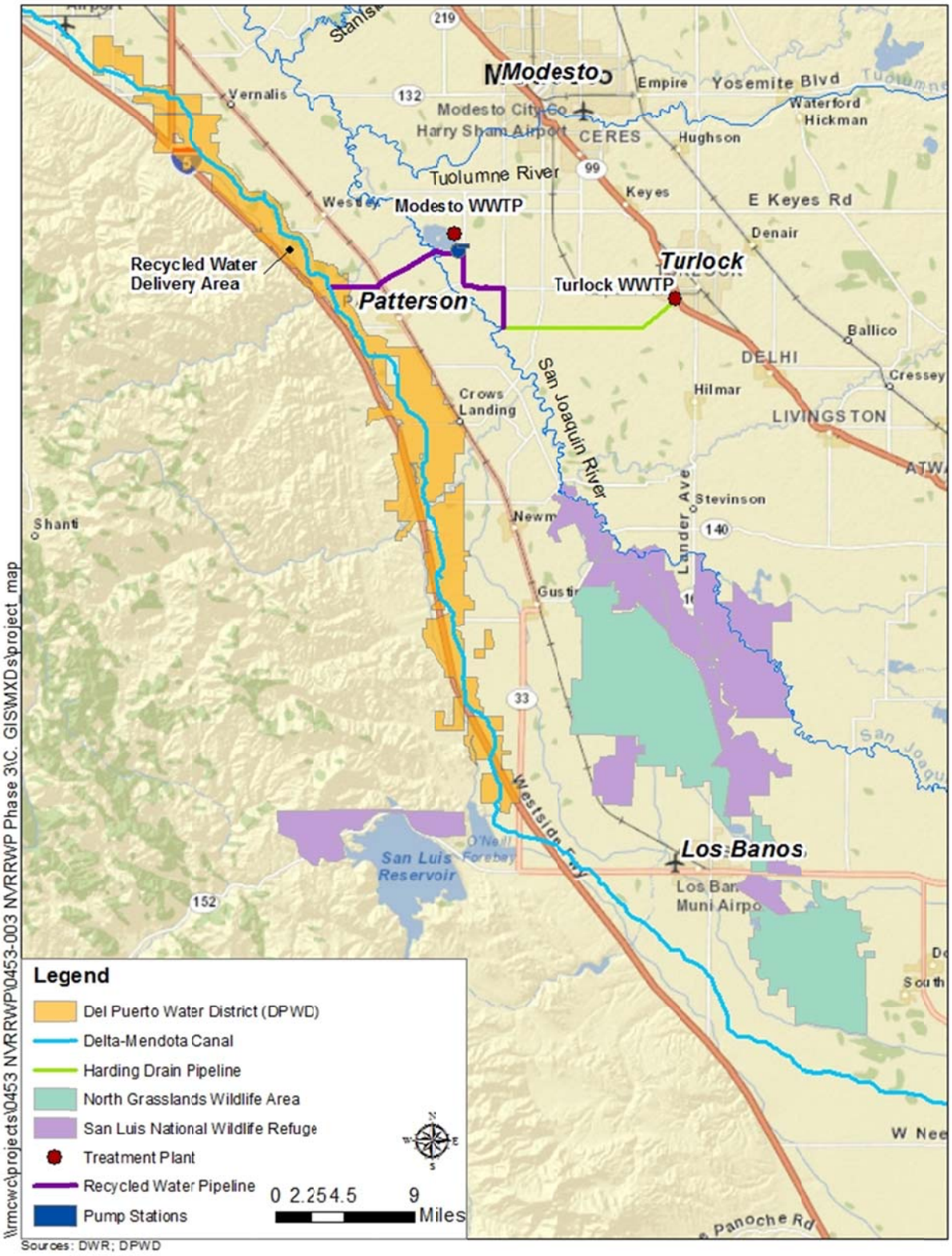


Figure 3-29: North Valley Regional Recycled Water Program Location



Project Physical Benefits

The following presents the physically quantifiable benefits that are expected from implementation of the NVRRWP.

The primary benefit of the NVRRWP is providing recycled water to new users at agricultural sites in disadvantaged communities in the DPWD service area thereby providing supplemental water supplies and increasing agricultural water supply reliability. The NVRRWP will expand recycled water use to the DPWD service area with recycled water produced by the Cities of Modesto and Turlock augmenting the District's CVP supplies by up to 59,000 AFY.

A secondary benefit is recycled water from the NVRRWP will be delivered to south of the Delta wildlife refuges, helping Reclamation meet Incremental Level 4 water demands. On average, approximately 10 percent of the available recycled water will be delivered to the refuges. Deliveries will vary by water year type, and will be made primarily during the winter-time "flood-up" months when the refuge water needs are the greatest.

Table 3-30: North Valley Regional Recycled Water Project Physical Benefits

Project Physical Benefit	Quantification of Benefit	Technical Basis for Benefit
CVP Supplies Augmented with Recycled Water	Up to 53,100 AFY of new agricultural water supply	• North Valley Regional Recycled Water Project Feasibility Study (December 2013) – Appendix C, Pages 3-9 and 3-10 (see Appendix 3.8 of this attachment)
Recycled Water to State and Federal South of the Delta Wildlife Refuges	Up to 5,900 AFY of new supply for wildlife and habitat management	• North Valley Regional Recycled Water Project Feasibility Study (December 2013) – Page 2-6, 4-5, 4-6, Appendix C, and Pages 3-9 and 3-10 (see Appendix 3.8 of this attachment) • Refuge Recycled Water Study (June 2013) (see Appendix 3.8 of this attachment)

The quantifiable physical benefits, including the CVP supplies augmented with recycled water and recycled water to wildlife refuges, are presented in the following tables.

Table 3-31: North Valley Regional Recycled Water Program – CVP Supplies Augmented with Recycled Water Benefit

Table 5 – Annual Project Physical Benefits (from PSP)			
Project Name: North Valley Regional Recycled Water Program			
Type of Benefit Claimed: CVP Agricultural Supplies Augmented with Recycled Water			
Units of the Benefit Claimed: acre-feet per year (AFY)			
Additional Information About the Benefit: CVP Supplies Augmented with Recycled Water Delivered to Agricultural Customers in DPWD Service Area from Cities of Turlock and Modesto			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2014			0
2015			0
2016			0
2017	0	27,540	27,540
2018	0	28,260	28,260
2019	0	29,160	29,160
2020	0	30,060	30,060
2021	0	30,960	30,960
2022	0	31,950	31,950
2023	0	32,940	32,940
2024	0	34,020	34,020
2025	0	35,190	35,190
2026	0	36,450	36,450
2027	0	41,940	41,940
2028	0	43,290	43,290
2029	0	44,640	44,640
2030	0	44,640	44,640
2031	0	44,640	44,640
2032	0	44,640	44,640
2033	0	44,640	44,640
2034	0	48,870	48,870
2035	0	48,870	48,870
2036	0	48,870	48,870
2037	0	48,870	48,870
2038	0	48,870	48,870
2039	0	48,870	48,870
2040	0	48,870	48,870
2041	0	53,100	53,100
2042	0	53,100	53,100

2043	0	53,100	53,100
2044	0	53,100	53,100
2045	0	53,100	53,100
2046	0	53,100	53,100
2047	0	53,100	53,100
2048	0	53,100	53,100
2049	0	53,100	53,100
2050	0	53,100	53,100
2051	0	53,100	53,100
2052	0	53,100	53,100
2053	0	53,100	53,100
2054	0	53,100	53,100
2055	0	53,100	53,100
2056	0	53,100	53,100
2057	0	53,100	53,100
2058	0	53,100	53,100
2059	0	53,100	53,100
2060	0	53,100	53,100
2061	0	53,100	53,100
2062	0	53,100	53,100
2063	0	53,100	53,100
2064	0	53,100	53,100
2065	0	53,100	53,100
2066	0	53,100	53,100
2067	0	53,100	53,100
Comments: Source of values - Calculation of Buildout Flows spreadsheet prepared for the North Valley Regional Recycled Water Program Feasibility Study, Volume 1: Final Report (Pages 3-9 and 3-10) (RMC, 2013). On average, 90% of available recycled water will be provided to DPWD; the remaining 10% of flows will be provided to Reclamation for the wildlife refuges as shown in the following table.			

Table 3-32: North Valley Regional Recycled Water Project – Recycled Water to CVPIA-designated State and Federal South of the Delta Wildlife Refuges Benefit

Table 5 – Annual Project Physical Benefits (from PSP)			
Project Name: North Valley Regional Recycled Water Project			
Type of Benefit Claimed: Recycled Water to CVPIA-designated State and Federal South of the Delta Wildlife Refuges			
Units of the Benefit Claimed: acre-feet per year (AFY)			
Additional Information About the Benefit: Recycled water delivered to Reclamation to use for habitat and wildlife management at the refuges			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2014			0
2015			0
2016			0
2017	0	3,060	3,060
2018	0	3,140	3,140
2019	0	3,240	3,240
2020	0	3,340	3,340
2021	0	3,440	3,440
2022	0	3,550	3,550
2023	0	3,660	3,660
2024	0	3,780	3,780
2025	0	3,910	3,910
2026	0	4,050	4,050
2027	0	4,660	4,660
2028	0	4,810	4,810
2029	0	4,960	4,960
2030	0	4,960	4,960
2031	0	4,960	4,960
2032	0	4,960	4,960
2033	0	4,960	4,960
2034	0	5,430	5,430
2035	0	5,430	5,430
2036	0	5,430	5,430
2037	0	5,430	5,430
2038	0	5,430	5,430
2039	0	5,430	5,430
2040	0	5,430	5,430
2041	0	5,900	5,900

2042	0	5,900	5,900
2043	0	5,900	5,900
2044	0	5,900	5,900
2045	0	5,900	5,900
2046	0	5,900	5,900
2047	0	5,900	5,900
2048	0	5,900	5,900
2049	0	5,900	5,900
2050	0	5,900	5,900
2051	0	5,900	5,900
2052	0	5,900	5,900
2053	0	5,900	5,900
2054	0	5,900	5,900
2055	0	5,900	5,900
2056	0	5,900	5,900
2057	0	5,900	5,900
2058	0	5,900	5,900
2059	0	5,900	5,900
2060	0	5,900	5,900
2061	0	5,900	5,900
2062	0	5,900	5,900
2063	0	5,900	5,900
2064	0	5,900	5,900
2065	0	5,900	5,900
2066	0	5,900	5,900
2067	0	5,900	5,900
Comments: Source of values - Calculation of Buildout Flows spreadsheet prepared for the North Valley Regional Recycled Water Program Feasibility Study, Volume 1: Final Report (Pages 3-9 and 3-10) (RMC, 2013). On average, 90% of available recycled water will be provided to DPWD as shown in the previous table; the remaining 10% of flows will be provided to Reclamation for the wildlife refuges.			

Technical Analysis of Physical Benefits Claimed

Technical Basis for Project

The NVRRWP is supported by a series of studies documenting the potential project benefits, including:

- North Valley Regional Recycled Water Project Feasibility Study
- Refuge Recycled Water Study (June 2013)

Page numbers referencing the physical benefits are provided in Table 3-30.

Recent and Historical Conditions that Provide Background for Benefits

DPWD provides agricultural irrigation water to approximately 45,000 acres of highly productive farmland in Stanislaus, San Joaquin, and Merced Counties with a production value of over $130 million gross farm dollars annually. DPWD serves its customers with water supplies from the Central Valley Project (CVP) which it receives through a contract with the U.S. Bureau of Reclamation. DPWD receives up to 140,210 AFY of CVP water based on its contract entitlement, but in recent years, due to drought conditions and Delta pumping restrictions, DPWD has experienced significant shortages and decreased reliability. DPWD's current year (2014) supply is 0% of its full contract amount, and its future contract deliveries are uncertain.

Historically, the Cities of Modesto and Turlock have collected and treated wastewater from their service areas and from the City of Ceres. In 2009, Modesto treated over 23 mgd at its Jennings Road Secondary Treatment Facility. Effluent produced at the facility is presently applied to Modesto-owned ranch land (approximately 2,500 acres) or is discharged to the San Joaquin River between October 1st and May 31st, when the San Joaquin River flows provide a 20:1 dilution ratio. Storage ponds at the plant site are used when effluent cannot be discharged to the river or land-applied. Modesto received a permit from the Regional Water Quality Control Board (RWQCB) in 2008 allowing for year-round discharge to the San Joaquin River, but in order to meet discharge requirements, Modesto is also required to provide nutrient removal, tertiary filtration, and disinfection for discharge to the River. Modesto is upgrading its facilities through a phased approach. In 2010, the first phase of the upgrades was completed, providing the City with 2.3 mgd of tertiary treated effluent meeting Title 22 recycled water standards for unrestricted reuse. Phase 2 is scheduled to be online by February 2016, resulting in a total volume of 14.9 mgd of recycled water available. Ultimately, the Modesto will implement a total of 5 phases of upgrades, resulting in a total production capacity of 27.5 mgd of recycled water by the year 2040.

The City of Turlock's wastewater treatment facility has a design capacity of 20 mgd and currently treats an annual average flow of approximately 10 mgd. The facilities include secondary treatment, tertiary treatment, and chlorine disinfection. All recycled water produced at Turlock's facilities meet Title 22 standards. Currently, the majority of recycled water produced is discharged year-round to the San Joaquin River via the Harding Drain, an open channel drain owned by Turlock Irrigation District (TID). In early 2014, Turlock completed construction of a pipeline, the Harding Drain Bypass Pipeline, to convey recycled water directly to the San Joaquin River for discharge. Permanent use of the Harding Drain Bypass Pipeline will commence sometime between October 9, 2014 and December 31, 2014.

Recognizing the Cities of Modesto and Turlock have a valuable resource that could be utilized rather than discharged to the San Joaquin River, and DPWD is in need of a reliable water supply, the three primary partners entered into a Memorandum of Understanding (MOU) and began developing the NVRRWP. The U.S. Bureau of Reclamation (Reclamation) has also been involved in program development. Reclamation has a contractual obligation under the Central Valley Project Improvement Act (CVPIA) and in cooperation with the U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Wildlife (CDFW) to provide water deliveries to the refuges on San Joaquin River to maintain and improve habitat areas on certain Federal and State wildlife refuges in the Central Valley (Level 2 deliveries). In addition to Level 2 deliveries, additional water supply is needed for optimal wildlife management (incremental Level 4 or IL4). Reclamation has entered into five long-term water supply contracts with Grassland Water District, USFWS, and CDFW for IL4 supplies. For the refuges south of the Delta, a total allocation of 105,514 AFY of IL4 supplies were identified. Reclamation is seeking additional supplies to meet the IL4 needs since this amount of delivery has not been achieved historically due to budget shortages, inconsistency in the timing of water deliveries, and other factors. The total 2012-2013 IL4 water delivery to the refuges

was just 36,600 AFY, resulting in a shortfall of approximately 70,000 AFY. The shortfall of Level 4 deliveries affects the ability to provide optimum habitat management .

Estimates of Without-Project Conditions

Without the project, new recycled water deliveries would not be established for agricultural users in the DPWD service area. The Cities of Modesto and Turlock would create the same amounts of recycled water at their wastewater treatment facilities and would discharge it to the San Joaquin River, in addition to certain existing land applications. The City of Turlock delivers some recycled water to the Walnut Energy Center; this amount will remain the same under with and without project conditions. Should the cities continue to discharge wastewater effluent to the San Joaquin River, it is likely they would need to upgrade their facilities include partial to reverse osmosis (RO) to meet the more stringent discharge requirements anticipated in the future. This would have an economic impact on the cities and result in greater greenhouse gas (GHG) emissions as RO facilities require more energy than is currently needed to create recycled water (i.e. tertiary treatment). With increased energy use, CO2 emissions would be greater than they would be with project implementation.

Under this no-project scenario, DPWD would continue to rely on CVP supplies, and a gap between supply and demand would remain. Future CVP allocations to DPWD are uncertain, but are expected to be 35% of its full allocation (or 49,000 AFY) in normal hydrologic years. Should drought conditions continue, even less of its contract CVP allocation would be expected. If DPWD does not receive its full CVP allocation, it will be forced to rely upon costly water transfers and/or groundwater which varies significantly in quantity and quality in the area. Further, reliance on groundwater supplies could result in depletion of the resource, degradation of groundwater quality, possible land subsidence, groundwater overdraft, and potential adverse impacts to crop yield from unsuitable groundwater quality. Water transfers are costly, and according to the 2009 California Water Plan Update, Delta exports and surface water supplies in the future are expected to become scarcer due to the impacts of climate change and the need to maintain the Delta ecosystem, which will likely result in water transfers becoming even costlier and less reliable. Without implementation of the NVRRWP, CVP supplies would not be augmented with recycled water.

If the NVRRWP recycled water is not delivered to the wildlife refuges south of the Delta, Reclamation would continue to seek a firm, reliable supply for IL4 and would likely not meet its mandated water deliveries. If Reclamation does not meet its contractual obligations to deliver IL4 water to the wildlife refuges, the ecosystems and habitats suffer. For example, the IL4 water is used to supply water to a 300-acre managed wetland in the Pixley National Wildlife Refuge (NWR) which provides habitat for migratory waterfowl and shorebirds. The Kern NWR provides wintering habitat for migratory birds, including endangered species.

Without the project, the DPWD service area will have poor water supply reliability, be susceptible to drought conditions, and continue to suffer from the lack of supplies it is receiving. The wildlife refuges will continue to suffer from the lack of supplies, resulting in impacts to the habitats and ecosystems.

Description of Methods Used to Estimate Physical Benefits

CVP Supplies Augmented with Recycled Water

As discussed on pages 3-9 and 3-10 of the NVRRWP Feasibility Study, approximately 52.7 mgd (approximately 59,000 AFY) of recycled water will be available for the NVRRWP, helping DPWD augment its existing CVP supplies. Beginning in 2018, 30,600 AFY of recycled water will be provided to DPWD. Then, as wastewater flows to the Cities of Modesto and Turlock increase, recycled water available to DPWD (and possibly other regional irrigators) will also increase.

Projections for the City of Modesto's wastewater flows were based on the City's current land use and using flow coefficients from the City's Wastewater Master Plan with expected buildout to occur in 2042. The City of Turlock General Plan Update estimates the City will reach an influent flow of 27.5 mgd at buildout in the year 2030. A significant portion of projected job growth will occur in water intensive industries, including food processors, contributing to wastewater flow increases in Turlock. From 2018 through 2042, expected buildout recycled water deliveries will increase to 59,000 AFY and continue through the project's useful life. Over the Project's 50 year life, this equates to 2.6 million AF of CVP supplies augmented with recycled water. Recycled water demands in DPWD's service area are greater than the projected recycled water available. Recycled water demands were estimated using the methodology described on page 3-2 of the NVRRWP Feasibility Study and in Appendix B of the Study. Water demands within the DPWD service area were estimated based on the specific water demand of each crop. Each year, DPWD conducts a survey of what crops were cultivated on each parcel and the associated acreages, which provided the basis for the demand estimate. Projected recycled water demand for 2040 for the District service area is approximately 120,000 AFY.

Recycled Water to Wildlife Refuges

The Refuge Recycled Water Study evaluated the feasibility of providing recycled water from the NVRRWP to the wildlife refuges. As described on page 2-6 of the NVRRWP Feasibility Study, on an annual basis, the optimum Incremental Level 4 (IL4) water delivered to wildlife refuges south of the Delta is 105,514 AFY. Recycled water would be delivered to the refuges via with Delta-Mendota Canal (DMC). Water quality sampling was conducted to ensure the quality would be appropriate for the refuges. The exact amount of recycled water that will be delivered to the refuges has not been determined, but is assumed to be 10% of available recycled water flows each year on average. This number will be negotiated between DPWD and the U.S. Bureau of Reclamation.

New Facilities Required to Obtain Physical Benefits

In order to achieve the benefits previously described, all NVRRWP facilities must be constructed, including:

- Turlock to Modesto Facilities:
  - 32,000 lineal feet (LF) of 42-inch diameter pipeline from the City of Turlock Harding Drain Bypass Pipeline to the City of Modesto wastewater treatment facility.
- Joint Facilities:
  - 4,000 LF of horizontal directionally drilled pipe from the City of Modesto wastewater treatment facility, crossing the San Joaquin River.
  - 27,350 LF of 54-inch pipeline from the San Joaquin River crossing to the DMC.
  - Two 500 hp pumps and one standby pump.

An agreement with the U.S. Bureau of Reclamation will also be required for conveyance and storage of recycled water in the DMC.

Potential Adverse Physical Effects

Construction of the NVRRWP will have temporary adverse impacts relating to project construction, but no long-term adverse effects are expected from the Project. Any adverse effects identified in the EIR/EIS will be fully mitigated.

Cost Effectiveness Analysis

The following questions are from Table 6 – Cost Effectiveness Analysis of the 2014 Drought Grant PSP.

Q1: Types of benefits provided as shown in Table 5.

The types of benefits the NVRRWP will provide are:

- CVP Supplies Augmented with Recycled Water
- Recycled Water to CVPIA-designated Wildlife Refuges

Q2: Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? If no, why? If yes, list the methods (including the proposed project) and estimated costs.

The NVRRWP Feasibility Study compares the recommended alternative of the NVRRWP (conveying recycled water via the DMC to DPWD) to other conveyance alternatives. These alternatives would deliver approximately the same amount of recycled water to DPWD and provide similar benefits to the NVRRWP as described in this proposal. The following table summarizes the alternatives analyzed.

Table 3-33: Alternatives Analysis

	Preferred Alternative: Conveyance in the DMC	Alternative 2B: Pipeline Conveyance to DPWD	Alternative 3: River Conveyance and Diversion	Alternative 4: Dilution and Conveyance via the Patterson Irrigation District to the DMC	Alternative 4: DMC Operational Changes with Groundwater Aquifer Treatment
Summary	Convey recycled water via a pipeline to the DMC	Convey recycled water in a pipeline to the southern and central area of DPWD, with additional storage	Discharge into and then divert recycled water from the San Joaquin River at a modified diversion facility	Divert recycled water to PID's sedimentation basins or main canal for dilution with river water; convey diluted recycled water to the DMC	Divert recycled water into the DMC when the O'Neil Pumps are off; infiltrate diluted recycled water to groundwater and extract 6 months later for conveyance in DMC
Recycled Water Delivered in 2018 (AFY)	30,600	25,700	30,600	30,600	20,200
Unit Cost	$180 - $240/AF	$630/AF	$100/AF	$150/AF	$450-$490/AF

1. Additional cost of advanced treatment could be required to meet future discharge regulations for the river conveyance alternative, potentially resulting in significant cost impacts resulting in a significantly larger unit cost of water.
2. Not including cost of PID upgrades.

Q3: If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods.

The NVRRWP project discussed herein is not the initial lowest cost alternative for conveying the recycled water to DPWD but is the recommended option for conveying the recycled water from the Cities of Turlock and Modesto to the DMC for conveyance to DPWD (based on the alternatives analysis performed in the NVRRWP Feasibility Study). However, when future requirements for advanced treatment of effluent (potentially reverse osmosis) are included in the analysis for continued discharge to the San Joaquin River, the project becomes the least cost alternative. (Cost analyses of the impacts of meeting more stringent treatment requirements indicate that O&M costs for treatment could be around $88/AF.) This alternative is technically feasible, avoids requirements for additional treatment upgrades, can convey all of the anticipated recycled water production at project buildout, uses the CVP facilities to provide seasonal storage, allows for delivery to all DPWD lands, is cost-effective compared to the other alternatives and has no identified fatal flaws from an institutional perspective. Additionally, it has fewer potential environmental impacts than Alternative 3, and is not as restrictive as Alternative 4 in terms of potential operational conflicts.

In addition to the alternatives analysis in which conveyance alternatives were analyzed for recycled water delivery, the Feasibility Study discusses alternative water supplies that could meet DPWD needs. Water transfers have been an effective and temporary way to meet DPWD's water demands, but are more costly than the NVRRWP and are not considered a long-term, reliable source of water due to uncertainties in the timing and quantities of Delta water that can be pumped in the future. Historically, water transfers have cost DPWD two to six times as much as its CVP contract supply (Table 3-34). Additionally, the cost of water transfers is expected to increase as demand for water increases. There are several factors that could impact future surface water supplies in California. Climate change is expected to affect the availability of Delta water exports because weather patterns are anticipated to become more severe (longer droughts and wetter non-drought years) and warmer temperatures are expected to reduce snowpack amounts and result in earlier springtime runoff. These weather changes are expected to impact the amount of surface water runoff, timing of runoff, and the ability to use runoff. For these reasons, relying on water transfers to meet DPWD current and future needs would not be reliable or cost effective.

Table 3-34: Historic Temporary water transfer data

Water Year	Bureau of Reclamation Contract ($/AF)	Additional Water Supply Rate [2] ($/AF)
2006-2007	$40	$118
2007-2008	$43	$156
2008-2009	$45	$145 - $220
2009-2010	$50	$245 - $320
2010-2011	$51	$162 - $200
2011-2012	$51	$187 - $215
2012-2013	$51	$180 - $217
2013-2014	$57	$192 - $305
2014-2015	$72	$353 - $955

1. Information provided by DPWD.
2. Additional water supplies were obtained through a combination of temporary water transfers from Exchange Contractors, Cross Valley Canal Contractors, Patterson Irrigation District, Tracy, In-District Emergency Groundwater, and West Stanislaus Irrigation District.

While agricultural water users supplement CVP supplies with groundwater, it is not considered an effective long-term solution due to the potential for overdraft conditions and water quality parameters. Water quality and quantity vary throughout the DPWD service area. The DWR California Water Plan Update estimated in 1995 that the majority of overdraft conditions that were occurring in California were in the Tulare Lake, San Joaquin River, and Central Coast regions. DPWD is located within the San Joaquin River groundwater basin and overlies the Delta-Mendota groundwater subbasin. Groundwater has been used within the District to supplement CVP water deliveries, but there are potential long-term challenges associated with continued reliance on groundwater pumping such as declining water table elevation, land subsidence, degradation of groundwater quality, and adverse impacts to crop yield from unsuitable groundwater quality. Further or increased reliance on groundwater pumping to meet crop water demand is not considered a viable or sustainable option for DPWD given the potential adverse impacts that would likely occur.

Appendix 3.1 – New Hickman Community Well Project Technical Documents

2010 Water System Engineer's Report
Final Program Environmental Impact Report

SCH# 2008092095
EA/PW 2008-18

Prepared Under the Direction of:

City of Modesto Public Works Department
1010 Tenth Street, Suite 4600
Modesto, CA 95353
Contact: Jack Bond
209/577-5200

Prepared by:

ICF International
630 K Street, Suite 400
Sacramento, CA 95814
Contact: Terry Rivasplata
916/737-3000

With assistance from:

Horizon Water and Environment, LLC.
1330 Broadway, Suite 424
Oakland, CA 94612
Contact: Michael Stevenson
510/986-1852

February 2010

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Final Program Environmental Impact Report

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February 2010

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Chapter 1
Introduction

Purpose of This Document

This document and the draft environmental impact report (EIR) that was circulated for public review between December 7, 2009 and January 21, 2010 constitute the final EIR for the 2010 Water System Engineer's Report. The information presented in this final EIR is being provided in accordance with the requirements of the State California Environmental Quality Act (CEQA) Guidelines and includes the following Chapters:

- Chapter 1, "Introduction," discusses the purpose of this document, public review process, CEQA requirements, and use of this document.
- Chapter 2, "Responses to Comments," contains the comments received during the public review period for the draft EIR and the written responses to those comments.

As mentioned in the draft EIR, this document is intended to be a program EIR, pursuant to State CEQA Guidelines Section 15168. A program EIR assesses the impacts of a series of actions that can be characterized as one large project.

Public Review Process

The draft EIR was distributed to various public agencies, citizen groups, and interested individuals for a 45-day public review period, beginning on December 7, 2009 and ending January 21, 2010.

CEQA Requirements

As lead agency under CEQA, the City has provided each public agency that commented on the draft EIR with a copy of its responses to comments at least 10 days before certifying the final EIR.

Use of This Document

The final EIR allows the public and the lead agency to review revisions to the draft EIR, comments, responses to comments, and other components of the EIR before approval of the project. This final EIR, including the draft EIR incorporated by reference, will serve as the environmental document used by the City when considering approval of the project.

After completing the final EIR and before approving the project, the City, as lead agency, must make the following three certifications (State CEQA Guidelines Section 15090):

- The final EIR has been completed in compliance with CEQA.
- The final EIR was presented to the decision-making body of the lead agency, and the decision-making body reviewed and considered the information in the final EIR before approving the project.
- The final EIR reflects the lead agency's independent judgment and analysis.

Separately from certification of the final EIR, when approving the project the City must adopt findings of fact describing the disposition of each of those impacts (State CEQA Guidelines Section 15091[a]). For each significant impact, the lead agency must make one of the following findings:

- Changes or alterations have been required in or incorporated into the project that avoid or substantially lessen the significant environmental effect as identified in the EIR.
- Such changes or alterations are within the responsibility and jurisdiction of another public agency, not the agency making the finding. Such changes have been adopted by such other agency or can and should be adopted by such other agency.
- Specific economic, legal, social, technological, or other considerations, including provision of employment opportunities for highly trained workers, make infeasible the mitigation measures or project alternatives identified in the final EIR.

Each finding must be accompanied by a brief explanation of the rationale for the finding. In addition, the City must adopt, in conjunction with the findings, a mitigation monitoring or reporting program for the mitigation measures (State CEQA Guidelines Section 15091[d]). These measures must be fully enforceable through permit conditions, agreements, or other measures.

In addition, because this project would result in significant and unavoidable impacts, the City must state in writing its reasons for approving the action (State CEQA Guidelines Section 15093[b]). This statement of overriding considerations will be supported by substantial information in the record, including the final EIR.

Other agencies, such as the Cities of Turlock and Waterford, may use this Final EIR as the basis for approving portions of this project that are under their jurisdictions and that are analyzed in this program EIR.

Chapter 2
Comments and Responses

This chapter contains responses to comments submitted by the following entities during the review period of the Draft EIR:

- Stanislaus County Environmental Review Committee.
- Modesto Irrigation District.

A third letter was received from the State Clearing House (SCH), but because the letter stated that there were no comments from the SCH or other state agencies, it is not included here.

Letter 1 Stanislaus County Environmental Review Committee (ERC)

Response to Comment 1

We thank the ERC for their comments. No response is necessary.

Response to Comment 2

Almost all of the community of Salida's existing urban area is addressed in the PEIR by being included in the Project's Study Area (although there are a few developed parcels being served by private water wells). The PEIR addresses reasonably foreseeable growth throughout the Study Area based on buildout of the existing land uses within the City of Modesto's Sphere of Influence (SOI), plus development in the City's outlying water service areas that are outside the SOI.

In 1995, the City acquired the former Del Este Water Company (DEW Co), which, along with other areas in the County, served water to the developed areas in Salida. The Salida Community Plan area is much larger than the former DEW Co service (tariff) area. At this time, it is primarily the former tariff area the City intends to serve. The reason for not including the entire Salida Community Plan in the study area is the same reason that the entire City General Plan area was not studied—because analyzing costly, detailed utility plans for large areas of undeveloped land that may be decades away from developing is impractical for this level of analysis due to the numerous uncertainties.

There are currently no plans to serve this larger area that would identify the location, size, and timing of future facilities. Figures 10 and 11 of the Draft EIR illustrate that there are no new facilities planned for Salida as a part of this project. Further, the City has not made a commitment to any specific facilities in the larger Salida Community Plan area outside of the tariff area.

Also, see response in Modesto Urban Area General Plan Final EIR, p IX-69.

Response to Comment 3

This comment expresses ERC's view that the Communities of Del Rio, Hickman and Grayson have been addressed in their entirety in the document. This does not require a response.

Letter 2 Modesto Irrigation District (MID)

Response to Comment 1

We thank the MID for their comments. No response is necessary.

Response to Comment 2

The commenter asserts that the MID reserves its future rights to utilize its property in a manner it deems necessary for the installation and maintenance of various facilities. This is recognized and does not require a response.

WEST YOST ASSOCIATES
Consulting Engineers

TECHNICAL MEMORANDUM

DATE: March 30, 2010 Project No.: 418-02-07-22

TO: Jack Bond, City of Modesto, Project Manager

FROM: Charles Duncan, Project Manager

SUBJECT: City of Modesto's 2010 Water System Engineer's Report
Evaluation of Existing and Buildout Water System for the Hickman Outlying Service Area (Hickman TM)

In the mid 1990's the City of Modesto (City) acquired the former Del Este Water System, which included the communities of Grayson, City of Waterford, Hickman, Del Rio, and a portion of the City of Turlock. The City now manages, operates, and maintains these five outlying water service areas. As a component of the City's Engineer's Report, the City has requested West Yost Associates (WYA) to provide an individual hydraulic assessment of each of these systems, in order to evaluate the ability of existing facilities to meet current and buildout demands. The hydraulic evaluation of the Community of Hickman (Hickman) water system is addressed in this Technical Memorandum (TM).

1.0 SUMMARY

The hydraulic assessment included three system components and the ability to serve current and buildout demands: groundwater pumping capacity; storage capacity; and distribution system needs. In addition, water supply requirements at buildout were evaluated; additional demands at buildout are minimal and do not require a change in the proposed facility plan.

1.1 Pumping Capacity

The system assessment evaluated the adequacy of existing production wells to meet current water demands for two conditions: Peak Hour; and Maximum Day plus fire flow conditions. Peak hour and Maximum Day demand were calculated as 635 gallons per minute (gpm) and 380 gpm, respectively.

The system was reviewed with all wells producing, and with the largest well out of service (i.e., reliable pumping capacity). The reliable pumping capacity was not sufficient to meet Peak Hour and Maximum Day demand conditions. Therefore, additional water supply is required. It is also recommended that a standby generator be installed at Well 309 to improve reliability of service in case of a power outage. Recommendations for additional water supply are outlined in the following sections.

7041 Koll Center Parkway, Suite 110 Pleasanton, CA Phone 925 426-2580 Fax 925 426-2585 e-mail: mail@westyost.com

1.2 Storage Capacity

The storage capacity assessment evaluated total storage and peaking capacity requirements based on three criteria: operational storage; fire storage; and emergency storage. Operational storage was established as 0.25 x Maximum Day demand. Fire flow demand was established as 1,500 gpm for a 2-hour duration. Emergency storage was established as 1.00 x the average day demand. Approximately 0.40 MG of storage is required to meet existing City storage criteria under reliable pump capacity conditions. Therefore, a 0.40 MG storage tank and 1.20 mgd pump station is recommended to provide the additional storage.

1.3 Existing Distribution System

The City has established a minimum requirement of 40 pounds per square inch (psi) of system pressure to meet Peak Hour demand, and 20 psi of residual pressure, measured at the flowing hydrant, to meet Maximum Day demand plus fire flows. Also, head loss should remain below 7 feet per 1,000 feet (ft/kft) of distribution piping, and velocity should be not greater than 7 feet per second (fps).

WYA developed the system hydraulic model using MWH Soft's H_2ONET software. Model inputs included pipe, junctions, wells, tanks, and pumps. Additional information about the hydraulic model is provided in Attachment A.

The hydraulic model indicates that with two wells in operation, the City cannot maintain the required system pressures of 40 psi during peak flow or 20 psi residual during Maximum Day plus fire flow. Further, head losses in existing pipelines exceed the City's criteria. In order to provide the needed service with all wells in operation, and further, to provide reliable service with the largest well of out of operation, additional supply is required.

To correct these existing system deficiencies, this memo presents two potential alternatives:

> Alternative A: Hickman remains an independent water service area. Under this alternative, the recommended capital improvements to the existing water system are listed below and anticipated to cost approximately $6.6M, as detailed in Table 7 of this TM.
>
> - Install backup generator at existing Well 309.
> - Construct new well with a pumping capacity of at least 600 gallons per minute (gpm), with standby generator to meet peak flow demands.
> - Install new 0.40 million gallons (MG) storage tank and associated 1.20 million gallon per day (mgd) pump station with standby power to meet storage and fire flow demands.
> - Construct 9,400 linear feet of upsized pipelines to convey fire flow.

Alternative B: Hickman service area is interconnected to the City of Waterford service area. Under this alternative, the recommended capital improvements are listed below and anticipated to cost approximately $4.8M, as detailed in Table 7 of this TM.

- Install backup generator at existing Well 309.
- Construct new well with a pumping capacity of at least 600 gpm, with standby generator to meet peak flow demands.
- Add 5,800 linear feet of new pipeline connecting the Hickman service area to the City of Waterford service area to meet fire flow demands.
- Construct 9,400 linear feet of upsized pipelines to convey fire flow.

Alternative A requires more equipment and has a higher cost than Alternative B. However, despite the higher cost, Alternative A is recommended because it allows the City of Modesto's water system in Hickman to remain independent of the water system in the City of Waterford. Alternative B would require negotiations with the City of Waterford to secure additional land for a suitable well location.

1.4 Buildout System

The existing Hickman water system is approximately 90 percent built out and has some vacant and undeveloped infill areas shown on Figure 1. The total area of the planned development land use is approximately 18 acres. In the previous hydraulic evaluation of the Hickman water system in 2005, this area was designated as road and railroad property; however projected use has changed to primarily residential property. The additional infill development is anticipated to increase the Hickman service area demands by approximately 0.05 mgd (36 gpm) to a total of 0.29 mgd (203 gpm).

The existing system recommendations discussed above are adequate to serve projected buildout demand. Therefore, no additional capital improvements are required for buildout of the Hickman system.

2.0 INTRODUCTION

In 2002, the City contracted with WYA to provide engineering services to assist in the conversion, updating, enhancement and calibration of a water system hydraulic model for the Hickman water system. Using the methodology described in Attachment A of this TM, WYA developed a hydraulic network analysis model of the Hickman water distribution system to allow computer simulations of various demands and flow conditions. The hydraulic model was used to evaluate the following demand conditions:

- Maximum day,
- Peak hour, and
- Maximum day plus fire flow.

In order to create a hydraulic network analysis model representative of the Hickman water system, WYA completed the steps listed below:

- Used shapefiles exported from the City of Modesto's Geographical Information System (GIS) and existing hard copy maps to develop the hydraulic model.
- Verified with City Operations staff that the converted hydraulic model system configuration (pipeline sizes, alignments, connections, and other facility sizes and locations) is representative of the current Hickman water system.
- Evaluated 2002 water demands to ensure proper distribution of demands in the hydraulic model.

In accomplishing these tasks, WYA worked closely with City Engineering and Operations staff to obtain and review the following: as-built drawings and maps to confirm pipeline sizes, material, age, locations and alignments; and land use and available metered data.

Since the development and calibration of the hydraulic model in 2002, approximately 800 feet of pipeline on Elma Street has been upsized from 4-inch diameter to 8-inch diameter pipe. Additionally, system demand has increased and infill areas previously identified for road and railroad are now planned to support residential infill. The 2002 model has been updated to reflect these changes in system infrastructure and demands. This TM presents the updates performed, model results, and recommended facility improvements.

This memo is organized as follows:

- Service Area
- Existing Water System
- Hickman Hydraulic Model
- Existing Water Supply System Evaluation & Recommendations
- Buildout Water Supply System Evaluation & Recommendations

3.0 SERVICE AREA

The community of Hickman is located approximately 14 miles east of the City of Modesto and south of Highway 132 and the City of Waterford. The Hickman water system serves approximately 460 residents, and encompasses a service area containing approximately 146 acres. This service area is primarily residential, and is approximately 90 percent built out. The Hickman service area was originally provided with water service by the Del Este Water Company; in the mid 1990's, the City of Modesto acquired the Del Este system and began providing water service to Hickman.

4.0 EXISTING WATER SYSTEM

The Hickman water system includes two existing wells, no storage tanks, and approximately 17,000 linear feet of pipeline. Existing Hickman pipelines vary in size from 4-inches to 10-inches in diameter and are comprised of cast iron or polyvinyl chloride pipe.

Currently, there are no interconnections with any other water systems. However, the City of Waterford is located approximately 1.1 miles from Hickman. Interconnecting these two independent water systems could be explored as a means for additional supply.

4.1 Wells

The Hickman water system is solely supplied by groundwater from two existing wells; Figure 1 shows the locations of Wells 272 and 309. Groundwater is disinfected by chlorine addition at the wellhead, and then discharged directly into the distribution system. In addition, granulated activated carbon (GAC) treatment for hydrogen sulfide occurs upstream of disinfection at Well 309. Well 272 is equipped with a backup power supply.
Well characteristics are summarized in Table 1.

Table 1. Well Characteristics[a]

Well No.	Address	History Pump Data			Well Construction Details							Total Depth
		Year Drilled	Rated Pump Capacity (at 60 psi), gpm[d]	Rated Hp	Standby Power	Treatment System	Casing Diameter (inches)	Gravel Packed	Depth of Annular Seal	Casing Depth	Perforated From/To	
272	13127 Hickman Rd	1961	360	30	Yes	None	14	No	NP[c]	104	None	332
309	6th Street & Montpelier	1994	450	40	No	GAC[b]	16	No	92	160	None	160

(a) Based on information provided by the City.
(b) GAC = Granulated Activated Carbon
(c) NP = Not Provided by City
(d) Based on data collected upon well completion

Pump efficiency tests were performed on both wells in December 2007. Well 272 is only pumping at 56 percent of its rated capacity. This well is 47-years old, and is near the end of its expected useful life of 35 to 50 years (useful life changes depending on site specific hydrogeologic conditions). The production decrease observed in Well 272 is probably due to incrustation of the well screens, integrity of the well casing, and other age-related matters. However, Well 272 is not recommended for replacement at this time because other recommendations, such as the new well, will provide sufficient capacity for this system.

Results of the pump efficiency tests are presented in Table 2.

Table 2. Well Pump Tests

Well No.	Date Tested	Motor HP	Measured Flow, gpm	Static Level, ft[(a)]	Pumping Level, ft[(a)]	Discharge Pressure, psi	Water HP
272	12/21/07	30	201	95	99	60	12.06
309	12/21/07	40	449	94	96.5	65	27.97

(a) Static and Pumping Levels indicate depth to water measurements from reference point elevations.

Table 3 provides a summary of the total monthly groundwater production of each individual well in 2005, and Figure 2 provides a graphical summary of this data.

Table 3. Summary of Hickman Service Area Monthly Production in 2008[a)]

Month	Well 272		Well 309	
	Gallons	MG	gallons	MG
January	1,458,608	1.46	827,921	0.83
February	1,445,955	1.45	815,409	0.82
March	2,875,663	2.88	1,162,968	1.16
April	4,663,265	4.66	1,582,883	1.58
May	5,639,610	5.64	2,234,687	2.23
June	4,744,690	4.74	4,675,243	4.68
July	5,052,547	5.05	4,796,866	4.80
August	5,205,861	5.21	4,464,121	4.46
September	4,650,205	4.65	2,823,416	2.82
October	3,479,365	3.48	1,777,412	1.78
November	1,855,214	1.86	1,037,594	1.04
December	1,494,811	1.49	869,078	0.87
Subtotal	42,565,792	42.57	27,067,598	27.07
			Total Annual Supply	69.64

(a) Data provided by the City of Modesto on September 4, 2009, from the file "monthly well flow totals 2002 to present.xls".

4.2 Wellhead Treatment

A wellhead treatment facility comprised of granulated activated carbon filtration is currently in use at Well 309. The system has operated since the late 1990s to remove hydrogen sulfide and eliminate associated taste and odor issues.

4.3 Storage

There are currently no storage facilities or pumping plants (other than the well pumps) in the Hickman service area.

4.4 Pipelines

General knowledge of the Hickman pipeline main locations and material type was gained through discussion with City Operations staff. Pipelines within the service area range from 4- to 10-inches in diameter, and are constructed of cast iron or polyvinyl chloride (PVC), with PVC pipes being newer than cast iron pipes. About 90 percent of the pipelines are approximately 30 to 40 years old, with the remaining 10 percent installed more recently (post 1990).

5.0 HICKMAN HYDRAULIC MODEL

In 2002, WYA developed a hydraulic model of the Hickman water service area using H_2ONET hydraulic modeling software. This model has been updated to reflect 2005 demands. The model represents the current system infrastructure, well characteristics and peaking factors through 2007. A summary of assumptions, criteria, and model components is included in Attachment A of this TM.

6.0 EXISTING WATER SUPPLY SYSTEM EVALUATION AND RECOMMENDATIONS

6.1 Overview

This section presents findings from the hydraulic evaluation of Hickman's existing water distribution system and its ability to meet the City of Modesto's recommended water system operational criteria under existing demand conditions. The existing water distribution system was evaluated under the following demand scenarios:

- Maximum Day Demand,
- Peak Hour Demand, and
- Maximum Day Demand Plus Fire Flow.

6.2 Potable Water Demands

Average day potable water demands for the existing Hickman system were estimated and allocated based on the methodology described in Attachment A. Based on production data provided by the City from 2003 through 2007, Table 4 shows the peaking factors used to estimate Maximum Day and Peak Hour demands. The Maximum Day peaking factor was developed based on a 5-year average from 2003 through 2007. The Peak Hour peaking factor was developed based on a 2-year average from 2006 through 2007.

Table 4. Water Demand Peaking Factors

Demand Condition	Peaking Factor[a]	2005 Demands	
		mgd	gpm
Average Day	–	0.24	167
Maximum Day	2.27 x Average Day	0.55	380
Peak Hour	3.79 x Average Day	0.91	635

[a] Based on available water production data for the Hickman service area. Peaking factors were provided by the City as Max-Day Peak Factor.xls on 7/31/08 and Peak-hour tabulation - Outlying Areas.xls on 8/1/08.

6.3 Pumping Capacity Evaluation

The Hickman service area is supplied exclusively by groundwater that is pumped from two existing production wells. Table 5 provides a summary of recent pump flow testing for each operational well, and indicates a total existing supply capacity of 620 gpm. However, for water supply planning purposes, this groundwater supply (groundwater pumping capacity) must be reduced to account for well or wells that are out of service at any given time due to mechanical breakdowns, maintenance or other operational issues. This reduced pumping capacity is defined as the Reliable Pumping Capacity. The City has defined the reliable groundwater supply as the system's groundwater pumping capacity assuming the largest well is out of service. This scenario provides an allowance for mechanical breakdowns, maintenance, or other operational issues.

As shown on Table 5, the current total Reliable Pumping Capacity of 190 gpm (with Well 309 out of service) is <u>not</u> sufficient to meet existing Maximum Day or Peak Hour demands of 380 gpm and 635 gpm, respectively. Further, with Well 309 in operation, the total available pumping capacity of 620 gpm is still not sufficient to meet the existing Peak Hour demand of 635 gpm. Therefore, additional water supply is required. Recommended Alternatives for this added supply are presented later in this TM.

In addition to added water supply, it is recommended that a standby generator be installed at Well 309 to improve reliability of service in case of a power outage.

Table 5. Summary of Existing System's Supply Facilities

Well Pump Name	Efficiency, percent[a]	Standby Power	Existing Capacity, gpm[b]	Existing Maximum Day Demand, gpm	Existing Peak Hour, gpm
272	47.50	Yes	190	–	–
309	36.27	No	430	–	–
Total Capacity			620	380	635
Total Reliable Capacity			190	380	635

(a) Based on pump efficiency testing from December 2007. Pump tests conducted by City operations staff.
(b) Based on pump capacity testing from August 2007. Pump tests conducted by City operations staff.

6.4 Storage Capacity Evaluation

Criteria has been defined by WYA for the City in 2003 for determining treated water storage and system peaking capacity needs to meet diurnal operational peaks, fire flows, and emergency conditions. Total storage and system peaking capacity requirements can be evaluated based on the following three components:

- Operational Storage: 25 percent of Maximum Day demand;
- Fire Storage: The required fire flow times the fire flow duration period, as required by the City's Fire Marshall; and
- Emergency Storage: 1 x average day demand.

The Hickman system currently does not have any tanks or storage reservoirs; therefore, all of its available storage capacity and ability to meet peak operational demands is based on groundwater basin storage and pumping capacity. This dependence on the groundwater basin for storage presents a reliability issue; there is no allowance for possible contamination or other scenario that renders a portion of the basin unavailable.

As shown on Table 6, approximately 0.40 MG of tank storage is required in the existing Hickman water system to meet existing City storage criteria. This volume was calculated using a Reliable Pumping Capacity scenario with Well 309 is out of service. Increased storage capacity may be obtained by either constructing a 0.40 MG storage tank and associated 1.2 MGD pump station or constructing a new 600 gpm well. However, approximately 0.02 MG of tank storage is still required if a new well is constructed. Therefore, both Alternatives are recommended because the storage tank will provide additional storage capacity, and the new well will provide additional supply capacity to meet fire flow conditions. The locations of the proposed facilities are for planning purposes only and should be developed further in future pre-design studies. Fire flow conditions are discussed further below.

Table 6. Summary of Required Above Ground Storage

Storage Component	Component Detail	Storage without New Well, MG	Storage with New Well[a], MG
Operational	0.25 x Maximum Day demand	0.14	0.14
Fire	1500 gpm for 2 hours	0.18	0.18
Emergency	1.00 x average day demand	0.24	0.24
Subtotal		0.56	0.56
Groundwater Credit	60% reliable production capacity	(0.16)[b]	(0.54)[c]
Total Storage Required		0.40	0.02

(a) New well assumed to have a production capacity of 600 gpm.
(b) Sixty percent of existing reliable groundwater pumping capacity (without Well 309).
(c) Sixty percent of existing reliable groundwater pumping capacity (without New Well).

6.5 Existing Distribution System Evaluation

The hydraulic model identified areas of Hickman's existing system in which minimum pressure could not be maintained, or where velocities and/or head losses were found to exceed City design standards. A discussion is provided in the following sections.

6.5.1 Peak Hour Demand Conditions

The Peak Hour demand for the City's potable water distribution system under existing 2005 conditions is approximately 0.91 mgd (635 gpm). This Peak Hour demand condition was simulated in the model. Results indicated that the existing distribution system cannot reliably deliver these demands under the City's minimum pressure criteria of 40 psi, even with both wells in service (see Figure 3). This analysis also indicated that head losses in existing pipelines exceed the City's criteria of $\leq$ 7 feet per 1,000 feet (ft/kft); however, flows were able to meet the velocity criteria of $\leq$7 feet per second (fps). The pipelines that did not exceed both headloss and velocity criteria are not recommended to be rehabilitated or upsized. However, other upsized pipelines are required in order to address pressure deficiencies. In order to remedy the pressure deficiency shown in Figure 3, WYA recommends that the City install a new well with a pumping capacity of 600 gpm and upsize pipelines throughout the system (see Figure 4).

6.5.2 Maximum Day Plus Fire Flow Demand Conditions

Fire flows are to be met concurrently with a Maximum Day demand condition, while maintaining a minimum residual system pressure of 20 psi, as measured at the flowing hydrant. The fire flow demand for Hickman is 1,500 gpm for a two hour duration. Based on the hydraulic analysis of the Maximum Day plus fire flow demand condition, Hickman's existing water system cannot maintain a minimum residual system pressure of 20 psi in any areas of the Hickman service area, even with both existing wells operating (see Figure 5).

Similar to the Peak Hour demand condition, the reason for the pressure deficiency is a lack of supply. The total pumping capacity of both existing wells is only 620 gpm, which is less than half of the required 1,500 gpm fire flow. However, with the addition of the previously recommended storage tank, then the additional construction of a new 600 gpm well is recommended to meet the max day with fire flow demand conditions. Constructing a storage tank and well is recommended over constructing two wells because the construction costs for a tank and well is more economical than the construction costs for two wells.

Alternatively, a new connection with the City of Waterford can also provide additional water supply. These two alternatives are outlined below:

- Alternative A: Construction of a 0.40 MG storage tank with associated 1.15 mgd booster pump station and back up generator that will be capable of supplying the additional required flow, and the addition of a new 600 gpm well; or
- Alternative B: A new interconnection to the City of Waterford water service area to the north, and the addition of a new 600 gpm well.

Due to the increased flow required to be distributed throughout the water system under either Alternative, approximately 55 percent of the existing pipelines will need to be upsized to deliver the water to hydrant locations. These two improvement Alternatives are shown in Figure 6 and detailed in Table 7.

Under Alternative A, a new 0.40 MG storage tank with associated 1.20 mgd booster pump station must be constructed in addition to the proposed new well and upsized pipelines. With these system requirements, the fire flow with concurrent Maximum Day demand condition can be met while maintaining the minimum required residual pressure of 20 psi, as shown in Figure 7.

Under Alternative B, the Hickman service area could be interconnected to the City of Waterford water service area to provide additional supplies and to increase system pressures in the Hickman service area (see Figure 8). Under this hydraulic scenario, a flow of approximately 1,300 gpm would be provided from the City of Waterford's water system into the Hickman water system; this additional supply would be used to meet Maximum Day plus fire flow demand, with Well 309 out of service. In addition to the benefit of providing additional supply to the Hickman service area for the Maximum Day demand plus fire flow condition, this interconnection would increase the reliability and flexibility of both systems in the event that water system facilities need to be taken out of service for routine maintenance or emergency conditions. Also, since Hickman has experienced water quality issues (i.e., Well 273 was abandoned due to the presence of uranium, and Well 309 requires additional treatment to remove hydrogen sulfide), this Alternative would help provide additional system redundancy to the Hickman system if one well must be taken out of service due to water quality issues.

Table 7. Recommended CIP Program for Hickman Existing Water System [a]

CIP ID	CIP Reason	Item	Unit	Quantity	Unit Cost[b] ($)	Alternative A Cost[c] ($)	Alternative B Cost[d] ($)
		Pipelines					
FF01	Fireflow	Along Montpelier Road from Lake Road to Emma Lane					
		12-inch	lf	2,360	136	322,225	322,225
FF02	Fireflow	Along Lake Road from Montpelier Road to I Street					
		8-inch	lf	800	101	80,117	80,117
FF03	Fireflow	Along I Street from Lake Road to 4th Street					
		8-inch	lf	1,030	101	103,187	103,187
	Fireflow	Along I Street from Lake Road to 4th Street					
		8-inch	lf	760	101	76,620	76,620
FF04	Fireflow	Tie-In between two north-south mains along Montpelier Road					
		10-inch	lf	20	123	2,308	2,308
FF05	Fireflow	Along Davis Street from Hickman Road to Elma Street					
		8-inch	lf	530	101	53,053	53,053
FF06	Fireflow	Along Kim Street from Hickman Road to Lorenzo Street & along Kim Court & Lorenzo Street					
		8-inch	lf	1,310	101	131,930	131,930
FF07	Fireflow	Along Hickman Road from Lake Road to Kim Street					
		10-inch	lf	1,040	123	127,339	127,339
FF08	Fireflow	Along 6th Street from Elma Street to Well 309					
		10-inch	lf	810	123	99,373	99,373
FF09	Fireflow	Along Lake Road from Hickman Road to Well 272					
		10-inch	lf	310	123	37,860	37,860
HL10	Headloss	Along Lake Road from Well 272 to Montpelier Road					
		12-inch	lf	380	136	51,364	51,364
	Supply	Connection from Waterford service area to Hickman service area					
		12-inch	lf	5,820	136		794,032
		Storage Tank					
	Supply	0.40 MG Storage Tank	ls			1,867,000	
	Supply	72 bhp Pump Station with backup generator and SCADA					
		Well					
	Supply	New Well with 600 gpm pump, backup generator, and SCADA	ls	1	1,333,000	1,333,000	1,333,000
		Well Backup Generator					
	Supply	Well 309	ls	1	133,000	133,000	133,000
					Subtotal (Overall Program)	4,418,000	3,212,000
					50% Contingency & Other Costs	2,210,000	1,606,000
					Total Estimated CIP Construction Cost	**6,628,000**	**4,818,000**

[a] Does not include site specific facilities.

[b] All unit prices presented in March 2010 dollars (ENR Construction Index = 9728.17). Unit prices based on combination of cost curves, construction cost guidelines and similar construction projects.

[c] Option A includes the construction of a new 0.40 MG storage tank, pump station and back up generator and SCADA.

[d] Option B includes the construction of the inter-connection pipeline between the Waterford service area and Hickman service area. Does not include costs to attend meetings with City of Waterford to discuss, negotiate and obtain approval to install proposed intertie.

7.0 RECOMMENDED WATER SYSTEM IMPROVEMENTS

Based on the evaluations completed for the Hickman water system, there is a need for specific water facility improvements throughout Hickman's overall service area. An overview of the recommended facilities is provided on Figure 6. A summary of the recommended improvements is provided below.

7.1 Existing System Improvements

The recommended improvements to Hickman water system ensure that reliable service can be provided to existing users in a manner that meets the City's system design criteria. Alternative A is recommended to provide increased reliability to the Hickman water system.

Under Alternative A, the recommendations include:

- Install backup generator at Well 309,
- Construct new well with a pumping capacity of at least 600 gpm, with standby generator,
- Construct new 0.40 MG storage tank and associated 1.20 mgd pump station with standby power, and
- Construct 9,400 linear feet of upsized pipelines.

Under Alternative B, the recommendations include:

- Install backup generator at Well 309,
- Construct new well with a pumping capacity of at least 600 gpm, with standby generator,
- Add 5,800 linear feet of new 12-inch diameter pipeline connecting the Hickman service area to the City of Waterford service area, and
- Construct 9,400 linear feet of upsized pipelines.

Locations of the recommended improvements are shown on Figure 6 and detailed in Table 7.

7.2 Required On-going Rehabilitation Improvements

In addition to the need to construct system improvements to meet current water system demands, the City should plan to repair or replace aging water system infrastructure over time. The decision to repair or replace existing facilities should be based primarily on facility condition. Pipelines that have experienced corrosion but have retained adequate structural integrity may often be repaired instead of replaced. Preventive maintenance is usually more cost effective and less disruptive than replacement, maximizes the useful life of the pipeline, and thereby optimizes lifecycle cost. Pipes that have experienced extensive corrosion and do not have adequate structural integrity should be replaced. In addition, the smaller diameter pipelines throughout the

service area should be replaced with 8-inch diameter pipelines to provide additional supply and fire flow demand capacity.

A system-wide condition assessment is also recommended to evaluate existing pipe conditions and to develop a prioritized replacement program. The program may involve internal and external corrosion evaluations to determine when to replace certain pipelines.

8.0 CAPITAL COSTS OF RECOMMENDED IMPROVEMENTS

The estimated probable capital costs for the recommended water system improvements to serve Hickman's existing condition are presented in Table 7. The capital costs are presented in March 2010 dollars at an Engineering News Record (ENR) construction cost index (CCI) of 9728.17 consistent with San Francisco. The costs include an estimate of 50 percent on the estimated construction cost to account for administration, design, and engineering costs and other contingencies. The costs for the facilities do not include costs for annual operation and maintenance, or costs for acquisition of rights-of-way.

9.0 EVALUATION OF BUILDOUT WATER SUPPLY SYSTEM

9.1 Overview

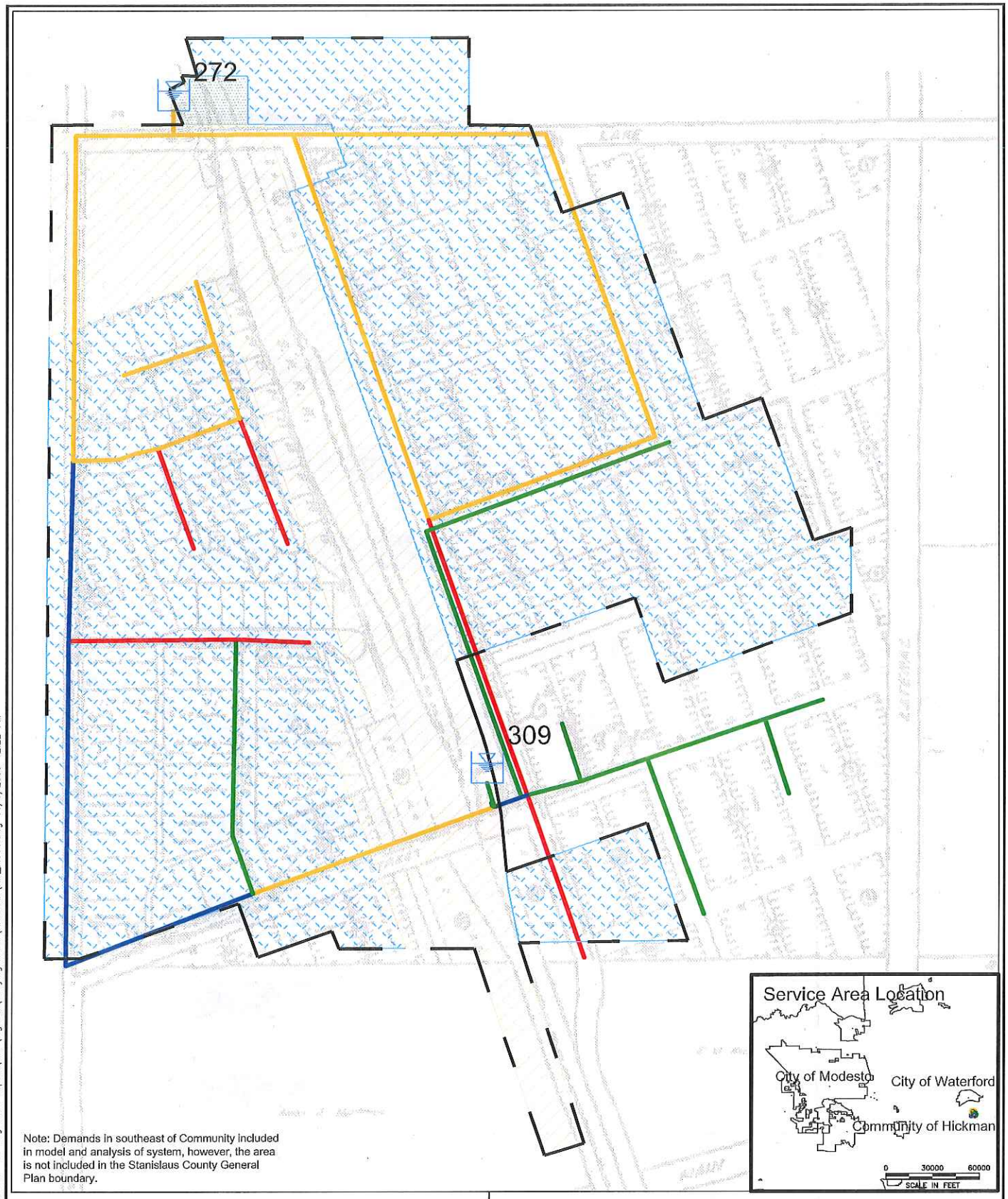
This section presents the hydraulic evaluation of the Hickman water distribution system and its ability to meet City of Modesto's recommended water system operational criteria under buildout demand conditions. The existing water distribution system was evaluated under Maximum Day, Peak Hour and Maximum Day with concurrent fire flow demand conditions.

9.2 Potable Water Demands

Although the Hickman water service area is approximately 90 percent built out, there will be some additional water demands on the system as buildout is completed. The 18 remaining acres available for buildout are designated as residential development; after development is completed, average day demand will increase by approximately 0.05 mgd. Therefore, the total future potable water demand under average day demand conditions will be 0.29 mgd. Using the same peaking factors of 2.27 and 3.79 that were applied to the evaluation of existing system capacity, demands for Maximum Day and Peak Hour flows are 0.66 mgd and 1.11 mgd, respectively.

9.3 Buildout Distribution System Evaluation

The same analyses and calculations that were conducted to evaluate the ability of the system to meet current demands were applied for the analysis of buildout conditions. Based on these analyses, buildout demands can be adequately met with construction of the previously recommended existing system improvements. However, to ensure adequate service for the Hickman service area customers, the City should consider developing a rehabilitation and replacement program for the service area's aging pipelines.



Note: Demands in southeast of Community included in model and analysis of system, however, the area is not included in the Stanislaus County General Plan boundary.

LEGEND:

- CITY WELL
- BOUNDARY BASED ON COUNTY GENERAL PLAN
- 4" PIPELINE
- 6" PIPELINE
- 8" PIPELINE
- 10" PIPELINE
- COMMERCIAL
- RESIDENTIAL
- PLANNED RESIDENTIAL

N

0 210 420
SCALE IN FEET

Figure 1

City of Modesto

COMMUNITY OF HICKMAN EXISTING SYSTEM WATER DISTRIBUTION SYSTEM

WEST YOST ASSOCIATES
Consulting Engineers

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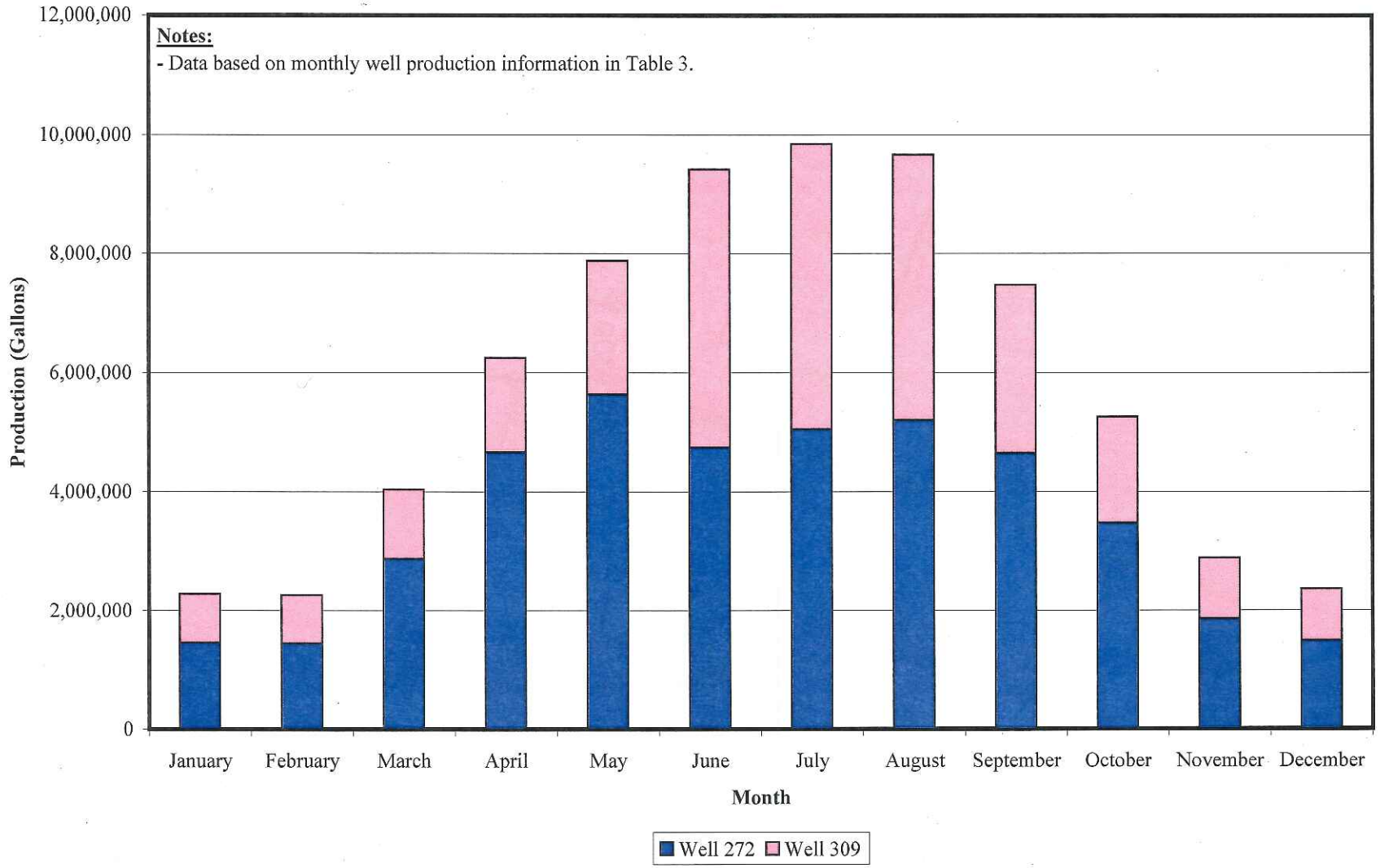
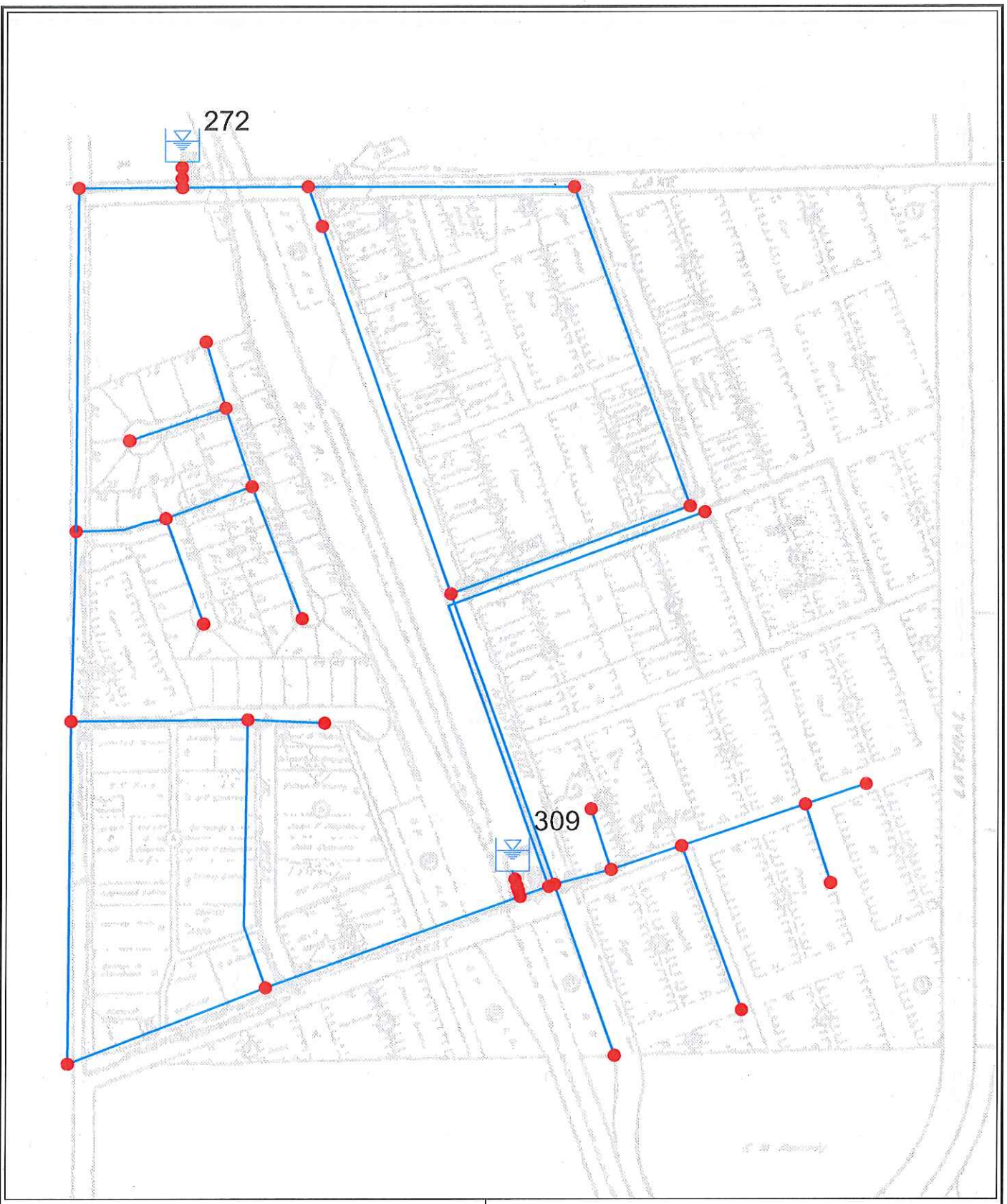
Figure 2. Town of Hickman - Monthly Production by Well (2008)





LEGEND:

- CITY WELL
- PRESSURES BELOW 40 PSI
- PRESSURES BETWEEN 40 & 50 PSI
- PRESSURES BETWEEN 50 & 60 PSI
- PRESSURES BETWEEN 60 & 70 PSI
- PRESSURES ABOVE 70 PSI

N

0 200 400
SCALE IN FEET

Figure 3

City of Modesto

COMMUNITY OF HICKMAN - PEAK HOUR PRESSURES W/ BOTH WELLS ON

WEST YOST ASSOCIATES
Consulting Engineers

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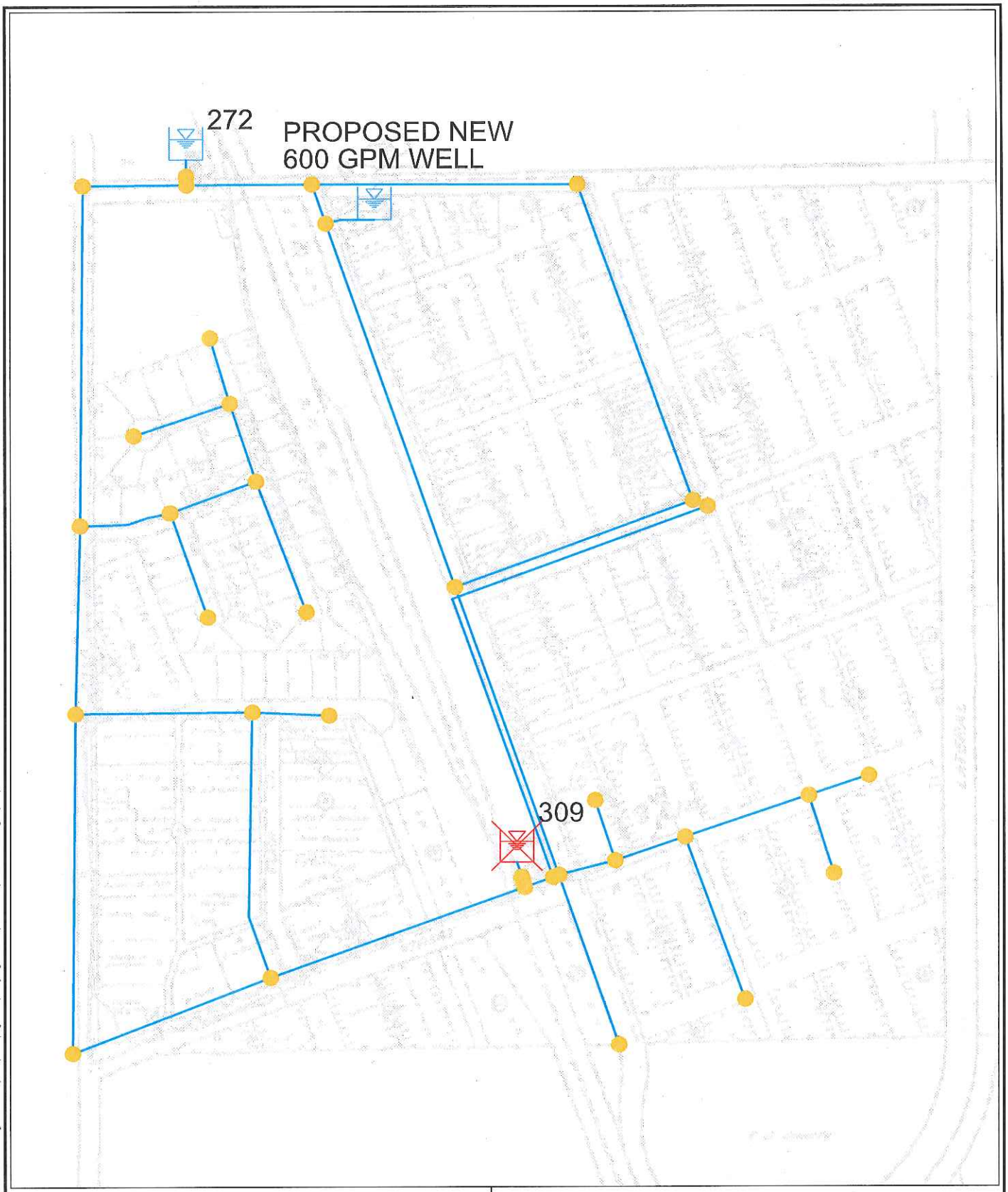

LEGEND:

- CITY WELL ONLINE
- CITY WELL OFFLINE
- PRESSURES BELOW 40 PSI
- PRESSURES BETWEEN 40 & 50 PSI
- PRESSURES BETWEEN 50 & 60 PSI
- PRESSURES BETWEEN 60 & 70 PSI
- PRESSURES ABOVE 70 PSI

N

0 200 400
SCALE IN FEET

Figure 4

City of Modesto

COMMUNITY OF HICKMAN - PEAK HOUR PRESSURES W/ ADDITIONAL WELL

WEST YOST ASSOCIATES
Consulting Engineers

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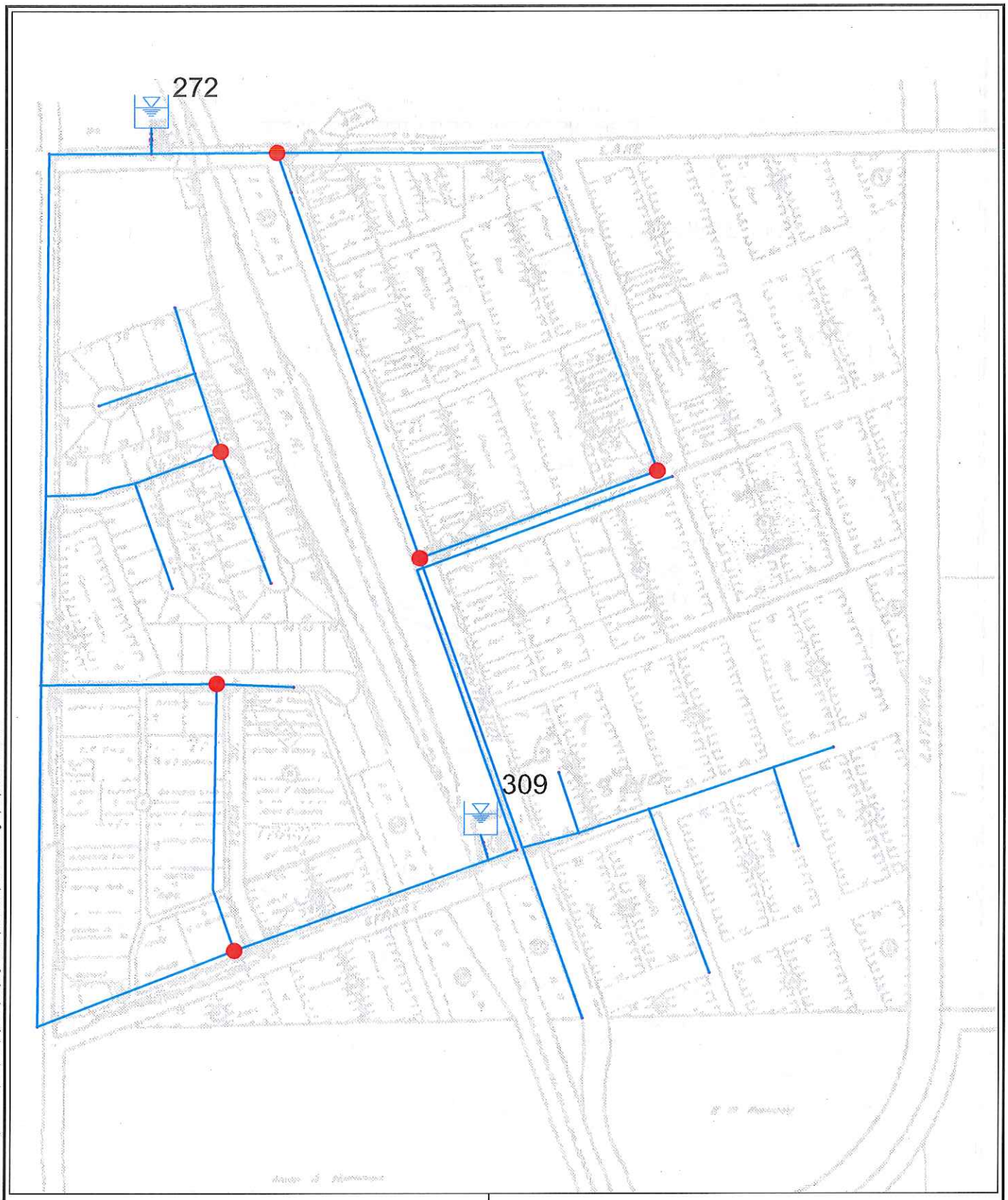

LEGEND:

- CITY WELL
- PRESSURES BELOW 20 PSI
- PRESSURES BETWEEN 20 & 30 PSI
- PRESSURES BETWEEN 30 & 40 PSI
- PRESSURES BETWEEN 40 & 50 PSI
- PRESSURES ABOVE 50 PSI

N

0 200 400
SCALE IN FEET

Figure 5

City of Modesto

COMMUNITY OF HICKMAN - EXISTING MAX DAY PLUS FIRE RESIDUAL PRESSURES

WEST YOST ASSOCIATES
Consulting Engineers

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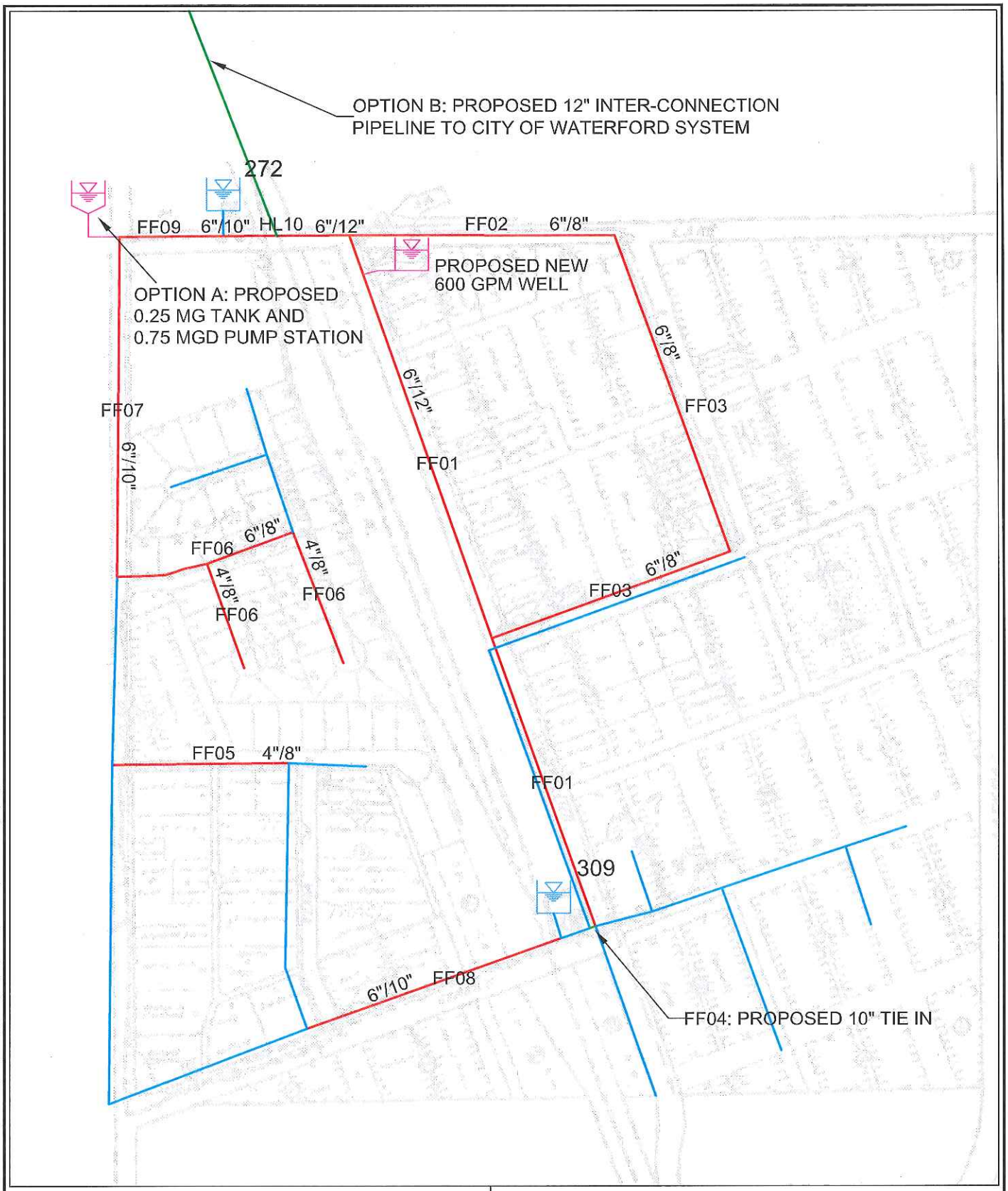

LEGEND:

- EXISTING CITY FACILITY
- PROPOSED CITY FACILITY
- EXISTING CITY PIPELINES
- 6"/8" EXISTING/RECOMMENDED PIPELINES
- RECOMMENDED NEW PIPELINE

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SCALE IN FEET

Figure 6
City of Modesto
COMMUNITY OF HICKMAN
EXISTING CIP RECOMMENDATIONS

WEST YOST ASSOCIATES
Consulting Engineers

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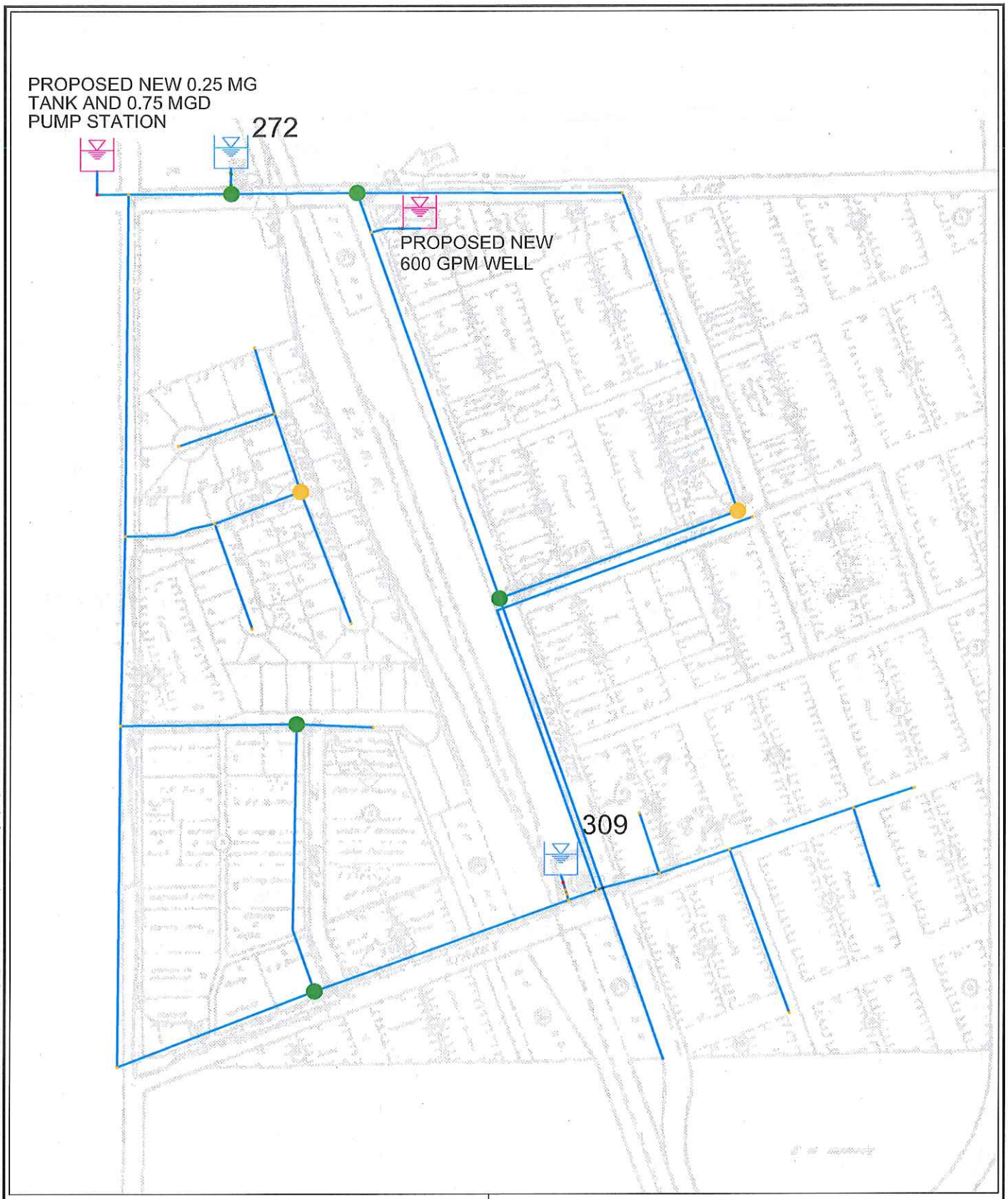

LEGEND:

- EXISTING CITY FACILITY
- PROPOSED CITY FACILITY
- PRESSURES BELOW 20 PSI
- PRESSURES BETWEEN 20 & 30 PSI
- PRESSURES BETWEEN 30 & 40 PSI
- PRESSURES BETWEEN 40 & 50 PSI
- PRESSURES ABOVE 50 PSI

N

0 200 400
SCALE IN FEET

Figure 7

City of Modesto

COMMUNITY OF HICKMAN - OPTION A: MAX DAY PLUS FIRE PRESSURES W/ NEW TANK

WEST YOST ASSOCIATES
Consulting Engineers

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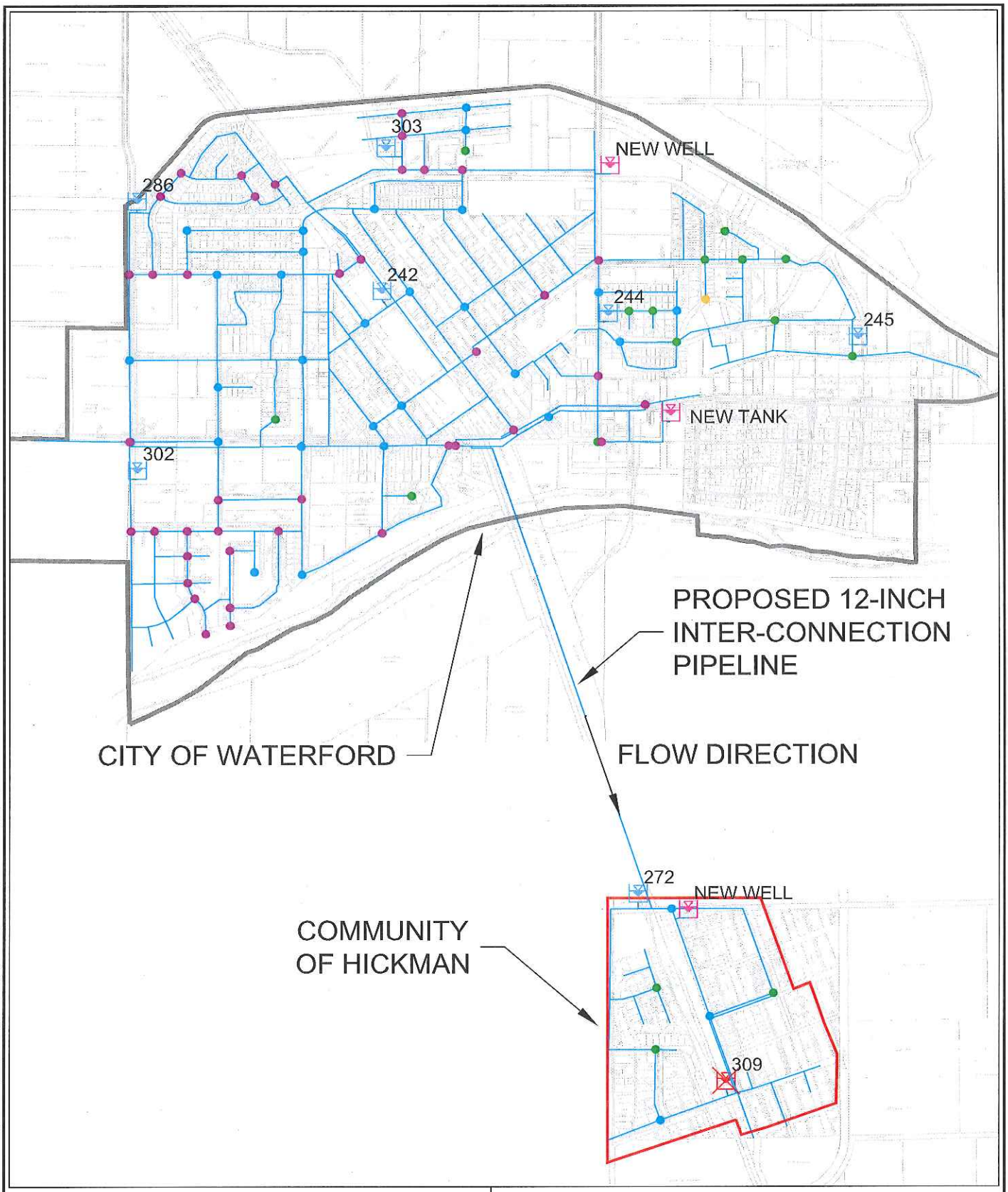

LEGEND:

- EXISTING CITY FACILITY
- PROPOSED CITY FACILITY
- PRESSURES BELOW 20 PSI
- PRESSURES BETWEEN 20 & 30 PSI
- PRESSURES BETWEEN 30 & 40 PSI
- PRESSURES BETWEEN 40 & 50 PSI
- PRESSURES ABOVE 50 PSI

N

0 200 400
SCALE IN FEET

Figure 8

City of Modesto

COMMUNITY OF HICKMAN - OPTION B:
MAX DAY PLUS FIRE RESIDUAL PRESSURES
W/ CONNECTION TO WATERFORD

WEST YOST ASSOCIATES
Consulting Engineers

O:\Clients\418 City of Modesto\02-07-22 Engineers Report\CAD\Figures\Outlying Areas\Hickman\HM_FIG08.dwg 9/10/2008 1:43 PM

ATTACHMENT A

Development of Hickman's Hydraulic Model

ATTACHMENT A. DEVELOPMENT OF HICKMAN'S HYDRAULIC MODEL

WYA developed a hydraulic model for the City of Modesto (City) of the Hickman Service Area (Hickman) using MWH Soft's H_2ONET hydraulic modeling software. The distribution system depicted in the City-provided AutoCAD file was replicated as pipe, junctions, wells, tanks, and pumps. In 2010, this model was converted to MWH Soft's InfoWater v7.0.

Modeling Assumptions and Criteria

Establishing computer modeling assumptions and criteria was important for the development of the model, calibrating and running the model, and interpreting the results of the computer runs. The assumptions and criteria that were used to develop Hickman's water distribution system hydraulic model are described below:

- A minimum pipe size of 4 inches was modeled.
- Information on pipe length, diameter, material type and age was extracted from the City's existing Geographical Information System (GIS) and hard copy maps.
- Pipe roughness coefficients, "C" values (C-factors), were assigned based on age (if available) and pipe material.
- Pump station piping configurations, performance curves, and motor size information were acquired from "as-built" plans and interviews with City Operational staff.
- Pipe length accuracy was assumed to be ±25 feet.
- Ground surface elevations were estimated using available digital topographic maps and surveyed benchmark elevations. Elevations were estimated to the nearest foot where spot elevations were not available.
- The water demands in the model were expressed in gallons per minute (gpm).

Peaking Factors

Maximum day and peak hour demand factors were calculated using data provided by the City. The maximum day peaking factor was developed based on a 5-year average from 2003 through 2007, as shown in Table 1. The peak hour peaking factor was developed based on a 2-year average from 2006 through 2007, as shown in Table 2.

Table 1. Maximum Day Demand Peaking Factor

Year	Date	Max Day, gpd	Average Day, gpd	Peaking Factor
2003	08/09/03	482,123	232,611	2.07
2004	07/15/04	470,481	235,629	2.00
2005	07/29/05	465,064	241,204	1.93
2006	06/25/06	564,157	173,321	3.25
2007	07/06/07	394,938	188,221	2.10
Average				2.27

Table 2. Peak Hour Demand Peaking Factor

Year	Date	Peak Hour, gpm	Average Day, gpm	Peaking Factor
2006	06/25/06	563	120	4.68
2007	07/06/07	379	131	2.90
Average				3.79

Model Development

Node elevations were automatically computed using U.S. Geological Survey Digital Elevation Models (DEM). Pipelines were assigned C-factors based on material types and age as indicated by City Operations staff and range from 135 to 100.

The water surface elevation for both existing wells were modeled as fixed-grade reservoirs, with water surface elevations equal to active water pumping levels as reported in City pump tests. Well pumps were modeled with design point curves as presented in Table 3. Flow and head data points are based on observed flow and computed total dynamic head from City pump tests.

Both wells have variable frequency drives (VFDs) to control system pressure. To simulate these VFD's, pumps are modeled with different speed settings to match system pressure settings provided by the City.

Table 3. Well Model Characteristics

Well	Diameter, in	Modeled with Design Point Curve	
		Head, ft	Flow, gpm
272	6	237.6	201
309	8	244.2	449

Demand Allocation

MWH Soft H_2ONet and InfoWater allow the definition of multiple demand fields at a single node to represent different use classes or demand types. Existing system demands are modeled in Field 10 and incremental future demands are modeled in Field 9.

Existing System Demands

Metered/Unmetered Residential Customers: The Hickman Service Area is mainly composed of residential land use. Because Hickman is close to fully developed, all parcels were assigned equal demand. The unit demand per parcel is the total consumption (0.24 mgd average day) divided by number of parcels (183), or 0.91 gpm per parcel. Parcels, and their associated demand, were aggregated to the nearest model junction nodes to develop the base average day demand set.

Unaccounted-For-Water: The City has determined Unaccounted-For-Water is approximately 15 percent of total production system-wide. Unaccounted-For-Water was assumed to be uniformly lost throughout the distribution system, and therefore was combined for allocation purposes with the residential unmetered component.

Fire: The Hickman Service Area has mainly residential land use. There are no other significant amounts of other land uses. A fire demand of 1,500 gpm for a 2-hour duration was used in this analysis for all hydrants in the system.

Future Demands

Approximately 18 acres of in-fill development is anticipated in the Hickman service area, with an associated average daily demand of 30 gpm. Maximum day and peak hour (see Table 4 in the TM for factors) demand sets were calculated by applying the appropriate factors to the average day demands. These demands were assigned in demand field 9 in the model demand table, with an associated designation of 'Infill.'

Scenarios

The scenarios modeled are shown in Table 4.

Table 4. Model Scenarios

Scenario	Description	Definition
EX_AD	Average Day Scenario	Model of average day demand condition
EX_MD	Maximum Day Scenario	Model of maximum day demand condition
EX_MDFF	Maximum Day plus Fire Flow Scenario	Model of the maximum day demand plus 1,500 gpm fire flow demand condition
EX_PH	Peak Hour Scenario	Model of peak hour demand condition
EX_CIP	Recommended Pipe Replacements for CIP	Model of maximum day plus fire flow demand condition with recommended improvements to meet the minimum design criteria
CIP_PHBO	Recommended Pipe Replacements for CIP	Model of future peak hour demand condition with recommended improvements to meet the minimum design criteria

Data Sets

The Data Sets contained in the model are shown in Tables 5 through 8.

Table 5. Demand Sets

Demand Set	Description	Definition
EX_AD	Average Day Demand Set	Existing average day demand condition
EX_MD	Maximum Day Demand Set	Existing maximum day demand condition
EX_MDFF	Maximum Day w/ Fire Flows	Existing maximum day plus fire flow demand condition
EX_PH	Peak Hour Demand Set	Existing peak hour demand condition
BO_PH	Peak Hour Demand Set	Buildout peak hour demand condition

Table 6. Pipe Sets

Pipe Set	Description	Definition
BASE	Existing Water System	Existing system configuration
PH_CIP	CIP Recommendations for Peak Hour demand	Recommended improvements for peak hour demands
EX_CIP	CIP Recommendations	Recommended system configuration improvements

Table 7. Fire Flow Sets

Fire Flow Set	Description	Definition
FF_1500	Fire Flow at Hydrant Nodes	Includes the fire flow required at each hydrant node

Table 8. Control Sets

Control Set	Description	Definition
EX-AD	Average Day Controls	Existing average day demand controls
EX-MD	Maximum Day Controls	Existing maximum day demand controls
EX-MDFF	Maximum Day with Concurrent Fire Flow Controls	Existing maximum day with concurrent fire flow demand controls
EX-PH	Peak Hour Controls	Existing peak hour demands controls
CIP_PH	Peak Hour Controls	Existing peak hour demand controls with CIP improvements
EX-CIP	Existing CIP Controls	Existing system CIP recommended controls

Calibration

WYA attempted to perform a very limited calibration of the hydraulic model based on data from a single hydrant test provided to WYA by the City. Unfortunately, this data was not adequate to determine a pipeline "C-factor."

Brown AND Caldwell

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Davis, California 95618
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Fax: 530-297-7148

Technical Memorandum

Prepared for: City of Modesto

Project Title: Hickman Test Well

Project No: 142339

Technical Memorandum No. 1

Subject: Test Well Report

Date: September 6, 2012

To: Robert F. Christensen, P.E., Senior Civil Engineer

From: Ken Worster

Prepared by: _____

Kenneth W. Worster, PE, Brown and Caldwell
California License No. AG474, Exp: 09/30/2012

PROFESSIONAL ENGINEER
KENNETH W. WORSTER
AG000474
EXP. 9/30/12
AGRICULTURAL
STATE OF CALIFORNIA

Reviewed by: _____

Robert A. Beggs, PE, Brown and Caldwell
California License No. C 46503, Exp: 06/30/2013

Limitations:

This document was prepared solely for City of Modesto in accordance with professional standards at the time the services were performed and in accordance with the contract between City of Modesto and Brown and Caldwell dated January 24, 2012. This document is governed by the specific scope of work authorized by City of Modesto; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by City of Modesto and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.

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1. Background/Objectives

The City of Modesto (City) retained Brown and Caldwell (BC) to provide engineering and field services to assess construction feasibility for a new municipal well on vacant property located at 910 Hickman Road in the community of Hickman, California (Hickman site). The proposed well will enhance the community's groundwater production reliability by supplementing two existing Hickman water supply wells. Attachment A shows the location of the Hickman test well site. The City would like the proposed groundwater well to produce a minimum of 600 gallons per minute (gpm) and meet State of California Title 22 drinking water quality requirements.

2. Hydrogeological Setting

Lying just south of the Tuolumne River, the community of Hickman is located on the northern border of the Turlock Subbasin (Groundwater Basin Number 5-22-03), which is a part of the larger San Joaquin Valley Groundwater Basin. The Turlock Subbasin lies between the Tuolumne and Merced Rivers and is bounded on the west by the San Joaquin River and on the east by basement rock of the Sierra Nevada mountain range.

Relatively-shallow water-bearing formations beneath Hickman consist of unconsolidated deposits that are comprised of continental deposits, older and younger alluvium, and flood-basin deposits. The primary water-yielding formations are the unconsolidated continental and older alluvium deposits.

Hickman Well No. 272 is located at 13127 Lake Road in on the north edge of the community and was constructed in 1961 using the cable tool drilling method. Well No. 272 was constructed by installing 14-inch diameter blank casing to a depth of 104 feet and then drilling below the casing to a reported depth of 332 feet. The well has an uncased open bore hole from 104 feet to the well bottom. It is equipped with a 30 horsepower well pump that produces approximately 200 gpm.

Hickman Well No. 309 is located at 2307 Brier Road and was constructed in 1993 by the cable tool drilling method. Well No. 309 was constructed to a depth of 176 feet with 24-inch diameter and 18-inch diameter casing. The 24-inch diameter casing is cemented in place to a depth of 92 feet and serves as the well's surface annular seal. The well is equipped with a 40 horsepower well pump that produces approximately 440 gpm. Well No. 309 wellhead equipment includes a charcoal filter used to reduce the concentration of hydrogen sulfide gas.

3. Drilling Method and Samples Descriptions

The City contracted with Dan's Water Well & Pump Service, Inc. (DWWPS) of Livermore, California, (California Well Driller's License # 892546 C57) through the public bid process to conduct mud rotary drilling and depth-specific water sampling activities at the Hickman site.

DWWPS mobilized to the site in early March 2012 and secured the work area with a cyclone fencing perimeter. After all other rig-up activities were completed, test hole drilling began. DWWPS used a portable tank equipped with a shaker-sander unit to manage the drilling fluid, to remove drill cuttings from the drilling fluid and to acquire formation samples as drilling progressed. The drilling rig and supporting equipment are shown in Photo 1. Test hole drilling was completed on March 19, 2012.

The driller collected representative formation samples from recovered drill cuttings, which included grab soil samples every 10 feet to the total borehole depth of 615 feet. Sample analysis provided information from which to develop lithologic descriptions. Sieve analyses provided information to determine formation gradation characteristics. Attachment B includes a description of the drilled formations and the formation

sieve analysis results. Formation lithologies were predominantly brown and gray sandy clays. The formations changed in color from brown to gray at an approximate depth of 110 feet.

Photo 1. Test Well Drilling Equipment

4. Geophysical Logs

On March 19, 2012, DWWPS retained Welenco of Bakersfield, California, to conduct geophysical logs that included a spontaneous potential and 16-inch/64-inch resistivity log.

- The spontaneous potential (SP) log measures the difference in direct current (DC) millivolts between an electrode in the test hole and one at the surface. When the drilling fluid in the test hole is less mineralized than the formation water, a negative SP occurs opposite water-bearing formations. When the formation water is less mineralized than the drilling fluid in the test hole, a positive SP occurs. The SP log for the Hickman test hole remained relatively stable throughout the test hole with a positive SP.
- The resistivity logs measure current loss (resistivity) between electrodes spaced 16 inches and 64 inches apart. The shape of the investigated area as the electrodes are lowered into the test hole is a sphere with a diameter equal to the electrode spacing. The 16-inch electrode spacing measures the resistivity of the near-hole zone invaded by drilling fluid and the 64-inch electrode spacing measures resistivity of the

invaded zone and the zone where native groundwater is present. High resistivity indicates sand/gravel formations, and lower resistivity indicates silt and clay formations. The resistivity logs for the Hickman test hole indicated that most of the homogeneous sand/gravel formations are located between the depths of 205 to 465 feet. Below the depth of 465 feet, the formations were predominately gray clay with intermixed sand and gravel. The Hickman site geophysical log is presented as Attachment C.

5. Depth-Specific Water Sampling and Results

DWWPS obtained depth-specific water samples from the test hole using the "pullback" method. The "pullback" sampling method requires construction of a small-diameter temporary well. Well pipe is lowered into the test hole with a perforated section of well pipe positioned next to the water-bearing formation of interest. The isolated water sample is captured by gravel packing the annulus at the perforated interval and placing bentonite pellet seals in the annulus above and below the perforations. The sampling pipe is shown in Photo 2. The driller develops the temporary well by air-lifting and pumping, and then takes a water sample after achieving the desired turbidity. As recommended by BC, DWWPS took five water samples from the depth intervals of 550 to 570 feet, 430 to 450 feet, 350 to 370 feet, 300 to 320 feet, and 220 to 240 feet. The water samples were obtained by the City and submitted to BSK Associates Laboratory of Fresno, CA, for a Title 22 analyses.

Photo 2. 4-inch-diameter Sampling Pipe

Table 1 lists specific constituents from the Hickman test well sampling and the applicable State of California, Department of Public Health (CDPH) maximum contaminant level (MCL). The concentrations of arsenic, nitrate and radiological uranium at all sampling depths are below the CDPH MCL. The concentration of total manganese in the deepest sampling depth and the total and dissolved manganese in the two shallowest sampling depths exceeds the CDPH MCL. To determine the dissolved manganese concentration, the laboratory filters the water sample through a 0.45 micron membrane filter to remove most of the particulate and colloidal manganese. Generally, the dissolved manganese concentration better represents the true manganese concentration when a relatively high amount of turbidity is present in the water sample. The iron concentration was only above the MCL in the deepest test interval. Complete State of California Title 22 water quality results for each depth-specific sample are provided as Attachments D, E, F, G and H.

Table1. Depth-Specific Water Quality Results

Chemical	Results by Depth, ft					MCL
	220 to 240	300 to 320	350 to 370	430 to 450	550 to 570	
Arsenic (µg/L)	ND	ND	ND	ND	ND	10
Total Manganese (µg/L)	83	61	62	ND	61	50
Dissolved Manganese (µg/L)	74	53	41	--	--	--
Total Iron (µg/L)	200	190	490	ND	390	300
Dissolved Iron (µg/L)	ND	ND	ND	--	--	--
Nitrate as NO3 (mg/L)	ND	ND	ND	ND	ND	45
Uranium (µg/L)	ND	ND	ND	ND	ND	--
Uranium –radiological (pC/L)	<0.67	<0.67	<0.67	<0.67	<0.67	20
Turbidity (NTU)	3.6	3.4	5.8	0.26	2.0	5

Notes:

µg/L is micrograms per liter; mg/L is milligrams per liter, NTU is net turbidity units

Results above MCL are in shaded cells.

The test zones located from 350 to 370 feet and from 430 to 450 feet appear to be the only test zones that comply with all CDPH MCLs and are included in the proposed well design's recommended screened interval (see Table 2 in Section 6). The MCL-exceeding total manganese and iron concentrations associated with the 350 to 370 foot sample zone are likely attributable to the water sample's high turbidity, 5.8 NTU, and thus, the dissolved values are more representative of actual concentrations. The two shallowest test zones were excluded from the proposed well design because of MCL-exceeding concentrations of manganese. The deepest test interval was also excluded from the proposed well design because of the uncertainty of the manganese and iron concentrations, and because its production contribution would be relatively low since its composition is predominantly clay. Based on the available data, completing the production well into these two zones should result in a high capacity well with no treatment required.

After the water samples were obtained, the test well was destroyed by filling the bore hole with sand cement grout from the ground level to a depth of 615 feet. A State of California Well Completion Report for the test well and its destruction is provided as Attachment I.

6. Proposed Well Design

Recommended well construction design details for the Hickman well are provided below and are based on the Hickman Test Well depth-specific water quality results, test hole formation samples, and geophysical logs. A cost estimate for the recommended well construction design, including its development and testing, is also provided below.

The inclusion of a 4-inch-diameter auxiliary access pipe with the well construction is recommended because it will enable the City to perform the following activities without having to remove the well pump and motor:

- **Water-Level Sounding:** Continual water-level sounding can be performed without interference from the pump or the pump's column pipe.
- **Well TV Surveying:** Periodic well TV inspections can be used to assess the condition of the well casing below the pump. This feature will provide the City with the ability to examine the condition of the casing perforations in order to develop a well rehabilitation maintenance schedule.
- **Depth Specific Sampling:** If, in the future, an undesirable water quality constituent is discovered in the well water, the City can perform depth-specific sampling to pinpoint the location and concentration of the chemical entering the well.
- **Flow Profile Logging:** The City can determine the well's flow profile characteristics when the well first operates. The City can perform periodic flow profiling to monitor the production from depth intervals within the well screen. This information would allow the City to address any production loss through proactive rehabilitation activities.
- **Aquifer Storage and Recovery (ASR):** The City can insert lightweight, easily removed, drop piping into the access pipe to prevent air entrainment when injecting ASR water.

Table 2. Well Design Recommendations

Surface Casing	30 inch diameter by 50 feet deep (cemented within a minimum 36–inch-diameter borehole)
Well Borehole	28 inch diameter to 484 feet
Blank Corrosion-Resistant Casing	14 inch diameter with 5/16-inch wall thickness +2 to 352 feet 464 to 474 feet
Casing Bottom Cap	474 feet
Louvered Corrosion-Resistant Well Screen	14 inch diameter with 5/16-inch wall thickness 352 to 464 feet
Gravel Feed Tube	4 inch internal diameter from +2 to 320 feet
TV Survey/Sounding Access Pipe	4 inch internal diameter from +2 to 340 feet (entry location from 340 to 347 feet)
Gravel Filter Pack	300 to 484 feet 8 x 16 gradation
Cement Annular Surface Seal	0 to 300 feet
Test Pump	1200 gpm @ 400 feet, TDH

6.1 Estimated Capital Cost for Hickman Well

The estimated capital cost for the Hickman Well has been calculated using the following sources, design features and assumptions.

1. The well construction cost is based on recent bid results for similar projects in Northern and Central California.
2. The acquisition of two depth-specific water samples in the proposed well screen interval to confirm the concentrations of arsenic, manganese and iron prior to well construction is included.
3. Corrosion-resistant blank casing and well screen is recommended because of its durability.
4. The cement surface seal depth has been maximized to help prevent contamination from shallower aquifers.
5. Well screen depth interval is based on geophysical log results and formation samples.
6. A 14-inch-diameter casing is proposed because it will readily accommodate a 10-inch-diameter bowl assembly capable of producing 600 gpm.
7. An area of approximately 50 feet x 100 feet will be needed to construct the well. The final well site will also need space for future maintenance access.
8. Gravel pack gradation recommendation is based on the finest formation samples located from 350 to 360 feet, 420 to 430 feet, and 440 to 450 feet.
9. The drilling specifications will need to include detailed provisions for disposing development and test pumped water during well construction.

Table 3 presents the estimated capital costs for the Hickman Well. The construction costs include a contingency of 25%.

Table 3. Estimated Capital Costs for Hickman Well

Item	Construction	Cost (Thousand Dollars Engineering Legal, and Administrative	Total
Drill, develop and test pump water supply well	$355,000	$55,000	$410,000

7. Conclusions

Based on the information obtained from the test hole drilling, logging, and sampling activities, it appears that the City should be able to drill and develop a production well at the Hickman site capable of producing 600 gpm and meeting State of California Title 22 drinking water quality requirements. The proposed well design will provide the City with a long-term water supply, and the inclusion of the 4-inch-diameter access pipe in the well's construction will enable the City to monitor water quality and pumping characteristics on a proactive basis.

Attachment A: Site Location

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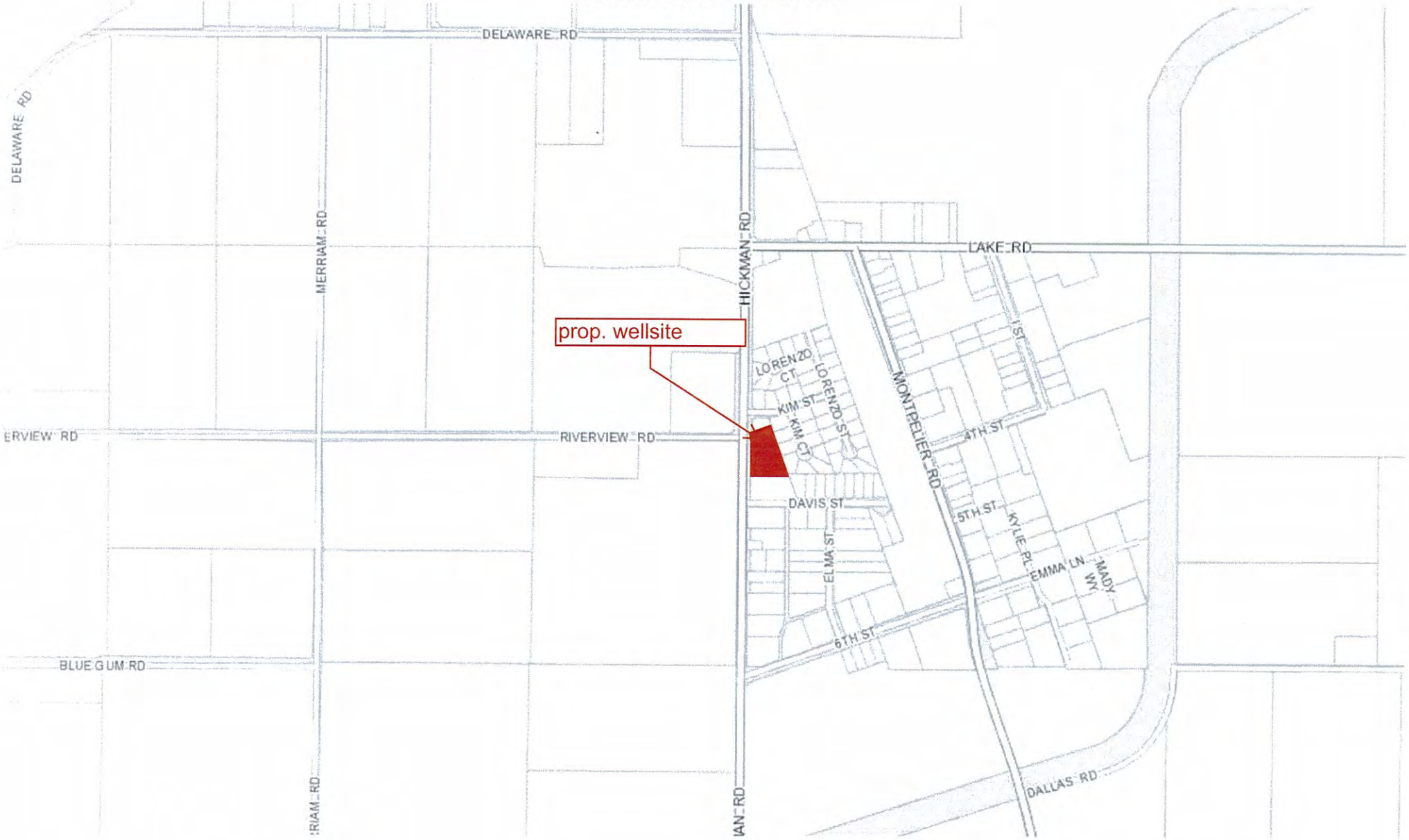
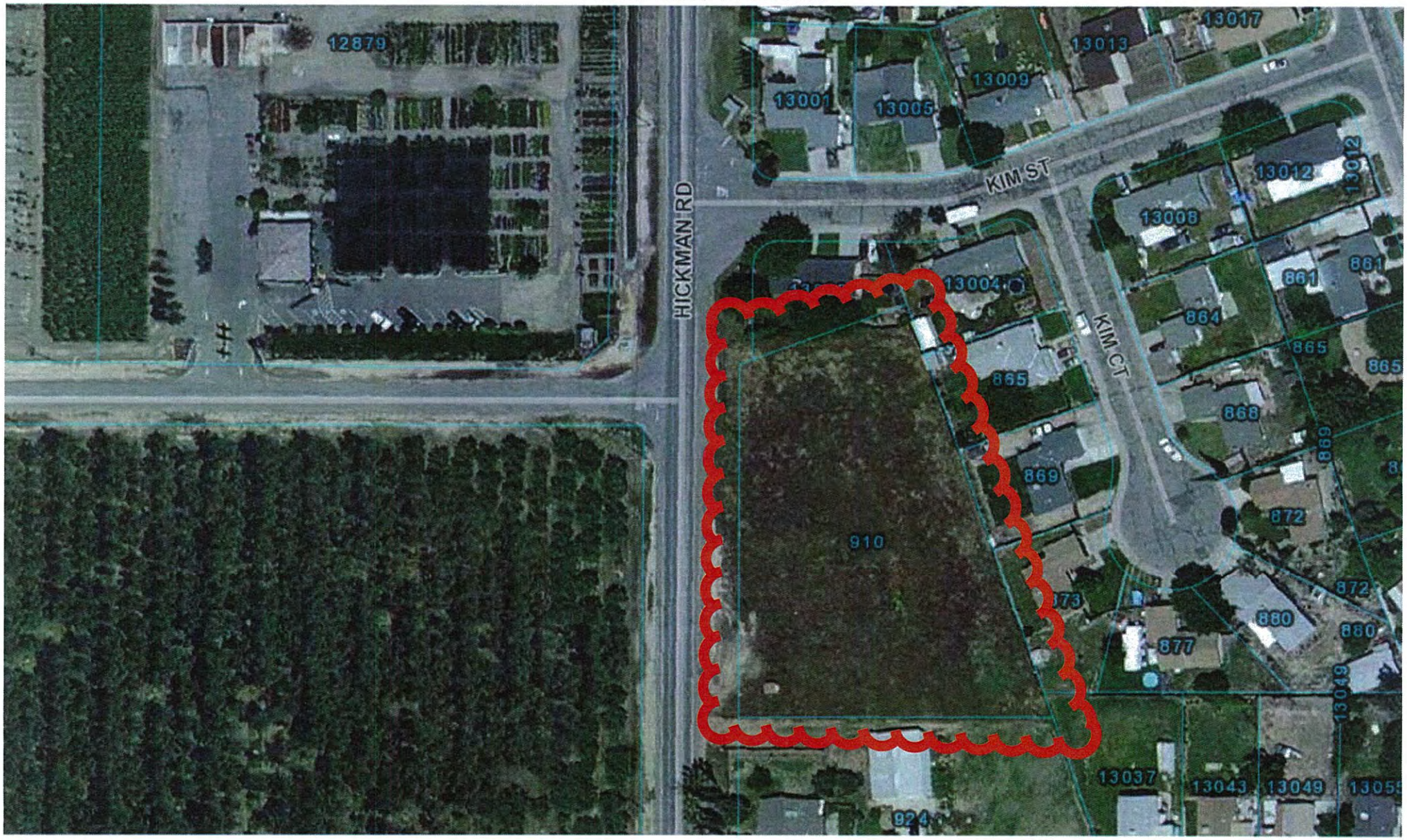
Hickman Wellsite



Hickman Wellsite



City of Modesto GIS

Attachment B: Formation Descriptions & Sieve Analysis

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HICKMAN TEST WELL
FORMATION DESCRIPTIONS

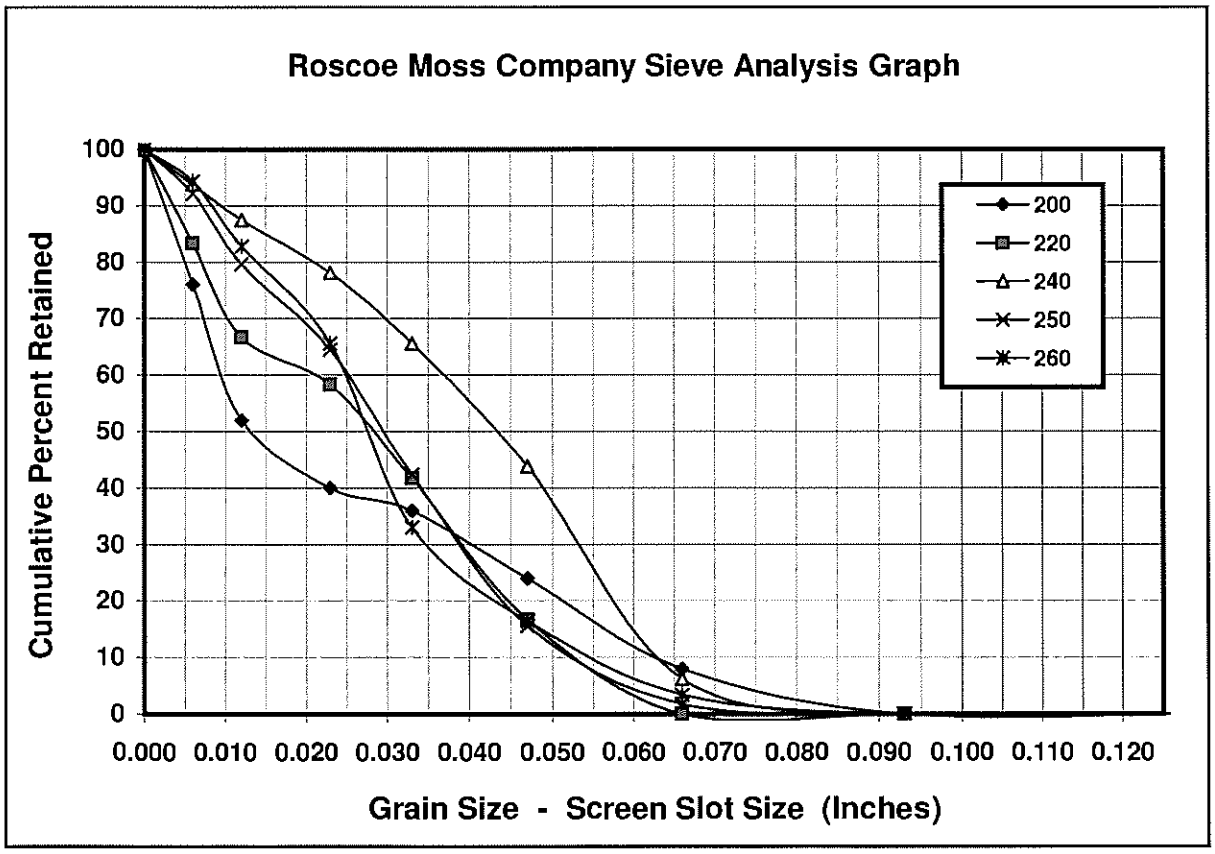
Depth (feet)	Description
0 – 100	brown sandy clay
100 – 110	brown sand and gravel with clay
110 – 120	brown and black sand and gravel with clay
120 – 140	gray and black sand and gravel with clay
140 – 150	gray clay with sand
150 – 160	gray sand and clay
160 – 180	gray sand and gravel and clay
180 – 200	gray clay with sand
200 – 210	no sample taken
210 – 230	gray clay with sand
230 – 240	gray sand and clay
240 – 250	gray/black clay with sand
250 – 260	gray sand with clay
260 – 270	gray sand and clay
270 – 280	gray clay with sand
280 – 300	gray sand and clay
300 – 310	gray sand with gravel and clay
310 – 340	gray sand and clay
340 – 360	gray clay with sand
360 – 380	gray sand with clay
380 – 400	gray clay with sand
400 – 420	gray sand and clay
420 – 430	gray clay with sand
430 – 440	gray clay with a little sand
440 – 450	gray sand and clay
450 – 460	gray sand with a little clay
460 – 470	gray clay with a little sand
470 – 480	gray sand and clay
480 – 490	gray clay
490 – 500	gray clay with a little sand
500 – 520	gray sand and clay
520 – 570	gray sand and gravel and clay
570 – 580	gray sand and clay
580 – 600	gray sand and gravel and clay

Roscoe Moss Company Sieve Analysis Report

Date: 23-Mar-12
Client: Dan's Water Well
Project: Hickman Test Well

pg1

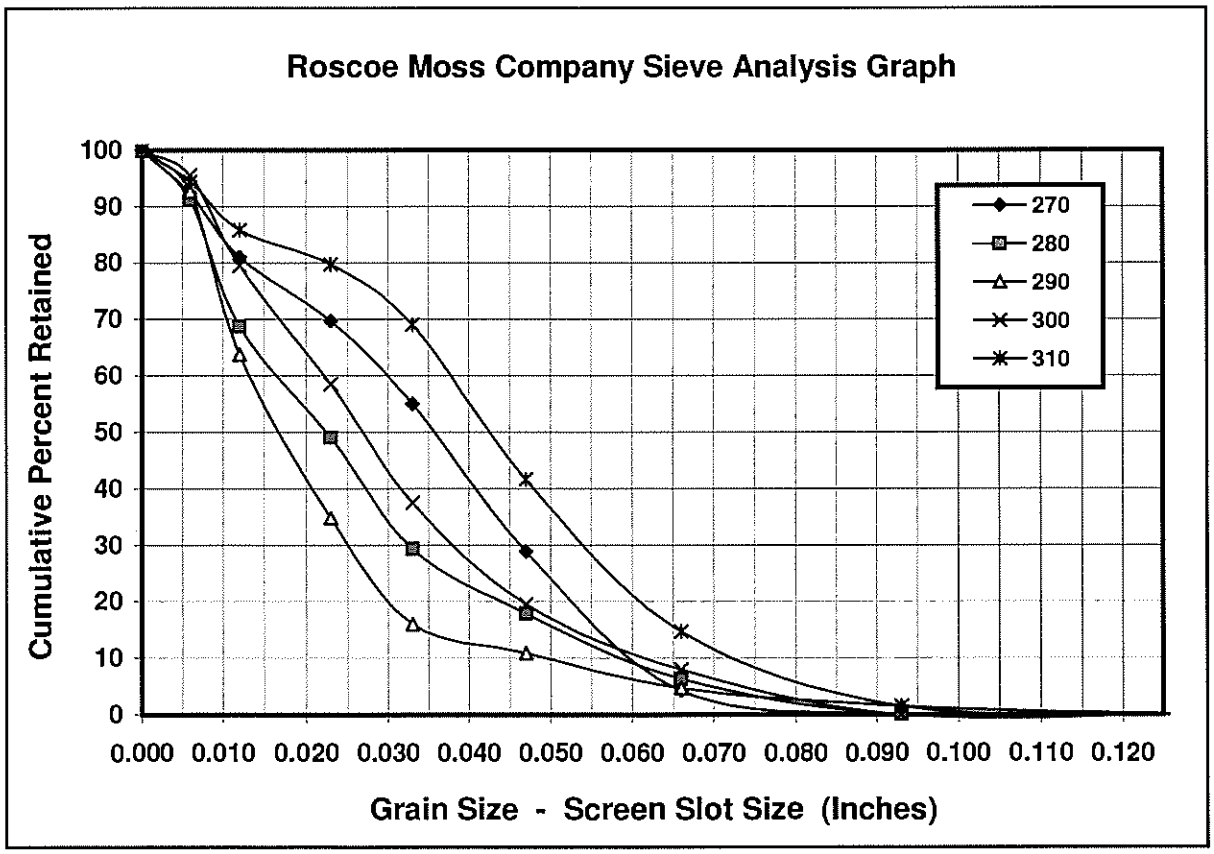
	Grain Size		Samples									
Sieve	Inches	mm	200		220		240		250		260	
			cum wt	%ret	cum wt	%ret	cum wt	%ret	cum wt	%ret	cum wt	%ret
4	0.187	4.7498	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.132	3.3528	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	0.093	2.3622	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	0.066	1.6764	2.0	8.0	0.0	0.0	2.0	6.3	4.0	1.7	9.0	3.4
16	0.047	1.1938	6.0	24.0	2.0	16.7	14.0	43.8	36.0	15.6	44.0	16.5
20	0.033	0.8382	9.0	36.0	5.0	41.7	21.0	65.6	98.0	42.4	88.0	33.0
30	0.023	0.5842	10.0	40.0	7.0	58.3	25.0	78.1	149.0	64.5	175.0	65.5
50	0.012	0.3048	13.0	52.0	8.0	66.7	28.0	87.5	184.0	79.7	221.0	82.8
100	0.006	0.1524	19.0	76.0	10.0	83.3	30.0	93.8	213.0	92.2	252.0	94.4
Par	0	0	25.0	100.0	12.0	100.0	32.0	100.0	231.0	100.0	267.0	100.0



Roscoe Moss Company Sieve Analysis Report

Date: 23-Mar-12
Client: Dan's Water Well
Project: Hickman Test Well pg2

	Grain Size		Samples									
Sieve	Inches	mm	270		280		290		300		310	
			cum wt	%ret	cum wt	%ret	cum wt	%ret	cum wt	%ret	cum wt	%ret
4	0.187	4.7498	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.132	3.3528	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	0.093	2.3622	0.0	0.0	0.0	0.0	3.0	1.6	0.0	0.0	3.0	1.5
12	0.066	1.6764	9.0	4.3	10.0	6.4	9.0	4.7	16.0	8.0	29.0	14.7
16	0.047	1.1938	61.0	28.9	28.0	17.8	21.0	10.9	39.0	19.5	82.0	41.6
20	0.033	0.8382	116.0	55.0	46.0	29.3	31.0	16.1	75.0	37.5	136.0	69.0
30	0.023	0.5842	147.0	69.7	77.0	49.0	67.0	34.7	117.0	58.5	157.0	79.7
50	0.012	0.3048	171.0	81.0	108.0	68.8	123.0	63.7	159.0	79.5	169.0	85.8
100	0.006	0.1524	195.0	92.4	143.0	91.1	179.0	92.7	191.0	95.5	186.0	94.4
Par	0	0	211.0	100.0	157.0	100.0	193.0	100.0	200.0	100.0	197.0	100.0

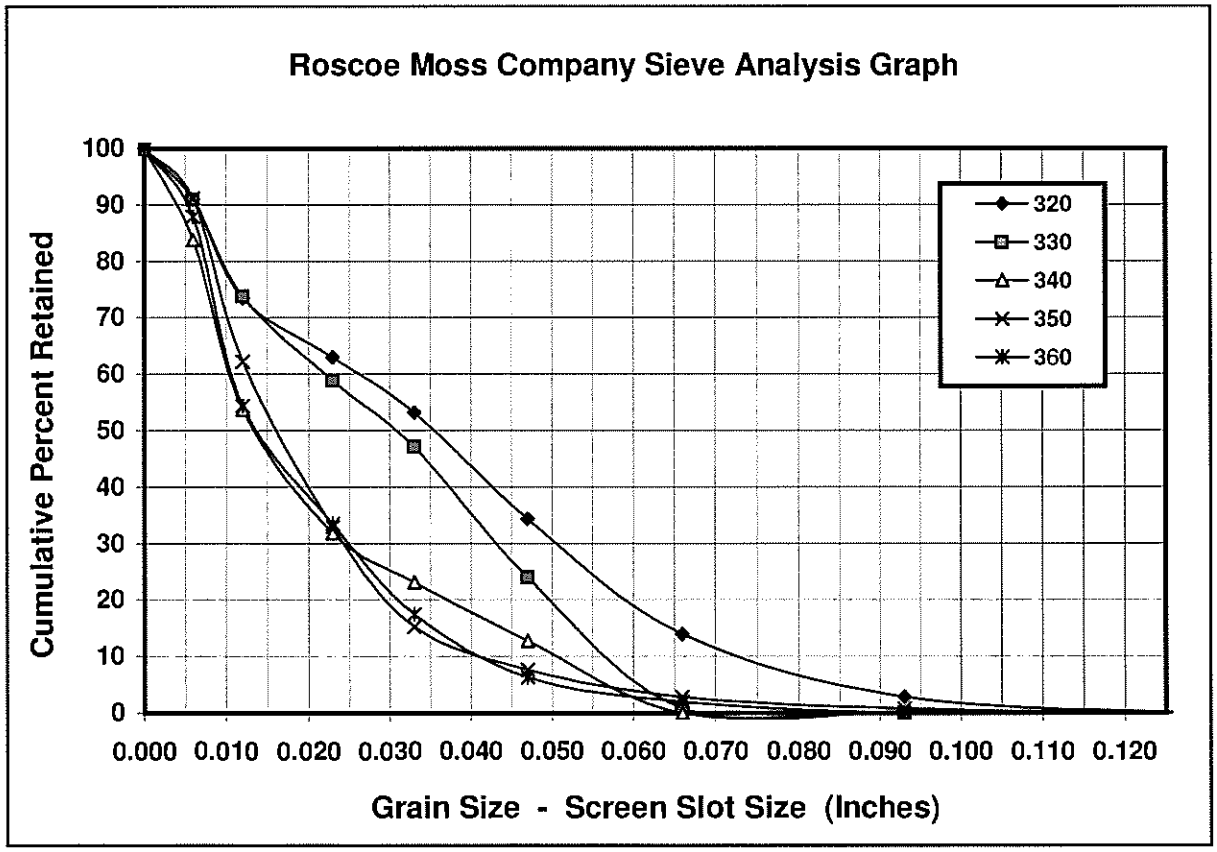


Roscoe Moss Company Sieve Analysis Report

Date: 23-Mar-12
Client: Dan's Water Well
Project: Hickman Test Well

pg3

	Grain Size		Samples									
Sieve	Inches	mm	320		330		340		350		360	
			cum wt	%ret	cum wt	%ret	cum wt	%ret	cum wt	%ret	cum wt	%ret
4	0.187	4.7498	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.132	3.3528	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	0.093	2.3622	4.0	2.8	0.0	0.0	0.0	0.0	2.0	0.8	0.0	0.0
12	0.066	1.6764	20.0	14.0	2.0	0.9	0.0	0.0	7.0	2.8	4.0	1.9
16	0.047	1.1938	49.0	34.3	53.0	24.0	22.0	12.7	19.0	7.6	13.0	6.3
20	0.033	0.8382	76.0	53.1	104.0	47.1	40.0	23.1	38.0	15.3	36.0	17.5
30	0.023	0.5842	90.0	62.9	130.0	58.8	55.0	31.8	82.0	32.9	69.0	33.5
50	0.012	0.3048	105.0	73.4	163.0	73.8	93.0	53.8	155.0	62.2	112.0	54.4
100	0.006	0.1524	130.0	90.9	201.0	91.0	145.0	83.8	227.0	91.2	181.0	87.9
Par	0	0	143.0	100.0	221.0	100.0	173.0	100.0	249.0	100.0	206.0	100.0

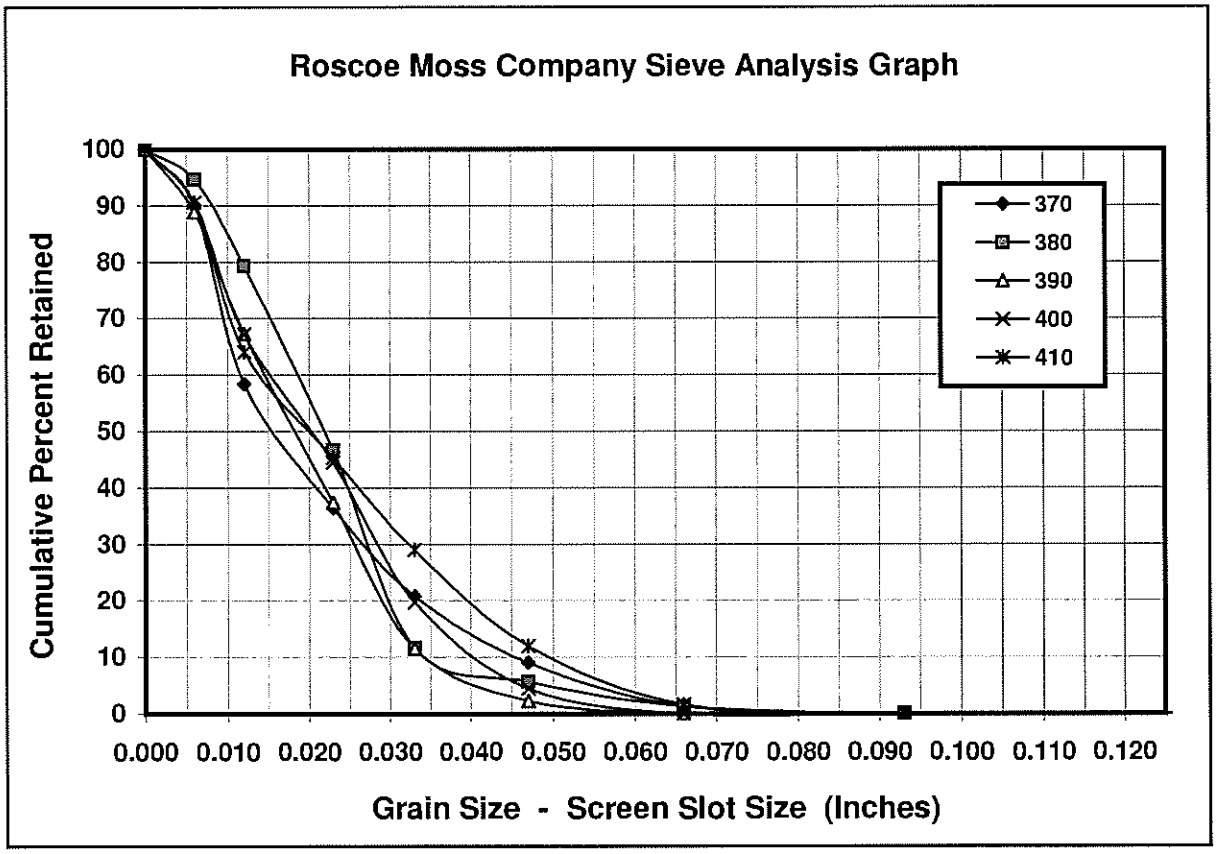


Roscoe Moss Company Sieve Analysis Report

Date: 23-Mar-12
Client: Dan's Water Well
Project: Hickman Test Well

pg4

	Grain Size		Samples									
Sieve	Inches	mm	370		380		390		400		410	
			cum wt	%ret	cum wt	%ret	cum wt	%ret	cum wt	%ret	cum wt	%ret
4	0.187	4.7498	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.132	3.3528	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	0.093	2.3622	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	0.066	1.6764	3.0	1.3	4.0	1.3	0.0	0.0	0.0	0.0	5.0	1.7
16	0.047	1.1938	21.0	9.1	17.0	5.7	5.0	2.3	10.0	4.5	36.0	12.0
20	0.033	0.8382	48.0	20.8	35.0	11.7	25.0	11.5	44.0	19.7	87.0	29.0
30	0.023	0.5842	84.0	36.4	140.0	46.7	81.0	37.3	99.0	44.4	136.0	45.3
50	0.012	0.3048	135.0	58.4	238.0	79.3	146.0	67.3	150.0	67.3	192.0	64.0
100	0.006	0.1524	208.0	90.0	284.0	94.7	193.0	88.9	202.0	90.6	272.0	90.7
Par	0	0	231.0	100.0	300.0	100.0	217.0	100.0	223.0	100.0	300.0	100.0

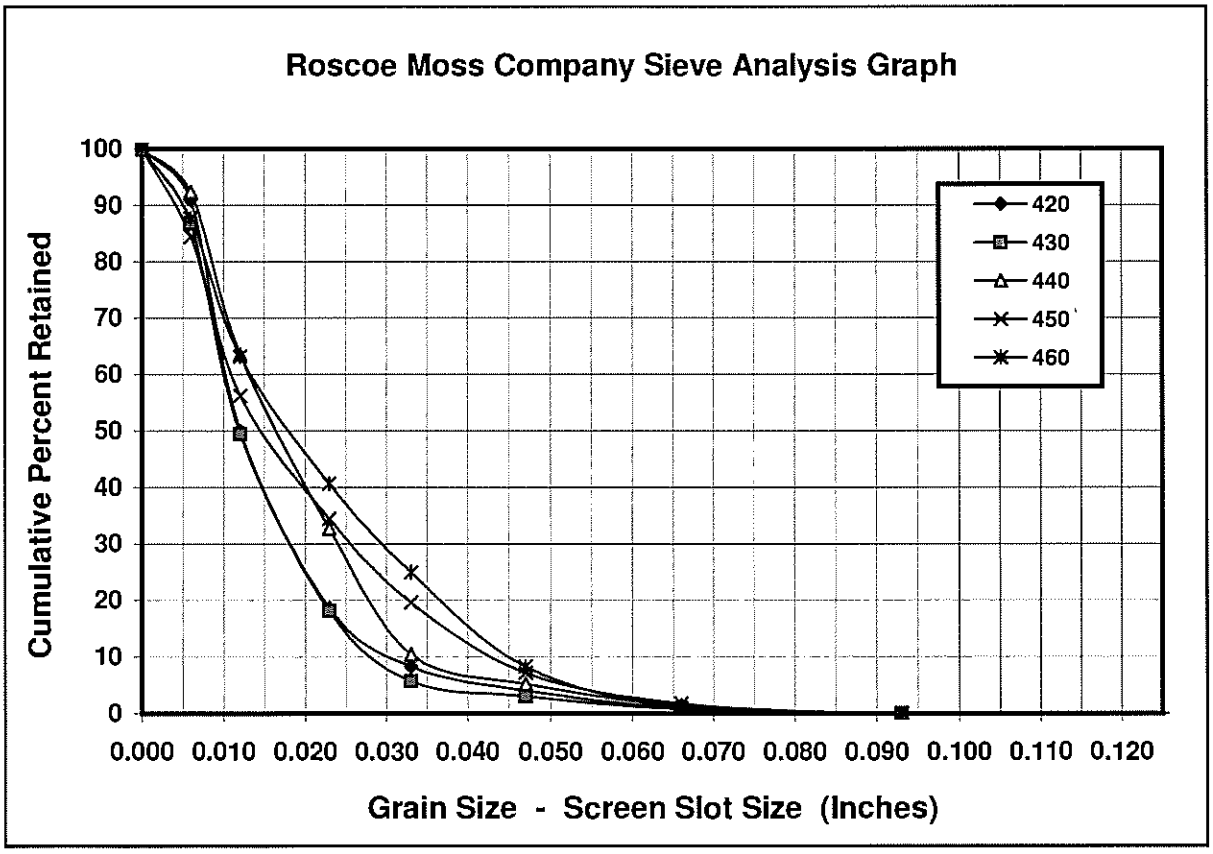


Roscoe Moss Company Sieve Analysis Report

Date: 23-Mar-12
Client: Dan's Water Well
Project: Hickman Test Well

pg5

	Grain Size		Samples									
Sieve	Inches	mm	420		430		440		450		460	
			cum wt	%ret	cum wt	%ret	cum wt	%ret	cum wt	%ret	cum wt	%ret
4	0.187	4.7498	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.132	3.3528	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	0.093	2.3622	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	0.066	1.6764	3.0	1.0	2.0	0.8	4.0	1.4	4.0	1.8	2.0	1.0
16	0.047	1.1938	12.0	4.0	8.0	3.0	15.0	5.2	16.0	7.1	17.0	8.3
20	0.033	0.8382	25.0	8.3	15.0	5.7	30.0	10.4	44.0	19.6	51.0	25.0
30	0.023	0.5842	56.0	18.7	48.0	18.1	94.0	32.6	77.0	34.4	83.0	40.7
50	0.012	0.3048	150.0	50.0	131.0	49.4	183.0	63.5	126.0	56.3	129.0	63.2
100	0.006	0.1524	273.0	91.0	230.0	86.8	266.0	92.4	189.0	84.4	179.0	87.7
Par	0	0	300.0	100.0	265.0	100.0	288.0	100.0	224.0	100.0	204.0	100.0

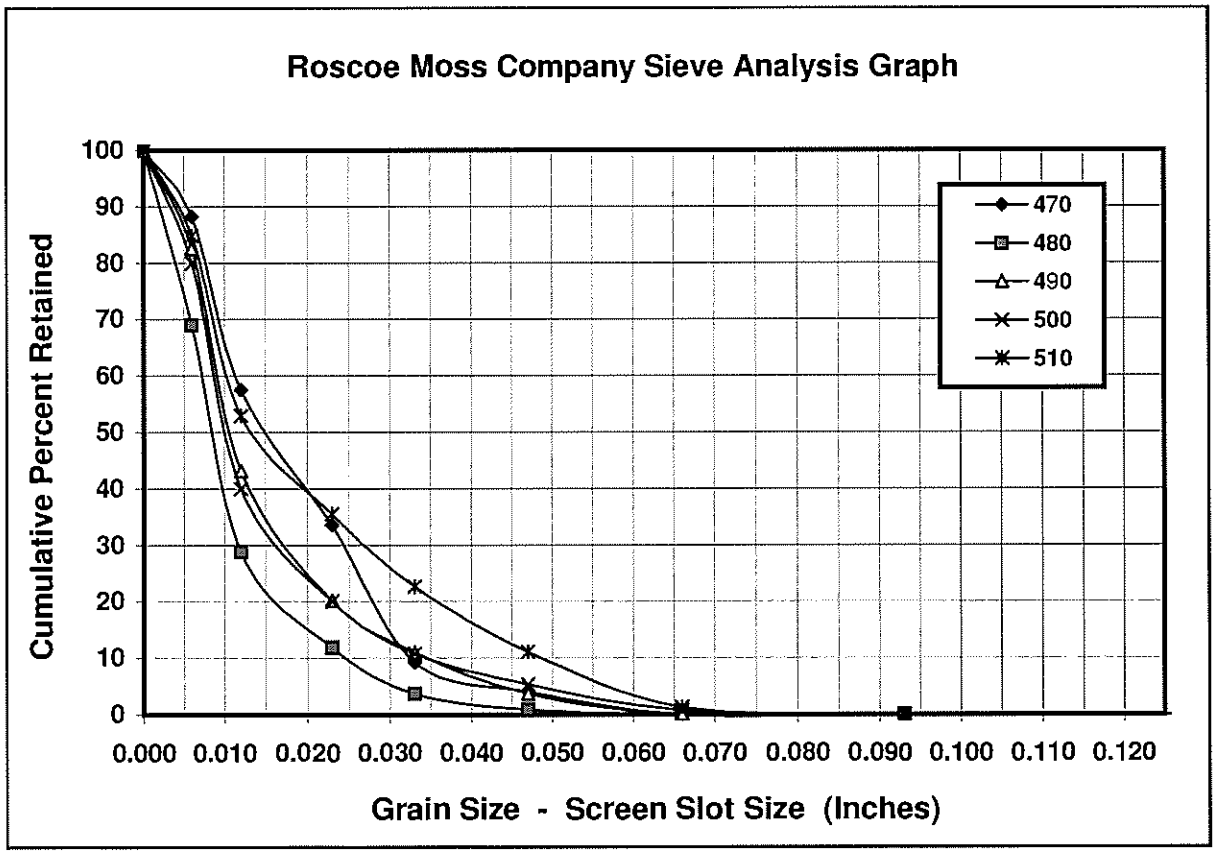


Roscoe Moss Company Sieve Analysis Report

Date: 23-Mar-12
Client: Dan's Water Well
Project: Hickman Test Well

pg6

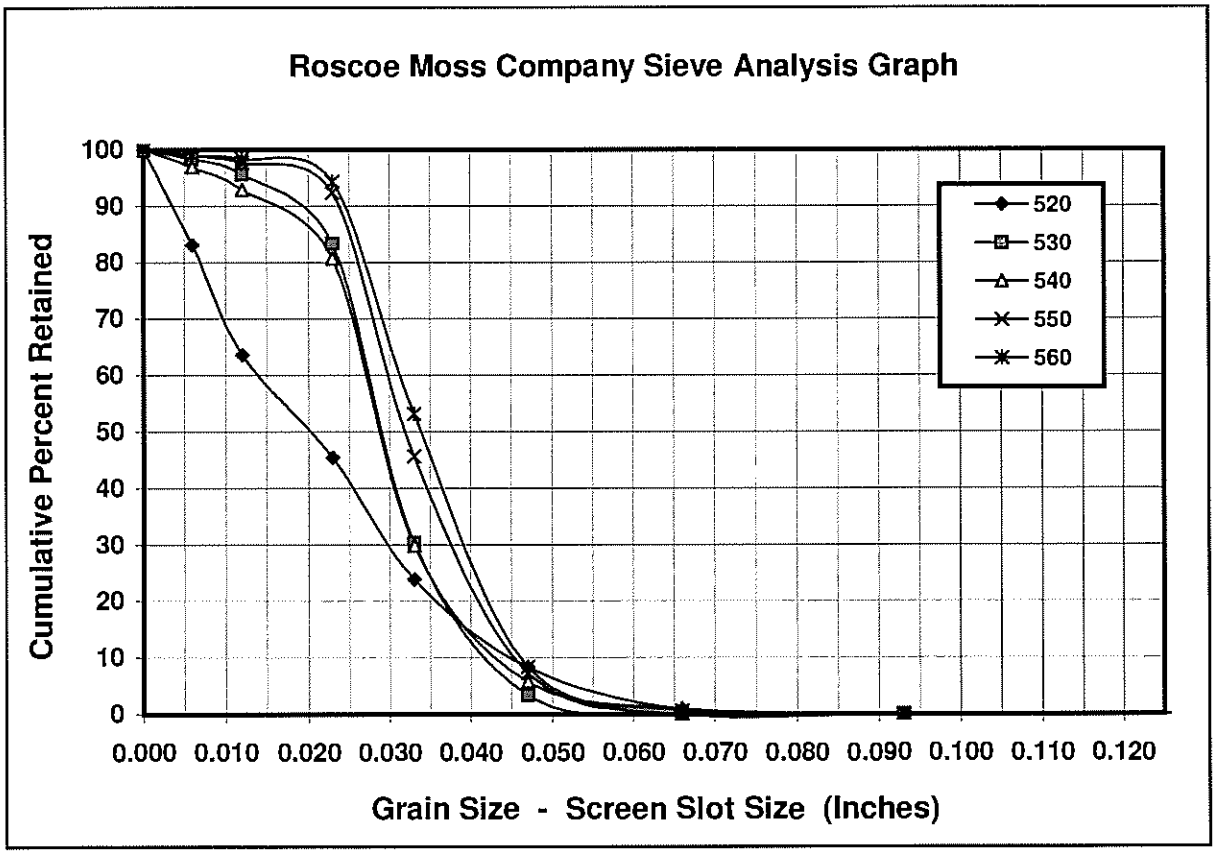
	Grain Size		Samples									
Sieve	Inches	mm	470		480		490		500		510	
			cum wt	%ret	cum wt	%ret	cum wt	%ret	cum wt	%ret	cum wt	%ret
4	0.187	4.7498	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.132	3.3528	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	0.093	2.3622	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	0.066	1.6764	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.8	3.0	1.3
16	0.047	1.1938	10.0	4.0	2.0	0.9	8.0	3.7	14.0	5.4	25.0	11.1
20	0.033	0.8382	23.0	9.3	8.0	3.7	24.0	11.0	28.0	10.8	51.0	22.7
30	0.023	0.5842	83.0	33.6	26.0	11.9	44.0	20.2	52.0	20.0	80.0	35.6
50	0.012	0.3048	142.0	57.5	63.0	28.8	94.0	43.1	104.0	40.0	119.0	52.9
100	0.006	0.1524	218.0	88.3	151.0	68.9	180.0	82.6	208.0	80.0	191.0	84.9
Par	0	0	247.0	100.0	219.0	100.0	218.0	100.0	260.0	100.0	225.0	100.0



Roscoe Moss Company Sieve Analysis Report

Date: 23-Mar-12
Client: Dan's Water Well
Project: Hickman Test Well

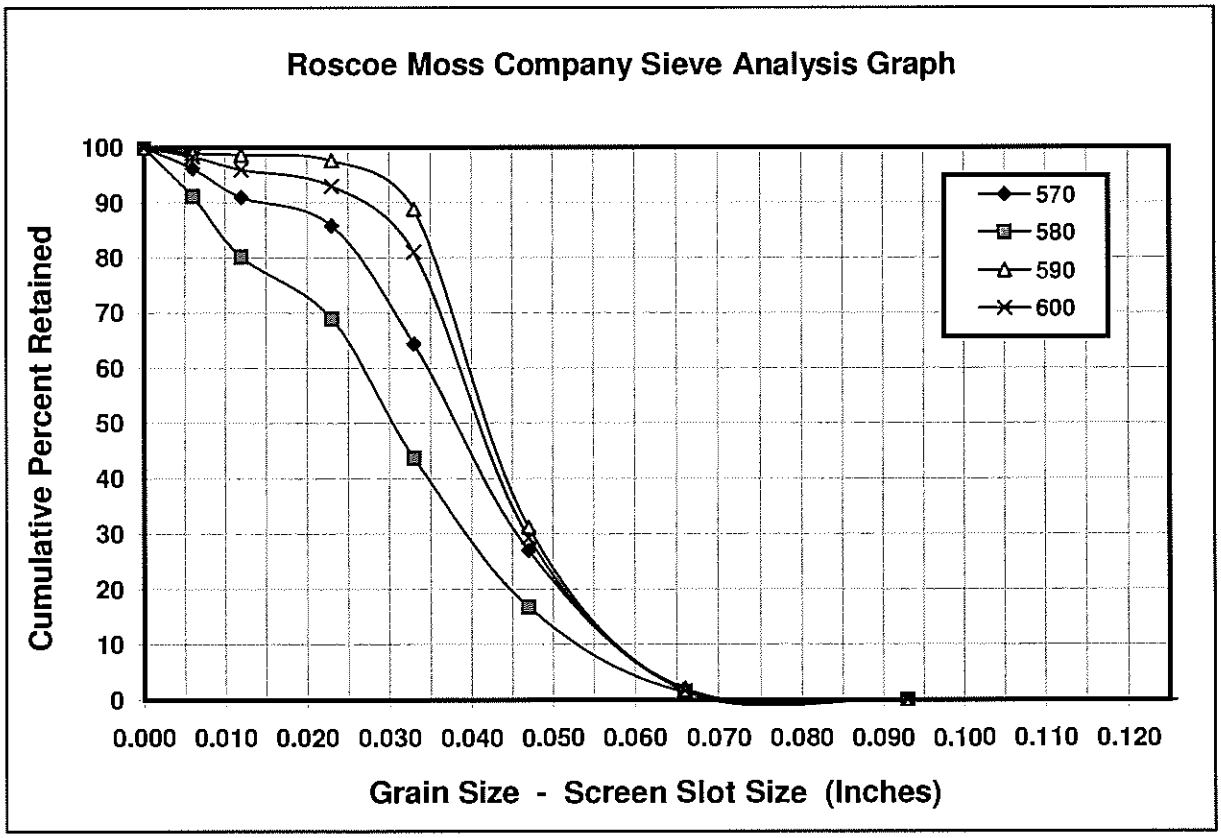
	Grain Size		Samples									
Sieve	Inches	mm	520		530		540		550		560	
			cum wt	%ret	cum wt	%ret	cum wt	%ret	cum wt	%ret	cum wt	%ret
4	0.187	4.7498	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.132	3.3528	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	0.093	2.3622	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	0.066	1.6764	2.0	0.9	0.0	0.0	3.0	1.0	0.0	0.0	2.0	0.7
16	0.047	1.1938	19.0	8.2	10.0	3.3	17.0	5.8	22.0	7.3	25.0	8.4
20	0.033	0.8382	55.0	23.8	91.0	30.3	88.0	29.8	137.0	45.7	159.0	53.2
30	0.023	0.5842	105.0	45.5	250.0	83.3	238.0	80.7	277.0	92.3	282.0	94.3
50	0.012	0.3048	147.0	63.6	287.0	95.7	274.0	92.9	293.0	97.7	294.0	98.3
100	0.006	0.1524	192.0	83.1	295.0	98.3	286.0	96.9	297.0	99.0	296.0	99.0
Par	0	0	231.0	100.0	300.0	100.0	295.0	100.0	300.0	100.0	299.0	100.0



Roscoe Moss Company Sieve Analysis Report

Date: 23-Mar-12
Client: Dan's Water Well
Project: Hickman Test Well

	Grain Size		Samples							
Sieve	Inches	mm	570		580		590		600	
			cum wt	%ret	cum wt	%ret	cum wt	%ret	cum wt	%ret
4	0.187	4.7498	0	0.0	0	0.0	0	0.0	0	0.0
6	0.132	3.3528	0	0.0	0	0.0	0	0.0	0	0.0
8	0.093	2.3622	0	0.0	0	0.0	0	0.0	0	0.0
12	0.066	1.6764	6	2.1	4	1.4	5	1.7	5	1.7
16	0.047	1.1938	78	27.0	49	16.7	92	31.2	88	29.3
20	0.033	0.8382	186	64.4	128	43.7	262	88.8	243	81.0
30	0.023	0.5842	248	85.8	202	68.9	288	97.6	279	93.0
50	0.012	0.3048	263	91.0	235	80.2	291	98.6	288	96.0
100	0.006	0.1524	278	96.2	267	91.1	292	99.0	295	98.3
Pan	0	0	289	100	293	100	295	100	300	100



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Attachment C: Electric Log

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welenco

5201 Woodmere Drive, Bakersfield, CA 93313-- www.welenco.com--(800) 445-9914
California Contractor's License No. 722373

ELECTRIC - CALIPER LOG

FILING NO.

