NOTICE

All drawings located at the end of the document

Enclosure 1
94-RF-06023

QUARTERLY REPORT

FOR JANUARY THROUGH MARCH 1994
INCLUDING DATA SUMMARY FOR OCTOBER THROUGH DECEMBER 1993

OPERABLE UNIT #1
IM/IRA TREATMENT FACILITY

PREPARED BY

ENVIRONMENTAL RESTORATION MANAGEMENT
ENVIRONMENTAL OPERATIONS MANAGEMENT

EG&G ROCKY FLATS
GOLDEN COLORADO

ADMIN RECORD

TABLE OF CONTENTS

SECTION A OPERATIONS SUMMARY

	PAGE
1 0 OPERATIONS SUMMARY INTRODUCTION	4
2 0 INFLUENT WATER CHARACTERISTICS	4
2 1 INFLUENT FLOW RATES	4
2 2 INFLUENT CONTAMINANTS	7
3 0 TREATMENT FACILITY PERFORMANCE	8
3 1 QUANTITY OF WATER TREATED	8
3 2 WATER FROM OTHER SOURCES	8
3 3 CHEMICAL USAGE	8
3 4 WASTE GENERATION	9
3 5 OPERATING COSTS	9
3 6 MAINTENANCE	9
3 7 SYSTEM OPTIMIZATION	1 0
4 0 ENVIRONMENTAL COMPLIANCE/EFFLUENT TANK SAMPLING	1 0
5 0 REPORTS AND CORRESPONDENCE	1 0
6 0 ANTICIPATED OPERATIONS FOR NEXT QUARTER	1 0
7 0 OPERATIONS SUMMARY/CONSLUSIONS	1 0

SECTION B DATA SUMMARY FOR OCTOBER DECEMBER 1993

		PAGE
8 0	DATA SUMMARY INTRODUCTION	1 2
9 0	GROUNDWATER ANALYSIS	1 2
9 1	GROUNDWATER ELEVATIONS	1 3
1 0 0	INFLUENT CHARACTERIZATION	1 7
1 1 0	CONTAMINATION DESTRUCTION/UV SYSTEM AND ION EXCHANGE SYTEM EFFICIENCY SAMPLING	1 7
1 1 1	IX#1 PERFORMANCE	1 8
1 1 2	IX#2 PERFORMANCE	1 8
1 1 3	IX#3 PERFORMANCE	1 8
1 1 4	IX#4 PERFORMANCE	22
1 2 0	DATA SUMMARY/CONCLUSIONS	2 3

SECTION A OPERATIONS SUMMARY

1 0 OPERATIONS SUMMARY INTRODUCTION

The Operable Unit No 1 (OU 1) water treatment facility located in Building 891 is responsible for treating groundwater collected from the 881 Hillside area The water is collected in a french drain located on the 881 hillside and pumped to the influent storage tanks located at Building 891 (see Figure 1 0 1) Next the water is treated with an ultraviolet (UV) light/hydrogen peroxide system (for removal of volatile organic compounds) and a four step ion exchange (IX) system (for removal of uranium total dissolved solids hardness alkalinity anions and selected metals) After treatment the water is stored in one of three effluent storage tanks until laboratory sample results verify that the water is acceptable for discharge into the South Interceptor Ditch (SID)

This report reflects the Building 891 Treatment Facility operations and data that are critical for determining optimal operating practices Section A (Operations Summary) of the report deals specifically with day to day operations activities for the January through March 1994 period Section B (Data Summary for October December 1993) of the report includes specific data for the groundwater wells influent sources and treatment system performance Validated results will be used to evaluate these data

2 0 INFLUENT WATER CHARACTERISTICS

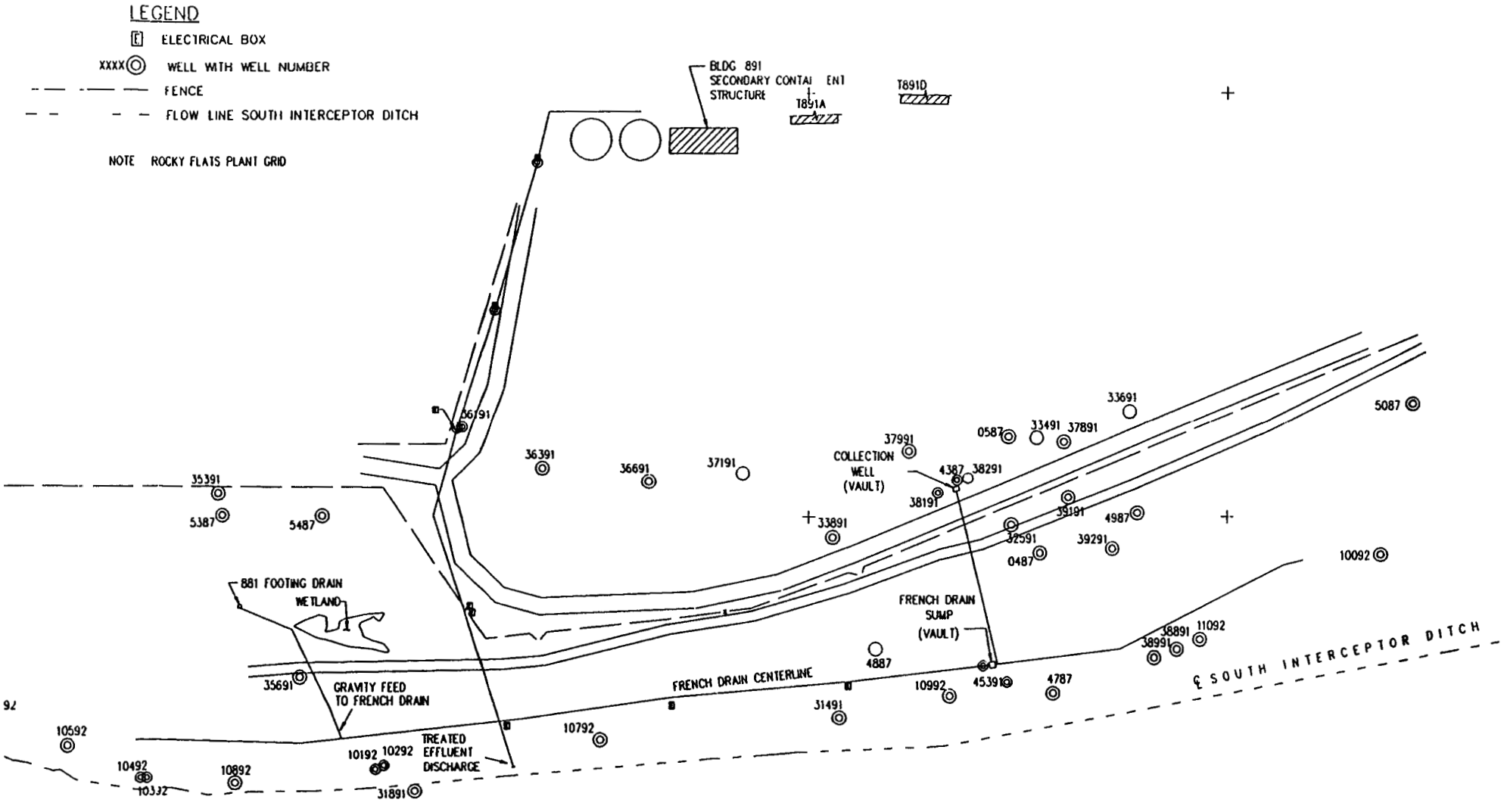
Influent water for the treatment facility comes from three different sources on the 881 Hillside These sources include the 881 footing drain the recovery well CW001 (located upgradient of the french drain) and groundwater intercepted by the french drain Water from the 881 footing drain flows by gravity into the french drain mixes with groundwater and collectively flows by gravity towards the french drain sump (see Figure 2 0 1) Recovery well water is pumped directly into the french drain sump and mixed with the groundwater/footing drain water The combined water is then pumped from the french drain sump into the treatment system influent tanks Sampling is performed at each of the 881 footing drain recovery well and the french drain sump for characterization of the influent waters

2 1 INFLUENT FLOW RATES

Damages to the recovery well (CW001) were identified in January 1994 The failure of pump P 100 to produce water at the recovery well sample hydrant was originally believed to be a pump malfunction However testing confirmed that the pump was operational and that the problem was most likely a break in the underground line between the well and valve vault A plan to reroute the collection well water above

FIGURE 2 0 1

881 HILLSIDE AREA



ground to the vault was developed The new line is expected to be complete in May 1994 The underground line that extends from the collection well to the valve vault (approximately 13 in length) will be abandoned

The stabilization project for the 881 footing drain flowmeter was completed in late March 1994 The flowmeter is now calibrated and operational Stabilization efforts have resulted in significantly increased reliability in flow measurements Data will be presented in the April through June 1994 Report

The installation of magnetic flowmeters inside building 891 has been completed These flowmeters indicated that the original UV/Peroxide flowmeter was not performing satisfactorily However the original ion exchange system flowmeter was found to read very close to the new magnetic flowmeters readings The historical reported volume of water treated at the treatment facility is fairly accurate as the ion exchange flowmeter was utilized for reporting these values The new flowmeters are now being used for measurement of both the UV/peroxide and ion exchange flows

2 2 INFLUENT CONTAMINANTS

Review of the most recent data (October December 1993) from the french drain sump indicates no significant change in the levels of contamination present in the groundwater Therefore the current configuration of the system remains sufficient to handle the water from the 881 hillside

Water (3 000 gallons) from the soil vapor extraction (SVE) unit (currently operated at Operable Unit #2) was transferred to Building 891 for testing on the UV/peroxide system This water contained high levels of carbon tetrachloride (200 ppb) and tetrachloroethene (360 ppb) These levels are much higher than what is typically treated at the 891 facility Testing of waters at higher levels of contamination assists in identifying capabilities and limitations of the treatment system for possible future treatment of incidental waters Operating parameters were adjusted to 20 gpm flowrate 100 ppm peroxide feed and 16 UV lamps (normal is 30 gpm 50 ppm peroxide feed and 8 uv lamps) for this testing Treatment of this water was unsuccessful due to the high levels of carbon tetrachloride in the influent The water was then recirculated back into Influent Tank T 201 for retreatment The water is currently being fed slowly into the system for treatment Specific results of this testing will appear in next quarter s data summary

3 0 TREATMENT FACILITY PERFORMANCE

The treatment system performance is measured by various criteria Quantity of water treated contamination destruction or removal efficiency waste generation operating costs chemical usage and system reliability Data on these criteria are utilized to modify or adjust the system as necessary for optimal performance An operations database system is presently under development for computerized data entry of all operational information

3 1 QUANTITY OF WATER TREATED

Approximately 180 000 gallons of groundwater were treated at the treatment facility during the past quarter It is expected that this figure will increase significantly for the next quarter when higher influent flows are experienced Two effluent tanks (210 000 gallons) of treated effluent were released to the South Interceptor Ditch Approximately 1 950 000 gallons of water have been processed through the system to date

3 2 WATER FROM OTHER SOURCES

An estimated 13 000 gallons of decontamination pad water was accepted at the treatment facility during the quarter The decontamination pad water requires treatment at Building 891 due to low level volatile organic compounds (VOCs) that cannot be processed through the 374 evaporator These waters contained VOC concentrations of 20 ug/l or less Decontamination pad water is pumped from the truck dock to one of the influent tanks and combined with the french drain waters until treatment is initiated Little or no information could be gained from sampling these specific events as the VOC CLP detection limits for most compounds is 5 ug/l Combined waters would be very close to the detection limit and would not provide useful data on the removal of VOCs by the UV/peroxide system Monthly sampling of the combined waters will continue at the UV influent sample port

3 3 CHEMICAL USAGE

Hydrochloric acid is utilized in the ion exchange system for regeneration of resins in IX#2 (weak acid cation exchanger) and IX#3 (strong acid cation exchanger) The resin in IX#4 (weak base anion exchanger) is regenerated with sodium hydroxide

A total of 450 gallons of hydrochloric acid and 200 gallons of sodium hydroxide were used for regeneration and neutralization activities Approximately 6 gallons of hydrogen peroxide were used for the UV/Peroxide destruction unit

Initial acid usage at the treatment facility was somewhat higher during the first year of operation (1992) The original vendor guidance was for regeneration of all columns every 56 500 gallons (based on anticipated influent concentrations) However the weak base column (IX#4) required regeneration much more frequently than the cation columns (IX#2 and IX#3) Therefore the regeneration of only the IX#4 resins was initiated on an experimental basis Samples were taken for analysis at the appropriate locations to check the performance of each column In line pH and conductivity sensors also provide general information on the ion loading on each resin bed After successful regeneration of the cation columns every second regeneration (approximately every 80 000 gallons) the process has now been expanded to the regeneration of the cation columns every third regeneration (approximately every 120 000 gallons)

3 4 WASTE GENERATION

Waste generated at the treatment facility includes sock filters and neutralized regenerant water One 55 gallon drum of sock filters has been generated in 24 months of operation Three tanker truck loads of neutralized regenerant water from Tank T 210 (12 408 gallons) were sent to the 374 evaporator for processing this quarter

3 5 OPERATING COSTS

Subcontracted operating costs for this quarter totaled approximately $50 000 These costs include chemical purchases spare parts labor and document preparation which are performed under the current operations and maintenance subcontract

3 6 MAINTENANCE

The following maintenance was performed during the October through December operating period

The 881 footing drain flowmeter stabilization was completed

Acid pump back pressure valve was rebuilt

Performed piping changes to accommodate the Gas Chromatograph in line sampling system Installation of the Gas Chromatograph is about 75% complete

Installed magnetic flowmeters on influent and effluent to the treatment facility

Completed valve identification with brass tags in Building 891

Engineering provided proposal for the repiping of the collection well Parts were placed on order

Replaced pressure switches and relief valves for acid and caustic regeneration system

3 7 SYSTEM OPTIMIZATION

Review of initial test results throughout the system indicate that systems are performing as expected Optimization of the ion exchange regeneration schedule is one goal of this testing The original ion exchange vendor recommends regeneration of the resins every 56 500 gallons However IX#4 is the limiting factor and requires regeneration more often than IX#2 and IX#3 Sampling continues to be performed in order to further evaluate the system

4 0 ENVIRONMENTAL COMPLIANCE/EFFLUENT TANK SAMPLING

Each effluent tank is sampled and analyzed prior to discharge During the past quarter two effluent tanks (TK 206 and TK 205) were discharged (approximately 210 000 gallons) into the south interceptor ditch All parameters were below ARAR for these tanks

