EQUIPMENT REUSE PROCESS: BARTERED SALE OF DOE MOUND USED CONTAMINATED EQUIPMENT TO A COMMERCIAL COMPANY

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This paper is dedicated to the memory of Paul Hart.

One of the many legacies that Paul has left to the D&D field was his instrumental support of our long-held belief that the D&D Focus Area ought to demonstrate important cost-savings processes, and not just demonstrate technologies. Our successful Mound Large Scale Technology Demonstration and Deployment Project, entitled "Equipment Reuse Process: Bartered Sale of Used Contaminated Equipment to Commercial Company", would never have been written for EM-50 dissemination as a LSDDP deliverable without the untiring support of Paul.

ABSTRACT

As a closure site, much of the DOE Miamisburg Environmental Management Project's (MEMP) - commonly known as the Mound Site, equipment is planned for disposal in the near future. However, instead of considering disposal as a first option, Mound has started to consider the additional benefits to the project from finding a way to re-use some equipment at another facility or company. For some equipment, cost and schedule savings to DOE as well as the receiving companies can result. Thus the concept considered here is to first seek opportunities for the reuse or recycle of equipment, where disposal becomes the last option, and in such a way that personnel and public safety is maintained or improved and cost and/or schedule savings result. The DOE National Metals Recycling Center (NMRC) in Oak Ridge has developed the know-how and the process to evaluate such opportunities for equipment reuse or recycle. It has also developed and used typical checklists and commercial terms and conditions to fit many situations in the DOE complex for equipment transfer and equipment / services barter agreements. It has successfully worked with many entities, including DOE and contractor site management, community reuse organizations and outside commercial companies, to complete equipment reuse projects at Rocky Flats, Hanford, Oak Ridge, and one small project at Mound. A second reuse project at Mound, just completed, provides an excellent opportunity to evaluate and document the process that NMRC is using in working with the Ohio field office and Mound site management. The purpose of this Demonstration is to evaluate and document the process

being implemented by DOE Ohio, DOE Mound, and BWXT of Ohio (the Mound Prime Contractor) with NMRC and a commercial company to achieve reuse of used, contaminated tritium-processing equipment at Mound, thereby avoiding disposal costs for the equipment. The goal is to demonstrate, evaluate and document this process as a useful tool for further application within the DOE complex. Strong emphasis is been placed on equipment reuse and recycle during D&D activities within the DOE complex. However, sites still frequently believe that reuse or recycle is not cost effective, due to lack of experience in the process, lack of contacts to find potential reusers or lack of site manpower and other resources to complete the arrangements. Assistance from NMRC brings needed expertise and focus to the many reuse and recycle opportunities that do exist. NMRC's experience is being applied to Mound to accomplish a bartered sale of contaminated tritium processing equipment from DOE Mound to a facility in Texas that has been licensed by the U.S. Nuclear Regulatory Commission (NRC). This project offers an excellent opportunity to evaluate and document a process of equipment reuse that will be instructive and encouraging to other sites for other potential equipment reuse opportunities within the DOE complex. NMRC and now BWXT of Ohio (BWXTO), DOE Mound, and DOE Ohio have gained experience in:

- Conducting high risk reviews of the equipment to be transferred
- Making radiological equipment assessments for transfer to a commercial company
- Declaring and processing excess equipment through the DOE system that will end up going to a commercial company
- Evaluating possible transfer of long term export control monitoring requirements from DOE to the NRC
- Conducting due diligence review of the commercial company
- Establishing legal requirements to limit or eliminate continuing DOE liabilities and risks
- Conducting commercial negotiations to establish a barter agreement of equipment and services
- Clarifying transportation requirements to a commercial company
- Conducting the process of the actual shipments

INTRODUCTION

The United States Department of Energy (DOE) continually seeks safer and more cost-effective remediation technologies for use in the decontamination and decommissioning (D&D) of nuclear facilities. To this end, the Deactivation and Decommissioning Focus Area (DDFA) of the DOE's office of Science and Technology sponsors Large Scale Demonstration & Deployment Projects (LSDDP). These LSDDPs allow developers and vendors of improved or innovative technologies showcase products that are potentially beneficial to the DOE's projects and to others in the D&D community. Benefits sought include decreased health and safety risks to personnel and the environment, increased productivity, decreased costs and shortened schedules.

