

PRE-FINAL CONSTRUCTION INSPECTION REPORT
Groundwater Extraction and Treatment System L-B
Western Groundwater Operable Unit (OU-3)

Aerojet General Corporation Superfund Site
Rancho Cordova, California

January 2012

Prepared for:



United States Environmental Protection Agency
Region 9
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Final

**PRE-FINAL CONSTRUCTION INSPECTION REPORT
Groundwater Extraction and Treatment System L-B
Western Groundwater Operable Unit (OU-3)**

**AEROJET GENERAL CORPORATION SUPERFUND SITE
RANCHO CORDOVA, CALIFORNIA**

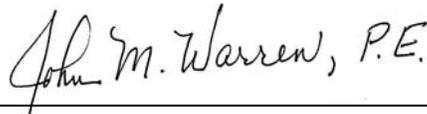
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U.S. Environmental Protection Agency

REVIEW AND APPROVAL

Inspector:



John Warren, P.E.
Sullivan International Group, Inc.

1/31/2012

Date

TABLE OF CONTENTS

REVIEW AND APPROVAL	i
ACRONYMS AND ABBREVIATIONS	iv
1.0 INTRODUCTION	1
1.1 PURPOSE AND OBJECTIVE	1
1.2 GENERAL HISTORY AND BACKGROUND.....	1
1.3 DESCRIPTION OF FACILITY AND COMPONENTS	2
2.0 PRE-FINAL CONSTRUCTION REVIEW	6
3.0 CONCLUSIONS.....	15

FIGURES

1	Site Location Map OU-3 Area 2
2	Process Flow Diagram of GET System L-B
3	Plan View of Well 4706
4	Section View of Well 4706
5	Plan View of Discharge Outlet
6	Section View of Discharge Outlet
7	Plan View of Treatment Facility GET L-B

TABLES

1	Extraction Well 4706 Information
2	Checklist for Extraction Well 4706
3	Checklist for Connection to Existing Discharge Outlet
4	Checklist for GET L-B Treatment Facility

TABLE OF CONTENTS (CONTINUED)

APPENDIX

A Site Photographs

ATTACHMENT

1 OU-3 Statement of Work Pages 17 to 20

ACRONYMS AND ABBREVIATIONS

Aerojet	Aerojet General Corporation
EPA	U.S. Environmental Protection Agency
GAC	Granular activated carbon
GET	Groundwater Extraction and Treatment
gpm	Gallons per minute
H ₂ O ₂	Hydrogen peroxide
NDMA	n-Nitrosodimethylamine
NPL	National Priorities List
OU-3	Operable Unit 3
PCD	Partial Consent Decree
PCE	Tetrachloroethylene (perchloroethylene)
PFCI	Pre-Final Construction Inspection
ROD	Record of Decision
SOW	Statement of Work
UV	Ultraviolet
VOC	Volatile organic compounds

1.0 INTRODUCTION

This Pre-Final Construction Inspection (PFCI) Report has been prepared in accordance with the United States Environmental Protection Agency's (EPA) Record of Decision (ROD) and Remedial Design/Remedial Action Statement of Work (SOW) with respect to Western Groundwater Operable Unit (OU-3) at the Aerojet General Corporation (Aerojet) Superfund Site in Rancho Cordova, California. During March 2011, site inspections were conducted on behalf of EPA at OU-3 Area 4, Groundwater Extraction and Treatment (GET) Facility L-B, as shown on [Figure 1](#). The inspection included Treatment Facility L-B, its associated extraction well, and the discharge outfall.

Figures in this document have been taken from drawings provided by Aerojet. The provided drawings are known as "Carmichael Water District / GENCORP Aerojet, Groundwater Extraction and Treatment System 'L1', Sheets 1-78" by Kennedy-Jenks Consultants. On [Figure 1](#) the direction of north is toward the top of the page and both the well and pipeline have been installed.

1.1 PURPOSE AND OBJECTIVE

The objectives of the construction inspection were to confirm whether construction is complete in accordance with the approved Remedial Design and that the Remedial Action (or the inspected portion) is operational and functional, as described in Section IV.F.4 of the SOW ([Attachment 1](#)). Outstanding construction items discovered during the inspection have been identified and noted in this report. The PFCI Report will be submitted to Aerojet and will provide the outline of outstanding construction items, actions required to resolve the items, expected completion date for the items, and an anticipated date for a Final Inspection, if required.

1.2 GENERAL HISTORY AND BACKGROUND

In 1951, Aerojet began operations in Rancho Cordova, Sacramento County, California. Aerojet and its subsidiaries manufactured liquid and solid propellants; fabricated, assembled, tested, and rehabilitated rocket engines; and manufactured paint components, herbicides, and

pharmaceutical products. Wastes from these operations were disposed of by burial, open burning, discharge into unlined evaporation ponds, and injection into wells. As a result of the disposal, volatile organic compounds (VOC), perchlorate, n-nitrosodimethylamine (NDMA), and other compounds leached into the drinking-water aquifers for various communities located in the area.

In 1983, the Aerojet Rancho Cordova facility was placed on the National Priorities List (NPL). In 2002 and as part of the Partial Consent Decree (PCD), the Site was divided into OUs. The cleanup approach for the Site under the modified PCD is to control groundwater contamination moving across the facility boundary within two OUs (OU-3 and OU-5), then remediate soil and groundwater at source areas, which consist of five OUs.

OU-3 provides for: 1) an inner groundwater boundary to prevent further contamination from flowing off-property on the western side of the Aerojet Site, 2) an outer boundary at the leading edge of groundwater contamination to prevent the further contamination of the aquifer above the cleanup levels specified in the ROD, and 3) the eventual restoration of the drinking-water aquifer.

1.3 DESCRIPTION OF FACILITY AND COMPONENTS

As previously noted, this PFCI Report is for the GET L-B Treatment Facility, the associated extraction well system, and the treated water discharge outfall. The GET L-B Facility is located at 3501 Bajamont Way in Carmichael, California. [Figure 1](#) presents a site map that shows the location of the GET L-B Facility and the location of associated Extraction Well 4706. The treatment facility receives groundwater from one extraction well (4706), which is screened in water-bearing zone E (see [Table 1](#)). Extraction Well 4706 is located on the north side of the treatment facility. The 6-inch discharge pipeline from Well 4706 transitions to an 8-inch raw water header at the treatment facility.

