

## **TREATMENT OF MIXED LOW-LEVEL WASTES ACROSS THE DOE COMPLEX UTILIZING THE OAK RIDGE BROAD SPECTRUM CONTRACTS**

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### **ABSTRACT**

A major element of the strategy of the DOE Oak Ridge Operations Office to meet the requirements of the State of Tennessee's Department of Environment and Conservation Commissioner's Order for treatment of mixed low level wastes is to implement contracts accessible by all DOE sites for treatment and disposal of a wide range of Mixed Low-Level Waste matrices making up a "broad spectrum" of the mixed low level wastes on the Oak Ridge Reservation. These contracts are providing complex-wide treatment options and savings to DOE by: eliminating construction of new facilities, improving schedules, maximizing economies of scale, enhancing competition, and eliminating redundant individual procurement actions. For these contracts to meet these objectives maximum participation from DOE sites is required.

This paper will describe the case history of treatment of several waste streams across the DOE complex. The paper will also include contract overview, waste category information, implementation activities, contract access, costs, and operational schedules. The contracts have been designed around six waste matrix groups with each group consisting of waste streams that have similar treatment requirements. The paper will discuss the specifics of several waste streams treated during the contract period including waste characteristics, treatment utilized, and treatment results. Contract specifics to be discussed include task order development, waste characterization and profiling, staging and delivery of waste to vendors, treatment pricing, and disposal process.

### **BACKGROUND**

The Federal Facility Compliance Act requires that all DOE facilities identify treatment for Mixed Low Level Waste (MLLW). In most cases this requires construction of new facilities or establishing new contracts with private sector firms having the capability to treat MLLW. However, volumes of MLLW at many DOE facilities are small, making the economies of many small treatment efforts unfavorable.

To take advantage of economies of scale, Bechtel Jacobs Company, the Oak Ridge management and integrating contractor for waste management and environmental restoration, initiated procurements for treatment of a wide variety of MLLW. This contracting action makes MLLW treatment available to all DOE facilities. The contracts have recently been modified to incorporate terms and conditions approved by the DOE Integrated Procurement Contracting Team, which

make the contracts more easily accessible throughout the DOE complex. There are roughly 80 separate waste streams or approximately 14 million pounds of MLLW stored on the Oak Ridge Reservation that are included in this action. Many other DOE sites have similar waste streams in storage and some sites continue to generate MLLW. This results in a potential to treat 40 million pounds of MLLW.

The procurements allowed competitive bids for six different categories of waste that reflect the spectrum of legacy mixed wastes in DOE; and are available to all sites as National Procurements. Six categories were chosen to maximize the competition between qualified firms and result in multiple contract awards. DOE treatment schedules are expected to be shortened as a result of greater DOE access to commercial mixed waste treatment capacity through the contracts. For those wastes where there is a lack of existing treatment capability at DOE sites, the contracts eliminate the need to construct new treatment facilities at DOE sites.

Qualified bidders must have had existing, or applications for: Resource Conservation and Recovery Act (RCRA) Part-B permits; Nuclear Regulatory Commission (NRC) licenses; and/or Toxic Substances Control Act (TSCA) approvals, depending on which categories they bid. For all waste in each category, vendors will transport the raw waste to their treatment facility and treat to meet waste acceptance criteria of a disposal facility under DOE contract at the time of disposal or successfully recycle the waste. The vendor's on-site activities will be limited to picking up containerized waste from staging areas at each site. After treatment, the vendors will be required to package and transport all treated and ancillary waste for disposal.

The procurements were structured so that up to six awards could have been made, one award for each waste category. Awarding six contracts resulted in two key benefits to DOE: (1) competition was fostered because contractors that were not qualified to propose on all the wastes but that had, or wished to develop, limited mixed waste treatment capability were qualified for some waste groups; and (2) the procurement actions covered multiple awards and allowed all DOE sites to utilize the awarded contracts, thereby eliminating redundant individual procurements.

## **WASTE CATEGORIES**

The waste categories were developed based on waste type, treatment technologies, and regulatory requirements and are described below. In all cases, the radionuclides in the raw waste will be below licensing levels at the disposal facility, such as Envirocare of Utah, Inc. which is currently under DOE contract, and consist of elements that are accepted for disposal at the disposal facility.