This project constitutes a first effort by the DDFA and the Mound LSDDP to describe a process that is applicable and valuable to the D&D of DOE's nuclear facilities. Most frequently DDFA develops, proves or demonstrates technologies that are expected to be useful to nuclear D&D. These technologies frequently encompass a technique, know-how designed into a piece of

equipment, or a physical or chemical process, that produces predictable and repeatable results useful to D&D. In a similar fashion, the goal of this project is to document a process demonstrated by the DOE National Metals Recycle Center (NMRC) in Oak Ridge, Tennessee. This process was spearheaded by the NMRC and involved certain key project and property managers at BWXTO and the DOE Mound and Ohio Field Office in Miamisburg, Ohio, for the reuse of used tritium processing equipment.

As a closure site, much of Mound's equipment is planned for disposal in the near future. However, instead of considering disposal as a first option, Mound has started to consider the additional benefits to the project from finding a way to re-use some equipment at another facility or company. For some equipment, cost and schedule savings to DOE as well as the receiving companies can result. Thus the concept considered here is to seek opportunities for reuse or recycle equipment first, where disposal then becomes the last option, and in such a way that personnel and public safety is maintained or improved and cost and/or schedule savings result.

The NMRC in Oak Ridge has developed the know-how and the process to evaluate such opportunities for equipment reuse or recycle. It has also developed and used typical checklists and commercial terms and conditions to fit many situations in the DOE complex for equipment transfer and equipment / services barter agreements. It has successfully worked with many entities, including DOE and contractor site management, community reuse organizations and outside commercial companies, to complete equipment reuse projects at Rocky Flats, Hanford, Oak Ridge, and one small project at Mound. A second reuse project at Mound, currently underway, provides an excellent opportunity to evaluate and document the process that NMRC is using in working with the Ohio field office and Mound site management.

The purpose of this Demonstration is to evaluate and document the process being implemented by DOE Ohio, MEMP, and BWXTO with NMRC and a commercial company to achieve reuse of used, tritium-contaminated processing equipment at Mound, thereby avoiding disposal costs for the equipment. The goal is to demonstrate, evaluate and document this process as a useful tool for further application within the DOE complex. By evaluating this transaction within the LSDDP process, the cost comparison will be rigorously documented and an effective means of transferring information about this process will be established.

It should be noted that reuse of DOE equipment was emphasized in the July 13, 2000 Memorandum from the Secretary of Energy, "Release of Surplus and Scrap Materials". In this memorandum Secretary Richardson directed all Departmental elements to expand "...efforts to promote the reuse and recycling within the complex of DOE facilities..." The innovative equipment reuse process demonstrated at Mound is a direct response to this Secretarial directive.

PROCESS

The Mound site has shutdown its tritium processing equipment and is carrying out D&D of its facilities. In many cases, the equipment contains radiological contaminants, and offsite disposal in a licensed landfill is planned. In some cases, contaminants also include hazardous materials that make landfill disposal problematic, in particular, tritium-contaminated, mercury-bearing pumps.

Mound has demonstrated an alternative solution, a process to achieve equipment reuse. In a step-by-step process, Mound developed a barter agreement with a commercial company that wanted to reuse this tritium processing equipment and was capable and willing to provide the service of tritium removal from the contaminated mercury mentioned above. This produced a win-win situation for both DOE and BWXTO, and the receiving company:

- DOE and BWXTO saved costs and shortened the site schedule, and
- the receiving company saved money and time in setting up a new product line: tritium tracers for testing new products in the pharmaceutical industry

The process is organized into 16 specific actions/blocks that are listed below and the sequence and timing of these 16 specific actions are shown in Figure 1, Sequence of Activities for Equipment Transfer and Reuse.

