Formerly Utilized Sites Remedial
Action Program (FUSRAP)

Maywood Chemical Company Superfund Site

ADMINISTRATIVE RECORD

Document Number

MISS- 124.

US Army Corps
of Engineers®

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94-295

Department of Energy

Oak Ridge Operations
P.O. Box 2001
Oak Ridge, Tennessee 37831— 8723

May 16, 1994

Mr. Jeffrey Gratz
Site Manager
U. S. Environmental Protection Agency,
Region II
Jacob K. Javits Federal Building
26 Federal Plaza
New York, New York 10278

Dear Mr. Gratz:

WAYNE AND MAYWOOD SITES--PROJECT OPERATIONS PLAN FOR THE PROPOSED SOIL WASHING TEST

Enclosed for your information are three copies of the subject document for your review. If you have any comments on this document please submit them no later than June 6, 1994. A sampling and analysis plan is currently being prepared and will be forwarded to you in June.

Please contact me at (615) 576-5724 if you have any questions.

Sincerely,

A. M. Cange

Susan M. Cange, Site Manager
Former Sites Restoration Division

Enclosures

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Department of Energy

Oak Ridge Operations
P.O. Box 2001
Oak Ridge, Tennessee 37831—8723

May 16, 1994

Mr. Nicholas Marton
Site Manager
New Jersey Department of Environmental
Protection and Energy
401 East State Street
Trenton, New Jersey 08625

Dear Mr. Marton:

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S. M. Cange

Susan M. Cange, Site Manager
Former Sites Restoration Division

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Formerly Utilized Sites Remedial Action Program (FUSRAP)
Contract No. DE-AC05-91OR21949

Project Operations Plan for the Soil Washing Test Project at the Wayne and Maywood Sites

Wayne and Maywood, New Jersey

May 1994


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PROJECT OPERATIONS PLAN FOR THE SOIL WASHING TEST PROJECT AT THE WAYNE AND MAYWOOD SITES

MAY 1994

Prepared for

United States Department of Energy

Oak Ridge Operations Office

Under Contract No. DE-AC05-91OR21949

By

Bechtel National, Inc.

Oak Ridge, Tennessee

Bechtel Job No. 14501

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INTRODUCTION

The objectives of this Project Operations Plan are to

- summarize the existing source data leading to this proposed test;
- illustrate the rationale used to select soil washing as a test technology;
- describe the test scope; and
- describe the sampling and analysis, health and safety, and other plans that will be followed during the test.

1.0 PROJECT DESCRIPTION

The Formerly Utilized Sites Remedial Action Program (FUSRAP) is a U.S. Department of Energy (DOE) program created to address radioactive contamination exceeding guidelines at a number of sites throughout the United States that are contaminated with varying, but typically low, levels of radionuclides and other contaminants. The program has been in existence since 1974, and during that time numerous sites have been decontaminated by excavation and storage of radioactively contaminated soils in temporary storage facilities or by disposal at permanent facilities. To date, contaminated soil volume reduction has not been implemented on FUSRAP sites.

Remediation work at selected FUSRAP sites falls under guidelines of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) that favor treatment (such as volume reduction) for remediation. Mining and other treatment technologies are increasingly being used to "clean" soils contaminated with heavy metals and radionuclides. An evaluation of soil treatment technologies and related ore mining technologies has determined that soil washing may be appropriate for treating New Jersey FUSRAP soils.

1.1 BACKGROUND INFORMATION

Two New Jersey FUSRAP sites are being considered for a soil washing test project; one or both may eventually be included in the test.

1.1.1 Wayne

The Wayne site is located in Passaic county approximately 60 km (36 mi) northwest of New York City and 32 km (20 mi) north-northwest of Newark. Contamination at the site

resulted from thorium processing activities conducted first by Rare Earths, Inc., and later by W. R. Grace and Company. The media of concern at the site are primarily soils with some building debris from past demolition activities.

The total volume of contaminated soil at the Wayne site is approximately 109,000 yd^3, of which 38,500 yd^3 is contained in a storage pile. The storage pile was created during 1985-1987 and is the result of the cleanup of 17 properties in the vicinity of the former processing plant. The primary contaminants of concern at the site are thorium-232, radium-226, and uranium-238; their average concentrations in the pile are 16.1, 1.8, and 9.6 pCi/g, respectively. Analytical data for soil samples from the pile indicate that the material does not exceed regulatory limits that define a hazardous waste as specified by the Resource Conservation and Recovery Act (RCRA).

