Y-12

OAK RIDGE Y-12 PLANT

MARTIN MARIETTA

BUILDING 9201-4 AT THE
OAK RIDGE Y-12 SITE

ANNUAL SURVEILLANCE AND MAINTENANCE REPORT 1994

M. L. Sollenberger
D. E. Sparkman
R. M. Reynolds

January 1995

Oak Ridge Y-12 Plant
Oak Ridge, Tennessee 37831
managed by
Martin Marietta Energy Systems, Inc.
for the
U.S. Department of Energy
under contract DE-AC05-84R21400

MANAGED BY
MARTIN MARIETTA ENERGY SYSTEMS, INC.
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I. SUMMARY

The Oak Ridge Y-12 Plant Decontamination and Decommissioning (D&D) Program is part of the Waste Management/D&D Organization and is funded by the Office of Environmental Restoration (EM-40). The strategic goals of the program are to protect human health and environment and to reduce the number of hazardous material-contaminated facilities by properly managing and dispositioning facilities when they are no longer required to fulfill a site mission. The D&D Program objectives include (1) providing surveillance and maintenance (S&M) activities in support of facilities in standby and awaiting D&D; (2) developing specific methods, schedules, and funding plans for the D&D of shutdown facilities; and (3) implementing plans to provide for facility disposition in a safe, compliant, and cost effective manner. Presently Building 9201-4 (Alpha-4) is the only facility at the complex that is in the Y-12 D&D Program.

This report provides a status of the program plans and specific S&M requirements for Building 9201-4 as part of the Y-12 D&D Program.

II. S&M PROGRAM OBJECTIVES

Following are the objectives of the Y-12 S&M Program:

1. Containment of Hazardous Materials

Hazardous materials are being controlled by an aggressive program of mercury draining and recovery and control of hazardous materials in the facility. A significant reduction of potential risk was achieved through the complete D&D of the electrochemical machining (ECM) area and the removal of hazardous chemicals from the building. Initial agreements have been put in place to remove over 90 percent of the drums presently stored in the interim storage area. The containment systems have been evaluated and checked to ensure the integrity of both primary and secondary containment capability. The soundness of the building containment is verified through an ongoing groundwater sampling program. The potential for contaminated water generation from steam condensate leakage was reduced by removing defective steam coils. Potential for exposure and spread of hazardous materials is kept to a minimum by strict enforcement of administrative controls and entry/egress requirements.

2. Safety and Security for the Facility

Three major efforts were begun to ensure the safety of persons assigned to the facility or occasional visitors. The accessing control system has been totally revised. This change guarantees that only properly qualified personnel gain access. Facility and work safety received added emphasis with the implementation of daily and monthly safety meetings and the development of job hazard analysis for repetitive tasks. Additional overview was provided through an expanded self-assessment program.

3. Cost-Effective Management

Conduct of Operations provided the guidance and direction to clarify the course of the D&D program for Alpha-4. Weekly schedules and reviews coupled with in-depth manpower utilization evaluations, cost accounting, equipment tracking and status, and use of performance indicators keep the effort focused and on track. Work flow is maintained through flexibility of work schedules and a strong cooperative effort with other organizations who support the Alpha-4 D&D Program.

III. INTRODUCTION

Currently Building 9201-4 is in the inactive-shutdown phase. It is part of an active S&M Program that is being carried out in support of risk mitigation, hazard abatement, and site preparation for subsequent D&D.

Alpha-4 originally began operating in 1945 as a uranium enrichment facility utilizing the electromagnetic separation process. However by 1947 the Oak Ridge Gaseous Diffusion Plant had demonstrated a superior ability to produce enriched uranium in sufficient quantities, and the electromagnetic process was abandoned. The building was in standby from 1947 until 1953, when the installation of the column exchange (Colex) process began. Facility retrofits were completed in 1955, when the facility began operation. The Colex process involved electrochemical and solvent extraction processes which required substantial quantities of mercury as a solvent to separate lithium-6 from lithium-7 (in the form of lithium hydroxide). The Colex process was discontinued in 1962, and the equipment was subsequently drained of the majority of process materials (including mercury). However, systems were not cleaned, and residual amounts of mercury and lithium hydroxide remained in the process equipment and lines. In 1983 a decision was made to develop an approach to remove the Colex process systems and recover as much process material as possible. The Environmental Restoration and Waste Management Program assumed full ownership in 1993 and provides for surveillance and maintenance under the responsibility of the Y-12 D&D Program.

