



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555

December 21, 1992

The Honorable Bruce Sundlun  
Governor of Rhode Island  
State House  
Providence, Rhode Island 02903

Dear Governor Sundlun:

On behalf of the Commission, I am writing to ensure that you are aware of current Nuclear Regulatory Commission activities related to the decommissioning of a site located in the State of Rhode Island.

Since the late 1980's, NRC has continued to strengthen its decommissioning program. A major item of concern is the decommissioning of contaminated sites that involve non-routine issues, such as large volumes of radiologically contaminated material, problems with the financial viability of the responsible party, groundwater contamination, and mixed radioactive and hazardous waste. To focus NRC efforts in this area, NRC staff issued the Site Decommissioning Management Plan (SDMP) in March 1990 (SECY-90-121). Revision 2 of the SDMP, SECY-92-200, was issued on May 29, 1992 (see enclosure). The SDMP lists the non-routine sites identified to date and outlines a strategy for accomplishing the cleanup of these sites in a timely manner.

One SDMP site is the United Nuclear Corporation site located in Wood River Junction, Rhode Island. A summary description of the site, including the concentration and volume of waste present and the cleanup activities conducted to date, is given in the enclosed SDMP. The NRC staff considers radiological cleanup at this site to be completed and is contemplating recommending to the Commission that the NRC license be terminated.

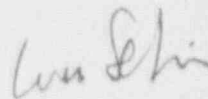
The oversight of SDMP site cleanups frequently poses special challenges to the NRC. One important generic challenge is to ensure that we are fully aware of State interests in our activities. On September 11, 1992, NRC's Director of the Office of Nuclear Material Safety and Safeguards met with Messrs. Harry Baird and Daniel Varin of the State of Rhode Island Department of Administration to discuss our respective responsibilities and areas of State involvement. The Commission believes that the dialogue we have had to date, including the September 11 meeting, has been most useful in allowing the NRC to understand the State of Rhode Island's interests and concerns.

The Honorable Bruce Sundlun

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If you would like to provide any additional input as we consider future NRC actions related to the Wood River Junction site, please contact me or, alternatively, Robert M. Bernero, Director, Office of Nuclear Material Safety and Safeguards, at 301-504-3352.

Sincerely,

A handwritten signature in dark ink, appearing to read "Ivan Selin", is written above the printed name.

Ivan Selin

Enclosure: SDMP, SECY-92-200

cc: Albert Scappaticci  
NRC State Liaison Officer





## **POLICY ISSUE**

(Information)

May 29, 1992

SECY-92-200

For: The Commissioners

From: James M. Taylor  
Executive Director  
for Operations

Subject: UPDATED REPORT ON SITE DECOMMISSIONING MANAGEMENT PLAN

Purpose: To provide the Commission with a status report on the actions that the staff has been taking toward cleanup of the sites in the Site Decommissioning Management Plan (SDMP) and to provide the Commission with Revision 2 of the SDMP (see Enclosure 1), which formally updates the April 1991, version of the SDMP provided to the Commission in SECY-91-096.

Summary: The staff continues to implement the SDMP to effectively use available staff resources to resolve decommissioning policy and regulatory issues and to prompt or compel, as necessary, timely decommissioning at SDMP sites. Since the last update of the SDMP report, in April 1991, program management has been enhanced and intensified to better ensure that priority attention is placed on the timely resolution of issues and timely site decommissionings.

Progress continues to be steady, but slower than desired, and to suffer from various obstacles and difficulties stemming from circumstances beyond the control of the staff. These obstacles include, for example, the lack of firm residual radioactivity criteria for cleanup, the presence of mixed

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Enclosure

waste or very high-volume waste, or licensee insolvency. Also, at 14 of the present 46 SDMP sites, there are no licenses in effect.

Because the SDMP sites are a collection of unique and problematic decommissioning cases, the SDMP program presents special challenges and requires special attention. For this reason, the SDMP management system is necessary, effective, and important in ensuring that site-specific problems and issues are identified and addressed.

Background:

A. Past Decommissioning Practices

The U.S. Atomic Energy Commission (AEC), formerly, and then the U.S. Nuclear Regulatory Commission, terminated approximately 33,000 material licenses during the past 4 decades. As part of the license-termination process, licensees were required to decommission their facilities by reducing or removing residual radioactivity in land, ground water, buildings, and equipment, to levels that allowed the property to be released for unrestricted use. Decommissioned sites were inspected by AEC and NRC inspectors, where appropriate, to verify the absence of excess residual contamination before license termination. However, certain sites were not decommissioned in accordance with the equivalent of current criteria, or have not undertaken decommissioning for an extended time after cessation of operations.

B. General Accounting Office Audits

NRC decommissioning requirements and practices have been repeatedly and critically reviewed by the General Accounting Office (GAO). In 1976, GAO reviewed NRC files of licenses terminated by the AEC before 1965 and expressed concern over inadequate documentation of decontamination. In 1982, GAO reviewed NRC, Department of Energy (DOE), Department of Defense, and Environmental Protection Agency (EPA) decommissioning activities. In 1989, GAO examined past NRC decommissioning actions at several material licensee facilities. Based on its findings, GAO recommended that NRC enhance its decommissioning efforts by: (1) improving procedures for retaining its decommissioning records and ensuring appropriate licensee monitoring of buried waste sites; (2) reconsidering residual contamination criteria; and (3) maintaining closer oversight of facility decontamination before NRC fully or partially releases a site for unrestricted use.

After publication of the 1989 GAO report, former NRC Chairman Carr testified at the August 3, 1989, "Hearing on Decommissioning and Decontamination Requirements for Closing Nuclear Facilities," before the Subcommittee on Environment, Energy, and Natural Resources, chaired by Congressman Synar. The Subcommittee's critical assessment of NRC's decommissioning activities prompted increased staff attention to existing and forthcoming decommissioning requirements, policies, and site-specific actions.

C. Staff Efforts to Develop a Comprehensive Material Licensee Decommissioning Program

A December 21, 1989, Commission briefing by the Executive Director for Operations (EDO), concerning strategies for decommissioning contaminated material licensee sites, resulted in the issuance of a Staff Requirements Memorandum (SRM) dated January 31, 1990, which directed the staff to develop a detailed list of contaminated sites that included schedules and descriptions of site cleanup actions. The staff responded to this request by creating the SDMP, which was forwarded to the Commission in March 1990 (SECY-90-121). A full update of the SDMP was provided to the Commission in SECY-91-096, April 12, 1991.

D. Recent Staff Papers on SDMP Matters

In response to a Commission request for an update on current staff activities associated with decommissioning of material licensee sites included in the SDMP, on October 22, 1991, the staff provided SECY-91-334, "Current Activities in Decommissioning of Material Licensee Sites." This paper comprehensively described the SDMP program, the status of activities underway and achievements made in implementing the program, and the major issues being addressed by the staff.

In SECY-91-342 (October 24, 1991) and SECY-91-342A (December 31, 1991), the staff provided a proposed action plan to ensure timely decommissioning and an in-depth analysis of the associated generic issues. (These papers contain attorney-client information and are limited to NRC unless the Commission determines otherwise.) These have been followed with SECY-92-106 (March 24, 1992), which provides staff's recommendation for publication of an action plan to ensure timely decommissioning of SDMP sites. The Commission approved the action plan on April 6, 1992, and it was published in the Federal Register on April 16, 1992 (54 FR 13389).

Additionally, the staff provided SECY-91-398 (December 9, 1991) in connection with decommissioning of the Kerr-McGee Cimarron site, and SECY-92-031 (January 27, 1992), concerning removal of the decontaminated Allied-Signal site from the SDMP.

A draft proposed rule to require timely decommissioning was forwarded for Commission consideration in SECY-92-057 (February 19, 1992), and a proposed approach for rulemaking to establish radioactivity cleanup criteria for unrestricted use was provided in SECY-92-045 (February 7, 1992).

Discussion:

A. Status of SDMP Activities

In the 2 years since the original SDMP was provided to the Commission (March 1990), the staff has continued to increase and improve efforts toward achieving timely and effective decommissioning of SDMP sites. In the last year, since Revision 1 of the SDMP was issued in April 1991, marked enhancements in management oversight and program management have been coupled with significant increases in the level of staff effort expended and the pace of site-specific activities.

1. Program Management Activities

To track and prompt SDMP actions, the cognizant offices have provided informal updates of the SDMP sites to the Division of Low-Level Waste Management and Decommissioning (LLWM) in monthly meetings since April 1991. These SDMP update meetings were held between LLWM and the staffs of the Division of Industrial and Medical Nuclear Safety (IMNS), Regions I and III, and the Office of Nuclear Regulatory Research (RES). These meetings specifically addressed actions that had taken place, potential problems or issues that could cause delay, and the expected "next action" to be taken.

To ensure an enhanced level of attention to SDMP activities, the EDO requested and received monthly briefings during 1991. These briefings covered major site activities, as well as progress in resolving generic issues.

Since December 1990, LLWM staff assumed (by transfer) project management responsibility for 11 sites for which there were no further ongoing licensed operations, and decommissionings were expected to take a year or more. Of those 11 sites, 8 are included in the SDMP. Under the terms of the Nuclear Material Safety and Safeguards (NMSS) procedure governing such transfers, sites undergoing large-scale routine decommissioning are assigned to LLWM for project management responsibility, but may not qualify for SDMP status.



During 1991 and the first quarter of 1992, another five sites were transferred from IMNS to LLWM, four of which are SDMP-listed (Fansteel, Muskogee, OK; Molycorp, Washington, PA; Shieldalloy, Cambridge, OH; and UNC, Wood River Junction, RI). To provide for further centralization of SDMP site project management at NRC Headquarters, two more sites will be transferred to LLWM, from IMNS, during 1992. Also, LLWM has assumed project management responsibility for six of seven newly-listed SDMP sites (see Enclosure 1, Section 2.4.1(4)). To assist in tracking decommissioning activities, a LLWM site monitor has been appointed for each site where project management resides outside LLWM.

Other program management enhancements included the establishment of a new Section in Region III, Fuel Facilities and Contaminated Sites, and a Decommissioning Task Force in Region I. Additionally, an SES manager, the Chief of Decommissioning and Regulatory Issues Branch, was designated lead SES responsibility for SDMP management.

## 2. Major Site Activities Completed in 1991

Site decommissioning activities that have taken place during 1991, since the last revision of the SDMP, are:

- Decommissioning plans were submitted for the Babcock & Wilcox (B&W) Apollo and Budd Company sites.
- Site characterization plans were submitted for the Nuclear Metals and Permagrain sites.
- SECY-91-398, "License Terminations for Cimarron Corporation Facilities, Crescent, Oklahoma," was provided to the Commission on December 9, 1991, in response to issues identified during the review of the decommissioning plan for the Kerr-McGee Cimarron site.
- In December 1991, NRC staff sent a letter to Dow Chemical, stating that its decommissioning plan for the Bay City and Midland, MI, wastes may not be viable to meet unrestricted release requirements.
- NRC staff approved the decommissioning plans for the Budd Company site, and for the buildings on the Heritage Minerals site, and the site characterization plan for the Permagrain site.
- NRC staff completed confirmatory termination surveys of the buildings and parking lot of the Cabot Corporation Reading site and the entire Cabot Corporation Revere site.

- No licenses were terminated for SDMP sites. However, one unlicensed SDMP site was released after cleanup was completed and confirmed. After advising the Commission in SECY-92-031, dated January 27, 1992, the staff sent a letter to the owner of the formerly licensed Allied-Signal site on February 27, 1992, stating that no further decontamination for uranium or thorium was necessary, and that NRC had no further regulatory interest in the Allied-Signal site. This was a Priority A site.

License termination during 1991 was previously thought possible for two sites (Amax and UNC, Wood River Junction) but has not yet occurred. Cleanup activities at these two sites are completed and they remain close to license termination and removal from the SDMP. See Section 4 for a brief discussion of the progress at these two sites.

### 3. Major Site Activities Expected in 1992

On the basis of current schedule estimates, the staff anticipates that the following major actions will be completed in 1992:

- Licensees will submit decommissioning plans for four sites (Permagrain; Texas Instruments; Old Vic; and Watertown Arsenal/Mall), and site characterization plans for two sites (Elkem Metals and Old Vic).
- NRC will complete its review of decontamination plans for four sites (B&W Apollo; Chemetron, Bert Avenue and Harvard Avenue sites; and RMI Titanium).
- NRC staff will complete a confirmatory closeout survey of the Budd Company and ALCOA sites.
- The NRC staff will likely release three sites for unrestricted use (ALCOA; Budd Company; and Cabot, Revere), and will terminate the 10 CFR Part 70 license for plutonium operations at the Kerr-McGee Cimarron site.

As discussed next, there is a possibility that before the end of 1992, depending on the course of future events, licenses will be terminated at two additional sites, resulting in removal of those sites from the SDMP list (UNC Wood River Junction and Amax). However, resolution of these two cases by license termination during 1992 remains uncertain at this time, because of circumstances beyond the control of the staff.

#### 4. Progress at Selected Sites

For a variety of reasons, progress toward final decommissioning at some sites has been slow. In some cases, this has been true despite the application of considerable staff resources. In other cases, such as the now decontaminated Allied-Signal site, progress has been more rapid. The following assortment of case summaries provides some insight into this situation.

##### Amax

At the Amax site, the NRC license is to be terminated when responsibility for the site is transferred from Amax to DOE, pursuant to the provisions of Section 151(c) of the Nuclear Waste Policy Act of 1982 (NWPA). After successfully negotiating long-term funding requirements and other details with Amax, the staff informed DOE, in August 1991, that Amax had satisfied all conditions for transfer in the NWPA. In an April 9, 1992, letter to NRC, DOE stated that they remain committed to taking title and custody of the site. However, two issues remain to be resolved: 1) DOE believes that NRC should write a re-opener clause into the license termination to protect the Government if non-radiological contaminants are present in concentrations sufficient to require further remedial action; and 2) DOE believes the financial arrangements, approved by NRC, for AMAX to pay for site monitoring are less than previously estimated by DOE. A meeting between NRC and DOE, to initiate discussions on these issues, is scheduled.

##### Chevron Corporation (formerly the Gulf United Nuclear Fuels Corporation site)

Since the last SDMP update, at the expense of considerable staff effort, the staff has determined that the last licensee at this site was General Atomic Company. Corporate responsibility can be tracked from General Atomic, as last licensee, through Valley Pines Associates, to Chevron Corporation. NRC has been trying to arrange for Chevron, as the owner of the immediate successor in interest to the last licensee, to participate in decontaminating the Nuclear Lake site near Pawling, NY. The National Park Service (NPS), acquired the site in 1979, to use for the Appalachian National Scenic Trail.

After lengthy and involved negotiations, Chevron offered a proposal to the NPS. Chevron would pay 50 percent of decontamination costs, and provide project management

services, if NPS paid all other costs, including all radioactive waste disposal costs. NPS responded that Chevron should pay all decontamination and waste disposal costs. In a letter to NPS, dated April 3, 1992, Chevron stated that since NPS has not satisfied Chevron's two fundamental requirements of cost sharing and an assurance that this will be Chevron's final cleanup obligation, Chevron would not take further actions toward site cleanup. At this time, the staff is considering the available options to compel the timely cleanup of the Nuclear Lake site.

#### Chemetron

At the two Chemetron sites, Harvard Avenue and Bert Avenue, more detailed site characterization studies were performed in 1991, which revealed additional radioactive contaminated material. These findings were submitted to NRC in a June 1991, site characterization report. The volume of radioactive contaminated material above 100 picocuries per gram is estimated to exceed 120,000 cubic feet at both sites. The licensee also estimates that there are over 1 million cubic feet of radioactive contaminated material, with a concentration greater than 15 picocuries of uranium-238 per gram of material.

Further site characterization work began in January 1992. As part of its enhanced site characterization program, Chemetron is evaluating the hydrogeology of both sites, in greater detail, to determine if there is existing, or if there may be future, ground water contamination.

In view of the importance of receiving a final site characterization report (SCR) from the licensee in a timely manner, the staff issued an Order Modifying License (effective immediately), to Chemetron Corporation, on April 8, 1992, to incorporate a date certain into its license, for submitting the final SCR. In accordance with the terms of the Order, on April 28, 1992, Chemetron responded to the Order and requested a hearing and motion to set aside the immediate effectiveness of the Order. To avoid lengthy litigative proceedings, the NRC staff and Chemetron agreed to a Consent Order. On May 13, 1992, the NRC staff signed the Consent Order to Chemetron; it supersedes the Order Modifying License, yet requires Chemetron to submit the final SCR to NRC by June 15, 1992. Staffs of NRC, the Ohio Department of Health, and the Ohio Environmental Protection Agency, will jointly review the final SCR, which will be used to develop a final site remediation plan.



UNC, Wood River Junction

At the UNC, Wood River Junction site, decontamination activities have been completed. However, ground water sampling continues to show strontium-90 (Sr-90) and nitrate concentrations above EPA's current drinking water standards. EPA has proposed, but not yet adopted, a higher drinking standard for Sr-90 which exceeds the highest detected Sr-90 level at the UNC site. A draft environmental evaluation for this site has been given to the State of Rhode Island. Based on this information, the State believes that it cannot agree with terminating the license unless certain conditions, including continued monitoring, are agreed to by the licensee. NRC met with the State, on May 6, 1992, to resolve these concerns. No resolution was reached with the State. NRC staff intends to proceed with decommissioning and will seek approval of DGC and the Commission considering the State's opposition. It is possible that this effort can be completed in 1992.

B. Specific Issues in SDMP Implementation

Most of the issues impinging on SDMP implementation have been comprehensively discussed in recent staff papers on SDMP matters (e.g., cleanup criteria and decommissioning timeliness). However, the staff wishes to bring the following selected topics to the Commission's attention.

1. High-Volume Wastes

Very large volumes of soil or tailings, generally containing low levels of uranium and thorium contamination, are present at about 20 sites listed in the SDMP. An NRC specific license is required for possession of uranium and thorium in concentrations greater than one-twentieth of 1 percent by weight, unless it is exempted or subject to general licensing under 10 CFR Part 40. For example, waste volume at each of the following sites is expected to total 1 million cubic feet or more: B&W Apollo; Chemetron; Dow Chemical; Shieldalloy, Cambridge; and Whittaker. A number of other SDMP sites have somewhat less, but still huge quantities of waste requiring disposal. Given current disposal costs at commercial low-level waste (LLW) disposal facilities, which exceed \$100 per cubic foot, commercial disposal of these high-volume wastes could force many of the licensees into bankruptcy. Costs for bulk disposal at the Envirocare facility in Utah are estimated to be \$30 per cubic foot.

Options for disposal of such high-volume waste are limited. In the B&W Apollo case, the licensee would like to ship waste by rail to the Envirocare facility near Clive, Utah. Significant funding from DOE will enable B&W to accomplish this. (In one case, i.e., ALCOA, over a thousand cubic feet of waste were shipped to Envirocare at a total cost of about 60 dollars per cubic foot; about half the total cost was for transportation.)

Another potential disposal option for the high-volume, low-activity waste found at many SDMP sites, is bulk transport and placement in a uranium mill tailings impoundment. A 1988 guidance document for evaluating and determining NRC action on requests for such disposals was revised and forwarded to the Commission on August 7, 1991, in SECY-91-243. The revisions addressed the issues of: (1) dual NRC and EPA regulation of the tailings site, and (2) DOE taking custody of the tailings site, on termination of the operator's source material license. An SRM dated September 20, 1991, directed the staff to make two revisions and prepare the document for public comment. An SRM dated February 7, 1992, concurred on the proposed changes to the Federal Register notice and directed that it be combined with the guidance in SECY-91-347. The combined Federal Register notice was submitted to the Commission on March 27, 1992. The guidance, as proposed, would allow, under certain conditions, the disposal of low-activity source material that is not byproduct material, as defined in Section 11e.(2) of the Atomic Energy Act of 1954, as amended. Some examples of conditions to be imposed are: the material to be disposed of is not regulated under the Resource Conservation and Recovery Act, and the material would not adversely affect the stability of the tailings impoundment.

If disposal at an existing offsite disposal facility is not feasible, licensees may apply to the Commission for approval to dispose of licensed material in accordance with 10 CFR 20.302. Staff continues to evaluate uranium and thorium disposals performed under 10 CFR 20.302 on a case-specific basis. Absent general residual contamination criteria, the staff is applying a technical position published in 1981 (46 FR 52061) for evaluating licensee proposals to dispose of uranium and thorium contamination under 10 CFR 20.302. This technical position provides four "options," which vary in activity concentration and corresponding radiological dose. However, as directed in

the Commission's April 6, 1992, staff requirements memorandum, only the lower-activity concentration limits and disposal methods provided in Options 1 and 2 of the technical position can be applied as criteria for the release of a site for unrestricted use.

The Option 2 concentration limits are based on a dose, from the human intruder pathway, of 170 mrem/yr to the critical organ. For soluble uranium, the critical organ is the bone. For insoluble uranium, the critical organ is the lung. For thorium, both soluble and insoluble, the critical organ is the whole body.

However, the dose of 170 mrem/yr to the whole body, from Option 2 concentrations of thorium, via the human intruder pathway, may be unacceptably high. Further, this 170 mrem/yr whole body dose assumes a 0.8 occupancy factor and a 0.5 shielding factor. If the occupancy and shielding factors are set to 1, the dose from thorium may be as high as 420 mrem/yr to the whole body. For this case, the 10 CFR 20 limit of 100 mrem/yr may be the appropriate unrestricted use release limit. The intruder exposure pathway could possibly be ignored when disposal makes the chance of future human access very remote, such as via deep disposal, or disposal by mine backfill.

When applying Option 2 of the technical position, the groundwater pathway is also evaluated, in addition to the human intruder pathway, when necessary because of site specific hydrogeological features and groundwater use. Dose from the groundwater pathway should not exceed 3 mrad/yr to the bone. Groundwater evaluations of Option 2 disposals of depleted or enriched uranium include the dose from uranium decay product buildup for a period of 1000 years. A more detailed discussion of this technical position is provided in Enclosure 2 of SECY-91-334.

## 2. Previous 10 CFR 20.304 Disposals

Before 1981, an unknown number of licensees disposed of licensed material under the provision of 10 CFR 20.304, which did not require Commission approval before disposal. Some of these burials included long-lived uranium and thorium wastes. Once identified, previous 10 CFR 20.304 burials must be evaluated, to determine if the burial site is suitable for unrestricted use.

It is anticipated that exhumation and disposal of such wastes at another location may be deemed necessary, for some facilities to meet the unrestricted use criterion (53 FR 24018).

Three sites currently listed in the SDMP with known burials containing uranium and/or thorium, are B&W Parks Township, Wyman-Gordon Company, and 3M Kerrick. It is an established Commission position that NRC maintains jurisdiction over burials made under 10 CFR 20.302 and 20.304, with respect to decommissioning. Language supporting this position is found in the Supplementary Information on the Final Rule on General Requirements for Decommissioning Nuclear Facilities, published in the Federal Register on June 27, 1988 (53 FR 24018). Accordingly, the three identified burials are currently undergoing characterization and dose assessment, to determine their suitability for release for unrestricted use.

It is anticipated that additional sites will be added to the SDMP, based on their containing 10 CFR 20.304 burials requiring characterization and remediation. There are two efforts currently underway to identify past burials under 10 CFR 20.304. First, a review of records of sites decommissioned after 1965 is being conducted to ensure that they were adequately decontaminated (see Section 2.5.1(6) of Enclosure 1). Burials authorized under 10 CFR 20.304 will be identified, during this review, to the extent that they are reflected in the licensing records. Second, an information notice is being developed to inform NRC licensees of recent experiences in recordkeeping, monitoring, and decommissioning, associated with buried wastes. The information notice should be complete in August 1992. The staff will also develop a temporary inspection instruction, for NRC regional offices, that will provide procedures for identifying previous burials and determining the extent of environmental contamination.

### 3. Financial Assurance for SDMP Sites

With regard to the status of financial assurance arrangements by the SDMP sites:

- a. Twelve sites have neither a license nor a financial assurance instrument in place. Ten of the sites are owned by viable organizations and cleanup of contamination is likely. However, at two of the



sites (Chevron and Hartley and Hartley landfill), responsibility is still in question. Chevron has not accepted responsibility for the site and discussions continue. NRC is currently trying to determine where responsibility rests for the Hartley and Hartley Landfill site.

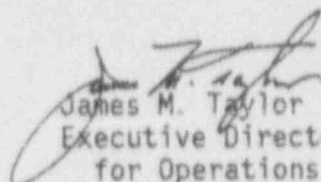
- b. Four sites have a license, but no instrument in place. Permagrain Products will be required to submit a decommissioning funding plan during the next license renewal. The Victoreen, Inc., site is now owned by Old Vic, Inc., which has assumed responsibility for the decommissioning and will submit a revised decommissioning plan and a funding plan. Safety Light Corporation is in hearing regarding decommissioning financial assurance matters. The Schott Glass Technologies site licensee has submitted a decommissioning plan for terminating the license. Region I is preparing a request for a funding plan.
- c. Twenty-three sites are in compliance with the financial assurance requirements. These have submitted the appropriate mechanisms for the required amounts.
- d. One site is seeking arrangements with DOE. The staff is ensuring that documentation of the arrangement is provided.
- e. Two sites are on the EPA National Priorities List. Pesses Company went bankrupt and site cleanup is being performed under Superfund. West Lake Landfill was put on the list on August 30, 1990. NRC financial assurance is not being required, because cleanup funding is being provided under Superfund authority.
- f. One site is being transferred to DOE under the NWPA, Section 151(c).
- g. One site has an expired license. The staff will review, with OGC, what funding requirements should be applied to the site.
- h. One site requested a reduction in possession limits, so that the financial assurance requirements do not apply.
- i. One site completed decommissioning and does not need financial assurance.

C. Resources

The resources needed to implement the proposed SDMP (in FTE and technical assistance) are provided, for FY 1992 through FY 1994, in Table 3 of the enclosure. The resource estimates for the SDMP are separated into three parts: 1) resources for overall project management; 2) resources for specific project management which also includes resources for enforcement action to compel timely and effective cleanup; and 3) resources for the resolution of SDMP policy issues. Although the resources in Table 3 of the enclosure exceed the resources contained in the FY 1992-1996 Five-Year Plan, the updated resource requirements will be addressed in the FY 1993-1997 Five-Year Plan.

D. Response to Congressman Synar

After the August 3, 1989, "Hearing on Decommissioning and Decontamination Requirements for Closing Nuclear Facilities," before the Subcommittee on Environment, Energy, and Natural Resources, Congressman Synar has received periodic updates, from NRC, on the status of decommissioning actions at Pawling, NY, at West Lake Landfill, and at the Kerr-McGee Cushing site. The updates have also included the status of selected policy issues related to decommissioning. Accordingly, Revision 2 of the SDMP will be transmitted to Congressman Synar, with a letter summarizing NRC's continuing efforts to improve regulatory oversight of the decommissioning of nuclear facilities.



James M. Taylor  
Executive Director  
for Operations

Enclosure:  
Site Decommissioning Management Plan  
(Revision 2)

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SITE DECOMMISSIONING MANAGEMENT PLAN

REVISION 2

April 1992

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## 1 INTRODUCTION

In SECY-88-308 (Contaminated Material Licensee Facilities, October 31, 1988) and in SECY-89-369 (Strategy for Decommissioning of Material Licensee Sites, December 8, 1989), the U.S. Nuclear Regulatory Commission staff listed over 30 sites of material licensees requiring special attention from the staff, to ensure their timely decommissioning. SECY-89-369 indicated that these sites must be decontaminated or stabilized before the applicable licenses can be terminated.

The sites have buildings, former waste disposal areas, large piles of tailings, ground water, and soil contaminated with low levels of uranium or thorium (source material) or other radionuclides. Consequently, they present varying degrees of radiological hazard, cleanup complexity, and cost. Some of the sites are still under the control of active NRC licenses, whereas licenses for other sites may have already been terminated or may have never been issued. At some sites, licensees are financially and technically capable of completing cleanup in a reasonable timeframe, whereas at other sites, the licensee or responsible party is unable or unwilling to perform cleanup. In addition, the sites are currently in various stages of decommissioning. At some sites, licensees have initiated decommissioning, whereas at other sites, decommissioning has not yet been planned or initiated.

The NRC staff requirements memorandum (SRM) from the Commission, dated August 22, 1989, indicated that it is imperative that the staff develop a comprehensive strategy for NRC activities to deal with these contaminated sites so that closure on cleanup issues is attained in a timely manner. In a subsequent SRM dated January 31, 1990, the Commission directed the staff to "...submit a list of contaminated sites in order of priority including the name and location of the site, name of responsible party, condition of the site, schedule and description of the next step in site cleanup, and other pertinent information. The list should be accompanied by a discussion of criteria used to rank each site."

The original report on the staff's planned strategy was submitted to the NRC Commissioners in March 1990 (SECY-90-121), and was followed by an updated report in April 1991 (SECY-91-096, Site Decommissioning Management Plan (SDMP)). This is the second update of the SDMP and includes all information available as of December 31, 1991, as well as some more recent important information. Significant changes occurred during the resolution of policy issues and through the progress made toward cleanup of some of the contaminated sites during 1991. The procedural aspects of the plan, such as the criteria for site eligibility and the method of site prioritization, are largely unchanged.

The objective of the SDMP is the timely cleanup of the contaminated sites listed in this report (and other contaminated problem sites identified in the future) and the subsequent removal of the sites from the list. Implementation of the following elements of the SDMP will ensure this objective:

- definition of project management plan
- identification of the sites to be listed in the SDMP
- prioritization of NRC staff efforts in the regulation of the contaminated sites on the basis of a combination of health and safety and program management issues
- schedules and resources needed for NRC oversight of contaminated site cleanup
- resolution of policy and Congressional hearing issues\* for SDMP implementation and minimization of problems with future contaminated sites

Section 2 of this report contains a description of each of the elements used in carrying out the SDMP. Appendix A provides a detailed description of each

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\*Hearing on "Decommissioning and Decontamination Requirements for Closing Nuclear Facilities," chaired by Congressman Synar, held on August 3, 1989. Congressman Synar chairs the Subcommittee on Environment, Energy and Natural Resources of the Committee on Government Operations.

contaminated site, and Appendix B provides the decommissioning status of shut down reactors.

## 2. SITE DECOMMISSIONING MANAGEMENT PLAN ELEMENTS

NRC has implemented the major elements of the SDMP to achieve timely cleanup of the contaminated sites listed in this report (and other contaminated sites identified in the future) and subsequent removal of the sites from the list. These elements are discussed below.

### 2.1 Project Management Plan

The NRC Division of Low-Level Waste Management and Decommissioning (LLWM) of the Office of Nuclear Material Safety and Safeguards (NMSS) has the overall program management responsibility for the SDMP. LLWM is the contact point for information on the SDMP and the overall status of the decommissioning of the sites listed in this report. This includes: (1) maintaining and updating the site listing in this report; (2) updating the schedule of tasks for decommissioning of sites that have been completed or rescheduled; (3) providing program direction and guidance to NRC organizations having site-specific project management responsibility; and (4) removing sites from the list as licenses are terminated or necessary cleanup operations short of license termination are completed.

Each site listed in this report has a specific project manager (PM) assigned primary responsibility for review and approval of decontamination and license termination activities. Site-specific project management is divided among the NMSS Divisions of Industrial and Medical Nuclear Safety (IMNS) and LLWM and the NRC regional offices. The specific site PM is the contact point for detailed information on the decontamination of a site under his or her review. The name of the PM for each site listed in this report is included in Appendix A to this report.

Schedules for activities needed for cleanup so that sites can be removed from the list in this report are established. The details of the current schedules are in each site's write-up in Appendix A and each site's level of priority as

indicated in Table 1, each site's schedule is summarized in Table 2. The schedule information also includes potential site-specific problems that may inhibit cleanup.

To assist in implementation of the SDMP, an updated version of Table 2 will be maintained by cognizant staff in LLWM. As progress is made toward completion of decontamination or survey activities, staff will provide LLWM with updates to the list of sites and the tables, particularly Table 2, on a quarterly basis. LLWM, with overall program management responsibility, will incorporate the changes into a master copy of this report, which will be updated annually on a formal basis. Sites designated for removal from the SDMP are so noted but retained in respective areas of this report one last time for completeness. (Section 2.4.1(4) of the report addresses those sites either designated for removal at the next formal update or removed from the SDMP during the current update.)

Sites that have shut down and are in the routine process of decommissioning have not been added to the SDMP list. Also, sites that are operational and have contamination in operational portions of the facility have not been added to the SDMP list.

A site is placed on the SDMP list if it meets one or more of the following criteria:

- There are problems with viability of the responsible organization (e.g., inability to pay for, or unwillingness to perform decommissioning).
- There are large amounts of contaminated soil or unused settling ponds or burial grounds that may be difficult to dispose of.
- There is long-term presence of contaminated, unused buildings.
- The license was previously terminated, and residual contamination is present in excess of unrestricted release limits.
- There is contamination or potential contamination of the ground water from onsite wastes.



A site will be removed from the list if it meets one of the following criteria:

- The license has been terminated after acceptable cleanup.
- For operating sites that have an inactive, contaminated portion of the site requiring cleanup (e.g., a contaminated, inactive settling pond or building or a large volume of contaminated soil), decontamination of the area has been completed, and the license has been modified to reflect the cleanup.
- For unlicensed sites, acceptable cleanup has been completed and the responsible party has been notified.
- When regulatory jurisdiction is completely assumed by an Agreement State (e.g., Kerr-McGee West Chicago becoming the responsibility of the Agreement State, Illinois).

## 2.2 Contaminated Site Descriptions

Appendix A of this report contains a detailed description of the characteristics and problems associated with each SDMP site. Each site description contains the following eight elements:

- (1) Site identification includes the name of the licensee, location of the facility, license and docket number, the license status, the name of the NRC project manager, and the name of the LLWM monitor if applicable.
- (2) Site and operations includes site characteristics such as the nature of the operations, number of process buildings, and acreage.
- (3) Radioactive wastes includes types of radionuclides present, radionuclide concentrations or exposure rates, and the likelihood for migration in air-borne or ground water systems. If there is contaminated soil, information about the area, depth and volume of contamination is included. If disposals have taken place, information about disposal methods (e.g., burial or discharge into sewers or other drains) and the type of wastes is

included. If the radionuclides are not well known, order of magnitude estimates are included.

- (4) Description of radiologic hazard includes the basis for the type of hazard (e.g., inhalation, ingestion, intrusion, ground water, occupational), the types of radioactive materials in the contaminated areas, and any actual or potential human exposure. Information on any known hazardous nonradioactive waste also is included.
- (5) Financial assurance and responsible organization includes available decommissioning cost estimate and financial assurance information. The capability of the responsible organization to perform the cleanup and any problems involved (e.g., licensee bankruptcy, unwillingness to perform cleanup, presence on Superfund list) also are discussed.
- (6) Status of decommissioning activities includes whether the licensee has submitted a plan, whether it has been approved, and whether it is a generalized plan or one that specifically addresses necessary decontamination and decommissioning efforts. If a plan will be required at license renewal and if ground water considerations are involved, this information is included. If the licensee is actively decontaminating the site, information about what work has been completed on buildings, soil, ponds, etc. is included.
- (7) Other involved parties provides information concerning third party involvement by other State or Federal regulatory or government agencies.
- (8) NRC actions needed and timing includes the NRC actions needed to complete site cleanup and the schedule for this activity or the anticipated schedule. A description of the next step in the site cleanup and schedule details, including dates, also are given. (They are also summarized in Table 2 of the report).

### 2.3 Priority of NRC Efforts in Review of Contaminated Sites

A combination of health and safety and program management issues is used as the basis to prioritize NRC efforts to review contaminated sites. The prioritization puts public health and safety first. It is also a pragmatic approach that recognizes, in certain cases, that prompt NRC staff action may result in early and effective resolution of simple issues which might otherwise impede progress. The following factors are evaluated for each site in this process:

- timeliness of action needed
- status of regulatory efforts
- knowledge of responsible party
- Congressional commitments

A score is determined for each of the listed factors, and the scores are summed so that the highest scores represent the highest priority for NRC staff action. The contaminated sites are ranked into three priority groups, referred to as Level A, Level B, and Level C. The factors and levels of priority are discussed below.

#### (1) Timeliness of Action Needed

Each of the contaminated sites represents a different radiologic hazard. The sites are contaminated with different radionuclides, have different activity levels and concentrations, and have different potential exposure pathways. Although the known contamination at the SDMP sites is generally stable or under control, and not currently causing significant adverse effects on public health and safety, they will all require remedial cleanup efforts before the licenses can be terminated and the sites can be released for unrestricted use.

The timeliness priority is subjectively ranked as high or low, depending on the overall toxicity of the radioactive species, the migration potential of the radioactive material, and the nearness to a potentially

exposed population. For example, a site would have a high timeliness priority if radionuclides such as plutonium-239 (Pu-239) or strontium-90 (Sr-90) (nuclides with relatively high radiologic toxicities) contaminated a site adjacent to a river or overlay a shallow aquifer (higher migration potential) used for drinking water through nearby wells (near a potentially exposed population). A site would have a low timeliness priority if the radionuclides have low dissolution rates, are nondispersive and have low migration potential, have low contamination levels, contaminate areas over deep or unusable aquifers, and are far away from human residences or drinking water supplies.

A site with measured offsite contamination, or ground water contamination, would have a higher timeliness priority ranking than one where no offsite migration had taken place or one where the nature or extent of the contamination is not clearly known.

A weighted priority score of 2 is assigned to those sites with a high timeliness priority ranking. A score of 0 is assigned to those sites having a low timeliness priority ranking.

## (2) Status of Regulatory Efforts

As noted earlier, the Commission indicated in its SRM of August 22, 1989, that it is imperative that closure on cleanup issues at the contaminated sites listed in this report be attained in a timely manner. Therefore, this factor addresses the status of regulatory efforts by taking into account the degree to which prompt NRC staff action may result in early and effective resolution of simple issues that, if left unresolved, would impede progress in site cleanup.

Timely NRC reviews and approvals will allow cleanup and survey actions to be completed without NRC action being on the critical path for final cleanup, closeout survey, and license termination. For example, if a licensee has proposed to initiate cleanup or decommissioning, it would be rated as higher priority.



Sites that have completed or are in the process of completing certain steps in the decommissioning process and for which prompt regulatory action may result in early and effective decommissioning are efforts considered to merit higher priority and are assigned a weighted score of 2. Other sites are assigned a score of 0 for this factor.

### (3) Knowledge of Responsible Organization

Some of the contaminated sites have never been licensed, or the licensee has gone into bankruptcy or is unable to fund the needed costs for site cleanup. A higher priority will be given to sites for which a financially responsible organization is unknown (does not exist or soon may not exist). Sites for which a financially responsible organization is known (e.g., under license to a large, financially secure organization) will be ranked with a lower priority score. This ranking approach facilitates accelerated cleanup at sites where marginal organizations may lose control over contaminated areas, where bankruptcy actions have taken place or may take place soon, or where responsible parties are questionable for other reasons, such as previous termination of a license.

A weighted score of 2 is assigned to those sites not having a viable, financially responsible party. A score of 0 is assigned to all other sites.

### (4) Congressional Commitments

The Commission committed to aggressive action at several sites during testimony before the Subcommittee on Environment, Energy and Natural Resources of the Committee on Government Operations on August 3, 1989, and in response to the U.S. General Accounting Office (GAO) report to the House Committee on Government Operations, entitled "NRC's Decommissioning Procedures and Criteria Need To Be Strengthened." Sites affected by such a commitment are given a weighted priority score of 1; sites not subject to such a commitment are assigned a score of 0.

Based on the above four factors, the sites are prioritized into three groups as defined below:

Level A: Those sites that will receive priority attention from NRC staff to complete decommissioning because, for example, the responsible organization is unknown and/or because there is a need for timely action in completing cleanup.

Level B: Those sites that have a strong impetus to completing decommissioning and it is necessary to expend NRC resources for timely progress to be made.

Level C: Those sites that have an impetus to completing decommissioning so that sites can be released or licenses can be terminated and where the lowest discretionary NRC resources should be expended on a routine basis.

Although NRC resources will be expended for all sites, the level of effort has been designated according to the three groups as shown in Table 1. Placing the sites in higher levels does not by itself imply a greater health and safety risk, but rather recognizes the overall pragmatic approach of attaining timely cleanup by prompt regulatory action. For example, a number of sites have completed or are in the process of completing certain steps in the decommissioning process and are listed in a higher priority level than other sites with similar radiological hazards.

The placement of a site in a certain priority level may change over time, as conditions change. For example, if the status of the organization responsible for a site becomes less viable, the site may be placed in a higher-priority-level group.

## 2.4 Schedules and Resources

### 2.4.1 Activity Schedules and Progress at Contaminated Sites

There are eight basic routine steps involved in site cleanup:

- (1) site and/or facility characterization, including preparation of the site characterization plan and performance of site characterization
- (2) NRC review and approval of site characterization plan and site characterization report
- (3) development and submittal of the decontamination or decommissioning plan
- (4) NRC review and approval of the decontamination or decommissioning plan
- (5) performance of all required decontamination or decommissioning activities
- (6) performance, documentation and submittal of the licensee's final site survey
- (7) performance and documentation of NRC's confirmatory survey
- (8) license termination

Element 6 of the site descriptions in Appendix A contains a detailed discussion of the status of decontamination activities and the steps in the cleanup that have been completed to date. Element 8 of the site descriptions in Appendix A contains a detailed discussion of the actions still needed to complete cleanup and the projected completion dates.

Table 2 summarizes, for each site, the decommissioning activities since the last SDMP update and the schedule for future activities and lists each site alphabetically under its designated priority level as discussed in Section 2.3 and shown in Table 1. Table 2 also identifies potential problem areas for each site that may inhibit cleanup.

The major activities completed in 1991 and the major activities expected to be completed in 1992 are discussed below.

# (1) Program Management Activity in 1991

Since the original SDMP was issued in March 1990, NRC staff has actively pursued site cleanups and resolution of generic issues. These efforts have led to the cleanup schedules established in Table 2. NRC headquarters and regional staff have continued to expend considerable effort reviewing site characterization plans, decommissioning plans, decommissioning activities, and site radiological surveys. To track and prompt these actions, the cognizant offices have provided informal updates of the SDMP sites to LLWM in monthly meetings since April 1991. These SDMP update meetings were held between LLWM and the staffs of the IMNS, Regions I and III, and the Office of Nuclear Regulatory Research (RES). These meetings specifically addressed actions that had taken place, potential problems or issues that could cause delay, and the expected "next action" to be taken. Additionally, numerous site-specific business meetings were held and there was ongoing communication between personnel responsible for the SDMP and the site project managers.

To ensure an enhanced level of attention on SDMP activities, the EDO requested and received monthly briefings during 1991. These briefings covered major site activities as well as progress in resolving generic issues.

Beginning in December 1990, LLWM staff assumed (by transfer from IMNS) the project management responsibility for 11 sites for which there was no further ongoing licensed operation and decommissioning was expected to take a year or more. Of those 11 sites, 8 are included in the SDMP.

During 1991 and the first quarter of 1992 another five sites were transferred from IMNS to LLWM, four of which are SDMP-listed. Two more sites will be transferred to LLWM from IMNS during 1992, and LLWM has assumed project management responsibility for six of the seven



newly-listed SDMP sites (see Section 2.4.1(4), below). Additionally, an LLWM "site monitor" has been appointed for each site where project management resides outside LLWM.

(2) Major Site Activities Completed in 1991

Site decommissioning activities that have taken place during 1991, since the last revision of the SDMP are--

- Decommissioning plans were submitted for the Babcock & Wilcox (B&W) Apollo and Budd Company sites.
- Site characterization plans were submitted for the Nuclear Metals and Permagrain sites.
- SECY-91-398, "License Terminations for Cimarron Corporation Facilities, Crescent, Oklahoma," was provided to the Commission on December 9, 1991 in response to issues identified during the review of the decommissioning plan for the Kerr-McGee Cimarron site.
- In December 1991, NRC staff sent a letter to Dow Chemical, stating that its decommissioning plan for the Bay City and Midland, MI, wastes may not be viable to meet unrestricted release requirements.
- NRC staff approved the decommissioning plans for the Budd Company site and the buildings on the Heritage Minerals site, and the site characterization plan for the Permagrain site.
- NRC staff completed confirmatory termination surveys of the buildings and parking lot of the Cabot Corporation Reading site and the entire Cabot Corporation Revere site.
- No licenses were terminated for SDMP sites. However, one unlicensed SDMP site was released after cleanup was completed and confirmed. After advising the Commission in SECY-92-031, dated January 27, 1992, the staff sent a letter to the owner of the formerly licensed

Allied-Signal site on February 27, 1992, stating that no further decontamination for uranium or thorium was necessary and the NRC had no further regulatory interest in the Allied-Signal site. This was a Priority A site.

License termination during 1991 was previously thought possible for two sites (Amax and UNC, Wood River Junction) but has not yet occurred. Cleanup activities at these two sites are completed and they remain close to license termination and removal from the SDMP.

At the Amax site, the NRC license is to be terminated when responsibility for the site is transferred from Amax to U.S. Department of Energy (DOE), pursuant to the provisions of Section 151(c) of the Nuclear Waste Policy Act of 1982 (NWSA). After successfully negotiating long-term funding requirements and other details with Amax, the staff informed DOE in August 1991 that Amax had satisfied all of the conditions for transfer in the NWSA. In an April 9, 1992, letter to NRC, DOE stated that they remain committed to taking title and custody of the site. However, two issues remain to be resolved: 1) DOE believes that NRC should write a re-opener clause into the license termination to protect the Government if non-radiological contaminants are present in concentrations sufficient to require further remedial action; and 2) DOE believes the financial arrangements, proposed by NRC, for AMAX to pay for site monitoring are less than previously estimated by DOE. A meeting between NRC and DOE, to initiate discussions on these issues, is scheduled.

At the UNC, Wood River Junction site, decontamination activities have been completed. However, ground water sampling continues to show Sr-90 and nitrate concentrations above the Environmental Protection Agency's (EPA) current drinking water standards. EPA has proposed, but not yet adopted, a higher drinking standard for Sr-90 which exceeds the highest detected

Sr-90 level at the UNC site. A draft environmental evaluation for this site has been given to the State of Rhode Island. Based on this information, the State feels that it cannot agree with terminating the license unless certain conditions, including continued monitoring, are agreed to by the licensee. NRC met with the State, on May 6, 1992, to resolve these concerns. No resolution was reached with the State. NRC staff intends to proceed with decommissioning and will seek approval of OGC and the Commission considering the State's opposition. It is possible that this effort can be completed in 1992.

#### (4) SDMP List Revisions

The following two sites were designated for removal in the previous SDMP edition, and are not included in this SDMP update:

- Kerr-McGee West Chicago

Regulation of the Kerr-McGee West Chicago site was relinquished by NRC and assumed by the State of Illinois, as of November 1, 1990. This site was retained in the previous SDMP report for completeness, but is omitted here.

- Mallinckrodt

Low-level uranium and thorium contamination remains present inside three buildings where columbium/tantalum processing operations were conducted. This operation is currently on standby. The NRC staff plans to review the need for cleanup at the time of the next license renewal in 1994. No special action is scheduled until then. As a licensed site with routine levels of contamination, the Mallinckrodt facility is in full compliance with all NRC regulations and is no longer considered to warrant inclusion in the SDMP.

The following site, Advanced Medical Systems, was previously designated for deletion from the SDMP but is being retained due to failure to provide adequate financial assurance for decommissioning. Upon NRC review and approval of an acceptable decommissioning funding plan, Advanced Medical Systems will be removed from the SDMP list.

- Advanced Medical Systems

Site cleanup work at the Advanced Medical Systems facility has been completed except for the liquid waste holdup tank room, which is maintained sealed and isolated. NRC staff have agreed to allow postponement of cleanup of the holdup tank room to allow for decay of high radiation levels.

The remainder of the facility has been decontaminated to levels consistent with the facility's status as an ongoing manufacturer of cobalt-60 (Co-60) and cesium-137 (Cs-137) sources. As this is a licensed and operating facility, the NRC staff plans to review the need for cleanup of the liquid waste holdup tank room at the time of the next license renewal in 1994.

Seven new sites are included in the SDMP. All of these sites have been assigned a Level C priority, and have detailed site description write-ups included in Appendix A. The seven newly listed sites include the following:

- Aluminum Company of America (ALCOA)

Contamination of soil by thorium-232 (Th-232) was found in several locations at this formerly licensed site in Cuyahoga Heights, Ohio, in surveys performed in 1989 and 1990. The site owner has subsequently removed and shipped offsite 1450 cubic feet of soil with more than 10 picocuries per gram (pCi/g) thorium, and Oak Ridge Associated Universities (ORAU) has performed a confirmatory survey. NRC staff will review the ORAU survey report, and the results of a confirmatory survey of the 40-ft by 100-ft onsite contaminated soil storage area scheduled for May 1992. Also, NRC and ALCOA must determine if radioactive material was buried onsite under the authorization of 10 CFR 20.304.

- Elkem Metals

Building contamination was discovered at this formerly licensed site in Marietta, Ohio, during a special NRC inspection conducted on



January 30, 1992. Exposure rates up to 2.5 mrem/hr were detected. Region III has required the contaminated area to be posted and controlled, and a site characterization plan is expected to be submitted in 1992.

- Englehard Corporation

This formerly licensed site in Plainville, Massachusetts was previously used for fabrication of reactor fuel assemblies. The licensee also operated an incinerator at the site to dispose of combustible low-level waste material and discharged uranium contaminated effluent to an onsite septic system. NRC staff met with representatives of Englehard Corporation on January 17, 1992, to discuss decommissioning requirements. Englehard committed to developing characterization and decontamination plans.

- Minnesota Mining and Manufacturing Co. (3M)

This formerly licensed site near Kerrick, Minnesota, was previously used for onsite disposal of various waste materials contaminated with natural uranium and thorium, and highly enriched uranium. The staff must determine if the site is suitable for unrestricted use.

- Northeast Ohio Regional Sewer District, Southerly Plant

Substantial volumes of soil contaminated with up to about 8,000 pCi/g Co-60 were discovered at this site, in Cleveland, Ohio, by an aerial monitoring survey performed in April 1991, for the purpose of mapping contamination at a nearby SDMP site (Chemetron.) Discovery of the contamination at the Sewer District site was incidental. The original source of the contamination has not yet been determined.

- RMI Titanium

Operations at this licensed site at Ashtabula, Ohio, were recently terminated. There is substantial soil and building uranium

contamination, and the licensee has estimated that there will be in excess of 20 million pounds of contaminated structural material waste. The DOE is funding the cleanup and will provide for waste disposal at the Nevada Test Site. The licensee estimates total decommissioning cost to be \$135 million. Nearly \$65 million is planned for expenditure in the first 5-year period.

- Old Vic, Inc.

The licensee at this site in Cleveland, Ohio previously decontaminated its 5-story, 15,000 square meter building and submitted a final survey indicating residual levels acceptable for unrestricted use. A May 1990 ORAU confirmatory survey included 68 surface activity measurements (about 33 percent) above the criteria for release. The licensee is proceeding with plans for further characterization and decommissioning.

