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BECHTEL SAIC COMPANY LLC

PUBLIC WATER SYSTEM OPERATION AND MAINTENANCE MANUAL

Prepared for:
U.S. Department of Energy
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Office of Repository Development
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DEFINITIONS

Chlorine–A greenish-yellow gas with a penetrating and distinctive odor. The gas is 2.5 times heavier than air. Chlorine gas or hypochlorite solutions may be used as a disinfecting agent for water treatment. When added to water, calcium hypochlorite forms hypochlorous acid and calcium hydroxide. The use of hypochlorite tends to raise the water pH with the formation of hydroxyl ions.

Coliform–A group of bacteria found in the intestines of warm-blooded animals (including humans) and also in plants, soil, air, and water. Fecal coliforms are a specific class of bacteria that only inhabit the intestines of warm-blooded animals. The presence of coliform bacteria is an indication that the water is polluted and may contain pathogenic organisms.

Concentration of Residual Disinfectant–The concentration of disinfectant, measurements in milligrams per liter (mg/L) or parts per million (ppm) in a representative sample of water.

Concentration Times Time–The product of the concentration of residual disinfectant in ppm that is determined before or at the point the water reaches the first customer served in the system and the corresponding disinfectant contact time in minutes.

Disinfectant Contact Time–The time in minutes that it takes the water to move from the point of application of the disinfectant to a point before or at the location where the concentration of residual disinfectant is measured.

Disinfection–A process that inactivates pathogenic organisms in water by using chemical oxidants or equivalent agents.

Factors Affecting Disinfection–The effectiveness of disinfection can be affected by water pH, temperature, turbidity, organic matter, inorganic matter, reducing agents, and microorganism population.

Hypochlorite–Chemical compounds containing available chlorine.

Level of Turbidity–The value in units of nephelometric turbidity obtained by measuring the turbidity of a representative sample of water at a specified regular interval of time.

Potable Water–Water that does not contain objectionable pollution, contamination, minerals, or infective agents, and is considered satisfactory for drinking.

Primary (Drinking Water) Standard–A standard that specifies a maximum contaminant level for any constituent found in a public water supply, which if exceeded, may adversely affect the health of persons.

Residual Chlorine–The amount of free available chlorine remaining after a given contact time under specified conditions.

Secondary (Drinking Water) Standard–A standard that specifies a maximum contaminant level for certain constituents found in a public water supply, which if exceeded, may adversely

affect the public welfare. Nevada requirements for secondary standards are specified in NAC 445A.455.

Turbidity–The cloudy appearance of water caused by the presence of suspended and colloidal matter. In the water treatment field, a turbidity measurement is used to indicate the clarity of water. Technically, turbidity is an optical property of the water based on the amount of light reflected by suspended particles. Turbidity cannot be directly equated to suspended solids because white particles reflects more light than dark particles and many small particles will reflect more light than an equivalent large particle.

Unit of Nephelometric Turbidity–A measurement of the turbidity of water as determined by the ratio of the intensity of light scattered by the sample to the intensity of incident light, using instrumentation and methods as described in the American Public Health Association, Standard Methods for the Examination of Water and Wastewater (Greenberg 1999) manual.

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ACRONYMS AND ABBREVIATIONS

BPD	backflow prevention device
BSC	Bechtel SAIC Company, LLC
CLSO	Craft Labor Support Organization
CRWMS	Civilian Radioactive Waste Management System
DOE	U.S. Department of Energy
EC	Environmental Compliance organization
EPA	Environmental Protection Agency
ESF	Exploratory Studies Facility
ES&H	Environmental, Safety and Health
FOC	Field Operations Center (Ranch Control)
GFO	granular ferric oxide
gpm	gallons per million
IH	industrial hygiene
MAXIMO	term for a computerized maintenance management system
NAC	Nevada Administrative Code
NDEP	Nevada Division of Environmental Protection, Bureau of Safe Drinking Water
NPDWR	National Primary Drinking Water Regulations
NTS	Nevada Test Site
O&M	operation and maintenance
OCRWM	Office of Civilian Radioactive Waste Management
OQA	Office of Quality Assurance
ORD	Office of Repository Development
ppb	parts per billion
ppm	parts per million
PVC	polyvinyl chloride
PWS	public water system
QC	Quality Control
YMP	Yucca Mountain Site Characterization Project

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1. INTRODUCTION

1.1 PURPOSE

The purpose of the *Public Water System Operations and Maintenance Manual* is to specify requirements, activities, and responsible organizations for the operations and maintenance (O&M) of the Yucca Mountain Project (YMP) Exploratory Studies Facility (ESF) public water system (PWS). This manual is prepared in accordance with the requirements of Nevada Administrative Code (NAC) 445A.535. System O&M in accordance with this manual and implementing procedure OP-PRO-9202, *Water System Operation*, will result in the production of water that complies with safe drinking water standards.

Substantive changes to this manual will be submitted through the U.S. Department of Energy (DOE)/Office of Repository Development (ORD) Environmental, Safety and Health (ES&H) Department to the Nevada Division of Environmental Protection, Bureau of Safe Drinking Water (NDEP). DOE/ORD must approve all changes prior to submittal. Preparation and updating of this Manual is the responsibility of the Bechtel SAIC Company, LLC (BSC) Field Engineering/Person in Responsible Charge of the PWS, working in coordination with BSC Environmental Compliance organization.

Workers with safety concerns or who have suggestions to improve this document are encouraged to discuss these issues with their immediate supervisor and/or the document preparer. Safety is the responsibility of all employees and line managers.

1.2 PROJECT DESCRIPTION

The YMP ESF is located approximately 100 miles northwest of Las Vegas, Nevada and approximately 35 miles northwest of Mercury, Nevada, the base operations area for the Nevada Test Site (NTS). The eastern part of the ESF (including surface facilities) is located on the NTS in Area 25, while the western part is on Nellis Air Force Range and Bureau of Land Management parcels for which land withdrawal/right-of-way reservations have been obtained (see Figure 1). The ESF consists of a series of underground tunnels and alcoves, in addition to surface support facilities. Currently, the ESF surface area (north portal access area to the underground) principally serves as a support area for underground testing activities and includes facilities for material storage, fabrication, maintenance, personnel support, and offices. Maps that depict the YMP site layout are included in Appendix A.

1.3 SCOPE

This manual describes the PWS for the ESF, which is supplied with raw water from wells J-12 and J-13. The J-12/J-13 well complex is part of the NTS water system. This manual focuses on O&M of the ESF PWS, and also includes a basic description of the raw water supply system constructed for and operated by the YMP. The J-12/J-13 well complex is addressed in the *Nevada Test Site (NTS) Water Systems Operations and Maintenance (O&M) Manual* (Bechtel Nevada 2003).

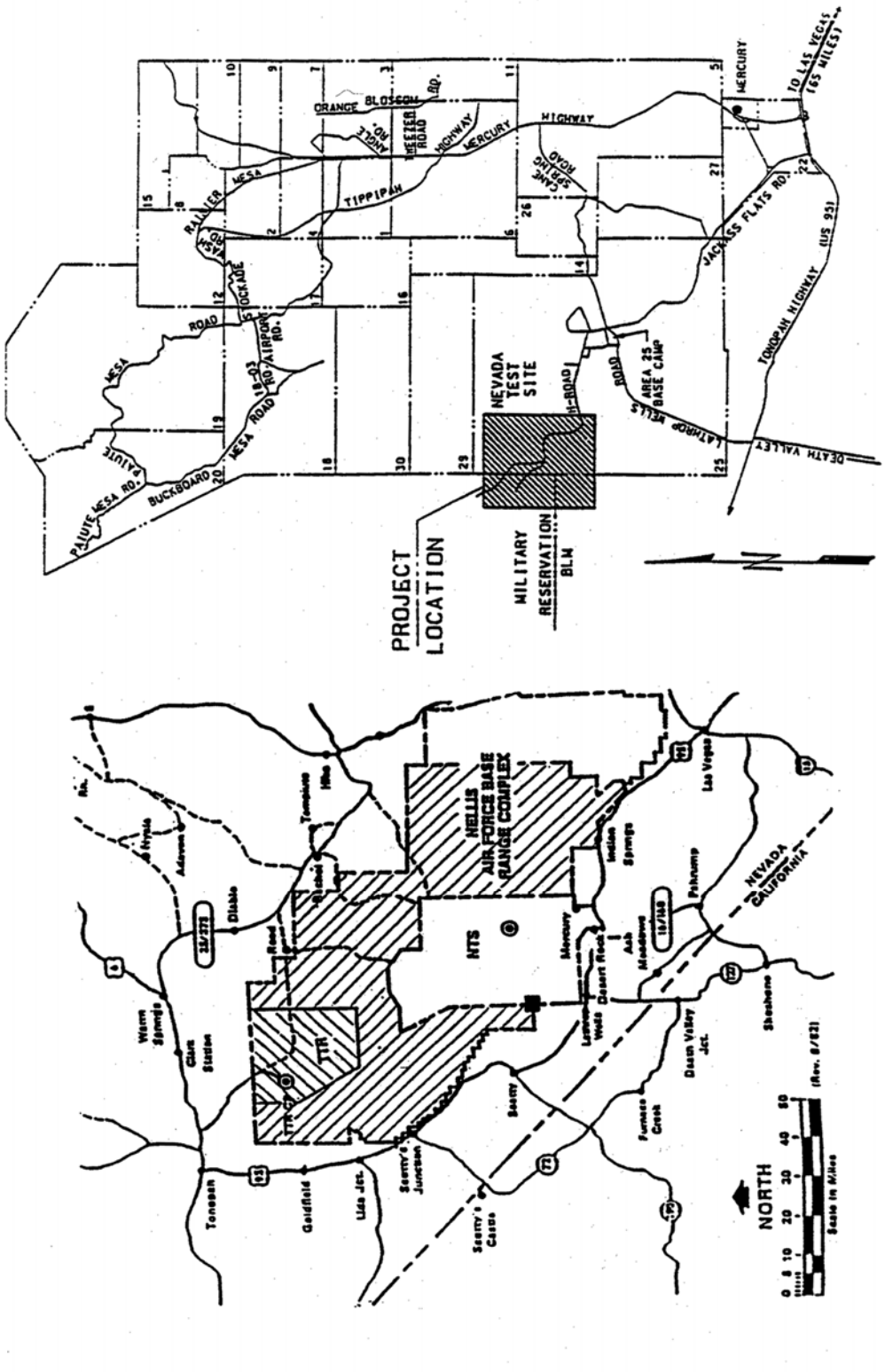


Figure 1. Nevada Test Site and Project Location Maps

This manual only addresses O&M of the ESF PWS after transfer of the system to the YMP as its own public water system beginning at a designated sample port in the J-13 pump house.

This manual has been prepared and is being submitted to the NDEP to add details resulting from the addition of a new chlorination system and arsenic treatment unit on Exile Hill. It also updates information from the last version of the manual published in June 2000.

2. REGULATORY REQUIREMENTS

2.1 BASIS FOR COMPLIANCE

The ESF PWS serves an average daily population of between 25 and 500 persons. It is designated as a public water system by the NDEP, as a non-community non-transient system that must comply with the applicable regulations.

Per NAC 445A.453, all public water systems must meet the requirements of NAC 445A.450 through 492, and of the National Primary Drinking Water Regulations (NPDWR) as set forth in 40 CFR 141, Protection of the Environment (specifically 14.1.1, 141.4, 141.5, 141.11 through 141.16, 141.61, 141.62, 141.63, 141.80 through 141.91, 141.100, 141.101, 141.110 and 141.11). Per NAC 445A.520, each supplier of water shall treat the water in accordance with the provisions of this section and NAC 445A.521 through 445A.526.

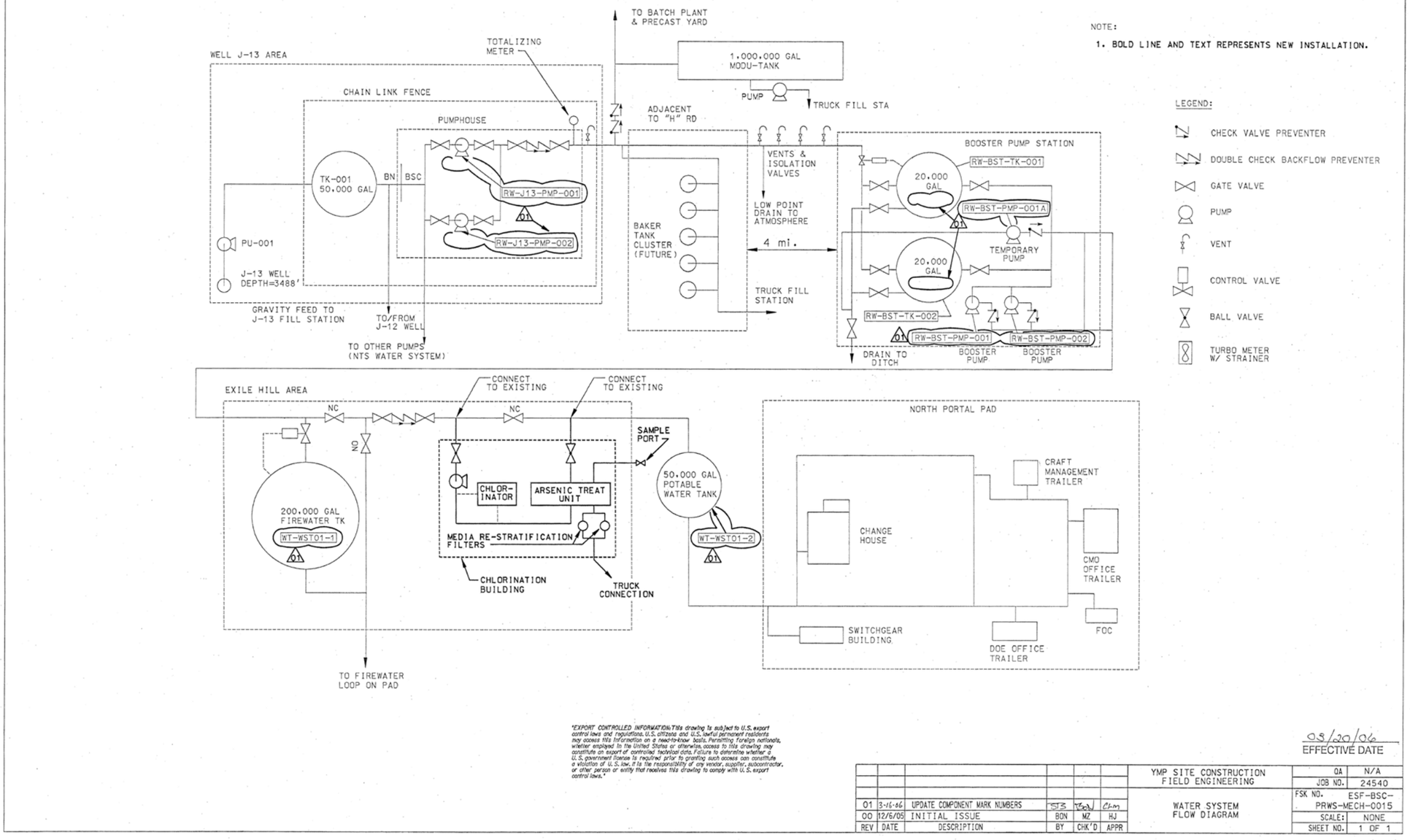
Monitoring and analytical requirements for the primary standards per NAC 445A.453 must be performed as required by 40 CFR 141.21 through 141.30 and 141.40 through 141.42. Requirements for secondary standards are specified per NAC 445A.455, which states, "any of the [indicated] chemical substances, as measured at representative points in the distribution system must not be present ... in excess of the listed levels."

2.2 PERMITS

The YMP has received water appropriations permits (number 57373, 57374, and 57376) for using water obtained from wells J-12 and J-13 as well as a Public Water System Permit (NY-0867-12NCNT), renewed annually, that covers the system described in this manual.

3. SYSTEM DESCRIPTION

The YMP public water system consists of wells J-12 and J-13; a raw water distribution system; a booster pump station and booster tanks; a fire water tank; chlorination system; arsenic treatment system; a potable water storage tank; and service connections to the public water system on the ESF north portal pad. A summary-level depiction of these systems is included as Figure 2.



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REV	DATE	DESCRIPTION	BY	CHK'D	APPR
01	3-16-06	UPDATE COMPONENT MARK NUMBERS	TJB	TJW	CHM
00	12/6/05	INITIAL ISSUE	BON	MZ	HJ

YMP SITE CONSTRUCTION FIELD ENGINEERING

WATER SYSTEM FLOW DIAGRAM

QA: N/A
JOB NO.: 24540
FSK NO.: ESF-BSC-PRWS-MECH-0015
SCALE: NONE
SHEET NO.: 1 OF 1

Figure 2. Water Flow System Flow Diagram

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3.1 WATER SUPPLY SYSTEM: WELLS J-12 AND J-13

Water servicing the ESF north portal pad facilities originates from wells J-12 and J-13 located approximately four miles from the ESF. These wells are part of the NTS Water Supply System, depicted by maps included as Appendix B. The water is pumped from wells J-12 or J-13 into a 50,000-gallon storage tank (TK-001). Linkage of wells J-12 and J-13 to the remainder of the NTS Water Supply System is shown in Figure B-3.

3.2 ESF RAW WATER SUPPLY SYSTEM

Water is drawn from tank TK-001 at the J-12/J-13 well complex via a 14-inch pipeline/manifold. Raw (untreated) water is drawn from this manifold with two transfer pumps (RW-J13-PMP-001 and RW-J13-PMP-002) dedicated to the ESF. Check valves are installed downstream of each pump. This water is transferred approximately four miles to the ESF (via 8-inch polyvinyl chloride [PVC] line) and to other locations away from the ESF (as depicted by Figure 2) utilizing transfer pumps, RW-J13-PMP-001 and RW-J13-PMP-002, each rated at 150 gpm. Water is received at the ESF in either of two Booster Tanks (RW-BST-TK-001 and 002), each with a capacity of 20,000 gallons. Water is currently transferred from the booster tanks to the 200,000-gallon fire/construction water tank, WT-WST01-1, atop Exile Hill via 8-inch PVC line utilizing a single temporary pump, RW-BST-PMP-001A. The approximate elevation of the booster pump station is 3,710 feet. Work on a permanent configuration of the Booster Pump Station will utilize two pumps, RW-BST-PMP-001 and RW-BST-PMP-002, to transfer water from the booster tanks to the fire/construction water tank on Exile Hill. The temporary and permanent configuration appears in Figure C-1 (drawing ESF-BSC-PRWS-MECH-0008) with the ESF Water System Schematic Drawings.

Drawings, which depict the ESF Water System General Arrangement and Distribution Piping, are included as Appendix D. System specifications for the ESF Raw Water System are included as Appendices E and F.

3.3 DISINFECTION SYSTEM

Chlorination of the PWS is necessary to ensure that bacteriological contamination does not enter the water system and is required by NAC 445A.526. Raw water from the Firewater tank on Exile Hill is transferred through the chlorination loop via pump and piping as shown on drawings in Appendix C.

The disinfection process is accomplished by the transfer of water through the treatment/ disinfection loop where the chlorination unit removes a sidestream of the main water flow and introduces a portion of it into the chlorinator. The chlorinator allows water to come in contact with calcium hypochlorite tablets that are eroded at a controlled rate. A centrifugal pump re-injects a metered quantity of the resulting chlorinated solution back into the main water line. If required to achieve the target concentration, additional injection of calcium hypochlorite solution may be performed via an injection point at the suction side of the transfer pump. The System Specification for Water Chlorination Equipment appears in Appendix G.

3.4 ARSENIC TREATMENT SYSTEM

The arsenic treatment system on Exile Hill was installed in January 2006 to comply with changes to NAC 445A.4525. NAC 445A.4525 adopted the July 1, 2003 requirements of National Primary Drinking Water Regulations (NPDWR) per 40 CFR 141. Maximum arsenic contamination levels are defined at 10 parts per billion (ppb). Prior to system installation, the supply wells J-12 and J-13 contained anywhere from 8 to 13 ppb of arsenic, based on YMP water quality sampling over a period of several years. Samples from the installed arsenic treatment system indicate arsenic levels have been decreased to less then 1.0 ppb.

The arsenic treatment system employs a fixed-bed system using granular ferric oxide (GFO). GFO media exhibits a high capacity for arsenic. The GFO media has received the National Science Foundation international approval for use in drinking water under their Standard 61. The System Specification for Water Treatment Equipment appears in Appendix H.

The Adsorption Package Unit consists of two adsorption pressure vessels, interconnecting piping, an automated valve harness, instrumentation, sample ports, GFO media, underdrain media, tank internals, and controls.

3.5 POTABLE WATER STORAGE AND DISTRIBUTION

The potable water storage tank on Exile Hill provides an on-demand supply of treated water to the ESF north portal pad service connections. The tank is at an approximate elevation of 3,860 feet, providing adequate head pressure to the ESF north portal pad that is approximately 3,675 feet in elevation. The 8-inch potable water loop at the north portal pad serves the Switchgear Building (Mine Rescue facility), the Change House with full shower and restroom facilities, and four office trailer complexes with restroom facilities at each. Drawings for these facilities are included in Appendix I. Service to additional facilities may be added in the future.

4. RESPONSIBILITIES FOR SYSTEM OPERATION AND MAINTENANCE

Several organizational entities play a part in the process of ensuring compliance, granting authorization for operation, and conduct of O&M of the ESF PWS. The organizations and relationships are graphically depicted by Figure 3. A list of contacts for the PWS operation and maintenance and support activities will be maintained and updated as required. Roles, responsibilities, and interfaces (relative to this system) for positions within each participating organization are provided in Sections 4.1 through 4.4.

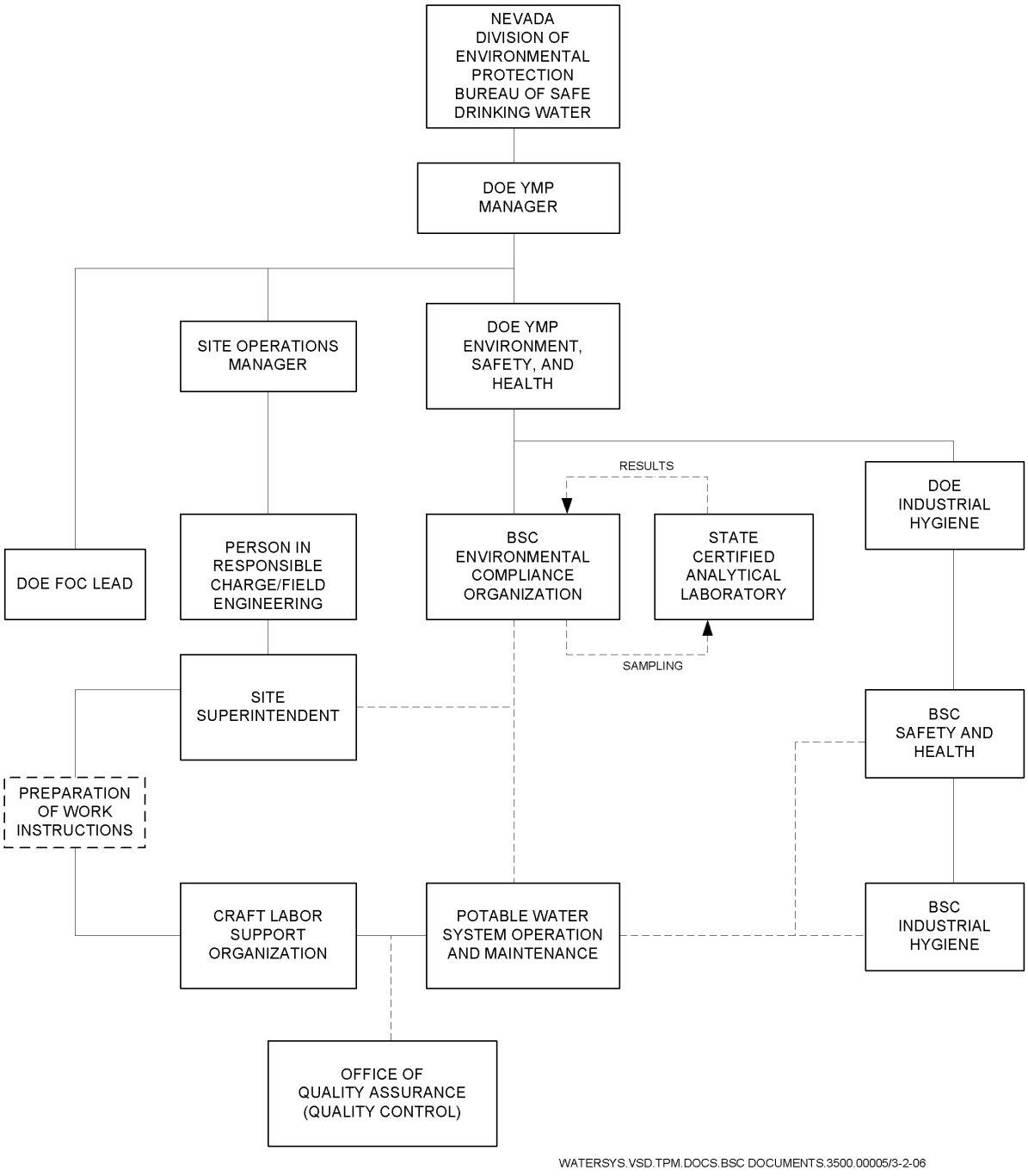

Figure 3. Responsibility Diagram for ESF Potable Water System Operation and Maintenance

4.1 NEVADA DIVISION OF ENVIRONMENTAL PROTECTION, BUREAU OF SAFE DRINKING WATER

The Nevada Division of Environmental Protection (NDEP), Bureau of Safe Drinking Water, approves the construction and installation of the PWS and grants authorization for its initial and ongoing operation and maintenance.

4.2 DOE/OFFICE OF REPOSITORY DEVELOPMENT

DOE/ORD Environment, Safety, and Health is responsible for obtaining all applicable permits and modifications, ensuring that the ESF PWS is prepared for operation, operated, and maintained in accordance with applicable regulatory requirements. Lead DOE environmental compliance and industrial hygiene personnel in the Office of Facility Operation ensure that applicable requirements are executed.

The DOE Field Operation Center (FOC) Lead has overall facility management responsibility and coordinates interface activity with the NTS, specifically with the Site Maintenance Department (SMD) as the operator of the NTS Water System well J-13 complex.

4.3 CIVILIAN RADIOACTIVE WASTE MANAGEMENT SYSTEM CONTRACTOR

4.3.1 BSC Environmental Compliance Organization

Acting on behalf of the DOE/ORD, the BSC Environmental Compliance (EC) organization is responsible for preparation of permit applications, conduct of regulatory interactions with the NDEP, coordination and conduct of sampling and analysis, general compliance oversight for system operation, and preparation of state compliance reporting.

4.3.2 Site Facilities Management

4.3.2.1 Site Operations Manager

A person designated by the Civilian Radioactive Waste Management System (CRWMS) M&O Assistant General Manager, Nevada site, who administers the overall operations activities for the YMP in Area 25 of the NTS and other field locations.

4.3.2.2 Person in Responsible Charge/Field Engineering

Acting on behalf of the Site Operations Manager, the Person in Responsible Charge/Field Engineering has direct line responsibility to administer the overall work control process, including O&M management responsibilities, coordinates the addition of any service connection that may be required in the future, compiles the required compliance information, and prepares a monthly compliance report to be provided to the EC.

4.3.2.3 Site-Superintendent

Acting on behalf of the Person in Responsible Charge/Field Engineering, the Site-Superintendent directs the Craft Labor Support Organization (CLSO) in PWS O&M activities (including

periodic operational checks and modifications/additions), through implementation of the Work Control Process.

4.3.2.4 Work Control Coordinator

Provides technical support to the Site Superintendent during the PWS O&M activities and is responsible for the implementation of the Work Control Process.

4.4 OFFICE OF QUALITY ASSURANCE

The Quality Control (QC) Section of the Office of Quality Assurance (OQA) is responsible for the conduct and documentation of activities required for initial system disinfection as well as routine operator-conducted tests for residual chlorine.

4.5 CLSO

The CLSO provides craft labor to perform the work activities associated with PWS O&M as defined in Work Instructions developed in accordance with the Work Control Process.

4.6 NTS CONTRACTOR

The NTS SMD is responsible for ensuring a reliable supply of water to feed the ESF Raw Water Supply System, which supplies the PWS. This principally entails operation of the well J-12/J-13 complex. The SMD also provides access to the J-12/J-13 complex to support water transfer operations by YMP personnel.

5. OPERATION AND CONTROL

The principal set of activities associated with system operation and control are presented in this section. Specific activities and implementation details are addressed by OP-PRO-9202, *Water System Operation*. The associated drawings provide a schematic of the system, component numbering, valve line up, and configurations for specific water transfer operations.

5.1 RAW WATER SUPPLY SYSTEM OPERATION

Water is pumped from well J-13 into storage tank TK-001. A sensor activates the pump in TK-001. The NTS SMD operates this equipment. Pumps, RW-J13-PMP-001 and 2, are actuated (manually by switch at the J-13 pump house, or in the future by automated process controls) and operated as required to pump water from TK-001 to the booster tanks (RW-BST-001 and -2) near the ESF.

Operations required to transfer water from TK-001 to the Booster Tanks (RW-BST-TK-001 and 2) are as follows:

1. Align system valves in accordance with site-approved procedure OP-PRO-9202, *Water System Operation*, and associated drawings.

2. Initiate transfer using pumps RW-J13-PMP-001 AND RW-J13-PMP-002.

3. Monitor booster tank level; when desired quantity is transferred turn off pumps and return valves to normal operating conditions.

The fire water tank quantity on Exile Hill is required to be maintained at a minimum of 144,000 gallons for fire protection of facilities on the ESF North Portal Pad. Operations required to transfer water from booster tanks (RW-BST-TK-001 and 2) to the fire water tank (WT-WST01-1) are as follows:

1. Align system valves in accordance with site-approved procedure OP-PRO-9202, *Water System Operation,* and associated drawings.

2. Initiate transfer using booster pump RW-BST-PMP-001A.

3. Monitor fire water tank level and when desired quantity is transferred turn off pumps and return valves to normal operating conditions.

5.2 POTABLE WATER SYSTEM DISINFECTION BEFORE COMMISSIONING

Initial disinfection of the public water system occurred when the Nevada Health Division (the PWS regulator at that time) approved the system for operation (based on submittal of a permit application, certified system drawings, and this O&M manual). Prior to the introduction of treated water to the PWS, all surfaces of equipment, tanks, and piping that this water could contact were treated with high concentration disinfectant (i.e., chlorine), with contact time/disinfectant concentration in accordance with the guidelines included as Appendix J. Sampling locations included the PWS tank and sites along the entire system to ensure the entire system met concentration and contact time requirements. Upon satisfactory completion and documentation of this exercise, the system was drained and charged with water treated to specification. Some additional flushing was required to remove any residual high concentration disinfectant. Representative water samples for coliform and chlorine were obtained and submitted to a state-certified laboratory, as coordinated by the EC organization (Section 4.3.1). In addition, the EC organization obtained water samples for the complete suite of primary and secondary safe drinking water standards. Based on acceptable results, the Nevada Health Division was notified and public water system operation began. Within 30 days the Nevada Health Division Environmental Engineer visited the site, evaluated the system, and confirmed acceptability.

When the PWS is modified to add lines, service feeds, or an arsenic treatment unit (for instance), the same disinfection process is repeated for the new installations. New sections of the system remain physically isolated from the balance of the system until the process is complete and confirmed as coliform absent and acceptable by the NDEP (the current PWS regulator).

After the disinfection process is completed, superchlorinated water is drained from the system into a tanker truck and discharged to the C-well spreading basin in accordance with approval from the NDEP, Bureau of Water Pollution Control and Bureau of Safe Drinking Water.

5.3 WATER DISINFECTION SYSTEM OPERATION

This section describes the operations to move water from the fire water tank, WT-WST01-1, to the potable water tank, WT-WST01-2, via the Disinfection (chlorination) Feed System and the Arsenic Treatment System (ATS). The system is equipped with an automated backflush capability and can be used if either pressure vessel reaches a 10 psi pressure drop from its inlet to outlet. Arsenic Treatment System and Disinfection Feed Equipment: Disinfection and Start-up Instructions appears in Appendix K.

1. Start Disinfection Feed System.

   Operations required to maintain the level of residual chlorine and transfer water from the fire water tank (WT-WST01-1) through the chlorination loop and into the potable water tank (WT-WST01-1). Residual chlorine must not be less that 0.2 ppm for more than four hours in any 24-hour period. The concentration of residual chlorine should not exceed 1.0 ppm, with the desired level being 0.5 ppm per the disinfection standards specified in 40 CFR 141.72.

   a. Align system valves in accordance with site-approved procedure OP-PRO-9202, *Water System Operation*, and associated drawings.

   b. Ensure chlorine solution tank is 1/3 to 1/2 full.

   c. Fill chlorinator tower to above half full with chlorine tablets as required.

   d. Place Hand-Off-Auto control switch to “Hand” to start Chlorine Injection Pump.

   e. Adjust chlorinator flow setting using the chlorinator feed valve in accordance with procedural guidance.

2. Start Arsenic Treatment Unit.

   a. Ensure ATS electric actuated valve positions match the alignment on the operating screen.

   b. Align ATS manual valves in accordance with site-approved procedure OP-PRO-9202, *Water System Operation*, and associated drawings.

3. Start Transfer And Chlorine Injection.

   a. Close the chlorine solution recirculation tank valve.
   b. Start transfer pump PW-EXH-PMP-004 at the motor starter panel.
   c. Take appropriate system samples in accordance with site-approved procedures.
   d. Adjust and log chlorine injection pump flow rates as required.

4. When Potable Water Tank, WT-WTS01-2, is at the desired level, stop transfer pump PW-EXH-PMP-004 at motor starter panel.

