

**ATTACHMENT B**

**GROUNDWATER REMEDIATION SYSTEM**



## **GROUNDWATER REMEDIATION SYSTEM**

The purpose of groundwater remediation system (GRS) operated by Conn-Selmer, Inc (CSI) at the former CSI musical instrument manufacturing site is to remove volatile organic compounds (VOCs) from the groundwater. Groundwater is withdrawn using an extraction well. The water is treated using air stripping towers and transferred to an on-site storage tank (Attachment A, Exhibit A-2). The treated water is analyzed. If results are below the concentration limits of CSI's aquifer protection permit, the water is transferred to a lined area adjacent to the west side of the Palo Duro Creek Golf Course and managed by the city of Nogales.

### **1.0 EXTRACTION WELL**

The GRS is designed to accommodate the flow from two extraction wells pumping to a maximum combined flow rate of 150 gallons per minute (gpm). At present, only one extraction well (EW-2) is used to extract groundwater for treatment. This well is located north of the groundwater remediation system and is approximately 200 feet deep. Well construction details for EW-2 include a six-inch diameter stainless steel casing and screen. The screened interval of the well extends from approximately 125 to 195 feet below ground surface (bgs), intercepting the top of the regional aquifer.

The well is equipped with a 15-horsepower electric submersible pump located at a depth of approximately 150 feet bgs. The maximum flow rate available from EW-2 is approximately 75 gpm. The pump is controlled with a hand-operated (on-off automatic) switch. In auto mode, a shutdown switch will activate if the pump amperage draw increases beyond a certain level, an indication that the well water has dropped to an unacceptably low level. A delay timer restarts the pump, which is field set to allow for recharge time. The pump will also shut down in auto mode if there is a high level signal from the equalization tank.

The discharge well head assembly at the surface consists of a check valve, a 50-micron sand-silt strainer, a ball valve, a pressure gauge, and a vacuum relief valve. Design of the strainer provides easy access for cleaning and will have a maximum pressure drop of 1 pound per square inch (psi) at the maximum pump rate. The vacuum relief valve allows air into the discharge line from the pump when the pump is stopped. The wellhead assembly is contained in a concrete vault. The vault is 10' x 5' x 5' and designed to withstand H-20 wheel-loading suitable for use in off-street locations not subjected to high-density traffic.

### **2.0 EXTRACTION WELL PIPELINES**

A 3-inch diameter pipe connects the extraction wellhead to the remediation system. A flow meter is installed in the line between the well and the equalization tank. Flow is measured to an accuracy of two percent. A Totalizer is used to record total volume

extracted to monitor compliance with the Arizona Department of Water Resources (ADWR) Permit to Withdraw Poor Quality Groundwater, 59-217075.0001, and the progress of the GRS.

### **3.0 AIR STRIPPING TREATMENT SYSTEM DESIGN**

The GRS is located within a locked, fenced, area. It includes two 3.4-foot diameter, 27-foot high air stripping towers operated in series (Exhibit B-1). Following extraction from EW-2, the groundwater is pumped into a 6,500-gallon equalization tank (Tank 1). Upper and lower level controls on Tank 1 regulate the operation of feed pump P-1, which discharges water to the top of the first air stripping tower (A-1) at a maximum rate of 150 gpm. Water flows through the tower and into a level controlled sump at the base of the tower. It is then pumped to the top of the second air stripping tower (A-2) via transfer pump, P-2, at a variable rate equal to or less than 150 gpm. From the level controlled sump at the base of A-2, the treated groundwater is discharged via effluent pump, P-3; to a 6,500-gallon holding tank (Tank 2).

Both air stripping towers contain 2-inch diameter polypropylene packing media that increase the contact surface area between air and water. By increasing the air to water surface contact area, volatilization of the VOCs increases. To further aid the transfer of VOCs to the vapor phase, two 10-horsepower blowers (B-1 and B-2) force air from the base of the columns, counter-current to water flow, at a rate of approximately 3,250 cubic feet per minute (cfm) each. The VOCs are discharged to the atmosphere.

The groundwater remediation system is controlled by switches on the control boxes located next to each piece of equipment in the air stripping treatment area and by two central control panels inside the control room. One central control panel provides power to the entire system (Control Panel 1) and the other contains the system alarms and variable speed drive controls (Control Panel 2).

