WASTE MANAGEMENT

WASTE MANAGEMENT INC. OF FLORIDA
2700 Wiles Road
Pompano Beach, FL 33073

November 14, 2012

Florida Department of Environmental Protection
Southeast District
Underground Injection Control Section
400 N. Congress Avenue, Suite 200
West Palm Beach, FL 33401
(Sent via FedEx November 15, 2012)

Re: RFI – Construction & Testing Permit Application for
Waste Management Inc. of Florida d.b.a. Medley Landfill

Dear Mr. Joe May:

Please find the attached Class I Injection Well System Construction & Testing Permit Application with supporting documents for the referenced project. In addition, a check in the amount of $12,500 is included for the permit application fee.

If you have any comments or questions regarding this application, please contact our consultants, L.S. Sims & Associates, Inc. at (321) 504-4046 or me at (863) 357-0824.

Sincerely,

Tim Hawkins, President
Waste Management, Inc. of Florida

Cc:
Mr. Gardner Strasser, FDEP
Joe Haberfeld, FDEP
Emily Richardson, SFWMD
Ron Reese, USGS
Nancy Marsh, US EPA
Larry Sims, L.S. Sims & Associates,

CLASS I INJECTION WELL SYSTEM
CONSTRUCTION & TESTING PERMIT APPLICATION
WASTE MANAGEMENT, INC. OF FLORIDA D.B.A. MEDLEY LANDFILL
MEDLEY, FLORIDA

November 2012

Prepared by:

L.S. Sims & Associates, Inc.
1530 U.S. Highway 1
Rockledge, Florida 32955
(321) 504-4046

CERTIFICATION

"I certify that this document and associated work was either completed by a professional geologist and/or completed by a qualified scientist supervised by a professional geologist, in accordance with Chapter 492, Florida Statutes, and/or a professional engineer, in accordance with Chapter 471, Florida Statutes, and was completed in accordance with applicable state rules and regulations."

James McGrath, P.G. #961
Senior Geologist

November 15, 2012

Date

Roger E. Mayfield, P.E. #0046092
Engineer of Record

November 15, 2012

Date

Prepared for:
Waste Management Inc, of Florida D.B.A. Medley Landfill

Prepared by:

L.S. Sims & Associates, Inc.
1530 U.S. Highway 1
Rockledge, Florida, 32955

Phone (321) 504-4046
Fax (321) 504-4035

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1.0 INTRODUCTION

This document has been prepared on behalf of Waste Management, Inc. of Florida (WM) dba Medley Landfill to support a Class I Injection Well Construction & Testing Permit Application. Medley Landfill intends to construct and operate a Class I Injection Well System at the Medley Landfill in accordance with the requirements set forth in Chapter 62-528 of the Florida Administrative Code (FAC). The Construction Permit Application [Form 62-528.900(1)] is included as **Appendix A**.

1.1 Facility Description

The Waste Management Medley Landfill is located in Dade County at 9350 NW 89th Avenue, Medley, Florida 33178 (Latitude 25.858612, Longitude -80.350834). The facility is located approximately 2 miles east of the Francis S Taylor Wildlife Management Area and about 6 miles west of the Opa Locka Executive Airport (**Figure 1**). The WM Medley Landfill is a Class I Landfill in Dade County and is operated pursuant to the Florida Department of Environmental Protection (FDEP) Permit No. 0056401-014-SC. The landfill generates leachate that is collected on-site via a leachate collection system. The leachate is currently delivered directly to the Medley sanitary sewer system which pipes the wastewater to the Wastewater Treatment Plant (a POTW) in Miami, FL for disposal. In addition to landfill leachate, the Medley Landfill will construct a Third Party Waste Receiving Facility that will be used to offload wastewater expected to be transported to the landfill in tanker trucks. Finally, in addition to landfill leachate and third party waste, a future onsite anaerobic digester will produce wastewater that will be disposed by the injection well. The planned anaerobic digester will be used to remove water from waste currently being disposed in the landfill. A site plan of the Medley Landfill facility is shown as **Figure 2**.

1.2 Project Overview

Waste Management has determined that leachate disposal via a properly constructed Class I Injection Well System is the most suitable long-term disposal method for the Medley Landfill facility.

1.3 Financial Responsibility

Waste Management, Inc. of Florida accepts complete financial responsibility for construction, operation and, if ever required, the plugging and abandonment of the proposed Class I injection well and/or completed Class I Injection Well System at the site. In accordance with Chapter 62-528.435 (7), a Plugging & Abandonment Plan was prepared by L.S. Sims & Associates, Inc. (LSSA). The Plugging & Abandonment Plan has been utilized as the basis for the WM Medley Landfill financial responsibility demonstration. The Plugging & Abandonment Plan is included in **Appendix B**. A Certification of Financial Responsibility is being prepared by Waste Management as part of this permit application. The certification will be sent directly to the FDEP Underground Injection Control (UIC) Section in Tallahassee, Florida under separate cover.

2.0 AREA OF REVIEW STUDY

The Area of Review (AOR) for this project has been established in accordance with the criteria set forth in Section 62-528.300(4).

2.1 Study Area

Computation of the zone of endangering influence has been calculated using the following equation presented by Warner and Lehr (1981):

$$r = (V/\pi b\phi)^{1/2}$$

where:

r = Radius distance of the wastewater front from the injection well (feet)
V = cumulative volume of injected wastewater (1.078×10^9 cubic feet)
b = Thickness of the injection zone (200 feet)
ϕ = average effective porosity (0.20)
π = 3.142 (dimensionless)

r = 2929 feet or approximately 0.55 miles

The thickness of the injection zone at the WM Medley Landfill site is estimated to be as much as 400 feet based on review of the available well logs in the area. By default, 200 feet has been used in the calculations for establishing the area of review. Operating at the design capacity of 2.2 million gallons per day (MGD) for a period of 10 years, the total volume of injected fluid is approximately 1.078×10^9 cubic feet. For purposes of establishing the AOR, a relatively low effective porosity value of 0.20 has been assumed for the injection zone. Based on the hydrogeologic conditions and maximum anticipated flow rates, a 0ne (1) mile AOR is proposed for this project.

2.2 Well Inventory

The South Florida Water Management District (SFWMD), Florida Geological Survey (FGS), and United States Geological Survey (USGS) and Florida Department of Health were contacted to determine the location, depth and ownership of wells within the AOR. The limits of the AOR and well locations are shown on **Figure 3**. For information purposes a copy of the agency well information for all wells within a radius of one (1) mile is included in **Appendix C**.

2.2.1 Wells Within the AOR

Seven (7) wells were identified within the AOR. All of the wells located within the area of review are water supply wells. Three (3) wells are located on the Medley Landfill property and one of the three has been plugged and abandoned. The depths of these wells range from 20 to 100 feet below land surface (BLS). A site map showing the locations of these wells relative to the Medley Landfill is included in **Appendix C**. All of the wells produce water for irrigation or process water and all of the wells are completed in the surficial aquifer. None of the wells is completed in the proposed injection zone or overlying confining units. There are no faults on record within the AOR.

2.3 Physiographic Features

The WM Medley Landfill site is situated at the southern end of the Lower East Coast sub region of South Florida and is located on the western edge of the Atlantic Coastal Ridge within two (2) miles of the Florida Everglades (*Cooke 1939, 1945 and White 1970*). In the area where the WM Medley Landfill site is located, land surface elevations are generally less than 10 feet above NGVD. The area is highly urbanized and present day landforms in this area have been attributed to urban sprawl (*Cooke 1945, Healy 1975* and others).

2.4 Hydrogeology

The site hydrogeology has been evaluated using data presented in studies conducted by the USGS (Lidz 1981; Miller 1986; Bradner 1994; and Aponte et.al., 1996) and the FGS (Chen 1965). Geophysical and lithologic logs for injection well systems at the City of Sunrise WWTP, Miramar WW Reclamation and Miramar Western WTP, North Miami Beach RO WTP, North District Miami Dade WWTP, Hialeah RO Test Well, Peninsula Utilities WWTP, Miami Dade South District WWTP, North District Miami Dade WWTP and the Monitor Site Lower East Coast WQ Network wells were reviewed. The location of these wells is shown on **Figure 1**. Using this information, hydrogeologic cross sections have been prepared and included as **Figures 4** and **5**. The following geologic formations and hydrogeologic units are expected to be present at the WM Medley Landfill site:

Table 2.1 Geologic Units Anticipated at the WM Medley Landfill Site

Depth (BLS)	Geologic Units
0 to 200	Undifferentiated Surficial Deposits
200 to 1050	Hawthorn Group
1050 to 1150	Suwannee
1150 to 2,500	Avon Park Formation
2,500 to 3,500	Oldsmar Formation

Table 2.2 Hydrogeologic Units Anticipated at the WM Medley Landfill Site

Depth (BLS)	Hydrogeologic Units
0 to 200	Surficial Aquifer System
200 to 1050	Upper Confining Unit
1050 to 1900	Upper Floridan Aquifer System
1900 to 3050	Primary Confining Unit
3050 to 3500	Injection Zone

2.4.1 Holocene, Pleistocene and Pliocene

2.4.1.1 *Surficial Aquifer System – Miami Limestone and Tamiami Formation*

Pleistocene sandy limestone is present from land surface to a depth of approximately 200 feet BLS in the vicinity of the WM Medley Landfill site [*Fish and Stewart (1991)*]. These deposits contain the Surficial Aquifer System (SAS). The SAS is highly transmissive and is used as a source of potable water supply in most areas of Dade County. The SAS consists of Sandy fossiliferous limestones (wackestone) of the Miami Limestone underlain by Sandy fossiliferous limestones (wackestone/packstone) of the Tamiami Formation. The SAS is unconfined.

2.4.2 Miocene

2.4.2.1 *Upper Confining Unit - Hawthorn Group*

The Hawthorn Group in south Florida has been differentiated into two (2) distinct formations (Scott 1988). The Peace River Formation consists predominantly of dolosilts interbedded with sand lenses, clay and limestone. This formation directly underlies the SAS. Geologic cross-sections prepared through the Dade County area (Scott 1988) indicate that the Peace River is approximately 400 feet thick in Dade County and thickens toward the east and southeast. The Arcadia Formation unconformably underlies the Peace River formation. The Arcadia formation contains more carbonates than the overlying Peace River and is characterized by abundant phosphate pellets and rubble beds. The Arcadia Formation is expected to be about 450 feet thick.

Collectively the middle to late-Miocene deposits of the Hawthorn Group form an Upper Confining Unit (Miller 1986) in the area of the WM Medley Landfill. Using geophysical and lithologic descriptions of cuttings from area wells near Medley, the Hawthorn Group Sediments are present between depths of approximately 200 feet to 1050 feet BLS at the proposed Medley Injection Well site.

2.4.3 Eocene - Floridan Aquifer System

Limestone

2.4.3.1 *Suwannee Limestone*

A thin interval of very light colored fine-grained packstone with good porosity is expected below the Hawthorn Group at a depth between 1,050 and 1,150 feet BLS. The interval should exhibit low natural radioactivity measured by gamma ray logs and no visible phosphate.

The interval is expected to lack the diagnostic fossils characteristic of the subjacent Avon Park Formation. There is a lack of consensus among local workers as to the presence or absence of the Suwannee Limestone in southeastern Florida because of marine erosion by the Florida current (Reese and Richardson, 2008). The Suwannee Limestone is regionally overlain by the Ocala Limestone except in the southern part of southeastern Florida, including most of Miami-Dade County (Reese and Richardson, 2008). Based on the documented absence of the Ocala, lack of visible phosphate and natural radioactivity, and lack of diagnostic fossils that would place the interval in the Avon Park Formation, the interval is placed in the early Oligocene-aged Suwannee.

2.4.3.2 *Avon Park Formation*

Applin and Applin (1944) proposed the name "Avon Park Limestone" to describe rocks of late Middle Eocene Age in northern and peninsular Florida. Miller (1986) combined the Avon Park Limestone with underlying Lake City Limestone into the Avon Park Formation because of the similarities between the units. In most areas of Florida, the units can only be divided by the micro fauna present within them. Miller defined the Avon Park Formation as "the sequence of predominantly brown limestones and dolomites of various textures that lies between the gray, largely micritic limestones and gray dolomites of the Oldsmar Formation and the white foraminiferal coquina or fossiliferous micrite of the Ocala Limestone." Duncan et al. (1994b) describes the lowermost section of the Avon Park Formation as characterized by intervals of nodular chert, cherty limestones and cherty dolostones. In Dade County the upper portion of the Avon Park is part of the Upper Floridan Aquifer, the middle portion of the Avon Park forms a semi-confining unit in some parts of the area and the lower Avon Park is part of the Lower Floridan Aquifer (Aponte et. al 1996 and Miller 1986).

Using lithologic data from the wells in the area of the project site (**Figures 4** and **5**), the Avon Park is expected to be between depths of approximately 1,150 to 2,500 feet BLS at the proposed Medley Landfill Injection Well site. The bottom of the Avon Park was delineated based on the presence of chert beds. The base of the Underground Source of Drinking Water (USDW) is expected to occur at a depth of approximately 1,750 feet BLS within the Avon Park at the Medley Landfill facility. The base of the USDW was determined at several wells in the area surrounding the subject site, notably the Peninsula Utilities well to the south and multiple Miramar wells to the north and the North Miami Beach and North District Miami Dade County wells to the east and a monitoring well to the west. Based on the identification of the base of the USDW at these wells locations, the base of the USDW at the Medley Landfill site is expected to occur at approximately 1,750 feet BLS. Below approximately 2,400 feet BLS, the lower portion of the Avon Park Formation is expected to form part of the principal confining unit overlying the target injection zone at the Medley Landfill site.

2.4.3.3 *Oldsmar Formation*

Applin and Applin (1944) applied the name "Oldsmar Limestone" to a series of faunal zones overlying the Cedar Keys Formation. Chen (1965) described the unit in peninsular Florida as being predominantly dolomite and limestone with gypsum and anhydrite as minor components. Duncan et al. (1994a) conformed to Miller (1986) and used the term "Oldsmar Formation" to describe the unit. They described the unit as consisting of "an upper section of interbedded white to light-gray, chalky packstone, wackestone,

mudstone, and grayish brown dolostone and a lower section of predominantly well-indurated, crystalline yellowish-brown dolostone." Glauconitic limestones are known to occur near the top of the formation accompanied by the index fossil, Helicostegina gyralis. The Oldsmar Formation contains the Lower Floridan Aquifer and the target injection zone (Boulder Zone) for the Medley Landfill Project.

At the Medley facility, the upper portion of the Oldsmar is expected to form part of the principal confining unit overlying the injection zone in the lower portion of the formation. Using the lithologic data and geophysical logs from the wells in the area of the project site (**Figures 4** and **5**), the Oldsmar is expected between depths of approximately 2,500 to 3,500 feet BLS at the proposed Medley Landfill Injection Well site. The bottom of the Oldsmar was not delineated in all wells in the area. The top of the Oldsmar was identified at several wells in the area surrounding the subject site, notably the Peninsula Utilities well to the south and multiple Miramar wells to the north and the North Miami Beach and North District Miami Dade County wells to the east and a monitoring well to the west. Based on the identification of the top of the Oldsmar Formation at these wells' locations, the Oldsmar Formation at the Medley Landfill site is expected to occur at approximately 2,500 feet BLS. The majority of the principal confining unit for the injection zone at the subject site is expected to lie within the Oldsmar Formation

These same area wells indicate the presence of a suitable injection zone is present in the interval from approximately 3,100 to 3,500 feet BLS at the Medley Landfill site. The geophysical logs indicate a highly fractured and cavernous formation is present at this depth and the records indicate that difficult drilling and lost circulation problems typical of the Boulder Zone occurred in this depth interval.

2.4.4 Paleocene – Sub Floridan Confining Unit

2.4.4.1 *Cedar Keys Formation*

The Paleocene-age Cedar Keys Formation forms a confining unit beneath the FAS. The Cedar Keys is easily identified on geophysical logs due to the markedly lower formation porosity. Secondary mineralization has filled most of the porosity in this formation with anhydrite. Based on the several nearby wells well logs the top of the Cedar Keys Formation is expected to occur at approximately 3,500 feet BLS at the Medley site. Penetration of the Cedar Keys Formation by more than a few feet, if at all, is not anticipated at the Medley Landfill site.

3.0 SYSTEM DESIGN CONSIDERATIONS

3.1 Leachate Generation and Collection

The WM Medley Class I Landfill is equipped with a leachate collection system. The leachate that is generated at the landfill is currently collected on-site via a leachate collection system. The leachate is then delivered directly to the Medley sanitary sewer system which pipes the wastewater to the Wastewater Treatment Plant (a POTW) in Miami, FL for disposal. In addition to landfill leachate, the Medley Landfill will construct a Third Party Waste Receiving Facility that will be used to offload wastewater expected to be transported to the landfill in tanker trucks. Finally, in addition to landfill leachate and third party waste, a future onsite anaerobic digester will produce wastewater that will be disposed by the injection well. The contribution of wastewater from each the three primary sources is expected to be as follows:

Leachate from Landfill	300,000 – 400,000
Future AD	200,000 – 300,000
3rd Party Waste	288,000 - 388,000
Growth Allowance	158,000
Total	946,000 – 1,246,000 Gallons Per-Day (GPD)

The anticipated average and maximum flows and well-head pressure are summarized in **Table 3.1** below for the initial ten years of operation:

3.1 Medley Proposed Operating Data

	Average			Maximum		
	Operational Testing	Operating Permit	10th Year Operation	Operational Testing	Operating Permit	10th Year Operation
Daily Volume (MGD)	0.300	0.588	0.946	0.400	0.788	1.245
Well-Head Pressure (PSI)	25.0	26.5	29.7	25.4	28.1	33.2

During calendar year 2011 the landfill generated approximately 38 million gallons (MG) of leachate or approximately 104,000 GPD. WM expects the landfill to be in operation for over 30 years and as the facility expands the leachate generation rate will also increase. Construction details for the proposed WM Medley Class I Injection Well are shown on **Figure 6**. Construction details for the proposed Dual Zone Monitor Well are shown on **Figure 7**. A more detailed version of the site plan is shown in **Figure 8** and shows the relative locations of the future anaerobic digester and the planned third party waste receiving pad.

3.2 Leachate Quality

On August 31, 2012 samples of the Medley Landfill leachate were collected and analyzed. The laboratory analytical test reports of these samples are included in **Appendix D**. The landfill leachate test results are either below laboratory detection limits (BDL), or the Florida Primary Drinking Water Standards (FPDWS Chapter 62-550 FAC), or the Florida Secondary Drinking Water Standards (FSDWS –Chapter 62-550 FAC) and/or the Florida Groundwater Cleanup Target Levels (GWCTLS –Chapter 62-777 FAC). None of the detected analytes were present in concentrations classifying the leachate as hazardous.

The landfill leachate test results are also below the standards for semi-volatile organics, chlorinated pesticides and carbamated pesticides. Several inorganic constituents exceeded the FPDWS including arsenic, chromium nickel and sodium. Several inorganic constituents also exceeded the FSDWS including iron, aluminum, chloride and TDS. The chloride concentrations were 1,400 mg/L and the TDS of the leachate sample was 6,520 mg/L.

The pH of the leachate sample was 7.9 standard units (S.U.). The corrosivity test (Langlier Saturation Index) indicates the leachate sample has the potential to be slightly scale forming in some piping materials.

The total kjeldahl nitrogen (TKN) concentration of the landfill leachate sample was reported at a concentration of 862 mg/L. The concentration of ammonia was 778 mg/L.

3.3 Fluid Compatibility

The Medley LF leachate should be compatible with the injection zone formation, ambient groundwater and the proposed well construction materials proposed for use in the Class I Injection Well. The following table shows a comparison of the constituents in the injection zone formation water (sampled January 14, 2009) at the Okeechobee Landfill, Inc. site and the Medley Landfill leachate sampled on August 28,, 2012. The injection zone water quality at the Medley LF site is expected to be very similar to that at the OLI site.

Table 3.2 Medley Leachate Quality vs. Injection Zone Water Quality

Analyte	Units	OLI Injection Zone 1/14/09	Medley Landfill Leachate		Lined LFRP Injection Tubing
			Leachate	Anaerobic Digester (Typ.)	
pH	mg/L	7.35	7.9	6.8-8.5	All Conc.
Sodium	mg/L	10,000	1,040	NA	All Conc.
Aluminum	mg/L	< 0.020	0.726	NA	All Conc.
Arsenic	mg/L	< 0.0026	0.152	NA	All Conc.
Barium	mg/L	0.037	0.396	NA	All Conc.
Chromium	mg/L	0.0020	0.202	NA	All Conc.
Copper	mg/L	< 0.0014	0.0059	NA	All Conc.
Manganese	mg/L	0.0090	0.132	NA	All Conc.
Nickel	mg/L	< 0.0020	0.0798	NA	All Conc.
Selenium	mg/L	< 0.0021	0.0027	NA	All Conc.
Antimony	mg/L	< 0.0023	0.0118	NA	All Conc.
Lead	mg/L	< 0.0030	0.004	NA	All Conc.
Ammonia	mg/L	20,000	778	3,000–5,000	All Conc.
Chloride	mg/L	20,000	1,400	NA	All Conc.
TDS	mg/L	32,000	6520	< 1,000	All Conc.
Sulfate	mg/L	2700	< 50	NA	No Data
Fluoride	mg/L	0.70	1.9	NA	All Conc.
Iron	mg/L	0.48	5.880	NA	All Conc.
TKN	mg/L	NM	862	3,000-5,000	All Conc.
Zinc	mg/L	0.057	0.0673	NA	No Data
Total Phosphorous	mg/L	NM	3.4	1,000–2,000	No Data
COD	mg/L	< 0.00029	4,000	50,000-60,000	All Conc.
BOD	mg/L	< 0.00023	310	3,000–4,000	All Conc.
Gross Alpha	pCi/L	200	71±44	NA	No Data
Acetone	mg/L	< 0.00021	1.310	NA	All Conc.
1,2-Dichloroethane	mg/L	< 0.00022	< 0.00025	NA	No Data
1,4-Dichlorobenzene	mg/L	< 0.00046	0.0034	NA	All Conc.
Benzene	mg/L	< 0.0002	0.0021	NA	All Conc.
Ethylbenzene	mg/L	< 0.00021	0.0022	NA	All Conc.
Toluene	mg/L	< 0.00022	0.0038	NA	All Conc.
Naphthalene	mg/L	< 0.0002	0.0133	NA	All Conc.
Total Xylenes	mg/L	< 0.00046	0.005	NA	All Conc.
Cyanide	mg/L	0.0081	0.014	NA	All Conc.
Alkalinity	mg/L	NM	NM	5,000-15,000	All Conc.
Potassium	mg/L	NM	NM	500-1,000	All Conc.
2-Butanone (MEK)	mg/L	NM	0.925	NA	All Conc.
Chloroform	mg/L	< 0.00025	0.0012	NA	All Conc.
Chlorobenzene	mg/L	< 0.0003	0.00087	NA	All Conc.
1,4Dichlorobenzene	mg/L	< 0.00023	0.0034	NA	All Conc.

NA – Not Available .... NM – Not Measured

3.4 Lined Fiberglass Reinforced Plastic (LFRP) Tubing Integrity

Chemical compatibility data from the Lined Fiberglass Reinforced Plastic (LFRP) tubing manufacturer (FPI-Future Pipe Industries) was reviewed to verify that there would be no potential incompatibilities between the Medley leachate and the LFRP tubing. Inorganics such as heavy metals and salts should have no effect on LFRP. Organic solvents (VOC-volatile organic compounds and SVOC-semi-volatile organic compounds) should have no effect on LFRP regarding deterioration of LFRP except for amines, chlorine, bromine and some strong acids. The FPI chemical resistance data for Blue Box Piping (**Appendix D**) was compared to the leachate analytical data in **Table 3.2**.

As with most chemical compatibility charts, the FPI data in Appendix D is based on pure chemical (or % level concentrations). The VOC and SVOC constituents in the leachate are in the parts per million or parts per billion ranges. In general, the leachate analysis does not show detectable concentrations of organic solvents which would typically be problematic for the LFRP tubing in the Medley Landfill Injection Well. The pH of the leachate is not extreme. The leachate does have a high inorganic salt concentration, but FPI's guidance does not indicate that this would be a problem.

3.5 Biologic Growth Potential

The Medley Landfill leachate does have relatively high ammonia, organic nitrogen and BOD levels. The Medley Landfill leachate could increase the nutrient loading to the groundwater in the injection zone. A possible problem scenario is bio-growth within the injection zone formation and/or injection tubing becoming thick enough to plug or impede flow. The Medley Landfill leachate data indicates the primary ingredients necessary for bio-growth are present (e.g. a carbonaceous food source (BOD), nitrogen available as a nutrient (TKN) and phosphorus available as a nutrient.

The other factor to consider is the nature of the injection zone. If we were injecting into a strata such as a sand zone, bio-growth could easily clog up the voids and plug the strata. However, the "boulder-zone" we are injecting into at the Medley Landfill site has very large cavities that serve as the flow path. In this situation it would be much more difficult to plug the injection zone with bio-growth.

In summary, there is definitely a potential for creating bio-growth in the injection strata due to the chemical nature of the leachate, so there is a risk of plugging. However, this risk is low at the Medley Landfill Injection Well because the injection zone is highly porous, with flow paths through large void areas and the volume of leachate proposed for disposal is relatively low.

3.6 Anticipated Injection Pressures

The maximum calculated shut-in pressure for the proposed injection well is approximately 24 pounds per square inch (PSI). This is considered a maximum value based on the assumption that the native formation water in the injection zone has the density of seawater and the leachate density is that of fresh water. The leachate density has not been measured but based on the chemical analyses it is expected to be greater than that of fresh water. Therefore the actual shut-in pressure of the injection well is expected to be about 24 PSI.

During operation, the wellhead pressure will increase due to friction losses in the injection tubing. Friction losses in the proposed 3,100-foot length of lined Fiberglass Reinforced Plastic (LLFRP) injection tubing have been calculated using an empirical formula developed by Hazen and Williams.

$$f = 0.2083\left(100/C\right)^{1.85} (q)^{1.85}/(d)^{4.8655}$$

where:

3100	= Casing/tubing depth in ft
8.9	d=Inside diameter of injection tubing (8.85 inches)
1534	q=Injection rate (1534 gallons per minute)
150	C=Tubing roughness coefficient (dimensionless, 150 for LFRP Tubing)
10	Land Surface elevation
63	Floridan Aquifer Head elevation (feet)
25.53257324	= friction loss in psi for whole string
24.346875	Floridan Aquifer Head elevation (PSI) above land surface
49.87944824	Maximum Predicted well head pressure

The calculated wellhead pressure due to pipe friction loss at the design flow rate of 2,260,000 GPD is 25 PSI. At the design flow rate the maximum operating pressure should not exceed 50 PSI.

3.7 Casing

The casings selected for construction of the proposed Class I Injection Well and Dual Zone Monitor Well will be new, unused, and conform with the American Society for Testing and Materials (ASTM) Designation A 53/A 53M-02 for seamless steel casings; ASTM Designation A 139-00 for spiral weld steel casing; and ASTM Designation D 2996-01 for LLFRP tubing. All steel casings will be plain end, with beveled finish for butt-welding. The LLFRP tubing will be threaded and coupled. The anticipated casing setting depths are shown on **Figures 6** and **7**. The exact casing setting depths will be determined in the field based on geologic conditions encountered during drilling. FDEP approval will be obtained prior to installation of the 20-inch NPS injection casing, 30-inch NPS intermediate casing string in the injection well and, 16-inch NPS intermediate casing string in the monitor well. Prior to casing installation the Contractor will be required to submit Mill Certifications for approval.

The 42-inch NPS conductor casing, 34-inch NPS surface casing, and 26-inch NPS intermediate casing proposed for the Class I Injection Well will be ASTM A 139, Grade B, electric fusion, arc—welded, helical-seam steel pipe (169.87 lb/ft, 137.80 lb/ft, and 105.73 lb/ft respectively). The 16-inch NPS injection casing proposed for the injection well will be ASTM A 53 Grade B, Type S-seamless steel, 0.500-inch thick wall (62.64 lb/ft). The LLFRP injection tubing proposed for the injection well will be Blue Box 1500 as manufactured by Future Pipe Industries (or equivalent). The nominal outside diameter is 9.94 inches and the nominal inner diameter is 8.85 inches (16.30 lb/ft). The tubing is threaded and coupled with a pin upset of 10.85 inches and box O.D. of 14.05 inches. At the design flow rate of 2.2 MGD the average fluid velocity inside the injection tubing will be 8.0 feet per second. The LLFRP injection tubing will transition to stainless steel casing at a depth of approximately 20 feet BLS. The stainless will extend through the concrete drill pad. All wellhead hardware on the Class I Injection Well will be stainless steel.

The 30-inch NPS conductor casing, 24-inch NPS surface casing and 16 NPS intermediate casing proposed for the Dual Zone Monitor Well will be ASTM A 53 Grade B, electric fusion, arc—welded, helical-seam steel pipe, standard (STD) 0.375-inch wall thickness 118.65 lb/ft, 94.71 lb/ft, and 62.64 lb/ft, respectively. The 16 NPS intermediate casing will transition to 316 stainless steel casing at the well-head.

The LFRP tubing proposed for the deep monitor zone will be Blue Box 1500 as manufactured by Future Pipe Industries (or equivalent). The nominal outside diameter is 6.10 inches and the nominal inner diameter is 5.43 inches (5.7 lb/ft). The tubing is threaded and coupled with a pin upset of 6.73 inches and a box O.D. of 8.00 inches. The upper 20 feet of tubing, including the portion extending through the pad, will be stainless steel.

3.8 Cement

In accordance with Chapter 62-528.410 (5) FAC, all cement utilized in construction of the injection well and monitor well will meet ASTM Type II standards or its equivalent, Standard Specification for Portland Cement, American National Standards Institute/ASTM C 150-05. Cementing procedures shall conform to The AWWA Standard for Water Wells, American Water Works Association A 100-90.

Prior to casing installation and cementing, the boreholes will be conditioned via wiper trips and circulating bottoms-up. A caliper log will be run to determine cement volumes. Casings will be centralized to ensure even placement of cement and to allow access for cement tremmie lines. The initial lift of cement for each casing string will be delivered by pressure grouting through a cement header. After allowing a minimum of 24 hours for curing, the top of the first lift will be tagged. Subsequent lifts will be delivered using a 1-inch tremmie pipe. After allowing time for each lift to cure, the top of the cement will be determined by tagging with the tremmie and verification using temperature logs run inside the casing. The theoretical cement volume will be compared with the actual cement volume placed in each lift.

The initial lift will be ASTM Type II neat cement and will not contain any additives. Remaining lifts may contain up to 12% bentonite gel. All drill mud, cement, and formation water displaced from the well during cementing will be containerized and shipped off-site for proper disposal.

3.9 Surge Control

The injection well pumping system will be equipped with variable frequency drives (VFDs) to control the speed of the pumps. The control system will be PLC-based, and designed to allow the operator to set the injection flow rate by setting the speed of the pumps. The PLC program will be written to automatically speed up the pumps (and thus flow rate) as the tank level approaches the high level mark, and slow down the flow rate as the tank level approaches the low level mark. Alarms will be enunciated to report high and low tank levels. The pump control will minimize abrupt starting and stopping of the injection well pumps, thus minimizing the potential for pressure surges and water hammer. As a secondary precaution, a surge suppressor will be installed in the piping system to further reduce the possibility of water hammer.

3.10 Drilling Fluids

No salt will be utilized as a drilling fluid additive during construction of the monitor well. Drilling mud (bentonite) will be used as necessary for hole conditioning and flow control. During construction of the injection well, drilling mud will be utilized for hole

conditioning and flow control until the intermediate casing is set and cemented in place. After installation of the intermediate casing, drilling mud and/or salt may be utilized as drilling fluid. All drilling fluids, formation water and drill cuttings will be contained in a closed circulation system. The system will be comprised of steel tanks with a minimum total capacity of 20,000 gallons. Solids will be separated from the drilling fluid with a screen (shale shaker) prior to being re-circulated in the well. The circulation system will be placed on a watertight containment area (drilling pad) to ensure that spills do not impact the SAS.

3.11 Waste Management

Drill cuttings and other non-hazardous solid wastes may be placed in the Medley Landfill. If necessary, excess drilling mud and formation water will be containerized and shipped off-site to an approved disposal facility. The name and location of the facility will be provided to the FDEP prior to beginning of construction.

4.0 DRILLING AND TESTING PROGRAM

The Injection Well will be constructed in phases to allow for the collection of data necessary to ensure that a Class I Injection Well can be constructed at the site in accordance with the requirements in Chapter 62-528 of the Florida Administrative Code (FAC). An Exploratory Drilling Program will be conducted initially to confirm the site specific hydrogeologic conditions at the site. If the conditions are suitable and approved by the FDEP, a Class I Injection Well will be constructed within the borehole used during the Exploratory Drilling Program. After approval for construction of the Class I Injection Well is obtained, construction of the Dual Zone Monitor Well may begin. Conversion of the exploratory borehole to a Class I Injection Well and construction of the Dual Zone Monitor Well may be completed at the same time using two drill rigs. Diagrams showing the Exploratory Drilling Phases of the Drilling Program are included in **Figure 8**.

The proposed WM Medley Landfill Class I Injection Well and Dual Zone Monitor Well have been designed to meet the criteria in Chapter 62-528.410 FAC. The proposed materials and construction methods have been selected to minimize impacts to ambient groundwater quality and to prevent movement of fluids into or between USDWs. Drilling will be conducted by a qualified water well Contractor with the equipment and experience necessary to complete the project. The Contractor will provide equipment capable of supporting the maximum loads exerted by the drilling string, collars, casings and other equipment necessary for completion of the wells as specified in the Technical Specifications included in **Appendix E**.

The drill rig(s) will be equipped with a geolograph or other equivalent method of recording depth and penetration rate. All depth measurements will be relative to land surface. Prior to well construction, the elevation of the pad at the injection well and dual zone monitor well will be measured and referenced to the National Geodetic Vertical Datum (NGVD) of 1983. All drilling will be done inside a temporary watertight containment area (drilling pad).

After completion of the wells the temporary pad will be removed and a concrete containment pad will be constructed. The finished pad layout is shown on **Figure 9**. As shown on **Figure 9**, the Dual Zone Monitor Well will be located approximately 100 feet from the Class I Injection Well. Both wells will be located within a concrete containment pad constructed after all drilling and testing has been completed. Four (4), surficial aquifer monitor wells will be installed at each corner of the drilling pad prior to any construction activities on the injection well or dual zone monitor well. A well construction diagram for the pad monitor wells is included on **Figure 10**. The pad monitor wells will be sampled for conductivity, temperature and chlorides prior to the Class I Injection Well drilling to establish background water quality.

4.1 Well Construction Phases

Drilling of both the Class I Injection Well and Dual Zone Monitor Well will be done in stages using a closed circulation system. To ensure the reamed holes track the pilot holes, a staged reaming assembly and lead bit will be used during reaming. In addition, inclination surveys will be conducted every 90 feet in the pilot hole and reamed hole. A maximum inclination of 1° from true vertical will be allowed. The Contractor will furnish and install blowout preventers on the wellheads to ensure that uncontrolled flow from the wells is not allowed at any time. The conventional mud-rotary drilling method will be utilized during the first stages of drilling through the SAS and Hawthorn Group. All drilling below the Hawthorn Group will be by the reverse-circulation, rotary drilling method. The conductor casings will be set into the top of the Hawthorn Group sediments to ensure that the SAS is sealed off during deeper drilling operations. The surface casing strings in each well will be set into the top of the upper FAS, sealing-off the Hawthorn Group.

4.1.1 Exploratory Drilling

4.1.1.1 *Phase I Exploratory Pilot Hole*

After setting the conductor casing and surface casing strings in the Class I Injection Well, a nominal $12^{1}/_{4}$-inch pilot hole will be drilled to approximately 2,000 feet BLS. During pilot hole drilling in this interval six (6) straddle packer tests will be conducted. After geophysical logging of the pilot hole, the depth of the USDW will be determined and the depth of the intermediate casing string will be selected. The pilot hole will then be reamed to a nominal 34-inches and the 26-inch nominal pipe size (NPS) intermediate casing string cemented in place to seal off the USDW prior to any drilling in the more saline portions of the Lower Floridan Aquifer.

4.1.1.2 *Phase II Exploratory Pilot Hole*

A nominal $12^{1}/_{4}$--inch pilot hole will be advanced from the bottom of the intermediate casing string to a depth of approximately 3,500 feet BLS. During pilot hole drilling in this interval, 10 cores will be collected and five (5) straddle packer tests conducted. After advancing the pilot hole to approximately 3,500 feet BLS a suite of geophysical logs will be run. This data will be used to evaluate lithologic and hydraulic properties of the confining sequence anticipated between approximately 1,900 to 3,050 feet BLS and the target injection zone anticipated between approximately 3,100 to 3,500 feet BLS.

4.1.2 Phase III - Class I Injection Well Construction

After confirming that suitable hydrogeologic conditions are present, the interval from the bottom of the intermediate casing to a depth of approximately 3,100 feet BLS will be reamed to nominal 26-inches in diameter. The 16-inch NPS injection casing will be cemented in place from surface to approximately 3,100 feet BLS. A Youngquist Brothers, Inc. (YBI) outer mandrel will be included in the bottom of the 16-inch string. The 10¾--inch LFRP injection tubing will be run inside the 16-inch injection casing. A YBI Positive Seal Packer will be placed at the bottom of 10¾- inch LFRP tubing. The LFRP tubing will be landed in the 16-ich casing outer mandrel. A stainless steel landing flange will be installed at the surface to seal the annulus between the 10¾- inch injection tubing and the 16-inch injection casing. The annulus will then be filled with a mixture of fresh water (90%) and a corrosion inhibitor (10%). The corrosion inhibitor will be Baracor®100 as manufactured by Halliburton. A schematic diagram of the completed injection well is shown on **Figure 6**.

If suitable hydrogeologic conditions are not present at the site, the Phase II pilot hole and intermediate casing string would be plugged with neat cement. Cavernous sections of the $12^{1}/_{4}$-inch pilot hole would be bridged with clean gravel.

4.1.3 Phase IV - Monitor Well Construction

The monitor well will be constructed after it is determined that suitable hydrogeologic conditions are present at the site. The Dual zone Monitor Well will be constructed by initially setting the conductor casing and surface casing strings. After these casings are installed a nominal $12^{1}/_{4}$-inch pilot hole will be drilled to approximately 2,000 feet BLS. A suite of geophysical logs will be run and three (3) straddle packer tests will be conducted (one in each monitor zone interval and one straddling the USDW). The target monitor zones are the first permeable interval below the base of the USDW and a second permeable horizon at least 100 feet below the base of the first permeable horizon below the base of the USDW. The base of the USDW is expected to occur at a depth of approximately 1,750 feet BLS at the Medley Landfill site. Based on the information gathered from wells in the area, the upper monitor zone may be present between depths of approximately 1,800 to 1,850 feet BLS at the Medley Landfill site. The lower monitor zone may be present between depths of approximately 1,950 to 2,000 feet BLS. After logging and testing, the pilot hole will be reamed to a nominal 24-inch diameter. The dual zone monitor well will then be completed as shown on **Figure 7**.

4.2 Step By Step Drilling Procedures

Exploratory drilling will commence after the Contractor has mobilized to the site, constructed the temporary drill pad, installed the four (4) pad monitor wells and the ambient groundwater quality has been established for the pad monitor wells. Prior to exploratory drilling the Contractor will also construct a minimum 4-inch diameter water supply well to a depth of approximately 140 feet BLS. This well will be used as a water source during the drilling and testing at the Medley Landfill site.

4.2.1 Phase I Exploratory Pilot Hole

Install nominal 48-inch Pit casing (Optional)

Drill nominal 48-inch borehole (0-200 feet BLS)
Inclination survey every 90 feet
Run caliper log and natural gamma logs

Set and cement 42-inch casing (0-200 feet BLS)
Run temperature logs after each lift

Drill $12^{1}/_{4}$-inch pilot hole (200 -600 feet BLS)
Inclination survey every 90 feet
Run caliper and natural gamma logs

Ream pilot hole to nominal 42 inches (200 – 1,000 feet BLS)
Inclination survey every 90 feet
Run temperature, DIL, caliper log and natural gamma logs

Set and cement 34-inch casing (0 – 1,000 feet BLS)
Run static temperature logs after each lift
Drill $12^{1}/_{4}$-inch pilot hole (1,000 – 2000 feet BLS)
Inclination survey every 90 feet
Run 6 straddle packer tests
Run caliper, natural gamma, DIL, BHC Sonic w/VDL,
Temperature (static & flowing), fluid resistivity (static & flowing)
Flow meter (static & flowing), video survey

Ream pilot hole to nominal 34 inches (1,000 - 2000 feet BLS)
Inclination survey every 90 feet
Run caliper log and natural gamma logs

Set and cement 26-inch casing (0 – 2000 feet BLS)
Run temperature logs after each lift, CBL-VDL before and after cementing
Conduct casing pressure test

4.2.2 Phase II Exploratory Pilot Hole

Drill $12^{1}/_{4}$-inch pilot hole (2,000 – 3,500 feet BLS)
Inclination survey every 90 feet
Run 5 straddle packer tests
Collect 10 cores

Run caliper, natural gamma, DIL, BHC Sonic w/VDL,
Temperature (static & flowing), fluid resistivity (static & flowing)
Flow meter (static & flowing), video survey

4.2.3 Phase III – Class I Injection Well Construction

Ream nominal 26-inch borehole (2,000 – 3,100 feet BLS)
Inclination survey every 90 feet

Run caliper log and natural gamma log (2,000 – 3,100 feet BLS)

Set and cement 16-inch casing (0 – 3,100 feet BLS)
Run temperature logs after each lift, CBL-VDL before and after cementing

Conduct 16-inch casing pressure test and video survey

Set 10¾- inch LLFRP tubing (0-3,100 feet BLS)
Run caliper, natural gamma, DIL, BHC Sonic w/VDL, temperature
Fluid resistivity and video survey (all logs run 0-3100 feet BLS)

Develop Well
Collect background water sample

Conduct MIT (10¾-inch tubing annulus pressure test, video and, temperature log Conduct RTS on Injection Well)

4.2.4 Phase IV – Dual Zone Monitor Well Construction

Install nominal 36-inch Pit casing (Optional)

Drill nominal 36-inch borehole (0-200 feet BLS)
Inclination survey every 90 feet
Run temperature, natural gamma, caliper log

Set and cement 30-inch casing (0-200 feet BLS)
Run temperature logs after each lift

Drill $12^{1}/_{4}$-inch pilot hole (200 -1,000 feet BLS)
Inclination survey every 90 feet
Run temperature, DIL, natural gamma, caliper log

Ream pilot hole to nominal 30 inches (200 – 1,000 feet BLS)
Inclination survey every 90 feet
Run temperature, natural gamma, caliper log

Set and cement 24-inch casing (0 – 1,000 feet BLS)
Run temperature logs after each lift

Drill $12^{1}/_{4}$-inch pilot hole (1,000 – 2,000 feet BLS)
Inclination survey every 90 feet
Conduct 3 straddle packer tests
Run caliper, natural gamma, DIL, BHCSonic w/VDL,
Temperature (static & flowing), fluid resistivity (static & flowing)
Flow meter (static & flowing), video survey

Ream pilot hole to nominal 24 inches (1,000 – 1,800 feet BLS)
Inclination survey every 90 feet
Run temperature, natural gamma, caliper log

Set and cement 16-inch casing (0 – 1,800 feet BLS)
Run temperature logs after each lift, CBL-VDL before and after cementing
Conduct Casing Pressure Test, video survey

Ream nominal 16-inch borehole (1,800 – 2,000 feet BLS)
Inclination survey every 90 feet
Run temperature, natural gamma, caliper log

Set $6^{5}/_{8}$-inch FRP tubing (0-1,950 feet BLS)
Place cement (1,850 – 1,950 feet BLS)
Run temperature logs after each lift, CBL-VDL before and after cementing,
Conduct tubing pressure test
Video survey

Develop monitor zones by pumping
Collect water quality samples from each monitor zone

4.2.5 Short Term Injection Test

Set up test pump, temporary piping, and flow meter
Install transducer system and wellhead gauges
Collect 24-hours of background data
Conduct 24 hour injection test at 208 GPM
Collect 12 hours of post test recovery data
Demobilize injection test equipment and restore site

4.3 Water Quality Testing

All water quality samples will be collected by LSSA in accordance with the company Quality Manual and the FDEP Standard Operating Procedures.

During the well construction project, water quality samples will be collected weekly from the pad monitor wells and analyzed in the field for chlorides, specific conductivity, temperature and water level (relative to NAVD 1988).

Water samples will be collected from the pump discharge at the end of each straddle packer test. These samples will be sent to a certified laboratory for analysis of TDS, chlorides, sulfate, specific conductivity, ammonia and TKN as N. A 2.5-gallon sample of water will be collected from the straddle packer pump discharge, the background injection zone and monitor zone samples. These samples will be sent to the Florida Geological Survey, Hydrogeology Program Coordinator, 903 West Tennessee Street, Tallahassee, Florida, 32304. Field measurements of pH, temperature, specific conductivity, dissolved oxygen and turbidity will also be collected. After development of the monitor wells, samples will be collected from each zone and sent to a certified laboratory for analysis of the primary and secondary drinking water standards (excluding asbestos, Dioxin®, epichlorohydrin, acrylamide and butachlor), potassium, ammonia and TKN as N. Field measurements of pH, temperature, specific conductivity, dissolved oxygen and turbidity will also be collected.

Prior to the injection test, a sample will be collected from the SAS water supply well at the Medley Landfill injection well site (short term injection test source water) and sent to a certified laboratory for analysis of the primary and secondary drinking water standards (excluding asbestos, Dioxin®, epichlorohydrin, acrylamide and butachlor), potassium, ammonia, TKN as N. Field measurements of pH, temperature, specific conductivity, dissolved oxygen and turbidity will also be collected.

4.4 Geophysical Logging

Geophysical logging will be conducted by an experienced operator under the supervision of the Site Geologist. The geophysical logs will provide additional information on lithology, water quality, aquifer characteristics, integrity of the well casing and borehole deviation. The surveys to be conducted include: natural gamma, BHC-Sonic with VDL, dual induction, fluid resistivity, 3-arm caliper, temperature with ΔT, CBL with VDL, and flow meter.

4.5 Cutting and Core Recovery

Cuttings will be collected at 10-foot intervals, and cores as directed by the Site Geologist. The lithology of the cuttings and cores will be determined under a binocular microscope with emphasis on rock type, color, texture, porosity (visual), grain size and type, induration, accessory minerals and fossil content.

Ten (10) cores will be collected in the lower confining sequence (1900 TO 2500 feet BLS). Cores will be collected using a 4-inch diameter core bit and 10-foot core barrel. Core intervals will be determined by the Site Geologist based on geophysical logs and cuttings analysis. All cores will be stored in wooden boxes marked with the depth from which they were collected. Portions of the cores will be submitted to a testing laboratory to determine vertical and horizontal hydraulic conductivity, porosity and specific gravity.

After the cuttings and cores have been analyzed, the FDEP will be notified so that arrangements can be made to transfer them to the Florida Geological Survey.

4.6 Straddle-Packer Testing

The straddle-packer tests will be performed to isolate selected portions of the borehole for testing to determine hydraulic characteristics and to collect representative groundwater samples. The depth intervals for the tests will be determined by the Site Geologist based on core data, cuttings analysis and geophysical logs. Inflatable packers will be inserted into the hole at specified depths. The packers will then be inflated and a constant discharge rate established using a submersible pump. A flow meter will be installed in the pump discharge line to determine total volume pumped and discharge rate. Prior to beginning the test, the isolated zone will be developed to remove drill mud. The zone will be pumped until drawdown has stabilized and representative water samples are being produced. Water levels will be recorded with a downhole pressure transducer. Background (static) data will be collected prior to pumping and recovery data will be collected after pump shutdown. All water discharged from the well will be contained on the pad for proper disposal.

Fourteen (14) straddle packer tests are proposed for the injection well. Six (6) tests will be conducted during the Phase I Exploratory Drilling most probably in the pilot hole between depths of 1,400 to 2,000 feet BLS. Five (5) tests will be conducted during the Phase II Exploratory Drilling in portions of the anticipated confining sequence between 2000 to 2500 feet BLS. During construction of the Dual Zone Monitor Well three (3) tests will be conducted. A straddle packer test will be conducted in each proposed monitor zone interval and a test will be designed to isolate the base of the lowermost USDW.