5. Place Hand-Off-Auto control switch to “Off” to stop Chlorine Injection Pump.

6. Align system valves in accordance with the procedure and associated drawings.

7. Record final readings on the Treatment System Readings Log.

5.4 ROUTINE MAINTENANCE

Routine maintenance activities will be performed by the CLSO, as defined in Work Instructions developed by the Person in Responsible Charge/Field Engineering. Routine maintenance repairs will be done according to the drawings and specifications provided by the BSC Architect/ Engineering Organization, the applicable regulations of the American Water Works Association, Uniform Plumbing Code UPC 91, and applicable manufacturer recommendations. Craft personnel, under the direction of the Site-Superintendent perform the actual work. Maintenance of chlorination and arsenic system components is in accordance with the manufacturers instructions, located in the Site Operations technical library. Routine maintenance (that may affect the quality of the water or water flow for emergency purposes) is reported by CLSO personnel to the following organizations before repairs are made:

- CLSO Supervisor in charge of day to day system/equipment operations
- BSC Person in Responsible Charge/Field Engineering
- BSC Site-Superintendent who notifies the EC organization, directs the performance of inspections and surveillance of corrective actions, and obtains required approvals for resumption of normal operations
- EC organization who notifies the NDEP through DOE/ORD Environmental, Safety, and Health Department
- Ranch Control at the FOC

5.5 EMERGENCY PLAN

Guidelines provided by the NDEP to comply with NAC 445A.66665 require a description of the PWS water sources, distribution system, pump station(s), and storage tanks (if applicable) in an emergency plan. These descriptions are found in other sections of this PWS O&M Manual and should be referenced to obtain this information. This section describes the remaining information necessary for compliance with NAC 445A.66665.

5.5.1 Emergency Definition

This plan describes the predetermined activities for the PWS to restore its services in the contingency that an emergency, including any failure of power, mechanical or electrical failure or natural disaster, reduces the capability of the PWS to supply the necessary water to the ESF North Portal pad. In the event the integrity of the PWS is compromised by (a) contamination of any kind; (b) unacceptable chlorine and/or arsenic levels (c) a leak or break in the pipeline(s) or

fire/construction and potable water tanks; or (d) a system malfunction at well J-13 or at the booster pump station, the emergency operating responses in this section will be followed.

5.5.2 Emergency Operating Response

In the event of an emergency or other situation affecting the PWS, a supervisor will notify appropriate personnel so necessary actions(s) can be taken. If a situation arises that results in the degradation of water quality to unacceptable levels, all PWS receptacles will be closed off until the situation is rectified and adequate sampling/analysis verifies that to be the case. Appropriate notification of employees prohibiting the use of the PWS at that time will be disseminated. If needed, arrangements will be made to use bottled water until the emergency is deemed over. If a situation arises that results in mechanical failure in the pipeline or at the supply well, the appropriate notification of personnel to immediately repair the situation shall be made. Emergency scenarios are shown in Table 1.

Table 1. Emergency Operating Response Scenarios

CONDITION	RESPONSE
Loss of Well J-13.	Make arrangement with NTS to use J-12 water.
Loss of line between Well J-13 and Baker Tank Cluster.	Use hauled J-12 water for construction, bottled water and portable toilets for personnel. Shut down operations if firewater drops below 144,000 gallons.
Leak in Baker Tanks.	Shut down tanks until repaired.
Loss of Booster Pump Station.	Use hauled J-12 water for construction, bottled water and portable toilets for personnel. Shut down operations if firewater drops below 144,000 gallons.
Loss of line between Booster Pump Station and Exile Hill Area.	Use hauled J-12 water for construction, bottled water and portable toilets for personnel. Shut down operations if firewater drops below 144,000 gallons.
Loss of Firewater Tank.	Shut down operations until repairs are made.
Loss of Potable Water Tank.	Use bottled water and portable toilets for personnel until repairs are made.
Loss of Chlorination and/or Arsenic System.	Use bottled water and portable toilets for personnel until repairs are made.
Loss of Firewater Loop on Pad.	Shut down operations until repairs are made.
Loss of potable water line between Exile Hill Area and Pad.	Use bottled water and portable toilets for personnel until repairs are made.

5.5.3 Emergency Notification

If an emergency or other situation results in the degradation of water quality to unacceptable levels or results in mechanical failure of the PWS, the NDEP will be notified immediately by the EC organization to discuss the appropriate course of action. When the PWS returns to service, the NDEP will be notified regarding the measures taken to respond to the emergency and satisfactorily rectify the situation.

5.5.4 List of Available Resources

The immediate emergency response team consists of a Duty Officer, Site Superintendent, Person in Responsible Charge/Field Engineering, and the EC organization. In the event of a system emergency, the personnel listed in Table 2 must be notified.

Table 2. Immediate Emergency Response Team

Emergency Response Team Member	Immediate Action Necessary
Duty Officer	Notify Site-Superintendent and other appropriate parties.
Site-Superintendent	Stabilize the situation by directing the CLSO in coordinated response. Notify Person in Responsible Charge/Field Engineering.
Person in Responsible Charge/Field Engineering	Notify Site Operations Manager if necessary. Interface with EC to determine and implement a plan for corrective action. If necessary, contact the DOE Nevada Operations Office Environment, Safety and Health Division to assure appropriate and immediate repairs.
EC organization	Notify OCRWM and the Nevada Division of Environmental Protection, NDEP. Participate in the process of determining plan for corrective action.

5.6 NEW CONSTRUCTION

New construction is performed by the CLSO according to drawings and specifications prepared and certified by the M&O Architect/Engineer and approved by the DOE and NDEP. Disinfection of new lines or water supplies that may be contaminated through maintenance and minor modifications will be performed in accordance with Section 5.2.

5.7 REPORTING WATER SYSTEM CHANGES TO THE STATE OF NEVADA

The NDEP must review plans and specifications for construction and reconstruction of existing water supplies. Written approval from the state may be required prior to construction. This section outlines construction and reconstruction activities, which require state approval prior to construction and activities, which have pre-approval based on operation and maintenance plans found in this document. Records must be kept for all repairs and changes, or any new construction, which is approved or incorporated into this O&M Manual. This specifically refers to any changes or modifications that have not received prior approval of NDEP personnel.

Activities that require review and approval by the NDEP prior to construction are:

- New facilities with multiple restrooms and/or other water system connections (i.e., steam cleaners, boilers, paint sprayers, etc.).
- Additions to the water system that exceed 100 feet of new water pipe.
- New chlorination and/or new water treatment equipment.

- New water lines being installed within a building (new service connections) such as fire sprinkler systems that are directly connected to the water main or that exceed 100 linear feet of new piping.

- Repairs to water mains–Repair work to water mains four inches and greater that:

- Require more than 100 linear feet of new pipe and include no laterals to potable water users.

- Involves more than 42 feet (two sections) of new pipe and that includes laterals to potable water users.

- Involves modification or replacement of existing thrust blocks or other thrust restraining devices.

The NDEP will be notified by telephone as soon as possible of any repair work that would normally require written state approval, but cannot be delayed due to emergency conditions (see Section 5.5).

The following activities will not be reported to the NDEP:

- New Construction–Connection of trailers, addition of hose bibs, and similar minor new construction to the existing water system. The new facilities can have only: (a) restrooms with toilets, sinks, and/or showers, (b) hose bibs, or (c) sinks. The waterline must be two inches or less in diameter and 100 feet or less in length.

- New Construction (Internal or Facilities)–New waterlines being installed within a building, such as fire sprinkler systems, provided that the waterline is not directly connected to the water main, and provided the construction activities will not exceed 100 linear feet of new piping.

- Repairs to water mains not requiring new pipe.

- Repairs to water mains four inches and greater in diameter and requiring less than 100 linear feet of new pipe that does not include thrust restraining devices or laterals to potable water users.

- Repairs to water mains four inches and greater in diameter that requires less than 42 linear feet (two sections) of new pipe and that includes laterals to potable water users.

- Repairs to water lines four inches and less in diameter requiring less than 100 linear feet of new pipe.

- All repair work completed within a building that includes, but is not limited to, work on water closets, hand sinks, utility sinks, showers, and hose bibs. Also, repairs to and replacement of service connections that do not exceed 100 linear feet.

- Replacing, repairing, or maintaining valves (all kinds), gauges, submersible pump equipment in wells, distribution pumps, chlorination equipment, water treatment equipment, metering equipment, control equipment, instrumentation equipment, air/vacuum relief devices, drains, vents and overflow pipes, seals gaskets, screens, and similar system equipment.

- Emergency repairs that are necessary and completed to portions of the PWS prior to the completion and approval of design drawings. This can be performed with as-built drawings that will require submittal to DOE/ORD and then to the NDEP after completion of repairs.

5.8 POTABLE WATER HAULING

The CLSO will not haul potable water produced by this system to other storage containers or vessels for use as potable water.

6. SAMPLING AND ANALYSIS

6.1 REQUIREMENTS AND REGULATORY BASES

A variety of sampling and analysis activities are required per federal and State of Nevada regulations for public water systems. Monitoring may be required for the following:

- Total coliform
- Organics, inorganics and radionuclides
- Residual chlorine (including temperature and pH)

The regulatory basis for these requirements is presented below.

Per NAC.445.454, "the activities of monitoring and analytical requirements for the *Primary Standards* contained in NAC 445A.453 must be performed as required by 40 CFR 141.21 to 30 and 141.40 to 42. Per NAC 445A.453, all public water systems must meet the requirements of NAC 445A.450 through 445A.492 and the National Primary Drinking Water Regulations (40 CFR 141)."

Sampling and analysis to determine compliance with Primary Standards for inorganic, organic, and radioactive contaminants is required per 40 CFR 141, with monitoring frequency as determined by the state. Monitoring to determine compliance with Secondary Standards is also required in accordance with the thresholds presented in NAC 445A. 455.

Per 40 CFR 141.21, "public water systems must collect total coliform samples at sites which are representative of water throughout the distribution system. Because the population served (375 persons/day maximum) is between 25 and 1000, one sample per month is required. The state may reduce the monitoring frequency if water source and historical site-specific conditions are favorable." Therefore, a variance was granted to reduce coliform sampling to a quarterly basis. Public water systems must conduct total coliform analyses in accordance with one of the following analytical methods:

- Multiple Tube Fermentation technique
- Membrane Filter technique

Turbidity measurements may be required in the future depending on the clarity of the system source water, though not currently anticipated based on source water characterization results. If monitoring is required, 40 CFR 141.22 specifies sampling requirements.

Chlorine residual measurements may be made by the water supplier utilizing an instrument and methods capable of meeting the requirements of 40 CFR 141.21 (h).

6.2 REQUIREMENTS FOR ANALYSIS

Per 40 CFR 141.28, "for the purpose of determining compliance with standards, samples may be considered only if they have been analyzed by a laboratory approved by the state, except that measurements for turbidity, free chlorine residual, pH and temperature may be performed by any person acceptable to the state. Per NAC 445A.458, Each [water] analysis required by NAC 445A through 445A.457 must be performed by a properly certified laboratory (... certified as acceptable by the laboratory certification officer in accordance with a certification plan approved by the Environmental Protection Agency and regulations and procedures adopted by the State Board of Health). If ever required, turbidity measurements may be made by a certified laboratory or by water supply personnel utilizing an instrument capable of meeting the requirements of the NPDWR. Chlorine residual measurements may be made by the water supplier utilizing an instrument and methods capable of meeting the requirements of the NPDWR."

6.3 SAMPLING AND ANALYSIS PLAN

A Sampling and Analysis Plan is included as Appendix L.

7. SURVEYS AND INSPECTIONS

7.1 SANITARY SURVEY

The NDEP will conduct a sanitary survey at least once every five years, as required by the Safe Drinking Water Act. Sanitary surveys may be scheduled more frequently if modifications to the public water system are made. The survey, generally scheduled in advance, covers inspection of the public water system from wells to taps, including examination of any changes to the system since the last inspection or modification.

7.2 SANITARY INSPECTIONS

An inspection will be conducted as part of the Industrial Hygiene health hazards annual inventory to determine if the system condition has changed. Identified health concerns will be brought to the attention of the Person in Responsible Charge/Field Engineering.

7.3 OPERATIONAL SURVEYS

Key PWS components will be inspected and documented on a daily basis in accordance with OP-PRO-9202 to verify proper system operation.

7.4 BACKFLOW PREVENTION DEVICE INSPECTIONS

Backflow prevention devices (BPDs) for the YMP PWS are inspected annually as described in Appendix H.

8. REPORTING AND NOTIFICATION REQUIREMENTS

8.1 NOTIFICATIONS

Per NAC 445A.485, "the owner or operator of a public water system who fails to perform monitoring as required by 40 CFR 141.21 of the NPDWR shall notify all persons served by the system within 45 days of the violation or failure. All other activities of reporting, public information and record keeping must be performed as required by 40 CFR 141.31 through 35 and by NAC 445A.450 through 445A.492." In the event of failure to comply with any Primary Standard, the supplier of water must report to the state within 48 hours of the failure to comply. If results indicate that any specified Secondary Standard contaminant threshold for the system is exceeded, "the supplier of water must report to the health authority within 30 days and initiate three additional analyses at the same sampling point within 90 days." If subsequent analysis indicates continued failure to comply, "the supplier of water must notify the health authority and give notice to the public (in a form and manner as prescribed by the health authority)." If a routine sample is total coliform-positive, the public water system must collect a set of repeat samples within 24 hours of being notified of the positive result. In the event of a total coliform-positive sample result for the YMP PWS from the repeat samples, the system will immediately be taken out of service, with the EC organization and DOE/ORD Environmental, Safety, and Health notified without delay. In such event, samples will be taken from all system discharge points due to the limited number of discharge points. Repeat sampling is addressed in Section 5 of Appendix L. The system will be returned to service only after:

- The root cause is determined
- Corrective action is taken
- Authorization from the EC and DOE/ORD (based on any required approvals from the NDEP) is provided through the Person in Responsible Charge/Field Engineering.

If results of analysis (which is not currently planned) indicate that the maximum allowable limit for turbidity has been exceeded, the sampling and measurement shall be confirmed by re-sampling as soon as practicable and preferably within one hour. If repeat sampling confirms that the allowable limit has been exceeded, the supplier of water shall report to the state within 48 hours. In the event that water clarity shows signs of significant deterioration, the system will be taken out of service until the source of the problem is identified and corrective action is taken. If chlorine residual measurements provide indication that the concentration is below 0.2 ppm or

above 1.0 ppm, the situation will be immediately investigated. If the problem is not immediately correctable, and the concentration is well out of the target range, the system will be immediately taken out of service until the source of the problem is identified and corrective action is taken.

8.2 REPORTING

The Person in Responsible Charge/Field Engineering will include basic monthly operating data in a monthly environmental compliance report provided to the EC organization. An annual PWS report is prepared and submitted to the NDEP each January for the previous year, summarizing activities and issues associated with the PWS.

9. RECORDS AND DATA

Preparation and maintenance of records is an essential element of demonstrating regulatory compliance. Per NAC 445A.536, "each supplier of water must maintain accurate and complete records of the operation of each treatment plant…" Records must include:

- Results of all monitoring (sampling and analysis)
- Quantity of water produced
- Hours of operation
- Rates of flow
- Dates and description of failures of major equipment

The records must be maintained for at least two years, unless the NDEP specifies otherwise.

10. OPERATOR CERTIFICATION

All PWSs require a certified operator who is knowledgeable in water treatment and distribution system operations. The following staffing designations are in effect for the YMP PWS:

Person in Responsible Charge - Bryan O. Newman, Water Distribution Operator Grade D-1 Certificate Number 4505 and Water Treatment Operator Grade T-1 OIT Certificate Number 4587

Foreperson - Michael O. Oettinger, Water Distribution Operator Grade D-3 Certificate Number 4690 and Water Treatment Operator Grade T-1 OIT Certificate Number 4504

11. SAFETY AND HEALTH

The principal issue of concern from the safety and health standpoint is exposure to chlorine during the solution preparation process. Guidelines for the safe handling of calcium hypochlorite are found in the material safety data sheet located in the Site Document Control Library.

12. ENVIRONMENTAL/SITE INTEGRITY PROTECTION

Handling of calcium hypochlorite tablets and the control of hypochlorite solutions are of utmost importance from the environmental and site integrity protection standpoint. All spills/releases of

tablets/powder or solution must be prevented. Care must be taken to avoid all releases, as even extremely small quantities may have a residual effect. This is important because the chlorine isotope is used for site characterization tests, which evaluate water infiltration.

13. TRAINING

A certified operator has been designated, meets the requirements delineated in NAC 445A, and is trained to this manual and OP-PRO-9202-BSC, *Water System Operation*. All other persons who fill positions identified in this manual will be provided training requisite with their functions and responsibilities.

14. REFERENCES

14.1 DOCUMENTS CITED

Bechtel Nevada 1999. *Nevada Test Site (NTS) Water Systems Operation and Maintenance (O&M) Manual*. Las Vegas, Nevada: Bechtel Nevada.

EPA (U.S. Environmental Protection Agency) Publication SW-846, *Test Methods for Evaluating Solid Waste Physical/Chemical Methods*.

Greenberg, A., 1999. *Standard Methods for the Examination of Water and Wastewater*. Washington, D.C.: American Public Health Association.

14.2 CODES, STANDARDS, AND REGULATIONS

29 CFR 1910. Labor: Occupation Safety and Health Standards.

40 CFR 141. Protection of Environment: National Primary Drinking Water Regulations Implementation.

Safe Drinking Water Act Total Coliform Rule.

NAC (Nevada Administrative Code) 445A. Public Water Systems.

UPC (Uniform Plumbing Code) 91. American Water Works Uniform Plumbing Code.

14.3 PROCEDURES

EV-PRO-5010, *Environmental Media Sampling*.

EV-DSK-5010-1001, *Sampling of Liquids*

OP-PRO-9202-BSC, *Water System Operation*

QA-PRO-1081, *Potable Water System Chlorine Residual Measurement*

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APPENDIX A

YUCCA MOUTAIN PROJECT WATER SYSTEM LOCATION MAP

APPENDIX A
YUCCA MOUTAIN PROJECT WATER SYSTEM LOCATION MAP

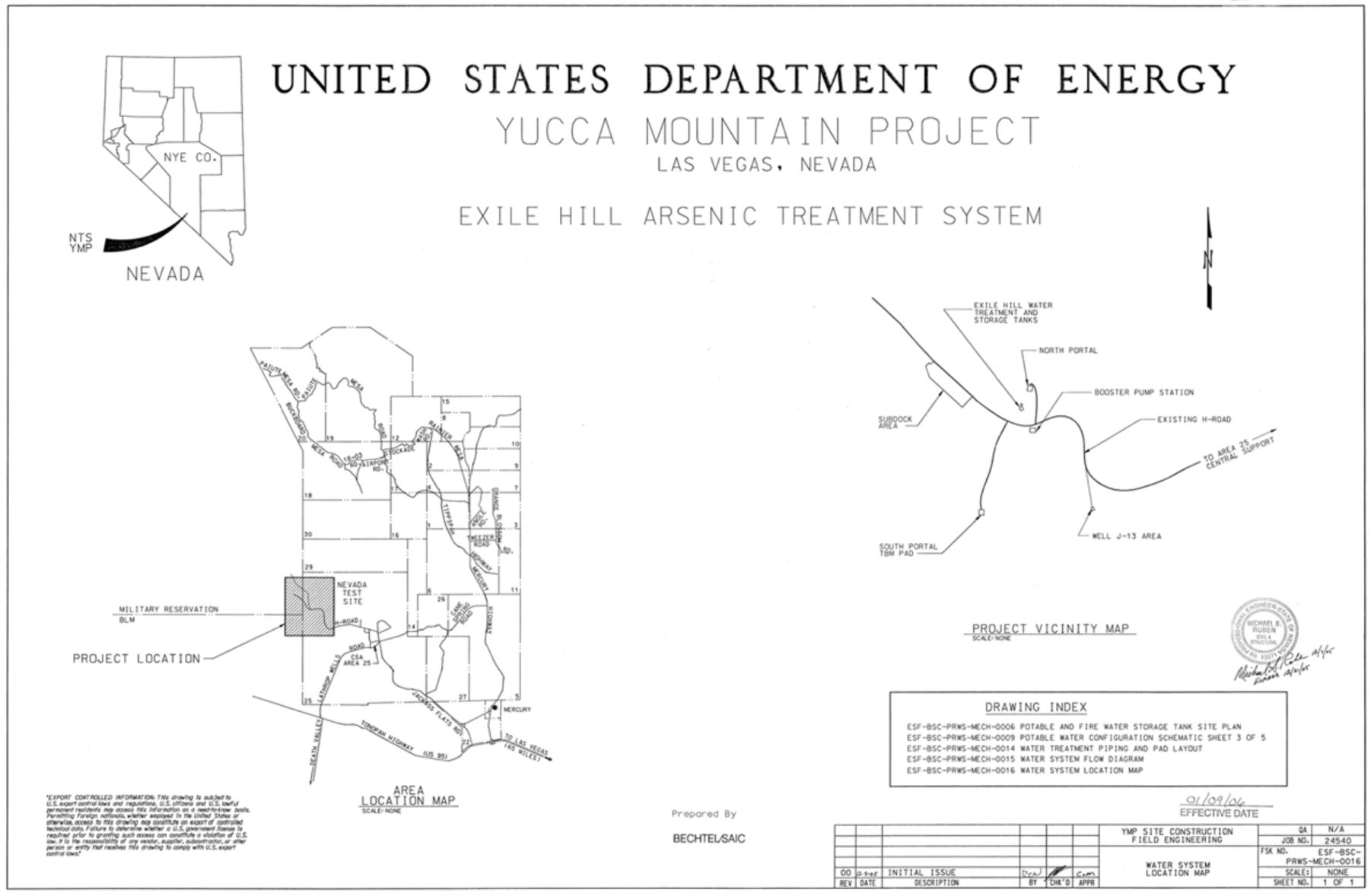

Figure A-1. Water System Location Map

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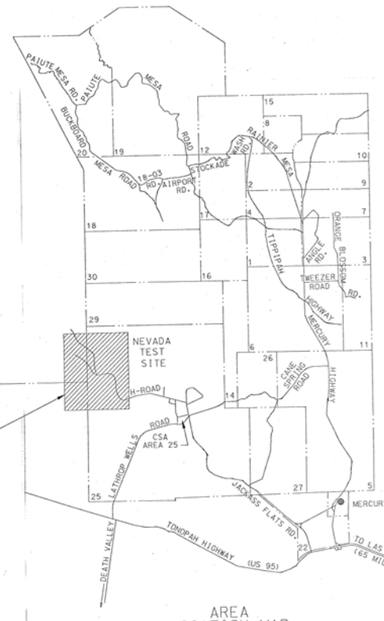
UNITED STATES DEPARTMENT OF ENERGY

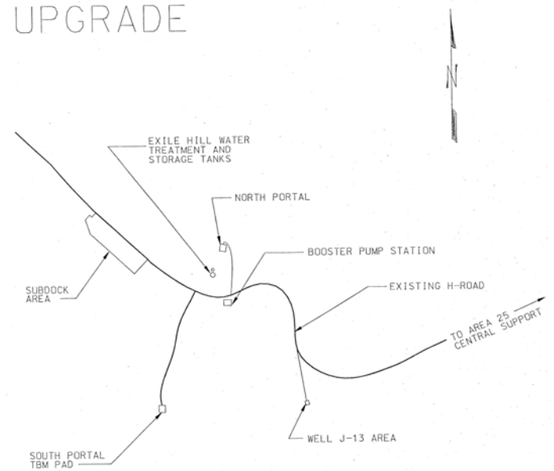
YUCCA MOUNTAIN PROJECT

LAS VEGAS, NEVADA

BOOSTER STATION UPGRADE



AREA
LOCATION MAP
SCALE: NONE



PROJECT VICINITY MAP
SCALE: NONE

MICHAEL S. RUBEN
CIVIL & STRUCTURAL
NO. 13571
Michael S. Ruben 12/8/05
EXPIRES 12/31/05

DRAWING INDEX

ESF-BSC-PRWS-CIVL-0003 BOOSTER PUMP STATION SITE PLAN
ESF-BSC-PRWS-MECH-0008 POTABLE WATER CONFIGURATION SCHEMATIC SHEET 2 OF 5
ESF-BSC-PRWS-MECH-0019 WATER SYSTEM LOCATION MAP BOOSTER PUMP STATION

12/13/05
EFFECTIVE DATE

*EXPORT CONTROLLED INFORMATION: This drawing is subject to U.S. export control laws and regulations. U.S. citizens and U.S. lawful permanent residents may access this information on a need-to-know basis. Permitting foreign nationals, whether employed in the United States or otherwise, access to this drawing may constitute an export of controlled technical data. Failure to determine whether a U.S. government license is required prior to granting such access can constitute a violation of U.S. law. It is the responsibility of any vendor, supplier, subcontractor, or other person or entity that receives this drawing to comply with U.S. export control laws.

Prepared By
BECHTEL SAIC

REV	DATE	DESCRIPTION	BY	CHK'D	APPR
00	12-8-05	INITIAL ISSUE	MR	BJZ	CLM

YMP SITE CONSTRUCTION FIELD ENGINEERING

WATER SYSTEM LOCATION MAP BOOSTER PUMP STATION

QA	N/A
JOB NO.	24540
FSK NO.	ESF-BSC-PRWS-MECH-0019
SCALE:	NONE
SHEET NO.	1 OF 1

Figure A-2. Water System Location Map Booster Pump Station

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APPENDIX B

NEVADA TEST SITE WATER SUPPLY SYSTEM MAPS

APPENDIX B

NEVADA TEST SITE WATER SUPPLY SYSTEM MAPS

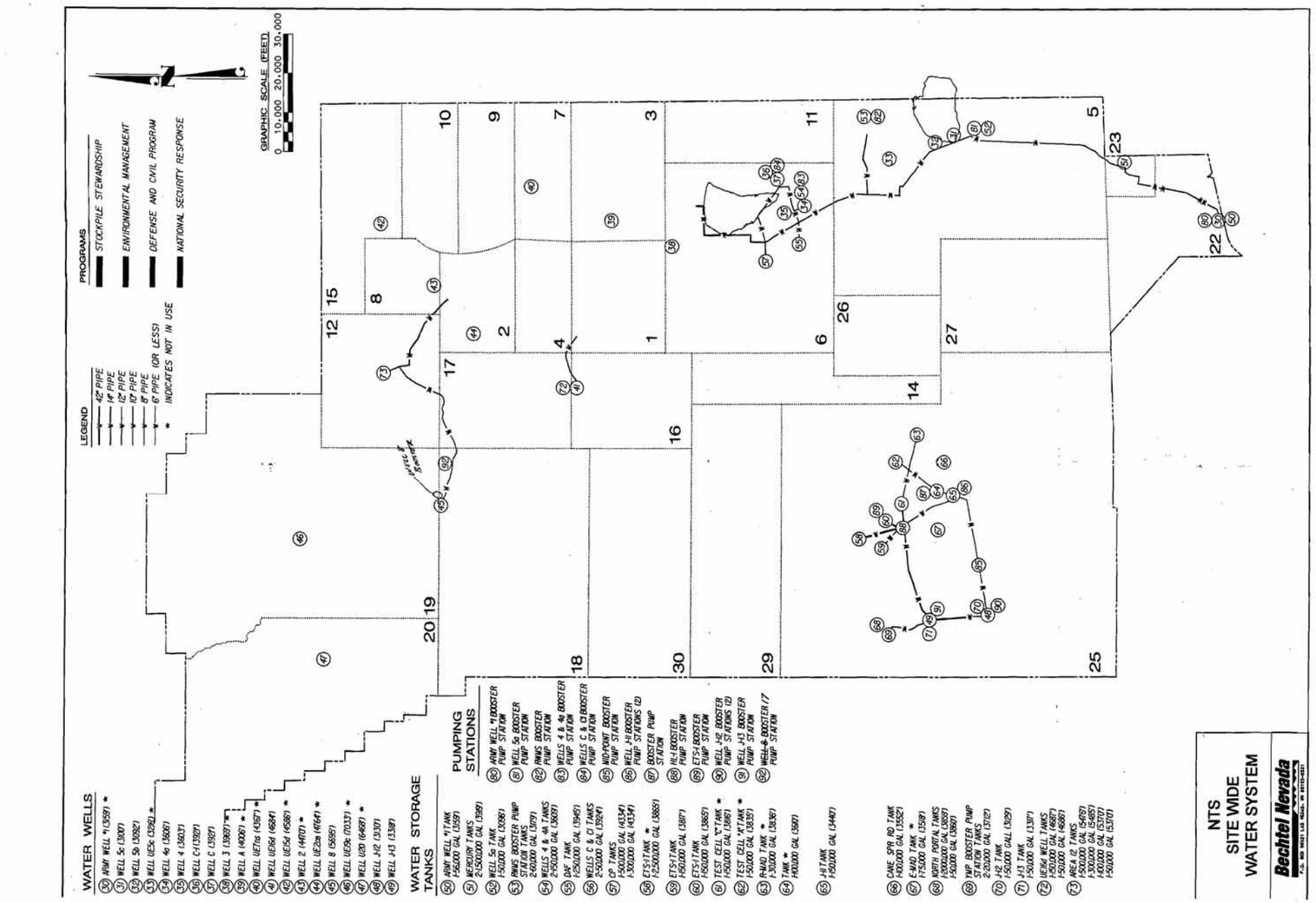

FIGURE XX

Figure B-1. NTS Site Wide Water System

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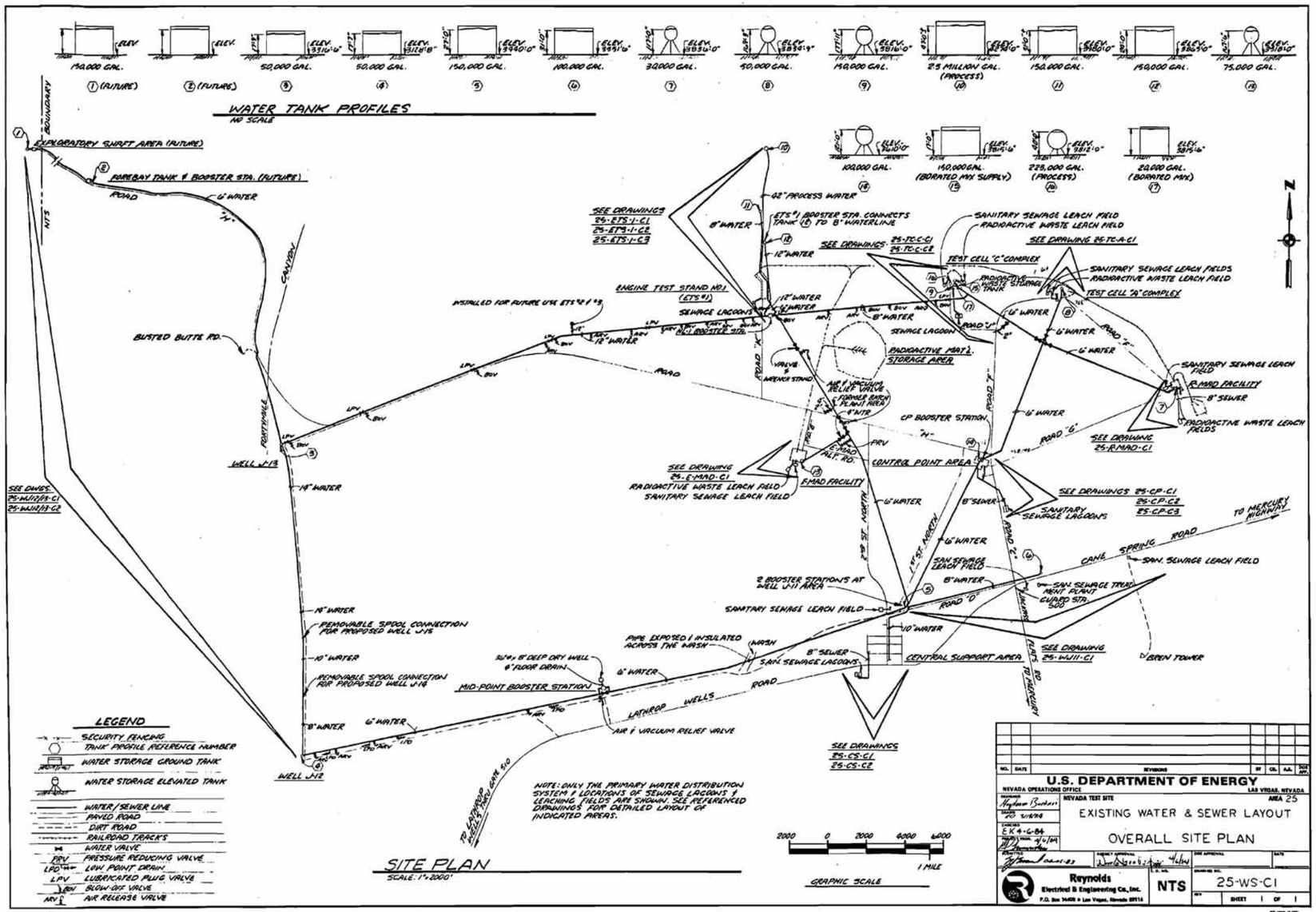