Six soil samples from the Wayne storage pile were tested by the Environmental Protection Agency's (EPA) National Air and Environmental Radiation Laboratory (NAREL) in Montgomery, Alabama; a report dated May 1991 ["Preliminary Characterization and Bench-Scale Testing of Soil Samples from W.R. Grace and Company (Wayne Plant) and Maywood Chemical Company Sites"] states that results of the particle size tests, radiation measurements, and petrographic analyses all indicate that separating the Wayne soil at 325 mesh (0.044 mm) would separate up to 65% of the soil with thorium-232 radioactivity less than 5 pCi/g.

1.1.2 Maywood

The Maywood site is located in Bergen County, approximately 20 km (12 mi) north-northwest of New York City and 21 km (13 mi) northeast of Newark. Operations at the former Maywood Chemical Works (MCW) resulted in contamination of numerous properties in the boroughs of Maywood and Lodi and the township of Rochelle Park. The

properties contaminated as a result of the original MCW activities include the property previously owned by MCW (now owned by the Stepan Company), the Maywood Interim Storage Site (MISS), 55 residential properties, and 23 commercial and governmental vicinity properties. These properties comprise the Maywood site.

The total volume of contaminated soil at the Maywood site is approximately 395,000 yd^3. Part of this soil (approximately 35,000 yd^3 of contaminated soil removed from vicinity properties during previous cleanup activities) is contained in an interim storage pile at MISS. The contaminants of concern at the Maywood site are thorium-232, radium-226, and uranium-238; average concentrations in the pile are 18.1, 2.4, and 17 pCi/g, respectively. Analytical data for soil samples from the pile indicate that the material does not exceed regulatory limits that define a RCRA-hazardous waste.

Five soil samples collected from the storage pile and 15 soil samples from other areas of the Maywood site were analyzed by EPA NAREL, and test results indicate that the Wayne and Maywood soil samples are very similar. The NAREL report ("Characterization of Soil Samples from the Maywood Chemical Company Site," dated March 17, 1993) states that soil washing operations using sieving techniques at 0.075 mm will produce an oversize product containing as much as 70% of the original material with radium-226 and radium-228 concentrations below 5 pCi/g.

1.2 TEST BACKGROUND

The proposed soil washing test project will evaluate the performance of a soil washing plant originally designed and constructed by EPA for potential use at the Montclair and Glen Ridge (New Jersey) Superfund sites, both of which are contaminated with radium-226. EPA elected not to pursue soil treatment as a part of the remedy; therefore, the soil washing plant is available for demonstrations at other Superfund sites. On the basis of the Wayne and

Maywood soil characterization reports prepared by EPA, soil washing may be an appropriate technology for reducing the volume of contaminated soil at these sites. Volume reduction could save tens of millions of dollars in transporting and disposing of the remaining contaminated soil. NAREL has advised that the soil washing plant appears to be capable of significantly reducing the volume of contaminated soil at Wayne and Maywood. The plant is available, and timing allows for input from this test to be used in the decision-making process for site cleanup. The test will allow DOE to gain operational experience with soil washing and to collect data on treatment performance and cost. In parallel with this test, DOE will gather other information on soil washing and treatment systems that may ultimately be used at the Wayne and Maywood sites.

2.0 VOLUME REDUCTION TECHNOLOGY

The plant uses a soil washing process, a physical separation technology, to reduce the volume of contaminated soil by separating it into three coarse fractions of rocks and sand and a fine fraction of clay and silt. The contaminants in the Wayne and Maywood soils (thorium, radium, and uranium) tend to adhere to the finer particles of silt and clay. Preliminary tests indicate that soil washing would result in a 55% to 80% reduction of the contaminated soil volume at the anticipated acceptance criteria. These tests are described in EPA NAREL reports: "Characterization of Soil Samples from the Maywood Chemical Company Site" (March 17, 1993) and "Preliminary Characterization and Bench Scale Testing of Soil Samples from W.R. Grace and Company (Wayne Plant) and Maywood Chemical Company Sites" (May 1991).