5 0 REPORTS AND CORRESPONDENCE

Comments are being incorporated into the Draft Standard Operating Procedures The current schedule for completion is late May 1994

The Draft 881 Footing Drain Report was submitted to the Department of Energy for review

6 0 ANTICIPATED OPERATIONS FOR NEXT QUARTER

Extended hours of operation will be needed for April and May Significant increases in the influent flowrate to the french drain can be expected during this time period Normal operations will continue through the quarter

7 0 OPERATIONS SUMMARY/CONCLUSIONS

Approximately 1 950 000 gallons of waters have been treated to date at the treatment facility An estimated 350 000 gallons of groundwater will be treated during the spring quarter As in previous springs it will be necessary to maintain awareness of the effluent storage

capacity at the treatment facility The analysis time (10 days) required for some of the radiochemistry samples becomes an important factor at this time of the year

An 881 Footing Drain Report comparing the OU1 ARARs to the analytical results is currently being developed by the Environmental Science and Engineering Division at EG&G A draft report was submitted by the subcontractor and comments returned for incorporation into the report It is expected that the report will be finalized in July 1994

Regeneration schedules have been refined to minimize acid usage at the facility This has been achieved in the past by regenerating the cation exchange columns (IX#2 and IX#3) at every second regeneration cycle (approximately every 80 000 gallons) Currently this schedule has been increased to once every three regeneration cycles (approximately every 120 000 gallons) All current information indicates that the new regeneration schedule is meeting necessary performance criteria

SECTION B DATA SUMMARY FOR OCTOBER DECEMBER 1993

8 0 DATA SUMMARY INTRODUCTION

This section of the report reflects the Building 891 Treatment Facility operations parameters and associated Operable Unit #1 data Documentation included covers the time period from October through December 1993 (July through September and October through December 1993 for Groundwater data) All data has been validated Data collected are used to determine optimal operating practices at the 891 treatment facility

9 0 GROUNDWATER ANALYSIS

The French Drain Performance Monitoring Plan (FDPMP) requires data for monitoring french drain performance The FDPMP requires groundwater level measurements of designated french drain monitoring wells 10092 10192 10292 10392 10492 10592 10692 10792 10892 10992 11092 39991 45391 4887 35691 31491 and 4787 (see Figure 2 0 1) Additionally quarterly water quality sampling of the wells is required Not all locations are sampled for all parameters due to the small quantities of water generated at most of these locations A summary of the analysis results (sampled September and November 1993) that exceeded the OU1 ARARs is in Table 1 (See Appendix A for the complete data set)

The results found during this sampling period are very similar to those of previous quarters Generally water quality parameters such as sulfate and Total Dissolved Solids constitute 80 / of the exceedances of ARARs This would be expected in wells near or beyond the western termination (wells 10492 10592 and 10692) of the french drain Low level volatile detections (toluene ≈ 34 ug/l tetrachloroethene ≈ 1 ug/l and trichloroethene ≈ 2 ug/l) were found in well 10792 but were well below the ARARs established for OU1 Similar concentrations of tetrachloroethene and trichloroethene were detected in well 45391

TABLE 1
GROUNDWATER PARAMETERS ABOVE ARAR FOR
JULY SEPTEMBER 1993 AND OCTOBER DECEMBER 1993

Location	Date	Parameter	Result	ARAR
10492	9/23/93	Sulfate	320 0 mg/l	250 mg/l
10492	9/23/93	Total Dissolved Solids	1100 0 mg/l	400 mg/l
10492	11/12/93	Selenium	672 0 ug/l	10 ug/l
10592	9/23/93	Sulfate	350 0 mg/l	250 mg/l
10592	9/23/93	Total Dissolved Solids	1200 0 mg/l	400 mg/l
10692	9/23/93	Sulfate	340 0 mg/l	250 mg/l
10692	9/23/93	Total Dissolved Solids	1300 0 mg/l	400 mg/l
10692	11/12/93	Sulfate	410 0 mg/l	250 mg/l
10692	11/12/93	Total Dissolved Solids	1300 0 mg/l	400 mg/l
10992	9/22/93	Nitrate/Nitrite	24 0 mg/l	10 mg/l
35691	9/15/93	Sulfate	449 4 mg/l	250 mg/l
35691	9/15/93	Total Dissolved Solids	1402 0 mg/l	400 mg/l
35691	9/15/93	Gross Alpha	35 pci/l	15 pci/l
35691	11/19/93	Sulfate	460 0 mg/l	250 mg/l
35691	11/19/93	Total Dissolved Solids	1400 0 mg/l	400 mg/l
45391	9/22/93	Total Dissolved Solids	460 0 mg/l	400 mg/l

9 1 GROUNDWATER ELEVATIONS

Figure 9 1 1 9 1 2 and 9 1 3 are water level maps that were constructed from July through September 1993 October through December 1993 and January through March 1994 water level data respectively Water level grids were constructed from these data using a 50 foot grid spacing The existing bedrock grid for OU1 was then subtracted from the respective water level grid to obtain a saturated thickness grid Areas within these saturated thickness grids that were negative were considered to be unsaturated In these areas the calculated water level grid extended below the bedrock surface The saturated thickness grids were then edited to match known areas within OU1 that contain dry wells These edited saturated thickness grids were then added to the bedrock grid to obtain a new water level grid for each quarter This water level grid is the basis for the presented maps

The maps present the configuration of water levels at the Operable Unit 1 (881 Hillside) during the third and fourth quarter of 1993 Examination of the maps reveals that there appear to be large areas of the 881 Hillside that are apparently unsaturated

These unsaturated areas are present in all of the unconsolidated materials present beneath OU1 even extending to Woman Creek From these maps the French Drain appears to intercept groundwater normally flowing through the subsurface to Woman Creek Other factors that could contribute to the extent of the unsaturated zones are the heterogeneity of the colluvial materials making up the 881 Hillside building footing drains (such as Building 881) and the generally low water levels It can also be seen that the unsaturated areas do appear to fluctuate during the year The January through March 1994 map shows some reduction in the unsaturated areas which is most likely due to recharge from snow melt Subsequent maps of water levels through the year should give additional indications to the effectiveness of the French Drain

10 0 INFLUENT CHARACTERIZATION

Influent water for the treatment facility comes from three different sources on the 881 Hillside These sources include the 881 footing drain the recovery well CW001 (located upgradient of the french drain) and groundwater intercepted by the french drain Water from the 881 footing drain flows by gravity into the french drain mixes with groundwater and collectively flows by gravity towards the french drain sump Recovery well water is pumped directly into the french drain sump and mixed with the groundwater/footing drain water The combined water is then pumped from the french drain sump into the treatment system influent tanks Sampling is performed at each of the 881 footing drain recovery well and the french drain sump for characterization of the influent waters Sufficient water was not available at the recovery well (CW001) for sampling during October and November A problem (as described in Section 2 1) with the recovery well prevented sampling at this location during December Appendix B illustrates the analysis results for October through December 1993 at the French Drain Sump and 881 Footing Drain respectively None of the parameters were found to be above ARAR with the exception of the Total Dissolved Solids which remain above the ARAR of 400 mg/l

11 0 CONTAMINATION DESTRUCTION/UV SYSTEM AND ION EXCHANGE SYSTEM EFFICIENCY SAMPLING

The primary purpose of sampling inside Building 891 is to determine the efficiency of the system in the removal of target contaminants (uranium metals anions VOCs) Table 2 and Table 3 describe UV system influent and UV system effluent data Both influent and effluent data show non detection for the compounds in the VOA CLP list Due to the fact that the influent from the french drain sump contains very low (non detectable) organics most sample results at the UV influent location are also normally below detection Incidental waters accepted such as the decontamination pad or soil vapor extraction unit appear to be the primary contributors to organics found at the UV influent location However no incidental waters were being treated during the sampling

of data presented here Discussions in this section will pertain primarily to the ion exchange system as there is very little information available to evaluate the performance of the UV/peroxide system during the October through December 1993 period

11 1 IX#1 PERFORMANCE

IX#1 contains a strong base anion exchange resin which serves to remove uranium from the groundwater Influent water contains uranium in the form of a carbonate complex (negatively charged) This ion loads on the weak base resin located in the first ion exchange column thus removing uranium from the water Unlike the other resins in the system this resin is not regenerated Recent sample data are shown in Table 4 These data are consistent with previous samples taken at this location Influent uranium activity levels continue to remain below 10 pci/l A 99/ reduction in the uranium activity level is achieved under these circumstances

11 2 IX#2 PERFORMANCE

The IX#2 resin is a weak acid cation exchange resin This primary function of the resin is to remove hardness associated with alkalinity (calcium and magnesium) Since these parameters are not of special interest (no ARARs) samples are not taken to determine the efficiency of this column

11 3 IX#3 PERFORMANCE

The IX#3 resin is a strong acid cation exchanger The primary function of this column is to remove metals from the water Sample results obtained from the effluent of IX#2 and IX#3 provide valuable information about the performance of this resin Table 5 presents data acquired from recent samples taken at these locations

Extensive ion exchange is still taking place in these resins although 83 000 gallons of water have been processed through the column since the last regeneration Some drop off in removal efficiency is seen at these higher treatment volumes (comparison made to data presented in October through December Report) However the main constituents (Calcium Magnesium Sodium Potassium) in the water do not have ARARs for OU1 and primarily come from naturally occurring geologic materials These constituents are removed to bring the only related parameter of concern Total Dissolved Solids within the ARAR of 400 mg/l Since other parameters are well within ARARs it is viable to allow the cation exchange columns to treat larger volumes of water (reducing acid consumption) before regeneration is necessary This will reduce sampling costs and minimize downtime associated with regeneration activities

TABLE 2

UV PERFORMANCE OCTOBER 1993 DECEMBER 1993 UV INFLUENT

L cation	Sample Numbe	Sample Date	Ch m l	Re lt U it Mea u	Q alifier	ARAR	# S m > ARAR
891UVINF	FT10117RG	16 NOV 93	1 1 1 TRICHLOROETHANE	5 UG/L	U	200	0
			1 1 2 2 TETRACHLOROETHANE	5 UG/L	U		
			1 1 2 TRICHLOROETHANE	5 UG/L	U	5	0
			1 1 DICHLOROETHANE	5 UG/L	U	7	0
			1 1 DICHLOROETHENE	5 UG/L	U	5	0
			1 2 DICHLOROETHANE	5 UG/L	U	5	0
			1 2 DICHLOROETHENE	5 UG/L	U		
			1 2 DICHLOROPROPANE	5 UG/L	U		
			2 BUTANONE	10 UG/L	U		
			2 HEXANONE	10 UG/L	U		
			4 METHYL 2 PENTANONE	10 UG/L	U		
			ACETONE	10 UG/L	U	50	0
			BENZENE	5 UG/L	U		
			BROMODICHLOROMETHANE	5 UG/L	U		
			BROMOFORM	5 UG/L	U		
			BROMOMETHANE	10 UG/L	U		
			CARBON DISULFIDE	5 UG/L	U	5	0
			CARBON TETRACHLORIDE	5 UG/L	U	5	0
			CHLOROBENZENE	5 UG/L	U		
			CHLOROETHANE	10 UG/L	U		
			CHLOROFORM	5 UG/L	U		
			CHLOROMETHANE	10 UG/L	U		
			DIBROMOCHLOROMETHANE	5 UG/L	U		
			ETHYLBENZENE	5 UG/L	U		
			METHYLENE CHLORIDE	5 UG/L	U	5	0
			STYRENE	5 UG/L	U		
			TETRACHLOROETHENE	5 UG/L	U	5	0
			TOLUENE	5 UG/L	U	2000	0
			TOTAL XYLENES	5 UG/L	U		
			TRICHLOROETHENE	5 UG/L	U	5	0
			VINYL ACETATE	10 UG/L	U		
			VINYL CHLORIDE	10 UG/L	U		
			cis 1 3 DICHLOROPROPENE	5 UG/L	U		
			tr s 1 3 DICHLOROPROPENE	5 UG/L	U		

TABLE 3

UV PERFORMANCE OCTOBER 1993 DECEMBER 1993 UV EFFLUENT

Loc tion	Sample N mbe	S mpl Date	Chemic l	R sult	Un t Measure	Q alifie	ARAR	# Sam > ARAR
891UVEFF	FT10118RG	16 NOV 93	1 1 1 TRICHLOROETHANE	5	UG/L	U	200	0
			1 1 2 2 TETRACHLOROETHANE	5	UG/L	U		
			1 1 2 TRICHLOROETHANE	5	UG/L	U	5	0
			1 1 DICHLOROETHANE	5	UG/L	U	7	0
			1 1 DICHLOROETHENE	5	UG/L	U	5	0
			1 2 DICHLOROETHANE	5	UG/L	U	5	0
			1 2 DICHLOROETHENE	5	UG/L	U		
			1 2 DICHLOROPROPANE	5	UG/L	U		
			2 BUTANONE	10	UG/L	U		
			2 HEXANONE	10	UG/L	U		
			4 METHYL 2 PENTANONE	10	UG/L	U		
			ACETONE	10	UG/L	U	50	0
			BENZENE	5	UG/L	U		
			BROMODICHLOROMETHANE	5	UG/L	U		
			BROMOFORM	5	UG/L	U		
			BROMOMETHANE	10	UG/L	U		
			CARBON DISULFIDE	5	UG/L	U	5	0
			CARBON TETRACHLORIDE	5	UG/L	U	5	0
			CHLOROBENZENE	5	UG/L	U		
			CHLOROETHANE	10	UG/L	U		
			CHLOROFORM	5	UG/L	U		
			CHLOROMETHANE	10	UG/L	U		
			DIBROMOCHLOROMETHANE	5	UG/L	U		
			ETHYLBENZENE	5	UG/L	U		
			METHYLENE CHLORIDE	5	UG/L	U	5	0
			STYRENE	5	UG/L	U		
			TETRACHLOROETHENE	5	UG/L	U	5	0
			TOLUENE	5	UG/L	U	2000	0
			TOTAL XYLENES	5	UG/L	U		
			TRICHLOROETHENE	5	UG/L	U	5	0
			VINYL ACETATE	10	UG/L	U		
			VINYL CHLORIDE	10	UG/L	U		
			cis 1 3 DICHLOROPROPENE	5	UG/L	U		
			trans 1 3 DICHLOROPROPENE	5	UG/L	U		