COMPANY Dan's Pump & Well Drilling

WELL Hickman Test Hole

FIELD Hickman

STATE California COUNTY Stanislaus

LOCATION:
910 Hickman Rd.

OTHER SERVICES:
None

JOB NO.
16059

SEC: 3 TWP: 4S RGE: 11E LAT.: 37° 37' 12.8" LONG.: 120° 45' 18.0" MERIDIAN.: Mt. Diablo

Permanent Datum: Ground Level, **Elev.** 180 **Ft. Elev.: K.B.** _____ **Ft.**
Log Measured From: Ground Level, 0 **Ft. Above Perm. Datum** **D.F.** _____ **Ft.**
Drilling Measured From: Ground Level **G.L.** 180 **Ft.**

Run	One			
Date	Mar. 19, 2012			
Depth-Driller	615 Ft	Ft	Ft	Ft
Depth-Logger	616 Ft	Ft	Ft	Ft
Top Logged Interval	0 Ft	Ft	Ft	Ft
Btm. Logged Interval	615 Ft	Ft	Ft	Ft
Casing-Driller	14 In @ 20 Ft	In @ Ft	In @ Ft	In @ Ft
Casing-Logger	14 In @ 20 Ft	In @ Ft	In @ Ft	In @ Ft
Bit Size	8.75 In	In	In	In
Time On Bottom	14:30			
Type Fluid In Hole	Bentonite			
Density / Viscosity	n/a / n/a			
pH / Fluid Loss	n/a / n/a ml	ml	ml	ml
Source of Sample	Shaker			
Rm @ Measured Temp.	13.4 @ 68 °F	@ °F	@ °F	@ °F
Rmf @ Measured Temp.	10.7 @ 75 °F	@ °F	@ °F	@ °F
Rmc @ Measured Temp.	n/a @ °F	@ °F	@ °F	@ °F
Source Rmf / Rmc	Meas			
Rm @ BHT	n/a @ °F	@ °F	@ °F	@ °F
Time Since Circulation	.75 Hr	Hr	Hr	Hr
Max. Rec. Temp.	72 °F	°F	°F	°F
Van No. / Location	LV-2 / Sac			
Recorded By	M. Sharpless			
Witnessed By	Manly Ormsby			

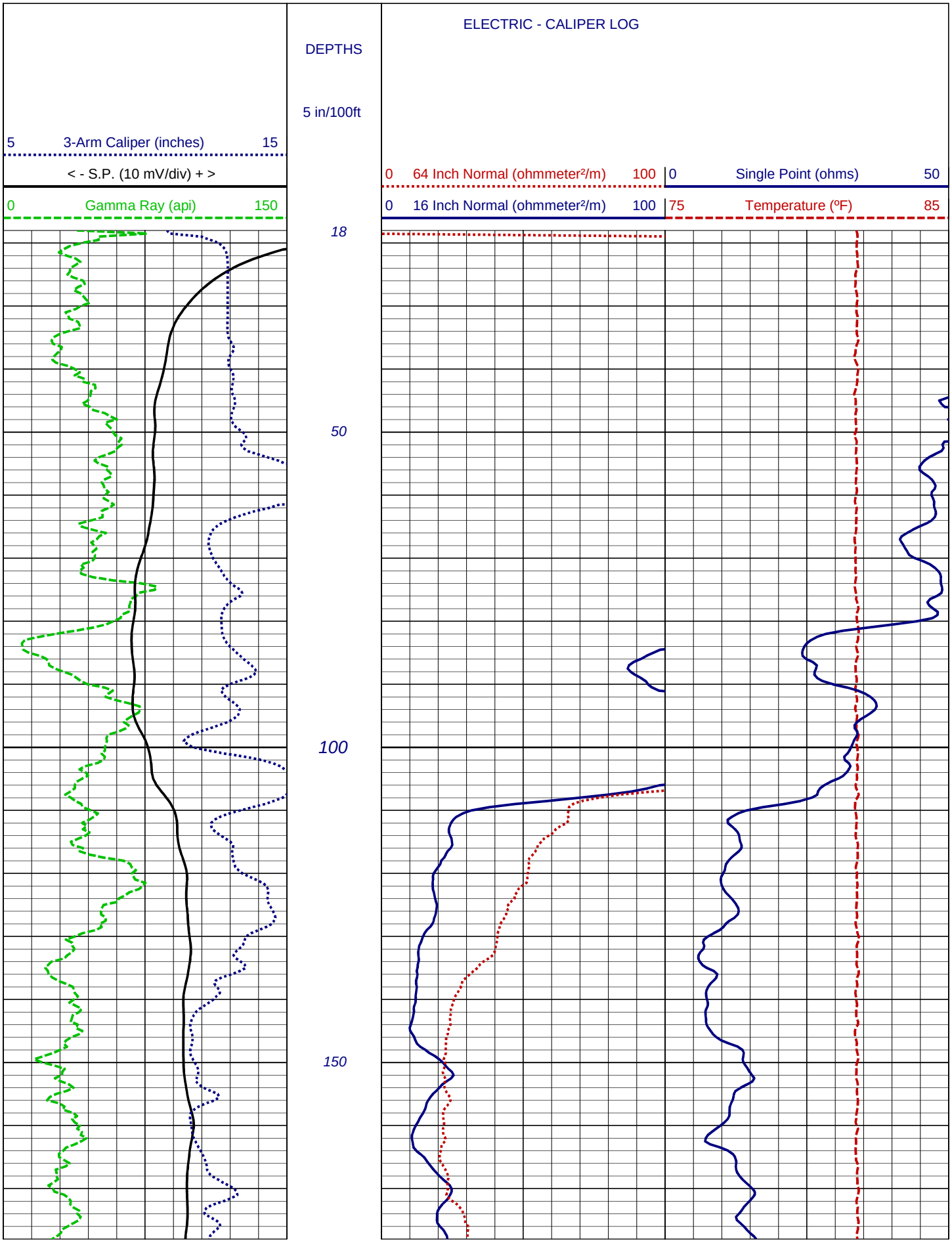
Miscellaneous Information

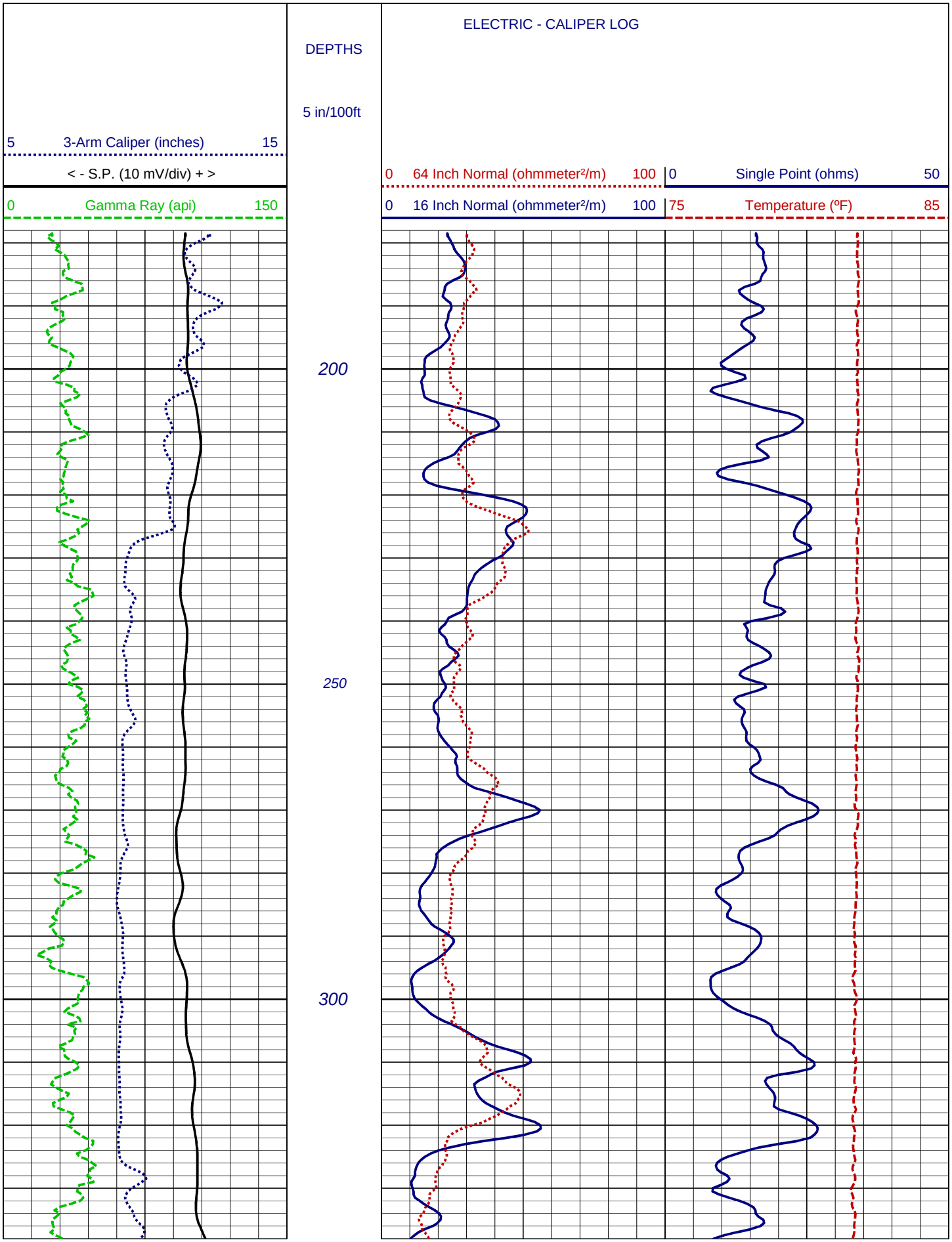
A recreational GPS accurate to +/- 45 feet set for Datum NAD27 was used to calculate Latitude, Longitude & Elevation values. The Section, Township, and Range then determined using the TRS program (TRS accuracy is not guaranteed). The TRS program converts Latitude and Longitude to Section, Township, and Range. The NOTICE at the bottom of this heading also applies.

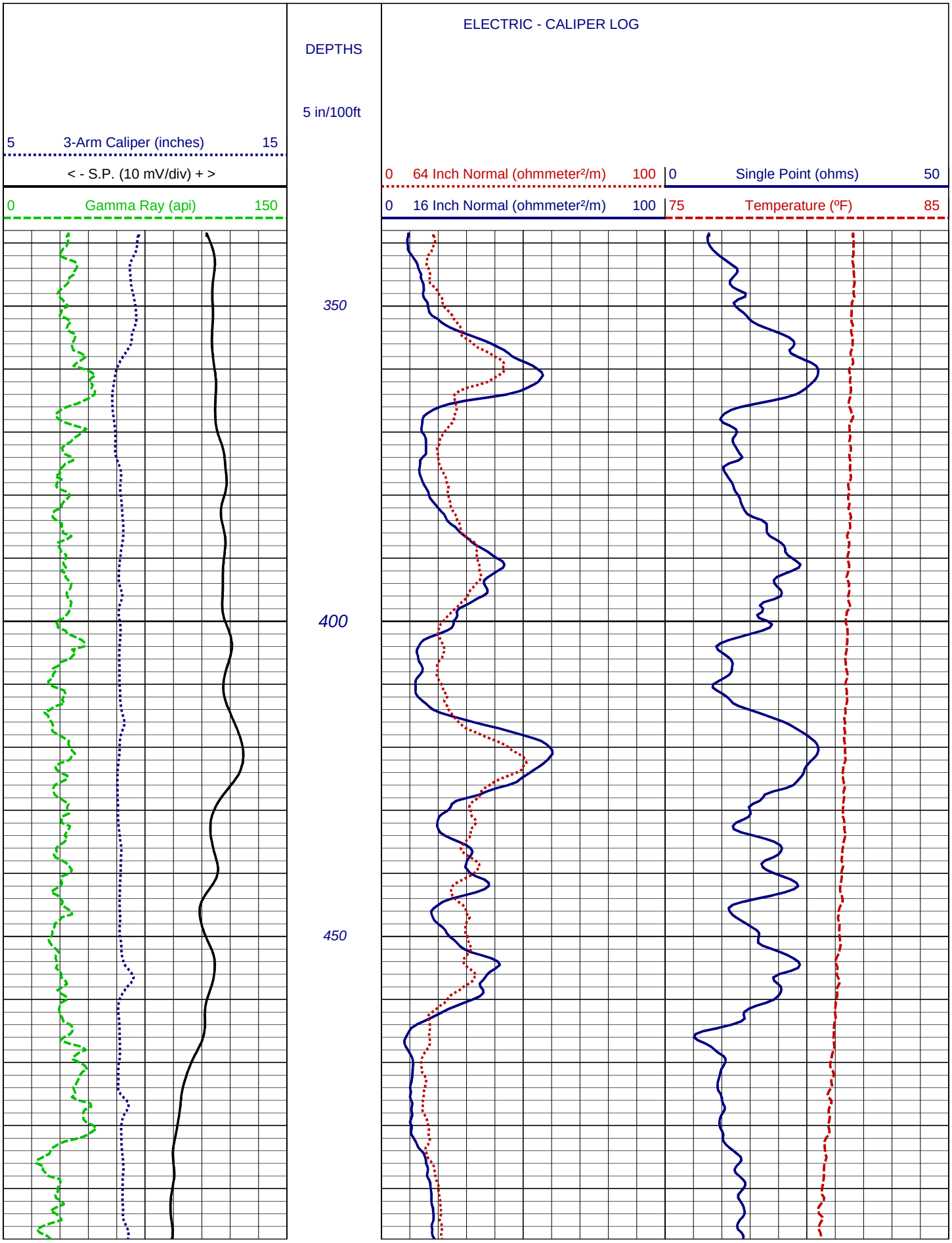
NOTICE

All interpretations are opinions based on inferences from electrical and other measurements and we do not guarantee the accuracy or correctness of any verbal or written interpretation, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretation made by one of our officers, agents or employees. These interpretations are also subject to our General Terms and Conditions as set out in our current Price Schedule.

welenco, inc. March 19, 2012


ELECTRIC - CALIPER LOG
DEPTHS
5 in/100ft
5 3-Arm Caliper (inches) 15
< - S.P. (10 mV/div) + >
0 Gamma Ray (api) 150
0 64 Inch Normal (ohmmeter²/m) 100
0 16 Inch Normal (ohmmeter²/m) 100
0 Single Point (ohms) 50
75 Temperature (ºF) 85
18
50
100
150


ELECTRIC - CALIPER LOG
DEPTHS
5 in/100ft
5 3-Arm Caliper (inches) 15
< - S.P. (10 mV/div) + >
0 Gamma Ray (api) 150
0 64 Inch Normal (ohmmeter²/m) 100
0 16 Inch Normal (ohmmeter²/m) 100
0 Single Point (ohms) 50
75 Temperature (ºF) 85
200
250
300



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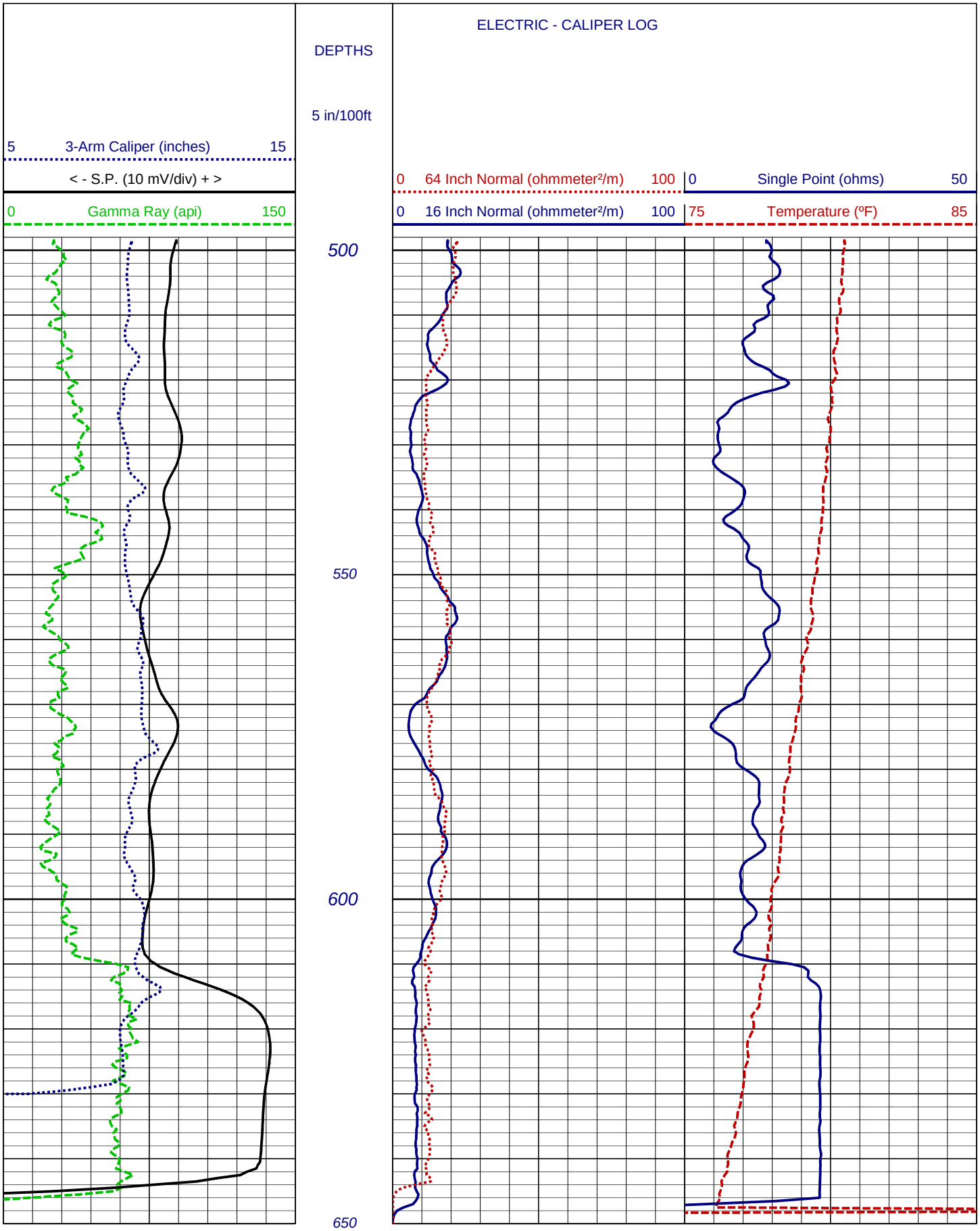

Page Length: 498 - 650 Feet (152 Feet) Time: 04:54:06 PM Date: Mar 19, 2012

Attachment D: Water Quality Results, 220–240’

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Amended

BSK Associates
Engineers & Laboratories

A2D1627

06/11/2012

Melissa Duran
City of Modesto Water Division/Corp Yard
P.O Box 642
Modesto, CA 95353

Dear Melissa Duran,

Thank you for selecting BSK Associates for your analytical testing needs. We have prepared this report in response to your request for analytical services. Enclosed are the results of analyses for samples received by the laboratory on 04/19/2012 16:36.

If additional clarification of any information is required, please contact your Client Services Representative, Michelle Harmstead at (800) 877-8310 or (559) 497-2888.

BSK ASSOCIATES

Kasanna Coulter
Quality Assurance Manager

1414 Stanislaus Street Fresno, CA 93706 (559) 497-2888 FAX (559) 485-6935 www.bsklabs.com

An Employee-Owned Company | Analytical Testing | Construction Observation
Environmental Engineering | Geotechnical Engineering | Materials Testing

Amended

06/11/2012

Case Narrative

Work Order Information

Client Name:	City of Modesto Water Division/Corp Yard	**Submitted by:**	N. Sandaz
Client Code:	Modes9588	**Shipped by:**	BSK Employee
Work Order:	A2D1627	**COC Number:**	
Project:	Title 22	**TAT:**	25
		PO #:	

Report Amendments

Date: 06/11/12

Initials: MLH

This amended report supersedes any previous reports issued by the laboratory. Amendments to this report are as follows:Per client request dissolved iron and manganese were added to sample -01.

Sample Receipt Conditions

Cooler: **Default Cooler** **Temp. ºC:** 4

Containers Intact
COC/Labels Agree
Received On Wet Ice
Sample(s) arrived at lab on same day sampled.
Packing Material - Bubble Wrap
Packing Material - Foam
Sample(s) were received in temperature range.
Initial receipt at BSK-FAL

Report Manager
Melissa Duran

Report Format
Final.rpt

1414 Stanislaus Street Fresno, CA 93706 (559) 497-2888 FAX (559) 485-6935 www.bsklabs.com

An Employee-Owned Company | Analytical Testing | Construction Observation
Environmental Engineering | Geotechnical Engineering | Materials Testing

Amended

BSK Associates Engineers & Laboratories

Certificate of Analysis

Melissa Duran
City of Modesto Water Division/Corp Yard
P.O Box 642
Modesto, CA 95353

Report Issue Date: 6/11/2012 13:16
Received Date: 04/19/2012
Received Time: 16:36

Lab Sample ID: A2D1627-01
Sample Date: 04/19/2012 09:30
Sampled by: N. Sandez
Sample Type: Grab
Matrix: Water

Sample Description: Hickman Test Well 210' // 142379

General Chemistry

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
***Aggressive Index**		**11**				A204448	04/30/12	04/30/12	
Alkalinity as CaCO3	SM 2320 B	**65**	3.0	mg/L	1	A204087	04/20/12	04/20/12	
Bicarbonate as CaCO3	SM 2320 B	**65**	3.0	mg/L	1	A204087	04/20/12	04/20/12	
Carbonate as CaCO3	SM 2320 B	ND	3.0	mg/L	1	A204087	04/20/12	04/20/12	
Chloride	EPA 300.0	**2.2**	1.0	mg/L	1	A204070	04/20/12	04/20/12	
***Color**	SM 2120 B	**5.0**	1.0	Color Units	1	A204111	04/20/12 12:06	04/20/12 12:06	
Cyanide (total)	SM 4500-CN E	ND	0.0050	mg/L	1	A204171	04/23/12	04/23/12	
Conductivity @ 25C	SM 2510 B	**140**	1.0	umhos/cm	1	A204087	04/20/12	04/20/12	
Fluoride	SM 4500-F C	**0.12**	0.10	mg/L	1	A204166	04/23/12	04/23/12	
Hydroxide as CaCO3	SM 2320 B	ND	3.0	mg/L	1	A204087	04/20/12	04/20/12	
Langelier Index	SM 2330 B	**-0.78**				A204448	04/30/12	04/30/12	
MBAS, Calculated as LAS, mol wt 340	SM 5540 C	ND	0.050	mg/L	1	A204122	04/20/12 16:10	04/20/12 16:10	
Nitrate as NO3	EPA 300.0	ND	1.0	mg/L	1	A204070	04/20/12 01:10	04/20/12 01:10	
Nitrite as N	EPA 300.0	ND	0.050	mg/L	1	A204070	04/20/12 01:10	04/20/12 01:10	
*Threshold Odor	SM 2150 B	ND	1.0	T.O.N.	1	A204111	04/20/12 12:06	04/20/12 12:06	
pH (1)	SM 4500-H+ B	**8.2**		pH Units	1	A204087	04/20/12	04/20/12	
pH Temperature in °C		**22.8**							
Sulfate as SO4	EPA 300.0	**5.3**	2.0	mg/L	1	A204070	04/20/12	04/20/12	
Total Dissolved Solids	SM 2540C	**140**	5.0	mg/L	1	A204107	04/20/12	04/24/12	
Bicarbonate as HCO3		**79**	3.7	mg/L					
Carbonate as CO3		ND	1.8	mg/L					
Hardness as CaCO3		**21**	0.41	mg/L					
Hydroxide as OH		ND	1.0	mg/L					
Turbidity	SM 2130 B	**3.6**	0.10	NTU	1	A204111	04/20/12 12:06	04/20/12 12:06	

Metals

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Aluminum	EPA 200.7	**0.24**	0.050	mg/L	1	A204147	04/23/12	04/29/12	
Antimony	EPA 200.8	ND	2.0	ug/L	1	A204147	04/23/12	04/30/12	
Arsenic	EPA 200.8	ND	2.0	ug/L	1	A204147	04/23/12	04/30/12	
Barium	EPA 200.7	ND	0.050	mg/L	1	A204147	04/23/12	04/29/12	
Beryllium	EPA 200.8	ND	1.0	ug/L	1	A204147	04/23/12	04/30/12	
Cadmium	EPA 200.8	ND	1.0	ug/L	1	A204147	04/23/12	04/30/12	

Amended

BSK Associates Engineers & Laboratories

Certificate of Analysis

Melissa Duran
City of Modesto Water Division/Corp Yard
P.O Box 642
Modesto, CA 95353

Report Issue Date: 6/11/2012 13:16
Received Date: 04/19/2012
Received Time: 16:36

Lab Sample ID: A2D1627-01
Sample Date: 04/19/2012 09:30
Sampled by: N. Sandez
Sample Type: Grab
Matrix: Water

Sample Description: Hickman Test Well 210' // 142379

Metals

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Calcium	EPA 200.7	**5.1**	0.10	mg/L	1	A204147	04/23/12	04/29/12	
Chromium	EPA 200.8	ND	10	ug/L	1	A204147	04/23/12	04/30/12	
Copper	EPA 200.8	ND	5.0	ug/L	1	A204147	04/23/12	04/30/12	
Iron	EPA 200.7	**0.20**	0.050	mg/L	1	A204147	04/23/12	04/29/12	
*Iron - Dissolved (1)	EPA 200.7	ND	0.050	mg/L	1	A205860	06/05/12	06/07/12	
Lead	EPA 200.8	ND	5.0	ug/L	1	A204147	04/23/12	04/30/12	
Magnesium	EPA 200.7	**2.1**	0.10	mg/L	1	A204147	04/23/12	04/29/12	
Manganese	EPA 200.7	**0.083**	0.010	mg/L	1	A204147	04/23/12	04/29/12	
***Manganese - Dissolved (1)**	EPA 200.7	**0.074**	0.010	mg/L	1	A205860	06/05/12	06/07/12	
Mercury	EPA 200.8	ND	0.40	ug/L	1	A204147	04/23/12	05/01/12	
Nickel	EPA 200.8	ND	10	ug/L	1	A204147	04/23/12	04/30/12	
Potassium	EPA 200.7	**5.2**	2.0	mg/L	1	A204147	04/23/12	04/29/12	
Selenium	EPA 200.8	ND	2.0	ug/L	1	A204147	04/23/12	04/30/12	
Silver	EPA 200.8	ND	10	ug/L	1	A204147	04/23/12	04/30/12	
Sodium	EPA 200.7	**22**	1.0	mg/L	1	A204147	04/23/12	04/29/12	
Thallium	EPA 200.8	ND	1.0	ug/L	1	A204147	04/23/12	04/30/12	
*Uranium	EPA 200.8	ND	1.0	ug/L	1	A204147	04/23/12	04/30/12	
***Uranium, Radiological**		**< 0.67**		pCi/L					
Zinc	EPA 200.7	ND	0.050	mg/L	1	A204147	04/23/12	04/29/12	

Radiological

Analyte	Method	Result	Units	Batch	Prepared	Analyzed	Qual
*Gross Alpha	EPA 00-02	ND	pCi/L	A204341	04/26/12	04/27/12	
***1.65 Sigma Uncertainty**		**0.110**	±				
***MDA95**		**1.09**	pCi/L				

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
EDB and DBCP by GC-ECD									
Dibromochloropropane (DBCP)	EPA 504.1	ND	0.010	ug/L	1	A204205	04/24/12	04/25/12	
Ethylene Dibromide (EDB)	EPA 504.1	ND	0.020	ug/L	1	A204205	04/24/12	04/25/12	
Surrogate: Bromoform	EPA 504.1	104 %		*Acceptable range: 70-130 %*					

A2D1627 FINAL 06112012 1316

Amended

BSK Associates Engineers & Laboratories

Certificate of Analysis

Melissa Duran
City of Modesto Water Division/Corp Yard
P.O Box 642
Modesto, CA 95353

Report Issue Date: 6/11/2012 13:16
Received Date: 04/19/2012
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Lab Sample ID: A2D1627-01
Sample Date: 04/19/2012 09:30
Sampled by: N. Sandez
Sample Type: Grab
Matrix: Water

Sample Description: Hickman Test Well 210' // 142379

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Organohalide Pesticides and PCBs by GC-ECD									
Aldrin	EPA 505	ND	0.075	ug/L	1	A204154	04/23/12	04/23/12	
Chlordane	EPA 505	ND	0.10	ug/L	1	A204154	04/23/12	04/23/12	
Chlorothalonil	EPA 505	ND	5.0	ug/L	1	A204154	04/23/12	04/23/12	
Dieldrin	EPA 505	ND	0.020	ug/L	1	A204154	04/23/12	04/23/12	
Endrin	EPA 505	ND	0.10	ug/L	1	A204154	04/23/12	04/23/12	
Heptachlor	EPA 505	ND	0.010	ug/L	1	A204154	04/23/12	04/23/12	
Heptachlor Epoxide	EPA 505	ND	0.010	ug/L	1	A204154	04/23/12	04/23/12	
Hexachlorobenzene	EPA 505	ND	0.50	ug/L	1	A204154	04/23/12	04/23/12	
Hexachlorocyclopentadiene	EPA 505	ND	1.0	ug/L	1	A204154	04/23/12	04/23/12	
Lindane	EPA 505	ND	0.20	ug/L	1	A204154	04/23/12	04/23/12	
Methoxychlor	EPA 505	ND	10	ug/L	1	A204154	04/23/12	04/23/12	
PCB Aroclor Screen	EPA 505	ND	0.50	ug/L	1	A204154	04/23/12	04/23/12	
Toxaphene	EPA 505	ND	1.0	ug/L	1	A204154	04/23/12	04/23/12	
Trifluralin	EPA 505	ND	1.0	ug/L	1	A204154	04/23/12	04/23/12	
Surrogate: TCMX	EPA 505	105 %		*Acceptable range: 70-130 %*					
Chlorinated Acid Herbicides by GC-ECD									
2,4,5-T	EPA 515.3	ND	1.0	ug/L	1	A204120	04/20/12	04/24/12	
2,4,5-TP (Silvex)	EPA 515.3	ND	1.0	ug/L	1	A204120	04/20/12	04/24/12	
2,4-D	EPA 515.3	ND	10	ug/L	1	A204120	04/20/12	04/24/12	
Bentazon	EPA 515.3	ND	2.0	ug/L	1	A204120	04/20/12	04/24/12	
Dalapon	EPA 515.3	ND	10	ug/L	1	A204120	04/20/12	04/24/12	
Dicamba	EPA 515.3	ND	1.5	ug/L	1	A204120	04/20/12	04/24/12	
Dinoseb	EPA 515.3	ND	2.0	ug/L	1	A204120	04/20/12	04/24/12	
Pentachlorophenol	EPA 515.3	ND	0.20	ug/L	1	A204120	04/20/12	04/24/12	
Picloram	EPA 515.3	ND	1.0	ug/L	1	A204120	04/20/12	04/24/12	
Surrogate: DCPAA	EPA 515.3	115 %		*Acceptable range: 70-130 %*					
Volatile Organics by GC-MS									
1,1,1,2-Tetrachloroethane	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
1,1,1-Trichloroethane	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
1,1,2,2-Tetrachloroethane	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
1,1,2-Trichloro-1,2,2-trifluoroethane	EPA 524.2	ND	10	ug/L	1	A204289	04/25/12	04/25/12	
1,1,2-Trichloroethane	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	

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Certificate of Analysis

Melissa Duran
City of Modesto Water Division/Corp Yard
P.O Box 642
Modesto, CA 95353

Report Issue Date: 6/11/2012 13:16
Received Date: 04/19/2012
Received Time: 16:36

Lab Sample ID: A2D1627-01
Sample Date: 04/19/2012 09:30
Sampled by: N. Sandez
Sample Type: Grab
Matrix: Water

Sample Description: Hickman Test Well 210' // 142379

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Volatile Organics by GC-MS									
1,1-Dichloroethane	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
1,1-Dichloroethene	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
1,1-Dichloropropene	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
1,2,3-Trichlorobenzene	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
1,2,4-Trichlorobenzene	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
1,2,4-Trimethylbenzene	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
1,2-Dichlorobenzene	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
1,2-Dichloroethane	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
1,2-Dichloropropane	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
1,3,5-Trimethylbenzene	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
1,3-Dichlorobenzene	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
1,3-Dichloropropane	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
1,4-Dichlorobenzene	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
2,2-Dichloropropane	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
2-Butanone	EPA 524.2	ND	5.0	ug/L	1	A204289	04/25/12	04/25/12	
2-Chlorotoluene	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
2-Hexanone	EPA 524.2	ND	10	ug/L	1	A204289	04/25/12	04/25/12	
4-Chlorotoluene	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
4-Methyl-2-pentanone	EPA 524.2	ND	5.0	ug/L	1	A204289	04/25/12	04/25/12	
Acetone	EPA 524.2	ND	10	ug/L	1	A204289	04/25/12	04/25/12	
Benzene	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
Bromobenzene	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
Bromochloromethane	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
Bromodichloromethane	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
Bromoform	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
Bromomethane	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
Carbon Tetrachloride	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
Chlorobenzene	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
Chloroethane	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
Chloroform	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
Chloromethane	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
cis-1,2-Dichloroethene	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
cis-1,3-Dichloropropene	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
Dibromochloromethane	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	

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Modesto, CA 95353

Report Issue Date: 6/11/2012 13:16
Received Date: 04/19/2012
Received Time: 16:36

Lab Sample ID: A2D1627-01
Sample Date: 04/19/2012 09:30
Sampled by: N. Sandez
Sample Type: Grab
Matrix: Water

Sample Description: Hickman Test Well 210' // 142379

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Volatile Organics by GC-MS									
Dibromomethane	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
Dichlorodifluoromethane	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
Dichloromethane	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
Di-isopropyl ether (DIPE)	EPA 524.2	ND	3.0	ug/L	1	A204289	04/25/12	04/25/12	
Ethyl tert-Butyl Ether (ETBE)	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
Ethylbenzene	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
Hexachlorobutadiene	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
Isopropylbenzene	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
m,p-Xylenes	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
Methyl-t-butyl ether	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
Naphthalene	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
n-Butylbenzene	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
n-Propylbenzene	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
o-Xylene	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
p-Isopropyltoluene	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
sec-Butylbenzene	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
Styrene	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
tert-Amyl Methyl Ether (TAME)	EPA 524.2	ND	3.0	ug/L	1	A204289	04/25/12	04/25/12	
tert-Butyl alcohol (TBA)	EPA 524.2	ND	2.0	ug/L	1	A204289	04/25/12	04/25/12	
tert-Butylbenzene	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
Tetrachloroethene (PCE)	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
Toluene	EPA 524.2	**1.9**	0.50	ug/L	1	A204289	04/25/12	04/25/12	
trans-1,2-Dichloroethene	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
trans-1,3-Dichloropropene	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
Trichloroethene (TCE)	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
Trichlorofluoromethane	EPA 524.2	ND	5.0	ug/L	1	A204289	04/25/12	04/25/12	
Vinyl Chloride	EPA 524.2	ND	0.50	ug/L	1	A204289	04/25/12	04/25/12	
Surrogate: 1,2-Dichlorobenzene-d4	EPA 524.2	92 %		*Acceptable range: 70-130 %*					
Surrogate: Bromofluorobenzene	EPA 524.2	94 %		*Acceptable range: 70-130 %*					
*Total 1,3-Dichloropropene, EPA 524.2		ND	0.50	ug/L					
*Total Trihalomethanes, EPA 524.2		ND	0.50	ug/L					
*Total Xylenes, EPA 524.2		ND	0.50	ug/L					
Semi-Volatile Organics by GC-MS									

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Report Issue Date: 6/11/2012 13:16
Received Date: 04/19/2012
Received Time: 16:36

Lab Sample ID: A2D1627-01
Sample Date: 04/19/2012 09:30
Sampled by: N. Sandez
Sample Type: Grab
Matrix: Water

Sample Description: Hickman Test Well 210' // 142379

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Semi-Volatile Organics by GC-MS									
Alachlor	EPA 525.2	ND	1.0	ug/L	1	A204425	04/28/12	04/28/12	
Atrazine	EPA 525.2	ND	0.50	ug/L	1	A204425	04/28/12	04/28/12	
Benzo(a)pyrene	EPA 525.2	ND	0.10	ug/L	1	A204425	04/28/12	04/28/12	
Bis(2-ethylhexyl) adipate	EPA 525.2	ND	3.0	ug/L	1	A204425	04/28/12	04/28/12	
Bis(2-ethylhexyl) phthalate	EPA 525.2	ND	3.0	ug/L	1	A204425	04/28/12	04/28/12	
Bromacil	EPA 525.2	ND	10	ug/L	1	A204425	04/28/12	04/28/12	
Butachlor	EPA 525.2	ND	0.38	ug/L	1	A204425	04/28/12	04/28/12	
Diazinon	EPA 525.2	ND	0.25	ug/L	1	A204425	04/28/12	04/28/12	
Dimethoate	EPA 525.2	ND	10	ug/L	1	A204425	04/28/12	04/28/12	
Metolachlor	EPA 525.2	ND	0.50	ug/L	1	A204425	04/28/12	04/28/12	
Metribuzin	EPA 525.2	ND	0.50	ug/L	1	A204425	04/28/12	04/28/12	
Molinate	EPA 525.2	ND	2.0	ug/L	1	A204425	04/28/12	04/28/12	
Propachlor	EPA 525.2	ND	0.50	ug/L	1	A204425	04/28/12	04/28/12	
Simazine	EPA 525.2	ND	1.0	ug/L	1	A204425	04/28/12	04/28/12	
Thiobencarb	EPA 525.2	ND	1.0	ug/L	1	A204425	04/28/12	04/28/12	
Surrogate: 1,3-Dimethyl-2-nitrobenzene	EPA 525.2	118 %		*Acceptable range: 70-130 %*					
Carbamates by HPLC									
3-Hydroxycarbofuran	EPA 531.1	ND	3.0	ug/L	1	A204384	04/27/12	04/29/12	
Aldicarb	EPA 531.1	ND	3.0	ug/L	1	A204384	04/27/12	04/29/12	
Aldicarb Sulfone	EPA 531.1	ND	2.0	ug/L	1	A204384	04/27/12	04/29/12	
Aldicarb Sulfoxide	EPA 531.1	ND	3.0	ug/L	1	A204384	04/27/12	04/29/12	
Carbaryl	EPA 531.1	ND	5.0	ug/L	1	A204384	04/27/12	04/29/12	
Carbofuran	EPA 531.1	ND	5.0	ug/L	1	A204384	04/27/12	04/29/12	
Methomyl	EPA 531.1	ND	2.0	ug/L	1	A204384	04/27/12	04/29/12	
Oxamyl	EPA 531.1	ND	20	ug/L	1	A204384	04/27/12	04/29/12	
Glyphosate by HPLC									
Glyphosate	EPA 547	ND	25	ug/L	1	A204149	04/23/12	04/24/12	
Surrogate: AMPA	EPA 547	96 %		*Acceptable range: 70-130 %*					
Endothall by GC-MS									
Endothall	EPA 548.1	ND	45	ug/L	1	A204197	04/23/12	04/25/12	
Diquat by HPLC									

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Lab Sample ID: A2D1627-01
Sample Date: 04/19/2012 09:30
Sampled by: N. Sandez
Sample Type: Grab
Matrix: Water

Sample Description: Hickman Test Well 210' // 142379

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Diquat by HPLC									
Diquat	EPA 549.2	ND	4.0	ug/L	1	A204142	04/21/12	04/27/12	
Diuron by HPLC									
Diuron	EPA 632	ND	1.0	ug/L	1	A204145	04/23/12	04/25/12	
Surrogate: Benthiocarb	EPA 632	104 %		*Acceptable range: 70-130 %*					

A2D1627 FINAL 06112012 1316

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General Chemistry Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204070				Analyst: AJT		Prepared: 4/19/2012					
Blank (A204070-BLK1) EPA 300.0 - Quality Control											
Chloride	ND	1.0	mg/L							04/19/12	
Nitrate as NO3	ND	1.0	mg/L							04/19/12	
Nitrite as N	ND	0.050	mg/L							04/19/12	
Sulfate as SO4	ND	2.0	mg/L							04/19/12	
Blank Spike (A204070-BS1) EPA 300.0 - Quality Control											
Chloride	51	1.0	mg/L	50		103	90-110			04/19/12	
Nitrate as NO3	51	1.0	mg/L	50		102	90-110			04/19/12	
Nitrite as N	0.52	0.050	mg/L	0.50		104	90-110			04/19/12	
Sulfate as SO4	51	2.0	mg/L	50		103	90-110			04/19/12	
Blank Spike Dup (A204070-BSD1) EPA 300.0 - Quality Control											
Chloride	51	1.0	mg/L	50		102	90-110	1	10	04/19/12	
Nitrate as NO3	51	1.0	mg/L	50		101	90-110	1	10	04/19/12	
Nitrite as N	0.51	0.050	mg/L	0.50		102	90-110	2	10	04/19/12	
Sulfate as SO4	52	2.0	mg/L	50		103	90-110	0	10	04/19/12	
Matrix Spike (A204070-MS1) EPA 300.0 - Quality Control						**Source: A2D1591-01**					
Chloride	120	2.0	mg/L	100	11	105	80-120			04/19/12	
Nitrate as NO3	120	2.0	mg/L	100	14	105	80-120			04/19/12	
Nitrite as N	0.94	0.10	mg/L	1.0	ND	94	80-120			04/19/12	
Sulfate as SO4	110	4.0	mg/L	100	4.9	105	80-120			04/19/12	
Matrix Spike (A204070-MS2) EPA 300.0 - Quality Control						**Source: A2D1627-01**					
Chloride	100	2.0	mg/L	100	2.2	102	80-120			04/20/12	
Nitrate as NO3	100	2.0	mg/L	100	ND	102	80-120			04/20/12	
Nitrite as N	1.0	0.10	mg/L	1.0	ND	102	80-120			04/20/12	
Sulfate as SO4	110	4.0	mg/L	100	5.3	104	80-120			04/20/12	
Matrix Spike Dup (A204070-MSD1) EPA 300.0 - Quality Control						**Source: A2D1591-01**					
Chloride	110	2.0	mg/L	100	11	102	80-120	2	10	04/19/12	
Nitrate as NO3	120	2.0	mg/L	100	14	103	80-120	2	10	04/19/12	
Nitrite as N	0.95	0.10	mg/L	1.0	ND	95	80-120	2	20	04/19/12	
Sulfate as SO4	110	4.0	mg/L	100	4.9	104	80-120	1	10	04/19/12	
Matrix Spike Dup (A204070-MSD2) EPA 300.0 - Quality Control						**Source: A2D1627-01**					
Chloride	100	2.0	mg/L	100	2.2	102	80-120	0	10	04/20/12	
Nitrate as NO3	100	2.0	mg/L	100	ND	102	80-120	0	10	04/20/12	
Nitrite as N	1.0	0.10	mg/L	1.0	ND	100	80-120	2	20	04/20/12	
Sulfate as SO4	110	4.0	mg/L	100	5.3	103	80-120	1	10	04/20/12	
Batch: A204087				Analyst: CEG		Prepared: 4/20/2012					
Blank (A204087-BLK1) SM 2320 B - Quality Control											
Alkalinity as CaCO3	ND	3.0	mg/L							04/20/12	

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General Chemistry Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204087				Analyst: CEG		Prepared: 4/20/2012					
Blank (A204087-BLK1) SM 2320 B - Quality Control											
Bicarbonate as CaCO3	ND	3.0	mg/L							04/20/12	
Carbonate as CaCO3	ND	3.0	mg/L							04/20/12	
Conductivity @ 25C	ND	1.0	umhos/cm							04/20/12	
Hydroxide as CaCO3	ND	3.0	mg/L							04/20/12	
Blank Spike (A204087-BS1) SM 2320 B - Quality Control											
Alkalinity as CaCO3	100	3.0	mg/L	100		101	80-120			04/20/12	
Blank Spike Dup (A204087-BSD1) SM 2320 B - Quality Control											
Alkalinity as CaCO3	99	3.0	mg/L	100		99	80-120	2	20	04/20/12	
Duplicate (A204087-DUP1) SM 2320 B - Quality Control						**Source: A2D1629-01**					
Alkalinity as CaCO3	110	3.0	mg/L		110			2	10	04/20/12	
Bicarbonate as CaCO3	110	3.0	mg/L		110			2	10	04/20/12	
Carbonate as CaCO3	ND	3.0	mg/L		ND				10	04/20/12	
Conductivity @ 25C	1400	1.0	umhos/cm		1400			1	20	04/20/12	
Hydroxide as CaCO3	ND	3.0	mg/L		ND				10	04/20/12	
pH (1)	8.2		pH Units		8.1			0	20	04/20/12	
Duplicate (A204087-DUP2) SM 2320 B - Quality Control						**Source: A2D1627-01**					
Alkalinity as CaCO3	64	3.0	mg/L		65			1	10	04/20/12	
Bicarbonate as CaCO3	64	3.0	mg/L		65			1	10	04/20/12	
Carbonate as CaCO3	ND	3.0	mg/L		ND				10	04/20/12	
Conductivity @ 25C	140	1.0	umhos/cm		140			1	20	04/20/12	
Hydroxide as CaCO3	ND	3.0	mg/L		ND				10	04/20/12	
pH (1)	8.2		pH Units		8.2			0	20	04/20/12	
Batch: A204107				Analyst: DEH		Prepared: 4/20/2012					
Blank (A204107-BLK1) SM 2540C - Quality Control											
Total Dissolved Solids	ND	5.0	mg/L							04/24/12	
Blank (A204107-BLK2) SM 2540C - Quality Control											
Total Dissolved Solids	ND	5.0	mg/L							04/24/12	
Duplicate (A204107-DUP1) SM 2540C - Quality Control						**Source: A2D1529-01**					
Total Dissolved Solids	2800	5.0	mg/L		2800			0	20	04/24/12	
Duplicate (A204107-DUP2) SM 2540C - Quality Control						**Source: A2D1560-08**					
Total Dissolved Solids	460	5.0	mg/L		450			2	20	04/24/12	
Batch: A204111				Analyst: DFS		Prepared: 4/20/2012					
Blank (A204111-BLK1) SM 2120 B - Quality Control											
Color	ND	1.0	Color Units							04/20/12	
Threshold Odor	ND	1.0	T.O.N.							04/20/12	

A2D1627 FINAL 06112012 1316

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General Chemistry Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204111				Analyst: DFS		Prepared: 4/20/2012					
Blank (A204111-BLK1) SM 2130 B - Quality Control											
Turbidity	ND	0.10	NTU							04/20/12	
Duplicate (A204111-DUP1) SM 2120 B - Quality Control						**Source: A2D1627-01**					
Color	5.0	1.0	Color Units		5.0			0	20	04/20/12	
Threshold Odor	ND	1.0	T.O.N.		ND				20	04/20/12	
Turbidity	3.6	0.10	NTU		3.6			1	20	04/20/12	
Duplicate (A204111-DUP2) SM 2120 B - Quality Control						**Source: A2D1696-01**					
Color	ND	1.0	Color Units		ND				20	04/20/12	
Threshold Odor	ND	1.0	T.O.N.		ND				20	04/20/12	
Turbidity	0.23	0.10	NTU		0.22			4	20	04/20/12	
Batch: A204122				Analyst: DFS		Prepared: 4/20/2012					
Blank (A204122-BLK1) SM 5540 C - Quality Control											
MBAS, Calculated as LAS, mol wt 340	ND	0.050	mg/L							04/20/12	
Blank Spike (A204122-BS1) SM 5540 C - Quality Control											
MBAS, Calculated as LAS, mol wt 340	1.0	0.050	mg/L	1.0		105	80-120			04/20/12	
Blank Spike Dup (A204122-BSD1) SM 5540 C - Quality Control											
MBAS, Calculated as LAS, mol wt 340	1.0	0.050	mg/L	1.0		102	80-120	3	20	04/20/12	
Matrix Spike (A204122-MS1) SM 5540 C - Quality Control						**Source: A2D1672-01**					
MBAS, Calculated as LAS, mol wt 340	0.73	0.050	mg/L	1.0	0.058	67	80-120			04/20/12	MS02 ***Low***
Matrix Spike (A204122-MS2) SM 5540 C - Quality Control						**Source: A2D1761-01**					
MBAS, Calculated as LAS, mol wt 340	0.98	0.050	mg/L	1.0	ND	97	80-120			04/20/12	
Matrix Spike Dup (A204122-MSD1) SM 5540 C - Quality Control						**Source: A2D1672-01**					
MBAS, Calculated as LAS, mol wt 340	0.77	0.050	mg/L	1.0	0.058	71	80-120	4	20	04/20/12	MS02 ***Low***
Matrix Spike Dup (A204122-MSD2) SM 5540 C - Quality Control						**Source: A2D1761-01**					
MBAS, Calculated as LAS, mol wt 340	0.99	0.050	mg/L	1.0	ND	99	80-120	1	20	04/20/12	
Batch: A204166				Analyst: CCH		Prepared: 4/23/2012					
Blank (A204166-BLK1) SM 4500-F C - Quality Control											
Fluoride	ND	0.10	mg/L							04/23/12	
Blank Spike (A204166-BS1) SM 4500-F C - Quality Control											
Fluoride	1.1	0.10	mg/L	1.0		108	80-120			04/23/12	
Blank Spike Dup (A204166-BSD1) SM 4500-F C - Quality Control											
Fluoride	1.1	0.10	mg/L	1.0		108	80-120	0	20	04/23/12	

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General Chemistry Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204166				Analyst: CCH		Prepared: 4/23/2012					
Matrix Spike (A204166-MS1) SM 4500-F C - Quality Control						**Source: A2D1560-04**					
Fluoride	1.1	0.10	mg/L	1.0	0.10	101	80-120			04/23/12	
Matrix Spike (A204166-MS2) SM 4500-F C - Quality Control						**Source: A2D1739-07**					
Fluoride	1.2	0.10	mg/L	1.0	0.13	105	80-120			04/23/12	
Matrix Spike Dup (A204166-MSD1) SM 4500-F C - Quality Control						**Source: A2D1560-04**					
Fluoride	1.1	0.10	mg/L	1.0	0.10	103	80-120	2	20	04/23/12	
Matrix Spike Dup (A204166-MSD2) SM 4500-F C - Quality Control						**Source: A2D1739-07**					
Fluoride	1.2	0.10	mg/L	1.0	0.13	104	80-120	1	20	04/23/12	
Batch: A204171				Analyst: ANALY		Prepared: 4/23/2012					
Blank (A204171-BLK1) SM 4500-CN E - Quality Control											
Cyanide (total)	ND	0.0050	mg/L							04/23/12	
Blank Spike (A204171-BS1) SM 4500-CN E - Quality Control											
Cyanide (total)	0.59	0.0050	mg/L	0.50		118	80-120			04/23/12	
Blank Spike Dup (A204171-BSD1) SM 4500-CN E - Quality Control											
Cyanide (total)	0.59	0.0050	mg/L	0.50		117	80-120	1	20	04/23/12	
Matrix Spike (A204171-MS1) SM 4500-CN E - Quality Control						**Source: A2D1657-01**					
Cyanide (total)	0.57	0.0050	mg/L	0.50	ND	113	80-120			04/23/12	
Matrix Spike (A204171-MS2) SM 4500-CN E - Quality Control						**Source: A2D1741-01**					
Cyanide (total)	0.59	0.0050	mg/L	0.50	ND	118	80-120			04/23/12	
Matrix Spike Dup (A204171-MSD1) SM 4500-CN E - Quality Control						**Source: A2D1657-01**					
Cyanide (total)	0.23	0.0050	mg/L	0.50	ND	47	80-120	84	20	04/23/12	MS02, MS07, ***Low***
Matrix Spike Dup (A204171-MSD2) SM 4500-CN E - Quality Control						**Source: A2D1741-01**					
Cyanide (total)	0.59	0.0050	mg/L	0.50	ND	119	80-120	1	20	04/23/12	

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Metals Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204147				Analyst: NRE		Prepared: 4/23/2012					
Blank (A204147-BLK2) EPA 200.7 - Quality Control											
Aluminum	ND	0.050	mg/L							04/29/12	
Barium	ND	0.050	mg/L							04/29/12	
Calcium	ND	0.10	mg/L							04/29/12	
Iron	ND	0.050	mg/L							04/29/12	
Magnesium	ND	0.10	mg/L							04/29/12	
Manganese	ND	0.010	mg/L							04/29/12	
Potassium	ND	2.0	mg/L							04/29/12	
Sodium	ND	1.0	mg/L							04/29/12	
Zinc	ND	0.050	mg/L							04/29/12	
Blank Spike (A204147-BS2) EPA 200.7 - Quality Control											
Aluminum	0.19	0.050	mg/L	0.20		96	85-115			04/29/12	
Barium	0.20	0.050	mg/L	0.20		102	85-115			04/29/12	
Calcium	10	0.10	mg/L	10		102	85-115			04/29/12	
Iron	2.1	0.050	mg/L	2.0		103	85-115			04/29/12	
Magnesium	10	0.10	mg/L	10		100	85-115			04/29/12	
Manganese	0.20	0.010	mg/L	0.20		102	85-115			04/29/12	
Potassium	9.9	2.0	mg/L	10		99	85-115			04/29/12	
Sodium	10	1.0	mg/L	10		102	85-115			04/29/12	
Zinc	0.20	0.050	mg/L	0.20		102	85-115			04/29/12	
Blank Spike Dup (A204147-BSD2) EPA 200.7 - Quality Control											
Aluminum	0.20	0.050	mg/L	0.20		101	85-115	6	20	04/29/12	
Barium	0.20	0.050	mg/L	0.20		100	85-115	1	20	04/29/12	
Calcium	10	0.10	mg/L	10		103	85-115	1	20	04/29/12	
Iron	2.1	0.050	mg/L	2.0		103	85-115	0	20	04/29/12	
Magnesium	10	0.10	mg/L	10		101	85-115	1	20	04/29/12	
Manganese	0.20	0.010	mg/L	0.20		102	85-115	0	20	04/29/12	
Potassium	10	2.0	mg/L	10		101	85-115	2	20	04/29/12	
Sodium	10	1.0	mg/L	10		103	85-115	0	20	04/29/12	
Zinc	0.21	0.050	mg/L	0.20		103	85-115	1	20	04/29/12	
Matrix Spike (A204147-MS3) EPA 200.7 - Quality Control					**Source: A2D1600-01**						
Aluminum	0.46	0.050	mg/L	0.20	0.23	118	70-130			04/29/12	
Barium	0.23	0.050	mg/L	0.20	ND	100	70-130			04/29/12	
Calcium	160	0.10	mg/L	10	160	58	70-130			04/29/12	MS02 ***Low***
Iron	2.5	0.050	mg/L	2.0	0.48	101	70-130			04/29/12	
Magnesium	61	0.10	mg/L	10	52	90	70-130			04/29/12	
Manganese	0.33	0.010	mg/L	0.20	0.13	99	70-130			04/29/12	
Potassium	15	2.0	mg/L	10	4.4	102	70-130			04/29/12	
Sodium	350	1.0	mg/L	10	340	65	70-130			04/29/12	MS02 ***Low***
Zinc	0.25	0.050	mg/L	0.20	0.051	101	70-130			04/29/12	
Matrix Spike (A204147-MS4) EPA 200.7 - Quality Control					**Source: A2D1627-01**						
Aluminum	0.64	0.050	mg/L	0.20	0.24	200	70-130			04/29/12	MS01 ***High***

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Metals Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204147				Analyst: NRE		Prepared: 4/23/2012					
Matrix Spike (A204147-MS4)	**EPA 200.7 - Quality Control**					**Source: A2D1627-01**					
Barium	0.25	0.050	mg/L	0.20	ND	103	70-130			04/29/12	
Calcium	15	0.10	mg/L	10	5.1	102	70-130			04/29/12	
Iron	2.3	0.050	mg/L	2.0	0.20	106	70-130			04/29/12	
Magnesium	12	0.10	mg/L	10	2.1	103	70-130			04/29/12	
Manganese	0.29	0.010	mg/L	0.20	0.083	102	70-130			04/29/12	
Potassium	15	2.0	mg/L	10	5.2	100	70-130			04/29/12	
Sodium	32	1.0	mg/L	10	22	100	70-130			04/29/12	
Zinc	0.25	0.050	mg/L	0.20	ND	100	70-130			04/29/12	
Matrix Spike Dup (A204147-MSD3)	**EPA 200.7 - Quality Control**					**Source: A2D1600-01**					
Aluminum	0.44	0.050	mg/L	0.20	0.23	106	70-130	5	20	04/29/12	
Barium	0.23	0.050	mg/L	0.20	ND	100	70-130	0	20	04/29/12	
Calcium	170	0.10	mg/L	10	160	106	70-130	3	20	04/29/12	
Iron	2.5	0.050	mg/L	2.0	0.48	100	70-130	1	20	04/29/12	
Magnesium	62	0.10	mg/L	10	52	107	70-130	3	20	04/29/12	
Manganese	0.34	0.010	mg/L	0.20	0.13	101	70-130	1	20	04/29/12	
Potassium	15	2.0	mg/L	10	4.4	104	70-130	1	20	04/29/12	
Sodium	360	1.0	mg/L	10	340	164	70-130	3	20	04/29/12	MS01 ***High***
Zinc	0.26	0.050	mg/L	0.20	0.051	102	70-130	1	20	04/29/12	
Matrix Spike Dup (A204147-MSD4)	**EPA 200.7 - Quality Control**					**Source: A2D1627-01**					
Aluminum	0.62	0.050	mg/L	0.20	0.24	190	70-130	3	20	04/29/12	MS01 ***High***
Barium	0.25	0.050	mg/L	0.20	ND	102	70-130	1	20	04/29/12	
Calcium	15	0.10	mg/L	10	5.1	100	70-130	2	20	04/29/12	
Iron	2.3	0.050	mg/L	2.0	0.20	104	70-130	1	20	04/29/12	
Magnesium	12	0.10	mg/L	10	2.1	100	70-130	2	20	04/29/12	
Manganese	0.28	0.010	mg/L	0.20	0.083	100	70-130	2	20	04/29/12	
Potassium	15	2.0	mg/L	10	5.2	98	70-130	2	20	04/29/12	
Sodium	31	1.0	mg/L	10	22	92	70-130	3	20	04/29/12	
Zinc	0.24	0.050	mg/L	0.20	ND	98	70-130	1	20	04/29/12	
Blank (A204147-BLK1)	**EPA 200.8 - Quality Control**										
Antimony	ND	2.0	ug/L							04/30/12	
Arsenic	ND	2.0	ug/L							04/30/12	
Beryllium	ND	1.0	ug/L							04/30/12	
Cadmium	ND	1.0	ug/L							04/30/12	
Chromium	ND	10	ug/L							04/30/12	
Copper	ND	5.0	ug/L							04/30/12	
Lead	ND	5.0	ug/L							04/30/12	
Mercury	ND	0.40	ug/L							04/30/12	
Nickel	ND	10	ug/L							04/30/12	
Selenium	ND	2.0	ug/L							04/30/12	
Silver	ND	10	ug/L							04/30/12	
Thallium	ND	1.0	ug/L							04/30/12	
Uranium	ND	1.0	ug/L							04/30/12	

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Metals Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204147				Analyst: MAS		Prepared: 4/23/2012					
Blank Spike (A204147-BS1)	**EPA 200.8 - Quality Control**										
Antimony	200	2.0	ug/L	200		99	85-115			04/30/12	
Arsenic	200	2.0	ug/L	200		102	85-115			04/30/12	
Beryllium	190	1.0	ug/L	200		96	85-115			04/30/12	
Cadmium	190	1.0	ug/L	200		97	85-115			04/30/12	
Chromium	210	10	ug/L	200		104	85-115			04/30/12	
Copper	190	5.0	ug/L	200		97	85-115			04/30/12	
Lead	200	5.0	ug/L	200		98	85-115			04/30/12	
Mercury	4.5	0.40	ug/L	5.0		91	85-115			04/30/12	
Nickel	200	10	ug/L	200		98	85-115			04/30/12	
Selenium	190	2.0	ug/L	200		97	85-115			04/30/12	
Silver	92	10	ug/L	100		92	75-125			04/30/12	
Thallium	230	1.0	ug/L	200		113	85-115			04/30/12	
Uranium	100	1.0	ug/L	100		102	85-115			04/30/12	
Blank Spike Dup (A204147-BSD1)	**EPA 200.8 - Quality Control**										
Antimony	200	2.0	ug/L	200		102	85-115	3	20	04/30/12	
Arsenic	210	2.0	ug/L	200		103	85-115	0	20	04/30/12	
Beryllium	190	1.0	ug/L	200		97	85-115	1	20	04/30/12	
Cadmium	190	1.0	ug/L	200		96	85-115	1	20	04/30/12	
Chromium	210	10	ug/L	200		106	85-115	2	20	04/30/12	
Copper	200	5.0	ug/L	200		100	85-115	3	20	04/30/12	
Lead	190	5.0	ug/L	200		97	85-115	2	20	04/30/12	
Mercury	4.4	0.40	ug/L	5.0		89	85-115	2	20	04/30/12	
Nickel	200	10	ug/L	200		100	85-115	2	20	04/30/12	
Selenium	200	2.0	ug/L	200		101	85-115	4	20	04/30/12	
Silver	93	10	ug/L	100		93	75-125	1	20	04/30/12	
Thallium	220	1.0	ug/L	200		112	85-115	1	20	04/30/12	
Uranium	100	1.0	ug/L	100		100	85-115	3	20	04/30/12	
Matrix Spike (A204147-MS1)	**EPA 200.8 - Quality Control**					**Source: A2D1600-01**					
Antimony	200	2.0	ug/L	200	ND	102	70-130			04/30/12	
Arsenic	210	2.0	ug/L	200	ND	106	70-130			04/30/12	
Beryllium	180	1.0	ug/L	200	ND	90	70-130			04/30/12	
Cadmium	190	1.0	ug/L	200	ND	94	70-130			04/30/12	
Chromium	210	10	ug/L	200	ND	103	70-130			04/30/12	
Copper	190	5.0	ug/L	200	8.7	91	70-130			04/30/12	
Lead	190	5.0	ug/L	200	ND	95	70-130			04/30/12	
Mercury	4.5	0.40	ug/L	5.0	ND	90	70-130			04/30/12	
Nickel	190	10	ug/L	200	ND	94	70-130			04/30/12	
Selenium	210	2.0	ug/L	200	3.0	106	70-130			04/30/12	
Silver	86	10	ug/L	100	ND	86	70-130			04/30/12	
Thallium	210	1.0	ug/L	200	ND	107	70-130			04/30/12	
Uranium	110	1.0	ug/L	100	5.7	101	70-130			04/30/12	
Matrix Spike (A204147-MS2)	**EPA 200.8 - Quality Control**					**Source: A2D1627-01**					

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Metals Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204147				Analyst: MAS		Prepared: 4/23/2012					
Matrix Spike (A204147-MS2)	**EPA 200.8 - Quality Control**					**Source: A2D1627-01**					
Antimony	200	2.0	ug/L	200	ND	101	70-130			04/30/12	
Arsenic	200	2.0	ug/L	200	ND	101	70-130			04/30/12	
Beryllium	190	1.0	ug/L	200	ND	96	70-130			04/30/12	
Cadmium	190	1.0	ug/L	200	ND	97	70-130			04/30/12	
Chromium	210	10	ug/L	200	ND	105	70-130			04/30/12	
Copper	190	5.0	ug/L	200	ND	97	70-130			04/30/12	
Lead	200	5.0	ug/L	200	ND	98	70-130			04/30/12	
Nickel	200	10	ug/L	200	ND	98	70-130			04/30/12	
Selenium	190	2.0	ug/L	200	ND	96	70-130			04/30/12	
Silver	92	10	ug/L	100	ND	92	70-130			04/30/12	
Thallium	230	1.0	ug/L	200	ND	113	70-130			04/30/12	
Uranium	100	1.0	ug/L	100	ND	103	70-130			04/30/12	
Matrix Spike (A204147-MS5)	**EPA 200.8 - Quality Control**					**Source: A2D1627-01**					
Mercury	5.1	0.40	ug/L	5.0	ND	101	70-130			05/01/12	
Matrix Spike Dup (A204147-MSD1)	**EPA 200.8 - Quality Control**					**Source: A2D1600-01**					
Antimony	210	2.0	ug/L	200	ND	103	70-130	2	20	04/30/12	
Arsenic	210	2.0	ug/L	200	ND	106	70-130	0	20	04/30/12	
Beryllium	180	1.0	ug/L	200	ND	91	70-130	2	20	04/30/12	
Cadmium	190	1.0	ug/L	200	ND	95	70-130	1	20	04/30/12	
Chromium	210	10	ug/L	200	ND	105	70-130	2	20	04/30/12	
Copper	190	5.0	ug/L	200	8.7	91	70-130	0	20	04/30/12	
Lead	190	5.0	ug/L	200	ND	94	70-130	1	20	04/30/12	
Mercury	4.5	0.40	ug/L	5.0	ND	90	70-130	1	20	04/30/12	
Nickel	190	10	ug/L	200	ND	94	70-130	0	20	04/30/12	
Selenium	220	2.0	ug/L	200	3.0	106	70-130	0	20	04/30/12	
Silver	88	10	ug/L	100	ND	88	70-130	2	20	04/30/12	
Thallium	210	1.0	ug/L	200	ND	107	70-130	0	20	04/30/12	
Uranium	110	1.0	ug/L	100	5.7	100	70-130	1	20	04/30/12	
Matrix Spike Dup (A204147-MSD2)	**EPA 200.8 - Quality Control**					**Source: A2D1627-01**					
Antimony	200	2.0	ug/L	200	ND	102	70-130	1	20	04/30/12	
Arsenic	200	2.0	ug/L	200	ND	100	70-130	2	20	04/30/12	
Beryllium	190	1.0	ug/L	200	ND	94	70-130	3	20	04/30/12	
Cadmium	200	1.0	ug/L	200	ND	98	70-130	1	20	04/30/12	
Chromium	200	10	ug/L	200	ND	101	70-130	4	20	04/30/12	
Copper	190	5.0	ug/L	200	ND	94	70-130	4	20	04/30/12	
Lead	190	5.0	ug/L	200	ND	97	70-130	1	20	04/30/12	
Nickel	190	10	ug/L	200	ND	94	70-130	5	20	04/30/12	
Selenium	190	2.0	ug/L	200	ND	96	70-130	1	20	04/30/12	
Silver	95	10	ug/L	100	ND	95	70-130	3	20	04/30/12	
Thallium	220	1.0	ug/L	200	ND	111	70-130	2	20	04/30/12	
Uranium	100	1.0	ug/L	100	ND	102	70-130	1	20	04/30/12	

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Metals Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204147				Analyst: MAS		Prepared: 4/23/2012					
Matrix Spike Dup (A204147-MSD5)	**EPA 200.8 - Quality Control**					**Source: A2D1627-01**					
Mercury	4.9	0.40	ug/L	5.0	ND	99	70-130	2	20	05/01/12	
Batch: A205860				Analyst: NRE		Prepared: 6/5/2012					
Blank (A205860-BLK1)	**EPA 200.7 - Quality Control**										
Iron - Dissolved (1)	ND	0.050	mg/L							06/07/12	
Manganese - Dissolved (1)	ND	0.010	mg/L							06/07/12	
Blank Spike (A205860-BS1)	**EPA 200.7 - Quality Control**										
Iron - Dissolved (1)	2.0	0.050	mg/L	2.0		99	85-115			06/07/12	
Manganese - Dissolved (1)	0.20	0.010	mg/L	0.20		101	85-115			06/07/12	
Blank Spike Dup (A205860-BSD1)	**EPA 200.7 - Quality Control**										
Iron - Dissolved (1)	2.0	0.050	mg/L	2.0		101	85-115	2	20	06/07/12	
Manganese - Dissolved (1)	0.20	0.010	mg/L	0.20		101	85-115	1	20	06/07/12	
Matrix Spike (A205860-MS1)	**EPA 200.7 - Quality Control**					**Source: A2D1159-01**					
Iron - Dissolved (1)	2.0	0.050	mg/L	2.0	ND	99	70-130			06/07/12	
Manganese - Dissolved (1)	0.24	0.010	mg/L	0.20	0.041	100	70-130			06/07/12	
Matrix Spike Dup (A205860-MSD1)	**EPA 200.7 - Quality Control**					**Source: A2D1159-01**					
Iron - Dissolved (1)	2.0	0.050	mg/L	2.0	ND	98	70-130	1	20	06/07/12	
Manganese - Dissolved (1)	0.24	0.010	mg/L	0.20	0.041	99	70-130	0	20	06/07/12	

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Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204120				Analyst: GAK		Prepared: 4/20/2012					
Blank (A204120-BLK1) EPA 515.3 - Quality Control											
2,4,5-T	ND	1.0	ug/L							04/23/12	
2,4,5-TP (Silvex)	ND	1.0	ug/L							04/23/12	
2,4-D	ND	10	ug/L							04/23/12	
Bentazon	ND	2.0	ug/L							04/23/12	
Dalapon	ND	10	ug/L							04/23/12	
Dicamba	ND	1.5	ug/L							04/23/12	
Dinoseb	ND	2.0	ug/L							04/23/12	
Pentachlorophenol	ND	0.20	ug/L							04/23/12	
Picloram	ND	1.0	ug/L							04/23/12	
Surrogate: DCPAA	*56*			*58*		*97*	*70-130*			04/23/12	
Blank Spike (A204120-BS1) EPA 515.3 - Quality Control											
2,4,5-T	3.6	1.0	ug/L	4.0		91	70-130			04/23/12	
2,4,5-TP (Silvex)	4.0	1.0	ug/L	4.0		99	70-130			04/23/12	
2,4-D	38	10	ug/L	40		95	70-130			04/23/12	
Bentazon	6.8	2.0	ug/L	8.0		86	70-130			04/23/12	
Dalapon	40	10	ug/L	40		100	70-130			04/23/12	
Dicamba	5.9	1.5	ug/L	6.0		98	70-130			04/23/12	
Dinoseb	8.2	2.0	ug/L	8.0		102	70-130			04/23/12	
Pentachlorophenol	0.80	0.20	ug/L	0.80		100	70-130			04/23/12	
Picloram	4.3	1.0	ug/L	4.0		108	70-130			04/23/12	
Surrogate: DCPAA	*57*			*58*		*98*	*70-130*			04/23/12	
Blank Spike Dup (A204120-BSD1) EPA 515.3 - Quality Control											
2,4,5-T	3.6	1.0	ug/L	4.0		89	70-130	2	20	04/24/12	
2,4,5-TP (Silvex)	3.9	1.0	ug/L	4.0		96	70-130	3	20	04/24/12	
2,4-D	37	10	ug/L	40		92	70-130	3	20	04/24/12	
Bentazon	6.5	2.0	ug/L	8.0		81	70-130	6	20	04/24/12	
Dalapon	40	10	ug/L	40		100	70-130	0	20	04/24/12	
Dicamba	5.8	1.5	ug/L	6.0		96	70-130	2	20	04/24/12	
Dinoseb	8.3	2.0	ug/L	8.0		104	70-130	2	20	04/24/12	
Pentachlorophenol	0.82	0.20	ug/L	0.80		102	70-130	2	20	04/24/12	
Picloram	4.2	1.0	ug/L	4.0		106	70-130	2	20	04/24/12	
Surrogate: DCPAA	*56*			*58*		*97*	*70-130*			04/24/12	
Matrix Spike (A204120-MS1) EPA 515.3 - Quality Control					**Source: A2D0841-01**						
2,4,5-T	3.5	1.0	ug/L	4.0	ND	86	70-130			04/24/12	
2,4,5-TP (Silvex)	4.0	1.0	ug/L	4.0	ND	100	70-130			04/24/12	
2,4-D	38	10	ug/L	40	ND	96	70-130			04/24/12	
Bentazon	6.5	2.0	ug/L	8.0	ND	82	70-130			04/24/12	
Dalapon	41	10	ug/L	40	ND	102	70-130			04/24/12	
Dicamba	5.9	1.5	ug/L	6.0	ND	99	70-130			04/24/12	
Dinoseb	8.2	2.0	ug/L	8.0	ND	102	70-130			04/24/12	
Pentachlorophenol	0.80	0.20	ug/L	0.80	ND	100	70-130			04/24/12	

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Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204120				Analyst: GAK		Prepared: 4/20/2012					
Matrix Spike (A204120-MS1) EPA 515.3 - Quality Control						**Source: A2D0841-01**					
Picloram	4.3	1.0	ug/L	4.0	ND	108	70-130			04/24/12	
Surrogate: DCPAA	*58*			*58*		*100*	*70-130*			04/24/12	
Matrix Spike Dup (A204120-MSD1) EPA 515.3 - Quality Control						**Source: A2D0841-01**					
2,4,5-T	3.5	1.0	ug/L	4.0	ND	88	70-130	1	20	04/24/12	
2,4,5-TP (Silvex)	3.9	1.0	ug/L	4.0	ND	98	70-130	2	20	04/24/12	
2,4-D	38	10	ug/L	40	ND	95	70-130	1	20	04/24/12	
Bentazon	6.8	2.0	ug/L	8.0	ND	86	70-130	5	20	04/24/12	
Dalapon	40	10	ug/L	40	ND	101	70-130	1	20	04/24/12	
Dicamba	6.0	1.5	ug/L	6.0	ND	100	70-130	1	20	04/24/12	
Dinoseb	8.3	2.0	ug/L	8.0	ND	104	70-130	2	20	04/24/12	
Pentachlorophenol	0.82	0.20	ug/L	0.80	ND	102	70-130	2	20	04/24/12	
Picloram	4.4	1.0	ug/L	4.0	ND	109	70-130	1	20	04/24/12	
Surrogate: DCPAA	*57*			*58*		*99*	*70-130*			04/24/12	
Batch: A204142				Analyst: PYA		Prepared: 4/21/2012					
Blank (A204142-BLK1) EPA 549.2 - Quality Control											
Diquat	ND	4.0	ug/L							04/27/12	
Blank Spike (A204142-BS1) EPA 549.2 - Quality Control											
Diquat	36	4.0	ug/L	40		91	70-130			04/27/12	
Blank Spike Dup (A204142-BSD1) EPA 549.2 - Quality Control											
Diquat	36	4.0	ug/L	40		89	70-130	2	30	04/27/12	
Matrix Spike (A204142-MS1) EPA 549.2 - Quality Control						**Source: A2D1436-01**					
Diquat	32	4.0	ug/L	40	ND	80	70-130			04/27/12	
Batch: A204145				Analyst: PYA		Prepared: 4/23/2012					
Blank (A204145-BLK1) EPA 632 - Quality Control											
Diuron	ND	1.0	ug/L							04/25/12	
Surrogate: Benthiocarb	*250*			*250*		*99*	*70-130*			04/25/12	
Blank Spike (A204145-BS1) EPA 632 - Quality Control											
Diuron	11	1.0	ug/L	10		107	70-130			04/25/12	
Surrogate: Benthiocarb	*250*			*250*		*101*	*70-130*			04/25/12	
Blank Spike Dup (A204145-BSD1) EPA 632 - Quality Control											
Diuron	5.2	1.0	ug/L	5.0		103	70-130	70	30	04/25/12	X01
Surrogate: Benthiocarb	*250*			*250*		*100*	*70-130*			04/25/12	
Matrix Spike (A204145-MS1) EPA 632 - Quality Control						**Source: A2D1627-01**					

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Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204145				Analyst: PYA		Prepared: 4/23/2012					
Matrix Spike (A204145-MS1) EPA 632 - Quality Control						**Source: A2D1627-01**					
Diuron	5.2	1.0	ug/L	4.8	ND	108	70-130			04/25/12	
Surrogate: Benthiocarb	*240*			*240*		*99*	*70-130*			04/25/12	
Batch: A204149				Analyst: XHX		Prepared: 4/23/2012					
Blank (A204149-BLK1) EPA 547 - Quality Control											
Glyphosate	ND	25	ug/L							04/24/12	
Surrogate: AMPA	*91*			*100*		*90*	*70-130*			04/24/12	
Blank Spike (A204149-BS1) EPA 547 - Quality Control											
Glyphosate	120	25	ug/L	120		93	70-130			04/24/12	
Surrogate: AMPA	*130*			*120*		*101*	*70-130*			04/24/12	
Blank Spike Dup (A204149-BSD1) EPA 547 - Quality Control											
Glyphosate	130	25	ug/L	120		104	70-130	12	30	04/24/12	
Surrogate: AMPA	*130*			*120*		*102*	*70-130*			04/24/12	
Matrix Spike (A204149-MS1) EPA 547 - Quality Control						**Source: A2D1264-01**					
Glyphosate	130	25	ug/L	120	ND	107	70-130			04/24/12	
Surrogate: AMPA	*110*			*120*		*90*	*70-130*			04/24/12	
Matrix Spike Dup (A204149-MSD1) EPA 547 - Quality Control						**Source: A2D1264-01**					
Glyphosate	140	25	ug/L	120	ND	112	70-130	4	30	04/24/12	
Surrogate: AMPA	*120*			*120*		*98*	*70-130*			04/24/12	
Batch: A204154				Analyst: gak		Prepared: 4/23/2012					
Blank (A204154-BLK1) EPA 505 - Quality Control											
Aldrin	ND	0.075	ug/L							04/23/12	
Chlordane	ND	0.10	ug/L							04/23/12	
Chlorothalonil	ND	5.0	ug/L							04/23/12	
Dieldrin	ND	0.020	ug/L							04/23/12	
Endrin	ND	0.10	ug/L							04/23/12	
Heptachlor	ND	0.010	ug/L							04/23/12	
Heptachlor Epoxide	ND	0.010	ug/L							04/23/12	
Hexachlorobenzene	ND	0.50	ug/L							04/23/12	
Hexachlorocyclopentadiene	ND	1.0	ug/L							04/23/12	
Lindane	ND	0.20	ug/L							04/23/12	
Methoxychlor	ND	10	ug/L							04/23/12	
PCB Aroclor Screen	ND	0.50	ug/L							04/23/12	
Toxaphene	ND	1.0	ug/L							04/23/12	
Trifluralin	ND	1.0	ug/L							04/23/12	
Surrogate: TCMX	*1.6*			*1.5*		*105*	*70-130*			04/23/12	

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Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204154				Analyst: gak		Prepared: 4/23/2012					
Blank Spike (A204154-BS1)	**EPA 505 - Quality Control**										
Aldrin	0.041	0.075	ug/L	0.040		103	70-130			04/23/12	
Chlorothalonil	0.39	5.0	ug/L	0.40		98	70-130			04/23/12	
Dieldrin	0.042	0.020	ug/L	0.040		105	70-130			04/23/12	
Endrin	0.041	0.10	ug/L	0.040		103	70-130			04/23/12	
Heptachlor	0.042	0.010	ug/L	0.040		105	70-130			04/23/12	
Heptachlor Epoxide	0.043	0.010	ug/L	0.040		107	70-130			04/23/12	
Hexachlorobenzene	0.17	0.50	ug/L	0.16		103	70-130			04/23/12	
Hexachlorocyclopentadiene	0.13	1.0	ug/L	0.12		109	70-130			04/23/12	
Lindane	0.041	0.20	ug/L	0.040		102	70-130			04/23/12	
Methoxychlor	0.041	10	ug/L	0.040		104	70-130			04/23/12	
Trifluralin	0.12	1.0	ug/L	0.12		103	70-130			04/23/12	
Surrogate: TCMX	*1.5*			*1.5*		*103*	*70-130*			04/23/12	
Blank Spike Dup (A204154-BSD1)	**EPA 505 - Quality Control**										
Aldrin	0.041	0.075	ug/L	0.040		102	70-130	2	20	04/23/12	
Chlorothalonil	0.38	5.0	ug/L	0.40		95	70-130	3	20	04/23/12	
Dieldrin	0.041	0.020	ug/L	0.040		101	70-130	3	20	04/23/12	
Endrin	0.039	0.10	ug/L	0.040		98	70-130	6	20	04/23/12	
Heptachlor	0.041	0.010	ug/L	0.040		101	70-130	3	20	04/23/12	
Heptachlor Epoxide	0.040	0.010	ug/L	0.040		100	70-130	7	20	04/23/12	
Hexachlorobenzene	0.16	0.50	ug/L	0.16		99	70-130	4	20	04/23/12	
Hexachlorocyclopentadiene	0.13	1.0	ug/L	0.12		107	70-130	1	20	04/23/12	
Lindane	0.039	0.20	ug/L	0.040		98	70-130	4	20	04/23/12	
Methoxychlor	0.040	10	ug/L	0.040		99	70-130	5	20	04/23/12	
Trifluralin	0.12	1.0	ug/L	0.12		98	70-130	5	20	04/23/12	
Surrogate: TCMX	*1.4*			*1.5*		*95*	*70-130*			04/23/12	
Matrix Spike (A204154-MS1)	**EPA 505 - Quality Control**					**Source: A2D1264-01**					
Aldrin	0.040	0.075	ug/L	0.040	ND	99	70-130			04/23/12	
Chlorothalonil	0.39	5.0	ug/L	0.40	ND	98	70-130			04/23/12	
Dieldrin	0.039	0.020	ug/L	0.040	ND	97	70-130			04/23/12	
Endrin	0.037	0.10	ug/L	0.040	ND	92	70-130			04/23/12	
Heptachlor	0.040	0.010	ug/L	0.040	ND	101	70-130			04/23/12	
Heptachlor Epoxide	0.040	0.010	ug/L	0.040	ND	101	70-130			04/23/12	
Hexachlorobenzene	0.16	0.50	ug/L	0.16	ND	99	70-130			04/23/12	
Hexachlorocyclopentadiene	0.14	1.0	ug/L	0.12	ND	113	70-130			04/23/12	
Lindane	0.039	0.20	ug/L	0.040	ND	96	70-130			04/23/12	
Methoxychlor	0.038	10	ug/L	0.040	ND	95	70-130			04/23/12	
Trifluralin	0.12	1.0	ug/L	0.12	ND	98	70-130			04/23/12	
Surrogate: TCMX	*1.7*			*1.5*		*116*	*70-130*			04/23/12	
Matrix Spike Dup (A204154-MSD1)	**EPA 505 - Quality Control**					**Source: A2D1264-01**					
Aldrin	0.039	0.075	ug/L	0.040	ND	97	70-130	2	20	04/23/12	
Chlorothalonil	0.39	5.0	ug/L	0.40	ND	96	70-130	2	20	04/23/12	

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Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204154				Analyst: gak		Prepared: 4/23/2012					
Matrix Spike Dup (A204154-MSD1)	**EPA 505 - Quality Control**					**Source: A2D1264-01**					
Dieldrin	0.038	0.020	ug/L	0.040	ND	96	70-130	1	20	04/23/12	
Endrin	0.036	0.10	ug/L	0.040	ND	89	70-130	3	20	04/23/12	
Heptachlor	0.039	0.010	ug/L	0.040	ND	98	70-130	3	20	04/23/12	
Heptachlor Epoxide	0.039	0.010	ug/L	0.040	ND	98	70-130	3	20	04/23/12	
Hexachlorobenzene	0.16	0.50	ug/L	0.16	ND	99	70-130	0	20	04/23/12	
Hexachlorocyclopentadiene	0.14	1.0	ug/L	0.12	ND	116	70-130	3	20	04/23/12	
Lindane	0.038	0.20	ug/L	0.040	ND	95	70-130	2	20	04/23/12	
Methoxychlor	0.039	10	ug/L	0.040	ND	97	70-130	2	20	04/23/12	
Trifluralin	0.12	1.0	ug/L	0.12	ND	99	70-130	1	20	04/23/12	
Surrogate: TCMX	*1.6*			*1.5*		*109*	*70-130*			04/23/12	
Batch: A204197				Analyst: GAK		Prepared: 4/23/2012					
Blank (A204197-BLK1)	**EPA 548.1 - Quality Control**										
Endothall	ND	45	ug/L							04/25/12	
Blank Spike (A204197-BS1)	**EPA 548.1 - Quality Control**										
Endothall	96	45	ug/L	100		96	34-141			04/25/12	
Blank Spike Dup (A204197-BSD1)	**EPA 548.1 - Quality Control**										
Endothall	93	45	ug/L	100		93	34-141	3	46	04/25/12	
Matrix Spike (A204197-MS1)	**EPA 548.1 - Quality Control**					**Source: A2D1264-01**					
Endothall	ND	45	ug/L	100	ND	0	34-141			04/25/12	MS02 ***Low***
Matrix Spike Dup (A204197-MSD1)	**EPA 548.1 - Quality Control**					**Source: A2D1264-01**					
Endothall	ND	45	ug/L	100	ND	0	34-141		46	04/25/12	MS02 ***Low***
Batch: A204205				Analyst: XHX		Prepared: 4/24/2012					
Blank (A204205-BLK1)	**EPA 504.1 - Quality Control**										
Dibromochloropropane (DBCP)	ND	0.010	ug/L							04/24/12	
Ethylene Dibromide (EDB)	ND	0.020	ug/L							04/24/12	
Surrogate: Bromoform	*0.26*			*0.25*		*102*	*70-130*			04/24/12	
Blank Spike (A204205-BS1)	**EPA 504.1 - Quality Control**										
Dibromochloropropane (DBCP)	0.24	0.010	ug/L	0.25		95	70-130			04/24/12	
Ethylene Dibromide (EDB)	0.26	0.020	ug/L	0.25		104	70-130			04/24/12	
Surrogate: Bromoform	*0.25*			*0.25*		*102*	*70-130*			04/24/12	
Blank Spike Dup (A204205-BSD1)	**EPA 504.1 - Quality Control**										
Dibromochloropropane (DBCP)	0.24	0.010	ug/L	0.25		96	70-130	1	20	04/25/12	
Ethylene Dibromide (EDB)	0.26	0.020	ug/L	0.25		105	70-130	1	20	04/25/12	
Surrogate: Bromoform	*0.26*			*0.25*		*105*	*70-130*			04/25/12	

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Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204205				Analyst: XHX		Prepared: 4/24/2012					
Matrix Spike (A204205-MS1)	**EPA 504.1 - Quality Control**					**Source: A2D1339-01**					
Dibromochloropropane (DBCP)	0.40	0.010	ug/L	0.25	0.19	85	70-130			04/24/12	
Ethylene Dibromide (EDB)	0.25	0.020	ug/L	0.25	ND	103	70-130			04/24/12	
Surrogate: Bromoform	*0.26*			*0.25*		*106*	*70-130*			04/24/12	
Batch: A204289				Analyst: JGB		Prepared: 4/25/2012					
Blank (A204289-BLK1)	**EPA 524.2 - Quality Control**										
1,1,1,2-Tetrachloroethane	ND	0.50	ug/L							04/25/12	
1,1,1-Trichloroethane	ND	0.50	ug/L							04/25/12	
1,1,2,2-Tetrachloroethane	ND	0.50	ug/L							04/25/12	
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	10	ug/L							04/25/12	
1,1,2-Trichloroethane	ND	0.50	ug/L							04/25/12	
1,1-Dichloroethane	ND	0.50	ug/L							04/25/12	
1,1-Dichloroethene	ND	0.50	ug/L							04/25/12	
1,1-Dichloropropene	ND	0.50	ug/L							04/25/12	
1,2,3-Trichlorobenzene	ND	0.50	ug/L							04/25/12	
1,2,4-Trichlorobenzene	ND	0.50	ug/L							04/25/12	
1,2,4-Trimethylbenzene	ND	0.50	ug/L							04/25/12	
1,2-Dichlorobenzene	ND	0.50	ug/L							04/25/12	
1,2-Dichloroethane	ND	0.50	ug/L							04/25/12	
1,2-Dichloropropane	ND	0.50	ug/L							04/25/12	
1,3,5-Trimethylbenzene	ND	0.50	ug/L							04/25/12	
1,3-Dichlorobenzene	ND	0.50	ug/L							04/25/12	
1,3-Dichloropropane	ND	0.50	ug/L							04/25/12	
1,4-Dichlorobenzene	ND	0.50	ug/L							04/25/12	
2,2-Dichloropropane	ND	0.50	ug/L							04/25/12	
2-Butanone	ND	5.0	ug/L							04/25/12	
2-Chlorotoluene	ND	0.50	ug/L							04/25/12	
2-Hexanone	ND	10	ug/L							04/25/12	
4-Chlorotoluene	ND	0.50	ug/L							04/25/12	
4-Methyl-2-pentanone	ND	5.0	ug/L							04/25/12	
Acetone	ND	10	ug/L							04/25/12	
Benzene	ND	0.50	ug/L							04/25/12	
Bromobenzene	ND	0.50	ug/L							04/25/12	
Bromochloromethane	ND	0.50	ug/L							04/25/12	
Bromodichloromethane	ND	0.50	ug/L							04/25/12	
Bromoform	ND	0.50	ug/L							04/25/12	
Bromomethane	ND	0.50	ug/L							04/25/12	
Carbon Tetrachloride	ND	0.50	ug/L							04/25/12	
Chlorobenzene	ND	0.50	ug/L							04/25/12	
Chloroethane	ND	0.50	ug/L							04/25/12	
Chloroform	ND	0.50	ug/L							04/25/12	
Chloromethane	ND	0.50	ug/L							04/25/12	
cis-1,2-Dichloroethene	ND	0.50	ug/L							04/25/12	
cis-1,3-Dichloropropene	ND	0.50	ug/L							04/25/12	

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Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204289				Analyst: JGB		Prepared: 4/25/2012					
Blank (A204289-BLK1) EPA 524.2 - Quality Control											
Dibromochloromethane	ND	0.50	ug/L							04/25/12	
Dibromomethane	ND	0.50	ug/L							04/25/12	
Dichlorodifluoromethane	ND	0.50	ug/L							04/25/12	
Dichloromethane	ND	0.50	ug/L							04/25/12	
Di-isopropyl ether (DIPE)	ND	3.0	ug/L							04/25/12	
Ethyl tert-Butyl Ether (ETBE)	ND	0.50	ug/L							04/25/12	
Ethylbenzene	ND	0.50	ug/L							04/25/12	
Hexachlorobutadiene	ND	0.50	ug/L							04/25/12	
Isopropylbenzene	ND	0.50	ug/L							04/25/12	
m,p-Xylenes	ND	0.50	ug/L							04/25/12	
Methyl-t-butyl ether	ND	0.50	ug/L							04/25/12	
Naphthalene	ND	0.50	ug/L							04/25/12	
n-Butylbenzene	ND	0.50	ug/L							04/25/12	
n-Propylbenzene	ND	0.50	ug/L							04/25/12	
o-Xylene	ND	0.50	ug/L							04/25/12	
p-Isopropyltoluene	ND	0.50	ug/L							04/25/12	
sec-Butylbenzene	ND	0.50	ug/L							04/25/12	
Styrene	ND	0.50	ug/L							04/25/12	
tert-Amyl Methyl Ether (TAME)	ND	3.0	ug/L							04/25/12	
tert-Butyl alcohol (TBA)	ND	2.0	ug/L							04/25/12	
tert-Butylbenzene	ND	0.50	ug/L							04/25/12	
Tetrachloroethene (PCE)	ND	0.50	ug/L							04/25/12	
Toluene	ND	0.50	ug/L							04/25/12	
trans-1,2-Dichloroethene	ND	0.50	ug/L							04/25/12	
trans-1,3-Dichloropropene	ND	0.50	ug/L							04/25/12	
Trichloroethene (TCE)	ND	0.50	ug/L							04/25/12	
Trichlorofluoromethane	ND	5.0	ug/L							04/25/12	
Vinyl Chloride	ND	0.50	ug/L							04/25/12	
Surrogate: 1,2-Dichlorobenzene-d4	*4.8*			*5.0*		*97*	*70-130*			04/25/12	
Surrogate: Bromofluorobenzene	*4.4*			*5.0*		*89*	*70-130*			04/25/12	
Blank Spike (A204289-BS1) EPA 524.2 - Quality Control											
1,1,1,2-Tetrachloroethane	9.3	0.50	ug/L	10		93	70-130			04/25/12	
1,1,1-Trichloroethane	9.2	0.50	ug/L	10		92	70-130			04/25/12	
1,1,2,2-Tetrachloroethane	9.3	0.50	ug/L	10		93	70-130			04/25/12	
1,1,2-Trichloro-1,2,2-trifluoroethane	9.7	10	ug/L	10		97	70-130			04/25/12	
1,1,2-Trichloroethane	9.4	0.50	ug/L	10		94	70-130			04/25/12	
1,1-Dichloroethane	9.2	0.50	ug/L	10		92	70-130			04/25/12	
1,1-Dichloroethene	9.5	0.50	ug/L	10		95	70-130			04/25/12	
1,1-Dichloropropene	9.8	0.50	ug/L	10		98	70-130			04/25/12	
1,2,3-Trichlorobenzene	8.8	0.50	ug/L	10		88	70-130			04/25/12	
1,2,4-Trichlorobenzene	9.0	0.50	ug/L	10		90	70-130			04/25/12	
1,2,4-Trimethylbenzene	9.1	0.50	ug/L	10		91	70-130			04/25/12	
1,2-Dichlorobenzene	8.8	0.50	ug/L	10		88	70-130			04/25/12	
1,2-Dichloroethane	9.7	0.50	ug/L	10		97	70-130			04/25/12	

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Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204289				Analyst: JGB		Prepared: 4/25/2012					
Blank Spike (A204289-BS1)	**EPA 524.2 - Quality Control**										
1,2-Dichloropropane	9.2	0.50	ug/L	10		92	70-130			04/25/12	
1,3,5-Trimethylbenzene	9.1	0.50	ug/L	10		91	70-130			04/25/12	
1,3-Dichlorobenzene	8.6	0.50	ug/L	10		86	70-130			04/25/12	
1,3-Dichloropropane	9.3	0.50	ug/L	10		93	70-130			04/25/12	
1,4-Dichlorobenzene	8.7	0.50	ug/L	10		87	70-130			04/25/12	
2,2-Dichloropropane	8.4	0.50	ug/L	10		84	70-130			04/25/12	
2-Butanone	10	5.0	ug/L	10		102	70-130			04/25/12	
2-Chlorotoluene	9.1	0.50	ug/L	10		91	70-130			04/25/12	
2-Hexanone	9.4	10	ug/L	10		94	70-130			04/25/12	
4-Chlorotoluene	9.3	0.50	ug/L	10		93	70-130			04/25/12	
4-Methyl-2-pentanone	9.7	5.0	ug/L	10		97	70-130			04/25/12	
Acetone	10	10	ug/L	10		100	70-130			04/25/12	
Benzene	9.6	0.50	ug/L	10		96	70-130			04/25/12	
Bromobenzene	9.0	0.50	ug/L	10		90	70-130			04/25/12	
Bromochloromethane	9.6	0.50	ug/L	10		96	70-130			04/25/12	
Bromodichloromethane	9.4	0.50	ug/L	10		94	70-130			04/25/12	
Bromoform	8.8	0.50	ug/L	10		88	70-130			04/25/12	
Bromomethane	10	0.50	ug/L	10		100	70-130			04/25/12	
Carbon Tetrachloride	9.6	0.50	ug/L	10		96	70-130			04/25/12	
Chlorobenzene	9.9	0.50	ug/L	10		99	70-130			04/25/12	
Chloroethane	9.2	0.50	ug/L	10		92	70-130			04/25/12	
Chloroform	9.5	0.50	ug/L	10		95	70-130			04/25/12	
Chloromethane	8.9	0.50	ug/L	10		89	70-130			04/25/12	
cis-1,2-Dichloroethene	9.2	0.50	ug/L	10		92	70-130			04/25/12	
cis-1,3-Dichloropropene	8.8	0.50	ug/L	10		88	70-130			04/25/12	
Dibromochloromethane	9.3	0.50	ug/L	10		93	70-130			04/25/12	
Dibromomethane	9.4	0.50	ug/L	10		94	70-130			04/25/12	
Dichlorodifluoromethane	9.9	0.50	ug/L	10		99	70-130			04/25/12	
Dichloromethane	9.3	0.50	ug/L	10		93	70-130			04/25/12	
Di-isopropyl ether (DIPE)	9.4	3.0	ug/L	10		94	70-130			04/25/12	
Ethyl tert-Butyl Ether (ETBE)	8.2	0.50	ug/L	10		82	70-130			04/25/12	
Ethylbenzene	9.8	0.50	ug/L	10		98	70-130			04/25/12	
Hexachlorobutadiene	9.4	0.50	ug/L	10		94	70-130			04/25/12	
Isopropylbenzene	9.2	0.50	ug/L	10		92	70-130			04/25/12	
m,p-Xylenes	19	0.50	ug/L	20		96	70-130			04/25/12	
Methyl-t-butyl ether	18	0.50	ug/L	20		89	70-130			04/25/12	
Naphthalene	8.7	0.50	ug/L	10		87	70-130			04/25/12	
n-Butylbenzene	9.0	0.50	ug/L	10		90	70-130			04/25/12	
n-Propylbenzene	9.2	0.50	ug/L	10		92	70-130			04/25/12	
o-Xylene	9.3	0.50	ug/L	10		93	70-130			04/25/12	
p-Isopropyltoluene	8.8	0.50	ug/L	10		88	70-130			04/25/12	
sec-Butylbenzene	8.9	0.50	ug/L	10		89	70-130			04/25/12	
Styrene	9.3	0.50	ug/L	10		93	70-130			04/25/12	
tert-Amyl Methyl Ether (TAME)	10	3.0	ug/L	10		104	70-130			04/25/12	
tert-Butyl alcohol (TBA)	11	2.0	ug/L	10		112	70-130			04/25/12	

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Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204289				Analyst: JGB		Prepared: 4/25/2012					
Blank Spike (A204289-BS1) EPA 524.2 - Quality Control											
tert-Butylbenzene	8.2	0.50	ug/L	10		82	70-130			04/25/12	
Tetrachloroethene (PCE)	9.3	0.50	ug/L	10		93	70-130			04/25/12	
Toluene	9.4	0.50	ug/L	10		94	70-130			04/25/12	
trans-1,2-Dichloroethene	9.3	0.50	ug/L	10		93	70-130			04/25/12	
trans-1,3-Dichloropropene	8.3	0.50	ug/L	10		83	70-130			04/25/12	
Trichloroethene (TCE)	9.5	0.50	ug/L	10		95	70-130			04/25/12	
Trichlorofluoromethane	9.8	5.0	ug/L	10		98	70-130			04/25/12	
Vinyl Chloride	8.8	0.50	ug/L	10		88	70-130			04/25/12	
Surrogate: 1,2-Dichlorobenzene-d4	*4.6*			*5.0*		*92*	*70-130*			04/25/12	
Surrogate: Bromofluorobenzene	*4.9*			*5.0*		*98*	*70-130*			04/25/12	
Blank Spike Dup (A204289-BSD1) EPA 524.2 - Quality Control											
1,1,1,2-Tetrachloroethane	8.9	0.50	ug/L	10		89	70-130	4	30	04/25/12	
1,1,1-Trichloroethane	9.2	0.50	ug/L	10		92	70-130	0	30	04/25/12	
1,1,2,2-Tetrachloroethane	9.2	0.50	ug/L	10		92	70-130	1	30	04/25/12	
1,1,2-Trichloro-1,2,2-trifluoroethane	9.6	10	ug/L	10		96	70-130	1	30	04/25/12	
1,1,2-Trichloroethane	8.9	0.50	ug/L	10		89	70-130	5	30	04/25/12	
1,1-Dichloroethane	9.0	0.50	ug/L	10		90	70-130	2	30	04/25/12	
1,1-Dichloroethene	9.3	0.50	ug/L	10		93	70-130	1	30	04/25/12	
1,1-Dichloropropene	9.8	0.50	ug/L	10		98	70-130	1	30	04/25/12	
1,2,3-Trichlorobenzene	8.9	0.50	ug/L	10		89	70-130	2	30	04/25/12	
1,2,4-Trichlorobenzene	9.0	0.50	ug/L	10		90	70-130	1	30	04/25/12	
1,2,4-Trimethylbenzene	9.6	0.50	ug/L	10		96	70-130	6	30	04/25/12	
1,2-Dichlorobenzene	9.2	0.50	ug/L	10		92	70-130	5	30	04/25/12	
1,2-Dichloroethane	9.4	0.50	ug/L	10		94	70-130	3	30	04/25/12	
1,2-Dichloropropane	9.7	0.50	ug/L	10		97	70-130	5	30	04/25/12	
1,3,5-Trimethylbenzene	9.5	0.50	ug/L	10		95	70-130	4	30	04/25/12	
1,3-Dichlorobenzene	9.0	0.50	ug/L	10		90	70-130	5	30	04/25/12	
1,3-Dichloropropane	8.8	0.50	ug/L	10		88	70-130	5	30	04/25/12	
1,4-Dichlorobenzene	9.1	0.50	ug/L	10		91	70-130	5	30	04/25/12	
2,2-Dichloropropane	8.0	0.50	ug/L	10		80	70-130	4	30	04/25/12	
2-Butanone	9.2	5.0	ug/L	10		92	70-130	10	30	04/25/12	
2-Chlorotoluene	9.4	0.50	ug/L	10		94	70-130	3	30	04/25/12	
2-Hexanone	8.4	10	ug/L	10		84	70-130	11	30	04/25/12	
4-Chlorotoluene	9.6	0.50	ug/L	10		96	70-130	3	30	04/25/12	
4-Methyl-2-pentanone	8.8	5.0	ug/L	10		88	70-130	10	30	04/25/12	
Acetone	8.5	10	ug/L	10		85	70-130	16	30	04/25/12	
Benzene	9.9	0.50	ug/L	10		99	70-130	3	30	04/25/12	
Bromobenzene	9.2	0.50	ug/L	10		92	70-130	3	30	04/25/12	
Bromochloromethane	10	0.50	ug/L	10		100	70-130	4	30	04/25/12	
Bromodichloromethane	9.5	0.50	ug/L	10		95	70-130	1	30	04/25/12	
Bromoform	8.7	0.50	ug/L	10		87	70-130	1	30	04/25/12	
Bromomethane	9.7	0.50	ug/L	10		97	70-130	3	30	04/25/12	
Carbon Tetrachloride	9.5	0.50	ug/L	10		95	70-130	1	30	04/25/12	
Chlorobenzene	9.7	0.50	ug/L	10		97	70-130	2	30	04/25/12	

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Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204289				Analyst: JGB		Prepared: 4/25/2012					
Blank Spike Dup (A204289-BSD1)	**EPA 524.2 - Quality Control**										
Chloroethane	9.1	0.50	ug/L	10		91	70-130	1	30	04/25/12	
Chloroform	9.6	0.50	ug/L	10		96	70-130	0	30	04/25/12	
Chloromethane	9.1	0.50	ug/L	10		91	70-130	2	30	04/25/12	
cis-1,2-Dichloroethene	9.4	0.50	ug/L	10		94	70-130	3	30	04/25/12	
cis-1,3-Dichloropropene	8.7	0.50	ug/L	10		87	70-130	1	30	04/25/12	
Dibromochloromethane	9.1	0.50	ug/L	10		91	70-130	2	30	04/25/12	
Dibromomethane	9.7	0.50	ug/L	10		97	70-130	3	30	04/25/12	
Dichlorodifluoromethane	9.6	0.50	ug/L	10		96	70-130	3	30	04/25/12	
Dichloromethane	9.3	0.50	ug/L	10		93	70-130	0	30	04/25/12	
Di-isopropyl ether (DIPE)	8.9	3.0	ug/L	10		89	70-130	5	30	04/25/12	
Ethyl tert-Butyl Ether (ETBE)	7.8	0.50	ug/L	10		78	70-130	6	30	04/25/12	
Ethylbenzene	9.8	0.50	ug/L	10		98	70-130	0	30	04/25/12	
Hexachlorobutadiene	9.3	0.50	ug/L	10		93	70-130	1	30	04/25/12	
Isopropylbenzene	9.4	0.50	ug/L	10		94	70-130	2	30	04/25/12	
m,p-Xylenes	19	0.50	ug/L	20		97	70-130	1	30	04/25/12	
Methyl-t-butyl ether	17	0.50	ug/L	20		84	70-130	5	30	04/25/12	
Naphthalene	8.6	0.50	ug/L	10		86	70-130	1	30	04/25/12	
n-Butylbenzene	9.4	0.50	ug/L	10		94	70-130	4	30	04/25/12	
n-Propylbenzene	9.5	0.50	ug/L	10		95	70-130	4	30	04/25/12	
o-Xylene	9.5	0.50	ug/L	10		95	70-130	1	30	04/25/12	
p-Isopropyltoluene	9.2	0.50	ug/L	10		92	70-130	5	30	04/25/12	
sec-Butylbenzene	9.3	0.50	ug/L	10		93	70-130	5	30	04/25/12	
Styrene	9.2	0.50	ug/L	10		92	70-130	1	30	04/25/12	
tert-Amyl Methyl Ether (TAME)	10	3.0	ug/L	10		102	70-130	2	30	04/25/12	
tert-Butyl alcohol (TBA)	7.8	2.0	ug/L	10		78	70-130	36	30	04/25/12	BS03
tert-Butylbenzene	10	0.50	ug/L	10		100	70-130	19	30	04/25/12	
Tetrachloroethene (PCE)	9.2	0.50	ug/L	10		92	70-130	2	30	04/25/12	
Toluene	9.4	0.50	ug/L	10		94	70-130	0	30	04/25/12	
trans-1,2-Dichloroethene	9.1	0.50	ug/L	10		91	70-130	2	30	04/25/12	
trans-1,3-Dichloropropene	8.0	0.50	ug/L	10		80	70-130	4	30	04/25/12	
Trichloroethene (TCE)	9.5	0.50	ug/L	10		95	70-130	0	30	04/25/12	
Trichlorofluoromethane	9.7	5.0	ug/L	10		97	70-130	0	30	04/25/12	
Vinyl Chloride	9.2	0.50	ug/L	10		92	70-130	5	30	04/25/12	
Surrogate: 1,2-Dichlorobenzene-d4	*4.8*			*5.0*		*97*	*70-130*			04/25/12	
Surrogate: Bromofluorobenzene	*4.9*			*5.0*		*98*	*70-130*			04/25/12	
Batch: A204384				Analyst: XHX		Prepared: 4/27/2012					
Blank (A204384-BLK1)	**EPA 531.1 - Quality Control**										
3-Hydroxycarbofuran	ND	3.0	ug/L							04/29/12	
Aldicarb	ND	3.0	ug/L							04/29/12	
Aldicarb Sulfone	ND	2.0	ug/L							04/29/12	
Aldicarb Sulfoxide	ND	3.0	ug/L							04/29/12	
Carbaryl	ND	5.0	ug/L							04/29/12	
Carbofuran	ND	5.0	ug/L							04/29/12	

A2D1627 FINAL 06112012 1316

Amended

BSK Associates Engineers & Laboratories

Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204384				Analyst: XHX		Prepared: 4/27/2012					
Blank (A204384-BLK1) EPA 531.1 - Quality Control											
Methomyl	ND	2.0	ug/L							04/29/12	
Oxamyl	ND	20	ug/L							04/29/12	
Blank Spike (A204384-BS1) EPA 531.1 - Quality Control											
3-Hydroxycarbofuran	37	3.0	ug/L	30		124	70-130			04/29/12	
Aldicarb	37	3.0	ug/L	30		123	70-130			04/29/12	
Aldicarb Sulfone	38	2.0	ug/L	30		125	70-130			04/29/12	
Aldicarb Sulfoxide	37	3.0	ug/L	30		124	70-130			04/29/12	
Carbaryl	39	5.0	ug/L	30		129	70-130			04/29/12	
Carbofuran	37	5.0	ug/L	30		125	70-130			04/29/12	
Methomyl	37	2.0	ug/L	30		123	70-130			04/29/12	
Oxamyl	38	20	ug/L	30		125	70-130			04/29/12	
Blank Spike Dup (A204384-BSD1) EPA 531.1 - Quality Control											
3-Hydroxycarbofuran	31	3.0	ug/L	30		102	70-130	19	20	04/29/12	
Aldicarb	30	3.0	ug/L	30		101	70-130	19	20	04/29/12	
Aldicarb Sulfone	31	2.0	ug/L	30		102	70-130	20	20	04/29/12	
Aldicarb Sulfoxide	30	3.0	ug/L	30		102	70-130	20	20	04/29/12	
Carbaryl	31	5.0	ug/L	30		105	70-130	21	20	04/29/12	BS03
Carbofuran	31	5.0	ug/L	30		103	70-130	19	20	04/29/12	
Methomyl	30	2.0	ug/L	30		102	70-130	19	20	04/29/12	
Oxamyl	31	20	ug/L	30		102	70-130	20	20	04/29/12	
Matrix Spike (A204384-MS1) EPA 531.1 - Quality Control					**Source: A2D1616-01**						
3-Hydroxycarbofuran	25	3.0	ug/L	30	ND	84	70-130			04/29/12	
Aldicarb	23	3.0	ug/L	30	ND	78	70-130			04/29/12	
Aldicarb Sulfone	25	2.0	ug/L	30	ND	84	70-130			04/29/12	
Aldicarb Sulfoxide	25	3.0	ug/L	30	ND	83	70-130			04/29/12	
Carbaryl	25	5.0	ug/L	30	ND	85	70-130			04/29/12	
Carbofuran	25	5.0	ug/L	30	ND	84	70-130			04/29/12	
Methomyl	25	2.0	ug/L	30	ND	83	70-130			04/29/12	
Oxamyl	25	20	ug/L	30	ND	84	70-130			04/29/12	
Batch: A204425				Analyst: KHH		Prepared: 4/28/2012					
Blank (A204425-BLK1) EPA 525.2 - Quality Control											
Alachlor	ND	1.0	ug/L							04/28/12	
Atrazine	ND	0.50	ug/L							04/28/12	
Benzo(a)pyrene	ND	0.10	ug/L							04/28/12	
Bis(2-ethylhexyl) adipate	ND	3.0	ug/L							04/28/12	
Bis(2-ethylhexyl) phthalate	ND	3.0	ug/L							04/28/12	
Bromacil	ND	10	ug/L							04/28/12	
Butachlor	ND	0.38	ug/L							04/28/12	
Diazinon	ND	0.25	ug/L							04/28/12	
Dimethoate	ND	10	ug/L							04/28/12	

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BSK Associates Engineers & Laboratories

Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204425				Analyst: KHH		Prepared: 4/28/2012					
Blank (A204425-BLK1) EPA 525.2 - Quality Control											
Metolachlor	ND	0.50	ug/L							04/28/12	
Metribuzin	ND	0.50	ug/L							04/28/12	
Molinate	ND	2.0	ug/L							04/28/12	
Propachlor	ND	0.50	ug/L							04/28/12	
Simazine	ND	1.0	ug/L							04/28/12	
Thiobencarb	ND	1.0	ug/L							04/28/12	
Surrogate: 1,3-Dimethyl-2-nitrobenzene	*5.4*			*5.0*		*108*	*70-130*			04/28/12	
Blank Spike (A204425-BS1) EPA 525.2 - Quality Control											
Alachlor	5.4	1.0	ug/L	4.9		109	70-130			04/28/12	
Atrazine	5.3	0.50	ug/L	4.9		107	70-130			04/28/12	
Benzo(a)pyrene	0.95	0.10	ug/L	0.99		96	70-130			04/28/12	
Bis(2-ethylhexyl) adipate	5.4	3.0	ug/L	4.9		110	70-130			04/28/12	
Bis(2-ethylhexyl) phthalate	5.6	3.0	ug/L	4.9		115	70-130			04/28/12	
Bromacil	5.7	10	ug/L	4.9		115	70-130			04/28/12	
Butachlor	2.9	0.38	ug/L	2.5		118	70-130			04/28/12	
Diazinon	2.5	0.25	ug/L	2.5		102	10-110			04/28/12	
Dimethoate	5.6	10	ug/L	4.9		113	70-130			04/28/12	
Metolachlor	5.5	0.50	ug/L	4.9		112	70-130			04/28/12	
Metribuzin	5.4	0.50	ug/L	4.9		110	70-130			04/28/12	
Molinate	5.4	2.0	ug/L	4.9		110	70-130			04/28/12	
Propachlor	5.7	0.50	ug/L	4.9		115	70-130			04/28/12	
Simazine	5.5	1.0	ug/L	4.9		111	70-130			04/28/12	
Thiobencarb	5.1	1.0	ug/L	4.9		104	70-130			04/28/12	
Surrogate: 1,3-Dimethyl-2-nitrobenzene	*5.2*			*4.9*		*105*	*70-130*			04/28/12	
Blank Spike Dup (A204425-BSD1) EPA 525.2 - Quality Control											
Alachlor	5.4	1.0	ug/L	4.9		110	70-130	1	30	04/28/12	
Atrazine	4.8	0.50	ug/L	4.9		97	70-130	9	30	04/28/12	
Benzo(a)pyrene	0.98	0.10	ug/L	0.99		99	70-130	3	30	04/28/12	
Bis(2-ethylhexyl) adipate	5.5	3.0	ug/L	4.9		112	70-130	2	30	04/28/12	
Bis(2-ethylhexyl) phthalate	5.5	3.0	ug/L	4.9		112	70-130	3	30	04/28/12	
Bromacil	5.2	10	ug/L	4.9		106	70-130	8	30	04/28/12	
Butachlor	3.0	0.38	ug/L	2.5		120	70-130	1	30	04/28/12	
Diazinon	2.7	0.25	ug/L	2.5		109	10-110	6	30	04/28/12	
Dimethoate	5.3	10	ug/L	4.9		106	70-130	6	30	04/28/12	
Metolachlor	5.2	0.50	ug/L	4.9		106	70-130	6	30	04/28/12	
Metribuzin	5.3	0.50	ug/L	4.9		107	70-130	3	30	04/28/12	
Molinate	5.5	2.0	ug/L	4.9		111	70-130	0	30	04/28/12	
Propachlor	5.5	0.50	ug/L	4.9		112	70-130	3	30	04/28/12	
Simazine	5.5	1.0	ug/L	4.9		111	70-130	1	30	04/28/12	
Thiobencarb	5.1	1.0	ug/L	4.9		102	70-130	2	30	04/28/12	
Surrogate: 1,3-Dimethyl-2-nitrobenzene	*5.0*			*4.9*		*100*	*70-130*			04/28/12	

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Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204425				Analyst: KHH		Prepared: 4/28/2012					
Matrix Spike (A204425-MS1)	**EPA 525.2 - Quality Control**					**Source: A2D1417-01**					
Alachlor	6.3	1.0	ug/L	5.2	ND	122	70-130			04/28/12	
Atrazine	5.7	0.50	ug/L	5.2	ND	109	70-130			04/28/12	
Benzo(a)pyrene	1.1	0.10	ug/L	1.0	ND	105	70-130			04/28/12	
Bis(2-ethylhexyl) adipate	6.3	3.0	ug/L	5.2	ND	121	70-130			04/28/12	
Bis(2-ethylhexyl) phthalate	6.3	3.0	ug/L	5.2	ND	118	70-130			04/28/12	
Bromacil	6.4	10	ug/L	5.2	ND	122	70-130			04/28/12	
Butachlor	3.3	0.38	ug/L	2.6	ND	128	70-130			04/28/12	
Diazinon	2.9	0.25	ug/L	2.6	ND	112	10-110			04/28/12	MS01 ***High***
Dimethoate	6.1	10	ug/L	5.2	ND	118	70-130			04/28/12	
Metolachlor	6.1	0.50	ug/L	5.2	ND	117	70-130			04/28/12	
Metribuzin	6.2	0.50	ug/L	5.2	ND	119	70-130			04/28/12	
Molinate	6.3	2.0	ug/L	5.2	ND	121	70-130			04/28/12	
Propachlor	6.7	0.50	ug/L	5.2	ND	129	70-130			04/28/12	
Simazine	6.2	1.0	ug/L	5.2	ND	119	70-130			04/28/12	
Thiobencarb	5.4	1.0	ug/L	5.2	ND	104	70-130			04/28/12	
Surrogate: 1,3-Dimethyl-2-nitrobenzene	*5.5*			*5.2*		*106*	*70-130*			04/28/12	

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Radiological Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204341				Analyst: KKC		Prepared: 4/26/2012					
Blank (A204341-BLK1) EPA 00-02 - Quality Control											
1.65 Sigma Uncertainty	ND		±							04/27/12	
Gross Alpha	ND	3	pCi/L							04/27/12	
MDA95	ND	0.00	pCi/L							04/27/12	
Blank Spike (A204341-BS1) EPA 00-02 - Quality Control											
Gross Alpha	28.4	3	pCi/L	30		95	80-120			04/27/12	
Blank Spike Dup (A204341-BSD1) EPA 00-02 - Quality Control											
Gross Alpha	34.4	3	pCi/L	30		115	80-120	19	50	04/27/12	
Matrix Spike (A204341-MS1) EPA 00-02 - Quality Control						**Source: A2D1907-02**					
Gross Alpha	123	3	pCi/L	120	ND	102	70-130			04/27/12	
Matrix Spike (A204341-MS2) EPA 00-02 - Quality Control						**Source: A2D1627-01**					
Gross Alpha	129	3	pCi/L	120	ND	108	70-130			04/27/12	
Matrix Spike Dup (A204341-MSD1) EPA 00-02 - Quality Control						**Source: A2D1907-02**					
Gross Alpha	125	3	pCi/L	120	ND	104	70-130	2	50	04/27/12	
Matrix Spike Dup (A204341-MSD2) EPA 00-02 - Quality Control						**Source: A2D1627-01**					
Gross Alpha	145	3	pCi/L	120	ND	121	70-130	11	50	04/27/12	

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Certificate of Analysis

06/11/2012

Notes:

- The Chain of Custody document and Sample Integrity Sheet are part of the analytical report.
- Any remaining sample(s) for testing will be disposed of one month from the final report date unless other arrangements are made in advance.
- Sample(s) received, prepared, and analyzed within the method specified criteria unless otherwise noted within this report.
- The results relate only to the samples analyzed in accordance with test(s) requested by the client on the Chain of Custody document. Any analytical quality control exceptions to method criteria that are to be considered when evaluating these results have been flagged and are defined in the data qualifiers section.
- All results are expressed on wet weight basis unless otherwise specified.
- All positive results for EPA Methods 504.1, 502.2, and 524.2 require the analysis of a Field Reagent Blank (FRB) to confirm that the results are not a contamination error from field sampling steps. If Field Reagent Blanks were not submitted with the samples, this method requirement has not been performed.
- Results contained in this analytical report must be reproduced in its entirety.
- Samples collected by BSK Analytical Laboratories were collected in accordance with the BSK Sampling and Collection Standard Operating Procedures.
- BSK Analytical Laboratories certifies that the test results contained in this report meet all requirements of the NELAC Standards for applicable certified drinking water chemistry analyses unless qualified or noted in the Case Narrative.
- Analytical data contained in this report may be used for regulatory purposes to meet the requirements of the Federal or State drinking water, wastewater, and hazardous waste programs.
- J-value is equivalent to DNQ (Detected, not quantified) which is a trace value. A trace value is an analyte detected between the MDL and the laboratory reporting limit. This result is of an unknown data quality and is only qualitative (estimated). Baseline noise, calibration curve extrapolation below the lowest calibrator, method blank detections, and integration artifacts can all produce apparent DNQ values, which contribute to the un-reliability of these values.
- (1) - Residual chlorine and pH analysis have a 15 minute holding time for both drinking and waste water samples as defined by the EPA and 40 CFR 136. Waste water and ground water (monitoring well) samples must be field filtered to meet the 15 minute holding time for dissolved metals.
- * - This is not a NELAP accredited analyte.
- Summations of analytes (i.e. Total Trihalomethanes) may appear to add individual amounts incorrectly, due to rounding of analyte values occurring before or after the total value is calculated, as well as rounding of the total value.
- (2) The digestion used to produce this result deviated from EPA 200.2 by excluding hydrochloric acid in order to produce acceptable recoveries for affected metals.
- (2C) Result reported from secondary analytical column.
- RL Multiplier is the factor used to adjust the reporting limit (RL) due to variations in sample preparation procedures and dilutions required for matrix interferences.

Certifications:

State of California - CDPH - ELAP	1180
State of California - CDPH - NELAP	04227CA
State of Nevada - NDEP	CA000792009A
State of Hawaii - DOH	04227CA

Definitions and Flags for Data Qualifiers

mg/L:	Milligrams/Liter (ppm)	M:	Method Detection Limit	MDA95:	Min. Detected Activity
mg/Kg:	Milligrams/Kilogram (ppm)	RL:	Reporting Limit	MPN:	Most Probable Number
µg/L:	Micrograms/Liter (ppb)		:DL x Dilution	CFU:	Colony Forming Unit
µg/Kg:	Micrograms/Kilogram (ppb)	ND:	None Detected at RL	Absent:	Less than 1 CFU/100mLs
%:	Percent Recovered (surrogates)	pCi/L:	Picocuries per Liter	Present:	1 or more CFU/100mLs
		NR:	Non-Reportable	RL Mult:	RL Multiplier

X01 BSD has a different spike level than the BS therefore the RPD does not apply

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Certificate of Analysis

06/11/2012

MS07	MS/MSD RPD exceeded limits as one of the matrix spikes recovered outside limits.
MS02	Matrix spike recovery was low; the associated blank spike recovery was acceptable.
MS01	Matrix spike recovery was high; the associated blank spike recovery was acceptable.
BS03	BS/BSD RPD exceeded the acceptance limit. Recovery met acceptance criteria.