The previously listed Government Services Administration (GSA) site, near Watertown, MA, is being segmented and reconstituted as the following two SDMP sites for clarification:

- GSA

This is the formerly licensed site which is now the responsibility of GSA for all required decontamination and survey activities. GSA submitted a final survey report in 1991 to NRC Region I. They believe the report demonstrates this site is now suitable for unrestricted use.

- Army Arsenal

The Watertown, MA, Army Arsenal site is licensed under 10 CFR Parts 30, 40, 50 and 70, and is on the Army's Base Closure List. The decommissioning plan for the research reactor was submitted in October 1991 and is currently under review by the NRR staff. An order to decommission the research reactor is expected to be issued in May

1992 and decommissioning complete in early 1993. A contamination plan for the remainder of the facility is expected during 1992.

In addition to the SDMP list changes noted already, two sites have been renamed to more accurately reflect the corporate entity with which the staff is working to effect cleanup. These sites are:

- Chevron Corporation (formerly Gulf United Nuclear Fuels Corporation)

This is the Nuclear Lake site near Pawling, NY. Since the last SDMP update the staff has determined that the last licensee at this site was General Atomic Company, and that General Atomic Company was subsequently renamed as Valley Pines Associates, which is now owned by Chevron U.S.A. Inc. (formerly Gulf Oil Company), which is in turn owned by Chevron Corporation. As the owner of the immediate successor in interest to the last licensee, the NRC is looking to Chevron to decontaminate the Nuclear Lake site. The site was acquired in 1979 by the National Park Service for use in siting the Appalachian National Scenic Trail. Chevron Corporation is a corporate sponsor of the Appalachian Trail Conference.

- Hartley and Hartley (Kawkawlin Landfill)

This unlicensed site near Kawkawlin, Michigan, became contaminated when it was operated as a landfill by Hartley and Hartley. The contamination is Th-232 and its daughter products in the form of thorium-magnesium slag.

#### (5) Major Activities Expected in 1992

On the basis of current schedule estimates, the staff anticipates that the following major actions will be completed in 1992:

- Licensees will submit site characterization plans for two sites (Elkem Metals; and Old Vic).

- Licensees will submit decommissioning plans for four sites (Watertown Arsenal/Mall; Permagrain; Texas Instruments; and Old Vic).
- NRC will complete its review of decontamination plans for four sites (B&W Apollo; Chemetron, Bert Avenue and Harvard Avenue; Watertown Arsenal/Mall; and RMI Titanium).
- NRC staff will complete a confirmatory closeout survey of the Budd Company and ALCOA sites.
- The NRC staff will likely release three sites for unrestricted use during 1992 (ALCOA; Budd Company; and Cabot, Revere), and will terminate the 10 CFR Part 70 license for plutonium operations at the Kerr-McGee Cimarron site.

There is a possibility that before the end of 1992, depending on the course of future events, the license may be terminated at two additional sites, resulting in removal of those sites from the SDMP list (UNC Wood River Junction and Amax). However, resolution of these two cases by license termination during 1992 remains uncertain at this time due to circumstances beyond control of the staff.

#### 2.4.2 Resources

The resource estimates for the SDMP are separated into three parts:

(1) resources for overall project management, as described in Section 2.1; (2) resources for specific project management which also includes resources for enforcement action to compel timely and effective cleanup, as described in Section 2.1; and (3) resources for the resolution of SDMP policy issues, as described in Section 2.5. Resource estimates for site-specific project management are based on NRC actions needed for each site as described in Appendix A. Resource estimates for the resolution of policy issues are based on the discussion of each policy issue discussed in Section 2.5.

The resources needed to implement the proposed SDMP (in staff-years and technical assistance) are provided for the appropriate NRC organizations in each of the three parts of the estimate and for the total resources for each NRC organization in Table 3 for FY 1992 through FY 1994. These resource requirements will be addressed in the FY 1993-1997 Five-Year Plan.

## 2.5 Policy Issues Requiring Resolution

There are a series of policy issues that need to be resolved involving: (1) the cleanup of contaminated sites of materials licensees, and (2) the minimization of future contaminated site problems. Resolution of the policy issues discussed below will provide a regulatory framework for more efficient and consistent licensing actions for site decontamination and decommissioning in the future. The policy issues discussed below also include those raised during the Synar congressional hearings.

### 2.5.1 Policy Issues

Each of these issues is discussed below with a plan, including estimated schedules and estimated resources for resolving each issue.

#### (1) Development of Radiological Criteria for Decommissioning

NRC criteria specifically pertaining to decommissioning and termination of license are contained in 10 CFR Parts 30, 40, 50, 70, and 72 and in NRC guidance documents and staff guidelines. However, these documents do not contain generally applicable and definitive decontamination criteria. Licensed facilities are currently decontaminated with staff guidance written in the 1970s. The numerical guidance has not been updated and does not cover all situations.

Comprehensive residual contamination criteria will be established by developing technical bases, rulemaking, and revising Regulatory Guide 1.86, "Termination of Operating Licenses For Nuclear Reactors."



(a) Development of Technical Bases for Decommissioning Lands and Structures

The staff is developing the technical bases to use in preparation of regulations containing radiological criteria for decommissioning. RES is supplying the needed technical bases by developing NUREG/CR-5512. NUREG/CR-5512, "Residual Radioactive Contamination From Decommissioning," Draft Report for Comment, was published in January 1990; a Federal Register (FR) notice was issued during February 1990 to solicit public comment. The revised draft NUREG/CR-5512 report is expected to be published, for interim use and comment, in three volumes and one supplement. Volume 1, which contains mathematical formulations with parameter values and references, is expected to be published in June 1992. Volume 2, which contains the computer code with user manual and example applications, is expected to be published in December 1992. The publication date for Volume 3, which contains sensitivity analysis and comparisons, is still to be determined. The supplement will provide an interface for using a hierarchy of increasingly sophisticated ground water models in connection with the NUREG/CR-5512 methodology.

Certain naturally occurring radionuclides such as radium-226 (Ra-226), radon-222 (Rn-222), and uranium and thorium series radionuclides may be present at sites being decommissioned. An issue that needs to be addressed in the development of radiological criteria for decommissioning is the proper treatment of contamination consisting of uranium and thorium and daughters (including radon), considering natural background and the regulation of the same radionuclides by EPA. This issue will be included in the development of the regulatory guide on radiological criteria for decommissioning and the rulemaking codifying residual contamination levels. The EPA standards for drinking water also must be considered (40 CFR 141.16).

The NRC actions needed to develop technical bases for decommissioning land and structures and the estimated dates for completion are given below.

- Complete NUREG/CR-5512, Volume 1, (lead: June 1992  
RES; support: LLWM, NRR, IMNS; resources:  
15 staff-months for RES, 1 staff-month  
each for LLWM, NRR, IMNS)
- Complete NUREG/CR-5512, Volume 2 (lead: December 1992  
RES; support: LLWM, NRR, IMNS; resources:  
10 staff-months for RES, 1 staff-month  
each for LLWM, NRR, IMNS)
- Complete NUREG/CR-5512, Volume 3 (lead: TBD  
RES; Support LLWM, NRR, IMNS; resources:  
10 staff-months for RES, 1 staff-month  
each for LLWM, NRR, IMNS)
- Complete Supplement 1 to NUREG/CR-5512 TBD  
(lead: RES; Support: LLWM and IMNS;  
resources: 15 staff months for RES,  
1 staff-month for LLWM, IMNS)

(b) Rulemaking

RES has the lead in current rulemaking activities for residual radioactivity criteria for termination of licenses. Activities that must take place to support rulemaking include outlining options for regulatory issues and approaches and preparing a generic environmental impact statement. This rulemaking will address criteria for release of lands and structures for unrestricted use. A discussion of the actions related to this rulemaking, including schedules and resources, is contained in SECY-92-045, "Enhanced Participatory Rulemaking Process".

A regulatory guide will be prepared containing radiological criteria for decommissioning, and detailed guidance on an acceptable approach for demonstrating compliance with license termination requirements for unrestricted release.

The NRC actions needed to complete rulemaking and the estimated dates for completion are given below.

- Forward proposed rule to Commission (lead: RES; support: LLWM, IMNS, OGC, regions; resources: 16 staff-months for RES, 3 staff-weeks each for LLWM, IMNS, OGC, NRR, regions). August 1993
- Issue proposed rule for comment (lead: RES; support: LLWM, IMNS, OGC, regions; resources: included in item above). October 1993
- Issue final rule (lead: RES; support: LLWM, IMNS, OGC, regions; resources: 15 staff-months for RES, 3 staff-weeks each for LLWM, IMNS, OGC, NRR, regions). October 1994
- Issue draft regulatory guide for comment (lead: RES; support: LLWM, NRR, IMNS, OGC; resources: 8 staff-months for RES, 3 staff-weeks each for LLWM, NRR, IMNS, OGC). October 1993
- Issue final regulatory guide (lead: RES; support: LLWM, NRR, IMNS, OGC; resources: 4 staff-months for RES, 2 staff-weeks each for LLWM, NRR, IMNS, OGC). October 1994

(c) Revision of Regulatory Guide 1.86

RES staff prepared a draft revision of Regulatory Guide 1.86 in 1989, which was held for comment, pending issuance of the interim residual

contamination criteria. Table 1 of Regulatory Guide 1.86, as it applies to building structures, will be superseded by the above guidance and rulemaking.

The NRC actions needed to revise the regulatory guide and estimated dates for completion are given below:

- Issue the draft regulatory guide for comment October 1993  
(lead: RES; support: NRR, LLWM, OGC;  
resources: 3 staff-month for RES, 2 staff-  
weeks each for NRR, LLWM, OGC)
  
- Issue regulatory guide (lead: RES; October 1994  
support: NRR, LLWM, IMNS, OGC; resources:  
3 staff-months for RES, 2 staff-weeks each  
for NRR, LLWM, OGC)

(2) Previous Disposals of Wastes under 10 CFR 20.302 and 10 CFR 20.304

NRC regulations allow licensees to dispose of radioactive wastes on their own property. Before 1981, 10 CFR 20.304 permitted licensees to make disposals limited to specifically given nuclide quantities and under specific conditions without prior approval. The regulation required that records of these disposals and the location of the burial be kept. On January 28, 1981, 10 CFR 20.304 was revoked because the NRC believed it inappropriate to continue generic authorization of these burials without licensees first notifying the NRC about the location of the burial, concentrations of radio-nuclides, and the form of packaging.

Licensees can still make disposals under 10 CFR 20.302; however, it requires an evaluation of proposed burials by the NRC or an Agreement State. This results in improved records and greater assurance against a health hazard in the future. To implement disposals under 10 CFR 20.302, NRC issued the 1981 Branch Technical Position, and later, in three volumes,



NUREG-1101, "Onsite Disposal of Radioactive Waste." NUREG-1101 provides guidance on contents of a licensee application for disposal under 10 CFR 20.302, a method for performing a radiological assessment of the disposals, and an approach for estimating potential ground water contamination.

Disposals performed under 10 CFR 20.304 have, at several sites, required exhumation during decommissioning because disposals of radioactive materials require evaluation before releasing a site for unrestricted use. In some cases, records of these disposals are limited or nonexistent. To effectively carry out decommissioning actions at contaminated sites, it will be necessary to develop procedures for identifying those sites where previous burials took place and evaluating the acceptability of those previous burials.

A proposed rule on "Decommissioning Recordkeeping and License Termination: Documentation Additions" was published in the Federal Register (56 FR 50524) on October 7, 1991 (see Section 2.5.1(4)). Among other recordkeeping requirements, the proposed rule requires licensees to have in one listing "all known locations and radionuclide contents of previous and current burial areas within a site." This adequately addresses the need to identify previous burial sites as discussed above. However, the acceptability of the burials must still be evaluated.

The staff is developing an information notice to inform NRC licensees of recent experience on recordkeeping, monitoring, and decommissioning associated with buried wastes. The staff will also develop a temporary inspection instruction for NRC regional offices that will provide procedures for identifying previous burials and determining the acceptability of the burials.



- Issue draft Information Notice and Temporary Instruction for comment  
(lead: LLWM; support: IMNS, Regions, OGC; resources: 2 staff-weeks for LLWM, 1 staff-week for IMNS, OGC, and Regions) July 31, 1992
- Issue final Information Notice and Temporary Instruction  
(lead: LLWM; support: IMNS, Regions, OGC; resources: 1 staff-month for LLWM, 1 staff-week for IMNS, OGC, and Regions) 60 days after Final Record-keeping Rule published

### (3) Use of Superfund\*

In SECY-88-308 the NRC staff described 31 sites of materials licensees that had a sufficient level of contamination to require special attention from the staff. In SECY-89-224, the NRC staff recommended that NRC initiate discussions with EPA on procedures to make use of Superfund to help resolve decommissioning cases when NRC exhausts its own regulatory options.

In the SRM dated January 31, 1990, the Commission rejected the NRC staff's recommendation to pursue discussions with EPA on the development of a protocol governing the application of Superfund to contaminated sites. Instead, the Commission stated that the NRC staff should first consult with the Commission in those cases where Superfund should be considered. When necessary, the Commission instructed the NRC staff to submit a detailed discussion of the circumstances at the given site, the reason(s) that existing NRC regulatory authority was inadequate, and the objectives that would be served by the application of Superfund to the site. In addition, the discussion should include an analysis of: (a) the cleanup standard that would apply under Superfund and the difference between that standard and

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\*Superfund was created by Congress in 1980 to rescue communities from hazardous debris deposited by industry.

the Atomic Energy Act standard; (b) the rights and authorities that the State would have if Superfund were extended to the site; and (c) the rights and authorities that private citizens would have to sue the Federal government or the licensee, using the Superfund provision for a citizen's suit. The SRM sufficiently resolves the issue of the use of Superfund and sets out the procedures to request action by the Commission. No further NRC staff actions are needed to resolve this issue.

In some cases, licensed sites are listed on the EPA's National Priority List (e.g., the Pesses Co. site) and completion of cleanup would be dependent on Superfund schedules and priorities. In other cases, such as West Lake Landfill, where an unlicensed site is involved and the potential hazard from chemical contaminants may dwarf the radiological hazard, cleanup of the radioactive contamination will be an integral part of total site remediation and NRC will defer to the EPA Superfund restoration. NRC's efforts in those cases will be to encourage EPA to consider timely cleanup, follow EPA actions to ensure satisfactory cleanup of radioactive materials, and continue discussion with EPA about sites that are candidates for Superfund (e.g., Safety Light).

(4) Development of a Rule Requiring Licensees to List in One Document All Land, Buildings, and Equipment Involved in Licensed Operations

NRC's rules on decommissioning specifically require licensees to keep all records important to decommissioning in one identified location. Such records include drawings of structures and equipment where radioactive materials were used or stored, documentation identifying the location of inaccessible residual contamination, detailed description of spilled radioactive materials, and the identification and characterization of wastes that have been disposed of on site. Section 3.1 of Regulatory Guide 3.65 (August 1989), issued to support the final decommissioning rule, indicates that facility radiological history information should be submitted to NRC in the decommissioning plan.

In its report, "NRC's Decommissioning Procedures and Criteria Need to Be Strengthened," GAO recommended that in addition to the above, NRC require licensees to specifically list in one document all land, buildings, and equipment involved with their licensed operations.

At the hearing before the Subcommittee on Environment, Energy and Natural Resources of the Committee on Government Operations on August 3, 1989, NRC agreed with the GAO recommendation and committed to requiring licensees to specifically list in one document all land, buildings, and equipment involved with their licensed operations. In addition, a history of the licensed operations would be included.

Subsequent to the hearing, NRC Chairman Carr sent a memorandum to the EDO, containing resulting action items, which included the need for rulemaking on such records. On September 28, 1989, R.M. Bernero, Director, NMSS, requested that RES proceed with revision of existing rules and draft guides to incorporate the GAO recommendation. In its December 7, 1990, action plan, RES identified this activity as a medium priority and established an FY-92 schedule for a final rule, dependent on available resources and higher-priority commitments.

In October 1991, a proposed rule on recordkeeping was issued for public comment (56 FR 50524). NRC actions needed to complete this rulemaking and the estimated dates of completion are given below. Because this issue is targeted as a medium priority, these dates may change.

• Rulemaking requiring submission of a facility history:

Initiate rulemaking requiring  
submission of facility history  
in response to Synar commitment

September 1990 (completed)

Publish proposed rule

October 1991 (completed)

Publish final rule (lead:  
RES; support: LLWM, IMNS, OGC;  
resources. TBD)

August 1992

- Regulatory guide on recordkeeping:

Develop draft regulatory guide for comment  
(lead: RES; support: IMNS, LLWM;  
resources: 3 staff-months for RES,  
1 staff-month for IMNS, 1 staff-week  
for LLWM)

December 1992

Develop final guide (lead: RES; support:  
IMNS, LLWM; resources: 1 staff-month for  
RES, 2 staff-weeks for IMNS, 1 staff-week  
for LLWM)

1993

(5) Development of Guidance on the Conduct of Termination Surveys

NRC's rules on decommissioning require that licensees perform a radiation survey to demonstrate that the premises are suitable for release for unrestricted use. In its report, GAO recommended NRC ensure that licensees decontaminate their facilities in accordance with NRC's guidelines before NRC fully or partially releases a site for unrestricted use.

Subsequent to the Subcommittee on Environment, Energy and Natural Resources of the Committee on Government Operations hearing, NRC Chairman Carr sent a memorandum to the EDO, containing resulting action items which included the need for guidance on verification (termination) surveys. On September 28, 1989, NMSS requested that RES revise existing guidance to clarify the scope and rigor of licensee termination surveys conducted to ensure adequate decontamination. New guidance on conducting termination surveys is under development by an NRC contractor, ORAU. The guidance will be issued as a contractor NUREG/CR report and will supercede NUREG/CR-2082, "Monitoring for Compliance with Decommissioning Termination Survey Criteria."



NRC actions needed to provide guidance on conducting termination surveys and estimated completion dates are given below.

- Issue draft termination survey NUREG/CR for interim use and comment (lead: RES; support: LLWM, IMNS; resources: RES, 10 staff-months; LLWM, IMNS, and regions, 2 staff-weeks). June 1992
- Issue final termination survey NUREG/CR (lead: RES support: LLWM, IMNS; resources: RES, 3 staff-months; LLWM, IMNS, and regions, 2 staff-weeks). December 1992

(6) Review of Licensed Sites Terminated After 1965

In its report, GAO recommended NRC ensure that all contamination at a site was cleaned up to below the levels allowed in NRC's guidelines before releasing all or part of a site for unrestricted use.

In response to this recommendation, NRC indicated (in a letter to Senator John Glenn, Chairman of the Committee on Governmental Affairs, dated September 26, 1989) that it would ensure sites are decontaminated in accordance with its guidance before terminating the license, and, if provided adequate resources, NRC planned to review the adequacy of decontamination at sites decommissioned since 1965. In addition, at the hearing before the Subcommittee on Environment, Energy and Natural Resources of the Committee on Government Operations on August 3, 1989, Chairman Carr committed to request funds in Fiscal Year 1991 to review the records of sites decommissioned after 1965 to ensure that they were adequately decontaminated. This study, which has been budgeted and started, could identify additional formerly licensed sites requiring further evaluation or remedial action. On the basis of the study, additional sites would be added to the SDMP list, if necessary.



NRC actions are needed for this study and estimated completion dates are given below.

- Begin study of sites decommissioned since 1965. September 1990  
(initiated)
- Complete study, including determination of sites September 1993  
to be added to SDMP (lead: IMNS; support: LLWM;  
resources: 12 staff-months for IMNS, and \$600K  
TA contract support in FY92; 12 staff-months for  
IMNS, 3 staff-months for LLWM, and \$400K TA  
contract support in FY93.)

(7) Development of a Rule to Require Licensees to Implement More Stringent  
Future Decommissioning Standards

EPA is in the process of developing residual contamination criteria for unrestricted release and expects to complete its efforts in the mid-1990s. To have criteria available for terminating licenses in the meantime, the NRC is preparing rulemaking to formally adopt residual contamination criteria (see Section 2.5.1(1) of this report). However, if the EPA standards are more restrictive than those adopted by NRC, NRC staff will need to decide whether terminated licenses will need to be reevaluated to come into compliance with the new, more restrictive criteria. Until this issue is resolved, licensees may be reluctant to clean up their sites, if future, more restrictive criteria may require them to take additional cleanup actions at a later time. The Commission discussed this issue in the SRM dated January 31, 1990, and requested that the NRC staff expedite the residual contamination rulemaking activities so that licensees will have an incentive to complete site decommissioning, rather than the current situation, which may encourage licensees to defer decommissioning pending issuance of NRC requirements. As part of the FR notice for the rulemaking, the Commission requested that the staff provide a general notice to licensees that additional cleanup may be necessary to comply with EPA standards promulgated in the future.

Consistent with this guidance, the Commission directed the NRC staff not to develop procedures to provide notice to licensees that licenses terminated in accordance with NRC requirements may be recalled if forthcoming EPA regulations indicate a need for further decontamination. If EPA should develop residual radioactivity standards, the NRC staff should emphasize to EPA the need (a) to "grandfather" those sites whose licenses have already been terminated in accordance with NRC requirements before issuance of such standards or (b) to demonstrate that EPA's standards result in significant and justifiable improvement in protecting human health and safety and the environment.

In response to this guidance, the NRC staff will provide general notice, as part of the Federal Register notice for the residual contamination rulemaking described in Section 2.5.1(1)(b), advising licensees of the potential need for additional cleanup to comply with standards promulgated at a future date by EPA. There will be no rulemaking or procedures requiring licensees to implement more stringent future decommissioning standards.

(8) Review and Modification, If Needed, of License Termination Procedures

The decommissioning rulemaking completed in June 1988 (53 FR 24018) modified the license termination procedures used by licensees and the NRC staff. Therefore, the procedures in effect now will need to be updated to reflect the new regulatory requirements. To provide guidance to licensees and the NRC staff on terminating licenses, the NRC staff plans to issue a regulatory guide on the procedural method for license termination for licenses under 10 CFR Parts 30, 40, and 70. Residual contamination criteria and licensee termination survey requirements are treated in the rulemaking and NUREG/CR that are discussed in Section 2.5.1(1) and (5).

The NRC actions need to provide this guidance and estimated dates for completion are given below.

- issue draft regulatory guide for comment TBD  
 (lead: RES; support: IMNS, LLWM, OGC, regions;  
 resources: 4 staff-months for RES. 2 staff-weeks  
 each for IMNS, LLWM, OGC, regions).
- Issue final regulatory guide (lead: RES; TBD  
 support: IMNS, LLWM, OGC; resources: 4 staff-  
 months for RES, 2 staff-weeks each for IMNS,  
 LLWM, OGC, regions).

(9) Development of Procedures to Ensure That Future License Terminations Meet NRC Requirements

In its report entitled "NRC's Decommissioning Procedures and Criteria Need to be Strengthened," GAO cited several cases for which license terminations were not performed in accordance with NRC requirements. To ensure that future license terminations will meet NRC requirements, the NRC staff will develop procedures, in the form of a Standard Review Plan (SRP), to ensure that appropriate decommissioning planning, inspections, recordkeeping (see Section 2.5.1(4)), and surveys (see Section 2.5.1(5)) are conducted.

The NRC actions needed to develop an SRP and estimated dates for completion are given below.

- Materials licensee decommissioning SRP:
 

Develop draft SRP.	July 1990 (completed)
Develop final SRP	June 1991 (completed)
- Development of decommissioning inspection procedures:

Develop draft inspection procedures in Manual  
Chapter 2800 (lead: LLWM; support: IMNS, regions;  
resources: 2 staff-months for LLWM, 2 staff-weeks  
each for IMNS, regions).

October 1992

Develop final inspection procedures in Manual  
Chapter 2800 (lead: LLWM; support: IMNS, regions;  
resources: 2 staff-months for LLWM, 2 staff-weeks  
each for IMNS, regions).

October 1993

(10) Coordination With Agreement States on SDMP Activities

The NRC staff has identified the sites of materials licensees that require cleanup. In addition to these sites, there are also other licensed sites requiring cleanup that are regulated under the Agreement States program. Actions taken on both the NRC and Agreement State licensed sites should ultimately be consistent and compatible. NRC requested Agreement States to identify materials sites requiring cleanup. As of December 19, 1991, 27 States had responded and identified 88 sites.

The State Programs (SP) staff intends to continue to monitor Agreement State decontamination and decommissioning activities, to coordinate Agreement State technical assistance requests, and to transmit copies of related NRC staff documents to the Agreement States to ensure that decommissioning activities are performed in a consistent manner. Resources required for this coordination are 1 staff-week each for LLWM and SP.

(11) Consideration of a "Reopener" Rulemaking To Require Additional Decontamination

Section 2.5.1(7) discusses a requirement for licensees to implement more stringent residual contamination standards that may be promulgated by EPA in the future. In an SRM dated January 31, 1990, the Commission requested the NRC staff expedite the residual contamination rulemaking and, as part of that rulemaking, provide a general notice to licensees that additional

cleanup may be necessary to comply with future EPA standards. Consistent with this approach, the Commission also instructed the NRC staff not to develop procedures providing notice to licensees that licenses terminated in accordance with NRC requirements may be recalled if the termination criteria are ultimately less restrictive than future EPA standards. Instead the NRC staff should emphasize to EPA the need to "grandfather" those sites whose licenses have already been terminated in accordance with NRC regulations, unless the EPA standards result in a significant and justifiable improvement in protecting human health and safety. Therefore, no rulemaking is contemplated to reopen terminated licenses as a result of more stringent EPA standards.

In a February 28, 1992, SRM, the Commission stated that if a licensee or responsible entity cleaned up a site under an NRC approved cleanup plan that meets the criteria at the time of approval of the plan, the NRC would not reopen the case due to any changes in NRC criteria or standards. However, NRC may need the ability to reopen terminated licenses, or issue new licenses to site owners or former licensees as a contingency if previously unknown contamination is found that is a significant health risk at either a formerly licensed or never-licensed site or if it is found that decommissioning was not completed in accordance with the approved plan. Also, a requirement is needed to compel reporting to NRC of the discovery of contamination above NRC's unrestricted release criteria by either former licensees or other persons. NMSS will send a "User Need Request Memorandum" to RES by August 1, 1992, to initiate a rulemaking to require additional decontamination if previously unknown contamination is discovered that is above criteria approved with the decommissioning plan or approved at license termination.

#### (12) Review of Test and Research Reactor License Terminations

Appendix B to this report lists the status of all decommissioned reactors. AEC and NRC terminated the licenses of 60 critical assemblies and test and research reactors. There are also four experimental reactors now under DOE control. NRC staff will review the non-DOE facilities to ensure that no



contamination above the NRC requirements still remains at these sites. Any sites that require cleanup will be added to the SDMP list for tracking.

A task order to review test and research reactor license termination files was initiated with ORAU in August 1990.

On June 18, 1991, ORAU submitted to NRC their report on the review of 59 docket files for test and research reactors with terminated licenses. The report concluded the docket files for 28 of the previously licensed sites do not contain complete documentation supporting a conclusion that the site meets current unrestricted release guidelines. However, there is adequate information to conclude that the potential for any of the 28 sites exceeding the current release guidelines is low.

An action plan was developed by LLWM, in conjunction with the Non-Power Reactor, Decommissioning and Environmental Project Directorate (PDNP), to further assess the potential for residual contamination at the 28 sites with incomplete documentation. The follow-up actions include reviewing contamination potential based on reactor design, evaluating the current status of the sites, attempting to locate missing records, and followup surveys, if necessary.

The NRC actions needed to complete this action plan and the estimated date for completion are given below.

- Evaluate the option of exempting certain sites from followup surveys based on reactor design (lead: LLWM; support: PDNP; resources: 1 staff-week for LLWM, 1 staff-week for PDNP) August 1, 1992
- Determine the current administrative or physical status of the formerly licensed sites (lead: LLWM; support: PDNP, resources: 1 staff-week for LLWM, 1 staff-month for PDNP) August 1, 1992

- Attempt to locate missing records  
(lead LLWM; resources: 2 staff-weeks  
for LLWM) August 1, 1992
- Evaluate followup information and determine  
need for additional surveys at the 28 NPR  
sites (lead: LLWM; support: PDNP;  
resources: 1 staff-month for LLWM;  
1 staff-week for PDNP) October 1, 1992
- Perform followup surveys (lead: LLWM;  
support: PDNP; resources: TBD) TBD

#### 2.5.2 Issues Requiring Resolution To Minimize Future Contaminated Site Problems

There are some policy issues that need to be resolved to minimize problems with or to better administer future contaminated sites. One major area that has been addressed and should minimize future problems is inclusion in the decommissioning rule of financial assurance requirements for applicants and licensees of material facilities (53 FR 24018). These requirements include cost amounts and funding methods for different categories of licensees. The decommissioning rule also includes procedures for decommissioning and license termination that should minimize problems with future contaminated sites.

However, two issues: (1) timeliness of cleanup rulemaking, and (2) development of enforcement guidance for decommissioning financial assurance requirements, need to be addressed at this time. They are discussed below and a plan, including schedules for resolving the issues and an estimate of the resources also are provided.

##### (1) Timeliness of Cleanup Rulemaking

As noted previously, the decommissioning rule includes procedures for decommissioning and license termination (e.g., 10 CFR 40.42). However, as discussed in SECY-89-369, the regulations allow licensees discretionary timing for decontamination and decommissioning activities. This has allowed

some licensees to remain inactive without decommissioning or to maintain inactive portions of contaminated facilities. Even when all licensed operations are permanently terminated, the regulations do not provide definitive requirements as to how soon final decommissioning plans must be developed, submitted, approved, or how soon decommissioning must be accomplished. Under these circumstances, NRC will likely encounter litigative vulnerability each time it issues an order to undertake or complete decommissioning.

A memorandum from SECY to the EDO, January 29, 1990, instructed the staff to establish a timeliness criterion for the completion of decontamination and cleanup activities after cessation of operations and discussed certain variances to the requirement. A proposed rule containing timeliness criteria has been submitted to the Commission (SECY-92-057) for approval prior to issuance for public comment.

NRC actions needed for this rulemaking and estimated dates for completion are given below.

- Issue proposed rule for comment (lead: RES; support: IMNS, LLWM, OGC, regions; resources: 7 staff-months for RES, 3 staff-weeks each for IMNS, LLWM, OGC, regions). May 1992
- Issue final rule (lead: RES; support: IMNS, LLWM OGC, regions; resources: 7 staff-months for RES, 3 staff-weeks for IMNS, LLWM, OGC, regions). May 1993

(2) Development of Enforcement Guidance for Decommissioning Financial Assurance Requirements

The financial assurance requirements for decommissioning, promulgated in the June 27, 1988, decommissioning rule, went into effect on July 27, 1990. It is likely that some licensees will be found in noncompliance with these new regulations because (a) they are unaware of the requirements; (b) they are making final arrangements to obtain a financial

assurance mechanism; (c) they are unable to obtain a financial assurance mechanism; or (d) they refuse to obtain a financial assurance mechanism. To ensure that NRC takes a consistent enforcement approach in dealing with these noncompliances, the NRC staff prepared enforcement guidance addressing these issues in SECY-91-271, "Strategy for Enforcing the Financial Assurance Requirements of the Decommissioning Rule for Materials Licenses," August 27, 1991, which was accepted by the Commission.

During implementation of the SDMP, because of the diversity of sites and licensees on the SDMP list, additional policy issues have arisen and problems have been encountered that can affect the SDMP schedules in Table 2. These three additional policy issues are discussed below.

#### (1) Compelling Cleanup by Responsible Parties at Unlicensed Sites

At SDMP sites where the license has been terminated, despite NRC staff efforts to work with responsible parties, the experience during SDMP implementation has been that former licensees are sometimes unwilling to perform cleanup. Issuing orders may be a means of compelling cleanup in this situation.

The Commission's statutory authority to issue orders is found in Section 161 of the Atomic Energy Act (AEA) of 1954, as amended, and is not limited solely to licensees. The Commission's AEA authority to issue orders is broad and extends to any person (entity, i.e., individual, corporation, or governmental agency) who (that) engages in conduct within the Commission's jurisdiction. Currently, NRC regulations for issuance of orders only address licensees. On April 3, 1990, NRC published a proposed rule (55 FR 12370) that would amend 10 CFR Part 2, Subpart B, to provide for the issuance of orders to persons subject to NRC jurisdiction, whether or not licensed by the Commission. The comment period on the proposed rule expired June 18, 1990, a final rule is being developed and the staff is considering issuing orders to responsible parties to compel cleanup at SDMP sites where the staff concludes that such action is necessary.

While NRC authority under Section 161 of the AEA is broad, it is generally phrased ("...the Commission is authorized to...prescribe such regulations or orders as it may deem necessary ... to govern any activity authorized pursuant to this Act ..."). Thus, the legal framework for NRC cleanup action is not fully articulated in the AEA. Unlike EPA under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), NRC is granted no specific authority to itself engage in cleanup actions, and there is no express AEA provision, as in CERCLA, imposing cleanup liability on former owners, licensees, and transporters. OGC believes that NRC jurisdiction to issue cleanup orders under Section 161 of the AEA extends clearly to persons currently in possession of materials subject to NRC regulation, whether or not such persons are licensees. Accordingly, persons currently owning contaminated sites are subject to NRC cleanup orders, whether or not such persons are licensees. The liability under AEA of former owners and licensees who are not currently in ownership or possession presents a more difficult question that has not been definitely resolved. OGC is continuing research on this question.

OGC has separately recommended that rulemaking be conducted to establish criteria and procedures applicable to the cleanup of never-licensed, as well as formerly licensed, contaminated sites. This concern is addressed by the rulemaking efforts described in Sections 2.5.1(1) and (11) and 2.5.2(1) concerning cleanup criteria, license reopening, and decommissioning timeliness, respectively. In the interim, staff will issue orders, when actions are necessary to protect public health and safety, on the basis of established criteria or guidance regarding decontamination or decommissioning.

## (2) Compelling Cleanup by Licensees

The NRC sometimes encounters licensees that are unwilling to proceed expeditiously with general or specific cleanup actions. At many of the SDMP sites, contamination may be widespread at low concentrations and poses no immediate or short-term risk to the public. The NRC staff is continuing to work with licensees at SDMP sites to effect cleanup. Should these efforts be unsuccessful, as permitted by 10 CFR 30.61, 40.71, and 70.61, staff actions may include unilaterally modifying terms of the lic-



ense in the interest of public health and safety to include such general or specific cleanup of the site as to be determined by the Commission. The procedure for unilateral modification of a license is by issuance of orders under 10 CFR 2.202 or 2.204. Although the best means for making individual recalcitrant licensees clean up their sites or facilities is to issue orders to such licensees, the best method for minimizing enforcement problems connected with orders and handling the problem generally is the promulgation of specific regulations, as described in Sections 2.5.1(1) and 2.5.2(1) above. Such regulations address the decommissioning cleanup criteria and timeliness of decontamination and would force recalcitrant licensees to clean up sites or face substantial civil penalties.

Since these rulemakings may take several years to complete, the staff has taken interim steps to accelerate the cleanup of SDMP sites. These steps are outlined in the form of an NRC Action Plan approved by the Commission on April 6, 1992, and published in the Federal Register on April 16, 1992 (57 FR 13385). The staff intends to proceed with site cleanup in accord with this plan until the rulemakings on decommissioning timeliness and decommissioning cleanup criteria are completed.

No additional resources are needed for this activity.

### (3) Residual Nonradioactive Contamination

There may be instances where residual radioactive contamination has been reduced to levels permitting release of the facility for unrestricted use and termination of the license; however, nonradioactive contamination above the limitations imposed by other agencies may remain.

The "Supplementary Information" to the "Final Rule on Decommissioning" (53 FR 24018) indicates that decommissioning activities do not include the removal and disposal of non-radioactive materials beyond that necessary to terminate the NRC license and that disposal of nonradioactive hazardous waste not necessary for NRC license termination is not covered by the regulations but would be treated by other appropriate agencies having responsibility over such wastes. Hence, NRC

actions will be to notify responsible State or Federal agencies of the presence of nonradioactive contaminants remaining on site before terminating the NRC license.

If, however, other agencies are not responsive to the nonradiological hazards, NRC may enforce the cleanup of chemical hazards generated by regulated activities in the area of decommissioning when the presence of the chemical hazard affects an activity normally regulated by NRC. (See memorandum from General Counsel to Commissioners, dated September 23, 1986, Analysis of Jurisdictional Issues ["Regulatory Gap"] associated with Nonradiological Hazards).

No additional resources are needed for this activity.

Table 1 Order of Priority of NRC Review of Contaminated Sites

Site Identification	Factor*				Total	Priority	Factor Score Bases
	TAN	SRE	RO	CC			
Allied Signal Aerospace, Bendix Div. 040-00772	2	2	0	0	4	A	Decommissioning complete. NRC letter to Allied Signal on 2/27/92 that no further decontamination necessary.
Babcock & Wilcox, Apollo, PA 070-00135	2	2	0	0	4	A	Uranium contamination in sewer and at river bank; DOE administering decontamination funds.
Chemetron Corporation (Bert Avenue/ Harvard Avenue) 040-08724	2	2	0	0	4	A	Cleanup in progress; potential mixed waste hazard.
Chevron Corporation (formerly Gulf United Nuclear Fuels Corporation) 070-00903	2	0	2	1	5	A	Licensee no longer in business; site in National Park area; Synar hearing 8/89; Pu contamination.
Kerr-McGee, Cimarron Plant 070-01193	0	2	0	1	3	A	Decontamination of buildings in progress; onsite disposal of waste under review; Synar hearing 8/89.
Kerr-McGee, Cushing Plant 070-03073	0	2	0	1	3	A	Synar hearing 8/89; license previously terminated; State of Oklahoma consent order; SNM license application to NRC.
Safety Light Corporation 030-05980	2	0	2	0	4	A	Litigation in progress; ASLB and ASLAB partially stayed NRC decontamination order; Sr-90, tritium, and Cs-137 contamination in ground water.
Texas Instruments, Inc. 070-00033	0	2	0	1	3	A	Decontamination in progress; ORAU final survey; disposition of licensed material; referenced in GAO Report.
UNC Recovery Systems 070-00820	2	2	0	0	4	A	Decontamination complete; some ground water contamination.
West Lake Landfill 040-08801	2	0	2	1	5	A	No license; EPA CERCLA/NPL site; high natural uranium concentration; Synar hearing 8/89.

Table 1 (Continued)

Site Identification	Factor*				Total	Priority	Factor Score Bases
	TAN	SRE	RO	CC			
Advanced Medical Systems 030-16055	0	0	2	0	2	B	Decommissioning funding issues.
Aluminum Company of America 040-00501	0	2	0	0	2	B	Remediation plan approved 09/06/91; confirmatory survey performed 11/91; confirmatory survey report under review.
Amax 040-08820	0	2	0	0	2	B	Contaminated soil in engineered cell; Amax transferring site to DOE.
BP Chemicals America, Inc. 040-07604	0	2	0	0	2	B	Decontamination plan for ponds to be submitted after approval by Ohio EPA.
Budd Co. 030-19963	0	2	0	0	2	B	License termination scheduled for 9/92.
Cabot Corporation, Revere, Reading, PA 040-06940	0	2	0	0	2	B	Revere: Decontamination scheduled for completion May 1992. Reading: 600 tons uranium/thorium slag.
Hartley and Hartley (Kawkawlin) Landfill (No Docket)	0	0	2	0	2	B	No licensee; no specific funding arrangement agreed to by affected parties.
Heritage Minerals 040-08980	0	2	0	0	2	B	License issued 12/90; decontamination in progress.
Molycorp, Inc. Washington, PA 040-08778	0	0	2	0	2	B	Licensee probably able but not inclined to undertake needed cleanup per NRC specifications.
Molycorp, Inc. York, PA 040-08794	0	2	0	0	2	B	Decontamination plan being revised.
Pesses Company METCOA Site 040-08406	0	0	2	0	2	B	Licensee bankrupt and abandoned site; site stabilized by potentially responsible parties; EPA involved.
RTI, Inc. (formerly Process Technology of North Jersey, Inc.) 030-07022	0	2	0	0	2	B	Site characterization plan and decontamination plan under NRC review.

Table 1 (Continued)

Site Identification	Factor*					Priority	Factor Score Bases
	TAN	SRE	RD	CC	Total		
Schott Glass Technologies 040-07924	0	2	0	0	2	B	Proposed final site closure plan submitted to PADER September 1991. NRC to review.
Shieldalloy Corporation, Cambridge 040-08948	0	2	0	0	2	B	Decontamination of portion of site and west pile complete; decontamination plan for east pile expected in 1991.
Watertown Arsenal/ Mall 040-02253 070-00263 030-04593	0	2	0	0	2	B	On base closure list. Army believes Mall property is ready for release.
Watertown GSA (No Docket)	0	2	0	0	2	B	Comprehensive site assessment complete.
Westinghouse Electric Corporation (Waltz Mill) 070-00698	2	0	0	0	2	B	Sr-90 contamination in ground water, but treatment appears to be lowering concentrations.
Army, Dept. of, Aberdeen Proving Ground 040-06394	0	0	0	0	0	C	
Babcock & Wilcox, Parks Township, PA 070-00364	0	0	0	0	0	C	
Cabot Corporation Boyertown, PA 040-06940	0	0	0	0	0	C	
Dow Chemical Company 040-00017	0	0	0	0	0	C	
Elkem Metals, Inc. (No Docket)	0	0	0	0	0	C	
Englehard Corporation 070-00139	0	0	0	0	0	C	
Fansteel, Inc. 040-07580	0	0	0	0	0	C	



Table 1 (Continued)

Site Identification	Factor*				Total	Priority	Factor Score Bases
	TAN	SRE	RO	CC			
Magnesium Elektron, Inc. 040-08904	0	0	0	0	0	C	
Minnesota Mining and Manufacturing Co. (No Docket)	0	0	0	0	0	C	
Northeast Ohio Regional Sewer District (No Docket)	0	0	0	0	0	C	
Nuclear Metals, Inc. 040-00672	0	0	0	0	0	C	
Permagrafin 030-13573	0	0	0	0	0	C	
Remington Arms Company 040-08767	0	0	0	0	0	C	
RMI Titanium Company 040-02384	0	0	0	0	0	C	
Shieldalloy Metallur- gical Corporation, Ne /ield, NJ 040-07102	0	0	0	0	0	C	
Victoreen, Inc. 030-19594	0	0	0	0	0	C	
Whittaker Corporation 040-07455	0	0	0	0	0	C	
Wyman-Gordon (No Docket)	0	0	0	0	0	C	

\*TAN = timeliness of action needed.

SRE = status of regulatory effort.

RO = responsible organization.

CC = congressional commitment.

Table 2 Site Decommissioning Management Plan Schedule

Site Identification	Site Characterization	Decontamination/Decommissioning (D/D) Plan			Final Site Survey	Terminate License	Problems/Issues
		Submittal	Status of NRC Review	Approved			
Level A Sites							
Allied Signal Aerospace, Bendix Div. 040-00772	Characterization measurements complete 6/90; results submitted 9/90	Stabilization plan approved by NRC; remediation plan submitted 10/90 and approved and implemented 12/90. plan completed 12/90.	Review characterization results and preliminary remediation	12/90	Stabilization complete 5/90; decommissioning complete.	complete Not licensed	License previously terminated. Letter to owner on 2/22/92 stating no further decontamination necessary.
Babcock & Wilcox, Apollo, PA 010-00135	In progress. Onsite soil samples completed; off-site soil characterization completed except under building.	Submitted revised decommissioning plan 8/91. Revision of 8/91 plan received 3/92.	Complete review by 5/92.	TBD	Building internal structure disassembled; remediation of onsite and offsite soil in progress; completion of decommissioning must wait for NRC approval of plan.	TBD 1993	DOE administering Federal decontamination funds.
Chemetron Corporation (Harvard Ave and Bert Ave) 040-08724	Phase I Site Characterization Report (SCR) submitted in June 1991. Comments on SCR sent to licensee in August 1991. Revised SCR submitted in November 1991. Phase II site characterization studies began January 1992. Final SCR expected June 1992 by NRC order.	Site Remediation Plan (SRP) submitted in August 1991. Comments on SRP sent to Chemetron in December 1991. NRC to notify Chemetron of acceptable remediation method in Spring 1992. Final SRP to be submitted. TBD.	Review of August 1991 SRP completed.	TBD		TBD	Ohio EPA may apply RCRA or Ohio State Solid waste regulations at Bert site, which may delay remediation activities. Midwest Compact Commission may identify requirements under LIRPAA. Possible local concerns over onsite disposal and lack of visible progress.
Chevron Corporation (formerly Gulf United Nuclear Fuels Corporation) (No Docket)	TBD	TBD	Further assertion of NRC authority being considered.			TBD	Licensee no longer in business; April 13, 1992 letter from Chevron to NPS stated that Chevron is unwilling to take any further action toward decommissioning.

Table 2 Site Decommissioning Management Plan Schedule

Site Identi- fication	Site Characterization	Decontamination/Decommissioning (D/D) Plan				Final Site Survey	Terminate License	Problems/Issues
		Submittal	Status of NRC Review	Approved	D/D In Progress			
Level A Sites								
Kerr-McGee, Cimarron Plant 070-01193	Plutonium license complete. Uranium license: Characterization of U in soil complete. Two additional burials, discovered 10/13/91, are currently being characterized.	Met with licensee on U contamination in soil 6/90; submitted decontamination plan on U contamination in soil 5/90.	Meeting with licensee on schedule for U building termination TBD. An environmental assessment (EA) evaluating disposal of U on site to be issued following Commission approval of SECY-91-398.	Pu license complete. Authorize U-contaminated in progress for soil disposal after completion of notification process.	PU license complete. Some decontamination in progress for U building; schedule for U contamination in soil TBD.	Pu License complete; 1992; U U license TBD.	Pu license - 1993	EA, FONSI, and notice of opportunity for hearing to be published.
Kerr-McGee, Cushing Plant 070-03073	Site characterization report submitted 5/4/91. Limited additional characterization needed.	Feasibility study of site remediation alternatives due 5/92, in accordance with Oklahoma consent order.	TBD	TBD	Cleanup of contaminated soil around process building; sediment and soil in skull creek; and surface contamination in the process building continues, in accordance with Oklahoma consent order.	TBD	TBD	Kerr-McGee applied for a license to possess the SNM at the Cushing site. The application is currently under NRC review.
Safety Light Corporation 030-05980	Plan conditionally approved by NRC; ASLB and ASLAB partially stayed NRC order requiring funds for characterization. Some characterization work completed 7/90.	ASLB partially stayed NRC order requiring decontamination.	TBD pending outcome of hearings.	TBD		TBD	TBD	Safety Light, USR Industries and the related corporations claim to be not capable of funding cleanup; USR and related corporations contest NRC jurisdiction. Hearing scheduled for June 1992. On 7/27/91 Safety Light requested an exemption from 10 CFR 30.35 citing lack of funds; the staff denied that request. Licensees have not complied with 10 CFR 30.35 and the staff is considering appropriate enforcement action.

Table 2 Site Decommissioning Management Plan Schedule

Site Identi- fication	Site Characterization	Decontamination/Decommissioning (D/D) Plan				Final Site Survey	Terminate License	Problems/Issues
		Submittal	Status of NRC Review	Approved	D/D In Progress			
Level A Sites								
Texas Instruments Inc. 070-00033	Complete	NRC met with licensee to develop decommissioning schedule on 4/14/92.	TBD	TBD	Remediation of contaminated soil by 9/93.	10/93	12/93	Licensee agreed to develop Financial Assurance plan May 31, 1992 and a decommissioning schedule by July 31, 1992.
UNC Recovery Systems 070-00820	Complete	Submitted	Complete	Complete	Complete	Oak Ridge Associated Universities (ORAU) survey complete; surfaces and soil met NRC for unrestricted release limits, however, Sr-90 concentration in ground water exceeds current EPA standards.	TBD	Small amount of ground water contamination in- cluding some nonradio- logical chemical con- tamination. NRC staff will meet with State of Rhode Island to address their concerns about residual contamination.
West Lake Landfill 040-08801	EPA is lead agency for site remediation. A re- medial investigation feasibility study began in 1991.	TBD	TBD	TBD		TBD	TBD	Site was added to EPA National Priorities List NRC maintaining contact with EPA with regard to resolution of final cleanup.
Level B Sites								
Advanced Medical Systems, Inc. 030-16055	Complete	Complete	Complete	Complete	Complete	N/A	N/A	Advanced Medical Systems remains in SDMP since NRC estimated cost for final decommissioning exceeds licensee's financial assurance statement.
Aluminum Company of America 040-00501	Complete	Complete	Complete	September 1991	Contaminated soil shipped offsite 12/91. Additional remediation of land and structures may be required, pending results of ORAU survey.	ORAU comple- ted build- ing sur- veys in 11/91. Final survey 6/92.	No existing NRC	If a 10 CFR 20.304 dis- posal area is identified at this site, additional characterization and remediation of burial area may be required.

Table 2 Site Decommissioning Management Plan Schedule

Site Identi- fication	Site Characterization	Decontamination/Decommissioning (D/D) Plan				Final Site Survey	Terminate License	Problems/Issues
		Submittal	Status of NRC Review	Approved	D/D In Progress			
Level B Sites								
Amax 040-08820	Complete	Amax is transferring site to the Department of Energy (DOE).	NRC sent site information to DOE 12/89; met with DOE, Amax, and State of West Virginia 6/90; met with DOE on remaining issues, principally monitoring wells, 9/90.	TBD	TBD when DOE assumes site responsibility.	TBD	TBD	DOE informed August 9, 1991 that NRC has made the requisite findings. Awaiting DOE action.
BP Chemicals America, Inc. 040-07604	In progress.	Health and safety plan for pond closure project 11/91. License application for onsite disposal mixed waste pond closure project 2/92; mixed waste pond closure project dated 1/92.	Completed review of chemical reactor decontamination plan 6/91. Review of pond closure plan TBD.	Health and Safety plan approved 12/91.	Decontamination of chemical reactors and grounds in progress.	1995	1995	Ponds contain mixed waste; offsite burial options need to be explored; Ohio EPA involved.
Budd Company 030-19963	Hot cell sealed for decay since 1967. Characterization satisfactory.	Final Plan submitted 4/91.	Complete	Complete	Approved plan currently being implemented.	7/92	9/92	
Cabot Corporation, Revere, Reading, PA 040-06940	Revere complete. Reading: building complete. Dump to be characterized.	Revere: Cabot is preparing final decontamination submittal requesting release from license. Reading: Buildings and parking lot request for release 10/90. No plans to release dump site.	Reading review underway to release buildings and lots.	Revere complete. Reading approved for buildings 4/91; TBD for dump.	Revere complete. Reading buildings complete; No plans at this time for dump.	Revere 5/91 Reading buildings 5/91; dump TBD.	Revere: 1992 Reading: 1993.	No plans to decontaminate dump portion of Reading site (60+ tons U/Th slag).



