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Section 3 of 3

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TECHNICAL SPECIFICATION

The document revision number is indicated below. Please replace all revised pages of this document and destroy the superseded copies.

PROJECT:	Final DBVS Design	145579-D-SP-032	REV. 2
PROJECT NO:	145579	DRIED WASTE TRANSFER SYSTEM	
CLIENT:	AMEC E&E - Richland, Washington		

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ABBREVIATIONS AND ACRONYMS

- AISC American Institute for Steel Construction
- ANSI American National Standards Institute, Inc.
- ASCE American Society of Civil Engineers
- ASHRAE American Society of Heating, Refrigeration, and Air Conditioning Engineers
- ASME American Society of Mechanical Engineers
- ASNT American Society of Nondestructive Testing
- ASTM American Society for Testing and Materials
- AWG American wire gauge



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AWS	American Welding Society
B&PV	Boiler and Pressure Vessel
CFR	<i>Code of Federal Regulations</i>
CH2M HILL	CH2M HILL Hanford Group, Inc.
CMTR	Certified Material Test Report
CoC	Certificate of Conformance
CWI	Certified Welding Inspector
DBVS	Demonstration Bulk Vitrification System
DOE	U.S. Department of Energy
HEPA	high-efficiency particulate air
ICV	In-Container Vitrification
IEC	International Engineering Consortium
IEEE	Institute of Electrical and Electronics Engineers, Inc.
IESNA	Illuminating Engineering Society of North America
MCS	Monitoring and Control System
NCR	nonconformance report
NDE	nondestructive examination
NEC®	<i>National Electric Code</i>
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NIST	National Institute of Standards and Technology
NPT	national pipe thread
NRTL	Nationally Recognized Testing Laboratory
P&ID	piping and instrumentation diagram
QA	Quality Assurance
SAE	Society of Automotive Engineers
UBC	Uniform Building Code
UL	Underwriters Laboratories, Inc.
WAC	<i>Washington Administrative Code</i>

TRADEMARKS

AutoCAD	Registered trademark of Autodesk, Inc.
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- Electromark Registered trademark of Permar Systems, Incorporated dba Electromark Company.
- Flanders G1 Series Trademark of Flanders Corporation.
- ICV Registered trademark of AMEC, Inc.
- Loctite Registered trademark of Henkel Loctite.
- MicroFiltrex Registered trademark of Porvair Filtration Group Ltd.
- NEC Registered trademark of the National Fire Protection Association.
- Weidmüller Registered trademark of C. A. Weidmüller K.G. Company.

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1 SCOPE

Throughout this specification, Contract Responder shall act as the Seller and AMEC Earth and Environmental, Inc. shall act as the Buyer.

1.1 INCLUDED IN SCOPE

This specification provides the minimum requirements for design, analysis, fabrication, inspection, testing, documentation, packaging, and shipping of a Dried Waste Transfer System. The system is comprised of the following: (1) dried waste inlet skid, (2) dried waste transfer skid, (3) waste receiver and filter housings, and (4) interconnecting piping and valves. The material handled is considered hazardous and radioactive waste that is regulated under the requirements of 40 CFR 264, Subpart J; 10 CFR 830; and WAC 173-303-640.

The Seller shall provide the necessary equipment, calculations, assembly instructions, drawings, and technical support required for this system.

Drawings and sketches provided with this specification represent a minimum set of Buyer expectations for the assembled system. The Seller shall use this information, along with additional material in the specification, to generate a set of design and fabrication drawings with sufficient detail for construction. Examples of information to be developed by the Seller includes, but is not limited to, dimensioning and associated tolerances, mounting details, weld details, and material types and quantities.

Component information provided on data sheets with this specification contain the critical characteristics identified by the Buyer for the assembled system. The Seller shall use this information, along with performance requirements either in the specification or generated from Seller-prepared calculations, to generate a completed set of data sheets for components of the assembled system. Form, fit, and function shall be evaluated by the Seller in the course of design work and development of the design and fabrication drawings.

Unless otherwise stated, alternative equipment designs are permissible, if proven to be effective in meeting the requirements in this specification. Any alternative design must be thoroughly explained with text supplemented by drawings or sketches and proposed with the original bid. Buyer approval is required before proceeding with an alternative equipment design.



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1.2 NOT INCLUDED IN SCOPE

Work not included in this specification is as follows:

1. Installation of the Dried Waste Transfer System,
2. Design or manufacture of the electrical conductors on the line side of the 480V power terminal box and the Monitoring and Control System (MCS) side of the instrument terminal box,
3. Motor starters and drives located in a remote motor control center,
4. Motor pushbutton stations,
5. Motor disconnect switches,
6. Monitoring and Control System,
7. Structural supports for Seller piping that is connected to Buyer equipment and/or structures, and
8. Radiation Monitors.



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2 APPLICABLE DOCUMENTS

The codes, standards, and other documents listed in Table 2-1 and Table 2-2 are of the latest issue and addenda in effect at the time of procurement (unless otherwise specified). These documents form a part of the basis of design for this procurement to the extent specified in the applicable sections of this specification. In the event of a conflict between documents referenced herein and the requirements of this specification, the requirements of this specification shall take precedence when the specification is more stringent. All conflicts, alternative standards, or omissions shall be brought to the attention of the Buyer for resolution. Significant sections noted are not meant to negate the remainder of the specification, but to emphasize sections of greater importance.

2.1 GOVERNMENT DOCUMENTS

Table 2-1: Government Documents

Government Documents	Title
10 CFR 830	"Nuclear Safety Management," <i>Code of Federal Regulations</i> , as amended.
29 CFR 1910	"Occupational Safety and Health Standards," <i>Code of Federal Regulations</i> , as amended.
40 CFR 264	"Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," Subpart J, <i>Code of Federal Regulations</i> , as amended.
47 CFR 15	"Radio Frequency Devices," <i>Code of Federal Regulations</i> , as amended.
DOE/RL-92-36	<i>Hanford Site Hoisting and Rigging Manual</i> , U.S. Department of Energy, Richland, Washington.
WAC 173-303-640	"Tank Systems," <i>Washington Administrative Code</i> , as amended.

2.2 NON-GOVERNMENT DOCUMENTS

Table 2-2: Non-Government Documents (4 sheets)

Code/Standard	Title
AISC	<i>Manual of Steel Construction—Allowable Stress Design</i> , Ninth Edition, American Institute of Steel Construction, Chicago, Illinois.



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Table 2-2: Non-Government Documents (4 sheets)

Code/Standard	Title
AISC	<i>Manual of Steel Construction—Load and Resistance Factor Design</i> , Third Edition, American Institute of Steel Construction, Chicago, Illinois.
ANSI/AWS D1.3	<i>Structural Welding Code—Sheet Steel</i> , American Welding Society, Miami, Florida.
ANSI C63.16	<i>American National Standard Guide for Electrostatic Discharge Test Methodologies and Criteria for Electronic Equipment</i> , American National Standards Institute, Washington, D.C.
ANSI Y14.1	<i>Drawing Sheet Size and Format</i> , American National Standards Institute, Inc., New York, New York.
ASCE 7-98	<i>Minimum Design Loads for Buildings and Other Structures</i> , American Society of Civil Engineers, Reston, Virginia.
ASHRAE Fundamentals Handbook	<i>2001 ASHRAE Handbook -- Fundamentals</i> , American Society of Heating, Refrigerating, and Air Conditioning Engineers, Atlanta, Georgia.
ASME AG-1-2003	<i>Code on Nuclear Air and Gas Treatment</i> , American Society of Mechanical Engineers, New York, New York.
ASME B&PV Code	<i>ASME Boiler and Pressure Vessel Code</i> , American Society of Mechanical Engineers, New York, New York. Section VIII, "Rules for Construction of Pressure Vessels" Section IX, "Welding and Brazing Qualifications"
ASME B30.20	<i>Below-the-Hook Lifting Devices</i> , American Society of Mechanical Engineers, New York, New York.
ASME B31.3	<i>Process Piping</i> , American Society of Mechanical Engineers, New York, New York.
ASME NQA-1, 1994*	<i>Quality Assurance Program Requirements for Nuclear Facilities</i> , American Society of Mechanical Engineers, New York, New York.
ASNT SNT-TC-1A	<i>Recommended Practice</i> , American Society of Nondestructive Testing, Columbus, Ohio.
ASTM A 36/A 36M	<i>Standard Specification for Carbon Structural Steel</i> , American Society of Testing and Materials, New York, New York.



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Table 2-2: Non-Government Documents (4 sheets)

Code/Standard	Title
ASTM A 108	<i>Standard Specification for Steel Bars, Carbon, Cold-Finished, Standard Quality, American Society for Testing and Materials, West Conshohocken, Pennsylvania.</i>
ASTM A 500	<i>Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes, American Society for Testing and Materials, West Conshohocken, Pennsylvania.</i>
ASTM A 569	<i>Standard Specification for Steel, Carbon (0.15 Maximum, Percent), Hot-Rolled Sheet and Strip Commercial, American Society for Testing and Materials, West Conshohocken, Pennsylvania.</i>
AWS D1.1/D1.1M	<i>Structural Welding Code—Steel, American Welding Society, Miami, Florida.</i>
AWS D1.6	<i>Structural Welding Code—Stainless Steel, American Welding Society, Miami, Florida.</i>
AWS QC-1	<i>Standard for AWS Certification of Welding Inspectors, American Welding Society, Miami, Florida.</i>
HNF-2962	<i>A List of EMI/EMC Requirements, Rev. 0, Numatec Hanford Corporation for Fluor Daniel Hanford, Inc., Richland, Washington.</i>
HNF-SD-GN-ER-501	<i>Natural Phenomena Hazards, Hanford Site, Washington, Revision 1B, Westinghouse Hanford Company, Richland, Washington.</i>
IEEE C62.41.1	<i>IEEE Guide on the Surge Environment in Low-Voltage (1000 V and Less) AC Power Circuits, Institute of Electrical and Electronics Engineers, New York, New York.</i>
IEEE C62.41.2	<i>IEEE Recommended Practice on Characterization of Surges in Low Voltage (1000 V and Less) AC Power Circuits, Institute of Electrical and Electronics Engineers, New York, New York.</i>
IEEE Std C37.90.2	<i>IEEE Standard for Withstand Capability of Relay Systems to Radiated Electromagnetic Interference from Transceivers, Institute of Electrical and Electronics Engineers, New York, New York.</i>
IEEE Std 142	<i>IEEE Recommended Practice for Grounding of Industrial and Commercial Power Systems, Institute of Electrical and Electronics Engineers, New York, New York.</i>



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Table 2-2: Non-Government Documents (4 sheets)

Code/Standard	Title
NEMA MG-1	<i>Motors and Generators</i> , National Electrical Manufacturers Association, Rosslyn, Virginia.
NFPA 70	<i>National Electrical Code</i> , 2002 Edition, National Fire Protection Association, Quincy, Massachusetts.
UBC, 1997	<i>1997 Uniform Building Code</i> , International Conference of Building Officials, Whittier, California.
UL-listed	<i>Electrical Appliance and Utilization Equipment Directory</i> , Underwriters Laboratories, Inc., Northbrook, Illinois.
UL 508A	<i>Standard for Industrial Control Panels</i> , Underwriters Laboratories, Inc., Northbrook, Illinois.
*NQA-1 (the relevant requirements of NQA-1 are included in Section 4).	



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3 TECHNICAL REQUIREMENTS

3.1 ITEM DEFINITION

The Dried Waste Transfer System shall be designed to convey the dried waste from the dryer to the In-Container Vitrification™ (ICV™) box. The system shall be capable of transferring 16,000 lb/h. The system shall use as little air as possible and still keep the transfer lines from acquiring buildup or plugging. The system will be used intermittently to transfer the dryer contents to the ICV™ box, approximately three times a day, for one hour.

The Seller shall provide two skids mounted with dried waste transfer equipment. One skid will support the components for the inlet of the system. As needed, this skid shall also support any electrical and/or instrumentation panel interfaces required by the Seller-provided equipment. This dried waste inlet skid shall be free standing and will be anchored to a concrete pad. The second skid will support the dried waste transfer vacuum pump, high-efficiency particulate air (HEPA) filters, and associated piping and electrical components located at the outlet of the system. This dried waste transfer skid shall be free standing and will rest on the Buyer's support structure above the ICV™ box inlet.

Seller-provided interconnecting piping and valves between the two skids, piping connecting the skids to the waste receiver and filter housings, and the waste receiver and filter housings themselves shall be supported by attachment to the Buyer's support structure. The Seller shall identify the support requirements via calculation and provide the Buyer with the drawings that illustrate what supports will be needed for fabrication by the Buyer and installation at the Buyer's location.

The following describe the Buyer's expectations for the Dried Waste Transfer System components.

1. Waste Receiver and Filter Housing. Two filter/receiver units complete as follows:
 - a. Filter/receiver housing complete with flanged conical outlet hopper to mate with rotary valve.



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b. **Pulse-back filter.** The receiver filtration system shall be MicroFiltrex® or equal sintered metal fiber. The filter shall be in the dried waste receiver and used to remove particulates before the Off-Gas Treatment System. Pulsed jet cleaning shall be used for *in-situ* removal of accumulated particulate from the filter element. If filter elements should become contaminated or laden with particles, a short sonic pulse of air shall be blown back through the Seller's predetermined number of elements to discharge the contaminants and allow them to drop back into the receiver. The filter elements are to be mounted to a removable top on the receiver unit for maintenance purposes. The Seller shall provide a Pneumatic Pulsejet Control System that provides cycled, automatic filter element cleaning without causing process interruption. The filter housing shall have two sets of national pipe thread (NPT) couplings (one on the filter inlet and one on the filter outlet for a differential pressure transmitter and a differential pressure switch.

The filter shall have a direct flanged connection to the receiver. The filter discharge flange shall be standard 150-lb raised face, the same diameter as the inlet to the HEPA filters. The Seller shall determine and indicate the appropriate size and flange orientation on the design drawings.

2. **Diverter.** The diverter shall be remotely operated using a 24V dc signal from the MCS and shall be designed to prevent the buildup of waste in the closed leg. Waste shall not be allowed to settle in the diverter.
3. **Vacuum Pump.** Pump assembly, v-belts and v-belt guard if required, vacuum gauge, oil level gauge, and 480V, 3-phase, 60-Hz, totally enclosed fan cooled motor.
4. **HEPA Filters.** HEPA filter housing shall be Flanders G1 Series® housing with 007 series filter or approved equivalent. The housing shall be equipped with two (2) static pressure ports. The ports shall be located upstream and downstream of the filter elements on the top of the housing. The housing shall be equipped with a floor drain centered at the bottom of the housing.



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5. Rotary Valves. Two quick clean rotary discharge valves complete with 480V, 3-phase, 60-Hz, wash-down duty motor and closed-end rotor.
6. Rotary Valve. One quick clean rotary discharge valve complete with 480V, 3-phase, wash-down duty motor for use with variable frequency drive. The valve shall be of a closed-end rotor design.
7. Knife Gate Valves. The knife gate valves shall be manually operated. Knife gate valves are intended for use during maintenance only.
8. Interconnecting Piping. The piping connecting the dried waste inlet skid to the waste receiver and filter housings shall have secondary containment. The secondary containment shall be capable of containing a leak of dried waste from the primary pipe to prevent release of material to the atmosphere. The secondary containment shall comply with all piping codes listed within this specification. The secondary containment piping will be instrumented with a pressure indicating transmitter as shown on Drawing F-145579-33-A-0106 in Appendix A. Location to be shown on fabrication drawings reviewed and approved by the Buyer.

3.1.1 Item Diagram

The piping and interface sketch shown in Figure 3-1 depicts the Dried Waste Transfer System and minimum associated equipment and interfaces to be provided by the Seller.

3.1.2 Interface Definition

For relation of the connection points listed below to the Seller-provided equipment, see Drawing F-145579-33-A-0106.

1. CP-01 and CP-02: A 1/2-in. male NPT connection fitted with quick-disconnect fittings for compressed air. Compressed air line maximum design pressure of 150 psig and operating pressure of 125 psig.
2. CP-03: A 20-in. standard 150-lb raised-face flange for waste inlet to transfer system.



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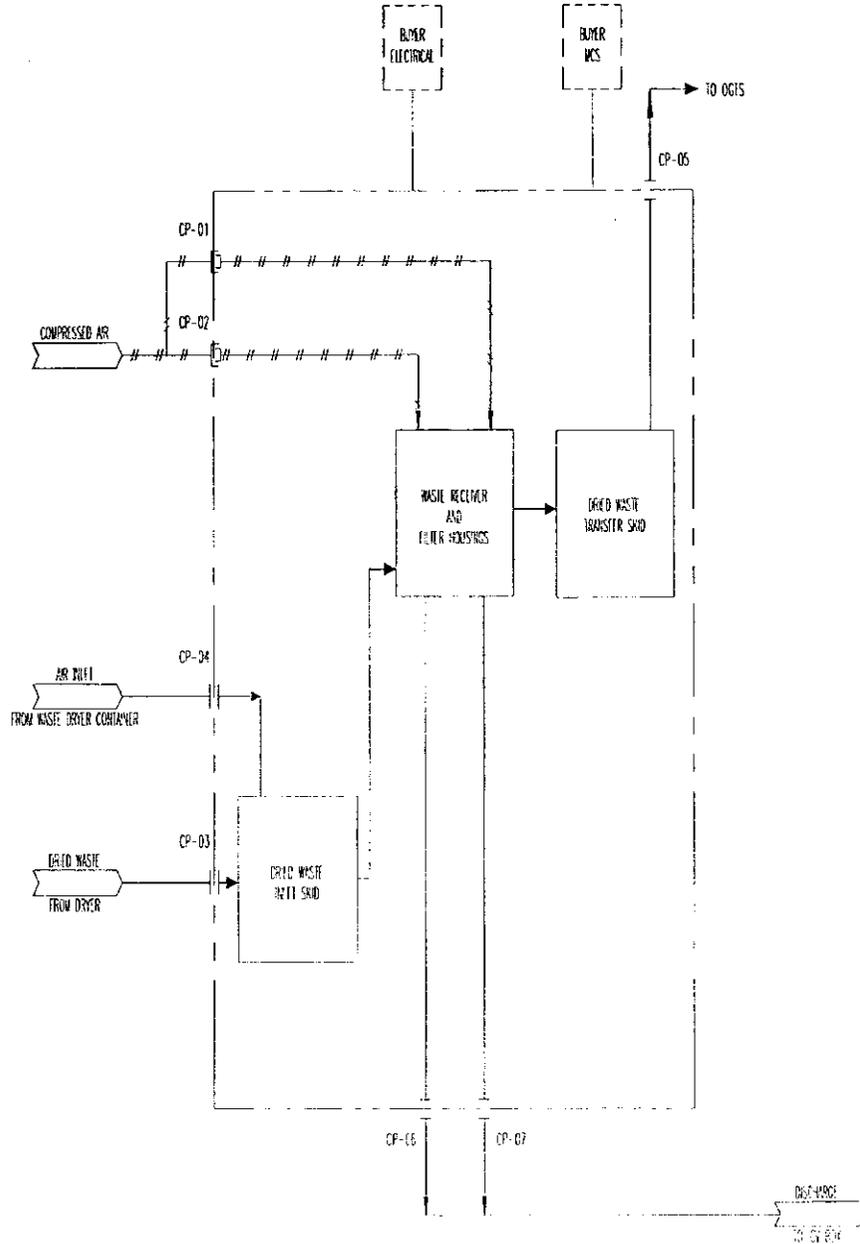


Figure 3-1: Dried Waste Transfer System Diagram



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3. CP-04: A 10-in. standard 150-lb raised-face flange for air inlet. The air inlet will draw through equipment that is not part of this scope consisting of two 12-inch in-line HEPA filters and an equivalent of 20 ft. of 10-in. pipe ducting.
4. CP-05: A 6-in. standard 150-lb raised-face flange air outlet to Off-Gas Treatment System. Static pressure in line at discharge of Dried Waste Transfer System blower is -80 in. w.c.
5. CP-06 and CP-07: A 10-in. standard 150-lb raised-face flange outlet from transfer system.
6. Electrical Interface: Since the electrically operative portions of the Dried Waste Transfer System are physically separate from each other, and motor starters and drives are remote, readily accessible electrical terminal boxes shall be provided to allow access to the 480V ac motor circuit conductors as shown on Sketch DBVS-SK-E105. Disconnect switches and local motor controls will be provided by others at the time of installation. If other power conductors are required (i.e., 120V ac power), the Seller shall provide a terminal box at each skid, as required, for access purposes. All terminals in terminal boxes shall be rated for 194 °F (90 °C). 25 percent space terminals shall be provided in all terminal boxes.
7. Installation Interface: The Dried Waste Inlet Skid shall have a minimum of four anchor points for installation on the concrete pad. Anchor points shall be shown on drawings with size and number clearly labeled. Proposed anchor points for the Dried Waste Transfer Skid shall be clearly shown on drawings for review by Buyer so that specific points can be located on Buyer's support structure.

3.2 CHARACTERISTICS

The characteristics (e.g., functional, physical, and environmental) that the dried waste transfer system must comply with to satisfy the requirements of this specification are described in the following subsections.

3.2.1 Functional Characteristics

The Dried Waste Transfer System shall be designed to pneumatically convey the dried waste at a maximum temperature of 250 °F or pure Hanford Site soil not



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exceeding the environmental conditions listed in Section 3.2.5 (Table 3-1) from the dryer to the ICV™ box. A summary of the material properties is presented in Appendix B.

The system shall be capable of transferring 16,000 lb/h (+10%, -0%). The waste/soil is to be lifted 17 ft from the base of the dryer to the top of the Ancillary Waste Transfer Enclosure. The dryer interface is 12 ft above the ground facing the ground. An expansion joint will be installed by the Buyer between the dryer interface and the inlet to the Dried Waste Inlet Skid. The inlet port on the ICV™ cover box is 29 ft above the ground facing up. See interface Sketch DBVS-SK-M107. While transferring, the waste transfer system will cycle between the two receivers above the ICV™ box.

3.2.2 Reliability

All Dried Waste Transfer System assembly equipment including, but not limited to, the piping, pumps and motors, casings, shafts, valves, filters, bearings, seals, and fasteners shall have a minimum service life of 2 years and a design life of 5 years.

3.2.3 Maintainability

Maintainability characteristics that affect the design (lubrication, parts replacement and repair, spares, modular construction, test points, etc.), shall be identified by the Seller and include, but are not limited to, the following:

1. Maintenance and Repair Cycles. Specify frequency requirements for maintenance of the components (e.g., scheduled maintenance every 40-operating hours).
2. Service and Access. Specify requirements for ease of service (e.g., access openings/spacing, self-test capability, inspection windows, test fixtures, sealed bearings). Include requirements for service (e.g., remove and replace only, bench repair, special tools, remote handling/maintenance). Include requirements for breakdown and storage of the system (e.g., drainage of piping, pressure relief before disconnect of fittings, de-energizing system). Adequate working space shall be provided around all electrical equipment in accordance with the NEC® (NFPA 70). Critical equipment, instrumentation, or high maintenance items shall be accessible for ease of inspection and removal and replacement. Adequate space and



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accessibility shall be provided for removal and replacement of individual instruments or equipment without removal of adjacent equipment. Valves, test points or ports, and calibration adjustments shall be accessible.

3. Decontamination. All components in contact with dried waste must be capable of being ultimately decommissioned, dismantled, and disposed of as radioactive waste. Components shall be installed to facilitate routine removal and cleaning as recommended by the component manufacturer. Attention shall be paid to eliminating crevices and obtaining smooth weldments through the entire process flow stream.
4. Spares and Spare Parts. Develop a list of recommended spares and spare parts.
5. Special Tools. The system shall facilitate maintenance with commercially available tools wherever possible. The Seller shall furnish all special tools unique to the Seller's equipment that are necessary for installation, startup, operation, maintenance, and adjustment of the equipment and accessories furnished by the Seller. The special tools become the property of the Buyer. If supplied, the Seller shall also provide a list of all special tools furnished, identifying the function of each tool and the specific item(s) for which the tool is used. The Seller shall indicate if the tool is required for assembly, disassembly, installation, startup, operation, maintenance, or adjustment. The Seller shall provide detailed drawings and procurement information for the special tools.
6. Maintenance Considerations. The design of the assembled system shall follow a minimum maintenance philosophy (i.e., selection of components should take into consideration potential maintenance in addition to other considerations). Components shall be designed to allow handling and maintenance by personnel outfitted in protective clothing, self-contained breathing apparatus, and gloves. Clean out ports shall be provided in locations determined by the Seller. Components shall also be designed so they can be removed and replaced in a modular manner.
7. Lock and Tag. Both mechanical and electrical systems shall be designed to be locked out and tagged during maintenance actions. Where applicable, the Seller shall identify on fabrication drawings those components which have a built-in feature that support the application of a lock and tag.



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8. Standardization. To the extent practical, common components shall be used to minimize spare parts, tools, and procedures. Fastener sizes, drive size, and type shall also be standardized to effect maintenance with a minimum number of tools.

3.2.4 Environment

The assembled system shall be designed to operate and be stored in the climatic and environmental conditions listed in Table 3-1.

Table 3-1: Operating System Environmental Conditions

Parameter	Environmental Condition^(a)
Ambient air temperature range	-25 to 115 °F with a maximum 24-h differential of 52 °F ^(b)
Relative humidity range	Near 0 to 100%
Maximum precipitation	2.5 in. in a 6-h period
Sand and dust concentrations	1.10 x 10 ⁻⁵ lbm/ft ³ with a typical size of 150 µm or less
Solar radiation	900 langley, distributed over a 12-h period
Heating and cooling basis wind factors	Derive from ASHRAE Fundamentals Handbook ^(c) for the Hanford Site

^(a) Unless otherwise noted, derived from HNF-SD-GN-ER-501, *Natural Phenomena Hazards, Hanford Site, Washington*, Revision 1B, Westinghouse Hanford Company, Richland, Washington.

^(b) The system is not expected to operate below 0 °F, but only provide freeze protection to this temperature.

^(c) *2001 ASHRAE Handbook – Fundamentals*, American Society of Heating, Refrigerating, and Air Conditioning Engineers, Atlanta, Georgia.

3.2.5 Transportability and Storage

The assembled system shall have a modular design to facilitate disassembly and relocation to the final destination at the Hanford Site.

1. The assembled system shall be capable of being moved by crane or truck without modifications.
2. Lift points shall be provided for the lifting and handling of equipment and components.



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3. The assembled system packaging shall support the contained equipment so it can withstand a 0.75-gravity (forward), hard-braking stop, and a rearward acceleration of 0.25 gravity, as well as, shock and vibration loads associated with transportation.
4. The assembled system and any accessories shall be sized for transport using local roadways and freeways (i.e., less than 8.5 ft wide, 53 ft long, and 14 ft tall).
5. The assembled system shall be stored and operated outside of an extended period of time, five years maximum, and will be exposed to the environmental conditions found at the Hanford Site as identified in Section 3.2.4.

3.2.6 Safety

The equipment shall be designed to maintain the safety of operators and the general public. The Seller shall provide all necessary guards, lockouts, and other safety equipment for safe operation as required under 29 CFR 1910.

3.3 DESIGN AND CONSTRUCTION

3.3.1 Parts/Materials/Processes

The Seller shall procure and use components with the characteristics listed in the data sheets provided in Appendix C. It is the Seller's responsibility to develop a complete data sheet for the components identified in the Seller's design drawings. Completed data sheets, as well as vendor information (catalog cut sheets, vendor drawings, etc.) for components shall be developed by the Seller. The Seller shall provide data sheets and catalog cut sheets for all components. The data sheet format shall be in conformance with the Buyer supplied forms contained in Appendix C (Electronic forms can be provided by the Buyer).

