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SPECIFICATIONS AND DRAWINGS
 FOR
 THE OPERABLE UNIT NO 2
 GRANULAR ACTIVATED CARBON
 TREATMENT SYSTEM

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SPECIFICATIONS AND DRAWINGS

FOR

THE OPERABLE UNIT No 2

**GRANULAR ACTIVATED CARBON
TREATMENT SYSTEM**

EG&G Rocky Flats
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Prepared By

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SPECIFICATION

FOR THE OPERABLE UNIT No 2 GRANULAR ACTIVATED CARBON TREATMENT SYSTEM

1 0 SCOPE

1 1 This specification covers the design fabrication installation start up and performance requirements for

- A) A temporary surface water collection system to include submersible pumps piping and a 10 000 gallon storage/equalization tank
- B) A trailer containing a skid mounted granulated activated carbon (GAC) treatment system which includes the GAC vessels bag filters interconnecting piping pumps motor starters process instrumentation and alarms

1 2 The specification does not include site preparation activities These activities are defined in a separate document

2 0 GENERAL REQUIREMENTS

2 1 The equipment shall include all components necessary for a complete operating unit even though the components may not be identified in this specification

2 2 All components shall be new free of defects or mechanical damage and in operating condition

2 3 Equipment performance shall be rated at 6 000 feet above sea level

2 4 All equipment and its anchorage shall be qualified for seismic loading in accordance with Rocky Flats Plant Standard SC 106 Rev E The seismic category is Important Low Hazard

2 5 Manuals instructions labels controls and all other printed material shall be in English Equipment and instrumentation specifications shall be in English engineering units

2 6 Codes and standards shall be those in effect on the date of order These Code and Standard revision levels shall be listed by the Seller and shall be certified as current

2 7 The design and construction of the GAC treatment unit shall provide for safe and reliable performance and for ease of maintenance in satisfaction of the requirements presented in this specification

- 2 8 The Seller shall base the design on the general process and performance requirements in Section 8 of this specification. The need for replacement of a GAC unit will be based on the effluent quality rather than on throughput volumes or fixed schedules.
- 2 9 Flow through the treatment unit will be manually controlled.
- 2 10 All valving operations shall be manual.
- 3 0 PRELIMINARY TEST AND FINAL ACCEPTANCE
- 3 1 A preliminary inspection and functional test shall be performed at the Seller's facility to verify that the requirements set forth in this specification exclusive of Section 13 have been met. The Seller shall furnish the support equipment, services and utilities necessary to test the GAC treatment unit. The tests shall include an operational check of each component without the GAC units plumbed in place.
- 3 2 At the option of the Buyer, a representative of the Buyer will be present to witness all phases of the preliminary tests and inspect the equipment. The Seller shall notify the Buyer at least seven (7) working days before the equipment will be ready for preliminary testing.
- 3 3 Final acceptance shall be contingent upon satisfactory testing at the point of installation in accordance with the provisions of Section 13 to demonstrate that the equipment conforms to all construction and performance specifications.
- 4 0 PACKAGING AND SHIPPING
- 4 1 Package and protect equipment to prevent physical damage and environmental damage during shipping or handling. Drain fluids and blow lines dry before packaging. Plug fluid and lubrication terminations to exclude moisture, dust, dirt, or other foreign material. Exposed flange faces shall be protected by 1/8" stainless blanks attached to the flanges.
- 5 0 DESCRIPTIVE SUBMITTALS
- 5 1 Submit for Buyer's approval: catalog data and specifications, equipment and material lists, process diagrams, wiring diagrams, installation instructions, maintenance instructions, and operating brochures for equipment and materials listed in Section 5.7 of this specification within 10 working days of award of contract.
- 5 2 Submit engineering data, design calculations, and shop drawings for Buyer's approval within 10 working days of approval of Section 5.1 before fabrication begins and show in sufficient detail for the Buyer to examine the Seller's conformance to the design concept, arrangement, and general construction set forth in these

specifications Catalogs submitted shall have clearly identified capacities and specified parameters relating to this specification with unrelated pages removed One set of shop drawings will be promptly returned by the Buyer with comments or with approval Buyer's approval shall not relieve the Seller of responsibility for the design accuracy of the drawings quality of workmanship and performance (to specifications) of this equipment