The groundwater treatment system at GET L-B consists of an in-line static mixer for the addition of hydrogen peroxide (H₂O₂), followed by ultraviolet (UV) treatment. Effluent from the UV treatment is passed through granulated activated carbon (GAC) filters prior to discharge. The

influent water passes through bag filters to remove sediment from the groundwater and minimize disruption of the UV treatment. The effluent water flows through strainers prior to discharge. [Figure 2](#) provides a schematic of the present flow diagram and anticipated future expansion. Additional space has been provided to allow for additional treatment units in the event that 1) perchlorate is detected in the influent (ion-exchange), or 2) for increased concentrations of NDMA or TCE, which could require additional UV or GAC vessels, respectively. Additional treatment units also would be necessary if another extraction well is installed thus increasing the flow of groundwater to the facility.

The ultraviolet oxidation system (H₂O₂ injection followed by UV exposure) is used to break down NDMA and provides treatment for trace amounts of trichloroethylene. If additional treatment is required in order to continue to meet effluent limitations, then UV reactors for NDMA and TCE, and ion-exchange vessels for perchlorate removal will be added.

TABLE 1 – EXTRACTION WELL 4706 INFORMATION

Pre-Final Construction Inspection Report, Groundwater Extraction & Treatment System L-B, Aerojet General Corporation Superfund Site, Rancho Cordova, California

Extraction Well Number	Aquifer	Total Depth (in Feet)	Screened Interval in Feet Below Surface Grade	Maximum Extraction Rate in Gallons per Minute (gpm)
4706	E	430	340 - 420	325

Note:
gpm Gallons per minute

FIGURE 1 – SITE LOCATION MAP OU-3 AREA 2

Pre-Final Construction Inspection Report, Groundwater Extraction & Treatment System L-B,
Aerojet General Corporation Superfund Site, Rancho Cordova, California

(Figure Not to Scale)

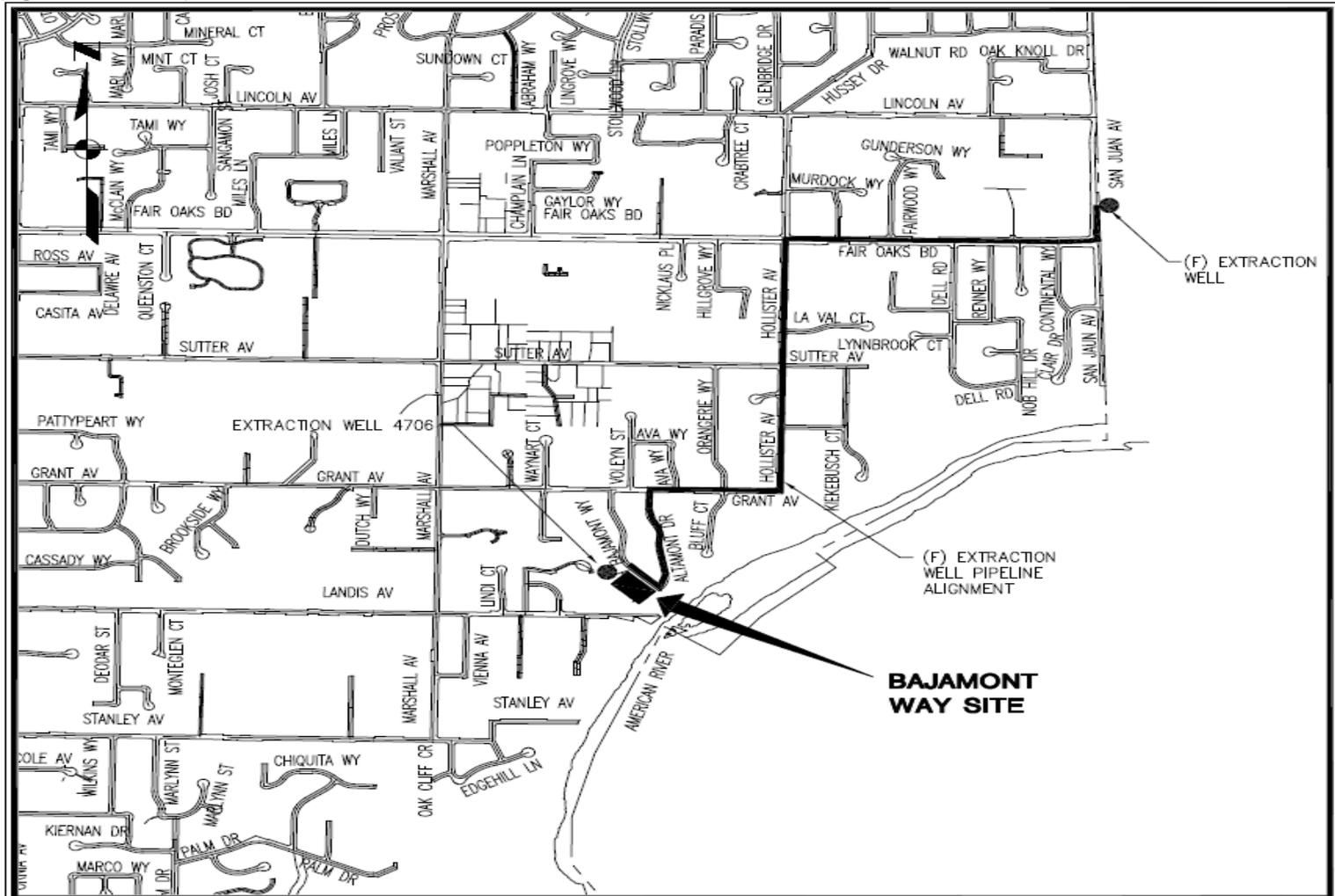
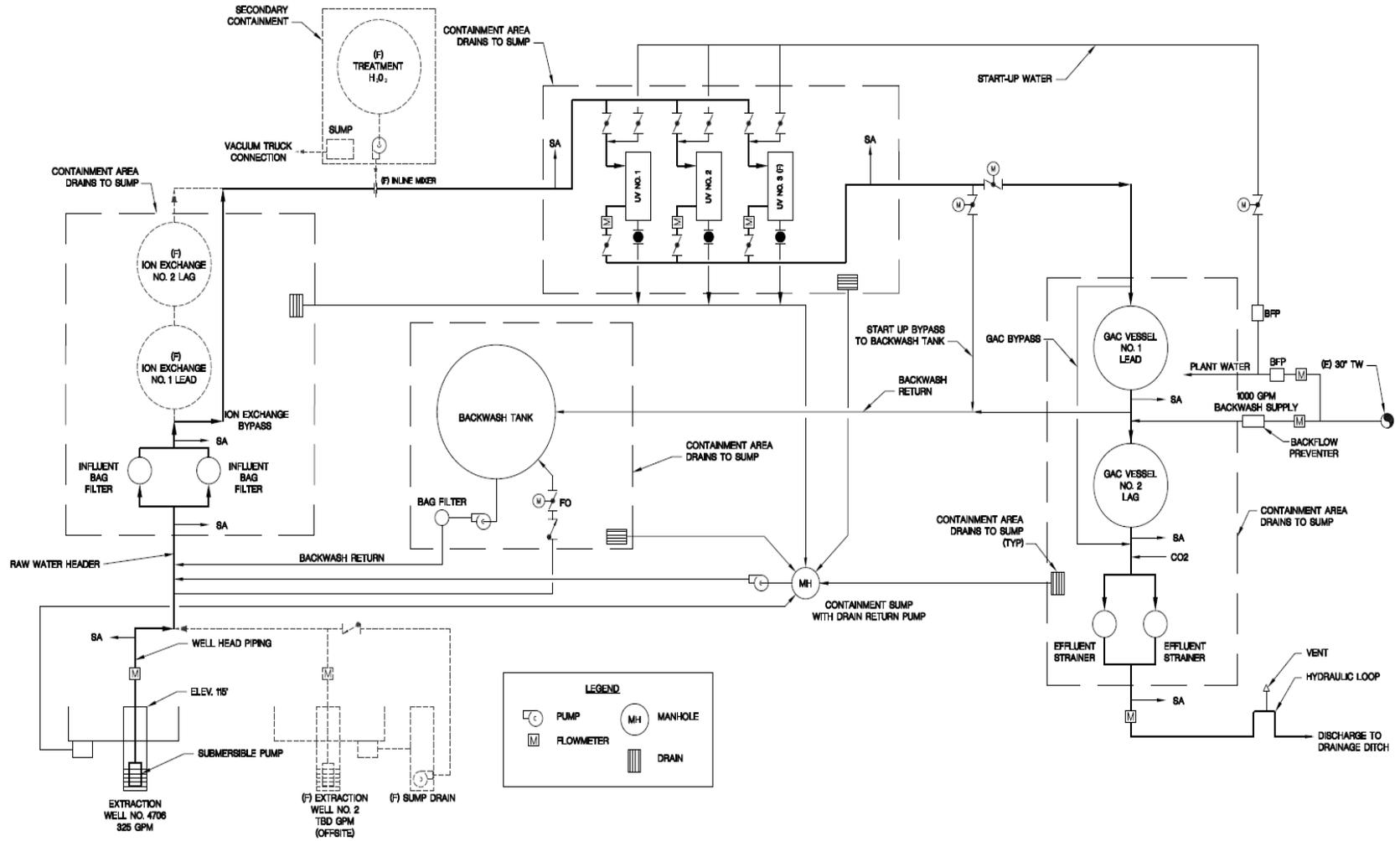


