Project:
FAIRFIELD WASTEWATER TREATMENT PLANT

Log of Boring No. 29

Depth, Ft.	Samples	Blows/Ft.	DESCRIPTION (CONTINUED:)	Moisture Content, %	Dry Density pcf	Unconfined Compressive Strength, psf
25						
	6	50	SILTY CLAY (CL) VERY STIFF, ORANGE-BROWN	23	103	7640
30						
	7	11	SILTY CLAY (CL) MEDIUM STIFF, TAN, SPECKLED	31	92	1670
35						
			} SILT LAYER (ML)			
	8	26		25	102	2680
40			Bottom of Hole @ 40'			
45			*Water Level at Time of Drilling			
50						

Job No. S-12693A | WOODWARD-LUNDGREN & ASSOCIATES | Figure 34

APPENDIX D

Mat Foundation Alternative for the New Chlorine Contact Basin

(Memorandum dated November 28, 2001)

MWH Energy & Infrastructure, Inc.

Memo

To: William A. Taplin – MWH America, Inc.

From: Sindhu Rudianto, G.E./ Ronald Bajuniemi, G.E.

CC: Barrett Crook – MWH America

Date: 12/19/01 (Revised from Nov 28, 2001)

Re: Mat Foundation Alternative for Contact Chlorine – FSSD Project (*MWH Project: 20437-GI)*

Based on information provided by Mr. Barrett Crook of MWH America, we understand that the dimension of the new Contact Chlorine Basin (CCB) will be revised from 90 by 160 feet to about 55 by 285 feet, approximately parallel to the relocated levee. The purpose of this revised memorandum is to provide alternative design criteria for a mat foundation system rather than a pile foundation for the new CCB structure, as requested by FSSD and MWH America, Inc.

Our present CPT-3 indicated the presence of an approximate 6-foot thick layer of firm silty clay, extending from the bottom of the proposed slab (Elev. +3 feet) to Elevation –3 feet as shown in Figure 3, of our draft report, dated November 21, 2001. The previous WCC Boring PB-1-89 drilled near the CCB location also encountered an approximately 6-foot thick layer of soft to firm silty clay at depths 13-18 feet or Elevation -1 to -6 feet. These materials are relatively compressible and will potentially cause long-term consolidation settlement if subjected to new loads.

The total structural load of the new CCB structure is about 22,264 kips with a gross induced bearing pressure of about 1,500 pounds per square foot (psf). The net induced bearing pressure acting on a mat foundation is calculated by subtracting the gross total load and the effective weight of removed soils below-grade.

If the new CCB structure is located within the footprint of existing 25-foot wide levee berm, we estimate the net induced bearing pressure onto the subsurface soils to be on the order of 200 psf with an estimated total settlement of about ½ to 1 inch.

However, if the structure is located on the existing flat ground surface (Elevation +14 feet), we estimate the net induced bearing pressure onto the subsurface soils to be on the order of 1,000 psf with an estimated total settlement of about 2 to 3 inches.

The estimated settlement for sloping ground can be interpolated between these two extreme values.

If a mat foundation alternative is to be selected, we strongly recommend that the new 55-foot wide CCB structure be located on the "shadow" of the existing levee berm to minimize the potential of long-term settlement. Under this condition, the mat foundation may be designed using an allowable bearing pressure of 1,750 pounds per square foot (psf) for dead loads, 2,500 psf for dead plus live loads, and 3,500 psf for all loads including wind and seismic. Live loads applied continuously for a long duration should be considered as dead load. These allowable bearing pressures are net; therefore, the weight of the mat foundation can be neglected for design purposes. A modulus of subgrade reaction of 60 pounds per square inch/inch (pci) can be used for design of the mat foundation.

However, if the CCB structure is located partially on the levee berm and flat ground surface, the structural engineer should design the mat foundation to accommodate the estimated differential settlement given above.

Other options to provide uniform settlement would be: a) surcharge the flat ground surface to about Elevation + 20 feet to minimize the future total settlement (wick drains may be required to expedite the consolidation process, if construction for the new CCB will be conducted early next year); b) extend the depth of structure in flat ground surface area, so that the induced bearing pressure equals to the weight of removed soils; and c) remove and replace the compressible clayey soils with compacted engineered fills that extend to an approximate Elevation –6 feet.

In addition to settlement, other implications of the long-rectangular CCB structure would be:

1. Mat foundation should be designed to resist the uplift pressure due to uniform designed groundwater level at Elevation + 14 feet for both northern and southern walls, unless under-drain system will be provided.
2. Below-grade walls should also be designed at design groundwater at Elev. +14 feet, unless back-drain system will be provided.
3. Stability of the structure, especially during seismic, in the north-south direction should be properly evaluated.
4. Depending on the grading topography and proximity to the toe of relocated levee, the northern wall of CCB structure may be subjected to additional unbalanced lateral pressure due to the weight of the relocated levee. We should evaluate this condition, when the revised site plan is available for review.

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The following soil investigation report entitled "Addendum to Geotechnical Study, Fairfield Suisun Sewer District, UV Disinfection Project" dated October 12, 2009 has been prepared by Fugro West Incorporated. Approximate soil boring locations and boring logs included in the report are for Contractor's information, but the report is not a warrant of subsurface conditions.

Neither the Owner nor its Consulting Design Engineers guarantee the accuracy of the information contained in the Geotechnical Report or any interpretation, deduction, or conclusion given in the report relative to subsurface conditions. Further, it shall be the responsibility of the Contractor to satisfy himself of the type of soil and the level of the water table to be encountered during construction of the facilities. The bidder shall make his own deductions and conclusions as to the nature of the materials to be excavated; the difficulties which may arise from the subsurface conditions and of doing any other work affected by the subsurface conditions and shall accept full responsibility therefore.

Appendix B

Addendum to Geotechnical Study, UV Disinfection Project, Fairfield Suisun Sewer District Wastewater Plant, Fairfield, CA, by Fugro West, Inc., Oakland, CA, dated October 12, 2009.

FUGRO WEST, INC.

1000 Broadway, Suite 440
Oakland, California 94607
Tel: (510) 268-0461
Fax: (510) 268-0545

October 12, 2009
Project No. 1944.001

Fairfield Suisun Sewer District
1010 Chadbourne Road
Fairfield, CA 94534

Attention: Mr. Kirk Howard, P.E.

Subject: Addendum to Geotechnical Study
UV Disinfection Project, Fairfield Suisun Sewer District Wastewater Plant
Fairfield, California

Dear Mr. Howard:

Fugro West, Inc., (Fugro) is pleased to submit this addendum to a geotechnical study that was prepared in 2001 by Montgomery Watson Harza (MWH) for a Tertiary Filter Expansion at the Fairfield Suisun Sewer District (FSSD) Wastewater Treatment Plant in Fairfield, California, as presented in Plate 1. Through acquisition, the geotechnical practice of MWH is now part of Fugro. It is our understanding that the proposed facilities discussed in this 2001 report were never constructed and that now a Ultra-Violet (UV) Disinfection Project is planned for the site.

Our addendum is based on: 1) project information presented by Eco Logic Engineers & Consultants in August 2009, relating to the size and loads of the proposed structures, 2) a review of available geotechnical and geological data near the site, 3) information from previous geotechnical studies performed by MWH in 2001, and 4) our previous work on similar projects. This addendum presents the results of additional geotechnical studies to evaluate subsurface conditions and update/provide geotechnical recommendations for the current proposed development.

PROJECT DESCRIPTION

The proposed development will consist of two separate buildings: a new, single-story, at-grade UV Disinfection Phase 1 System with a footprint area of approximately 4,200 square feet and an adjacent single-story UV Disinfection Building of approximately 750 square feet, as shown in Plate 2. The main structure will also feature an overhead canopy with a bridge crane that will be approximately 25 feet above existing grade. The inlet and outlet structures of the project will be situated approximately five feet below existing grade. The site is currently an undeveloped grassy section of the FSSD Wastewater Treatment Plant. It is to be situated directly east of an existing filtration building and west of Road H. The final grade in the area is expected to remain largely unchanged from the current condition.

The loads to be experienced on the UV Disinfection Phase 1 System structure are as follows: a concrete structure uniform dead load of 900 pounds per square foot (psf); a concrete structure live load of 400 psf; a canopy column concentrated dead load of 10,000 pounds; and a

canopy column concentrated live load of 24,000 pounds. If columns are assumed to have an 18-foot spacing, this leads to an unfactored dead plus live load of approximately 460 kips per column.

The loads to be experienced on the adjacent UV Disinfection Building structure are as follows: a concrete structure uniform dead load of 150 psf; a concrete structure live load of 300 psf; a building column concentrated dead load of 4,000 pounds; and a canopy column concentrated live load of 8,000 pounds. If columns are assumed to have an 16-foot spacing, this leads to an unfactored dead plus live load of approximately 500 psf.

Based on the information presented in our 2001 report, we believe that we have sufficient subsurface data to develop/update geotechnical recommendations for the new UV Disinfection Project.

SCOPE OF SERVICES

We proposed to review the information from our 2001 study and analyze the data for application to the new UV Disinfection Project. Following our review and analysis, we proposed to prepare an addendum letter to our 2001 report that will describe subsurface conditions at the site, logs of the borings and cone penetrometer tests (CPTs), and a site plan showing the location of each investigation point with respect to the proposed UV Disinfection Project. This letter presents the following:

- A brief discussion of site geology and seismicity; soil, and groundwater conditions encountered; seismic hazards, including liquefaction potential;
- Updated site factors for seismic design based on the California Building Code (2007);
- Appropriate foundation types for the proposed UV Disinfection Project;
- Geotechnical design criteria for the recommended foundation types, including allowable bearing capacities and resistance to lateral loads;
- Estimates of total and differential foundation settlement; and
- Recommendations for subgrade preparation and earthwork, including fill, backfill, and compaction requirements.

DATA REVIEW

In 2001, MWH prepared two documents for a Tertiary Filter Expansion at the FSSD Wastewater Treatment Plant. The first of these was a memo dated September 10, 2001, presenting Preliminary Geotechnical Recommendations (MWH 2001a); the second was a Final Geotechnical Investigation Report dated November 21, 2001 (MWH 2001b).

We have reviewed these documents and have found that the field investigations, laboratory tests, and engineering analyses undertaken in these reports are applicable to the structures proposed for the new UV Disinfection Project.

Of specific note are two field investigation points in the immediate vicinity of the proposed UV Disinfection Project. The first of these is a boring denoted as PB-1-89 on Plate 2, included in

Appendix A, which extends to a depth of 82.0 feet below ground surface. This boring was performed by Woodward-Clyde Consultants (WCC) for the Stage 1 Expansion of the tertiary filters. The second of these points is a CPT denoted as CPT-2-2001 on Plate 2, included in Appendix A, which extends to a depth of 64.5 feet below ground surface. This CPT was performed by MWH. These two subsurface investigation points provide adequate data to perform geotechnical engineering analyses suitable to the new UV Disinfection Project.

Additionally, foundation types investigated in these reports have also been found to be applicable to the new UV Disinfection Project with some modification.

SITE CONDITIONS

Regional Seismicity

Geologists and seismologists recognize the San Francisco Bay Area as one of the most active seismic regions in the United States. Seven active faults extend through the Bay Area in a northwesterly direction and have produced approximately 12 large (magnitude 6 or greater) earthquakes in the last two centuries that were strong enough to cause structural damage. The faults causing such earthquakes are part of a system of faults along the boundary of the Pacific and North American plates and locally include the San Andreas, Calaveras and Hayward faults. The major fault in the system is the San Andreas fault that extends for at least 450 miles along the coast of California.