Table 2 Site Decommissioning Management Plan Schedule

Site Identification	Site Characterization	Decontamination/Decommissioning (D/D) Plan				Final Site Survey	Terminate License	Problems/Issues
		Submittal	Status of NRC Review	Approved	D/D In Progress			
Level B Sites								
Hartley and Hartley (Kawkawlin) Landfill (No Docket)	Letter of agreement between NRC and State of Michigan for 3-year monitoring program. TBD when NRC evaluates responsibility for wastes.	Obtain agreement with Waste Management of North America, Wayne Hartley, and State of Michigan on disposition of material in landfill, in 1992; NRC contacted Hartley on cleanup of site 2/92.	No decommissioning plan submitted as of 3/92	TBD	Partial hazardous waste remediation planned for 1992.	TBD	TBD	No licensee; no specific funding arrangement for cleanup. Thorium wastes may be mixed with hazardous wastes.
Heritage Minerals 040-08980	Complete	Submittal of on-site burial proposal 11/91. Plan for decontamination of buildings submitted 1991.	NRC decision for disposal set for 5/92.	Plan for decontamination of buildings approved 1991.	Decon work finished except for monazite pile. Waiting NRC's 5/92 decision.	3/93	1993	Facility operations ceased in 9/90.
Molycorp, Inc. Washington, PA 040-08778	TBD	TBD	TBD			TBD	TBD	Licensee not inclined to undertake cleanup. NRC to issue letter in May 1992 requesting decommissioning schedule.
Molycorp, Inc. York, PA 040-08794	TBD	TBD	TBD	TBD		TBD	TBD	
Pesses Company, METCOA Site 040-08406	Characterization plan approved August 1991. Work completed December 1991.	Phase One remediation plan submitted to NRC and EPA for approval 10/90.	Complete	Phase One remediation approved by NRC and EPA 11/90.	Phase One remediation completed April 1991.	TBD	TBD	Licensee bankrupt; cleanup being conducted under EPA consent order. NRC reviewing plans for compliance with NRC regulations and guidance.

Table 2 Site Decommissioning Management Plan Schedule

Site Identification	Site Characterization	Decontamination/Decommissioning (D/D) Plan				Final Site Survey	Terminate License	Problems/Issues
		Submitted	Status of NRC Review	Approved	D/D In Progress			
Level B Sites								
RTI, Inc. (formerly Process Technology of North Jersey, Inc.) 030-07022	Submitted to NRC in 1989.	Submitted to NRC in 1989.	Complete. More information to be submitted and reviewed on contamination and potential for more buried waste, 8/92.	1989	Remediation of 5-acre area completed.	8/93	Amend license 12/93.	Licensee contends site is clean. Information under review.
Schott Glass Technologies 040-07924	Complete	Submitted to NRC 1988.	Complete	5/90	Began in 6/90 but is on hold because lead contamination was discovered.	TBD	TBD	PADER needs to approve plan for dealing with lead contamination.
Shieldalloy Metallurgical Corporation Cambridge, OH 040-08948	Characterization program to be submitted for ground water, surface water, and sediments, June 30, 1992.	Plan for west pile submitted 2/90 and rejected 5/92. Licensee will submit plan for east and west piles in late 1992.	NRC reviewed hydrology 7/90.	TBD	Complete except for slag piles.	Complete for site area and except slag TBD.	Non-slag area and piles TBD.	Offsite disposal of slag not financially possible. Shieldalloy currently holds financial assurance of \$750,000.
Watertown Arsenal/ Mall 040-02253 070-00263 030-04593	Draft report submitted August 1991.	6/92	TBD	9/92	1992-1996	6/96	12/96	None
Watertown GSA (No Docket)	Complete	Complete	Planned completion in summer 1992.	TBD	TBD	1993	1993	High water table and other hazardous wastes at site.
Westinghouse Electric Corporation (Waltz Mill) 070-00698	Submit at current license renewal.	Submit at current license renewal.	Updated plan to be requested by 6/92.	TBD	TBD	TBD	TBD	

Table 2 Site Decommissioning Management Plan Schedule

Site Identification	Site Characterization	Decontamination/Decommissioning (D/D) Plan				Final Site Survey	Terminate License	Problems/Issues
		Submittal	Status of NRC Review	Approved	D/D In Progress			
Level C Sites								
Army, Dept. of, Aberdeen Proving Ground 040-05394	Army submitted enhanced environmental monitoring program at license renewal 12/90.	N/A	Complete. Review of environmental monitoring program by 9/92. Review licensee's sampling and environmental data by 12/93. Remove site from list if cleanup not needed by 5/94.			TBD	5/94 if cleanup is needed	If decontamination of site is necessary, removal of DU would be difficult.
Babcock & Wilcox, Parks Township, PA 070-00364	Ground water wells have been installed at burial ground for characterization. Analysis being submitted to NRC quarterly.		NRC is reviewing ground water analysis.		No plans at this time.	Not planned.	Not planned.	Possible remediation of 20.304 on site burial.
Cabot Corporation, Boyertown, PA 040-04690	Submitted renewal application 12/88.	Renewal application incomplete. Staff requesting Decommissioning funding Plan April 1992.	TBD	TBD	No decontamination proposed at this time.	Ongoing operation	Not planned.	
Dow Chemical Company 040-00017	Complete	10 CFR 20.302 application for disposal of wastes at Salzberg landfill submitted 11/89.	Combined NRC and State of Michigan comments sent 9/91. NRC and State met with licensee 11/91.	TBD	TBD pending 20.302 application review.	After 1993	After 1993	NRC and Dow must resolve issue of unrestricted release of thorium wastes.
Elkem Metals, Inc. (No Docket)	Site characterization initiated 4/13/92 and expected to be completed by 5/92.	Depending on outcome of characterization of air ducts, vent lines, and equipment in building A, a decommissioning plan will be developed.	TBD	TBD		TBD	TBD	

Table 2 Site Decommissioning Management Plan Schedule

Site Identi- fication	Site Characterization	Decontamination/Decommissioning (D/D) Plan				Final Site Survey	Terminate License	Problems/Issues
		Submittal	Status of NRC Review	Approved	D/D In Progress			
Level C Sites								
Engelhard Corporation 070-00139	TBD	TBD	TBD	TBD	Preliminary sampling data expected 4/92.	TBD	TBD	Radioactive wastes may be mixed with hazardous wastes.
Fansteel, Inc. 040-07580	Revised site charac- terization plan 2/92.	Conceptual decommis- sioning plan submitted 2/91	NRC comments on site characteri- zation plan and conceptual D&D plan due 5/92.	TBD		TBD	TBD	
Magnesium Elektron (No Docket)	TBD	No plan to decontami- nate at this time as facility is in operation.	TBD	TBD		TBD	N/A	License application sub- mitted 8/7/89. Applica- tion under review.
Minnesota Mining and Manufacturing Co. (3M) (No Docket)	No site characterization activities performed as of March 1992. Waste characterization and available site informa- tion being reviewed.	None submitted as of March 1992.	NRC to contact 3M about possible needs for site characterization information in Spring 1992.	TBD	None as of March 1992.	TBD	No existing NRC license	Existing 10 CFR 20.304 disposal site that con- tains enriched uranium, natural uranium, and natural thorium. Site may require additional characterization and remediation. Minnesota Pollution Control Agency requesting NRC review of 3M's site report and NRC's position on site monitoring requirements.
Northeast Ohio Region- al Sewer District/ Southerly Plant 030-18276	ORAU completed Phase I survey 9/91, and submitted report 1/92. Phase II field work completed 3/92 and report due 6/92.	The D/D plan will be decided based on Phase II survey results.						Identification of responsible party or parties.

Table 2 Site Decommissioning Management Plan Schedule

Site Identi- fication	Site Characterization	Decontamination/Decommissioning (D/D) Plan				Final Site Survey	Terminat License	Problems/Issues
		Submittal	Status of NRC Review	Approved	D/D In Progress			
Level C Sites								
Nuclear Metals, Inc. 040-00672	Complete for holding basin. Additional ground water monitoring in progress	NRC to request, by 5/92, decontamination plan and schedule.	TBD	10/92		12/97	Amend license 6/98.	On State of Massachu- setts' "priority dis- posal site" list. Licensee indicates that to make recycling of holding basin material viable, it must be accomplished over 5-7 year period.
Old Vic, Inc. 030-19594	Licensee has requested a meeting with NRC to discuss development of a new characterization plan.	Licensee has requested a meeting with NRC to discuss new decommissioning plan.	TBD	TBD		TBD	TBD	Licensee has indicated desire to complete decommissioning by end of 1992.
Permagrain 030-13573	Characterization plan developed and implemen- ted 9/91. License condi- tion requires submittal of site characterization report by 7/92.	Licensee to submit proposed plan 10/92.	12/92	TBD		4/94	12/94	Licensee may not be financially capable of decontaminating the site. Commonwealth of Pennsyl- vania has agreed to finance.
Remington Arms Company, Lake City Army Amuni- tion Plant 040-08767	Characterization/ remediation plan scope of work submitted 3/92.	At time of license renewal in 1993.	Review at license renewal in 1993.	TBD		TBD		U.S. Army has not allocated funds for cleanup in FY92.
RMI Titanium Company 040-02384	Hydrogeologic Assessment performed 5/89. RFI Equivalency Document completed 8/89.	Final draft decommissioning plan submitted 12/91	Review to be completed 12/92.	TBD	Partial D/D in in progress. Some tasks have been initiated	TBD	TBD	DOE has assumed full financial responsibility for decommissioning.
Shieldalloy Metallurgical Corporation, Newfield, NJ 040-07102	Licensee is currently characterizing the site radiologically. Operations continue.	Characterization report submitted in April 1992. This report is required for license renewal application review.	NRC review of radiological characterization report and license renewal applica- tion is antici- pated to commence by 7/92.	TBD		TBD	TBD	Superfund site; NRC activities being conduc- ted in cooperation with State of New Jersey.



Table 2 Site Decommissioning Management Plan Schedule

Site Identi- fication	Site Characterization	Decontamination/Decommissioning (D/D) Plan				Final Site Survey	Terminate License	Problems/Issues
		Submittal	Status of NRC Review	Approved	D/D In Progress			
<u>Level C Sites</u>								
Whittaker Corporation 040-07455	1993	1993	Review at license renewal in 1993.	TBD		TBD	TBD	
Wyman-Gordon Company (No Docket)	Ground water sampling being conducted.	TBD	NRC will perform dose assessment to be completed by 6/92 to deter- mine if remedia- tion necessary.	TBD		TBD		

TABLE 3 SDMP Resource Requirements

Organization	Resources (FTE)*		
	FY 92	FY 93	FY 94
Overall Program Management			
LLWM	1.5	1.5	1.5
Site-Specific Project Management			
LLWM	6.4	7.1	8.8
IMNS	4.0	4.3	4.2
Region I	3.5	2.6	2.6
Region III	1.6	1.4	1.4
OGC	1.0	1.0	1.0
Policy Issues			
LLWM	0.3	0.4	0.3
IMNS	1.3	1.2	0.3
RES	1.3	3.3	3.4
NRR	0.2	0.2	0.2
OGC	0.1	0.1	0.1
GPA/SP	0.1	0.1	0.1
Total Resources			
LLWM	8.2	9.0	10.6
IMNS	4.3	4.5	4.5
Region I	3.5	2.6	2.6
Region III	1.6	1.4	1.4
RES	1.3	3.3	1.4
NRR	0.2	0.2	0.2
OGC	1.1	1.1	1.1
SP	0.1	0.1	0.1
Total FTE	20.6	22.2	21.9
Total Technical Assistance:	\$400K	\$1250K	\$390K

\*Direct unloaded FTE

APPENDIX A

CONTAMINATED SITE DESCRIPTIONS



# CONTAMINATED SITE LIST

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- \* The Allied Signal Aerospace, Bendix Division, site was released for unrestricted use on February 27, 1992 and is no longer an "SDMP listed" site. However, a summary of actions taken in 1991 leading to the site's removal from the SDMP list is included in this section.



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## FOREWORD

This appendix provides a discussion of the characteristics and problems associated with each site requiring decontamination or decommissioning and a basis on which NRC staff can prioritize its efforts. The sites currently placed on the Site Decommissioning Management Plan (SDMP) list are presented in alphabetical order. The eight descriptive factors explained in Section 2.2 of the report are listed below and are addressed for each site.

- (1) site identification, including U.S. Nuclear Regulatory Commission (NRC) project manager and the Division of Low-Level Waste Management and Decommissioning (LLWM) Monitor, in the Office of Nuclear Material Safety and Safeguards (NMSS)
- (2) site operations
- (3) description of radioactive wastes and activities remaining on site
- (4) description of radiologic hazard
- (5) financial assurance/viable responsible organization
- (6) status of decommissioning activities
- (7) other involved parties
- (8) NRC/Licensee actions and timing

The information in this appendix is summarized in Section 3 of the report.

Some sites have the same licensees or owners and are further identified by specific location for clarity.



## FOREWORD

This appendix provides a discussion of the characteristics and problems associated with each site requiring decontamination or decommissioning and a basis on which NRC staff can prioritize its efforts. The sites currently placed on the Site Decommissioning Management Plan (SDMP) list are presented in alphabetical order. The eight descriptive factors explained in Section 2.2 of the report are listed below and are addressed for each site.

- (1) site identification, including U.S. Nuclear Regulatory Commission (NRC) project manager and the Division of Low-Level Waste Management and Decommissioning (LLWM) Monitor, in the Office of Nuclear Material Safety and Safeguards (NMSS)
- (2) site operations
- (3) description of radioactive wastes and activities remaining on site
- (4) description of radiologic hazard
- (5) financial assurance/viable responsible organization
- (6) status of decommissioning activities
- (7) other involved parties
- (8) NRC/Licensee actions and timing

The information in this appendix is summarized in Section 3 of the report.

Some sites have the same licensees or owners and are further identified by specific location for clarity.





Advanced Medical Systems, Inc.

1. Site Identification

Advanced Medical Systems, Inc.

Cleveland, OH

License No.: 34-19089-01

Docket No.: 030-16055

License Status: Active

Project Manager: D. Sreniawski, Region III

LLWM Monitor: D. Orlando

2. Site and Operations

Advanced Medical Systems, Inc. (AMS), manufactures cobalt-60 (Co-60) and cesium-137 (Cs-137) sources for use in medical teletherapy devices and radiography machines. Poor radiation safety practices in plant operations have led to serious contamination of the facility. A 1985 survey by Oak Ridge Associated Universities (ORAU) found surface contamination in a hot cell, the ventilation system, the dry waste storage area, the liquid waste area, and the holding tank and piping. No offsite contamination was found. However, some detectable activity was found in sediments, soil, and vegetation in the southern portion of the AMS property. ORAU believed that this contamination resulted from stack effluent releases. Per a July 1987 Nuclear Regulatory Commission (NRC) order, the licensee has cleaned-up the site, with the exception of a holdup tank room, to contamination levels suitable for continuing operations. Exposure rates of 2000 Rem per hour at 30 centimeters have been measured in the holdup tank room making the activity level too high to compel cleanup at this time. NRC gave AMS permission to seal and monitor this room until radiation levels are low enough to permit decontamination.

Currently, AMS plans to continue sealed source manufacturing operations and does not plan to decommission the facility soon. During the next

license renewal, in 1994 NRC staff will evaluate whether decontamination activities should begin in the liquid waste holdup tank room.

AMS is located in an industrial and residential neighborhood on London Road on the east side of Cleveland, Ohio. The facility is in the northeastern portion of a large warehouse building formerly occupied by Picker Corporation, who used it for similar operations. AMS occupies about one quarter of the 8000 square foot building. Currently, the remainder of the building is unused. The facility occupies portions of three floors in the warehouse. The first floor consists of an office area, an isotope shop area, a hot cell, a shielded work room, and a storage area. The second floor area houses a mechanical equipment room and an exhaust ventilation equipment room. A liquid waste handling room and the former liquid waste holdup tank room and dry waste storage area are located in the basement. Waste is stored in a locked room with roped areas on the south side of the warehouse area.

A 1985 ORAU assessment of the fire protection and operational safety programs at the facility resulted in a recommendation that the licensee decontaminate numerous work areas (see above) in the facility. ORAU also recommended that the basement floor drain be plugged to prevent contamination of the sanitary sewer system. The ORAU survey showed contamination up to  $1.51 \text{ E6 dpm/100 square centimeters}$  in the hot cell access port in the isotope shop area. A water sample from the liquid waste room floor contained  $1.75 \text{ E5 pCi/l}$  of Co-60. The sediment from the loading dock drain also showed low, but detectable levels of activity. No offsite contamination was detected.

On July 23, 1987, NRC issued AMS an order to clean the facility so that continued operations could be conducted safely. This order stated that decontamination was to begin no later than August 31, 1987. NRC later amended the order to require decontamination to be completed by April 1988. In November 1988 ORAU performed a survey of the facility that included analysis of samples from a sanitary sewer. Access to this sewer is prohibited by a locking manhole cover. Exposure rates of up to  $20 \text{ mR/hr}$  were measured in the manhole. Water samples from the sewer

showed Co-60 levels up to 150 pCi/l and sediment samples showed up to 640 pCi/g. No Cs-137 was detected. AMS completed cleanup to activity levels suitable for continued operation in 1989. Unrestricted release criteria were not used. The holdup tank room remains sealed and cleanup of this room will be evaluated during the license renewal in December 1994.

### 3. Radioactive Wastes

The contaminated material at the AMS facility consists of equipment and concrete contaminated with Co-60. There is also some Co-60 contaminated sludge in sewer piping. The concrete and equipment contain a wide range of activity levels with relatively low exposure rates up to 2000 R/hr in the holdup tank room. Activity levels for the contaminated sludge are relatively low with exposure rates up to 20 mR/hr. In addition Co-60 pellets, used to manufacture sealed sources, may be present. The licensee is not currently using Cs-137, and the bulk of this isotope is in the form of sealed sources that were returned from customers. These sources are stored in a sealed source storage vault in the isotope shop.

### 4. Description of Radiologic Hazard

The principal hazards associated with the AMS facility are direct exposure, inhalation, ingestion, intrusion, and ground water contamination. No immediate threat to the public health and safety exists. Direct exposure has been significantly reduced by the licensee's previous cleanup activities. Access to the high exposure rates and contamination in the holdup tank room is prohibited by a concrete block wall. Sufficient shielding exists to reduce exposure rates to less than 30 mR/hr outside the holdup tank room. Inhalation and ingestion of radioactive material is minimized by high efficiency particulate air filter (HEPA) filtered ventilation systems and by protection of the hot cell and sealed rooms. Intrusion into the facility is unlikely because the facility is protected as a restricted area. Offsite ground water samples show Co-60 levels at or just above background.

5. Financial Assurance/Viable Responsible Organization

In 1990 AMS provided a decommissioning funding plan and financial assurance statement to NRC. NRC staff estimated that decommissioning funding needed will exceed the amount provided by AMS. Currently NRC Region III is evaluating what steps will need to be taken to address this issue.

6. Status of Decommissioning Activities

As required by the NRC order, AMS has completed the cleanup to allow the facility to continue operations. The disposition of the holdup tank room will be addressed during the license renewal in November 1994. AMS plans to continue operations and has no current plans to decommission the entire facility.

7. Other Involved Parties

Currently, no other parties are involved in the decommissioning of this facility.

8. NRC/Licensee Actions and Timing

No decommissioning actions are required until the license is renewed in 1994. NRC Region III is evaluating options for addressing the financial assurance issue (see item 5 above). Upon NRC review and approval of an acceptable decommissioning funding plan, AMS will be removed from the SDMP list.

## Allied Signal Aerospace - Bendix Division

### 1. Site Identification

Allied Signal Aerospace - Bendix Division  
Teterboro, NJ

License No.: STB-424  
Docket No.: 040-00772  
License Status: Expired  
Project Manager: J. Kinneman, Region I  
LLWM Monitor: R. Abu-Eid

### 2. Site and Operations

In the 1940s, the Bendix Corporation (now Allied Signal) built and operated a magnesium foundry for the Navy, producing magnesium, magnesium-thorium, and aluminum castings. In 1961, the Navy discontinued its involvement with the foundry; however, Bendix continued operations of the foundry on a limited basis until 1968 when operations ceased. The foundry buildings were closed, cleaned out, and converted for office space in 1969.

Use of thorium may have begun at the Teterboro site as early as 1941. However, Bendix representatives have stated that before 1958, only limited thorium-magnesium technology existed; therefore, use of large amounts of thorium was unlikely until 1958. Atomic Energy Commission (AEC) licenses were issued to Bendix Corporation during the 1958 to 1973 period for the possession of up to 10,000 pounds of 40-percent thorium-magnesium hardener for the production of up to 4-percent thorium-magnesium alloy. The process consisted of 40-percent thorium alloy being received at the foundry in the form of small metal pellets and being added to the magnesium to produce standard magnesium-thorium alloys containing 3.3-percent thorium.

The most recent source material license for which records can be found expired in 1973; although there is some indication another thorium license may have been active until 1975.



In the late 1970s, Bendix sold 23 acres of the site to Metpath, Incorporated, and 7.5 acres of the site to Sumitomo Machinery Corporation.

In January 1988 during a survey of the Teterboro area, the U.S. Department of Energy (DOE) identified several drums of radioactive material along the outside of the fenceline along the drainage ditch of the property now belonging to Metpath. DOE analysis indicated that the drums contained natural thorium. Radioactive material also was identified on the former Bendix property now owned by Sumitomo. Representatives of Metpath and Sumitomo indicated that they had no knowledge of the contamination until the DOE survey.

The drainage ditch is an open ditch running along the western property line of all three properties. The ditch is 6 feet below the existing site elevations and 8 feet wide. The water in the ditch eventually empties into Berry's Creek, a tributary of the Hackensack River. Water levels in the ditch have been as little as 6 inches and as much as 4 or 5 feet.

The water table is at a very shallow depth (i.e., 2 to 5 feet) across the site. Local ground water flow is estimated to be toward the boundary drainage channels found on the east and west sides of the plant.

### 3. Radioactive Wastes

Prior to remediation partially buried 55-gallon drums were located on the Metpath property outside the existing fenceline. About 15 to 20 drums were visible, beginning about 80 feet south of the current Bendix property and extending 100 feet along the bank of the western drainage channel from the top of the bank down to the waterline. Some of the drums had deteriorated, exposing material that had a physical consistency ranging from concrete-like to wet and crumbly.

After the DOE survey, NRC began an investigation in March 1988. Samples taken from four of the drums contained as much as 480 pCi/g of thorium. Soil samples taken from the drainage channel along the Metpath and Sumitomo properties had thorium levels of 0.7 to 25.4 pCi/g. The normal environmental concentrations of thorium in soil typically are in the range of 0.2

to 1.3 pCi/g. These data showed that two of the four drums sampled exceeded the concentration of thorium that is exempted from licensing by 10 CFR 40.13(a).

Radiation levels along the inside of the Metpath fenceline were at background (4 to 6  $\mu\text{R/hr}$  for this area). Radiation levels along the outside of the fence were also at background, except in the location of the drums where the radiation levels were 40 to 60  $\mu\text{R/hr}$ . Radiation levels near the waterline ranged from 4 to 12  $\mu\text{R/hr}$ , except in the location of the exposed drums along the waterline where contact radiation levels ranged from 40 to 800  $\mu\text{R/hr}$ . Radiation levels at 1 meter above ground at the water's edge ranged from 4 to 80  $\mu\text{R/hr}$ .

On the basis of the surveys, it was considered likely that the source of the contamination was the thorium used in earlier site activities and the source of the radiation levels along the bank is the drums.

DOE also surveyed the Sumitomo property. Soil samples taken from the property indicated radium-226 (Ra-226) contamination. No thorium was noted in these samples. The sample west of the building contained 315 pCi/g of Ra-226, and the sample from the northeast corner contained 2500 pCi/g. Environmental concentrations of Ra-226 in soil typically are in the range of 0.5 to 2.0 pCi/g. This material is regulated by the State of New Jersey.

The survey of the Sumitomo property identified a 25-by-30-foot area in the northeast corner with radiation levels ranging from 14 to 100  $\mu\text{R/hr}$ . One spot had a reading of 2000  $\mu\text{R/hr}$ . Several discrete spots were noted on the west and south sides of the Sumitomo building, with levels of 20 to 30  $\mu\text{R/hr}$ , with one spot of 2 inches in diameter having a level of 3000  $\mu\text{R/hr}$ . Surveys along the drainage ditch had levels of 20 to 30  $\mu\text{R/hr}$ . All other areas were background.

#### 4. Description of Radiologic Hazard

There was no immediate threat. Fencing prevented the material in the drums from being accessible to persons working on the property or to the general

public. Surveys by NRC and by the State of New Jersey indicated that the drum material did not appear to be moving, even though it is near the drainage ditch. To minimize the threat, Bendix stabilized the area where the drums were located, while a complete characterization of the site is performed.

The drum area was stabilized in May 1990. The remaining contamination consisted of soil contamination at isolated spots on site, which are fenced, thus minimizing the hazard.

5. Financial Assurance/Viable Responsible Organization

The financial assurance requirements of the decommissioning rule do not apply since Allied Signal is not a licensee. NRC Region I considered whether to require Allied Signal to become licensed and decided it was not necessary.

With regard to viability of a responsible organization, Allied Signal entered into an agreement with Metpath and Sumitomo by Memorandum of Understanding, dated October 24, 1988, by which Allied Signal took the lead in characterization and stabilization activities regarding radioactive material on all of the company's properties at Teterboro, including providing funding, and determining the necessary remedial actions on the properties.

Allied Signal is the parent company of Allied Signal Aerospace, Bendix Division. Bendix currently holds NRC License No. 29-15797-01, which authorizes the possession of a Lixiscope containing iodine-125.

6. Status of Decommissioning Activities

The NRC approved a stabilization plan for the drums on March 23, 1989. The stabilization plan consisted of: determining the number of drums, delineating the stabilization area, obtaining a stream encroachment permit from the New Jersey Department of Environmental Protection, erecting a coffer dam around the drums, and placing a synthetic cover over the entire

closure. The stabilization plan was carried out in a manner to facilitate the remediation of the area at a future date. The plan was submitted to the State of New Jersey, approved by the State and site stabilization was completed in May 1990.

The NRC approved the site characterization plan on September 9, 1989. The site characterization plan also was submitted to the State of New Jersey. Site characterization measurements were completed in June 1990, and the results were submitted to the NRC in September 1990. A remediation plan was submitted in October 1990. The plan was approved and implemented in early December 1990.

NRC Region I observed portions of the remediation work. Contaminated material was packaged and transported to Envirocare, Inc., in Clive, Utah, for storage and ultimate disposal. Allied submitted data to demonstrate that the area meets criteria for unrestricted use. Sumitomo, acting separately, submitted survey data and a request for release of their property. NRC Region I recommended that the site be released for unrestricted use.

#### 7. Other Interested Parties

The following parties were, or will be, involved:

- a. The New Jersey Department of Environmental Protection, to provide a permit for a stream encroachment as part of the stabilization plan.
- b. The State of New Jersey for review and approval of the site characterization measurements. The state is responsible for regulating the radium contamination on the site.
- c. Envirocare, Inc. of Utah for storage and ultimate disposal of waste.

Thus, cleanup and remedial action were completed. A letter to inform that no further cleanup is needed and decommissioning of the site has been complete will be sent on February 19, 1992.

8. NRC/Licensee Actions and Timing

Decommissioning of the site was completed on February 19, 1992. The site will be released for unrestricted use. In a letter dated February 27, 1992, NRC informed Allied Signal that no further decontamination is necessary.



## Aluminum Company of America

### 1. Site Identification

Aluminum Company of America

Cleveland, OH

License No.: AEC Licensed C-5023

Docket No.: 040-00501

License Status: Expired 2/28/61

Project Manager: A. Huffert

### 2. Site and Operations

The Aluminum Company of America (ALCOA) Cleveland Works is a large, multiple function aluminum refining, casting, and finishing facility at 2210 Harvard Avenue in the villages of Newburgh Heights and Cuyahoga Heights, which are suburbs of Cleveland, Ohio. The permanent mold castings facility division area is located at the southeast corner of the Cleveland Works, comprising some 14 acres. This area of the site is currently idle and is being prepared for possible sale or reconstruction.

According to ALCOA personnel, thorium was used at the Cleveland Works Plant since 1900 by American Magnesium Company (AMC), which was a wholly-owned subsidiary of ALCOA. There is little information on the quantities and forms of thorium used at this site prior to 1954.

After 1954, ALCOA obtained an Atomic Energy Commission (AEC) license for possession and use of 1600 pounds of refined thorium for experimental purposes and the production of magnesium-thorium alloys at Cleveland Works. AEC licensing records indicate that thorium was received in both powder and pellet forms, processed to make roller rings out of HM21XA ingot (a magnesium-thorium alloy), and then shipped to the Bendix Corporation in Kansas City, Kansas. Prior to the expiration of the license on February 28, 1961, all excess thorium was shipped back to Dow

Chemical Company, the supplier. However, AEC licensing records also indicate that thorium wastes may have been buried in accordance with 10 CFR 20.304.

The former AEC licensee does not intend to reactivate this program. On January 12, 1981, the Nuclear Regulatory Commission (NRC) received a Certificate of Disposition of Materials (NRC Form 314) dated January 8, 1981, which certified disposal of all licensed material. Limited radiological surveys were performed at the site by NRC in 1980, by Oak Ridge Associated Universities (ORAU) in 1985, by NUS Corporation in 1989, and by Remcor Corporation in 1990. Survey results reported by the latter two firms working for ALCOA showed thorium-232 contamination in several locations of the facility. However, these radiological surveys were not extensive enough to fully characterize the facility.

3. Radioactive Wastes

Approximately 1450 cubic feet of soil contaminated with greater than 10 pCi/g thorium was shipped to a licensed facility in December 1991. The contaminated soil was located in a 100 ft x 40 ft area in the southeast corner of the property.

4. Description of Radiologic Hazard

This site poses no immediate threat to the public as it is an industrial site with controlled access.

5. Financial Assurance/Viable Responsible Organization

ALCOA owns the site and is responsible for financial assurance and remediation.

6. Status of Decommissioning Activities

NRC reviewed and approved the thorium remediation plan on September 6, 1991. Decontamination was performed between September 1991

and October 1991. ALCOA is waiting the outcome of the confirmatory survey performed in November 1991 by ORAU prior to disposing of the contaminated soil. If the confirmatory survey does not identify additional contaminated areas, a confirmatory survey of the contaminated soil storage area will be performed.

7. Other Involved Parties

No parties other than ALCOA and NRC are involved in the decontamination work at this time.

8. NRC/Licensee Actions and Timing

- ORAU to submit draft confirmatory survey report for majority of site area May 1992
- NRC to complete review of ALCOA's final survey report May 1992
- NRC to complete review of ORAU draft confirmatory survey report for majority of site area May 1992
- NRC, Cuyahoga County Board of Health, and ALCOA to determine if the ALCOA site contains radwaste in burial area June 1992
- ORAU to complete confirmatory survey by assessing soil storage area, Building 65 ductwork, and burial area June 1992
- NRC to review confirmatory survey data on soil storage area and Building 65 ductwork June 1992
- Release site for unrestricted use (assuming no burial site exists) June 1992

Amax

1. Site Identification

Amax, Inc.

Washington Bottom, Wood County, WV

License No.: SNM-1418

Docket No.: 040-08820

License Status: Active

Project Manager: A. T. Clark, IMNS/NMSS

LLWM Monitor: R. Abu-Eid

2. Site and Operations

The site is located in Washington Bottoms, Wood County, West Virginia, on the east side of the Ohio River. The engineered disposal cell containing the thorium and uranium occupies 15.16 acres and is surrounded by a 6-foot high security fence. Four ground water monitoring wells have been monitored semiannually since 1985.

3. Radioactive Wastes

At this site zirconium ores containing low concentrations of uranium and thorium were processed from 1957 to 1974, to produce zirconium metal, primarily for the federal government. Natural thorium and its decay products are the principal radionuclides; the maximum concentration in soil is about 1.6 wt. percent thorium.

4. Description of Radiologic Hazard

This site poses no immediate threat to the public. The waste contains only low concentrations of natural thorium and uranium and is confined in an engineered cell.

5. Financial Assurance/Viable Responsible Organization

The site is owned by Amax, Inc. Well monitoring is performed by the State of West Virginia. Although, Amax has been responsible for site-related activities to date, this site will be transferred to the U.S. Department of Energy (DOE) as discussed below.

6. Status of Decommissioning Activities

The contaminated soil has been retained in an engineered disposal cell since December 1982. Well monitoring since then shows no signs of leakage of radionuclides.

7. Other Involved Parties

The following parties were, or will be, involved:

- a. The State of West Virginia was involved in performing well monitoring.
- b. The DOE to take title and custody of the site.

8. NRC/Licensee Actions and Timing

Amax is in the process of transferring this site to the DOE pursuant to the provisions of Title I, Subtitle D, Section 151 (c), of the Nuclear Waste Policy Act of 1982.

Nuclear Regulatory Commission (NRC) visited the site and met with DOE and Amax representatives in June 1990. After the visit, DOE decided that the existing monitoring wells on the site may not be adequate for their long-term needs. The staff met with DOE again in September 1990 to discuss DOE's concern about the wells and to formulate a procedure for turning over responsibility of the site to DOE.



In February 1990, Amax submitted a proposal for the financial arrangements they would make to support long-term maintenance of the Wood County site. After meeting and corresponding with DOE about the financial arrangements, NRC wrote Amax on June 12, 1991, setting forth NRC's conclusions with regard to adequate financial arrangements. Amax agreed to these, by letter of June 29, 1991. By letter of August 9, 1991, NRC informed DOE that all of the conditions of the Nuclear Waste Policy Act of 1982 bearing on the Parkersburg, WV site had been satisfied, and that the next step is for DOE to take title and custody of the site as required by the legislation.

In an April 9, 1992, letter to NRC, DOE stated that they remain committed to taking title and custody of the site. However, two issues remain to be resolved: 1) DOE believes that NRC should write a re-opener clause into the license termination to protect the Government if non-radiological contaminants are present in concentrations sufficient to require further remedial action; and 2) DOE believes the financial arrangements, proposed by NRC, for AMAX to pay for site monitoring are less than previously estimated by DOE. A meeting between NRC and DOE, to initiate discussions on these issues, is scheduled for May 1, 1992.

Department of Army, Aberdeen Proving Ground

1. Site Identification

Department of the Army  
Combat Systems Test Activity  
Aberdeen Proving Ground, MD  
License No.: SMB-141  
Docket No.: 040-06354  
License Status: Active  
Project Manager: M. Roberts, Region I  
LLWM Monitor: R. Abu-Eid

2. Site and Operations

The U.S. Army Aberdeen Proving Ground (APG) is an active Department of Defense test facility. One of the main functions performed at APG is to plan and conduct development tests, initial production tests, and other tests of ammunition for the various weapons systems within the Army inventory.

APG is located in southeastern Harford County, Maryland, about 30 miles northeast of Baltimore, as two peninsulas near the head of the Chesapeake Bay. APG was designated as a permanent military post in 1919, but ordinance was probably tested at this area earlier. APG consists of two administratively controlled areas, the Aberdeen Area and the Edgewood Area. The Aberdeen Area comprises approximately 17,000 acres and is bordered on the north by Swan Creek and Chesapeake Bay, on the east by Chesapeake Bay, and on the south - southwest by the Bush River. Some 80 to 85 percent of the Aberdeen Area is composed of ballistic test ranges, impact areas, vehicle test tracks, and other test facilities. Many of the test facilities within the Aberdeen Area are operated by the Combat Systems Test Activity (CSTA). The Edgewood Area is not involved in this matter.

The topography of the Aberdeen Area is typified by gently rolling, low-lying terrain of the coastal plain consisting of open water, wetlands, marshlands, and woodlands. Elevations range from sea level to about 70 feet above main sea level.

Ground water systems occurring within Harford County are divided into several generalized hydrogeologic units. The Talbot Formation and the Potomac Group underlie the Aberdeen Area and together represent the zone of greatest water productivity. These systems consist of series of permeable zones of sand and gravel, more or less isolated by confining layers of silt and clay. Both the area extent and thickness of these units are variable. They may act separately in one area and as a single aquifer system in another. The uppermost water producing zone usually occurs at depths of less than 50 feet below ground surface. Depth to ground water in the Area varies from surface exposure to perhaps 6 meters. The USGS has begun a major investigative effort to improve the knowledge of the status and structure of the geology and ground water.

The Aberdeen Area is underlaid by a thick series of ancient coastal plain sediments. A veneer of recent-age silts and clays occurs in the stream valleys and outwash plains. The soils have developed through deposition rather than weathering of bedrock. A typical soil profile consists of a dark brown silt loam surface layer about seven inches thick, followed by a subsoil about 27 inches thick and composed of silty clay with many prominent yellowish-brown mottles. The subsoil layer is very sticky and plastic when wet. One of the characteristic features of local soil profiles is the presence of a loose and friable sand at a depth of 30 to 40 inches.

The Aberdeen Area is adjacent to the towns of Aberdeen and Perryman, and within a few miles of the towns of Edgewood and Havre de Grace. Baltimore is about 30 miles to the southwest. The Bush River shoreline west of the Aberdeen Area is used extensively for summer homes and recreational activities. The waters surrounding the Aberdeen Area inside a line drawn from Carroll Island to Pooles Island to Spesutie Island are restricted and not available to fishing and boating during periods of active testing. The rest of Chesapeake Bay is available at all times for commercial

fishing, sport fishing, and other recreational activities. The land surrounding the Aberdeen Area is used primarily for agriculture and manufacturing although home construction is becoming increasingly important especially in the Perryman area. Municipal water for the town of Aberdeen is obtained from wells located on the Aberdeen Area of APG near the northernmost boundary.

Testing of munitions containing depleted uranium (DU) has been conducted at various ranges on APG since the 1950s under NRC (then AEC) license. Testing of DU penetrators by CSTA (then called the Materials Test Directorate) was begun in the early 1970s at what is now the Outdoor Testing Range and at the Ford's Farm Range. The facility at Ford's Farm originally entailed testing penetrators against "hard" targets in the open air. An enclosure was constructed at Ford's Farm in the late 1970s to contain the aerosolization of the penetrator which occurs upon impact with a hard target and the impact area for previous testing was decontaminated. An additional enclosure for DU testing was constructed in late 1981 at the Bomb Throwing Device (BTD) Area and testing at Ford's Farm decreased. A new enclosed facility for DU testing was completed in 1991 at Ford's Farm. The old enclosure at Ford's Farm was rebuilt to accommodate target disassembly operations. Based on effluent monitoring, testing in enclosed ranges does not contribute significant uranium contamination to the environment. Used armor plate contaminated with DU from testing is currently stored outdoors on a concrete pad, in a controlled area. However, CSTA is reviewing the need for covered storage for the contaminated armor and is looking into building specifications and costs. An armor reclamation facility at the BTD Area began operation in 1990.

Currently penetrators are test-fired on the Outdoor Testing Range for accuracy and performance at "soft" targets positioned vertically and extending about 10 meters above the ground. The penetrators do not fragment as they pass through the cloth or plywood targets. Eventually the penetrators impact with the ground, skip along the surface, and finally stop on the surface or burrow into the ground. The Chesapeake Bay is about 500 meters from the edge of the impact area. In the past, penetrators were not retrieved on a routine basis due to the presence of unexploded ordinance in the impact area which is about 5 miles long by 2 miles wide.



Two sand filled catch boxes were constructed behind the targets downrange in the fall and winter of 1989-1990 to expedite the trapping and recovery of expended penetrators and limit the amount of DU added to the environment. Each box consists of sand as a stop, surrounded on both sides and the rear by a wood frame and earth berms.

3. Radioactive Wastes

An area approximately 5 miles by 2 miles in the Outdoor Testing Range is contaminated with approximately 82,000 kilograms of fired DU rounds. The distribution of rounds is not uniform throughout the area. The Outdoor Testing Range is also contaminated with a large amount of unexploded ordinance.

4. Description of Radiologic Hazard

There is no immediate threat from this site. Access to the site is controlled by guarded gates and there are additional controls on access to the various restricted areas. An Environmental Radiological Monitoring (ERM) Plan based on analysis of some of the pathways which the radio-nuclides of interest would travel through the environment has been performed at the Outdoor Testing Range since 1980. The area where spent DU penetrators are most likely to be found is drained primarily by Mosquito Creek to the north and by Delph Creek to the south. Since 1979 samples of soil, water, vegetation, and sediment have been collected quarterly at Mosquito Creek and Delph Creek sampling points. The results of this monitoring show measurable amounts of uranium in some samples, but there is insufficient data to determine if this is naturally occurring or if it is environmentally significant. The licensee states the uranium contamination is environmentally of low consequence because the rounds do not disintegrate in the environment and because of the low solubility of DU in water.

The NRC is reviewing the site closely because the licensee desires to continue testing of DU penetrators indefinitely, increasing the amount of DU in the environment. The preliminary conclusion of the NRC is that



environmental monitoring to date supports the licensee's conclusions, but is not sufficiently comprehensive to support a conclusion by NRC that current DU may be allowed to remain in the environment and that testing may continue indefinitely. An enhanced environmental monitoring program (discussed below) is being instituted by the Army to better characterize the impact of the DU testing on the environment.

5. Financial Assurance/Viable Responsible Organization

Based on the decommissioning rule, a financial assurance certification was required and a statement of intent was provided to meet this requirement. The Army has provided a decommissioning cost estimate which is under review.

The Army is a viable and visible government agency who has committed to enhanced environmental monitoring and all reasonable actions to control environmental impact and contamination.

6. Status of Decommissioning Activities

The Outdoor Testing Range is in current use and the Army plans to use it for munition testing for the foreseeable future; therefore there is currently no plan to clean the contaminated area to unrestricted use criteria. However, due to their own and NRC concerns regarding the environmental impact of increases in the amount of DU remaining in the Outdoor Testing Area, the Army has taken the following actions:

1. Annual "recovery operations" have been performed to retrieve spent DU munitions from the Outdoor Testing Range. Since 1989, more than 14,000 kg of DU has been recovered, of which more than 12,000 kg has been recycled. The unexploded ordinance at the range presents personnel hazards during this activity.
2. In 1989 and 1990, two "Catch Boxes" were constructed in the Outdoor Testing Area. These are 40 feet long by 40 feet wide by 30 feet high structures filled with sand. All DU munitions are fired at these

catch boxes. The Army expects that more than half of the penetrators will impact in the sand, making recovery of the rounds safer, and reducing the amount of DU added to the environment.

3. In 1989 Battelle Pacific Northwest Laboratories was contracted to evaluate the then current sampling procedures and results. Their evaluation was submitted to the Army in October 1989 and used to revise the ERM plan.
4. A study was begun during 1989 by Los Alamos National Laboratory to determine the environmental effects of depleted uranium munitions in the outdoor firing ranges at Aberdeen and Yuma Proving Grounds. The Phase I Report of this study was issued in June 1990. Additional studies are in progress.
5. Based on the results of the studies described in Items 3 and 4, the Army provided an extensive revision of their Environmental Radiation Monitoring (ERM) Plan with the renewal application submitted to the NRC in December 1990. The ERM plan is very complex, so it has been separated from the renewal for separate review. However, preliminary review of the plan indicates it is much improved over the current ERM. Therefore, the licensee will be required to implement the plan in 1991, pending additional review and request for modification by NRC.

As noted above, no site cleanup is planned at this time. At this time, no significant environmental migration of DU has been found, although additional characterization is under way. Due to the large area involved and the large amount of non-radioactive unexploded ordinance, it will be very difficult to decontaminate and release the Outdoor Testing Range for unrestricted use. The current NRC objective is to determine if the environmental impact of the continued firing of DU at this location is acceptable.

7. Other Involved Parties

Department of the Army is the only involved party.

8. NRC/Licensee Actions and Timing

A. NRC actions consist of the following:

- Complete review of the renewal application submitted by the licensee and issue the renewed license, including a requirement to implement revised ERM June 1992
- Complete review of the revised Environmental Monitoring Program and request any necessary modification from licensee September 1992
- Receive report of licensee's sampling and environmental data pursuant to revised plan and other studies December 1993
- If termination of use and cleanup is not necessary remove site from SDMP. If termination is needed meet with licensee and develop a schedule for termination and cleanup May 1994

B. Potential problems inhibiting site cleanup:

If evaluation of environmental data indicates that decontamination is necessary and termination of use is required, decontamination of the site will be difficult because of the large area and presence of nonradioactive unexploded ordinance and other hazards.

Babcock and Wilcox, Apollo, PA

1. Site Identification

Babcock & Wilcox, Pennsylvania Nuclear Service Operations  
Apollo, PA

License No.: SNM-145  
Docket No.: 070-00135  
License Status: Current renewal  
Project Manager: K. McDaniel, NMSS/IMNS  
LLWM Monitor: J. Shepherd

2. Site and Operations

The 5-acre site is located in a mixed commercial/residential area next to the Kiskiminetas River in the center of Apollo Borough, which is in western Pennsylvania about 30 miles northeast of Pittsburgh. The plant is contiguous to an inactive metal fabrication plant operated by Metal Services.

The site comprises a former uranium fuel processing and fabrication plant. There is some residual enriched uranium (approximately 3 percent uranium-235 (U-235) enrichment) contamination in certain parts of the plant from previous operations. There also is uranium contamination in soil around the plant, the adjacent metal fabrication plant, four sewers, and the Kiskiminetas River bank. Fuel activities were discontinued and partial decontamination began in 1983.

In recent years, the plant has housed radioanalytical laboratories, principally for measurement of contamination in soil from the Apollo and nearby Parks Township sites. Babcock & Wilcox (B&W) received on March 18, 1991, a license amendment to its Parks Township facility license to permit the transfer of the soil analytical laboratory from its Apollo facility to Parks Township.



Nuclear fuel manufacturing operations commenced in the main building in 1957 and were terminated in 1983. The primary operation was the chemical conversion of both low-enriched uranium (LEU) and high-enriched uranium (HEU) hexafluoride gas into uranium dioxide powder. HEU processing began in 1958 on the first floor of the main building. In 1963 this operation was relocated to the second floor and continued until it was terminated in 1978.

Small scale LEU production also began on the first floor in 1958. These facilities were moved to the second floor in 1960. A second small scale production line was established on the second floor later in 1960 and discontinued in 1962. The original small scale production line was replaced by a large scale, continuous production line in 1963. This line was terminated in early 1983.

The laundry building was constructed in 1959 and began operations in late 1960. Initial activities consisted of decontaminating protective apparel for both B&W and outside customers including the government. In March 1965 an amendment to the laundry facility license was issued to allow decontaminating submarine control rod drive mechanisms for the United States Navy. These activities continued until they were terminated in February 1984.

The main B&W building situated on B&W property is on the east side of the site. It consists of approximately one acre of roofed area bounded by the offsite area on the north, west, and south, and by the parking lot on the east. The main building is a two story structure that previously contained uranium processing and manufacturing facilities and currently houses associated building services.

The parking lot, an approximately 2-1/2 acre L-shaped area, is situated on the south and east portions of the Apollo site. Approximately one acre of the total 2-1/2 acres is owned by B&W, one acre is leased by B&W, and the remaining 1/2 acre is offsite. The parking lot is bounded by the



Kiskiminetas River on the west, Warren Avenue on the east, private property on the south, and the offsite area occupied by the neighboring industrial facility on the north. The laundry building, the small block building foundations, and several utility services are located in the parking lot.

The offsite area, which is not owned by B&W, is on the west and north sides of the site. It consists of approximately three acres of land bounded by the Kiskiminetas River on the west, B&W property on the east, the parking lot on the south, and private property on the north. The neighboring main building, office building, south bay, paint shed, breezeway, and alcove are located in the offsite area. This area also contains the north, middle, and south sewer outfalls, several utility services, and a portion of the riverbank.

### 3. Radioactive Wastes

There is residual uranium contamination in the plant from previous operations. Uranium is considered to be of low concentration, and solubility. There is also uranium contamination in soil around the plant, the adjacent metal fabrication plant, sewer lines under the site, and the Kiskiminetas River bank at the sewer outlets to the river.

B&W estimates that the interior of the main building is contaminated to a concentration between 400 and 1500 pCi/g, and about 750,000 cubic feet of soil are contaminated at a concentration between 30 and 2000 pCi/g and an additional 10,000 cubic feet greater than 2000 pCi/g.

There is also some technetium-99 (Tc) from processing contaminated hexafluoride gas. Site characterization also shows barium, beryllium, lead, and trichloroethylene exceeding ground water maximum contaminant levels by factors of 10 to 100.

Contamination of the river bank to the west of the site, and of four sewer lines running under the site have been identified. Concentrations are similar to those given in the preceding paragraphs.

4. Description of Radiologic Hazard

The facility is controlled by B&W. This site poses no immediate threat to the public. The only substantial contamination at present is low-solubility uranium in soil. The peak concentrations reported are 1200 pCi/g in soil in the parking lot and 4200 pCi/g in offsite soil. The median value for these concentrations is less than 200 pCi/g. All accessible materials known to be contaminated in excess of 2000 pCi/g were removed from the site prior to December 31, 1991.

5. Financial Assurance/Viable Responsible Organization

The site is owned and all currently licensed activities are conducted by B&W. The site was previously owned by ARCO and NUMEC. B&W is willing and able to undertake necessary cleanup activities; the parent company has guaranteed \$750,000. An Act of Congress granted \$30 million to aid in the cleanup; B&W has spent about \$20 million of B&W funds so far.

6. Status of Decommissioning Activities

B&W has completed the site characterization and submitted a formal decontamination plan; they have made significant progress decontaminating the site. B&W proceeded at an accelerated pace, particularly through the last quarter of 1991, before the increase in burial costs that occurred on January 1, 1992. To that end, B&W has successfully removed all accessible radioactive material contaminated to  $>2000 \text{ pCi/g}$  (  $10,400 \text{ ft}^3$  ) to the Barnwell disposal facility in South Carolina. The remaining tasks are to demolish and remove the main building, and to dispose of large volumes of slightly contaminated soil.

B&W has executed a contract with Envirocare for this disposal. However, Envirocare must have precise procedures to accept the Apollo waste because of SNM limits (see item 8B for a discussion of this).

B&W's preparatory activities, done under existing Nuclear Regulatory Commission (NRC) License No. SNM-145, have been quite extensive and have

required the staff's approval of several unanticipated license amendments. It was requested by B&W that issuance of these amendments be given top priority over review of the decommissioning plan. As a result, our schedule for review of the decommissioning plan has been extended by three months.

The licensee's schedule for decommissioning has also been recently delayed because the disposal site, operated by Envirocare at Clive, Utah, is not currently authorized by the State of Utah to accept more than 350 g of U-235 at one time. This would limit Envirocare to receiving only one or two railcars of contaminated B&W soil at a time. The availability of the Envirocare disposal site is essential to B&W's decommissioning schedule, and, pending confirmation of this availability, B&W has withheld declaring formally that it is seeking license termination. Envirocare is currently taking actions to resolve the remaining open issues.

B&W intends to essentially complete decommissioning in 1992, with a goal of terminating the license and releasing the site for unrestricted use in the first half of 1993.

#### 7. Other Involved Parties

There is interest in this project by Congressman John Murtha, who has requested weekly status reports. Apollo Councilmember Cynthia Virostek and the Government Accountability Project have requested NRC to perform an Environmental Impact Statement prior to any D&D activities, and to become parties to any NRC-B&W meetings. The staff met with B&W in an open meeting on January 14, 1992, at the White Flint building, to discuss the status of decommissioning. Representatives from Congressman John Murtha's office and the State of Pennsylvania attended. As stated in Section 5, DOE has granted \$30 million to support the site cleanup.