Soil washing uses a variety of unit operations common to the mineral and coal processing industries, and the process is constructed of standard, proven equipment. Unit operations consist of excavation, physical separation, mixing, and treatment of the extraction fluid. Initially, the soil is intensively mixed with water. Mixing is followed by separation of

liquids and solids to recover coarse soil particles, which are rinsed, dewatered, sampled, and analyzed to verify that the material has been cleaned to the prescribed acceptance criteria. The extraction fluid (water), with contaminants and finer-sized soil particles, is thickened and dewatered. This dewatered cake is the contaminated waste stream. The water in the soil washing process is recycled and reused. There is no wastewater discharge stream during operation. The soil washing process has been effectively used at other sites and has proven to be successful. Most recently at the King of Prussia Technical Corporation site in Winslow Township, New Jersey, soil washing successfully remediated 19,200 tons of soil contaminated with metals. Approximately 85 percent of the soils was cleaned to the specified acceptance criteria.

3.0 TEST OBJECTIVES

The overall objectives of the test are to evaluate performance of the pilot-scale system to determine possible improvements that can be implemented in a full-scale system, and to obtain data that can be scaled up to a larger unit and be compared with excavation and offsite disposal. In addition, the test will allow DOE an opportunity to gain operational experience with this technology and will provide the stakeholders an opportunity to observe the system, on a pilot scale. Design modifications on the field-scale plant are currently being made to improve system performance. After design modifications to the existing soil washing plant are implemented, the plant will be mobilized to the Wayne site for testing. The test will be accomplished by:

- running the soil washing plant at the Wayne site for 4 to 8 weeks beginning in July 1994 using soil from the storage pile;
- collecting data on the plant's performance;
- determining unit operating costs for plant operation, sampling and analysis, health and safety, and overhead; and

- obtaining operational experience including evaluation of impacts to workers and the community.

All of the data collected will be used to recommend the next steps that will be necessary to evaluate treatment. After testing of the Wayne site is completed, the soil washing plant may be moved to Maywood for similar testing, or a demonstration of at least two vendor-supplied soil washing test plants may be performed at the site. A decision on the approach to be taken at Maywood will be made this summer.

4.0 TEST OPERATIONS

The soil washing test will include

- site preparation activities (to include construction of an equipment support pad, secondary containment, collection sump, and necessary temporary support facilities such as personnel and equipment decontamination areas);
- pile excavation activities;
- stockpiling of excavated soils;
- soil washing and particle size separation processes;
- collection, movement, and storage of soil processed through the soil washing plant;
- equipment maintenance and decontamination activities; and
- demobilization.

Data collection and management activities are described in Section 6.0.

4.1 LOCATION, MOBILIZATION, AND TESTING

On the Wayne site, the soil washing plant will be in the area west of and adjacent to the storage pile. Figure 1 shows the plant location. A secondary containment system will be