TABLE 4

881 IX1 COLUMN PERFORMANCE OCTOBER 1993 DECEMBER 1993

Location	Sample Number	Sample Date	Chemical	Result	Unit Measure	Error	Qualifier	ARAR	# SAM > ARAR
891IXINF	FT10119RG	16 NOV 93	URANIUM 233 234	3 7	PCI/L	0 32			
			URANIUM 235	0 17	PCI/L	0 071	J		
			URANIUM 238	2 8	PCI/L	0 27			
			TOTAL URANIUM	6 67	PCI/L			40	0
891IX1EFF	FT10121RG	16 NOV 93	URANIUM 233 234	0 17	PCI/L	0 17	U		
			URANIUM 235	0	PCI/L	0 069	U		
			URANIUM 238	0 14	PCI/L	0 11	U		
			TOTAL URANIUM	0 31	PCI/L			40	0
			Percent Removal						
			Total U IX1	95 35					
891IXINF	FT10146RG	29 DEC 93	URANIUM 233 234	4 7	PCI/L	0 35			
			URANIUM 235	0 17	PCI/L	0 063	J		
			URANIUM 238	3 7	PCI/L	0 29			
			TOTAL URANIUM	8 57	PCI/L			40	0
891IX1EFF	FT10148RG	29 DEC 93	URANIUM 233 234	0 085	PCI/L	0 071	U		
			URANIUM 235	0 009	PCI/L	0 017	U		
			URANIUM 238	0 014	PCI/L	0 028	U		
			TOTAL URANIUM	0 09	PCI/L			40	0
			Percent Removal						
			Total U IX1	98 95					

TABLE 5
IX#3 REMOVAL EFFICIENCY

PARAMETER	SAMPLE FT10150RG 12/29/93 IX2 Effluent pH=3 76	SAMPLE FT10151RG 12/29/93 IX3 Effluent pH=2 62	ARAR	% REMOVAL
Dissolved Calcium	14100 ug/l	1490 ug/l	NS	89 4 /
Dissolved Lithium	14 0 ug/l	2 6 ug/l	2500 ug/l	81 4 /
Dissolved Magnesium	11900 ug/l	313 ug/l	NS	97 4 /
Dissolved Potassium	3100 ug/l	694 ug/l	NS	77 6 /
Dissolved Sodium	79300 ug/l	2570 ug/l	NS	96 8 %
Dissolved Tin	884 ug/l	374 ug/l	NS	57 6 /
Total Zinc	50 3 ug/l	7 8 ug/l (U)	2000 ug/l	84 5 /
Dissolved Strontium	122 ug/l	6 5 ug/l (B)	NS	94 7 /

83 807 gallons treated since last regeneration of IX#3 All CLP metals were analyzed however most results were very close to detection limits and therefore were not useful in this analysis

(B) Less than method detection limit but greater than or equal to instrument detection limit

(U) Parameter not detected at specified value

11 4 IX#4 PERFORMANCE

The IX#4 resin is a weak base anion exchange resin The primary function of this resin is to remove anions (such as chloride sulfate nitrate/nitrite etc) from the water Samples are taken from the effluent of IX#3 and IX#4 to observe the loading of anions on the resin bed Table 6 demonstrates that the IX#4 resin is performing well in reducing the levels of chloride and sulfate in the water The TDS remaining in the effluent of IX#4 is primarily from the leakage of cations through the IX#3 resin Therefore the 45 3 / removal efficiency is expected at this point in the process

TABLE 6
IX#4 REMOVAL EFFICIENCY

PARAMETER	FT10124RG	FT10125RG	ARAR	/ REMOVAL
	11/16/93 IX#3 EFFLUENT PH=2 9	11/16/93 IX#4 EFFLUENT PH=6 1		
Chloride	102 mg/l	4 2 mg/l	250 mg/l	95 8 /
Sulfate	45 7 mg/l	5 0 mg/l (U)	250 mg/l	89 1 /
TDS	64 mg/l	35 mg/l	400 mg/l	45 3 /

Samples taken after 34 000 gallons of water treated since last regeneration
(U) Parameter no detected at specified value

12 0 SUMMARY

The French drain appears to be intercepting water flowing through the subsurface of the 881 Hillside Groundwater analysis performed at the French Drain Monitoring Wells indicates some low levels of organics However no significant contamination of any type was found during the sampling of these wells during the July September 1993 or October Decmber 1993 sampling periods The analysis of waters taken from the 881 footing drain and french drain sump would also support this concept Samples were not collected at the recovery well due to low water levels and damage to the well discovered late in December 1993

There was not enough information available (due to extremely low levels of volatile organics in the influent) to make any determinations as to the effectiveness of the UV/peroxide system Some testing was performed on the removal efficiency of IX#3 (metals removal) It was found to be performing well even at longer run times before regeneration of this resin

Results for val dated water qual ty data for 881 Treatment Plant
Data for samples collected July September and October December 1993 sampling periods

14 43 Monday April 18 1994

OBS	LOCATION	SAMPLE	SDATE	ANALYTE	RESULT	UNITS	QUAL	DETECT	VAL	ARAR
1	10492	GW01231WC	09/23/93	CHLORIDE	150 00	MG/L		0 20	V	250
2	10492	GW01231WC	09/23/93	NITRATE/NITRITE	5 50	MG/L		0 02	V	10
3	10492	GW01231WC	09/23/93	SULFATE	320 00	MG/L		2 00	V	250
4	10492	GW01231WC	09/23/93	TOTAL DISSOLVED SOLIDS	1100 00	MG/L		10 00	V	400
5	10592	GW01232WC	09/23/93	CHLORIDE	230 00	MG/L		0 20	V	250
6	10592	GW01232WC	09/23/93	NITRATE/NITRITE	5 60	MG/L		0 02	V	10
7	10592	GW01232WC	09/23/93	SULFATE	350 00	MG/L		2 00	V	250
8	10592	GW01232WC	09/23/93	TOTAL DISSOLVED SOLIDS	1200 00	MG/L		10 00	V	400
9	10592	GW01484WC	11/12/93	NITRATE/NITRITE	5 80	MG/L		0 02	V	10
10	10692	GW01233WC	09/23/93	CHLORIDE	160 00	MG/L		0 20	V	250
11	10692	GW01233WC	09/23/93	NITRATE/NITRITE	0 20	MG/L		0 02	V	10
12	10692	GW01233WC	09/23/93	SULFATE	340 00	MG/L		2 00	V	250
13	10692	GW01233WC	09/23/93	TOTAL DISSOLVED SOLIDS	1300 00	MG/L		10 00	V	400
14	10692	GW01485WC	11/12/93	CHLORIDE	150 00	MG/L		0 20	V	250
15	10692	GW01485WC	11/12/93	NITRATE/NITRITE	0 13	MG/L		0 02	V	10
16	10692	GW01485WC	11/12/93	SULFATE	410 00	MG/L		2 00	V	250
17	10692	GW01485WC	11/12/93	TOTAL DISSOLVED SOLIDS	1300 00	MG/L		10 00	V	400
18	10792	GW01234WC	09/21/93	NITRATE/NITRITE	0 51	MG/L		0 10	V	10
19	10992	GW01235WC	09/22/93	NITRATE/NITRITE	24 00	MG/L		0 02	V	10
20	11092	GW01236WC	09/21/93	NITRATE/NITRITE	3 10	MG/L		0 02	V	10
21	35691	GW01328WC	09/15/93	CHLORIDE	154 00	MG/L		5 00	V	250
22	35691	GW01328WC	09/15/93	NITRATE/NITRITE	1 72	MG/L		0 10	V	10
23	35691	GW01328WC	09/15/93	SULFATE	449 40	MG/L		50 00	V	250
24	35691	GW01328WC	09/15/93	TOTAL DISSOLVED SOLIDS	1402 00	MG/L		14 00	V	400
25	35691	GW01582WC	11/19/93	CHLORIDE	160 00	MG/L		0 20	JA	250
26	35691	GW01582WC	11/19/93	NITRATE/NITRITE	0 12	MG/L		0 02	V	10
27	35691	GW01582WC	11/19/93	SULFATE	460 00	MG/L		2 00	JA	250
28	35691	GW01582WC	11/19/93	TOTAL DISSOLVED SOLIDS	1400 00	MG/L		10 00	V	400
29	45391	GW01360WC	09/22/93	CHLORIDE	83 00	MG/L		0 20	V	250
30	45391	GW01360WC	09/22/93	SULFATE	41 00	MG/L		2 00	V	250
31	45391	GW01360WC	09/22/93	TOTAL DISSOLVED SOLIDS	460 00	MG/L		10 00	V	400

Results for alidated rad onucl de data for 881 Treatment Plant
Data for samples collected July September and October December 1993 sampling per ods

14 43 Mond y April 18 1994

OBS	LOCATION	SAMPLE	SDATE	ANALYTE	RESULT	UNITS	QUAL	VAL	ARAR
1	10692	GW01233WC	09/23/93	GROSS ALPHA	9 40	PCI/L		V	15
2	10692	GW01233WC	09/23/93	GROSS BETA	7 90	PCI/L		V	50
3	10692	GW01233WC	09/23/93	STRONTIUM 89 90	0 76	PCI/L	J	V	8
4	10692	GW01233WC	09/23/93	URANIUM (TOTAL)	17 00	PCI/L	B	A	40
5	10692	GW01233WC	09/23/93	URANIUM (TOTAL)	0 31	PCI/L	J	A	40
6	10692	GW01233WC	09/23/93	URANIUM (TOTAL)	13 00	PCI/L	B	A	40
7	35691	GW01328WC	09/15/93	GROSS ALPHA	35 00	PCI/L		V	15
8	35691	GW01328WC	09/15/93	GROSS BETA	6 70	PCI/L		V	50
9	35691	GW01328WC	09/15/93	STRONTIUM 89 90	0 92	PCI/L	J	V	8
10	35691	GW01328WC	09/15/93	URANIUM (TOTAL)	21 00	PCI/L	B	A	40
11	35691	GW01328WC	09/15/93	URANIUM (TOTAL)	0 32	PCI/L	BJ	A	40
12	35691	GW01328WC	09/15/93	URANIUM (TOTAL)	13 00	PCI/L	B	A	40

Re ults fo al d t d m t ls data fo 881 T atm t Plant
Data for samples collected July September and Octobe December 1993 sampling per ods 14 43 Monday April 18 1994

OBS	LOCATION	SAMPLE	SDATE	ANALYTE	RESULT	UNITS	QUAL	DETECT	VAL	ARAR
1	10492	GW01483WC	11/12/93	ALUMINUM	40 0	UG/L	U	40 0	V	5000
2	10492	GW01483WC	11/12/93	ANTIMONY	36 0	UG/L	U	36 0	V	60
3	10492	GW01483WC	11/12/93	ARSENIC	2 0	UG/L	U	2 0	V	50
4	10492	GW01483WC	11/12/93	BARIUM	40 3	UG/L	B	23 0	V	1000
5	10492	GW01483WC	11/12/93	BERYLLIUM	1 0	UG/L	U	1 0	V	100
6	10492	GW01483WC	11/12/93	CADMIUM	3 0	UG/L	U	3 0	V	10
7	10492	GW01483WC	11/12/93	CHROMIUM	3 0	UG/L	U	3 0	V	50
8	10492	GW01483WC	11/12/93	COPPER	4 0	UG/L	U	4 0	V	200
9	10492	GW01483WC	11/12/93	IRON	9 0	UG/L	U	9 0	V	300
10	10492	GW01483WC	11/12/93	LEAD	1 0	UG/L	U	1 0	V	50
11	10492	GW01483WC	11/12/93	LITHIUM	193 0	UG/L		30 0	V	2500
12	10492	GW01483WC	11/12/93	MANGANESE	2 4	UG/L	U	2 0	JA	50
13	10492	GW01483WC	11/12/93	MERCURY	0 2	UG/L	U	0 2	V	2
14	10492	GW01483WC	11/12/93	MOLYBDENUM	15 0	UG/L	U	15 0	V	100
15	10492	GW01483WC	11/12/93	NICKEL	10 0	UG/L	U	10 0	V	200
16	10492	GW01483WC	11/12/93	SELENIUM	672 0	UG/L	S	2 0	V	10
17	10492	GW01483WC	11/12/93	SILVER	4 0	UG/L	U	4 0	V	50
18	10492	GW01483WC	11/12/93	THALLIUM	3 0	UG/L	UW	3 0	JA	10
19	10492	GW01483WC	11/12/93	VANADIUM	5 0	UG/L	U	5 0	V	100
20	10492	GW01483WC	11/12/93	ZINC	5 5	UG/L	B	3 0	V	2000
21	10692	GW01233WC	09/23/93	ALUMINUM	15 0	UG/L	U	200 0	V	5000
22	10692	GW01233WC	09/23/93	ANTIMONY	17 0	UG/L	U	60 0	V	60
23	10692	GW01233WC	09/23/93	ARSENIC	1 0	UG/L	U	10 0	V	50
24	10692	GW01233WC	09/23/93	BARIUM	77 4	UG/L	B	200 0	V	1000
25	10692	GW01233WC	09/23/93	BERYLLIUM	1 0	UG/L	U	5 0	V	100
26	10692	GW01233WC	09/23/93	CADMIUM	4 0	UG/L	U	5 0	V	10
27	10692	GW01233WC	09/23/93	CHROMIUM	3 0	UG/L	U	10 0	V	50
28	10692	GW01233WC	09/23/93	COPPER	2 0	UG/L	U	25 0	V	200
29	10692	GW01233WC	09/23/93	IRON	35 0	UG/L	U	100 0	JA	300
30	10692	GW01233WC	09/23/93	LEAD	1 0	UG/L	U	3 0	V	50
31	10692	GW01233WC	09/23/93	LITHIUM	31 3	UG/L	BE	100 0	JA	2500
32	10692	GW01233WC	09/23/93	MANGANESE	43 1	UG/L		15 0	V	50
33	10692	GW01233WC	09/23/93	MERCURY	0 2	UG/L	U	0 2	V	2
34	10692	GW01233WC	09/23/93	MOLYBDENUM	5 0	UG/L	U	200 0	V	100
35	10692	GW01233WC	09/23/93	NICKEL	7 0	UG/L	U	40 0	V	200
36	10692	GW01233WC	09/23/93	SELENIUM	2 0	UG/L	UW	5 0	JA	10
37	10692	GW01233WC	09/23/93	SILVER	3 0	UG/L	U	10 0	V	50
38	10692	GW01233WC	09/23/93	THALLIUM	1 0	UG/L	UW	10 0	JA	10
39	10692	GW01233WC	09/23/93	VANADIUM	14 0	UG/L	U	50 0	V	100
40	10692	GW01233WC	09/23/93	ZINC	8 6	UG/L	U	20 0	JA	2000
41	10692	GW01485WC	11/12/93	ALUMINUM	21 0	UG/L	U	200 0	V	5000
42	10692	GW01485WC	11/12/93	ANTIMONY	16 0	UG/L	U	60 0	V	60
43	10692	GW01485WC	11/12/93	ARSENIC	1 0	UG/L	U	10 0	JA	50
44	10692	GW01485WC	11/12/93	BARIUM	74 4	UG/L	B	200 0	V	1000
45	10692	GW01485WC	11/12/93	BERYLLIUM	1 0	UG/L	U	5 0	V	100
46	10692	GW01485WC	11/12/93	CADMIUM	3 0	UG/L	U	5 0	V	10
47	10692	GW01485WC	11/12/93	CHROMIUM	3 0	UG/L	U	10 0	V	50
48	10692	GW01485WC	11/12/93	COPPER	2 0	UG/L	U	25 0	V	200
49	10692	GW01485WC	11/12/93	IRON	4 0	UG/L	U	100 0	V	300
50	10692	GW01485WC	11/12/93	LEAD	1 0	UG/L	U	3 0	JA	50
51	10692	GW01485WC	11/12/93	LITHIUM	28 9	UG/L	B	100 0	V	2500
52	10692	GW01485WC	11/12/93	MANGANESE	26 3	UG/L		15 0	V	50
53	10692	GW01485WC	11/12/93	MERCURY	0 2	UG/L	U	0 2	V	2
54	10692	GW01485WC	11/12/93	MOLYBDENUM	6 0	UG/L	U	200 0	V	100
55	10692	GW01485WC	11/12/93	NICKEL	8 0	UG/L	U	40 0	V	200
56	10692	GW01485WC	11/12/93	SELENIUM	1 0	UG/L	UW	5 0	JA	10
57	10692	GW01485WC	11/12/93	SILVER	3 0	UG/L	U	10 0	V	50
58	10692	GW01485WC	11/12/93	THALLIUM	1 0	UG/L	U	10 0	V	10
59	10692	GW01485WC	11/12/93	VANADIUM	2 0	UG/L	U	50 0	V	100
60	10692	GW01485WC	11/12/93	ZINC	3 0	UG/L	U	20 0	JA	2000
61	35691	GW01328WC	09/15/93	ALUMINUM	30 0	UG/L	U	30 0	V	5000
62	35691	GW01328WC	09/15/93	ANTIMONY	36 0	UG/L	U	36 0	V	60
63	35691	GW01328WC	09/15/93	ARSENIC	2 0	UG/L	UW	2 0	V	50
64	35691	GW01328WC	09/15/93	BARIUM	51 5	UG/L	B	16 0	V	1000