## 8. NRC/Licensee Actions and Timing

### A. Action/Milestones

The staff intends to aggressively proceed with the review of the decommissioning plan. The staff has had to approve unscheduled license amendments to support the ongoing B&W decontamination work. As a result of this additional licensing effort, the original schedule to complete the review of the decommissioning plan was moved back three months. The staff met with B&W on January 14, 1992, to discuss the status of decommissioning efforts and our revised review schedule. B&W indicated that they were satisfied with our approach and schedule. The current plan is for completion of plan review by May 1992.

### B. Problems

As discussed in Section 6, final decommissioning potentially could be delayed because Envirocare is not licensed to accept more than 350 g of U-235 at one time. This limits Envirocare to receiving only one or two railcars of soil at a time. Procedures are being developed to accommodate this.

Babcock and Wilcox, Parks Township, PA

1. Site Identification

Babcock & Wilcox, Pennsylvania Nuclear Service Operations  
Parks Township, PA

License No.: SNM-414  
Docket No.: 070-00364  
License Status: Active, current  
Project Manager: K. McDaniel, NMSS/IMNS  
LLWM Monitor: J. Shepherd

2. Site and Operations

The 114-acre site is located in a rural area across the highway from the Kiskiminetas River in Parks Township, which is in western Pennsylvania about 35 miles northeast of Pittsburgh.

There are three principal buildings on the site, formerly used for plutonium fuel fabrication, highly-enriched uranium fuel preparation, and zirconium/hafnium bar production. There is some residual plutonium contamination in certain parts of the plutonium plant, and residual high-enriched uranium in the uranium plant. There are uranium and thorium wastes (from Apollo) in identified trenches in a burial ground on the site. As a result of exhumation of the trenches in the mid-1960s, surface soil became contaminated. Surface soil remediation was completed and verified by the NRC in 1991. Fuel activities were discontinued and partial decontamination began in 1980.

In recent years, the plutonium and hafnium plants have been used for decontamination and refurbishment of nuclear reactor components and equipment. Previously, the AEC/NRC-licensed activities consisted mainly of plutonium fuel processing in Building A (1960-80), radionuclide laboratory activities in Building B (1960-present), and high-enriched



uranium fuel processing in Building C (1972-78). In addition, starting in 1960, Nuclear Materials and Equipment Corporation (NUMEC), a predecessor of the Babcock & Wilcox Company (B&W), conducted research and development activities and fabricated mixed plutonium/uranium fuels for the nuclear power industry. From 1961 through 1970, burials of uranium contaminated waste from a sister facility located in Apollo, Pennsylvania, were made on the Parks Township site (PTS) in accordance with the regulations specified in 10 CFR 20.304. (This regulation was deleted in 1981.)

Presently, the principal NRC-licensed activities conducted in Buildings A, B, and C at PTS consist of repair, maintenance, decontamination, and testing of equipment and components contaminated with radioactive materials; low-level radioactive waste volume reduction by cutup and/or compaction; and decontamination of facilities, equipment, and site. B&W has pending an application for license renewal for continuation of these activities and received on March 18, 1991 a license amendment to permit the relocation of their soil analytical laboratory from its Apollo facility to Parks Township.

Various decontamination activities and nuclear services operations have been ongoing at PTS since the cessation of fuel processing operations. On April 14, 1989, B&W submitted its license renewal request to NRC for the continuation of the PTS nuclear service operations, and the license is currently active in timely renewal.

### 3. Radioactive Wastes

The radioactive material presently at PTS consists mainly of byproduct material contamination on/within equipment being serviced, and of uranium and plutonium contamination and radwaste remaining from previous nuclear fuel fabrication operations.

At the 20.304 burial site, contaminated surface soil was completely remediated to less than 30 pCi/g by 1991. The disposed material probably

involves kilogram quantities of uranium and thorium in a volume of a few hundred thousand cubic feet.

4. Description of Radiologic Hazard

The facility is controlled by B&W. The site poses no immediate threat to the public. Total building contamination is approximately  $4\text{E-}4$  Ci (alpha plus beta). The only substantial contamination at present is in the burial site which contains low-solubility uranium and thorium that NUMEC disposed of by burial before 1971. Ground water contaminants include trichloroethylene up to  $110\text{ }\mu\text{g/l}$  and barium up to  $1100\text{ }\mu\text{g/l}$ . At the request of the NRC, the licensee has implemented a ground water monitoring program to detect any migration of radionuclides from the burial ground. No evidence of other hazardous materials has been found by the licensee.

5. Financial Assurance/Viable Responsible Organization

The site is owned and all currently licensed activities are conducted by B&W; this license is currently active in timely renewal. The site was previously owned by ARCO and NUMEC. B&W is willing and able to undertake necessary cleanup activities. NRC has requested, but has not received, a decommissioning funding plan.

6. Status of Decommissioning Activities

B&W is continuing plutonium decontamination at the plutonium plant and does not have a formal decontamination plan. All known material contaminated to greater than  $2000\text{ pCi/g}$  was removed to Barnwell during 1991. The NRC approved a decommissioning plan in 1978, which essentially provides for financial assurance and a general outline of decommissioning actions.

B&W has no plans to decontaminate this facility because they will continue to use it for nuclear activities. B&W and the NRC are evaluating ground water data from the ground water monitoring program to determine if cleanup of the 20.304 burial site is necessary.

7. Other Involved Parties

No specific interest has been expressed in this site. However, there is local and Federal Government interest in the sister site, Apollo; there has been exchange of material between the sites.

8. NRC/Licensee Actions and Timing

NRC received from B&W in January 1990 an acceptable, revised ground water monitoring plan for the disposal area. The program became operational during 1990. NRC will evaluate the ground water monitoring data annually to determine if remedial action is necessary at the 20.304 disposal area.

BP Chemicals America, Inc.

1. Site Identification

BP Chemicals America, Inc.

Lima, OH

License No.: SUB-908

Docket No.: 040-07604

License Status: Possession Only

Project Manager: M. (Sam) Nalluswami

2. Site and Operations

The site is located at the corner of Fort Amanda Road and Adgate Road on the southwest side of the city and on the east side of the Ottawa River. The facility is an active petrochemical operation.

BP Chemicals America, Inc. (BPC), a subsidiary of British Petroleum, is authorized to possess and store depleted uranium (DU) waste incident to the decontamination of the facility and plant areas at the Lima, Ohio facility. The DU waste resulted from the manufacture and use of a chemical catalyst containing DU by Vistron Corporation, the former owner of the property. The catalyst was used in a process to produce acrylonitrile, a basic component in the manufacture of plastics. Catalyst production and use discontinued in 1971.

The site contains several contaminated areas. The DU catalyst production building was decontaminated and released for unrestricted use in December 1988. Areas that remain contaminated include the Acrylo I and Acrylo II production areas, several chemical processing buildings, associated warehouses and loading docks, the grounds around these structures, and four ponds that contain both DU and chemical wastes listed as hazardous waste under the Resource Conservation and Recovery Act (RCRA).

### 3. Radioactive Wastes

The Acrylo II complex is an operating acrylonitrile chemical production system, although the DU catalyst is no longer used. There are several contaminated components in the system. The contaminated areas include the chemical reactors, Catalyst Hoppers, B Quench Coolers, and the Waste Water Column. Of 363 swipes taken to determine removable contamination levels, only one exceeded 1000 dpm/100 cm<sup>2</sup> (1410 dpm/100 cm<sup>2</sup>). Fixed contamination measurements range from zero to 214,400 dpm/100 cm<sup>2</sup>. Exposure rate measurements range from 7 µR/hr to 71 µR/hr. Contamination extends throughout the system.

The contaminated ponds are the Celite Pond, the Deepwell Pond, the Burn Pond, and the V-1 Pond. The Celite Pond contains 86,400 cu. ft. of sludge, 172,250 cu. ft. of liquid waste, and 63,045 cu. ft. of contaminated soil. The Deepwell Pond contains 36,500 cu. ft. of sludge, 149,240 cu. ft. of liquid waste, and 121,500 cu. ft. of contaminated soil. The Burn Pond contains 332,100 cu. ft. of sludge, 44,800 cu. ft. of liquid waste, and 122,850 cu. ft. of contaminated soil. The V-1 Pond contains 197,100 cu. ft. of sludge, 172,250 cu. ft. of liquid waste, and 63,045 cu. ft. of contaminated soil. The activity of the pond sludges ranges from 20 to 500 pCi/g and the total activity of the sludge and contaminated soil ranges from 0.21 Ci to 2 Ci. The liquid waste concentrations range from 4.0 E-8 µCi/ml to 2.3 E-7 µCi/ml. The ponds contain RCRA listed hazardous wastes K011, K013, and K014. About two thousand 55-gallon drums are present with less than 35 pCi/g DU mixed in sandblast medium.

There has been no identified off-site contamination.

### 4. Description of Radiologic Hazard

The BPC facility is located in an industrial area and is fenced and controlled. There is no identified off-site contamination, including well-water contamination, and there is no evidence that the contamination is spreading. Maximum gamma exposure rates are 71 µR/hr.



In a December 18, 1991, inspection of BPC three Severity Level IV violations were identified. A Notice of Violation was issued on January 28, 1992. Two of these violations were administrative, but the other was for not posting the Acrylo I excavation area and the four ponds as "Caution Radioactive Materials" areas. The posting was completed on January 25, 1992.

The licensee submitted a dose assessment with the pond closure plan. The highest exposure rates to workers for normal closure operations were estimated to be equivalent to background. Doses to a maximally exposed individual from hypothetical accidents were estimated to be less than 2.5 mRem.

Based on the control of the site, the exposure rate data, and the concentrations of waste materials, there is no immediate threat to public health and safety.

5. Financial Assurance/Viable Responsible Organization

The licensee submitted a decommissioning funding plan with a parent guarantee for \$10,000,000. The decommissioning funding plan was reviewed by NRC staff and a deficiency letter was transmitted to BPC on May 31, 1991. To date BPC has not responded to the deficiency letter. The licensee is currently performing decontamination operations and is committed to complete decommissioning.

6. Status of Decommissioning Activities

The catalyst production building and warehouse were decontaminated and released for unrestricted use on December 22, 1988. These buildings were released based on confirmatory surveys performed by Oak Ridge Associated Universities (ORAU) in April 1988. By letter dated January 3, 1990, BPC submitted the results of an October 1989 radiological survey and assessment of the internals of its Acrylo II Unit B reactor, associated components, and downstream equipment. In this letter BPC stated that a full scale radiological assessment of the remaining contamination of the Lima facility was being conducted.

The licensee submitted a decommissioning plan for the Acrylo I and grounds areas on July 30, 1990, a decommissioning plan for the Acrylo II B-Reactor and associated components in March 1990, final decontamination plans for the Boneyard Area, Catalyst Laboratory, Soil Laydown Area, and Acrylo II Control Room Laboratory on July 29, 1991, and a mixed waste pond closure plan on August 15, 1991. The mixed waste pond closure plan was submitted in a revised form on February 28, 1992.

At the request of BPC, the NRC reviewed the Phase I plan for the mixed waste pond closure so that work could be initiated on an advanced schedule. While the Phase I work (pumping sludge and liquid waste from two ponds into another one) was covered under the current license, the NRC staff requested a Safety Analysis Report and a Health and Safety Plan for these activities. The Phase I Safety Analysis Report and Health and Safety Plan were submitted on July 10, 1991. This review was completed and a Safety Evaluation Report was prepared on December 10, 1991.

In the Phase I mixed waste pond closure approval NRC set a condition that liquid wastes would not be discharged to an EPA approved deep well injection system. The use of the deep well injection has been previously performed under the assumption that these releases could be performed as effluent releases under 10 CFR Part 20, Appendix B. In 1970 and 1971 BPC submitted to AEC staff information on their deep well injection system. The AEC staff, however, made no final determination on the acceptability of the discharges. The NRC staff considers these discharges to require a 10 CFR 20.302 disposal authorization. On February 3, 1992, the NRC staff confirmed a BPC commitment to request a 10 CFR 20.302 authorization for further use of the deep well injection system.

The licensee performed decontamination operations in the Acrylo II Reactors A and B during a preplanned maintenance shutdown. BPC submitted final survey data on the chemical reactor internals on July 15, 1991. In June 1991 ORAU, under contract to the NRC, performed a confirmatory survey and found contamination above the release limits. The Acrylo II complex went back into operation and will continue to be held under license until further cleanup is performed.

The licensee performed surveys on a large quantity of clean steel removed during the cleanup of several plant areas. The survey data were submitted to the NRC on July 30, 1991, and a formal request for release of the steel was made on August 27, 1991. These metals were surveyed by ORAU in August 1991. Several contaminated pieces were identified by ORAU and were segregated from the clean material. On October 7, 1991, the NRC staff approved the release of the steel meeting the release requirements.

On June 25, 1990, BPC requested a 10 CFR 20.302 disposal authorization for approximately 1700 drums of construction debris with DU contamination less than 35 pCi/g. No hazardous chemical materials were in these wastes. A subsequent request was made on May 7, 1991. The NRC staff subsequently informed BPC that the request would be processed with the preparation of the required environmental assessments and the associated notification procedures. BPC subsequently informed the NRC that it wished to delay processing of this request.

The NRC staff published Federal Register notices on November 4, 1991, and November 19, 1991, announcing consideration of the issuance of amendments for the decommissioning of the Acrylo I and II complexes, buildings, and grounds, and the mixed waste pond closure. These notices also offered the opportunity for affected parties to request public hearings. No requests for public hearings were made in response to the two notices.

The following activities need to be performed:

- |   |                  |
|---|------------------|
| a. Review of the mixed waste pond closure plan                    | June 30, 1992    |
| b. Request responses to the financial assurance deficiency letter | April 30, 1992   |
| c. Review the Acrylo I and grounds decommissioning plan           | October 31, 1992 |
| d. Review the Acrylo II decommissioning plan                      | January 31, 1993 |

- e. BPC to submit deep well injection system authorization April 30, 1992
- f. Review the deep well injection system authorization request July 31, 1992
- g. License termination (projected) December 31, 1995

7. Other Involved Parties

The Ohio EPA is involved in the review of the hazardous chemical aspects of the mixed waste pond closure plan. The Ohio Department of Health is also following the progress at the site, but has not taken an active role in the reviews of the decommissioning plan submittals.

8. NRC/Licensee Actions and Timing

The staff should complete its review of the revised decontamination plan for the first acrylonitrile reactor by October 1992. The staff also should begin to review the decommissioning plan for the rest of the site. Once decontaminated, confirmatory surveys will have to be performed. License termination is projected for 1995.

## Budd Company

### 1. Site Identification

The Budd Company

Philadelphia, PA

License No.: 37-05680-04

Docket No.: 030-19963

License Status: Authorized for storage and decommissioning

Project Manager: M. Roberts, Region I

LLWM Monitor: M. Harvey

### 2. Site and Operations

In 1967 the Budd Company's facility in Philadelphia, PA, where sealed iridium-192 and cobalt-60 (Co-60) sources had been manufactured in a hot cell for use in industrial radiography, was shutdown. The facility had been operating since 1956. Following shutdown, a large amount of byproduct material and equipment was removed and properly disposed. Following cleaning of the interior of the hot cell and contaminated areas outside the hot cell, all parts of the facility except the hot cell were surveyed and painted. It was thought that all radioactive contamination had been removed from the facility except surface contamination remaining in the hot cell.

Since the hot cell had not been completely decontaminated, all access openings to the cell (door, shielded window opening, master-slave ports, ventilation and exhaust ports) were sealed with 16 inch thick solid concrete block followed by a 1 inch thick finish coat of smooth mortar. In addition, structural steel barriers were added directly forward of the sealed door opening and the sealed shielded window opening to prevent accidental damage. The hot cell is an "L" shaped structure of about 200 square feet in the corner of a much larger building.



The interior of the enclosed hot cell was maintained as a restricted area until remediation began in July 1990. Access to the remainder of the facility is unrestricted. Ground water is not an issue at this site since the activity is confined to the building.

Physical surveys were conducted annually at the facility.

3. Radioactive Wastes

At the time of facility shutdown, the quantity of Co-60 in the hot cell was estimated to be less than 5 curies. Prior to the beginning of remediation, it was estimated that no more than 1 curie of Co-60 remained in the hot cell.

4. Description of Radiologic Hazard

The site never posed an immediate threat. Radioactive material was contained in the reinforced concrete hot cell which had all access ports sealed with concrete and mortar, with structural steel coverings to prevent damage. In addition, the licensee performed annual testing for leakage from the sealed hot cell. As described below, nearly all radioactive contamination has been removed from the hot cell, properly packaged, and shipped for licensed disposal. Little if any hazard remains.

5. Financial Assurance/Viable Responsible Organization

The Budd Company continues to own the facility and appears financially capable of carrying out the decommissioning activities. Budd has provided financial assurance as required by 10 CFR 30.35. The cost of decommissioning and waste disposal activities has been about \$900,000 as of February 1992. Remaining remediation costs are estimated to be \$100,000 which includes a final survey by the licensee's contractor.

## 6. Status of Decommissioning Activities

In May 1990 the licensee was informed that submission and implementation of a decommissioning plan for the hot cell was required. The licensee had been informed at the time of the previous license renewal about five years earlier that decontamination would be required at the time of this renewal. A formal decommissioning plan was submitted by the licensee in early November 1990. NRC Region I approved the initial characterization described in this plan and the characterization was carried out late in December 1990. Measurements through ports drilled in the cell walls indicated low radiation levels in the cell (a maximum of 5 millirem per hour). Samples obtained for analysis indicated no removable contamination. Based on these results a final decontamination plan was submitted and approved in April 1991.

The licensee's contractor performed the major tasks described in the decommissioning plan from July 1991 to December 1991. An overhead crane, the crane rail, ventilation ducts, two four foot deep source wells, a three foot deep stainless steel storage pit and other contaminated debris have been removed from the hot cell. One of the source wells was estimated to contain 800 mCi of Co-60 when it was removed. This necessitated use of a special disposal cask. The superficial layers of the concrete walls and floor have been mechanically removed from the interior of the cell. The concrete and some of the soil from under the source wells was also removed. Samples taken from the remaining soil show little or no migration of the contamination. All waste generated (about 1000 cu. ft.) has been removed to licensed disposal.

During the decontamination effort NRC Region I conducted inspections to assure that work was progressing safely and in accordance with the approved plan.

Fixed contamination found on the concrete floor just outside the hot cell and at several other locations in the building housing the hot cell has necessitated additional decontamination work and delayed the expected completion date. A small amount of cesium-137 contamination was also identified. The licensee is reviewing the contractor's plans for removing

this contamination and completing the final facility survey. These plans were submitted to the licensee in early March 1992.

7. Other Involved Parties

No significant third party involvement is anticipated.

8. NRC Actions Needed and Timing

A. NRC actions consist of the following:

- |   |                |
|---|----------------|
| • Require decommissioning plan as part of license renewal | Completed      |
| • Review and approve decommissioning plan                 | Completed      |
| • Inspect implementation of decommissioning plan          | Completed      |
| • Receive licensee's final survey report                  | June 1992      |
| • Perform NRC closeout survey                             | July 1992      |
| • Terminate license                                       | September 1992 |

B. Potential problems inhibiting site cleanup

None at this time.

Cabot Corporation, Boyertown, PA

1. Site Identification

Cabot Corporation

Boyertown, PA

License No.: SMB-920\*

Docket No.: 040-06940

License Status: Operating

Project Manager: K. McDaniel, NMSS/IMNS

LLWM Monitor: H. Astwood

2. Site and Operations

The 160-acre site consisting of operation buildings and several sludge storage buildings is located in a rural setting in southeastern Pennsylvania, 1.5 miles northeast of Boyertown. Cabot processes ores to extract tantalum and columbium. Natural uranium and thorium are present in the ores in sufficient concentration to require a source material license. Cabot received an NRC license for the Boyertown plant in 1963 and is still operating under that license.

3. Radioactive Wastes

When the ores are processed to extract tantalum and columbium, the left-over sludges contain natural uranium and thorium. The combined concentration of uranium and thorium in the sludges is a maximum of 2 percent by weight, but more typically a few tenths of a percent. Cabot does not consider these sludges to be waste, but plans to keep them in storage for possible future recycling. Cabot is currently applying for building permits to construct an additional sludge storage building. As of February 1992 Cabot was storing an estimated 17,918m<sup>3</sup> of sludge.

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\* All three Cabot sites are on the same License SMB-920.

Cabot is developing a process to recover uranium from the sludge, which should be in operation by 1993. After reprocessing the sludge, it will contain residual uranium and thorium and therefore be classified as waste and sent to a disposal facility.

4. Description of Radiologic Hazard

This site poses no immediate threat to the public. Most of the uranium and thorium is contained in sludges stored in concrete vaults.

5. Financial Assurance/Viable Responsible Organization

Cabot Corporation owns the site, is currently under license, and has the resources to decontaminate the site. Cabot submitted a letter of credit for \$750,000 as financial assurance for decommissioning of its three sites (Boyertown, Reading, and Revere, Pennsylvania).

6. Status of Decommissioning Activities

The latest license renewal application contains an inadequate decommissioning plan, but states the intention of removing all sludges from the site when the facility is eventually closed.

The plant is operating at present and no decontamination activities are in progress.

7. Other Involved Parties

No significant third party involvement is anticipated.

8. NRC/Licensee Actions and Timing

The staff has determined the license renewal application to be incomplete and are requesting a decommissioning funding plan as a supplement to the



application. The condition of the site will be reviewed with regard to need for interim decontamination, as part of the renewal process. NRC has notified Cabot that they are required to submit a decommissioning funding plan. A written request will be sent to Cabot in April 1992. License renewal is expected to be completed in 1992.

Cabot Corporation, Reading, PA

1. Site Identification

Cabot Corporation

Reading, PA

License No.: SMB-920\*

Docket No.: 040-06940

License Status: Decommissioning

Project Manager: K. McDaniel, NMSS/IMNS

LLWM Monitor: H. Astwood

2. Site and Operations

The 5-acre site is located in an industrial part of the city of Reading. From 1967 through 1969, Cabot used a building on the site to process tin slag, extracting columbium and tantalum. Natural uranium and thorium were present in the slag in sufficient concentrations to require a source material license. Processing stopped in 1969, but ores and slags were stored at the site for some time thereafter. Cabot has no equipment or operations of any type on this site at present. Only a large empty building remains.

3. Description of Wastes

The bulk of the waste associated with the Reading site is located down an embankment located to the rear of the site. This waste, consisting mainly of tin slag, originated from ore processing operations at the Reading site and from a contaminated sand bed on which tin slag was temporarily stored in Baltimore, Maryland. The waste from Baltimore primarily consists of sand containing fragments of tin slag. In total, approximately 546 cubic meters of slag and sand was dumped down the

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\* All three Cabot sites are on the same License SMB-920.

embankment consisting mostly of large chunks of slag weighing several tons each. The slag is a black, glass-like material with very low solubility.

Other wastes associated with the Reading site is in the form of uranium and thorium contamination found by ORAU during their July 1991 confirmatory survey. Areas of high beta and gamma activity were found inside the Processing Building and in several locations outside the building. These areas appeared in isolated spots and ranged from 13 to 78 pCi/g for total uranium and from 13 to 51 pCi/g for total thorium.

4. Description of Radiologic Hazard

This site poses no immediate threat to the public. The uranium and thorium are contained in insoluble slag. Cabot samples the ground water around the slag pile and monitors the area for erosion.

5. Financial Assurance/Viable Responsible Organization

The site was never owned by Cabot, only leased. The present owner is Hamburg Fabricators. It is believed that Cabot can and will responsibly decontaminate the site. Cabot has submitted a letter of credit for \$750,000 as financial assurance for decontamination of its three sites (Boyertown, Reading, and Revere, Pennsylvania).

6. Status of Decommissioning Activities

Cabot decontaminated the building and its parking lot areas as necessary for unrestricted release and has requested release for unrestricted use. Cabot has not planned to request release of the dump portion of the site.

All ores and slags stored on the site have been removed except from the dump portion. Contaminated soil has been removed and transported to Cabot's Boyertown site. Oak Ridge Associated Universities (ORAU) surveyed the building and parking lot in August 1991 and found some remaining contamination which Cabot is working to remove. It has no plans for decontaminating the dump portion of the site.

NRC staff suggested Cabot transfer the dump site material from the Reading site to Boyertown, in order to completely decommission the Reading site. Cabot claims to have no storage space available at Boyertown at the present time. However, when they begin recycling the sludge material in 1993, the storage buildings will be emptied and the Reading dump material can be transferred.

7. Other Involved Parties

No significant third party involvement is anticipated.

8. NRC/Licensee Actions and Timing

Staff is reviewing ORAU's confirmatory survey which they received February 1992 and should complete the review by the first week of April 1992. Preliminary information of the survey indicates there is some residual contamination still on site. Staff will inform Cabot of its position on the timely remediation of the Reading site both dump and buildings in May 1992. Cabot is expected to have a response to the request for timely remediation by the end of June 1992. It is projected that this site can be released from the license by 1993.

Cabot Corporation, Revere, PA

1. Site Identification

Cabot Corporation

Revere, PA

License No.: SMB-920\*

Docket No.: 040-06940

License Status: Decommissioning

Project Manager: K. McDaniel, NMSS/IMNS

LLWM Monitor: H. Astwood

2. Site and Operations

The site is located in eastern Pennsylvania between Philadelphia and Allentown. Cabot processed ores and slags at the site to extract tantalum and columbium. Natural uranium and thorium were present in the ores and slags in sufficient concentration to require a source material license. No source material processing has occurred at the site in several years, and Cabot does not plan any more in the future. Cabot is actively processing non-licensable materials on the site.

3. Radioactive Wastes

Trace quantities of natural thorium and uranium.

4. Description of Radiologic Hazard

This site poses no immediate threat to the public. The licensee says that the site is decontaminated.

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\* All three Cabot sites are on the same License SMB-920.



5. Financial Assurance/Viable Responsible Organization

Cabot Corporation owns the site and is currently under license. Cabot is a large company with the resources to decontaminate the site.

6. Status of Decommissioning Activities

The site has been decontaminated by the licensee. Upon Cabot's request Oak Ridge Associated Universities (ORAU) has performed a confirmatory survey from July 22 through 26, 1991 of the site for unrestricted release.

7. Other Involved Parties

No significant third party involvement is anticipated.

8. NRC/Licensee Actions and Timing

NRC's review of ORAU's confirmatory survey which they received February 1, 1992, should be completed by the first week of June 1992. Preliminary information of the survey indicates the site meets release criteria. Staff is preparing an environmental assessment and safety evaluation report both of which will be completed by September 1992. These will be enclosures to the Commission Paper for site release that will be submitted to the Commission in October 1992. Release of the site is expected by the end of 1992.

## Chemetron Corporation, Bert Avenue

### 1. Site Identification

Chemetron Corporation

Newburgh Heights, OH

License No : SUB-1357

Docket No.: 040-08724

License Status: Timely renewal

Project Manager: A. Huffert

### 2. Site and Operations

The Chemetron Bert Avenue site is a former uncontrolled landfill located in an industrial part of suburban Cleveland, a short distance from the Chemetron Harvard Avenue site. The site occupies about 7 acres and is bordered by industrial property and private residences.

Material contaminated with depleted uranium (DU) from the Harvard Avenue site was disposed at the Bert Avenue site in 1975. The Village of Newburgh Heights would like to build a storm sewer through this site.

### 3. Radioactive Wastes

Portions of the Bert Avenue site were contaminated with DU, antimony oxide slag containing natural uranium, and fly ash and fire brick containing natural uranium and thorium with daughters. Hazardous waste also may contaminate the site.

The estimated volume of radioactive contaminated material increased during excavation work at the Bert Avenue site in 1990. In 1991, more detailed site characterization studies revealed additional radioactive contaminated material. Recently, the volume of radioactive contaminated

material above 100 pCi/g has been estimated to exceed 70,000 cubic feet at this site. The licensee also estimates that there is over 1,000,000 cubic feet of radioactive contaminated material with a concentration greater than 15 pCi of uranium-238 (U-238) per gram of soil. The 15 pCi U-238 per gram of soil was selected by the licensee to define a "clean" sample, which is a lower activity concentration than the Option 2 limit of the 1981 Branch Technical Position (35 pCi total uranium per gram of soil or about 23 pCi U-238 per gram of soil).

The calculated average concentration of radioactive contaminated material at the Bert Avenue site is 207 pCi/g. In 1985 Oak Ridge Associated Universities (ORAU) reported a maximum surface concentration of 231,100 pCi (total uranium) per gram of material and a maximum subsurface concentration of 10,200 pCi (total uranium) per gram of material. Recently, the licensee reported a maximum surface concentration of 2341 pCi (U-238) per gram of material and a maximum subsurface concentration of 9130 pCi (U-238) per gram of material.

The licensee is currently evaluating further the hydrogeology of the Bert Avenue site to determine if there is existing or the potential for future ground water contamination. However, there are no known drinking water wells near the site, as the local water source is Lake Erie.

In October 1991 the Nuclear Regulatory Commission (NRC), ORAU, and the State of Ohio Department of Health (ODH) conducted radiological surveys of nearby residences to determine if there was any offsite contamination. Survey results indicate that radiation levels are consistent with natural background.

#### 4. Description of Radiologic Hazard

The critical pathway of radiation dose to a person exposed to land contaminated with DU is mainly from inhalation through the resuspension of particulates from contaminated soil. At the Bert Avenue site, soil piles are covered with tarps to minimize soil resuspension. NRC has

installed air sampling equipment to measure airborne contamination and environmental radiation dosimeters to measure radiation at the fence boundary. Airborne and direct gamma radiation measurements indicate radiation levels well below 10 CFR 20 limits for public exposure.

Radiological surveys of ground surfaces performed by NRC in 1991 indicate radiation exposure levels of less than 30  $\mu\text{R/hr}$  in restricted areas and less than 20  $\mu\text{R/hr}$  in unrestricted areas. This site is fenced off and patrolled daily.

5. Financial Assurance/Viable Responsible Organization

The site is owned by McGean-Rohco, Inc., of Cleveland, Ohio. Chemetron Corporation of Providence, Rhode Island holds the license. Chemetron had been owned by Allegheny International. Both filed for bankruptcy in February 1988. In September of 1990, Sunbeam/Oster became Chemetron's grandparent company in a buy-out of Allegheny International, lifting Chemetron out of bankruptcy. Sunbeam/Oster has provided a parent company guarantee in the amount of \$7,465,000 for decommissioning the Bert and Harvard Avenue sites.

6. Status of Decommissioning Activities

Dames and Moore has been assigned the responsibility of site manager for purposes of development and implementation of site characterization and remediation activities. Nuclear Energy Services is responsible for site radiological safety and support activities.

Phase I site characterization activities were completed by February 1991 and a licensee report entitled, "Site Characterization Report, Harvard Avenue and Bert Avenue Sites, Chemetron Corporation, Newburgh Heights, Ohio, June 28, 1991," was submitted to NRC documenting their findings. NRC, ODH, and the Ohio Environmental Protection Agency (OEPA) reviewed the licensee's report and transmitted comments to Chemetron in August 1991. As requested by NRC, Chemetron responded to these comments by October 1991.

In total, about 900 surface and subsurface samples were taken from the Bert Avenue site during Phase I site characterization activities. Further site characterization work at this site began in January 1992 after NRC, OEPA, and ODH reviewed Chemetron's Phase II Site Characterization Plan, dated January 1992. Phase II site characterization activities were completed at the Bert Avenue site in February 1992.

NRC is verifying information contained in Chemetron's site characterization reports by collecting soil samples from the Bert Avenue site and performing independent analyses at NRC's Region III Office and through an NRC contractor.

In August 1991 Chemetron submitted to NRC a site remediation plan entitled, "Remediation Plan for the Harvard Avenue and Bert Avenue Sites, August 16, 1991." Upon completion of their respective reviews in December 1991 NRC, ODH, and OEPA sent comments on the remediation plan to the licensee. Chemetron responded to the agencies' comments in February 1992.

The licensee proposed, in its August 1991 remediation plan, to bury radioactive contaminated material from both sites at a closure cell located at the Bert Avenue site. These burials would be performed under the provisions of 10 CFR 20.302. However, at the request of local citizens, Chemetron stated in October 1991 that wastes present at the Harvard Avenue site would not be disposed of at the Bert Avenue site.

On April 8, 1992, an immediately effective order modifying the license was issued requiring Chemetron to submit a final site characterization report by June 15, 1992.

NRC continues to meet with the president of Chemetron and his staff at Headquarters on a quarterly basis to discuss ongoing and future site characterization activities and site remediation. In addition, NRC meets with Chemetron staff at the NRC Region III office on a quarterly basis to discuss inspection and enforcement matters related to decontamination and decommissioning of both sites.



## 7. Other Involved Parties

ODH coordinates radioactive material safety matters in offsite areas. ODH also participates on the Mid. t Compact Commission and will identify Compact Commission requirements under the authority of the Low-Level Radioactive Policy Amendments Act that need to be met.

OEPA is responsible for ensuring the hazardous wastes requirements under the Resource Conservation and Recovery Act (RCRA) and has the authority to regulate RCRA hazardous wastes and mixed wastes. Under RCRA, OEPA has the authority to perform cleanup actions and recover costs from the principally responsible parties. OEPA is responsible for ensuring that State of Ohio solid waste requirements are defined and met and also has authority over sites that do not qualify under Superfund (Chemetron, for example).

The EPA has delegated authority under RCRA and Superfund to the State of Ohio, but can reassert authority, if necessary, to protect health and safety.

ODH and OEPA have participated in the review of Chemetron's June 1991 site characterization report, August 1991 site remediation plan, and January 1992 Phase II site characterization plan. ODH and OEPA also meet with NRC and local officials on a quarterly basis to coordinate the remediation of the Chemetron sites.

NRC, ODH, and OEPA participate in public meetings in Newburgh Heights to discuss regulatory oversight of Chemetron's plans for decontaminating and decommissioning the Bert Avenue site and to ensure that local concerns are properly addressed. Public meetings were held in January 1991 and October 1991 and the next public meeting is scheduled for spring 1992.

8. NRC/Licensee Actions and Timing

- Attend quarterly meetings with Ohio Department of Health, Ohio EPA, County Public Health, Representatives of Village, State and Federal elected officials 6/92; 9/92; and 12/92
- Attend NRC/LLWD quarterly meetings with licensee 4/92; 6/92; 9/92; and 12/92
- Attend quarterly meetings with licensee in NRC Region III 5/92; 8/92; and 11/92
- Exchange TLDs in TLD monitoring system for evaluation of hi-energy radiation at fence line 6/92; 9/92; and 12/92
- Participate in third public meeting 6/92
- Receive final site characterization report from licensee and send to OEPA and ODH for review 6/92
- Obtain NRC decision on what remediation strategies are acceptable 5/92
- Perform routine inspection (site security adherence to health and safety plan) 9/92
- Collect environmental split samples TBD
- Develop plan for ORAU independent confirmation of site characterization offsite and onsite TBD

- Develop inspection plan to audit analytical labs used by licensee TBD
- Inspect analytical labs used by licensee TBD
- Develop inspection plan to audit remediation work TBD
- Perform inspection of remediation work TBD
- Have ORAU perform confirmatory closeout survey TBD
- Release facility for unrestricted use TBD

Chemetron Corporation, Harvard Avenue

1. Site Identification

Chemetron Corporation

Newburgh Heights, OH

License No.: SUB-1357

Docket No.: 040-08724

License Status: Timely renewal

Project Manager: A. Huffert

2. Site Description

The Chemetron Corporation Harvard Avenue site is located in an industrial area of suburban Cleveland. The property required to be remediated is owned by McGean-Rohco Inc. and occupies approximately 3 acres. It is located on the west side of the McGean-Rohco property and is bordered by property owned by the Aluminum Company of America to the west of the site and a railroad line to the south of the site.

Chemetron was authorized to possess and use depleted  $UF_6$  for conversion to  $U_3O_8$  in the production of a chemical catalyst used in the plastics industry. The catalyst was produced at the Harvard Avenue site in Building 21 from 1965 to 1972. Remediation of the site was attempted with varying levels of effort since 1972.

3. Radioactive Wastes

Portions of the Harvard Avenue site were contaminated with depleted uranium (DU) during catalyst production. In 1976 Chemetron disposed of 442,690 pounds of DU and an additional 678,500 pounds of material were shipped for disposal in 1978. Building 21 was dismantled in 1984 and excavation of contaminated soil was also completed in 1984. During 1985 approximately 6,900 cubic feet of soil and building rubble was shipped

offsite. However, a radiological survey of the southern portion of the site later that year revealed additional soil contamination.

In 1989 a new contractor began remediation activities at the Harvard Avenue site and, in 1990 the estimated volume of radioactive contaminated material increased to over 50,000 cubic feet. Due to the identification of increased volumes of contaminated soil, a new site characterization plan was developed later that year.

Based on the collection and analysis of nearly 500 soil samples, approximately 75 percent of the Harvard Avenue site contains DU at concentrations greater than 35 pCi of total uranium per gram of soil. The licensee estimates that there is over 300,000 cubic feet of radioactive contaminated material with a concentration greater than 15 pCi U-238 per gram of soil. The 15 pCi U-238 per gram of soil was selected by the licensee to define a "clean" sample, which is a lower activity concentration than the Option 1 limit of the 1981 BTP (35 pCi total uranium per gram of soil or about 23 pCi U-238 per gram of soil).

The calculated average concentration of radioactive contaminated material at this site is 34 pCi of U-238 per gram of soil. In 1985 Oak Ridge Associated Universities (ORAU) reported a maximum surface concentration of 13,200 pCi (total uranium) per gram of material and a maximum subsurface concentration of 15,040 pCi (total uranium) per gram of material. Recently, the licensee reported a maximum surface concentration of 107 pCi (U-238) per gram of material and a maximum subsurface concentration of 81 pCi (U-238) per gram of material.

The licensee is currently evaluating further the hydrogeology of the Harvard Avenue site to determine if there is existing or the potential for future ground water contamination. However, there are no known drinking water wells near the site, as the local water source is Lake Erie.



4. Description of Radiologic Hazard

The critical pathway of radiation dose to a person exposed to land contaminated with DU is mainly from inhalation through the resuspension of particulates from contaminated soil. At the Harvard Avenue site, soil piles are covered with tarps to minimize soil resuspension. Airborne and direct gamma radiation measurements indicate radiation levels well below 10 CFR 20 limits for public exposure.

Radiological surveys of ground surfaces performed by the Nuclear Regulatory Commission (NRC) in 1991 indicate radiation exposure levels of less than 20  $\mu\text{R/hr}$  in restricted areas and less than 15  $\mu\text{R/hr}$  in unrestricted areas. The owner of the site, McGean-Rohco, Inc., maintains access control and the restricted area is enclosed with a fence and a locked gate.

5. Financial Assurance/Viable Responsible Organization

The site is owned by McGean-Rohco, Inc., of Cleveland, Ohio. Chemetron Corporation of Providence, Rhode Island, holds the license. Chemetron had been owned by Allegheny International. Both filed for bankruptcy in February 1988. In September of 1990 Sunbeam/Oster became Chemetron's grandparent company in a buy-out of Allegheny International, lifting Chemetron out of bankruptcy. Sunbeam/Oster has provided a parent company guarantee in the amount of \$7,465,000 for decommissioning the Bert and Harvard Avenue sites.

6. Status of Decommissioning Activities

Dames and Moore has been assigned the responsibility of site manager for purposes of development and implementation of the remediation plan and associated activities. Nuclear Energy Services is responsible for site radiological safety and support activities.

Phase I site characterization activities were completed by February 1991 and a licensee report entitled, "Site Characterization Report, Harvard Avenue and Bert Avenue Sites, Chemetron Corporation, Newburgh Heights,

Ohio, June 28, 1991," was submitted to NRC documenting their findings. NRC, Ohio Department of Health (ODH), and the Ohio Environmental Protection Agency (OEPA) reviewed the licensee's report and transmitted comments to Chemetron in August 1991. As requested by NRC, Chemetron responded to these comments by October 1991.

In total, nearly 500 surface and subsurface samples were taken from the Harvard Avenue site during Phase I site characterization activities. Further site characterization work at this site began in February 1992 after NRC, OEPA, and ODH review of Chemetron's Phase II Site Characterization Plan, dated January 1992. Phase II site characterization activities were completed at the Harvard Avenue site in March 1992.

NRC is verifying information contained in Chemetron's site characterization reports by collecting soil samples from the Harvard Avenue site and performing independent analyses at NRC's Region III office and through an NRC contractor.

In August 1991, Chemetron submitted to NRC their site remediation plan entitled, "Remediation Plan for the Harvard Avenue and Bert Avenue Sites, August 16, 1991." Upon completion of their respective reviews in December 1991 NRC, ODH, and OEPA sent comments on the remediation plan to the licensee. Chemetron responded to the agencies' comments in February 1992.

The licensee proposed, in its August 1991 remediation plan, to bury radioactive contaminated material from both sites at a closure cell located at the Bert Avenue site. These burials would be performed under the provisions of 10 CFR 20.302. However, at the request of local citizens, Chemetron stated in October 1991 that wastes present at the Harvard Avenue site would not be disposed of at the Bert Avenue site.

On April 8, 1992, an immediately effective order modifying the license was issued requiring Chemetron to submit a final site characterization report by June 15, 1992.

NRC continues to meet with the president of Chemetron and his staff at Headquarters on a quarterly basis to discuss ongoing and future site characterization activities and site remediation. In addition, NRC meets with Chemetron staff at the NRC Region III office on a quarterly basis to discuss inspection and enforcement matters related to decontamination and decommissioning of both sites.

#### 7. Other Involved Parties

ODH coordinates radioactive material safety matters in offsite areas. ODH also participates on the Midwest Compact Commission and will identify Compact Commission requirements under the authority of the Low-Level Radioactive Policy Amendments Act that need to be met.

OEPA is responsible for ensuring the hazardous wastes requirements under the Resource Conservation and Recovery Act (RCRA) and has the authority to regulate RCRA hazardous wastes and mixed wastes. Under RCRA, OEPA has the authority to perform cleanup actions and recover costs from the principally responsible parties. OEPA is responsible for ensuring that State of Ohio solid waste requirements are defined and met and also has authority over sites that do not qualify under Superfund (Chemetron, for example).

The U.S. Environmental Protection Agency (EPA) has delegated authority under RCRA and Superfund to the State of Ohio, but can reassert authority if necessary to protect health and safety.

ODH and OEPA have participated in the review of Chemetron's June 1991 site characterization report, August 1991 site remediation plan, and January 1992 Phase II site characterization plan. ODH and OEPA also meet with NRC and local officials on a quarterly basis to coordinate the remediation of the Chemetron sites.

NRC, ODH, and OEPA participate in public meetings in Newburgh Heights to discuss regulatory oversight of Chemetron's plans for site decontaminating and decommissioning and to ensure that local concerns are

properly addressed. Public meetings were held in January 1991 and October 1991 and the next public meeting is scheduled for spring 1992.

NRC Licensee Actions and Timing

- Attend quarterly meetings with Ohio Department of Health, Ohio EPA, County Public Health, Representatives of Village, State and Federal elected officials  
6/92; 9/92;  
and 12/92
- Attend Office of Nuclear Material Safety and Safeguards (NMSS)/Division of Low-Level Waste Management and Decommissioning (LLWM) quarterly meetings with licensee  
4/92; 6/92;  
9/92; and 12/92
- Attend quarterly meetings with licensee in NRC Region III  
5/92; 8/92;  
and 11/92
- Exchange TLDs in TLD monitoring system for evaluation of hi-energy radiation at fence line, change quarterly  
6/92; 9/92;  
and 12/92
- Participate in third public meeting  
6/92
- Receive final site characterization report from licensee and distribute to OEPA and ODH for review  
6/92
- Obtain NRC decision on what remediation strategies are acceptable  
TBD

- Perform routine inspection (site security adherence to health and safety plan) 9/92
- Develop procedure for collection of environmental split samples TBD
- Collect environmental split samples TBC
- Develop plan for ORAU independent confirmation of site characterization offsite and onsite TBD
- Develop inspection plan to audit analytical labs used by licensee TBD
- Inspect analytical labs used by licensee TBD
- Review Chemetron's revised site characterization, provide comments to LLWD TBD
- Develop inspection plan to audit remediation work TBD
- Perform inspection of remediation work TBD
- Have ORAU perform confirmatory closeout survey TBD
- Release facility for unrestricted use TBD



Chevron Corporation (formerly Gulf United Nuclear Fuels Corporation)

1. Site Identification

Chevron Corporation

Nuclear Lake

Pawling, NY

License No.: SNM-871

Docket No.: 070-00903

License Status: Terminated in 1975

Project Manager: M. (Sam) Nalluswami

2. Site and Operations

The 1137-acre site is located in a wooded, rural area near Pawling in Dutchess County, New York, about equidistant between Poughkeepsie, New York, and Danbury, Connecticut. The site includes a dammed lake of about 50 acres, known locally as Nuclear Lake. The site now contains a portion of the Appalachian Trail.

Beginning in 1958, licensed nuclear fuels research and development were conducted at the site. Facilities included laboratories for fabrication and testing of uranium, thorium, and plutonium fuels, a hot cell, three research reactors (Docket Nos. 050-0023, 050-00101, and 050-00290), and a sodium test loop. The original site owner and licensee was Nuclear Development Associates, which, after a few years, became United Nuclear Corporation (UNC). The licenses were transferred in 1971 to a partnership formed by Gulf General Atomics (GA) (itself a partnership of Gulf Oil and Royal Dutch Shell) and UNC, known as Gulf United Nuclear Fuels Corporation (GUNFC). UNC retained ownership of the site and also was a co-licensee with GUNFC for the remaining two reactors, Docket Nos. 050-00101 and 050-00290. (One reactor license, Docket No. 050-0023, had been terminated and replaced with a new license in June 1961.) Activities at the site were never resumed after December 1972, when a glove box explosion in the plutonium laboratory building resulted in substantial contamination. License renewal was still being actively pursued by GUNFC, however, as late as mid-1973.

As of September 27, 1973, GUNFC was a wholly-owned subsidiary of Gulf UNC had no further responsibility to the NRC at this point since GUNFC continued as the licensee and continued to be responsible for all matters of NRC regulatory compliance. UNC continued to own the site and buildings which were leased to GUNFC.

On November 19, 1973, General Atomics Company (GAC) applied to the AEC for consent to acquire all the interests of Gulf (and GUNFC) in a number of licenses, including both the Pawling, NY reactor licenses (R-49 and CX-25) and the special nuclear material license (SNM-871). Consent to the transfer was provided by letter from the AEC to GAC, dated December 14, 1973. Consent was provided with the understanding that GAC would assume all the "rights, duties, responsibilities, liabilities, and obligations of the Gulf Oil Corporation."

Upon completion of decontamination and survey work, Gulf Nuclear Fuels Company (GNFC) sent a letter to the AEC dated March 11, 1974 requesting that Pawling, NY be deleted from SNM-871 and enclosing a supporting survey report. The letter indicated that the absence of contamination had been verified at all buildings.

A letter from GNFC to the AEC, dated May 9, 1974, requested that the licensee name be changed to GAC. The letter stated that GNFC (formerly GUNFC) would become part of GAC retroactive to January 1, 1974. By letter dated May 23, 1974, License No. SNM-871 was amended to specify GAC as the licensee. Also, on July 19, 1974, a renewed License No. SNM-871 was issued to GAC.

A closeout survey and inspection was conducted by the AEC at the site during April 1974 (inspection report 70-903/74-01). Following further removal of plutonium-contaminated soil from the Pawling, NY site, License No. SNM-871 was terminated on July 14, 1975. The remaining reactor licenses had been terminated in June 1974 (Docket Nos. 50-101 and 50-290).

Subsequently, there was a partial distribution of the assets of GAC to the partners (under which GA Technologies Inc., wholly-owned by Gulf Oil Corporation, undertook all the NRC licenses of GAC) and GAC was renamed as Valley Pines Associates (VPA) as of November 30, 1982. VPA continued to be owned by Gulf Oil Corporation and Scallop Nuclear, Inc. The names of the partners owning VPA have changed and VPA is now owned by Chevron U.S.A. Inc. (a wholly-owned subsidiary of Chevron Corporation and formerly Gulf Oil Corporation) and Shell Oil Company.

The site itself was sold in 1979 by Harpoon, Inc., a wholly-owned subsidiary of United Nuclear Corporation, to the U.S. Department of Interior (DOI) for use by the National Park Service (NPS).

### 3. Radioactive Wastes

In February 1984 Nuclear Energy Services of Danbury, Connecticut, conducted a radiological survey of the site for the site owner, the NPS. During the course of that survey, it was discovered that a small area of the concrete floor in what was the waste storage building had fixed beta-gamma radiation levels of 25 to 35 mrem/hr. The NPS notified NRC Region I of this condition by letter dated March 12, 1984. A verification survey was conducted by the NRC on May 22, 1984. Most of this contamination was removed from the area by destructive sampling on February 25 and 26, 1985.

Oak Ridge Associated Universities (ORAU) conducted a site-wide radiological survey for the NPS September 18 through 23, 1986. The ORAU survey report, issued in July 1988, identified limited areas of residual contamination in the plutonium laboratory and the multiple failure building. In the plutonium laboratory, there is fixed alpha (plutonium) contamination ranging to 9400 dpm/100 cm<sup>2</sup> in the concrete flooring of five separate rooms, totaling approximately 2500 square feet. In the same five rooms there are two areas, totaling about 170 square feet, of fixed beta-gamma (cesium-137 (Cs-137)) contamination ranging to 12,000,000 dpm/100 cm<sup>2</sup>. ORAU reported the external exposure rate to be 30 µR/hr at a height of 1 meter at the location of peak beta-gamma contamination. The surface

contamination in the multiple failure building consists of only beta-gamma (Cs-137) contamination ranging to 110,000 dpm/100 cm<sup>2</sup> over an area of several square feet.

ORAU found surface plutonium-239/240 (Pu-239/240) contamination in soil in isolated locations outside the buildings ranging to 91 pCi/g, and subsurface Cs-137 contamination at two other locations ranging from about 20 to 48 pCi/g. A sample of sludge from the plutonium laboratory septic tank had 0.41 pCi/g of plutonium-238 (Pu-238), 5.95 pCi/g of Pu-239/240, and 0.71 pCi/g of Cs-137. A single soil sample from under a downspout at the shield mock-up building had 15.5 pCi/g of Cs-137.

Magnetometry and ground-penetrating radar showed 50 to 60 metallic "anomalies" within Nuclear Lake, which are probably solid objects of some kind. Sediment samples from Nuclear Lake indicate Cs-137 ranging to 9.9 pCi/g and uranium-238 (U-238) ranging to 16.5 pCi/g. The peak Cs-137 concentration occurs near the location of the previous liquid waste discharge point. Water and sediment concentrations downstream from the dam are within the range of background or slightly above.

Wastes produced during decontamination would include concrete rubble or scabbling waste from decontamination of about 2500 square feet of concrete floor and some contaminated soil. Other wastes could develop if further studies identify further contamination, or determine the metallic anomalies need to be removed from Nuclear Lake.