Component substitutions may be proposed by the Seller in the fabrication drawings for approval by the Buyer. Substitutions will be considered if a component is no longer available, or the proposed substitution improves the design, reduces cost, or improves the production schedule.

Only new parts and materials shall be used for the assembly. Used, surplus, or reconditioned parts and materials are prohibited.



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All components shall be installed in accordance with manufacturer's instructions. If conflicts arise with the specified components or component interfaces (line sizes, fittings, electrical requirements, etc.) during design and fabrication, they shall be brought to the attention of the Buyer for resolution.

No aluminum or "yellow" metals are to be used. No beryllium shall be present. Exposed polymer materials shall be constructed of anti-static materials. No asbestos shall be used.

Lead shall not be used unless the lead is fully encapsulated and identified with a permanent tag. Polychlorinated biphenyls shall not be used in the design of the assembled system.

3.3.1.1 Piping – Design

Piping systems shall be fabricated, inspected, and tested in accordance with ASME B31.3, Category D, piping code for "Normal Fluid Service." The minimum design pressure for the dried waste transfer system piping and components, including instrumentation, is to be determined by the Seller and reviewed by the Buyer. The Seller shall develop drawings showing pipe routing consistent with the requirements of this specification.

Erosion of the transfer piping is of special concern. The abrasiveness of the actual dried waste/soil mixture cannot be accurately predicted through simulant testing. Consequently, to maximize service life, the transfer piping wall thickness shall be schedule 80.

3.3.1.2 Piping – Pipe and Equipment Supports

The Seller is responsible for developing drawings and calculations for pipe and equipment supports for the assembled system. For piping and equipment that is mounted on one of the two skids, the Seller shall provide detailed fabrication drawings of the required piping and equipment supports, including welding details, and then use this information for the fabrication of the skids. For the interconnecting piping and waste receiver and filter housings that will be support by attachment to the Buyer's structure, the Seller shall provide detailed fabrication drawings for supports that the Buyer will use for fabrication and field installation.



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Pipe supports shall be capable of supporting the piping in all conditions of operation and shipment. The supports shall allow free expansion and contraction of the piping and prevent excessive stress resulting from transferred weight being introduced into the piping and connected equipment.

The Seller shall level-plumb piping on skids using shims, etc., to support the pipe and to avoid forced piping deflections at support points.

3.3.1.3 Piping Materials

Piping components (e.g., fittings and fasteners) shall be listed components in accordance with ASME B31.3 (Table 326.1). Pipe material shall be traceable to an ASTM standard and be a listed component as stated in ASME B31.3 (Table 326.1).

The Seller shall select materials based on acceptable lifetime performance of materials subjected to the chemical and radiation exposures described in this specification. Exposed polymer materials shall be constructed of anti-static materials. Material selection shall be identified in the Seller documents to the Buyer.

Material type and grade shall be clearly identified on the Bill of Materials. Certified Material Test Reports (CMTR) are required for all materials and components coming in contact with the waste. Pipe flange bolting and pipe support materials for the waste fluid piping shall also have CMTRs. The Seller shall identify any materials that do not have CMTRs for review and approval. CMTRs are not required for electrical materials, components or accessories, insulating materials, gaskets, or seals. Copies of Certificates of Conformance (CoC) shall be provided for all materials not having CMTRs. CMTRs are required for all materials normally.

The Seller shall provide CMTRs and CoCs for review.

3.3.1.4 Structural Materials

3.3.1.4.1 Weld Studs

Weld studs shall be metallurgically compatible with the material in which they are welded.



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3.3.1.4.2 Carbon-Steel Plate and Sheet

All carbon-steel plate shall be general purpose, hot-rolled, low-carbon steel in accordance with ASTM A 36/A 36M. Carbon-steel sheet shall be provided in accordance with ASTM A 569.

3.3.1.4.3 Carbon-Steel Shapes

Carbon-steel structural shapes shall conform to the requirements of ASTM A 36/A 36M.

3.3.1.4.4 Carbon-Steel Bars and Rods

Carbon-steel bars and rods shall conform to ASTM A 108 with a minimum yield of 36,000 psi and maximum carbon content 0.35 percent.

3.3.1.4.5 Carbon-Steel Structural Rectangular Tube

Structural carbon-steel, rectangular tubing shall conform to the requirements of ASTM A 500, Grade B.

3.3.1.5 Fasteners

The Seller shall ensure that suspect or counterfeit fasteners and components are not used. Suspect fasteners can be identified by the following inspection methods:

1. Head markings are marred, missing, or appear to have been altered;
2. Threads show evidence of dressing or wear (threads should be of uniform color and finish);
3. Head markings are inconsistent within a heat lot; and
4. Head markings matching one of those identified on the U.S. Customs Service Control of Suspect/Counterfeit Items (0).

No fasteners shall be capable of vibrating loose under operating conditions. All such joints should be tack welded or have some equivalent means of ensuring



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they remain intact. Double-nutting is not an acceptable method of securing fasteners. Low-chloride, Loctite® threadlock may be used where applicable.

3.3.1.6 Electrical – Design and Component Selection

3.3.1.6.1 General

The electrical installation shall meet the requirements of the NEC® (NFPA 70), as administered by the CH2M HILL Hanford Group, Inc. (CH2M HILL) electrical inspector.

Electrical equipment shall be listed or labeled by a Nationally Recognized Testing Laboratory (NRTL), such as Underwriters Laboratories, Inc. (UL), when a category exists. Note: NRTL's are listed on the Occupational Safety and Health Administration website at <http://www.osha-slc.gov/dts/otpca/nrtl/index.html>. It is the Seller's responsibility to ensure the listing is appropriate for the equipment specified.

It is the Seller's responsibility to obtain a listing or label for equipment without a listing or label by a NRTL.

When a listing or label can not be obtained, it is the Seller's responsibility to provide equipment critical characteristics, engineering data, and test data for the Buyers engineer to evaluate the acceptance of the product.

Any component, equipment, assembly, or system without a NRTL listing or label shall be subject to the approval of the CH2M HILL electrical inspector.

Where NEC® inspection is required, the Seller shall arrange for a CH2M HILL NEC® inspection to occur at the Seller's facility before shipping any assembly not covered in whole by a NRTL listing or label. The Seller shall perform modifications as required by the NEC® inspector before shipping.

Cabinets containing assembled control systems shall be designed, constructed, and listed or labeled to UL 508A, as applicable.

Design and operation of the assembled system shall meet the requirements of IEEE Std 142.



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A permanent plaque or directory shall be installed at each feed and branch circuit disconnect location denoting all other services, feeder or branch circuits supplying the skid.

3.3.1.6.2 Electrical – Grounding

1. All power circuits shall include a ground wire that serves as the equipment grounding conductor, independent from the neutral wire. All powered devices shall be connected to the ground circuit wire. In addition, the skid frames, enclosures, raceways, covers, and enclosure doors shall be attached to the respective skid electrical ground. This may be accomplished by means of a screw, lock washer, and ring connector attachment at a spot where all paint and surface corrosion has been cleaned from the frame. The frame shall not be used as a current carrying conductor between devices. See Sketch DBVS-SK-E105 for grounding diagram.
2. Ground wires shall be green-insulated or bare-stranded copper wire.
3. Ground conductors shall be unspliced and continuous between termination points. Ground distribution shall be through terminal blocks or a ground bus. Wire nuts or butt splices are not acceptable.
4. The resistance between the main ground connection for each skid and any point in the ground circuit shall be less than 0.1 ohm as measured with a calibrated ohm meter.
5. The instrument ground circuit shall be separate and isolated from the power ground circuit to the extent allowed by the NEC® (NFPA 70). The requirements for the instrument ground circuit installation are the same as the power ground requirements given above.

3.3.1.6.3 Electrical – Enclosure Wiring

All enclosure wiring shall be routed, harnessed, appropriately faced, or in plastic wiring ducts. Where possible, all electrical penetrations into cabinets shall be from the bottom of the cabinet.



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3.3.1.6.4 Electrical – Instrument Enclosures

Exposed live parts and contacts (greater than 50V) in enclosures shall be guarded to prevent unintentional contact during maintenance activities. Door-mounted equipment shall be constructed or shielded so that no live parts will be exposed to unintentional contact when the door is open.

3.3.1.7 Electrical Materials

3.3.1.7.1 Conduit

1. Rigid galvanized steel conduit shall be used in accordance with the NEC® (NFPA 70). The conduit shall be NRTL-approved, standard weight, 1/2 in. minimum size for control wiring and 3/4 in. minimum size for power wiring.
2. Liquid-tight flexible conduit shall be installed where flexible conduit is required or where connecting to vibrating loads. Liquid-tight flexible conduit shall be grounding type with a polyvinyl chloride jacket.
3. Conduit fittings shall be approved for this purpose.

3.3.1.7.2 Wire and Cable

1. Conductors shall be stranded copper for all sizes of wire and cable unless specifically designated otherwise on the drawings. All wire and cable shall be NRTL-listed.
2. Wire insulation shall be THHN/THWN for all 600V conductors.
3. Minimum size of power conductors, 600V and below shall be No. 12 American wire gauge (AWG).
4. Conductors for control circuits shall be No. 14 AWG minimum, except that remote control circuits, signaling circuits, instrumentation, and power limited circuits may be sized smaller in accordance with the NEC® (NFPA 70).
5. Outdoor enclosures shall be rated a minimum of NEMA 3R.
6. Power wiring shall have color-coded insulation as indicated in Table 3-2.



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Table 3-2: Wire Color Coding Requirements

Service, Feeder, or Branch Circuit	Conductor	Insulation Color	Insulation Type
480Y/277V ac, 3-phase systems	Phase A	Red	THWN/THHN or XHHW
	Phase B	Yellow	
	Phase C	Blue	
	Neutral	White or Gray	
	Equipment Grounding Conductor	Green (or bare)	
208Y/120V ac, 3-phase systems	Phase A	Black	THWN/THHN or XHHW
	Phase B	Purple	
	Phase C	Brown	
	Neutral	White or Gray	
	Equipment Grounding Conductor	Green (or bare)	
120/240V ac, 1-phase systems	Hot No. 1	Black	THWN/THHN or XHHW
	Hot No. 2	Brown	
	Neutral	White or Gray	
	Equipment Grounding Conductor	Green (or bare)	

7. Instrumentation cable shall be 600V, multipair for analog signals, multiconductor for discrete signals, flame retardant, jacketed cable suitable for installation in wet or dry locations. Conductors shall be No. 18 AWG or larger stranded, copper, in twisted pairs or triads with ethylene propylene insulation. Each pair or triad shall be shielded with a drain wire and metallic tape. Multipair cables shall have an individual shield and an overall shield of metallic tape and drain wire. Conductor color coding shall be black, white, and red if triad. Temperature rating shall be 90 °C. Each pair or triad shall be numbered for simplified termination.
8. Control and power multiconductor cable shall be 600V, flame resistant, jacketed cable suitable for wet or dry locations. Conductors shall be

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stranded copper with ethylene propylene insulation with a temperature rating of 90 °C.

3.3.1.7.3 Electrical Wire/Cable Markers

Conductors shall be identified with white heat-shrink tubing with indelible black typed-on letters. Hand-lettered labels shall not be used.

3.3.1.8 Drawings

The Seller shall develop drawings that detail how the specified parts and materials will be assembled to meet the requirements of this specification. The drawing package shall include detail fabrication drawings, assembly drawings, arrangement drawings, general electrical drawings, electrical wiring and conduit schedule, and final as-built drawings. Drawings shall have a parts and materials list, as applicable, that clearly identifies quantity, manufacturer, the part or model number, material type and grade, electrical characteristics, size, and general descriptions. Drawings shall include dimensional layouts, dimensioned subassemblies, dimensioned component details (if not included on manufacturer's cut sheets), flow and electrical diagrams, material and fastener sizes, descriptions, weld symbols, and notes. The arrangement drawings shall provide weight and center of gravity locations for the overall assembly as well as for major subassemblies (e.g., skid-mounted equipment within a larger assembly or large equipment moved and mounted as a unit).

The assembled system shall be designed to comply with the piping and instrumentation diagram (P&ID) and include all components specified on the P&ID. If conflicts arise between the proposed design and the P&ID, they shall be brought to the attention of the Buyer for resolution. Any changes from the approved drawings shall be identified to the Buyer using the Request for Information form for review of the change. The change shall then be controlled by the Seller to ensure the fabrication drawings are properly updated to incorporate the change. Final as-built drawings shall be prepared by the Seller at the conclusion of fabrication and testing.

Drawing size shall be per ANSI Y14.1. Parts and materials list shall include quantity, manufacturer, the part or model number, material type and grade, electrical characteristics, size, and general descriptions. All component parts shall refer to applicable material specifications, such as the military, ASME,



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ASTM, federal, or other specifications. As-built drawings shall be verified in accordance with Quality Assurance (QA) Program Controls before submittal.

Drawings shall be prepared using AutoCAD® compatible drafting software. A copy of all as-built drawing files (one of which shall be an electronic AutoCAD® release 2000 or higher compatible file format) shall be included in the final drawing package. Drawings shall use the ROMANS AutoCAD® text font and the minimum text height shall be 1/8 in.

3.3.1.9 Material Control Process

The Seller shall develop a material control procedure to be used in the execution of the work. The material control procedure shall address procurement controls, segregation, and traceability of materials including weld filler rod from receipt at the shop through processing.

3.3.1.9.1 Exposure of Stainless Steel to Chloride Materials

Stainless steel shall not be in contact with materials containing more than 250-ppm chlorine. Low-chloride markers shall be used. Chlorinated solvents shall not be used to clean stainless steel.

3.3.1.9.2 Contact of Stainless and Carbon Steel

Contact between carbon steel and stainless steel shall be avoided during fabrication. Temporary carbon-steel clamps, supports, braces, and fixtures shall not come into direct contact with stainless-steel surfaces. Galvanized-steel clamps or fixtures may not be used on stainless-steel piping or components. Wire brushes shall be stainless steel. Grinding wheels and wire brushes shall be new or used previously on stainless steel only.

3.3.1.10 Welding Process

Welding of all piping shall be performed in accordance with ASME B31.3, Category D, piping code for "Normal Fluid Service." Certified welders shall perform welding of all structural steel in accordance with AWS D1.1/D1.1M for carbon steel or AWS D1.6 for stainless steel. Welding for sheet steel shall be in accordance with ANSI/AWS D1.3. Welding Procedures, Procedure Qualification Records, and Welder Procedure Qualification Records, visual and nondestructive examination (NDE) procedures shall be submitted for review and approval.



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3.3.1.10.1 Welding Procedure Requirements

All welding shall be performed in accordance with the Seller's approved Welding Procedure Specifications. Each Welding Procedure Specification shall be qualified with a Procedure Qualification Record as required in ASME B&PV Code, Section IX; AWS D1.1/D1.1M; AWS D1.6; or ANSI/AWS D1.3; as applicable.

Welding of all stainless steel including, but not limited to, structural shapes, rectangular tubing, plate, and sheet shall be performed in accordance with AWS D1.6 nontubular, statically-loaded conditions. Welding of stainless-steel or carbon-steel piping shall be performed in accordance with the ASME B31.3 piping code for "Normal Fluid Service." Automatic pipe welding equipment and techniques may be used.

Welding of all carbon steel including, but not limited to, structural shapes, rectangular tubing, plate, and sheet shall be performed in accordance with AWS D1.1/D1.1M nontubular, statically-loaded conditions.

Welded connections on the lifting components shall be 100 percent visual and 100 percent Dye-Penetrant Test or Magnetic-Particle Test inspected. If a weld is in a radioactive material boundary (e.g., process piping), then these welds will require a minimum of a visual inspection and additional NDE (dye penetrant, magnetic particle, or x-ray, as appropriate).

3.3.1.10.2 Weld Joints and Preparation

Weld joints are as permitted by the referenced standards. Weld joint design, as noted on the fabrication drawings, shall be sent to the Buyer for review and approval before fabrication.

Post-weld heat treatment of carbon-steel piping is not required.

3.3.1.10.3 Weld Repairs

Weld defects shall be removed and repaired as allowed by the referenced welding standards. The original Welding Procedure Specification shall be used for weld repair. Welds that fail examination shall not be ground out and repaired more than twice before the section is abandoned and replaced.



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3.3.1.10.4 Welding Materials

The weld filler material shall be as specified in the approved Welding Procedure Specification.

3.3.1.10.5 Weld Map

All welds (including typical welds) shall have unique numbering listed on a weld map(s). The weld map(s) shall include the weld number, weld procedure number, filler material control number, welder identification, NDE procedure number, and examiner identification. Individual weld maps are to be provided per component when multiple components are produced.

Weld identification shall be performed as follows:

1. Prepare weld identification drawings, isometric or spool, which show relative position of pressure containing welds and attachment welds to pressure retaining components.
2. Assign weld numbers to pressure-containing welds and attachment welds to pressure-retaining components as made. Record weld numbers on weld identification drawings as welds are made.
3. Place the welder bonder identification symbol and weld number adjacent to welds on completion. Place the identification symbol approximately every 3 ft on long seams or large welds.
4. Do not reuse weld numbers. If a weld is completely replaced, assign a new number.
5. Show heat and lot numbers on weld identification drawings for materials requiring CMTR.

Weld identification documentation shall be submitted to the Buyer for review and approval.

3.3.1.11 Fabrication Travelers

The Seller shall prepare fabrication traveler(s) for the fabrication and testing of the assembled system. The fabrication traveler(s) shall include detailed



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procurement, fabrication, assembly, cleaning, examination, inspection, testing, packaging, shipping, and handling steps required to properly fabricate, assemble, and test the equipment in accordance with the drawings and specifications.

3.3.1.12 Monitoring and Control System

The MCS is not part of this contract; therefore, the Seller shall provide two or more termination panels that the Buyer will use to access components on the assembled system. The termination panels shall be rated for outside environmental condition, shall be easily accessible for maintenance; and shall meet NEC® (NFPA 70) requirements for working clearances. The exact location of the panels will be determined based on minimization of wiring, internal skid interferences, and external connection routing.

Only local instruments and components are required to be wired and terminated to the termination panel. The local instruments and components¹ shall be routed in conduit and terminated at the local termination panel. Terminations shall be tension-clamp terminals capable of individual replacement (i.e., DIN rail mounted). An example is a Weidmüller® type WDU. Alternating current power and alternating current/direct current inputs shall be physically separated.

The normal field voltages from or to the MCS is 24V dc, which enhances personal safety during maintenance. Over 50V represent hazardous voltage which should be avoided unless authorized by the Buyer. This does not apply to equipment that requires 120V ac, but with low voltage interfaces to the MCS.

The Seller shall prepare an interface panel wiring to instrument/component drawing. See Figure 3-2 as an example.

Twisted shielded pair with a minimum wire size of No. 18 AWG shall be used for analog instrument signal wiring. Individual wires shall be labeled for the destination with the cable being labeled with both FROM and TO information (see 0).

¹ Instruments shown on the drawings with a box around the symbol are Monitoring and Control System virtual displays or controls, and require no action by the Seller.



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3.3.1.13 Instrument Calibration and Characteristics

All instrument transmitters shall provide an isolated 4-20-mA-signal to the MCS, unless a different output is required for the process. Justification shall be clearly indicated on the completed Component Data Sheet. All pneumatic control valves shall accept a 24V dc control signal from the MCS and provide position indication to the MCS. All remotely operated discrete valves shall have open and closed position switches. Interface connections shall be through wire termination points on the instruments. Instruments, tubing, piping, and wiring shall be installed in accordance with the instrument manufacturer's recommendations and the best practice for the industry. Purchasing and installation of the MCS input/output modules are not included in this contract. Locally indicating instruments/sensors shall be installed such that they are easily readable by an operator. The Buyer shall provide guidance with positioning based on best available knowledge of the configuration.

All instruments shall be factory-calibrated and a Calibration Data Package shall be provided including a Certificate of Calibration traceable to the National Institute of Standards and Technology (NIST), for each article contracted. In addition, the actual Calibration Records for each instrument shall also be included containing the instrument identification, accuracy requirements and results, and the as-found and as-left data.



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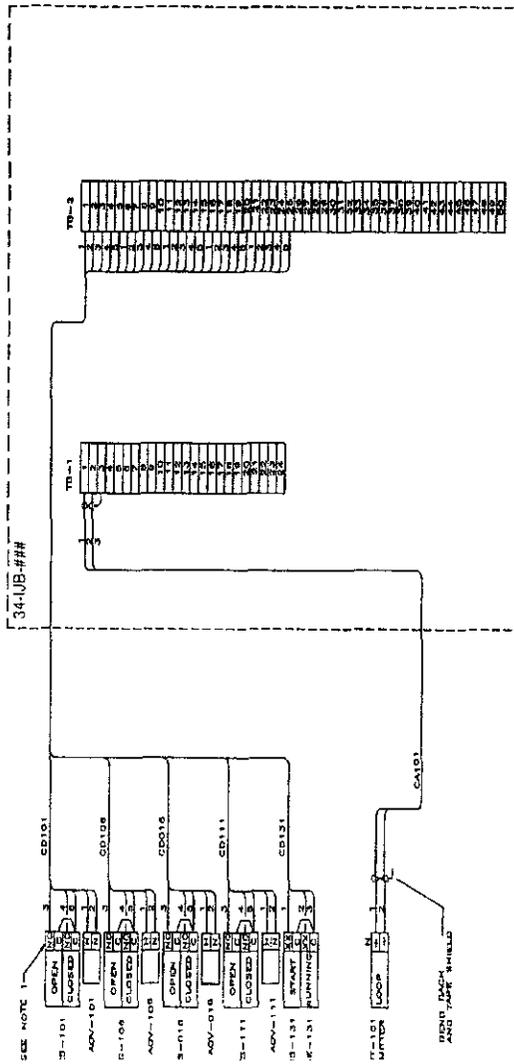


Figure 3-2: Interface Panel Wiring to Instrument/Component Drawing (Example)



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Each calibration certificate shall be signed by the Seller's representative responsible for calibration, attesting to its authenticity and shall be identified with the:

1. Buyer's contract number,
2. Identification of the article to which the certificates applies, and
3. Standards used for calibration.

The Certificates of Calibration will be held on file by the Buyer's Records Management as objective evidence to support the actual test results and attest to the fact that the calibrated item(s) met requirements.

Certification stating the equipment furnished to the contract requirements has been calibrated using standards whose calibration is traceable to the NIST or other documented evidence, must be submitted stating the basis of the calibration. In addition, the Seller shall submit a report of actual calibration results. The report shall be identifiable to the acceptance criteria of the items submitted and shall meet contract requirements. The report shall contain the signature of the authorized representative of the agency verifying compliance. One copy of the documentation, unless otherwise specified, shall accompany the applicable item(s) shipped.

The Seller shall provide Instrumentation types and manufacturer to the Buyer for approval before purchase of the instrument. Recommended field recalibration procedures shall also be provided in the final data package along with a list of special tools required for recalibration.

Component data sheets for the process instrumentation are provided in Appendix C.

3.3.1.14 Workmanship

General: Remove all burrs and break all sharp edges.

1. Drawings:
 - a. Dimensioning and tolerancing shall be interpreted per ANSI Y14.5M and



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b. Tolerances not specified on drawings shall be as shown in Table 3-3.

Table 3-3: Standard Drawing Dimension Tolerances

Dimension	Tolerance
Fractional	$\pm 1/16$
One Decimal Place	± 0.1
Two Decimal Places	± 0.06
Three Decimal Places	± 0.030
Angular	$\pm 2^\circ$

2. Welding to ball valves:
 - a. Ball valves shall be disassembled before welding to the valve body.
3. Piping and components:
 - a. Pipe flange and flange faces shall be within $\pm 2^\circ$ of vertical or horizontal, whichever is appropriate;
 - b. Pipe flange bolt holes shall straddle centerlines;
 - c. Material and debris shall be removed from piping and components before welding/assembly; and
 - d. Secondary containment flanges shall be flat.

3.3.2 Industry and Government Standards

The codes, standards, and source documents that provide the design fabrication and testing requirements are listed in Section 2. Sections within this specification provide specific details or reference for application of the codes and standards documents. Conflicts found between the referenced codes and standards will be referred to the Buyer for resolution.

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3.3.3 Radiation**3.3.3.1 Electromagnetic Interference/
Electromagnetic Compatibility**

The equipment shall be designed in accordance with the limits set forth in HNF-2962 as summarized in the following subsections.

3.3.3.1.1 Unintentional Radiators

Equipment shall comply with the emission limits specified in 47 CFR 15, Subpart B. The Seller must provide certification that the emissions from equipment or the device are within the limits specified in 47 CFR 15 or an Federal Communications Commission-accepted international standard.

3.3.3.1.2 Radio Frequency Interference Susceptibility

Applicable equipment shall be tested and evaluated for the immunity to radio frequency interference from portable communications equipment. The testing method and procedure for testing process instrumentation are found in IEEE Std C37.90.2.

Since the frequencies of interest are in the bands of 120 to 190 MHz and 420 to 480 MHz, the equipment shall be evaluated from 20 to 1,000 MHz. The electric field intensity of 30V/m shall be used for testing.

3.3.3.1.3 Equipment Alternating Current Mains Surge Protection

Applicable equipment shall be designed to withstand the surge waves specified in IEEE C62.41.1 and IEEE C62.41.2. The equipment shall be type tested by the manufacturer in accordance with this standard, and certification provided by the Seller.

3.3.3.1.4 Electrostatic Discharge Protection

The system or individual parts of the system shall not be damaged and shall continue to function after being subject to electrostatic discharge on operating panels and other controls normally available to operating personnel. The manufacturer shall provide certification that electrostatic discharge testing was performed according to the methodologies found in ANSI C63.16. The test



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voltage should be at least 4 kV. ANSI C63.16 provides additional references to selecting the proper voltage ranges to be used.

3.3.3.2 Nuclear

All materials of fabrication shall be evaluated to be able to operate without loss of service while exposed to the maximum estimated unshielded contact radiation dose (10,000 R for dried waste contacting components and 1,000 R for nonwaste contacting components) based on a 5-year design life.

3.3.4 Cleanliness

Before assembly, and before preparing for shipment, all components shall be cleaned by flushing with clean water (or just air if deemed appropriate by the Seller) and blown clean and dry with compressed air to the extent that extraneous materials, such as those listed below, are not present:

1. Metallic or other dusts (shop dust), chips, turnings, and weld splatter;
2. Abrasive particles;
3. Rust and other loose corrosion particles;
4. Magnetic and liquid penetrant residues, dye check, etc.;
5. Foreign material (i.e., paper, tape, plastic, sand, and wood);
6. Cutting oils;
7. Excess lubrication, grease, and oil; and
8. Marking dyes.

3.3.5 Corrosion of Parts

Stainless-steel components do not require painting except as required for identification or other markings. If used, paint on stainless steel shall be epoxy-phenolic. Solvents and cleaning solutions used on stainless steel for paint preparation shall be chloride free.



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All exposed surfaces of carbon steel shall be protected from corrosion by priming and painting (see Section 3.3.6 for protective coating requirements).

To the extent practical, connections between dissimilar metals shall be avoided.

