

# QUARTERLY REPORT

ADMIN RECORD

FOR JULY THROUGH SEPTEMBER 1993

OPERABLE UNIT 2  
IM/IRA SURFACE WATER  
FIELD TREATABILITY UNIT

PREPARED BY

 **EG&G ROCKY FLATS**  
ENVIRONMENTAL RESTORATION  
FACILITIES OPERATIONS MANAGEMENT

DOCUMENT CLASSIFICATION  
REVIEW WAIVER PER  
CLASSIFICATION OFFICE

October 1993

A-0102-001365

## Table of Contents

	<u>Page</u>
1.0 Introduction	1
2.0 Treatment Facility Performance	1
2.1 Quantity of Water Treated	1
2.2 Chemical Usage	2
2.3 Waste Generation	2
2.4 Operating Costs	3
2.5 Power	3
2.6 Preventive Maintenance	3
2.7 Periods of Non-Collection	4
3.0 Sampling	4
3.1 Sampling Objectives	4
3.2 RS-1 (Untreated Influent Water from Weirs)	5
3.3 RS-5 (Treated Effluent from Chemical Precipitation/Microfiltration (Prior to GAC))	5
3.4 RS-6 (Lead GAC effluent)	6
3.5 RS-7 (Treated Effluent)	6
3.6 RS-8 (Sludge)	6
4.0 Operations Summary	6
5.0 Environmental Compliance	6
6.0 Reports/Correspondence	7
7.0 Anticipated Operations for Next Quarter	7
8.0 Summary/Conclusions	8

## **Quarterly Operations Report for July Through September of 1993**

**at**

### **Operable Unit No. 2 IM/IRA Field Treatability Unit**

#### **1.0 INTRODUCTION**

This report covers operations of the Field Treatability Unit (FTU) for the third quarter of 1993. It is the fourth Quarterly Report to be prepared for this facility.

The FTU is being operated as an Interim Measure/Interim Remedial Action (IM/IRA) under the Decision Document issued by the Department of Energy (DOE) on May 8, 1991. The FTU began operation as Phase I for treatment of surface water from a portion of the South Walnut Creek drainage at OU-2 for removal of volatile organic compounds (VOCs) of concern. The Phase I system consisted of collection facilities at Surface Water locations SW-59 and SW-61, equalization tankage, bag pre-filters, granular activated carbon (GAC) treatment units and insulated, heat traced transfer piping, pumps, and controls. Phase I was conducted between May 13, 1991 and April 27, 1992 at which time the Radionuclides Removal System (RRS) was implemented under the Phase II program. The RRS added provisions for treatment of radionuclides and metals by pH adjustment, chemical precipitation and cross-flow membrane filtration. The RRS replaced bag pre-filters as pretreatment to the GAC system. Detailed descriptions of the FTU and its operation can be found in the IM/IRAP, the Field Sampling Plan (FSP), and related documentation. The Field Treatability Study, Phase II (draft) for the South Walnut Creek Basin Surface Water Interim Measure/Interim Remedial Action report contains a detailed operating history of the FTU prior to this reporting period. Previous quarterly reports also contain information about the FTU.

#### **2.0 TREATMENT FACILITY PERFORMANCE**

##### **2.1 QUANTITY OF WATER TREATED**

The FTU collects surface water from three weirs, SW 59, 61, and 132 twenty four hours per day, 375 days per year. Collected water is stored in a ten thousand gallon double walled polypropylene equalization tank until enough water is present initiating a batch for treatment. The FTUs goal is to collect all water from the three weirs, up to 60 gallons per minute total, and

treat the water to remove all contaminants below Applicable or Relevant and Appropriate Requirements (ARAR) limits.

The following illustrates the volume of water treated during this reporting period.

