# WASTE MANAGEMENT FOR THE SHIPPINGPORT STATION DECOMMISSIONING PROJECT

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## ABSTRACT

The Shippingport Station Decommissioning Project (SSDP) is being performed by the US Department of Energy (DOE) with the objectives of placing the station in a radiologically safe condition, demonstrating safe and cost effective dismantlement and providing useful data for future decommissioning projects. This paper describes the development of the Waste Management Plan which is being used for the accomplishment of the SSDP. Significant aspects of the Plan are described, such as the use of a process control and inventory system. The current status of waste management activities is reported. It is concluded that SSDP has some unique aspects which will provide useful information for future decommissioning projects.

## INTRODUCTION

The Shippingport Station is located 25 miles northwest of Pittsburgh, Pennsylvania. The land is owned by the Duquesne Light Company and was leased in 1954 to the US Department of Energy (DOE) for forty years. The reactor plant is a four-loop, 72 megawatt electric pressurized water reactor. Critical operations began in December, 1957. The plant was permanently shut down in October, 1982 for decommissioning by the DOE.

Planning for the Shippingport Station Decommissioning Project (SSDP) has been underway for the past several years. The planning was initiated with a review of the environmental considerations as called for by the National Environmental Policy Act (NEPA). DOE decided on prompt dismantlement of the Shippingport Station, and after a series of conceptual and engineering studies, the project entered the current phase which is known as Decommissioning Operations. The General Electric Company, assisted by MK-Ferguson Company (an integrated subcontractor), is responsible to the DOE as the Decommissioning Operations Contractor (DOC). UNC Nuclear Industries functions on site as the technical support contractor to DOE.

The objectives of the decommissioning operations are:

- To place Shippingport in a radiological safe condition. This includes the removal of all government-owned radioactive portions of the station.
- To demonstrate safe, cost effective dismantlement of a large scale power plant.
- To provide useful data for future decommissioning projects.

The remainder of this paper is divided into the following sections:

- Development of the Waste Management Plan
- Waste Management Plan
- Status of Waste Management Activities
- Conclusion

## DEVELOPMENT OF THE WASTE MANAGEMENT PLAN

The conceptual planning for the handling of the waste resulting from the decommissioning of Shippingport was an integral part of the initial engineering studies. The engineering included the Environmental Impact Statement, the Preconceptual Engineering Decommissioning Assessment, the Conceptual Engineering Baseline, and the Detailed Engineering Decommissioning Plan. Those engineering activities established the waste management policy for the project. It was decided that the radioactive waste would be buried at the Hanford, Washington burial ground. Hazardous waste would be disposed of in accordance with the Environmental Protective Agency requirements. Liquid waste would be handled in accordance with the National Pollution Environmental Discharge Elimination System Permit applicable to the Shippingport Station.

Table I summarizes the radioactive waste which is being handled by the SSDP.

TABLE I

Shippingport Decommissioning Project
Radioactive Waste Quantities and Activities

| Type | Volume | Activity |
|---|---|---|
| Reactor Vessel | 12,000 Cubic Feet | 6500 Curies |
| Components, Piping & Misc. Waste | 91,000 Cubic Feet | About 1000 Curies |
| Insulation | 34,800 Cubic Feet | Less Than 1 Curie |
| Radioactive Liquid Waste | 515,000 Gallons | Less Than 1 Curie |

The Detailed Engineering Decommissioning Plan provides outline specifications for the various activities of the project known as Activity Specifications. Activity Specifications were delineated for both solid and liquid waste processing activities. Those activity specifications formed a basis for the DOC Waste Management Plan. The DOC Waste Management Plan provides additional detail and

revises the earlier planning where DOC engineering studies showed that alternative means could provide cost effective improvements.

## WASTE MANAGEMENT PLAN

The policy of the SSDP is to comply with all applicable federal, state and local regulations for the handling, packaging and transportation of hazardous and radioactive material, as well as the applicable DOE orders which amplify the federal regulations. It is the policy, as stated in the DOC Waste Management Plan, that the DOC will provide safe and cost effective management of all waste materials associated with the project. All DOC managers, employees and subcontract personnel are expected to take appropriate measures in accordance with the Waste Management Plan and other applicable DOC procedures to protect the health and safety of all employees and personnel at the Shippingport site, as well as the environment and the public. The burial portion of the waste cycle is being performed by DOE and their contractor, Rockwell Hanford Operations, in accordance with the DOE orders for the Hanford facility.

The DOC Waste Management Plan is implemented through a set of more detailed instructions and manuals. Included are the Procurement Manual, Quality Assurance Manual, Safety Manual, Site Utilization Plan, Radiological Controls Manual, Project Instructions for Hazardous Waste Packaging and Storage, Traffic and Transportation, an Occupational Medical Plan and the Shippingport Plant Systems Operating Instructions. The Waste Management Plan provides flowcharts depicting the process for handling each of the various waste stream sources which are present on the site. The sources include solid radioactive waste, radioactive mixed waste, liquid radioactive waste, nonradioactive hazardous waste and nonhazardous waste.