Figure B-2. Existing Water and Sewer Layout Overall Site Plan

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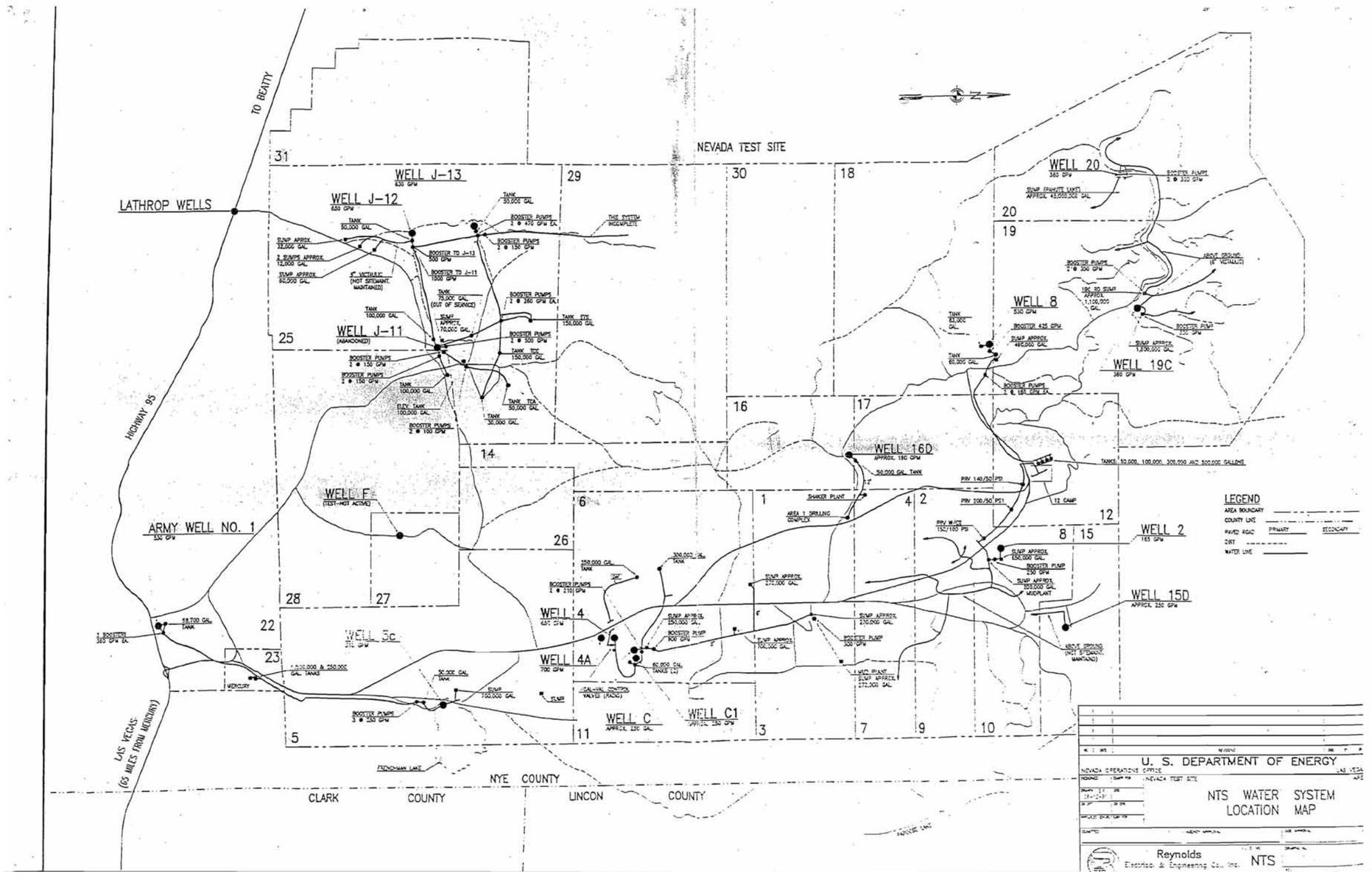

Figure B-3. NTS Water System Location Map

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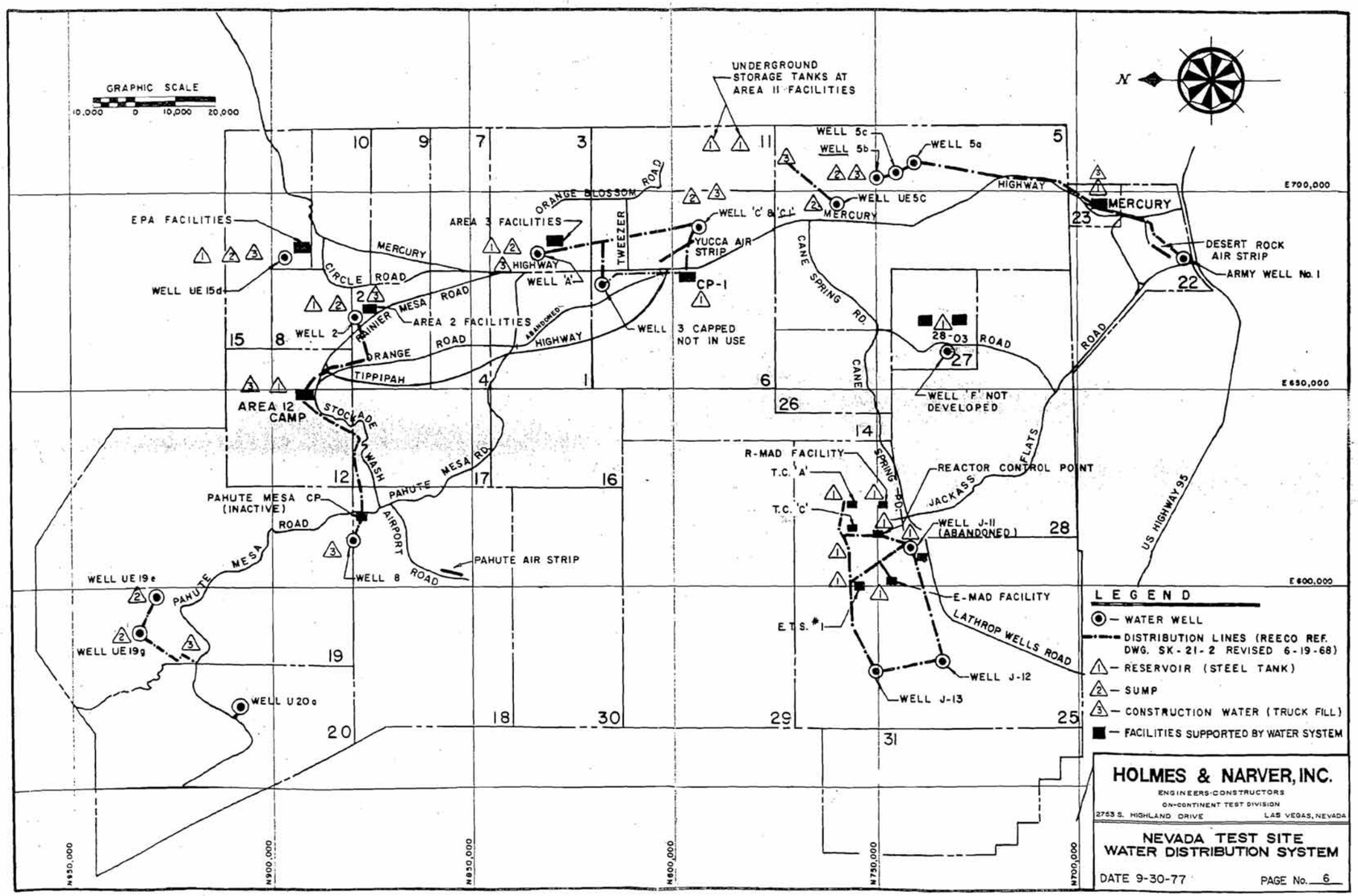

Figure B-4. Nevada Test Site Water Distribution System

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APPENDIX C

ESF WATER SYSTEM SCHEMATIC DRAWINGS

APPENDIX C
ESF WATER SYSTEM SCHEMATIC DRAWINGS

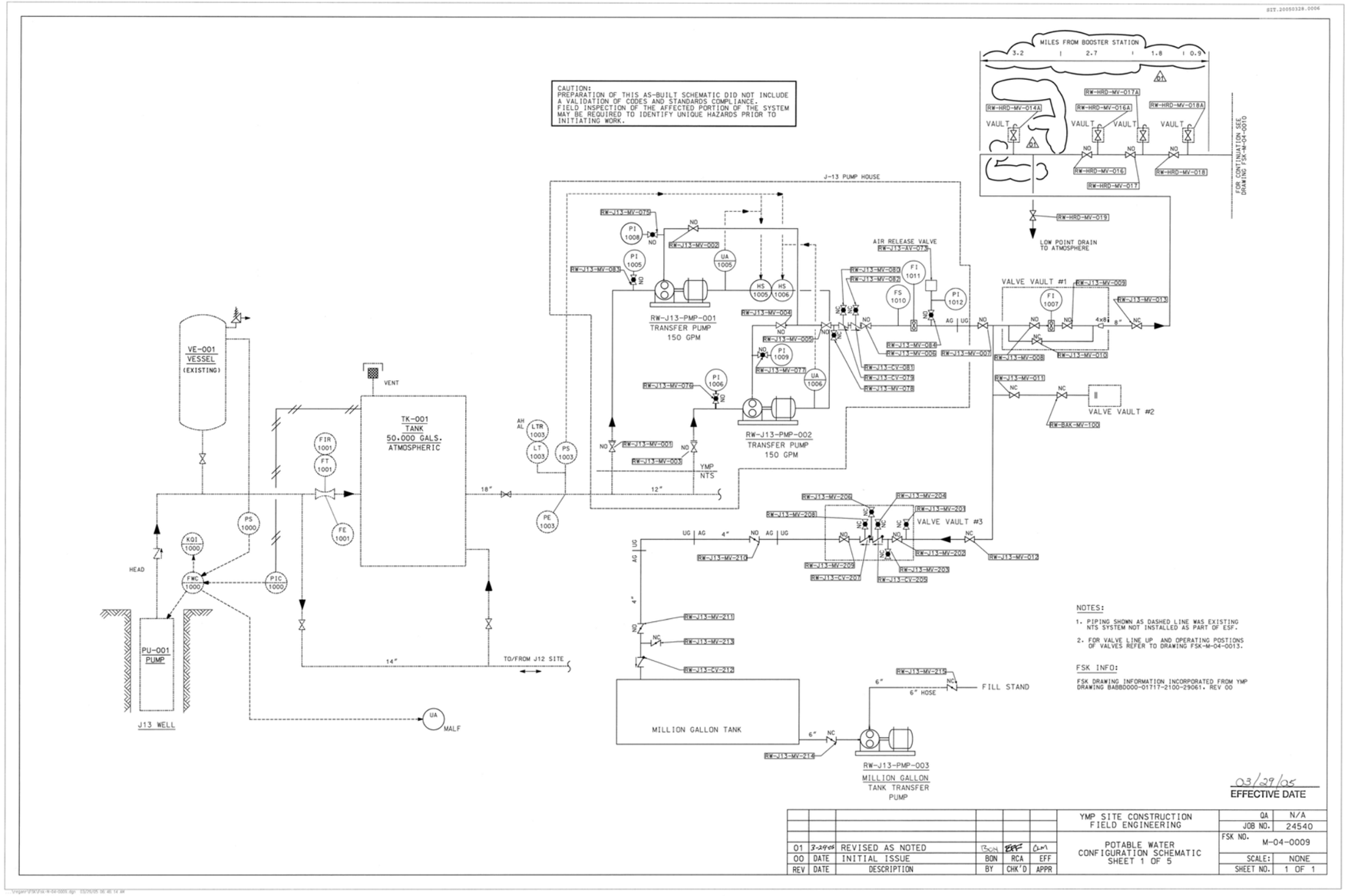

Figure C-1. Potable Water Configuration Schematic (Sheet 1 of 5)

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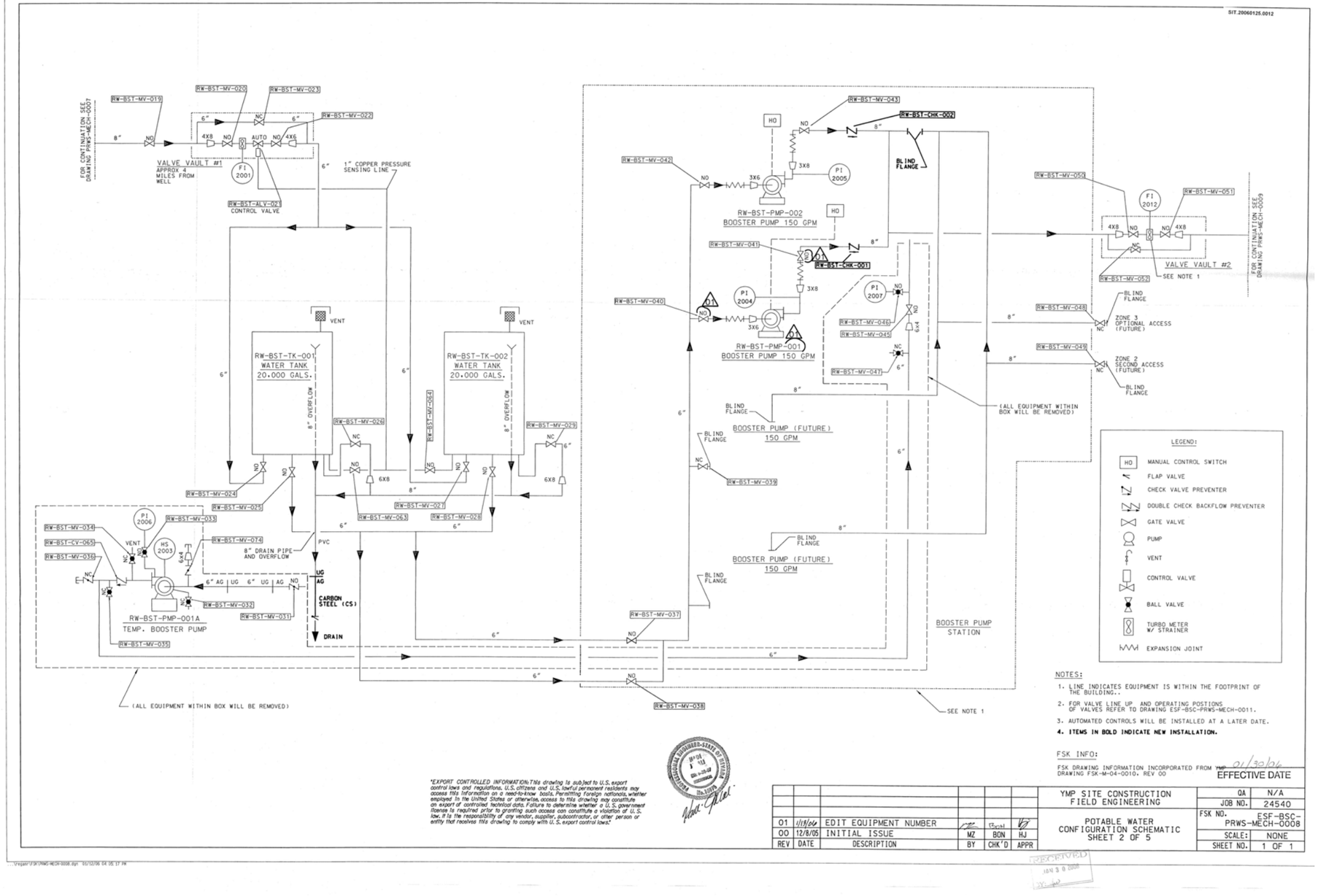

Figure C-1. Potable Water Configuration Schematic (Sheet 2 of 5)

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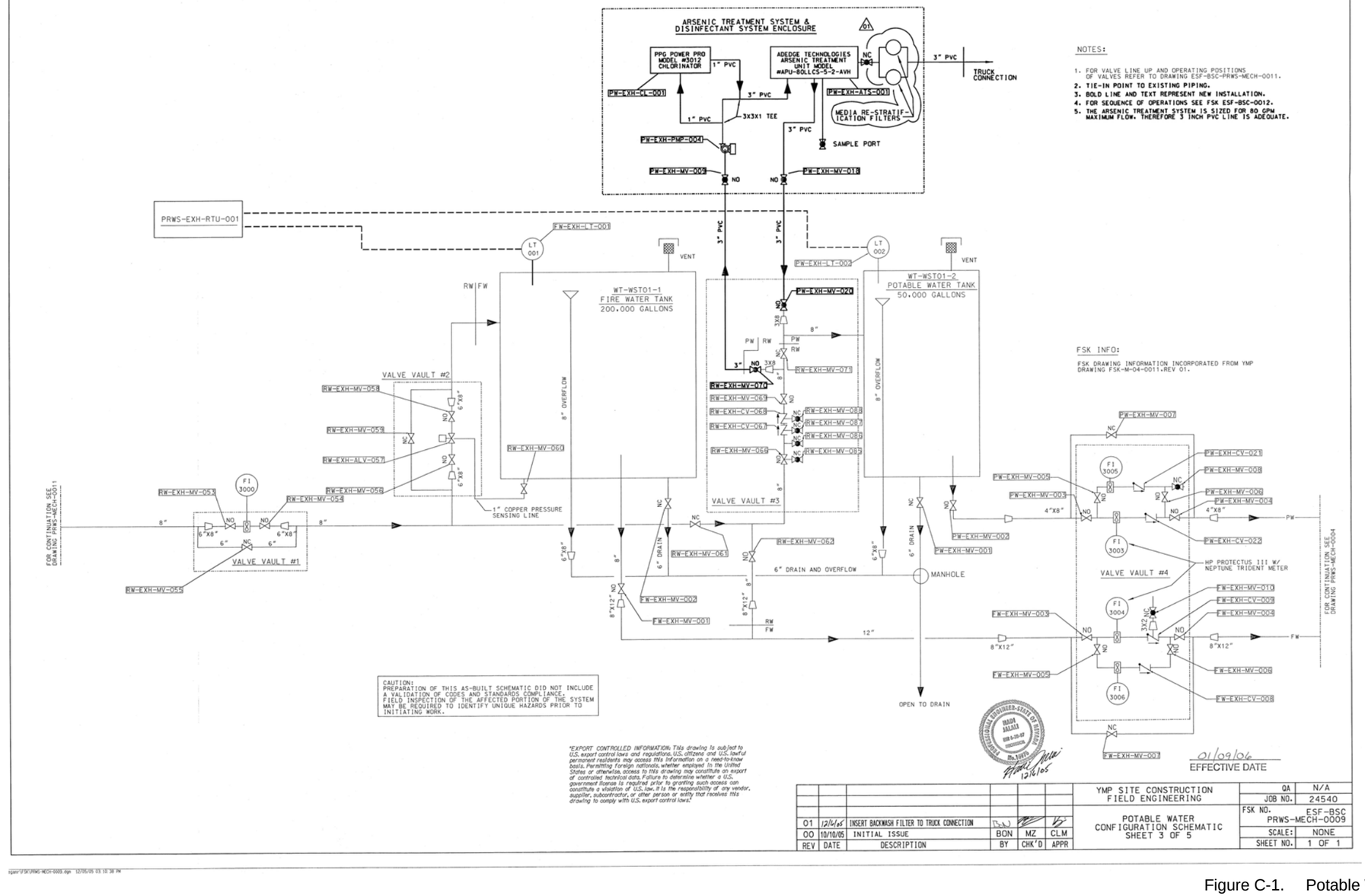

Figure C-1. Potable Water Configuration Schematic (Sheet 3 of 5)

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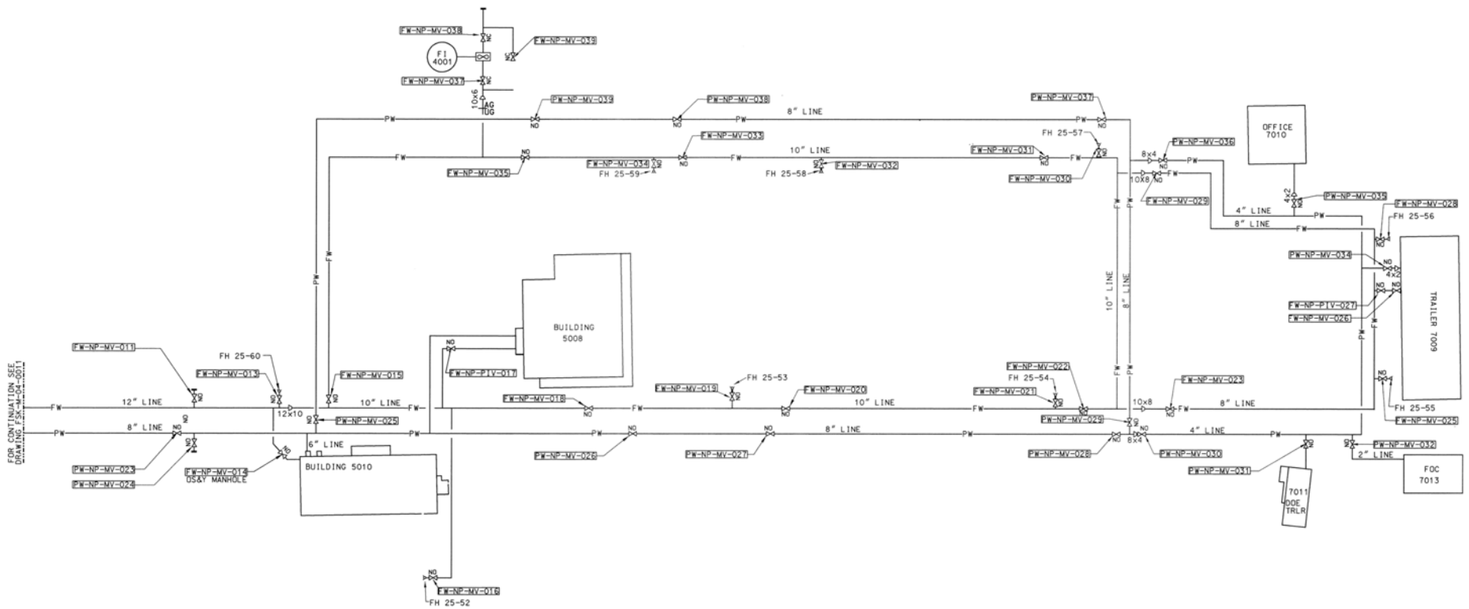

FIRE HYDRANT LOCATIONS

PT NO	COORDINATES		ELEV TOP FLANGE	DESCRIPTION
	NORTH	EAST		
FH 25-55	765995.13	570548.20	3677.55	FIRE HYDRANT
FH 25-56	766061.35	570430.04	3679.24	FIRE HYDRANT
FH 25-59	765458.32	570031.01	3681.98	FIRE HYDRANT
FH 25-52	765074.66	570263.71	3675.66	FIRE HYDRANT
FH 25-57	765882.45	570215.28	3683.76	FIRE HYDRANT
FH 25-60	765044.43	570040.44	3675.70	FIRE HYDRANT
FH 25-54	765726.41	570394.47	3678.99	FIRE HYDRANT
FH 25-58	765626.13	570100.33	3683.51	FIRE HYDRANT
FH 25-53	765442.30	570228.72	3678.19	FIRE HYDRANT

CAUTION:
PREPARATION OF THIS AS-BUILT SCHEMATIC DID NOT INCLUDE A VALIDATION OF CODES AND STANDARDS COMPLIANCE. FIELD INSPECTION OF THE AFFECTED PORTION OF THE SYSTEM MAY BE REQUIRED TO IDENTIFY UNIQUE HAZARDS PRIOR TO INITIATING WORK.

EFFECTIVE DATE

NOTES:

1. FOR VALVE LINE UP AND OPERATING POSITIONS OF VALVES REFER TO DRAWING FSK-M-04-0013

FSK INFO:

FSK DRAWING INFORMATION INCORPORATED FROM YMP DRAWING BABBD000-01717-2100-29064, REV 00

LEGEND:

FW — FIREWATER LINE
PW — POTABLE WATER LINE
HYDRANT

04/02/04
EFFECTIVE DATE

REV	DATE	DESCRIPTION	BY	CHK'D	APPR
00	5-27-04	INITIAL ISSUE			

YMP SITE CONSTRUCTION FIELD ENGINEERING

POTABLE WATER CONFIGURATION SCHEMATIC SHEET 4 OF 5

QA	N/A
JOB NO.	24540
FSK NO.	M-04-0012
SCALE:	NONE
SHEET NO.	1 OF 1

Figure C-1. Potable Water Configuration Schematic (Sheet 4 of 5)

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SIT.20040602.0005

RAW WATER VALVES

VALVE NUMBER	DESCRIPTION	NORMAL POSITION	DRAWING
RW-J13-MV-001	4" Gate Valve	NO	Fsk-E-04-0009
RW-J13-MV-002	4" Plug Valve	NO	Fsk-E-04-0009
RW-J13-MV-003	4" Gate Valve	NO	Fsk-E-04-0009
RW-J13-MV-004	4" Plug Valve	NO	Fsk-E-04-0009
RW-J13-MV-005	4" Gate Valve	NO	Fsk-E-04-0009
RW-J13-MV-006	4" Gate Valve	NO	Fsk-E-04-0009
RW-J13-MV-007	4" Gate Valve	NO	Fsk-E-04-0009
RW-J13-MV-008	4" Gate Valve	NO	Fsk-E-04-0009
RW-J13-MV-009	4" Gate Valve	NO	Fsk-E-04-0009
RW-J13-MV-010	4" Gate Valve	NC	Fsk-E-04-0009
RW-J13-MV-011	6" Gate Valve	NC	Fsk-E-04-0009
RW-J13-MV-012	4" Gate Valve	NC	Fsk-E-04-0009
RW-J13-MV-013	8" Gate Valve	NC	Fsk-E-04-0009
RW-HRD-MV-014A	Air Release Valves	N/A	Fsk-E-04-0009
RW-HRD-MV-014	8" Gate Valve	NO	Fsk-E-04-0009
RW-HRD-MV-015	Flush Hydrant Valve	N/A	Fsk-E-04-0009
RW-HRD-MV-016A	Air Release Valve	N/A	Fsk-E-04-0009
RW-HRD-MV-016	8" Gate Valve	NO	Fsk-E-04-0009
RW-HRD-MV-017A	Air Release Valve	N/A	Fsk-E-04-0009
RW-HRD-MV-017	8" Gate Valve	NO	Fsk-E-04-0009
RW-HRD-MV-018	8" Gate Valve	NO	Fsk-E-04-0009
RW-HRD-MV-018A	Air Release Valves	N/A	Fsk-E-04-0009
RW-HRD-MV-019	2" Gate valve	NC	Fsk-E-04-0009
RW-BST-MV-019	8" Gate Valve	NO	Fsk-E-04-0010
RW-BST-MV-020	4" Gate Valve	NO	Fsk-E-04-0010
RW-BST-ALV-021	4" Altitude Valve	Auto	Fsk-E-04-0010
RW-BST-MV-022	4" Gate Valve	NO	Fsk-E-04-0010
RW-BST-MV-023	6" Gate Valve	NC	Fsk-E-04-0010
RW-BST-MV-024	6" Gate Valve	NO	Fsk-E-04-0010
RW-BST-MV-025	6" Gate Valve	NC	Fsk-E-04-0010
RW-BST-MV-026	6" Gate Valve	NO	Fsk-E-04-0010
RW-BST-MV-027	6" Gate Valve	NO	Fsk-E-04-0010
RW-BST-MV-028	6" Gate Valve	NC	Fsk-E-04-0010
RW-BST-MV-029	6" Gate Valve	NO	Fsk-E-04-0010
RW-BST-MV-030	2" Ball Valve	NC	Fsk-E-04-0010
RW-BST-MV-031	6" Butterfly Valve	NO	Fsk-E-04-0010
RW-BST-MV-032	3/4" Ball Valve	NC	Fsk-E-04-0010
RW-BST-MV-033	1/2" Ball Valve	NO	Fsk-E-04-0010
RW-BST-MV-034	3/4" Ball Valve	NC	Fsk-E-04-0010
RW-BST-MV-035	3/4" Ball Valve	NC	Fsk-E-04-0010
RW-BST-MV-036	6" Butterfly Valve	NC	Fsk-E-04-0010
RW-BST-MV-037	6" Gate Valve	NC	Fsk-E-04-0010
RW-BST-MV-038	6" Gate Valve	NC	Fsk-E-04-0010
RW-BST-MV-039	6" Gate Valve	NC	Fsk-E-04-0010
RW-BST-MV-040	6" Gate Valve	NC	Fsk-E-04-0010
RW-BST-MV-041	8" Gate Valve	NC	Fsk-E-04-0010
RW-BST-MV-042	6" Gate Valve	NC	Fsk-E-04-0010
RW-BST-MV-043	8" Gate Valve	NC	Fsk-E-04-0010
RW-BST-MV-045	4" Gate Valve	NO	Fsk-E-04-0010
RW-BST-MV-046	3/4" Ball Valve	NO	Fsk-E-04-0010
RW-BST-MV-047	3/4" Ball Valve	NC	Fsk-E-04-0010
RW-BST-MV-048	8" Gate Valve	NC	Fsk-E-04-0010
RW-BST-MV-049	8" Gate Valve	NC	Fsk-E-04-0010
RW-BST-MV-050	4" Gate Valve	NO	Fsk-E-04-0010

VALVE NUMBER	DESCRIPTION	NORMAL POSITION	DRAWING
RW-BST-MV-051	4" Gate Valve	NO	Fsk-E-04-0010
RW-BST-MV-052	4" Gate Valve	NC	Fsk-E-04-0010
RW-EXH-MV-053	6" Gate Valve	NO	Fsk-E-04-0011
RW-EXH-MV-054	6" Gate Valve	NO	Fsk-E-04-0011
RW-EXH-MV-055	6" Gate Valve	NC	Fsk-E-04-0011
RW-EXH-MV-056	6" Gate Valve	NO	Fsk-E-04-0011
RW-EXH-ALV-057	6" Altitude Valve	AUTO	Fsk-E-04-0011
RW-EXH-MV-058	6" Gate Valve	NO	Fsk-E-04-0011
RW-EXH-MV-059	6" Gate Valve	NC	Fsk-E-04-0011
RW-EXH-MV-061	8" Gate Valve	NC	Fsk-E-04-0011
RW-EXH-MV-062	8" Gate Valve	NC	Fsk-E-04-0011
RW-BST-MV-063	1" Gate Valve	NO	Fsk-E-04-0010
RW-BST-MV-064	1" Gate Valve	NO	Fsk-E-04-0010
RW-BST-CV-065	6" Check Valve	N/A	Fsk-E-04-0010
RW-EXH-MV-066	8" Gate Valve	NO	Fsk-E-04-0011
RW-EXH-CV-067	8" Check Valve	N/A	Fsk-E-04-0011
RW-EXH-CV-068	8" Check Valve	N/A	Fsk-E-04-0011
RW-EXH-MV-069	8" Gate Valve	NO	Fsk-E-04-0011
RW-EXH-MV-070	2" Ball Valve	NO	Fsk-E-04-0011
RW-EXH-MV-071	8" Gate Valve	NC	Fsk-E-04-0011
RW-J13-AV-073	Air Release Valve	N/A	Fsk-E-04-0009
RW-BST-MV-074	6" Butterfly Valve	NC	Fsk-E-04-0010
RW-J13-MV-075	3/4" Ball Valve	NO	Fsk-E-04-0009
RW-J13-MV-076	3/4" Ball Valve	NO	Fsk-E-04-0009
RW-J13-MV-077	3/4" Ball Valve	NO	Fsk-E-04-0009
RW-J13-MV-078	1/2" Ball Valve	NC	Fsk-E-04-0009
RW-J13-CV-079	4" Check Valve	N/A	Fsk-E-04-0009
RW-J13-MV-080	1/2" Ball Valve	NC	Fsk-E-04-0009
RW-J13-CV-081	4" Check Valve	N/A	Fsk-E-04-0009
RW-J13-MV-082	1-1/2" Ball Valve	NC	Fsk-E-04-0009
RW-J13-MV-083	3/4" Ball Valve	NO	Fsk-E-04-0009
RW-J13-MV-084	1" Ball Valve	NO	Fsk-E-04-0009
RW-J13-MV-085	3/4" Ball Valve	NO	Fsk-E-04-0011
RW-J13-MV-086	3/4" Ball Valve	NO	Fsk-E-04-0011
RW-J13-MV-087	3/4" Ball Valve	NO	Fsk-E-04-0011
RW-J13-MV-088	3/4" Ball Valve	NO	Fsk-E-04-0011
RW-BAK-MV-100	6" Gate Valve	NC	Fsk-E-04-0009
RW-J13-MV-201	3/4" Ball Valve	NC	Fsk-E-04-0009
RW-J13-MV-202	4" Gate Valve	NO	Fsk-E-04-0009
RW-J13-MV-203	3/4" Ball Valve	NC	Fsk-E-04-0009
RW-J13-MV-204	3/4" Ball Valve	NC	Fsk-E-04-0009
RW-J13-CV-205	4" Check Valve	N/A	Fsk-E-04-0009
RW-J13-MV-206	3/4" Ball Valve	N/A	Fsk-E-04-0009
RW-J13-CV-207	4" Check Valve	N/A	Fsk-E-04-0009
RW-J13-MV-208	3/4" Ball Valve	NC	Fsk-E-04-0009
RW-J13-MV-209	4" Gate Valve	NO	Fsk-E-04-0009
RW-J13-MV-210	4" Butterfly Valve	NO	Fsk-E-04-0009
RW-J13-MV-211	4" Butterfly Valve	NO	Fsk-E-04-0009
RW-J13-CV-212	4" Check Valve	N/A	Fsk-E-04-0009
RW-J13-MV-213	4" Butterfly Valve	NC	Fsk-E-04-0009
RW-J13-MV-214	6" Butterfly Valve	NC	Fsk-E-04-0009
RW-J13-MV-215	6" Butterfly Valve	NC	Fsk-E-04-0009

POTABLE WATER VALVES

VALVE NUMBER	DESCRIPTION	NORMAL POSITION	DRAWING
PW-EXH-MV-001	6" Gate Valve	NC	Fsk-E-04-0011
PW-EXH-MV-002	8" Gate Valve	NO	Fsk-E-04-0011
PW-EXH-MV-003	4" Gate Valve	NO	Fsk-E-04-0011
PW-EXH-MV-004	4" Gate Valve	NO	Fsk-E-04-0011
PW-EXH-MV-005	1-1/2" Gate Valve	NO	Fsk-E-04-0011
PW-EXH-MV-006	1-1/2" Gate Valve	NO	Fsk-E-04-0011
PW-EXH-MV-007	4" Gate Valve	NC	Fsk-E-04-0011
PW-EXH-MV-008	1-1/2" Ball Valve	NC	Fsk-E-04-0011
PW-EXH-MV-009	2" Ball Valve	NO	Fsk-E-04-0011
PW-EXH-MV-010	2" Ball Valve	NC	Fsk-E-04-0011
PW-EXH-MV-011	2" Ball Valve	NC	Fsk-E-04-0011
PW-EXH-MV-012	2" Ball Valve	NC	Fsk-E-04-0011
PW-EXH-MV-013	2" Ball Valve	NC	Fsk-E-04-0011
PW-EXH-CV-014	2" Ball Check Valve	N/A	Fsk-E-04-0011
PW-EXH-MV-015	3/4" Ball Valve	NO	Fsk-E-04-0011
PW-EXH-MV-016	3/4" Bleed Valve	NO	Fsk-E-04-0011
PW-EXH-MV-017	1/2" Ball Valve	NC	Fsk-E-04-0011
PW-EXH-MV-018	2" Ball Valve	NO	Fsk-E-04-0011
PW-EXH-MV-019	2" Ball Valve	NC	Fsk-E-04-0011
PW-EXH-MV-020	2" Ball Valve	NO	Fsk-E-04-0011
PW-EXH-CV-021	X"Check Valve	N/A	Fsk-E-04-0011
PW-EXH-CV-022	X"Check Valve	N/A	Fsk-E-04-0011

