Proposal for
Construction/Demonstration/Implementation
of
A Material Handling System

Vortec Corporation Proposal No. VC01-14
(August 24, 2001)

Prepared by
Vortec Corporation
&
The United States Enrichment Corporation
In Partial Fulfillment
of
DOE/NETL Contract No. DE-AC21-92MC29120
# Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>Introduction</td>
<td>1</td>
</tr>
<tr>
<td>2.0</td>
<td>Scope of Work</td>
<td>1</td>
</tr>
<tr>
<td>2.1</td>
<td>Vortec Scope of Work</td>
<td>1</td>
</tr>
<tr>
<td>2.2</td>
<td>USEC Scope of Work</td>
<td>3</td>
</tr>
<tr>
<td>2.2.1</td>
<td>Demonstration Testing</td>
<td>4</td>
</tr>
<tr>
<td>2.2.2</td>
<td>Commercial Implementation</td>
<td>5</td>
</tr>
<tr>
<td>2.3</td>
<td>BJC and DOE/Paducah Participation</td>
<td>5</td>
</tr>
<tr>
<td>3.0</td>
<td>Schedule</td>
<td>5</td>
</tr>
<tr>
<td>4.0</td>
<td>Cost</td>
<td>6</td>
</tr>
<tr>
<td>4.1</td>
<td>Demonstration System Construction Cost</td>
<td>6</td>
</tr>
<tr>
<td>4.2</td>
<td>Demonstration Testing Cost</td>
<td>6</td>
</tr>
<tr>
<td>4.3</td>
<td>Implementation Phase Cost</td>
<td>6</td>
</tr>
<tr>
<td>5.0</td>
<td>Technology Implementation</td>
<td>8</td>
</tr>
<tr>
<td>6.0</td>
<td>Assumptions, Terms and Conditions</td>
<td>9</td>
</tr>
</tbody>
</table>

Exhibit 1 Material Handling System Description........................................ 12
Exhibit 2 USEC Implementation Proposal.................................................. 22
Exhibit 2 Site Commitment Letters......................................................... 26

# List of Figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 1</td>
<td>Construction Testing and Implementation Schedule</td>
<td>8</td>
</tr>
</tbody>
</table>

# List of Tables

<table>
<thead>
<tr>
<th>Table</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 1</td>
<td>Direct Labor Rates</td>
<td>10</td>
</tr>
</tbody>
</table>
CONSTRUCTION/DEMONSTRATION/IMPLEMENTATION
OF
A MATERIAL HANDLING SYSTEM

1.0 INTRODUCTION

Vortec Corporation, the United States Enrichment Corporation (USEC) and DOE/Paducah propose to complete the technology demonstration and the implementation of the Material Handling System developed under Contract Number DE-AC21-92MC29120. The demonstration testing and operational implementation will be done at the Paducah Gaseous Diffusion Plant. The scope of work, schedule and cost for the activities are included in this proposal. A description of the facility to be constructed and tested is provided in Exhibit 1, attached. The USEC proposal for implementation at Paducah is presented in Exhibit 2, and the commitment letters from the site are included in Exhibit 3.

Under our agreements with USEC, Bechtel Jacobs Corporation and DOE/Paducah, Vortec will be responsible for the construction of the demonstration facility as documented in the engineering design package submitted under Phase 4 of this contract on August 9, 2001. USEC will have responsibility for the demonstration testing and commercial implementation of the plant. The demonstration testing and initial commercial implementation of the technology will be achieved by means of a USEC work authorization task with the Bechtel Jacobs Corporation. The initial processing activities will include the processing of approximately 4,250 drums of LLW. Subsequent processing of LLW and TSCA/LLW will be done under a separate contract or work authorization task. To meet the schedule for commercial implementation, it is important that the execution of the Phase 4 project option for construction of the demonstration system be executed as soon as possible. The schedule we have presented herein assumes initiation of the construction phase by the end of September 2001.

Vortec proposes to complete construction of the demonstration test system for an estimated cost of $3,254,422. This price is based on the design submitted to DOE/NETL under the Phase 4 engineering design deliverable (9 August 2001). The cost is subject to the assumptions and conditions identified in Section 6 of this proposal.

2.0 SCOPE OF WORK

The construction, testing and implementation activities will be performed through the cooperation and support of Vortec, USEC, Bechtel Jacobs Corporation and DOE/Paducah. The scopes of work for the individual participants are summarized below.

2.1 VORTEC SCOPE OF WORK

The program activities to be performed by Vortec represent a continuation of the tasks initiated under Phase 4 of this development program (Modification M042 of Contract Number DE-AC21-92MC29120). Phase 4 of this project consists of 7 tasks including:

Task 4.1 – Site Commitment Agreement, Schedule, and Cost
Task 4.2 – Test Plan Plan Development
Task 4.3 – Operational Plan
Task 4.4 – Final Subsystem Design
Task 4.5 – Quality Assurance Plan
Task 4.6 – Facility Disposition
Task 4.7 – Construction of Subsystems

This document and its exhibits constitute the deliverables of Task 4.1 (Site Agreement, Schedule and Cost) of this contract modification. Tasks 4.2 through 4.4 have been completed and the deliverables have been submitted. Task 4.6 (Facility Disposition) is a continuing activity, and Task 4.7 (Construction of Subsystems) is an optional task and the primary focus of this proposal. Task 4.7 is to be performed at the discretion of DOE upon the completion of Tasks 4.1 through 4.5.