In 2003, the Working Group on California Earthquake Probabilities (Working Group), in conjunction with the United States Geological Survey (USGS), published an updated report evaluating the probabilities of significant earthquakes occurring in the Bay Area over the next three decades (USGS, 2002). The Working Group determined there is a 62 percent probability that at least one magnitude 6.7 or greater earthquake will occur in the San Francisco Bay region before 2031. This probability is an aggregate value that considers seven principal Bay Area fault systems and unknown faults (background values). The principal active faults in the Bay Area include the San Andreas, Hayward, Calaveras, and the San Gregorio faults. Earthquakes occurring along these faults are capable of generating strong ground shaking at the project site.

The approximate distances of the site to the six closest known mapped active faults, based on the program FRISKSP by Thomas F. Blake (Blake, 2000), are summarized in Table 1. The FRISKSP program was run using the 2002 California Geological Survey (CGS) fault model (Blake, 2002). The project site is not located within an Alquist-Priolo Earthquake Fault Zone.

Table 1. Regional Faults and Seismicity

Fault (segments)	Approximate Distance from Site	Direction from Site	Maximum Moment Magnitude	Fault Type	Slip Rate (mm/yr)
Concord – Green Valley (CON+SGV+NGV)	4.4 km (2.8 mi)	W	6.7	B	2 to 5
Hayward (SH+NH+RC)	33.8 km (21.0 mi)	SW	7.3	A	9
Calaveras (SC+CC+NC)	45.1 km (28.0 mi)	SE	6.9	B	6 to 15
San Andreas (SCZ+PN+NCS+NCN)	62.5 km (38.8 mi)	SW	7.9	A	17 to 24
San Gregorio (SGS+SGN)	68.5 km (42.6 mi)	SW	7.4	B	3 to 7
Greenville (SG+NG)	69.5 km (43.2 mi)	SE	6.9	B	2

Earthquakes on these or other active faults (including unmapped faults) could cause strong ground shaking at the site. Earthquake intensities vary throughout the Bay Area depending upon the magnitude of the earthquake, the distance of the site from the causative fault, the type of materials underlying the site, and other factors.

Site Geology

The surficial geology of the entire plain located southwest of Fairfield, California, which contains the site of the FSSD Wastewater Treatment Plant, is mapped by Crane (1993) as alluvium of the Holocene period. Surrounding this larger area are bay muds to the east and south. Approximately 1.5 miles to the west of the site is a hilly area that mainly consists of mio-pliocene ash-flow tufts.

Surface Conditions

The development area is generally flat, except for the levees surrounding the reservoirs. Vegetation surrounding the area consists of scattered trees and grass. The site is bounded by the plant entrance on the north, the Balancing Reservoir on the south, the existing Tertiary Filters and various other buildings on the east, and Road H and then Chadbourne Road on the west.

Subsurface Conditions

For this addendum, we did not perform any site investigation for the proposed UV Disinfection Project. Therefore, the characterization of subsurface conditions is based upon our review of previous geotechnical reports performed by MWH (2001a and 2001b) for the existing Tertiary Filter Building and previously proposed Tertiary Filter Expansion.

The previous Boring PB-1-89 encountered firm to stiff silty clay with low to medium plasticity and a low to moderate expansion potential in the upper 25 feet. A softer layer of silty clay with a trace of sand was encountered between depths 13 and 18 feet. Below 25 feet, WCC encountered

layers of stiff to hard silty clay that extended to the maximum explored depth of about 82 feet below ground surface or at Elevation –70 feet (Project Datum).

Similar conditions were found in CPT-2-2001 where MWH encountered approximately 2 feet of very stiff clayey fill, underlain by firm to very stiff silty clay that extended to a depth of about 55 feet. Below this clayey soil, they encountered very dense silty sand or hard silt that reached penetration refusal at maximum depth of about 65 feet below ground surface or at Elevation –51 feet (Project Datum).

Groundwater

Groundwater measurements in CPT-2-2001 indicated that the approximate groundwater level was at a depth of about 7 feet below ground surface, which corresponded to approximate Elevation +7.0 feet (Project Datum). However, this measurement should be interpreted with care because the ground water level in these areas might have not stabilized yet due to on-going seepage from the recently filled reservoirs. The depth to groundwater was not observed in PB-01-89.

DISCUSSIONS & CONCLUSIONS

Seismicity and Geologic Hazards

The site is located in a seismically active region of California. Significant earthquakes in the Bay Area have been associated with movements along well-defined fault zones. Earthquakes occurring along any of a number of other Bay Area faults have the potential to produce strong ground shaking at the site. For this reason, the structures should be designed to resist lateral and uplift forces generated by earthquake shaking, in accordance with local design practice.

Hazards such as slope instability, lateral spreads, lurching, or fault rupture are considered unlikely at this site because of the relatively gentle terrain, subsurface soil and rock conditions, and distance from a known active fault. The site is not located within a Fault-Rupture Hazard Zone as designated by the Alquist-Priolo Earthquake Fault Zoning Act (1972), as mapped on the official Earthquake Fault Hazard Zone Maps issued by the State of California (1993). The site is approximately 2.8 miles east of the closest known active fault zone (i.e., Concord-Green Valley fault).

Liquefaction Evaluation

Soil liquefaction is a phenomenon primarily associated with saturated cohesionless soil layers located close to the ground surface. These soils lose strength during cyclic loading, such as imposed by earthquakes. During the loss of strength, the soil acquires "mobility" sufficient to permit both horizontal and vertical movements. Soils that are most susceptible to liquefaction are clean, loose, uniformly graded, saturated, fine-grained sands that lie close to the ground surface, a depth usually considered to be 50 feet.

Based on the boring logs and CPTs, the near-surface soil layers encountered at the site of the new UV Disinfection Project generally consist of medium stiff to hard silty clay that extended to a depth of about 80 feet with a very small silty sand layer present from 57 to 60 feet below ground

surface. Borings in the surrounding area indicate that any sandy layers are localized lenses. Therefore, the liquefaction potential at the site is considered to be low.

Foundation Support

It is our opinion that the site is suitable for the proposed UV Disinfection Project from a geotechnical engineering standpoint. The conclusions and recommendations presented in this letter should be incorporated in the design and construction of the project to minimize possible soil and/or foundation related problems. The primary considerations for foundation design are the compressibility of the near surface clays under the moderate induced loads.

Based on the results of our review of the existing site conditions from previous field investigations, and due to the relatively weak nature of the surface clayey soils, moderate structural loads, as well as to minimize the potential differential settlement with the near-by existing pile-supported Tertiary Filter Building, we recommend that the new UV Disinfection Phase 1 System structure be supported on a pile foundation.

The adjacent UV Disinfection Building will be supported on near-surface stiff clayey soils. Considering the structural load of this building is relatively light, and the soil condition below the structure is uniform, we recommend that the structure be supported on a reinforced concrete mat foundation. The mat foundation should be appropriately designed to resist the anticipated structural loads and uplift water pressure, as well as accommodating the estimated differential settlement.

Expansive Soils

The moderate expansion potential of the clayey near surface soils encountered is a consideration for foundation design. We recommend that all interior slabs-on-grade be supported on a layer of imported non-expansive engineered fill. The amount of required non-expansive engineered fill can be reduced if reinforcement is provided in the slab to reduce the impact of expansion pressures. Note that special design considerations will apply for the design of exterior slabs.

Construction Considerations

Excavations will be required to construct mat foundations, install utilities, and to remove locally weak or unsuitable soils. All excavations that will be deeper than 5 feet and will be entered by workers should be sloped for safety in accordance with Occupational Safety and Health Administration (OSHA) standards.

Groundwater was observed in CPT-2-2001 at approximately 7 feet below existing grade. Further, groundwater levels may be affected by the water level present in the surrounding reservoirs. It is anticipated that some of the excavations for site grading, new foundations, and utilities may encounter groundwater or perched water. Dewatering may be required for the inlet and outlet structures and deeper pipeline excavations. However, the near-surface soils may be appreciably wet of optimum. As a result, subgrades in depressed areas may be unstable under equipment loads, and may require stabilization in order to properly prepare and compact the subgrades for fill placement, or foundation and pavement section construction.

If earthwork is performed during the dry season, moisture conditioning will be required to raise the in-situ moisture contents to near optimum moisture content (per ASTM D1557). If earthwork is performed during or shortly after wet weather conditions, the moisture content of the onsite soils could be appreciably above optimum. Consequently, subgrade preparation and fill placement may be difficult. Additional recommendations for wet weather construction can be provided at the time of construction, if required.

RECOMMENDATIONS

Seismic Design

The proposed structure should be designed to resist the lateral forces generated by earthquake shaking in accordance with local design practice. This section presents seismic design parameters for use with the 2007 California Building Code (CBC). The CBC is based on the 2006 International Building Code (IBC). Design values based on the 2007 CBC are tabulated below.

Table 2. 2007 CBC Seismic Design Parameters

Parameter/Coefficient Description	2007 CBC Reference	Parameter/ Coefficient	Value
MCE for 0.2 sec Spectral Response Acceleration, Site Class B	Figure 1613.5(3)	S_s	1.52
MCE for 1.0 sec Spectral Response Acceleration, Site Class B	Figure 1613.5(4)	S_1	0.60
Soil Profile Type	Table 1613A.5.2	Site Class	D
Site Coefficient	Table 1613A.5.3(1)	F_a	1.0
Site Coefficient	Table 1613A.5.3(2)	F_v	1.5
Adjusted MCE Spectral Design Parameters	Equation 16-37	S_{MS}	1.52
	Equation 16-38	S_{M1}	0.90
Code Based Design Spectral Acceleration Parameters	Equation 16-39	S_{DS}	1.01
	Equation 16-40	S_{D1}	0.60
Seismic Design Category	Table 1613.5.6(1)&(2)	Occupancy Category I to IV	D

**Site Located at: Latitude: 38.2219, Longitude: -122.0817

Site Preparation

The site should be cleared of all obstructions, including utility lines and debris. Based on the previous field explorations, we do not anticipate that appreciable amounts of concrete, asphalt concrete, and aggregate base will be encountered. However, if such material is encountered, it may be reused as fill, provided it is broken up to meet the requirements in *Engineered Fill Materials*. Holes resulting from the removal of underground obstructions extending below the proposed finish grade should be cleared and backfilled with suitable material compacted to the requirements in *Fill*

Placement and Compaction. We recommend backfilling operations for any excavations to remove deleterious material be carried out under the observation of the Geotechnical Engineer.

Subgrade Preparation

Following excavation to the required grades, soil subgrades in areas to receive engineered fill, as defined in *Engineered Fill Materials*, or slabs-on-grade should be scarified to a depth of at least 6 inches, moisture conditioned to slightly above optimum moisture content, and compacted to at least 90 percent of the soil's maximum dry density. The top 6 inches of subgrade in areas to receive pavements should be moisture conditioned and compacted to at least 95 percent of the soil's maximum dry density. Locally weak soils, if encountered, should be excavated and replaced, or otherwise stabilized as recommended by the geotechnical engineer at the time of construction. The compacted surface should be firm and unyielding and should be protected from damage caused by traffic or weather. Soil subgrades should be kept moist during construction. If the subgrade is allowed to become dry, it should be moisture conditioned to eliminate shrinkage cracks.

In order to achieve satisfactory compaction of the subgrade materials, the water content may need to be adjusted at the time of construction. This may require that water be added to soils that are too dry, or that scarification and aeration be performed on any soils that are too wet.

If required, we recommend areas of unstable soils be overexcavated to competent soils or a minimum of 18 inches below finished subgrade elevation where competent soils are not encountered. The bottom of the excavation should then be completely covered with a ground stabilization geotextile fabric such as Mirafi 500X, or equivalent, and backfilled with Class 2 aggregate base. Alternative stabilization methods such as lime treatment may also be considered at the time of construction.

The subgrade stabilization procedure presented above is preliminary, and for cost estimating only. The geotechnical engineer should develop final detailed stabilization recommendations when the actual subgrade materials are exposed during construction.