65	35691	GW01328WC	09/15/93	BERYLLIUM	1	0	UG/L	U	1	0	V	100
66	35691	GW01328WC	09/15/93	CADMIUM	2	0	UG/L	U	2	0	V	10
67	35691	GW01328WC	09/15/93	CHROMIUM	3	0	UG/L	U	3	0	V	50
68	35691	GW01328WC	09/15/93	COPPER	2	0	UG/L	U	2	0	V	200
69	35691	GW01328WC	09/15/93	IRON	7	0	UG/L	U	7	0	V	300
70	35691	GW01328WC	09/15/93	LEAD	2	0	UG/L	U	2	0	V	50
71	35691	GW01328WC	09/15/93	LITHIUM	19	8	UG/L	B	17	0	V	2500
72	35691	GW01328WC	09/15/93	MANGANESE	3	2	UG/L	U	2	0	JA	50
73	35691	GW01328WC	09/15/93	MERCURY	0	2	UG/L	UN	0	2	V	2
74	35691	GW01328WC	09/15/93	MOLYBDENUM	11	0	UG/L	U	11	0	V	100
75	35691	GW01328WC	09/15/93	NICKEL	14	0	UG/L	U	14	0	V	200
76	35691	GW01328WC	09/15/93	SELENIUM	7	8	UG/L	S	2	0	V	10
77	35691	GW01328WC	09/15/93	SILVER	3	0	UG/L	U	3	0	V	50
78	35691	GW01328WC	09/15/93	THALLIUM	4	0	UG/L	UW	4	0	JA	10
79	35691	GW01328WC	09/15/93	VANADIUM	5	0	UG/L	U	5	0	V	100
80	35691	GW01328WC	09/15/93	ZINC	20	2	UG/L	U	3	0	JA	2000
81	35691	GW01582WC	11/19/93	ALUMINUM	21	0	UG/L	U	200	0	V	5000
82	35691	GW01582WC	11/19/93	ANTIMONY	16	0	UG/L	U	60	0	V	60
83	35691	GW01582WC	11/19/93	ARSENIC	1	0	UG/L	U	10	0	V	50
84	35691	GW01582WC	11/19/93	BARIUM	55	2	UG/L	B	200	0	V	1000
85	35691	GW01582WC	11/19/93	BERYLLIUM	1	0	UG/L	U	5	0	V	100
86	35691	GW01582WC	11/19/93	CADMIUM	3	0	UG/L	U	5	0	V	10
87	35691	GW01582WC	11/19/93	CHROMIUM	3	0	UG/L	U	10	0	V	50
88	35691	GW01582WC	11/19/93	COPPER	2	0	UG/L	B	25	0	V	200
89	35691	GW01582WC	11/19/93	IRON	4	0	UG/L	U	100	0	V	300
90	35691	GW01582WC	11/19/93	LEAD	1	0	UG/L	U	3	0	V	50
91	35691	GW01582WC	11/19/93	LITHIUM	31	7	UG/L	B	100	0	V	2500
92	35691	GW01582WC	11/19/93	MANGANESE	4	1	UG/L	U	15	0	JA	50
93	35691	GW01582WC	11/19/93	MERCURY	0	2	UG/L	U	0	2	V	2
94	35691	GW01582WC	11/19/93	MOLYBDENUM	6	0	UG/L	U	200	0	V	100
95	35691	GW01582WC	11/19/93	NICKEL	8	0	UG/L	U	40	0	V	200
96	35691	GW01582WC	11/19/93	SELENIUM	4	6	UG/L	B	5	0	V	10
97	35691	GW01582WC	11/19/93	SILVER	3	0	UG/L	U	10	0	V	50
98	35691	GW01582WC	11/19/93	THALLIUM	2	0	UG/L	U	10	0	V	10
99	35691	GW01582WC	11/19/93	VANADIUM	5	1	UG/L	B	50	0	V	100
100	35691	GW01582WC	11/19/93	ZINC	10	2	UG/L	U	20	0	JA	2000

Res lts f v l d t d VOA d ta fo 881 T eatme t Pla t
D t for samples collected July September and October Decembe 1993 sampl ng per ods 14 43 Monday April 18 1994

OBS	LOCATION	SAMPLE	SDATE	ANALYTE	RESULT	UNITS	QUAL	DETECT	VAL	ARAR
1	10492	GW01231WC	09/23/93	1 1 1 TRICHLOROETHANE	0 1	UG/L	U	0 1	V	200
2	10492	GW01231WC	09/23/93	1 1 DICHLOROETHANE	0 1	UG/L	U	0 1	V	5
3	10492	GW01231WC	09/23/93	1 1 DICHLOROETHENE	0 2	UG/L	U	0 2	V	7
4	10492	GW01231WC	09/23/93	1 2 DICHLOROETHANE	0 4	UG/L	U	0 4	V	5
5	10492	GW01231WC	09/23/93	CARBON TETRACHLORIDE	0 2	UG/L	U	0 2	V	5
6	10492	GW01231WC	09/23/93	METHYLENE CHLORIDE	0 1	UG/L	U	0 1	V	5
7	10492	GW01231WC	09/23/93	TETRACHLOROETHENE	0 1	UG/L	U	0 1	V	5
8	10492	GW01231WC	09/23/93	TOLUENE	0 1	UG/L	U	0 1	V	2000
9	10492	GW01231WC	09/23/93	TRICHLOROETHENE	0 1	UG/L	U	0 1	V	5
10	10492	GW01483WC	11/12/93	1 1 1 TRICHLOROETHANE	0 1	UG/L	U	0 1	V	200
11	10492	GW01483WC	11/12/93	1 1 DICHLOROETHANE	0 1	UG/L	U	0 1	V	5
12	10492	GW01483WC	11/12/93	1 1 DICHLOROETHENE	0 2	UG/L	U	0 2	V	7
13	10492	GW01483WC	11/12/93	1 2 DICHLOROETHANE	0 4	UG/L	U	0 4	V	5
14	10492	GW01483WC	11/12/93	CARBON TETRACHLORIDE	0 2	UG/L	U	0 2	V	5
15	10492	GW01483WC	11/12/93	METHYLENE CHLORIDE	0 1	UG/L	U	0 1	V	5
16	10492	GW01483WC	11/12/93	TETRACHLOROETHENE	0 1	UG/L	U	0 1	V	5
17	10492	GW01483WC	11/12/93	TOLUENE	0 1	UG/L	U	0 1	V	2000
18	10492	GW01483WC	11/12/93	TRICHLOROETHENE	0 1	UG/L	U	0 1	V	5
19	10592	GW01232WC	09/23/93	1 1 1 TRICHLOROETHANE	0 1	UG/L	U	0 1	V	200
20	10592	GW01232WC	09/23/93	1 1 DICHLOROETHANE	0 1	UG/L	U	0 1	V	5
21	10592	GW01232WC	09/23/93	1 1 DICHLOROETHENE	0 2	UG/L	U	0 2	V	7
22	10592	GW01232WC	09/23/93	1 2 DICHLOROETHANE	0 4	UG/L	U	0 4	V	5
23	10592	GW01232WC	09/23/93	CARBON TETRACHLORIDE	0 2	UG/L	U	0 2	V	5
24	10592	GW01232WC	09/23/93	METHYLENE CHLORIDE	0 1	UG/L	U	0 1	V	5
25	10592	GW01232WC	09/23/93	TETRACHLOROETHENE	0 1	UG/L	U	0 1	V	5
26	10592	GW01232WC	09/23/93	TOLUENE	0 1	UG/L	U	0 1	V	2000
27	10592	GW01232WC	09/23/93	TRICHLOROETHENE	0 1	UG/L	U	0 1	V	5
28	10592	GW01484WC	11/12/93	1 1 1 TRICHLOROETHANE	0 1	UG/L	U	0 1	V	200
29	10592	GW01484WC	11/12/93	1 1 DICHLOROETHANE	0 1	UG/L	U	0 1	V	5
30	10592	GW01484WC	11/12/93	1 1 DICHLOROETHENE	0 2	UG/L	U	0 2	V	7
31	10592	GW01484WC	11/12/93	1 2 DICHLOROETHANE	0 4	UG/L	U	0 4	V	5
32	10592	GW01484WC	11/12/93	CARBON TETRACHLORIDE	0 2	UG/L	U	0 2	V	5
33	10592	GW01484WC	11/12/93	METHYLENE CHLORIDE	0 1	UG/L	U	0 1	V	5
34	10592	GW01484WC	11/12/93	TETRACHLOROETHENE	0 1	UG/L	U	0 1	V	5
35	10592	GW01484WC	11/12/93	TOLUENE	0 1	UG/L	U	0 1	V	2000
36	10592	GW01484WC	11/12/93	TRICHLOROETHENE	0 1	UG/L	U	0 1	V	5
37	10692	GW01233WC	09/23/93	1 1 1 TRICHLOROETHANE	0 1	UG/L	U	0 1	V	200
38	10692	GW01233WC	09/23/93	1 1 DICHLOROETHANE	0 1	UG/L	U	0 1	V	5
39	10692	GW01233WC	09/23/93	1 1 DICHLOROETHENE	0 2	UG/L	U	0 2	V	7
40	10692	GW01233WC	09/23/93	1 2 DICHLOROETHANE	0 4	UG/L	U	0 4	V	5
41	10692	GW01233WC	09/23/93	CARBON TETRACHLORIDE	0 2	UG/L	U	0 2	V	5
42	10692	GW01233WC	09/23/93	METHYLENE CHLORIDE	0 1	UG/L	U	0 1	V	5
43	10692	GW01233WC	09/23/93	TETRACHLOROETHENE	0 1	UG/L	U	0 1	V	5
44	10692	GW01233WC	09/23/93	TOLUENE	0 1	UG/L	U	0 1	V	2000
45	10692	GW01233WC	09/23/93	TRICHLOROETHENE	0 1	UG/L	U	0 1	V	5
46	10692	GW01485WC	11/12/93	1 1 1 TRICHLOROETHANE	0 1	UG/L	U	0 1	V	200
47	10692	GW01485WC	11/12/93	1 1 DICHLOROETHANE	0 1	UG/L	U	0 1	V	5
48	10692	GW01485WC	11/12/93	1 1 DICHLOROETHENE	0 2	UG/L	U	0 2	V	7
49	10692	GW01485WC	11/12/93	1 2 DICHLOROETHANE	0 4	UG/L	U	0 4	V	5
50	10692	GW01485WC	11/12/93	CARBON TETRACHLORIDE	0 2	UG/L	U	0 2	V	5
51	10692	GW01485WC	11/12/93	METHYLENE CHLORIDE	0 1	UG/L	U	0 1	V	5
52	10692	GW01485WC	11/12/93	TETRACHLOROETHENE	0 1	UG/L	U	0 1	V	5
53	10692	GW01485WC	11/12/93	TOLUENE	0 1	UG/L	U	0 1	V	2000
54	10692	GW01485WC	11/12/93	TRICHLOROETHENE	0 1	UG/L	U	0 1	V	5
55	10792	GW01234WC	09/21/93	1 1 1 TRICHLOROETHANE	0 1	UG/L	U	0 1	V	200
56	10792	GW01234WC	09/21/93	1 1 DICHLOROETHANE	0 1	UG/L	U	0 1	V	5
57	10792	GW01234WC	09/21/93	1 1 DICHLOROETHENE	0 2	UG/L	U	0 2	V	7
58	10792	GW01234WC	09/21/93	1 2 DICHLOROETHANE	0 4	UG/L	U	0 4	V	5
59	10792	GW01234WC	09/21/93	CARBON TETRACHLORIDE	0 2	UG/L	U	0 2	V	5
60	10792	GW01234WC	09/21/93	METHYLENE CHLORIDE	0 1	UG/L	U	0 1	V	5
61	10792	GW01234WC	09/21/93	TETRACHLOROETHENE	0 9	UG/L		0 1	V	5
62	10792	GW01234WC	09/21/93	TOLUENE	34 0	UG/L		0 1	V	2000
63	10792	GW01234WC	09/21/93	TRICHLOROETHENE	0 1	UG/L		0 1	V	5
64	10792	GW01486WC	11/12/93	1 1 1 TRICHLOROETHANE	0 1	UG/L	U	0 1	V	200