- 5 3 Provide final design drawings (in reproducible form) prior to fabrication The drawings must be signed by a registered Professional engineer with qualifications and experience in the design and implementation of GAC treatment systems Identify drawings with the equipment builders drawing title and number and with equipment or job order number
- 5 4 Fabrication and delivery to site shall be complete within 60 calendar days of award of contract but no later than January 15 1991
- 5 5 Define installation requirements so the Buyer can prepare the installation site before receiving equipment Define electrical power service utility piping floor loading and foundation requirements as applicable by schematic diagrams connection details layouts and instructions
- 5 6 Operating and maintenance instructions shall explain operating theory and provide step by step instructions for preventative maintenance to ensure safe operation and long life Instructions shall include lubrication schedules and block and schematic diagrams to describe trouble shooting diagnoses with corrective action for malfunctions and schedules for frequency of maintenance checks
- 5 7 Instructions shall be in English written in terms easily understood by the operating and maintenance technicians and bound into a properly identified manual
- 5 8 The minimum list of submittals required are listed below
 - A Preliminary Engineering Data Design Calculations and Shop Drawings
 - 1 Photographs dimensional outlines assembly drawings and general arrangements
 - 2 Overall dimensions total weight weight distribution and capacities
 - 3 Weight and size of largest component to be shipped
 - 4 Recommended access and clearance data

- 5 Service connections utility requirements and electrical wiring diagrams
- 6 Preliminary piping and instrumentation drawings (P&IDs)
- 7 Preliminary equipment and instrumentation lists
- 8 Motor data
- 9 Copy of performance test procedure
- 10 Carbon manufacturers specifications
- 11 Design parameters for carbon
- 12 Carbon mesh size and fines elimination method
- 13 Design perimeters for carbon activity
- 14 Carbon regeneration method to provide design activity
- 15 Design calculations In addition to conventional design calculations the Seller shall submit documentation which demonstrates that secondary waste minimization (solid and liquid) has been considered in design options and operating procedures The Seller shall submit calculations estimating carbon consumption based upon the surface water contaminant concentrations listed in Table 1 at the design flow of 60 gpm
- 16 GAC vessel lining material specifications
- 17 Preliminary equalization tank secondary containment design drawings

B Installation Data and Instructions

- 1 Recommended method of leveling and anchoring equipment and trailer
- 2 Anchor bolt layout and sizes
- 3 Electrical power requirements (location size and type)
- 4 Detailed equipment instrumentation and material lists
- 5 Assembly drawings and details

6 Installation instructions

7 Outline of operator training

C Final Data Design Calculations and Drawings and Operating and Maintenance Instructions

1 Factory performance data characteristics and curves

2 Complete parts lists including recommendations for on hand spare parts and current price lists

3 Final drawings including sectional or exploded views showing all parts

4 Final motor data

5 Final operating and maintenance instructions operating and maintenance manuals training materials and electrical diagrams

6 Final vessel data including x ray data shall be submittal for review as early as possible

5 9 Five copies of all submittals shall be sent under separate cover identified by the Buyer s purchase order number Each submittal shall include a contact name and telephone number for each component supplier Buyer will not be responsible for recovery of such material packed with the equipment

5 10 SUBMITTAL SCHEDULE

A Paragraph 5 8A and 5 8B submittals shall be received by the Buyer within 30 calendar days of award of contract

B Paragraph 5 8C submittals shall be delivered at the time of equipment delivery to site

6 0 APPLICABLE PUBLICATIONS AND STANDARDS

The following specifications and standards listed in this paragraph (including amendments addenda and errata designated) but referred to hereinafter by basic designation only form a part this specification to the extent required by the references thereto If this specification is in conflict with the referenced documents this specification takes precedence

6 1 AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI TI 1A Practices for Nondestructive Testing Personnel Qualification and Certification