Treatment Category A: The waste offered for treatment is generally expected to consist of non-combustible, low-level, contact-handled soils, sludges, and other solids material meeting the Environmental Protection Agency (EPA) definition of debris, all of which is contaminated with organic constituents alone, or organic constituents and RCRA metals, including mercury. The

predominant waste codes in this category will be D004 through D011 and F001 through F007. Additional codes that are expected include D018 through D043 and those list codes that may need similar treatment technology. Polychlorinated Biphenyls (PCBs), at levels requiring regulation under TSCA are not present in this waste.

Treatment Category B: This category is generally expected to consist of non-combustible, low-level, contact-handled soils, sludges, and other solids material meeting the EPA definition of debris, all of which is contaminated with PCBs above levels requiring regulation under TSCA. The waste will also contain organic constituents alone, or organic constituents and RCRA metals, including mercury. The predominant waste codes in this category will be D004 through D011 and F001 through F007. Additional codes that are expected include D018 through D043 and those list codes that may need similar treatment technology.

Treatment Category C: This category is generally expected to consist of non-combustible, low-level, contact-handled, non-combustible soils, sludges, and other solids material meeting the EPA definition of debris, all of which is contaminated with RCRA metals. The predominant waste codes in this category will be D004 through D011, F006, and F007 and those list codes that may need similar treatment technology. Mercury levels will be below 260 ppm.

Treatment Category D: This category consists of low-level, contact-handled, combustible and non-combustible material including soils, sludges, and may contain some material meeting the EPA definition of debris. All of this waste is contaminated with PCBs above levels requiring regulation under TSCA. The waste will also contain RCRA constituents that require incineration and may contain other RCRA constituents that may be treated by incineration or stabilization.

Treatment Category E: This category consists of low-level, contact-handled, combustible and non-combustible soils, sludges, electrical equipment and debris contaminated with PCBs above levels requiring regulation under TSCA and needing thermal treatment or permitted alternative. RCRA regulated materials are not present.

Treatment Category L: This category consists of low-level, contact-handled, liquid aqueous and organic RCRA non-wastewaters all of which are contaminated with organic constituents alone, or organic constituents and RCRA metals. The category also includes elemental mercury. The predominant waste codes in this category are D001 through D011 and F001 through F009. Additional codes that are expected include D018 through D043 and those listed codes that may need similar treatment technology. The wastes are expected to contain primarily listed hazardous wastes and/or characteristically hazardous wastes. In addition, some of the wastes have come in contact with PCBs at a concentration greater than 50 parts per million (ppm) and therefore are regulated under Toxic Substances Control Act (TSCA). Cyanide levels in the raw waste may exceed 30 mg/L (amenable) and 590 mg/L (total).

## CURRENT STATUS

Five Broad Spectrum contracts were signed in June 1998 with two vendors. East Tennessee Materials and Energy Corporation (M&EC) of Oak Ridge, Tennessee was awarded contracts for treatment of Categories A, B, and D. Waste Control Specialists (WCS) of Andrews, Texas was awarded contracts for Categories C and E. An additional contract was signed in August 1999 with Allied Technology Group (ATG) in Richland, Washington. The contract is to treat liquid aqueous and organic RCRA non-wastewaters and elemental mercury. Recently the terms and conditions of the contracts have been modified to conform to the DOE Integrated Contracting Procurement Team terms and conditions. This is part of an effort by DOE to consolidate procurements and eliminate redundant procurements.

M&EC has removed equipment and cleaned up a former uranium processing building at the East Tennessee Technology Park in Oak Ridge to provide capacity for their waste processing and treatment capabilities. M&EC has completed its waste storage facility. In the fall of 2000, Perma-Fix Environmental Services, Inc. began acquisition of a majority share in M&EC. Perma-Fix has brought needed capital and resources to the development of the processing and handling facilities. The schedule for installing processing and handling equipment at the waste treatment facility is being met. M&EC has received their RCRA permits and will utilize equipment that has an EPA mobile PCB authorization. The First Article Test for Category A is expected to begin in late April 2001. Production quantity waste acceptance is expected to begin in May 2001. In addition, waste treatment is being pursued under the Category A contract at the Perma-Fix Environmental Services facility at Gainesville, Florida under a subcontract to M&EC. A separate First Article Test for that facility was begun in February 2001. The Gainesville facility has installed a smaller scale low-thermal process system that is similar to the M&EC facility. Following the First Article Test, the Gainesville facility is expected to treat small quantities of difficult to treat waste such as labpacks.