Under this optional contract phase, Vortec shall be responsible for the following two major activities:

**Task 4.6 - Facility Disposition**
The contractor shall be responsible for maintaining the existing equipment from the full-scale demonstrated located at the pilot plant facility and the Paducah Gaseous Diffusion Plant. The contractor shall maintain the equipment until the DOE can complete the disposition process. The contractor shall provide the necessary storage facilities for the equipment to preserve the integrity of the capital investment.

**Deliverables (Task 4.6)**
The following property management deliverables will be provided under this program option for Task 4.6:
1. Annual Report of Property in Custody of Contractors
2. Report of Physical Inventory of Capital Equipment
3. Report of Termination or Completion Inventory.

The report of Contractor’s Property Management System was previously provided at the initiation of Phase 4 and will not be resubmitted unless directed by DOE.

**Task 4.7 -- Construction of Subsystems**
After the first five milestones (Tasks 4.1 to 4.5) are met, the contractor shall be responsible for the procurement, finalized engineering relating to the procurement, and delivery of the equipment to the Paducah Gaseous Diffusion Plant. The contractor shall be responsible for the construction of the soil preparation and conditioning subsystems. During the construction of the subsystems, the contractor shall be responsible for preparing and maintaining the overall site construction schedule; providing and maintaining the site field office; supervising, managing, and coordinating the site contractors, and administering the construction contracts; maintaining on-going measurements of general contractor performance and progress versus schedule; tracking, receiving, and inspecting purchased materials and equipment; maintaining site documents and files, and performing field quality control functions; and coordinating with the site operator. When construction is complete, the contractor shall provide a set of “as built”
drawings and a synopsis of actual versus budgeted costs for the construction, as well as a summary of problems encountered and solved in the final topical report.

USEC will participate in the construction phase of the program as a subcontractor to Vortec. USEC will provide a construction coordinator during construction phase. USEC will prepare and submit the necessary permit applications for air and TSCA permits on behalf of the government.

**Milestone 7**
The contractor shall complete the final construction of the soil preparation and conditioning subsystems within 240 days after construction authorization by the Department of Energy, and provide a final construction schedule to the Department of Energy for review 30 days after execution of the option to proceed is issued. The COR shall provide review comments within two weeks of receipt of the schedule.

**Deliverables (Task 4.7)**
Deliverables as specified in the Statement of Work include:

1. Construction Schedule as described in Task 4.7 is due within 30 days of authorization to proceed.
2. Completion of the final construction of the soil preparation and conditioning subsystems within 240 days after construction authorization

**2.2 USEC SCOPE OF WORK**
USEC will be responsible for the demonstration test program (Phase 5) and the commercial implementation activities (Phase 6) of the program. Phases 5 and 6 will be performed under an work authorization task(s) to be awarded by BJC. The demonstration testing and commercial operations will be done under USEC operational rules and plans. Vortec will participate in the demonstration test phase and commercial implementation phase as a sub contractor to USEC. In addition to performing the tasks below, USEC will be responsible for ensuring the project is compliant with NEPA and has the necessary operational and construction permits. The permit requirements for construction and operation of the plant have been reviewed with the Kentucky and U.S. EPA regulators and USEC. It has been determined that the air permit requirements for demonstration and initial commercial operation will be limited to a “registration” versus an air permit. Initial implementation will be limited to LLW. A NESHAPS analysis will be performed by USEC for the LLW we intend to process. We do not intend to apply for a TSCA or RCRA permit for demonstration testing or initial implementation. Subsequent processing may include PCB/LLW, and USEC may opt to file for a TSCA permit for subsequent implementation activities. We are not intending to process mixed waste at this time. This decision is based on the fact that mixed waste represents less than 10% of the legacy waste at Paducah. In addition, application for a RCRA permit would preclude the start of construction until the permit is issued. This restriction does not apply to a TSCA permit.
2.2.1 Demonstration Testing
The demonstration testing will consist of 5 tasks. The performance of these tasks will be the responsibility of USEC.

The tasks to be performed by USEC will include:

<table>
<thead>
<tr>
<th>Task</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1</td>
<td>Preparation of Surrogate Test Materials</td>
</tr>
<tr>
<td>5.2</td>
<td>Demonstration Phase Readiness Review</td>
</tr>
<tr>
<td>5.3</td>
<td>System Check-out/Startup</td>
</tr>
<tr>
<td>5.4</td>
<td>Demonstration Testing</td>
</tr>
<tr>
<td>5.5</td>
<td>Demonstration Testing Topical Report</td>
</tr>
</tbody>
</table>

Brief description of these tasks are provided below:

**Task 5.1 Preparation of Surrogate Test Materials**
Non-hazardous, non-radioactive surrogate materials will be used for the demonstration testing. The surrogate materials will be prepared by USEC or another DOE contractor under a BJC work authorization task. Up to 500 drums of surrogate waste will be prepared for the demonstration testing. Vortec will participate in this task on an as-needed basis.

**Task 5.2 Demonstration Readiness Review**
Because non-hazardous and non-radioactive materials will be used for the demonstration testing, it is anticipated that the demonstration phase readiness review will be less formal than the operational phase readiness review. USEC rules for establishing the readiness of the demonstration plant will be used. Vortec will participate in this task on an as-needed basis.

**Task 5.3 System Check-out/Startup**
Upon completion of the demonstration phase readiness review, the system will be checked out and started up. USEC rules and procedures for start-up and check-out of non-hazardous process facilities will be used. Vortec will participate in this task on an as-needed basis.