- 6 2 AMERICAN WELDING SOCIETY (AWS)
 - AWS D1 1 Structural Welding Code
- 6 3 AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)
 - ASME Boiler and Pressure Vessel Code Section VIII
Division 1 Pressure Vessels
 - ASME Boiler and Pressure Vessel Code Section IX Welding
and Brazing Qualifications
 - ASME/ANSI B31 Code for Pressure Piping
- 6 4 NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)
 - MG 1 1978 (including Motors and Generators Rev 1 through 7)
 - MG 2 Safety Standards for Construction and Guide for Selection
Installation and Use of Electrical Motors and Generators
- 7 0 PHYSICAL AND ENVIRONMENTAL LIMITATIONS
 - 7 1 The GAC treatment unit will be located in the area shown in Figure
1
 - 7 2 The surface water collection systems and the GAC treatment unit
are to be temporary and therefore all aspects of this system
must be designed such that no permanent environmental effects
occur
- 8 0 PROCESS AND PERFORMANCE REQUIREMENTS
 - 8 1 A GAC system will be used to treat contaminated surface water
collected in the Operable Unit No 2 (OU 2) area of the Rocky
Flats Plant (RFP) The GAC treatment system shall consist of two
process trains an on line train and for system redundancy an
on line standby train Each train shall consist of a at least two
(2) GAC vessels One vessel will serve as the lead adsorber
while the second will serve as the polishing adsorber The
process piping shall be designed to allow the following vessel
position changes within the process trains to be performed
manually with valve position changes An on line standby unit is
brought into service as the polishing unit when the lead
unit is determined to be exhausted The former polishing adsorber
becomes the lead adsorber and the exhausted unit is removed and
replaced with a new GAC unit Pipe disconnections shall be
required only when an exhausted GAC unit is replaced with a new
unit
 - 8 2 The expected chemical characteristics of the surface water are
presented in Table 1

- 8 3 To prevent fouling of the GAC units bag filters shall be used to remove suspended solids The bag filters shall be designed to handle flows up to 60 gpm Dual 50 micron bag filters shall be provided with the appropriate valving to permit changeover without interrupting flow to the GAC units
- 8 4 The GAC treatment unit will be used as an Interim Remedial Action and as an Interim Treatability Study to determine the overall effectiveness of the GAC to remove volatile organic compounds surface water The carbon capacity of each GAC unit shall be a minimum of 2 000 pounds each and should be capable of handling flows up to 60 gpm
- 8 5 As a minimum sample ports shall be provided at the system inlet and outlet and between each individual GAC vessel
- 8 6 Freeze protection shall be provided for all outdoor piping and the 10 000 gallon storage tank Freeze protection shall include heat tracing and insulation sufficient to maintain minimum temperatures in the range of 40 °F to 60 °F
- 8 7 A single appropriately sized vapor phase GAC unit will be provided for the vent on the closed 10 000 gallon tank
- 8 8 GUARANTEES
 - A All equipment and component parts shall be guaranteed by the Seller against fault in design defective or improper materials poor workmanship and failure from normal usage for one (1) year after being placed in the specified service
 - B If any defects or malperformance occur during the guarantee period the Seller shall make all necessary alterations repairs and replacements free of charge FOB Buyer s facility Field labor charges if any shall be negotiated between the Buyer and the Seller

9 0 MATERIALS AND EQUIPMENT

9 1 General

- A Two surface water collection systems shall include temporary (see Section 7 2) weirs and pump stations The temporary weirs for Collection System CS 59 and CS 61 shall be designed to divert 4 5 gpm and 38 gpm respectively from the drainage Diverted waters shall be transferred from the collection station to the 10 000 gallon storage tank at the respective flow rates
- B The trailer in which the GAC treatment system will be housed shall be 48 feet long and wide enough to accommodate the GAC

units and all ancillary equipment (ie bag filter pumps and piping) The trailer width shall also provide sufficient access from all sides of all process equipment to facilitate operation and maintenance of the equipment

Access doors shall be designed to allow for the safe and efficient replacement of exhausted GAC units Since wet GAC preferentially removes oxygen from air warning signs shall be provided to indicate the potential for a low oxygen area Warning signs shall also be provided indicating that the access doors shall remain open while servicing the GAC units

An HVAC system shall also be designed into the trailer

The Seller shall design anchorage for the trailer

C Each GAC unit shall contain 2 000 pounds of GAC and shall have a hydraulic loading of 2 to 3 gpm/ft² The GAC vessels shall be ASME code stamped at 75 psig and 150 °F and shall be provided with 72 psig pressure relief The vessels shall be constructed of carbon steel with a vinyl ester liner suitable for potable water and a powder coat enamel external coating The Seller shall determine the vessel thickness based upon design pressure