Engineered Fill Materials

All fill placed at the site should consist of engineered fill meeting the requirements presented in this report, except for landscaping materials which are placed on level ground. On-site soil below the stripped layer and having an organic content of less than 3 percent by volume can be reused as fill except where "non-expansive" import is required beneath the slabs. All engineered fill placed at the site, including on-site soils, should not contain rocks or lumps larger than 4 inches in greatest dimension and contain no more than 15 percent larger than 2.5 inches.

"Non-expansive" fill should be predominantly granular, have an organic content of less than 3 percent by volume, should have a liquid limit less than 40 percent, have a plasticity index not exceeding 12, and should contain no environmental contaminants or debris. Imported fill should consist of "non-expansive" fill.

Fill Placement and Compaction

Engineered fill should be compacted to at least 90 percent of the soil's maximum dry density as determined by ASTM Designation D1557 (latest edition). The upper 6 inches of subgrade soils beneath pavements should be compacted to at least 95 percent of the soil's maximum dry density. Fill material should be spread and compacted in lifts not exceeding 8 inches in uncompacted thickness. The moisture content of the natural on-site, potentially expansive clayey soils reused as fill should be slightly above the optimum moisture content for the soil at the time of compaction. In order to achieve satisfactory compaction of fill materials, the water content may need to be adjusted at the time of construction. This may require that water be added to soils that are too dry, or that aeration be performed in any soils that are too wet.

Surface Drainage

Positive surface gradients should be provided adjacent to the buildings to direct surface water away from foundations and slabs toward suitable discharge facilities. Similarly, roof downspouts should be connected to solid collector pipes that discharge to appropriate facilities. Ponding of surface water should not be allowed adjacent to the buildings or on pavements.

Construction Slopes

If temporary slopes are required, the Contractor should be aware that in no case should slope height, inclination, and excavation depths exceed those specified in local, state, or federal safety regulations. Specifically, one needs to be aware of the current OSHA Health and Safety Standards for Excavations, 29 CFR Part 1926, Subpart P.

Fugro recommends that the Contractor, or his specialty subcontractor, design temporary construction slopes to conform to the OSHA "Guidelines for Excavations and Temporary Sloping." The Contractor, or responsible subcontractor, should determine temporary slope inclinations based on the subsurface conditions exposed at the time of construction.

For planning purposes, the stiff clay material near the existing ground surface should be categorized as OSHA Type B with temporary slope inclination of no steeper than 1:1 (horizontal: vertical).

If temporary slopes are left open for extended periods of time, exposure to weathering and rain could have detrimental effects such as sloughing and erosion. We recommend that all vehicles and other surcharge loads be kept at least 10 feet away from the top of temporary slopes and that the temporary slopes be protected from excessive drying or saturation during construction.

Construction Dewatering

Groundwater and perched water was observed in one of the test pits performed during our field exploration and in some of our previous test borings. Localized groundwater control may be required in portions of the site, depending upon groundwater conditions encountered during construction, or to address seepage zones and/or locally perched groundwater. The design, installation, and maintenance of all necessary systems for groundwater control and dewatering during construction are the responsibilities of the contractor.

Pile Foundations – UV Disinfection Phase 1 System

Capacity

It is our understanding that the loads to be experienced on the UV Disinfection Phase 1 System structure are as follows: a concrete structure uniform dead load of 900 psf; a concrete structure live load of 400 psf; a canopy column concentrated dead load of 10000 pounds; and a canopy column concentrated live load of 24000 pounds. If columns are assumed to have an 18-foot spacing, this leads to an unfactored dead plus live load of approximately 460 kips per column.

In agreement to MWH (2001b) the new UV Disinfection Phase 1 System structure can be supported by 12 or 14-inch square, precast, prestressed concrete pile deriving their supports in skin friction from the underlying medium stiff to hard silty clay. The pile should have a minimum center – to-center spacing of three times the pile width. Under this condition, the group efficiency of piles supported in a group will be at least equal to one.

We recommend that the piles for the new UV Disinfection Phase 1 System structure be designed using an allowable skin friction of 500 psf for dead plus live loads, representing medium stiff clay, that extended to Elevation –10 feet (Project Datum). Below the medium stiff clay layer, an allowable skin friction of 800 psf for dead plus live loads can be used. The allowable skin friction values can be increased by one-third for all loads including wind or seismic. Uplift resistances can be determined using 80 percent of the allowable skin friction values. A 12-inch pile driven to a minimum depth of 60 feet below the pile cap will provide a compression load of 170 kips. A 14-inch pile driven to a minimum depth of 70 feet below the pile cap will provide a compression load of 230 kips.

Before installation of production piles, we recommend that an indicator-piling program be conducted to confirm the ordering length and to verify the ultimate capacity of the pile foundation, as well as to determine the driving characteristic for production piles.

Anticipated total and differential settlements of the piles designed as recommended above should be negligible. We estimate that total settlements and post-construction differential settlements should be less than 1/4 inch.

Installation

All piles should be driven vertically to their design tip elevations at the specified locations in order to develop adequate vertical pile capacities. The pile driving criteria should be established in conjunction with the Geotechnical Engineer during the indicator pile program recommended below and after the type and size of pile and pile hammer have been finalized. We should note, however, that in no case should driving be terminated without the approval of the Geotechnical Engineer. A Geotechnical Engineer should evaluate the allowable capacity of any piles driven shorter than their anticipated lengths.

The pile driving hammer should have a minimum rated energy of 70,000 foot-pounds. It is possible for a very large or very small hammer to cause damage to the particular pile during driving; therefore, we recommend that our office review the hammer type and capacity selected by the Contractor. In addition, the method of handling, picking, and setting the piles should be established

by the pile driving subcontractor and should be reviewed by the Structural and Geotechnical Engineers prior to construction.

We recommend that our office review the final foundation plans and specifications to confirm that the recommendations presented in this report have been properly incorporated into the contract documents. To confirm that piles are installed to adequate depths and to confirm that they have encountered sufficient resistance to develop the required supporting capacities, we recommend that our firm observe the driving of all piles at the site on full-time basis.

Indicator Piles

To confirm the recommended pile capacities and to develop pile-driving criteria, as well as to confirm whether piles for the UV Disinfection Project structure we recommend that an indicator pile program be completed prior to ordering the production piles. We recommend that at least 10 indicator piles be driven at the start of construction. Where possible, indicator piles should be driven in close proximity to the exploratory borings and/or CPTs. The indicator pile program should be conducted using the same equipment and same installation methods that will be used for installing the production piles. The indicator piles should be at least 5 feet longer than the production piles and can be driven at production pile locations.

In order to optimize the ordering length of driven piles and to verify the ultimate capacity of the driven pile, as well as to confirm the drivability of the piles, we recommend that Pile Dynamic Analyzer (PDA) tests be performed on selected indicator piles during installation. In addition, a Wave Equation Analysis of Pile Driving (WEAP) analysis will be performed by our office prior to approval of the indicator pile driving system. The PDA tests should be performed for the re-tapped indicator piles after they had set-up (regained soils strength after being disturbed during pile driving) of minimum 3 days between driving of last indicator piles and re-tapping. In addition, the method of handling and picking up the piles should be established by the pile driving subcontractor and should be approved by both the structural engineer and the geotechnical engineer prior to construction.

Mat Foundations – UV Disinfection Building

It is our understanding that the loads to be experienced on the adjacent UV Disinfection Building structure are as follows: a concrete structure uniform dead load of 150 psf; a concrete structure live load of 300 psf; a building column concentrated dead load of 4,000 pounds; and a canopy column concentrated live load of 8000 pounds. If columns are assumed to have an 16-foot spacing, this leads to an unfactored dead plus live load of approximately 500 psf.

We recommend that the new UV Disinfection Building be supported on a mat foundation bearing on 18 inches of compacted Class 2 Aggregate Base over undisturbed native stiff clays.

The mat foundation may be designed using an allowable bearing pressure of 1,750 pounds psf for dead loads, 2,500 psf for dead plus live loads, and 3,500 psf for all loads including wind and seismic. Live loads applied continuously for a long duration should be considered as dead load. These allowable bearing pressures are net; therefore, the weight of the mat foundation can be neglected for design purposes.

A modulus of subgrade reaction of 60 pounds per square inch/inch (pci) can be used for design of the mat foundation. Total and differential settlement of a perfectly flexible mat foundation for the anticipated loads bearing on native clayey soils and designed in accordance with recommendations presented above is estimated to be on the order of 2 and 1 inches, respectively.

Foundation Compatibility

As discussed in above sections it is anticipated that there will be a difference in the amount of settlement between the UV Disinfection Phase 1 System structure and the adjacent UV Disinfection Building. It is recommended that any subsurface electrical conduits or additional utility piping between the two buildings be designed to account for this difference in settlement.

Lateral Load Resistance

For soil-supported structures, lateral load resistance can be developed by bottom friction between the floor slab and native subgrade, as well as side frictions between the below-grade walls and surrounding soil. A bottom friction coefficient of 0.3 and 0.4 is considered applicable for the foundation supported on native subgrade and import compacted Class 2 Aggregate Base, respectively.

For side friction, a frictional resistance equal to 0.3 times the at-rest horizontal pressure (excluding the earthquake pressure) on the below-grade walls is considered applicable if the on-site clays are used for the wall backfill. If import granular materials are used for the wall backfill, the friction coefficient may be increased to 0.4.

If foundations are poured neat against the soil, the bottom and side frictions may be combined to resist the total loads, including seismic or wind loads. A relatively small displacement on the order of 1/2 to 1 inch may be required to mobilize the bottom and side friction resistances.

In addition, below-grade structures will also develop lateral load resistances by passive soil pressures acting against the below-grade walls. Under static loading, an ultimate passive resistances equal to an equivalent fluid weighing 350 and 175 pounds per cubic foot acting against the vertical face of the pile-caps or grade beams bearing on native soils may be used for drained and undrained conditions. Under temporary dynamic loading, a uniform passive resistance of 2,000 psf is considered applicable. The passive resistance on the upper two feet should be ignored unless it is confined by slab or pavement. It may require lateral deformation of the order of 2 percent of wall height in order to mobilize a full passive resistance.

For pile-supported structures, the lateral resistances can be developed from the passive pressures acting against the pile shaft, pile caps, and grade beams connecting the piles. Due to the adversity impact of dewatering to the subsurface soils, we anticipate that a thin separation may be developed between the floor slab and supporting subgrade by the consolidation. Therefore, it is appropriate to ignore the bottom and side frictions in providing the lateral load resistances.

Under static loading, an ultimate passive resistance equal to an equivalent fluid weighing 350 and 175 pounds per cubic foot acting against the vertical face of the pile-caps or grade beams bearing on native soils may be used for drained and undrained conditions. Under temporary dynamic loading, a uniform passive resistance of 2,000 psf is considered applicable. We anticipate

that a minimum safety factor of 2 and 3 is required for mobilizing passive resistance with an allowable lateral deformation of about 1/2 and 1/4 inch, respectively.

In addition to passive resistance acting on pile-caps and grade beams, we analyzed the lateral resistance of 12 and 14-inch-square precast, prestressed concrete piles with an approximate length of 60 and 70 feet subjected to various lateral loads using subgrade modulus approach via a computer program LPILE (1997).

These analyses are presented in MWH (2001b) and were performed assuming free-head and fixed head conditions for both single and group pile foundations for allowable lateral deflection of 1/4 and 1/2 inch, respectively. Single pile condition applies for center-to-center spacing of eight times the pile width. Group pile condition applies for center-to-center spacing of three times the pile width. If a single pile is designed in groups with center-to-center spacing of three times the pile width, a proper reduction to the initial subgrade modulus should be conducted. The results of these analyses are discussed below.