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A2D1627

City of Modesto Water Division/Corp Yard

Modes9588

04192012

Turnaround: Standard

Due Date: 5/3/2012

Printed: 4/19/2012 6:02:42PM

City of Modesto Water Divisio
Chain of Custody

A2D1627
Modes9588

04/19/2012
10

LAB: BSK

DATE: 4-19-12

SAMPLER: N. Sanchez

SOURCE: X Groundwater ____ System ____ Surface

REASON FOR ANALYSIS: ____ Routine ____ Repeat X Investigative

Sample ID:	Description	Analysis	Time	AM/PM
				AM/PM
	Hickman Test Well - 210'	GM/IO/GP Title 22 Organic&	930	AM/PM 1412379
		Title 22 externals	930	AM/PM
				AM/PM
				AM/PM
				AM/PM
				AM/PM
				AM/PM
				AM/PM
				AM/PM
				AM/PM
				AM/PM
				AM/PM
				AM/PM

Sampled by	N. Sanchez	Date: 4-19-12	Time: 930 AM/PM
Relinquished by	N. Sanchez	4-19-12	1034 AM/PM
Received by	[signature]	4/19/12	10:40 AM/PM
Relinquished by	[signature]	4/19/12	12:30 AM/PM
Received by	[signature]	4/19/12	12:50 AM/PM
	[signature]	4/19/12	1622

A2D1627
Modes9588

04/19/2012
10

Sample Integrity

Pg. 1 of 2

Date Received 4/19/12

Section 1- Receiving Information

Sample Transport: ONTRAC UPS PMS Walk-In BSK-Courier GSO Fed Exp. Other: _____

Samples arrived at lab on same day sampled: Yes 2 No ___ Has Chilling Process Begun: Yes X No ___

Coolers/Ice Chests Description/Temperature(s): (If more than 5 received, list information in comment section)

1) 4 2) ___ 3) ___ 4) ___ 5) ___

Was Temperature In Range: Y N N/A Received On Ice: Wet Blue Received Ambient: Y N

Describe type of packing materials: Bubble Wrap Foam Packing Peanuts Paper Other: _____

Initial Receipt: BSK-Visalia BSK-Bakersfield BSK-SAC BSK-FAD

Were ice chest custody seals present? Y N Intact: Y N

Section 2- COC Info.	Completed Yes	Completed No	Info From Container		Completed Yes	Completed No	Info From Container
Was COC Received	✓			Analysis Requested	✓		
Date Sampled	✓			Hold times less than 72hr	✓		
Time Sampled	✓			Client Name	✓		
Sample ID	✓			Address	✓		
Special Storage/Handling Ins.		✓		Telephone #	✓		

Section 3- Bottles / Analysis	Yes	No	N/A	Comment
Did all bottles arrive unbroken and intact?	✓			
Were bottle custody seals present?		✓		
Were bottle custody seals intact?		✓		
Did all bottle labels agree with COC?	✓			
Were correct containers used for the tests requested?	✓			
Were correct preservations used for the tests requested?	✓			
Was a sufficient amount of sample sent for tests indicated?	✓			
Were bubbles present in VOA Vials? (**Volatile Methods Only**)		✓		
Were Ascorbic Acid Bottles received with the VOAs?				

Section 4- Comments / Discrepancies

Sample(s) Split/Preserve: Yes No Container: _____ Preservation: _____ Dt/Time/Init _____

Container: _____ Preservation: _____ Dt/Time/Init _____

Was Client Service Rep. notified of discrepancies: Yes No N/A CSR: _____ Notified By/Time: _____

Explanations / Comments

Report Comment Entered:

Labeled by: JH @ 17:17 Labels checked by: M @ 17:18 RUSH Paged by: _____ @ _____

(4/11)

A2D1627
Modes9588

04/19/2012
10

Sample Integrity Pg 2 of 2

BSK Bottles Yes Nc

250ml (A) 500ml (B) 1Liter (C) Amber Glass (AG)

Container(s) Received	1						
Bacti $Na_2S_2O_3$							
None (p) White Cap	2C						
None (p) Blue Cap w/NH4 + Buffer							
HNO_3 (p) Red Cap	4G, 1B						
H_2SO_4 (p) Yellow Cap							
NaOH (p) Green Cap	1A						
EDA (p) Brown Cap/Label							
Other:							
Dissolved Oxygen 300ml (g)							
250ml (AG) None							
250ml (AG) H_2SO_4 COD Yellow Label							
250ml (AG) $Na_2S_2O_3$ 515,547 Blue Label	2						
250ml (AG) $Na_2S_2O_3$+ MCAA 531.1 Orange Label	1						
250ml (AG) NH_4Cl 552 Purple Label							
250ml (AG) EDA DBPs Brown Label							
250ml (AG) Other:							
500ml (AG) None	1						
500ml (AG) H_2SO_4 Yellow Label							
1 Liter (AG) None	4						
1 Liter (AG) H_2SO_4 O&G / TPH-Diesel Yellow Label							
1 Liter (AG) $Na_2S_2O_3$ 548 / 525 / 521 Blue Label	3						
1 Liter (P) $Na_2S_2O_3$+ H_2SO_4 549	1						
1 Liter (AG) NaOH+ZnAc Sulfide							
40ml VOA Vial Clear – HCL	3						
40ml VOA Vial Clear – Buffer pH 4							
40ml VOA Vial Clear – None							
40ml VOA Vial Amber – $Na_2S_2O_3$							
40ml VOA Vial Clear - $Na_2S_2O_3$ 504, 505	6						
40ml VOA Vial Clear – H_3PO_4							
Other:							
½ Gallon (p)							
Asbestos 1Liter Plastic/Foil	1						
Radon 200ml Clear (g)							
Low Level Hg/Metals Double Baggie							
Bioassay Jug							
Ampule							
PT Sample Bottle							
250 Clear Glass Jar							
500 Clear Glass Jar							
1 Liter Clear Glass Jar							
Plastic Bag							
Soil Tube Brass / Steel / Plastic							
Tedlar Bags							

(4/11)

External

A2D1627

Pace Analytical Services, Inc.
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

May 22, 2012

Ms. Michelle Harmstead
BSK Analytical Laboratories
1414 Stanislaus St.
Fresno, CA 93706

RE: Project: A2D1627
Pace Project No.: 3068553

Dear Ms. Harmstead:
Enclosed are the analytical results for sample(s) received by the laboratory on April 30, 2012. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Jacquelyn Collins

jacquelyn.collins@pacelabs.com
Project Manager

Enclosures

Pace Analytical Services, Inc.
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

CERTIFICATIONS

Project: A2D1627
Pace Project No.: 3068553

Pennsylvania Certification IDs
1638 Roseytown Rd Suites 2,3&4 Greensburg, PA 15601
ACLASS DOD-ELAP Accreditation #: ADE-1544
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California/TNI Certification #: 04222CA
Colorado Certification
Connecticut Certification #: PH 0694
Delaware Certification
Florida/TNI Certification #: E87683
Guam/PADEP Certification
Hawaii/PADEP Certification
Idaho Certification
Illinois/PADEP Certification
Indiana/PADEP Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: 90133
Louisiana/TNI Certification #: LA080002
Louisiana/TNI Certification #: 4086
Maine Certification #: PA0091
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification
Missouri Certification #: 235
Montana Certification #: Cert 0082
Nevada Certification
New Hampshire/TNI Certification #: 2976
New Jersey/TNI Certification #: PA 051
New Mexico Certification
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
Oregon/TNI Certification #: PA200002
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
South Dakota Certification
Tennessee Certification #: TN2867
Texas/TNI Certification #: T104704188
Utah/TNI Certification #: ANTE
Virgin Island/PADEP Certification
Virginia Certification #: 00112
Virginia VELAP (Cert # 460198)
Washington Certification #: C868
West Virginia Certification #: 143
Wisconsin/PADEP Certification
Wyoming Certification #: 8TMS-Q

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Pace Analytical Services, Inc.
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

SAMPLE SUMMARY

Project: A2D1627
Pace Project No.: 3068553

Lab ID	Sample ID	Matrix	Date Collected	Date Received
3068553001	**A2D1627-01**	Drinking Water	04/19/12 09:30	04/30/12 09:30

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SAMPLE ANALYTE COUNT

Project: A2D1627
Pace Project No.: 3068553

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
3068553001	**A2D1627-01**	EPA 903.1	SLA	1	PASI-PA
		EPA 904.0	WRR	1	PASI-PA

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PROJECT NARRATIVE

Project: A2D1627
Pace Project No.: 3068553

Method: **EPA 903.1**
Description: 903.1 Radium 226
Client: BSK Analytical Laboratories
Date: May 22, 2012

General Information:
1 sample was analyzed for EPA 903.1. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

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PROJECT NARRATIVE

Project: A2D1627
Pace Project No.: 3068553

Method: **EPA 904.0**
Description: 904.0 Radium 228
Client: BSK Analytical Laboratories
Date: May 22, 2012

General Information:
1 sample was analyzed for EPA 904.0. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

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ANALYTICAL RESULTS

Project: A2D1627
Pace Project No.: 3068553

Sample: A2D1627-01 **Lab ID: 3068553001** Collected: 04/19/12 09:30 Received: 04/30/12 09:30 Matrix: Drinking Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC)	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**-0.053 ± 0.180 (0.493)**	pCi/L	05/18/12 13:55	13982-63-3	
Radium-228	EPA 904.0	**0.340 ± 0.430 (0.916)**	pCi/L	05/21/12 15:39	15262-20-1	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: A2D1627
Pace Project No.: 3068553

QC Batch: RADC/11964
QC Batch Method: EPA 903.1
Analysis Method: EPA 903.1
Analysis Description: 903.1 Radium-226
Associated Lab Samples: 3068553001

METHOD BLANK: 437409
Matrix: Water
Associated Lab Samples: 3068553001

Parameter	Act ± Unc (MDC)	Units	Analyzed	Qualifiers
Radium-226	-0.139 ± 0.242 (0.608)	pCi/L	05/18/12 12:43	

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Greensburg, PA 15601
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QUALITY CONTROL DATA

Project: A2D1627
Pace Project No.: 3068553

QC Batch: RADC/11996
QC Batch Method: EPA 904.0
Analysis Method: EPA 904.0
Analysis Description: 904.0 Radium 228
Associated Lab Samples: 3068553001

METHOD BLANK: 438631
Matrix: Water
Associated Lab Samples: 3068553001

Parameter	Act ± Unc (MDC)	Units	Analyzed	Qualifiers
Radium-228	-0.0975 ± 0.343 (0.787)	pCi/L	05/21/12 15:39	

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Greensburg, PA 15601
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QUALIFIERS

Project: A2D1627
Pace Project No.: 3068553

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Act - Activity

Unc - Uncertainty

(MDC) - Minimum Detectable Concentration

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-PA Pace Analytical Services - Greensburg

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Quality Control Sample Performance Assessment

Pace Analytical

Analyst Must Manually Enter All Fields Highlighted In Yellow.

Test:	Ra-226
Analyst:	SLA
Date:	5/4/2012
Worklist:	11984
Matrix:	DW

Method Blank Assessment

MB Sample ID	437409
MB concentration:	-0.139
MB Counting Uncertainty:	0.240
MB MDC:	0.608
MB Numerical Performance Indicator:	-0.24
MB Status vs Numerical Indicator:	N/A
MB Status vs. MDC:	Pass

Laboratory Control Sample Assessment

	LCSD (Y or N)?	Y
	LCS11984	LCSD11984
Count Date:	5/18/2012	5/18/2012
Spike I.D.:	12-011	12-011
Spike Concentration (pCi/mL):	56.715	56.715
Volume Used (mL):	0.10	0.10
Aliquot Volume (L, g, F):	0.500	0.500
Target Conc. (pCi/L, g, F):	11.343	11.343
Uncertainty (Calculated):	0.272	0.272
Result (pCi/L, g, F):	12.070	12.097
LCS/LCSD Counting Uncertainty (pCi/L, g, F):	1.559	1.583
Numerical Performance Indicator:	0.90	0.92
Percent Recovery:	106.41%	106.64%
Status vs Numerical Indicator:	N/A	N/A
Status vs Recovery:	Pass	Pass

Sample Matrix Spike Control Assessment

Sample Collection Date:	4/25/2012
Sample I.D.	3068545001
Sample MS I.D.	3068545001MS
Sample MSD I.D.	
Spike I.D.:	12-011
MS/MSD Decay Corrected Spike Concentration (pCi/mL):	56.717
Spike Volume Used in MS (mL):	0.20
Spike Volume Used in MSD (mL):	
MS Aliquot (L, g, F):	0.500
MS Target Conc.(pCi/L, g, F):	22.687
MSD Aliquot (L, g, F):	
MSD Target Conc. (pCi/L, g, F):	
Spike uncertainty (calculated):	0.544
Sample Result:	0.000
Sample Result Counting Uncertainty (pCi/L, g, F):	0.208
Sample Matrix Spike Result:	18.032
Matrix Spike Result Counting Uncertainty (pCi/L, g, F):	1.835
Sample Matrix Spike Duplicate Result:	
Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F):	
MS Numerical Performance Indicator:	-4.737
MSD Numerical Performance Indicator:	
MS Percent Recovery:	79.48%
MSD Percent Recovery:	
MS Status vs Numerical Indicator:	N/A
MSD Status vs Numerical Indicator:	
MS Status vs Recovery:	Pass
MSD Status vs Recovery:	

Duplicate Sample Assessment

Sample I.D.:	LCS11984
Duplicate Sample I.D.	LCSD11984
Sample Result (pCi/L, g, F):	12.070
Sample Result Counting Uncertainty (pCi/L, g, F):	1.559
Sample Duplicate Result (pCi/L, g, F):	12.097
Sample Duplicate Result Counting Uncertainty (pCi/L, g, F):	1.583
Are sample and/or duplicate results below MDC?	ND
Duplicate Numerical Performance Indicator:	-0.023
Duplicate RPD:	0.22%
Duplicate Status vs Numerical Indicator:	N/A
Duplicate Status vs RPD:	Pass

Enter Duplicate sample IDs if other than LCS/LCSD in the space below.

Matrix Spike/Matrix Spike Duplicate Sample Assessment

Sample I.D.	
Sample MS I.D.	
Sample MSD I.D.	
Sample Matrix Spike Result:	
Matrix Spike Result Counting Uncertainty (pCi/L, g, F):	
Sample Matrix Spike Duplicate Result:	
Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F):	
Duplicate Numerical Performance Indicator:	
MS/ MSD Duplicate RPD:	
MS/ MSD Duplicate Status vs Numerical Indicator:	
MS/ MSD Duplicate Status vs RPD:	

Evaluation of duplicate precision is not applicable if either the sample or duplicate results are below the MDC.

Comments:

05/22/12

Quality Control Sample Performance Assessment

Pace Analytical

Test:	Ra-228
Analyst:	WRR
Date:	4/25/2012
Worklist:	11996
Matrix:	DW

Analyst Must Manually Enter All Fields Highlighted in Yellow.

Method Blank Assessment

MB Sample ID	438831
MB concentration:	-0.097
M/B Counting Uncertainty.	0.343
MB MDC:	0.787
MB Numerical Performance Indicator:	-0.56
MB Status vs Numerical Indicator:	N/A
MB Status vs. MDC:	Pass

Laboratory Control Sample Assessment

	LCSD (Y or N)?	Y
	LCS11996	LCSD11996
Count Date:	5/21/2012	5/21/2012
Spike I.D.:	11-024	11-024
Spike Concentration (pCi/ml.):	60.641	60.641
Volume Used (mL):	0.10	0.10
Aliquot Volume (L, g, F):	0.800	0.800
Target Conc. (pCi/L, g, F):	7.580	7.580
Uncertainty (Calculated):	0.235	0.235
Result (pCi/L, g, F):	5.112	6.604
LCS/LCSD Counting Uncertainty (pCi/L, g, F):	0.926	1.102
Numerical Performance Indicator:	-5.07	-4.70
Percent Recovery:	67.44%	87.12%
Status vs Numerical Indicator:	N/A	N/A
Status vs Recovery:	Pass	Pass

Sample Matrix Spike Control Assessment

Sample Collection Date:	4/20/2012
Sample I.D.	3088554001
Sample MS I.D.	3088554001MS
Sample MSD I.D.	
Spike I.D.:	11-024
MS/MSD Decay Corrected Spike Concentration (pCi/mL):	61.266
Spike Volume Used in MS (mL):	0.20
Spike Volume Used in MSD (mL):	
MS Aliquot (L, g, F):	0.800
MS Target Conc.(pCi/L, g, F):	15.316
MSD Aliquot (L, g, F):	
MSD Target Conc. (pCi/L, g, F):	
Spike uncertainty (calculated):	0.475
Sample Result:	0.183
Sample Result Counting Uncertainty (pCi/L, g, F):	0.376
Sample Matrix Spike Result:	19.014
Matrix Spike Result Counting Uncertainty (pCi/L, g, F):	2.102
Sample Matrix Spike Duplicate Result:	
Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F):	
MS Numerical Performance Indicator:	3.149
MSD Numerical Performance Indicator:	
MS Percent Recovery:	122.95%
MSD Percent Recovery:	
MS Status vs Numerical Indicator:	N/A
MSD Status vs Numerical Indicator:	
MS Status vs Recovery:	Pass
MSD Status vs Recovery:	

Duplicate Sample Assessment

Sample I.D.:	LCS11996	Enter Duplicate sample IDs if other than LCS/LCSD in the space below.
Duplicate Sample I.D.	LCSD11996	
Sample Result (pCi/L, g, F):	5.112	
Sample Result Counting Uncertainty (pCi/L, g, F):	0.926	
Sample Duplicate Result (pCi/L, g, F):	6.604	
Sample Duplicate Result Counting Uncertainty (pCi/L, g, F):	1.102	
Are sample and/or duplicate results below MDC?	NO	
Duplicate Numerical Performance Indicator:	-2.032	
Duplicate RPD:	25.47%	
Duplicate Status vs Numerical Indicator:	N/A	
Duplicate Status vs RPD:	Pass	

Matrix Spike/Matrix Spike Duplicate Sample Assessment

Sample I.D.	
Sample MS I.D.	
Sample MSD I.D.	
Sample Matrix Spike Result:	
Matrix Spike Result Counting Uncertainty (pCi/L, g, F):	
Sample Matrix Spike Duplicate Result:	
Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F):	
Duplicate Numerical Performance Indicator:	
MS/ MSD Duplicate RPD:	
MS/ MSD Duplicate Status vs Numerical Indicator:	
MS/ MSD Duplicate Status vs RPD:	

Evaluation of duplicate precision is not applicable if either the sample or duplicate results are below the MDC.

Comments:

C 5/22/12

Pace Analytical Services, Inc.
1700 Elm Street
Minneapolis, MN 55414
Phone: 612.607.1700
Fax: 612.607.6444

www.pacelabs.com

Report Prepared for:

Michelle Harmstead
BSK Analytical Laboratories
1414 Stanislaus Street
Fresno CA 93706

REPORT OF LABORATORY ANALYSIS FOR 2,3,7,8-TCDD

Report Summary:

This report contains results of one drinking water sample analyzed to determine 2,3,7,8-TCDD content. This sample was analyzed according to Method 1613 by High Resolution Gas Chromatography/High Resolution Mass Spectrometry.

Report Prepared Date:

May 8, 2012

Report Information:

Pace Project #: 10189854
Sample Receipt Date: 04/24/2012
Client Project #: A2D1627
Client Sub PO #: N/A
State Cert #: 01155CA

Invoicing & Reporting Options:

The report provided has been invoiced as a Level 2 Drinking Water Report. If an upgrade of this report package is requested, an additional charge may be applied.

Please review the attached invoice for accuracy and forward any questions to Emily Hazelroth, your Pace Project Manager.

This report has been reviewed by:

May 08, 2012

Emily Hazelroth, Project Manager
(612) 607-6407
(612) 607-6444 (fax)
emily.hazelroth@pacelabs.com

ACCREDITED IN ACCORDANCE WITH nelac

Report of Laboratory Analysis

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The results relate only to the samples included in this report.

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612- 607-6444

Minnesota Laboratory Certifications

Authority	Certificate #	Authority	Certificate #
Alabama	40770	Montana	92
Alaska	MN00064	Nebraska	
Arizona	AZ0014	Nevada	MN_00064_200
Arkansas	88-0680	New Jersey (N	MN002
California	01155CA	New Mexico	MN00064
Colorado	MN00064	New York (NEL	11647
Connecticut	PH-0256	North Carolina	27700
EPA Region 5	WD-15J	North Dakota	R-036
EPA Region 8	8TMS-Q	Ohio	4150
Florida (NELAP	E87605	Ohio VAP	CL101 9507
Georgia (DNR)	959	Oklahoma	D9922
Guam	959	Oregon (ELAP)	MN200001-005
Hawaii	SLD	Oregon (OREL	MN300001-001
Idaho	MN00064	Pennsylvania	68-00563
Illinois	200012	Saipan	MP0003
Indiana	C-MN-01	South Carolina	74003001
Indiana	C-MN-01	Tennesee	2818
Iowa	368	Tennessee	02818
Kansas	E-10167	Texas	T104704192-08
Kentucky	90062	Utah (NELAP)	PAM
Louisiana	LA0900015	Virginia	00251
Maine	2007029	Washington	C755
Maryland	322	West Virginia	9952C
Michigan	9909	Wisconsin	999407970
Minnesota	027-053-137	Wyoming	8TMS-Q
Mississippi	MN00064		

REPORT OF LABORATORY ANALYSIS

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Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612- 607-6444

Reporting Flags

A = Reporting Limit based on signal to noise

B = Less than 10x higher than method blank level

C = Result obtained from confirmation analysis

D = Result obtained from analysis of diluted sample

E = Exceeds calibration range

I = Interference present

J = Estimated value

Nn = Value obtained from additional analysis

P = PCDE Interference

R = Recovery outside target range

S = Peak saturated

U = Analyte not detected

V = Result verified by confirmation analysis

X = %D Exceeds limits

Y = Calculated using average of daily RFs

* = See Discussion

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1130

BSK Analytical Laboratories
Engineers & Laboratories

SUBCONTRACT ORDER

A2D1627

10189854

SENDING LABORATORY:

BSK Associates
1414 Stanislaus St
Fresno, CA 93706
Phone: 559-497-2888
Fax: 559-485-6935
Project Manager: Michelle Harmstead
E-mail: mharmstead@bskinc.com

RECEIVING LABORATORY:

Pace Analytical-Dioxin
1700 Elm Street S.E. Stuite 200
Minneapolis, MN 55414
Phone :(612) 607-1700
Fax: (612) 607-6444
Turnaround (Days): Standard
QC Deliverables: I (Std) III IV

Sample ID	Samp Desc	Sample Date 001
A2D1627-01	Hickman Test Well 210'	04/19/2012 09:30

Matrix: Water

Analysis (1) L AG w/ none
EXT-Dioxin-DW matrix, EPA 1613 2,3,7,8-TCDD

Pc 1.7

Released By	Date	Received By	Date
[signature]	4/23/12	BM pace	4/24/12 0959

Pace Analytical®	Document Name: **Sample Condition Upon Receipt Form**	Revised Date: 15Feb2012 Page 1 of 1
	Document Number: **F-MN-L-213-rev.02**	Issuing Authority: Pace Minnesota Quality Office

Sample Condition Upon Receipt

Client Name: BSK **Project #** _____

Courier: ☒ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace Other _____

Tracking #: 7983 1482 6792

Custody Seal on Cooler/Box Present: ☐ yes ☒ no **Seals intact:** ☐ yes ☒ no

Packing Material: ☐ Bubble Wrap ☒ Bubble Bags ☐ None ☐ Other _____ **Temp Blank: Yes** ____ **No** ☒

Thermometer Used 80344042 or 80512447 **Type of Ice:** (Wet) Blue None ☐ Samples on ice, cooling process has begun

Cooler Temperature 1.7 **Biological Tissue is Frozen:** Yes No

Temp should be above freezing to 6°C

Date and Initials of person examining contents: 4/24/12 [illegible]

Comments:

Chain of Custody Present:	☒Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☒Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☒Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☐Yes ☒No ☐N/A	4.
Samples Arrived within Hold Time:	☒Yes ☐No ☐N/A	5.
Short Hold Time Analysis (<72hr):	☐Yes ☒No ☐N/A	6.
Rush Turn Around Time Requested:	☐Yes ☒No ☐N/A	7.
Sufficient Volume:	☒Yes ☐No ☐N/A	8.
Correct Containers Used:	☒Yes ☐No ☐N/A	9.
-Pace Containers Used:	☐Yes ☒No ☐N/A	
Containers Intact:	☒Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☒N/A	11.
Sample Labels match COC:	☒Yes ☐No ☐N/A	12.
-Includes date/time/ID/Analysis Matrix: WT		
All containers needing acid/base preservation have been checked. Noncompliance are noted in 13.	☐Yes ☐No ☒N/A	13. ☐ HNO3 ☐ H2SO4 ☐ NaOH ☐ HCl Samp #
All containers needing preservation are found to be in compliance with EPA recommendation. (HNO3, H2SO4, HCL<2; NaOH >12)	☐Yes ☐No ☒N/A	
Exceptions: VOA,Coliform, TOC, Oil and Grease, WI-DRO (water)	☐Yes ☒No	Initial when completed [illegible] Lot # of added preservative
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☒N/A	14.
Trip Blank Present:	☐Yes ☒No ☐N/A	15.
Trip Blank Custody Seals Present	☐Yes ☐No ☒N/A	
Pace Trip Blank Lot # (if purchased): _____		

Client Notification/ Resolution: **Field Data Required?** Y / N

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: [illegible] **Date:** 4/26/12

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

Pace AnalyticalServices, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612-607-6444

Drinking Water Analysis Results
2,3,7,8-TCDD -- USEPA Method 1613B

Sample ID.....A2D1627-01
Client..... BSK Analytical Laboratories
Lab Sample ID.....10189854001

Date Collected.....04/19/2012
Date Received.....04/24/2012
Date Extracted.....04/26/2012

	Sample A2D1627-01	Method Blank	Lab Spike	Lab Spike Dup
[2,3,7,8-TCDD]	**ND**	ND	--	--
RL	5.0 pg/L	5.0 pg/L	--	--
2,3,7,8-TCDD Recovery	--	--	121%	105%
Spike Recovery Limit	--	--	73-146%	73-146%
RPD			13.9%	
IS Recovery	**58%**	54%	65%	66%
IS Recovery Limits	31-137%	31-137%	25-141%	25-141%
CS Recovery	**68%**	63%	72%	76%
CS Recovery Limits	42-164%	42-164%	37-158%	37-158%
Filename	R120427B_28	R120427A_09	R120427A_03	R120427A_04
Analysis Date	04/28/2012	04/27/2012	04/27/2012	04/27/2012
Analysis Time	13:03	13:50	10:26	11:00
Analyst	CVS	CVS	CVS	CVS
Volume	1.008L	1.007L	1.026L	1.028L
Dilution	NA	NA	NA	NA
ICAL Date	04/24/2012	04/24/2012	04/24/2012	04/24/2012
CCAL Filename	R120427B_24	R120427A_02	R120427A_02	R120427A_02

! = Outside the Control Limits
ND = Not Detected
RL = Reporting Limit
Limits = Control Limits from Method 1613 (10/94 Revision), Tables 6A and 7A
RPD = Relative Percent Difference of Lab Spike Recoveries
IS = Internal Standard [2,3,7,8-TCDD-$^{13}C_{12}$]
CS = Cleanup Standard [2,3,7,8-TCDD-$^{37}Cl_4$]

Analyst: Chuck Swepson

Project No.....10189854

LA Testing

520 Mission Street South Pasadena, CA 91030

Phone: (323) 254-9960 Fax: (323) 254-9982 Web: http://www.latesting.com Email:pasadenalab@latesting.com

Attn: **Michelle Harmstead**
BSK Analytical Laboratories
1414 Stanislaus Street
Fresno, CA 93706

Fax: Phone: (559) 497-2888

Project: A2D1627

EMSL Order: 321206627
Customer ID: 32BSK50
Customer PO:
EMSL Project ID:
Received: 4/20/2012
Analyzed: 5/04/2012

Test Report: Determination of Asbestos Structures >10µm in Drinking Water Performed by the 100.2 Method (EPA 600/R-94/134)

Sample ID Client / EMSL	Sample Filtration Date/Time	Original Sample Vol. Filtered (ml)	Effective Filter Area (mm²)	Area Analyzed (mm²)	ASBESTOS Asbestos Types	Fibers Detected	Analytical Sensitivity	Concentration	Confidence Limits
							MFL (million fibers per liter)		
A2D1627-01 321206627-0001	4/20/2012 05:00 PM	100	1288	0.0670	None Detected	ND	0.19	<0.19	0.00 - 0.71

Initial report from: 05/04/2012 10:29:04

Analyst(s)
Sherrie Ahmad (1)

Jerry Drapala Ph.D, Laboratory Manager
or other Approved Signatory

Any questions please contact Jerry Drapala.

Sample collection and containers provided by the client, acceptable bottle blank level is defined as ≤0.01MFL>10um. ND=None Detected. This report relates only to those items tested. This report may not be reproduced, except in full, without written permission by LA Testing. Samples received in good condition unless otherwise noted.

Samples analyzed by LA Testing South Pasadena, CA CA ELAP 2283

321206627

BSK Analytical Laboratories
Engineers & Laboratories

SUBCONTRACT ORDER

A2D1627 321206627

SENDING LABORATORY:

BSK Associates
1414 Stanislaus St
Fresno, CA 93706
Phone: 559-497-2888
Fax: 559-485-6935
Project Manager: Michelle Harmstead
E-mail: mharmstead@bskinc.com

RECEIVING LABORATORY:

L A Testing
520 Mission St.
South Pasadena, CA 91030
Phone :(800) 303-0047
Fax: -
Turnaround (Days): Standard
QC Deliverables: I (Std) III IV

Sample ID	Samp Desc	Sample Date
A2D1627-01	Hickman Test Well 210'	04/19/2012 09:30

Matrix: Water 1 L P w/ Pol

Analysis
EXT-Asbestos, Drinking Water by EPA 100.2

Released By	Date	Received By	Date
[signature]	4/17/12	[signature] (courier)	4/20/12 10:20am

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Attachment E: Water Quality Results, 300–320’

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Amended

BSK Associates
Engineers & Laboratories

A2D1327

06/11/2012

Melissa Duran
City of Modesto Water Division/Corp Yard
P.O Box 642
Modesto, CA 95353

Dear Melissa Duran,

Thank you for selecting BSK Associates for your analytical testing needs. We have prepared this report in response to your request for analytical services. Enclosed are the results of analyses for samples received by the laboratory on 04/17/2012 15:30.

If additional clarification of any information is required, please contact your Client Services Representative, Michelle Harmstead at (800) 877-8310 or (559) 497-2888.

BSK ASSOCIATES

Kasanna Coulter
Quality Assurance Manager

1414 Stanislaus Street Fresno, CA 93706 (559) 497-2888 FAX (559) 485-6935 www.bsklabs.com

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Environmental Engineering | Geotechnical Engineering | Materials Testing

Amended

06/11/2012

Case Narrative

Work Order Information

Client Name:	City of Modesto Water Division/Corp Yard	**Submitted by:**	N. Sandaz
Client Code:	Modes9588	**Shipped by:**	BSK Employee
Work Order:	A2D1327	**COC Number:**	
Project:	Title 22	**TAT:**	29
		PO #:	

Report Amendments

Date: 06/11/12

Initials: MLH

This amended report supersedes any previous reports issued by the laboratory. Amendments to this report are as follows:Per client request dissolved iron and manganese were added to sample -01.

Sample Receipt Conditions

Cooler: **Default Cooler** **Temp. ºC:** 4

Containers Intact
COC/Labels Agree
Received On Wet Ice
Sample(s) arrived at lab on same day sampled.
Packing Material - Bubble Wrap
Packing Material - Foam
Sample(s) were received in temperature range.
Initial receipt at BSK-FAL

Cooler: **New Cooler** **Temp. ºC:** 3

Containers Intact
COC/Labels Agree
Received On Wet Ice
Sample(s) arrived at lab on same day sampled.
Packing Material - Bubble Wrap
Packing Material - Foam
Sample(s) were received in temperature range.
Initial receipt at BSK-FAL

Report Manager
Melissa Duran

Report Format
Final.rpt

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BSK Associates Engineers & Laboratories

Certificate of Analysis

Melissa Duran
City of Modesto Water Division/Corp Yard
P.O Box 642
Modesto, CA 95353

Report Issue Date: 6/11/2012 13:14
Received Date: 04/17/2012
Received Time: 15:30

Lab Sample ID: A2D1327-01
Sample Date: 04/17/2012 09:30
Sample Type: Grab
Sampled by: N. Sandez
Matrix: Water

Sample Description: Hickman Test Well - 135' // 142165

General Chemistry

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
***Aggressive Index**		**11**				A204385	04/27/12	04/27/12	
Alkalinity as CaCO3	SM 2320 B	**72**	3.0	mg/L	1	A203960	04/17/12	04/17/12	
Bicarbonate as CaCO3	SM 2320 B	**72**	3.0	mg/L	1	A203960	04/17/12	04/17/12	
Carbonate as CaCO3	SM 2320 B	ND	3.0	mg/L	1	A203960	04/17/12	04/17/12	
Chloride	EPA 300.0	**7.0**	1.0	mg/L	1	A203965	04/17/12	04/17/12	
***Color**	SM 2120 B	**5.0**	1.0	Color Units	1	A203943	04/17/12 17:15	04/17/12 17:15	
Cyanide (total)	SM 4500-CN E	ND	0.0050	mg/L	1	A204113	04/20/12	04/20/12	
Conductivity @ 25C	SM 2510 B	**170**	1.0	umhos/cm	1	A203960	04/17/12	04/17/12	
Fluoride	SM 4500-F C	**0.15**	0.10	mg/L	1	A204152	04/23/12	04/23/12	
Hydroxide as CaCO3	SM 2320 B	ND	3.0	mg/L	1	A203960	04/17/12	04/17/12	
Langelier Index	SM 2330 B	**-0.73**				A204387	04/27/12	04/27/12	
MBAS, Calculated as LAS, mol wt 340	SM 5540 C	ND	0.050	mg/L	1	A203940	04/17/12 17:05	04/17/12 17:05	
Nitrate as NO3	EPA 300.0	ND	1.0	mg/L	1	A203965	04/17/12 20:49	04/17/12 20:49	
Nitrite as N	EPA 300.0	ND	0.050	mg/L	1	A203965	04/17/12 20:49	04/17/12 20:49	
***Threshold Odor**	SM 2150 B	**1.0**	1.0	T.O.N.	1	A203943	04/17/12 17:15	04/17/12 17:15	
pH (1)	SM 4500-H+ B	**8.2**		pH Units	1	A203960	04/17/12	04/17/12	
pH Temperature in °C		**23.8**							
Sulfate as SO4	EPA 300.0	**3.5**	2.0	mg/L	1	A203965	04/17/12	04/17/12	
Total Dissolved Solids	SM 2540C	**160**	5.0	mg/L	1	A204036	04/19/12	04/23/12	
Bicarbonate as HCO3		**88**	3.7	mg/L					
Carbonate as CO3		ND	1.8	mg/L					
Hardness as CaCO3		**21**	0.41	mg/L					
Hydroxide as OH		ND	1.0	mg/L					
Turbidity	SM 2130 B	**3.4**	0.10	NTU	1	A203943	04/17/12 17:15	04/17/12 17:15	

Metals

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Aluminum	EPA 200.7	**0.26**	0.050	mg/L	1	A204032	04/19/12	04/24/12	
Antimony	EPA 200.8	ND	2.0	ug/L	1	A204032	04/19/12	04/26/12	
Arsenic	EPA 200.8	ND	2.0	ug/L	1	A204032	04/19/12	04/26/12	
Barium	EPA 200.7	ND	0.050	mg/L	1	A204032	04/19/12	04/24/12	
Beryllium	EPA 200.8	ND	1.0	ug/L	1	A204032	04/19/12	04/26/12	
Cadmium	EPA 200.8	ND	1.0	ug/L	1	A204032	04/19/12	04/26/12	

A2D1327 FINAL 06112012 1314

Amended

BSK Associates Engineers & Laboratories

Certificate of Analysis

Melissa Duran
City of Modesto Water Division/Corp Yard
P.O Box 642
Modesto, CA 95353

Report Issue Date: 6/11/2012 13:14
Received Date: 04/17/2012
Received Time: 15:30

Lab Sample ID: A2D1327-01
Sample Date: 04/17/2012 09:30
Sampled by: N. Sandez
Sample Type: Grab
Matrix: Water

Sample Description: Hickman Test Well - 135' // 142165

Metals

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Calcium	EPA 200.7	**5.3**	0.10	mg/L	1	A204032	04/19/12	04/24/12	
Chromium	EPA 200.8	ND	10	ug/L	1	A204032	04/19/12	04/26/12	
Copper	EPA 200.8	ND	5.0	ug/L	1	A204032	04/19/12	04/26/12	
Iron	EPA 200.7	**0.19**	0.050	mg/L	1	A204032	04/19/12	04/24/12	
*Iron - Dissolved (1)	EPA 200.7	ND	0.050	mg/L	1	A205860	06/05/12	06/07/12	
Lead	EPA 200.8	ND	5.0	ug/L	1	A204032	04/19/12	04/26/12	
Magnesium	EPA 200.7	**2.0**	0.10	mg/L	1	A204032	04/19/12	04/24/12	
Manganese	EPA 200.7	**0.061**	0.010	mg/L	1	A204032	04/19/12	04/24/12	
***Manganese - Dissolved (1)**	EPA 200.7	**0.053**	0.010	mg/L	1	A205860	06/05/12	06/07/12	
Mercury	EPA 200.8	ND	0.40	ug/L	1	A204032	04/19/12	04/26/12	
Nickel	EPA 200.8	ND	10	ug/L	1	A204032	04/19/12	04/26/12	
Potassium	EPA 200.7	**7.0**	2.0	mg/L	1	A204032	04/19/12	04/24/12	
Selenium	EPA 200.8	ND	2.0	ug/L	1	A204032	04/19/12	04/26/12	
Silver	EPA 200.8	ND	10	ug/L	1	A204032	04/19/12	04/26/12	
Sodium	EPA 200.7	**26**	1.0	mg/L	1	A204032	04/19/12	04/24/12	
Thallium	EPA 200.8	ND	1.0	ug/L	1	A204032	04/19/12	04/26/12	
*Uranium	EPA 200.8	ND	1.0	ug/L	1	A204032	04/19/12	04/26/12	
***Uranium, Radiological**		**< 0.67**		pCi/L					
Zinc	EPA 200.7	ND	0.050	mg/L	1	A204032	04/19/12	04/24/12	

Radiological

Analyte	Method	Result	Units	Batch	Prepared	Analyzed	Qual
*Gross Alpha	EPA 00-02	ND	pCi/L	A204158	04/23/12	04/24/12	
***1.65 Sigma Uncertainty**		**0.110**	±				
***MDA95**		**1.09**	pCi/L				

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
EDB and DBCP by GC-ECD									
Dibromochloropropane (DBCP)	EPA 504.1	ND	0.010	ug/L	1	A204078	04/19/12	04/20/12	
Ethylene Dibromide (EDB)	EPA 504.1	ND	0.020	ug/L	1	A204078	04/19/12	04/20/12	
Surrogate: Bromoform	EPA 504.1	103 %		*Acceptable range: 70-130 %*					

A2D1327 FINAL 06112012 1314

Amended

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Sample Type: Grab
Matrix: Water

Sample Description: Hickman Test Well - 135' // 142165

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Organohalide Pesticides and PCBs by GC-ECD									
Aldrin	EPA 505	ND	0.075	ug/L	1	A204154	04/23/12	04/23/12	
Chlordane	EPA 505	ND	0.10	ug/L	1	A204154	04/23/12	04/23/12	
Chlorothalonil	EPA 505	ND	5.0	ug/L	1	A204154	04/23/12	04/23/12	
Dieldrin	EPA 505	ND	0.020	ug/L	1	A204154	04/23/12	04/23/12	
Endrin	EPA 505	ND	0.10	ug/L	1	A204154	04/23/12	04/23/12	
Heptachlor	EPA 505	ND	0.010	ug/L	1	A204154	04/23/12	04/23/12	
Heptachlor Epoxide	EPA 505	ND	0.010	ug/L	1	A204154	04/23/12	04/23/12	
Hexachlorobenzene	EPA 505	ND	0.50	ug/L	1	A204154	04/23/12	04/23/12	
Hexachlorocyclopentadiene	EPA 505	ND	1.0	ug/L	1	A204154	04/23/12	04/23/12	
Lindane	EPA 505	ND	0.20	ug/L	1	A204154	04/23/12	04/23/12	
Methoxychlor	EPA 505	ND	10	ug/L	1	A204154	04/23/12	04/23/12	
PCB Aroclor Screen	EPA 505	ND	0.50	ug/L	1	A204154	04/23/12	04/23/12	
Toxaphene	EPA 505	ND	1.0	ug/L	1	A204154	04/23/12	04/23/12	
Trifluralin	EPA 505	ND	1.0	ug/L	1	A204154	04/23/12	04/23/12	
Surrogate: TCMX	EPA 505	111 %		*Acceptable range: 70-130 %*					
Chlorinated Acid Herbicides by GC-ECD									
2,4,5-T	EPA 515.3	ND	1.0	ug/L	1	A204120	04/20/12	04/24/12	
2,4,5-TP (Silvex)	EPA 515.3	ND	1.0	ug/L	1	A204120	04/20/12	04/24/12	
2,4-D	EPA 515.3	ND	10	ug/L	1	A204120	04/20/12	04/24/12	
Bentazon	EPA 515.3	ND	2.0	ug/L	1	A204120	04/20/12	04/24/12	
Dalapon	EPA 515.3	ND	10	ug/L	1	A204120	04/20/12	04/24/12	
Dicamba	EPA 515.3	ND	1.5	ug/L	1	A204120	04/20/12	04/24/12	
Dinoseb	EPA 515.3	ND	2.0	ug/L	1	A204120	04/20/12	04/24/12	
Pentachlorophenol	EPA 515.3	ND	0.20	ug/L	1	A204120	04/20/12	04/24/12	
Picloram	EPA 515.3	ND	1.0	ug/L	1	A204120	04/20/12	04/24/12	
Surrogate: DCPAA	EPA 515.3	122 %		*Acceptable range: 70-130 %*					
Volatile Organics by GC-MS									
1,1,1,2-Tetrachloroethane	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
1,1,1-Trichloroethane	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
1,1,2,2-Tetrachloroethane	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
1,1,2-Trichloro-1,2,2-trifluoroethane	EPA 524.2	ND	10	ug/L	1	A204033	04/19/12	04/19/12	
1,1,2-Trichloroethane	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	

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Amended

BSK Associates Engineers & Laboratories

Certificate of Analysis

Melissa Duran
City of Modesto Water Division/Corp Yard
P.O Box 642
Modesto, CA 95353

Report Issue Date: 6/11/2012 13:14
Received Date: 04/17/2012
Received Time: 15:30

Lab Sample ID: A2D1327-01
Sample Date: 04/17/2012 09:30
Sampled by: N. Sandez
Sample Type: Grab
Matrix: Water

Sample Description: Hickman Test Well - 135' // 142165

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Volatile Organics by GC-MS									
1,1-Dichloroethane	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
1,1-Dichloroethene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
1,1-Dichloropropene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
1,2,3-Trichlorobenzene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
1,2,4-Trichlorobenzene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
1,2,4-Trimethylbenzene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
1,2-Dichlorobenzene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
1,2-Dichloroethane	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
1,2-Dichloropropane	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
1,3,5-Trimethylbenzene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
1,3-Dichlorobenzene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
1,3-Dichloropropane	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
1,4-Dichlorobenzene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
2,2-Dichloropropane	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
2-Butanone	EPA 524.2	ND	5.0	ug/L	1	A204033	04/19/12	04/19/12	
2-Chlorotoluene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
2-Hexanone	EPA 524.2	ND	10	ug/L	1	A204033	04/19/12	04/19/12	
4-Chlorotoluene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
4-Methyl-2-pentanone	EPA 524.2	ND	5.0	ug/L	1	A204033	04/19/12	04/19/12	
Acetone	EPA 524.2	ND	10	ug/L	1	A204033	04/19/12	04/19/12	
Benzene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Bromobenzene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Bromochloromethane	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Bromodichloromethane	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Bromoform	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Bromomethane	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Carbon Tetrachloride	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Chlorobenzene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Chloroethane	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Chloroform	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Chloromethane	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
cis-1,2-Dichloroethene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
cis-1,3-Dichloropropene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Dibromochloromethane	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	

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Certificate of Analysis

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Lab Sample ID: A2D1327-01
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Sample Type: Grab
Sampled by: N. Sandez
Matrix: Water

Sample Description: Hickman Test Well - 135' // 142165

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Volatile Organics by GC-MS									
Dibromomethane	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Dichlorodifluoromethane	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Dichloromethane	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Di-isopropyl ether (DIPE)	EPA 524.2	ND	3.0	ug/L	1	A204033	04/19/12	04/19/12	
Ethyl tert-Butyl Ether (ETBE)	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Ethylbenzene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Hexachlorobutadiene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Isopropylbenzene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
m,p-Xylenes	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Methyl-t-butyl ether	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Naphthalene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
n-Butylbenzene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
n-Propylbenzene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
o-Xylene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
p-Isopropyltoluene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
sec-Butylbenzene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Styrene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
tert-Amyl Methyl Ether (TAME)	EPA 524.2	ND	3.0	ug/L	1	A204033	04/19/12	04/19/12	
tert-Butyl alcohol (TBA)	EPA 524.2	ND	2.0	ug/L	1	A204033	04/19/12	04/19/12	
tert-Butylbenzene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Tetrachloroethene (PCE)	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Toluene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
trans-1,2-Dichloroethene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
trans-1,3-Dichloropropene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Trichloroethene (TCE)	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Trichlorofluoromethane	EPA 524.2	ND	5.0	ug/L	1	A204033	04/19/12	04/19/12	
Vinyl Chloride	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Surrogate: 1,2-Dichlorobenzene-d4	EPA 524.2	111 %		*Acceptable range: 70-130 %*					
Surrogate: Bromofluorobenzene	EPA 524.2	112 %		*Acceptable range: 70-130 %*					
*Total 1,3-Dichloropropene, EPA 524.2		ND	0.50	ug/L					
*Total Trihalomethanes, EPA 524.2		ND	0.50	ug/L					
*Total Xylenes, EPA 524.2		ND	0.50	ug/L					
Semi-Volatile Organics by GC-MS									

A2D1327 FINAL 06112012 1314

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Certificate of Analysis

Melissa Duran
City of Modesto Water Division/Corp Yard
P.O Box 642
Modesto, CA 95353

Report Issue Date: 6/11/2012 13:14
Received Date: 04/17/2012
Received Time: 15:30

Lab Sample ID: A2D1327-01
Sample Date: 04/17/2012 09:30
Sampled by: N. Sandez
Sample Type: Grab
Matrix: Water

Sample Description: Hickman Test Well - 135' // 142165

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Semi-Volatile Organics by GC-MS									
Alachlor	EPA 525.2	ND	1.0	ug/L	1	A204138	04/21/12	04/23/12	
Atrazine	EPA 525.2	ND	0.50	ug/L	1	A204138	04/21/12	04/23/12	
Benzo(a)pyrene	EPA 525.2	ND	0.10	ug/L	1	A204138	04/21/12	04/23/12	
Bis(2-ethylhexyl) adipate	EPA 525.2	ND	3.0	ug/L	1	A204138	04/21/12	04/23/12	
Bis(2-ethylhexyl) phthalate	EPA 525.2	ND	3.0	ug/L	1	A204138	04/21/12	04/23/12	
Bromacil	EPA 525.2	ND	10	ug/L	1	A204138	04/21/12	04/23/12	
Butachlor	EPA 525.2	ND	0.38	ug/L	1	A204138	04/21/12	04/23/12	
Diazinon	EPA 525.2	ND	0.25	ug/L	1	A204138	04/21/12	04/23/12	
Dimethoate	EPA 525.2	ND	10	ug/L	1	A204138	04/21/12	04/23/12	
Metolachlor	EPA 525.2	ND	0.50	ug/L	1	A204138	04/21/12	04/23/12	
Metribuzin	EPA 525.2	ND	0.50	ug/L	1	A204138	04/21/12	04/23/12	
Molinate	EPA 525.2	ND	2.0	ug/L	1	A204138	04/21/12	04/23/12	
Propachlor	EPA 525.2	ND	0.50	ug/L	1	A204138	04/21/12	04/23/12	
Simazine	EPA 525.2	ND	1.0	ug/L	1	A204138	04/21/12	04/23/12	
Thiobencarb	EPA 525.2	ND	1.0	ug/L	1	A204138	04/21/12	04/23/12	
Surrogate: 1,3-Dimethyl-2-nitrobenzene	EPA 525.2	113 %		*Acceptable range: 70-130 %*					
Carbamates by HPLC									
3-Hydroxycarbofuran	EPA 531.1	ND	3.0	ug/L	1	A204065	04/19/12	04/20/12	
Aldicarb	EPA 531.1	ND	3.0	ug/L	1	A204065	04/19/12	04/20/12	
Aldicarb Sulfone	EPA 531.1	ND	2.0	ug/L	1	A204065	04/19/12	04/20/12	
Aldicarb Sulfoxide	EPA 531.1	ND	3.0	ug/L	1	A204065	04/19/12	04/20/12	
Carbaryl	EPA 531.1	ND	5.0	ug/L	1	A204065	04/19/12	04/20/12	
Carbofuran	EPA 531.1	ND	5.0	ug/L	1	A204065	04/19/12	04/20/12	
Methomyl	EPA 531.1	ND	2.0	ug/L	1	A204065	04/19/12	04/20/12	
Oxamyl	EPA 531.1	ND	20	ug/L	1	A204065	04/19/12	04/20/12	
Glyphosate by HPLC									
Glyphosate	EPA 547	ND	25	ug/L	1	A204149	04/23/12	04/24/12	
Surrogate: AMPA	EPA 547	97 %		*Acceptable range: 70-130 %*					
Endothall by GC-MS									
Endothall	EPA 548.1	ND	45	ug/L	1	A204197	04/23/12	04/25/12	
Diquat by HPLC									

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BSK Associates Engineers & Laboratories

Certificate of Analysis

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City of Modesto Water Division/Corp Yard
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Modesto, CA 95353

Report Issue Date: 6/11/2012 13:14
Received Date: 04/17/2012
Received Time: 15:30

Lab Sample ID: A2D1327-01
Sample Date: 04/17/2012 09:30
Sampled by: N. Sandez
Sample Type: Grab
Matrix: Water

Sample Description: Hickman Test Well - 135' // 142165

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Diquat by HPLC									
Diquat	EPA 549.2	ND	4.0	ug/L	1	A204142	04/21/12	04/27/12	
Diuron by HPLC									
Diuron	EPA 632	ND	1.0	ug/L	1	A204145	04/23/12	04/25/12	
Surrogate: Benthiocarb	EPA 632	103 %		*Acceptable range: 70-130 %*					

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General Chemistry Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203940				Analyst: DFS		Prepared: 4/17/2012					
Blank (A203940-BLK1) SM 5540 C - Quality Control											
MBAS, Calculated as LAS, mol wt 340	ND	0.050	mg/L							04/17/12	
Blank Spike (A203940-BS1) SM 5540 C - Quality Control											
MBAS, Calculated as LAS, mol wt 340	1.0	0.050	mg/L	1.0		104	80-120			04/17/12	
Blank Spike Dup (A203940-BSD1) SM 5540 C - Quality Control											
MBAS, Calculated as LAS, mol wt 340	1.0	0.050	mg/L	1.0		104	80-120	1	20	04/17/12	
Matrix Spike (A203940-MS1) SM 5540 C - Quality Control					**Source: A2D1224-01**						
MBAS, Calculated as LAS, mol wt 340	0.96	0.050	mg/L	1.0	ND	96	80-120			04/17/12	
Matrix Spike Dup (A203940-MSD1) SM 5540 C - Quality Control					**Source: A2D1224-01**						
MBAS, Calculated as LAS, mol wt 340	0.97	0.050	mg/L	1.0	ND	97	80-120	1	20	04/17/12	
Batch: A203943				Analyst: DFS		Prepared: 4/17/2012					
Blank (A203943-BLK1) SM 2120 B - Quality Control											
Color	ND	1.0	Color Units							04/17/12	
Threshold Odor	ND	1.0	T.O.N.							04/17/12	
Turbidity	ND	0.10	NTU							04/17/12	
Duplicate (A203943-DUP1) SM 2120 B - Quality Control					**Source: A2D1224-02**						
Color	ND	1.0	Color Units		ND				20	04/17/12	
Threshold Odor	ND	1.0	T.O.N.		ND				20	04/17/12	
Turbidity	ND	0.10	NTU		ND				20	04/17/12	
Duplicate (A203943-DUP2) SM 2120 B - Quality Control					**Source: A2D1293-01**						
Color	ND	1.0	Color Units		ND				20	04/17/12	
Threshold Odor	ND	1.0	T.O.N.		ND				20	04/17/12	
Turbidity	ND	0.10	NTU		ND				20	04/17/12	
Batch: A203960				Analyst: CEG		Prepared: 4/17/2012					
Blank (A203960-BLK1) SM 2320 B - Quality Control											
Alkalinity as CaCO3	ND	3.0	mg/L							04/17/12	
Bicarbonate as CaCO3	ND	3.0	mg/L							04/17/12	
Carbonate as CaCO3	ND	3.0	mg/L							04/17/12	
Conductivity @ 25C	ND	1.0	umhos/cm							04/17/12	
Hydroxide as CaCO3	ND	3.0	mg/L							04/17/12	
Blank Spike (A203960-BS1) SM 2320 B - Quality Control											
Alkalinity as CaCO3	98	3.0	mg/L	100		98	80-120			04/17/12	
Blank Spike Dup (A203960-BSD1) SM 2320 B - Quality Control											
Alkalinity as CaCO3	97	3.0	mg/L	100		97	80-120	1	20	04/17/12	

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General Chemistry Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203960				Analyst: CEG		Prepared: 4/17/2012					
Duplicate (A203960-DUP1) SM 2320 B - Quality Control						**Source: A2D1327-01**					
Alkalinity as CaCO3	71	3.0	mg/L		72			1	10	04/17/12	
Bicarbonate as CaCO3	71	3.0	mg/L		72			1	10	04/17/12	
Carbonate as CaCO3	ND	3.0	mg/L		ND				10	04/17/12	
Conductivity @ 25C	170	1.0	umhos/cm		170			0	20	04/17/12	
Hydroxide as CaCO3	ND	3.0	mg/L		ND				10	04/17/12	
pH (1)	8.2		pH Units		8.2			0	20	04/17/12	
Duplicate (A203960-DUP2) SM 2320 B - Quality Control						**Source: A2D1340-02**					
Alkalinity as CaCO3	76	3.0	mg/L		76			1	10	04/17/12	
Bicarbonate as CaCO3	76	3.0	mg/L		76			1	10	04/17/12	
Carbonate as CaCO3	ND	3.0	mg/L		ND				10	04/17/12	
Conductivity @ 25C	180	1.0	umhos/cm		180			0	20	04/17/12	
Hydroxide as CaCO3	ND	3.0	mg/L		ND				10	04/17/12	
pH (1)	8.3		pH Units		8.3			0	20	04/17/12	
Batch: A203965				Analyst: AJT		Prepared: 4/17/2012					
Blank (A203965-BLK1) EPA 300.0 - Quality Control											
Chloride	ND	1.0	mg/L							04/17/12	
Nitrate as NO3	ND	1.0	mg/L							04/17/12	
Nitrite as N	ND	0.050	mg/L							04/17/12	
Sulfate as SO4	ND	2.0	mg/L							04/17/12	
Blank Spike (A203965-BS1) EPA 300.0 - Quality Control											
Chloride	50	1.0	mg/L	50		101	90-110			04/17/12	
Nitrate as NO3	50	1.0	mg/L	50		101	90-110			04/17/12	
Nitrite as N	0.54	0.050	mg/L	0.50		108	90-110			04/17/12	
Sulfate as SO4	51	2.0	mg/L	50		101	90-110			04/17/12	
Blank Spike Dup (A203965-BSD1) EPA 300.0 - Quality Control											
Chloride	50	1.0	mg/L	50		100	90-110	1	10	04/17/12	
Nitrate as NO3	50	1.0	mg/L	50		100	90-110	1	10	04/17/12	
Nitrite as N	0.53	0.050	mg/L	0.50		105	90-110	2	10	04/17/12	
Sulfate as SO4	51	2.0	mg/L	50		101	90-110	0	10	04/17/12	
Matrix Spike (A203965-MS1) EPA 300.0 - Quality Control						**Source: A2D1302-02**					
Chloride	140	2.0	mg/L	100	25	116	80-120			04/17/12	
Nitrate as NO3	120	2.0	mg/L	100	4.9	115	80-120			04/17/12	
Nitrite as N	1.1	0.10	mg/L	1.0	ND	109	80-120			04/17/12	
Sulfate as SO4	140	4.0	mg/L	100	23	116	80-120			04/17/12	
Matrix Spike (A203965-MS2) EPA 300.0 - Quality Control						**Source: A2D1231-06**					
Chloride	130	2.0	mg/L	100	6.2	121	80-120			04/17/12	MS01 ***High***
Nitrate as NO3	130	2.0	mg/L	100	13	121	80-120			04/17/12	MS01 ***High***
Nitrite as N	1.1	0.10	mg/L	1.0	ND	106	80-120			04/17/12	

A2D1327 FINAL 06112012 1314

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General Chemistry Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203965				Analyst: AJT		Prepared: 4/17/2012					
Matrix Spike (A203965-MS2) EPA 300.0 - Quality Control						**Source: A2D1231-06**					
Sulfate as SO4	130	4.0	mg/L	100	7.2	122	80-120			04/17/12	MS01 ***High***
Matrix Spike Dup (A203965-MSD1) EPA 300.0 - Quality Control						**Source: A2D1302-02**					
Chloride	140	2.0	mg/L	100	25	114	80-120	1	10	04/17/12	
Nitrate as NO3	120	2.0	mg/L	100	4.9	114	80-120	1	10	04/17/12	
Nitrite as N	1.1	0.10	mg/L	1.0	ND	107	80-120	2	20	04/17/12	
Sulfate as SO4	140	4.0	mg/L	100	23	115	80-120	1	10	04/17/12	
Matrix Spike Dup (A203965-MSD2) EPA 300.0 - Quality Control						**Source: A2D1231-06**					
Chloride	130	2.0	mg/L	100	6.2	120	80-120	1	10	04/18/12	
Nitrate as NO3	130	2.0	mg/L	100	13	120	80-120	1	10	04/18/12	
Nitrite as N	1.0	0.10	mg/L	1.0	ND	104	80-120	2	20	04/18/12	
Sulfate as SO4	130	4.0	mg/L	100	7.2	121	80-120	1	10	04/18/12	MS01 ***High***
Batch: A204036				Analyst: DEH		Prepared: 4/19/2012					
Blank (A204036-BLK1) SM 2540C - Quality Control											
Total Dissolved Solids	ND	5.0	mg/L							04/23/12	
Blank (A204036-BLK2) SM 2540C - Quality Control											
Total Dissolved Solids	ND	5.0	mg/L							04/23/12	
Duplicate (A204036-DUP1) SM 2540C - Quality Control						**Source: A2D1314-01**					
Total Dissolved Solids	460	5.0	mg/L		450			1	20	04/23/12	
Duplicate (A204036-DUP2) SM 2540C - Quality Control						**Source: A2D1191-01**					
Total Dissolved Solids	42	5.0	mg/L		30			33	20	04/23/12	DP01
Batch: A204113				Analyst: LJL		Prepared: 4/20/2012					
Blank (A204113-BLK1) SM 4500-CN E - Quality Control											
Cyanide (total)	ND	0.0050	mg/L							04/20/12	
Blank Spike (A204113-BS1) SM 4500-CN E - Quality Control											
Cyanide (total)	0.52	0.0050	mg/L	0.50		103	80-120			04/20/12	
Blank Spike Dup (A204113-BSD1) SM 4500-CN E - Quality Control											
Cyanide (total)	0.51	0.0050	mg/L	0.50		103	80-120	0	20	04/20/12	
Matrix Spike (A204113-MS1) SM 4500-CN E - Quality Control						**Source: A2D1314-01**					
Cyanide (total)	0.48	0.0050	mg/L	0.50	ND	96	80-120			04/20/12	
Matrix Spike (A204113-MS2) SM 4500-CN E - Quality Control						**Source: A2D1509-02**					
Cyanide (total)	0.52	0.0050	mg/L	0.50	ND	105	80-120			04/20/12	
Matrix Spike Dup (A204113-MSD1) SM 4500-CN E - Quality Control						**Source: A2D1314-01**					

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General Chemistry Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204113				Analyst: LJL		Prepared: 4/20/2012					
Matrix Spike Dup (A204113-MSD1)	**SM 4500-CN E - Quality Control**					**Source: A2D1314-01**					
Cyanide (total)	0.49	0.0050	mg/L	0.50	ND	97	80-120	1	20	04/20/12	
Matrix Spike Dup (A204113-MSD2)	**SM 4500-CN E - Quality Control**					**Source: A2D1509-02**					
Cyanide (total)	0.52	0.0050	mg/L	0.50	ND	104	80-120	1	20	04/20/12	
Batch: A204152				Analyst: CCH		Prepared: 4/23/2012					
Blank (A204152-BLK1)	**SM 4500-F C - Quality Control**										
Fluoride	ND	0.10	mg/L							04/23/12	
Blank Spike (A204152-BS1)	**SM 4500-F C - Quality Control**										
Fluoride	1.0	0.10	mg/L	1.0		105	80-120			04/23/12	
Blank Spike Dup (A204152-BSD1)	**SM 4500-F C - Quality Control**										
Fluoride	1.1	0.10	mg/L	1.0		106	80-120	1	20	04/23/12	
Matrix Spike (A204152-MS1)	**SM 4500-F C - Quality Control**					**Source: A2D1293-01**					
Fluoride	1.2	0.10	mg/L	1.0	ND	109	80-120			04/23/12	
Matrix Spike (A204152-MS2)	**SM 4500-F C - Quality Control**					**Source: A2D1390-03**					
Fluoride	1.5	0.10	mg/L	1.0	0.39	108	80-120			04/23/12	
Matrix Spike Dup (A204152-MSD1)	**SM 4500-F C - Quality Control**					**Source: A2D1293-01**					
Fluoride	1.2	0.10	mg/L	1.0	ND	110	80-120	1	20	04/23/12	
Matrix Spike Dup (A204152-MSD2)	**SM 4500-F C - Quality Control**					**Source: A2D1390-03**					
Fluoride	1.5	0.10	mg/L	1.0	0.39	108	80-120	0	20	04/23/12	

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Metals Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204032				Analyst: NRE		Prepared: 4/19/2012					
Blank (A204032-BLK2) EPA 200.7 - Quality Control											
Aluminum	ND	0.050	mg/L							04/24/12	
Barium	ND	0.050	mg/L							04/24/12	
Calcium	ND	0.10	mg/L							04/24/12	
Iron	ND	0.050	mg/L							04/24/12	
Magnesium	ND	0.10	mg/L							04/24/12	
Manganese	ND	0.010	mg/L							04/24/12	
Potassium	ND	2.0	mg/L							04/24/12	
Sodium	ND	1.0	mg/L							04/24/12	
Zinc	ND	0.050	mg/L							04/24/12	
Blank Spike (A204032-BS2) EPA 200.7 - Quality Control											
Aluminum	0.20	0.050	mg/L	0.20		101	85-115			04/24/12	
Barium	0.21	0.050	mg/L	0.20		103	85-115			04/24/12	
Calcium	9.6	0.10	mg/L	10		96	85-115			04/24/12	
Iron	2.0	0.050	mg/L	2.0		99	85-115			04/24/12	
Magnesium	9.8	0.10	mg/L	10		98	85-115			04/24/12	
Manganese	0.20	0.010	mg/L	0.20		98	85-115			04/24/12	
Potassium	10	2.0	mg/L	10		100	85-115			04/24/12	
Sodium	10	1.0	mg/L	10		101	85-115			04/24/12	
Zinc	0.19	0.050	mg/L	0.20		95	85-115			04/24/12	
Blank Spike Dup (A204032-BSD2) EPA 200.7 - Quality Control											
Aluminum	0.20	0.050	mg/L	0.20		98	85-115	3	20	04/24/12	
Barium	0.20	0.050	mg/L	0.20		101	85-115	2	20	04/24/12	
Calcium	9.4	0.10	mg/L	10		94	85-115	2	20	04/24/12	
Iron	1.9	0.050	mg/L	2.0		97	85-115	3	20	04/24/12	
Magnesium	9.5	0.10	mg/L	10		95	85-115	2	20	04/24/12	
Manganese	0.19	0.010	mg/L	0.20		95	85-115	3	20	04/24/12	
Potassium	9.8	2.0	mg/L	10		98	85-115	3	20	04/24/12	
Sodium	10	1.0	mg/L	10		100	85-115	1	20	04/24/12	
Zinc	0.19	0.050	mg/L	0.20		93	85-115	2	20	04/24/12	
Matrix Spike (A204032-MS3) EPA 200.7 - Quality Control						**Source: A2D1327-01**					
Aluminum	0.62	0.050	mg/L	0.20	0.26	182	70-130			04/24/12	MS01 ***High***
Barium	0.25	0.050	mg/L	0.20	ND	102	70-130			04/24/12	
Calcium	15	0.10	mg/L	10	5.3	94	70-130			04/24/12	
Iron	2.2	0.050	mg/L	2.0	0.19	99	70-130			04/24/12	
Magnesium	12	0.10	mg/L	10	2.0	96	70-130			04/24/12	
Manganese	0.25	0.010	mg/L	0.20	0.061	95	70-130			04/24/12	
Potassium	16	2.0	mg/L	10	7.0	94	70-130			04/24/12	
Sodium	35	1.0	mg/L	10	26	95	70-130			04/24/12	
Zinc	0.21	0.050	mg/L	0.20	ND	107	70-130			04/24/12	
Matrix Spike (A204032-MS4) EPA 200.7 - Quality Control						**Source: A2D1387-01**					
Aluminum	0.19	0.050	mg/L	0.20	ND	97	70-130			04/24/12	

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Metals Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204032				Analyst: NRE		Prepared: 4/19/2012					
Matrix Spike (A204032-MS4) EPA 200.7 - Quality Control						**Source: A2D1387-01**					
Barium	0.22	0.050	mg/L	0.20	ND	108	70-130			04/24/12	
Calcium	26	0.10	mg/L	10	17	90	70-130			04/24/12	
Iron	1.9	0.050	mg/L	2.0	ND	96	70-130			04/24/12	
Magnesium	20	0.10	mg/L	10	11	95	70-130			04/24/12	
Manganese	0.19	0.010	mg/L	0.20	ND	96	70-130			04/24/12	
Potassium	11	2.0	mg/L	10	ND	97	70-130			04/24/12	
Sodium	19	1.0	mg/L	10	8.8	99	70-130			04/24/12	
Zinc	0.19	0.050	mg/L	0.20	ND	94	70-130			04/24/12	
Matrix Spike Dup (A204032-MSD3) EPA 200.7 - Quality Control						**Source: A2D1327-01**					
Aluminum	0.62	0.050	mg/L	0.20	0.26	184	70-130	1	20	04/24/12	MS01 ***High***
Barium	0.24	0.050	mg/L	0.20	ND	99	70-130	2	20	04/24/12	
Calcium	15	0.10	mg/L	10	5.3	93	70-130	0	20	04/24/12	
Iron	2.2	0.050	mg/L	2.0	0.19	99	70-130	0	20	04/24/12	
Magnesium	12	0.10	mg/L	10	2.0	96	70-130	1	20	04/24/12	
Manganese	0.25	0.010	mg/L	0.20	0.061	95	70-130	0	20	04/24/12	
Potassium	16	2.0	mg/L	10	7.0	94	70-130	0	20	04/24/12	
Sodium	35	1.0	mg/L	10	26	90	70-130	1	20	04/24/12	
Zinc	0.20	0.050	mg/L	0.20	ND	101	70-130	6	20	04/24/12	
Matrix Spike Dup (A204032-MSD4) EPA 200.7 - Quality Control						**Source: A2D1387-01**					
Aluminum	0.20	0.050	mg/L	0.20	ND	101	70-130	4	20	04/24/12	
Barium	0.22	0.050	mg/L	0.20	ND	108	70-130	0	20	04/24/12	
Calcium	26	0.10	mg/L	10	17	92	70-130	1	20	04/24/12	
Iron	1.9	0.050	mg/L	2.0	ND	97	70-130	1	20	04/24/12	
Magnesium	21	0.10	mg/L	10	11	98	70-130	2	20	04/24/12	
Manganese	0.19	0.010	mg/L	0.20	ND	96	70-130	0	20	04/24/12	
Potassium	11	2.0	mg/L	10	ND	100	70-130	2	20	04/24/12	
Sodium	19	1.0	mg/L	10	8.8	100	70-130	1	20	04/24/12	
Zinc	0.19	0.050	mg/L	0.20	ND	93	70-130	0	20	04/24/12	
Blank (A204032-BLK1) EPA 200.8 - Quality Control											
Antimony	ND	2.0	ug/L							04/26/12	
Arsenic	ND	2.0	ug/L							04/26/12	
Beryllium	ND	1.0	ug/L							04/26/12	
Cadmium	ND	1.0	ug/L							04/26/12	
Chromium	ND	10	ug/L							04/26/12	
Copper	ND	5.0	ug/L							04/26/12	
Lead	ND	5.0	ug/L							04/26/12	
Mercury	ND	0.40	ug/L							04/26/12	
Nickel	ND	10	ug/L							04/26/12	
Selenium	ND	2.0	ug/L							04/26/12	
Silver	ND	10	ug/L							04/26/12	
Thallium	ND	1.0	ug/L							04/26/12	
Uranium	ND	1.0	ug/L							04/26/12	

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Metals Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204032				Analyst: MAS		Prepared: 4/19/2012					
Blank Spike (A204032-BS1)	**EPA 200.8 - Quality Control**										
Antimony	200	2.0	ug/L	200		100	85-115			04/26/12	
Arsenic	200	2.0	ug/L	200		102	85-115			04/26/12	
Beryllium	190	1.0	ug/L	200		93	85-115			04/26/12	
Cadmium	200	1.0	ug/L	200		98	85-115			04/26/12	
Chromium	210	10	ug/L	200		103	85-115			04/26/12	
Copper	200	5.0	ug/L	200		98	85-115			04/26/12	
Lead	210	5.0	ug/L	200		105	85-115			04/26/12	
Mercury	4.6	0.40	ug/L	5.0		91	85-115			04/26/12	
Nickel	190	10	ug/L	200		97	85-115			04/26/12	
Selenium	200	2.0	ug/L	200		101	85-115			04/26/12	
Silver	94	10	ug/L	100		94	75-125			04/26/12	
Thallium	230	1.0	ug/L	200		113	85-115			04/26/12	
Uranium	110	1.0	ug/L	100		112	85-115			04/26/12	
Blank Spike Dup (A204032-BSD1)	**EPA 200.8 - Quality Control**										
Antimony	200	2.0	ug/L	200		99	85-115	1	20	04/26/12	
Arsenic	200	2.0	ug/L	200		99	85-115	3	20	04/26/12	
Beryllium	180	1.0	ug/L	200		91	85-115	3	20	04/26/12	
Cadmium	190	1.0	ug/L	200		95	85-115	3	20	04/26/12	
Chromium	200	10	ug/L	200		99	85-115	4	20	04/26/12	
Copper	190	5.0	ug/L	200		93	85-115	5	20	04/26/12	
Lead	210	5.0	ug/L	200		104	85-115	2	20	04/26/12	
Mercury	4.3	0.40	ug/L	5.0		85	85-115	7	20	04/26/12	
Nickel	190	10	ug/L	200		94	85-115	3	20	04/26/12	
Selenium	200	2.0	ug/L	200		100	85-115	1	20	04/26/12	
Silver	94	10	ug/L	100		94	75-125	1	20	04/26/12	
Thallium	220	1.0	ug/L	200		108	85-115	4	20	04/26/12	
Uranium	110	1.0	ug/L	100		110	85-115	2	20	04/26/12	
Matrix Spike (A204032-MS1)	**EPA 200.8 - Quality Control**					**Source: A2D1327-01**					
Antimony	200	2.0	ug/L	200	ND	99	70-130			04/26/12	
Arsenic	200	2.0	ug/L	200	ND	100	70-130			04/26/12	
Beryllium	180	1.0	ug/L	200	ND	91	70-130			04/26/12	
Cadmium	190	1.0	ug/L	200	ND	96	70-130			04/26/12	
Chromium	200	10	ug/L	200	ND	100	70-130			04/26/12	
Copper	190	5.0	ug/L	200	ND	94	70-130			04/26/12	
Lead	210	5.0	ug/L	200	ND	103	70-130			04/26/12	
Mercury	4.7	0.40	ug/L	5.0	ND	93	70-130			04/26/12	
Nickel	190	10	ug/L	200	ND	93	70-130			04/26/12	
Selenium	190	2.0	ug/L	200	ND	97	70-130			04/26/12	
Silver	91	10	ug/L	100	ND	91	70-130			04/26/12	
Thallium	220	1.0	ug/L	200	ND	108	70-130			04/26/12	
Uranium	110	1.0	ug/L	100	ND	108	70-130			04/26/12	
Matrix Spike (A204032-MS2)	**EPA 200.8 - Quality Control**					**Source: A2D1387-01**					

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Metals Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204032				Analyst: MAS		Prepared: 4/19/2012					
Matrix Spike (A204032-MS2)	**EPA 200.8 - Quality Control**					**Source: A2D1387-01**					
Antimony	200	2.0	ug/L	200	ND	102	70-130			04/26/12	
Arsenic	200	2.0	ug/L	200	ND	101	70-130			04/26/12	
Beryllium	180	1.0	ug/L	200	ND	91	70-130			04/26/12	
Cadmium	200	1.0	ug/L	200	ND	99	70-130			04/26/12	
Chromium	200	10	ug/L	200	ND	102	70-130			04/26/12	
Copper	190	5.0	ug/L	200	ND	95	70-130			04/26/12	
Lead	210	5.0	ug/L	200	ND	104	70-130			04/26/12	
Mercury	4.9	0.40	ug/L	5.0	ND	98	70-130			04/26/12	
Nickel	180	10	ug/L	200	ND	92	70-130			04/26/12	
Selenium	200	2.0	ug/L	200	ND	97	70-130			04/26/12	
Silver	95	10	ug/L	100	ND	95	70-130			04/26/12	
Thallium	210	1.0	ug/L	200	ND	107	70-130			04/26/12	
Uranium	110	1.0	ug/L	100	ND	109	70-130			04/26/12	
Matrix Spike Dup (A204032-MSD1)	**EPA 200.8 - Quality Control**					**Source: A2D1327-01**					
Antimony	200	2.0	ug/L	200	ND	98	70-130	1	20	04/26/12	
Arsenic	190	2.0	ug/L	200	ND	96	70-130	3	20	04/26/12	
Beryllium	180	1.0	ug/L	200	ND	89	70-130	2	20	04/26/12	
Cadmium	190	1.0	ug/L	200	ND	96	70-130	1	20	04/26/12	
Chromium	200	10	ug/L	200	ND	98	70-130	2	20	04/26/12	
Copper	180	5.0	ug/L	200	ND	92	70-130	2	20	04/26/12	
Lead	210	5.0	ug/L	200	ND	104	70-130	0	20	04/26/12	
Mercury	4.9	0.40	ug/L	5.0	ND	99	70-130	6	20	04/26/12	
Nickel	180	10	ug/L	200	ND	92	70-130	1	20	04/26/12	
Selenium	200	2.0	ug/L	200	ND	98	70-130	0	20	04/26/12	
Silver	91	10	ug/L	100	ND	91	70-130	0	20	04/26/12	
Thallium	220	1.0	ug/L	200	ND	108	70-130	0	20	04/26/12	
Uranium	110	1.0	ug/L	100	ND	111	70-130	3	20	04/26/12	
Matrix Spike Dup (A204032-MSD2)	**EPA 200.8 - Quality Control**					**Source: A2D1387-01**					
Antimony	200	2.0	ug/L	200	ND	99	70-130	3	20	04/26/12	
Arsenic	200	2.0	ug/L	200	ND	98	70-130	3	20	04/26/12	
Beryllium	180	1.0	ug/L	200	ND	89	70-130	3	20	04/26/12	
Cadmium	190	1.0	ug/L	200	ND	95	70-130	4	20	04/26/12	
Chromium	200	10	ug/L	200	ND	98	70-130	4	20	04/26/12	
Copper	190	5.0	ug/L	200	ND	93	70-130	1	20	04/26/12	
Lead	210	5.0	ug/L	200	ND	104	70-130	0	20	04/26/12	
Mercury	4.9	0.40	ug/L	5.0	ND	98	70-130	0	20	04/26/12	
Nickel	180	10	ug/L	200	ND	92	70-130	1	20	04/26/12	
Selenium	200	2.0	ug/L	200	ND	98	70-130	1	20	04/26/12	
Silver	91	10	ug/L	100	ND	91	70-130	4	20	04/26/12	
Thallium	220	1.0	ug/L	200	ND	110	70-130	3	20	04/26/12	
Uranium	110	1.0	ug/L	100	ND	113	70-130	4	20	04/26/12	
Batch: A205860				Analyst: NRE		Prepared: 6/5/2012					

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Metals Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A205860				Analyst: NRE		Prepared: 6/5/2012					
Blank (A205860-BLK1) EPA 200.7 - Quality Control											
Iron - Dissolved (1)	ND	0.050	mg/L							06/07/12	
Manganese - Dissolved (1)	ND	0.010	mg/L							06/07/12	
Blank Spike (A205860-BS1) EPA 200.7 - Quality Control											
Iron - Dissolved (1)	2.0	0.050	mg/L	2.0		99	85-115			06/07/12	
Manganese - Dissolved (1)	0.20	0.010	mg/L	0.20		101	85-115			06/07/12	
Blank Spike Dup (A205860-BSD1) EPA 200.7 - Quality Control											
Iron - Dissolved (1)	2.0	0.050	mg/L	2.0		101	85-115	2	20	06/07/12	
Manganese - Dissolved (1)	0.20	0.010	mg/L	0.20		101	85-115	1	20	06/07/12	
Matrix Spike (A205860-MS1) EPA 200.7 - Quality Control						**Source: A2D1159-01**					
Iron - Dissolved (1)	2.0	0.050	mg/L	2.0	ND	99	70-130			06/07/12	
Manganese - Dissolved (1)	0.24	0.010	mg/L	0.20	0.041	100	70-130			06/07/12	
Matrix Spike Dup (A205860-MSD1) EPA 200.7 - Quality Control						**Source: A2D1159-01**					
Iron - Dissolved (1)	2.0	0.050	mg/L	2.0	ND	98	70-130	1	20	06/07/12	
Manganese - Dissolved (1)	0.24	0.010	mg/L	0.20	0.041	99	70-130	0	20	06/07/12	

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Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204033				Analyst: JGB		Prepared: 4/19/2012					
Blank (A204033-BLK1) EPA 524.2 - Quality Control											
1,1,1,2-Tetrachloroethane	ND	0.50	ug/L							04/19/12	
1,1,1-Trichloroethane	ND	0.50	ug/L							04/19/12	
1,1,2,2-Tetrachloroethane	ND	0.50	ug/L							04/19/12	
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	10	ug/L							04/19/12	
1,1,2-Trichloroethane	ND	0.50	ug/L							04/19/12	
1,1-Dichloroethane	ND	0.50	ug/L							04/19/12	
1,1-Dichloroethene	ND	0.50	ug/L							04/19/12	
1,1-Dichloropropene	ND	0.50	ug/L							04/19/12	
1,2,3-Trichlorobenzene	ND	0.50	ug/L							04/19/12	
1,2,4-Trichlorobenzene	ND	0.50	ug/L							04/19/12	
1,2,4-Trimethylbenzene	ND	0.50	ug/L							04/19/12	
1,2-Dichlorobenzene	ND	0.50	ug/L							04/19/12	
1,2-Dichloroethane	ND	0.50	ug/L							04/19/12	
1,2-Dichloropropane	ND	0.50	ug/L							04/19/12	
1,3,5-Trimethylbenzene	ND	0.50	ug/L							04/19/12	
1,3-Dichlorobenzene	ND	0.50	ug/L							04/19/12	
1,3-Dichloropropane	ND	0.50	ug/L							04/19/12	
1,4-Dichlorobenzene	ND	0.50	ug/L							04/19/12	
2,2-Dichloropropane	ND	0.50	ug/L							04/19/12	
2-Butanone	ND	5.0	ug/L							04/19/12	
2-Chlorotoluene	ND	0.50	ug/L							04/19/12	
2-Hexanone	ND	10	ug/L							04/19/12	
4-Chlorotoluene	ND	0.50	ug/L							04/19/12	
4-Methyl-2-pentanone	ND	5.0	ug/L							04/19/12	
Acetone	ND	10	ug/L							04/19/12	
Benzene	ND	0.50	ug/L							04/19/12	
Bromobenzene	ND	0.50	ug/L							04/19/12	
Bromochloromethane	ND	0.50	ug/L							04/19/12	
Bromodichloromethane	ND	0.50	ug/L							04/19/12	
Bromoform	ND	0.50	ug/L							04/19/12	
Bromomethane	ND	0.50	ug/L							04/19/12	
Carbon Tetrachloride	ND	0.50	ug/L							04/19/12	
Chlorobenzene	ND	0.50	ug/L							04/19/12	
Chloroethane	ND	0.50	ug/L							04/19/12	
Chloroform	ND	0.50	ug/L							04/19/12	
Chloromethane	ND	0.50	ug/L							04/19/12	
cis-1,2-Dichloroethene	ND	0.50	ug/L							04/19/12	
cis-1,3-Dichloropropene	ND	0.50	ug/L							04/19/12	
Dibromochloromethane	ND	0.50	ug/L							04/19/12	
Dibromomethane	ND	0.50	ug/L							04/19/12	
Dichlorodifluoromethane	ND	0.50	ug/L							04/19/12	
Dichloromethane	ND	0.50	ug/L							04/19/12	
Di-isopropyl ether (DIPE)	ND	3.0	ug/L							04/19/12	
Ethyl tert-Butyl Ether (ETBE)	ND	0.50	ug/L							04/19/12	
Ethylbenzene	ND	0.50	ug/L							04/19/12	

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Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204033				Analyst: JGB		Prepared: 4/19/2012					
Blank (A204033-BLK1) EPA 524.2 - Quality Control											
Hexachlorobutadiene	ND	0.50	ug/L							04/19/12	
Isopropylbenzene	ND	0.50	ug/L							04/19/12	
m,p-Xylenes	ND	0.50	ug/L							04/19/12	
Methyl-t-butyl ether	ND	0.50	ug/L							04/19/12	
Naphthalene	ND	0.50	ug/L							04/19/12	
n-Butylbenzene	ND	0.50	ug/L							04/19/12	
n-Propylbenzene	ND	0.50	ug/L							04/19/12	
o-Xylene	ND	0.50	ug/L							04/19/12	
p-Isopropyltoluene	ND	0.50	ug/L							04/19/12	
sec-Butylbenzene	ND	0.50	ug/L							04/19/12	
Styrene	ND	0.50	ug/L							04/19/12	
tert-Amyl Methyl Ether (TAME)	ND	3.0	ug/L							04/19/12	
tert-Butyl alcohol (TBA)	ND	2.0	ug/L							04/19/12	
tert-Butylbenzene	ND	0.50	ug/L							04/19/12	
Tetrachloroethene (PCE)	ND	0.50	ug/L							04/19/12	
Toluene	ND	0.50	ug/L							04/19/12	
trans-1,2-Dichloroethene	ND	0.50	ug/L							04/19/12	
trans-1,3-Dichloropropene	ND	0.50	ug/L							04/19/12	
Trichloroethene (TCE)	ND	0.50	ug/L							04/19/12	
Trichlorofluoromethane	ND	5.0	ug/L							04/19/12	
Vinyl Chloride	ND	0.50	ug/L							04/19/12	
Surrogate: 1,2-Dichlorobenzene-d4	*4.7*			*5.0*		*94*	*70-130*			04/19/12	
Surrogate: Bromofluorobenzene	*5.0*			*5.0*		*99*	*70-130*			04/19/12	
Blank Spike (A204033-BS1) EPA 524.2 - Quality Control											
1,1,1,2-Tetrachloroethane	10	0.50	ug/L	10		100	70-130			04/19/12	
1,1,1-Trichloroethane	11	0.50	ug/L	10		107	70-130			04/19/12	
1,1,2,2-Tetrachloroethane	9.0	0.50	ug/L	10		90	70-130			04/19/12	
1,1,2-Trichloro-1,2,2-trifluoroethane	11	10	ug/L	10		112	70-130			04/19/12	
1,1,2-Trichloroethane	10	0.50	ug/L	10		101	70-130			04/19/12	
1,1-Dichloroethane	9.6	0.50	ug/L	10		96	70-130			04/19/12	
1,1-Dichloroethene	11	0.50	ug/L	10		111	70-130			04/19/12	
1,1-Dichloropropene	10	0.50	ug/L	10		100	70-130			04/19/12	
1,2,3-Trichlorobenzene	10	0.50	ug/L	10		100	70-130			04/19/12	
1,2,4-Trichlorobenzene	9.3	0.50	ug/L	10		93	70-130			04/19/12	
1,2,4-Trimethylbenzene	8.9	0.50	ug/L	10		89	70-130			04/19/12	
1,2-Dichlorobenzene	9.0	0.50	ug/L	10		90	70-130			04/19/12	
1,2-Dichloroethane	12	0.50	ug/L	10		116	70-130			04/19/12	
1,2-Dichloropropane	9.7	0.50	ug/L	10		97	70-130			04/19/12	
1,3,5-Trimethylbenzene	9.8	0.50	ug/L	10		98	70-130			04/19/12	
1,3-Dichlorobenzene	8.8	0.50	ug/L	10		88	70-130			04/19/12	
1,3-Dichloropropane	10	0.50	ug/L	10		102	70-130			04/19/12	
1,4-Dichlorobenzene	8.9	0.50	ug/L	10		89	70-130			04/19/12	
2,2-Dichloropropane	10	0.50	ug/L	10		103	70-130			04/19/12	
2-Butanone	10	5.0	ug/L	10		104	70-130			04/19/12	

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Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual	
Batch: A204033				Analyst: JGB		Prepared: 4/19/2012						
Blank Spike (A204033-BS1)	**EPA 524.2 - Quality Control**											
2-Chlorotoluene	9.3	0.50	ug/L	10		93	70-130			04/19/12		
2-Hexanone	11	10	ug/L	10		110	70-130			04/19/12		
4-Chlorotoluene	9.6	0.50	ug/L	10		96	70-130			04/19/12		
4-Methyl-2-pentanone	10	5.0	ug/L	10		101	70-130			04/19/12		
Acetone	17	10	ug/L	10		171	70-130			04/19/12	BS06	***High***
Benzene	9.5	0.50	ug/L	10		95	70-130			04/19/12		
Bromobenzene	9.6	0.50	ug/L	10		96	70-130			04/19/12		
Bromochloromethane	9.9	0.50	ug/L	10		99	70-130			04/19/12		
Bromodichloromethane	11	0.50	ug/L	10		106	70-130			04/19/12		
Bromoform	11	0.50	ug/L	10		107	70-130			04/19/12		
Bromomethane	11	0.50	ug/L	10		107	70-130			04/19/12		
Carbon Tetrachloride	11	0.50	ug/L	10		107	70-130			04/19/12		
Chlorobenzene	9.9	0.50	ug/L	10		99	70-130			04/19/12		
Chloroethane	10	0.50	ug/L	10		101	70-130			04/19/12		
Chloroform	10	0.50	ug/L	10		103	70-130			04/19/12		
Chloromethane	11	0.50	ug/L	10		111	70-130			04/19/12		
cis-1,2-Dichloroethene	9.7	0.50	ug/L	10		97	70-130			04/19/12		
cis-1,3-Dichloropropene	11	0.50	ug/L	10		112	70-130			04/19/12		
Dibromochloromethane	11	0.50	ug/L	10		107	70-130			04/19/12		
Dibromomethane	11	0.50	ug/L	10		107	70-130			04/19/12		
Dichlorodifluoromethane	9.4	0.50	ug/L	10		94	70-130			04/19/12		
Dichloromethane	9.5	0.50	ug/L	10		95	70-130			04/19/12		
Di-isopropyl ether (DIPE)	9.2	3.0	ug/L	10		92	70-130			04/19/12		
Ethyl tert-Butyl Ether (ETBE)	10	0.50	ug/L	10		100	70-130			04/19/12		
Ethylbenzene	9.5	0.50	ug/L	10		95	70-130			04/19/12		
Hexachlorobutadiene	8.9	0.50	ug/L	10		89	70-130			04/19/12		
Isopropylbenzene	10	0.50	ug/L	10		100	70-130			04/19/12		
m,p-Xylenes	19	0.50	ug/L	20		95	70-130			04/19/12		
Methyl-t-butyl ether	21	0.50	ug/L	20		107	70-130			04/19/12		
Naphthalene	9.8	0.50	ug/L	10		98	70-130			04/19/12		
n-Butylbenzene	8.8	0.50	ug/L	10		88	70-130			04/19/12		
n-Propylbenzene	9.5	0.50	ug/L	10		95	70-130			04/19/12		
o-Xylene	10	0.50	ug/L	10		101	70-130			04/19/12		
p-Isopropyltoluene	8.9	0.50	ug/L	10		89	70-130			04/19/12		
sec-Butylbenzene	8.7	0.50	ug/L	10		87	70-130			04/19/12		
Styrene	12	0.50	ug/L	10		118	70-130			04/19/12		
tert-Amyl Methyl Ether (TAME)	10	3.0	ug/L	10		103	70-130			04/19/12		
tert-Butyl alcohol (TBA)	13	2.0	ug/L	10		130	70-130			04/19/12		
tert-Butylbenzene	9.3	0.50	ug/L	10		93	70-130			04/19/12		
Tetrachloroethene (PCE)	10	0.50	ug/L	10		100	70-130			04/19/12		
Toluene	9.7	0.50	ug/L	10		97	70-130			04/19/12		
trans-1,2-Dichloroethene	9.7	0.50	ug/L	10		97	70-130			04/19/12		
trans-1,3-Dichloropropene	11	0.50	ug/L	10		113	70-130			04/19/12		
Trichloroethene (TCE)	9.6	0.50	ug/L	10		96	70-130			04/19/12		
Trichlorofluoromethane	12	5.0	ug/L	10		119	70-130			04/19/12		

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Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204033				Analyst: JGB		Prepared: 4/19/2012					
Blank Spike (A204033-BS1) EPA 524.2 - Quality Control											
Vinyl Chloride	10	0.50	ug/L	10		104	70-130			04/19/12	
Surrogate: 1,2-Dichlorobenzene-d4	*4.4*			*5.0*		*89*	*70-130*			04/19/12	
Surrogate: Bromofluorobenzene	*4.8*			*5.0*		*97*	*70-130*			04/19/12	
Blank Spike Dup (A204033-BSD1) EPA 524.2 - Quality Control											
1,1,1,2-Tetrachloroethane	9.3	0.50	ug/L	10		93	70-130	7	30	04/19/12	
1,1,1-Trichloroethane	11	0.50	ug/L	10		107	70-130	0	30	04/19/12	
1,1,2,2-Tetrachloroethane	7.4	0.50	ug/L	10		74	70-130	19	30	04/19/12	
1,1,2-Trichloro-1,2,2-trifluoroethane	11	10	ug/L	10		110	70-130	2	30	04/19/12	
1,1,2-Trichloroethane	8.8	0.50	ug/L	10		88	70-130	13	30	04/19/12	
1,1-Dichloroethane	9.9	0.50	ug/L	10		99	70-130	3	30	04/19/12	
1,1-Dichloroethene	11	0.50	ug/L	10		110	70-130	1	30	04/19/12	
1,1-Dichloropropene	9.7	0.50	ug/L	10		97	70-130	3	30	04/19/12	
1,2,3-Trichlorobenzene	9.0	0.50	ug/L	10		90	70-130	10	30	04/19/12	
1,2,4-Trichlorobenzene	8.4	0.50	ug/L	10		84	70-130	10	30	04/19/12	
1,2,4-Trimethylbenzene	8.9	0.50	ug/L	10		89	70-130	1	30	04/19/12	
1,2-Dichlorobenzene	8.0	0.50	ug/L	10		80	70-130	11	30	04/19/12	
1,2-Dichloroethane	10	0.50	ug/L	10		101	70-130	14	30	04/19/12	
1,2-Dichloropropane	9.0	0.50	ug/L	10		90	70-130	8	30	04/19/12	
1,3,5-Trimethylbenzene	9.8	0.50	ug/L	10		98	70-130	0	30	04/19/12	
1,3-Dichlorobenzene	8.2	0.50	ug/L	10		82	70-130	7	30	04/19/12	
1,3-Dichloropropane	8.9	0.50	ug/L	10		89	70-130	14	30	04/19/12	
1,4-Dichlorobenzene	8.3	0.50	ug/L	10		83	70-130	7	30	04/19/12	
2,2-Dichloropropane	10	0.50	ug/L	10		103	70-130	0	30	04/19/12	
2-Butanone	8.8	5.0	ug/L	10		88	70-130	16	30	04/19/12	
2-Chlorotoluene	9.1	0.50	ug/L	10		91	70-130	3	30	04/19/12	
2-Hexanone	8.3	10	ug/L	10		83	70-130	28	30	04/19/12	
4-Chlorotoluene	9.4	0.50	ug/L	10		94	70-130	2	30	04/19/12	
4-Methyl-2-pentanone	8.3	5.0	ug/L	10		83	70-130	20	30	04/19/12	
Acetone	14	10	ug/L	10		142	70-130	18	30	04/19/12	BS06 ***High***
Benzene	9.4	0.50	ug/L	10		94	70-130	1	30	04/19/12	
Bromobenzene	8.8	0.50	ug/L	10		88	70-130	8	30	04/19/12	
Bromochloromethane	8.6	0.50	ug/L	10		86	70-130	14	30	04/19/12	
Bromodichloromethane	9.8	0.50	ug/L	10		98	70-130	8	30	04/19/12	
Bromoform	8.8	0.50	ug/L	10		88	70-130	19	30	04/19/12	
Bromomethane	11	0.50	ug/L	10		107	70-130	0	30	04/19/12	
Carbon Tetrachloride	11	0.50	ug/L	10		108	70-130	1	30	04/19/12	
Chlorobenzene	9.3	0.50	ug/L	10		93	70-130	6	30	04/19/12	
Chloroethane	10	0.50	ug/L	10		103	70-130	2	30	04/19/12	
Chloroform	10	0.50	ug/L	10		102	70-130	1	30	04/19/12	
Chloromethane	10	0.50	ug/L	10		103	70-130	7	30	04/19/12	
cis-1,2-Dichloroethene	9.6	0.50	ug/L	10		96	70-130	1	30	04/19/12	
cis-1,3-Dichloropropene	10	0.50	ug/L	10		101	70-130	11	30	04/19/12	
Dibromochloromethane	8.8	0.50	ug/L	10		88	70-130	20	30	04/19/12	
Dibromomethane	9.0	0.50	ug/L	10		90	70-130	17	30	04/19/12	

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Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204033				Analyst: JGB		Prepared: 4/19/2012					
Blank Spike Dup (A204033-BSD1)	**EPA 524.2 - Quality Control**										
Dichlorodifluoromethane	10	0.50	ug/L	10		100	70-130	5	30	04/19/12	
Dichloromethane	9.2	0.50	ug/L	10		92	70-130	4	30	04/19/12	
Di-isopropyl ether (DIPE)	8.7	3.0	ug/L	10		87	70-130	6	30	04/19/12	
Ethyl tert-Butyl Ether (ETBE)	9.0	0.50	ug/L	10		90	70-130	10	30	04/19/12	
Ethylbenzene	9.4	0.50	ug/L	10		94	70-130	1	30	04/19/12	
Hexachlorobutadiene	8.7	0.50	ug/L	10		87	70-130	2	30	04/19/12	
Isopropylbenzene	9.8	0.50	ug/L	10		98	70-130	1	30	04/19/12	
m,p-Xylenes	18	0.50	ug/L	20		92	70-130	3	30	04/19/12	
Methyl-t-butyl ether	19	0.50	ug/L	20		94	70-130	13	30	04/19/12	
Naphthalene	8.3	0.50	ug/L	10		83	70-130	17	30	04/19/12	
n-Butylbenzene	9.0	0.50	ug/L	10		90	70-130	2	30	04/19/12	
n-Propylbenzene	9.6	0.50	ug/L	10		96	70-130	1	30	04/19/12	
o-Xylene	9.7	0.50	ug/L	10		97	70-130	4	30	04/19/12	
p-Isopropyltoluene	8.9	0.50	ug/L	10		89	70-130	0	30	04/19/12	
sec-Butylbenzene	8.7	0.50	ug/L	10		87	70-130	0	30	04/19/12	
Styrene	11	0.50	ug/L	10		112	70-130	5	30	04/19/12	
tert-Amyl Methyl Ether (TAME)	8.6	3.0	ug/L	10		86	70-130	19	30	04/19/12	
tert-Butyl alcohol (TBA)	11	2.0	ug/L	10		109	70-130	17	30	04/19/12	
tert-Butylbenzene	9.3	0.50	ug/L	10		93	70-130	1	30	04/19/12	
Tetrachloroethene (PCE)	9.8	0.50	ug/L	10		98	70-130	2	30	04/19/12	
Toluene	9.6	0.50	ug/L	10		96	70-130	2	30	04/19/12	
trans-1,2-Dichloroethene	9.8	0.50	ug/L	10		98	70-130	1	30	04/19/12	
trans-1,3-Dichloropropene	9.7	0.50	ug/L	10		97	70-130	15	30	04/19/12	
Trichloroethene (TCE)	9.7	0.50	ug/L	10		97	70-130	1	30	04/19/12	
Trichlorofluoromethane	12	5.0	ug/L	10		118	70-130	1	30	04/19/12	
Vinyl Chloride	10	0.50	ug/L	10		103	70-130	1	30	04/19/12	
Surrogate: 1,2-Dichlorobenzene-d4	*4.3*			*5.0*		*85*	*70-130*			04/19/12	
Surrogate: Bromofluorobenzene	*4.6*			*5.0*		*93*	*70-130*			04/19/12	
Batch: A204065				Analyst: XHX		Prepared: 4/19/2012					
Blank (A204065-BLK1)	**EPA 531.1 - Quality Control**										
3-Hydroxycarbofuran	ND	3.0	ug/L							04/19/12	
Aldicarb	ND	3.0	ug/L							04/19/12	
Aldicarb Sulfone	ND	2.0	ug/L							04/19/12	
Aldicarb Sulfoxide	ND	3.0	ug/L							04/19/12	
Carbaryl	ND	5.0	ug/L							04/19/12	
Carbofuran	ND	5.0	ug/L							04/19/12	
Methomyl	ND	2.0	ug/L							04/19/12	
Oxamyl	ND	20	ug/L							04/19/12	
Blank Spike (A204065-BS1)	**EPA 531.1 - Quality Control**										
3-Hydroxycarbofuran	31	3.0	ug/L	30		104	70-130			04/19/12	
Aldicarb	30	3.0	ug/L	30		101	70-130			04/19/12	
Aldicarb Sulfone	31	2.0	ug/L	30		102	70-130			04/19/12	

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Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204065				Analyst: XHX		Prepared: 4/19/2012					
Blank Spike (A204065-BS1) EPA 531.1 - Quality Control											
Aldicarb Sulfoxide	30	3.0	ug/L	30		101	70-130			04/19/12	
Carbaryl	30	5.0	ug/L	30		98	70-130			04/19/12	
Carbofuran	31	5.0	ug/L	30		102	70-130			04/19/12	
Methomyl	31	2.0	ug/L	30		102	70-130			04/19/12	
Oxamyl	30	20	ug/L	30		101	70-130			04/19/12	
Blank Spike Dup (A204065-BSD1) EPA 531.1 - Quality Control											
3-Hydroxycarbofuran	31	3.0	ug/L	30		105	70-130	1	20	04/19/12	
Aldicarb	30	3.0	ug/L	30		101	70-130	0	20	04/19/12	
Aldicarb Sulfone	31	2.0	ug/L	30		103	70-130	1	20	04/19/12	
Aldicarb Sulfoxide	31	3.0	ug/L	30		103	70-130	2	20	04/19/12	
Carbaryl	31	5.0	ug/L	30		102	70-130	4	20	04/19/12	
Carbofuran	32	5.0	ug/L	30		106	70-130	4	20	04/19/12	
Methomyl	31	2.0	ug/L	30		104	70-130	2	20	04/19/12	
Oxamyl	31	20	ug/L	30		102	70-130	1	20	04/19/12	
Matrix Spike (A204065-MS1) EPA 531.1 - Quality Control						**Source: A2D0740-01**					
3-Hydroxycarbofuran	30	3.0	ug/L	30	ND	99	70-130			04/20/12	
Aldicarb	30	3.0	ug/L	30	ND	99	70-130			04/20/12	
Aldicarb Sulfone	30	2.0	ug/L	30	ND	100	70-130			04/20/12	
Aldicarb Sulfoxide	30	3.0	ug/L	30	ND	99	70-130			04/20/12	
Carbaryl	29	5.0	ug/L	30	ND	97	70-130			04/20/12	
Carbofuran	29	5.0	ug/L	30	ND	98	70-130			04/20/12	
Methomyl	29	2.0	ug/L	30	ND	97	70-130			04/20/12	
Oxamyl	30	20	ug/L	30	ND	99	70-130			04/20/12	
Batch: A204078				Analyst: XHX		Prepared: 4/19/2012					
Blank (A204078-BLK1) EPA 504.1 - Quality Control											
Dibromochloropropane (DBCP)	ND	0.010	ug/L							04/19/12	
Ethylene Dibromide (EDB)	ND	0.020	ug/L							04/19/12	
Surrogate: Bromoform	*0.24*			*0.25*		*94*	*70-130*			04/19/12	
Blank Spike (A204078-BS1) EPA 504.1 - Quality Control											
Dibromochloropropane (DBCP)	0.23	0.010	ug/L	0.25		93	70-130			04/19/12	
Ethylene Dibromide (EDB)	0.25	0.020	ug/L	0.25		100	70-130			04/19/12	
Surrogate: Bromoform	*0.24*			*0.25*		*96*	*70-130*			04/19/12	
Blank Spike Dup (A204078-BSD1) EPA 504.1 - Quality Control											
Dibromochloropropane (DBCP)	0.22	0.010	ug/L	0.25		87	70-130	6	20	04/20/12	
Ethylene Dibromide (EDB)	0.24	0.020	ug/L	0.25		96	70-130	4	20	04/20/12	
Surrogate: Bromoform	*0.23*			*0.25*		*94*	*70-130*			04/20/12	
Matrix Spike (A204078-MS1) EPA 504.1 - Quality Control						**Source: A2D0417-01**					

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Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204078				Analyst: XHX		Prepared: 4/19/2012					
Matrix Spike (A204078-MS1)	**EPA 504.1 - Quality Control**					**Source: A2D0417-01**					
Dibromochloropropane (DBCP)	0.44	0.010	ug/L	0.25	0.22	85	70-130			04/19/12	
Ethylene Dibromide (EDB)	0.25	0.020	ug/L	0.25	ND	102	70-130			04/19/12	
Surrogate: Bromoform	*0.65*			*0.25*		*261*	*70-130*			04/19/12	*SR03*
Batch: A204120				Analyst: GAK		Prepared: 4/20/2012					
Blank (A204120-BLK1)	**EPA 515.3 - Quality Control**										
2,4,5-T	ND	1.0	ug/L							04/23/12	
2,4,5-TP (Silvex)	ND	1.0	ug/L							04/23/12	
2,4-D	ND	10	ug/L							04/23/12	
Bentazon	ND	2.0	ug/L							04/23/12	
Dalapon	ND	10	ug/L							04/23/12	
Dicamba	ND	1.5	ug/L							04/23/12	
Dinoseb	ND	2.0	ug/L							04/23/12	
Pentachlorophenol	ND	0.20	ug/L							04/23/12	
Picloram	ND	1.0	ug/L							04/23/12	
Surrogate: DCPAA	*56*			*58*		*97*	*70-130*			04/23/12	
Blank Spike (A204120-BS1)	**EPA 515.3 - Quality Control**										
2,4,5-T	3.6	1.0	ug/L	4.0		91	70-130			04/23/12	
2,4,5-TP (Silvex)	4.0	1.0	ug/L	4.0		99	70-130			04/23/12	
2,4-D	38	10	ug/L	40		95	70-130			04/23/12	
Bentazon	6.8	2.0	ug/L	8.0		86	70-130			04/23/12	
Dalapon	40	10	ug/L	40		100	70-130			04/23/12	
Dicamba	5.9	1.5	ug/L	6.0		98	70-130			04/23/12	
Dinoseb	8.2	2.0	ug/L	8.0		102	70-130			04/23/12	
Pentachlorophenol	0.80	0.20	ug/L	0.80		100	70-130			04/23/12	
Picloram	4.3	1.0	ug/L	4.0		108	70-130			04/23/12	
Surrogate: DCPAA	*57*			*58*		*98*	*70-130*			04/23/12	
Blank Spike Dup (A204120-BSD1)	**EPA 515.3 - Quality Control**										
2,4,5-T	3.6	1.0	ug/L	4.0		89	70-130	2	20	04/24/12	
2,4,5-TP (Silvex)	3.9	1.0	ug/L	4.0		96	70-130	3	20	04/24/12	
2,4-D	37	10	ug/L	40		92	70-130	3	20	04/24/12	
Bentazon	6.5	2.0	ug/L	8.0		81	70-130	6	20	04/24/12	
Dalapon	40	10	ug/L	40		100	70-130	0	20	04/24/12	
Dicamba	5.8	1.5	ug/L	6.0		96	70-130	2	20	04/24/12	
Dinoseb	8.3	2.0	ug/L	8.0		104	70-130	2	20	04/24/12	
Pentachlorophenol	0.82	0.20	ug/L	0.80		102	70-130	2	20	04/24/12	
Picloram	4.2	1.0	ug/L	4.0		106	70-130	2	20	04/24/12	
Surrogate: DCPAA	*56*			*58*		*97*	*70-130*			04/24/12	
Matrix Spike (A204120-MS1)	**EPA 515.3 - Quality Control**					**Source: A2D0841-01**					
2,4,5-T	3.5	1.0	ug/L	4.0	ND	86	70-130			04/24/12	

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Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204120				Analyst: GAK		Prepared: 4/20/2012					
Matrix Spike (A204120-MS1)	**EPA 515.3 - Quality Control**					**Source: A2D0841-01**					
2,4,5-TP (Silvex)	4.0	1.0	ug/L	4.0	ND	100	70-130			04/24/12	
2,4-D	38	10	ug/L	40	ND	96	70-130			04/24/12	
Bentazon	6.5	2.0	ug/L	8.0	ND	82	70-130			04/24/12	
Dalapon	41	10	ug/L	40	ND	102	70-130			04/24/12	
Dicamba	5.9	1.5	ug/L	6.0	ND	99	70-130			04/24/12	
Dinoseb	8.2	2.0	ug/L	8.0	ND	102	70-130			04/24/12	
Pentachlorophenol	0.80	0.20	ug/L	0.80	ND	100	70-130			04/24/12	
Picloram	4.3	1.0	ug/L	4.0	ND	108	70-130			04/24/12	
Surrogate: DCPAA	*58*			*58*		*100*	*70-130*			04/24/12	
Matrix Spike Dup (A204120-MSD1)	**EPA 515.3 - Quality Control**					**Source: A2D0841-01**					
2,4,5-T	3.5	1.0	ug/L	4.0	ND	88	70-130	1	20	04/24/12	
2,4,5-TP (Silvex)	3.9	1.0	ug/L	4.0	ND	98	70-130	2	20	04/24/12	
2,4-D	38	10	ug/L	40	ND	95	70-130	1	20	04/24/12	
Bentazon	6.8	2.0	ug/L	8.0	ND	86	70-130	5	20	04/24/12	
Dalapon	40	10	ug/L	40	ND	101	70-130	1	20	04/24/12	
Dicamba	6.0	1.5	ug/L	6.0	ND	100	70-130	1	20	04/24/12	
Dinoseb	8.3	2.0	ug/L	8.0	ND	104	70-130	2	20	04/24/12	
Pentachlorophenol	0.82	0.20	ug/L	0.80	ND	102	70-130	2	20	04/24/12	
Picloram	4.4	1.0	ug/L	4.0	ND	109	70-130	1	20	04/24/12	
Surrogate: DCPAA	*57*			*58*		*99*	*70-130*			04/24/12	
Batch: A204138				Analyst: KHH		Prepared: 4/21/2012					
Blank (A204138-BLK1)	**EPA 525.2 - Quality Control**										
Alachlor	ND	1.0	ug/L							04/21/12	
Atrazine	ND	0.50	ug/L							04/21/12	
Benzo(a)pyrene	ND	0.10	ug/L							04/21/12	
Bis(2-ethylhexyl) adipate	ND	3.0	ug/L							04/21/12	
Bis(2-ethylhexyl) phthalate	ND	3.0	ug/L							04/21/12	
Bromacil	ND	10	ug/L							04/21/12	
Butachlor	ND	0.38	ug/L							04/21/12	
Diazinon	ND	0.25	ug/L							04/21/12	
Dimethoate	ND	10	ug/L							04/21/12	
Metolachlor	ND	0.50	ug/L							04/21/12	
Metribuzin	ND	0.50	ug/L							04/21/12	
Molinate	ND	2.0	ug/L							04/21/12	
Propachlor	ND	0.50	ug/L							04/21/12	
Simazine	ND	1.0	ug/L							04/21/12	
Thiobencarb	ND	1.0	ug/L							04/21/12	
Surrogate: 1,3-Dimethyl-2-nitrobenzene	*5.5*			*5.0*		*111*	*70-130*			04/21/12	
Blank Spike (A204138-BS1)	**EPA 525.2 - Quality Control**										
Alachlor	5.7	1.0	ug/L	4.9		116	70-130			04/21/12	

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Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204138				Analyst: KHH		Prepared: 4/21/2012					
Blank Spike (A204138-BS1)	**EPA 525.2 - Quality Control**										
Atrazine	5.4	0.50	ug/L	4.9		110	70-130			04/21/12	
Benzo(a)pyrene	0.90	0.10	ug/L	0.99		91	70-130			04/21/12	
Bis(2-ethylhexyl) adipate	5.1	3.0	ug/L	4.9		103	70-130			04/21/12	
Bis(2-ethylhexyl) phthalate	5.1	3.0	ug/L	4.9		103	70-130			04/21/12	
Bromacil	5.8	10	ug/L	4.9		118	70-130			04/21/12	
Butachlor	3.0	0.38	ug/L	2.5		120	70-130			04/21/12	
Diazinon	2.6	0.25	ug/L	2.5		107	10-110			04/21/12	
Dimethoate	5.7	10	ug/L	4.9		116	70-130			04/21/12	
Metolachlor	5.7	0.50	ug/L	4.9		115	70-130			04/21/12	
Metribuzin	5.7	0.50	ug/L	4.9		115	70-130			04/21/12	
Molinate	5.8	2.0	ug/L	4.9		118	70-130			04/21/12	
Propachlor	5.7	0.50	ug/L	4.9		116	70-130			04/21/12	
Simazine	5.4	1.0	ug/L	4.9		110	70-130			04/21/12	
Thiobencarb	5.5	1.0	ug/L	4.9		111	70-130			04/21/12	
Surrogate: 1,3-Dimethyl-2-nitrobenzene	*5.1*			*4.9*		*103*	*70-130*			04/21/12	
Blank Spike Dup (A204138-BSD1)	**EPA 525.2 - Quality Control**										
Alachlor	5.5	1.0	ug/L	4.9		113	70-130	3	30	04/21/12	
Atrazine	5.1	0.50	ug/L	4.9		104	70-130	6	30	04/21/12	
Benzo(a)pyrene	1.0	0.10	ug/L	0.98		105	70-130	14	30	04/21/12	
Bis(2-ethylhexyl) adipate	5.6	3.0	ug/L	4.9		113	70-130	9	30	04/21/12	
Bis(2-ethylhexyl) phthalate	5.4	3.0	ug/L	4.9		110	70-130	6	30	04/21/12	
Bromacil	5.9	10	ug/L	4.9		119	70-130	1	30	04/21/12	
Butachlor	3.0	0.38	ug/L	2.5		122	70-130	2	30	04/21/12	
Diazinon	2.6	0.25	ug/L	2.5		105	10-110	2	30	04/21/12	
Dimethoate	5.4	10	ug/L	4.9		111	70-130	5	30	04/21/12	
Metolachlor	5.6	0.50	ug/L	4.9		114	70-130	1	30	04/21/12	
Metribuzin	5.5	0.50	ug/L	4.9		112	70-130	3	30	04/21/12	
Molinate	5.3	2.0	ug/L	4.9		108	70-130	9	30	04/21/12	
Propachlor	5.5	0.50	ug/L	4.9		112	70-130	5	30	04/21/12	
Simazine	5.3	1.0	ug/L	4.9		109	70-130	2	30	04/21/12	
Thiobencarb	5.2	1.0	ug/L	4.9		107	70-130	4	30	04/21/12	
Surrogate: 1,3-Dimethyl-2-nitrobenzene	*5.1*			*4.9*		*104*	*70-130*			04/21/12	
Matrix Spike (A204138-MS1)	**EPA 525.2 - Quality Control**					**Source: A2D0988-01**					
Alachlor	5.8	1.0	ug/L	5.1	ND	114	70-130			04/21/12	
Atrazine	0.38	0.50	ug/L	5.1	ND	7	70-130			04/21/12	MS02 ***Low***
Benzo(a)pyrene	1.2	0.10	ug/L	1.0	ND	116	70-130			04/21/12	
Bis(2-ethylhexyl) adipate	6.0	3.0	ug/L	5.1	ND	117	70-130			04/21/12	
Bis(2-ethylhexyl) phthalate	5.8	3.0	ug/L	5.1	ND	114	70-130			04/21/12	
Bromacil	6.2	10	ug/L	5.1	ND	123	70-130			04/21/12	
Butachlor	3.3	0.38	ug/L	2.5	ND	126	70-130			04/21/12	
Diazinon	2.2	0.25	ug/L	2.5	ND	86	10-110			04/21/12	
Dimethoate	6.0	10	ug/L	5.1	ND	118	70-130			04/21/12	

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Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204138				Analyst: KHH		Prepared: 4/21/2012					
Matrix Spike (A204138-MS1) EPA 525.2 - Quality Control						**Source: A2D0988-01**					
Metolachlor	5.7	0.50	ug/L	5.1	ND	112	70-130			04/21/12	
Metribuzin	5.6	0.50	ug/L	5.1	ND	109	70-130			04/21/12	
Molinate	5.7	2.0	ug/L	5.1	ND	112	70-130			04/21/12	
Propachlor	5.9	0.50	ug/L	5.1	ND	116	70-130			04/21/12	
Simazine	0.20	1.0	ug/L	5.1	ND	4	70-130			04/21/12	MS02 ***Low***
Thiobencarb	5.7	1.0	ug/L	5.1	ND	113	70-130			04/21/12	
Surrogate: 1,3-Dimethyl-2-nitrobenzene	*5.6*			*5.1*		*110*	*70-130*			04/21/12	
Batch: A204142				Analyst: PYA		Prepared: 4/21/2012					
Blank (A204142-BLK1) EPA 549.2 - Quality Control											
Diquat	ND	4.0	ug/L							04/27/12	
Blank Spike (A204142-BS1) EPA 549.2 - Quality Control											
Diquat	36	4.0	ug/L	40		91	70-130			04/27/12	
Blank Spike Dup (A204142-BSD1) EPA 549.2 - Quality Control											
Diquat	36	4.0	ug/L	40		89	70-130	2	30	04/27/12	
Matrix Spike (A204142-MS1) EPA 549.2 - Quality Control						**Source: A2D1436-01**					
Diquat	32	4.0	ug/L	40	ND	80	70-130			04/27/12	
Batch: A204145				Analyst: PYA		Prepared: 4/23/2012					
Blank (A204145-BLK1) EPA 632 - Quality Control											
Diuron	ND	1.0	ug/L							04/25/12	
Surrogate: Benthiocarb	*250*			*250*		*99*	*70-130*			04/25/12	
Blank Spike (A204145-BS1) EPA 632 - Quality Control											
Diuron	11	1.0	ug/L	10		107	70-130			04/25/12	
Surrogate: Benthiocarb	*250*			*250*		*101*	*70-130*			04/25/12	
Blank Spike Dup (A204145-BSD1) EPA 632 - Quality Control											
Diuron	5.2	1.0	ug/L	5.0		103	70-130	70	30	04/25/12	X01
Surrogate: Benthiocarb	*250*			*250*		*100*	*70-130*			04/25/12	
Matrix Spike (A204145-MS1) EPA 632 - Quality Control						**Source: A2D1627-01**					
Diuron	5.2	1.0	ug/L	4.8	ND	108	70-130			04/25/12	
Surrogate: Benthiocarb	*240*			*240*		*99*	*70-130*			04/25/12	
Batch: A204149				Analyst: XHX		Prepared: 4/23/2012					
Blank (A204149-BLK1) EPA 547 - Quality Control											
Glyphosate	ND	25	ug/L							04/24/12	

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Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204149				Analyst: XHX		Prepared: 4/23/2012					
Blank (A204149-BLK1) EPA 547 - Quality Control											
Surrogate: AMPA	*91*			*100*		*90*	*70-130*			04/24/12	
Blank Spike (A204149-BS1) EPA 547 - Quality Control											
Glyphosate	120	25	ug/L	120		93	70-130			04/24/12	
Surrogate: AMPA	*130*			*120*		*101*	*70-130*			04/24/12	
Blank Spike Dup (A204149-BSD1) EPA 547 - Quality Control											
Glyphosate	130	25	ug/L	120		104	70-130	12	30	04/24/12	
Surrogate: AMPA	*130*			*120*		*102*	*70-130*			04/24/12	
Matrix Spike (A204149-MS1) EPA 547 - Quality Control						**Source: A2D1264-01**					
Glyphosate	130	25	ug/L	120	ND	107	70-130			04/24/12	
Surrogate: AMPA	*110*			*120*		*90*	*70-130*			04/24/12	
Matrix Spike Dup (A204149-MSD1) EPA 547 - Quality Control						**Source: A2D1264-01**					
Glyphosate	140	25	ug/L	120	ND	112	70-130	4	30	04/24/12	
Surrogate: AMPA	*120*			*120*		*98*	*70-130*			04/24/12	
Batch: A204154				Analyst: gak		Prepared: 4/23/2012					
Blank (A204154-BLK1) EPA 505 - Quality Control											
Aldrin	ND	0.075	ug/L							04/23/12	
Chlordane	ND	0.10	ug/L							04/23/12	
Chlorothalonil	ND	5.0	ug/L							04/23/12	
Dieldrin	ND	0.020	ug/L							04/23/12	
Endrin	ND	0.10	ug/L							04/23/12	
Heptachlor	ND	0.010	ug/L							04/23/12	
Heptachlor Epoxide	ND	0.010	ug/L							04/23/12	
Hexachlorobenzene	ND	0.50	ug/L							04/23/12	
Hexachlorocyclopentadiene	ND	1.0	ug/L							04/23/12	
Lindane	ND	0.20	ug/L							04/23/12	
Methoxychlor	ND	10	ug/L							04/23/12	
PCB Aroclor Screen	ND	0.50	ug/L							04/23/12	
Toxaphene	ND	1.0	ug/L							04/23/12	
Trifluralin	ND	1.0	ug/L							04/23/12	
Surrogate: TCMX	*1.6*			*1.5*		*105*	*70-130*			04/23/12	
Blank Spike (A204154-BS1) EPA 505 - Quality Control											
Aldrin	0.041	0.075	ug/L	0.040		103	70-130			04/23/12	
Chlorothalonil	0.39	5.0	ug/L	0.40		98	70-130			04/23/12	
Dieldrin	0.042	0.020	ug/L	0.040		105	70-130			04/23/12	
Endrin	0.041	0.10	ug/L	0.040		103	70-130			04/23/12	
Heptachlor	0.042	0.010	ug/L	0.040		105	70-130			04/23/12	

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Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204154				Analyst: gak		Prepared: 4/23/2012					
Blank Spike (A204154-BS1)	**EPA 505 - Quality Control**										
Heptachlor Epoxide	0.043	0.010	ug/L	0.040		107	70-130			04/23/12	
Hexachlorobenzene	0.17	0.50	ug/L	0.16		103	70-130			04/23/12	
Hexachlorocyclopentadiene	0.13	1.0	ug/L	0.12		109	70-130			04/23/12	
Lindane	0.041	0.20	ug/L	0.040		102	70-130			04/23/12	
Methoxychlor	0.041	10	ug/L	0.040		104	70-130			04/23/12	
Trifluralin	0.12	1.0	ug/L	0.12		103	70-130			04/23/12	
Surrogate: TCMX	*1.5*			*1.5*		*103*	*70-130*			04/23/12	
Blank Spike Dup (A204154-BSD1)	**EPA 505 - Quality Control**										
Aldrin	0.041	0.075	ug/L	0.040		102	70-130	2	20	04/23/12	
Chlorothalonil	0.38	5.0	ug/L	0.40		95	70-130	3	20	04/23/12	
Dieldrin	0.041	0.020	ug/L	0.040		101	70-130	3	20	04/23/12	
Endrin	0.039	0.10	ug/L	0.040		98	70-130	6	20	04/23/12	
Heptachlor	0.041	0.010	ug/L	0.040		101	70-130	3	20	04/23/12	
Heptachlor Epoxide	0.040	0.010	ug/L	0.040		100	70-130	7	20	04/23/12	
Hexachlorobenzene	0.16	0.50	ug/L	0.16		99	70-130	4	20	04/23/12	
Hexachlorocyclopentadiene	0.13	1.0	ug/L	0.12		107	70-130	1	20	04/23/12	
Lindane	0.039	0.20	ug/L	0.040		98	70-130	4	20	04/23/12	
Methoxychlor	0.040	10	ug/L	0.040		99	70-130	5	20	04/23/12	
Trifluralin	0.12	1.0	ug/L	0.12		98	70-130	5	20	04/23/12	
Surrogate: TCMX	*1.4*			*1.5*		*95*	*70-130*			04/23/12	
Matrix Spike (A204154-MS1)	**EPA 505 - Quality Control**					**Source: A2D1264-01**					
Aldrin	0.040	0.075	ug/L	0.040	ND	99	70-130			04/23/12	
Chlorothalonil	0.39	5.0	ug/L	0.40	ND	98	70-130			04/23/12	
Dieldrin	0.039	0.020	ug/L	0.040	ND	97	70-130			04/23/12	
Endrin	0.037	0.10	ug/L	0.040	ND	92	70-130			04/23/12	
Heptachlor	0.040	0.010	ug/L	0.040	ND	101	70-130			04/23/12	
Heptachlor Epoxide	0.040	0.010	ug/L	0.040	ND	101	70-130			04/23/12	
Hexachlorobenzene	0.16	0.50	ug/L	0.16	ND	99	70-130			04/23/12	
Hexachlorocyclopentadiene	0.14	1.0	ug/L	0.12	ND	113	70-130			04/23/12	
Lindane	0.039	0.20	ug/L	0.040	ND	96	70-130			04/23/12	
Methoxychlor	0.038	10	ug/L	0.040	ND	95	70-130			04/23/12	
Trifluralin	0.12	1.0	ug/L	0.12	ND	98	70-130			04/23/12	
Surrogate: TCMX	*1.7*			*1.5*		*116*	*70-130*			04/23/12	
Matrix Spike Dup (A204154-MSD1)	**EPA 505 - Quality Control**					**Source: A2D1264-01**					
Aldrin	0.039	0.075	ug/L	0.040	ND	97	70-130	2	20	04/23/12	
Chlorothalonil	0.39	5.0	ug/L	0.40	ND	96	70-130	2	20	04/23/12	
Dieldrin	0.038	0.020	ug/L	0.040	ND	96	70-130	1	20	04/23/12	
Endrin	0.036	0.10	ug/L	0.040	ND	89	70-130	3	20	04/23/12	
Heptachlor	0.039	0.010	ug/L	0.040	ND	98	70-130	3	20	04/23/12	
Heptachlor Epoxide	0.039	0.010	ug/L	0.040	ND	98	70-130	3	20	04/23/12	
Hexachlorobenzene	0.16	0.50	ug/L	0.16	ND	99	70-130	0	20	04/23/12	

A2D1327 FINAL 06112012 1314

Amended

BSK Associates Engineers & Laboratories

Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204154				Analyst: gak		Prepared: 4/23/2012					
Matrix Spike Dup (A204154-MSD1)	**EPA 505 - Quality Control**					**Source: A2D1264-01**					
Hexachlorocyclopentadiene	0.14	1.0	ug/L	0.12	ND	116	70-130	3	20	04/23/12	
Lindane	0.038	0.20	ug/L	0.040	ND	95	70-130	2	20	04/23/12	
Methoxychlor	0.039	10	ug/L	0.040	ND	97	70-130	2	20	04/23/12	
Trifluralin	0.12	1.0	ug/L	0.12	ND	99	70-130	1	20	04/23/12	
Surrogate: TCMX	*1.6*			*1.5*		*109*	*70-130*			04/23/12	
Batch: A204197				Analyst: GAK		Prepared: 4/23/2012					
Blank (A204197-BLK1)	**EPA 548.1 - Quality Control**										
Endothall	ND	45	ug/L							04/25/12	
Blank Spike (A204197-BS1)	**EPA 548.1 - Quality Control**										
Endothall	96	45	ug/L	100		96	34-141			04/25/12	
Blank Spike Dup (A204197-BSD1)	**EPA 548.1 - Quality Control**										
Endothall	93	45	ug/L	100		93	34-141	3	46	04/25/12	
Matrix Spike (A204197-MS1)	**EPA 548.1 - Quality Control**					**Source: A2D1264-01**					
Endothall	ND	45	ug/L	100	ND	0	34-141			04/25/12	MS02 ***Low***
Matrix Spike Dup (A204197-MSD1)	**EPA 548.1 - Quality Control**					**Source: A2D1264-01**					
Endothall	ND	45	ug/L	100	ND	0	34-141		46	04/25/12	MS02 ***Low***

A2D1327 FINAL 06112012 1314

Amended

BSK Associates Engineers & Laboratories

Radiological Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204158				Analyst: KKC		Prepared: 4/23/2012					
Blank (A204158-BLK1) EPA 00-02 - Quality Control											
1.65 Sigma Uncertainty	ND		±							04/24/12	
Gross Alpha	ND	3	pCi/L							04/24/12	
MDA95	ND	0.00	pCi/L							04/24/12	
Blank Spike (A204158-BS1) EPA 00-02 - Quality Control											
Gross Alpha	27.4	3	pCi/L	30		91	80-120			04/24/12	
Blank Spike Dup (A204158-BSD1) EPA 00-02 - Quality Control											
Gross Alpha	26.8	3	pCi/L	30		89	80-120	2	50	04/24/12	
Matrix Spike (A204158-MS1) EPA 00-02 - Quality Control						**Source: A2D1369-01**					
Gross Alpha	102	3	pCi/L	120	3.13	83	70-130			04/24/12	
Matrix Spike (A204158-MS2) EPA 00-02 - Quality Control						**Source: A2D1622-01**					
Gross Alpha	131	3	pCi/L	120	ND	108	70-130			04/24/12	
Matrix Spike Dup (A204158-MSD1) EPA 00-02 - Quality Control						**Source: A2D1369-01**					
Gross Alpha	122	3	pCi/L	120	3.13	99	70-130	18	50	04/24/12	
Matrix Spike Dup (A204158-MSD2) EPA 00-02 - Quality Control						**Source: A2D1622-01**					
Gross Alpha	121	3	pCi/L	120	ND	99	70-130	8	50	04/24/12	

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BSK Associates Engineers & Laboratories

Certificate of Analysis

06/11/2012

Notes:

- The Chain of Custody document and Sample Integrity Sheet are part of the analytical report.
- Any remaining sample(s) for testing will be disposed of one month from the final report date unless other arrangements are made in advance.
- Sample(s) received, prepared, and analyzed within the method specified criteria unless otherwise noted within this report.
- The results relate only to the samples analyzed in accordance with test(s) requested by the client on the Chain of Custody document. Any analytical quality control exceptions to method criteria that are to be considered when evaluating these results have been flagged and are defined in the data qualifiers section.
- All results are expressed on wet weight basis unless otherwise specified.
- All positive results for EPA Methods 504.1, 502.2, and 524.2 require the analysis of a Field Reagent Blank (FRB) to confirm that the results are not a contamination error from field sampling steps. If Field Reagent Blanks were not submitted with the samples, this method requirement has not been performed.
- Results contained in this analytical report must be reproduced in its entirety.
- Samples collected by BSK Analytical Laboratories were collected in accordance with the BSK Sampling and Collection Standard Operating Procedures.
- BSK Analytical Laboratories certifies that the test results contained in this report meet all requirements of the NELAC Standards for applicable certified drinking water chemistry analyses unless qualified or noted in the Case Narrative.
- Analytical data contained in this report may be used for regulatory purposes to meet the requirements of the Federal or State drinking water, wastewater, and hazardous waste programs.
- J-value is equivalent to DNQ (Detected, not quantified) which is a trace value. A trace value is an analyte detected between the MDL and the laboratory reporting limit. This result is of an unknown data quality and is only qualitative (estimated). Baseline noise, calibration curve extrapolation below the lowest calibrator, method blank detections, and integration artifacts can all produce apparent DNQ values, which contribute to the un-reliability of these values.
- (1) - Residual chlorine and pH analysis have a 15 minute holding time for both drinking and waste water samples as defined by the EPA and 40 CFR 136. Waste water and ground water (monitoring well) samples must be field filtered to meet the 15 minute holding time for dissolved metals.
- * - This is not a NELAP accredited analyte.
- Summations of analytes (i.e. Total Trihalomethanes) may appear to add individual amounts incorrectly, due to rounding of analyte values occurring before or after the total value is calculated, as well as rounding of the total value.
- (2) The digestion used to produce this result deviated from EPA 200.2 by excluding hydrochloric acid in order to produce acceptable recoveries for affected metals.
- (2C) Result reported from secondary analytical column.
- RL Multiplier is the factor used to adjust the reporting limit (RL) due to variations in sample preparation procedures and dilutions required for matrix interferences.

Certifications:

State of California - CDPH - ELAP	1180
State of California - CDPH - NELAP	04227CA
State of Nevada - NDEP	CA000792009A
State of Hawaii - DOH	04227CA

Definitions and Flags for Data Qualifiers

mg/L:	Milligrams/Liter (ppm)	M:	Method Detection Limit	MDA95:	Min. Detected Activity
mg/Kg:	Milligrams/Kilogram (ppm)	RL:	Reporting Limit	MPN:	Most Probable Number
µg/L:	Micrograms/Liter (ppb)		:DL x Dilution	CFU:	Colony Forming Unit
µg/Kg:	Micrograms/Kilogram (ppb)	ND:	None Detected at RL	Absent:	Less than 1 CFU/100mLs
%:	Percent Recovered (surrogates)	pCi/L:	Picocuries per Liter	Present:	1 or more CFU/100mLs
		NR:	Non-Reportable	RL Mult:	RL Multiplier

X01 BSD has a different spike level than the BS therefore the RPD does not apply

A2D1327 FINAL 06112012 1314

Certificate of Analysis

06/11/2012

SR03	Surrogate recovery was affected by matrix interference.
MS02	Matrix spike recovery was low; the associated blank spike recovery was acceptable.
MS01	Matrix spike recovery was high; the associated blank spike recovery was acceptable.
DP01	Sample Duplicate RPD exceeded the method acceptance limit.
BS06	Blank spike recovery for this analyte was biased high; associated samples were ND.

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A2D1327

City of Modesto Water Division/Corp Yard

Modes9588 **04172012**

Turnaround: Standard

Due Date: 5/1/2012

City of Modesto Water Division
Chain of Custody

LAB: BSK DATE: 4-17-12

SAMPLER: N. Sanchez

SOURCE: X Groundwater ____ System ____ Surface

REASON FOR ANALYSIS: ____ Routine ____ Repeat X Investigative

Sample ID:	Description	Analysis	Time	AM/PM
				AM/PM
	Hickman Test Well —135'	GM/IO/GP Title 22 Organic&	930	AM/PM 142165
		Title 22 externals	930	AM/PM
				AM/PM
				AM/PM
				AM/PM
				AM/PM
				AM/PM
				AM/PM
				AM/PM
				AM/PM
				AM/PM
				AM/PM
				AM/PM
				AM/PM

Sampled by	N. Sanchez	Date: 4-17-12	Time: 930 AM/PM
Relinquished by	N. Sanchez	4-17-12	1030 AM/PM
Received by	[illegible]	4/17/12	10:40 AM/PM
Relinquished by	[illegible]	4/17/12	1:10 AM/PM
Received by	[illegible]	[illegible]	[illegible] AM/PM
	"	"	1530
	[illegible]	4/17/12	1530

Sample Integrity

Pg. 1 of 2

Date Received 4/17/12

Section 1- Receiving Information

Sample Transport: ONTRAC UPS PMS Walk-In BSK-Courier GSO Fed Exp. Other: _____

Samples arrived at lab on same day sampled: Yes X No ___ Has Chilling Process Begun: Yes X No ___

Coolers/Ice Chests Description/Temperature(s): (If more than 5 received, list information in comment section)

1) 4 2) 3 3) _____ 4) _____ 5) _____

Was Temperature In Range: Y N N/A Received On Ice: Wet Blue Received Ambient: Y N

Describe type of packing materials: Bubble Wrap Foam Packing Peanuts Paper Other: _____

Initial Receipt: BSK-Visalia BSK-Bakersfield BSK-SAC BSK-FAL

Were ice chest custody seals present? Y N Intact: Y N

Section 2- COC Info.	Completed Yes	Completed No	Info From Container		Completed Yes	Completed No	Info From Container
Was COC Received	✓			Analysis Requested	✓		
Date Sampled	✓			Hold times less than 72hr	✓		
Time Sampled	✓			Client Name	✓		
Sample ID	✓			Address	✓		
Special Storage/Handling Ins.		✓		Telephone #	✓		

Section 3- Bottles / Analysis	Yes	No	N/A	Comment
Did all bottles arrive unbroken and intact?	✓			
Were bottle custody seals present?		✓		
Were bottle custody seals intact?		✓		
Did all bottle labels agree with COC?	✓			
Were correct containers used for the tests requested?	✓			
Were correct preservations used for the tests requested?	✓			
Was a sufficient amount of sample sent for tests indicated?	✓			
Were bubbles present in VOA Vials? (**Volatile Methods Only**)		—		
Were Ascorbic Acid Bottles received with the VOAs?			—	

Section 4- Comments / Discrepancies

Sample(s) Split/Preserve: Yes No Container: _____ Preservation: _____ Dt/Time/Init _____

Container: _____ Preservation: _____ Dt/Time/Init _____

Was Client Service Rep. notified of discrepancies: Yes No N/A CSR: Notified By/Time:

Explanations / Comments

Report Comment Entered:

Labeled by: MA @ 1610 Labels checked by: JCH @ 1611 RUSH Paged by: _____ @ _____

(4/11)

Sample Integrity Pg 2 of 2

BSK Bottles (Yes) N

A2D1327
Modes9588

04/17/2012
10

250ml (A) 500ml (B) 1Liter (C) Amber Glass (AG)

Container(s) Received	1
Bacti $Na_2S_2O_3$	
None (p) White Cap	2C
None (p) Blue Cap w/NH4 + Buffer	
HNO_3 (p) Red Cap	4 5 1B
H_2SO_4 (p) Yellow Cap	
NaOH (p) Green Cap	1A
EDA (p) Brown Cap/Label	
Other:	
Dissolved Oxygen 300ml (g)	
250ml (AG) None	
250ml (AG) H_2SO_4 COD Yellow Label	
250ml (AG) $Na_2S_2O_3$ 515,547 Blue Label	2
250ml (AG) $Na_2S_2O_3$+ MCAA 531.1 Orange Label	1
250ml (AG) NH_4Cl 552 Purple Label	
250ml (AG) EDA DBPs Brown Label	
250ml (AG) Other:	
500ml (AG) None	1
500ml (AG) H_2SO_4 Yellow Label	
1 Liter (AG) None	4
1 Liter (AG) H_2SO_4 O&G / TPH-Diesel Yellow Label	
1 Liter (AG) $Na_2S_2O_3$ 548 / 525 / 521 Blue Label	3
1 Liter (P) $Na_2S_2O_3$+ H_2SO_4 549	1
1 Liter (AG) NaOH+ZnAc Sulfide	
40ml VOA Vial Clear – HCL	3
40ml VOA Vial Clear – Buffer pH 4	
40ml VOA Vial Clear – None	
40ml VOA Vial Amber – $Na_2S_2O_3$	
40ml VOA Vial Clear - $Na_2S_2O_3$ 504, 505	6
40ml VOA Vial Clear – H_3PO_4	
Other:	
½ Gallon (p)	
Asbestos 1Liter Plastic/Foil	1
Radon 200ml Clear (g)	
Low Level Hg/Metals Double Baggie	
Bioassay Jug	
Ampule	
PT Sample Bottle	
250 Clear Glass Jar	
500 Clear Glass Jar	
1 Liter Clear Glass Jar	
Plastic Bag	
Soil Tube Brass / Steel / Plastic	
Tedlar Bags	

4/17/10

External

A2D1327

Pace Analytical Services, Inc.
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

May 18, 2012

Ms. Michelle Harmstead
BSK Analytical Laboratories
1414 Stanislaus St.
Fresno, CA 93706

RE: Project: A2D1327
Pace Project No.: 3068311

Dear Ms. Harmstead:
Enclosed are the analytical results for sample(s) received by the laboratory on April 26, 2012. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Jacquelyn Collins

jacquelyn.collins@pacelabs.com
Project Manager

Enclosures

Pace Analytical Services, Inc.
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Greensburg, PA 15601
(724)850-5600

CERTIFICATIONS

Project: A2D1327
Pace Project No.: 3068311

Pennsylvania Certification IDs
1638 Roseytown Rd Suites 2,3&4 Greensburg, PA 15601
ACLASS DOD-ELAP Accreditation #: ADE-1544
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California/TNI Certification #: 04222CA
Colorado Certification
Connecticut Certification #: PH 0694
Delaware Certification
Florida/TNI Certification #: E87683
Guam/PADEP Certification
Hawaii/PADEP Certification
Idaho Certification
Illinois/PADEP Certification
Indiana/PADEP Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: 90133
Louisiana/TNI Certification #: LA080002
Louisiana/TNI Certification #: 4086
Maine Certification #: PA0091
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification
Missouri Certification #: 235
Montana Certification #: Cert 0082
Nevada Certification
New Hampshire/TNI Certification #: 2976
New Jersey/TNI Certification #: PA 051
New Mexico Certification
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
Oregon/TNI Certification #: PA200002
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
South Dakota Certification
Tennessee Certification #: TN2867
Texas/TNI Certification #: T104704188
Utah/TNI Certification #: ANTE
Virgin Island/PADEP Certification
Virginia Certification #: 00112
Virginia VELAP (Cert # 460198)
Washington Certification #: C868
West Virginia Certification #: 143
Wisconsin/PADEP Certification
Wyoming Certification #: 8TMS-Q

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SAMPLE SUMMARY

Project: A2D1327
Pace Project No.: 3068311

Lab ID	Sample ID	Matrix	Date Collected	Date Received
3068311001	**A2D1327-01**	Drinking Water	04/17/12 09:30	04/26/12 09:45

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SAMPLE ANALYTE COUNT

Project: A2D1327
Pace Project No.: 3068311

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
3068311001	**A2D1327-01**	EPA 903.1	SLA	1	PASI-PA
		EPA 904.0	WRR	1	PASI-PA

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PROJECT NARRATIVE

Project: A2D1327
Pace Project No.: 3068311

Method: EPA 903.1
Description: 903.1 Radium 226
Client: BSK Analytical Laboratories
Date: May 18, 2012

General Information:
1 sample was analyzed for EPA 903.1. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

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PROJECT NARRATIVE

Project: A2D1327
Pace Project No.: 3068311

Method: **EPA 904.0**
Description: 904.0 Radium 228
Client: BSK Analytical Laboratories
Date: May 18, 2012

General Information:
1 sample was analyzed for EPA 904.0. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

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ANALYTICAL RESULTS

Project: A2D1327
Pace Project No.: 3068311

Sample: A2D1327-01 **Lab ID: 3068311001** Collected: 04/17/12 09:30 Received: 04/26/12 09:45 Matrix: Drinking Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC)	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.000 ± 0.289 (0.685)**	pCi/L	05/08/12 14:38	13982-63-3	
Radium-228	EPA 904.0	**0.179 ± 0.417 (0.941)**	pCi/L	05/18/12 12:05	15262-20-1	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: A2D1327
Pace Project No.: 3068311

QC Batch: RADC/11937
QC Batch Method: EPA 903.1
Analysis Method: EPA 903.1
Analysis Description: 903.1 Radium-226
Associated Lab Samples: 3068311001

METHOD BLANK: 436745
Matrix: Water
Associated Lab Samples: 3068311001

Parameter	Act ± Unc (MDC)	Units	Analyzed	Qualifiers
Radium-226	0.000 ± 0.401 (0.869)	pCi/L	05/08/12 12:33	

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QUALITY CONTROL DATA

Project: A2D1327
Pace Project No.: 3068311

QC Batch: RADC/11967
QC Batch Method: EPA 904.0
Analysis Method: EPA 904.0
Analysis Description: 904.0 Radium 228
Associated Lab Samples: 3068311001

METHOD BLANK: 437412
Matrix: Water
Associated Lab Samples: 3068311001

Parameter	Act ± Unc (MDC)	Units	Analyzed	Qualifiers
Radium-228	0.237 ± 0.341 (0.742)	pCi/L	05/18/12 12:05	

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QUALIFIERS

Project: A2D1327
Pace Project No.: 3068311

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Act - Activity

Unc - Uncertainty

(MDC) - Minimum Detectable Concentration

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-PA Pace Analytical Services - Greensburg

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Quality Control Sample Performance Assessment

Pace Analytical

Analyst Must Manually Enter All Fields Highlighted in Yellow.