D All piping within the trailer shall be schedule 80 Poly vinyl chloride and shall be adequately supported to prevent deformation or breakage All process valves shall be tru union type ball valves with Teflon seats and elastomeric backing cushions of the same material as the valve seals All exterior piping shall be double contained polyethylene piping The annular space of the double containment piping shall be provided with leak detection or the piping system shall be design such that any leakage from the carrier pipe is directed back to the collection weir

E The Seller shall determine the total head for each pump and select each pump based on the following flow rates

<u>PUMP</u>	<u>FLOW RATE</u>
CS 59	4 5 gpm
CS 61	38 gpm
PROCESS	60 gpm

All wetted pump parts shall be compatible with the contaminants shown in Table 1

F The Seller shall provide a 10 000 gallon storage tank constructed of materials suitable for the solutions being stored The tank shall be freeze protected with heat

tracing and insulation Jacketing shall be provided to protect the insulation from damage due to wind and weather The tank shall be supplied with all requisite nozzles manways and venting The tank vent system shall be provided with vapor phase activated carbon units A temporary secondary containment system for the storage tank shall be designed to hold 120% of the tank capacity All requisite anchorage for the tank shall be provided by the Seller

- G The Seller shall provide schedule 80 PVC piping for the GAC unit effluent This piping shall be routed to a point just downstream of the CS 61 weir and shall be heat traced and insulated
- H Items provided by the Buyer shall include 280 volt 3 phase electrical service natural gas and phone hook up

9 2 INSTRUMENTATION AND MONITORING

- A All instrumentation is to be in accordance with the best industrial practice consistent with sound engineering and safety requirements and all applicable RFP standards Instruments shall be selected to provide a high degree of dependability with a minimum of operator attention and maintenance for plant operation
- B It shall be the responsibility of the Seller to provide compatible and standardized equipment insofar as possible in order to simplify servicing and reduce the number of items in the spare parts inventory
- C All instruments shall be accessible for testing calibration and servicing and must be readily removable for maintenance procedures The design of equipment shall be such that testing calibration and servicing procedures may be carried out with a minimum of disruption of plant operation
- D Sample ports for monitoring water quality shall be provided between each unit operation for all possible flow configurations
- E As a minimum the following instrumentation shall be required
 - 1 Treatment system influent flow indication
 - 2 Treatment system influent flow totalization
 - 3 Pressure indication on the treatment system line and between each GAC unit for all possible flow configurations

- 4 Equalization/Storage tank high and low level indication
- 5 Leak detection for all double containment piping (if applicable)

F As a minimum the following alarms and control interlocks shall be included in the surface water collection and treatment systems

Alarms

- 1 Equalization tank low level alarm at 5 percent of tank capacity
- 2 Equalization tank high level alarm at 90 percent of tank capacity
- 3 Equalization tank overflow alarm at 95 percent of tank capacity
- 4 Double containment pipe leak detection (if applicable)

System alarming shall provide both visual indication (ie flashing red light) and annunciation. The design shall also provide for individual push button acknowledgement of each alarm

Control Interlocks

- 1 Shutdown of Collection System pumps on equalization tank overflow alarm
- 2 Shutdown of treatment system transfer pump on equalization tank low level alarm

System control interlocks shall provide automatic emergency shutdown to protect the equipment and the environment

10 0 STRUCTURAL FRAMES

- 10 1 Structural frames shall be of welded carbon steel construction
- 10 2 The framing shall be designed to evenly distribute the weight of the skid components
- 10 3 Skid framework shall be designed such that the unit may be picked up by a forklift
- 10 4 All welding shall comply with AWS D1.1. All procedures shall be submitted to the Buyer prior to the start of welding

11 0 FINISHES

Ungalvanized ferrous (carbon) steel surfaces shall be cleaned using SSPC SP 6 (Sandblasting) SP 3 (Power Tool Cleaning) or SP 2 (Hand Tool Cleaning) Surface shall be free of any rust or dirt prior to the application of coating Coating shall consist of one of the following three alternatives

- A AMERCOAT ALTERNATE Prime coat Amercoat 185 (3 mil) Finish coats (minimum 2) Amercoat 5401 (3 mils total) Total thickness of system 6 mils
- B ENGARD ALTERNATE Prime coat Engard 126 (3mil) Finish coats (minimum 2) Engard 222 (3 mils total) Total thickness of system 6 mils
- C KOPPERS ALTERNATE Prime coat Koppers 622 HB (3mils) Finish coats (minimum 2) Koppers 501 (3 mils total) Total thickness of system 6 mils