All groundwater remediation activities occur within a locked, chain linked fence, surrounding an 8,150-gallon secondary containment consisting of a walled concrete slab coated with a chemical-resistant epoxy resin in compliance with 40 CFR 264.193. The secondary containment area is equipped with a level control in the sump that alarms and shuts down all remediation system pumps (*including the extraction well pump*) in the event of a loss of treatment system integrity. Sump pump P-5 is located in the sump and can transfer water from the sump into Tank 1 under appropriate level conditions.

The treated water, from Tank 2, is pumped by the effluent discharge pump (P-4) to a lined storage pond adjacent to the western boarder of the Palo Duro Creek Golf Course, for management by the City of Nogales. The groundwater remediation system has operated for 24 hours per day, seven days a week, since 1998, with intermittent down time due to maintenance and occasional power disruptions.

## **Exhibit B-1**

# **Groundwater Remediation System Plumbing and Mechanical Diagrams**



**NOTES**

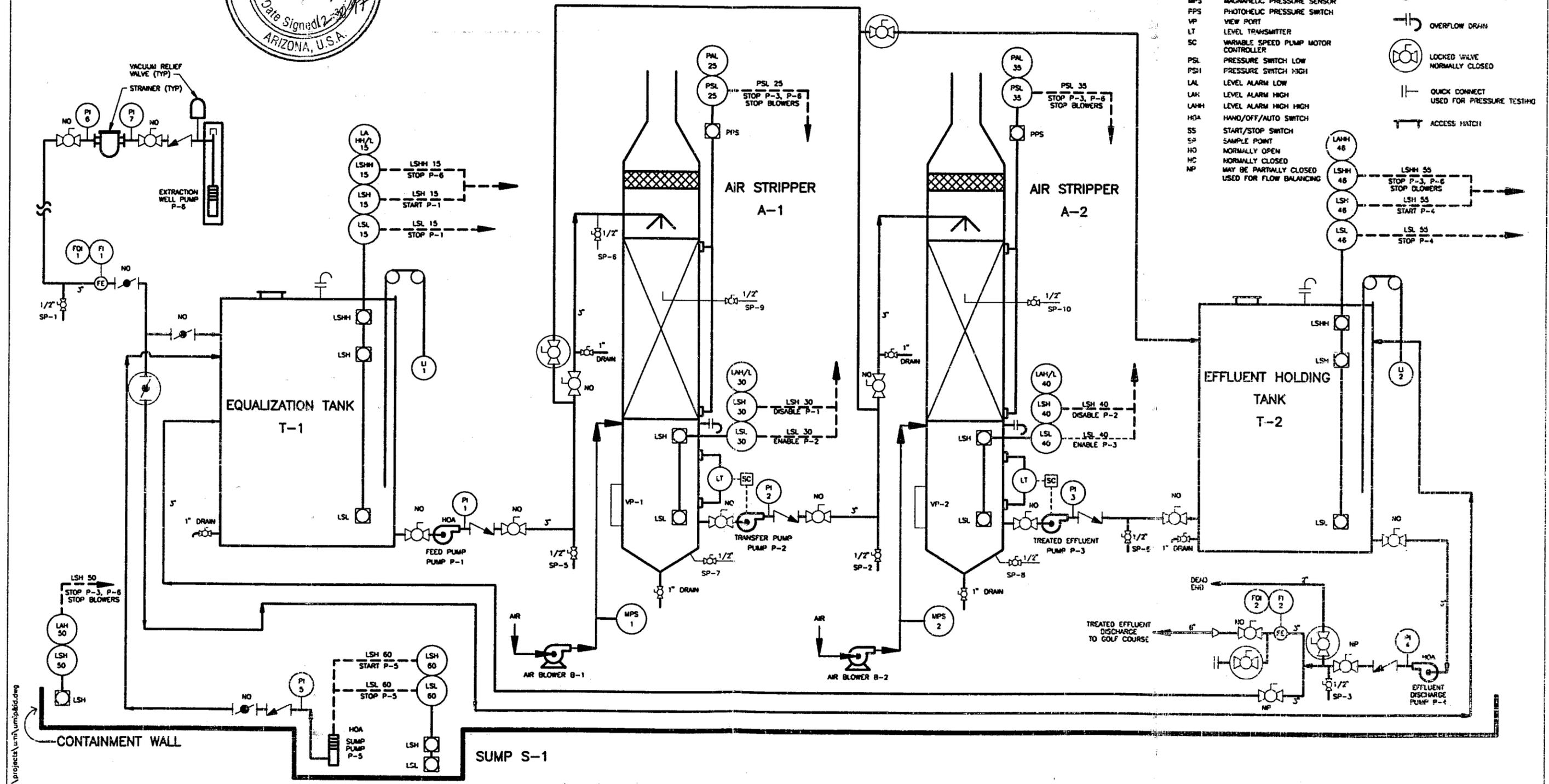
AIR STRIPPER 1 LEVEL CONTROLLER CONNECTED TO VARIABLE SPEED CONTROLLER AFD-2  
 AIR STRIPPER 2 LEVEL CONTROLLER CONNECTED TO VARIABLE SPEED CONTROLLER AFD-3  
 SP-4 LOCATED AT GOLF COURSE POND