- Under free-head condition, the computed lateral load was on the order of 10 and 14 kips for a specified lateral deflection of 1/4 and 1/2 inch of a single 12-inch pile. Under fixed-head condition, the computed lateral loads was on the order of 22 and 29 kips for a specified lateral deflection of 1/4 and 1/2 inch of a 12-inch single pile.
- Under free-head condition, the computed lateral load was on the order of 13 and 18 kips for a specified lateral deflection of 1/4 and 1/2 inch of a single 14-inch pile. Under fixed-head condition, the computed lateral loads was on the order of 29 and 38 kips for a specified lateral deflection of 1/4 and 1/2 inch of a 14-inch single pile.
- Under free-head condition, the computed lateral load was on the order of 5 and 10 kips for a specified lateral deflection of 1/4 and 1/2 inch of a 12-inch single pile on a group. Under fixed-head condition, the computed lateral loads was on the order of 15 and 28 kips for a specified lateral deflection of 1/4 and 1/2 inch of a 12-inch single pile on a group.
- Under free-head condition, the computed lateral load was on the order of 7 and 14 kips for a specified lateral deflection of 1/4 and 1/2 inch of a 14-inch single pile on a group. Under fixed-head condition, the computed lateral loads was on the order of 20 and 37 kips for a specified lateral deflection of 1/4 and 1/2 inch of a 14-inch single pile on a group.

If lateral resistance of pile foundation is more controlling than the axial or uplift, we recommend the design pile length be reduced to meet actual axial or uplift loads required for supporting the structures. For relatively long pile (longer or equal to 40 feet), the lateral resistances of pile foundation are not length dependent anymore.

Concrete Slabs-on-Grade

Interior Slabs-on-Grade

Interior slabs should be reinforced with a minimum of #4 bars on 18-inch centers, both ways. Slab reinforcing should be provided in accordance with the anticipated use and loading of

the slab. Slab-on-grade subgrade surfaces should be proof-rolled to provide a smooth, unyielding surface for slab support.

If migration of moisture through the slab is undesirable, a moisture barrier should be provided between the slab and subgrade. We recommend that the moisture barrier consist of 4 inches of free-draining gravel, such as 3/4-inch, clean, crushed, uniformly graded gravel with less than 3 percent passing No. 200 sieve, overlain by a minimum 10-mil thick impermeable membrane. The membrane should be covered with 2 inches of sand for protection during construction and for concrete curing purposes. The sand should be lightly moistened just prior to placing the concrete. Alternatively, a capillary break consisting of 6 inches of free draining gravel could be used

If additional protection is desired by the owner, a higher quality vapor barrier conforming to the requirements of ASTM E 1745 Class A, with a water vapor transmission rate less than or equal to 0.006 gr/ft^2/hr (i.e., .012 perms) per ASTM E 96 (e.g., 15-mil thick "Stego Wrap Class A") may be used in place of the retarder.

During construction, all penetrations (e.g., pipes and conduits,) overlap seams, and punctures should be completely sealed using a waterproof tape or mastic applied in accordance with the vapor retarder manufacturer's specifications. The vapor retarder or barrier should extend to the perimeter cutoff beam or footing. The vapor retarder or barrier should be placed directly under the slab, or at the structural engineer's option, the retarder may be covered with 2 inches of sand. Sand, if used, should be lightly moistened just prior to placing the concrete.

Exterior Slabs-on-Grade

As previously discussed, the onsite moderate expansive surface soils could be subjected to volume changes during fluctuations in moisture content. As a result of these volume changes, some vertical movement of exterior slabs, sidewalks, and pavements should be anticipated. This movement could result in damage to the slabs, sidewalks, and pavements that might require periodic maintenance or replacement. Adequate clearance should be provided between the exterior slabs and building elements that overhang these slabs, such as window sills or doors that open outward.

Exterior slabs such as sidewalks could be reinforced with steel reinforcing bars in lieu of wire mesh to minimize the impact of expansion pressures.

Walkways and pavement curbs and gutters should be supported directly on properly prepared native soils. Eliminating rock base beneath slabs will reduce the potential for migration of landscape irrigation water into pavement and walkway subgrade. Curbs should extend to the bottom of the pavement and baserock layer. One to two days prior to placing concrete, subgrade soils should be soaked to increase their moisture content to at least 3 to 5 percent above laboratory optimum moisture (ASTM D1557). The water content of subgrade soils should be verified by field testing by the Geotechnical Engineer prior to placing concrete.

To reduce moisture changes in the natural soils and fills in landscaped areas, we recommend that drought resistant plants and/or a "drip" irrigation watering system be used. If landscaping plans include trees, they should be planted a minimum distance of one-half the

anticipated mature height of the tree from slabs or pavements to reduce the effects of tree roots on these improvements.

Below Grade Walls

Below grade walls must be designed to resist both lateral earth pressures and any additional lateral loads caused by surcharging.

Restrained walls should be designed to resist an equivalent fluid pressure of 40 pounds per cubic foot (pcf), plus an additional uniform lateral pressure of 8H psf, where H = height of backfill above the top of the wall footing, in feet. Walls with inclined backfill should be designed for an additional equivalent fluid pressure of 1 pcf for every 2 degrees of slope inclination.

Walls subjected to surcharge loads should be designed for an additional uniform lateral pressure equal one-half the anticipated surcharge load. The design surcharge should include the anticipated surcharge caused by vehicular traffic and construction equipment. Surcharge loads from adjacent structures need to be considered if the proposed walls extend below the zone of influence of adjacent foundations. The zone of influence of adjacent foundations can be defined as the area below an imaginary 1.5:1 (horizontal to vertical) line extending downward from the bottom of footings near the wall.

The recommended lateral pressures assume walls are fully back drained to prevent the build-up of hydrostatic pressures. Adequate drainage could be provided by means of either weep holes with permeable material installed behind the walls or by means of a system of subdrains.

For the subdrain system, the top of the perforated pipe should be below the bottom of the adjacent slab or grade. Drains should consist of a drain rock layer at least 12 inches thick that extends to within 2 feet of the ground surface. Four-inch-diameter perforated plastic pipe should be installed (with perforations down) along the base of the walls on a 2-inch-thick bed of drain rock. The pipe should be sloped to drain by gravity to a suitable drainage facility. Drain rock should conform to Caltrans specifications for Class 2 permeable material. A more open-graded material, such as 3/4-inch crushed rock, could be used provided the rock is surrounded by a geotextile filter fabric (Mirafi 140 N or equivalent) to reduce the migration of fine-grained soils into the drain rock. Paving or a two-foot-thick cap of clayey soil should be placed over the drain rock to inhibit surface water infiltration. Alternatively, wall back-drainage can be provided by prefabricated drainage material (such as Miradrain 6000 or an approved alternative). The drainage material can be installed on the back (soil) face of the basement wall and should terminate at a 4-inch-diameter perforated plastic pipe surrounded by at least 6 inches of drain rock as defined above. Drain pipes should outlet to an appropriate drainage facility.

Alternative to an installed subdrain system the walls can be designed for an undrained condition assuming an equivalent pressure of 85 pcf, plus an additional uniform lateral pressure of 8H psf.

Retaining wall backfill less than 5 feet deep should be compacted to at least 90 percent relative compaction using light compaction equipment. Backfill greater than 5 feet deep should be entirely compacted to at least 95 percent relative compaction. If heavy compaction equipment is

used, the walls should be appropriately designed to withstand loads exerted by the heavy equipment, and/or temporarily braced.

Additional Geotechnical Services

Fugro should review geotechnical aspects of the plans and specifications to check for conformance with the intent of our recommendations. The analyses, designs, opinions, and recommendations submitted in this report are based in part upon the data obtained from the subsurface explorations conducted for the UV Disinfection Project, and upon the conditions existing when services were conducted. Variations of subsurface conditions from those analyzed or characterized in the report are possible, as may become evident during construction. In that event, it may be advisable to revisit certain analyses or assumptions.

We recommend that Fugro be retained to provide geotechnical services during site grading and foundation installation to observe compliance with the design concepts, specifications and recommendations presented in this report. Our presence will also allow us to modify design if unanticipated subsurface conditions are encountered.

LIMITATIONS

Our services consist of professional opinions, conclusions, and recommendations that are made in accordance with generally accepted geotechnical engineering principles and practices. This warranty is in lieu of all other warranties, either expressed or implied.

The analyses and recommendations contained in this report are based on the data obtained from the subsurface explorations conducted for this study and relevant previous explorations. These explorations indicate subsurface conditions only at specific locations and times, and only to the depths penetrated. Variations may exist and conditions not observed or described in this report could be encountered during construction. Our conclusions and recommendations are based on our analysis of the observed conditions. If conditions other than those described in this report are encountered, we should be notified so that we can provide additional recommendations, if warranted.

This report has been prepared for the exclusive use of the Fairfield Suisun Sewer District and their consultants for specific application to the UV Disinfection Project as described herein. In the event that there are any changes in the ownership, nature, design, or location of the proposed project, or if any future additions are planned, the conclusions and recommendations contained in this report should not be considered valid unless (1) the project changes are reviewed by Fugro, and (2) conclusions and recommendations presented in this report are modified or verified in writing. Reliance on this report by others must be at their risk unless we are consulted on the use or limitations. We cannot be responsible for the impacts of any changes in geotechnical standards, practices, or regulations subsequent to performance of services without our further consultation. We can neither vouch for the accuracy of information supplied by others, nor accept consequences for unconsulted use of segregated portions of this report.

CLOSURE

We appreciate the opportunity to be of continued service to the Fairfield Suisun Sewer District. Please contact Mr. Ron Bajuniemi at (510) 267-4448 or Mr. Stephen Coulter at (510) 267-4439 if you have any questions regarding the information presented in this report.

Sincerely,
FUGRO WEST, INC.

Stephen E. Coulter, P.E.
Staff Engineer

Ronald L. Bajuniemi, P.E., G.E.
Principal Consultant

SEC/RLB:afp

Attachments: Plate 1: Vicinity Map
Plate 2: Site Plan
Appendix A: Previous Borings

Copies Submitted: (2 and PDF) Addressee
(PDF) Yulya Borroum, Eco Logic

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PLATES

October 2009
Project No. 1944.001

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SOURCE: This aerial photo was obtained from Google Earth Pro dated September 2009.