**Task 5.4 Demonstration Testing**
The Test Plan developed by Vortec under Phase 4 of the program will be used as a guide for performing the demonstration testing. USEC will be responsible for performing the demonstration testing using its operating rules and procedures. Vortec will participate in recording data and the data analysis of the demonstration testing as a subcontractor to USEC.

**Task 5.5 Demonstration Testing Topical Report**
Upon completion of the demonstration testing, USEC will be responsible for preparing a topical report for the demonstration test phase of the program. Vortec will assist USEC in the preparation of this report as a subcontractor to USEC.
Deliverables
The primary deliverable for Phase 5 will be the Demonstration Testing Topical Report which will be due 60 days after completion of the demonstration testing.

2.2.2 Commercial Implementation
USEC will be responsible for the initial implementation of the technology. The scope of supply and definition of the project are described in their proposal to BJC (see Exhibit 2). This phase of the project will be performed by USEC under its rules and operational plan. USEC will be responsible for NEPA compliance, and all other permitting requirements. The operational readiness review will be performed by USEC with approval by DOE/Paducah management.

Vortec will participate in this phase of the project as a subcontractor by providing technical support and assistance to USEC. The initial implementation will be performed under a USEC work authorization task to BJC. For initial implementation, USEC is targeting the processing of 4,250 drums of LLW. The processing of the waste will be on a per unit basis. Subsequent use of the technology will be via an additional work authorization or a separate contract.

2.3 BJC AND DOE/PADUCAH PARTICIPATION
Bechtel Jacobs Corporation and DOE/Paducah are providing support for the project by supplying site infrastructure facilities for the project as well a funding for the demonstration testing and commercial implementation phases of the project. Their letter of commitment and support are provided in Exhibit 3, attached to this proposal. Their interest in pursuing the technology implementation is to reduce worker risk by: (a) reducing their handling of and exposure to radioactive and hazardous wastes, (b) to accelerate the removal of drums from the site, and (c) to reduce the cost of waste management which, in turn, will free up resources for other waste management projects.

3.0 SCHEDULE
The schedule for the project including construction, testing and commercial implementation is summarized in Figure 1 below. The schedule assumes the construction phase will be initiated by the end of September 2001 with construction competed by the end of April 2002. Upon completion of the construction, two months are allocated for startup and demonstration testing. Operational processing is scheduled to begin June/July 2002. The permitting activities will be initiated immediately upon activation and funding of the Task 4.7 option. Discussions with the Kentucky regulators indicate that an air permit will not be required, and that the air emission “registration” can be completed in less than 2 months. A NESHAPS analysis will be performed by USEC for the LLW to be processed. Based on data developed by USEC under the drum mountain performed in 2000, the NESHAPS analysis is not expected to require an air permit for operation of the Material Handling and Conditioning System. Three months of commercial operation are scheduled for July, August and September of 2002. Operation beyond September 2002 would require a new work authorization task or contract for USEC. Should USEC opt to secure a TSCA permit for continued operations, the estimated time to obtain a TSCA permit is 6-8 months. This time table is based on discussions between Vortec, USEC and Region IV EPA TSCA regulators.
4.0 COST

4.1 DEMONSTRATION SYSTEM CONSTRUCTION COST
Based on the final engineering and procurement packages prepared by Vortec under Phase 4 of this contract, we have determined that construction of the demonstration test facility can be completed within and time frame and cost specified under Optional Task 4.7 of Modification A042 dated May 11, 2001.

The total estimated cost for construction of the demonstration plant is $3,354,422. This estimated cost for completion of this activity is consistent with the cost substantiation presented in Vortec’s cost proposal VC01-6 dated April 19, 2001.

Vortec proposes to perform this contract activity on a cost plus basis. We do not intend to provide any cost sharing for the contract for the following reasons:

1. There is no statutory requirement for cost sharing in this procurement
2. The technology we have developed is uniquely applicable to the Department of Energy and there is no potential for commercial use of the technology.
3. Vortec has no effective means of recovering any cost sharing in future government business. In this regard, major DOE waste management contractors such as USEC and BJC are the companies that will receive the actual waste management contracts and receive the benefits of the use of our technology. Vortec’s role in future contracts will be limited to subcontract activities with limited scope and limited potential for profits to repay any cost share contribution.
4. Because Vortec is a small business, cost sharing puts us in an unfavorable financial situation with regard to securing bank credit for working capital and other operations.
5. Our proposal assumes the construction phase will be totally funded by DOE EM. The plant will be constructed at the Paducah Gaseous Diffusion Plant at facilities prepared by DOE for the demonstration. A summary description of the subsystems to be constructed for the limited demonstration program and the site for the construction are presented in Exhibit 1 to this proposal.

4.2 DEMONSTRATION TESTING COST
The demonstration testing portion of the program will be supported by USEC, DOE/Paducah and BJC. The test plan developed by Vortec under Phase 4 of the project is to be reviewed and approved by the participating parties prior to its implementation.

Vortec does not have access to the total cost associated with the demonstration testing because these costs are spread among the participating parties. Our original estimate for conducting the demonstration testing was approximately $600K. This cost did not include preparation of the 500 drums of surrogate waste that is to be covered by DOE/Paducah.