FIGURE 2 – PROCESS FLOW DIAGRAM OF GET SYSTEM L-B

Pre-Final Construction Inspection Report, Groundwater Extraction & Treatment System L-B,
Aerojet General Corporation Superfund Site, Rancho Cordova, California

(Figure Not to Scale)



2.0 PRE-FINAL CONSTRUCTION REVIEW

The following tables and figures provide the PFCI checklists and provide the reader with a depiction of the actual installation. It is to be noted that the underground features of this facility were installed and covered prior to the PFCI. Therefore, verification of buried piping and valve sizes, buried connections between pieces of equipment, and installed pumps was not conducted during this inspection. Photographs of the facility are provided in [Appendix A](#).

The first set of figures and tables is for Extraction Well 4706, which pumps water to the GET L-B Treatment Facility, and, subsequently, to the effluent pipeline, which discharges to a drainage ditch that in turn flows to the American River. Physical verification of these installations was conducted in March 2011. For Extraction Well 4706, drawings provided by Aerojet representing the “as constructed” state of the extraction-well installation are provided ([Figures 3](#) and [4](#)). The PFCI checklist follows ([Table 2](#)).

Following the extraction well figures and table, figures and a table are provided for the GET L-B Treatment Facility Discharge Outlet ([Figure 5](#), [Figure 6](#), [Table 3](#)) and the GET L-B Treatment Facility ([Figure 7](#), [Table 4](#)). Future treatment system expansions, if necessary, are indicated on [Figure 7](#) and in [Table 4](#) by the symbol (F) or the word “Future”, respectively.

FIGURE 3 – PLAN VIEW OF WELL 4706

Pre-Final Construction Inspection Report, Groundwater Extraction & Treatment System L-B,
Aerojet General Corporation Superfund Site, Rancho Cordova, California

(Figure Not to Scale)