	<u>Location</u>	<u>Monthly Total</u>	<u>Daily Average</u>	<u>Gallons per Min.</u>
July	SW-59	9,963 gal	996 gal	0.69
	SW-61,132	487,584 gal	15,729 gal	11.37
August	SW-59	23,785 gal	14,488 gal	0.53
	SW-61,132	449,120 gal	767 gal	10.06
September	SW-59	13,026 gal	434 gal	0.30
	SW-61,132	601,295 gal	20,043 gal	13.92

The weirs operated properly without incident. During high precipitation events, it is not uncommon for the flows to exceed the 60 gallon per minute collection rate. All water in excess of 60 gallon per minute is allowed to overflow the weirs.

## 2.2 CHEMICAL USAGE

Chemical usage for operations of the FTU were as follows:

<u>Month</u>	<u>Sulfuric Acid</u>	<u>Calcium Hydroxide</u>	<u>Ferric Sulfate</u>	<u>Peroxide(H<sub>2</sub>O<sub>2</sub>)</u>
July	161 gallons	1,835 lbs	190 lbs	35 gallons
Aug.	95 gallons	1,550 lbs	270 lbs	50 gallons
Sept.	73.3 gallons	1,542 lbs	338 lbs	60 gallons

## 2.3 WASTE GENERATION

All of the sludge generated at the OU-2 FTU is handled and packaged as low-level radioactive mixed waste. A total of thirty five 55-gallon drums were packaged this quarter.

Approximately two 55-gallon bags of personnel protective equipment is generated per month, with seven bags generated during this quarter. The PPE is monitored for contaminants, and then sent to the Rocky Flats Plant Landfill for disposal.

## 2.4 OPERATING COSTS

Operations and maintenance (O&M) of the FTU is performed by Resource Technology Group, Inc. (RTG), a subcontractor under the Master Task Subcontract (MTS) system. By utilizing subcontract labor, EG&G is able to operate the FTU at a significantly lower cost, while still providing qualified personnel. Burdened labor costs for EG&G operators is approximately \$95/hour, whereas subcontract labor for O&M averages \$38/hour. MTS subcontractors bring many years operating experience on similar systems with them, and must complete the same RFP training as EG&G personnel. The EG&G project manager oversees all of the FTUs operations, and provides input into the operations of the unit.

Monthly operating costs for subcontractor labor and supplies were as follows

	<u>July</u>	<u>August</u>	<u>September</u>
Subcontract labor	\$71,454	\$71,049	\$69,999
Chemicals/Supplies	<u>\$ 6,718</u>	<u>\$ 6,242</u>	<u>\$ 5,802</u>
Total:	\$78,172	\$77,291	\$75,801

## 2.5 POWER

Power for the FTU is provided by a portable 250-kW diesel generator. The generator experienced several shutdowns (see section 2.7, Periods of Non-Collection) from mechanical troubles during the quarter. On September 15, 1993 the generator was replaced with a backup generator provided by Plant Power. The OU-2 FTU generator is scheduled to go offsite for engine and generator rebuilding.

FOM is still pursuing installation of permanent plant power to the FTU. The installation of permanent power will eliminate many all of the shutdowns that the FTU experiences. Construction is anticipated to commence during the first quarter of 1994.

## 2.6 PREVENTIVE MAINTENANCE

During this reporting period a rigorous preventative maintenance program was implemented. All process equipment at the FTU is being characterized and evaluated for preventative maintenance frequency, spare parts requirements, and impacts on the system from individual equipment failure. A preventative maintenance computer program tracks all planned maintenance activities and helps to assure that all equipment is properly maintained.

All pressure gauges were inventoried during the later part of the quarter. Annual gauge calibration will take place during the next quarter.

Replacement parts and equipment for vital equipment is being ordered. This will significantly reduce any down time due to equipment failure.

All freeze protection items were inspected to assure that the facility is winterized and protected from freeze damage. The only item requiring maintenance was the piping from the radiological removal system to the granular activated carbon system. This line had been replaced during the summer, and the insulation that surrounds it needed replacement. Plant maintenance personnel have been tasked with replacing the insulation to insure proper freeze protection.