4.7 Short Term Injection Test

A short term (24 hour) injection test will be conducted after completion of the Class I Test Injection Well and Dual Zone Monitor Well. An injection test request will be prepared and submitted to FDEP for approval prior to conducting the test. After FDEP approval of the injection test request submittal, a 24-hour injection test will be conducted at a flow rate of approximately 208 gpm (300,000 GPD). A minimum of 24-hours of background data will be collected prior to the test and 12-hours of post-injection data will be collected after the test.

The SAS water supply well constructed by the Contractor adjacent to the Medley Landfill injection well site will be used as the water source for the injection test. Water quality analysis of the well water will be submitted to the TAC as part of the injection test request submittal.

The Contractor will provide the injection test pump, suction line and discharge line (with totalizing flow meter) to the injection well. Injectate temperature and flow rate will be recorded during the injection test period. Transducers placed in the monitor zones and injection tubing will be used to record pressure and temperature. The monitor well and injection well will also be equipped with direct reading pressure gauges at the wellheads. Temperature and pressure readings will be recorded for both the monitor zones, injection tubing annulus and injection zone during the background monitoring period, injection test and post test period. Barometric pressure and tidal fluctuations will be recorded during the entire test period. (Including pre and post test periods). Test data will be presented in tabular and graphical format.

4.8 Mechanical Integrity Tests

The purpose of the Mechanical Integrity Test (MIT) is to demonstrate (in accordance with requirements set forth in Chapter 62-528 FAC) that the Medley Landfill injection well tubing and casing are intact, with no holes or leaks. The MIT is also conducted to demonstrate that injected effluent will not migrate vertically upward from the permitted injection zone via channels or conduits outside the injection casing or tubing.

The MIT will consist of a pressure test on the injection tubing annulus, radioactive tracer surveys (RTS), temperature logging and video survey. The pressure test will demonstrate that the inner tubing is intact with no holes or leaks. The RTS and temperature log will demonstrate that there are no channels or vertical conduits outside the injection tubing. The MIT will be initiated during daylight hours, Monday through Friday. The FDEP will be notified prior to conducting the MIT so that a representative has sufficient time to arrive on site to witness the tests.

4.8.1 Television Surveys

Television surveys will be conducted in both the 20-inch injection casing and the 10¾ -inch LLFRP injection tubing. The television surveys will be in color and the geophysical logging Contractor will be required to furnish a video with sufficient clarity acceptable to the LSSA and the FDEP. The color television camera will have a rotating side-hole viewer and must be equipped with centralizers to ensure the camera remains centralized over the entire length of the well. Prior to running the video survey, water will be pumped into the well through a stripperhead assembly. The water supply line to the stripperhead will be equipped with a check valve to prevent backflow from the well. A minimum of three (3) casing volumes of water will be pumped into the well to provide clarity for the survey.

4.8.2 Pressure Tests

Casing pressure tests will be conducted on the 20-inch NPS injection casing and the 10¾ -inch LLFRP injection tubing annulus. The 20-inch injection casing will be pressure tested after cementing and prior to drilling out the cement plug. The pressure test on the injection tubing annulus will be conducted after the 10¾ -inch LLFRP injection tubing is installed and the annulus is sealed with a landing flange at the surface.

The tests will be conducted after completely filling the casing and annulus with water. They will then be placed under an initial pressure of 100 PSI (>1.5 x maximum anticipated injection pressure) as read from a calibrated pressure gauge located on the wellhead. The gauge will be sensitive enough to accurately measure pressure test variations of five percent in increments of 0.25 PSI or less. The Contractor will submit certification documenting the date and place of pressure gauge calibration prior to conducting the pressure tests. During the pressure tests, a wellhead pressure of 100 PSI will be maintained for a period of one (1) hour with less than five percent (5%) pressure change. A pressure test will also be conducted on the 16-inch upper monitor zone casing and the 6 $^{5}/_{8}$-inch lower monitor zone LFRP tubing in the Dual Zone Monitor Well. These

tests will be conducted at a maximum pressure of 50 PSI. During the pressure tests, the wellhead pressure will be recorded every five (5) minutes for 65 minutes. After successful completion of the pressure tests, the Contractor will depressurize the injection casing and annulus and record the volume of water that is discharged.

4.8.3 Radioactive Tracer Survey and Temperature Log

RTS and temperature logging will be conducted after the injection tubing annulus has been pressure tested. A qualified geophysical logging company licensed to handle radioactive materials in the State of Florida will conduct the tests. The temperature logging will be run from the bottom of the well (approximately 3,100 feet BLS) to land surface.

Background gamma logs and a caliper log will be run from the bottom of the well to land surface as part of the tracer surveys. The background gamma logging will be conducted within 24 hours, prior to initiating the RTS.

The RTS tool will be capable of ejecting the radioactive tracer and simultaneously monitoring the gamma-ray detectors. Film documentation of the radioactive tracer ejection time will be provided and the tracer ejection time will be calibrated to ± 1 millisecond. No time lag between ejection and monitoring will be permitted. The RTS tool shall be configured with three (3) gamma detectors. One gamma-ray detector shall be located at least 6-feet above the ejector chambers and one detector shall be located at least 6-feet below the ejectors. A middle detector will be located near the ejector ports to monitor tracer ejections.

The tracer material to be used shall be radioactive Iodine 131. Documentation about the activity and volume of Iodine 131 loaded into the RTS tool must be done so that the strength of tracer ejections can be accurately determined. A person licensed in handling radioactive materials and experienced in these testing procedures will conduct the tracer survey. The tracer will have an assay date within one half-life (8.1 days) at the time the RTS is conducted.

The vertical log scale will be 5-inches per 100 feet when in logging mode and 1.5-inches per minute when in time-drive mode. The horizontal log scale will be recorded in API units. Two gamma curves will be recorded at different sensitivities on each log pass. All logs will include data on the tool configuration, sensitivity (API units per log division), logging speed, time constant, injection rate, volume and concentration of tracer material ejected, time and depth of tracer ejection, beginning and ending clock times for each log pass, and vertical time scale (when in time-drive mode).

Flows to the well will be measured using a calibrated, in-line, flow meter. Flows will be regulated using a gate valve and check valve or other approved valve assembly installed by the Contractor in the water-supply line. Testing will be conducted using the SAS water supply well installed by the Drilling Contractor adjacent to the Medley Landfill injection well site. A standpipe with a stripperhead assembly will be installed on the wellhead to ensure that the logging tools are free to move within the well without permitting the well to flow. The standpipe will be configured with a tap for connection to the water-supply line.

4.8.3.1 *RTS Logging Procedures*

1. Mobilize logging unit, rig-up, install stripperhead and standpipe assembly, assemble and calibrate logging tools.
2. With flow to well off (static), run a temperature log a background or base gamma log and caliper log. The background temperature log will be run going "in the hole". The base gamma log will be recorded logging "out of the hole".
3. Position RTS tool so that the ejector port is positioned approximately 5 feet above the bottom of the injection tubing. Detector GRM should be positioned inside the tubing and GRB should be positioned in the open hole below the tubing. Establish a flow rate of approximately 16 gpm (injection fluid velocity of approximately five feet per minute).
4. Commence time-drive gamma monitoring and eject a 1 to 2-mci slug of Iodine 131. Record time of ejection.
5. Continue time-drive gamma monitoring for 1 hour while recording flow rate and time since ejection.
6. If upward migration of tracer is not observed, make an upward gamma log pass to a depth at least 200 feet above the top of any tracer slug that is detected, or to a depth of approximately 2,000 feet BLS, whichever is higher.
7. In the event tracer movement is observed on the upper gamma detector; make gamma log passes through the tracer material as many times as required to determine the extent of possible channeling. Make overlapping passes to follow slug movement uphole. Each log pass shall extend from the approximately 100 feet below the bottom of the previously recorded slug to approximately 100 feet above the top of the new slug location. The last log pass shall be run high enough to ensure that the slug is no longer detectable.

8. Repeat low flow test steps 3 through 7 (minimum 30 minutes of time-drive monitoring for step 5).
9. Completely displace injection tubing with a minimum of one casing volume of water and conduct another gamma log pass from the bottom of the tubing to at least 200 feet above the tracer slug or 2,000 feet BLS, whichever is higher.
10. Lower RTS logging tool into the open-hole interval below the bottom of the injection tubing, establish high flow rate (maximum GPM available) and eject remaining tracer material.
11. Repeat steps 5 through 7 (30 minutes of time-drive monitoring for step 5) as necessary.
12. Conduct final gamma log from the total depth of the well to land surface.
13. Rig down, reassemble wellhead and cleanup site.

5.0 PROJECT MANAGEMENT

The drilling and testing program is designed to collect lithologic data, water quality data and formation hydraulic parameters through cuttings analysis, core analysis and, straddle-packer tests. This information will be used to demonstrate that the Medley Landfill injection well system will operate in compliance with Chapter 62-528 FAC and to support a request for operational testing of the system.

During all phases of this project, there will be frequent communications with the FDEP and Technical Advisory Committee (TAC) as required by the construction permit. A Site Geologist will provide continuous monitoring of the drilling activities during all phases of construction. Activity reports will be made on a daily basis, and along with a weekly summary prepared by the Project Manager, distributed to the individual TAC members. Typical responsibilities of the Site Geologist are lithologic descriptions, core sampling depth descriptions, water sample collection and analysis, observation of drilling operations (i.e., rate, mud additives, depths, cementing), geophysical log analysis and all drilling specification-related activities.

5.1 TAC Meetings and Submittals

TAC meetings may be scheduled during construction at significant milestones or as specified in the construction permit. Prior to start of well construction, the following submittals will be made to the TAC:

1. The survey data including pad elevations at the proposed injection well and dual zone monitor well locations, top of casing elevations for the pad monitor wells. The elevations will be referenced to NGVD 1983.
2. A construction schedule.
3. Water quality analytical data for the pad monitor wells.
4. Well construction completion reports for the pad monitor wells.
5. A revised set of Contract Documents including any revisions to the technical specifications as requested by FDEP, a copy of the responses to FDEP requests for additional information and a copy of the Injection Well Construction Permit.
6. The name and location of the disposal site for all wastes generated during well construction.

During the well construction project the following submittals will be presented to the TAC for approval:

1. Phase I Drilling Test Results including the Intermediate Casing setting depth request for the Exploratory Well.
2. Cementing Program for the Intermediate Casing in the injection well including cement volumes, number of stages and caliper logs of the nominal 36-inch reamed hole.
3. Phase II Drilling Test Results and Class I Injection Well Construction and Testing Permit Application. The submittal will also include Injection Casing and Injection Tubing setting depth requests for the Class I Injection Well based on a Demonstration of Confinement. In the event suitable hydrogeologic conditions are not present at the site a Plugging and Abandonment Request will be submitted for the Exploratory Well.
4. Cementing Program for the 20-inch injection casing including cement volumes, number of stages and caliper logs of the nominal 30-inch reamed hole.
5. Results of Dual Zone Monitor Well drilling and testing including Monitor Zone selection and casing setting depth requests.
6. Cementing Program for the Dual Zone Monitor Well 16 NPS casing and LLFRP Tubing including cement volumes, number of stages and caliper logs of the nominal 24-inch reamed hole.
7. Request for approval of Short term injection testing.

The casing seat requests will include technical justification based on lithologic logs, geophysical logs, straddle packer test data, water quality test data, confining unit delineation, monitor zone delineation, drilling data, USDW delineation and formation evaluation.

The request for short term injection testing approval will include technical justification based on cement bond logs, temperature logs of each cement lift, theoretical versus actual cement volume calculations, final down-hole TV survey, effluent water quality analysis and mechanical integrity test results. The request will include planned injection test procedures and certification of mechanical integrity. Prior to the request, all weekly progress reports will be submitted to the TAC.

The request for monitor zone approval will include technical justification based on delineation of the USDW, confining bed delineation, water quality data from the proposed monitor zones, TV survey, transmissivity or specific capacity of the proposed monitor zones and straddle packer test data.

5.2 Reporting

All reports will be submitted to the TAC. All reports will be prepared and submitted in accordance with the FDEP Class I Injection Well Construction Permit issued to Medley Landfill for this project. The following reports will be submitted as necessary:

1. The TAC and other applicable agencies will be notified of any unusual or abnormal events that may occur during the construction project including noncompliance with permit conditions, spill events and drilling difficulties. Oral reports will be made within 24 hours of any abnormal event or incident. A written report describing the details of the event will be submitted within 5 days following the incident.
2. The TAC will be notified at least 72 hours prior to testing for mechanical integrity. The MIT will be scheduled during normal business hours Monday through Friday.
3. Weekly progress reports will be submitted within 7 days following the week of record. The reports will include the following information:
    - A cover letter summarizing the driller's and Site Geologists daily logs along with a projection of work activities for the next reporting period.

- Copies of the daily reports including detailed descriptions of all drilling progress, cementing, testing, logging, casing installation, and data interpretations.
- Lithologic logs, geophysical logs, water quality test data and data interpretations with certified evaluations.
- An interpretation of all test results collected up to and including the week of record.
- Detailed descriptions of any unusual construction related events.
- Weekly water quality test results for samples collected from the pad monitor wells.
- Descriptions of the formations encountered during drilling.
- Details of cementing operations including cement slurry composition, laboratory analysis of dry cement composition for neat cement lift at each casing shoe, specific gravity, pumping rate, cement volume, theoretical fill depth, actual tag depth, percent fill and an explanation for differences in theoretical versus actual fill.

4. After completion of core and cuttings analysis, the FDEP will be contacted so these materials can be transferred to the Florida Geological Survey.
5. A Summary Report will be submitted to the TAC no later than 14 days after completion of the Phase II Exploratory Drilling Program. If suitable hydrogeologic conditions are present, the report will include delineation of the injection zone, a demonstration of confinement, delineation of the USDWs, and proposed monitor zones. The Summary Report will also include a Class I Injection Well Construction and Testing Permit Application. If suitable hydrogeologic conditions are not present the Summary Report will include the Phase II data and a request to plug and abandon the Exploratory Well.

5.3 Operational Testing Request

After all construction and testing is completed and the FDEP has issued the Class I Injection Well Construction and Testing Permit, a request to begin Operational Testing of the Medley Landfill Class I Injection Well System will be submitted to the TAC. In accordance with Chapter 62-528 FAC the request will include the following information:

1. Certification of completion of well construction and well construction drawings including a geologic cross section depicting the formations, the base of the USDW and the boundaries of the confining and injection zone intervals.

2. Data from the short term injection testing with interpretation, conducted pursuant to Rules 62 528.405(3)(a), 62 .528.410(7)(e) and 62 528.450(3)(a) 2., F.A.C.
3. A copy of the borehole television/imaging survey with interpretation.
4. Lithologic and geophysical logs and interpretations.
5. Certification of mechanical integrity and interpretation of the test data.
6. A description of the injection procedures including the anticipated maximum pressure and flow rate at which the well will be operated under normal and emergency conditions.
7. Information concerning the compatibility of the injected waste with fluids and minerals in the receiving zone.
8. Surface equipment (including pumping station, piping, pressure gauges and flow meters and all appurtenances) completion certified by the engineer of record. Calibration certificates for pressure gauges and flow meters shall also be submitted.
9. Signed and sealed record "as-built" engineering drawings of the injection well system, including all well construction, the pump station, subsurface and surface piping and equipment and appurtenances. These drawings shall include the location of sampling points for injectate and the dual monitor zone samples.
10. Draft operating and maintenance manual, including a description of water hammer control, with emergency discharge management plan procedures. The emergency discharge system must be fully constructed and operational prior to approval of operational testing.
11. The demonstration of confinement. Confirmation of confinement and delineation of the injection and confining sequences utilizing data collected during the drilling, logging and testing of the injection well and dual zone monitor well. The report shall include the results of hydraulic testing (permeability, porosity, etc.). This submittal shall be prepared, signed and sealed by a Florida Registered Professional Geologist or appropriately experienced Professional Engineer.
12. Wastestream analysis, sampled within 6 months of the request to operate the well, for primary and secondary drinking water standards (62-550, F.A.C.) and minimum criteria.

5.4 Project Construction Schedule

A detailed construction schedule will be prepared by the Drilling Contractor as part of the project submittal requirements. This schedule will be submitted to the FDEP prior to construction along with the Contract Documents.

6.0 REFERENCES

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Environmental Consulting

FIGURE 1
SITE LOCATION MAP
WMI - MEDLEY LANDFILL
MEDLEY, FLORIDA

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FIGURE 2
SITE SPLAN
WMI - MEDLEY LANDFILL
MEDLEY, FLORIDA

Legend

One Mile Radius Around WMI (Medley) IW

4 Well Inventory Location (Details on Table)

Proposed Injection Well Location

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FIGURE 3
WMI (MEDLEY) AREA OF REVIEW
WMI - MEDLEY LANDFILL
MEDLEY, FLORIDA

Map by Google, Inc.

A
NORTH
TOTAL DEPTH
(FEET)

A'
SOUTH
TOTAL DEPTH
(FEET)

City of Sunrise WWTP

Miramar WW
Reclamation IW

Miramar Western
WTP RO IW-2

Hialeah RO Test Well

Medley Landfill IW

Peninsula Utilities Corp Sunset Park
WWTP IW-1

Miami Dade South District WWTP IW

UNDIFFERENTIATED DEPOSITS

HAWTHORN GROUP

NO DATA

SUWANNEE LIMESTONE

AVON PARK
FORMATION

BASE USDW

TD~ 1,747' BLS

OLDSMAR
FORMATION

TOP INJECTION ZONE

TD - 3,400' BLS

TD - 3,520' BLS

TD - 3,500' BLS

TD - 3,500' BLS

TD - 2,947' BLS

TD - 3,112' BLS

+20
0
400
800
1200
1600
2000
2400
2800
3200
3600

LEGEND

- UNDIFFERENTIATED DEPOSITS
- CLAY / DOLOSILTS
- LIMESTONE
- CARBONATE SEDIMENTARY ROCKS (Predominately micritic or chalky to fine-grained limestone)
- LIMESTONE / DOLOMITE

Horizontal Scale (Miles)
0 2 4

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FIGURE 4
GEOLOGIC CROSS SECTION A - A' (NORTH - SOUTH)
WMI - MEDLEY LANDFILL
MEDLEY, FLORIDA

B
WEST
TOTAL DEPTH
(FEET)

B'
EAST
TOTAL DEPTH
(FEET)

Monitor Site Lower East Coast WQ Network

Hialeah RO Test Well

Medley Landfill IW

North Miami Beach RO Plant IW

North District Miami Dade WWTP IW

+20
0
400
800
1200
1600
2000
2400
2800
3200
3600

UNDIFFERENTIATED DEPOSITS

HAWTHORN GROUP

SUWANNEE LIMESTONE

AVON PARK FORMATION

BASE USDW

TOP CONFINING ZONE

OLDSMAR FORMATION

TOP INJECTION ZONE

NO DATA

TD - 1,747' BLS

TD - 2,745' BLS

TD - 3,500' BLS

TD - 3,420' BLS

TD - 3,300' BLS

LEGEND

- UNDIFFERENTIATED DEPOSITS
- CLAY / DOLOSILTS
- LIMESTONE
- CARBONATE SEDIMENTARY ROCKS (Predominately micritic or chalky to fine-grained limestone)
- LIMESTONE / DOLOMITE

Horizontal Scale (Miles)

0 1.25 2.5

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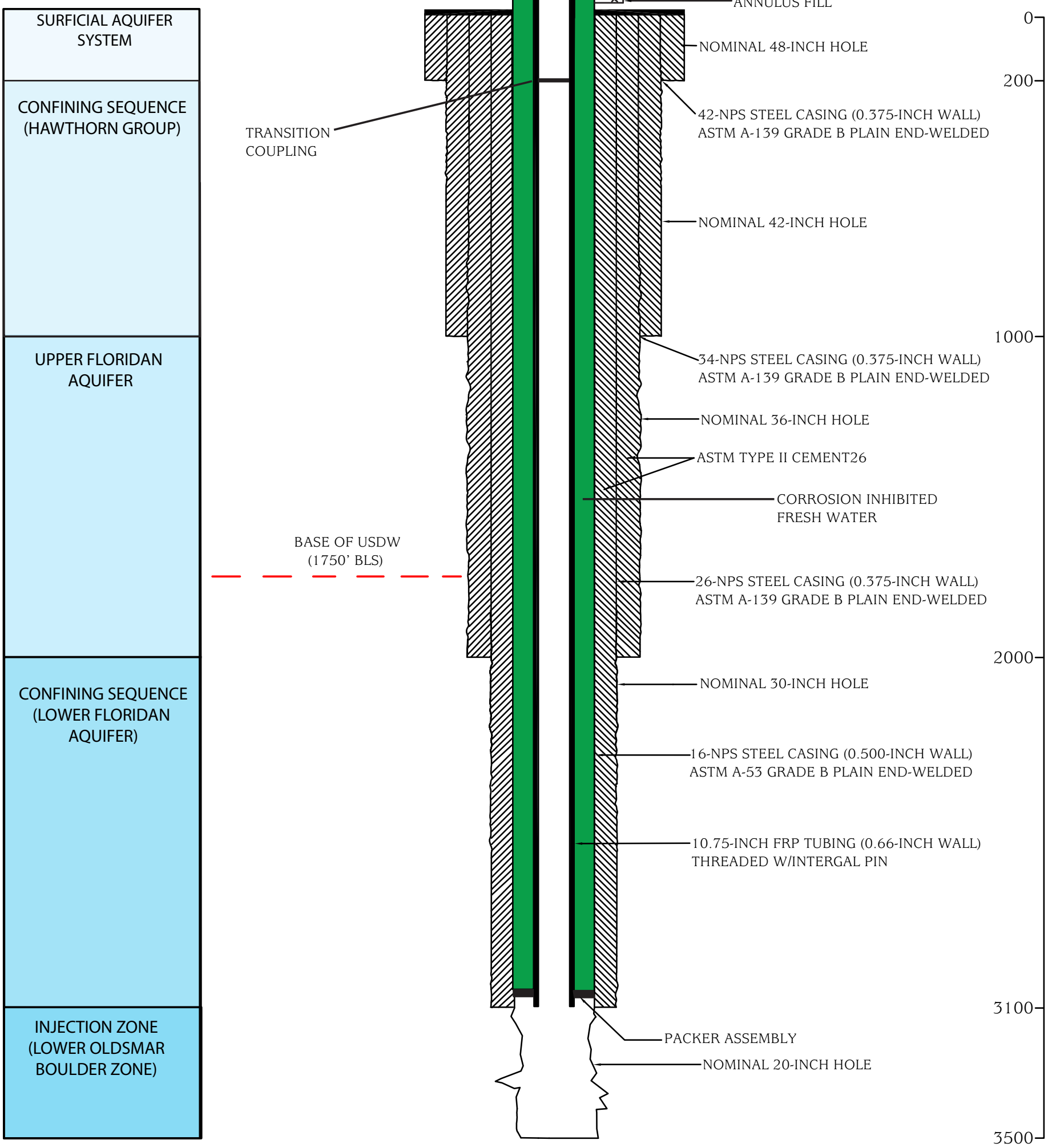
FIGURE 5
GEOLOGIC CROSS SECTION B - B' (WEST - EAST)
WMI - MEDLEY LANDFILL
MEDLEY, FLORIDA



NOT TO SCALE

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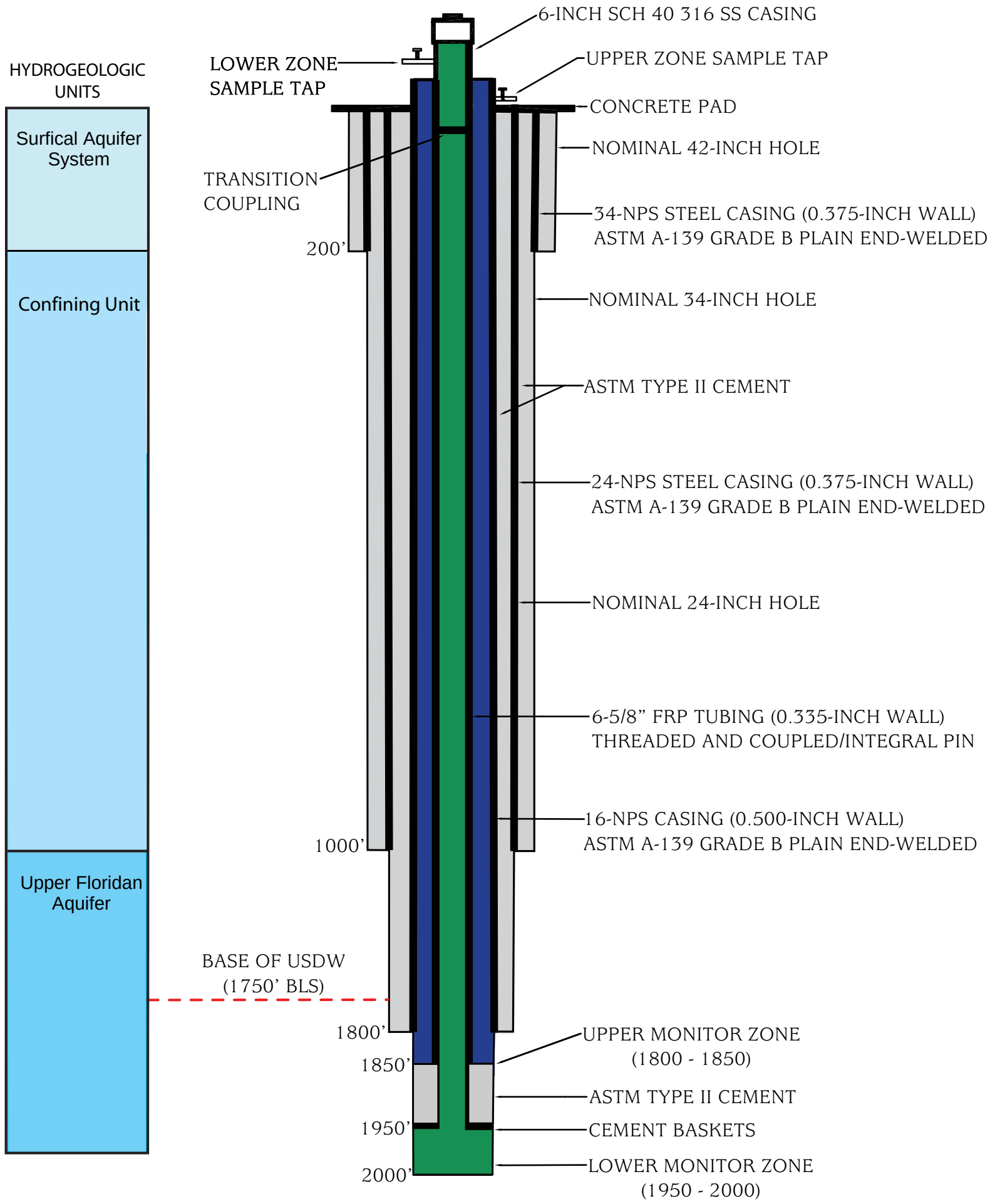
FIGURE 6
CLASS 1 INJECTION WELL CONSTRUCTION DETAILS
WMI - MEDLEY LANDFILL
MEDLEY, FLORIDA



NOT TO SCALE

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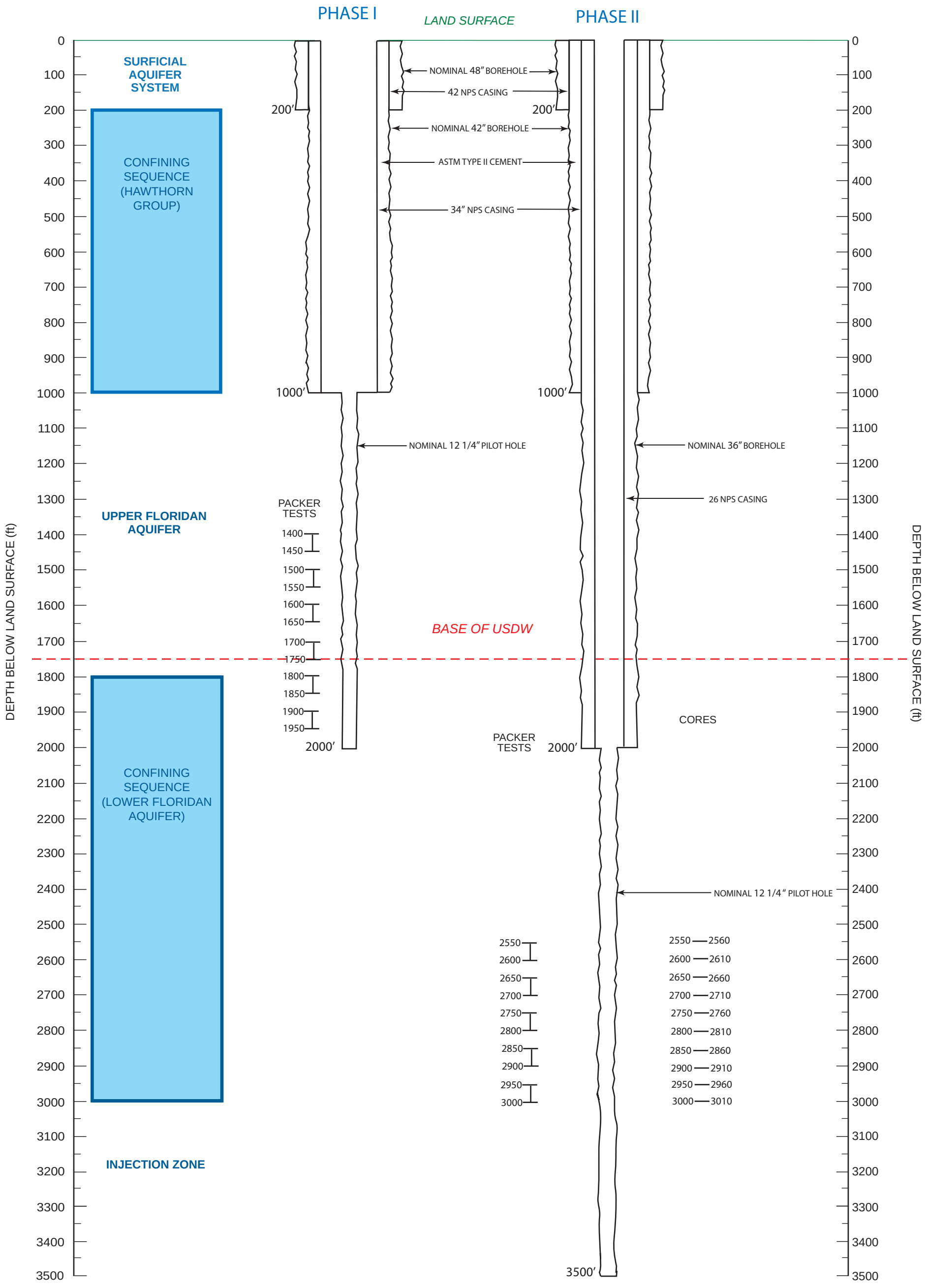
FIGURE 7
DUAL ZONE MONITOR WELL CONSTRUCTION DETAILS
WMI - MEDLEY LANDFILL
MEDLEY, FLORIDA



NOT TO SCALE

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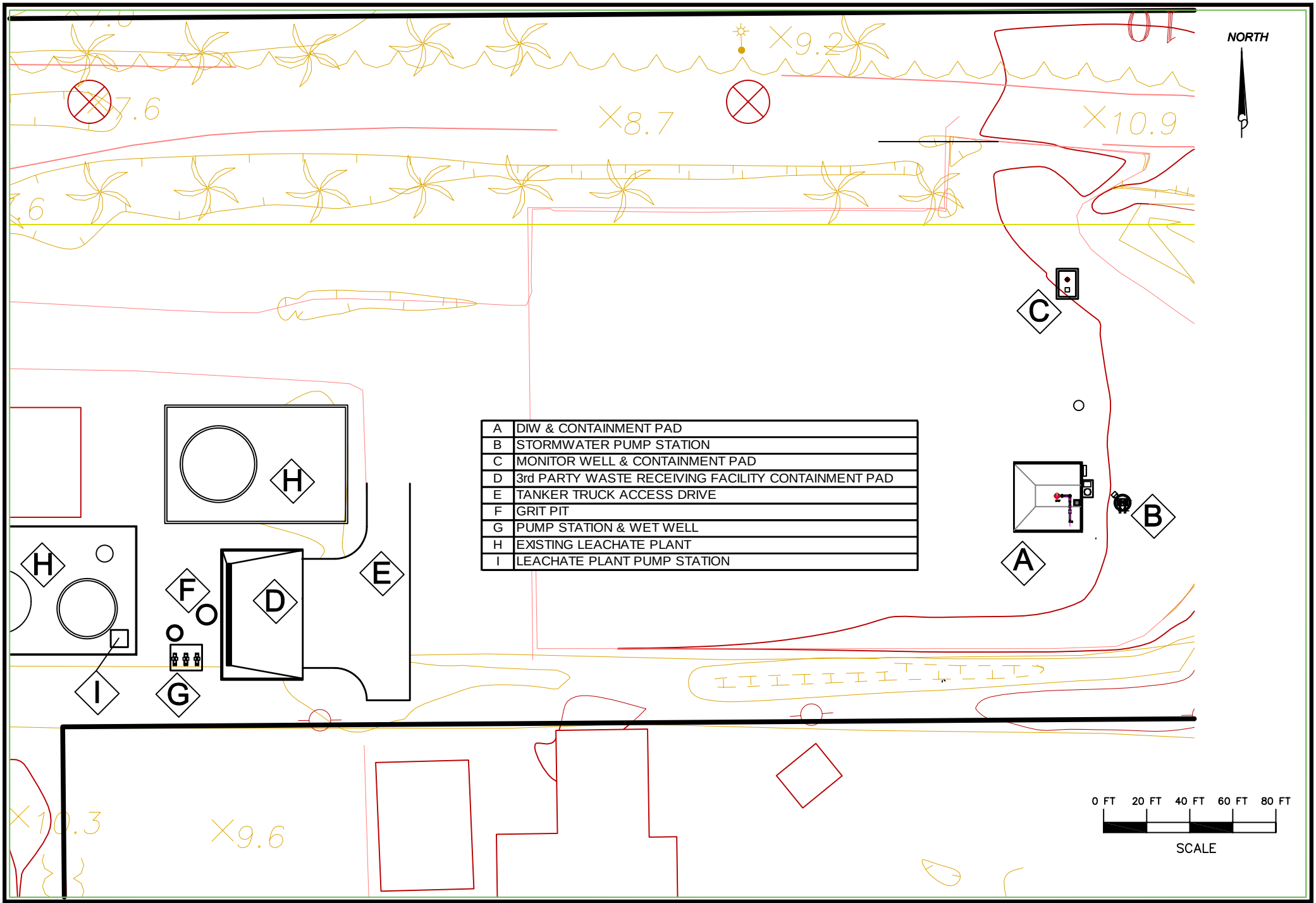
FIGURE 8
EXPLORATORY DRILLING PROGRAM
WMI - MEDLEY LANDFILL
MEDLEY, FLORIDA



A	DIW & CONTAINMENT PAD
B	STORMWATER PUMP STATION
C	MONITOR WELL & CONTAINMENT PAD
D	3rd PARTY WASTE RECEIVING FACILITY CONTAINMENT PAD
E	TANKER TRUCK ACCESS DRIVE
F	GRIT PIT
G	PUMP STATION & WET WELL
H	EXISTING LEACHATE PLANT
I	LEACHATE PLANT PUMP STATION

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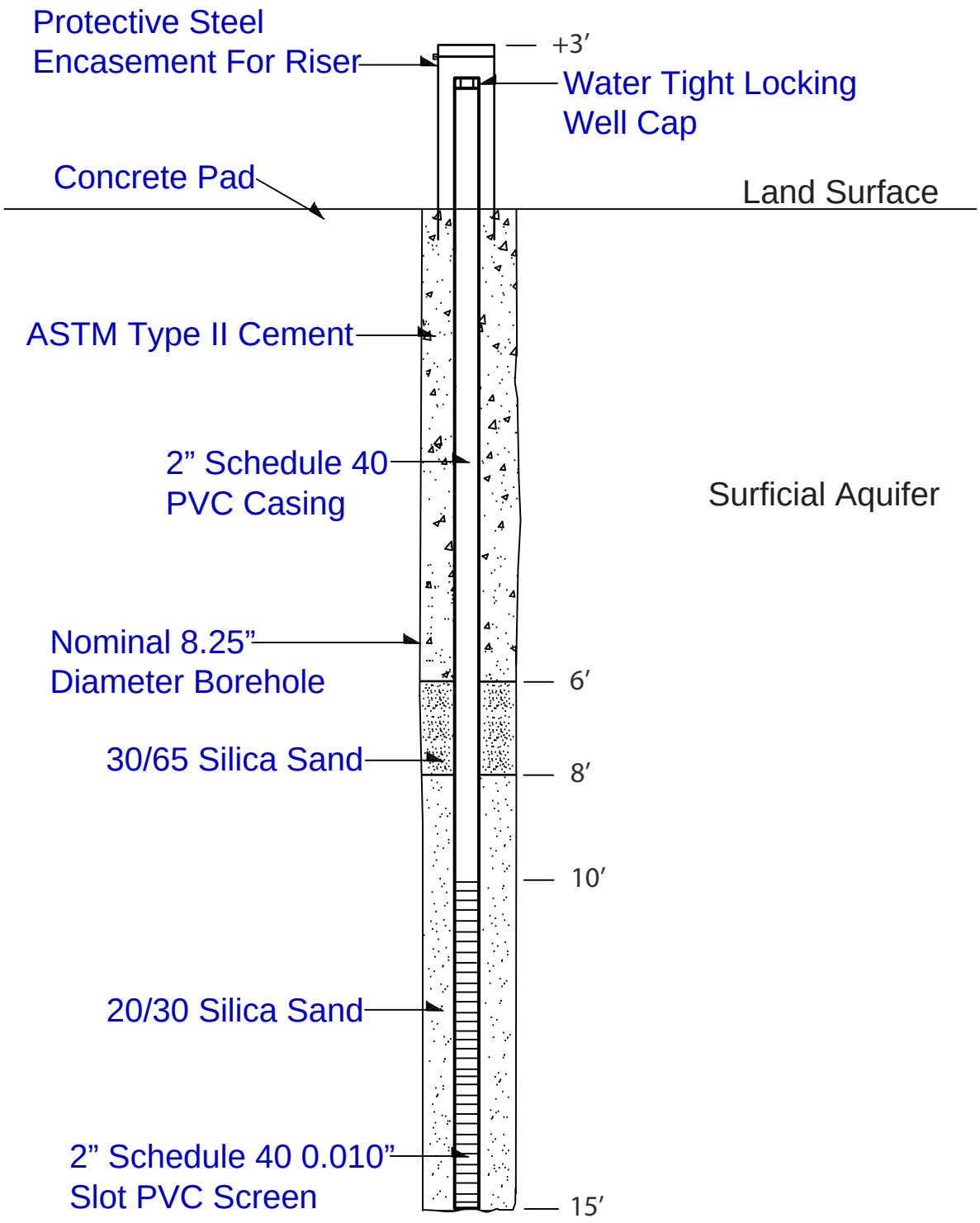
FIGURE 9
PAD LAYOUT
WMI - MEDLEY LANDFILL
MEDLEY, FLORIDA



NOTE: NOT TO SCALE
ACTUAL DEPTHS MAY VARY BASED ON SITE CONDITIONS

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FIGURE 10
TYPICAL WELL CONSTRUCTION DIAGRAM
SHALLOW DRILL PAD MONITORING WELLS
WMI - MEDLEY LANDFILL
MEDLEY, FLORIDA

Florida Department of Environmental Protection

Twin Towers Office Bldg., 2600 Blair Stone Road,
Tallahassee, Florida 32399-2400

DEP Form No:	62-528.900(1)
Form Title:	Application to Construct/ Operate/Abandon Class I, III, or V Injection Well Systems
Effective Date:	
DEP Application No.:	(Filled in by DEP)

APPLICATION TO CONSTRUCT/OPERATE/ABANDON
CLASS I, III, OR V INJECTION WELL SYSTEMS

Part I. Directions

A. All applicable items must be completed in full in order to avoid delay in processing this application. Where attached sheets or other technical documentation are utilized in lieu of the blank space provided, indicate appropriate cross-reference in the space and provide copies to the Department in accordance with C. below. Where certain items do not appear applicable to the project, indicate N/A in the appropriate spaces.

B. All information is to be typed or printed in ink.

C. Four (4) copies of this application and four (4) copies of supporting information such as plans, reports, drawings and other documents shall be submitted to the appropriate District/Subdistrict office. An engineering report is also required to be submitted to support this application pursuant to the applicable sections of Rule 62-528, F.A.C. The attached list* shall be used to determine completeness of supporting data submitted or previously received. A check for the application fee in accordance with Rule 62-4.050, F.A.C., made payable to the Department shall accompany the application.

D. For projects involving construction, this application is to be accompanied by four (4) sets of engineering drawings, specifications and design data as prepared by a Professional Engineer registered in Florida, where required by Chapter 471, Florida Statutes.

E. Attach 8 1/2" x 11" USGS site location map indicating township, range and section and latitude/longitude for the project.

PART II. General Information

A. Applicant Name Tim Hawkins Title Area Vice President

Address 2700 NW 48th Street

City Pompano Beach State Florida Zip 33073-0000

Telephone Number (954) 984-2035

B. Project Status: ☒ New ☐ Existing

☐ Modification (specify) _____

*"Engineering and Hydrogeologic Data Required for Support of Application to Construct, Operate and Abandon Class I, III, or V Injection Wells"

C. Well Type: ☐ Exploratory Well ☒ Test/Injection Well

D. Type of Permit Application

☒ Class I Test/Injection Well Construction and Testing Permit

☐ Class I Well Operation Permit

☐ Class I Well Operation Repermitting

☐ Class I Well Plugging and Abandonment Permit

☐ Class III Well Construction/Operation/Plugging and Abandonment Permit

☐ Class I Exploratory Well Construction and testing Permit

☐ Class V Well Construction Permit

☐ Class V Well Operation Permit

☐ Class V Well Plugging and Abandonment Permit

☐ Monitor Well Only

E. Facility Identification:

Name Waste Management of Florida, Inc. d.b.a Medley Landfill

Facility Location: Street 9350 Northwest 89th Avenue, Medley, FL 33178

City Medley County Dade

SIC Code(s) 495303

F. Proposed facility located on Indian Lands: Yes ☐ No ☒

G. Well Identification:

Well No. 1 of 1 Wells
(total #)

Purpose (Proposed Use) Class I Landfill Leachate

Well Location: Latitude: N25° 51′ 33″ Longitude: W80° 20′ 36″
(attach separate sheet(s), if necessary, for multiple wells)

Subpart B. General Project Description:

H. General Project Description: Describe the nature, extent and schedule of the injection well project. Refer to existing and/or future pollution control facilities, expected improvement in performance of the facilities and state whether the project will result in full compliance with the requirements of Chapter 403, F.S., and all rules of the Department. Attach additional sheet(s) if necessary or cross-reference the engineering report.

See Construction & Testing Permit Application Support Document

L.S. Sims & Associates, Inc., October 2012

DEP Form No:	62-528.900(1)
Form Title:	Application to Construct/ Operate/Abandon Class I, III, or V Injection Well Systems
Effective Date:	
DEP Application No.:	(Filled in by DEP)

PART III. Statement by Applicant and Engineer

A. Applicant

I, the owner/authorized representative* of Waste Management Inc.of Florida , certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. I understand that this certification also applies to all subsequent reports submitted pursuant to this permit. Where construction is involved, I agree to retain the design engineer, or other professional engineer registered in Florida, to provide inspection of construction in accordance with Rule 62-528.455(1)(c), F.A.C.

Signed 11-14-12
Date

Tim Hawkins, President
Name and Title (Please Type)

(954) 984-2035
Telephone Number

*Attach a Letter of Authorization.

B. Professional Engineer Registered in Florida

This is to certify that the engineering features of this injection well have been designed/examined by me and found to be in conformity with modern engineering principles applicable to the disposal of pollutants characterized in the permit application. There is reasonable assurance, in my professional judgement, that the well, when properly maintained and operated, will discharge the effluent in compliance with all applicable statutes of the State of Florida and the rules of the Department. It is also agreed that the undersigned will furnish the applicant a set of instructions for proper maintenance and operation of the well.

ROGER E. MAYFIELD LICENSE No 046092 STATE OF FLORIDA PROFESSIONAL ENGINEER

(Please Affix Seal)

Signed

Roger E. Mayfield
Name (Please Type)

L.S. Sims & Associates, Inc.
Company Name (Please Type)

397 Imperial Blvd., Suite #3, Cape Canaveral, FL 32920
1530 U.S. Highway 1, Rockledge, Florida 32955
Mailing Address(Please Type)

Florida Registration No. 0046092 Date 8/30/12 Phone No. (407) 300-8786

ENGINEERING AND HYDROLOGIC DATA
REQUIRED FOR SUPPORT OF APPLICATION
TO CONSTRUCT, OPERATE, AND ABANDON
CLASS I, III, OR V INJECTION WELL SYSTEMS

The following information shall be provided for each type of permit application.

A. CLASS I TEST/INJECTION WELL CONSTRUCTION AND TESTING PERMIT

1. A map showing the location of the proposed injection wells of well field area for which a permit is sought and the applicable area of review. Within the area of review, the map must show the number or name, and location of all producing wells, injection wells, abandoned wells, dry holes, surface bodies of water, springs, public water systems, mines (surface and subsurface), quarries, water wells and other pertinent surface features including residences and roads. The map should also show faults, if known or suspected. Only information of public record and pertinent information known to the applicant is required to be included on this map.

2. A tabulation of data on all wells within the area of review which penetrate into the proposed injection zone, confining zone, or proposed monitoring zone. Such data shall include a description of each well's type, construction, date drilled, location, depth, record of plugging and/or completion, and any additional information the Department may require.

3. Maps and cross sections indicating the general vertical and lateral limits within the area of review of all underground sources of drinking water, their position relative to the injection formation and the direction of water movement, where known, in each underground source of drinking water which may be affected by the proposed injection.

4. Maps and cross sections detailing the hydrology and geologic structures of the local area.

5. Generalized maps and cross sections illustrating the regional geologic setting.

6. Proposed operating data.

   (a) Average and maximum daily rate and volume of the fluid to be injected;

   (b) Average and maximum injection pressure; and,

   (c) Source and an analysis of the chemical, physical, radiological and biological characteristics of injection fluids.

7. Proposed formation testing program to obtain an analysis of the chemical, physical and radiological characteristics of and other information on the injection zone.

8. Proposed stimulation program.

9. Proposed injection procedure.

10. Engineering drawings of the surface and subsurface construction details of the system.

11. Contingency plans to cope with all shut-ins or well failures, so as to protect the quality of the waters of the State as defined in Rule 62-3 and 62-520, F.A.C., including alternate or emergency discharge provisions.

12. Plans (including maps) and proposed monitoring data to be reported for meeting the monitoring requirements in Rule 62-528.425, F.A.C.

13. For wells within the area of review which penetrate the injection zone but are not properly completed or plugged, the corrective action proposed to be taken under Rule 62-528.300(5), F.A.C.

14. Construction procedures including a cementing and casing program, logging procedures, deviation checks, proposed methods for isolating drilling fluids from surficial aquifers, proposed blowout protection (if necessary), and a drilling, testing and coring program.

15. A certification that the applicant has ensured, through a performance bond or other appropriate means, the resources necessary to close, plug or abandon the well as required by Rule 62-528.435(9), F.A.C.

B. CLASS I INJECTION WELL OPERATION PERMIT

1. A report shall be submitted with each application for a Class I Well operating permit, which shall include, but not be limited to, the following information:

   (a) Results of the information obtained under the construction permit described in A. CLASS I TEST/INJECTION WELL CONSTRUCTION AND TESTING PERMIT, including:

      (1) All available logging and testing program data and construction data on the well or well field;

      (2) A satisfactory demonstration of mechanical integrity for all new wells pursuant to Rule 62-528.300(6), F.A.C;

      (3) The actual operating data, including injection pressures versus pumping rates where feasible, or the anticipated maximum pressure and flow rate at which the permittee will operate, if approved by the Department;

      (4) The actual injection procedure;

      (5) The compatibility of injected waste with fluids in the injection zone and minerals in both the injection zone and the confining zone; and,

      (6) The status of corrective action on defective wells in the area of review.