Several activities including S&M, enhanced S&M, and asbestos abatement projects are currently under way to mitigate chemical, as well as other safety issues and concerns. The S&M program focuses on ensuring that the health and safety of the worker and environment are maintained by performing monitoring tasks, controlling site access, and complying with Hazardous Waste Operations and Response (HAZWOPER) regulations. A full-time, on-site building manager is located at Alpha-4, as is a site safety and health officer, maintenance and operator crews, and supervisors. Deterioration of the facility has been addressed by a reroofing project, numerous facility repairs, system test/inspections, and an aggressive housekeeping program; all are key to the S&M Program.

Near-term removal actions have been identified to reduce risks, eliminate hazards, and reduce S&M costs. Mercury is currently being recovered in the facility through draining and cleaning of lines, valves, tanks, and process systems; obsolete steam systems have been identified and removed. Asbestos abatement is under way, and substantial amounts of material have been removed and disposed of in the Y-12 Sanitary Landfill. A project within a project was the total decommissioning, decontamination, and removal of the ECM area located on the first floor of Alpha-4. The project began in January 1994 and was completed in September 1994. All milestones and objectives were achieved ahead of schedule and below projected budget costs.

IV. D&D PLANNING

Fiscal Year (FY) 1994 was a year of accomplishment and achievement which will provide the stimulus for movement and progress in FY 1995. A great deal of time and effort have been directed to developing and planning short, intermediate, and long-range objectives. Each affects and controls the others, impacting in very positive ways when the planning is well thought out. For FY 1995 the following tasks will be the primary focus of the D&D Program.

1. Cleanup of the absorber room will achieve a number of objectives of the mercury cleanup and mitigation effort by significantly reducing the mercury vapor levels on the third floor of Building 9201-4. Through the removal of peripheral equipment, accurate sampling data will be obtained on mercury contamination on the exterior of hardware and equipment. This effort will involve chemical operators, maintenance and other crafts, safety, engineering, Industrial Hygiene, Health Physics, and management. This project will extend beyond FY 1995.
2. Removal of pipe, pumps, tanks, and hardware associated with the ECM area on the second floor will be completed in FY 1995. All planning and budget requirements are in place.
3. Steam coil removal will continue with the planned removal of fifty coils. The safety plan and JHA are in place and the job is planned for the fall of 1994. When the FY 1995 set is completed, a total of 111 coils will have been removed.
4. A major and necessary effort to complete is the transfer of materials presently stored in the RCRA interim storage area on the first floor to the K-25 storage facility. The initial phase of identification of drums for shipment and finalization of K-25 acceptance criteria has been completed. Transfer actions will continue in FY 1995.
5. The characterization and identification of hazardous materials in the facility will continue in FY 1995 and RADIAN Corporation's contract extends to the mid-year. As a result of their findings, additional decontamination personnel will be added to the enriched uranium operations (EUO) crew to assist with cleanup throughout the building. Their efforts will center primarily on polychlorinated biphenyl (PCB) cleanup on the first floor and around pumps and motors in the remainder of the building.
6. An outside storage tank containing a weak solution of lithium hydroxide (0.3 percent by volume), mercury, and water will be transferred to the Disassembly and Special Materials Organization after the mercury has been removed from the solution. Lithium operation personnel will recover the lithium and dispose of the remaining clean water.
7. Assistance will be provided to the Jacobs Corporation which is involved in developing a long-range strategy for the final disposition of Building 9201-4.