## 2.7 PERIODS OF NON-COLLECTION

Periods of non-collection are periods when for some reason (usually power loss) the collection weir pumps cannot collect all collected surface water (up to 60 gallons per minute) and transfer it to the equalization tank for storage and later treatment. Shutdown of the generator, which provides power to the FTU, occurs for a period of ten to fifteen minutes each day to allow for fuel, oil, and preventative maintenance.

Once per week the generator is shut down for approximately 30 minutes while the oil is changed.

Unscheduled shutdowns of collection are listed below:

8/3/93	2 hrs	Generator would not restart
9/10/93	25 min	Generator would not restart
9/11/93	30 min	Generator would not restart
9/15/93	1 hr, 15 min	Generator replaced with another unit
9/21/93	3 hr, 15 min	Mixer in tank TK-2 failed to operate

## 3.0 SAMPLING

### 3.1 SAMPLING OBJECTIVES

Characterization of the water from the three weirs (SW 59, 61, and 132) indicates the presence of radionuclides, heavy metals, volatile organic compounds (VOCs), and suspended solids to which contamination may be absorbed. The Interim Remedial Action Plan (IRAP) identified specific contaminants of concern and established possible chemical-specific ARARs as effluent standards for discharge of the treated water. Influent concentrations (estimated from a flow-weighted maximum concentration model, and prepared to establish a basis for conceptual design for the surface water treatment system) and associated ARARs are presented in Table 1 located in appendix A.

Sampling at the FTU is performed to characterize the influent surface water, generated wastes, and effluent water, as well as to initiate optimization of FTU operations to minimize chemical consumption and waste generation.

Preliminary sample results showing contaminants exceeding ARARs are presented below, as well as contaminants not associated with ARARs that are present in the water stream and are elevated above detection levels.

Samples that have been analyzed to date for this quarter have not been validated. Sample results contained in this report are unvalidated, and are presented to provide a general scope of the contaminants treated at the facility. Additionally, the last quarterly report stated that validated data would be presented in the next reporting period, however, that most of that data has not been validated process and will have to be presented in a future report.

### 3.2 RS-1 (UNTREATED INFLUENT WATER FROM WEIRS)

Below is a breakdown of contaminants detected in the water from the sampling location RS-1:

<u>Chemical</u>	<u>Detects</u>	<u>Detects &gt;ARAR</u>	<u>Units</u>	<u>High Value</u>	<u>Average<sup>1</sup></u>	<u>ARAR</u>
<b>VOCs</b>						
1,1-Dichloroethene	4	0	ug/l	1.0	0.44	7.00
1,1,1-Trichloroethane	6	-	ug/l	4	2.01	-
Carbon Tetrachloride	7	6	ug/l	62	25.4	5.00
Chloroform	6	6	ug/l	11	4.39	1.00
Methylene Chloride	2	-	ug/l	1.0	0.19	-
Tetrachloroethene	8	8	ug/l	26	12.3	1.00
Trichloroethene	8	6	ug/l	30	14.0	5.00
cis-1,2-Dichloroethene	7	-	ug/l	29	13.9	-
<b>Metals</b>						
Zinc	6	6	ug/l	221	124	50.0

### Radionuclides

No third quarter radionuclide data has been received prior to preparation of this report.

<sup>1</sup> Average value calculated by taking all values (for non-detect, 1/2 the detection limit was used) and dividing the value by the number of samples.

- No ARARs exist for this chemical at the FTU

### 3.3 RS-5 (TREATED EFFLUENT FROM CHEMICAL PRECIPITATION/MICROFILTRATION (PRIOR TO GAC))

Review of the received sample data for this quarter indicates that no ARARs were exceeded at this sample point. Radionuclide data has not been received.