NORTH

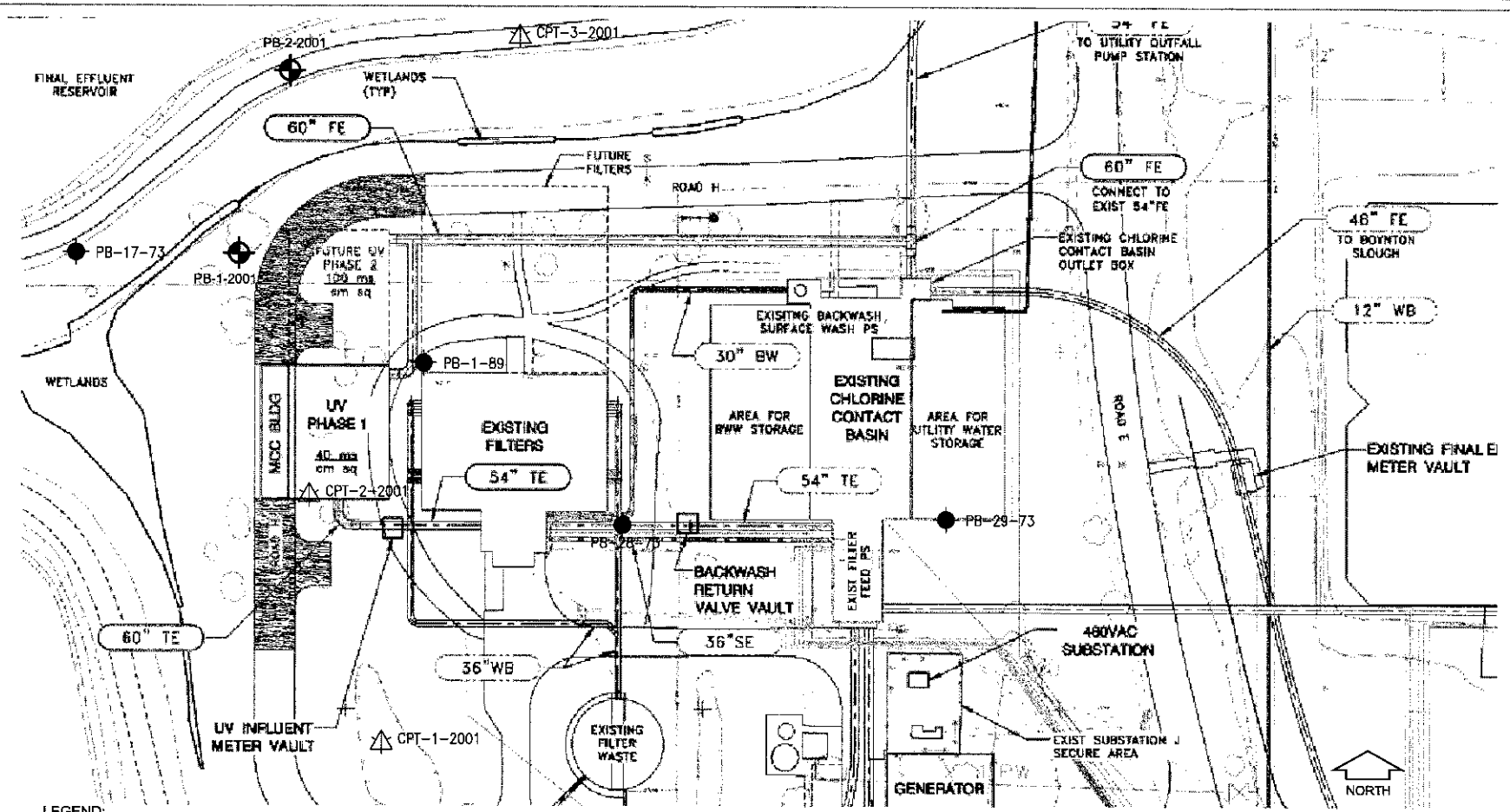
0 2000 4000

FEET

VICINITY MAP
FAIRFILED SUISUN UV PLANT
Chadbourne, California

PLATE 1

October 2009
Project No. 1944.001



LEGEND:

PB-1-2001 — APPROXIMATE LOCATION PREVIUS BORING PERFORMED BY MWH (2001)

CPT-3-2001 — APPROXIMATE LOCATION OF CONE PENETRATION TEST PERFORMED BY MWH (2001)

PB-1-89 — APPROXIMATE LOCATION OF PREVIOUS BORING PERFORMED BY WCC (1989)

PB-1-73 — APPROXIMATE LOCATION OF PREVIOUS BORING PERFORMED BY WCC (1973)

NOTE:

THIS SITE MAP IS BASED ON A PLATE PROVIDED BY ECO:LOGIC CONSULTING AND ENGINEERING

0 60 120
FEET

SITE PLAN WITH PREVIOUS BORINGS AND CPT LOCATION
Fairfiled Suisun UV Plant
Chadbourne, California
PLATE 2

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APPENDIX A
PREVIOUS BORINGS

Project: **FAIRFIELD-SUISUN SUBREGIONAL WASTEWATER TREATMENT PLANT**
Fairfield, California

Log of Boring No. 1

Date Drilled: June 19, 1989
Type of Boring: 4-7/8-inch rotary wash
Hammer: 140 pounds falling 30 inches

Remarks: See Figure A-1 for Boring Log Legend
Location:

Surface Elevation: Approx. 12 feet

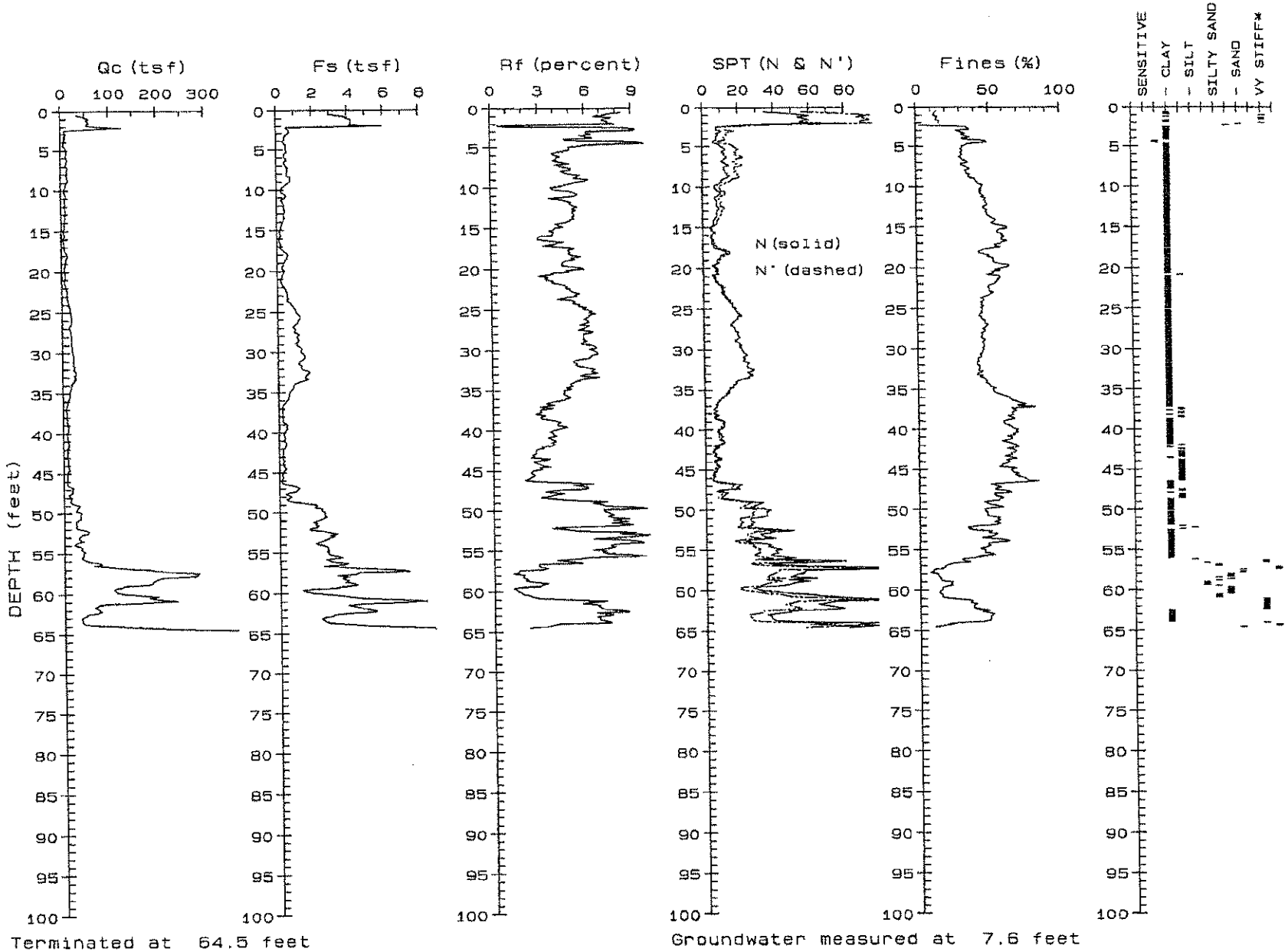
Depth, ft.	Samples	Blows/ft.	MATERIAL DESCRIPTION	Moisture Content %	Dry Density psf	Unconfined Compress. Strength, psf
			SILTY CLAY (CL) Medium stiff, damp, brown With some gravel			
5	1	5	SILTY CLAY (CL-CH) Medium stiff, moist, gray-brown	28	93	1380
			Becomes medium stiff to stiff			
10	2	9		--	--	---
			Becomes soft, with trace of sand			
15	3	6		31	90	400
			SILTY CLAY (CL) Medium stiff to stiff, saturated, gray-brown, with trace of sand			
20	4	13		23	104	1630
			SILTY CLAY (CL-CH) Stiff, moist, gray-brown			
25	5	33		25	97	3420
			Becomes very stiff			
30	6	44		24	99	3790
			SILTY CLAY (CL-CH) Stiff, moist, brown, mottled gray			
35	7	19		27	96	2080
40	8	16		--	--	---
			SILTY CLAY (CL) Medium stiff, saturated, gray-brown			
45	9	9		34	88	790

Project No. 8910138A | **Woodward-Clyde Consultants** | Figure A-2a

Project: **FAIRFIELD-SUISUN SUBREGIONAL WASTEWATER TREATMENT PLANT**
Fairfield, California

Log of Boring No. 1
(Continued)

Depth Ft.	Samples	Blows/Ft	MATERIAL DESCRIPTION	Moisture Content %	Dry Density psf	Unconfined Compress. Strength, psf
50	9	9	SILTY CLAY (CL)..... Continued	34	88	790
	10	15		32	90	1300
55			With some sand and gravel			
60	11	35	SILTY CLAY (CL) Very stiff, moist, red-brown, with calcareous nodules	21	106	6000
65			Becomes very stiff to hard			
70	12	74		--	--	---
75			SILTY CLAY (CL) Very stiff, moist, brown			
80	13	34		23	103	5010
			Bottom of boring at 81'-6".			
85						
90						



PROJECT: FAIRFIELD-SUISUN WWTP
LOCATION: Fairfield CA
PROJ. NO.: 20437-G1 (MWH-35)

CPT NO.: CPT-2
DATE : 10-30-2001

John Sarmiento & Associates
Cone Penetration Testing Service

PROJECT: FAIRFIELD-SUISUN WWTP
LOCATION: Fairfield CA
PROJ. NO.: 20437-G1(MWH-35)