4.3 IMPLEMENTATION PHASE COST
The implementation phase of the program is to be supported by USEC via a Work Authorization Task with the Bechtel Jacobs Corporation. The USEC proposal calls for the processing and disposal of 4,250 drums of low-level waste. The processing of this waste will free up warehouse/storage space for planned priority remediation projects at Paducah.
A proposal has been prepared by USEC and is to be reviewed by BJC for their approval. A copy of the proposal is attached for reference in Exhibit 2. Copies of the commitment letters from USEC, Bechtel Jacobs Corporation and DOE/Paducah are provided in Exhibit 3 attached to this proposal.
Figure 1  Construction, Testing and Implementation Schedule
5.0 TECHNOLOGY IMPLEMENTATION BENEFITS

The implementation schedule calls for waste processing and disposal of approximately 4,250 LLW waste drums by the end of FY 2001. Upon completion of the initial Work Authorization activity, USEC/Vortec will pursue the processing of additional LLW as well as PCB contaminated wastes. Approximately 50,000 drums of LLW and PCB/LLW are currently stored at Paducah and are targeted for processing/disposal. The processing of mixed waste will be addressed in the future upon the issuance of a RCRA permit.

The Material Handling and Conditioning technology has significant benefits in that waste materials can be prepared for further treatment by a variety of thermal or non-thermal processes and/or directly disposed with substantially reduced sampling, characterization, handling, transport and disposal costs.

Primary benefits of the process include:

1. Improved quality in sampling and characterization of the wastes.
2. Reduced risk of exposure to operational hazards by workers.
3. Control of any emissions and mitigation of risk to human health and the environment.
4. Ability to handle drummed or bulk waste. [The basic process is designed to handle drummed and containerized waste; however, the system can be readily modified to handle certain bulk wastes as needed.]

The material handling and conditioning facilities can also yield a substantial cost savings by:

1. Reducing waste sampling costs by eliminating intensive manual operations and using automated sampling techniques.
2. Reducing characterization costs by homogenizing discrete waste streams and repackaging the waste into bulk containers, thus providing more accurate characterization with fewer samples.
3. Facilitating treatment (if required) by providing a sized, homogeneous waste form for final treatment.
4. Lowering transportation costs by efficiently repackaging the waste in bulk containers, thus reducing handling costs and allowing greater volumes to be shipped on transport carriers.
5. Reducing disposal cost by reducing the waste volume and the number of containers to be handled.
6. Reducing disposal cost by removing free liquids from the waste, thus ensuring waste acceptance criteria are satisfied.
7. Reduction of long-term drum storage and oversight costs.

It is estimated that the implementation of the waste pre-treatment and conditioning technology could save more than $400 million across the DOE complex. The system, when constructed, will be available to solve problems where radioactive and/or hazardous wastes contained in drums or in certain bulk forms must be removed for treatment or disposal.
6.0 ASSUMPTIONS, TERMS AND CONDITIONS
Vortec agrees to perform the Scope of Work described herein for Option Task 4.7 subject to the following assumptions, terms and conditions. The price for performing this work is based on the system design submitted to DOE/NEL under the Phase 4 engineering design deliverable. In addition, the following assumptions, terms and conditions provide for Vortec Corporation’s cost estimate. Any substantive changes from these assumptions, terms and conditions will constitute grounds for a fair change in the price of the contract.

1. DOE and/or its subcontractors will perform the necessary permitting and other regulatory liaison functions.
2. This proposal is valid for a period of 30 days; any delay beyond this period may result in a contract price change. Costs are based on funding being available according to the proposal schedule (i.e., no later than September 28, 2001)
3. No legal, regulatory or other impediments will delay the start of the project or construction activities.
4. Vortec Corporation overhead, G&A and labor rates for the construction phase are to be based on the construction phase cost and hours submitted to DOE on April 19, 2001 in Vortec Corporation’s proposal VC01-6. The labor rates listed below are the maximum rate per labor category. Billing will be for actual individual rates within a labor category.

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<tr>
<th>Category Description</th>
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<tr>
<td>VC2 (Program Mgmt)</td>
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<td>VC9 (Designer)</td>
<td>30.13</td>
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<tr>
<td>VCA (Tech-A/Operator)</td>
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<td>VCB (Tech-B/Operator)</td>
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<tr>
<td>VCC (Clerical)</td>
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5. Any contractors briefings or progress reports to explain the plans, progress, and results of the technical effort to the COR in Morgantown, West Virginia will not occur more than monthly. Meetings and briefings relating to program status will alternate between Collegeville, PA and Morgantown, WV. Weekly progress reports will not be required for this contract phase.
6. The program costs for construction do not include start-up and demonstration testing activities.
7. Task 4.6 (Facility Disposition) costs include costs for existing equipment that will be used for construction of the demonstration plant and existing Phase 3 equipment not used for the Ltd Demonstration. It has been assumed that all previous Phase 3 non limited Demonstration surplus equipment currently located and stored at Paducah will be transferred out of the program by December 31, 2001.
8. DOE will provide Health and Safety support during construction operation.
9. DOE will provide water and electrical power during construction and demonstration testing.
10. DOE will provide perimeter fencing of an 8ft high chain link fence surrounding the operational site.
11. Costs are based on Vortec bearing no risk for unforeseen circumstances beyond our control, including but not limited to:

- Naturally occurring unforeseen site conditions (e.g., unanticipated naturally occurring rock or sand and/or adverse weather conditions);
- The financial inability, misconduct or default of the General Contractor, a Subcontractor or supplier;
- The unavailability of materials or parts;
- Fire;
- Strikes, boycotts, or like obstructive actions by employees or labor organizations;
- Acts of God, such as earthquakes;
- A man-made (not naturally occurring) unforeseen site condition such as buried utility lines.
Exhibit 1  Material Handling System Description
MATERIAL HANDLING
AND
CONDITIONING SYSTEM
FOR
LOW-LEVEL RADIOACTIVE
AND
TSCA (PCB) WASTES