Test:	Ra-226
Analyst:	SLA
Date:	5/3/2012
Worklist:	11937
Matrix:	DW

Method Blank Assessment

MB Sample ID	436745
MB concentration:	0.000
MB Counting Uncertainty:	0.401
MB MDC:	0.869
MB Numerical Performance Indicator:	0.00
MB Status vs Numerical Indicator:	N/A
MB Status vs. MDC:	Pass

Laboratory Control Sample Assessment

	LCSD (Y or N)?	Y
	LCS11937	LCSD11937
Count Date:	5/8/2012	5/8/2012
Spike I.D.:	12-011	12-011
Spike Concentration (pCi/mL):	56.716	56.716
Volume Used (mL):	0.10	0.10
Aliquot Volume (L, g, F):	0.500	0.500
Target Conc. (pCi/L, g, F):	11.343	11.343
Uncertainty (Calculated):	0.272	0.272
Result (pCi/L, g, F):	12.916	8.803
LCS/LCSD Counting Uncertainty (pCi/L, g, F):	2.068	1.715
Numerical Performance Indicator:	1.48	-2.87
Percent Recovery:	113.86%	77.61%
Status vs Numerical Indicator:	N/A	N/A
Status vs Recovery:	Pass	Pass

Sample Matrix Spike Control Assessment

Sample Collection Date:	4/23/2012
Sample I.D.	3555240001
Sample MS I.D.	3555240001MS
Sample MSD I.D.	
Spike I.D.:	12-011
MS/MSD Decay Corrected Spike Concentration (pCi/mL):	56.717
Spike Volume Used in MS (mL):	0.20
Spike Volume Used in MSD (mL):	
MS Aliquot (L, g, F):	0.500
MS Target Conc.(pCi/L, g, F):	22.687
MSD Aliquot (L, g, F):	
MSD Target Conc. (pCi/L, g, F):	
Spike uncertainty (calculated):	0.544
Sample Result:	0.455
Sample Result Counting Uncertainty (pCi/L, g, F):	0.556
Sample Matrix Spike Result:	17.530
Matrix Spike Result Counting Uncertainty (pCi/L, g, F):	2.456
Sample Matrix Spike Duplicate Result:	
Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F):	
MS Numerical Performance Indicator:	-4.268
MSD Numerical Performance Indicator:	
MS Percent Recovery:	75.27%
MSD Percent Recovery:	
MS Status vs Numerical Indicator:	N/A
MSD Status vs Numerical Indicator:	
MS Status vs Recovery:	Pass
MSD Status vs Recovery:	

Duplicate Sample Assessment

Sample I.D.:	LCS11937
Duplicate Sample I.D.	LCSD11937
Sample Result (pCi/L, g, F):	12.918
Sample Result Counting Uncertainty (pCi/L, g, F):	2.068
Sample Duplicate Result (pCi/L, g, F):	8.803
Sample Duplicate Result Counting Uncertainty (pCi/L, g, F):	1.715
Are sample and/or duplicate results below MDC?	NO
Duplicate Numerical Performance Indicator:	3.000
Duplicate RPD:	37.87%
Duplicate Status vs Numerical Indicator:	N/A
Duplicate Status vs RPD:	Fail***

Enter Duplicate sample IDs if other than LCS/LCSD in the space below.

Matrix Spike/Matrix Spike Duplicate Sample Assessment

Sample I.D.	
Sample MS I.D.	
Sample MSD I.D.	
Sample Matrix Spike Result:	
Matrix Spike Result Counting Uncertainty (pCi/L, g, F):	
Sample Matrix Spike Duplicate Result:	
Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F):	
Duplicate Numerical Performance Indicator:	
MS/ MSD Duplicate RPD:	
MS/ MSD Duplicate Status vs Numerical Indicator:	
MS/ MSD Duplicate Status vs RPD:	

Evaluation of duplicate precision is not applicable if either the sample or duplicate results are below the MDC.

Comments:

RPD N/A
(5/23/12

***Batch must be re-prepped due to unacceptable precision.

Quality Control Sample Performance Assessment

Pace Analytical

Test:	Ra-228
Analyst:	WRR
Date:	4/3/2012
Worklist:	11967
Matrix:	DW

Analyst Must Manually Enter All Fields Highlighted in Yellow.

Method Blank Assessment

MB Sample ID	437412
MB concentration:	0.237
M/B Counting Uncertainty:	0.338
MB MDC:	0.742
MB Numerical Performance Indicator:	1.37
MB Status vs Numerical Indicator:	N/A
MB Status vs. MDC:	Pass

Laboratory Control Sample Assessment

	LCSD (Y or N)?	Y
	LCS11967	LCSD11967
Count Date:	5/16/2012	5/16/2012
Spike I.D.:	11-024	11-024
Spike Concentration (pCi/mL):	60.701	60.701
Volume Used (mL):	0.10	0.10
Aliquot Volume (L, g, F):	0.800	0.800
Target Conc. (pCi/L, g, F):	7.588	7.588
Uncertainty (Calculated):	0.235	0.235
Result (pCi/L, g, F):	8.160	7.542
LCS/LCSD Counting Uncertainty (pCi/L, g, F):	1.162	1.066
Numerical Performance Indicator:	0.95	-0.08
Percent Recovery:	107.54%	99.39%
Status vs Numerical Indicator:	N/A	N/A
Status vs Recovery:	Pass	Pass

Sample Matrix Spike Control Assessment

Sample Collection Date:	4/18/2012
Sample I.D.	3068331001
Sample MS I.D.	3068331001MS
Sample MSD I.D.	
Spike I.D.:	11-024
MS/MSD Decay Corrected Spike Concentration (pCi/mL):	61.307
Spike Volume Used in MS (mL):	0.20
Spike Volume Used in MSD (mL):	
MS Aliquot (L, g, F):	0.800
MS Target Conc.(pCi/L, g, F):	15.327
MSD Aliquot (L, g, F):	
MSD Target Conc. (pCi/L, g, F):	
Spike uncertainty (calculated):	0.475
Sample Result:	0.006
Sample Result Counting Uncertainty (pCi/L, g, F):	0.298
Sample Matrix Spike Result:	14.545
Matrix Spike Result Counting Uncertainty (pCi/L, g, F):	1.582
Sample Matrix Spike Duplicate Result:	
Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F):	
MS Numerical Performance Indicator:	-0.921
MSD Numerical Performance Indicator:	
MS Percent Recovery:	94.86%
MSD Percent Recovery:	
MS Status vs Numerical Indicator:	N/A
MSD Status vs Numerical Indicator:	
MS Status vs Recovery:	Pass
MSD Status vs Recovery:	

Duplicate Sample Assessment

Sample I.D.:	LCS11967
Duplicate Sample I.D.	LCSD11967
Sample Result (pCi/L, g, F):	8.160
Sample Result Counting Uncertainty (pCi/L, g, F):	1.162
Sample Duplicate Result (pCi/L, g, F):	7.542
Sample Duplicate Result Counting Uncertainty (pCi/L, g, F):	1.066
Are sample and/or duplicate results below MDC?	NO
Duplicate Numerical Performance Indicator:	0.769
Duplicate RPD:	7.68%
Duplicate Status vs Numerical Indicator:	N/A
Duplicate Status vs RPD:	Pass

Enter Duplicate sample IDs if other than LCS/LCSD in the space below.

Matrix Spike/Matrix Spike Duplicate Sample Assessment

Sample I.D.	
Sample MS I.D.	
Sample MSD I.D.	
Sample Matrix Spike Result:	
Matrix Spike Result Counting Uncertainty (pCi/L, g, F):	
Sample Matrix Spike Duplicate Result:	
Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F):	
Duplicate Numerical Performance Indicator:	
MS/ MSD Duplicate RPD:	
MS/ MSD Duplicate Status vs Numerical Indicator:	
MS/ MSD Duplicate Status vs RPD:	

Evaluation of duplicate precision is not applicable if either the sample or duplicate results are below the MDC.

Comments:

Ms 5/18/12

BSK Analytical Laboratories
Engineering Laboratories

SUBCONTRACT ORDER

A2D1627

30068563

SENDING LABORATORY:

BSK Associates
1414 Stanislaus St
Fresno, CA 93706
Phone: 559-497-2888
Fax: 559-485-6935
Project Manager: Michelle Harmstead
E-mail: mharmstead@bskinc.com

RECEIVING LABORATORY:

Pace Analytical-Radiochem
1638 Roseytown Rd Ste 2,3,4
Greensburg, PA 15601
Phone :(724) 850-5600
Fax: (724) 722-5208
Turnaround (Days): Standard
QC Deliverables: I Std III IV

Sample ID	Samp Desc	Sample Date
A2D1627-01	Hickman Test Well 210'	04/19/2012 09:30

Matrix: Water

Analysis (2) 1 D W / HNO3

EXT-Radium 226-DW Matrix
EXT-Radium 228-DW Matrix

001

Released By	Date	Received By	Date
	4/23/12		4/30/12 0130
Released By	Date	Received By	Date

Sample Condition Upon Receipt

Pace Analytical

Client Name: BSK

Project # 30608553

Courier: ☐ Fed Ex ☑ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace Other _____

Tracking #: 1Z93V921035192357 54

Optional
Proj. Due Date:
Proj. Name:

Custody Seal on Cooler/Box Present: ☐ yes ☑ no Seals intact: ☐ yes ☐ no

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☐ None ☑ Other Styrofoam

Thermometer Used 5 6 7 Type of Ice: Wet Blue (None) ☐ Samples on ice, cooling process has begun

Cooler Temperature NA Biological Tissue is Frozen: Yes No

Date and initials of person examining contents: AB 4/30/12

Temp should be above freezing to 6°C

		Comments:
Chain of Custody Present:	☑Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☑Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☑Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☐Yes ☑No ☐N/A	4.
Samples Arrived within Hold Time:	☑Yes ☐No ☐N/A	5.
Short Hold Time Analysis (<72hr):	☐Yes ☑No ☐N/A	6.
Rush Turn Around Time Requested:	☐Yes ☑No ☐N/A	7.
Sufficient Volume:	☑Yes ☐No ☐N/A	8.
Correct Containers Used:	☑Yes ☐No ☐N/A	9.
-Pace Containers Used:	☐Yes ☑No ☐N/A	
Containers Intact:	☑Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☑N/A	11.
Sample Labels match COC:	☑Yes ☐No ☐N/A	12.
-Includes date/time/ID/Analysis Matrix: WT		
All containers needing preservation have been checked.	☑Yes ☐No ☐N/A	13. pH<2
All containers needing preservation are found to be in compliance with EPA recommendation.	☑Yes ☐No ☐N/A	
exceptions: VOA, coliform, TOC, O&G, WI-DRO (water)	☐Yes ☑No	Initial when completed AB / Lot # of added preservative
Samples checked for dechlorination:	☐Yes ☐No ☑N/A	14.
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☑N/A	15.
Trip Blank Present:	☐Yes ☐No ☑N/A	16.
Trip Blank Custody Seals Present	☐Yes ☐No ☑N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution: Field Data Required? Y / N

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: _____ **Date:** 5/1/12

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

F-ALL-C003-6 SCURF front 2April2012.xls

Pace Analytical Services, Inc.
1700 Elm Street
Minneapolis, MN 55414
Phone: 612.607.1700
Fax: 612.607.6444

www.pacelabs.com

Report Prepared for:

Michelle Harmstead
BSK Analytical Laboratories
1414 Stanislaus Street
Fresno CA 93706

REPORT OF LABORATORY ANALYSIS FOR 2,3,7,8-TCDD

Report Summary:

This report contains results of one drinking water sample analyzed to determine 2,3,7,8-TCDD content. This sample was analyzed according to Method 1613 by High Resolution Gas Chromatography/High Resolution Mass Spectrometry.

Report Prepared Date:

May 4, 2012

Report Information:

Pace Project #: 10189648
Sample Receipt Date: 04/20/2012
Client Project #: A2D1327
Client Sub PO #: N/A
State Cert #: 01155CA

Invoicing & Reporting Options:

The report provided has been invoiced as a Level 2 Drinking Water Report. If an upgrade of this report package is requested, an additional charge may be applied.

Please review the attached invoice for accuracy and forward any questions to Emily Hazelroth, your Pace Project Manager.

This report has been reviewed by:

May 04, 2012

Emily Hazelroth, Project Manager
(612) 607-6407
(612) 607-6444 (fax)
emily.hazelroth@pacelabs.com

ACCREDITED IN ACCORDANCE WITH nelac

Report of Laboratory Analysis

This report should not be reproduced, except in full, without the written consent of Pace Analytical Services, Inc.

The results relate only to the samples included in this report.

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612- 607-6444

Minnesota Laboratory Certifications

Authority	Certificate #	Authority	Certificate #
Alabama	40770	Montana	92
Alaska	MN00064	Nebraska	
Arizona	AZ0014	Nevada	MN_00064_200
Arkansas	88-0680	New Jersey (N	MN002
California	01155CA	New Mexico	MN00064
Colorado	MN00064	New York (NEL	11647
Connecticut	PH-0256	North Carolina	27700
EPA Region 5	WD-15J	North Dakota	R-036
EPA Region 8	8TMS-Q	Ohio	4150
Florida (NELAP	E87605	Ohio VAP	CL101 9507
Georgia (DNR)	959	Oklahoma	D9922
Guam	959	Oregon (ELAP)	MN200001-005
Hawaii	SLD	Oregon (OREL	MN300001-001
Idaho	MN00064	Pennsylvania	68-00563
Illinois	200012	Saipan	MP0003
Indiana	C-MN-01	South Carolina	74003001
Indiana	C-MN-01	Tennesee	2818
Iowa	368	Tennessee	02818
Kansas	E-10167	Texas	T104704192-08
Kentucky	90062	Utah (NELAP)	PAM
Louisiana	LA0900015	Virginia	00251
Maine	2007029	Washington	C755
Maryland	322	West Virginia	9952C
Michigan	9909	Wisconsin	999407970
Minnesota	027-053-137	Wyoming	8TMS-Q
Mississippi	MN00064		

REPORT OF LABORATORY ANALYSIS

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Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612- 607-6444

Reporting Flags

A = Reporting Limit based on signal to noise

B = Less than 10x higher than method blank level

C = Result obtained from confirmation analysis

D = Result obtained from analysis of diluted sample

E = Exceeds calibration range

I = Interference present

J = Estimated value

Nn = Value obtained from additional analysis

P = PCDE Interference

R = Recovery outside target range

S = Peak saturated

U = Analyte not detected

V = Result verified by confirmation analysis

X = %D Exceeds limits

Y = Calculated using average of daily RFs

* = See Discussion

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without the written consent of Pace Analytical Services, Inc.

BSK Analytical Laboratories
Engineers & Laboratories

SUBCONTRACT ORDER

A2D1327

10189648

SENDING LABORATORY:

BSK Associates
1414 Stanislaus St
Fresno, CA 93706
Phone: 559-497-2888
Fax: 559-485-6935
Project Manager: Michelle Harmstead
E-mail: mharmstead@bskinc.com

RECEIVING LABORATORY:

Pace Analytical-Dioxin
1700 Elm Street S.E. Stuite 200
Minneapolis, MN 55414
Phone :(612) 607-1700
Fax: (612) 607-6444
Turnaround (Days): Standard
QC Deliverables: I Std III IV

Sample ID	Samp Desc		Sample Date
A2D1327-01	Hickman Test Well - 135'	10189648001	04/17/2012 09:30
Sample Alias: 142165			
Matrix: Water			

Analysis 1 L AG w/ NONE
EXT-Dioxin, EPA 1613 2,3,7,8-TCDD

4/19/12 — Released By — Date

J Richardson Pace Mn 4-20-12 T=1.6° — Received By — Date

4-23-12 09:43

Released By — Date — Received By — Date

130

Pace Analytical®	Document Name: **Sample Condition Upon Receipt Form**	Revised Date: 15Feb2012 Page 1 of 1
	Document Number: F-MN-L-213-rev.02	Issuing Authority: Pace Minnesota Quality Office

Sample Condition Upon Receipt

Client Name: BSK Project # 10189648

Courier: ☒ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace Other _____

Tracking #: 7934 7306 1818

Custody Seal on Cooler/Box Present: ☐ yes ☒ no Seals intact: ☐ yes ☐ no

Packing Material: ☒ Bubble Wrap ☐ Bubble Bags ☐ None ☐ Other _____ Temp Blank: Yes ☒ No ____

Thermometer Used 80344042 or 80512447 **Type of Ice:** Wet Blue None ☐ Samples on ice, cooling process has begun

Cooler Temperature 1.6° **Biological Tissue is Frozen:** Yes No

Temp should be above freezing to 6°C

Date and initials of person examining contents: 4-20-12 JA

		Comments:
Chain of Custody Present:	☑Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☑Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☑Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☐Yes ☑No ☐N/A	4.
Samples Arrived within Hold Time:	☑Yes ☐No ☐N/A	5.
Short Hold Time Analysis (<72hr):	☐Yes ☑No ☐N/A	6.
Rush Turn Around Time Requested:	☐Yes ☑No ☐N/A	7.
Sufficient Volume:	☑Yes ☐No ☐N/A	8.
Correct Containers Used:	☑Yes ☐No ☐N/A	9.
-Pace Containers Used:	☐Yes ☑No ☐N/A	
Containers Intact:	☑Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☑N/A	11.
Sample Labels match COC:	☑Yes ☐No ☐N/A	12.
-Includes date/time/ID/Analysis Matrix: WT		
All containers needing acid/base preservation have been checked. Noncompliance are noted in 13.	☐Yes ☐No ☑N/A	13. ☐ HNO3 ☐ H2SO4 ☐ NaOH ☐ HCl
All containers needing preservation are found to be in compliance with EPA recommendation. (HNO3, H2SO4, HCL<2; NaOH >12)	☐Yes ☐No ☑N/A	Samp #
Exceptions: VOA,Coliform, TOC, Oil and Grease, WI-DRO (water)	☐Yes ☑No	Initial when completed / Lot # of added preservative
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☑N/A	14.
Trip Blank Present:	☐Yes ☑No ☐N/A	15.
Trip Blank Custody Seals Present	☐Yes ☐No ☑N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution: Field Data Required? Y / N

Person Contacted: Michelle Harmstead Date/Time: 4/19/12 @ 10:30

Comments/ Resolution: 1613 DW

Project Manager Review: EKH **Date:** 4/23/12

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

Pace AnalyticalServices, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612-607-6444

Drinking Water Analysis Results
2,3,7,8-TCDD -- USEPA Method 1613B

Sample ID.....A2D1327-01
Client..... BSK Analytical Laboratories
Lab Sample ID.....10189648001

Date Collected.....04/17/2012
Date Received.....04/20/2012
Date Extracted.....04/25/2012

	Sample A2D1327-01	Method Blank	Lab Spike	Lab Spike Dup
[2,3,7,8-TCDD]	**ND**	ND	--	--
RL	5.0 pg/L	5.0 pg/L	--	--
2,3,7,8-TCDD Recovery	--	--	104%	105%
Spike Recovery Limit	--	--	73-146%	73-146%
RPD			1.6%	
IS Recovery	**79%**	76%	80%	74%
IS Recovery Limits	31-137%	31-137%	25-141%	25-141%
CS Recovery	**77%**	76%	82%	75%
CS Recovery Limits	42-164%	42-164%	37-158%	37-158%
Filename	R120427B_26	R120427A_10	R120427A_05	R120427A_06
Analysis Date	04/28/2012	04/27/2012	04/27/2012	04/27/2012
Analysis Time	11:54	14:24	11:34	12:08
Analyst	CVS	CVS	CVS	CVS
Volume	1.010L	1.031L	1.025L	1.027L
Dilution	NA	NA	NA	NA
ICAL Date	04/24/2012	04/24/2012	04/24/2012	04/24/2012
CCAL Filename	R120427B_24	R120427A_02	R120427A_02	R120427A_02

! = Outside the Control Limits
ND = Not Detected
RL = Reporting Limit
Limits = Control Limits from Method 1613 (10/94 Revision), Tables 6A and 7A
RPD = Relative Percent Difference of Lab Spike Recoveries
IS = Internal Standard [2,3,7,8-TCDD-$^{13}C_{12}$]
CS = Cleanup Standard [2,3,7,8-TCDD-$^{37}Cl_4$]

Analyst: Chuck Swepson

Project No.....10189648

LA Testing

520 Mission Street South Pasadena, CA 91030

Phone: (323) 254-9960 Fax: (323) 254-9982 Web: http://www.latesting.com Email:pasadenalab@latesting.com

Attn: **Michelle Harmstead**
BSK Analytical Laboratories
1414 Stanislaus Street
Fresno, CA 93706

Fax: Phone: (559) 497-2888

Project: A2D1327

EMSL Order: 321206471
Customer ID: 32BSK50
Customer PO:
EMSL Project ID:
Received: 4/18/2012
Analyzed: 5/01/2012

Test Report: Determination of Asbestos Structures >10µm in Drinking Water Performed by the 100.2 Method (EPA 600/R-94/134)

Sample ID Client / EMSL	Sample Filtration Date/Time	Original Sample Vol. Filtered (ml)	Effective Filter Area (mm²)	Area Analyzed (mm²)	ASBESTOS Asbestos Types	Fibers Detected	Analytical Sensitivity	Concentration	Confidence Limits
							MFL (million fibers per liter)		
A2D1327-01 321206471-0001	4/16/2012 02:00 PM	100	1288	0.0670	None Detected	ND	0.19	<0.19	0.00 - 0.71

Initial report from: 05/01/2012 18:00:28

Analyst(s)
Sherrie Ahmad (1)

Jerry Drapala Ph.D, Laboratory Manager
or other Approved Signatory

Any questions please contact Jerry Drapala.

Sample collection and containers provided by the client, acceptable bottle blank level is defined as ≤0.01MFL>10um. ND=None Detected. This report relates only to those items tested. This report may not be reproduced, except in full, without written permission by LA Testing. Samples received in good condition unless otherwise noted.

Samples analyzed by LA Testing South Pasadena, CA CA ELAP 2283

321206471

BSK Analytical Laboratories
Engineers & Laboratories

SUBCONTRACT ORDER

A2D1327 321206471

SENDING LABORATORY:

BSK Associates
1414 Stanislaus St
Fresno, CA 93706
Phone: 559-497-2888
Fax: 559-485-6935
Project Manager: Michelle Harmstead
E-mail: mharmstead@bskinc.com

RECEIVING LABORATORY:

L A Testing
520 Mission St.
South Pasadena, CA 91030
Phone :(800) 303-0047
Fax: -
Turnaround (Days): Standard
QC Deliverables: I (Std) III IV

Sample ID	Samp Desc	Sample Date
A2D1327-01	Hickman Test Well - 135'	**04/17/2012 09:30**

Sample Alias: 142165
Matrix: Water

Analysis 1 L P w/ Foil
EXT-Asbestos, Drinking Water by EPA 100.2

Released By	Date	Received By	Date
[signature]	4/17/12	[signature] (courier)	4/18/12 10:30am

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Attachment F: Water Quality Results, 360–370’

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Amended

BSK Associates
Engineers & Laboratories

A2D1159

06/11/2012

Melissa Duran
City of Modesto Water Division/Corp Yard
P.O Box 642
Modesto, CA 95353

Dear Melissa Duran,

Thank you for selecting BSK Associates for your analytical testing needs. We have prepared this report in response to your request for analytical services. Enclosed are the results of analyses for samples received by the laboratory on 04/13/2012 15:43.

If additional clarification of any information is required, please contact your Client Services Representative, Michelle Harmstead at (800) 877-8310 or (559) 497-2888.

BSK ASSOCIATES

Kasanna Coulter
Quality Assurance Manager

1414 Stanislaus Street Fresno, CA 93706 (559) 497-2888 FAX (559) 485-6935 www.bsklabs.com

An Employee-Owned Company | Analytical Testing | Construction Observation
Environmental Engineering | Geotechnical Engineering | Materials Testing

Amended

06/11/2012

Case Narrative

Work Order Information

Client Name:	City of Modesto Water Division/Corp Yard	**Submitted by:**	L. P.
Client Code:	Modes9588	**Shipped by:**	BSK Employee
Work Order:	A2D1159	**COC Number:**	
Project:	Title 22	**TAT:**	30
		PO #:	

Report Amendments

Date: 06/11/12

Initials: MLH

This amended report supersedes any previous reports issued by the laboratory. Amendments to this report are as follows:Per client request dissolved iron and manganese were added to sample -01.

Sample Receipt Conditions

Cooler: **Default Cooler** **Temp. ºC:** 4

Containers Intact
COC/Labels Agree
Received On Wet Ice
Sample(s) arrived at lab on same day sampled.
Packing Material - Bubble Wrap
Packing Material - Foam
Sample(s) were received in temperature range.
Initial receipt at BSK-FAL

Report Manager
Melissa Duran

Report Format
Final.rpt

1414 Stanislaus Street Fresno, CA 93706 (559) 497-2888 FAX (559) 485-6935 www.bsklabs.com

An Employee-Owned Company | Analytical Testing | Construction Observation
Environmental Engineering | Geotechnical Engineering | Materials Testing

Amended

BSK Associates Engineers & Laboratories

Certificate of Analysis

Melissa Duran
City of Modesto Water Division/Corp Yard
P.O Box 642
Modesto, CA 95353

Report Issue Date: 6/11/2012 13:11
Received Date: 04/13/2012
Received Time: 15:43

Lab Sample ID: A2D1159-01
Sample Date: 04/13/2012 09:20
Sampled by: L. P.
Sample Type: Grab
Matrix: Water

Sample Description: Hickman Test Well 350' depth // 142098

General Chemistry

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
***Aggressive Index**		**11**				A204230	04/24/12	04/24/12	
Alkalinity as CaCO3	SM 2320 B	**73**	3.0	mg/L	1	A203933	04/17/12	04/17/12	
Bicarbonate as CaCO3	SM 2320 B	**73**	3.0	mg/L	1	A203933	04/17/12	04/17/12	
Carbonate as CaCO3	SM 2320 B	ND	3.0	mg/L	1	A203933	04/17/12	04/17/12	
Chloride	EPA 300.0	**8.3**	1.0	mg/L	1	A203835	04/13/12	04/13/12	
***Color**	SM 2120 B	**10**	1.0	Color Units	1	A203831	04/13/12 16:33	04/13/12 16:33	
Cyanide (total)	SM 4500-CN E	ND	0.0050	mg/L	1	A203875	04/16/12	04/23/12	
Conductivity @ 25C	SM 2510 B	**220**	1.0	umhos/cm	1	A203933	04/17/12	04/17/12	
Fluoride	SM 4500-F C	**0.14**	0.10	mg/L	1	A203982	04/18/12	04/18/12	
Hydroxide as CaCO3	SM 2320 B	ND	3.0	mg/L	1	A203933	04/17/12	04/17/12	
Langelier Index	SM 2330 B	**-0.66**				A204231	04/24/12	04/24/12	
MBAS, Calculated as LAS, mol wt 340	SM 5540 C	ND	0.050	mg/L	1	A203838	04/13/12 16:47	04/13/12 16:47	
Nitrate as NO3	EPA 300.0	ND	1.0	mg/L	1	A203835	04/13/12 21:22	04/13/12 21:22	
***Threshold Odor**	SM 2150 B	**2.0**	1.0	T.O.N.	1	A203831	04/13/12 16:33	04/13/12 16:33	
pH (1)	SM 4500-H+ B	**8.2**		pH Units	1	A203933	04/17/12	04/17/12	
pH Temperature in °C		**24.4**							
Sulfate as SO4	EPA 300.0	**14**	2.0	mg/L	1	A203835	04/13/12	04/13/12	
Total Dissolved Solids	SM 2540C	**180**	5.0	mg/L	1	A203893	04/16/12	04/17/12	
Bicarbonate as HCO3		**89**	3.7	mg/L					
Carbonate as CO3		ND	1.8	mg/L					
Hardness as CaCO3		**24**	0.41	mg/L					
Hydroxide as OH		ND	1.0	mg/L					
Turbidity	SM 2130 B	**5.8**	0.10	NTU	1	A203831	04/13/12 16:33	04/13/12 16:33	

Metals

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Aluminum	EPA 200.7	**0.54**	0.050	mg/L	1	A203936	04/17/12	04/23/12	
Antimony	EPA 200.8	ND	2.0	ug/L	1	A203936	04/17/12	04/26/12	
Arsenic	EPA 200.8	ND	2.0	ug/L	1	A203936	04/17/12	04/26/12	
Barium	EPA 200.7	**0.050**	0.050	mg/L	1	A203936	04/17/12	04/23/12	
Beryllium	EPA 200.8	ND	1.0	ug/L	1	A203936	04/17/12	04/26/12	
Cadmium	EPA 200.8	ND	1.0	ug/L	1	A203936	04/17/12	04/26/12	
Calcium	EPA 200.7	**6.2**	0.10	mg/L	1	A203936	04/17/12	04/23/12	

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Certificate of Analysis

Melissa Duran
City of Modesto Water Division/Corp Yard
P.O Box 642
Modesto, CA 95353

Report Issue Date: 6/11/2012 13:11
Received Date: 04/13/2012
Received Time: 15:43

Lab Sample ID: A2D1159-01
Sample Date: 04/13/2012 09:20
Sampled by: L. P.
Sample Type: Grab
Matrix: Water

Sample Description: Hickman Test Well 350' depth // 142098

Metals

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Chromium	EPA 200.8	ND	10	ug/L	1	A203936	04/17/12	04/26/12	
Copper	EPA 200.8	ND	5.0	ug/L	1	A203936	04/17/12	04/26/12	
Iron	EPA 200.7	**0.49**	0.050	mg/L	1	A203936	04/17/12	04/23/12	
*Iron - Dissolved (1)	EPA 200.7	ND	0.050	mg/L	1	A205860	06/05/12	06/07/12	
Lead	EPA 200.8	ND	5.0	ug/L	1	A203936	04/17/12	04/26/12	
Magnesium	EPA 200.7	**2.0**	0.10	mg/L	1	A203936	04/17/12	04/23/12	
Manganese	EPA 200.7	**0.062**	0.010	mg/L	1	A203936	04/17/12	04/23/12	
***Manganese - Dissolved (1)**	EPA 200.7	**0.041**	0.010	mg/L	1	A205860	06/05/12	06/07/12	
Mercury	EPA 200.8	ND	0.40	ug/L	1	A203936	04/17/12	04/26/12	
Nickel	EPA 200.8	ND	10	ug/L	1	A203936	04/17/12	04/26/12	
Potassium	EPA 200.7	**8.6**	2.0	mg/L	1	A203936	04/17/12	04/23/12	
Selenium	EPA 200.8	ND	2.0	ug/L	1	A203936	04/17/12	04/26/12	
Silver	EPA 200.8	ND	10	ug/L	1	A203936	04/17/12	04/26/12	
Sodium	EPA 200.7	**38**	1.0	mg/L	1	A203936	04/17/12	04/23/12	
Thallium	EPA 200.8	ND	1.0	ug/L	1	A203936	04/17/12	04/26/12	
*Uranium	EPA 200.8	ND	1.0	ug/L	1	A203936	04/17/12	04/26/12	
***Uranium, Radiological**		**< 0.67**		pCi/L					
Zinc	EPA 200.7	ND	0.050	mg/L	1	A203936	04/17/12	04/23/12	

Radiological

Analyte	Method	Result	Units	Batch	Prepared	Analyzed	Qual
*Gross Alpha	EPA 00-02	ND	pCi/L	A203988	04/18/12	04/19/12	
***1.65 Sigma Uncertainty**		**0.156**	±				
***MDA95**		**1.09**	pCi/L				

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
EDB and DBCP by GC-ECD									
Dibromochloropropane (DBCP)	EPA 504.1	ND	0.010	ug/L	1	A204078	04/19/12	04/20/12	
Ethylene Dibromide (EDB)	EPA 504.1	ND	0.020	ug/L	1	A204078	04/19/12	04/20/12	
Surrogate: Bromoform	EPA 504.1	100 %	*Acceptable range: 70-130 %*						

Organohalide Pesticides and PCBs by GC-ECD

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Matrix: Water

Sample Description: Hickman Test Well 350' depth // 142098

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Organohalide Pesticides and PCBs by GC-ECD									
Aldrin	EPA 505	ND	0.075	ug/L	1	A203920	04/17/12	04/18/12	
Chlordane	EPA 505	ND	0.10	ug/L	1	A203920	04/17/12	04/18/12	
Chlorothalonil	EPA 505	ND	5.0	ug/L	1	A203920	04/17/12	04/18/12	
Dieldrin	EPA 505	ND	0.020	ug/L	1	A203920	04/17/12	04/18/12	
Endrin	EPA 505	ND	0.10	ug/L	1	A203920	04/17/12	04/18/12	
Heptachlor	EPA 505	ND	0.010	ug/L	1	A203920	04/17/12	04/18/12	
Heptachlor Epoxide	EPA 505	ND	0.010	ug/L	1	A203920	04/17/12	04/18/12	
Hexachlorobenzene	EPA 505	ND	0.50	ug/L	1	A203920	04/17/12	04/18/12	
Hexachlorocyclopentadiene	EPA 505	ND	1.0	ug/L	1	A203920	04/17/12	04/18/12	
Lindane	EPA 505	ND	0.20	ug/L	1	A203920	04/17/12	04/18/12	
Methoxychlor	EPA 505	ND	10	ug/L	1	A203920	04/17/12	04/18/12	
PCB Aroclor Screen	EPA 505	ND	0.50	ug/L	1	A203920	04/17/12	04/18/12	
Toxaphene	EPA 505	ND	1.0	ug/L	1	A203920	04/17/12	04/18/12	
Trifluralin	EPA 505	ND	1.0	ug/L	1	A203920	04/17/12	04/18/12	
Surrogate: TCMX	EPA 505	106 %		*Acceptable range: 70-130 %*					
Chlorinated Acid Herbicides by GC-ECD									
2,4,5-T	EPA 515.3	ND	1.0	ug/L	1	A204120	04/20/12	04/24/12	
2,4,5-TP (Silvex)	EPA 515.3	ND	1.0	ug/L	1	A204120	04/20/12	04/24/12	
2,4-D	EPA 515.3	ND	10	ug/L	1	A204120	04/20/12	04/24/12	
Bentazon	EPA 515.3	ND	2.0	ug/L	1	A204120	04/20/12	04/24/12	
Dalapon	EPA 515.3	ND	10	ug/L	1	A204120	04/20/12	04/24/12	
Dicamba	EPA 515.3	ND	1.5	ug/L	1	A204120	04/20/12	04/24/12	
Dinoseb	EPA 515.3	ND	2.0	ug/L	1	A204120	04/20/12	04/24/12	
Pentachlorophenol	EPA 515.3	ND	0.20	ug/L	1	A204120	04/20/12	04/24/12	
Picloram	EPA 515.3	ND	1.0	ug/L	1	A204120	04/20/12	04/24/12	
Surrogate: DCPAA	EPA 515.3	118 %		*Acceptable range: 70-130 %*					
Volatile Organics by GC-MS									
1,1,1,2-Tetrachloroethane	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
1,1,1-Trichloroethane	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
1,1,2,2-Tetrachloroethane	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
1,1,2-Trichloro-1,2,2-trifluoroethane	EPA 524.2	ND	10	ug/L	1	A203859	04/13/12	04/16/12	
1,1,2-Trichloroethane	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	

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Lab Sample ID: A2D1159-01
Sample Date: 04/13/2012 09:20
Sample Type: Grab
Sampled by: L. P.
Matrix: Water

Sample Description: Hickman Test Well 350' depth // 142098

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Volatile Organics by GC-MS									
1,1-Dichloroethane	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
1,1-Dichloroethene	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
1,1-Dichloropropene	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
1,2,3-Trichlorobenzene	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
1,2,4-Trichlorobenzene	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
1,2,4-Trimethylbenzene	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
1,2-Dichlorobenzene	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
1,2-Dichloroethane	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
1,2-Dichloropropane	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
1,3,5-Trimethylbenzene	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
1,3-Dichlorobenzene	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
1,3-Dichloropropane	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
1,4-Dichlorobenzene	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
2,2-Dichloropropane	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
2-Butanone	EPA 524.2	ND	5.0	ug/L	1	A203859	04/13/12	04/16/12	
2-Chlorotoluene	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
2-Hexanone	EPA 524.2	ND	10	ug/L	1	A203859	04/13/12	04/16/12	
4-Chlorotoluene	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
4-Methyl-2-pentanone	EPA 524.2	ND	5.0	ug/L	1	A203859	04/13/12	04/16/12	
Acetone	EPA 524.2	ND	10	ug/L	1	A203859	04/13/12	04/16/12	
Benzene	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
Bromobenzene	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
Bromochloromethane	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
Bromodichloromethane	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
Bromoform	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
Bromomethane	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
Carbon Tetrachloride	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
Chlorobenzene	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
Chloroethane	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
Chloroform	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
Chloromethane	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
cis-1,2-Dichloroethene	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
cis-1,3-Dichloropropene	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
Dibromochloromethane	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	

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Certificate of Analysis

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Report Issue Date: 6/11/2012 13:11
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Lab Sample ID: A2D1159-01
Sample Date: 04/13/2012 09:20
Sampled by: L. P.
Sample Type: Grab
Matrix: Water

Sample Description: Hickman Test Well 350' depth // 142098

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Volatile Organics by GC-MS									
Dibromomethane	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
Dichlorodifluoromethane	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
Dichloromethane	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
Di-isopropyl ether (DIPE)	EPA 524.2	ND	3.0	ug/L	1	A203859	04/13/12	04/16/12	
Ethyl tert-Butyl Ether (ETBE)	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
Ethylbenzene	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
Hexachlorobutadiene	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
Isopropylbenzene	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
m,p-Xylenes	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
Methyl-t-butyl ether	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
Naphthalene	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
n-Butylbenzene	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
n-Propylbenzene	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
o-Xylene	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
p-Isopropyltoluene	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
sec-Butylbenzene	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
Styrene	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
tert-Amyl Methyl Ether (TAME)	EPA 524.2	ND	3.0	ug/L	1	A203859	04/13/12	04/16/12	
tert-Butyl alcohol (TBA)	EPA 524.2	ND	2.0	ug/L	1	A203859	04/13/12	04/16/12	
tert-Butylbenzene	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
Tetrachloroethene (PCE)	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
Toluene	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
trans-1,2-Dichloroethene	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
trans-1,3-Dichloropropene	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
Trichloroethene (TCE)	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
Trichlorofluoromethane	EPA 524.2	ND	5.0	ug/L	1	A203859	04/13/12	04/16/12	
Vinyl Chloride	EPA 524.2	ND	0.50	ug/L	1	A203859	04/13/12	04/16/12	
Surrogate: 1,2-Dichlorobenzene-d4	EPA 524.2	90 %		*Acceptable range: 70-130 %*					
Surrogate: Bromofluorobenzene	EPA 524.2	97 %		*Acceptable range: 70-130 %*					
*Total 1,3-Dichloropropene, EPA 524.2		ND	0.50	ug/L					
*Total Trihalomethanes, EPA 524.2		ND	0.50	ug/L					
*Total Xylenes, EPA 524.2		ND	0.50	ug/L					
Semi-Volatile Organics by GC-MS									

A2D1159 FINAL 06112012 1311

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Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Semi-Volatile Organics by GC-MS									
Alachlor	EPA 525.2	ND	1.0	ug/L	1	A204138	04/21/12	04/21/12	
Atrazine	EPA 525.2	ND	0.50	ug/L	1	A204138	04/21/12	04/21/12	
Benzo(a)pyrene	EPA 525.2	ND	0.10	ug/L	1	A204138	04/21/12	04/21/12	
Bis(2-ethylhexyl) adipate	EPA 525.2	ND	3.0	ug/L	1	A204138	04/21/12	04/21/12	
Bis(2-ethylhexyl) phthalate	EPA 525.2	ND	3.0	ug/L	1	A204138	04/21/12	04/21/12	
Bromacil	EPA 525.2	ND	10	ug/L	1	A204138	04/21/12	04/21/12	
Butachlor	EPA 525.2	ND	0.38	ug/L	1	A204138	04/21/12	04/21/12	
Diazinon	EPA 525.2	ND	0.25	ug/L	1	A204138	04/21/12	04/21/12	
Dimethoate	EPA 525.2	ND	10	ug/L	1	A204138	04/21/12	04/21/12	
Metolachlor	EPA 525.2	ND	0.50	ug/L	1	A204138	04/21/12	04/21/12	
Metribuzin	EPA 525.2	ND	0.50	ug/L	1	A204138	04/21/12	04/21/12	
Molinate	EPA 525.2	ND	2.0	ug/L	1	A204138	04/21/12	04/21/12	
Propachlor	EPA 525.2	ND	0.50	ug/L	1	A204138	04/21/12	04/21/12	
Simazine	EPA 525.2	ND	1.0	ug/L	1	A204138	04/21/12	04/21/12	
Thiobencarb	EPA 525.2	ND	1.0	ug/L	1	A204138	04/21/12	04/21/12	
Surrogate: 1,3-Dimethyl-2-nitrobenzene	EPA 525.2	107 %		*Acceptable range: 70-130 %*					
Carbamates by HPLC									
3-Hydroxycarbofuran	EPA 531.1	ND	3.0	ug/L	1	A204065	04/19/12	04/20/12	
Aldicarb	EPA 531.1	ND	3.0	ug/L	1	A204065	04/19/12	04/20/12	
Aldicarb Sulfone	EPA 531.1	ND	2.0	ug/L	1	A204065	04/19/12	04/20/12	
Aldicarb Sulfoxide	EPA 531.1	ND	3.0	ug/L	1	A204065	04/19/12	04/20/12	
Carbaryl	EPA 531.1	ND	5.0	ug/L	1	A204065	04/19/12	04/20/12	
Carbofuran	EPA 531.1	ND	5.0	ug/L	1	A204065	04/19/12	04/20/12	
Methomyl	EPA 531.1	ND	2.0	ug/L	1	A204065	04/19/12	04/20/12	
Oxamyl	EPA 531.1	ND	20	ug/L	1	A204065	04/19/12	04/20/12	
Glyphosate by HPLC									
Glyphosate	EPA 547	ND	25	ug/L	1	A203917	04/17/12	04/17/12	
Surrogate: AMPA	EPA 547	114 %		*Acceptable range: 70-130 %*					
Endothall by GC-MS									
Endothall	EPA 548.1	ND	45	ug/L	1	A203850	04/13/12	04/17/12	
Diquat by HPLC									

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BSK Associates Engineers & Laboratories

Certificate of Analysis

Melissa Duran
City of Modesto Water Division/Corp Yard
P.O Box 642
Modesto, CA 95353

Report Issue Date: 6/11/2012 13:11
Received Date: 04/13/2012
Received Time: 15:43

Lab Sample ID: A2D1159-01
Sample Date: 04/13/2012 09:20
Sampled by: L. P.
Sample Type: Grab
Matrix: Water

Sample Description: Hickman Test Well 350' depth // 142098

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Diquat by HPLC									
Diquat	EPA 549.2	ND	4.0	ug/L	1	A203913	04/16/12	04/18/12	
Diuron by HPLC									
Diuron	EPA 632	ND	1.0	ug/L	1	A203854	04/16/12	04/17/12	
Surrogate: Benthiocarb	EPA 632	99 %		*Acceptable range: 70-130 %*					

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BSK Associates Engineers & Laboratories

General Chemistry Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203831				Analyst: DFS		Prepared: 4/13/2012					
Blank (A203831-BLK1) SM 2120 B - Quality Control											
Color	ND	1.0	Color Units							04/13/12	
Threshold Odor	ND	1.0	T.O.N.							04/13/12	
Turbidity	ND	0.10	NTU							04/13/12	
Duplicate (A203831-DUP1) SM 2120 B - Quality Control						**Source: A2D0988-01**					
Color	ND	1.0	Color Units		ND				20	04/13/12	
Threshold Odor	ND	1.0	T.O.N.		ND				20	04/13/12	
Turbidity	ND	0.10	NTU		ND				20	04/13/12	
Duplicate (A203831-DUP2) SM 2120 B - Quality Control						**Source: A2D1159-01**					
Color	10	1.0	Color Units		10			0	20	04/13/12	
Threshold Odor	2.0	1.0	T.O.N.		2.0			0	20	04/13/12	
Turbidity	5.9	0.10	NTU		5.8			2	20	04/13/12	
Batch: A203835				Analyst: AJT		Prepared: 4/13/2012					
Blank (A203835-BLK1) EPA 300.0 - Quality Control											
Chloride	ND	1.0	mg/L							04/13/12	
Nitrate as NO3	ND	1.0	mg/L							04/13/12	
Sulfate as SO4	ND	2.0	mg/L							04/13/12	
Blank Spike (A203835-BS1) EPA 300.0 - Quality Control											
Chloride	54	1.0	mg/L	50		108	90-110			04/13/12	
Nitrate as NO3	53	1.0	mg/L	50		107	90-110			04/13/12	
Sulfate as SO4	55	2.0	mg/L	50		109	90-110			04/13/12	
Blank Spike Dup (A203835-BSD1) EPA 300.0 - Quality Control											
Chloride	54	1.0	mg/L	50		108	90-110	0	10	04/13/12	
Nitrate as NO3	53	1.0	mg/L	50		107	90-110	0	10	04/13/12	
Sulfate as SO4	54	2.0	mg/L	50		109	90-110	0	10	04/13/12	
Matrix Spike (A203835-MS1) EPA 300.0 - Quality Control						**Source: A2D1112-02**					
Chloride	110	2.0	mg/L	100	5.2	108	80-120			04/13/12	
Nitrate as NO3	110	2.0	mg/L	100	3.6	107	80-120			04/13/12	
Sulfate as SO4	110	4.0	mg/L	100	4.4	109	80-120			04/13/12	
Matrix Spike (A203835-MS2) EPA 300.0 - Quality Control						**Source: A2D1137-01**					
Chloride	120	2.0	mg/L	100	3.7	116	80-120			04/13/12	
Nitrate as NO3	110	2.0	mg/L	100	ND	114	80-120			04/13/12	
Sulfate as SO4	150	4.0	mg/L	100	36	115	80-120			04/13/12	
Matrix Spike Dup (A203835-MSD1) EPA 300.0 - Quality Control						**Source: A2D1112-02**					
Chloride	120	2.0	mg/L	100	5.2	110	80-120	2	10	04/13/12	
Nitrate as NO3	110	2.0	mg/L	100	3.6	109	80-120	2	10	04/13/12	
Sulfate as SO4	110	4.0	mg/L	100	4.4	110	80-120	1	10	04/13/12	

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BSK Associates Engineers & Laboratories

General Chemistry Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203835				Analyst: AJT		Prepared: 4/13/2012					
Matrix Spike Dup (A203835-MSD2)	**EPA 300.0 - Quality Control**					**Source: A2D1137-01**					
Chloride	120	2.0	mg/L	100	3.7	116	80-120	1	10	04/13/12	
Nitrate as NO3	120	2.0	mg/L	100	ND	115	80-120	1	10	04/13/12	
Sulfate as SO4	150	4.0	mg/L	100	36	116	80-120	1	10	04/13/12	
Batch: A203838				Analyst: DFS		Prepared: 4/13/2012					
Blank (A203838-BLK1)	**SM 5540 C - Quality Control**										
MBAS, Calculated as LAS, mol wt 340	ND	0.050	mg/L							04/13/12	
Blank Spike (A203838-BS1)	**SM 5540 C - Quality Control**										
MBAS, Calculated as LAS, mol wt 340	1.1	0.050	mg/L	1.0		107	80-120			04/13/12	
Blank Spike Dup (A203838-BSD1)	**SM 5540 C - Quality Control**										
MBAS, Calculated as LAS, mol wt 340	1.1	0.050	mg/L	1.0		108	80-120	1	20	04/13/12	
Matrix Spike (A203838-MS1)	**SM 5540 C - Quality Control**					**Source: A2D1137-01**					
MBAS, Calculated as LAS, mol wt 340	0.96	0.050	mg/L	1.0	ND	96	80-120			04/13/12	
Matrix Spike Dup (A203838-MSD1)	**SM 5540 C - Quality Control**					**Source: A2D1137-01**					
MBAS, Calculated as LAS, mol wt 340	0.97	0.050	mg/L	1.0	ND	97	80-120	1	20	04/13/12	
Batch: A203875				Analyst: ANALY		Prepared: 4/16/2012					
Blank (A203875-BLK1)	**SM 4500-CN E - Quality Control**										
Cyanide (total)	ND	0.0050	mg/L							04/23/12	
Blank Spike (A203875-BS1)	**SM 4500-CN E - Quality Control**										
Cyanide (total)	0.50	0.0050	mg/L	0.50		100	80-120			04/23/12	
Blank Spike Dup (A203875-BSD1)	**SM 4500-CN E - Quality Control**										
Cyanide (total)	0.49	0.0050	mg/L	0.50		98	80-120	2	20	04/23/12	
Matrix Spike (A203875-MS1)	**SM 4500-CN E - Quality Control**					**Source: A2D1159-01**					
Cyanide (total)	0.49	0.0050	mg/L	0.50	ND	97	80-120			04/23/12	
Matrix Spike Dup (A203875-MSD1)	**SM 4500-CN E - Quality Control**					**Source: A2D1159-01**					
Cyanide (total)	0.45	0.0050	mg/L	0.50	ND	90	80-120	8	20	04/23/12	
Batch: A203893				Analyst: DEH		Prepared: 4/16/2012					
Blank (A203893-BLK1)	**SM 2540C - Quality Control**										
Total Dissolved Solids	ND	5.0	mg/L							04/17/12	
Duplicate (A203893-DUP1)	**SM 2540C - Quality Control**					**Source: A2D1077-01**					
Total Dissolved Solids	290	5.0	mg/L		290			0	20	04/17/12	

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General Chemistry Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203933				Analyst: CEG		Prepared: 4/17/2012					
Blank (A203933-BLK1) SM 2320 B - Quality Control											
Alkalinity as CaCO3	ND	3.0	mg/L							04/17/12	
Bicarbonate as CaCO3	ND	3.0	mg/L							04/17/12	
Carbonate as CaCO3	ND	3.0	mg/L							04/17/12	
Conductivity @ 25C	ND	1.0	umhos/cm							04/17/12	
Hydroxide as CaCO3	ND	3.0	mg/L							04/17/12	
Blank Spike (A203933-BS1) SM 2320 B - Quality Control											
Alkalinity as CaCO3	97	3.0	mg/L	100		97	80-120			04/17/12	
Blank Spike Dup (A203933-BSD1) SM 2320 B - Quality Control											
Alkalinity as CaCO3	98	3.0	mg/L	100		98	80-120	0	20	04/17/12	
Duplicate (A203933-DUP1) SM 2320 B - Quality Control						**Source: A2D1233-02**					
Alkalinity as CaCO3	190	3.0	mg/L		190			0	10	04/17/12	
Bicarbonate as CaCO3	190	3.0	mg/L		190			0	10	04/17/12	
Carbonate as CaCO3	ND	3.0	mg/L		ND				10	04/17/12	
Conductivity @ 25C	700	1.0	umhos/cm		690			0	20	04/17/12	
Hydroxide as CaCO3	ND	3.0	mg/L		ND				10	04/17/12	
pH (1)	7.9		pH Units		7.9			0	20	04/17/12	
Duplicate (A203933-DUP2) SM 2320 B - Quality Control						**Source: A2D1301-01**					
Alkalinity as CaCO3	110	3.0	mg/L		110			0	10	04/17/12	
Bicarbonate as CaCO3	110	3.0	mg/L		110			0	10	04/17/12	
Carbonate as CaCO3	ND	3.0	mg/L		ND				10	04/17/12	
Conductivity @ 25C	1300	1.0	umhos/cm		1300			0	20	04/17/12	
Hydroxide as CaCO3	ND	3.0	mg/L		ND				10	04/17/12	
pH (1)	8.0		pH Units		8.0			0	20	04/17/12	
Batch: A203982				Analyst: CCH		Prepared: 4/18/2012					
Blank (A203982-BLK1) SM 4500-F C - Quality Control											
Fluoride	ND	0.10	mg/L							04/18/12	
Blank Spike (A203982-BS1) SM 4500-F C - Quality Control											
Fluoride	0.98	0.10	mg/L	1.0		98	80-120			04/18/12	
Blank Spike Dup (A203982-BSD1) SM 4500-F C - Quality Control											
Fluoride	0.99	0.10	mg/L	1.0		99	80-120	1	20	04/18/12	
Matrix Spike (A203982-MS1) SM 4500-F C - Quality Control						**Source: A2D1137-01**					
Fluoride	1.5	0.10	mg/L	1.0	0.51	98	80-120			04/18/12	
Matrix Spike (A203982-MS2) SM 4500-F C - Quality Control						**Source: A2D1143-03**					
Fluoride	1.8	0.10	mg/L	1.0	0.82	99	80-120			04/18/12	
Matrix Spike Dup (A203982-MSD1) SM 4500-F C - Quality Control						**Source: A2D1137-01**					

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General Chemistry Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203982				Analyst: CCH		Prepared: 4/18/2012					
Matrix Spike Dup (A203982-MSD1)	**SM 4500-F C - Quality Control**					**Source: A2D1137-01**					
Fluoride	1.5	0.10	mg/L	1.0	0.51	98	80-120	0	20	04/18/12	
Matrix Spike Dup (A203982-MSD2)	**SM 4500-F C - Quality Control**					**Source: A2D1143-03**					
Fluoride	1.8	0.10	mg/L	1.0	0.82	98	80-120	1	20	04/18/12	

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BSK Associates Engineers & Laboratories

Metals Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203936				Analyst: NRE		Prepared: 4/17/2012					
Blank (A203936-BLK2) EPA 200.7 - Quality Control											
Aluminum	ND	0.050	mg/L							04/23/12	
Barium	ND	0.050	mg/L							04/23/12	
Calcium	ND	0.10	mg/L							04/23/12	
Iron	ND	0.050	mg/L							04/23/12	
Magnesium	ND	0.10	mg/L							04/23/12	
Manganese	ND	0.010	mg/L							04/23/12	
Potassium	ND	2.0	mg/L							04/23/12	
Sodium	ND	1.0	mg/L							04/23/12	
Zinc	ND	0.050	mg/L							04/23/12	
Blank Spike (A203936-BS2) EPA 200.7 - Quality Control											
Aluminum	0.19	0.050	mg/L	0.20		97	85-115			04/23/12	
Barium	0.21	0.050	mg/L	0.20		103	85-115			04/23/12	
Calcium	10	0.10	mg/L	10		103	85-115			04/23/12	
Iron	2.0	0.050	mg/L	2.0		102	85-115			04/23/12	
Magnesium	10	0.10	mg/L	10		102	85-115			04/23/12	
Manganese	0.21	0.010	mg/L	0.20		104	85-115			04/23/12	
Potassium	10	2.0	mg/L	10		102	85-115			04/23/12	
Sodium	10	1.0	mg/L	10		102	85-115			04/23/12	
Zinc	0.21	0.050	mg/L	0.20		103	85-115			04/23/12	
Blank Spike Dup (A203936-BSD2) EPA 200.7 - Quality Control											
Aluminum	0.19	0.050	mg/L	0.20		95	85-115	2	20	04/23/12	
Barium	0.21	0.050	mg/L	0.20		103	85-115	0	20	04/23/12	
Calcium	10	0.10	mg/L	10		103	85-115	0	20	04/23/12	
Iron	2.0	0.050	mg/L	2.0		102	85-115	0	20	04/23/12	
Magnesium	10	0.10	mg/L	10		101	85-115	1	20	04/23/12	
Manganese	0.21	0.010	mg/L	0.20		104	85-115	0	20	04/23/12	
Potassium	10	2.0	mg/L	10		102	85-115	0	20	04/23/12	
Sodium	10	1.0	mg/L	10		102	85-115	0	20	04/23/12	
Zinc	0.21	0.050	mg/L	0.20		103	85-115	0	20	04/23/12	
Matrix Spike (A203936-MS3) EPA 200.7 - Quality Control						**Source: A2D1157-03**					
Aluminum	0.20	0.050	mg/L	0.20	ND	99	70-130			04/23/12	
Barium	0.23	0.050	mg/L	0.20	ND	115	70-130			04/23/12	
Calcium	16	0.10	mg/L	10	5.6	105	70-130			04/23/12	
Iron	2.1	0.050	mg/L	2.0	ND	105	70-130			04/23/12	
Magnesium	12	0.10	mg/L	10	1.7	103	70-130			04/23/12	
Manganese	0.21	0.010	mg/L	0.20	ND	105	70-130			04/23/12	
Potassium	11	2.0	mg/L	10	ND	103	70-130			04/23/12	
Sodium	15	1.0	mg/L	10	5.3	102	70-130			04/23/12	
Zinc	0.28	0.050	mg/L	0.20	0.066	105	70-130			04/23/12	
Matrix Spike (A203936-MS4) EPA 200.7 - Quality Control						**Source: A2D1191-01**					
Aluminum	0.35	0.050	mg/L	0.20	0.095	126	70-130			04/23/12	

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BSK Associates Engineers & Laboratories

Metals Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203936				Analyst: NRE		Prepared: 4/17/2012					
Matrix Spike (A203936-MS4)	**EPA 200.7 - Quality Control**					**Source: A2D1191-01**					
Barium	0.22	0.050	mg/L	0.20	ND	108	70-130			04/23/12	
Calcium	14	0.10	mg/L	10	3.6	102	70-130			04/23/12	
Iron	2.2	0.050	mg/L	2.0	0.18	102	70-130			04/23/12	
Magnesium	11	0.10	mg/L	10	0.77	101	70-130			04/23/12	
Manganese	0.24	0.010	mg/L	0.20	0.034	103	70-130			04/23/12	
Potassium	11	2.0	mg/L	10	ND	107	70-130			04/23/12	
Sodium	14	1.0	mg/L	10	3.5	101	70-130			04/23/12	
Zinc	0.21	0.050	mg/L	0.20	ND	103	70-130			04/23/12	
Matrix Spike Dup (A203936-MSD3)	**EPA 200.7 - Quality Control**					**Source: A2D1157-03**					
Aluminum	0.19	0.050	mg/L	0.20	ND	97	70-130	2	20	04/23/12	
Barium	0.23	0.050	mg/L	0.20	ND	113	70-130	2	20	04/23/12	
Calcium	16	0.10	mg/L	10	5.6	101	70-130	3	20	04/23/12	
Iron	2.0	0.050	mg/L	2.0	ND	101	70-130	4	20	04/23/12	
Magnesium	12	0.10	mg/L	10	1.7	100	70-130	3	20	04/23/12	
Manganese	0.20	0.010	mg/L	0.20	ND	102	70-130	3	20	04/23/12	
Potassium	11	2.0	mg/L	10	ND	100	70-130	3	20	04/23/12	
Sodium	15	1.0	mg/L	10	5.3	100	70-130	1	20	04/23/12	
Zinc	0.26	0.050	mg/L	0.20	0.066	99	70-130	5	20	04/23/12	
Matrix Spike Dup (A203936-MSD4)	**EPA 200.7 - Quality Control**					**Source: A2D1191-01**					
Aluminum	0.35	0.050	mg/L	0.20	0.095	128	70-130	1	20	04/23/12	
Barium	0.21	0.050	mg/L	0.20	ND	107	70-130	1	20	04/23/12	
Calcium	14	0.10	mg/L	10	3.6	102	70-130	1	20	04/23/12	
Iron	2.2	0.050	mg/L	2.0	0.18	102	70-130	1	20	04/23/12	
Magnesium	11	0.10	mg/L	10	0.77	100	70-130	1	20	04/23/12	
Manganese	0.24	0.010	mg/L	0.20	0.034	102	70-130	1	20	04/23/12	
Potassium	11	2.0	mg/L	10	ND	107	70-130	0	20	04/23/12	
Sodium	13	1.0	mg/L	10	3.5	98	70-130	2	20	04/23/12	
Zinc	0.21	0.050	mg/L	0.20	ND	103	70-130	0	20	04/23/12	
Blank (A203936-BLK1)	**EPA 200.8 - Quality Control**										
Antimony	ND	2.0	ug/L							04/26/12	
Arsenic	ND	2.0	ug/L							04/26/12	
Beryllium	ND	1.0	ug/L							04/26/12	
Cadmium	ND	1.0	ug/L							04/26/12	
Chromium	ND	10	ug/L							04/26/12	
Copper	ND	5.0	ug/L							04/26/12	
Lead	ND	5.0	ug/L							04/26/12	
Mercury	ND	0.40	ug/L							04/26/12	
Nickel	ND	10	ug/L							04/26/12	
Selenium	ND	2.0	ug/L							04/26/12	
Silver	ND	10	ug/L							04/26/12	
Thallium	ND	1.0	ug/L							04/26/12	
Uranium	ND	1.0	ug/L							04/26/12	

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Amended

BSK Associates Engineers & Laboratories

Metals Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203936				Analyst: MAS		Prepared: 4/17/2012					
Blank Spike (A203936-BS1)	**EPA 200.8 - Quality Control**										
Antimony	210	2.0	ug/L	200		104	85-115			04/26/12	
Arsenic	210	2.0	ug/L	200		103	85-115			04/26/12	
Beryllium	190	1.0	ug/L	200		95	85-115			04/26/12	
Cadmium	200	1.0	ug/L	200		100	85-115			04/26/12	
Chromium	210	10	ug/L	200		105	85-115			04/26/12	
Copper	200	5.0	ug/L	200		98	85-115			04/26/12	
Lead	220	5.0	ug/L	200		108	85-115			04/26/12	
Mercury	4.9	0.40	ug/L	5.0		97	85-115			04/26/12	
Nickel	200	10	ug/L	200		98	85-115			04/26/12	
Selenium	200	2.0	ug/L	200		101	85-115			04/26/12	
Silver	100	10	ug/L	100		100	75-125			04/26/12	
Thallium	230	1.0	ug/L	200		113	85-115			04/26/12	
Uranium	110	1.0	ug/L	100		114	85-115			04/26/12	
Blank Spike Dup (A203936-BSD1)	**EPA 200.8 - Quality Control**										
Antimony	210	2.0	ug/L	200		105	85-115	1	20	04/26/12	
Arsenic	210	2.0	ug/L	200		103	85-115	0	20	04/26/12	
Beryllium	190	1.0	ug/L	200		94	85-115	1	20	04/26/12	
Cadmium	200	1.0	ug/L	200		102	85-115	2	20	04/26/12	
Chromium	210	10	ug/L	200		104	85-115	1	20	04/26/12	
Copper	200	5.0	ug/L	200		100	85-115	3	20	04/26/12	
Lead	220	5.0	ug/L	200		110	85-115	1	20	04/26/12	
Mercury	5.0	0.40	ug/L	5.0		100	85-115	3	20	04/26/12	
Nickel	200	10	ug/L	200		100	85-115	2	20	04/26/12	
Selenium	200	2.0	ug/L	200		102	85-115	1	20	04/26/12	
Silver	98	10	ug/L	100		98	75-125	2	20	04/26/12	
Thallium	230	1.0	ug/L	200		115	85-115	2	20	04/26/12	
Uranium	110	1.0	ug/L	100		114	85-115	0	20	04/26/12	
Matrix Spike (A203936-MS1)	**EPA 200.8 - Quality Control**					**Source: A2D1157-03**					
Antimony	210	2.0	ug/L	200	ND	106	70-130			04/26/12	
Arsenic	200	2.0	ug/L	200	ND	102	70-130			04/26/12	
Beryllium	190	1.0	ug/L	200	ND	93	70-130			04/26/12	
Cadmium	200	1.0	ug/L	200	ND	100	70-130			04/26/12	
Chromium	210	10	ug/L	200	ND	104	70-130			04/26/12	
Copper	200	5.0	ug/L	200	ND	99	70-130			04/26/12	
Lead	220	5.0	ug/L	200	ND	111	70-130			04/26/12	
Mercury	5.0	0.40	ug/L	5.0	ND	101	70-130			04/26/12	
Nickel	200	10	ug/L	200	ND	98	70-130			04/26/12	
Selenium	200	2.0	ug/L	200	ND	100	70-130			04/26/12	
Silver	96	10	ug/L	100	ND	96	70-130			04/26/12	
Thallium	230	1.0	ug/L	200	ND	114	70-130			04/26/12	
Uranium	120	1.0	ug/L	100	ND	117	70-130			04/26/12	
Matrix Spike (A203936-MS2)	**EPA 200.8 - Quality Control**					**Source: A2D1191-01**					

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Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203936				Analyst: MAS		Prepared: 4/17/2012					
Matrix Spike (A203936-MS2)	**EPA 200.8 - Quality Control**					**Source: A2D1191-01**					
Antimony	200	2.0	ug/L	200	ND	102	70-130			04/26/12	
Arsenic	200	2.0	ug/L	200	ND	102	70-130			04/26/12	
Beryllium	180	1.0	ug/L	200	ND	92	70-130			04/26/12	
Cadmium	200	1.0	ug/L	200	ND	98	70-130			04/26/12	
Chromium	210	10	ug/L	200	ND	104	70-130			04/26/12	
Copper	200	5.0	ug/L	200	ND	100	70-130			04/26/12	
Lead	220	5.0	ug/L	200	ND	109	70-130			04/26/12	
Mercury	4.9	0.40	ug/L	5.0	ND	99	70-130			04/26/12	
Nickel	200	10	ug/L	200	ND	98	70-130			04/26/12	
Selenium	200	2.0	ug/L	200	ND	98	70-130			04/26/12	
Silver	95	10	ug/L	100	ND	95	70-130			04/26/12	
Thallium	230	1.0	ug/L	200	ND	114	70-130			04/26/12	
Uranium	120	1.0	ug/L	100	ND	116	70-130			04/26/12	
Matrix Spike Dup (A203936-MSD1)	**EPA 200.8 - Quality Control**					**Source: A2D1157-03**					
Antimony	210	2.0	ug/L	200	ND	105	70-130	0	20	04/26/12	
Arsenic	200	2.0	ug/L	200	ND	102	70-130	0	20	04/26/12	
Beryllium	190	1.0	ug/L	200	ND	93	70-130	0	20	04/26/12	
Cadmium	200	1.0	ug/L	200	ND	99	70-130	1	20	04/26/12	
Chromium	200	10	ug/L	200	ND	102	70-130	2	20	04/26/12	
Copper	200	5.0	ug/L	200	ND	98	70-130	1	20	04/26/12	
Lead	210	5.0	ug/L	200	ND	107	70-130	3	20	04/26/12	
Mercury	5.0	0.40	ug/L	5.0	ND	100	70-130	0	20	04/26/12	
Nickel	200	10	ug/L	200	ND	98	70-130	0	20	04/26/12	
Selenium	200	2.0	ug/L	200	ND	101	70-130	1	20	04/26/12	
Silver	98	10	ug/L	100	ND	98	70-130	1	20	04/26/12	
Thallium	220	1.0	ug/L	200	ND	112	70-130	2	20	04/26/12	
Uranium	110	1.0	ug/L	100	ND	112	70-130	4	20	04/26/12	
Matrix Spike Dup (A203936-MSD2)	**EPA 200.8 - Quality Control**					**Source: A2D1191-01**					
Antimony	210	2.0	ug/L	200	ND	103	70-130	1	20	04/26/12	
Arsenic	200	2.0	ug/L	200	ND	101	70-130	2	20	04/26/12	
Beryllium	180	1.0	ug/L	200	ND	91	70-130	1	20	04/26/12	
Cadmium	200	1.0	ug/L	200	ND	100	70-130	2	20	04/26/12	
Chromium	200	10	ug/L	200	ND	102	70-130	3	20	04/26/12	
Copper	190	5.0	ug/L	200	ND	97	70-130	3	20	04/26/12	
Lead	210	5.0	ug/L	200	ND	107	70-130	1	20	04/26/12	
Mercury	5.2	0.40	ug/L	5.0	ND	103	70-130	4	20	04/26/12	
Nickel	190	10	ug/L	200	ND	96	70-130	2	20	04/26/12	
Selenium	200	2.0	ug/L	200	ND	101	70-130	2	20	04/26/12	
Silver	94	10	ug/L	100	ND	94	70-130	1	20	04/26/12	
Thallium	220	1.0	ug/L	200	ND	111	70-130	3	20	04/26/12	
Uranium	110	1.0	ug/L	100	ND	114	70-130	2	20	04/26/12	
Batch: A205860				Analyst: NRE		Prepared: 6/5/2012					

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Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A205860				Analyst: NRE		Prepared: 6/5/2012					
Blank (A205860-BLK1) EPA 200.7 - Quality Control											
Iron - Dissolved (1)	ND	0.050	mg/L							06/07/12	
Manganese - Dissolved (1)	ND	0.010	mg/L							06/07/12	
Blank Spike (A205860-BS1) EPA 200.7 - Quality Control											
Iron - Dissolved (1)	2.0	0.050	mg/L	2.0		99	85-115			06/07/12	
Manganese - Dissolved (1)	0.20	0.010	mg/L	0.20		101	85-115			06/07/12	
Blank Spike Dup (A205860-BSD1) EPA 200.7 - Quality Control											
Iron - Dissolved (1)	2.0	0.050	mg/L	2.0		101	85-115	2	20	06/07/12	
Manganese - Dissolved (1)	0.20	0.010	mg/L	0.20		101	85-115	1	20	06/07/12	
Matrix Spike (A205860-MS1) EPA 200.7 - Quality Control						**Source: A2D1159-01**					
Iron - Dissolved (1)	2.0	0.050	mg/L	2.0	ND	99	70-130			06/07/12	
Manganese - Dissolved (1)	0.24	0.010	mg/L	0.20	0.041	100	70-130			06/07/12	
Matrix Spike Dup (A205860-MSD1) EPA 200.7 - Quality Control						**Source: A2D1159-01**					
Iron - Dissolved (1)	2.0	0.050	mg/L	2.0	ND	98	70-130	1	20	06/07/12	
Manganese - Dissolved (1)	0.24	0.010	mg/L	0.20	0.041	99	70-130	0	20	06/07/12	

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Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203850				Analyst: GAK		Prepared: 4/13/2012					
Blank (A203850-BLK1) EPA 548.1 - Quality Control											
Endothall	ND	45	ug/L							04/16/12	
Blank Spike (A203850-BS1) EPA 548.1 - Quality Control											
Endothall	95	45	ug/L	100		95	34-141			04/16/12	
Blank Spike Dup (A203850-BSD1) EPA 548.1 - Quality Control											
Endothall	94	45	ug/L	100		94	34-141	1	46	04/16/12	
Matrix Spike (A203850-MS1) EPA 548.1 - Quality Control						**Source: A2D0740-01**					
Endothall	ND	45	ug/L	100	ND	0	34-141			04/16/12	MS02 ***Low***
Matrix Spike Dup (A203850-MSD1) EPA 548.1 - Quality Control						**Source: A2D0740-01**					
Endothall	ND	45	ug/L	100	ND	0	34-141		46	04/16/12	MS02 ***Low***
Batch: A203854				Analyst: PYA		Prepared: 4/16/2012					
Blank (A203854-BLK1) EPA 632 - Quality Control											
Diuron	ND	1.0	ug/L							04/17/12	
Surrogate: Benthiocarb	*130*			*120*		*106*	*70-130*			04/17/12	
Blank Spike (A203854-BS1) EPA 632 - Quality Control											
Diuron	5.4	1.0	ug/L	5.0		109	70-130			04/17/12	
Surrogate: Benthiocarb	*130*			*120*		*103*	*70-130*			04/17/12	
Blank Spike Dup (A203854-BSD1) EPA 632 - Quality Control											
Diuron	6.2	1.0	ug/L	5.0		123	70-130	12	30	04/17/12	
Surrogate: Benthiocarb	*150*			*120*		*120*	*70-130*			04/17/12	
Matrix Spike (A203854-MS1) EPA 632 - Quality Control						**Source: A2D0660-01**					
Diuron	5.6	1.0	ug/L	5.0	ND	111	70-130			04/17/12	
Surrogate: Benthiocarb	*130*			*120*		*104*	*70-130*			04/17/12	
Batch: A203859				Analyst: JGB		Prepared: 4/16/2012					
Blank (A203859-BLK1) EPA 524.2 - Quality Control											
1,1,1,2-Tetrachloroethane	ND	0.50	ug/L							04/16/12	
1,1,1-Trichloroethane	ND	0.50	ug/L							04/16/12	
1,1,2,2-Tetrachloroethane	ND	0.50	ug/L							04/16/12	
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	10	ug/L							04/16/12	
1,1,2-Trichloroethane	ND	0.50	ug/L							04/16/12	
1,1-Dichloroethane	ND	0.50	ug/L							04/16/12	
1,1-Dichloroethene	ND	0.50	ug/L							04/16/12	
1,1-Dichloropropene	ND	0.50	ug/L							04/16/12	
1,2,3-Trichlorobenzene	ND	0.50	ug/L							04/16/12	

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Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203859				Analyst: JGB		Prepared: 4/16/2012					
Blank (A203859-BLK1) EPA 524.2 - Quality Control											
1,2,4-Trichlorobenzene	ND	0.50	ug/L							04/16/12	
1,2,4-Trimethylbenzene	ND	0.50	ug/L							04/16/12	
1,2-Dichlorobenzene	ND	0.50	ug/L							04/16/12	
1,2-Dichloroethane	ND	0.50	ug/L							04/16/12	
1,2-Dichloropropane	ND	0.50	ug/L							04/16/12	
1,3,5-Trimethylbenzene	ND	0.50	ug/L							04/16/12	
1,3-Dichlorobenzene	ND	0.50	ug/L							04/16/12	
1,3-Dichloropropane	ND	0.50	ug/L							04/16/12	
1,4-Dichlorobenzene	ND	0.50	ug/L							04/16/12	
2,2-Dichloropropane	ND	0.50	ug/L							04/16/12	
2-Butanone	ND	5.0	ug/L							04/16/12	
2-Chlorotoluene	ND	0.50	ug/L							04/16/12	
2-Hexanone	ND	10	ug/L							04/16/12	
4-Chlorotoluene	ND	0.50	ug/L							04/16/12	
4-Methyl-2-pentanone	ND	5.0	ug/L							04/16/12	
Acetone	ND	10	ug/L							04/16/12	
Benzene	ND	0.50	ug/L							04/16/12	
Bromobenzene	ND	0.50	ug/L							04/16/12	
Bromochloromethane	ND	0.50	ug/L							04/16/12	
Bromodichloromethane	ND	0.50	ug/L							04/16/12	
Bromoform	ND	0.50	ug/L							04/16/12	
Bromomethane	ND	0.50	ug/L							04/16/12	
Carbon Tetrachloride	ND	0.50	ug/L							04/16/12	
Chlorobenzene	ND	0.50	ug/L							04/16/12	
Chloroethane	ND	0.50	ug/L							04/16/12	
Chloroform	ND	0.50	ug/L							04/16/12	
Chloromethane	ND	0.50	ug/L							04/16/12	
cis-1,2-Dichloroethene	ND	0.50	ug/L							04/16/12	
cis-1,3-Dichloropropene	ND	0.50	ug/L							04/16/12	
Dibromochloromethane	ND	0.50	ug/L							04/16/12	
Dibromomethane	ND	0.50	ug/L							04/16/12	
Dichlorodifluoromethane	ND	0.50	ug/L							04/16/12	
Dichloromethane	ND	0.50	ug/L							04/16/12	
Di-isopropyl ether (DIPE)	ND	3.0	ug/L							04/16/12	
Ethyl tert-Butyl Ether (ETBE)	ND	0.50	ug/L							04/16/12	
Ethylbenzene	ND	0.50	ug/L							04/16/12	
Hexachlorobutadiene	ND	0.50	ug/L							04/16/12	
Isopropylbenzene	ND	0.50	ug/L							04/16/12	
m,p-Xylenes	ND	0.50	ug/L							04/16/12	
Methyl-t-butyl ether	ND	0.50	ug/L							04/16/12	
Naphthalene	0.53	0.50	ug/L							04/16/12	BL04
n-Butylbenzene	ND	0.50	ug/L							04/16/12	
n-Propylbenzene	ND	0.50	ug/L							04/16/12	
o-Xylene	ND	0.50	ug/L							04/16/12	
p-Isopropyltoluene	ND	0.50	ug/L							04/16/12	

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Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203859				Analyst: JGB		Prepared: 4/16/2012					
Blank (A203859-BLK1) EPA 524.2 - Quality Control											
sec-Butylbenzene	ND	0.50	ug/L							04/16/12	
Styrene	ND	0.50	ug/L							04/16/12	
tert-Amyl Methyl Ether (TAME)	ND	3.0	ug/L							04/16/12	
tert-Butyl alcohol (TBA)	ND	2.0	ug/L							04/16/12	
tert-Butylbenzene	ND	0.50	ug/L							04/16/12	
Tetrachloroethene (PCE)	ND	0.50	ug/L							04/16/12	
Toluene	ND	0.50	ug/L							04/16/12	
trans-1,2-Dichloroethene	ND	0.50	ug/L							04/16/12	
trans-1,3-Dichloropropene	ND	0.50	ug/L							04/16/12	
Trichloroethene (TCE)	ND	0.50	ug/L							04/16/12	
Trichlorofluoromethane	ND	5.0	ug/L							04/16/12	
Vinyl Chloride	ND	0.50	ug/L							04/16/12	
Surrogate: 1,2-Dichlorobenzene-d4	*4.4*			*5.0*		*87*	*70-130*			04/16/12	
Surrogate: Bromofluorobenzene	*4.6*			*5.0*		*92*	*70-130*			04/16/12	
Blank Spike (A203859-BS1) EPA 524.2 - Quality Control											
1,1,1,2-Tetrachloroethane	9.3	0.50	ug/L	10		93	70-130			04/16/12	
1,1,1-Trichloroethane	11	0.50	ug/L	10		107	70-130			04/16/12	
1,1,2,2-Tetrachloroethane	7.8	0.50	ug/L	10		78	70-130			04/16/12	
1,1,2-Trichloro-1,2,2-trifluoroethane	11	10	ug/L	10		112	70-130			04/16/12	
1,1,2-Trichloroethane	9.3	0.50	ug/L	10		93	70-130			04/16/12	
1,1-Dichloroethane	9.8	0.50	ug/L	10		98	70-130			04/16/12	
1,1-Dichloroethene	13	0.50	ug/L	10		129	70-130			04/16/12	
1,1-Dichloropropene	10	0.50	ug/L	10		102	70-130			04/16/12	
1,2,3-Trichlorobenzene	9.5	0.50	ug/L	10		95	70-130			04/16/12	
1,2,4-Trichlorobenzene	9.3	0.50	ug/L	10		93	70-130			04/16/12	
1,2,4-Trimethylbenzene	8.9	0.50	ug/L	10		89	70-130			04/16/12	
1,2-Dichlorobenzene	8.5	0.50	ug/L	10		85	70-130			04/16/12	
1,2-Dichloroethane	10	0.50	ug/L	10		102	70-130			04/16/12	
1,2-Dichloropropane	9.2	0.50	ug/L	10		92	70-130			04/16/12	
1,3,5-Trimethylbenzene	9.9	0.50	ug/L	10		99	70-130			04/16/12	
1,3-Dichlorobenzene	8.6	0.50	ug/L	10		86	70-130			04/16/12	
1,3-Dichloropropane	9.3	0.50	ug/L	10		93	70-130			04/16/12	
1,4-Dichlorobenzene	8.4	0.50	ug/L	10		84	70-130			04/16/12	
2,2-Dichloropropane	10	0.50	ug/L	10		104	70-130			04/16/12	
2-Butanone	10	5.0	ug/L	10		105	70-130			04/16/12	
2-Chlorotoluene	9.1	0.50	ug/L	10		91	70-130			04/16/12	
2-Hexanone	9.5	10	ug/L	10		95	70-130			04/16/12	
4-Chlorotoluene	9.3	0.50	ug/L	10		93	70-130			04/16/12	
4-Methyl-2-pentanone	9.4	5.0	ug/L	10		94	70-130			04/16/12	
Acetone	12	10	ug/L	10		118	70-130			04/16/12	
Benzene	9.9	0.50	ug/L	10		99	70-130			04/16/12	
Bromobenzene	9.1	0.50	ug/L	10		91	70-130			04/16/12	
Bromochloromethane	9.5	0.50	ug/L	10		95	70-130			04/16/12	
Bromodichloromethane	10	0.50	ug/L	10		105	70-130			04/16/12	

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Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203859				Analyst: JGB		Prepared: 4/16/2012					
Blank Spike (A203859-BS1)	**EPA 524.2 - Quality Control**										
Bromoform	9.9	0.50	ug/L	10		99	70-130			04/16/12	
Bromomethane	11	0.50	ug/L	10		109	70-130			04/16/12	
Carbon Tetrachloride	11	0.50	ug/L	10		108	70-130			04/16/12	
Chlorobenzene	9.8	0.50	ug/L	10		98	70-130			04/16/12	
Chloroethane	10	0.50	ug/L	10		102	70-130			04/16/12	
Chloroform	10	0.50	ug/L	10		104	70-130			04/16/12	
Chloromethane	10	0.50	ug/L	10		104	70-130			04/16/12	
cis-1,2-Dichloroethene	10	0.50	ug/L	10		101	70-130			04/16/12	
cis-1,3-Dichloropropene	11	0.50	ug/L	10		107	70-130			04/16/12	
Dibromochloromethane	9.6	0.50	ug/L	10		96	70-130			04/16/12	
Dibromomethane	9.9	0.50	ug/L	10		99	70-130			04/16/12	
Dichlorodifluoromethane	9.8	0.50	ug/L	10		98	70-130			04/16/12	
Dichloromethane	9.4	0.50	ug/L	10		94	70-130			04/16/12	
Di-isopropyl ether (DIPE)	9.5	3.0	ug/L	10		95	70-130			04/16/12	
Ethyl tert-Butyl Ether (ETBE)	9.9	0.50	ug/L	10		99	70-130			04/16/12	
Ethylbenzene	9.4	0.50	ug/L	10		94	70-130			04/16/12	
Hexachlorobutadiene	9.1	0.50	ug/L	10		91	70-130			04/16/12	
Isopropylbenzene	10	0.50	ug/L	10		100	70-130			04/16/12	
m,p-Xylenes	19	0.50	ug/L	20		93	70-130			04/16/12	
Methyl-t-butyl ether	20	0.50	ug/L	20		101	70-130			04/16/12	
Naphthalene	9.0	0.50	ug/L	10		90	70-130			04/16/12	
n-Butylbenzene	9.1	0.50	ug/L	10		91	70-130			04/16/12	
n-Propylbenzene	9.6	0.50	ug/L	10		96	70-130			04/16/12	
o-Xylene	10	0.50	ug/L	10		100	70-130			04/16/12	
p-Isopropyltoluene	9.0	0.50	ug/L	10		90	70-130			04/16/12	
sec-Butylbenzene	8.9	0.50	ug/L	10		89	70-130			04/16/12	
Styrene	12	0.50	ug/L	10		120	70-130			04/16/12	
tert-Amyl Methyl Ether (TAME)	9.5	3.0	ug/L	10		95	70-130			04/16/12	
tert-Butyl alcohol (TBA)	12	2.0	ug/L	10		124	70-130			04/16/12	
tert-Butylbenzene	9.2	0.50	ug/L	10		92	70-130			04/16/12	
Tetrachloroethene (PCE)	9.9	0.50	ug/L	10		99	70-130			04/16/12	
Toluene	9.9	0.50	ug/L	10		99	70-130			04/16/12	
trans-1,2-Dichloroethene	10	0.50	ug/L	10		100	70-130			04/16/12	
trans-1,3-Dichloropropene	9.8	0.50	ug/L	10		98	70-130			04/16/12	
Trichloroethene (TCE)	9.9	0.50	ug/L	10		99	70-130			04/16/12	
Trichlorofluoromethane	12	5.0	ug/L	10		118	70-130			04/16/12	
Vinyl Chloride	11	0.50	ug/L	10		108	70-130			04/16/12	
Surrogate: 1,2-Dichlorobenzene-d4	*4.2*			*5.0*		*85*	*70-130*			04/16/12	
Surrogate: Bromofluorobenzene	*4.6*			*5.0*		*92*	*70-130*			04/16/12	
Blank Spike Dup (A203859-BSD1)	**EPA 524.2 - Quality Control**										
1,1,1,2-Tetrachloroethane	9.6	0.50	ug/L	10		96	70-130	3	30	04/16/12	
1,1,1-Trichloroethane	11	0.50	ug/L	10		111	70-130	4	30	04/16/12	
1,1,2,2-Tetrachloroethane	7.7	0.50	ug/L	10		77	70-130	2	30	04/16/12	
1,1,2-Trichloro-1,2,2-trifluoroethane	13	10	ug/L	10		127	70-130	12	30	04/16/12	

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BSK Associates Engineers & Laboratories

Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203859				Analyst: JGB		Prepared: 4/16/2012					
Blank Spike Dup (A203859-BSD1)	**EPA 524.2 - Quality Control**										
1,1,2-Trichloroethane	9.1	0.50	ug/L	10		91	70-130	2	30	04/16/12	
1,1-Dichloroethane	10	0.50	ug/L	10		102	70-130	4	30	04/16/12	
1,1-Dichloroethene	12	0.50	ug/L	10		119	70-130	8	30	04/16/12	
1,1-Dichloropropene	10	0.50	ug/L	10		102	70-130	1	30	04/16/12	
1,2,3-Trichlorobenzene	7.2	0.50	ug/L	10		72	70-130	28	30	04/16/12	
1,2,4-Trichlorobenzene	7.9	0.50	ug/L	10		79	70-130	16	30	04/16/12	
1,2,4-Trimethylbenzene	9.2	0.50	ug/L	10		92	70-130	2	30	04/16/12	
1,2-Dichlorobenzene	8.3	0.50	ug/L	10		83	70-130	3	30	04/16/12	
1,2-Dichloroethane	9.9	0.50	ug/L	10		99	70-130	3	30	04/16/12	
1,2-Dichloropropane	9.0	0.50	ug/L	10		90	70-130	1	30	04/16/12	
1,3,5-Trimethylbenzene	10	0.50	ug/L	10		100	70-130	2	30	04/16/12	
1,3-Dichlorobenzene	8.6	0.50	ug/L	10		86	70-130	1	30	04/16/12	
1,3-Dichloropropane	9.3	0.50	ug/L	10		93	70-130	0	30	04/16/12	
1,4-Dichlorobenzene	8.5	0.50	ug/L	10		85	70-130	1	30	04/16/12	
2,2-Dichloropropane	11	0.50	ug/L	10		112	70-130	7	30	04/16/12	
2-Butanone	8.3	5.0	ug/L	10		83	70-130	23	30	04/16/12	
2-Chlorotoluene	9.5	0.50	ug/L	10		95	70-130	4	30	04/16/12	
2-Hexanone	9.5	10	ug/L	10		95	70-130	1	30	04/16/12	
4-Chlorotoluene	9.6	0.50	ug/L	10		96	70-130	3	30	04/16/12	
4-Methyl-2-pentanone	8.9	5.0	ug/L	10		89	70-130	6	30	04/16/12	
Acetone	13	10	ug/L	10		130	70-130	10	30	04/16/12	
Benzene	9.9	0.50	ug/L	10		99	70-130	0	30	04/16/12	
Bromobenzene	9.1	0.50	ug/L	10		91	70-130	1	30	04/16/12	
Bromochloromethane	9.0	0.50	ug/L	10		90	70-130	5	30	04/16/12	
Bromodichloromethane	9.9	0.50	ug/L	10		99	70-130	6	30	04/16/12	
Bromoform	9.9	0.50	ug/L	10		99	70-130	1	30	04/16/12	
Bromomethane	12	0.50	ug/L	10		122	70-130	12	30	04/16/12	
Carbon Tetrachloride	11	0.50	ug/L	10		110	70-130	3	30	04/16/12	
Chlorobenzene	10	0.50	ug/L	10		100	70-130	2	30	04/16/12	
Chloroethane	11	0.50	ug/L	10		113	70-130	10	30	04/16/12	
Chloroform	10	0.50	ug/L	10		103	70-130	0	30	04/16/12	
Chloromethane	11	0.50	ug/L	10		108	70-130	4	30	04/16/12	
cis-1,2-Dichloroethene	10	0.50	ug/L	10		101	70-130	0	30	04/16/12	
cis-1,3-Dichloropropene	10	0.50	ug/L	10		101	70-130	6	30	04/16/12	
Dibromochloromethane	9.8	0.50	ug/L	10		98	70-130	1	30	04/16/12	
Dibromomethane	9.5	0.50	ug/L	10		95	70-130	4	30	04/16/12	
Dichlorodifluoromethane	11	0.50	ug/L	10		111	70-130	13	30	04/16/12	
Dichloromethane	9.7	0.50	ug/L	10		97	70-130	3	30	04/16/12	
Di-isopropyl ether (DIPE)	9.6	3.0	ug/L	10		96	70-130	0	30	04/16/12	
Ethyl tert-Butyl Ether (ETBE)	10	0.50	ug/L	10		101	70-130	2	30	04/16/12	
Ethylbenzene	9.8	0.50	ug/L	10		98	70-130	5	30	04/16/12	
Hexachlorobutadiene	7.9	0.50	ug/L	10		79	70-130	14	30	04/16/12	
Isopropylbenzene	10	0.50	ug/L	10		104	70-130	4	30	04/16/12	
m,p-Xylenes	20	0.50	ug/L	20		98	70-130	4	30	04/16/12	
Methyl-t-butyl ether	20	0.50	ug/L	20		101	70-130	0	30	04/16/12	

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Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203859				Analyst: JGB		Prepared: 4/16/2012					
Blank Spike Dup (A203859-BSD1)	**EPA 524.2 - Quality Control**										
Naphthalene	7.1	0.50	ug/L	10		71	70-130	24	30	04/16/12	
n-Butylbenzene	9.0	0.50	ug/L	10		90	70-130	1	30	04/16/12	
n-Propylbenzene	10	0.50	ug/L	10		102	70-130	5	30	04/16/12	
o-Xylene	10	0.50	ug/L	10		105	70-130	5	30	04/16/12	
p-Isopropyltoluene	9.1	0.50	ug/L	10		91	70-130	1	30	04/16/12	
sec-Butylbenzene	9.0	0.50	ug/L	10		90	70-130	1	30	04/16/12	
Styrene	12	0.50	ug/L	10		124	70-130	3	30	04/16/12	
tert-Amyl Methyl Ether (TAME)	9.6	3.0	ug/L	10		96	70-130	0	30	04/16/12	
tert-Butyl alcohol (TBA)	12	2.0	ug/L	10		121	70-130	3	30	04/16/12	
tert-Butylbenzene	9.3	0.50	ug/L	10		93	70-130	1	30	04/16/12	
Tetrachloroethene (PCE)	10	0.50	ug/L	10		102	70-130	3	30	04/16/12	
Toluene	9.8	0.50	ug/L	10		98	70-130	2	30	04/16/12	
trans-1,2-Dichloroethene	11	0.50	ug/L	10		106	70-130	6	30	04/16/12	
trans-1,3-Dichloropropene	9.8	0.50	ug/L	10		98	70-130	1	30	04/16/12	
Trichloroethene (TCE)	10	0.50	ug/L	10		100	70-130	2	30	04/16/12	
Trichlorofluoromethane	12	5.0	ug/L	10		120	70-130	2	30	04/16/12	
Vinyl Chloride	12	0.50	ug/L	10		115	70-130	7	30	04/16/12	
Surrogate: 1,2-Dichlorobenzene-d4	*4.3*			*5.0*		*86*	*70-130*			04/16/12	
Surrogate: Bromofluorobenzene	*4.8*			*5.0*		*97*	*70-130*			04/16/12	
Batch: A203913				Analyst: PYA		Prepared: 4/16/2012					
Blank (A203913-BLK1)	**EPA 549.2 - Quality Control**										
Diquat	ND	4.0	ug/L							04/18/12	
Blank Spike (A203913-BS1)	**EPA 549.2 - Quality Control**										
Diquat	7.7	4.0	ug/L	8.0		96	70-130			04/18/12	
Blank Spike Dup (A203913-BSD1)	**EPA 549.2 - Quality Control**										
Diquat	8.8	4.0	ug/L	8.0		111	70-130	14	30	04/18/12	
Matrix Spike (A203913-MS1)	**EPA 549.2 - Quality Control**					**Source: A2D1118-01**					
Diquat	9.4	4.0	ug/L	8.0	ND	117	70-130			04/18/12	
Batch: A203917				Analyst: RJB/X		Prepared: 4/17/2012					
Blank (A203917-BLK1)	**EPA 547 - Quality Control**										
Glyphosate	ND	25	ug/L							04/17/12	
Surrogate: AMPA	*100*			*100*		*101*	*70-130*			04/17/12	
Blank Spike (A203917-BS1)	**EPA 547 - Quality Control**										
Glyphosate	150	25	ug/L	120		120	70-130			04/17/12	
Surrogate: AMPA	*150*			*120*		*120*	*70-130*			04/17/12	

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Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203917				Analyst: RJB/X		Prepared: 4/17/2012					
Blank Spike Dup (A203917-BSD1)	**EPA 547 - Quality Control**										
Glyphosate	150	25	ug/L	120		118	70-130	2	30	04/17/12	
Surrogate: AMPA	*140*			*120*		*115*	*70-130*			04/17/12	
Matrix Spike (A203917-MS1)	**EPA 547 - Quality Control**					**Source: A2D0739-01**					
Glyphosate	130	25	ug/L	120	ND	101	70-130			04/17/12	
Surrogate: AMPA	*120*			*120*		*95*	*70-130*			04/17/12	
Batch: A203920				Analyst: gak		Prepared: 4/17/2012					
Blank (A203920-BLK1)	**EPA 505 - Quality Control**										
Aldrin	ND	0.075	ug/L							04/18/12	
Chlordane	ND	0.10	ug/L							04/18/12	
Chlorothalonil	ND	5.0	ug/L							04/18/12	
Dieldrin	ND	0.020	ug/L							04/18/12	
Endrin	ND	0.10	ug/L							04/18/12	
Heptachlor	ND	0.010	ug/L							04/18/12	
Heptachlor Epoxide	ND	0.010	ug/L							04/18/12	
Hexachlorobenzene	ND	0.50	ug/L							04/18/12	
Hexachlorocyclopentadiene	ND	1.0	ug/L							04/18/12	
Lindane	ND	0.20	ug/L							04/18/12	
Methoxychlor	ND	10	ug/L							04/18/12	
PCB Aroclor Screen	ND	0.50	ug/L							04/18/12	
Toxaphene	ND	1.0	ug/L							04/18/12	
Trifluralin	ND	1.0	ug/L							04/18/12	
Surrogate: TCMX	*1.5*			*1.5*		*102*	*70-130*			04/18/12	
Blank Spike (A203920-BS1)	**EPA 505 - Quality Control**										
Aldrin	0.039	0.075	ug/L	0.040		98	70-130			04/18/12	
Chlorothalonil	0.38	5.0	ug/L	0.40		95	70-130			04/18/12	
Dieldrin	0.039	0.020	ug/L	0.040		96	70-130			04/18/12	
Endrin	0.037	0.10	ug/L	0.040		93	70-130			04/18/12	
Heptachlor	0.039	0.010	ug/L	0.040		98	70-130			04/18/12	
Heptachlor Epoxide	0.040	0.010	ug/L	0.040		101	70-130			04/18/12	
Hexachlorobenzene	0.16	0.50	ug/L	0.16		98	70-130			04/18/12	
Hexachlorocyclopentadiene	0.11	1.0	ug/L	0.12		95	70-130			04/18/12	
Lindane	0.039	0.20	ug/L	0.040		97	70-130			04/18/12	
Methoxychlor	0.041	10	ug/L	0.040		101	70-130			04/18/12	
Trifluralin	0.12	1.0	ug/L	0.12		99	70-130			04/18/12	
Surrogate: TCMX	*1.4*			*1.5*		*94*	*70-130*			04/18/12	
Blank Spike Dup (A203920-BSD1)	**EPA 505 - Quality Control**										
Aldrin	0.040	0.075	ug/L	0.040		101	70-130	3	20	04/18/12	
Chlorothalonil	0.40	5.0	ug/L	0.40		100	70-130	5	20	04/18/12	
Dieldrin	0.041	0.020	ug/L	0.040		102	70-130	6	20	04/18/12	

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Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203920				Analyst: gak		Prepared: 4/17/2012					
Blank Spike Dup (A203920-BSD1)	**EPA 505 - Quality Control**										
Endrin	0.040	0.10	ug/L	0.040		101	70-130	8	20	04/18/12	
Heptachlor	0.041	0.010	ug/L	0.040		102	70-130	4	20	04/18/12	
Heptachlor Epoxide	0.041	0.010	ug/L	0.040		104	70-130	3	20	04/18/12	
Hexachlorobenzene	0.16	0.50	ug/L	0.16		98	70-130	0	20	04/18/12	
Hexachlorocyclopentadiene	0.12	1.0	ug/L	0.12		103	70-130	8	20	04/18/12	
Lindane	0.042	0.20	ug/L	0.040		105	70-130	7	20	04/18/12	
Methoxychlor	0.042	10	ug/L	0.040		104	70-130	2	20	04/18/12	
Trifluralin	0.12	1.0	ug/L	0.12		101	70-130	3	20	04/18/12	
Surrogate: TCMX	*1.5*			*1.5*		*101*	*70-130*			04/18/12	
Matrix Spike (A203920-MS1)	**EPA 505 - Quality Control**					**Source: A2D1118-01**					
Aldrin	0.039	0.075	ug/L	0.040	ND	98	70-130			04/18/12	
Chlorothalonil	0.40	5.0	ug/L	0.40	ND	99	70-130			04/18/12	
Dieldrin	0.038	0.020	ug/L	0.040	ND	96	70-130			04/18/12	
Endrin	0.039	0.10	ug/L	0.040	ND	98	70-130			04/18/12	
Heptachlor	0.040	0.010	ug/L	0.040	ND	99	70-130			04/18/12	
Heptachlor Epoxide	0.040	0.010	ug/L	0.040	ND	100	70-130			04/18/12	
Hexachlorobenzene	0.16	0.50	ug/L	0.16	ND	101	70-130			04/18/12	
Hexachlorocyclopentadiene	0.12	1.0	ug/L	0.12	ND	102	70-130			04/18/12	
Lindane	0.040	0.20	ug/L	0.040	ND	99	70-130			04/18/12	
Methoxychlor	0.041	10	ug/L	0.040	ND	104	70-130			04/18/12	
Trifluralin	0.12	1.0	ug/L	0.12	ND	99	70-130			04/18/12	
Surrogate: TCMX	*1.5*			*1.5*		*100*	*70-130*			04/18/12	
Batch: A204065				Analyst: XHX		Prepared: 4/19/2012					
Blank (A204065-BLK1)	**EPA 531.1 - Quality Control**										
3-Hydroxycarbofuran	ND	3.0	ug/L							04/19/12	
Aldicarb	ND	3.0	ug/L							04/19/12	
Aldicarb Sulfone	ND	2.0	ug/L							04/19/12	
Aldicarb Sulfoxide	ND	3.0	ug/L							04/19/12	
Carbaryl	ND	5.0	ug/L							04/19/12	
Carbofuran	ND	5.0	ug/L							04/19/12	
Methomyl	ND	2.0	ug/L							04/19/12	
Oxamyl	ND	20	ug/L							04/19/12	
Blank Spike (A204065-BS1)	**EPA 531.1 - Quality Control**										
3-Hydroxycarbofuran	31	3.0	ug/L	30		104	70-130			04/19/12	
Aldicarb	30	3.0	ug/L	30		101	70-130			04/19/12	
Aldicarb Sulfone	31	2.0	ug/L	30		102	70-130			04/19/12	
Aldicarb Sulfoxide	30	3.0	ug/L	30		101	70-130			04/19/12	
Carbaryl	30	5.0	ug/L	30		98	70-130			04/19/12	
Carbofuran	31	5.0	ug/L	30		102	70-130			04/19/12	
Methomyl	31	2.0	ug/L	30		102	70-130			04/19/12	

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Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204065				Analyst: XHX		Prepared: 4/19/2012					
Blank Spike (A204065-BS1) EPA 531.1 - Quality Control											
Oxamyl	30	20	ug/L	30		101	70-130			04/19/12	
Blank Spike Dup (A204065-BSD1) EPA 531.1 - Quality Control											
3-Hydroxycarbofuran	31	3.0	ug/L	30		105	70-130	1	20	04/19/12	
Aldicarb	30	3.0	ug/L	30		101	70-130	0	20	04/19/12	
Aldicarb Sulfone	31	2.0	ug/L	30		103	70-130	1	20	04/19/12	
Aldicarb Sulfoxide	31	3.0	ug/L	30		103	70-130	2	20	04/19/12	
Carbaryl	31	5.0	ug/L	30		102	70-130	4	20	04/19/12	
Carbofuran	32	5.0	ug/L	30		106	70-130	4	20	04/19/12	
Methomyl	31	2.0	ug/L	30		104	70-130	2	20	04/19/12	
Oxamyl	31	20	ug/L	30		102	70-130	1	20	04/19/12	
Matrix Spike (A204065-MS1) EPA 531.1 - Quality Control						**Source: A2D0740-01**					
3-Hydroxycarbofuran	30	3.0	ug/L	30	ND	99	70-130			04/20/12	
Aldicarb	30	3.0	ug/L	30	ND	99	70-130			04/20/12	
Aldicarb Sulfone	30	2.0	ug/L	30	ND	100	70-130			04/20/12	
Aldicarb Sulfoxide	30	3.0	ug/L	30	ND	99	70-130			04/20/12	
Carbaryl	29	5.0	ug/L	30	ND	97	70-130			04/20/12	
Carbofuran	29	5.0	ug/L	30	ND	98	70-130			04/20/12	
Methomyl	29	2.0	ug/L	30	ND	97	70-130			04/20/12	
Oxamyl	30	20	ug/L	30	ND	99	70-130			04/20/12	
Batch: A204078				Analyst: XHX		Prepared: 4/19/2012					
Blank (A204078-BLK1) EPA 504.1 - Quality Control											
Dibromochloropropane (DBCP)	ND	0.010	ug/L							04/19/12	
Ethylene Dibromide (EDB)	ND	0.020	ug/L							04/19/12	
Surrogate: Bromoform	*0.24*			*0.25*		*94*	*70-130*			04/19/12	
Blank Spike (A204078-BS1) EPA 504.1 - Quality Control											
Dibromochloropropane (DBCP)	0.23	0.010	ug/L	0.25		93	70-130			04/19/12	
Ethylene Dibromide (EDB)	0.25	0.020	ug/L	0.25		100	70-130			04/19/12	
Surrogate: Bromoform	*0.24*			*0.25*		*96*	*70-130*			04/19/12	
Blank Spike Dup (A204078-BSD1) EPA 504.1 - Quality Control											
Dibromochloropropane (DBCP)	0.22	0.010	ug/L	0.25		87	70-130	6	20	04/20/12	
Ethylene Dibromide (EDB)	0.24	0.020	ug/L	0.25		96	70-130	4	20	04/20/12	
Surrogate: Bromoform	*0.23*			*0.25*		*94*	*70-130*			04/20/12	
Matrix Spike (A204078-MS1) EPA 504.1 - Quality Control						**Source: A2D0417-01**					
Dibromochloropropane (DBCP)	0.44	0.010	ug/L	0.25	0.22	85	70-130			04/19/12	
Ethylene Dibromide (EDB)	0.25	0.020	ug/L	0.25	ND	102	70-130			04/19/12	
Surrogate: Bromoform	*0.65*			*0.25*		*261*	*70-130*			04/19/12	*SR03*

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Amended

BSK Associates Engineers & Laboratories

Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204120				Analyst: GAK		Prepared: 4/20/2012					
Blank (A204120-BLK1) EPA 515.3 - Quality Control											
2,4,5-T	ND	1.0	ug/L							04/23/12	
2,4,5-TP (Silvex)	ND	1.0	ug/L							04/23/12	
2,4-D	ND	10	ug/L							04/23/12	
Bentazon	ND	2.0	ug/L							04/23/12	
Dalapon	ND	10	ug/L							04/23/12	
Dicamba	ND	1.5	ug/L							04/23/12	
Dinoseb	ND	2.0	ug/L							04/23/12	
Pentachlorophenol	ND	0.20	ug/L							04/23/12	
Picloram	ND	1.0	ug/L							04/23/12	
Surrogate: DCPAA	*56*			*58*		*97*	*70-130*			04/23/12	
Blank Spike (A204120-BS1) EPA 515.3 - Quality Control											
2,4,5-T	3.6	1.0	ug/L	4.0		91	70-130			04/23/12	
2,4,5-TP (Silvex)	4.0	1.0	ug/L	4.0		99	70-130			04/23/12	
2,4-D	38	10	ug/L	40		95	70-130			04/23/12	
Bentazon	6.8	2.0	ug/L	8.0		86	70-130			04/23/12	
Dalapon	40	10	ug/L	40		100	70-130			04/23/12	
Dicamba	5.9	1.5	ug/L	6.0		98	70-130			04/23/12	
Dinoseb	8.2	2.0	ug/L	8.0		102	70-130			04/23/12	
Pentachlorophenol	0.80	0.20	ug/L	0.80		100	70-130			04/23/12	
Picloram	4.3	1.0	ug/L	4.0		108	70-130			04/23/12	
Surrogate: DCPAA	*57*			*58*		*98*	*70-130*			04/23/12	
Blank Spike Dup (A204120-BSD1) EPA 515.3 - Quality Control											
2,4,5-T	3.6	1.0	ug/L	4.0		89	70-130	2	20	04/24/12	
2,4,5-TP (Silvex)	3.9	1.0	ug/L	4.0		96	70-130	3	20	04/24/12	
2,4-D	37	10	ug/L	40		92	70-130	3	20	04/24/12	
Bentazon	6.5	2.0	ug/L	8.0		81	70-130	6	20	04/24/12	
Dalapon	40	10	ug/L	40		100	70-130	0	20	04/24/12	
Dicamba	5.8	1.5	ug/L	6.0		96	70-130	2	20	04/24/12	
Dinoseb	8.3	2.0	ug/L	8.0		104	70-130	2	20	04/24/12	
Pentachlorophenol	0.82	0.20	ug/L	0.80		102	70-130	2	20	04/24/12	
Picloram	4.2	1.0	ug/L	4.0		106	70-130	2	20	04/24/12	
Surrogate: DCPAA	*56*			*58*		*97*	*70-130*			04/24/12	
Matrix Spike (A204120-MS1) EPA 515.3 - Quality Control					**Source: A2D0841-01**						
2,4,5-T	3.5	1.0	ug/L	4.0	ND	86	70-130			04/24/12	
2,4,5-TP (Silvex)	4.0	1.0	ug/L	4.0	ND	100	70-130			04/24/12	
2,4-D	38	10	ug/L	40	ND	96	70-130			04/24/12	
Bentazon	6.5	2.0	ug/L	8.0	ND	82	70-130			04/24/12	
Dalapon	41	10	ug/L	40	ND	102	70-130			04/24/12	
Dicamba	5.9	1.5	ug/L	6.0	ND	99	70-130			04/24/12	
Dinoseb	8.2	2.0	ug/L	8.0	ND	102	70-130			04/24/12	
Pentachlorophenol	0.80	0.20	ug/L	0.80	ND	100	70-130			04/24/12	

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Amended

BSK Associates Engineers & Laboratories

Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204120				Analyst: GAK		Prepared: 4/20/2012					
Matrix Spike (A204120-MS1) EPA 515.3 - Quality Control						**Source: A2D0841-01**					
Picloram	4.3	1.0	ug/L	4.0	ND	108	70-130			04/24/12	
Surrogate: DCPAA	*58*			*58*		*100*	*70-130*			04/24/12	
Matrix Spike Dup (A204120-MSD1) EPA 515.3 - Quality Control						**Source: A2D0841-01**					
2,4,5-T	3.5	1.0	ug/L	4.0	ND	88	70-130	1	20	04/24/12	
2,4,5-TP (Silvex)	3.9	1.0	ug/L	4.0	ND	98	70-130	2	20	04/24/12	
2,4-D	38	10	ug/L	40	ND	95	70-130	1	20	04/24/12	
Bentazon	6.8	2.0	ug/L	8.0	ND	86	70-130	5	20	04/24/12	
Dalapon	40	10	ug/L	40	ND	101	70-130	1	20	04/24/12	
Dicamba	6.0	1.5	ug/L	6.0	ND	100	70-130	1	20	04/24/12	
Dinoseb	8.3	2.0	ug/L	8.0	ND	104	70-130	2	20	04/24/12	
Pentachlorophenol	0.82	0.20	ug/L	0.80	ND	102	70-130	2	20	04/24/12	
Picloram	4.4	1.0	ug/L	4.0	ND	109	70-130	1	20	04/24/12	
Surrogate: DCPAA	*57*			*58*		*99*	*70-130*			04/24/12	
Batch: A204138				Analyst: KHH		Prepared: 4/21/2012					
Blank (A204138-BLK1) EPA 525.2 - Quality Control											
Alachlor	ND	1.0	ug/L							04/21/12	
Atrazine	ND	0.50	ug/L							04/21/12	
Benzo(a)pyrene	ND	0.10	ug/L							04/21/12	
Bis(2-ethylhexyl) adipate	ND	3.0	ug/L							04/21/12	
Bis(2-ethylhexyl) phthalate	ND	3.0	ug/L							04/21/12	
Bromacil	ND	10	ug/L							04/21/12	
Butachlor	ND	0.38	ug/L							04/21/12	
Diazinon	ND	0.25	ug/L							04/21/12	
Dimethoate	ND	10	ug/L							04/21/12	
Metolachlor	ND	0.50	ug/L							04/21/12	
Metribuzin	ND	0.50	ug/L							04/21/12	
Molinate	ND	2.0	ug/L							04/21/12	
Propachlor	ND	0.50	ug/L							04/21/12	
Simazine	ND	1.0	ug/L							04/21/12	
Thiobencarb	ND	1.0	ug/L							04/21/12	
Surrogate: 1,3-Dimethyl-2-nitrobenzene	*5.5*			*5.0*		*111*	*70-130*			04/21/12	
Blank Spike (A204138-BS1) EPA 525.2 - Quality Control											
Alachlor	5.7	1.0	ug/L	4.9		116	70-130			04/21/12	
Atrazine	5.4	0.50	ug/L	4.9		110	70-130			04/21/12	
Benzo(a)pyrene	0.90	0.10	ug/L	0.99		91	70-130			04/21/12	
Bis(2-ethylhexyl) adipate	5.1	3.0	ug/L	4.9		103	70-130			04/21/12	
Bis(2-ethylhexyl) phthalate	5.1	3.0	ug/L	4.9		103	70-130			04/21/12	
Bromacil	5.8	10	ug/L	4.9		118	70-130			04/21/12	
Butachlor	3.0	0.38	ug/L	2.5		120	70-130			04/21/12	
Diazinon	2.6	0.25	ug/L	2.5		107	10-110			04/21/12	

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BSK Associates Engineers & Laboratories

Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204138				Analyst: KHH		Prepared: 4/21/2012					
Blank Spike (A204138-BS1) EPA 525.2 - Quality Control											
Dimethoate	5.7	10	ug/L	4.9		116	70-130			04/21/12	
Metolachlor	5.7	0.50	ug/L	4.9		115	70-130			04/21/12	
Metribuzin	5.7	0.50	ug/L	4.9		115	70-130			04/21/12	
Molinate	5.8	2.0	ug/L	4.9		118	70-130			04/21/12	
Propachlor	5.7	0.50	ug/L	4.9		116	70-130			04/21/12	
Simazine	5.4	1.0	ug/L	4.9		110	70-130			04/21/12	
Thiobencarb	5.5	1.0	ug/L	4.9		111	70-130			04/21/12	
Surrogate: 1,3-Dimethyl-2-nitrobenzene	*5.1*			*4.9*		*103*	*70-130*			04/21/12	
Blank Spike Dup (A204138-BSD1) EPA 525.2 - Quality Control											
Alachlor	5.5	1.0	ug/L	4.9		113	70-130	3	30	04/21/12	
Atrazine	5.1	0.50	ug/L	4.9		104	70-130	6	30	04/21/12	
Benzo(a)pyrene	1.0	0.10	ug/L	0.98		105	70-130	14	30	04/21/12	
Bis(2-ethylhexyl) adipate	5.6	3.0	ug/L	4.9		113	70-130	9	30	04/21/12	
Bis(2-ethylhexyl) phthalate	5.4	3.0	ug/L	4.9		110	70-130	6	30	04/21/12	
Bromacil	5.9	10	ug/L	4.9		119	70-130	1	30	04/21/12	
Butachlor	3.0	0.38	ug/L	2.5		122	70-130	2	30	04/21/12	
Diazinon	2.6	0.25	ug/L	2.5		105	10-110	2	30	04/21/12	
Dimethoate	5.4	10	ug/L	4.9		111	70-130	5	30	04/21/12	
Metolachlor	5.6	0.50	ug/L	4.9		114	70-130	1	30	04/21/12	
Metribuzin	5.5	0.50	ug/L	4.9		112	70-130	3	30	04/21/12	
Molinate	5.3	2.0	ug/L	4.9		108	70-130	9	30	04/21/12	
Propachlor	5.5	0.50	ug/L	4.9		112	70-130	5	30	04/21/12	
Simazine	5.3	1.0	ug/L	4.9		109	70-130	2	30	04/21/12	
Thiobencarb	5.2	1.0	ug/L	4.9		107	70-130	4	30	04/21/12	
Surrogate: 1,3-Dimethyl-2-nitrobenzene	*5.1*			*4.9*		*104*	*70-130*			04/21/12	
Matrix Spike (A204138-MS1) EPA 525.2 - Quality Control					**Source: A2D0988-01**						
Alachlor	5.8	1.0	ug/L	5.1	ND	114	70-130			04/21/12	
Atrazine	0.38	0.50	ug/L	5.1	ND	7	70-130			04/21/12	MS02 ***Low***
Benzo(a)pyrene	1.2	0.10	ug/L	1.0	ND	116	70-130			04/21/12	
Bis(2-ethylhexyl) adipate	6.0	3.0	ug/L	5.1	ND	117	70-130			04/21/12	
Bis(2-ethylhexyl) phthalate	5.8	3.0	ug/L	5.1	ND	114	70-130			04/21/12	
Bromacil	6.2	10	ug/L	5.1	ND	123	70-130			04/21/12	
Butachlor	3.3	0.38	ug/L	2.5	ND	126	70-130			04/21/12	
Diazinon	2.2	0.25	ug/L	2.5	ND	86	10-110			04/21/12	
Dimethoate	6.0	10	ug/L	5.1	ND	118	70-130			04/21/12	
Metolachlor	5.7	0.50	ug/L	5.1	ND	112	70-130			04/21/12	
Metribuzin	5.6	0.50	ug/L	5.1	ND	109	70-130			04/21/12	
Molinate	5.7	2.0	ug/L	5.1	ND	112	70-130			04/21/12	
Propachlor	5.9	0.50	ug/L	5.1	ND	116	70-130			04/21/12	
Simazine	0.20	1.0	ug/L	5.1	ND	4	70-130			04/21/12	MS02 ***Low***
Thiobencarb	5.7	1.0	ug/L	5.1	ND	113	70-130			04/21/12	
Surrogate: 1,3-Dimethyl-2-nitrobenzene	*5.6*			*5.1*		*110*	*70-130*			04/21/12	

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BSK Associates Engineers & Laboratories

Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual

Batch: A204138 Analyst: KHH Prepared: 4/21/2012

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BSK Associates Engineers & Laboratories

Radiological Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203988				Analyst: KKC		Prepared: 4/18/2012					
Blank (A203988-BLK1) EPA 00-02 - Quality Control											
1.65 Sigma Uncertainty	ND		±							04/19/12	
Gross Alpha	ND	3	pCi/L							04/19/12	
MDA95	ND	0.00	pCi/L							04/19/12	
Blank Spike (A203988-BS1) EPA 00-02 - Quality Control											
Gross Alpha	31.8	3	pCi/L	30		106	80-120			04/19/12	
Blank Spike Dup (A203988-BSD1) EPA 00-02 - Quality Control											
Gross Alpha	28.1	3	pCi/L	30		94	80-120	12	50	04/19/12	
Matrix Spike (A203988-MS1) EPA 00-02 - Quality Control						**Source: A2D1154-01**					
Gross Alpha	120	3	pCi/L	120	4.17	96	70-130			04/19/12	
Matrix Spike Dup (A203988-MSD1) EPA 00-02 - Quality Control						**Source: A2D1154-01**					
Gross Alpha	130	3	pCi/L	120	4.17	105	70-130	8	50	04/19/12	

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Certificate of Analysis

06/11/2012

Notes:

- The Chain of Custody document and Sample Integrity Sheet are part of the analytical report.
- Any remaining sample(s) for testing will be disposed of one month from the final report date unless other arrangements are made in advance.
- Sample(s) received, prepared, and analyzed within the method specified criteria unless otherwise noted within this report.
- The results relate only to the samples analyzed in accordance with test(s) requested by the client on the Chain of Custody document. Any analytical quality control exceptions to method criteria that are to be considered when evaluating these results have been flagged and are defined in the data qualifiers section.
- All results are expressed on wet weight basis unless otherwise specified.
- All positive results for EPA Methods 504.1, 502.2, and 524.2 require the analysis of a Field Reagent Blank (FRB) to confirm that the results are not a contamination error from field sampling steps. If Field Reagent Blanks were not submitted with the samples, this method requirement has not been performed.
- Results contained in this analytical report must be reproduced in its entirety.
- Samples collected by BSK Analytical Laboratories were collected in accordance with the BSK Sampling and Collection Standard Operating Procedures.
- BSK Analytical Laboratories certifies that the test results contained in this report meet all requirements of the NELAC Standards for applicable certified drinking water chemistry analyses unless qualified or noted in the Case Narrative.
- Analytical data contained in this report may be used for regulatory purposes to meet the requirements of the Federal or State drinking water, wastewater, and hazardous waste programs.
- J-value is equivalent to DNQ (Detected, not quantified) which is a trace value. A trace value is an analyte detected between the MDL and the laboratory reporting limit. This result is of an unknown data quality and is only qualitative (estimated). Baseline noise, calibration curve extrapolation below the lowest calibrator, method blank detections, and integration artifacts can all produce apparent DNQ values, which contribute to the un-reliability of these values.
- (1) - Residual chlorine and pH analysis have a 15 minute holding time for both drinking and waste water samples as defined by the EPA and 40 CFR 136. Waste water and ground water (monitoring well) samples must be field filtered to meet the 15 minute holding time for dissolved metals.
- * - This is not a NELAP accredited analyte.
- Summations of analytes (i.e. Total Trihalomethanes) may appear to add individual amounts incorrectly, due to rounding of analyte values occurring before or after the total value is calculated, as well as rounding of the total value.
- (2) The digestion used to produce this result deviated from EPA 200.2 by excluding hydrochloric acid in order to produce acceptable recoveries for affected metals.
- (2C) Result reported from secondary analytical column.
- RL Multiplier is the factor used to adjust the reporting limit (RL) due to variations in sample preparation procedures and dilutions required for matrix interferences.

Certifications:

State of California - CDPH - ELAP	1180
State of California - CDPH - NELAP	04227CA
State of Nevada - NDEP	CA000792009A
State of Hawaii - DOH	04227CA

Definitions and Flags for Data Qualifiers

mg/L:	Milligrams/Liter (ppm)	M:	Method Detection Limit	MDA95:	Min. Detected Activity
mg/Kg:	Milligrams/Kilogram (ppm)	RL:	Reporting Limit	MPN:	Most Probable Number
µg/L:	Micrograms/Liter (ppb)		:DL x Dilution	CFU:	Colony Forming Unit
µg/Kg:	Micrograms/Kilogram (ppb)	ND:	None Detected at RL	Absent:	Less than 1 CFU/100mLs
%:	Percent Recovered (surrogates)	pCi/L:	Picocuries per Liter	Present:	1 or more CFU/100mLs
		NR:	Non-Reportable	RL Mult:	RL Multiplier

SR03 Surrogate recovery was affected by matrix interference.

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Certificate of Analysis

06/11/2012

MS02 Matrix spike recovery was low; the associated blank spike recovery was acceptable.

BL04 Detected in the method blank. All associated samples were non-detect for this analyte.

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A2D1159

City of Modesto Water Division/Corp Yard

Modes9588

04132012

Turnaround: Standard

Due Date: 4/27/2012

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Modes9588 10

City of Modesto Water Division
Chain of Custody

LAB: BSK DATE: 4-13-12

SAMPLER: LP

SOURCE: X Groundwater ____ System ____ Surface

REASON FOR ANALYSIS: ____ Routine ____ Repeat X Investigative

Sample ID:	Description	Analysis	Time	AM/PM
				AM/PM
	Hickman Test Well	GM/IO/GP Title 22 Organic&	9:20	AM/PM
		Title 22 externals		AM/PM
				AM/PM
	Sample depth 350 feet			AM/PM
				AM/PM
				AM/PM
				AM/PM
				AM/PM
				AM/PM
				AM/PM
				AM/PM
				AM/PM
				AM/PM
				AM/PM

Sampled by	LP	Date: 4-13	Time: 9:20	AM/PM
Relinquished by	[illegible]	4-13-12	1:00	AM/PM
Received by	[illegible]	4-13-12	1326	AM/PM
Relinquished by	[illegible]	4-13-12	1543	AM/PM
Received by	[illegible]	4.13.12	1543	AM/PM

A2D1159
Modes9588

04/13/2012
10

Sample Integrity

Pg. 1 of 2

Date Received 4-13-12

Section 1- Receiving Information

Sample Transport: ONTRAC UPS PMS Walk-In BSK-Courier GSO Fed Exp. Other: _____

Samples arrived at lab on same day sampled: Yes Y No ___ Has Chilling Process Begun: Yes Y No ____

Coolers/Ice Chests Description/Temperature(s): (If more than 5 received, list information in comment section)

1) 4° 2) _____ 3) _____ 4) _____ 5) _____

Was Temperature In Range: Y N N/A Received On Ice: Wet Blue Received Ambient: Y N

Describe type of packing materials: Bubble Wrap Foam Packing Peanuts Paper Other: _____

Initial Receipt: BSK-Visalia BSK-Bakersfield BSK-SAC BSK-EAL

Were ice chest custody seals present? Y N Intact: Y N

Section 2- COC Info.	Completed Yes	Completed No	Info From Container		Completed Yes	Completed No	Info From Container
Was COC Received	✓			Analysis Requested	✓		
Date Sampled	✓			Hold times less than 72hr	✓		
Time Sampled	✓			Client Name	✓		
Sample ID	✓			Address	✓		
Special Storage/Handling Ins.		✓		Telephone #	✓		

Section 3- Bottles / Analysis	Yes	No	N/A	Comment
Did all bottles arrive unbroken and intact?	✓			
Were bottle custody seals present?		✓		
Were bottle custody seals intact?		✓		
Did all bottle labels agree with COC?	✓			
Were correct containers used for the tests requested?	✓			
Were correct preservations used for the tests requested?	✓			
Was a sufficient amount of sample sent for tests indicated?	✓			
Were bubbles present in VOA Vials? (**Volatile Methods Only**)		✓		
Were Ascorbic Acid Bottles received with the VOAs?			✓	

Section 4- Comments / Discrepancies

Sample(s) Split/Preserve: Yes No Container: _____ Preservation: _____ Dt/Time/Init _____

Container: _____ Preservation: _____ Dt/Time/Init _____

Was Client Service Rep. notified of discrepancies: Yes No N/A CSR: _____ Notified By/Time:

Explanations / Comments

Report Comment Entered:

Labeled by: JMH @ 1605 Labels checked by: MM @ 1604 RUSH Paged by: _____ @ _____

(4/11)

Sample Integrity Pg 2 of 2

BSK Bottles Yes No

A2D1159
Modes9588

WORK ORDER
04/13/2012
10

250ml (A) 500ml (B) 1Liter (C) Amber Glass (AG)

Container(s) Received	1						
Bacti $Na_2S_2O_3$							
None (p) White Cap	2C						
None (p) Blue Cap w/NH4 + Buffer							
HNO_3 (p) Red Cap	4C, 1B						
H_2SO_4 (p) Yellow Cap							
NaOH (p) Green Cap	1A						
EDA (p) Brown Cap/Label							
Other:							
Dissolved Oxygen 300ml (g)							
250ml (AG) None							
250ml (AG) H_2SO_4 COD Yellow Label							
250ml (AG) $Na_2S_2O_3$ 515,547 Blue Label	2						
250ml (AG) $Na_2S_2O_3$+ MCAA 531.1 Orange Label	1						
250ml (AG) NH_4Cl 552 Purple Label							
250ml (AG) EDA DBPs Brown Label							
250ml (AG) Other:							
500ml (AG) None	1						
500ml (AG) H_2SO_4 Yellow Label							
1 Liter (AG) None	4						
1 Liter (AG) H_2SO_4 O&G / TPH-Diesel Yellow Label							
1 Liter (AG) $Na_2S_2O_3$ 548 / 525 / 521 Blue Label	3						
1 Liter (P) $Na_2S_2O_3$+ H_2SO_4 549	1						
1 Liter (AG) NaOH+ZnAc Sulfide							
40ml VOA Vial Clear – HCL	3						
40ml VOA Vial Clear – Buffer pH 4							
40ml VOA Vial Clear – None							
40ml VOA Vial Amber – $Na_2S_2O_3$							
40ml VOA Vial Clear - $Na_2S_2O_3$ 504, 505	6						
40ml VOA Vial Clear – H_3PO_4							
Other:							
½ Gallon (p)							
Asbestos 1Liter Plastic/Foil	1						
Radon 200ml Clear (g)							
Low Level Hg/Metals Double Baggie							
Bioassay Jug							
Ampule							
PT Sample Bottle							
250 Clear Glass Jar							
500 Clear Glass Jar							
1 Liter Clear Glass Jar							
Plastic Bag							
Soil Tube Brass / Steel / Plastic							
Tedlar Bags							

4/13/12

(4/11)

External

A2D1159

Pace Analytical Services, Inc.
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

May 18, 2012

Ms. Michelle Harmstead
BSK Analytical Laboratories
1414 Stanislaus St.
Fresno, CA 93706

RE: Project: A2D1159
Pace Project No.: 3067997

Dear Ms. Harmstead:
Enclosed are the analytical results for sample(s) received by the laboratory on April 23, 2012. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Jacquelyn Collins

jacquelyn.collins@pacelabs.com
Project Manager

Enclosures

Pace Analytical Services, Inc.
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

CERTIFICATIONS

Project: A2D1159
Pace Project No.: 3067997

Pennsylvania Certification IDs
1638 Roseytown Rd Suites 2,3&4 Greensburg, PA 15601
ACLASS DOD-ELAP Accreditation #: ADE-1544
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California/TNI Certification #: 04222CA
Colorado Certification
Connecticut Certification #: PH 0694
Delaware Certification
Florida/TNI Certification #: E87683
Guam/PADEP Certification
Hawaii/PADEP Certification
Idaho Certification
Illinois/PADEP Certification
Indiana/PADEP Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: 90133
Louisiana/TNI Certification #: LA080002
Louisiana/TNI Certification #: 4086
Maine Certification #: PA0091
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification
Missouri Certification #: 235
Montana Certification #: Cert 0082
Nevada Certification
New Hampshire/TNI Certification #: 2976
New Jersey/TNI Certification #: PA 051
New Mexico Certification
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
Oregon/TNI Certification #: PA200002
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
South Dakota Certification
Tennessee Certification #: TN2867
Texas/TNI Certification #: T104704188
Utah/TNI Certification #: ANTE
Virgin Island/PADEP Certification
Virginia Certification #: 00112
Virginia VELAP (Cert # 460198)
Washington Certification #: C868
West Virginia Certification #: 143
Wisconsin/PADEP Certification
Wyoming Certification #: 8TMS-Q

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Greensburg, PA 15601
(724)850-5600

SAMPLE SUMMARY

Project: A2D1159
Pace Project No.: 3067997

Lab ID	Sample ID	Matrix	Date Collected	Date Received
3067997001	**A2D1159-01**	Water	04/13/12 09:20	04/23/12 09:40

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Greensburg, PA 15601
(724)850-5600

SAMPLE ANALYTE COUNT

Project: A2D1159
Pace Project No.: 3067997

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
3067997001	**A2D1159-01**	EPA 903.1	SLA	1	PASI-PA
		EPA 904.0	WRR	1	PASI-PA

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Greensburg, PA 15601
(724)850-5600

PROJECT NARRATIVE

Project: A2D1159
Pace Project No.: 3067997

Method: **EPA 903.1**
Description: 903.1 Radium 226
Client: BSK Analytical Laboratories
Date: May 18, 2012

General Information:
1 sample was analyzed for EPA 903.1. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

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Greensburg, PA 15601
(724)850-5600

PROJECT NARRATIVE

Project: A2D1159
Pace Project No.: 3067997

Method: **EPA 904.0**
Description: 904.0 Radium 228
Client: BSK Analytical Laboratories
Date: May 18, 2012

General Information:
1 sample was analyzed for EPA 904.0. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

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Greensburg, PA 15601
(724)850-5600

ANALYTICAL RESULTS

Project: A2D1159
Pace Project No.: 3067997

Sample: A2D1159-01 **Lab ID: 3067997001** Collected: 04/13/12 09:20 Received: 04/23/12 09:40 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC)	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.246 ± 0.282 (0.166)**	pCi/L	05/10/12 15:33	13982-63-3	
Radium-228	EPA 904.0	**-0.222 ± 0.341 (0.851)**	pCi/L	05/17/12 18:18	15262-20-1	

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Greensburg, PA 15601
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QUALITY CONTROL DATA

Project: A2D1159
Pace Project No.: 3067997

QC Batch: RADC/11896
QC Batch Method: EPA 904.0
Analysis Method: EPA 904.0
Analysis Description: 904.0 Radium 228
Associated Lab Samples: 3067997001

METHOD BLANK: 434312
Matrix: Water
Associated Lab Samples: 3067997001

Parameter	Act ± Unc (MDC)	Units	Analyzed	Qualifiers
Radium-228	-0.134 ± 0.421 (0.973)	pCi/L	05/17/12 18:16	

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Greensburg, PA 15601
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QUALITY CONTROL DATA

Project: A2D1159
Pace Project No.: 3067997

QC Batch: RADC/11908
QC Batch Method: EPA 903.1
Analysis Method: EPA 903.1
Analysis Description: 903.1 Radium-226
Associated Lab Samples: 3067997001

METHOD BLANK: 434336
Matrix: Water
Associated Lab Samples: 3067997001

Parameter	Act ± Unc (MDC)	Units	Analyzed	Qualifiers
Radium-226	-0.243 ± 0.378 (0.914)	pCi/L	05/10/12 14:27	

REPORT OF LABORATORY ANALYSIS

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Pace Analytical Services, Inc.
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

QUALIFIERS

Project: A2D1159
Pace Project No.: 3067997

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Act - Activity

Unc - Uncertainty

(MDC) - Minimum Detectable Concentration

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-PA Pace Analytical Services - Greensburg

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BSK Analytical Laboratories
Engineering Laboratories

SUBCONTRACT ORDER

A2D1327

SENDING LABORATORY:

BSK Associates
1414 Stanislaus St
Fresno, CA 93706
Phone: 559-497-2888
Fax: 559-485-6935
Project Manager: Michelle Harmstead
E-mail: mharmstead@bskinc.com

RECEIVING LABORATORY:

Pace Analytical-Radiochem
1638 Roseytown Rd Ste 2,3,4
Greensburg, PA 15601
Phone :(724) 850-5600
Fax: (724) 722-5208
Turnaround (Days): Standard
QC Deliverables: Std III IV

3068311

Sample ID	Samp Desc	Sample Date
A2D1327-01	Hickman Test Well - 135'	**04/17/2012 09:30**

Sample Alias: 142165
Matrix: Water

001

Analysis (2) L P W/ HNO3
EXT-Radium 226
EXT-Radium 228

Released By	Date	Received By	Date
[signature]	4/19/12	[signature]	4-26-12 0945

Pace Analytical

Sample Condition Upon Receipt

Client Name: BSIC Project # 3068311

Courier: ☐ Fed Ex ☒ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace Other _____

Tracking #: 1Z 93X 721 03 5669 5492

Optional	
Proj. Due Date:	
Proj. Name:	

Custody Seal on Cooler/Box Present: ☑ yes ☐ no Seals intact: ☑ yes ☐ no

Packing Material: ☑ Bubble Wrap ☐ Bubble Bags ☐ None ☐ Other _____

Thermometer Used 5 6 7 Type of Ice: Wet Blue (None) ☐ Samples on ice, cooling process has begun

Cooler Temperature N/A Biological Tissue is Frozen: Yes No Date and initials of person examining contents: 4-26-12

Temp should be above freezing to 6°C

				Comments:
Chain of Custody Present:	☑Yes	☐No	☐N/A	1.
Chain of Custody Filled Out:	☑Yes	☐No	☐N/A	2.
Chain of Custody Relinquished:	☑Yes	☐No	☐N/A	3.
Sampler Name & Signature on COC:	☐Yes	☑No	☐N/A	4.
Samples Arrived within Hold Time:	☑Yes	☐No	☐N/A	5.
Short Hold Time Analysis (<72hr):	☐Yes	☑No	☐N/A	6.
Rush Turn Around Time Requested:	☐Yes	☑No	☐N/A	7.
Sufficient Volume:	☑Yes	☐No	☐N/A	8.
Correct Containers Used:	☑Yes	☐No	☐N/A	9.
-Pace Containers Used:	☐Yes	☑No	☐N/A	
Containers Intact:	☑Yes	☐No	☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes	☐No	☑N/A	11.
Sample Labels match COC:	☑Yes	☐No	☐N/A	12.
-Includes date/time/ID/Analysis Matrix: WT				
All containers needing preservation have been checked.	☑Yes	☐No	☐N/A	13. pH<2
All containers needing preservation are found to be in compliance with EPA recommendation.	☑Yes	☐No	☐N/A	
exceptions: VOA, coliform, TOC, O&G, WI-DRO (water)	☐Yes	☐No		Initial when completed: XH Lot # of added preservative:
Samples checked for dechlorination:	☐Yes	☐No	☑N/A	14.
Headspace in VOA Vials (>6mm):	☐Yes	☐No	☑N/A	15.
Trip Blank Present:	☐Yes	☐No	☑N/A	16.
Trip Blank Custody Seals Present	☐Yes	☐No	☐N/A	
Pace Trip Blank Lot # (if purchased):				

Client Notification/ Resolution: Field Data Required? Y / N

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: [signature] **Date:** 4/26/12

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

F-ALL-C003-6 SCURF front 2April2012.xls

Pace Analytical Services, Inc.
1700 Elm Street
Minneapolis, MN 55414
Phone: 612.607.1700
Fax: 612.607.6444

www.pacelabs.com

Report Prepared for:

Michelle Harmstead
BSK Analytical Laboratories
1414 Stanislaus Street
Fresno CA 93706

REPORT OF LABORATORY ANALYSIS FOR 2,3,7,8-TCDD

Report Summary:

Enclosed are analytical results of one drinking water sample analyzed for 2,3,7,8-TCDD content. The results reported for this sample and the associated quality control samples were all within the criteria described in Method 1613B.

It should be noted that this field sample was received outside the recommended temperature range. Analysis was completed upon client approval. If you have any questions or concerns regarding these results, please contact Emily Hazelroth, your Pace Project Manager.

Report Prepared Date:

April 30, 2012

Report Information:

Pace Project #: 10189287
Sample Receipt Date: 04/18/2012
Client Project #: A2D1159
Client Sub PO #: N/A
State Cert #: 01155CA

Invoicing & Reporting Options:

The report provided has been invoiced as a Level 2 Drinking Water Report. If an upgrade of this report package is requested, an additional charge may be applied.

Please review the attached invoice for accuracy and forward any questions to Emily Hazelroth, your Pace Project Manager.

This report has been reviewed by:

April 30, 2012

Emily Hazelroth, Project Manager
(612) 607-6407
(612) 607-6444 (fax)
emily.hazelroth@pacelabs.com

ACCREDITED IN ACCORDANCE WITH nelac

Report of Laboratory Analysis

This report should not be reproduced, except in full, without the written consent of Pace Analytical Services, Inc.

The results relate only to the samples included in this report.