   (b) Record drawings, based upon inspections by the engineer or persons under his direct supervision, with all deviations noted;

   (c) Certification of completion submitted by the engineer of record;

   (d) If requested by the Department, operation manual including emergency procedures;

(e) Proposed monitoring program and data to be submitted;

(f) Proof that the existence of the well has been recorded on the surveyor's plan at the county courthouse; and,

(g) Proposed plugging and abandonment plan pursuant to Rule 62-528.435(2), F.A.C.

C. CLASS I WELL OPERATION REPERMITTING

1. An updated map showing the location of the injection wells or well field area for which a permit is sought and the applicable area of review. Within the area of review, the map must show the number or name, and location of all producing wells, injection wells, abandoned wells, dry holes, surface bodies of water, springs, public water systems, mines (surface and subsurface), quarries, water wells and other pertinent surface features including residences and roads. The map should also show faults, if known or suspected. Only information of pubic record and pertinent information known to the applicant is required to be included on this map.

2. A tabulation of data on all wells within the area of review which penetrate into the injection zone, confining zone, or monitoring zone. Such data shall include a description of each well's type, construction, date drilled, location, depth, record of plugging and/or completion, and any additional information the Department may require.

3. Maps and cross sections indicating the general vertical and lateral limits within the area of review of all underground sources of drinking water, their position relative to the injection formation and the direction of water movement, where known, in each underground source of drinking water which may be affected by the injection.

4. Maps and cross sections detailing the hydrology and geologic structures of the local area.

5. Generalized maps and cross sections illustrating the regional geologic setting.

6. Contingency plans to cope with all shut-ins or well failures, so as to protect the quality of the waters of the State as defined in Rule 62-3 and 62-520, F.A.C., including alternate or emergency discharge provisions.

7. For wells within the area of review which penetrate the injection zone but are not properly completed or plugged, the corrective action proposed to be taken under Rule 62-528.300(5), F.A.C.

8. A certification that the applicant has ensured, through a performance bond or other appropriate means, the resources necessary to close, plug or abandon the well as required by Rule 62-528.435(9), F.A.C.

9. A report shall be submitted with each application for repermitting of Class I Well operation which shall include the following information:

   (a) All available logging and testing program data and construction data on the well or well field;

(b) A satisfactory demonstration of mechanical integrity for all wells pursuant to Rule 62-528.300(6), F.A.C.;

(c) The actual operating data, including injection pressures versus pumping rates where feasible, or the anticipated maximum pressure and flow rate at which the permittee will operate, if approved by the Department;

(d) The actual injection procedure;

(e) The compatibility of injected waste with fluids in the injection zone and minerals in both the injection zone and the confining zone;

(f) The status of corrective actin on defective wells in the area of review;

(g) Record drawings, based upon inspections by the engineer or persons under his direct supervision, with all deviations noted;

(h) Certification of completion submitted by the engineer of record;

(i) An updated operation manual including emergency procedures;

(j) Proposed revisions to the monitoring program or data to be submitted; and,

(k) Proposed plugging and abandonment plan pursuant to Rule 62-528.435(2), F.A.C.

D. CLASS I WELL PLUGGING AND ABANDONMENT PERMIT

1. The reasons for abandonment.

2. A proposed plan for plugging and abandonment describing the preferred and alternate methods, and justification for use.

   (a) The type and number of plugs to be used;

   (b) The placement of each plug including the elevation of the top and bottom;

   (c) The type and grade and quantity of cement or any other approved plugging material to be used; and,

   (d) The method for placement of the plugs.

3. The procedure to be used to meet the requirements of Rule 62-528.435, F.A.C.

E. CLASS III WELLS CONSTRUCTION/OPERATION/PLUGGING AND ABANDONMENT PERMIT

Construction Phase

1. A map showing the location of the proposed injection wells or well field area for which a permit is sought and the applicable area of review. Within the area of review, the map must show the number or name, and location of all producing wells, injection wells, abandoned wells, dry holes, surface bodies of water, springs, public water system, mines (surface and subsurface), quarries, water wells and other pertinent surface features including residences and roads. The map should also show faults, if known or suspected. Only information of public record and pertinent information known to the applicant is required to be included on this map.

2. A tabulation of data on all wells within the area of review which penetrate into the proposed injection zone, confining zone, or proposed monitoring zone. Such data shall include a description of each well's type, construction, date drilled, location, depth, record of plugging and/or completion, and any additional information the Department may require.

3. Maps and cross sections indicating the general vertical and lateral limits within the area of review of all underground sources of drinking water, their position relative to the injection formation and the direction of water movement, where known, in each underground source of drinking water which may be affected by the proposed injection.

4. Maps and cross sections detailing the hydrology and geologic structures of the local area.

5. Generalized maps and cross sections illustrating the regional geologic setting.

6. Proposed operating data:

   (a) Average and maximum daily rate and volume of the fluid to be injected;

   (b) Average and maximum injection pressure; and,

   (c) Source and an analysis of the chemical, physical, radiological and biological characteristics of injection fluids, including any additives.

7. Proposed formation testing program to obtain an analysis of the chemical, physical and radiological characteristics of and other information on the injection zone.

8. Proposed stimulation program.

9. Proposed injection procedure.

10. Engineering drawings of the surface and subsurface construction details of the system.

11. Contingency plans to cope with all shut-ins or well failures or catastrophic collapse, so as to protect the quality of the waters of the State as defined in Rule 62-3 and 62-520, F.A.C., including alternate or emergency discharge provisions.

12. Plans (including maps) and proposed monitoring data to be reported for meeting the monitoring requirements in Rule 62-528.425, F.A.C.

13. For wells within the area of review which penetrate the injection zone but are not properly completed or plugged, the corrective action proposed to be taken under Rule 62-528.300(5), F.A.C.

14. Construction procedures including a cementing and casing program, logging procedures, deviation checks, proposed methods for isolating drilling fluids from surficial aquifers, and a drilling, testing and coring program.

15. A certificate that the applicant has ensured, through a performance bond or other appropriate means, the resources necessary to close, plug or abandon the well as required by Rule 62-528.435(9), F.A.C.

16. Expected changes in pressure, native fluid displacement, direction of movement of injection fluid.

17. A proposed monitoring plan, which includes a plan for detecting migration of fluids into underground sources of drinking water, a plan to detect water quality violation in the monitoring wells, and the proposed monitoring data to be submitted.

Operation Phase

1. The following information shall be provided to the Department prior to granting approval for the operation of the well or well field:

   (a) All available logging and testing program data and construction data on the well or well field;

   (b) A satisfactory demonstration of mechanical integrity for all new wells pursuant to Rule 62-528.300(6), F.A.C.;

   (c) The actual operating data, including injection pressure versus pumping rate where feasible, or the anticipated maximum pressure and flow rate at which the permittee will operate, if approved by the Department;

   (d) The results of the formation testing program;

   (e) The actual injection procedure; and,

   (f) The status of corrective action on defective wells in the area of review.

Plugging and abandonment Phase

1. The justification for abandonment.

2. A proposed plan for plugging and abandonment describing the preferred and alternate methods.

   (a) The type and number of plugs to be used;

   (b) The placement of each plug including the elevation of the top and bottom;

   (c) The type and grade and quantity of cement or any other approved plugging material to be used; and,

   (d) The method for placement of the plugs.

3. The procedure to be used to meet the requirements of Rule 62-528.435, F.A.C.

F. EXPLORATORY WELL CONSTRUCTION AND TESTING PERMIT

1. Conceptual plan of the injection project. Include number of injection wells, proposed injection zone, nature and volume of injection fluid, and proposed monitoring program.

2. Preliminary Area of Review Study. Include the proposed radius of the area of review with justification for that radius. Provide a map showing the location of the proposed injection well or well field area for which a permit is sought and the applicable area of review. Within the area of review, the map must show the number or name, and location of all producing wells, injection wells, abandoned wells, dry holes, surface bodies of water, springs, public water systems, mines (surface and subsurface), quarries, water wells and other pertinent surface features including residences and roads. The map should also show faults, if known or suspected. Only information of public record and pertinent information known to the applicant is required to be included on this map.

3. Proposed other uses of the exploratory well.

4. Drilling and testing plan for the exploratory well. The drilling plan must specify the proposed drilling program, sampling, coring, and testing procedures.

5. Abandonment Plan.

G. CLASS V WELL CONSTRUCTION PERMIT

(This form should be used for Class V Wells instead of Form 62-528.900(3), F.A.C., when there is a need for a Technical Advisory Committee and an engineering report.)

1. Type and number of proposed Class V Wells:

_____ Wells Receiving Domestic Waste

_____ Desalination Process Concentrate Wells (Reverse Osmosis, etc.)

_____ Aquifer Storage and Recovery Wells

_____ Aquifer Remediation Wells

_____ Salt-water Intrusion Barrier Wells

_____ Cooling Water Return Flow Wells Open-looped System

_____ Subsidence Control Wells

_____ Sand Backfill Wells

_____ Experimental Technology Wells

_____ Wells used to inject spent brine after halogen recovery

_____ Radioactive Waste Disposal Wells*

_____ Borehole Slurry Mining Wells

_____ Other non-hazardous Industrial or Commercial Disposal Wells

(explain) _____

_____ Other (explain) _____

*Provided the concentrations of the waste do not exceed drinking water standards contained in Chapter 62-550, F.A.C.

2. Project Description:

(a) Description and use of proposed injection system;

(b) Nature and volume of injected fluid (the Department may require an analysis including bacteriological analysis) in accordance with Rule 62-528.635(2)(b), F.A.C.; and,

(c) Proposed pretreatment.

3. Water well contractor’s name, title, state license number, address, phone number and signature.

4. Well Design and Construction Details. (For multi-casing configurations or unusual construction provisions, an elevation drawing of the proposed well should be attached.)

   (a) Proposed total depth;

   (b) Proposed depth and type of casing(s);

   (c) Diameter of well;

   (d) Cement type, depth, thickness; and,

   (e) Injection pumps (if applicable): _____ gpm @ _____ psi

   Controls: _____

   _____

   _____

5. Water Supply Wells - When required by Rule 62-528.635(1), F.A.C., attach a map section showing the locations of all water supply wells within a one-half (1/2) mile radius of the proposed well. The well depths and casing depths should be included. When required by Rule 62-528.635(2), F.A.C., results of bacteriological examinations of water from all water supply wells within one-half (1/2) mile and drilled to approximate depth of proposed well should be attached.

6. Area of review (When required by Rule 62-528.300(4), F.A.C.)

   Include the proposed radius of the area of review with justification for that radius. Provide a map showing the location of the proposed injection well or well field area for which a permit is sought and the applicable area of review. Within the area of review, the map must show the number or name, and location of all producing wells, injection wells, abandoned wells, dry holes, surface bodies of water, springs, public water systems, mines (surface and subsurface), quarries, water wells and other pertinent surface features including residences and roads. The map should also show faults, if known or suspected. Only information of public record and pertinent information known to the applicant is required to be included on this map.

H. CLASS V WELL OPERATION PERMIT

(Final report of the construction that includes the following information may be submitted with the application to operate.)

1. Permit Number of Class V Construction Permit: _____

2. Owner's Name: _____

3. Type of Wells: _____

4. Construction and Testing Summary:

(a) Actual Dimensions:

Diameter (inches)	Well Depth (feet)	Casing Depth (feet)

(b) Result of Initial Testing

5. Proposed Operating Data:

(a) Injection Rate (GPM);

(b) Description of injected waste; and,

(c) Injection pressure and pump controls.

6. Proposed Monitoring Plan (if any):

(a) Number of monitoring wells;

(b) Depth(s);

(c) Parameters;

(d) Frequency of sampling; and,

(e) Instrumentation (if applicable) Flow _____

Pressure _____

I. CLASS V WELLS PLUGGING AND ABANDONMENT PERMIT

1. Permit number of Class V construction or operating permit.

2. Type of well.

3. Proposed plugging procedures, plans and specifications.

4. Reasons for abandonment.

J. MONITOR WELL PERMIT

This section should be used only when application is made for a monitor well only. If a monitor well is to be constructed under a Class I, III, or V injection well construction permit, it is necessary to fill in this section.

1. A site map showing the location of the proposed monitor wells for which a permit is sought. The map must be to scale and show the number or name, and location of all producing wells, injection wells, abandoned wells, dry holes, water wells and other pertinent surface features including structures and roads.

2. Maps and cross sections indicating the general vertical and lateral limits within the area of review of all underground sources of drinking water, their position relative to the injection formation and the direction of water movement, where known, in each underground source of drinking water which may be affected by the proposed injection.

3. Maps and cross sections detailing the hydrology and geologic structures of the local area.

4. Generalized maps and cross sections illustrating the regional geologic setting.

5. Proposed formation testing program to obtain an anlysis of the chemical, physical and radiological characteristics of and other information on the monitor zone(s).

6. Proposed monitoring procedure.

7. Engineering drawings of the surface and subsurface construction details of the monitoring system.

8. Proposed monitoring data to be reported for meeting the monitoring requirements in Rule 62-528.425, F.A.C.

9. Construction procedures including a cementing and casing program, logging procedures, deviation checks, proposed methods for isolating drilling fluids from surficial aquifers, proposed blowout protection (if necessary), and a drilling, testing and coring program

10. Monitor Well Information:

☐ On-site ☐ Multizone ☐ Single-zone

☐ Regional ☐ Other (specify) _____

Proposed Monitoring Interval(s) _____

Distance and Direction From Associated Injection Well _____

_____

APPENDIX B

PLUGGING AND ABANDONMENT PLAN

CLASS I INJECTION WELL
CONSTRUCTION & TESTING PERMIT APPLICATION
WASTE MANAGEMENT OF FLORIDA, INC. D.B.A. MEDLEY LANDFILL
MEDLEY, FLORIDA

If the Waste Management, Inc. Medley Landfill, (dba Medley Landfill) Test / Injection Well in Medley become inoperable or are determined to be a threat to the Underground Sources of Drinking Water (USDW), the Florida Department of Environmental Protection (FDEP) can order the wells to be plugged and abandoned. The referenced rule for plugging and abandonment is Chapter 62.528.435 (7) FAC. MEDLEY LANDFILL accepts the financial responsibility for the plugging and abandonment in accordance with the plans and specifications outlined below:

PLUGGING AND ABANDONMENT PLAN

The purpose of the plugging and abandonment program is to effectively seal or isolate the permitted injection zone from overlying aquifers. In accordance with FDEP rules, the injection well must be sealed from 10 feet below the base of injection casing. The proposed Medley Landfill injection well has 3,100 feet of 10¾-inch injection tubing installed with a packer assembly inside 3,100 feet of 16-inch injection casing that is cemented into the formation. The annulus between the 10¾-inch injection tubing and the 16-inch injection casing is filled with corrosion inhibited fluid.

Test/Injection Well

After completion of the Drilling & Testing Program, the Test/Injection Well will be plugged & abandoned if suitable hydrogeologic conditions are not present at the site for operation of a Class I Injection Well system in accordance with Chapter 62-528 FAC. The Test/Injection Well would be plugged to a depth of at least 10 feet above the first major cavity encountered in the lower Oldsmar Formation. An inflatable packer or bridge plug would be installed in the open-hole interval at this depth. After successfully setting the packer or bridge plug, the $12^{1}/_{4}$ inch pilot hole above the bridge plug and the 30-inch intermediate casing string would be filled from bottom to top with neat cement. A schematic diagram of the abandoned MEDLEY LANDFILL Test/Injection Well is attached.

APPENDIX B

PLUGGING AND ABANDONMENT PLAN

Injection Well

Prior to abandonment, the fresh water head in the tubing would be killed with brine and the pressure would be bled-off the annulus. The wellhead would be then be disassembled, the packer unseated, and the 10¾-inch injection tubing removed from the well. After the tubing and packer assembly are removed, a cementing head /blow-out preventer would be installed. To effectively plug the well to a depth of at least 10 feet below the bottom of the injection casing, an inflatable packer or bridge plug must be installed in the open-hole interval below the 16-inch injection casing. After successfully setting the packer or bridge plug, the injection casing would be filled from bottom to top with neat cement. The cement plug would completely fill the 16-inch injection casing and extend 10 feet below the casing into the nominal 16-inch open hole. A schematic diagram of the abandoned Medley Landfill Test/Injection Well is attached.

Monitor Well

The proposed multi-zone monitor well at the Medley Landfill facility would also be plugged with cement as shown on the attached schematic diagram. The proposed monitor well is designed to monitor two zones within the Floridan Aquifer System (FAS). The upper monitor zone will extend from approximately 1,800 feet below land surface (BLS) to 1,850 feet BLS and the lower interval will extend from approximately 1,900 feet BLS to 1,950 feet BLS. The lower zone will be constructed with 1,900 feet of 6 $^{5}/_{8}$-inch FRP tubing with 50 feet of open hole. Prior to abandonment, the fresh water head in both monitor zones would be killed with brine, the wellhead disassembled and removed from the well. A cementing head /blow-out preventer would be installed and the lower monitor zone plugged by filling the entire casing and open hole interval with neat cement. The upper monitor zone will be plugged by filling the entire annulus between the 6 $^{5}/_{8}$ –inch FRP tubing and 16-inch steel casing with neat cement. If cavities are present in the open-hole intervals of the monitor zones, they will be bridged with gravel.

All plugging and abandonment work will be completed by a qualified Water Well Contractor licensed to work in Florida. A qualified engineering and/or hydrogeological consultant will be retained to oversee the project and ensure it is completed in accordance with FDEP requirements. Cementing would be completed in stages or lifts using a tremmie line. To ensure the casings are properly sealed, the theoretical cement volumes will be compared with actual cement volume pumped and the top of each cement lift will be tagged prior to completing the next stage.

APPENDIX B

PLUGGING AND ABANDONMENT PLAN

MEDLEY LANDFILL INJECTION WELL PLUGGING AND ABANDONMENT PROCEDURES

The following procedures have been developed for the plugging and abandonment of the Medley Landfill Test / Injection Well:

I. Contractor Mobilization

1. Rig up
2. Layout piping and equipment

II. Remove Tubing and Packer Assembly

1. Rig up kill lines to 10¾-inch tubing and tubing annulus
2. Pump sufficient volume of drilling fluid (bentonite or salt mixture) to suppress fluid level
   In the tubing and annulus to approximately 30 feet BLS
3. Unseat Packer
4. Remove 10¾-inch tubing and packer assembly

III. Geophysical Logging

1. Rig up standpipe assembly
2. Flush casing with potable water
3. Conduct Video Survey
4. Complete Temperature, Caliper, CBL, and Fluid Resistivity logs
5. Rig down standpipe assembly

IV. Cementing

1. Install cementing head and blow-out preventer
2. Rig up and surface test packer (if used)
3. Use appropriate drill stem or tubing to set (inflate) centerline of packer or other bridging device at approximately 3,110 feet BLS in Injection Well.
4. Trip out and rig up for cementing
5. Pump neat cement (ASTM Type II) plug (100-foot fill-up)
6. Flush and trip out cement tremmie
7. Allow plug to set for 24 hours
8. Run in tremmie line and tag top of plug
   A. If no fill up
      a. Pump alternating lifts of 50 feet^3 of sand/gravel and neat cement with 12% gel and additives (flocele and gillsonite). Wait 8 hours between cement lifts and tags.
      b. After a tag is made fill remaining casing with neat cement to surface in lifts approximately 600 feet^3 each.
   B. If fill up
      a. Grout to surface with neat cement in lifts approximately 600 feet^3 each.
9. Remove cementing head and blow-out preventer

V. Contractor Demobilization

1. Rig down
2. Clean-up site

NOTE: All excess cement, drilling fluids and displacement fluids are to be containerized on-site and properly disposed of at a pre-approved facility. All tubing, valves, gaskets and fittings are to be stored on-site within the drilling pad area until recycled or properly disposed of at a pre-approved facility.

APPENDIX B

PLUGGING AND ABANDONMENT PLAN

MEDLEY LANDFILL MONITOR WELL PLUGGING AND ABANDONMENT PROCEDURES

The following procedures have been developed for the plugging and abandonment of the Medley Landfill Multi-Zone Monitor Well:

I. Contractor Mobilization

1. Rig up
2. Layout piping and equipment

II. Wellhead Removal

1. Rig up kill lines to 16-inch casing and 6 $^{5}/_{8}$ –inch FRP tubing
2. Pump sufficient volume of weighting material (bentonite or salt) to suppress the fluid level in the 16-inch casing and 6 $^{5}/_{8}$ –inch FRP tubing to 30 feet BLS.
3. Remove valve from well and install cementing head and blow-out preventer

III. Plug Lower Monitor Zone (1,900 to 1,950 BLS)

1. Run 1-inch tremmie line to approximately 1,950 feet BLS to clear obstructions
2. Pump approximately 16 feet^3 of neat cement (theoretical 100 linear feet)
3. Flush and remove tremmie line
4. After 24 hours, tag top of cement with 1-inch steel tremmie
5. Pump additional neat cement (approximately 300 ft^3) to surface through 1-inch tremmie
6. Remove and flush tremmie line
7. Remove cementing head and blow-out preventer

IV. Plug Upper Monitor Zone (1,800 feet BLS to 1,850 feet BLS)

1. Run tremmie to approximately 1,850 feet BLS.
2. Pump approximately 135 feet^3 of ASTM Type II cement (approximately 100 linear feet)
3. Remove and flush tremmie line
4. After 24 hours tag cement with tremmie
5. Pump additional neat cement (approximately 700 ft^3) to surface through 1-inch tremmie
6. Remove and flush tremmie line
7. Remove cementing head and blow-out preventer

V. Contractor Demobilization

5. Rig down
6. Clean-up site

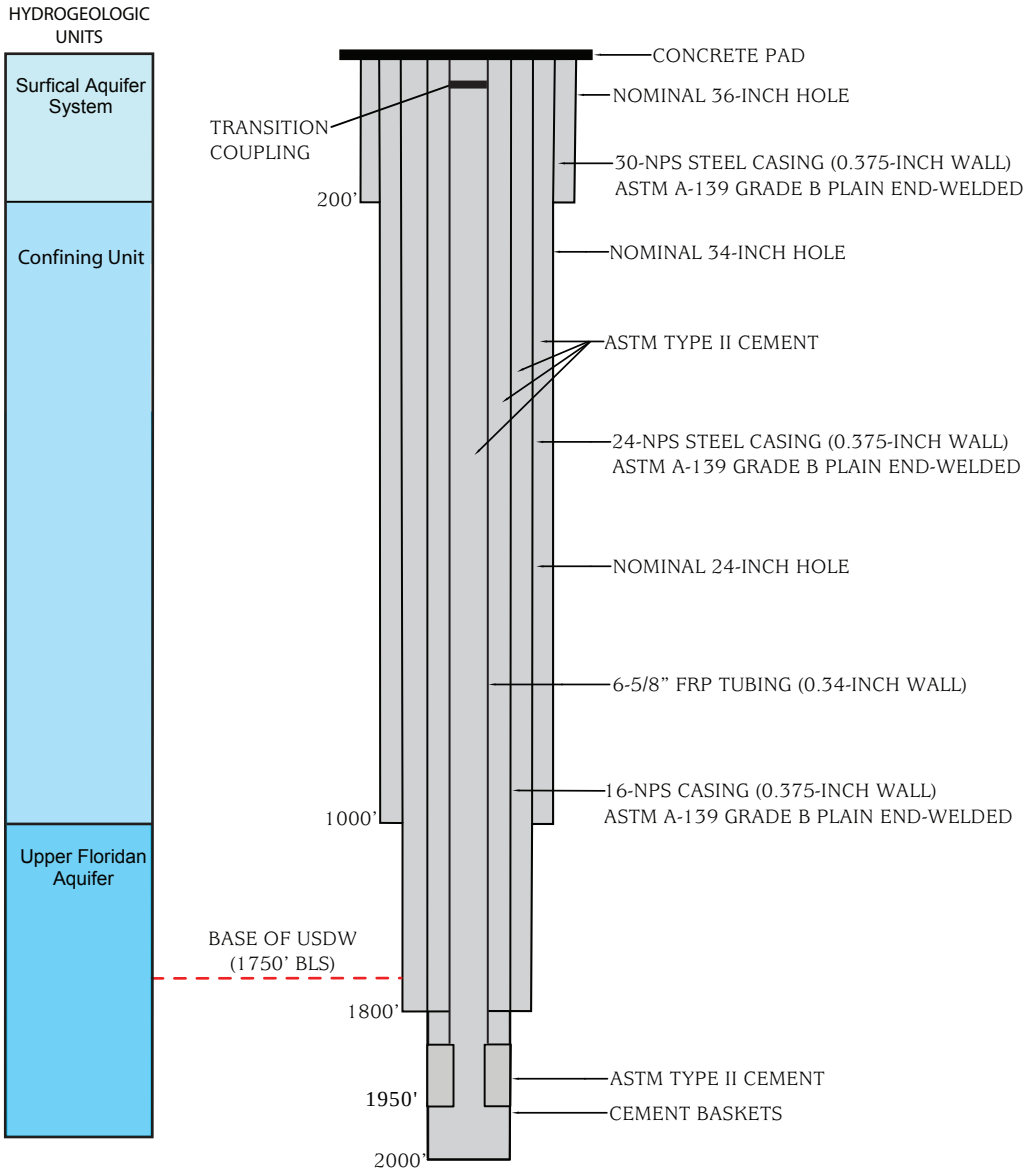
NOTE: All excess cement, drilling fluids and displacement fluids are to be containerized on-site and properly disposed of at a pre-approved facility. All tubing, valves, gaskets and fittings are to be stored on-site within the drilling pad area until recycled or properly disposed of at a pre-approved facility.

APPENDIX B

PLUGGING AND ABANDONMENT PLAN

COST ESTIMATES
MEDLEY LANDFILL INJECTION WELL & MONITOR WELL
PLUGGING & ABANDONMENT

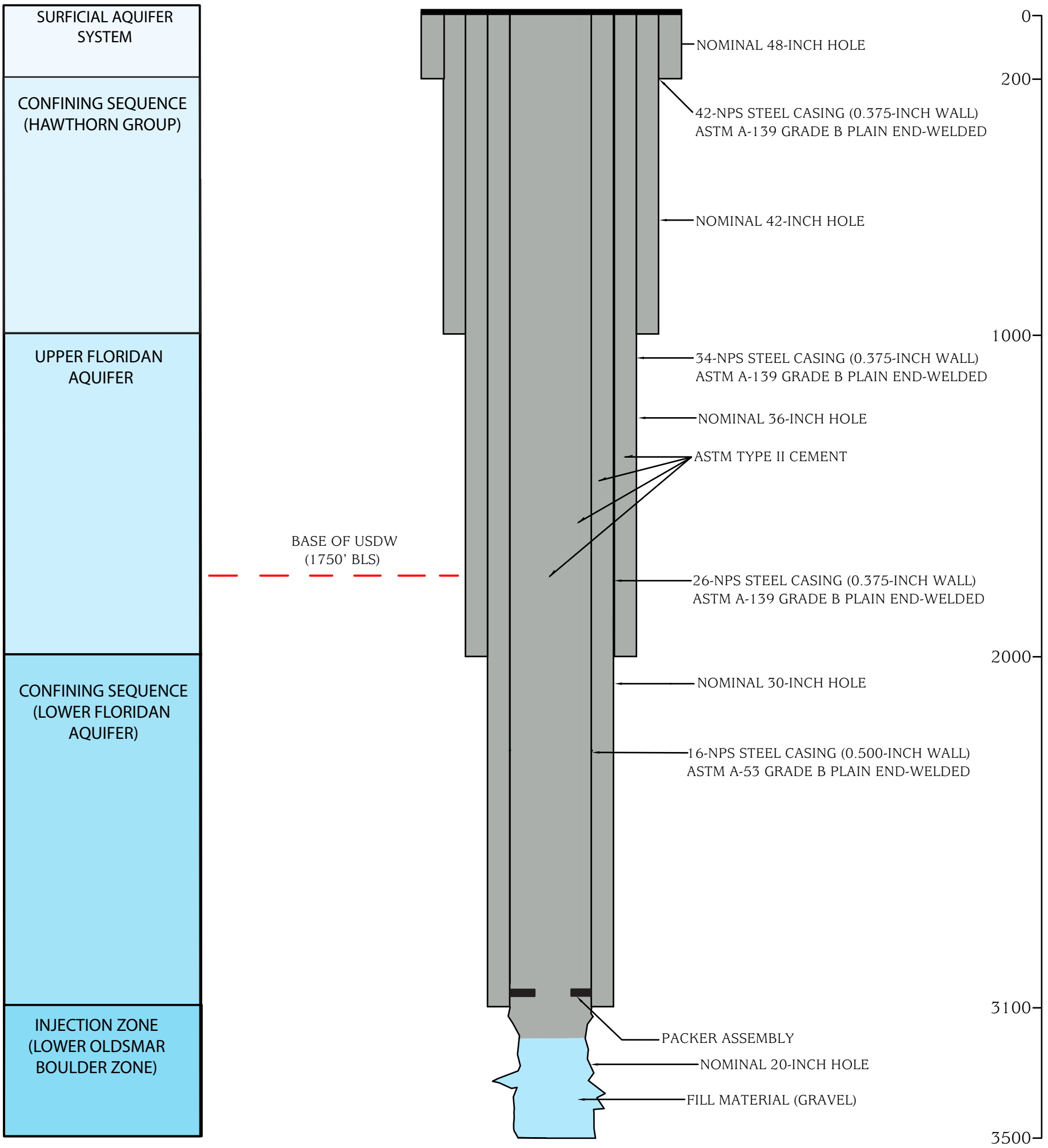
CONSULTING SERVICES -		$ 20,000
GEOPHYSICAL LOGGING -		$ 9,000
CONTRACTOR -		
Mobilizitation & Equipment Set Up	$ 85,000	
Demobilization & Site Restoration	$ 25,000	
Injection Well		
Kill Well & Remove Wellhead	$ 8,000	
Install Bridge Plug at 3,110 ' BLS	$ 15,000	
Neat Cement to Surface (3,800 Ft^3)	$ 55,000	
Monitor Well		
Kill Well & Remove Wellhead	$ 8,000	
Neat Cement to Surface (2,200 Ft^3)	$ 40,000	
Contractor Sub Total		$236,000
TOTAL PROJECT ESTIMATE		**$265,000**



NOT TO SCALE

L.S. SIMS & ASSOCIATES
Environmental Consulting

>MMBKAFU ? FIGURE 2
SCHEMATIC OF ABANDONED MONITOR WELL
WMI - MEDLEY LANDFILL
MEDLEY, FLORIDA



NOT TO SCALE

NOTE: 10.72-INCH FRP TUBING REMOVED PRIOR TO GROUTING

L.S. SIMS & ASSOCIATES
Environmental Consulting

APPENDIX B FIGURE 1
SCHEMATIC OF ABANDONED INJECTION WELL
WMI - MEDLEY LANDFILL
MEDLEY, FLORIDA

APPENDIX C

AREA OF REVIEW
CLASS I TEST/CLASS I INJECTION WELL
CONSTRUCTION & TESTING PERMIT APPLICATION
WASTE MANAGEMENT, INC. OF FLORIDA D.B.A. MEDLEY LANDFILL
MEDLEY, FLORIDA

Table 1. U.S. Geological Survey / SFWMD Wells Within 1-Mile Radius, August 2012

PERMIT No.	MAP No.	PROJECT NAME	DIAMETER	PUMP DEPTH	PUMP CAPAC	X COORD	Y COORD	WELL DEPTH	CASE DEPTH	SOURCE	WATER USE	SEC	TWP	RGE
13-00484-W	1	Waste Management, Inc	6	0	300	872131	555102	45	20	SAS	IRR	4	53S	40E
13-00484-W	2	Waste Management, Inc	3	0	0	868521	555411	25	20	SAS	IRR	4	53S	40E
13-00484-W	3	Waste Management, Inc	6	0	90	868350	556280	45	42	SAS	IRR / IND	4	53S	40E
13-04087-W	4	Ferdoss Pulling Laguna	2	0	120	873169	553839	30	25	SAS	IND	4	53S	40E
13-01298-W	5	Gardens Commercial Realty LTD	4	0	90	877089	555970	100	90	FAS	IRR	3	53S	40E
13-01298-W	6	Gardens Commercial Realty LTD	4	0	90	877098	555970	100	90	FAS	IRR	3	53S	40E
13-04922-W	7	Rosy Construction, Inc	2	0	40	877240	554980	20	15	SAS	IRR	3	53S	40E

NOTE: FAS = Floridan Aquifer System
SAS = Surficial Aquifer System
IRR = Irrigation
IND = Industrial

Pace Analytical Services, Inc.
3610 Park Central Blvd N
Pompano Beach, FL 33064
954-582-4300

September 18, 2012

Aaron Schilke
Waste Management-Medley
9350 NW 89 Ave
Miami, FL 33178

RE: Project: Leachate Medley Landfill
Pace Project No.: 3566688

Dear Aaron Schilke:
Enclosed are the analytical results for sample(s) received by the laboratory on August 31, 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,

Terrence Anderson

terrence.anderson@pacelabs.com
Project Manager

Enclosures

cc: Joe Gagne, Waste Management-Medley
Yoansy Vina, Waste Management-Medley

Pace Analytical Services, Inc.
3610 Park Central Blvd N
Pompano Beach, FL 33064
954-582-4300

CERTIFICATIONS

Project: Leachate Medley Landfill
Pace Project No.: 3566688

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 Certification #: 460198
Washington Certification #: C868
West Virginia Certification #: 143
Wisconsin/PADEP Certification
Wyoming Certification #: 8TMS-Q

Ormond Beach Certification IDs
8 East Tower Circle, Ormond Beach, FL 32174
Alabama Certification #: 41320
Arizona Certification #: AZ0735
Colorado Certification: FL NELAC Reciprocity
Connecticut Certification #: PH-0216
Florida Certification #: E83079
Georgia Certification #: 955
Guam Certification: FL NELAC Reciprocity
Hawaii Certification: FL NELAC Reciprocity
Illinois Certification #: 200068
Indiana Certification: FL NELAC Reciprocity
Kansas Certification #: E-10383
Kentucky Certification #: 90050
Louisiana Certification #: FL NELAC Reciprocity
Louisiana Environmental Certificate #: 05007
Maine Certification #: FL01264
Massachusetts Certification #: M-FL1264
Michigan Certification #: 9911
Mississippi Certification: FL NELAC Reciprocity
Missouri Certification #: 236
Montana Certification #: Cert 0074
Nevada Certification: FL NELAC Reciprocity
New Hampshire Certification #: 2958
New Jersey Certification #: FL765
New York Certification #: 11608
North Carolina Environmental Certificate #: 667
North Carolina Certification #: 12710
Pennsylvania Certification #: 68-00547
Puerto Rico Certification #: FL01264
Tennessee Certification #: TN02974
Texas Certification: FL NELAC Reciprocity
US Virgin Islands Certification: FL NELAC Reciprocity
Virginia Environmental Certification #: 460165
Washington Certification #: C955
West Virginia Certification #: 9962C
Wisconsin Certification #: 399079670
Wyoming (EPA Region 8): FL NELAC Reciprocity

South Florida Certification IDs
3610 Park Central Blvd N Pompano Beach, FL 33064
Florida Certification #: E86240

Pace Analytical Services, Inc.
3610 Park Central Blvd N
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SAMPLE SUMMARY

Project: Leachate Medley Landfill
Pace Project No.: 3566688

Lab ID	Sample ID	Matrix	Date Collected	Date Received
3566688001	**LEACHATE SP**	Water	08/31/12 11:30	08/31/12 16:20

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SAMPLE ANALYTE COUNT

Project: Leachate Medley Landfill
Pace Project No.: 3566688

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
3566688001	**LEACHATE SP**	EPA 504.1	JLR	2	PASI-O
		EPA 508.1	JTT	28	PASI-O
		EPA 515.3	LJM	13	PASI-O
		EPA 531.1	WFH	10	PASI-O
		EPA 547	WFH	1	PASI-O
		EPA 549.2	WFH	2	PASI-O
		EPA 552.2	JLR	7	PASI-O
		EPA 200.7	JTJ	8	PASI-O
		EPA 200.8	HEA	9	PASI-O
		EPA 245.1	DRS	1	PASI-O
		EPA 525.2	WFH	27	PASI-O
		EPA 548.1	EAO	1	PASI-O
		EPA 524.2	JBH	70	PASI-O
		SM 7110C	JC2	1	PASI-PA
		EPA 903.1	SLA	1	PASI-PA
		EPA 904.0	MAW	1	PASI-PA
		ASTM D5811-95	MBT	1	PASI-PA
		SM 2150B	LCM	2	PASI-SF
		SM 2540C	LCM	1	PASI-SF
		SM 2540D	LCM	1	PASI-SF
		SM 4500-H+B	LCM	2	PASI-SF
		SM 9222B	JJJ	1	PASI-SF
		SM 2120B	KHC	1	PASI-O
		SM 4500-ClO2	LAJ	1	PASI-O
		SM 5540C	KDM	1	PASI-O
		EPA 300.0	IRL	3	PASI-O
		EPA 300.0	IRL	3	PASI-O
		EPA 300.1	KDM	2	PASI-O
		EPA 300.1	KDM	2	PASI-O
		EPA 335.4	SOA	1	PASI-O
		EPA 350.1	SOA	1	PASI-O
		EPA 351.2	MSM	1	PASI-O
		EPA 365.4	MSM	1	PASI-O

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ANALYTICAL RESULTS

Project: Leachate Medley Landfill
Pace Project No.: 3566688

Sample: LEACHATE SP **Lab ID: 3566688001** Collected: 08/31/12 11:30 Received: 08/31/12 16:20 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
504.1 GCS EDB and DBCP	Analytical Method: EPA 504.1 Preparation Method: EPA 504.1								
1,2-Dibromo-3-chloropropane	**0.0049U**	ug/L	0.020	0.0049	1	09/04/12 08:30	09/04/12 15:26	96-12-8	
1,2-Dibromoethane (EDB)	**0.0062U**	ug/L	0.010	0.0062	1	09/04/12 08:30	09/04/12 15:26	106-93-4	
508.1 GCS Pesticides	Analytical Method: EPA 508.1 Preparation Method: EPA 508.1								
Alachlor	**0.34U**	ug/L	2.0	0.34	1	09/07/12 12:50	09/08/12 18:51	15972-60-8	
Atrazine	**0.21U**	ug/L	1.0	0.21	1	09/07/12 12:50	09/08/12 18:51	1912-24-9	
gamma-BHC (Lindane)	**0.030U**	ug/L	0.20	0.030	1	09/07/12 12:50	09/08/12 18:51	58-89-9	
Butachlor	**0.15U**	ug/L	1.0	0.15	1	09/07/12 12:50	09/08/12 18:51	23184-66-9	
Chlordane (Technical)	**0.47U**	ug/L	2.0	0.47	1	09/07/12 12:50	09/08/12 18:51	57-74-9	
alpha-Chlordane	**0.020U**	ug/L	0.20	0.020	1	09/07/12 12:50	09/08/12 18:51	5103-71-9	N2
gamma-Chlordane	**0.020U**	ug/L	0.20	0.020	1	09/07/12 12:50	09/08/12 18:51	5103-74-2	N2
Dieldrin	**0.14U**	ug/L	1.0	0.14	1	09/07/12 12:50	09/08/12 18:51	60-57-1	
Endrin	**0.020U**	ug/L	0.10	0.020	1	09/07/12 12:50	09/08/12 18:51	72-20-8	
Heptachlor	**0.060U**	ug/L	0.40	0.060	1	09/07/12 12:50	09/08/12 18:51	76-44-8	
Heptachlor epoxide	**0.030U**	ug/L	0.20	0.030	1	09/07/12 12:50	09/08/12 18:51	1024-57-3	
Hexachlorobenzene	**0.11U**	ug/L	1.0	0.11	1	09/07/12 12:50	09/08/12 18:51	118-74-1	
Hexachlorocyclopentadiene	**0.12U**	ug/L	1.0	0.12	1	09/07/12 12:50	09/08/12 18:51	77-47-4	
Methoxychlor	**0.14U**	ug/L	1.0	0.14	1	09/07/12 12:50	09/08/12 18:51	72-43-5	
Metolachlor	**0.11U**	ug/L	1.0	0.11	1	09/07/12 12:50	09/08/12 18:51	51218-45-2	
Metribuzin	**0.35U**	ug/L	1.0	0.35	1	09/07/12 12:50	09/08/12 18:51	21087-64-9	
PCB-1016 (Aroclor 1016)	**0.80U**	ug/L	1.0	0.80	1	09/07/12 12:50	09/08/12 18:51	12674-11-2	
PCB-1221 (Aroclor 1221)	**0.29U**	ug/L	1.0	0.29	1	09/07/12 12:50	09/08/12 18:51	11104-28-2	
PCB-1232 (Aroclor 1232)	**0.29U**	ug/L	1.0	0.29	1	09/07/12 12:50	09/08/12 18:51	11141-16-5	
PCB-1242 (Aroclor 1242)	**0.51U**	ug/L	1.0	0.51	1	09/07/12 12:50	09/08/12 18:51	53469-21-9	
PCB-1248 (Aroclor 1248)	**0.62U**	ug/L	1.0	0.62	1	09/07/12 12:50	09/08/12 18:51	12672-29-6	
PCB-1254 (Aroclor 1254)	**0.23U**	ug/L	1.0	0.23	1	09/07/12 12:50	09/08/12 18:51	11097-69-1	
PCB-1260 (Aroclor 1260)	**0.66U**	ug/L	1.0	0.66	1	09/07/12 12:50	09/08/12 18:51	11096-82-5	
PCB, Total	**0.80U**	ug/L	1.0	0.80	1	09/07/12 12:50	09/08/12 18:51	1336-36-3	
Propachlor	**0.10U**	ug/L	1.0	0.10	1	09/07/12 12:50	09/08/12 18:51	1918-16-7	
Simazine	**0.44U**	ug/L	0.70	0.44	1	09/07/12 12:50	09/08/12 18:51	122-34-9	
Toxaphene	**6.1U**	ug/L	10.0	6.1	1	09/07/12 12:50	09/08/12 18:51	8001-35-2	
Surrogates									
Decachlorobiphenyl (S)	52	%	70-130		1	09/07/12 12:50	09/08/12 18:51	2051-24-3	J(S2)
515.3 Chlorinated Herbicides	Analytical Method: EPA 515.3 Preparation Method: EPA 515.3								
Acifluorfen	**0.053U**	ug/L	0.10	0.053	1	09/05/12 10:30	09/07/12 10:40	62476-59-9	
Bentazon	**0.16U**	ug/L	0.20	0.16	1	09/05/12 10:30	09/07/12 10:40	25057-89-0	
2,4-D	**0.081U**	ug/L	0.10	0.081	1	09/05/12 10:30	09/07/12 10:40	94-75-7	
Dalapon	**0.89U**	ug/L	1.0	0.89	1	09/05/12 10:30	09/07/12 10:40	75-99-0	
2,4-DB	**1.7U**	ug/L	2.0	1.7	1	09/05/12 10:30	09/07/12 10:40	94-82-6	
Dicamba	**0.067U**	ug/L	0.10	0.067	1	09/05/12 10:30	09/07/12 10:40	1918-00-9	
Dichlorprop	**0.55U**	ug/L	0.70	0.55	1	09/05/12 10:30	09/07/12 10:40	120-36-5	
Dinoseb	**0.16U**	ug/L	0.20	0.16	1	09/05/12 10:30	09/07/12 10:40	88-85-7	
Pentachlorophenol	**0.030U**	ug/L	0.040	0.030	1	09/05/12 10:30	09/07/12 10:40	87-86-5	
Picloram	**0.094U**	ug/L	0.10	0.094	1	09/05/12 10:30	09/07/12 10:40	1918-02-1	
2,4,5-T	**0.16U**	ug/L	0.20	0.16	1	09/05/12 10:30	09/07/12 10:40	93-76-5	

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ANALYTICAL RESULTS

Project: Leachate Medley Landfill
Pace Project No.: 3566688

Sample: LEACHATE SP **Lab ID: 3566688001** Collected: 08/31/12 11:30 Received: 08/31/12 16:20 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
515.3 Chlorinated Herbicides	Analytical Method: EPA 515.3 Preparation Method: EPA 515.3								
2,4,5-TP (Silvex)	**0.16U**	ug/L	0.20	0.16	1	09/05/12 10:30	09/07/12 10:40	93-72-1	
Surrogates									
2,4-DCAA (S)	116	%	70-130		1	09/05/12 10:30	09/07/12 10:40	19719-28-9	
531.1 GCS Carbamates	Analytical Method: EPA 531.1								
Aldicarb	**64.3U**	ug/L	200	64.3	100		09/06/12 21:30	116-06-3	L3
Aldicarb sulfone	**35.3U**	ug/L	200	35.3	100		09/06/12 21:30	1646-88-4	L3
Aldicarb sulfoxide	**29.5U**	ug/L	200	29.5	100		09/06/12 21:30	1646-87-3	
Carbofuran	**31.5U**	ug/L	200	31.5	100		09/06/12 21:30	1563-66-2	L3
3-Hydroxycarbofuran	**26.0U**	ug/L	200	26.0	100		09/06/12 21:30	16655-82-6	D3,L3
Methiocarb	**48.0U**	ug/L	200	48.0	100		09/06/12 21:30	2032-65-7	L3
Methomyl	**57.0U**	ug/L	200	57.0	100		09/06/12 21:30	16752-77-5	L3
Oxamyl	**40.7U**	ug/L	200	40.7	100		09/06/12 21:30	23135-22-0	
Carbaryl	**20.4U**	ug/L	200	20.4	100		09/06/12 21:30	63-25-2	L3
Surrogates									
Propoxur (S)	0	%	80-120		100		09/06/12 21:30	114-26-1	S4
547 HPLC Glyphosate	Analytical Method: EPA 547								
Glyphosate	**210U**	ug/L	600	210	100		09/05/12 20:03		D3
549.2 GCS Paraquat Diquat	Analytical Method: EPA 549.2 Preparation Method: EPA 549.2								
Diquat	**7.4U**	ug/L	20.0	7.4	50	09/04/12 16:00	09/04/12 21:43	85-00-7	
Paraquat	**13.7U**	ug/L	20.0	13.7	50	09/04/12 16:00	09/04/12 21:43	1910-42-5	
552.2 Haloacetic Acids	Analytical Method: EPA 552.2 Preparation Method: EPA 552.2								
Dibromoacetic Acid	**2.4U**	ug/L	4.0	2.4	2	09/07/12 09:00	09/11/12 22:58	631-64-1	
Dichloroacetic Acid	**2.4U**	ug/L	4.0	2.4	2	09/07/12 09:00	09/11/12 22:58	79-43-6	
Haloacetic Acids (Total)	**2.4U**	ug/L	4.0	2.4	2	09/07/12 09:00	09/11/12 22:58		
Monobromoacetic Acid	**2.4U**	ug/L	4.0	2.4	2	09/07/12 09:00	09/11/12 22:58	79-08-3	
Monochloroacetic Acid	**2.4U**	ug/L	4.0	2.4	2	09/07/12 09:00	09/11/12 22:58	79-11-8	
Trichloroacetic Acid	**2.4U**	ug/L	4.0	2.4	2	09/07/12 09:00	09/11/12 22:58	76-03-9	
Surrogates									
2,3-Dibromopropanoic Acid (S)	165	%	70-130		2	09/07/12 09:00	09/11/12 22:58	600-05-5	D3
200.7 MET ICP	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Aluminum	**726**	ug/L	500	250	1	09/04/12 11:20	09/05/12 10:46	7429-90-5	
Cadmium	**2.5U**	ug/L	5.0	2.5	1	09/04/12 11:20	09/05/12 10:46	7440-43-9	
Chromium	**202**	ug/L	25.0	12.5	1	09/04/12 11:20	09/05/12 10:46	7440-47-3	
Iron	**5880**	ug/L	200	100	1	09/04/12 11:20	09/05/12 10:46	7439-89-6	
Nickel	**79.8**	ug/L	25.0	12.5	1	09/04/12 11:20	09/05/12 10:46	7440-02-0	
Silver	**12.5U**	ug/L	25.0	12.5	1	09/04/12 11:20	09/05/12 10:46	7440-22-4	
Sodium	**1040000**	ug/L	5000	2500	1	09/04/12 11:20	09/05/12 10:46	7440-23-5	
Zinc	**67.3 I**	ug/L	100	50.0	1	09/04/12 11:20	09/05/12 10:46	7440-66-6	

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3610 Park Central Blvd N
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ANALYTICAL RESULTS