**ABBREVIATION LIST**

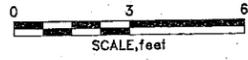
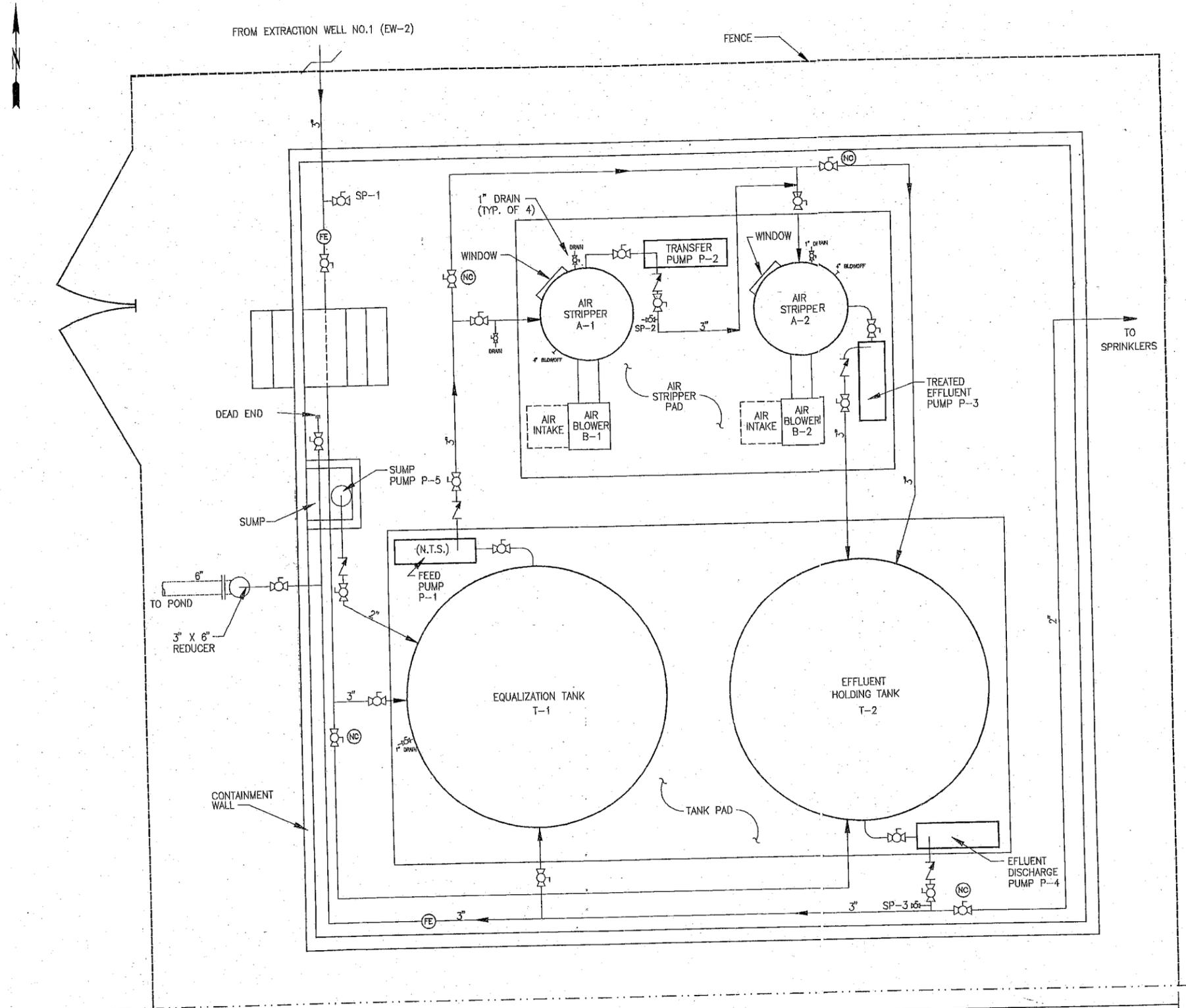
FI FLOW RATE INDICATOR  
 FQI FLOW QUANTITY TOTALIZER  
 LI LEVEL INDICATOR  
 LSH HIGH LEVEL SWITCH  
 LSHH HIGH HIGH LEVEL SWITCH  
 LSL LOW LEVEL SWITCH  
 PI PRESSURE INDICATOR (GAUGE)  
 MPS MAGNETIC PRESSURE SENSOR  
 PPS PHOTOELECTRIC PRESSURE SWITCH  
 VP VIEW PORT  
 LT LEVEL TRANSMITTER  
 SC VARIABLE SPEED PUMP MOTOR CONTROLLER  
 PSL PRESSURE SWITCH LOW  
 PSH PRESSURE SWITCH HIGH  
 LAL LEVEL ALARM LOW  
 LAH LEVEL ALARM HIGH  
 LAHH LEVEL ALARM HIGH HIGH  
 HOA HAND/OFF/AUTO SWITCH  
 SS START/STOP SWITCH  
 SP SAMPLE POINT  
 NO NORMALLY OPEN  
 NC NORMALLY CLOSED  
 MP MAY BE PARTIALLY CLOSED USED FOR FLOW BALANCING