65	10792	GW01486WC	11/12/93	1 1 DICHLOROETHANE	0 1	UG/L	U	0 1	V	5
66	10792	GW01486WC	11/12/93	1 1 DICHLOROETHENE	0 2	UG/L	U	0 2	V	7
67	10792	GW01486WC	11/12/93	1 2 DICHLOROETHANE	0 4	UG/L	U	0 4	V	5
68	10792	GW01486WC	11/12/93	CARBON TETRACHLORIDE	0 2	UG/L	U	0 2	V	5
69	10792	GW01486WC	11/12/93	METHYLENE CHLORIDE	0 1	UG/L	U	0 1	V	5
70	10792	GW01486WC	11/12/93	TETRACHLOROETHENE	0 8	UG/L		0 1	V	5
71	10792	GW01486WC	11/12/93	TOLUENE	6 0	UG/L		0 1	V	2000
72	10792	GW01486WC	11/12/93	TRICHLOROETHENE	0 1	UG/L	U	0 1	V	5
73	10992	GW01235WC	09/22/93	1 1 1 TRICHLOROETHANE	0 1	UG/L	U	0 1	V	200
74	10992	GW01235WC	09/22/93	1 1 DICHLOROETHANE	0 1	UG/L	U	0 1	V	5
75	10992	GW01235WC	09/22/93	1 1 DICHLOROETHENE	0 2	UG/L	U	0 2	V	7
76	10992	GW01235WC	09/22/93	1 2 DICHLOROETHANE	0 4	UG/L	U	0 4	V	5
77	10992	GW01235WC	09/22/93	CARBON TETRACHLORIDE	0 2	UG/L	U	0 2	V	5
78	10992	GW01235WC	09/22/93	METHYLENE CHLORIDE	0 1	UG/L	U	0 1	V	5
79	10992	GW01235WC	09/22/93	TETRACHLOROETHENE	0 1	UG/L	U	0 1	V	5
80	10992	GW01235WC	09/22/93	TOLUENE	0 1	UG/L	U	0 1	V	2000
81	10992	GW01235WC	09/22/93	TRICHLOROETHENE	0 1	UG/L	U	0 1	V	5
82	10992	GW01487WC	11/11/93	1 1 1 TRICHLOROETHANE	0 1	UG/L	U	0 1	V	200
83	10992	GW01487WC	11/11/93	1 1 DICHLOROETHANE	0 1	UG/L	U	0 1	V	5
84	10992	GW01487WC	11/11/93	1 1 DICHLOROETHENE	0 2	UG/L	U	0 2	V	7
85	10992	GW01487WC	11/11/93	1 2 DICHLOROETHANE	0 4	UG/L	U	0 4	V	5
86	10992	GW01487WC	11/11/93	CARBON TETRACHLORIDE	0 2	UG/L	U	0 2	V	5
87	10992	GW01487WC	11/11/93	METHYLENE CHLORIDE	0 1	UG/L	U	0 1	V	5
88	10992	GW01487WC	11/11/93	TETRACHLOROETHENE	0 1	UG/L	U	0 1	V	5
89	10992	GW01487WC	11/11/93	TOLUENE	0 1	UG/L	U	0 1	V	2000
90	10992	GW01487WC	11/11/93	TRICHLOROETHENE	0 1	UG/L	U	0 1	V	5
91	11092	GW01236WC	09/21/93	1 1 1 TRICHLOROETHANE	0 1	UG/L	U	0 1	V	200
92	11092	GW01236WC	09/21/93	1 1 DICHLOROETHANE	0 1	UG/L	U	0 1	V	5
93	11092	GW01236WC	09/21/93	1 1 DICHLOROETHENE	0 2	UG/L	U	0 2	V	7
94	11092	GW01236WC	09/21/93	1 2 DICHLOROETHANE	0 4	UG/L	U	0 4	V	5
95	11092	GW01236WC	09/21/93	CARBON TETRACHLORIDE	0 2	UG/L	U	0 2	V	5
96	11092	GW01236WC	09/21/93	METHYLENE CHLORIDE	0 1	UG/L	U	0 1	V	5
97	11092	GW01236WC	09/21/93	TETRACHLOROETHENE	0 1	UG/L	U	0 1	V	5
98	11092	GW01236WC	09/21/93	TOLUENE	0 1	UG/L	U	0 1	V	2000
99	11092	GW01236WC	09/21/93	TRICHLOROETHENE	0 1	UG/L	U	0 1	V	5
100	11092	GW01488WC	11/11/93	1 1 1 TRICHLOROETHANE	0 1	UG/L	U	0 1	V	200
101	11092	GW01488WC	11/11/93	1 1 DICHLOROETHANE	0 1	UG/L	U	0 1	V	5
102	11092	GW01488WC	11/11/93	1 1 DICHLOROETHENE	0 2	UG/L	U	0 2	V	7
103	11092	GW01488WC	11/11/93	1 2 DICHLOROETHANE	0 4	UG/L	U	0 4	V	5
104	11092	GW01488WC	11/11/93	CARBON TETRACHLORIDE	0 2	UG/L	U	0 2	V	5
105	11092	GW01488WC	11/11/93	METHYLENE CHLORIDE	0 1	UG/L	U	0 1	V	5
106	11092	GW01488WC	11/11/93	TETRACHLOROETHENE	0 1	UG/L	U	0 1	V	5
107	11092	GW01488WC	11/11/93	TOLUENE	0 1	UG/L	U	0 1	V	2000
108	11092	GW01488WC	11/11/93	TRICHLOROETHENE	0 1	UG/L	U	0 1	V	5
109	35691	GW01328WC	09/15/93	1 1 1 TRICHLOROETHANE	0 1	UG/L	U	0 1	V	200
110	35691	GW01328WC	09/15/93	1 1 DICHLOROETHANE	0 1	UG/L	U	0 1	V	5
111	35691	GW01328WC	09/15/93	1 1 DICHLOROETHENE	0 2	UG/L	U	0 2	V	7
112	35691	GW01328WC	09/15/93	1 2 DICHLOROETHANE	0 4	UG/L	U	0 4	V	5
113	35691	GW01328WC	09/15/93	CARBON TETRACHLORIDE	0 2	UG/L	U	0 2	V	5
114	35691	GW01328WC	09/15/93	METHYLENE CHLORIDE	0 1	UG/L	U	0 1	V	5
115	35691	GW01328WC	09/15/93	TETRACHLOROETHENE	0 1	UG/L	U	0 1	V	5
116	35691	GW01328WC	09/15/93	TOLUENE	0 1	UG/L	U	0 1	V	2000
117	35691	GW01328WC	09/15/93	TRICHLOROETHENE	0 1	UG/L	U	0 1	V	5
118	35691	GW01582WC	11/19/93	1 1 1 TRICHLOROETHANE	0 1	UG/L	U	0 1	V	200
119	35691	GW01582WC	11/19/93	1 1 DICHLOROETHANE	0 1	UG/L	U	0 1	V	5
120	35691	GW01582WC	11/19/93	1 1 DICHLOROETHENE	0 2	UG/L	U	0 2	V	7
121	35691	GW01582WC	11/19/93	1 2 DICHLOROETHANE	0 4	UG/L	U	0 4	JA	5
122	35691	GW01582WC	11/19/93	CARBON TETRACHLORIDE	0 2	UG/L	U	0 2	V	5
123	35691	GW01582WC	11/19/93	METHYLENE CHLORIDE	0 1	UG/L	U	0 1	V	5
124	35691	GW01582WC	11/19/93	TETRACHLOROETHENE	0 1	UG/L	U	0 1	JA	5
125	35691	GW01582WC	11/19/93	TOLUENE	0 1	UG/L	U	0 1	JA	2000
126	35691	GW01582WC	11/19/93	TRICHLOROETHENE	0 1	UG/L	U	0 1	JA	5
127	45391	GW01360WC	09/22/93	1 1 1 TRICHLOROETHANE	0 1	UG/L	U	0 1	V	200
128	45391	GW01360WC	09/22/93	1 1 DICHLOROETHANE	0 1	UG/L	U	0 1	V	5
129	45391	GW01360WC	09/22/93	1 1 DICHLOROETHENE	0 2	UG/L	U	0 2	V	7
130	45391	GW01360WC	09/22/93	1 2 DICHLOROETHANE	0 4	UG/L	U	0 4	V	5
131	45391	GW01360WC	09/22/93	CARBON TETRACHLORIDE	0 2	UG/L	U	0 2	V	5
132	45391	GW01360WC	09/22/93	METHYLENE CHLORIDE	0 1	UG/L	U	0 1	V	5
133	45391	GW01360WC	09/22/93	TETRACHLOROETHENE	0 5	UG/L		0 1	V	5

134	45391	GW01360WC	09/22/93	TOLUENE	0 1	UG/L	U	0 1	V	2000
135	45391	GW01360WC	09/22/93	TRICHLOROETHENE	0 2	UG/L		0 1	V	5
136	45391	GW01489WC	11/12/93	1 1 1 TRICHLOROETHANE	0 1	UG/L	U	0 1	V	200
137	45391	GW01489WC	11/12/93	1 1 DICHLOROETHANE	0 1	UG/L	U	0 1	V	5
138	45391	GW01489WC	11/12/93	1 1 DICHLOROETHENE	0 2	UG/L	U	0 2	V	7
139	45391	GW01489WC	11/12/93	1 2 DICHLOROETHANE	0 4	UG/L	U	0 4	V	5
140	45391	GW01489WC	11/12/93	CARBON TETRACHLORIDE	0 2	UG/L	U	0 2	V	5
141	45391	GW01489WC	11/12/93	METHYLENE CHLORIDE	0 1	UG/L	U	0 1	V	5
142	45391	GW01489WC	11/12/93	TETRACHLOROETHENE	0 1	UG/L	U	0 1	V	5
143	45391	GW01489WC	11/12/93	TOLUENE	0 1	UG/L	U	0 1	V	2000
144	45391	GW01489WC	11/12/93	TRICHLOROETHENE	0 1	UG/L	U	0 1	V	5

APPENDIX B

881 Footing Drain Metals October December 93

Sample Number	FT10106RG	FT10111RG	FT10140RG				
Sample Date	27 OCT 93	30 NOV 93	14 DEC 93				
	(total)	(dissolved)	(dissolved)				
Chemical		Result		Qualifier	Max Value Unit Measure	ARAR	# SAM > ARAR
ALUMINUM	38 30	21 00	33 50	U	38 30 UG/L	5000	0
ANTIMONY	16 00	16 00	18 00	U	18 00 UG/L	60	0
ARSENIC	1 10	1 00	1 00	U	1 10 UG/L	50	0
BARIUM	154 00	162 00	168 00	B	168 00 UG/L	1000	0
BERYLLIUM	1 00	1 00	1 00	U	1 00 UG/L	100	0
CADMIUM	3 00	3 00	4 00	U	4 00 UG/L	10	0
CALCIUM	97700 00	98300 00	106000 00		106000 00 UG/L		
CESIUM	63 00	63 00	85 00	U	85 00 UG/L		
CHROMIUM	3 50	3 00	3 00	B	3 50 UG/L	50	0
COBALT	3 50	3 00	4 00	B	4 00 UG/L		
COPPER	2 00	2 00	2 00	U	2 00 UG/L	200	0
IRON	12 70	18 40	17 80	B	18 40 UG/L	300	0
LEAD	1 00	2 00	1 00	U	2 00 UG/L	50	0
LITHIUM	13 20	13 80	13 80	B	13 80 UG/L	2500	0
MAGNESIUM	20300 00	21300 00	22300 00		22300 00 UG/L		
MANGANESE	1 70	1 00	1 60	U	1 70 UG/L	50	0
MERCURY	0 20	0 20	0 20	U	0 20 UG/L	2	0
MOLYBDENUM	6 00	6 00	7 50	U	7 50 UG/L	100	0
NICKEL	8 00	8 00	8 00	U	8 00 UG/L	200	0
POTASSIUM	2970 00	2840 00	2920 00	B	2970 00 UG/L		
SELENIUM	2 30	3 40	2 30	U	3 40 UG/L	10	0
SILICON	6890 00	6600 00	6990 00		6990 00 UG/L		
SILVER	3 00	3 00	2 00	U	3 00 UG/L	50	0
SODIUM	42500 00	46000 00	49000 00		49000 00 UG/L		
STRONTIUM	654 00	686 00	715 00		715 00 UG/L		
THALLIUM	2 00	2 00	1 00	U	2 00 UG/L	10	0
TIN	21 00	21 00	25 00	U	25 00 UG/L		
VANADIUM	2 00	2 00	3 00	U	3 00 UG/L	100	0
ZINC	38 10	43 80	32 70		43 80 UG/L	2000	0