PREPARED BY
Vortec Corporation
3770 Ridge Pike
Collegeville, PA 19426

August 24, 2001
MATERIAL HANDLING AND CONDITIONING SYSTEM

PROCESS DESCRIPTION

1.0 PROCESS OBJECTIVES

The objectives of the Material Handling and Conditioning (MH/C) System are to precondition, sample and repackaging low level radioactive and TSCA (i.e., PCB) contaminated solid wastes so as to improve the quality of sampling and characterization of the waste and to improve human health and safety during the handling, sampling, characterization, treatment, transport and disposal of the waste. Cost savings in the performance of these waste management functions is also anticipated. The process operates under negative pressure to avoid discharge of any hazardous constituents.

2.0 TARGETED WASTES

The targeted wastes to be processed are classified as low-level contact handled and TSCA (i.e., PCB contaminated). The low-level waste targeted for characterization at the Paducah Gaseous Diffusion Plant will generally contain less than $1\%$ uranium and less than $1/2\%$ technetium with possible trace levels of transuranics. The PCB contaminated solid waste to be processed will be limited to low concentration PCBs (i.e., $< 500$ ppm by weight). The low concentration PCB waste will be further divided into two waste categories; i.e., (a) wastes with PCB concentrations less than $50$ ppm, and (b) wastes with PCB concentrations in the range of $50$ ppm to less than $500$ ppm. Liquid PCBs and/or PCB articles will not be processed. The process is designed to handle solid waste stored in drums or selected bulk waste with up to $30\%$ moisture.

3.0 BENEFITS OF PROCESS

The Material Handling and Conditioning technology has significant benefits in that waste materials can be prepared for further treatment by a variety of thermal or non-thermal processes and/or directly disposed with substantially reduced sampling, characterization, handling, transport and disposal costs. Primary benefits of the process include:

(1) Improved quality in sampling and characterization of the wastes.
(2) Reduced risk of exposure to operational hazards by workers.
(3) Control of any emissions and mitigation of risk to human health and the environment.
(3) Ability to handle drummed or bulk waste. [The basic process is designed to handle drummed and containerized waste; however, the system can be readily modified to handle certain bulk wastes as needed.]

The material handling and conditioning facilities can also yield a substantial cost savings by:

(1) Reducing waste sampling costs by eliminating intensive manual operations and using automated sampling techniques.
(2) Reducing characterization costs by homogenizing discrete waste streams and repackaging the waste into bulk containers, thus providing more accurate characterization with fewer samples.

(3) Facilitating treatment (if required) by providing a sized, homogeneous waste form for final treatment.

(4) Lowering transportation costs by efficiently repackaging the waste in bulk containers, thus reducing handling costs and allowing greater volumes to be shipped on transport carriers.

(5) Reducing disposal cost by reducing the waste volume and the number of containers to be handled.

(6) Reducing disposal cost by removing free liquids from the waste, thus ensuring waste acceptance criteria are satisfied.

(7) Reduction of long-term drum storage and oversight costs.

It is estimated that the implementation of the waste pre-treatment and conditioning technology could save more than $400 million across the DOE complex with additional substantial savings for FUSRAP and DOD projects. The system, when constructed, will be available to solve problems where radioactive and/or hazardous wastes contained in drums or in certain bulk forms must be removed for treatment or disposal.

4.0 PROCESS DESCRIPTION

4.1 Process Design for Low-Level Waste

The Material Handling and Conditioning (MH/C) facility will consist of a drum weighing and loading assembly, shredding assembly, homogenization/drying assembly, ferrous metals separation assembly, prepared waste delivery/loading assembly, a comprehensive emissions control system, an automated sampling assembly, a PLC-based control system, and utilities/power distribution. A process diagram for the system designed to process LLW is provided in Figure 4-1. This is the system configuration that will be used for the demonstration test program.

The Material Handling and Conditioning System begins with the delivery of drums or bulk waste to the MH/C staging area. The sealed drummed soils will be weighed and loaded into the Primary Shredder via a Manipulating Arm and Skip Hoist. Materials will pass from the Primary Shredder to the Secondary Shredder to complete the drum shredding process. Shredding will yield metal strips no larger than 2” by 6” and break down rocks, concrete, rebar, and other objects to less than 2” for good metal separation and flow characteristics. Upon leaving the secondary shredder, the metal strips and drum contents are delivered to a belt conveyor that transports the shredded materials to the
FIGURE 4-1: PROCESS DIAGRAM OF MATERIAL HANDLING AND CONDITIONING SYSTEM FOR WASTE SAMPLING AND CHARACTERIZATION
Rotary Drum Homogenizer/Dryer. A propane-fired air heater can be used to warm the air swept into the Rotary Drum Homogenizer/Dryer to further promote the drying of any moist materials as they pass through this stage.

The mixed and dried materials are discharged from the Rotary Drum Homogenizer/Dryer onto a belt conveyor, which transports them to the conditioned soil loading subsystem. At the head of the conveyor, a tramp iron magnet removes ferrous materials from the material stream. Separated metals are discharged to an ST-90 box for subsequent treatment/disposal. Likewise, conditioned soil is discharged from the belt conveyor to the waste delivery/loading assembly into ST-90 boxes for subsequent treatment/disposal. An automated sampling system takes periodic samples of the waste as it is delivered to the ST-90 box. The method of sampling and the homogenization of the waste ensures that characterization of the waste is substantially improved over the sampling of individual drums.