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612- 607-6444

Minnesota Laboratory Certifications

Authority	Certificate #	Authority	Certificate #
Alabama	40770	Montana	92
Alaska	MN00064	Nebraska	
Arizona	AZ0014	Nevada	MN_00064_200
Arkansas	88-0680	New Jersey (N	MN002
California	01155CA	New Mexico	MN00064
Colorado	MN00064	New York (NEL	11647
Connecticut	PH-0256	North Carolina	27700
EPA Region 5	WD-15J	North Dakota	R-036
EPA Region 8	8TMS-Q	Ohio	4150
Florida (NELAP	E87605	Ohio VAP	CL101 9507
Georgia (DNR)	959	Oklahoma	D9922
Guam	959	Oregon (ELAP)	MN200001-005
Hawaii	SLD	Oregon (OREL	MN300001-001
Idaho	MN00064	Pennsylvania	68-00563
Illinois	200012	Saipan	MP0003
Indiana	C-MN-01	South Carolina	74003001
Indiana	C-MN-01	Tennesee	2818
Iowa	368	Tennessee	02818
Kansas	E-10167	Texas	T104704192-08
Kentucky	90062	Utah (NELAP)	PAM
Louisiana	LA0900015	Virginia	00251
Maine	2007029	Washington	C755
Maryland	322	West Virginia	9952C
Michigan	9909	Wisconsin	999407970
Minnesota	027-053-137	Wyoming	8TMS-Q
Mississippi	MN00064		

REPORT OF LABORATORY ANALYSIS

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Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612- 607-6444

Reporting Flags

A = Reporting Limit based on signal to noise

B = Less than 10x higher than method blank level

C = Result obtained from confirmation analysis

D = Result obtained from analysis of diluted sample

E = Exceeds calibration range

I = Interference present

J = Estimated value

Nn = Value obtained from additional analysis

P = PCDE Interference

R = Recovery outside target range

S = Peak saturated

U = Analyte not detected

V = Result verified by confirmation analysis

X = %D Exceeds limits

Y = Calculated using average of daily RFs

* = See Discussion

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BSK Analytical Laboratories
Engineers & Laboratories

1131

SUBCONTRACT ORDER

A2D1159

10189287

SENDING LABORATORY:

BSK Associates
1414 Stanislaus St
Fresno, CA 93706
Phone: 559-497-2888
Fax: 559-485-6935
Project Manager: Michelle Harmstead
E-mail: mharmstead@bskinc.com

RECEIVING LABORATORY:

Pace Analytical-Dioxin
1700 Elm Street S.E. Stuite 200
Minneapolis, MN 55414
Phone :(612) 607-1700
Fax: (612) 607-6444
Turnaround (Days): Standard
QC Deliverables: I (Std) III IV

Sample ID	Samp Desc	Sample Date
A2D1159-01	Hickman Test Well 350' depth	**04/13/2012 09:20**
Sample Alias: 142098		001
Matrix: Water		

Analysis 1 L AG w/ NONE
EXT-Dioxin, EPA 1613 2,3,7,8-TCDD

Released By	Date	Received By	Date
[signature]	4/17/12	Cassie Sicard	4-18-12 Temp=4.4°C 1342
Released By	Date	Received By	Date

Pace Analytical®	Document Name: **Sample Condition Upon Receipt Form**	Revised Date: 15Feb2012 Page 1 of 1
	Document Number: **F-MN-L-213-rev.02**	Issuing Authority: Pace Minnesota Quality Office

Sample Condition Upon Receipt

Client Name: BSH **Project #** 10189287

Courier: [X] Fed Ex [ ] UPS [ ] USPS [ ] Client [ ] Commercial [ ] Pace Other _____

Tracking #: 7982 4340 7588

Custody Seal on Cooler/Box Present: [ ] yes [X] no Seals intact: [ ] yes [X] no

Packing Material: [ ] Bubble Wrap [ ] Bubble Bags [ ] None [ ] Other foam Temp Blank: Yes X No ____

Thermometer Used 80344042 or 80512447 **Type of Ice:** Wet Blue None [ ] Samples on ice, cooling process has begun

Cooler Temperature 4.4 **Biological Tissue is Frozen:** Yes No

Date and Initials of person examining contents: C.S 4-18-12

Temp should be above freezing to 6°C

		Comments:
Chain of Custody Present:	[X] Yes [ ] No [ ] N/A	1.
Chain of Custody Filled Out:	[X] Yes [ ] No [ ] N/A	2.
Chain of Custody Relinquished:	[X] Yes [ ] No [ ] N/A	3.
Sampler Name & Signature on COC:	[ ] Yes [X] No [ ] N/A	4.
Samples Arrived within Hold Time:	[X] Yes [ ] No [ ] N/A	5.
Short Hold Time Analysis (<72hr):	[ ] Yes [X] No [ ] N/A	6.
Rush Turn Around Time Requested:	[ ] Yes [X] No [ ] N/A	7.
Sufficient Volume:	[X] Yes [ ] No [ ] N/A	8.
Correct Containers Used:	[X] Yes [ ] No [ ] N/A	9.
-Pace Containers Used:	[X] Yes [ ] No [ ] N/A	
Containers Intact:	[X] Yes [ ] No [ ] N/A	10.
Filtered volume received for Dissolved tests	[ ] Yes [ ] No [X] N/A	11.
Sample Labels match COC:	[X] Yes [ ] No [ ] N/A	12.
-Includes date/time/ID/Analysis. Matrix: WT		
All containers needing acid/base preservation have been checked. Noncompliance are noted in 13.	[ ] Yes [X] No [ ] N/A	13. [ ] HNO3 [ ] H2SO4 [ ] NaOH [ ] HCl Samp #
All containers needing preservation are found to be in compliance with EPA recommendation. (HNO3, H2SO4, HCL<2; NaOH >12)	[ ] Yes [X] No [ ] N/A	
Exceptions: VOA,Coliform, TOC, Oil and Grease, WI-DRO (water)	[ ] Yes [X] No	Initial when completed / Lot # of added preservative
Headspace in VOA Vials (>6mm):	[ ] Yes [ ] No [X] N/A	14.
Trip Blank Present:	[ ] Yes [ ] No [X] N/A	15.
Trip Blank Custody Seals Present	[ ] Yes [ ] No [X] N/A	
Pace Trip Blank Lot # (if purchased): ____		

Client Notification/ Resolution: Field Data Required? Y / N

Person Contacted: Michelle Hamstead Date/Time: 4/17/12 @ 10:30

Comments/ Resolution: 1613 DW Temp never on file ~~for all ID~~ up to 6°C

Project Manager Review: SKH **Date:** 4/19/12

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

Pace AnalyticalServices, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612-607-6444

Drinking Water Analysis Results
2,3,7,8-TCDD -- USEPA Method 1613B

Sample ID.....A2D1159-01
Client..... BSK Analytical Laboratories
Lab Sample ID.....10189287001

Date Collected.....04/13/2012
Date Received.....04/18/2012
Date Extracted.....04/20/2012

	Sample A2D1159-01	Method Blank	Lab Spike	Lab Spike Dup
[2,3,7,8-TCDD]	**ND**	ND	--	--
RL	5.0 pg/L	5.0 pg/L	--	--
2,3,7,8-TCDD Recovery	--	--	119%	97%
Spike Recovery Limit	--	--	73-146%	73-146%
RPD			19.7%	
IS Recovery	**81%**	83%	84%	90%
IS Recovery Limits	31-137%	31-137%	25-141%	25-141%
CS Recovery	**81%**	85%	80%	90%
CS Recovery Limits	42-164%	42-164%	37-158%	37-158%
Filename	R120423B_19	R120423B_06	R120423B_03	R120424A_10
Analysis Date	04/24/2012	04/23/2012	04/23/2012	04/24/2012
Analysis Time	02:44	19:23	17:43	15:40
Analyst	SMT	SMT	SMT	SMT
Volume	1.023L	1.026L	1.035L	1.019L
Dilution	NA	NA	NA	NA
ICAL Date	04/18/2012	04/18/2012	04/18/2012	04/24/2012
CCAL Filename	R120423B_02	R120423B_02	R120423B_02	R120424A_07

! = Outside the Control Limits
ND = Not Detected
RL = Reporting Limit
Limits = Control Limits from Method 1613 (10/94 Revision), Tables 6A and 7A
RPD = Relative Percent Difference of Lab Spike Recoveries
IS = Internal Standard [2,3,7,8-TCDD-$^{13}C_{12}$]
CS = Cleanup Standard [2,3,7,8-TCDD-$^{37}Cl_4$]

Analyst: _____

Project No.....10189287

LA Testing
520 Mission Street South Pasadena, CA 91030
Phone: (323) 254-9960 Fax: (323) 254-9982 Web: http://www.latesting.com Email:pasadenalab@latesting.com

Attn: **Michelle Harmstead**
BSK Analytical Laboratories
1414 Stanislaus Street
Fresno, CA 93706

Fax: Phone: (559) 497-2888

Project: A2D1159

EMSL Order: 321206672
Customer ID: 32BSK50
Customer PO:
EMSL Project ID:
Received: 4/18/2012
Analyzed: 5/01/2012

Test Report: Determination of Asbestos Structures >10µm in Drinking Water Performed by the 100.2 Method (EPA 600/R-94/134)

Sample ID Client / EMSL	Sample Filtration Date/Time	Original Sample Vol. Filtered (ml)	Effective Filter Area (mm²)	Area Analyzed (mm²)	ASBESTOS Asbestos Types	Fibers Detected	Analytical Sensitivity	Concentration	Confidence Limits
							MFL (million fibers per liter)		
A2D1159-01 321206672-0001	4/25/2012 04:35 PM	30	1288	0.2278	None Detected	ND	0.19	<0.19	0.00 - 0.70

Sample received past 48 hours hold time. UV Ozonated.

Initial report from: 05/01/2012 17:56:08

Analyst(s)
Sherrie Ahmad (1)

Jerry Drapala Ph.D, Laboratory Manager
or other Approved Signatory

Any questions please contact Jerry Drapala.

Sample collection and containers provided by the client, acceptable bottle blank level is defined as ≤0.01MFL>10um. ND=None Detected. This report relates only to those items tested. This report may not be reproduced, except in full, without written permission by LA Testing. Samples received in good condition unless otherwise noted.

Samples analyzed by LA Testing South Pasadena, CA CA ELAP 2283

321206672

BSK Analytical Laboratories
Engineers & Laboratories

SUBCONTRACT ORDER

A2D1159

321206672

SENDING LABORATORY:

BSK Associates
1414 Stanislaus St
Fresno, CA 93706
Phone: 559-497-2888
Fax: 559-485-6935
Project Manager: Michelle Harmstead
E-mail: mharmstead@bskinc.com

RECEIVING LABORATORY:

L A Testing
520 Mission St.
South Pasadena, CA 91030
Phone :(800) 303-0047
Fax: -
Turnaround (Days): Standard
QC Deliverables: I (Std) III IV

Sample ID	Samp Desc	Sample Date
A2D1159-01	Hickman Test Well 350' depth	**04/13/2012 09:20**

Sample Alias: 142098
Matrix: Water

Analysis (1) L P w/ Foil
EXT-Asbestos, Drinking Water by EPA 100.2

Released By	Date	Received By	Date
[signature]	4/16/12	Kenney (courier)	4/18/12 10:20am

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Attachment G: Water Quality Results, 430–450’

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BSK Associates
Engineers & Laboratories

A2D0660

05/24/2012

Melissa Duran
City of Modesto Water Division/Corp Yard
P.O Box 642
Modesto, CA 95353

Dear Melissa Duran,

Thank you for selecting BSK Associates for your analytical testing needs. We have prepared this report in response to your request for analytical services. Enclosed are the results of analyses for samples received by the laboratory on 04/09/2012 14:33.

If additional clarification of any information is required, please contact your Client Services Representative, Michelle Harmstead at (800) 877-8310 or (559) 497-2888.

BSK ASSOCIATES

Michelle Harmstead

Michelle Harmstead
Project Manager

1414 Stanislaus Street Fresno, CA 93706 (559) 497-2888 FAX (559) 485-6935 www.bsklabs.com

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Environmental Engineering | Geotechnical Engineering | Materials Testing

05/24/2012

Case Narrative

Work Order Information

Client Name:	City of Modesto Water Division/Corp Yard	**Submitted by:**	Brent Jonson
Client Code:	Modes9588	**Shipped by:**	BSK Employee
Work Order:	A2D0660	**COC Number:**	
Project:	Title 22	**TAT:**	35
		PO #:	

Sample Receipt Conditions

Cooler: **Default Cooler** **Temp. ºC:** 6

Containers Intact
COC/Labels Agree
Received On Wet Ice
Sample(s) arrived at lab on same day sampled.
Packing Material - Bubble Wrap
Packing Material - Foam
Sample(s) were received in temperature range.
Initial receipt at BSK-FAL

Report Manager	Report Format
Melissa Duran	Final.rpt

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Environmental Engineering | Geotechnical Engineering | Materials Testing

BSK Associates Engineers & Laboratories

Certificate of Analysis

Melissa Duran
City of Modesto Water Division/Corp Yard
P.O Box 642
Modesto, CA 95353

Report Issue Date: 05/24/2012 8:42
Received Date: 04/09/2012
Received Time: 14:33

Lab Sample ID: A2D0660-01
Sample Date: 04/09/2012 09:25
Sample Type: Grab
Sampled by: Brent Jonson
Matrix: Water

Sample Description: Hickman Test Well - Level 235 // 141809

General Chemistry

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
***Aggressive Index**		**11**				A203956	04/17/12	04/17/12	
Alkalinity as CaCO3	SM 2320 B	**72**	3.0	mg/L	1	A203664	04/10/12	04/10/12	
Bicarbonate as CaCO3	SM 2320 B	**70**	3.0	mg/L	1	A203664	04/10/12	04/10/12	
Carbonate as CaCO3	SM 2320 B	ND	3.0	mg/L	1	A203664	04/10/12	04/10/12	
Chloride	EPA 300.0	**14**	1.0	mg/L	1	A203603	04/10/12	04/10/12	
*Color	SM 2120 B	ND	1.0	Color Units	1	A203643	04/10/12 11:55	04/10/12 11:55	
Cyanide (total)	SM 4500-CN E	ND	0.0050	mg/L	1	A203725	04/11/12	04/12/12	
Conductivity @ 25C	SM 2510 B	**190**	1.0	umhos/cm	1	A203664	04/10/12	04/10/12	
Fluoride	SM 4500-F C	**0.24**	0.10	mg/L	1	A203786	04/12/12	04/12/12	
Hydroxide as CaCO3	SM 2320 B	ND	3.0	mg/L	1	A203664	04/10/12	04/10/12	
Langelier Index	SM 2330 B	**-1.3**				A203956	04/17/12	04/17/12	
MBAS, Calculated as LAS, mol wt 340	SM 5540 C	ND	0.050	mg/L	1	A203673	04/10/12 15:45	04/10/12 15:45	
Nitrate as NO3	EPA 300.0	ND	1.0	mg/L	1	A203603	04/10/12 06:11	04/10/12 06:11	
Nitrite as N	EPA 300.0	ND	0.050	mg/L	1	A203603	04/10/12 06:11	04/10/12 06:11	
***Threshold Odor**	SM 2150 B	**4.0**	1.0	T.O.N.	1	A203643	04/10/12 11:55	04/10/12 11:55	
pH (1)	SM 4500-H+ B	**8.4**		pH Units	1	A203664	04/10/12	04/10/12	
pH Temperature in °C		**21.8**							
Sulfate as SO4	EPA 300.0	**3.5**	2.0	mg/L	1	A203603	04/10/12	04/10/12	
Total Dissolved Solids	SM 2540C	**170**	5.0	mg/L	1	A203630	04/10/12	04/13/12	
Bicarbonate as HCO3		**85**	3.7	mg/L					
Carbonate as CO3		ND	1.8	mg/L					
Hardness as CaCO3		**3.5**	0.41	mg/L					
Hydroxide as OH		ND	1.0	mg/L					
Turbidity	SM 2130 B	**0.26**	0.10	NTU	1	A203643	04/10/12 11:55	04/10/12 11:55	

Metals

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Aluminum	EPA 200.7	ND	0.050	mg/L	1	A203648	04/10/12	04/16/12	
Antimony	EPA 200.8	ND	2.0	ug/L	1	A203648	04/10/12	04/17/12	
Arsenic	EPA 200.8	ND	2.0	ug/L	1	A203648	04/10/12	04/17/12	
Barium	EPA 200.7	ND	0.050	mg/L	1	A203648	04/10/12	04/16/12	
Beryllium	EPA 200.8	ND	1.0	ug/L	1	A203648	04/10/12	04/17/12	
Cadmium	EPA 200.8	ND	1.0	ug/L	1	A203648	04/10/12	04/17/12	
Calcium	EPA 200.7	**0.90**	0.10	mg/L	1	A203648	04/10/12	04/16/12	
Chromium	EPA 200.8	ND	10	ug/L	1	A203648	04/10/12	04/17/12	
Copper	EPA 200.8	ND	5.0	ug/L	1	A203648	04/10/12	04/17/12	

A2D0660 FINAL 05242012 0842

BSK Associates Engineers & Laboratories

Certificate of Analysis

Melissa Duran
City of Modesto Water Division/Corp Yard
P.O Box 642
Modesto, CA 95353

Report Issue Date: 05/24/2012 8:42
Received Date: 04/09/2012
Received Time: 14:33

Lab Sample ID: A2D0660-01
Sample Date: 04/09/2012 09:25
Sample Type: Grab
Sampled by: Brent Jonson
Matrix: Water

Sample Description: Hickman Test Well - Level 235 // 141809

Metals

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Iron	EPA 200.7	ND	0.050	mg/L	1	A203648	04/10/12	04/16/12	
Lead	EPA 200.8	ND	5.0	ug/L	1	A203648	04/10/12	04/17/12	
Magnesium	EPA 200.7	**0.30**	0.10	mg/L	1	A203648	04/10/12	04/16/12	
Manganese	EPA 200.7	ND	0.010	mg/L	1	A203648	04/10/12	04/16/12	
Mercury	EPA 200.8	ND	0.40	ug/L	1	A203648	04/10/12	04/17/12	
Nickel	EPA 200.8	ND	10	ug/L	1	A203648	04/10/12	04/17/12	
Potassium	EPA 200.7	**2.7**	2.0	mg/L	1	A203648	04/10/12	04/16/12	
Selenium	EPA 200.8	ND	2.0	ug/L	1	A203648	04/10/12	04/17/12	
Silver	EPA 200.8	ND	10	ug/L	1	A203648	04/10/12	04/17/12	
Sodium	EPA 200.7	**41**	1.0	mg/L	1	A203648	04/10/12	04/16/12	
Thallium	EPA 200.8	ND	1.0	ug/L	1	A203648	04/10/12	04/17/12	
*Uranium	EPA 200.8	ND	1.0	ug/L	1	A203648	04/10/12	04/17/12	
***Uranium, Radiological**		**< 0.67**		pCi/L					
Zinc	EPA 200.7	ND	0.050	mg/L	1	A203648	04/10/12	04/16/12	

Radiological

Analyte	Method	Result	Units	Batch	Prepared	Analyzed	Qual
*Gross Alpha	EPA 00-02	ND	pCi/L	A203827	04/13/12	04/17/12	
***1.65 Sigma Uncertainty**		**0.110**	±				
***MDA95**		**1.09**	pCi/L				

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
EDB and DBCP by GC-ECD									
Dibromochloropropane (DBCP)	EPA 504.1	ND	0.010	ug/L	1	A203894	04/16/12	04/17/12	
Ethylene Dibromide (EDB)	EPA 504.1	ND	0.020	ug/L	1	A203894	04/16/12	04/17/12	
Surrogate: Bromoform	EPA 504.1	101 %		*Acceptable range: 70-130 %*					
Organohalide Pesticides and PCBs by GC-ECD								**Analysis Qualifiers: HT07**	
Aldrin	EPA 505	ND	0.075	ug/L	1	A203826	04/13/12	04/14/12	
Chlordane	EPA 505	ND	0.10	ug/L	1	A203826	04/13/12	04/14/12	
Chlorothalonil	EPA 505	ND	5.0	ug/L	1	A203826	04/13/12	04/14/12	
Dieldrin	EPA 505	ND	0.020	ug/L	1	A203826	04/13/12	04/14/12	
Endrin	EPA 505	ND	0.10	ug/L	1	A203826	04/13/12	04/14/12	
Heptachlor	EPA 505	ND	0.010	ug/L	1	A203826	04/13/12	04/14/12	

A2D0660 FINAL 05242012 0842

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Lab Sample ID: A2D0660-01
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Sample Description: Hickman Test Well - Level 235 // 141809

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Organohalide Pesticides and PCBs by GC-ECD									**Analysis Qualifiers: HT07**
Heptachlor Epoxide	EPA 505	ND	0.010	ug/L	1	A203826	04/13/12	04/14/12	
Hexachlorobenzene	EPA 505	ND	0.50	ug/L	1	A203826	04/13/12	04/14/12	
Hexachlorocyclopentadiene	EPA 505	ND	1.0	ug/L	1	A203826	04/13/12	04/14/12	
Lindane	EPA 505	ND	0.20	ug/L	1	A203826	04/13/12	04/14/12	
Methoxychlor	EPA 505	ND	10	ug/L	1	A203826	04/13/12	04/14/12	
PCB Aroclor Screen	EPA 505	ND	0.50	ug/L	1	A203826	04/13/12	04/14/12	
Toxaphene	EPA 505	ND	1.0	ug/L	1	A203826	04/13/12	04/14/12	
Trifluralin	EPA 505	ND	1.0	ug/L	1	A203826	04/13/12	04/14/12	
Surrogate: TCMX	EPA 505	105 %		*Acceptable range: 70-130 %*					
Chlorinated Acid Herbicides by GC-ECD									
2,4,5-T	EPA 515.3	ND	1.0	ug/L	1	A203739	04/11/12	04/14/12	
2,4,5-TP (Silvex)	EPA 515.3	ND	1.0	ug/L	1	A203739	04/11/12	04/14/12	
2,4-D	EPA 515.3	ND	10	ug/L	1	A203739	04/11/12	04/14/12	
Bentazon	EPA 515.3	ND	2.0	ug/L	1	A203739	04/11/12	04/14/12	
Dalapon	EPA 515.3	ND	10	ug/L	1	A203739	04/11/12	04/14/12	
Dicamba	EPA 515.3	ND	1.5	ug/L	1	A203739	04/11/12	04/14/12	
Dinoseb	EPA 515.3	ND	2.0	ug/L	1	A203739	04/11/12	04/14/12	
Pentachlorophenol	EPA 515.3	ND	0.20	ug/L	1	A203739	04/11/12	04/14/12	
Picloram	EPA 515.3	ND	1.0	ug/L	1	A203739	04/11/12	04/14/12	
Surrogate: DCPAA	EPA 515.3	98 %		*Acceptable range: 70-130 %*					
Volatile Organics by GC-MS									
1,1,1,2-Tetrachloroethane	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
1,1,1-Trichloroethane	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
1,1,2,2-Tetrachloroethane	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
1,1,2-Trichloro-1,2,2-trifluoroethane	EPA 524.2	ND	10	ug/L	1	A204033	04/19/12	04/19/12	
1,1,2-Trichloroethane	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
1,1-Dichloroethane	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
1,1-Dichloroethene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
1,1-Dichloropropene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
1,2,3-Trichlorobenzene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
1,2,4-Trichlorobenzene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
1,2,4-Trimethylbenzene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
1,2-Dichlorobenzene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
1,2-Dichloroethane	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
1,2-Dichloropropane	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	

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BSK Associates Engineers & Laboratories

Certificate of Analysis

Melissa Duran
City of Modesto Water Division/Corp Yard
P.O Box 642
Modesto, CA 95353

Report Issue Date: 05/24/2012 8:42
Received Date: 04/09/2012
Received Time: 14:33

Lab Sample ID: A2D0660-01
Sample Date: 04/09/2012 09:25
Sample Type: Grab
Sampled by: Brent Jonson
Matrix: Water

Sample Description: Hickman Test Well - Level 235 // 141809

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Volatile Organics by GC-MS									
1,3,5-Trimethylbenzene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
1,3-Dichlorobenzene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
1,3-Dichloropropane	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
1,4-Dichlorobenzene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
2,2-Dichloropropane	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
2-Butanone	EPA 524.2	ND	5.0	ug/L	1	A204033	04/19/12	04/19/12	
2-Chlorotoluene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
2-Hexanone	EPA 524.2	ND	10	ug/L	1	A204033	04/19/12	04/19/12	
4-Chlorotoluene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
4-Methyl-2-pentanone	EPA 524.2	ND	5.0	ug/L	1	A204033	04/19/12	04/19/12	
Acetone	EPA 524.2	ND	10	ug/L	1	A204033	04/19/12	04/19/12	
Benzene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Bromobenzene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Bromochloromethane	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Bromodichloromethane	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Bromoform	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Bromomethane	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Carbon Tetrachloride	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Chlorobenzene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Chloroethane	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Chloroform	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Chloromethane	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
cis-1,2-Dichloroethene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
cis-1,3-Dichloropropene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Dibromochloromethane	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Dibromomethane	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Dichlorodifluoromethane	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Dichloromethane	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Di-isopropyl ether (DIPE)	EPA 524.2	ND	3.0	ug/L	1	A204033	04/19/12	04/19/12	
Ethyl tert-Butyl Ether (ETBE)	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Ethylbenzene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Hexachlorobutadiene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Isopropylbenzene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
m,p-Xylenes	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Methyl-t-butyl ether	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Naphthalene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
n-Butylbenzene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	

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Environmental Engineering | Geotechnical Engineering | Materials Testing

BSK Associates Engineers & Laboratories

Certificate of Analysis

Melissa Duran
City of Modesto Water Division/Corp Yard
P.O Box 642
Modesto, CA 95353

Report Issue Date: 05/24/2012 8:42
Received Date: 04/09/2012
Received Time: 14:33

Lab Sample ID: A2D0660-01
Sample Date: 04/09/2012 09:25
Sample Type: Grab
Sampled by: Brent Jonson
Matrix: Water

Sample Description: Hickman Test Well - Level 235 // 141809

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Volatile Organics by GC-MS									
n-Propylbenzene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
o-Xylene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
p-Isopropyltoluene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
sec-Butylbenzene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Styrene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
tert-Amyl Methyl Ether (TAME)	EPA 524.2	ND	3.0	ug/L	1	A204033	04/19/12	04/19/12	
tert-Butyl alcohol (TBA)	EPA 524.2	ND	2.0	ug/L	1	A204033	04/19/12	04/19/12	
tert-Butylbenzene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Tetrachloroethene (PCE)	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Toluene	EPA 524.2	**0.97**	0.50	ug/L	1	A204033	04/19/12	04/19/12	
trans-1,2-Dichloroethene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
trans-1,3-Dichloropropene	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Trichloroethene (TCE)	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Trichlorofluoromethane	EPA 524.2	ND	5.0	ug/L	1	A204033	04/19/12	04/19/12	
Vinyl Chloride	EPA 524.2	ND	0.50	ug/L	1	A204033	04/19/12	04/19/12	
Surrogate: 1,2-Dichlorobenzene-d4	EPA 524.2	87 %		*Acceptable range: 70-130 %*					
Surrogate: Bromofluorobenzene	EPA 524.2	91 %		*Acceptable range: 70-130 %*					
*Total 1,3-Dichloropropene, EPA 524.2		ND	0.50	ug/L					
*Total Trihalomethanes, EPA 524.2		ND	0.50	ug/L					
*Total Xylenes, EPA 524.2		ND	0.50	ug/L					
Semi-Volatile Organics by GC-MS									
Alachlor	EPA 525.2	ND	1.0	ug/L	1	A203806	04/13/12	04/16/12	
Atrazine	EPA 525.2	ND	0.50	ug/L	1	A203806	04/13/12	04/16/12	
Benzo(a)pyrene	EPA 525.2	ND	0.10	ug/L	1	A203806	04/13/12	04/16/12	
Bis(2-ethylhexyl) adipate	EPA 525.2	ND	3.0	ug/L	1	A203806	04/13/12	04/16/12	
Bis(2-ethylhexyl) phthalate	EPA 525.2	ND	3.0	ug/L	1	A203806	04/13/12	04/16/12	
Bromacil	EPA 525.2	ND	10	ug/L	1	A203806	04/13/12	04/16/12	
Butachlor	EPA 525.2	ND	0.38	ug/L	1	A203806	04/13/12	04/16/12	
Diazinon	EPA 525.2	ND	0.25	ug/L	1	A203806	04/13/12	04/16/12	
Dimethoate	EPA 525.2	ND	10	ug/L	1	A203806	04/13/12	04/16/12	
Metolachlor	EPA 525.2	ND	0.50	ug/L	1	A203806	04/13/12	04/16/12	
Metribuzin	EPA 525.2	ND	0.50	ug/L	1	A203806	04/13/12	04/16/12	
Molinate	EPA 525.2	ND	2.0	ug/L	1	A203806	04/13/12	04/16/12	
Propachlor	EPA 525.2	ND	0.50	ug/L	1	A203806	04/13/12	04/16/12	
Simazine	EPA 525.2	ND	1.0	ug/L	1	A203806	04/13/12	04/16/12	
Thiobencarb	EPA 525.2	ND	1.0	ug/L	1	A203806	04/13/12	04/16/12	

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Certificate of Analysis

Melissa Duran
City of Modesto Water Division/Corp Yard
P.O Box 642
Modesto, CA 95353

Report Issue Date: 05/24/2012 8:42
Received Date: 04/09/2012
Received Time: 14:33

Lab Sample ID: A2D0660-01
Sample Date: 04/09/2012 09:25
Sample Type: Grab
Sampled by: Brent Jonson
Matrix: Water

Sample Description: Hickman Test Well - Level 235 // 141809

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Surrogate: 1,3-Dimethyl-2-nitrobenzene	EPA 525.2	123 %		*Acceptable range: 70-130 %*					
Carbamates by HPLC									
3-Hydroxycarbofuran	EPA 531.1	ND	3.0	ug/L	1	A203779	04/12/12	04/13/12	
Aldicarb	EPA 531.1	ND	3.0	ug/L	1	A203779	04/12/12	04/13/12	
Aldicarb Sulfone	EPA 531.1	ND	2.0	ug/L	1	A203779	04/12/12	04/13/12	
Aldicarb Sulfoxide	EPA 531.1	ND	3.0	ug/L	1	A203779	04/12/12	04/13/12	
Carbaryl	EPA 531.1	ND	5.0	ug/L	1	A203779	04/12/12	04/13/12	
Carbofuran	EPA 531.1	ND	5.0	ug/L	1	A203779	04/12/12	04/13/12	
Methomyl	EPA 531.1	ND	2.0	ug/L	1	A203779	04/12/12	04/13/12	
Oxamyl	EPA 531.1	ND	20	ug/L	1	A203779	04/12/12	04/13/12	
Glyphosate by HPLC									
Glyphosate	EPA 547	ND	25	ug/L	1	A203633	04/10/12	04/11/12	
Surrogate: AMPA	EPA 547	102 %		*Acceptable range: 70-130 %*					
Endothall by GC-MS									
Endothall	EPA 548.1	ND	45	ug/L	1	A203620	04/09/12	04/12/12	
Diquat by HPLC									
Diquat	EPA 549.2	ND	4.0	ug/L	1	A203689	04/10/12	04/12/12	
Diuron by HPLC									
Diuron	EPA 632	ND	1.0	ug/L	1	A203854	04/16/12	04/17/12	
Surrogate: Benthiocarb	EPA 632	99 %		*Acceptable range: 70-130 %*					

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BSK Associates Engineers & Laboratories

General Chemistry Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203603				Analyst: AJT		Prepared: 04/10/2012					
Blank (A203603-BLK1) EPA 300.0 - Quality Control											
Chloride	ND	1.0	mg/L							04/10/12	
Nitrate as NO3	ND	1.0	mg/L							04/10/12	
Nitrite as N	ND	0.050	mg/L							04/10/12	
Sulfate as SO4	ND	2.0	mg/L							04/10/12	
Blank Spike (A203603-BS1) EPA 300.0 - Quality Control											
Chloride	53	1.0	mg/L	50		105	90-110			04/10/12	
Nitrate as NO3	52	1.0	mg/L	50		105	90-110			04/10/12	
Nitrite as N	0.55	0.050	mg/L	0.50		110	90-110			04/10/12	
Sulfate as SO4	52	2.0	mg/L	50		105	90-110			04/10/12	
Blank Spike Dup (A203603-BSD1) EPA 300.0 - Quality Control											
Chloride	53	1.0	mg/L	50		105	90-110	0	10	04/10/12	
Nitrate as NO3	52	1.0	mg/L	50		105	90-110	0	10	04/10/12	
Nitrite as N	0.55	0.050	mg/L	0.50		110	90-110	0	10	04/10/12	
Sulfate as SO4	53	2.0	mg/L	50		106	90-110	1	10	04/10/12	
Matrix Spike (A203603-MS1) EPA 300.0 - Quality Control						**Source: A2D0652-01**					
Chloride	110	2.0	mg/L	100	9.6	105	80-120			04/10/12	
Nitrate as NO3	130	2.0	mg/L	100	24	103	80-120			04/10/12	
Nitrite as N	1.0	0.10	mg/L	1.0	ND	100	80-120			04/10/12	
Sulfate as SO4	120	4.0	mg/L	100	16	104	80-120			04/10/12	
Matrix Spike (A203603-MS2) EPA 300.0 - Quality Control						**Source: A2D0652-06**					
Chloride	110	2.0	mg/L	100	10	104	80-120			04/10/12	
Nitrate as NO3	130	2.0	mg/L	100	24	102	80-120			04/10/12	
Nitrite as N	1.0	0.10	mg/L	1.0	ND	101	80-120			04/10/12	
Sulfate as SO4	120	4.0	mg/L	100	15	104	80-120			04/10/12	
Matrix Spike Dup (A203603-MSD1) EPA 300.0 - Quality Control						**Source: A2D0652-01**					
Chloride	110	2.0	mg/L	100	9.6	105	80-120	0	10	04/10/12	
Nitrate as NO3	130	2.0	mg/L	100	24	104	80-120	0	10	04/10/12	
Nitrite as N	1.0	0.10	mg/L	1.0	ND	101	80-120	1	20	04/10/12	
Sulfate as SO4	120	4.0	mg/L	100	16	104	80-120	0	10	04/10/12	
Matrix Spike Dup (A203603-MSD2) EPA 300.0 - Quality Control						**Source: A2D0652-06**					
Chloride	110	2.0	mg/L	100	10	104	80-120	0	10	04/10/12	
Nitrate as NO3	130	2.0	mg/L	100	24	103	80-120	1	10	04/10/12	
Nitrite as N	1.0	0.10	mg/L	1.0	ND	100	80-120	1	20	04/10/12	
Sulfate as SO4	120	4.0	mg/L	100	15	105	80-120	1	10	04/10/12	
Batch: A203630				Analyst: DEH		Prepared: 04/10/2012					
Blank (A203630-BLK1) SM 2540C - Quality Control											
Total Dissolved Solids	ND	5.0	mg/L							04/13/12	
Blank (A203630-BLK2) SM 2540C - Quality Control											
Total Dissolved Solids	ND	5.0	mg/L							04/13/12	

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General Chemistry Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203630				Analyst: DEH		Prepared: 04/10/2012					
Duplicate (A203630-DUP1) SM 2540C - Quality Control						**Source: A2D0470-02**					
Total Dissolved Solids	1000	5.0	mg/L		1000			0	20	04/13/12	
Duplicate (A203630-DUP2) SM 2540C - Quality Control						**Source: A2D0500-02**					
Total Dissolved Solids	900	5.0	mg/L		910			1	20	04/13/12	
Batch: A203643				Analyst: DFS		Prepared: 04/10/2012					
Blank (A203643-BLK1) SM 2120 B - Quality Control											
Color	ND	1.0	Color Units							04/10/12	
Threshold Odor	ND	1.0	T.O.N.							04/10/12	
Turbidity	ND	0.10	NTU							04/10/12	
Duplicate (A203643-DUP1) SM 2120 B - Quality Control						**Source: A2D0660-01**					
Color	ND	1.0	Color Units		ND				20	04/10/12	
Threshold Odor	4.0	1.0	T.O.N.		4.0			0	20	04/10/12	
Turbidity	0.23	0.10	NTU		0.26			12	20	04/10/12	
Batch: A203664				Analyst: CEG		Prepared: 04/10/2012					
Blank (A203664-BLK1) SM 2320 B - Quality Control											
Alkalinity as CaCO3	ND	3.0	mg/L							04/10/12	
Bicarbonate as CaCO3	ND	3.0	mg/L							04/10/12	
Carbonate as CaCO3	ND	3.0	mg/L							04/10/12	
Conductivity @ 25C	ND	1.0	umhos/cm							04/10/12	
Hydroxide as CaCO3	ND	3.0	mg/L							04/10/12	
Blank Spike (A203664-BS1) SM 2320 B - Quality Control											
Alkalinity as CaCO3	100	3.0	mg/L	100		100	80-120			04/10/12	
Blank Spike Dup (A203664-BSD1) SM 2320 B - Quality Control											
Alkalinity as CaCO3	100	3.0	mg/L	100		100	80-120	0	20	04/10/12	
Duplicate (A203664-DUP1) SM 2320 B - Quality Control						**Source: A2D0660-01**					
Alkalinity as CaCO3	72	3.0	mg/L		72			0	10	04/10/12	
Bicarbonate as CaCO3	70	3.0	mg/L		70			0	10	04/10/12	
Carbonate as CaCO3	ND	3.0	mg/L		ND				10	04/10/12	
Conductivity @ 25C	190	1.0	umhos/cm		190			0	20	04/10/12	
Hydroxide as CaCO3	ND	3.0	mg/L		ND				10	04/10/12	
pH (1)	8.4		pH Units		8.4			0	20	04/10/12	
Duplicate (A203664-DUP2) SM 2320 B - Quality Control						**Source: A2D0692-01**					
Alkalinity as CaCO3	ND	3.0	mg/L		ND				10	04/10/12	
Bicarbonate as CaCO3	ND	3.0	mg/L		ND				10	04/10/12	
Carbonate as CaCO3	ND	3.0	mg/L		ND				10	04/10/12	
Conductivity @ 25C	280	1.0	umhos/cm		280			0	20	04/10/12	
Hydroxide as CaCO3	ND	3.0	mg/L		ND				10	04/10/12	
pH (1)	6.1		pH Units		6.3			3	20	04/10/12	

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General Chemistry Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203673				Analyst: DFS		Prepared: 04/10/2012					
Blank (A203673-BLK1) SM 5540 C - Quality Control											
MBAS, Calculated as LAS, mol wt 340	ND	0.050	mg/L							04/10/12	
Blank Spike (A203673-BS1) SM 5540 C - Quality Control											
MBAS, Calculated as LAS, mol wt 340	1.1	0.050	mg/L	1.0		106	80-120			04/10/12	
Blank Spike Dup (A203673-BSD1) SM 5540 C - Quality Control											
MBAS, Calculated as LAS, mol wt 340	1.1	0.050	mg/L	1.0		108	80-120	2	20	04/10/12	
Matrix Spike (A203673-MS1) SM 5540 C - Quality Control						**Source: A2D0654-01**					
MBAS, Calculated as LAS, mol wt 340	1.0	0.050	mg/L	1.0	ND	101	80-120			04/10/12	
Matrix Spike (A203673-MS2) SM 5540 C - Quality Control						**Source: A2D0700-01**					
MBAS, Calculated as LAS, mol wt 340	0.95	0.050	mg/L	1.0	ND	95	80-120			04/10/12	
Matrix Spike Dup (A203673-MSD1) SM 5540 C - Quality Control						**Source: A2D0654-01**					
MBAS, Calculated as LAS, mol wt 340	0.98	0.050	mg/L	1.0	ND	98	80-120	3	20	04/10/12	
Matrix Spike Dup (A203673-MSD2) SM 5540 C - Quality Control						**Source: A2D0700-01**					
MBAS, Calculated as LAS, mol wt 340	0.98	0.050	mg/L	1.0	ND	98	80-120	3	20	04/10/12	
Batch: A203725				Analyst: LJL		Prepared: 04/11/2012					
Blank (A203725-BLK1) SM 4500-CN E - Quality Control											
Cyanide (total)	ND	0.0050	mg/L							04/12/12	
Blank Spike (A203725-BS1) SM 4500-CN E - Quality Control											
Cyanide (total)	0.53	0.0050	mg/L	0.50		106	80-120			04/12/12	
Blank Spike Dup (A203725-BSD1) SM 4500-CN E - Quality Control											
Cyanide (total)	0.53	0.0050	mg/L	0.50		105	80-120	0	20	04/12/12	
Matrix Spike (A203725-MS1) SM 4500-CN E - Quality Control						**Source: A2D0700-01**					
Cyanide (total)	0.51	0.0050	mg/L	0.50	ND	102	80-120			04/12/12	
Matrix Spike (A203725-MS2) SM 4500-CN E - Quality Control						**Source: A2D0846-01**					
Cyanide (total)	0.49	0.0050	mg/L	0.50	0.051	89	80-120			04/12/12	
Matrix Spike Dup (A203725-MSD1) SM 4500-CN E - Quality Control						**Source: A2D0700-01**					
Cyanide (total)	0.44	0.0050	mg/L	0.50	ND	88	80-120	14	20	04/12/12	
Matrix Spike Dup (A203725-MSD2) SM 4500-CN E - Quality Control						**Source: A2D0846-01**					
Cyanide (total)	0.51	0.0050	mg/L	0.50	0.051	93	80-120	4	20	04/12/12	
Batch: A203786				Analyst: CCH		Prepared: 04/12/2012					
Blank (A203786-BLK1) SM 4500-F C - Quality Control											
Fluoride	ND	0.10	mg/L							04/12/12	
Blank Spike (A203786-BS1) SM 4500-F C - Quality Control											

1414 Stanislaus Street **Fresno, CA 93706** **(559) 497-2888** **FAX (559) 485-6935** **www.bsklabs.com**

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General Chemistry Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203786				Analyst: CCH		Prepared: 04/12/2012					
Blank Spike (A203786-BS1) SM 4500-F C - Quality Control											
Fluoride	0.98	0.10	mg/L	1.0		98	80-120			04/12/12	
Blank Spike Dup (A203786-BSD1) SM 4500-F C - Quality Control											
Fluoride	0.98	0.10	mg/L	1.0		98	80-120	0	20	04/12/12	
Matrix Spike (A203786-MS1) SM 4500-F C - Quality Control						**Source: A2D0583-02**					
Fluoride	1.5	0.10	mg/L	1.0	0.47	102	80-120			04/12/12	
Matrix Spike (A203786-MS2) SM 4500-F C - Quality Control						**Source: A2D0590-04**					
Fluoride	1.6	0.10	mg/L	1.0	0.67	97	80-120			04/12/12	
Matrix Spike Dup (A203786-MSD1) SM 4500-F C - Quality Control						**Source: A2D0583-02**					
Fluoride	1.5	0.10	mg/L	1.0	0.47	104	80-120	1	20	04/12/12	
Matrix Spike Dup (A203786-MSD2) SM 4500-F C - Quality Control						**Source: A2D0590-04**					
Fluoride	1.6	0.10	mg/L	1.0	0.67	98	80-120	1	20	04/12/12	

A2D0660 FINAL 05242012 0842

BSK Associates Engineers & Laboratories

Metals Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203648				Analyst: NRE		Prepared: 04/10/2012					
Blank (A203648-BLK2) EPA 200.7 - Quality Control											
Aluminum	ND	0.050	mg/L							04/16/12	
Barium	ND	0.050	mg/L							04/16/12	
Calcium	ND	0.10	mg/L							04/16/12	
Iron	ND	0.050	mg/L							04/16/12	
Magnesium	ND	0.10	mg/L							04/16/12	
Manganese	ND	0.010	mg/L							04/16/12	
Potassium	ND	2.0	mg/L							04/16/12	
Sodium	ND	1.0	mg/L							04/16/12	
Zinc	ND	0.050	mg/L							04/16/12	
Blank Spike (A203648-BS2) EPA 200.7 - Quality Control											
Aluminum	0.20	0.050	mg/L	0.20		98	85-115			04/16/12	
Barium	0.21	0.050	mg/L	0.20		103	85-115			04/16/12	
Calcium	10	0.10	mg/L	10		102	85-115			04/16/12	
Iron	2.0	0.050	mg/L	2.0		101	85-115			04/16/12	
Magnesium	9.9	0.10	mg/L	10		99	85-115			04/16/12	
Manganese	0.20	0.010	mg/L	0.20		101	85-115			04/16/12	
Potassium	10	2.0	mg/L	10		100	85-115			04/16/12	
Sodium	10	1.0	mg/L	10		103	85-115			04/16/12	
Zinc	0.20	0.050	mg/L	0.20		100	85-115			04/16/12	
Blank Spike Dup (A203648-BSD2) EPA 200.7 - Quality Control											
Aluminum	0.19	0.050	mg/L	0.20		97	85-115	1	20	04/16/12	
Barium	0.20	0.050	mg/L	0.20		102	85-115	1	20	04/16/12	
Calcium	10	0.10	mg/L	10		102	85-115	1	20	04/16/12	
Iron	2.0	0.050	mg/L	2.0		102	85-115	1	20	04/16/12	
Magnesium	10	0.10	mg/L	10		100	85-115	1	20	04/16/12	
Manganese	0.20	0.010	mg/L	0.20		102	85-115	1	20	04/16/12	
Potassium	10	2.0	mg/L	10		101	85-115	1	20	04/16/12	
Sodium	10	1.0	mg/L	10		101	85-115	2	20	04/16/12	
Zinc	0.20	0.050	mg/L	0.20		101	85-115	1	20	04/16/12	
Matrix Spike (A203648-MS3) EPA 200.7 - Quality Control					**Source: A2D0676-01**						
Aluminum	0.22	0.050	mg/L	0.20	ND	94	70-130			04/16/12	
Barium	0.21	0.050	mg/L	0.20	ND	105	70-130			04/16/12	
Calcium	96	0.10	mg/L	10	84	121	70-130			04/16/12	
Iron	2.2	0.050	mg/L	2.0	0.31	95	70-130			04/16/12	
Magnesium	47	0.10	mg/L	10	36	112	70-130			04/16/12	
Manganese	0.20	0.010	mg/L	0.20	0.013	94	70-130			04/16/12	
Potassium	21	2.0	mg/L	10	11	107	70-130			04/16/12	
Sodium	150	1.0	mg/L	10	140	58	70-130			04/16/12	MS02 ***Low***
Zinc	0.21	0.050	mg/L	0.20	ND	107	70-130			04/16/12	
Matrix Spike Dup (A203648-MSD3) EPA 200.7 - Quality Control					**Source: A2D0676-01**						
Aluminum	0.23	0.050	mg/L	0.20	ND	96	70-130	1	20	04/16/12	
Barium	0.21	0.050	mg/L	0.20	ND	107	70-130	1	20	04/16/12	
Calcium	95	0.10	mg/L	10	84	109	70-130	1	20	04/16/12	
Iron	2.3	0.050	mg/L	2.0	0.31	99	70-130	3	20	04/16/12	

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Metals Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203648				Analyst: NRE		Prepared: 04/10/2012					
Matrix Spike Dup (A203648-MSD3)	**EPA 200.7 - Quality Control**					**Source: A2D0676-01**					
Magnesium	46	0.10	mg/L	10	36	97	70-130	3	20	04/16/12	
Manganese	0.21	0.010	mg/L	0.20	0.013	98	70-130	4	20	04/16/12	
Potassium	20	2.0	mg/L	10	11	98	70-130	4	20	04/16/12	
Sodium	150	1.0	mg/L	10	140	69	70-130	1	20	04/16/12	MS02 ***Low***
Zinc	0.21	0.050	mg/L	0.20	ND	105	70-130	1	20	04/16/12	
Blank (A203648-BLK1)	**EPA 200.8 - Quality Control**										
Antimony	ND	2.0	ug/L							04/16/12	
Arsenic	ND	2.0	ug/L							04/16/12	
Beryllium	ND	1.0	ug/L							04/16/12	
Cadmium	ND	1.0	ug/L							04/16/12	
Chromium	ND	10	ug/L							04/16/12	
Copper	ND	5.0	ug/L							04/16/12	
Lead	ND	5.0	ug/L							04/16/12	
Mercury	ND	0.40	ug/L							04/16/12	
Nickel	ND	10	ug/L							04/16/12	
Selenium	ND	2.0	ug/L							04/16/12	
Silver	ND	10	ug/L							04/16/12	
Thallium	ND	1.0	ug/L							04/16/12	
Uranium	ND	1.0	ug/L							04/16/12	
Blank Spike (A203648-BS1)	**EPA 200.8 - Quality Control**										
Antimony	210	2.0	ug/L	200		103	85-115			04/16/12	
Arsenic	200	2.0	ug/L	200		101	85-115			04/16/12	
Beryllium	190	1.0	ug/L	200		93	85-115			04/16/12	
Cadmium	200	1.0	ug/L	200		98	85-115			04/16/12	
Chromium	200	10	ug/L	200		102	85-115			04/16/12	
Copper	190	5.0	ug/L	200		96	85-115			04/16/12	
Lead	200	5.0	ug/L	200		99	85-115			04/16/12	
Mercury	4.5	0.40	ug/L	5.0		89	85-115			04/16/12	
Nickel	200	10	ug/L	200		99	85-115			04/16/12	
Selenium	200	2.0	ug/L	200		98	85-115			04/16/12	
Silver	100	10	ug/L	100		100	75-125			04/16/12	
Thallium	210	1.0	ug/L	200		105	85-115			04/16/12	
Uranium	96	1.0	ug/L	100		96	85-115			04/16/12	
Blank Spike Dup (A203648-BSD1)	**EPA 200.8 - Quality Control**										
Antimony	200	2.0	ug/L	200		102	85-115	1	20	04/16/12	
Arsenic	200	2.0	ug/L	200		101	85-115	1	20	04/16/12	
Beryllium	180	1.0	ug/L	200		92	85-115	1	20	04/16/12	
Cadmium	190	1.0	ug/L	200		97	85-115	1	20	04/16/12	
Chromium	210	10	ug/L	200		103	85-115	1	20	04/16/12	
Copper	190	5.0	ug/L	200		95	85-115	1	20	04/16/12	
Lead	200	5.0	ug/L	200		100	85-115	1	20	04/16/12	
Mercury	4.7	0.40	ug/L	5.0		93	85-115	4	20	04/16/12	
Nickel	190	10	ug/L	200		96	85-115	3	20	04/16/12	
Selenium	190	2.0	ug/L	200		96	85-115	1	20	04/16/12	
Silver	97	10	ug/L	100		97	75-125	3	20	04/16/12	

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Metals Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203648				Analyst: MAS		Prepared: 04/10/2012					
Blank Spike Dup (A203648-BSD1)	**EPA 200.8 - Quality Control**										
Thallium	210	1.0	ug/L	200		107	85-115	2	20	04/16/12	
Uranium	95	1.0	ug/L	100		95	85-115	1	20	04/16/12	
Matrix Spike (A203648-MS1)	**EPA 200.8 - Quality Control**					**Source: A2D0676-01**					
Antimony	200	2.0	ug/L	200	ND	102	70-130			04/16/12	
Arsenic	190	2.0	ug/L	200	ND	94	70-130			04/16/12	
Beryllium	160	1.0	ug/L	200	ND	80	70-130			04/16/12	
Cadmium	170	1.0	ug/L	200	ND	87	70-130			04/16/12	
Chromium	190	10	ug/L	200	ND	93	70-130			04/16/12	
Copper	190	5.0	ug/L	200	24	81	70-130			04/16/12	
Lead	170	5.0	ug/L	200	ND	84	70-130			04/16/12	
Mercury	4.2	0.40	ug/L	5.0	ND	83	70-130			04/16/12	
Nickel	170	10	ug/L	200	ND	87	70-130			04/16/12	
Selenium	190	2.0	ug/L	200	ND	93	70-130			04/16/12	
Silver	91	10	ug/L	100	ND	91	70-130			04/16/12	
Thallium	180	1.0	ug/L	200	ND	90	70-130			04/16/12	
Uranium	110	1.0	ug/L	100	18	87	70-130			04/16/12	
Matrix Spike (A203648-MS2)	**EPA 200.8 - Quality Control**					**Source: A2D0660-01**					
Antimony	210	2.0	ug/L	200	ND	103	70-130			04/17/12	
Arsenic	200	2.0	ug/L	200	ND	97	70-130			04/17/12	
Beryllium	180	1.0	ug/L	200	ND	91	70-130			04/17/12	
Cadmium	190	1.0	ug/L	200	ND	97	70-130			04/17/12	
Chromium	200	10	ug/L	200	ND	100	70-130			04/17/12	
Copper	180	5.0	ug/L	200	ND	91	70-130			04/17/12	
Lead	190	5.0	ug/L	200	ND	96	70-130			04/17/12	
Mercury	4.9	0.40	ug/L	5.0	ND	98	70-130			04/17/12	
Nickel	180	10	ug/L	200	ND	90	70-130			04/17/12	
Selenium	140	2.0	ug/L	200	ND	71	70-130			04/17/12	
Silver	99	10	ug/L	100	ND	99	70-130			04/17/12	
Thallium	210	1.0	ug/L	200	ND	104	70-130			04/17/12	
Uranium	100	1.0	ug/L	100	ND	101	70-130			04/17/12	
Matrix Spike Dup (A203648-MSD1)	**EPA 200.8 - Quality Control**					**Source: A2D0676-01**					
Antimony	210	2.0	ug/L	200	ND	103	70-130	1	20	04/16/12	
Arsenic	200	2.0	ug/L	200	ND	102	70-130	7	20	04/16/12	
Beryllium	170	1.0	ug/L	200	ND	87	70-130	8	20	04/16/12	
Cadmium	180	1.0	ug/L	200	ND	92	70-130	6	20	04/16/12	
Chromium	200	10	ug/L	200	ND	102	70-130	9	20	04/16/12	
Copper	200	5.0	ug/L	200	24	89	70-130	9	20	04/16/12	
Lead	180	5.0	ug/L	200	ND	90	70-130	6	20	04/16/12	
Mercury	4.4	0.40	ug/L	5.0	ND	89	70-130	6	20	04/16/12	
Nickel	180	10	ug/L	200	ND	92	70-130	6	20	04/16/12	
Selenium	200	2.0	ug/L	200	ND	97	70-130	5	20	04/16/12	
Silver	91	10	ug/L	100	ND	91	70-130	0	20	04/16/12	
Thallium	190	1.0	ug/L	200	ND	97	70-130	7	20	04/16/12	
Uranium	120	1.0	ug/L	100	18	101	70-130	12	20	04/16/12	

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Metals Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203648				Analyst: MAS		Prepared: 04/10/2012					
Matrix Spike Dup (A203648-MSD2)	**EPA 200.8 - Quality Control**					**Source: A2D0660-01**					
Antimony	200	2.0	ug/L	200	ND	101	70-130	1	20	04/17/12	
Arsenic	200	2.0	ug/L	200	ND	97	70-130	0	20	04/17/12	
Beryllium	180	1.0	ug/L	200	ND	91	70-130	0	20	04/17/12	
Cadmium	190	1.0	ug/L	200	ND	96	70-130	1	20	04/17/12	
Chromium	200	10	ug/L	200	ND	98	70-130	2	20	04/17/12	
Copper	180	5.0	ug/L	200	ND	91	70-130	1	20	04/17/12	
Lead	190	5.0	ug/L	200	ND	96	70-130	1	20	04/17/12	
Mercury	5.0	0.40	ug/L	5.0	ND	101	70-130	3	20	04/17/12	
Nickel	180	10	ug/L	200	ND	91	70-130	1	20	04/17/12	
Selenium	140	2.0	ug/L	200	ND	70	70-130	2	20	04/17/12	
Silver	97	10	ug/L	100	ND	97	70-130	1	20	04/17/12	
Thallium	210	1.0	ug/L	200	ND	105	70-130	1	20	04/17/12	
Uranium	100	1.0	ug/L	100	ND	101	70-130	0	20	04/17/12	

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Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203620				Analyst: KHH		Prepared: 04/09/2012					
Blank (A203620-BLK1) EPA 548.1 - Quality Control											
Endothall	ND	45	ug/L							04/11/12	
Blank Spike (A203620-BS1) EPA 548.1 - Quality Control											
Endothall	86	45	ug/L	100		86	34-141			04/11/12	
Blank Spike Dup (A203620-BSD1) EPA 548.1 - Quality Control											
Endothall	81	45	ug/L	100		81	34-141	6	46	04/11/12	
Matrix Spike (A203620-MS1) EPA 548.1 - Quality Control						**Source: A2D0064-01**					
Endothall	67	45	ug/L	100	ND	67	34-141			04/12/12	
Matrix Spike Dup (A203620-MSD1) EPA 548.1 - Quality Control						**Source: A2D0064-01**					
Endothall	64	45	ug/L	100	ND	64	34-141	4	46	04/11/12	
Batch: A203633				Analyst: RJB		Prepared: 04/10/2012					
Blank (A203633-BLK1) EPA 547 - Quality Control											
Glyphosate	ND	25	ug/L							04/11/12	
Surrogate: AMPA	*100*			*100*		*102*	*70-130*			04/11/12	
Blank Spike (A203633-BS1) EPA 547 - Quality Control											
Glyphosate	99		ug/L	100		99	70-130			04/11/12	
Surrogate: AMPA	*120*			*120*		*97*	*70-130*			04/11/12	
Blank Spike Dup (A203633-BSD1) EPA 547 - Quality Control											
Glyphosate	100		ug/L	100		100	70-130	1	30	04/11/12	
Surrogate: AMPA	*120*			*120*		*99*	*70-130*			04/11/12	
Matrix Spike (A203633-MS1) EPA 547 - Quality Control						**Source: A2D0273-01**					
Glyphosate	100		ug/L	100	ND	101	70-130			04/11/12	
Surrogate: AMPA	*120*			*120*		*98*	*70-130*			04/11/12	
Matrix Spike (A203633-MS2) EPA 547 - Quality Control						**Source: A2D0595-01**					
Glyphosate	31	25	ug/L	29	ND	98	70-130			04/11/12	
Surrogate: AMPA	*82*			*110*		*72*	*70-130*			04/11/12	
Matrix Spike Dup (A203633-MSD1) EPA 547 - Quality Control						**Source: A2D0273-01**					
Glyphosate	98		ug/L	100	ND	98	70-130	2	30	04/11/12	
Surrogate: AMPA	*120*			*120*		*98*	*70-130*			04/11/12	
Batch: A203689				Analyst: PYA		Prepared: 04/10/2012					
Blank (A203689-BLK1) EPA 549.2 - Quality Control											
Diquat	ND	4.0	ug/L							04/12/12	
Blank Spike (A203689-BS1) EPA 549.2 - Quality Control											

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Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203689				Analyst: PYA		Prepared: 04/10/2012					
Blank Spike (A203689-BS1) EPA 549.2 - Quality Control											
Diquat	38	4.0	ug/L	40		96	70-130			04/12/12	
Blank Spike Dup (A203689-BSD1) EPA 549.2 - Quality Control											
Diquat	40	4.0	ug/L	40		100	70-130	4	30	04/12/12	
Matrix Spike (A203689-MS1) EPA 549.2 - Quality Control						**Source: A2D0457-01**					
Diquat	40	4.0	ug/L	40	ND	99	70-130			04/12/12	
Matrix Spike Dup (A203689-MSD1) EPA 549.2 - Quality Control						**Source: A2D0457-01**					
Diquat	38	4.0	ug/L	40	ND	95	70-130	3	30	04/12/12	
Batch: A203739				Analyst: GAK		Prepared: 04/11/2012					
Blank (A203739-BLK1) EPA 515.3 - Quality Control											
2,4,5-T	ND	1.0	ug/L							04/13/12	
2,4,5-TP (Silvex)	ND	1.0	ug/L							04/13/12	
2,4-D	ND	10	ug/L							04/13/12	
Bentazon	ND	2.0	ug/L							04/13/12	
Dalapon	ND	10	ug/L							04/13/12	
Dicamba	ND	1.5	ug/L							04/13/12	
Dinoseb	ND	2.0	ug/L							04/13/12	
Pentachlorophenol	ND	0.20	ug/L							04/13/12	
Picloram	ND	1.0	ug/L							04/13/12	
Surrogate: DCPAA	*57*			*58*		*97*	*70-130*			04/13/12	
Blank Spike (A203739-BS1) EPA 515.3 - Quality Control											
2,4,5-T	3.6	1.0	ug/L	4.0		90	70-130			04/13/12	
2,4,5-TP (Silvex)	3.8	1.0	ug/L	4.0		96	70-130			04/13/12	
2,4-D	38	10	ug/L	40		96	70-130			04/13/12	
Bentazon	6.3	2.0	ug/L	8.0		79	70-130			04/13/12	
Dalapon	42	10	ug/L	40		104	70-130			04/13/12	
Dicamba	6.0	1.5	ug/L	6.0		101	70-130			04/13/12	
Dinoseb	8.2	2.0	ug/L	8.0		103	70-130			04/13/12	
Pentachlorophenol	0.80	0.20	ug/L	0.80		100	70-130			04/13/12	
Picloram	4.3	1.0	ug/L	4.0		108	70-130			04/13/12	
Surrogate: DCPAA	*57*			*58*		*99*	*70-130*			04/13/12	
Blank Spike Dup (A203739-BSD1) EPA 515.3 - Quality Control											
2,4,5-T	3.6	1.0	ug/L	4.0		89	70-130	1	20	04/14/12	
2,4,5-TP (Silvex)	3.9	1.0	ug/L	4.0		96	70-130	1	20	04/14/12	
2,4-D	38	10	ug/L	40		96	70-130	0	20	04/14/12	
Bentazon	6.3	2.0	ug/L	8.0		78	70-130	1	20	04/14/12	
Dalapon	41	10	ug/L	40		102	70-130	3	20	04/14/12	
Dicamba	6.1	1.5	ug/L	6.0		101	70-130	0	20	04/14/12	
Dinoseb	8.5	2.0	ug/L	8.0		106	70-130	3	20	04/14/12	
Pentachlorophenol	0.78	0.20	ug/L	0.80		97	70-130	3	20	04/14/12	
Picloram	4.3	1.0	ug/L	4.0		108	70-130	1	20	04/14/12	

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Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203739				Analyst: GAK		Prepared: 04/11/2012					
Blank Spike Dup (A203739-BSD1)	**EPA 515.3 - Quality Control**										
Surrogate: DCPAA	*57*			*58*		*99*	*70-130*			04/14/12	
Matrix Spike (A203739-MS1)	**EPA 515.3 - Quality Control**					**Source: A2D0566-01**					
2,4,5-T	3.8	1.0	ug/L	4.0	ND	96	70-130			04/14/12	
2,4,5-TP (Silvex)	3.8	1.0	ug/L	4.0	ND	96	70-130			04/14/12	
2,4-D	38	10	ug/L	40	ND	95	70-130			04/14/12	
Bentazon	7.7	2.0	ug/L	8.0	ND	96	70-130			04/14/12	
Dalapon	40	10	ug/L	40	ND	100	70-130			04/14/12	
Dicamba	6.0	1.5	ug/L	6.0	ND	100	70-130			04/14/12	
Dinoseb	8.0	2.0	ug/L	8.0	ND	100	70-130			04/14/12	
Pentachlorophenol	0.76	0.20	ug/L	0.80	ND	95	70-130			04/14/12	
Picloram	4.3	1.0	ug/L	4.0	ND	108	70-130			04/14/12	
Surrogate: DCPAA	*57*			*58*		*99*	*70-130*			04/14/12	
Batch: A203779				Analyst: XHX		Prepared: 04/12/2012					
Blank (A203779-BLK1)	**EPA 531.1 - Quality Control**										
3-Hydroxycarbofuran	ND	3.0	ug/L							04/13/12	
Aldicarb	ND	3.0	ug/L							04/13/12	
Aldicarb Sulfone	ND	2.0	ug/L							04/13/12	
Aldicarb Sulfoxide	ND	3.0	ug/L							04/13/12	
Carbaryl	ND	5.0	ug/L							04/13/12	
Carbofuran	ND	5.0	ug/L							04/13/12	
Methomyl	ND	2.0	ug/L							04/13/12	
Oxamyl	ND	20	ug/L							04/13/12	
Blank Spike (A203779-BS1)	**EPA 531.1 - Quality Control**										
3-Hydroxycarbofuran	29	3.0	ug/L	30		98	70-130			04/13/12	
Aldicarb	29	3.0	ug/L	30		97	70-130			04/13/12	
Aldicarb Sulfone	29	2.0	ug/L	30		97	70-130			04/13/12	
Aldicarb Sulfoxide	29	3.0	ug/L	30		97	70-130			04/13/12	
Carbaryl	30	5.0	ug/L	30		98	70-130			04/13/12	
Carbofuran	29	5.0	ug/L	30		97	70-130			04/13/12	
Methomyl	29	2.0	ug/L	30		98	70-130			04/13/12	
Oxamyl	29	20	ug/L	30		97	70-130			04/13/12	
Blank Spike Dup (A203779-BSD1)	**EPA 531.1 - Quality Control**										
3-Hydroxycarbofuran	23	3.0	ug/L	30		76	70-130	25	20	04/13/12	BS03
Aldicarb	23	3.0	ug/L	30		77	70-130	24	20	04/13/12	BS03
Aldicarb Sulfone	23	2.0	ug/L	30		76	70-130	24	20	04/13/12	BS03
Aldicarb Sulfoxide	22	3.0	ug/L	30		75	70-130	25	20	04/13/12	BS03
Carbaryl	24	5.0	ug/L	30		78	70-130	23	20	04/13/12	BS03
Carbofuran	23	5.0	ug/L	30		77	70-130	22	20	04/13/12	BS03
Methomyl	23	2.0	ug/L	30		77	70-130	24	20	04/13/12	BS03
Oxamyl	23	20	ug/L	30		76	70-130	25	20	04/13/12	BS03
Matrix Spike (A203779-MS1)	**EPA 531.1 - Quality Control**					**Source: A2D0273-01**					

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Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203779				Analyst: XHX		Prepared: 04/12/2012					
Matrix Spike (A203779-MS1) EPA 531.1 - Quality Control						**Source: A2D0273-01**					
3-Hydroxycarbofuran	22	3.0	ug/L	30	ND	73	70-130			04/13/12	
Aldicarb	22	3.0	ug/L	30	ND	73	70-130			04/13/12	
Aldicarb Sulfone	21	2.0	ug/L	30	ND	71	70-130			04/13/12	
Aldicarb Sulfoxide	21	3.0	ug/L	30	ND	70	70-130			04/13/12	
Carbaryl	22	5.0	ug/L	30	ND	75	70-130			04/13/12	
Carbofuran	22	5.0	ug/L	30	ND	73	70-130			04/13/12	
Methomyl	22	2.0	ug/L	30	ND	72	70-130			04/13/12	
Oxamyl	21	20	ug/L	30	ND	71	70-130			04/13/12	
Batch: A203806				Analyst: GAK		Prepared: 04/13/2012					
Blank (A203806-BLK1) EPA 525.2 - Quality Control											
Alachlor	ND	1.0	ug/L							04/16/12	
Atrazine	ND	0.50	ug/L							04/16/12	
Benzo(a)pyrene	ND	0.10	ug/L							04/16/12	
Bis(2-ethylhexyl) adipate	ND	3.0	ug/L							04/16/12	
Bis(2-ethylhexyl) phthalate	ND	3.0	ug/L							04/16/12	
Bromacil	ND	10	ug/L							04/16/12	
Butachlor	ND	0.38	ug/L							04/16/12	
Diazinon	ND	0.25	ug/L							04/16/12	
Dimethoate	ND	10	ug/L							04/16/12	
Metolachlor	ND	0.50	ug/L							04/16/12	
Metribuzin	ND	0.50	ug/L							04/16/12	
Molinate	ND	2.0	ug/L							04/16/12	
Propachlor	ND	0.50	ug/L							04/16/12	
Simazine	ND	1.0	ug/L							04/16/12	
Thiobencarb	ND	1.0	ug/L							04/16/12	
Surrogate: 1,3-Dimethyl-2-nitrobenzene	*5.1*			*5.0*		*103*	*70-130*			04/16/12	
Blank Spike (A203806-BS1) EPA 525.2 - Quality Control											
Alachlor	5.5	1.0	ug/L	4.9		112	70-130			04/16/12	
Atrazine	5.1	0.50	ug/L	4.9		104	70-130			04/16/12	
Benzo(a)pyrene	0.97	0.10	ug/L	0.99		98	70-130			04/16/12	
Bis(2-ethylhexyl) adipate	5.8	3.0	ug/L	4.9		118	70-130			04/16/12	
Bis(2-ethylhexyl) phthalate	6.6	3.0	ug/L	4.9		133	70-130			04/16/12	BS06 ***High***
Bromacil	5.9	10	ug/L	4.9		119	70-130			04/16/12	
Butachlor	2.7	0.38	ug/L	2.5		108	70-130			04/16/12	
Diazinon	2.4	0.25	ug/L	2.5		99	10-110			04/16/12	
Dimethoate	5.5	10	ug/L	4.9		111	70-130			04/16/12	
Metolachlor	5.7	0.50	ug/L	4.9		115	70-130			04/16/12	
Metribuzin	5.5	0.50	ug/L	4.9		111	70-130			04/16/12	
Molinate	5.2	2.0	ug/L	4.9		104	70-130			04/16/12	
Propachlor	5.5	0.50	ug/L	4.9		111	70-130			04/16/12	
Simazine	5.6	1.0	ug/L	4.9		112	70-130			04/16/12	
Thiobencarb	5.0	1.0	ug/L	4.9		101	70-130			04/16/12	
Surrogate: 1,3-Dimethyl-2-nitrobenzene	*5.8*			*4.9*		*117*	*70-130*			04/16/12	

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Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203806				Analyst: GAK		Prepared: 04/13/2012					
Blank Spike Dup (A203806-BSD1)	**EPA 525.2 - Quality Control**										
Alachlor	5.7	1.0	ug/L	4.9		115	70-130	3	30	04/16/12	
Atrazine	5.3	0.50	ug/L	4.9		108	70-130	4	30	04/16/12	
Benzo(a)pyrene	0.98	0.10	ug/L	0.99		100	70-130	2	30	04/16/12	
Bis(2-ethylhexyl) adipate	5.6	3.0	ug/L	4.9		113	70-130	5	30	04/16/12	
Bis(2-ethylhexyl) phthalate	6.2	3.0	ug/L	4.9		126	70-130	5	30	04/16/12	
Bromacil	6.5	10	ug/L	4.9		132	70-130	10	30	04/16/12	BS06 ***High***
Butachlor	3.0	0.38	ug/L	2.5		123	70-130	13	30	04/16/12	
Diazinon	2.4	0.25	ug/L	2.5		98	10-110	1	30	04/16/12	
Dimethoate	6.0	10	ug/L	4.9		122	70-130	9	30	04/16/12	
Metolachlor	5.9	0.50	ug/L	4.9		120	70-130	4	30	04/16/12	
Metribuzin	5.8	0.50	ug/L	4.9		118	70-130	5	30	04/16/12	
Molinate	5.6	2.0	ug/L	4.9		113	70-130	7	30	04/16/12	
Propachlor	5.6	0.50	ug/L	4.9		114	70-130	3	30	04/16/12	
Simazine	5.8	1.0	ug/L	4.9		118	70-130	5	30	04/16/12	
Thiobencarb	5.4	1.0	ug/L	4.9		109	70-130	7	30	04/16/12	
Surrogate: 1,3-Dimethyl-2-nitrobenzene	*5.5*			*4.9*		*112*	*70-130*			04/16/12	
Matrix Spike (A203806-MS1)	**EPA 525.2 - Quality Control**					**Source: A2D0488-01**					
Alachlor	5.7	1.0	ug/L	5.0	ND	112	70-130			04/16/12	
Atrazine	0.48	0.50	ug/L	5.0	ND	10	70-130			04/16/12	MS02 ***Low***
Benzo(a)pyrene	0.99	0.10	ug/L	1.0	ND	99	70-130			04/16/12	
Bis(2-ethylhexyl) adipate	6.2	3.0	ug/L	5.0	ND	123	70-130			04/16/12	
Bis(2-ethylhexyl) phthalate	6.5	3.0	ug/L	5.0	ND	123	70-130			04/16/12	
Bromacil	6.5	10	ug/L	5.0	ND	128	70-130			04/16/12	
Butachlor	2.9	0.38	ug/L	2.5	ND	117	70-130			04/16/12	
Diazinon	1.3	0.25	ug/L	2.5	ND	50	10-110			04/16/12	
Dimethoate	5.8	10	ug/L	5.0	ND	116	70-130			04/16/12	
Metolachlor	5.9	0.50	ug/L	5.0	ND	118	70-130			04/16/12	
Metribuzin	5.7	0.50	ug/L	5.0	ND	114	70-130			04/16/12	
Molinate	5.4	2.0	ug/L	5.0	ND	108	70-130			04/16/12	
Propachlor	5.5	0.50	ug/L	5.0	ND	110	70-130			04/16/12	
Simazine	0.42	1.0	ug/L	5.0	ND	8	70-130			04/16/12	MS02 ***Low***
Thiobencarb	5.4	1.0	ug/L	5.0	ND	107	70-130			04/16/12	
Surrogate: 1,3-Dimethyl-2-nitrobenzene	*5.8*			*5.0*		*115*	*70-130*			04/16/12	
Batch: A203826				Analyst: gak		Prepared: 04/13/2012					
Blank (A203826-BLK1)	**EPA 505 - Quality Control**										
Aldrin	ND	0.075	ug/L							04/14/12	
Chlordane	ND	0.10	ug/L							04/14/12	
Chlorothalonil	ND	5.0	ug/L							04/14/12	
Dieldrin	ND	0.020	ug/L							04/14/12	
Endrin	ND	0.10	ug/L							04/14/12	
Heptachlor	ND	0.010	ug/L							04/14/12	
Heptachlor Epoxide	ND	0.010	ug/L							04/14/12	
Hexachlorobenzene	ND	0.50	ug/L							04/14/12	
Hexachlorocyclopentadiene	ND	1.0	ug/L							04/14/12	

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Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203826				Analyst: gak		Prepared: 04/13/2012					
Blank (A203826-BLK1) EPA 505 - Quality Control											
Lindane	ND	0.20	ug/L							04/14/12	
Methoxychlor	ND	10	ug/L							04/14/12	
PCB Aroclor Screen	ND	0.50	ug/L							04/14/12	
Toxaphene	ND	1.0	ug/L							04/14/12	
Trifluralin	ND	1.0	ug/L							04/14/12	
Surrogate: TCMX	*1.7*			*1.5*		*110*	*70-130*			04/14/12	
Blank Spike (A203826-BS1) EPA 505 - Quality Control											
Aldrin	0.042	0.075	ug/L	0.040		106	70-130			04/14/12	
Chlorothalonil	0.40	5.0	ug/L	0.40		101	70-130			04/14/12	
Dieldrin	0.042	0.020	ug/L	0.040		105	70-130			04/14/12	
Endrin	0.040	0.10	ug/L	0.040		99	70-130			04/14/12	
Heptachlor	0.041	0.010	ug/L	0.040		103	70-130			04/14/12	
Heptachlor Epoxide	0.043	0.010	ug/L	0.040		107	70-130			04/14/12	
Hexachlorobenzene	0.16	0.50	ug/L	0.16		103	70-130			04/14/12	
Hexachlorocyclopentadiene	0.13	1.0	ug/L	0.12		106	70-130			04/14/12	
Lindane	0.042	0.20	ug/L	0.040		105	70-130			04/14/12	
Methoxychlor	0.043	10	ug/L	0.040		109	70-130			04/14/12	
Trifluralin	0.12	1.0	ug/L	0.12		103	70-130			04/14/12	
Surrogate: TCMX	*1.6*			*1.5*		*105*	*70-130*			04/14/12	
Blank Spike Dup (A203826-BSD1) EPA 505 - Quality Control											
Aldrin	0.040	0.075	ug/L	0.040		99	70-130	7	20	04/14/12	
Chlorothalonil	0.38	5.0	ug/L	0.40		95	70-130	6	20	04/14/12	
Dieldrin	0.039	0.020	ug/L	0.040		98	70-130	7	20	04/14/12	
Endrin	0.038	0.10	ug/L	0.040		94	70-130	5	20	04/14/12	
Heptachlor	0.039	0.010	ug/L	0.040		98	70-130	5	20	04/14/12	
Heptachlor Epoxide	0.039	0.010	ug/L	0.040		98	70-130	8	20	04/14/12	
Hexachlorobenzene	0.16	0.50	ug/L	0.16		98	70-130	5	20	04/14/12	
Hexachlorocyclopentadiene	0.12	1.0	ug/L	0.12		101	70-130	5	20	04/14/12	
Lindane	0.039	0.20	ug/L	0.040		98	70-130	6	20	04/14/12	
Methoxychlor	0.041	10	ug/L	0.040		102	70-130	6	20	04/14/12	
Trifluralin	0.12	1.0	ug/L	0.12		98	70-130	5	20	04/14/12	
Surrogate: TCMX	*1.5*			*1.5*		*100*	*70-130*			04/14/12	
Matrix Spike (A203826-MS1) EPA 505 - Quality Control					**Source: A2D0660-01**						
Aldrin	0.035	0.075	ug/L	0.040	ND	87	70-130			04/14/12	
Chlorothalonil	0.28	5.0	ug/L	0.40	ND	70	70-130			04/14/12	
Dieldrin	0.038	0.020	ug/L	0.040	ND	96	70-130			04/14/12	
Endrin	0.037	0.10	ug/L	0.040	ND	92	70-130			04/14/12	
Heptachlor	0.039	0.010	ug/L	0.040	ND	96	70-130			04/14/12	
Heptachlor Epoxide	0.039	0.010	ug/L	0.040	ND	97	70-130			04/14/12	
Hexachlorobenzene	0.16	0.50	ug/L	0.16	ND	98	70-130			04/14/12	
Hexachlorocyclopentadiene	0.12	1.0	ug/L	0.12	ND	99	70-130			04/14/12	
Lindane	0.041	0.20	ug/L	0.040	ND	102	70-130			04/14/12	
Methoxychlor	0.046	10	ug/L	0.040	ND	115	70-130			04/14/12	

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Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203826				Analyst: gak		Prepared: 04/13/2012					
Matrix Spike (A203826-MS1) EPA 505 - Quality Control						**Source: A2D0660-01**					
Trifluralin	0.12	1.0	ug/L	0.12	ND	102	70-130			04/14/12	
Surrogate: TCMX	*1.6*			*1.5*		*106*	*70-130*			04/14/12	
Batch: A203854				Analyst: PYA		Prepared: 04/16/2012					
Blank (A203854-BLK1) EPA 632 - Quality Control											
Diuron	ND	1.0	ug/L							04/17/12	
Surrogate: Benthiocarb	*130*			*120*		*106*	*70-130*			04/17/12	
Blank Spike (A203854-BS1) EPA 632 - Quality Control											
Diuron	5.4	1.0	ug/L	5.0		109	70-130			04/17/12	
Surrogate: Benthiocarb	*130*			*120*		*103*	*70-130*			04/17/12	
Blank Spike Dup (A203854-BSD1) EPA 632 - Quality Control											
Diuron	6.2	1.0	ug/L	5.0		123	70-130	12	30	04/17/12	
Surrogate: Benthiocarb	*150*			*120*		*120*	*70-130*			04/17/12	
Matrix Spike (A203854-MS1) EPA 632 - Quality Control						**Source: A2D0660-01**					
Diuron	5.6	1.0	ug/L	5.0	ND	111	70-130			04/17/12	
Surrogate: Benthiocarb	*130*			*120*		*104*	*70-130*			04/17/12	
Batch: A203894				Analyst: XHX		Prepared: 04/16/2012					
Blank (A203894-BLK1) EPA 504.1 - Quality Control											
Dibromochloropropane (DBCP)	ND	0.010	ug/L							04/16/12	
Ethylene Dibromide (EDB)	ND	0.020	ug/L							04/16/12	
Surrogate: Bromoform	*0.25*			*0.25*		*100*	*70-130*			04/16/12	
Blank Spike (A203894-BS1) EPA 504.1 - Quality Control											
Dibromochloropropane (DBCP)	0.25	0.010	ug/L	0.25		98	70-130			04/16/12	
Ethylene Dibromide (EDB)	0.26	0.020	ug/L	0.25		103	70-130			04/16/12	
Surrogate: Bromoform	*0.25*			*0.25*		*100*	*70-130*			04/16/12	
Blank Spike Dup (A203894-BSD1) EPA 504.1 - Quality Control											
Dibromochloropropane (DBCP)	0.23	0.010	ug/L	0.25		94	70-130	5	20	04/17/12	
Ethylene Dibromide (EDB)	0.25	0.020	ug/L	0.25		100	70-130	3	20	04/17/12	
Surrogate: Bromoform	*0.24*			*0.25*		*97*	*70-130*			04/17/12	
Matrix Spike (A203894-MS1) EPA 504.1 - Quality Control						**Source: A2D0503-03**					
Dibromochloropropane (DBCP)	0.24	0.010	ug/L	0.25	ND	96	70-130			04/16/12	
Ethylene Dibromide (EDB)	0.25	0.020	ug/L	0.25	ND	101	70-130			04/16/12	
Surrogate: Bromoform	*0.25*			*0.25*		*101*	*70-130*			04/16/12	
Batch: A204033				Analyst: JGB		Prepared: 04/19/2012					

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Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204033				Analyst: JGB		Prepared: 04/19/2012					
Blank (A204033-BLK1) EPA 524.2 - Quality Control											
1,1,1,2-Tetrachloroethane	ND	0.50	ug/L							04/19/12	
1,1,1-Trichloroethane	ND	0.50	ug/L							04/19/12	
1,1,2,2-Tetrachloroethane	ND	0.50	ug/L							04/19/12	
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	10	ug/L							04/19/12	
1,1,2-Trichloroethane	ND	0.50	ug/L							04/19/12	
1,1-Dichloroethane	ND	0.50	ug/L							04/19/12	
1,1-Dichloroethene	ND	0.50	ug/L							04/19/12	
1,1-Dichloropropene	ND	0.50	ug/L							04/19/12	
1,2,3-Trichlorobenzene	ND	0.50	ug/L							04/19/12	
1,2,4-Trichlorobenzene	ND	0.50	ug/L							04/19/12	
1,2,4-Trimethylbenzene	ND	0.50	ug/L							04/19/12	
1,2-Dichlorobenzene	ND	0.50	ug/L							04/19/12	
1,2-Dichloroethane	ND	0.50	ug/L							04/19/12	
1,2-Dichloropropane	ND	0.50	ug/L							04/19/12	
1,3,5-Trimethylbenzene	ND	0.50	ug/L							04/19/12	
1,3-Dichlorobenzene	ND	0.50	ug/L							04/19/12	
1,3-Dichloropropane	ND	0.50	ug/L							04/19/12	
1,4-Dichlorobenzene	ND	0.50	ug/L							04/19/12	
2,2-Dichloropropane	ND	0.50	ug/L							04/19/12	
2-Butanone	ND	5.0	ug/L							04/19/12	
2-Chlorotoluene	ND	0.50	ug/L							04/19/12	
2-Hexanone	ND	10	ug/L							04/19/12	
4-Chlorotoluene	ND	0.50	ug/L							04/19/12	
4-Methyl-2-pentanone	ND	5.0	ug/L							04/19/12	
Acetone	ND	10	ug/L							04/19/12	
Benzene	ND	0.50	ug/L							04/19/12	
Bromobenzene	ND	0.50	ug/L							04/19/12	
Bromochloromethane	ND	0.50	ug/L							04/19/12	
Bromodichloromethane	ND	0.50	ug/L							04/19/12	
Bromoform	ND	0.50	ug/L							04/19/12	
Bromomethane	ND	0.50	ug/L							04/19/12	
Carbon Tetrachloride	ND	0.50	ug/L							04/19/12	
Chlorobenzene	ND	0.50	ug/L							04/19/12	
Chloroethane	ND	0.50	ug/L							04/19/12	
Chloroform	ND	0.50	ug/L							04/19/12	
Chloromethane	ND	0.50	ug/L							04/19/12	
cis-1,2-Dichloroethene	ND	0.50	ug/L							04/19/12	
cis-1,3-Dichloropropene	ND	0.50	ug/L							04/19/12	
Dibromochloromethane	ND	0.50	ug/L							04/19/12	
Dibromomethane	ND	0.50	ug/L							04/19/12	
Dichlorodifluoromethane	ND	0.50	ug/L							04/19/12	
Dichloromethane	ND	0.50	ug/L							04/19/12	
Di-isopropyl ether (DIPE)	ND	3.0	ug/L							04/19/12	
Ethyl tert-Butyl Ether (ETBE)	ND	0.50	ug/L							04/19/12	
Ethylbenzene	ND	0.50	ug/L							04/19/12	
Hexachlorobutadiene	ND	0.50	ug/L							04/19/12	
Isopropylbenzene	ND	0.50	ug/L							04/19/12	
m,p-Xylenes	ND	0.50	ug/L							04/19/12	

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Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204033				Analyst: JGB		Prepared: 04/19/2012					
Blank (A204033-BLK1) EPA 524.2 - Quality Control											
Methyl-t-butyl ether	ND	0.50	ug/L							04/19/12	
Naphthalene	ND	0.50	ug/L							04/19/12	
n-Butylbenzene	ND	0.50	ug/L							04/19/12	
n-Propylbenzene	ND	0.50	ug/L							04/19/12	
o-Xylene	ND	0.50	ug/L							04/19/12	
p-Isopropyltoluene	ND	0.50	ug/L							04/19/12	
sec-Butylbenzene	ND	0.50	ug/L							04/19/12	
Styrene	ND	0.50	ug/L							04/19/12	
tert-Amyl Methyl Ether (TAME)	ND	3.0	ug/L							04/19/12	
tert-Butyl alcohol (TBA)	ND	2.0	ug/L							04/19/12	
tert-Butylbenzene	ND	0.50	ug/L							04/19/12	
Tetrachloroethene (PCE)	ND	0.50	ug/L							04/19/12	
Toluene	ND	0.50	ug/L							04/19/12	
trans-1,2-Dichloroethene	ND	0.50	ug/L							04/19/12	
trans-1,3-Dichloropropene	ND	0.50	ug/L							04/19/12	
Trichloroethene (TCE)	ND	0.50	ug/L							04/19/12	
Trichlorofluoromethane	ND	5.0	ug/L							04/19/12	
Vinyl Chloride	ND	0.50	ug/L							04/19/12	
Surrogate: 1,2-Dichlorobenzene-d4	*4.7*			*5.0*		*94*	*70-130*			04/19/12	
Surrogate: Bromofluorobenzene	*5.0*			*5.0*		*99*	*70-130*			04/19/12	
Blank Spike (A204033-BS1) EPA 524.2 - Quality Control											
1,1,1,2-Tetrachloroethane	10	0.50	ug/L	10		100	70-130			04/19/12	
1,1,1-Trichloroethane	11	0.50	ug/L	10		107	70-130			04/19/12	
1,1,2,2-Tetrachloroethane	9.0	0.50	ug/L	10		90	70-130			04/19/12	
1,1,2-Trichloro-1,2,2-trifluoroethane	11	10	ug/L	10		112	70-130			04/19/12	
1,1,2-Trichloroethane	10	0.50	ug/L	10		101	70-130			04/19/12	
1,1-Dichloroethane	9.6	0.50	ug/L	10		96	70-130			04/19/12	
1,1-Dichloroethene	11	0.50	ug/L	10		111	70-130			04/19/12	
1,1-Dichloropropene	10	0.50	ug/L	10		100	70-130			04/19/12	
1,2,3-Trichlorobenzene	10	0.50	ug/L	10		100	70-130			04/19/12	
1,2,4-Trichlorobenzene	9.3	0.50	ug/L	10		93	70-130			04/19/12	
1,2,4-Trimethylbenzene	8.9	0.50	ug/L	10		89	70-130			04/19/12	
1,2-Dichlorobenzene	9.0	0.50	ug/L	10		90	70-130			04/19/12	
1,2-Dichloroethane	12	0.50	ug/L	10		116	70-130			04/19/12	
1,2-Dichloropropane	9.7	0.50	ug/L	10		97	70-130			04/19/12	
1,3,5-Trimethylbenzene	9.8	0.50	ug/L	10		98	70-130			04/19/12	
1,3-Dichlorobenzene	8.8	0.50	ug/L	10		88	70-130			04/19/12	
1,3-Dichloropropane	10	0.50	ug/L	10		102	70-130			04/19/12	
1,4-Dichlorobenzene	8.9	0.50	ug/L	10		89	70-130			04/19/12	
2,2-Dichloropropane	10	0.50	ug/L	10		103	70-130			04/19/12	
2-Butanone	10	5.0	ug/L	10		104	70-130			04/19/12	
2-Chlorotoluene	9.3	0.50	ug/L	10		93	70-130			04/19/12	
2-Hexanone	11	10	ug/L	10		110	70-130			04/19/12	
4-Chlorotoluene	9.6	0.50	ug/L	10		96	70-130			04/19/12	
4-Methyl-2-pentanone	10	5.0	ug/L	10		101	70-130			04/19/12	
Acetone	17	10	ug/L	10		171	70-130			04/19/12	BS06 ***High***

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BSK Associates Engineers & Laboratories

Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204033				Analyst: JGB		Prepared: 04/19/2012					
Blank Spike (A204033-BS1)	**EPA 524.2 - Quality Control**										
Benzene	9.5	0.50	ug/L	10		95	70-130			04/19/12	
Bromobenzene	9.6	0.50	ug/L	10		96	70-130			04/19/12	
Bromochloromethane	9.9	0.50	ug/L	10		99	70-130			04/19/12	
Bromodichloromethane	11	0.50	ug/L	10		106	70-130			04/19/12	
Bromoform	11	0.50	ug/L	10		107	70-130			04/19/12	
Bromomethane	11	0.50	ug/L	10		107	70-130			04/19/12	
Carbon Tetrachloride	11	0.50	ug/L	10		107	70-130			04/19/12	
Chlorobenzene	9.9	0.50	ug/L	10		99	70-130			04/19/12	
Chloroethane	10	0.50	ug/L	10		101	70-130			04/19/12	
Chloroform	10	0.50	ug/L	10		103	70-130			04/19/12	
Chloromethane	11	0.50	ug/L	10		111	70-130			04/19/12	
cis-1,2-Dichloroethene	9.7	0.50	ug/L	10		97	70-130			04/19/12	
cis-1,3-Dichloropropene	11	0.50	ug/L	10		112	70-130			04/19/12	
Dibromochloromethane	11	0.50	ug/L	10		107	70-130			04/19/12	
Dibromomethane	11	0.50	ug/L	10		107	70-130			04/19/12	
Dichlorodifluoromethane	9.4	0.50	ug/L	10		94	70-130			04/19/12	
Dichloromethane	9.5	0.50	ug/L	10		95	70-130			04/19/12	
Di-isopropyl ether (DIPE)	9.2	3.0	ug/L	10		92	70-130			04/19/12	
Ethyl tert-Butyl Ether (ETBE)	10	0.50	ug/L	10		100	70-130			04/19/12	
Ethylbenzene	9.5	0.50	ug/L	10		95	70-130			04/19/12	
Hexachlorobutadiene	8.9	0.50	ug/L	10		89	70-130			04/19/12	
Isopropylbenzene	10	0.50	ug/L	10		100	70-130			04/19/12	
m,p-Xylenes	19	0.50	ug/L	20		95	70-130			04/19/12	
Methyl-t-butyl ether	21	0.50	ug/L	20		107	70-130			04/19/12	
Naphthalene	9.8	0.50	ug/L	10		98	70-130			04/19/12	
n-Butylbenzene	8.8	0.50	ug/L	10		88	70-130			04/19/12	
n-Propylbenzene	9.5	0.50	ug/L	10		95	70-130			04/19/12	
o-Xylene	10	0.50	ug/L	10		101	70-130			04/19/12	
p-Isopropyltoluene	8.9	0.50	ug/L	10		89	70-130			04/19/12	
sec-Butylbenzene	8.7	0.50	ug/L	10		87	70-130			04/19/12	
Styrene	12	0.50	ug/L	10		118	70-130			04/19/12	
tert-Amyl Methyl Ether (TAME)	10	3.0	ug/L	10		103	70-130			04/19/12	
tert-Butyl alcohol (TBA)	13	2.0	ug/L	10		130	70-130			04/19/12	
tert-Butylbenzene	9.3	0.50	ug/L	10		93	70-130			04/19/12	
Tetrachloroethene (PCE)	10	0.50	ug/L	10		100	70-130			04/19/12	
Toluene	9.7	0.50	ug/L	10		97	70-130			04/19/12	
trans-1,2-Dichloroethene	9.7	0.50	ug/L	10		97	70-130			04/19/12	
trans-1,3-Dichloropropene	11	0.50	ug/L	10		113	70-130			04/19/12	
Trichloroethene (TCE)	9.6	0.50	ug/L	10		96	70-130			04/19/12	
Trichlorofluoromethane	12	5.0	ug/L	10		119	70-130			04/19/12	
Vinyl Chloride	10	0.50	ug/L	10		104	70-130			04/19/12	
Surrogate: 1,2-Dichlorobenzene-d4	*4.4*			*5.0*		*89*	*70-130*			04/19/12	
Surrogate: Bromofluorobenzene	*4.8*			*5.0*		*97*	*70-130*			04/19/12	
Blank Spike Dup (A204033-BSD1)	**EPA 524.2 - Quality Control**										
1,1,1,2-Tetrachloroethane	9.3	0.50	ug/L	10		93	70-130	7	30	04/19/12	
1,1,1-Trichloroethane	11	0.50	ug/L	10		107	70-130	0	30	04/19/12	

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BSK Associates Engineers & Laboratories

Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual	
Batch: A204033				Analyst: JGB		Prepared: 04/19/2012						
Blank Spike Dup (A204033-BSD1)	**EPA 524.2 - Quality Control**											
1,1,2,2-Tetrachloroethane	7.4	0.50	ug/L	10		74	70-130	19	30	04/19/12		
1,1,2-Trichloro-1,2,2-trifluoroethane	11	10	ug/L	10		110	70-130	2	30	04/19/12		
1,1,2-Trichloroethane	8.8	0.50	ug/L	10		88	70-130	13	30	04/19/12		
1,1-Dichloroethane	9.9	0.50	ug/L	10		99	70-130	3	30	04/19/12		
1,1-Dichloroethene	11	0.50	ug/L	10		110	70-130	1	30	04/19/12		
1,1-Dichloropropene	9.7	0.50	ug/L	10		97	70-130	3	30	04/19/12		
1,2,3-Trichlorobenzene	9.0	0.50	ug/L	10		90	70-130	10	30	04/19/12		
1,2,4-Trichlorobenzene	8.4	0.50	ug/L	10		84	70-130	10	30	04/19/12		
1,2,4-Trimethylbenzene	8.9	0.50	ug/L	10		89	70-130	1	30	04/19/12		
1,2-Dichlorobenzene	8.0	0.50	ug/L	10		80	70-130	11	30	04/19/12		
1,2-Dichloroethane	10	0.50	ug/L	10		101	70-130	14	30	04/19/12		
1,2-Dichloropropane	9.0	0.50	ug/L	10		90	70-130	8	30	04/19/12		
1,3,5-Trimethylbenzene	9.8	0.50	ug/L	10		98	70-130	0	30	04/19/12		
1,3-Dichlorobenzene	8.2	0.50	ug/L	10		82	70-130	7	30	04/19/12		
1,3-Dichloropropane	8.9	0.50	ug/L	10		89	70-130	14	30	04/19/12		
1,4-Dichlorobenzene	8.3	0.50	ug/L	10		83	70-130	7	30	04/19/12		
2,2-Dichloropropane	10	0.50	ug/L	10		103	70-130	0	30	04/19/12		
2-Butanone	8.8	5.0	ug/L	10		88	70-130	16	30	04/19/12		
2-Chlorotoluene	9.1	0.50	ug/L	10		91	70-130	3	30	04/19/12		
2-Hexanone	8.3	10	ug/L	10		83	70-130	28	30	04/19/12		
4-Chlorotoluene	9.4	0.50	ug/L	10		94	70-130	2	30	04/19/12		
4-Methyl-2-pentanone	8.3	5.0	ug/L	10		83	70-130	20	30	04/19/12		
Acetone	14	10	ug/L	10		142	70-130	18	30	04/19/12	BS06	***High***
Benzene	9.4	0.50	ug/L	10		94	70-130	1	30	04/19/12		
Bromobenzene	8.8	0.50	ug/L	10		88	70-130	8	30	04/19/12		
Bromochloromethane	8.6	0.50	ug/L	10		86	70-130	14	30	04/19/12		
Bromodichloromethane	9.8	0.50	ug/L	10		98	70-130	8	30	04/19/12		
Bromoform	8.8	0.50	ug/L	10		88	70-130	19	30	04/19/12		
Bromomethane	11	0.50	ug/L	10		107	70-130	0	30	04/19/12		
Carbon Tetrachloride	11	0.50	ug/L	10		108	70-130	1	30	04/19/12		
Chlorobenzene	9.3	0.50	ug/L	10		93	70-130	6	30	04/19/12		
Chloroethane	10	0.50	ug/L	10		103	70-130	2	30	04/19/12		
Chloroform	10	0.50	ug/L	10		102	70-130	1	30	04/19/12		
Chloromethane	10	0.50	ug/L	10		103	70-130	7	30	04/19/12		
cis-1,2-Dichloroethene	9.6	0.50	ug/L	10		96	70-130	1	30	04/19/12		
cis-1,3-Dichloropropene	10	0.50	ug/L	10		101	70-130	11	30	04/19/12		
Dibromochloromethane	8.8	0.50	ug/L	10		88	70-130	20	30	04/19/12		
Dibromomethane	9.0	0.50	ug/L	10		90	70-130	17	30	04/19/12		
Dichlorodifluoromethane	10	0.50	ug/L	10		100	70-130	5	30	04/19/12		
Dichloromethane	9.2	0.50	ug/L	10		92	70-130	4	30	04/19/12		
Di-isopropyl ether (DIPE)	8.7	3.0	ug/L	10		87	70-130	6	30	04/19/12		
Ethyl tert-Butyl Ether (ETBE)	9.0	0.50	ug/L	10		90	70-130	10	30	04/19/12		
Ethylbenzene	9.4	0.50	ug/L	10		94	70-130	1	30	04/19/12		
Hexachlorobutadiene	8.7	0.50	ug/L	10		87	70-130	2	30	04/19/12		
Isopropylbenzene	9.8	0.50	ug/L	10		98	70-130	1	30	04/19/12		
m,p-Xylenes	18	0.50	ug/L	20		92	70-130	3	30	04/19/12		
Methyl-t-butyl ether	19	0.50	ug/L	20		94	70-130	13	30	04/19/12		

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BSK Associates Engineers & Laboratories

Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A204033				Analyst: JGB		Prepared: 04/19/2012					
Blank Spike Dup (A204033-BSD1)	**EPA 524.2 - Quality Control**										
Naphthalene	8.3	0.50	ug/L	10		83	70-130	17	30	04/19/12	
n-Butylbenzene	9.0	0.50	ug/L	10		90	70-130	2	30	04/19/12	
n-Propylbenzene	9.6	0.50	ug/L	10		96	70-130	1	30	04/19/12	
o-Xylene	9.7	0.50	ug/L	10		97	70-130	4	30	04/19/12	
p-Isopropyltoluene	8.9	0.50	ug/L	10		89	70-130	0	30	04/19/12	
sec-Butylbenzene	8.7	0.50	ug/L	10		87	70-130	0	30	04/19/12	
Styrene	11	0.50	ug/L	10		112	70-130	5	30	04/19/12	
tert-Amyl Methyl Ether (TAME)	8.6	3.0	ug/L	10		86	70-130	19	30	04/19/12	
tert-Butyl alcohol (TBA)	11	2.0	ug/L	10		109	70-130	17	30	04/19/12	
tert-Butylbenzene	9.3	0.50	ug/L	10		93	70-130	1	30	04/19/12	
Tetrachloroethene (PCE)	9.8	0.50	ug/L	10		98	70-130	2	30	04/19/12	
Toluene	9.6	0.50	ug/L	10		96	70-130	2	30	04/19/12	
trans-1,2-Dichloroethene	9.8	0.50	ug/L	10		98	70-130	1	30	04/19/12	
trans-1,3-Dichloropropene	9.7	0.50	ug/L	10		97	70-130	15	30	04/19/12	
Trichloroethene (TCE)	9.7	0.50	ug/L	10		97	70-130	1	30	04/19/12	
Trichlorofluoromethane	12	5.0	ug/L	10		118	70-130	1	30	04/19/12	
Vinyl Chloride	10	0.50	ug/L	10		103	70-130	1	30	04/19/12	
Surrogate: 1,2-Dichlorobenzene-d4	*4.3*			*5.0*		*85*	*70-130*			04/19/12	
Surrogate: Bromofluorobenzene	*4.6*			*5.0*		*93*	*70-130*			04/19/12	

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BSK Associates Engineers & Laboratories

Radiological Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203827				Analyst: RMJ		Prepared: 04/13/2012					
Blank (A203827-BLK1) EPA 00-02 - Quality Control											
1.65 Sigma Uncertainty	ND		±							04/17/12	
Gross Alpha	ND	3	pCi/L							04/17/12	
MDA95	ND	0.00	pCi/L							04/17/12	
Blank Spike (A203827-BS1) EPA 00-02 - Quality Control											
Gross Alpha	28.9	3	pCi/L	30		96	80-120			04/17/12	
Blank Spike Dup (A203827-BSD1) EPA 00-02 - Quality Control											
Gross Alpha	28.7	3	pCi/L	30		96	80-120	1	50	04/17/12	
Matrix Spike (A203827-MS1) EPA 00-02 - Quality Control						**Source: A2D0605-04**					
Gross Alpha	109	3	pCi/L	120	ND	90	70-130			04/17/12	
Matrix Spike (A203827-MS2) EPA 00-02 - Quality Control						**Source: A2D1006-01**					
Gross Alpha	153	3	pCi/L	120	13.0	117	70-130			04/17/12	
Matrix Spike Dup (A203827-MSD1) EPA 00-02 - Quality Control						**Source: A2D0605-04**					
Gross Alpha	139	3	pCi/L	120	ND	115	70-130	24	50	04/17/12	
Matrix Spike Dup (A203827-MSD2) EPA 00-02 - Quality Control						**Source: A2D1006-01**					
Gross Alpha	144	3	pCi/L	120	13.0	109	70-130	6	50	04/17/12	

1414 Stanislaus Street **Fresno, CA 93706** **(559) 497-2888** **FAX (559) 485-6935** **www.bsklabs.com**

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Certificate of Analysis

05/24/2012

Notes:

- The Chain of Custody document and Sample Integrity Sheet are part of the analytical report.
- Any remaining sample(s) for testing will be disposed of one month from the final report date unless other arrangements are made in advance.
- Sample(s) received, prepared, and analyzed within the method specified criteria unless otherwise noted within this report.
- The results relate only to the samples analyzed in accordance with test(s) requested by the client on the Chain of Custody document. Any analytical quality control exceptions to method criteria that are to be considered when evaluating these results have been flagged and are defined in the data qualifiers section.
- All results are expressed on wet weight basis unless otherwise specified.
- All positive results for EPA Methods 504.1, 502.2, and 524.2 require the analysis of a Field Reagent Blank (FRB) to confirm that the results are not a contamination error from field sampling steps. If Field Reagent Blanks were not submitted with the samples, this method requirement has not been performed.
- Results contained in this analytical report must be reproduced in its entirety.
- Samples collected by BSK Analytical Laboratories were collected in accordance with the BSK Sampling and Collection Standard Operating Procedures.
- BSK Analytical Laboratories certifies that the test results contained in this report meet all requirements of the NELAC Standards for applicable certified drinking water chemistry analyses unless qualified or noted in the Case Narrative.
- Analytical data contained in this report may be used for regulatory purposes to meet the requirements of the Federal or State drinking water, wastewater, and hazardous waste programs.
- J-value is equivalent to DNQ (Detected, not quantified) which is a trace value. A trace value is an analyte detected between the MDL and the laboratory reporting limit. This result is of an unknown data quality and is only qualitative (estimated). Baseline noise, calibration curve extrapolation below the lowest calibrator, method blank detections, and integration artifacts can all produce apparent DNQ values, which contribute to the un-reliability of these values.
- (1) - Residual chlorine and pH analysis have a 15 minute holding time for both drinking and waste water samples as defined by the EPA and 40 CFR 136. Waste water and ground water (monitoring well) samples must be field filtered to meet the 15 minute holding time for dissolved metals.
- * - This is not a NELAP accredited analyte.
- Summations of analytes (i.e. Total Trihalomethanes) may appear to add individual amounts incorrectly, due to rounding of analyte values occurring before or after the total value is calculated, as well as rounding of the total value.
- (2) The digestion used to produce this result deviated from EPA 200.2 by excluding hydrochloric acid in order to produce acceptable recoveries for affected metals.
- (2C) Result reported from secondary analytical column.
- RL Multiplier is the factor used to adjust the reporting limit (RL) due to variations in sample preparation procedures and dilutions required for matrix interferences.

Certifications:

State of California - CDPH - ELAP	1180
State of California - CDPH - NELAP	04227CA
State of Nevada - NDEP	CA000792009A
State of Hawaii - DOH	04227CA

Definitions and Flags for Data Qualifiers

mg/L:	Milligrams/Liter (ppm)	M:	Method Detection Limit	MDA95:	Min. Detected Activity
mg/Kg:	Milligrams/Kilogram (ppm)	RL:	Reporting Limit	MPN:	Most Probable Number
µg/L:	Micrograms/Liter (ppb)		:DL x Dilution	CFU:	Colony Forming Unit
µg/Kg:	Micrograms/Kilogram (ppb)	ND:	None Detected at RL	Absent:	Less than 1 CFU/100mLs
%:	Percent Recovered (surrogates)	pCi/L:	Picocuries per Liter	Present:	1 or more CFU/100mLs
		NR:	Non-Reportable	RL Mult:	RL Multiplier

MS02 Matrix spike recovery was low; the associated blank spike recovery was acceptable.

HT07 Extract hold time exceeded. Sample was not analyzed within 24h of extraction.

BS06 Blank spike recovery for this analyte was biased high; associated samples were ND.

BS03 BS/BSD RPD exceeded the acceptance limit. Recovery met acceptance criteria.

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A2D0660

City of Modesto Water Division/Corp Yard

Modes9588

04092012

Turnaround: Standard

Due Date: 04/23/2012

City of Modesto Water Division
Chain of Custody

LAB: BSK

DATE: 4/9/12

SAMPLER: Brent Jonson

SOURCE: X Groundwater ____ System ____ Surface

REASON FOR ANALYSIS: ____ Routine ____ Repeat X Investigative

Sample ID:	Description	Analysis	Time	AM/PM
				AM/PM
	Hickman Test Well	GM/IO/GP Title 22 Organic&	0925	AM/PM
Level 235		Title 22 externals		AM/PM
				AM/PM
				AM/PM
				AM/PM
				AM/PM
				AM/PM
				AM/PM
				AM/PM
				AM/PM
				AM/PM
				AM/PM
				AM/PM

Sampled by	Brent Jonson	Date: 4/9/12	Time: 0925 AM/PM
Relinquished by	[illegible]	4/9/12	1129 AM/PM
Received by	[illegible]	4/9/12	12:35 AM/PM
Relinquished by	[illegible]	4/9/12	14:33 AM/PM
Received by	[illegible]	4/9/12	1433 AM/PM

A2D0660
Modes9588

04/09/2012
10

Sample Integrity

Pg. 1 of 2

Date Received 4/9/12

Section 1- Receiving Information

Sample Transport: ONTRAC UPS PMS Walk-In BSK-Courier GSO Fed Exp. Other: _____

Samples arrived at lab on same day sampled: Yes ✓ No ___ Has Chilling Process Begun: Yes ✓ No ___

Coolers/Ice Chests Description/Temperature(s): (If more than 5 received, list information in comment section)

1) 4 2) _____ 3) _____ 4) _____ 5) _____

Was Temperature In Range: Y N N/A Received On Ice: Wet Blue Received Ambient: Y N

Describe type of packing materials: Bubble Wrap Foam Packing Peanuts Paper Other: _____

Initial Receipt: BSK-Visalia BSK-Bakersfield BSK-SAC BSK-FAL

Were ice chest custody seals present? Y N Intact: Y N

Section 2- COC Info.	Completed Yes	Completed No	Info From Container		Completed Yes	Completed No	Info From Container
Was COC Received	✓			Analysis Requested	✓		
Date Sampled	✓			Hold times less than 72hr	✓		
Time Sampled	✓			Client Name	✓		
Sample ID	✓			Address	✓		
Special Storage/Handling Ins.		—		Telephone #			

Section 3- Bottles / Analysis	Yes	No	N/A	Comment
Did all bottles arrive unbroken and intact?	✓			
Were bottle custody seals present?		✓		
Were bottle custody seals intact?		✓		
Did all bottle labels agree with COC?	✓			
Were correct containers used for the tests requested?	✓			
Were correct preservations used for the tests requested?	✓			
Was a sufficient amount of sample sent for tests indicated?	✓			
Were bubbles present in VOA Vials? (**Volatile Methods Only**)		✓		
Were Ascorbic Acid Bottles received with the VOAs?		✓		

Section 4- Comments / Discrepancies

Sample(s) Split/Preserve: Yes No Container: _____ Preservation: _____ Dt/Time/Init _____

Container: _____ Preservation: _____ Dt/Time/Init _____

Was Client Service Rep. notified of discrepancies: Yes No N/A CSR: _____ Notified By/Time: _____

Explanations / Comments

Report Comment Entered:

Labeled by: MM @ 1512 Labels checked by: M @ 1533 RUSH Paged by: _____ @ _____

(4/11)

Sample Integrity Pg 2 of 2

BSK Bottles Yes No

A2D0660
Modes9588

04/09/2012
10

250ml (A) 500ml (B) 1Liter (C) Amber Glass (AG)

Container(s) Received	1						
Bacti $Na_2S_2O_3$							
None (p) White Cap	x						
None (p) Blue Cap w/NH4 + Buffer							
HNO_3 (p) Red Cap	1B4C						
H_2SO_4 (p) Yellow Cap							
NaOH (p) Green Cap	10						
EDA (p) Brown Cap/Label							
Other:							
Dissolved Oxygen 300ml (g)							
250ml (AG) None							
250ml (AG) H_2SO_4 COD Yellow Label							
250ml (AG) $Na_2S_2O_3$ 515,547 Blue Label	2						
250ml (AG) $Na_2S_2O_3$+ MCAA 531.1 Orange Label	1						
250ml (AG) NH_4Cl 552 Purple Label							
250ml (AG) EDA DBPs Brown Label							
250ml (AG) Other:							
500ml (AG) None	1						
500ml (AG) H_2SO_4 Yellow Label							
1 Liter (AG) None	4						
1 Liter (AG) H_2SO_4 O&G / TPH-Diesel Yellow Label							
1 Liter (AG) $Na_2S_2O_3$ 548 / 525 / 521 Blue Label	3						4/9/12
1 Liter (P) $Na_2S_2O_3$+ H_2SO_4 549	1						
1 Liter (AG) NaOH+ZnAc Sulfide							88
40ml VOA Vial Clear – HCL	3						
40ml VOA Vial Clear – Buffer pH 4							
40ml VOA Vial Clear – None							
40ml VOA Vial Amber – $Na_2S_2O_3$							
40ml VOA Vial Clear - $Na_2S_2O_3$ 504, 505	10						
40ml VOA Vial Clear – H_3PO_4							
Other:							
½ Gallon (p)							
Asbestos 1Liter Plastic/Foil							
Radon 200ml Clear (g)							
Low Level Hg/Metals Double Baggie							
Bioassay Jug							
Ampule							
PT Sample Bottle							
250 Clear Glass Jar							
500 Clear Glass Jar							
1 Liter Clear Glass Jar							
Plastic Bag							
Soil Tube Brass / Steel / Plastic							
Tedlar Bags							

External

A2D0660

Pace Analytical Services, Inc.
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

May 15, 2012

Ms. Michelle Harmstead
BSK Analytical Laboratories
1414 Stanislaus St.
Fresno, CA 93706

RE: Project: A2D0660
Pace Project No.: 3067901

Dear Ms. Harmstead:
Enclosed are the analytical results for sample(s) received by the laboratory on April 20, 2012. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Jacquelyn Collins

jacquelyn.collins@pacelabs.com
Project Manager

Enclosures

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CERTIFICATIONS

Project: A2D0660
Pace Project No.: 3067901

Pennsylvania Certification IDs
1638 Roseytown Rd Suites 2,3&4 Greensburg, PA 15601
ACLASS DOD-ELAP Accreditation #: ADE-1544
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California/TNI Certification #: 04222CA
Colorado Certification
Connecticut Certification #: PH 0694
Delaware Certification
Florida/TNI Certification #: E87683
Guam/PADEP Certification
Hawaii/PADEP Certification
Idaho Certification
Illinois/PADEP Certification
Indiana/PADEP Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: 90133
Louisiana/TNI Certification #: LA080002
Louisiana/TNI Certification #: 4086
Maine Certification #: PA0091
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification
Missouri Certification #: 235
Montana Certification #: Cert 0082
Nevada Certification
New Hampshire/TNI Certification #: 2976
New Jersey/TNI Certification #: PA 051
New Mexico Certification
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
Oregon/TNI Certification #: PA200002
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
South Dakota Certification
Tennessee Certification #: TN2867
Texas/TNI Certification #: T104704188
Utah/TNI Certification #: ANTE
Virgin Island/PADEP Certification
Virginia Certification #: 00112
Virginia VELAP (Cert # 460198)
Washington Certification #: C868
West Virginia Certification #: 143
Wisconsin/PADEP Certification
Wyoming Certification #: 8TMS-Q

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SAMPLE SUMMARY

Project: A2D0660
Pace Project No.: 3067901

Lab ID	Sample ID	Matrix	Date Collected	Date Received
3067901001	**A2D0660-01**	Drinking Water	04/09/12 09:25	04/20/12 09:30

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SAMPLE ANALYTE COUNT

Project: A2D0660
Pace Project No.: 3067901

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
3067901001	**A2D0660-01**	EPA 903.1	SLA	1	PASI-PA
		EPA 904.0	WRR	1	PASI-PA

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PROJECT NARRATIVE

Project: A2D0660
Pace Project No.: 3067901

Method: EPA 903.1
Description: 903.1 Radium 226
Client: BSK Analytical Laboratories
Date: May 15, 2012

General Information:
1 sample was analyzed for EPA 903.1. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

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PROJECT NARRATIVE

Project: A2D0660
Pace Project No.: 3067901

Method: **EPA 904.0**
Description: 904.0 Radium 228
Client: BSK Analytical Laboratories
Date: May 15, 2012

General Information:
1 sample was analyzed for EPA 904.0. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

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ANALYTICAL RESULTS

Project: A2D0660
Pace Project No.: 3067901

Sample: A2D0660-01 **Lab ID: 3067901001** Collected: 04/09/12 09:25 Received: 04/20/12 09:30 Matrix: Drinking Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC)	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.000 ± 0.292 (0.632)**	pCi/L	05/10/12 14:27	13982-63-3	
Radium-228	EPA 904.0	**0.176 ± 0.424 (0.947)**	pCi/L	05/14/12 15:17	15262-20-1	

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QUALITY CONTROL DATA

Project: A2D0660
Pace Project No.: 3067901

QC Batch: RADC/11895
QC Batch Method: EPA 904.0
Analysis Method: EPA 904.0
Analysis Description: 904.0 Radium 228
Associated Lab Samples: 3067901001

METHOD BLANK: 434311
Matrix: Water
Associated Lab Samples: 3067901001

Parameter	Act ± Unc (MDC)	Units	Analyzed	Qualifiers
Radium-228	0.116 ± 0.411 (0.930)	pCi/L	05/14/12 15:16	

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QUALITY CONTROL DATA

Project: A2D0660
Pace Project No.: 3067901

QC Batch: RADC/11908
QC Batch Method: EPA 903.1
Analysis Method: EPA 903.1
Analysis Description: 903.1 Radium-226
Associated Lab Samples: 3067901001

METHOD BLANK: 434336
Matrix: Water
Associated Lab Samples: 3067901001

Parameter	Act ± Unc (MDC)	Units	Analyzed	Qualifiers
Radium-226	-0.243 ± 0.378 (0.914)	pCi/L	05/10/12 14:27	

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QUALIFIERS

Project: A2D0660
Pace Project No.: 3067901

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Act - Activity

Unc - Uncertainty

(MDC) - Minimum Detectable Concentration

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-PA Pace Analytical Services - Greensburg

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BSK Analytical Laboratories
Engineering Laboratories

SUBCONTRACT ORDER

A2D1159

SENDING LABORATORY:

BSK Associates
1414 Stanislaus St
Fresno, CA 93706
Phone: 559-497-2888
Fax: 559-485-6935
Project Manager: Michelle Harmstead
E-mail: mharmstead@bskinc.com

RECEIVING LABORATORY:

Pace Analytical-Radiochem
1638 Roseytown Rd Ste 2,3,4
Greensburg, PA 15601
Phone :(724) 850-5600
Fax: (724) 722-5208
Turnaround (Days): Standard
QC Deliverables: I Std III IV

3067997

Sample ID	Samp Desc	Sample Date
A2D1159-01	Hickman Test Well 350' depth	04/13/2012 09:20

Sample Alias: 142098
Matrix: Water

Analysis (2) L P w/ HNO^3
EXT-Radium 226
EXT-Radium 228

Released By	Date	Received By	Date
	4/16/12		4/23/12 0940

Sample Condition Upon Receipt

Pace Analytical

Client Name: BSK Project # 30567997

Courier: ☐ Fed Ex ☒ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace Other _____

Tracking #: 1Z9 3X9 21035679 5009

Custody Seal on Cooler/Box Present: ☐ yes ☒ no Seals intact: ☐ yes ☐ no

Optional
Proj. Due Date:
Proj. Name:

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☐ None ☒ Other Paper

Thermometer Used 5 6 7 Type of Ice: Wet Blue None ☐ Samples on ice, cooling process has begun

Cooler Temperature NA Biological Tissue is Frozen: Yes No

Date and initials of person examining contents: 4-23-12

Temp should be above freezing to 6°C

				Comments:
Chain of Custody Present:	☒Yes	☐No	☐N/A	1.
Chain of Custody Filled Out:	☒Yes	☐No	☐N/A	2.
Chain of Custody Relinquished:	☒Yes	☐No	☐N/A	3.
Sampler Name & Signature on COC:	☐Yes	☒No	☐N/A	4.
Samples Arrived within Hold Time:	☒Yes	☐No	☐N/A	5.
Short Hold Time Analysis (<72hr):	☐Yes	☒No	☐N/A	6.
Rush Turn Around Time Requested:	☐Yes	☒No	☐N/A	7.
Sufficient Volume:	☒Yes	☐No	☐N/A	8.
Correct Containers Used:	☒Yes	☐No	☐N/A	9.
-Pace Containers Used:	☐Yes	☒No	☐N/A	
Containers Intact:	☒Yes	☐No	☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes	☐No	☒N/A	11.
Sample Labels match COC:	☒Yes	☐No	☐N/A	12.
-Includes date/time/ID/Analysis Matrix: WT				
All containers needing preservation have been checked.	☒Yes	☐No	☐N/A	13. pH<2
All containers needing preservation are found to be in compliance with EPA recommendation.	☒Yes	☐No	☐N/A	
exceptions: VOA, coliform, TOC, O&G, WI-DRO (water)	☐Yes	☐No		Initial when completed: AJ Lot # of added preservative
Samples checked for dechlorination:	☐Yes	☐No	☒N/A	14.
Headspace in VOA Vials (>6mm):	☐Yes	☐No	☒N/A	15.
Trip Blank Present:	☐Yes	☐No	☒N/A	16.
Trip Blank Custody Seals Present	☐Yes	☐No	☐N/A	
Pace Trip Blank Lot # (if purchased):				

Client Notification/ Resolution: Field Data Required? Y / N

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: _____ **Date:** 4/23/12

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

F-ALL-C003-6 SCURF front 2April2012.xls

Quality Control Sample Performance Assessment

Pace Analytical

Test:	Ra-226
Analyst:	SLA
Date:	5/1/2012
Worklist:	11909
Matrix:	DW

Analyst Must Manually Enter All Fields Highlighted in Yellow.

Method Blank Assessment

MB Sample ID	434337
MB concentration:	0.205
MB Counting Uncertainty:	0.431
MB MDC:	0.704
MB Numerical Performance Indicator:	4.25
MB Status vs Numerical Indicator:	N/A
MB Status vs. MDC:	Pass

Laboratory Control Sample Assessment

	LCSD (Y or N)?	Y
	LCS11909	LCSD11909
Count Date:	5/12/2012	5/12/2012
Spike I.D.:	12-011	12-011
Spike Concentration (pCi/mL):	56.715	56.715
Volume Used (mL):	0.10	0.10
Aliquot Volume (L, g, F):	0.500	0.500
Target Conc. (pCi/L, g, F):	11.343	11.343
Uncertainty (Calculated):	0.272	0.272
Result (pCi/L, g, F):	10.555	14.285
LCS/LCSD Counting Uncertainty (pCi/L, g, F):	1.929	2.141
Numerical Performance Indicator:	-0.79	2.57
Percent Recovery:	93.06%	125.94%
Status vs Numerical Indicator:	N/A	N/A
Status vs Recovery:	Pass	Pass

Sample Matrix Spike Control Assessment

Sample Collection Date:	4/25/2012
Sample I.D.	3068159001
Sample MS I.D.	3068159001MS
Sample MSD I.D.	
Spike I.D.:	12-011
MS/MSD Decay Corrected Spike Concentration (pCi/mL):	56.717
Spike Volume Used in MS (mL):	0.20
Spike Volume Used in MSD (mL):	
MS Aliquot (L, g, F):	0.500
MS Target Conc.(pCi/L, g, F):	22.687
MSD Aliquot (L, g, F):	
MSD Target Conc. (pCi/L, g, F):	
Spike uncertainty (calculated):	0.544
Sample Result:	0.223
Sample Result Counting Uncertainty (pCi/L, g, F):	0.526
Sample Matrix Spike Result:	25.293
Matrix Spike Result Counting Uncertainty (pCi/L, g, F):	2.778
Sample Matrix Spike Duplicate Result:	
Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F):	
MS Numerical Performance Indicator:	1.622
MSD Numerical Performance Indicator:	
MS Percent Recovery:	110.50%
MSD Percent Recovery:	
MS Status vs Numerical Indicator:	N/A
MSD Status vs Numerical Indicator:	
MS Status vs Recovery:	Pass
MSD Status vs Recovery:	

Duplicate Sample Assessment

Sample I.D.:	LCS11909
Duplicate Sample I.D.	LCSD11909
Sample Result (pCi/L, g, F):	10.555
Sample Result Counting Uncertainty (pCi/L, g, F):	1.929
Sample Duplicate Result (pCi/L, g, F):	14.285
Sample Duplicate Result Counting Uncertainty (pCi/L, g, F):	2.141
Are sample and/or duplicate results below MDC?	NO
Duplicate Numerical Performance Indicator:	-2.537
Duplicate RPD:	30.03%
Duplicate Status vs Numerical Indicator:	N/A
Duplicate Status vs RPD:	Pass

Enter Duplicate sample IDs if other than LCS/LCSD in the space below.

Matrix Spike/Matrix Spike Duplicate Sample Assessment

Sample I.D.	
Sample MS I.D.	
Sample MSD I.D.	
Sample Matrix Spike Result:	
Matrix Spike Result Counting Uncertainty (pCi/L, g, F):	
Sample Matrix Spike Duplicate Result:	
Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F):	
Duplicate Numerical Performance Indicator:	
MS/ MSD Duplicate RPD:	
MS/ MSD Duplicate Status vs Numerical Indicator:	
MS/ MSD Duplicate Status vs RPD:	

Evaluation of duplicate precision is not applicable if either the sample or duplicate results are below the MDC.

Comments:

MS 5/18/12

Quality Control Sample Performance Assessment

Pace Analytical

Test:	Ra-228
Analyst:	WRR
Date:	4/13/2012
Worklist:	11896
Matrix:	DW

Analyst Must Manually Enter All Fields Highlighted In Yellow.

Method Blank Assessment

MB Sample ID	434312
MB concentration:	-0.134
MB Counting Uncertainty:	0.420
MB MDC:	0.973
MB Numerical Performance Indicator:	-0.63
MB Status vs Numerical Indicator:	N/A
MB Status vs. MDC:	Pass

Laboratory Control Sample Assessment

	LCSD (Y or N)?	Y
	LCS11896	LCSD11896
Count Date:	5/17/2012	5/17/2012
Spike I.D.:	11-024	11-024
Spike Concentration (pCi/mL):	60.719	60.719
Volume Used (mL):	0.10	0.10
Aliquot Volume (L, g, F):	0.800	0.800
Target Conc. (pCi/L, g, F):	7.590	7.590
Uncertainty (Calculated):	0.235	0.235
Result (pCi/L, g, F):	5.351	5.867
LCS/LCSD Counting Uncertainty (pCi/L, g, F):	0.922	0.963
Numerical Performance Indicator:	-4.61	-3.41
Percent Recovery:	70.50%	77.30%
Status vs Numerical Indicator:	N/A	N/A
Status vs Recovery:	Pass	Pass

Sample Matrix Spike Control Assessment

Sample Collection Date:	4/25/2012
Sample I.D.	3068160001
Sample MS I.D.	3068160001MS
Sample MSD I.D.	
Spike I.D.:	11-024
MS/MSD Decay Corrected Spike Concentration (pCi/mL):	61.166
Spike Volume Used in MS (mL):	0.20
Spike Volume Used in MSD (mL):	
MS Aliquot (L, g, F):	0.800
MS Target Conc.(pCi/L, g, F):	15.291
MSD Aliquot (L, g, F):	
MSD Target Conc. (pCi/L, g, F):	
Spike uncertainty (calculated):	0.474
Sample Result:	0.494
Sample Result Counting Uncertainty (pCi/L, g, F):	0.471
Sample Matrix Spike Result:	11.476
Matrix Spike Result Counting Uncertainty (pCi/L, g, F):	1.461
Sample Matrix Spike Duplicate Result:	
Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F):	
MS Numerical Performance Indicator:	-5.259
MSD Numerical Performance Indicator:	
MS Percent Recovery:	71.62%
MSD Percent Recovery:	
MS Status vs Numerical Indicator:	N/A
MSD Status vs Numerical Indicator:	
MS Status vs Recovery:	Pass
MSD Status vs Recovery:	

Duplicate Sample Assessment

Sample I.D.:	LCS11896	Enter Duplicate sample IDs if other than LCS/LCSD in the space below.
Duplicate Sample I.D.	LCSD11896	
Sample Result (pCi/L, g, F):	5.351	
Sample Result Counting Uncertainty (pCi/L, g, F):	0.922	
Sample Duplicate Result (pCi/L, g, F):	5.867	
Sample Duplicate Result Counting Uncertainty (pCi/L, g, F):	0.963	
Are sample and/or duplicate results below MDC?	NO	
Duplicate Numerical Performance Indicator:	-0.759	
Duplicate RPD:	9.20%	
Duplicate Status vs Numerical Indicator:	N/A	
Duplicate Status vs RPD:	Pass	

Matrix Spike/Matrix Spike Duplicate Sample Assessment

Sample I.D.	
Sample MS I.D.	
Sample MSD I.D.	
Sample Matrix Spike Result:	
Matrix Spike Result Counting Uncertainty (pCi/L, g, F):	
Sample Matrix Spike Duplicate Result:	
Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F):	
Duplicate Numerical Performance Indicator:	
MS/ MSD Duplicate RPD:	
MS/ MSD Duplicate Status vs Numerical Indicator:	
MS/ MSD Duplicate Status vs RPD:	

Evaluation of duplicate precision is not applicable if either the sample or duplicate results are below the MDC.

Comments:

MS 5/18/12

Pace Analytical Services, Inc.
1700 Elm Street
Minneapolis, MN 55414
Phone: 612.607.1700
Fax: 612.607.6444

www.pacelabs.com

Report Prepared for:

Michelle Harmstead
BSK Analytical Laboratories
1414 Stanislaus Street
Fresno CA 93706

REPORT OF LABORATORY ANALYSIS FOR 2,3,7,8-TCDD

Report Summary:

This report contains results of one drinking water sample analyzed to determine 2,3,7,8-TCDD content. This sample was analyzed according to Method 1613 by High Resolution Gas Chromatography/High Resolution Mass Spectrometry.

Report Prepared Date:

April 25, 2012

Report Information:

Pace Project #: 10188453
Sample Receipt Date: 04/11/2012
Client Project #: A2D0660
Client Sub PO #: N/A
State Cert #: 01155CA

Invoicing & Reporting Options:

The report provided has been invoiced as a Level 2 Drinking Water Report. If an upgrade of this report package is requested, an additional charge may be applied.

Please review the attached invoice for accuracy and forward any questions to Emily Hazelroth, your Pace Project Manager.

This report has been reviewed by:

April 25, 2012

Emily Hazelroth, Project Manager
(612) 607-6407
(612) 607-6444 (fax)
emily.hazelroth@pacelabs.com

ACCREDITED IN ACCORDANCE WITH nelac

Report of Laboratory Analysis

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The results relate only to the samples included in this report.

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612- 607-6444

Minnesota Laboratory Certifications

Authority	Certificate #	Authority	Certificate #
Alabama	40770	Montana	92
Alaska	MN00064	Nebraska	
Arizona	AZ0014	Nevada	MN_00064_200
Arkansas	88-0680	New Jersey (N	MN002
California	01155CA	New Mexico	MN00064
Colorado	MN00064	New York (NEL	11647
Connecticut	PH-0256	North Carolina	27700
EPA Region 5	WD-15J	North Dakota	R-036
EPA Region 8	8TMS-Q	Ohio	4150
Florida (NELAP	E87605	Ohio VAP	CL101 9507
Georgia (DNR)	959	Oklahoma	D9922
Guam	959	Oregon (ELAP)	MN200001-005
Hawaii	SLD	Oregon (OREL	MN300001-001
Idaho	MN00064	Pennsylvania	68-00563
Illinois	200012	Saipan	MP0003
Indiana	C-MN-01	South Carolina	74003001
Indiana	C-MN-01	Tennesee	2818
Iowa	368	Tennessee	02818
Kansas	E-10167	Texas	T104704192-08
Kentucky	90062	Utah (NELAP)	PAM
Louisiana	LA0900015	Virginia	00251
Maine	2007029	Washington	C755
Maryland	322	West Virginia	9952C
Michigan	9909	Wisconsin	999407970
Minnesota	027-053-137	Wyoming	8TMS-Q
Mississippi	MN00064		

REPORT OF LABORATORY ANALYSIS

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Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612- 607-6444

Reporting Flags

A = Reporting Limit based on signal to noise

B = Less than 10x higher than method blank level

C = Result obtained from confirmation analysis

D = Result obtained from analysis of diluted sample

E = Exceeds calibration range

I = Interference present

J = Estimated value

Nn = Value obtained from additional analysis

P = PCDE Interference

R = Recovery outside target range

S = Peak saturated

U = Analyte not detected

V = Result verified by confirmation analysis

X = %D Exceeds limits

Y = Calculated using average of daily RFs

* = See Discussion

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BSK Analytical Laboratories
Engineers & Laboratories

1148

SUBCONTRACT ORDER

A2D0660

10188453

SENDING LABORATORY:

BSK Associates
1414 Stanislaus St
Fresno, CA 93706
Phone: 559-497-2888
Fax: 559-485-6935
Project Manager: Michelle Harmstead
E-mail: mharmstead@bskinc.com

RECEIVING LABORATORY:

Pace Analytical-Dioxin
1700 Elm Street S.E. Stuite 200
Minneapolis, MN 55414
Phone :(612) 607-1700
Fax: (612) 607-6444
Turnaround (Days): Standard
QC Deliverables: I Std III IV

Sample ID	Samp Desc		Sample Date
A2D0660-01	Hickman Test Well - Level 235	10188453001	04/09/2012 09:25

Matrix: Water

Analysis 1 L AG w/ NONE
EXT-Dioxin, EPA 1613 2,3,7,8-TCDD

T= 3.0

Released By	Date	Received By	Date
[signature]	4/10/12	[signature] Pace	4/11/12 0957
Released By	Date	Received By	Date

Pace Analytical*	Document Name: **Sample Condition Upon Receipt Form**	Revised Date: 15Feb2012 Page 1 of 1
	Document Number: **F-MN-L-213-rev.02**	Issuing Authority: Pace Minnesota Quality Office

Sample Condition Upon Receipt

Client Name: BSK **Project #** 10188453

Courier: ☒ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace Other _____

Tracking #: 7934387359 21

Custody Seal on Cooler/Box Present: ☒ yes ☐ no Seals intact: ☒ yes ☐ no

Packing Material: ☐ Bubble Wrap ☒ Bubble Bags ☒ None ☐ Other _____ Temp Blank: Yes ____ No ☒

Thermometer Used 80844042 or 80512447 **Type of Ice:** Wet Blue None ☐ Samples on ice, cooling process has begun

Cooler Temperature 3.0 **Biological Tissue is Frozen:** Yes No

Temp should be above freezing to 6°C

Date and Initials of person examining contents: 4/11/12 SA

		Comments:
Chain of Custody Present:	☒Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☒Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☒Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☐Yes ☒No ☐N/A	4.
Samples Arrived within Hold Time:	☒Yes ☐No ☐N/A	5.
Short Hold Time Analysis (<72hr):	☐Yes ☒No ☐N/A	6.
Rush Turn Around Time Requested:	☐Yes ☒No ☐N/A	7.
Sufficient Volume:	☒Yes ☐No ☐N/A	8.
Correct Containers Used:	☒Yes ☐No ☐N/A	9.
-Pace Containers Used:	☐Yes ☒No ☐N/A	
Containers Intact:	☒Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☒N/A	11.
Sample Labels match COC:	☒Yes ☐No ☐N/A	12.
-Includes date/time/ID/Analysis. Matrix: WT		
All containers needing acid/base preservation have been checked. Noncompliance are noted in 13.	☐Yes ☐No ☒N/A	13. ☐ HNO3 ☐ H2SO4 ☐ NaOH ☐ HCl Samp #
All containers needing preservation are found to be in compliance with EPA recommendation. (HNO3, H2SO4, HCL<2; NaOH >12)	☐Yes ☐No ☒N/A	
Exceptions: VOA,Coliform, TOC, Oil and Grease, WI-DRO (water)	☐Yes ☒No	Initial when completed SA Lot # of added preservative
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☒N/A	14.
Trip Blank Present:	☐Yes ☒No ☐N/A	15.
Trip Blank Custody Seals Present	☐Yes ☐No ☒N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution: Field Data Required? Y / N

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: SKH **Date:** 4/12/12

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

Pace AnalyticalServices, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612-607-6444

Drinking Water Analysis Results
2,3,7,8-TCDD -- USEPA Method 1613B

Sample ID.....A2D0660-01
Client..... BSK Analytical Laboratories
Lab Sample ID.....10188453001

Date Collected.....04/09/2012
Date Received.....04/11/2012
Date Extracted.....04/13/2012

	Sample A2D0660-01	Method Blank	Lab Spike	Lab Spike Dup
[2,3,7,8-TCDD]	**ND**	ND	--	--
RL	5.0 pg/L	5.0 pg/L	--	--
2,3,7,8-TCDD Recovery	--	--	100%	99%
Spike Recovery Limit	--	--	73-146%	73-146%
RPD			0.6%	
IS Recovery	**73%**	72%	43%	79%
IS Recovery Limits	31-137%	31-137%	25-141%	25-141%
CS Recovery	**72%**	71%	87%	78%
CS Recovery Limits	42-164%	42-164%	37-158%	37-158%
Filename	R120415A_18	R120415A_16	R120415A_13	R120415A_14
Analysis Date	04/16/2012	04/16/2012	04/16/2012	04/16/2012
Analysis Time	21:00	19:52	18:11	18:45
Analyst	SMT	SMT	SMT	SMT
Volume	1.016L	1.014L	1.026L	1.035L
Dilution	NA	NA	NA	NA
ICAL Date	04/11/2012	04/11/2012	04/11/2012	04/11/2012
CCAL Filename	R120415A_02	R120415A_02	R120415A_02	R120415A_02

! = Outside the Control Limits
ND = Not Detected
RL = Reporting Limit
Limits = Control Limits from Method 1613 (10/94 Revision), Tables 6A and 7A
RPD = Relative Percent Difference of Lab Spike Recoveries
IS = Internal Standard [2,3,7,8-TCDD-$^{13}C_{12}$]
CS = Cleanup Standard [2,3,7,8-TCDD-$^{37}Cl_4$]

Analyst: _____

Project No.....10188453

321206022

BSK Analytical Laboratories
Engineers & Laboratories

SUBCONTRACT ORDER

A2D0660

321206022

SENDING LABORATORY:

BSK Associates
1414 Stanislaus St
Fresno, CA 93706
Phone: 559-497-2888
Fax: 559-485-6935
Project Manager: Michelle Harmstead
E-mail: mharmstead@bskinc.com

RECEIVING LABORATORY:

L A Testing
520 Mission St.
South Pasadena, CA 91030
Phone :(800) 303-0047
Fax: -
Turnaround (Days): Standard
QC Deliverables: I Std III IV

Sample ID	Samp Desc	Sample Date
A2D0660-01	Hickman Test Well - Level 235	04/09/2012 09:25

Matrix: Water

Analysis LLP w/ Foil
EXT-Asbestos, Drinking Water by EPA 100.2

Released By	Date	Received By	Date
[signature]	4/9/12	K Chan (Courier)	4/10/12 11Am

LA Testing

520 Mission Street South Pasadena, CA 91030

Phone: (323) 254-9960 Fax: (323) 254-9982 Web: http://www.latesting.com Email:pasadenalab@latesting.com

Attn: **Michelle Harmstead**
BSK Analytical Laboratories
1414 Stanislaus Street
Fresno, CA 93706

Fax: Phone: (559) 497-2888

Project: A2D0660

EMSL Order: 321206022
Customer ID: 32BSK50
Customer PO:
EMSL Project ID:
Received: 4/10/2012
Analyzed: 4/23/2012

Test Report: Determination of Asbestos Structures >10µm in Drinking Water Performed by the 100.2 Method (EPA 600/R-94/134)

Sample ID Client / EMSL	Sample Filtration Date/Time	Original Sample Vol. Filtered (ml)	Effective Filter Area (mm²)	Area Analyzed (mm²)	ASBESTOS Asbestos Types	Fibers Detected	Analytical Sensitivity	Concentration	Confidence Limits
							MFL (million fibers per liter)		
A2D0660-01 321206022-0001	4/10/2012 05:00 PM	100	1288	0.0670	None Detected	ND	0.19	<0.19	0.00 - 0.71

Initial report from: 04/24/2012 08:21:44

Analyst(s)
Sherrie Ahmad (1)

Jerry Drapala Ph.D, Laboratory Manager
or other Approved Signatory

Any questions please contact Jerry Drapala.

Sample collection and containers provided by the client, acceptable bottle blank level is defined as ≤0.01MFL>10um. ND=None Detected. This report relates only to those items tested. This report may not be reproduced, except in full, without written permission by LA Testing. Samples received in good condition unless otherwise noted.

Samples analyzed by LA Testing South Pasadena, CA CA ELAP 2283

Attachment H: Water Quality Results, 550–570’

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BSK Associates
Engineers & Laboratories

A2D0064

05/11/2012

Melissa Duran
City of Modesto Water Division/Corp Yard
P.O Box 642
Modesto, CA 95353

Dear Melissa Duran,

Thank you for selecting BSK Associates for your analytical testing needs. We have prepared this report in response to your request for analytical services. Enclosed are the results of analyses for samples received by the laboratory on 04/02/2012 16:15.

If additional clarification of any information is required, please contact your Client Services Representative, Michelle Harmstead at (800) 877-8310 or (559) 497-2888.