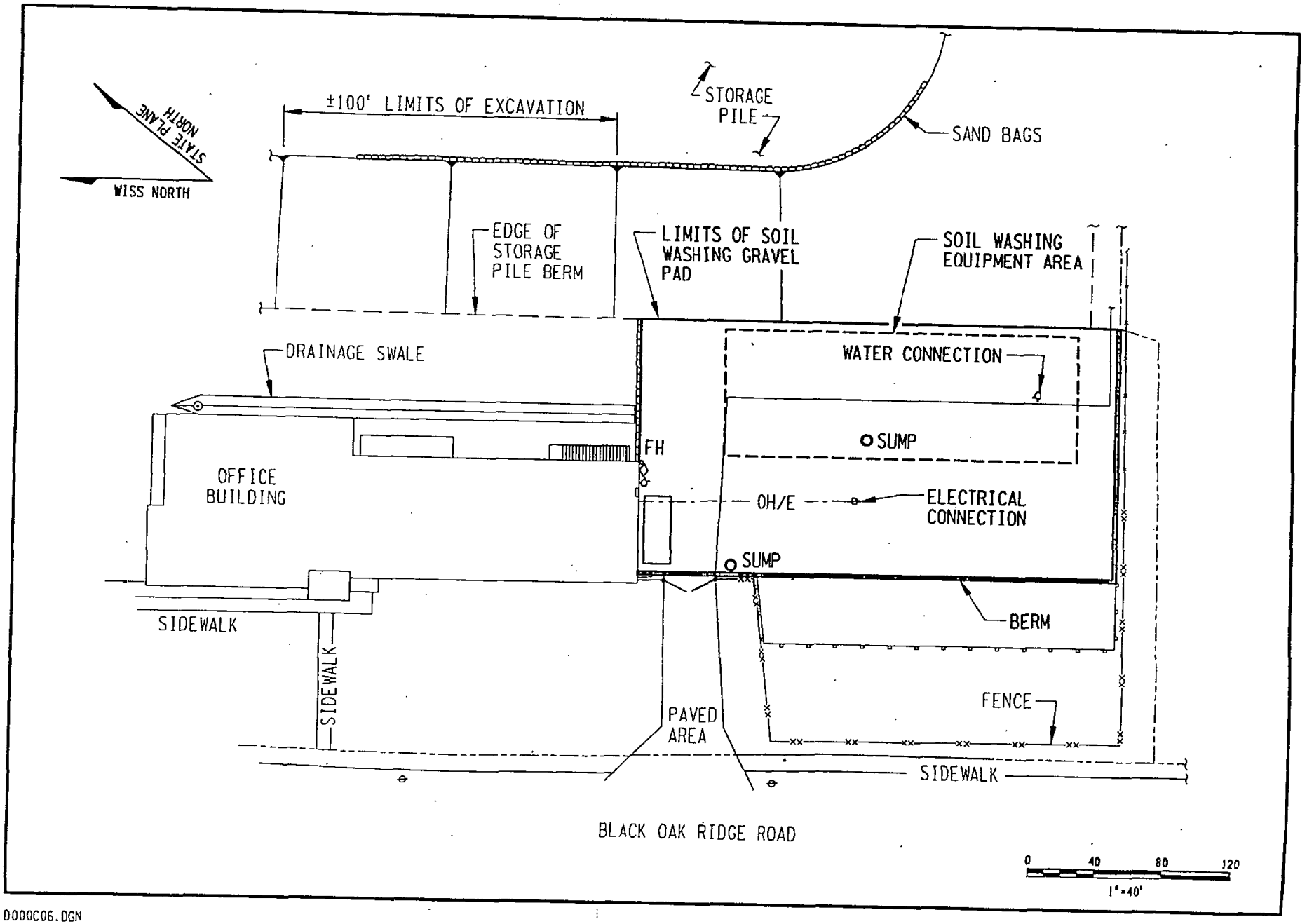

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Figure 1
Wayne Soil Washing Location

constructed at the site to support the equipment and contain spills during operation. Sumps will be included in the design to collect leaking water and pump it back into the soil washing system. Electrical and water utilities will be supplied from existing connections on the site.

The soil washing plant consists of trailer and skid-mounted modules that will be located on the equipment pad, which will be constructed of compacted gravel; interconnected via electrical, piping, and material handling components; and hooked up to the site electrical and water supplies. The plant will be tested to verify proper operation before any contaminated soil is processed.

4.2 PILE EXCAVATION

The storage pile at the Wayne site has been engineered with covers and specified slopes to contain the contaminated soil. Field procedures will be prepared to address equipment used for excavation, access to the pile, removal and replacement of the cover, and reshaping of the material in the pile. Pile access points and traffic patterns to and from the soil washing plant will be designed to minimize interference with other site activities. The pile cover will be opened in an area adjacent to the soil washing plant to minimize equipment travel distance. A front-end loader will be used to excavate material from the pile, transport it to the machine, and return material processed by the plant to the pile. Opening of the interim storage piles and operation of the soil washing plant at each site will require National Emission Standards for Hazardous Air Pollutants (NESHAPs) Subpart H modeling to determine whether all radionuclide emissions from these operations are less than 1 percent of an effective dose equivalent of 10 mrem per year to the maximally exposed individual. If emissions are less than 1 percent of the standard, no further action under this subpart is required. Projected emissions in excess of 1 percent of the standard will require control measures to ensure that the specified limits are not exceeded. With regard to compliance

with NESHAPs Subpart Q, opening of the Maywood storage pile would require prior notification of EPA; no EPA notification under Subpart Q is required for opening the Wayne pile.

Substantive requirements of soil erosion and sediment control measures of the Passaic and Bergen County Soil Conservation Districts will be incorporated into field operating procedures.

4.3 STOCKPILING

Soil from the pile and cleaned and contaminated soils processed by the soil washing plant may be stockpiled to optimize material handling actions. Stockpiles will be covered with plastic sheeting when not in use. Appropriate dust and erosion control measures such as water sprays will be implemented to minimize the movement of material by wind or rain when the stockpiles are exposed.

4.4 SOIL WASHING OPERATIONS

The soil washing plant is designed to process approximately 2 tons per hour; output consists of three clean streams of different particle sizes and one contaminated stream. One objective of the test is to determine the performance capability of the soil washing plant with soils from the storage pile. This will be accomplished by operating the plant under steady-state conditions and determining input and output stream flow rates and contaminant concentrations.