881 French Drain Sump Metals October December 93

Sample Number	FT10107RG	FT10113RG	FT10142RG				
Sample Date	27 OCT 93	30 NOV 93	14 DEC 93				
Chemical	Result			Qualifier	Max Value	Unit Measure	ARAR	# SAM > ARAR
ALUMINUM	26 40	21 00	29 30	U	29 30	UG/L	5000	0
ANTIMONY	16 00	16 00	18 00	U	18 00	UG/L	60	0
ARSENIC	3 60	5 10	4 50	U	5 10	UG/L	50	0
BARIUM	167 00	162 00	184 00	B	184 00	UG/L	1000	0
BERYLLIUM	1 00	1 00	1 00	U	1 00	UG/L	100	0
CADMIUM	3 00	3 00	4 00	U	4 00	UG/L	10	0
CALCIUM	105000 00	96100 00	108000 00		108000 00	UG/L		
CESIUM	63 00	63 00	85 00	U	85 00	UG/L		
CHROMIUM	3 40	3 00	3 00	B	3 40	UG/L	50	0
COBALT	3 00	3 00	4 00	U	4 00	UG/L		
COPPER	2 00	2 00	2 90	U	2 90	UG/L	200	0
IRON	12 90	14 40	23 10	B	14 40	UG/L	300	0
LEAD	1 40	2 30	1 00	B	2 30	UG/L	50	0
LITHIUM	16 30	14 90	16 40	B	16 40	UG/L	2500	0
MAGNESIUM	22200 00	21300 00	23600 00		23600 00	UG/L		
MANGANESE	2 40	1 00	1 30	U	2 40	UG/L	50	0
MERCURY	0 20	0 20	0 20	U	0 20	UG/L	2	0
MOLYBDENUM	6 00	6 00	6 00	U	6 00	UG/L	100	0
NICKEL	8 00	8 00	8 00	U	8 00	UG/L	200	0
POTASSIUM	3120 00	2640 00	2890 00	B	3120 00	UG/L		
SELENIUM	6 90	6 20	5 70	N	6 90	UG/L	10	0
SILICON	7180 00	6440 00	7120 00		7180 00	UG/L		
SILVER	3 00	3 00	2 00	U	3 00	UG/L	50	0
SODIUM	50400 00	49200 00	55000 00		55000 00	UG/L		
STRONTIUM	726 00	689 00	760 00		760 00	UG/L		
THALLIUM	2 00	2 00	1 00	U	2 00	UG/L	10	0
TIN	21 00	21 00	25 00	U	25 00	UG/L		
VANADIUM	2 00	2 00	3 00	U	3 00	UG/L	100	0
ZINC	169 00	347 00	102 00		347 00	UG/L	2000	0

881 French Drain Sump RADS October December 1993

Sample Number	Sample Date	Chemical	Result	Unit Measure	Error	Qualifier	ARARS	# SAM > ARAR
FT10107RG	27 OCT 93	AMERICIUM 241	0 006	PCI/L	0 007	U	4	0
		GROSS ALPHA	4 6	PCI/L	2 5		15	0
		GROSS BETA	5 7	PCI/L	1 6		50	0
		PLUTONIUM 239/240	0 005	PCI/L	0 009	U	15	0
		STRONTIUM 89 90	0 014	PCI/L	0 088	U	8	0
		TOTAL RADIOCESIUM	0 090	PCI/L	0 11	U		
		TRITIUM	40	PCI/L	120	U	20 000	0
		URANIUM 233 234	4 0	PCI/L	0 50			
		URANIUM 235	0 13	PCI/L	0 086	J		
		URANIUM 238	2 8	PCI/L	0 40			
		TOTAL URANIUM	6 93				40	0
FT10113RG	30 NOV 93	AMERICIUM 241	0 001	PCI/L	0 007	U	4	0
		GROSS ALPHA	1 9	PCI/L	1 6	U	15	0
		GROSS BETA	6 5	PCI/L	1 6		50	0
		PLUTONIUM 239/240	0	PCI/L	0 002	U	15	0
		STRONTIUM 89 90	0 17	PCI/L	0 27	U	8	0
		TOTAL RADIOCESIUM	0 18	PCI/L	0 30	U		
		TRITIUM	68	PCI/L	140	U	20 000	0
		URANIUM 233 234	4 3	PCI/L	0 86			
		URANIUM 235	0 14	PCI/L	0 14	U		
		URANIUM 238	2 5	PCI/L	0 57			
		TOTAL URANIUM	6 94				40	0
FT10142RG	14 DEC 93	AMERICIUM 241	0 001	PCI/L	0 001	U	4	0
		GROSS ALPHA	3 0	PCI/L	1 8		15	0
		GROSS BETA	3 6	PCI/L	1 5	J	50	0
		PLUTONIUM 239/240	0	PCI/L	0 002	U	15	0
		STRONTIUM 89 90	0 028	PCI/L	0 11	U	8	0
		TOTAL RADIOCESIUM	0 076	PCI/L	0 12	U		
		TRITIUM	22	PCI/L	150	U	20 000	0
		URANIUM 233 234	3 2	PCI/L	0 55			
		URANIUM 235	0 21	PCI/L	0 13	J		
		URANIUM 238	2 7	PCI/L	0 51			
		TOTAL URANIUM	6 11				40	0

881 Footing Drain RADS October December 1993

Sample Number	Sample Date	Chemical	Result	Unit Measure	Error	Qualifier	ARARS	# SAM > ARAR
FT10106RG	27 OCT 93	AMERICIUM 241	0 010	PCI/L	0 006		4	0
		GROSS ALPHA	6 2	PCI/L	1 8		15	0
		GROSS BETA	7 1	PCI/L	1 2		50	0
		PLUTONIUM 239/240	0 006	PCI/L	0 004	U	15	0
		STRONTIUM 89 90	0 004	PCI/L	0 19	U	8	0
		TOTAL RADIOCESIUM	0 052	PCI/L	0 12	U		
		TRITIUM	75	PCI/L	130	U	20000	0
		URANIUM 233 234	3 5	PCI/L	0 49			
		URANIUM 235	0 25	PCI/L	0 12	J		
		URANIUM 238	2 8	PCI/L	0 42			
		TOTAL URANIUM	6 55				40	0
FT10111RG	30 NOV 93	AMERICIUM 241	0 005	PCI/L	0 007	U	4	0
		GROSS ALPHA	2 0	PCI/L	1 8		15	0
		GROSS BETA	6 1	PCI/L	1 5		50	0
		PLUTONIUM 239/240	0 002	PCI/L	0 007	U	15	0
		STRONTIUM 89 90	0 12	PCI/L	0 19	U	8	0
		TOTAL RADIOCESIUM	0 095	PCI/L	0 28	U		
		TRITIUM	51	PCI/L	150	U	20000	0
		URANIUM 233 234	3 5	PCI/L	0 80			
		URANIUM 235	0 31	PCI/L	0 23	J		
		URANIUM 238	3 0	PCI/L	0 72			
		TOTAL URANIUM	6 81				40	0
FT10140RG	14 DEC 93	AMERICIUM 241	0	PCI/L	0 003	U	4	0
		GROSS ALPHA	3 5	PCI/L	2 3		15	0
		GROSS BETA	7 3	PCI/L	1 8		50	0
		PLUTONIUM 239/240	0	PCI/L	0 003	U	15	0
		STRONTIUM 89 90	0 037	PCI/L	0 13	U	8	0
		TOTAL RADIOCESIUM	0 037	PCI/L	0 091	U		
		TRITIUM	11	PCI/L	150	U	20000	0
		URANIUM 233 234	3 6	PCI/L	0 65			
		URANIUM 235	0 14	PCI/L	0 15	U		
		URANIUM 238	2 7	PCI/L	0 54			
		TOTAL URANIUM	6 44				40	0

881 F h D i S mp W t Q lty O t b D mb 1993

S mpl N mb	FT10107RG	FT10113RG	FT10142RG
S mpl D t	27 OCT 93	30 NOV 93	14 DEC 93

Chemi l	R lt		U it M	Q lf	M V l	ARAR	# SAM > ARAR
4 4 DDD	0 10	0 10	0 10 UG/L	U			
4 4 DDE	0 10	0 10	0 10 UG/L	U			
4 4 DDT	0 10	0 10	0 10 UG/L	U			
ALDRIN	0 050	0 050	0 050 UG/L	U			
AROCLOR 1016	0 50	0 50	0 50 UG/L	U			
AROCLOR 1221	0 50	0 50	0 50 UG/L	U			
AROCLOR 1232	0 50	0 50	0 50 UG/L	U			
AROCLOR 1242	0 50	0 50	0 50 UG/L	U			
AROCLOR 1248	0 50	0 50	0 50 UG/L	U			
AROCLOR 1254	1 0	1 0	1 0 UG/L	U			
AROCLOR 1260	1 0	1 0	1 0 UG/L	U			
BICARBONATE AS CACO3	240	230	250 MG/L				
CARBONATE	1	1	1 MG/L	U			
CHLORIDE	110	130	120 MG/L			250	0
DIELDRIN	0 10	0 10	0 10 UG/L	U			
ENDOSULFAN I	0 050	0 050	0 050 UG/L	U			
ENDOSULFAN II	0 10	0 10	0 10 UG/L	U			
ENDOSULFAN SULFATE	0 10	0 10	0 10 UG/L	U			
ENDRIN	0 10	0 10	0 10 UG/L	U			
ENDRIN KETONE	0 10	0 10	0 10 UG/L	U			
FLUORIDE	1 1	1 1	1 0 MG/L				
HEPTACHLOR	0 050	0 050	0 050 UG/L	U			
HEPTACHLOR EPOXIDE	0 050	0 050	0 050 UG/L	U			
METHOXYCHLOR	0 50	0 50	0 50 UG/L	U			
NITRATE/NITRITE	5 7		MG/L			10	0
SPECIFIC CONDUCTIVITY	930		UMHOS/CM				
SULFATE	60	60	59 MG/L			250	0
TOTAL DISSOLVED SOLIDS	510	620	570 MG/L		620	400	3
TOTAL SUSPENDED SOLIDS	4	4	4 MG/L	U			
TOXAPHENE	1 0	1 0	1 0 UG/L	U			
alpha BHC	0 050	0 050	0 050 UG/L	U			
lpha CHLORDANE	0 50	0 50	0 50 UG/L	U			
bet BHC	0 050	0 050	0 050 UG/L	U			
d lta BHC	0 050	0 050	0 050 UG/L	U			
g mm BHC (LINDANE)	0 050	0 050	0 050 UG/L	U			
g mma CHLORDANE	0 50	0 50	0 50 UG/L	U			
pH	8 05		PH				

881 F t g D i W t Q lty O t b D mb 1993

S mple N mb	FT10106RG	FT10111RG	FT10140RG
S mple D t	27 OCT 93	30 NOV 93	14 DEC 93

Ch mic l	R lt		U t M	Q lf	M V l	ARAR	# SAM > ARAR
4 4 DDD	0 10	0 10	0 10 UG/L	U			
4 4 DDE	0 10	0 10	0 10 UG/L	U			
4 4 DDT	0 10	0 10	0 10 UG/L	U			
ALDRIN	0 050	0 050	0 050 UG/L	U			
AROCLOR 1016	0 50	0 50	0 50 UG/L	U			
AROCLOR 1221	0 50	0 50	0 50 UG/L	U			
AROCLOR 1232	0 50	0 50	0 50 UG/L	U			
AROCLOR 1242	0 50	0 50	0 50 UG/L	U			
AROCLOR 1248	0 50	0 50	0 50 UG/L	U			
AROCLOR 1254	1 0	1 0	1 0 UG/L	U			
AROCLOR 1260	1 0	1 0	1 0 UG/L	U			
BICARBONATE AS CACO3	220	220	230 MG/L				
CARBONATE	1	1	1 MG/L	U			
CHLORIDE	110	140	120 MG/L			250	0
DIELDRIN	0 10	0 10	0 10 UG/L	U			
ENDOSULFAN I	0 050	0 050	0 050 UG/L	U			
ENDOSULFAN II	0 10	0 10	0 10 UG/L	U			
ENDOSULFAN SULFATE	0 10	0 10	0 10 UG/L	U			
ENDRIN	0 10	0 10	0 10 UG/L	U			
ENDRIN KETONE	0 10	0 10	0 10 UG/L	U			
FLUORIDE	1 1	1 1	1 1 MG/L				
HEPTACHLOR	0 050	0 050	0 050 UG/L	U			
HEPTACHLOR EPOXIDE	0 050	0 050	0 050 UG/L	U			
METHOXYCHLOR	0 50	0 50	0 50 UG/L	U			
NITRATE/NITRITE	6 2		MG/L			10	0
SPECIFIC CONDUCTIVITY	880		UMHOS/CM				
SULFATE	45	43	45 MG/L			250	0
TOTAL DISSOLVED SOLIDS	500	580	540 MG/L		580	400	3
TOTAL SUSPENDED SOLIDS	4	4	4 MG/L	U			
TOXAPHENE	1 0	1 0	1 0 UG/L	U			
alpha BHC	0 050	0 050	0 050 UG/L	U			
lpha CHLORDANE	0 50	0 50	0 50 UG/L	U			
b t BHC	0 050	0 050	0 050 UG/L	U			
delt BHC	0 050	0 050	0 050 UG/L	U			
g mma BHC (LINDANE)	0 050	0 050	0 050 UG/L	U			
gamma CHLORDANE	0 50	0 50	0 50 UG/L	U			
pH	8 15		PH				