BSK ASSOCIATES

Michelle Harmstead

Michelle Harmstead
Project Manager

1414 Stanislaus Street Fresno, CA 93706 (559) 497-2888 FAX (559) 485-6935 www.bsklabs.com

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Environmental Engineering | Geotechnical Engineering | Materials Testing

05/11/2012

Case Narrative

Work Order Information

Client Name:	City of Modesto Water Division/Corp Yard	**Submitted by:**	Melissa Duran
Client Code:	Modes9588	**Shipped by:**	BSK Employee
Work Order:	A2D0064	**COC Number:**	
Project:	Title 22	**TAT:**	30
		PO #:	

Sample Receipt Conditions

Cooler: **Default Cooler** **Temp. ºC:** 4

Containers Intact
COC/Labels Agree
Received On Wet Ice
Sample(s) arrived at lab on same day sampled.
Packing Material - Bubble Wrap
Packing Material - Foam
Sample(s) were received in temperature range.
Initial receipt at BSK-FAL

Cooler: **New Cooler** **Temp. ºC:** 5

Containers Intact
COC/Labels Agree
Received On Wet Ice
Sample(s) arrived at lab on same day sampled.
Packing Material - Bubble Wrap
Packing Material - Foam
Sample(s) were received in temperature range.
Initial receipt at BSK-FAL

Report Manager	Report Format
Melissa Duran	Final.rpt

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BSK Associates Engineers & Laboratories

Certificate of Analysis

Melissa Duran
City of Modesto Water Division/Corp Yard
P.O Box 642
Modesto, CA 95353

Report Issue Date: 05/11/2012 9:24
Received Date: 04/02/2012
Received Time: 16:15

Lab Sample ID: A2D0064-01
Sample Date: 04/02/2012 09:30
Sample Type: Grab
Sampled by: N. Sandez
Matrix: Water

Sample Description: Hickman Test Well - 397.13 // 141327

General Chemistry

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
***Aggressive Index**		**12**				A203767	04/12/12	04/12/12	
Alkalinity as CaCO3	SM 2320 B	**100**	3.0	mg/L	1	A203333	04/03/12	04/03/12	
Bicarbonate as CaCO3	SM 2320 B	**100**	3.0	mg/L	1	A203333	04/03/12	04/03/12	
Carbonate as CaCO3	SM 2320 B	ND	3.0	mg/L	1	A203333	04/03/12	04/03/12	
Chloride	EPA 300.0	**170**	3.0	mg/L	3	A203347	04/03/12	04/03/12	
*Color	SM 2120 B	ND	1.0	Color Units	1	A203361	04/03/12 13:13	04/03/12 13:13	
Cyanide (total)	SM 4500-CN E	ND	0.0050	mg/L	1	A203375	04/03/12	04/04/12	
Conductivity @ 25C	SM 2510 B	**770**	1.0	umhos/cm	1	A203333	04/03/12	04/03/12	
Fluoride	SM 4500-F C	**0.15**	0.10	mg/L	1	A203578	04/09/12	04/09/12	
Hydroxide as CaCO3	SM 2320 B	ND	3.0	mg/L	1	A203333	04/03/12	04/03/12	
Langelier Index	SM 2330 B	**-0.40**				A203767	04/12/12	04/12/12	
MBAS, Calculated as LAS, mol wt 340	SM 5540 C	ND	0.050	mg/L	1	A203376	04/03/12 16:50	04/03/12 16:50	
Nitrate as NO3	EPA 300.0	ND	1.0	mg/L	1	A203301	04/02/12 19:19	04/02/12 19:19	
Nitrite as N	EPA 300.0	ND	0.050	mg/L	1	A203301	04/02/12 19:19	04/02/12 19:19	
***Threshold Odor**	SM 2150 B	**1.0**	1.0	T.O.N.	1	A203361	04/03/12 13:13	04/03/12 13:13	
pH (1)	SM 4500-H+ B	**8.2**		pH Units	1	A203333	04/03/12	04/03/12	
pH Temperature in °C		**20.9**							
Sulfate as SO4	EPA 300.0	ND	2.0	mg/L	1	A203301	04/02/12	04/02/12	
Total Dissolved Solids	SM 2540C	**430**	5.0	mg/L	1	A203331	04/03/12	04/05/12	
Bicarbonate as HCO3		**120**	3.7	mg/L					
Carbonate as CO3		ND	1.8	mg/L					
Hardness as CaCO3		**31**	0.41	mg/L					
Hydroxide as OH		ND	1.0	mg/L					
Turbidity	SM 2130 B	**2.0**	0.10	NTU	1	A203361	04/03/12 13:13	04/03/12 13:13	

Metals

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Aluminum	EPA 200.7	**0.36**	0.050	mg/L	1	A203337	04/03/12	04/09/12	
Antimony	EPA 200.8	ND	2.0	ug/L	1	A203337	04/03/12	04/11/12	
Arsenic	EPA 200.8	ND	2.0	ug/L	1	A203337	04/03/12	04/11/12	
Barium	EPA 200.7	**0.072**	0.050	mg/L	1	A203337	04/03/12	04/09/12	
Beryllium	EPA 200.8	ND	1.0	ug/L	1	A203337	04/03/12	04/11/12	
Cadmium	EPA 200.8	ND	1.0	ug/L	1	A203337	04/03/12	04/11/12	
Calcium	EPA 200.7	**8.9**	0.10	mg/L	1	A203337	04/03/12	04/09/12	
Chromium	EPA 200.8	ND	10	ug/L	1	A203337	04/03/12	04/11/12	
Copper	EPA 200.8	ND	5.0	ug/L	1	A203337	04/03/12	04/11/12	

1414 Stanislaus Street **Fresno, CA 93706** **(559) 497-2888** **FAX (559) 485-6935** **www.bsklabs.com**

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BSK Associates Engineers & Laboratories

Certificate of Analysis

Melissa Duran
City of Modesto Water Division/Corp Yard
P.O Box 642
Modesto, CA 95353

Report Issue Date: 05/11/2012 9:24
Received Date: 04/02/2012
Received Time: 16:15

Lab Sample ID: A2D0064-01
Sample Date: 04/02/2012 09:30
Sample Type: Grab
Sampled by: N. Sandez
Matrix: Water

Sample Description: Hickman Test Well - 397.13 // 141327

Metals

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Iron	EPA 200.7	**0.39**	0.050	mg/L	1	A203337	04/03/12	04/09/12	
Lead	EPA 200.8	ND	5.0	ug/L	1	A203337	04/03/12	04/11/12	
Magnesium	EPA 200.7	**2.1**	0.10	mg/L	1	A203337	04/03/12	04/09/12	
Manganese	EPA 200.7	**0.061**	0.010	mg/L	1	A203337	04/03/12	04/09/12	
Mercury	EPA 200.8	ND	0.40	ug/L	1	A203337	04/03/12	04/11/12	
Nickel	EPA 200.8	ND	10	ug/L	1	A203337	04/03/12	04/11/12	
Potassium	EPA 200.7	**9.0**	2.0	mg/L	1	A203337	04/03/12	04/09/12	
Selenium	EPA 200.8	ND	2.0	ug/L	1	A203337	04/03/12	04/11/12	
Silver	EPA 200.8	ND	10	ug/L	1	A203337	04/03/12	04/11/12	
Sodium	EPA 200.7	**140**	1.0	mg/L	1	A203337	04/03/12	04/09/12	
Thallium	EPA 200.8	ND	1.0	ug/L	1	A203337	04/03/12	04/11/12	
*Uranium	EPA 200.8	ND	1.0	ug/L	1	A203337	04/03/12	04/11/12	
***Uranium, Radiological**		**< 0.67**		pCi/L					
Zinc	EPA 200.7	ND	0.050	mg/L	1	A203337	04/03/12	04/09/12	

Radiological

Analyte	Method	Result	Units	Batch	Prepared	Analyzed	Qual
*Gross Alpha	EPA 00-02	ND	pCi/L	A203414	04/04/12	04/05/12	
***1.65 Sigma Uncertainty**		**0.156**	±				
***MDA95**		**1.09**	pCi/L				

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
EDB and DBCP by GC-ECD									
Dibromochloropropane (DBCP)	EPA 504.1	ND	0.010	ug/L	1	A203541	04/06/12	04/06/12	
Ethylene Dibromide (EDB)	EPA 504.1	ND	0.020	ug/L	1	A203541	04/06/12	04/06/12	
Surrogate: Bromoform	EPA 504.1	95 %		*Acceptable range: 70-130 %*					
Organohalide Pesticides and PCBs by GC-ECD									
Aldrin	EPA 505	ND	0.075	ug/L	1	A203354	04/03/12	04/03/12	
Chlordane	EPA 505	ND	0.10	ug/L	1	A203354	04/03/12	04/03/12	
Chlorothalonil	EPA 505	ND	5.0	ug/L	1	A203354	04/03/12	04/03/12	
Dieldrin	EPA 505	ND	0.020	ug/L	1	A203354	04/03/12	04/03/12	
Endrin	EPA 505	ND	0.10	ug/L	1	A203354	04/03/12	04/03/12	
Heptachlor	EPA 505	ND	0.010	ug/L	1	A203354	04/03/12	04/03/12	

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BSK Associates Engineers & Laboratories

Certificate of Analysis

Melissa Duran
City of Modesto Water Division/Corp Yard
P.O Box 642
Modesto, CA 95353

Report Issue Date: 05/11/2012 9:24
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Lab Sample ID: A2D0064-01
Sample Date: 04/02/2012 09:30
Sample Type: Grab
Sampled by: N. Sandez
Matrix: Water

Sample Description: Hickman Test Well - 397.13 // 141327

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Organohalide Pesticides and PCBs by GC-ECD									
Heptachlor Epoxide	EPA 505	ND	0.010	ug/L	1	A203354	04/03/12	04/03/12	
Hexachlorobenzene	EPA 505	ND	0.50	ug/L	1	A203354	04/03/12	04/03/12	
Hexachlorocyclopentadiene	EPA 505	ND	1.0	ug/L	1	A203354	04/03/12	04/03/12	
Lindane	EPA 505	ND	0.20	ug/L	1	A203354	04/03/12	04/03/12	
Methoxychlor	EPA 505	ND	10	ug/L	1	A203354	04/03/12	04/03/12	
PCB Aroclor Screen	EPA 505	ND	0.50	ug/L	1	A203354	04/03/12	04/03/12	
Toxaphene	EPA 505	ND	1.0	ug/L	1	A203354	04/03/12	04/03/12	
Trifluralin	EPA 505	ND	1.0	ug/L	1	A203354	04/03/12	04/03/12	
Surrogate: TCMX	EPA 505	108 %		*Acceptable range: 70-130 %*					
Chlorinated Acid Herbicides by GC-ECD									
2,4,5-T	EPA 515.3	ND	1.0	ug/L	1	A203552	04/06/12	04/09/12	
2,4,5-TP (Silvex)	EPA 515.3	ND	1.0	ug/L	1	A203552	04/06/12	04/09/12	
2,4-D	EPA 515.3	ND	10	ug/L	1	A203552	04/06/12	04/09/12	
Bentazon	EPA 515.3	ND	2.0	ug/L	1	A203552	04/06/12	04/09/12	
Dalapon	EPA 515.3	ND	10	ug/L	1	A203552	04/06/12	04/09/12	
Dicamba	EPA 515.3	ND	1.5	ug/L	1	A203552	04/06/12	04/09/12	
Dinoseb	EPA 515.3	ND	2.0	ug/L	1	A203552	04/06/12	04/09/12	
Pentachlorophenol	EPA 515.3	ND	0.20	ug/L	1	A203552	04/06/12	04/09/12	
Picloram	EPA 515.3	ND	1.0	ug/L	1	A203552	04/06/12	04/09/12	
Surrogate: DCPAA	EPA 515.3	95 %		*Acceptable range: 70-130 %*					
Volatile Organics by GC-MS									
1,1,1,2-Tetrachloroethane	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
1,1,1-Trichloroethane	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
1,1,2,2-Tetrachloroethane	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
1,1,2-Trichloro-1,2,2-trifluoroethane	EPA 524.2	ND	10	ug/L	1	A203332	04/03/12	04/03/12	
1,1,2-Trichloroethane	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
1,1-Dichloroethane	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
1,1-Dichloroethene	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
1,1-Dichloropropene	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
1,2,3-Trichlorobenzene	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
1,2,4-Trichlorobenzene	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
1,2,4-Trimethylbenzene	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
1,2-Dichlorobenzene	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
1,2-Dichloroethane	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
1,2-Dichloropropane	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	

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Melissa Duran
City of Modesto Water Division/Corp Yard
P.O Box 642
Modesto, CA 95353

Report Issue Date: 05/11/2012 9:24
Received Date: 04/02/2012
Received Time: 16:15

Lab Sample ID: A2D0064-01
Sample Date: 04/02/2012 09:30
Sample Type: Grab
Sampled by: N. Sandez
Matrix: Water

Sample Description: Hickman Test Well - 397.13 // 141327

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Volatile Organics by GC-MS									
1,3,5-Trimethylbenzene	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
1,3-Dichlorobenzene	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
1,3-Dichloropropane	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
1,4-Dichlorobenzene	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
2,2-Dichloropropane	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
2-Butanone	EPA 524.2	ND	5.0	ug/L	1	A203332	04/03/12	04/03/12	
2-Chlorotoluene	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
2-Hexanone	EPA 524.2	ND	10	ug/L	1	A203332	04/03/12	04/03/12	
4-Chlorotoluene	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
4-Methyl-2-pentanone	EPA 524.2	ND	5.0	ug/L	1	A203332	04/03/12	04/03/12	
Acetone	EPA 524.2	ND	10	ug/L	1	A203332	04/03/12	04/03/12	
Benzene	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
Bromobenzene	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
Bromochloromethane	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
Bromodichloromethane	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
Bromoform	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
Bromomethane	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
Carbon Tetrachloride	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
Chlorobenzene	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
Chloroethane	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
Chloroform	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
Chloromethane	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
cis-1,2-Dichloroethene	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
cis-1,3-Dichloropropene	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
Dibromochloromethane	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
Dibromomethane	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
Dichlorodifluoromethane	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
Dichloromethane	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
Di-isopropyl ether (DIPE)	EPA 524.2	ND	3.0	ug/L	1	A203332	04/03/12	04/03/12	
Ethyl tert-Butyl Ether (ETBE)	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
Ethylbenzene	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
Hexachlorobutadiene	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
Isopropylbenzene	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
m,p-Xylenes	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
Methyl-t-butyl ether	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
Naphthalene	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
n-Butylbenzene	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	

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Lab Sample ID: A2D0064-01
Sample Date: 04/02/2012 09:30
Sample Type: Grab
Sampled by: N. Sandez
Matrix: Water

Sample Description: Hickman Test Well - 397.13 // 141327

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Volatile Organics by GC-MS									
n-Propylbenzene	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
o-Xylene	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
p-Isopropyltoluene	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
sec-Butylbenzene	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
Styrene	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
tert-Amyl Methyl Ether (TAME)	EPA 524.2	ND	3.0	ug/L	1	A203332	04/03/12	04/03/12	
tert-Butyl alcohol (TBA)	EPA 524.2	ND	2.0	ug/L	1	A203332	04/03/12	04/03/12	
tert-Butylbenzene	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
Tetrachloroethene (PCE)	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
Toluene	EPA 524.2	**1.4**	0.50	ug/L	1	A203332	04/03/12	04/03/12	
trans-1,2-Dichloroethene	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
trans-1,3-Dichloropropene	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
Trichloroethene (TCE)	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
Trichlorofluoromethane	EPA 524.2	ND	5.0	ug/L	1	A203332	04/03/12	04/03/12	
Vinyl Chloride	EPA 524.2	ND	0.50	ug/L	1	A203332	04/03/12	04/03/12	
Surrogate: 1,2-Dichlorobenzene-d4	EPA 524.2	101 %		*Acceptable range: 70-130 %*					
Surrogate: Bromofluorobenzene	EPA 524.2	101 %		*Acceptable range: 70-130 %*					
*Total 1,3-Dichloropropene, EPA 524.2		ND	0.50	ug/L					
*Total Trihalomethanes, EPA 524.2		ND	0.50	ug/L					
*Total Xylenes, EPA 524.2		ND	0.50	ug/L					
Semi-Volatile Organics by GC-MS									
Alachlor	EPA 525.2	ND	1.0	ug/L	1	A203577	04/09/12	04/12/12	
Atrazine	EPA 525.2	ND	0.50	ug/L	1	A203577	04/09/12	04/12/12	
Benzo(a)pyrene	EPA 525.2	ND	0.10	ug/L	1	A203577	04/09/12	04/12/12	
Bis(2-ethylhexyl) adipate	EPA 525.2	ND	3.0	ug/L	1	A203577	04/09/12	04/12/12	
Bis(2-ethylhexyl) phthalate	EPA 525.2	ND	3.0	ug/L	1	A203577	04/09/12	04/12/12	
Bromacil	EPA 525.2	ND	10	ug/L	1	A203577	04/09/12	04/12/12	
Butachlor	EPA 525.2	ND	0.38	ug/L	1	A203577	04/09/12	04/12/12	
Diazinon	EPA 525.2	ND	0.25	ug/L	1	A203577	04/09/12	04/12/12	
Dimethoate	EPA 525.2	ND	10	ug/L	1	A203577	04/09/12	04/12/12	
Metolachlor	EPA 525.2	ND	0.50	ug/L	1	A203577	04/09/12	04/12/12	
Metribuzin	EPA 525.2	ND	0.50	ug/L	1	A203577	04/09/12	04/12/12	
Molinate	EPA 525.2	ND	2.0	ug/L	1	A203577	04/09/12	04/12/12	
Propachlor	EPA 525.2	ND	0.50	ug/L	1	A203577	04/09/12	04/12/12	
Simazine	EPA 525.2	ND	1.0	ug/L	1	A203577	04/09/12	04/12/12	
Thiobencarb	EPA 525.2	ND	1.0	ug/L	1	A203577	04/09/12	04/12/12	

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Certificate of Analysis

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Modesto, CA 95353

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Received Date: 04/02/2012
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Lab Sample ID: A2D0064-01
Sample Date: 04/02/2012 09:30
Sample Type: Grab
Sampled by: N. Sandez
Matrix: Water

Sample Description: Hickman Test Well - 397.13 // 141327

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Surrogate: 1,3-Dimethyl-2-nitrobenzene	EPA 525.2	115 %		*Acceptable range: 70-130 %*					
Carbamates by HPLC									
3-Hydroxycarbofuran	EPA 531.1	ND	3.0	ug/L	1	A203483	04/05/12	04/06/12	
Aldicarb	EPA 531.1	ND	3.0	ug/L	1	A203483	04/05/12	04/06/12	
Aldicarb Sulfone	EPA 531.1	ND	2.0	ug/L	1	A203483	04/05/12	04/06/12	
Aldicarb Sulfoxide	EPA 531.1	ND	3.0	ug/L	1	A203483	04/05/12	04/06/12	
Carbaryl	EPA 531.1	ND	5.0	ug/L	1	A203483	04/05/12	04/06/12	
Carbofuran	EPA 531.1	ND	5.0	ug/L	1	A203483	04/05/12	04/06/12	
Methomyl	EPA 531.1	ND	2.0	ug/L	1	A203483	04/05/12	04/06/12	
Oxamyl	EPA 531.1	ND	20	ug/L	1	A203483	04/05/12	04/06/12	
Glyphosate by HPLC									
Glyphosate	EPA 547	ND	25	ug/L	1	A203633	04/10/12	04/11/12	
Surrogate: AMPA	EPA 547	104 %		*Acceptable range: 70-130 %*					
Endothall by GC-MS									
Endothall	EPA 548.1	ND	45	ug/L	1	A203620	04/09/12	04/11/12	
Diquat by HPLC									
Diquat	EPA 549.2	ND	4.0	ug/L	1	A203396	04/03/12	04/05/12	
Diuron by HPLC									
Diuron	EPA 632	ND	1.0	ug/L	1	A203516	04/06/12	04/09/12	
Surrogate: Benthiocarb	EPA 632	105 %		*Acceptable range: 70-130 %*					

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General Chemistry Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203301				Analyst: AJT		Prepared: 04/02/2012					
Blank (A203301-BLK1) EPA 300.0 - Quality Control											
Nitrate as NO3	ND	1.0	mg/L							04/02/12	
Nitrite as N	ND	0.050	mg/L							04/02/12	
Sulfate as SO4	ND	2.0	mg/L							04/02/12	
Blank Spike (A203301-BS1) EPA 300.0 - Quality Control											
Nitrate as NO3	50	1.0	mg/L	50		99	90-110			04/02/12	
Nitrite as N	0.53	0.050	mg/L	0.50		106	90-110			04/02/12	
Sulfate as SO4	49	2.0	mg/L	50		99	90-110			04/02/12	
Blank Spike Dup (A203301-BSD1) EPA 300.0 - Quality Control											
Nitrate as NO3	49	1.0	mg/L	50		99	90-110	0	10	04/02/12	
Nitrite as N	0.54	0.050	mg/L	0.50		108	90-110	2	10	04/02/12	
Sulfate as SO4	49	2.0	mg/L	50		99	90-110	0	10	04/02/12	
Matrix Spike (A203301-MS1) EPA 300.0 - Quality Control						**Source: A2D0016-03**					
Nitrate as NO3	120	2.0	mg/L	100	18	105	80-120			04/02/12	
Nitrite as N	0.86	0.10	mg/L	1.0	ND	86	80-120			04/02/12	
Sulfate as SO4	140	4.0	mg/L	100	31	104	80-120			04/02/12	
Matrix Spike (A203301-MS2) EPA 300.0 - Quality Control						**Source: A2D0009-05**					
Nitrate as NO3	130	2.0	mg/L	100	23	112	80-120			04/02/12	
Nitrite as N	1.0	0.10	mg/L	1.0	ND	104	80-120			04/02/12	
Sulfate as SO4	130	4.0	mg/L	100	19	112	80-120			04/02/12	
Matrix Spike Dup (A203301-MSD1) EPA 300.0 - Quality Control						**Source: A2D0016-03**					
Nitrate as NO3	120	2.0	mg/L	100	18	106	80-120	0	10	04/02/12	
Nitrite as N	0.86	0.10	mg/L	1.0	ND	86	80-120	1	20	04/02/12	
Sulfate as SO4	140	4.0	mg/L	100	31	104	80-120	0	10	04/02/12	
Matrix Spike Dup (A203301-MSD2) EPA 300.0 - Quality Control						**Source: A2D0009-05**					
Nitrate as NO3	130	2.0	mg/L	100	23	112	80-120	0	10	04/02/12	
Nitrite as N	1.1	0.10	mg/L	1.0	ND	105	80-120	1	20	04/02/12	
Sulfate as SO4	130	4.0	mg/L	100	19	113	80-120	0	10	04/02/12	
Batch: A203331				Analyst: DEH		Prepared: 04/03/2012					
Blank (A203331-BLK1) SM 2540C - Quality Control											
Total Dissolved Solids	ND	5.0	mg/L							04/05/12	
Blank (A203331-BLK2) SM 2540C - Quality Control											
Total Dissolved Solids	ND	5.0	mg/L							04/05/12	
Duplicate (A203331-DUP1) SM 2540C - Quality Control						**Source: A2C2200-01**					
Total Dissolved Solids	1000	5.0	mg/L		980			3	20	04/05/12	
Duplicate (A203331-DUP2) SM 2540C - Quality Control						**Source: A2C2184-01**					
Total Dissolved Solids	10	5.0	mg/L		9.0			11	20	04/05/12	

A2D0064 FINAL 05112012 0924

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General Chemistry Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203333				Analyst: CEG		Prepared: 04/03/2012					
Blank (A203333-BLK1) SM 2320 B - Quality Control											
Alkalinity as CaCO3	ND	3.0	mg/L							04/03/12	
Bicarbonate as CaCO3	ND	3.0	mg/L							04/03/12	
Carbonate as CaCO3	ND	3.0	mg/L							04/03/12	
Conductivity @ 25C	ND	1.0	umhos/cm							04/03/12	
Hydroxide as CaCO3	ND	3.0	mg/L							04/03/12	
Blank Spike (A203333-BS1) SM 2320 B - Quality Control											
Alkalinity as CaCO3	99	3.0	mg/L	100		99	80-120			04/03/12	
Blank Spike Dup (A203333-BSD1) SM 2320 B - Quality Control											
Alkalinity as CaCO3	99	3.0	mg/L	100		99	80-120	0	20	04/03/12	
Duplicate (A203333-DUP1) SM 2320 B - Quality Control						**Source: A2D0029-02**					
Alkalinity as CaCO3	22	3.0	mg/L		22			1	10	04/03/12	
Bicarbonate as CaCO3	22	3.0	mg/L		22			1	10	04/03/12	
Carbonate as CaCO3	ND	3.0	mg/L		ND				10	04/03/12	
Conductivity @ 25C	51	1.0	umhos/cm		51			1	20	04/03/12	
Hydroxide as CaCO3	ND	3.0	mg/L		ND				10	04/03/12	
pH (1)	7.3		pH Units		7.3			1	20	04/03/12	
Duplicate (A203333-DUP2) SM 2320 B - Quality Control						**Source: A2D0064-01**					
Alkalinity as CaCO3	100	3.0	mg/L		100			0	10	04/03/12	
Bicarbonate as CaCO3	100	3.0	mg/L		100			0	10	04/03/12	
Carbonate as CaCO3	ND	3.0	mg/L		ND				10	04/03/12	
Conductivity @ 25C	770	1.0	umhos/cm		770			1	20	04/03/12	
Hydroxide as CaCO3	ND	3.0	mg/L		ND				10	04/03/12	
pH (1)	8.2		pH Units		8.2			0	20	04/03/12	
Batch: A203347				Analyst: AJT		Prepared: 04/03/2012					
Blank (A203347-BLK1) EPA 300.0 - Quality Control											
Chloride	ND	1.0	mg/L							04/03/12	
Blank Spike (A203347-BS1) EPA 300.0 - Quality Control											
Chloride	50	1.0	mg/L	50		99	90-110			04/03/12	
Blank Spike Dup (A203347-BSD1) EPA 300.0 - Quality Control											
Chloride	49	1.0	mg/L	50		99	90-110	0	10	04/03/12	
Matrix Spike (A203347-MS1) EPA 300.0 - Quality Control						**Source: A2D0097-01**					
Chloride	190	2.0	mg/L	100	91	98	80-120			04/03/12	
Matrix Spike (A203347-MS2) EPA 300.0 - Quality Control						**Source: A2D0085-02**					
Chloride	120	2.0	mg/L	100	21	97	80-120			04/03/12	
Matrix Spike Dup (A203347-MSD1) EPA 300.0 - Quality Control						**Source: A2D0097-01**					
Chloride	190	2.0	mg/L	100	91	99	80-120	0	10	04/03/12	

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General Chemistry Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203347				Analyst: AJT		Prepared: 04/03/2012					
Matrix Spike Dup (A203347-MSD2) EPA 300.0 - Quality Control						**Source: A2D0085-02**					
Chloride	120	2.0	mg/L	100	21	98	80-120	1	10	04/03/12	
Batch: A203361				Analyst: DFS		Prepared: 04/03/2012					
Blank (A203361-BLK1) SM 2120 B - Quality Control											
Color	ND	1.0	Color Units							04/03/12	
Threshold Odor	ND	1.0	T.O.N.							04/03/12	
Turbidity	ND	0.10	NTU							04/03/12	
Duplicate (A203361-DUP1) SM 2120 B - Quality Control						**Source: A2D0071-02**					
Color	ND	1.0	Color Units		ND				20	04/03/12	
Threshold Odor	ND	1.0	T.O.N.		ND				20	04/03/12	
Turbidity	0.46	0.10	NTU		0.46			0	20	04/03/12	
Duplicate (A203361-DUP2) SM 2120 B - Quality Control						**Source: A2D0079-01**					
Color	ND	1.0	Color Units		ND				20	04/03/12	
Threshold Odor	ND	1.0	T.O.N.		ND				20	04/03/12	
Turbidity	ND	0.10	NTU		ND				20	04/03/12	
Batch: A203375				Analyst: LJL		Prepared: 04/03/2012					
Blank (A203375-BLK1) SM 4500-CN E - Quality Control											
Cyanide (total)	ND	0.0050	mg/L							04/04/12	
Blank Spike (A203375-BS1) SM 4500-CN E - Quality Control											
Cyanide (total)	0.52	0.0050	mg/L	0.50		104	80-120			04/04/12	
Blank Spike Dup (A203375-BSD1) SM 4500-CN E - Quality Control											
Cyanide (total)	0.49	0.0050	mg/L	0.50		99	80-120	5	20	04/04/12	
Matrix Spike (A203375-MS1) SM 4500-CN E - Quality Control						**Source: A2C2189-01**					
Cyanide (total)	0.42	0.0050	mg/L	0.50	ND	84	80-120			04/04/12	
Matrix Spike (A203375-MS2) SM 4500-CN E - Quality Control						**Source: A2D0079-01**					
Cyanide (total)	0.45	0.0050	mg/L	0.50	ND	90	80-120			04/04/12	
Matrix Spike Dup (A203375-MSD1) SM 4500-CN E - Quality Control						**Source: A2C2189-01**					
Cyanide (total)	0.40	0.0050	mg/L	0.50	ND	81	80-120	4	20	04/04/12	
Matrix Spike Dup (A203375-MSD2) SM 4500-CN E - Quality Control						**Source: A2D0079-01**					
Cyanide (total)	0.47	0.0050	mg/L	0.50	ND	94	80-120	4	20	04/04/12	
Batch: A203376				Analyst: DFS		Prepared: 04/03/2012					
Blank (A203376-BLK1) SM 5540 C - Quality Control											
MBAS, Calculated as LAS, mol wt 340	ND	0.050	mg/L							04/03/12	
Blank Spike (A203376-BS1) SM 5540 C - Quality Control											

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General Chemistry Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203376				Analyst: DFS		Prepared: 04/03/2012					
Blank Spike (A203376-BS1) SM 5540 C - Quality Control											
MBAS, Calculated as LAS, mol wt 340	1.0	0.050	mg/L	1.0		103	80-120			04/03/12	
Blank Spike Dup (A203376-BSD1) SM 5540 C - Quality Control											
MBAS, Calculated as LAS, mol wt 340	1.0	0.050	mg/L	1.0		105	80-120	1	20	04/03/12	
Matrix Spike (A203376-MS1) SM 5540 C - Quality Control						**Source: A2D0064-01**					
MBAS, Calculated as LAS, mol wt 340	0.92	0.050	mg/L	1.0	ND	92	80-120			04/03/12	
Matrix Spike (A203376-MS2) SM 5540 C - Quality Control						**Source: A2D0099-08**					
MBAS, Calculated as LAS, mol wt 340	0.98	0.050	mg/L	1.0	ND	98	80-120			04/03/12	
Matrix Spike Dup (A203376-MSD1) SM 5540 C - Quality Control						**Source: A2D0064-01**					
MBAS, Calculated as LAS, mol wt 340	0.92	0.050	mg/L	1.0	ND	92	80-120	0	20	04/03/12	
Matrix Spike Dup (A203376-MSD2) SM 5540 C - Quality Control						**Source: A2D0099-08**					
MBAS, Calculated as LAS, mol wt 340	0.96	0.050	mg/L	1.0	ND	96	80-120	2	20	04/03/12	
Batch: A203578				Analyst: DFS		Prepared: 04/09/2012					
Blank (A203578-BLK1) SM 4500-F C - Quality Control											
Fluoride	ND	0.10	mg/L							04/09/12	
Blank Spike (A203578-BS1) SM 4500-F C - Quality Control											
Fluoride	1.0	0.10	mg/L	1.0		103	80-120			04/09/12	
Blank Spike Dup (A203578-BSD1) SM 4500-F C - Quality Control											
Fluoride	1.0	0.10	mg/L	1.0		104	80-120	1	20	04/09/12	
Matrix Spike (A203578-MS1) SM 4500-F C - Quality Control						**Source: A2C2224-01**					
Fluoride	1.1	0.10	mg/L	1.0	ND	106	80-120			04/09/12	
Matrix Spike (A203578-MS2) SM 4500-F C - Quality Control						**Source: A2D0103-04**					
Fluoride	1.4	0.10	mg/L	1.0	0.34	107	80-120			04/09/12	
Matrix Spike Dup (A203578-MSD1) SM 4500-F C - Quality Control						**Source: A2C2224-01**					
Fluoride	1.2	0.10	mg/L	1.0	ND	107	80-120	1	20	04/09/12	
Matrix Spike Dup (A203578-MSD2) SM 4500-F C - Quality Control						**Source: A2D0103-04**					
Fluoride	1.4	0.10	mg/L	1.0	0.34	108	80-120	1	20	04/09/12	

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Metals Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203337				Analyst: NRE		Prepared: 04/03/2012					
Blank (A203337-BLK2) EPA 200.7 - Quality Control											
Aluminum	ND	0.050	mg/L							04/09/12	
Barium	ND	0.050	mg/L							04/09/12	
Calcium	ND	0.10	mg/L							04/09/12	
Iron	ND	0.050	mg/L							04/09/12	
Magnesium	ND	0.10	mg/L							04/09/12	
Manganese	ND	0.010	mg/L							04/09/12	
Potassium	ND	2.0	mg/L							04/09/12	
Sodium	ND	1.0	mg/L							04/09/12	
Zinc	ND	0.050	mg/L							04/09/12	
Blank Spike (A203337-BS2) EPA 200.7 - Quality Control											
Aluminum	0.17	0.050	mg/L	0.20		87	85-115			04/09/12	
Barium	0.21	0.050	mg/L	0.20		106	85-115			04/09/12	
Calcium	10	0.10	mg/L	10		101	85-115			04/09/12	
Iron	1.9	0.050	mg/L	2.0		97	85-115			04/09/12	
Magnesium	10	0.10	mg/L	10		100	85-115			04/09/12	
Manganese	0.21	0.010	mg/L	0.20		103	85-115			04/09/12	
Potassium	10	2.0	mg/L	10		100	85-115			04/09/12	
Sodium	10	1.0	mg/L	10		100	85-115			04/09/12	
Zinc	0.20	0.050	mg/L	0.20		100	85-115			04/09/12	
Blank Spike Dup (A203337-BSD2) EPA 200.7 - Quality Control											
Aluminum	0.18	0.050	mg/L	0.20		88	85-115	1	20	04/09/12	
Barium	0.21	0.050	mg/L	0.20		106	85-115	0	20	04/09/12	
Calcium	10	0.10	mg/L	10		101	85-115	1	20	04/09/12	
Iron	2.0	0.050	mg/L	2.0		101	85-115	3	20	04/09/12	
Magnesium	10	0.10	mg/L	10		101	85-115	1	20	04/09/12	
Manganese	0.20	0.010	mg/L	0.20		102	85-115	1	20	04/09/12	
Potassium	10	2.0	mg/L	10		102	85-115	1	20	04/09/12	
Sodium	10	1.0	mg/L	10		101	85-115	1	20	04/09/12	
Zinc	0.21	0.050	mg/L	0.20		105	85-115	4	20	04/09/12	
Matrix Spike (A203337-MS3) EPA 200.7 - Quality Control					**Source: A2D0064-01**						
Aluminum	0.71	0.050	mg/L	0.20	0.36	175	70-130			04/09/12	MS01 ***High***
Barium	0.27	0.050	mg/L	0.20	0.072	100	70-130			04/09/12	
Calcium	19	0.10	mg/L	10	8.9	96	70-130			04/09/12	
Iron	2.3	0.050	mg/L	2.0	0.39	96	70-130			04/09/12	
Magnesium	12	0.10	mg/L	10	2.1	98	70-130			04/09/12	
Manganese	0.26	0.010	mg/L	0.20	0.061	99	70-130			04/09/12	
Potassium	18	2.0	mg/L	10	9.0	95	70-130			04/09/12	
Sodium	150	1.0	mg/L	10	140	56	70-130			04/09/12	MS02 ***Low***
Zinc	0.21	0.050	mg/L	0.20	ND	105	70-130			04/09/12	
Matrix Spike (A203337-MS4) EPA 200.7 - Quality Control					**Source: A2D0075-01**						
Aluminum	0.18	0.050	mg/L	0.20	ND	92	70-130			04/09/12	
Barium	0.25	0.050	mg/L	0.20	ND	104	70-130			04/09/12	
Calcium	52	0.10	mg/L	10	43	91	70-130			04/09/12	
Iron	1.9	0.050	mg/L	2.0	ND	97	70-130			04/09/12	

A2D0064 FINAL 05112012 0924

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Metals Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203337				Analyst: NRE		Prepared: 04/03/2012					
Matrix Spike (A203337-MS4)	**EPA 200.7 - Quality Control**					**Source: A2D0075-01**					
Magnesium	27	0.10	mg/L	10	17	98	70-130			04/09/12	
Manganese	0.20	0.010	mg/L	0.20	ND	101	70-130			04/09/12	
Potassium	12	2.0	mg/L	10	2.4	101	70-130			04/09/12	
Sodium	38	1.0	mg/L	10	29	90	70-130			04/09/12	
Zinc	0.23	0.050	mg/L	0.20	ND	99	70-130			04/09/12	
Matrix Spike Dup (A203337-MSD3)	**EPA 200.7 - Quality Control**					**Source: A2D0064-01**					
Aluminum	0.70	0.050	mg/L	0.20	0.36	173	70-130	1	20	04/09/12	MS01 ***High***
Barium	0.28	0.050	mg/L	0.20	0.072	103	70-130	2	20	04/09/12	
Calcium	19	0.10	mg/L	10	8.9	99	70-130	1	20	04/09/12	
Iron	2.3	0.050	mg/L	2.0	0.39	97	70-130	1	20	04/09/12	
Magnesium	12	0.10	mg/L	10	2.1	99	70-130	1	20	04/09/12	
Manganese	0.26	0.010	mg/L	0.20	0.061	100	70-130	1	20	04/09/12	
Potassium	19	2.0	mg/L	10	9.0	99	70-130	2	20	04/09/12	
Sodium	150	1.0	mg/L	10	140	60	70-130	0	20	04/09/12	MS02 ***Low***
Zinc	0.21	0.050	mg/L	0.20	ND	106	70-130	1	20	04/09/12	
Matrix Spike Dup (A203337-MSD4)	**EPA 200.7 - Quality Control**					**Source: A2D0075-01**					
Aluminum	0.18	0.050	mg/L	0.20	ND	90	70-130	1	20	04/09/12	
Barium	0.25	0.050	mg/L	0.20	ND	104	70-130	0	20	04/09/12	
Calcium	52	0.10	mg/L	10	43	91	70-130	0	20	04/09/12	
Iron	1.9	0.050	mg/L	2.0	ND	97	70-130	1	20	04/09/12	
Magnesium	27	0.10	mg/L	10	17	97	70-130	0	20	04/09/12	
Manganese	0.20	0.010	mg/L	0.20	ND	102	70-130	1	20	04/09/12	
Potassium	12	2.0	mg/L	10	2.4	101	70-130	0	20	04/09/12	
Sodium	38	1.0	mg/L	10	29	89	70-130	0	20	04/09/12	
Zinc	0.23	0.050	mg/L	0.20	ND	99	70-130	0	20	04/09/12	
Blank (A203337-BLK1)	**EPA 200.8 - Quality Control**										
Antimony	ND	2.0	ug/L							04/11/12	
Arsenic	ND	2.0	ug/L							04/11/12	
Beryllium	ND	1.0	ug/L							04/11/12	
Cadmium	ND	1.0	ug/L							04/11/12	
Chromium	ND	10	ug/L							04/11/12	
Copper	ND	5.0	ug/L							04/11/12	
Lead	ND	5.0	ug/L							04/11/12	
Mercury	ND	0.40	ug/L							04/11/12	
Nickel	ND	10	ug/L							04/11/12	
Selenium	ND	2.0	ug/L							04/11/12	
Silver	ND	10	ug/L							04/11/12	
Thallium	ND	1.0	ug/L							04/11/12	
Uranium	ND	1.0	ug/L							04/11/12	
Blank Spike (A203337-BS1)	**EPA 200.8 - Quality Control**										
Antimony	210	2.0	ug/L	200		106	85-115			04/11/12	
Arsenic	200	2.0	ug/L	200		101	85-115			04/11/12	
Beryllium	220	1.0	ug/L	200		109	85-115			04/11/12	
Cadmium	200	1.0	ug/L	200		99	85-115			04/11/12	

A2D0064 FINAL 05112012 0924

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Metals Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203337				Analyst: MAS		Prepared: 04/03/2012					
Blank Spike (A203337-BS1)	**EPA 200.8 - Quality Control**										
Chromium	200	10	ug/L	200		100	85-115			04/11/12	
Copper	190	5.0	ug/L	200		95	85-115			04/11/12	
Lead	200	5.0	ug/L	200		101	85-115			04/11/12	
Mercury	5.2	0.40	ug/L	5.0		103	85-115			04/11/12	
Nickel	200	10	ug/L	200		101	85-115			04/11/12	
Selenium	210	2.0	ug/L	200		104	85-115			04/11/12	
Silver	100	10	ug/L	100		100	75-125			04/11/12	
Thallium	200	1.0	ug/L	200		100	85-115			04/11/12	
Uranium	110	1.0	ug/L	100		107	85-115			04/11/12	
Blank Spike Dup (A203337-BSD1)	**EPA 200.8 - Quality Control**										
Antimony	210	2.0	ug/L	200		104	85-115	1	20	04/11/12	
Arsenic	200	2.0	ug/L	200		99	85-115	2	20	04/11/12	
Beryllium	220	1.0	ug/L	200		108	85-115	0	20	04/11/12	
Cadmium	190	1.0	ug/L	200		97	85-115	2	20	04/11/12	
Chromium	200	10	ug/L	200		100	85-115	0	20	04/11/12	
Copper	190	5.0	ug/L	200		96	85-115	1	20	04/11/12	
Lead	200	5.0	ug/L	200		101	85-115	0	20	04/11/12	
Mercury	5.2	0.40	ug/L	5.0		103	85-115	0	20	04/11/12	
Nickel	200	10	ug/L	200		99	85-115	2	20	04/11/12	
Selenium	210	2.0	ug/L	200		104	85-115	1	20	04/11/12	
Silver	100	10	ug/L	100		100	75-125	1	20	04/11/12	
Thallium	200	1.0	ug/L	200		102	85-115	3	20	04/11/12	
Uranium	110	1.0	ug/L	100		107	85-115	0	20	04/11/12	
Matrix Spike (A203337-MS1)	**EPA 200.8 - Quality Control**					**Source: A2D0064-01**					
Antimony	220	2.0	ug/L	200	ND	109	70-130			04/11/12	
Arsenic	200	2.0	ug/L	200	ND	101	70-130			04/11/12	
Beryllium	210	1.0	ug/L	200	ND	106	70-130			04/11/12	
Cadmium	200	1.0	ug/L	200	ND	99	70-130			04/11/12	
Chromium	200	10	ug/L	200	ND	101	70-130			04/11/12	
Copper	190	5.0	ug/L	200	ND	92	70-130			04/11/12	
Lead	200	5.0	ug/L	200	ND	98	70-130			04/11/12	
Mercury	5.0	0.40	ug/L	5.0	ND	101	70-130			04/11/12	
Nickel	200	10	ug/L	200	ND	98	70-130			04/11/12	
Selenium	200	2.0	ug/L	200	ND	102	70-130			04/11/12	
Silver	99	10	ug/L	100	ND	99	70-130			04/11/12	
Thallium	190	1.0	ug/L	200	ND	97	70-130			04/11/12	
Uranium	110	1.0	ug/L	100	ND	106	70-130			04/11/12	
Matrix Spike (A203337-MS2)	**EPA 200.8 - Quality Control**					**Source: A2D0075-01**					
Antimony	210	2.0	ug/L	200	ND	107	70-130			04/11/12	
Arsenic	200	2.0	ug/L	200	2.3	100	70-130			04/11/12	
Beryllium	220	1.0	ug/L	200	ND	108	70-130			04/11/12	
Cadmium	200	1.0	ug/L	200	ND	98	70-130			04/11/12	
Chromium	200	10	ug/L	200	ND	99	70-130			04/11/12	
Copper	190	5.0	ug/L	200	ND	93	70-130			04/11/12	
Lead	200	5.0	ug/L	200	ND	99	70-130			04/11/12	

A2D0064 FINAL 05112012 0924

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Metals Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203337				Analyst: MAS		Prepared: 04/03/2012					
Matrix Spike (A203337-MS2)	**EPA 200.8 - Quality Control**					**Source: A2D0075-01**					
Mercury	5.1	0.40	ug/L	5.0	ND	102	70-130			04/11/12	
Nickel	190	10	ug/L	200	ND	97	70-130			04/11/12	
Selenium	200	2.0	ug/L	200	ND	100	70-130			04/11/12	
Silver	97	10	ug/L	100	ND	97	70-130			04/11/12	
Thallium	200	1.0	ug/L	200	ND	100	70-130			04/11/12	
Uranium	130	1.0	ug/L	100	19	106	70-130			04/11/12	
Matrix Spike Dup (A203337-MSD1)	**EPA 200.8 - Quality Control**					**Source: A2D0064-01**					
Antimony	220	2.0	ug/L	200	ND	108	70-130	1	20	04/11/12	
Arsenic	200	2.0	ug/L	200	ND	98	70-130	3	20	04/11/12	
Beryllium	210	1.0	ug/L	200	ND	105	70-130	1	20	04/11/12	
Cadmium	200	1.0	ug/L	200	ND	100	70-130	0	20	04/11/12	
Chromium	200	10	ug/L	200	ND	98	70-130	3	20	04/11/12	
Copper	190	5.0	ug/L	200	ND	93	70-130	1	20	04/11/12	
Lead	190	5.0	ug/L	200	ND	97	70-130	0	20	04/11/12	
Mercury	5.0	0.40	ug/L	5.0	ND	100	70-130	0	20	04/11/12	
Nickel	190	10	ug/L	200	ND	95	70-130	3	20	04/11/12	
Selenium	200	2.0	ug/L	200	ND	100	70-130	1	20	04/11/12	
Silver	100	10	ug/L	100	ND	100	70-130	1	20	04/11/12	
Thallium	190	1.0	ug/L	200	ND	97	70-130	1	20	04/11/12	
Uranium	100	1.0	ug/L	100	ND	105	70-130	1	20	04/11/12	
Matrix Spike Dup (A203337-MSD2)	**EPA 200.8 - Quality Control**					**Source: A2D0075-01**					
Antimony	220	2.0	ug/L	200	ND	108	70-130	1	20	04/11/12	
Arsenic	200	2.0	ug/L	200	2.3	98	70-130	2	20	04/11/12	
Beryllium	220	1.0	ug/L	200	ND	109	70-130	0	20	04/11/12	
Cadmium	200	1.0	ug/L	200	ND	99	70-130	1	20	04/11/12	
Chromium	200	10	ug/L	200	ND	98	70-130	0	20	04/11/12	
Copper	190	5.0	ug/L	200	ND	94	70-130	1	20	04/11/12	
Lead	200	5.0	ug/L	200	ND	99	70-130	1	20	04/11/12	
Mercury	5.0	0.40	ug/L	5.0	ND	99	70-130	3	20	04/11/12	
Nickel	200	10	ug/L	200	ND	98	70-130	1	20	04/11/12	
Selenium	200	2.0	ug/L	200	ND	98	70-130	2	20	04/11/12	
Silver	98	10	ug/L	100	ND	98	70-130	1	20	04/11/12	
Thallium	200	1.0	ug/L	200	ND	99	70-130	2	20	04/11/12	
Uranium	120	1.0	ug/L	100	19	106	70-130	0	20	04/11/12	

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Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203332				Analyst: JGB		Prepared: 04/03/2012					
Blank (A203332-BLK1) EPA 524.2 - Quality Control											
1,1,1,2-Tetrachloroethane	ND	0.50	ug/L							04/03/12	
1,1,1-Trichloroethane	ND	0.50	ug/L							04/03/12	
1,1,2,2-Tetrachloroethane	ND	0.50	ug/L							04/03/12	
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	10	ug/L							04/03/12	
1,1,2-Trichloroethane	ND	0.50	ug/L							04/03/12	
1,1-Dichloroethane	ND	0.50	ug/L							04/03/12	
1,1-Dichloroethene	ND	0.50	ug/L							04/03/12	
1,1-Dichloropropene	ND	0.50	ug/L							04/03/12	
1,2,3-Trichlorobenzene	ND	0.50	ug/L							04/03/12	
1,2,4-Trichlorobenzene	ND	0.50	ug/L							04/03/12	
1,2,4-Trimethylbenzene	ND	0.50	ug/L							04/03/12	
1,2-Dichlorobenzene	ND	0.50	ug/L							04/03/12	
1,2-Dichloroethane	ND	0.50	ug/L							04/03/12	
1,2-Dichloropropane	ND	0.50	ug/L							04/03/12	
1,3,5-Trimethylbenzene	ND	0.50	ug/L							04/03/12	
1,3-Dichlorobenzene	ND	0.50	ug/L							04/03/12	
1,3-Dichloropropane	ND	0.50	ug/L							04/03/12	
1,4-Dichlorobenzene	ND	0.50	ug/L							04/03/12	
2,2-Dichloropropane	ND	0.50	ug/L							04/03/12	
2-Butanone	ND	5.0	ug/L							04/03/12	
2-Chlorotoluene	ND	0.50	ug/L							04/03/12	
2-Hexanone	ND	10	ug/L							04/03/12	
4-Chlorotoluene	ND	0.50	ug/L							04/03/12	
4-Methyl-2-pentanone	ND	5.0	ug/L							04/03/12	
Acetone	ND	10	ug/L							04/03/12	
Benzene	ND	0.50	ug/L							04/03/12	
Bromobenzene	ND	0.50	ug/L							04/03/12	
Bromochloromethane	ND	0.50	ug/L							04/03/12	
Bromodichloromethane	ND	0.50	ug/L							04/03/12	
Bromoform	ND	0.50	ug/L							04/03/12	
Bromomethane	ND	0.50	ug/L							04/03/12	
Carbon Tetrachloride	ND	0.50	ug/L							04/03/12	
Chlorobenzene	ND	0.50	ug/L							04/03/12	
Chloroethane	ND	0.50	ug/L							04/03/12	
Chloroform	ND	0.50	ug/L							04/03/12	
Chloromethane	ND	0.50	ug/L							04/03/12	
cis-1,2-Dichloroethene	ND	0.50	ug/L							04/03/12	
cis-1,3-Dichloropropene	ND	0.50	ug/L							04/03/12	
Dibromochloromethane	ND	0.50	ug/L							04/03/12	
Dibromomethane	ND	0.50	ug/L							04/03/12	
Dichlorodifluoromethane	ND	0.50	ug/L							04/03/12	
Dichloromethane	ND	0.50	ug/L							04/03/12	
Di-isopropyl ether (DIPE)	ND	3.0	ug/L							04/03/12	
Ethyl tert-Butyl Ether (ETBE)	ND	0.50	ug/L							04/03/12	
Ethylbenzene	ND	0.50	ug/L							04/03/12	
Hexachlorobutadiene	0.78	0.50	ug/L							04/03/12	BL04
Isopropylbenzene	ND	0.50	ug/L							04/03/12	

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Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual	
Batch: A203332				Analyst: JGB		Prepared: 04/03/2012						
Blank (A203332-BLK1) EPA 524.2 - Quality Control												
m,p-Xylenes	ND	0.50	ug/L							04/03/12		
Methyl-t-butyl ether	ND	0.50	ug/L							04/03/12		
Naphthalene	0.53	0.50	ug/L							04/03/12	BL04	
n-Butylbenzene	ND	0.50	ug/L							04/03/12		
n-Propylbenzene	ND	0.50	ug/L							04/03/12		
o-Xylene	ND	0.50	ug/L							04/03/12		
p-Isopropyltoluene	ND	0.50	ug/L							04/03/12		
sec-Butylbenzene	ND	0.50	ug/L							04/03/12		
Styrene	ND	0.50	ug/L							04/03/12		
tert-Amyl Methyl Ether (TAME)	ND	3.0	ug/L							04/03/12		
tert-Butyl alcohol (TBA)	ND	2.0	ug/L							04/03/12		
tert-Butylbenzene	ND	0.50	ug/L							04/03/12		
Tetrachloroethene (PCE)	ND	0.50	ug/L							04/03/12		
Toluene	ND	0.50	ug/L							04/03/12		
trans-1,2-Dichloroethene	ND	0.50	ug/L							04/03/12		
trans-1,3-Dichloropropene	ND	0.50	ug/L							04/03/12		
Trichloroethene (TCE)	ND	0.50	ug/L							04/03/12		
Trichlorofluoromethane	ND	5.0	ug/L							04/03/12		
Vinyl Chloride	ND	0.50	ug/L							04/03/12		
Surrogate: 1,2-Dichlorobenzene-d4	*5.4*			*5.0*		*107*	*70-130*			04/03/12		
Surrogate: Bromofluorobenzene	*5.3*			*5.0*		*107*	*70-130*			04/03/12		
Blank Spike (A203332-BS1) EPA 524.2 - Quality Control												
1,1,1,2-Tetrachloroethane	10	0.50	ug/L	10		104	70-130			04/03/12		
1,1,1-Trichloroethane	12	0.50	ug/L	10		115	70-130			04/03/12		
1,1,2,2-Tetrachloroethane	9.3	0.50	ug/L	10		93	70-130			04/03/12		
1,1,2-Trichloro-1,2,2-trifluoroethane	12	10	ug/L	10		124	70-130			04/03/12		
1,1,2-Trichloroethane	9.0	0.50	ug/L	10		90	70-130			04/03/12		
1,1-Dichloroethane	11	0.50	ug/L	10		105	70-130			04/03/12		
1,1-Dichloroethene	15	0.50	ug/L	10		153	70-130			04/03/12	BS06	***High***
1,1-Dichloropropene	11	0.50	ug/L	10		107	70-130			04/03/12		
1,2,3-Trichlorobenzene	7.8	0.50	ug/L	10		78	70-130			04/03/12		
1,2,4-Trichlorobenzene	8.8	0.50	ug/L	10		88	70-130			04/03/12		
1,2,4-Trimethylbenzene	11	0.50	ug/L	10		108	70-130			04/03/12		
1,2-Dichlorobenzene	9.8	0.50	ug/L	10		98	70-130			04/03/12		
1,2-Dichloroethane	9.6	0.50	ug/L	10		96	70-130			04/03/12		
1,2-Dichloropropane	9.2	0.50	ug/L	10		92	70-130			04/03/12		
1,3,5-Trimethylbenzene	11	0.50	ug/L	10		109	70-130			04/03/12		
1,3-Dichlorobenzene	10	0.50	ug/L	10		104	70-130			04/03/12		
1,3-Dichloropropane	9.2	0.50	ug/L	10		92	70-130			04/03/12		
1,4-Dichlorobenzene	10	0.50	ug/L	10		100	70-130			04/03/12		
2,2-Dichloropropane	12	0.50	ug/L	10		119	70-130			04/03/12		
2-Butanone	8.3	5.0	ug/L	10		83	70-130			04/03/12		
2-Chlorotoluene	11	0.50	ug/L	10		107	70-130			04/03/12		
2-Hexanone	8.3	10	ug/L	10		83	70-130			04/03/12		
4-Chlorotoluene	11	0.50	ug/L	10		107	70-130			04/03/12		
4-Methyl-2-pentanone	8.7	5.0	ug/L	10		87	70-130			04/03/12		

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Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203332				Analyst: JGB		Prepared: 04/03/2012					
Blank Spike (A203332-BS1)	**EPA 524.2 - Quality Control**										
Acetone	9.5	10	ug/L	10		95	70-130			04/03/12	
Benzene	10	0.50	ug/L	10		100	70-130			04/03/12	
Bromobenzene	10	0.50	ug/L	10		102	70-130			04/03/12	
Bromochloromethane	9.6	0.50	ug/L	10		96	70-130			04/03/12	
Bromodichloromethane	9.9	0.50	ug/L	10		99	70-130			04/03/12	
Bromoform	9.8	0.50	ug/L	10		98	70-130			04/03/12	
Bromomethane	11	0.50	ug/L	10		112	70-130			04/03/12	
Carbon Tetrachloride	12	0.50	ug/L	10		117	70-130			04/03/12	
Chlorobenzene	10	0.50	ug/L	10		102	70-130			04/03/12	
Chloroethane	12	0.50	ug/L	10		122	70-130			04/03/12	
Chloroform	11	0.50	ug/L	10		107	70-130			04/03/12	
Chloromethane	11	0.50	ug/L	10		107	70-130			04/03/12	
cis-1,2-Dichloroethene	10	0.50	ug/L	10		105	70-130			04/03/12	
cis-1,3-Dichloropropene	11	0.50	ug/L	10		109	70-130			04/03/12	
Dibromochloromethane	9.7	0.50	ug/L	10		97	70-130			04/03/12	
Dibromomethane	9.0	0.50	ug/L	10		90	70-130			04/03/12	
Dichlorodifluoromethane	12	0.50	ug/L	10		120	70-130			04/03/12	
Dichloromethane	10	0.50	ug/L	10		101	70-130			04/03/12	
Di-isopropyl ether (DIPE)	9.5	3.0	ug/L	10		95	70-130			04/03/12	
Ethyl tert-Butyl Ether (ETBE)	9.7	0.50	ug/L	10		97	70-130			04/03/12	
Ethylbenzene	11	0.50	ug/L	10		107	70-130			04/03/12	
Hexachlorobutadiene	11	0.50	ug/L	10		107	70-130			04/03/12	
Isopropylbenzene	11	0.50	ug/L	10		109	70-130			04/03/12	
m,p-Xylenes	22	0.50	ug/L	20		109	70-130			04/03/12	
Methyl-t-butyl ether	19	0.50	ug/L	20		95	70-130			04/03/12	
Naphthalene	7.4	0.50	ug/L	10		74	70-130			04/03/12	
n-Butylbenzene	11	0.50	ug/L	10		108	70-130			04/03/12	
n-Propylbenzene	11	0.50	ug/L	10		108	70-130			04/03/12	
o-Xylene	11	0.50	ug/L	10		108	70-130			04/03/12	
p-Isopropyltoluene	11	0.50	ug/L	10		109	70-130			04/03/12	
sec-Butylbenzene	11	0.50	ug/L	10		108	70-130			04/03/12	
Styrene	11	0.50	ug/L	10		112	70-130			04/03/12	
tert-Amyl Methyl Ether (TAME)	9.0	3.0	ug/L	10		90	70-130			04/03/12	
tert-Butyl alcohol (TBA)	12	2.0	ug/L	10		117	70-130			04/03/12	
tert-Butylbenzene	11	0.50	ug/L	10		108	70-130			04/03/12	
Tetrachloroethene (PCE)	11	0.50	ug/L	10		106	70-130			04/03/12	
Toluene	10	0.50	ug/L	10		100	70-130			04/03/12	
trans-1,2-Dichloroethene	11	0.50	ug/L	10		109	70-130			04/03/12	
trans-1,3-Dichloropropene	9.7	0.50	ug/L	10		97	70-130			04/03/12	
Trichloroethene (TCE)	10	0.50	ug/L	10		102	70-130			04/03/12	
Trichlorofluoromethane	12	5.0	ug/L	10		121	70-130			04/03/12	
Vinyl Chloride	12	0.50	ug/L	10		124	70-130			04/03/12	
Surrogate: 1,2-Dichlorobenzene-d4	*5.1*			*5.0*		*103*	*70-130*			04/03/12	
Surrogate: Bromofluorobenzene	*5.3*			*5.0*		*105*	*70-130*			04/03/12	
Blank Spike Dup (A203332-BSD1)	**EPA 524.2 - Quality Control**										
1,1,1,2-Tetrachloroethane	9.9	0.50	ug/L	10		99	70-130	5	30	04/03/12	

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Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203332				Analyst: JGB		Prepared: 04/03/2012					
Blank Spike Dup (A203332-BSD1)	**EPA 524.2 - Quality Control**										
1,1,1-Trichloroethane	10	0.50	ug/L	10		104	70-130	10	30	04/03/12	
1,1,2,2-Tetrachloroethane	10	0.50	ug/L	10		104	70-130	11	30	04/03/12	
1,1,2-Trichloro-1,2,2-trifluoroethane	10	10	ug/L	10		102	70-130	20	30	04/03/12	
1,1,2-Trichloroethane	9.7	0.50	ug/L	10		97	70-130	8	30	04/03/12	
1,1-Dichloroethane	9.8	0.50	ug/L	10		98	70-130	7	30	04/03/12	
1,1-Dichloroethene	11	0.50	ug/L	10		109	70-130	33	30	04/03/12	BS03
1,1-Dichloropropene	9.9	0.50	ug/L	10		99	70-130	7	30	04/03/12	
1,2,3-Trichlorobenzene	10	0.50	ug/L	10		105	70-130	29	30	04/03/12	
1,2,4-Trichlorobenzene	10	0.50	ug/L	10		102	70-130	15	30	04/03/12	
1,2,4-Trimethylbenzene	10	0.50	ug/L	10		100	70-130	7	30	04/03/12	
1,2-Dichlorobenzene	10	0.50	ug/L	10		101	70-130	3	30	04/03/12	
1,2-Dichloroethane	10	0.50	ug/L	10		104	70-130	8	30	04/03/12	
1,2-Dichloropropane	10	0.50	ug/L	10		103	70-130	11	30	04/03/12	
1,3,5-Trimethylbenzene	10	0.50	ug/L	10		100	70-130	9	30	04/03/12	
1,3-Dichlorobenzene	10	0.50	ug/L	10		100	70-130	4	30	04/03/12	
1,3-Dichloropropane	10	0.50	ug/L	10		100	70-130	9	30	04/03/12	
1,4-Dichlorobenzene	9.9	0.50	ug/L	10		99	70-130	1	30	04/03/12	
2,2-Dichloropropane	11	0.50	ug/L	10		106	70-130	11	30	04/03/12	
2-Butanone	9.7	5.0	ug/L	10		97	70-130	15	30	04/03/12	
2-Chlorotoluene	10	0.50	ug/L	10		100	70-130	7	30	04/03/12	
2-Hexanone	10	10	ug/L	10		101	70-130	19	30	04/03/12	
4-Chlorotoluene	10	0.50	ug/L	10		100	70-130	7	30	04/03/12	
4-Methyl-2-pentanone	10	5.0	ug/L	10		101	70-130	15	30	04/03/12	
Acetone	11	10	ug/L	10		105	70-130	10	30	04/03/12	
Benzene	9.8	0.50	ug/L	10		98	70-130	2	30	04/03/12	
Bromobenzene	10	0.50	ug/L	10		103	70-130	2	30	04/03/12	
Bromochloromethane	9.6	0.50	ug/L	10		96	70-130	0	30	04/03/12	
Bromodichloromethane	10	0.50	ug/L	10		104	70-130	5	30	04/03/12	
Bromoform	11	0.50	ug/L	10		108	70-130	10	30	04/03/12	
Bromomethane	9.4	0.50	ug/L	10		94	70-130	18	30	04/03/12	
Carbon Tetrachloride	10	0.50	ug/L	10		102	70-130	14	30	04/03/12	
Chlorobenzene	9.8	0.50	ug/L	10		98	70-130	4	30	04/03/12	
Chloroethane	10	0.50	ug/L	10		100	70-130	19	30	04/03/12	
Chloroform	10	0.50	ug/L	10		101	70-130	6	30	04/03/12	
Chloromethane	9.7	0.50	ug/L	10		97	70-130	10	30	04/03/12	
cis-1,2-Dichloroethene	9.9	0.50	ug/L	10		99	70-130	6	30	04/03/12	
cis-1,3-Dichloropropene	12	0.50	ug/L	10		118	70-130	8	30	04/03/12	
Dibromochloromethane	10	0.50	ug/L	10		104	70-130	7	30	04/03/12	
Dibromomethane	10	0.50	ug/L	10		101	70-130	12	30	04/03/12	
Dichlorodifluoromethane	9.7	0.50	ug/L	10		97	70-130	22	30	04/03/12	
Dichloromethane	9.6	0.50	ug/L	10		96	70-130	6	30	04/03/12	
Di-isopropyl ether (DIPE)	9.5	3.0	ug/L	10		95	70-130	0	30	04/03/12	
Ethyl tert-Butyl Ether (ETBE)	9.8	0.50	ug/L	10		98	70-130	1	30	04/03/12	
Ethylbenzene	9.9	0.50	ug/L	10		99	70-130	8	30	04/03/12	
Hexachlorobutadiene	10	0.50	ug/L	10		100	70-130	7	30	04/03/12	
Isopropylbenzene	9.9	0.50	ug/L	10		99	70-130	10	30	04/03/12	
m,p-Xylenes	20	0.50	ug/L	20		100	70-130	9	30	04/03/12	

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Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203332				Analyst: JGB		Prepared: 04/03/2012					
Blank Spike Dup (A203332-BSD1)	**EPA 524.2 - Quality Control**										
Methyl-t-butyl ether	20	0.50	ug/L	20		101	70-130	6	30	04/03/12	
Naphthalene	10	0.50	ug/L	10		104	70-130	35	30	04/03/12	BS03
n-Butylbenzene	10	0.50	ug/L	10		100	70-130	8	30	04/03/12	
n-Propylbenzene	9.6	0.50	ug/L	10		96	70-130	12	30	04/03/12	
o-Xylene	10	0.50	ug/L	10		101	70-130	7	30	04/03/12	
p-Isopropyltoluene	9.9	0.50	ug/L	10		99	70-130	9	30	04/03/12	
sec-Butylbenzene	10	0.50	ug/L	10		100	70-130	8	30	04/03/12	
Styrene	11	0.50	ug/L	10		110	70-130	2	30	04/03/12	
tert-Amyl Methyl Ether (TAME)	9.3	3.0	ug/L	10		93	70-130	3	30	04/03/12	
tert-Butyl alcohol (TBA)	11	2.0	ug/L	10		107	70-130	9	30	04/03/12	
tert-Butylbenzene	10	0.50	ug/L	10		100	70-130	7	30	04/03/12	
Tetrachloroethene (PCE)	10	0.50	ug/L	10		100	70-130	6	30	04/03/12	
Toluene	9.9	0.50	ug/L	10		99	70-130	2	30	04/03/12	
trans-1,2-Dichloroethene	9.8	0.50	ug/L	10		98	70-130	11	30	04/03/12	
trans-1,3-Dichloropropene	11	0.50	ug/L	10		108	70-130	10	30	04/03/12	
Trichloroethene (TCE)	9.7	0.50	ug/L	10		97	70-130	5	30	04/03/12	
Trichlorofluoromethane	11	5.0	ug/L	10		106	70-130	14	30	04/03/12	
Vinyl Chloride	10	0.50	ug/L	10		102	70-130	20	30	04/03/12	
Surrogate: 1,2-Dichlorobenzene-d4	*5.0*			*5.0*		*100*	*70-130*			04/03/12	
Surrogate: Bromofluorobenzene	*5.0*			*5.0*		*101*	*70-130*			04/03/12	
Batch: A203354				Analyst: gak		Prepared: 04/03/2012					
Blank (A203354-BLK1)	**EPA 505 - Quality Control**										
Aldrin	ND	0.075	ug/L							04/03/12	
Chlordane	ND	0.10	ug/L							04/03/12	
Chlorothalonil	ND	5.0	ug/L							04/03/12	
Dieldrin	ND	0.020	ug/L							04/03/12	
Endrin	ND	0.10	ug/L							04/03/12	
Heptachlor	ND	0.010	ug/L							04/03/12	
Heptachlor Epoxide	ND	0.010	ug/L							04/03/12	
Hexachlorobenzene	ND	0.50	ug/L							04/03/12	
Hexachlorocyclopentadiene	ND	1.0	ug/L							04/03/12	
Lindane	ND	0.20	ug/L							04/03/12	
Methoxychlor	ND	10	ug/L							04/03/12	
PCB Aroclor Screen	ND	0.50	ug/L							04/03/12	
Toxaphene	ND	1.0	ug/L							04/03/12	
Trifluralin	ND	1.0	ug/L							04/03/12	
Surrogate: TCMX	*1.6*			*1.5*		*105*	*70-130*			04/03/12	
Blank Spike (A203354-BS1)	**EPA 505 - Quality Control**										
Aldrin	0.044	0.075	ug/L	0.040		110	70-130			04/03/12	
Chlorothalonil	0.36	5.0	ug/L	0.40		89	70-130			04/03/12	
Dieldrin	0.045	0.020	ug/L	0.040		114	70-130			04/03/12	
Endrin	0.045	0.10	ug/L	0.040		112	70-130			04/03/12	
Heptachlor	0.044	0.010	ug/L	0.040		110	70-130			04/03/12	
Heptachlor Epoxide	0.046	0.010	ug/L	0.040		115	70-130			04/03/12	

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Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203354				Analyst: gak		Prepared: 04/03/2012					
Blank Spike (A203354-BS1) EPA 505 - Quality Control											
Hexachlorobenzene	0.17	0.50	ug/L	0.16		105	70-130			04/03/12	
Hexachlorocyclopentadiene	0.12	1.0	ug/L	0.12		101	70-130			04/03/12	
Lindane	0.045	0.20	ug/L	0.040		112	70-130			04/03/12	
Methoxychlor	0.046	10	ug/L	0.040		116	70-130			04/03/12	
Trifluralin	0.13	1.0	ug/L	0.12		106	70-130			04/03/12	
Surrogate: TCMX	*1.5*			*1.5*		*99*	*70-130*			04/03/12	
Blank Spike Dup (A203354-BSD1) EPA 505 - Quality Control											
Aldrin	0.041	0.075	ug/L	0.040		102	70-130	7	20	04/03/12	
Chlorothalonil	0.36	5.0	ug/L	0.40		90	70-130	1	20	04/03/12	
Dieldrin	0.043	0.020	ug/L	0.040		106	70-130	7	20	04/03/12	
Endrin	0.043	0.10	ug/L	0.040		107	70-130	5	20	04/03/12	
Heptachlor	0.042	0.010	ug/L	0.040		105	70-130	4	20	04/03/12	
Heptachlor Epoxide	0.043	0.010	ug/L	0.040		109	70-130	6	20	04/03/12	
Hexachlorobenzene	0.17	0.50	ug/L	0.16		104	70-130	1	20	04/03/12	
Hexachlorocyclopentadiene	0.12	1.0	ug/L	0.12		101	70-130	1	20	04/03/12	
Lindane	0.043	0.20	ug/L	0.040		106	70-130	5	20	04/03/12	
Methoxychlor	0.042	10	ug/L	0.040		106	70-130	9	20	04/03/12	
Trifluralin	0.12	1.0	ug/L	0.12		102	70-130	3	20	04/03/12	
Surrogate: TCMX	*1.5*			*1.5*		*99*	*70-130*			04/03/12	
Matrix Spike (A203354-MS1) EPA 505 - Quality Control					**Source: A2C2178-01**						
Aldrin	0.041	0.075	ug/L	0.040	ND	103	70-130			04/03/12	
Chlorothalonil	0.37	5.0	ug/L	0.40	ND	74	70-130			04/03/12	
Dieldrin	0.043	0.020	ug/L	0.040	ND	95	70-130			04/03/12	
Endrin	0.043	0.10	ug/L	0.040	ND	106	70-130			04/03/12	
Heptachlor	0.042	0.010	ug/L	0.040	ND	106	70-130			04/03/12	
Heptachlor Epoxide	0.044	0.010	ug/L	0.040	ND	111	70-130			04/03/12	
Hexachlorobenzene	0.17	0.50	ug/L	0.16	ND	106	70-130			04/03/12	
Hexachlorocyclopentadiene	0.13	1.0	ug/L	0.12	ND	110	70-130			04/03/12	
Lindane	0.043	0.20	ug/L	0.040	ND	107	70-130			04/03/12	
Methoxychlor	0.044	10	ug/L	0.040	ND	110	70-130			04/03/12	
Trifluralin	0.12	1.0	ug/L	0.12	ND	103	70-130			04/03/12	
Surrogate: TCMX	*1.7*			*1.5*		*110*	*70-130*			04/03/12	
Batch: A203396				Analyst: PYA		Prepared: 04/03/2012					
Blank (A203396-BLK1) EPA 549.2 - Quality Control											
Diquat	ND	4.0	ug/L							04/05/12	
Blank Spike (A203396-BS1) EPA 549.2 - Quality Control											
Diquat	39	4.0	ug/L	40		97	70-130			04/05/12	
Blank Spike Dup (A203396-BSD1) EPA 549.2 - Quality Control											
Diquat	39	4.0	ug/L	40		98	70-130	0	30	04/05/12	
Matrix Spike (A203396-MS1) EPA 549.2 - Quality Control						**Source: A2C2205-01**					

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Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203396				Analyst: PYA		Prepared: 04/03/2012					
Matrix Spike (A203396-MS1) EPA 549.2 - Quality Control						**Source: A2C2205-01**					
Diquat	40	4.0	ug/L	40	ND	99	70-130			04/05/12	
Batch: A203483				Analyst: XHX		Prepared: 04/05/2012					
Blank (A203483-BLK1) EPA 531.1 - Quality Control											
3-Hydroxycarbofuran	ND	3.0	ug/L							04/06/12	
Aldicarb	ND	3.0	ug/L							04/06/12	
Aldicarb Sulfone	ND	2.0	ug/L							04/06/12	
Aldicarb Sulfoxide	ND	3.0	ug/L							04/06/12	
Carbaryl	ND	5.0	ug/L							04/06/12	
Carbofuran	ND	5.0	ug/L							04/06/12	
Methomyl	ND	2.0	ug/L							04/06/12	
Oxamyl	ND	20	ug/L							04/06/12	
Blank Spike (A203483-BS1) EPA 531.1 - Quality Control											
3-Hydroxycarbofuran	30	3.0	ug/L	30		100	70-130			04/06/12	
Aldicarb	29	3.0	ug/L	30		98	70-130			04/06/12	
Aldicarb Sulfone	30	2.0	ug/L	30		99	70-130			04/06/12	
Aldicarb Sulfoxide	29	3.0	ug/L	30		98	70-130			04/06/12	
Carbaryl	30	5.0	ug/L	30		99	70-130			04/06/12	
Carbofuran	29	5.0	ug/L	30		97	70-130			04/06/12	
Methomyl	30	2.0	ug/L	30		98	70-130			04/06/12	
Oxamyl	30	20	ug/L	30		99	70-130			04/06/12	
Blank Spike Dup (A203483-BSD1) EPA 531.1 - Quality Control											
3-Hydroxycarbofuran	30	3.0	ug/L	30		101	70-130	1	20	04/06/12	
Aldicarb	30	3.0	ug/L	30		100	70-130	3	20	04/06/12	
Aldicarb Sulfone	31	2.0	ug/L	30		102	70-130	3	20	04/06/12	
Aldicarb Sulfoxide	30	3.0	ug/L	30		101	70-130	3	20	04/06/12	
Carbaryl	30	5.0	ug/L	30		101	70-130	2	20	04/06/12	
Carbofuran	30	5.0	ug/L	30		100	70-130	3	20	04/06/12	
Methomyl	30	2.0	ug/L	30		102	70-130	3	20	04/06/12	
Oxamyl	30	20	ug/L	30		101	70-130	2	20	04/06/12	
Matrix Spike (A203483-MS1) EPA 531.1 - Quality Control						**Source: A2C1696-01**					
3-Hydroxycarbofuran	30	3.0	ug/L	30	ND	99	70-130			04/06/12	
Aldicarb	29	3.0	ug/L	30	ND	97	70-130			04/06/12	
Aldicarb Sulfone	30	2.0	ug/L	30	ND	99	70-130			04/06/12	
Aldicarb Sulfoxide	29	3.0	ug/L	30	ND	98	70-130			04/06/12	
Carbaryl	30	5.0	ug/L	30	ND	99	70-130			04/06/12	
Carbofuran	29	5.0	ug/L	30	ND	96	70-130			04/06/12	
Methomyl	30	2.0	ug/L	30	ND	99	70-130			04/06/12	
Oxamyl	30	20	ug/L	30	ND	99	70-130			04/06/12	
Batch: A203516				Analyst: PYA		Prepared: 04/06/2012					
Blank (A203516-BLK1) EPA 632 - Quality Control											
Diuron	ND	1.0	ug/L							04/09/12	

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Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203516				Analyst: PYA		Prepared: 04/06/2012					
Blank (A203516-BLK1) EPA 632 - Quality Control											
Surrogate: Benthiocarb	*190*			*120*		*152*	*70-130*			04/09/12	*SR02* ***High***
Blank Spike (A203516-BS1) EPA 632 - Quality Control											
Diuron	5.0	1.0	ug/L	5.0		100	70-130			04/09/12	
Surrogate: Benthiocarb	*120*			*120*		*99*	*70-130*			04/09/12	
Blank Spike Dup (A203516-BSD1) EPA 632 - Quality Control											
Diuron	5.5	1.0	ug/L	5.0		109	70-130	8	30	04/09/12	
Surrogate: Benthiocarb	*130*			*120*		*105*	*70-130*			04/09/12	
Batch: A203541				Analyst: XHX		Prepared: 04/06/2012					
Blank (A203541-BLK1) EPA 504.1 - Quality Control											
Dibromochloropropane (DBCP)	ND	0.010	ug/L							04/06/12	
Ethylene Dibromide (EDB)	ND	0.020	ug/L							04/06/12	
Surrogate: Bromoform	*0.26*			*0.25*		*103*	*70-130*			04/06/12	
Blank Spike (A203541-BS1) EPA 504.1 - Quality Control											
Dibromochloropropane (DBCP)	0.21	0.010	ug/L	0.25		83	70-130			04/06/12	
Ethylene Dibromide (EDB)	0.25	0.020	ug/L	0.25		98	70-130			04/06/12	
Surrogate: Bromoform	*0.24*			*0.25*		*94*	*70-130*			04/06/12	
Blank Spike Dup (A203541-BSD1) EPA 504.1 - Quality Control											
Dibromochloropropane (DBCP)	0.21	0.010	ug/L	0.25		83	70-130	0	20	04/07/12	
Ethylene Dibromide (EDB)	0.23	0.020	ug/L	0.25		90	70-130	9	20	04/07/12	
Surrogate: Bromoform	*0.24*			*0.25*		*98*	*70-130*			04/07/12	
Matrix Spike (A203541-MS1) EPA 504.1 - Quality Control						**Source: A2D0064-01**					
Dibromochloropropane (DBCP)	0.21	0.010	ug/L	0.25	ND	83	70-130			04/06/12	
Ethylene Dibromide (EDB)	0.23	0.020	ug/L	0.25	ND	95	70-130			04/06/12	
Surrogate: Bromoform	*0.23*			*0.25*		*95*	*70-130*			04/06/12	
Batch: A203552				Analyst: GAK		Prepared: 04/06/2012					
Blank (A203552-BLK1) EPA 515.3 - Quality Control											
2,4,5-T	ND	1.0	ug/L							04/09/12	
2,4,5-TP (Silvex)	ND	1.0	ug/L							04/09/12	
2,4-D	ND	10	ug/L							04/09/12	
Bentazon	ND	2.0	ug/L							04/09/12	
Dalapon	ND	10	ug/L							04/09/12	
Dicamba	ND	1.5	ug/L							04/09/12	
Dinoseb	ND	2.0	ug/L							04/09/12	
Pentachlorophenol	ND	0.20	ug/L							04/09/12	
Picloram	ND	1.0	ug/L							04/09/12	
Surrogate: DCPAA	*57*			*58*		*98*	*70-130*			04/09/12	

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Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203552				Analyst: GAK		Prepared: 04/06/2012					
Blank Spike (A203552-BS1) EPA 515.3 - Quality Control											
2,4,5-T	4.0	1.0	ug/L	4.0		100	70-130			04/09/12	
2,4,5-TP (Silvex)	4.0	1.0	ug/L	4.0		100	70-130			04/09/12	
2,4-D	39	10	ug/L	40		98	70-130			04/09/12	
Bentazon	7.8	2.0	ug/L	8.0		97	70-130			04/09/12	
Dalapon	41	10	ug/L	40		103	70-130			04/09/12	
Dicamba	5.8	1.5	ug/L	6.0		97	70-130			04/09/12	
Dinoseb	8.0	2.0	ug/L	8.0		100	70-130			04/09/12	
Pentachlorophenol	0.78	0.20	ug/L	0.80		97	70-130			04/09/12	
Picloram	4.0	1.0	ug/L	4.0		99	70-130			04/09/12	
Surrogate: DCPAA	*56*			*58*		*97*	*70-130*			04/09/12	
Blank Spike Dup (A203552-BSD1) EPA 515.3 - Quality Control											
2,4,5-T	4.1	1.0	ug/L	4.0		103	70-130	3	20	04/09/12	
2,4,5-TP (Silvex)	4.0	1.0	ug/L	4.0		101	70-130	1	20	04/09/12	
2,4-D	41	10	ug/L	40		102	70-130	4	20	04/09/12	
Bentazon	8.2	2.0	ug/L	8.0		102	70-130	5	20	04/09/12	
Dalapon	42	10	ug/L	40		106	70-130	3	20	04/09/12	
Dicamba	6.2	1.5	ug/L	6.0		103	70-130	5	20	04/09/12	
Dinoseb	8.2	2.0	ug/L	8.0		102	70-130	2	20	04/09/12	
Pentachlorophenol	0.78	0.20	ug/L	0.80		97	70-130	0	20	04/09/12	
Picloram	4.0	1.0	ug/L	4.0		100	70-130	1	20	04/09/12	
Surrogate: DCPAA	*56*			*58*		*97*	*70-130*			04/09/12	
Matrix Spike (A203552-MS1) EPA 515.3 - Quality Control						**Source: A2D0064-01**					
2,4,5-T	4.0	1.0	ug/L	4.0	ND	100	70-130			04/09/12	
2,4,5-TP (Silvex)	4.2	1.0	ug/L	4.0	ND	104	70-130			04/09/12	
2,4-D	40	10	ug/L	40	ND	101	70-130			04/09/12	
Bentazon	7.9	2.0	ug/L	8.0	ND	99	70-130			04/09/12	
Dalapon	37	10	ug/L	40	ND	92	70-130			04/09/12	
Dicamba	6.1	1.5	ug/L	6.0	ND	102	70-130			04/09/12	
Dinoseb	8.3	2.0	ug/L	8.0	ND	104	70-130			04/09/12	
Pentachlorophenol	0.78	0.20	ug/L	0.80	ND	97	70-130			04/09/12	
Picloram	4.1	1.0	ug/L	4.0	ND	102	70-130			04/09/12	
Surrogate: DCPAA	*58*			*58*		*101*	*70-130*			04/09/12	
Batch: A203577				Analyst: KHH		Prepared: 04/09/2012					
Blank (A203577-BLK1) EPA 525.2 - Quality Control											
Alachlor	ND	1.0	ug/L							04/12/12	
Atrazine	ND	0.50	ug/L							04/12/12	
Benzo(a)pyrene	ND	0.10	ug/L							04/12/12	
Bis(2-ethylhexyl) adipate	ND	3.0	ug/L							04/12/12	
Bis(2-ethylhexyl) phthalate	ND	3.0	ug/L							04/12/12	
Bromacil	ND	10	ug/L							04/12/12	
Butachlor	ND	0.38	ug/L							04/12/12	
Diazinon	ND	0.25	ug/L							04/12/12	

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Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203577				Analyst: KHH		Prepared: 04/09/2012					
Blank (A203577-BLK1) EPA 525.2 - Quality Control											
Dimethoate	ND	10	ug/L							04/12/12	
Metolachlor	ND	0.50	ug/L							04/12/12	
Metribuzin	ND	0.50	ug/L							04/12/12	
Molinate	ND	2.0	ug/L							04/12/12	
Propachlor	ND	0.50	ug/L							04/12/12	
Simazine	ND	1.0	ug/L							04/12/12	
Thiobencarb	ND	1.0	ug/L							04/12/12	
Surrogate: 1,3-Dimethyl-2-nitrobenzene	*5.2*			*5.0*		*105*	*70-130*			04/12/12	
Blank Spike (A203577-BS1) EPA 525.2 - Quality Control											
Alachlor	6.2	1.0	ug/L	5.0		124	70-130			04/12/12	
Atrazine	6.2	0.50	ug/L	5.0		124	70-130			04/12/12	
Benzo(a)pyrene	1.1	0.10	ug/L	1.0		112	70-130			04/12/12	
Bis(2-ethylhexyl) adipate	6.6	3.0	ug/L	5.0		132	70-130			04/12/12	BS06 ***High***
Bis(2-ethylhexyl) phthalate	6.4	3.0	ug/L	5.0		129	70-130			04/12/12	
Bromacil	6.5	10	ug/L	5.0		130	70-130			04/12/12	
Butachlor	3.2	0.38	ug/L	2.5		126	70-130			04/12/12	
Diazinon	2.9	0.25	ug/L	2.5		116	10-110			04/12/12	BS06 ***High***
Dimethoate	6.3	10	ug/L	5.0		126	70-130			04/12/12	
Metolachlor	6.1	0.50	ug/L	5.0		122	70-130			04/12/12	
Metribuzin	6.1	0.50	ug/L	5.0		122	70-130			04/12/12	
Molinate	5.9	2.0	ug/L	5.0		119	70-130			04/12/12	
Propachlor	6.3	0.50	ug/L	5.0		127	70-130			04/12/12	
Simazine	6.1	1.0	ug/L	5.0		123	70-130			04/12/12	
Thiobencarb	5.8	1.0	ug/L	5.0		116	70-130			04/12/12	
Surrogate: 1,3-Dimethyl-2-nitrobenzene	*5.3*			*5.0*		*107*	*70-130*			04/12/12	
Blank Spike Dup (A203577-BSD1) EPA 525.2 - Quality Control											
Alachlor	5.4	1.0	ug/L	4.9		110	70-130	13	30	04/12/12	
Atrazine	5.0	0.50	ug/L	4.9		102	70-130	21	30	04/12/12	
Benzo(a)pyrene	0.98	0.10	ug/L	0.98		100	70-130	13	30	04/12/12	
Bis(2-ethylhexyl) adipate	6.0	3.0	ug/L	4.9		122	70-130	9	30	04/12/12	
Bis(2-ethylhexyl) phthalate	6.0	3.0	ug/L	4.9		121	70-130	7	30	04/12/12	
Bromacil	5.9	10	ug/L	4.9		121	70-130	9	30	04/12/12	
Butachlor	2.8	0.38	ug/L	2.5		112	70-130	13	30	04/12/12	
Diazinon	2.5	0.25	ug/L	2.5		100	10-110	16	30	04/12/12	
Dimethoate	5.7	10	ug/L	4.9		115	70-130	11	30	04/12/12	
Metolachlor	5.4	0.50	ug/L	4.9		110	70-130	12	30	04/12/12	
Metribuzin	5.4	0.50	ug/L	4.9		110	70-130	11	30	04/12/12	
Molinate	5.3	2.0	ug/L	4.9		107	70-130	11	30	04/12/12	
Propachlor	5.5	0.50	ug/L	4.9		112	70-130	13	30	04/12/12	
Simazine	5.5	1.0	ug/L	4.9		111	70-130	11	30	04/12/12	
Thiobencarb	4.7	1.0	ug/L	4.9		96	70-130	20	30	04/12/12	
Surrogate: 1,3-Dimethyl-2-nitrobenzene	*4.7*			*4.9*		*96*	*70-130*			04/12/12	
Matrix Spike (A203577-MS1) EPA 525.2 - Quality Control						**Source: A2C2205-01**					

BSK Associates Engineers & Laboratories

Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203577				Analyst: KHH		Prepared: 04/09/2012					
Matrix Spike (A203577-MS1) EPA 525.2 - Quality Control						**Source: A2C2205-01**					
Alachlor	5.8	1.0	ug/L	5.0	ND	115	70-130			04/12/12	
Atrazine	0.54	0.50	ug/L	5.0	ND	11	70-130			04/12/12	MS02 ***Low***
Benzo(a)pyrene	0.98	0.10	ug/L	1.0	ND	98	70-130			04/12/12	
Bis(2-ethylhexyl) adipate	6.0	3.0	ug/L	5.0	ND	119	70-130			04/12/12	
Bis(2-ethylhexyl) phthalate	6.3	3.0	ug/L	5.0	ND	126	70-130			04/12/12	
Bromacil	6.0	10	ug/L	5.0	ND	120	70-130			04/12/12	
Butachlor	2.9	0.38	ug/L	2.5	ND	115	70-130			04/12/12	
Diazinon	2.1	0.25	ug/L	2.5	ND	85	10-110			04/12/12	
Dimethoate	5.9	10	ug/L	5.0	ND	117	70-130			04/12/12	
Metolachlor	5.7	0.50	ug/L	5.0	ND	114	70-130			04/12/12	
Metribuzin	5.5	0.50	ug/L	5.0	ND	110	70-130			04/12/12	
Molinate	5.7	2.0	ug/L	5.0	ND	114	70-130			04/12/12	
Propachlor	6.0	0.50	ug/L	5.0	ND	120	70-130			04/12/12	
Simazine	0.45	1.0	ug/L	5.0	ND	9	70-130			04/12/12	MS02 ***Low***
Thiobencarb	5.3	1.0	ug/L	5.0	ND	105	70-130			04/12/12	
Surrogate: 1,3-Dimethyl-2-nitrobenzene	*6.3*			*5.0*		*125*	*70-130*			04/12/12	
Batch: A203620				Analyst: KHH		Prepared: 04/09/2012					
Blank (A203620-BLK1) EPA 548.1 - Quality Control											
Endothall	ND	45	ug/L							04/11/12	
Blank Spike (A203620-BS1) EPA 548.1 - Quality Control											
Endothall	86	45	ug/L	100		86	34-141			04/11/12	
Blank Spike Dup (A203620-BSD1) EPA 548.1 - Quality Control											
Endothall	81	45	ug/L	100		81	34-141	6	46	04/11/12	
Matrix Spike (A203620-MS1) EPA 548.1 - Quality Control						**Source: A2D0064-01**					
Endothall	67	45	ug/L	100	ND	67	34-141			04/12/12	
Matrix Spike Dup (A203620-MSD1) EPA 548.1 - Quality Control						**Source: A2D0064-01**					
Endothall	64	45	ug/L	100	ND	64	34-141	4	46	04/11/12	
Batch: A203633				Analyst: RJB		Prepared: 04/10/2012					
Blank (A203633-BLK1) EPA 547 - Quality Control											
Glyphosate	ND	25	ug/L							04/11/12	
Surrogate: AMPA	*100*			*100*		*102*	*70-130*			04/11/12	
Blank Spike (A203633-BS1) EPA 547 - Quality Control											
Glyphosate	99		ug/L	100		99	70-130			04/11/12	
Surrogate: AMPA	*120*			*120*		*97*	*70-130*			04/11/12	
Blank Spike Dup (A203633-BSD1) EPA 547 - Quality Control											
Glyphosate	100		ug/L	100		100	70-130	1	30	04/11/12	
Surrogate: AMPA	*120*			*120*		*99*	*70-130*			04/11/12	

A2D0064 FINAL 05112012 0924

BSK Associates Engineers & Laboratories

Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203633				Analyst: RJB		Prepared: 04/10/2012					
Blank Spike Dup (A203633-BSD1)	**EPA 547 - Quality Control**										
Matrix Spike (A203633-MS1)	**EPA 547 - Quality Control**					**Source: A2D0273-01**					
Glyphosate	100		ug/L	100	ND	101	70-130			04/11/12	
Surrogate: AMPA	*120*			*120*		*98*	*70-130*			04/11/12	
Matrix Spike (A203633-MS2)	**EPA 547 - Quality Control**					**Source: A2D0595-01**					
Glyphosate	31	25	ug/L	29	ND	98	70-130			04/11/12	
Surrogate: AMPA	*82*			*110*		*72*	*70-130*			04/11/12	
Matrix Spike Dup (A203633-MSD1)	**EPA 547 - Quality Control**					**Source: A2D0273-01**					
Glyphosate	98		ug/L	100	ND	98	70-130	2	30	04/11/12	
Surrogate: AMPA	*120*			*120*		*98*	*70-130*			04/11/12	

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Radiological Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Batch: A203414				Analyst: KKC		Prepared: 04/04/2012					
Blank (A203414-BLK1) EPA 00-02 - Quality Control											
1.65 Sigma Uncertainty	ND		±							04/05/12	
Gross Alpha	ND	3	pCi/L							04/05/12	
MDA95	ND	0.00	pCi/L							04/05/12	
Blank Spike (A203414-BS1) EPA 00-02 - Quality Control											
Gross Alpha	29.5	3	pCi/L	30		98	80-120			04/05/12	
Blank Spike Dup (A203414-BSD1) EPA 00-02 - Quality Control											
Gross Alpha	33.1	3	pCi/L	30		110	80-120	12	50	04/05/12	
Matrix Spike (A203414-MS1) EPA 00-02 - Quality Control						**Source: A2C2095-01**					
Gross Alpha	129	3	pCi/L	120	ND	107	70-130			04/05/12	
Matrix Spike (A203414-MS2) EPA 00-02 - Quality Control						**Source: A2D0071-03**					
Gross Alpha	141	3	pCi/L	120	7.30	111	70-130			04/05/12	
Matrix Spike Dup (A203414-MSD1) EPA 00-02 - Quality Control						**Source: A2C2095-01**					
Gross Alpha	111	3	pCi/L	120	ND	92	70-130	16	50	04/05/12	
Matrix Spike Dup (A203414-MSD2) EPA 00-02 - Quality Control						**Source: A2D0071-03**					
Gross Alpha	134	3	pCi/L	120	7.30	106	70-130	5	50	04/05/12	

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Certificate of Analysis

05/11/2012

Notes:

- The Chain of Custody document and Sample Integrity Sheet are part of the analytical report.
- Any remaining sample(s) for testing will be disposed of one month from the final report date unless other arrangements are made in advance.
- Sample(s) received, prepared, and analyzed within the method specified criteria unless otherwise noted within this report.
- The results relate only to the samples analyzed in accordance with test(s) requested by the client on the Chain of Custody document. Any analytical quality control exceptions to method criteria that are to be considered when evaluating these results have been flagged and are defined in the data qualifiers section.
- All results are expressed on wet weight basis unless otherwise specified.
- All positive results for EPA Methods 504.1, 502.2, and 524.2 require the analysis of a Field Reagent Blank (FRB) to confirm that the results are not a contamination error from field sampling steps. If Field Reagent Blanks were not submitted with the samples, this method requirement has not been performed.
- Results contained in this analytical report must be reproduced in its entirety.
- Samples collected by BSK Analytical Laboratories were collected in accordance with the BSK Sampling and Collection Standard Operating Procedures.
- BSK Analytical Laboratories certifies that the test results contained in this report meet all requirements of the NELAC Standards for applicable certified drinking water chemistry analyses unless qualified or noted in the Case Narrative.
- Analytical data contained in this report may be used for regulatory purposes to meet the requirements of the Federal or State drinking water, wastewater, and hazardous waste programs.
- J-value is equivalent to DNQ (Detected, not quantified) which is a trace value. A trace value is an analyte detected between the MDL and the laboratory reporting limit. This result is of an unknown data quality and is only qualitative (estimated). Baseline noise, calibration curve extrapolation below the lowest calibrator, method blank detections, and integration artifacts can all produce apparent DNQ values, which contribute to the un-reliability of these values.
- (1) - Residual chlorine and pH analysis have a 15 minute holding time for both drinking and waste water samples as defined by the EPA and 40 CFR 136. Waste water and ground water (monitoring well) samples must be field filtered to meet the 15 minute holding time for dissolved metals.
- * - This is not a NELAP accredited analyte.
- Summations of analytes (i.e. Total Trihalomethanes) may appear to add individual amounts incorrectly, due to rounding of analyte values occurring before or after the total value is calculated, as well as rounding of the total value.
- (2) The digestion used to produce this result deviated from EPA 200.2 by excluding hydrochloric acid in order to produce acceptable recoveries for affected metals.
- (2C) Result reported from secondary analytical column.
- RL Multiplier is the factor used to adjust the reporting limit (RL) due to variations in sample preparation procedures and dilutions required for matrix interferences.

Certifications:

State of California - CDPH - ELAP	1180
State of California - CDPH - NELAP	04227CA
State of Nevada - NDEP	CA000792009A
State of Hawaii - DOH	04227CA

Definitions and Flags for Data Qualifiers

mg/L:	Milligrams/Liter (ppm)	M:	Method Detection Limit	MDA95:	Min. Detected Activity
mg/Kg:	Milligrams/Kilogram (ppm)	RL:	Reporting Limit	MPN:	Most Probable Number
µg/L:	Micrograms/Liter (ppb)		:DL x Dilution	CFU:	Colony Forming Unit
µg/Kg:	Micrograms/Kilogram (ppb)	ND:	None Detected at RL	Absent:	Less than 1 CFU/100mLs
%:	Percent Recovered (surrogates)	pCi/L:	Picocuries per Liter	Present:	1 or more CFU/100mLs
		NR:	Non-Reportable	RL Mult:	RL Multiplier

SR02 Surrogate recovery was above acceptance limits. No target analytes were detected in the sample.

MS02 Matrix spike recovery was low; the associated blank spike recovery was acceptable.

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MS01	Matrix spike recovery was high; the associated blank spike recovery was acceptable.
BS06	Blank spike recovery for this analyte was biased high; associated samples were ND.
BS03	BS/BSD RPD exceeded the acceptance limit. Recovery met acceptance criteria.
BL04	Detected in the method blank. All associated samples were non-detect for this analyte.

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A2D0064

City of Modesto Water Division/Corp Yard

Modes9588

04022012

Turnaround: Standard

Due Date: 4/16/2012

A2D0064 04/02/2012
Modes9588 10

City of Modesto Water Division
Chain of Custody

LAB: BSK DATE: 4.2.12

SAMPLER: N. SANDEZ

SOURCE: X Groundwater ____ System ____ Surface

REASON FOR ANALYSIS: ____ Routine ____ Repeat X Investigative

Sample ID:	Description	Analysis	Time	AM/PM
				AM/PM
	Hickman Test Well —	GM/IO/GP Title 22 Organic&	930	AM/PM 141327
	397'.13"	Title 22 externals	930	AM/PM
				AM/PM
				AM/PM
				AM/PM
				AM/PM
				AM/PM
				AM/PM
				AM/PM
				AM/PM
				AM/PM
				AM/PM
				AM/PM

		Date:	Time:
Sampled by	N. SANDEZ	4.2.12	930 AM/PM
Relinquished by	[illegible]	4/2/12	10:45 AM/PM
Received by	[illegible]	4/2/12	10:50 AM/PM
Relinquished by	[illegible]	4/2/12	11:45 AM/PM
Received by	[illegible]	4/2/12	1145 AM/PM
	[illegible]	4/2/12	1615
	[illegible]	4/2/12	1615

Sample Integrity

Pg. 1 of 2

A2D0064
Modes9588

04/02/2012
10

Date Received 4/2/12

Section 1- Receiving Information

Sample Transport: ONTRAC UPS PMS Walk-In BSK-Courier GSO Fed Exp. Other: _____

Samples arrived at lab on same day sampled: Yes X No ___ Has Chilling Process Begun: Yes X No ___

Coolers/Ice Chests Description/Temperature(s): (If more than 5 received, list information in comment section)

1) 4 2) 5 3) ___ 4) ___ 5) ___

Was Temperature In Range: Y N N/A Received On Ice: Wet Blue Received Ambient: Y N

Describe type of packing materials: Bubble Wrap Foam Packing Peanuts Paper Other: _____

Initial Receipt: BSK-Visalia BSK-Bakersfield BSK-SAC BSK-FAL

Were ice chest custody seals present? Y N Intact: Y N

Section 2- COC Info.	Completed Yes	Completed No	Info From Container		Completed Yes	Completed No	Info From Container
Was COC Received	✓			Analysis Requested	✓		
Date Sampled	✓			Hold times less than 72hr	✓		
Time Sampled	✓			Client Name	✓		
Sample ID	✓			Address	✓		
Special Storage/Handling Ins.		✓		Telephone #	✓		

Section 3- Bottles / Analysis	Yes	No	N/A	Comment
Did all bottles arrive unbroken and intact?	✓			
Were bottle custody seals present?		✓		
Were bottle custody seals intact?		✓		
Did all bottle labels agree with COC?	✓			
Were correct containers used for the tests requested?	✓			
Were correct preservations used for the tests requested?	✓			
Was a sufficient amount of sample sent for tests indicated?	✓			
Were bubbles present in VOA Vials? (**Volatile Methods Only**)			✓	
Were Ascorbic Acid Bottles received with the VOAs?			✓	

Section 4- Comments / Discrepancies

Sample(s) Split/Preserve: Yes No Container: _____ Preservation: _____ Dt/Time/Init _____

Container: _____ Preservation: _____ Dt/Time/Init _____

Was Client Service Rep. notified of discrepancies: Yes No N/A CSR: Notified By/Time:

Explanations / Comments

Report Comment Entered:

Labeled by: _____ @ _____ Labels checked by: KCC @ 16:51 RUSH Paged by: _____ @ _____

(4/11)

SP-FL-0002-06

Sample Integrity Pg 2 of 2

BSK Bottles Yes No

A2D0064
Modes9588

04/02/2012
10

250ml (A) 500ml (B) 1Liter (C) Amber Glass (AG)

Container(s) Received	1						
Bacti $Na_2S_2O_3$							
None (p) White Cap	2C						
None (p) Blue Cap w/NH4 + Buffer							
HNO_3 (p) Red Cap	4C, 1B						
H_2SO_4 (p) Yellow Cap							
NaOH (p) Green Cap	1A						
EDA (p) Brown Cap/Label							
Other:							
Dissolved Oxygen 300ml (g)							
250ml (AG) None							
250ml (AG) H_2SO_4 COD Yellow Label							
250ml (AG) $Na_2S_2O_3$ 515 547 Blue Label	2						
250ml (AG) $Na_2S_2O_3$+ MCAA 531.1 Orange Label	1						
250ml (AG) NH_4Cl 552 Purple Label							
250ml (AG) EDA DBPs Brown Label							
250ml (AG) Other:							
500ml (AG) None	1						
500ml (AG) H_2SO_4 Yellow Label							
1 Liter (AG) None	4						
1 Liter (AG) H_2SO_4 O&G / TPH-Diesel Yellow Label							
1 Liter (AG) $Na_2S_2O_3$ 548 / 525 / 521 Blue Label	3						
1 Liter (P) $Na_2S_2O_3$+ H_2SO_4 549	1						
1 Liter (AG) NaOH+ZnAc Sulfide							
40ml VOA Vial Clear – HCL	3						
40ml VOA Vial Clear – Buffer pH 4							
40ml VOA Vial Clear – None							
40ml VOA Vial Amber – $Na_2S_2O_3$							
40ml VOA Vial Clear - $Na_2S_2O_3$ 504, 505	6						
40ml VOA Vial Clear – H_3PO_4							
Other:							
½ Gallon (p)							
Asbestos 1Liter Plastic/Foil	1						
Radon 200ml Clear (g)							
Low Level Hg/Metals Double Baggie							
Bioassay Jug							
Ampule							
PT Sample Bottle							
250 Clear Glass Jar							
500 Clear Glass Jar							
1 Liter Clear Glass Jar							
Plastic Bag							
Soil Tube Brass / Steel / Plastic							
Tedlar Bags							

4/2/12

External

A2D0064

LA Testing
520 Mission Street South Pasadena, CA 91030
Phone: (323) 254-9960 Fax: (323) 254-9982 Web: http://www.latesting.com Email:pasadenalab@latesting.com

Attn: **Michelle Harmstead**
BSK Analytical Laboratories
1414 Stanislaus Street
Fresno, CA 93706

Fax: Phone: (559) 497-2888

Project: A2D0064

EMSL Order: 321205547
Customer ID: 32BSK50
Customer PO:
EMSL Project ID:
Received: 4/03/2012
Analyzed: 4/17/2012

Test Report: Determination of Asbestos Structures >10µm in Drinking Water Performed by the 100.2 Method (EPA 600/R-94/134)

Sample ID Client / EMSL	Sample Filtration Date/Time	Original Sample Vol. Filtered (ml)	Effective Filter Area (mm^2)	Area Analyzed (mm^2)	ASBESTOS Asbestos Types	Fibers Detected	Analytical Sensitivity	Concentration	Confidence Limits
							MFL (million fibers per liter)		
A2D0064-01 321205547-0001	4/3/2012 03:00 PM	100	1288	0.0670	None Detected	ND	0.19	<0.19	0.00 - 0.71

Initial report from: 04/17/2012 15:00:01

Analyst(s)
Sherrie Ahmad (1)

Jerry Drapala Ph.D, Laboratory Manager
or other Approved Signatory

Any questions please contact Jerry Drapala.

Sample collection and containers provided by the client, acceptable bottle blank level is defined as ≤0.01MFL>10um. ND=None Detected. This report relates only to those items tested. This report may not be reproduced, except in full, without written permission by LA Testing. Samples received in good condition unless otherwise noted.

Samples analyzed by LA Testing South Pasadena, CA CA ELAP 2283

321205547

BSK Analytical Laboratories
Engineering Laboratories

SUBCONTRACT ORDER

A2D0064

321205547-

SENDING LABORATORY:

BSK Associates
1414 Stanislaus St
Fresno, CA 93706
Phone: 559-497-2888
Fax: 559-485-6935
Project Manager: Michelle Harmstead
E-mail: mharmstead@bskinc.com

RECEIVING LABORATORY:

L A Testing
520 Mission St.
South Pasadena, CA 91030
Phone :(800) 303-0047
Fax: -
Turnaround (Days): Standard
QC Deliverables: I Std III IV

Sample ID	Samp Desc	Sample Date
A2D0064-01	Hickman Test Well - 397.13	**04/02/2012 09:30**

Sample Alias: 141327
Matrix: Water

Analysis 1 L P W / Foil
EXT-Asbestos, Drinking Water by EPA 100.2

temp 2°

Released By	Date	Received By	Date
[signature]	4/2/12	[signature] (courier)	4/3/12 10:30 AM
Released By	Date	Received By	Date

Pace Analytical Services, Inc.
1700 Elm Street
Minneapolis, MN 55414
Phone: 612.607.1700
Fax: 612.607.6444

www.pacelabs.com

Report Prepared for:

Michelle Harmstead
BSK Analytical Laboratories
1414 Stanislaus Street
Fresno CA 93706

REPORT OF LABORATORY ANALYSIS FOR 2,3,7,8-TCDD

Report Summary:

This report contains results of one drinking water sample analyzed to determine 2,3,7,8-TCDD content. This sample was analyzed according to Method 1613 by High Resolution Gas Chromatography/High Resolution Mass Spectrometry.

Report Prepared Date:

April 20, 2012

Report Information:

Pace Project #: 10188046
Sample Receipt Date: 04/06/2012
Client Project #: A2D0064
Client Sub PO #: N/A
State Cert #: 01155CA

Invoicing & Reporting Options:

The report provided has been invoiced as a Level 2 Drinking Water Report. If an upgrade of this report package is requested, an additional charge may be applied.

Please review the attached invoice for accuracy and forward any questions to Emily Hazelroth, your Pace Project Manager.

This report has been reviewed by:

April 20, 2012

Emily Hazelroth, Project Manager
(612) 607-6407
(612) 607-6444 (fax)
emily.hazelroth@pacelabs.com

ACCREDITED IN ACCORDANCE WITH nelac

Report of Laboratory Analysis

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The results relate only to the samples included in this report.

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612- 607-6444

Minnesota Laboratory Certifications

Authority	Certificate #	Authority	Certificate #
Alabama	40770	Montana	92
Alaska	MN00064	Nebraska	
Arizona	AZ0014	Nevada	MN_00064_200
Arkansas	88-0680	New Jersey (N	MN002
California	01155CA	New Mexico	MN00064
Colorado	MN00064	New York (NEL	11647
Connecticut	PH-0256	North Carolina	27700
EPA Region 5	WD-15J	North Dakota	R-036
EPA Region 8	8TMS-Q	Ohio	4150
Florida (NELAP	E87605	Ohio VAP	CL101 9507
Georgia (DNR)	959	Oklahoma	D9922
Guam	959	Oregon (ELAP)	MN200001-005
Hawaii	SLD	Oregon (OREL	MN300001-001
Idaho	MN00064	Pennsylvania	68-00563
Illinois	200012	Saipan	MP0003
Indiana	C-MN-01	South Carolina	74003001
Indiana	C-MN-01	Tennesee	2818
Iowa	368	Tennessee	02818
Kansas	E-10167	Texas	T104704192-08
Kentucky	90062	Utah (NELAP)	PAM
Louisiana	LA0900015	Virginia	00251
Maine	2007029	Washington	C755
Maryland	322	West Virginia	9952C
Michigan	9909	Wisconsin	999407970
Minnesota	027-053-137	Wyoming	8TMS-Q
Mississippi	MN00064		

REPORT OF LABORATORY ANALYSIS

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Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612- 607-6444

Reporting Flags

A = Reporting Limit based on signal to noise

B = Less than 10x higher than method blank level

C = Result obtained from confirmation analysis

D = Result obtained from analysis of diluted sample

E = Exceeds calibration range

I = Interference present

J = Estimated value

Nn = Value obtained from additional analysis

P = PCDE Interference

R = Recovery outside target range

S = Peak saturated

U = Analyte not detected

V = Result verified by confirmation analysis

X = %D Exceeds limits

Y = Calculated using average of daily RFs

* = See Discussion

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BSK Analytical Laboratories
Engineers & Laboratories

1160

SUBCONTRACT ORDER

A2D0064

10188046

SENDING LABORATORY:

BSK Associates
1414 Stanislaus St
Fresno, CA 93706
Phone: 559-497-2888
Fax: 559-485-6935
Project Manager: Michelle Harmstead
E-mail: mharmstead@bskinc.com

RECEIVING LABORATORY:

Pace Analytical-Dioxin
1700 Elm Street S.E. Stuite 200
Minneapolis, MN 55414
Phone :(612) 607-1700
Fax: (612) 607-6444
Turnaround (Days): Standard
QC Deliverables: I Std III IV

Sample ID	Samp Desc	Sample Date
A2D0064-01	Hickman Test Well - 397.13	**04/02/2012 09:30**

Sample Alias: 141327
Matrix: Water

Analysis 1 L AG w/ NONE
EXT-Dioxin, EPA 1613 2,3,7,8-TCDD

T=2.1

Released By	Date	Received By	Date
	4/5/12	Pace	4/6/12 1008
Released By	Date	Received By	Date

Pace Analytical®	Document Name: **Sample Condition Upon Receipt Form**	Revised Date: 15Feb2012 Page 1 of 1
	Document Number: F-MN-L-213-rev.02	Issuing Authority: Pace Minnesota Quality Office

Sample Condition Upon Receipt

Client Name: BSK Project # 10188046

Courier: ☒ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace Other _____

Tracking #: 7982 5313 9949

Custody Seal on Cooler/Box Present: ☐ yes ☒ no Seals intact: ☐ yes ☒ no

Packing Material: ☐ Bubble Wrap ☒ Bubble Bags ☐ None ☐ Other _____ Temp Blank: Yes ____ No ☒

Thermometer Used 80344072 or 80512447 **Type of Ice:** Wet Blue None ☐ Samples on ice, cooling process has begun

Cooler Temperature 2.1 **Biological Tissue is Frozen:** Yes No

Temp should be above freezing to 6°C

Date and Initials of person examining contents: 4/9/12 [illegible]

		Comments:
Chain of Custody Present:	☒Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☒Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☒Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☐Yes ☒No ☐N/A	4.
Samples Arrived within Hold Time:	☒Yes ☐No ☐N/A	5.
Short Hold Time Analysis (<72hr):	☐Yes ☒No ☐N/A	6.
Rush Turn Around Time Requested:	☐Yes ☒No ☐N/A	7.
Sufficient Volume:	☒Yes ☐No ☐N/A	8.
Correct Containers Used:	☒Yes ☐No ☐N/A	9.
-Pace Containers Used:	☐Yes ☒No ☐N/A	
Containers Intact:	☒Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☒N/A	11.
Sample Labels match COC: -Includes date/time/ID/Analysis Matrix: WT	☒Yes ☐No ☐N/A	12.
All containers needing acid/base preservation have been checked. Noncompliance are noted in 13.	☐Yes ☐No ☒N/A	13. ☐ HNO3 ☐ H2SO4 ☐ NaOH ☐ HCl Samp #
All containers needing preservation are found to be in compliance with EPA recommendation. (HNO3, H2SO4, HCL<2; NaOH >12)	☐Yes ☐No ☒N/A	
Exceptions: VOA,Coliform, TOC, Oil and Grease, WI-DRO (water)	☐Yes ☒No	Initial when completed [illegible] Lot # of added preservative
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☒N/A	14.
Trip Blank Present:	☐Yes ☒No ☐N/A	15.
Trip Blank Custody Seals Present	☐Yes ☐No ☒N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution: Field Data Required? Y / N

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: [illegible] **Date:** 4/9/12

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

Pace AnalyticalServices, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612-607-6444

Drinking Water Analysis Results
2,3,7,8-TCDD -- USEPA Method 1613B

Sample ID.....A2D0064-01
Client..... BSK Analytical Laboratories
Lab Sample ID.....10188046001

Date Collected.....04/02/2012
Date Received.....04/06/2012
Date Extracted.....04/11/2012

	Sample A2D0064-01	Method Blank	Lab Spike	Lab Spike Dup
[2,3,7,8-TCDD]	**ND**	ND	--	--
RL	5.0 pg/L	5.0 pg/L	--	--
2,3,7,8-TCDD Recovery	--	--	103%	89%
Spike Recovery Limit	--	--	73-146%	73-146%
RPD			14.5%	
IS Recovery	**73%**	57%	86%	88%
IS Recovery Limits	31-137%	31-137%	25-141%	25-141%
CS Recovery	**88%**	58%	84%	85%
CS Recovery Limits	42-164%	42-164%	37-158%	37-158%
Filename	R120414B_22	P120414B_20	P120414B_16	P120414B_17
Analysis Date	04/15/2012	04/15/2012	04/15/2012	04/15/2012
Analysis Time	02:53	05:05	02:53	03:26
Analyst	ACE	ACE	ACE	ACE
Volume	1.014L	1.025L	1.016L	1.027L
Dilution	NA	NA	NA	NA
ICAL Date	04/11/2012	04/08/2012	04/08/2012	04/08/2012
CCAL Filename	R120414B_04	P120414B_15	P120414B_15	P120414B_15

! = Outside the Control Limits
ND = Not Detected
RL = Reporting Limit
Limits = Control Limits from Method 1613 (10/94 Revision), Tables 6A and 7A
RPD = Relative Percent Difference of Lab Spike Recoveries
IS = Internal Standard [2,3,7,8-TCDD-$^{13}C_{12}$]
CS = Cleanup Standard [2,3,7,8-TCDD-$^{37}Cl_4$]

Analyst: Amanda Ellis

Project No.....10188046

Pace Analytical Services, Inc.
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

May 04, 2012

Ms. Michelle Harmstead
BSK Analytical Laboratories
1414 Stanislaus St.
Fresno, CA 93706

RE: Project: A2D0064
Pace Project No.: 3067415

Dear Ms. Harmstead:
Enclosed are the analytical results for sample(s) received by the laboratory on April 13, 2012. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Jacquelyn Collins

jacquelyn.collins@pacelabs.com
Project Manager

Enclosures

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Greensburg, PA 15601
(724)850-5600

CERTIFICATIONS

Project: A2D0064
Pace Project No.: 3067415

Pennsylvania Certification IDs
1638 Roseytown Rd Suites 2,3&4 Greensburg, PA 15601
ACLASS DOD-ELAP Accreditation #: ADE-1544
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California/TNI Certification #: 04222CA
Colorado Certification
Connecticut Certification #: PH 0694
Delaware Certification
Florida/TNI Certification #: E87683
Guam/PADEP Certification
Hawaii/PADEP Certification
Idaho Certification
Illinois/PADEP Certification
Indiana/PADEP Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: 90133
Louisiana/TNI Certification #: LA080002
Louisiana/TNI Certification #: 4086
Maine Certification #: PA0091
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification
Missouri Certification #: 235
Montana Certification #: Cert 0082
Nevada Certification
New Hampshire/TNI Certification #: 2976
New Jersey/TNI Certification #: PA 051
New Mexico Certification
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
Oregon/TNI Certification #: PA200002
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
South Dakota Certification
Tennessee Certification #: TN2867
Texas/TNI Certification #: T104704188
Utah/TNI Certification #: ANTE
Virgin Island/PADEP Certification
Virginia Certification #: 00112
Virginia VELAP (Cert # 460198)
Washington Certification #: C868
West Virginia Certification #: 143
Wisconsin/PADEP Certification
Wyoming Certification #: 8TMS-Q

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Greensburg, PA 15601
(724)850-5600

SAMPLE SUMMARY

Project: A2D0064
Pace Project No.: 3067415

Lab ID	Sample ID	Matrix	Date Collected	Date Received
3067415001	**A2D0064-01**	Drinking Water	04/02/12 09:30	04/13/12 09:50

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SAMPLE ANALYTE COUNT

Project: A2D0064
Pace Project No.: 3067415

Lab ID	Sample ID	Method	Analysts	Analytes Reported
3067415001	**A2D0064-01**	EPA 903.1	SLA	1
		EPA 904.0	WRR	1

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Greensburg, PA 15601
(724)850-5600

ANALYTICAL RESULTS

Project: A2D0064
Pace Project No.: 3067415

Sample: A2D0064-01 **Lab ID: 3067415001** Collected: 04/02/12 09:30 Received: 04/13/12 09:50 Matrix: Drinking Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC)	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.241 ± 0.334 (0.560)**	pCi/L	05/03/12 15:10	13982-63-3	
Radium-228	EPA 904.0	**0.203 ± 0.399 (0.882)**	pCi/L	04/26/12 16:38	15262-20-1	

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Greensburg, PA 15601
(724)850-5600

QUALITY CONTROL DATA

Project: A2D0064
Pace Project No.: 3067415

QC Batch: RADC/11779 Analysis Method: EPA 904.0
QC Batch Method: EPA 904.0 Analysis Description: 904.0 Radium 228
Associated Lab Samples: 3067415001

METHOD BLANK: 431282 Matrix: Water
Associated Lab Samples: 3067415001

Parameter	Act ± Unc (MDC)	Units	Analyzed	Qualifiers
Radium-228	0.0118 ± 0.392 (0.906)	pCi/L	04/26/12 16:38	

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Greensburg, PA 15601
(724)850-5600

QUALITY CONTROL DATA

Project: A2D0064
Pace Project No.: 3067415

QC Batch: RADC/11796
QC Batch Method: EPA 903.1
Analysis Method: EPA 903.1
Analysis Description: 903.1 Radium-226
Associated Lab Samples: 3067415001

METHOD BLANK: 431299
Matrix: Water
Associated Lab Samples: 3067415001

Parameter	Act ± Unc (MDC)	Units	Analyzed	Qualifiers
Radium-226	-0.155 ± 0.269 (0.676)	pCi/L	05/03/12 15:10	

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Greensburg, PA 15601
(724)850-5600

QUALIFIERS

Project: A2D0064
Pace Project No.: 3067415

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Act - Activity

Unc - Uncertainty

(MDC) - Minimum Detectable Concentration

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

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BSK Analytical Laboratories
Engineers & Laboratories

SUBCONTRACT ORDER

A2D0064

30407415

SENDING LABORATORY:

BSK Associates
1414 Stanislaus St
Fresno, CA 93706
Phone: 559-497-2888
Fax: 559-485-6935
Project Manager: Michelle Harmstead
E-mail: mharmstead@bskinc.com

RECEIVING LABORATORY:

Pace Analytical-Radiochem
1638 Roseytown Rd Ste 2,3,4
Greensburg, PA 15601
Phone :(724) 850-5600
Fax: (724) 722-5208
Turnaround (Days): Standard
QC Deliverables: I Std III IV

Sample ID	Samp Desc	Sample Date
A2D0064-01	Hickman Test Well - 397.13	**04/02/2012 09:30**

Sample Alias: 141327
Matrix: Water

001

Analysis (2) L P w/ HNO3
EXT-Radium 226
EXT-Radium 228

Released By	Date	Received By	Date
	4/6/12		4/13/12 0950
Released By	Date	Received By	Date

Sample Condition Upon Receipt

Pace Analytical

Client Name: BSK

Project # 30167415

Courier: ☐ Fed Ex ☑ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace Other _____

Tracking #: 1Z93X9210356755955

Optional
Proj. Due Date:
Proj. Name:

Custody Seal on Cooler/Box Present: ☐ yes ☑ no Seals intact: ☐ yes ☐ no

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☐ None ☑ Other Styrofoam

Thermometer Used 5 6 7 Type of Ice: Wet Blue None ☐ Samples on ice, cooling process has begun

Cooler Temperature NA Biological Tissue is Frozen: Yes No

Date and Initials of person examining contents: AD 4/13/12

Temp should be above freezing to 6°C

				Comments:
Chain of Custody Present:	☑Yes	☐No	☐N/A	1.
Chain of Custody Filled Out:	☑Yes	☐No	☐N/A	2.
Chain of Custody Relinquished:	☑Yes	☐No	☐N/A	3.
Sampler Name & Signature on COC:	☐Yes	☑No	☐N/A	4.
Samples Arrived within Hold Time:	☑Yes	☐No	☐N/A	5.
Short Hold Time Analysis (<72hr):	☐Yes	☑No	☐N/A	6.
Rush Turn Around Time Requested:	☐Yes	☑No	☐N/A	7.
Sufficient Volume:	☑Yes	☐No	☐N/A	8.
Correct Containers Used:	☑Yes	☐No	☐N/A	9.
-Pace Containers Used:	☐Yes	☑No	☐N/A	
Containers Intact:	☑Yes	☐No	☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes	☐No	☑N/A	11.
Sample Labels match COC:	☑Yes	☐No	☐N/A	12.
-Includes date/time/ID/Analysis Matrix: WT				
All containers needing preservation have been checked.	☑Yes	☐No	☐N/A	13. pH < 2
All containers needing preservation are found to be in compliance with EPA recommendation.	☑Yes	☐No	☐N/A	
exceptions: VOA, coliform, TOC, O&G, WI-DRO (water)	☐Yes	☑No		Initial when completed AD Lot # of added preservative
Samples checked for dechlorination:	☐Yes	☐No	☑N/A	14.
Headspace in VOA Vials (>6mm):	☐Yes	☐No	☑N/A	15.
Trip Blank Present:	☐Yes	☐No	☑N/A	16.
Trip Blank Custody Seals Present	☐Yes	☐No	☑N/A	
Pace Trip Blank Lot # (if purchased):				

Client Notification/ Resolution: Field Data Required? Y / N

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: _____ **Date:** 4/13/12

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

F-ALL-C003-6 SCURF front 2April2012.xls

Quality Control Sample Performance Assessment

Pace Analytical
www.pacelabs.com

Test:	Ra-226
Analyst:	SLA
Date:	4/23/2012
Worklist:	11796
Matrix:	DW

Analyst Must Manually Enter All Fields Highlighted in Yellow.

Method Blank Assessment

MB Sample ID	491299
MB concentration:	-0.155
MB Counting Uncertainty:	0.268
MB MDC:	0.676
MB Numerical Performance Indicator:	-8.31
MB Status vs Numerical Indicator:	N/A
MB Status vs. MDC:	Pass

Laboratory Control Sample Assessment

	LCSD (Y or N)?	Y
	LCS11796	LCSD11796
Count Date:	5/3/2012	5/3/2012
Spike I.D.:	12-011	12-011
Spike Concentration (pCi/mL):	56.716	56.716
Volume Used (mL):	0.10	0.10
Aliquot Volume (L, g, F):	0.500	0.500
Target Conc. (pCi/L, g, F):	11.343	11.343
Uncertainty (Calculated):	0.272	0.272
Result (pCi/L, g, F):	11.566	12.727
LCS/LCSD Counting Uncertainty (pCi/L, g, F):	1.611	1.738
Numerical Performance Indicator:	0.27	1.54
Percent Recovery:	101.96%	112.20%
Status vs Numerical Indicator:	N/A	N/A
Status vs Recovery:	Pass	Pass

Sample Matrix Spike Control Assessment

Sample Collection Date:	4/11/2012
Sample I.D.	3067523001
Sample MS I.D.	3067523001MS
Sample MSD I.D.	
Spike I.D.:	12-011
MS/MSD Decay Corrected Spike Concentration (pCi/mL):	56.717
Spike Volume Used in MS (mL):	0.20
Spike Volume Used in MSD (mL):	
MS Aliquot (L, g, F):	0.500
MS Target Conc.(pCi/L, g, F):	22.687
MSD Aliquot (L, g, F):	
MSD Target Conc. (pCi/L, g, F):	
Spike uncertainty (calculated):	0.544
Sample Result:	0.116
Sample Result Counting Uncertainty (pCi/L, g, F):	0.161
Sample Matrix Spike Result:	21.099
Matrix Spike Result Counting Uncertainty (pCi/L, g, F):	2.042
Sample Matrix Spike Duplicate Result:	
Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F):	
MS Numerical Performance Indicator:	-1.576
MSD Numerical Performance Indicator:	
MS Percent Recovery:	92.49%
MSD Percent Recovery:	
MS Status vs Numerical Indicator:	N/A
MSD Status vs Numerical Indicator:	
MS Status vs Recovery:	Pass
MSD Status vs Recovery:	

Duplicate Sample Assessment

Sample I.D.:	LCS11796	Enter Duplicate sample IDs if other than LCS/LCSD in the space below.
Duplicate Sample I.D.	LCSD11796	
Sample Result (pCi/L, g, F):	11.566	
Sample Result Counting Uncertainty (pCi/L, g, F):	1.611	
Sample Duplicate Result (pCi/L, g, F):	12.727	
Sample Duplicate Result Counting Uncertainty (pCi/L, g, F):	1.738	
Are sample and/or duplicate results below MDC?	NO	
Duplicate Numerical Performance Indicator:	-0.960	
Duplicate RPD:	9.56%	
Duplicate Status vs Numerical Indicator:	N/A	
Duplicate Status vs RPD:	Pass	

Matrix Spike/Matrix Spike Duplicate Sample Assessment

Sample I.D.	
Sample MS I.D.	
Sample MSD I.D.	
Sample Matrix Spike Result:	
Matrix Spike Result Counting Uncertainty (pCi/L, g, F):	
Sample Matrix Spike Duplicate Result:	
Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F):	
Duplicate Numerical Performance Indicator:	
MS/ MSD Duplicate RPD:	
MS/ MSD Duplicate Status vs Numerical Indicator:	
MS/ MSD Duplicate Status vs RPD:	

Evaluation of duplicate precision is not applicable if either the sample or duplicate results are below the MDC.

Comments:

Quality Control Sample Performance Assessment

Pace Analytical
www.pacelabs.com

Test:	Ra-228
Analyst:	WRR
Date:	3/29/2012
Worklist:	11779
Matrix:	DW

Analyst Must Manually Enter All Fields Highlighted in Yellow.

Method Blank Assessment

MB Sample ID	431282
MB concentration:	0.012
MB Counting Uncertainty:	0.392
MB MDC:	0.906
MB Numerical Performance Indicator:	0.06
MB Status vs Numerical Indicator:	N/A
MB Status vs. MDC:	Pass

Laboratory Control Sample Assessment

	LCSD (Y or N)?	Y
	LCS11779	LCSD11779
Count Date:	4/26/2012	4/26/2012
Spike I.D.:	11-024	11-024
Spike Concentration (pCi/mL):	61.140	61.140
Volume Used (mL):	0.10	0.10
Aliquot Volume (L, g, F):	0.800	0.800
Target Conc. (pCi/L, g, F):	7.642	7.642
Uncertainty (Calculated):	0.237	0.237
Result (pCi/L, g, F):	7.203	9.782
LCS/LCSD Counting Uncertainty (pCi/L, g, F):	1.342	1.535
Numerical Performance Indicator:	-0.63	2.70
Percent Recovery:	94.25%	127.99%
Status vs Numerical Indicator:	N/A	N/A
Status vs Recovery:	Pass	Pass

Sample Matrix Spike Control Assessment

Sample Collection Date:	4/13/2012
Sample I.D.	3067485001
Sample MS I.D.	3067485001MS
Sample MSD I.D.	
Spike I.D.:	11-024
MS/MSD Decay Corrected Spike Concentration (pCi/mL):	61.411
Spike Volume Used in MS (mL):	0.20
Spike Volume Used in MSD (mL):	
MS Aliquot (L, g, F):	0.800
MS Target Conc.(pCi/L, g, F):	15.353
MSD Aliquot (L, g, F):	
MSD Target Conc. (pCi/L, g, F):	
Spike uncertainty (calculated):	0.476
Sample Result:	-0.437
Sample Result Counting Uncertainty (pCi/L, g, F):	0.350
Sample Matrix Spike Result:	13.442
Matrix Spike Result Counting Uncertainty (pCi/L, g, F):	1.538
Sample Matrix Spike Duplicate Result:	
Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F):	
MS Numerical Performance Indicator:	-1.752
MSD Numerical Performance Indicator:	
MS Percent Recovery:	90.41%
MSD Percent Recovery:	
MS Status vs Numerical Indicator:	N/A
MSD Status vs Numerical Indicator:	
MS Status vs Recovery:	Pass
MSD Status vs Recovery:	

Duplicate Sample Assessment

Sample I.D.:	LCS11779
Duplicate Sample I.D.	LCSD11779
Sample Result (pCi/L, g, F):	7.203
Sample Result Counting Uncertainty (pCi/L, g, F):	1.342
Sample Duplicate Result (pCi/L, g, F):	9.782
Sample Duplicate Result Counting Uncertainty (pCi/L, g, F):	1.535
Are sample and/or duplicate results below MDC?	NO
Duplicate Numerical Performance Indicator:	-2.479
Duplicate RPD:	30.36%
Duplicate Status vs Numerical Indicator:	N/A
Duplicate Status vs RPD:	Pass

Enter Duplicate sample IDs if other than LCS/LCSD in the space below.

Matrix Spike/Matrix Spike Duplicate Sample Assessment

Sample I.D.	
Sample MS I.D.	
Sample MSD I.D.	
Sample Matrix Spike Result:	
Matrix Spike Result Counting Uncertainty (pCi/L, g, F):	
Sample Matrix Spike Duplicate Result:	
Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F):	
Duplicate Numerical Performance Indicator:	
MS/ MSD Duplicate RPD:	
MS/ MSD Duplicate Status vs Numerical Indicator:	
MS/ MSD Duplicate Status vs RPD:	

Evaluation of duplicate precision is not applicable if either the sample or duplicate results are below the MDC.

Comments:

Attachment I: State of California, Well Completion Report

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*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0151968

Page 1 of 1

Owner's Well Number

Date Work Began 03/12/2012 Date Work Ended 4/24/2012

Local Permit Agency Stanislaus Caunty Environmental Resources

Permit Number 12-24 Permit Date 2/24/12

DWR Use Only – Do Not Fill In

State Well Number/Site Number

Latitude N Longitude W

APN/TRS/Other

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify

Drilling Method Drilling Fluid Bentonite mud

Depth from Surface Feet	to Feet	Description: Describe material, grain size, color, etc
0	20	sand light brown
20	40	sand light brown
40	60	sand light brown
60	80	clay light brown
80	100	sand silt light brown
100	120	sand black courses
120	140	sand black courses
140	160	clay light brown
160	180	clay light brown
180	200	sand courses
200	220	sand fine
220	240	clay dark brown
240	260	sand courses brown
260	280	sand fine brown
280	300	clay gray
300	340	sand fine black
340	380	clay dark brown
380	420	clay dark brown
420	460	sand fine black
460	500	sand, clay grey dark brown
500	540	sand gray
540	580	clay dark brown
580	620	grave, sand clay dark brown
		Test Hole Destruction
		Remove all temporary casing,
		drill out to the original depth, clean out hole,
		fill with cement placement by tremie pipe
		27 yard of 10.3 sack sand slurry mix

Total Depth of Boring 615 Feet

Total Depth of Completed Well 0 Feet

Well Owner

Name City of Modesto

Mailing Address 1010 Tenth Street

City Modesto State CA Zip 95353

Well Location

Address 910 Hickman Rd

City Hickman County Stanislaus

Latitude 37 Deg. 37 Min. 13 Sec. N Longitude 120 Deg. 45 Min. 18 Sec. W

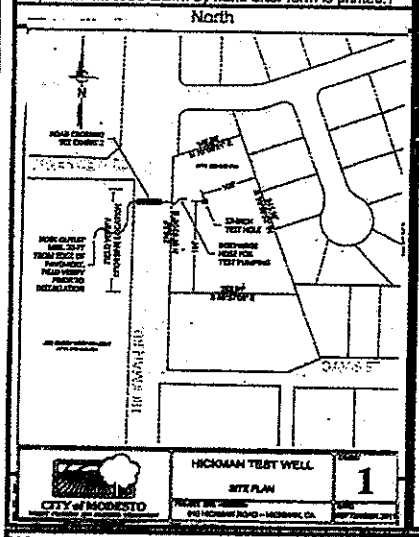
Datum Decimal Lat. Decimal Long.

APN Book Page Parcel

Township 4S Range 11E Section 3

Location Sketch

(Sketch must be drawn by hand after form is printed.)



Activity

- ○ New Well
- ○ Modification/Repair
  - ○ Deepen
  - ○ Other
- ⦿ Destroy

Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

- ○ Water Supply
  - ☐ Domestic ☐ Public
  - ☐ Irrigation ☐ Industrial
- ○ Cathodic Protection
- ○ Dewatering
- ○ Heat Exchange
- ○ Injection
- ○ Monitoring
- ○ Remediation
- ○ Sparging
- ⦿ Test Well
- ○ Vapor Extraction
- ○ Other Temporary

Water Level and Yield of Completed Well

Depth to first water (Feet below surface)

Depth to Static Water Level (Feet) Date Measured

Estimated Yield * (GPM) Test Type

Test Length (Hours) Total Drawdown (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	615	12 1/4"						

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	13	Fill	Site topsoil
13	615	Cement	10.3sk sand slurry
			27 Yards

Attachments

- ☐ Geologic Log
- ☐ Well Construction Diagram
- ☐ Geophysical Log(s)
- ☐ Soil/Water Chemical Analyses
- ☐ Other

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Dan's Water Well & Pump Service, Inc (Person, Firm or Corporation)

8200 Collier Canyon Rd (Address) Livermore (City) CA (State) 94551 (Zip)

Signed (C-57 Licensed Water Well Contractor) 05/11/12 (Date Signed) 892546 (C-57 License Number)

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

City of Modesto

Finding of Conformance to Water System Engineer's Report Program EIR

Initial Study Environmental Checklist No. EA/UP&P 2011-09

For the proposed:

Hickman Tank and Well

Prepared by:
City of Modesto
Utility Planning and Projects Department

October 2011

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City of Modesto
Program EIR Initial Study Environmental Checklist

I. PURPOSE

CEQA allows for the limited environmental review of subsequent projects under the City's Water System Engineer's Report Program Environmental Impact Report ("Program EIR" or "PEIR"). This Initial Study Environmental Checklist ("Initial Study") is used in determining whether the Hickman Tank and Well is "within the scope" of the project analyzed in the Water System Engineer's Report Program EIR (SCH# 2008092095) (Public Resources Code Sections 21003, 21093, and 21094 and Government Code Sections 15152 and 15168). When the Initial Study supports this conclusion, the City will issue a finding of conformance.

A subsequent project is "within the scope" of the Program EIR when:

1. it will have no additional significant effects on the environment that were not addressed as significant effects in the Program EIR; and

2. no new or additional mitigation measures or alternatives are required.

"Additional significant effects" means a project-specific effect that was not addressed as a significant effect in the Program EIR. [Public Resources Code Section 21094]

The determination must be based on substantial evidence in the record. "Substantial evidence" means facts, reasonable assumptions predicated upon facts, or expert opinion based on facts. It does not include speculation or unsubstantiated opinion. (CEQA Guidelines Section 15384)

II. PROJECT DESCRIPTION

A. Title: **Hickman Tank and Well**

B. Address or Location: **APN 019-042-064, southeast of the intersection of Hickman Road and Kim Street**

C. Applicant: **City of Modesto, Utility Planning and Projects Department**
1010 10th Street, 4th Floor
Modesto, CA 95354

D. City Contact Person: **Rob Christensen**

Project Manager: Rob Christensen
Department: Utility Planning and Projects
Phone Number: 209.571-5869
E-mail address: rchristensen@modestogov.com

E. Current General Plan Designation(s): LDR, Low-Density Residential (County)

F. Current Zoning Classification(s): R-1, Single-Family Residential District (County)

G. Existing Conditions: The essentially flat 1.37-acre site is vacant at this time.

H. Surrounding Land Uses:

North: single-family residences
South: single-family residences
East: single-family residences
West: commercial agriculture

I. Project Description, including the project type listed in Section II.C (Anticipated Future Projects) of the Program EIR (Attach additional maps/support materials as needed for complete record):

The City of Modesto intends to construct a water storage tank, booster pump, and domestic water well, which will provide additional storage volume and pressure for the existing water system serving the Hickman community. Currently, the existing water system does not meet certain design pressure and volume storage requirements, and the proposed tank and well will help the system meet these requirements and is sized to meet the needs of Hickman when it is completed as planned by Stanislaus County, but not to allow additional development beyond that planned. Hickman will continue to be an independent water service area, described as Alternative 1 in the Water System Engineer's Report Program EIR.

The total project facilities will consist of an above ground water storage tank, water well and motor, a booster pump station, and other appurtenances including a stand-by generator and motor control center. Site improvements will include a small parking and access area, fencing or walls, a retention basin, low-level night lighting for security and maintenance needs, and low-maintenance landscaping. Landscaping will include trees to help screen the tank from adjacent properties and from Hickman Road. As proposed, the water tank would store a minimum of 400,000 gallons of water. The size of the tank will be a maximum 25 feet above grade, and between 70 feet and 90 feet in diameter. The specific dimensions of the tank will be determined during final design, and will be based on site layout constraints, aesthetic qualities, and cost. The footprint area of the tank will vary with the diameter, and will be between 3,800 and 6,400 square feet.

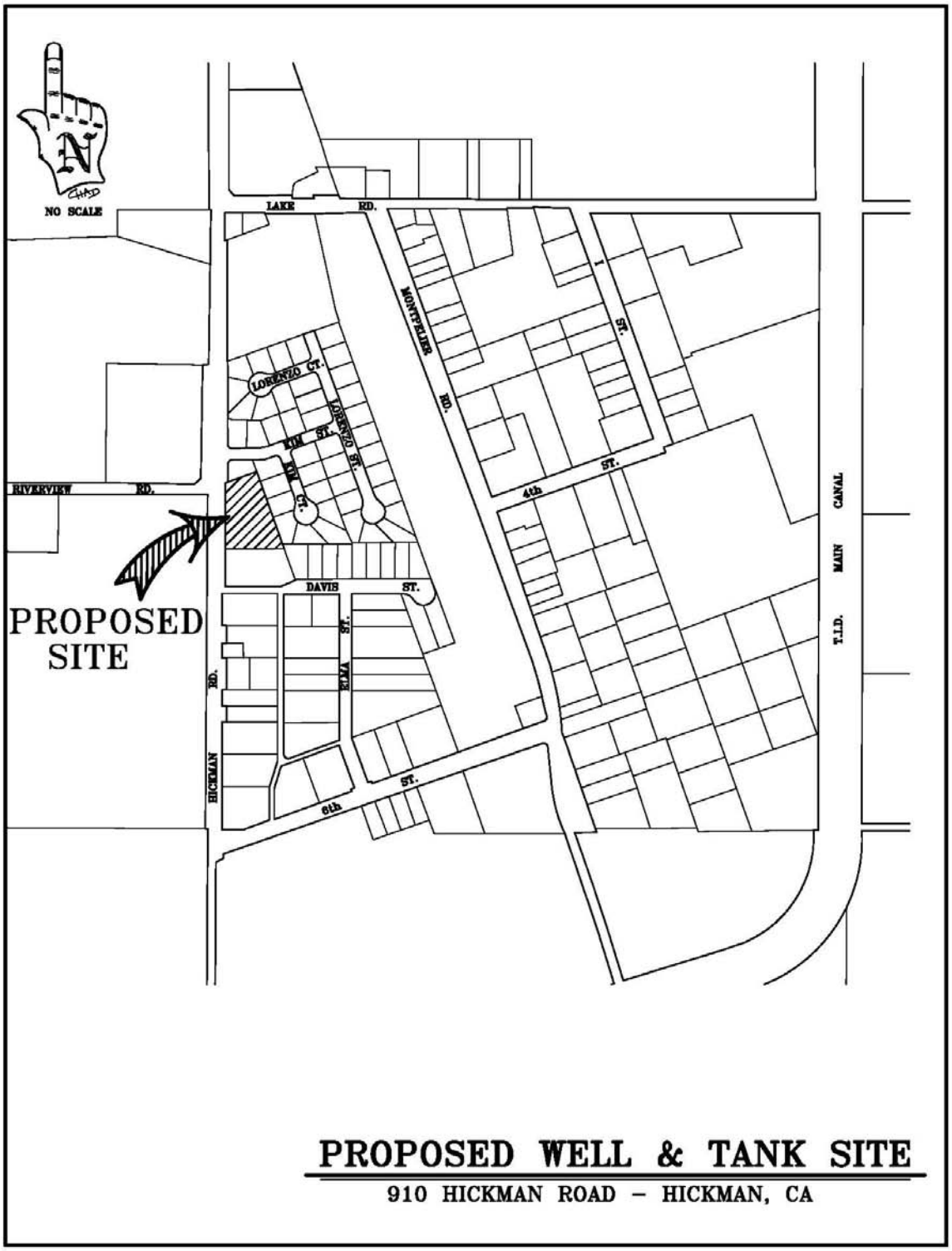
The site will be enclosed within a security wall or fence, which will be constructed either of an 8- to 12-foot-high masonry block wall, or wrought iron fence topped with no-climb points. The specific type of wall or fence will be determined during the final design, and will be based on site layout constraints, aesthetic qualities, and cost. Vehicular access and parking areas within the site will be paved either with Portland cement concrete or asphaltic concrete. Other portions of the site will be covered either with low-maintenance landscaping or gravel.

Additionally, a transmission main from the tank will be constructed to connect to the distribution system in Hickman Road. Ultimately, about 9,400 feet of distribution line will be laid throughout Hickman, most likely in phases.

A water well will be drilled to below the Corcoran Clay layer, which lies about 150 to 250 feet below the surface. It is necessary to drill to that depth because the clay layer protects groundwater from pollutants migrating downward from the surface. Municipal wells are held to higher water quality standards than are private wells.

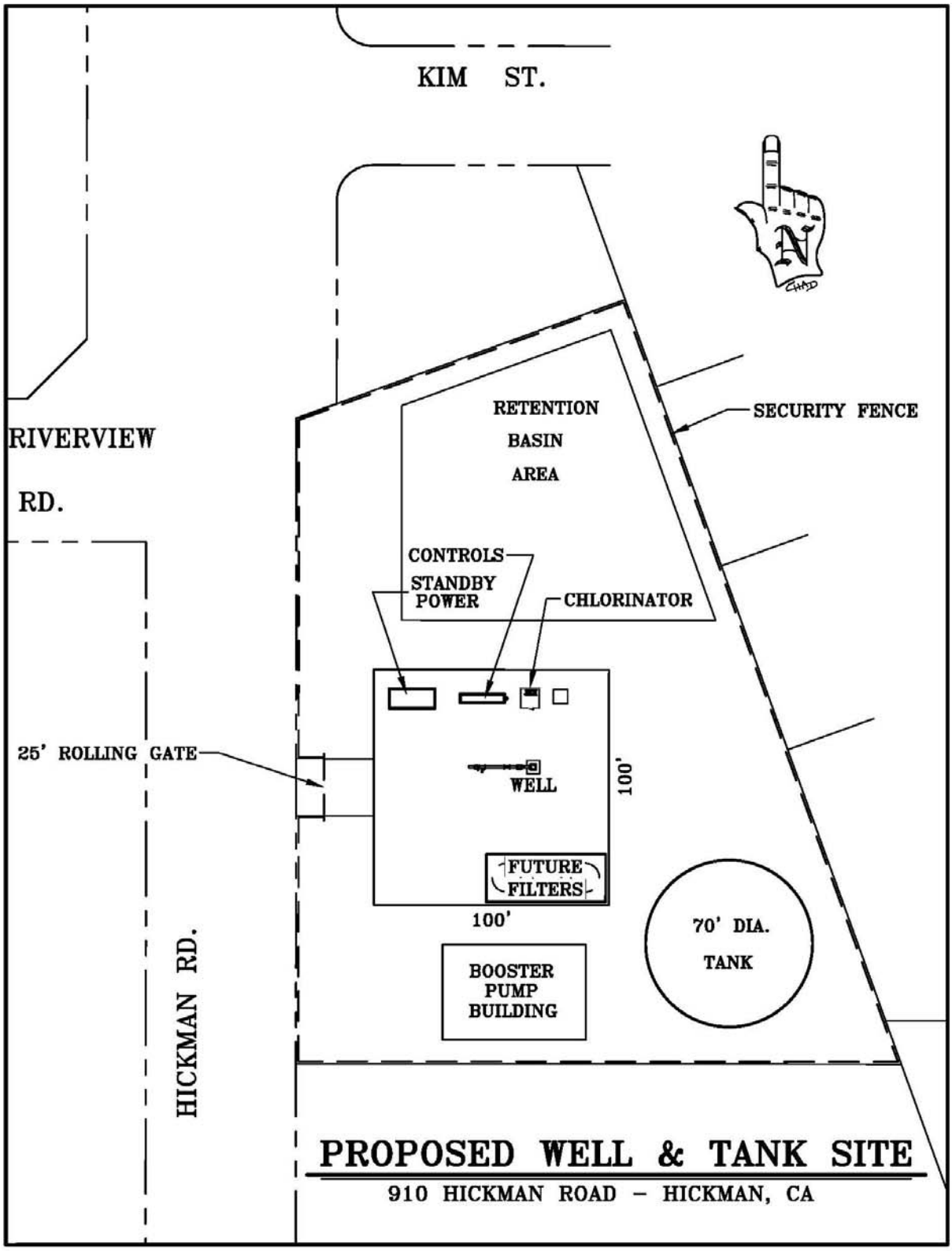
Figure 1 shows the project site and vicinity.
Figure 2 shows the conceptual site plan.
Figure 3 shows the Hickman community boundary

Figure 1 Project Site and Vicinity



Project Site and Vicinity

Figure 2 Conceptual Site Plan



Conceptual Site Plan

Figure 3 Hickman Community

Hickman Community Map

J. Other Public Agencies Whose Approval is Required:

Every municipal water well must receive the following approvals:

Stanislaus County Health Department—permit to drill the well
Regional Water Quality Control Board—receives and approves County permit
State Department of Public Health--issues a permit to use the water after all water testing and distribution procedures have been completed

III. FINDINGS/DETERMINATION (SELECT ONE ON THE BASIS OF THE ANALYSIS IN SECTION IV)

1. _X_ Within the Scope - The City of Modesto finds that pursuant to Government Code Section 15162, no new effects could occur or no new mitigation measures would be required, therefore the activity is within the scope of the project covered by the Program EIR and no new environmental document or Public Resources Code Section 21083 findings are required. All of the following statements are found to be true:

A. The proposed project is of a type described in Chapter II of the Program EIR.

B. All applicable policies, regulations, and mitigation measures identified in the Program EIR have been applied to the project or otherwise made conditions of approval of the project.