V. FY 1994 SURVEILLANCE

No production activities are being carried out at the Building 9201-4 facility which is kept in an environmentally safe condition by the Y-12 Waste Management and D&D Organization personnel. The surveillance activities were performed daily in FY-1994 with emphasis on structural damages, leak detection, safeguards, health of personnel, environmental issues, safety conditions, equipment, hazardous materials, mercury monitoring, and cleanup. The sump water volume discharged to East Fork Popular Creek was monitored, and daily rates were chronicled. Daily mercury vapor-in-air readings were taken in at least three locations in each of the 20 zones within Building 9201-4, and a permanent record of the results was kept. During periods of elevated building temperatures or increased activities, additional readings were taken. Personnel exposure to mercury vapor was monitored through the Y-12 Plant Urinalysis Program. Samples were analyzed by lab personnel, results were reviewed with the employee, and results were filed. Ingress and egress of all persons entering and exiting the building were recorded, and all events (entry and exit) are subsequently logged into a permanent data base.

Facility surveillances were conducted by the facility manager, personnel assigned to Building 9201-4, other Y-12 personnel and Martin Marietta employees, DOE, and state and federal government employees. These surveillances included:

1. Visual inspection of the facility and equipment for structural deficiencies, material degradation, any type of leak, unusual odors, equipment irregularities, etc.
2. Routine checks of primary and secondary containment systems for liquids and checks of building ventilation systems.
3. Observation of sump flow rates, storage tank integrity, and dikes around storage tanks.
4. Operability checks of tank, water and sump pumps.
5. Verification that appropriate system checks have been performed on facility-specific steam, air, water, and air conditioning/heating systems to maintain safe protective storage and facility structural integrity.

In addition to operator surveillance activities, routine inspections of radiation monitoring instruments, building condition (exterior and roof), overhead cranes, testing of high-efficiency particulate air filtration systems are performed by facility personnel and supervision. Y-12 Plant quality assurance (QA) requirements are met through these self-assessments and QA audits. The frequency, roles and responsibilities, associated documentation, and work hours required for routine S&M activities are tracked and reviewed each month.

VI. SAFETY AND SECURITY/PROTECTION SYSTEMS

1. Access Control

Building 9201-4 is located in the west end of the Y-12 Plant Bear Creek Valley complex. This portion of the plant has specific badging and entry requirements and is controlled at access points (guard posts) which are manned continuously by security personnel. Access to Building 9201-4 is controlled through a single point entry at the north side, center second floor of the building. A large mezzanine area houses the administrative, support, and supervisor offices. Access to the remainder of the building is controlled by a roto-gate which is activated by the employee identification badge. A stringent set of entry requirements are in place to control access. If requirements are not met, access to the facility is denied. These entry requirements are based on specified training criteria which must be periodically renewed. These requirements include either 24-hour or 40-hour HAZWOPER training, building briefing, medical evaluation, three-day on-the-job training, and specific reason to be in the facility. The data base control system for the roto-gate has been upgraded to incorporate completion dates of required training (24 or 40 hour) and the medical requirements. If an individual does not recertify within the required time, he or she will automatically be denied access. Once the required recertification/retraining is completed, the data base will be updated and the person will again be allowed access.

2. Daily Walkdowns

Each day a walk-through of the building is performed by management, operators, and maintenance personnel. The daily routine includes the inspection of fire suppression systems and other fire protection equipment such as fire extinguishers and alarm boxes. Housekeeping and proper storage of combustibles is also essential to a successful fire prevention program and are the focal points of each inspection and daily walk-through. Any findings are quickly resolved, and results reviewed with all personnel at safety meetings. This ensures thoroughness of corrective actions and awareness of all safety concerns.