881 F en h Dral Sump VOA Oct be Decembe 1993

S mpl Numbe	FT10107RG	FT10113RG	FT10142RG					
Sample D	27 OCT 93	30-NOV 93	14-DEC 93					
Chemical		Result		Unit M	re	Qualifie	ARAR	# SAM > ARAR
1 1 1 TRICHLOROETHANE	5	5	5	UG/L		U	200	0
1 1 2 2 TETRACHLOROETHANE	5	5	5	UG/L		U		
1 1 2 TRICHLOROETHANE	5	5	5	UG/L		U	5	0
1 1 DICHLOROETHANE	5	5	5	UG/L		U	5	0
1 1 DICHLOROETHENE	5	5	5	UG/L		U	7	0
1 2 4-TRICHLOROBENZENE	10	10	10	UG/L		U		
1 2 DICHLOROBENZENE	10	10	10	UG/L		U		
1 2 DICHLOROETHANE	5	5	5	UG/L		U	5	0
1 2 DICHLOROETHENE	5	5	5	UG/L		U		
1 2 DICHLOROPROPANE	5	5	5	UG/L		U		
1 3 DICHLOROBENZENE	10	10	10	UG/L		U		
1 4 DICHLOROBENZENE	10	10	10	UG/L		U		
2 4 5 TRICHLOROPHENOL	50	50	50	UG/L		U		
2 4 6 TRICHLOROPHENOL	10	10	10	UG/L		U		
2 4 DICHLOROPHENOL	10	10	10	UG/L		U		
2 4 DIMETHYLPHENOL	10	10	10	UG/L		U		
2 4 DINITROPHENOL	50	50	50	UG/L		U		
2 4 DINITROTOLUENE	10	10	10	UG/L		U		
2 6 DINITROTOLUENE	10	10	10	UG/L		U		
2 BUTANONE	10	10	10	UG/L		U		
2 CHLORONAPHTHALENE	10	10	10	UG/L		U		
2 CHLOROPHENOL	10	10	10	UG/L		U		
2 CYCLOHEXEN 1 ONE		18		UG/L		BJ		
2 HEXANONE	10	10	10	UG/L		U		
2 METHYLNAPHTHALENE	10	10	10	UG/L		U		
2 METHYLPHENOL	10	10	10	UG/L		U		
2 NITROANILINE	50	50	50	UG/L		U		
2 NITROPHENOL	10	10	10	UG/L		U		
2 PENTANONE 4 HYDROXY 4 MET		23		UG/L		JA		
3 3 DICHLOROBENZIDINE	20	20	20	UG/L		U		
3 NITROANILINE	50	50	50	UG/L		U		
4 6 DINITRO 2 METHYLPHENOL	50	50	50	UG/L		U		
4 CHLORO 3 METHYLPHENOL	10	10	10	UG/L		U		
4 CHLOROANILINE	10	10	10	UG/L		U		
4 CHLOROPHENYL P ENYL ETHER	10	10	10	UG/L		U		
4 METHYL 2 PENTANONE	10	10	10	UG/L		U		
4 METHYLPHENOL	10	10	10	UG/L		U		
4 NITROANILINE	50	50	50	UG/L		U		
4 NITROPHENOL	50	50	50	UG/L		U		
ACENAPHTHENE	10	10	10	UG/L		U		
ACENAPHTHYLENE	10	10	10	UG/L		U		
ACETONE	10	10	10	UG/L		U	50	0
ANTHRACENE	10	10	10	UG/L		U		
BENZENE	5	5	5	UG/L		U		
BENZO( )ANTHRACENE	10	10	10	UG/L		U		
BENZO( )PYRENE	10	10	10	UG/L		U		
BENZO(b)FLUORANTHENE	10	10	10	UG/L		U		
BENZO(ghi)PERYLENE		10	10	UG/L		U		
BENZO(k)FLUORANTHENE	10	10	10	UG/L		U		
BENZOIC ACID	50	50	50	UG/L		U		
BENZYL ALCOHOL	10	10	10	UG/L		U		
BIS(2 CHLOROETHOXY)METHANE	10	10	10	UG/L		U		
BIS(2 CHLOROETHYL)ETHER	10	10	10	UG/L		U		
BIS(2 CHLOROISOPROPYL)ETHER	10	10	10	UG/L		U		
BIS(2 ETHYLHEXYL)PHTHALATE	10	10	10	UG/L		U		
BROMODICHLOROMETHANE	5	5	5	UG/L		U		
BROMOFORM	5	5	5	UG/L		U		
BROMOMETHANE	10	10	10	UG/L		U		
BUTYL BENZYL PHTHALATE	10	10	10	UG/L		U		
CARBON DISULFIDE	5	5	5	UG/L		U	5	0
CARBON TETRACHLORIDE	5	5	5	UG/L		U	5	0
CHLOROBENZENE	5	5	5	UG/L		U		
CHLOROETHANE	10	10	10	UG/L		U		
CHLOROFORM	5	5	5	UG/L		U		
CHLOROMETHANE	10	10	10	UG/L		U		
CHRYSENE	10	10	10	UG/L		U		
DI n-BUTYL PHTHALATE	10	10	3 BJ	UG/L		U		
DI n-OCTYL P THALATE	10	10	10	UG/L		U		
DIBENZO(h)ANTHRACENE		10	10	UG/L		U		
DIBENZOFURAN	10	10	10	UG/L		U		

881 French Drai Sump VOA Octobe Decembe 1993

S mple Numbe	FT10107RG	FT10113RG	FT10142RG				
Sample D t	27 OCT 93	30-NOV 93	14 DEC 93				
Chemical		R lt		Unit M as re	Q lifie	ARAR	# SAM > ARAR
DIBROMOCHLOROMETHANE	5	5	5	UG/L	U		
DIETHYL PHTHALATE	10	10	4 J	UG/L	U		
DIMETHYL PHTHALATE	10	10	10	UG/L	U		
ETHYLBENZENE	5	5	5	UG/L	U		
FLUORANTHENE	10	10	10	UG/L	U		
FLUORENE	10	10	10	UG/L	U		
HEXACHLOROBENZENE	10	10	10	UG/L	U		
HEXACHLOROBUTADIENE	10	10	10	UG/L	U		
HEXACHLOROCYCLOPENTADIENE	10	10	10	UG/L	U		
HEXACHLOROETHANE	10	10	10	UG/L	U		
INDENO(1 2 3 d)PYRENE	10	10	10	UG/L	U		
ISOPHORONE	10	10	10	UG/L	U		
METHYLENE CHLORIDE	5	5	5	UG/L	U	5	0
N NITROSO-DI n-PROPYLAMINE	10	10	10	UG/L	U		
N NITROSODIPHENYLAMINE	10	10	10	UG/L	U		
NAPHTHALENE	10	10	10	UG/L	U		
NITROBENZENE	10	10	10	UG/L	U		
PENTACHLOROPHENOL	50	50	50	UG/L	U		
PHENANTHRENE	10	10	10	UG/L	U		
PHENOL	10	10	10	UG/L	U		
PYRENE	10	10	10	UG/L	U		
STYRENE	5	5	5	UG/L	U		
TETRACHLOROETHENE	5	2	1 J	UG/L	U	5	0
TOLUENE	5	5	5	UG/L	U	2000	0
TOTAL XYLENES	5	5	5	UG/L	U		
TRICHLOROETHENE	5	5	5	UG/L	U	5	0
UNKNOWN		44		UG/L	J		
VINYL ACETATE	10	10	10	UG/L	U		
VINYL CHLORIDE	10	10	10	UG/L	U		
1 3 DICHLOROPROPENE	5	5	5	UG/L	U		
p BROMODIPHENYL ETHER	10	10	10	UG/L	U		
t ns 1 3 DICHLOROPROPENE	5	5	5	UG/L	U		

881 F ting Drain VOA Octobe De embe 1993

S mpl Numbe	FT10106RG	FT10111RG	FT10140RG
S mpl D t	27 OCT 93	30-NOV 93	14 DEC 93

Chemical	Result			U it M as	Q alifie	ARAR	# SAM > ARAR
1 1 1 TRICHLOROETHANE	5	5	5	UG/L	U	200	0
1 1 2 2 TETRACHLOROETHANE	5	5	5	UG/L	U		
1 1 2 TRICHLOROETHANE	5	5	5	UG/L	U	5	0
1 1 DICHLOROETHANE	5	5	5	UG/L	U	5	0
1 1 DICHLOROETHENE	5	5	5	UG/L	U	7	0
1 2 4-TRICHLOROBENZENE	10	10	10	UG/L	U		
1 2 DICHLOROBENZENE	10	10	10	UG/L	U		
1 2 DICHLOROETHANE	5	5	5	UG/L	U	5	0
1 2 DICHLOROETHENE	5	5	5	UG/L	U		
1 2 DICHLOROPROPANE	5	5	5	UG/L	U		
1 3 DICHLOROBENZENE	10	10	10	UG/L	U		
1 4-DICHLOROBENZENE	10	10	10	UG/L	U		
2 4 5 TRICHLOROPHENOL	50	50	50	UG/L	U		
2 4 6 TRICHLOROPHENOL	10	10	10	UG/L	U		
2 4-DICHLOROPHENOL	10	10	10	UG/L	U		
2 4-DIMETHYLPHENOL	10	10	10	UG/L	U		
2 4-DINITROPHENOL	50	50	50	UG/L	U		
2 4 DINITROTOLUENE	10	10	10	UG/L	U		
2 6 DINITROTOLUENE	10	10	10	UG/L	U		
2 BUTANONE	10	10	10	UG/L	U		
2 CHLORONAPHTHALENE	10	10	10	UG/L	U		
2 CHLOROPHENOL	10	10	10	UG/L	U		
2 HEXANONE	10	10	10	UG/L	U		
2 METHYLNAPHTHALENE	10	10	10	UG/L	U		
2 METHYLPHENOL	10	10	10	UG/L	U		
2 NITROANILINE	50	50	50	UG/L	U		
2 NITROPHENOL	10	10	10	UG/L	U		
3 3 DICHLOROBENZIDINE	20	20	20	UG/L	U		
3 NITROANILINE	50	50	50	UG'L	U		
3 PENTEN-2 ONE 4 METHYL		35		UG/L	J		
4 6 DINITRO 2 METHYLPHENOL	50	50	50	UG/L	U		
4 CHLORO 3 METHYLPHENOL	10	10	10	UG/L	U		
4 CHLOROANILINE	10	10	10	UG/L	U		
4 CHLOROPHENYL PHENYL ETHER	10	10	10	UG/L	U		
4 METHYL 2 PENTANONE	10	10	10	UG/L	U		
4 METHYLPHENOL	10	10	10	UG/L	U		
4 NITROANILINE	50	50	50	UG/L	U		
4 NITROPHENOL	50	50	50	UG/L	U		
ACENAPHTHENE	10	10	10	UG/L	U		
ACENAPHTHYLENE	10	10	10	UG/L	U		
ACETONE	10	10	10	UG/L	U	50	0
ANTHRACENE	10	10	10	UG/L	U		
BENZENE	5	5	5	UG/L	U		
BENZO( )ANTHRACENE	10	10	10	UG/L	U		
BENZO( )PYRENE	10	10	10	UG/L	U		
BENZO(b)FLUORANTHENE	10	10	10	UG/L	U		
BENZO(gh)PERYLENE		10	10	UG/L	U		
BENZO(k)FLUORANTHENE	10	10	10	UG/L	U		
BENZOIC ACID	50	50	50	UG/L	U		
BENZYL ALCOHOL	10	10	10	UG/L	U		
BIS(2 CHLOROETHOXY)METHANE	10	10	10	UG/L	U		
BIS(2 CHLOROETHYL)ETHER	10	10	10	UG/L	U		
BIS(2 CHLOROISOPROPYL)ETHER	10	10	10	UG/L	U		
BIS(2 ETHYLHEXYL)PHTHALATE	10	13	4 J	UG/L	U		
BROMODICHLOROMETHANE	5	5	5	UG/L	U		
BROMOFORM	5	5	5	UG/L	U		
BROMOMETHANE	10	10	10	UG/L	U		
BUTYL BENZYL PHTHALATE	10	10	10	UG/L	U		
CARBON DISULFIDE	5	5	5	UG/L	U	5	0
CARBON TETRACHLORIDE	5	5	5	UG/L	U	5	0
CHLOROBENZENE	5	5	5	UG/L	U		
CHLOROETHANE	10	10	10	UG/L	U		
CHLOROFORM	5	5	5	UG/L	U		
CHLOROMETHANE	10	10	10	UG/L	U		
CHRYSENE	10	10	10	UG/L	U		
CYCLOPENTENE 3 ETHYL		33		UG/L	J		

881 Footing Drain VOA Oct be Decembe 1993

Sample Numbe	FT10106RG	FT10111RG	FT10140RG
S mple D	27 OCT 93	30-NOV 93	14-DEC 93

Ch mical	R ult			U It Measure	Qualifier	ARAR	# SAM > ARAR
DI n-BUTYL PHTHALATE	2	10 U	3 BJ	UG/L	J		
DI n-OCTYL PHTHALATE	10	10	10	UG/L	U		
DIBENZO(h)ANTHRACENE		10	10	UG/L	U		
DIBENZOFURAN	10	10	10	UG/L	U		
DIBROMOCHLOROMETHANE	5	5	5	UG/L	U		
DIETHYL PHTHALATE	10	10	10	UG/L	U		
DIMETHYL PHTHALATE	10	10	10	UG/L	U		
ETHYLBENZENE	5	5	5	UG/L	U		
FLUORANTHENE	10	10	10	UG/L	U		
FLUORENE	10	10	10	UG/L	U		
HEXACHLOROBENZENE	10	10	10	UG/L	U		
HEXACHLOROBUTADIENE	10	10	10	UG/L	U		
HEXACHLOROCYCLOPENTADIENE	10	10	10	UG/L	U		
HEXACHLOROETHANE	10	10	10	UG/L	U		
INDENO(1 2 3 d)PYRENE	10	10	10	UG/L	U		
ISOPHORONE	10	10	10	UG/L	U		
METHYLENE CHLORIDE	5	5	5	UG/L	U	5	0
N NITROSO-DI n-PROPYLAMINE	10	10	10	UG/L	U		
N NITROSODIPHENYLAMINE	10	10	10	UG/L	U		
NAPHTHALENE	10	10	10	UG/L	U		
NITROBENZENE	10	10	10	UG/L	U		
PENTACHLOROPHENOL	50	50	50	UG/L	U		
PHENANTHRENE	10	10	10	UG/L	U		
PHENOL	10	10	10	UG/L	U		
PYRENE	10	10	10	UG/L	U		
STYRENE	5	5	5	UG/L	U		
TETRACHLOROETHENE	1	3	1	UG/L	J	5	0
TOLUENE	5	5	5	UG/L	U	2000	0
TOTAL XYLENES	5	5	5	UG/L	U		
TRICHLOROETHENE	5	5	5	UG/L	U	5	0
VINYL ACETATE	10	10	10	UG/L	U		
VINYL CHLORIDE	10	10	10	UG/L	U		
1 3 DICHLOROPROPENE	5	5	5	UG/L	U		
p BROMODIPHENYL ETHER	10	10	10	UG/L	U		
ns 1 3 DICHLOROPROPENE	5	5	5	UG/L	U		