As waste is generated, it is radiologically surveyed to establish the proper waste classification. After classification, the waste is packaged to meet the DOE burial ground criteria using Department of Transportation (DOT) approved shipping containers. The majority of waste is being packaged in low specific activity (LSA) containers. The containers used at Shippingport are the same as those which are utilized elsewhere in the commercial nuclear industry.

The waste management process at SSDP involves several different organizations -- both DOC and subcontractors. Therefore, to provide the integration of all elements of the waste management system and the desired quality assurance, a Process Control and Inventory (PCI) system was developed. The system provides assurance that waste management instructions are being properly accomplished and maintains a current inventory record throughout the process. A PCI form is utilized which contains requirements for certification signatures at key places during the process -- such as surveys, packaging, container tightness, etc. All subcontractors and DOC personnel are trained in waste management practices and in the use of the PCI form prior to participating in waste management activities. Table II summarizes the functions and certifications accomplished in the PCI system.

TABLE II

Process Control and Inventory System Functions & Certifications

| Function | Certified By |
|---|---|
| Pre-use Inspection of Container | Materials Group and User |
| Description of Inventory During Container Load | User During Loading |
| Determination of Curie Content | DOC Health Physics (independent from user) |
| Shipping Classification | DOC Health Physics |
| Verification That Container has been Properly Packaged and Closed | DOC Health Physics, Work Administrator, User, and DOC Waste Packaging Engineer |
| Verification That Container is Acceptable for Storage | Container User |
| Acceptance for Interim Storage | DOC Materials Group |
| Acknowledgement of Disposal and Closeout of Package Inventory | DOC Materials & DOC Plant Subsection Groups |

It is planned to transport the larger components -- reactor pressure vessel, pressurizer, steam generators and other radioactive materials on an ocean barge. The proposed barge route will be down the Ohio River and the Mississippi River to the Gulf of Mexico, through the Panama Canal and up the west coast to the Columbia River, then to the Port of Benton, Washington. At Benton, the radioactive material will be off-loaded and transported by truck to the DOE burial ground at Hanford, Washington.

To assure compliance with burial ground requirements, the design of all shipping containers (including standard LSA boxes) is transmitted to the burial-ground contractor for pre-approval prior to using the specified container. A burial compliance checklist is made out to ensure that all requirements are met.

## STATUS OF WASTE MANAGEMENT ACTIVITIES

The processing of the initial inventory of liquid radioactive waste is nearly complete. This processing was accomplished by the use of the installed systems, primarily with the use of filtration. The radioactivity levels at discharge were typically a factor of one hundred below the DOE limits. The total activity discharged was substantially below the value predicted in the Environmental Impact Statement.

The non-fuel bearing irradiated core components, which were left in the fuel storage canal, have been either loaded in the reactor vessel or transported by truck to the burial ground. The components which have been loaded in the vessel are being sealed in place with concrete as part of the

integral one-piece reactor pressure vessel (RPV) shipment.

Five hundred cubic yards (in-place volume) of asbestos has been removed from piping systems. The radioactive asbestos, which originated from contaminated systems, has been buried at Hanford. The noncontaminated asbestos was buried in a local EPA licensed burial facility. All non-radioactive hazardous waste has been removed from the site. Five truck shipments of that waste were removed to an EPA licensed burial facility by a licensed hazardous waste subcontractor.

Currently, some shipments of LSA waste are being made by truck to the Hanford burial ground. However, almost all the remaining radioactive waste (which is being generated during the removal of piping and components) will be stored on-site until the barge shipment at the completion of removals.

## CONCLUSION

The Shippingport Station (SSDP) is demonstrating that the techniques and methodologies of waste management, which are currently employed by the nuclear industry, provide adequate management and control of waste activities for the decommissioning of a large scale nuclear plant.

The SSDP has some unique aspects in that as part of the objective to promote technology transfer, multiple subcontractors are being utilized in the project. The interfaces resulting from multiple subcontractors require additional controls. Effective control has been accomplished by the use of a process control and inventory system, coupled with personnel training in waste management activities.

Decommissioning provides some unique opportunities for cost effective waste management practice. The utilization of the larger components as their own single-piece shipping container will result in substantial cost savings.

While the decommissioning operations are not scheduled to be completed until January, 1990, a substantial portion of the waste management activities of the project has already been completed. The record of accomplishment thus far; completing activities on schedule, within budgeted costs and without any serious problems, demonstrates the effectiveness of the Waste Management Plan employed by the DOC.