The soil is assumed to contain up to 30% water by weight, and the rotary Homogenizer/dryer is designed to condition and/or dry soil to a free flowing condition to provide homogenization of the waste. The conditioned waste material exiting the Homogenizer/dryer typically has a temperature in the range of ambient temperature to 180°F, depending on the moisture content of the as received waste. The drying air (with moisture) from the Rotary Drum Homogenizer/Dryer typically has a temperature in the range of ambient temperature to 250°F, depending on the moisture content of the waste and the drying characteristics of the waste. The drying air/moisture from the Rotary Drum Homogenizer/Dryer is passed through a roughing filter and high efficiency particulate air (HEPA) filter for control of particulates emissions.

The Rotary Drum Homogenizer/Dryer operates under a slight negative pressure to minimize any air infiltration into the Rotary Drum Homogenization/Drying circuit. The feeding assembly and the discharge breaching are equipped with low-leakage seals. Double-gate airlocks provide the means for charging and discharging materials to and from the Rotary Drum Homogenizer/Dryer.

The shredding equipment and conveyors operate under negative pressure and/or are enclosed and discharge to a dust control subsystem to minimize fugitive dust or other particulate emissions from the process. The dust control subsystem provides the capability to withdraw air from all of the soil processing equipment and filter it through a dust collector and HEPA filter prior to discharge to the atmosphere. The dust control subsystem consists of the ductwork, Nuisance Dust Collector/HEPA filter, blower, and stack.

The Rotary Drum Homogenizer/Dryer exhaust gas is vented through a dust collector and HEPA filter. Both of the Dust Collection Assemblies (Nuisance and Rotary Drum Homogenizer/Dryer) are equipped with automatically controlled air pulse subsystems to clean the filter media. In each unit, the dust removed from the filter media drops to a live bottom hopper where it is discharged to a pneumatic conveying system for delivery to the conditioned soil loading facility. In this manner, all potential dust sources during operation of the system are effectively controlled and fugitive losses are minimized or eliminated.

The compressed air subsystem provides both instrument air and utility air to the plant. It consists of a single stage rotary screw type compressor with air-cooled after-cooler, a heatless,
regenerative, desiccant type air dryer and air receiver. The subsystem is designed to provide 800 scfm of compressed air at 125 psig with a -40°F dew point. The compressor and air dryer operate with manufacturer provided local control panels.

To provide transportability and ease of installation, most equipment is skid mounted, meets Department of Transportation regulations, and uses flanged and/or hose connections. The systems are designed for operation outdoors at temperatures below freezing.

4.2 Process Design for PCB Waste

The system for processing PCB contaminated waste is similar to the process described in section 4.1 except for additional equipment necessary for the abatement of volatile organic vapor emissions. In addition, absorbent materials will be mixed with the waste to capture freestanding moisture. The modified system is depicted in Figure 4-2.

Absorbent materials will be introduced and mixed with the process material just after the inlet airlock to the Rotary Drum Homogenizer/Dryer. The absorbent materials will capture freestanding water and improve the flow characteristics of the processed waste materials.

To ensure that no organic emissions are released from the Rotary Drum Homogenizer/Dryer or the Nuisance Dust Collection systems, exhaust gas will pass through an activated carbon filter assembly before its final discharge to the atmosphere. Activated carbon filter assemblies usually incorporate a gas cooler assembly to condition the gas prior to the activated carbon filter assembly. Cooling the gas usually increases the efficiency of the activated carbon filter assembly. Condensate that may result from the cooling of the effluent gas streams is contained in a storage tank. This condensate may be subsequently treated, disposed, or recycled back to the Rotary Drum Homogenizer/Dryer to be absorbed by the process materials.
FIGURE 4-2: PROCESS DIAGRAM OF MATERIAL HANDLING AND CONDITIONING SYSTEM FOR PCB WASTES
5.0 PROCESS EMISSIONS

5.1 Air Emissions Points

There will be two air emissions points, the vent from the Nuisance Dust Collection subsystem and the vent from the Homogenizer/dryer. The emission potential for these two point sources is shown in Table 5-1. The data presented is for operation at a processing rate of 36 ton/hr for 8760 hrs/yr (i.e., 24 hrs/day for 365 days/yr).

<table>
<thead>
<tr>
<th>Source</th>
<th>Nuisance Dust Collection</th>
<th>Homogenizer/dryer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow rate, acfm</td>
<td>17,020</td>
<td>9,850</td>
</tr>
</tbody>
</table>

### Table 5-1. Point Source Information

<table>
<thead>
<tr>
<th>Pollutant rate, (lb/yr)</th>
<th>lb/yr</th>
<th>lb/yr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Particulate</td>
<td>&lt; 10 lb/yr</td>
<td>&lt; 10 lb/yr</td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td>--</td>
<td>&lt; 2000 lb/yr</td>
</tr>
<tr>
<td>Oxides of Nitrogen</td>
<td>--</td>
<td>&lt; 4000 lb/yr</td>
</tr>
<tr>
<td>Sulfur Dioxide</td>
<td>--</td>
<td>&lt; 2000 lb/yr</td>
</tr>
<tr>
<td>Volatile PCBs (1)</td>
<td>--</td>
<td>&lt; 100 lb/yr</td>
</tr>
</tbody>
</table>

Note 1: Assumes all PCBs are volatile and activated carbon filter has a 99.5% effectiveness. Processing of PCB's to occur after modifications to the system per modifications in §4.0.2.