#### 4. Description of Radiologic Hazard

The site poses no immediate threat to the public. The NPS controls access to the site and has a full-time caretaker on site. The building contamination above acceptable levels is fixed contamination and does not constitute a significant exposure hazard because of its limited use. The soil contamination is not severe and is not widespread. Contamination levels of water and sediment within and downstream of Nuclear Lake are slight and do not pose a short-term radiologic hazard.



5. Financial Assurance/Viable Responsible Organization

At the time of license termination in 1975, the licensee was GAC. GAC's successor in interest is VPA, a subsidiary of Chevron Corporation (Chevron). Chevron has undertaken the role of its subsidiary, VPA, and has been discussing site cleanup with NRC and NPS.

Despite its status as a corporate sponsor of the Appalachian Trail Conference, Chevron has not accepted responsibility for cleanup. Thus, there is no viable responsible organization. Also, there is no financial assurance.

6. Status of Decommissioning Activities

There are no current acceptable plans for decontamination.

On September 26, 1989, the NPS, NRC, and ORAU held a joint meeting to discuss options available to the NPS for additional surveys and/or cleanup of the site. It was decided to contact the former licensee to determine its willingness to assume responsibility for cleanup of the site.

NRC staff and representatives of Chevron, GA, and VPA held a telephone conference on February 14, 1990, to discuss the residual contamination and responsibility of the parties. On April 3, 1990, representatives of the NPS, NRC, and VPA met at the Pawling site to tour the site and discuss various cleanup options.

On November 27, 1990, a Chevron attorney met with NMSS staff. It was explained that NRC could hold the last licensee responsible for all site cleanup even though residual contamination might be the result of previous operations conducted by a former licensee. The Chevron representative indicated that Chevron would provide its position concerning further site characterization and cleanup by January 1991.

Subsequently, a letter was received from Chevron dated January 24, 1991, stating that they were continuing to review the matter internally, and



asking questions about cleanup criteria, further site characterization, waste disposal, and release for unrestricted use. NRC staff provided a response to Chevron's questions, including specific cleanup criteria in a letter dated April 22, 1991. The letter stated that the NRC was looking to VPA to provide the necessary site cleanup because VPA is the immediate successor in interest to the last licensee, GAC.

Further communications dwelled on Chevron's position that UNC as the former licensee, and site owner throughout licensed operations, should also be held responsible for site cleanup. This was discussed in a conference call on July 25, 1991, and in a detailed explanation of NRC's position sent to Chevron in a letter dated August 20, 1991, and again, at length, in a meeting at NRC offices on November 20, 1991. In this meeting, Chevron indicated some willingness to participate in site cleanup if certain concerns were adequately addressed. (On August 9, 1991, a site visit and tour was conducted, at Chevron's request, for the purpose of familiarizing three potential cleanup contractors with the site and cleanup needs.)

In another meeting held on December 13, 1991, at the DOI building in Washington, D.C., Chevron indicated their intent to provide a cleanup proposal to the NPS by the end of the year.

By letter dated February 13, 1992, Chevron proposed to the NPS to provide project management for cleanup of known areas of contamination, and to pay 50 percent of the cost of decontamination work. Under the Chevron proposal, NPS would pay 50 percent of decontamination costs, and 100 percent of the costs of radioactive waste disposal and nonradiological building demolition and debris removal. The NPS responded to Chevron's proposal by letter dated March 12, 1992, and indicated that there was no basis for assigning any portion of the cleanup costs to the NPS.

On April 3, 1992, Chevron wrote a letter to NPS indicating that although Chevron has expended a great deal of effort and presented a significant offer to the NPS, to date, the NPS has not come forth with anything to satisfy Chevron's two fundamental requirements of cost sharing and an assurance that this would be Chevron's final cleanup obligation. Due to this situation, Chevron wrote that they cannot justify expending any more resources at this site and would take no further action.

7. Other Involved Parties

The New York State Department of Environmental Control sent representatives to the August 9, 1991 site visit and tour, and is being kept advised of significant developments.

8. NRC/Licensee Actions and Timing

Because of the unwillingness on the part of Chevron to remediate the Pawling site, as indicated in the letter of April 13, 1992 to NPS, NRC is considering the utility of compelling site cleanup by Order, or other means.

Dow Chemical Company

1. Site Identification

Dow Chemical Company

Midland, MI

Bay City, MI

License No.: STB-527

Docket No.: 040-00017

License Status: Timely Renewal

Project Manager: J. Parrott

2. Site and Operations

The Dow Chemical Company was granted License No. C-2782 by the Atomic Energy Commission (AEC) in 1956 to use thorium metal and compounds for the production of thorium-magnesium alloys. In 1962 the AEC issued Dow a new license encompassing operations at three locations: Bay City and Midland, Michigan, and Madison, Illinois. In 1973 the license was amended to authorize only storage at Bay City, Midland, and Madison or transfer of metal or process sludge to authorized recipients. Licensed operations resulted in the production of slag material and contaminated soil containing thorium that require disposal.

Dow sold its Madison site in 1971 to Phelps Dodge Aluminum Corporation, which later merged with Consolidated Aluminum Corporation. The material at Madison was transferred to the Consolidated Aluminum Corporation pursuant to License No. STB-1097 (Docket No. 040-8088).

Waste materials and contaminated soil are being stored at the Midland and Bay City sites. The Bay City site also includes some contaminated material transferred there from the Wellman-Dynamics Corporation, a licensed site where similar operations took place. Dow has proposed to dispose of this material in its Salzburg hazardous waste landfill located in Midland.

### Bay City Site

The Bay City site is located about 1 mile south of Saginaw Bay and is about 20 miles east of Midland. The contaminated material is stored on a fenced-in Dow-owned site that is controlled by Dow security. Another area (75 by 150 feet) used for the storage of some additional contaminated materials from the Wellman site is roped off and posted. Approximately 3890 cubic yards of contaminated materials were initially estimated to be stored at the Bay City site. In the Dow disposal application submitted to the NRC on October 30, 1989, Dow revised this estimate to be 40,000 cubic yards of material requiring disposal.

Hydrologic data for the Bay City site is available and indicates that the primary ground water flow direction is southwesterly toward an inlet canal that leads to a pumping station and Saginaw Bay. Ground water under a small portion of the site flows in a northeasterly direction toward Saginaw Bay. There are several monitoring wells around the site. Data from 96 well samples taken by Dow during 1985 show gross alpha levels between less than 2.5 and 17 pCi/l and gross beta levels between 8 and 1758 pCi/l. Sample data are also available from surface waters and wells from 1970 and show activity levels less than 1 pCi/g. Sampling performed by NRC Region III staff in 1979 indicated gross alpha activity up to a maximum of 4 pCi/l in six samples taken from wells, the canal, and ponds. Sample data taken from monitoring wells in 1985 by NRC Region III staff during an NRC inspection indicate thorium activity levels at background to 1.25 pCi/l. More recent sampling data are unavailable.

### Midland Site

Between 3000 and 5000 cubic yards of thorium slag material were initially estimated to be at the Midland site. In the Dow disposal application submitted to the NRC on October 30, 1989, Dow revised its volume estimate to be 12,000 cubic yards. The 160 foot by 300 foot Midland site is roped off and the contaminated material is covered by a 1 to 2 foot thick clay cap. Hydrologic information for the Midland site is not contained in the licensing files. However, some water sampling data are available.



28 grab samples from the Tittabawassee River, which flows adjacent to the storage site, taken above and below the plant in 1967 and show gross beta levels ranging from 2.6 to 16.3 pCi/l. An NRC sample of sludge taken in 1983 from Shot Pond had a thorium-232 (Th-232) activity of 2 pCi/g. More recent sampling data are unavailable.

#### Site History

In March 1979 Dow compared several methods for the disposal of these magnesium-thorium slag piles. They concluded that temporary storage in the existing configuration would be the best alternative until the State of Michigan can develop a disposal facility for these materials in accordance with NRC requirements.

In October 1979 the NRC requested that Dow provide a comprehensive plan for removal and disposal of the thorium-magnesium wastes. In February 1980 Dow agreed to provide site information, but continued to state that the wastes should remain in storage and not be removed. Site information was submitted to the NRC in August 1981.

In August 1981 Dow requested that the Midland site license be terminated based on survey results that indicated that the radioactivity levels met NRC guidelines for unrestricted release. At the same time, Dow also informed the NRC that the Bay City site slag storage pile had an average thorium concentration of 1700 pCi/g. This pile had been graded and compressed to 2.5 feet thick and covered with a tar-based road sealant in 1978. Ground water monitoring wells had been installed around the site and a 7-foot chain link fence had been installed to secure the site.

In June 1982 NRC Region III staff performed contamination surveys at the Midland site. The results of this survey indicated that contamination still existed above NRC guidelines. NRC Region III staff recommended that the site not be released for unrestricted use until the contaminated material is disposed and a confirmatory survey is performed by Oak Ridge Associated Universities (ORAU).



In August 1982 NRC Region III staff documented that contaminated soil and debris had been removed from the Wellman Foundry site in Bay City to the Dow storage site in Bay City. The Wellman Foundry site was the original Dow operation at Bay City, MI licensed by the AEC in 1956. In 1961 Wellman Bronze and Aluminum Company (later the Wellman-Dynamics Corporation) took over the Bay City operations. Wellman was licensed by the AEC (License No. STB-136) to manufacture magnesium-thorium castings. Wellman's operations involved thorium aluminum alloys.

In 1972 Wellman requested that its license be terminated and the site be released for unrestricted use. The termination survey performed by Wellman indicated that a considerable amount of contaminated material remained in three buildings. This material was either transferred to Wellman's licensed facility in Creston, IA, or buried in accordance with 10 CFR 20.304 and an agreement with the State of Michigan. The license was terminated in May 1972 and the site reverted back to Dow, who sold the property in 1974 to the Dore Wrecking Company (now Dore Enterprises, Inc.).

In May 1982 NRC Region III staff conducted an inspection of the Wellman site to verify that previously licensed material had been removed and the area had been decontaminated to meet NRC unrestricted release criteria. This inspection was performed after a review of 16,230 formerly licensed sites identified 12 sites, including the Wellman site, to require further evaluation to ensure that the sites had been properly cleaned up. This review of formerly licensed sites was performed because of recommendations made by Government Accounting Office in 1976.

Substantial contamination was found in or around five buildings. These areas were subsequently decontaminated and about 1570 cubic yards of soil material removed to Dow's Bay City thorium storage site located two miles from the Wellman site. In August 1984 ORAU performed a confirmatory survey but found additional contamination. Dow performed further decontamination, and in November 1985, ORAU performed a second survey verifying that the

site met NRC release criteria. These criteria required that soil contamination be less than 10 pCi/g and have an exposure rate of less than 10  $\mu$ R/hr above background at 1 meter. Based on the ORAU survey, the NRC released the site for unrestricted release in March 1987.

In 1982 Dow submitted a decommissioning plan for the Midland site. This plan proposed transferring all the contaminated material to the Bay City site. In 1987 Dow proposed moving the contaminated material at both the Midland and Bay City sites to the Salzburg landfill on Salzburg Avenue in Midland. In December 1987 Dow submitted a relocation/decommissioning plan that proposed a temporary relocation of the contaminated material at the Midland site 1000 feet east of its current location so that an adjacent diversion basin could be cleaned up to meet a closure schedule pursuant to the Resource Conservation and Recovery Act (RCRA). Dow had proposed an aggressive cleanup schedule and requested a timely response from those agencies having regulatory jurisdiction. The licensee subsequently performed a radiological survey that depicted an outline of the area containing the radioactive material. This enabled Dow to physically separate the radioactive material from the RCRA material by installing sheet pilings and to clean up the diversion basin without having to move the radioactively contaminated material.

In January 1988 a draft 10 CFR 20.302 license application was provided for comment to the NRC and the State of Michigan. In October 1989 Dow submitted an application for the disposal of the Midland and Bay City contaminated material at the Salzburg landfill. The review of this application was completed on September 23, 1991, with input from U.S. Environmental Protection Agency (EPA) and the Michigan Department of Health (MDH). Numerous comments were generated. Dow is in the process of responding to these comments.

#### Salzburg Landfill

The Salzburg Landfill, where Dow wants to bury their thorium wastes, is a 152-acre site owned by Dow that is fully permitted by the State for hazardous and non-hazardous wastes. It is located 1.5 miles from the

Midland site and 20 miles from the Bay City site. The site has an average 4-foot thick sand layer overlaying 14 to 24 feet of lake bed clay and an average of 125 feet of glacial clay. The regional aquifer is 0 to 50 feet thick at a depth of 120 feet below grade. However, the regional aquifer does not extend beneath the proposed waste disposal cell designated for radioactive waste disposal.

The proposed cell for the thorium wastes include a 3-foot recompactd clay underliner, a 1-foot sand drainage layer, 5 feet of recompactd clay, a 100-mil high density polyethylene (HDPE) synthetic liner, a 1-foot sand leachate drainage layer, 24 feet of waste, a 100-mil HDPE synthetic liner, a 3-foot clay cap covered with 2 feet of top soil. No liquid waste is allowed to be disposed at the Salzburg Landfill.

There are 16 shallow monitoring wells around the disposal cell. These monitoring wells are required under RCRA and Michigan hazardous waste requirements. Ground water monitoring wells and domestic wells are sampled as part of the disposal site monitoring program.

### 3. Radioactive Wastes

The contaminated material in the Bay City storage area was initially estimated to consist of about 3890 cubic yards of insoluble slag material and soil with activities up to 1700 pCi/g. In the Dow disposal application submitted to the NRC in October 1989, Dow conservatively estimated the total volume of contaminated material at the Bay City site to be 40,000 cubic yards with an average concentration of 188 pCi/g and a range of 2-7000 pCi/g Th-232. In 1978 Dow performed a leaching study of the slag material and concluded that even under aggressive conditions the waste would leach at very low rates. Exposure rates above the pile are up to 8.4  $\mu$ R/hr. Some of this material (1570 cubic yards averaging about 60 pCi/g) was transferred from the Wellman site. Dow estimates that there are about 9.2 Ci of Th-232 at the Bay City location.

The Midland site was initially estimated to contain between 3000 and 5000 cubic yards of contaminated soil and slag similar to that at the Bay City site. In the Dow disposal application submitted to the NRC in October 1989, Dow conservatively estimated the total volume of contaminated material at the Midland site to be 12,000 cubic yards. The activity in the contaminated material varies substantially and ranges up to 2000 pCi/g with an average of 29 pCi/g Th-232. Dow estimates approximately 0.46 Ci of Th-232 are in this material.

4. Description of Radiologic Hazard

The principal hazards associated with the contamination at the Midland and Bay City sites involve direct exposure, inhalation, ingestion, and intrusion. No immediate threat to public health and safety exists at either location. The direct exposure, inhalation, and ingestion hazards are low because the storage areas are covered (by an asphalt cover at the Bay City site and by a 1-to-2-foot clay cover at the Midland site). However, the asphalt cover at the Bay City site is beginning to deteriorate. In 1978 Dow performed a study to determine the respirable fraction of the slag material. The respirable fraction was determined to be less than 0.1 percent. Of this fraction about 1.5 percent would be thorium. Both sites are within property protected by Dow security so intrusion hazards are minimized. Ground water sampling data indicate that there is minimal contamination. Because of the insoluble nature of the waste material, it is expected that the ground water hazard will remain low.

5. Financial Assurance/Viable Responsible Organization

The possession limits for the Dow license are source material not to exceed 200,000 pounds as metal or process sludge, 1000 pounds as an oxide or fluoride, and 300 pounds as compounds. The current license expired on March 31, 1978 and has been on timely renewal ever since.

Because Dow possesses greater than 100 mCi of thorium, Dow was required to provide a financial certification for \$750,000 by July 27, 1990. The Dow



Chemical Company is a very large organization that is expected to remain viable and be capable of providing the financial resources for cleanup of both the Bay City and Midland sites.

On July 27, 1990, Dow submitted financial assurance in the amount of \$6,625,000 for three NRC licenses, including License No. STB-527.

#### Status of Decommissioning Activities

On October 30, 1989, Dow submitted a 10 CFR 20.302 disposal application to the NRC for disposal of the Bay City and Midland wastes at the Salzburg landfill. This submittal was reviewed and comments were sent back to Dow on September 23, 1991. Dow is keeping Federal, State, and local authorities informed of their proposed activities and expects to address the comments shortly.

#### 7. Other Involved Parties

MDH and EPA's Region V provided comments on Dow's 20.302 application. The Michigan Department of Natural Resources has also been involved in review of the proposed burial.

#### 8. NRC/Licensee Actions and Timing

##### A. Actions/Milestones

The NRC staff has reviewed the Dow disposal application. After receiving review comments from the State of Michigan and EPA, a formal response to Dow incorporating the NRC, EPA, and State comments was issued to the licensee on September 23, 1991.

The licensee plans to begin construction of the disposal cell at Salzburg, as soon as NRC approves the proposal. Pending approval, disposal of Bay City and Midland wastes could begin in late 1993 or early 1994. The licensee's final surveys of the Bay City and Midland sites would be completed by the summer of 1994.



NRC Region III staff will perform a final survey with ORAU upon completion of the burials. Subsequently, the license could be terminated by late 1994 or early 1995.

#### B. Problems

An NRC preliminary dose assessment done on this material, assuming unrestricted release of a burial in the Salzburg Landfill, has indicated that subsequent doses would exceed unrestricted use objectives. In response to this, NRC sent a letter to Dow, dated December 20, 1991, indicating that the Salzburg Landfill may not be a viable option for the disposal of this waste. NRC suggested that Dow look at alternatives to burial in a Salzburg Landfill disposal cell. NRC and Dow will be meeting in late April 1992 to resolve this issue.

Elkem Metals, Inc.

1. Site Identification

Elkem Metals, Inc.

Marietta, OH

License No.: Not Licensed

Docket No.: NA

License Status: Terminated by NRC in 1985

Project Manager: C. L. Pittiglio, Jr.

2. Site and Operations

The site is located in a rural industrial area, approximately 4 miles from the town of Marietta, Ohio which is located north on State Route 7 and County Road 10 and north of the Ohio River. The facility is an active manufacturer of manganese products which are used in the steel manufacturing industry. Elkem possesses a Nuclear Regulatory Commission (NRC) license authorizing the use of fixed nuclear gauges; however, that licensed activity is not involved with this contamination problem.

3. Radioactive Wastes

During the early 1960s, Union Carbide Corporation processed tin slags at this facility for the production of tantalum-columbium metals. This activity was conducted under NRC Source Material License No. SMB-993. Process residues containing thorium and uranium were retained and stored onsite. Operations were terminated in the early 1970s. This license was terminated on July 8, 1985, based upon surveys conducted by the licensee's consultant and confirmatory surveys by Oak Ridge Associated Universities. Records indicate that residues were disposed of by transfer to a commercial burial site and equipment was removed and buildings were decontaminated. Review of these records indicate that only one building was decontaminated (Building 77); however, there are no indications that the building that was used to process this material was

ever decontaminated. An onsite special inspection conducted on January 30, 1992, indicates that the former process building (Simplex Storage Building A) contained process equipment, air ducts and vent lines contaminated with removable radioactive material (thorium). Radiation levels up to 2.5 mR/hr were detected. Various smear tests for removable contamination were taken and indicate a maximum of 17,000 dpm/100 cm<sup>2</sup> of removable contamination. Further review of the records indicate that an evaluation of the extent of the contamination in an adjacent sludge pond was not evaluated.

4. Description of Radiologic Hazard

This site poses no immediate threat to the public as it is in an industrial site controlled access. The Simplex Building has been posted with "Caution Radioactive Material" signs and personnel access is restricted.

5. Financial Assurance/Viable Responsible Organization

The site is owned by Elkem Metals, Inc. The former NRC licensee, Union Carbide, has assumed financial responsibility for the decontamination of this facility through a covenant to the sale of the property to Elkem Metals.

6. Status of Decommissioning Activities

The Region issued a Confirmatory Action Letter (CAL) to Elkem Metals on February 5, 1992. This CAL confirmed Elkem Metal's commitment to (1) restrict access to the area and post the area with "Caution Radioactive Material" signs, and (2) within 30 days provide the Commission with a characterization plan and schedule. Elkem has negotiated a contract to have this plan and schedule put together as soon as possible.

Characterization of the site commenced during the week of April 13, 1992. The results are expected to be completed within three weeks following receipt of their laboratory analytical results.

7. Other Involved Parties

No significant third party involvement is anticipated.

8. NRC/Licensee Actions and Timing

Upon receipt of Elkem's characterization report, the NRC Region III in concurrence with the Division of Low-Level Waste Management and Decommissioning within the Office of Nuclear Material Safety and Safeguards will provide comments to Elkem regarding identified deficiencies. NRC Region III will conduct periodic onsite inspections during the site remediation.

## Engelhard Corporation

### 1. Site Identification

Engelhard Corporation

Plainville, MA

License No.: None

Docket No.: 070-00139

License Status: Terminated by AEC in 1962

Project Manager: J. Parrott

### 2. Site and Operations

A subsidiary of Engelhard Corporation called D.E. Makepeace was licensed by the Atomic Energy Commission (AEC) to use enriched uranium to make fuel elements from the late 1950s to the early 1960s. During this period, the licensee was allowed to discharge uranium contaminated effluent to an on-site septic system and to incinerate uranium contaminated solid waste on-site. At license termination, only indoor areas were surveyed for release. The outdoor contamination was not discovered until the site became subject to characterization for the presence of hazardous wastes on-site under Resource Conservation and Recovery Act (RCRA). Because the contamination was from special nuclear material, and therefore not subject to regulation by RCRA, the U.S. Environmental Protection Agency (EPA) contacted the Nuclear Regulatory Commission (NRC) in late 1991.

The site is currently operating but does not use licensable material. The majority of the approximately 25 acre site is covered by buildings and parking lots. This site is adjacent to a small reservoir called Turnpike Lake. Engelhard is in the process of shutting down this facility and hopes to be able to market the property in 1993.



### 3. Radioactive Wastes

Very little data on the radioactive wastes at this site exists. A gamma survey was done by Engelhard in 1988 on the buildings that existed at the time that licensed activities took place, and also around the septic system and pump house. Inside the buildings, maximum readings of 70-80  $\mu\text{R/hr}$  were found in isolated areas. Sludge inside the unused septic tank was also found to be contaminated. Engelhard plans to submit the results of this gamma survey and other radiological sampling in the near future. Preliminary sampling in the area of the old septic system have yielded gross alpha values as high as 66 pCi/g in the soil and 1300 pCi/l in the ground water. Areas of the site are also contaminated with heavy metals and organic solvents, so the potential for mixed wastes exists.

### 4. Description of Radiologic Hazard

Access to indoor areas suspected of being radiologically contaminated is not controlled. The known outdoor contaminated areas are under pavement. Access to the old septic tank is possible through a man-hole in the parking lot. The radiological contamination detected so far is confined to the site. Hazardous waste has been detected in on-site soil and ground water and in off-site ground water.

### 5. Financial Assurance/Viable Responsible Organization

Since no license exists for this site, compliance with financial assurance regulations does not apply. Engelhard appears to be a financially viable company and seems willing to properly decommission this site. Engelhard will soon be receiving an administrative order from EPA's Region I RCRA office to characterize and remediate the hazardous contamination associated with this site.

6. Status of Decommissioning Activities

With respect to radiological contamination, past activities at the site were limited to the indoor radiation survey in 1988 and outdoor sampling in conjunction with a recent preliminary hazardous waste characterization. On January 17, 1992, NRC Region I and Headquarters personnel met with representatives of EPA Region I, and Engelhard Corporation at the site. Engelhard personnel requested clean-up criteria for the radiologically contaminated portions of the site and were told to use Reg. Guide 1.86 and BTP 81. Engelhard would like to remove all necessary radiological contamination from this site before the end of 1992 to avoid increased low-level waste disposal costs.

No specific plans for site characterization/remediation exist. Engelhard personnel were told that more radiological characterization needs to be done at this site, they agreed.

7. Other Involved Parties

EPA Region I RCRA office is involved at this site due to the hazardous contamination.

8. NRC/Licensee Actions and Timing

A. Actions/Milestones

During NRC's visit to the site on January 17, 1992, it was decided that the next step would be for Engelhard to send NRC a letter outlining a schedule for the characterization and decontamination of any radiological contamination on and off-site as well as results from past radiological sampling and surveys. Engelhard expects to send this information by the end of April 1992. As of April 17, 1992, NRC had not received the information.

## B. Problems

No specific problems have been identified with this site as of yet. However, as mentioned above, there is a possibility for mixed waste at this site. Since it will probably take a number of months for RCRA actions to be initiated at this site, it is not likely that the RCRA and NRC actions will occur concurrently. However, NRC will suggest that gross alpha and beta analysis be added to the RCRA site characterization parameters to screen for areas of undiscovered radiological contamination.

Fansteel, Inc.

1. Site Identification

Fansteel, Inc.

Muskogee Plant

Muskogee, OK

License No.: SMB-911

Docket No.: 040-07580

License Status: Timely renewal

Project Manager: H. Spiro

2. Site and Operations

The facility is located on approximately 110 acres in Muskogee County, Oklahoma, northeast of the city of Muskogee adjacent to an interstate highway and on the bank of the Arkansas River. Tin slags, ores, and ore concentrates were received and processed for the tantalum and columbium values. The natural uranium and thorium contained in the feed materials remains in the process residues. Fansteel ceased processing of feed materials containing natural uranium and thorium in 1989. Historically, in the feed materials, the natural thorium content exceeded the natural uranium content. However, during the final years of operation, this relationship was reversed because of Fansteel's increased dependence on tin slags and ore concentrates as feed materials.

3. Radioactive Wastes

A single process building and liquid waste treatment facility are contaminated with small quantities of natural uranium and thorium. Most of the natural uranium and thorium is found in the form of undissolved solid residues deposited in several settling ponds. Before September 1979 a large

portion of these residues were collected in Pond 2, which is covered with plastic sheets and 6 to 12 inches of soil. Pond 3 was used for the collection of residues until the pond's liner failed in mid-1989. Following that time, the residues were collected by filtration or mechanical separation and stored in lined drums.

The total quantities of natural uranium and thorium in Ponds 2 and 3 and several other clarification ponds are estimated to be 23,000 kilograms (25.4 tons) and 59,000 kilograms (65.0 tons), respectively. The total volume of waste is estimated to be approximately 200 cubic yards. There is no indication of any offsite contamination at the present time.

The metal processing operations involve the use of solvents and extractants which may result in the residues being classified as mixed waste. Fansteel will perform radiologic and hazardous characterization of the facility and environs to determine the nature and extent of contamination.

#### 4. Description of Radiologic Hazard

This site poses no immediate threat to the public. The only substantial contamination outside of the settling ponds is low-solubility natural uranium and thorium in low concentrations in the soil. Fansteel controls access to the site so inadvertent exposure by a member of the public to contamination on the site is unlikely. Ground water contamination is a potential problem due to past leakage of fluids from Pond 3 into the ground water and the detection of low pH values in the ground water.

The following estimates of gamma radiation exposure rates were obtained by a cursory radiation survey performed by the Nuclear Regulatory Commission (NRC) Region IV inspectors during several tours and radiation safety inspections of the Fansteel facility in November and December 1991. The exposure rate at a height of approximately 1 meter ranged from 0.04 to 0.2 mR/hr in outside unsheltered areas covered by the tours. The contact exposure rates in various areas and equipment in buildings ranged to a maximum of approximately 2 mR/hr with the average approximately 0.4 mR/hr.



During an NRC inspection in April 1991, the following violation of 10 CFR Part 20 was identified. The licensee failed to perform surveys of radioactive materials in air during the actual removal of equipment from the ball mill room as required by 10 CFR Part 20.201(b), to demonstrate compliance with 10 CFR Part 20.103(a)(1). Also, adequate bioassay data was not obtained in a timely manner.

5. Financial Assurance/Viable Responsible Organization

The site is owned by Fansteel, Inc., and all licensed activities are conducted by Fansteel. Fansteel has the resources and accepts the responsibility for site cleanup and provided an irrevocable standby letter of credit in the amount of \$750,000 as financial assurance for decommissioning. A site-specific financial assurance plan will be submitted after the completion of site characterization.

6. Status of Decommissioning Activities

Fansteel has indicated that the contaminated residues in settling ponds will be processed at their existing facility for transfer to a facility in another country. Fansteel has stated that these residues contain quantities of tantalum that will be recovered at the other facility. To date, Fansteel has been unsuccessful in exporting the contaminated residues to another country. An option under consideration involves the sale of these contaminated sludges and process equipment to Ecotek, Inc., a subsidiary of Nuclear Fuel Service, for recovery of mineral values by Ecotek. Fansteel expects to resolve this issue by March 1992.

Fansteel submitted a site Remedial Assessment Work Plan (RAWP) in June 1990 and a Conceptual Decommissioning Plan (CDP) in August 1990. The RAWP is the licensee's site characterization plan. In November 1990, staff provided review comments and guidance to the licensee for revising

the RAWP to resolve staff concerns. Staff from the Oklahoma Water Resources Board and Department of Health (OWRBDH) also reviewed the work plan and provided comments to Fansteel.

Fansteel responded to staff comments by submittal of Revision 1 of the RAWP and the CDP dated February 19, 1991, using the revised CDP as part of the technical basis for the revised RAWP. In December 1991 staff provided more explicit review comments and guidance to the licensee for revising the RAWP and the CDP to resolve the remaining staff concerns on Fansteel's radiological characterization and proposed soil remediation approaches.

In October 1991 Fansteel submitted an Alkaline Ponds Closure Plan (APCP, Revision 0) for engineering and geological investigations for their proposed closure of the alkaline ponds 6, 7, 8, and 9. The APCP is a plan to characterize these ponds.

#### 7. Other Involved Parties

OWRBDH are other involved parties in site remediation activities. Congressional interest in decontamination activities at this site is also evident from call received by NRC Congressional Affairs from Congressman Synar's Office.

#### 8. NRC/Licensee Actions and Timing

Although the Fansteel license was recently revised, it remains under timely renewal. Staff will further amend the license in response to expected licensee requests to change operations to the recovery and shipping of pond sludges. Staff will review Fansteel's RAWP, Revision 2 which was submitted in February 1992 and expects to provide comments to the licensee by May 1, 1992.

The NRC staff is currently reviewing Fansteel's revised APCP (Revision 1) dated December 15, 1991, which responds to the staff's comments dated December 2, 1991, on the APCP, Revision 0.

In February 1992 staff provided review comments to Fansteel on their financial assurance certification for decommissioning. Staff requested that Fansteel submit a revised financial assurance certification by April 1992. In addition, a site-specific financial assurance plan is required after the completion of site characterization.

Any particular option which Fansteel will choose for disposal of the contaminated sludges and/or the contaminated process equipment will affect the schedules for completion of tasks within Fansteel's decommissioning process. Upon submittal by Fansteel, staff will review their remedial assessment or site characterization report, their final decommissioning and decommissioning funding plans. The staff will request that Fansteel submit a site characterization report by November 1992.

Potential problem areas associated with this site include: 1) the possible classification of process residues as mixed waste; and, 2) Fansteel's upcoming decision concerning the processing and final disposition of process residues discussed in Section 6 above.

## Hartley and Hartley (Kawkawlin) Landfill

### 1. Site Identification

Hartley and Hartley (Kawkawlin) Landfill

Bay County, MI

Docket No.: 040-01790

License Status: No License

Project Manager: J. Parrott

### 2. Site and Operations

The former Hartley and Hartley Landfill and the adjacent Michigan Department of Natural Resources (MDNR) property are located in the Tobico Marsh Game Area north of Kawkawlin, which is northeast of Bay City. In 1962 it was discovered that the area, owned by a waste handler, Hartley and Hartley, was being used as a landfill.

In 1972 Hartley and Hartley sold out to SCA Services, Inc. of Somerville, Massachusetts. Hartley and Hartley continued to operate the site for SCA. In 1978 the landfill was closed because an onsite industrial waste incinerator was in noncompliance with State of Michigan incinerator effluent (non-radiological) requirements.

In 1980 the State of Michigan conducted an aerial radiological survey of the landfill area because its agencies were concerned that material, formerly used at a facility in St. Louis, Michigan, may have been disposed at the landfill. The survey indicated an excess of thallium-208 (Tl-208), a daughter of thorium-232 (Th-232), over the former Hartley and Hartley Landfill.

In May 1983 the Michigan Division of Radiological Health informed Nuclear Regulatory Commission (NRC) Region III that radioactive material was found in the SCA Services, Inc. landfill which is now owned by Waste Management of North America (WMNA). Contamination was also found on the MDNR property. The material was identified as Th-232 and its daughter products

and is believed to have come from an NRC-licensed activity. The material also contained magnesium. Dow Chemical, USA and Wellman-Dynamics Corporation were two local organizations known to have used similar material. The State of Michigan requested an NRC investigation to determine if an NRC licensee was involved in the disposal of the material.

In August 1983 NRC Region III performed independent sampling of soil, rock (or slag), and metal mesh in areas of high surface radiation. Direct surveys of these samples in their containers showed radiation levels of up to 2.5 times background. When surface material was removed the radiation levels did not change appreciably, indicating that the contamination extended deeper into the soil. It was not known how deep the contamination extended. The soil samples were split with the State of Michigan.

NRC Region III staff interviewed several individuals who might be knowledgeable on the disposal of the contaminated material found in the former Hartley and Hartley Landfill. Representatives of Dow Chemical and Wellman-Dynamics Corporation were contacted. NRC Region III learned that thorium-magnesium slag from Wellman-Dynamics was transferred to Dow until about 1970; however, when Dow stopped accepting this waste, it appears that Hartley and Hartley disposed of it in their landfill in violation of AEC requirements.

In 1984 encapsulation measures were taken at the Hartley and Hartley Landfill and the adjacent MDNR property to isolate the migration of toxic chemical wastes. These toxic chemicals had been detected in surface waters at the site. Encapsulation measures included the installation of bentonite slurry walls, clay capping, and monitoring wells. The State of Michigan requested input from the NRC on whether the encapsulation measures being taken for the toxic chemicals also would provide protection for the radioactive hazard. The NRC staff agreed to have ORAU perform a survey



that would be the basis for a hazard evaluation. The ORAU survey was undertaken in July 1984 before encapsulation began. Thoriated material was found in the Hartley and Hartley Landfill and on the MDNR property in a layer about 0 to 1 foot thick lying about 1 foot below the surface. An additional contaminated area was located on adjacent property still owned by Hartley. This contamination appeared to be confined to the surface and significantly less extensive in area than the contamination in the former Hartley and Hartley Landfill and the MDNR property.

NRC and State of Michigan staff concluded, on the basis of the ORAU survey, that the contamination levels exceeded Option 4 in the 1981 Branch Technical Position on uranium and thorium wastes. They also concluded that the toxic chemical and radioactive waste mixture would make the wastes unacceptable at a chemical or radioactive waste disposal site and agreed to implement a monitoring program and to place a restriction on the deed to prohibit intrusion activities. These measures would likely make the encapsulation measures acceptable for the thorium-magnesium slag. It appeared to be a suitable solution considering the lack of permitted or licensed disposal sites that would accept the wastes.

Monitoring wells were installed and a program implemented to require semi-annual monitoring through 1990 and yearly thereafter through 2005, at which time, the site owner may demonstrate that additional monitoring is unnecessary. The samples monitored for radioactivity as well as for toxic chemicals.

In an inspection in October 1984, a sample from a surface water source at the landfill was taken and analyzed. The sample showed a gross alpha activity level of 3 pCi/l compared with the EPA limit of 15 pCi/l for drinking water. Ground water samples taken since 1985 have continued to show very low activity levels.

No detailed hydrology data is available in the Hartley and Hartley landfill file. However, the area is marshy and ground water sampling is required under the agreement between WMNA, the State of Michigan, and the NRC. There are residential wells in the area, but over the last 10 years fewer

are being used as public drinking water systems become available. Sampling data obtained to date show thorium concentrations to be less than EPA gross alpha drinking water limits.

### 3. Radioactive Wastes

The contaminated material at the WMNA property and the adjacent MDNR property is an insoluble thorium-magnesium slag similar to that in storage at the Dow Chemical Bay City and Midland sites. The total volume is uncertain. A rough volume estimate for the MDNR property is 150,000 feet<sup>3</sup> and 2700 feet<sup>3</sup> for the Hartley property. The radiological characteristics are not well characterized, but surveys show the thorium-magnesium to be nonhomogeneous. Direct radiation measurements taken by the State of Michigan and the EPA in 1983 at some locations on the SCA and MDNR properties showed up to 80  $\mu$ R/hr at waist level, compared to background levels of 3 to 5  $\mu$ R/hr. Soil samples showed 36 to 670 pCi/g (dry) of Th-232 with its daughter products, and 6 to 20 percent magnesium. In physical appearance the material resembled the thorium-magnesium slag at the Dow Chemical storage areas in Midland and Bay City. Exposure rate measurements also were taken by NRC Region III in 1983. The highest surface reading was 800  $\mu$ R/hr with a background of 5 to 6  $\mu$ R/hr. A grayish material usually covered the area where radiation levels ranged from 100 to about 600  $\mu$ R/hr. Sampling of soil, rock (or slag), and metal mesh showed Th-232 activity levels of 52-165 pCi/g, Th-230 activity levels of 71-356 pCi/g, and Th-228 activity levels of 39-120 pCi/g. The presence of potassium-40, Cs-137, Tl-208, lead-212, lead-214, bismuth-212, bismuth-214, actinium-228, and protactinium-234 (Pa) also was noted by gamma spectroscopy. One small area on the MDNR property had an activity level of 561 pCi/g Th-232 and 527 pCi/g Th-228. Ground water sampling data confirm that the material is insoluble.

### 4. Description of Radiologic Hazard

The principal hazards associated with the contamination at the WMNA, MDNR and Hartley properties involve direct exposure, inhalation, ingestion, and intrusion. No immediate threat to public health and safety

exists. The direct exposure, inhalation, and ingestion hazards are low because of the containment measures taken at both the WMNA and MDNR properties. These containment measures include installation a clay cap and sides around the areas. However, containment measures have not been taken for the small contaminated area on the Hartley property.

The former Hartley and Hartley Landfill is fenced and under the control of WMNA. Deed restrictions have been added to the property. The MDNR property is owned by the State of Michigan and is encapsulated. Therefore, intrusion hazards will be low. Because the contaminated thorium material is in an insoluble form, ground water hazards will be low. This is confirmed by the ground water and surface water monitoring program. Sampling data indicate that thorium levels continue to be well below the EPA gross alpha drinking water standards.

5. Financial Assurance/Viable Responsible Organization

There is no license for possession of radioactive material on any of these sites. Therefore, the financial assurance requirements in the 1988 decommissioning rule do not apply.

The former Hartley and Hartley Landfill is currently owned by WMNA, a very large corporation in the waste management business. The MDNR property is owned by the State of Michigan. Mr. Wayne Hartley's viability is unknown at this time.

6. Status of Decommissioning Activities

On June 25, 1985, NRC Region III staff met with Michigan Department of Public Health staff and reached an understanding to undertake an independent water monitoring program at the MDNR and WMNA sites.

No specific decontamination of the radioactive waste at these sites has been proposed. Once responsibility for the thorium wastes is determined by NRC, it will be incumbent on the responsible party(ies) to propose a decontamination plan for these wastes.

7. Other Involved Parties

MDNR is involved at this site by virtue of the fact that part of the contamination is on property owned by them. MDH remains involved as an observer. The EPA has been involved in the past.

8. NRC/Licensee Actions and Timing

A. Actions/Milestones

NRC is currently trying to determine if the successor to Wellman-Dynamics is responsible for these sites, or if responsibility rests with the current owners of the properties. NRC staff is also in the process of compelling Mr. Wayne Hartley to secure the thorium contamination that is on his property.

Agreement to the final disposition of all these contaminated properties will be targeted for late 1992.

## Heritage Minerals

### 1. Site Identification

Heritage Minerals

Lakehurst, NJ

License No.: SMB-1541

Docket No.: 040-08980

License Status: Decommissioning

Project Manager: M. Miller, Region I

LLWM Monitor: H. Astwood

### 2. Site and Operations

The Heritage Minerals site consists of 7000 acres near Lakehurst, New Jersey, of which between 1000 and 1200 has been involved in the mining and processing of local ores. The processing plant, including the tailings piles, occupies about 500 acres. Heritage Minerals began operation at the site in 1987 and ceased processing operations in July and August 1990.

The Heritage site is located on the Atlantic Coastal Plain. The formations under the site are sandy and permeable to at least 1500 feet, where some clay is encountered. Bedrock is not encountered until at least 3000 feet. The uppermost aquifer at the site is the Cohansey. Depth below grade to the seasonal high water of this aquifer is about six feet. From 1971 until 1982 sands containing economically interesting components as well as small concentrations of uranium and thorium were dredged from about 50 to 70 feet below the site by ASARCO, the original owner.

Beginning in 1987 Heritage Minerals processed the stockpiled mineral sands which were left behind as tailings from the previous mining operation by ASARCO. The sands were processed by physical methods to separate the economically valuable minerals, zircon and leucoxene (titanium oxide).



The stockpiled sand (also referred to as "new feed") which was the raw material for Heritage's plant is a mixture of silica sand (about 70 percent), aluminum silicate minerals (15 percent), zircon, and leucoxene, and a trace amount of monazite sand and uranium (0.5 percent). Monazite is a complex phosphate of rare earth elements containing about 3.5 percent thorium chemically bound with the rare earth phosphates.

The Heritage plant processed the new feed to extract the zircon and leucoxene for commercial sale using gravimetric, electrostatic, and magnetic methods of separation. Until 1989 the waste streams from each of the separation processes were re-combined and pumped from the processing plant onto previously mined areas known as the tailings pile. The monazite sand is concentrated in one of the waste streams. The re-combined tailings do not meet the legal definition of source material, although the waste stream containing the monazite sand does.

In 1989 NRC informed Heritage that because this waste stream met the definition of source material they were in possession of source material in excess of quantities required to be licensed under 10 CFR 40 and directed Heritage to apply for an NRC license. Subsequently, Heritage submitted a license application to NRC (see below).

The current owner of the site and Heritage intend to build a housing development on the site following the end of Heritage operations and is awaiting various state and local permits. Development of the present plant location would take place last; the entire project is expected to last 20 years.

Heritage estimates that 695 cubic yards of monazite-rich sand remain on site. Heritage planned to sell the monazite-rich sand, but has been unable to do so.

### 3. Radioactive Wastes

The monazite, initially in the new feed, became concentrated during processing. Prior to 1989, all waste streams were re-combined, including

that containing the monazite, and sent to the tailings pile, producing a waste that averages 22 picocuries of thorium per gram of material.

At the time of the NRC inspection in January 1989, analysis of the recombined tailings indicated a total quantity of approximately 62 tons each of uranium and thorium in the tailings piles. The analysis also showed that the table concentrate (material containing valuable minerals and monazite resulting from wet gravimetric separation) had a source material concentration of 0.074 percent by weight and the subsequent monazite-rich waste (non-conducting and non-magnetic tailings produced after further processing of the table concentrate) had a source material concentration of 0.585 percent by weight. Based on the result of the available analyses, only the thorium becomes concentrated in the monazite-rich product. In March 1989 Heritage submitted a license application. The license was issued in January 1991 covering only the processing plant and source material produced during processing and stored in the monazite pile. The NRC license does not include the tailings piles since this material was not produced under an NRC license and does not meet the definition of source material.

During the NRC inspection, background radiation levels were observed to be about 7  $\mu\text{R/hr}$ . Radiation levels at the dry mill building were 50  $\mu\text{R/hr}$  in the area of the dry mill feed were 300  $\mu\text{R/hr}$ ; in the area of the dry mill tailings discharge were 240  $\mu\text{R/hr}$  and over the tailings pile about 30  $\mu\text{R/hr}$ .

Following their application for a license in 1989 until operations ended in 1990, Heritage stopped re-combining the monazite-rich waste stream, which was then transferred to a separate "monazite pile". This pile is not pure monazite sand; Heritage speaks of it being a "monazite-rich product". Subsequent inspections measured radiation levels of up to 2000  $\mu\text{R/hr}$  on contact with this pile. The thorium concentration in this material is about 4000 pCi/g.

The licensee planned to sell the monazite-rich product and transfer it to other licensees. However, the licensee was unable to sell the

monazite-rich sand, and closed operations before completing processing of the tailings piles.

4. Description of Radiologic Hazard

There is no immediate threat. Heritage states that they have decontaminated the buildings and equipment to meet the criteria included in their license. The monazite sand was not chemically altered by the licensee's process and appears to be stable in the environment and not to become airborne.

Four ground water samples analyzed by the licensee showed no increase in radioactive contamination.

Since Heritage has been unable to sell the monazite rich product, they submitted a proposal to the NRC in November 1991 for onsite disposal of the monazite pile. They have requested NRC approval to mix the 695 cubic yards of monazite-rich sand into the 102,500 cubic yards of sand tailings from which it was originally separated. They stated they would consider deed restricting this portion of the property for use as a golf course, with appropriate cover material.

Heritage continues to seek a purchaser for the monazite pile and has identified a potential overseas customer. Heritage has obtained an export license and hopes to export the material.

5. Financial Assurance/Viable Responsible Organization

The licensee has submitted a decommissioning funding plan as part of its application for a license. The cost estimate is small and depends on the licensee being able to sell all source material generated during operations. However, Heritage has indicated that it will ensure that its decommissioning of the site is in full compliance with NRC regulations.

## 6. Status of Decommissioning Activities

On March 22, 1989, Heritage submitted a license application for source material that was previously unlicensed in order to correct the violation identified during an NRC inspection. In August 1990 Heritage announced that due to changing market conditions, the facility had been closed and that decommissioning would begin immediately. While Heritage committed to clean the plant site and the monazite storage area to meet NRC criteria, they asserted that NRC lacks jurisdiction over other areas. NRC Region I, after consultation with NMSS and OGC, agreed with the licensee's position when they issued License No. SMB-1541 on December 13, 1990.

The licensee has cleaned the insides of the wet and dry mills including the removal and decontamination of all pumps. Radiation level surveys were performed using a micro-R meter, and indicated that cleaning had been successful in most areas. However, radiation levels in the dry mill were measurably higher in the area near to the monazite pile. Ten wipe samples were taken in areas with highest radiation levels and counted by their consultant. Results were less than 1 disintegration per minute (dpm) alpha and less than 29 dpm beta. This decontamination effort involved the labor of six persons for one month, and three persons for three additional months. Two employees remain onsite.

The licensee has proposed to dispose of monazite sand by dilution. That request is under review and an NRC conclusion should be available in May 1992. The State of New Jersey objects to NRC's decision that NRC jurisdiction does not extend to various areas of the site. The staff has no plans to change the determination on this matter. The State has stated they will bring their concern to the attention of more senior NRC managers.

## 7. Other Involved Parties

The State of New Jersey feels that NRC jurisdiction is too limited and does not cover enough of the contaminated site. They are objecting to NRC's position.

8. NRC/Licensee Actions and Timing

A. NRC actions consist of the following:

- |   |            |
|---|------------|
| • Review the license application submitted by the applicant including the decommissioning funding plan                          | Complete   |
| • Determine if NRC can require complete cleanup of site and impose decommissioning plan by license condition for disputed areas | Complete   |
| • Review and approve decontamination plan for buildings   | Complete   |
| • Inspect implementation of decontamination of buildings  | Complete   |
| • Respond to the licensee's request to dispose by dilution  | May 1992   |
| • Perform NRC survey of area being decontaminated and remove site from list   | March 1993 |

B. Potential problems inhibiting site cleanup:

The State of New Jersey's objection to the NRC regulatory position.



## Kerr-McGee, Cimarron Plants

### 1. Site Identification

Kerr-McGee Cimarron Plants (Cimarron Corporation)

Crescent, OK

License Nos.: SNM-928 (Uranium), SNM-1174 (Plutonium)

Docket Nos: 070-00925 (Uranium Plant), 070-01193 (Plutonium Plant)

License Status: Possession only (Decontamination/Decommissioning)

Project Managers: G. Comfort (Pu Plant), NMSS/IMNS

K. McDaniel (U Plant), NMSS/IMNS

LLWM Monitor: W. Lahe

### 2. Site and Operations

There were two fuel fabrication plants on the site, one for mixed-oxide fuels and one for low-enriched uranium fuels, plus several waste-water treatment settling ponds and a burial area (for burials previously allowed under §20.304), which were licensed as part of the uranium plant. As a result of fabrication operations, both buildings were contaminated with uranium and plutonium, respectively. The settling ponds are contaminated with uranium, while the burial areas (two additional areas recently discovered) contain uranium and trace amounts of thorium from waste disposals associated with offsite activities. Fuel fabrication operations at both plants were terminated in 1975.

The 1100-acre site is located in a rural part of central Oklahoma, 30 miles north of Oklahoma City, in a predominantly farming area. Major facilities include the plutonium plant (~ 26,000 ft<sup>2</sup>), the low-enriched uranium plant (~ 60,000 ft<sup>2</sup>), 3 waste-water treatment settling ponds and an initially identified waste burial area. There were also 5 previous waste water treatment ponds closed in 1977 and 1978 pursuant to 10 CFR 20.304.

### 3. Radioactive Wastes

There is low-solubility enriched (ranging 2 to 9.1 percent Uranium-235) uranium contamination in the soil around the uranium plant and in the building itself, as well as in soil around the settling ponds and the burial grounds (two additional burial pits have recently been discovered). The total volume of contaminated soil is greater than 500,000 cubic feet, mostly with concentrations between 30 pCi/g and 100 pCi/g of about 1.3 percent average enrichment. Uranium contamination has also been found in the ground water below the previously exhumed burial site, along with chemical contamination. The waste-water treatment lagoons also contain chemical contamination (primarily nitrates).

The plutonium plant has been decontaminated to below current standards. To date no plutonium contamination has been detected outside the building.

There is a small amount of thorium contamination in the soil around the initially identified burial area.

### 4. Description of Radiologic Hazard

This access-controlled site poses no immediate threat to the public. The only substantial contamination is onsite and, at present involves the trace amounts of thorium and the uranium in fairly low concentrations in the soil.

The plutonium facility has been decontaminated and, the confirmatory survey has been conducted by the Nuclear Regulatory Commission (NRC) contractor, Oak Ridge Associated Universities (ORAU), in August 1988 and October 1989. Criteria in "Policy and Guidance Directive FC 83-23: Termination of Byproduct, Source and Special Nuclear Material Licenses," dated November 4, 1983 have been met.

### 5. Financial Assurance/Viable Responsible Organization

The site is owned by Kerr-McGee (Cimarron) Corporation and all licensed activities were conducted by Kerr-McGee. Kerr-McGee has provided a parent-company guarantee for \$750,000 applicable to the uranium license.

## 6. Status of Decommissioning Activities

Kerr-McGee submitted decommissioning plans for the plutonium plant, and they were approved. Kerr-McGee discussed plans for the uranium plant and they have been partly approved. Kerr-McGee is performing decontamination/decommissioning operations in accordance with SNM-928, License Condition No. 20 (uranium license). The NRC staff has asked for better information on the extent of uranium contamination in the soil. During August 1989, ORAU evaluated and NRC accepted a Kerr-McGee technique for measuring total uranium in soil.