Control of noise and dust during plant operations will be closely monitored. Noise levels will be measured to determine whether noise abatement measures are required. Dust control will be accomplished by water sprays. Air monitoring data will be used to determine

the need for additional dust control measures. Expected hours of operation for the soil washing plant are 8 hours per day for 5 days a week. There may be several days of extended operation of up to 16 hours per day to test plant performance over longer periods of time.

4.5 PROCESSED MATERIALS

After samples have been collected from the materials processed by the soil washing plant, the cleaned and possibly the contaminated materials will be returned to the interim storage pile. The cleaned material will be segregated from the contaminated material when placed back in the pile. All material processed during the test may be returned to the pile because the small quantities of materials involved may not justify the cost and effort required to maintain segregation and implement the necessary controls and monitoring activities. Contaminated filter cake from the Wayne site may be transported and disposed of offsite. The decision to do this will be based on a number of factors, including whether a mechanism is in place to allow the action. Contaminated filter cake from the Maywood test may be transported offsite if pile removal actions coincide with treatment activities.

4.6 MAINTENANCE AND DECONTAMINATION

Maintenance and equipment monitoring activities will be described in field procedures and will be scheduled to ensure proper equipment performance and availability. Maintenance and equipment actions will be performed in accordance with equipment suppliers' recommendations. In addition, weekly inspections will be conducted to ensure that equipment outages are minimized.

The soil washing plant will be decontaminated when testing is complete. Water drained from the system and decontamination waste water streams will be collected, monitored, and

treated as necessary before being removed from the site by a qualified waste water disposal contractor. Solid waste materials removed from the plant during decontamination will be placed in the interim storage pile.

4.7 DEMOBILIZATION

When decontamination is completed, the soil washing plant will be disassembled for shipment. At this time, plans are to ship the soil washing plant from New Jersey to the Nevada Test Site near Las Vegas, Nevada.

5.0 EQUIPMENT AND MATERIALS

The soil washing plant is primarily constructed of off-the-shelf mining equipment. Figure 2 illustrates the basic components:

- hopper/grizzly to load whole soil and separate materials larger than 2 to 4 in.;
- trommel to vigorously wash, tumble, and separate material larger than 1/4 in.;
- primary classifier to transfer +60 mesh (250 microns) material to attrition mills and -60 mesh material to the fines sizing feed sump;
- attrition mill to scrub +60 mesh material for separation of fine particles;
- secondary classifier to separate +100 mesh (149 microns) sand from the finer material;
- fines sizing circuit to separate fine material (approximately 75 microns or 44 microns);
- clarifier to combine the fines with flocculent to increase particle size for faster and more effective settling; and
- filter press to filter water from the flocculated material and produce a filter cake.