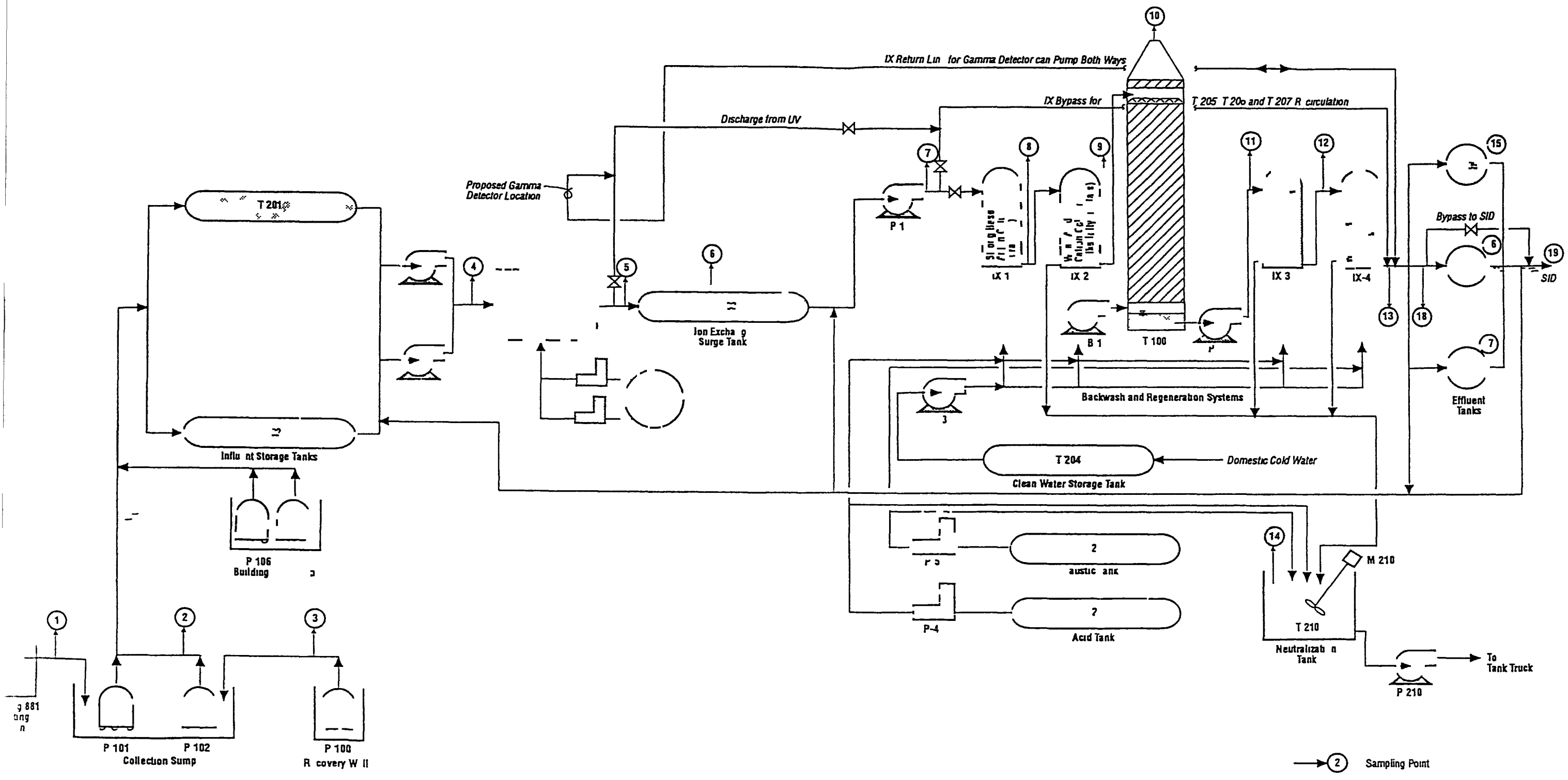
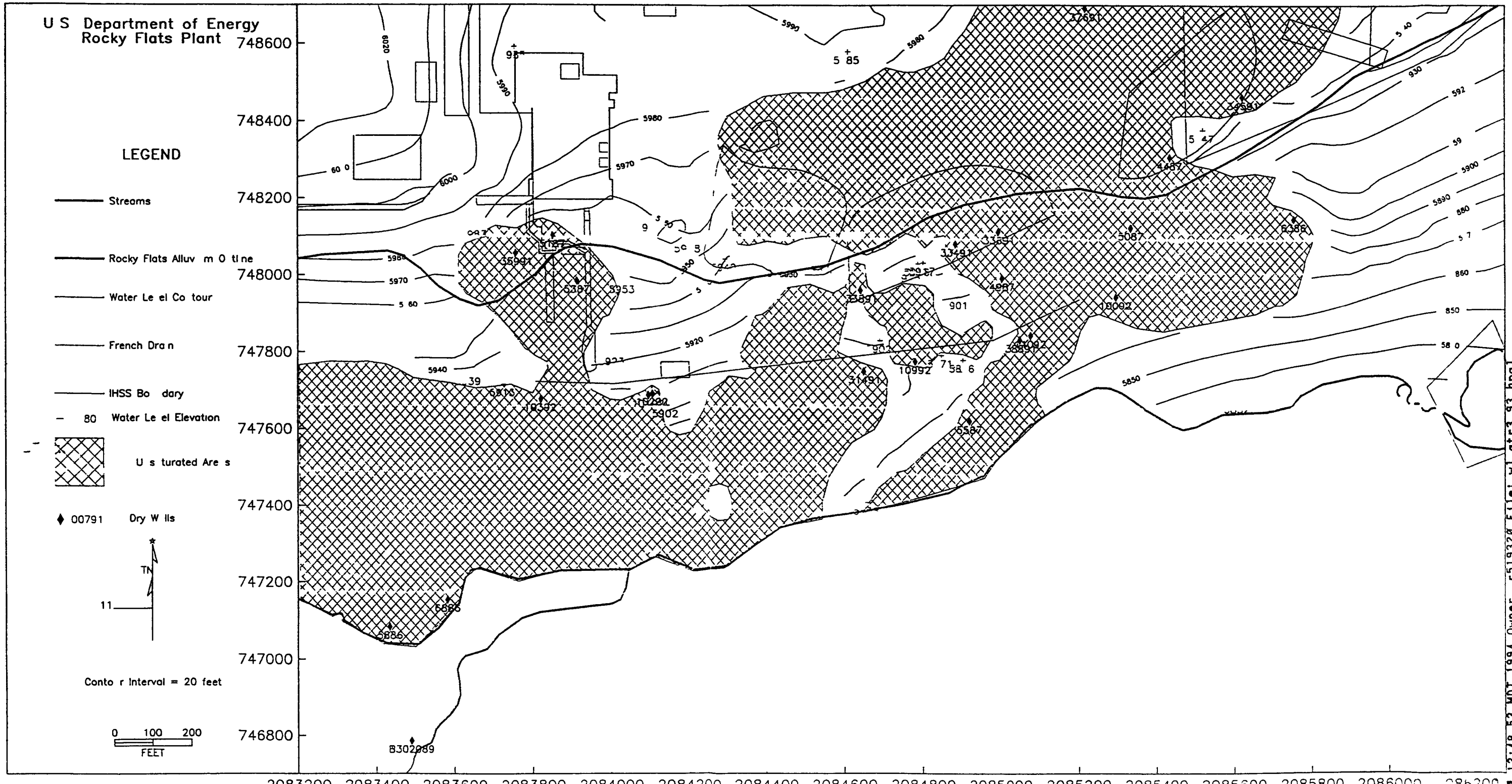


FIGURE 1 0 1
PROCESS FLOW DIAGRAM

FIGURE 9 1 1

Rocky Flats OU1 July – September 1993 Water Level Map



May 18 13:48 53 MDT 1994 Owner r519320 File: wl_qtr3_93 hpgl

FIGURE 9 1 2

Rocky Flats OU1 October – December 1993 Water Level Map

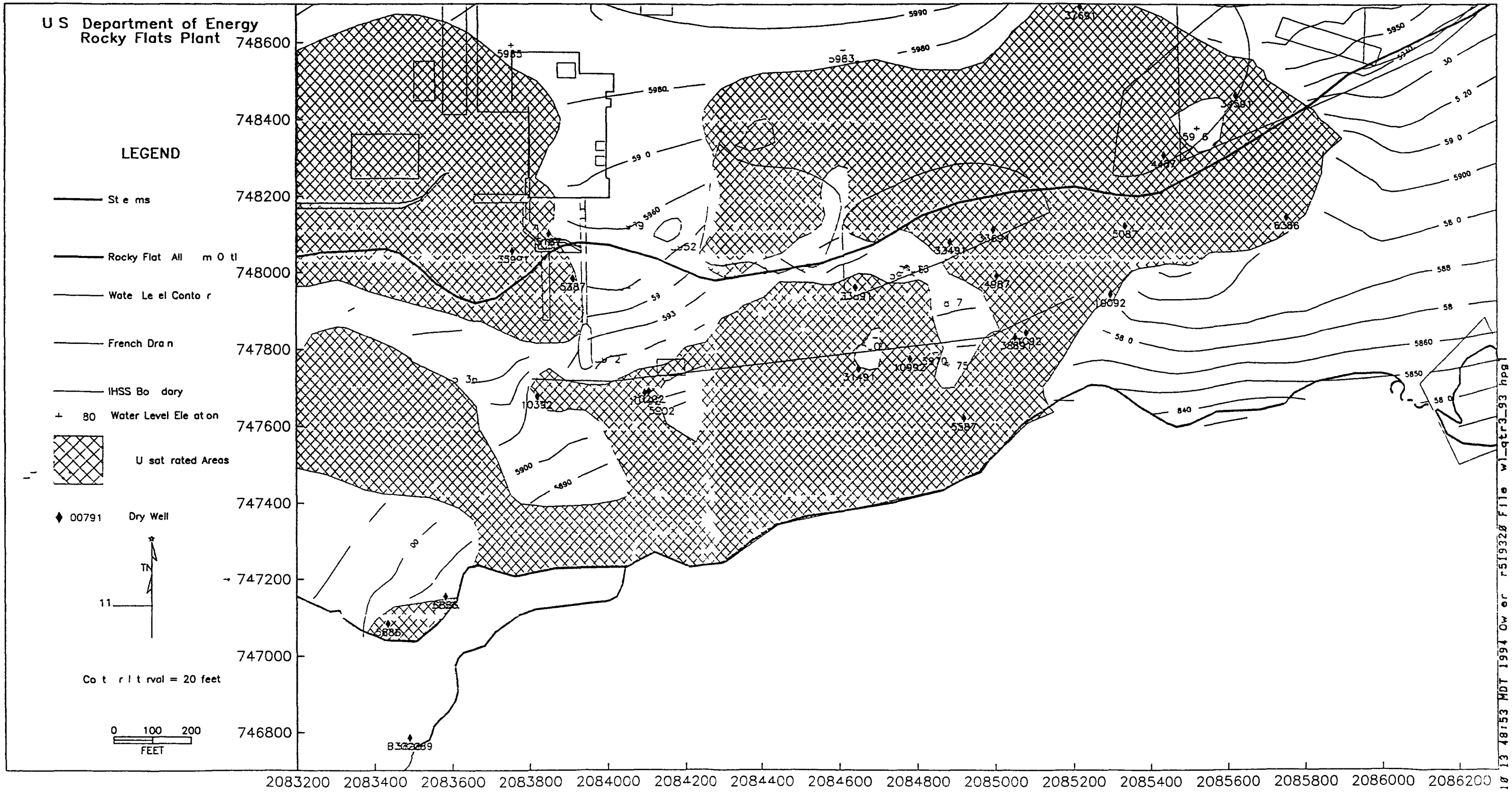
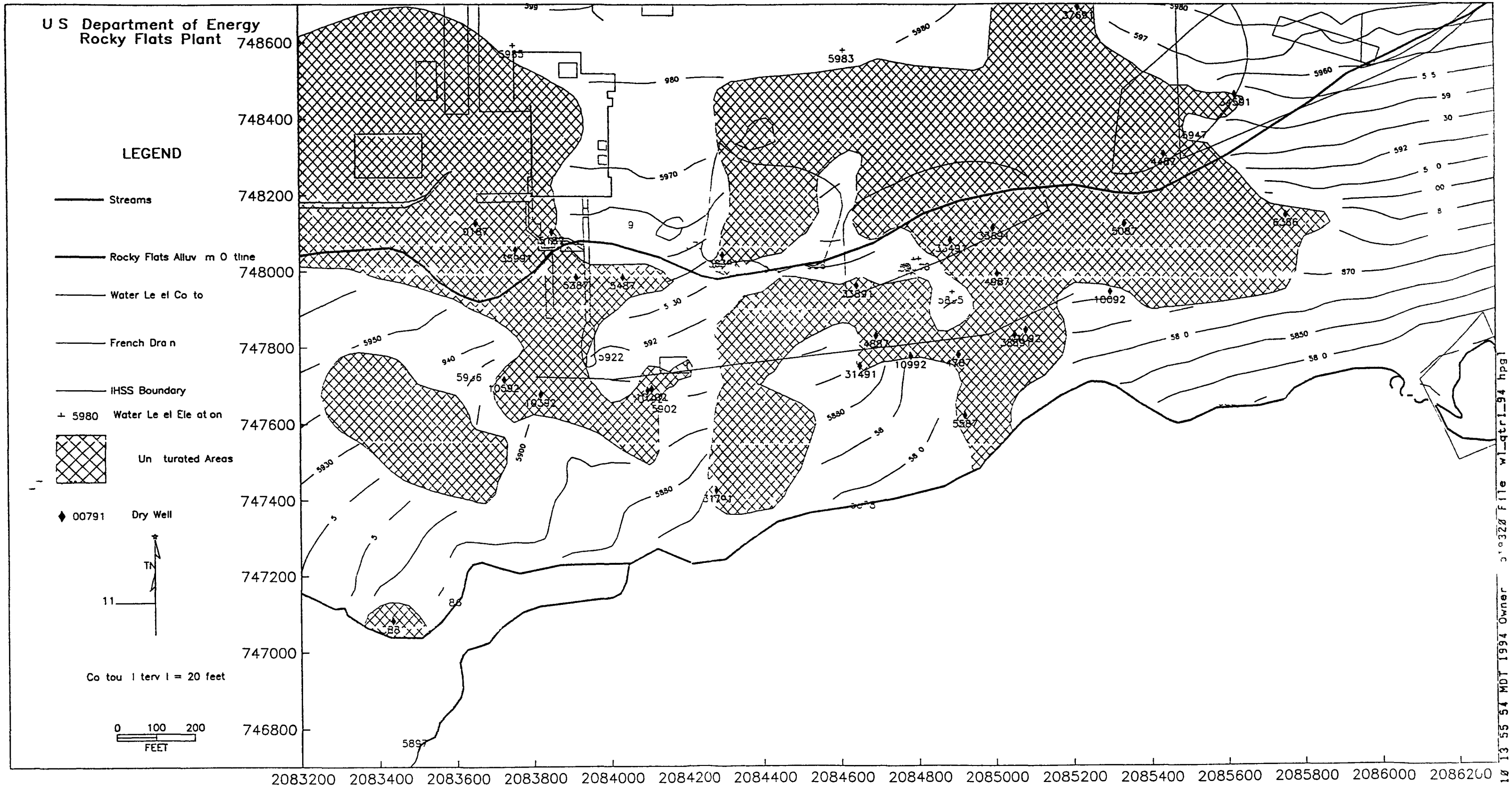


FIGURE 9 1 3

Rocky Flats OU1 January – March 1994 Water Level Map