3.3.6 Protective Coatings

Protective coatings shall be used on equipment in order to meet reliability and maintainability requirements; to protect equipment from environmental conditions; and to provide a clean, smooth surface for decontamination. The weldments shall be completed and painted entirely before installation of piping and components on the frames. Care shall be taken to protect the paint during equipment installation. Touch-up shall be performed to repair defects after the equipment installation is completed. Protective coating specifications shall be prepared by the Seller. All exposed carbon-steel surfaces shall be painted manufacturer's standard color.

3.3.6.1 Painting Preparation

The Seller shall prepare all surfaces in accordance with the manufacturer's instructions. Painting shall be performed in a clean, well-ventilated area separated from airborne particulates generated by shop operations.

3.3.6.2 Primer

The Seller shall use standard zinc-rich primer for carbon-steel structures or piping. Precoated or stainless-steel pipe support components do not require painting.

3.3.6.3 Paint

1. The Seller shall use a standard top coat compatible with the primer for finish coats on carbon-steel structures or piping.
2. Precoated or stainless-steel pipe support components do not require painting.



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3.3.6.4 Paint Application

Paint application shall be in accordance with manufacturer's instructions. Special attention shall be paid to crevices, weld lines, corners, and edges to obtain film thicknesses to meet manufacturer recommendations. Care shall be taken when painting so that motor nameplates, lifting eyes, or lifting swivel nameplates are not covered.

3.3.7 Interchangeability

The Seller shall specify the assembly level at which components shall be interchangeable or replaceable. This is a design consideration to be reflected on the design drawings and/or supporting documents (such as calculations and analyses).

3.3.8 Identification and Marking

Component identification labeling shall be performed in accordance with the following guidelines and shall match the final P&ID or electrical one-line diagram for the assembled system. Clearly mark and identify any components that are required to be removed before installation of the assembly at Buyer location (e.g., shipping blocks). The markings on all motors shall be in accordance with the NEC® (NFPA 70) and NEMA MG-1.

3.3.8.1 Equipment Labeling

The Seller shall label all equipment in accordance with this specification. Equipment to be labeled shall include, as a minimum:

1. Valves and dampers;
2. Instruments and gauges, pumps, motors, tanks, compressors, and filters;
3. Label external valves;
4. Motor controls centers, power panels, instrument enclosures, and switches;
and



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5. Junction boxes shall follow the labeling convention below:
 - a. Instrument (24V dc): 34-IJB-###
 - b. Electrical (110V ac): 34-EJB-###
 - c. Power (480V ac): 34-PJB-###

Only the Equipment Identification Number (EIN) is required to be on the tag. Tags shall be 1-3/8 in. by 2-3/4 in. minimum and use 3/16-in.-high black text on white background. The tags shall be plastic and have at least a single hole for attaching to components.

Tags shall be attached to components without a flat surface using a nylon tie wrap. Tags shall be attached to components with a flat surface using clear silicon rubber adhesive. Equipment tags shall be located where they are readily visible and not subject to damage or accidental removal during equipment operation. Tags shall be suitable for the environment on which they are installed.

3.3.8.2 Piping Labeling

Piping shall be marked with arrows to denote fluid flow direction and text to denote fluid type conveyed. The fluid conveyed shall be marked as "DRIED WASTE," "COMPRESSED AIR," or "EXHAUST," as applicable. Text shall be all capital letters. The label background and lettering colors shall be per the following list.

1. Process fluid piping shall be yellow field with black letters,
2. Compressed air piping shall be blue field with white letters,
3. Air stream ductwork shall be yellow field with black letters, and
4. Labels shall be made from self-sticking polyester or vinyl (Electromark® part number P400 series of Buyer-approved equal). For pipes that are less than 3/4 in. in diameter, the label size and lettering shall be appropriately sized to the size of the pipe. For pipe that is greater than 3/4 in. in diameter, lettering shall be in accordance with Table 3-4.



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Table 3-4: Pipe Labeling Format

Pipe Outside Diameter (minimum) (inch)	Pipe Outside Diameter (maximum) (inch)	Length of Color for Field for Pipe Marker (inch)	Size of Letter for Legend (inch)
0.75	1.25	8	0.5
1.5	2	8	0.75
2.5	6	12	1.25
8	10	24	2.5
10	—	32	3.5

5. The labels shall be placed on pipes in the location most readable from the operator's normal viewing position.
6. Piping labels shall be placed before and after each valve and piping joint.

3.3.8.3 Wire and Cable Labeling

All wires and cables shall be labeled at both terminations with the identification shown on the Seller-developed fabrication drawings. Labels for instrumentation wire and cabling shall follow the convention in 0. Wire label material requirements and color coding are given in Table 3-2.

3.3.8.4 Terminal Labeling

Terminal block label tags shall be a durable plastic material. The tag color shall be white background with black lettering. Each terminal on the terminal block shall be labeled with a clearly visible terminal number. Numbered terminal block covers may be used for this purpose.

The tag may be mounted on a surface of the enclosure in close proximity of the terminal block. Tags shall be attached securely by means of durable stranded stainless-steel cable, clamps, or chains.



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3.3.8.5 Conduit Labeling

1. All conduits shall be labeled with the identification tag on the contract drawings and the highest voltage contained in the conduit as in the following example:

E-123 - 110 VAC 1PH

2. The minimum letter height shall be 1/4 in. The label length shall be as long as required to contain the required information. The label color shall be white background with black lettering. Text shall be all capital letters. The labels shall be a durable material that is permanently secured to the conduit by an adhesive or mechanical means. The label may be metallic or plastic. The label shall be affixed securely in place in a manner to prevent their loss, damage, slippage, or accidental removal. However, the means used to mount the label should permit its removal when necessary without damage to the surface to which it was attached.

3.3.8.6 Labeling of Handling and Lifting Devices

All equipment that is designed to be mechanically lifted shall have marked lifting points and be marked with the lifting weight. Lift points shall be identified with yellow paint. All specialized lifting devices shall be marked in accordance with DOE/RL-92-36, as follows:

1. Structural and mechanical below-the-hook devices shall be provided with identification displaying the following data, as a minimum:
 - a. Rated load,
 - b. Manufacturer's name,
 - c. Lifting device weight (if over 100 lb),
 - d. Drawing number (if applicable), and
 - e. Serial number (if applicable).



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2. The identification data may be displayed on a nametag, nameplate, metal stamp, or other permanent marker. If the lifting device comprises several lifting devices that can be detached from the assembly, these individual lifting devices shall be marked with their individual load rating also.

3. Clearly mark and identify any components required for removal before equipment installation (e.g., shipping blocks).

3.3.9 Nameplates

The assembled system shall have a Seller-provided nameplate with the following minimum information: project number, purchase order number, assembly name and number (provided by the Buyer), assembly weight, and this specification number (including revision).

3.3.10 Human Engineering

Human factors engineering principles and criteria shall be integrated into the design of systems and the facilities that house and support these systems. Operator movements and accessibility of equipment and controls in the work area shall be considered, and practical access to each system component for operation and maintenance shall be provided.

3.3.11 Qualification

The drawings, calculations, and associated design media shall show full compliance with this specification and Buyer-approved exceptions or modifications. Portions of drawings originated by others, such as as-built vendor information on P&IDs, shall be clearly identified.

To obtain approval for the design of the fabricated system the Seller shall perform the following:

1. Prepare calculations required by this specification and document how the results of the calculations were incorporated into the design and fabrication drawings (e.g., adequacy of pump to meet calculated demand, selection of weld size to meet structural requirement).



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2. Identify those materials and/or components that require a CMTR or CoC. At a minimum, CMTRs are required for process piping and all material that provides a structural support function (e.g., struts, plate, pipe fasteners).
3. Prepare complete data sheets and obtain vendor cut sheets for major components of the assembled system. At a minimum, the set of major components shall be those shown on the P&ID (valves, instruments, equipment, etc.). This information package will be used to evaluate how the Seller has evaluated the form, fit, and function of components for their intended use as shown on drawings and in supporting calculations.

3.3.11.1 Structural Calculations

In general, equipment and structures shall be analyzed and designed in accordance with UBC (1997) and ASCE 7-98, as the minimum requirements. The loads and load combinations used in the analysis shall be as defined in UBC (1997) or other national codes and standards, as referenced in this section or as otherwise defined in this specification. In addition, the Hanford Site-specific design requirements are included as part of this specification and shall be incorporated in the analysis, as applicable, in determining the loads, load combinations, and allowable stresses to which the equipment or structures shall be designed.

Calculations shall demonstrate that equipment will withstand applied loads without loss of integrity or release of radioactive/hazardous material.

3.3.11.1.1 Dead Loads

Dead loads include the weight of all permanent materials and equipment, including the assembled system equipment weight, with and without the weights of fluids and materials being handled.

The unit weights of material and construction assemblies shall be those given in ASCE 7-98. Where unit weights are neither established in that standard nor determined by test or analysis, the weights shall be determined from data in Seller design and fabrication drawings or from catalog cut sheets.



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3.3.11.1.2 Live Loads

Live loads are those loads produced by the use and occupancy of the unit and do not include construction and environmental loads such as wind load, snow load, rain load, earthquake load, flood load, or dead load. Live loads are produced by operations, maintenance workers, and equipment.

1. Live loads shall be not less than the minimum uniform load or concentrated load stipulated in ASCE 7-98.
2. The minimum roof design live load shall be 20 lb/ft² (includes ashfall).
3. The weight of service equipment that may be removed with change of use of a given area shall be considered as live load.

3.3.11.1.3 Earthquake Loads

Earthquake induced design loads, as a minimum, shall comply with the UBC (1997) Seismic Zone 2B for essential facilities. The structural response may be determined using the methods of UBC (1997), with an importance factor, $I_p = 1.5$ for structures, systems and components and seismic zone factor, $Z = 0.2$.

The soil profile type as defined by UBC (1997) (Section 1636.2) is SC.

3.3.11.1.4 Snow Loads

Snow loads for the equipment shall be in conformance with ASCE 7-98. A ground snow load, P_g of 15 lb/ft² shall be used for calculating roof snow load. Unbalanced snow loads resulting from drifting or sliding shall be considered. Snow loads, full or unbalanced, shall be substituted for roof live loads where such loading results in larger members or connections.

3.3.11.1.5 Wind Loads

The equipment shall be designed to resist pressures from wind from any direction. Partial wind loading shall be considered if it produces a more severe effect. Wind load design shall comply with ASCE 7-98, using the 85 mph "3-second gust wind velocity" with an importance factor of 1.15 and Exposure Category C.



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3.3.11.1.6 Ash Loads

An ash loading of 5 lb/ft² shall be considered in the design of equipment or support structures exposed to the elements. The ash loading shall be evaluated using the load combination, $S = D + L + A$ in addition to other load combinations, defined by the referenced codes and standards in determining the governing loads for design and analysis.

3.3.11.1.7 Load Combinations and Stresses

Load combinations, allowable stresses, and strength requirements as defined in UBC (1997) and ASCE 7-98 shall be used in determining the governing load combination(s), acceptability of the design, and stability of the equipment or structure.

The stability of the equipment or structure against overturning and sliding shall be determined and the stability maintained, based on a safety factor of 1.5. Anchorage of the equipment components to the support structure(s) shall be designed using the methods in UBC (1997) for life-safety systems (importance factor, $I = 1.5$).

Anchorage shall comply with UBC (1997). Acceptable types of concrete anchorages include cast-in-place anchors satisfying the requirements of UBC (1997), and industry-standard wedge-type expansion-type anchors having capacities published by the International Conference of Building Officials. Anchor size shall be a minimum diameter of 12 mm (1/2 in.) regardless of calculated anchorage requirements. Alternative anchorage methods or types may be proposed for Buyer consideration.

3.3.11.1.8 Hoisting and Rigging Loads

The lifting apparatus (eyebolts, hoist rings, and lifting bails) shall be designed in accordance with the *AISC Manual of Steel Construction Allowable Stress Design*, the *AISC Manual of Steel Construction Load and Resistance Factor Design*, and ASME B30.20. Equipment designed and fabricated by the Seller shall have a safety factor of 3 based on yield strength. Equipment purchased by the Seller shall have a safety factor of 5 based on ultimate strength. Documents shall be provided to the Buyer demonstrating incorporation of these safety factors. The Seller shall identify the total weight, the center of gravity, and the lift points and rigging methods necessary for lifting each component. Lift points



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shall be identified with yellow paint. Any special tooling, spreader bars, or other recommended fabricated devices for lifting shall be provided by the Seller.

3.3.11.2 Mechanical Calculations

Mechanical calculations performed for the piping system shall be prepared in accordance with piping code requirements in ASME B31.3. As a minimum, calculation shall include the following subjects:

1. Pipe wall thickness calculations for pressure (ASME B31.3, Paragraph 304.1).
2. Stress calculations for sustained loads because of pressure, dead load, and any other sustained loads (ASME B31.3, Paragraph 302.3.5).
3. Stress calculations for displacement stresses, such as thermal loads. Use Equation (16) in ASME B31.3 (Paragraph 319.4) for flexibility analysis on simple systems.
4. Stress calculations for occasional load such as pressure, dead weight, other sustained loads, and earthquake loads (ASME B31.3, Paragraph 302.3.6).
5. Hanger stress calculations for dead weight, thermal, and seismic loads (ASME B31.3, Section 321; ASCE 7-98; UBC 1997, and AISC *Manual of Steel Construction Allowable Stress Design* for source reference, in addition use an Importance factor - $I_p = 1.5$ and Seismic coefficient - $C_a = 0.34$)

The Seller shall determine compatibility of the selected material components with the waste material to be handled and assess if an allowance is required for corrosion, or other wear, in the design of the system.

Additional calculations that shall be performed, if applicable for the assembled system, include: vacuum pump sizing, valve actuator sizing, wear allowances, and piping.



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3.3.11.3 Electrical Calculations

Electrical calculations shall be done in support of NEC® (NFPA 70) requirements and requirements of this specification. Calculations shall include, but are not limited to:

1. Electrical load calculation, with any assumptions regarding demand factors or load diversity clearly stated.
2. Wire sizing calculation for all power conductors, with all assumptions regarding duty cycle clearly stated.
3. Equipment sizing/selection calculation (overcurrent protection, etc.), with any assumptions clearly stated.
4. Raceway sizing calculation, for all conduit and other raceways.

Care shall be taken to ensure that ambient temperature considerations and heat gain from direct sun are considered appropriately when performing calculations for wire and equipment size.

3.3.12 Document Submittal

The following subsections provide the minimum document requirement submittals.

3.3.12.1 General Requirements

Information to be supplied with the bid, for review, and as final is shown on the Bidder's Drawing and Data Commitments sheet. The submittals presented on this sheet shall be delivered as the delineated packages for review and approval.

Each document submittal shall be identified with this specification number, item number, purchase order number, and Seller's identification number. Submittals shall be transmitted to the Buyer in accordance with the directions found in the Request for Quote.

Data shall be sufficiently clear to allow legible copies to be made on standard reproduction equipment after microfilming.



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Approval by the Buyer does not relieve the Seller from the responsibility for accuracy or adequacy of design under this specification.

Submittals are divided into two types: (1) those requiring "approval before proceeding" (i.e., weld procedures or prepurchase evaluation data) and (2) those requiring "approval before shipment" (i.e., vendor information data).

Submittals requiring approval before shipment will be reviewed to verify completeness and adequacy for their intended purposes.

Unacceptable items that require approval before proceeding will be handled as specified below.

A submittal requiring approval that is not approved by the Buyer will be dispositional as:

1. "Not Approved, Revise and Resubmit." The submittal is considered technically deficient, or incomplete, and is therefore unacceptable. Resubmittal is required; hence fabrication, procurement, or performance of procedures shall not proceed.
2. "Approved with Exception." Fabrication, procurement, and performance of procedures may proceed, and re-submittal is required to verify incorporation of the exception. Final acceptance of the item is contingent on the Buyer's receipt and approval of the corrected submittal.

Submittals requiring approval before shipment that are determined to be incomplete or inadequate will be marked "Resubmit" and will be returned. An explanation of the deficiencies will be included for corrective action by the Seller.

3.3.12.1.1 Design Documentation

The Seller shall provide all shop fabrication drawings that detail how the specified parts and materials will be assembled to meet the requirements of this specification. Shop fabrication drawings shall clearly identify the material type and grade on the Bill of Material. The Seller shall include a Bill of Material and submit to the Buyer for review and approval. Final as-built drawings shall be provided by the Seller at the conclusion of fabrication and testing (see Sketch DBVS-SK-M107). Modifications to the arrangement drawings can be proposed by the Seller to improve the fabrication of the total assembly; however,



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modifications and the detailed fabrication drawings are to be approved by the Buyer before procurement of material or initiation of fabrication.

The Seller shall fabricate the equipment according to the approved design drawings submitted to the Buyer.

The Seller shall submit design questions and request design changes in writing to the Buyer for resolution or concurrence.

The Seller shall maintain designated full-size drawing sets for incorporating design changes concurred with the Buyer. The Seller shall incorporate all redline changes on the drawings and submit both paper and electronic copies of the as-built drawings to the Buyer.

All design calculations required for the ASME piping, support structure, and lifting and handling shall be included in reports that have undergone independent review by the Seller's qualified personnel. Design calculation reports shall be submitted to the Buyer for review and approval before the start of fabrication.

3.3.12.1.2 As-Built Drawings

The Seller shall deliver to the Buyer three hard copies and one electronic copy of the final fabrication level as-built drawings and specifications accurately depicting the product delivered. Drawings shall include dimensional layouts, dimensioned subassemblies, dimensioned component details (if not included on manufacturer's cut sheets), flow and electrical diagrams, material and fastener sizes, descriptions, weld symbols, and notes. The designer's name, responsible engineer's name, Bill of Materials, and drawing numbers shall appear on the index (cover sheet).

3.3.12.2 Fabrication Traveler Submittal

The Buyer will insert witness/hold points in the fabrication traveler during the review and approval of the fabrication traveler. Witness points can be waived by the Buyer, but must be documented in writing. Hold points require the Buyer personnel to be present during the fabrication, examination, inspection, or test step. Final fabrication traveler shall include final hold point for Buyer walkdown for final article acceptance before shipment.



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3.3.12.3 Schedule and Component Lead Time

A proposed schedule of fabrication, inspection, and testing of all Dried Waste Transfer System equipment shall be submitted for review with the bid and approval with the submittal of the fabrication traveler(s).

A proposed schedule shall be provided showing the discrete steps and schedule to complete all work described in this specification. The schedule shall identify fabrication drawings, engineering, parts procurements, fabrication, examination, inspection, and testing activities. A list of components and lead time delivery for each component shall be provided to the Buyer. Component substitutions can be proposed by the Seller to improve the fabrication, schedule, or cost; provided such substitutions are approved by the Buyer. The schedule shall allow two weeks for review and approval of structural calculations and one week for review and approval of all other documents. The Buyer shall provide a calculation review sheet identifying requirements for the calculations.

3.3.12.4 Spare Parts List and Special Tool Requirements

The Seller shall provide the following, as required for installation, maintenance, and operation of the assembly:

1. Recommended spare parts list for Buyer concurrence. The spare parts lists shall be based on equipment mean time between failures and long lead procurement items (long lead defined as longer than four weeks from order placement to delivery).
2. List of required special tools.
3. Special tools manufactured during fabrication shall also be provided on delivery.
4. List of required lubricants.
5. Lubricant required for startup and operations shall be delivered with Material Safety Data Sheets and shall be provided on delivery of related equipment.



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Submit spare parts, special tool, and supporting vendor data for review and approval.

3.3.12.5 Final Data Package

The Seller shall not ship the Dried Waste Transfer System equipment until all tests and inspections have been performed and the final data package is complete and approved by the Buyer. The Seller shall notify the Buyer three weeks before the intended shipping date, and shall allow the Buyer one week after receiving the package, and before shipment, to review the data package. The final data package shall include all items specified on the Bidder's Drawing and Data Commitments sheet (0).

3.3.13 Personnel and Training

Records for the following areas shall be prepared and made available for the Buyer. Review of the qualifications may be subject to a surveillance or source inspection by the Buyer.

3.3.13.1 Welder Qualification

Welder shall be qualified in accordance with ASME B&PV Code, Section IX and AWS D1.1/D1.1M, as applicable. Documentation for personnel performing welding, including tacking, shall be maintained in a Welder Performance Qualification Record.

3.3.13.2 Weld Examination

Welds shall be examined per ASME B31.3 at a minimum for piping and pipe supports and per AWS D1.1/D1.1M for structural steel. A ASME B31.3 weld examiner shall meet the code requirements. Welded connections on the lifting components shall be 100 percent visual and 100 percent Dye-Penetrant Test or Magnetic-Particle Test inspected.

3.3.13.3 Electrical Inspection

The Hanford Site CH2M Hill Hanford Group, Inc. NEC® Electrical Inspector shall inspect equipment fabricated under this contract that is not NRTL-listed or labeled. All deficiencies found shall be corrected or dispositioned before shipment.



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4 QUALITY ASSURANCE REQUIREMENTS

The following subsections provide the minimum QA requirements for this specification.

4.1 GENERAL

This procurement has been designated safety significant. The Seller shall document, implement, and maintain a QA Program that meets the specified criteria of DOE O 414.1, "Quality Assurance Requirements; paragraph 830.122 of 10 CFR 830, Subpart A, "Quality Assurance Requirements," and the requirements of ASME NQA-1-1989 as described in this section. The QA Program shall identify the activities and items to which it applies. The QA Program must address each of the areas discussed within this QA requirements flowdown. The Seller must submit the QA Program to the Buyer for review before award of contract.

The Seller shall assess its QA Program regularly to ensure its effective implementation.

The QA Program shall provide for indoctrination and training, as necessary, of personnel performing activities affecting quality to ensure that suitable proficiency is achieved and maintained. Personnel who conduct inspection and test activities shall be qualified to conduct those activities and certification of the qualification must be submitted to the Buyer on request.

4.1.1 Design

The Seller must define, control, and verify designs developed for this contract. Design inputs must be specified and correctly translated into design documents. Design interfaces must be identified and controlled. Persons who did not design the item must be used to verify design adequacy. Design changes, including field changes, must be reviewed and approved by the same personnel who reviewed and approved the initial designs.

4.1.2 Document Control

The Subcontractor/Supplier shall implement a document control system to ensure that approved and correct documents are being employed. This system shall describe the process for the preparation, issue, approval and changes of



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documents that specify quality requirements or prescribe activities affecting quality. Such documents, including changes thereto, shall be reviewed for adequacy and approved for release by authorized personnel Procurement Document Control.

Procurement documents must include or reference sufficient quality and technical requirements in order to describe the items and services requested. Procurement documents must be reviewed and approved by the authorized personnel within the Seller's organization, and changes must be reviewed and approved by the same individuals who reviewed and approved the original procurement documents.

The Seller must have a process for accepting procured items. This process must include one or a combination of the following: Certificate of Conformance, source verification, receiving inspection, and post-installation testing.

The Seller shall provide a legible and reproducible Certificate of Conformance. The Certificate of Conformance shall be signed by the Seller's authorized representative responsible for quality assurance.

The Certificate of Conformance shall contain, as a minimum, the following information:

1. Identification of the Buyer's contract or purchase order number under which the materials, equipment, component, or service is being purchased.
2. Provide traceability by means of positive identification from the material, equipment, component, or service to the Certificate of Conformance.
3. Identify the specific procurement requirements met by the material, equipment, component, or service supplied (i.e., codes, standards, or other applicable specification). The procurement requirements shall include any approved changes, waivers, or deviations applicable to the subject materials, equipment, component, or service.
4. Identify any procurement requirements that have not been met, together with an explanation and the means for resolving the nonconformance.



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The Seller's certification system, including the procedures to be followed in filling out a certificate and the administrative procedures for review and approval of the certificates, shall be described in the Seller's QA Program.

The certification system shall provide a means to verify the validity of the Seller's certificates and the effectiveness of the certification system, such as during the performance of audits of the Seller or independent inspection or test of the items. The Buyer shall conduct this verification at intervals commensurate with the Seller's past quality performance.

The Seller is required to flow down all quality assurance requirements from this contract to any sub-tier subcontractor/suppliers.

Any access to the sub-tier subcontractor/suppliers' facilities for verification activities will be requested through the Seller before access, and verification activities may be performed jointly.

The Seller shall warrant that all items furnished under the contract are genuine (i.e., new; not refurbished, not counterfeit) and match the quality, test reports, markings, and/or fitness for intended use as required by the contract. Any materials furnished as part of the contract that the government or other duly recognized agency had been previously found to be suspect/counterfeit shall not be used.

All items are subject to inspection at the Seller's facility or lower-tier subcontractor's facility. The Seller shall notify the Buyer, at least seven working days in advance of the time when such items or activities will reach the Buyer's identified inspection hold points. As a minimum, final inspection prior to packaging for shipment shall be considered such a hold point, unless specifically waived by the Buyer.

The Seller shall obtain all materials to be delivered under the contract directly from the original manufacturer or an authorized manufacturer's representative. The Seller shall provide legible and reproducible documentation, with the materials, that provides objective evidence that the items were provided by the original manufacturer. Such documentation may include a copy of the purchase order to the manufacturer and shipping documentation or manufacturer invoice; each of which would identify that the materials were obtained from the original manufacturer.



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The Seller shall submit, with or prior to item shipment, a recommended spare parts list. The list shall provide the name and address of the original supplier of the replacement part, and the part's drawings, specification, or catalog identity including applicable change or revision information.

All items and/or services procured under this specification shall be subject to inspection by the Buyer or Buyer's representative throughout the contract. Additionally, procured items and/or services shall be subject to inspection for acceptance.

The Seller shall grant access to the Seller's facilities and records for inspection or audit by the Buyer, his designated representative, and/or other parties authorized by the Buyer.

4.1.3 Instructions, Procedures, and Drawings

The Seller must document and implement appropriate instructions, procedures, and drawings. Instructions and procedures must include or reference appropriate quantitative or qualitative acceptance criteria for determining that prescribed activities have been satisfactorily accomplished.

4.1.4 Identification and Control of Items

The Seller shall establish controls to ensure that only correct and accepted items are used or installed.

All items shall be identified with the applicable part number, model number, or other identifier prescribed in this specification. Identification shall be on the item or the package containing the item. When the identification is on the item, such marking shall not impair the service of the item or violate dimensional, chemical, or physical requirements.

The Seller shall submit a legible and reproducible copy of the product data sheet (e.g., drawing, catalog cut sheet, brochure, etc.) that provides adequate information to enable the Buyer to verify the form and function of the articles procured. One copy of such documentation, unless otherwise specified, shall accompany the item.

The Seller shall identify each item, assembly, package, container, or material, having limited shelf life, with the cure date or date of manufacture and the



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expiration date. The Seller shall specify any storage temperatures, humidity and environmental conditions that should be maintained. Material shall not be furnished having less than 75 percent of the total shelf life available at the time of shipment.

When specified in Section 3.0 of this specification, Certified Material Test Reports (CMTRs) containing actual chemical analysis and mechanical properties of the material being supplied shall be submitted prior to or with each shipment of material. Each CMTR shall contain the following information as a minimum:

1. Product description -specification(s), codes, type of material, etc.;
2. Actual results of chemical analysis/mechanical testing in accordance with the provisions of the code, standard, and/or specification;
3. The specification and material grade;
4. Traceability to the item tested (e.g., heat number, lot number, etc.);
5. Name and address of manufacturer (may be identified by letterhead, logo, etc.);
6. Manufacturer's ASME certificate number and expiration date;
7. Buyer's contract number and item number to which the report applies; and
8. The report shall be signed by an authorized representative of the manufacturer.