CPT NO.: CPT-2
DATE : 10-30-2001
Groundwater measured at 7.6 feet

DEPTH (feet)	Qc (tsf)	Fs (tsf)	Rf (%)	SPT (N)	SPT (N')	TotHzStr (ksf)	PHI (deg.)	SU (ksf)	SOIL BEHAVIOR TYPE	DENSITY RANGE (pcf)
0.50	35.22	2.931	8.3	35	56	0.06	----	4.69	"	"
1.00	59.51	3.915	6.6	60	95	0.13	----	7.93	Very Stiff Fine Grained *	"
1.50	59.63	4.212	7.1	60	95	0.19	----	7.94	"	"
2.00	75.34	5.938	7.9	75	121	0.26	----	10.03	"	>140
2.50	8.41	0.709	8.4	8	13	0.32	----	1.65	CLAY	120-130
3.00	11.48	0.695	6.1	11	18	0.39	----	1.88	"	"
3.50	8.61	0.488	5.7	9	14	0.45	----	1.68	"	110-120
4.00	8.22	0.385	4.7	8	13	0.50	----	1.59	"	"
4.50	5.76	0.564	9.8	6	9	0.56	----	1.10	Organic Material	"
5.00	11.20	0.565	5.0	11	18	0.62	----	1.81	CLAY	120-130
5.50	11.58	0.540	4.7	12	19	0.69	----	1.87	"	"
6.00	11.56	0.479	4.1	12	18	0.75	----	1.86	"	"
6.50	11.93	0.500	4.2	12	19	0.81	----	1.92	"	"
7.00	11.56	0.581	5.0	12	18	0.87	----	1.85	"	"
7.50	13.06	0.612	4.7	13	19	0.94	----	1.68	"	"
8.00	13.40	0.600	4.5	13	19	1.00	----	1.72	"	"
8.50	14.17	0.803	5.7	14	20	1.06	----	1.82	"	"
9.00	12.36	0.768	6.2	12	17	1.12	----	1.57	"	"
9.50	9.79	0.496	5.1	10	13	1.18	----	1.53	"	110-120
10.00	6.88	0.263	3.8	7	9	1.24	----	1.25	"	100-110
10.50	8.49	0.422	5.0	8	11	1.29	----	1.57	"	110-120
11.00	9.06	0.486	5.4	9	12	1.36	----	1.40	"	"
11.50	7.16	0.313	4.4	7	9	1.41	----	1.29	"	"
12.00	7.94	0.399	5.0	8	10	1.47	----	1.44	"	"
12.50	8.96	0.475	5.3	9	12	1.53	----	1.64	"	"
13.00	8.24	0.427	5.2	8	11	1.58	----	1.49	"	"
13.50	8.28	0.439	5.3	8	10	1.64	----	1.49	"	"
14.00	6.86	0.348	5.1	7	9	1.70	----	1.20	"	"
14.50	6.47	0.268	4.1	6	8	1.75	----	1.12	"	100-110
15.00	4.41	0.180	4.1	4	5	1.80	----	0.70	"	90-100
15.50	5.57	0.221	4.0	6	7	1.85	----	0.93	"	100-110
16.00	4.52	0.137	3.0	5	5	1.90	----	0.71	"	90-100
16.50	4.80	0.166	3.5	5	6	1.95	----	0.77	"	"
17.00	5.45	0.225	4.1	5	7	2.00	----	0.89	"	100-110
17.50	6.43	0.340	5.3	6	8	2.05	----	1.08	"	"
18.00	12.70	0.630	5.0	13	15	2.11	----	1.55	"	120-130
18.50	9.97	0.571	5.7	10	12	2.18	----	1.48	"	"
19.00	7.92	0.372	4.7	8	9	2.23	----	1.36	"	110-120
19.50	6.58	0.298	4.5	7	7	2.29	----	1.09	"	100-110
20.00	7.26	0.431	5.9	7	8	2.34	----	1.22	"	110-120
20.50	7.53	0.283	3.8	8	8	2.40	----	1.27	"	100-110
21.00	6.19	0.222	3.6	6	7	2.45	----	0.99	"	"
21.50	6.74	0.263	3.9	7	7	2.51	----	1.10	"	"
22.00	8.77	0.404	4.6	9	10	2.56	----	1.50	"	110-120
22.50	10.32	0.513	5.0	10	11	2.62	----	1.50	"	120-130
23.00	10.15	0.569	5.6	10	11	2.69	----	1.47	"	"
23.50	12.43	0.590	4.7	12	13	2.75	----	1.47	"	"
24.00	14.33	0.759	5.3	14	15	2.81	----	1.72	"	"
24.50	16.38	0.901	5.5	16	17	2.87	----	1.99	"	"
25.00	17.41	1.043	6.0	17	18	2.94	----	2.13	"	130-140
25.50	18.64	1.232	6.6	19	19	3.01	----	2.29	"	"
26.00	19.26	1.166	6.1	19	20	3.07	----	2.36	"	"
26.50	16.98	1.054	6.2	17	17	3.14	----	2.05	"	"
27.00	15.45	0.964	6.2	15	16	3.20	----	1.85	"	120-130
27.50	17.26	0.944	5.5	17	17	3.27	----	2.08	"	"
28.00	19.01	1.096	5.8	19	19	3.33	----	2.31	"	130-140
28.50	20.02	1.185	5.9	20	20	3.40	----	2.44	"	"
29.00	18.12	1.056	5.8	18	18	3.47	----	2.19	"	"
29.50	20.51	1.347	6.6	21	20	3.54	----	2.50	"	"
30.00	20.82	1.332	6.4	21	21	3.60	----	2.54	"	"
30.50	22.71	1.522	6.7	23	23	3.67	----	2.78	"	"
31.00	22.46	1.370	6.1	22	22	3.74	----	2.75	"	"
31.50	23.20	1.215	5.2	23	23	3.81	----	2.84	"	"

PROJECT: FAIRFIELD-SUISUN WWTP
LOCATION: Fairfield CA
PROJ. NO.: 20437-G1(MWH-35)

CPT NO.: CPT-2
DATE : 10-30-2001
Groundwater measured at 7.6 feet

DEPTH (feet)	Qc (tsf)	Fs (tsf)	Rf (%)	SPT (N)	SPT (N')	TotHzStr (ksf)	PHI (deg.)	SU (ksf)	SOIL BEHAVIOR TYPE	DENSITY RANGE (pcf)
32.00	23.93	1.348	5.6	24	24	3.87	----	2.93	"	"
32.50	27.77	1.767	6.4	28	28	3.94	----	3.44	"	"
33.00	25.64	1.516	5.9	26	25	4.01	----	3.15	"	"
33.50	25.03	1.511	6.0	25	25	4.08	----	3.07	"	"
34.00	17.67	0.910	5.2	18	17	4.14	----	2.08	"	120-130
34.50	16.08	0.819	5.1	16	16	4.20	----	1.86	"	"
35.00	14.05	0.627	4.5	14	14	4.27	----	1.59	"	"
35.50	12.85	0.581	4.5	13	12	4.33	----	1.42	"	"
36.00	9.69	0.459	4.7	10	9	4.39	----	1.25	"	110-120
36.50	7.77	0.287	3.7	8	7	4.45	----	1.11	"	100-110
37.00	7.00	0.212	3.0	7	7	4.50	----	0.95	"	"
37.50	7.64	0.226	3.0	5	5	4.55	----	1.07	Silty CLAY to CLAY	"
38.00	7.53	0.204	2.7	5	5	4.60	----	1.05	"	"
38.50	7.99	0.245	3.1	5	5	4.66	----	1.13	"	"
39.00	11.40	0.493	4.3	11	10	4.72	----	1.51	CLAY	120-130
39.50	10.50	0.490	4.7	11	9	4.78	----	1.35	"	"
40.00	8.14	0.307	3.8	8	7	4.83	----	1.14	"	110-120
40.50	8.96	0.339	3.8	9	8	4.89	----	1.30	"	"
41.00	8.89	0.317	3.6	9	8	4.95	----	1.28	"	"
41.50	11.48	0.428	3.7	11	10	5.01	----	1.50	"	"
42.00	8.12	0.252	3.1	5	5	5.06	----	1.12	Silty CLAY to CLAY	100-110
42.50	8.22	0.225	2.7	5	5	5.11	----	1.13	"	"
43.00	8.45	0.213	2.5	6	5	5.17	----	1.17	"	"
43.50	9.14	0.329	3.6	9	8	5.22	----	1.09	CLAY	110-120
44.00	8.88	0.236	2.7	6	5	5.28	----	1.25	Silty CLAY to CLAY	100-110
44.50	11.86	0.423	3.6	8	7	5.33	----	1.53	"	110-120
45.00	8.76	0.223	2.5	6	5	5.39	----	1.21	"	100-110
45.50	7.92	0.208	2.6	5	4	5.44	----	1.04	"	"
46.00	6.74	0.150	2.2	4	4	5.49	----	0.80	"	90-100
46.50	7.26	0.344	4.7	7	6	5.54	----	0.90	CLAY	110-120
47.00	19.01	1.127	5.9	19	15	5.61	----	2.16	"	130-140
47.50	15.65	0.591	3.8	10	8	5.67	----	1.71	Silty CLAY to CLAY	120-130
48.00	16.55	0.653	3.9	11	9	5.74	----	1.82	"	"
48.50	13.23	0.499	3.8	9	7	5.80	----	1.38	"	"
49.00	32.47	2.036	6.3	32	26	5.86	----	3.94	CLAY	130-140
49.50	27.04	2.378	8.8	27	21	5.93	----	3.21	"	"
50.00	36.20	2.521	7.0	36	28	6.00	----	4.43	"	"
50.50	34.49	2.619	7.6	34	27	6.07	----	4.19	"	"
51.00	24.78	2.123	8.6	25	19	6.13	----	2.90	"	"
51.50	26.74	2.004	7.5	27	21	6.20	----	3.15	"	"
52.00	35.04	1.682	4.8	23	18	6.27	----	4.25	Silty CLAY to CLAY	"
52.50	49.38	2.718	5.5	49	38	6.34	----	6.16	CLAY	"
53.00	30.77	3.054	9.9	31	23	6.40	----	3.68	"	"
53.50	39.12	2.457	6.3	39	30	6.47	----	4.78	"	"
54.00	22.89	2.166	9.5	23	17	6.54	----	2.62	"	"
54.50	34.73	2.667	7.7	35	26	6.61	----	4.19	"	"
55.00	38.82	2.758	7.1	39	29	6.67	----	4.73	"	"
55.50	37.78	3.230	8.6	38	28	6.74	----	4.59	"	"
56.00	50.42	2.723	5.4	50	37	6.81	----	6.27	"	"
56.50	62.63	3.532	5.6	63	46	6.88	----	7.89	Very Stiff Fine Grained *	"
57.00	176.85	5.115	2.9	59	43	6.94	39	----	Silty SAND to Sandy SILT	"
57.50	280.87	4.470	1.6	56	41	7.01	42	----	SAND	"
58.00	205.95	3.824	1.9	51	37	7.08	40	----	SAND to Silty SAND	"
58.50	184.60	3.825	2.1	62	44	7.15	40	----	Silty SAND to Sandy SILT	"
59.00	125.38	4.300	3.4	50	36	7.22	----	16.24	Sandy SILT to Clayey SILT	"
59.50	103.05	1.812	1.8	34	24	7.28	36	----	Silty SAND to Sandy SILT	"
60.00	125.94	1.869	1.5	31	22	7.35	37	----	SAND to Silty SAND	"
60.50	177.44	3.921	2.2	59	42	7.42	39	----	Silty SAND to Sandy SILT	"
61.00	173.72	8.167	4.7	174	121	7.48	----	22.66	Very Stiff Fine Grained *	>140
61.50	68.48	3.812	5.6	68	48	7.55	----	8.63	"	130-140
62.00	72.51	4.936	6.8	73	50	7.62	----	9.16	"	"
62.50	45.96	3.897	8.5	46	32	7.69	----	5.62	CLAY	"

PROJECT: FAIRFIELD-SUISUN WWTP
LOCATION: Fairfield CA
PROJ. NO.: 20437-G1(MWH-35)

CPT NO.: CPT-2
DATE : 10-30-2001
Groundwater measured at 7.6 feet

DEPTH (feet)	Qc (tsf)	Fs (tsf)	Rf (%)	SPT (N)	SPT (N')	TotHzStr (ksf)	PHI (deg.)	SU (ksf)	SOIL BEHAVIOR TYPE	DENSITY RANGE (pcf)
63.00	34.31	2.564	7.5	34	24	7.76	----	4.06	"	"
63.50	36.87	2.484	6.7	37	25	7.82	----	4.39	"	"
64.00	111.95	4.540	4.1	112	76	7.89	----	14.40	Very Stiff Fine Grained *	"
64.50	398.50	8.683	2.2	80	54	7.96	44	----	SAND	"

DEPTH = Sampling interval (2 inches)
Qc = Tip bearing resistance
Fs = Sleeve friction resistance
Rf = Tip/Sleeve ratio
SPT = Equivalent Standard Penetration Test*
TotStr = Total Stress using est. density**
Phi = Soil friction angle*
Su = Undrained Soil Strength* (Nk=10 for Qc<9 tsf) (Nk=12 for Qc=9 to 12 tsf) (Nk=15 for Qc>12 tsf)

References: * Robertson and Campanella, 1988
** Olsen, 1989 *** Durgunoglu & Mitchell, 1975

Appendix C

Wedeco Scope of Supply

ITT

Engineered for life

WEDECO'S SCOPE OF SUPPLY

The proposed UV disinfection system will be installed in concrete channels and shall operate under gravity conditions:

- **UV Modules**: Each module will be supplied completely assembled containing UV lamps, quartz sleeves, wiping equipment, and multiple quick connectors.

Model & Make:	TAK55HP
Quantity:	81 UV modules will be supplied each consisting of 18 UV lamp assemblies
Material:	Stainless steel 316 frame
Approx. weight	205 lb per UV module

- **Lamp Cables**: One thousand four hundred fifty-eight (1458) lamp-to-ballast cables will be supplied. **Field terminations of these cables are the responsibility of the CONTRACTOR.**

- **Instrumentation Control Automation (ICA)**: One (1) ICA-300UL unit will be supplied to monitor and control the UV system and shall contain the PLC system together with the operator interface. The PLC will include a communication module to import and export all UV plant data from/to the SCADA system.