WCS has already obtained all RCRA permits and have installed stabilization equipment to treat Category C waste. WCS successfully completed the First Article Test for Category C in July 1999. PCB authorization for treatment and process equipment for Category E waste is being obtained by WCS. A First Article Test for Category E is planned for November 2001. To date, several waste streams have been shipped to WCS for treatment. Three small waste streams associated with facility clean up from the Mound Site have been treated and are planned for disposal at the Nevada Test Site. Two waste streams from the Paducah Gaseous Diffusion Plant was shipped in the fall of 1999 and in the summer of 2000 for stabilization. Twelve Oak Ridge waste streams, primarily debris, labpacks, contaminated soils, and waste water treatment sludges, totaling approximately 500,000 kgs were shipped for stabilization from November 1998 through February 2001. Treatment of these wastes is significant in that compliance milestones exist for each waste stream. The crushed light bulb waste stream was successfully treated to complete the First Article Test under the contract for Category C. Also, in December 1999, three Naval Shipyard

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facilities made shipments totaling 3,800 kgs to WCS for treatment utilizing the Broad Spectrum contracts through a memorandum of understanding with DOE.

An additional contract was signed in August 1999 with Allied Technology Group (ATG) in Richland, Washington. The contract is to treat liquid aqueous and organic RCRA non-wastewaters and elemental mercury. ATG has obtained RCRA permits and is in the process of completing its treatment demonstration under the permit. A new gas vitrification treatment unit is being constructed and is planned to be operational in March 2001 for a First Article Test. Elemental mercury will be treated by Nuclear Fuel Storage, ATG's partner, through amalgamation.

Bechtel Jacobs Company and the Department of Energy Oak Ridge Operations Office conducted an audit of WCS in September 2000. The audit reviewed the storage, treatment, and analytical laboratory facilities at WCS. The findings indicated that WCS had corrected deficiencies from previous audits. Based on the recent audit, Bechtel Jacobs Company approved the use of WCS for storage and treatment of MLLW. The Department of Energy Oak Ridge Operations Office completed an audit at the Perma-Fix Gainesville facility in late November 2000. Based on the audit, Bechtel Jacobs Company approved the facility for treatment of mixed waste in January 2001. It is expected that an audit will be conducted for M&EC in early March 2001 and in late March 2001 for ATG.

In September 1998, Bechtel Jacobs Company established a website for the Broad Spectrum contracts. The address for the website is [www.bechteljacobs/broadspectrum/bstihome.htm](http://www.bechteljacobs/broadspectrum/bstihome.htm). The website includes descriptions of each Broad Spectrum contract waste category. These descriptions include waste matrix, EPA waste codes, and other significant parameters. The website contains descriptions of each vendor's capabilities. Waste acceptance criteria for M&EC and WCS are provided on the website. Contract responsibilities of the vendor and the originating site is also described. A task order form is attached to assist in completing an order for waste treatment. An interactive cost sheet is provided to let potential users develop estimates for treatment of specific waste streams. Table 1 is an example of the information required. By inputting information on the waste matrix, quantity, container type, and certain chemical parameters, an estimate is calculated that is used in completing the task order with the treatment vendor. The website will be updated periodically.

Meetings on utilizing the Broad Spectrum contracts have been held at the Oakland Operations Office, Idaho Operations Office, and DOE Ohio Area Office, and Savannah River Site. Idaho National Environmental Laboratory and Rocky Flats Environmental Technology Park have issued task orders under the contract. Additionally, Pantex Site, Hanford Operations Office, Lawrence Livermore National Laboratory, Rocky Flats Environmental Technology Park, and Savannah River Site are considering using the contracts or have task orders in development.

## **CONTRACT IMPLEMENTATION**

### **Responsibilities of the Vendor**

The vendor's on-site activities will be limited to picking up containerized wastes from staging areas at each site. Vendors will only drive transport vehicles on-site to be loaded and secured by DOE contractor employees, then drive the loaded vehicles off-site to their treatment facility.

The treated waste must meet the Land Disposal Restriction treatment standards and the Waste Acceptance Criteria (WAC) of a disposal site under DOE contract at the time of disposal. After treatment, vendors will be required to package and transport to the dispose site all treated and ancillary waste.

Once taken, if the seller cannot treat the waste to disposal criteria, the waste will be returned to compliant storage at the site of origin at no cost to DOE with all vendor-developed characterization data.