12 0 TEST REQUIREMENTS

- 12 1 All electrical systems shall be factory tested
- 12 2 All instrumentation shall be factory tested
- 12 3 GAC vessels shall be inspected in accordance with ASME Boiler and Pressure Vessel Code Section VIII Division 1 Where leaks are found the joints shall be rewelded (rewelds shall be limited to 2 rewelds without Buyer approval) seals replaced or other corrective measures taken and retested until no leakage is observed Mastic or caulking compound shall not be used to stop leaks

13 0 INSTALLATION AND START UP ASSISTANCE

- 13 1 The Seller shall supply on site supervision for the placement and installation of equipment It should be assumed that the site will be ready when the unit is shipped and that the placement and installation activities will require five (5) working days
- 13 2 An acceptance test shall be run when representative surface water is available for treatment Acceptance shall be contingent upon the unit processing up to 10 000 gallons of surface water with a minimum on line factor of 90% while meeting the effluent requirements shown in Table 1 The Seller shall be notified at least fifteen (15) days in advance of the schedule for the test

- 13 3 Upon acceptance of the unit the Seller shall supply up to five (5) days of additional training supervision for facility operators. An outline of the training program shall be submitted for approval by the Buyer prior to delivery of the treatment system.

END OF SPECIFICATION

TABLE 1
SURFACE WATER QUALITY

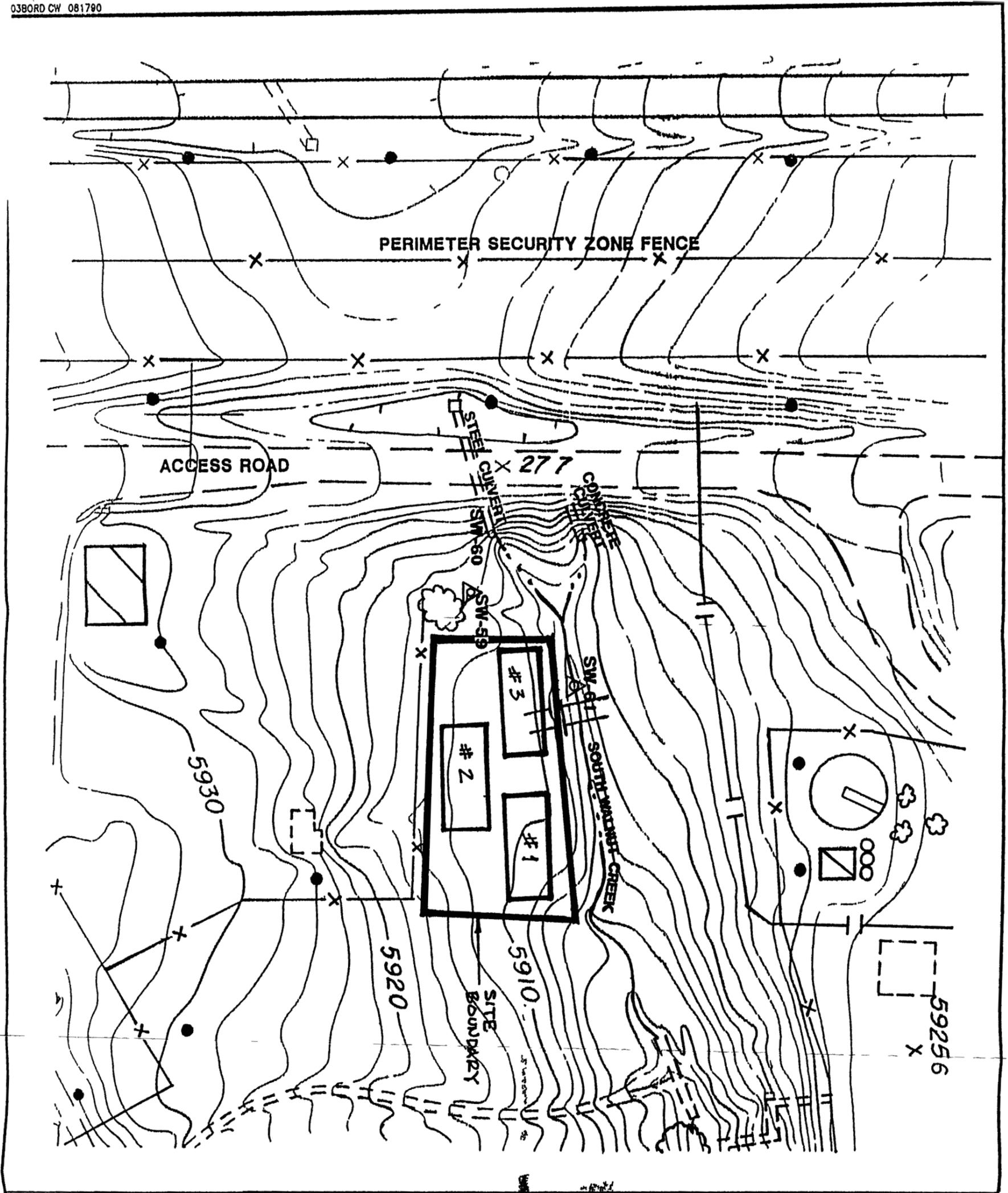
	<u>UNITS</u>	<u>INFLUENT</u>	<u>EFFLUENT</u>
		<u>CONCENTRATION</u>	
<u>Organics</u>			
Vinyl Chloride	ug/l	11	NA
Methylene Chloride	ug/l	34	NA
Acetone	ug/l	99	NA
Carbon Disulfide	ug/l	5	5U
1 1 Dichloroethene	ug/l	127	5U
1 1 Dichloroethane	ug/l	6	5U