  Provisions for a suitable climate-controlled (max. 104 deg. F) building to house all enclosure(s) and ancillary equipment are the responsibility of the CONTRACTOR.

Model & Make:	Allen Bradley ControlLogix PLC
Operator interface:	Acnodes PC5171 with Wonderware HMI software
Material:	Painted Sheet Steel
Quantity:	One (1)
Rating:	TYPE 12
Dimensions:	39 3/8"W x 23 5/8"D x 82 ¾"H

- **TDS Ballast Distribution UL Style "B"**: All required TDS Ballast Distribution UL Style "B" units will be supplied completely assembled containing the power that will serve the TDS Ballast 72 UL enclosures for the bank in each channel. All units will be equipped with fan for cooling.

  NOTE: Field wiring and terminations to be performed by the CONTRACTOR.

Material:	Painted Sheet Steel
Quantity:	Nine (9)
Rating:	TYPE 12
Equipment Cooling:	Fan-cooling
Dimensions:	23 5/8"W x 23 5/8"D x 82 ¾"H

- **TDS Ballast 72 UL**: All required TDS Ballast 72 UL units will be supplied completely assembled containing the ballast that will operate the UV lamps. All units will be equipped with fan for cooling.

NOTE: Field wiring and terminations to be performed by the CONTRACTOR.

Material:	Painted Sheet Steel
Quantity:	Twenty-seven (27)
Rating:	TYPE 12
Ballast cooling:	Fan-cooling
Dimensions:	31 ½"W x 23 5/8"D x 82 ¾"H

NOTE: All enclosures will be provided with an 8" base/plinth size.

- **Power Panel:** Power panel(s) will be supplied to receive incoming power from the isolation transformers and supply power to the TDS Ballast Distribution Enclosures.

Type:	I-Line PanelBoard
Rating:	NEMA3R
Quantity:	One (1) per channel

- **Transformer**: Three (3) isolation transformers will be supplied to accommodate the 3-wire plus ground connection on the primary leg and send a 3-wire+neutral+ground to the power panels off of the secondary leg. The transformer shall be installed in its own NEMA3R enclosure for outdoor rated installation. Each transformer will also include appropriate rodent guard.

Type:	Isolation transformer
Rating:	NEMA3R

- **Junction Box (JB)**: Nine (9) junction boxes will be supplied, providing lamp power connections, control signal connections, and compressed air connections for the UV modules. Connections from junction boxes to the UV modules are by multiple quick-disconnect plug and socket arrangements.

Material:	304 Stainless steel

- **Modem**: One (1) modem for remote PLC monitoring and diagnostic capabilities will be supplied. Supply and installation of the phone line is the responsibility of the CONTRACTOR.

- **A-Frame Lifting Bracket**: One (1) A-frame lifting bracket will be supplied for module removal.

- **Automatic Wiping System**: An automatic mechanical wiping system, pneumatically powered, will be supplied including air compressors.

Model & Make:	Ingersoll-Rand, 2475N5 or equal
Quantity:	One (1)

- **Water Level Sensor**: Three (3) water level sensors will be supplied to indicate low water level conditions to the UV PLC.

Make & Model: Endress+Hauser, Liquipoint T FTW-31 Series

- **Water Level Control Device**: Three (3) fiberglass trough weirs will be supplied including fabrication and supply. The weir maintains a defined constant water level above the lamps ensuring full submergence of the modules and preventing short-circuiting.

  Material: Fiberglass

- **Baffle Plate**: Three (3) baffle plates along with mounting brackets and guides will be supplied. The baffle plate will be installed upstream of the UV modules to ensure plug flow conditions in the channel.

  Material: 304 stainless steel

- **Professional Engineer Stamp:** Seismic calculations sealed by a professional engineer registered in the State of California will be submitted.

- **Uninterruptible Power Supply (UPS):** UPS shall be supplied for backup for the system controls (PLC) for a period of fifteen (15) minutes. UPS shall be Liebert or equal. Room shall also be provided in the ICA to accommodate APC 1000XL UPS if required at a later time.

- **Out of Channel Cleaning System:** Out of channel cleaning shall be provided including an additional junction box that will have provisions for wiping including eight air quick disconnects to allow modules' wipers to operate during the cleaning cycle, and brackets and bars for placing the modules into the tank.

  NOTE: Modules will be capable of being removed individually. Cleaning system tank and cover (if required) to be provided by installing contractor. Customer will need to provide control wiring to additional junction box.

- **On-line UV transmittance monitor:** Two (2) on-line UV transmittance monitors, HIPPO or equal, will be provided.

- **Spare Parts and Safety Equipment**: The following spare parts and safety equipment will be supplied with the UV system:

  - Ten (10) percent installed lamps
  - Five (5) percent installed electronic ballasts
  - Ten (10) percent installed quartz sleeves
  - Five (5) percent installed UV intensity sensors
  - One (1) Allen Bradley ControlLogix processor
  - One (1) I/O module of each type
  - Two (2) UV-protective face shields
  - Two (2) warning signs
  - Additional digital input module, combo analog input/output module, extra relays, terminals, and wiring as required per the PID

- **Field Services**: WEDECO will provide the services of a qualified technician for the following:
  - Twenty-six (26) days, three (3) trips for installation assistance, inspection, start-up, and operator training as required per specifications.
  - Please note that any additional services as required are available on a per diem rate upon request.

- **Warranty**: WEDECO warrants the performance of this equipment to produce an effluent bacterial content according the criteria stated. This warranty is contingent upon the equipment being operated, cleaned, and maintained as per WEDECO' instructions, all replacement components being purchased from WEDECO and the effluent characteristics being per the design specification.

- **Documentation (Shop Drawings and O&M Manuals)**: WEDECO will provide the following documentation to the contractor per the following schedule:
  - All required copies of submittal shop drawings 8 weeks after receipt of written purchase order

SCOPE OF SUPPLY BY OTHERS

- All commissioning as required by Title-22 (i.e. velocity and hydraulic resident time profiling and/or spot-check bioassay) will be paid for by the Owner and performed by ECO:LOGIC.

- The CONTRACTOR is responsible for the full bank cleaning system tank and cover (if required), as well as all associated chemicals.

- The CONTRACTOR is responsible for all field terminations and electrical conduits. The field terminations include the lamp cable to ballast terminations within the ballast enclosures. There are 1458 total lamp cables. All other terminations and conduits to be per the specification.

- The CONTRACTOR is responsible for installing the ballast cards in the ballast enclosures.

- The CONTRACTOR is responsible for supplying and installing an influent flow measurement to the UV system PLC (4 – 20 mA signal).

- The CONTRACTOR is responsible for setting in place and anchoring all electrical enclosures as indicated in the drawings.

  All conduits and conductors are the responsibility of the CONTRACTOR in accordance with local and national electrical codes.

- The CONTRACTOR is responsible for setting in place and anchoring the transformers as indicated in the drawings. The CONTRACTOR shall also be responsible for the power feed to the transformers:

  - 480 V, 3-phase, 3 wires plus ground, 60 Hz

  All conduits and conductors are the responsibility of the CONTRACTOR.

- The CONTRACTOR is responsible for setting in place and anchoring the junction boxes (JB) across the channel as indicated in the drawings.

- The CONTRACTOR is responsible for setting in place and anchoring the components as indicated in the drawings.

- The CONTRACTOR is responsible for setting in place and anchoring the compressed air supply as indicated in the drawings. The CONTRACTOR shall also be responsible for the power feed to the air compressor and automatic drain.

  - 480 V, 3-phase, 60 Hz to air compressor
  - 120 V, 1-phase, 60 Hz to the air compressor automatic drain
  - 120 V, 1-phase, 60 Hz to the air compressor filter

  All conduits and conductors are the responsibility of the CONTRACTOR.

Air line (3/8" diameter) and conduit from compressor to junction boxes shall be supplied by the CONTRACTOR.

- The CONTRACTOR is responsible for supplying and installing a light-tight covering for the channel.
- The CONTRACTOR is responsible for setting in place and anchoring the water level control device(s) to the channel walls and bottom ensuring water tightness.
- The CONTRACTOR is responsible for setting in place and anchoring the water level sensor(s) indicated in the drawings. Size of the conduit to be the responsibility of the contractor.
- The CONTRACTOR is responsible for supplying a suitable climate-controlled building for the system electrical enclosures and ancillary equipment. The building shall be a maximum of 95 degrees F.
- The CONTRACTOR is responsible for the unloading of all the components supplied by WEDECO. The CONTRACTOR is also responsible for storage of all the components if required.
- The CONTRACTOR is responsible for supplying and installing a dedicated phone line for the modem.
- The CONTRACTOR is responsible for supplying and installing a lifting device for individual module removal.
- The CONTRACTOR is responsible for any video taping of training if required.

ITEM NO.	QTY	DESCRIPTION	PRICE
1	1	UV System Model TAK55 as defined in scope of supply	INCLUDED
		TOTAL:	**US$ 1,670,700**

NOTES:

- Freight to jobsite is included in amount. Offloading and arrangement of the equipment is not included.
- Price quoted is firm and valid for deliveries as late as fall 2010.
- Price is based upon the following payment terms (net 30 days):
  - 15% upon approved drawings
  - 75% upon delivery of equipment to site, unless delayed by purchaser then upon notification of ready to ship
  - 10% upon start-up or within six (6) months from date of delivery, whichever occurs first
- Schedule:
  - Submittals are available within 8-10 weeks after acceptance of purchase order.
  - Equipment delivery is within 18-22 weeks after approved submittals.
  - Delivery times are based upon an approval period of four (4) weeks, which approval shall not be unreasonably withheld.
  - Please note that schedule as described above is WEDECO's standard. We would be happy to meet a different schedule, including one which is more expedited, if required.
- WEDECO does not provide for any process utility requirements including electrical power.
- This firm proposal is based upon WEDECO's General Terms of Business.
- No taxes of any kind have been included in this firm proposal.

Standard Warranties

1. General Statement of Warranty

The warranty period is 18 months from date of delivery and 12 months from date of Substantial Completion of UV Equipment whichever comes first. Seller warrants that the Equipment purchased (i) will be free from defects in material and/or workmanship excluding consumables such as lamps, ballasts, sleeves and sensors for which specific warranties are provided below and (ii) will be built in accordance with the specifications referred to in the quotation or confirmation of sale, as the case may be Substantial Completion must occur within one (1) year from the date of shipment or warranty will automatically default to ship date as delivery. When using Substantial Completion as the beginning of the warranty period a copy of the Certificate of Completion will be required to support any Warranty Claims submitted for approval.

2. Lamp Warranty

ITT Water & Wastewater warrants 10,000 hours operating time for each lamp SLR32143HP under normal operating conditions. Normal operating conditions include:

- On/off cycles max. 4 per 24 operating hours,
- Voltage fluctuations according DIN IEC 38 (230/400 V ± 10% relating to 480 V ± 10%).

In case of premature lamp failure, the client is requested to send the lamp back prepaid to ITT Water & Wastewater together with the information of UV unit serial number, hours run and on/off cycles. ITT Water & Wastewater then offers the following:

- Lamp failure before 9,000 hours: ITT Water & Wastewater will send a replacement lamp free of charge,
- Lamp failure after 9,000 hours: ITT Water & Wastewater will issue a credit proportional to the hours not used from the 10,000 hour lamp warranty.

As part of ITT Water & Wastewater's corporate commitment to the environment, used and failed but complete lamps returned to our facilities to Charlotte, NC, will be properly recycled/disposed of at no charge to the client. For every new lamp purchased ITT Water & Wastewater will take one back for disposal. Lamps should be shipped back prepaid in good packaging that avoids the possibility of breakage. A return authorization (NCR) number must be received from the returns department at ITT Water & Wastewater and written on the outside of the shipping container(s).