FIREWATER VALVES

VALVE NUMBER	DESCRIPTION	NORMAL POSITION	DRAWING
FW-EXH-MV-001	8" Gate Valve	NO	Fsk-E-04-0011
FW-EXH-MV-002	6" Gate Valve	NC	Fsk-E-04-0011
FW-EXH-MV-003	8" Gate Valve	NO	Fsk-E-04-0011
FW-EXH-MV-004	8" Gate Valve	NO	Fsk-E-04-0011
FW-EXH-MV-005	2" Gate Valve	NO	Fsk-E-04-0011
FW-EXH-MV-006	2" Gate Valve	NO	Fsk-E-04-0011
FW-EXH-MV-007	8" Gate Valve	NC	Fsk-E-04-0011
FW-EXH-CV-008	X"Check Valve	N/A	Fsk-E-04-0011
FW-EXH-CV-009	X"Check Valve	N/A	Fsk-E-04-0011
FW-EXH-MV-010	2" Ball Valve	NC	Fsk-E-04-0011

FIRE AND POTABLE WATER LOOPS VALVES

VALVE NUMBER	COORDINATES NORTH	COORDINATES EAST	ELEV	DESCRIPTION	NORMAL POSITION	DRAWING
PW-NP-MV-023	764091.98	569913.20	3694.57	8" Gate Valve	NO	Fsk-E-04-0012
PW-NP-MV-024	764090.85	569914.52	3694.64	8" Gate Valve	NC	Fsk-E-04-0012
PW-NP-MV-025	765062.50	570052.10	3676.87	8" Gate Valve	NO	Fsk-E-04-0012
PW-NP-MV-026	765288.24	570184.07	3677.88	8" Gate Valve	NO	Fsk-E-04-0012
PW-NP-MV-027	765460.85	570279.17	3677.77	8" Gate Valve	NO	Fsk-E-04-0012
PW-NP-MV-028	765747.45	570438.54	3677.25	8" Gate Valve	NO	Fsk-E-04-0012
PW-NP-MV-029	765776.58	570454.79	3677.15	8" Gate Valve	NO	Fsk-E-04-0012
PW-NP-MV-030	765786.89	570462.36	3676.87	4" Gate Valve	NO	Fsk-E-04-0012
PW-NP-MV-031	765957.14	570556.90		1" Gate Valve	NO	Fsk-E-04-0012
PW-NP-MV-032	765967.56	570562.71	3677.26	2" Gate Valve	NO	Fsk-E-04-0012
PW-NP-MV-034	766075.01	570494.84	3680.92	4" Gate Valve	NO	Fsk-E-04-0012
PW-NP-MV-035	766031.85	570374.36	3682.30	4" Gate Valve	NO	Fsk-E-04-0012
PW-NP-MV-036	765886.57	570252.58	3681.76	4" Gate Valve	NO	Fsk-E-04-0012
FW-NP-MV-037	765856.09	570476.97	3678.07	8" Gate Valve	NO	Fsk-E-04-0012
FW-NP-MV-038	765491.65	570046.87	3681.40	8" Gate Valve	NO	Fsk-E-04-0012
FW-NP-MV-039	765307.31	570017.51	3680.45	8" Gate Valve	NO	Fsk-E-04-0012
FW-NP-MV-011	764078.45	569921.30	3691.85	12" Gate Valve	NC	Fsk-E-04-0012
FW-NP-MV-013	765041.29	570044.21	3676.20	6" Gate Valve	NO	Fsk-E-04-0012
FW-NP-MV-014	764996.02	570072.75	3676.80	6" Gate Valve	NO	Fsk-E-04-0012
FW-NP-MV-015	765060.86	570051.12	3673.89	10" Gate Valve	NO	Fsk-E-04-0012
FW-NP-MV-016	765077.24	570265.10	3674.93	6" Gate Valve	NO	Fsk-E-04-0012
FW-NP-PIV-017	765190.86	570062.64	3676.23	6" Gate Valve (PIV)	NO	Fsk-E-04-0012
FW-NP-MV-018	765282.42	570182.21	3677.61	10" Gate Valve	NO	Fsk-E-04-0012
FW-NP-MV-019	765440.17	570232.49	3678.65	6" Gate Valve	NO	Fsk-E-04-0012
FW-NP-MV-020	765465.48	570284.29	3677.37	10" Gate Valve	NO	Fsk-E-04-0012
FW-NP-MV-021	765724.17	570389.43	3678.72	6" Gate Valve	NO	Fsk-E-04-0012
FW-NP-MV-022	765748.38	570441.15	3677.20	10" Gate Valve	NO	Fsk-E-04-0012
FW-NP-MV-023	765791.95	570467.94	3676.89	8" Gate Valve	NO	Fsk-E-04-0012
FW-NP-MV-025	765991.41	570546.25	3677.73	6" Gate Valve	NO	Fsk-E-04-0012
FW-NP-MV-026	766076.55	570494.33	3680.45	6" Gate Valve	NO	Fsk-E-04-0012
FW-NP-PIV-027	766037.98	570471.06	3679.02	6" Gate Valve (PIV)	NO	Fsk-E-04-0012
FW-NP-MV-028	766058.90	570428.90	3679.94	6" Gate Valve	NO	Fsk-E-04-0012
FW-NP-MV-029	765889.39	570253.14	3681.71	8" Gate Valve	NO	Fsk-E-04-0012
FW-NP-MV-030	765880.41	570218.95	3683.32	6" Gate Valve	NO	Fsk-E-04-0012
FW-NP-MV-031	765825.30	570197.31	3682.42	10" Gate Valve	NO	Fsk-E-04-0012
FW-NP-MV-032	765629.23	570093.68	3683.11	6" Gate Valve	NO	Fsk-E-04-0012
FW-NP-MV-033	765497.17	570045.37	3681.47	10" Gate Valve	NO	Fsk-E-04-0012
FW-NP-MV-034	765457.85	570034.64	3681.62	6" Gate Valve	NO	Fsk-E-04-0012
FW-NP-MV-035	765307.89	570015.42	3679.69	10" Gate Valve	NO	Fsk-E-04-0012
FW-NP-MV-037	ABOVE GROUND NOT IN USE			6" Gate Valve	NC	Fsk-E-04-0012
FW-NP-MV-038	ABOVE GROUND NOT IN USE			6" Gate Valve	NC	Fsk-E-04-0012
FW-NP-MV-039	ABOVE GROUND NOT IN USE			6" Gate Valve	NC	Fsk-E-04-0012

NORMAL VALVE CONFIGURATION

TABLES SHOW THE NORMAL CONFIGURATION OF THE VALVES IN THE POTABLE WATER SYSTEM

LEGEND:

FW: FIREWATER
PW: POTABLE WATER
RW: RAW WATER

BAK: BAKER TANKS
BST: BOOSTER STATION
EXH: EXILE HILL
HRD: H-ROAD
J13: J-13 PUMP HOUSE

ALV: ALTITUDE VALVE
AV: AIR RELEASE VALVE
CV: CHECK VALVE
MV: MANUAL VALVE
PIV: POST INDICATOR VALVE

NC: NORMALLY CLOSED
NO: NORMALLY OPEN
AUTO: AUTOMATIC OPERATION
N/A: NOT APPLICABLE

OPERATIONAL CONFIGURATION

TABLES SHOW ONLY THOSE VALVES WHOSE CONFIGURATION IN THE OPERATION IS DIFFERENT THAN THE NORMAL VALVE CONFIGURATION

WATER TRANSFER

J-13 TO BOOSTER STATION

EQUIPMENT / VALVE NUMBER	DESCRIPTION	OPERATING POSITION	DRAWING
RW-J13-MV-013	8" Gate Valve	OPEN	Fsk-E-04-0009
RW-J13-PMP-001	PUMP	ON	Fsk-E-04-0009
RW-J13-PMP-002	PUMP	ON	Fsk-E-04-0009

J-13 TO MILLION GALLON TANK

EQUIPMENT / VALVE NUMBER	DESCRIPTION	OPERATING POSITION	DRAWING
RW-J13-MV-012	8" Gate Valve	OPEN	Fsk-E-04-0009
RW-J13-PMP-001	PUMP	ON	Fsk-E-04-0009
RW-J13-PMP-002	PUMP	ON	Fsk-E-04-0009

BOOSTER STATION TO FIREWATER TANK

EQUIPMENT / VALVE NUMBER	DESCRIPTION	OPERATING POSITION	DRAWING
NPW-BST-PMP-001a	Pump	ON	Fsk-E-04-0010

POTABLE WATER

OPTION #1 - TRANSFER PUMP PW-EXH-PMP-004

EQUIPMENT / VALVE NUMBER	DESCRIPTION	OPERATING POSITION	DRAWING
RW-EXH-MV-062	8" Gate Valve	OPEN	Fsk-E-04-0011
PW-EXH-MV-011	2" Ball Valve	OPEN	Fsk-E-04-0011
PW-EXH-MV-012	2" Ball Valve	OPEN	Fsk-E-04-0011
PW-EXH-PMP-004	PUMP	ON	Fsk-E-04-0011
PW-EXH-PMP-005	PUMP	ON	Fsk-E-04-0011

OPTION #2 - BOOSTER PUMP RW-BST-PMP-003

EQUIPMENT / VALVE NUMBER	DESCRIPTION	OPERATING POSITION	DRAWING
RW-EXH-MV-056	6" Gate Valve	CLOSED	Fsk-E-04-0011
RW-EXH-MV-061	8" Gate Valve	OPEN	Fsk-E-04-0011
RW-EXH-MV-013	2" Ball Valve	OPEN	Fsk-E-04-0011
NPW-BST-PMP-001a	Pump	ON	Fsk-E-04-0010
PW-EXH-PMP-005	Pump	ON	Fsk-E-04-0011

OPTION #3 - GRAVITY FEED

VALVE NUMBER	DESCRIPTION	OPERATING POSITION	DRAWING
RW-EXH-MV-062	8" Gate Valve	OPEN	Fsk-E-04-0011
PW-EXH-MV-013	2" Ball Valve	OPEN	Fsk-E-04-0011
PW-EXH-PMP-005	Pump	ON	Fsk-E-04-0011

EFFECTIVE DATE

CAUTION:
PREPARATION OF THIS AS-BUILT SCHEMATIC DID NOT INCLUDE A VALIDATION OF CODES AND STANDARDS COMPLIANCE. FIELD INSPECTION OF THE AFFECTED PORTION OF THE SYSTEM MAY BE REQUIRED TO IDENTIFY UNIQUE HAZARDS PRIOR TO INITIATING WORK.

FSK INFO:

FSK DRAWING INFORMATION INCORPORATED FROM YMP DRAWING BABB0000-01717-2100-29064, REV 00

06/02/04
EFFECTIVE DATE

REV	DATE	DESCRIPTION	BY	CHK'D	APPR
00	5/27/04	INITIAL ISSUE	TJN	RLA	EBT

YMP SITE CONSTRUCTION FIELD ENGINEERING

POTABLE WATER CONFIGURATION SCHEMATIC SHEET 5 OF 5

QA	N/A
JOB NO.	24540
FSK NO.	M-04-0013
SCALE:	NONE
SHEET NO.	1 OF 1

M-04-0013.dgn 06/27/04 03:20:48 PM

Figure C-1. Potable Water Configuration Schematic (Sheet 5 of 5)

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APPENDIX D

ESF WATER SYSTEM EQUIPMENT GENERAL ARRANGEMENT AND DISTRIBUTION PIPING

APPENDIX D
ESF WATER SYSTEM EQUIPMENT GENERAL ARRANGEMENT AND DISTRIBUTION PIPING

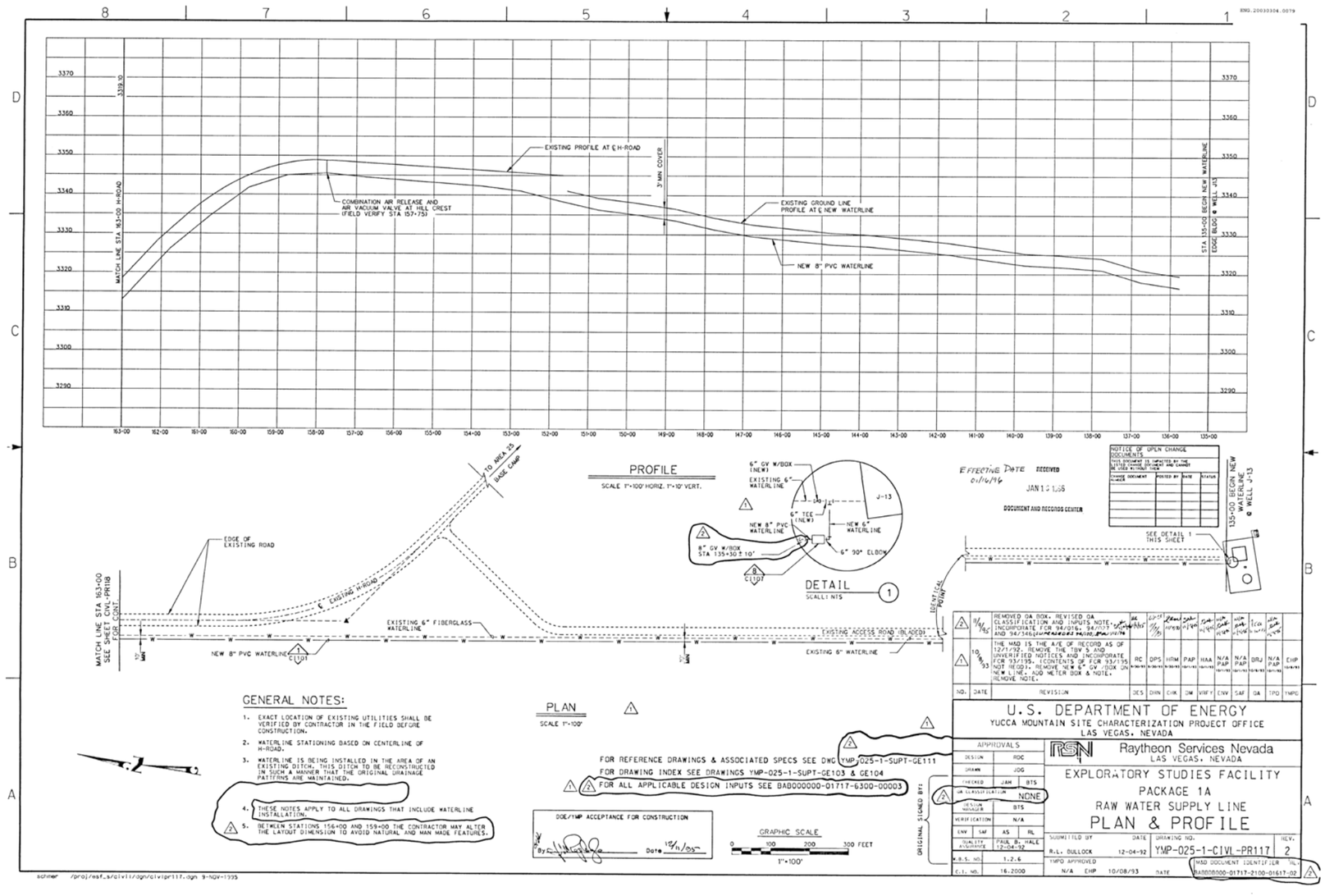

Figure D-1. Exploratory Studies Facility Package 1A Raw Water Supply Line Plan & Profile (Sheet 1 of 8)

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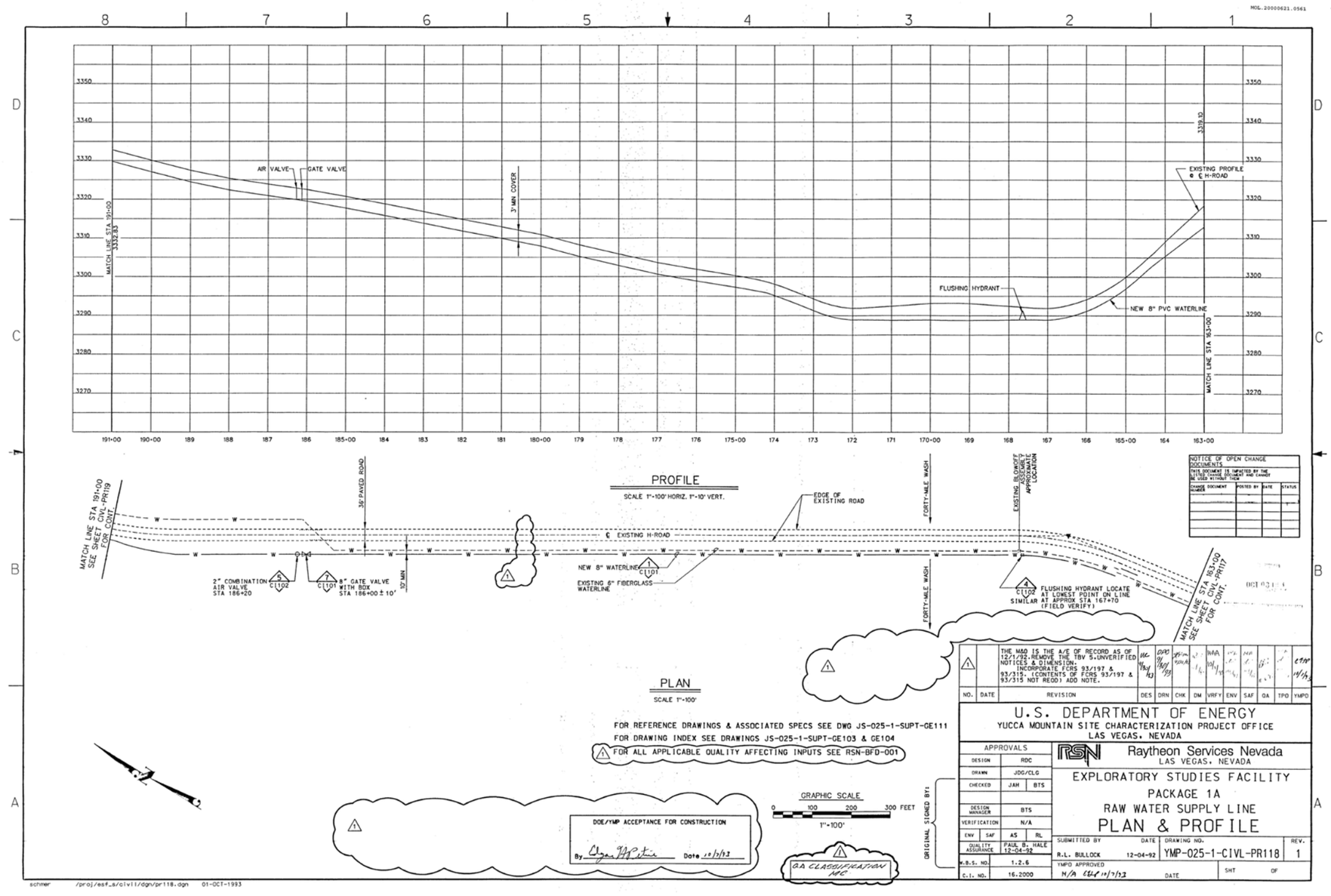

Figure D-1. Exploratory Studies Facility Package 1A Raw Water Supply Line Plan & Profile (Sheet 2 of 8)

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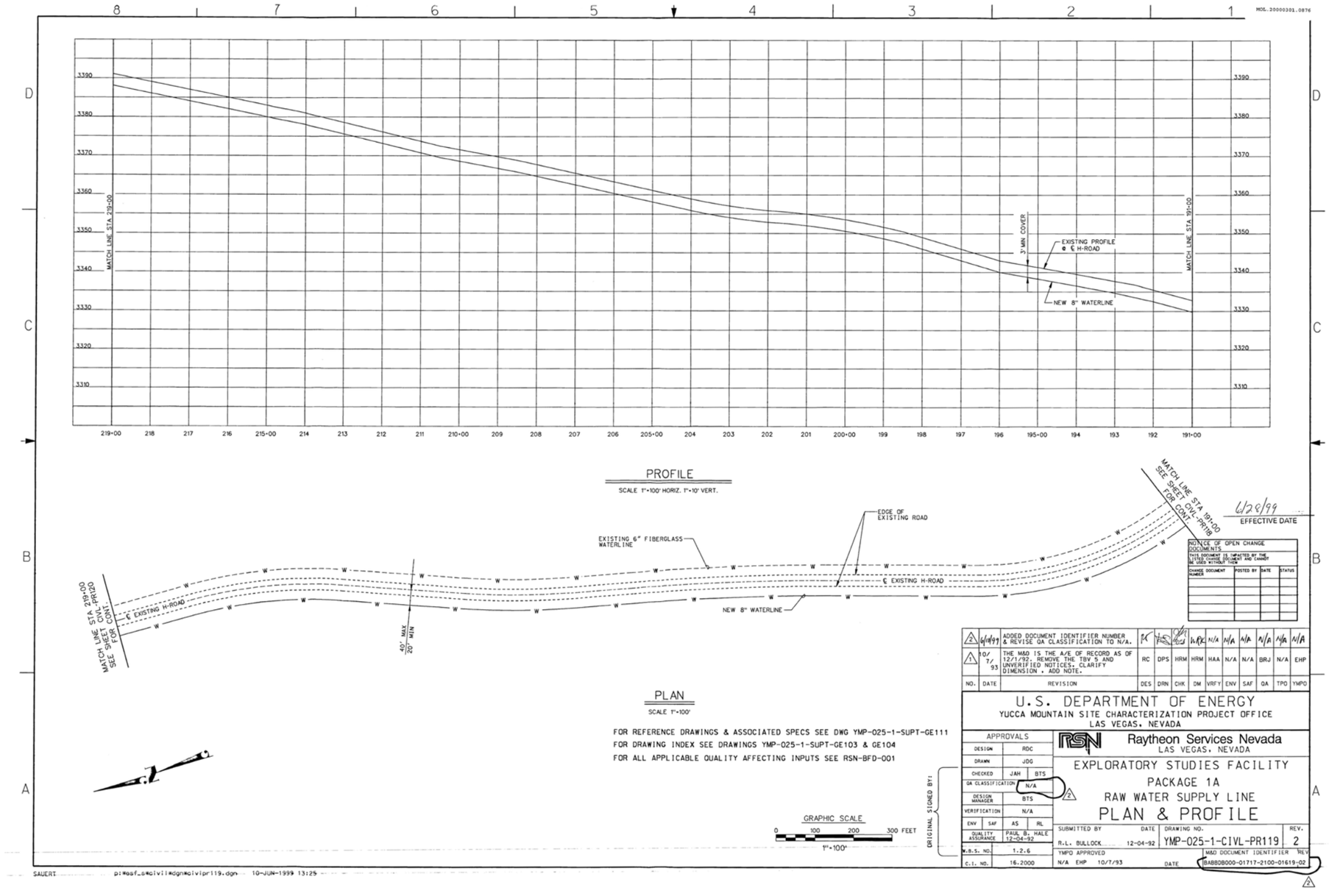

Figure D-1. Exploratory Studies Facility Package 1A Raw Water Supply Line Plan & Profile (Sheet 3 of 8)

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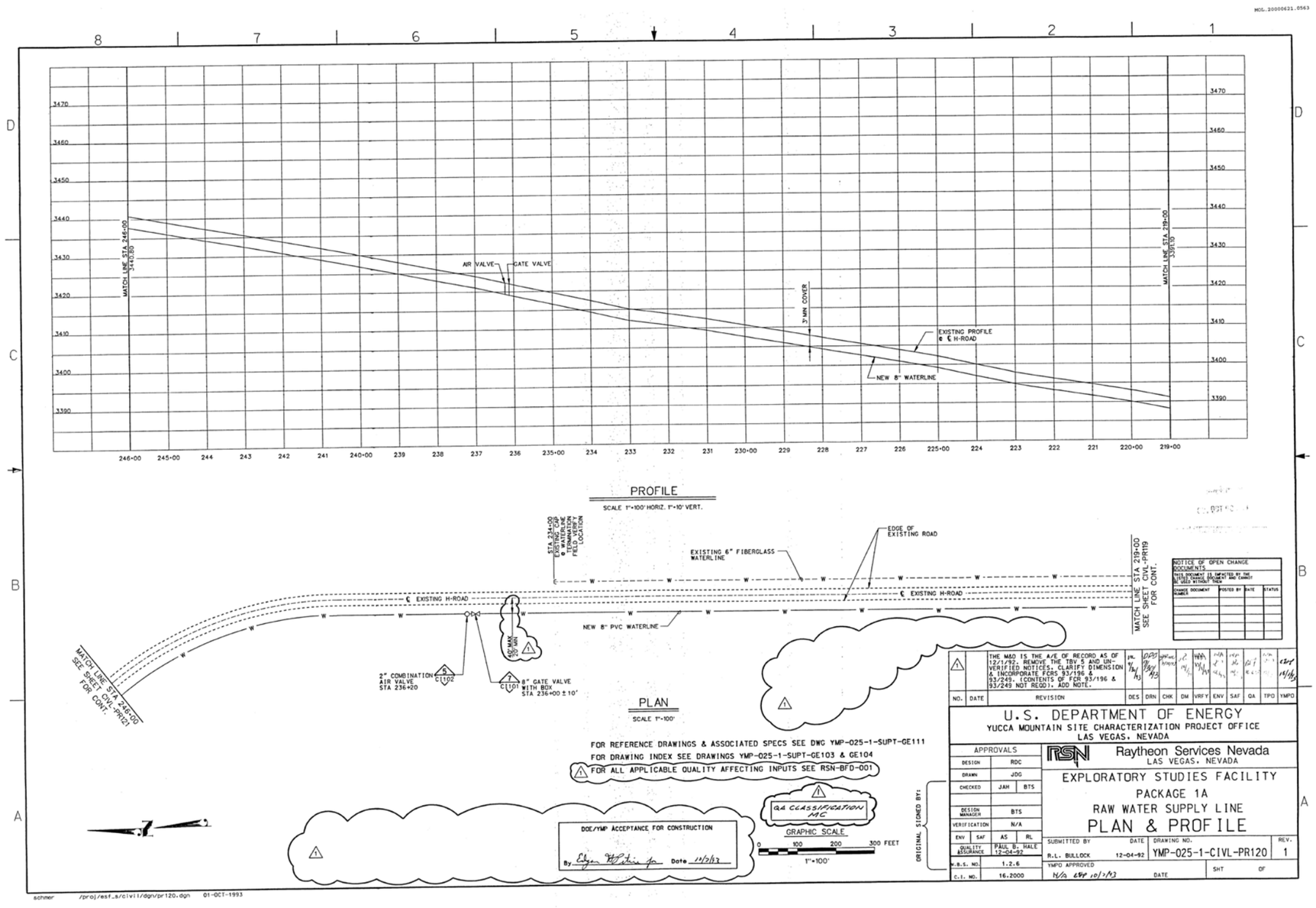

Figure D-1. Exploratory Studies Facility Package 1A Raw Water Supply Line Plan & Profile (Sheet 4 of 8)

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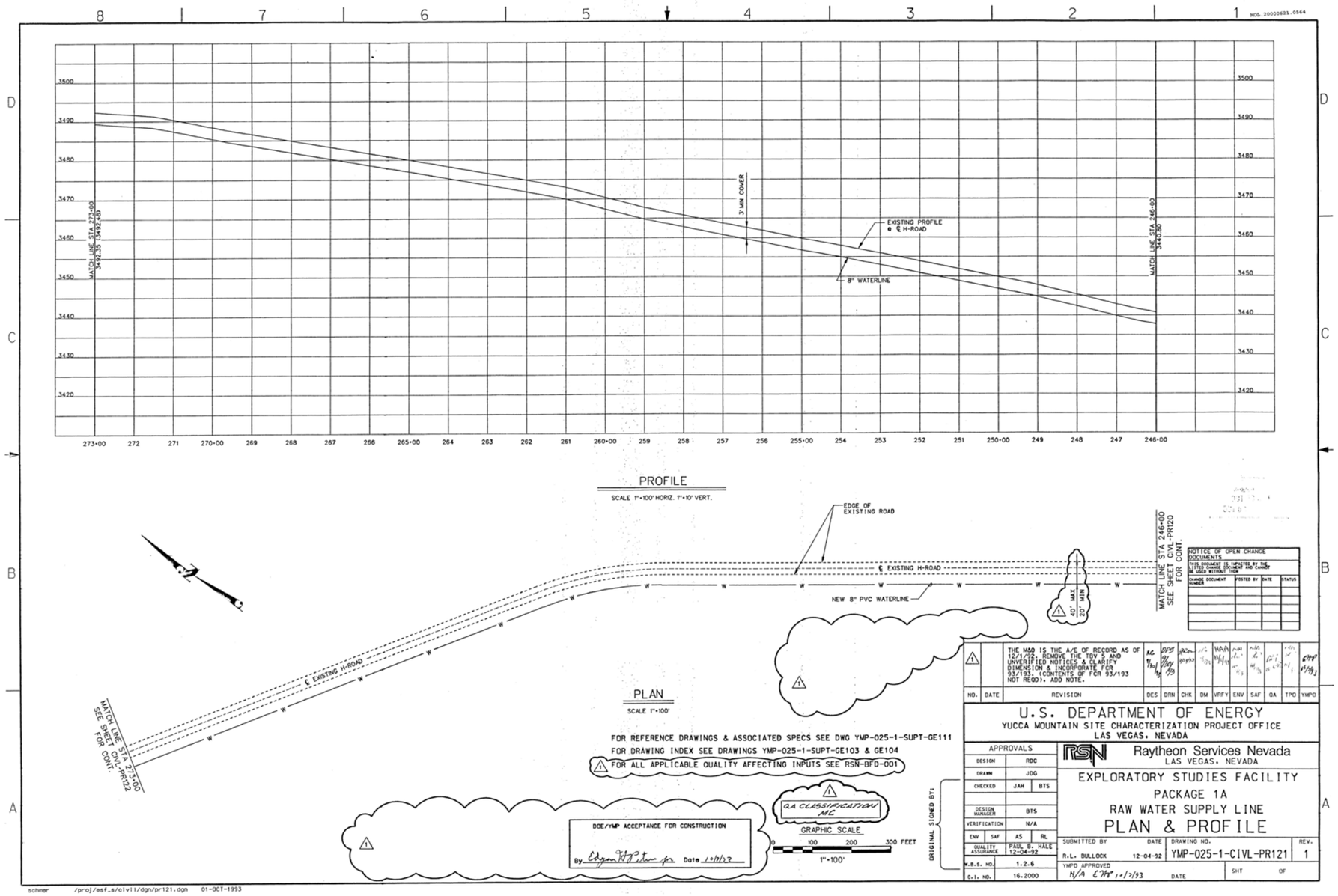

Figure D-1. Exploratory Studies Facility Package 1A Raw Water Supply Line Plan & Profile (Sheet 5 of 8)

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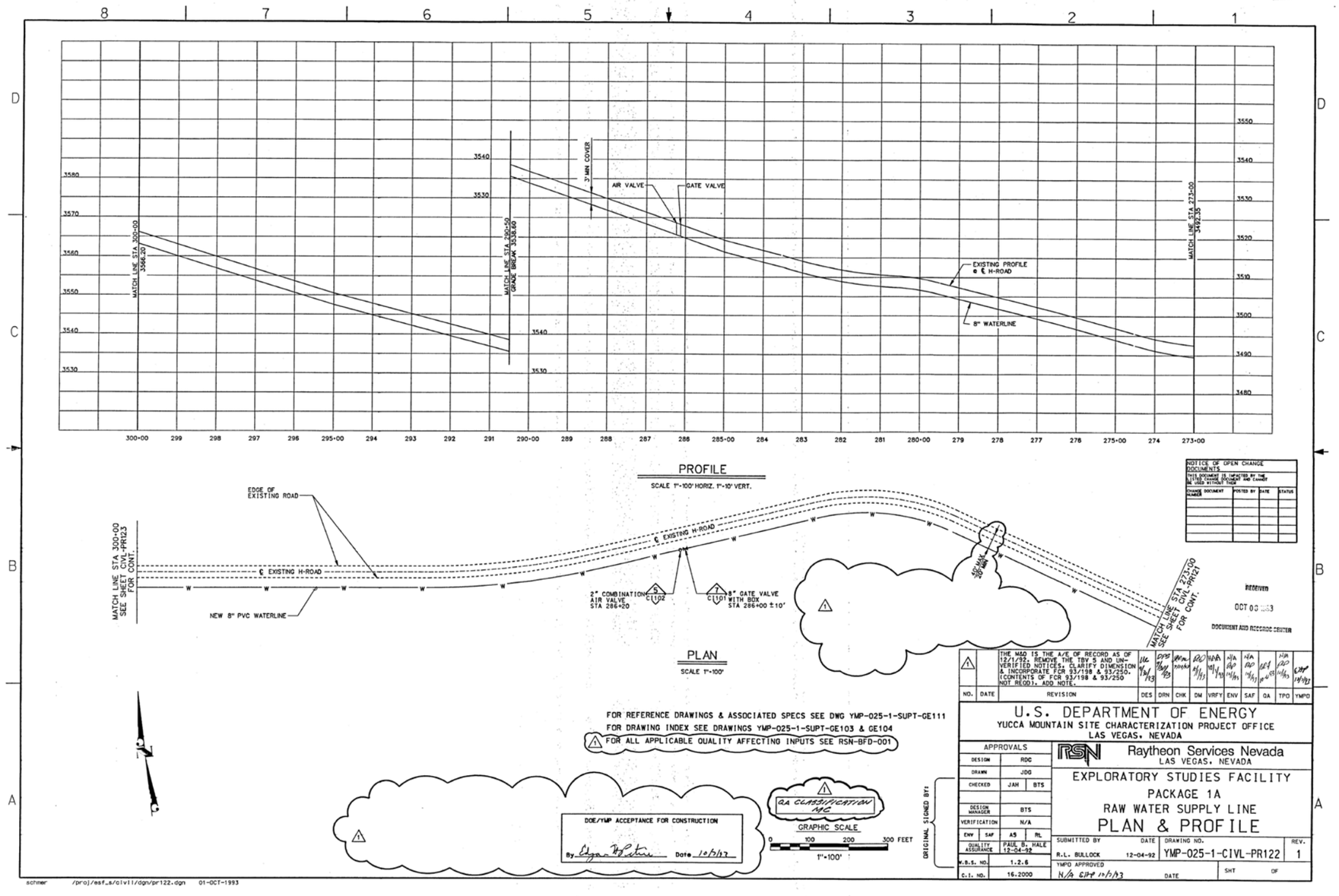