5.2 Liquid Effluents

Liquid effluents to an outfall are expected to be limited to uncontaminated storm water runoff. Liquids collected at the bottom of the shredder assembly and from the off gas cooler will be collected in approved containers, analyzed and either re-introduced back into the system or disposed in accordance with applicable regulations.

5.3 Solids Discharge Points

There will be two solids discharge points. Solids at each point will be collected in an ST-90 box for disposal by DOE. The two points are: the ferrous metals discharge at the tramp iron metal separator, and the prepared and conditioned soil discharge point. Spent activated carbon filter material will removed from the Homogenizer/dryer emissions control assembly and replaced on an as needed basis. Disposal of the spent filter material will performed in accordance with applicable regulations.
6.0 PLANT LOCATION

The Vortec demonstration facility will be located on the western edge of the PGDP on the Paducah Site. The Paducah Site is in McCracken County, Kentucky, approximately 24 km (15 mi) west of the city of Paducah and about 5.6 km (3.5 mi) south of the Ohio River. The Paducah Site is a DOE reservation consisting of a 582-ha (1,437-acre) DOE-managed site and an 804-ha (1,986-acre) wildlife management area leased to the Commonwealth of Kentucky. The Paducah Site has included an active uranium enrichment facility since 1951. PGDP occupies a 303-ha (748-acre) complex at the center of the Paducah Site and is surrounded by a security fence. United States Enrichment Corporation (USEC), a private corporation, operates the uranium enrichment facilities at PGDP. Figure 5-1 depicts the location of the Material Handling and Conditioning facility relative to the gaseous diffusion plant.

Figure 5-1 Location of MH/C Facility Relative to Gaseous Diffusion Plant
Exhibit 2  USEC Proposal for Technology Implementation
**FY01 WORK AUTHORIZATION FORM**

*(For Services procured from United States Enrichment Corporation)*

<table>
<thead>
<tr>
<th>WORK AUTHORIZATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>WORK TITLE: Process and Ship for Disposal 4,250 LLW Drums</td>
</tr>
<tr>
<td>Bechtel Jacobs Company Technical Contact:</td>
</tr>
<tr>
<td>Phone No.:</td>
</tr>
<tr>
<td>USEC Technical Contact: Scott Shuemaker/J. Hankins</td>
</tr>
<tr>
<td>Phone No: (270) 441-5809/5806</td>
</tr>
<tr>
<td>Start Date: October 1, 2001</td>
</tr>
<tr>
<td>End Date: September 30, 2002</td>
</tr>
<tr>
<td>Not To Exceed Funding:</td>
</tr>
</tbody>
</table>

**MODIFICATIONS**

This Work Authorization and any revision thereto may be amended to incorporate fee in an amount to be negotiated between Bechtel Jacobs Company LLC and USEC, which is subject to Department of Energy approval.

STR –

See attached Scope of Work.

**BECHTEL JACOBS COMPANY APPROVALS:**

Health & Safety:

Quality Assurance:

Project Controls:

Procurement:

Technical Manager:

FM/PM: MOP:

Controller: Task ID:

**USEC WORK ACCEPTANCE APPROVAL:**

Name: Date:

Title:

Task ID: USEC Management Approval:

All services performed by the DOE-ORO Performing Contractor, under this Work Authorization (WA), shall be in accordance with the Master Agreement for Services between United States Enrichment Corporation (USEC) and Bechtel Jacobs Company LLC (BJC).
SUBJECT: Process 4,250 Drums of LLW for Disposal

INTRODUCTION/OVERALL SCOPE: Utilizing the Vortec Processing System to be constructed by DOE, convert 4,250 drums of low level waste from 55-gallon containerized waste to debris waste, composite sample and characterize the debris waste, repackage the waste in approved shipping containers, and transport the waste to DOE approved disposal site or sites. USEC will retain Vortec in a technical support role to ensure performance of the plant.

SCHEDULE: October 1, 2001 – September 30, 2002

DELIVERABLES:
ACCEPTANCE CRITERIA: N/A

NOT TO EXCEED COST ESTIMATE: Fixed Unit Price for not less than 4,250 drums at $ per drum not to exceed $ 
PERFORMANCE REVIEWS AND REPORTS: N/A

ENVIRONMENTAL, SAFETY AND HEALTH: BJC is dedicated to the concept that all accidents are preventable, including unpermitted discharges and releases to the environment. This “zero accident philosophy” must be extended to all workers. Workers must be committed to this philosophy and strive to prevent accidents, injuries, illnesses and adverse impacts to the environment. All workers must have consistent use of safe practices in their daily work activities and participate in Integrated Safety Management. All workers have stop work authority when conditions are observed or perceived that present unsafe conditions or threats to the environment
The Integrated Safety Management System (ISMS) is a methodology that integrates ES&H philosophies, goals, and practices into management and work practices at all levels so that workers, the public, and the environment are protected while tasks are accomplished. ISMS involves identifying the work to be performed, identifying hazards that may be present, establishing hazard controls, performing the work safely, and providing feedback and continuous improvement for performing the task. All workers must be involved in one or more phases of ISMS.

QA REQUIREMENTS: USEC Quality Assurance/Quality Control procedures will be followed for

TASK MANAGEMENT: The technical points of contact for these services are Sam Leone for BJC and Scott Shuemaker and Jimmie Hankins of USEC.