C. An Initial Study was prepared by the City of Modesto that analyzed whether the proposed subsequent project may cause any significant effect on the environment that was not examined in the Program EIR and it has been determined that the project was described as being within the scope of the Program EIR.

D. Pursuant to Public Resources Code 21094 and Government Code Section 15162 and based on the Initial Study, the City of Modesto finds and determines:

1) No substantial changes are proposed in the project which will require major revisions of the Program EIR due to new or substantially more severe significant environmental effects;

2) No substantial changes occur with respect to the circumstances under which the project is undertaken which will require major revisions of the Program EIR as a result of new or substantially more severe significant environmental effects; or

3) No new information of substantial importance, which was not known and could not have been known with the exercise of reasonable diligence at the time the Program EIR was certified as complete shows any of the following:

a. The project will have one or more significant effects not discussed in the Program EIR;

b. Significant effects previously examined will be substantially more severe than shown in the Program EIR;

c. Mitigation measures or alternatives previously found not to be feasible would in fact be feasible, and would substantially reduce one or more significant effects of the projects, but the project proponent declines to adopt the mitigation measure or alternative; or

d. Mitigation measures or alternatives which are considerably different from those analyzed in the Program EIR would substantially reduce one or more significant effects on the environment, but the project proponent declines to adopt the mitigation measure or alternative.

2. ____ Mitigated Negative Declaration Required - On the basis of the above determinations, the project is not within the scope of the Program EIR. A mitigated negative declaration will be prepared for the project. The following statements are all found to be true:

A. The proposed project is of a type described in Chapter II of the Program EIR.

B. All applicable policies, regulations, and mitigation measures identified in the Program EIR have been applied to the project or otherwise made conditions of approval of the project.

C. No subsequent Mitigated Negative Declaration or EIR shall be prepared unless the lead agency determines one or more of the following, pursuant to Government Code Section 15162(a):

1) Substantial changes are proposed in the project which will require major revisions of the Program EIR due to the involvement of new significant environmental effects or a substantial increase in the severity of previously identified significant effects.

2) Substantial changes have or will occur with respect to the circumstances since the Program EIR was adopted which will require major revisions in the Program EIR due to new significant environmental effects or a substantial increase in the severity of previously identified significant environmental effects.

3) New information of substantial importance which was not known and could not have been known with the exercise of reasonable diligence at the time the Program EIR was certified as complete (a) shows new significant environmental effects or (b) shows that environmental effects previously examined will be substantially more severe or (c) shows that mitigation measures or alternatives found not to be feasible are indeed feasible or (d) shows that mitigation measures considerably different than those in the Program EIR, but not adopted, would substantially reduce project impacts.

D. The project will have one or more potential new significant effects on the environment that were not addressed as significant effects in the Program EIR. New or additional mitigation measures are being required of the project that will reduce the effects to a less-than-significant level.

3.____ Focused EIR Required On the basis of the above determinations, the project is not within the scope of the Program EIR. A Focused EIR will be prepared for the project. All of the following statements are found to be true:

A. The proposed project is of a type described in Chapter II of the Program EIR.

B. All applicable policies, regulations, and mitigation measures identified in the Program EIR have been applied to the project or otherwise made conditions of approval of the project.

C. No subsequent Mitigated Negative Declaration or EIR shall be prepared unless the lead agency determines one or more of the following, pursuant to Government Code Section 15162(a):

1) Substantial changes are proposed in the project which will require major revisions of the Program EIR due to the involvement of new significant environmental effects or a substantial increase in the severity of previously identified significant effects.

2) Substantial changes have or will occur with respect to the circumstances since the Program EIR was adopted which will require major revisions in the Program EIR due to new significant environmental effects or a substantial increase in the severity of previously identified significant environmental effects.

3) New information of substantial importance which was not known and could not have been known with the exercise of reasonable diligence at the time the Program EIR was certified as complete (a) shows new significant environmental effects or (b) shows that environmental effects previously examined will be substantially more severe or (c) shows that mitigation measures or alternatives found not to be feasible are indeed feasible or (d) shows that mitigation measures considerably different than those in the Program EIR, but not adopted, would substantially reduce project impacts.

D. The project will have one or more new significant effects on the environment that were not addressed as significant effects in the Program EIR. New or additional mitigation measures or alternatives are required as a result.

Robert L. Christensen	Sr. Civil Engineer	12/1/11
Project Manager	Title	Date

4. Within the Scope Analysis of this Document:

The Program EIR allows projects to be found within the scope of the PEIR if certain criteria are met. If the following statements are found to be true for all 15 impact categories identified during the Program EIR scoping process, then the proposed project is addressed by the PEIR analysis and is within the scope of the Program EIR. Any "No" response must be discussed.

		YES	NO
(1)	The lead agency for subsequent projects is the City of Modesto or a responsible agency identified in the Program EIR.	**X**	☐
(2)	City policies which reduce, avoid, or mitigate environmental effects will continue to be in effect and, therefore, would be applied to subsequent projects where appropriate. The policies are described in the list of policies in place and mitigation measures attached to the Initial Study template. Project impacts would be mitigated to a less-than-significant level using Program EIR mitigations only.	**X**	☐
(3)	Federal, State, regional, and Stanislaus County regulations do not change in a manner that is less restrictive on development than current law (i.e., would not offer the same level of protection assumed under the Program EIR).	**X**	☐
(4)	No specific information concerning the known or potential presence of significant resources is identified in future reports, or through formal or informal input received from responsible or trustee agencies or other qualified sources.	**X**	☐
(5)	The development will occur within the boundaries of the City's contiguous and outlying water service areas, as established in the Water System Engineer's Report.	**X**	☐
(6)	Development within the project will comply with all appropriate mitigation measures contained and enumerated in the 2010 Water System Engineer's Report Program EIR.	**X**	☐

Discussion:

All responses are "yes," therefore, there is no need to discuss the responses above.

IV. ENVIRONMENTAL ANALYSIS

In accordance with Section 15168 of the Government Code, this Initial Study discloses whether the proposed project described in Section II above may cause any project-specific significant effect on the environment that was not examined in the Final Program EIR for the Water System Engineer's Report and whether new or additional mitigation measures or alternatives may be required as a result. The Initial Study thereby documents whether or not the project is "within the scope" of the Program EIR.

Pursuant to Government Code Section 15168, no new environmental document is necessary for projects that are determined to be within the scope of the Program EIR. Adoption of the findings specified in Section III.1, above after completion of the Initial Study fulfills the City's obligation if the project is within the scope of the Program EIR.

The Water System Engineer's Report identifies a Capital Improvement Program that will deliver safe and reliable water and effectively meet water demands under existing and future developed conditions. The Program EIR assumes that the City's Sphere of Influence will be completely developed by 2038. Outlying service areas: Del Rio is expected to grow to the north, east, and southwest; Grayson is almost completely developed; Hickman is almost completely developed; Turlock service area is completely developed; Waterford service area is expected to be completely developed in five years.

The environmental impact analysis in the Program EIR for the Water System Engineer's Report is organized in fifteen subject areas. The following analysis is based on the impact analyses contained in Chapter 3 of the Program EIR. For ease of reference, the sections are numbered in the same order as the analyses in Chapter 3.

1. AESTHETICS

a. Significant Effects Identified in the Program EIR

The Program EIR discloses the following significant aesthetic impacts and their associated mitigation measures. Refer to pages 3.1-9 to 3.1-11 in the PEIR for details.

Direct Impacts

Impact AES-3: Temporary degradation of visual character or quality during construction activities (Less than Significant with Mitigation)

Mitigation Measure AES-1: Locate staging areas away from public areas
Mitigation Measure AES-2: Screen staging and construction areas

Impact AES-4: Permanent degradation of visual character or quality from proposed facilities (Less than Significant with Mitigation)

Mitigation Measure AES-3: Design fencing, storage tanks, and booster pump station and groundwater well buildings to be consistent with the surrounding setting

Impact AES-5: Permanent degradation of visual character or quality from proposed new corporation yard (Significant and Unavoidable)

No mitigation measures identified.

Cumulative Impacts

No significant cumulative impacts were disclosed in the PEIR.

b. Program EIR and/or New Mitigation Measures Applied to the Project

Aesthetic mitigation measures pertinent to this project are found on PEIR pages 3.1-9 to 3.1-11 and above. All mitigation measures appropriate to the project, including any new measures, will be incorporated into or made conditions of approval of this project and are listed in Section V, Mitigation Measures Applied to Project.

Discussion:

The appropriate mitigations to be applied to this project are **AES-2 and AES-3**. No new or additional mitigation measures or alternatives are required to reduce project impacts to a less-than-significant level.

c. Project-Specific Effects

Section 3.1 of the Program EIR provides an analysis of aesthetic impacts of implementation of the Water System Engineer's Report. The following is an analysis of whether the proposed project would result in a new, significant, project-specific effect not disclosed in the Program EIR.

Significance Criteria: A subsequent development project will have a new significant effect on the environment if it would exceed the following criteria:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
1. AESTHETICS				
1) Would the project have a substantial adverse effect on a scenic vista?	☐	☐	☐	X
2) Would the project substantially damage scenic resources, including trees, rock outcroppings, and historic buildings along a scenic highway?	☐	☐	☐	X
3) Would the project substantially degrade the existing visual character or quality of the site and its surroundings?	☐	☐	X	☐
4) Would the project create a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area?	☐	☐	☐	X
5) Would the project substantially degrade views from riverside areas and parks?	☐	☐	☐	X
6) Would the project substantially degrade views of riverside areas from public roadways and nearby properties?	☐	☐	☐	X

Discussion:

(1-2) There are no scenic vistas from or of the project site, which lies near an established residential area. The project site does not lie along or near a scenic highway.

(3) Development of this site with a well, tank, wall or fence, and landscaping, is consistent with the type of development described in the Program EIR and is expected to occur at various locations in the City's water service area. Mitigation Measures AES-2 and AES-3 would be implemented to reduce visual impacts. Construction activities would be screened to the extent feasible from Hickman Road. Because the site is relatively small and lies in a built area, it will not be possible to completely screen construction from view. The structures would be designed as shown conceptually on Figure 2 and screened with trees, as shown conceptually on Figure 3.

(4) Night lighting would be used on site for security and to illuminate the site should maintenance be required after dark. When the gate opens or a motion sensor is triggered, additional lighting will be activated. All lighting would be directed on site and would be consistent with existing lighting levels in the project vicinity, as disclosed in the Program EIR. Lighting fixtures will be shielded from neighboring properties.

(5-6) The project site is not visible from the Tuolumne River, nor will it be visible from any parks along the Tuolumne River. Neither the river nor any parks along the river are visible from the site.

2. AGRICULTURAL RESOURCES

a. Significant Effects Identified in the Program EIR

The Program EIR discloses the following significant impacts on agricultural resources and their associated mitigation measures. Refer to pages 3.2-5 to 3.2-8 and 4-9 for details.

Direct Impacts

Impact AG-1: Direct conversion of Important Farmland (Significant and Unavoidable)
Mitigation Measure AG-1: Compensate for a loss of farmland

Impact AG-3: Indirect conversion of farmland to non-agricultural uses (Significant and Unavoidable)
No mitigation measures identified.

Cumulative Impacts

Impact CUM-1: Conversion of agriculture to nonagricultural uses (Significant and Unavoidable)

b. Program EIR and/or New Mitigation Measures Pertinent to the Project

Agricultural resource mitigation measures pertinent to the proposed project are found on pages 3.2-5 to 3.2-8 of the Program EIR. All mitigation measures appropriate to the project and any new mitigation to be incorporated into or made conditions of approval of this project are listed in Section V, Mitigation Applied to Project.

Discussion:

The appropriate mitigation to be applied to this project is AG-1. No new or additional mitigation measures or alternatives are required to reduce project impacts to a less-than-significant level.

c. Project-Specific Effects

Section 3.2 of the Program EIR discloses the impacts resulting from the implementation of the Water System Engineer's Report. The following is an analysis of whether the proposed project would result in a new, significant, project-specific effect not disclosed in the Program EIR

Significance Criteria: Determination of project effects will be based on the following thresholds. The project-specific effects will be less than significant unless:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
2. EFFECTS ON AGRICULTURAL RESOURCES				
1) The proposed project would result in the conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (loss of farmland).	☐	☐	☐	**X**
2) The proposed project conflicts with existing zoning for agricultural use.	☐	☐	☐	**X**
3) The proposed project conflicts with a Williamson Act contract.	☐	☐	☐	**X**
4) The proposed project would indirectly result in the conversion of Farmland to a nonagricultural use.	☐	☐	☐	**X**

Discussion:

(1-3) The project site is zoned for single-family residential development and is not in cultivation. Furthermore, there is no Williamson Act contract on the property. No agricultural mitigation is required.

(4) The proposed well and tank are sized to serve the existing Hickman community and future development in the Hickman community that could occur without a general plan amendment or zone change, as shown in the Draft 2009 Stanislaus County Housing Element (pers. Comm. Bill Carlson). Therefore, no indirect conversion of agricultural land is expected and no mitigation is required.

3. AIR QUALITY

a. Significant Effects Identified in the Program EIR

The Program EIR discloses the following significant impacts on air quality and their associated mitigation measures. Refer to pages 3.3-15 to 3.3-21 and 4-9 to 4-11 in the PEIR for details.

Direct Impacts

Impact AIR-1: Conflicts with or obstruction of implementation of the applicable air quality plan (Significant and Unavoidable)

No mitigation measures identified.

Impact AIR-2: Violations of any air quality standard or substantial contribution to existing or projected air quality violation during construction of proposed improvements (Less than Significant with Mitigation)

Mitigation Measure AIR-1: Implement SJVAPCD Regulation VIII control measures for construction emissions of PM_{10}.

Mitigation Measure AIR-2: Implement enhanced control measures for construction emissions of PM_{10}.

Impact AIR-3: Violations of any air quality standard or substantial contribution to an existing or projected air quality violation during operation of proposed improvements (Less than Significant with Mitigation)

Mitigation Measure AIR-3: Implement control measures for operation emissions of PM_{10} and for ozone precursors (ROG and NO_x)

Impact AIR-4: Result in a Cumulatively Considerable Net Increase of Any Criteria Pollutant for which the Program Region is in Nonattainment under an Applicable Federal or State Ambient Air Quality Standard (Including Releasing Emissions that Exceed Quantitative Thresholds for Ozone Precursors) (Significant and Unavoidable)

No mitigation measures identified.

Cumulative Impacts

Impact CUM-2: Construction-related emissions of PM_{10} and ozone precursors (Significant and Unavoidable)

Impact CUM-3: Emissions of greenhouse gases (Significant and Unavoidable)

Mitigation Measure CUM-1: Greenhouse gas calculations and emissions reduction measures

Impact CUM-4: Result in a cumulatively considerable net increase of any criteria pollutant for which the program region is in nonattainment under an applicable federal or State Ambient Air Quality Standard (including releasing emissions that exceed quantitative thresholds for ozone precursors) (Significant and Unavoidable)

b. Master EIR and/or New Mitigation Measures Applied to the Project

Air quality mitigation measure(s) pertinent to the proposed project are found on pages 3.3-15 to 3.3-21 and 4-9 to 4-11 of the Program EIR. All mitigation measures appropriate to the project will be incorporated into or made conditions of approval of this project and are listed in Section V, Mitigation Measures Applied to Project.

Discussion:

The appropriate mitigation to be applied to this project includes AIR-1, AIR-2, AIR-3, and CUM-1 from the Program EIR. No new or additional mitigation measures or alternatives are required to reduce project impacts to a less-than-significant level.

c. Project-Specific Effects

Section 3.3 of the Program EIR is the analysis of air quality impacts resulting from development of the Urban Area General Plan. The following is an analysis of whether the proposed project would result in a new, significant, project -specific effect not analyzed in the Program EIR.

Significance Criteria: Determination of project effects will be based on the following thresholds. The project-specific effects will be less than significant unless:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
3. DEGRADATION OF AIR QUALITY				
1) The project will conflict with or obstruct implementation of the applicable air quality plan.	☐	☐	☐	X
2) The project will violate any air quality standard or contribute substantially to an existing or projected air quality violation.	☐	☐	☐	X
3) The project will result in a cumulatively considerable net increase of any criteria pollutant for which the program region is in non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors).	☐	☐	☐	X
4) The project will expose sensitive receptors to substantial pollutant concentrations.	☐	☐	☐	X
5) The project will create objectionable odors affecting a substantial number of people.	☐	☐	☐	X
6) The project will fail to comply with the SJVAPCD's mitigation measures for particulate matter 10 microns or less in diameter (PM_{10}) during construction. The SJVAPCD has determined that compliance with its Regulation VIII and the implementation of other control measures presented in its *Guide for Assessing and Mitigating Air Quality Impacts* will constitute sufficient mitigation to reduce PM_{10} impacts to a level considered less than significant.	☐	☐	☐	X

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
7) The project would cause emissions of air pollutants that would cause or substantially contribute to either localized or regional violations of the ambient air quality standards. Program emissions of more than 10 tons per year of oxides of nitrogen (NOx) or reactive organic gases (ROG) would substantially contribute to existing violations of ozone standards. Ten tons per year equals 54.8 pounds per day.	☐	☐	☐	X
8) The project would cause localized carbon monoxide (CO) concentrations that exceed the California ambient air quality standards (CAAQS) of 9 parts per million (ppm) averaged over 8 hours or 20 ppm averaged over 1 hour.	☐	☐	☐	X
9) The project would cause odor problems that result in more than one confirmed complaint per year, averaged over a 3-year period, or three unconfirmed complaints per year averaged over a 3-year period.	☐	☐	☐	X
10) The project would expose sensitive receptors or the general public to substantial levels of TACs. The SJVAPCD's threshold of significance is whether the program would exceed: (1) an increased cancer risk for the person with maximum exposure potential by 10 in 1 million, or (2) ground level concentrations of noncarcinogenic TACs resulting in a non-cancer hazard index greater than 1 for the person with maximum exposure.	☐	☐	☐	X

Discussion:

(1-4) Construction emissions, as disclosed in the Program EIR, are expected to be significant. However, the proposed well and tank are consistent with the type of project described in the Program EIR and the resulting air quality impacts are expected to be similar to impacts described in the Program EIR. No additional impacts are expected, particularly with implementation of mitigation measures AIR-1 and AIR-2.

(5) No objectionable odors are expected to result from construction or operation of the well and tank and associated infrastructure.

(6) Mitigation measures to control PM_{10} emissions during construction (AIR-1, AIR-2, and AIR-3) would reduce construction impacts to a less-than-significant level, as disclosed in the Program EIR.

(7-10) The proposed project is entirely consistent with the type of project described and analyzed in the Program EIR. Emissions of nitrogen oxides, reactive organic gases, carbon monoxide, toxic air contaminants, and odors, which would occur almost exclusively during construction, would thus be consistent with emissions analyzed and quantified in the Program EIR. To

reduce operation emissions, mitigation measure AIR-3 will be applied. No additional impact would occur, as compared to impacts disclosed in the Program EIR.

Greenhouse gases do not comfortably fall under any of these impact categories, as emissions of CO_2, CH_4, and N_2O are not criteria pollutants, although these emissions do need to be estimated pursuant to Assembly Bill 32 and Senate Bill 375. Water transmission is one of the most difficult activities in which to reduce energy use. Using electricity to power equipment, instead of generators results in small reductions in greenhouse gas emissions because the Modesto Irrigation District produces electricity largely through combustion of fossil fuels (diesel fuel and natural gas), similar to those used in generators. Solar panels and other alternative sources of electricity are a potential future energy source, but are not efficient enough to warrant the additional expense to the City, particularly given the need for on-site energy storage. Emissions offsets could be purchased but have a number of drawbacks, such as adding significant expense to the project and the uncertainty surrounding what is being purchased. The greatest potential for reduction in energy use may actually occur through water conservation measures: if less water is being treated and transported, less energy is used for treatment and transportation. The amount of energy reduced is related to the reduction in water use.

As detailed in Attachment A, two new mitigation measures will be incorporated into this project.

GHG Measure 1: Limit idling time of off-road construction equipment to three minutes.
GHG Measure 2: Limit idling time of on-road construction vehicles to three minutes.

Each of these measures is expected to reduce source emissions up to 1%. These measures will be included as requirements in the construction service contract for the project.

4. BIOLOGICAL RESOURCES

a. Significant Effects Identified in the Program EIR

The Program EIR discloses the following significant and unavoidable impacts on biological resources and their associated mitigation measures. Refer to pages 3.4-24 to 3.4-44 and 4-11 and 4-12 for details.

Direct Impacts

Impact BIO-1: Program-related impacts on plants (less than significant with mitigation)
- Mitigation Measure BIO-1: Perform focused surveys for Special-Status plant species
- Mitigation Measure BIO-2: Avoid and minimize impacts on Special-Status plant species
- Mitigation Measure BIO-3: Compensate for unavoidable impacts on Special-Status plant species

Impact BIO-2: Impacts on the Valley elderberry longhorn beetle (less than significant with mitigation)
- Mitigation Measure BIO-4: Conduct preconstruction surveys for the Valley elderberry longhorn beetle and its elderberry host species plant
- Mitigation Measure BIO-5: Agency coordination and consultation for impacts on the Valley elderberry longhorn beetle
- Mitigation Measure BIO-6: Avoid Valley elderberry longhorn beetle habitat

Mitigation Measure BIO-7: Transplant elderberry plants

Impact BIO-3: Construction-related loss of occupied burrowing owl habitat (less than significant with mitigation)

Mitigation Measure BIO-8: Avoid and protect burrowing owls

Mitigation Measure BIO-9: Compensate for loss of burrowing owl habitat

Impact BIO-4: Construction-related loss of Swainson's hawk foraging habitat (less than significant with mitigation)

Mitigation Measure BIO-10: compensate for loss of Swainson's hawk foraging habitat

Impact BIO-5: Construction-related impacts on nesting Swainson's hawks (less than significant with mitigation)

Mitigation Measure BIO-11: Conduct preconstruction surveys for Swainson's hawk nests

Impact BIO-6: Construction disturbance of bald eagle, tricolored blackbird, and other migratory birds, including raptors (less than significant with mitigation)

Mitigation Measure BIO-12: Conduct preconstruction surveys for nesting birds

Mitigation Measure BIO-13: Avoid and minimize impacts on nesting raptors and other migratory birds

Impact BIO-7: Construction impacts on vernal pool branchiopods (less than significant with mitigation)

Mitigation Measure BIO-14: Avoid habitat for vernal pool branchiopods

Mitigation Measure BIO-15: Conduct protocol-level surveys for vernal pool branchiopods

Mitigation Measure BIO-16: Compensate for impacts on vernal pool branchiopods

Impact BIO-8: Construction impacts on California tiger salamander (less than significant with mitigation)

Mitigation Measure BIO-17: Avoid habitat for California tiger salamander

Mitigation Measure BIO-18: Conduct protocol-level surveys for California tiger salamander

Mitigation Measure BIO-19: Compensate for impacts on California tiger salamander

Impact BIO-9: Construction-related impacts on western pond turtles (less than significant with mitigation)

Mitigation Measure BIO-20: Conduct preconstruction surveys for and minimize impacts on western pond turtles

Impact BIO-12: Construction-related impacts on riparian brush rabbit and riparian wood rat (less than significant with mitigation)

Mitigation Measure BIO-21: Avoid habitat for riparian wood rat and riparian brush rabbit

Mitigation Measure BIO-22: Conduct surveys for riparian wood rat and riparian brush rabbit

Mitigation Measure BIO-23: Consult with the USFWS to conduct monitoring for riparian wood rat and riparian brush rabbit / environmental training for construction crews

Impact BIO-13: Construction-related impacts on fish (less than significant with mitigation)

Mitigation Measures HYD-1 and HYD-2 relating to the City's NPDES permit would reduce impacts to a less-than-significant level.

Impact BIO-14: Loss of shaded river aquatic cover and riparian habitat (less than significant with mitigation)

Mitigation Measure BIO-24: Avoid or minimize disturbance to waters, wetlands, or riparian areas

Mitigation Measure BIO-25: Mitigate for permanent disturbance to sensitive habitats
Mitigation Measure BIO-26: Confine project design and construction to minimize impacts on sensitive habitats
Mitigation Measure BIO-27: Preserve habitat values

Impact BIO-15: Impacts on sensitive natural communities (less than significant with mitigation)
Mitigation Measure BIO-28: Preserve native trees
Mitigation Measure BIO-29: Protect riparian corridors
Mitigation Measure BIO-30: Use native species for landscaping

Impact BIO-16: Effects on Waters of the United States and Waters of the State (less than significant with mitigation)
Mitigation Measures BIO-24 through BIO-26 and BIO-28 would reduce this impact to a less-than-significant level.

Impact BIO-17: Effects on wildlife corridors and native wildlife nurseries (less than significant with mitigation)
Mitigation Measures BIO-1 through BIO-30 would reduce this impact to a less-than-significant level.

Impact BIO-18: Inconsistency with local policies or ordinances protecting biological resources (less than significant with mitigation)
Mitigation Measures BIO-1 through BIO-27 would reduce this impact to a less-than-significant level.

Cumulative Impacts

Impact CUM-5: Effects on biological resources (less than significant with mitigation)
Mitigation Measures BIO-1 through BIO-30 would reduce this impact to a less-than-significant level.

b. Program EIR and/or New Mitigation Measures Applied to the Project

Biological resource mitigation measures pertinent to the proposed project are found on pages 3.4-24 through 3.4-44 V-7-24 of the Program EIR. All mitigation measures appropriate to the project to be incorporated into or made conditions of approval of this project are listed in Section V, Mitigation Measures Applied to Project.

Discussion:

The appropriate mitigation to be applied to this project includes BIO-6, BIO-11, BIO-12, BIO-13, BIO-14, BIO-17, BIO-21, BIO-24, and HYD-1 from the Program EIR; of these, BIO-11, BIO-12, BIO-13, and HYD-1 require the city take specific actions prior to construction, while the remaining mitigation measures have been implemented by selecting a less-sensitive project site than was evaluated in the Program EIR. No new or additional mitigation measures or alternatives are required to reduce project impacts to a less-than-significant level.

c. Project-Specific Effects

Section 3.4 of the Program EIR discloses impacts on biological resources resulting from implementation of the Water System Engineer's Report. The following is an analysis of whether the proposed project would result in a new, significant, project-specific effect not disclosed in the Program EIR.

Significance Criteria: Determination of project effects will be based on the following thresholds. The project-specific effects will be less than significant unless the project would:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
4. BIOLOGICAL RESOURCES				
1) Have a substantial adverse effect, either directly or through habitat modification, on any species identified as a candidate, sensitive, or special-status in local or regional plans, policies, or regulations, or by the DFG or USFWS.	☐	☐	☐	X
2) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the DFG or USFWS.	☐	☐	☐	X
3) Have a substantial adverse effect on federally-protected wetlands, as defined by CWA Section 404 (including marsh, vernal pool, and coastal wetlands) through direct removal, filling, hydrological interruption, or other means.	☐	☐	☐	X
4) Interfere substantially with the movement of any native resident or migratory fish or wildlife species, or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.	☐	☐	☐	X
5) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.	☐	☐	☐	X
6) Conflict with the provisions of an adopted Habitat Conservation Plan (HCP), Natural Communities Conservation Plan (NCCP), or other approved local, regional, or state Habitat Conservation Plan.	☐	☐	☐	X

Discussion:

(1) The Hickman tank and well are proposed on a vacant site bordered on three sides by single-family residential development. Grasslands containing various regulated species are known to occur in the Hickman area, so a preconstruction survey will be performed to determine whether regulated grassland plants (BIO-1, BIO-2, possibly BIO-3) exist on the site. Additionally, burrowing owls, nesting and migratory birds, and tiger salamanders may use the site. A preconstruction survey will be performed to determine whether mitigation measures BIO-8, BIO-9, BIO-12, BIO-13, and BIO-17 should be implemented.

The proposed site is approximately one mile south of the Tuolumne River and therefore, significant impacts on raptors (kites, hawks, and owls) are not expected to occur.

(2-4) The project site is not occupied by riparian habitat or any known sensitive natural communities. Neither is the site occupied by vernal pools, marshes, or wetlands. The site is not known to be part of a wildlife corridor or a nursery site. The project site also lies outside the 100-year floodplain.

(5-6) There are neither local policies protecting biological resources nor an HCP, NCCP, or other habitat conservation plan in effect in the project area.

5. CULTURAL RESOURCES

a. Significant Effects Identified in the Program EIR

The Program EIR discloses the following significant impacts on cultural resources and their associated mitigation measures. Refer to pages 3.5-12 to 3.5-17 and 4-12 in the PEIR for details.

Direct Impacts

Impact CR-2: Impacts on previously undiscovered archaeological resources (less than significant with mitigation)

Mitigation Measure CR-1: Implement plan to address discovery of unanticipated buried cultural resources

Impact CR-3: Impacts on previously undiscovered human remains (less than significant with mitigation)

Mitigation Measure CR-2: Implement plan to address the discovery of human remains

Impact CR-4: Impacts on paleontological resources (less than significant with mitigation)

Mitigation Measure CR-3: Minimize potential adverse impacts on paleontological resources

Cumulative Impacts

Impact CUM-6: Effects on Cultural Resources (Less than Significant with Mitigation)

Mitigation Measures CR-1 through CR-3 would reduce this impact to a less-than-significant level.

b. Program EIR and/or New Mitigation Measures Applied to the Project

Cultural resources mitigation measures pertinent to the project being analyzed in this Initial Study are found on page 3.5-12 to 3.5-17 of the Program EIR. All mitigation measures appropriate to the project to be incorporated into or made conditions of approval of this project are listed in Section V, Mitigation Applied to Project.

Discussion:

The appropriate mitigation to be applied to this project includes: CR-2, CR-2, and CR-3 from the Program EIR. No new or additional mitigation measures or alternatives are required to reduce project impacts to a less-than-significant level.

c. Project-Specific Effects

Section 3.5 of the PEIR discloses impacts on cultural resources resulting from implementation of the Water System Engineer's Report. The following is an analysis of whether the proposed project would result in a new, significant, project-specific effect not disclosed in the Program EIR.

Significance Criteria: Determination of project effects will be based on the following thresholds. The project-specific effects will be less than significant unless:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
5. CULTURAL RESOURCES				
1) The project would cause a substantial adverse change in the significance of a historic resource as defined in Section 15064.5 of the State CEQA Guidelines.	☐	☐	☐	X
2) The project would cause a substantial adverse change in the significance of a unique archaeological resource pursuant to Section 15064.5.	☐	☐	☐	X
3) The project would directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.	☐	☐	☐	X
4) The project would disturb any human remains, including those interred outside of formal cemeteries.	☐	☐	☐	X

Discussion:

(1-4) The project site has no known historic structures on it or within 100 feet and would therefore have no impact on a known historic resource. The area has been under cultivation for many years and is unlikely to yield any significant cultural or paleontological resources as a result of construction. However, should human remains, historic resources, or paleontological resources be encountered during construction, Mitigation Measures CR-1, CR-2, and CR-3 will be implemented to minimize impacts.

6. GEOLOGY, SOILS, AND MINERAL RESOURCES

a. Significant Effects Identified in the Program EIR

The Program EIR discloses the following significant impacts on cultural resources and their associated mitigation measures. Refer to pages 3.6-9 to 3.6-10 in the PEIR for details.

Direct Impacts

Impact GEO-1: Damage due to surface rupture, ground-shaking, liquefaction, expansive soils, or landsliding (less than significant with mitigation)

Mitigation Measure GEO-1: Conduct project-specific geotechnical investigation prior to construction

Impact GEO-2: Soil erosion or loss of topsoil due to program construction or operation (less than significant with mitigation)

Mitigation Measure HYD-1 would minimize the potential for erosion and sedimentation to a less-than-significant level.

Cumulative Impacts

No significant cumulative impact was disclosed in the Program EIR.

b. Program EIR and/or New Mitigation Measures Applied to the Project

Geology, soils, and mineral resource mitigation measures pertinent to the proposed project are found on pages 3.6-9 to 3.6-10 of the Program EIR. All mitigation measures appropriate to the project to be incorporated into or made conditions of approval of the proposed project are listed in Section V, Mitigation Measures Applied to Project.

Discussion:

The appropriate mitigation to be applied to this project includes GEO-1 and HYD-1 from the Program EIR. No new or additional mitigation measures or alternatives are required to reduce project impacts to a less-than-significant level.

c. Project-Specific Effects

Section 3.6 of the PEIR discloses geology, soils, and mineral resource impacts resulting from implementation of the Water System Engineer's Report. The following is an analysis of whether the proposed project would result in a new, significant, project-specific effect not disclosed in the Program EIR.

Significance Criteria: Determination of project effects will be based on the following thresholds. Project-specific effects will be less than significant unless:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
6. GEOLOGY, SOILS, AND MINERAL RESOURCES				
1) The project would expose people, structures, or infrastructure to potential substantial adverse effects, including the risk of loss, damage, injury, or death involving surface rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area, or based on other substantial evidence of a known fault, strong seismic ground shaking, liquefaction and other related types of seismically induced ground failure, expansive soils, or landslides.	☐	☐	☐	**X**
2) The project would cause substantial soil erosion or loss of topsoil due to program operation or construction.	☐	☐	☐	**X**
3) The project would result in the loss of availability of a known mineral resource or mineral resource recovery site.	☐	☐	☐	**X**

Discussion:

(1) To ensure that the project site is underlain with soils suitable for the proposed tank and well, Mitigation Measure GEO-1 will be implemented.

(2) Mitigation Measure HYD-1 will to implemented to reduce erosion and sedimentation to a less-than-significant level.

(3) As noted in the Program EIR, the proposed infrastructure would have no significant impact on the recoverability of any sand and gravel deposits in the vicinity of the project site.

7. HAZARDS AND HAZARDOUS MATERIALS

a. Significant Effects Identified in the Program EIR

The Program EIR discloses the following significant impacts related to hazards and hazardous materials and their associated mitigation measures. Refer to pages 3.7-8 to 3.7-11 in the PEIR for details.

Direct Impacts

Impact HAZ-4: Release of hazardous materials from an existing contaminated site (less than significant with mitigation)

Mitigation Measure HAZ-1: Prepare a risk assessment prior to construction activity

Mitigation Measure HAZ-2: Control contamination resulting from previously unidentified hazardous waste materials

Cumulative Impacts

No significant cumulative impact was identified in the Program EIR.

b. Program EIR and/or New Mitigation Measures Applied to the Project

Hazardous materials mitigation measures pertinent to the proposed project are found on pages 3.7-8 to 3.7-11 of the Program EIR. All mitigation measures appropriate to the project to be incorporated into or made conditions of approval of this project are listed in Section V, Mitigation Measures Applied to Project.

Discussion:

The appropriate mitigation to be applied to this project includes HAZ-1 from the Program EIR. No new or additional mitigation measures or alternatives are required to reduce project impacts to a less-than-significant level.

c. Project-Specific Effects

Section 3.7 of the Program EIR discloses impacts on hazardous materials resulting from implementation of the Water System Engineer's Report. The following is an analysis of whether the proposed project would result in a new, significant, project-specific effect not disclosed in the Program EIR.

Significance Criteria: Determination of project effects will be based on the following thresholds. The project-specific effects will be less than significant unless the project would:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
7. GENERATION OF HAZARDOUS MATERIALS				
1) Create a hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.	☐	☐	☐	X
2) Create a hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.	☐	☐	☐	X
3) Emit hazardous emissions or involve handling hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school.	☐	☐	☐	X
4) Be located on a site that is listed as hazardous by the California Environmental Protection Agency, and, as a result, would create a significant hazard to the public or the environment.	☐	☐	☐	X
5) Result in safety hazards near a public or public-use airport.	☐	☐	☐	X
6) Expose people or structures to risk of loss, injury, or death involving wildland fires.	☐	☐	☐	X
7) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.	☐	☐	☐	X

Discussion:

(1-3) Most of the equipment to be installed runs on electricity, which neither creates nor uses hazardous materials on the project site. Backup generators use diesel fuel, which would be transported to the site, stored on site, and disposed of from time to time. On-site containment is required and would be implemented as part of project design. This impact is consistent with the impact disclosed in the Program EIR.

(4) The project site is not known to the State of California to be contaminated with hazardous materials. A Phase I assessment will be prepared for the site, as required by Mitigation Measure HAZ-1. All of the recommended mitigation measures will be implemented in order to reduce, avoid, or eliminate any potentially significant impacts to a less than significant level.

(5-6) There are no public or public-use airports near the project site. Additionally, the site is vacant. Therefore, there is no anticipated impact from wildfires.

(7) In order to install distribution pipelines, there may be temporary lane closures in the vicinity of the site. Implementation of a traffic management plan would be included as part of the City's Standard Construction Procedures.

8. HYDROLOGY AND WATER QUALITY

a. Significant Effects Identified in the Program EIR

The Program EIR discloses the following significant impacts related to hydrology and water quality and their associated mitigation measures. Refer to pages 3.8-17 to 3.8-22 in the Program EIR for details.

Direct Impacts

Impact HYD-1: Water quality impacts from program construction (less than significant with mitigation)
Mitigation Measure HYD-1: Prepare and implement a drilling-contingency (or "frac-out") plan during microtunneling

Impact HYD-5: Flood hazards (less than significant with mitigation)
Mitigation Measure HYD-2: Conduct floodplain studies prior to program design

Cumulative Impacts

No significant cumulative impact was disclosed in the Program EIR.

b. Program EIR and/or New Mitigation Measures Applied to the Project

Hydrology and Water Quality mitigation measures pertinent to the project being analyzed in this Initial Study are found on pages 3.8-17 to 3.8-22 of the Program EIR. All mitigation measures appropriate to the project will be incorporated into or made conditions of approval of this project are listed in Section V, Mitigation Applied to Project.

Discussion:

The appropriate mitigation to be applied to this project is HYD-1 from the Program EIR. No new or additional mitigation measures or alternatives are required to reduce project impacts to a less-than-significant level.

c. Project-Specific Effects

Section 3.8 of the Program EIR provides analysis of Hydrology and Water Quality impacts of implementation of the Water System Engineer's Report, the following is an analysis of whether the proposed project would result in a new, significant, project-specific effect not previously analyzed in the Program EIR.

Significance Criteria: Determination of project effects will be based on the following thresholds. The project-specific effects will be less than significant unless the project would:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
8. HYDROLOGY AND WATER QUALITY				
1) Violate water-quality standards or waste discharge requirements.	☐	☐	☐	X
2) Substantially alter the existing drainage pattern of the site or area or the course of a stream or river in a manner that would result in substantial erosion or siltation onsite or offsite.	☐	☐	☐	X
3) Create or contribute runoff water that would provide substantial additional sources of polluted runoff.	☐	☐	☐	X
4) Place housing within a 100-year flood hazard area or place structures within a 100-year flood hazard area that would impede or redirect flood flows.	☐	☐	☐	X
5) Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam.	☐	☐	☐	X
6) Substantially alter the existing drainage pattern of the site or area or the course of a stream or river that would result in flooding onsite or offsite.	☐	☐	☐	X

Discussion:

(1-3) Tuolumne River water quality would not be affected by construction of the tank and well, because the site is approximately one mile from the river. Municipal wells have higher water quality standards than do private wells and are typically drilled to greater depths than are private wells in order to avoid contaminants that permeate shallower soils. Rivers typically draw water from shallower aquifers, thus the proposed well is not expected to significantly affect the local drainage pattern or course of the Tuolumne River. Mitigation Measure HYD-1 would be implemented, further reducing the potential for impacts.

(4) This project does not involve the construction or relocation of housing and the site does not lie within the 100-year floodplain.

(5-6) The project site lies outside the 100-year floodplain, so risk of flood damage to the proposed infrastructure is consistent with the degree of risk assumed in the Program EIR. Furthermore, there would be no change in the risk of flooding from dam failure as compared to the risk throughout the area. Finally, the project would not substantially alter any existing drainage pattern or change a watercourse such that flood hazards are increased, and is consistent with the degree of risk analyzed in the Program EIR.

9. LAND USE AND PLANNING

a. Significant Effects Identified in the Program EIR

The Program EIR discloses the following significant impacts related to land use and planning.

Direct Impacts

No significant direct impacts were disclosed in the Program EIR, therefore no mitigation measures were identified.

Cumulative Impacts

No significant cumulative impact was disclosed in the Program EIR.

b. New Mitigation Measures Applied to the Project

All mitigation measures appropriate to the project will be incorporated into or made conditions of approval of this project. Those measures will be listed in Section V, Mitigation Applied to Project.

Discussion:

There are no required mitigation measures in the Program EIR. No new or additional mitigation measures or alternatives are required to reduce project impacts to a less-than-significant level.

c. Project-Specific Effects

Section 3.9 of the Program EIR discloses impacts of implementing the Water System Engineer's Report on land use and planning. The following is an analysis of whether the proposed project would result in a new, significant, project-specific effect not disclosed in the Program EIR.

Significance Criteria: Determination of project effects will be based on the following thresholds. The project-specific effects will be less than significant unless the project would:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
9. LAND USE AND PLANNING				
1) Physically divide an established community	☐	☐	☐	X
2) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the program adopted for the purpose of avoiding or mitigating an environmental effect.	☐	☐	☐	X
3) Conflict with any applicable habitat conservation plan or natural community conservation plan.	☐	☐	☐	X

Discussion:

(1) Construction and operation of the proposed well and tank would occur at the western edge of the Hickman community. No impact greater than impacts disclosed in the Program EIR would occur.

(2) The well and tank are permitted in accordance with state law and thus would be consistent with existing land use plans, policies, and regulations.

(3) There are no habitat conservation plans or natural community conservation plans in effect in Stanislaus County.

10. NOISE

a. Significant Effects Identified in the Program EIR

The Program EIR discloses the following significant impacts related to noise and their associated mitigation measures. Refer to pages 3.10-8 to 3.10-12 and 4-12 in the PEIR for details.

Direct Impacts

Impact NOISE-1: Exposure of Residences to Noise from Grading and Construction Activities (Significant and Unavoidable)

Mitigation Measure NOISE-1: Employ Noise-Reducing Construction Practices
Mitigation Measure NOISE-2: Limit Nighttime Construction Noise

Impact NOISE-2: Exposure of Residences to Noise from the Operation of Engines at Proposed Improvements Such as Wells and Pump Stations (Less than Significant with Mitigation)

Mitigation Measure NOISE-3: Employ Noise-Reducing Methods During Operations

Cumulative Impacts

Impact CUM-7: Program-Related Noise Emissions (Less than Significant with Mitigation)

Mitigation Measures NOISE-1 through NOISE-3 would reduce this impact to a less-than-significant level.

b. Master EIR and/or New Mitigation Measures Applied to the Project

Noise policies and mitigation measures pertinent to the project being analyzed in this Initial Study are found on pages 3.10-8 to 3.10-12 of the Program EIR. All mitigation measures appropriate to the project will be incorporated into or made conditions of approval of this project and any new measures are listed in Section V, Mitigation Applied to Project.

Discussion:

The appropriate mitigation to be applied to this project includes NOISE-1, NOISE-2, and NOISE-3 from the Program EIR. No new or additional mitigation measures or alternatives are required to reduce project impacts to a less-than-significant level.

c. Project-Specific Effects

Section 3.10 of the PEIR discloses noise impacts resulting from implementation of the Water System Engineer's Report. The following is an analysis of whether the proposed project would result in a new, significant, project -specific effect not analyzed in the Program EIR.

Significance Criteria: Determination of the proposed project's effects is based on the following thresholds. Project-specific effects will be less than significant unless the project would:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
10. NOISE				
1) Expose persons to or generate noise levels in excess of standards established in a local general plan or noise ordinance or applicable standards of other agencies.	☐	☐	☐	X
2) Expose persons to or generate excessive groundborne vibration or groundborne noise levels.	☐	☐	☐	X
3) Result in a substantial permanent increase in ambient noise levels in the program vicinity above levels existing without the proposed program.	☐	☐	☐	X
4) Result in a substantial temporary or periodic increase in ambient noise levels in the program vicinity above levels existing without the program.	☐	☐	X	☐
5) Be located within an airport land use plan area, or, where such a plan has not been adopted, within 2 miles of a public airport or public-use airport and expose people residing or working in the program area to excessive noise levels.	☐	☐	☐	X
6) Be located in the vicinity of a private airstrip and expose people residing or working in the program area to excessive noise levels.	☐	☐	☐	X

Discussion:

(1-4) Noise from the project would primarily result from construction activities, a temporary impact. Construction noise would be substantial and is likely to exceed noise thresholds at times, however, this impact was disclosed in the Program EIR and the proposed project is expected to result in similar noise impacts. Mitigation Measures NOISE-1 and NOISE-2 would be implemented to reduce the impact of construction noise on nearby residences. Noise during from operation of the well and tank would result from the pumps, which could be significant, as described in the Program EIR. The on-site diesel generator will also be in use on those occasions when there is an electric power interruption, creating substantial temporary noise impacts, also disclosed in the Program EIR. Mitigation Measure NOISE-3 would be implemented to reduce operational noise impacts to a less-than-significant level.

(5-6) There is no airport or airstrip within 2 miles of the project site.

11. POPULATION AND HOUSING

a. Significant Effects Identified in the Program EIR

The Program EIR discloses the following significant impacts related to population and housing. Refer to pages 3.11-7 to 3.11-11 in the PEIR for details.

Direct Impacts

Impact POP-2: Potential to Induce Substantial Population Growth (Significant and Unavoidable)
No mitigation measures were identified for this impact.

Cumulative Impacts

No significant cumulative impact was identified in the PEIR.

b. New Mitigation Measures Applied to the Project

All mitigation measures appropriate to the project will be incorporated into or made conditions of approval of this project. Those measures will be listed in Section V, Mitigation Applied to Project.

Discussion:

The Program EIR did not identify mitigation measures to reduce impacts on population and housing. No new or additional mitigation measures or alternatives are required to reduce project impacts to a less-than-significant level.

c. Project-Specific Effects

Section 3.11 of the Program EIR discloses impacts of implementing the Water System Engineer's Report on population and housing. The following is an analysis of whether the proposed project would result in a new, significant, project-specific effect not disclosed in the Program EIR.

Significance Criteria: Determination of project effects will be based on the following thresholds. The project-specific effects will be less than significant unless the project would:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
11. POPULATION AND HOUSING				
1) Induce substantial population growth in an area, either directly (e.g., by proposing new homes and businesses) or indirectly (e.g., through the extension of roads or other infrastructure).	☐	☐	☐	X
2) Displace a substantial number of existing housing units, necessitating the construction of	☐	☐	☐	X

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
replacement housing elsewhere.				
3) Displace a substantial number of people, necessitating the construction of replacement housing elsewhere.	☐	☐	☐	X

Discussion:

(1) Addition of the proposed well and tank in the Hickman area is intended to improve the reliability of Hickman's water supply to meet the "maximum day" plus fire flow demands that can occur with the level of development allowed under the existing zoning and general plan designations. The well and tank are not of sufficient size to permit growth beyond that expected in the Hickman community. This impact was disclosed in the Program EIR and no mitigation was proposed to reduce the impact; the impact of this specific project is consistent with the impact disclosed in the Program EIR.

(2-3) No people or housing would be displaced as a result of construction or operation of the proposed well and tank. The proposed project site is currently vacant.

12. PUBLIC SERVICES

a. Significant Effects Identified in the Program EIR

The Program EIR discloses the following significant impacts related to public services. Refer to page 3.12-9 in the PEIR for details.

Direct Impacts

No significant impacts were identified in the Program EIR, therefore there are no mitigation measures.

Cumulative Impacts

No significant cumulative impact was disclosed in the Program EIR.

b. New Mitigation Measures Applied to the Project

All mitigation measures appropriate to the project will be incorporated into or made conditions of approval of this project. Those measures will be listed in Section V, Mitigation Applied to Project.

Discussion:

The Program EIR did not identify an impact and thus did not identify mitigation measures. No new or additional mitigation measures or alternatives are required to reduce project impacts to a less-than-significant level.

c. Project-Specific Effects

Section 3.12 of the Program EIR discloses impacts of implementing the Water System Engineer's Report on public services. The following is an analysis of whether the proposed project would result in a new, significant, project-specific effect not disclosed in the Program EIR.

Significance Criteria: Determination of project effects will be based on the following thresholds. The project-specific effects will be less than significant unless the project would:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
12. PUBLIC SERVICES				
1) Result in substantial adverse physical impacts associated with the provision of new or physically-altered governmental facilities or the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for fire protection, police protection, schools, parks, or other public facilities.	☐	☐	☐	X

Discussion:

(1) The Program EIR did not identify any significant impacts resulting from the proposed program. The proposed well and tank are very similar to those projects described in the Program EIR, thus impacts would be similar to those disclosed in the Program EIR. No significant impact is anticipated.

13. RECREATION

a. Significant Effects Identified in the Program EIR

The Program EIR discloses the following significant impacts related to recreation. Refer to page 3.13-9 in the PEIR for details.

Direct Impacts

No significant impacts were identified in the Program EIR, therefore there are no mitigation measures.

Cumulative Impacts

No significant cumulative impact was disclosed in the PEIR.

b. New Mitigation Measures Applied to the Project

All mitigation measures appropriate to the project will be incorporated into or made conditions of approval of this project. Those measures will be listed in Section V, Mitigation Applied to Project.

Discussion:

The Program EIR did not identify an impact and thus did not identify mitigation measures. No new or additional mitigation measures or alternatives are required to reduce project impacts to a less-than-significant level.

c. Project-Specific Effects

Section 3.13 of the Program EIR discloses impacts of implementing the Water System Engineer's Report on recreation. The following is an analysis of whether the proposed project would result in a new, significant, project-specific effect not disclosed in the Program EIR.

Significance Criteria: Determination of project effects will be based on the following thresholds. The project-specific effects will be less than significant unless the project would:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
13. RECREATION				
1) Cause any changes in the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated.	☐	☐	☐	X
2) include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical impact on the environment.	☐	☐	☐	X

Discussion:

(1-2) Construction and operation of the proposed well and tank are not expected to have any impact on the use or quality of parks. Furthermore, this project would create no demand for new or expanded parks or other recreational facilities.

14. TRAFFIC/TRANSPORTATION

a. Significant Effects Identified in the Program EIR

The Program EIR discloses the following significant impacts related to traffic/transportation and their associated mitigation measures. Refer to pages 3.14-17 to 3.14-19 and page 4-12 in the PEIR for details.

Direct Impacts

No significant impacts were identified in the Program EIR, therefore there are no mitigation measures.

Cumulative Impacts

No significant cumulative impact was disclosed in the Program EIR.

b. Master EIR and/or New Mitigation Measures Applied to the Project

Traffic policies and mitigation measures pertinent to the project being analyzed in this Initial Study are found on pages 3.14-17 to 3.14-19 of the Program EIR. All mitigation measures appropriate to the project will be incorporated into or made conditions of approval of this project and any new measures are listed in Section V, Mitigation Applied to Project.

Discussion:

The Program EIR did not identify an impact and thus did not identify mitigation measures. No new or additional mitigation measures or alternatives are required to reduce project impacts to a less-than-significant level.

c. Project-Specific Effects

Section 3.14 of the PEIR discloses traffic/transportation impacts resulting from implementation of the Water System Engineer's Report. The following is an analysis of whether the proposed project would result in a new, significant, project-specific effect not analyzed in the Program EIR.

Significance Criteria: Determination of the proposed project's effects is based on the following thresholds. Project-specific effects will be less than significant unless the project would:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
14. TRAFFIC/TRANSPORTATION				
1) Cause an increase in traffic that is substantial in relation to the existing traffic load and the capacity of the street system (i.e., result in a substantial increase in the number of vehicle trips, the volume-to-capacity ratio on roads, or congestion at intersections).	☐	☐	☐	X
2) Cause, either individually or cumulatively, an exceedance of an LOS standard established by the County congestion management agency for designated roads or highways.	☐	☐	☐	X
3) Result in inadequate emergency access.	☐	☐	☐	X
4) Result in inadequate parking capacity.	☐	☐	☐	X
5) The proposed program would have a significant impact if it resulted in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks.	☐	☐	☐	X
6) The proposed program would have a significant impact if it substantially increased hazards because of a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).	☐	☐	☐	X
7) The proposed program would have a significant impact if it conflicted with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts and bicycle racks).	☐	☐	☐	X

Discussion:

(1-2) The Program EIR disclosed that a very small number of vehicle trips would occur during construction of individual projects and that even fewer vehicle trips would occur during operation of the well and tank. Construction trips would result from the conveyance of equipment to the site and from construction workers arriving and departing the site. Operation of the well and tank would result in occasional visits to the site primarily for maintenance purposes.

(3) Construction activities would temporarily increase emergency response times due to lane narrowing or lane closures to allow the installation of approximately 9,400 linear feet of water transmission pipelines throughout the Hickman community. However, these impacts were disclosed in the Program EIR and no greater impacts would be expected to occur as a result of the proposed project. The City's Standard Construction Procedures would be implemented during construction; these include preparing a traffic control plan, public notification, and preconstruction meetings. Adherence to the City's Standard Construction Procedures would result in a less-than-significant impact, consistent with the Program EIR.

(4) There would be no continuous demand for parking for maintenance staff. Any needed parking would be accommodated on site.

(5-7) The project site is not located near any airport or airstrip and the infrastructure would have no effect on air traffic due to any of its features. This is consistent with the analysis in the Program EIR. Furthermore, the construction of the tank, well, and associated infrastructure would result in no significant changes to the affected roadways or traffic on them, after construction is complete. The project does not conflict with plans or policies for non-automobile transportation.

15. UTILITIES

a. Significant Effects Identified in the Program EIR

The Program EIR discloses the following significant impacts related to utilities. Refer to pages 3.15-12 and 3.15-13 and page 4-13 in the PEIR for details.

Direct Impacts

No significant impacts were identified in the PEIR, therefore there are no mitigation measures.

Cumulative Impacts

Impact CUM-11: Effects on Water Quality (Less than Significant with Mitigation)
Mitigation Measures HYD-1 and HYD-2 would ensure there is no contribution to identified impairments.

b. New Mitigation Measures Applied to the Project

All mitigation measures appropriate to the project will be incorporated into or made conditions of approval of this project. Those measures will be listed in Section V, Mitigation Applied to Project.

Discussion:

There is no need to apply mitigation measures from the Program EIR to this project. No new or additional mitigation measures or alternatives are required to reduce project impacts to a less-than-significant level.

c. Project-Specific Effects

Section 3.15 of the Program EIR discloses impacts of implementing the Water System Engineer's Report on utilities. The following is an analysis of whether the proposed project would result in a new, significant, project-specific effect not disclosed in the Program EIR.

Significance Criteria: Determination of project effects will be based on the following thresholds. The project-specific effects will be less than significant unless the project would:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
15. UTILITIES				
1) Require or result in the construction of new water, storm water, or wastewater treatment facilities or in the expansion of existing facilities.	☐	☐	☐	X
2) Have insufficient water supplies available to serve the program from existing entitlements and resources.	☐	☐	☐	X
3) Be served by a landfill with insufficient permitted capacity to accommodate the program's solid waste disposal needs.	☐	☐	☐	X
4) Fail to comply with federal, state, and local statutes and regulations related to wastewater treatment or solid waste.	☐	☐	☐	X

Discussion:

(1) The proposed new water supply infrastructure would not directly result in a substantial increase in the demand for storm water drainage or wastewater treatment facilities. Surface runoff is expected to be minimal, as noted in the discussion of hydrology and water quality. Impacts from this project are expected to be consistent with those disclosed in the Program EIR.

(2) The purpose of this project is to address existing deficiencies and future demand in the water supply system in the Hickman area. The proposed project would help diversify water supply and improve reliability, consistent with the Program EIR.

(3) Any solid waste resulting from construction and maintenance of the proposed well and tank would be disposed of at the Fink Road Landfill, if it cannot be recycled, as disclosed in the Program EIR. The Fink Road Landfill is expected to have adequate capacity to serve the very limited need expected to result from this project and no significant impact is anticipated.

(4) All relevant federal, state, and local statutes and regulations will be complied with and no impact is expected to occur.

V. MITIGATION MEASURES APPLIED TO THE PROPOSED PROJECT

If the Initial Study results in the determination that a Finding of Conformance can be adopted for the proposed project, then Section A, below, applies. If the Initial Study results in the determination that a Finding of Conformance cannot be adopted and a Mitigated Negative Declaration/EIR must be prepared for the project then Section B, below, applies.

A. Program EIR Mitigation Measures Applied to the Project

Pursuant to Public Resources Code Section 21094, in order for a Finding of Conformance to be made, all appropriate mitigation measures from the Program EIR shall be incorporated into the proposed project. Urban Area General Plan Policies/Master EIR mitigation measures shall be made part of the proposed project prior to approval by means of conditions of project approval or incorporation into the appropriate document or plan. All applicable and appropriate mitigation measures have been applied to the project (see mitigation measures listed below).

Aesthetics:

Mitigation Measure AES-2: Screen staging and construction areas
Mitigation Measure AES-3: Design fencing, storage tanks, and booster pump station and groundwater well buildings to be consistent with the surrounding setting

Agricultural Resources:

None.

Air Quality:

Mitigation Measure AIR-1: Implement SJVAPCD Regulation VIII control measures for construction emissions of PM_{10}.
Mitigation Measure AIR-2: Implement enhanced control measures for construction emissions of PM_{10}.
Mitigation Measure AIR-3: Implement control measures for operation emissions of PM_{10} and for ozone precursors (ROG and NO_x)
Mitigation Measure CUM-1: Greenhouse gas calculations and emissions reduction measures
See Attachment A for calculations and emissions reduction measures.

Biological Resources:

Mitigation Measure BIO-1: Perform focused surveys for Special-Status plant species
Mitigation Measure BIO-2: Avoid and minimize impacts on Special-Status plant species
Mitigation Measure BIO-3: Compensate for unavoidable impacts on Special-Status plant species
Mitigation Measure BIO-8: Avoid and protect burrowing owls
Mitigation Measure BIO-9: Compensate for loss of burrowing owl habitat
Mitigation Measure BIO-12: Conduct preconstruction surveys for nesting birds
Mitigation Measure BIO-13: Avoid and minimize impacts on nesting raptors and other migratory birds
Mitigation Measure BIO-17: Avoid habitat for California tiger salamander

Cultural Resources:

Mitigation Measure CR-1: Implement plan to address discovery of unanticipated buried cultural resources
Mitigation Measure CR-2: Implement plan to address the discovery of human remains
Mitigation Measure CR-3: Minimize potential adverse impacts on paleontological resources

Geology, Soils, and Mineral Resources:

Mitigation Measure GEO-1: Conduct project-specific geotechnical investigation prior to construction
Mitigation Measure HYD-1: Prepare and implement a drilling-contingency (or "frac-out") plan during microtunneling

Hazards and Hazardous Materials:

Mitigation Measure HAZ-1: Prepare a risk assessment prior to construction activity

Hydrology and Water Quality:

Mitigation Measure HYD-1: Prepare and implement a drilling-contingency (or "frac-out") plan during microtunneling

A Phase I hazardous materials study has not yet been prepared for this site, but will be prepared prior to purchase of the property. All mitigation measures identified in the Phase I study will be applied to the project if the City of Modesto elects to utilize the proposed project site.

Land Use and Planning:

None.

Noise:

Mitigation Measure NOISE-1: Employ Noise-Reducing Construction Practices
Mitigation Measure NOISE-2: Limit Nighttime Construction Noise
Mitigation Measure NOISE-3: Employ Noise-Reducing Methods During Operations

Population and Housing:

None.

Public Services:

None.

Recreation:

None.

Traffic/Transportation:

None.

Utilities:

None.

B. New or Additional Mitigation Measures or Alternatives Required

The Water System Engineer's Report Program EIR was certified on September 14, 2010, with City Council Resolution 2010-408, which included a series of findings and statements of overriding consideration addressing project impacts, mitigation measures, and alternatives. Among the significant unavoidable impacts disclosed in the Program EIR was the project's cumulative impact on greenhouse gas emissions.

A mitigation measure from the Program EIR and identified in this Finding of Conformance, CUM-1, required that emission calculations be made and any additional feasible measures to reduce greenhouse gas emissions be considered as part of subsequent environmental documents. This has been done and the additional measures below have been identified as feasible. However, the project's impact will be significant and unavoidable even when the mitigation measures are implemented. Therefore, City Council Resolution 2010-408 continues to be applicable to the project and no further environmental review is necessary.

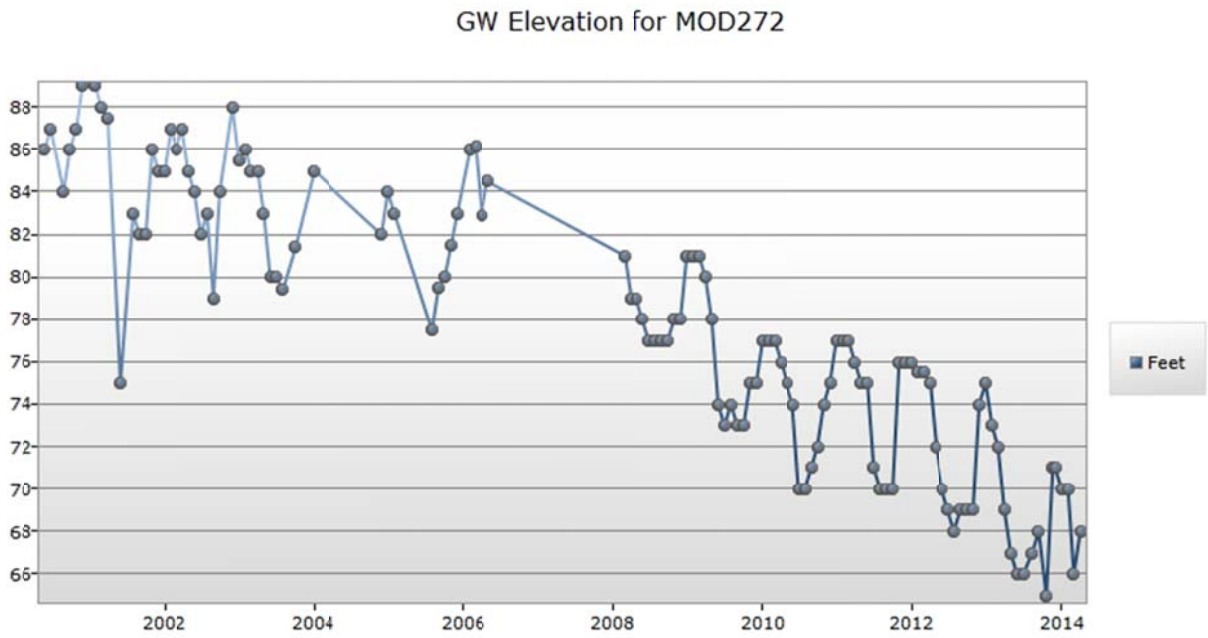
Air Quality:

GHG Measure 1: Limit idling time of off-road construction equipment to three minutes.
GHG Measure 2: Limit idling time of on-road construction equipment to three minutes.

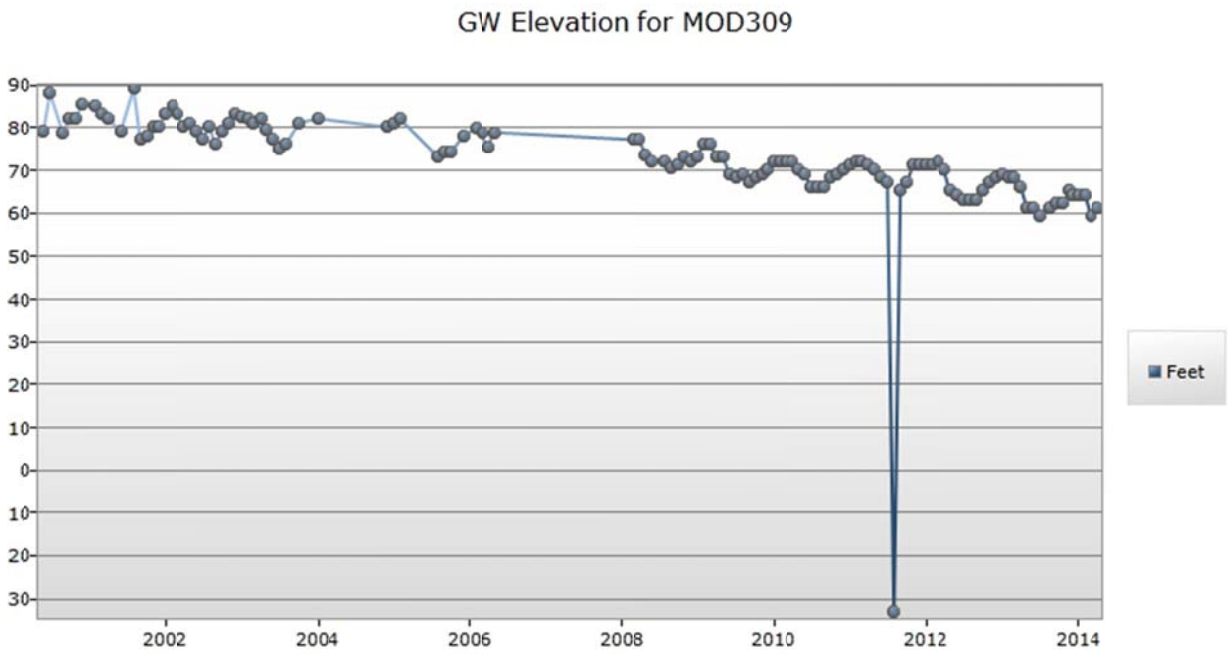
These mitigations are expected to reduce construction emissions up to 1 percent each. These measures will be included as requirements in the construction service contract for the project.

Hickman

Well 272: Variance up to 2006 with an 84-foot average, but there is a drastic decline after 2006 to about 68 feet.



Well 309: Not much variation, a slight drop from 2000 (~85 feet) to 2014 (~65 feet).



Appendix 3.2 – Grayson Water System Efficiency Improvements Technical Documents

WEST YOST ASSOCIATES
Consulting Engineers

TECHNICAL MEMORANDUM

DATE: March 30, 2010 Project No.: 418-02-07-22

TO: Jack Bond, City of Modesto, Project Manager

FROM: Charles Duncan, Project Manager

SUBJECT: City of Modesto's 2008 Water System Engineer's Report
Evaluation of the Existing and Buildout Water System for the Grayson Outlying Service Area (Grayson TM)

In the mid 1990's the City of Modesto (City) acquired the former Del Este Water System, which included the communities of Grayson, Hickman, and Del Rio, the City of Waterford, and a portion of the City of Turlock. The City now manages, operates and maintains these five outlying water service areas. As a component of the City's Engineer's Report, the City has requested West Yost Associates (WYA) to provide an individual hydraulic assessment of each of these separate systems. The hydraulic evaluation of the Town of Grayson (Grayson) water system is addressed in this technical memorandum.

1.0 SUMMARY

The hydraulic assessment included three system components and the ability to serve current and buildout demands: groundwater pumping capacity; storage capacity; and distribution system needs. In addition, water supply requirements at buildout were evaluated; additional demands at buildout are minimal and do not require a change in the proposed facility plan.

1.1 Pumping Capacity

The system assessment evaluated the adequacy of existing production wells to meet current water demands for two conditions: Peak Hour; and Maximum Day plus fire flow conditions. Peak hour and Maximum Day demand were calculated as 456 gallons per minute (gpm) and 201 gpm, respectively.

The system was reviewed with all wells and booster pumps producing, and with the largest well out of service (i.e., reliable pumping capacity). The reliable pumping capacity is sufficient to meet Peak Hour demand conditions. Standby pumps are recommended at Well 274 and Booster Pump #1 to ensure a reliable supply. The booster pump station is limited by the ability of the well pumps to provide enough supply to maintain the minimum tank level, approximately 4 feet. A new well is required to provide additional supply. An additional two 50 HP pumping units are required at the Tank 9 booster station to meet Maximum Day plus fire flow demand conditions.

7041 Koll Center Parkway, Suite 110 Pleasanton, CA Phone 925 426-2580 Fax 925 426-2585 e-mail: mail@westyost.com

1.2 Storage Capacity

The storage capacity assessment evaluated total storage and peaking capacity requirements based on three criteria: operational storage; fire storage; and emergency storage. Operational storage was established as 0.25 x Maximum Day demand. Fire flow demand was established as 1,500 gpm for a 2-hour duration. Emergency storage was established as 1.00 x the average day demand. Available storage at the tank and from groundwater production provides sufficient storage for the Grayson water system.

1.3 Existing System

The City has established a minimum requirement of 40 pounds per square inch (psi) of system pressure to meet Peak Hour demand, and 20 psi of residual pressure, measured at the flowing hydrant, to meet Maximum Day plus fire flow demands. Also, head loss should remain below 7 feet per 1,000 feet (ft/kft) of distribution piping, and velocity should be not greater than 7 feet per second (fps).

WYA developed the system hydraulic model using MWH Soft's H_2ONET software. Model inputs included pipe, junctions, wells, tanks, and pumps. Additional information about the hydraulic model is provided in Attachment A.

The hydraulic model indicates that the existing supply system, comprised of two operational wells, a 0.22 million gallon (MG) storage tank, and associated distribution system is sufficient to meet peak flow conditions. However, the system cannot maintain a minimum 20 psi residual system pressure during a simulated Maximum Day plus fire flow demand condition. To correct these existing system deficiencies, the City must install a new production well capable of producing approximately 400 gallons per minute (gpm), and replace 4,600 feet of existing small diameter pipeline with new 8-inch diameter pipeline. Our evaluation indicates that a backup generator should also be installed for the new well, Well 274, and Booster Pump #1 to ensure reliable service.

Recommended capital improvements to the existing Grayson water system are listed below, and anticipated to cost approximately $4.63M, as detailed in Table 8 of this TM.

- Construct new 400 gpm production well with standby generator to meet fire flow demands
- Install a standby generator at existing Well 274
- Install a standby generator at existing Booster Tank #1
- Construct 4,600 linear feet of upsized pipeline to convey fire flow

1.4 Buildout System

The existing Grayson water system is approximately 75 percent built out. There is approximately 30 acres of remaining development within Grayson to reach buildout conditions. This additional development is anticipated to increase the Grayson service area demands by approximately 0.11 mgd (76 gpm) to a total of 0.27 mgd (185 gpm). With the completion of the facility recommendations discussed above, no additional capital improvements are required for buildout of the Grayson system.

2.0 INTRODUCTION

In 2002, the City contracted with WYA to provide engineering services to assist in the development and calibration of a water system hydraulic model for the Grayson water system. Using the methodology described in Attachment A of this TM, WYA developed a hydraulic network analysis model of the Grayson water distribution system to allow computer simulations of various demands and flow conditions. The developed hydraulic model was used to evaluate the following demand conditions:

- Maximum day,
- Peak hour, and
- Maximum day plus fire flow.

In order to create a hydraulic network analysis model representative of the Grayson water system, WYA completed the steps listed below:

- Used shapefiles exported from the City of Modesto's Geographical Information System (GIS) and existing hard copy maps to develop the hydraulic model.
- Verified with City Operations staff that the converted hydraulic model system configuration (pipeline sizes, alignments, connections, and other facility sizes and locations) is representative of the current Grayson water system.
- Evaluated 2002 water demands by land use type to ensure proper distribution of demands in the hydraulic model.

In accomplishing these tasks WYA worked closely with City Engineering and Operations staff to obtain and review the following: as-built drawings and maps to confirm pipeline sizes, material, age, locations and alignments; and land use and available metered data.

Since the development and calibration of the hydraulic model in 2002, there have been no significant developments or changes to the Grayson water system infrastructure. However, leak detection and associated repairs of water mains in 2005 resulted in a significant decrease in system demands. The 2002 model has been updated to reflect the decrease in the demands. This TM presents the updates performed, model results, and recommended facility improvements.

This memo is organized as follows:

- Service Area
- Existing Water System
- Grayson Hydraulic Model
- Existing Water Supply System Evaluation & Recommendations
- Buildout Water Supply System Evaluation & Recommendations

3.0 SERVICE AREA

The Town of Grayson is located approximately 14 miles west of the City of Modesto along County Road J16 (Grayson Road) as shown on Figure 1. The Grayson water system serves approximately 1,100 residents and encompasses a service area of approximately 120 acres. This service area is primarily residential and is considered 75 percent developed. The Grayson water service area was originally provided with water service by the Del Este Water Company; in the mid 1990's, the City of Modesto acquired the Del Este system and began providing water service to Grayson.

The remaining development area within the Grayson water system is located primarily in the northern and southern regions of the service area. A small amount of remaining development will be infill.

4.0 EXISTING WATER SYSTEM

The Grayson water system includes two wells, one 0.22 MG tank (City Tank 9), and approximately 16,000 linear feet of pipeline. Existing Grayson pipelines vary in size from 4-inches to 10-inches in diameter and are comprised of welded steel and polyvinylchloride (PVC) pipe. The entire water system was metered in 2003.

There are no interconnections with other systems and there are no nearby water utilities with potential for interconnection.

4.1 Wells

The Grayson water system is solely supplied by groundwater. There are currently two existing wells that are operational. Groundwater is disinfected by chlorine addition at the wellhead, and then pumped into Tank 9. Tank 9 discharges the disinfected groundwater directly into the distribution system (see Figure 1 for locations).

Well characteristics are summarized in Table 1.

Table 1. Well Characteristics[a]

Well No.	Address	History Pump Data			Well Construction Details							Total Depth
		Year Drilled	Rated Pump Capacity (at 60 psi), gpm	Rated Hp	Standby Power	Treatment System	Casing Diameter (inches)	Gravel Packed	Depth of Annular Seal (ft)	Casing Depth (ft)	Perforated From/To	
274	8820 Charles	1967	321	20	No	No	14/12	No	NP[d]	168	146-168	168
295	8415 Yamamoto Way (Grayson Park)	1989	835	75	Yes	GAC[b]/ IX[c]	18/16	No	108	332	156-192, 252-328	336

(a) Based on information provided by the City.
(b) GAC = Granulated Activated Carbon
(c) IX = Ion Exchange Treatment
(d) NP = Not provided by the City

Pump efficiency tests were performed on both wells in October 2007. Results of these tests are presented in Table 2 and Table 6.

Table 2. Well Pump Test Results

Well No.	Date Tested	Motor HP	Measured Flow, gpm	Static Level, ft[a]	Pumping Level, ft[a]	Discharge Pressure, psi	Water HP
274	10/12/07	20	375	18	29	50	14
295	10/12/07	50	600	22	57	58	29

(a) Static and Pumping Levels indicate depth to water measurements from reference point elevations.

Table 3 provides a summary of the total monthly groundwater production of each individual well in 2008, and Figure 2 provides a graphical summary of this data.

Table 3. Summary of Grayson Service Area Monthly Production in 2008[a]

Month	Well 274		Well 295	
	Gallons	MG	Gallons	MG
January	2,401,206	2.40	1,853,875	1.85
February	2,182,256	2.18	1,701,416	1.70
March	2,836,178	2.84	2,279,202	2.28
April	3,106,652	3.11	2,473,171	2.44
May	3,510,827	3.51	2,725,892	2.73
June	3,880,070	3.88	2,930,051	2.93
July	4,227,551	4.23	3,129,240	3.13
August	4,472,373	4.47	3,367,469	3.37
September	4,116,327	4.12	3,238,032	3.24
October	3,639,096	3.64	2,847,034	2.85
November	2,891,921	2.89	2,254,168	2.25
December	2,826,122	2.83	2,196,233	2.20
Subtotals	40,090,579	40.09	30,995,781	31.00

(a) Data provided by the City of Modesto on September 4, 2009, from the file "monthly well flow totals 2002 to present.xls".

4.2 Unaccounted-for-Water

For the past few years, the City of Modesto has been monitoring water demands for the 270 connections (primarily residential) that comprise the Grayson water system. The average system water losses amount to 12 percent in 2006, which is a significant decrease from 38 percent measured in 2004. The City estimates that the detection of leaks and associated water main repairs completed in 2005 have reduced water demands and production by almost 40 percent. The City has decided to assume an average unaccounted-to-water (UAFW) of 15 percent for the Grayson water system, with a goal to achieve an UAFW rate of between 8 to 10 percent.

The Grayson original high UAFW rate was probably the result of two factors: 1) unauthorized water use (water theft), and 2) leakage from aging steel distribution pipelines. The City's capital improvement program, which replaced these steel pipelines, addressed one of these issues. It is recommended that the City of Modesto further investigate this issue of unauthorized water deliveries through the implementation of additional studies and investigations.

4.3 Wellhead Treatment

Wellhead treatment facilities are currently in use at Well 295. To reduce elevated levels of nitrates in the groundwater produced from this well, the City has installed granulated activated carbon (GAC) and ion exchange (IX) wellhead treatment systems. The ion exchange treatment system replaced an existing electro-dialysis system during the first quarter of 2004, in an effort to increase production for the Grayson service area.

Water from Well 274 also exceeds the maximum allowable concentration level of 45 mg/L for NO_3. However, there are currently no wellhead treatment facilities at this well. Therefore, water is pumped from Well 274 and is combined with water from Well 295 prior to ion exchange treatment to reduce nitrate concentrations below the maximum allowable level. The combined water is then stored in Tank 9 prior to being discharged into the distribution system. The hydraulic capacity of the wellhead treatment process at Well 295, combined with the associated process wastewater discharge permit, controls the maximum production rate.

4.4 Storage and Pumping Facilities

The Grayson Service Area includes one tank that is located on the same site as Well 295, at 8415 Yamamoto Way. Tank 9 is an at-grade steel tank. Therefore, all storage must be pumped into the distribution system.

Tank 9 was constructed in the early 1990's and is well maintained. The minimum allowable tank level is 4 feet to provide adequate suction head for the tank booster pump. This level control results in an operating range of 15.5 feet and available storage of 0.16 MG. Tank characteristics are shown in Table 4.

Table 4. Tank Characteristics

Tank	Supply Source	Base Elevation[(a)], ft	Diameter, ft	Height, ft	Overflow Level, ft	Gross Volume, MG[(b)]
9	Wells 274 & 295	56	42	22	19.5	0.22

(a) Base elevation estimated using available digital topographic map.
(b) Available storage volume is 0.16 MG due to a minimum operating tank level of 4 feet and operating range of 15.5 feet.

The pump station at Tank 9 includes two 50 hp booster pumps – one duty and one backup. There is also a backup generator at this site to provide service in the event of a power outage. Under Maximum Day plus fire flow conditions, the station's pumping capacity is limited by the need to maintain a minimum tank level to provide adequate suction head for the tank booster pumps, and by discharge pumping limitations.

4.5 Pipelines

General knowledge of the Grayson pipeline main locations and material type was gained through discussion with City Operations staff. Pipelines within the portion of the service area generally north of Minnie Street are comprised of 8-inch and 10-inch diameter PVC. The remainder of the service area distribution pipelines are comprised of a rectangular grid of smaller diameter steel mains (believed to be unlined), installed during the 1950's and 1960's. The perimeter of the grid on the north, west, and south consists of 6-inch diameter pipe. The remainder of the grid consists of 4-inch diameter pipe. An 8-inch diameter PVC transmission main is dedicated to transporting water from Well 274 to Tank 9 (see Figure 1).

5.0 GRAYSON HYDRAULIC MODEL

In 2002, WYA developed a hydraulic model of the Grayson water service area using MWH Soft's H_2ONET hydraulic modeling software. This model has been updated to reflect 2006 demands and well characteristics. The model represents the current system infrastructure, which has not changed since 2002. A summary of assumptions, criteria, and model components is included in Attachment A of this TM.

6.0 EXISTING WATER SUPPLY SYSTEM EVALUATION AND RECOMMENDATIONS

6.1 Overview

This section presents findings from the hydraulic evaluation of the Grayson existing water distribution system and its ability to meet the City of Modesto's recommended water system operational criteria under existing demand conditions. The existing water distribution system was evaluated under the following demand scenarios:

- Maximum Day Demand
- Peak Hour Demand
- Maximum Day Demand Plus Fire Flow

6.2 Potable Water Demands

Average day potable water demands and peaking factors for the existing Grayson system were estimated and allocated based on the methodology described in Attachment A. Based on production data provided by the City of Modesto from 2003 through 2007, Table 5 shows the peaking factors used to estimate Maximum Day and Peak Hour demands. The Maximum Day peaking factor was developed based on a 5-year average from 2003 through 2007. The Peak Hour peaking factor was developed based on a 2-year average from 2006 through 2007.

Table 5. Water Demand Peaking Factors

Demand Condition	Peaking Factor[(a)]	2006 Demands	
		Mgd	gpm
Average Day	--	0.16	109
Maximum Day	1.85 x Average Day	0.29	201
Peak Hour	4.19 x Average Day	0.66	456

[(a)] Based on available Tank 9 water production data for the Grayson service area. Peaking factors were provided by the City as Max-Day Peak Factor.xls on 7/31/08 and Peak-hour tabulation - Outlying Areas.xls on 8/1/08.

6.3 Pumping Capacity Evaluation

The Grayson service area is supplied exclusively by groundwater. The system includes two existing production wells that feed Tank 9 (Wells 274 and 295), as well as wellhead treatment and disinfection facilities. Tank 9 is located at grade; therefore, the stored water is pumped into the distribution system. Operation of the booster pumps is alternated to equalize wear and maintain a sufficient tank level. Each pump is equipped with a variable frequency drive motor; the pumps are never operated simultaneously. Available stand-by power at the site is capable of supporting Well 295, the treatment facility, and one booster pump concurrently. Wells are tested on an "as-needed" basis by City operations staff and/or Pacific Gas and Electric Company.

The two water distribution booster pumps at Tank 9 each have a design capacity of 715 gpm. Recent field testing of the pumping capacity of these booster pumps was conducted in August 2007. The booster pumps were recorded to pump at a capacity of 450 gpm each.

Table 6 provides a summary of recent pump flow testing for each operational well and information on the pumps at the booster pump station. The table indicates a total existing supply capacity of 1000 gpm and distribution capacity of 900 gpm. However, for water supply planning purposes, this groundwater supply (groundwater pumping capacity) and distribution supply must be reduced to account for a well or a distribution pump that is out of service at any given time due to mechanical breakdowns, maintenance or other operational issues. This reduced pumping capacity is defined as the Reliable Pumping Capacity.

For water supply planning purposes, the City has defined Reliable Pumping Capacity as the system's groundwater (or distribution) pumping capacity with the largest well out of service.

Due to the configuration of the system, the booster pump station at Tank 9 controls flow into the distribution system. However, under high demand conditions (especially under a fire flow condition concurrent with a Maximum Day demand condition), the booster pump station is limited by the ability of the well pumps to provide enough supply to maintain the minimum tank level, approximately 4 feet. Therefore, a supply deficiency exists. A new well is required to provide additional supply. Alternatively, changing out the pump at Well 295 may provide additional capacity. However, the new well is also needed to meet fire flow demands, as discussed below, and the new well will provide an additional supply source for operational flexibility and reliability. Therefore it is recommended that a new well instead of a replacement pump be installed to provide the additional supply. An additional two 50 HP pumping units are also required at the Tank 9 booster station to meet Maximum Day plus fire flow demand conditions. The fire flow analysis assumed that the new well and the booster station would both be used to meet fire flows in the system.

As shown on Table 6, the current total Reliable Pumping Capacity of 450 gpm (with either of the booster pumps out of service) is sufficient to meet existing Maximum Day or Peak Hour demands of 201 gpm and 456 gpm, respectively. While the Reliable Pumping Capacity of 450 gpm is approximately 1% less than the Peak Hour Demand of 456 gpm, it is within an acceptable margin for the purposes of this analysis. However, if Well 274 fails, then Tank 9 may drain down to below the minimum pumping level. Therefore, standby pumps are recommended at all the pumps to improve reliability during a power outage.

Table 6. Summary of Existing System's Pumping Facilities[a]

Well Pump Name	Efficiency, percent	Standby Power	Hp	Existing Capacity, gpm[a]	Existing Maximum Day Demand, gpm	Existing Peak Hour, gpm
274[b]	62	No	20	400	--	--
295[b]	39	Yes	50	600	--	--
Booster Pump #1	NP[c]	No	50	450	--	--
Booster Pump #2	NP[c]	Yes	50	450	--	--
Total Capacity[d]				450	201	456
Total Reliable Capacity[e]				450	201	456

(a) Based on pump capacity testing from August 2007. Pump tests conducted by City operations staff.
(b) Because of water quality issues, both Well 295 and 274 are used only to fill Tank 9.
(c) NP = Information Not Provided
(d) Based on system configuration – distribution fed only with Tank 9 booster pump station, however, both pumps cannot be operated concurrently due to hydraulic constraints.
(e) Based on normal operation – distribution fed only from a single booster pump at Tank 9.

Based on these recent pump tests, the efficiency of the wells can be improved, and the potential savings in operating costs should be evaluated.

6.4 Storage Capacity Evaluation

Criteria have been defined for determining treated water storage and system peaking capacity needs to meet diurnal operational peaks, fire flows, and emergency conditions. Total storage and system peaking capacity requirements can be evaluated based on the following three components:

- Operational Storage: 25 percent of Maximum Day demand;
- Fire Storage: The required fire flow times the fire flow duration period, as required by the City's Fire Marshall; and
- Emergency Storage: 1 x average day demand.

The existing storage facility (Tank 9) was evaluated to determine whether it has sufficient capacity to provide the required fire, emergency, and operational storage using Grayson's current Maximum Day demand condition. As shown on Table 7, available storage at Tank 9 is sufficient to meet existing City of Modesto storage criteria.

Table 7. Summary of Required Above Ground Storage[a]

Storage Component	Component Detail	Storage, MG
Operational	0.25 x max day demand	0.07
Fire	1,500 gpm for 2 hours	0.18
Emergency	1 x average day demand	0.16
Subtotal		0.41
Existing Storage		(0.16)
Groundwater Credit[b]	60% reliable production capacity	(0.35)
Total Storage Required		0.00

(a) Data based on the Water Demand Peaking Factors presented in Table 5.
(b) Sixty percent of existing reliable groundwater pumping capacity (without Well 295).

6.5 Existing Distribution System Evaluation

The hydraulic model identified areas of the Grayson existing system in which minimum pressure could not be maintained, or where velocities and/or head losses were found to exceed City of Modesto design standards. A discussion is provided in the following sections.

6.5.1 Peak Hour Demand Conditions

Peak hour demand for the Grayson potable water distribution system under existing conditions is approximately 0.66 mgd (456 gpm). This demand condition was simulated in the hydraulic model, and results indicated that the existing distribution system could reliably deliver these demands under the City's minimum pressure criteria of 40 psi. This analysis also indicated that head losses in existing pipelines met the City's criteria of $\leq$ 7 ft/kft and the velocity criteria of $\leq$ 7 fps. Therefore, since the distribution system pipelines met both criteria, pipelines were not recommended to be rehabilitated or upsized.

6.5.2 Maximum Day Plus Fire Flow Demand Conditions

Fire flows are to be met concurrently with a Maximum Day demand condition while maintaining a minimum residual system pressure of 20 psi, as measured at the flowing hydrant. The fire flow demand for Grayson is 1,500 gpm for a two hour duration. Based on the hydraulic analysis of the Maximum Day plus fire flow demand condition, the Grayson existing water system cannot maintain a minimum residual pressure requirement of 20 psi in the southern half of Grayson's service area (see Figure 3). In addition to the facility improvements discussed above, Figure 4 shows recommended pipeline improvements necessary to ensure minimum system pressures during fire flow conditions.

7.0 RECOMMENDED WATER SYSTEM IMPROVEMENTS

Based on the evaluations completed for the Grayson water system, there is a need for specific water facility improvements throughout Grayson's overall service area. An overview of the recommended facilities is provided on Figure 4. A summary of the recommended improvements is provided below.

7.1 Existing System Improvements

The recommended improvements to the Grayson water system ensure that reliable service can be provided to existing users in a manner that meets the city's system design criteria. These recommendations include the construction of a new well (with a pumping capacity of approximately 400 gpm), a new backup generator at Well 274 and Booster Pump 1, 900 gpm of additional pump capacity at the Tank 9 booster station and 4,600 linear feet of upsized pipelines. Locations of the recommended improvements are shown on Figure 4 and detailed in Table 8 (does not include costs for any well head treatment facilities required to meet water quality standards, if required). The locations of the proposed facilities are for planning purposes only and should be developed further in future pre-design studies. With the completion of these recommendations, residual pressure under fire flow concurrent with Maximum Day demand conditions will meet the 20 psi requirement (see Figure 5).

7.2 Required On-going Rehabilitation Improvements

In addition to the need to construct system improvements to meet current water system demands, the City should plan to repair or replace aging water system infrastructure over time. The decision to repair or replace existing facilities should be based primarily on facility condition. Pipelines that have experienced corrosion but have retained adequate structural integrity may often be repaired instead of replaced. Preventive maintenance is usually more cost effective and less disruptive than replacement, maximizes the useful life of the pipeline, and thereby optimizes lifecycle cost. Pipes that have experienced extensive corrosion and do not have adequate structural integrity should be replaced.

A system-wide condition assessment is also recommended to evaluate existing pipe conditions and to develop a prioritized replacement program. The program may involve internal and external corrosion evaluations to determine when to replace certain pipelines.

8.0 CAPITAL COSTS OF RECOMMENDED IMPROVEMENTS

The estimated probable capital costs for the recommended water system improvements to serve the Grayson existing and buildout condition are presented in Table 8. The capital costs are presented in March 2010 dollars at an Engineering News Record (ENR) construction cost index (CCI) of 9728.17 consistent with San Francisco. The costs include an estimate of 50 percent on the estimated construction cost to account for administration, design, and engineering costs and other contingencies. The costs for the facilities do not include costs for annual operation and maintenance, or costs for acquisition of rights-of-way.

Table 8. Recommended CIP Program for Existing Grayson Water System[a]

CIP ID	CIP Reason	Item	Unit	Quantity	Unit Cost [b] ($)	Cost ($)
		Pipelines				
FF01	Fireflow	Along Minne Street from Tank 9 to Laird Road				
		8-inch	lf	810	101	81,000
FF02	Fireflow	Along Laird Road from Minnie Street to Amelia Street				
		8-inch	lf	700	101	70,000
FF03	Fireflow	Along Stakes and Charles Street From Minnie to Mary Street				
		8-inch	lf	1,640	101	165,000
FF04	Fireflow	Along River Road from Mary Street to Amelia Street				
		8-inch	lf	750	101	75,000
FF05	Fireflow	Along Mary Street from Laird to River Road				
		8-inch	lf	710	101	71,000
		Wells				
	Supply	New Well with 400 gpm pump, backup generator, and SCADA[c]	well	1	1,333,000	1,333,000
		Well Backup Generators				
	Supply	Well 274	mgd	1	133,000 [d]	133,000
	Supply	Booster Pump #1	mgd	1	133,000	133,000
		Tank 9 Booster Upgrade				
		Rehab pump station, add two new units	HP	100	10,220	1,022,000
					Subtotal (Overall Program)	3,083,000
					50% Contingency & Other Costs	1,543,000
					Total Estimated Construction Cost	**4,626,000**

[a] Does not include site specific facilities.

[b] All unit prices presented in SF March 2010 dollars (ENR Construction Index = 9728.17). Unit prices based on combination of cost curves, construction cost guidelines and similar construction projects.

[c] Does not include costs for any well head treatment facilities required to meet water quality standards, if necessary. Includes land acquisition

[d] Backup generator cost estimated at $200,000 per unit, including markup.

9.0 EVALUATION OF BUILDOUT WATER SUPPLY SYSTEM

9.1 Overview

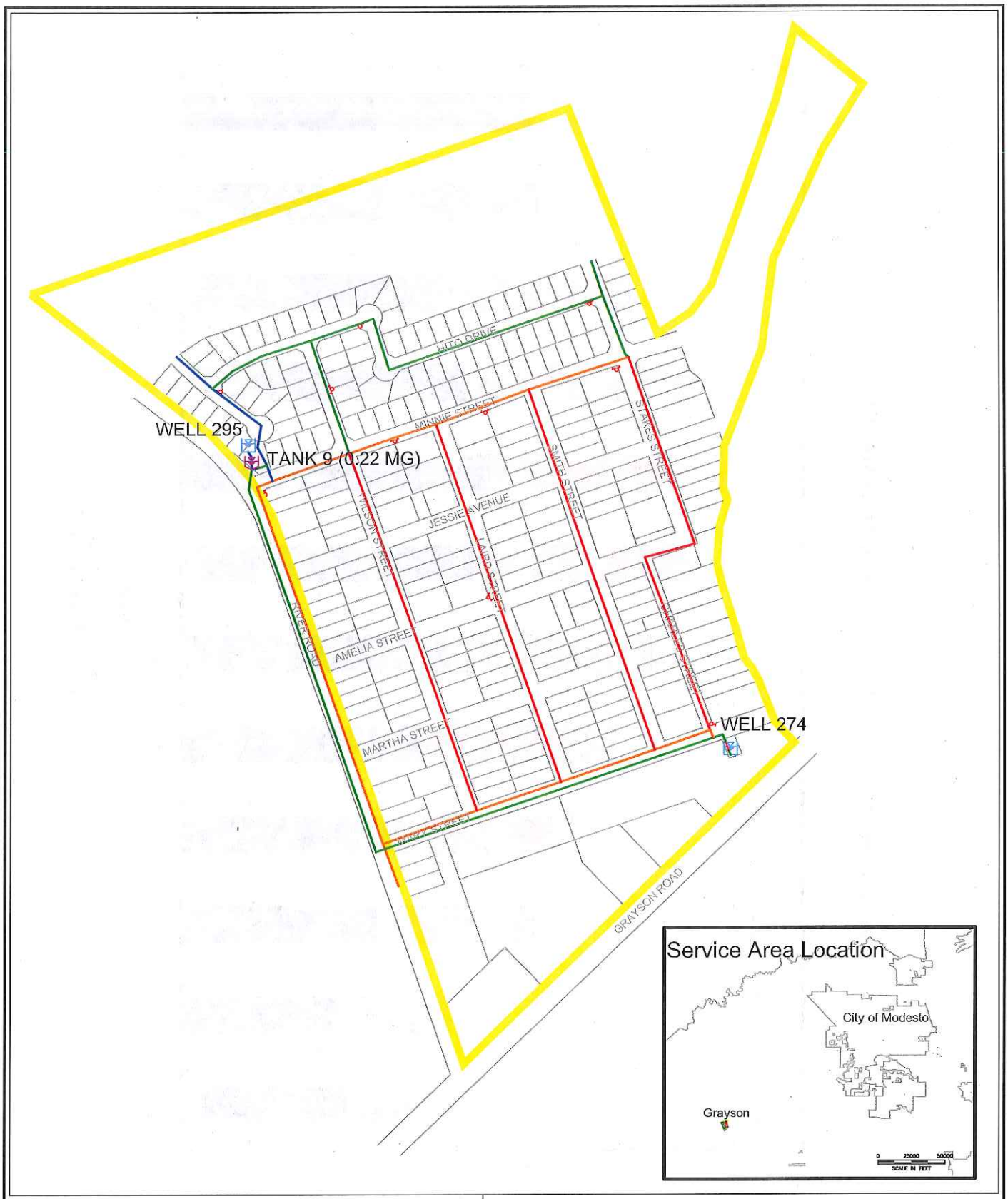
This section presents the hydraulic evaluation of the Grayson water distribution system and its ability to meet City of Modesto's recommended water system operational criteria under buildout demand conditions. The existing water distribution system was evaluated under Maximum Day, Peak Hour, and Maximum Day with concurrent fire flow demands.

9.2 Potable Water Demands

The Grayson water service area is approximately 75 percent built out, and there will be some additional water demands on the system as the vacant areas are developed. The total future potable water demand under average day demand conditions will be 0.27 mgd. Using peaking factors of 1.85 and 4.19, the demands for Maximum Day and Peak Hour are 0.50 mgd and 1.13 mgd respectively.

9.3 Buildout Distribution System Evaluation

The same analyses and calculations that were conducted to evaluate the ability of the system to meet current demands were applied for the analysis of buildout conditions. Based on these analyses, buildout demands can be adequately met with construction of the previously recommended existing system improvements.



LEGEND:

- PARCEL LINES
- SERVICE AREA BOUNDARY
- TANK
- WELL
- 4" PIPELINES & SMALLER
- 6" PIPELINES
- 8" PIPELINES
- 10" PIPELINES OR LARGER

N

0 250 500
SCALE IN FEET

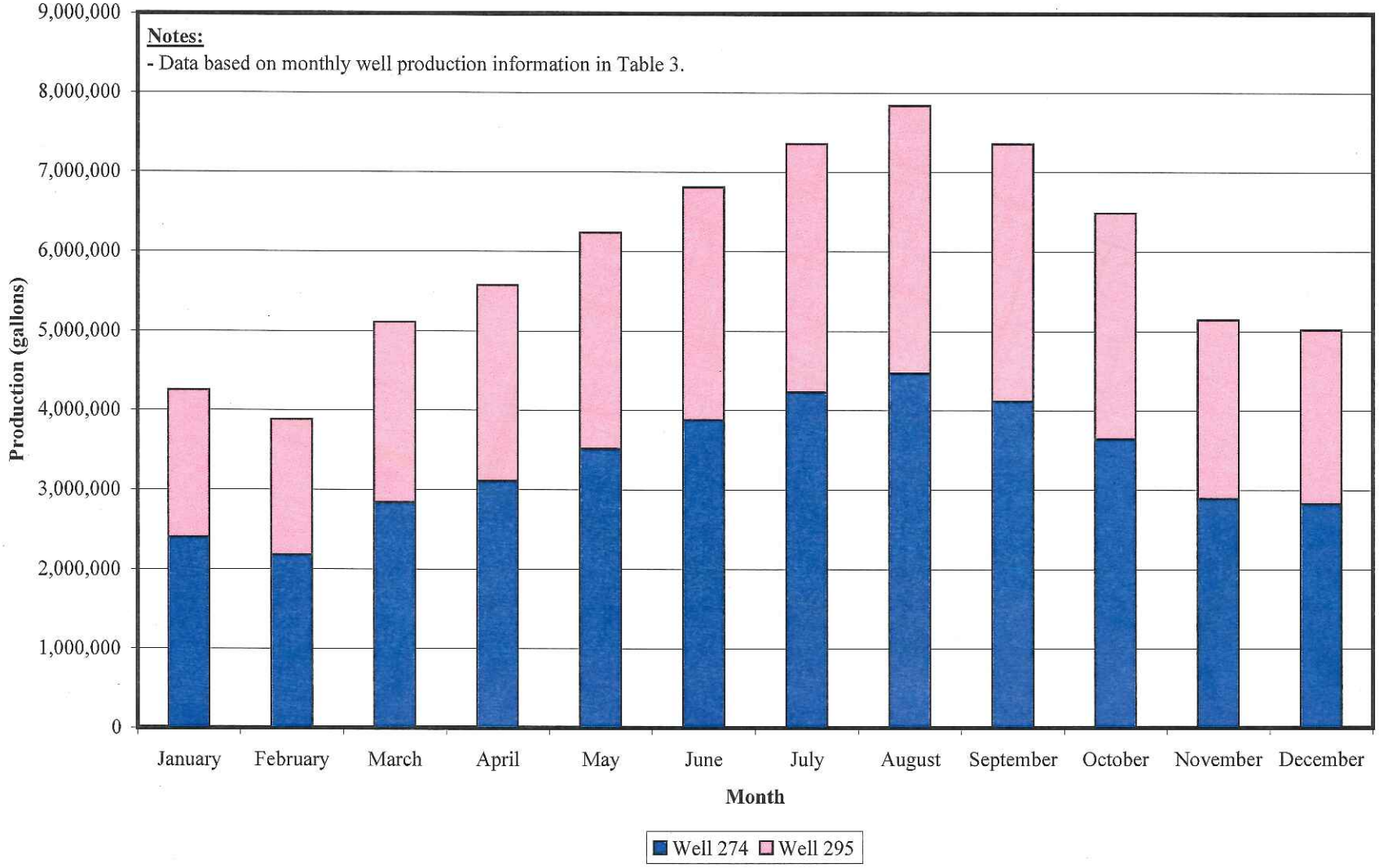
Figure 1

City of Modesto
TOWN OF GRAYSON
WATER DISTRIBUTION SYSTEM

WEST YOST ASSOCIATES
Consulting Engineers

O:\Clients\418 City of Modesto\02-07-22 Engineers Report\CAD\Figures\Outlying Areas\Grayson\Grayson_FIG01.dwg 11-06-09 12:14:53 PM csimmons

Figure 2. Town of Grayson - Monthly Production by Well (2008)



LEGEND:

- STORAGE TANK
- CITY WELL
- DISTRIBUTION PIPELINE
- PRESSURE BELOW 20 PSI
- PRESSURE BETWEEN 20 & 30 PSI
- PRESSURE BETWEEN 30 & 40 PSI
- PRESSURE BETWEEN 40 & 50 PSI
- PRESSURE ABOVE 50 PSI

N

0 250 500
SCALE IN FEET

Figure 3

City of Modesto

TOWN OF GRAYSON EXISTING SYSTEM
RESIDUAL PRESSURE UNDER MAX DAY PLUS
FIRE DEMAND (0.24 MGD)

WEST YOST ASSOCIATES
Consulting Engineers

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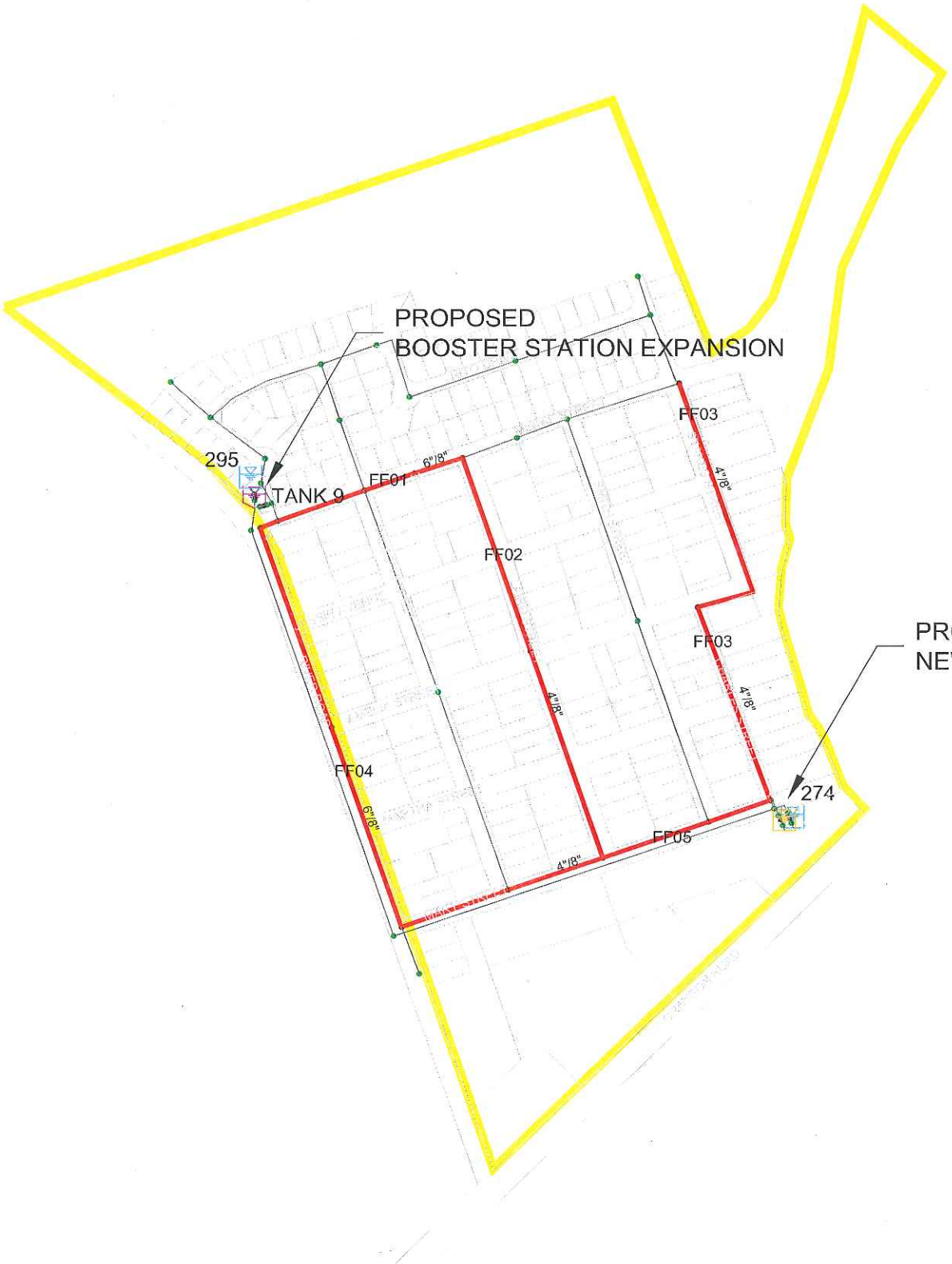

LEGEND:

- STORAGE TANK
- CITY WELL
- RECOMMENDED WELL
- DISTRIBUTION PIPELINE
- 6"/8" RECOMMENDED PIPELINE UPSIZE

N

0 250 500
SCALE IN FEET

Figure 4

City of Modesto
TOWN OF GRAYSON EXISTING SYSTEM
RECOMMENDED CIP

WEST YOST ASSOCIATES
Consulting Engineers

O:\Clients\418 City of Modesto\02-07-22 Engineers Report\CAD\Figures\Outlying Areas\Grayson\Grayson_FIG04.dwg 5-12-10 03:40:10 PM bmadhavan

LEGEND:

- STORAGE TANK
- CITY WELL
- DISTRIBUTION PIPELINE
- PRESSURE BELOW 20 PSI
- PRESSURE BETWEEN 20 & 30 PSI
- PRESSURE BETWEEN 30 & 40 PSI
- PRESSURE BETWEEN 40 & 50 PSI
- PRESSURE ABOVE 50 PSI

N

0 250 500
SCALE IN FEET

Figure 5

City of Modesto

TOWN OF GRAYSON EXISTING SYSTEM
RESIDUAL PRESSURE UNDER MAX DAY PLUS
FIRE DEMAND (0.24 MGD)
W/ RECOMMENDED CIP

WEST YOST ASSOCIATES
Consulting Engineers

O:\Clients\418 City of Modesto\02-07-22 Engineers Report\CAD\Figures\Outlying Areas\Grayson\Grayson_FIG05.dwg 11-06-09 12:17:41 PM csimmons

ATTACHMENT A

Development of Grayson's Hydraulic Model

ATTACHMENT A. DEVELOPMENT OF GRAYSON'S HYDRAULIC MODEL

WYA developed a hydraulic model of the Grayson Service Area using MWH Soft's H_2ONET hydraulic modeling software. The distribution system depicted in the City provided AutoCAD file was replicated as pipe, junctions, wells, tanks, and pumps. In 2010, this model was converted to MWH Soft's InfoWater v7.0.

Modeling Assumptions and Criteria

Establishing computer modeling assumptions and criteria was important for the development of the model, calibrating and running the model, and interpreting the results of the computer runs. The assumptions and criteria that were used to develop Grayson's water distribution system hydraulic model are described below:

- A minimum pipe size of 4 inches was modeled.
- Information on pipe length, diameter, material type and age was extracted from the City's existing GIS and hard copy maps.
- Pipe roughness coefficients, "C" values, were assigned based on age and pipe material.
- Pump station piping configurations, performance curves, and motor size information were acquired from "as-built" plans and interviews with City operational staff.
- Pipe length accuracy was assumed to be ±25 feet.
- Ground surface elevations were estimated using available digital topographic maps and surveyed benchmark elevations. Elevations were estimated to the nearest foot where spot elevations were not available.
- The water demands in the model were expressed in gallons per minute (gpm).

Peaking Factors

Maximum day and peak hour demand factors were calculated using data provided by the City of Modesto. The maximum day peaking factor was developed based on a 5-year average from 2003 through 2007, as shown in Table 1. The peak hour peaking factor was developed based on a 2-year average from 2006 through 2007, as shown in Table 2.

Table 1. Maximum Day Demand Peaking Factor

Year	Date	Max Day, gpd	Average Day, gpd	Peaking Factor
2003	06/29/03	428,459	256,183	1.67
2004	07/18/04	337,410	231,975	1.45
2005	07/31/05	389,313	211,335	1.84
2006	07/23/06	335,811	156,758	2.14
2007	07/16/07	378,875	178,168	2.13
Average				1.85

Table 2. Peak Hour Demand Peaking Factor

Year	Date	Peak Hour, gpm	Average Day, gpm	Peaking Factor
2006	07/23/06	380	109	3.49
2007	07/16/07	604	124	4.88
Average				4.19

Model Development

Node elevations were automatically computed using U.S. Geological Survey Digital Elevation Models (DEM). Pipeline were assigned C-factors based on material types and age as indicated by City Operations staff, ranged from 135 to 100.

The water surface elevation for both wells were as modeled as fixed-grade reservoirs, with water surface elevations equal to active water pumping levels as reported in City pump tests. Well pumps modeled with design point curves as presented in Table 3. Flow and head data points are based on observed flow and computed total dynamic head from City pump tests.

Although well 295 has a variable frequency drive, the well is typically operated at a constant speed, pumping into Tank 9.

Table 3. Well Model Characteristics

Well	Diameter, in	Modeled with Design Point Curve	
		Head, ft	Flow, gpm
274	4	144.5	375
295[(a)]	8	191	600

(a) Well pump has variable frequency drive. Well pumps to Tank 9.

Tank 9 booster pump station also has two pumps (one duty, one standby) with variable frequency drives. The booster pumps were modeled as constant power pumps of 50 horsepower followed by a pressure reducing valve to reduce downstream pressure to a maximum pressure of 55 pounds per square inch (psi) in order to simulate a variable speed pump.

Demand Allocation

MWH Soft H_2ONet and InfoWater allow the definition of multiple demand fields at a single node to represent different use classes or demand types. Because the system is almost fully developed, all demands are allocated in demand field 1.

Existing Demands

Unaccounted-for-Water: The City has determined Unaccounted-For-Water is approximately 15 percent of total production system-wide. The Town of Grayson's unaccounted-for water is approximately 12 percent of total production. Because this unaccounted-for water is probably due to unauthorized water use (water theft) which will be investigated separately, and leakage from old, small diameter steel pipelines that will be replaced as part of the recommended CIP, for purposes of this study unaccounted-for water was assumed to be uniformly lost throughout the distribution system.

Metered Non-residential Customers: While large metered customer loads are typically assigned individually to the closest model node, the Grayson Service Area metered non-residential demand amounts to only approximately 5% of the total, with no significantly large individual accounts. Therefore, metered non-residential consumption was combined and allocated with the residential component.

Metered Residential Customers: The Grayson Service Area is mainly composed of residential land use. Because Grayson is almost fully developed, all parcels were assigned equal demand. The unit demand per parcel is the total consumption (109 gpm average day) divided by number of parcels (270), or 0.40 gpm per parcel. Parcels, and their associated 0.40 gpm demand, were aggregated to the nearest model junction nodes to develop the base Average Day demand set. Maximum Day and Peak Hour (see Table 5 for factors) demand sets were calculated by applying the appropriate factors to the average day demands.

Fire: The Grayson service area has no large industry or dense commercial areas. Therefore, the fire demand of 1,500 gpm for a two hour duration was used for the entire service area.

Future System Demands

Future demands were estimated from planning information provided by the City of Modesto. Because the system is close to fully developed, future demands were estimated and then system demand was uniformly scaled up to incorporate anticipated future demands.

Scenarios

The scenarios modeled are shown in Table 4.

Table 4. Model Scenarios

Scenario	Description	Definition
AD	2006 Average Day Demand Scenario	Model of the 2006 average day demand condition
MD	2006 Maximum Day Demand Scenario	Model of the 2006 maximum day demand condition
MDFF	2006 Maximum Day plus Fire Flow Scenario	Model of the 2006 maximum day demand plus 1,500 gpm fire flow demand condition
PH	2006 Peak Hour Demand Scenario	Model of 2006 peak hour demand condition
EX-CIP	Existing System with CIP Recommendations	Model of 2006 fire flow runs with recommended improvements to meet the minimum design criteria

Data Sets

The Data Sets contained in the model are shown in Tables 5 through 7.

Table 5. Demand Sets

Demand Set	Description	Definition
AD	2006 Average Day Demand Set	Average day demand
MD	2006 Maximum Day Demand Set	Maximum day demand condition
MDFF	2006 Maximum Day w/ Fire Flows	Maximum day demand concurrent 1,500 gpm fire flow demand condition
PH	2006 Peak Hour Demand Set	Peak hour demand condition

Table 6. Pipe Sets

Pipe Set	Description	Definition
EXIST	2006 Existing Infrastructure	Existing system configuration
EX-CIP	Recommended CIP Infrastructure	Recommended system configuration

Table 7. Fire Flow Sets

Fire Flow	Description	Definition
FF1500	1,500 gpm Fire Flow at Fire Hydrant Nodes	This sets up the fire flow analysis at each hydrant node

Verification

The initial assessment was performed prior to field verification of the model in 2002 to provide a preliminary understanding of the system's capacity.

Modeling Element Information

To provide flexibility in modeling various system configurations, each modeling element was assigned a phase number as listed in Table 8 below. Each Phase number corresponds to a system configuration assignment.

Table 8. Phase Numbering

Phase	Configuration
1	Existing System
2	Existing System CIP

Grayson Energy Usage

	Unit	Tank No. 9	Well 1	Well 2	**Total**
Pump	hp	50	20	75	
Operation (based on SCADA)	hours/day	8	7.5	7.5	
	days/year	365	365	365	
	hours/year	2,920	2,738	2,738	
Energy Usage	kWh/year	108,872	40,827	153,102	**302,801**
5% Energy Savings (based on 5% water savings)	**kWh/year**	**5,444**	**2,041**	**7,655**	**15,140**

Note: calculation assumes 75% pump efficiency

Grayson Water System Efficiency Project

Annual Energy Use without the Grayson Water System Efficiency Project

302,801 kWh/year

303 MWh/year

Annual Energy Use with the Grayson Water System Efficiency Project

287,661 kWh/year

288 MWh/year

Energy Savings

15,140 kWh/year

15 MWh/year

Avoided GHG Emissions

GHG Emissions Factors from *GHG Emission Factors: Guidance for PG&E Customers* (PG&E, April 2013)

	Emission Factor	
Year	**Lbs CO_2/MWh**	**Avoided CO_2 Emissions**
2014	412	design
2015	391	construction
2016	370	5,602
2017	349	5,284
2018	328	4,966
2019	307	4,648
2020-2066	290	4,391

CO_2 Emissions without Grayson Water System Efficiency Project (lbs CO_2/year)

2016	112,036
2017	105,677
2018	99,319
2019	92,960
2020-2066	87,812

CO_2 Emissions with Grayson Water System Efficiency Project (lbs CO_2/year)

2016	106,434
2017	100,394
2018	94,353
2019	88,312
2020-2066	83,422

Avoided CO_2 Emissions

2016	5,602
2017	5,284
2018	4,966
2019	4,648
2020-2066	4,391

Pacific Gas and Electric Company

FOR INFORMATIONAL PURPOSES ONLY

Greenhouse Gas Emission Factors: Guidance for PG&E Customers

April 2013

In recent years, an increasing number of PG&E customers have started to track the greenhouse gas (GHG) emissions from their business operations, generated within their city, or saved through energy efficiency. This document is intended to help PG&E customers understand the different emission factors they can use to estimate GHG emissions for their own climate action planning or voluntary GHG emissions tracking or reporting. PG&E's latest GHG emission factor for delivered electricity is available online.

Please note: The information in this document is not to be used for mandatory GHG reporting, financial analysis, or regulatory compliance, and does not necessarily reflect the approaches taken by PG&E for its own regulatory compliance purposes.

What is a GHG emission factor?

A GHG emission factor[1] is a measure of the pounds of carbon dioxide (CO_2) emitted per megawatt-hour of electricity or per therm of natural gas.

- **Electricity** generated from fossil fuels such as natural gas or coal emit CO_2, while other sources of electricity such as hydropower, wind, solar, and nuclear power are considered to be carbon-free. The electricity that PG&E delivers to customers comes from a mix of these generation sources. PG&E's emission factor for delivered electricity incorporates the annual energy and associated emissions from each generation source for the given year. Variance in PG&E's mix of electricity sources largely account for changes in PG&E's GHG emission factor from year to year.
- The **natural gas** emission factor represents the amount of GHGs emitted per therm of natural gas combusted. This emission factor does not vary because the composition of PG&E's natural gas does not change significantly over time.

Electricity Emission Factors

If you are estimating the GHG emissions generated by a business, city, county, or related entity over the course of a year, and if 100% of your electricity was purchased from PG&E, you can use the average emission factor for all the PG&E electricity delivered during that specific year.

Historic emissions: Historic average emissions factors take into account all of the sources of electricity that PG&E delivered to customers during a specific year in the past. As a founding member of the California Climate Action Registry (CCAR), PG&E

[1] An emission factor is also known as an emission rate or emission coefficient.

has emission factors that have been third-party verified starting in the year 2003. For factors prior to 2003, please see FAQ #2.

Current/Future emissions: Because of the multiple sources of power used in the course of a year and the rigorous process PG&E follows to have its emissions independently verified by a third party, the emission factor for delivered electricity lags by a year. To estimate GHG emissions in a recent or future year for which an emission factor is not yet available, use the emissions factor forecast for PG&E's electricity in the CPUC GHG Calculator. The calculator is a publicly-available document that provides emission factor forecasts from 2012–2020 which are listed in the table below.

Avoided emissions: When you implement an energy efficiency project or install a renewable generation project (e.g., a solar photovoltaic system), you are reducing your use of electricity from the utility, and therefore are avoiding the associated GHG emissions. Determining the emissions avoided from these projects can be complicated, depending on the season and time of day the electricity was saved.

For simplicity, you can use the relevant annual emission factor to estimate the GHGs avoided from these projects. See FAQ #5 for more information.

PG&E Emissions Factor Summary

Emission Type	Emission Factor			Source
	Year	*Lbs CO_2 /MWh*	*Metric tons CO_2/MWh*	
Historical Emissions	2003	620	0.281	PG&E's third-party-verified GHG inventory submitted to the California Climate Action Registry (CCAR)[2] (2003-2008) or The Climate Registry (TCR) (2009-2011)
	2004	566	0.257	
	2005	489	0.222	
	2006	456	0.207	
	2007	636	0.288	
	2008	641	0.291	
	2009	575	0.261	
	2010	445	0.202	
	2011	393	0.178	
Future Emissions (estimated)	2012[3]	453	0.205	CPUC GHG Calculator, which provides an independent forecast of PG&E's emission factors as part of a model on how the electricity sector
	2013	431	0.196	
	2014	412	0.187	
	2015	391	0.177	
	2016	370	0.168	

[2] The 2003-2008 factors are in the Power/Utility Protocol (PUP) spreadsheet of PG&E's CCAR reports. The 2009-2011factors are in the Additional Optional Information tab of the Electric Power Sector (EPS) Report spreadsheet of PG&E's TCR report.

[3] PG&E's actual 2012 emission factor will be available in January 2014.

	2017	349	0.158	would reduce emissions under AB 32[4]
	2018	328	0.149	
	2019	307	0.139	
	2020	290	0.131	

Natural Gas Emission Factors

Historic, Current, and/or Future: The combustion of natural gas (in your stove, a furnace, or a natural gas power plant) releases CO_2. The emission factor for natural gas represents the amount of GHGs emitted per therm of natural gas combusted. Since the composition of PG&E natural gas does not change significantly over time, this factor does not change from year to year.

Emission Type		Emission Factor		Source
	Year	*Lbs CO_2/therm*	*Metric ton CO_2/therm*	
Historic, Current, or Future	All years	11.7	0.00531	U.S. Energy Information Administration[5]

UPDATES: The emissions factors will be updated annually, so please check with your PG&E account manager or the PG&E website at www.pge.com/environment for the most recent version.

Frequently Asked Questions:

1. Why do the emission factors for PG&E electricity vary from year to year? 4
2. Does PG&E have emission factors from years prior to 2003? 4
3. What emission factor should I use to calculate the emissions from electricity use in 1990? 4
4. Why do you use an average emission factor to estimate avoided emissions and not a marginal or project-specific emission factor? 5
5. What emission factor should I use if I want to estimate the emissions avoided through participation in PG&E's demand response programs? 5
6. If I am a direct access electricity customer, what emission factor should I use? 5
7. Can PG&E customers use the U.S. EPA carbon calculator to calculate the emissions from PG&E electricity? 5
8. What is the difference between the emission factors used in the U.S. EPA's Portfolio Manager benchmarking tool and PG&E's emission factors? 6
9. Does PG&E have emission factors for smaller geographic areas like cities or counties within its service territory? 6
10. What measures can I use to compare a reduction of one metric tonne of CO_2? 6
11. Why are PG&E's emission factors in CO_2 and not CO_2e (i.e. CO_2 equivalent)? 7

[4] E3, GHG Calculator version 3c, worksheet tab "CO_2 Allocations," cells AH35 - AH44.
[5] U.S. Energy Information Administration, Voluntary Reporting of Greenhouse Gases Program.

12. Why don't PG&E's emission factors include the emissions associated with the delivery of electricity or natural gas? 7
13. Who can I contact at PG&E to ask questions about emission factors? 7

1. Q: Why do the emission factors for PG&E electricity vary from year to year?
   A: PG&E's electricity emission factors vary primarily because the amount of available hydroelectricity varies from year to year. During drought years, less hydroelectricity is available and other power sources (usually natural gas generation) are used instead.

   Emission factors also change, but less significantly, based on variables such as change in demand due to weather (hot summers mean more air conditioning demand). Increased demand on a short-term basis is generally met by fossil fuel generation, which raises the average emission factor. PG&E works to mitigate demand by following California's "loading order," which involves reducing electricity demand by increasing energy efficiency and demand response, and meeting new long-term generation needs first with renewable and distributed generation resources, and second with clean fossil-fueled generation. The loading order was adopted in the 2003 Energy Action Plan prepared by the California energy agencies[6].

   Over time, PG&E's emission factor is also decreasing as we make steady progress toward California's target of 33% renewables by the end of 2020.

2. Q: Does PG&E have emission factors from years prior to 2003?
   A: PG&E was among the earliest companies to voluntarily quantify and report its GHG emissions using rigorous, publicly-vetted GHG reporting standards. As a charter member of the California Climate Action Registry which later grew into The Climate Registry, PG&E has voluntarily registered and publicly reported its third-party verified GHG inventory every year since 2003. Prior to 2003, there were no commonly-accepted guidelines to report the GHG emission factors from a utility. If you would like to calculate emissions prior to 2003, you can use the 1990 emission factor in FAQ #3 below.

3. Q: What emission factor should I use to calculate the emissions from electricity use in 1990?
   A: You can use the factor from a study published by Lawrence Berkeley National Laboratory, which cites an emission factor of 0.070 kg C/kWh for PG&E in 1990.[7] This figure translates to approximately 572 lbs CO_2/MWh or 0.259 metric tons CO_2/MWh.[8]

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[6] Implementing California's Loading Order for Electricity Resources.
[7] LBNL-49945, Marnay *et al*, Estimating the CO_2 emissions factors for the California Electric Power Sector, August 2002.
[8] Assuming 1 kg CO_2 = 0.27 kg C and 2.2046 lbs/kg.

4. Q:Why do you use an average emission factor to estimate avoided emissions and not a marginal[9] or project-specific emission factor?
   A: For the purposes of climate action planning or voluntary tracking and reporting, using an average emission factor simplifies the emissions calculation process. While some large entities may be required to estimate the amount of GHGs avoided by using emission factors specific to the hours of the day, the days of the year, or the seasons in which the energy use was avoided, the use of an average emission factor is appropriate for most customers.

5. Q: What emission factor should I use if I want to estimate the emissions avoided through participation in PG&E's demand response programs[10]?
   A: For the purposes of climate action planning or voluntary tracking or reporting, an average emission factor is appropriate. If you are participating in a third-party Demand Response program, you may reach out to your program manager for further guidance. Using the average factor is a simplification and may not reflect the approach taken by large entities for regulatory compliance purposes.

6. Q: If I am a direct access electricity customer, what emission factor should I use?
   A: If you are a direct access customer, you should contact your direct access electricity provider for the appropriate emission factor. If the emission factor is unavailable, The Climate Registry's Local Government Operations Protocol and the World Resources Institute's GHG Protocol recommend using the EPA Emissions & Generation Resource Integrated Database (eGRID) annual output emission factors for the WECC California (CAMX) sub-region.

7. Q: Can PG&E customers use the U.S. EPA carbon calculator to calculate the emissions from PG&E electricity?
   A: PG&E does not recommend that customers use this calculator. The EPA calculator uses an average emission factor for electricity generated nationwide. PG&E's emission factor is independently verified and based on the PG&E-specific mix of electricity delivered to PG&E customers. Because of PG&E's higher use of lower- and zero-emission generation sources, PG&E's emission factor is more than 60 percent cleaner than the national average.[11] Using the EPA carbon calculator would dramatically overstate PG&E customers' emissions and any emissions savings associated with energy efficiency projects.

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[9] A marginal emission factor represents the emissions from electricity generated "at the margin", i.e., electricity generated in response to an additional unit of electricity demand. In California, this factor is typically that of a natural gas power plant, because this type of plant is most frequently deployed when electricity demand increases in the state. The California Air Resources Board (ARB) uses a marginal emission factor for California of 944 lbs CO_2e/MWh. *See*: ARB, Mandatory Reporting Requirement Final Regulation, Section 95111(b)(1).

[10] PG&E's demand response programs offer incentives to customers that volunteer and participate by temporarily reducing their electricity use when demand could outpace supply.

[11] PG&E website: http://www.pge.com/myhome/environment/pge/cleanenergy/index.shtml.

8. Q: What is the difference between the emission factors used in the U.S. EPA's Portfolio Manager benchmarking tool and PG&E's emission factors?
   A: The EPA tool uses emission factors from the EPA Emissions & Generation Resource Integrated Database (eGRID), which are derived from utility data for each of the 26 sub-regions of the U.S. power grid. Users are not able to enter a PG&E-specific emission factor into the tool. Instead, based on the zip code of each building entered, Portfolio Manager identifies the appropriate sub-region and emission factor, and provides a graphic comparison of the sub-region's emission factor and electric generation fuel mix to the national factor. PG&E customers are in the WECC[12] California (CAMX) sub-region. Because eGRID's WECC California emission factor has consistently been higher than PG&E's historic emission factors, customers should understand that this tool overestimates emissions from buildings that use PG&E electricity.

   The tool also gives users the choice of selecting a specific power generation facility, which is not generally appropriate for the purposes of climate action planning or voluntary tracking and reporting, since the electricity delivered by PG&E to customers comes from a variety of sources.

9. Q: Does PG&E have emission factors for smaller geographic areas like cities or counties within its service territory?
   A: No, PG&E's emission factor is based on the electricity delivered to all of its customers. Because electricity enters PG&E's electrical transmission and distribution system from multiple sources and gets distributed throughout the system to customers, it is not possible to calculate emission factors for specific geographic areas.

10. Q: What measures can I use to compare a reduction of one metric tonne of CO_2?
    A: Reducing one metric ton (2204.6 lbs) of CO_2 is approximately equivalent to:
    - Taking 0.21 of an average passenger car in California off the road for a year in 2011;[13]
    - Avoiding the use of 112 gallons of gasoline;[14] or
    - Eliminating the GHGs associated with about 3.3 homes in PG&E's service territory for a month.[15]

[12] The Western Energy Coordinating Council (WECC) is a regional organization that promotes reliable electric service by establishing operating criteria and facilitating electric system support between utilities.
[13] California Air Resources Board's EMFAC 2011 model indicates an average passenger car in California in 2011 emitted 4.76 metric tons (5.24 short tons) of CO_2 per car per year.
[14] U.S. EPA website: http://www.epa.gov/cleanenergy/energy-resources/refs.html#gasoline.
[15] In PG&E's service territory in 2011, the average residential customer consumed 0.584 MWh and 38 therms per month. 0.584 MWh/home times 0.178 metric tonnes (MT) CO2/MWh in 2011 is approximately 0.104 MT of CO2 per home each month for electricty. 38 therms/home times 0.00531 MT of CO2 per therm is approximately 0.202 MT of CO2 per month. Combined energy use per house accounts for about 0.306 MT per month. Therefore, reducing 1 MT of CO2 is equivalent to reducing the emissions for about 3.3 homes per month.

11. Q: Why are PG&E's emission factors in CO_2 (carbon dioxide) and not CO_2e (i.e. CO_2 equivalent)?[16]
    A: The electricity emission factors reported via CCAR and TCR are in pounds of CO_2 and not CO_2e because their methodology for calculating emission factors only includes CO_2 and not methane (CH_4) or nitrous oxide (N_2O) from electricity generation. CCAR and TCR do not include CH_4 or N_2O because these emissions are considered to be *de minimis*.

    However, PG&E customers can still estimate the CH_4 and N_2O emissions associated with their electricity use by using the California-specific emission factors provided by The Climate Registry's Local Government Operations Protocol[17]. For natural gas, customers can use the relevant default emission factors for natural gas provided by the same protocol[18].

12. Q: Why don't PG&E's emission factors include the emissions associated with the delivery of electricity or natural gas?
    A: The emissions associated with the delivery of electricity or natural gas are not included in PG&E's emission factors for delivered electricity or natural gas because those emissions are reported separately by PG&E in its own GHG inventory. Standard voluntary reporting practice is to report such emissions, like the emissions associated with transmission and distribution line losses, natural gas compressor stations, and vehicles used to service electricity and natural gas delivery systems, separately from the emissions attributed to the generation or use of the energy itself.

13. Q: Who can I contact at PG&E to ask questions about emission factors?
    A: Email ghgdatarequests@pge.com and a PG&E employee will get back to you shortly.

[16] CO_2e or CO_2 equivalent is a measure used to compare the emissions from various GHGs based upon their global warming potential (GWP). The CO_2e for a gas is derived by multiplying the amount of the gas by the GWP of the gas.
[17] Version 1.1, May 2010. Page 209, Table G.7: California Grid Average Electricity Emission Factors (1990-2007).
[18] Page 205, Table G.3: Default Methane and Nitrous Oxide Emission Factors by Fuel Type and Sector.

Appendix 3.3 – South Modesto Infrastructure Efficiency Project Technical Documents

CITY OF MODESTO
UTILITY PLANNING AND PROJECTS DEPARTMENT

CONCEPTUAL DESIGN REPORT

GENERAL PROJECT INFORMATION	
Project Name: South Modesto Strengthen & Replace, Phase 2	**Project Number:** unassigned
Funding Source: Water CIP	**Total Budget:** $2.6M
Project Manager / Contact: UP&P:/Rob Christensen	**Client / End User Contact:** Water Division / Dave Savidge

PROJECT DESCRIPTION

The Project Manager shall provide the information requested herein to the best of their knowledge at this early stage of design.

☒ Estimated Cost: $2.0M CON / $2.6M Total	Cost Estimate Attached? ☒ *Attach budgetary cost estimate, any supporting data*
☒ Est. Design Duration 5 Months +/-	☒ Est. Construction Duration5 Months+/-
MS Project Schedule Attached? ☒	*Provide Simple MS Project Schedule*

☒ Location:

Generally bounded by Glenn Ave. on the north, Rutherford St. on the west, Lassen Ave. on the south, Dallas St. on the east. Additionally, project is currently proposed to include Modoc Ave., Placer Ave., Plumas Ave. and W. Whitmore Ave. between Tucson Ave. and Ustick; as well as Tucson Ave. from Marin to W Whitmore. See attached map for further information.

Provide site address(es) or location(s), as appropriate. For linear projects, include extents of improvement. A separate drawing or map may also be attached and referenced

☒ Project Background:

This area consists of old steel mains which are prone to leaks. The area has been identified as a high priority by Water Division for replacement due to the frequent maintenance issues in the area.

Identify reasons for project (known deficiencies, future planning, etc…), direction given by other departments, and document sources of information, if any.

☒ Project Objective:

Replacement of existing undersized and dilapidated steel water mains with standard size new water mains (8" min.) and appurtenances (valves, hydrants, services). In addition, meters will be installed at residential properties. Some of the services will be moved from the back of the lot in the alley to the front of the lot to allow for better maintenance, as well as to reduce redundant piping for fire hydrants.

Briefly state objective of project, benefits to be achieved, deficiencies to correct, as applicable.

☒ Scope of Project

Project will install new water mains, valves, hydrants and new residential services generally per the attached sketch.

Provide description of infrastructure to be designed and constructed, if known. Be as descriptive as possible.

Conceptual Sketch Attached? ☒ *Provide simple, conceptual sketch of indicating general scope of project. Elaborate or highly detailed drawings are not required.*

☒ Scheduling Constraints:

No known scheduling constraints with permitting, funding, or timing of adjacent projects.

Indicate known scheduling constraints such as funding deadlines, coordination with adjacent project's construction windows, weather, permit timing, or other schedule-related factor that should be considered for the project's design and construction.

☒ Known Project Issues to be Resolved, Questions to be Answered, Challenges and/or Constraints:

- It is currently unclear which residential lots will have services transferred from the rear of the house to the front of the house. This will need to be determined prior to completion of 35% Preliminary Design. It is recommended to develop a rating and prioritization method to determine which lots will have services moved from alleys to streets.

- Estimated streets and/or alleys that are proposed for water main replacement are indicated in the attached sketch. However, some of the waterlines may shift from alley to street, or vice versa, depending on whether it is decided to shift residential services from the rear of the lot to the front. The estimated cost for the attached sketch is considered valid for conceptual design purposes as the total quantity of water main replacement should be relatively similar even if shifts between alleys and streets are made. However, the total quantity and extent of water main will need to be verified prior to completion of 35% design in order to ensure that the project is within an acceptable budget and the highest priority water mains are replaced. This will be accomplished through close coordination between UP&P and Water Division, and through objective analysis of the various alternatives.

- As indicated previously, some of the residential lots will have services moved from the back of the lot to the front of the lot. Design and specifications for performing this work have been prepared for the adjacent South Modesto Phase I project, and the project is currently beginning construction as of the date of this report. This adjacent project should be reviewed during construction to gather any knowledge of conflicts or issues. This will allow the new South Modesto Phase II project design to be improved as necessary to incorporate any experience obtained from the current Phase I construction.

Provide brief listing of known questions regarding the project that will need to be answered as the project progresses through design process. Indicate how and by what point in the design the questions will be answered. Provide brief listing of known challenges or constraints to project that will need to be addressed as part of the design

SITE VISIT

The Project Manager shall conduct a site visit as part of the Conceptual Design, take photos, and note any unique challenges or constraints due to existing conditions

☐ Date of Site Visit:	Site Photos Included? ☐ *Attach Site Photos*

☐ Notes or Pertinent Information:

(Site visit not performed for conceptual purposes for this project.)

Indicate any apparent physical constraints of existing site or other pertinent information. References to Project Description Section are acceptable

CLIENT / END USER DISCUSSION

The Project Manager shall meet with the appropriate Client and/or End User to confirm that the scope and information contained in the Conceptual Design Report is acceptable. This may require multiple meetings.

☒ Date of Meeting: 12-22-11	☒Attendees: Jeff Daniels, Dave Savidge, Manuel Martinez, Allen Lagarbo
Was Scope of Project Confirmed?: Yes ☐ No ☐ Yes w/Comments ☒	

☒ Comments: A meeting to review this report was held on 12/22/11 as indicated above. The layout originally presented at that meeting had an estimated construction cost of $2.6M, which is over the amount indicated for cashflow/CIP priority planning. Thus, UP&P prepared an alternative layout and cost estimate to reduce the project construction cost, and that layout and cost is included in this report. Jeff indicated that it

would be preferable to complete the 16" main extension in Glenn Ave. to Dallas Street from the west if possible, and this was the basis of revising the layout to the one included in this report. At this time, the estimated construction cost is $2M, which is inline with the current cashflow/CIP Priority worksheet.

The topic of whether to replace mains in the street or to keep the mains in the existing alley alignments was discussed at length during the meeting. Advantages to installing new mains in streets include easier maintenance and less redundant piping for hydrant runs which would save on construction cost. Disadvantages include higher cost due to pavement replacement and service line reconnection. The service line reconnections would also require entry onto private property which poses some potential issues with construction timing, as well as some increase in liability. Dave suggested that mains could be replaced in alleys if those alleys are in a condition that would allow for maintenance and installation of new mains. However, it is not practical at this stage of the project to determine which alleys meet that condition. At this time, the estimate includes all mains installed in the streets.

The conclusion reached during the meeting was that prior to forming a new CIP, UP&P would provide an alternative layout to bring the estimated cost closer to the planned amount shown in the cashflow worksheet. This has been completed with the layout included in this report. Determination of which mains to install in the streets or alleys would occur at the 35% design stage. With the 35% design documents, UP&P will provide layouts & costs for different options of replacing mains in alleys and/or streets. A collective decision between Public Works and UP&P would be made prior to finalizing the design documents beyond the 35% stage.

It was also noted during the meeting that water meters for the project should be provided by the City. This is contrary to S. Modesto Ph. 1 in which the contractor is required by the specs to provide meters. Also, water division will need to provide direction for the tie-in location in the vicinity of Tank 7 on Plumas Ave.

Note any comments to project from Client / End User that will need to be incorporated into the next phases of project design. The Conceptual Design Report should be revised if there are major changes in scope.

ADDITIONAL INFORMATION

It is recommended to create a new CIP for the design and construction of these improvements based on the layout, cost estimate and other information contained herein. This will be performed with the annual CIP process for the upcoming 12/13 fiscal year.

Include any additional information pertinent to the project not previously indicated herein

ENVIRONMENTAL REVIEW

It is intended that this project will be Categorically Exempt, similar to South Modesto Phase I, since it is replacement of existing utilities, and it is not considered an expansion of use. A Notice of Exemption will need to be filed prior to project bidding.

Indicate estimated environmental review / permitting procedures required for the project. Indicate basis of proposed review (discussions held, similar projects, etc…)

RIGHT-OF-WAY, LAND ACQUISITION OR ACCESS

Acquisition of additional easements or R/W is not intended as all improvements will be within the public R/W. However, entry onto private property will be required to transfer services from alleys to streets. No special Right of Entry Agreements or other formal permissions from property owners are anticipated based on the procedures outlined in the S. Modesto Phase I project. However, notification to affected residences will need to be sent prior to project bidding to determine if any issues. Unless new information is discovered during construction of S. Modesto Phase I, the same procedure for entry onto private property should be followed for the new Phase II project.