### **Responsibilities of the DOE Site:**

The following is a list of the services to be provided by the DOE site, as called for in the approved contracts:

- Selection of all containerized waste awarded for treatment, and delivery of this waste, in accordance with an agreed-to schedule, to a designated staging area at a DOE site.
- Development of staging areas on the DOE sites, where containerized waste will be staged for loading prior to transport to the treatment facility.
- Obtain a waiver to DOE Order 5820.2A to allow disposal of radioactive waste off the DOE site.
- Provide NEPA documentation as required.
- If seller's treatment facility WAC requires completed waste profile forms, the origin site will complete as required.
- At the staging areas, provide all equipment and labor, and load all containerized untreated waste on the Seller's transporting vehicles.
- After loading, review all marking, labeling, and placarding activities as required by Department of Transportation (DOT) regulations 49 CFR 172 Subparts D, E, and F, respectively.
- Perform Health Physics survey for radioactivity and release for transport off-site.
- Perform Quality Assurance (QA) inspection and release for transport off-site.
- Provide required characterization data to meet RCRA, TSCA, DOT and vendor waste profile requirements to ship the wastes off site and fill out shipping papers and manifests for each load of untreated waste leaving a staging area for transport to the seller's treatment facility.

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DOE-ORO will be conducting annual audits of the facilities. If other sites wish, they will be free to participate as members of the audits. If additional audits are needed, they will also be conducted by DOE approved personnel.

### **Qualification and Evaluation Criteria**

The following criteria was required to be submitted by each proposer

- submit evidence on the ability to treat or to obtain a permit/license/authorization to treat or recycle RCRA, radioactive, or TSCA contaminated wastes;
- have experience directly associated with the handling of low-level radioactive, mixed or hazardous waste and the transportation of same;
- submit a process description sufficient to allow Bechtel Jacobs Company a thorough understanding of the process to be utilized in treating the waste;
- have a management plan which is sufficient for Bechtel Jacobs Company to thoroughly understand how the project will be managed and includes an estimated project schedule, a project management system description, and a plan for coordinating with Bechtel Jacobs Company;
- because of the likelihood that a bidder may not have in place all permits, recycling exemptions, and licenses, or have the facilities, systems, and equipment needed to treat and process all waste in a category, the bidder was required to complete and submit a Treatment Milestone Schedule and fully describe the actions required to meet this milestone schedule and start First Article Test (FAT) treatment of the awarded waste by the required date;
- submit a health and safety plan;
- have a satisfactory record in environmental, health and safety matters;
- supply requested NEPA documentation.

### **IMPLEMENTATION SCHEDULE**

The implementation schedule calls for the completion of an environmental critique process, M&O/M&I audits of each treatment vendor after award, the development of environmental impact statements (EIS) or environmental assessments (EA), the successful completion of a FAT, and adequate characterization of legacy waste to the treatment vendor's WAC.

The NEPA environmental critique process is described in 10 CFR 1021.216 and began prior to issuance of the request for proposal (RFP) with initial stakeholder meetings and the development of environmental checklists and templates. DOE will publish the environmental critique synopsis that will briefly describe the results of the NEPA screening and review of the proposed action. Stakeholders will be allowed to comment on the synopsis and a determination will be made on the level of NEPA review.

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The contracts awarded as a result of this procurement are contingent upon completion of the NEPA process by DOE. Following completion of the environmental critique, DOE Oak Ridge determined that only an environmental assessment on the potential impacts from transportation of mixed waste was needed. The final environmental assessment is expected in February 2001.

The treatment contracts extend for five years from the date of award and include the time necessary to modify facilities or obtain necessary permits or licenses.

## **PRICING APPROACH**

The pricing approach was developed to address the uncertain treatment needs and volumes of the currently stored wastes while obtaining the economic and administrative advantages of a fixed price contract. These uncertainties led to the need to develop five representative treatment categories that reflected the expected treatment needs, but did not define the waste in precise terms. For example, representative hazardous waste codes were supplied in each category description and were reported to reflect the *predominant* hazardous waste characteristics of the waste (and the most likely treatment requirements); however, all of the supplied waste codes were not present on all wastes within a particular waste category.

The pricing approach also addressed the desire to obtain a fixed price contract awarded based on price alone. This simplified the selection process and made it more price competitive but complicated the RFP. To obtain an award based on price alone, a second, more detailed description of each category was provided that was based on expected treatment needs. This second description was used in determining the lowest price bidder. Without this second description the final bids would have reflected each bidder's assumptions. These assumptions would have benefited that bidder's treatment process and comparisons based on price alone would have been impossible. The selection process would then have had to consider technical ability as well as price.