In addition to the ASTM/ASME marking, the Seller shall physically identify each item/part furnished to the Buyer with the heat number (or identification number that is traceable to the heat number) and the contract number. Methods and materials used to accomplish required markings shall be compatible with the material being marked. Small items shall be bagged/wrapped and tagged.

4.1.5 Control of Processes

The Seller shall have processes to control processes, including special processes that control or verify quality (e.g., welding, heat treating, and



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nondestructive examination). Special processes must be performed by qualified personnel using qualified procedures in accordance with specified requirements.

Seller personnel performing weld inspections shall be certified as a Certified Welding Inspector (CWI) in accordance with the requirements of the American Welding Society (AWS) QC-1. The following documentation shall be submitted for Buyer approval before the start of fabrication:

1. Current AWS CWI certification;
2. Current/valid visual acuity examination (must be given every three years); and
3. Visual weld inspection procedure(s).

Welding procedures and personnel shall be qualified in accordance with applicable AWS or ASME requirements specified in the contract. The Seller shall submit copies of all welding procedures, procedure qualification records, and welder qualification records to be employed. Buyer review and approval of these documents is required before start of fabrication.

Nondestructive examination (NDE) personnel shall be qualified and certified in accordance with the recommended guidelines of the American Society of Nondestructive Testing (ASNT) SNT-TC-1A. The Seller is not authorized to begin fabrication until the following documentation has been approved by the Buyer:

1. NDE personnel qualification and certification procedure;
2. Level I, II, and/or III personnel qualification and certification records, including objective evidence of NDE training, formal education, examination, experience, date of hire, and current visual acuity exam; and
3. NDE method procedure(s) compliant with the applicable requirements of the Buyer's contract.

Nondestructive examination reports and radiographs shall be traceable to the item examined, shall include all essential examination parameters, and shall be signed and dated by a qualified/certified NDE examiner. All NDE reports and radiographs shall accompany or precede shipment of the item or component.



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Radiographs and radiographic technique and examination reports shall be subject to approval by the Buyer prior to shipment.

These requirements shall be passed to lower-tier subcontractors.

4.1.6 Inspection

The Seller shall have a process to plan and execute inspections to verify conformance of an item or activity to specified requirements. The process shall document the characteristics to be inspected and inspection methods to be employed. The Seller shall document the results of inspections. Inspections for acceptance shall be performed by persons other than those who performed or directly supervised the work being inspected.

The Seller shall submit, as required by the contract, legible, reproducible copies of inspection and/or test reports. The reports shall include, as a minimum, the following information:

1. Identification of applicable inspection and/or test procedure;
2. Resulting data for all characteristics evaluated, as required by inspection or test procedures, including reference to information on action taken in connection with nonconformances;
3. Traceability to the item inspected/tested (e.g., serial number, part number, lot number, etc.), date of inspection, name of inspector, type of observation; and
4. Signature of the Seller's authorized representative or agency performing the inspection or test.

Key items to be verified include, but are not limited to, the mechanical and electrical function of all equipment and components.

4.1.7 Test Control

The Seller shall have a process to plan and execute tests to verify conformance of an item or activity to specified requirements. The process shall document the characteristics to be tested and test methods to be employed. Tests required to collect data, such as for siting or design input, shall be evaluated.

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The Seller shall prepare a detailed test plan. Prior to starting work, the plan shall be submitted to the Buyer for approval and insertion of Buyer's designated source inspection and witness notification points. The test plan shall provide the following, at a minimum:

1. Traceability to the Buyer's purchase/contract order document number;
2. Name or description of the item to be tested (e.g., components, assemblies, subassemblies); and
3. Method/procedure to be used during test; and

Subsequent revisions/modifications to the test plan require review and approval by the Buyer before implementation of the changes.

The Seller shall provide test reports that include, as a minimum:

1. Item tested,
2. Date of test,
3. Tester or data recorder,
4. Type of observation,
5. Results and acceptability,
6. Action taken in connection with any deviations noted, and
7. Person evaluating test results.

Test plans and test reports must be submitted to the Buyer for the project records.

4.1.8 Control of Measuring and Test Equipment

The Seller shall control tools, gauges, instruments, and other measuring and testing equipment used for activities affecting quality, and shall calibrate at specified periods and adjust to maintain accuracy within necessary limits.



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The Seller shall maintain legible, reproducible copies of the Certificates of Calibration, traceable to the National Institute of Standards and Technology (NIST), for each article contracted. Each Certificate of Calibration shall be signed by the Seller's representative responsible for calibration, attesting to its authenticity, and shall be identified with the following information:

1. Buyer's contract number,
2. Identification of the article to which the Certificate of Calibration applies, and
3. Standards used for calibration.

In addition, the Seller shall submit a report of actual calibration results. The report shall be identifiable to the acceptance criteria of the items submitted and shall meet the contract requirements. The report shall contain the signature of the authorized representative of the agency verifying compliance.

One copy of the documentation, unless otherwise specified, shall accompany the applicable item(s) shipped.

The Certification of Calibration will be held on file by the Buyer as objective evidence to support the actual test results and attest to the fact that the calibrated item(s) met requirements.

4.1.9 Handling, Storage, and Shipping

The Seller shall prepare and submit for Buyer review and approval, prior to use, procedure(s) or plan(s) for the packaging and shipping of materials, equipment, or components to be furnished under the contract. The procedure(s) or plan(s) shall include, as appropriate, cleanliness inspection prior to packaging, use of preservatives and coatings, descriptions of specially designed shipping containers, handling and rigging data, final inspections, and the type of transfer and shipping vehicles.

4.1.10 Inspection, Test, and Operating Status

The Seller shall have a process to identify the status of inspection and activities on items or in documents traceable to the items, and to ensure that items which have not passed the required inspections and tests are not inadvertently

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installed, used, or operated. Status shall be maintained through indicators (i.e., physical location) and tags, markings, shop travelers, stamps, inspection records, or other suitable means. The Seller must specify the authority for application and removal of tags, markings, labels, and stamps.

4.1.11 Control of Nonconforming Items

The Seller must have a process to control items that do not conform to specified requirements to prevent inadvertent installation or use. These controls must provide for identification, documentation, evaluation, segregation (when practical), and disposition of nonconforming items, and for notification to affected organizations.

All nonconforming conditions identified at the Seller's facility, with a proposed disposition of "Accept-As-Is" or "Repair," as defined below, shall be approved by the Buyer before Supplier implementation of the Nonconformance Report (NCR) disposition:

1. Accept-As-Is: Nonconforming materials will perform its intended function.
2. Repair: Nonconforming item can be corrected so that its characteristics meet requirements of the contract.

Nonconforming items identified as "Repair" or "Rework" shall be re-examined in accordance with applicable procedures and with the original acceptance criteria, unless the nonconforming item disposition has established alternate acceptance criteria.

Nonconformances shall be documented by the Seller on their own nonconformance form or one provided by the Buyer. After documenting the nonconformance and providing a proposed disposition and technical justification, the report shall be submitted to the Buyer.

After the proposed disposition has been evaluated, and approved or rejected by the Buyer, the form shall be returned to the Seller. Corrective action may only take place after Buyer approval. Copies of completed, Buyer-approved, NCRs shall be shipped to the Buyer with the affected item.



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4.1.12 Corrective Action

The Seller shall have a process to promptly identify conditions adverse to quality, and to correct them as soon as practical. The identification, cause, and corrective action for conditions adverse to quality shall be documented and reported to appropriate levels of management. Follow-up action shall be taken to verify implementation of this corrective action.

During the period of performance of work for this contract, the Seller shall provide, to the Buyer, copies of all documents that constitute reports of conditions adverse to quality (e.g., deficiencies, weaknesses, nonconformances, or noncompliances with established requirements) related to items or services provided to the Buyer.

In addition, the Seller shall ensure flowdown of these requirements to its subtier subcontractors/suppliers of quality-affecting items and/or services procured for work performed for the Seller.

4.1.13 Quality Assurance Records

The Seller shall have a process to specify, prepare, and maintain records that furnish documentary evidence of quality. Records shall be legible, identifiable, retrievable, and protected against damage, deterioration, or loss. The process shall establish and document responsibilities and requirements for records transmittal, distribution, retention, maintenance, and disposition.

4.1.14 Computer Software

The development, procurement, maintenance, and use of the computer software shall comply with applicable requirements of ASME NQA-1, Subpart 2.7, including problem reporting and corrective action.

4.1.15 Control of Graded Fasteners

The following are minimum requirements for high strength graded fasteners produced in compliance with national consensus standards (i.e., SAE, ASTM, ASME):



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1. Fasteners shall exhibit grade marks and manufacturers identification symbols (headmarks) as required in the specifications referenced in the contract.
2. When requested by the Buyer, the Seller shall provide legible and reproducible copies of the manufacturers CMTRs. These CMTRs shall report the values of the actual chemical and physical tests performed on the represented fastener lot and material heat. Fastener packaging and labeling shall be traceable by lot number or other means to the CMTR.
3. Fasteners shall be inspected and documented to verify compliance with this QA Clause. Additionally, fasteners may also be subject to destructive testing by the Buyer to verify compliance.

4.2 INSPECTIONS AND TESTS

Seller shall provide all necessary reviews, inspections, tests, analyses, demonstrations, and documentation required to verify that all qualifications have been satisfied, including:

- (a) Testing to ensure satisfaction of the specified functional characteristics, as specified in Section 3.2.1, including leak and pressure testing.
- (b) Measurement of the specified physical characteristics and comparison with previous tests on similar equipment.
- (c) Examination for workmanship.

The Hanford Site CH2M Hill NEC Electrical Inspector shall inspect equipment fabricated under this contract that is not NRTL listed or labeled. All deficiencies found shall be corrected or dispositioned before shipment. The Seller shall prepare certification and documentation for the electrical inspector and inspection report.

Factory Acceptance Testing of the equipment is required. Factory Acceptance Test procedure shall be prepared and submitted for Buyer Approval. All temporary electrical equipment including wiring and instruments necessary to allow component testing will be provided by the Seller.



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Water used for hydrostatic testing of stainless steel shall be tested for chlorides before use. The chloride content of the test medium shall not exceed 250 ppm for water temperatures of 149 °F or less.

Dated calibration labels shall be visible on all test equipment. Measuring and test equipment used for acceptance inspections and tests shall be controlled in accordance with the Seller's QA Program and shall be traceable to a national measurement standard.

Each component, instrument, sensor, and valve shall be tested to verify that it is functional. In order to complete these functional check-out tests, the Seller will have to provide temporary power and switches for each valve activation and component activation circuit in the system. Compressed air or bottled nitrogen is also required for pneumatically-actuated valves. All electrical devices shall be tested from the skid junction box to the end device and all instrumentation shall be tested from the skid junction box termination.

4.2.1 Electrical Testing

The following subsections detail the requirements for electrical testing.

4.2.1.1 Motor Test

All motors shall be given a routine test to demonstrate that the motors are installed correctly and free from mechanical and electrical defects. Motor tests shall be performed in accordance with the Seller's standard practice. Tests shall include, but are not limited to:

1. Motors shall be designed and tested by the manufacturer in accordance with NEMA MG-1. Certificates of Conformance and/or certified test results shall be supplied for the following tests:
 - a. Rated load readings of current, power, and speed at rated voltage and frequencies;
 - b. No load readings of current, power, and speed at rated voltage and frequencies;
 - c. Mechanical vibration and motor balance test results in accordance with NEMA MG 1-12.06;



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- d. High potential test results in accordance with NEMA MG 1-12.03; and
 - e. 1000V dc Megger test for one minute, phase to ground. The minimum insulation reading from the megger shall be 3 meg-ohm.
2. Motors shall be checked for correct rotation and incoming power terminals shall be labeled by phase for proper rotation.

4.2.1.2 Wiring and Breaker Test

All wiring and breakers shall be given routine tests to demonstrate that they are free from mechanical and electrical defects. Wiring and breaker tests shall be performed in accordance with the Seller's standard practice. The Seller shall provide wiring and breakers test data that include, but are not limited to:

1. 1000V dc Megger tests are required for all electrical power wiring. The minimum insulation reading from the megger shall be 1 meg-ohm.;
2. Continuity testing is required for all electrical power and instrumentation wiring; and
3. Circuit breakers are to be inspected for proper size, correct installation, manual operation of handles, and suspect/counterfeit parts.

4.2.2 Instrumentation Test

Each instrument will be tested for proper operation. This may require applying temporary power, a 4-20-mA loop with indicators, or other methods to verify proper indication and function. All signals that are fed to the termination panel shall be verified at the termination panel. The device should be tested with fluid to physically activate the devices for detecting level, pressure, flow, etc., as applicable.

For control loops provided by the MCS, no testing will be required except the individual sensors/switches and starters. Example: A level switch feeds the programmable logic controller, which controls the feed pump. The level switch shall be tested, but the shutdown signal to the pump can not be verified without the MCS hardware and program, provided later.



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For local control function, the system shall be provided with the normal fluid, where practical, to operationally test the control loop. Example: Level interlock to the feed pump shutdown will be tested by filling the tank above the level switch position and verifying the pump shuts down.

4.2.3 Leak Test

HEPA filter housings shall be tested in accordance with ASME AG-1 requirements.

All piping, primary and secondary, shall be tested for leaks in accordance with ASME B31.3 (Section 345). Results shall be recorded. A video record of the tests shall be submitted to the Buyer with test records and documentation.

4.2.4 Factory Acceptance Test

The Seller shall perform a full mock up Factory Acceptance Test at the Seller's location before shipment.

The following minimum set of tests shall be performed as part of the full mock-up of the Dried Waste Transfer System. Additional tests will be negotiated with the Seller based on the results of process testing and the details for the final design.

1. Demonstrate material transfer rate with a material that has representative properties as identified by the Seller (see Section 3.2.1). Acceptable transfer rate range is 16,000 lb/hr (+10%, -0%).
2. Demonstrate recovery from a loss of power during material transfer. Primary recovery option is to restart material transfer. Secondary recovery option is removal of material, which will be radioactively contaminated at Buyer's facility. Recovery options will be identified in the Test Plan reviewed and approved by the Buyer.
3. Demonstrate operation of the pulsed air filter actuated using differential pressure and timer modes.



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4.2.5 Inspections

Specific inspections by the Buyer or Buyer's representative that may take place at the Seller's facilities include a suspect fasteners inspection before shipment of equipment. Where NEC® inspection is required, the Seller shall arrange for a CH2M HILL NEC® inspection to occur at the Seller's facility before shipping any assembly not covered in whole by a NRTL listing or label. The Seller shall perform modifications as required by the NEC® inspector before shipping.

4.3 TRAINING OF INSPECTION AND TEST PERSONNEL

The Seller shall qualify Inspection and Test Personnel performing acceptance inspections and testing. In addition, the Seller shall document all qualifications.

Review of the qualifications may be subject to a surveillance or source inspection by the Buyer.

4.4 QUALITY ASSURANCE RECORDS

Records that furnish documentary evidence of quality shall be specified, prepared, and maintained. Records shall be legible, identifiable, and retrievable. Records shall be protected against damage, deterioration, or loss. Requirements and responsibilities for record transmittal, distribution, retention, maintenance, and disposition shall be established and documented.

5 PREPARATION FOR DELIVERY

The following subsections provide the minimum requirements for packaging, labeling, handling, shipping, and receiving.

5.1 GENERAL

Every item that is shipped shall arrive at the jobsite in the same condition when it passed all quality control inspections and tests.

The equipment shall be prepared for delivery to the Buyer's specified site located near the U.S. Department of Energy's Hanford Site in Richland, Washington in a manner that can easily be inspected by the Buyer's personnel. The Seller shall be responsible for the equipment and associated components provided by the Seller through shipping and receiving of the equipment. The Seller shall be responsible for any damage that occurred during shipping.

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The equipment will remain the property of the Seller until the Buyer has completed a receipt inspection at the Buyer's facility.

5.1.1 Packaging and Shipping Instruction Manual

The Seller shall prepare an instruction manual(s) that includes packaging, handling, shipping, and storage information; and operational, maintenance, and special assembly procedures. The instruction manual(s) shall be submitted to the Buyer for review and approval.

A recommended spare parts list shall be prepared and provided to the Buyer.

5.1.2 Operation and Maintenance Manual

Provide an Operation and Maintenance Manual containing all information and procedures necessary to operate and maintain the assembled system. Component manuals and other vendor data such as the following shall be provided, as applicable:

1. One-line diagram, layout drawings, schematic and wiring diagrams;
2. Illustrated parts lists with manufacturer catalog numbers;
3. Certified copy of factory test results;
4. Recommended maintenance schedule;
5. Maintenance procedures; and
6. Operating procedures.

Submit Operation and Maintenance Manual, component manuals, and other vendor data to the Buyer for approval before shipment.

5.2 PRESERVATION AND PACKAGING

Before packaging, all residual water present in the systems from acceptance testing shall be thoroughly drained and dried by purging oil-free dry air through the system. All open pipe ends shall be sealed to prevent ingress of debris and vermin into the system. The assembly shall be thoroughly cleaned to remove



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any dirt or dust that may have accumulated on the equipment during testing. Defects in the paint shall be touched-up. Moving parts shall be secured to prevent movement during shipping.

5.3 PACKING

1. The Seller shall package equipment to protect items during shipping. Bracing structures shall be installed where items could be damaged or vibrate loose during transportation. All bracing must be clearly identified, both in the packaging instruction and by labeling on the outside of the receipt tanks.
2. Rigging sketches or a handling procedure shall be prepared by the Seller for items that require special handling. These sketches will identify weights, sling locations, balance points, methods of attachment, and other information necessary for safe handling.
3. Packaging or preservative coatings shall be visually inspected after loading. Damaged areas shall be repaired. Items shipped with desiccants shall be inspected after loading to verify that seals are intact.
4. Cushioning shall be used where protection from shock and vibration is required. Cushioning materials shall have sufficient strength to provide the required protection, shall exhibit no corrosive effect when in contact with the item being cushioned, and shall not readily support combustion.
5. Temporary cushioning, blocking, bracing, or anchoring placed within an item for shipping protection that shall be removed before operation of the item, shall be identified by a warning(s) placed in a conspicuous manner to effect proper removal of the packing material.
6. Blocking and bracing used for protection of the load shall prevent item movement and withstand thrust and impact applied in any direction. Blocking and bracing used in direct contact with the item being blocked shall not have a corrosive effect on the item.
7. The weight, lifting points, or center of gravity indicated on the crate, skid, or package of major components shall be used to ensure proper handling during loading.



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8. Written instructions covering the location and stacking limits of the crates or boxes on the transport vehicle shall be specified, as appropriate. These instructions should be marked on the container.
9. Precautions shall be taken to minimize marring of the finish of painted surfaces during handling and shipping, as practicable.
10. Cables, slings, chain falls, etc., shall not be placed where they can cause damage to any component part. Mating surfaces, machined areas, etc., shall be avoided.
11. All items shall be protected from the deleterious effects of shock, vibration, physical damage, moisture, salt spray, condensation, and weather during shipping, as applicable.
12. Items shall be inspected for cleanliness before packaging. Dirt, oil, residue, metal chips, or other forms of contamination shall be removed in accordance with Section 3.3.4. Any entrapped water shall be removed.
13. All openings into items shall be capped, plugged, and sealed with materials which perform their intended function without causing deleterious effects on the equipment or its operation.
14. Nonmetallic plugs and caps shall be brightly colored. Clear plastic caps or plugs are not to be used except when specified.
15. Plugs or caps shall be prevented from falling into, or being pushed into, openings after installation and shall be secured to prevent accidental removal.
16. Items subject to corrosion, either internal or external, shall be suitably protected.
17. Items packed in containers shall be blocked, braced, or cushioned to prevent physical damage.
18. Instrumentation, electrical and electronic equipment, motors, and other electrical assemblies and equipment shall be packaged in a waterproof enclosure. This may be the enclosure the item will operate in. For items without waterproof enclosures, a vapor barrier shall be placed around the

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enclosure. In either case, the enclosure shall be able to exclude dirt and facilitate handling and marking of the item. Barrier materials shall be nonhalogenated if used in contact with austenitic stainless steels, shall be noncorrosive, shall not readily support combustion, and shall not be, otherwise, harmful to the item being packaged. Desiccants may be used inside the enclosure or vapor barrier.

19. "Anchoring" of the item within a crate or on a skid means to adequately fasten the item during shipment and protect the item from potential damage as a result of rough handling. Bolting is preferred. When bolts are used for anchoring, the following criteria shall apply:
 - a. If precision holes in the item are used for anchoring, properly fitting bolts shall be used to prevent marring or elongation of the holes.
 - b. Items shall be marked to preserve identity during shipping, receiving, and storage per the following requirements:
 - i. Identification shall be stamped, etched, stenciled, or otherwise marked on the item or on tags affixed to the item.
 - ii. The marking shall not be deleterious to the material nor violate any other section of this specification.
 - iii. When tags are employed, they shall be of material that will retain the marking and withstand weathering deterioration and other normal shipping and handling effects.
20. Items not specifically covered by these requirements shall be handled in accordance with sound material handling practices.

5.4 MARKING

Packages shall be properly and clearly marked. At a minimum, the required information shall include the contract number, the name and equipment number of the item within the package, the actual weight of the package and its contents, and the orientation of the equipment within the crate. Each package shall be labeled as part of the entire shipment, such as "Crate 1 of 2."

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5.5 HANDLING

The Seller shall lift equipment using a forklift or crane, utilizing the lifting points designed for that purpose.

5.6 SHIPPING

The Seller's truck driver shall carry bills of lading for each shippable unit that is delivered to the Buyer.

The Seller shall obtain approval to ship from the Buyer before the equipment is prepared for shipment.

5.7 RECEIVING

The Buyer's agent will perform a receipt inspection on receipt of the equipment at the Buyer's specified site.

This receipt inspection shall consist of the following:

1. Verify all parts are present and not damaged during shipping.
2. Documentation review—determine that documentation required by contract to accompany equipment is present and traceable to the equipment shipped as required by the Bidder's Drawing and Data Commitments sheet (0).

The Seller is responsible for accommodating the receipt inspection process by:

1. Designing and using packaging that allows for easy opening or disassembly to reveal the item(s) for inspection, then reclosing to permit the same packaging to be used for post-receipt transportation on the Hanford Site.
2. Selecting locations on equipment for identification numbers that promotes easy identification without extensive disassembly of packaging materials. It is preferred that packaging be marked to indicate the approximate position of identification numbers on equipment within the packaging.


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3. Ensuring that all required documentation accompanying the equipment is present and obvious on, or within, the packaging.



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6 NOTES

1. Unless otherwise specified, equipment furnished under this section shall be fabricated and installed in compliance with the instructions of the manufacturer.
2. The Seller shall ensure that all equipment, accessories, and installation materials comply with the specification and that adequate provision is made in the Dried Waste Transfer System assembly design and fabrication for mounting the specified system equipment and accessories.
3. The Seller is solely responsible for construction means, methods, techniques, sequences, procedures, and safety precautions and programs.
4. The Seller shall provide all labor, equipment, and material required to provide a complete and functional system.
5. To avoid delays in construction, the Seller shall ensure that all components of the system are available to meet the required schedule.
6. The Seller shall obtain necessary permits, arrange for inspections, and obtain approval of the appropriate Seller's local "Authority Having Jurisdiction" over the work described.



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7 APPENDICES

The following appendices make up part of this specification:

Appendices	Description
A	Drawings and Sketches
B	Flow Properties Test
C	Data Sheets
D	TFC-ESHQ-Q_C-C-03, Revision C-2, Control of Suspect/Counterfeit Items
E	Request for Information
F	Instrumentation Naming and Tagging Convention
G	Bidder's Drawing and Data Commitments



TECHNICAL SPECIFICATION

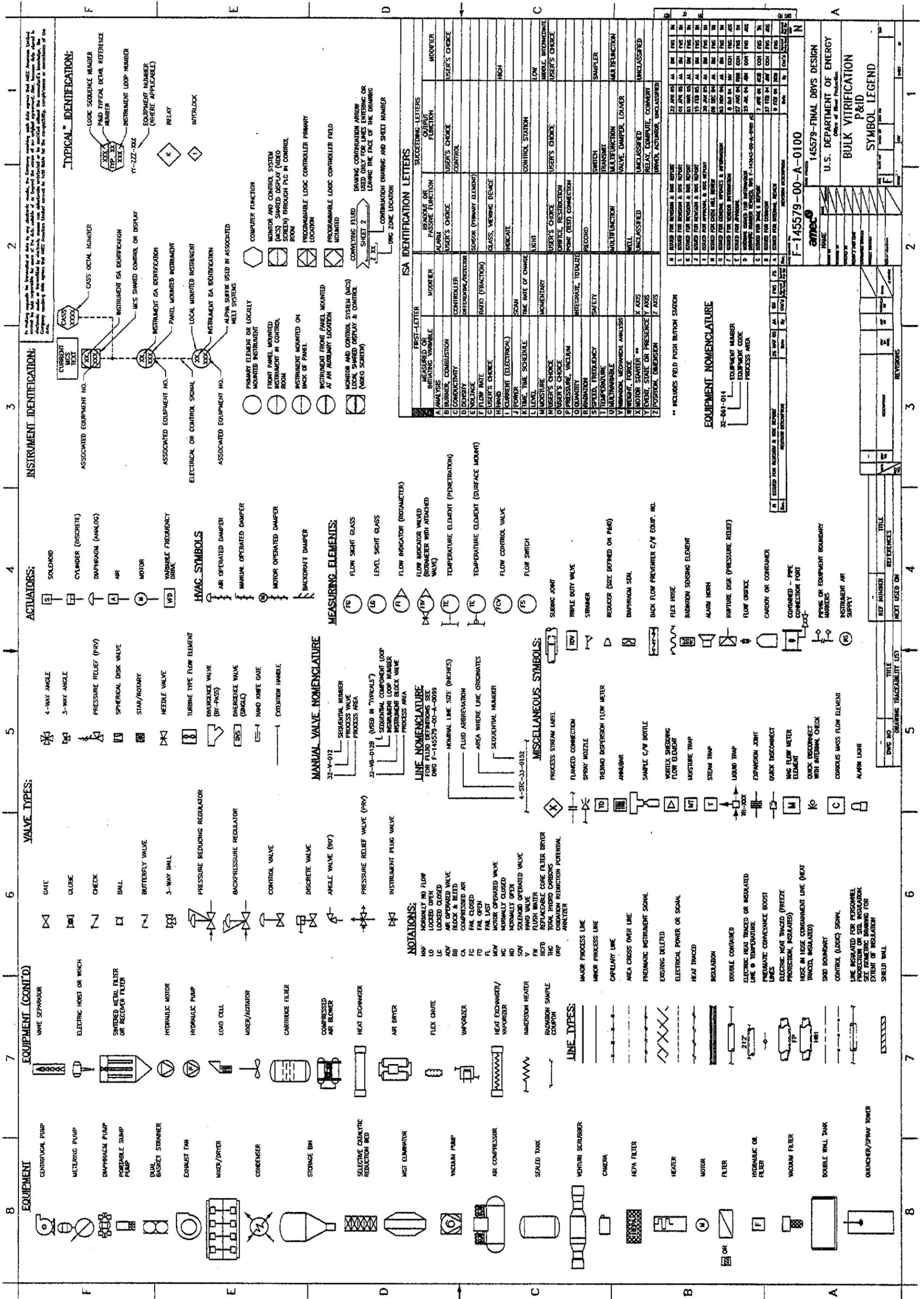
PROJECT:	Final DBVS Design	145579-D-SP-032	REV. 2
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CLIENT:	AMEC E&E - Richland, Washington		