Project: Leachate Medley Landfill
Pace Project No.: 3566688

Sample: LEACHATE SP **Lab ID: 3566688001** Collected: 08/31/12 11:30 Received: 08/31/12 16:20 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.8 MET ICPMS	Analytical Method: EPA 200.8 Preparation Method: EPA 200.8								
Antimony	**11.8**	ug/L	5.0	2.5	1	09/04/12 11:20	09/05/12 18:52	7440-36-0	
Arsenic	**152**	ug/L	5.0	2.5	1	09/04/12 11:20	09/05/12 18:52	7440-38-2	
Barium	**396**	ug/L	5.0	2.5	1	09/04/12 11:20	09/05/12 18:52	7440-39-3	
Beryllium	**1.2U**	ug/L	2.5	1.2	5	09/04/12 11:20	09/06/12 14:08	7440-41-7	
Copper	**5.9**	ug/L	5.0	4.6	1	09/04/12 11:20	09/05/12 18:52	7440-50-8	
Lead	**4.0 I**	ug/L	5.0	2.5	1	09/04/12 11:20	09/05/12 18:52	7439-92-1	
Manganese	**132**	ug/L	5.0	3.4	1	09/04/12 11:20	09/05/12 18:52	7439-96-5	
Selenium	**2.7 I**	ug/L	5.0	2.5	1	09/04/12 11:20	09/05/12 18:52	7782-49-2	
Thallium	**2.5U**	ug/L	5.0	2.5	1	09/04/12 11:20	09/05/12 18:52	7440-28-0	
245.1 Mercury	Analytical Method: EPA 245.1 Preparation Method: EPA 245.1								
Mercury	**1.0U**	ug/L	2.0	1.0	1	09/01/12 05:00	09/04/12 08:04	7439-97-6	
525.2 Base Neutral Extractable	Analytical Method: EPA 525.2 Preparation Method: EPA 525.2								
Aldrin	**0.36U**	ug/L	1.0	0.36	1	09/07/12 08:00	09/07/12 17:05	309-00-2	
Benzo(a)pyrene	**0.19U**	ug/L	1.0	0.19	1	09/07/12 08:00	09/07/12 17:05	50-32-8	
Butachlor	**0.74U**	ug/L	1.0	0.74	1	09/07/12 08:00	09/07/12 17:05	23184-66-9	
Butylbenzylphthalate	**1.1U**	ug/L	20.0	1.1	1	09/07/12 08:00	09/07/12 17:05	85-68-7	
2-Chlorobiphenyl	**0.24U**	ug/L	1.0	0.24	1	09/07/12 08:00	09/07/12 17:05		
Dieldrin	**0.47U**	ug/L	1.3	0.47	1	09/07/12 08:00	09/07/12 17:05	60-57-1	
Diethylphthalate	**2.0U**	ug/L	20.0	2.0	1	09/07/12 08:00	09/07/12 17:05	84-66-2	
Dimethylphthalate	**10.9U**	ug/L	16.0	10.9	1	09/07/12 08:00	09/07/12 17:05	131-11-3	
Di-n-butylphthalate	**2.3U**	ug/L	20.0	2.3	1	09/07/12 08:00	09/07/12 17:05	84-74-2	
bis(2-Ethylhexyl)adipate	**3.8U**	ug/L	16.0	3.8	1	09/07/12 08:00	09/07/12 17:05	103-23-1	
bis(2-Ethylhexyl)phthalate	**14.8 I**	ug/L	20.0	5.0	1	09/07/12 08:00	09/07/12 17:05	117-81-7	
Fluorene	**0.25U**	ug/L	2.0	0.25	1	09/07/12 08:00	09/07/12 17:05	86-73-7	
Indeno(1,2,3-cd)pyrene	**0.24U**	ug/L	2.0	0.24	1	09/07/12 08:00	09/07/12 17:05	193-39-5	
Metolachlor	**0.35U**	ug/L	10.0	0.35	1	09/07/12 08:00	09/07/12 17:05	51218-45-2	
Metribuzin	**5.5**	ug/L	3.0	0.31	1	09/07/12 08:00	09/07/12 17:05	21087-64-9	
Molinate	**1.2U**	ug/L	20.0	1.2	1	09/07/12 08:00	09/07/12 17:05	2212-67-1	N2
trans-Nonachlor	**1.2U**	ug/L	2.0	1.2	1	09/07/12 08:00	09/07/12 17:05	39765-80-5	N2
Octachlorobiphenyl	**0.80U**	ug/L	1.0	0.80	1	09/07/12 08:00	09/07/12 17:05	31472-83-0	
Pentachlorobiphenyl	**0.40U**	ug/L	1.0	0.40	1	09/07/12 08:00	09/07/12 17:05	25429-29-2	
Phenanthrene	**1.7 I**	ug/L	2.0	0.50	1	09/07/12 08:00	09/07/12 17:05	85-01-8	N2
Propachlor	**0.30U**	ug/L	2.0	0.30	1	09/07/12 08:00	09/07/12 17:05	1918-16-7	
Pyrene	**0.34U**	ug/L	2.0	0.34	1	09/07/12 08:00	09/07/12 17:05	129-00-0	
Tetrachlorobiphenyl	**0.36U**	ug/L	1.0	0.36	1	09/07/12 08:00	09/07/12 17:05	26914-33-0	
Thiobencarb	**1.0U**	ug/L	20.0	1.0	1	09/07/12 08:00	09/07/12 17:05	28249-77-6	N2
Surrogates									
1,3-Dimethyl-2-nitrobenzene(S)	94	%	70-130		1	09/07/12 08:00	09/07/12 17:05	81209	
Perylene-d12 (S)	62	%	70-130		1	09/07/12 08:00	09/07/12 17:05	1520963	J(S0)
Triphenylphosphate (S)	198	%	70-130		1	09/07/12 08:00	09/07/12 17:05	115-86-6	J(S0)
548.1 GCS Endothall	Analytical Method: EPA 548.1 Preparation Method: EPA 548.1								
Endothall	**2.7U**	ug/L	9.0	2.7	1	09/05/12 16:30	09/06/12 17:52		J(IS)

Pace Analytical Services, Inc.
3610 Park Central Blvd N
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ANALYTICAL RESULTS

Project: Leachate Medley Landfill
Pace Project No.: 3566688

Sample: LEACHATE SP **Lab ID: 3566688001** Collected: 08/31/12 11:30 Received: 08/31/12 16:20 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
524.2 MSV	Analytical Method: EPA 524.2								
Acetone	**1310**	ug/L	500	250	100		09/10/12 12:40	67-64-1	
Benzene	**2.1**	ug/L	0.50	0.25	1		09/02/12 19:30	71-43-2	
Bromobenzene	**0.25U**	ug/L	0.50	0.25	1		09/02/12 19:30	108-86-1	
Bromochloromethane	**0.25U**	ug/L	0.50	0.25	1		09/02/12 19:30	74-97-5	
Bromodichloromethane	**0.25U**	ug/L	0.50	0.25	1		09/02/12 19:30	75-27-4	
Bromoform	**0.25U**	ug/L	0.50	0.25	1		09/02/12 19:30	75-25-2	
Bromomethane	**0.25U**	ug/L	0.50	0.25	1		09/02/12 19:30	74-83-9	
2-Butanone (MEK)	**925**	ug/L	40.0	20.0	10		09/08/12 14:12	78-93-3	
n-Butylbenzene	**0.25U**	ug/L	0.50	0.25	1		09/02/12 19:30	104-51-8	
sec-Butylbenzene	**0.25U**	ug/L	0.50	0.25	1		09/02/12 19:30	135-98-8	
tert-Butylbenzene	**0.25U**	ug/L	0.50	0.25	1		09/02/12 19:30	98-06-6	
Carbon tetrachloride	**0.25U**	ug/L	0.50	0.25	1		09/02/12 19:30	56-23-5	
Chlorobenzene	**0.87**	ug/L	0.50	0.25	1		09/02/12 19:30	108-90-7	
Chloroethane	**0.25U**	ug/L	0.50	0.25	1		09/02/12 19:30	75-00-3	
Chloroform	**1.2**	ug/L	0.50	0.25	1		09/02/12 19:30	67-66-3	
Chloromethane	**0.25U**	ug/L	0.50	0.25	1		09/02/12 19:30	74-87-3	
2-Chlorotoluene	**0.25U**	ug/L	0.50	0.25	1		09/02/12 19:30	95-49-8	
4-Chlorotoluene	**0.25U**	ug/L	0.50	0.25	1		09/02/12 19:30	106-43-4	
Dibromochloromethane	**0.25U**	ug/L	0.50	0.25	1		09/02/12 19:30	124-48-1	
1,2-Dibromoethane (EDB)	**0.25U**	ug/L	0.50	0.25	1		09/02/12 19:30	106-93-4	
Dibromomethane	**0.25U**	ug/L	0.50	0.25	1		09/02/12 19:30	74-95-3	
1,2-Dichlorobenzene	**0.25U**	ug/L	0.50	0.25	1		09/02/12 19:30	95-50-1	
1,3-Dichlorobenzene	**0.25U**	ug/L	0.50	0.25	1		09/02/12 19:30	541-73-1	
1,4-Dichlorobenzene	**3.4**	ug/L	0.50	0.25	1		09/02/12 19:30	106-46-7	
Dichlorodifluoromethane	**0.25U**	ug/L	0.50	0.25	1		09/02/12 19:30	75-71-8	
1,1-Dichloroethane	**0.25U**	ug/L	0.50	0.25	1		09/02/12 19:30	75-34-3	
1,2-Dichloroethane	**0.25U**	ug/L	0.50	0.25	1		09/02/12 19:30	107-06-2	
1,1-Dichloroethene	**0.25U**	ug/L	0.50	0.25	1		09/02/12 19:30	75-35-4	
cis-1,2-Dichloroethene	**0.47 I**	ug/L	0.50	0.25	1		09/02/12 19:30	156-59-2	
trans-1,2-Dichloroethene	**0.25U**	ug/L	0.50	0.25	1		09/02/12 19:30	156-60-5	
1,2-Dichloropropane	**0.25U**	ug/L	0.50	0.25	1		09/02/12 19:30	78-87-5	
1,3-Dichloropropane	**0.25U**	ug/L	0.50	0.25	1		09/02/12 19:30	142-28-9	
2,2-Dichloropropane	**0.25U**	ug/L	0.50	0.25	1		09/02/12 19:30	594-20-7	
1,1-Dichloropropene	**0.25U**	ug/L	0.50	0.25	1		09/02/12 19:30	563-58-6	
cis-1,3-Dichloropropene	**0.25U**	ug/L	0.50	0.25	1		09/02/12 19:30	10061-01-5	
1,3-Dichloropropene	**0.25U**	ug/L	0.50	0.25	1		09/02/12 19:30	10061-02-6	N2
trans-1,3-Dichloropropene	**0.25U**	ug/L	0.50	0.25	1		09/02/12 19:30	10061-02-6	
Ethylbenzene	**2.2**	ug/L	0.50	0.25	1		09/02/12 19:30	100-41-4	
Hexachloro-1,3-butadiene	**0.25U**	ug/L	0.50	0.25	1		09/02/12 19:30	87-68-3	
Isopropylbenzene (Cumene)	**0.29 I**	ug/L	0.50	0.25	1		09/02/12 19:30	98-82-8	
p-Isopropyltoluene	**2.0**	ug/L	0.50	0.25	1		09/02/12 19:30	99-87-6	
Methylene Chloride	**0.44U**	ug/L	0.50	0.44	1		09/02/12 19:30	75-09-2	
Methyl-tert-butyl ether	**0.36 I**	ug/L	0.50	0.25	1		09/02/12 19:30	1634-04-4	
Naphthalene	**13.3**	ug/L	0.50	0.25	1		09/02/12 19:30	91-20-3	
n-Propylbenzene	**0.25U**	ug/L	0.50	0.25	1		09/02/12 19:30	103-65-1	
Styrene	**0.25U**	ug/L	0.50	0.25	1		09/02/12 19:30	100-42-5	

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ANALYTICAL RESULTS

Project: Leachate Medley Landfill
Pace Project No.: 3566688

Sample: LEACHATE SP **Lab ID: 3566688001** Collected: 08/31/12 11:30 Received: 08/31/12 16:20 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
524.2 MSV	Analytical Method: EPA 524.2								
1,1,1,2-Tetrachloroethane	**0.25U**	ug/L	0.50	0.25	1		09/02/12 19:30	630-20-6	
1,1,2,2-Tetrachloroethane	**0.49 I**	ug/L	0.50	0.25	1		09/02/12 19:30	79-34-5	
Tetrachloroethene	**0.25U**	ug/L	0.50	0.25	1		09/02/12 19:30	127-18-4	
Toluene	**3.8**	ug/L	0.50	0.25	1		09/02/12 19:30	108-88-3	
Total Trihalomethanes (Calc.)	**1.3**	ug/L	0.50	0.25	1		09/02/12 19:30		
1,2,3-Trichlorobenzene	**0.25U**	ug/L	0.50	0.25	1		09/02/12 19:30	87-61-6	
1,2,4-Trichlorobenzene	**0.25U**	ug/L	0.50	0.25	1		09/02/12 19:30	120-82-1	
1,1,1-Trichloroethane	**0.25U**	ug/L	0.50	0.25	1		09/02/12 19:30	71-55-6	
1,1,2-Trichloroethane	**0.25U**	ug/L	0.50	0.25	1		09/02/12 19:30	79-00-5	
Trichloroethene	**0.25U**	ug/L	0.50	0.25	1		09/02/12 19:30	79-01-6	
Trichlorofluoromethane	**0.25U**	ug/L	0.50	0.25	1		09/02/12 19:30	75-69-4	
1,2,3-Trichloropropane	**0.33U**	ug/L	0.50	0.33	1		09/02/12 19:30	96-18-4	
1,1,2-Trichlorotrifluoroethane	**0.25U**	ug/L	0.50	0.25	1		09/02/12 19:30	76-13-1	N2
1,2,3-Trimethylbenzene	**0.96**	ug/L	0.50	0.25	1		09/02/12 19:30	526-73-8	N2
1,2,4-Trimethylbenzene	**1.2**	ug/L	0.50	0.25	1		09/02/12 19:30	95-63-6	
1,3,5-Trimethylbenzene	**0.28 I**	ug/L	0.50	0.25	1		09/02/12 19:30	108-67-8	
Vinyl chloride	**0.25U**	ug/L	0.50	0.25	1		09/02/12 19:30	75-01-4	
Xylene (Total)	**5.0**	ug/L	0.50	0.25	1		09/02/12 19:30	1330-20-7	
m&p-Xylene	**3.0**	ug/L	0.50	0.25	1		09/02/12 19:30	179601-23-1	
o-Xylene	**2.0**	ug/L	0.50	0.25	1		09/02/12 19:30	95-47-6	
Surrogates									
4-Bromofluorobenzene (S)	96	%	70-130		1		09/02/12 19:30	460-00-4	
Dibromofluoromethane (S)	95	%	70-130		1		09/02/12 19:30	1868-53-7	
Toluene-d8 (S)	95	%	70-130		1		09/02/12 19:30	2037-26-5	
1,2-Dichloroethane-d4 (S)	93	%	70-130		1		09/02/12 19:30	17060-07-0	
2150B Threshold Odor Number	Analytical Method: SM 2150B								
Temperature, Water (C)	**40.7**	deg C			1		09/05/12 15:00		
Threshold Odor Number	**400**	TON	1.0	1.0	1		09/05/12 15:00		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**6520**	mg/L	100	100	1		09/05/12 15:42		
2540D Total Suspended Solids	Analytical Method: SM 2540D								
Total Suspended Solids	**27.0**	mg/L	10.0	10.0	1		09/04/12 10:33		
4500H+ pH, Electrometric	Analytical Method: SM 4500-H+B								
Temperature, Water (C)	**25.0**	deg C	0.010	0.010	1		09/05/12 11:30		
pH at 25 Degrees C	**7.0**	Std. Units	0.10	0.10	1		09/05/12 11:30		Q
9222B Total Coliform MF	Analytical Method: SM 9222B Preparation Method: SM 9222B								
Total Coliforms	**20000**	CFU/100 mL	100	100	100	08/31/12 17:10	09/01/12 15:20		Z
2120B True Color	Analytical Method: SM 2120B								
True Color	**3000**	units	500	500	100		09/01/12 09:30		

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ANALYTICAL RESULTS

Project: Leachate Medley Landfill
Pace Project No.: 3566688

Sample: LEACHATE SP **Lab ID: 3566688001** Collected: 08/31/12 11:30 Received: 08/31/12 16:20 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
4500ClO2 Chlorine Dioxide	Analytical Method: SM 4500-ClO2								
Chlorine Dioxide	**1.3U**	mg/L	2.0	1.3	20		09/05/12 14:30		D3,Q
5540C MBAS Surfactants	Analytical Method: SM 5540C								
Surfactants	**2.4 I**	mg/L	8.0	2.3	1		09/01/12 10:12		D3
300.0 IC Anions	Analytical Method: EPA 300.0								
Nitrate as N	**0.50U**	mg/L	1.0	0.50	20		09/01/12 21:06	14797-55-8	
Nitrite as N	**0.50U**	mg/L	1.0	0.50	20		09/01/12 21:06	14797-65-0	
Nitrogen, NO2 plus NO3	**0.50U**	mg/L	1.0	0.50	20		09/01/12 21:06		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**1400**	mg/L	100	50.0	20		09/01/12 21:06	16887-00-6	
Fluoride	**1.9**	mg/L	1.0	0.50	20		09/01/12 21:06	16984-48-8	
Sulfate	**50.0U**	mg/L	100	50.0	20		09/01/12 21:06	14808-79-8	
300.1 Oxihalide IC Anions 14d	Analytical Method: EPA 300.1								
Chlorite	**27.5U**	ug/L	250	27.5	50		09/03/12 01:09		D3
Surrogates									
Dichloroacetate (S)	99	%	90-115		50		09/03/12 01:09	79-43-6	
300.1 Oxihalide IC Anions 28d	Analytical Method: EPA 300.1								
Bromate	**25.9U**	ug/L	125	25.9	50		09/03/12 01:09	15541-45-4	D3
Surrogates									
Dichloroacetate (S)	99	%	90-115		50		09/03/12 01:09	79-43-6	
335.4 Cyanide, Total	Analytical Method: EPA 335.4 Preparation Method: EPA 335.4								
Cyanide	**0.014**	mg/L	0.010	0.0050	1	09/05/12 09:45	09/05/12 11:46	57-12-5	
350.1 Ammonia	Analytical Method: EPA 350.1								
Nitrogen, Ammonia	**778**	mg/L	5.0	2.0	100		09/04/12 12:48	7664-41-7	
351.2 Total Kjeldahl Nitrogen	Analytical Method: EPA 351.2 Preparation Method: EPA 351.2								
Nitrogen, Kjeldahl, Total	**862**	mg/L	20.0	3.4	10	09/04/12 10:00	09/04/12 20:19	7727-37-9	
365.4 Phosphorus, Total	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus, Total (as P)	**3.4**	mg/L	0.40	0.20	1	09/04/12 10:00	09/04/12 18:35	7723-14-0	

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QUALITY CONTROL DATA

Project: Leachate Medley Landfill
Pace Project No.: 3566688

QC Batch: GCSV/6785
QC Batch Method: EPA 531.1
Analysis Method: EPA 531.1
Analysis Description: 531.1 HPLC Carbamate
Associated Lab Samples: 3566688001

METHOD BLANK: 458451
Matrix: Water
Associated Lab Samples: 3566688001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
3-Hydroxycarbofuran	ug/L	0.26U	2.0	09/06/12 15:35	
Aldicarb	ug/L	0.64U	2.0	09/06/12 15:35	
Aldicarb sulfone	ug/L	0.35U	2.0	09/06/12 15:35	
Aldicarb sulfoxide	ug/L	0.30U	2.0	09/06/12 15:35	
Carbaryl	ug/L	0.20U	2.0	09/06/12 15:35	
Carbofuran	ug/L	0.32U	2.0	09/06/12 15:35	
Methiocarb	ug/L	0.48U	2.0	09/06/12 15:35	
Methomyl	ug/L	0.57U	2.0	09/06/12 15:35	
Oxamyl	ug/L	0.41U	2.0	09/06/12 15:35	
Propoxur (S)	%	99	80-120	09/06/12 15:35	

LABORATORY CONTROL SAMPLE: 458452

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
3-Hydroxycarbofuran	ug/L	10	12.1	121	80-120	J(L0)
Aldicarb	ug/L	10	12.7	127	80-120	J(L0)
Aldicarb sulfone	ug/L	10	12.9	129	80-120	J(L0)
Aldicarb sulfoxide	ug/L	10	10.9	109	80-120	
Carbaryl	ug/L	10	12.3	123	80-120	J(L0)
Carbofuran	ug/L	10	12.7	127	80-120	J(L0)
Methiocarb	ug/L	10	12.6	126	80-120	J(L0)
Methomyl	ug/L	10	12.2	122	80-120	J(L0)
Oxamyl	ug/L	10	11.9	119	80-120	
Propoxur (S)	%			119	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 458453 458454

Parameter	Units	3566431005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
3-Hydroxycarbofuran	ug/L	0.26U	10	10	11.0	12.9	110	129	80-120	16	20	J(M0)
Aldicarb	ug/L	0.64U	10	10	10.8	13.0	108	130	80-120	18	20	J(M0)
Aldicarb sulfone	ug/L	0.35U	10	10	17.4	17.1	174	171	80-120	1	20	J(M0)
Aldicarb sulfoxide	ug/L	0.30U	10	10	15.5	15.0	155	150	80-120	3	20	J(M1)
Carbaryl	ug/L	0.20U	10	10	11.3	13.0	113	130	80-120	14	20	J(M0)
Carbofuran	ug/L	0.32U	10	10	11.4	13.4	114	134	80-120	16	20	J(M0)
Methiocarb	ug/L	0.48U	10	10	11.5	13.5	115	135	80-120	16	20	J(M0)
Methomyl	ug/L	0.57U	10	10	13.1	12.8	131	128	80-120	2	20	J(M0)
Oxamyl	ug/L	0.41U	10	10	15.8	14.4	158	144	80-120	9	20	J(M1)
Propoxur (S)	%						111	129	80-120			J(S0)

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QUALITY CONTROL DATA

Project: Leachate Medley Landfill
Pace Project No.: 3566688

QC Batch: GCSV/6801
QC Batch Method: EPA 547
Analysis Method: EPA 547
Analysis Description: 547 HPLC Glyphosate
Associated Lab Samples: 3566688001

METHOD BLANK: 458960 Matrix: Water
Associated Lab Samples: 3566688001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Glyphosate	ug/L	2.1U	6.0	09/05/12 14:50	

LABORATORY CONTROL SAMPLE: 458961

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Glyphosate	ug/L	50	45.0	90	70-130	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 458962 458963

Parameter	Units	3566451001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Glyphosate	ug/L	2.1U	50	50	47.0	44.1	94	88	70-130	6	30	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 458964 458965

Parameter	Units	3566561001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Glyphosate	ug/L	2.1U	50	50	44.4	45.6	89	91	70-130	3	30	

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QUALITY CONTROL DATA

Project: Leachate Medley Landfill
Pace Project No.: 3566688

QC Batch: MERP/3095
QC Batch Method: EPA 245.1
Analysis Method: EPA 245.1
Analysis Description: 245.1 Mercury
Associated Lab Samples: 3566688001

METHOD BLANK: 457778 Matrix: Water
Associated Lab Samples: 3566688001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	ug/L	0.10U	0.20	09/04/12 07:32	

LABORATORY CONTROL SAMPLE: 457779

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	ug/L	2	2.0	98	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 457780 457781

Parameter	Units	92129531001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	ug/L	ND	2	2	2.0	2.0	100	100	70-130	1	20	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 457782 457783

Parameter	Units	92129801001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	ug/L	ND	2	2	2.0	2.0	100	102	70-130	1	20	

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QUALITY CONTROL DATA

Project: Leachate Medley Landfill
Pace Project No.: 3566688

QC Batch: MPRP/10110
QC Batch Method: EPA 200.7
Analysis Method: EPA 200.7
Analysis Description: 200.7 MET
Associated Lab Samples: 3566688001

METHOD BLANK: 458204 Matrix: Water
Associated Lab Samples: 3566688001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Aluminum	ug/L	50.0U	100	09/05/12 16:41	
Cadmium	ug/L	0.50U	1.0	09/05/12 16:41	
Chromium	ug/L	2.5U	5.0	09/05/12 16:41	
Iron	ug/L	20.0U	40.0	09/05/12 16:41	
Nickel	ug/L	2.5U	5.0	09/05/12 16:41	
Silver	ug/L	2.5U	5.0	09/05/12 16:41	
Sodium	ug/L	500U	1000	09/05/12 16:41	
Zinc	ug/L	10.0U	20.0	09/05/12 16:41	

LABORATORY CONTROL SAMPLE: 458205

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Aluminum	ug/L	2500	2460	99	85-115	
Cadmium	ug/L	25	25.8	103	85-115	
Chromium	ug/L	250	248	99	85-115	
Iron	ug/L	2500	2540	101	85-115	
Nickel	ug/L	250	258	103	85-115	
Silver	ug/L	25	24.6	98	85-115	
Sodium	ug/L	12500	12500	100	85-115	
Zinc	ug/L	1250	1270	102	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 458206 458207

Parameter	Units	3566659010 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Aluminum	ug/L	298	2500	2500	2830	2840	101	102	70-130	.5	20	
Cadmium	ug/L	0.50U	25	25	24.5	24.5	98	98	70-130	.1	20	
Chromium	ug/L	2.5U	250	250	244	246	97	98	70-130	.8	20	
Iron	ug/L	398	2500	2500	2810	2820	96	97	70-130	.4	20	
Nickel	ug/L	2.5U	250	250	243	244	96	97	70-130	.3	20	
Silver	ug/L	2.5U	25	25	26.4	27.5	105	110	70-130	4	20	
Sodium	ug/L	1520000	12500	12500	1490000	1510000	-218	-98	70-130	1	20	J(M1)
Zinc	ug/L	184	1250	1250	1480	1490	104	104	70-130	.5	20	

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QUALITY CONTROL DATA

Project: Leachate Medley Landfill
Pace Project No.: 3566688

QC Batch: MPRP/10111
QC Batch Method: EPA 200.8
Analysis Method: EPA 200.8
Analysis Description: 200.8 MET
Associated Lab Samples: 3566688001

METHOD BLANK: 458208 Matrix: Water
Associated Lab Samples: 3566688001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Antimony	ug/L	0.50U	1.0	09/05/12 18:18	
Arsenic	ug/L	0.50U	1.0	09/05/12 18:18	
Barium	ug/L	0.50U	1.0	09/05/12 18:18	
Beryllium	ug/L	0.050U	0.10	09/06/12 11:53	
Copper	ug/L	0.93U	1.0	09/05/12 18:18	
Lead	ug/L	0.50U	1.0	09/05/12 18:18	
Manganese	ug/L	0.69U	1.0	09/05/12 18:18	
Selenium	ug/L	0.50U	1.0	09/05/12 18:18	
Thallium	ug/L	0.50U	1.0	09/05/12 18:18	

LABORATORY CONTROL SAMPLE: 458209

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	ug/L	50	49.0	98	85-115	
Arsenic	ug/L	50	53.3	107	85-115	
Barium	ug/L	50	50.3	101	85-115	
Beryllium	ug/L	5	5.4	108	85-115	
Copper	ug/L	50	54.0	108	85-115	
Lead	ug/L	50	49.9	100	85-115	
Manganese	ug/L	50	52.0	104	85-115	
Selenium	ug/L	50	55.4	111	85-115	
Thallium	ug/L	50	48.9	98	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 458210 458211

Parameter	Units	3566659011 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Antimony	ug/L	0.50U	50	50	50.1	49.7	100	99	70-130	.9	20	
Arsenic	ug/L	0.83 I	50	50	51.1	50.6	101	100	70-130	.9	20	
Barium	ug/L	11.0	50	50	62.7	62.5	103	103	70-130	.3	20	
Beryllium	ug/L	0.050U	5	5	4.9	4.5	98	90	70-130	9	20	
Copper	ug/L	1.3	50	50	48.7	47.9	95	93	70-130	2	20	
Lead	ug/L	0.50U	50	50	52.7	52.4	105	105	70-130	.6	20	
Manganese	ug/L	23.8	50	50	72.7	72.0	98	96	70-130	.9	20	
Selenium	ug/L	0.50U	50	50	47.7	47.4	95	95	70-130	.6	20	
Thallium	ug/L	0.50U	50	50	52.5	52.0	105	104	70-130	.9	20	

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QUALITY CONTROL DATA

Project: Leachate Medley Landfill
Pace Project No.: 3566688

QC Batch: MSV/6440
QC Batch Method: EPA 524.2
Analysis Method: EPA 524.2
Analysis Description: 524.2 MSV
Associated Lab Samples: 3566688001

METHOD BLANK: 458071
Matrix: Water
Associated Lab Samples: 3566688001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,1,1,2-Tetrachloroethane	ug/L	0.25U	0.50	09/02/12 16:19	
1,1,1-Trichloroethane	ug/L	0.25U	0.50	09/02/12 16:19	
1,1,2,2-Tetrachloroethane	ug/L	0.25U	0.50	09/02/12 16:19	
1,1,2-Trichloroethane	ug/L	0.25U	0.50	09/02/12 16:19	
1,1,2-Trichlorotrifluoroethane	ug/L	0.25U	0.50	09/02/12 16:19	N2
1,1-Dichloroethane	ug/L	0.25U	0.50	09/02/12 16:19	
1,1-Dichloroethene	ug/L	0.25U	0.50	09/02/12 16:19	
1,1-Dichloropropene	ug/L	0.25U	0.50	09/02/12 16:19	
1,2,3-Trichlorobenzene	ug/L	0.25U	0.50	09/02/12 16:19	
1,2,3-Trichloropropane	ug/L	0.33U	0.50	09/02/12 16:19	
1,2,3-Trimethylbenzene	ug/L	0.25U	0.50	09/02/12 16:19	N2
1,2,4-Trichlorobenzene	ug/L	0.25U	0.50	09/02/12 16:19	
1,2,4-Trimethylbenzene	ug/L	0.25U	0.50	09/02/12 16:19	
1,2-Dibromoethane (EDB)	ug/L	0.25U	0.50	09/02/12 16:19	
1,2-Dichlorobenzene	ug/L	0.25U	0.50	09/02/12 16:19	
1,2-Dichloroethane	ug/L	0.25U	0.50	09/02/12 16:19	
1,2-Dichloropropane	ug/L	0.25U	0.50	09/02/12 16:19	
1,3,5-Trimethylbenzene	ug/L	0.25U	0.50	09/02/12 16:19	
1,3-Dichlorobenzene	ug/L	0.25U	0.50	09/02/12 16:19	
1,3-Dichloropropane	ug/L	0.25U	0.50	09/02/12 16:19	
1,3-Dichloropropene	ug/L	0.25U	0.50	09/02/12 16:19	N2
1,4-Dichlorobenzene	ug/L	0.25U	0.50	09/02/12 16:19	
2,2-Dichloropropane	ug/L	0.25U	0.50	09/02/12 16:19	
2-Butanone (MEK)	ug/L	2.0U	4.0	09/02/12 16:19	
2-Chlorotoluene	ug/L	0.25U	0.50	09/02/12 16:19	
4-Chlorotoluene	ug/L	0.25U	0.50	09/02/12 16:19	
Acetone	ug/L	2.5U	5.0	09/02/12 16:19	
Benzene	ug/L	0.25U	0.50	09/02/12 16:19	
Bromobenzene	ug/L	0.25U	0.50	09/02/12 16:19	
Bromochloromethane	ug/L	0.25U	0.50	09/02/12 16:19	
Bromodichloromethane	ug/L	0.25U	0.50	09/02/12 16:19	
Bromoform	ug/L	0.25U	0.50	09/02/12 16:19	
Bromomethane	ug/L	0.25U	0.50	09/02/12 16:19	
Carbon tetrachloride	ug/L	0.25U	0.50	09/02/12 16:19	
Chlorobenzene	ug/L	0.25U	0.50	09/02/12 16:19	
Chloroethane	ug/L	0.25U	0.50	09/02/12 16:19	
Chloroform	ug/L	0.25U	0.50	09/02/12 16:19	
Chloromethane	ug/L	0.25U	0.50	09/02/12 16:19	
cis-1,2-Dichloroethene	ug/L	0.25U	0.50	09/02/12 16:19	
cis-1,3-Dichloropropene	ug/L	0.25U	0.50	09/02/12 16:19	
Dibromochloromethane	ug/L	0.25U	0.50	09/02/12 16:19	
Dibromomethane	ug/L	0.25U	0.50	09/02/12 16:19	
Dichlorodifluoromethane	ug/L	0.25U	0.50	09/02/12 16:19	

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QUALITY CONTROL DATA

Project: Leachate Medley Landfill
Pace Project No.: 3566688

METHOD BLANK: 458071 Matrix: Water

Associated Lab Samples: 3566688001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Ethylbenzene	ug/L	0.25U	0.50	09/02/12 16:19	
Hexachloro-1,3-butadiene	ug/L	0.25U	0.50	09/02/12 16:19	
Isopropylbenzene (Cumene)	ug/L	0.25U	0.50	09/02/12 16:19	
m&p-Xylene	ug/L	0.25U	0.50	09/02/12 16:19	
Methyl-tert-butyl ether	ug/L	0.25U	0.50	09/02/12 16:19	
Methylene Chloride	ug/L	0.44U	0.50	09/02/12 16:19	
n-Butylbenzene	ug/L	0.25U	0.50	09/02/12 16:19	
n-Propylbenzene	ug/L	0.25U	0.50	09/02/12 16:19	
Naphthalene	ug/L	0.25U	0.50	09/02/12 16:19	
o-Xylene	ug/L	0.25U	0.50	09/02/12 16:19	
p-Isopropyltoluene	ug/L	0.25U	0.50	09/02/12 16:19	
sec-Butylbenzene	ug/L	0.25U	0.50	09/02/12 16:19	
Styrene	ug/L	0.25U	0.50	09/02/12 16:19	
tert-Butylbenzene	ug/L	0.25U	0.50	09/02/12 16:19	
Tetrachloroethene	ug/L	0.25U	0.50	09/02/12 16:19	
Toluene	ug/L	0.25U	0.50	09/02/12 16:19	
Total Trihalomethanes (Calc.)	ug/L	0.25U	0.50	09/02/12 16:19	
trans-1,2-Dichloroethene	ug/L	0.25U	0.50	09/02/12 16:19	
trans-1,3-Dichloropropene	ug/L	0.25U	0.50	09/02/12 16:19	
Trichloroethene	ug/L	0.25U	0.50	09/02/12 16:19	
Trichlorofluoromethane	ug/L	0.25U	0.50	09/02/12 16:19	
Vinyl chloride	ug/L	0.25U	0.50	09/02/12 16:19	
Xylene (Total)	ug/L	0.25U	0.50	09/02/12 16:19	
1,2-Dichloroethane-d4 (S)	%	95	70-130	09/02/12 16:19	
4-Bromofluorobenzene (S)	%	94	70-130	09/02/12 16:19	
Dibromofluoromethane (S)	%	100	70-130	09/02/12 16:19	
Toluene-d8 (S)	%	97	70-130	09/02/12 16:19	

LABORATORY CONTROL SAMPLE & LCSD: 458072 458073

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
1,1,1,2-Tetrachloroethane	ug/L	5	4.7	4.5	94	90	70-130	4	40	
1,1,1-Trichloroethane	ug/L	5	4.1	5.0	82	101	70-130	21	40	
1,1,2,2-Tetrachloroethane	ug/L	5	4.5	4.4	90	88	70-130	2	40	
1,1,2-Trichloroethane	ug/L	5	5.3	5.2	105	104	70-130	1	40	
1,1,2-Trichlorotrifluoroethane	ug/L	5	3.8	4.0	75	81	50-150	7	40	N2
1,1-Dichloroethane	ug/L	5	4.6	4.7	91	94	70-130	2	40	
1,1-Dichloroethene	ug/L	5	4.5	4.8	89	96	70-130	7	40	
1,1-Dichloropropene	ug/L	5	4.5	4.8	90	96	70-130	6	40	
1,2,3-Trichlorobenzene	ug/L	5	4.5	4.9	90	99	70-130	9	40	
1,2,3-Trichloropropane	ug/L	5	4.1	4.9	82	97	70-130	17	40	
1,2,3-Trimethylbenzene	ug/L	5	5.2	5.3	104	107	70-130	2	40	N2
1,2,4-Trichlorobenzene	ug/L	5	4.5	4.8	89	97	70-130	8	40	
1,2,4-Trimethylbenzene	ug/L	5	4.8	4.9	96	99	70-130	3	40	
1,2-Dibromoethane (EDB)	ug/L	5	4.9	5.0	99	100	70-130	1	40	

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QUALITY CONTROL DATA

Project: Leachate Medley Landfill
Pace Project No.: 3566688

LABORATORY CONTROL SAMPLE & LCSD: 458072 458073

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
1,2-Dichlorobenzene	ug/L	5	4.8	4.6	96	91	70-130	5	40	
1,2-Dichloroethane	ug/L	5	4.5	4.8	90	96	70-130	6	40	
1,2-Dichloropropane	ug/L	5	4.4	5.2	88	105	70-130	17	40	
1,3,5-Trimethylbenzene	ug/L	5	5.0	5.0	99	100	70-130	.9	40	
1,3-Dichlorobenzene	ug/L	5	4.7	4.8	94	96	70-130	3	40	
1,3-Dichloropropane	ug/L	5	5.1	4.8	103	96	70-130	7	40	
1,3-Dichloropropene	ug/L	10	9.4	9.7	94	97	70-130	3	40	N2
1,4-Dichlorobenzene	ug/L	5	4.5	4.8	89	96	70-130	7	40	
2,2-Dichloropropane	ug/L	5	5.0	5.5	100	110	70-130	9	40	
2-Butanone (MEK)	ug/L	5	4.3	5.1	86	101	70-130	17	40	
2-Chlorotoluene	ug/L	5	4.8	5.0	96	100	70-130	4	40	
4-Chlorotoluene	ug/L	5	4.8	5.1	96	102	70-130	6	40	
Acetone	ug/L	5	4.2 I	4.3 I	84	87	70-130		40	
Benzene	ug/L	5	4.7	5.1	94	103	70-130	8	40	
Bromobenzene	ug/L	5	4.8	5.0	96	101	70-130	5	40	
Bromochloromethane	ug/L	5	4.8	5.2	97	104	70-130	7	40	
Bromodichloromethane	ug/L	5	4.3	4.9	87	98	70-130	12	40	
Bromoform	ug/L	5	6.4	5.8	128	116	70-130	10	40	
Bromomethane	ug/L	5	4.4	4.9	88	98	70-130	10	40	
Carbon tetrachloride	ug/L	5	4.5	5.0	91	100	70-130	10	40	
Chlorobenzene	ug/L	5	4.9	4.7	97	94	70-130	3	40	
Chloroethane	ug/L	5	4.3	4.7	86	94	70-130	9	40	
Chloroform	ug/L	5	4.5	5.0	90	100	70-130	11	40	
Chloromethane	ug/L	5	5.0	5.2	101	103	70-130	3	40	
cis-1,2-Dichloroethene	ug/L	5	4.4	5.0	89	100	70-130	12	40	
cis-1,3-Dichloropropene	ug/L	5	4.1	4.8	82	96	70-130	16	40	
Dibromochloromethane	ug/L	5	5.1	5.0	102	99	70-130	3	40	
Dibromomethane	ug/L	5	4.5	5.2	90	104	70-130	14	40	
Dichlorodifluoromethane	ug/L	5	5.6	5.8	112	115	70-130	3	40	
Ethylbenzene	ug/L	5	4.8	4.7	95	95	70-130	.2	40	
Hexachloro-1,3-butadiene	ug/L	5	4.7	4.9	93	98	70-130	5	40	
Isopropylbenzene (Cumene)	ug/L	5	4.6	4.8	92	96	70-130	4	40	
m&p-Xylene	ug/L	10	9.7	9.4	97	94	70-130	2	40	
Methyl-tert-butyl ether	ug/L	5	4.7	5.2	94	104	70-130	11	40	
Methylene Chloride	ug/L	5	3.5	4.1	71	81	70-130	14	40	
n-Butylbenzene	ug/L	5	4.9	5.0	99	99	70-130	.3	40	
n-Propylbenzene	ug/L	5	5.0	4.8	99	95	70-130	4	40	
Naphthalene	ug/L	5	4.3	5.0	87	100	70-130	14	40	
o-Xylene	ug/L	5	4.6	4.6	91	92	70-130	.5	40	
p-Isopropyltoluene	ug/L	5	5.0	5.2	101	104	70-130	3	40	
sec-Butylbenzene	ug/L	5	4.8	4.9	97	98	70-130	2	40	
Styrene	ug/L	5	4.6	4.8	92	97	70-130	5	40	
tert-Butylbenzene	ug/L	5	4.6	5.0	91	99	70-130	8	40	
Tetrachloroethene	ug/L	5	4.8	4.8	96	96	70-130	.1	40	
Toluene	ug/L	5	5.0	4.7	100	95	70-130	5	40	
Total Trihalomethanes (Calc.)	ug/L	20	20.4	20.7	102	103	70-130	1	40	
trans-1,2-Dichloroethene	ug/L	5	4.4	4.5	87	89	70-130	3	40	
trans-1,3-Dichloropropene	ug/L	5	5.3	4.9	106	97	70-130	9	40	

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QUALITY CONTROL DATA

Project: Leachate Medley Landfill
Pace Project No.: 3566688

LABORATORY CONTROL SAMPLE & LCSD: 458072 458073

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
Trichloroethene	ug/L	5	4.4	4.6	89	92	70-130	4	40	
Trichlorofluoromethane	ug/L	5	4.8	5.1	95	101	70-130	6	40	
Vinyl chloride	ug/L	5	4.6	4.5	91	89	70-130	2	40	
Xylene (Total)	ug/L	15	14.2	14.0	95	93	70-130	1	40	
1,2-Dichloroethane-d4 (S)	%				98	105	70-130			
4-Bromofluorobenzene (S)	%				98	95	70-130			
Dibromofluoromethane (S)	%				97	104	70-130			
Toluene-d8 (S)	%				99	97	70-130			

Pace Analytical Services, Inc.
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QUALITY CONTROL DATA

Project: Leachate Medley Landfill
Pace Project No.: 3566688

QC Batch: OEXT/9769
QC Batch Method: EPA 504.1
Analysis Method: EPA 504.1
Analysis Description: 504 EDB DBCP
Associated Lab Samples: 3566688001

METHOD BLANK: 458165 Matrix: Water
Associated Lab Samples: 3566688001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,2-Dibromo-3-chloropropane	ug/L	0.0049U	0.020	09/04/12 14:55	
1,2-Dibromoethane (EDB)	ug/L	0.0062U	0.010	09/04/12 14:55	

LABORATORY CONTROL SAMPLE: 458166

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,2-Dibromo-3-chloropropane	ug/L	.25	0.24	96	70-130	
1,2-Dibromoethane (EDB)	ug/L	.25	0.23	90	70-130	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 458167 458168

Parameter	Units	3566485001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
1,2-Dibromo-3-chloropropane	ug/L	0.0050 U	.44	.44	0.42	0.47	97	108	65-135	11	40	
1,2-Dibromoethane (EDB)	ug/L	0.0063 U	.44	.44	0.39	0.44	89	101	65-135	13	40	

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QUALITY CONTROL DATA

Project: Leachate Medley Landfill
Pace Project No.: 3566688

QC Batch: OEXT/9807 Analysis Method: EPA 508.1
QC Batch Method: EPA 508.1 Analysis Description: 508 GCS Pesticide
Associated Lab Samples: 3566688001

METHOD BLANK: 459995 Matrix: Water
Associated Lab Samples: 3566688001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Alachlor	ug/L	0.034U	0.20	09/08/12 17:34	
alpha-Chlordane	ug/L	0.0020U	0.020	09/08/12 17:34	N2
Atrazine	ug/L	0.021U	0.10	09/08/12 17:34	
Butachlor	ug/L	0.015U	0.10	09/08/12 17:34	
Chlordane (Technical)	ug/L	0.047U	0.20	09/08/12 17:34	
Dieldrin	ug/L	0.014U	0.10	09/08/12 17:34	
Endrin	ug/L	0.0020U	0.010	09/08/12 17:34	
gamma-BHC (Lindane)	ug/L	0.0030U	0.020	09/08/12 17:34	
gamma-Chlordane	ug/L	0.0020U	0.020	09/08/12 17:34	N2
Heptachlor	ug/L	0.0060U	0.040	09/08/12 17:34	
Heptachlor epoxide	ug/L	0.0030U	0.020	09/08/12 17:34	
Hexachlorobenzene	ug/L	0.011U	0.10	09/08/12 17:34	
Hexachlorocyclopentadiene	ug/L	0.012U	0.10	09/08/12 17:34	
Methoxychlor	ug/L	0.014U	0.10	09/08/12 17:34	
Metolachlor	ug/L	0.011U	0.10	09/08/12 17:34	
Metribuzin	ug/L	0.035U	0.10	09/08/12 17:34	
PCB, Total	ug/L	0.080U	0.10	09/08/12 17:34	
PCB-1016 (Aroclor 1016)	ug/L	0.080U	0.10	09/08/12 17:34	
PCB-1221 (Aroclor 1221)	ug/L	0.029U	0.10	09/08/12 17:34	
PCB-1232 (Aroclor 1232)	ug/L	0.029U	0.10	09/08/12 17:34	
PCB-1242 (Aroclor 1242)	ug/L	0.051U	0.10	09/08/12 17:34	
PCB-1248 (Aroclor 1248)	ug/L	0.062U	0.10	09/08/12 17:34	
PCB-1254 (Aroclor 1254)	ug/L	0.023U	0.10	09/08/12 17:34	
PCB-1260 (Aroclor 1260)	ug/L	0.066U	0.10	09/08/12 17:34	
Propachlor	ug/L	0.010U	0.10	09/08/12 17:34	
Simazine	ug/L	0.044U	0.070	09/08/12 17:34	
Toxaphene	ug/L	0.61U	1.0	09/08/12 17:34	
Decachlorobiphenyl (S)	%	107	70-130	09/08/12 17:34	

LABORATORY CONTROL SAMPLE: 459996

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alachlor	ug/L	1	1.1	108	70-130	
alpha-Chlordane	ug/L	.1	0.12	123	70-130	
Atrazine	ug/L	.5	0.47	95	70-130	
Butachlor	ug/L	.5	0.58	116	70-130	
Dieldrin	ug/L	.5	0.62	124	70-130	
Endrin	ug/L	.05	0.060	119	70-130	
gamma-BHC (Lindane)	ug/L	.1	0.11	113	70-130	
gamma-Chlordane	ug/L	.1	0.13	128	70-130	
Heptachlor	ug/L	.2	0.23	113	70-130	

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QUALITY CONTROL DATA

Project: Leachate Medley Landfill
Pace Project No.: 3566688

LABORATORY CONTROL SAMPLE: 459996

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Heptachlor epoxide	ug/L	.1	0.12	120	70-130	
Hexachlorobenzene	ug/L	.5	0.48	97	70-130	
Hexachlorocyclopentadiene	ug/L	.5	0.37	74	70-130	
Methoxychlor	ug/L	.5	0.52	104	70-130	
Metolachlor	ug/L	.5	0.50	100	70-130	
Metribuzin	ug/L	.5	0.56	111	70-130	
Propachlor	ug/L	.5	0.50	100	70-130	
Simazine	ug/L	.35	0.39	112	70-130	
Decachlorobiphenyl (S)	%			113	70-130	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 460622 460623

Parameter	Units	3566560001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Alachlor	ug/L	0.034U	2	2	2.0	2.0	102	102	70-130	.8	40	
alpha-Chlordane	ug/L	0.0020 U	.2	.2	0.26	0.26	130	130	70-130	.2	40	
Atrazine	ug/L	0.021U	1	1	1.1	1.0	111	102	70-130	9	40	
Butachlor	ug/L	0.015U	1	1	1.1	1.1	109	109	70-130	.06	40	
Dieldrin	ug/L	0.014U	1	1	1.2	1.2	121	122	70-130	.05	40	
Endrin	ug/L	0.0020 U	.1	.1	0.10	0.10	100	103	70-130	3	40	
gamma-BHC (Lindane)	ug/L	0.0030 U	.2	.2	0.22	0.22	111	111	70-130	.2	40	
gamma-Chlordane	ug/L	0.0020 U	.2	.2	0.27	0.27	134	133	70-130	.2	40	J(M1)
Heptachlor	ug/L	0.0060 U	.4	.4	0.42	0.43	104	108	70-130	3	40	
Heptachlor epoxide	ug/L	0.0030 U	.2	.2	0.25	0.26	125	128	70-130	2	40	
Hexachlorobenzene	ug/L	0.011U	1	1	0.93	0.95	93	95	70-130	2	40	
Hexachlorocyclopentadiene	ug/L	0.012U	1	1	0.68	0.66	68	66	70-130	4	40	J(M1)
Methoxychlor	ug/L	0.014U	1	1	0.76	0.79	76	79	70-130	4	40	
Metolachlor	ug/L	0.011U	1	1	0.96	0.96	96	96	70-130	.4	40	
Metribuzin	ug/L	0.035U	1	1	1.1	1.1	113	107	70-130	6	40	
Propachlor	ug/L	0.010U	1	1	0.93	0.94	93	94	70-130	.9	40	
Simazine	ug/L	0.044U	.7	.7	0.93	0.41	133	58	70-130	79	40	J(D6), J(M1)
Decachlorobiphenyl (S)	%						109	112	70-130		40	