Figure D-1. Exploratory Studies Facility Package 1A Raw Water Supply Line Plan & Profile (Sheet 6 of 8)

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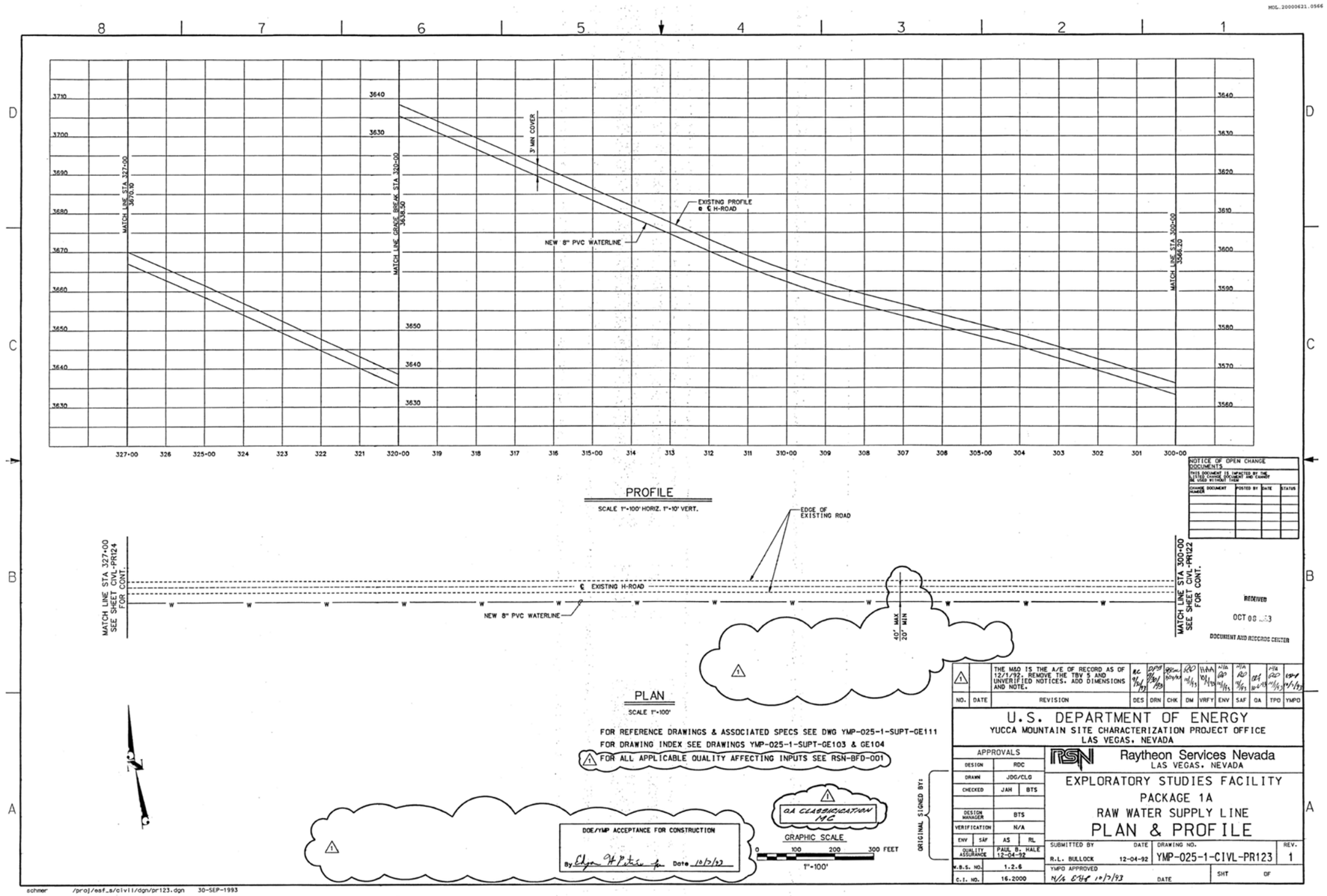

Figure D-1. Exploratory Studies Facility Package 1A Raw Water Supply Line Plan & Profile (Sheet 7 of 8)

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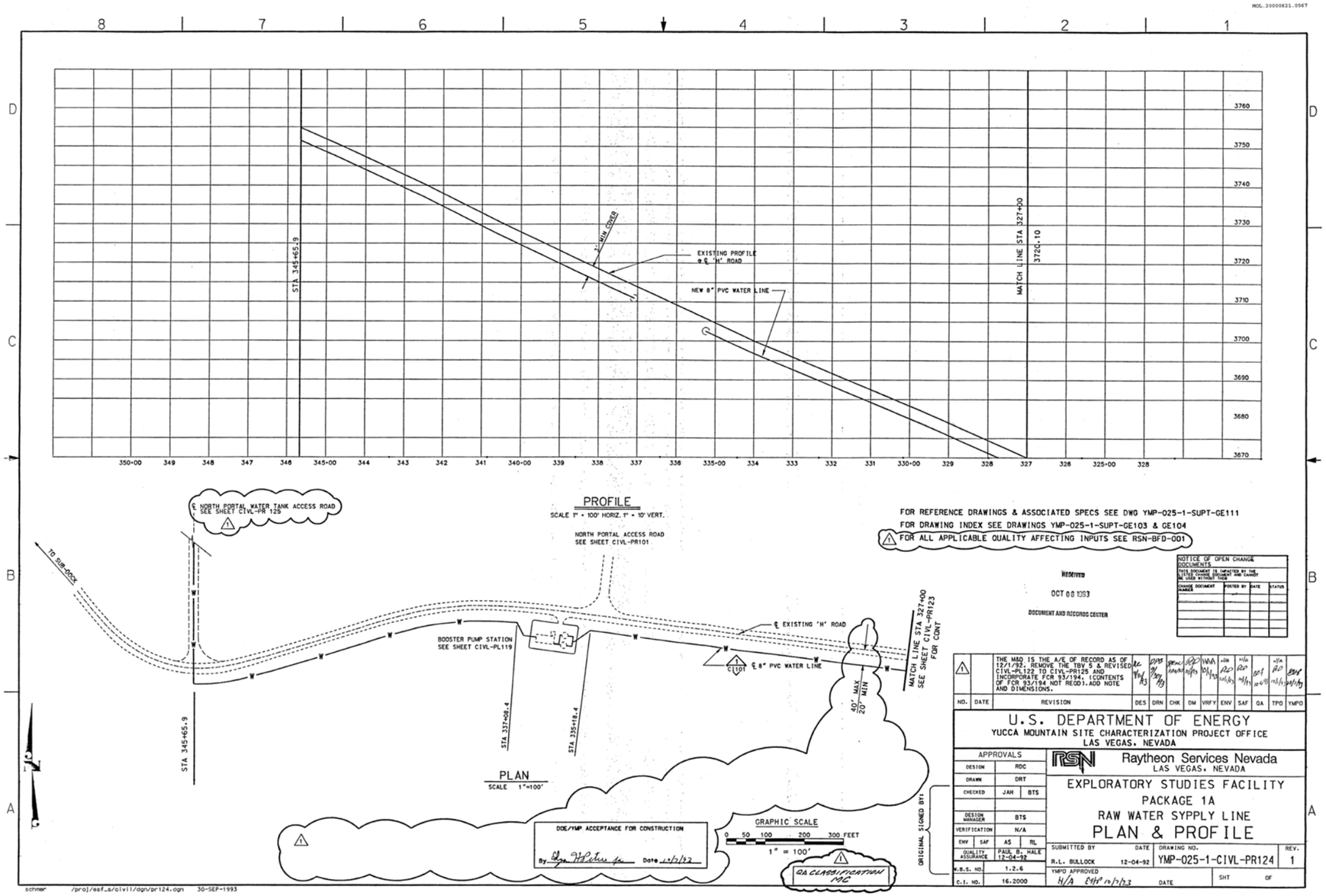

Figure D-1. Exploratory Studies Facility Package 1A Raw Water Supply Line Plan & Profile (Sheet 8 of 8)

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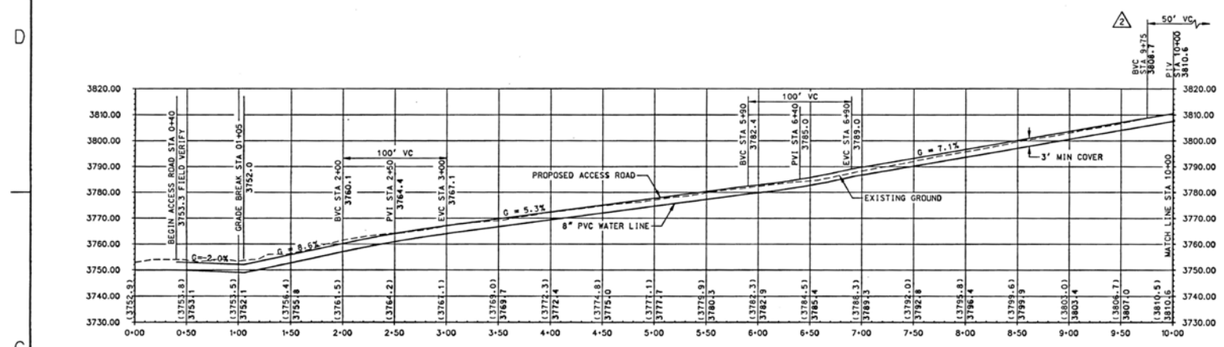

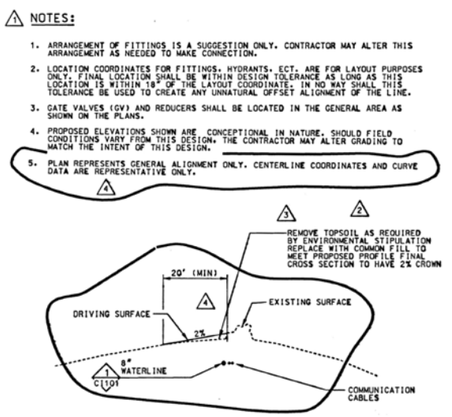

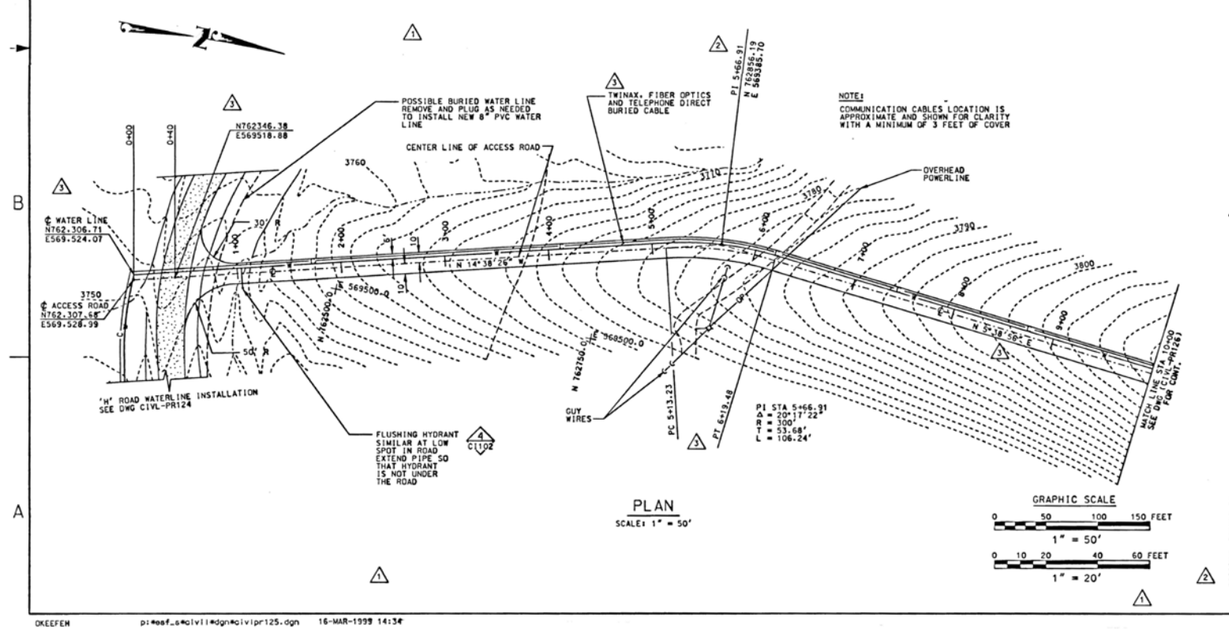

3/31/99
EFFECTIVE DATE

FOR GENERAL NOTES SEE DRAWING YMP025-1-CIVL-GE101
FOR REFERENCE DRAWINGS & ASSOCIATED SPECS SEE DWG YMP-025-1-SUPT-GE110
FOR DRAWING INDEX SEE DRAWINGS YMP-025-1-1SUPT-GE103 & GE10
FOR ALL APPLICABLE DESIGN INPUTS SEE BABO00000-01717-6300-00003

NO.	DATE	REVISION	DES	DRN	CHK	DM	VRFY	ENV	SAF	QA	TPO	YMPO
4	3/1/99	REVISED TYPICAL ROAD SECTION TO REFLECT SURFACE AS BUILT CONDITION AND REQUIRED IMPROVEMENTS AND ADDED NOTE 5.	HO	DPS	[illegible]	[illegible]	N/A	N/A	N/A	N/A	N/A	N/A
3	11/30/95	REVISED INPUTS NOTE & WATER LINE COORD. AT STA 0+00. INCORPORATE FCR 54/333, 54/337 & BCP-02-95-013.	RC	DPS	HRM	GNK	N/A GNK	N/A GNK	N/A GNK	FAA	N/A GNK	GNK
2	6/1/94	REMOVE TBD-126. REVISE ACCESS ROAD & WATERLINE ALIGNMENT TO AVOID GUY ANCHORS. REVISED GRADE. ADD QA INPUT NOTES & COMMUNICATION CABLES.	RC	DPS	HRM	PAP	N/A PAP	N/A PAP	N/A PAP	JWW	N/A PAP	MGB
1	10/1/93	THE M&O IS THE A/E OF RECORD AS OF 12/1/92. REMOVE THE TBV'S AND UNVERIFIED NOTICES. ADD NOTES.	RC	DPS	HRM	PAP	HAA	N/A PAP	N/A PAP	BRJ	N/A PAP	EHP

U.S. DEPARTMENT OF ENERGY
YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT OFFICE
LAS VEGAS, NEVADA

Raytheon Services Nevada
LAS VEGAS, NEVADA

APPROVALS	
DESIGN	RDC
DRAWN	FIE
CHECKED	JAH BTS
QA CLASSIFICATION	NONE
DESIGN MANAGER	BTS
VERIFICATION	N/A
ENV SAF	AS RL
QUALITY ASSURANCE	PAUL B. HALE 12-04-92
W.B.S. NO.	1.2.6
C.I. NO.	16.2000

EXPLORATORY STUDIES FACILITY
PACKAGE 1A
WATER STORAGE TANK ACCESS ROAD
WATERLINE, PLAN & PROFILE

SUBMITTED BY	DATE	DRAWING NO.	REV.
R.L. BULLOCK	12-04-92	YMP-025-1-CIVL-PR125	4
YMPO APPROVED N/A EHP 12-07-93	DATE	M&O DOCUMENT IDENTIFIER BABCH0000-01717-2100-01625-04	REV 2

ORIGINAL SIGNED BY:

OKEEFEH p:\esf_s\civil\dgn\civlpr125.dgn 16-MAR-1999 14:34

Figure D-2. Exploratory Studies Facility Package 1A Water Storage Tank Access Road Waterline Plan & Profile (Sheet 1 of 2)

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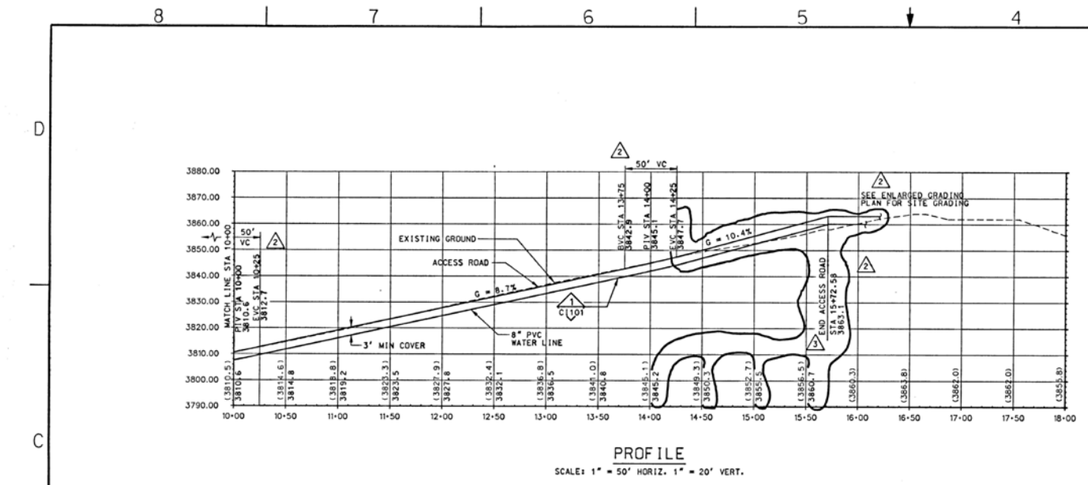
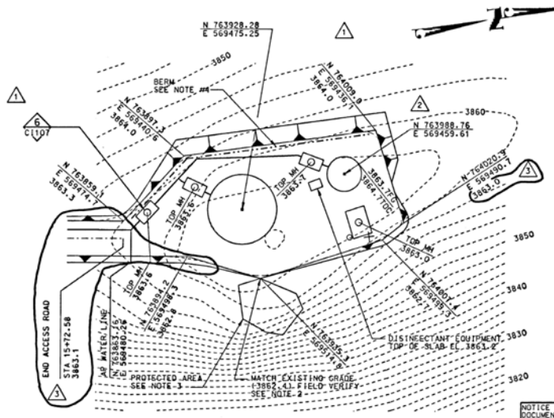
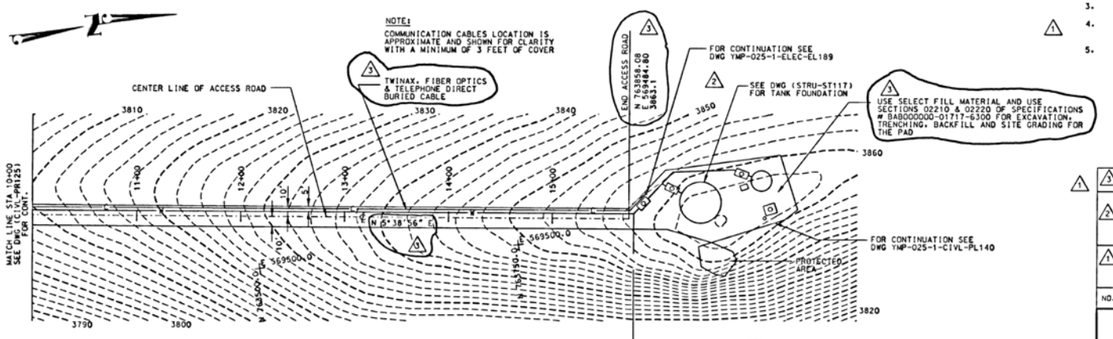




FOR GENERAL NOTES SEE DRAWING YMP-025-1-CIVL-GE101
FOR REFERENCE DRAWINGS & ASSOCIATED SPECS SEE DWG YMP-025-1-SUPT-GE110
FOR DRAWING INDEX SEE DRAWINGS YMP-025-1-SUPT-GE103 & GE104
1 2 FOR ALL APPLICABLE DESIGN INPUTS SEE BAB000000-01717-6300-00003



GRAPHIC SCALES
0 50 100 150 FEET
1" = 50'
0 10 20 40 60 FEET
1" = 20'

DOE/YMP ACCEPTANCE FOR CONSTRUCTION
Date 12/11/95

NOTES:

1. PROPOSED ELEVATIONS SHOWN ARE CONCEPTIONAL IN NATURE. SHOULD FIELD CONDITIONS VARY FROM THIS DESIGN, THE CONTRACTOR MAY ALTER GRADING TO MATCH THE INTENT OF THIS DESIGN.
2. GRADING SHOWN AT THIS POINT SHALL MEET THE EXISTING GRADE. NO CUT OR FILL ALLOWED AT THIS POINT.
3. NO GRADING OR ACCESS IS ALLOWED INSIDE THIS PROTECTED AREA.
4. CONSTRUCT 1' HIGH BERM WITH 1' TOP AND 2:1 SIDE SLOPE AFTER THE TANKS ARE CONSTRUCTED
5. ARRANGEMENT OF FITTINGS IS A SUGGESTION ONLY. CONTRACTOR MAY ALTER THIS ARRANGEMENT AS NEEDED TO MAKE CONNECTION.

EFFECTIVE DATE 01/16/96

RECEIVED JAN 19 1996 DOCUMENT AND RECORDS CENTER

NOTICE OF OPEN CHANGE DOCUMENTS
THIS DOCUMENT IS IMPACTED BY THE OPEN CHANGE DOCUMENT AND CANNOT BE USED WITHOUT THEM

CHANGE DOCUMENT NUMBER	POSTED BY	DATE	STATUS

NO.	DATE	REVISION	DES	DRN	CHK	DM	VRFY	ENV	SAF	QA	TPO	YMPO
3	11/16/95	REVISED INPUTS NOTE. INCORPORATE FCR 94/333, 94/337 AND 94/360.	VK	DPS	HRM	PAP	N/A PAP	N/A PAP	N/A PAP	JWW	N/A PAP	MCB
2	6/7/94	REVISE WATERLINE, ACCESS ROAD AND PROFILE ALIGNMENT. REVISE & ADD NOTES. ADD PROTECTED AREA. REVISE ENLARGED GRADING PLAN AND TANK LOCATIONS. ADD COMMUNICATION CABLES AND QA INPUT NOTES.	RC	DPS	HRM REH	PAP	N/A PAP	N/A PAP	N/A PAP	JWW	N/A PAP	MCB
1	10/8/93	THE MAD IS THE A/E OF RECORD AS OF 12/1/92. REMOVE THE TBV'S AND UNVERIFIED NOTICES. ADD METER VAULT AND NOTES.	RC	DPS	HRM	PAP	HAA	N/A PAP	N/A PAP	BRJ	N/A PAP	EHP

U.S. DEPARTMENT OF ENERGY
YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT OFFICE
LAS VEGAS, NEVADA

Raytheon Services Nevada
LAS VEGAS, NEVADA

EXPLORATORY STUDIES FACILITY
PACKAGE 1A
WATER STORAGE TANK ACCESS ROAD
WATERLINE, PLAN & PROFILE

APPROVALS		
DESIGN	RDC	
DRAWN	FIE	
CHECKED	JAM	BTS
QA CLASSIFICATION	NONE	
DESIGN MANAGER	BTS	
VERIFICATION	N/A	
ENV SAF	AS	RL
QUALITY ASSURANCE	PAUL B. HALE 12-04-92	
W.B.S. NO.	1.2.6	
C.I. NO.	16.2000	

SUBMITTED BY	DATE	DRAWING NO.	REV.
R.L. BULLOCK	12-04-92	YMP-025-1-CIVL-PR126	3
YMPO APPROVED N/A EHP 10/08/93	DATE	MAD DOCUMENT IDENTIFIER BABCH0000-01717-2100-01526-03	REV 2

ORIGINAL SIGNED BTS

/proj/esf_s/civil/dgn/civlpr126.dgn 9-NOV-1995

ENG.20030306.0002

Figure D-2. Exploratory Studies Facility Package 1A Water Storage Tank Access Road Waterline Plan & Profile (Sheet 2 of 2)

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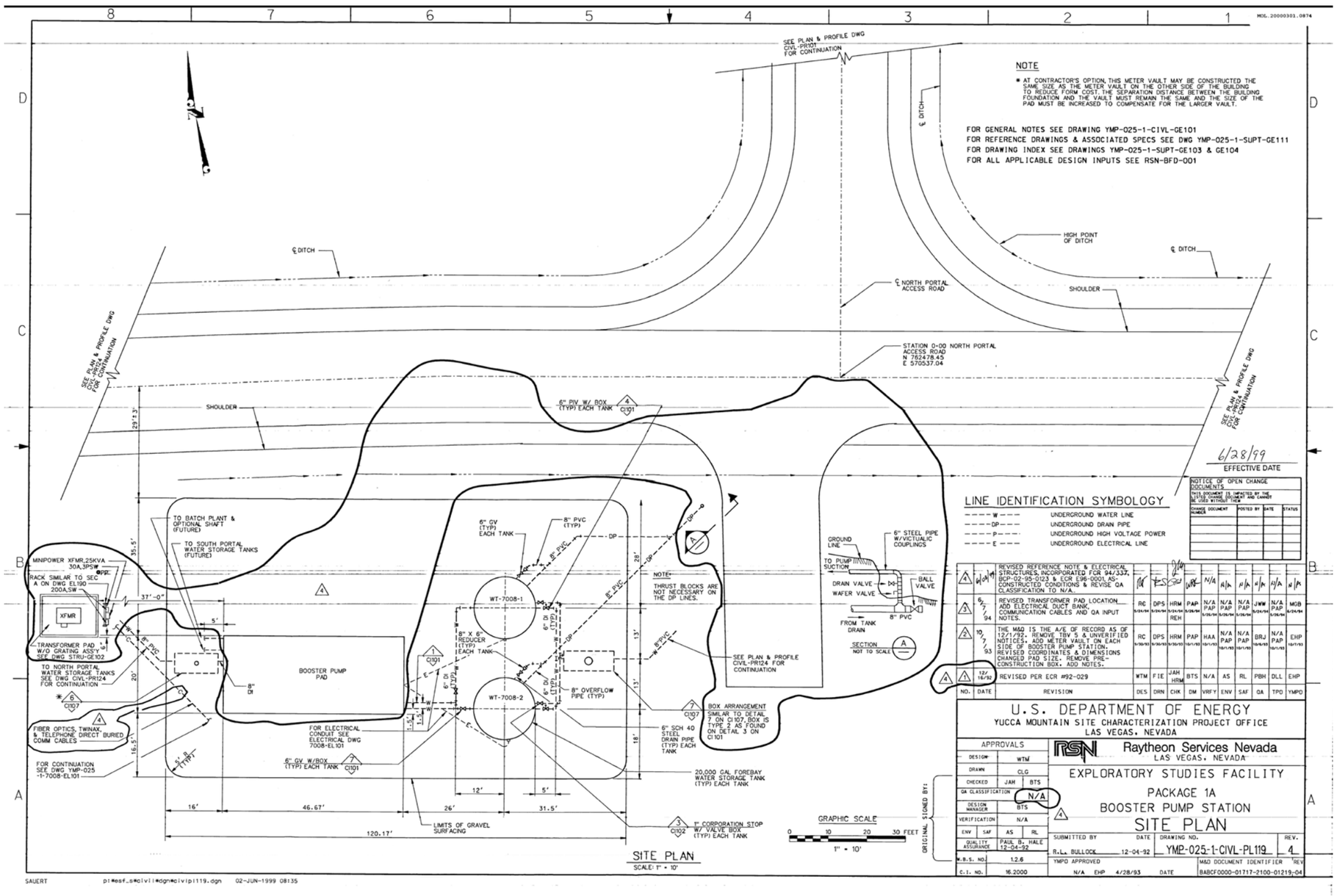

Figure D-3. Exploratory Studies Facility Package 1A Booster Pump Station Site Plan

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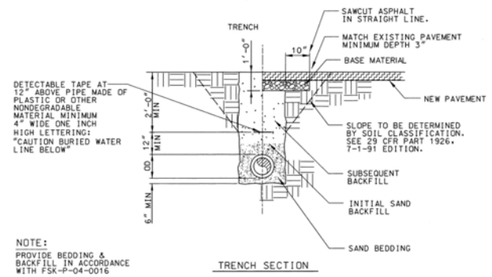
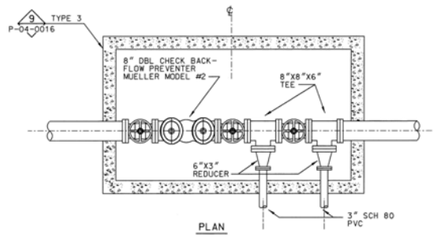
SIT.20051130.0001



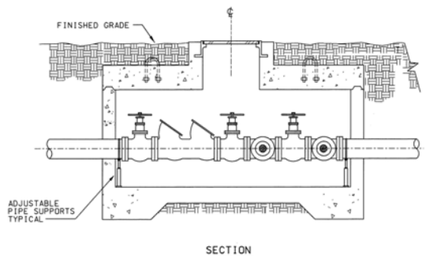
NOTE:
PROVIDE BEDDING & BACKFILL IN ACCORDANCE WITH FSK-P-04-0016

TRENCH SECTION

STANDARD DETAIL 1
NOT TO SCALE

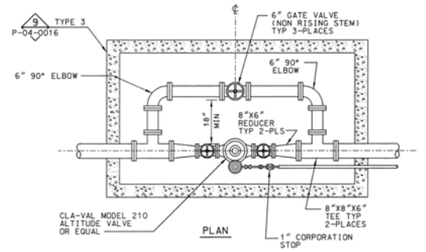


PLAN

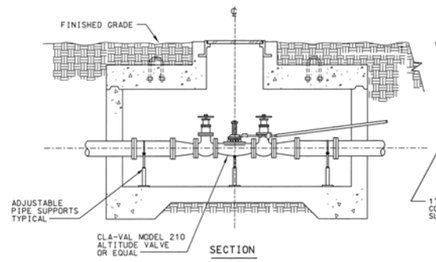


SECTION

STANDARD DETAIL 10
NOT TO SCALE



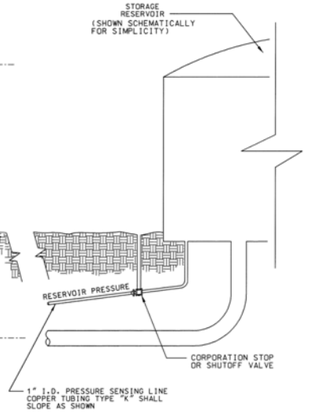
PLAN

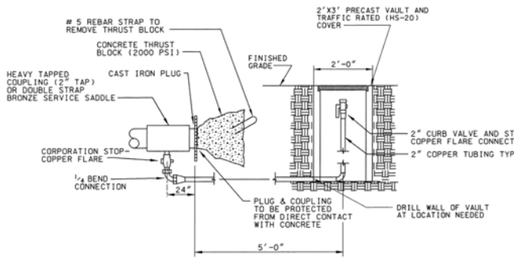


SECTION

ALTITUDE VALVE W/ VAULT

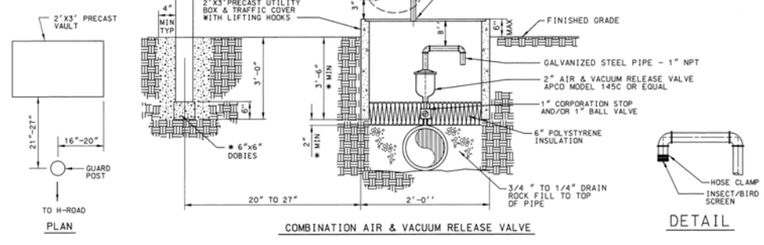
STANDARD DETAIL 2
NOT TO SCALE





FLUSHING HYDRANT

STANDARD DETAIL 4
NOT TO SCALE

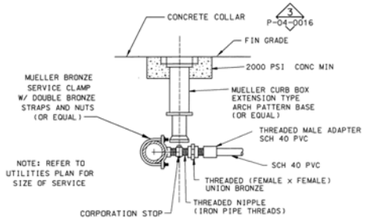


PLAN

COMBINATION AIR & VACUUM RELEASE VALVE

DETAIL

STANDARD DETAIL 5
NOT TO SCALE



CORPORATION STOP W/ BOX

STANDARD DETAIL 3
NOT TO SCALE

GENERAL NOTES:

1. ALTITUDE VALVES SHALL BE ADJUSTED TO SHUT OFF WHEN THE ELEVATION OF THE WATER IN THE TANKS MEETS THE PUMP OFF ELEVATION AS SHOWN ON THE ELECTRICAL DRAWINGS.
2. THE VAULT MAY BE PRECAST OR CAST-IN-PLACE CONCRETE MEETING THE REQUIREMENTS OF CAST-IN-PLACE CONCRETE SPECIFICATIONS.
3. ALL FITTINGS WITHIN THE ALTITUDE VALVE VAULT SHALL BE MECHANICAL OR FLANGED JOINTS AND SPOOL PIECES SHALL BE DUCTILE IRON.

FSK INFO: 12/01/05 EFFECTIVE DATE

FSK DRAWING INFORMATION INCORPORATED FROM YMP DRAWING FSK-P-05-0001, REV 00.