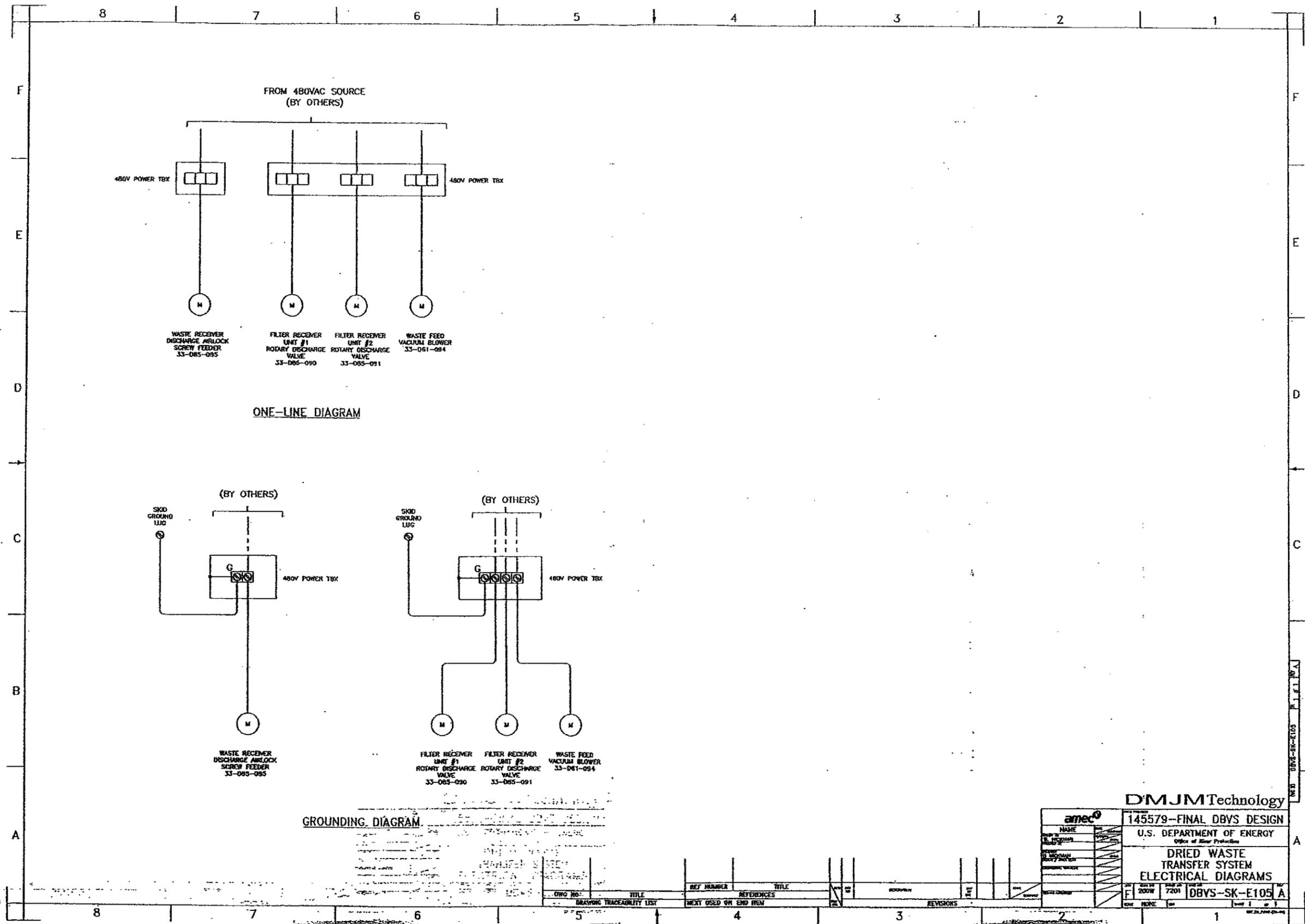
Appendix A

Drawings and Sketches

Drawing and Sketch	Revision	Sheet	Title
F-145579-00-A-0100	N	1	Bulk Vitrification P&ID Symbol Legend
F-145579-33-A-0106	E	1	Bulk Vitrification Waste Feed Dryer to Box P&ID
DBVS-SK-E105	A	1	Dried Waste Transfer System Electrical Diagrams
DBVS-SK-M107	E	1	Bulk Vitrification Dried Waste Transfer System
DBVS-SK-M107	C	2	Bulk Vitrification Dried Waste Transfer System Plan
DBVS-SK-M107	C	3	Bulk Vitrification Dried Waste Transfer System Elevations
Total Drawing Pages including cover:			7

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GROUNDING DIAGRAM

DMJM Technology

145579-FINAL DBYS DESIGN

U.S. DEPARTMENT OF ENERGY
Office of Air Protection

DRIED WASTE TRANSFER SYSTEM ELECTRICAL DIAGRAMS

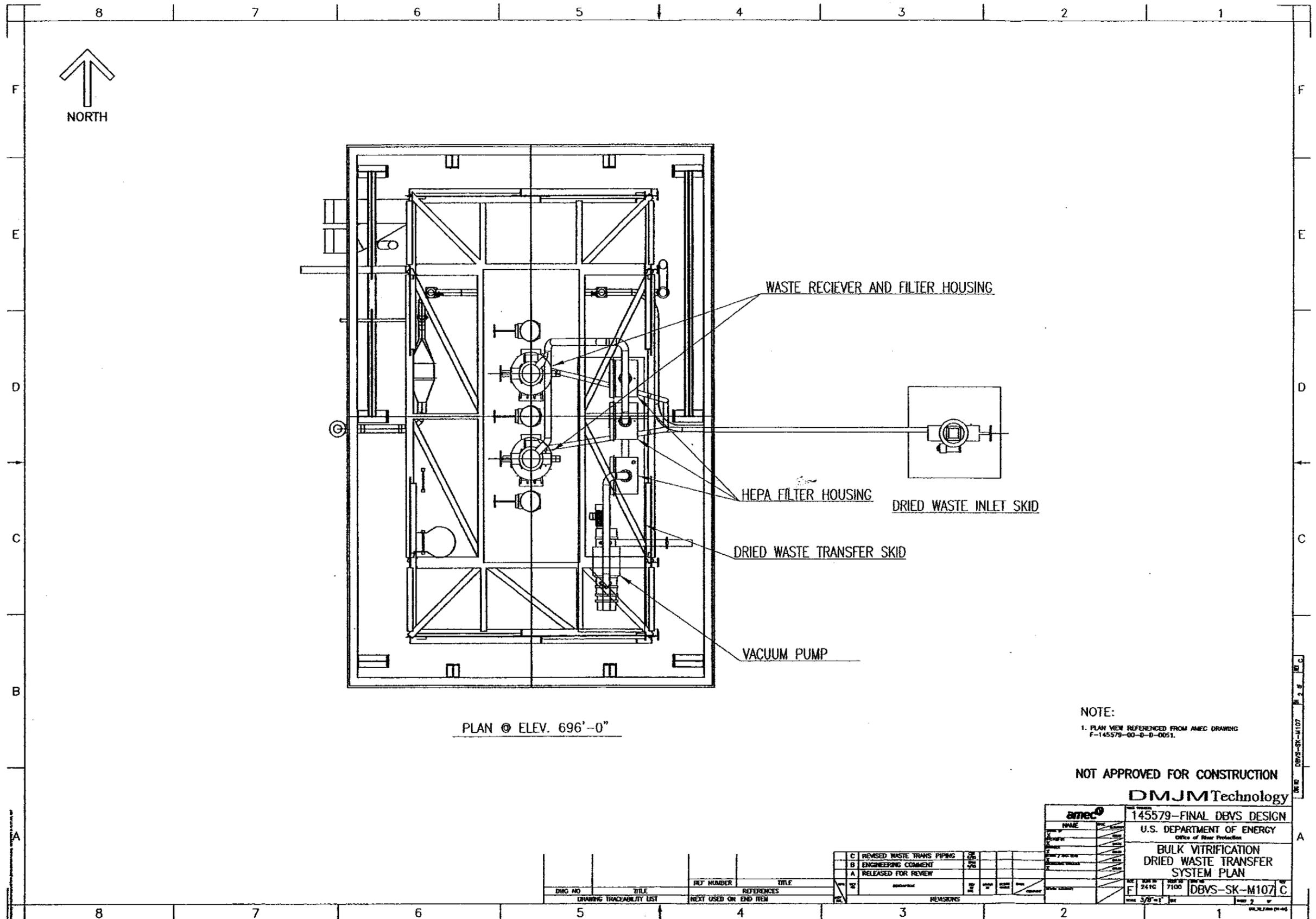
DBYS-SK-E105 A

NAME	
DATE	
SCALE	
PROJECT	
REVISIONS	

REV	DATE	BY	CHKD	DESCRIPTION

REF NUMBER	TITLE

REV	DATE	BY	CHKD	DESCRIPTION



PLAN @ ELEV. 696'-0"

NOTE:
1. PLAN VIEW REFERENCED FROM AMEC DRAWING F-145579-00-0-0-0051.

NOT APPROVED FOR CONSTRUCTION
DMJMTechnology

amec		145579-FINAL DBVS DESIGN	
NAME		U.S. DEPARTMENT OF ENERGY	
JOB NO.		Office of Risk Protection	
PROJECT		BULK VITRIFICATION	
DRAWING NO.		DRIED WASTE TRANSFER	
DATE		SYSTEM PLAN	
REV	DATE	BY	CHKD
F	2410 7100		
SCALE 3/8"=1'		DBVS-SK-M107	

DWG NO	TITLE	REF NUMBER	TITLE
	DRAWING TRACEABILITY LIST		REFERENCES
			NEXT USED ON END ITEM

REV	DATE	BY	CHKD	DESCRIPTION
C				REVISED WASTE TRANS PIPING
B				ENGINEERING COMMENT
A				RELEASED FOR REVIEW



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Appendix B

Flow Properties Test Summary

(5 pages including cover)

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SUMMARY OF MATERIAL PROPERTIES

Note: All results were obtained with materials at ambient conditions.

Particle Size

Particle size distribution was determined using sieve fractionation. A Ro-Tap sieve shaker was set for 5 minutes with seven decks of varying mesh size. The percentages of the total sample retained on each deck are as follows:

Material	¼ inch 6.35 mm	#6 mesh 3.35 mm	#12 mesh 1.68 mm	#20 mesh 0.85 mm	#40 mesh 0.42 mesh	#70 mesh 0.21 mm	#100 mesh 0.15 mm	Pan
Simulant 1	0.00	4.02	11.76	8.93	19.04	38.99	9.69	7.57
Simulant 2	0.00	1.34	4.62	7.84	16.39	30.10	13.33	26.37
Soil	0.00	0.00	0.63	3.69	10.96	36.49	20.61	27.62

Density

The particle and bulk densities of the materials were measured as follows:

Material	Particle Density (lb/ft ³)	Minimum Bulk Density (lb/ft ³)	Bulk Density at 20 ft. Effective Head (lb/ft ³)
Simulant 1	156.6	97.8	101.2
Simulant 2	156.2	95.3	100.1
Soil	162.0	86.3	93.7

Angle of Repose

The angles of repose of the materials were measured as follows:

Material	Range	Average
Simulant 1	31° - 33°	32°
Simulant 2	33° - 34°	33°
Soil	34° - 36°	35°



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Moisture Pickup

A thin layer (approximately 1/8 in. deep) moisture pickup test was conducted using 95°F and 95% RH air for 24 hours. The weight percentages of moisture content of the materials at varying times are as follows:

Material	As-received	1 hour	5 hours	24 hours
Simulant 1	0.50	1.76	4.51	12.14
Simulant 2	0.80	2.50	6.18	15.38
Soil	1.67	1.77	1.74	1.76

A pneumatic conveying moisture pickup test was simulated by blowing 95°F and 95% RH air through a bed of material. The weight percentages of moisture of the materials generally decreased slightly from the as-received contents or not at all.

Air Permeability

Test results indicate that none of the materials are flow rate limited due to the effects of air entrained in the solids.

Cohesive Strength

To prevent cohesive arching in a mass flow or funnel flow bin, the minimum outlet diameter for a conical hopper on a continuous flow basis (BC) and after one day storage at rest (BC₂₄) was determined as follows:

Material	BC (inches)	BC ₂₄ (inches)
Simulant 1	None	None
Simulant 2	None	1
Soil	None	None

Cohesive strength test results identified a cohesive property that indicates the ability to form a stable rathole if stored in a funnel flow bin. A mass flow bin is recommended to provide a first-in-first-out flow sequence, eliminate ratholes, and minimize segregation effects.

Maximum Hopper Angle for Mass Flow

The maximum recommended wall friction angles from vertical for a conical hopper with a 1 ft. dia. opening for combinations of materials of construction flow conditions were determined as follows:



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Material Combination	Continuous Flow Condition	After 1-Day Storage at Rest
304 SST Sheet #2B Finish w/ Simulant 1	23°	23°
304 SST Sheet #2B Finish w/ Simulant 2	21°	19°
304 SST Sheet #2B Finish w/ Soil	14°	14°
304 SST Plate #1 Mill Finish w/ Simulant 1	16°	12°
304 SST Plate #1 Mill Finish w/ Simulant 2	12°	8°
304 SST Plate #1 Mill Finish w/ Soil	10°	6°
A.R. 500 Carbon Steel Mill Finish w/ Simulant 1	17°	12°
A.R. 500 Carbon Steel Mill Finish w/ Simulant 2	14°	9°
A.R. 500 Carbon Steel Mill Finish w/ Soil	10°	8°

Minimum Chute Angle to Ensure Flow After Impact

The minimum recommended angles from horizontal for a chute for combinations of materials of construction and impact pressures were determined as follows:

Material Combination	5 lb/ft ² Impact Pressure	80 lb/ft ² Impact Pressure
304 SST Sheet #2B Finish w/ Simulant 1	31°	34°
304 SST Sheet #2B Finish w/ Simulant 2	31°	32°
304 SST Sheet #2B Finish w/ Soil	40°	35°
304 SST Plate #1 Mill Finish w/ Simulant 1	33°	34°
304 SST Plate #1 Mill Finish w/ Simulant 2	34°	35°
304 SST Plate #1 Mill Finish w/ Soil	35°	39°
A.R. 500 Carbon Steel Mill Finish w/ Simulant 1	30°	32°
A.R. 500 Carbon Steel Mill Finish w/ Simulant 2	34°	35°
A.R. 500 Carbon Steel Mill Finish w/ Soil	36°	34°

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Appendix C

Data Sheets

Title	Number of Pages
Cover Page	1
Check Valves	1
HEPA Filter	1
Filter	1
Butterfly Valves	1
Rotary Valves	1
Variable Speed Rotary Valves	1
Diverter	1
Waste Feed Vacuum Pump Suction Pressure	1
Waste Feed System Inlet Pressure	1
ICV Feed Chute Filter No. 1 DP	1
ICV Feed Chute Filter No. 2 DP	1
Primary HEPA Filter DP	1
Secondary HEPA Filter DP	1
Knife Gate Valves	1
Vacuum Pump	1
Dried Waste Receiver/Filter Housing	1
Total Data Sheet Pages:	17

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	Butterfly Valves					SPEC. No. 145579-D-SP-032				
	NO.	BY	DATE	REVISION		SHEET	OF	DATE		
	A	CWB	10/12/2004			1	1	12/7/2006		
						BY	CHKD	APPR.		
						CWB				
						P.O.				
Project: 145579 Demonstration Bulk Vitrification						REQ.				
1. Type Butterfly Valves 2. Body Size SEE BELOW 3. Body Material* 4. Port Size 5. Number of Ports 2 6. Guiding 7. End Conn/Rating* 8. Packing Material/Type 9. Lubricator 10. Iso Valve 11. Bonnet Type 12. Trim From* 13. Trim Material Seat/Plug* 14. Shaft Material* 15. Required Seat Tightness MSS-SP-067 16. Max Allow Sound Level dBA Design Pressure Design Temperature 250 F					17. MFR. Bray Series 41 18. Model No.* 19. Flow Composition 20. Required Cv 21. Inlet Press Norm/Max 22. Flow Rate Norm/Max 23. dP/Max Shut Off dP 24. Temp Oper/Max 25. Oper sp gr/Visc 26. % Superheat/Flash 27. Crit Press/% Solids 28. Mol Wt/Vapor 29. Pred. Sound Level dBA 30. Supplier Unit Process Company 31. Address Everett, WA 32. Phone (509) 346-9920 33. Fax (509) 346-9951					
Rev.	Tag No.	Line no. / Equip.	P&ID	Body Size	T ⁺ Max.	Pressure			Service	Notes
	YV-404		33-A-0106			Norm.	Max.	Range		
	YV-407		33-A-0106							
	YV-411		33-A-0106							
	HV-420		33-A-0106							
	HV-421		33-A-0106							
	HV-422		33-A-0106							
	HV-423		33-A-0106							
	HV-414		33-A-0106							
	HV-413		33-A-0106							
NOTES										

		AMEC E&C Services Limited Trail, BC Canada		Instrumentation Data Sheet	
ASSET NUMBER: 145579-D-SP-032			TAG NUMBER: 33-PIT-412		
SUBJECT: Bulk Vitrification Dried Waste Transfer System					
SERVICE: Waste Feed Vacuum Pump Suction Pressure					
SUPPLIER:					
MAKE: Yokogawa		P.O. No.:			
MODEL: EJA Series		P&ID No.:		DBVS-SK-P010	
TRANSMITTER					
Model No.: EJA510A		Power Supply: 24V dc			
Range: 0-29 PSIA		Output: 4-20 mA Isolated			
Calibrated Range: 0 to 1000 torr (mm Hg)		Relay Output: N/R			
Case Material: Low copper cast-aluminum		Local Indication: 1.0" LCD (3 1/2" Digits)			
Enclosure Rating: NEMA4X		Conduit Connect:			
		Mounting Bracket: Integral to transducer			
TRANSDUCERS					
Model No.: EJA510A-EAS4N-02DN					
Line Material: SS					
Line Size/Sch'd:					
Transducer Mat'l.: SS					
Process Connection:					
Signal Cable Length:					
Mounting: Vertical					
Classification: Factory Mutual					
316SS Tags permanently affixed to instrument:					
OPTIONS Accuracy 0.25% span or better					
Display to read 0-1000 torr					
SERVICE CONDITIONS:					
Line No./Size/Sch		Max. Velocity:			
Fluid: air		Spec. Gravity:			
Flow: none		Acidity:			
Temp Min.: 32 deg F		Percent Solids:			
Temp Oper.: 85 deg F		Material Build-Up:			
Temp Max.: 150 deg F		Vibration:			
Press Oper.: -14 psig (vacuum)		Line Material:			
Press Max.: atm					
NOTES:					
1. The Seller has reviewed the transmitters offered and found that the following ordering information from Yokogawa, EJA510A-EAS4N-02DN may be suitable. In any case, the final selection the component is the responsibility of the Seller as this is provided for information only.					
By: RW	Chk:	Appd:	Date: 101104	Project: DBVS	Rev: 0

	AMEC E&C Services Limited Trail, BC Canada	Instrumentation Data Sheet	
ASSET NUMBER: 145579-D-SP-032		TAG NUMBER: 33-PIT-402	
SUBJECT: <u>Bulk Vitrification Dried Waste Transfer System</u>			
SERVICE: <u>Waste Feed System Inlet Pressure</u>			
SUPPLIER: _____			
MAKE: <u>Yokogawa</u>		P.O. No.: _____	
MODEL: <u>EJA Series</u>		P&ID No.: <u>DBVS-SK-P010</u>	
TRANSMITTER			
		Power Supply:	<u>24V dc</u>
Model No.:	<u>EJA510A</u>	Output:	<u>4-20 mA Isolated</u>
Range:	<u>0-29 PSIA</u>	Relay Output:	<u>N/R</u>
Calibrated Range:	<u>0 to 1000 torr (mm Hg)</u>	Local Indication:	<u>1.0" LCD (3 1/2" Digits)</u>
Case Material:	<u>Low copper cast-aluminum</u>	Conduit Connect:	_____
Enclosure Rating:	<u>NEMA4X</u>	Mounting Bracket:	<u>Integral to transducer</u>
TRANSDUCERS			
Model No.:	<u>EJA510A-EAS4N-02DN</u>	_____	
Line Material:	<u>SS</u>	_____	
Line Size/Sch'd:	_____	_____	
Transducer Mat'l:	<u>SS</u>	_____	
Process Connection:	_____	_____	
Signal Cable Length:	_____	_____	
Mounting.:	<u>Vertical</u>	_____	
Classification:	<u>Factory Mutual</u>	_____	
316SS Tags permanently affixed to instrument:			
OPTIONS			
Accuracy <u>0.25% span or better</u>			
Display to read <u>0-1000 torr</u>			

SERVICE CONDITIONS:			
Line No./Size/Sch	_____	Max. Velocity:	_____
Fluid:	<u>air</u>	Spec. Gravity:	_____
Flow:	<u>none</u>	Acidity:	_____
Temp Min.:	<u>32 deg F</u>	Percent Solids:	_____
Temp Oper.:	<u>85 deg F</u>	Material Build-Up:	_____
Temp Max.:	<u>150 deg F</u>	Vibration:	_____
Press Oper.:	<u>-14 psig (vacuum)</u>	Line Material:	_____
Press Max.:	<u>atm</u>	_____	
NOTES:			
1. The Seller has reviewed the transmitters offered and found that the following ordering information from Yokogawa, EJA510A-EAS4N-02DN may be suitable. In any case, the final selection the component is the responsibility of the Seller as this is provided for information only			
By: RW	Chk: _____	Appd. _____	Date: 101104
Project: DBVS		Rev: 0	

		AMEC E&C Services Limited Trail, BC Canada		Instrumentation Data Sheet	
ASSET NUMBER: 145579-D-SP-032			TAG NUMBER: 33-PDIT-417		
SUBJECT: <u>Bulk Vitrification Dried Waste Transfer System</u>					
SERVICE: <u>ICV Feed Chute Filter No. 1 DP</u>					
SUPPLIER: _____					
MAKE: <u>Yokogawa</u>		P.O. No.: _____			
MODEL: <u>EJA Series</u>		P&ID No.:		<u>DBVS-SK-P010</u>	
TRANSMITTER					
Model No.: <u>EJA110A</u>		Power Supply:		<u>24V dc</u>	
Range: <u>-40 to 40 in H₂O</u>		Output:		<u>4-20 mA Isolated</u>	
Calibrated Range: <u>0 to 40 in H₂O</u>		Relay Output:		<u>N/R</u>	
Case Material: <u>Low copper cast-aluminum</u>		Local Indication:		<u>1.0" LCD (3 1/2" digits)</u>	
Enclosure Rating: <u>NEMA4X</u>		Conduit Connect:		<u>_____</u>	
Mounting Bracket:		<u>Integral to transducer</u>			
TRANSDUCERS					
Model No.: <u>EJA110A-ELSSA-92DA/FF1</u>		_____			
Line Material: <u>SS</u>		_____			
Line Size/Sch'd: _____		_____			
Transducer Mat'l.: <u>SS</u>		_____			
Process Connection: _____		_____			
Signal Cable Length: _____		_____			
Mounting: <u>Vertical</u>		_____			
Classification: <u>Factory Mutual</u>		_____			
316SS Tags permanently affixed to instrument:					
OPTIONS					
<u>Accuracy 0.25% span or better</u>					
<u>Display to read in "in H₂O"</u>					
SERVICE CONDITIONS:					
Line No./Size/Sch		Max. Velocity: _____			
Fluid: <u>air</u>		Spec. Gravity: _____			
Flow: <u>none</u>		Acidity: _____			
Temp Min.: <u>32 deg F</u>		Percent Solids: _____			
Temp Oper.: <u>85 deg F</u>		Material Build-Up: _____			
Temp Max.: <u>150 deg F</u>		Vibration: _____			
Press Oper.: <u>14 psig (vacuum)</u>		Line Material: _____			
Press Max.: <u>atm</u>		_____			
NOTES:					
1. The Seller has reviewed the transmitters offered and found that the following ordering information from Yokogawa, EJA110A-ELSSA-92DA/FF1 may be suitable. In any case, the final selection the component is the responsibility of the Seller as this is provided for information only.					
By: RW	Chk:	Appd	Date: 101104	Project: DBVS	Rev: 0

	AMEC E&C Services Limited Trail, BC Canada	Instrumentation Data Sheet
ASSET NUMBER: 145579-D-SP-032		TAG NUMBER: 33-PDIT-418
SUBJECT: <u>Bulk Vitrification Dried Waste Transfer System</u>		
SERVICE: <u>ICV Feed Chute Filter No. 2 DP</u>		
SUPPLIER: _____		
MAKE: <u>Yokogawa</u>	P.O. No.: _____	
MODEL: <u>EJA Series</u>	P&ID No.: <u>DBVS-SK-P010</u>	
TRANSMITTER		
Model No.: <u>EJA110A</u>	Power Supply: <u>24V dc</u>	
Range: <u>-40 to 40 in H₂O</u>	Output: <u>4-20 mA Isolated</u>	
Calibrated Range: <u>0 to 40 in H₂O</u>	Relay Output: <u>N/R</u>	
Case Material: <u>Low copper cast-aluminum</u>	Local Indication: <u>1.0" LCD (3 1/2" digits)</u>	
Enclosure Rating: <u>NEMA4X</u>	Conduit Connect: _____	
	Mounting Bracket: <u>integral to transducer</u>	
TRANSDUCERS		
Model No.: _____		
Line Material: <u>SS</u>		
Line Size/Sch'd: _____		
Transducer Mat'l: <u>SS</u>		
Process Connection: _____		
Signal Cable Length: _____		
Mounting: <u>Vertical</u>		
Classification: <u>Factory Mutual</u>		
316SS Tags permanently affixed to instrument:		
OPTIONS		
	<u>Accuracy 0.25% span or better</u>	
	<u>Display to read in "in H₂O"</u>	
SERVICE CONDITIONS:		
Line No./Size/Sch _____	Max. Velocity: _____	
Fluid: <u>air</u>	Spec. Gravity: _____	
Flow: <u>none</u>	Acidity: _____	
Temp Min.: <u>32 deg F</u>	Percent Solids: _____	
Temp Oper.: <u>85 deg F</u>	Material Build-Up: _____	
Temp Max.: <u>150 deg F</u>	Vibration: _____	
Press Oper.: <u>-14 psig (vacuum)</u>	Line Material: _____	
Press Max.: <u>atm</u>		
NOTES:		
1. The Seller has reviewed the transmitters offered and found that the following ordering information from Yokogawa, EJA110A-EL55A-92DA/FF1 may be suitable. In any case, the final selection the component is the responsibility of the Seller as this is provided for information only.		
By: RW	Chk _____	Appd. _____
Date: 101104	Project: DBVS	Rev: 0