3. Safety Awareness

As part of the effort to increase safety awareness a daily safety meeting program was implemented. Since implementation, personnel assigned to Alpha-4 have worked six and one half months or 28,000 accident/incident-free employee hours. This includes the daily operational support of activities associated with the ECM decon project. Initially a number of safety concerns surfaced during the daily meetings, and immediate action was taken to resolve them. One major concern was four sections of eight-inch process line which presented a hazard to forklift traffic. The crafts involved reviewed the task and two job hazard analyses were written. Approximately two hundred feet of 8-inch pipe was removed, eliminating the hazard. Another concern was abandoned nitrogen stations which posed a hazard to persons using walkways on the third floor. These have been removed using the same planning and evaluation process used on the pipe job. A third action was begun in conjunction with the daily safety meeting and the in-depth job planning; a monthly safety meeting, chaired by the building manager, was initiated. The format is flexible, and all attendees are encouraged to provide input and suggestions.

4. Safety Equipment

Safety equipment in the building was also upgraded. Six 8-gallon and eight 36-gallon portable eyebaths were purchased. They are in use at work areas throughout the building. A new air-driven vacuum cleaner was purchased, which is much more efficient and quieter than the electric. It also runs cooler, greatly reducing the mercury vapor emissions. A new style of hearing protector was obtained that protects an additional five decibels over the previous style.

VII. ACCOMPLISHMENTS

During FY-1994 many milestones were met in the areas of surveillance and maintenance, both routine and enhanced. The following is a synopsis of these activities:

1. Sixty-one steam coils were removed. This significantly reduced the numbers of leaks in the building-wide system and allowed for a reduction of operating pressure from 100 pound per square inch (PSI) to 30 PSI. Additionally, the potential for contamination dispersion in the event of a system failure was greatly reduced. This combined with a total shutdown of steam to the building from March to September resulted in a savings of approximately \$60,000 in utility costs.
2. Additional steps were taken to identify and remove air and steam stations which were no longer in an active system due to coil and air line removal. The removal of this abandoned hardware eliminated the chance of accidental pressurization of an inactive system from an active system.
3. Mercury draining and recovery was extended into FY 1994. The primary emphasis was on the draining of process piping and re-check of storage tanks which were connected to the process. The total amount collected during FY 1994 was 28,700 pounds of clean elemental mercury.
4. A total of 53,700 pounds of mercury was flaked, packaged on skids, and transferred to the Materials Department for resale on the commercial market.
5. Over 80,000 pounds of lithium materials stored in Building 9201-4 were transferred to the Disassembly and Special Materials Division. This transfer significantly reduced one of the major hazardous chemical vulnerabilities associated with the facility.
6. Hazardous and non-hazardous materials that were located in Building 9201-4 were identified and inventoried. All except three of these items were removed, and of these, 90 percent were taken and used by other organizations in the plant. This removal resulted in disposal cost savings of approximately \$15,000 to \$20,000.
7. A project to decommission and decontaminate the ECM facility located on the first floor was evaluated, planned, implemented, executed, and completed. This effort interfaced the skills of Building 9201-4 management and chemical operators, Maintenance, Industrial Hygiene, Enriched Uranium Operations (EUO), and Health Physics. A number of significant accomplishments were achieved:
 - a. All equipment, materials, and hardware were removed. The total exceeded 300,000 pounds, and approximately 50,000 pounds were cleaned and sent to the scrap yard.
 - b. All milestones were met ahead of schedule.
 - c. Actual costs were below those projected, and areas of savings were documented and verified.