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QUALITY CONTROL DATA

Project: Leachate Medley Landfill
Pace Project No.: 3566688

QC Batch: OEXT/9775
QC Batch Method: EPA 515.3
Analysis Method: EPA 515.3
Analysis Description: 5153 GCS Herbicides
Associated Lab Samples: 3566688001

METHOD BLANK: 458423 Matrix: Water
Associated Lab Samples: 3566688001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
2,4,5-T	ug/L	0.16U	0.20	09/07/12 07:41	
2,4,5-TP (Silvex)	ug/L	0.16U	0.20	09/07/12 07:41	
2,4-D	ug/L	0.081U	0.10	09/07/12 07:41	
2,4-DB	ug/L	1.7U	2.0	09/07/12 07:41	
Acifluorfen	ug/L	0.053U	0.10	09/07/12 07:41	
Bentazon	ug/L	0.16U	0.20	09/07/12 07:41	
Dalapon	ug/L	0.89U	1.0	09/07/12 07:41	
Dicamba	ug/L	0.067U	0.10	09/07/12 07:41	
Dichlorprop	ug/L	0.55U	0.70	09/07/12 07:41	
Dinoseb	ug/L	0.16U	0.20	09/07/12 07:41	
Pentachlorophenol	ug/L	0.030U	0.040	09/07/12 07:41	
Picloram	ug/L	0.094U	0.10	09/07/12 07:41	
2,4-DCAA (S)	%	97	70-130	09/07/12 07:41	

LABORATORY CONTROL SAMPLE: 458424

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
2,4,5-T	ug/L	1	1.0	100	70-130	
2,4,5-TP (Silvex)	ug/L	1	0.99	99	70-130	
2,4-D	ug/L	.5	0.49	99	70-130	
2,4-DB	ug/L	10	9.9	99	70-130	
Acifluorfen	ug/L	.5	0.47	94	70-130	
Bentazon	ug/L	1	0.97	97	70-130	
Dalapon	ug/L	5	5.3	106	70-130	
Dicamba	ug/L	.5	0.53	107	70-130	
Dichlorprop	ug/L	3.5	3.6	102	70-130	
Dinoseb	ug/L	1	0.99	99	70-130	
Pentachlorophenol	ug/L	.2	0.20	98	70-130	
Picloram	ug/L	.5	0.52	105	70-130	
2,4-DCAA (S)	%			96	70-130	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 458467 458468

Parameter	Units	3566055001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
2,4,5-T	ug/L	0.16U	1	1	1.0	1.0	100	105	70-130	5	40	
2,4,5-TP (Silvex)	ug/L	0.16U	1	1	0.91	0.97	91	97	70-130	6	40	
2,4-D	ug/L	0.081U			0.45	0.47				6	40	
2,4-DB	ug/L	1.7U	10	10	8.2	8.5	82	85	70-130	3	40	
Acifluorfen	ug/L	0.053U	.5	.5	0.33	0.39	65	77	70-130	16	40	J(M1)

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QUALITY CONTROL DATA

Project: Leachate Medley Landfill
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MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 458467 458468

Parameter	Units	3566055001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Bentazon	ug/L	0.16U	1	1	1.1	0.97	113	97	70-130	15	40	
Dalapon	ug/L	3.6	5	5	6.1	6.3	51	53	70-130	2	40	J(M1)
Dicamba	ug/L	0.067U	.5	.5	0.62	0.60	123	120	70-130	3	40	
Dichlorprop	ug/L	0.55U	3.5	3.5	3.2	3.4	91	97	70-130	6	40	
Dinoseb	ug/L	0.16U	1	1	0.83	1.0	83	101	70-130	19	40	
Pentachlorophenol	ug/L	0.030U	.2	.2	0.16	0.18	82	91	70-130	11	40	
Picloram	ug/L	0.094U	.5	.5	0.56	0.55	113	110	70-130	2	40	
2,4-DCAA (S)	%						120	130	70-130			

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QUALITY CONTROL DATA

Project: Leachate Medley Landfill
Pace Project No.: 3566688

QC Batch: OEXT/9808
QC Batch Method: EPA 525.2
Analysis Method: EPA 525.2
Analysis Description: 525.2 Base Neutral Extractables
Associated Lab Samples: 3566688001

METHOD BLANK: 459998
Matrix: Water
Associated Lab Samples: 3566688001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
2-Chlorobiphenyl	ug/L	0.024U	0.10	09/07/12 15:54	
Aldrin	ug/L	0.036U	0.10	09/07/12 15:54	
Benzo(a)pyrene	ug/L	0.019U	0.10	09/07/12 15:54	
bis(2-Ethylhexyl)adipate	ug/L	0.38U	1.6	09/07/12 15:54	
bis(2-Ethylhexyl)phthalate	ug/L	0.50U	2.0	09/07/12 15:54	
Butachlor	ug/L	0.074U	0.10	09/07/12 15:54	
Butylbenzylphthalate	ug/L	0.11U	2.0	09/07/12 15:54	
Di-n-butylphthalate	ug/L	0.23U	2.0	09/07/12 15:54	
Dieldrin	ug/L	0.047U	0.13	09/07/12 15:54	
Diethylphthalate	ug/L	0.20U	2.0	09/07/12 15:54	
Dimethylphthalate	ug/L	1.1U	1.6	09/07/12 15:54	
Fluorene	ug/L	0.025U	0.20	09/07/12 15:54	
Indeno(1,2,3-cd)pyrene	ug/L	0.024U	0.20	09/07/12 15:54	
Metolachlor	ug/L	0.035U	1.0	09/07/12 15:54	
Metribuzin	ug/L	0.031U	0.30	09/07/12 15:54	
Molinate	ug/L	0.12U	2.0	09/07/12 15:54	N2
Octachlorobiphenyl	ug/L	0.080U	0.10	09/07/12 15:54	
Pentachlorobiphenyl	ug/L	0.040U	0.10	09/07/12 15:54	
Phenanthrene	ug/L	0.050U	0.20	09/07/12 15:54	N2
Propachlor	ug/L	0.030U	0.20	09/07/12 15:54	
Pyrene	ug/L	0.034U	0.20	09/07/12 15:54	
Tetrachlorobiphenyl	ug/L	0.036U	0.10	09/07/12 15:54	
Thiobencarb	ug/L	0.10U	2.0	09/07/12 15:54	N2
trans-Nonachlor	ug/L	0.12U	0.20	09/07/12 15:54	N2
1,3-Dimethyl-2-nitrobenzene(S)	%	113	70-130	09/07/12 15:54	
Perylene-d12 (S)	%	95	70-130	09/07/12 15:54	
Triphenylphosphate (S)	%	110	70-130	09/07/12 15:54	

LABORATORY CONTROL SAMPLE: 459999

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
2-Chlorobiphenyl	ug/L	.4	0.37	92	70-130	
Aldrin	ug/L	.4	0.46	114	70-130	
Benzo(a)pyrene	ug/L	.4	0.38	96	70-130	
bis(2-Ethylhexyl)adipate	ug/L	6.4	6.2	96	70-130	
bis(2-Ethylhexyl)phthalate	ug/L	8	6.9	86	70-130	
Butachlor	ug/L	.4	0.44	109	70-130	
Butylbenzylphthalate	ug/L	8	7.6	94	70-130	
Di-n-butylphthalate	ug/L	8	8.5	106	70-130	
Dieldrin	ug/L	.52	0.51	97	70-130	
Diethylphthalate	ug/L	8	8.3	103	70-130	

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QUALITY CONTROL DATA

Project: Leachate Medley Landfill
Pace Project No.: 3566688

LABORATORY CONTROL SAMPLE: 459999

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Dimethylphthalate	ug/L	6.4	6.4	100	70-130	
Fluorene	ug/L	.8	0.80	100	70-130	
Indeno(1,2,3-cd)pyrene	ug/L	.8	0.83	103	70-130	
Metolachlor	ug/L	4	4.2	105	70-130	
Metribuzin	ug/L	1.2	1.3	104	70-130	
Molinate	ug/L	8	8.2	102	70-130	N2
Octachlorobiphenyl	ug/L	.4	0.40	101	70-130	
Pentachlorobiphenyl	ug/L	.4	0.45	112	70-130	
Phenanthrene	ug/L	.8	0.82	102	70-130	N2
Propachlor	ug/L	.8	0.85	106	70-130	
Pyrene	ug/L	.8	0.85	106	70-130	
Tetrachlorobiphenyl	ug/L	.4	0.41	103	70-130	
Thiobencarb	ug/L	8	7.7	97	70-130	N2
trans-Nonachlor	ug/L	.8	0.97	121	70-130	N2
1,3-Dimethyl-2-nitrobenzene(S)	%			107	70-130	
Perylene-d12 (S)	%			91	70-130	
Triphenylphosphate (S)	%			108	70-130	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 460601 460602

Parameter	Units	3566473001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
2-Chlorobiphenyl	ug/L	0.024U	.8	.8	0.70	0.73	87	91	70-130	4	40	
Aldrin	ug/L	0.036U	.8	.8	0.83	0.81	104	101	70-130	3	40	
Benzo(a)pyrene	ug/L	0.019U	.8	.8	0.77	0.77	96	96	70-130	.05	40	
bis(2-Ethylhexyl)adipate	ug/L	0.38U	12.8	12.8	12.4	12.5	97	98	70-130	.3	40	
bis(2-Ethylhexyl)phthalate	ug/L	10.3	16	16	23.3	23.7	81	84	70-130	2	40	
Butachlor	ug/L	0.074U	.8	.8	0.77	0.81	96	101	70-130	5	40	
Butylbenzylphthalate	ug/L	0.11U	16	16	14.8	14.8	92	92	70-130	.2	40	
Di-n-butylphthalate	ug/L	0.23U	16	16	16.0	16.0	100	100	70-130	.1	40	
Dieldrin	ug/L	0.047U	1	1	1.0	0.89	96	86	70-130	11	40	
Diethylphthalate	ug/L	0.19U	16	16	16.5	16.1	103	101	70-130	2	40	
Dimethylphthalate	ug/L	1.1U	12.8	12.8	13.7	13.3	107	104	70-130	3	40	
Fluorene	ug/L	0.025U	1.6	1.6	1.7	1.7	105	103	70-130	2	40	
Indeno(1,2,3-cd)pyrene	ug/L	0.024U	1.6	1.6	1.8	1.7	112	106	70-130	5	40	
Metolachlor	ug/L	0.035U	8	8	8.1	7.8	102	98	70-130	4	40	
Metribuzin	ug/L	0.031U	2.4	2.4	2.6	2.5	109	106	70-130	3	40	
Molinate	ug/L	0.12U	16	16	16.4	16.4	103	102	70-130	.4	40	N2
Octachlorobiphenyl	ug/L	0.080U	.8	.8	0.91	0.85	114	106	70-130	7	40	
Pentachlorobiphenyl	ug/L	0.040U	.8	.8	0.80	0.81	100	101	70-130	1	40	
Phenanthrene	ug/L	0.050U	1.6	1.6	1.6	1.5	99	96	70-130	3	40	N2
Propachlor	ug/L	0.030U	1.6	1.6	1.8	1.7	113	104	70-130	9	40	
Pyrene	ug/L	0.034U	1.6	1.6	1.6	1.6	102	102	70-130	.8	40	
Tetrachlorobiphenyl	ug/L	0.036U	.8	.8	0.85	0.86	107	108	70-130	.9	40	
Thiobencarb	ug/L	0.10U	16	16	14.8	14.8	92	92	70-130	.004	40	N2
trans-Nonachlor	ug/L	0.12U	1.6	1.6	1.8	1.7	114	108	70-130	5	40	N2

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QUALITY CONTROL DATA

Project: Leachate Medley Landfill
Pace Project No.: 3566688

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 460601 460602

Parameter	Units	3566473001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
1,3-Dimethyl-2-nitrobenzene(S)	%						105	101	70-130			
Perylene-d12 (S)	%						92	89	70-130			
Triphenylphosphate (S)	%						106	108	70-130			

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QUALITY CONTROL DATA

Project: Leachate Medley Landfill
Pace Project No.: 3566688

QC Batch: OEXT/9783
QC Batch Method: EPA 548.1
Analysis Method: EPA 548.1
Analysis Description: 548 GCS Endothall
Associated Lab Samples: 3566688001

METHOD BLANK: 458871 Matrix: Water
Associated Lab Samples: 3566688001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Endothall	ug/L	2.7U	9.0	09/06/12 13:42	

LABORATORY CONTROL SAMPLE: 458872

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Endothall	ug/L	50	40.9	82	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 459085 459086

Parameter	Units	3566473003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Endothall	ug/L	2.7U	50	50	10.3	7.2 I	21	14	80-120		40	J(M1)

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 459272 459273

Parameter	Units	3566880001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Endothall	ug/L	2.7U	50	50	29.6	33.3	59	67	80-120	12	40	J(M1)

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QUALITY CONTROL DATA

Project: Leachate Medley Landfill
Pace Project No.: 3566688

QC Batch: OEXT/9761
QC Batch Method: EPA 549.2
Analysis Method: EPA 549.2
Analysis Description: 549 GCS Paraquat Diquat
Associated Lab Samples: 3566688001

METHOD BLANK: 457639 Matrix: Water
Associated Lab Samples: 3566688001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Diquat	ug/L	0.15U	0.40	09/04/12 18:46	
Paraquat	ug/L	0.27U	0.40	09/04/12 18:46	

LABORATORY CONTROL SAMPLE: 457640

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Diquat	ug/L	2	2.1	107	70-130	
Paraquat	ug/L	2	2.2	109	70-130	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 458461 458462

Parameter	Units	3566473001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Diquat	ug/L	0.15U	2	2	2.3	2.3	117	117	70-130	.4	40	
Paraquat	ug/L	0.27U	2	2	2.5	2.4	123	119	70-130	3	40	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 458463 458464

Parameter	Units	3566617001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Diquat	ug/L	<0.15	2	2	1.3	2.3	66	113	70-130	53	40	J(D6), J(M1)
Paraquat	ug/L	<0.27	2	2	1.4	2.4	71	120	70-130	52	40	J(D6)

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QUALITY CONTROL DATA

Project: Leachate Medley Landfill
Pace Project No.: 3566688

QC Batch: OEXT/9797
QC Batch Method: EPA 552.2
Analysis Method: EPA 552.2
Analysis Description: 5522 Haloacetic Acids
Associated Lab Samples: 3566688001

METHOD BLANK: 459929 Matrix: Water
Associated Lab Samples: 3566688001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Dibromoacetic Acid	ug/L	0.61U	1.0	09/11/12 21:50	
Dichloroacetic Acid	ug/L	0.61U	1.0	09/11/12 21:50	
Haloacetic Acids (Total)	ug/L	0.61U	1.0	09/11/12 21:50	
Monobromoacetic Acid	ug/L	0.61U	1.0	09/11/12 21:50	
Monochloroacetic Acid	ug/L	0.61U	1.0	09/11/12 21:50	
Trichloroacetic Acid	ug/L	0.61U	1.0	09/11/12 21:50	
2,3-Dibromopropanoic Acid (S)	%	105	70-130	09/11/12 21:50	

LABORATORY CONTROL SAMPLE: 459930

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Dibromoacetic Acid	ug/L	10	12.3	123	70-130	
Dichloroacetic Acid	ug/L	10	9.4	94	70-130	
Haloacetic Acids (Total)	ug/L	50	49.8	100		
Monobromoacetic Acid	ug/L	10	9.5	95	70-130	
Monochloroacetic Acid	ug/L	10	8.4	84	70-130	
Trichloroacetic Acid	ug/L	10	10.1	101	70-130	
2,3-Dibromopropanoic Acid (S)	%			98	70-130	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 459931 459932

Parameter	Units	3566664001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Dibromoacetic Acid	ug/L	0.61U	10	10	16.7	18.0	167	180	70-130	7	30	
Dichloroacetic Acid	ug/L	18.3	10	10	28.3	29.5	100	113	70-130	4	30	
Haloacetic Acids (Total)	ug/L	46.9	50	50	120	127	146	160		6		
Monobromoacetic Acid	ug/L	0.61U	10	10	10.8	12.1	108	121	70-130	11	30	
Monochloroacetic Acid	ug/L	1.9	10	10	10.7	11.9	88	100	70-130	11	30	
Trichloroacetic Acid	ug/L	27.0	10	10	53.4	55.7	265	287	70-130	4	30	
2,3-Dibromopropanoic Acid (S)	%						115	106	70-130			

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 459933 459934

Parameter	Units	3566799004 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Dibromoacetic Acid	ug/L	0.61U	10	10	15.1	12.2	151	122	70-130	21	30	
Dichloroacetic Acid	ug/L	0.61U	10	10	12.9	12.9	129	129	70-130	.3	30	
Haloacetic Acids (Total)	ug/L	0.61U	50	50	56.3	56.6	113	113		.6		

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QUALITY CONTROL DATA

Project: Leachate Medley Landfill
Pace Project No.: 3566688

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 459933 459934

Parameter	Units	3566799004 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Monobromoacetic Acid	ug/L	0.61U	10	10	10	11.7	100	117	70-130	16	30	
Monochloroacetic Acid	ug/L	0.61U	10	10	8.1	9.1	81	91	70-130	11	30	
Trichloroacetic Acid	ug/L	0.61U	10	10	10.2	10.7	102	107	70-130	5	30	
2,3-Dibromopropanoic Acid (S)	%						91	77	70-130			

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QUALITY CONTROL DATA

Project: Leachate Medley Landfill
Pace Project No.: 3566688

QC Batch: SFL/5826
QC Batch Method: SM 2150B
Analysis Method: SM 2150B
Analysis Description: Threshold Odor Number
Associated Lab Samples: 3566688001

METHOD BLANK: 459022
Matrix: Water
Associated Lab Samples: 3566688001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Temperature, Water (C)	deg C	40.3		09/05/12 15:00	
Threshold Odor Number	TON	1.0U	1.0	09/05/12 15:00	

SAMPLE DUPLICATE: 459023

Parameter	Units	3566688001 Result	Dup Result	RPD	Max RPD	Qualifiers
Temperature, Water (C)	deg C	40.7	40.6	.2	20	
Threshold Odor Number	TON	400	400	0	20	

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QUALITY CONTROL DATA

Project: Leachate Medley Landfill
Pace Project No.: 3566688

QC Batch: SFL/5828
QC Batch Method: SM 2540C
Analysis Method: SM 2540C
Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 3566688001

METHOD BLANK: 459044 Matrix: Water
Associated Lab Samples: 3566688001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	5.0U	5.0	09/05/12 15:31	

LABORATORY CONTROL SAMPLE: 459045

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	300	306	102	90-110	

SAMPLE DUPLICATE: 459046

Parameter	Units	3566391001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	1750	1730	1	20	

SAMPLE DUPLICATE: 459047

Parameter	Units	3566442002 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	<5.0	5.0U		20	

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QUALITY CONTROL DATA

Project: Leachate Medley Landfill
Pace Project No.: 3566688

QC Batch: SFL/5819
QC Batch Method: SM 2540D
Analysis Method: SM 2540D
Analysis Description: 2540D Total Suspended Solids
Associated Lab Samples: 3566688001

METHOD BLANK: 458282 Matrix: Water
Associated Lab Samples: 3566688001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Suspended Solids	mg/L	5.0U	5.0	09/04/12 10:19	

LABORATORY CONTROL SAMPLE: 458283

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Suspended Solids	mg/L	100	93.0	93	90-110	

SAMPLE DUPLICATE: 458284

Parameter	Units	3566641001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Suspended Solids	mg/L	4.0	3.5	14	20	

SAMPLE DUPLICATE: 458285

Parameter	Units	3566676004 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Suspended Solids	mg/L	10.4	13.6	26	20	J(D6)

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QUALITY CONTROL DATA

Project: Leachate Medley Landfill
Pace Project No.: 3566688

QC Batch: SFL/5827
QC Batch Method: SM 4500-H+B
Analysis Method: SM 4500-H+B
Analysis Description: 4500H+B pH
Associated Lab Samples: 3566688001

SAMPLE DUPLICATE: 459024

Parameter	Units	3566688001 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	7.0	7.0	.6	20	Q
Temperature, Water (C)	deg C	25.0	25.0	0	20	

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QUALITY CONTROL DATA

Project: Leachate Medley Landfill
Pace Project No.: 3566688

QC Batch: SFL/5866
QC Batch Method: SM 9222B
Analysis Method: SM 9222B
Analysis Description: 9222B MBIO Total Coliforms
Associated Lab Samples: 3566688001

METHOD BLANK: 462742
Matrix: Water
Associated Lab Samples: 3566688001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Coliforms	CFU/100 mL	1.0U	1.0	09/01/12 15:20	

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QUALITY CONTROL DATA

Project: Leachate Medley Landfill
Pace Project No.: 3566688

QC Batch: WET/14912 Analysis Method: SM 2120B
QC Batch Method: SM 2120B Analysis Description: 2120B True Color
Associated Lab Samples: 3566688001

METHOD BLANK: 457950 Matrix: Water
Associated Lab Samples: 3566688001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
True Color	units	5.0U	5.0	09/01/12 09:30	

LABORATORY CONTROL SAMPLE: 457951

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
True Color	units	20	20.0	100	90-110	

SAMPLE DUPLICATE: 457952

Parameter	Units	3566673001 Result	Dup Result	RPD	Max RPD	Qualifiers
True Color	units	50.0	50.0	0	20	

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QUALITY CONTROL DATA

Project: Leachate Medley Landfill
Pace Project No.: 3566688

QC Batch: WET/14950
QC Batch Method: SM 4500-ClO2
Analysis Method: SM 4500-ClO2
Analysis Description: 4500ClO2 Chlorine Dioxide
Associated Lab Samples: 3566688001

METHOD BLANK: 459389
Matrix: Water
Associated Lab Samples: 3566688001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chlorine Dioxide	mg/L	0.067U	0.10	09/05/12 14:30	Q

SAMPLE DUPLICATE: 459390

Parameter	Units	3566617001 Result	Dup Result	RPD	Max RPD	Qualifiers
Chlorine Dioxide	mg/L	<0.067	0.067U		20	Q

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QUALITY CONTROL DATA

Project: Leachate Medley Landfill
Pace Project No.: 3566688

QC Batch: WET/14905 Analysis Method: SM 5540C
QC Batch Method: SM 5540C Analysis Description: 5540C MBAS Surfactants
Associated Lab Samples: 3566688001

METHOD BLANK: 457734 Matrix: Water
Associated Lab Samples: 3566688001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Surfactants	mg/L	0.059U	0.20	08/31/12 18:06	

LABORATORY CONTROL SAMPLE: 457735

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Surfactants	mg/L	.3	0.30	100	90-110	

MATRIX SPIKE SAMPLE: 457737

Parameter	Units	3566560001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Surfactants	mg/L	0.14 I	.3	0.43	97	80-120	

SAMPLE DUPLICATE: 457736

Parameter	Units	3566560001 Result	Dup Result	RPD	Max RPD	Qualifiers
Surfactants	mg/L	0.14 I	0.14 I		20	

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QUALITY CONTROL DATA

Project: Leachate Medley Landfill
Pace Project No.: 3566688

QC Batch: WETA/19688 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 3566688001

METHOD BLANK: 457984 Matrix: Water
Associated Lab Samples: 3566688001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Nitrate as N	mg/L	0.025U	0.050	09/01/12 13:49	
Nitrite as N	mg/L	0.025U	0.050	09/01/12 13:49	
Nitrogen, NO2 plus NO3	mg/L	0.025U	0.050	09/01/12 13:49	

LABORATORY CONTROL SAMPLE: 457985

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Nitrate as N	mg/L	5	4.7	94	90-110	
Nitrite as N	mg/L	5	4.6	93	90-110	
Nitrogen, NO2 plus NO3	mg/L	10	9.3	93	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 457986 457987

Parameter	Units	3566624003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Nitrate as N	mg/L	2.2	5	5	7.5	7.5	105	106	90-110	.2	20	
Nitrite as N	mg/L	0.025U	5	5	4.6	4.6	92	92	90-110	.2	20	
Nitrogen, NO2 plus NO3	mg/L	2.2	10	10	12.1	12.1	99	99	90-110	.2	20	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 457988 457989

Parameter	Units	3566676004 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Nitrate as N	mg/L	0.025U	5	5	4.9	4.9	98	98	90-110	.1	20	
Nitrite as N	mg/L	0.025U	5	5	4.7	4.7	94	94	90-110	.03	20	
Nitrogen, NO2 plus NO3	mg/L	0.025U	10	10	9.6	9.6	96	96	90-110	.06	20	

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QUALITY CONTROL DATA

Project: Leachate Medley Landfill
Pace Project No.: 3566688

QC Batch: WETA/19693
QC Batch Method: EPA 300.0
Analysis Method: EPA 300.0
Analysis Description: 300.0 IC Anions
Associated Lab Samples: 3566688001

METHOD BLANK: 458043 Matrix: Water
Associated Lab Samples: 3566688001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	2.5U	5.0	09/01/12 20:42	
Fluoride	mg/L	0.025U	0.050	09/01/12 20:42	
Sulfate	mg/L	2.5U	5.0	09/01/12 20:42	

LABORATORY CONTROL SAMPLE: 458044

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	50	51.1	102	90-110	
Fluoride	mg/L	5	5.0	99	90-110	
Sulfate	mg/L	50	49.8	100	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 458045 458046

Parameter	Units	3566676004 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	9.4	50	50	61.0	61.0	103	103	90-110	.03	20	
Fluoride	mg/L	0.11	5	5	4.8	4.8	94	94	90-110	.005	20	
Sulfate	mg/L	7.6	50	50	57.6	57.6	100	100	90-110	.05	20	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 458047 458048

Parameter	Units	3566713003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	40.3	50	50	93.5	93.4	106	106	90-110	.02	20	
Fluoride	mg/L	0.28	5	5	5.1	5.1	96	96	90-110	.3	20	
Sulfate	mg/L	2.5U	50	50	51.1	51.1	97	97	90-110	.02	20	

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QUALITY CONTROL DATA

Project: Leachate Medley Landfill
Pace Project No.: 3566688

QC Batch: WETA/19692
QC Batch Method: EPA 300.1
Analysis Method: EPA 300.1
Analysis Description: 300.1 Oxihalides IC Anions
Associated Lab Samples: 3566688001

METHOD BLANK: 458039 Matrix: Water
Associated Lab Samples: 3566688001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chlorite	ug/L	0.55U	5.0	09/01/12 21:19	
Dichloroacetate (S)	%	99	90-115	09/01/12 21:19	

LABORATORY CONTROL SAMPLE: 458040

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chlorite	ug/L	40	39.7	99	85-115	
Dichloroacetate (S)	%			100	90-115	

MATRIX SPIKE SAMPLE: 458042

Parameter	Units	3565960001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Chlorite	ug/L	ND	40	39.9	93	75-125	
Dichloroacetate (S)	%				99	90-115	

SAMPLE DUPLICATE: 458041

Parameter	Units	3565960001 Result	Dup Result	RPD	Max RPD	Qualifiers
Chlorite	ug/L	ND	2.6 I		20	
Dichloroacetate (S)	%	102	101	.6		

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QUALITY CONTROL DATA

Project: Leachate Medley Landfill
Pace Project No.: 3566688

QC Batch: WETA/19690
QC Batch Method: EPA 300.1
Analysis Method: EPA 300.1
Analysis Description: 300.1 Oxihalides IC Anions
Associated Lab Samples: 3566688001

METHOD BLANK: 458029 Matrix: Water
Associated Lab Samples: 3566688001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Bromate	ug/L	0.52U	2.5	09/01/12 21:19	
Dichloroacetate (S)	%	99	90-115	09/01/12 21:19	

LABORATORY CONTROL SAMPLE: 458030

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Bromate	ug/L	20	19.8	99	85-115	
Dichloroacetate (S)	%			100	90-115	

MATRIX SPIKE SAMPLE: 458032

Parameter	Units	3565960001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Bromate	ug/L	ND	20	19.3	96	75-125	
Dichloroacetate (S)	%				99	90-115	

MATRIX SPIKE SAMPLE: 458034

Parameter	Units	3566654002 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Bromate	ug/L	8.3	20	26.2	90	75-125	
Dichloroacetate (S)	%				96	90-115	

SAMPLE DUPLICATE: 458031

Parameter	Units	3565960001 Result	Dup Result	RPD	Max RPD	Qualifiers
Bromate	ug/L	ND	0.52U		20	
Dichloroacetate (S)	%	102	101	.6		

SAMPLE DUPLICATE: 458033

Parameter	Units	3566654002 Result	Dup Result	RPD	Max RPD	Qualifiers
Bromate	ug/L	8.3	8.2	.4	20	
Dichloroacetate (S)	%	98	98	.8		

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QUALITY CONTROL DATA

Project: Leachate Medley Landfill
Pace Project No.: 3566688

QC Batch: WETA/19746
QC Batch Method: EPA 335.4
Analysis Method: EPA 335.4
Analysis Description: 335.4 Cyanide, Total
Associated Lab Samples: 3566688001

METHOD BLANK: 458843 Matrix: Water
Associated Lab Samples: 3566688001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Cyanide	mg/L	0.0050U	0.010	09/05/12 11:31	

LABORATORY CONTROL SAMPLE: 458844

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cyanide	mg/L	.05	0.051	102	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 458845 458846

Parameter	Units	92129801001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cyanide	mg/L	ND			0.051	0.050				1	20	J(M1)

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 458847 458848

Parameter	Units	3566467004 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cyanide	mg/L	0.0050 U	.05	.05	0.032	0.031	60	57	90-110	4	20	J(M1)

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QUALITY CONTROL DATA

Project: Leachate Medley Landfill
Pace Project No.: 3566688

QC Batch: WETA/19701
QC Batch Method: EPA 350.1
Analysis Method: EPA 350.1
Analysis Description: 350.1 Ammonia
Associated Lab Samples: 3566688001

METHOD BLANK: 458117 Matrix: Water
Associated Lab Samples: 3566688001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Nitrogen, Ammonia	mg/L	0.020U	0.050	09/04/12 08:15	

LABORATORY CONTROL SAMPLE: 458118

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Nitrogen, Ammonia	mg/L	1	1.0	102	90-110	

MATRIX SPIKE SAMPLE: 458120

Parameter	Units	3566659002 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Nitrogen, Ammonia	mg/L	0.055	1	1.0	99	90-110	

SAMPLE DUPLICATE: 458119

Parameter	Units	3566659002 Result	Dup Result	RPD	Max RPD	Qualifiers
Nitrogen, Ammonia	mg/L	0.055	0.064	16	20	

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QUALITY CONTROL DATA

Project: Leachate Medley Landfill
Pace Project No.: 3566688

QC Batch: WETA/19730 Analysis Method: EPA 351.2
QC Batch Method: EPA 351.2 Analysis Description: 351.2 TKN
Associated Lab Samples: 3566688001

METHOD BLANK: 458316 Matrix: Water
Associated Lab Samples: 3566688001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Nitrogen, Kjeldahl, Total	mg/L	0.086U	0.50	09/04/12 18:20	

LABORATORY CONTROL SAMPLE: 458317

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Nitrogen, Kjeldahl, Total	mg/L	20	20.5	103	90-110	

MATRIX SPIKE SAMPLE: 458319

Parameter	Units	3566676001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Nitrogen, Kjeldahl, Total	mg/L	0.99	20	22.6	108	90-110	

SAMPLE DUPLICATE: 458318

Parameter	Units	3566676001 Result	Dup Result	RPD	Max RPD	Qualifiers
Nitrogen, Kjeldahl, Total	mg/L	0.99	1.0	.4	20	

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QUALITY CONTROL DATA

Project: Leachate Medley Landfill
Pace Project No.: 3566688

QC Batch: WETA/19731 Analysis Method: EPA 365.4
QC Batch Method: EPA 365.4 Analysis Description: 365.4 Phosphorus
Associated Lab Samples: 3566688001

METHOD BLANK: 458320 Matrix: Water
Associated Lab Samples: 3566688001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Phosphorus, Total (as P)	mg/L	0.050U	0.10	09/04/12 18:49	

LABORATORY CONTROL SAMPLE: 458321

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Phosphorus, Total (as P)	mg/L	4	4.1	102	90-110	

MATRIX SPIKE SAMPLE: 458323

Parameter	Units	3566676001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Phosphorus, Total (as P)	mg/L	0.11	4	4.3	104	80-120	

SAMPLE DUPLICATE: 458322

Parameter	Units	3566676001 Result	Dup Result	RPD	Max RPD	Qualifiers
Phosphorus, Total (as P)	mg/L	0.11	0.10	4	20	

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ANALYTICAL RESULTS

Project: Leachate Medley Landfill
Pace Project No.: 3566688

Sample: LEACHATE SP **Lab ID: 3566688001** Collected: 08/31/12 11:30 Received: 08/31/12 16:20 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC)	Units	Analyzed	CAS No.	Qual
Gross Alpha	SM 7110C	**2.08U ± 1.30 (2.08)**	pCi/L	09/14/12 18:46	12587-46-1	
Radium-226	EPA 903.1	**8.91 ± 7.19 (3.45)**	pCi/L	09/12/12 11:29	13982-63-3	
Radium-228	EPA 904.0	**36.2U ± 15.6 (36.2)**	pCi/L	09/13/12 12:03	15262-20-1	
Strontium-90	ASTM D5811-95	**9.7 ± 12.2 (26.5)**	pCi/L	09/18/12 08:34	10098-97-2	

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QUALITY CONTROL DATA

Project: Leachate Medley Landfill
Pace Project No.: 3566688

QC Batch: RADC/13169
QC Batch Method: SM 7110C
Analysis Method: SM 7110C
Analysis Description: 7110C Gross Alpha
Associated Lab Samples: 3566688001

METHOD BLANK: 486133
Matrix: Water
Associated Lab Samples: 3566688001

Parameter	Act ± Unc (MDC)	Units	Analyzed	Qualifiers
Gross Alpha	0.183 ± 0.617 (1.58)	pCi/L	09/14/12 09:17	

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QUALITY CONTROL DATA

Project: Leachate Medley Landfill
Pace Project No.: 3566688

QC Batch: RADC/13122
QC Batch Method: EPA 904.0
Analysis Method: EPA 904.0
Analysis Description: 904.0 Radium 228
Associated Lab Samples: 3566688001

METHOD BLANK: 484192
Matrix: Water
Associated Lab Samples: 3566688001

Parameter	Act ± Unc (MDC)	Units	Analyzed	Qualifiers
Radium-228	-0.281 ± 0.438 (0.975)	pCi/L	09/13/12 12:40	

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QUALITY CONTROL DATA

Project: Leachate Medley Landfill
Pace Project No.: 3566688

QC Batch: RADC/13176
QC Batch Method: ASTM D5811-95
Analysis Method: ASTM D5811-95
Analysis Description: 905.0 Strontium 89/90 Eichrom
Associated Lab Samples: 3566688001

METHOD BLANK: 486140
Matrix: Water
Associated Lab Samples: 3566688001

Parameter	Act ± Unc (MDC)	Units	Analyzed	Qualifiers
Strontium-90	0.282 ± 0.611 (1.41)	pCi/L	09/18/12 08:33	

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QUALITY CONTROL DATA

Project: Leachate Medley Landfill
Pace Project No.: 3566688

QC Batch: RADC/13121 Analysis Method: EPA 903.1
QC Batch Method: EPA 903.1 Analysis Description: 903.1 Radium-226
Associated Lab Samples: 3566688001

METHOD BLANK: 484191 Matrix: Water
Associated Lab Samples: 3566688001

Parameter	Act ± Unc (MDC)	Units	Analyzed	Qualifiers
Radium-226	-0.140 ± 0.433 (0.985)	pCi/L	09/12/12 10:43	

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QUALIFIERS

Project: Leachate Medley Landfill
Pace Project No.: 3566688

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.

MDL - Adjusted Method Detection Limit.

PRL - Pace Reporting Limit.

RL - Reporting 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-O	Pace Analytical Services - Ormond Beach
PASI-PA	Pace Analytical Services - Greensburg
PASI-SF	Pace Analytical Services - South Florida

ANALYTE QUALIFIERS

I	The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.
D3	Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.
J(D6)	Estimated Value. The relative percent difference (RPD) between the sample and sample duplicate exceeded laboratory control limits.
J(IS)	Estimated Value. The internal standard recovery associated with this result exceeds the lower control limit. The reported result should be considered an estimated value.
J(L0)	Estimated Value. Analyte recovery in the laboratory control sample (LCS) was outside QC limits.
J(M0)	Estimated Value. Matrix spike recovery was outside laboratory control limits.
J(M1)	Estimated Value. Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.
J(S0)	Estimated Value. Surrogate recovery outside laboratory control limits.
J(S2)	Estimated Value. Surrogate recovery outside laboratory control limits due to matrix interferences (confirmed by similar results from sample re-analysis).
L3	Analyte recovery in the laboratory control sample (LCS) exceeded QC limits. Analyte presence below reporting limits in associated samples. Results unaffected by high bias.
N2	The lab does not hold TNI accreditation for this parameter.

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QUALIFIERS

Project: Leachate Medley Landfill
Pace Project No.: 3566688

ANALYTE QUALIFIERS

Q	Sample held beyond the accepted holding time.
Q	Sample held beyond the accepted holding time. Analysis initiated more than 15 minutes after sample collection.
S4	Surrogate recovery not evaluated against control limits due to sample dilution.
Z	Too many colonies were present (TNTC); the numeric value represents the estimated colony counts from the highest dilution used in this test.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Leachate Medley Landfill
Pace Project No.: 3566688

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
3566688001	**LEACHATE SP**	EPA 504.1	OEXT/9769	EPA 504.1	GCSV/6788
3566688001	**LEACHATE SP**	EPA 508.1	OEXT/9807	EPA 508.1	GCSV/6821
3566688001	**LEACHATE SP**	EPA 515.3	OEXT/9775	EPA 515.3	GCSV/6810
3566688001	**LEACHATE SP**	EPA 531.1	GCSV/6785		
3566688001	**LEACHATE SP**	EPA 547	GCSV/6801		
3566688001	**LEACHATE SP**	EPA 549.2	OEXT/9761	EPA 549.2	GCSV/6796
3566688001	**LEACHATE SP**	EPA 552.2	OEXT/9797	EPA 552.2	GCSV/6824
3566688001	**LEACHATE SP**	EPA 200.7	MPRP/10110	EPA 200.7	ICP/6578
3566688001	**LEACHATE SP**	EPA 200.8	MPRP/10111	EPA 200.8	ICPM/4200
3566688001	**LEACHATE SP**	EPA 245.1	MERP/3095	EPA 245.1	MERC/3096
3566688001	**LEACHATE SP**	EPA 525.2	OEXT/9808	EPA 525.2	MSSV/3760
3566688001	**LEACHATE SP**	EPA 548.1	OEXT/9783	EPA 548.1	MSSV/3752
3566688001	**LEACHATE SP**	EPA 524.2	MSV/6440		
3566688001	**LEACHATE SP**	SM 7110C	RADC/13169		
3566688001	**LEACHATE SP**	EPA 903.1	RADC/13121		
3566688001	**LEACHATE SP**	EPA 904.0	RADC/13122		
3566688001	**LEACHATE SP**	ASTM D5811-95	RADC/13176		
3566688001	**LEACHATE SP**	SM 2150B	SFL/5826		
3566688001	**LEACHATE SP**	SM 2540C	SFL/5828		
3566688001	**LEACHATE SP**	SM 2540D	SFL/5819		
3566688001	**LEACHATE SP**	SM 4500-H+B	SFL/5827		
3566688001	**LEACHATE SP**	SM 9222B	SFL/5866	SM 9222B	SFL/5867
3566688001	**LEACHATE SP**	SM 2120B	WET/14912		
3566688001	**LEACHATE SP**	SM 4500-ClO2	WET/14950		
3566688001	**LEACHATE SP**	SM 5540C	WET/14905		
3566688001	**LEACHATE SP**	EPA 300.0	WETA/19688		
3566688001	**LEACHATE SP**	EPA 300.0	WETA/19693		
3566688001	**LEACHATE SP**	EPA 300.1	WETA/19692		
3566688001	**LEACHATE SP**	EPA 300.1	WETA/19690		
3566688001	**LEACHATE SP**	EPA 335.4	WETA/19746	EPA 335.4	WETA/19748
3566688001	**LEACHATE SP**	EPA 350.1	WETA/19701		
3566688001	**LEACHATE SP**	EPA 351.2	WETA/19730	EPA 351.2	WETA/19739
3566688001	**LEACHATE SP**	EPA 365.4	WETA/19731	EPA 365.4	WETA/19740

Pace Analytical Services, Inc.
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954-582-4300

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Leachate Medley Landfill
Pace Project No.: 3566688

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch

WASTE MANAGEMENT, INC. OF FLORIDA

MEDLEY LANDFILL, FLORIDA

DISPOSAL INJECTION WELL & ASSOCIATED FACILITIES

CIVIL DRAWINGS	
C-1	SITE PLAN
C-2	WELL LOCATION SITE PLAN
C-3	FACILITIES LOCATION PLAN
C-4	DIW / MW FACILITY DIMENSION PLAN
C-5	3RD PARTY RECEIVING FACILITY DIMENSION PLAN
C-6	DIW / MW ELEVATION SCHEMATIC & SPOT ELEVS
C-7	3RD PARTY RECEIVING FACILITY ELEVATION SCHEMATIC & SPOT ELEVS
C-8	DEMOLITION PLAN

PIPING / PROCESS DRAWINGS	
P-1	DIW PROCESS FLOW DIAGRAM (PFD)
P-2	YARD PIPING PLAN
P-3	DIW PIPING PLAN
P-4	DIW PIPING SECTIONS & DETAILS
P-5	MW PLAN & STORMWATER PUMP STATION DETAIL
P-6	MONITOR WELLHEAD DETAILS
P-7	MONITOR WELL EQUIPMENT & PIPING DETAILS
P-8	ANNULUS TANK DETAILS
P-9	3RD PARTY RECEIVING FACILITY PIPING PLAN
P-10	3RD PARTY RECEIVING FACILITY PIPING DETAILS
P-11	LEACHATE PLANT PUMP STATION PIPING PLAN & DETAILS

INSTRUMENTATION DRAWINGS	
I-1	DIW P&ID - SHT 1
I-2	DIW P&ID - SHT 2

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L.S. SIMS ASSOCIATES
CERTIFICATE OF AUTHORIZATION # 28089
1530 U.S.HIGHWAY 1
ROCKLEDGE, FLORIDA 32955

L.S.SIMS & ASSOCIATES
ENVIRONMENTAL CONSULTING

Signature
Date

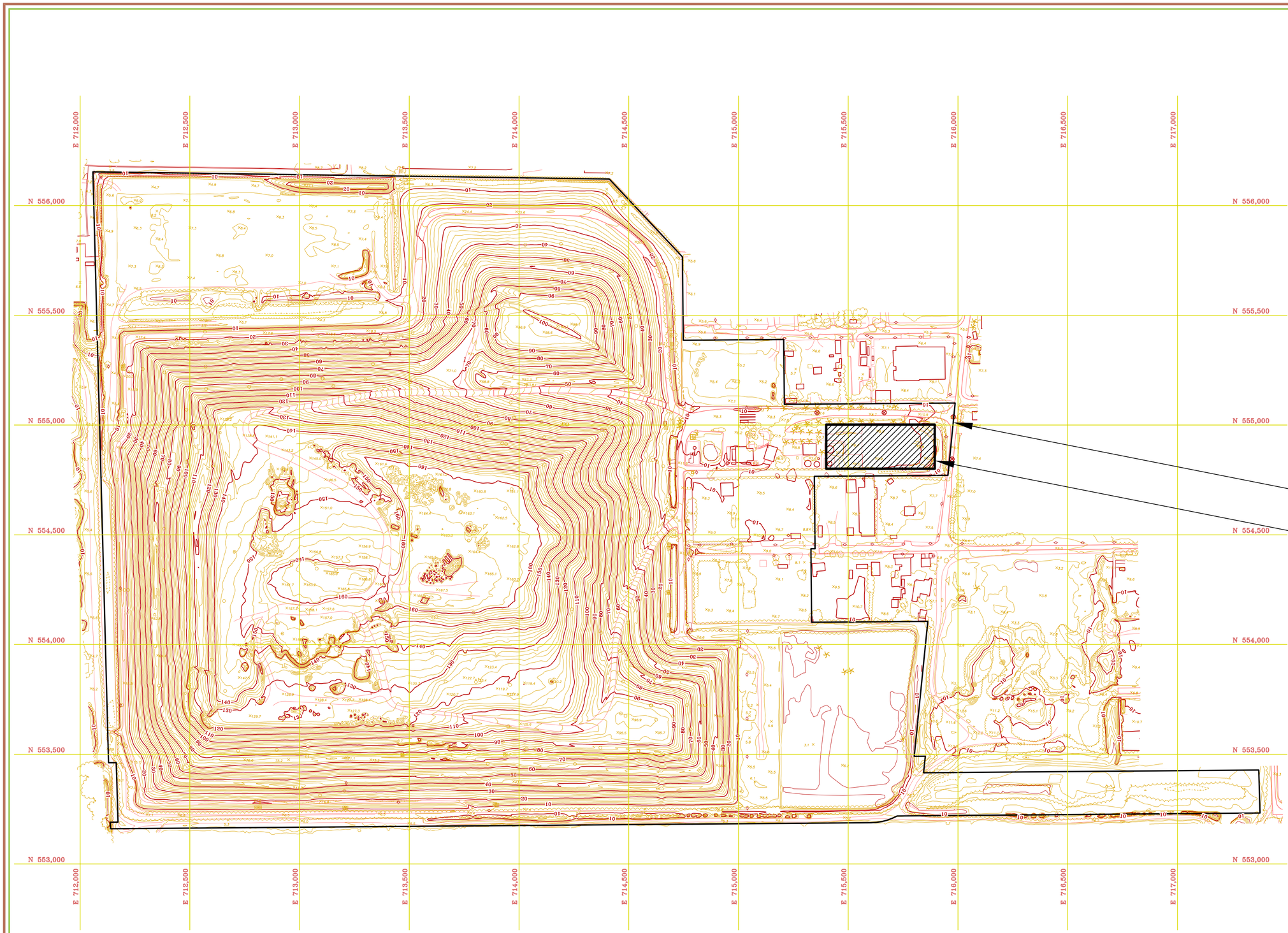
DESCRIPTION
CHKD BY
DRWN BY
DATE
REV NO

DESIGN
DRWN
CHKD
JOB NUMBER
ISSUE DATE
ISSUE

COVER SHEET

WMI MEDLEY
DISPOSAL
INJECTION WELL

DRAWING NUMBER
COVER SHT
SHEET OF



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NOTE: BASE MAP BASED ON SITE SURVEY
BY PICKETT & ASSOCIATES, INC. DECEMBER 28, 2011

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L.S. SIMS ASSOCIATES
CERTIFICATE OF AUTHORIZATION # 28089
1530 U.S.HIGHWAY 1
ROCKLEDGE, FLORIDA 32955

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Signature
Date

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DESIGN	DRWN	CHKD
JOB NUMBER		
ISSUE DATE		
ISSUE		

SITE PLAN

WMI MEDLEY
DISPOSAL
INJECTION WELL

WASTE MANAGEMENT

DRAWING NUMBER
C-1
SHEET OF

66 FT OFF CORNER OF BLACK ORNAMENTAL FENCE

DIW
Northing = 554,873.92
Easting = 715,807.67
Elevation = 9.20

MW
Northing = 554,974.44
Easting = 715,812.30
Elevation = 9.27

MW

CENTER TO CENTER 101 FT

108 FT +/-

DIW

104 FT +/-

99 FT +/-

APPROX LOCATION OF EXISTING BLACK ORNAMENTAL FENCE

PROPERTY LINE

EXISTING CHAIN-LINK FENCE

WELL LOCATION SURVEY
PROVIDED BY
CROWEN THOMPSON & ASSOCIATES, INC.