 <p>AMEC E&C Services Limited Trail, BC Canada</p>	<p>Instrumentation Data Sheet</p>				
<p>ASSET NUMBER: 145579-D-SP-032 TAG NUMBER: 33-PDIT-419</p>					
<p>SUBJECT: <u>Bulk Vitrification Dried Waste Transfer System</u></p>					
<p>SERVICE: <u>Primary HEPA Filter DP</u></p>					
<p>SUPPLIER: _____</p>					
<p>MAKE: <u>Yokogawa</u></p>	<p>P.O. No.: _____</p>				
<p>MODEL: <u>EJA Series</u></p>	<p>P&ID No.: <u>DBVS-SK-P010</u></p>				
<p>TRANSMITTER</p>					
<p>Model No.: <u>EJA110A</u></p>	<p>Power Supply: <u>24V dc</u></p>				
<p>Range: <u>-40 to 40 in H₂O</u></p>	<p>Output: <u>4-20 mA Isolated</u></p>				
<p>Calibrated Range: <u>0 to 40 in H₂O</u></p>	<p>Relay Output: <u>N/R</u></p>				
<p>Case Material: <u>Low copper cast-aluminium</u></p>	<p>Local Indication: <u>1.0" LCD (3 1/2" digits)</u></p>				
<p>Enclosure Rating: <u>NEMA4X</u></p>	<p>Conduit Connect: _____</p>				
	<p>Mounting Bracket: <u>integral to transducer</u></p>				
<p>TRANSDUCERS</p>					
<p>Model No.: _____</p>					
<p>Line Material: <u>SS</u></p>					
<p>Line Size/Sch'd: _____</p>					
<p>Transducer Mat'l.: <u>SS</u></p>					
<p>Process Connection: _____</p>					
<p>Signal Cable Length: _____</p>					
<p>Mounting: <u>Vertical</u></p>					
<p>Classification: <u>Factory Mutual</u></p>					
<p>316SS Tags permanently affixed to instrument:</p>					
<p>OPTIONS <u>Accuracy 0.25% span or better</u></p>					
<p> <u>Display to read in "in H₂O"</u></p>					
<p> _____</p>					
<p> _____</p>					
<p>SERVICE CONDITIONS:</p>					
<p>Line No./Size/Sch _____</p>	<p>Max. Velocity: _____</p>				
<p>Fluid: <u>air</u></p>	<p>Spec. Gravity: _____</p>				
<p>Flow: <u>none</u></p>	<p>Acidity: _____</p>				
<p>Temp Min.: <u>32 deg F</u></p>	<p>Percent Solids: _____</p>				
<p>Temp Oper.: <u>85 deg F</u></p>	<p>Material Build-Up: _____</p>				
<p>Temp Max.: <u>150 deg F</u></p>	<p>Vibration: _____</p>				
<p>Press Oper.: <u>- 14 psig (vacuum)</u></p>	<p>Line Material: _____</p>				
<p>Press Max.: <u>atm</u></p>					
<p>NOTES:</p>					
<p>1. The Seller has reviewed the transmitters offered and found that the following ordering information from Yokogawa, EJA110A-ELS5A-92DA/FF1 may be suitable. In any case, the final selection the component is the responsibility of the Seller as this is provided for information only.</p>					
By: RW	Chk: _____	Appd: _____	Date: 101104	Project: DBVS	Rev: 0

	AMEC E&C Services Limited Trail, BC Canada	Instrumentation Data Sheet
ASSET NUMBER: 145579-D-SP-032		TAG NUMBER: 33-PDIT-424
SUBJECT: <u>Bulk Vitrification Dried Waste Transfer System</u>		
SERVICE: <u>Secondary HEPA Filter DP</u>		
SUPPLIER: _____		
MAKE: <u>Yokogawa</u>	P.O. No.: _____	
MODEL: <u>EJA Series</u>	P&ID No.: _____	DBVS-SK-P010
TRANSMITTER		
Model No.: <u>EJA110A</u>	Power Supply: <u>24V dc</u>	Output: <u>4-20 mA Isolated</u>
Range: <u>-40 to 40 in H₂O</u>	Relay Output: <u>N/R</u>	Local Indication: <u>1.0" LCD (3 1/2" digits)</u>
Calibrated Range: <u>0 to 40 in H₂O</u>	Conduit Connect: _____	Mounting Bracket: <u>integral to transducer</u>
Case Material: <u>Low copper cast-aluminium</u>	Enclosure Rating: <u>NEMA4X</u>	
TRANSDUCERS		
Model No.: _____	Line Material: <u>SS</u>	
Line Size/Sch'd: _____	Transducer Mat'l.: <u>SS</u>	
Process Connection: _____	Signal Cable Length: _____	
Mounting: <u>Vertical</u>	Classification: <u>Factory Mutual</u>	
316SS Tags permanently affixed to instrument:		
OPTIONS		
Accuracy <u>0.25% span or better</u>	Display to read in " <u>in H₂O</u> "	

SERVICE CONDITIONS:		
Line No./Size/Sch _____	Max. Velocity: _____	Fluid: <u>air</u>
Flow: <u>none</u>	Spec. Gravity: _____	Acidity: _____
Temp Min.: <u>32 deg F</u>	Percent Solids: _____	Material Build-Up: _____
Temp Oper.: <u>85 deg F</u>	Vibration: _____	Line Material: _____
Temp Max.: <u>150 deg F</u>	Press Oper.: <u>- 14 psig (vacuum)</u>	
Press Oper.: _____	Press Max.: <u>atm</u>	
NOTES:		
1. The Seller has reviewed the transmitters offered and found that the following ordering information from Yokogawa, EJA110A-ELSSA-92DA/FF1 may be suitable. In any case, the final selection the component is the responsibility of the Seller as this is provided for information only.		
By: RW	Chk: _____	Appd: _____
Date: 101104	Project: DBVS	Rev: 0

	Knife Gate Valves				SPEC. No. 145579-D-SP-032					
	NO.	BY	DATE	REVISION	SHEET	OF	DATE			
	A	CWB	10/12/2004		1	1	12/7/2006			
					BY	CHK'D	APPR.			
					CWB					
Project: 145579 Demonstration Bulk Vitrification					P.O.		REQ.			
1. Type Knife Gate Valves 2. Body Size SEE BELOW 3. Body Material* 4. Port Size 5. Number of Ports 2 6. Guiding 7. End Conn/Rating* 8. Packing Material/Type 9. Lubricator 10. Iso Valve 11. Bonnet Type 12. Trim From* 13. Trim Material Seat/Plug* 14. Shaft Material* 15. Required Seat Tightness 16. Max Allow Sound Level dBA Design Pressure Design Temperature					17. MFR 18. Model No.* 19. Flow Composition 20. Required Cv 21. Inlet Press Norm/Max 22. Flow Rate Norm/Max 23. dP/Max Shut Off dP 24. Temp Oper/Max 25. Oper sp gr/Visc 26. % Superheat/Flash 27. Crit Press/% Solids 28. Mol Wt/Vapor 29. Pred. Sound Level dBA 30. Supplier Unit Process Company 31. Address Everett, WA 32. Phone (509) 346-9920 33. Fax (509) 346-9951					
Rev.	*Tag. No.	Line no. /Equip.	P&ID	Body Size	T" Max.	Pressure			Service	Notes
						Norm	Max.	Range		
	V-105		33-A-0106							
	V-103		33-A-0106							
	V-104		33-A-0106							
	V-109		33-A-0106							
	V-110		33-A-0106							
NOTES										



TECHNICAL SPECIFICATION

PROJECT:	Final DBVS Design	145579-D-SP-032	REV. 2
PROJECT NO.:	145579	DRIED WASTE TRANSFER SYSTEM	
CLIENT:	AMEC E&E - Richland, Washington		

Appendix D

TFC-ESHQ-Q_C-C-03, Revision C-2, *Control of Suspect/Counterfeit Items*

(53 pages including cover)

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CH2M HILL Hanford Group, Inc.	Manual	ESHQ
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1.0 PURPOSE AND SCOPE
(7.1.1)

This procedure describes the process for the identification, prevention, evaluation, notification, and disposition of suspect/counterfeit items (S/CIs) at CH2M HILL. This procedure applies to items that are:

- In the procurement cycle
- In source or receiving inspection
- In inventory at warehouses and staging areas
- Installed
- In operation.

This procedure applies to:

- Company ordered material
- Material supplied by subcontractors
- Material and test equipment supplied by test sponsors
- Construction
- Fabrication shops
- Laboratory work and experiments
- Surplus/excess property
- Government property
- Material obtained from U.S. Department of Energy (DOE) sources.

2.0 IMPLEMENTATION

This procedure is effective on the date shown in the header.

3.0 RESPONSIBILITIES

3.1 Procurement Personnel

Maintain awareness of S/CI and support S/CI program implementation.

3.2 Inspection Personnel

Perform inspections for conformance or acceptance of material including verifications that the item(s) being inspected do not exhibit indications attributed to potential suspect/counterfeit items.

3.3 Quality Assurance Engineer

1. Ensures appropriate procurement controls are implemented to preclude entry of S/CI to the site through review of procurement documents.
2. Notifies the S/CI coordinator of nonconformance reports (NCRs) associated with S/CI.

3.4 S/CI Coordinator

Apprises company, DOE, and DOE local Office of the Inspector General personnel of S/CI status and final disposition.

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3.5 Assigned Engineering Personnel

1. Evaluate S/CI information for applicability to design and procurement specifications, system configuration, and operating conditions.
2. Provide technical specifications, critical characteristics, and acceptance methods in support of procurement and inspection activities to prevent introduction of S/CI.

3.6 Responsible Managers and Supervisors

1. Maintain awareness of S/CI.
2. Control potential S/CI.
3. Evaluate training needs based on job classification and ensure individuals receive training in S/CI awareness, prevention, detection, and reporting, as appropriate, to respective assignments.

4.0 PROCEDURE

4.1 Introduction

The two most common S/CI's found at DOE facilities have been threaded fasteners fraudulently marked as high-strength bolts, and refurbished electrical circuit breakers sold and distributed under false certifications. Purchasers have also been misled into accepting S/CI's that do not conform to specified requirements by falsified documentation.

NOTE: Questions about a specific item should be referred to the S/CI coordinator. Attachment A provides a historical listing of suspect components. Equipment/material types or classes have been established to identify those specific items which are classified as potentially misrepresented or S/CI. Attachment B provides a listing of those classifications and items subject to S/CI control at tank farm facilities.

4.2 Procurement

CH2M HILL Personnel

1. Ensure material requirements are specified in subcontracts to preclude the purchase or introduction of S/CI. Use the information in Attachments A, B, C, D, E, F, G, H, and I to identify specific components, characteristics, precautions, and other considerations that are to be addressed during the procurement process to prevent introduction of S/CI.
2. Ensure material requests for quality level 1, 2, and 3 items and services include appropriate technical specifications, procurement quality clauses, documentation, and inspection requirements to prevent introduction of S/CI.
3. In maintenance and construction/fabrication subcontracts, specify appropriate requirements to preclude the purchase or introduction of S/CI.

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- | | |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Quality Assurance Engineer | 4. Review procurement documents to ensure they contain the appropriate procurement controls to preclude entry of S/CI to the site. |
| Procurement Personnel | 5. Ensure vendor selection complies with qualification requirements for the quality level of the items and services and is based on the vendor's ability to demonstrate the capability of delivering acceptable items. |

4.3 Inspection for Potential S/CI

- | | |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Bill of Material Preparers | 1. For quality level 0 and P-Card items listed in Attachment B, designate an S/CI inspection in the special instruction of the Bill of Material in accordance with the requirements of <u>TFC-BSM-FPM MC-C-01</u> . |
| | 2. Ensure quality level 0 and P-Card items are inspected prior to material issuance. |
| First Line Manager | 3. Obtain on-site S/CI inspection for quality level 0 and P-Card items prior to material issue and use. |
| Engineering Personnel | 4. Provide technical specifications, critical characteristics, and acceptance methods to facilitate inspection planning for S/CI prevention and detection. |
| Quality Assurance Engineer | 5. Ensure S/CI detection criteria is incorporated into QA inspection planning activities. |
| Assigned Inspection Personnel | 6. Use Attachments G, H, and I as resources for detecting S/CIs during walkdowns and inspections. Specific items are subject to inspection. |
| | 7. Verify and document that the items being inspected do not exhibit indications attributed to potential S/CIs as described in Attachments G through J. |
| | 8. If an S/CI is detected during inspection activities, document and control the S/CI in accordance with <u>TFC-ESHQ-Q ADM-C-02</u> . |

4.4 Control of Material Identified as S/CI

- | | |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Responsible Manager or Delegate | 1. Ensure items identified as potential S/CI are documented as nonconforming and controlled in accordance with <u>TFC-ESHQ-Q ADM-C-02</u> . Non conformances identified as S/CI shall be reviewed and processed within four working days to determine whether or not the items are S/CI. |
| | 2. Transfer tagged S/CIs to 2101-HV for storage. |
| Cognizant Quality Engineer | 3. Notify the S/CI coordinator of all NCRs associated with the S/CI. |

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4.5 Reporting of S/CI

- | | |
|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Assigned Company
Personnel | 1. Report all items identified as potential S/CI in accordance with <u>TFC-OPS-OPER-C-24</u> . (7.1.1) |
| | NOTE: Reporting of S/CIs is required regardless of safety class, where the S/CIs are located (receiving inspection, inventory/storage areas, fabrication and maintenance areas, installed, etc.), or their operating status. |
| S/CI Coordinator | 2. Notify the DOE S/CI coordinator of all occurrence reports associated with S/CIs. As appropriate, transmit copies of NCRs and applicable documentation. |
| | 3. Notify the DOE local Office of Inspector General of all S/CIs. Notification should be e-mailed to the DOE local Office of Inspector General points of contact providing information in the following format: |
| | <ul style="list-style-type: none"> • NCR number • Date NCR was written • Purchase order/job control number (if known) • End use of product • Name of manufacturer, distributor, supplier • Safety class (if known) • Occurrence report number • Value of item(s) • Point(s) of contact • Description of item(s) • Quantity • Description of nonconformance • Any other pertinent information that would help the DOE local Office of Inspector General. |

4.6 Acceptance, Removal, and Disposition of S/CI

- | | |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| S/CI Coordinator | 1. Notify responsible company personnel that S/CI may not be destroyed or disposed of without written release from the DOE local Office of Inspector General. |
| | 2. Prior to destroying or disposing of S/CIs, consult the Inspector General to determine if there is a need to retain the items as evidence for potential litigation. Based on the Office of Inspector General's decision, either: |
| | a. Retain S/CI material as evidence for potential litigation, or |
| | b. Release S/CI material for final disposition and/or disposal as directed by the S/CI coordinator. |

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- | | |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Engineering
Personnel | 3. Evaluate S/CI to determine if its use could create a safety hazard in its current/proposed application. |
| Assigned Company
Personnel | <p>4. If the engineering evaluation of the S/CI has determined that its use could not create a safety hazard in its current/proposed application:</p> <p>a. Disposition the S/CI to remain in place.</p> <p>NOTE: Criteria for dispositioning S/CI is by acceptance, removal, or replacement after an engineering evaluation. This should be based on the deficient characteristic of the particular item.</p> <p>b. Identify the accepted S/CI by marking with orange paint or other appropriate methods and note its location.</p> <p>c. In areas where operating temperatures are 500°F and above or are subject to cyclic loading where fatigue failure is likely to occur, replace all grades 8 and 8.2 S/CI fasteners prior to further use of the equipment.</p> <p>d. Engineering must also identify a way to prevent its reuse in an application it may not be suitable for.</p> <p>e. If removed, prepare the S/CI for disposal.</p> <p>5. If the engineering evaluation of the S/CI has determined that its use could create a safety hazard in its current/ proposed application:</p> <p>a. Contact Waste Feed Operations (WFO) Shift Operations to secure the equipment.</p> <p>b. Remove the S/CI as soon as practical.</p> <p>c. Tag, segregate, or otherwise control the S/CI to prevent inadvertent use.</p> <p>d. Prepare the S/CI for disposal.</p> |
| S/CI Coordinator | <p>6. Ensure that all S/CI material dispositioned for disposal is properly controlled and arranged for the material to be permanently and irrevocably altered so that it cannot be used. Examples of alterations include:</p> <ul style="list-style-type: none"> • Melting • Shredding • Destroying the threads on fasteners. |

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7. If the DOE/Office of Inspector General has approved disposal, arrange for pick-up and disposal of the altered S/CI material on a yearly basis. Burying S/CIs may be acceptable if they do not contain hazardous material or material prohibited by federal, state, or local regulations.

4.7 Surplus/Excess Material

- | | |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Responsible
Personnel | <ol style="list-style-type: none"> 1. Remove S/CI from surplus/excess material before they are released for sale or transfer of accountability. 2. Ensure surplus items received from DOE or other facilities are inspected for S/CI prior to installation. |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

4.8 Assessments

- | | |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Performance
Assurance | <ol style="list-style-type: none"> 1. Conduct assessments of the effectiveness of the S/CI program.

NOTE: The assessment should be performance based and designed to determine if company activities are conducted in accordance with this procedure, DOE 414.1B, DOE O 440.1A, DOE G 414.1-3, and 10 CFR 830, Subpart A. 2. Lines of inquiry will be used as appropriate during assessments in areas that interface with the S/CI process. See Attachment J. |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

4.9 Training

- | | |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Managers and
Supervisors | <ol style="list-style-type: none"> 1. Evaluate individual training needs of assigned personnel to ensure they are proficient in S/CI identification and control procedures within their areas of responsibility. 2. All personnel involved in the following specific areas will receive S/CI process and hands-on training, whether it be formal, continuing training, or required reading. The formal training course that is available is Module #1, Course 170720, "Suspect/Counterfeit Items." <ul style="list-style-type: none"> • Quality Assurance/technicians • Engineers (design, systems, etc.) who procure materials/equipment • Maintenance personnel (electricians, pipefitters, millwrights, instrument technicians) • Warehouse personnel who handle and process materials/equipment • Tool crib attendants. |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

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S/CI Coordinator 3. Collect, maintain, disseminate, and use the most accurate, up-to-date information on S/CIs and suppliers using all available sources, including:

- Government-Industry Data Exchange Program (www.gidep.org)
- Institute of Nuclear Operators (www.inpo.org)
- DOE Occurrence Reporting and Processing System
- DOE Suspect/Counterfeit web site (<http://tis.eh.doe.gov/paa/sci/>).

NOTE: Information identified during this review that may be applicable to CH2M HILL's on-site suspect/counterfeit program will be provided to the appropriate personnel using one of the following methods: lessons learned, required reading, briefings, training, or changes to this procedure.

5.0 DEFINITIONS

Counterfeit part. A part made or altered so as to imitate or resemble an "approved part" without authority or right, and with the intent to mislead or defraud by passing the imitation as original or genuine.

Fastener (regardless of the safety classification).

- A screw, nut, bolt, or stud with internal or external threads or a load-indicating washer with a nominal diameter of 5 millimeters or greater in the case of such items described in metric terms; or 1/4 inch or greater in the case of such items in terms of the English system of measurement which contains any quantity of metal and held out as meeting a standard or specification which requires through-hardening; or
- A screw, nut, bolt, or stud having internal or external threads which bears a grade identification marking required by a standard or specification; or
- A washer to the extent that it is subject to a standard or specification applicable to a screw, nut, bolt, or studs described above, except that such term does not include any screw, nut, bolt, or stud that is produced and marked as American Society for Testing and Materials (ASTM) A 307 Grade A or produced in accordance with ASTM F432.

Grade identification. Any symbol appearing on a fastener purporting to indicate that the fastener's base material, strength properties, or performance capabilities conform to a specific standard of a consensus standards organization or government agency.

Graded classifications. System used to determine minimum requirements for structures, systems and components (e.g., design, operation, procurement, and maintenance requirements). The graded classifications in order of precedence are safety class, safety significant, and enhanced quality general services.

High strength graded fastener. Fasteners having a minimum tensile strength of 75 ksi, including those produced and procured in accordance with the Society of Automotive Engineers Standard

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J429, Grades 5, 5.2, 8, and 8.2; ASTM Standard A325, Types 1, 2, and 3; ASTM A490, ASTM A354, ASTM A449 (I&II), and some ASTM F468.

Item. An all-inclusive term used in place of any of the following: appurtenance, assembly, component, equipment, material, module, part, structure, subassembly, subsystem, system, or unit.

An all-inclusive term used in place of any of the following: appurtenance, facility, sample, assembly, component, equipment, material, module, part, structure, subassembly, subsystem, system, unit, documented concept, or data.

Substantial safety hazard. A loss of safety function to the extent that there is a major reduction in the degree of protection to the public or employee health and safety.

Suspect/counterfeit items. A suspect item is one in which there is an indication by visual inspection, testing, or other information that it may not conform to established Government or industry-accepted specifications or national consensus standards. A counterfeit item is a suspect item that is a copy or substitute without legal right or authority to do so or one whose material, performance, or characteristics are knowingly misrepresented by the vendor, supplier, distributor, or manufacturer. An item that does not conform to established requirements is not normally considered S/CI if the nonconformity results from one or more of the following conditions, which should be controlled by site procedures as nonconforming items:

- Defects resulting from inadequate design or production quality control
- Damage during shipping, handling, or storage
- Improper installation
- Deterioration during service
- Degradation during removal
- Failure resulting from aging or misapplication, or
- Other controllable causes.

6.0 RECORDS

No records are generated during the performance of this procedure.

7.0 SOURCES

7.1 Requirements

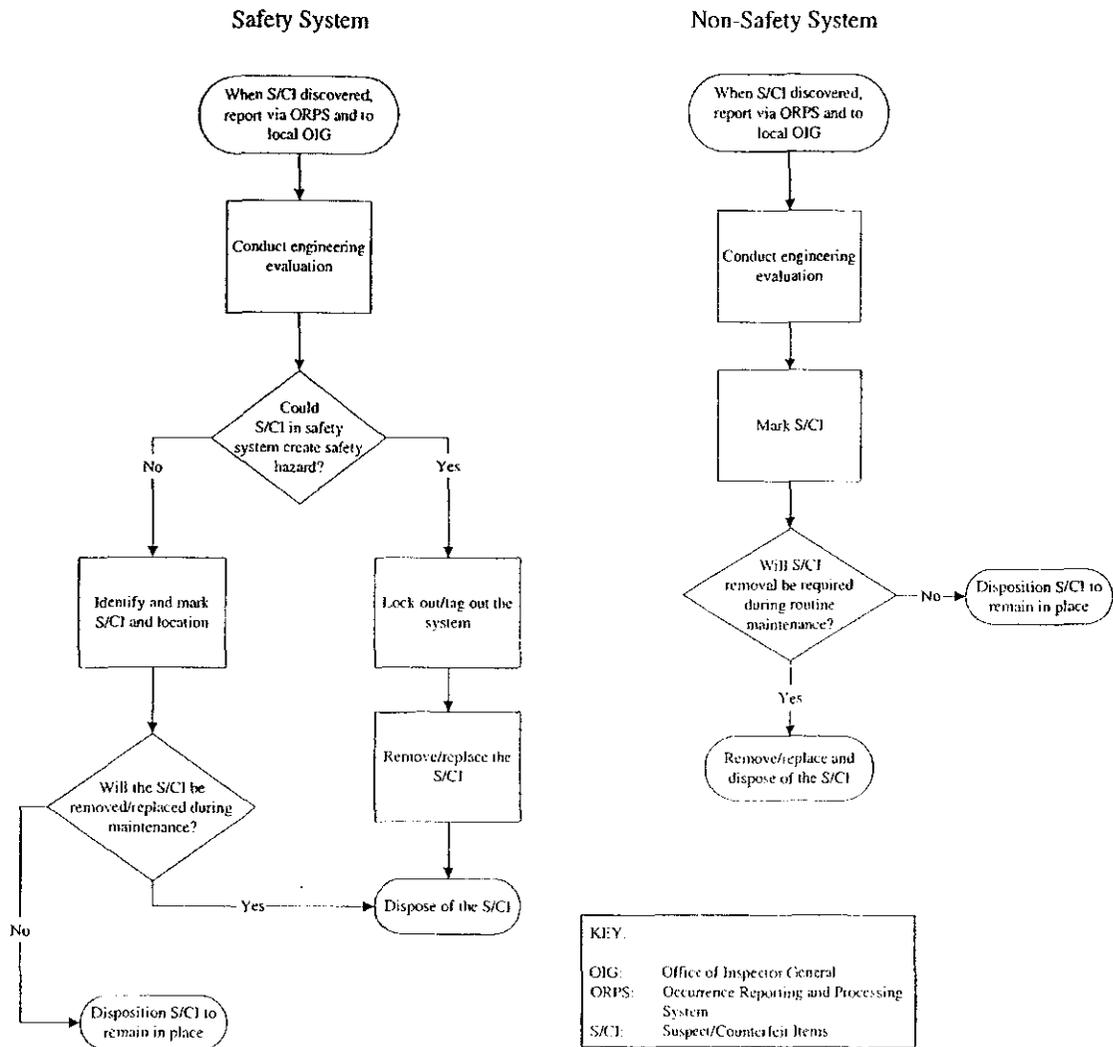
1. TFC-PLN-02, "Quality Assurance Program Description."

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7.2 References

1. DOE G 414.1-3, "Suspect/Counterfeit Items Guide for Use with 10 CFR 830 Subpart A, Quality Assurance Requirements, and DOE O 414.1B, Quality Assurance."
2. HNF-SD-MP-SRID-001, "Standards/Requirements Identification Document for the Tank Farm Contractor."
3. NRC Information Notice 89-70: "Possible Indications of Misrepresented Vendor Products."
4. NRC Information Notice 89-70, Supplement 1: "Possible Indications of Misrepresented Vendor Products."
5. TFC-BSM-CP_CPR-C-01, "Purchasing Card (P-Card)."
6. TFC-BSM-CP_CPR-C-03, "Buyer's Technical Representative Process."
7. TFC-BSM-CP_CPR-C-06, "Procurement of Items (Materials)."
8. TFC-BSM-CP_CPR-C-09, "Supply Chain Process."
9. TFC-BSM-CP_CPR-C-11, "Acquisition Planning."
10. TFC-BSM-FPM_MC-C-01, "Material Receipt, Storage, Issuance, Return, and Excess Control."
11. TFC-ESHQ-Q_ADM-C-02, "Nonconforming Item Reporting and Control."
12. TFC-OPS-OPER-C-24, "Occurrence Reporting and Processing of Operations Information."
13. TFC-PLN-03, "Engineering Program Management Plan."

Figure 1. Management of Suspect/Counterfeit Items.



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ATTACHMENT A - SUSPECT COMPONENTS LIST

This list was extracted from the U.S. Department of Energy Quarterly Reports on the "Analysis and Trending of Suspect/Counterfeit Items at Department of Energy Facilities," July 1997.

NOTE: It is not necessarily a negative reflection on a supplier or manufacturer if S/CIs are reported regarding its particular product. Reputable manufacturers and suppliers have a vital interest in preventing the manufacture or distribution of S/CI associated with themselves. It may be that the supplier or manufacturer was victimized and is pursuing S/CI associated with its products in an aggressive, prudent, and professional manner in order to get such items off the market. Therefore, each particular case regarding the manufacture or supply of S/CI must be examined on its own merit without making premature conclusions regarding fault or culpability of the manufacturer or supplier whose name is associated with the S/CI. In short, what follows is a "suspect components list" and not a "suspect manufacturer or supplier list." The manufacturer or supplier identified in the following table should not be considered to have engaged in any wrongdoing without additional information.

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ATTACHMENT A - SUSPECT COMPONENTS LIST (cont.)