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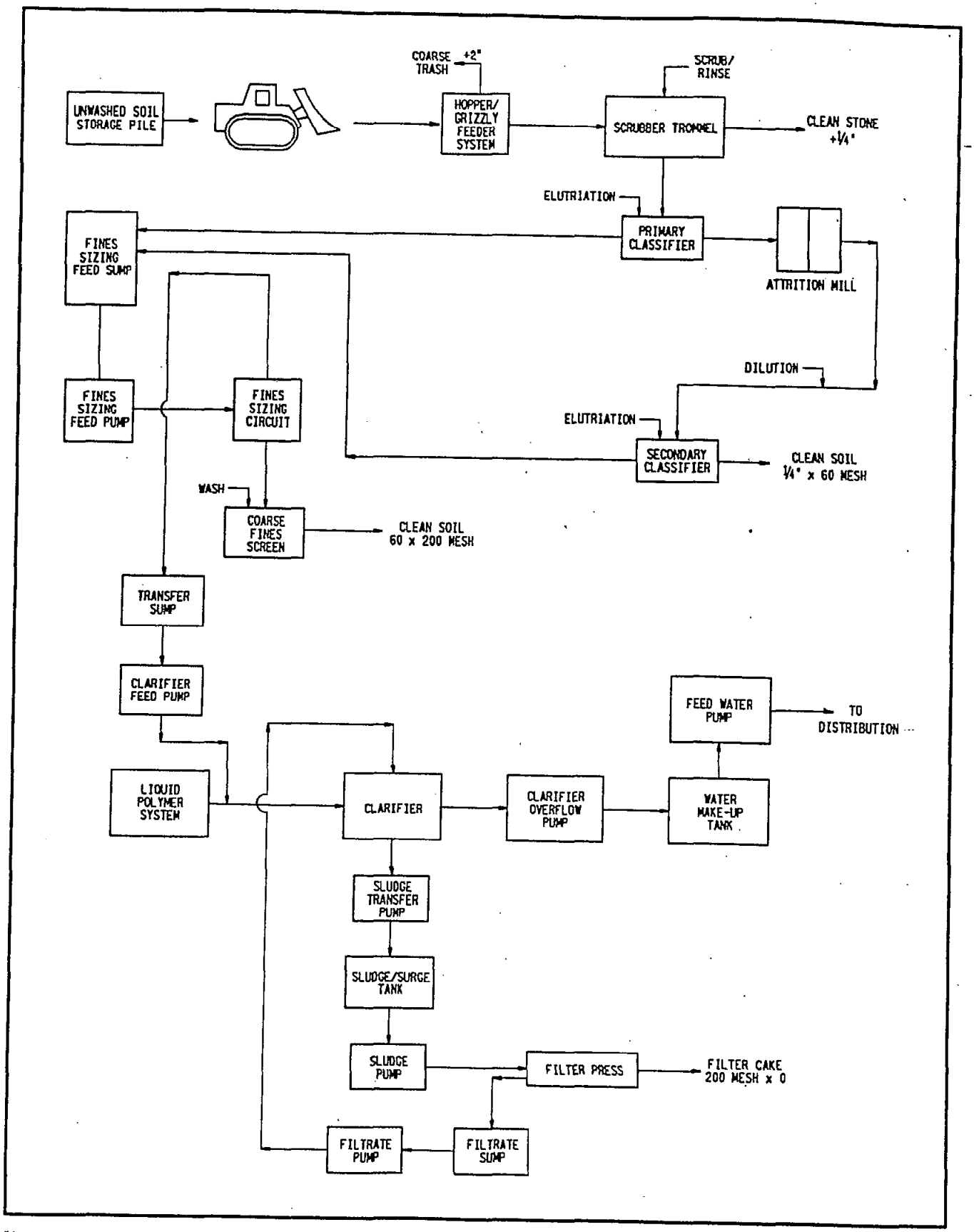

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Figure 2
SOIL WASHING PLANT
FLOW DIAGRAM

Figure 3 shows a photograph of the soil washing plant before being modified to improve operating performance. The physical dimensions of the plant are approximately 100 ft long by 50 ft wide by 25 ft high.

6.0 DATA COLLECTION, MANAGEMENT, AND ANALYSIS

Sampling and analysis activities are designed to support an evaluation of the performance of the pilot-scale soil washing plant and thus must result in collection of representative samples and accurate characterization of test samples before and after treatment. Data collection during the test will also include cost information and health and safety aspects.

Data from the test of the soil washing plant will be evaluated to determine

- steady-state performance of the plant;
- expected long-term production rate;
- unit operating costs for plant operation, sampling and analysis, health and safety, and overhead;
- operational impacts on site workers and the community to be used when identifying the needs for a full-scale system; and
- suggestions on possible modifications to improve performance.

The specifics of investigations, sampling, and related analytical activities will be documented in the Sampling and Analysis Plan, field logbooks, and other work-controlling documents. The purpose of the Sampling and Analysis Plan is to ensure that the samples obtained for characterization and testing are representative and the quality of the analytical data generated is known and adequate for its intended purpose. The data quality objective for on-site laboratory data is to produce data of known quality to evaluate the equipment