Block 1. Involve All Key People of DOE Site Office and Contractor's Organization, Identify and Address All Key Issues as Early as Possible

Block 2. Submit Excess Equipment to Energy Asset Disposal System (EADS) and Federal Disposal System (FEDS) for possible equipment reuse within the Federal Government

Block 3. Conduct High Risk Review of All Equipment to be Transferred; Review with DOE's Nuclear Non-proliferation department, NN-1, as Required

Block 4. Form an Action Team for Effective Implementation of the Equipment Transfer Process

Block 5. Locate & Contact Potentially Interested Companies in Taking Possession of DOE Excess Equipment

Block 6. Calculate Cost Savings versus Baseline Disposal Costs

Block 7. Decide to Proceed; Determine the Type of Commercial Agreement to be Used and the Key Items to be Addressed

Block 8. Actions when Interest is expressed by ONLY ONE Company

Block 9. Actions when Interest is expressed by MULTIPLE Companies

Block 10. DOE and Site Contractor Re-schedule Non-critical Path Activities in order to Make Needed Equipment Available on Time

Block 11. Prepare Draft Agreement for Property Transfer

Block 12. Perform Due Diligence of the Company

Block 13. Prepare Scope of Work for Equipment Removal

Block 14. Discuss and Confirm Details for Packaging & Transportation

Block 15. Formulate Final Agreement; Negotiate with the Company; Sign Agreement

Block 16. Release for Shipment: Remove Equipment, Package, Load, Ship Equipment

The following is a systematic discussion of the key issues that the Action Team encountered for each of the steps shown in Figure 1 (Sequence of Activities for Equipment Transfer and Reuse).

Block 1. Involve All Key People of DOE Site Office and Contractor's Organization, Identify and Address All Key Issues as Early as Possible

Many discussions occurred in 1997-8 about processing tritium-contaminated mercury and a little later about equipment reuse, but little action was taken until DOE and BWXTO provided active sponsorship of the process in 1999. In the early time frame, work had been approved but no resources were allocated to develop the opportunity. Also Mound managers were not prepared to "invent" the process. A key to success was a DOE PM and a site contractor PM who saw significant benefit to the Mound project if the equipment reuse process was successful, as well as understanding that equipment reuse was "the right thing to do". They also uncovered significant cost and schedule savings for the Mound project.

Past decommissioning philosophies at Mound, and elsewhere, emphasized getting the equipment removed and disposing of it and any discussion about what else could be done with the equipment was considered distracting and detrimental to the paramount decommissioning effort. However, this perception has been changing with new management policies, programs for Pollution Prevention and Waste Minimization, and efforts by NMR. In fact, the policy to reuse DOE equipment where practical was emphasized in Secretary Richardson's memorandum of July 13, 2000 that also addresses a suspension on recycling of potentially contaminated metals to the open market. This memorandum also emphasized promoting reuse of equipment and materials within the DOE complex and in other controlled venues (e.g., companies with radiological licenses and appropriate permits) in a safe and cost effective manner.

The role of NMR was helpful in bringing experience from other DOE sites to Miamisburg, by explaining how similar opportunities were accomplished and by pointing out many pitfalls to avoid. This support helped to convince key managers that this sensible project could in fact be accomplished.

Block 2. Submit Excess Equipment to EADS and FEDS for possible equipment reuse within the Federal Government

Use of the EADS system provides the formal method for a DOE site to determine if other DOE facilities can make use of its equipment. By offering the equipment as a package, the worth of the equipment to the Company was maintained.

Mound did not want to commit to the additional cost of a radiation survey for unconditional release of the equipment. Mound knew that the one company that had expressed interest would probably accept potentially contaminated equipment under its NRC license.

Mound designated an EADS processing time of about a week. Only after excess equipment was offered to other DOE sites through EADS was it considered available to commercial companies for possible reuse. As the detailed list of equipment that Mound intended to offer to the Company grew, several EADS submittals were required.