Kerr-McGee has finished decontaminating the plutonium plant. At the uranium plant, Kerr-McGee has dug up and shipped away the contents of the initially-identified burial area and has continued decontaminating the building. It has surveyed for uranium contamination in the soil around the building and submitted a request for authorization (pursuant to 10 CFR 20.302) to dispose of 400,000 cubic feet of uranium-contaminated soil on the site under Option 2 of the "Branch Technical Position on the Disposal of Uranium and Thorium Wastes" (46 FR 52061, October 23, 1991). During the week of October 13, 1991, Kerr-McGee notified NRC Region III that two additional burial pits were discovered (~ 50 meters east of the Pu plant boundary fence). Kerr-McGee is presently recharacterizing the site, including these burial areas.

On December 9, 1991, ORAU conducted and NRC Region III witnessed a confirmatory survey of the old burial area and their associated berms and loading dock. The survey confirmed that the area had been adequately decontaminated, so that the exhumed burial area could be backfilled. However, permission to backfill is not yet official.

## 7. Other Involved Parties

This site is one of the eight sites specifically addressed in the May 1989 General Accounting Office report "NRC's Decommissioning Procedures Criteria Need to be Strengthened." The Oklahoma State Department of Health has been involved with regard to the chemical contamination at the site.

## 8. NRC/Licensee Actions and Timing

NRC contractors completed a confirmatory survey of the plutonium plant, finding that the facilities are sufficiently decontaminated to be released for unrestricted use (August 1988; October 1989). The NRC staff is preparing the documentation (Environmental Assessment) required to terminate the plutonium plant license.

The NRC staff has prepared an environmental assessment to evaluate a proposed disposal of uranium-contaminated soil on the uranium plant site. Subject to conditions regarding the concentrations and solubility of the uranium, the staff has recommended that the disposal be approved as a first step toward decommissioning the entire uranium plant site. An opportunity for hearing will be offered when the availability of the environmental assessment is announced in the Federal Register. The NRC staff has prepared a Commission Paper (SECY 91-398, December 9, 1991) on the Plutonium Plant License Termination and the proposed on-site disposal of uranium, as requested in the Staff Requirements Memorandum of January 31, 1990.

### A. Actions/Milestones

- |  |                           |
|--|---------------------------|
| • Commission SRM responding to SECY-91-398 | TBD                       |
| • Plutonium Plant License Termination      | May 1992<br>(at earliest) |
| • Uranium Plant License Termination        | Mid-1993                  |

### B. Problems

Milestones could be significantly affected by Commission policy decision regarding onsite burial.

## Kerr-McGee, Cushing Plant

### 1. Site Identification

Kerr-McGee Cushing Plant

Cushing, OK

License Nos.: SNM-695 (terminated), SNM-664 (terminated)

Docket Nos. 070-03073

Project Manager: D. Fauver

### 2. Site and Operations

The site is located halfway between Oklahoma City and Tulsa. Under Atomic Energy Commission (AEC) licenses SNM-695 and SNM-664, Kerr-McGee chemically processed enriched, normal, and depleted uranium and natural thorium at this site from 1962 through 1966. During this period, Kerr-McGee owned approximately 400 acres of property to conduct AEC-licensed activities and operate an oil refinery. Materials were received in the form of  $UF_6$ , mill concentrates, unirradiated scrap fuel elements, and various chemical compounds. The licensee converted uranium to other compounds suitable for use in the nuclear fuel cycle and produced metal alloys of uranium and thorium.

In 1966, the site was decommissioned in accordance with practices at the time and the license was terminated. Between 1972 and 1982, Kerr-McGee further decontaminated the site by shipping the more highly radioactive materials off site and burying some of the contaminated soil and trash in an existing refinery waste sludge pit (pit number 4) or in trenches located in the northeast corner of the tank farm area. Some soil contamination has been detected at levels higher than the Option 1 criteria of the Branch Technical Position (BTP) on uranium and thorium wastes around and in the former process buildings.



### 3. Radioactive Wastes

The Kerr-McGee, Cushing site contains approximately 500 kilograms of uranium and 2000 kilograms of thorium, in about 500,000 cubic feet of contaminated soil, sediment, buried trash, and building rubble. The former process building is also contaminated.

There are areas of contamination, containing thorium and uranium exceeding 35 pCi/g, in and around the former processing building. Kerr-McGee has found more uranium contamination under the building than anticipated, which may require removal of the building to gain access to contaminated soils. The soils and sediments in Skull Creek, which was a discharge point for processing effluent, contain concentrations up to 279 pCi/g thorium and 968 pCi/g uranium.

The northern area of the tank farm contains discrete and general areas of uranium and thorium contamination. Pit number 4 contains hazardous waste and radionuclides with concentrations up to 34 pCi/g of thorium, and 18 pCi/g of uranium. The hazardous waste in Pit 4 is an oily-acid sludge which will be neutralized and made non-hazardous. A few tank berms contain radioactive waste, and closed trenches, located in the northeast area of the tank farm area, were used for contaminated soil burial during previous decommissioning. The berms and trenches contain up to 31 pCi/g thorium and 21 pCi/g uranium. The northern area also contains a berm previously used as a disposal area for laboratory trash and soil contaminated with up to 33 pCi/g thorium and 107 pCi/g uranium.

A small area south of the process buildings contain soil contaminated with Ra-226. The Ra-226 resulted from a small pipe scaling operation associated with the oil refinery and is not subject to NRC license.

### 4. Description of Radiologic Hazard

This site poses no immediate threat to the public. The concentration of uranium and thorium in soils is low and the material does not become airborne readily. Kerr-McGee has been on site since June 1990 and has adequate site access controls to meet 10 CFR 20 requirements.

5. Financial Assurance/Viable Responsible Organization

Kerr-McGee owns the tank farm area and the former processing building and has pursued acquisition of other land and buildings that were owned by Kerr-McGee at the time of AEC-licensed operations. Kerr-McGee is willing and able to clean up radiologically contaminated site areas. The site has been proposed for the Environmental Protection Agency's National Priorities List for Uncontrolled Hazardous Waste sites.

6. Status of Decommissioning Activities

All decommissioning work completed to date has been in response to the consent order with the State of Oklahoma. NRC has been on copy for significant correspondence related to the consent order. A site characterization report summarizing the radiological conditions of the Cushing site was submitted on May 4, 1991. Additional characterization will be required.

The cleanup of contaminated soil around the process building, sediment and soil in Skull Creek, and surface contamination in the process building continues. The majority of contaminated soil excavated from these areas has been sorted by contamination level and retained onsite pending a decision as to the disposal method. Soil with higher contamination levels and septic tank sludge has been shipped to Barnwell for disposal, along with contaminated material resulting from shotblasting process building surfaces.

In a letter dated May 20, 1991, NRC informed Kerr-McGee that the cleanup activities at the Cushing site must be in accordance with NRC requirements under an NRC license. In a follow-up meeting, held on June 7, 1991, Kerr-McGee agreed to apply for an NRC license to possess the radioactive contamination at the Cushing site by September 15, 1991. NRC provided Kerr-McGee with guidance on the preparation of the application on July 30, 1991. On October 17, 1991, the license application was submitted to NRC. The application is currently under review.

7. Other Involved Parties

A consent order was entered into by the Oklahoma State Department of Health and Kerr-McGee Corporation on May 4, 1990. The consent order required: 1) the characterization of the entire site, and if necessary, controls to prevent the removal or inadvertent spread of contamination to adjacent properties; 2) that contaminated soil around the process buildings be evaluated and excavated, if necessary, to meet BTP Option 1 limits; 3) that the process building surfaces be decontaminated to meet current NRC release criteria; and 4) that a feasibility study on remedial alternatives for the contamination in the northern portion of the site be submitted by May 1992.

Congressman Mike Synar is interested in the progress of decommissioning at the Cushing site. He receives annual updates from NRC.

8. NRC/Licensee Actions Needed and Timing

- site visit by LLWM staff to observe progress and perform pre-licensing assessment July 1992
- issue possession only license for contamination at Cushing site August 1, 1992
- inspect for license compliance September 1, 1992
- request licensee to perform additional site characterization TBD
- request licensee to submit a site remediation plan with schedule for completion TBD

## Magnesium Elektron

### 1. Site Identification

Magnesium Elektron, Inc.

Flemington, NJ

License No.: (New Application)

Docket No.: 040-08984

License Status: Pending

Project Manager: Y. Faraz, NMSS/IMNS

LLWM Monitor: H. Spiro

### 2. Site and Operations

Processing of purchased zircon flour to produce zirconium chemicals began at the site in 1952. Magnesium Elektron, Inc. (MEI), purchased the site in 1973. The facility is located in a rural area. About 30 acres of the 113-acre site are used in the operation.

MEI separates the byproducts and impurities from the ore of zirconium and manufactures zirconium chemicals for other industries that further process it into finished products. The feed ore contains trace impurities of uranium and thorium and the waste sludge generated becomes source material because of the concentration resulting from precipitating and separating the impurities. The sludge, containing the hydrates of uranium and thorium generated from this process, is stored in an onsite containment lagoon. There is no intended use for this sludge.

After an inspection in January 1989, Nuclear Regulatory Commission (NRC) informed MEI that they were in possession of source materials in excess of quantities required to be licensed under 10 CFR 40.3, which requires licensing for source material levels above 0.05 percent. The NRC directed MEI to apply for a license. On August 7, 1989, MEI submitted a license application which the NRC Region I has reviewed. MEI has responded to NRC comments. The NRC is in the process of determining the adequacy of MEI's response.

The site contains various buildings and effluent/sludge control lagoons. The site rests on two different types of shale that has folded and fractured, allowing for penetration by water. There is little information available about the ground water.

### 3. Radioactive Wastes

The contaminated sludge is a wet solid that contains, among other constituents, low concentrations of uranium and thorium. Approximately 2700 tons of wet sludge are generated annually. The sludge is deposited in two cement settling basins and is periodically pumped to a containment lagoon for onsite storage.

At the NRC inspection in January 1989, samples taken from the sludge bed indicated that the sludge had a source material concentration of 0.37 percent. In addition to the sludge, samples taken from the incoming zircon flour indicated that the flour had a source material concentration of 0.05 percent, which would result in an estimated source material inventory of 70 tons.

MEI intends to propose to add sand and fly ash to the sludge in order to produce a daily cover soil for use by landfills. This soil and sludge mixture would have a composition of less than 500 parts per million (ppm) source material. MEI indicates that this would put the soil outside the requirement for special consideration as a source material. The NRC will review this proposal following its submittal.

### 4. Description of Radiologic Hazard

Radiation readings were taken at the 1989 NRC inspection, showing background levels of 15  $\mu$ R/hr. Radiation levels where the feed ore is located were about 30  $\mu$ R/hr and ranged up to 350  $\mu$ R/hr over the dry sludge beds. A radiation level of 700  $\mu$ R/hr was measured in a narrow band at the wooden tanks where precipitation of heavy metal occurs. Radiation levels in most other areas of the facility were about 15 to 25  $\mu$ R/hr.



The site poses no immediate threat to the public. The concentration of uranium and thorium in the material is low and the probability of exposure is low because the material does not appear to become airborne.

5. Financial Assurance/Viable Responsible Organization

MEI is a wholly-owned subsidiary of Magnesium Elektron, Ltd. in England. MELtd is a wholly-owned subsidiary of British Alcan Aluminum which is, in turn, a wholly-owned subsidiary of Alcan Aluminum Ltd. of Canada.

Decommissioning funding information will be required as part of the license application.

6. Status of Decommissioning Activities

MEI submitted a license application for source material that was previously unlicensed on August 7, 1989. The NRC is reviewing this application.

The facility is in operation and there are no plans to decontaminate it at this time.

MEI has stated that it will remove all sludges in accordance with New Jersey ECRA regulations should it leave the site.

7. Other Involved Parties

State of New Jersey regulations may add requirements to the sludge cleanup.

8. NRC/Licensee Actions and Timing

A. Actions/Milestones

- Applicant to perform site characterization and submit to NRC

TBD

- NRC to review the license application submitted by the applicant including the decommissioning funding plan

TBD

B. Potential problems inhibiting site cleanup:

Possible involvement of the U.S. Environmental Protection Agency if zirconium is found in sludge, making it a mixed waste.

Minnesota Mining and Manufacturing Co. (3M)

1. Site Identification

3M Kerrick Site

Pine County, MN

License Nos.: SNM-764, SMB-239

Docket Nos.: 070-00832, 040-01020

License Status: Expired October 31, 1967

Project Manager: A. Huffert

2. Site and Operations

This site, located about 6 miles east of the city of Kerrick in Pine County, Minnesota, is owned by the Minnesota Mining and Manufacturing Company (3M) and was used for disposal of wastes contaminated with enriched uranium, natural uranium, and natural thorium. The material originated from 3M's Twin Cities Army Ammunition Plant facility in New Brighton, Minnesota, which produced enriched uranium carbide fuel and utilized natural uranium and natural thorium for research activities. 3M made four burials at this site between December 7, 1966 and November 27, 1968.

3. Radioactive Wastes

Under the provisions of 10 CFR 20.304, 3M disposed of approximately 40 millicuries of 93 percent enriched uranium, 3 millicuries of natural uranium, and 1.5 millicuries of natural thorium. The four burials are reported to comprise over 20,000 cubic feet of steel drums, wooden crates, and unpackaged piping, ductwork, and other bulky contaminated material.

The chemical composition of all radioactive waste is not known, but according to 3M representatives, the majority of the uranium waste is in the form of uranium carbide.

4. Description of Radiologic Hazard

Site access is controlled by fence. The nearest resident is located several miles away. There is no known offsite contamination from this burial site.

Enriched uranium and natural thorium concentrations in buried wastes exceed the concentration limits of Option 2 of the 1981 Branch Technical Position entitled, "Disposal or Onsite Storage and Thorium or Uranium Wastes from Past Operations" (the 1981 BTP). Natural uranium in the buried wastes exceed the Option 3 limit of the 1981 BTP.

Monitoring of the burial site has occurred irregularly since emplacement. In October 1972 representatives from the Minnesota Department of Health (MDH) collected water samples from nearby wells. In August 1977 3M collected water samples from areas sampled previously by MDH.

Radiological surveys of gamma radiation at 21 site locations recorded a maximum exposure rate of 0.07 mR/hr and an average exposure rate of 0.03 mR/hr. These surveys were taken by 3M in August 1977 and June 1983 using a geiger-mueller radiation detector.

For thorium-contaminated wastes, the primary radiation hazard is from external exposures to gamma radiation. For natural uranium and enriched uranium, ingestion of contaminated ground water and inhalation of contaminated dust are the limiting exposure pathways.

5. Financial Assurance/Viable Responsible Organization

There is no financial assurance arrangement in place. However, the Office of General counsel has concluded in its August 9, 1990 memorandum on this subject, that NRC maintains jurisdiction over burials made under

10 CFR 20.302 and 20.304, even if the license has been terminated, as in this case. Therefore, 3M is legally responsible for maintaining the site and performing site remediation, if necessary.

6. Status of Decommissioning Activities

The Division Low-Level Waste Management and Decommissioning (LLWM) is evaluating the ability of the Kerrick site to meet current NRC requirements for unrestricted use. In July 1990 LLWM contracted with Battelle-Pacific Northwest Laboratories (PNL) for assistance in performing a radiological dose assessment of the Kerrick site. PNL submitted a draft report of their assessment in September 1991, which is currently under NRC review.

The results of the radiological dose assessment will be used to assist in determining whether: 1) no remedial action is necessary; 2) additional site-specific information is needed for the radiological dose assessment; or 3) waste should be exhumed.

7. Other Involved Parties

The Minnesota Pollution Control Agency (MPCA) and the MDH have reviewed a 1983 3M report concerning these disposals. The MPCA requested NRC review of the 3M report and that NRC provide to MPCA information on long-term monitoring requirements for this and other 20.304 burial sites. NRC Region III staff maintain contact with the MPCA concerning their requests.

8. NRC/Licensee Actions and Timing

- LLWM to complete review of PNL draft report June 1992
- NRC to send letter to 3M concerning monitoring requirements and radiological dose assessment June 1992



- NRC to conduct site inspection and collect water samples with MPCA July 1992
- Final radiological dose assessment to be completed TBD
- NRC to arrange meeting between 3M, MPCA, MDH concerning radiological dose assessment  
one month after final radiological dose assessment completed
- NRC to determine whether: 1) no action is necessary; 2) additional site-specific information is needed for radiological dose assessment; or 3) waste is to be exhumed TBD

Molycorp, Inc., Washington, PA

1. Site Identification

Molycorp, Inc.

Washington, PA

License No.: SMB-1393

Docket No.: 040-08778

License Status: Possession Only License

Project Manager: C. Glenn

2. Site and Operations

The site consists of approximately 17 acres in Washington, Pennsylvania. Between 1964 and 1970, Molycorp produced a ferrocolumbium alloy from a Brazilian ore which contained natural thorium at concentrations of 1-1.5 percent by weight. Although the site is active, Molycorp no longer processes source material. The site includes a number of buildings, eight holding ponds and a large slag pile located in the southern part of the property.

3. Radioactive Wastes

There is thorium spread in low concentrations in the soil throughout most of the site, often exceeding 10 pCi/g and in some locations as high as 2650 pCi/g. Average thorium concentrations on site range between 100 and 200 pCi/g. Molycorp estimates that the quantity of contaminated material on site is approximately 36,000 kilograms of thorium in 1700 m<sup>3</sup> of slag and soil. There is no indication of any mixed waste on site.

4. Description of Radiologic Hazard

There is a fence around the site so there is no immediate threat to the public. Some contamination extends beyond the fenceline mainly on the

banks of Chartier's Creek. The only substantial contamination at present is fairly low concentrations of thorium. There is no evidence of further spreading of contamination.

Radioactivity levels have been measured at various locations on site:

- Building 34 has alpha contamination (fixed) up to 90 dpm/100 cm<sup>2</sup>; beta contamination (fixed) up to 8680 dpm/100 cm<sup>2</sup>; and direct radiation levels up to 169  $\mu$ R/hr and the source of contamination is suspected to be below the floor.
- Well, creek and storm drain lines have gross alpha levels less than 5 pCi/l and gross beta levels less than 20 pCi/l.

5. Financial Assurance/Viable Responsible Organization

The site is owned by Molycorp, and all licensed activities were conducted by Molycorp. Molycorp is probably able but not inclined to undertake the necessary cleanup activities to NRC specifications. Molycorp is a subsidiary of Unocal, an oil company. Molycorp has submitted a financial assurance guarantee for \$750,000.

6. Status of Decommissioning Activities

Molycorp proposed decontamination criteria that the NRC rejected, because the criteria would result in unacceptable residual contamination levels. NRC staff requested that Molycorp create a better decontamination plan for the site. Molycorp is working on another plan for decontaminating the site beginning with the holding ponds. An NRC contractor did a radiological survey of the site in 1985 which identified elevated levels of thorium contained in the dikes which separate the holding ponds.

7. Other Involved Parties

There are currently no other parties involved with radiological cleanup activities at this site.

8. NRC/Licensee Actions and Timing

Molycorp is developing a decontamination plan for eight holding ponds and the area immediately around these ponds, but no submittal date for that plan has been established. When the plan is submitted, it will be reviewed by the NRC before any decommissioning activities are undertaken by the licensee.

Molycorp expects to meet with NRC staff in the first quarter of 1992 to propose decommissioning of eight surface impoundments. NRC staff anticipates requiring Molycorp to decommission the site in accord with a specified schedule. NRC staff will issue a letter to Molycorp by May 31, 1992 requesting that remediation milestones be established.

Molycorp, Inc., York, PA

1. Site Identification

Molycorp, Inc.

York, PA

License No.: SMB-1408

Docket No.: 040-08794

License Status: Timely Renewal

Project Manager: Y. Faraz, NMSS/IMNS

LLWM Monitor: C. Glenn

2. Site and Operations

The 6-acre site in York, Pennsylvania, is used to process lanthanide ores and concentrates containing low concentrations of thorium and uranium. The residue presently stored on site, includes uranium and thorium, packaged in 103, 55-gallon plastic drums and 350, 3000 pound bags. Bagged material is being sent off site to Mountain Pass, California, for further processing. Material contained in the 55-gallon drums is most likely to be mixed waste containing lead. Licensed activities are still being conducted. Molycorp's license allows them to possess up to 100,000 kilograms of thorium and 315 kilograms of uranium. Molycorp recently announced it would resume processing at the site for cerium and other lanthanides.

3. Radioactive Wastes

There is thorium in the soil throughout the site at concentrations up to 700 pCi/g. There is also evidence of uranium in the soil in a few localized areas at concentrations up to 230 pCi/g. In addition, a large quantity of thorium-232 (Th-232), radium-226 (Ra-226), and uranium-238 (U-238) contaminated residues (estimated at 460-690 cubic meters) is located in a pile on the site.



4. Description of Radiologic Hazard

This site poses no immediate threat to the public and site access is controlled. The only substantial contamination is from thorium and uranium in the soil and buildings and a limited number of 55-gallon drums of residue material. Based on a radiological survey done by an NRC contractor in 1985, direct gamma exposure rates were measured up to 70  $\mu\text{R/hr}$  at 1 meter above the surface and 96  $\mu\text{R/hr}$  on contact at the site perimeter. Outside the site perimeter exposure rates were measured up to 59  $\mu\text{R/hr}$  at 1 meter above the surface and 490  $\mu\text{R/hr}$  on contact. Soil samples collected outside the site perimeter showed that Th-232, U-238 and Ra-226 concentrations were as high as 320, 110, and 90 pCi/g, respectively. Well water samples indicated gross alpha and gross beta concentrations less than 12, 42 pCi/l, respectively. Molycorp-York was cited on January 8, 1992, for violating 10 CFR 20.201(6) involving inadequate site surveys.

5. Financial Assurance/Viable Responsible Organization

The site is owned by Molycorp; all licensed activities were conducted by Molycorp. Molycorp, a wholly-owned subsidiary of Unocal, an oil company, is able and generally willing to undertake necessary cleanup operations. Molycorp has submitted a financial assurance guarantee for \$750,000.

6. Status of Decommissioning Activities

Molycorp submitted a revised conceptual decontamination plan in December 1991 as part of its license renewal application. At the time of decommissioning, Molycorp anticipates decontaminating the facility by use of high pressure water spray and/or sandblasting, in conjunction with disposal at a license facility of some parts of buildings and flooring. Molycorp anticipates disposing offsite about 500 cubic meters of soil contaminated with thorium at levels greater than Option 1. Molycorp has estimated the cost of decommissioning to be about \$3 million.

7. Other Involved Parties

There are currently no other parties involved in radiological cleanup activities at this site.

8. NRC/Licensee Actions and Timing

The NRC is in the process of examining Molycorp's revised request for renewal of its license submitted in December of 1991. This application includes plans for processing for cerium, lanthanum, and yttrium. Licensed activities are still being conducted at this site so there is currently no schedule for decommissioning the site.

Northeast Ohio Regional Sewer District/Southerly Plant

1. Site Identification

Northeast Ohio Regional Sewer District

6000 Canal Road

Cleveland, OH

License No.: 34-17726-02

Docket No.: 030-18276

License Status: (Not a licensed facility for Co-60)

Project Manager: M. (Sam) Nalluswami

2. Site and Operations

The Northeast Ohio Regional Sewer District/Southerly Plant (NEORS/SP) is a waste water (sewage) treatment plant servicing large areas of Cleveland, Ohio. The treatment includes incineration of sludge, transport of the ash in slurry form to settlement/evaporation ponds, and eventual removal of the dried product as fill.

The NEORS/SP was found to have cobalt-60 (Co-60) soil contamination as a result of an aerial monitoring survey (AMS) flight in April 1991. The AMS flight was performed to monitor another facility in nearby Newburgh Heights, Ohio, and the identification of the NEORS/SP site was incidental. Followup site visits and surveys confirmed the contaminant was Co-60 in the soil with readings 30 to 60  $\mu\text{R/hr}$  at 1 meter including background. Soil samples (2) from the area showed 27 and 79 pCi/g of Co-60. The areas involved were at the north end of the site where fill had been transferred in the late 1970s or early 1980s and at the southeast end where three settling ponds are located.

### 3. Radioactive Wastes

The contaminated material appears to be sewage obtained from the City of Cleveland which has been incinerated to ash, transferred in water and sludge to settling ponds then moved again when dry.

Oak Ridge Associated Universities (ORAU) performed preliminary radiological characterization on September 16-25, 1991, around the North Fill Area (1300 m<sup>2</sup>) and Sanitary Ponds Area (6400 m<sup>2</sup>) (Phase I). One hundred twenty-six (126) surface soil samples, 36 subsurface soil samples, 17 sediment samples and nine water samples were collected. Gamma surface scans identified several areas with elevated levels of direct radiation ranging from 1 to 100 times the background levels.

The maximum concentrations in surface soil samples were 6798 pCi/g for the North Fill Area and 9990 pCi/g for the Sanitary Ponds Area. The maximum concentrations in subsurface soil samples (15-30 cm depth) were 7733 pCi/g for the North Fill Area and 1730 pCi/g for the Sanitary Ponds Area. (One sample in the Sanitary Ponds Area showed 3,000,000 pCi/g which is not considered to be representative.)

### 4. Description of Radiologic Hazard

The site poses no immediate threat to the public with the sewer district maintaining adequate security to the contaminated areas. NRC Region III attempted to discover the source of the contamination; however, no responsible party was identified.

Based on the ORAU survey, the exposure rates at the North Fill area exceed the NRC guideline which is 5  $\mu$ R/hr. Further assessment of the radiologic hazard depends on the Phase II ORAU report due in June 1992.

### 5. Financial Assurance/Viable Responsible Organization

The license possessed by the NEORSD (a local governmental agency) is for sealed Cs-137 sources for use in industrial gauges and not related to the

Co-60 contamination of the sludge. The contamination apparently originated by discharge into the Cleveland metropolitan sewer system by parties unknown. Since the contamination exists on county property, the NRC does not anticipate being unable to have a viable responsible organization. NEORS is not a licensee to possess Co-60.

6. Status of Decommissioning Activities

ORAU has initiated a radiological assessment of the site. Preliminary surveys were completed during the fall of 1991 with additional surveys and sampling performed during March 1992. Regular inspection programs will be conducted.

7. Other Involved Parties

It is unknown who contributed the Co-60. Since this is a waste water treatment facility, Ohio EPA and/or U.S. Environmental Protection Agency may be involved in the resolution of the issue, in addition to other state, county, and city of Cleveland agencies.

8. NRC/Licensee Actions and Timing

Based on the ORAU preliminary (Phase I) report, NRC assisted ORAU during the field survey in March 1992. NRC will also assist ORAU in the preparation of the final assessment due in June 1992. When the site assessment is completed, a decision will be made regarding course of remediation. ORAU will be consulted on the remediation plan including a schedule.

The following key activities are tentatively planned:

- |  |           |
|--|-----------|
| • Phase II survey (field work)                                   | complete  |
| • Phase II Report due (final assessment)                         | June 1992 |
| • Prepare Remediation Plan (if required)<br>and other activities | TBD       |



Nuclear Metals, Inc.

1. Site Identification

Nuclear Metals, Inc.

Concord, MA

License Nos.: SMB-179, SUB-1452

Docket Nos.: 040-00672, 040-08866

License Status: Active, renewal under review

Project Manager: M. Roberts, Region I

LLWM Monitor: W. Lahs

2. Site and Operations

Nuclear Metals, Inc. (NMI) has manufactured products from depleted uranium (DU) for military, industrial, and medical applications since 1958. The licensee plans to continue operations at the site indefinitely.

The major source of uranium at the NMI site was the discharge of neutralized pickling liquor containing oxidized copper and depleted uranium to an unlined holding basin between 1958 and 1985. In 1985 discharge to the holding basin ceased as the result of an acid recycling process and the basin was covered with a synthetic cover in 1986 to prevent water infiltration.

The DU appears to be confined to the holding basin. Monitoring has indicated no evidence of migration of uranium to the ground water, although possible ground water contamination with volatile organic compounds (unagreed origin) had been previously indicated.

The licensee submitted a license renewal application in 1989, in which a brief decontamination plan was included.

The facility consists of five major buildings and a holding basin on a 29.5-acre site in the West Concord Industrial Park, Concord, Massachusetts. The area is partially wooded and includes a number of natural ponds and bogs. The adjacent lands to the east and south of the site are residential (nearest residence at approximately 300 meters).

3. Radioactive Wastes

The holding basin contains about 3500 cubic yards of material consisting of about 6.5 percent (approximately 250,000 pounds total) depleted uranium, 16 percent nonradioactive copper, 3 percent nitrates and 60 percent soil sludges.

Current waste streams from manufacturing activities produce an average of approximately 25,000 cubic feet of radioactive waste per year. This radioactive waste is presently disposed of at licensed disposal sites.

4. Description of Radiologic Hazard

There is no immediate threat to the public health and safety. The holding basin currently is completely fenced in and access is controlled through gates.

The licensee has had a contractor perform ground water monitoring since 1981. This monitoring program has documented the movement of nonradioactive nitrate to a nearby stream, but has given no clear evidence of offsite migration of DU through the ground water. The semi-annual monitoring program includes sampling of the water supply used by the licensee, the licensee's discharges, ground water from 19 wells and surface waters at a total of 24 locations on and off the NMI site. Soil and sediment samples are also collected and analyzed. The highest concentrations of DU measured have been in wells HB-7 and HB-8, which are located within a few feet of the holding basin and may actually penetrate material discharged early in the use of the basin. DU concentrations in

these wells peaked in 1983 at about 1500 parts per billion (ppb) but have dropped and stabilized ( at around 100 ppb) for the last four years. The contractor has also conducted various studies to determine the hydrogeology of the site.

In 1980 elevated levels of volatile organic compounds (VOC's) were measured in two wells. Based on apparent ground water contamination with VOC's and presence of the unlined holding basin containing DU, the Commonwealth of Massachusetts, Department of Environmental Protection (DEP) classified Nuclear Metals as a "priority disposal site". This classification requires that DEP review and approve all remedial actions at the site. Based on corrective actions taken and current measurements, NMI believes that VOC's are no longer a problem. However, in accordance with commitments as part of the Massachusetts Contingency Plan Phase II Comprehensive Site Assessment process, the licensee will be installing three new wells, and will perform additional soil and sediment sampling to more fully characterize the site.

In 1982 an environmental survey was conducted at the site by Oak Ridge Associated Universities (ORAU), and in 1985 an aerial radiological survey by EG&G was performed over the NMI site, both under contract to NRC. The results of these surveys were in agreement with the results of the licensee's environmental and effluent monitoring programs. Offsite radiation measurements were in the background baseline range.

5. Financial Assurance/Viable Responsible Organization

NMI has stated that they are totally committed to complete decontamination and decommissioning of the holding basin and its contents. An irrevocable letter of credit for \$750,000 is in effect (7/27/90).

6. Status of Decommissioning Activities

Since 1985, when the holding basin was closed, the licensee has been working to develop a plan to decommission the holding basin and remove

its contents. This activity has resulted in periodic discussions between the NRC, the Commonwealth of Massachusetts, the Concord Board of Health, and NMI.

Presently, Nuclear Metals is exploring two options for treatment of the holding basin: 1) recycling the material in the basin for resource recovery (a pilot project to determine economic feasibility of recycling is in progress, this included sampling of the contents of the basin), or 2) sending the basin contents to a burial site for disposal.

The licensee submitted a brief description of a decontamination plan as part of their request to renew the license in 1989. In December 1991 the licensee met with NRC Region I to discuss a tentative removal and disposal plan they are developing. Implementation of this plan, which involves recovery and recycling of the copper and uranium, is dependent on the acceptability of the plan by a number of regulatory groups.

#### 7. Other Involved Parties

A factor in the process is that the Massachusetts DEP has classified NMI as a "priority disposal site," which means that a detailed process must be followed for developing the decontamination plan and that DEP must approve all remedial actions at the site.

#### 8. NRC/Licensee Actions and Timing

A. NRC actions consist of the following:

- Review Available Site Data and Request Decontamination Plan and firm Schedule May 1992
- Begin review of decontamination plan August 1992

- Approve plan for the decontamination of the holding basin following excavation October 1992
- Inspect implementation of decontamination plan (Ongoing) June 1996
- Perform NRC survey of the area being decontaminated December 1997
- Amend license and remove site from list of sites June 1998

B. Potential problems inhibiting site cleanup:

NMI is still exploring options for treatment of the contents of the holding basin. Licensee indicates that to make reprocessing and recycling of material in holding basin economically viable, it must be accomplished over an extended time (5 to 7 years).

Massachusetts DEP has classified Nuclear Metals as a "priority disposal site". This means DEP must approve all remedial actions at the site. NRC Region I has been in communication with DEP and does not anticipate significant delays caused by DEP. However, NMI believes this process will significantly increase the time necessary to complete the project.



Old Vic, Inc.

1. Site Identification

Old Vic, Inc.

Cleveland, OH

License No.: 31-26394-01

Docket No.: 030-19594

License Status: Active

Project Manager: K. Lambert, Region III

LLWM Monitor: D. Orlando

2. Site and Operations

The licensee actively used radionuclides at the facility, a 5-story brick structure, until 1987, for the purpose of conducting research, calibrating instruments and manufacturing electronic components. The major activities which resulted in past facility contamination were the production of electronic tubes containing radium-226 (Ra-226) and Nickel-63 (Ni-63) as ionization sources. Currently, most of the building is unoccupied. A portion of the second floor is used by a plumbing company to store excess equipment. Two locations on the second floor exhibited exposure rates in excess of the Nuclear Regulatory Commission (NRC) unrestricted use criteria. A representative of the plumbing company has indicated that access to the building is limited and those individuals entering the building are instructed to remain away from these two areas. As of February 1992, the two areas have been roped off and posted with caution radioactive material signs.

The licensee began decommissioning the facility in October 1988 and performed a final survey in August 1989. Their final survey indicated that the facility was cleaned to levels acceptable for unrestricted use. A confirmatory survey by the Oak Ridge Associated Universities (ORAU) in May 1990 identified multiple locations that were above NRC unrestricted use criteria. Currently, decommissioning has halted while a new

decommissioning contractor is being selected. On March 23, 1992, the license issued to Victoreen, Inc. was terminated and a new, possession only, license was issued to Old Vic Inc. This action was taken at the request of Victoreen's parent company, 21 International Holdings, to allow the parent company to assume responsibility for the decommissioning of the facility.

3. Radioactive Wastes

The predominant contaminants at the Victoreen facility are Ra-226 and Ni-63. These radioisotopes are found on building structures such as walls and floors.

4. Description of Radiologic Hazard

The site poses no threat to the public. The building site is maintained under 24 hour security with access limited to those individuals associated with Victoreen or the plumbing company. The plumbing company has limited access to the facility to less than 10 individuals.

5. Financial Assurance/Viable Responsible Organization

Because the licensee believed that decommissioning had been completed and had requested license termination in early 1990 a decommissioning funding plan or financial certification was not submitted to NRC in accordance with the decommissioning financial assurance requirements. On March 23, 1992, Old Vic Inc. assumed responsibility for the decommissioning of this facility. The possession only license issued to Old Vic Inc. does not allow decommissioning of the facility until new site characterization, decommissioning and decommissioning funding plans have been reviewed and approved by NRC. The licensee has indicated that they wish to meet with NRC Region III to discuss the requirements for these plans.

6. Status of Decommissioning Activities

The licensee previously submitted a termination survey in support of releasing the facility for unrestricted use. A confirmatory survey by ORAU identified multiple locations that were above NRC unrestricted release criteria. The total alpha and beta-gamma activities ranged from 32 to 4200 dpm/100 square centimeters and 200 to 980,000 dpm/100 square centimeters, respectively. Of the 206 surface activity measurements, 57 exceeded the Ra-226 guidelines.

Presently, the licensee is in the process of selecting another contractor to complete the decommissioning of the facility.

7. Other Involved Parties

Because of the presence of Ra-226, the Ohio Department of Health, Radiological Health Program has requested that the licensee file a Radioactive Materials Registration with that agency. NRC Region III is currently cooperating with the State of Ohio on the decommissioning of this facility.

8. NRC/Licensee Actions and Timing

On February 7, 1992, NRC received a request for a license amendment to change the ownership of the facility from Victoreen to a subsidiary of 21 International Holdings and to name a new RSO. On March 23, 1992, the existing license was terminated and a new license was issued. The licensee is meeting with NRC Region III on April 28, 1992 to discuss the requirements for decommissioning the facility. Based upon the results of this meeting milestones for the following activities will be established.

- Submission of a revised decommissioning plan and a decommissioning funding plan by Old Vic Inc.

- Review and approval of the revised plans by NRC
- Selection of decommissioning contractor by Old Vic Inc.
- Begin cleanup
- Complete cleanup/submit final survey to NRC Region III. The licensee has indicated that they want to complete the decommissioning project by the end of 1992
- Confirmatory survey by ORAU
- Termination of license

## Permagrain Products

### 1. Site Identification

Permagrain Products

Media, PA

License No.: 37-17860-02

Docket No.: 030-29288

License Status: Timely renewal

Project Manager: M. Bouwens, Region I

LIWM Monitor: H. Spiro

### 2. Site and Operations

The Permagrain site is located in the Quehanna Wild Area, part of the Moshannon State Forest near Karthaus, Pennsylvania. The building was built in 1957 to house a research reactor and hot cells which were intended for the examination of various irradiated materials as part of a research and development program. This program and the reactor were only active for a very brief period, ending in about 1960. In 1960 Curtiss-Wright, the original owner, donated the site to the Pennsylvania State University. The land and buildings are now owned by the Pennsylvania Forest Service and are leased to the current licensee. Various companies have leased and operated the facility since 1960, including Martin Marietta, Arco, NUMEC and the current licensee. All irradiated fuel was removed from the site in the 1960s.

The facility is located in north central Pennsylvania, about 50 miles northwest of State College. The nearest population centers are 10 miles away and are very small towns.

Permagrain, a company formed by several former site employees, purchased the operation from Arco in 1978. Their NRC license authorizes the use of the former reactor pool as an underwater irradiator to produce plastic impregnated wood products for commercial sale. Cobalt-60 (Co-60) contained within sealed sources is used for irradiations.



The license expired August 31, 1990, and is in timely renewal.

3. Radioactive Wastes

The radioactive contamination is in inactive portions of the facilities and equipment including ventilation systems, drainage systems, storage tanks, the hot cells, a chemistry laboratory and a decontamination room. Isolated areas of contamination are also found on a crane walkway and various support structures for the building. The principal contaminant is strontium-90 (Sr-90) which was used by Martin Marietta during the period 1962 to 1967 when they leased the hot cells for production of heat sources containing large (as much as 80,000 curies each) of Sr-90. The actual volume of waste has not been estimated, but it is estimated that less than 15 millicuries of Sr-90 remain in the facility. One hot cell also contains small amounts of unsealed Co-60 which was used by Arco prior to 1978.

4. Description of Radiologic Hazard

There is no immediate threat. The contamination is confined to facilities on site and there is no public access to these facilities. The licensee maintains an active radiation safety and effluent monitoring program.

Measurements taken by the State of Pennsylvania, EG&G and Oak Ridge Associated Universities (ORAU) indicate that no ground water contamination is occurring as a result of past activities at the site, thus indicating no evidence of migration of radioactive materials from the facility.

5. Financial Assurance/Viable Responsible Organization

Permagrain is probably not financially capable of decontaminating the site; however, the Commonwealth of Pennsylvania, as owner of the property, has

8. NRC Actions Needed and Timing

A. NRC actions consist of the following:

- Review the site characterization data and determine if the data is adequate August 1992
- Review and approve the site decontamination plan December 1992
- Inspect implementation of plan December 1993
- Receive and review a final survey from the licensee June 1994
- Perform confirmatory survey August 1994
- Release site for unrestricted use December 1994

B. Potential problems inhibiting site cleanup:

Availability of state funds.

accepted responsibility for providing the financial resources required for decontamination and has signed a statement of intent submitted by the licensee. In a lease agreement between Permagrain and the Pennsylvania Department of Environmental Resources (DER), DER acknowledges that Permagrain is not financially responsible for decontamination of the site.

NRC has reminded Permagrain that, notwithstanding the financial agreements with DER, the responsibility for compliance with NRC requirements for site characterization and decommissioning rests with the licensee, Permagrain.

6. Status of Decommissioning Activities

Pursuant to agreement with NRC Region I the licensee and PADER have worked together about 2 years to develop a plan for characterizing the site with state funds. As a result of those agreements and activities, PADER has contracted with Canberra Nuclear to develop a characterization plan and to characterize the site. Field work for the site characterization began in September 1991 under the supervision of the licensee and another consultant and was largely completed by January 31, 1991. NRC Region I inspected the implementation of the characterization plan in December 1991. Preliminary results indicate that contamination remains confined to the facility. A draft report of the results of the characterization is due to the PADER by March 30, 1992.

The Permagrain license contains requirements that Permagrain: 1) submit to NRC, on or before July 1, 1992, a report that characterizes the extent of onsite radioactive contamination, and 2) submit to NRC, on or before October 1, 1992, a plan and schedule for the removal, packaging, remediation, and disposal of all radioactive materials which exist as contamination at the site.

7. Other Involved Parties

Since the State of Pennsylvania owns the property, and has apparently entered into contractual arrangements with Permagrain, they will need to be kept informed.

Pesses Company, METCOA Site

1. Site Identification

Pesses Company (METCOA)

Pulaski, PA

License No.: STB-1254

Docket No.: 040-08406

License Status: Expired 7/31/86 (licensee bankrupt)

Project Manager: M. Roberts, Region I

LLWM Monitor: H. Spiro

2. Site and Operations

The METCOA site is a defunct metal reclaiming facility that was abandoned, without informing the Nuclear Regulatory Commission (NRC), after the company declared bankruptcy in 1983. The NRC became aware of the abandonment during a routine inspection in September 1984. Materials handled at the facility during operation from 1975 to 1983 included low-level radioactive compounds, such as ores containing uranium and thorium; thoriated magnesium and nickel; and nonradioactive heavy metals, such as chromium, cobalt, lead, cadmium, and copper.

The site is located on 22 acres in a rural agricultural area. A 6-acre portion of the site, surrounded by a fence, contains four interconnected buildings that were used for scrap metal reprocessing and ferrocolumbium production.

Approximately 550 people live within 1 mile of the site. At least one home is within 1/4 mile, with 22 homes within 1/2 mile, and approximately 138 homes within 1 mile of the site. An open air farmers' market operates near the site during part of the year. The site is located in the Allegheny Plateau region, which is characterized by deep, narrow valleys and drains into the Delaware, Allegheny, and Monongahela River systems.

The original license authorized disposal of the slag waste products containing uranium and thorium. It is uncertain whether onsite disposals took place. The licensee claims that no disposals took place and no specific burial sites were found during the site surveys. However, there is soil contamination at various locations on site.

On January 22, 1986, the NRC issued an order requiring the licensee or its successor to submit a decontamination plan, complete the decontamination, submit a final survey report, and control entry to the site until the NRC could confirm that the decontamination had been properly performed. The licensee failed to comply with the order.

### 3. Radioactive Wastes

When NRC first identified the abandonment of the site, there was a wide variety of magnesium and nickel thorium scrap, nonhazardous scrap metal, obvious soil contamination, ore and just plain rubbish spread around the site and buildings.

Following stabilization and preliminary inventory by USEPA and prior to Phase One of the removal action (discussed below), approximately 1500 drums, totes (large metal boxes of varying size) and overpacks of various waste were stored at the site.

There were also about 500 cubic yards in four piles of contaminated soil and a low solubility, siliceous slag material. Much of these materials were contaminated with thorium. Surface soil was found to be contaminated with natural thorium up to 2410 pCi/g. Exposure rates around the drums and piles were typically 30 to 50  $\mu$ R/hr with some up to 1 mR/hr. Other wastes on the site included approximately 800 cubic yards of hazardous wastes containing chromium, lead, and cadmium.

### 4. Description of Radiologic Hazard

The NRC contracted with Oak Ridge Associated Universities (ORAU) to perform a radiologic survey that was completed in November 1985 and



revealed elevated levels of radiation from the waste generated by the metal processing operation. Soil samples collected also contained elevated levels of lead, chromium, and cadmium. The NRC brought the site to the attention of the Pennsylvania Department of Environmental Resources (PADER). PADER then conducted their own site assessment, including sampling, which confirmed the NRC findings. PADER requested that U.S. Environmental Protection Agency (EPA) perform a site assessment to investigate the potential threat to public health and the environment.

Between June and September 1986, Roy F. Weston, Inc. (Weston), the EPA on-scene coordinator, performed a comprehensive site assessment that included soil, drum, surface water, and ground water sampling. Geophysical surveys also were conducted, including a magnetometer survey and ground penetrating radar.

The principal hazards associated with the contamination and wastes at the METCOA site involve inhalation, ingestion, intrusion, and ground water. No immediate threats to public health and safety exist. Stabilization measures have been taken to minimize the transport of radioactive materials from the site. Although deterioration of visquene and geotextile barriers has occurred, restabilization efforts have taken place. The inhalation and ingestion hazards are considered to be minimal. The intrusion hazard is minimized by the fencing around the contaminated areas and local police security. The waste slag has a very low solubility which is not expected to result in contamination of groundwater supplies. Samples of surface waters and ground water confirm that radioactive materials have not migrated.

Specific hydrological data is unavailable. However, surface drainage patterns were studied in the stabilization program so the barriers to sediment transport could be installed. One well exists onsite. This well and surface water in streams, drainage ditches, and ponds were sampled in the ORAU site survey. No contamination in water or sediment samples was found. Current sampling data are unavailable. Buchanan Run is a small stream that flows adjacent to the site.

Security of the fenced-in area containing the radioactive material is provided by the Pulaski Township Police.

5. Financial Assurance/Viable Responsible Organization

The Pesses Company possession limit is 100,000 kilograms of source material containing 2000 kilograms of thorium (440 mCi). Under this possession limit a decommissioning funding plan would be required. However, the licensee has gone bankrupt and its remaining assets are insufficient to fund the site cleanup. Stabilization efforts have been funded by the Superfund. The potentially responsible parties (PRPs) funded the restabilization efforts.

The NRC also became a party in the bankruptcy litigation. The bankruptcy court ruled that the NRC had the same claim to the licensee's assets as an unsecured creditor.

6. Status of Decommissioning Activities

Based on the information generated by the various surveys EPA stabilized the site in 1987 using Superfund money and began a thorough investigation of the source(s) of the contamination. Weston, an EPA contractor for the PRPs of this site, conducted the site stabilization phase of the cleanup.

OH Materials, Inc., of Findlay, Ohio was the prime contractor responsible for the staging and securing waste materials. These activities consisted of creating bulk (slag waste) staging piles and covering the piles with a combination of visquene and geotextile fabrics. Included in the activities were the staging of approximately 1500 drums located onsite. Approximately 1300 cubic yards of hazardous waste were collected in four piles. Weston issued a report documenting the site and the stabilization activities. The visquene and geotextile coverings subsequently deteriorated and are now ineffective in minimizing the infiltration of water and preventing transport of sediments as a result wind and water. In November 1988 the PRPs proposed to restabilize these waste piles. This restabilization took place in November 1989.

On August 13, 1990, the EPA began a removal operation after offering the PRP's the opportunity to sign a consent order and control the removal action themselves, thereby avoiding potential penalties. On August 17, 1990 a group of the PRP's agreed to the order and submitted Phase One of a removal work plan for approval. The EPA and NRC Region I reviewed the plan and EPA formally approved the plan in October 1990. Work commenced in November 1990.

Phase One of the plan primarily involved setting up a base of operations at the site and initiating a screening program for the wastes followed by disposal of as much waste as possible. Wastes were classified as non-hazardous and non-radiological, hazardous, radiological or mixed waste (hazardous and radiological) by direct monitoring or through analysis of previously taken samples. Phase One was completed in April 1991 and resulted in the removal of 861 drums and 20 larger containers of radioactive waste, 90 containers of hazardous waste, 1134 cubic yards of radioactive or hazardous wastes and 4500 gallons of contaminated liquids. Each type of waste was sent to appropriately approved or licensed facilities for processing, packaging and disposal. About 350 cubic yards of nonradioactive nonhazardous waste were disposed locally. No mixed wastes were removed from the site. An NRC inspector visited the site in December 1990 to review the activities associated with Phase One.

While Phase One of the remediation plan was underway, the PRP's contractor submitted a Phase Two work plan. This portion of the work plan was also reviewed by EPA, PADER and Region I and approved by EPA. Phase Two involved further characterization of the site through analysis of soil samples, a radiological survey of the site at defined grid points and a further magnetic survey. The field work for Phase Two commenced in August 1991 and was completed in December 1991. NRC inspectors visited the site in August 1991 to review site activities. A report which includes the results of the sample analyses is expected by EPA in late April 1992.

After review of the report, EPA expects to write a second consent order to require development of further plans and subsequent excavation of contaminated soils and demolition or decontamination of the site buildings.

This phase of the removal project is not likely to start before July 1992. Disposal of the mixed waste will be considered during this phase and will likely be the subject of a third order.

7. Other Involved Parties

Since this is a Superfund site, EPA has the lead on cleanup activities. EPA and NRC Region I reviewed the remediation plan during October, and EPA approved the plan and started work in November 1990. NRC Region I will assist EPA in monitoring the progress of work. An NRC inspector visited the site to review activities several times each year.

8. NRC/Licensee Actions and Timing

NRC is maintaining contact with EPA regarding resolution of final cleanup issues. NRC Region I will assist EPA in review of work plans to ensure compliance with relevant NRC guidance and appropriate monitoring of the progress of work. As in previous phases of the work, the NRC will continue to inspect site activities as needed. It is important to recognize that EPA normally relies on the final survey performed by the PRP contractor to release sites for unrestricted use. Since NRC will plan to perform our own confirmatory survey, close coordination with the PRP's and EPA will be important as the PRP's complete the removal action.

The NRC actions will be --

- |   |             |
|---|-------------|
| • Request confirmation of schedule from EPA | May 1992    |
| • Review work plan provided by PRP's        | June 1992   |
| • Inspect Ongoing removal activities        | August 1992 |
| • Review EPA analytical data                | 1993/1994   |
| • Perform NRC final survey                  | 1993/1994   |

- Document cleanup and final survey and agreement that site may be released for unrestricted use

1993/1994

Dates are tentative and in part based upon EPA estimates of site milestones.

B. Problems

- Present plans do not address disposal of mixed waste at this site. The PRP's have begun to characterize the waste and plan to dispose of hazardous and radioactive that are separate and then address the mixed waste.



Remington Arms Company

1. Site Identification

Remington Arms Company, Incorporated

Lake City Army Ammunition Plant (LCAAP)

Independence, MO

License No.: SUB-1195 (Issued to Remington Arms Company, Inc.)