0 FT 20 FT 40 FT 60 FT 80 FT
SCALE

NORTH

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L.S. SIMS ASSOCIATES
CERTIFICATE OF AUTHORIZATION # 28089
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ROCKLEDGE, FLORIDA 32955

L.S.SIMS & ASSOCIATES
ENVIRONMENTAL CONSULTING

Signature Date

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DESIGN | DRWN | CHKD | JOB NUMBER | ISSUE DATE | ISSUE

WELL LOCATION SITE PLAN

WMI MEDLEY
DISPOSAL
INJECTION WELL

DRAWING NUMBER
C-2
SHEET OF

A	DIW & CONTAINMENT PAD
B	STORMWATER PUMP STATION
C	MONITOR WELL & CONTAINMENT PAD
D	3rd PARTY WASTE RECEIVING FACILITY CONTAINMENT PAD
E	TANKER TRUCK ACCESS DRIVE
F	GRIT PIT
G	PUMP STATION & WET WELL
H	EXISTING LEACHATE PLANT
I	LEACHATE PLANT PUMP STATION

NORTH

0 FT 20 FT 40 FT 60 FT 80 FT

SCALE

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L.S. SIMS ASSOCIATES
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ROCKLEDGE, FLORIDA 32955

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Signature Date

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DESIGN DRWN CHKD

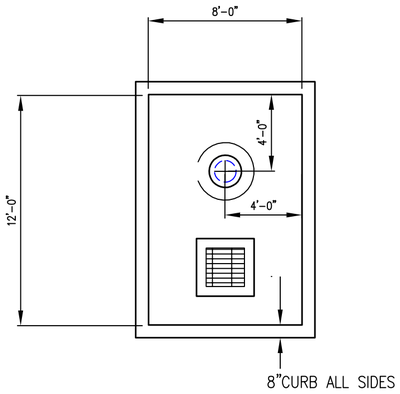
JOB NUMBER
ISSUE DATE
ISSUE

FACILITIES LOCATION PLAN

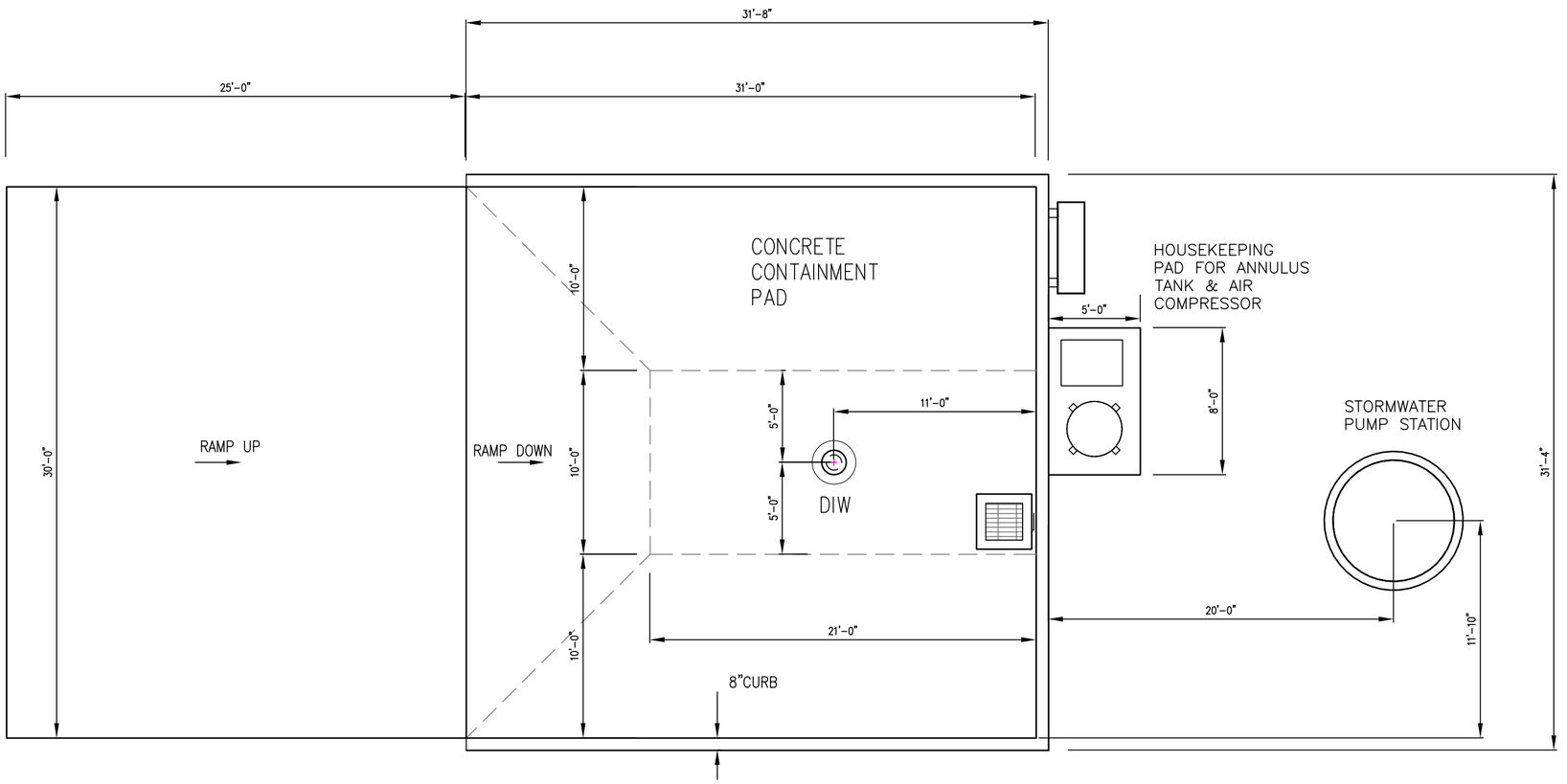
WMI MEDLEY
DISPOSAL
INJECTION WELL

WASTE MANAGEMENT

DRAWING NUMBER
C-3
SHEET OF



MONITORING WELL PLAN
SCALE AS SHOWN



INJECTION WELL
SLAB PLAN
SCALE AS SHOWN

NORTH

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CERTIFICATE OF AUTHORIZATION # 28089
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ROCKLEDGE, FLORIDA 32955

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Signature
Date

REV NO	DATE	DRWN BY	CHKD BY	DESCRIPTION

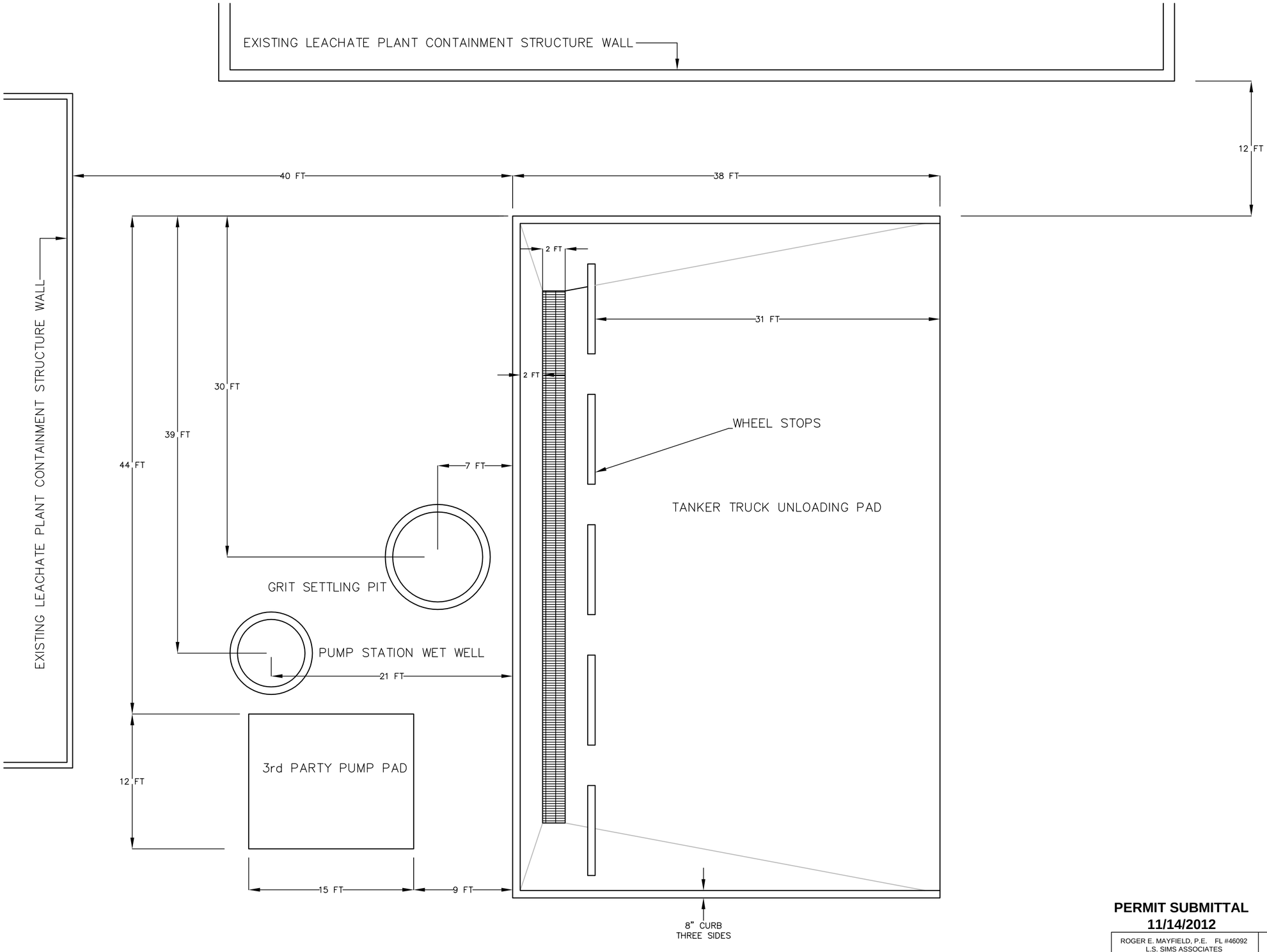
DESIGN
DRWN
CHKD
JOB NUMBER
ISSUE DATE
ISSUE

DIW / MW FACILITY DIMENSION PLAN

WMI MEDLEY
DISPOSAL
INJECTION WELL

WASTE MANAGEMENT

DRAWING NUMBER
C-4
SHEET OF



NORTH

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L.S. SIMS ASSOCIATES
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ROCKLEDGE, FLORIDA 32955

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Signature Date

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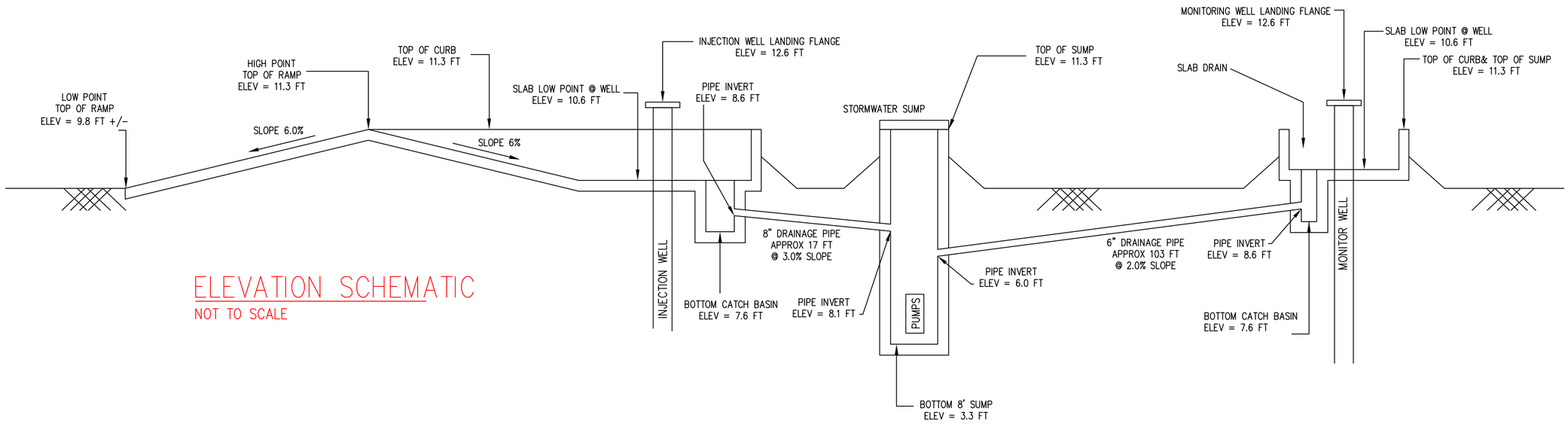
DESIGN DRWN CHKD
JOB NUMBER
ISSUE DATE
ISSUE

3RD PARTY RECEIVING FACILITY DIMENSION PLAN

WMI MEDLEY DISPOSAL INJECTION WELL

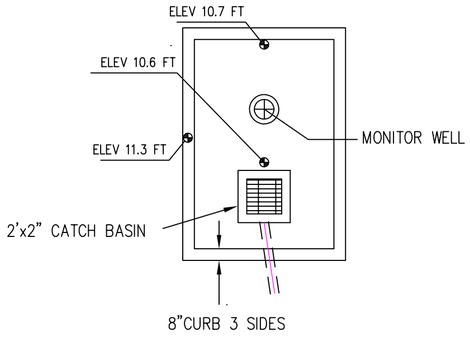
WASTE MANAGEMENT

DRAWING NUMBER
C-5
SHEET OF



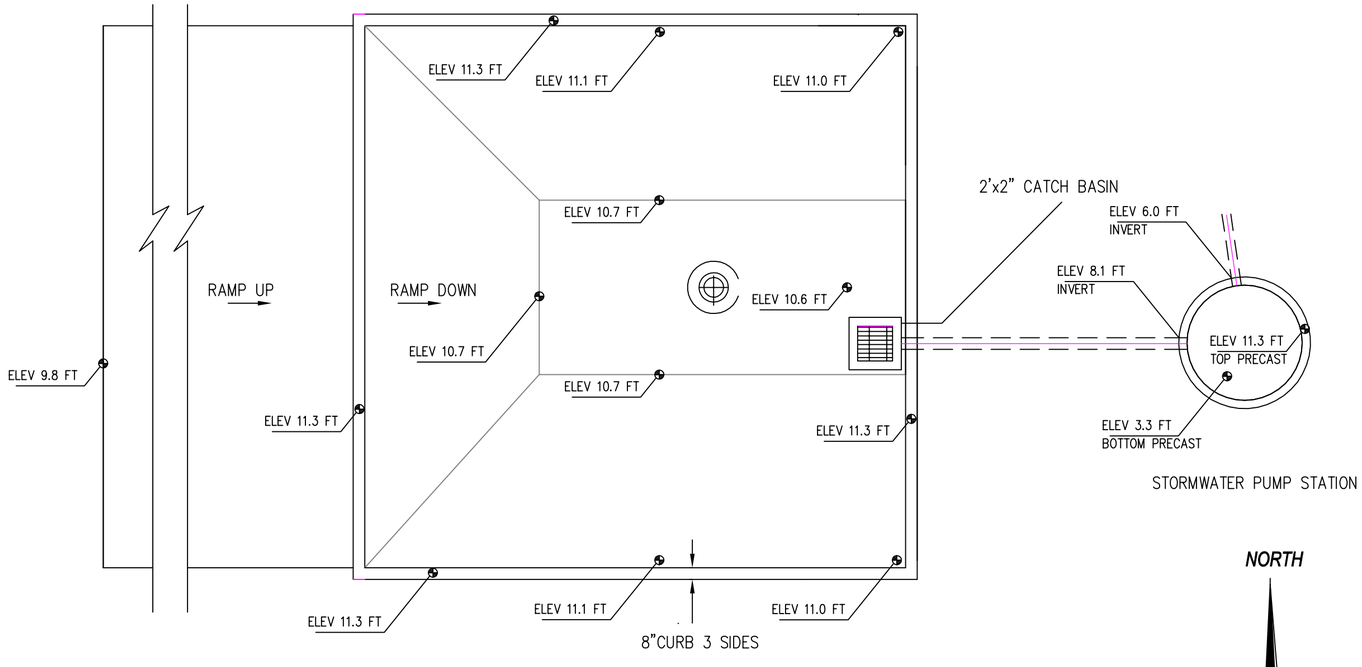
ELEVATION SCHEMATIC

NOT TO SCALE



MONITORING WELL & STORMWATER SUMP – SPOT ELEVATIONS

NOT TO SCALE



INJECTION WELL PAD – SPOT ELEVATIONS

NOT TO SCALE

NORTH

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Date

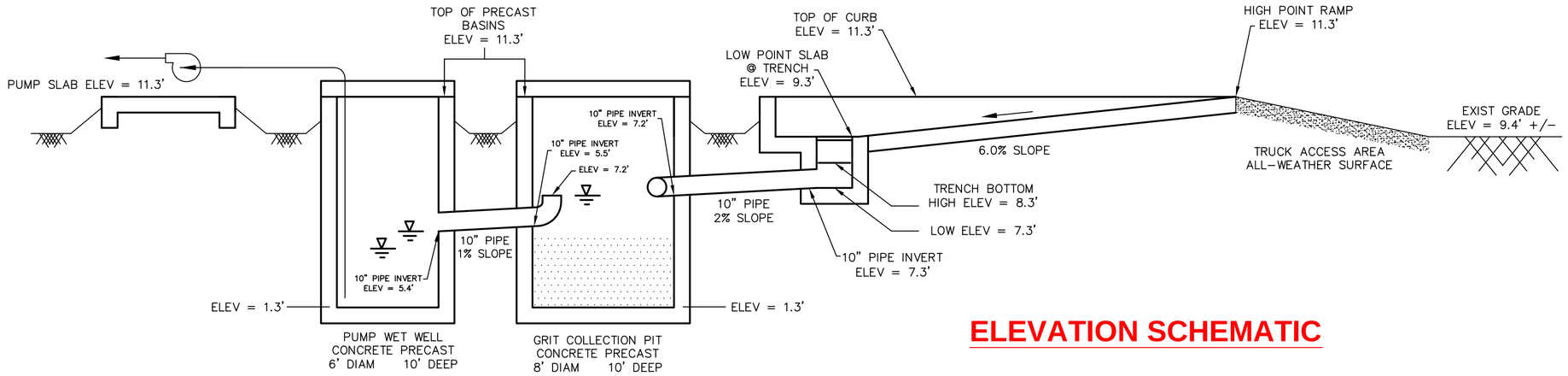
DESCRIPTION
REV NO | DATE | DRWN BY | CHKD BY

DESIGN | DRWN | CHKD
JOB NUMBER
ISSUE DATE
ISSUE

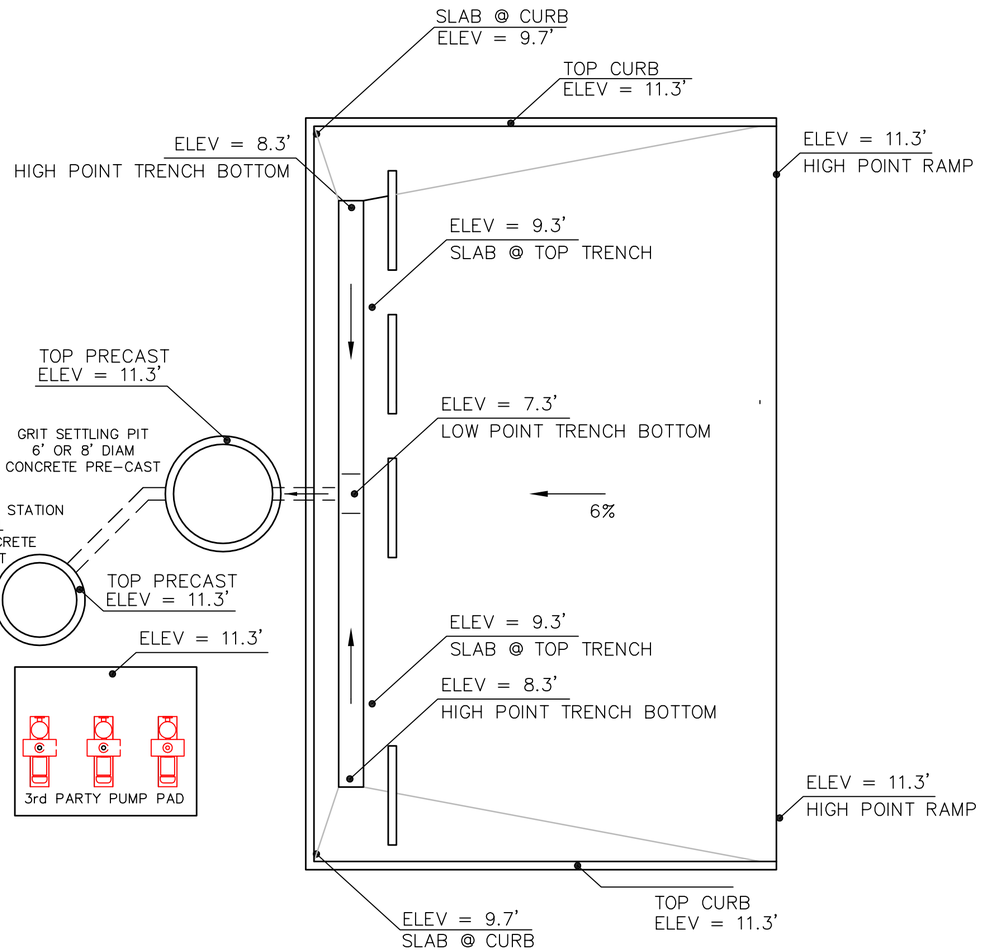
DIW/MW ELEVATION SCHEMATIC & SPOT ELEVS

WMI MEDLEY DISPOSAL INJECTION WELL

DRAWING NUMBER
C-6
SHEET OF



ELEVATION SCHEMATIC



SPOT ELEVATION PLAN

0 FT — 20 FT

SCALE

NORTH

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CERTIFICATE OF AUTHORIZATION # 28089
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ROCKLEDGE, FLORIDA 32955

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Signature | Date

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DESIGN	DRWN	CHKD	JOB NUMBER	ISSUE DATE	ISSUE

3RD PARTY RECEIVING FACILITY ELEVATION SCHEMATIC & SPOT ELEVS

WMI MEDLEY
DISPOSAL
INJECTION WELL

WASTE MANAGEMENT

DRAWING NUMBER
C-7
SHEET OF

NORTH

PERMIT SUBMITTAL
11/14/2012

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L.S. SIMS ASSOCIATES
CERTIFICATE OF AUTHORIZATION # 28089
1530 U.S.HIGHWAY 1
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ENVIRONMENTAL CONSULTING

Signature | Date

REV NO	DATE	DRWN BY	CHKD BY	DESCRIPTION

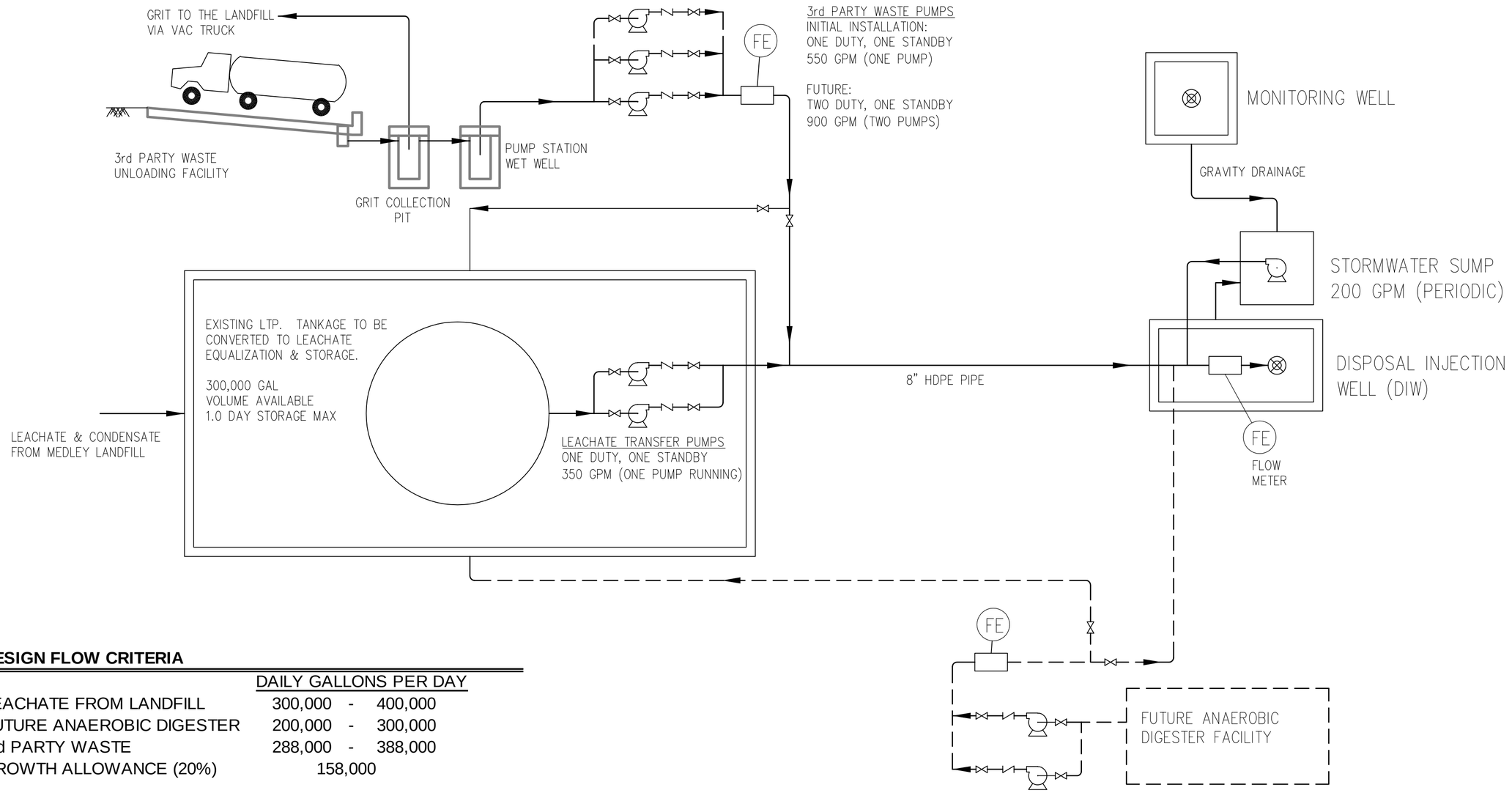
DESIGN | DRWN | CHKD
JOB NUMBER
ISSUE DATE
ISSUE

DEMOLITION PLAN

WMI MEDLEY
DISPOSAL
INJECTION WELL

WASTE MANAGEMENT

DRAWING NUMBER
C-8
SHEET OF



DESIGN FLOW CRITERIA

	DAILY GALLONS PER DAY		
LEACHATE FROM LANDFILL	300,000	-	400,000
FUTURE ANAEROBIC DIGESTER	200,000	-	300,000
3rd PARTY WASTE	288,000	-	388,000
GROWTH ALLOWANCE (20%)	158,000		
TOTAL	946,000		

PUMP CRITERIA

LEACHATE PLANT PUMP STATION		
1 DUTY, 1 STANDBY	350	GPM
THIRD PARTY WASTE PUMP STATION		
1 DUTY, 1 STANDBY	550	GPM
2 DUTY, 1 STANDBY	900	GPM

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11/14/2012

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L.S. SIMS ASSOCIATES
CERTIFICATE OF AUTHORIZATION # 28089
1530 U.S.HIGHWAY 1
ROCKLEDGE, FLORIDA 32955

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ENVIRONMENTAL CONSULTING

Signature
Date

REV NO	DATE	DRWN BY	CHKD BY	DESCRIPTION

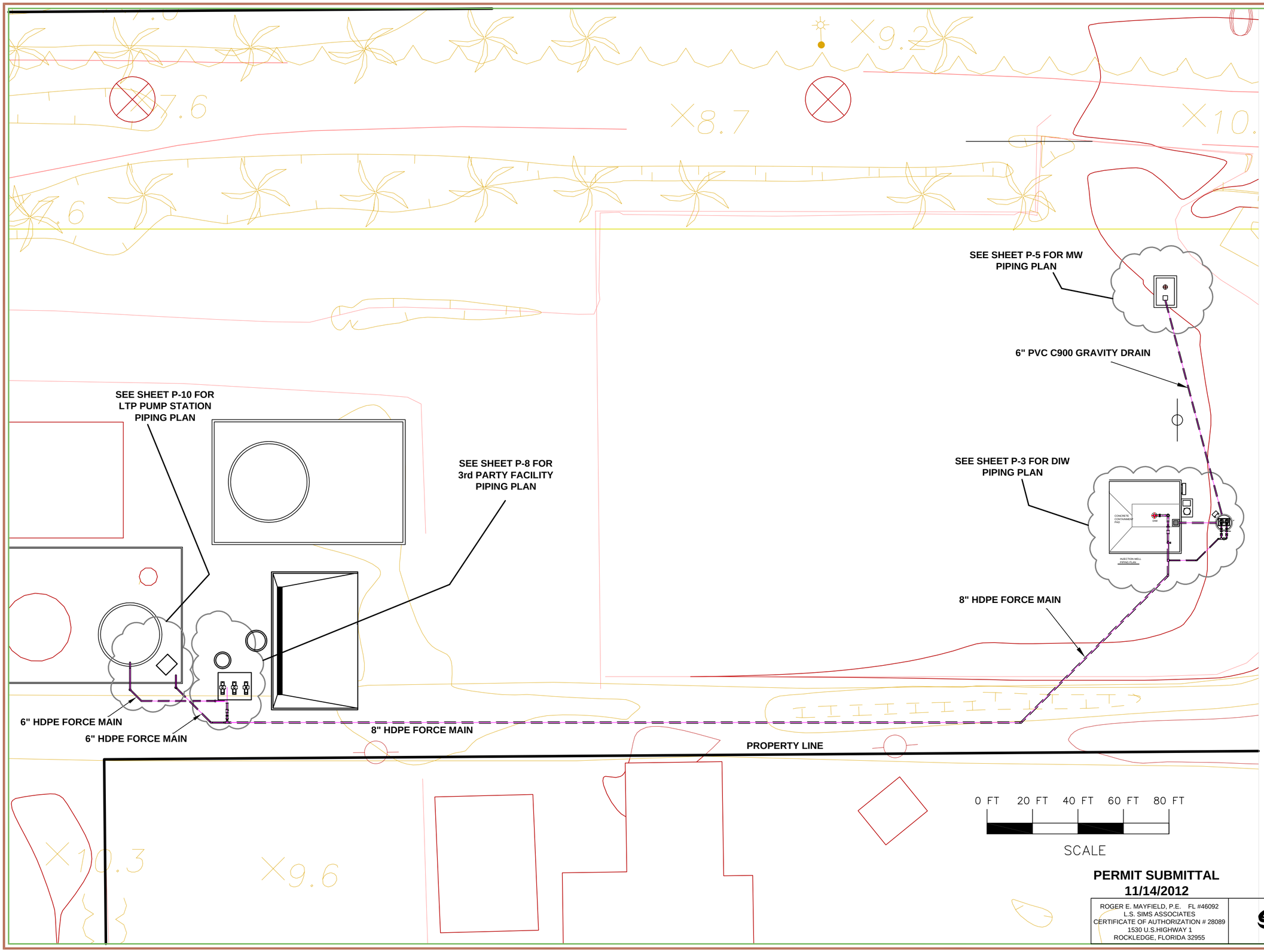
DESIGN | DRWN | CHKD
JOB NUMBER
ISSUE DATE
ISSUE

DIW PROCESS FLOW DIAGRAM (PFD)

WMI MEDLEY
DISPOSAL
INJECTION WELL

WASTE MANAGEMENT

DRAWING NUMBER
P-1
SHEET OF



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CERTIFICATE OF AUTHORIZATION # 28089
1530 U.S.HIGHWAY 1
ROCKLEDGE, FLORIDA 32955

L.S.SIMS & ASSOCIATES
ENVIRONMENTAL CONSULTING

Signature | Date

REV NO	DATE	DRWN BY	CHKD BY	DESCRIPTION

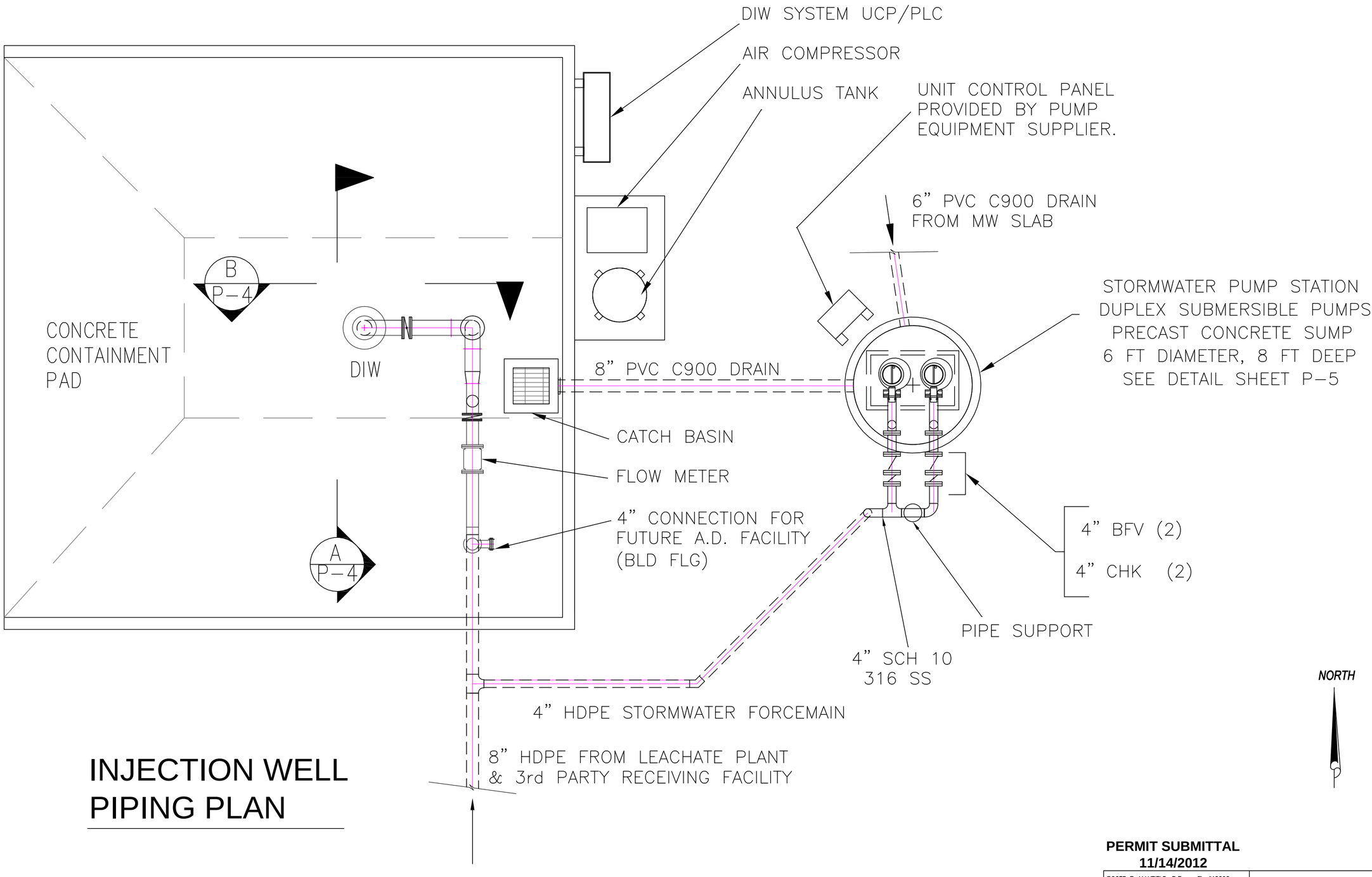
DESIGN | DRWN | CHKD
JOB NUMBER
ISSUE DATE
ISSUE

YARD PIPING PLAN

WMI MEDLEY
DISPOSAL
INJECTION WELL

WASTE MANAGEMENT

DRAWING NUMBER
P-2
SHEET OF



INJECTION WELL PIPING PLAN

PERMIT SUBMITTAL
11/14/2012

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CERTIFICATE OF AUTHORIZATION # 28089
1530 U.S.HIGHWAY 1
ROCKLEDGE, FLORIDA 32955

L.S.SIMS & ASSOCIATES
ENVIRONMENTAL CONSULTING

Signature
Date

REV NO	DATE	DRWN BY	CHKD BY	DESCRIPTION

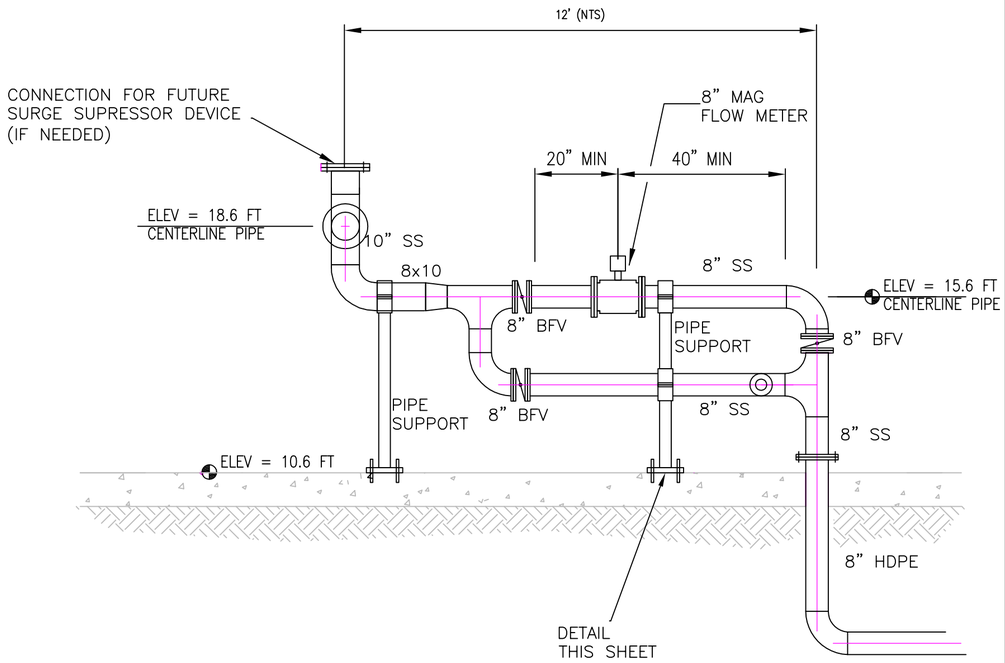
DESIGN | DRWN | CHKD
JOB NUMBER
ISSUE DATE
ISSUE

DIW PIPING PLAN

WMI MEDLEY
DISPOSAL
INJECTION WELL

WASTE MANAGEMENT

DRAWING NUMBER
P-3
SHEET OF

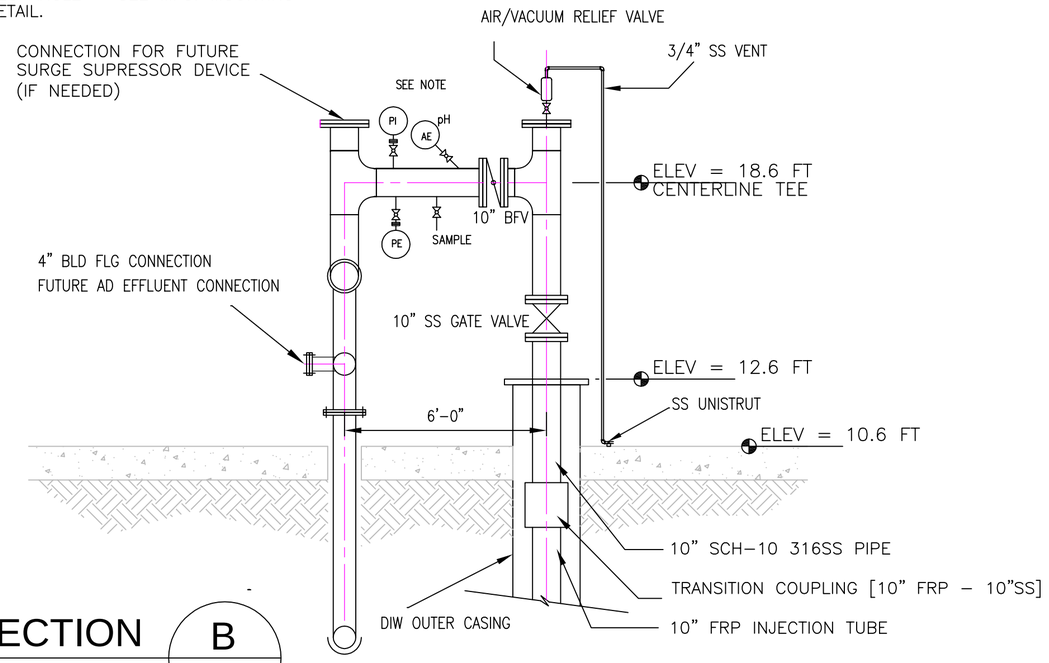


SECTION A / P-3

NOTE:
PI, PE & SAMPLE ALL 1/2" 316 SS BALL VALVES

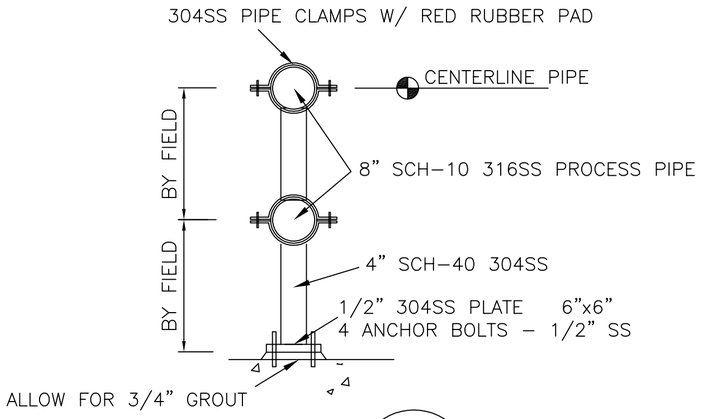
AE – 1–1/4" SS BALL VALVE @ 45 DEG ANGLE – SEE MFG. MOUNTING DETAIL.