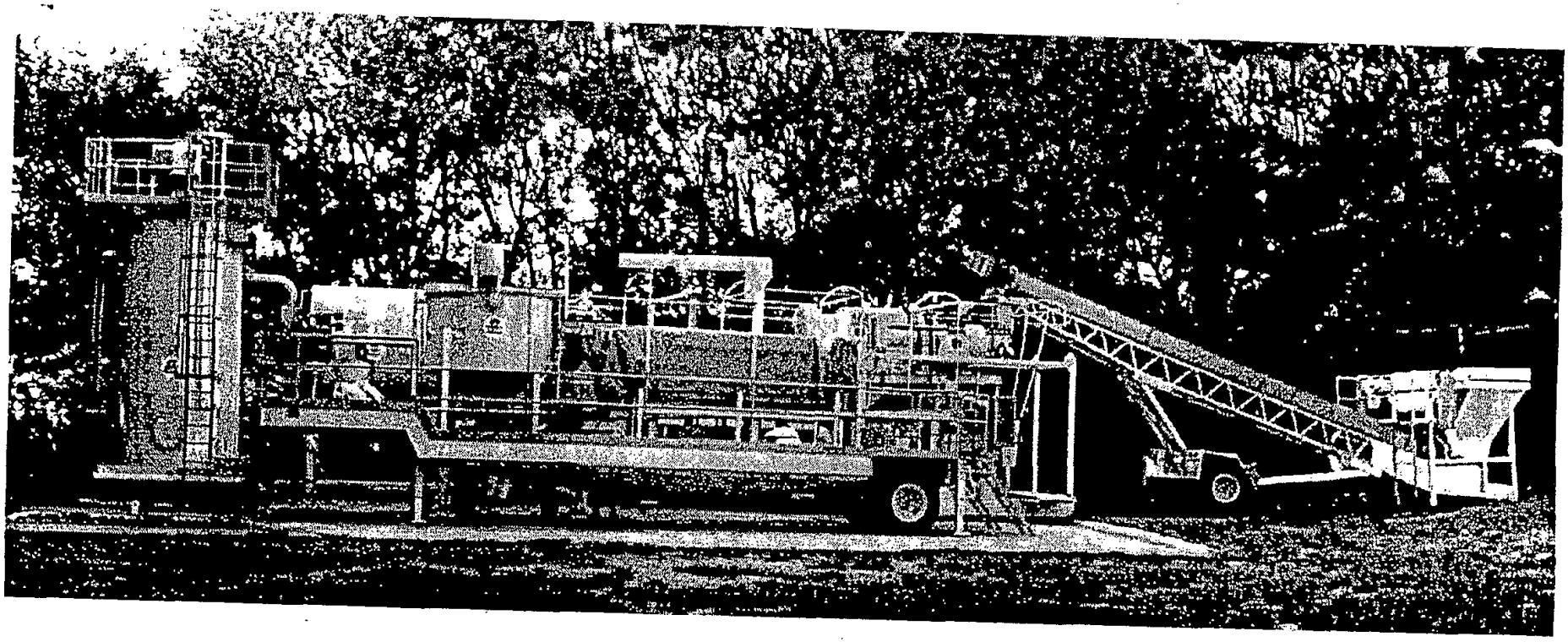

Figure 3
Soil Washing Machine

performance; analytical Level II will be used. Off-site laboratory data will be used to verify the on-site laboratory results; analytical Level III will be used for the off-site laboratory.

The quality assurance (QA) objectives for sample collection and handling are to verify that collection, packaging, handling, and decontamination do not introduce variables (contaminants or interferences) into the sampling chain that could jeopardize the validity of the samples. Quality control (QC) samples will be used to fulfill the QA objectives. The Sampling and Analysis Plan will include a Quality Assurance Project Plan that will describe the QA/QC procedures to be employed during sampling to ensure accurate and precise data.

Samples from the feed stream, the cleaned soil, and the filter cake will be analyzed onsite to determine contaminant levels and evaluate plant performance; the onsite laboratory will provide quick turnaround on sample test results. A percentage of the samples analyzed at the onsite laboratory will be sent offsite for independent verification of the accuracy of the onsite laboratory results. Specific analytical methods and equipment detection limits for both onsite and offsite laboratory work will be specified in the Sampling and Analysis Plan. Analytical results from previous characterizations have indicated that the pile material is not RCRA-hazardous; however, limited chemical analyses will be performed to ensure that the contaminated filter cake generated by the soil washing plant is not a RCRA-hazardous waste.

Data from the test will be collected as notes in field logbooks and analytical results from onsite and offsite sample testing. Additional data management details (e.g., recording of laboratory test results, use of an electronic database, and data validation) will be provided in the Sampling and Analysis Plan. Photographs will be taken of soil washing activities to provide a historical record of the test.

Equipment downtime and failure records from the field logs will be used qualitatively to evaluate the suitability of the soil washing plant components. The need for backup equipment and replacement part inventories will also be evaluated from field logs.

Air monitoring and quality data obtained during the test will be used to determine the need for worker protection, dust, or other control measures. Air quality data will also be used to identify any potential revisions to Health and Safety Plans (HSPs).

7.0 HEALTH AND SAFETY

The HSP identifies the hazards associated with each phase of site or facility operations and prescribes appropriate protective measures. The existing site-specific HSPs for Wayne and Maywood have been developed to protect the health and safety of radiation workers in compliance with standards of the Occupational Safety and Health Administration (OSHA). OSHA standards, along with the requirements of DOE Orders and other federal, state, and local requirements, form the basis of the Wayne and Maywood HSPs. These HSPs will be reviewed and revised as necessary to accommodate the operations of the soil washing test.