Component	Manufacturer/Type	Description	Supplier	References
Circuit Breakers	Westinghouse (Component Examples)			
	<ul style="list-style-type: none"> • TF136090 • TF361050WL • TED1130020 	Commercial Grade	Westinghouse Electric Supply Co. (WESCO)	NRC I.N. 91-48
	<ul style="list-style-type: none"> • Not Provided 			
	<ul style="list-style-type: none"> • DB-25 & DS-416 	Low Voltage	Satin America & Circuit Breaker Systems, Inc.	NRC I.N. 89-45 & Supplement #2
	<ul style="list-style-type: none"> • FSN-5925-628-0641 • DB-25 • DB-50 • HKB3150T • FB3020 • FB3070 • FB3050 • EHB3025 • LBB3125 • HKA31250 • JA3200 • EHB2100 • 225N 	Trip units; Navy Trip units; 1, 2, & 3 pole various amp. ratings	General Circuit Breaker & Electrical Supply	NRC I.N. 88-46, Supplements and Attachments
	<ul style="list-style-type: none"> • EB 1020 • HDEA 2030 • MCP331100R • MCP431550CR • BAB3060H • 656D14 8G03 • FA-2100 • EH-2050 • HFB-3050 • HFD(B)-3020 • MA3600 • F2020 • EH2100 • EB3050 • HMC3800F • EA2090 • FA3125 • JMCP 150 		HLC Electrical Supply	Office Of Nuclear Safety 93-9
			California Breakers, Inc.	
			PENCON International (DBA) General Magnetics/Electric Wholesale	
			ANTI THEFT Systems, Inc. (DBA) AFS Circuit Breakers and AC Circuit Breaker - Electrical Supply	
			Molded Case Circuit Breakers	
			NSSS, Inc.	
			Spectrum, Tech.	
		Rosen Electric		
		Luckow Circuit Breaker		

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Component	Manufacturer/Type	Description	Supplier	References
Circuit Breakers	Westinghouse (cont.) (Component Examples)			
	<ul style="list-style-type: none"> • HFD • EH2070 • FA2050 • JA2225 • JL3B125 • JL3B070 • JL3B150 • JL3B200 • JL3B090 • JL3B100 • HLM3800T • F3100N • MA3500 • EH2015 • FA3035 • FA2100 • HLA2125OTM • EH2070 • JB3100 • EB2030 • 8MC800 • CAH3200 • E1HB3040 • JL3-B150 • JL3-B200 • JL3-B090 • JL3-B1000 • HFA, HFB, FA • JL3-(B)8070 • JL3-B125 • FH-2020 • FA-3035 • EH-2050 • FA-2100 • FA-2050 • HFB-3050 • JA-2225 • HLM3800T • F3100N • MA3500 • EH2015 • LA3200W1 • HLA3200T • 2602D58U9 	Shunt Trips Aux. Contacts 2 & 3 pole circuit breakers of various amperages	<p>General Circuit Breaker & Electrical Supply</p> <p>HLC Electrical Supply</p> <p>PENCON International (DBA) General Magnetics/ Electric Wholesale</p> <p>ANTI THEFT Systems, Inc. (DBA) ATS Circuit Breakers and AC Circuit Breaker - Electrical Supply</p> <p>Molded Case Circuit Breakers Co. (MCCB)</p>	NRC I.N. 88-46 Supplements and Attachments

ATTACHMENT A - SUSPECT COMPONENTS LIST (cont.)

Component	Manufacturer/Type	Description	Supplier	References
Circuit Breakers	Westinghouse (cont.) (Component Examples)			
	<ul style="list-style-type: none"> • HLB3200T • 262156G19 • 1A & 1B • HL300T • HLA2400TM • HMA3600T • HMA3700T • HKA3225T • HNB2700T 	<p>225 amp, 3 pole 3 pole, 20 amp 3 pole, 30 amp 1 pole, 20 & 30 amp 2 pole, 20 & 30 amp 3 pole, 60 amp</p>	Not Provided	<p>NRC I.N. 88-46 Supp. & Attach.</p> <p>SENS ID #10 3-17-89 SENS ID #11 3-3-89</p>
	<ul style="list-style-type: none"> • MDL#KAF • QNB3020 • QNB3030 • BA 	3 pole, 20 amp	Not Provided	
	<ul style="list-style-type: none"> • BA • BA • E3060 • F3020 			<p>SENS Report ID #12 10-19-88 NRC I.N. 88-46</p>
Circuit Breakers	ITE (Component Examples)			
	<ul style="list-style-type: none"> • Model - E43B015 	3-phase 480 volt	Cal. Breakers/Elect. Wholesale Supply Co.	SENS Report ID #8, 5-5-89
	<ul style="list-style-type: none"> • EQ-B 	1 pole, 20 amp 3 pole, 30 amp	Not Provided	SENS ID #10 3-17-89
	<ul style="list-style-type: none"> • EE-3B030 			SENS ID #11 3-3-89
	<ul style="list-style-type: none"> • EF3B070 • EF3H050 • EF3B125 • EF3B040 • E42B020 • QJ2B200 • JL3B400 	2 & 3 pole various amperages	<p>General Circuit Breaker & Electrical Supply</p> <p>HLC Electrical Supply</p>	NRC I.N. 88-46, Supplements and Attachments

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Component	Manufacturer/Type	Description	Supplier	References
Circuit Breakers	ITE (cont.) (Component Examples) <ul style="list-style-type: none"> • HE9B040 • EE3B050 • BQ2B030 • EE3B070 • EE2B100 • EE2B050 • EE2B030 • FJ3B225 • ET • KA • EH-313015 • JL-3B070 • JL-3B150 • E43B015 • EF2-B030 • EH3B100 • QP1B020 • QJ3B200 • EF3B100 • J193 		California Breakers, Inc. PENCON International (DBA) General Magnetics/Electric Wholesale ATS Circuit Breakers, Inc. Panel Board Specialties Rosen Electric Equipment	
Circuit Breakers	ITE, Gould & ITE Imperial Brown Boveri Elect. (BBE) ASEA Brown Boveri (Component Examples) <ul style="list-style-type: none"> • Type HK • 5 HK • 7.5 HK • 15 HK • 38 HK • ITE 62-6 	Not Provided ID-4KV Not Provided Not Provided Not Provided	Brown Boveri ASEA Brown Boveri	NRC I.N. 89-86 NRC I.N. 87-41 Office of Nuclear Safety, 92-25
Circuit Breakers	Square "D" Co. Component Examples <ul style="list-style-type: none"> • K11L 36125 (Any Type) 	Molded Case	General Circuit Breaker & Electrical Supply HLC Electric Supply California Breakers, Inc. PENCON International (DBA) General Magnetics/Electric Wholesale	NRC I.N. 88-46 Supp. & Attach. NRCB 88-10 NRC I.N. 90-46

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Component	Manufacturer/Type	Description	Supplier	References
Circuit Breakers	Square "D" Co. Component Examples (cont.)		ANTI THEFT Systems Inc. (DBA) ATS Circuit Breakers and AC Circuit Breaker - Electrical Supply	
	• QOB220	1 pole, 15 amp	Not Provided	SENS ID #10 3-17-89
	• QO220 • LO-3	2 & 3 pole 20 & 50 amp breakers	General Circuit Breaker & Electrical Supply	NRC I.N. 89-45 & Supplement #2
	• SBW-12 • 989316 • FAL3650-16M or • FAL36050-16M • KA36200	3 pole - 200 amp breaker 30A/600V	HLC Electric Supply California Breakers, Inc.	
	• 999330	Not Provided	PENCON International (DBA) General Magnetics/Electric Wholesale	
Manufacturer not Provided	Not Provided	Stokely Enterprises	DOE Letter 8-26-91 Reprinted NuVEP: Bulletin 7-26-91	
• EHB3025		Molded Case Circuit Breakers		
Circuit Breakers	Fed. Pacific (Component Examples)		General Circuit Breaker & Electrical Supply	
	• NEF431020R • NE111020 • NE	3 pole, 20 amp 1 pole, 20 amp 1 pole, 15 amp	HLC Electric Supply California Breakers, Inc.	
			PENCON International (DBA) General Magnetics/Electric Wholesale	SENS ID. #10 3-17-89

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Component	Manufacturer/Type	Description	Supplier	References
Circuit Breakers	Fed. Pacific (Component Examples) (cont.) <ul style="list-style-type: none"> • NF63-1100 • NE22-4060 • NE22-4100 • NEF-433030 • 2P125 	1, & 3 pole - 30, 60 & 100 amp breakers	ANTI THEFT Systems, Inc. (DBA) ATS Circuit Breakers and AC Circuit Breaker - Electrical Supply General Circuit Breaker & Electrical Supply HLC Electric Supply California Breakers, Inc.	SENS ID. #11 3-3-89 NRC I.N. 88-46, Supp. & Attach.
	Jefferson (Component Examples)	Not Provided	PENCON International (DBA) General Magnetics/electric Wholesale ANTI THEFT Systems, Inc. (DBA) ATS Circuit Breakers and AC Circuit Breaker - Electrical Supply Mid West Co.	NRC I.N. 88-46, Supp. & Attach.
Circuit Breakers	Superior (Component Examples) <ul style="list-style-type: none"> • 246U-3 	Not Provided	General Circuit Breaker & Electrical Supply Rosen Electric HLC Electric Supply California Breakers, Inc. PENCON International (DBA) General Magnetics/Electric Wholesale ANTI THEFT Systems, Inc. (DBA) ATS Circuit Breakers and AC Circuit Breaker - Electrical Supply	NRC I.N. 88-46 Supp. & Attach.

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Component	Manufacturer/Type	Description	Supplier	References
Circuit Breakers	Manufacturer Not Provided (Component Examples) 50DHP250	2 pole - 50 amp	General Circuit Breaker & Electrical Supply HLC Electric Supply California Breakers, Inc. PENCON International (DBA) ATS Circuit Breakers and AC Circuit Breaker - Electrical Supply	NRC I.N. 88-46, Supp. & Attach.
Circuit Breakers Heaters	Cutler Hammer (Component Examples) • 10177H13 • 10177H21 • 10177H32 • 10177H036 • 10177H1049	Not Provided	AAKER General Circuit Breaker & Electrical Supply HLC Electrical Supply California Breakers, Inc. PENCON International (DBA) General Magnetics/Electric Wholesale ANTI THEFT Systems, Inc. (DBA) ATS Circuit Breakers and AC Circuit Breaker - Electrical Supply	NRC I.N. 88-46, Supp. & Attach.

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Component	Manufacturer/Type	Description	Supplier	References
Switches	(Component Examples) Crouse Hinds #EDSC2129 Sq. D Type G. Class 9012, 9025, 9016	Tumbler, ft. op	Platt Electric Supply Co. Gen. Motors, Electro-Motive Design	SENS ID #16 1-27-92 Office of Nuclear Safety 93-24 & 93-27
Transmitters	Rosemount	(Component Examples) • Model 1151 GP • Model 1151 DP	Venotech	E.L. Wilmot letter dated 8-1-91 H. Richardson letter HR-81-91 dated 8-15-91
Motors	Siemen & Allis (Component Examples) INP J43 T 215 T	10 H.P.	General Circuit Breaker & Electrical Supply HLC Electric Supply California Breakers, Inc. PENCON International (DBA) General Magnetics/Electric Wholesale ANTI THEFT Systems, Inc. (DBA) ATS Circuit Breakers and AC Circuit Breaker - Electrical Supply Rosen Electric Equipment	NRC I.N. 88-46, Supplements and Attachments

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Component	Manufacturer/Type	Description	Supplier	References
Relays	Potter & Brumfield (Component Examples)	Not-latching rotary	Stokely Enterprises Spectronics, Inc. Nutherm International The Martin Co.	NRC I.N. 90-57 & Attach.
	MDR-138, 173-1 134-1, 142-1			
	Teledyne	All qualified to MIL-R-28776 and MIL-R-39016	Not Provided	DOE-ID Wilmot letter, 7-16-91
	G.E. & Exide (Component Examples)	Overload & Aux.	General Circuit Breaker & Electrical Supply HLC Electric Supply California Breakers, Inc. PENCON International (DBA) General Magnetics/Electric Wholesale ANTI THEFT Systems, Inc. (DBA) ATS Circuit Breakers and AC Circuit Breaker - Electrical Supply	NRC I.N. 88-46, Supp. & Attach.
	• 12HGA-11S52 • NX 400			
	Manufacturer not provided	Not Provided	Stokely Enterprises	DOE Letter 8-26-91 Reprinted NuVEP: Bulletin 7-26-91
• FSC-5945				
Amerace (or Agastat) (Component Examples)	Electro Pneumatic Timing Relays	Amerace Control Components Supply	SENS ID #1 11-1-91 NRC I.N. 92-24	
Models: E7024 E7022				
A through L Series Model 7032	PRB			

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Component	Manufacturer/Type	Description	Supplier	References
Fuses	Bussman Co. (Component Examples) REN 15 & NOS-30 Class 1E	15A-250V & 30A-600V All Supplied by PMS	General Circuit Breaker & Electrical Supply HLC Electric Supply California Breakers, Inc. PENCON International (DBA) General Magnetics/Electric Wholesale ANTI THEFT Systems, Inc. (DBA) ATS Circuit Breakers and AC Circuit Breaker - Electrical Supply Preventive Maintenance Systems (PMS)	NRC I.N. 88-46, Supp. & Attach. NRC I.N. 88-19
Controllers	Manufacturer Not Listed (Component Examples)	Motor Controllers	Stokely Distributors & Stokely Enterprises, Inc.	DOE letter 8-26-91 & NUVEP Bulletin 7-26-91
Starters	Westinghouse (Component Examples) 626B187G17 626B187G13	Not Provided	General Circuit Breaker & Electrical Supply HLC Electric Supply California Breakers, Inc. PENCON International (DBA) General Magnetics/Electric Wholesale ANTI THEFT Systems, Inc. (DBA) ATS Circuit Breakers and AC Circuit Breaker - Electrical Supply	NRC I.N. 88-45 Supp. & Attach.
Resistors	Unknown	All	Impala Electronics	NRC I.N. 91-01

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Component	Manufacturer/Type	Description	Supplier	References
Semiconductors	Solid State Devices Inc. (SSDI) SFF9140	P-Channel MOSFET	SSDI	DOE Albuquerque Letter, 06-25-96 to DOD Inspector General
	SPD 1511-1-11	Pin Diode (SA3059)		
	2A14/18 or 2A14/52	Ion Implanted Diode		
	SSR4045CTTXV	SCHOTTKY Diodes		
	SFF9140TWX	Power Transistors		
	SPMF106ANH	Special Pack MOSFET Switch		
	SPD 5818 or IN5858JTXV	Axial Leaded SCHOTTKY Diode		
	2N797	Transistor		
	Unknown	Diode (SA 3436)		
Starter Controls	Westinghouse (Component Examples)	Not Provided	General Circuit Breaker & Electrical Supply	NRC I.N. 88-48
	• A200MICAC		HLC Electric Supply	
	• A201K1CA		California Breakers, Inc.	
	• A201L2CA			
	• AN13A		PENCON International (DBA) General Magnetics/Electric Wholesale	
	ANTI THEFT Systems, Inc. (DBA) ATS Circuit Breakers and AC Circuit Breaker - Electrical Supply			

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Component	Manufacturer/Type	Description	Supplier	References
Gauge Glasses	Siemen & Allis (Component Examples) #00-737-637-118 215 T	Not Provided	Rosen Electric Co.	NRC I.N. 88-46 Supp. & Attach.
Mercury Lamps	Spectro Inc. (Component Examples) V00014	Not Provided	General Circuit Breaker & Electrical Supply HLC Electric Supply California Breakers, Inc. PENCON International (DBA) General Magnetics/Electric Wholesale ANTI THEFT Systems, Inc. (DBA) ATS Circuit Breakers and AC Circuit Breaker - Electrical Supply	NRC I.N. 88-46
Electrical Frames	Westinghouse (Component Examples) LA2600F LA3600F MA2800F	Not Provided	General Circuit Breaker & Electrical Supply HLC Electric Supply California Breakers, Inc. PENCON International (DBA) General Magnetics/Electric Wholesale ANTI THEFT Systems, Inc. (DBA) ATS Circuit Breakers and AC Circuit Breaker - Electrical Supply	NRC I.N. 88-46
Push button station	Crouse Hinds (Component Examples) #00-737-637-118	Single gang, pushbutton	Platt Electric Supply Co.	SENS Report ID #16 1-27-92

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Component	Manufacturer/Type	Description	Supplier	References
Overload Relay Thermal Unit	Square D (Component Examples) B19.5, B22	Not Provided	Not Provided	NRC I.N. 88-46
Piping, Fittings, Flanges, and Components	Tube-line Corp. Ray Miller, Inc.	Subassemblies, fittings, flanges, & other components (Carbon and Stainless Steel components)	Tube-line Ray Miller, Inc.	NRC IEB 83-06 NRC I.N. 89-18 NRC IEB 83-07 NRC I.N. 83-01
Piping, Fittings, Flanges, and Components	Piping Supplies, Inc. & West Jersey Mfg. & Chews Landing Metal Mfg.	Carbon and Stainless Steel Fittings and Flanges	Piping Supplies, Inc. & West Jersey Mfg. & Chews Landing Metal Mfg.	NRC Bulletin 88-05 & Supplements
Valves	VOGT	Full port design 2-inch Model SW-13111 & 1023	CMA International IMA Valve Refurbisher	NRC I.N. 88-48 & Supplements
	Crane	4"-1500psi, pressure sealed	Southern Cal. Valve Maintenance co., Amesse Welding Service & CMA Int.	NRC I.N. 91-09
	ITT Grinnell Valve Co., Inc	Diaphragm valves	ITT Grinnell Valve Co. Inc. Div. of Diaflo & ITT Engineered Valves	NRC Comp. Bulletin 87-02
	Crane, Pacific, Powell, Walworth & Lunkenheimer	Gate Valves	Coffeyville Valve Inc.	NRC I.N. 92-56
	Pacific	8" & 3" Globe Valve	CMA & IMA Valve Refurbisher	NRC I.N. 88-48, Supp. & Attach.
	Crane Chapman	24" Check Valve	CMA & IMA Valve Refurbisher	NRC I.N. 88-48, Supp. & Attach.
Pacific	Check Valve	Check Valve	CMA & IMA Valve Refurbisher	NRC I.N. 88-48, Supp. & Attach.

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Component	Manufacturer/Type	Description	Supplier	References
Valves	Kerotest	8" Valve	CMA & IMA Valve Refurbisher	NRC I.N. 88-48 Supp. & Attach.
	Pacific	4" Gate Valve	CMA & IMA Valve Refurbisher	NRC I.N. 88-48 Supp. & Attach.
	Lukenheimer	6" Model 1542 20" Model 3013	CMA & IMA Valve Refurbisher	NRC I.N. 88-48 Supp. & Attach.
	Crane	All	CMA & IMA Valve Refurbisher	NRC I.N. 88-48 Supp. & Attach.
Flanges	China Ding Zinang Nan Xi Li Flange Co. Shou Gang Mach. Eng. Co.	Flanges, ASTM A105, ASME SA105	Billiongold Co. LTD. Tain Gong Co. Sanxi Province Overseas Trading Corp	NRC I.N. 92-68 and Attachments Office of Nuclear Safety 92-25, 93-23, and 92-35 National Board of Boiler and Pressure Vessel Inspectors (NBB) Bulletin: Special Report, 1992, Volume 48, Number 2, The Chinese Flange Investigation
Valve Replacement Parts	Masonellian-Dresser Industries	Plug stem, stem to plug anti-rotation pin, seat ring, valve plugs, bushings, cages & packing box components	Cor-Val, Control Valve Specialists, H.H. Barnum & M.D. Norwood, Sample Webtrol Controls, Inc.	NRC I.N. 88-97 Supp. & Attach.
Pumps & Replacement Parts	Hayward Tyler Pump Co.	HTPC ASME Nuclear Code	Hayward Tyler Pump Co.	IEB 83-05 & Attachments
Channel Members	Unistrut Corporation	Continuously slotted channels, structural framing members, fasteners, nuts, fittings, pipe clamps	Unistrut Corporation	NRC I.N. 91-25
Fire Barriers	Thermal Science Inc.	Thermo-Log 330	None Listed	ES&Q Update #8 NRC I.N. 92-55
Valve Actuator	Limitorque	Eyebolts on housing cover	None Listed	Office of Nuclear Safety 93-25 NRC I.N. 93-37

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Component	Manufacturer/Type	Description	Supplier	References
Steel	Alloy & Carbon Steel Co. Inc., Atlantic Steel Co., Livingston Steel Co., & Copperweld Steel co.	Plate Angle Flat Bar Bar	Meredith Corporation Pressure Vessel Nuclear Alloy & Carbon Steel Co., Inc.	NRC I.N. 89-56, Attachments and Supplements
Fasteners (Bolts, Screws, Nuts, and Washers)	(parentheses designated headmark) Asahi (A) Daichi (D) Daiei (E) Fastener Co. of Japan (FM) Hinomoto Metal (H) Jin Her (J) Kyowa (K) Kosaka Kogyo (KS) Kyoei Minamida Seiybo (M) Mnato Kogyo (MS) Nippon (NF) Takai (RT) Tsukimori (S) Unytte (UNY) Yamadai (Y) Ivaco, Infasco (hollow triangled)	<ul style="list-style-type: none"> • Those with suppliers or manufacturers • Those that are improperly marked • Those of foreign manufacture that do not meet Public Law 101-592. Fastener Quality Act 	<p>Note: Listed suppliers may also be manufacturers</p> <p>Lawrence Engineering & Supply Co. Metal Building Bolts Nichimin Corporation UNICO Ace Corporation E. K. Fasteners, Inc. H. Y. Port Fasteners Co. Kobayashi Metals, LTD. Takai Screw Mfg. Co. LTD. Yamaguchi Sesakusho Co. LTD. Highland Bolt & Nut Porteous Fastener Co. Northwest Fasteners Ziegler Bolts & Parts Co. Edgewater Fasteners, Inc. Reynolds Fasteners A & G Engineering</p>	<p>Commercial Carrier Journal Articles for: 6/88, 1/90, 2/90, 3/90, 4/90, 6/90, 7/90, 12/90</p> <p>INEL Suspect Headmark List</p> <p>SENS Report #5 2/6/91</p> <p>SENS Report #13 2/6/91</p> <p>HR 3000, U.S. House of Representatives, July 1988</p> <p>J. A. Jones, Ltr. 9/23/92</p> <p>Memo from L. Kubicek, 3/28/91</p> <p>Memo from D. Sanow, 3/8/91</p> <p>"Fastener Technology International," Feb., April, and June 1993</p> <p>Rep. J. Dingell Ltr to Comm. Dept. & NRC June 18, 1993</p> <p>Office of Nuclear Safety 93-26, 93-22, 93-11</p> <p>DOE Quality Alert, Bulletin, Issue No. 92-4, August 1992</p> <p>FDH Hanford Suspect Headmark List</p>

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ATTACHMENT A - SUSPECT COMPONENTS LIST (cont.)

Component	Manufacturer/Type	Description	Supplier	References
Fasteners (Bolts, Screws, Nuts, and Washers)	NUCOR	1-1/4" x 2" Zinc Chromate plated surface Hexhead cap screws	Cordova Bolt, Inc.	SENS ID #13 11-6/91
	Any	Any	Aircom Barnett Bolt Works Bolts & Nuts, Inc. Glasser & Assoc. Knoxville Bolt & Screw Metal Fastener Supply Phoell Mfg. Co. Service Supply Co. Southeastern Bolt & Screw Sure Loc Victory Bolt	NRC Compliance Bulletin 87-02 NRC I.N. 89-59

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**ATTACHMENT B - CLASSIFICATION OF POTENTIALLY SUSPECT/COUNTERFEIT
ITEMS**

- A. **ELECTRICAL ITEMS**
- Molded Case Circuit Breakers
 - Motor Control Centers
 - Complete Units
 - Components
 - Starters
 - Starting coils
 - Contactors
 - Overload relays
 - Starter control relays
 - Overload heaters
 - Protective/control relays
 - DC power supplies/chargers
 - AC inverters
 - Current/potential transformers
 - Exciters/regulators
 - Bus transfers/auto bus transfers
 - Motor generator sets
 - Generators
 - Rewindable motors
 - Printed circuit boards
 - Bulk commodity items
 - Fuses
 - Splices
 - Electrical connectors
 - Indicators/controllers
 - Panel lights/switches
 - Transmitters/instrument switches
 - Isolation devices.

The following items are excluded unless required by the applicable program/project: 600V or less: motors; outlets, switches, and plugs; boxes, conduit (i.e., bodies and covers, nipples, fittings, EMT, flex, liquid tight, rigid); wire; miscellaneous wire connections #10 and below; fixtures; lights.

- B. **MECHANICAL ITEMS**
- Welding materials
 - Rod
 - Wire
 - Flux
 - Structural members (pipe supports)
 - Channel members

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**ATTACHMENT B - CLASSIFICATION OF POTENTIALLY SUSPECT/COUNTERFEIT
ITEMS (cont.)**

- Sheet
- Plate
- Bars
- Round stock
- Other raw material which requires an ASTM or national standard
- All lifting/rigging gear (wire rope shall be made in the United States by a member of the Wire Rope Technical Board (WRTB) or the Associated Wire Rope Fabricators (AWRF) (except stainless steel, and unless recommended otherwise by a crane or hoist manufacturer); stainless steel wire rope shall be made in the United States and shall be 302 or 304 grade stainless steel unless otherwise recommended by a crane or hoist manufacturer)
- Ratchet tie-downs/strapping devices and come-a-longs, with fasteners.

The following materials are excluded unless required by the applicable program/project:
ASTM-A36, brass, copper, sheet metal 7 GA or less, and aluminum.

C. PIPING - which requires an ASTM or ASME standard

- Fittings
- Flanges
- Valves
- Pipe
- Components.

The following materials are excluded unless required by the applicable program/project:
ASTM-A-53, Swagelock; cast iron, galvanized, copper, bronze, and brass; PVC; and gaskets.

D. FASTENERS - All fasteners 1/4" and above in diameter

- Bolts
- Studs
- Cap screws
- High-strength washers
- Nuts
- Anchors.

NOTE: Attachment I identifies headmarkings for stainless steel and carbon steel high strength fasteners that are considered counterfeit. Fasteners exhibiting these headmarks are counterfeit and no further testing is required.

The following items are excluded, unless required by the applicable program/project: sheetmetal screws, wood screws, stove bolts, pan heads, machine screws, lag bolts, threaded rod, rivets, and carriage bolts.

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ATTACHMENT C - SUSPECT/COUNTERFEIT ITEMS INFORMATION SOURCE LIST

A wide variety of industry and Government sources publish information relative to suspect/counterfeit products. The following sources provide information which is available on a continuing basis:

Industrial Fasteners Institute (IFI)

The following information is available from IFI via subscription:

- "Fastener Application Advisory" (Published Monthly)
- "North American Manufacturers Identification Markings for Fasteners"
- Fastener-related video cassettes.

The National Board of Pressure Vessel Inspectors (NBBI)

The NBBI publishes "National Board Bulletins" to alert manufacturers and users of misrepresented products as they are discovered.

National Highway Traffic Safety Administration (NHTSA)

The NHTSA's Office of Defects Investigation issued a "Suspect Bolt List" in late 1990 identifying numerous fasteners, which they determined to be misrepresented.

Trade Journals and Magazines

There are numerous trade-oriented magazines which have carried articles identifying incidents of failure of substandard parts in industry applications which have caused personal injury and death, as well as serious property damage.

Newspaper and Television Reports

Another good source of information are news reports, which provide current accounts of problems encountered as a result of misrepresented products.

U.S. Nuclear Regulatory Commission (NRC)

The NRC issues bulletins, notices, and regulatory guidance on a continuing basis to alert nuclear power utilities of potential intrusion of misrepresented products into the operations environment of operating nuclear power plants.