Docket No.: 040-08303

License No.: SUC-1380 (Issued to Dept. of Army)

Docket No.: 040-08767

License Status: SUB-1195--Retired as of 1986

SUC-1380--Active, due for renewal in 1993

Project Manager: K. Lambert, Region III

LLWM Monitor: D. Orlando

2. Site and Operations

Contamination at the Lake City Army Ammunition Plant (LCAAP) site arose from the assembly, testing and demilitarization of cartridges containing depleted uranium (DU). DU was used at the LCAAP from the early 1960s through the mid-1980s.

Contamination at the LCAAP site consists of approximately 7655 pounds (1531 millicuries) of DU as fragmented DU penetrators. This material is located on two areas at a firing range on the facility property. The total volume of contaminated soil at the firing range sites is estimated to be approximately 400,000 cubic feet. In addition, up to 3,000,000 cubic feet of radioactive waste, consisting of sand contaminated with DU, from bullet catchers, is located in a sand storage pile at the LCAAP. This sand may also contain hazardous material, such as lead and unexploded munitions. Two buildings, used in the product of DU munitions are also located at the LCAAP. However, these buildings were decontaminated by April 1987.

The LCAAP continues to operate and has a current NRC license. Present operations do not include work with DU, and should not increase the volume of the radiologically contaminated material already onsite. The firing range containing the contaminated soil and sand is still used for the testing of nonradioactive munitions. The LCAAP is not expected to close in the near future.

The LCAAP is located in the western portion of Missouri, approximately 20 miles east of Kansas City, MO. The nearest town, Buckner (pop. about 3000), is located 3 miles to the east of the LCAAP. The LCAAP is in an agricultural region. The major crops produced in this area are corn and soybeans. Considerable cattle and pig farming is also done in the region.

The LCAAP consists of approximately 3909 acres. There are 30 major buildings on the facility and the facility is provided with 24 hour a day security. Currently, about 1000 individuals work at the LCAAP. Military personnel and their families (about 30 individuals) live on the facility property. The LCAAP is a Government-owned, contractor operated facility. The Remington Arms Company operated the facility until November 1985 and held NRC License SUE-1195. The current contractor is the OLIN Corporation. This company holds NRC License No. 24-24576-01 for the possession and use of Cs-137 and Am-241 in non-portable measuring gauges.

The LCAAP SDMP site consists of two production buildings (3A and 12A, decontaminated as of April 1987) and a firing range area. The firing range is located at the southeast portion of the LCAAP and is approximately 2500 meters by 300 meters in area. Two areas on the range are infiltrated with DU fragments, lead and unexploded munitions. The firing range is completely fenced and secured from unauthorized entry at all times. Contaminated areas on the range are posted and health physics personnel inspect the enclosure annually.

In addition to the contaminated soil at the firing range, a sand storage pile, and possibly the surrounding area, are also contaminated with DU, lead, and unexploded munitions. This storage pile is located next to the

range area within the fence enclosing the range. A portion of the range (called the 600 meter range) was used to demilitarize approximately 44,000 cartridges each containing 206 grams of DU. The sand storage pile is made up of sand from the 600 meter range (and other ranges) that was contained in the range's bullet catcher.

### 3. Radioactive Wastes

Radioactive waste from the LCAAP site consists of contaminated soil from the firing range and sand from the sand storage pile. These materials are contaminated with DU, lead and unexploded munitions. The volume of contaminated soil from the range is estimated to be 400,000 cubic feet. The volume of contaminated sand is estimated to be 3,000,000 cubic feet. The volume of contaminated sand is large because of the past practice of combining sand from all range backstops at one storage location. This practice contributed to the presence of lead and unexploded munitions in the sand. Because of the presence of lead and explosive material, the sand may be considered "mixed waste." The DU contaminated waste resulting from the decontamination of Buildings 3A and 12A was containerized and disposed of in a licensed low-level disposal facility by Chem-Nuclear, the contractor responsible for decontaminating the buildings.

### 4. Description of Radiologic Hazard

The principle hazards associated with this site are direct exposure, inhalation, ingestion, intrusion, and ground water contamination. NRC Region III staff assessment is that the DU contamination at this site does not present an immediate threat to the public health and safety. This assessment is based on the conditions of the site. Direct exposure and intrusion is minimized because the site is fenced and is protected by 24 hour security. Inhalation, ingestion, and ground water contamination is minimized by the physical form of the DU. Most of the DU is in an insoluble, solid form that is not expected to readily migrate either through the atmosphere or through surface or ground water. The licensee has designated seven onsite locations where water samples are

taken annually. An initial water sampling program in August and October 1988, did not reveal significant DU in any areas sampled. DU has not been detected in any subsequent water samples.

5. Financial Assurance/Viable Responsible Organization

In July 1990 the Department of the Army submitted a certification of financial assurance for decommissioning in the amount of \$750,000. A decommissioning funding plan will be submitted during the next license renewal in 1993.

6. Status of Decommissioning Activities

Currently, decommissioning activities are halted until a decommissioning plan has been submitted to, and approved, by NRC Region III. In February 1990 the licensee submitted a draft proposal entitled "Remedial Feasibility Study for Lake City Army Ammunition Plant" to NRC Region III, which described radiation monitoring procedures to determine the extent of DU contamination at the site. A proposed Scope of Work (SOW) was submitted to NRC Region III in March 1992. The licensee has requested a meeting with NRC Region III to discuss the SOW, decommissioning plan, and NRC's site remediation criteria. This meeting is scheduled for May 1992.

7. Other Involved Parties

Because of the presence of non-radiological hazardous materials in the soil and sand the Environmental Protection Agency (EPA), or equivalent State authority, will need to be involved in the decommissioning of the site. The LCAAP is listed on EPA's National Priorities List (NPL). However, this listing was not for radioactive materials. NRC will need to coordinate work with the EPA in this matter.

8. NRC/Licensee Actions and Timing

The next milestone for this site is the submission of a characterization/remediation plan to NRC Region III. The proposed SOW for developing this plan was submitted to NRC Region III in March 1992, and the licensee has requested a meeting to discuss the plan and NRC's remediation criteria. This meeting is scheduled to take place in May 1992. A complete milestone schedule will be developed as part of the characterization/remediation plan. It should be noted that the Department of the Army has not allocated funds for decommissioning the LCAAP site in FY 1992. Unless this situation changes, the earliest that cleanup would begin is the first quarter of FY 1993.



## RMI Titanium Company

### 1. Site Identification

RMI Titanium Company

Astabula, OH

License No.: SMB-602

Docket No.: 040-02384

License Status: Renewed on October 15, 1991,  
Expires October 31, 1996

Project Manager: M. (Sam) Nalluswami

### 2. Site and Operations

The RMI Titanium Company's (RMI) Extrusion Plant performed uranium metal extrusion for the Department of Energy (DOE) from 1962 to 1988. RMI also possessed a Nuclear Regulatory Commission (NRC) license, which allows RMI to possess at any one time 5000 kilograms of natural uranium and 300,000 kilograms of depleted uranium (DU). The DOE uranium averaged about 1 percent enrichment, maximum enrichment was 2.1 percent. The NRC uranium was depleted. Since November 1, 1990, the only licensed activities onsite dealt with decontamination and decommissioning.

On September 27, 1991, RMI submitted the following draft documents:

1) outline of characterization plan and decommissioning, decontamination and remediation plan, and 2) decommissioning financial assurance plan and decommissioning funding plan. The final draft decommissioning plan was received by NRC Region III in December 1991. RMI submitted their plan to EPA in October 1991.

The site consists of 25 buildings on 26 acres. There has been ground water contamination found near a former onsite evaporation pond. Samples from monitoring wells showed a maximum of 8380 pCi uranium per liter and 625,000 pCi technetium-99 (Tc) per liter.

Trichloroethylene (TCE) has also been found in the ground water (maximum of 440,000 µg/l) making a mixed waste concern. Soil/sediments showed maximum concentrations of 963 pCi/g of the total uranium, 83 pCi/g of Tc-99 and 1120 µg/g of TCE.

### 3. Radioactive Wastes

The largest portion of contamination is inside the extrusion building and remediation will result in generation of wastes.

The projected (estimated) waste quantities are:

structural materials = 20,745,800 pounds

(structural steel and metal piping = 1,179,205 pounds	
concrete	= 15,909,330 pounds
miscellaneous--insulation, wood,	
asphalt and masonry	= 3,657,265 pounds)

Of the total estimated quantity (20,745,800 pounds) of building materials, it is unknown at this time the percentage that is considered contaminated waste.

Additional data are required to estimate wastes from equipment, ground water and soil. The radioactive contaminants are uranium and Tc-99.

### 4. Description of Radiologic Hazard

This site is controlled and poses no immediate threat to the public. However, it appears that the ground water may need to be treated to achieve proposed clean-up levels at RMI's facility boundary. The maximum background radiation level (gamma exposure rate) at 1 meter above the surface is 10 µR/hr.

5. Financial Assurance/Viable Responsible Organization

The licensee submitted their final draft decommissioning plan and financial plan to NRC Region III in December 1991. This plan indicates that DOE has accepted full financial responsibility. The funds for the project are requested by DOE through the annual congressional budgeting process.

6. Status of Decommissioning Activities

Decommissioning efforts of the soil surrounding the buildings has been initiated. Currently, the licensee has placed a high priority on surveys and decontamination of any offsite locations. RMI is planning to ship waste materials to the DOE Nevada Test Site.

Some tasks have been initiated:

- Conduct pre-decommissioning radiological characterization surveys of soil, ground water and facilities
- Remove remaining source nuclear material and hazardous material required to prepare the site for decontamination and decommissioning efforts
- Conduct planning, engineering and procurement activities for the decommissioning project
- Remediate soil, ground water, and facility structures and utilities, as needed
- Maintain site services and physical security
- Maintain site health and safety support services (e.g., As Low As Reasonably Achievable, health physics, construction safety, monitoring)

- Package and transport all decommissioning project waste to an appropriate disposal facility

#### 7. Other Involved Parties

Since RMI was a contractor to DOE, full financial responsibility has been accepted by DOE. WEMCO (Westinghouse Environmental Management Company of Ohio), as a result of having RMI's DOE contract assigned to it in September 1987 by the DOE, is responsible for administering the funding provided by DOE for the remediation and restoration project and RMI is responsible for managing the project. RMI is actually a subcontractor to WEMCO to restore the RMI site and not a DOE contractor. U.S. Environmental Protection Agency (EPA) is involved due to the proposed remediation of non-radioactive (hazardous materials) contamination in addition to reducing residual radioactive contamination.

#### 8. NRC/Licensee Actions and Timing

A routine inspection was performed during the week of February 10, 1992 and included a followup to the deficiencies in the licensee's analytical process which was identified by ORAU in December 1990. NRC Region III and Division of Low-Level Waste Management and Decommissioning in the Office of Nuclear Material Safety and Safeguards will be reviewing the licensee's final remediation plan.

##### A. Actions/Milestones

- Prepare comments on the decommissioning plan May 1992
- Approve the decommissioning plan December 1992

##### B. Problems

The problems in completing the decommissioning activities are anticipated to be coordination between various agencies (DOE, WEMCO, EPA, RMI, ODOH, and NRC).

RTI, Inc. (formerly Process Technology of North Jersey, Inc.)

1. Site Identification

RTI

Rockaway, NJ

License No.: 29-13613-02

Docket No.: 030-07022

License Status: Active, expires March 31, 1993

Project Manager: J. Bondick, Region I

LLWM Monitor: W. Lahs

2. Site and Operations

RTI, Inc. is licensed by the Nuclear Regulatory Commission (NRC) to perform service irradiations on a variety of items using a large, mega-curie cobalt-60 (Co) in-air irradiator.

Previous leakage from sources resulted in low-level Co-60 contamination of the irradiator pool. Contamination of soil in restricted areas resulted from the previous burials of waste materials (contaminated cleaning materials) and the residue from the effluent from the regeneration of the licensee's demineralizers used to remove Co-60 from the storage pool. Specific license actions to characterize and remediate the site have been submitted and approved, and progress in decontaminating the site has been made (removal of contamination and waste from unrestricted areas).

The current byproduct license was recently renewed and now expires on March 31, 1993.



The site is located in a suburban location on approximately 100 acres. Facility buildings (an office building, irradiator facility, and various warehouses) and work areas occupy 5 acres of a restricted access site on the north side of Lake Denmark Road about 300 feet south of Lake Denmark. RTI also owns about 201 acres of unrestricted land on the south side of the road.

### 3. Radioactive Wastes

In 1975 and 1976, leaking Co-60 sources contaminated the water in the irradiator storage pool. This contamination was not immediately identified and flocculant and other cleaning agents used in cleaning the pool of dirt and algae, apparently at the time thought to be free of radioactive contamination, were swept onto the ground south of the irradiator building. Also, water used to backwash and regenerate the demineralizers after the contamination had been reduced was released in this area. While the licensee states the discharge met the limits in 10 CFR 20 for a release to unrestricted areas, this practice apparently resulted in build-up of Co-60 in the soil. This area has been designated as Area D in the licensee's most recent correspondence. It covers about 1500 square feet.

During 1976 and 1977, the licensee disposed of solid radioactive waste by burial on site. These burials were made pursuant to 10 CFR 20.304. The only documented burials were located in the northern corner of the 5 acre fenced site. These burials resulted in soil contamination with Co-60 in the areas around the burials. The documents describing these burials were discovered in 1986 by new managers at RTI. The areas where the burials were made are designated areas A and B in the licensee's correspondence.

There is also a surface water runoff path leading toward Lake Denmark (Area C) which has elevated Co-60 concentrations (composite sample of soil contained 17 pCi/g).

4. Description of Radiologic Hazard

There is no immediate threat to the public. Previously discovered buried drums of radioactive waste material and most of the contaminated soil have been removed, leaving only contaminated soil in the restricted area. External radiation levels within the 5-acre area are less than 22  $\mu\text{rem/hr}$  above background. In the unrestricted areas, radiation levels from Co-60 contaminated soil are less than 11  $\mu\text{rem/hr}$  above background.

5. Financial Assurance/Viable Responsible Organization

Based on the possession limits for Co-60 contamination in the license, the licensee is required to provide financial assurance in the amount of \$750,000 to satisfy the decommissioning rule requirements. RTI has provided adequate financial assurance for the sealed sources in the irradiator (\$75,000) and argues that the possession limit for Co-60 contamination in their license should be reduced based on surveys and decontamination accomplished to date. This request to amend the license is under review.

6. Status of Decommissioning Activities

In 1987 in response to Confirmatory Action Letter No. 87-92, the licensee agreed to characterize the radioactive waste burial site by:

- 1) performing a radiation level survey of the entire 5 acre fenced site;
- 2) having a magnetometry scan of the site performed by a qualified contractor; and, 3) to develop a Remediation Action Plan for any contamination identified. The results of the magnetometry scan of the north corner were submitted to NRC Region I in April 1987. The radiation level survey results were submitted in May 1987. A Remediation Action Plan for removal of buried material identified as a result of these surveys was submitted in May 1987.

Removal of drums and waste from the north corner burial site was accomplished from June through September 1987.

In July 1989 the licensee proposed to remediate the areas inside the 5 acre fenced site to 15 pCi of Co-60 per gram of soil and maintain the

area as a restricted area for at least 5 years (one half-life for Co-60). In May 1990 NRC Region I agreed to this, providing that the licensee committed to further remediation if the areas were to be released for unrestricted use. The NRC also requested that the licensee provide evidence to demonstrate that no additional buried radioactive material or soil contamination in excess of 8 pCi of Co-60 per gram of soil remained on site; provide plans to monitor migration of Co-60 contamination remaining; and, provide the results of surveys performed to show that remediation activities had been completed as proposed. The licensee removed several areas of contaminated soil.

In July 1990 the licensee proposed that they take a core sample in Area A to determine if additional radioactive material was buried there, and to perform quarterly monitoring of water from existing wells to detect any migration of Co-60 in the ground water.

In January 1991 the licensee submitted results of surveys performed after these remediation activities. No soil samples were taken. Only one bore sample was taken in Area A to determine the depth of contamination and to attempt to determine if additional buried material existed in that area. Water samples were not taken from wells, based on the licensee's conclusion that Co-60 contamination was found only on the surface soil.

The licensee's remediation surveys have been reviewed, additional information was requested, and subsequently received. A site visit was performed by the NRC in December 1991 to view the remediated areas.

Available information is being evaluated to determine if the licensee's request that the NRC accept the remediation and surveys and reduce the possession limits in the license can be granted or if additional sampling is required prior to those changes.

## 7. Other Involved Parties

The New Jersey Department of Environmental Protection and Energy has been studying ground water contamination from activities involving hazardous

materials on the property south of Lake Denmark Road and plastic monomers in the restricted area.

B. NRC/Licensee Actions and Timing

A. Actions/Milestones

- |  |                |
|--|----------------|
| • Review and approve decontamination plan  | Completed      |
| • Inspect implementation of plan   | Completed      |
| • Perform NRC site visit   | Completed      |
| • Evaluate the need for further surveys of cleanup based on the results of licensee's submission | August 1992    |
| • Request additional information from/work by license  | September 1992 |
| • Perform NRC survey of site   | August 1993    |
| • Reduce license limits authorizing storage of contaminated materials                            | December 1993  |

B. Problems

1. There is some concern about the licensee's ability to fund a complete cleanup. However, RTI continues to maintain an active program of Co-60 service irradiation and they have expended significant funds to decontaminate the site and dispose of waste.
2. The fragmentation of the licensee's records, data and plans.

## Safety Light Corporation

### 1. Site Identification

Safety Light Corporation

Bloomsburg, PA

License No.: 037-00030-02

Docket No.: 030-05980

License Status: Renewal denied--hearing requested

Project Manager: P. Vacca, NMSS/IMNS

LLWM Monitor: J. Parrott

### 2. Site and Operations

The Safety Light Corporation (SLC) site is located in central Pennsylvania approximately 0.6 miles east of Almedia in South Centre Township along Old Berwick Road. Larger population centers nearby include Bloomsburg about 2.5 miles west and Berwick about 3 miles east of the site. The 10 acre site is located 490 feet above mean sea level on an old terrace and floodplain on the north bank of the Susquehanna River.

In the late 1940s, USRC began manufacturing and distributing self-illuminating watch and instrument dials and conducted other activities involving the use of a wide variety of radioactive materials. In early work, the principal radionuclide was radium-226 (Ra-226), a material not regulated by the Atomic Energy Commission (AEC). Later, AEC-licensed work involved the use of many radionuclides, including tritium (H-3), strontium-90 (Sr-90), cesium-137 (Cs-137) and americium-241 (Am-241). Since approximately 1968, H-3 has been the only radionuclide in use; it is used in the manufacture of self-illuminating exit signs and other similar products. Since the early 1980s, following a complex series of reorganizations, corporate name changes, and sales of corporate entities, SLC has conducted H-3 manufacturing and distribution activities at the Bloomsburg site. (The corporate reorganizations and transfers are the subject of ongoing litigation before the ASLB involving jurisdictional issues.)



Contamination is found in buildings, soils, and ground water. There are few, if any, records of materials buried or disposed of at the site. Many of the approximately 17 structures on the Bloomsburg site were previously used for radioactive work, are contaminated and/or in disrepair, and now are either unused or used primarily for storage of contaminated equipment. In addition to radioactive contamination at the Bloomsburg site, there is also contamination resulting from a fuel oil spill and there may be contamination from various chemicals and heavy metals used on site.

USRC terminated use of radionuclides other than H-3 in the late 1960s. At that time the AEC licensed it to decontaminate the site and prepare it for eventual release for unrestricted use. By the late 1970s little had been accomplished. In 1978 USRC identified more than 32 contaminated areas on the site and proposed a decontamination program to mitigate the contamination, beginning with those identified areas. This program, however, has not been fully implemented. A considerable portion of the site is still contaminated with varying levels of Ra-226, H-3, Sr-90, and Cs-137. Some of these areas continue to release activity into the ground water system and soils. In addition, only limited survey information is available to determine the extent of contamination.

### 3. Radioactive Wastes

Several studies (i.e., by Radiation Management Corporation (RMC) in 1979, Oak Ridge Associated Universities (ORAU) in 1982 and Chem-Nuclear Systems, Inc. (CNSI) in 1990) indicated widespread contamination of buildings, equipment, soil, ground water, and other outdoor areas of the Bloomsburg site at levels exceeding those acceptable for release for unrestricted use. For the most part, ORAU found higher concentrations in individual samples from the site than were found by RMC or CNSI. The ORAU data are shown below.

	MAXIMUM CONCENTRATION	AVERAGE CONCENTRATION
	IN SOIL	IN SOIL
	(pCi/g)	(pCi/g)
Sr-90	15.4	3.5
Cs-137	631	20.1
Ra-226+	672	14.3

	MAXIMUM CONCENTRATION	AVERAGE CONCENTRATION
	IN GROUND WATER	IN GROUND WATER
	(pCi/l)	(pCi/l)
H-3	72,200 (138,000 CNSI in 1990)	9,790
Sr-90	62,100	10,800
Cs-137	57	31.3
Ra-226+	9.1	1.1

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+ NRC does not have regulatory authority over Ra-226.

The 1990 CNSI partial site characterization study indicated that ground water tends to move toward the south (i.e., toward the river). However, the limited nature of that study did not rule out the possibility that there may be some flow toward the adjacent properties on the east or west.

Contamination has also been detected offsite. Soil contaminated with Cs-137 was detected on the property to the east, i.e., on the Vance-Walton property. Much of this contamination was removed and relocated to the Bloomsburg site. Ground water offsite has shown evidence of radioactivity. Offsite wells have shown evidence of H-3 with the highest level, 30,000 pCi/l, recorded at the Vance-Walton well. This value is above the U. S. Environmental Protection Agency's (EPA's) Maximum Contaminant Level of 20,000 pCi/l. The 1990 CNSI study also showed evidence of Sr-90 in ground water samples taken from properties to the east and west of the Bloomsburg site. (Note that in the late 1980s SLC bought the Vance-Walton property and the staff does not believe that offsite wells are currently used for drinking water.)

Current NRC-licensed activities at the Bloomsburg site involve manufacture and distribution of H-3 containing products. These activities generate radioactive wastes, some of which are packaged and stored onsite; they also lead to environmental releases of H-3, which are believed to be responsible for observed H-3 contamination onsite and offsite.

There has been no formal estimate of the volume of waste that would be generated during site decontamination. However, in a December 1991 report, CNSI estimated the costs of certain tasks, as outlined below.

BRIEF DESCRIPTION OF TASK	ESTIMATED COST
1. Geophysical and radiological survey	\$320,000
2. Excavate underground silos; store waste onsite	956,900
3. Same as Task 2, but if material is not mixed waste, dispose of it as low-level radioactive waste	2,203,300
4. Characterize only underground silos, lagoons, plant dumps, abandoned canal	835,700
5. Characterize site (except buildings, equipment, etc.)	1,108,900
6. Same as Task 5, but includes buildings, etc.	1,224,500

#### 4. Description of Radiologic Hazard

The principal hazards associated with the contamination at the Bloomsburg site are radiation doses to humans resulting from direct exposure, inhalation and ingestion pathways. The contaminated areas are fenced and posted as required by 10 CFR Part 20, thus minimizing the effects of intrusion. Inhalation and ingestion pathway doses have been estimated to be 0.02 mrem/yr effective whole body equivalent for worker inhalation, and 27.2 mrem/yr to the bone and 1.5 mrem/yr effective whole body equivalent for ingestion of food grown onsite. Ground water from an offsite well (Vance-Walton) indicates H-3 levels at or above EPA recommendations. Drinking ground water obtained from onsite wells could result in a bone dose of 5400 mrem/yr and an effective whole body equivalent dose of 400 mrem/yr. These doses are well above EPA interim drinking water standards. Note that drinking water is not now taken from onsite ground water sources, but this could occur if the site is released for unrestricted use.

5. Financial Assurance/Viable Responsible Organization

SLC has several licenses, two of which authorize possession and use of types and quantities of radioactive material that necessitate compliance with 10 CFR 30.35, which requires financial assurance for decommissioning a site after the licensees cease use of licensed material. The rule requires the submission of a financial certification in the amount of \$750,000 per license and a decommissioning funding plan (DFP). The licensees have not submitted a certification or DFP. As a result, on February 7, 1992, the staff denied the applications for renewal of two of the licenses.

Unrelated to 10 CFR 30.35, the licensees expended \$125,000 for the 1990 CNSI study that partially characterized the site. In addition, the licensees have represented to the staff that the licensees have set aside \$500,000 for the purpose of further site characterization, decontamination, or remediation and that they expect to commit an additional \$275,000 for this purpose within the next year. The licensees have represented to the staff that these funds were obtained in partial settlement of their lawsuit against their insurance carriers.

6. Status of Decommissioning Activities

The licensee fenced and posted contaminated areas of the Bloomsburg site and arranged for CNSI to perform a partial site characterization in mid-1990. As noted above, they have also represented to the NRC staff that they are setting aside certain funds received from their insurance carriers, for the purpose of site characterization and decontamination.

7. Other Involved Parties

No other involved parties.

8. NRC/Licensee Actions and Timing

Actions to be taken will be dependent on the results of on-going hearings.



## Schott Glass Technologies

### 1. Site Identification

Schott Glass Technologies

Duryea, PA

License No.: STB-988

Docket No.: 040-07924

License Status: Expires 4/30/92

Project Manager: J. Bondick, Region I

LLWM Monitor: H. Spiro

### 2. Site and Operations

Between 1969 and 1980, Schott Glass produced special optical glass containing up to 30 percent thorium by weight at its facility in Duryea, Pennsylvania. After production ended in 1980, radioactive surveys of the property indicated that some scrap material from this production was deposited in a landfill located on the Schott property adjacent to buildings on site.

The specified area of the landfill is adjacent to the industrial structures of Schott Glass in an industrial park. The area, zoned industrial, is in the Pocono Mountains with relatively low surrounding population density. Residential growth is considered unlikely.

The base of the landfill is undisturbed, relatively impervious clay soil indigenous to the area. The soil also provides a minimal covering of overburden for the landfill. The geology below the natural soil is sedimentary rock (principally shale). There are no surface waters in the immediate vicinity. The ground water is of poor quality and is generally not used.

### 3. Radioactive Wastes

The contaminated wastes in the landfill include: 1) soil contaminated with scraps of thoriated glass from the manufacture of optical glass, and 2) pieces of refractory tile that lined the ovens of the Schott plants containing trace amounts of thoria ( $\text{ThO}_2$ ) and urania ( $\text{UO}_2$ ). The tiles contained less than 0.05 percent thorium plus uranium by weight and were not licensed as source material.

The recent discovery of lead-containing compounds may cause some of the waste to be classified as mixed waste.

The landfill occupies a parabolically-shaped area approximately 250 feet wide and 250 feet long. Material is buried to a maximum depth of approximately 20 feet. It is estimated that the volume is approximately 10,000 cubic yards because it is not buried to a uniform 20-foot depth.

Laboratory analysis of five contaminated soil samples from four locations on and around the landfill indicate that the average concentration of thorium-228 (Th-228) is approximately 2 pCi/g. The concentration of thorium in the glass scrap obtained from one of the soil samples is 4710 pCi/g. The average concentration of thorium in the glass scrap is above the amount allowed by the Technical Position (TP).

The licensee estimated that the thoriated glass in the landfill contains a total of 1000 pounds of thorium. Using 10,000 cubic yards as the total volume, a conservative density of 2 grams per cubic centimeter and the specific activity of natural thorium of  $2.2 \times 10^{-7}$  curies per gram, the average concentration of thorium in the landfill is 6.5 pCi/g.

### 4. Description of Radiologic Hazard

There is no immediate threat to the public. The waste onsite is in the form of source material (thorium) in soil and in glass scraps. The contamination in glass scrap is very unlikely to migrate offsite.

A radiation survey of the landfill area yielded exposure rates ranging from 30 to 350  $\mu\text{R/hr}$ . The average exposure in the landfill area is less than 200  $\mu\text{R/hr}$ .

5. Financial Assurance/Viable Responsible Organization

The licensee has submitted a decommissioning plan for terminating the license. Although there is no financial assurance in the plan, the licensee has indicated that resources are available, and that the plan will be implemented when approved by all reviewing parties.

6. Status of Decommissioning Activities

Schott submitted a plan, dated June 30, 1988, for the decontamination and disposal of the scrap material by burial on site pursuant to 10 CFR 20.302. The plan consisted of: 1) preliminary survey of the property; 2) collection and storage of immediately recoverable pieces of thoriated glass scrap from the landfill area; 3) excavation of the entire landfill area to a depth of 4 feet below the planned final grade; 4) placement of collected thoriated glass scraps at the excavated depth of greater than 4 feet below final grade; 5) placement of clean overburden to a depth of four feet; and 6) a final survey. Thus, the thoriated glass scrap was proposed to be placed in the landfill at a 4-foot burial depth.

The Schott plan estimated the cost to transport and dispose of all of the contaminated material at a licensed disposal facility as being about \$18 million in 1988. The plan also discussed the site characteristics favoring the planned disposal at the site. These include the fact that the landfill is in an area with only industrial activities, and no foreseeable reason for residential growth on this specific land and the fact that ground water in the area is of poor quality and not generally used.

NRC reviewed the Schott plan and found that the proposed disposal could be authorized under Option 1 of NRC's Branch Technical Position (BTP) subject to certain conditions. These included requiring that any thoriated glass scrap which is collected during implementation of the plan be disposed in a licensed low-level waste disposal facility and assuring appropriate notification of the local government.

Based on a satisfactory response from the licensee to the NRC request, the modified plan was approved on May 29, 1990. The licensee began decommissioning activities in June 1990. During these activities the licensee discovered lead-containing compounds (a hazardous waste regulated by the Pennsylvania Department of Environmental Resources (PADER)) in the area.

The licensee performed an assessment of the lead contamination and found that it was primarily lead oxide which is used as an ingredient in the manufacture of various types of glass. An eroded area of the landfill allowed some of the lead contamination to be transported to an athletic field down gradient from the landfill. Based on sampling by the licensee, no thorium was transported with the lead. The licensee removed the lead contaminated soil from the athletic field and plans to dispose of it in accordance with hazardous materials disposal regulations. They have been negotiating with PADER to develop a site closure plan which is acceptable to PADER. A proposed final plan was submitted to PADER in late September 1991. PADER has indicated they will likely make final determination on acceptability of the plan in mid-spring 1992. NRC Region I has met with PADER to discuss their concerns and answer questions about our position. If the plan is approved by PADER, NRC Region I will determine if additional review by NRC is necessary prior to allowing site closure. The licensee states they will implement the site closure plan as soon as PADER and NRC approvals are obtained.

#### 7. Other Involved Parties

PADER is currently reviewing the licensee's revised decommissioning plan.

8. NRC/Licensee Actions and Timing

A. NRC actions consist of the following:

- |  |                                     |
|--|-------------------------------------|
| • Review and approve/disapprove Revised Closure Plan | 1 month after PADER approval        |
| • Inspect implementation of plan                     | 1 month after NRC approval of plan  |
| • Perform NRC closeout survey                        | 2 months after NRC approval of plan |
| • Terminate license                                  | 6 months after NRC approval of plan |

B. Potential problems inhibiting site cleanup.

EPA-regulated materials are in the area to be decontaminated.



Shieldalloy Metallurgical Corporation, Cambridge, Ohio

1. Site Identification

Shieldalloy Metallurgical Corporation  
Cambridge, OH

License No.: SB-1507  
Docket No.: 040-08948  
License Status: Decommissioning  
Project Manager: M. Harvey

2. Site and Operations

The site is located south of Cambridge, Ohio. The previous owners of the site had processed columbium ore, containing licen/able quantities of thorium and uranium. The radionuclides from the ores became incorporated into waste slag and are stored in two separate piles (west and east) on site. Shieldalloy has decontaminated the site such that the only contamination is contained in the two slag piles.

3. Radioactive Wastes

West Pile:

This pile originally consisted of approximately 300,000 tons of slag and soil covering 7.6 acres with an average concentration of thorium-232 (Th-232), uranium-238 (U-238), and radium-226 (Ra-226) of 1.4 pCi/g, 3 pCi/g and 2.4 pCi/g, respectively. Following site decontamination, an additional 140,000 tons of higher-concentration slag and soil was added. The additional material had an average concentration of Th-232, U-238, and Ra-226 of 42 pCi/g, 54 pCi/g, and 42 pCi/g, respectively. The crown of the pile has at least 4 feet of cover material consisting of Chemfix (a clay-like material), geotextile material and sand.

East Pile:

The pile is uncovered and consists of approximately 90,000 tons of slag covering 2.6 acres with an average concentration of Th-232 of 4 pCi/g, U-238 of 21 pCi/g and Ra-226 of 66 pCi/g.

U.S. Environmental Protection Agency's (EPA) analysis of surface water samples from a stream that runs through the site indicated gross alpha levels ranging from 0 to 5621 pCi/l, and gross beta levels ranging from 1 to 476 pCi/l. It has not yet been determined whether one of the sources of the contamination is the slag piles. It should be noted that strip mines are located upstream from this facility and that the highest concentration values were associated with upstream samples.

4. Description of Radiologic Hazard

The site poses no immediate threat to the public. The contamination consists of radium and uranium and thorium in rock-like slag material. A leachability test conducted by Shieldalloy in 1991 in accordance with ANSI 16.1 for similar slag material stored at its Newfield, New Jersey, facility, indicated that diffusive leaching of radium, uranium and thorium is insignificant.

In January 1992 the licensee was given a violation for failing to properly control access to the east pile and was given one month to install a fence. Shieldalloy has been asked orally and will be asked formally by letter to demonstrate the lack of overland transport of contamination from the slag piles (via surface runoff) to the stream. Shieldalloy is expected to respond to this concern by performing isotopic analysis on soil samples to be obtained from expected overland runoff paths.

Because of a cover, exposure rates over the west pile are at background levels, and because of the lack of a cover over the east pile, levels there average 115  $\mu$ R/hr.

5. Financial Assurance/Viable Responsible Organization

The site is owned by Shieldalloy, although licensable activities were undertaken by previous owners, Shieldalloy is able and willing to undertake necessary cleanup activities but is unwilling to dispose of radioactive material offsite. Shieldalloy believes that offsite disposal of material having concentrations greater than Option 1 is an unreasonable requirement considering the current dose levels from the piles. Shieldalloy has indicated that offsite disposal is not a financially possible option for them. Offsite disposal of this material would be at least \$75 million (estimated at \$30 per cubic foot).

Shieldalloy currently holds financial assurance of \$750,000.

6. Status of Decommissioning Activities

Shieldalloy has decontaminated all of the site to Option 1 levels except the slag piles. Confirmatory surveys have been performed by ORAU on the decontaminated areas. Two localized areas remain slightly above Option 1 levels. Considering the extent and level of contamination and the difficulty that would be involved in its retrieval, the licensee is not being required to clean these areas further.

Shieldalloy submitted a decommissioning plan for the west pile in February 1990 which involved in situ disposal. NRC informed the licensee that the plan could not be approved as submitted because a large portion of the higher-concentration slag and soil placed on the original pile exceeded Option 2 concentrations. NRC met with the licensee in August 1991, and May 1992 to discuss this topic. The licensee intends to request an exemption from the unrestricted release requirement and with 10 CFR 20.302. By September 1992, the licensee will develop a technical basis for a preferred decommissioning option for the west and east piles. This technical basis document will include an analysis of decommissioning alternatives and costs. The licensee will then submit a site-wide decommissioning plan and schedule for the west and east piles based on the Technical Basis Document. This plan will supersede the February 1990 West Pile Decommissioning Plan.

In response to EPA Region V surface water sampling, Shieldalloy was requested by NRC in February 1991 to establish a sampling and analysis program to adequately characterize ground water, surface water and sediments in and around the site. Shieldalloy is currently in the process of setting up a ground water characterization program. No date has been established for the initiation of this characterization study.

7. Other Involved Parties

EPA Region V has sampled surface water and sediment from a stream that runs through this site. Due to the anomalous nature of the results, EPA Region V is considering a more extensive characterization of the surface water and sediments.

8. NRC/Licensee Actions and Timing

A. Actions/Milestones

- Licensee to submit program for surface water, ground water and sediment characterization June 30, 1992
- Licensee to submit draft Technical Basis Document Work Plan for decommissioning June 30, 1992
- Amendment to extend license expiration date June 30, 1992
- Licensee to submit Technical Basis Document for Decommissioning (Will include site-specific pathway analysis, and analysis of decommissioning alternatives and costs) September 30, 1992
- NRC prepare Commission Paper on general policy options October 1992



- Licensee to submit site-wide decommissioning plan and schedule Late 1992
- Environmental Assessment TBD
- Safety Evaluation Report TBD
- License termination TBD

B. Problems

The most significant problem is the licensee's lack of funds necessary to dispose of higher concentration material offsite. The only other alternatives are for the licensee to apply for an exemption from the unrestricted release requirement or for other disposal options under 10 CFR 20.302.



Shieldalloy Metallurgical Corporation, Newfield, NJ

1. Site Identification

Shieldalloy Metallurgical Corporation

Newfield, NJ

License No.: SMB-1507

Docket No.: 040-07102

License Status: Timely renewal

Project Manager: Y. Faraz, NMSS/IMNS

LLWM Monitor: M. Harvey

2. Site and Operations

This facility is a manufacturer of specialty ferro alloys. The site covers 67.5 acres in Newfield, NJ. Operations began in 1955 and are ongoing. There are multiple buildings on the property; however, all smelting operations involving source material are conducted in a foundry, near the west central portion of the site. Licensed ores are stored in a warehouse near the foundry. Licensed slag containing thorium and uranium is located in two piles (high ratio and standard ratio) in a controlled area. Exhaust air from processing activities passes through baghouse dust collectors. Dust collected in the baghouses is considered as licensed material and is accumulated in a pile located within the confines of the controlled area.

Standard Ratio Pile:

This pile consists of 46,100 tons (16,800 m<sup>3</sup>) of slag with concentrations of thorium-232 (Th-232) averaging 516 pCi/g, radium-226 (Ra-226) averaging 123 pCi/g and uranium-238 (U-238) averaging 202 pCi/g.

High Ratio Pile:

This pile consists of 3200 tons (1000 m<sup>3</sup>) of slag with concentrations of Th-232 averaging 366 pCi/g, Ra-226 averaging 69 pCi/g and U-238 averaging 105 pCi/g.

#### Baghouse Dust Pile:

This pile consists of 13,400 tons (15,000 m<sup>3</sup>) of lime dust with concentrations of Th-232 averaging 55 pCi/g, and Ra-226 and U-238 each averaging 16 pCi/g.

Processing of nonradioactive materials in other (i.e., non-licensed) facilities on the site has resulted in a plume of chemical (nonradioactive) contamination in the ground water (primarily chromium). This has caused the site to be a high-priority listing on the Superfund National Priorities List. Ground water remediation is ongoing.

### 3. Radioactive Wastes

There is contamination of soil around the piles and at numerous locations around the main yard of the site and foundry building. Soil around the piles has average concentrations of Th-232, Ra-226 and U-238 of 28.6 pCi/g, 8.4 pCi/g, and 10.5 pCi/g, respectively.

Some off site contamination has occurred. Levels of radionuclides in some soil samples outside the perimeter fence exceed 10 pCi/g above background for thorium and radium and 35 pCi/g for uranium.

Water samples from both onsite and offsite boreholes and wells indicate concentrations below regulatory levels. Sediments from area drainage pathways leading from the site indicate some locations of contamination at the plant perimeter but no accumulation in area surface water.

### 4. Description of Radiologic Hazard

Site access is controlled. The site poses no immediate threat to the public. The only significant contamination present is relatively insoluble radium, thorium and uranium in the slag and baghouse dust piles and in low-levels in the soil. Diffusive leaching of each of these radionuclides from the slag was determined to be insignificant in a leachability test performed in 1991 by Shieldalloy in accordance with ANSI 16.1. Low concentrations in subsurface soil and water provide additional evidence

that contamination from the site operations is not migrating into the soil or ground water. Soil contaminants appear to be limited to the upper 30-60 centimeters of soil. Water samples from boreholes and wells have contamination levels below NRC guidelines for water in unrestricted areas. A likely pathway and source of contamination offsite appears to be overland runoff from the baghouse dust piles. Once the nature and extent of this contamination is determined by the site characterization report due in April 1992, Shieldalloy will be asked to take appropriate cleanup action.

A walkover survey indicates elevated gamma exposure rates of up to 175  $\mu$ R/hr at 1 meter above the surface at the perimeter fence. Most of the elevated levels are due to gamma shine originating from the licensed slag piles.

Radiation doses to the worker and the nearest resident are expected to be well within 10 CFR Part 20 limits.

5. Financial Assurance/Viable Responsible Organization

The site is owned by Shieldalloy and all licensed activities were conducted by Shieldalloy. Shieldalloy seems able and willing to undertake in situ cleanup activities but claims that in the absence of recycling or recovery of useful material, it does not have the means to fund disposal of licensed material offsite.

Shieldalloy currently holds financial assurance in the amount of \$750,000.

6. Status of Decommissioning Activities

Shieldalloy has submitted a statement with their renewal application indicating that they are committed to decommissioning the facility at the cessation of operations and will submit a plan for approval prior to commencement of decommissioning operations.

Shieldalloy is emphasizing new procedures and housecleaning techniques to keep any newly produced licensed material within controlled areas. There is no expectation for a detailed decontamination plan any time in the near future since the facility is still operating.

In conjunction with a survey for nonradiological hazards for the New Jersey Department of Environmental Protection for Superfund remediation activities, Shieldalloy has completed a survey of radioactivity on site and in the site vicinity. A radiological characterization report was submitted in April 1992.

7. Other Involved Parties

The site is on the NPL, so NRC activities are being conducted in coordination with the NJ Department of Environmental Protection.

8. NRC/Licensee Actions and Timing

A. Actions/Milestones

- |  |                |
|--|----------------|
| • Licensee to submit revised license renewal application | June 15, 1992  |
| • Licensee to submit revised Environmental Report        | September 1992 |
| • Environmental Assessment                               | September 1993 |
| • Safety Evaluation Report                               | September 1993 |

B. Problems

In February 1991 Shieldalloy was given a violation for exceeding their source material possession limits. Shieldalloy claims that it does not have the means to fund offsite disposal of slag and baghouse dust. Taking into account the current disposal costs, other uses of the licensed material such as for uranium recovery are being explored.



Texas Instruments, Inc.

1. Site Identification

Texas Instruments, Inc.

Attleboro, MA

License No.: SNM-23

Docket No.: 070-00033

License Status: Decommissioning - expiration  
date removed by amendment

Project Manager: J. Roth/M. Miller, Region I

LLWM Monitor: J. Shepherd

2. Site and Operations

The Texas Instruments, Inc. (TI) facility is located in Attleboro, MA south of Boston on Route 123. The site was originally owned by the General Plate Division of Metals and Controls, Inc. when it began to fabricate enriched uranium foils in 1952. That company later merged with TI who fabricated nuclear fuel for the U.S. Navy and for commercial customers during the period from 1957 to 1983. Other than possession of the contamination and any necessary decontamination, licensed activities no longer take place at this location.

The TI site is approximately 100 acres in size. Fuel fabrication operations performed under contract to the Atomic Energy Commission (exempt from the requirement for a license) took place in about six buildings. Operations performed under the NRC (originally AEC) license took place in one part of one building (Building 10) having an area of about 10,000 square feet.

Some noncombustible uranium and thorium scrap metal and machinery were buried on-site in a disposal area of about 1.1 hectares between Buildings 11 and 12. This burial site was disturbed during construction of Building 12 in the late 1960s, and contaminated soil may have been

distributed over the construction site or moved to a location offsite. For these reasons the potentially contaminated area covers approximately 5.1 hectares onsite and an unknown quantity offsite at a former landfill.

### 3. Radioactive Wastes

Material remaining at the Attleboro site consists only of contaminated soil. The buildings were decontaminated and a final survey of the buildings made in January 1985 indicated that no contaminated material exceeding the Regulatory Guide 1.86 criteria remained.

An unknown quantity of contaminated soil and metal scrap containing at least 30 millicuries of uranium-235 (U-235) and natural uranium in the oxide form were buried at the site in an area of originally 1.1 hectare until 1964. The disposal area is described as being at least 1.2 m deep and covered with a soil cap of unknown thickness. There is no indication that any liner material was used or that any natural liner exists. Based on a transit survey conducted in 1985 by the NRC it appeared that an unknown quantity of material may have been removed from the 1.1 hectare disposal area. It is believed that this material, contaminated with uranium, was disposed at a private landfill on property owned by Mr. P. Shpack in Norton and Attleboro, MA, which operated from 1946 to 1965.

Samples taken at the Shpack landfill site include a metal casting, soils, mud, and ground water. The metal casting containing about 40 percent total uranium enriched to about 20 percent U-235 had a contact exposure of approximately 20 millirem per hour. Depleted, natural, and enriched uranium was found in the soil samples at concentrations ranging from 1.35 picocuries per gram (pCi/g) to 225,000 pCi/g. However, all the water samples were at background levels. Following a survey of other licensees in the area, NRC Region I concluded that it is likely that some of these materials resulted from work performed by Metals and Controls (now TI) under contract to the Atomic Energy Commission. The radioactive wastes found at the landfill are considered to be typical of what may have been disposed at the TI burial site in Attleboro. In December 1980 DOE placed the Shpack landfill under the Formerly Utilized Site Remedial

Action Program (FUSRAP) to develop appropriate response actions for the cleanup of the radionuclides at the Shpack landfill. In addition TI has entered into a consent order with EPA regarding the landfill.

4. Description of Radiologic Hazard

The principal hazards associated with the contamination at the Texas Instruments, Inc. site in Attleboro, MA involve inhalation, ingestion, intrusion, and ground water. Since only small amounts of material remain on the site, there is minimal hazard remaining at this facility. Information from the ground water monitoring wells that were installed in 1980 through 1983 indicated that concentrations of radioactive material in the ground water were at background levels.

Regarding the radiological hazard at the Shpack landfill, Texas Instruments, has engaged a contractor to characterize the uranium contamination and to coordinate with DOE. Since the landfill is part of a DOE FUSRAP site and Texas Instruments is a party to the consent order with EPA, NRC will not consider the landfill further.

5. Financial Assurance/Viable Responsible Organization

The possession limit listed in this license is 700 grams of U-235 (approximately 45 millicuries). Although the decommissioning rule required the licensee to have a financial certification in the amount of \$750,000 by July 27, 1990, a financial certification has not been submitted. Since the licensee was decommissioning the facility, the license expiration date was removed by license amendment on May 5, 1982. The licensee will submit a plan for meeting financial assurance requirements by May 31, 1992.

TI is a very large company, that is not in financial difficulty, and is considered to be capable of providing the required financial assurance. With respect to the Shpack landfill, under an EPA consent order an annual financial assurance certification for the estimated costs of work to be performed is required.

6. Status of Decommissioning Activities

TI submitted a decommissioning plan on July 20, 1978. This plan was approved by the NRC on October 9, 1978. A detailed decontamination plan was submitted to the NRC in August 1981. In accordance to this detailed plan, TI in 1983 cleaned up contamination remaining within the buildings at the Attleboro site. Oak Ridge Associated Universities performed a survey of these buildings for the NRC in January 1985. The final survey criteria used was Regulatory Guide 1.86.

7. Other Involved Parties

DOE is involved in cleanup of Shpack landfill.

8. NRC/Licensee Actions and Timing

NRC Region I staff have verbally requested on numerous occasions that TI provide documentation acknowledging that the radioactive material apparently removed from the Attleboro burial site was transferred to the Shpack landfill. TI, however, has not provided this acknowledgement probably due to possible liability concerns with respect to the Shpack landfill cleanup.

EPA designated the Shpack landfill as a Superfund site and issued a Consent Order for a remedial investigation feasibility study on September 14, 1990. EPA's "Findings of Fact," as detailed in their consent order, state that EPA has reason to believe that Settling Party, TI arranged for disposal of hazardous substances, including uranium wastes at the Shpack Landfill. Based on this finding and all other information available to NRC, the NRC staff considers the material in the Shpack landfill likely to be that removed from the Attleboro site and plans to proceed from that conclusion.



NRC Region I is working with the licensee representatives to establish a schedule for remediation. In an April 14, 1992 meeting with NRC the licensee agree to submit a decommissioning schedule by July 31, 1992.

8. NRC/Licensee Actions and Timing

A. NRC actions consist of the following:

- |                                     |                |
|-------------------------------------|----------------|
| • Receive decommissioning plan      | October 1992   |
| • Approve decommissioning plan      | December 1992  |
| • Inspect decommissioning plan      | March 1993     |
| • Evaluate licensee's final survey  | September 1993 |
| • Conduct Confirmatory Survey       | October 1993   |
| • Release site for unrestricted use | December 1993  |

B. Potential problems inhibiting site cleanup.

The willingness of the licensee to commit to a clear schedule for decommissioning.



## UNC Recovery Systems

### 1. Site Identification

UNC Recovery Systems

Wood River Junction, RI

License No.: SNM-777

Docket No.: 070-00820

License Status: Current (until termination by the Commission)

Project Manager: J. Parrott

### 2. Site and Operations

The site is located in southwestern Rhode Island and occupies about 1114 acres. United Nuclear Corporation (UNC) operated an enriched uranium scrap recovery facility from 1964 until 1980. The site contained buildings, lagoons, and an old burial ground. The operational portion of the site covered an area of about 5.6 acres.

UNC operated the recovery plant from 1964 until 1980. The facility processed various types of unirradiated scrap to reclaim uranium for reuse as fuel for nuclear reactor operations. Although primarily nonirradiated fuel elements were processed, slightly irradiated fuel elements from zero power test reactors were processed from 1967 to 1980. Additionally, UNC experienced a nuclear criticality excursion in 1964. Therefore, fission products were present and had to be considered during decommissioning activities. Uranium-235 enrichment in the scrap ranged from a few percent to greater than 90 percent. The scrap processed in the facility for uranium recovery was received in several different matrices; included were zirconium, ceramics, aluminum, carbon, thorium, and contaminated wastes of varying kinds. The process used at the facility included acid digestion with nitric and hydrofluoric acids and organic separation with tributyl phosphate and kerosene. In addition to these, the following chemicals were used in the recovery process and were present in the wastes in

varying concentrations: aluminum nitrate, calcium hydroxide, mercury, sodium carbonate, sodium hydroxide, and potassium hydroxide.

Solid wastes from the process were shipped offsite. Liquid wastes were originally discharged to the Pawcatuck River through a buried drain pipe. From 1966 to 1979, liquids were discharged into lined ponds and trenches which were used as "evaporation" ponds. From 1979 until the facility closed, storage tanks were used for liquid wastes.

From 1974 to 1977, the Rhode Island Water Resources Board drilled several test wells on UNC property to obtain water quality information. This testing program resulted in the discovery of above background levels of radioactivity and nitrates in the ground water under UNC property. UNC responded by initially drilling 10 observation wells between the plant and the river to assess the contamination problem. Additional wells were added later. The U.S. Geological Survey (USGS) also installed a number of wells. Review of the data revealed that the plume extended from the lagoons to the Pawcatuck River a distance of about 1500 feet.

By letter dated April 29, 1980, UNC informed the NRC of its plans to terminate recovery operations and initiate decommissioning. UNC characterized and decontaminated the facility in conjunction with ORAU confirmatory surveys. These activities were completed in 1989. By letter dated July 19, 1990, UNC requested the site be released for unrestricted use and its license terminated.

