

Inspection And Evaluation  
Of Nuclear Fuel Services  
High-Level Waste Storage System

Program Plan Summary Overview

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INSPECTION AND EVALUATION OF NUCLEAR  
FUEL SERVICES HIGH-LEVEL  
WASTE STORAGE SYSTEM

PROGRAM PLAN SUMMARY OVERVIEW

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## INTRODUCTION

Rockwell Hanford Operations' (Rockwell) document RHO-CD-882, entitled "Inspection and Evaluation of Nuclear Fuel Services High-Level Waste Storage System Program Plan", dated January 1980, presents detailed plans for carrying out technical investigations and studies relating to the condition and safety of High-Level Waste storage tanks located at West Valley, New York. This overview summarizes the scope, budget, and schedule for all work required by the program plan.

## BACKGROUND

Nuclear reactor fuel reprocessing performed from 1966 through 1972 at the Western New York State Nuclear Service Center near West Valley, New York produced 572,000 gallons of high-level radioactive waste. This waste is stored in two underground tanks. One carbon steel tank contains 560,000 gallons of neutralized waste (530,000 gallons of supernate, and 30,000 gallons of sludge). A second stainless steel tank contains 12,000 gallons of acid liquid waste. Surveillance of the idle reprocessing facilities and stored waste has continued under a contract between Nuclear Fuel Services (NFS) and the New York State Energy Research and Development Authority (NYSERDA) and an operating license under the Nuclear Regulatory Commission (NRC).

Early in 1978, the E. I. du Pont de Nemours & Company, Savannah River Plant, prepared an analysis of available information relating to the waste storage system at West Valley. This analysis, filed in NRC Docket Number 50-201, entitled, "Safety Related Information Available on NFS Waste Tanks", set forth recommendations for studies to obtain additional information in order to improve the understanding of the existing storage system and to improve future planning. These recommendations formed the bases for a program initiated by the NRC.

In November 1978, the NRC with the concurrence of the Department of Energy (DOE) requested Rockwell, a DOE contractor, to prepare a proposal and plan to inspect the West Valley waste storage tanks, determine their condition, and generally achieve the information objectives recommended in the analysis. In addition to evaluating the condition of the tanks, the potential for radionuclide transport in surrounding soils is to be studied. The initial plan, RHO-LD-97, entitled, "Project Plan for Inspection and Evaluation of Nuclear Fuel Services High-Level Waste Storage System", was issued in August 1979. RHO-CD-882 updates and supercedes the initial plan.

## OBJECTIVES

The program objectives are to:

- (1) determine the condition of the waste storage tanks and vaults, and
- (2) predict the potential for radionuclide (waste) transport through soils surrounding the tanks.

The data developed by this program are intended to be used in evaluating the safety of continued storage of the wastes for an interim period pending final disposition of the wastes. The evaluation is needed to assure that continued storage of the wastes poses no significant risks during the interim period.

## WORK BREAKDOWN STRUCTURE

The program plan sets forth details for four tasks.

- 1.0 Program Management and Support
- 2.0 Tank and Vault Inspection
- 3.0 Soil Transport Studies
- 4.0 Thermal Evaluation

1.0 Program Management and Support - Is a level of effort providing planning, control, and technical direction. Functions of Health, Safety, and Quality Assurance are performed under this activity to ensure the safety and quality of all activities performed by Rockwell and Rockwell subcontractors.

2.0 Tank and Vault Inspection - All waste tanks are single-shell tanks contained in underground concrete vaults as contrasted to direct burial of tanks. Photographic inspection will be made of the interior of the neutralized waste tank, and photographic and television inspection will be made of the tank exterior and vault interior concrete surface. Due to limited access, only a portion of the tank exterior and vault interior surface will be examined.

Each active waste tank has an identical spare tank. While detailed inspections of the spare tanks are not included in the program, inspection of the spare tanks, if desired, would be routine. The spare tank for acid waste is stainless steel and has not be used for storing acid waste. The spare tank for neutralized waste is currently being used to collect condensate from the active neutralized waste tank. The spare tank for neutralized waste can be viewed directly from the annulus space between the tank exterior and vault walls since radiation levels are low and permit entry into the annulus space.



To further support the evaluation of the neutralized waste tank, wall thickness measurements of the tank will be obtained over a limited area accessible through the existing opening into the annulus space formed by the tank exterior and concrete vault. Measurements will be obtained by remotely operated ultrasonic test equipment.

A review of structural specifications, static and design loads, thermal history, and fabrication reports will be performed. Prior corrosion data will be reviewed and stress corrosion cracking coupons will be installed within the tank to evaluate prior and future corrosion potentials.

Comprehensive reports of the overall evaluation of the tank condition will be prepared.

3.0 Soil Transport Studies - The potential for radionuclides to be transported through the soils surrounding the tanks will be determined to evaluate the potential risks associated with any leaks which breach the tanks and vaults. Soil sampling and drilling will be performed in order to determine soil permeability and sorptive properties with respect to the waste solutions. Radionuclide transport modeling will be used to assess the impact of various release scenarios. The impact of predicted transport mechanisms on the environment will be assessed.

4.0 Thermal Evaluation - To provide a basis for predicting temperatures of wastes and tank structures associated with various options for managing the West Valley wastes, measured values of heat generation in the tank are desirable. In addition to estimates based on radiochemical analysis, in situ measurements of soil thermal conductivity and temperature gradients of the soil covering the tanks will be obtained. Based on these data, the heat flowing from the tank to the surface will be calculated. Heat balance calculations will be made for the tank to establish a basis for assessing temperatures resulting from various options such as liquid removal or partial sludge removal.