The pricing approach used was developed to take maximum advantage of efficiencies of scale. The procurement concept was to address the needs of DOE to treat numerous small-volume waste streams without developing a like number of individual procurements and obtain lower prices by taking advantage of volume discounts. It was also desirable to capitalize on efficiencies by allowing bidders to develop prices on two or more categories and submit them as a unified, dependent bid. In this case, if a bidder believed that they had a process that could treat more than one waste category, they were encouraged to develop bid prices for two or more categories that would be submitted together as one bid for both categories, resulting in a "multiple category dependent bid." The award process considered the bids for both categories as linked together.

Finally, because the amount of waste to be sent to the vendors in each shipment was unknown, a tiered pricing structure was requested from the bidders that would factor in price reductions as the



amount of waste in a task order increased. As a result, each bidder developed a series of prices based on the efficiencies of their treatment process that decreased as quantity of waste increased. Table 1 is an example of the form provided to vendors to develop the unit pricing for a range of waste under a specific waste category. The award process extracted bid prices for several predetermined shipment amounts to determine the best price over a wide range of waste expected to need treatment.

## **INNOVATIVE APPROACHES**

### **Incentive to Minimize Disposal Volume**

In order to provide an incentive to minimize disposal volumes and, therefore, cost to the government, Bechtel Jacobs Company included a method to benefit the vendor if disposal volumes are less than anticipated at the time of award or penalize the vendor if disposal volumes exceed the anticipated amount. To accomplish this, the proposer included a formula in their proposal that calculated the anticipated disposal volume of treated waste based on the initial waste characteristics and the proposer's treatment process.

The formula, along with a specified disposal price, was used in determining the total price to the government for each proposer and addressed the factors that were considered important to the proposer to establish the disposal volume for mixed waste. After award, this formula will be used in determining the final payment to the vendor by comparing the actual disposal volume with the calculated disposal volume. If the disposal volume of treated waste is less than that calculated, Bechtel Jacobs Company will provide compensation to the proposer at 50 percent of the volume difference times a specified disposal price per cubic foot. If the disposal volume is greater than that calculated, Bechtel Jacobs Company will withhold compensation from the vendor at 100 percent of the volume difference times the same disposal price per cubic foot.

### **Assurance that the Vendor Can Do the Work**

In order to obtain reasonable assurance the vendor is capable of performing the required treatment, Bechtel Jacobs Company will require one FAT be conducted for each treatment category awarded under the contract. FAT quantities will be offered from what is available for treatment at the time of request by the contractor and within the awarded treatment category.

The Contractor shall perform the FAT using the same facilities, systems, equipment, method of treatment, technology, and personnel that are planned for full production processing. These planned facilities must meet the throughput requirements to accomplish treatment of minimum specified amounts within the contractual period. The same method for container handling, delidding, emptying, debris separation, blending, transfer, packaging, and residual waste management, described in the Project Plan for full production treatment, shall be used for the FAT. Also, all FAT

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activities shall adhere to all aspects of sampling, testing, inspection, safety, and quality plans that were submitted to Bechtel Jacobs Company.

The Contractor shall sample, characterize, and inspect each container or package of residual waste produced during the FAT. All FAT residual material must be accepted for disposal or recycle, as evidenced by acceptance of approved profile sheets by the disposal site or accepted for resale, prior to Bechtel Jacobs Company approval of the FAT. The contractor will be compensated for waste treated during the FAT on the same per unit basis as full production processing.

If, by his actions, the Contractor is unable to start or complete the FAT in accordance with the treatment schedule milestone, or if the final product does not meet the disposal contractor's WAC or is not accepted for resale and the FAT is determined unsuccessful, the Contractor will not be allowed to start production treatment of the awarded grouping of waste and must return the waste to compliant storage at the generating DOE site. The Contractor will not be paid for an unsuccessful FAT.

### **Protection From Numerous Change Orders**

Although all the waste anticipated to be treated through the Broad Spectrum contracts has not been fully characterized, a price agreement list has been developed that will reduce the number of change orders. This price agreement list requests unit prices for those waste characteristics that are expected to result in significant differences in treatment prices within a given waste category. For example, within one waste category separate costs are requested for waste contaminated with organics and wastes contaminated with organics and metals, or for wastes contaminated with mercury above 260 parts per million (ppm) and for those contaminated with mercury below 260 ppm. In addition, different handling prices have been requested for wastes contained in 55-gallon drums or B-25 boxes.