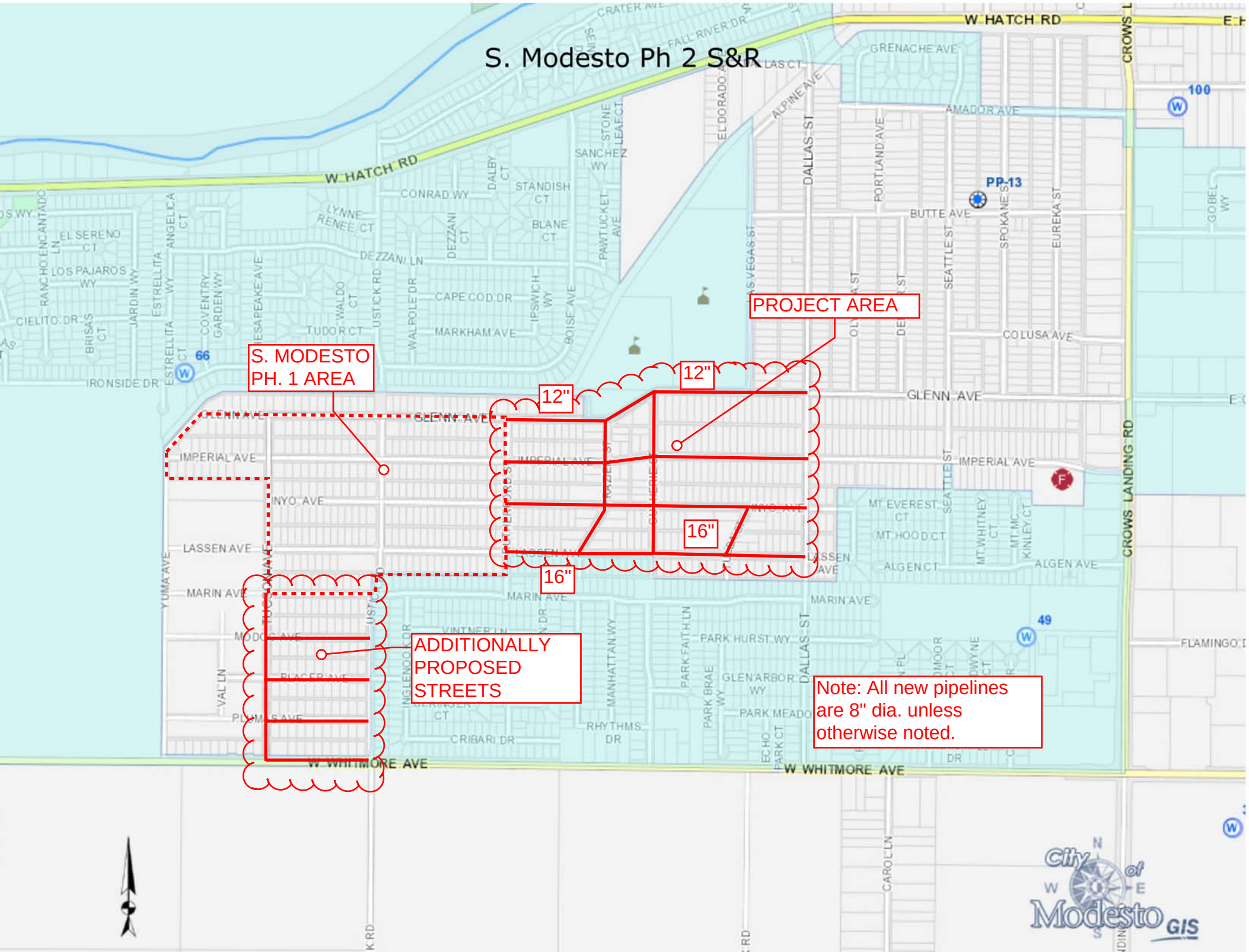
Typical provisions and specifications for construction nuisances, traffic control and safety should be sufficient to address potential neighbor concerns for the project.

Indicate any known requirements or coordination issues for additional R/W, Easement or Land Acquisition. Also indicate any issues with adjacent private property owners (rights of entry, construction nuisances, entry onto private property, etc…)

REVIEW *Signature indicates review of report only, and does not imply authorization to proceed with design, bidding or other expenditures of funds for this project.*		
REVIEW	SIGNATURE	DATE
Project Manager: Rob Christensen	Robert F. Christensen	1/4/12
Senior Civil Engineer: Rob Christensen	Robert F. Christensen	1/4/12

Upon completion and review, copies of the Conceptual Design Report are to be stored in the project file, and copies sent to the Deputy Director of the Client/End User's Department.

S. Modesto Ph 2 S&R



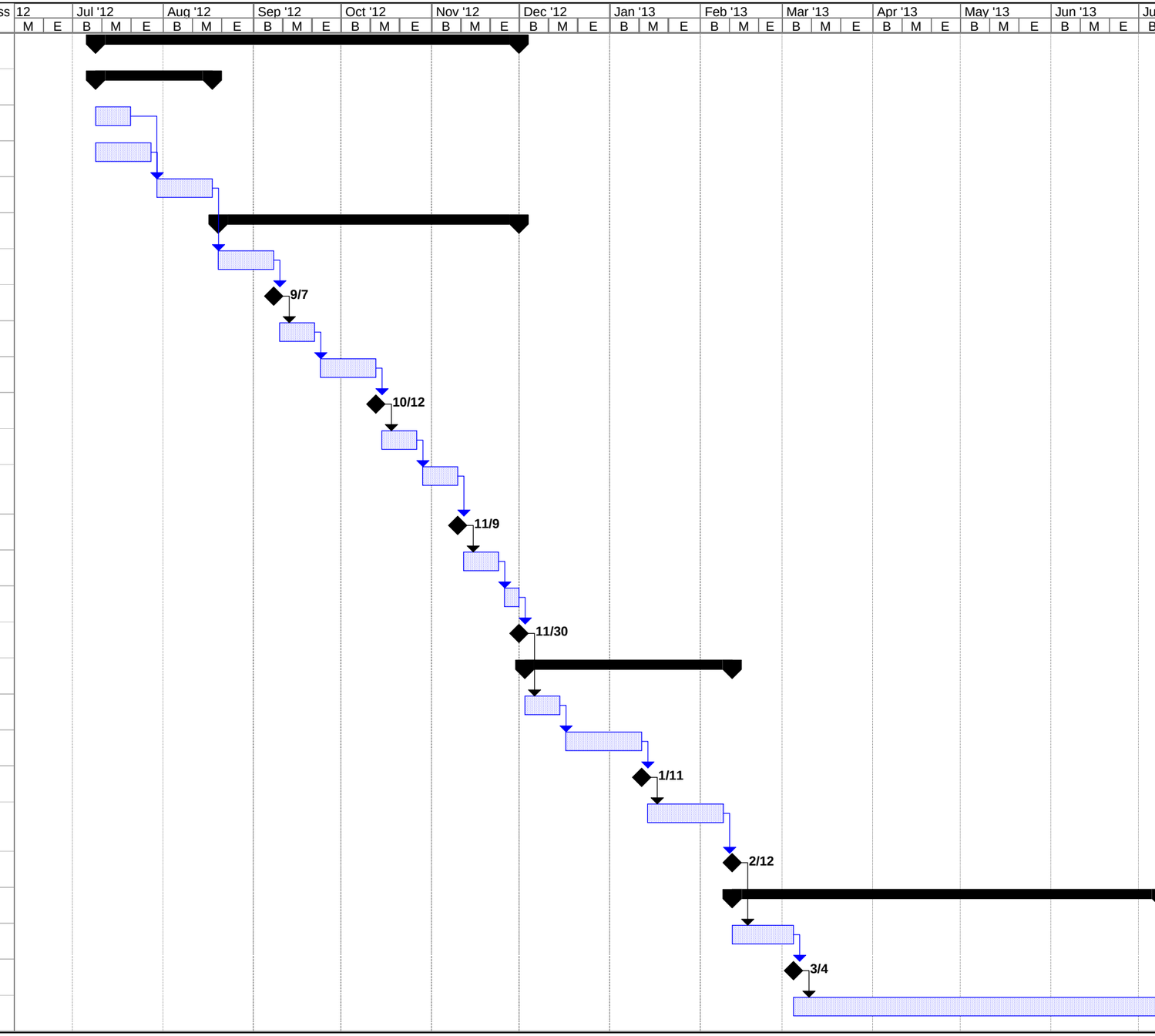
STREET/ALLEY	FROM	TO	LENGTH			8" VALVES (INLINE)	12" VALVES (INLINE)	16" VALVES (INLINE)	HYDRANTS	TOTAL 6" HYDRANT RUNS w/VALVE	PAVEMENT	SERVICES
			8" PVC PIPE DR-18	12" PVC PIPE DR-18	16" DI PIPE CL350							
GLENN AVE	RUTHERFORD ST	DALLAS ST	0	2164	0	0	4	0	4	120	2284	46
IMPERIAL AVE	RUTHERFORD ST	DALLAS ST	2104	0	0	4	0	0	4	120	2224	66
INYO AVE	RUTHERFORD ST	DALLAS ST	2102	0	0	4	0	0	4	120	2222	49
LASSEN AVE	RUTHERFORD ST	DALLAS ST	0	0	2102	0	0	4	4	120	2222	59
FRAZIER ST	GLENN AVE	LASSEN AVE	989	0	0	2	0	0	1	30	1019	20
GUTHERIE ST	GLENN AVE	LASSEN AVE	1141	0	0	2	0	0	2	60	1201	7
TULSA ST	INYO AVE	LASSEN AVE	376	0	0	1	0	0	0	0	376	6
MODOC AVE	TUCSON AVE	USTICK RD	727	0	0	2	0	0	1	30	757	23
PLACER AVE	TUCSON AVE	USTICK RD	727	0	0	2	0	0	1	30	757	22
PLUMAS AVE	TUCSON AVE	USTICK RD	727	0	0	2	0	0	1	30	757	21
WHITMORE AVE	TUCSON AVE	USTICK RD	742	0	0	2	0	0	1	30	772	11
TUSCON AVE	MARIN AVE	WHITMORE AVE	1189	0	0	2	0	0	2	60	1249	0
			0	0	0	0	0	0	0	0	0	0
		TOTAL	**10824**	**2164**	**2102**	**23**	**4**	**4**	**25**	**750**	**15840**	**330**
											0.060	
											950	
		UNIT COST	$ 50.00	$ 65.00	$ 100.00	$ 1,100.00	$ 2,000.00	$ 3,000.00	$ 3,200.00	$ 40.00	$ 335.00	$ 1,500.00
			$ 541,200.00	$ 140,660.00	$ 210,200.00	$ 25,300.00	$ 8,000.00	$ 12,000.00	$ 80,000.00	$ 30,000.00	$ 318,250.00	$ 495,000.00

Traffic Control		$ 40,000.00
Clear Alleys/Remove Debris/Grade		$ -
Furnish/Install 8" PVC Pipe DR-18		$ 541,200.00
Furnish/Install 12" PVC Pipe DR-18		$ 140,660.00
Furnish/Install 16" DI Pipe CL350		$ 210,200.00
Furnish/Install 6" PVC CL150 - Hydrant Run		$ 30,000.00
Furnish/Install Fire Hydrant Assembly		$ 80,000.00
Furnish/Install 1" Water Services		$ 495,000.00
Pavement		$ 318,250.00
8" Butterfly Valve		$ 25,300.00
8" Butterfly Valve		$ 8,000.00
8" Butterfly Valve		$ 12,000.00
8" Backflow Prevention Assembly		$ 10,000.00
6040	Const Cost	$ 1,910,610.00
6040	Design Cont (added for conceptual purposes)	$ 89,390.00
6040		**$ 2,000,000.00**
6010	Design 10%	$ 200,000.00
6060	Const Admin 10%	$ 200,000.00
6041	City Forces Const.	$ 40,000.00
6050	Const Cont 10%	$ 200,000.00
		$ 2,640,000.00

South Modesto Area Phase 2 Strengthen & Replace
Project Schedule

Wed 12/14/11

ID	Task Name	Duration	Start	Finish	Predecess
1	**Design**	**105 days**	**Mon 7/9/12**	**Fri 11/30/12**	
2	**Topographic Survey**	**30 days**	**Mon 7/9/12**	**Fri 8/17/12**	
3	Existing Utility Investigations	10 days	Mon 7/9/12	Fri 7/20/12	
4	Field Work	15 days	Mon 7/9/12	Fri 7/27/12	
5	Prepare Survey Base map	15 days	Mon 7/30/12	Fri 8/17/12	3,4
6	**P.S&E**	**75 days**	**Mon 8/20/12**	**Fri 11/30/12**	
7	Prepare 35% Plans, Estimate	15 days	Mon 8/20/12	Fri 9/7/12	5
8	Complete 35% Plans & Estimate	0 days	Fri 9/7/12	Fri 9/7/12	7
9	Review & Comment	10 days	Mon 9/10/12	Fri 9/21/12	8
10	Prepare 65% PS&E	15 days	Mon 9/24/12	Fri 10/12/12	9
11	Complete 65% PS&E	0 days	Fri 10/12/12	Fri 10/12/12	10
12	Review & Comment	10 days	Mon 10/15/12	Fri 10/26/12	11
13	Prepare 95% PS&E	10 days	Mon 10/29/12	Fri 11/9/12	12
14	Complete 95% PS&E	0 days	Fri 11/9/12	Fri 11/9/12	13
15	Review & Comment	10 days	Mon 11/12/12	Fri 11/23/12	14
16	100% PS&E --finalize per comme	5 days	Mon 11/26/12	Fri 11/30/12	15
17	Complete 100% PS&E	0 days	Fri 11/30/12	Fri 11/30/12	16
18	**Bidding**	**51 days**	**Mon 12/3/12**	**Tue 2/12/13**	
19	Bid Authorization	10 days	Mon 12/3/12	Fri 12/14/12	17
20	Bid Advertise	20 days	Mon 12/17/12	Fri 1/11/13	19
21	Bid Opening	0 days	Fri 1/11/13	Fri 1/11/13	20
22	Award (wait time for next available Council)	20 days	Mon 1/14/13	Fri 2/8/13	21
23	Award at Council Meeting	0 days	Tue 2/12/13	Tue 2/12/13	22
24	**Construction**	**105 days**	**Tue 2/12/13**	**Mon 7/8/13**	
25	Issue Notice to Proceed	15 days	Tue 2/12/13	Mon 3/4/13	23
26	Precon. Meeting	0 days	Mon 3/4/13	Mon 3/4/13	25
27	Construction	90 days	Tue 3/5/13	Mon 7/8/13	26



Project: S. Modesto Ph. 2.mpp
Date: Wed 12/14/11

Task | Progress | Summary | External Tasks | Deadline
Split | Milestone | Project Summary | External Milestone

WEST YOST ASSOCIATES
Consulting Engineers

TECHNICAL MEMORANDUM

DATE: March 30, 2010 Project No: 418-02-07-22

TO: Jack Bond, City of Modesto

CC: Rich Ulm, City of Modesto
Jim Alves, City of Modesto
Glenn Prasad, City of Modesto

FROM: Charles Duncan
Polly Boissevain

SUBJECT: City of Modesto's 2010 Water System Engineer's Report
Evaluation of the Buildout Water System for the Contiguous Service Area – Option A (Buildout System Evaluation TM)

This technical memorandum (TM) presents an overview evaluation of the City of Modesto's (City) Sphere of Influence (SOI) buildout water system for the contiguous service area and its ability to meet the City's recommended performance and planning criteria under buildout demand conditions. The evaluation presented in this TM assumes that a supplemental water supply would be received from the Turlock Irrigation District (TID) via a Regional Surface Water Supply Project (RSWSP). The RSWSP and associated City-Side Downstream Improvements needed to receive that water supply are described in the sections below. This TM contains the following sections that describe the data and methodology utilized to evaluate the City's buildout water system of the contiguous service area:

- Background
- Contiguous Service Area's Water System Demands
- Contiguous Service Area's Buildout System Evaluation
- Contiguous Service Area's Buildout System Evaluation Results
- Contiguous Service Area's Buildout System Summary of Recommended System Improvements

This TM does not evaluate any system facilities or system performance for the outlying service areas, such as Del Rio, Grayson, Hickman, Turlock, Waterford, and Ceres (specifically the Walnut Manor neighborhood). These outlying service areas are addressed in subsequent TMs, (Appendices F through J) with the exception of the Walnut Manor neighborhood, which is assumed to be completely built out.

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1.0 BACKGROUND

West Yost Associates (WYA) conducted this evaluation by using a model developed after the Existing System Evaluation TM (Appendix D) was completed, at which point, the improvements needed to eliminate the existing system deficiencies were incorporated into the model. Additional planned system improvements were also incorporated into the model to provide sufficient water supply and distribution service to existing and future customers under buildout water system demand condition. These system improvements include:

- Transmission pipeline grid for Comprehensive Planning District (CPD) areas,
- Infrastructure within development areas,
- New and replacement groundwater wells,
- City-Side Downstream Improvements needed to utilize the increased flow from the completion of the Modesto Regional Water Treatment Plant (MRWTP) Phase Two Expansion Project, and
- Facilities required to integrate a RSWSP into the City's water distribution system.

It was assumed in this analysis that all of the recommended CIP improvements from the Existing System Evaluation TM (Appendix D), projects currently in design or construction, and any additional recommended wells and facilities for planned developments will be fully constructed and operational prior to the implementation of the Buildout Water System infrastructure and facilities.

Because of water rights issues concerning the place-of-use for water supplied by the TID for a RSWSP, this evaluation includes a discussion of the recommended facilities to allow the City to operate the South Modesto system somewhat independently from the North Modesto water system.

1.1 TID Supply Source

The City is currently pursuing the option of participating in a RSWSP with TID supplied water to provide an additional supply source for customers in South Modesto. Planned facilities for this project can be divided into two categories: regional improvements likely to be owned and operated by a Joint Powers Authority (JPA) formed by the participating Cities and local improvements owned and operated by each respective City. The regional facilities include a surface water treatment plant initially sized at 40.5 mgd (final size has not yet been determined) and transmission pipelines for water conveyance to four cities: Modesto, Turlock, Ceres, and Hughson. This analysis identifies the local, City-Side Improvements required for the City to use this additional supply under the buildout scenario for the contiguous service area. According to the RSWSP's Final Environmental Impact Report (EIR), the plant is expected to be operational and delivering water between 2010 and 2011. However, based on the current schedule, and for purposes of this TM, it is assumed that a RSWSP will be operational in 2013.

The proposed RSWSP currently includes a single 30-inch diameter turnout for the City at the intersection of East Whitmore Avenue and Morgan Road. It is recommended that the City construct a storage tank and booster pump station at or near that location. To convey water from the tank to the distribution system, it is recommended that the City construct a transmission main in Whitmore Avenue from Morgan Road to Carpenter Road and then northward in Carpenter Road from Whitmore Avenue to Hatch Road. This transmission main should vary in diameter from 24-inch to 16-inch and have approximately 5 connections to the distribution system, as indicated on Figure 1. The recommended sizing for these facilities is described below in the Buildout System Evaluation discussion.

1.2 Buildout System

The contiguous service area buildout system evaluation includes an analysis of water storage capacity, pumping capacity, and the buildout pipeline system's ability to meet recommended performance and design criteria under Maximum Day demand plus fire flow and Peak Hour demand scenarios. The evaluations, findings, and recommendations for addressing the identified water system deficiencies during buildout demand conditions are included in this TM. In addition, a description of the recommended Buildout System CIP to implement the proposed improvements is also included with an estimate of probable construction costs.

2.0 CONTIGUOUS SERVICE AREA'S BUILDOUT SYSTEM DEMANDS

As discussed in the Demand TM (Appendix B), there is no precise way to measure customer water use due to unaccounted for water and the City's current billing procedure of having some residential flat-fee accounts, except to select and set a baseline demand equal to a production quantity at some specific point in time. Thus, throughout this TM (and the other related TM's), by definition, the system wide baseline demand ("demand") includes both customer water use (the amount actually measured and billed) and unaccounted for water (unmeasured system losses). For this analysis, the Average Day production of 2006 was set as the baseline demand from which future demand distributions were built. Since the baseline demand was established as equal to production, it was assumed that future projection of water demands would also equal production.

Water system demands have been estimated and projected for the contiguous service area (not including the outlying areas of Del Rio, Grayson, Hickman, Turlock, Ceres (Walnut Manor), and Waterford) during a buildout scenario. All water system demands include a 15 percent estimation of unaccounted for water (UAFW), as defined above. The existing water system demands, and projections of the buildout water system demands are discussed below.

The calculation of the peaking factors used to estimate the Maximum Day demand and the Peak Hour demand are documented in the Demand TM (Appendix B, Table 7). The Maximum Day demand peaking factor is estimated to be 1.75 times the Average Day demand, and the Peak Hour peaking factor is estimated to be 2.46 times the Average Day demand.

2.1 Existing System Demands

The estimation of the existing system water demands are documented in the Demand TM (Appendix B) and summarized in Table 1. For purposes of this evaluation, the demands in portions of the contiguous service area that are located south of the Tuolumne River (South Modesto) were separated out since a RSWSP supplied with TID water can only be used to serve those areas. Due to the fact that South Modesto and North Modesto are hydraulically linked, there are areas located in South Modesto that receive supply from North Modesto. Specifically, these areas include, but are not necessarily limited to, customers north of Tank 3 along the 18-inch diameter pipeline on Zeff Road and in North Ceres bordered by South 7th Street, Bunker Avenue, River Road, and Hosmer Avenue.

Table 1. 2006 Contiguous Service Area's Demands[a]

Demand Condition	South Modesto Area[b]		Contiguous Service Area	
	Gpm	mgd	gpm	mgd
Average Day[c]	4,861	7.0	46,625	67.1
Maximum Day[d]	8,472	12.2	81,594	117.5
Peak Hour[e]	11,944	17.2	114,698	165.2

(a) Demands include the existing system demand presented in the Demand TM (Appendix B). Demand does not include outlying service areas of Del Rio, Grayson, Hickman, Turlock, Ceres (Walnut Manor) and Waterford.

(b) Demands include areas south of the Tuolumne River (South Modesto) within the contiguous service area that are hydraulically supplied by sources in South Modesto. Source: South Modesto Interim Water Supply Study, October 2007. That study estimated Maximum Day demands in South Modesto and derived average day and peak hour numbers using system-wide peaking factors. Average day and Peak Hour estimates have been re-calculated using peaking factor estimates from the current study.

(c) Average Day demand was provided by City staff (2000-2006 Water System Summary by Year.xls) in December 2007 [presented in the Demand Evaluation (Appendix B, Table 5)].

(d) Maximum Day demand is 1.75 times the 2006 Average Day demand.

(e) Peak Hour demand is 2.46 times the 2006 Average Day demand.

2.2 Buildout System Demands

The system demands at buildout for the City were estimated based on the projected buildout land use information provided by City staff and the unit water use factors as described in the Demand TM (Appendix B). The buildout demands include a 10 percent reduction in existing residential water use to account for anticipated water use reductions as the City implements its metering program. The projected buildout demands were allocated into the existing model using the model's *Demand Allocation/Pro* ™and are summarized in Table 2.

Table 2. Projected Buildout (2038) System Demands for the Contiguous Service Area[a]

Demand Condition	South Modesto Area[b]		Contiguous System Area	
	gpm	mgd	gpm	mgd
Average Day	6,512	9.4	68,190	98.2
Maximum Day[c]	11,395	16.4	119,333	171.9
Peak Hour[d]	16,019	23.1	167,748	241.6

(a) Demands include the existing demand, interim demand, and accounts for demand increase due to UAFW. Demand does not include outlying service areas of Del Rio, Grayson, Hickman, Turlock, Ceres (Walnut Manor) and Waterford.

(b) Demands include areas south of the Tuolumne River (South Modesto) within the contiguous service area that are hydraulically supplied by sources in South Modesto. Source: South Modesto Interim Supply Study, October 2007. Numbers are adjusted to reflect anticipated water use due to the City's metering program. Reductions assume the same residential mix for North and South Modesto.

(c) Maximum Day demand is 1.75 times the Average Day demand.

(d) Peak Hour demand is 2.46 times the Average Day demand.

3.0 CONTIGUOUS SERVICE AREA'S BUILDOUT SYSTEM EVALUATION

To meet the buildout demand presented in the previous section, it is recommended that the City construct additional infrastructure, including storage tanks, booster pumps, and piping. In order to appropriately size the recommended infrastructure, analyses addressing the following system performance elements were conducted:

- Future System Infrastructure Additions,
- Storage Capacity Evaluation,
- Pumping Capacity Evaluation, and
- Critical Supply Facilities

The results of the infrastructure analyses are described below.

3.1 Future System Infrastructure Additions

Additional transmission pipelines and water supply facilities are required to serve the increased demands under the buildout scenario. For this TM, considerations were also made for sizing infrastructure specific to integrating a RSWSP into the City's water system. In addition, the phasing of the additional infrastructure based on the needs for the buildout scenario is presented below.

3.1.1 City-Side Downstream Improvements Related to a RSWSP

As discussed above, the City would need to construct local improvements to accommodate the RSWSP flow and distribute surface water to customers in South Modesto. Since the TID surface water supply will be contracted specifically for use in South Modesto, a minimum 7.2 MG terminal tank was sized based on South Modesto buildout system demands (Table 3).

Table 3. South Modesto Terminal Tank Sizing Criteria and Storage Required at Buildout[a]

Storage Component	Criteria	Storage Required, MG
Operational	0.25 x Maximum Day demand	4.1
Fire Flow	4,000 gpm for 4 hours plus 2,500 gpm for 2 hours	1.3
Emergency	1.00 x Average Day demand	9.4
Total Storage Requirement		14.8
Tank Storage Available		(3.5)[b]
Emergency Groundwater Storage Credit		(4.1)[c]
Actual Storage Deficiency[d]		7.2
Additional Terminal Tank Allowance	0.25 x Average Day demand	2.4
Recommended Tank Size		9.6

(a) Based on South Modesto specific buildout demands presented in Table 2 above. This calculation does not consider the entire contiguous service area.
(b) Storage available includes Tanks 3, 7, 8, and 10 and assumes all four tanks are operational.
(c) Emergency groundwater storage credit is based on the total pumping capacity of the existing South Modesto wells in service that have generators for backup power or are recommended for backup power (excluding wells that pump to tanks). Well 49 has backup power and is to be returned to service. Wells 100, 216, 217, and 284 are recommended to have backup power installed.
(d) This recommended tank size is subject to change depending on the actual delivery flow that will be determined as part of the City's participation in a RSWSP. A subsequent pre-design evaluation will be required to determine the exact size of the facility.

In addition to the system storage components presented in Table 3, a "terminal" storage tank is typically sized to hold an additional terminal storage component, which is usually at least 25 percent of the water treatment plant average day production, based on typical engineering practice. However, since the City will not be receiving the full production capacity of the water treatment plant, it is recommended that the proposed terminal storage component of this facility be based on the average day production delivered to South Modesto from the plant. A final average day production delivery amount has not been determined, so a volume of 2.4 MG using the projected average day demand for South Modesto (9.4 x 0.25 = 2.4 MG) is assumed. The total volume of the "terminal" storage tank (South Modesto Terminal Tank) will need to be reevaluated when the actual delivery flow has been decided.

The incoming supply from the RSWSP is expected to be a constant flow, so it is recommended that the City construct a booster pump station at the terminal storage tank facility with an initial minimum firm pumping capacity of 11.5 mgd, as recommended in the *Evaluation of TID Water Supply Project Quantities to be Requested by City of Modesto for Use in the South Modesto Service Area* dated June 2003 by WYA. Similar to the terminal tank sizing, the actual firm pumping capacity of this facility should be revisited when the final size of the tank and actual delivery flow has been determined.

Transmission pipelines to convey the new surface water supply to the existing South Modesto distribution system are required as part of the City-Side Downstream Improvements, and are shown on Figure 1. Using information provided by results from the hydraulic model, specifically head loss and velocities, it is recommended that a 24-inch diameter transmission main be constructed along Whitmore Avenue from the South Modesto terminal tank, near Morgan Road to a proposed connection near Tank 7 (intersection of Whitmore Avenue and Tucson Avenue). It is also recommended that a 16-inch diameter pipeline be constructed from Tucson Avenue to Carpenter Road and along Carpenter Road north to Hatch Road. In addition, five recommended connection points and sizing are listed below in order of distance from the South Modesto Terminal Tank:

1. 16-inch diameter connection at Whitmore Avenue and Morgan Road
2. 12-inch diameter connection at Whitmore Avenue and Nickerson Drive
3. 16-inch diameter connection at Whitmore Avenue and Crows Landing Road
4. 12-inch diameter connection at Whitmore Avenue and Tucson Avenue
5. 16-inch diameter connection at Hatch Road and Carpenter Road

It is recommended that all of these facilities be constructed as one complete project prior to the City receiving RSWSP deliveries in order to accommodate the new supply source.

3.1.2 Buildout System Improvements

In addition to the Existing System CIP improvements recommended in the Existing System Evaluation TM (Appendix D), specific pipeline grids and other recommended improvements were added to the existing system infrastructure to represent near-term developments, for which planning information is available, based on information provided by City staff and various developers (see Figure 2). Some of the developments are in preliminary planning stages, so no infrastructure could be added to the hydraulic model for these specific developments. The developments, with associated pipeline improvements and detailed demands, that were added to the model include:

- Promenade
- Woodglen
- Pelandale-McHenry
- Martin (aka Rose Villas)
- Tivoli
- Kansas-Woodland (aka Kansas Avenue Business Park)
- Fairview Village (including Westport Landing and Bava Brothers)
- 9th and Carver
- Cornerstone Business Park
- Kiernan Business Park East

- Kiernan Business Park South
- Riverdale Water System

Other facilities that were added to the existing system improvements to represent near-term system infrastructure included:

- Groundwater Well(s): FMC and Tivoli
- Storage Tank(s): South Modesto Terminal Tank (related to the TID RSWSP)
- Pipeline(s): City-Side Transmission Mains (related to the TID RSWSP)
- Pump(s): Booster Pump Station at the South Modesto Terminal Tank and an additional pump at the MID's MRWTP Terminal Reservoir

Since specific plans for some of the buildout developments are unavailable or currently do not exist, it was assumed that a pipeline grid with a minimum 12-inch diameter would be constructed along the outskirts of the existing contiguous service area to grid out the planned buildout land use. In addition to this pipeline grid, additional groundwater wells associated with planned developments were included to complete the proposed buildout water system improvements, as illustrated on Figure 3.

3.2 Storage Capacity Evaluation

The principal advantage that storage provides a water system is the ability to help equalize the fluctuating demands otherwise placed on the supply source production and transmission facilities, along with meeting peak demands quickly (i.e. fighting fires, emergency source in case of supply failure, etc). The contiguous service area has two forms of available storage: at grade storage tanks and the groundwater basin. Together, these two types of storage must be sufficient to meet the water system's operational, emergency, and fire flow storage criteria. The volumes required for each of these three storage components are detailed below:

- Operational Storage: 25 percent of Maximum Day demand;
- Emergency Storage: Average Day demand for one day; and
- Fire Flow Storage: the required maximum fire flow multiplied by the fire flow duration period, as required by the City of Modesto Fire Department. However, two simultaneous fire flow events were assumed for storage to provide a more conservative fire flow storage estimate (appropriate for a larger municipality like Modesto). The largest fire flow of 4,000 gpm for the duration of 4 hours and a smaller multi-family residential fire flow of 2,500 gpm for the duration of 2 hours were assumed for this evaluation.

As illustrated on Figure 3, the proposed buildout water system will have thirteen at grade storage tanks (9 existing, including 2 owned by MID, plus 4 proposed) in the contiguous service area. The groundwater basin will be used for a portion of the recommended storage volume and system pumping capacity. The recommended storage volume includes a groundwater credit which is described below. For the system pumping capacity, the groundwater basin can use the

reliable firm groundwater pumping capacity (60% of the total operating well pumping capacity), which is further described in Subsection 3.2.1. Though these groundwater facilities are capable of being counted toward these system needs, sufficient water transmission facilities must be available from these supplies to distribute this water to demand areas.

Credit for groundwater storage can be used to satisfy the emergency storage requirement; however, sufficient transmission facilities must be available to distribute this water to the demand areas. Emergency groundwater storage credit is equal to the production capacity of wells in service that have generators for back-up power (wells that pump directly into storage tanks are not included). On a system-wide basis, the minimum credit is equal to zero, and the maximum credit is equal to the recommended emergency storage capacity (one day's worth of Average Day demand). On an individual well basis that is equipped with back-up power, the minimum credit is zero and the maximum credit is equal to the pumping capacity of the well. It was assumed that all new groundwater facilities proposed in the interim and buildout systems would have auxiliary power installed. The calculation of the required storage volume, including the groundwater emergency storage credit, is discussed below.

3.2.1 Buildout System Storage Capacity

The buildout water system infrastructure was evaluated to determine whether there is sufficient capacity to provide the required operational, fire flow, and emergency storage to the contiguous service area at buildout (Year 2038) demand conditions. In order to determine the needed buildout storage facilities, this evaluation included an analysis of the existing storage facilities, improvements recommended in the Existing System Evaluation TM (Appendix D), and a groundwater credit determination; all of which are summarized in Table 4. With these existing and proposed facilities constructed and operational, the City has a projected buildout water storage capacity deficit of 38.8 MG, as shown in Table 3. If the emergency storage credit is maximized by adding additional auxiliary power to a number of existing and planned wells (for an additional credit of 33.8 MG), the storage deficit drops to 5.0 MG. This would require the addition of auxiliary power at 25 existing and planned groundwater wells (Table B1).

Several locations in North Modesto have been discussed for the construction of additional storage to satisfy the 5.0 MG storage deficiency shown in Table 4. These locations include:

- Near the existing MID owned Terminal Reservoirs
- On the site of Tank 4
- On the site of the proposed North Tank
- On the site of the proposed West Tank

At this point, the preferred location of the additionally required storage facilities is adjacent to the existing MID owned Terminal Reservoirs on a City-owned property. Constructing the additionally required storage facilities at that location may eliminate the need for additional pumping and conveyance improvements, thus lowering the capital costs relative to alternative sites.

Table 4. Comparison of Available and Required Buildout System Storage Capacity for the Contiguous Service Area[a]

Storage Component	Criteria	Storage Required, MG	
		South Modesto[b]	Contiguous Area[c]
Operational	0.25 x Max Day demand	4.1	43.0
Fire Flow	4,000 gpm for 4 hours plus 2,500 gpm for 2 hours	1.3	1.3
Emergency	1.00 x Average Day demand	9.4	98.2
Total Storage Requirement		14.8	142.5
Existing Tank Storage Available		(3.5)	(18.1)[d]
Proposed Tank Storage		(7.2)[e]	(21.2)[f]
Emergency Groundwater Storage Credit		(4.1)[g]	(64.4)[h]
Buildout Storage Deficiency		0.0	38.8
Additional Emergency Groundwater Storage Credit		0.0	(33.8)[i]
Actual Buildout Storage Deficiency		0.0	5.0

(a) Information representative of only the Modesto contiguous service area and is based on the Demand TM (Appendix B), which includes Salida, Empire, South Modesto, and North Ceres.
(b) Information only includes facilities within service area in South Modesto and North Ceres.
(c) Demands include South Modesto demands.
(d) Storage available (Table 2 of Appendix A, Facilities Inventory TM) includes 10 MG in the MID owned Terminal Reservoirs and 0.7 MG in Tank 10 (the Galas Subdivision Tank which has recently become operational).
(e) Includes the proposed South Modesto Terminal Tank (Table 3). The volume of 7.2 MG was calculated so that the actual storage deficiency in South Modesto at buildout would be 0.0 MG, as shown. The total South Modesto Terminal Tank requirement is 9.6 MG, which also includes an allowance of 2.4 MG, which is assumed to be dedicated to WTP operations, and not available for system use.
(f) Proposed Tank Storage includes City-Side Downstream Improvements previously identified in other TMs and related to the MRWTP Phase Two Expansion (North Tank, Industrial Tank, and West Tank, with a total capacity of 14 MG), and the proposed South Modesto Terminal Tank (operational portion at 7.2 MG).
(g) Emergency groundwater storage credit is based on the total pumping capacity of the existing South Modesto wells in service that have generators for backup power (excluding wells that pump to tanks): Wells 100, 216, 217, and 284.
(h) Emergency groundwater storage credit is based on the total pumping capacity of the existing wells in service that have generators for backup power and wells proposed to have backup power installed, per recommendations in the Existing System Evaluation (See Appendix D, Table A-1). The maximum credit is equal to the recommended emergency storage capacity (one day's worth of Average Day Demand).
(i) Emergency groundwater storage credit based on wells proposed to have backup power installed (see Table B-1) to maximize the emergency groundwater storage credit. Credit computed in Table B-1 is 34.1. Only 33.8 mg can be applied to emergency storage need, since total emergency storage credit cannot exceed emergency storage requirement (33.8 MG + 64.4 MG = 98.2 MG).

3.3 Pumping Capacity Evaluation

The pumping capacity from wells and booster pumps associated with storage tanks within the contiguous service area was evaluated to assess their ability to deliver reliable firm capacity during high demand conditions for the buildout scenario. Therefore, the total pumping capacity

was reduced to account for pumps that are expected to be out of service at any given time due to mechanical breakdowns, routine maintenance, water quality, or other operational issues. For each booster pump station associated with active storage tanks, firm booster pumping capacity is defined as the total booster pump station capacity with the largest pump out of service. For groundwater well pumps, the firm groundwater pumping capacity is defined (as presented in the *2005 Hydraulic Model Update*) as equal to 60% of the total groundwater production capacity from all operational wells for one day. As a result, a firm pumping capacity from the groundwater wells of approximately 48,392 gpm (60 percent of 80,653 gpm from Table 5) can be assumed available to meet peak demands under buildout system conditions.

3.3.1 Buildout System Pumping Capacity

The two pumping capacity criteria for the City's system are:

- To have sufficient reliable firm pumping capacity from supply sources and storage tanks to meet the greater of either a Maximum Day plus fire flow demand or a Peak Hour demand, via all available wells and booster pump stations, and
- To have sufficient reliable firm pumping capacity from all supply sources (MRWTP Terminal Reservoirs and South Modesto Terminal Tank, supplemented by groundwater wells) to meet a Maximum Day demand.

For the analysis of pumping capacity from supply sources and storage tanks, the Peak Hour demand for both the contiguous service area and south Modesto area is the larger of the two demand conditions. For the South Modesto area, there is a 9,091 gpm surplus under the Peak Hour demand condition (Table 6). The projected buildout booster pump stations and groundwater pumping capacity for the contiguous service area is 167,700 gpm, as detailed in Table 6, indicating a nominal deficit of 48 gpm. However, as indicated in Table 6, there is a large surplus is in South Modesto. Therefore, there is a corresponding deficiency of 9,139 gpm in north Modesto (9,091 gpm + 48 gpm). This deficiency can be remedied with the installation of additional groundwater wells in the distribution system or new booster pump station capacity associated with new storage.

To meet Maximum Day demand conditions for the contiguous service area, the City will rely on the MRWTP and South Modesto Terminal Reservoir supplies supplemented by groundwater wells. The reason non-terminal storage tanks are not included in this calculation is because each tank only holds about 4 to 6 hours worth of supply under a Maximum Day demand scenario (not a long enough duration to warrant inclusion).

Table 5. Summary of the Buildout System Contiguous Service Area's Pumping Facilities

Station	Status[a]	Backup Power	Pump 1, gpm	Pump 2, gpm	Pump 3, gpm	Pump 4, gpm	Pump 5, gpm	Pump 6, gpm	Total Capacity, gpm	Firm Capacity[b], gpm
MID Terminal Reservoir[b]	Active	Y	13,900	13,900	6,950	6,950	13,900	13,900	69,500	55,600
Tank 3	Active	Y	600	600	600	600			2,400	1,800
Tank 4	Active	Y	950	950	950	910			3,760	2,810
Tank 5	Active	Y	950	900	950	950			3,750	2,800
Tank 6	Active	Y	2,475	2,460	2,515				7,450	4,935
Tank 7	Active	Y	2,450	2,450	2,450				7,350	4,900
Tank 8	Active	Y	2,570	2,570	2,570				7,710	5,140
Tank 10 (Galas)	OOS-Repair	Y	2,085	2,085	2,085				6,255	4,170
North Tank	Proposed	Y[d]	4,167	4,167	4,167	4,167			16,667	12,500
Industrial Tank	Proposed	Y[d]	2,778	2,778	2,778	2,778			11,111	8,333
West Tank	Proposed	Y[d]	2,778	2,778	2,778	2,778			11,111	8,333
South Modesto Terminal Tank	Proposed	Y[d]	2,662	2,662	2,662	2,662			10,648	7,986
Booster Station Capacity (excluding Terminal Tanks)									77,564	55,722
Total Tank Pumping Capacity									235,276	119,308
Well 001	Active	Y[d]	950						950	
Well 002	OOS - WQ		1,500						--	
Well 003	OOS - WQ		650						--	
Well 004	Active	Y[d]	950						950	
Well 006	Active	Y	950						950	
Well 007	Active	Y[d]	950						950	
Well 008	OOS - WQ		775						--	
Well 010	Active	Y[c]	400						400	
Well 014	OOS - WQ	Y	1,500						--	
Well 016	Active	Y[d]	1,800						1,800	
Well 017	Active	Y[c]	1,450						1,450	
Well 018	OOS - WQ		750						--	
Well 019	OOS - WQ		600						--	
Well 021	OOS - WQ		1,500						--	
Well 022	OOS - WQ		1,000						--	
Well 024	OOS - WQ		1,500						--	
Well 025	Active	Y	1,500						1,500	
Well 029	Tank Fill		1,058						--	
Well 030	Tank Fill		1,000						--	
Well 032	OOS - WQ		800						--	
Well 033	Active	Y	1,800						1,800	
Well 034	OOS - WQ		1,250						--	
Well 036	Active	Y[c]	1,050						1,050	
Well 037	OOS - WQ		1,250						--	
Well 038	Tank Fill		1,163						--	
Well 039	Active	Y	1,950						1,950	
Well 040	Active	Y	1,400						1,400	
Well 041	Active	Y	1,200						1,200	
Well 042	Active	Y	1,800						1,800	
Well 043	Active	Y	1,900						1,900	
Well 044	OOS - WQ	Y	1,250						--	
Well 045	Active	Y[c]	1,500						1,500	
Well 046	Active		1,150						1,150	
Well 047	Active	Y[c]	1,600						1,600	
Well 048	Active	Y[c]	1,330						1,330	
Well 049	OOS - WQ	Y	500						--	
Well 050	Active	Y[d]	800						800	
Well 051	Active		2,200						2,200	
Well 052	Active	Y	1,600						1,600	
Well 053	OOS - WQ		1,500						--	
Well 054	Tank Fill	Y	2,400						--	
Well 055	OOS - WQ		1,500						--	
Well 056	Active	Y[c]	650						650	
Well 057	Active	Y	1,350						1,350	
Well 058	Active	Y[d]	1,300						1,300	
Well 059	Active		1,400						1,400	
Well 061	Active	Y	1,575						1,575	
Well 062	Active	Y	2,200						2,200	
Well 064	Active	Y	1,800						1,800	
Well 065	Tank Fill	Y	2,000						--	
Well 066	Tank Fill	Y	1,350						--	
Well 100	Active	Y[d]	650						650	
Well 204	Active	Y[c]	1,450						1,450	
Well 211	Active	Y[c]	1,450						1,450	
Well 212	Active		1,000						1,000	48,392
Well 213	Active	Y[d]	--						--	
Well 214	OOS - WQ		400						--	
Well 216	Active	Y[c]	550						550	
Well 217	Active	Y[d]	400						400	
Well 223	Tank Fill	Y	400						--	
Well 225	Active	Y	1,200						1,200	
Well 226	OOS - WQ		675						--	
Well 229	Active		425						425	
Well 232	Active	Y[d]	775						775	
Well 236	OOS - WQ		750						--	
Well 237	Active	Y[d]	630						630	
Well 241	Active	Y[d]	350						350	
Well 247	Active	Y[c]	560						560	
Well 250	Active	Y[c]	835						835	
Well 259	Active	Y[c]	400						400	
Well 262	Active	Y[c]	350						350	
Well 264	Active	Y[c]	700						700	
Well 265	Active	Y[c]	500						500	
Well 267	Active	Y[d]	1,190						1,190	
Well 269	Active		750						750	
Well 277	Active		1,000						1,000	
Well 278	Active	Y[d]	800						800	
Well 279	Active		800						800	
Well 281	Active	Y[c]	480						480	
Well 283	OOS - WQ		800						--	
Well 284	Active	Y[d]	750						750	
Well 285	OOS - WQ		1,000						--	
Well 287	Active		750						750	
Well 288	Active		650						650	
Well 290	Active		633						633	
Well 291	Active	Y[c]	500						500	
Well 292	Active	Y[c]	850						850	
Well 293	OOS - WQ	Y	825						--	
Well 294	Active	Y	1,325						1,325	
Well 296	Active	Y	900						900	
Well 297	Active		1,300						1,300	
Well 298	Active	Y	1,200						1,200	
Well 299	Active	Y	450						450	
Well 300	Active	Y[c]	700						700	
Well 301	Tank Fill	Y	500						--	
Well 304	OOS - WQ	Y	525						--	
Well 305	Tank Fill	Y	750						--	
Well 307	Active	Y[d]	1,050						1,050	
Well 308	Active		850						850	
Well 310	Active	Y	1,320						1,320	
Well 312	Active	Y[d]	1,000						1,000	
Well 313	Active	Y	1,175						1,175	
Well 063	Proposed	Y[d]	1,500						1,500	
Shelter Cove Well	Proposed	Y[c]	1,000						1,000	
Tivoli Well	Proposed	Y[c]	1,500						1,500	
Grogan Well	Proposed	Y[c]	1,500						1,500	
FMC Well	Proposed	Y[c]	1,000						1,000	
Plastipak Well	Proposed	Y[c]	1,000						1,000	
Well Pumping Capacity									80,653	48,392
System Pumping Capacity									315,929	167,700

[a] OOS = out of service due to water quality issues [during 2009]

[b] Firm capacity is defined as the total booster pumping capacity with the largest pump out of service or 60 percent of the total active/proposed groundwater well pumping capacity from all operational wells for one day (an operational well is defined as any well that has not been formally abandoned).

[c] Under the current MID Supply Agreement with the completion of Phase 2, 60 mgd (41,666 gpm) will be available for City use

[d] Backup power has been proposed at this facility in the Existing System Evaluation TM (Appendix D).

[e] Backup power is being proposed for this facility.

= Existing or proposed well included in capacity calculations

Table 6. Evaluation of the Contiguous Service Area's Firm Pumping Capacity under Buildout Demand Conditions

Demand or Firm Pumping Capacity	Supply and Storage Tank Booster Stations				Supply Booster Stations	
	Peak Hour Demand Condition, gpm		Maximum Day Plus Fire Flow Demand Condition, gpm		Maximum Day Demand Condition, gpm	
	South Modesto Area[a]	Contiguous Service Area	South Modesto Area	Contiguous Service Area	South Modesto Area[a]	Contiguous Service Area
Buildout Demand, gpm [e]	16,765	167,748	15,352	125,733	11,926	119,333
Booster Pump Station at the MRWTP Terminal Reservoirs[b]	---	(55,600)	---	(55,600)	---	(55,600)
Booster Pump Station at the South Modesto Terminal Tank	(7,986)	(7,986)	(7,986)	(7,986)	(7,986)	(7,986)
Booster Pump Stations at Tank Sites	(16,010)	(55,722)	(16,010)	(55,722)	NA[c]	NA[c]
Groundwater Wells	(1,860)	(48,392)	(1,860)	(48,392)	(1,860)	(48,392)
Total Firm Pumping Capacity[d]	(25,856)	(167,700)	(25,856)	(167,700)	(9,846)	(111,978)
Pumping Deficiency (or Surplus)	(9,091)	48	(10,504)	(41,967)	2,080	7,355

(a) South Modesto tank capacity includes Tanks 3, 7, 8, and 10 and assumes that all four are operational. South Modesto groundwater well capacity includes 60 percent of well capacity providing supply for South Modesto and North Ceres (Wells 100, 216, 217, 284, and 287).

(b) With the completion of the MRWTP Phase Two Expansion, under the City/MID surface water supply agreement (Amended and Restated Treatment and Delivery Agreement), 60 mgd (41,666 gpm) will be available for City use. However, it is assumed that the City can use all available pumping capacity at the booster pump station for meeting peaking demands.

(c) NA = Not applicable

(d) Defined as the total capacity of the individual booster pump station with the largest pump out of service or 60 percent of the total capacity of operational/proposed wells, and excludes wells that pump directly into tanks.

(e) Based on projected buildout demands and Peak Hour and Maximum Day peaking factors of 2.46 and 1.75 times the Average Day demand, respectively (Table 2). Maximum Day Plus Fire Flow scenario assumes two simultaneous fires of 4,000 gpm and 2,500 gpm under Maximum Day Demand conditions.

The combined available total firm pumping capacity is 111,978 gpm, which is currently insufficient for the 119,333 gpm buildout Maximum Day demand. The pumping capacity deficiency of 7,355 gpm will need to be supplied by additional supply sources such as new groundwater wells and or additional surface water supplies. For purposes of this analysis, it is assumed that the water production deficit can be satisfied by using 60 percent of the total pumping capacity provided by groundwater wells that fill tanks in the system (7,270 gpm out of a total capacity of 12,116 gpm). This assumption is based on the ability of the booster pump stations being able to pump out the same amount of water that the wells are supplying to the tanks. The remaining deficiency is a nominal 85 gpm, much less than the capacity of one well. In the South Modesto area, there is a deficiency of 2,080 gpm all of which can be remedied in a

similar fashion by allowing 60 percent of the pumping capacity to tanks in South Modesto be considered an a part of the available pumping capacity to meet the Maximum Day demand condition.

Table 5 details the pumping capacity of each individual facility that was totaled for the calculations presented in Table 6.

3.4 Critical Supply Facilities

All critical supply facilities should be equipped with an on-site generator for back-up power. Critical supply facilities are defined as those facilities that provide service to local service area(s) without sufficient emergency storage and that meet at least one of the following criteria:

- The largest pumping facility that provides water;
- A pumping facility that provides water from a supply turnout (i.e. MRWTP pumps);
- Valve facilities at key locations along the MID and proposed City-Side Downstream Improvements and for the RSWSP Transmission pipelines;
- A pumping facility that provides water from key groundwater supply wells (based on capacity, quality, location, and/or local pressure cluster); and
- All storage tank booster pump stations.

Each of the critical supply facilities listed above will be equipped with generators for back-up power, if it does not already have an auxiliary power source, via the proposed buildout system capital improvement program (CIP) in order to provide reliable pumping capacity during an emergency power outage.

4.0 CONTIGUOUS SERVICE AREA'S BUILDOUT SYSTEM EVALUATION RESULTS

This section of the TM discusses the performance criteria and results of the water distribution system analyses for the contiguous service area under the buildout scenario.

4.1 Distribution System Performance Criteria

Steady state hydraulic analyses using the updated water system hydraulic computer model were conducted to identify areas of the buildout distribution system that do not meet the recommended performance criteria discussed in the *Revised Design/System and Performance Criteria TM,* dated June 17, 2004 (by WYA). The results of the evaluation are presented below for the following demand scenarios:

- Peak Hour Demand—A Peak Hour flow condition was simulated for the buildout distribution facilities to evaluate their capability to meet a Peak Hour demand scenario. Peak Hour demands are met by the combined flows from the MRWTP and South Modesto Terminal Reservoirs, storage tanks booster pump stations, and groundwater wells.

- Maximum Day Demand plus Fire Flow—To evaluate the system under the Maximum Day demand plus fire flow condition, the model's "*Available Fire Flow Analysis*" tool was used to determine the extent of improvements required to meet the minimum residual pressure of 20 psi at demand locations within the buildout water system. The available residual pressures and flows at these demand locations were determined by assigning specific fire flow demand requirements based on land use categories.

4.1.1 Peak Hour Demand Scenario

As shown in Table 4, the Peak Hour demand is 2.46 times the Average Day demand. The City's system performance criteria require that during a Peak Hour demand condition, a minimum pressure of 40 psi must be maintained throughout the system. In addition, maximum head loss per thousand feet of distribution main should not exceed 7 ft/kft and maximum velocities should not exceed 7 fps. Details of system performance as simulated in the model under the Peak Hour demand condition are discussed below.

4.1.2 Maximum Day plus Fire Flow Demand Scenario

Fire flow demands were simulated at various locations within the City's service area to determine if the minimum residual pressure criterion of 20 psi could be met during a Maximum Day plus fire flow demand. As shown in Table 2, the Maximum Day demand is 1.75 times the Average Day demand. During a Maximum Day demand condition, a minimum pressure of 20 psi must be maintained throughout the system. In addition, maximum head loss per thousand feet of distribution main should not exceed 10 ft/kft and maximum velocities should not exceed 12 fps. These fire flow demands, which are the standard for the buildout water system, were determined based on land use categories and listed below in Table 7.

Table 7. City's Fire Flow Demand Requirements[(a)]

Land Use	Fire Flow, gpm	Duration, hours
Single Family Residential	1,500	2
Multi Family Residential	2,500	2
Commercial	4,000	2
Institutional	4,000	4
Industrial / Business Park	4,000	4

(a) Specific fire flows were based on the City's previously defined Water System Planning and Design Performance Criteria documented in the 2005 Hydraulic Model Update, under the Revised Design / System Performance Criteria TM, dated June 17, 2004. The cited flows and durations assume that approved automatic sprinkler systems are installed for commercial, institutional, industrial, and business park land use buildings.

4.1.3 Recommended Improvements Criteria

Pipelines need to deliver water that meets Peak Hour demands and Maximum Day plus fire flow demands within the acceptable pressure, velocity and head loss ranges as identified in the performance criteria previously established in the *2005 Hydraulic Model Update,* but the

distribution system will be evaluated using pressure as the primary criterion. Recommended improvements needed to comply with the performance criteria were added to the buildout system to fix any deficiencies found and are also described below in the Buildout System Evaluation Results section.

However, as discussed under the System Evaluation Results section, a large fraction of the junctions within the model failed to meet the Maximum Day plus fire flow demand performance criteria. Recommended improvements to meet the residual pressure requirement of 20 psi during a Maximum Day plus fire flow demand scenario would require the replacement of a substantial amount of the water distribution system and therefore, are not individually identified by pipe segment, but accounted for on a planning level as part of the City's *Strengthen and Replace Pipelines CIP* presented in the Engineer's Report.

The performance criteria described above will be used to evaluate the buildout system during Peak Hour demand and Maximum Day plus fire flow demand scenarios. The evaluation results are discussed below.

4.2 Buildout System Evaluation Results

The results of the Peak Hour demand and Maximum Day plus fire flow demand analyses under the buildout system condition; with the addition of the RSWSP, planned near-term, and newly proposed buildout system facilities, are discussed below.

Since the RSWSP and associated City-Side Downstream Improvements will be coming on-line as a surface water supply for South Modesto in the near-term, it is recommended that the distribution pipelines coming from Tank 6 be reconfigured and its operation modified such that it will provide water supply to customers in the area of Modesto near the tank and north of the Tuolumne River instead of filling Tank 7 in South Modesto. This would include opening various valves which currently isolate the transmission pipeline between the two tanks. In addition, there should be consideration for reconfiguring Tank 3 so that it can be filled with water from South Modesto under a low demand condition to utilize more of the future incoming RSWSP supply. Within the South Modesto service area, the addition of the RSWSP supply will also allow the City to reduce, and in some cases eliminate, the use of the groundwater wells that currently experience water quality problems, which require expensive wellhead treatment facilities, under Average Day and Maximum Day demand conditions.

While it is possible for water to be moved from South Modesto to areas north of the Tuolumne River during low demand periods, the water must be blended with the groundwater supply and an equivalent amount must be extracted from the groundwater basin. As indicated in Table 4, the South Modesto Average Day demand for buildout (9.4 mgd) demand conditions is less than the proposed RSWSP delivery flow rate of 11.5 mgd. Therefore, the full benefit of the TID supply will not be realized unless water is blended and allowed to move freely or a storage facility is fully operational (South Modesto Terminal Tank) to absorb the surplus supply until a peak demand need requires its use.

4.2.1 Peak Hour Demand Scenario

During a Peak Hour demand condition, results indicate that the buildout system could not adequately deliver Peak Hour flows to meet the City's minimum pressure criteria of 40 psi, even with the added use of all previously and newly proposed facilities for storage and pumping capacity. As shown in Figure 4, system pressures ranged from 37 to 60 psi. The area of low pressure identified during the simulation includes the area in the northeast portion of the water system area.

To remedy the pressure deficiency during a Peak Hour demand condition, it is recommended that the City construct an additional groundwater well in the northeast corner of the proposed buildout water system, as shown in Figure 5. With the addition of this recommended well, capable of supplying at least 1,500 gpm, system pressures would range from 40 to 65 psi. However, the simulated operation in the model for a Peak Hour demand condition does not reduce the groundwater pumping capacity to account for pumps that are out of service at any given time due to mechanical breakdown, maintenance, water quality, or other operational issues because it would be difficult to predict where these problems would occur. Therefore, the City would need to construct the recommended Buildout System CIP pumping facilities proposed in the Pumping Capacity Evaluation to account for pumps that may be out of service.

There are also pipelines in the water system that did not meet maximum head loss and velocity criteria for a Peak Hour demand condition as illustrated in Figure 4. The following list details those pipelines that exceeded the maximum pipeline criteria, but are not near a pumping facility or control valve, with numbers below cross-referenced to locations indicated on the figure:

- The 12-inch diameter pipeline at the intersection of Bangs Avenue and Tully Road had a velocity of 9 fps and a head loss of 21 ft/kft. This pipeline connects 24-inch diameter pipelines to 10-inch diameter pipelines.
- The 10-inch diameter pipeline on Merle Avenue east of Oakdale Road had a velocity of 9 fps and a head loss of 21 ft/kft.
- The 16-inch on Claus Road between East Briggsmore Ave and Merle Ave had a velocity of 7 fps and a head loss of 11 ft/kft.
- The 12-inch diameter pipeline on Claus Road at East Orangeburg Avenue had a velocity of 9 fps and a head loss of 18 ft/kft.
- The 4-inch diameter pipeline on Encina Avenue, west of Wilson Avenue had a velocity of 7 fps and a head loss of 168 ft/kft.
- The 8-inch diameter pipeline on Pecos Avenue, east of South 7th Street had a velocity of 8 fps and a head loss of 24 ft/kft.
- The 6-inch diameter pipeline north of Holm Avenue between Well 284 and Musick Avenue had a velocity of 8 fps and a head loss of 33 ft/kft.

Because pipeline velocity and head loss are secondary criteria, no improvements for pipelines exceeding the velocity and head loss criteria are recommended unless the primary criterion (pressure) is not met. Based on results of the Peak Hour simulation as illustrated on Figure 4,

none of these listed pipelines require upsizing to mitigate pressure deficiencies. Therefore, no additional improvements are recommended at this time. As the City replaces these pipelines as part of its *Strengthen and Replace Water System* CIP, it should consider replacing with a larger diameter pipeline.

4.2.2 Maximum Day Demand plus Fire Flow Scenario

Using the model's "*Available Fire Flow Analysis*" tool, the available residual pressure within the buildout system was determined by assigning specific fire flow demand requirements based on land use categories. As shown in Figure 6, results indicate that 487 (9 percent) of the 5,375 specified fire flow locations could not meet the minimum required residual pressure of 20 psi. However, 381 out of the 487 failed fire flow locations may be able to meet the minimum required residual pressure of 20 psi if the fire flow demand was split between two adjacent hydrants, as shown on Figure 6. This result indicates that splitting the fire flow may be an option to address these fire flow deficiencies. WYA recommends that additional field testing should be conducted by the City's Fire Department to confirm the available fire flow in the various areas. Figure 6 also shows the remaining 106 locations that were not able to meet the minimum required residual pressure of 20 psi even at half the required fire flow. Further inspections into these areas indicate that in most cases, the pipelines are undersized and would need to be replaced by larger diameter pipelines to supply the required fire flow demand.

Due to the large number of failed fire flow locations (almost 500), necessary improvements are not individually identified in the CIP. However, it is recommended that City staff consider these fire flow deficiencies as a factor when prioritizing future main replacement projects under the City's *Strengthen and Replace Water System* CIP. Table A1 of Attachment A lists the fire flow requirement and simulated available fire flow at a residual pressure of 20 psi for each junction within the buildout system that could not meet the minimum required residual pressure.

5.0 CONTIGUOUS SERVICE AREA'S BUILDOUT SYSTEM SUMMARY OF RECOMMENDED IMPROVEMENTS

The recommended system improvements for the buildout system condition includes facilities that are proposed as part of the City's continued growth and improvements that eliminate system deficiencies identified in the analyses described above. The recommended system improvements with associated costs are presented in the discussion below.

5.1 Estimated Capital Cost for Recommended Improvements

The estimated probable capital costs for the recommended water system improvements to reliably serve the buildout condition of the contiguous service area is presented in Table 8. The capital costs are presented in March 2010 dollars at an Engineering News Record (ENR) San Francisco construction cost index (CCI) of 9728.17. The costs include a total markup of 50 percent (see Attachment A of the Engineer's Report for more detail) on the estimated construction cost to account for administration, planning, design, construction management, and other soft-costs appropriate for this level of planning. The costs for the facilities do not include costs for the purchase of raw water, annual operation and maintenance, or costs for acquisition of rights-of-way. Costs for the facilities and pipelines associated with proposed developments are

not included in these cost estimates. Also, costs related to the City's Downstream Improvement Project related to the MRWTP Phase Two Expansion are not included in these cost estimates because they have already been accounted for elsewhere in the development of the overall CIP.

5.2 Buildout System Recommendations

The recommended improvements needed to address continued City growth and eliminate deficiencies identified in the analysis of the buildout distribution system are summarized below. Detailed improvements are summarized with costs in Table 8 and illustrated on Figure 7.

Table 8. Summary of Recommended CIP Cost Estimates to Serve the Buildout System of the Contiguous Service Area

Recommendation	Cost Estimate[a]
Storage	
Two 5.0 MG TID Terminal Tanks	$13,760,000
5.0 MG Storage Tank (location assumed at MID Terminal Tanks)	$6,880,000
Pump Station	
Well Backup Generators[b]	$2,667,000
North Modesto 10 MGD Booster Pump Station	$1,940,000
TID Tank 11.5 MGD Booster Pump Station	$2,028,000
Pipeline	
Proposed Buildout System Pipelines[c]	$34,170,000
TID Transmission Pipeline[c]	$3,733,000
South Modesto System Improvements[d]	$9,392,000
Proposed Development Infrastructure	NA[e]
Other Improvements	
Tivoli Well w/ 1,500 gpm capacity	NA[e]
FMC Well w/ 1,000 gpm capacity	NA[e]
Shelter Cove Well w/ 1,000 gpm capacity	NA[e]
Grogan Well w/ 1,500 gpm capacity	NA[e]
Plastipak Well w/ 1,000 gpm capacity	NA[e]
Well #1 w/ 1,500 gpm capacity	$1,333,000
Total CIP Recommendation Subtotal	$75,903,000
Soft Costs and Contingencies[f]	$37,952,000
Total Buildout System CIP Cost Estimate	$113,855,000

(a) Capital costs presented in March 2010 dollars at an Engineering News Record (ENR) construction cost index (CCI) of 9728.17 for the San Francisco Average. Capital costs are based on an analysis of the City's water distribution and do not include the City's share of the TID RSWSP regional facilities, which is expected to be $68 million. The cost for the TID RSWSP regional facilities is included in the CIP TM.

(b) Capital costs detailed in Table B1 (Attachment B).

(c) Capital costs detailed in Table B2 (Attachment B).

(d) Includes existing localized recommendations detailed in Table 7 of *South Modesto Interim Water Supply Study TM*.

(e) Funding is assumed to be provided by developer associated with facility.

(f) Soft cost and contingency mark-ups include: construction contingency (20%), engineering (10%), construction management (10%), and program implementation (10%).

The specific recommended improvements listed in Table 8 with associated remedy for the buildout contiguous service area are detailed below:

5.2.1 Storage Facilities

- To incorporate the RSWSP with the existing water system, two new 5 MG South Modesto Terminal Tanks should be constructed near the intersection of Whitmore Avenue and Morgan Avenue. Of the total 10 MG storage required, 7.2 MG is required to meet system needs, and the remaining storage is required for RSWSP operations. The size of these facilities should be adjusted as necessary based on the actual delivery flow determined by the RSWSP prior to design and construction of the facility.
- To alleviate the buildout system storage deficiency, a new 5.0 MG storage tank should be constructed at a location to be determined. The associated booster pump station, along with the new well discussed below, will satisfy the buildout peak hour pumping deficiency.

5.2.2 Pumping Facilities

- To distribute flow from the proposed South Modesto Terminal Tank, a booster pump station with a reliable firm capacity of at least 11.5 mgd should be constructed at the site. Similar to the sizing of the South Modesto Terminal Tank, the capacity of this booster pump station should be revisited after the actual delivery flow is determined by TID RSWSP prior to design and construction of this facility.
- To provide additional supply needed to meet the increasing demands under the buildout condition for future developments, five new developer-funded groundwater wells are planned as part of the future infrastructure. These groundwater wells are:
  - Tivoli Well: 1,500 gpm
  - FMC Well: 1,000 gpm
  - Grogan Well: 1,500 gpm
  - Plastipak Well: 1,000 gpm
  - Shelter Cove Well: 1,000 gpm
- To alleviate the pressure deficiency under a Peak Hour demand condition, one new groundwater well (Well # 1) with a pumping capacity of approximately 1,500 gpm should be constructed in the northeast portion of the service area.
- To alleviate the storage capacity deficit, generators should be installed at existing and proposed groundwater wells as shown in Table 8, and detailed in Table B1, thus increasing the available emergency groundwater credit. Backup generator costs are not calculated for the proposed wells, since these costs are assumed to be part of the well installation cost.
- To increase the reliable pumping capacity in the water system, generators should be installed at all new pumping facilities. Generators at new groundwater wells will also increase the reliable firm pumping capacity.

5.2.3 Pipelines

- Install proposed pipelines of various diameters and lengths as shown in Figure 7 and as summarized in Table B2.
- Examine the need for pipeline improvements in areas where the available fire flow at a residual pressure of 20 psi is below the recommended fire flow requirements as shown in Table A1.

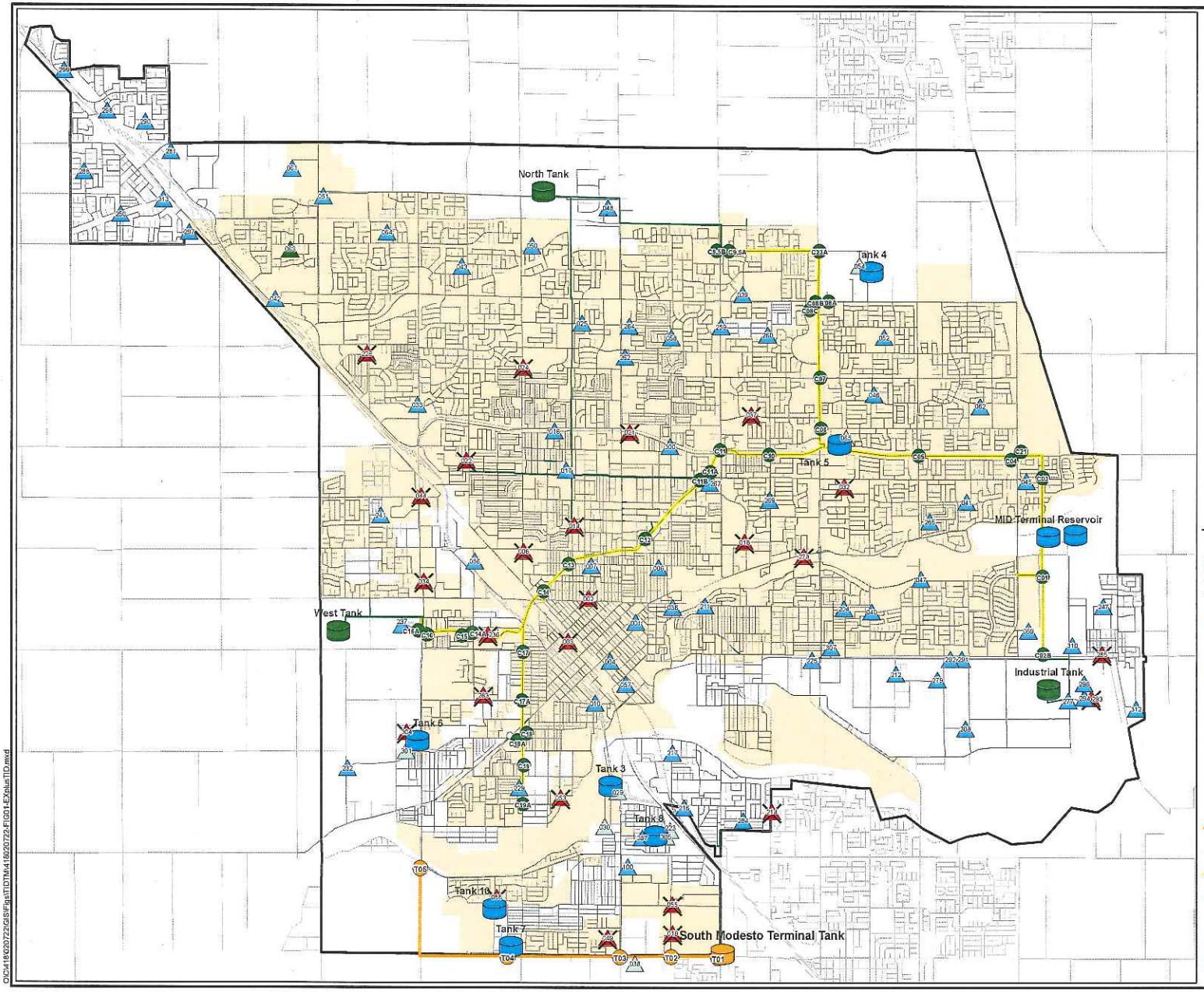

FIGURE 1

City of Modesto

RECOMMENDED CITY-SIDE DOWNSTREAM FACILITIES RELATED TO RSWSP

N

0 1,700 3,400 6,800

Scale in Feet

NOTES:

- Inactive wells based on City's August 2009 Out of Service Well Report
- Locations for Existing CIP Facilities based on Existing System Evaluation TM, Appendix D

LEGEND:

- City Limits
- Contiguous Service Area Boundary
- Street
- Existing Tank & Pump Station
- Existing CIP Tank & Pump Station
- Proposed South Modesto Terminal Tank
- Existing Active Well
- Existing Inactive Well
- Existing Blending Well
- Proposed Existing CIP Well
- MID Turnout Connection
- Proposed City-Side RSWSP Connection
- Proposed City-Side RSWSP Transmission Pipeline
- Existing Pipeline
- Existing MID Transmission Main
- Recommended Existing CIP Pipeline

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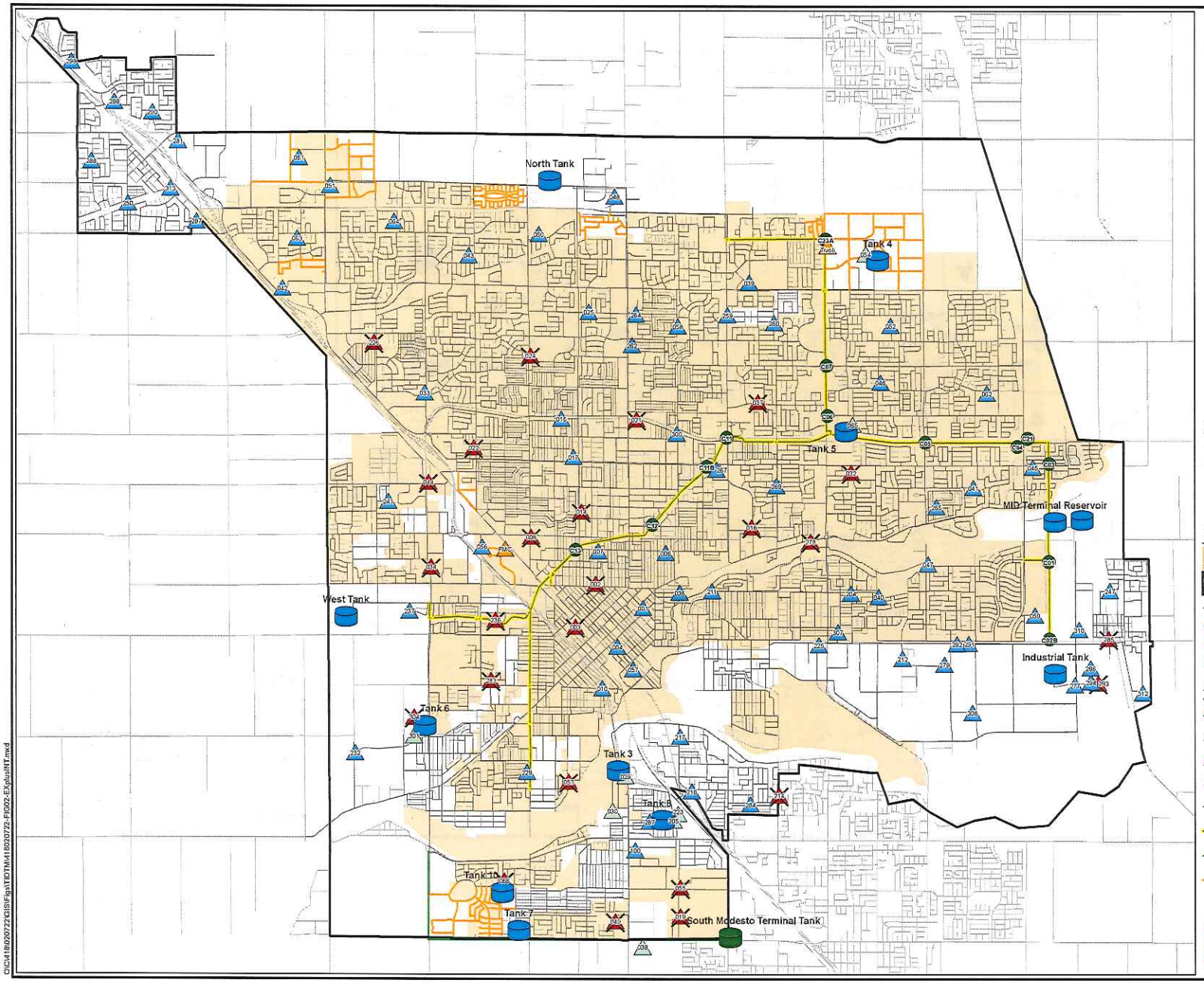

FIGURE 2

City of Modesto

PROPOSED NEAR-TERM CONTIGUOUS SERVICE AREA SYSTEM FACILITIES

N

0 1,750 3,500 7,000

Scale in Feet

NOTES:

- Inactive wells based on City's August 2009 Out of Service Well Report
- Near-term pipeline alignments based on information provided by City and developers
- Existing facilities include recommended Existing System CIP facilities detailed in Existing System Evaluation TM (Appendix D)

LEGEND:

- City Limits
- Contiguous Service Area Boundary
- Street
- Existing Tank & Pump Station
- Proposed City-Side TID RSWSP Tank & Pump Station
- Existing Active Well
- Existing Inactive Well
- Existing Blending Well
- Proposed Near-term Well
- MID Turnout Connection
- Existing Pipeline
- Existing MID Transmission Main
- City-Side TID RSWSP Transmission Pipeline
- Proposed Near-term Pipeline

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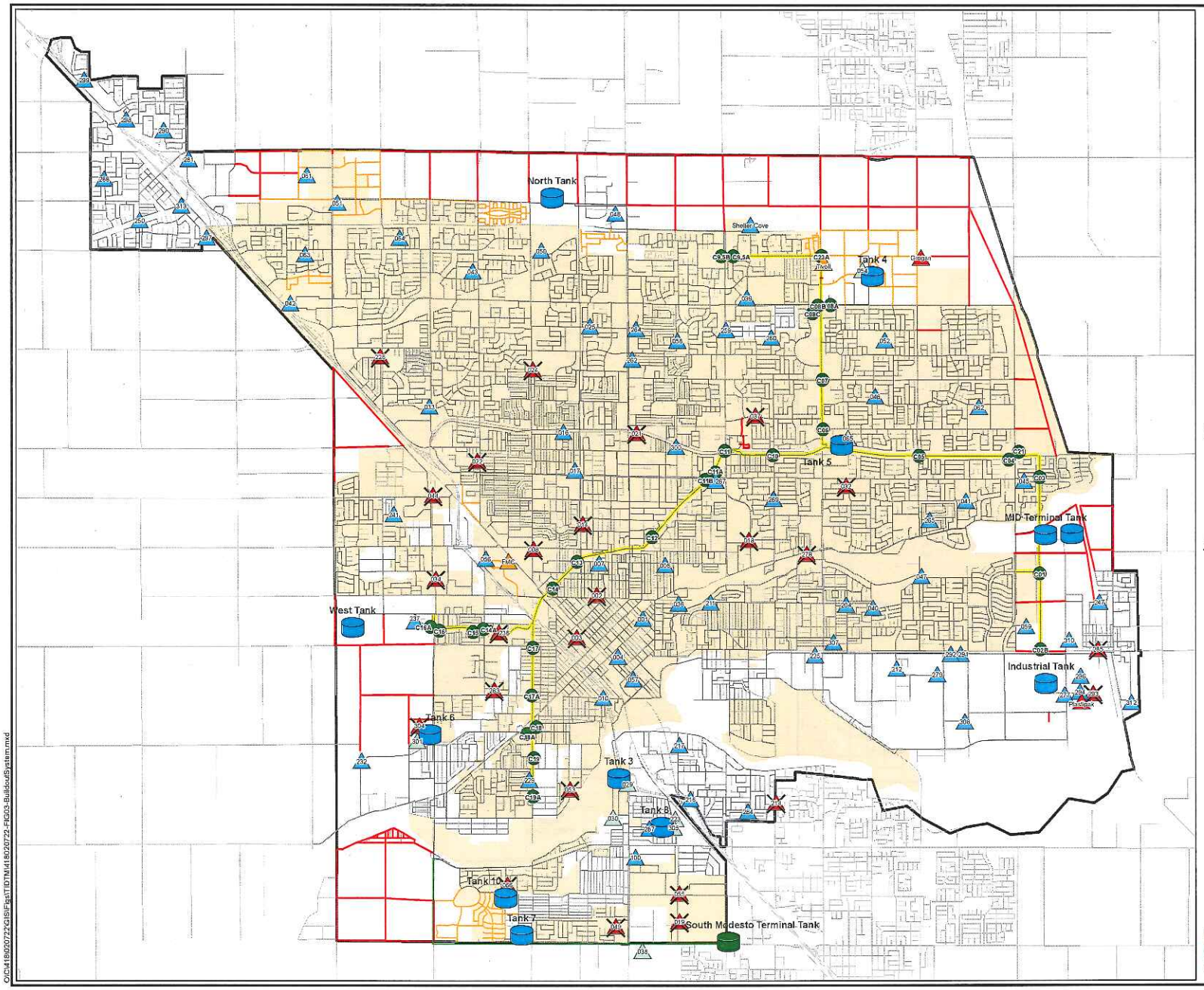

FIGURE 3

City of Modesto

PROPOSED BUILDOUT CONTIGUOUS SERVICE AREA SYSTEM FACILITIES

N

0 1,650 3,300 6,600

Scale in Feet

NOTES:

- Inactive wells based on City's August 2009 Out of Service Well Report
- Near-term pipeline alignments based on information provided by City and developers
- Existing facilities include recommended Existing System CIP facilities detailed in Existing System Evaluation TM (Appendix D)

LEGEND:

- City Limits
- Contiguous Service Area Boundary
- Street
- Existing Tank & Pump Station
- Proposed City-Side TID RSWSP Tank & Pump Station
- Existing Blending Well
- Existing Inactive Well
- Existing Active Well
- Proposed Near-term Well
- Proposed Buildout Well
- MID Turnout Connection
- Existing Pipeline
- Existing MID Transmission Main
- City-Side TID RSWSP Transmission Pipeline
- Proposed Near-term Pipelines
- Proposed Buildout Pipeline

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O:\C416\20\22\GIS\Figs\TID\TM\416\20\22-FIG03-BuildoutSystem.mxd

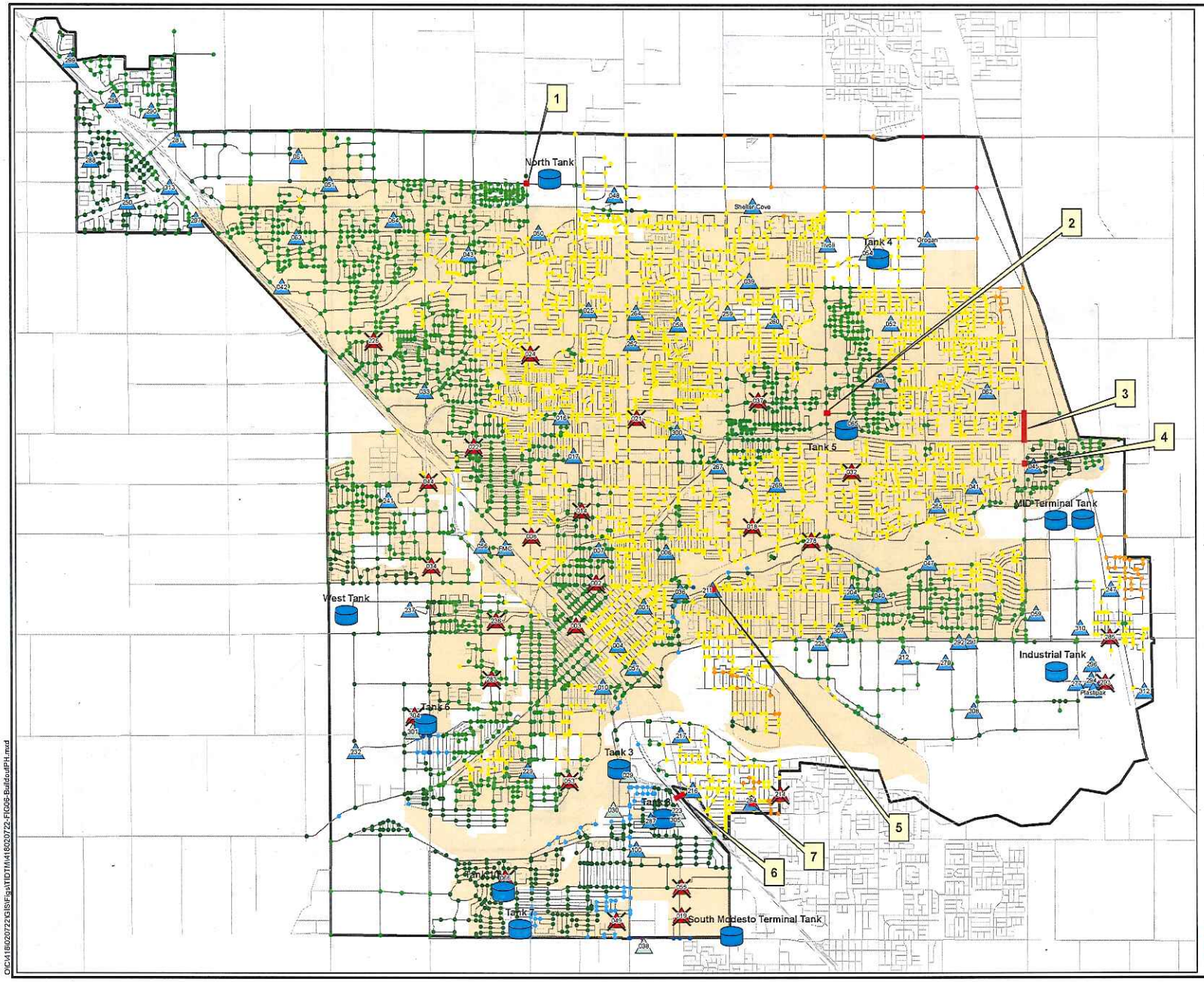

FIGURE 4

City of Modesto

BUILDOUT CONTIGUOUS SERVICE AREA PEAK HOUR SYSTEM PRESSURES

N

0 1,750 3,500 7,000

Scale in Feet

NOTES:

- Inactive wells based on City's August 2009 Out of Service Well Report
- Active facilities include Existing System, Existing CIP, and proposed Buildout System

LEGEND:

- City Limits
- Contiguous Service Area Boundary
- Street
- Active Tank & Pump Station
- Active Well
- Inactive Well
- Blending Well
- Pressure < 40 psi
- 40 psi ≤ Pressure < 45 psi
- 45 psi ≤ Pressure < 50 psi
- 50 psi ≤ Pressure < 55 psi
- 55 psi ≤ Pressure < 60 psi
- 60 psi ≤ Pressure < 65 psi
- 65 psi ≤ Pressure < 70 psi
- Pressure > 70 psi
- Pipeline Velocity ≤ 7 fps
- Pipeline Velocity > 7 fps

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OIC\418\020722\GIS\Figs\TIDT\M418020722-FIG05-BuildoutPH.mxd

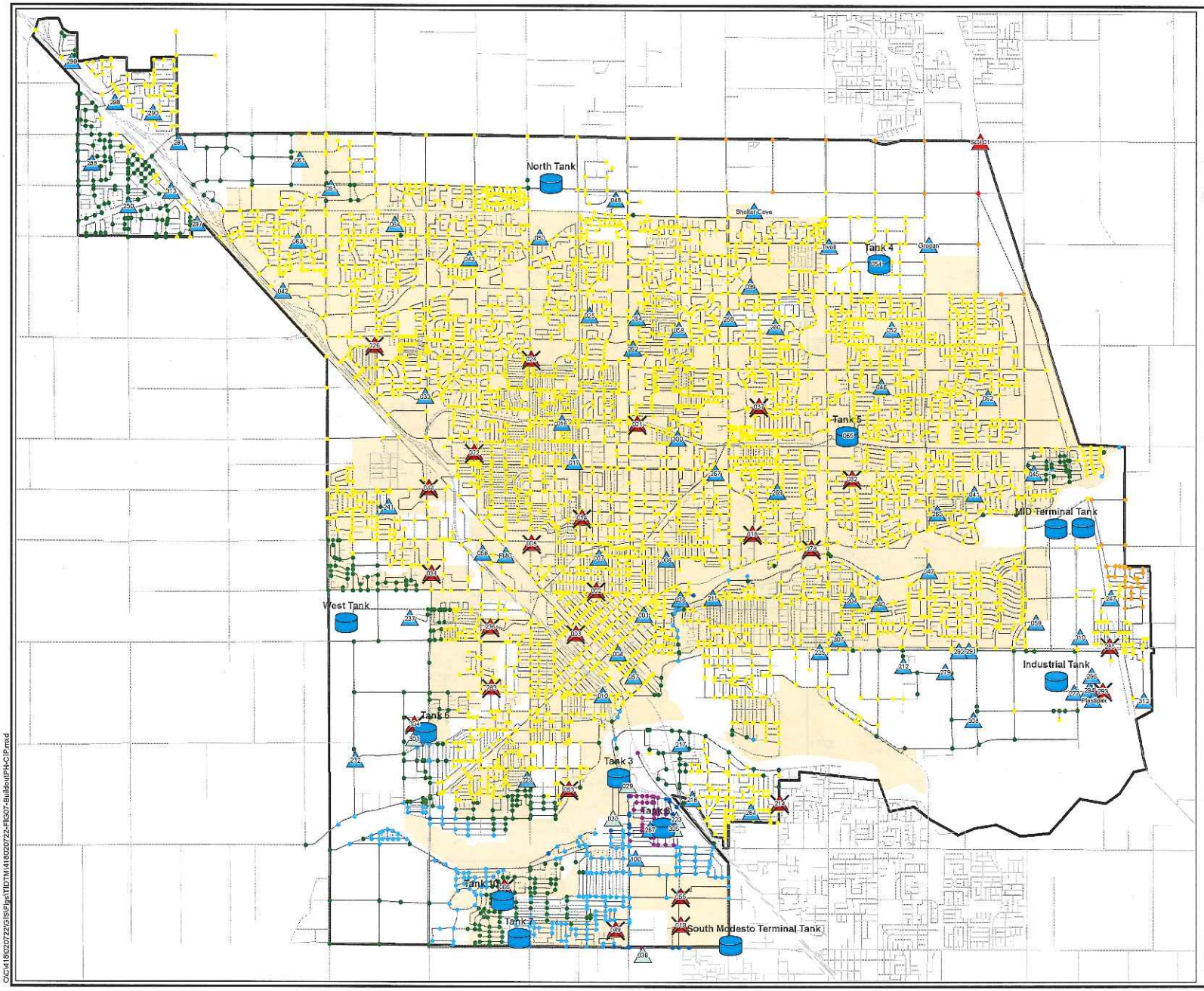

FIGURE 5

City of Modesto

BUILDOUT CONTIGUOUS SERVICE AREA W/ CIP PEAK HOUR SYSTEM PRESSURES

N

0 1,750 3,500 7,000

Scale in Feet

NOTES:

- Inactive wells based on City's August 2009 Out of Service Well Report
- Active facilities include Existing System, Existing CIP, and proposed Buildout System

LEGEND:

- City Limits
- Contiguous Service Area Boundary
- Street
- Active Tank & Pump Station
- Active Well
- Inactive Well
- Blending Well
- Proposed Buildout Well
- Pressure < 40 psi
- 40 psi ≤ Pressure < 45 psi
- 45 psi ≤ Pressure < 50 psi
- 50 psi ≤ Pressure < 55 psi
- 55 psi ≤ Pressure < 60 psi
- 60 psi ≤ Pressure < 65 psi
- 65 psi ≤ Pressure < 70 psi
- Pressure > 70 psi
- Pipeline

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O:\C4186\20722\GIS\Figs\TIDTM\4180\20722-FIG07-Buildout\PH-CIP.mxd

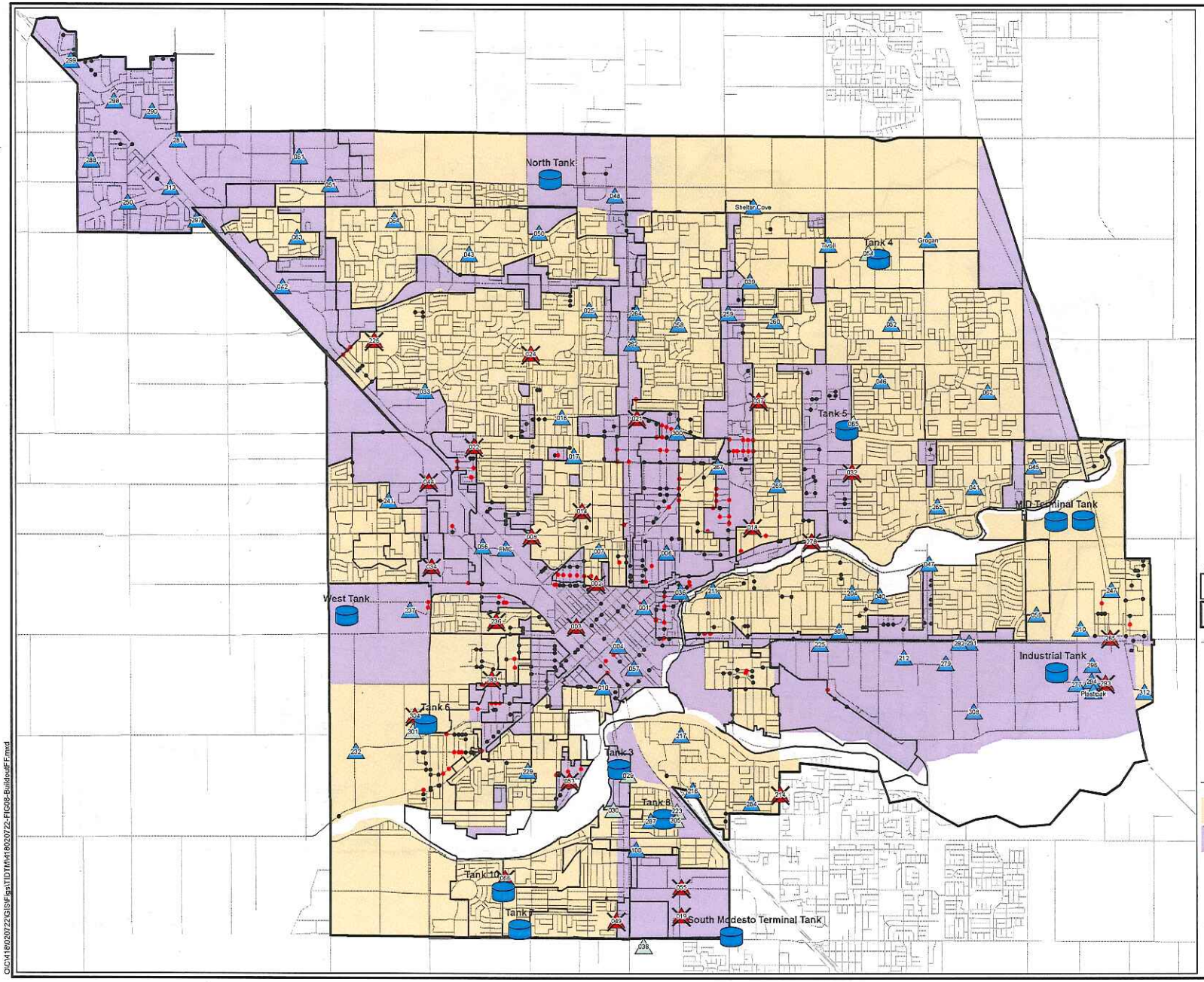

FIGURE 6

City of Modesto

BUILDOUT CONTIGUOUS SERVICE AREA MAXIMUM DAY PLUS FIRE FLOW (Failed Fire Flow Locations)

N

0 1,750 3,500 7,000

Scale in Feet

NOTES:

- Inactive wells based on City's August 2009 Out of Service Well Report
- Active facilities include Existing System, Existing CIP, and proposed Buildout System
- Fire flow locations do not include nodes and dead-end junctions

LEGEND:

- City Limits
- Contiguous Service Area Boundary
- Street
- Active Tank & Pump Station
- Active Well
- Inactive Well
- Blending Well
- Pipeline
- Fire Flow Demand = 1,500 gpm
- Fire Flow Demand = 4,000 gpm
- Residual Pressure < 20 psi at half required flow
- Residual Pressure ≥ 20 psi at half required flow

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O:\C\418020\22\GIS\Figs\T10T1\f\418020\22-FIG08-BuildoutFF.mxd

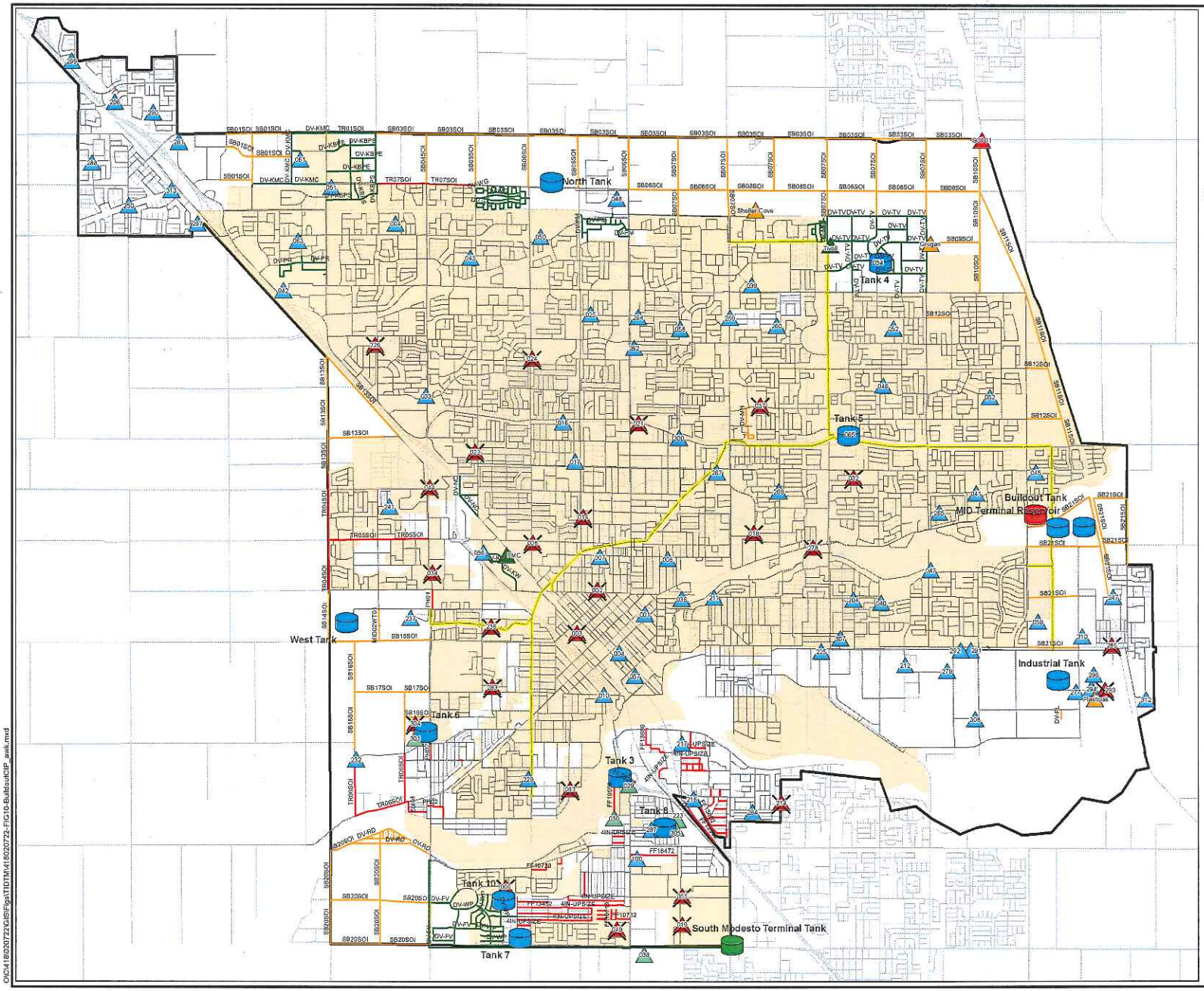

FIGURE 7

City of Modesto

RECOMMENDED BUILDOUT CONTIGUOUS SERVICE AREA SYSTEM CIP

N

0 1,750 3,500 7,000

Scale in Feet

NOTES:

- Inactive wells based on City's August 2009 Out of Service Well Report
- Existing facilities include recommended Existing System CIP facilities detailed in Existing System Evaluation TM (Appendix D)
- Near-term pipeline alignments based on information provided by City and developers

LEGEND:

- Contiguous Service Area Boundary
- City Limits
- Existing Tank & Pump Station
- Proposed South Modesto Terminal Tank & Pump Station
- Recommended CIP Tank
- Existing Active Well
- Existing Inactive Well
- Existing Blending Well
- Proposed Near-term Well
- Proposed Buildout Well
- Recommended CIP Well
- Existing Pipeline
- Existing MID Transmission Pipeline
- Proposed Near-term Pipeline
- Proposed Buildout Pipeline
- Recommended Near-term CIP Pipeline Improvement
- Street

CITY of MODESTO

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O:\C418\0207\22\GIS\Figs\TIDTM\418020722-FIG10-BuildoutCIP_awk.mxd

ATTACHMENT A

Available Fire Flows

Table A1. Available Fire Flow at 20 psi for Buildout System at Failed Fire Flow Locations

Model ID	Fire-Flow Demand, gpm	Available Flow, gpm	Split Flow Available
2024	4,000	3,336	YES
2026	4,000	3,493	YES
2028	4,000	2,940	YES
2030	4,000	2,440	YES
2168	4,000	3,584	YES
2174	4,000	2,372	YES
2250	4,000	3,508	YES
2284	4,000	2,770	YES
2334	4,000	3,630	YES
2336	4,000	3,450	YES
2338	4,000	3,698	YES
2340	4,000	3,358	YES
2342	4,000	3,252	YES
2344	4,000	3,314	YES
2346	4,000	3,525	YES
2438	4,000	3,491	YES
10190	4,000	1,637	
10212	4,000	3,746	YES
10238	4,000	3,629	YES
10244	1,500	1,254	YES
10246	1,500	1,109	YES
10248	4,000	1,596	
10254	4,000	868	
10256	4,000	887	
10258	4,000	278	
10260	1,500	1,507	YES
10262	4,000	3,266	YES
10266	4,000	3,006	YES
10268	4,000	1,488	
10270	4,000	1,677	
10276	4,000	3,346	YES
10280	4,000	2,137	YES
10284	4,000	3,607	YES
10288	4,000	2,255	YES
10290	4,000	3,387	YES
10320	1,500	1,214	YES
10336	4,000	3,990	YES
10340	4,000	2,306	YES
10342	4,000	2,284	YES
10344	4,000	3,593	YES
10346	4,000	3,392	YES
10348	4,000	1,534	
10360	1,500	1,127	YES
10362	1,500	981	YES
10364	1,500	1,186	YES

Table A1. Available Fire Flow at 20 psi for Buildout System at Failed Fire Flow Locations

Model ID	Fire-Flow Demand, gpm	Available Flow, gpm	Split Flow Available
10382	4,000	2,665	YES
10402	1,500	1,123	YES
10410	4,000	3,650	YES
10412	4,000	932	
10428	4,000	934	
10442	1,500	940	YES
10468	1,500	1,258	YES
10470	1,500	1,327	YES
10484	4,000	269	
10488	1,500	617	
10502	1,500	1,393	YES
10506	4,000	3,313	YES
10508	4,000	1,872	
10510	1,500	1,415	YES
10518	4,000	1,815	
10526	4,000	1,472	
10528	4,000	1,481	
10536	4,000	1,465	
10538	4,000	1,461	
10540	4,000	1,413	
10546	4,000	1,410	
10552	1,500	1,042	YES
10572	4,000	1,965	
10592	4,000	1,555	
10594	4,000	1,458	
10600	4,000	3,530	YES
10618	1,500	797	YES
10628	1,500	1,037	YES
10634	4,000	572	
10636	4,000	574	
10640	4,000	578	
10644	1,500	582	
10646	4,000	3,203	YES
10664	1,500	916	YES
10670	4,000	1,536	
10680	1,500	1,499	YES
10682	1,500	691	
10688	1,500	635	
10732	4,000	2,080	YES
10978	1,500	601	
10990	4,000	3,342	YES
11002	4,000	2,295	YES
11046	4,000	3,838	YES
11372	4,000	3,485	YES
11378	4,000	3,568	YES

Table A1. Available Fire Flow at 20 psi for Buildout System at Failed Fire Flow Locations

Model ID	Fire-Flow Demand, gpm	Available Flow, gpm	Split Flow Available
11410	4,000	1,658	
11414	4,000	2,837	YES
11416	4,000	2,368	YES
11422	4,000	977	
11428	4,000	3,656	YES
11430	4,000	3,767	YES
11434	4,000	2,979	YES
11436	4,000	2,008	YES
11438	4,000	2,389	YES
11466	4,000	2,851	YES
11470	4,000	3,769	YES
11474	4,000	3,535	YES
11480	4,000	1,146	
11488	4,000	2,177	YES
11492	4,000	1,447	
11506	4,000	2,169	YES
11510	4,000	3,617	YES
11528	4,000	3,408	YES
11536	4,000	2,387	YES
11554	4,000	2,415	YES
11562	4,000	2,795	YES
11564	4,000	3,484	YES
11580	4,000	3,750	YES
11582	4,000	2,579	YES
11586	4,000	3,374	YES
11590	4,000	3,167	YES
11606	4,000	3,690	YES
11608	4,000	1,815	
11622	4,000	3,939	YES
11624	4,000	3,371	YES
11626	4,000	3,590	YES
11632	4,000	1,874	
11714	4,000	3,739	YES
11804	4,000	3,418	YES
11806	4,000	1,975	
11812	4,000	3,739	YES
11816	4,000	3,755	YES
11822	4,000	2,446	YES
11824	4,000	2,937	YES
11842	4,000	2,073	YES
11844	4,000	989	
11846	4,000	2,943	YES
11854	4,000	3,495	YES
11858	4,000	3,642	YES
11866	4,000	3,498	YES

Table A1. Available Fire Flow at 20 psi for Buildout System at Failed Fire Flow Locations

Model ID	Fire-Flow Demand, gpm	Available Flow, gpm	Split Flow Available
11868	4,000	3,464	YES
11958	4,000	2,270	YES
11960	4,000	2,710	YES
11968	1,500	1,441	YES
11974	1,500	918	YES
11978	4,000	3,979	YES
11988	4,000	2,132	YES
11990	4,000	1,816	
11996	4,000	2,115	YES
11998	4,000	1,705	
12000	4,000	3,737	YES
12002	4,000	3,103	YES
12010	4,000	1,474	
12012	4,000	1,660	
12014	4,000	1,332	
12018	4,000	2,188	YES
12026	4,000	1,613	
12066	1,500	1,294	YES
12078	1,500	1,021	YES
12080	1,500	1,225	YES
12090	1,500	868	YES
12096	1,500	867	YES
12100	1,500	1,462	YES
12108	4,000	3,010	YES
12112	4,000	3,468	YES
12114	4,000	2,508	YES
12118	4,000	2,492	YES
12124	4,000	3,612	YES
12132	1,500	1,431	YES
12144	4,000	3,881	YES
12148	4,000	3,044	YES
12156	1,500	1,166	YES
12158	1,500	898	YES
12208	4,000	2,312	YES
12212	4,000	2,404	YES
12216	4,000	1,703	
12222	4,000	838	
12224	4,000	821	
12226	1,500	1,503	YES
12228	4,000	2,309	YES
12230	1,500	1,372	YES
12234	1,500	1,133	YES
12238	1,500	1,498	YES
12316	1,500	1,268	YES
12318	1,500	1,502	YES

Table A1. Available Fire Flow at 20 psi for Buildout System at Failed Fire Flow Locations

Model ID	Fire-Flow Demand, gpm	Available Flow, gpm	Split Flow Available
12322	1,500	1,377	YES
12334	4,000	3,565	YES
12336	4,000	2,957	YES
12342	1,500	426	
12350	1,500	1,358	YES
12352	1,500	907	YES
12354	1,500	1,156	YES
12356	1,500	710	
12358	1,500	981	YES
12370	4,000	2,159	YES
12372	4,000	2,173	YES
12374	4,000	1,847	
12376	4,000	1,771	
12378	4,000	1,807	
12380	4,000	3,845	YES
12382	4,000	3,769	YES
12390	4,000	2,189	YES
12392	4,000	1,636	
12394	1,500	1,359	YES
12396	1,500	1,393	YES
12398	1,500	1,361	YES
12428	1,500	1,199	YES
12438	1,500	1,056	YES
12440	1,500	1,371	YES
12464	4,000	3,799	YES
12472	4,000	3,768	YES
12488	1,500	1,322	YES
12636	1,500	1,337	YES
12640	4,000	1,673	
12646	4,000	1,622	
12656	4,000	2,011	YES
12662	4,000	2,039	YES
12664	4,000	2,167	YES
12678	1,500	759	YES
12680	1,500	1,271	YES
12688	1,500	1,155	YES
12694	1,500	762	YES
12698	1,500	583	
12700	1,500	648	
12706	1,500	921	YES
12710	1,500	1,031	YES
12712	1,500	897	YES
12716	1,500	1,359	YES
12718	4,000	1,879	
12728	1,500	1,436	YES

Table A1. Available Fire Flow at 20 psi for Buildout System at Failed Fire Flow Locations

Model ID	Fire-Flow Demand, gpm	Available Flow, gpm	Split Flow Available
12744	4,000	1,615	
12764	4,000	2,016	YES
12768	4,000	1,724	
12772	4,000	3,513	YES
12774	4,000	3,876	YES
12778	4,000	2,950	YES
12782	4,000	1,828	
12784	1,500	1,221	YES
12786	1,500	872	YES
12808	1,500	918	YES
12824	4,000	3,566	YES
12826	1,500	460	
12828	4,000	2,747	YES
12830	1,500	871	YES
12836	1,500	1,498	YES
12838	4,000	3,605	YES
12840	4,000	3,684	YES
12844	4,000	3,604	YES
12846	4,000	1,800	
12848	4,000	2,910	YES
12850	4,000	1,095	
12890	4,000	2,877	YES
12892	4,000	3,258	YES
13074	4,000	2,852	YES
13094	4,000	3,024	YES
13096	4,000	2,679	YES
13108	1,500	1,451	YES
13110	1,500	978	YES
13112	1,500	1,241	YES
13116	1,500	1,321	YES
13118	1,500	1,266	YES
13120	1,500	723	
13122	1,500	1,371	YES
13126	1,500	1,104	YES
13138	1,500	1,031	YES
13192	1,500	1,186	YES
13202	4,000	3,327	YES
13248	4,000	3,610	YES
13250	4,000	3,070	YES
13252	4,000	3,339	YES
13272	4,000	2,992	YES
13278	4,000	3,449	YES
13280	4,000	3,473	YES
13340	1,500	1,302	YES
13342	1,500	1,292	YES

Table A1. Available Fire Flow at 20 psi for Buildout System at Failed Fire Flow Locations

Model ID	Fire-Flow Demand, gpm	Available Flow, gpm	Split Flow Available
13350	1,500	1,043	YES
13356	1,500	1,261	YES
13358	1,500	1,363	YES
13360	1,500	1,307	YES
13362	1,500	1,306	YES
13370	1,500	1,064	YES
13380	1,500	1,038	YES
13400	4,000	3,744	YES
13402	1,500	931	YES
13420	1,500	1,284	YES
13422	1,500	707	
13426	1,500	1,488	YES
13434	1,500	1,224	YES
13512	4,000	2,579	YES
13514	4,000	2,905	YES
13620	4,000	3,154	YES
13664	1,500	1,484	YES
13780	4,000	1,691	
13794	4,000	3,904	YES
13796	4,000	3,400	YES
13798	4,000	3,905	YES
13800	4,000	3,819	YES
13802	4,000	3,864	YES
13806	4,000	2,926	YES
13808	4,000	1,609	
13812	4,000	3,943	YES
13820	4,000	1,758	
13830	4,000	3,911	YES
13956	1,500	1,284	YES
13972	4,000	1,997	
13982	4,000	1,017	
13984	4,000	588	
13992	4,000	1,786	
13994	4,000	1,701	
14030	1,500	1,304	YES
14052	4,000	2,812	YES
14054	4,000	2,730	YES
14056	4,000	2,796	YES
14060	4,000	3,236	YES
14064	4,000	2,735	YES
14068	4,000	3,621	YES
14098	4,000	3,333	YES
14118	1,500	1,432	YES
14122	4,000	2,034	YES
14124	1,500	1,068	YES

Table A1. Available Fire Flow at 20 psi for Buildout System at Failed Fire Flow Locations

Model ID	Fire-Flow Demand, gpm	Available Flow, gpm	Split Flow Available
14158	4,000	3,090	YES
14200	4,000	3,833	YES
14202	4,000	3,514	YES
14276	4,000	3,650	YES
14278	4,000	659	
14280	4,000	914	
14288	4,000	1,531	
14290	4,000	1,847	
14292	4,000	3,966	YES
14298	4,000	3,185	YES
14300	4,000	1,723	
14302	4,000	2,043	YES
14308	1,500	1,221	YES
14310	1,500	1,309	YES
14312	1,500	644	
14316	4,000	2,867	YES
14318	4,000	2,892	YES
14320	4,000	261	
14324	4,000	783	
14338	4,000	1,740	
14354	4,000	3,028	YES
14358	1,500	723	
14392	4,000	3,988	YES
14434	4,000	2,632	YES
14454	4,000	2,045	YES
14460	4,000	3,660	YES
14476	4,000	4,013	YES
14492	4,000	2,749	YES
14504	4,000	2,591	YES
14540	4,000	3,645	YES
14584	4,000	3,733	YES
14590	4,000	3,885	YES
14594	1,500	1,281	YES
14596	4,000	3,703	YES
14628	1,500	1,083	YES
14632	4,000	2,092	YES
14662	1,500	1,523	YES
14664	4,000	3,345	YES
14666	4,000	2,129	YES
14668	4,000	1,821	
14674	4,000	873	
14676	4,000	2,687	YES
14678	4,000	2,681	YES
14682	4,000	3,120	YES
14684	4,000	2,018	YES

Table A1. Available Fire Flow at 20 psi for Buildout System at Failed Fire Flow Locations

Model ID	Fire-Flow Demand, gpm	Available Flow, gpm	Split Flow Available
14688	4,000	3,438	YES
14690	4,000	1,027	
14696	4,000	3,578	YES
14698	4,000	2,807	YES
14700	4,000	3,972	YES
14704	4,000	2,831	YES
14706	4,000	1,474	
14708	4,000	2,079	YES
14712	4,000	1,732	
14714	4,000	3,559	YES
14716	4,000	2,630	YES
14718	4,000	1,450	
14720	4,000	2,087	YES
14952	4,000	2,321	YES
14960	4,000	3,785	YES
14998	4,000	3,892	YES
15028	4,000	3,482	YES
15030	4,000	3,819	YES
15034	4,000	3,029	YES
15038	4,000	2,761	YES
15040	4,000	3,342	YES
15190	4,000	2,555	YES
15192	4,000	2,368	YES
15270	4,000	3,572	YES
15290	4,000	3,149	YES
15340	4,000	3,645	YES
15510	4,000	3,553	YES
15514	4,000	2,318	YES
15770	4,000	2,792	YES
15790	1,500	1,497	YES
15828	1,500	1,052	YES
15994	4,000	2,677	YES
16000	4,000	3,317	YES
16042	4,000	3,178	YES
16044	4,000	2,940	YES
16224	4,000	3,642	YES
16232	4,000	2,672	YES
16234	4,000	3,766	YES
16240	4,000	3,791	YES
16496	1,500	857	YES
16562	1,500	1,461	YES
16976	1,500	1,256	YES
17048	4,000	3,527	YES
17100	1,500	1,362	YES
17102	1,500	1,273	YES

Table A1. Available Fire Flow at 20 psi for Buildout System at Failed Fire Flow Locations

Model ID	Fire-Flow Demand, gpm	Available Flow, gpm	Split Flow Available
17104	1,500	1,363	YES
17146	4,000	2,573	YES
17644	4,000	3,860	YES
17826	1,500	1,118	YES
17828	1,500	1,217	YES
17830	1,500	1,112	YES
17916	1,500	1,418	YES
17918	1,500	1,043	YES
17920	1,500	1,054	YES
17922	1,500	1,418	YES
17924	1,500	1,386	YES
17926	4,000	1,912	
18200	1,500	1,338	YES
18610	4,000	924	
18616	1,500	1,197	YES
18658	4,000	3,565	YES
18728	4,000	2,642	YES
18770	4,000	3,241	YES
18792	1,500	671	
18818	1,500	1,421	YES
18824	4,000	1,929	
18832	4,000	3,750	YES
18838	1,500	1,214	YES
18840	1,500	1,030	YES
19064	1,500	1,539	YES
19090	4,000	3,998	YES
19242	4,000	3,138	YES
19330	1,500	1,434	YES
19358	1,500	1,419	YES
19376	4,000	2,122	YES
19378	4,000	2,410	YES
19394	1,500	717	
19396	1,500	933	YES
19408	1,500	641	
19610	4,000	1,578	
19634	1,500	713	
19638	4,000	3,502	YES
19684	4,000	3,541	YES
19690	1,500	1,396	YES
19692	1,500	1,194	YES
19748	4,000	2,089	YES
19750	1,500	926	YES
19754	4,000	2,821	YES
19838	4,000	1,990	
19840	4,000	2,448	YES

Table A1. Available Fire Flow at 20 psi for Buildout System at Failed Fire Flow Locations

Model ID	Fire-Flow Demand, gpm	Available Flow, gpm	Split Flow Available
20016	4,000	2,963	YES
20020	4,000	2,497	YES
20022	4,000	3,147	YES
20086	1,500	819	YES
20124	1,500	1,098	YES
20126	1,500	971	YES
20130	1,500	763	YES
20136	4,000	3,331	YES
20138	4,000	1,664	
20140	4,000	1,127	
20246	4,000	3,768	YES
20384	1,500	1,375	YES
20388	1,500	1,461	YES
20736	4,000	2,904	YES
20738	4,000	2,234	YES
20740	4,000	2,332	YES
20832	4,000	1,972	
20930	4,000	4,195	YES
20952	4,000	3,042	YES
20954	4,000	3,150	YES
21016	1,500	1,498	YES
21056	4,000	3,099	YES
21060	4,000	1,533	
21062	4,000	1,886	
21064	4,000	1,887	
21066	4,000	2,279	YES
21068	4,000	2,178	YES
21070	4,000	2,585	YES
21114	4,000	3,461	YES
21116	4,000	3,223	YES
21118	4,000	2,464	YES
21120	4,000	2,843	YES
21122	4,000	3,689	YES
21138	4,000	3,711	YES
21140	4,000	3,704	YES
80026	4,000	3,892	YES
80028	4,000	3,840	YES

ATTACHMENT B

Detailed Cost Tables

Table B1. Summary of CIP Recommendation Cost Estimate for Pumping Facility Backup Power for Buildout Contiguous Service Area[a]

Pump Station	Status[b]	Pump HP	Total Capacity [gpm][c]	Firm Capacity [gpm][c]	Backup Power Required[d]	Backup Power Recommended[e]	Existing Backup Power[f]	Backup Cost[g]	GW Storage Credit	Remarks
Booster Pump Stations										
Tank 3	Active		2,400	1,800	Y		Yes	$0		
Tank 4	Active		3,760	2,810	Y		Yes	$0		
Tank 5	Active		3,750	2,800	Y		Yes	$0		
Tank 6	Active		7,450	4,935	Y		Yes	$0		
Tank 7	Active		7,350	4,900	Y		Yes	$0		
Tank 8	Active		7,710	5,140	Y		Yes	$0		
Tank 10	OOS - Repair		6,255	4,170			Yes	$0		
MID Terminal Reservoir	Active		55,600	20,833	Y		Yes	$0		
Well Pump Stations										
Well 001	Active	60	950	950	Y			$0	--	Recommended in Existing System CIP
Well 002	OOS - WQ	150	1,500	--				$0	--	
Well 003	OOS - WQ	60	800	--				$0	--	
Well 004	Active	100	950	950	Y			$0	--	Recommended in Existing System CIP
Well 006	Active	75	950	950	Y		Yes	$0	--	
Well 007	Active	75	950	950	Y			$0	--	Recommended in Existing System CIP
Well 008	OOS - WQ	50	775	--				$0	--	
Well 010	Active	60	400	400	Y	Y		$133,333	0.58	
Well 014	OOS - WQ	100	1,500	--			Yes	$0	--	
Well 016	Active	150	1,800	1,800	Y			$0	--	Recommended in Existing System CIP
Well 017	Active	100	1,450	1,450	Y	Y		$133,333	2.09	
Well 018	OOS -WQ	100	750	--				$0	--	
Well 019	OOS - WQ	40	600	--				$0	--	
Well 021	OOS - WQ	125	1,500	--				$0	--	
Well 022	OOS - WQ	125	1,000	--				$0	--	
Well 024	OOS - WQ	150	1,500	--				$0	--	
Well 025	Active	125	1,500	1,500	Y		Yes	$0	--	
Well 029	Active	75	1,058	--				$0	--	
Well 030	Active	75	1,000	--				$0	--	
Well 032	OOS - WQ	75	800	--				$0	--	
Well 033	Active	150	1,800	1,800	Y		Yes	$0	--	
Well 034	OOS - WQ	100	1,250	--				$0	--	
Well 036	Active	100	1,050	1,050	Y	Y		$133,333	1.51	
Well 037	OOS - WQ	125	1,250	--				$0	--	
Well 038	Active	100	1,163	--				$0	--	
Well 039	Active	150	1,950	1,950	Y		Yes	$0	--	
Well 040	Active	150	1,400	1,400	Y		Yes	$0	--	
Well 041	Active	150	1,200	1,200	Y		Yes	$0	--	
Well 042	Active	150	1,800	1,800	Y		Yes	$0	--	
Well 043	Active	150	1,900	1,900	Y		Yes	$0	--	
Well 044	OOS - WQ	100	1,250	--			Yes	$0	--	
Well 045	Active	100	1,500	1,500	Y	Y		$133,333	2.16	
Well 046	Active	100	1,150	--				$0	--	
Well 047	Active	150	1,600	1,600	Y	Y		$133,333	2.3	
Well 048	Active	125	1,330	1,330	Y	Y		$133,333	1.92	
Well 049	OOS - WQ	75	500	--			Yes	$0	--	To be returned to service
Well 050	Active	100	800	800	Y			$0	--	Recommended in Existing System CIP
Well 051	Active	250	2,200	--				$0	--	
Well 052	Active	150	1,600	1,600	Y		Yes	$0	--	
Well 053	OOS - WQ	100	1,500	--				$0	--	
Well 054	Active	200	2,400	2,400	Y		Yes	$0	--	
Well 055	OOS - WQ	100	1,500	--				$0	--	
Well 056	Active	75	650	650	Y	Y		$133,333	0.94	
Well 057	Active	100	1,350	1,350	Y		Yes	$0	--	
Well 058	Active	100	1,300	1,300	Y			$0	--	Recommended in Existing System CIP
Well 059	Active	125	1,400	--				$0	--	
Well 061	Active	200	1,575	1,575	Y		Yes			
Well 062	Active		2,200	2,200	Y		Yes	$0	--	
Well 063	Proposed		1,500	1,500	Y			$0	--	Recommended in Existing System CIP
Well 064	Active	40	2,250	2,250	Y		Yes	$0	--	
Well 065	Active	100	2,600	2,600	Y		Yes	$0	--	
Well 066	Active	100	1,590	1,590	Y		Yes	$0	--	
Well 100	Active	100	650	650	Y			$0	--	Recommended in Existing System CIP
Well 204	Active	25	1,450	1,450	Y	Y		$133,333	2.09	
Well 211	Active	40	1,450	1,450	Y	Y		$133,333	2.09	
Well 212	Active	40	1,000	--				$0	--	
Well 213	Active	40	240	240	Y			$0	--	Recommended in Existing System CIP
Well 214	OOS - WQ	30	400	--				$0	--	
Well 216	Active	150	550	550	Y	Y		$133,333	0.79	
Well 217	Active	40	400	400	Y			$0	--	Recommended in Existing System CIP
Well 223	Active	50	340	340	Y		Yes	$0	--	
Well 225	Active	75	1,200	1,200	Y		Yes	$0	--	
Well 226	OOS - WQ	75	675	--				$0	--	
Well 229	Active	20	425	--				$0	--	
Well 232	Active	15	775	775	Y			$0	--	Recommended in Existing System CIP
Well 236	OOS - WQ	40	750	--				$0	--	
Well 237	Active	75	630	630	Y			$0	--	Recommended in Existing System CIP
Well 241	Active	40	350	350	Y			$0	--	Recommended in Existing System CIP
Well 247	Active	20	560	560	Y	Y		$133,333	0.81	
Well 250	Active	20	835	835	Y	Y		$133,333	1.2	
Well 259	Active	40	400	400	Y	Y		$133,333	0.58	
Well 262	Active	100	350	350	Y	Y		$133,333	0.5	
Well 264	Active	50	700	700	Y	Y		$133,333	1.01	
Well 265	Active	100	500	500	Y	Y		$133,333	0.72	
Well 267	Active	150	1,190	1,190	Y			$0	--	Recommended in Existing System CIP
Well 269	Active	100	750	--				$0	--	
Well 277	Active	100	1,000	--				$0	--	
Well 278	Active	75	800	800	Y			$0	--	Recommended in Existing System CIP
Well 279	Active	75	800	800	Y		Yes	$0	--	
Well 281	Active	100	480	480	Y	Y		$133,333	0.69	
Well 283	OOS - WQ	75	800	--				$0	--	
Well 284	Active	50	750	750	Y			$0	--	Recommended in Existing System CIP
Well 285	OOS - WQ	50	1,000	--			Yes	$0	--	
Well 287	Active	75	825	--				$0	--	
Well 288	Active	75	650	--				$0	--	
Well 290	Active	100	633	--				$0	--	
Well 291	Active	100	500	500	Y	Y		$133,333	0.72	
Well 292	Active	75	850	850	Y	Y		$133,333	1.22	
Well 293	OOS - WQ	100	825	--			Yes	$0	--	
Well 294	Active	100	1,325	1,325	Y		Yes	$0	--	
Well 296	Active	100	900	900	Y		Yes	$0	--	
Well 297	Active	75	1,300	--				$0	--	
Well 298	Active	40	1,200	1,200	Y		Yes	$0	--	
Well 299	Active	40	450	450	Y		Yes	$0	--	
Well 300	Active		700	--				$0	--	
Well 301	Active	100	500	500	Y		Yes	$0	--	
Well 304	OOS - WQ	75	525	--			Yes	$0	--	
Well 305	Active	150	560	560	Y		Yes	$0	--	
Well 307	Active	40	1,050	1,050	Y	Y		$133,333	1.51	
Well 308	Active		850	--				$0	--	
Well 310	Active		1,320	1,320	Y		Yes	$0	--	
Well 312	Active		1,040	1,040	Y			$0	--	Recommended in Existing System CIP
Well 313	Active		1,020	1,020	Y		Yes	$0	--	
Shelter Cove Well	Proposed		1,000	1,000	Y	Y		--[h]	1.44	
Tivoli Well	Proposed		1,500	1,500	Y	Y		--[h]	2.16	
Grogan Well	Proposed		1,500	1,500	Y	Y		--[h]	2.16	
FMC Well	Proposed		1,000	1,000	Y	Y		--[h]	1.44	
Plastipak Well	Proposed		1,000	1,000	Y	Y		--[h]	1.44	
GRAND Total						**25**		**$2,667,000**	**34.1**	

[a] Table includes existing facilities and proposed developer wells.

[b] Pump capacity based on information provided by City staff.

[c] Firm capacity (Pumping capacity with largest pump out of service or single pump with available backup power supply) with the installation of additional pumps or backup power supply as described in recommended CIP.

[d] Based on need to satisfy required buildout system storage capacity deficiency.

[e] Backup power information provided by City.

[f] Backup generator cost provided by City. Marsh 2010 (ENR 9728.17) costs.

[g] OOS – Out of Service [as of August 2009]

[h] The cost of backup power for proposed wells is included in the well construction cost.

= Recommended location for installation of backup powe

Table B2. Buildout Contiguous Service Area CIP Pipeline Recommendations

CIP ID	CIP Reason[a]	Recommendation / Reference Source	Diameter (in) Existing	Diameter (in) Proposed	Address	Quantity [lf]	Unit Cost [$/lf][b]	Total Cost [$]
TID Transmission Pipelines								
TID01	City TID		--	24	Whitmore Avenue between Morgan Road and Crows Landing Road	5,540	218	$1,205,000
TID02	City TID		--	16	Whitmore Avenue between Crows Landing Road and Carpenter Road	10,630	163	$1,727,000
TID03	City TID		--	16	Carpenter Road between Hatch Road and Whitmore Avenue	4,710	163	$765,000
TID04	City TID		--	16	TID Connection to Distribution	60	163	$10,000
	City TID		--	12	TID Connection to Distribution	190	136	$26,000
Total								**$3,733,000**
Developer-Funded Improvements								
DV-KBPE	Development	KBPE Water Capacity Study	--	12	Kiernan Business Park East Development	10,370	136	$1,414,000
DV-PR	Development	Promenade Water Capacity Study	--	12	Promenade Development	6,680	136	$911,000
DV-KMC	Development		--	12	Kaiser Medical Center Development	6,710	136	$915,000
	Development		--	16	Kaiser Medical Center Development	3,700	163	$601,000
DV-KBPS	Development	KBPS Water Capacity Study	--	12		4,920	136	$671,000
DV-WG	Development	Woodglen Water Capacity Study	--	8	Woodglen Development	20,840	101	$2,095,000
	Development	Woodglen Water Capacity Study	--	10	Woodglen Development	80	123	$10,000
	Development	Woodglen Water Capacity Study	--	12	Woodglen Development	690	136	$94,000
DV-PM	Development	Pelandale-McHenry Water Capacity Study	--	8	Pelandale-McHenry Development	4,740	101	$477,000
	Development	Pelandale-McHenry Water Capacity Study	--	10	Pelandale-McHenry Development	4,950	123	$607,000
DV-MAR	Development	Martin Water Capacity Study	--	8	Martin Development	1,870	101	$188,000
	Development	Martin Water Capacity Study	--	10	Martin Development	3,630	123	$445,000
	Development	Martin Water Capacity Study	--	12	Martin Development	100	136	$14,000
	Development	Martin Water Capacity Study	--	16	Martin Development	960	163	$156,000
DV-TIV	Development	Tivoli Water Capacity Study	--	12	Tivoli Development	21,290	136	$2,903,000
	Development	Tivoli Water Capacity Study	--	16	Tivoli Development	10,710	163	$1,740,000
DV-NC	Development	Ninth and Carver Water Capacity Study	--	10	Ninth and Carver Development	4,140	123	$507,000
DV-KW	Development	Kansas-Woodland Water Capacity Study	--	10	Kansas-Woodland Development	1,630	123	$200,000
	Development		--	12	Kansas-Woodland Development	3,330	136	$454,000
DV-WP	Development		--	8	Westport Landing Development	13,900	101	$1,397,000
	Development		--	12	Westport Landing Development	12,710	136	$1,733,000
DV-BB	Development		--	8	Bava Brothers Development	5,920	101	$595,000
	Development		--	12	Bava Brothers Development	1,850	136	$252,000
Total								**$18,379,000**
Previously Funded MID Phase 2 Downstream Improvement Infrastructure								
MID02WT01	MID P2		--	16	Rosemore Avenue between Maze Boulevard and Elm Avenue	1,330	163	$216,000
Proposed Buildout System Pipelines								
TR01SOI	Grid	KBPE Water Capacity Study	--	16	Kiernan Avenue between Dale Avenue and American Avenue	1,280	163	$208,000
TR02SOI	Grid	Tivoli Water Capacity Study	--	16	Roselle Avenue between Sylvan Avenue and Claratina Avenue	4,000	163	$650,000
TR04SOI	Grid		10	12	Morse Road between McDonald Avenue and Kansas Avenue	6,110	136	$833,000
TR05SOI	Grid		10	12	Woodland Avenue between Morse Road and Carpenter Road	5,300	136	$723,000
TR06SOI	Grid		10	12	Grimes Avenue between Chicago Avenue and Paradise Road	2,950	136	$402,000
	Grid		10	12	Paradise Road between Grimes Avenue and Ohio Avenue	2,740	136	$374,000
	Grid		10	12	Ohio Avenue between Chicago Avenue and Paradise Road	2,560	136	$349,000
TR07SOI	Grid		--	12	Bangs Avenue between American Avenue and Carver Avenue	5,240	136	$714,000
SB01SOI	Grid		--	16	Kiernan Avenue between Stoddard Road and Dale Road	5,320	163	$865,000
	Grid		--	12	Technology Drive between Stoddard Road and Dale Road	3,630	136	$495,000
	Grid		--	12	Bangs Avenue between Stoddard Road and Chapman Road	1,690	136	$230,000
	Grid		--	12	Chapman Road between Bangs Avenue and Kiernan Avenue	2,580	136	$352,000
SB02SOI	Grid		--	12	Dale Road south of Kiernan Avenue	150	136	$20,000
SB03SOI	Grid		--	12	Kiernan Avenue between American Avenue and Terminal Avenue	34,980	136	$4,769,000
SB04SOI	Grid		--	12	East of Morrow Road between Kiernan Avenue and Avignon Lane	2,520	136	$344,000
SB05SOI	Grid		--	12	Carver Road between Kiernan Avenue and Avignon Lane	2,630	136	$359,000
SB06SOI	Grid		--	12	Tully Road between Kiernan Avenue and Avignon Lane	3,050	136	$416,000
	Grid		--	12	East of Tully Road between Kiernan Avenue and Avignon Lane	2,700	136	$368,000
	Grid		--	12	Henry Avenue between Claribel Avenue and Bangs Avenue	1,240	136	$169,000
SB07SOI	Grid		--	12	East of Henry Avenue between Claribel Avenue and Claratina Avenue	2,600	136	$354,000
	Grid		--	12	Coffee Road between Claribel Avenue and Claratina Avenue	2,640	136	$360,000
	Grid		--	12	Coffee Road between Claribel Avenue and Bangs Avenue	1,300	136	$177,000
	Grid		--	12	Oakdale Road between Claribel Avenue and Claratina Avenue	3,930	136	$536,000
	Grid		--	12	East of Oakdale Road between Claribel Avenue and Claratina Avenue	3,970	136	$541,000
	Grid		--	12	Roselle Avenue between Claribel Avenue and Plainview Road	670	136	$91,000
	Grid		--	16	Roselle Avenue south of Plainview Road	2,630	163	$427,000
SB08SOI	Grid		--	12	Plainview Road between McHenry Avenue and Oakdale Road	10,520	136	$1,434,000
	Grid		--	16	Plainview Road between Oakdale Road and Litt Road	7,930	163	$1,289,000
SB09SOI	Grid		--	12	Mabel Avenue between Roselle Avenue and Litt Road	2,890	136	$394,000
SB10SOI	Grid		--	12	Litt Road between Claribel Avenue and Sylvan Avenue	6,840	136	$933,000
SB11SOI	Grid		--	12	Terminal Avenue between Parker Road and Plainview Avenue	14,210	136	$1,937,000
SB12SOI	Grid		--	10	Hillglen Avenue between Roselle Avenue and Esta Avenue	1,320	123	$162,000
	Grid		--	12	Floyd Avenue between Claus Road and Santa Fe Avenue	1,150	136	$157,000
	Grid		--	12	Meryl Avenue between Claus Road and Santa Fe Avenue	1,910	136	$260,000
SB13SOI	Grid		--	12	Morse Avenue between McDonald Avenue and Brink Avenue	6,080	136	$829,000
	Grid		--	12	Shoemaker Avenue between Morse Avenue and Brink Avenue	2,990	136	$408,000
	Grid		--	16	Brink Avenue between Shoemaker Avenue and north of North Avenue	5,680	163	$923,000
SB14SOI	Grid		--	16	Nebraska Avenue between Kansas Avenue and Maze Boulevard	2,670	163	$434,000
SB15SOI	Grid		--	12	Maze Boulevard between Rosemore Avenue and Carpenter Road	2,710	136	$369,000
	Grid		--	16	Maze Boulevard between Rosemore Avenue and Carpenter Road	2,660	163	$432,000
SB16SOI	Grid		--	12	Grimes Avenue between Maze Boulevard and California Avenue	5,610	136	$765,000
SB17SOI	Grid		--	12	California Avenue between Grimes Avenue and Carpenter Road	4,010	136	$547,000
SB18SOI	Grid		--	12	Ohio Avenue between Chicago Avenue and California Avenue	2,580	136	$352,000
SB19SOI	Grid		--	12	Houser Lane between Ohio Avenue and Carpenter Road	1,370	136	$187,000
SB20SOI	Grid		--	12	Parkdale Drive	1,130	136	$154,000
	Grid		--	12	Vivian Road between Whitmore Avenue and Hatch Road	4,900	136	$668,000
	Grid		--	12	Whitmore Avenue between Vivian Road and Carpenter Road	5,290	136	$721,000
	Grid		--	12	Carpenter Road north of Whitmore Avenue	2,190	136	$299,000
	Grid		--	12	Whitmore-Carpenter Development	11,710	136	$1,596,000
	Dist		8	--	North of Hatch Road and west of Carpenter Road[c]	7,150	0	$0
	Dist		12	--	North of Hatch Road and west of Carpenter Road[c]	8,350	0	$0
SB21SOI	Grid		--	12	SOI Buildout Pipelines for Empire Region	27,830	136	$3,794,000
Total								**$34,170,000**

[a] Grid = Recommended City-Wide System Grid
Development = Infrastructure associated with developments. Funds provided by developer constructing development
City TID = City facility for TID SWSP
MID P2 = MID Phase 2 Downstream Improvement Infrastructure. Funding included in previous Engineer's Report
[b] Pipe cost based on March 2010 San Francisco ENR Index (9728.17).

Appendix 3.4 – Expanded Non-potable Water Use Program Technical Documents

City of Turlock Expanded Non-Potable Use Project - Water Demands

Monthly Non-Potable Water Demands by Park in MGD for 2013

	Pedretti	Country Walk	Wellington	Sports Complex	Donnelly (E&W)	Totals (MGD)	Total Demands (gpd)
Acre	21	18.5	11.1	35.1	40	125.7	
Jan	0.071	0.105	0.007	0.369	0.627	1.179	1,178,682
Feb	0.593	0.943	0.072	0.955	2.091	4.654	4,654,491
Mar	1.313	3.107	0.001	0.694	3.344	8.459	8,459,167
Apr	2.027	4.774	0.000	1.991	3.235	12.027	12,026,536
May	3.572	6.888	0.000	5.883	6.128	22.471	22,470,817
Jun	3.571	6.723	0.209	6.137	6.594	23.234	23,233,905
Jul	3.405	7.450	2.335	5.970	7.947	27.107	27,107,000
Aug	2.999	5.906	1.914	5.612	8.214	24.645	24,645,000
Sep	2.588	5.990	1.772	3.853	6.013	20.216	20,216,492
Oct	1.266	4.379	0.855	2.142	3.207	11.849	11,849,000
Nov	0.581	2.546	0.266	0.414	2.492	6.299	6,299,061
Dec	0.354	0.021	0.061	0.050	0.043	0.529	529,299
Totals	22.34	48.83	7.49	34.07	49.94	162.67	162,669,450

Demand Estimates by Park

	Markley	Christoffersen	Rotary	Summerfaire	Sunnyview	Walnut	**Total**
Acres	6.5	12.7	5	16.6	9.8	20	70.6
Rate [1]	*0.05*	*0.10*	*0.04*	*0.13*	*0.08*	*0.16*	*0.56*
	gallons	gallons	gallons	gallons	gallons	gallons	gallons
January	60,950	119,087	46,885	155,657	91,894	187,539	662,012
February	240,686	470,263	185,143	614,674	362,880	740,571	2,614,217
March	437,427	854,665	336,482	1,117,121	659,505	1,345,930	4,751,131
April	621,897	1,215,092	478,382	1,588,230	937,630	1,913,530	6,754,761
May	1,161,975	2,270,321	893,827	2,967,506	1,751,901	3,575,309	12,620,841
June	1,201,435	2,347,419	924,181	3,068,280	1,811,394	3,696,723	13,049,433
July	1,401,714	2,738,734	1,078,242	3,579,763	2,113,354	4,312,967	15,224,775
August	1,274,403	2,489,988	980,310	3,254,630	1,921,408	3,921,241	13,841,981
September	1,045,403	2,042,557	804,156	2,669,799	1,576,147	3,216,626	11,354,688
October	612,717	1,197,154	471,321	1,564,784	923,788	1,885,282	6,655,047
November	325,727	636,421	250,559	831,857	491,096	1,002,237	3,537,897
December	27,370	53,477	21,054	69,899	41,266	84,216	297,283
Total (gallons per year)	8,411,706	16,435,179	6,470,543	21,482,203	12,682,264	25,882,172	91,364,067
Demand (gpd)	23,046	45,028	17,728	58,855	34,746	70,910	250,313
Demand (AFY)	26	50	20	66	39	79	**281**

Footnotes:

1. Consumption estimate based on current non-potable parks usage for 2013 by month

Potable Groundwater Use - Energy Usage

Potable Water Wells Energy Usage (2005-2012)

Year	# of Wells	Flow	KWH/MG
2005	23	8272	1443
2006	24	8218	1454
2007	24	8090	1557
2008	24	7638	1544
2009	24	7243	1555
2010	24	6688	1528
2011	24	6301	1740
2012	23	6671	1619
		Avg	1555
			518 kWh per AF

Energy Pumping for Reduced Lift based on City of Turlock Electricity Use Data for Pumping

$$E = \emptyset \cdot W \cdot h$$

Where
E - energy (MWh)
Ø - coefficient
h - average groundwer depth from land surface
W - million cubic meters of groundwater pumped

and

$$\emptyset = \gamma \cdot \rho \cdot g/1000$$

Where
g= pumping efficiency (typically between 0.4 and 0.7)
r= density of water (1000 kg/m^3)
g = acceleration of gravity (9.8 m/s2)

1 AF = 1233.482 m^3

Based on City of Turlock pumping information:

= 518 kWh/AF or	0.419949	kWh/m^3

and therefore the energy required to pump 1M m^3 =

419949.4	kWh
419.9494	MWh

so:

E =	419.9494	MWh
W =	1	million m^3
h =	600	ft
therefore:		
Ø =	0.699916	

So, pumping from the shallow aquifer (150 ft depth) would require:

E=	105	MWh	for 1 million m^3
or	0.105	kWh/m^3	
or	130	kWh/AF	