INJECTION WELLHEAD



SECTION B / P-3

PIPE SUPPORT



DETAIL 2 / -

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11/14/2012

ROGER E. MAYFIELD, P.E. FL #46092
L.S. SIMS ASSOCIATES
CERTIFICATE OF AUTHORIZATION # 28089
1530 U.S.HIGHWAY 1
ROCKLEDGE, FLORIDA 32955

L.S.SIMS & ASSOCIATES
ENVIRONMENTAL CONSULTING

Signature | Date

REV NO	DATE	DRWN BY	CHKD BY	DESCRIPTION

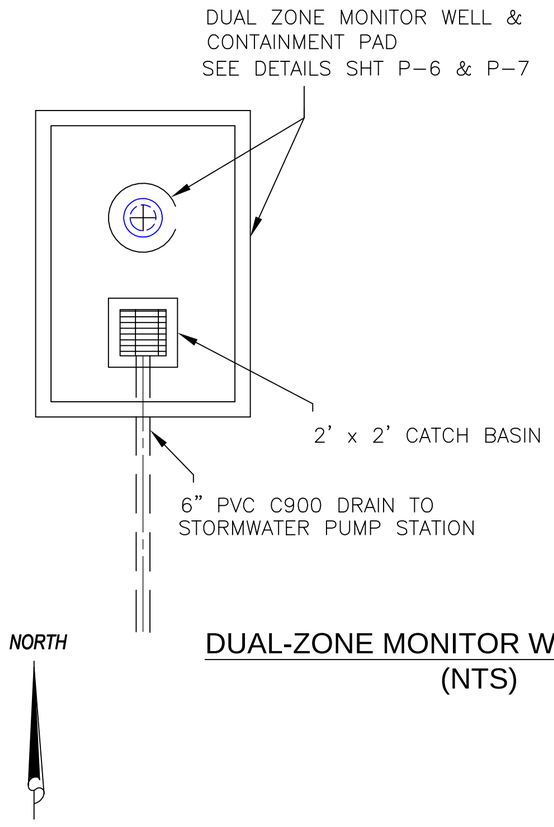
DESIGN	DRWN	CHKD	JOB NUMBER	ISSUE DATE	ISSUE

DIW PIPING SECTIONS & DETAILS

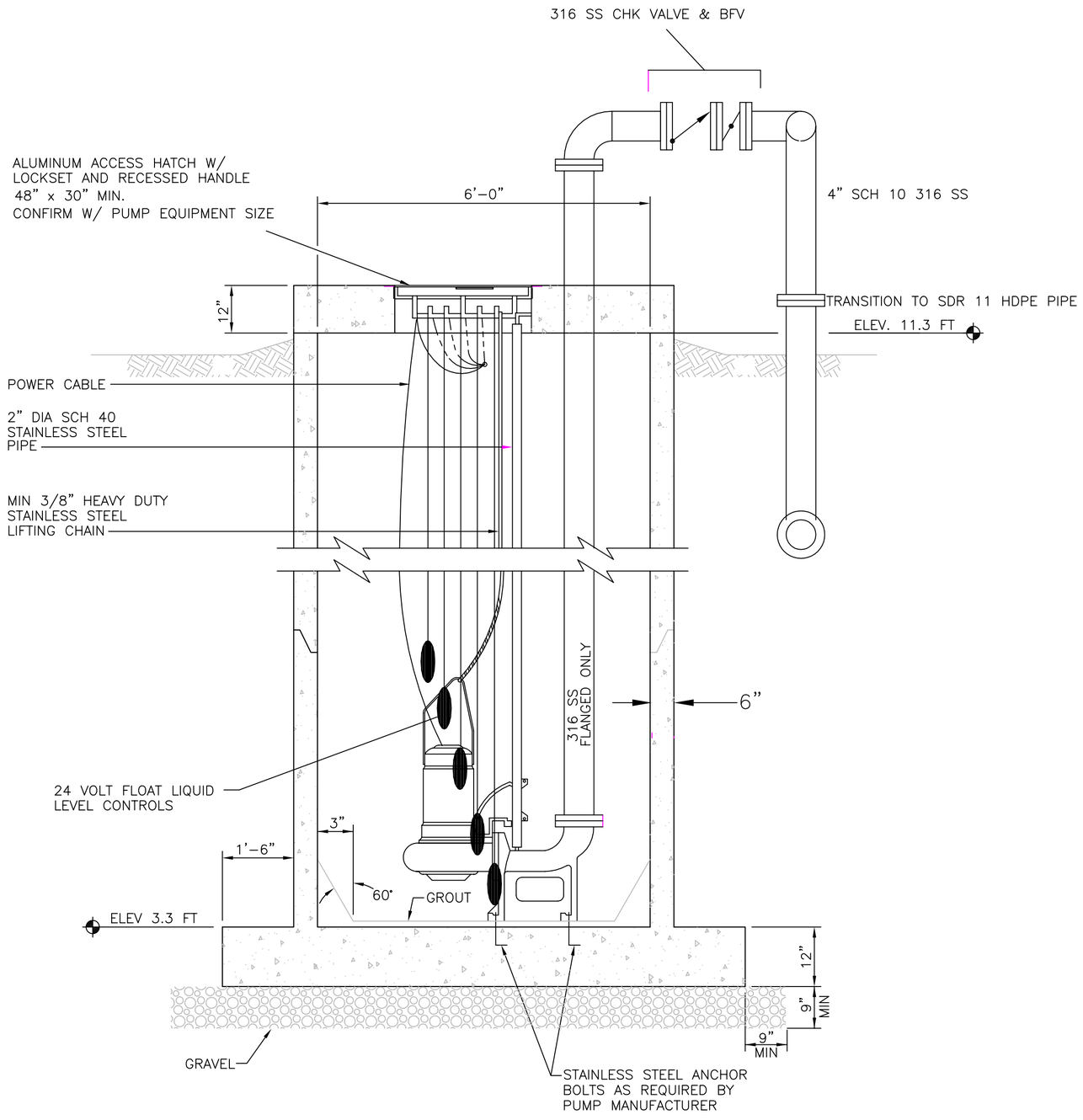
WMI MEDLEY DISPOSAL INJECTION WELL

WASTE MANAGEMENT

DRAWING NUMBER
P-4
SHEET OF



DUAL-ZONE MONITOR WELL PLAN
(NTS)



STORMWATER PUMP STATION
SECTIONAL VIEW
(NTS)

PERMIT SUBMITTAL
11/14/2012

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L.S. SIMS ASSOCIATES
CERTIFICATE OF AUTHORIZATION # 28089
1530 U.S.HIGHWAY 1
ROCKLEDGE, FLORIDA 32955

L.S.SIMS & ASSOCIATES
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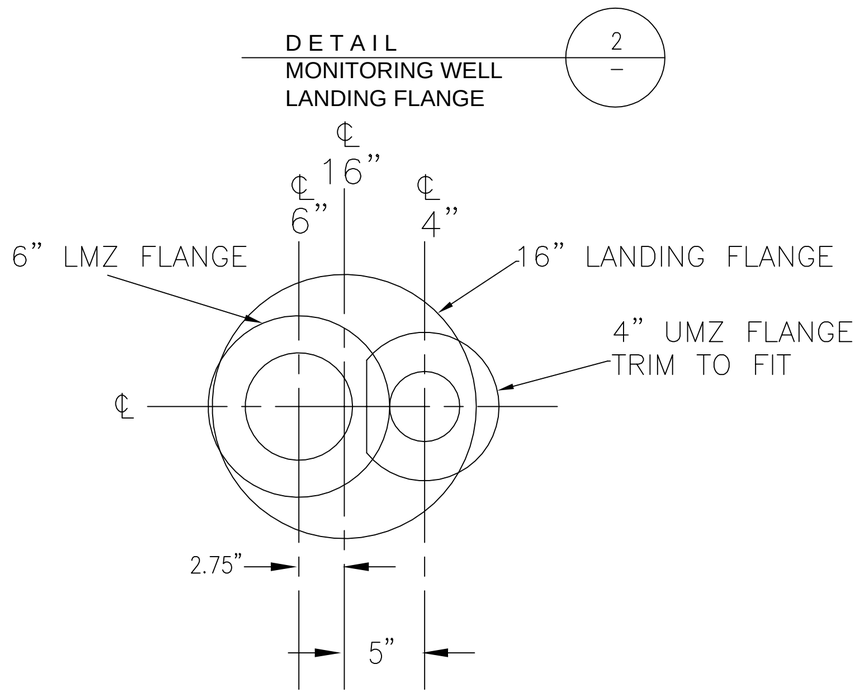
IMW PLAN & STORMWATER PUMP STATION DETAIL

WMI MEDLEY
DISPOSAL
INJECTION WELL

WASTE MANAGEMENT

DRAWING NUMBER
P-5
SHEET OF



DETAIL
MONITORING WELL
LANDING FLANGE
2
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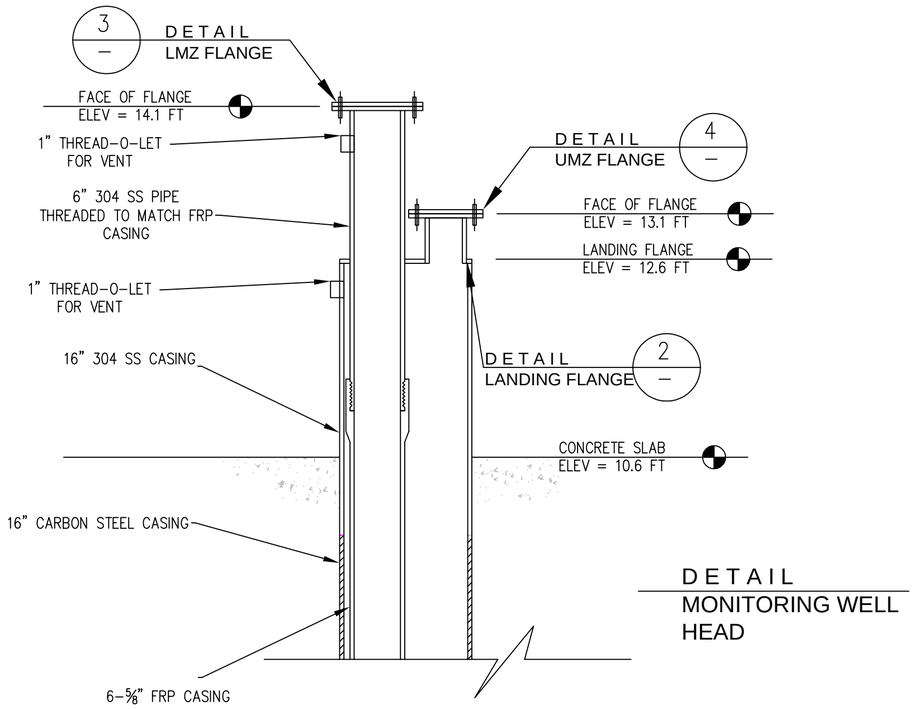
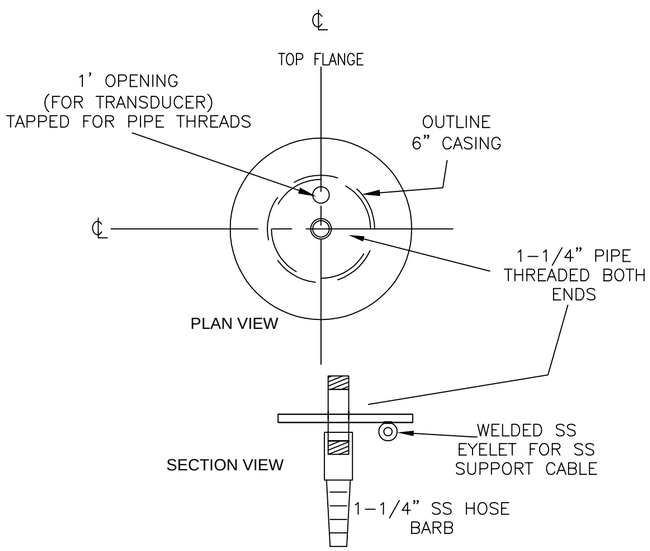
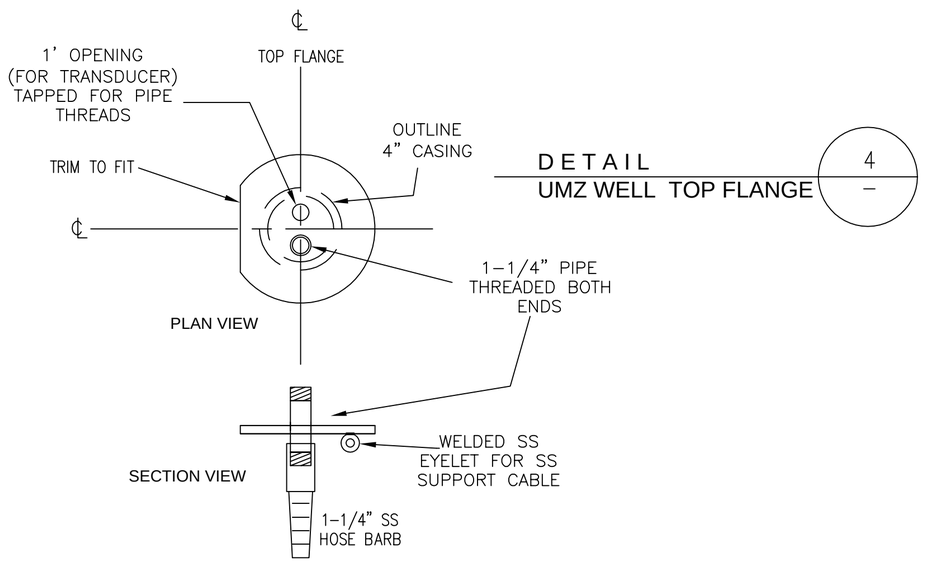


DETAIL
MONITORING WELL
HEAD



DETAIL
LMZ WELL TOP FLANGE
3
–



DETAIL
UMZ WELL TOP FLANGE
4
–

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11/14/2012

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L.S. SIMS ASSOCIATES
CERTIFICATE OF AUTHORIZATION # 28089
1530 U.S.HIGHWAY 1
ROCKLEDGE, FLORIDA 32955

L.S.SIMS & ASSOCIATES
ENVIRONMENTAL CONSULTING

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Date

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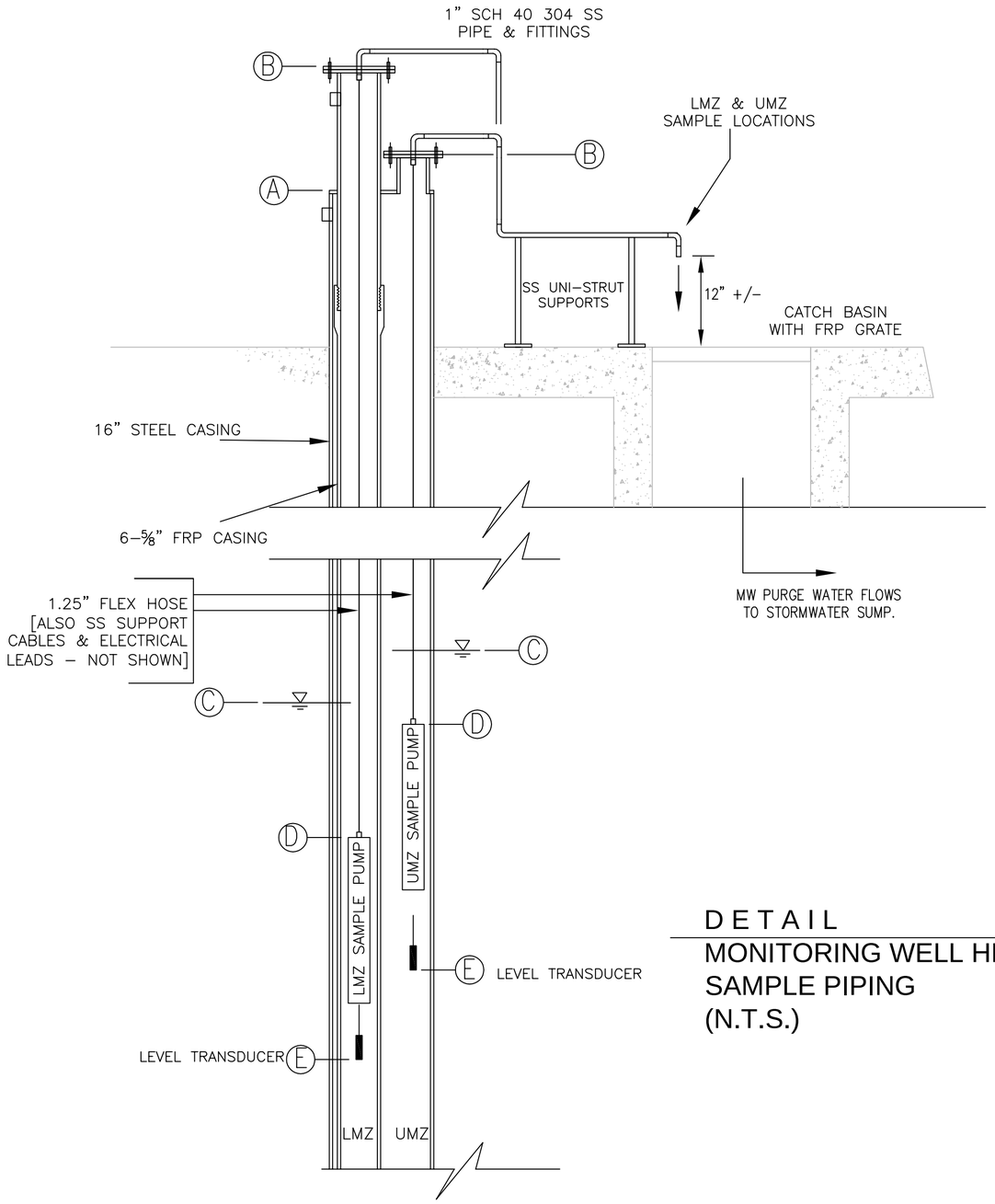
DESIGN | DRWN | CHKD | JOB NUMBER | ISSUE DATE | ISSUE

MONITOR WELLHEAD DETAILS

WMI MEDLEY
DISPOSAL
INJECTION WELL

WASTE MANAGEMENT

DRAWING NUMBER
P-6
SHEET OF



Ⓐ LANDING FLANGE
ELEV NGVD FT 12.6'
ELEV NAVD FT TBD

LOWER MONITORING ZONE (LMZ)	UPPER MONITORING ZONE (UMZ)
Ⓑ WELL FLANGE ELEV NGVD FT 14.1' ELEV NAVD FT TBD	Ⓑ WELL FLANGE ELEV NGVD FT 13.1' ELEV NAVD FT TBD
Ⓒ WATER TABLE FOLLOWING RECOVERY PERIOD DEPTH BELOW FLANGE FT TBD ELEV NGVD FT TBD ELEV NAVD FT TBD	Ⓒ WATER TABLE FOLLOWING RECOVERY PERIOD DEPTH BELOW FLANGE FT TBD ELEV NGVD FT TBD ELEV NAVD FT TBD
Ⓓ TOP OF SUBMERSIBLE PUMP DEPTH BELOW FLANGE FT TBD ELEV NGVD FT TBD ELEV NAVD FT TBD	Ⓓ TOP OF SUBMERSIBLE PUMP DEPTH BELOW FLANGE FT TBD ELEV NGVD FT TBD ELEV NAVD FT TBD
Ⓔ BOTTOM OF LEVEL TRANSDUCER DEPTH BELOW FLANGE FT TBD ELEV NGVD FT TBD ELEV NAVD FT TBD	Ⓔ BOTTOM OF LEVEL TRANSDUCER DEPTH BELOW FLANGE FT TBD ELEV NGVD FT TBD ELEV NAVD FT TBD
READABLE RANGE MINIMUM ELEV ELEV NGVD FT TBD ELEV NAVD FT TBD MAXIMUM ELEVATION ELEV NGVD FT TBD ELEV NAVD FT TBD	READABLE RANGE MINIMUM ELEV ELEV NGVD FT TBD ELEV NAVD FT TBD MAXIMUM ELEVATION ELEV NGVD FT TBD ELEV NAVD FT TBD

TBD = TO BE DETERMINED AT TIME OF INSTALLATION BASED ON WATER LEVELS IN LMZ & UMZ

DETAIL
MONITORING WELL HEAD
SAMPLE PIPING
(N.T.S.)

PERMIT SUBMITTAL
11/14/2012

ROGER E. MAYFIELD, P.E. FL #46092
L.S. SIMS ASSOCIATES
CERTIFICATE OF AUTHORIZATION # 28089
1530 U.S.HIGHWAY 1
ROCKLEDGE, FLORIDA 32955

L.S.SIMS & ASSOCIATES
ENVIRONMENTAL CONSULTING

Signature Date

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DESIGN | DRWN | CHKD | JOB NUMBER | ISSUE DATE | ISSUE

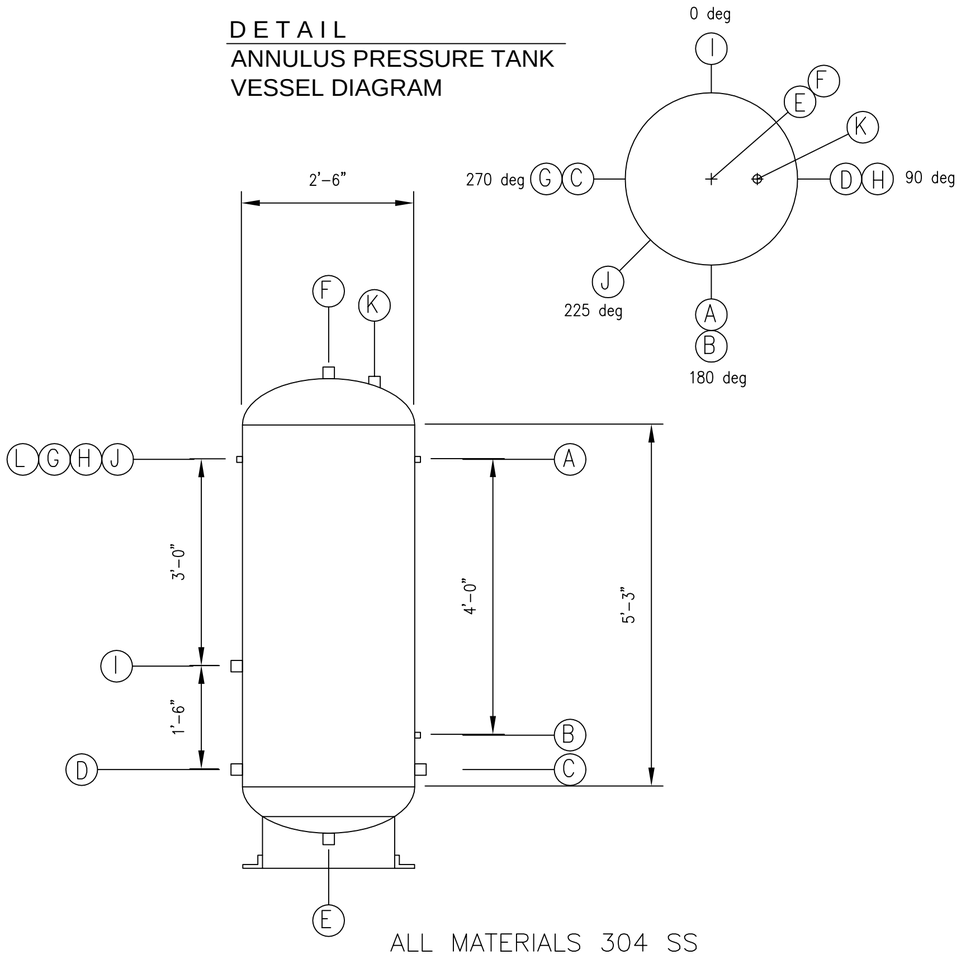
MONITOR WELL EQUIPMENT & PIPING DETAILS

WMI MEDLEY
DISPOSAL
INJECTION WELL

WASTE MANAGEMENT

DRAWING NUMBER
P-7
SHEET OF

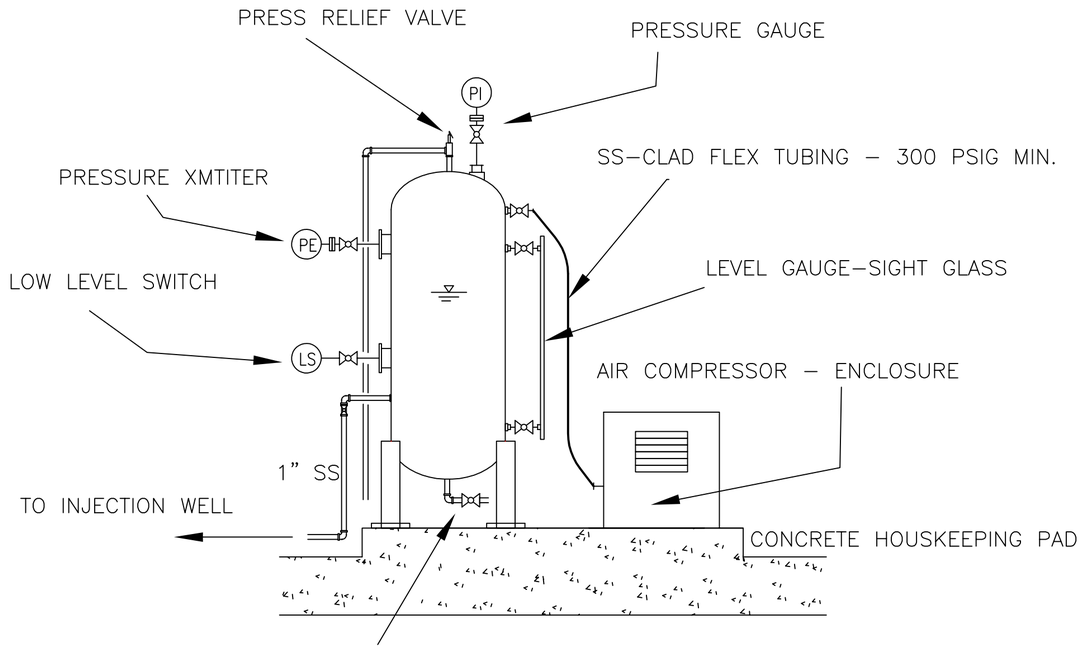
DETAIL
ANNULUS PRESSURE TANK
VESSEL DIAGRAM



ALL MATERIALS 304 SS

A	1/2"	NPT	LE 110
B	1/2"	NPT	LE 110
C	1"	NPT	LINE TO ANNULUS
D	1" w/ PLUG	NPT	EXTRA
E	1" w/ PLUG	NPT	DRAIN
F	1-1/2" w/ PLUG	NPT	FILL
G	1/2"	NPT	PE 110
H	1/2"	NPT	PRESSURE AIR
I	2"	NPT	LS 110
J	1/2"	NPT	PI 110
K	2"	NPT	PRV
L	1/2" w/ PLUG	NPT	EXTRA

A.S.M.E. SECTION VIII
MAWP 150 PSIG @ 200 DEG F
M.D.M.T. –20 DEG F @ 150 PSIG
235 GALLONS
HYDRO @ 199 PSIG MIN.



ALL PIPING & FITTINGS SCH–40 304 SS, N.P.T.

304 SS BALL VALVES

DETAIL
ANNULUS PRESSURE TANK
& AIR COMPRESSOR

PERMIT SUBMITTAL
11/14/2012

ROGER E. MAYFIELD, P.E. FL #46092
L.S. SIMS ASSOCIATES
CERTIFICATE OF AUTHORIZATION # 28089
1530 U.S.HIGHWAY 1
ROCKLEDGE, FLORIDA 32955

L.S.SIMS & ASSOCIATES
ENVIRONMENTAL CONSULTING

Signature
Date

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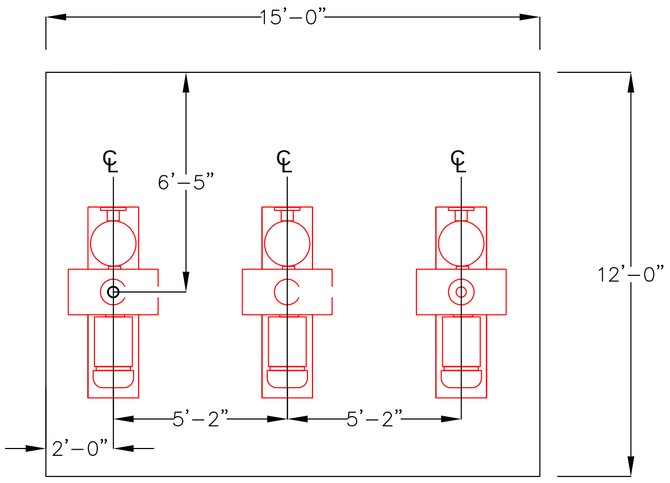
DESIGN	DRWN	CHKD
JOB NUMBER		
ISSUE DATE		
ISSUE		

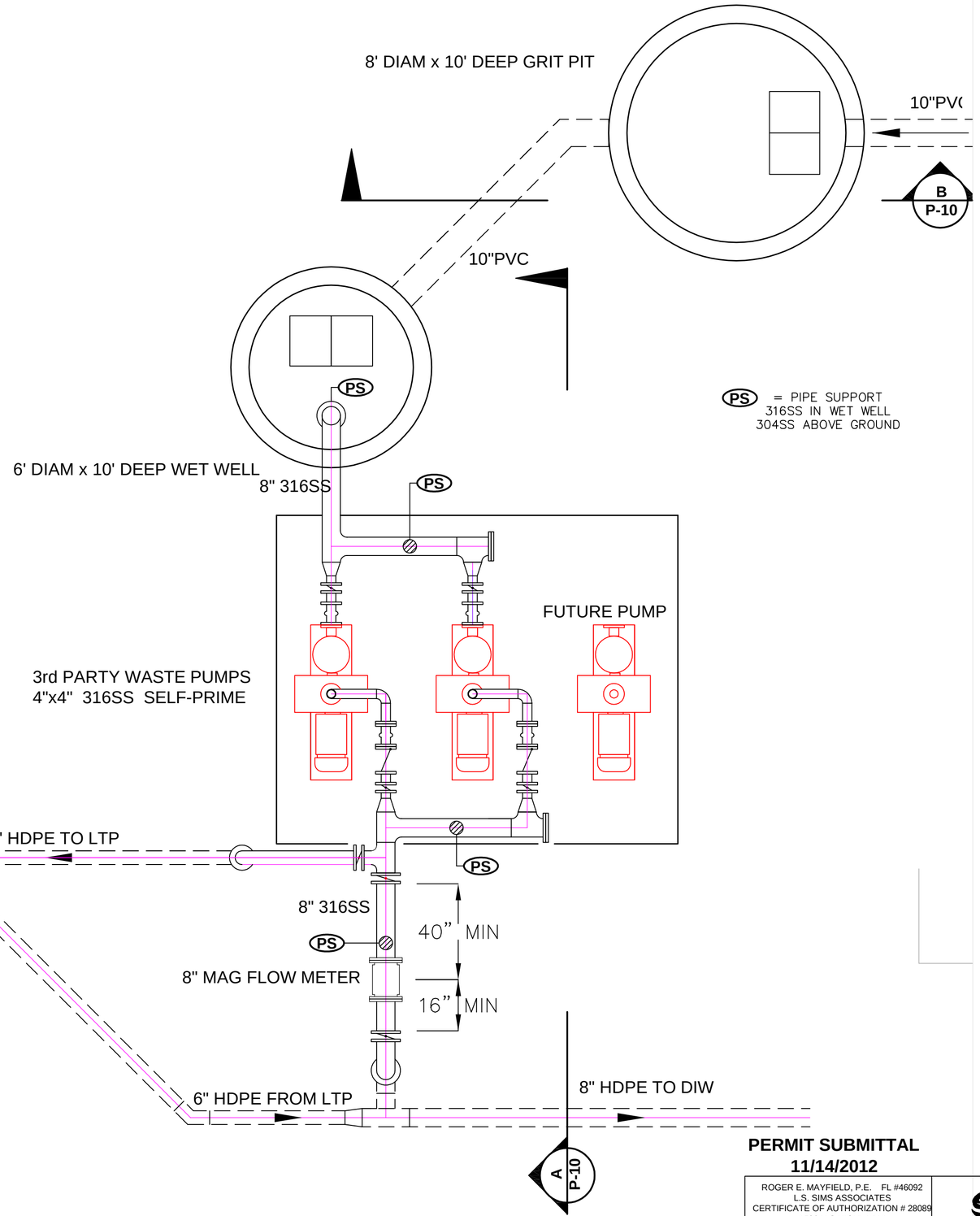
INJECTION WELL PIPING PLAN & DETAILS

WMI MEDLEY
DISPOSAL
INJECTION WELL

DRAWING NUMBER
P-8
SHEET OF



PUMP PAD LAYOUT DETAIL



PS = PIPE SUPPORT
316SS IN WET WELL
304SS ABOVE GROUND

SEE SHEET C-11 FOR CONTINUATION OF PIPING

0 FT 10 FT
SCALE

NORTH

PERMIT SUBMITTAL
11/14/2012

ROGER E. MAYFIELD, P.E. FL #46092
L.S. SIMS ASSOCIATES
CERTIFICATE OF AUTHORIZATION # 28089
1530 U.S.HIGHWAY 1
ROCKLEDGE, FLORIDA 32955

L.S.SIMS & ASSOCIATES
ENVIRONMENTAL CONSULTING

Signature Date

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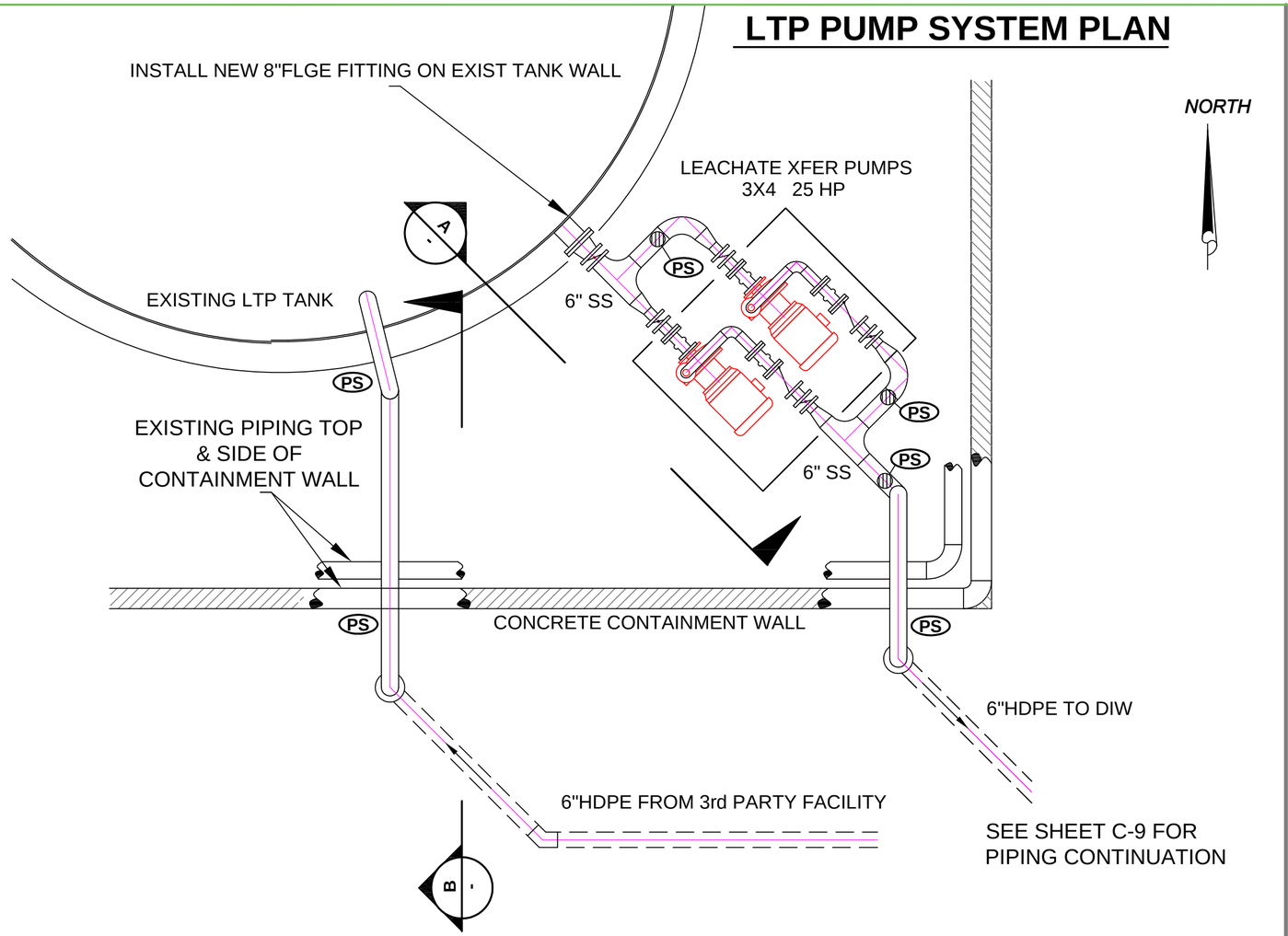
JOB NUMBER
ISSUE DATE
ISSUE

3RD PARTY RECEIVING FACILITY PIPING PLAN

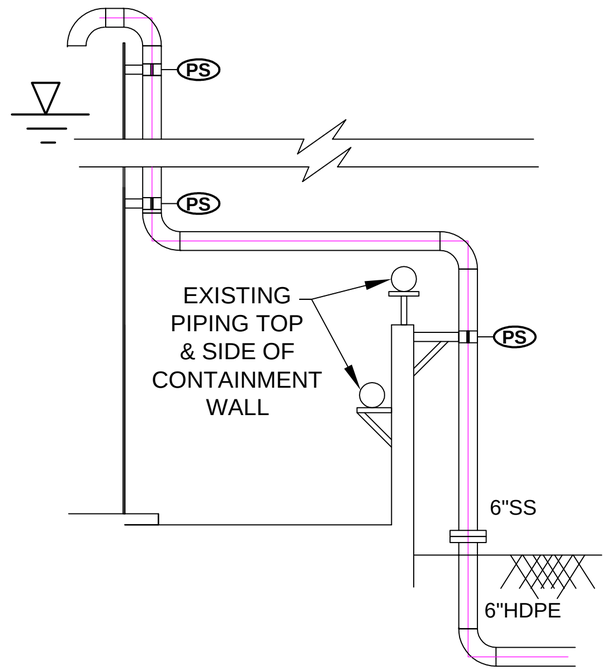
WMI MEDLEY
DISPOSAL
INJECTION WELL

DRAWING NUMBER
P-9
SHEET OF

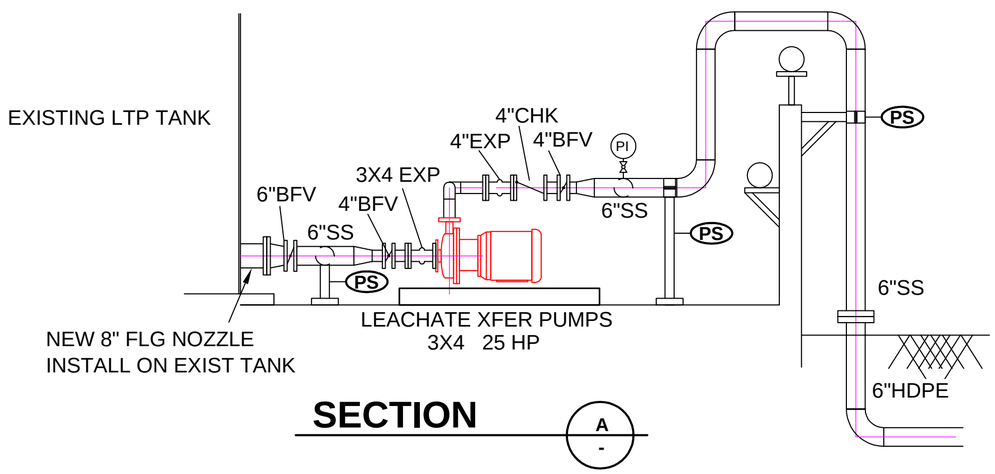
LTP PUMP SYSTEM PLAN



PS = PIPE SUPPORT
316SS IN WET WELL
304SS ABOVE GROUND



SECTION B



SECTION A

PERMIT SUBMITTAL
11/14/2012

ROGER E. MAYFIELD, P.E. FL #46092
L.S. SIMS ASSOCIATES
CERTIFICATE OF AUTHORIZATION # 28089
1530 U.S.HIGHWAY 1
ROCKLEDGE, FLORIDA 32955

L.S.SIMS & ASSOCIATES
ENVIRONMENTAL CONSULTING

Signature
Date

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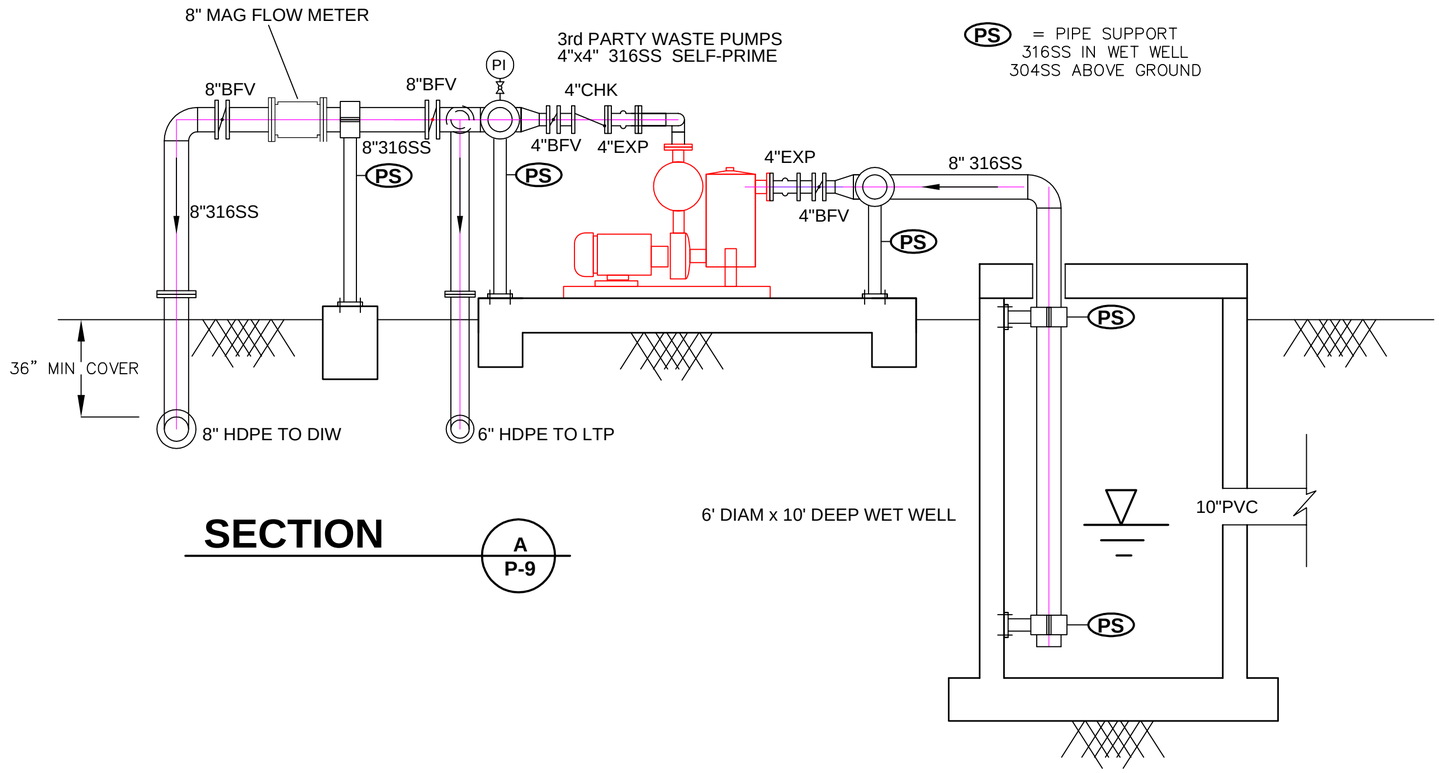
ISSUE

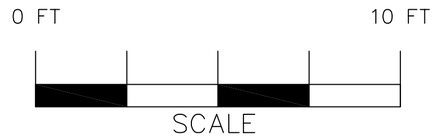
LEACHATE PLANT PUMP STATION
PIPING PLAN & DETAILS

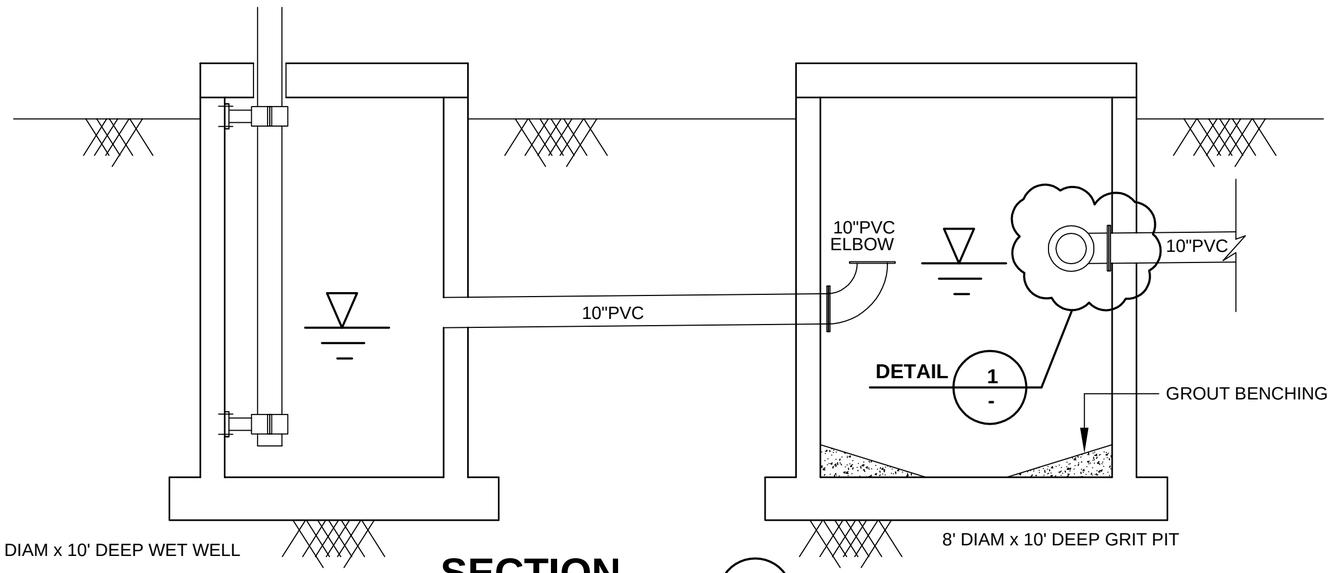
WMI MEDLEY
DISPOSAL
INJECTION WELL

DRAWING NUMBER
P-11
SHEET OF

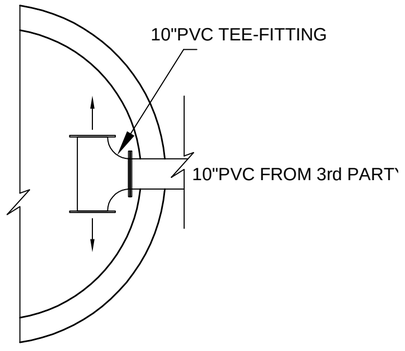


SECTION A P-9





SECTION B P-9



TOP VIEW OF GRIT PIT

DETAIL 1 -

PERMIT SUBMITTAL
11/14/2012

ROGER E. MAYFIELD, P.E. FL #46092
L.S. SIMS ASSOCIATES
CERTIFICATE OF AUTHORIZATION # 28089
1530 U.S.HIGHWAY 1
ROCKLEDGE, FLORIDA 32955

L.S.SIMS & ASSOCIATES
ENVIRONMENTAL CONSULTING

Signature Date

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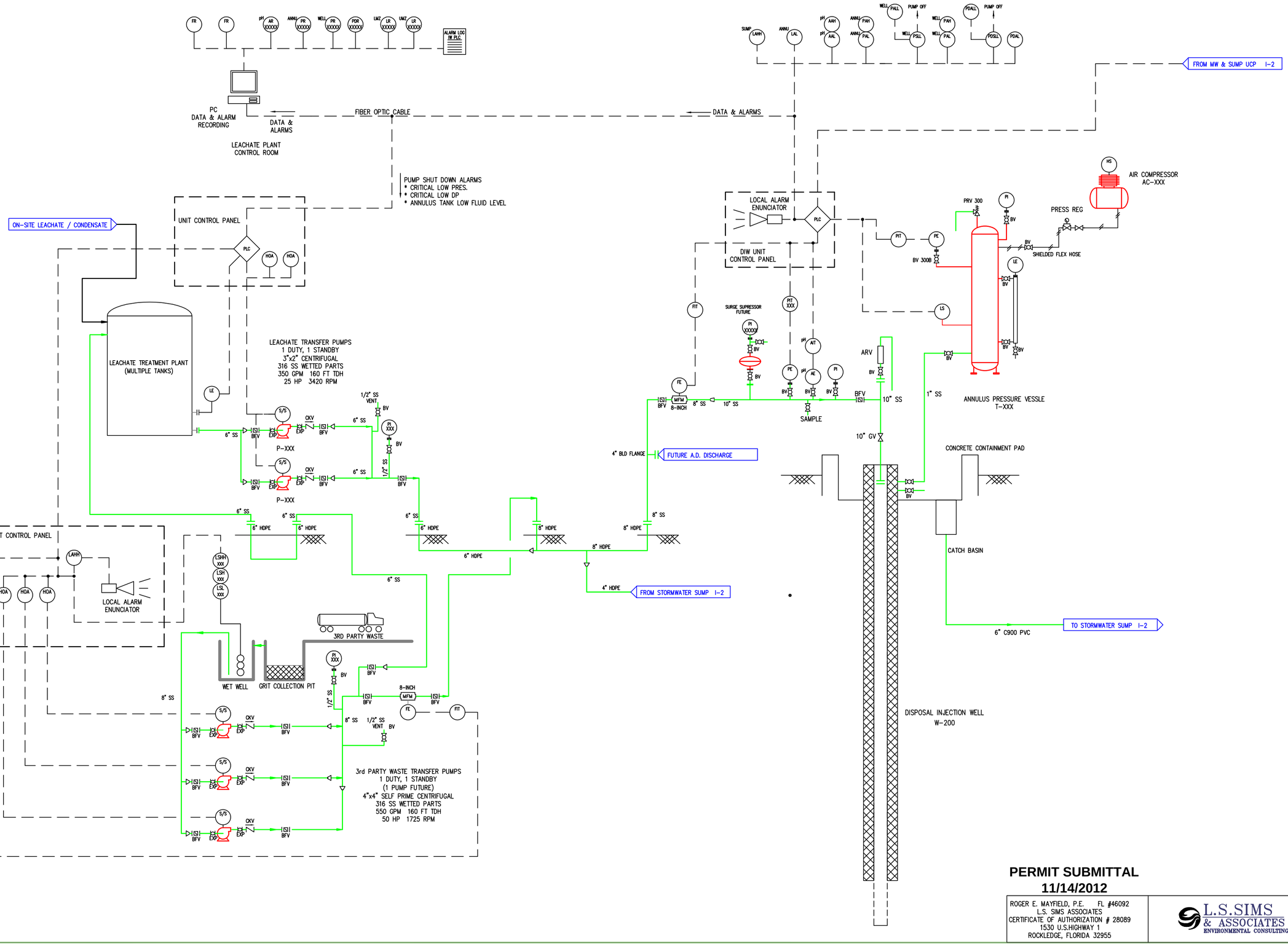
ISSUE DATE
ISSUE

3RD PARTY RECEIVING FACILITY PIPING DETAILS

WMI MEDLEY
DISPOSAL
INJECTION WELL

WASTE MANAGEMENT

DRAWING NUMBER
P-10
SHEET OF



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11/14/2012

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L.S. SIMS ASSOCIATES
CERTIFICATE OF AUTHORIZATION # 28089
1530 U.S.HIGHWAY 1
ROCKLEDGE, FLORIDA 32955

L.S.SIMS & ASSOCIATES
ENVIRONMENTAL CONSULTING

Signature
Date

REV NO	DATE	DRWN BY	CHKD BY	DESCRIPTION

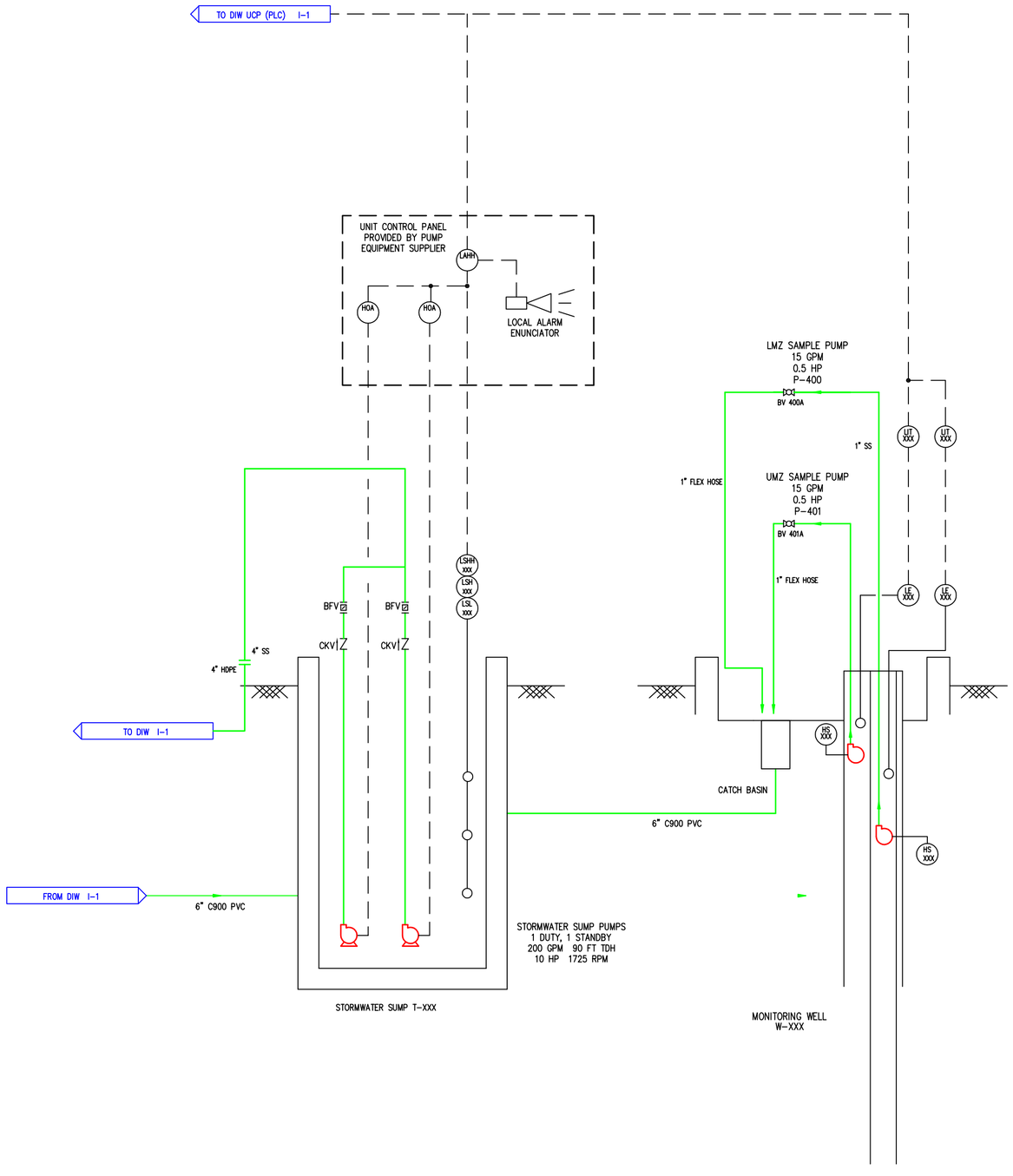
DESIGN
DRWN
CHKD
JOB NUMBER
ISSUE DATE
ISSUE

WMI MEDLEY DISPOSAL INJECTION WELL

WASTE MANAGEMENT

P&ID SHT 1 OF 2

I - 1
SHEET



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11/14/2012

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L.S. SIMS ASSOCIATES
CERTIFICATE OF AUTHORIZATION # 28089
1530 U.S.HIGHWAY 1
ROCKLEDGE, FLORIDA 32955

L.S.SIMS & ASSOCIATES
ENVIRONMENTAL CONSULTING

Signature | Date

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P&ID SHT 2 0F 2

WMI MEDLEY
DISPOSAL
INJECTION WELL

WASTE MANAGEMENT

I - 2
SHEET

APPENDIX E

TECHNICAL SPECIFICATIONS

CLASS I INJECTION WELL SYSTEM
CONSTRUCTION & TESTING PERMIT APPLICATION
WASTE MANAGEMENT INC. OF FLORIDA D.B.A. MEDLEY LANDFILL
MEDLEY, FLORIDA

November 2012

Prepared by:

L.S. Sims & Associates, Inc.
1530 U.S. Highway 1
Rockledge, Florida 32955
(321) 504-4046

TECHNICAL SPECIFICATIONS

CLASS I INJECTION WELL SYSTEM
CONSTRUCTION & TESTING PERMIT APPLICATION
WASTE MANAGEMENT INC. OF FLORIDA D.B.A. MEDLEY LANDFILL
MEDLEY, FLORIDA

November 2012

TABLE OF CONTENTS

TECHNICAL SPECIFICATIONS

CLASS I INJECTION WELL SYSTEM
CONSTRUCTION & TESTING PERMIT APPLICATION
WASTE MANAGEMENT INC. OF FLORIDA D.B.A. MEDLEY LANDFILL
MEDLEY, FLORIDA

November 2012

SECTION 0100 - TECHNICAL SPECIFICATIONS
CLASS I TEST / INJECTION WELL
CONSTRUCTION & TESTING

1.0 SCOPE OF SERVICES

The work described herein is for the construction and testing of an Exploratory/Class I Injection Well and a Dual Zone Monitor Well for the Waste Management of Florida, Inc. d.b.a. Medley Landfill. (Medley Landfill) Landfill site located at 9350 NW 89th Avenue, Medley, Florida 33178. The well construction shall be performed by a State of Florida licensed water well contractor and the contractor must meet all standards set forth by the Florida Department of Environmental Protection (FDEP), South Florida Water Management District (SFWMD), American Water Works Association (AWWA), and applicable Miami Dade County Regulations. Before any construction activities commence, the contractor shall provide L.S. Sims & Associates, Inc. (LSSA), Medley Landfill, and the Technical Advisory Committee (TAC) governing this project with proof of all secured permits and operating licenses as required by local and State agencies.

