

**1 Description Operable Unit 2, Field Treatability Unit, Scientific Notebook Plan**

- Governing Work Plan No            DOE EA - 0496. FINAL 8. MARCH 1991
- Governing Work Plan Title        SURFACE WATER INTERIM MEASURES/INTERIM REMEDIAL ACTION PLAN/ ENVIRONMENTAL ASSESSMENT AND DECISION DOCUMENT. SOUTH WALNUT CREEK BASIN. OPERABLE UNIT NO. 2 (IRAP)
- Scientific Notebook Plan purpose and objective (Provide sufficient detail to permit reviewers and others to understand what the work is to accomplish )

The Operable Unit 2 Field Treatability Unit (FTU) was constructed as part of an Interim Measure / Interim Remedial Action (IM / IRA) to collect and treat contaminated surface water in a portion of the South Walnut Creek drainage at the Rocky Flats Plant. Although no immediate threat to public health or the environment is posed by the surface water contamination, there is a potential threat. The Remedial Investigation at OU-2 indicated the presence of volatile organic compounds (VOC's), radionuclides, and metals in the Walnut Creek Basin surface waters.

Surface water is collected from three locations within the drainage. SW-59, SW-61, and SW-132. SW-59 represents a surface water seep on the south bank of the South Walnut Creek drainage. SW-59 is located within the drainage and represents the combined flows of SW-59, surface water run-off south of the (PA) Protected Area (discharge from a corrugated metal culvert), and surface water run-off from within the PA (discharge from a concrete culvert). SW-132 represents the discharge from a second corrugated metal culvert approximately 225 feet downstream of SW-61, this discharge is the flow from the upper reach of South Walnut Creek. During construction of the Rocky Flats Plant, the headwater area of South Walnut Creek had been filled, and, as a result, flow originates from a buried culvert located west of Building 991. This flow is directed south of Building 991 under the PA by a buried, corrugated metal culvert and discharged at SW-132.

The design flows were developed to ensure collection of above-average precipitation wet season flows not corresponding to major storm events. SW-59 design flow rate is 4.5 gpm, SW-61 design flow rate is 37.5 gpm, and SW-132 design flow rate is 18 gpm. The total design flow of 60 gpm is the IM/IRA treatment system capacity.

The FTU consists of the following sub-systems, chemical precipitation, microfiltration, and Granular Activated Carbon (GAC) adsorption. The first step of the chemical precipitation treatment is to lower influent pH to approx. 4.5 to avoid carbonate complexation of uranium and to neutralize total alkalinity. Ferric sulfate is added as a coagulant and co-precipitating agent. Lime is then added to raise the pH to 9.5 which causes the precipitation of iron and dissolved heavy metals as metal hydroxides. Radionuclides and metals adsorb to

particulates and are entrained in the floc

The microfiltration system physically separates the floc. The microfiltration system consists of a membrane filter in a shell and tube configuration in which the membrane is contained inside the tubes. The permeate passes through the tubes perpendicular to the main flow at a relatively low operating pressure. Filtrate is directed to a neutralization tank. Solids are returned to a concentration tank for transfer to a filter press. The filter press removes water from the solids and creates a filter cake which is drummed. The filtrate produced by the filter press is recycled to the concentration tank.

Finally, the neutralized filtrate is pumped through two GAC columns, configured in series. The GAC system is designed for 60 gpm through-put, and for the removal of VOC's in the water. The treated water is then discharged back to the South Walnut Creek basin.

This Scientific Notebook will be used to identify activities at the Operable Unit 2 Field Treatability Unit which can be proceduralized, and will also serve as documentation for system adjustments and modifications. Additionally, the "notebook" will be used to document the activities of operations personnel while performing on-going testing and optimization of the facilities equipment.

## **2 Scientific Notebook Plan Summary**

(Describe proposed approach including procedures and methods for achieving the objectives. Include analytical models, data reduction and qualification methods, and any mandatory hold-points that can be identified at this stage of the work.)

Standard Operating Procedures (SOP's) are required to perform routine activities. Several SOP's have been identified to date and are in draft form. Refer to attached memo "Corrective Action Plan for Operable Units 1 and 2 Interim Measure/Interim Remedial Action Treatment Facilities"-MBU-032093 from M. C. Burmeister to K. Bentzen, dated October 18, 1993. The present list of required SOP's is as follows.

- (1) Normal Operations, Field Treatability Unit, Operable Unit 2, Surface Water IM/IRA
- (2) Chemical Cleaning Operations, Field Treatability Unit, Operable Unit 2, Surface Water IM/IRA
- (3) Filter Press Operation and Cleaning, Field Treatability Unit, Operable Unit 2, Surface Water IM/IRA
- (4) Granular Activated Carbon (GAC) Transfer, Field Treatability Unit, Operable Unit 2, Surface Water IM/IRA
- (5) Chemical Handling, Field Treatability Unit, Operable Unit 2, Surface Water IM/IRA
- (6) Calibration, Operation, and Maintenance of Monitoring and Fluid Handling Equipment, Field Treatability Unit, Operable Unit 2, Surface Water IM/IRA

Activities or tasks which require regular or routine response from the operator will be identified as requiring a procedure System tests, adjustments, and modifications will be documented in the Scientific Notebook and utilized as reference data for optimization of the treatment facility Data will be recorded by operations staff and eventually input into a computerized database system which is presently under development

All operating parameter and optimization testing cannot be identified at this time Operating conditions change rapidly and require immediate action by operations staff Several of the parameters which require adjustment periodically are flow rate, pH, acid addition, lime addition, etc. Optimization of the facility is a dynamic process which can only be accomplished while operating the system with varying parameters ( environmental, weather, chemical, etc). Once standard operating criteria is established, procedures may be developed as guidance for future operations.