**SYMBOLS LIST**

BALL VALVE  
 CHECK VALVE  
 BUTTERFLY VALVE  
 FLOW METER  
 OVERFLOW DRAIN  
 LOCKED VALVE NORMALLY CLOSED  
 QUICK CONNECT USED FOR PRESSURE TESTING  
 ACCESS HATCH



<p>DESIGNED: BSA          DRAWN: BSA          CHECKED: MCL          REVIEWED:          DATE: 12-15-97</p>		<p><b>Woodward-Clyde</b>          Consulting Engineers, Geologists and Environmental Scientists          OAKLAND, CALIFORNIA</p>		<p><b>UNITED MUSICAL INSTRUMENTS</b>          NOGALES, ARIZONA</p>		<p><b>AQUIFER REMEDIATION SYSTEM</b>          PROJECT: 944-050F          DRAWING: P &amp; I D          SHEET 1 OF 1</p>	
<p>WARNING          0 1/2 1          IF THIS BAR DOES NOT MEASURE THEN DRAWING IS NOT TO SCALE</p>		<p>REVISION          NO. BY DATE</p>		<p>MINOR CONTROL MODIFICATIONS (AS-BUILT)          FIELD INSPECTION (AS-BUILT)</p>		<p>REVISION          NO. BY DATE</p>	



- NOTES:
- 1.) THERE IS APPROXIMATELY 80 FEET OF 3-INCH I.D. PROCESS PIPING LOCATED BELOW THE CONTAINMENT WALL.
  - 2.) THE LENGTH AND LOCATION OF PIPING ARE APPROXIMATE.
  - 3.) THE LOCATION OF THE AIR STRIPPER PAD AND THE TANK PAD ARE APPROXIMATE.

EXISTING BUILDING



**Woodward-Clyde**

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**AQUIFER REMEDIATION SYSTEM  
MECHANICAL PLAN**

PROJECT:	DESIGNED/CHECKED BY:
<b>C. G. CONN, INC.</b>	WMM
<b>ARTLEY FLUTE PLANT</b>	DRAFTED BY:
PROJ. No.: 944X050	FIGURE: 2-2
DATE: DEC 1997	