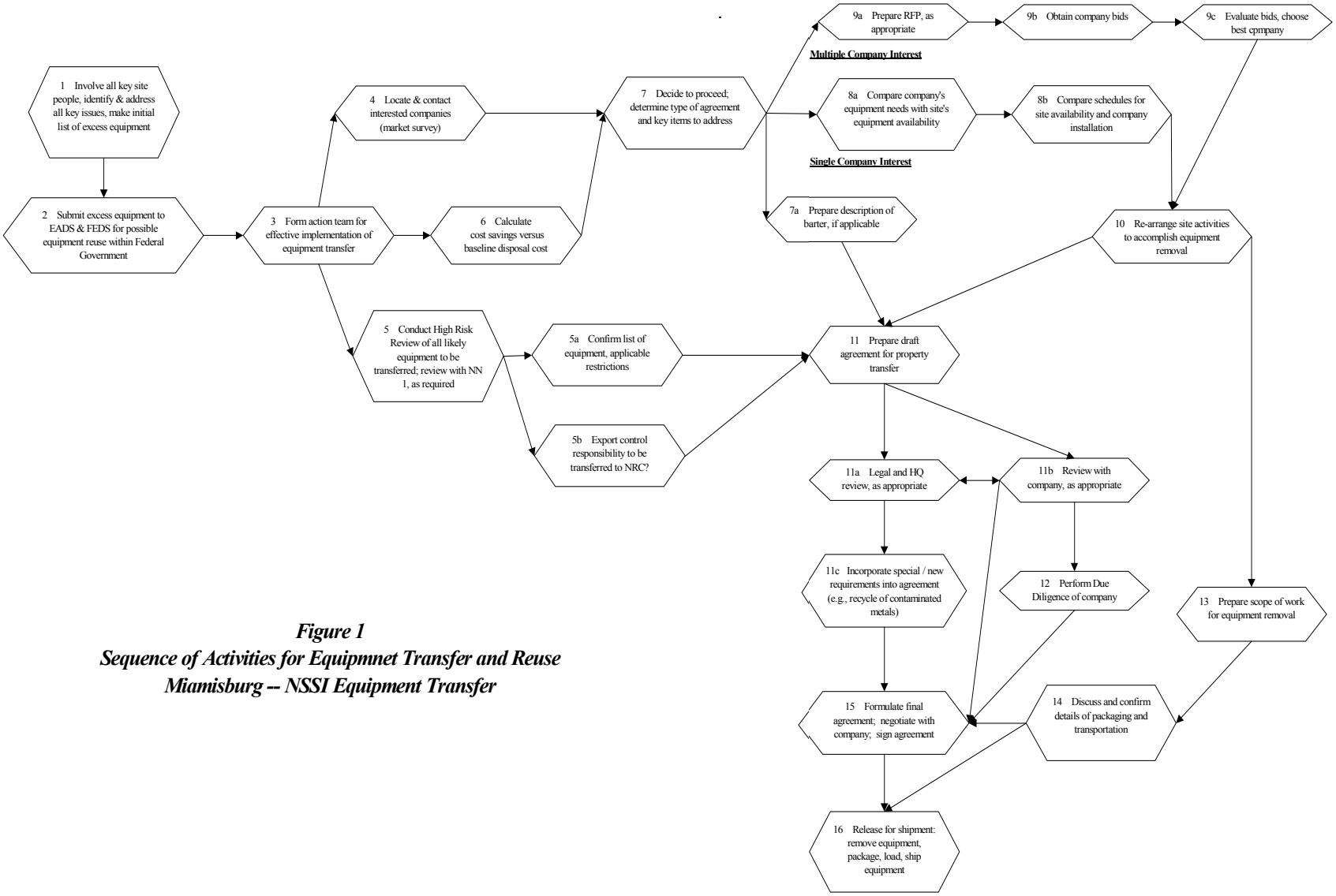

Figure 1
Sequence of Activities for Equipmnet Transfer and Reuse
Miamisburg -- NSSI Equipment Transfer

Another DOE resource that was used was the DOE complex-wide Material Exchange that was developed and maintained by the Idaho National Engineering and Environmental Laboratory. Its web site, http://wastenot.er.doe.gov/DOEmatex provides a listing of equipment that is available or wanted in the DOE complex. This service had been helpful in other cases but provided no new answers for Mound.

Block 3. Conduct High Risk Review of All Equipment to be transferred; Review with NN-1, as required

- Block 3a. Confirm list of equipment and applicable restrictions

- Block 3b. Check into the desirability of transferring responsibility for Export Control from DOE to NRC:

The people performing this process seemed to be a critical resource at Miamisburg, and the high-risk review process itself seemed to be fairly time consuming.

It was helpful to ensure that all the equipment being considered is in fact on the list going through the high-risk review. Some equipment needed to be added later, which delayed completion of the review.

The review determined that one piece of equipment, a monitor, could not be released, due to special markings that were considered classified and could not be removed. Classified markings on another item, a fume hood, were successfully removed prior to release.