### **3.4 RS-6 (LEAD GAC EFFLUENT)**

Review of the received sample data for this quarter indicates that no ARARs were exceeded at this sample point. Radionuclide data has not been received.

### **3.5 RS-7 (TREATED EFFLUENT)**

The only constituent that exceeded ARAR values is chromium. On July 13, 1993 chromium was detected at 13.5 UG/L, and on July 16 it was detected at 12.5 UG/L (ARAR is 10 UG/L). Radionuclide data has not been received for this sample location.

### **3.6 RS-8 (SLUDGE)**

Preliminary data indicates that all VOC samples for the sludge taken during this sample period contain no VOCs. The two radiological samples that have been returned indicated that plutonium 239/240 exceeded ARARs one time with a result of  $0.07063 \pm 0.0182$  pci/g (ARAR is 0.05 pci/g).

## **4.0 OPERATIONS SUMMARY**

Operations of the FTU was taken over by a new subcontractor on May 1, 1993. Reidel Environmental Services, Inc., provided two months of on-the-job training (March and April) to the new subcontractor, Resource Technology Group, Inc. (RTG). Reidel Environmental Services had operated the FTU throughout the startup of both Phase I and Phase II operations. RTG initially designed and supplied the Phase II chemical precipitation/microfiltration units, and has operated several similar systems at other DOE facilities.

The FTU operated as required throughout the quarter. Due to the drier conditions experienced during this time of year, the FTU was not required to operate at maximum capacity as during more inclement times of the year. Advantage was taken from the extra time and good weather to clean, maintain, and upgrade the facility.

Preparation of Standard Operating Procedures (SOPs) began during this quarter. It is anticipated that all routine operations at the FTU will be operating under SOPs by the end of the next quarter. Currently the subcontractor is utilizing operations and maintenance manuals to operate the FTU.

## **5.0 ENVIRONMENTAL COMPLIANCE**

No spills or releases of hazardous material took place at the FTU during this quarter.

On two occasions the chromium levels exiting the OU-2 FTU facility exceeded the established ARAR of 10.00 UG/L. While the levels were only slightly above the ARAR, they exceeded the established limit. Chromium was not detected at levels exceeding ARARs upstream of the final effluent at any time. Further investigations will continue to determine the source of the chromium.

## **6.0 REPORTS/CORRESPONDENCE**

During this reporting period, the following reports/documents that pertained to the OU-2 FTU were generated:

- Letter from James K. Hartman (DOE,RFO) to Martin Hestmark (EPA) and Gary Baughman (CDH) dated July 21, 1993 discussing IAG milestone deliverable dates for completion of the document entitled "SUMMARY AND ANALYSIS OF RESULTS, FIELD TREATABILITY STUDY, PHASE II, SOUTH WALNUT CREEK BASIN, SURFACE WATER INTERIM MEASURE/INTERIM REMEDIAL ACTION, OPERABLE UNIT 2", DOE correspondence number 93-DOE-08451.
- Letter from T. C. Greengard (EG&G) to Richard J. Schassburger (DOE,RFO) dated August 20, 1993 entitled "SUMMARY OF MEETING ON AUGUST 17, 1993 BETWEEN DOE/RFO AND EG&G-TCG-163-93", correspondence control outgoing letter number 93-RF-10294.
- Letter from N. M. Hutchins (EG&G) to J. K. Hartman (DOE,RFO) dated September 3, 1993, entitled "QUARTERLY NOTIFICATION FOR PERIODS OF NON COLLECTION AT THE OPERABLE UNIT NO. 2 (OU-2) FIELD TREATABILITY UNIT (FTU) - NMH-448-93", correspondence number 93-RF-10852.
- Letter from T. C. Greengard (EG&G) to Richard J. Schassburger (DOE,RFO) dated September 3, 1993, entitled "OPERABLE UNIT NO. 2 SURFACE WATER TREATABILITY STUDY REPORT MEETING AUGUST 20, 1993 - TCG-170-93", correspondence number 93-RF-10904.