PROCUREMENT: The procurement type is a fixed unit price. Any USEC fee associated with work purchased by BJC shall be in accordance with the USEC/DOE agreement and is identified in this work authorization.

SPECIFIC SERVICES REQUIRED/SPECIAL INSTRUCTIONS: N/A
INVOICING REQUIREMENTS: The draft is due on the contractors 5th work day (including the labor detail and material charges report for the time and materials section and a lump sum for the fixed price). A final invoice is due on the 15th of the calendar month.

REFERENCES: Service Agreement between Bechtel Jacobs Company LLC and USEC

Statement of Work

Under this Work Authorization, USEC will provide personnel and equipment necessary to convert 4250 drums of low-level waste presently in DOE storage to a condition which will allow its disposal as debris waste. To insure effective and safe operations, USEC is providing a project manager as well as a full time dedicated Health and Safety Officer. This statement of work assumes the Vortec Material Handling and Conditioning Facility will be constructed, tested, and ready for operation by May 31, 2001.

USEC will provide personnel and equipment to transport the 55 gallon drums from DOE storage to the Material Handling and Conditioning Facility (MHCF), unload the drums at the MHCF, stage and weigh the drums, process them through the MHCF, sample and characterize the waste, containerize the waste in intermodals, and load the intermodals onto railcars for shipment. Bechtel Jacobs Company LLC (BJC) will provide equipment and operators to load the drums onto USEC transport trucks at the entrance to the DOE storage.

At the MCHF, the drums will be off-loaded and staged for feeding into the system. The drums will be weighed before being fed into a primary shredder via a manipulating arm and skip hoist. The drums will pass through the primary shredder into a secondary shredder which completes the drum shredding process. Shredding will yield metal strips no larger than 2 inches by 6 inches and break down rocks, concrete, rebar, and other objects to less than 2 inches to facilitate metal separation and flow characteristics.

The waste is then transported to a rotary drum homogenizer/dryer where it is mixed with absorbent and/or the moisture content is reduced by contact with drying air. The materials are discharged from the rotary drum onto a conveyor belt which transports them to conditioned soil loading subsystem. This conveyor belt system includes a metal separation system and sampling system. Metals are pulled off and directed to a separate loading system if required.

Once that is accomplished, samples are pulled from the waste stream at predetermined intervals which will meet or exceed regulatory statistical sampling guidelines. The entire system as described, is enclosed and operates under negative pressure to eliminate fugitive emissions. HEPA filters are also utilized to control all fugitive particulate air emissions.

The waste, both metal and non-metal are then loaded into intermodal containers and staged for shipment. Once analytical results for the samples are received, the intermodels are loaded onto railcars for shipment.

The cost assumes the DOE chosen disposal site would be EnviroCare of Utah. Should DOE decide to use its on-site contained landfill, USEC could deliver the waste to the landfill at a reduced overall cost.
Exhibit 3  Site Commitment Letters
August 24, 2001

Mr. Jim Hnat
Vortec Corporation
3770 Ridge Pike
Collegeville, PA  19246-3158

Dear Jim:

Based on our discussions over the last few months, USEC has submitted to Bechtel Jacobs Corporation (BJC) a proposal which would utilize a fully constructed and operational low-level waste characterization and volume reduction plant (demo plant).

Discussions this week with BJC senior management indicate a favorable response to our draft proposal. Discussions are to be held early next week to finalize terms of that agreement.

USEC believes it can process 4000 drums in DOE FY 2002 if Vortec and DOE can construct the facility per your schedule. USEC is committed to work with DOE and BJC to implement this technical approach of low-level waste treatment to provide significant cost savings to DOE.

We will keep you informed of progress next week. If you have any questions, please contact me at 270/441-5802.

Sincerely,

Charles W. Martin
Director, Field Services

CWM:mm
James G. Hnat, Ph.D.
Vortec Corporation
3770 Ridge Pike
Collegeville, Pennsylvania 19426

Subject: Low Level Waste (LLW) Processing

Dear Dr. Hnat:

This letter is to confirm our discussions concerning the commitment of the Paducah Gaseous Diffusion Plant (PGDP) LLW drums to the operation of the Vortec waste pre-treatment equipment.

Bechtel Jacobs Company LLC (BJC), with the concurrence of the United States Department of Energy (DOE), has budgeted for the FY 02 fiscal baseline processing of up to 4,250 drums of LLW soils or soil-like material. This baseline project is based upon processing of drums in FY 02 only. It is understood that some transportation to Envirocare will occur in FY 03.

The commitment is based upon successful completion of negotiations with the United States Enrichment Corporation (USEC) for a work authorization (WA) substantially equivalent to the draft WA prepared August 6, 2001. As we discussed, BJC must expend the LLW budget in FY 02; therefore, should the project start be delayed, a proportional reduction in drums available for processing through Vortec would be directed. Finally, as always, we are subject to approval of funding by DOE.

To summarize, we are excited to participate in this venture and look forward to reducing our on-site inventory of LLW.

If you have any questions, please call me at (270) 441-5030.

Sincerely,

Gordon L. Dover
Paducah Manager of Projects

GLD/ras
LTR-PAD/MP-AS-01-0265

c: S. J. Davis
S. M. Houser
C. Martin
W. D. Seaborg, DOE-PAD
File-EMEF-DMC-PAD-RC

761 Veterans Avenue Kevil, Kentucky 42053