For Mound, NN-1 at DOE HQ confirmed there is no significant burden to DOE to maintain export control responsibilities and thus no need to transfer responsibility to NRC. NN clarified that it does not need to actively track former DOE equipment with dual use or export control restrictions that is being reused in industry.

Block 4. Form an Action Team for Effective Implementation of the Equipment Transfer Process

The action to investigate possible reuse of contaminated equipment was not considered as a mandated action but as something that made economic sense to do. It was seen as a business opportunity, and certain key people were willing to take enough time to develop the opportunity.

In 1997, Mound had an unsolved problem: how to dispose of tritium-contaminated mercury. In 1998 the Company's capability to treat contaminated mercury became known to Mound, and Mound considered buying the service. The idea of a trade of equipment for services was discussed in 1998, but Mound was not certain how to make that happen commercially and how much effort it would require. In 1999 the economic benefit to DOE and to the Company became clear, and the experience and support of DOE's NMR helped Mound to make the concept of the equipment reuse a reality in 2000.

The people who formed the Action Team for Mound were:

- Project management
  DOE-MEMP ** Site Contractor **
  Assistant ** Assistant **
- Property management and contract management
  DOE Ohio ** Site Contractor **
  Assistant ** Assistant **
- National Metals Recycle Center
  DOE Oak Ridge **
  Assistant **
- DOE Ohio Representative and Supporter:
  DOE Ohio Tech/Pollution Prevention/Waste Mgmt **
  Assistant **
- Other supporting Miamisburg resources:
  Security
  Radiation Protection
  Transportation
  Waste Management
  QA / Due Diligence Audit
- DOE HQ Support, NN-1
  Non-proliferation

** Participated in routine conference calls and meetings, when available

Block 5. Locate & Contact Potentially Interested Companies in Taking Possession of DOE Excess Equipment

The receiving Company had been exploring the possibility of reusing tritium-processing equipment from Mound for several years before a formal equipment reuse process began.

NMR served as a helpful catalyst to the process. Under this topic, its representatives helped to clarify needs of THE COMPANY and to verify that no other companies were interested in the equipment.

In general NMR helped to provide experience from other DOE sites to apply the process of equipment reuse to Mound's situation.

Block 6. Calculate Cost Savings versus Baseline Disposal Costs

DOE Ohio assisted Mound by preparing a calculation on the multiple elements of costs for equipment removal and disposal or transferring the equipment to the Company for reuse. Separate calculations and reports were made for the first shipment of equipment and for the complete package of equipment expected to be shipped to the Company.

Block 7. Decide to Proceed; Determine the Type of Commercial Agreement to be Used and the Key Items to be Addressed:

NMR was helpful in providing a sample agreement that Oak Ridge used recently. These served as starting points for DOE Ohio procurement office / property management to work from. The NMR also helped with suggestions in legal and commercial approaches to special needs for the agreement.

BWXTO prepared a description of the bartered services to be provided by the Company. In the Mound case, the Company agreed to process tritium-contaminated mercury still remaining in old processing pumps. It planned to recover the tritium and clean and sell the mercury in the open market. This action was later curtailed due to the decision that mercury was to be included in the metals recycling moratorium.

Block 8. Actions when Interest is expressed by ONLY ONE Company:

- Block 8a. Compare the Company's equipment needs with the site's equipment availability

- Block 8b. Compare schedules for site availability and Company installation of equipment

The comparison of equipment needed and equipment available and compatibility of schedules for removal and installation were addressed in general terms initially through telephone discussions, while remaining consistent with procurement rules and practices.

A comparative listing of equipment needed versus available was prepared by a DOE Ohio support contractor as part of its testing of the Cost Savings Evaluation Process, using information in letters from the Company and Mound's detailed inventory of equipment. This correlation showed good matching of the Company's needs with Mound's excess equipment

After initial expression of interest and preliminary investigation into compatibility of expectations, face-to-face discussion(s) and Company inspection of the actual equipment to be transferred proved invaluable to moving the agreement forward.

The site determined that not all the desired equipment could be made available at the same time, so multiple shipments were planned. The scope of the first shipment was made into a distinct agreement between DOE and the Company. Subsequent shipments will be the subject of addenda to this agreement or will become separate agreements.