8. A comprehensive review and inventory was completed for all drums stored in the RCRA interim storage facility. The information was organized by row, skid, and position on the skid. This information was tabulated into three notebooks and filed in the supervisor's office. Upon completion of the inventory, 80 drums were identified for transfer to a permanent storage facility at K-25. An additional 240 drums are scheduled for transfer at a later date.
9. A sampling station was installed to sample water which is pumped from the building sumps which collect groundwater. The water in the sumps accumulates from a source isolated from the building. Any water collected in or associated with building operations is controlled and does not empty into the sump system. Data gathered from the sampling are essential to validate the effectiveness of the mercury cleanup and mitigation effort for Building 9201-4.
10. Contract work in Building 9201-4 involved a number of companies, the bulk of which was provided by three contractors:
 - a. MK-Ferguson. The majority of work involved asbestos abatement and reinsulation of steam lines with approved insulation materials. Approximately 8000 feet of asbestos materials and asbestos-contaminated materials were removed, processed, and transported to approved disposal sites. Lines which will remain active were reinsulated with 5000 feet of nonasbestos materials.
 - b. RADIANT Corporation. The hazard characterization program was contracted to accurately characterize hazards within the facility. Sampling for PCBs, mercury, lead, asbestos, and radioactive contamination has begun. Sampling will continue into FY 1995.
 - c. Jacobs Engineering Group. Jacobs engaged in long-range facility studies, primarily those associated with the environmental hazards present, and determined how best to mitigate the hazard, and what effect total shutdown of the building would have on the materials responsible for the hazard(s).

APPENDIX

SAFETY BY ORGANIZATION 9201-4

NUMBER OF INCIDENTS ASSIGNED PERSONNEL

Access to the HAZWOPER site is restricted and controlled by a single entry point which is activated by a coded access badge.

The control of hazardous asbestos particles is controlled during removal/abatement by using glove bags. The glove bag isolates the material being removed from the surrounding equipment, area, and personnel performing the work.

9201-4 ELECTRO CHEMICAL MACHINING (1st FLOOR) DECONTAMINATION and DECOMMISSIONING

TOTAL SQUARE FOOTAGE DECONTAMINATED: 24,118 SQFT

TOTAL MATERIALS REMOVED: 1,000,000 LBS

9 YEAR PROJECT COMPLETED 2 MONTHS AHEAD OF
SCHEDULE.

♦ 2.2 MILLION PROJECT UNDER BUDGET 400K.

Prior to the initiation of the D&D of the ECM facility, the area looked like this.

The EOM area approximately half-way through the project.

Many crafts were involved in the BOM D&D project. The two riggers are cutting beams into proper lengths for movement out of the area.

Each individual shop area had an extensive array of equipment, machinery, and utility services that had to be removed or cleaned.

Wire removal from the electrical system was separated by type and placed in B-25 Boxes. All metals, scrap, fiberglass, and other materials were all separated and placed in B-25 Boxes.

BEFORE CLEANING - Most of the tanks of the clarifier system were coated with process residue.

AFTER CLEANING - Effective cleaning removed the residue and contamination.

A variety of equipment was used from the powered shot blaster and vacuum cleaner to 409 cleaner and rags. The bulk of the work required that all personnel don the Personal Protective Equipment shown here.

All equipment, walls, and associated materials have been removed and all decontamination has been completed. The acceptance survey by Health Physics has been done and the building manager

Steam coil removal and isolation of defective system components has resulted in significant utilities savings. Six coils have been removed and the remaining supply lines re-insulated.

Each crate contains 45 flasks of elemental mercury and there are 76 pounds of mercury in each flask. There are 53,700 pounds of mercury packed for storage.

RCA hazardous material collected during routine operations are presently stored in an Interim Storage Area.

MK-veryson is the contractor for the asbestos abatement project for the building. As material is removed it is sampled, categorized, and prepared for removal to a permanent storage facility.

The two 6-inch pipes were identified as a safety hazard due to location and height above the floor. There was very little clearance for forklifts to pass under the pipes.

The area after the pipes were removed.
This is one of four areas in the building
where the pipes were removed.

Portable safety showers and eyewashes were purchased. These are moved to each work site in the building when work is in progress.

These pneumatic vacuum cleaners are the most recent development from Nilfisk and are the most effective tool available for Mercury cleanup .

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Richard Nace, Branch chief, Nonenrichment Facilities, Oak Ridge Program Division, Office of Eastern Area Program, Office of Environmental Restoration, EM-423, Trevision 2, U.S. Department of Energy, Washington, DC 20585 (2)
D. G. Page
S. P. Riddle, DOE- Oak Ridge Field Office, P.O. Box 2001, Oak Ridge, TN 37831-8541. (5)
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