## **7.0 ANTICIPATED OPERATIONS FOR NEXT QUARTER**

Normal operations are expected to continue next quarter. No shutdowns (other than routine generator servicing) are expected at the treatment facility.

Methods for reducing the volume of sludge will continue to be explored. EG&G and the O&M subcontractor RTG will continue to explore reducing the volume of sludge generated per volume of water treated. FOM feels that by continuing to fine-tune the facility, waste generation can be minimized. Since disposal of mixed waste is very difficult and expensive, FOM will test a proposed method from the FTU subcontractor to reduce the generated waste by fifty percent or more. If this method is acceptable, it will result in a significant waste reduction at the facility.

Installation of permanent plant power to the FTU is still in progress.

Modifications will be made to the sampling and analysis plan for the FTU. A net reduction in samples, along with onsite analysis of other samples will result in a significant cost savings.

Water collected from the OU-2 Vapor Extraction Unit will be treated at the OU-2 FTU. The water will be sampled to assure that it is compatible with the FTUs treatment capabilities. At this time estimates range from zero to twenty-thousand gallons of collected water during the first month.

Purge water collected from contaminated wells may be treated at the FTU. All purge water would be sampled to determine the best facility to treat the water. Possibilities for treatment include the OU-1 IM/IRA (Bldg. 891), OU-2 IM/IRA FTU, 374 Evaporator, and the Sewage Treatment Plant. Each facility is limited by certain contaminants, so sampling would determine the final destination.

## **8.0 SUMMARY/CONCLUSIONS**

The OU-2 FTU continues to collect and treat contaminated surface water from the South Walnut Creek Basin 24-hours per day, 375-days per year. Process improvements have reduced both operating costs and generated hazardous waste, and these efforts will continue. Waste reduction, chemical use reduction, and treatment facility optimization will also continue to be explored/implemented in order to make the FTU a more efficient treatability unit .

# Appendix A

**TABLE 1**  
**Surface Water Contaminants**  
**Identified in the South Walnut Creek Basin IM/IRAP<sup>1,2</sup>**

<b>Analyte</b>	<b>Unit</b>	<b>Average Concentration</b>	<b>ARAR</b>
<b>Radionuclides</b>			
Am-241	pCi/l	0.53	0.05
Gross alpha	pCi/l	730.00	11.00
Gross beta	pCi/l	545.00	19.00
PU-239/240	pCi/l	3.28	0.05
U-total	pCi/l	11.69	10.00
<b>VOCs<sup>3</sup></b>			
1,1-Dichloroethene	µg/l	142	7.00
Carbon Tetrachloride	µg/l	219	5.00
Chloroform	µg/l	82	1.00
Tetrachloroethene	µg/l	279	1.00
Trichloroethene	µg/l	153	5.00
Vinyl Chloride	µg/l	-	2.00
<b>Metals-Dissolved</b>			
Iron	µg/l	-	300.00
Manganese	µg/l	0.5790	50.00
<b>Metals-Total</b>			
Aluminum	µg/l	25.1214	200.00
Arsenic	µg/l	-	50.00
Barium	µg/l	1.8530	1,000.
Beryllium	µg/l	0.0519	100.00
Cadmium	µg/l	0.0132	5.00
Chromium	µg/l	0.1918	10.00
Copper	µg/l	0.2664	25.00
Iron	µg/l	183.964	1,000.
Lead	µg/l	0.1954	5.00
Manganese	µg/l	3.3068	1,000.
Mercury	µg/l	0.0022	0.20
Nickel	µg/l	0.2239	40.00
Selenium	µg/l	0.0070	10.00
Zinc	µg/l	1.3475	50.00

1 From the IM/IRAP (DOE, 1991).

2 Only analytes with ARARs are presented.

3 Analyzed by EPA Method 524.2.

- Not calculated in the IM/IRAP.