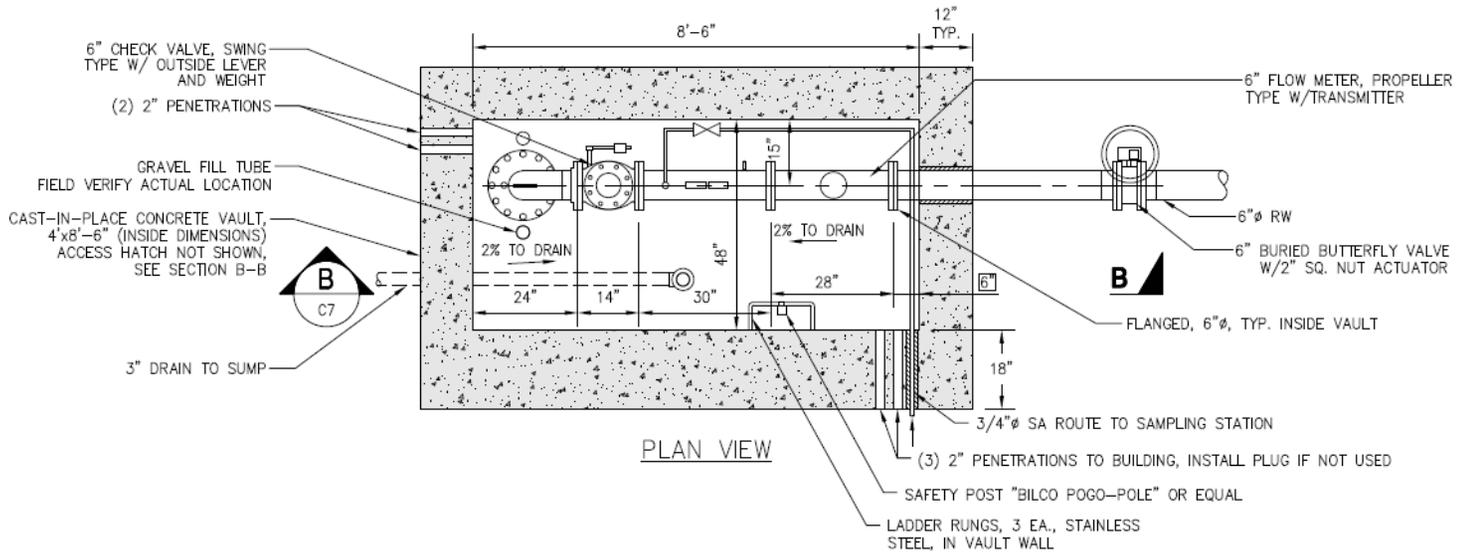


FIGURE 4 – SECTION VIEW OF WELL 4706

Pre-Final Construction Inspection Report, Groundwater Extraction & Treatment System L-B,
Aerojet General Corporation Superfund Site, Rancho Cordova, California

(Figure Not to Scale)

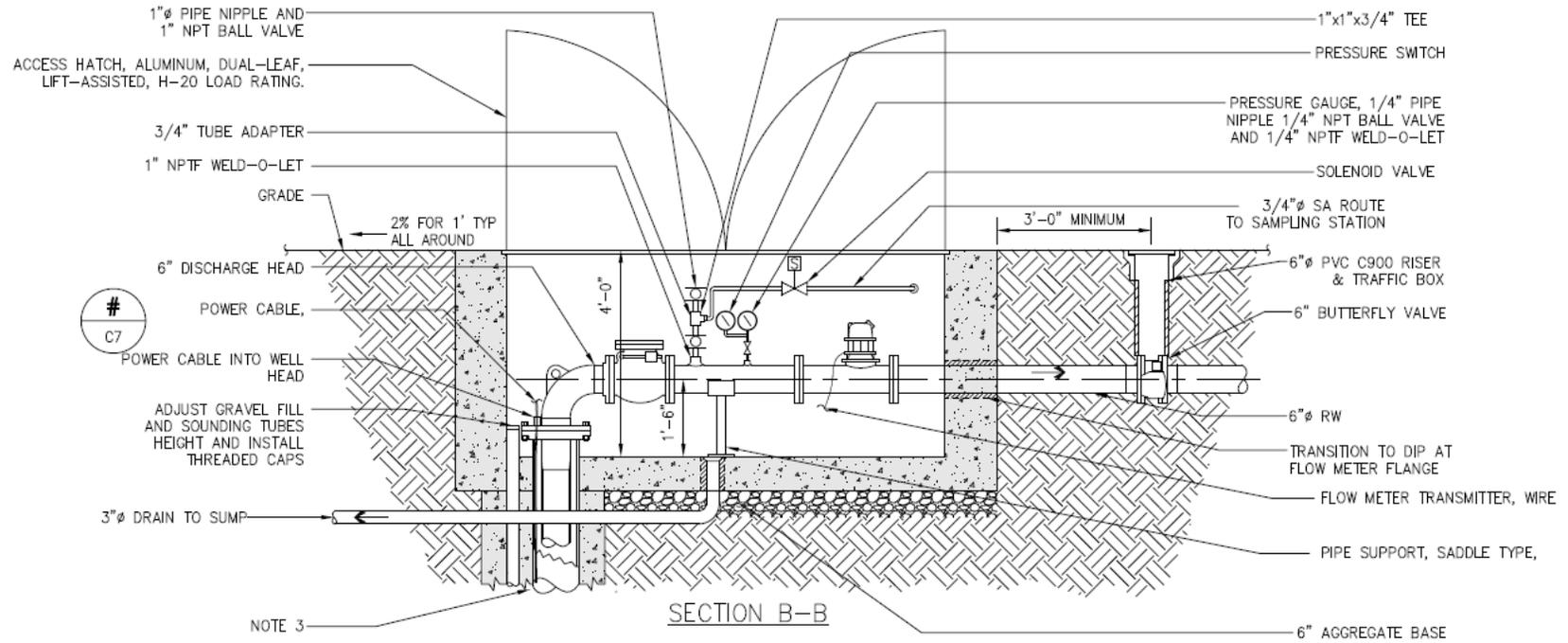


TABLE 2 – CHECKLIST FOR EXTRACTION WELL 4706

Pre-Final Construction Inspection Report, Groundwater Extraction & Treatment System L-B,
Aerojet General Corporation Superfund Site, Rancho Cordova, California

Well Installation – Phase 1 Wells						
	Installed	Meets Plans & Specs	Not Compliant	Item to Correct	Estimated Time for Correction	Comment
Well Vault	✓	✓				
Access Hatch	✓	✓				
Ladder Rungs	✓	✓				
Drain	✓	✓				
Well	✓	✓				
Pump	✓	✓				
Sounding Tube	✓	✓				
6-Inch Check Valve	✓	✓				
Flow Meter	✓	✓				
Pressure Switch	✓	✓				
Pressure Gauge	✓	✓				
Solenoid Valve	✓	✓				
1-inch Ball Valve (2)	✓	✓				
6-inch Butterfly Valve	✓	✓				
Drain Sump	✓	✓				
Valve Traffic Box	✓	✓				

FIGURE 5 – PLAN VIEW OF DISCHARGE OUTLET

Pre-Final Construction Inspection Report, Groundwater Extraction & Treatment System L-B,
Aerojet General Corporation Superfund Site, Rancho Cordova, California

(Figure Not to Scale)