### **Proposer Supplied with Maximum Information in Readily Accessible Format**

In order to supply the proposer with the maximum available information in a readily accessible format, Bechtel Jacobs Company developed a CD ROM presentation of all significant Broad Spectrum data. Although there was an enormous amount of information contained in the RFP package, the structure of the CD ROM allowed the proposer to quickly determine the information it needed to review for proposal development and, because of the electronic format, allowed the proposer to quickly access that information. In addition, use of the CD ROM supported the Bechtel Jacobs Company belief that supplying the proposer with all available information would allow development of an informed proposal and lead to the best price for the government and minimize complications during the conduct of the work.

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The information on the CD ROM addressed the text of the request for proposal and statement of work; detailed analytical characterization data for waste streams, where available; over 800 photographs of open containers showing the condition and variety of the waste; a listing of all potential waste streams from all DOE sites; and, a unit price calculation spreadsheet which developed the unit price for each category based on the baseline definition of each waste category and proposer-supplied prices.

## **CONCLUSIONS**

The Broad Spectrum Contracts are in place with several task orders written. Any DOE contractor or subcontractor may access the contracts by completing direct task orders with the vendors and citing the Bechtel Jacobs Company contract number. Approximately 500,000 kilograms of waste have been shipped to one of the Broad Spectrum vendors for treatment. The remaining two vendors with Broad Spectrum contracts have received storage and treatment permits. The vendors will be completing First Article Tests in the winter and spring of 2001. Receipt of production quantity waste will be accepted in spring of 2001. The Broad Spectrum website provides detailed information on the contracts, their utilization, vendor descriptions, and cost calculation. The website will be updated to provide current status of the contracts and their use.

Table I. Price Agreement

| <u>Pricing Options</u>                 | <u>Unit</u> | <u>Independent Category Bids</u> |              |              | <u>Multiple Category Dependent Bids</u> |              |              |
|--|-------------|----------------------------------|--------------|--------------|---|--------------|--------------|
|  |             | <u>Unit</u>                      | <u>Unit</u>  | <u>Unit</u>  | <u>Unit</u>                             | <u>Unit</u>  | <u>Unit</u>  |
|  |             | <u>Price</u>                     | <u>Price</u> | <u>Price</u> | <u>Price</u>                            | <u>Price</u> | <u>Price</u> |
| Treatment Category A Task Order Prices |             | Tier 1                           | Tier 2       | Tier i       | Tier 1                                  | Tier 2       | Tier i       |
| Solids:                                |             |                                  |              |              |   |              |              |
| Treatment for organics (\$/kg)         | \$          | _____                            | _____        | _____        | _____                                   | _____        | _____        |
| Treatment for organics and metals      |             |                                  |              |              |   |              |              |
| Mercury above 260 ppm (\$/kg)          | \$          | _____                            | _____        | _____        | _____                                   | _____        | _____        |
| Mercury below 260 ppm (\$/kg)          | \$          | _____                            | _____        | _____        | _____                                   | _____        | _____        |
| Handling costs:                        |             |                                  |              |              |   |              |              |
| 55 Gal. Drums (\$/container)           | \$          | _____                            | _____        | _____        | _____                                   | _____        | _____        |
| B-25 Boxes (\$/container)              | \$          | _____                            | _____        | _____        | _____                                   | _____        | _____        |
| Sludges:                               |             |                                  |              |              |   |              |              |
| Treatment for organics (\$/kg)         | \$          | _____                            | _____        | _____        | _____                                   | _____        | _____        |
| Treatment for organics and metals      |             |                                  |              |              |   |              |              |
| Mercury above 260 ppm (\$/kg)          | \$          | _____                            | _____        | _____        | _____                                   | _____        | _____        |
| Mercury below 260 ppm (\$/kg)          | \$          | _____                            | _____        | _____        | _____                                   | _____        | _____        |
| Handling costs:                        |             |                                  |              |              |   |              |              |
| 55 Gal. Drums (\$/container)           | \$          | _____                            | _____        | _____        | _____                                   | _____        | _____        |
| Overpacks (\$/container)               | \$          | _____                            | _____        | _____        | _____                                   | _____        | _____        |