Block 9. Actions when Interest is expressed by MULTIPLE Companies:

- 9a. Prepare a Request For Proposal, Request for Sealed Bids, Auction, etc., as appropriate
- 9b. Obtain company bids
- 9c. Evaluate bids, choose best company

If more than one company is interested and considered qualified to accept the excess equipment, a formal bidding process must be conducted. At Mound, although such a bidding process was

anticipated, only one interested company was found AND this company agreed to provide additional services to Mound as part of a barter agreement. A negotiated barter agreement resulted. Since only one company was interested, the process was simplified.

Block 10. DOE and Site Contractor Re-schedule Non-critical Path Activities in order to Make Needed Equipment Available on Time

A revision to Mound's planned activities required involvement of several site project managers, since the equipment or the activities to be delayed involved several site projects.

At Mound, it proved valuable to the process that both the DOE project manager and the site contractor's PM understood the benefits to DOE and to the site contractor of equipment reuse and took the initiative to reach agreement with the other involved site managers.

Block 11. Prepare Draft Agreement for Property Transfer

- 11a. DOE Ohio Field office legal review and HQ non-proliferation review, as appropriate
- 11b. Review with the Company, as appropriate
- 11c. Incorporate special or new requirements into the agreement

Mound used a planned, iterative process between DOE property / contract management, DOE legal counsel, and the Company to determine what the Company would accept and what DOE legal requirements applied to this situation of equipment reuse.

NMR provided a contract from Oak Ridge that was used as a starting point. Property management reviewed drafts of the agreement with the Company and worked out acceptable wording in parallel with legal review.

Legal review at Mound required a long span of time, and the entire equipment reuse process waited about 2 months for this critical resource to become available. Once the resource became available, the issues were resolved expeditiously.

For Mound, a new requirement in the agreement resulted from this agreement falling under the restrictions of the Secretarial Suspension of 7/13/00, which prohibited commercial recycling of contaminated metals, including mercury. The Company had planned to receive tritium-contaminated liquid mercury in Mound pumps that were tagged for ultimate disposal. The Company had planned to treat the mercury to remove the tritium contaminant and then sell the decontaminated mercury on the open market. It also planned to use the recovered tritium in tracers to help to test new products in the pharmaceutical industry and dispose of the used pump carcasses. The Secretarial Suspension allowed reuse of tritium (not a metal) but prohibited recycling of metals in the open market in the near term, that is, until DOE EH revises procedures on how to process potentially contaminated metals, including mercury. A revision to the agreement with the Company was made to reflect this new requirement.

One could say in retrospect that the lengthy time for the legal review effectively slipped the process into the time frame where it was affected by the Secretarial Suspension of 7/13/00, since

the Secretary included a grandfather clause in his letter. As such, additional time and cost were incurred in completing this process.

Block 12. Perform Due Diligence of the Company

The Company provided copies of previous audit reports by the State of Texas for both its license for nuclear materials and its permits for hazardous materials. The Company also provided names and phone numbers of contacts at other DOE locations that were customers of the Company. DOE contacted these people and obtained audit reports from them directly.

DOE sent a QA auditor and a project manager from the site contractor's organization and a technical expert (and consultant to DOE-MEMP) to the Company for a due diligence audit at the Company's facility in Houston, Texas

Review of previous DOE audit reports uncovered some difficulties encountered by the Company in the past, and the audit team evaluated those and other findings. It concluded that the Company is operating in an acceptable fashion so that it is acceptable for DOE to transfer equipment and materials to the Company. This conclusion was accepted by DOE Ohio and DOE MEMP and reported to the Company.

Block 13. Prepare Scope of Work for Equipment Removal

In some areas that are restricted due to classification of equipment in the area, availability of workers may be reduced by the requirement for a security clearance. This aspect of labor support must be considered in the equipment removal cost estimate and schedule.

At Mound, four pieces of equipment had been surveyed for shipment as radioactive material, but had been prepared for shipment on skids in the staging area. Due to the varying degree of difficulty in survey, two pieces were surveyed for unconditional release. For the other two pieces, two wooden boxes were fabricated so that they could be shipped as radioactive material (too time consuming to conduct a survey for unconditional release).