REV	DATE	DESCRIPTION	BY	CHK'D	APPR
00	11-30-05	INITIAL ISSUE	[illegible]	[illegible]	[illegible]

YMP SITE CONSTRUCTION FIELD ENGINEERING	QA: N/A
	JOB NO.: 24540
WATER SYSTEM DETAILS SHEET 1 OF 2	FSK NO.: ESF-BSC-PRWS-MECH-0013
	SCALE: NONE
	SHEET NO.: 1 OF 2

Figure D-4. Water System Details (Sheet 1 of 2)

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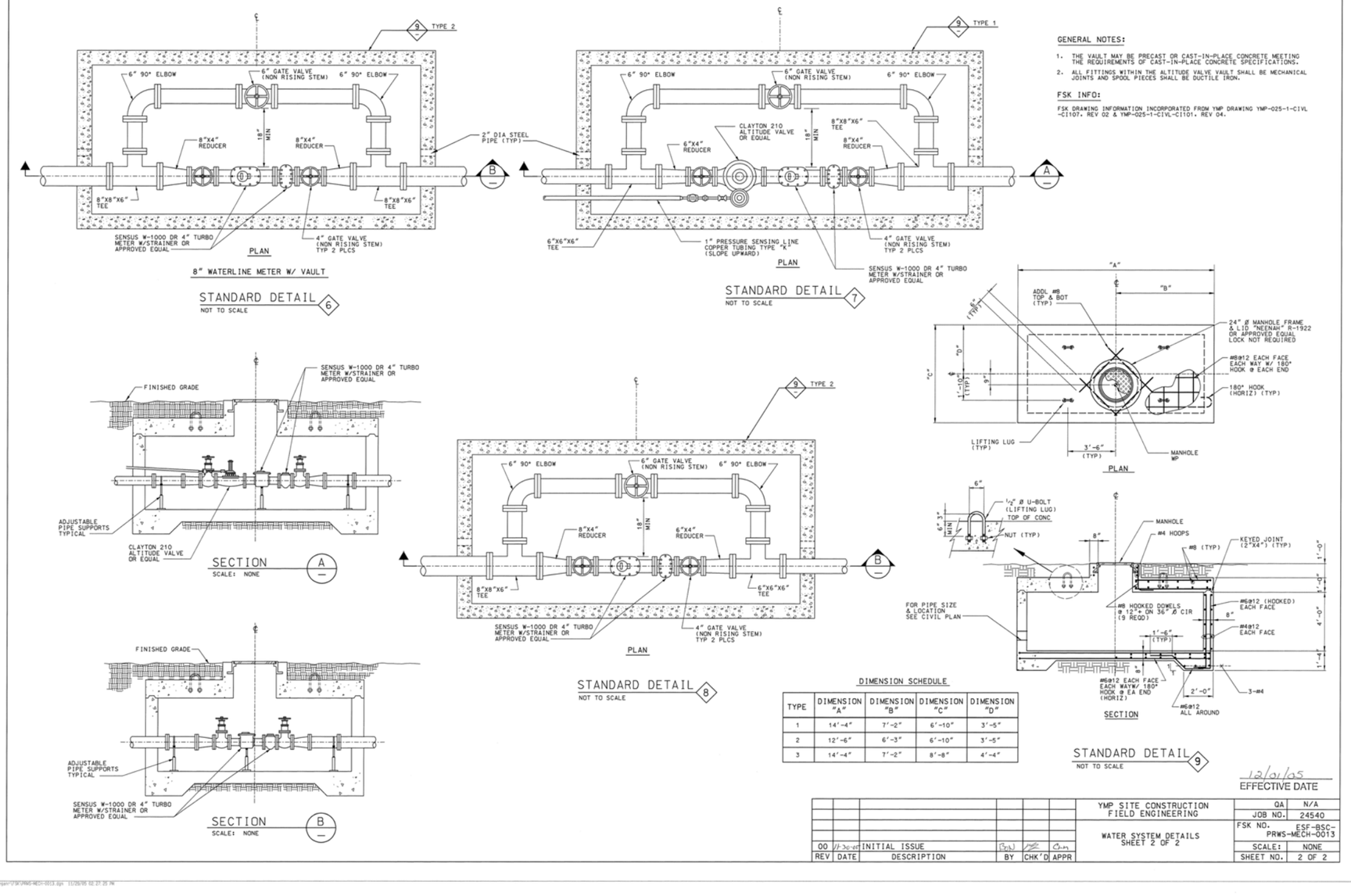

Figure D-4. Water System Details (Sheet 2 of 2)

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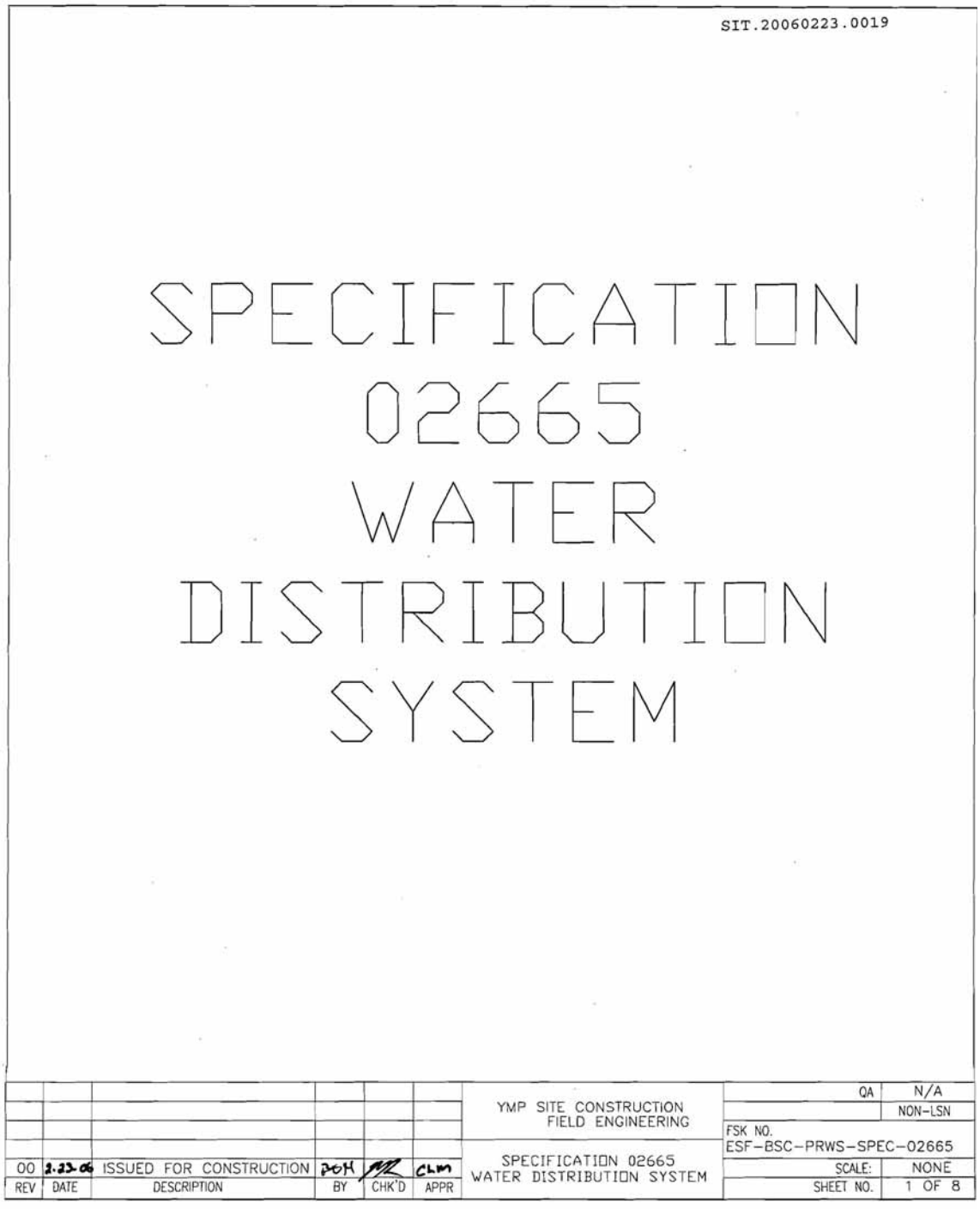
APPENDIX E

SYSTEM SPECIFICATION FOR WATER DISTRIBUTION SYSTEM

APPENDIX E

SYSTEM SPECIFICATION FOR
WATER TREATMENT EQUIPMENT



ESF-BSC-PRWS-SPEC-02265
SPECIFICATION SECTION 02265
WATER DISTRIBUTION SYSTEM

PART 1 GENERAL

1.01 SECTION INCLUDES

Work covered in this Specification Section includes furnishing all labor, equipment and materials to construct a Water Distribution System, which includes the firewater, potable water and the buried surface wastewater system complete and as specified herein and as indicated on the drawings.

1.02 REALTED SECTIONS

A. Section 11260 Water Treatment Equipment

B. Section 11261 Water Chlorination Equipment

C. Section 01601 Equipment Identification

1.03 REFERENCES

A. American Waterworks Association (AWWA)

1. AWWA C104/A21.4-95 Cement Mortar Lining for Ductile iron Pipe and Fittings for Water

2. AWWA C110/A21.10-98 Ductile Iron and Gray iron Fittings, 3 Inch Through 48 inch for Water

3. AWWA C111/A21.11-00 Rubber Gasket Joints for Ductile Iron Pressure Pipe and Fittings

4. AWWA C150/A21.50-96 American National Standard for Thickness Design of Ductile iron Pipe

5. AWWA C151/A21.51-96 American National Standard for Ductile Iron Pipe, Centrifugally Cast for Water or Other Liquids

6. AWWA C200-97 AWWA Standard for Steel Water Pipe 6 inch and Larger

7. AWWA C206-97 AWWA Standard for Field Welding of Steel Pipe

8. AWWA C207-01 AWWA Standard for Steel Pipe Flanges for Waterworks Service – Sizes 4 inch through 144 inch

9. AWWA C502-94 AWWA Standard for Dry Barrel Fire Hydrants

10. AWWA C509-01 AWWA Standard for Resilient Seated Gate Valves for Water Supply Service

11. AWWA C600-99 AWWA Standard for Installation of Ductile Iron Water Mains and Their Appurtenances

12. AWWA C651-99 AWWA Standard for Disinfecting Water Mains

13. AWWA C701-88 AWWA Standard for Cold Ware Meters-Turbine Type for Customer Service

14. AWWA C703-96 AWWA Standard for Cold Water Meters-Fire Service Type

15. AWWA C900-97 AWWA Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 inch Through 12 inch for Water Distribution

16. AWWA C901-96 AWWA Standard for Polyethylene (PE) Pressure Pipe and Tubing, ½ in. through 3 in. for water Service

17. AWWA C208-01 AWWA Standard for Dimensions for Fabricated Steel Water Pipe Fittings

18. AWWA C500-93 AWWA Standard for Metal Seated Gate Valves for Water Supply services

19. AWWA Steel Water Pipe: A Guide for Design and Installation, Manual of Water Supply Practices Manual M11

20. AWWA PVC Pipe design and Installation, Manual of Water Supply Practices Manual M23

B. Augmented Quality Assurance Program (AQAP) DOE/RW-0565

C. Underwriters Laboratories Listed

D. Factory Mutual Approved

1.04 QUALITY ASSURANCE

A. Quality Assurance shall be conducted in accordance with Augmented Quality Assurance Program (AQAP) DOE/RW-0565

B. No QA controls apply to the materials and activities covered by this Specification Section, except those QA controls which are required by the related Specification Sections which are either listed in Paragraph 1.02 or specifically referenced in the body of this Specification Section.

C. Acceptance of Product

1. Receipt Verification: Dimensional/visual inspection of the Water pressure pipe, gate valves, ductile iron fittings, rubber joint gaskets, fire hydrants and pipe bedding material.

2. Field Verification:

a. Dimensional/visual inspection of the installed ductile iron pipe and Polyvinyl Chloride (PVC) water lines and appurtenances (WITNESS POINT)

b. Ductile iron water line Hydrostatic pressure test (WITNESS POINT)

c. PVC Waterline Hydrostatic pressure test (WITNESS POINT)

d. Steel waterline Hydrostatic pressure test (WITNESS POINT)

PART 2 PRODUCTS

All valves, piping and appurtenances for the fire water distribution system should be either Underwriters Laboratories (UL) listed or Factory Mutual approved

2.01 WATER PRESSURE PIPE

A. The PVC water pressure pipe shall conform to the requirements of AWWA C900 Dimension Ratio 14 with Cast-Iron-Pipe equivalent outside diameters

B. Ductile iron pipe shall conform to AWWA C151 Thickness Class 50, as identified in AWWA C150. All Ductile iron pipe shall be cement mortar lined in accordance with AWWA C104

C. Steel water pipe shall conform to the requirements of AWWA C200. Connections shall be welded or flanged connections conforming to AWWA C206 or C207

D. Polyethylene (PE) pipe shall conform to the requirements of AWWA C901, Pressure Class 160

2.02 GATE VALVES

Gate valves shall conform to the requirements of AWWA C509

2.03 PIPE BEDDING MATERIAL

Pipe bedding material, excavation, trenching and backfill shall conform to the requirements as specified on the drawings.

2.04 FIRE HYDRANTS

Fire Hydrants shall conform to the requirements of AWWA C502

2.05 DUCTILE IRON FITTINGS

Ductile iron fittings shall conform to the requirements of AWWA C110 and shall be cement mortar lined in accordance with AWWA C104

2.06 RUBBER GASKET JOINTS

A. Push-on joints and mechanical joints in ductile iron pipe shall comply with AWWA C111

B. Mechanical joints in PVC pipe shall be made with ductile iron fittings and the joints shall comply with AWWA C111. Slip-on joints in PVC shall be Elastomeric-gasket bell ends conforming to AWWA C900

2.07 ALTITUDE VALVES

A. The valve shall only operate for flow in one direction

B. Valve shall be hydraulically operated, diaphragm-activated globe or angle pattern

C. The diaphragm assembly containing a valve stem shall be fully guided at both ends by a bearing in the valve cover and an integral bearing in the valve seat

D. Packing glands and/or stuffing boxes are not permitted

E. All necessary repairs shall be possible without removing the valve from the line

F. The entire valve and control systems shall be designed so that no water can be drawn into pilot system

G. The valve shall have an adjustment which will allow the height of the water to be controlled to within 5 percent ot the tank height

H. The valve shall be similar in all respects to the Clayton 210 altitude valve as manufacture by CLA-VAL or an approved equal

2.08 AIR-VACUUM AND AIR RELEASE VALVES

Unless otherwise specified, air-vacuum and air-release valve shall have screwed ends. The bodies shall be of high strength cast iron, and the float shall be of stainless steel. Seat washers and gaskets shall be of a material ensuring water tightness with a minimum of maintenance. Valve shall be designed for normal operation at a working pressure equal to the design pressure of the pipeline, shall be tested under a hydrostatic pressure of at least 300 psi, and shall be APCO Heavy Duty Combination Air Release Valve or approved equal.

2.09 WATER DISTRIBUTION METERS

The meters identified on the plans for use on the potable water and the firewater lines shall correspond to the requirements of AWWA C701 Class II inline type meter. The meters used on the firewater line shall be classified by UL for use on fire protection systems.

PART 3 EXECUTION

3.01 GENERAL

Maintenance and operation of items performed in accordance with manufactures recommendations as implemented by preventive maintenance program.

3.02 EXCAVATION, TRENCHING AND BACKFILL

Excavation, trenching and backfill shall be performed in accordance as specified on the drawings.

3.03 INSTALLATION

A. Ductile iron water lines and appurtenances shall be installed in accordance with AWWA C600

B. PVC water lines and appurtenances shall be installed as recommended in AWWA Manual of Water Supply Practices No. M23 Chapter 7, Installation

C. Steel water lines shall be fabricated and installed in accordance with AWWA C200. All Field welding shall conform to the requirements of AWWA C206

D. Concrete thrust blocks, constructed in accordance with the standard details on the drawings shall be placed at each change of direction of the water lines

3.04 FIELD QUALITY CONTROL

A. Backfill shall be tested as specified on the drawings

B. Pressure testing: Pressure tests will be performed by the Constructor and observed by Field Engineering (WITNESS POINT)

1. Ductile iron water lines shall be hydrostatically pressure tested in accordance with Section 4 of AWWA C600. Leakage shall not exceed the allowable leakage as defined in that Standard. The test pressure for this pipe is 200 psi.

2. PVC water lines shall be hydrostatically pressure tested in accordance with Section 8 of AWWA M23. The rate of leakage shall not exceed the allowable rate stipulated in that referenced manual. The test pressure for this pipe is 200 psi.

3. Steel water piping shall be hydrostatically pressure tested as specified in AWWA M11. The minimum test pressure for this pipe is 200 psi

3.05 DISINFECTION

After testing is complete, the potable water lines shall be disinfected as specified in AWWA C651. No chlorination of the Non-potable water lines will be allowed

PART 4 SUBMITTALS AND NOTIFICATIONS

4.01 SUBMITTALS

Submittals shall be in accordance with the attached Submittal and Notification requirements sheet

4.02 NOTIFICATION

A. Notify field Engineering 2 working days prior to any hydrostatic test so that the test can be observed by the Field Engineer

B. Should any change in the Specification Package be required to comply with these requirements, the constructor shall notify Field Engineering in writing for review

APPENDIX F

SYSTEM SPECIFICATION FOR WATER DISTRIBUTION PUMPS

APPENDIX F

SYSTEM SPECIFICATION FOR
WATER DISTRIBUTION PUMPS

SIT.20060223.0016

SPECIFICATION 15130 WATER DISTRIBUTION PUMP

REV	DATE	DESCRIPTION	BY	CHK'D	APPR
00	2-23-06	ISSUED FOR CONSTRUCTION	BOH		Chm

YMP SITE CONSTRUCTION
FIELD ENGINEERING

SPECIFICATION 15130
WATER DISTIBUTION PUMP

QA	N/A
	NON-LSN
FSK NO.	ESF-BSC-PRWS-SPEC-15130
SCALE:	NONE
SHEET NO.	1 OF 6

SECTION 15130

WATER DISTRIBUTION PUMPS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The work under this Specification Section includes furnishing all materials, tools, equipment, and labor to install Centrifugal Pumps as specified herein and indicated on the Drawings.

B. This work includes centrifugal pumps with drivers up to 75 hp.

C. The specification shall apply to multiple stage horizontal split case design.

1.02 RELATED SECTIONS

A. Section 01601 Equipment Identification

B. Section 02665 Water Distribution System

1.03 REFRENCES

A. American Society of Mechanical Engineers (ASME):
   1. ASME B1.20.1-83 Pipe Threads, General Purpose (Inch)
   2. ASME B16.5-98 Cast Iron Pipe Flanges and Flanged Fittings
   3. Augmented Quality Assurance Program (AQAP) DOE/RW-0565

1.04 QUALITY ASSURANCE

A. Quality Assurance (QA) shall be conducted in accordance with Augmented Quality Assurance Program (AQAP) DOE/RW-0565.

B. No QA controls apply to the materials and activities covered by this Specification Section, except those QA controls required by the related Specification Section either listed in Paragraph 1.02 or specifically referenced in the body for this Specification Section.

C. Acceptance of Product

   1. Receipt Verification: Visual inspection of the pump and pump components. (WITNESS POINT)

2. Field Verification: Visual inspection for the installed pump and pump components. (WITNESS POINT)

PART 2 PRODUCTS

2.01 MATERIALS

General: Pumps and pump components shall be new, unless otherwise noted on the Drawings.

2.02 PERFROMANCE

A. Each pump shall be capable of delivering the design flow shown on the drawings at 60 degrees F with raw water, or as the design requirements are shown on the drawing.

B. Pumps shall be capable of continuos operation without producing noise in accordance with DOE Order 440.1a.

2.03 COMPONENTS

A. Pump Casings

1. Pump shall be of the two stage horizontally split case type with suction and discharge connections located on opposite sides in the lower half of the casing, allowing removal of the rotating element without disturbing the pipe connections.

2. Pump Casing shall be capable of withstanding a hydrostatic test pressure 150% of the maximum pumping pressure under which the pump could operate at the design speed.

3. Suction and Discharge nozzles to be either ASME B16.5 Flanged, or NPT thread connections, ASME B1.20.1.

4. The casing shall be of cast iron free from blow holes, sand pockets, and other detrimental defects. Water passageways shall be smooth to permit maximum efficiency.

5. Casing rings shall provide close clearance to permit a minimum of recirculation. Casing rings shall be shouldered in the casing to prevent axial movement and pinned to prevent rotation.

B. Impellers

The impellers shall be made of cast bronze, single suction type. A pump having an equal number of stages shall have an equal number of impellers facing each direction to obtain hydraulic balance. The impellers shall be balanced, keyed to the shaft and fixed in an axial position by shaft sleeves or shaft sleeve nuts.

C. Seals and Packing

1. The pump shall be designed so that first stage pressure plus suction pressure will be the maximum pressure on either stuffing box.

2. Stuffing boxes shall be large and deep and shall hold a minimum of five rows of packing and lantern ring.

3. Packing glands shall be removable to facilitate repacking of stuffing boxes.

4. Gland bolts shall be of the swing type.

D. Shaft and Bearings

1. The shaft shall be carbon steel adequately sized for the loads transmitted. The shaft shall be threaded adjacent to both the first and second stage impeller hubs to allow axial adjustment of the impellers by means of threaded sleeves or sleeve nuts.

2. The shaft shall be protected through the stuffing box with bronze shaft sleeves. They shall be designed to prevent leakage between the shaft and the shaft sleeve. The shaft sleeve shall be threaded to tighten against the impellers and locked in place with set screws.

3. Bearings shall be designed for minimum B-10 life of 20,000 hours. The outboard bearing shall be of the duplex angular contact ball bearing. The inboard bearing shall be a single row radial type ball bearing.

E. Couplings

Couplings to be sized for the required horsepower and speed, and to provide for minor axial, radial, and angular misalignment.

F. Miscellaneous Fittings

Drain connections shall be provided at all low points in the pump volutes as well as at the drip pocket underneath the stuffing box. The volutes and interstage passages shall be provided with air vents for release of air from the casing.

G. Motors

1. Motor Size, Voltage, Phase, Frame Size and Frequency to be listed on drawing.

H. Nameplate Information

1. At a minimum nameplate for pump to include the following:

a) Pump Model Number
b) Impeller Size
c) Manufacturer

2. At a minimum nameplate for motor to include the following:

a) Motor Rating (hp)
b) Voltage
c) Amperage
d) Phase
e) Frequency
f) Manufacturer
g) Model Number

3. Nameplates to be attached to pump and motor.

PART 3 EXECUTION

3.01 Installation of Pumps

A. Pumps to be installed as specified herein and as indicated on drawings.

PART 4 SUBMITTALS AND NOTIFICATIONS

4.01 SUBMITTALS

A. Manufacturer's data shall indicate overall dimensions, installation instructions, wiring diagrams, foundation requirements, operation and maintenance manual, standard performance data, actual pump performance data, spare parts list, and other information necessary for the evaluation that the materials and equipment meet the requirements of this Specification.

APPENDIX G

SYSTEM SPECIFICATION FOR WATER CHLORINATION EQUIPMENT

APPENDIX G

SYSTEM SPECIFICATION FOR
WATER CHLORINATION EQUIPMENT

SIT.20060223.0021

SPECIFICATION 11261 WATER CHLORINATION EQUIPMENT

REV	DATE	DESCRIPTION	BY	CHK'D	APPR
00	2.23.06	ISSUED FOR CONSTRUCTION	BOM	[illegible]	CLM

YMP SITE CONSTRUCTION
FIELD ENGINEERING

SPECIFICATION 11261
WATER CHLORINATION
EQUIPMENT

QA	N/A
	NON-LSN
FSK NO.	ESF-BSC-PRWS-SPEC-11261
SCALE:	NONE
SHEET NO.	1 OF 5

ESF-BSC-PRWS-SPEC-11261
SPECIFICATION SECTION 11261
WATER CHLORINATION EQUIPMENT

PART 1: GENERAL

1.1 SUMMARY

A. Work covered in this section includes the design, fabrication, transportation and installation of Water Chlorination Equipment as specified herein and as indicated on the drawings

1.01 RELATED SECTIONS

A. Section 02226 Water Distribution Systems

B. Section 01601 Equipment Identification

C. Section 11260 Water Treatment Equipment

REFERENCES

A. Nevada Administrative Code 445A.450 to 445A.540 as effective march 16, 2005.

B. Augmented Quality Assurance Program (AQAP) DOE/RW-0565

C. NSF 60 Drinking Water Treatment Chemicals - Health Effects

D. NSF 61 Drinking water system components - Health effects

E. AWWA B300-99 Hypochlorites

1.02 QUALITY ASSURANCE

A. Quality Assurance shall be conducted in accordance with Augmented Quality Assurance Program (AQAP) DOE/RW-0565

B. No QA controls apply to the materials and activities covered by this Specification Section, except those QA controls which are required by the related Specification Sections which are either listed in Paragraph 1.02 or specifically referenced in the body of this Specification Section

C. Acceptance of Product

1. Receipt Verification: Dimensional/visual inspection of the Water Treatment Equipment components (HOLD POINT)

2. Field Verification

   a. Dimensional/visual inspection of the Water Chlorination Equipment components (HOLD POINT)

   b. Operational Test (WITNESS POINT)

3. Final acceptance of products by YMP/BSC Field Engineering, Person in Responsible Charge of the PWS

PART 2: PRODUCTS

2.01 Service Conditions

A. Location: Yucca Mountain Project Exploratory Studies Facility (ESF), Approximately 162 km (100 miles) northwest of Las Vegas, Nye County, Nevada.

B. Potable Water System (PWS) name: Yucca Mountain Project

C. PWS No. NY-0867-12-NCNT

D. PWS type: Non-Community, Non-Transient

E. Elevation: Approximately 3870 feet above sea level.

F. Service Temperature: >32 to 108 degrees F. unit will be installed in heated and ventilated enclosure.

G. Surface relative Humidity: 13 to 71 percent

2.02 EQUIPMENT

A. Chlorinator system shall be a tablet type chlorinator device.

B. Unit shall be pre-packaged, skid mounted or modular construction.

C. Process shall be to remove a sidestream of the main water flow and introduce a

portion of it into the chlorinator, where tablets are eroded at a controlled rate. A centrifugal pump re-injects the resulting chlorinated solution back into the main water line.

D. Must be able to perform under intermittent flow under batch production runs (2 week intervals at 20,000 gal. Per batch) up to continuous operation conditions.

E. 80 GPM design flow rated capacity

F. Chlorinator, digital flow meter, 22 gallon level controlled reservoir tank, injection pump, 208v 3ph power, weigh scale and low tablet alarm.

G. Chlorinator system components shall be NSF Standard 61 approved

H. Hypochlorites shall meet the requirements of AWWA B300 and shall be NSF Standard 60 approved

I. Chlorinator shall include a tablet chamber dehumidifier to prevent tablet saturation and accelerated erosion.

PART 3: EXECUTION

3.1 INSTALLATION

A. Requirements: Install chlorination equipment according to the manufacturer's instructions. Provide necessary fittings to make the system operational.

3.2 FIELD QUALITY CONTROL

A. Testing: The Contractor shall test the chlorination equipment to assure that it is adjusted and operating properly.

3.3 ADJUSTING

A. Requirements: The Contractor shall adjust the metering pump and switch, injector, or restricting valve, as recommended by the manufacturer.

PART 4 SUBMITTALS AND NOTIFICATION

4.01 SUBMITTALS

A. System Specifications

B. Shop drawings

C. Operation and Maintenance Manual

4.02 NOTIFICATIONS

Should any change in the Specification Package be required to comply with these requirements, the supplier shall notify BSC Field Engineering in writing for review and approval.

END OF SECTION

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APPENDIX H

SYSTEM SPECIFICATION FOR WATER TREATMENT EQUIPMENT

APPENDIX H

SYSTEM SPECIFICATION FOR
WATER TREATMENT EQUIPMENT

SIT.20060223.0020

SPECIFICATION 11260 WATER TREATMENT EQUIPMENT

REV	DATE	DESCRIPTION	BY	CHK'D	APPR
00	2-23-06	ISSUED FOR CONSTRUCTION	BKM	CLM	CLM

YMP SITE CONSTRUCTION FIELD ENGINEERING

SPECIFICATION 11260 WATER TREATMENT EQUIPMENT

QA	N/A
	NON-LSN
FSK NO.	ESF-BSC-PRWS-SPEC-11260
SCALE:	NONE
SHEET NO.	1 OF 6

ESF-BSC-PRWS-SPEC-11260
SPECIFICATION SECTION 11260
WATER TRATMENT EQUIPMENT

1 PART 1 GENERAL

1.01 SECTION INCLUDES

Work covered in this section includes the design, fabrication, transportation and erection of Water Treatment Equipment for the removal arsenic as specified herein and as indicated on the drawings

1.02 RELATED SECTIONS

A. Section 02226 Water Distribution Systems

B. Section 01601 Equipment Identification

C. Section 11261 Water Chlorination Equipment

1.03 REFERENCES

A. Nevada Administrative Code 625A.610 through 625A.612

B. Proposed amendments Nevada Administrative Code Chapter 445A PUBLIC WATER SYSTEMS Sections 445A.450 through 445A.540 (Water Quality and the Treatment of Water)

C. Nevada Administrative Code 445A.65505 to 445A.6731. as effective march 16, 2005.

D. Augmented Quality Assurance Program (AQAP) DOE/RW-0565

1.04 QUALITY ASSURANCE

A. Quality Assurance shall be conducted in accordance with Augmented Quality Assurance Program (AQAP) DOE/RW-0565

B. No QA controls apply to the materials and activities covered by this Specification Section, except those QA controls which are required by the related Specification Sections which are either listed in Paragraph 1.02 or specifically referenced in the body of this Specification Section

C. Acceptance of Product

1. Receipt Verification: Dimensional/visual inspection of the Water Treatment Equipment components (HOLD POINT)

2. Field Verification

   a. Dimensional/visual inspection of the Water Treatment Equipment components (HOLD POINT)

   b. Operational Test (WITNESS POINT)

3. Final acceptance of products by YMP/BSC Field Engineering, Person in Responsible Charge of the PWS and approval of system by Nevada Bureau of Safe Drinking Water.

4. System acceptance shall be based upon conformance with the requirements of this exhibit and proof of system compliance with the newly adopted Nevada Administrative Code (NAC) Section 445A, PUBLIC WATER SYSTEMS

I. PART 2 PRODUCTS

2.01 Service Conditions

A. Location: Yucca Mountain Project Exploratory Studies Facility (ESF), Approximately 162 km (100 miles) northwest of Las Vegas, Nye County, Nevada.

B. Potable Water System (PWS) name: Yucca Mountain Project

C. PWS No. NY-0867-12-NCNT

D. PWS type: Non-Community, Non-Transient

E. Elevation: Approximately 3870 feet above sea level.

F. Service Temperature: >32 to 108 degrees F. unit will be installed in heated and ventilated enclosure.

G. Surface relative Humidity: 13 to 71 percent

2.02 DESIGN AND FABRICATION

3.1 Standards for design shall comply with Nevada Administrative Code (NAC) 445A.66685.

3.2 Supplier shall submit documentation to YMP/BSC to verify that the treatment technology has been proven to treat drinking water to minimum requirements stated in Section 20 of the proposed Nevada Health Division (NHD) regulations. Per the proposed Nevada Health Division (NHD) regulations sections 8.2: If the treatment technology recommended in the Preliminary Engineering Report has been tested on water with similar characteristics, the treatment technology may be approved without a pilot study. Upon review of the vendors documentation YMP/BSC may request the pilot study to be performed at this time.

3.3 YMP/BSC will submit application with supplier documentation to the NHD for approval of a groundwater treatment facility with the intent to defer a pilot study. If upon NHD denial of the application a pilot plant study will be performed by the supplier.

3.3.1 Per sections 8 of the proposed (NHD) regulations, The design of a groundwater treatment facility must be based upon a pilot plant study. The pilot plant study must identify;

a) Hydraulic characteristics such as the loading rate or the proper blending rates; and

b) The unit process performance such as the optimum chemical feed and the most effective chemicals to be use for adequate removal.

3.4 In support of application for approval per sections 9 of the proposed (NHD) water quality regulations. Supplier shall be responsible for and supply shop drawings and submittals as sufficient to approve the system for fabrication and to complete the permit application process including but not limited to:

1. Complete system specifications.
2. Design Report that includes:
   a. Description of the basis for selection and design of the water project.
   b. Criteria for design, data and other information defining the water project.
   c. Establishes the adequacy of the proposed water project to meet the needs of the public water system.

d. Any other pertinent information required by the health authority for review and approval of the water project application.

e. Shop drawings

f. Operation and Maintenance Manual

3.5 All design documents and submittals to YMP/BSC will be minimum ten copies each document

4.0 ENGINEERING

A. Per sections 10 of the proposed Nevada Health Division (NHD) regulations. Preparation of plans, specifications and design reports to treat groundwater: Duties of an engineer. All initial and final plans, specifications and design report for a facility to treat groundwater must be prepared by, or under the direct supervision of, an engineer. The engineer shall affix his signature, the applicable date and his wet seal or stamp to each sheet of those plans and to each title page for those specifications and design reports in accordance with NAC 625A.610 through 625A.612.

PART 3 EXECUTION

A. 3.01 Treatment system shall be pre-packaged, skid mounted or modular construction.

B. Skid and frame to be stainless steel and/or epoxy coated steel construction.

C. Two (2) minimum adsorption vessels to provide redundant capacity if vessels are out of service for backwash or to allow media change-out with minimal interruption in service.

D. Adsorption vessels may be replaceable cartridge type or permanently installed to allow for in place media replacement.

E. No pH adjustment will be performed.

F. 75 GPM design flow rated capacity

G. Must be able to perform under intermittent flow under batch production runs (2 week intervals at 20,000 gal. Per batch) up to continuous operation conditions.

H. Pressure flow system

I. Vessel down-flow treatment flow direction

J. No by-passing or re-blending of treated water back into process stream

K. Provide data supporting that the backwash (if used) is considered non-hazardous i.e., Toxicity Characteristics Leaching Procedure (TLCP) and pH test results.

L. Provide documentation supporting the conclusion that the granular media will pass the TLCP test upon media disposal.

M. Provide sampling port(s)s to allow sampling of the treated water discharged from the unit.

PART 4 SUBMITTALS AND NOTIFICATION

4.01 SUBMITTALS

A. Documentation supporting pilot study deferral

B. System Specifications

C. Shop drawings

D. Operation and Maintenance Manual

4.02 NOTIFICATIONS

A. Should any change in the Specification Package be required to comply with these requirements, the supplier shall notify BSC Field Engineering in writing for review and approval.