### 3 Personnel

#### Training and Qualification Requirements

- OSHA 40 hour hazwopper training and OJT
- OU-2 Health and Safety Plan Orientation and Training
- Familiarity with the OU-2 Treatment Facility process
- Properly trained in all applicable SOP's

<u>Position</u>	<u>Special Qualifications/Training</u>
Principal Investigator <u>M C Burmeister</u>	<u>Environmental Operations Management (EOM) Facilities Program Manager-Project Mgr for OU-1 IM/IRA construction activities. Involved with design, construction and operation of Bldg. 891 Facility since start-up.</u>
Secondary Investigator <u>M T Vess</u>	<u>EOM, OU-2 Project Manager. Also assisted with design and construction activities for OU-1 IM/IRA. Assisted with start-up of 891 Facility.</u>

Instrumentation Engineer

J L Caldwell

EOM, Instrument Specialist, Programmable Logic Controller programming experience, has been involved with OU-1 and 2 Facility operations for the past year.

Test Engineer

C D. Cowdery

Environmental Engineering and Technology (EE&T) Chemical Engineer, involved with start-up and operation of the OU-1/ and OU-2 Treatment Facilities. Start-up Process Engineer for the 891 Facility

**4 Equipment**

(List materials/equipment planned for the conduct of the activity, including any experimental equipment, special handling, shipping, or storage requirements )

<u>Equipment</u>	<u>Calibration Procedure (if required)</u>
<u>Calgon Granular Activated Carbon Unit</u>	<u>N/A</u>
<u>MEMTEK Microfiltration Unit</u>	<u>N/A</u>
<u>Misc pumps, valves, piping</u>	<u>N/A</u>
<u>Misc instrumentation, and switchgear (see list below)</u>	<u>as required</u>
-pH instrumentation	<u>Calibration, Operation, and Maintenance of Monitoring and Fluid Handling Equipment, Field Treatability Unit, Operable Unit 2, Surface Water IM/IRA</u>
-turbidity meter	<u>Calibration, Operation, and Maintenance of Monitoring and Fluid Handling Equipment, Field Treatability Unit, Operable Unit 2, Surface Water IM/IRA</u>
-thermometers	<u>Calibration, Operation, and Maintenance of Monitoring and Fluid Handling Equipment, Field Treatability Unit, Operable Unit 2, Surface Water IM/IRA</u>
-flow meters	<u>Calibration, Operation, and Maintenance of Monitoring and Fluid Handling Equipment, Field Treatability Unit, Operable Unit 2, Surface Water IM/IRA</u>
-pressure relief devices	<u>Calibration, Operation, and Maintenance of Monitoring and Fluid Handling Equipment, Field Treatability Unit, Operable Unit 2, Surface Water IM/IRA</u>
-conductivity meter	<u>Calibration, Operation, and Maintenance of Monitoring and Fluid Handling Equipment, Field Treatability Unit, Operable Unit 2, Surface Water IM/IRA</u>

5 **Limitations** (Describe potential sources of uncertainty/error which must be controlled or measured and input data that is suspect )

Much of the testing and optimization of the treatment facility is dependent upon sample analysis by outside laboratories. Sample analysis is a potential source of error, however, this error is minimized with the use of existing SOP's, sample lab blanks, duplicates. All sampling will be performed in accordance with applicable SOP's and the OU-2 Sampling and Analysis Plan.

6 **Quantitative/Qualitative Criteria** (Specify quantitative criteria, i.e., tolerances, operating limits, and qualitative criteria, i.e., comparative samples, as appropriate, against which job performance may be evaluated )

The Operable Unit 2 Field Treatability Unit is typically operated at 60 gpm flow, however flow rates vary depending on environmental conditions. Treatment system performance needs to be evaluated with varying operating parameters (chemical addition rates, pH, etc.) and influent streams. Existing SOP's will be utilized when applicable. As noted earlier, operating conditions vary, acceptable criteria for discharge are outlined in the IRAP. During the testing, operating parameters may be varied from 0-60 gpm, pH 2-12.5, and chemicals may be substituted in order to compare performance data.

7 **Impacts on Other Activities** (Discuss any special work environmental conditions that might be applicable, including impacts this activity might have on other activities )

N/A

8 **Approval**

MC Burmeister 11-9-93  
Principal Investigator Date

M. Sykes 11-9-93  
Project Manager Date

CP Conroy 11/9/93  
Technical Reviewer Date

K. Butz 11-19-93  
ERM QAPM Date