#### RELATED ACTIVITIES

This program has a strong interface with a current DOE program studying various options for managing West Valley, high-level wastes. A fiscal year 1980 appropriations act directed the DOE to study and recommend a nuclear waste solidification project at West Valley.

"Within the funding provided for commercial waste management, the department is directed to provide necessary technical support to study and recommend a nuclear waste solidification program at West Valley, New York, and to assist the state of New York as appropriate in developing such a program."

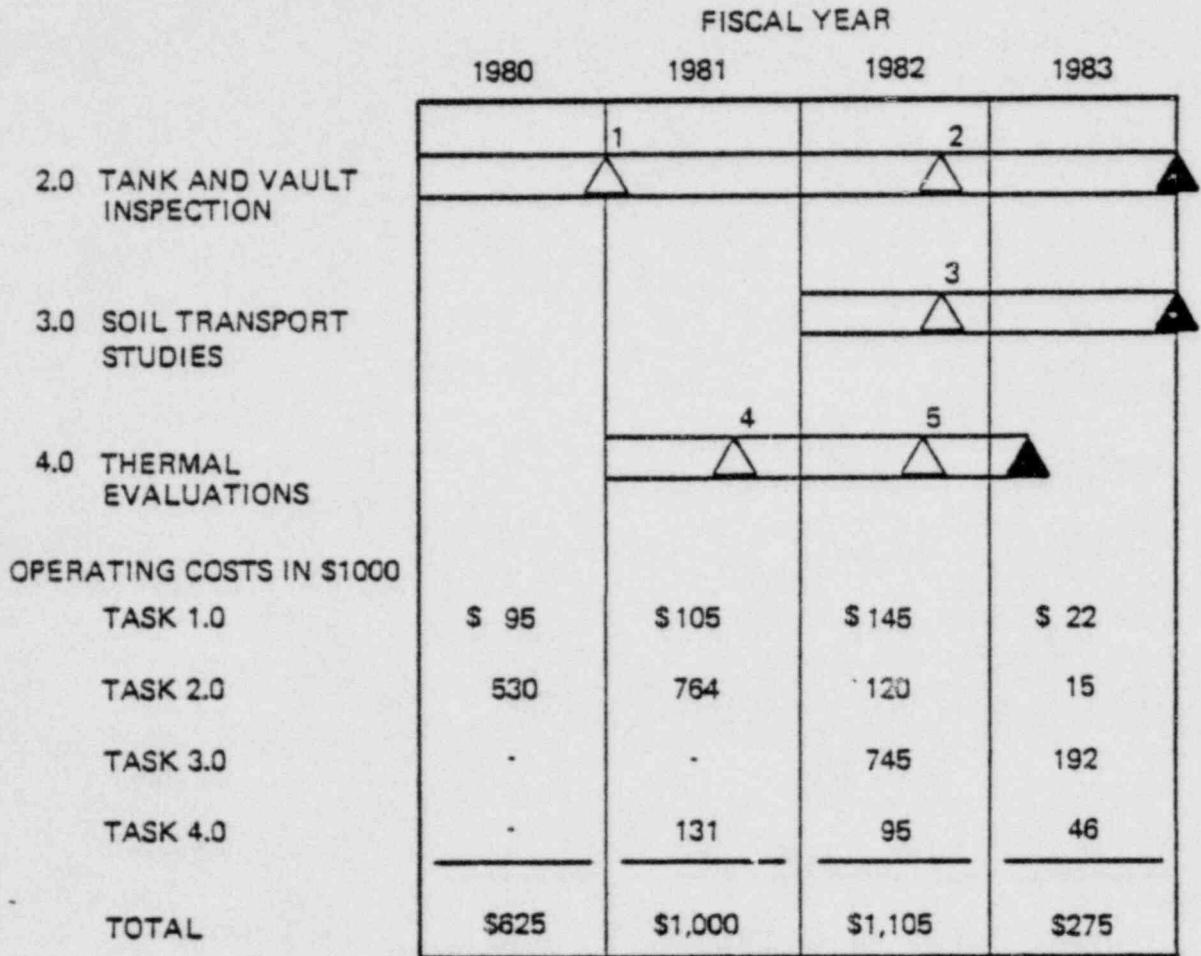
Accordingly on November 15, 1979, the DOE expressed an interest in assuming programmatic and financial responsibility for selected tasks from the program originally planned and formulated for the NRC, (RHO-LD-97). The tasks selected by the DOE were ones characterizing the high-level wastes since they support the DOE overall study of options to remove NFS wastes, immobilize them, and place the wastes in interim storage pending final disposal in a repository. To determine the chemical and radioisotopic properties of wastes, current representative samples will be obtained and analyzed. The interface between supernate and sludge will be measured to determine sludge volumes, and in-tank temperatures will be measured. These data characterizing the chemical and radioisotopic content of the wastes also support the NRC studies of tank corrosion and radionuclide transport in the soils surrounding the tanks.

#### BUDGET AND SCHEDULE

Figure 1 illustrates the budget and schedule required to complete the program work scope. During fiscal years 1980 and 1981, work is concentrated on the tank and vault inspection, while the balance of the work scope is completed during the later years 1982 and 1983.

FIGURE 1 SCHEDULE AND BUDGET

INSPECTION AND EVALUATION  
OF NFS HIGH-LEVEL WASTE STORAGE SYSTEM



NOTES:

1. PHOTOGRAPHIC & TV INSPECTION COMPLETE
2. WALL THICKNESS MEASUREMENTS COMPLETE
3. SOIL SAMPLING COMPLETE
4. SOIL THERMOCOUPLES INSTALLED
5. SOIL HEAT FLUX MEASUREMENTS COMPLETE
- ▲ EVALUATIONS COMPLETE