End Of Section

APPENDIX I

ESF POTABLE WATER SYSTEM DRAWINGS

APPENDIX I

ESF POTABLE WATER SYSTEM DRAWINGS

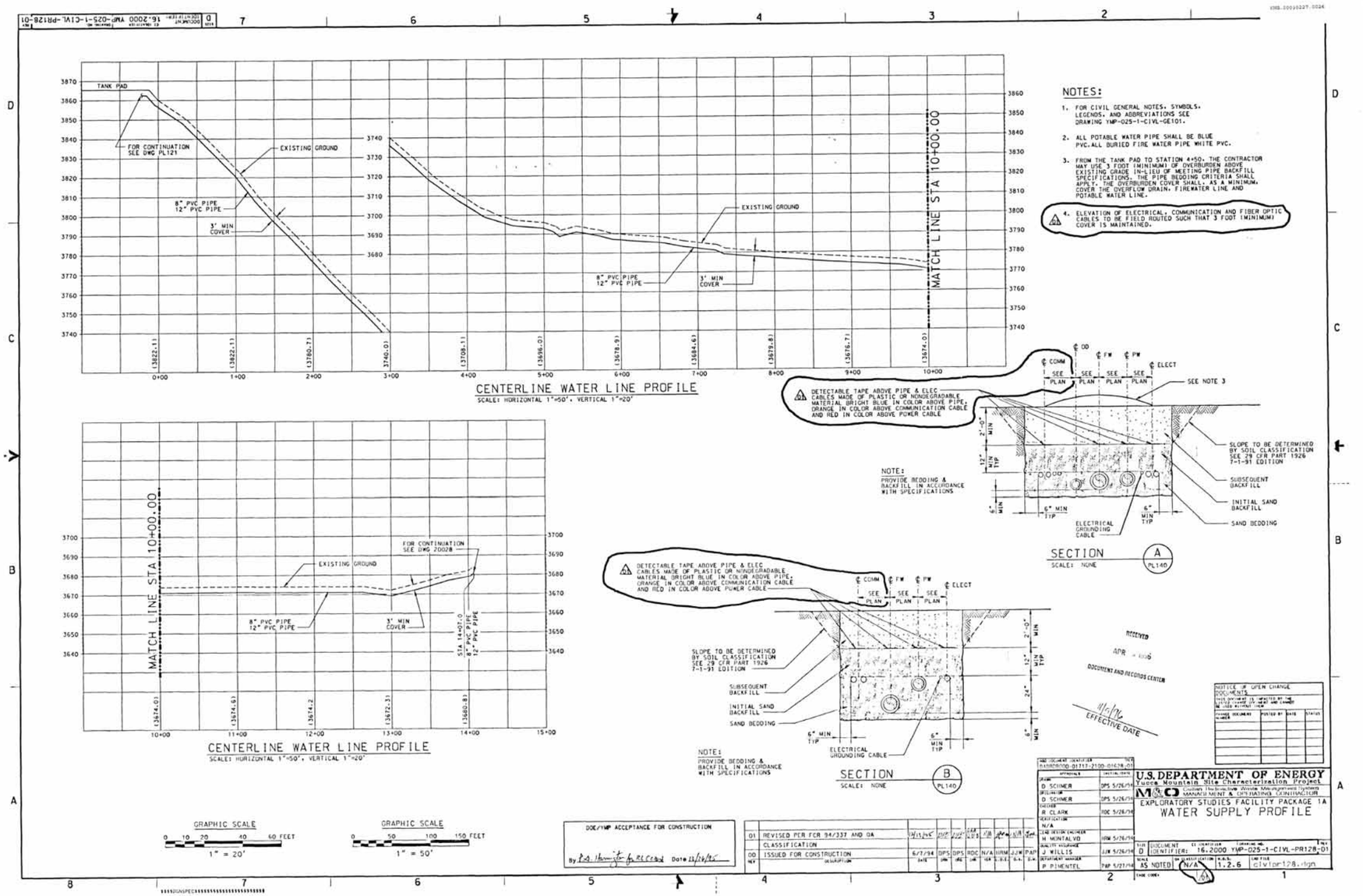

Figure I-1. Water Supply Profile

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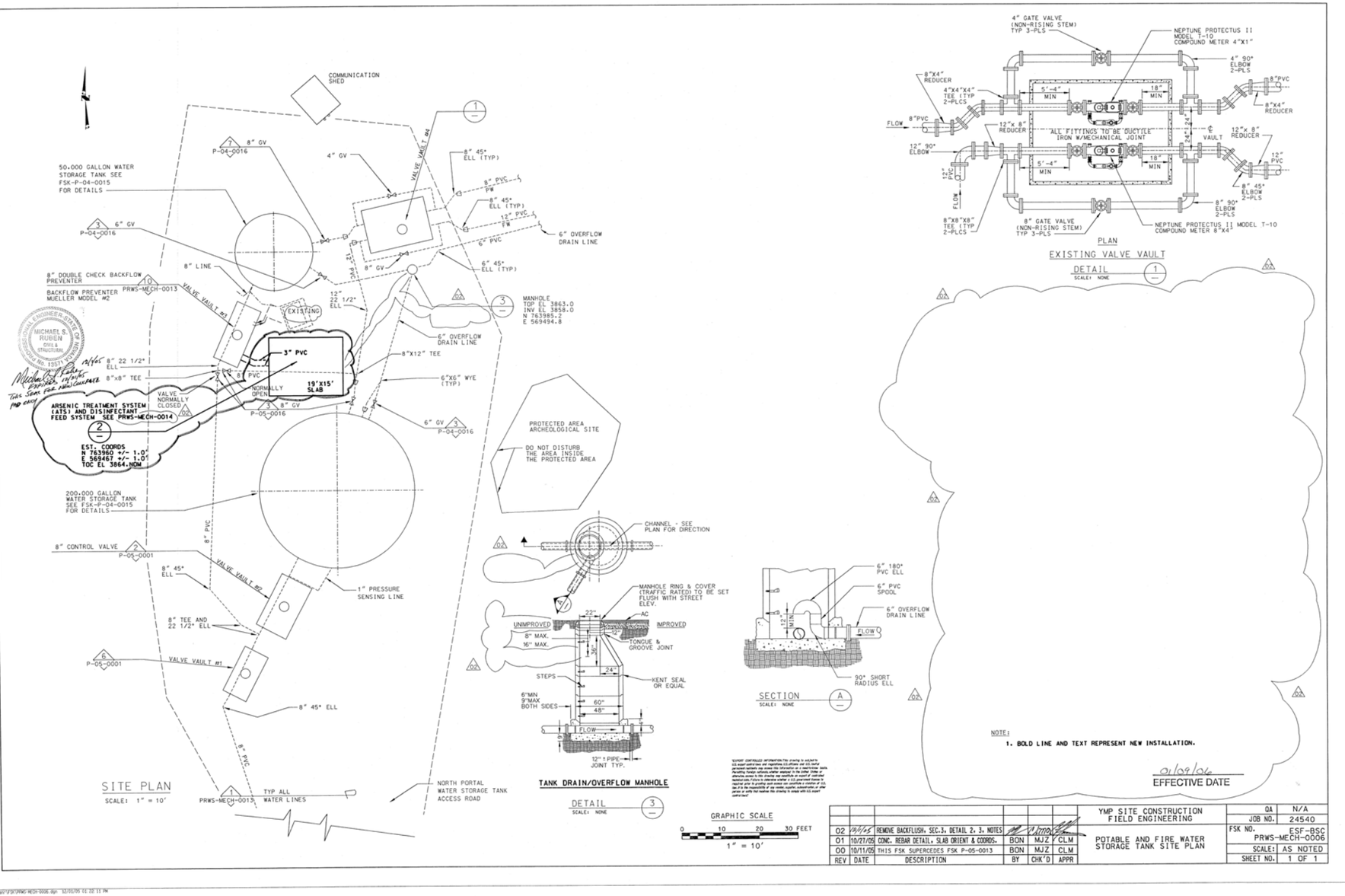

Figure I-2. Potable and Fire Water Storage Tank Site Plan

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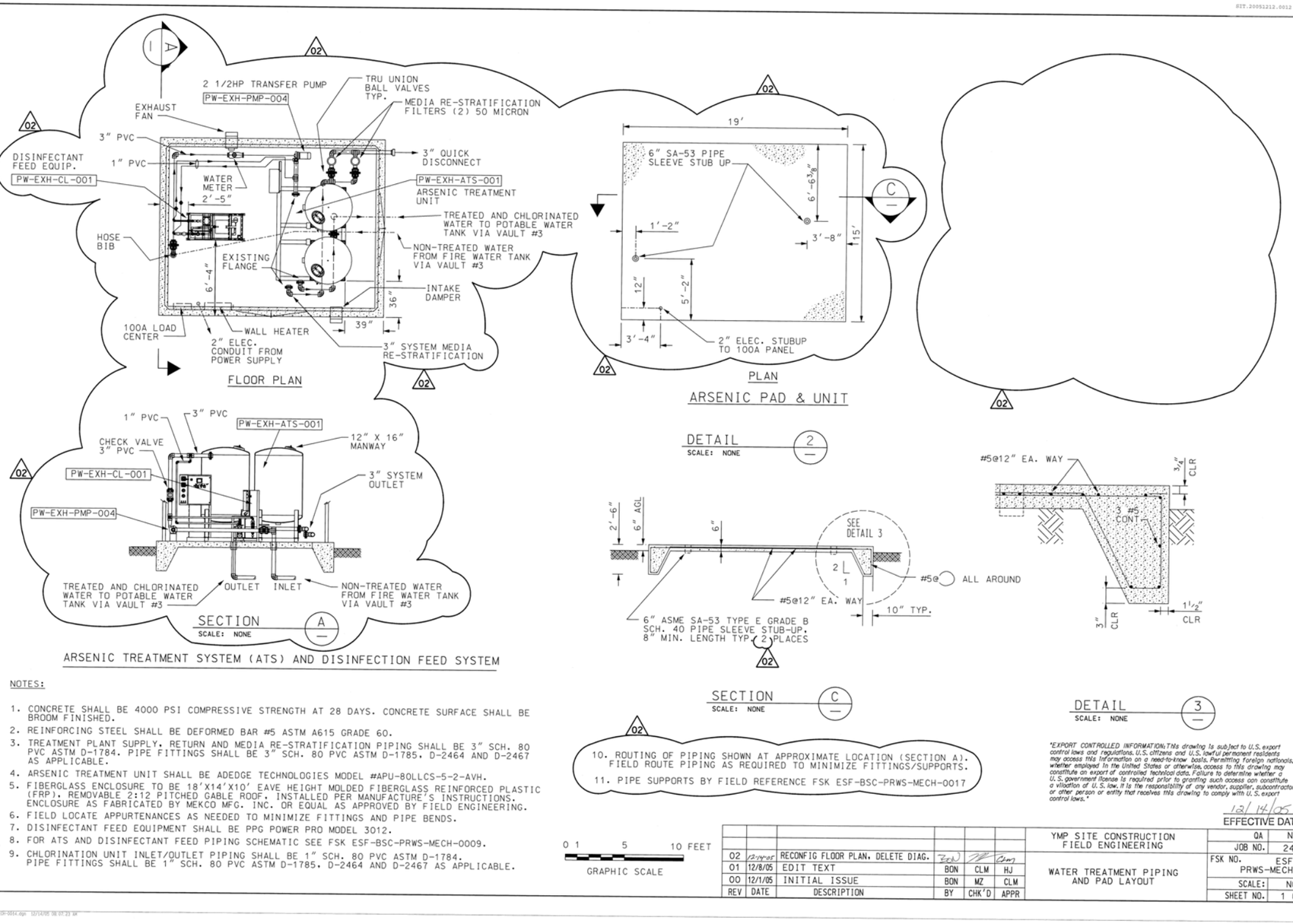

ARSENIC TREATMENT SYSTEM (ATS) AND DISINFECTION FEED SYSTEM

NOTES:

1. CONCRETE SHALL BE 4000 PSI COMPRESSIVE STRENGTH AT 28 DAYS. CONCRETE SURFACE SHALL BE BROOM FINISHED.
2. REINFORCING STEEL SHALL BE DEFORMED BAR #5 ASTM A615 GRADE 60.
3. TREATMENT PLANT SUPPLY, RETURN AND MEDIA RE-STRATIFICATION PIPING SHALL BE 3" SCH. 80 PVC ASTM D-1784. PIPE FITTINGS SHALL BE 3" SCH. 80 PVC ASTM D-1785, D-2464 AND D-2467 AS APPLICABLE.
4. ARSENIC TREATMENT UNIT SHALL BE ADEDGE TECHNOLOGIES MODEL #APU-80LLCS-5-2-AVH.
5. FIBERGLASS ENCLOSURE TO BE 18'X14'X10' EAVE HEIGHT MOLDED FIBERGLASS REINFORCED PLASTIC (FRP). REMOVABLE 2:12 PITCHED GABLE ROOF. INSTALLED PER MANUFACTURE'S INSTRUCTIONS. ENCLOSURE AS FABRICATED BY MEKCO MFG. INC. OR EQUAL AS APPROVED BY FIELD ENGINEERING.
6. FIELD LOCATE APPURTENANCES AS NEEDED TO MINIMIZE FITTINGS AND PIPE BENDS.
7. DISINFECTANT FEED EQUIPMENT SHALL BE PPG POWER PRO MODEL 3012.
8. FOR ATS AND DISINFECTANT FEED PIPING SCHEMATIC SEE FSK ESF-BSC-PRWS-MECH-0009.
9. CHLORINATION UNIT INLET/OUTLET PIPING SHALL BE 1" SCH. 80 PVC ASTM D-1784. PIPE FITTINGS SHALL BE 1" SCH. 80 PVC ASTM D-1785, D-2464 AND D-2467 AS APPLICABLE.
10. ROUTING OF PIPING SHOWN AT APPROXIMATE LOCATION (SECTION A). FIELD ROUTE PIPING AS REQUIRED TO MINIMIZE FITTINGS/SUPPORTS.
11. PIPE SUPPORTS BY FIELD REFERENCE FSK ESF-BSC-PRWS-MECH-0017

0 1 5 10 FEET
GRAPHIC SCALE

EXPORT CONTROLLED INFORMATION: This drawing is subject to U.S. export control laws and regulations. U.S. citizens and U.S. lawful permanent residents may access this information on a need-to-know basis. Permitting foreign nationals, whether employed in the United States or otherwise, access to this drawing may constitute an export of controlled technical data. Failure to determine whether a U.S. government license is required prior to granting such access can constitute a violation of U.S. law. It is the responsibility of any vendor, supplier, subcontractor, or other person or entity that receives this drawing to comply with U.S. export control laws.

12/14/05
EFFECTIVE DATE

REV	DATE	DESCRIPTION	BY	CHK'D	APPR
02	12-14-05	RECONFIG FLOOR PLAN, DELETE DIAG.	ZW	MZ	CLM
01	12/8/05	EDIT TEXT	BON	CLM	HJ
00	12/1/05	INITIAL ISSUE	BON	MZ	CLM

YMP SITE CONSTRUCTION FIELD ENGINEERING

WATER TREATMENT PIPING AND PAD LAYOUT

QA	N/A
JOB NO.	24540
FSK NO.	ESF-BSC-PRWS-MECH-0014
SCALE:	NONE
SHEET NO.	1 OF 1

Figure I-3. Water Treatment Piping and Pad Layout

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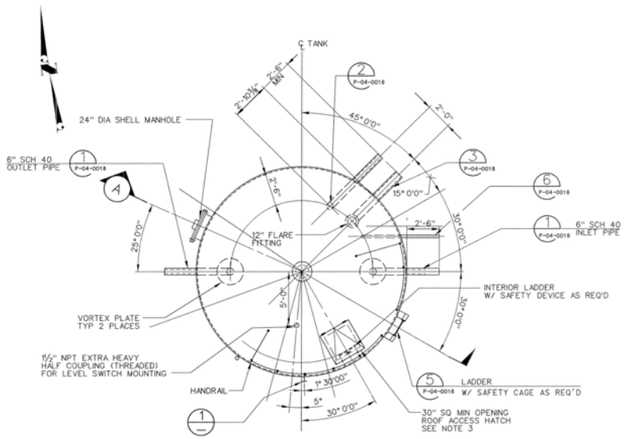
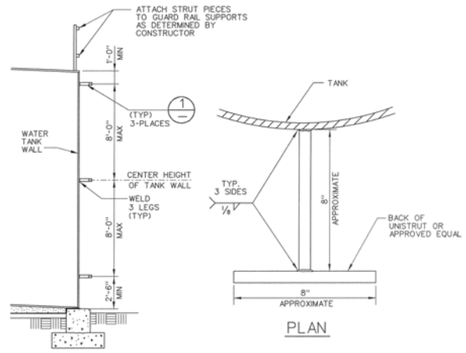


20,000 GAL FOREBAY WATER TANK (2 REQ'D)

PLAN

SCALE: ¼" = 1'-0"



SECTION

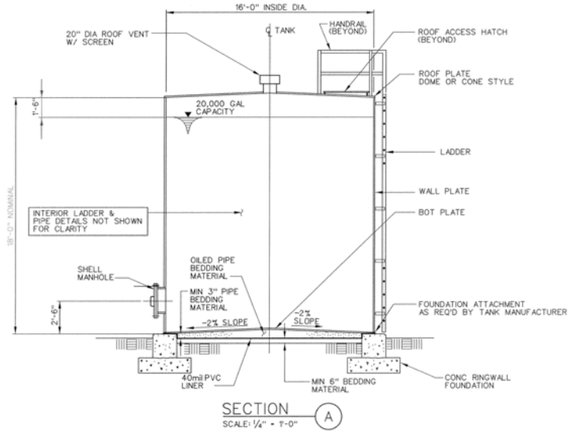
PLAN

DETAIL 1 P-04-0015

SCALE: NONE

NOTES:

1. CONSTRUCTION OF THE TANKS SHALL CONFORM TO THE NFPA 22 STANDARD FOR WATER TANKS FOR PRIVATE FIRE PROTECTION AND AWWA D100 STANDARD FOR WELDED STEEL TANKS FOR WATER STORAGE.
2. TANKS ARE NON-POTABLE.
3. THE ROOF ACCESS HATCH SHALL BE HINGED AND SHALL BE EQUIPPED TO ACCEPT A ⅜" DIA x 1½" DEEP THROAT PADLOCK. IN ADDITION PROVIDE A LOCKING DEVICE TO SECURE THE HATCH IN THE VERTICAL OPEN POSITION.
4. PVC LINER SHALL BE PERMANENTLY EPOXIED TO THE RING WALL. IT SHALL BE TRIMMED FLUSH WITH THE TOP OF THE RING WALL.
5. THE VOLUME OF OIL THAT SHALL BE ADDED TO THE SAND/BEDDING MATERIAL SHALL BE 4 GALLONS OF 30 WEIGHT MOTOR OIL, WHICH MAY BE DILUTED 100% FOR SPRAY APPLICATION. THE MIXTURE SHALL BE EVENLY SPREAD OVER THE SAND. THE OIL SHALL NOT BE ADDED TO THE SAND ANY SOONER THAN 24 HOURS PRIOR TO THE INSTALLATION OF THE TANK BOTTOM.



SECTION A

SCALE: ¼" = 1'-0"

GRAPHIC SCALE

0 2 4 8 12 FEET

¼" = 1'-0"

09/25/04
EFFECTIVE DATE

REV	DATE	DESCRIPTION	BY	CHK'D	APPR
00	9/24/04	INITIAL ISSUE	[illegible]	[illegible]	[illegible]

YMP SITE CONSTRUCTION FIELD ENGINEERING

BOOSTER PUMP STATION WATER TANKS PLAN AND SECTIONS

QA	N/A
JOB NO.	24540
FSK NO.	P-04-0014
SCALE:	BAR
SHEET NO.	1 OF 1

Figure I-4. Booster Pump Station Water Tanks Plan and Sections

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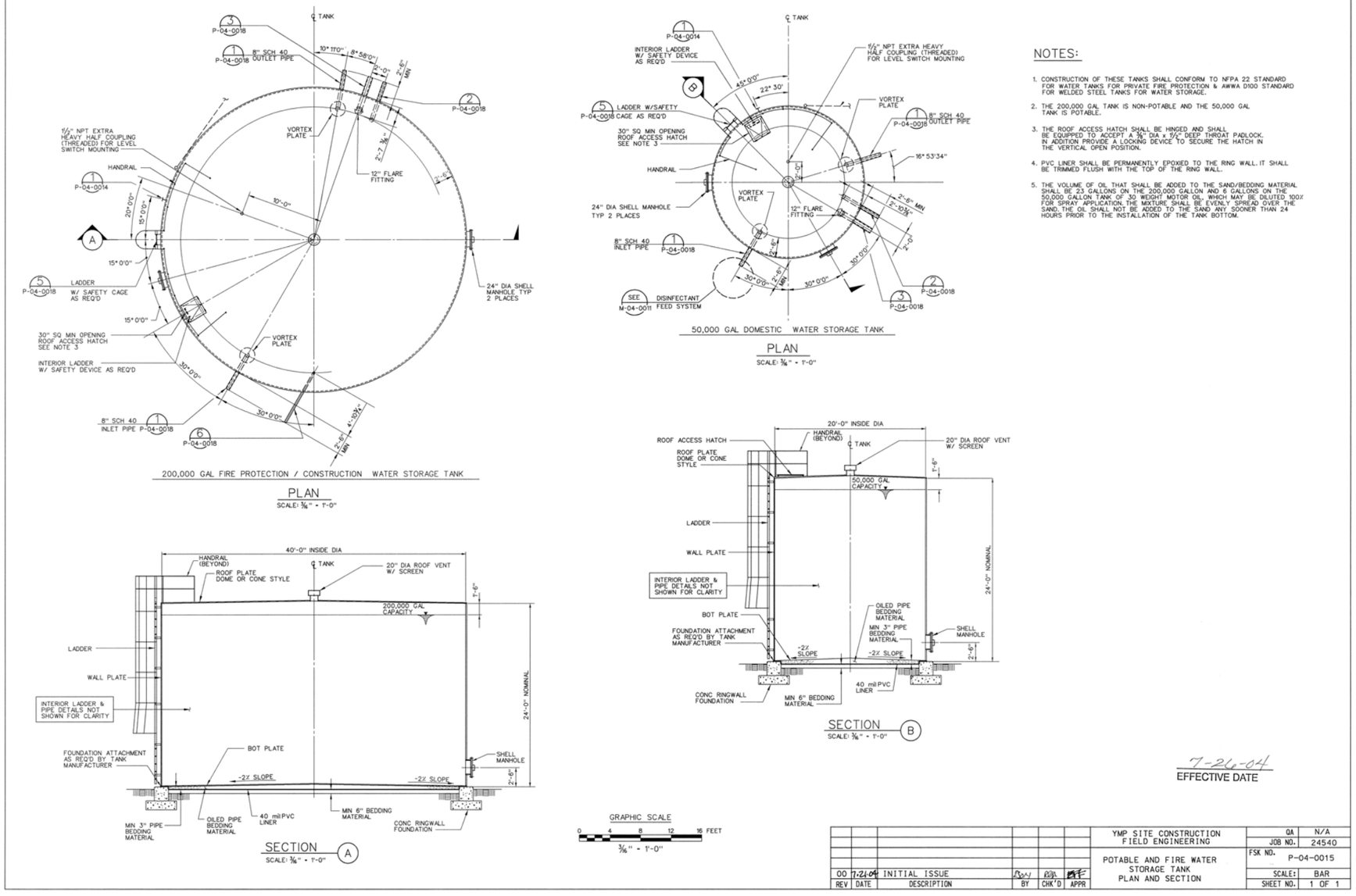

200,000 GAL FIRE PROTECTION / CONSTRUCTION WATER STORAGE TANK

PLAN

SCALE: 3/16" = 1'-0"

50,000 GAL DOMESTIC WATER STORAGE TANK

PLAN

SCALE: 3/16" = 1'-0"

NOTES:

1. CONSTRUCTION OF THESE TANKS SHALL CONFORM TO NFPA 22 STANDARD FOR WATER TANKS FOR PRIVATE FIRE PROTECTION & AWWA D100 STANDARD FOR WELDED STEEL TANKS FOR WATER STORAGE.
2. THE 200,000 GAL TANK IS NON-POTABLE AND THE 50,000 GAL TANK IS POTABLE.
3. THE ROOF ACCESS HATCH SHALL BE HINGED AND SHALL BE EQUIPPED TO ACCEPT A ⅜" DIA x 1½" DEEP THROAT PADLOCK. IN ADDITION PROVIDE A LOCKING DEVICE TO SECURE THE HATCH IN THE VERTICAL OPEN POSITION.
4. PVC LINER SHALL BE PERMANENTLY EPOXIED TO THE RING WALL. IT SHALL BE TRIMMED FLUSH WITH THE TOP OF THE RING WALL.
5. THE VOLUME OF OIL THAT SHALL BE ADDED TO THE SAND/BEDDING MATERIAL SHALL BE 23 GALLONS ON THE 200,000 GALLON AND 6 GALLONS ON THE 50,000 GALLON TANK OF 30 WEIGHT MOTOR OIL, WHICH MAY BE DILUTED 100X FOR SPRAY APPLICATION. THE MIXTURE SHALL BE EVENLY SPREAD OVER THE SAND. THE OIL SHALL NOT BE ADDED TO THE SAND ANY SOONER THAN 24 HOURS PRIOR TO THE INSTALLATION OF THE TANK BOTTOM.

SECTION A

SCALE: 3/16" = 1'-0"

SECTION B

SCALE: 3/16" = 1'-0"

GRAPHIC SCALE

0 4 8 12 16 FEET

3/16" = 1'-0"

7-26-04
EFFECTIVE DATE

REV	DATE	DESCRIPTION	BY	CHK'D	APPR
00	7.26.04	INITIAL ISSUE	[illegible]	[illegible]	[illegible]

YMP SITE CONSTRUCTION FIELD ENGINEERING

POTABLE AND FIRE WATER STORAGE TANK PLAN AND SECTION

QA	N/A
JOB NO.	24540
FSK NO.	P-04-0015
SCALE:	BAR
SHEET NO.	1 OF 1

Figure I-5. Potable and Fire Water Storage Tank Plan and Section

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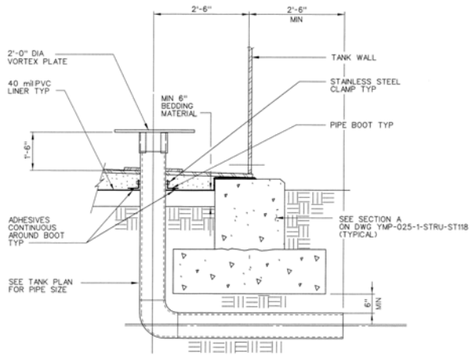
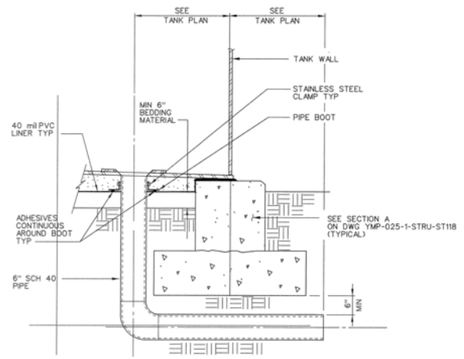


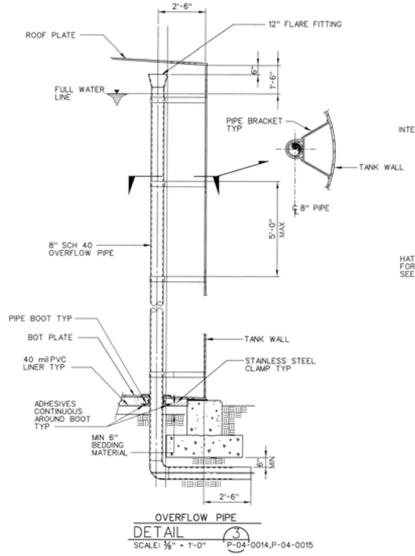
INLET / OUTLET PIPE
DETAIL 1 P-04-0014,P-04-0015
SCALE: 3/4" = 1'-0"



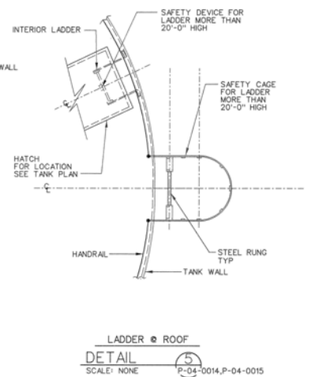
DRAIN PIPE
DETAIL 2 P-04-0014,P-04-0015
SCALE: 3/4" = 1'-0"

NOTES

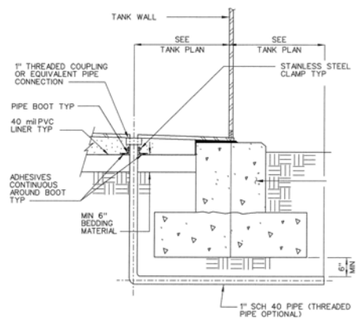
1. PVC LINER SHALL BE PERMANENTLY EPOXIED TO THE RING WALL. IT SHALL BE TRIMMED FLUSH WITH THE TOP OF THE RING WALL.



OVERFLOW PIPE
DETAIL 3 P-04-0014,P-04-0015
SCALE: 3/8" = 1'-0"



LADDER @ ROOF
DETAIL 5 P-04-0014,P-04-0015
SCALE: NONE



PRESSURE SENSING LINE
DETAIL 6 P-04-0014,P-04-0015
SCALE: 3/4" = 1'-0"

09/28/04
EFFECTIVE DATE

REV	DATE	DESCRIPTION	BY	CHK'D	APPR
00	9/28/04	INITIAL ISSUE	DRJ	[illegible]	[illegible]

YMP SITE CONSTRUCTION FIELD ENGINEERING

WATER STORAGE TANK DETAILS

QA	N/A
JOB NO.	24540
FSK NO.	P-04-0018
SCALE:	AS NOTED
SHEET NO.	1 OF 1

Figure I-6. Water Storage Tank Details

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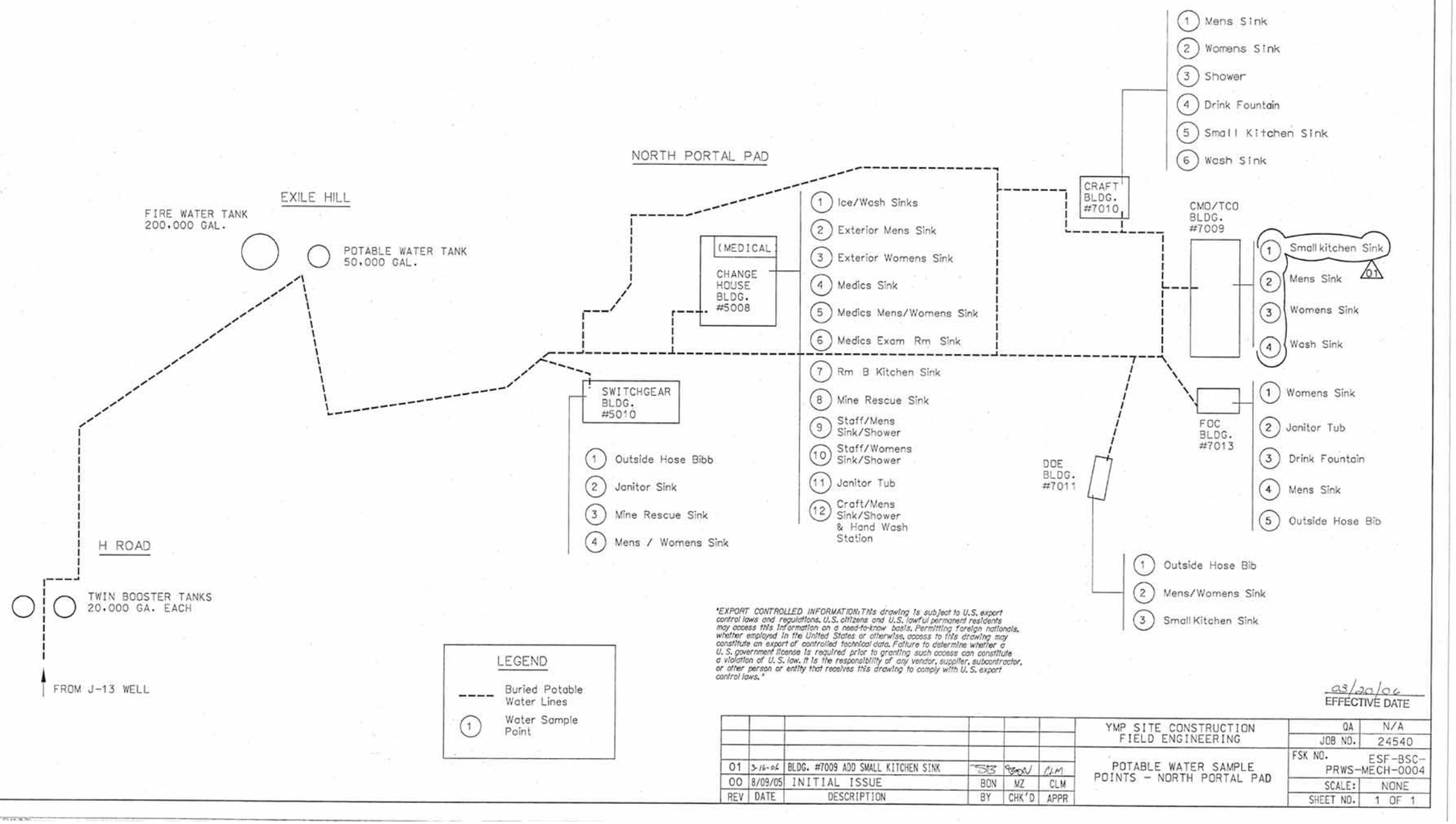
YUCCA MT. POTABLE WATER SAMPLE POINTS



"EXPORT CONTROLLED INFORMATION: This drawing is subject to U.S. export control laws and regulations. U.S. citizens and U.S. lawful permanent residents may access this information on a need-to-know basis. Permitting foreign nationals, whether employed in the United States or otherwise, access to this drawing may constitute an export of controlled technical data. Failure to determine whether a U.S. government license is required prior to granting such access can constitute a violation of U.S. law. It is the responsibility of any vendor, supplier, subcontractor, or other person or entity that receives this drawing to comply with U.S. export control laws."

03/30/06
EFFECTIVE DATE

REV	DATE	DESCRIPTION	BY	CHK'D	APPR
01	3-16-06	BLDG. #7009 ADD SMALL KITCHEN SINK	SB	BON	CLM
00	8/09/05	INITIAL ISSUE	BON	MZ	CLM

YMP SITE CONSTRUCTION FIELD ENGINEERING

POTABLE WATER SAMPLE POINTS – NORTH PORTAL PAD

QA	N/A
JOB NO.	24540
FSK NO.	ESF-BSC-PRWS-MECH-0004
SCALE:	NONE
SHEET NO.	1 OF 1

Figure I-7. Potable Water Sample Points - North Portal Pad

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APPENDIX J

GUIDELINES FOR SUPERCHLORINATION PRIOR TO COMMISSIONING

APPENDIX J

GUIDELINES FOR SUPERCHLORINATION PRIOR TO COMMISSIONING

The YMP PWS consists of two distinct portions that require superchlorination:

- Superchlorinator discharge piping (to the Potable Water Tank) and the Potable Water Tank
- The PWS loop and branch lines serving facilities on the ESF North Portal Pad.