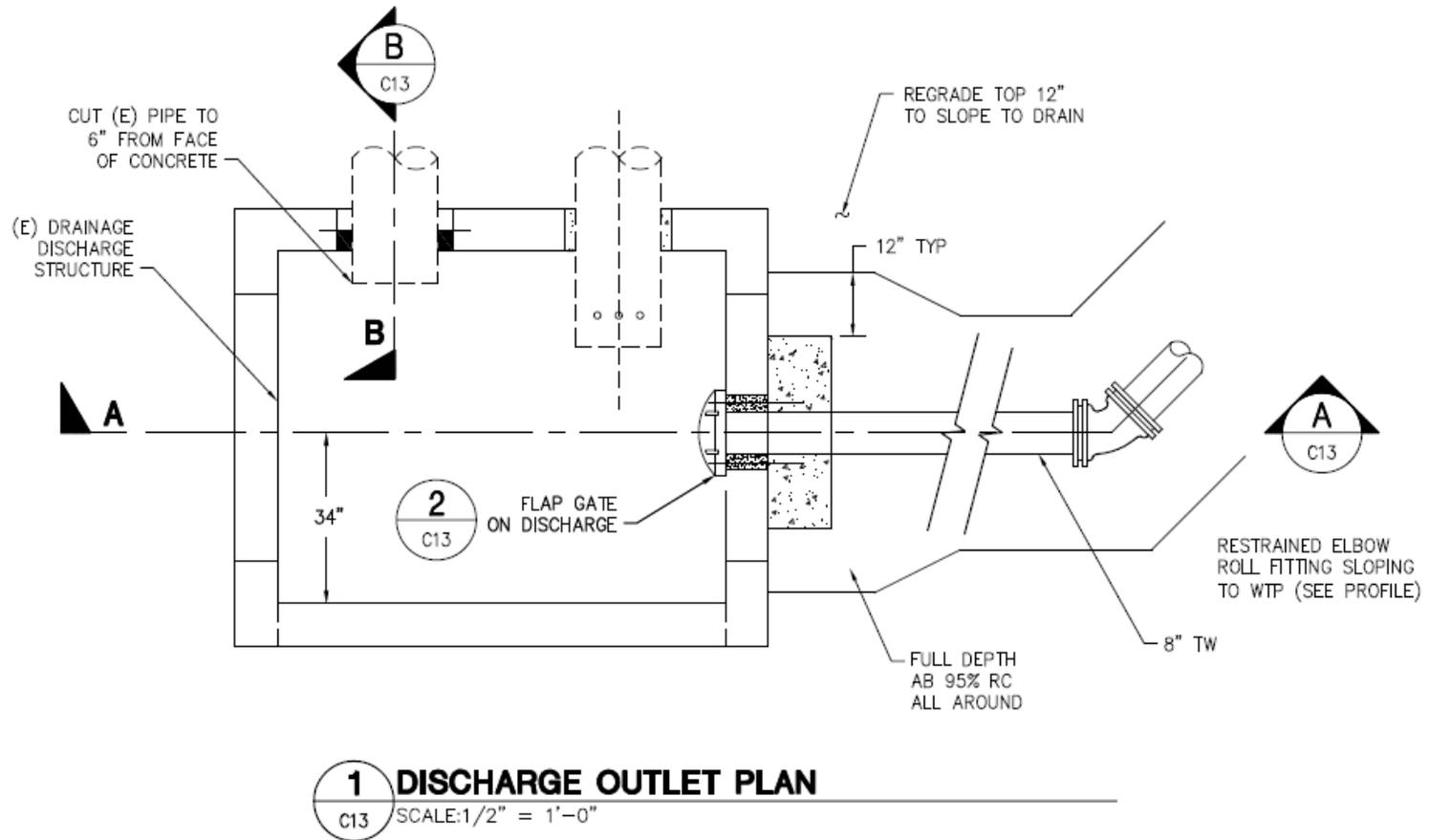
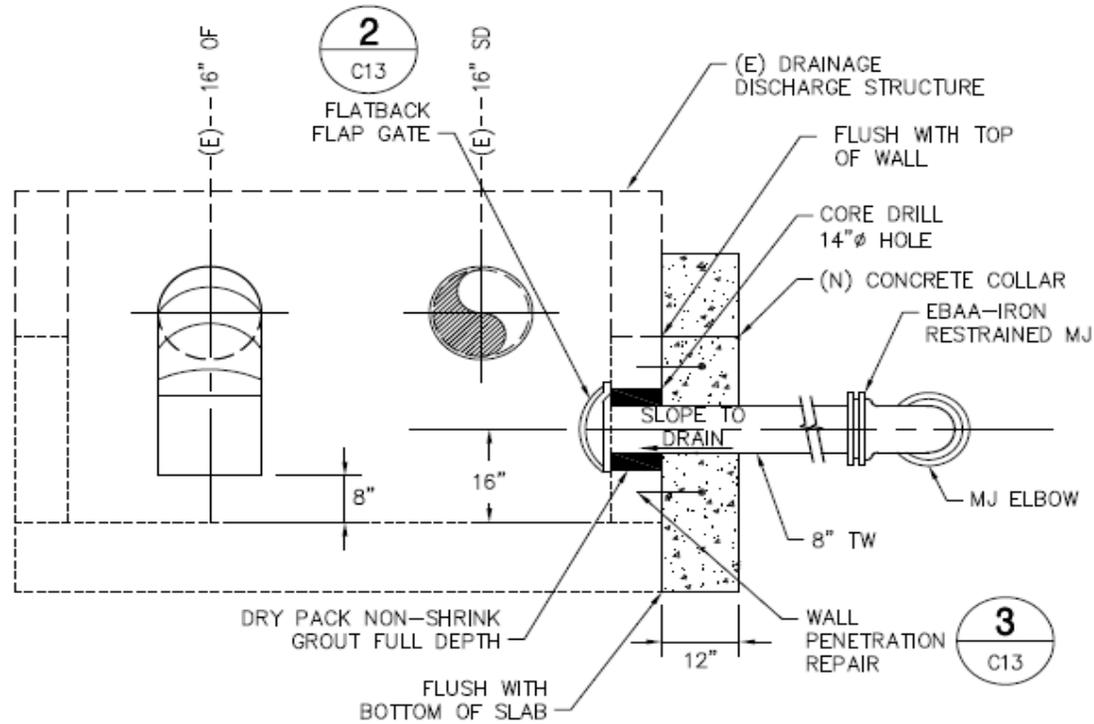


FIGURE 6 – SECTION VIEW OF DISCHARGE OUTLET

Pre-Final Construction Inspection Report, Groundwater Extraction & Treatment System L-B,
Aerojet General Corporation Superfund Site, Rancho Cordova, California

(Figure Not to Scale)



A DISCHARGE OUTLET SECTION
C13 SCALE: 1/2" = 1'-0"

TABLE 3 – CHECKLIST FOR CONNECTION TO EXISTING DISCHARGE OUTLET

Pre-Final Construction Inspection Report, Groundwater Extraction & Treatment System L-B,
Aerojet General Corporation Superfund Site, Rancho Cordova, California