It shall be the Contractor's responsibility to supply an adequate number of drillers and competent helpers to accomplish the work described herein. The contractor shall furnish well drilling equipment suitable to the construction of the wells.

Drilling equipment capable of performing the described construction activities will be supplied and set-up by the contractor. The equipment will be in first class working condition and capable of handling the largest load placed upon it during construction activities. The drilling rig will be equipped with a geolograph or other equivalent method of recording drilling time and weight of the tool string during drilling of the pilot and reamed holes. Air compressors used during reverse air drilling will be capable of producing a minimum of 240 pounds per square inch (PSI). A back-up air compressor capable of producing a minimum of 240 PSI shall be available at the site for the duration of drilling.

1.1 Site Preparation: The Contractor shall clear and grub trees, stumps, timber, brush, and any other objects as directed by LSSA in the site area. These materials shall be moved to an approved disposal area.

1.2 Water Supply and Sanitation: It is the Contractor's responsibility to provide and maintain an adequate supply of water for domestic consumption and construction activities. The Contractor is also responsible for providing temporary sanitation facilities for employees while on the job site.

1.3 Electricity and Telephone: Electric current and telephone service required by the Contractor will be acquired at his own expense. Any power lines to be installed by the Contractor shall be approved by LSSA and Medley Landfill.

1.4 Formation Samples: Three sets of formation samples shall be collected during drilling of the pilot holes. It is the Contractor's responsibility to obtain the samples at 10 foot intervals or at breaks in the formations as directed by LSSA. The samples are to be stored in properly labeled containers (sample bags) illustrating the sample depth. It is the Contractor's responsibility to deliver a set of formation samples to the Florida Geological Survey (FGS) in Tallahassee and the SFWMD if required.

1.5 Cores: The Contractor shall collect ten (10) core barrel samples in the intervals of the injection well pilot hole from 1,500 to 3,100 feet below land surface (BLS) as directed by LSSA. The core barrel samples shall have a minimum length of 10 feet and diameter of 4-inches. The core barrel shall be advanced by being rotated its full length into the undisturbed formation. Once the core has been withdrawn, recovered and stored in approved core boxes (provided by the Contractor), it shall be given to LSSA for analysis. A section of the core shall then be selected by LSSA and shipped to a laboratory approved by LSSA (such as CORE LAB, in Houston, Texas) for analysis at the Contractor's expense. The analysis that shall be done on all core samples from the well will include: vertical and horizontal hydraulic conductivity (ASTM D2434), porosity, specific gravity (ASTM D854), elastic modulus (ASTM D2938) and compressive strength (ASTM D2938). It is the Contractor's responsibility to deliver a set of formation samples to the FGS in Tallahassee and the SFWMD if required.

1.6 Deviation Surveys: During the drilling of the pilot holes and reaming of the open holes to the total depth of the well, an inclination survey will be made every 90 feet. The mechanical indicator shall be an Eastman mechanical drift indicator (Eastman Oil Well Survey company) or equivalent approved by LSSA. A 3-degree unit shall be used with the indicator capable of being read to the nearest 0.1 degree. The tool shall be centralized in the pipe during the survey. Records of the deflection readings will be made a part of the permanent record. The original disks will be kept by LSSA. The depth at which the survey is taken shall be accurately determined using a calibrated wire-line with numerical depth counter. The drift from vertical shall not be greater than 0.5 degrees between any two consecutive surveys and not more than 1 degree over the entire depth of the well. Any deviation of greater than 1 degree shall be corrected by the Contractor to the satisfaction of LSSA and at no expense to Medley Landfill prior to further deepening of the well.

1.7 Geophysical Logs: The Contractor shall furnish the services of a qualified company to provide geophysical logs. It shall be the Contractor's responsibility to notify the geophysical logging crew of the need to conduct geophysical logging. Fifteen copies of each geophysical log shall be delivered to LSSA within 10 days of log completion. Two field copies will be delivered as they are completed at the site. A digital copy of each log shall be provided to LSSA with field copies as they are completed at the site. The suite of logs to be performed includes; natural gamma, dual induction, fluid resistivity, borehole compensated sonic with variable density display, radioactive tracer surveys, caliper, temperature (differential and absolute), cement bond log and spinner flow meter.

1.8 Fluid Handling: The excess cuttings and mud and/or water may be temporarily stored in a settling tank for all drilling involved with the wells. The excess from the settling tank shall be trucked away for off-site disposal at an approved site. The Contractor will be required to obtain all necessary permits for the use of a disposal site and submit written evidence to LSSA showing compliance with such. Discharge of mud, water, and cuttings will not be allowed on the land or adjacent bodies of water at any time during construction. If spillage of fluids is recorded or detected in the shallow monitor well, the Contractor will be required to restore the natural resident water quality to the aquifer at his own expense and in a method approved by LSSA.

1.9 Straddle Packer Tests: Straddle packers will be used to perform short duration aquifer performance tests (APT) and collect water samples. A total of fourteen (14) packer tests will be conducted during the project. It is anticipated that six (6) tests will be conducted in the Class I Injection well pilot-hole in the interval between approximately 1500 feet BLS and 2,000 feet BLS. Another five (5) tests will be conducted in the Class I Injection Well pilot-hole interval between approximately 2,000 feet BLS and 3,100 feet BLS. A minimum of three (3) settings will be made in the Monitor Well pilot hole. The tests shall be performed using two inflatable packers with a section of perforated pipe between them installed in the borehole on drill pipe. The pressure data shall be collected using a down-hole differential pressure transducer and data logger. The transducer system and data logger specifications must be delivered to LSSA for approval prior to initiating the test. Depending upon the configuration of the borehole at the time of testing, LSSA may choose to perform a single-packer test instead of a dual-packer test. If a single packer drill stem test is utilized, drilling activity will be temporarily suspended to conduct the test at the bottom of the pilot-hole borehole. The contractor may at his discretion collect geophysical logs, such as caliper log with gamma ray log, immediately prior to installing and setting the single packer drill stem test equipment.

The pumping duration and flow rates will be determined in the field by LSSA. The Contractor will be responsible for providing all necessary pumps, prime movers, pipelines, meters, and gauges necessary for testing and will provide access for water-level measurements using an M-scope, tape, and/or transducer. The upper 200 feet of the casing or the pipe being used to set the straddle packers or single packer shall have an inside diameter to facilitate the installation of a 4-inch submersible pump. The submersible pump shall have the capability of pumping at rates between 50 and 100 gallons per minute (GPM) at 200 feet BLS.

The Contractor shall supply a flow meter and gate valve in the pump discharge line. The flow meter must be capable of measuring instantaneous flow rates and recording total gallons pumped. Prior to conducting the test the packed off interval will be developed until drill mud and suspended matter are removed as determined by LSSA. The pump will be shut down and static pressure readings will be collected for a minimum of 1 hour. The test will then begin and continue until drawdown has stabilized and representative formation water is being produced. The pumping portion of the test will not continue beyond 8 hours. After the pump is shut down, recovery data will be collected until the zone returns to static conditions.

1.10 Mechanical Integrity Tests:

1.10.1 *Pressure Tests*: The Contractor shall conduct a hydrostatic pressure test of the 30-inch intermediate casing, the 20-inch injection casing, and 10¾-inch injection tubing annulus in the Class I Test / Injection Well. A pressure test will also be conducted on the16-inch upper monitor zone casing and 6 $^{5}/_{8}$-inch lower monitor zone tubing in the Dual Zone Monitor Well. The injection well casings/annulus shall be filled with water and placed under a maximum of 100 PSI for a period of one (1) hour. The Dual zone Monitor Well casing and tubing will be placed under a maximum pressure of 50 PSI. If after temperature corrections, the pressure drops or the casing/tubing collapses or breaks, the integrity of the casing/tubing will be considered unsatisfactory and it will be repaired by the Contractor at no expense to Medley Landfill, in a manner approved by LSSA.

The criterion for acceptance of the pressure test is no greater than ± 5 percent change of wellhead pressure for the period of the test. If the pressure changes or if there is some other indication of leakage in the equipment, the Contractor shall take steps to locate the leak and make repairs in a manner satisfactory to LSSA.

Pressure test apparatus will consist of a wellhead assembly equipped with a pressure gauge that can seal the wellhead without leaks to a pressure of 100 PSI, a water line with a valve that can be used to shut in the well when the pressure reaches the test pressure, and a potable water source and pump that can be used to increase the pressure in the well to the desired level. The pressure gauges used in pressure tests shall have a minimum diameter of 6-inches, and have a 0 to 150 PSI range with major gradations of 10 PSI and minor gradations of 1 PSI. Gauge accuracy shall be ¼ of 1 percent of full scale. Calibration records for the gauges shall be provided to LSSA prior to testing.

The pressure measured at the wellhead shall be recorded every 5 minutes for the entire period of the test. The Contractor shall notify LSSA at least 72 hours before the start of the test.

The Contractor shall conduct a preliminary test to determine if the test apparatus leaks. The contractor shall notify LSSA at least 12 hours before starting the preliminary test. If the well fails the pressure test described above, the Contractor must re-run the test until the well meets the acceptance criteria. In the event that the casing pressure in the well cannot be maintained at the test pressure, the Contractor will set a mechanical (inflatable) packer at another depth and repeat the test as required to meet the test acceptance criteria.

1.10.2 *Video Surveys*: The purpose of the surveys is to evaluate the condition of the casing and of the formation open hole. The survey will be run using equipment that is capable of providing a clear image with sufficient resolution to identify the targets of the survey. The Contractor shall install a standpipe, tee and valve on the wellhead to permit access to the well by the video camera. The Contractor shall pump water from a source approved by LSSA into the monitor well through the tee until a volume of at least three (3x) times the borehole volume has been pumped into the well. The Contractor will continue to pump during the survey until a clear record of the well has been made. A video record of the entire well shall be made from land surface to the total depth of the well. Each weld shall be inspected using a sideward-looking camera with full 360° rotational capability. The Contractor shall provide fifteen copies of the completed surveys to LSSA within 30 days of completion of the survey.

1.10.3 *Radioactive Tracer Surveys*: RTS and temperature logging will be conducted after the 10¾-inch injection tubing has been installed and background water quality sampling has been completed. The tests will be conducted by a qualified geophysical logging company licensed to handle radioactive materials in the State of Florida. The temperature logging will be run from the bottom of the well (approximately 3,100 feet BLS) to land surface.

Background gamma logs and caliper log will be run from the bottom of the well to land surface as part of the tracer surveys. The background gamma logging will be conducted within 24 hours prior to initiating the RTS.

The RTS tool will be capable of ejecting the radioactive tracer and simultaneously monitoring the gamma-ray detectors. Film documentation of the radioactive tracer ejection time will be provided and the tracer ejection time will be calibrated to ± 1 millisecond. No time lag between ejection and monitoring will be permitted. The RTS tool shall be configured with three (3) gamma detectors. One gamma-ray detector shall be located at least 6 feet above the ejector chambers and one detector shall be located at least 6 feet below the ejectors. A middle detector will be located near the ejector ports to monitor tracer ejections.

The tracer material to be used shall be radioactive Iodine 131. Documentation about the activity and volume of Iodine 131 loaded into the RTS tool must be provided to LSSA so that the strength of tracer ejections can be verified. The tracer survey will be conducted by a person licensed in handling radioactive materials and experienced in these testing procedures. The tracer material will have an assay date within one half-life (8.1 days) at the time the RTS is conducted.

The vertical log scale will be 5-inches per 100 feet when in logging mode and 1.5-inches per minute when in time-drive mode. The horizontal log scale will be recorded in API units. Two (2) gamma curves will be recorded at different sensitivities on each log pass. All logs will include data on the tool configuration, sensitivity (API units per log division), logging speed, time constant, injection rate, volume and concentration of tracer material ejected, time and depth of tracer ejection, beginning and ending clock times for each log pass, and vertical time scale (when in time-drive mode).

Flows to the well will be measured using a calibrated, in-line, flow meter. Flows will be regulated using a gate valve and check valve or other approved valve assembly installed by the Contractor in the water-supply line. Testing will be conducted using water from a water supply well constructed in the Surficial Aquifer System (SAS) by the Contractor at the Medley Landfill facility in Medley, Florida. A standpipe with a stripper-head assembly will be installed on the wellhead to ensure that the logging tools are free to move within the well without permitting the well to flow. The standpipe will be configured with a tap for connection to the water-supply line.

RTS Logging Procedures

1. Mobilize logging unit, rig-up, install stripper-head and standpipe assembly, assemble, and calibrate logging tools.
2. With flow to well off (static), run a temperature log and background or base gamma log and caliper log. The background temperature log will be run going "in the hole". The base gamma log will be recorded logging "out of the hole".
3. Position RTS tool so that the ejector port is positioned approximately 5 feet above the bottom of the injection casing. Detector GRM should be positioned inside the casing and GRB should be positioned in the open hole below the casing. Establish a flow rate of approximately 16 GPM (injection fluid velocity of approximately 5 feet per minute).
4. Commence time-drive gamma monitoring and eject a 0.5 to 1 millicurie (MCI) slug of Iodine 131. Record time of ejection.
5. Continue time-drive gamma monitoring for one (1) hour while recording flow rate and time since ejection.
6. If upward migration of tracer is not observed, make an upward gamma log pass to a depth at least 200 feet above the top of any tracer slug that is detected or to a depth of approximately 2,000 feet BLS, whichever is higher.
7. In the event tracer movement is observed on the upper gamma detector; make gamma log passes through the tracer material as many times as required to determine the extent of possible channeling. Make overlapping passes to follow slug movement up-hole. Each log pass shall extend from the approximately 100 feet below the bottom of the previously recorded slug to approximately 200 feet above the top of the new slug location. The last log pass shall be run high enough to ensure that the slug is no longer detectable.
8. Repeat low flow test steps 3 through 7 (with minimum 30 minutes of time-drive monitoring for step 5).
9. Completely displace injection tubing with a minimum of one casing volume of potable water and conduct another gamma log pass from the bottom of the tubing to at least 200 feet above the tracer slug or 2,000 feet BLS, whichever is higher.
10. Lower RTS logging tool into the open hole interval below the bottom of the injection tubing, establish high flow rate (maximum GPM from SAS well) and eject remaining tracer material.
11. Repeat steps 5 through 7 (30 minutes of time-drive monitoring for step 5) as necessary.

12. Conduct final gamma log pass from total well depth to land surface.
13. Rig down, reassemble wellhead and cleanup site.

1.11 Injection Test: A 24-hour hour injection test will be conducted at a flow rate of approximately 1,534 gpm or 2.2 million gallons per day (MGD). Prior to the test, 24 hours of background monitoring will be completed. After the test, 12 hours of post test monitoring will be completed. Potable water from the SAS water supply well constructed at the site will be used for water supply during the short term injection test. Barometric pressure and tidal fluctuations will be recorded during all phases of the testing. The Contractor will provide the injection test pump, suction line and discharge line (with totalizing flow meter) to the injection well. Differential pressure transducers placed in the monitor zones and injection tubing will be used to measure pressure and temperature. The data will be recorded on a multi-channel data logger provided by the Contractor. The transducer system and data logger specifications must be delivered to LSSA for approval prior to initiating the test. The monitor well and injection well will also be equipped with direct reading pressure gauges at the wellheads. Temperature and pressure readings will be recorded in the monitor zones, injection tubing annulus and, injection zone before during and after the injection test. Injectate temperature, total flow volume and flow rate will be recorded during the injection test phase.

1.12 Water Quality Testing: The Contractor shall collect water samples for analysis by a State of Florida certified laboratory. Samples will be collected as directed by LSSA at the end of each straddle packer test (for total dissolved solids, chlorides, specific conductance, ammonia, TKN as N and sulfate); from the injection zone of the completed Class I Injection Well (for the Florida Primary and Secondary Drinking Water Standards, potassium, ammonia and TKN as N); from each monitor zone of the completed Dual Zone Monitor Well (for the Florida Primary and Secondary Drinking Water Standards, potassium, ammonia and TKN as N); and from the SAS Water Supply Well constructed near the to injection well site (for the Florida Primary and Secondary Drinking Water Standards, potassium, ammonia and TKN as N). A 2.5 gallon water sample will be collected at the end of each packer test and from the background injection zone and monitor zone samples. The 2.5 gallon samples will be shipped to the FGS, Hydrogeology Program, 903 west Tennessee Street, Tallahassee, Florida, 32304.

The Contractor shall be responsible for the cost of collection and analysis of each set of samples. Samples for which laboratory analysis is required shall be collected in specially designated and approved sample containers to be provided by the Contractor by a State of Florida certified laboratory approved by LSSA for the specific type of parameters for which the water samples will be analyzed. The sample containers shall be clearly labeled with the well identification, and the depth interval BLS from which the sample was collected and the time and date of sample collection. The Contractor shall collect the samples, store them in the appropriate manner as specified by the laboratory, and deliver them in accordance with the laboratory's instructions. Chain of Custody forms shall be completed for all water samples. Copies of the Chain of Custody forms shall be submitted with the sample test results. All personnel handling the samples will be required to sign the Chain of Custody.

1.13 Daily Log: The Contractor shall maintain a detailed log of daily events and activities associated with the well construction projects. The information shall be recorded on IADC-API Official Daily Drilling Report forms or equivalent forms approved by LSSA. The report forms shall be fully completed, providing information on bit assembly, drill string, drill collars, drilling mud characteristics, fluid losses, water and fluid level changes, footage drilled, formations encountered, cementing operations, instrument calibration data, equipment repair and subcontractor information. One legible copy of the form shall be submitted to LSSA on a daily basis.

1.14 Standby Time: The Contractor may be directed by the Site Geologist or owner to stop operations from time to time so that additional testing or data collection not included in the Technical Specifications can be completed. The Contractor shall be reimbursed at hourly rates specified in the unit bid pricing during these time periods. The Contractor is advised not to conduct any out of scope work without prior approval of LSSA and Medley Landfill.

1.15 Guarantee: The Contractor guarantees that the work performed and the workmanship, materials and equipment supplied or used in the execution of the work, are free from defects or flaws and are furnished in strict accordance with the contract documents in every respect. The Contractor further guarantees that the performance test requirements of the contract documents shall be fulfilled and that all work is in accordance with permits and conditions issued by FDEP, SFWMD and Miami Dade County. The Contractor shall repair, correct, or replace all damage to the work resulting from failures covered by the guarantee. The guarantee shall remain in effect for a period of one (1) year from the date of final acceptance by Medley Landfill.

2.0 WELL LOCATIONS

The injection well and monitor well shall be located as depicted on the contract drawings. The location of the sites will be clearly marked in the field by LSSA. The contractor shall accept the locations as shown and it is his responsibility to familiarize himself with the actual site conditions before commencing work. Medley Landfill reserves the right to change the locations to similar locations on the property. The proposed unit prices shall remain the same even if the well locations are changed.

2.1 It shall be the Contractor's responsibility to engage a registered Professional Surveyor to establish the position of the wells on the property relative to latitude/longitude, Section Township & Range, State Planar Coordinates and GPS Coordinates. The vertical measurement points (pad elevation) for the injection well and dual zone monitor well shall be referenced to NGVD of 1983 and NAVD of 1988 prior to the onset of drilling activities. The top of casing elevations for the four (4) drilling pad monitor wells shall be measured and referenced to NGVD 1983 and NAVD of 1988. The locations of each well shall also be reference to State Planar Coordinates.

3.0 PRODUCTS

3.1 Casings: All well casings shall be new, unused and meet the minimum specifications specified herein. If the casing should break or collapse or its integrity is not satisfactory and/or the grout emplacement is of poor quality, it shall be withdrawn and replaced at the contractor's expense. If the casing cannot be withdrawn, the contractor will plug and abandon it at his own expense and in a manner approved by LSSA. Another well will then be brought to the same level of completion, at another site selected by Medley Landfill at no additional cost.

INJECTION WELL

3.1.1 *Pit Casing*: The Contractor (at his option) shall install a protective pit casing of sufficient diameter to accommodate a 48-inch drill bit. The exact length, diameter, material, and installation shall be the contractor's option subject to approval by LSSA.

3.1.2 *Conductor Casing*: [Outer Diameter (OD)–42.00-inches, Inner diameter (ID)–41.25-inches].
The conductor casing shall be new, unused, steel, random length, 42 Nominal Pipe Size (NPS), a minimum wall thickness of 0.375-inches, STD Weight Class, 167.00 lb/ft. The casing shall conform to the minimum standards for grade B in ASTM A-139-00 for electrical-fusion arc-welded, helical-seam pipe. The ends of each joint shall be machine beveled perpendicular to the casing axis to insure the straightness of each assembled section. Approximately 200 linear feet will be installed in the injection well.

3.1.3 *Surface Casing*: (OD – 34.00-inches, ID– 33.25-inches)
The surface casing shall be new, unused, steel, random length, 36 NPS, a minimum wall thickness of 0.375-inches, STD Weight Class, 142.68 lb/ft. The casing shall conform to the minimum standards for Grade B in ASTM A-139-00, for electrical-fusion arc-welded, helical-seam pipe. The ends of each joint shall be machine beveled perpendicular to the casing axis to insure the straightness of each assembled section. Approximately 1,000 linear feet will be installed in the injection well.

3.1.4 *Intermediate Casing*: (OD–26.00-inches, ID–25.25-inches)
The intermediate casing shall be new, unused, seamless steel, random length, 26 NPS, a minimum wall thickness of 0.375 inches, STD Weight Class, 118.65 lb/ft. The casing shall conform to the minimum standards for Grade B in ASTM A-139-00 for electrical-fusion arc-welded, helical-seam pipe. The ends of each joint shall be machine beveled perpendicular to the casing axis to insure the straightness of each assembled section. Approximately 2,000 linear feet will be installed in the injection well.

3.1.5 *Injection Casing*: (OD–16.00-inches, ID–15.00-inches)
The injection casing shall be new, unused, seamless steel, random length, 16 NPS, a minimum wall thickness of 0.500-inches, XS Weight Class, 82.85 lb/ft. The casing shall conform to the minimum standards in ASTM A 53/A 53M-02, Type S, Grade B. The ends of each joint shall be machine beveled perpendicular to the casing axis to insure the straightness of each assembled section. Approximately 3,100 linear feet will be installed in the injection well. The upper 20 feet of injection casing, including the portion extending through the pad, shall be stainless steel.

3.1.6 *Injection Tubing*: (OD–10.75-inches, ID–8.85-inches)
The injection tubing shall be new, unused, 10¾-inch, FRP, Blue Box 1500, as manufactured by Tubular Fiberglass Corporation. The tubing shall conform to the minimum standards in ASTM D 2996-01. The tubing shall have a wall thickness of 0.54-inches and a unit weight of 16.30 lb/ft. The tubing shall have a pressure rating of not less than 1,500 psig. The ends shall be threaded and coupled with a pin upset of 10.85-inches and maximum box O.D. of 14.05-inches. Approximately 3,100 linear feet will be installed in the injection well. The upper 20 feet of injection tubing, including the portion extending through the pad, shall be stainless steel.

MONITOR WELL

3.1.7 *Pit Casing*: The contractor (at his option) shall install a protective pit casing of sufficient diameter to accommodate a 36-inch drill bit. The exact length, diameter, material, and installation shall be the contractor's option subject to approval by LSSA.

3.1.8 *Conductor Casing*: (OD–30.00 inches, ID–29.25 inches) The conductor casing shall be new, unused, seamless steel, random length, 30 NPS, a minimum wall thickness of 0.375-inches, STD Weight Class, 118.65 lb/ft. The casing shall conform to the minimum standards for Grade B in ASTM A-139-00 for electrical-fusion arc-welded, helical-seam pipe. The ends of each joint shall be machine beveled perpendicular to the casing axis to insure the straightness of each assembled section. Approximately 200 linear feet will be installed in the monitor well.

3.1.9 *Surface Casing*: (OD–24.00-inches, ID–23.25-inches)
The surface casing shall be new, unused, seamless steel, random length, 24 NPS, a minimum wall thickness of 0.375-inches, STD Weight Class, 94.71 lb/ft. The casing shall conform to the minimum standards for Grade B in ASTM A-139-00 for electrical-fusion arc-welded, helical-seam pipe. The ends of each joint shall be machine beveled perpendicular to the casing axis to insure the straightness of each assembled section. Approximately 1,000 linear feet will be installed in the monitor well.

3.1.10 *Upper Monitor Zone Casing*: (OD–16.00-inches, ID–15.25-inches).

The upper monitor zone casing shall be new, unused, seamless steel, random length, 16 NPS, a minimum wall thickness of 0.375 inches, STD Weight Class, 62.64 lb/ft. The casing shall conform to the minimum standards for Grade B in ASTM A-139-00 for electrical-fusion arc-welded, helical-seam pipe. The ends of each joint shall be machine beveled perpendicular to the casing axis to insure the straightness of each assembled section. Approximately 1,800 linear feet will be installed in the monitor well. The upper 20 feet of 16-inch casing, including the portion extending through the pad, shall be stainless steel.

3.1.11 *Lower Monitor Zone Tubing*: (OD–5.43-inches, ID–6.10-inches).

The lower monitor zone tubing shall be new, unused, $6^{5}/_{8}$-inch, FRP, Red Box 1500, as manufactured by Tubular Fiberglass Corporation. The tubing shall conform to the minimum standards in ASTM D 2996-01. The tubing shall have a wall thickness of 0.34-inches and a unit weight of 5.70 lb/ft. The tubing shall have a pressure rating of not less than 1,500 psig. The ends shall be threaded and coupled with a pin upset of 6.73 inches and maximum box O.D. of 8.00-inches. Approximately 1,900 linear feet will be installed in the monitor well. The upper section of the lower monitor zone tubing, including the exposed portion, shall be stainless steel.

3.2 Welding: All welding shall be performed by certified welders and the Contractor must supply proof of certification to LSSA prior to any installation of casing. The Contractor shall furnish LSSA procedure specifications and qualification records of welding procedures for all pipe welding to be performed. All steel casing joints will be double welded in accordance with the requirements of Section 5, Part B, of ANSI/AWS (96) Structural Welding Code-Steel.

3.3 Mill Certificates: The Contractor shall supply LSSA copies of the mill certificates or certified test reports showing compliance with the physical and chemical properties of the casings specified herein.

3.4 Centralizers: All casing shall be fitted with steel strap type centralizers at 10 feet above the bottom of the casing and at 90 foot intervals to the top of the casing to ensure that the casing is centered in the borehole prior to cementing. The Contractor may pre-fabricate strap-type

centralizers or may use Halliburton-type centralizers that meet or exceed API specification 10D. The centralizers shall be secured to the casing to prevent vertical or rotational movement of the centralizers on the casing. Centralizers for the FRP tubing shall be constructed of SDR-35 PVC Pipe. One PVC centralizer shall be placed on every joint of the FRP tubing.

3.5 Cement: All cement used shall be ASTM C150-05, Type II, conforming to API Standard 10A. Neat cement shall contain no more than 5.2 gallons of water per 94 pound bag. Lost circulation materials (Flocele and/or Gillsonite) and other additives (Bentonite, Calcium) may be used, but are limited to the concentrationsn below:

Flocele	< 12 %	Bentonite	< 12 %
Gilsonite	< 12 %	Calcium	< 3 %

No more than ten percent (10 %) additives may be used with up to three percent (3 %) accelerators. Cement placed within the bottom 100 feet of the casings shall be neat. All cement mixtures shall be approved by LSSA. Cement additives will only be approved in zones of high permeability.

3.5.1 *Cement Placement*: The grout shall be placed in the well by a qualified cementing contractor approved by LSSA. Prior to grouting, water or other fluids will be circulated in the annular space sufficiently to clear obstructions. The cementing method used shall conform to those specified in Section A1-8.4 – "Grouting of Annular Space Surrounding Protective Casing", (AWWA Standard for Deep Wells: AWWA A100-90). When tremmie pipes are used each lift will be allowed to harden and be tagged before continuing with cementing. After the well casings are cemented they must remain undisturbed for 24 hours. All cementing operations will be carried out in the presence of LSSA.

3.5.2 *Cement Samples*: Samples of each lift (one sample per lift) of cement shall be taken by the Contractor labeled and delivered to LSSA. The Contractor shall submit chemical analysis of the dry cement mixture to LSSA at least 72 hours prior to cementing operations.

3.5.3 *Cementing Program*: The Contractor shall complete and submit a copy of the cementing program to LSSA at least 72 hours prior to cementing operations.

3.6 Drilling Fluid and Testing and Handling Facilities

3.6.1 When drilling mud is used in drilling, only high grade approved clays in common usage for oil field drilling shall be used in the makeup of the drilling fluid. Drilling with a mixture of water and unprocessed mud, clay, or other objectionable material, will not be permitted. The drilling fluid shall possess such characteristics as are required to adequately condition the walls of the hole to prevent caving of the well as drilling progresses.

3.6.2 The Contractor shall supply a closed, steel lined circulation system for all drilling operations. The cuttings will be removed and fluids either returned to the drill hole or disposed of at a pre-approved off site facility. Adequate fluid tanks shall be employed by the Contractor to settle out drill cuttings and to ensure that a minimum of silt and clay is returned to the drill hole. Steel tanks or leak proof containers of sufficient capacity to store a minimum of 20,000 gallons of fluid and cuttings will be a part of this system. The system will also have suitable devices for the removal of cuttings from drilling fluids such as; shale shakers, settling tanks and/or screens. The Contractor shall submit for LSSA approval, a shop drawing of the circulation system prior to initiation of any site work.

3.6.3 The well will have a tendency to flow after the installation of the surface casing. The Contractor will be required to prevent the spillage of formation waters. The reverse air circulation method of drilling shall be required after installing the surface casing. Drilling fluid for well construction by the reverse air circulation method shall be compressed air and water.

Bentonite or other materials shall not be utilized without acceptance by LSSA. If utilization of these materials is necessary due to lost circulation or other drilling problems that may arise, the Contractor shall submit the procedure to LSSA for review. A blow-out preventer will be kept on site during the drilling operation. The blow-out preventer will be placed on the well during lapses in the drilling operation. It shall be the Contractor's responsibility to clean up any spillage of formation fluids that are recorded or detected in the shallow (water table) monitor wells at his expense.

3.6.4 A temporary drilling pad shall be constructed of sufficient size to accommodate all drilling equipment, including pumps, engines, generators, tanks, fluid handling devices, etc., and be of sufficient size to accommodate the well drilling activities. The perimeter of the temporary pad shall have sufficient curb height to contain any spilled fluids. The temporary pad shall be designed by a Professional Engineer registered in the State of Florida and engaged by the Contractor. The temporary pad shall be designed to withstand the loading from all of the various drilling equipment and shall be water tight. The pad shall be watertight and include a drainage sump for collection of spillage and drilling fluid. It shall also be equipped with an external drain and valve to facilitate draining of the drilling pad and sump upon completion of the well. All temporary pad drainage shall move towards the drainage sump. Prior to the temporary pads construction, the design must be submitted to FDEP for approval. After completion of the well the temporary pad and all appurtenances (except for supporting fill) shall be removed by the Contractor.

3.7 Drill Pad Monitor Wells:

3.7.1 *Casing*: Four (4) wells will be constructed at the corners of the drill pad. The wells will be constructed of 2-inch Schedule 40 PVC pipe with 5 feet of slotted, Schedule 40 PVC screen (0.01-inch slot) and end cap. The wells shall be installed to a depth of approximately 15 feet BLS at locations marked by LSSA. The well casing shall be joined by threaded & coupled pipe or with couplings attached to the pipe with stainless steel screws. Special care should be taken to ensure that the casing and screen are straight and plumb prior to gravel packing and cementing.

3.7.2 *Cement*: All cement used on the work shall be standard brand Portland cement conforming to the requirements of ASTM Designation C 150, Type 2. The neat cement shall contain no more than 5.2 gallons of water per 94 lb. bag of cement. After a well is cemented, casing and well must remain undisturbed for at least 24 hours.

3.7.3 *Well Pad*: The contractor shall complete the wellhead inside a cast iron meter box and lid. A concrete pad, sloping away from the well pipe approximately 24" X 24" X 4" shall be placed around the meter box.

3.7.4 *Capping*: The contractor shall furnish and install a PVC cap for the shallow monitor wells. The cap will fit securely over the top of the well effectively sealing it from surface elements. It shall be equipped with a device that can be securely locked with a padlock.

3.8 Wellhead Capping and Valves: The wellhead piping, instrumentation and valves for the injection well and monitor well shall be installed in accordance with the Contract Drawings. All valves and fittings above grade shall be stainless steel

3.9 Pressure Gauges: The Contractor shall provide and install pressure gauges for use during testing of the wells. These gauges shall be calibrated before use and calibration records shall be submitted to LSSA prior to use. The pressure gauges used in pressure tests shall have a minimum diameter of 6-inches, and have a 0 to 150 psi range with major gradations of 10 psi and minor gradations of one (1) psi. Gauge accuracy shall be ¼ of one percent (1 %) of full scale.

3.10 Hardware: All hardware (nuts, bolts, flanges, washers, screws) used to secure the wellhead and other above grade equipment shall be stainless steel. All rubber gaskets shall be new, unused, free from defects and secured as per the manufacturers specifications.

4.0 CONSTRUCTION ACTIVITIES OUTLINE

4.1 Mobilization

4.1.1 *Site Preparation*
4.1.2 *Install Pit Casings*
4.1.3 Construct Temporary Pad
4.1.4 *Drill Pad Monitor Wells and Begin Sampling*
4.1.5 *Set-up Well Drilling Equipment*
4.1.6 *Construct SAS Water Supply Well*

4.2 PHASE I – Exploratory Drilling & Testing

4.2.1 Conventional mud-rotary method through setting of the surface casing; reverse-air rotary for the remainder of the drilling; no salt or brine may be used for weight control during any of the drilling operations above 2,000 feet BLS.
4.2.2 Drill nominal 48-inch hole to approximately 200 feet BLS

4.2.3 Use mud-rotary drilling; collect formation cuttings every 10 feet, conduct inclination surveys every 90 feet (1° maximum allowed).

4.2.4 Perform geophysical logging of 48-inch hole. Logs will include temperature, natural gamma, and caliper.

4.2.5 Install and cement 42-inch diameter conductor casing (0-200 ft BLS). Run temperature logs after each lift.

4.2.6 Drill nominal $12^{1}/_{4}$-inch pilot hole from approximately 200 to 1,000 feet BLS. Conduct inclination surveys every 90 feet (1° maximum allowed). Collect formation cuttings every 10 feet.

4.2.7 Perform geophysical logging of pilot hole. Logs will include temperature, DIL, natural gamma, and caliper.

4.2.8 Ream nominal 42-inch diameter borehole 200 to 1,000 feet BLS. Conduct inclination surveys every 90 feet (1° maximum allowed).

4.2.9 Perform geophysical logging of reamed hole. Logs will include temperature, natural gamma, and caliper.

4.2.10 Install and cement 34-inch diameter surface casing (0 to 1,000 feet BLS). Run temperature logs after each lift.

4.2.11 Switch to reverse air circulation. Drill nominal $12^{1}/_{4}$-inch pilot hole from approximately 1,000 to 2,000 feet BLS. Conduct inclination surveys every 90 feet (1° maximum allowed). Collect formation cuttings every 10 feet. Conduct six (6) straddle packer tests. Pilot hole drilling may be interrupted to conduct single packer drill-stem tests in lieu of straddle packer tests. The contractor may at his discretion, run geophysical logs (caliper log and gamma ray log) prior to installing the single packer drill-stem test tool string.

4.2.12 Perform geophysical logging of pilot hole. Logs will include temperature (static and flowing), natural gamma, caliper, dual induction, BHC-Sonic with VDL, single-point resistivity (static and flowing), spinner flow meter (static and flowing) and video survey.

4.2.13 Ream nominal 36-inch diameter borehole 1,000 to 2,000 feet BLS. Conduct inclination surveys every 90 feet (1° maximum allowed).

4.2.14 Perform geophysical logging of reamed hole. Logs will include temperature, natural gamma, and caliper.

4.2.15 Install and cement 26-inch diameter intermediate casing (0 to 2,000 feet BLS). Run temperature logs after each lift, CBL with VDL before and after casing installation.

4.2.16 Conduct casing pressure test.

4.3 PHASE II – Exploratory Drilling & Testing

4.3.1 Drill nominal $12^{1}/_{4}$-inch pilot hole from approximately 2,000 to 3,500 feet BLS. Conduct inclination surveys every 60 feet (1° maximum allowed). Collect ten (10) cores and conduct five (5) straddle packer tests. Pilot hole drilling may be interrupted to conduct single packer drill-stem tests in lieu of straddle packer tests. The contractor may at his discretion, run geophysical logs (caliper log and gamma ray log) prior to installing the single packer drill-stem test tool string.

4.3.2 Perform geophysical logging of pilot hole. Logs will include temperature (static and flowing), natural gamma, caliper, dual induction, BHC-Sonic with VDL, single-point resistivity (static and flowing), spinner flow meter (static and flowing) and video survey.

4.4 PHASE III – Class I Test Injection Well Drilling & Testing

4.4.1 Ream nominal 26-inch diameter borehole 2,000 to 3,100 feet BLS. Conduct inclination surveys every 90 feet (1° maximum allowed).

4.4.2 Perform geophysical logging of reamed holes (2,000 to 3,100 feet BLS). Logs will include natural gamma, and caliper.

4.4.3 Install 3,100 feet of 16-inch diameter injection casing (0 to 3,100 feet BLS). Run temperature logs after each lift, CBL with VDL before and after casing installation.

4.4.4 Conduct casing pressure test and video survey on 16-inch casing.

4.4.5 Install packer

4.4.6 Install 3,100 feet of 10¾-inch FRP injection tubing (0 to 3,100 feet BLS).

4.4.7 Perform geophysical logging from total depth to land surface. Logs will include natural gamma, caliper, DIL, BHC Sonic w/VDL, temperature and, fluid resistivity.

4.4.8 Develop well and collect background water sample

4.4.9 Conduct MIT (annulus pressure test on 10¾-inch tubing, video survey and temperature log).

4.4.10 Complete wellhead assembly.

4.4.11 Demobilize injection well drill rig and restore site

4.5 PHASE IV –Dual Zone Monitor Well Drilling and Testing

4.5.1 Conventional mud-rotary method through setting of the surface casing; reverse-air rotary for the remainder of the drilling; no salt or brine may be used for weight control during any of the drilling operations.

4.5.2 Drill nominal 36-inch hole to approximately 200 feet BLS

4.5.3 Use mud-rotary drilling, collect formation cuttings every ten (10) feet, conduct inclination surveys every 90 feet (1° maximum allowed).

4.5.4 Perform geophysical logging of 36-inch hole. Logs will include temperature, natural gamma, and caliper.

4.5.5 Install and cement 30-inch diameter conductor casing (0-200 feet BLS). Run temperature logs after each lift.

4.5.6 Drill nominal $12^{1}/_{4}$-inch pilot hole from approximately 200 to 1,000 feet BLS. Conduct inclination surveys every 90 feet (1° maximum allowed). Collect formation cuttings every 10 feet.

4.5.7 Perform geophysical logging of pilot hole. Logs will include temperature, DIL, natural gamma, and caliper.

4.5.8 Ream nominal 30-inch diameter borehole 200 to 1,000 feet BLS. Conduct inclination surveys every 90 feet (1° maximum allowed).

4.5.9 Perform geophysical logging of reamed hole. Logs will include temperature, natural gamma, and caliper.

4.5.10 Install and cement 24-inch diameter surface casing (0 to 1,000 feet BLS). Run temperature logs after each lift.

4.5.11 Switch to reverse air circulation. Drill nominal $12^{1}/_{4}$-inch pilot hole from approximately 1,000 to 1,950 feet BLS. Conduct inclination surveys every 90 feet (1° maximum allowed). Collect formation cuttings every 10 feet and conduct 3 straddle packer tests. Pilot hole drilling may be interrupted to conduct single packer drill-stem tests in lieu of straddle packer tests. The contractor may at his discretion, run geophysical logs (caliper log and gamma ray log) prior to installing the single packer drill-stem test tool string.

4.5.12 Perform geophysical logging of pilot hole. Logs will include temperature (static and flowing), natural gamma, caliper, dual induction, BHC-Sonic with VDL, single-point resistivity (static and flowing), spinner flow meter (static and flowing) and video survey.

4.5.13 Ream nominal 24-inch diameter borehole 1,000 to 1,800 feet BLS. Conduct inclination surveys every 90 feet (1° maximum allowed).

4.5.14 Perform geophysical logging of reamed hole. Logs will include temperature, natural gamma, and caliper.
4.5.15 Install and cement 16-inch diameter upper monitor zone casing (0 to 1,800 feet BLS). Run temperature logs after each lift, CBL with VDL before and after casing installation, complete video survey.
4.5.16 Conduct casing pressure test.
4.5.17 Ream nominal 16-inch diameter borehole from approximately 1,800 to 1,950 feet BLS. Conduct inclination surveys every 60 feet (1° maximum allowed).
4.5.18 Perform geophysical logging of reamed hole. Logs will include temperature, natural gamma, and caliper.
4.5.19 Plug $12^{1}/_{4}$-inch pilot hole from approximately 2,000 to 1,950 feet BLS, if directed by LSSA.
4.5.20 Tag top of cement at 1,950 feet BLS.
4.5.21 Install 1,900 feet of $6^{5}/_{8}$-inch lower monitor zone FRP tubing.
4.5.22 Cement tubing between 1,800 to 1,900 feet BLS.
4.5.23 Perform temperature logs after each stage of cementing, CBL with VDL before and after casing installation, complete video.
4.5.24 Conduct tubing pressure test.
4.5.25 Develop monitor zones and disinfect well.
4.5.26 Collect and analyze water samples from each monitor zone for the primary/secondary drinking water standards, potassium, ammonia and TKN.
4.5.27 Conduct video survey of lower monitor zone tubing.
4.5.28 Complete wellhead assembly.
4.5.29 Demobilize monitor well drill rig and restore site

4.6 Short Term Injection Test

4.6.1 Set up test pump, temporary piping, and flow meter.
4.6.2 Install transducer system and wellhead gauges.
4.6.3 Collect 24-hour background data.
4.6.4 Conduct 24 hour injection test at 1,534 GPM.
4.6.5 Collect 12 hours of post test recovery data.
4.6.6 Demobilize injection test equipment and restore site.
4.6.7 Conduct RTS on Injection Well.

4.7 Concrete Pad

4.7.1 Remove temporary drill pad.
4.7.2 Backfill, compact and grade pad site.
4.7.3 Construct concrete pad as per Contract Drawings.

5.0 WELL DEVELOPMENT

5.1 Develop the Monitor Well: After the monitor well has been completely constructed in accordance with the requirements of the contract documents, the Contractor shall make the necessary arrangements for conducting the well development, and sample collection. Within 24 hours after completion of the well, the contractor shall commence development of the monitor zones by surging, using an air compressor or test pump.

The cycle of pumping and surging shall be repeated until the discharge water is clear of sand, silt and mud and until there is no increase in specific capacity (discharge per foot of drawdown) in the monitor well. The monitor well shall be thoroughly developed so that it will produce a reasonable maximum capacity based on the consideration of depth and nature of the water-bearing formations, and so that it will not produce a composite amount of fine sands in excess of 5 parts per million. Development procedures, quantities, sand production, and times shall be recorded in the daily log. Upon completion of the development, the Contractor shall collect background water quality samples from each monitor zone and deliver them to the approved testing laboratory for analysis.

5.2 Disinfection: After collection of the background water quality samples, the Contractor shall provide for disinfection of the monitor well. The contractor shall carry out adequate cleaning procedures immediately preceding disinfection where evidence indicates that normal well construction and development work have not adequately cleaned the well. All oil, soil, and other materials, shall be removed from the well. Disinfection of the well shall be performed in accordance with the requirements of ANSI/AWWA C654, except as modified herein. The method of chlorination to be used shall consist of (1) treating the water in the well casing to provide a chlorine residual of approximately 500 mg/L; (2) circulating the chlorinated water within the well casing and pump column; and (3) pumping the well waste to remove chlorinated water.

6.0 SITE CLEAN UP

After the injection well and monitor well have been completed, the site shall be returned to its original condition. The contractor shall demobilize, remove all equipment from the site and clean-up the site to original conditions, as specified herein before.