3. Ballast Warranty

ITT Water & Wastewater warrants 5 years of ballast life after installation under normal operating conditions. Normal operating conditions include:

- On/off cycles max. 4 per 24 operating hours,
- Voltage fluctuations according DIN IEC 38 (230/400 V ± 10% relating to 480 V ± 10%).

In case of premature ballast failures, the client is requested to send the ballast back prepaid to ITT Water & Wastewater together with the information of UV unit serial number, hours run and on/off cycles. ITT Water & Wastewater then offers the following:

- Ballast failure before 1 year: ITT Water & Wastewater will send a replacement ballast free of charge,
- Ballast failure after 1 year: ITT Water & Wastewater will issue a credit proportional to the time not used.

4. QUARTZ SLEEVE WARRANTY

ITT Water & Wastewater warrants a 20-year lifetime for each quartz sleeve under normal operating conditions based upon operation and maintenance according to the O&M manuals.

In case of premature quartz sleeve failure, the client is requested to send the quartz sleeve back prepaid to ITT Water & Wastewater together with the information of UV unit serial number, hours run and on/off cycles. ITT Water & Wastewater then offers the following:

- Quartz sleeve failure before 5 years: ITT Water & Wastewater will send a replacement quartz sleeve free of charge,
- Quartz sleeve failure before 20 years: ITT Water & Wastewater will issue a credit proportional to the hours not used.

5. SENSOR WARRANTY

ITT Water & Wastewater warrants a 10-year lifetime for each sensor UCI under normal operating conditions based upon operation and maintenance according to the O&M manuals.

In case of premature sensor failure, the client is requested to send the sensor back prepaid to ITT Water & Wastewater together with the information of UV unit serial number, hours run and on/off cycles. ITT Water & Wastewater then offers the following:

- Sensor failure before 2 years: ITT Water & Wastewater will send a replacement quartz sleeve free of charge,
- Sensor failure after 10 years: ITT Water & Wastewater will issue a credit proportional to the hours not used.

6. WIPER WARRANTY

ITT Water & Wastewater warrants a 1-year or 30,000 wipes lifetime for each wiper ring under normal operating conditions based upon operation and maintenance according to the O&M manuals.

7. CONDITIONS APPLICABLE TO ALL WARRANTIES

The above warranties shall not apply to any failure or defect which results (i) from the Equipment not being installed, operated and/or maintained in strict accordance with instructions specified in the

Operation and Maintenance manuals of WEDECO products; or (ii) from mishandling, misuse, neglect, accident, physical damage, improper storage,; or (iii) from ordinary wear and tear, corrosion, or chemical attack; or (iv) from improper operation of the Equipment with other equipment furnished by the Owner or by other third parties; or (v) from damage due to a defective power supply or improper electrical protection; or (vi) from defects in designs or specifications furnished by or on behalf of the Owner by a person other than ITT Water & Wastewater. In addition, this warranty shall not apply to Equipment that has been altered or repaired after start-up by any one except:

- Authorized representatives of ITT Water & Wastewater for WEDECO products, or
- The Owner personnel acting under specific instructions from ITT Water & Wastewater.

The Owner must notify ITT Water & Wastewater in writing within 5 days of the date of any Equipment failure. This notification shall include a description of the problem, a copy of the operator's log, a copy of the Owner's maintenance record and any analytical results detailing the problem. If the Owner has not maintained the operator's log and maintenance record in the manner directed in the Operation and Maintenance manual, or does not notify ITT Water & Wastewater of the problem as specified above, this warranty may, in ITT Water & Wastewater's discretion, be invalid.

The Owner will fully cooperate with ITT Water & Wastewater, in the manner requested by ITT Water & Wastewater, in attempting to diagnose and resolve the problem by way of telephone support. If the problem can be diagnosed by telephone support and the Equipment is determined to be in breach of this warranty, then ITT Water & Wastewater will either, at ITT Water & Wastewater's expense, ship a repaired, reworked or new part to the Owner who will install such part as directed by ITT Water & Wastewater or will direct the Owner to acquire, at ITT Water & Wastewater's expense, such part from a third party and then install such part as directed by ITT Water & Wastewater.

In the event that ITT Water & Wastewater determines that the problem cannot be resolved by way of telephone support and/or shipment by ITT Water & Wastewater, or acquisition by the Owner, of a replacement part for installation by the Owner, ITT Water & Wastewater will send one or more persons to make an on-site inspection of the problem. If an on-site visit is made, ITT Water & Wastewater personnel will evaluate the problem and repair or replace any Equipment determined to be in breach of this warranty. If the problem is not attributable to a breach of this warranty, ITT Water & Wastewater reserves the right to invoice the Owner for this service.

THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ANY AND ALL OTHER EXPRESS OR IMPLIED WARRANTIES, GUARANTEES, CONDITIONS OR TERMS OF WHATEVER NATURE RELATING TO THE EQUIPMENT PROVIDED HEREUNDER, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WHICH ARE HEREBY EXPRESSLY DISCLAIMED AND EXCLUDED. BUYER'S EXCLUSIVE REMEDY AND SELLER'S AGGREGATE LIABILITY FOR BREACH OF ANY OF THE FOREGOING WARRANTIES IS LIMITED TO REPAIRING OR REPLACING THE PRODUCT AND SHALL IN ALL CASES BE LIMITED TO THE AMOUNT PAID BY THE BUYER HEREUNDER. IN NO EVENT IS SELLER LIABLE FOR ANY OTHER FORM OF DAMAGES, WHETHER DIRECT, INDIRECT, LIQUIDATED, INCIDENTAL, CONSEQUENTIAL,

PUNITIVE, EXEMPLARY OR SPECIAL DAMAGES, INCLUDING BUT NOT LIMITED TO LOSS OF PROFIT, LOSS OF ANTICIPATED SAVINGS OR REVENUE, LOSS OF INCOME, LOSS OF BUSINESS, LOSS OF PRODUCTION, LOSS OF OPPORTUNITY OR LOSS OF REPUTATION.

Appendix D

Solano County Air Pollution Control District, Air Permit Application

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
939 Ellis Street, San Francisco, CA 94109
Engineering Division (415) 749-4990
www.baaqmd.gov fax (415) 749-5030

Form P-101B
Authority to Construct/
Permit to Operate

1. Application Information

BAAQMD Plant No. 1404 Company Name Fairfield Suisun Sewer District

Equipment/Project Description Emergency backup diesel generator for the WWTP UV Project

2. Plant Information

If you have not previously been assigned a Plant Number by the District or if you want to update any plant data that you have previously supplied to the District, please complete this section.

Equipment Location See attached site map

City _____ Zip Code _____

Mail Address _____

City _____ State _____ Zip Code _____

Plant Contact _____ Title _____

Telephone ( ) _____ Fax ( ) _____ Email _____

NAICS (North American Industry Classification System) see www.census.gov/epcd/naics02/naico602.htm _____

3. Proximity to a School (K-12)

The sources in this permit application (*check one*) ☐ Are ☑ Are not within 1,000 ft of the outer boundary of the nearest school.

4. Application Contact Information

All correspondence from the District regarding this application will be sent to the plant contact unless you wish to designate a different contact for this application.

Application Contact Kirk Howard Title Senior Environmental Engineer

Mail Address 1010 Chadbourne Rd

City Fairfield State CA Zip Code 94534-9700

Telephone (707) 428-9155 Fax (707) 429-1280 Email khoward@fssd.com

5. Additional Information

The following additional information is required for all permit applications and should be included with your submittal. Failure to provide this information may delay the review of your application. Please indicate that each item has been addressed by checking the box. Contact the Engineering Division if you need assistance. (See exhibits attached)

☐ If a new Plant, a local street map showing the location of your business

☑ A facility map, drawn roughly to scale, that locates the equipment and its emission points

☑ Completed data form(s) and a pollutant flow diagram for each piece of equipment.
(See www.baaqmd.gov/Forms/Engineering.aspx)

☑ Project/equipment description, manufacturer's data

☑ Discussion and/or calculations of the emissions of air pollutants from the equipment

6. Trade Secrets

Under the California Public Records Act, all information in your permit application will be considered a matter of public record and may be disclosed to a third party. If you wish to keep certain items separate as specified in Regulation 2, Rule 1, Section 202.7, please complete the following steps.

☐ Each page containing trade secret information must be labeled "trade secret" with the trade secret information clearly marked.

☐ A second copy, with trade secret information blanked out, marked "public copy" must be provided.

☐ For each item asserted to be trade secret, you must provide a statement which provides the basis for your claim.

7. Small Business Certification *You are entitled to a reduced permit fee if you qualify as a small business as defined in Regulation 3. In order to qualify, you must certify that your business meets all of the following criteria:*

☐ The business does not employ more than 10 persons and its gross annual income does not exceed $600,000.

☐ And the business is not an affiliate of a non-small business. (Note: a non-small business employs more than 10 persons and/or its gross income exceeds $600,000.)

8. Accelerated Permitting *The Accelerated Permitting Program entitles you to install and operate qualifying sources of air pollution and abatement equipment* ***without waiting for the District to issue a Permit to Operate****. To participate in this program you must certify that your project will meet all of the following criteria. Please acknowledge each item by checking each box.*

☐ Uncontrolled emissions of any single pollutant are each less than 10 lb/highest day, or the equipment has been precertified by the BAAQMD.

☐ Emissions of toxic compounds do not exceed the trigger levels identified in Table 2-5-1 (see Regulation 2, Rule 5).

☐ The project is not subject to public notice requirements (the source is either more than 1000 ft. from the nearest school, or the source does not emit any toxic compound in Table 2-5-1).

☐ For replacement of abatement equipment, the new equipment must have an equal or greater overall abatement efficiency for all pollutants than the equipment being replaced.

☐ For alterations of existing sources, for all pollutants the alteration does not result in an increase in emissions.

☐ Payment of applicable fees (the minimum permit fee to install and operate each source). See Regulation 3 or contact the Engineering Division for help in determining your fees.

9. CEQA *Please answer the following questions pertaining to CEQA (California Environmental Quality Act).*

A. Has another public agency prepared, required preparation of, or issued a notice regarding preparation of a California Environmental Quality Act (CEQA) document (initial study, negative declaration, environmental impact report, or other CEQA document) that analyzes impacts of this project or another project of which it is a part or to which it is related? ☑YES ☐NO If no, go to section 9B.

Describe the document or notice, preparer, and date of document or expected date of completion:

To ensure compliance with mitigation measures during WWTP UV Upgrade Project implementation, a CEQA mitigation monitoring and reporting program (MMRP) report was prepared by ECO:LOGIC, dated May 2009.

B. List and describe any other permits or agency approvals required for this project by city, regional, state or federal agencies:

1. In order to discharge treated wastewater, the District has a National Pollution Discharge Elimination System (NPDES) permit, number CA0038024.
2. The treatment plant has a number of point sources for air pollution and has a BAAQMD air permit, number 1404.
3. To construct the upgrade project, the Contractor needs a local, City of Fairfield, business licence.

C. List and describe all other prior or current projects for which either of the following statements is true: (1) the project that is the subject of this application could not be undertaken without the project listed below, (2) the project listed below could not be undertaken without the project that is the subject of this application:

The UV Disinfection Upgrade Project (that is required to meet the new NPDES discharge permit) cannot be reliably operational without the new backup diesel generator, which provides power to disinfect and fully treat the wastewater during a power outage.

10. Certification *I hereby certify that all information contained herein is true and correct. (Please sign and date this form)*

Kirk Howard	Senior Environmental Engineer		
Name of person certifying (print)	Title of person certifying	Signature of person certifying	Date

Send all application materials to the **BAAQMD Engineering Division, 939 Ellis Street, San Francisco, CA 94109.**

Exhibit 5A

Facility Map, Emission Locations