Block 14. Discuss and Confirm Details for Packaging & Transportation

A site visit by the Company proved invaluable, when DOE was able to arrange for access to view the equipment or similar equipment. The site contractor was able to take digital photos of the equipment, which proved helpful for several reasons. The Company's Canadian consultant was not allowed access to the classified rooms where the equipment was still located, but was able to study the photos after they were cleared by site security. The photos also proved useful in subsequent discussions on details of packaging and transportation and for the Company's designers in integrating this equipment into its new facility. The site contractor also provided equipment dimensions. It also found and supplied drawings and technical manuals for much of the equipment. It was imperative that the site contractor and the Company conducted detailed discussions about packaging and shipment.

The site contractor discovered that some of the containers were not marked in accordance with DOT requirements or the container's DOT certification. Agreement with the Company allowed the contractor to make the necessary markings on the containers.

Block 15. Formulate Final Agreement; Negotiate with the Company; Sign Agreement

DOE and the Company worked through needed changes to the draft wording of the agreement. DOE forwarded the agreement for signature on June 27.

The Company signed the agreement on July 3, stating in its forwarding letter that it has complied with the conditions of the agreement as follows:

- The Company received contamination information about the equipment to be shipped but still needed the radionuclide millicurie content of the equipment.
- The Company has the necessary licenses to receive the equipment and materials to be processed.
- The Company has provided copies to DOE of the pertinent licenses and permits and statement of qualifications.
- DOE has performed a due diligence review, and the Company has not been requested to resolve any conditions found to be unacceptable.
- The Company has provided the requested indemnification.
- The Company has agreed to provide the listed services in exchange for the equipment.
- Title will be transferred at the time of transport from the Mound facility

Block 16. Release for Shipment: Remove Equipment, Package, Load, Ship Equipment

Since all contractual issues except the Secretarial Suspension on recycling metals were resolved by the end of June, the equipment was staged and transported prior to the release for shipment. The transferred equipment, except for the mercury-bearing pumps, shipped from Mound on October 4, 2000. The pumps are expected to ship in early 2001.

RESULTS

Regulatory

The company receiving the equipment for reuse was required to have a valid radioactive materials license from the United Stated Nuclear Regulatory Commission (NRC) or the controlling state's equivalent. It also needed to have the appropriate hazardous materials permit(s), again based on state law and US law.

Health and Safety

The use of this process was actually safer than the baseline planned D&D since the equipment did not need to be cut up, processed, and disposed of, but instead was packaged and transferred intact to a commercial company.

Effective Cooperation / Productivity:

NMR and the site team worked well together. The DOE site mangers and the site contractor managers, both project management and property management, absorbed the know-how and experience from NMR and used the process described herein to complete the transfer of equipment and its reuse.

Costs Saved

The overall cost reduction expected for the Mound project was estimated to be about $1,400,000, which included a schedule savings to the critical path of the site closure project. The cost savings without the schedule acceleration was about $400,000.

Schedule Saved

The schedule acceleration for one Mound project, the Main Hill Tritium project, was estimated to be about 34 days, using Primavera scheduling software. This shorter schedule for the Main Hill Tritium project was estimated to result in an acceleration of 7 days in the critical path of complete Mound closure project.

Present Status

The first shipment of equipment to the receiving company occurred on October 4, 2000. Other shipments are expected to follow.

CONCLUSIONS

Equipment is being reused: a financially and technically responsible company is reusing formerly DOE owned equipment that was used in weapons production in its new product line of tritium tracers that help to test new products in the pharmaceutical industry. No special permits or licenses were needed to apply this process to opportunities for equipment reuse at Mound.

Equipment reuse is an ideal approach for DOE because:

- equipment reuse achieves the highest possible value for used equipment, when the equipment's useful life continues in its original or close to its originally designed intent,
- equipment reuse avoids disposal costs, and
- equipment reuse transfers, from DOE to a responsible commercial company, the full responsibility for the equipment's ultimate decommissioning after its full life and usefulness has been realized.

New programs in DOE, such as Pollution Prevention & Waste Minimization in EM-22 and DOE's National Metals Recycle (NMR) Center in Oak Ridge, Tennessee, have helped to place a new emphasis within DOE on reducing the cost of nuclear waste processing and disposal through equipment reuse. DOE Ohio, DOE-MEMP and BWXTO have been active in these efforts.

This demonstration/process is a great example of a DOE effort to turn "Swords into Plowshares."