1 2 Dichloroethene	ug/l	10	5U
Carbon Tetrachloride	ug/l	249	5U
Trichloroethene	ug/l	298	5U
Tetrachloroethene	ug/l	235	5U
<u>Dissolved Metals</u>			
Antimony	mg/l	0 0607	NA
Beryllium	mg/l	0 0052	NA
Iron	mg/l	0 3476	NA
Manganese	mg/l	0 6073	NA
Selenium	mg/l	0 0063	NA
Strontium	mg/l	0 8772	NA
Tin	mg/l	0 7641	NA
<u>Total Metals</u>			
Aluminum	mg/l	24 0745	NA
Antimony	mg/l	0 645	NA
Barium	mg/l	1 5985	NA
Beryllium	mg/l	0 0439	NA
Cadmium	mg/l	0 0120	NA
Chromium	mg/l	0 1642	NA
Cobalt	mg/l	0 1105	NA
Copper	mg/l	0 2281	NA
Iron	mg/l	155 5478	NA
Lead	mg/l	0 1664	NA
Lithium	mg/l	0 5859	NA
Manganese	mg/l	2 8410	NA
Mercury	mg/l	0 0019	NA
Molybdenum	mg/l	0 1426	NA
Nickel	mg/l	0 1922	NA
Selenium	mg/l	0 0078	NA
Strontium	mg/l	0 9081	NA
Tin	mg/l	0 1941	NA
Vanadium	mg/l	0 4244	NA
Zinc	mg/l	1 3159	NA

TABLE 1 (cont)
SURFACE WATER QUALITY

	<u>UNITS</u>	<u>INFLUENT CONCENTRATION</u>	<u>EFFLUENT</u>
<u>Dissolved Radionuclides</u>			
Gross Alpha	pCi/l	17 70	NA
Gross Beta	pCi/l	33 86	NA
Plutonium 239/240	pCi/l	0 17	NA
Total Uranium	pCi/l	10 17	NA
<u>Total Radionuclides</u>			
Gross Alpha	pCi/l	632	NA
Gross Beta	pCi/l	463	NA
Plutonium 239/240	pCi/l	7 34	NA
Americium 241	pCi/l	2 96	NA
Total Uranium	pCi/l	13 21	NA

The influent concentrations are based on flow weighted maximum concentrations of 903 Pad and Lip Area Seeps (SW 50 51 52 55 57 58 and 77) SW 53 59 63 64 and Upper South Walnut Creek seeps and surface water stations (SW 56 60 61 101)

The effluent concentration requirements are based upon Applicable or Relevant and Appropriate Requirements (ARARs) The U designation following the effluent concentrations indicates that the concentration is the detection limit for that constituent



SCALE 1" = 50'



△ COLLECTION POINT

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