Transition Manhole & Outfall						
	Installed	Meets Plans & Specs	Not Compliant	Item to Correct	Estimated Time for Correction	Completed
Flap Valve	✓	✓				
8-Inch Connection	✓	✓				

FIGURE 7 – PLAN VIEW OF TREATMENT FACILITY GET L-B
 Pre-Final Construction Inspection Report, Groundwater Extraction & Treatment System L-B,
 Aerojet General Corporation Superfund Site, Rancho Cordova, California

(Figure Not to Scale)

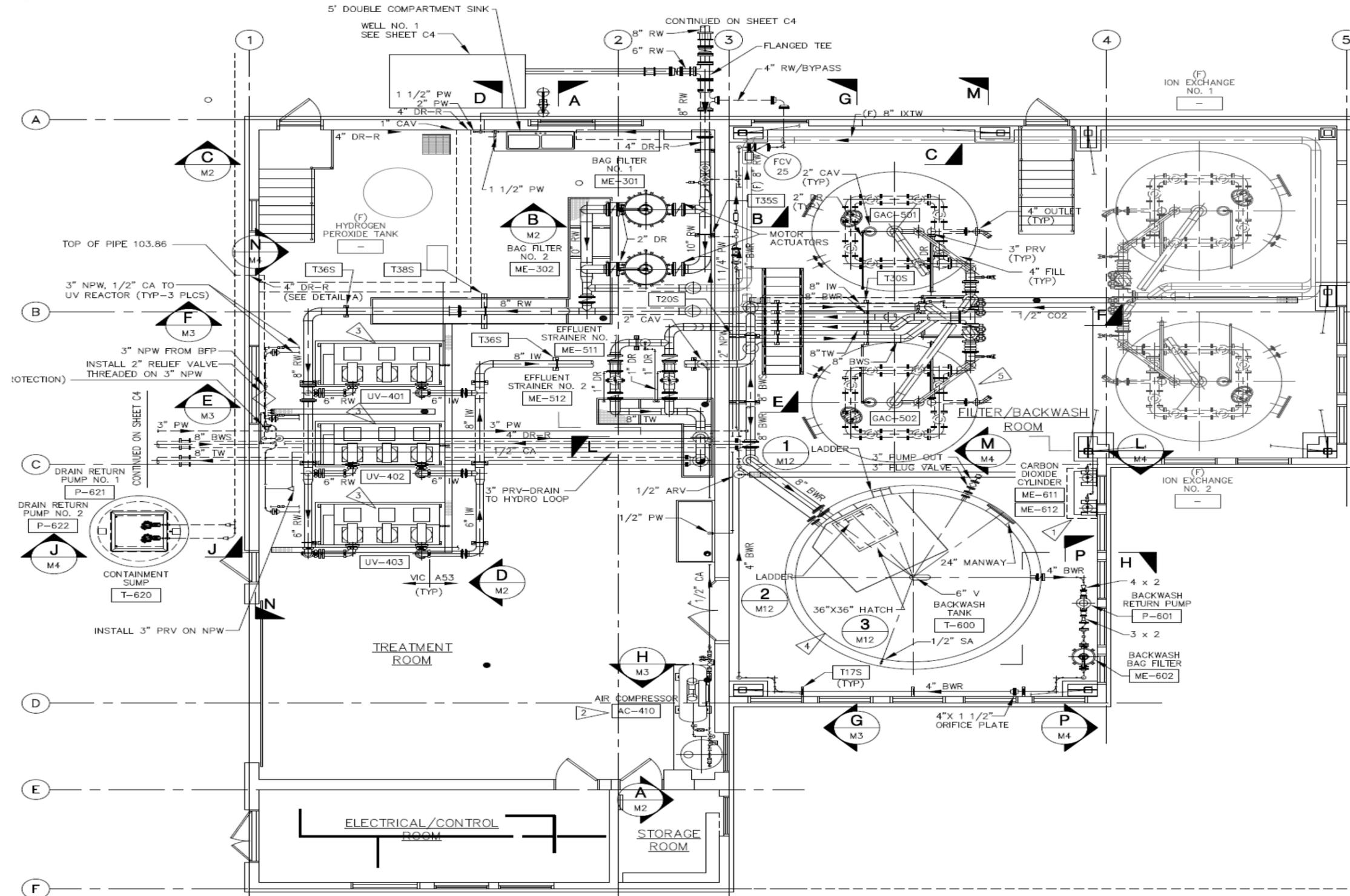


TABLE 4 – CHECKLIST FOR GET L-B TREATMENT FACILITY

Pre-Final Construction Inspection Report, Groundwater Extraction & Treatment System L-B,
Aerojet General Corporation Superfund Site, Rancho Cordova, California

GET L-B Treatment Facility						
	Installed	Meets Plans & Specs	Not Compliant	Item to Correct	Estimated Time for Correction	Completed
H ₂ O ₂ – 2,000-gallon tank		Future				
Backwash Tank – 20,000 gallon	√	√				
Ion Exchange Vessel No. 1		Future				
Ion Exchange Vessel No. 2		Future				
UV No. 1	√	√				
UV No. 2	√	√				
UV No. 3	√	√				
Influent Bag Filters	√	√				
Ion Booster Pump		Future				
Trench Sump Pump	√	√				
GAC Vessel – No. 1A	√	√				
GAC Vessel – No. 1B	√	√				
Ion Exchange Vessel No. 1A		Future				
Ion Exchange Vessel No. 1B		Future				
Effluent Strainers (2)	√	√				

Future treatment system expansions, if necessary, are indicated in the table by the word Future in column 3.

3.0 CONCLUSIONS

The objectives of the inspection were to confirm whether construction is complete and the Remedial Action (or the inspected portion) is operational and functional.

Construction: No outstanding construction items were discovered during the inspection; therefore, no final construction inspection will be required. Because the extraction well, groundwater collection piping systems, sampling systems, and other appurtenances had been installed and were operational prior to this PFCI inspection, the inspection verified the equipment, its size, and its materials to the extent feasible.

Operation: Operational efficiency of the treatment system is monitored through the results of samples collected from the treated effluent and sent to EPA, California Central Valley Regional Water Quality Control Board, and California Department of Toxic Substance Control for review.

APPENDIX A
SITE PHOTOGRAPHS



Photograph 1: Front of GET L-B treatment building.



Photograph 2: Front and side of GET L-B treatment building.