### 3. Radioactive Wastes

The contamination consisted of enriched uranium and fission products on surfaces and in soil, and ground water. Site access is still controlled, and there is no off-site contamination. It is unlikely that off-site ground water could become contaminated due to the discharge to and dilution by the river. Peak ground water concentrations are described below. In a few isolated unrestricted areas, peak total uranium residual

soil concentrations above 30 pCi/g were found by ORAU. However, when averaged over a grid block or adjacent land areas these isolated areas satisfied the release criteria. Likewise in the restricted area, some isolated hotspots satisfied the release criteria when averaged over their grid or over adjacent grids. The highest exposure rate measured at the site, after the completion of remediation activities, was 10  $\mu$ R/hr at 1 meter above the surface. Preliminary dose analysis of this site indicates that it would not exceed 10 mrem/yr Effective Dose Equivalent.

4. Description of Radiologic Hazard

Surface and soil contamination has been remediated to the point of being acceptable for unrestricted release. Ground water contamination by strontium-90 (Sr-90) and nitrate remains. The last ground water sampling took place in 1990. The highest Sr-90 concentration measured at that time was 33.6 pCi/l and the highest NO<sub>3</sub> was 257 mg/l. Due to natural flushing, the ground water Sr-90 and nitrate concentrations have been going down over the years since the plant ceased operations. The contaminated ground water plume is discharged into the Pawcatuck River on-site and is diluted to below detectable levels. Therefore, the contaminated ground water does not leave the site.

5. Financial Assurance/Viable Responsible Organization

UNC owns the site and has been willing and able to decontaminate the site to unrestricted release levels.

6. Status of Decommissioning Activities

The site has been remediated to NRC specifications. ORAU's termination surveys of this site indicate that it is suitable for unrestricted release. However, nitrate and Sr-90 contamination remains in the ground water above U.S. Environmental Protection Agency (EPA) standards. A meeting was held in Charlestown, R.I., on October 4, 1991, between all the involved parties. At this meeting, the draft Safety and Environmental Evaluation Report, which indicates that the site can be released for

unrestricted use, was submitted to the State of Rhode Island Department of Environmental Management and Department of Health as well as to the Narragansett Indian Tribe (whose Reservation borders the site) and the U.S. Department of Interior (DOI) for their concurrence. NRC has received and responded to comments on the draft report from the Narragansett Tribe and the DOI. NRC has recently received comments from the State of Rhode Island. The State is recommending against delicensing at this time unless certain conditions are met by the licensee. NRC is commencing to work with the State so that their concerns are met allowing NRC to terminate the license. No firm commitment schedule has been agreed to by the involved parties. It is expected that if issues raised by the State can be easily resolved, the license can be terminate by the end of 1992.

7. Other Involved Parties

Parties involved in this site are the Rhode Island Departments of Environmental Management and Health, the Narragansett Indian Tribe and the DOI. Other interested parties are the Rhode Island Governor's Office and the Town of Charlestown, R.I.

8. NRC/Licensee Actions and Timing

A. Actions/Milestones

As described above, the NRC met with the involved parties on October 4, 1991, and distributed a draft of the Safety and Environmental Evaluation Report for this site. NRC requested comments on the Report within 60 days. NRC has received comments on this draft report form the Narragansett Indian Tribe and the DOI. In November 1991, the State of Rhode Island requested additional information and an extension of the due date for their comments. NRC received comments from the State of Rhode Island on February 24, 1992. NRC met with the State on May 6, 1992, to discuss their comments. The State does not want NRC to terminate the license on this site because they feel that there is inadequate data on the Sr-90 residual contamination. They also feel that NRC should

regulate the monitoring and/or clean-up of the nitrate contamination because it occurred under an NRC license. NRC staff does not agree with the State. A letter is being drafted to send to the State stating the NRC position. Staff intends to go ahead with the decommissioning and will seek OGC and Commission approval for the termination of this license considering the State's opposition. NRC has committed to hold a public meeting on this site before unrestricted release is granted.

#### B. Problems

The State of Rhode Island is concerned that there is nitrate and Sr-90 contamination in on-site ground water above EPA drinking water standards.



## Watertown Arsenal/Mall

### 1. Site Identification

Watertown Arsenal/Mall Site

Watertown, MA

License Nos.: SUB-238

SNM-244

Docket Nos.: 040-022-53

070-002-63

030-045-93

License Status: All Active

Project Manager: M. Bouwens, Region I

LLWM Monitor: D. Orlando

### 2. Site and Operations

The Watertown Arsenal/Mall site is composed of a tract of land located along the north branch of the Charles River approximately 7 miles west of Boston, Massachusetts. The site extends west along Arsenal Street approximately 1.2 miles from the intersection of Arsenal Street and Charles River Road. The main entrance is on Arsenal Street approximately 0.6 miles west of this intersection. At the main entrance, a roadway runs south, from Arsenal Street, bisecting the site and connecting with the intersection of North Beacon Street and Charles River Rd., which forms the southern site boundary. The area east of the main entrance is owned by the Watertown Redevelopment Authority (the Mall area) while the area to the west remains under U.S. Army control (the current Watertown Arsenal area).

Beginning in 1946 work involving radioactive materials was conducted at various locations within the then Watertown Arsenal, which encompassed the entire site. In 1946 the Massachusetts Institute of Technology (MIT) moved a research program on African ore (containing uranium) to Building

421 of the Watertown Arsenal (now in the Mall area) for the Manhattan Engineering District (MED). In 1953 the AEC transferred these operations to another laboratory outside the Arsenal.

Also now in the Mall area, Building 34 housed a uranium machine shop, a portion of Building 41 contained a foundry that was used for uranium work, and Building 421 was used for uranium processing. Army operations involving depleted uranium continued under license in the mall area sometime until June 1967, when this area, including the sites of Buildings 34, 41 and 421 were exsessed and transferred to the Governmental Service Administration (GSA). Sometime after 1968, the Mall area was sold to the Watertown Redevelopment Authority (WRA).

Buildings 421, 34 and 41 were razed sometime after release by the Army, and only the concrete floor slabs, access driveways, and underground utility service trenches remained. During the early 1980s, these areas were used as parking lots. The entire area was then gradually converted to sites for rental living units and commercial business use. Currently, a shopping mall, associated parking lots and residential condominium units are on the Mall area.

At the current Arsenal area, a number of facilities including, Buildings 43, 312, 292, 97 and 100 have been used for work with depleted uranium and other radioactive materials from the 1940s until the current date. These include NRC licensed uranium and thorium operations (alloy fabrication and utilization for research, development, and prototype testing of depleted uranium specimens, projectiles, or penetrators).

No specific information on the hydrology of the site is available. However, the site is adjacent to the Charles River. Water was sampled in 1977 in natural surface drainage areas, in storm drains, and in floor drain openings in various concrete pads. There was no indication of contamination above background levels except in some concrete pad floor drains. Recent water sampling data is unavailable. However, the licensee plans ground water sampling as part of their site characterization prior to and during decommissioning.

In 1960 a research reactor was constructed at the Arsenal for use in neutron radiography. The reactor was deactivated in 1970. A decommissioning plan for the reactor was submitted to NRC in October 1991. An order to decommission the reactor is scheduled to be issued in May 1992 and the license terminated in early 1993. The reactor is not considered part of SDMP.

In the late 1970s, the Watertown Arsenal was identified by the Department of Energy (DOE) as an area where Manhattan Engineering District activities had occurred. The DOE reviewed historical records regarding the site and investigated to determine if DOE has authority to conduct remedial action at the Mall and the current Arsenal area. On the basis of the available data, in April 1986, the DOE determined that there was not sufficient information to provide DOE authority under the Atomic Energy Act to perform cleanup activities and eliminated this site from Formerly Utilized Site Remedial Action Program (FUSRAP) consideration.

The current Watertown Arsenal area is scheduled for decommissioning and closure by 1996. Therefore, the army is reducing operations at the Arsenal and preparing for decommissioning.

### 3. Radioactive Wastes

DOE found no records to indicate whether the AEC or the Army surveyed Building 421 prior to its release and demolition. Records found by DOE indicated Buildings 34 and 41 were surveyed in 1967 and found to be contaminated in excess of the prescribed criteria for uncontrolled release. Buildings 34 and 41 were to be decontaminated and surveyed by Isotopes, Inc., prior to their transfer to GSA and ultimately to the WRA. The Army was to perform independent verification surveys. Apparently, these activities were completed and the buildings released to GSA for unrestricted use, but records of these actions were not found by DOE.

In a report dated 1980, Argonne National Laboratory (ANL) found during direct instrument surveys of the pad of Building 421 and the south wall of

Building 331 (nearest building to the pad) three small spots of radioactive contamination that exceeded DOE FUSRAP guidelines. Smears indicated that the contamination was fixed, and the analysis of one sample identified the contamination as natural uranium. Other direct instrument measurements showed no readings above natural background. Analyses of soil and water samples and measurements of radon in the air gave no indications of levels above background. One Building 41 concrete pad floor drain sludge sample and the suspended solids from a water sample showed slightly elevated levels of uranium (5.8 - 12.0 pCi/g).

During the ANL radiological assessment of the Building 421 site, Buildings 34 and 41 were identified as areas also involved in uranium operations during the AEC era. In 1981, ANL surveyed Buildings 34 and 41. Levels of contamination in excess of the DOE FUSRAP guidelines were measured at Building 34. At the Building 34 site, soil contaminated just slightly in excess of Option 1 of the Branch Technical Position was found. In addition, 33 spots of fixed uranium contamination were found on the concrete pad. The highest was 7 millirem per hour at the concrete surface. The volume of contaminated concrete was not estimated. No contamination was found on the Building 41 pad; however, two-thirds of the concrete pad was covered with soil up to 4 feet thick. One of the soil corings taken adjacent to the Building 41 pad had slightly elevated levels of uranium.

Records currently available to the Army and the NRC do not clearly establish that necessary decontamination occurred before the property was released for unrestricted use. However, every indication is that this is due to a lack of records. From available records the Army was clearly required to complete the decontamination and had made plans to accomplish it. The NRC and the Army are working to determine what actually occurred.

Building 43 contained furnaces, presses and other machine shop equipment used with depleted uranium. In December 1991, efforts began in Building 43 to remove all of the contaminated equipment. To date, approximately 10 truck loads of equipment have been removed from Building 43 to the Chem-Nuclear holding facility in Barnwell, South Carolina. The holding



facility is used to separate the salvageable equipment from the contaminated equipment prior to burial of the equipment at the Chem-Nuclear Low-Level Waste facility at Barnwell, South Carolina.

Building 312 contains two machine shops where beryllium and depleted uranium were used. Preliminary surveys by an Army contractor indicate that decontamination of this area may produce mixed waste.

4. Description of Radiologic Hazard

The principal hazards associated with the contamination at the Mall area site east of the main entrance involve potential ingestion and ground water contamination. Even if no decontamination took place prior to release, no immediate threats to public health and safety exist due to the relatively low concentrations and small amount of uranium then on the site. The extensive addition of concrete foundation likely reduces the hazard even more.

The hazards on the Arsenal Area are those presented by a typical military industrial research and development program involving radioactive material. However, these are controlled by the active radiation safety program.

5. Financial Assurance/Viable Responsible Organization

The Army provided explicit financial assurance for the current Arsenal area. The Army agrees that they are responsible for demonstrating that the Mall area meets criteria for release for unrestricted use.

6. Status of Decommissioning Activities

In preparation for closure of the Arsenal, the Army hired The Roy F. Weston Company to characterize the facilities at the Watertown Arsenal site, Watertown, MA and develop a decommissioning plan. A draft site characterization plan was submitted to NRC in a report dated August 1991. The report shows Buildings 43 and 312 as having depleted uranium contamination.



An inventory of all depleted uranium stock and waste has taken place. All depleted uranium is presently being packaged for shipment. Usable stock and waste will be shipped to Barnwell, South Carolina for disposal.

The Army has agreed to provide a schedule and plan for resolving the status of the Mall area by June 1992 and a preliminary decommissioning plan for the Arsenal property by the same date.

7. Other Involved Parties

No other involved parties.

8. NRC/Licensee Actions and Timing

A. Necessary NRC actions consist of the following:

- |   |               |
|---|---------------|
| • Review Submission concerning Mall area  | July 1992     |
| • Review and Approve Decommissioning plan | August 1992   |
| • Inspect Decommissioning                 | December 1995 |
| • Final NRC survey                        | June 1996     |
| • Release Site for Unrestricted Use       | December 1996 |

B. Potential problems inhibiting site cleanup

None

## Watertown GSA

### 1. Site Identification

Government Services Administration

Boston, MA

License Status: None

Project Manager: M. Bouwens, Region I

LLWM Monitor: D. Orlando

### 2. Site Description

The Watertown GSA site is composed of 12 acres located along with north branch of the Charles River approximately 7 miles west of Boston, Massachusetts. The site is located north of Arsenal Street between Greenough Boulevard on the east and Coolidge Avenue to the west. The site extends north along Greenough Boulevard approximately 1750 feet and west along Arsenal Street approximately 800 feet. The site is currently under Federal Government control and is principally used by the General Services Administration (GSA).

Beginning in 1946 the area that is now the Watertown GSA site was part of the Watertown Arsenal and became involved in depleted uranium operations conducted by the U.S. Army as part of the activities of the Manhattan Engineering District (MED). This area was used for packaging and storing radioactive waste, burning of uranium scrap, and staging of radioactive waste shipments. Army operations involving depleted uranium apparently continued partly under AEC license and partly under AEC prime contractor exemption in this area of the Arsenal until June 1967, when records become somewhat unclear. In 1968 the site was apparently transferred to GSA as excess property.

In 1980, the GSA site was identified by the Department of Energy (DOE) as an area involved in uranium operations between 1946 and 1953. In the early 1980s, the DOE reviewed historical records regarding the site and investigated to determine if DOE had authority to conduct remedial action at the Arsenal based on activities conducted by MED or the former AEC. Records found by DOE indicated the GSA site was surveyed in 1967 and found

to be contaminated in excess of the then in use criteria for uncontrolled release. Some decontamination apparently was performed at the site and then control of the site was transferred to GSA. According to some available records, the radiation levels met the guidelines for unrestricted use except for some areas on a concrete pad and the surrounding soil. The site was apparently transferred to GSA in a contaminated condition.

The GSA site is now being used by a number of Federal agencies. The property includes several buildings being used for storage, equipment maintenance, and a pistol firing range. An outdoor fenced area is used for the storage of excess Federal vehicles.

The topography of the site has been reshaped to varying degrees by construction activities in this densely populated area. The site is essentially flat and is located on a segment of what was once a swampy flood plain of the Charles River. Recent filling activities by man have raised the level of the site to form a terrace above the former swamp surface of between 6 and 8 feet above sea level. An artificial retaining wall exists along the western property boundary of the site.

Drainage of the site is complex and results from the interaction of natural drainage processes with modifications made at the site. The natural drainage pattern prior to filling and construction activities involved transport of surface runoff to several tributaries which dissected the site and discharged to the Charles River. These tributaries have since been removed or modified. A small stream reportedly traversed the center of the site from higher terrain to the west, but this was filled in the early 1900s. A second stream which emptied Sawins Pond was re-routed to its current configuration and it currently passes by the southern boundary of the site.

Properties abutting the GSA site contain a mixture of recreational, residential, light industrial and commercial uses. The area between the GSA property and Coolidge Avenue to the west is zoned heavy industrial, the area to the north is residential, the area to the east and southeast is open space conservancy, and a portion to the south is light industrial.

This area encompasses a portion of the current Watertown Arsenal property. The GSA site itself is zoned as open space conservancy.

3. Radioactive Wastes

In 1981 Argonne National Laboratory (ANL) surveyed the GSA site for DOE and found levels of uranium contamination in excess of the DOE Formerly Utilized Site Remedial Action Project (FUSRAP) guidelines. Soil concentrations were as high as 26,000 picocuries of uranium per gram of soil (pCi/g) in one location and several thousand pCi/g in several other locations. The average soil activity concentration was estimated to be 240 pCi/g and the radiation exposure levels were about 20 to 30 microroentgen per hour. Contamination reached to a depth of 6 feet in some places. The total volume of contaminated soil was estimated to be no larger than 12 m<sup>3</sup>. All buildings were found to be free of residual radioactivity. In November 1986 the NRC conducted a confirmation survey on the GSA site and determined that no changes in the activity levels had occurred since the ANL survey.

4. Description of Radiologic Hazard

The principal hazards associated with the contamination at the Watertown GSA site involve intrusion and ground water contamination. No immediate threats to public health and safety exist due to the relatively low concentrations and small amount of uranium on the site. The migration potential to ground water systems is expected to be small because the uranium is expected to be relatively insoluble. Access to the contaminated areas of the site is restricted providing little potential for intrusion.

5. Financial Assurance/Viable Responsible Organization

Since there is no license there are no possession limits established for the site. However, the amount of uranium contamination on the site is likely far below that which would require financial assurance under the current rule. The site is under the control of the GSA who has expended



significant resources in the evaluation and decontamination of the site. It appears likely they will complete the decommissioning.

6. Status of Decommissioning Activities

On the basis of the available data, in April 1986, the DOE determined that there was not sufficient information regarding the cause or source of the uranium contamination at this site to provide DOE authority under the Atomic Energy Act to perform cleanup activities at the site. Therefore, DOE eliminated the site from FUSRAP consideration. DOE then notified NRC, EPA and the Commonwealth of Massachusetts of their findings.

On October 15, 1986 NRC requested that GSA apply for a license to cover possession of the contaminated site until release requirements were met and to submit a decontamination plan. Subsequently, GSA agreed to promptly perform the needed cleanup, but has not applied for a license.

In 1988 GSA contracted with Chem-Nuclear Systems, Inc. to decontaminate the site and decontamination operations began that year. The high water table limited activities that year. However a concrete pad contaminated with uranium was removed and disposed that year. Decontamination resumed in 1989, but the discovery of an underground petroleum storage tank and volatile organic compounds in the ground water limited further activities. GSA's contractor believes these compounds are coming from an adjacent property (one of the previous landfills) rather than the tank. Onsite sampling was performed in the spring and summer of 1990 by Chem-Nuclear. On October 1990, a Comprehensive Site Assessment of the Watertown GSA site was prepared by the contractor and submitted to GSA. This assessment was forwarded to NRC for review in May 1991.

While the Assessment requires significant additional review, it appears to recommend a small amount of additional removal of uranium contamination followed by application of a protective "cap" to limit human exposure to the other hazardous wastes present. It also appears GSA plans to provide the land to another governmental entity for use as a park with restrictions on access below the surface after complete remediation and capping.



7. Other Involved Parties

No other involved parties.

8. NRC Actions Needed and Timing

A. NRC actions consist of the following:

- Evaluate the Site Assessment June 1992
- Meet with GSA to request a schedule for modifying and/or implementing the recommendations in the assessment May and August 1992
- Inspect additional decontamination activities August 1992
- Receive final survey from GSA August 1993
- Perform final closeout surveys October 1993
- Release site for unrestricted use December 1993

B. Potential problems inhibiting site cleanup

Presence of high water table and other hazardous wastes at the site.

## Westinghouse Electric Corporation, Waltz Mill Site

### 1. Site Identification

Westinghouse Electric Corporation  
Advanced Power Systems Division  
Pittsburgh, PA  
(Site located at Madison, PA (known as Waltz Mill))  
License No.: SNM-770  
Docket No.: 070-00698  
License Status: Timely Renewal  
Project Manager: J. Kinneman, Region I  
LLWM Monitor: C. Glenn

### 2. Site and Operations

The Waltz Mill site is located near Waltz Mill, and Yukon, PA on approximately 850 acres in a sparsely settled area. The site is fenced and provided with continuous security. There are 13 major buildings including the Westinghouse Test Reactor (WTR), (licensed under 10 CFR 50, License No. TR-2) located at the site. The WTR Part 50 reactor license is a possession-only type which expires in November 1993. Possession-only licenses for research and test reactors will not be renewed unless necessary to protect the health and safety of the public. The NRR staff plans to request by September 1992 that Westinghouse submit a decommissioning plan for staff review. Decommissioning of the Part 50 reactor facility is a separate action, not associated with the SDMP.

The WTR first went critical in 1959, was the site of a core disruption in April 1960, and was rebuilt and returned to service in December 1960. The WTR was permanently shut down in March 1962. All fuel was removed from the site and the reactor facility was partially dismantled, but not completely decontaminated. The Part 50 reactor facility continues to be maintained as a restricted area by the licensee. The WTR site liquid waste retention basin, the evaporator plant, and certain tanks previously

associated with WTR are now possessed under License No. SNM-770 (separate from the Part 50 reactor license) and are part of the licensee's current Waste Disposal Facility.

The Waste Disposal Facility consists of the site liquid waste retention basin, five tanks used for liquid radioactive waste storage and processing, a concrete pad for storage and sorting of solid waste and a concrete block building which houses an ion exchange system for processing of radioactive water. The site radioactive drain systems converge into a single 16 inch cast iron pipe which formerly discharged to the site liquid waste retention basin, but now discharges into the radioactive waste storage tanks. The water collected in the tanks is appropriately analyzed and processed prior to discharge or other disposal.

Three retention basins that had been used in connection with operation of the WTR facility have been dirt filled and are maintained under License No. TR-2.

The Advanced Energy Systems Division (AESD) of the Westinghouse Electric Corporation (WEC) is the landlrd division for the Waltz Mill site. In addition to WTR, since at least 1963, source, byproduct, and special nuclear material have been used in a variety of chemical and physical forms in various laboratories and associated facilities. WEC currently carries out a wide range of engineering design, research, development, and services involving licensed material at this site. Decontamination of contaminated metal components from nuclear power plants to reduce the volume of radioactive waste disposed in licensed sites is performed as a service. Nuclear laundry, liquid waste treatment, waste storage, and waste packaging operations are also present.

### 3. Radioactive Wastes

The Waltz Mill site includes radioactive contamination in various active and inactive buildings, systems, possibly in the closed and stabilized waste retention basins and as strontium-90 (Sr-90) in ground water. With regard to the ground water contamination, in November 1982 License No.

SNM-770 was amended to require quarterly sampling of ground water from seven wells surrounding the site liquid waste retention basin. Since that time WEC has submitted quarterly reports to the NRC summarizing the results of the monitoring program and the status of their study to identify the source of the contamination. As part of their attempts to understand the contamination, the licensee has increased the number of monitoring wells to 38. A geotechnical consultant to the licensee has concluded that the ground water containing the contamination is flowing in the fractured bedrock (upper 10 to 15 feet) underlying the Waste Disposal Facility.

The source of the ground water contamination has been suspected to be leakage from the site liquid waste retention basin since the highest concentrations of Sr-90 are measured in the wells closest to the basin. Concentrations as high as 6200 pCi/l gross beta and 2900 pCi/l Sr-90 have been measured. However, it has not been conclusively shown that the basin is leaking. Although the ground water flow direction is toward Calleys Run (located south of the basin), two test holes located north of the basin have shown Sr-90 concentrations of up to 120 pCi/l. A review of WTR records by the licensee found that three retired catch basins, now dirt filled, had at one time contained highly contaminated water from the reactor. One of these basins is located north of the two test holes. It is, therefore, possible that these basins are the source of the contamination. The NRC on several occasions has split samples of ground water with WEC for analysis. The NRC results were consistent with WEC results.

In an attempt to identify the source of the ground water contamination, WEC performed fluorescent dye tests and visually inspected the underground drain line that carried all contaminated water to the site liquid waste retention basin. None of the ground water well samples indicated the presence of the fluorescent dye. No evidence of breaks or leaks in the drain piping was detected.

Dry radioactive waste is routinely generated by the licensee's service activities, but the licensee is prohibited from storing this radioactive

waste for more than 12 months. The licensee routinely disposes of this material by transfer to a waste broker. WEC has a small quantity (2-55 gallon drums) of mixed waste (hazardous and radioactive) in storage. This waste was produced by freon decontamination operations. Freon is no longer used for radioactive decontamination.

4. Description of Radiologic Hazard

The possible radiologic hazards associated with the Waltz Mill site involve inhalation, ingestion, intrusion, and movement of onsite contaminated ground water to the unrestricted area. No immediate threat to public health and safety exists. The liquid waste retention basins which may still contain contamination have been closed and stabilized, eliminating airborne, surface water and wind transport from those locations. Intrusion into contaminated areas is controlled since WEC maintains control over the site by fencing, continuous security and an active radiation safety program. Since 1982 WEC has been increasing its activities at this site including maintenance and decontamination of contaminated metal components, waste sorting, reduction and packaging and laundry of contaminated clothing. Partly as a result of these increases, frequent routine radiological surveillances of effluents and environmental samples are conducted. Releases in excess of NRC limits have not occurred and contamination in excess of NRC limits has not been identified in environmental samples off-site.

5. Financial Assurance/Viable Responsible Organization

The licensee's possession limits require that WEC provide a decommissioning funding plan during the next renewal. WEC has made a submission to NRC concerning financial assurance. The NRC is currently reviewing WEC's submission and license renewal application.

Since WEC is a very large company with extensive resources, it is expected that they have the capability to fund any cleanup activities needed.



6. Status of Decommissioning Activities

WEC continues a program it began in the summer of 1986 to pump the ground water from the monitoring well nearest the site liquid waste retention basin and to treat the liquid through an ion-exchange column. This operation has resulted in lower ground water concentration levels.

A decontamination plan for the facilities under License No. SNM-770 was submitted to the NRC on June 22, 1978. Revisions were submitted on August 30, 1978 and November 13, 1978. On December 22, 1978 the plan was approved by the NRC as an amendment to License No. SNM-770. This decontamination plan is very general and does not specifically address all of the current issues and implementation is not required at any specific time. During a May 13, 1992, meeting between NRC and WEC, WEC stated their intentions to decontaminate the inactive facilities on the site and establish a schedule for the decontamination activities.

7. Other Involved Parties

There is currently no significant third party involvement at the site.

8. NRC/Licensee Actions and Timing

The NRC is currently reviewing a license renewal application from WEC. The decontamination of the site is one issue which is to be resolved in the review now in progress. Region I staff plan to request from WEC a more comprehensive ground water monitoring plan, an improved description of the geohydrology of the site an updated decontamination plan for the inactive facilities including those covered by the WTR license, and a specific schedule for implementation of the decontamination plan.

A. NRC actions consist of the following:

- Review license renewal application June 1992
- Request augmented ground water monitoring from WEC September 1992
- NMSS to resolve with NRR WTR decommissioning issues Complete
- Inspection implementation of cleanup TBD
- Review WEC close-out survey data TBD
- Perform NRC final survey TBD
- Terminate license for contaminated areas. TBD

B. Potential problems inhibiting site cleanup:

The willingness of the licensee to spend the large sums necessary to effect cleanup.

## West Lake Landfill

### 1. Site Identification

West Lake Landfill Bridgeton

St. Louis County, MO

Docket Nos.: 040-08035

040-08801

License Status: None

Project Manager: L. Bell

### 2. Site and Operations

The West Lake landfill property, owned by Laidlow and Rockroad, Inc. is a 200-acre tract on the outskirts of the city of St. Louis. Limestone was quarried there from 1939 to 1987, and an unregulated landfill was operated on part of the site from 1962 to 1974. About 43,000 tons of contaminated soil, from Cotter Corporation's Latty Avenue site, was placed in the landfill in 1973.

A concrete plant is operating on site, as well as a 22-acre demolition landfill and a 52-acre sanitary landfill. The property is on the border of the Missouri River Valley about 1.2 miles from the river.

### 3. Radioactive Wastes

Two areas on the site have a layer of radiologically contaminated soil, mostly covered with 3 to 20 feet of other waste. The larger area in the northern site area comprises about 13 acres and contains about 3.5 million cubic feet of soil contaminated to more than 5 pCi/g of radium-226 (Ra-226). This contaminated soil forms a more or less continuous layer from 2 to 15 feet in thickness and lies above 16 to 20 feet of landfill debris. The smaller area to the south covers about 3 acres and contains about 0.5 million cubic feet. This soil body lies above a former quarry pit that was filled with debris.

The average Ra-226 concentration is about 90 pCi/g, uranium radioactivity concentrations average appreciably smaller, and the thorium-230 (Th-230) concentrations are 20 to 100 times those of Ra-226. The contamination originated with residues from extraction of uranium and radium from very rich uranium ores for the Atomic Energy Commission.

4. Description of Radiologic Hazard

This site poses no immediate threat to the public. Radioactivity has been detected in ground water monitoring wells on site, indicating slight contamination above background.

5. Financial Assurance/Viable Responsible Organization

The Cotter Corporation is judged capable of remedial action and is being held responsible for site remediation.

6. Status of Decommissioning Activities

The Nuclear Regulatory Commission (NRC) had a radiological survey performed in 1981 and an environmental characterization of the site performed in 1983. NRC previously informed Cotter Corporation that it is being held responsible for site remediation and asked for its plans for remedial action. However, no site remedial action has taken place yet. The property owner has not allowed any more waste to be dumped in these areas.

On August 30, 1990, the U.S. Environmental Protection Agency (EPA) listed the site on the Comprehensive Environmental Response, Compensation, and Liability National Priorities List for Uncontrolled Hazardous Waste Sites and ranked it as site number 1003 (55 FR 35502). In discussions between NRC and Cotter Corporation in November 1990, it was acknowledged that EPA is taking the lead for site remediation activities.

7. Other Involved Parties

NRC is considering how to best work with EPA to ensure a satisfactory cleanup and disposal of any removed waste material subject to NRC jurisdiction. In the interim, the NRC will monitor EPA activities and progress on this case.

8. NRC Actions Needed and Timing

A. Actions/Milestones

EPA Region VII planned to send the Division of Low-Level Waste Management and Decommissioning (LLWM) in December 1991 two draft Scope of Works for remediation of the West Lake Landfill and Earth City property. Final Scope documents were scheduled to be sent January 1992. Approximately 90 days after the Scope of Work is issued, EPA Region VII will request LLWM technical review.

B. Problems

As of March 6, 1992, LLWM has not received any of the documents promised by EPA.



## Whittaker Corporation

### 1. Site Identification

Whittaker Corporation

Greenville, PA

License No.: SMA-1018

Docket No. 040-07455

License Status: Current/Possession for storage only

Project Manager: L. Bykoski

### 2. Site and Operations

Beginning in the 1960s, the Greenville, PA firm of Mercer Alloys, a predecessor of Whittaker Metals Corporation, produced ferro-columbian and ferro-nickel alloys by an aluminothermic melting process. Columbian ores and nickel scrap used in this operation contained licensable concentrations up to approximately 2 percent of thorium. Process slag containing thorium was retained on-site. Natural and depleted uranium were unwanted contaminants of some of the feed-metal scrap; slags containing low-levels of uranium contamination are also present on the site. Concentrations of radium-226 (Ra-226) have been noted in some of the waste slags.

Whittaker terminated all manufacturing operations involving source material in 1974. Currently, no processing is done at the site, the license is for storage of the contaminated materials. The site is located about 3.5 miles south of Greenville on the west side of the Shenango River. The site is an irregularly shaped parcel of about 6 acres near the river. The surface of the property has been built up over a period of about 40-50 years through repeated disposal of building rubble, scrap metal, general trash, and foundry slag. The present surface is generally level. The central and southern portions of the property are predominantly slag. The northern portion contains slag with other rubble and waste--some dating to the early use as an Army supply base (during WW II).

There are no buildings on the property. The property contains about 20 storage bins which contain about 70 drums and boxes containing contaminated material or in some cases soil which act as shields at the fenceline. The site also contains some uncontaminated empty shipping containers. There is no known mixed waste on the property.

3. Radioactive Wastes

The slag material contains natural thorium and uranium. ORAU estimated the total volume to be 1.05 million cubic feet. Thorium concentrations range from less than detectable levels to 6779 pCi/g of total thorium. Concentrations of uranium-238 (U-238) and Ra-226 also vary considerably with the highest levels being 2179 pCi/g and 226 pCi/g, respectively.

4. Description of Radiologic Hazard

The site poses no immediate threat to the public. Quarterly ground water sampling since 1974 has not shown any significant offsite migration of radionuclides. Ground water results have shown slightly elevated levels (a few pCi/l from wells on the slag site, generally in the central part of the site (wells W8, W9, W14)). Leaching studies performed on the slag by ORAU show that under conditions encountered in nature, the slags are not going to leach out to any significant degree.

The site area is fenced to control access. Whittaker also maintains an access control program and the general public will not have access to the site. On a semiannual basis, the licensee conducts a monitoring program that consists of a visual inspection of the site for erosion. The licensee conducts an annual monitoring program that consists of sampling of ground water from monitoring wells present in the slag area and analysis for alpha and beta activity as well as measurement of direct radiation levels at 1 meter above the ground at all boundaries of the site. During radiation monitoring conducted on November 12, 1991, the 12 river side fence post positions had readings ranging from 28  $\mu$ R/hr to 390  $\mu$ R/hr.

5. Financial Assurance/Viable Responsible Organization

The licensee has provided a \$750,000 irrevocable standby letter of credit which is currently under review. The licensee is going to provide a standby trust agreement. The license expiration date is September 30, 1993.

6. Status of Decommissioning Activities

An area adjacent to the site known as Greenville Metals was decontaminated and released by NRC in 1985 for unrestricted use. This property was subsequently sold.

License renewal date is September 30, 1993, at which time a final decommissioning plan is expected to be addressed.

Whittaker's consultant met with NRC staff on January 24, 1992 to discuss possible options for decommissioning and was informed of NRC's strong interest in accelerating the decommissioning process.

7. Other Involved Parties

Any movement of material along the Shenango River would involve the Army Corps of Engineers.

8. NRC/Licensee Actions and Timing

TBD

Wyman-Gordon Company

1. Site Identification

Wyman-Gordon Company

North Grafton, MA

License Status: License Terminated

Project Manager: L. Bell

2. Site and Operations

The Wyman-Gordon Company (WG) makes large titanium forgings for the aerospace industry. Between 1958 and 1971, WG had several Atomic Energy Commission licenses for the possession and use of magnesium-thorium alloys and uranium. These materials were used in the manufacture of forgings for Department of Defense classified projects. The last of these licenses was terminated in 1971. At the North Grafton site, magnesium-thorium alloys containing between 2 and 3 percent thorium were disposed on site under 10 CFR 20.304. These disposals became a significant media issue on September 23, 1990, when an article appeared in the Worcester Telegram describing the disposal and 1983 and 1984 ground water sampling issues.

In 1983 WG sampled on site monitoring wells in the immediate vicinity of the disposal area, which is located in the northeast corner of the site. The results showed gross alpha, gross beta, and radium levels that exceeded U.S. Environmental Protection Agency (EPA) drinking water requirements. Because of a large amount of scatter in the data, additional sampling was performed by WG and by the Commonwealth of Massachusetts in 1983 and 1984. The resampling results showed radioactivity levels to be well within the EPA requirements. Based on these results, both WG and the Commonwealth considered that there was no threat to public health and safety. However, no formal analysis closing out this issue was documented by either WG or by the Commonwealth. Further complicating the issue, an attorney for WG, without authorization from WG, transmitted a letter to the Commonwealth requesting that the initial sampling data be held confidential until new sampling could be taken.

A consultant to WG had previously done a detailed hydrologic study of the WG site in support of submittals made by WG to the EPA for compliance with Resource Conservation and Recovery Act (RCRA). This site investigation included mapping the hydrogeologic system and the installation of monitoring wells, including in the area immediately downstream from the magnesium-thorium disposal area. Three wells are located within 100 feet of the disposal area. Two of these wells are sampled annually by the consultant and analyzed for hazardous chemical constituents. No radioactive assays have been performed since 1984. A third well is located between two smaller disposal locations within the disposal area. Ground water sampling was performed in October 1990 on samples from the three onsite wells adjacent to the disposal area and five offsite private wells. The assay results indicate no ground water contamination in excess of EPA drinking water limits for gross alpha and gross beta. Assays of sediment samples from the onsite wells indicate no thorium migration above background levels.

### 3. Radioactive Wastes

Approximately 50,000 pounds of the alloy material was disposed in an area in the northeast corner of the site. The disposed material included scrap that had no recycle value and contaminated equipment such as grinders and other tools. The magnesium-thorium alloy wastes are buried and covered by 4 feet of soil. The material is in an insoluble form. Radiation surveys taken immediately over the disposal trenches indicate background levels of radiation.

### 4. Description of Radiologic Hazard

There is no immediate threat to public health and safety. Ground water and ground water sediment sample analyses indicate no migration of thorium and compliance with EPA drinking water requirements. The entire area is fenced and access controlled.



5. Financial Assurance/Viable Responsible Organization

The Wyman-Gordon Company is one of the largest manufacturers of large titanium forgings for the aerospace industry and is financially capable of cleanup activities if remediation is required. Financial assurance requirements in the decommissioning rule do not apply because the AEC licenses were terminated.

6. Status of Decommissioning Activities

The September 23, 1990, newspaper article prompted local State Senator John Houston to call a meeting of Commonwealth and the Nuclear Regulatory Commission (NRC) regulators and Town Selectmen to discuss the roles and responsibilities of each agency. This meeting was held on September 27, 1990. At this meeting, it was agreed that

- The Commonwealth and the NRC would participate in a split sampling program of ground water samples taken onsite and offsite.
- The Massachusetts Department of Public Health would take offsite samples from several public wells located in the vicinity of the disposal area.
- After the sample analyses were obtained and evaluated, the Town Selectmen would call a public meeting and report on the results.

NRC sample assays were performed by the Radiological and Environmental Sciences Laboratory (RESL) in Idaho Falls, Idaho, and the assay data were transmitted to WG, State Senator Houston, Town of Grafton Selectmen, and Massachusetts regulatory agencies on December 10, 1990. On January 29, 1991, NRC staff participated in a public meeting in Grafton to discuss the results of the ground water sampling. Also in January 1991, the NRC requested Wyman-Gordon to provide a dose assessment of the disposal area. In a letter dated March 11, 1991, Wyman-Gordon informed the NRC staff that they would not perform a dose assessment, but would support the staff by providing data that were available.

Pacific Northwest Laboratories (PNL) was contracted to perform a dose assessment of the buried waste, and all available information in the Wyman-Gordon file was forwarded to PNL on July 19, 1991. A site visit by NRC and PNL staff was made on October 17 and 18, 1991.

7. Other Involved Parties

The NRC staff has committed to keep the local government official informed of all activities at the Wyman-Gordon site. The North Grafton City Administrator was briefed on October 18, 1991 by NRC and PNL staff on the status of the pending site dose assessment.

8. NRC/Licensee Actions and Timing

A. Action/Milestones

The NRC staff reviewed the draft PNL dose assessment report and as a result of that review provided PNL with written comments and requested PNL come to Washington to discuss.

B. Problems

There is a need to get PNL to a point where they understand the NRC staff needs. A meeting with PNL has been requested to resolve our comments related to their draft dose assessment report.

## APPENDIX B

### REACTOR DECOMMISSIONING STATUS

The following six tables provide the decommissioning status of power reactors, test and nuclear ship reactors, shut down research reactors, and decommissioned research reactors, decommissioned critical facilities, and decommissioned demonstration nuclear power plants.

Table 1 Shut Down Power Reactors

Docket No.	Reactor (Type)	Thermal Power (MW)	Location	Date Shut Down	Licensee Status	Fuel On Site
50-3	Indian Point-1 (PWR)	615	Buchanan NY	10-31-74	Possession Only	Yes
50-10	Dresden 1 (BWR)	700	Morris IL	10-31-78	Possession Only	Yes
50-16	Fermi 1 Fast Breeder*	200	Monroe Co. MI	09-22-72	Possession Only	No
50-18	Vallecitos (BWR)*	50	Alameda Co. CA	12-09-63	Possession Only	No
50-114	Carolina/Virginia Tube Reactor (Heavywater)	65	Parr SC	01-1967	Byproduct (Agreement State)	No
50-130	Pathfinder Nuclear Superheat (BWR)*	190	Sioux Falls SD	09-16-67	Dismantling NRC Part 30	No
50-133	Humbolt Bay-3 (BWR)*	200	Eureka CA	07-02-76	Possession Only	Yes
50-171	Peach Bottom 1 (HTGR)*	115	Lancaster PA	10-31-74	Possession Only	No
50-267	Fort St. Vrain (HTGR)	842	Platteville CO	08-18-89	Shut Down 1/3 Defueled	Yes
50-312	Rancho Seco (PWR)	2772	Sacramento CA	06-07-89	Shut Down Defueled	Yes
50-320	Three Mile Island - 2 (PWR)	2772	Middletown PA	03-28-79	Shut Down Defueled	No
50-322	Shoreham (BWR)	2436	Brookhaven NY	06-28-89	Shut Down Defueled	Yes
50-409	LaCrosse (BWR)*	165	LaCrosse WI	04-30-87	Possession Only	Yes

\*Project management assigned to U.S. Nuclear Regulatory Commission Office of Nuclear Material Safety and Safeguards.

Note:

PWR = pressurized-water reactor

BWR = boiling-water reactor

HTGR = high-temperature gas reactor

Table 2 Shut Down Test and Nuclear Ship Reactors  
in SAFSTOR With Continued License

Docket No.	Reactor (Type)	Thermal Power (MW)	Location	Licensee Status	Fuel On Site
Test Reactors:					
50-22	Westinghouse Test Reactor (Pool Type)	60	Waltz Mill PA	Possession Only	No
50-30	NASA Plum Brook (Pool Type)	60	Sandusky OH	Possession Only	No
50-70	General Electric Test Reactor (Pool Type)	50	Alameda Co. CA	Possession Only	No
50-146	Saxton (PWR Test)	28	Saxton PA	Possession Only	No
50-183	EVESR (Experimental Superheat)	17	Alameda Co. CA	Possession Only	No
50-200	BAWTR (Pool Type)*	6	Lynchburg VA	Byproduct (NRC)	No
50-231	SEFOR (Sodium Cooled)	20	Strickler AR	Byproduct (Agreement State)	No
Nuclear Ship:					
50-238	NS Savannah (PWR)	80	Charleston SC	Possession Only	No

\*Project management assigned to NRC NMSS.

Note:

EVESR = ESADA (Empire States Atomic Development Associates) Vallecitos Experimental Superheat Reactor  
 BAWTR = Babcock & Wilcox Nuclear Development Center Test Reactor  
 SEFOR = Southeast Experimental Fast Oxide Reactor



Table 3 Shut Down Research Reactors (Continued License)

Docket No.	Reactor (Type)	Thermal Power	Location	Licensee Status	Fuel On Site
50-47	Watertown Arsenal, U.S. Army (Pool Type)	5 MW	Watertown MA	Possession Only--Dismantling Plan Under Staff Review	No
50-54	Cintichem (Pool Type)	5 MW	Tuxedo NY	Decommissioning Order 9/91	Yes
50-77	Catholic University (AGN-201)	0.1 W	Washington DC	Possession Only--Dismantling Plan Under Staff Review	Yes
50-139	University of Washington	100 kW	Seattle WA	Shut Down	No
50-142	University of California (Argonaut)	100 kW	Los Angeles CA	Dismantling*	No
50-148	University of Kansas (Pool)	10 kW	Lawrence KS	Dismantling	No
50-185	NASA Mockup (Pool)	100 kW	Sandusky OH	Possession	No
50-192	University of Texas	250 kW	Austin TX	Dismantling	No
50-262	Brigham Young (L 77)	10 W	Provo UT	Possession Only--Dismantling Plan Under Staff Review	No
50-396	University of Virginia Cavalier	100 W	Charlottesville VA	Dismantling	Yes

\*License terminated. ASLB dismantling order in effect.

Note:

AGN = Aerojet-General Nucleonics

Table 4 Decommissioned Research Reactors (License Terminated)

Docket No.	Reactor (Type)	Thermal Power	Location	Termination Date
50-1	Illinois Institute of Technology (Water Boiler Research)	100 kW	Chicago IL	04-28-72
50-4	USN Research Laboratory (Pool Type)	1 MW	Washington DC	03-18-71
50-6	Battelle Memorial Institute (Pool Type)	2 MW	Columbus OH	12-22-87
50-8	North Carolina State (Aqueous Homogeneous)	100 W	Raleigh NC	09-07-66
50-17	Industrial Reactor Laboratories (Pool Type)	5 MW	Plainsboro NJ	11-04-77
50-43	U.S. Naval Post-Graduate School (AGN-201)	0.1 W	Monterey CA	10-11-72
50-50	North American Aviation (L-47 Homogeneous)	5 W	Canoga Park CA	06-30-58
50-58	Oklahoma State University (AGN-201)	0.1 W	Stillwater OK	03-19-74
50-60	U.S. Navy Hospital (AGN-201M)	5 W	Bethesda MD	06-24-65
50-64	University of Akron (AGN-201)	0.1 W	Akron OH	10-09-67
50-84	University of California (AGN-201)	0.1 W	Berkeley CA	08-23-66
50-87	Westinghouse Training Reactor (Pool)	10 kW	Zion IL	10-27-88
50-94	Rockwell International (L-77)	10W	Canoga Park IL	02-11-82

Table 4 (Continued)

Docket No.	Reactor (Type)	Thermal Power	Location	Termination Date
50-98	University of Delaware (AGN-201)	0.1 W	Newark DE	02-26-79
50-99	Babcock & Wilcox Lynchburg (Pool)	1.0 MW	Lynchburg VA	07-20-82
50-101	Gulf United Nuclear (Pawling Lattice Test Rig)	100 W	Pawling NY	06-25-74
50-106	Oregon State (AGN-201)	0.1 W	Corvallis OR	11-10-81
50-111	North Carolina State (Pool)	10 kW	Raleigh OK	01-13-83
50-112	University of Oklahoma (AGN-211)	100 W	Norman OK	02-14-90
50-114	William March Rice University (AGN-211)	15 W	Houston TX	09-26-67
50-122	University of Wyoming (L-77)	10 W	Laramie WY	12-05-75
50-124	Virginia Technical Institute (Pool)	100 kw	Blacksburg VA	08-11-88
50-129	West Virginia (AGN-211 P)	75 W	Morgantown WV	09-07-84
50-135	Walter Reed Medical Center (L-54, Homogeneous Solution)	50 kW	Washington DC	07-26-72
50-141	Stanford University (Pool)	10 kW	Stanford CA	06-21-83
50-147	Rockwell International	200 W	Canoga Park CA	10-01-80
50-167	Lockheed (Pool)	10 W	Dawson Co. GA	09-01-60
50-172	Lockheed (Radiation Effects Reactor)	3 MW	Dawson Co. GA	08-31-71

Table 4 (Continued)

Docket No.	Reactor (Type)	Thermal Power	Location	Termination Date
50-187	Northrup		Hawthorne CA	06-29-86
50-202	University of Nevada (L-77)	10 W	Reno NV	02-24-75
50-212	General Dynamics (Fast Critical Assembly)	500 W	San Diego CA	03-05-65
50-216	Polytechnic Institute (AGN-201M)	0.1 W	Bronx NY	12-21-77
50-224	University of California (Pool)	1.0 MW	Berkeley CA	03-08-91
50-227	General Atomic (TRIGA Mark III)	1.5 MW	San Diego CA	12-10-75 Co.
50-235	Gulf General Atomic (APFA)	500 W	San Diego CA	10-22-69
50-240	Gulf General Atomic (HTGR)	100 W	San Diego CA	04-02-73
50-253	Gulf Oil Corp. (APFA III)	500 W	San Diego CA	08-10-73
50-267	Georgia Tech	0.1 W	Atlanta GA	01-07-86
50-294	Michigan State (Triga Mark I)	250 kW	East Lansing MI	04-05-90
50-310	NUMEC and Commonwealth of Pennsylvania (Pool)	1 W	Quehanna PA	12-02-66
50-375	Rockwell International (L-85)	3 kW	Canoga Park CA	04-08-87
50-394	California Polytechnic (AGN-201)	0.1	San Luis Obispo CA	07-19-85
50-406	Tuskegee		Tuskegee AL	11-02-84

Table 4 (Continued)

Docket No.	Reactor (Type)	Thermal Power	Location	Termination Date
50-433	University of California (AGN-211)	10 W	Santa Barbara CA	11-17-89
50-538	Memphis State University (AGN-201)	0.1 W	Memphis TN	10-19-88

## Note:

AGN = Aerojet-General Nucleonics  
TRIGA = training reactor and isotopes production, General Atomics  
APFA = accelerator pulsed fast (critical) assembly  
HTGR = high-temperature gas reactor



Table 5 Decommissioned Critical Facilities (License Terminated)

Docket No.	Reactor (Type)	Thermal Power	Location	Termination Date
50-13	Babcock & Wilcox (Split Table)	1 kW	Lynchburg VA	02-26-88
50-14	Battelle Memorial (Plastics Moderated Critical Assembly)	200 W	W. Jefferson OH	05-11-70
50-23	Nuclear Development Corp of American (Critical Experiment)	100 W	Pawling NY	06-22-61
50-24	General Electric (BWR Critical Experiment)	200 W	Alameda Co. CA	12-01-69
50-34	Westinghouse Electric (Critical Experiment)	1 kW	San Diego CA	12-08-69
50-37	General Dynamics (CIRGA Zirconium Hydride Moderator)	25 W	San Diego CA	03-15-60
50-75	NASA (ZPR-1, Solution Type Critical Facility)	100 W	Cleveland OH	10-13-73
50-87	Westinghouse Electric (Station)	100 W	Waltz Hill PA	01-26-72
50-108	Allis Chalmers (Critical Experiment Facility)	100 W	Greendale WI	01-20-67
50-153	Westinghouse (CVTR MOCKUP, Heavy Water)	3 kW	Waltz Mill PA	04-24-63
50-154	Martin Marietta (Fluidized Bed Critical Experiment)	10 W	Middle River MD	02-07-66
50-191	Babcock & Wilcox (Plutonium Recycle Critical Experiment)	50 W	Lynchburg VA	06-01-73
50-197	NASA (ZPR-2 Solution Type Critical Experiment Facility)	100 W	Cleveland OH	10-13-73

Table 5 (Continued)

Project No.	Reactor (Type)	Thermal Power	Location	Termination Date
50-203	GE (Mixed Spectrum Critical Assembly)	400 W	Alameda Co. CA	03-11-68
50-204	GE Corp. Critical Assembly	200 W	San Diego CA	08-10-73
50-246	GE Dynamics (ACRE)	10 W	San Diego CA	12-30-66
50-290	GE General Nuclear (Water Moderator Proof Test Facility)	100 W	Pawling NY	06-25-74
50-360	Battelle Pacific Northwest Laboratory (Plutonium Recycle)		Richland WA	10-07-81

Table 6 Decommissioned Demonstration Nuclear Power Plants  
(AEC/DOE Owned) Not Licensed  
(Operating Authorization Under 10 CFR Part 115)

Docket No.	Thermal Power	Location	Date Shut Down	Present Status
115-1 Elk River (BWR)	58.2 MW	Elk River MN	1968	Dismantled Federal Control Terminated
115-2 Piqua	45.5 MW	Piqua OH	1966	Entombed DOE Monitoring
115-3 Hallam	256 MW	Hallam NE	1964	Entombed DOE Monitoring
115-4 Bonus (BWR Nuclear Superheat)	50 W	Rincon PR	1968	Entombed DOE Monitoring