Guidelines for each are presented below. Supplemental information is located in the Site Operations Library. Each step of the process will be documented.

J.1 Superchlorinator Discharge Piping and Potable Water Tank

1. Simultaneously fill the Potable Water Tank with water and a requisite amount of calcium hypochlorite sufficient to achieve a concentration of 60 ppm (includes a margin of concentration about 50 ppm).
2. With proper valving, fill the piping between the superchlorinator and the Potable Water Tank.
3. Close the tank hatch.
4. Sample the waters to verify that the residual chlorine concentration is at least 25 ppm after 24 hours.

NOTE: An alternate method of spraying the inside of the tank with superchlorinated water at 200 ppm may be employed, but is not currently planned nor reflected above.

J.2 PWS Loop and Branch Lines

1. If required, adjust the chlorine concentration of the water in the tank to 60 ppm.
2. Open the main potable water tank supply valve and others, which feed each loop segment.
3. Open all water faucets in facilities connected to the system to ensure that water is flowing to those points and also to vent air from the system, thus ensuring a complete fill of the system.
4. Test for chlorine concentration at all system discharge points to ensure a concentration of at least 50 ppm. Once the concentration is verified, close each faucet.
5. Allow the superchlorinated water to remain in contact with the piping for 24 hours.
6. Sample the water from each discharge point to verify that the residual chlorine concentration is at least 25 ppm.

7. Upon obtaining satisfactory results, drain the system. This is performed by opening the bleedcock, adjacent to the small office trailer complex, and discharging the water into a tanker truck. The bulk of the water from the system will be drained from this bleedcock. Water will also have to be removed from some faucets. Extreme care must be exercised to avoid any spillage. Note that since 50,000 gallons of superchlorinated water are generated to treat the Potable Water Tank and subsequently (in part) to treat the piping loop on the pad, a total of 50,000 gallons will require disposal. The volume of the piping loop is just under 10,000 gallons. Either the entire 50,000 gallons will be drained through the ESF piping loop, or the supply valve at the Potable Water Tank will be closed and the remaining 40,000 gallons of water in the tank will be removed from the tank by conventional pumping means (using sanitized equipment). The later may be preferable.

8. Used superchlorinated water will be disposed of at the C-Well Spreading Basin in accordance with environmental regulatory and determination of importance evaluation requirements.

9. After the lines have been thoroughly flushed, the chlorinator system will be started, thereby starting the process of filling the Potable Water Tank. Once the system is sufficiently calibrated to achieve the desired level of chlorination (0.2 to 1.0 ppm, with 0.5 the optimum level), the piping system will be filled.

10. The water will be sampled at each discharge point to verify that the desired level of chlorination is achieved. Any water discharged from the system, which is above 1.0 ppm must be disposed of per item 8.

11. Once the desired results are achieved, samples will be taken at multiple locations and will be analyzed for a full suite of constituents as described in Appendix G.

12. The system will be locked out (restrooms locked, etc.) until satisfactory results are achieved based on laboratory analysis.

NOTE: The above steps are guidelines, which represent a planned approach and is not reflective of detailed steps, which must be performed to achieve the desired results. A test execution traveler package will be developed to specify detailed steps and to facilitate documenting successful completion of each.

APPENDIX K

ARSENIC TREATMENT SYSTEM AND DISINFECTION FEED EQUIPMENT: DISINFECTION AND START-UP INSTRUCTIONS

QA:N/A

YUCCA MOUNTAIN PROJECT

Arsenic Treatment System and Disinfection Feed Equipment: Disinfection and Start-Up Instructions

Bryan Newman 1/9/06
Preparer Sign Date

Curtiss Davis 1/9/06
Project Field Engineer Sign Date

Mike Kennedy 1/10/06
Site Operations Manager Sign Date

Non LSN Relevant

Arsenic Treatment System and Disinfection Feed Equipment:
Disinfection and Start-Up Instructions

Summary

System flushing, testing, disinfection, and start up will be performed as detailed below and, upon satisfactory completion of all required sampling results the system will be commissioned and placed into operation.

1. System Flushing:

The piping and components must be cleaned before disinfecting the system. Mud, sand, dirty water or a variety of debris left in the system will shield bacteria from contact with the chlorine solution resulting in incomplete disinfection and possible delivery of contaminated water to the distribution system.

A. Configure piping in Flushing Configuration as shown in Attachment A.

B. Fill system with water at a rate that allows air to be released at the same rate as the water entering the system. Open vents as required to allow trapped air to escape.

C. Flush through system using the transfer pump. The arsenic treatment system has flow restrictor installed to reduce flow to 80 gallons per minute (gpm). 80 gpm flowing through 3" SCH. 80 PVC pipe has a velocity of 4.0 feet per second.

D. Flush a minimum of three changes of total system volume. 3 volumes (3,170 gallons) @ 80 gpm = 40 minutes flush time.

E. Flush water into water truck and save to serve as dust control applications. Leave system full of water.

2. Hydrostatic Testing and Leakage Testing

Hydrostatic testing of the newly installed system is required to prove the integrity of system components, piping and connections by use of pressure. Leakage testing will be performed simultaneously with the hydrostatic test. Leakage testing is performed to visually inspect for leaks and verify the test due to variations in test pressure from factors such as trapped air, piping restraints, and temperature variations.

A. Configure piping in Hydro Test Configuration as shown on Attachment A

B. Pressurize system to 75 pounds per square inch (psi). Based on maximum pump head = 110 foot head plus tank height = 24 feet giving a maximum

system pressure of 58 psi. 58 psi X 125% = 75 psi minimum to 90 psi maximum test pressure.

C. Maintain pressure for 2 hours by applying additional pressure to maintain 75 - 90 psi.

D. Field Engineering will inspect all exposed piping for leakage. Any leaks will be repaired and the system shall be retested.

E. Acceptance of 75-90 psi will be maintained for 2 hours with no visible or obvious leaks.

F. If hydraulic testing is acceptable, the vessels will need to be partially drained to 1/3-1/2 full of water prior to media loading

3. **Adsorption Media Installation**

A. Attach rope to manway to prevent accidental dropping of manway into vessel, which could damage the vessel internal components. Loosen yoke nuts and remove manway assembly.

B. Inspect the internals of the adsorption vessel(s) to ensure the collection hub and lateral at the bottom of the tank(s) appear securely connected to the outlet/inlet ports, are in good condition, and free of debris or obstructions that may hinder flow or performance. Remove debris or any foreign objects before proceeding.

C. Wear the appropriate safety equipment per the Material Safety Data Sheetsand Job Planning Hazard Analysis.

D. Ensure the vessels are 1/3-1/2 full of water before adding underbedding or adsorption media. This is very important to reduce the potential for the gravel/media to damage the internal hub/lateral(s) inside the tank while filling and to provide the proper conditioning of the media.

E. Be sure to cover the top opening of the riser tube (if present) with a piece of duct tape or equivalent to prevent any gravel or media from entering into the riser tube.

F. Pour in 7 cubic feet of 1/4" x 1/8" underdrain media through the top access port using a funnel. This layer should be approximately 2 ¾" from bottom head seam. For the top course gravel, pour in 3 cubic feet of the 1/8 x 1/16" stone. This layer should be approximately 5 ¾" from bottom head seam. Quantities or grading of materials may be adjusted as directed by Supplier Representative or Field Engineering as required.

G. The Bayoxide E33 media is provided in 7 cubic feet drums and super sacks. Ensure that sufficient water is in the vessel before adding the adsorption media.

Tap the vessel lightly with a rubber mallet to loosen clumps or prevent uneven filling during the process. Fill the vessel with 38 cubic feet of media allowing for the designed headspace in the vessels for backwashing. Backwashing requires approx. 58% headspace for bed expansion.

1. To add media supplied in drums remove the lid and attach the drum-top cone adapter to an open drum. Drum weight = approx. 211 lbs. A short section of 4" flexible hose should be connected to the cone to allow flexibility in positioning the drum above the flange opening. Using a forklift and drum hoist, secure the drum lift to the drum and raise it above the top opening of the vessel. Rotate the drum with the pull chain to the appropriate angle for emptying the container. Guide the flexible hose into the tank opening. Media should flow freely from the container.

2. Super sacks should be hoisted by forklift or crane and positioned over the flange opening with funnel placed in opening if needed. Super sack weight = approximately 1,155 lbs. Release the media by pulling the strap attached to the sack outlet. Fill until the required amount of media has been loaded into the vessel. Use appropriate safety procedures during filling.

H. Once the appropriate amount of media is in the vessel, take a tape measure and measure the distance from the top of the tank (flange) to the top of the media bed. Top off the vessel with water; allow the media to stand for a few minutes if possible to wet the material and eliminate entrapped air (which is the most common cause of pressure drop and channeling). Re-secure the inlet flange and piping and tighten.

I. Configure piping in Flushing Configuration as shown on Attachment A, with backwash hose discharging into water truck.

J. Using the controls on each vessel (one vessel at a time), manually backwash the media (upflow direction) for roughly 5-10 bed volumes (1,795 – 3,590 gallons), beginning at approximately 5-6 gpm per square foot (63 – 75 gpm) of tank surface area and increase to 8-9 gpm per square foot (100-113 gpm) gradually. AdEdge APU systems with an automatic control package will be programmed or pre-set for the appropriate time and gpm. Some initial dark color and turbidity in the backwash water (first few bed volumes) is common due to the presence of fines that are evacuated. The water should become very clear with time. Two or more backwashing sequences may be required for each vessel to properly condition the media. Be careful to begin slowly and monitor the flow rate during backwashing to ensure that it is in the correct range for backwashing. High surges or excessive flow rates during backwashing can cause the adsorption media to be inadvertently evacuated out of the system through the backwash line. It is important that all fine particulate be evacuated from the vessels during this conditioning step. Open bleed or sample valves during the initial flushing to also eliminate entrapped air in

the vessel. [Note: More than one initial backwash cycle may be needed to complete the conditioning step and obtain clear product water.] Do not allow the water to flow in a service mode or forward flow through the media / vessels (service mode) until backwashing has been completed and objectives achieved in that vessel.

K. Record backwash data on Attachment B. APU System Backwash Log.

L. Contact Environmental Field Support for disposal of backwash water.

M. After allowing the suspended adsorbent media to re-settle, put the unit into a rinse cycle (forward flow) with the rinse going to the water truck. Check the water for clarity; the water should be free of particulate or color after a minute or two.

N. Operate according to the recommended design flow rates and operating conditions. After placing into service, allow forward (service) flow for a few bed volumes before obtaining any effluent samples for testing to ensure steady state conditions are achieved.

4. Disinfection Process

Disinfection of the piping, appurtenances, vessels and media is required for all elements of the treatment plant that are in contact with disinfected water under normal operating conditions. Reference AWWA C653-97 Disinfection of Water Treatment Plants

A. Disinfection process will be accomplished by creating a closed loop by installing a temporary jumper as shown in attachment A. Water will circulate through the loop where the chlorination unit removes a sidestream of the main water flow and introduces a portion of it into the chlorinator. The chlorinator allows water to come in contact with calcium hypochlorite tablets, which are eroded at a controlled rate. A centrifugal pump re-injects a metered quantity of the resulting chlorinated solution back into the main water line. If required to achieve the target concentration, additional injection of calcium hypochlorite solution may be performed via an injection point at the suction side of the transfer pump.

B. Configure piping in Disinfection Configuration as shown on Attachment A.

C. Turn on transfer pump to circulate water through the loop. Vent air from high points as needed.

D. Start up chlorinator unit per manufacturer's instructions to begin delivery disinfectant solution into circulating stream.

E. Start up arsenic treatment unit per manufacturer's operating instructions.

F. Sample water via minimum of two sample ports for chlorine parts million (ppm). Minimum free chlorine residual shall be 25 ppm to begin the disinfection process. Calcium hypochlorite solution may be injected into circulating stream to augment proper free chlorine residual. Iron oxide media within the arsenic treatment vessels are expected to have a chlorine demand, therefore circulation at >25 ppm should be performed until the ppm shows to be stable or at a steady upward trend.

G. Allow chlorinated water to stand in the system for a minimum of 12 hours. Circulation of chlorinated water through the loop during the 12-hour period may continue to allow set up of arsenic treatment and chlorine equipment.

H. At the end of the 12-hour contact time, the chlorinated water shall be tested at a minimum of two sample points to determine the amount of free chlorine residual. If the free chlorine residual is less than 15 ppm in any point sampled within the system, the chlorination process shall be repeated. If satisfactory chlorine residuals are obtained after the chlorine retention period, the disinfection will be considered successful

I. Configure piping in Flushing Configuration as shown on Attachment A.

J. Flush system to water truck until maximum level of free chlorine residuals of 1.0 ppm is achieved at system discharge.

K. Contact Environmental Field Support for disposal of super-chlorinated water.

5. Chlorinator Unit and Arsenic Treatment Unit Initial Start Up

A. With piping in Flushing Configuration as shown on Attachment A. Operate system discharging to water truck to produce sufficient quantity of water for sampling.

B. Initiate operation of the chlorinator unit and arsenic treatment unit system per manufactures operating instructions. Existing Calcium hypochlorite solution injection system may be used in the event it is required due unforeseen complications during new chlorinator start up.

C. Adjust system parameters as required to obtain free chlorine residual target of 1.0 PPM. The goal is to achieve free chlorine residual of the waters within the potable water tank to 1.0 PPM. Adjustments to chlorine at injection point may be adjusted from 0.5 to 1.5 PPM to achieve influent to the potable tank goal.

D. Informational testing for arsenic to be performed by supplier to verify system effective operation using test kit supplied with unit.

E. Record system readings on Attachment C Treatment System Readings Log.

F. Environmental Compliance organization personnel will sample the effluent stream for bacteriological testing.

G. Environmental Compliance organization personnel will sample the influent and effluent water for arsenic testing.

6. Chlorinator Unit and Arsenic Treatment Unit Start Commissioning

A. Upon acceptable laboratory test results for bacteriological sampling Make final piping connection, commission system and place into service.

B. Draining of the potable water tank will be required to connect the arsenic treatment system and disinfection feed piping to the tank supply piping. The potable water tank will be drained to a level that allows piping connections and will still maintain pressure to the distribution system by natural head pressure of the distribution supply piping.

C. Drain Potable water tank down to top of tank outlet. Draining may be performed in advance as long as sufficient supplies are maintained to support site activities prior to taking PWS out of service. Drain potable tank through drain/overflow to bottom of hill and into water truck/water master.

D. Contact Environmental Field Support for disposal of water.

E. Complete piping connection potable water tank inlet IAW FSK-BSC-PRWS-MECH0009, and Normal Configuration as shown on Attachment A. Swab piping with 1-5% solution of chlorine just prior to installation. Reference AWWA C651-99 Section 4.6.2

F. Operate system in accordance with Manufacturers Operation and Maintenance Manuals pending final approval of final Potable Operation and Maintenance Manual

7. Attachments

A. Arsenic Treatment System and Disenfection Feed Equipment Disinfection and Start-Up Instructions Exile Hill Vault #4 Piping Configuration

B. Treatment System Backwash Log

C. Treatment System Readings Log

8. References

A. AWWA Manual of Water Supply Practices M23 PVC Pipe – Design and Installation Section 8.

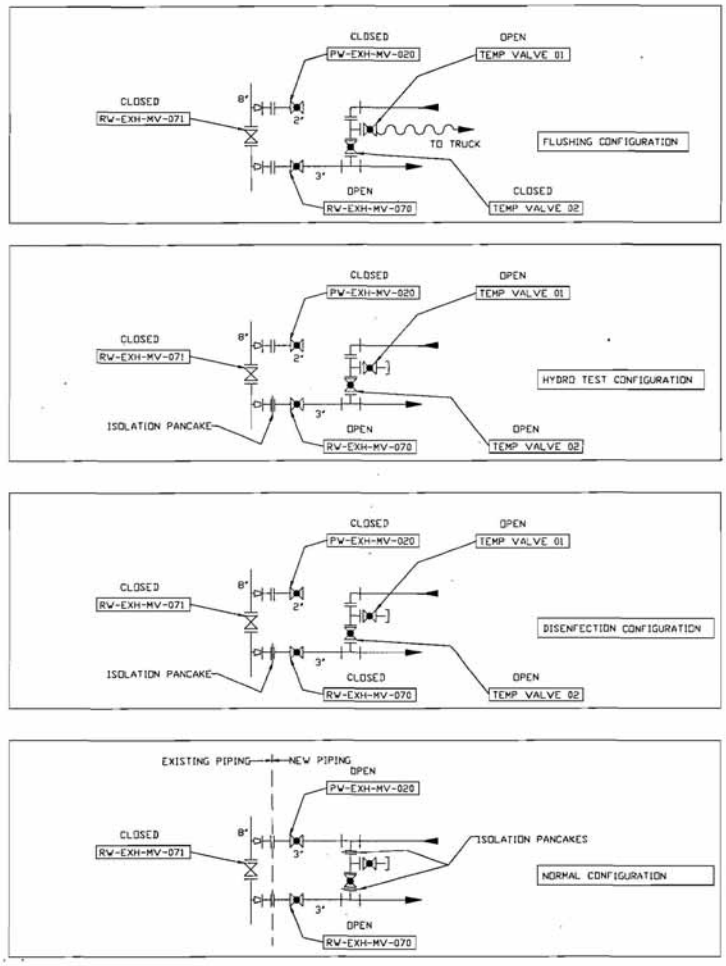
B. Adedge Operation and Maintenance Manual Adsorption package Unit for Arsenic Reduction.

C. AWWA C653-97 Disinfection of Water Treatment Plants

D. AWWA C651-99 Disinfecting Water Mains Section 4.6.2

E. Accu-Tab System PowerPro Operation and Installation Manual

Arsenic Treatment System and Disenfection Feed Equipment Disinfection and Start-Up Instructions Exile Hill Vault #4 Piping Configuration



ATTACHMENT A

Yucca Mountain Project - Potable Water Treatment System

Treatment System Backwash Log

Date	Vessel A or B		Backwash Begun	Backwash Ended		Backwash Flowrate	Backwash Duration	Wastewater Generated	Comments/Purpose of Backwash
	A	B	Time	Time	GAL	GPM	min	GAL	
0	1	2	3	4	5	6	7	8	9

Attachment B

Attachment B

Yucca Mountain Project - Potable Water Treatment System

Arsenic Reduction System

Potable Water Production Date_____

TREATMENT SYSTEM READINGS LOG

					Instrument Panel							
	Date	Time	Water Meter Reading	Inlet Pressure	Outlet Pressure	APU Vessel A Flow Meter		APU Vessel B Flow Meter		Vessel A Pressure Differential	Vessel B Pressure Differential	Oper. Initials
						Flowrate	Totalizer	Flowrate	Totalizer			
				psig	psig	gpm	gal	gpm	gal	psig	psig	
	1	2	3	4	5	8	9	6	7	8	9	10
1												
2												
3												
4												
5												
6												
7												

Attachment C

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APPENDIX L

PUBLIC WATER SYSTEM SAMPLING AND ANALYSIS PLAN

APPENDIX L

PUBLIC WATER SYSTEM SAMPLING AND ANALYSIS PLAN
(last revised 2/27/06)

L.1. INTRODUCTION

The National Primary Drinking Water Regulations in 40 CFR 141 require that each public water system perform sampling and analysis in accordance with a written sampling plan that is subject to State approval.

This appendix sets forth a plan for conduct of potable water system sampling and analysis, to ensure that the water meets all applicable regulatory requirements on an ongoing basis.

L.2. WATER SOURCE

The ESF water supply system (including the PWS) is supplies with water from wells J-12 and J-13 located in Area 25, approximately four miles from the ESF. The YMP water distribution system commences at a sample port inside the well J-13 pump house that draws water from either well J-12 or J-13, depending on which well is being pumped.

L.3. REQUIREMENTS

Sampling and analysis requirements for the ESF PWS are rationalized in Section 6 of this Manual.

A variety of water sampling and analysis is required per U.S. EPA regulations promulgated by and under the authority of the Nevada Division of Environmental Protection, Bureau of Safe Drinking Water (NDEP) as the regulatory for public water systems. Monitoring is required for parameters such as:

- Total coliform
- Residual chlorine (including temperature and pH)
- Total trihalomethanes and haloacetic acides
- Organics, inorganics, and radionuclides (gross alpha and gross beta)

For a complete listing of required water sampling, see EV-DSK-5010-1001, *Sampling of Liquids.*

L.4. RESPONSIBILITIES

L.4.1 ENVIRONMENTAL COMPLIANCE ORGANIZATION

Sampling required to evaluate compliance with primary and secondary drinking water standards is by BSC's Environmental Compliance (EC) organization. The EC organization also prepares regulatory reports on laboratory analyses.

L.4.2 OQA QC

Chlorine residual, turbidity (if required), and related temperature/pH analysis is performed by OQA QC. Any anomalous conditions will be reported immediately to Site Operations and the Person-in-Responsible Charge for the public water system.

L.5. IMPLEMENTING PROCEDURES

This section address sample collection, frequency, and performance of sampling, including repeat sampling.

L.5.1 SAMPLE COLLECTION

L.5.1.1 Sampling Locations

All samples must be taken from representative points of the system for results to be valid. Figure E-7 of this Manual depicts potable water sample points on the ESF pad.

Chlorine residual samples will be taken from the sample locations around the ESF pad, on a rotating basis, but at the same locations and approximately at the same time as quarterly coliform sampling.

Bacteriological samples (for total coliform) will be taken at a point that is representative of the conditions within the distribution system. These samples will be taken from locations around the ESF pad, on a rotating basis.

Sampling to assess compliance with primary and secondary standards will be taken either at the J-13 pump house sample port, the pre- and post-treatment arsenic sample ports on Exile Hill, or at locations around the ESF, depending on the parameter to be sampled and analyzed.

L.5.1.2 Sampling Frequency

Sampling frequency will be in accordance with the intervals indicated in EV-DSK-5010-1001, *Sampling for Liquids.*

L.5.1.3 Performance of Sampling

Sampling by the EC organization will be performed in accordance with EV-PRO-5010, *Environmental Media Sampling* and EV-DSK-5010-1001, *Sampling of Liquids.*

Water quality samples will be collected in approved containers provided by a State-certified laboratory that will analyze all water samples in accordance with applicable federal and NDEP.

Daily chlorine residual measurements will be performed and documented by OQA OC in accordance with QA-PRO-1081, *Potable Water System Chlorine Residual Measurement.*

L.5.1.4 Repeat Sampling

When total coliform results are positive, repeat sampling will be performed within 24 hours of notification of the original sample results. A total of four repeat samples with one sample being at the same location as the positive sample will be taken. Two of the other four samples must be within five service connections upstream and five service connections downstream from the positive result. If the repeat samples are positive, the Emergency Plan in Section 5.5 of this Manual will be immediately implemented. A total of five water samples will be collected from the potable water system following the month of the positive coliform result.

If sampling parameters result in an analysis that exceeds the maximum contaminant level for that parameter, BSC's Environmental Compliance organization will immediately notify:

- ✓ Site Operations
- ✓ PWS Responsible-Person-in-Charge
- ✓ DOE ORD Environmental Safety and Health Department
- ✓ NDEP, Bureau of Safe Drinking Water

BSC will coordinate with the NDEP and follow their direction for necessary repeat sampling and reporting for the specific parameter.

L.6. REPORTING AND RECORD-KEEPING

Public water system sampling and analysis reporting and record-keeping shall be recorded and maintained as specified by the NDEP and according to EV-PRO-5010, *Environmental Media Sampling.*

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APPENDIX M

BACKFLOW PREVENTION CONTROL PLAN

APPENDIX M

BACKFLOW PREVENTION CONTROL PLAN
(last revised 2/23/06)

M.1 PURPOSE AND NEED

Plumbing cross-connections, which are defined as actual or potential connections between a potable and non-potable water supply, may constitute a public health hazard. Failure of cross-connections could result in contamination of a public drinking water supply. Control of cross-connections through the use of BPDs is an essential part of any public water system.

The purpose of this backflow prevention control plan is to describe the BPDs utilized in conjunction

The need for a backflow prevention control plan is either explicitly or implicitly required in federal and state environmental laws or regulations. As such, this backflow prevention control plan serves to meet requirements of the Safe Drinking Water Act Total Coliform Rule; Occupational Safety and Health Administration regulation 29 CFR 1910.141; State of Nevada regulations NAC 445A.67185(3) and NAC 445A.67245; Uniform Plumbing Code; recommended practices for backflow prevention; and best management practices.

M.2 YMP BACKFLOW PREVENTION PROGRAM

The YMP has nine BPDs associated with public water system permit NY-0867-12NCNT. Two are located at well J-13, one is located at the Exile Hill valve vault, and the remaining six are located at various buildings on the ESF north portal pad. Table M-1 provides the location, serial number, hazard ranking, manufacturer, model number, and size of the YMP BPDs. Each of the nine BPDs are assigned a low (or non-health) hazard ranking. This ranking applies to BPDs involving a substance that is generally not a health hazard, but would constitute a nuisance or aesthetic objections if introduced into the public water supply. A low hazard ranking is also characteristic of the probability that backflow will occur.

M.3 BACKFLOW PREVENTION PROGRAM RESPONSIBILITIES

YMP Site Operations is responsible for the inspection, maintenance and repair of the BPDs for the YMP public water system (for additional information, see section M.4). In the event that the integrity of the PWS is compromised by (a) contamination of any kind, (b), a leak or break in the pipeline(s) or fire/construction and potable water tanks, or (c) a system malfunction at Wells J-12, J-13 or the booster pump station, the emergency operating responses in Section 5.5 of this Manual will be followed.

Table M-1. YMP Backflow Prevention Devices

Location (Building Number)	Serial Number	Hazard Ranking L = Low H = High	Manufacturer	Model Number	Size	REMARKS
J-13 Pump House	169840	L	Watts	709	4"	Passed in November 2005.
J-13 Valve Vault	178168	L	Watts	909	4"	Passed in May 2005. Will retest by May 2006.
Exile Hill Valve Vault	9408288	L	Hersey	2	8"	Passed in November 2005.
Switchgear Building (5010)	111750	L	Watts	007M1-QT	1"	Passed in November 2005.
Change House (5008)	129459	L	Watts	709	3"	Passed in November 2005.
Craft Management Trailer (7010)	111550	L	Watts	007M1-QT	1"	Passed in November 2005.
Construction Management and Operations (CMO) Office Trailer (7009)	09526	L	Watts	007M2-QT	1¼"	Passed in November 2005.
DOE Office Trailer (7011)	111651	L	Watts	007M1-QT	1"	Passed in November 2005.
Field Operations Center (FOC)/ Ranch Control (7013)	187001	L	Watts	007M1-QT	1”	Passed in November 2005.

M.4 ANNUAL INSPECTION PROGRAM

M.4.1 Testing Procedure

The BPD inspection program consists of identification, inspection, preventative maintenance, and correction action. Each BPD for the YMP public drinking water system has been identified (see section M.2) and entered into a computerized maintenance management system (Maximo) at the site. A schedule for annual inspections of the BPDs is input into Maximo; a BSC work instruction is automatically initiated based on the schedule for BPD inspection that has been input into Maximo. Subsequently, when the BPD needs to be inspected, a BSC work instruction to perform the inspection is automatically issued.

Any necessary corrective maintenance on the BPD as a result of the inspection is conducted through issuance of a corrective maintenance work instruction. The corrective maintenance work instruction then provides historical data on a particular BPD that can be tracked through Maximo over a period of time.

Only State of Nevada-certified backflow prevention assembly testers will be used to conduct BPD inspections. The YMP has one State of Nevada-certified employees, Mike Oettinger, to perform the required annual BPD inspections. A copy of the American Water Works

Association Backflow Prevention Assembly General Tester certificate for YMP's inspector is found in Figure M-1.

The YMP certified backflow prevention tester performs the field testing of the assemblies for the prevention of backflow in accordance with the recommended practices for backflow prevention and best management practices. For testing of the reduced pressure principle assemblies, double check valve assemblies, and pressure vacuum breakers, the tester uses a differential pressure gauge that has a differential range of at least zero to 15 pounds per square inch (psi) and graduations of not more than 0.2 psi. The tester ensures that the testing equipment has all the necessary hoses and fittings, and that it is calibrated to the manufacturers' specifications not less than annually.

H.4.2 Testing Documentation

All inspections are documented on a BPD inspection form (see Figure M-2). This form identifies the BPD location, serial number, manufacturer, model number, size, and provides the results of the inspection. The date and time of the inspection are noted, as well as the inspector's name and certified tester number. Upon completion of the annual BPD inspection, the inspection forms are provided to the Nevada Division of Environmental Protection, Bureau of Safe Drinking Water.

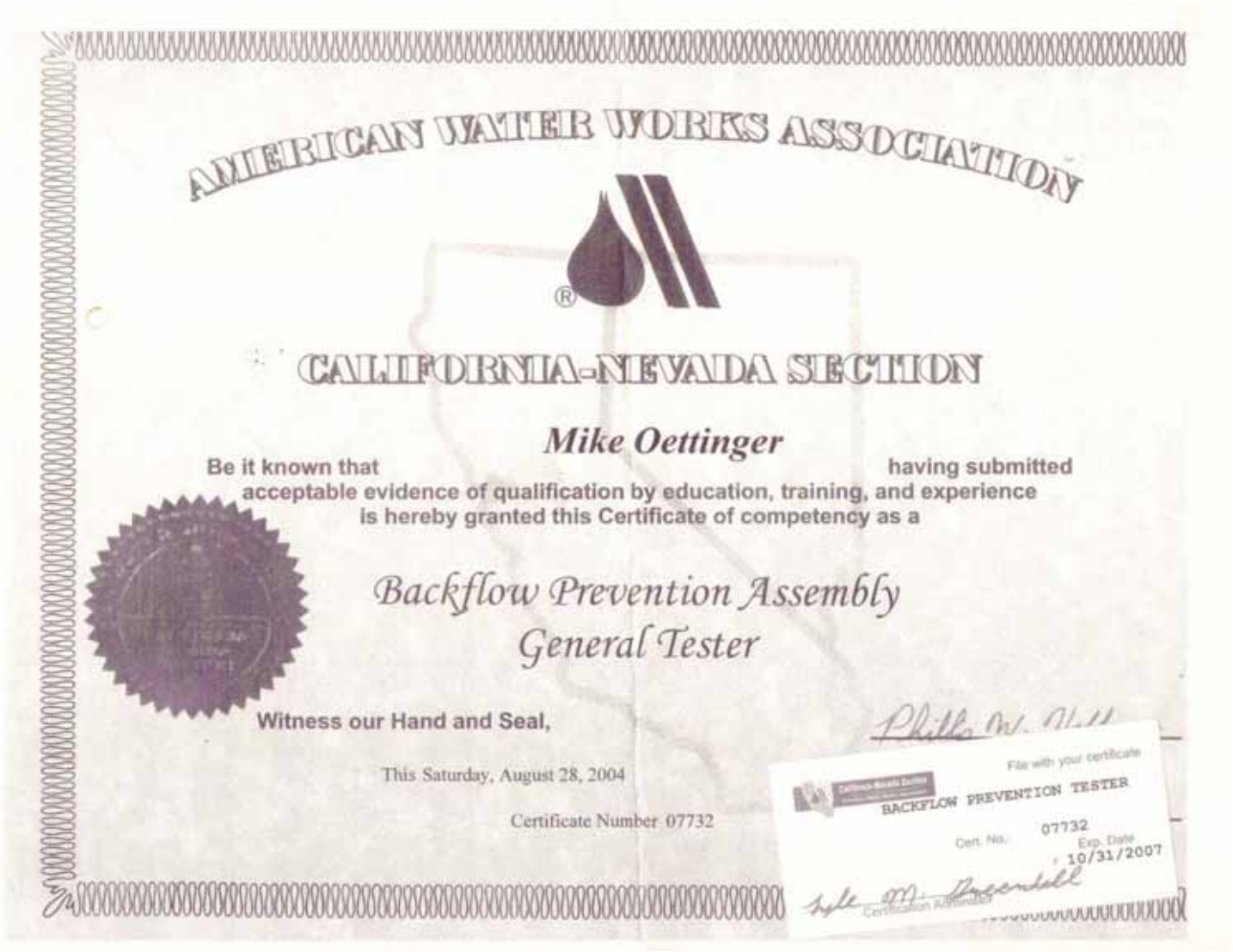

Figure M-1. American Water Works Association Backflow Prevention Assembly General Tester Certificate

MANUFACTURE MODEL SIZE SERIAL NUMBER

SERVICE NUMBER: _____ LOCATION: _____

SERVICE NAME/ADDRESS: _____ OWNER NAME/ADDRESS: _____

RP ☐
DC ☐
PVB ☐
SVB ☐
DCDA ☐
RPDA ☐

Reduced Pressure Principal Assembly

Double Check Valve Assembly

	Check Valve #1	Check Valve #2	Relief Valve	PVB/SVB
INITIAL TEST	Held at _____ PSID Leaked ☐	Held at _____ PSID Closed Tight ☐ Leaked ☐	Opened at ____ PSID Did Not Open ____ ☐	AIR INLET Opened at ____ PSID Did Not Open ☐
REPAIRS: Give details of repairs made here	☐ Cleaned ☐ Replaced _____ _____ _____ _____ _____ _____ _____	☐ Cleaned ☐ Replaced _____ _____ _____ _____ _____ _____ _____	☐ Cleaned ☐ Replaced _____ _____ _____ _____ _____ _____ _____	CHECK VALVE Held at _____ PSID Leaked _____ ☐ ☐ Cleaned ☐ Replaced _____ _____ _____
FINAL TEST	_____ PSID	_____ PSID Closed Tight ___ ☐	Opened at ____ PSID	Air Inlet _____ PSID Check Valve __ PSID

Comments: _____

Initial Test	Date _____ Time _____ Certified Tester No. _____ ☐ Passed ☐ Failed Test By (Signature) _____ Print Name _____	INITIAL TEST
Repair	Date _____ Time _____ Certified Tester No. _____ Test By (Signature) _____ Print Name _____	REPAIRS
Final Test	Date _____ Time _____ Certified Tester No. _____ ☐ Passed ☐ Failed Test By (Signature) _____ Print Name _____	FINAL TEST

Acknowledged _____

Figure M-2. Backflow Prevention Device Inspection Form

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