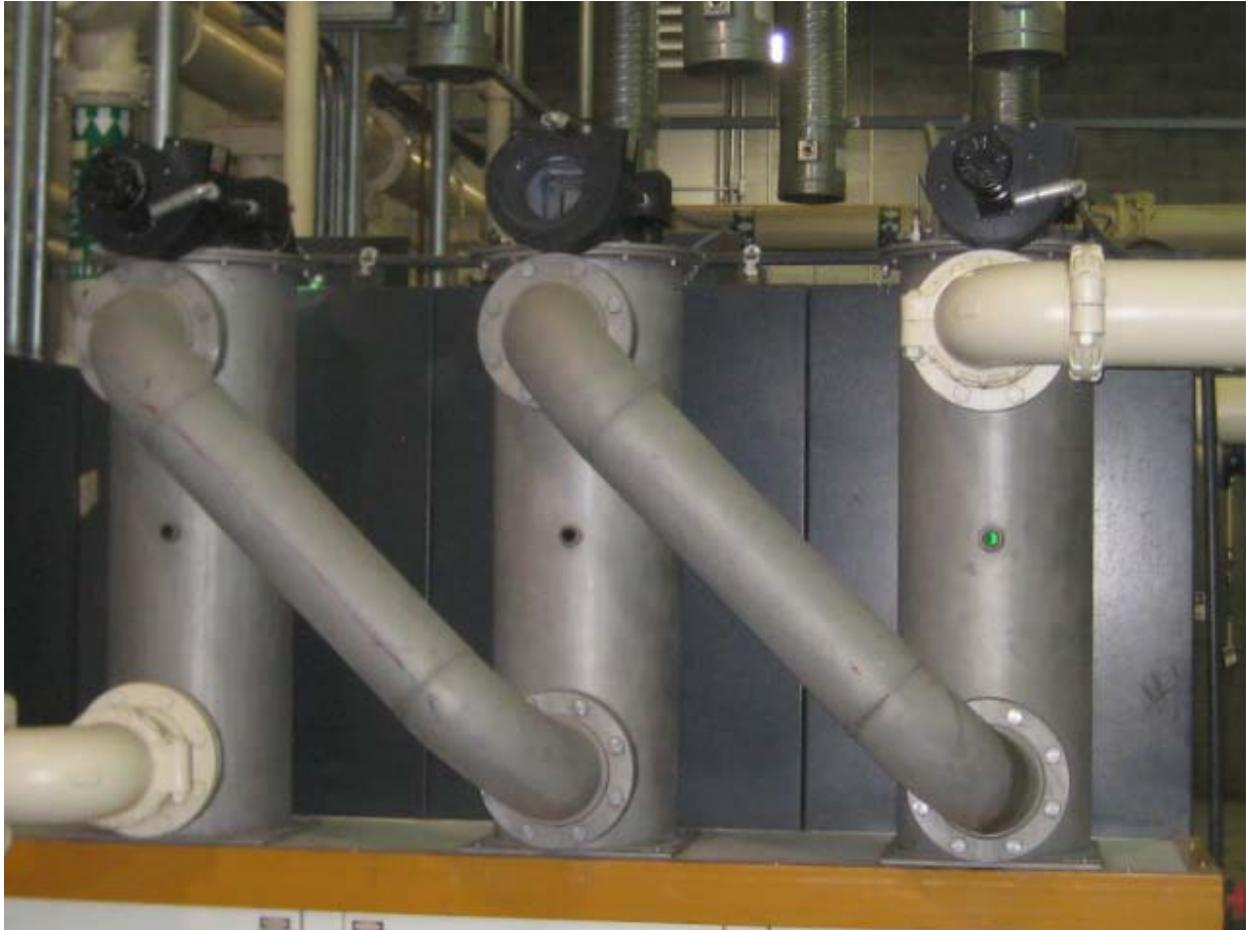
Photograph 3: Rear of GET L-B treatment building from near outfall.



Photograph 4: Influent bag filters.



Photograph 5: UV Reactors.



Photograph 6: Detail of UV reactor.



Photograph 7: GAC vessel.



Photograph 8: Piping between GAC vessels.

ATTACHMENT 1
OU-3 STATEMENT OF WORK PAGES 17 TO 20

Major Deliverables and Other Tasks) of this SOW. The Prefinal Design shall fully address all Agencies' comments provided by the EPA on the Conceptual/Preliminary Design Report, and if not previously addressed, be accompanied by a memorandum indicating how the comments were incorporated into the Prefinal Design. The Prefinal Design documents shall be certified by a Professional Engineer registered in the State of California.

The Prefinal Remedial Design shall serve as the Final Remedial Design if the Agencies have no further comments and EPA provides its approval. The Prefinal Remedial Design submittals shall include a capital and operation and maintenance cost estimate; reproducible drawings and specifications; and a complete set of construction drawings in full and one-half size reduction. The Final Remedial Design should also include a schedule for completion of construction including inspection certifications to establish Construction Criteria of this SOW are met.

3. GET E/F Modification

Respondents is proceeding to modify the existing GET E/F Facility to achieve on-property groundwater boundary containment needed for the OU-3 remedy under the existing Partial Consent Decree in Civil Action No. CIVS-86-0063-EJG and CIVS-86-0064-EJG consolidated. If the GET E/F modifications have been completed prior to entry of this Administrative Order and meet the provisions of this SOW, Respondents shall only be obligated to provide each of the Agencies with a set of reproduceable as-built drawings, a hard copy of the as-built drawing signed and stamped by a Professional Engineer, and an electronic PDF file of the Final Design documents for the GET E/F facility modification. Any completed GET E/F modifications which do not meet the Performance Standards of this SOW shall be modified as needed to meet the Performance Standards.

F. Remedial Action

Respondents shall implement the Remedial Action. During the design period, in preparation for implementation of the Remedial Action and in accordance with Section IV(M) (Supporting Plans) and Section V (Schedule for Major Deliverables and Other Tasks) of this SOW, Respondents shall submit to the Agencies for review a Construction SAP with Field Sampling Plan and QAPP; Construction Quality Assurance Program Plan; Construction Health and Safety Plan; Construction Contingency Plan; and any needed updates to the RD/RA Work Plan.