All field activities related to this test will be conducted in accordance with the approved site HSP, which will identify the potential hazards (primarily exposure to mechanical equipment and contaminated soils) and prescribe appropriate protective measures. These measures will include

- employee training and medical monitoring,
- personal protective equipment,
- personnel and environmental monitoring during the test,
- decontamination procedures, and
- emergency response plan.

All field activities will be conducted under the surveillance of a Site Safety and Health Officer, who is responsible for implementing the project health and safety program.

8.0 TEST RESULTS

After the test is completed, an evaluation report will be developed to discuss performance, production rate, costs, and experience gained. The report will also include analytical data that have been reviewed and evaluated. Based on the test results and experience with running the soil washing plant, recommendations will be given for next steps to evaluate treatment of the Wayne and Maywood sites. Because soil washing is very sensitive to specific soil parameters, results obtained from this test may not be representative of the technology's potential performance on other soils at the site. The test evaluation report will be provided to the regulations, local officials, and other interested citizens. A copy will be placed in the administrative record file for the site.

9.0 SCHEDULE

The schedule for the soil washing project shown in Figure 4 provides the anticipated activities, scheduled durations, and start and completion dates for the soil washing test at the Wayne site.

WAYNE SOIL WASHING PILOT TEST

Name	Duration	Scheduled Start	Scheduled Finish
PROJECT DOCUMENTS AND PLANS	67d	3/2/94	6/3/94
DESIGN MODS TO SOIL WASHING PLANT	25d	3/14/94	4/15/94
MODIFY SOIL WASHING PLANT	55d	4/26/94	7/13/94
WAYNE SITE PREPARATION	15d	5/16/94	6/6/94
WAYNE SITE OPERATIONS	53d	7/19/94	9/29/94
WAYNE TEST REPORT	66d	10/4/94	1/3/95

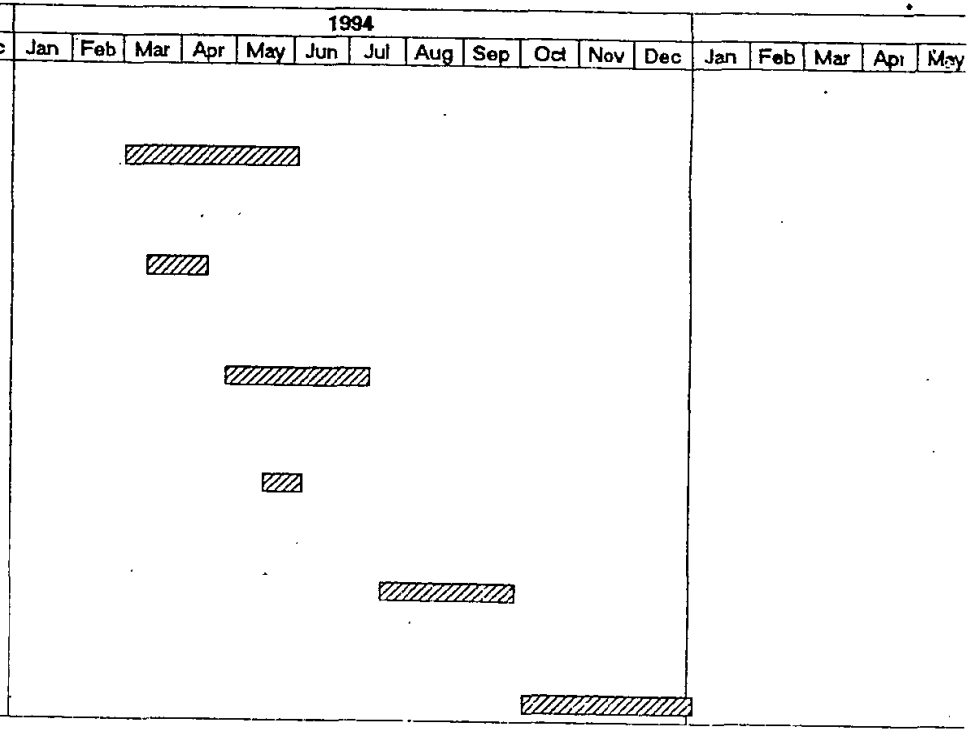

Figure 4
Wayne Soil Washing Test Schedule

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