Unless otherwise approved by the EPA, Respondents shall not begin any phase of the construction until after the EPA has approved its Final Remedial Design, Construction Contingency Plan, and Construction SAP. Field changes to the Remedial Action, as set forth in the RD/RA Work Plan and Final Design, shall not be undertaken without review by the Agencies and the EPA's approval. All Work on the Remedial Action shall be documented in enough detail to produce as-built construction drawings after the Remedial Action is complete. Review by the Agencies and/or EPA's approval of submittals does not guarantee

that the Remedial Action, when constructed, will meet the Performance Standards of this SOW.

1. Remedial Action Work Plan

Respondents shall not be required to submit a separate Remedial Action Work Plan. Instead, Respondents shall provide supplemental information as necessary to update the RD/RA Work Plan.

2. Pre-Construction Meeting

A pre-construction meeting shall be held after selection of the construction contractor but before initiation of construction in accordance with the schedule contained in Section V (Schedule of Major Deliverables and Other Tasks) of this SOW. The meeting shall include Respondents's representatives and interested federal, state and local regulatory agency personnel. At the meeting, Respondents shall describe the roles, relationships, and responsibilities of all parties; review the work area security and safety protocols; review any access issues; review the construction schedule; and review the construction quality assurance procedures.

Respondents shall document the meeting results in a Pre-Construction Meeting Report and submit the report in accordance with the schedule contained in Section V (Schedule of Major Deliverables and Other Tasks) of this SOW. Respondents shall submit the report to all parties in attendance, and shall include the names of people in attendance, issues discussed, clarifications made, and action items and due dates.

Respondents shall provide the Agencies with a Start of Construction Notice in accordance with the schedule contained in Section V (Schedule of Major Deliverables and Other Tasks) of this SOW.

3. Remedial Action Construction

Respondents shall implement the Remedial Action as detailed in the approved RD/RA Work Plan (as updated) and approved Final Design.

4. Prefinal Construction Inspection

A Prefinal Construction Inspection shall be scheduled in accordance with the schedule contained in Section V (Schedule of Major Deliverables and Other Tasks) of this SOW after Respondents determine that construction is complete and the Remedial Action, or a discrete portion of the Remedial Action, is operational and functional meeting the Performance Standards of Section III (Performance Standards) of this SOW. Respondents shall notify the Agencies so that a prefinal inspection can be conducted and attended by the Agencies, Respondents, and other participants including the Project Coordinators and other federal, state, and local regulatory Agencies with a jurisdictional

interest. If a Prefinal Construction Inspection is held for a portion of the Remedial Action, one or more additional inspections shall be conducted so that the entire Remedial Action shall have been inspected.

The objective of the inspection/s is to determine whether construction is complete and the Remedial Action (or the inspected portion) is operational and functional. Any outstanding construction items discovered during the inspection shall be identified and noted on a bullet list. Respondents shall certify that the equipment is effectively meeting the purpose and intent of the specifications. Retesting shall be completed where deficiencies are revealed. A Prefinal Construction Inspection Report shall be submitted by Respondents which outlines the outstanding construction items, actions required to resolve the items, completion date for the items, and an anticipated date for a Final Inspection. The Prefinal Inspection Report can be in the form of a bullet list or letter.

5. Final Construction Inspection

If required by the EPA, a Final Construction Inspection shall be conducted after completion of any work identified in the prefinal inspection report in accordance with the schedule contained in Section V (Schedule of Major Deliverables and Other Tasks) of this SOW. Respondents shall notify the Agencies and coordinate the schedule for any final inspection. The final inspection shall consist of a walk-through inspection by the Agencies and Respondents. The prefinal inspection report shall be used as a checklist, with the final inspection focusing on the outstanding construction items identified in the prefinal inspection. Confirmation shall be made that outstanding items have been resolved for all items, including any items which may have been found after the checklist has been developed.

Any outstanding construction items discovered by Respondents or the Agencies during the inspection, whether or not identified on the prefinal inspection, to still require correction shall be identified and noted on a punch list. If any items are still unresolved, the inspection shall be considered to be a Prefinal Construction Inspection requiring another Prefinal Construction Inspection Report and subsequent Final Construction Inspection. After all items are resolved, Respondents shall issue a Final Construction Inspection Report in accordance with the schedule contained in Section V (Schedule of Major Deliverables and Other Tasks) of this SOW.

6. Remedial Action Construction Complete Report

As specified in the approved schedule included in Section V (Schedule for Major Deliverables and Other Tasks) of this SOW, after construction is completed on the entire Remedial Action and the systems are operational and functional as intended and Contaminated Groundwater is contained in all layers of the aquifer, Respondents shall submit a Remedial Action Construction Complete Report. In the Report, a registered Professional Engineer and Respondents' Project Coordinator shall state that the construction of the Remedial Action has been completed in accordance with the RD/RA

Work Plan submitted under this SOW. The written Report shall provide a synopsis of the Work defined in this SOW, describe deviations from the RD/RA Work Plan, include reproduceable and PDF electronic file version of as-built drawings signed and stamped by a Professional Engineer, provide actual costs of the Remedial Action, O&M to date, and a summary of the results of operational and performance monitoring completed to date. The Report shall contain the following statement, signed by a responsible corporate official of Respondents or Respondents' Project Coordinator:

“To the best of our knowledge, after thorough investigation, we certify that the information contained in or accompanying this submission is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.”

7. Remedial Action Report

As specified in the approved schedule included in Section V (Schedule for Major Deliverables and Other Tasks) of this SOW, after Respondents has determined that the Performance Standards of the Remedial Action are being met and all phases of the work including Operation and Maintenance (O&M), Respondents shall submit an Remedial Action Report. In the Report, a registered Professional Engineer and Respondents' Project Coordinator shall certify that the Remedial Action is operating and functioning as intended and that Performance Standards listed in Section III (Performance Standards) of this SOW are being met. The written Report shall provide a summary of the results of operational and performance monitoring completed to date and shall provide documentation to substantiate Respondents' certification in full compliance with Sections IV(K) (Performance Evaluation Reports) and IV(L) (Quarterly Compliance Monitoring Reports) of this SOW. The Remedial Action Report shall contain the following statement, signed by a responsible corporate official of Respondents or Respondents' Project Coordinator:

“To the best of our knowledge, after thorough investigation, we certify that the information contained in or accompanying this submission is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.”

G. Operation and Maintenance

O&M shall be performed in accordance with the approved O&M Manual.

1. Operation and Maintenance Plan

An Operation and Maintenance (O&M) Plan is not required. O&M-related information shall be provided by Respondents in Section IV(G)(2) (Operations and Maintenance Manual) of this SOW.

2. Operation and Maintenance Manual