U.S. Department of Defense (DOD) and U.S. Department of Commerce publications are also monitored by the DOE to assure that the deficiencies identified do not contaminate DOE facilities.

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ATTACHMENT C - SUSPECT/COUNTERFEIT ITEMS INFORMATION SOURCE LIST (cont.)

Government Industry Data Exchange Program (GIDEP)

The mission of this program, established by the Office of Management and Budget, is to support government systems readiness, logistics effectiveness, productivity, and cost reduction through timely retrieval, storage, and distribution of data among government and industry organizations.

U.S. Department of Energy

The following documents are issued by the DOE to provide information and guidance relative to the suspect/counterfeit parts issue:

- DOE Orders
- Letters of Direction
- Bulletins and Quality Alerts

(In addition, the DOE periodically sponsors seminars/workshops relative to the detection and control of suspect/counterfeit parts).

U.S. Customs Service

The U.S. Customs Service has published the Suspect Headmark List (Figure 1) identifying graded fasteners determined to be of indeterminate quality, which has been adopted by DOE and, ultimately, Project Hanford, as a formal guide for use when evaluating currently installed and newly procured graded fasteners to assure their fitness for use on the Hanford Site.

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ATTACHMENT D - CHARACTERISTICS THAT MAY MAKE PRODUCTS VULNERABLE TO MISREPRESENTATION, FRAUDULENT PRACTICES, AND COUNTERFEITING

The following information has been extracted from the NRC Information Notice 89-70, Supplement 1, Attachment 3:

- High-turnover usage rate.
- No easy or practical way to uniquely mark the component itself.
- Critical characteristics, including environmental qualification not easily discernable in external visual inspection, or characteristics that are difficult to verify through receipt testing.
- May be widely used in non-critical and critical applications.
- Use may not result in used appearance.
- Often marketed through a supplier and dropped shipped from locations other than that of the original supplier.
- Special processes for ASME materials may be subcontracted (heat treating, testing, and inspections).
- Easily copied by secondary market suppliers.
- Viable salvage market.
- Reduced number of original equipment manufacturers.
- Obsolete or hard-to-get components.
- Components manufactured by a company that is no longer in business.
- Items with documentation from a plant where construction has been suspended, canceled, or deferred.
- Moderate or low cost.
- High potential for profit (rejected heats of material are purchased and decertified).

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ATTACHMENT E - WHERE TO LOOK FOR SUSPECT/COUNTERFEIT ITEMS

The following areas should receive increased scrutiny to assure that suspect/counterfeit items are not evident:

Items in Supply

- Company supply stock
- Wagon stock
- Other sources of supply contamination.

Items in Use

- Plant facilities, components, and systems
- Equipment
- Operations and maintenance.

Items Being Procured

- "Known" critical items
- Critical equipment and assemblies
- Non-critical "known" purchases.

Operations Decisions

- Major disaster risks
- Personnel safety risks
- Program/mission risks (cost and schedule).

Cost of Implementation

- Potential consequential costs
- Management risk assessment
- Cost of focusing established controls
- Impact on schedule and program mission.

Cost of Focus on Known Suspect/Counterfeit Parts

- Uses existing procurement program
- Focuses on "known parts first"
- Reduction in major disaster potential
- Program costs low/benefits high.

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ATTACHMENT F - SUSPECT/COUNTERFEIT PARTS DETECTION

It is very important to remember that just because an item is identified as being "suspect/counterfeit" it may not be appropriate to simply reject it. A review should be performed prior to formal disposition of the item to assure that it is indeed unfit for the intended application.

DETECTION METHODS

Visual Inspection

Items may be substandard or fraudulent when:

- Nameplates, labels, or tags have been altered, photocopied, painted over, are not secured well, show incomplete data, or are missing (e.g., preprinted labels normally show typed entries).
- Obvious attempts at beautification have been made, e.g., excess painting or wire brushing, evidence of hand painting (touch-up), or stainless steel is painted.
- Handmade parts are evident, gaskets are rough cut, shims and thin metal part edges show evidence of cutting or dressing by hand tools (filing, hacksaw marking, use of tin snips or nippers).
- Hand tool marks on fasteners or other assembly parts (upset metal exists on screw or bolt heads) or dissimilar parts are evident (e.g., seven or eight bolts are of the same material and one is a different material).
- Poor fit between assembled items.
- Configuration is not consistent with other items from the same supplier or varies from that indicated in supplier literature or drawings.
- Unusual box or packing of component or item.
- The supplier is not a factory-authorized distributor.
- Dimensions of the item are inconsistent with the specifications requested on the purchase order and/or those provided by the supplier at the time of shipment.
- The item or component matches the description of one that is on a suspect items list (e.g., U.S. Customs Service "Suspect Headmark List," National Board of Boiler and Pressure Vessel Inspectors (NBBI) "Special Bulletin," etc.).

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ATTACHMENT F - SUSPECT/COUNTERFEIT PARTS DETECTION (cont.)

Documentation

Documents may be suspect/counterfeit when:

- The use of correction fluid or correction tape is evident. Type or pitch change is evident.
- The document is not signed or initialed when required, is excessively faded or unclear (indicating multiple, sequential copying), or data are missing.
- The name or title of the document approved cannot be determined.
- Technical data is inconsistent (e.g., chemical analysis indicates one material and physical tests indicate another).
- Certification or test results are identical between items when normal variations should be expected.
- Document traceability is not clear. The document should be traceable to the item(s).
- Technical data are not consistent with code or standard requirements (e.g., no impact test results provided when impact testing is required or CMTRS physical test data indicate no heat treatment and heat treatment is required).
- Documentation is not delivered as required on the purchase order or is in an unusual format.
- Lines on forms are bent, broken, or interrupted indicating data has been deleted or exchanged (cut and paste).
- Handwritten entries of data are on the same document where typed or preprinted data exists.
- Data on a single line located at different heights indicate the possibility of retyping.

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ATTACHMENT F - SUSPECT/COUNTERFEIT PARTS DETECTION (cont.)

Fasteners

- Headmarkings are marred, missing, or appear to have been altered.
- Threads show evidence of dressing or wear (threads should be of uniform color and finish).
- Headmarkings are inconsistent with a heat lot.
- Headmarkings matching one of those identified on the U.S. Customs Service, "Suspect Headmark List" (Figure QP 3.2-1).
 - Headmarkings which depict both raised and hand-stamped markings, such as those described in WHC Quality Assurance Bulletin # 94-01, "Discrepant Dual Head Stamped Stainless Steel Bolts." This bulletin documents the results of internal inspections and independent testing of stainless steel bolts purchased to ASTM A193, Grade B8, which were found to be substandard.
 - Only manufacturers listed on the "Suspect Fastener Headmark List" (Figure QP 3.2-1) are known to produce substandard graded fasteners. If graded fasteners are discovered which exhibit headmarks matching those on the Suspect/Fastener Headmark List, they shall be considered to be defective without further testing, unless traceable manufacturer's certifications are received which provide documented evidence that the fasteners were not produced by the manufacturer listed on the Suspect Fastener Headmark List.
 - Interpretation of headmark/manufacturers listed on the "Suspect Fastener Headmark List," including newly discovered variations thereto, shall only be provided by the designated S/CI coordinator based on guidance received from the DOE.

Electrical Devices

- Connections show evidence of previous attachment (metal upset or marring).
- Connections show arcing or discoloration.
- Fasteners are loose, missing, or show metal upset.
- Molded case circuit breakers are not consistent with manufacturer-provided checklists for detecting substandard/fraudulent breakers.
- Missing or photocopied Underwriters Laboratories (UL) labels on products requiring such.

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ATTACHMENT F - SUSPECT/COUNTERFEIT PARTS DETECTION (cont.)

Rotating Machinery and Valve Internal Parts

- Shows marring, tool impressions, wear marks, traces of Prussian blue or lapping compound, or other evidence of previous attempts at fit up or assembly.
- Heat discoloration is evident.
- Evidence of erosion, corrosion, wire-drawing or "dimples" (inverted cone-shaped impressions) on valve discs, seats, or pump impellers.

Valves

- **Paint**
 - Valve appears to be freshly painted and valve stem has paint on it
 - Wear marks on any painted surface
 - Valve stem is protected, but protection has paint on it
 - Paint does not match standard Original Equipment Manufacturer (OEM) color.
- **Valve Tags**
 - Tags attached with screws instead of rivets
 - Tags attached in a different location than normal
 - Tags appear to be worn or old
 - Tags with paint on them
 - Tags that look newer than the valve
 - Tags with no part numbers
 - Tags with irregular stamping.
- **Hand Wheels**
 - Old looking hand wheels on new looking valves
 - Hand wheels that look sand blasted or newer than the valve
 - Different types of hand wheels on valves of the same manufacturer.
- **Bolts and Nuts**
 - Bolts and nuts have a used appearance (excessive wrench marks on flats)
 - Improper bolt/nut material (e.g., a bronze nut on a stainless stem).

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ATTACHMENT F - SUSPECT/COUNTERFEIT PARTS DETECTION (cont.)

- **Valve Body**
 - Ground off casting marks with other markings stamped in the area (OEM markings are nearly always raised, not stamped)
 - Signs of weld repairs
 - Incorrect dimensions
 - Freshly sand-blasted appearance, including eye bolts, grease fittings, stem, etc.
 - Evidence of previous bolt head scoring on backsides of flanges, or evidence that this area has been ground to remove such marks
 - On a stainless valve, a finish that is unusually shiny indicates bead-blasting. A finish that is unusually dull indicates sand-blasting. The finish on a new valve is in-between.

Manufacturer's Logo

- Missing.
- Logo plate looks newer than the valve.
- Logo plate shows signs of discoloration from previous use.

Other

- Foreign material inside the valve (e.g., metal shavings).
- Valve stem packing that shows all the adjustments have been run out.
- In gate valves, a gate that is off-center when checked through the open end of the valve.
- Obvious differences between valves in the same shipment.

Price

- Price is significantly less than that of the competition.

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ATTACHMENT G - FASTENERS

1.0 Counterfeit/Substandard High-Strength Bolts

1.1 General Background

Counterfeit bolts have been found in military and commercial aircraft, surface ships, submarines, nuclear weapon production facilities, bridges, buildings, and the space shuttle. These bolts often do not possess the capabilities of the genuine bolts they counterfeit and can threaten the reliability of industrial and consumer products, National Security, or lives. At Congressional hearings in 1987, the Army testified that they had purchased bolts that bore the headmarks of Grade 8 high-strength bolts, but that were actually inferior Grade 8.2 bolts.

The International Fasteners Institute (IFI) reported finding substandard, mis-marked, and/or counterfeit high-strength Grade 8 bolts in the United States commercial marketplace. In 1988, IFI reported that counterfeit medium-strength Grade 5 bolts had also been found.

Foreign bolts dominate the American marketplace due to their price advantage, and the majority of suspect/counterfeit bolts are imported. Identifying, testing, and replacing these bolts has proven expensive and difficult, both mechanically and technically. Not finding and replacing these bolts, however, has proven fatal in some instances.

1.2 Headmarks

Attachment I may be removed and photocopied, as needed, for use as a poster and reference to known suspect fastener headmarks. Bolts with the headmarkings shown have a significant likelihood of being found to be inferior to standards. Generally, the cost of replacement of these bolts is less than the cost of chemical, hardness, and tensile strength testing. Note also that counterfeit bolts can be delivered with counterfeit certificates. Documentation alone is insufficient to demonstrate compliance with standards.

1.3 Consensus Standards

There are several consensus organizations that have published standards for the properties of fasteners. One of these is the Society of Automotive Engineers (SAE). The SAE grade (or alleged grade on a suspect item) of a bolt is indicated by raised or indented radial lines on the bolt's head, as shown in Attachment I. These markings are called headmarks. DOE is currently concerned with two different grades of fasteners: one has three equally spaced radial lines on the head of a bolt which indicate that it should meet the specifications for a Grade 5 bolt; the other has six equally spaced radial lines which indicate a Grade 8 bolt. Letters or symbols on the head of a bolt indicate the manufacturer.

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ATTACHMENT G - FASTENERS (cont.)

Attachment I is a Suspect/Counterfeit Headmark List that was prepared by the United States Customs Service after extensive testing of many samples of bolts from around the nation. Any bolts anywhere in the DOE community that are currently in stock, in bins, or installed that are on the Customs Headmark List should be considered suspect/counterfeit. The headmarks on this list are those of manufacturers that have often been found to have sold bolts that did not meet the indicated consensus standards. Sufficient testing has been done on the bolts on this list to presume them defective without further testing.

1.4 Precautions: Selective Testing

Some facilities (manufacturers, distributors, etc.) perform selective testing of sample bolts rather than have an independent testing laboratory run all the tests required by consensus standards. In many cases, a new counterfeit bolt has roughly the same physical strength as the graded bolt it mimics, but does not have either the chemical composition or the heat treatment specified by the consensus standards. As a result, it will stretch, exhibit metal fatigue, or corrode under less harsh service than the genuine bolt. Simple tensile strength tests cannot be used to identify substandard high-strength fasteners and should not be solely relied upon in performing acceptance test.

1.5 Using Suspect/Counterfeit Grade 5 Bolts in Grade 2 Applications

Some sites use suspect/counterfeit Grade 5 bolts in applications that only call for Grade 2 bolts. Eventually, the suspect/counterfeit Grade 5 bolts may find its way into an application that requires a genuine Grade 5 bolt and that application may fail. In some cases, cheap imported graded bolts have been purchased in place of upgraded bolts because the small price differential made the extra quality seem to be a bargain. Given the expense of removing suspect bolts from DOE facilities, the practice of using suspect bolts for any application should be discontinued.

1.6 Keep Bolts in Original Packages

All bolts purchased should be kept in the original packages, not emptied into bins. The packages should have labels or other markings that would permit them to be associated with a particular procurement action and a specific vendor. Approved supplier lists should be checked to assure that fastener suppliers on that list have been recently qualified/audited for adequacy of their quality programs.

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ATTACHMENT G - FASTENERS (cont.)

2.0 Stainless Steel fasteners

2.1 Purpose

To provide follow-up information to the previous notification sent to the DOE field and contractor organizations in late 1996.

2.2 Background

In November 1993, the Industrial Fastener Institute (IFI) issued a Fastener Advisory regarding 18-8 stainless steel bolts. The advisory warned about a "bait and switch" tactic in which a distributor takes an 18-8 bolt (indicated by two radial lines 90 degrees apart), but no manufacturer's marking, and sells them as ASTM A320 Grade B8 bolts after hand-stamping B8 on to the heads.

As a result of this IFI Advisory, DOE sites conducted a search of facility stores for stainless steel fasteners with hand-stamped B8 grade marks. Hundreds of stainless steel bolts with hand-stamped B8 grade markings, along with a variety of other raised and depressed head and manufacturer's markings were identified in facility stores throughout the DOE complex.

For example, an inspection of shop stock at a Hanford Site facility revealed bolts with three different raised grade markings, 18-8, 304, and F593C, along with raised manufacturer's identifications of CK, H, HP, C, SO, CS, PMC, TH, THE, and a STAR. The majority of the remaining samples found at Hanford exhibited raised grade markings of 18-8 and 304, with a B8 grade marking and manufacturer's identification hand-stamped into the head of the bolt.

Finally, a few samples did not display any manufacturer's markings. Most of the bolts discovered were purchased with the specification to meet a national consensus standard, American Society for Testing and Materials (ASTM) A193, B8 Class 1 rather than the ASTM A320 standard discussed in the IFI warning.

The Savannah River Site also conducted a site-wide search of facility stores with similar results. A total of 159 stainless steel fasteners with hand-stamped B8 grade marks and raised or hand-stamped manufacturer's symbols were found. Fifteen stainless steel fasteners that had no manufacturer's symbol were also found.

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ATTACHMENT G - FASTENERS (cont.)

2.3 Issue

The requirements of the ASTM A193 standard regarding fastener marking and certification are very similar those required by the ASTM A320 standard discussed in the IFI advisory. The ASTM A193 standard requires that grade and manufacturer's identification symbols be applied to the heads of bolts that are larger than 1/4" in diameter. The standard, however, does not specifically differentiate between raised and depressed headmarkings, but states only that "for the purposes of identification marking, the manufacturer is considered the organization that certifies the fastener was manufactured, sampled, tested, inspected in accordance with this specification." In other words, the standard allows for some of the required markings to be formed into the head of the bolt (either raised or lowered) during manufacturing, and the rest to be applied later on via hand-stamping.

Since ASTM A193 does not differentiate between raised and depressed markings, these fasteners can be counterfeited in the same way as the ASTM A320 fasteners discussed in the November 1993 IFI warning. For example, distributors can procure 18-8 stainless steel bolts that were manufactured by an anonymous party, and without conducting the necessary upgrading process or certification testing, a second party could hand-stamp B8 and a manufacturer's marking into the heads to indicate that the fasteners exhibit the mechanical and chemical properties required of ASTM A193 Grade B8 Class 1.

Unless the certification documentation is specifically requested, and in most cases it is not, there is no way to determine by visual inspection whether these fasteners were properly certified and tested to meet the requirements of the ASTM standard.

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ATTACHMENT H - DOE HEADMARK LIST



Help Stamp Out Suspects/Counterfeits

Suspect Stainless Steel Fastener Headmark List

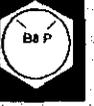
Examples of stainless steel fasteners that have been upgraded from 18-8 to ASTM A320 or ASTM A193 Grade B8 after hand stamping. The last three examples show samples of fasteners to indicate conformance to two non-compatible standards, ASTM A193 and ASTM F 593C.

Any bolt on this list should be treated as defective without further testing and process in accordance with HNF-PRO-301. Note: This list was originally Published by DOE /EH-0196, Issue No. 97-6

If any of these fasteners are located, contact your facility S/CI Point of Contact (POC) for instructions. The POC list is on the Hanford Intranet at: <http://docs.rl.gov/han.info/hiansci/hiansci.doc>. Scroll to the end of the document for the list.

	Surrounding White Color Illustrates Head Markings Before Hand Stamping
	Surrounding Black Color Illustrates Head Markings After Hand Stamping

Suspect

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Document

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ATTACHMENT H - DOE HEADMARK LIST (cont.)

Help Stamp Out Suspects/Counterfeits



Suspect Fastener Headmark List

All Grade 5 and Grade 8 fasteners of foreign origin which do not bear any manufacturers' headmarks:



Grade 5



Grade 8

Grade 5 fasteners with the following Manufacturers' headmarks:

Mark	Manufacturer	Mark	Manufacturer
	J Jinn Her (TW)		KS Kosaka Kogyo (JP)

Grade 8 fasteners with the following Manufacturers' headmarks:

Mark	Manufacturer	Mark	Manufacturer
	A Asahi Mfg (JP)		KS Kosaka Kogyo (JP)
	NF Nippon Fasteners (JP)		RT Takai Ltd (JP)
	H Hinomoto Metal (JP)		FM Fastener Co. of Japan (JP)
	M Minamida Sieybo (JP)		KY Kyoei Mfg (JP)
	MS Minato Kogyo (JP)		J Jinn Her (TW)
	Hollow Triangle Infasco (CA, TW, JP, YU) (Greater than 1/2-inch diameter Grade 8 Hollow Triangle only)		
	E Daiei (JP)		UNY Unytite (JP)

Grade 8.2 fasteners with the following headmarks:



Mark
KS Kosaka Kogyo (JP)

Grade A325 fasteners (Bennett Denver target only) with the following headmarks:

Type	Mark	Manufacturer
Type 1		A325 KS Kosaka Kogyo (JP)
Type 2		
Type 3		

Key: CA-Canada, JP-Japan, TW-Taiwan, YU-Yugoslavia

Any bolt on this list should be treated as defective without further testing.

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ATTACHMENT I - REFURBISHED MOLDED CASE CIRCUIT BREAKERS

Investigations thus far of electrical components at DOE facilities uncovered over 700 suspect/ counterfeit molded-case circuit breakers that were previously used, refurbished and sold to DOE contractors.

I. Recognition Factors

The following factors should be recognized regarding suspect or refurbished circuit breakers:

- A. The quality and safety of refurbished molded-case circuit breakers is questionable since they are not designed to be taken apart and serviced or refurbished. There are no electrical standards established by Underwriters Laboratory (UL) for the refurbishing of molded-case electrical circuit breakers, nor are there any "authorized" refurbishes of molded case circuit breakers. Therefore, "refurbished" molded-case circuit breakers should not be accepted for use in any DOE facility.
- B. One source of refurbished molded-case circuit breakers is from the demolition of old buildings. Some refurbishes are junk dealers who may change the amperage labels on the circuit breakers to conform to the amperage ordered and then merely clean and shine the breakers.

This situation was brought to DOE's attention by the Nuclear Regulatory Commission (NRC), which, in turn, had been informed of the practice by the company that manufactures circuit breakers. In early 1988, a sales representative identified "refurbished" circuit breakers at Diablo Canyon Nuclear Power Plant. A subsequent investigation confirmed that circuit breakers sold to the power plant as new equipment were actually refurbished. The managers of the two firms that refurbished and sold these breakers have been convicted of fraud and have paid a substantial fine.

- C. NRC published information Notice No. 88-46 dated July 8, 1988, on the investigation findings and circulated it to all applicable government agencies, including DOE. On July 20, 1988, DOE notified all field offices that refurbished circuit breakers may have been installed in critical systems. Shortly thereafter, DOE established the Suspect Equipment Notification System (SENS), a sub-module of ES&H Events and News on the Safety Performance Measurement System (SPMS). SENS has since been replaced by the Supplier Evaluation and Suspect Equipment (SESE) sub-module which includes Suspect Equipment Reports.
- D. Some of DOE's older sites have circuit breakers in use that are no longer manufactured. According to the Nuclear Management and Resources Council (NUMARC), examples of such breakers are Westinghouse breakers with frames E, EA, F, and FA. If a DOE contractor has an electrical box that requires a breaker with one of these frame sizes, that contractor would not have been able to purchase it from Westinghouse for several years. If the contractor were to order a replacement breaker from an authorized Westinghouse dealer, the dealer could not get a new replacement breaker from the manufacturer. To fill the order, the dealer had to turn to the secondary or refurbished market.

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ATTACHMENT I - REFURBISHED MOLDED CASE CIRCUIT BREAKERS (cont.)

Dealing with an authorized distributor does not preclude ending up with refurbished circuit breakers. Westinghouse has announced that it is considering satisfying this market by manufacturing circuit breakers that will fit in these applications.

The solution, as recommended by NUMARC, is not to focus on the credentials of the distributor but on the traceability of the circuit breaker itself. A purchaser can be assured of having a new circuit breaker only if the breaker can be traced back to the original manufacturer.

2. Indicators of Refurbished Breakers

Typically, refurbished circuit breakers sold as new equipment have one or more of the following characteristics:

The style of breaker is no longer manufactured.

The breakers may have come in cheap, generic-type packaging instead of in the manufacturer's original boxes.

Refurbished circuit breakers are often bulk-packaged in plastic bags, brown paper bags, or cardboard boxes with handwritten labels. New circuit breakers are packed individually in boxes that are labeled with the manufacturer's name, which is usually in two or more colors, and are often date stamped.

The original manufacturer's labels and/or the Underwriter's Laboratory (UL) or Factory Mutual (FM) labels may have been counterfeited or removed from the breaker. Refurbishing operations have been known to use copying machines to produce poor quality copies of the original manufacturer's and the certifying body's labels.

Breakers may be labeled with the refurbisher's name rather than the label of a known manufacturer.

The manufacturer's seal (often multicolored) across the two halves of the case of the breaker is broken or missing.

Wire lugs (connectors) show evidence of tampering.

The surface of the circuit breaker may be nicked or scratched yet have a high gloss. Refurbishers often coat breakers with clear plastic to produce a high gloss that gives the casual observer the impression that the breaker is new. The plastic case of new circuit breakers often have a dull appearance.

Some rivets may have been removed and the case may be held together by wood screws, metal screws, or nuts and bolts.

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ATTACHMENT I - REFURBISHED MOLDED CASE CIRCUIT BREAKERS (cont.)

Contradictory amperage ratings may appear on different parts of the same refurbished breaker. On a new breaker, the amperage rating is stamped into, raised from, or machine-painted on the handle of the circuit breaker. In order to supply a breaker with a hard-to-find rating, refurbishers have been known to file down the surface of the handle to remove the original rating and hand-paint the desired amperage rating.

3. Testing

In a news release dated February 6, 1989, the National Electrical Manufacturers Association (NEMA) announced the cancellation of its Publication AB-2-1984 entitled, "Procedures for Field Inspection and Performance Verification of Molded-Case Circuit Breakers used in Commercial and Industrial Applications," and stated the following:

"These procedures were intended for use with breakers that had been originally tested and calibrated in accordance with NEMA Standards Publication AB 1 or Underwriters Laboratories Standard UL 489, and not subsequently opened, cleaned or modified...Therefore, the Standards Publication contained none of the destructive test procedures...necessary to verify the product's ability to withstand such conditions as full voltage overload or short circuit. Without such tests, even if a rebuilt breaker had passed the tests specified in AB-2, there would be no assurance that it would not fail under overload or short circuit conditions. It is NEMA's position that regardless of the results of electrical testing, refurbished electrical circuit breakers are not reliable and should not be used."

4. Precautions

Follow these precautions regarding suspect or refurbished circuit breakers.

- A. Require that molded-case breakers be new and unaltered. Proof that they are new and unaltered requires the vendor to show traceability back to the original manufacturer.
- B. Do not rely completely on dealing with authorized dealers for protection from purchasing refurbished molded-case circuit breakers.
- C. Approve formal procedures for inspecting circuit breakers that are received and installed according to the indicators of refurbished breakers listed above.
- D. Contact the original manufacturer if any indication of misrepresentation is encountered. There are many original manufacturers of molded-case circuit breakers whose products are being refurbished and sold as new. These manufacturers have the most specific information about how to ensure that their products have not been refurbished.

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ATTACHMENT I - REFURBISHED MOLDED CASE CIRCUIT BREAKERS (cont.)

5. Disposition
 - A. Segregate and retain all circuit breakers found with indications that they may be refurbished. These will be retained as potential evidence until specifically released by the Office of Inspector General and the Office of Nuclear Safety for Price Anderson Enforcement. Circuit breakers that may be refurbished may only be disposed of when the above organizations no longer need them as evidence.
 - B. Report suspect electrical components to Occurrence Reporting and Processing System (ORPS). The ORPS categorization group should be identified as "Cross-Category items, Potential Concerns or issues." The description of cause section in the ORPS report should include the text "suspect counterfeit parts."
 - C. Witness and document the destruction of all suspect/counterfeit circuit breakers when approval is given for disposal.

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ATTACHMENT J - ASSESSMENT/SURVEILLANCE LINES OF INQUIRY

1. S/CI processes and other S/CI related processes are effective in addressing the safety-related aspects of S/CI.
2. Formal supplier qualification and re-qualification processes are established and implemented, including routine collection of evaluations of feedback on vendor performance.
3. Controls are established on a graded basis that considers the risks involved and historical experience with S/CIs.
4. Controls are implemented for segregation and separate storage of material identified as suspect/counterfeit
5. Subcontractors have established and implemented sufficient controls to preclude an introduction or use of S/CIs. These controls address construction materials, maintenance or modification equipment and components, and the use subcontractor owned or rented equipment (cranes, hoists, etc.) on site.
6. S/CI processes, requirements, and controls are fully integrated into Integrated Safety Management (ISM) and quality assurance programs and procedures. e.g., training, procurement, maintenance, and assessment) to ensure adequate linkage to S/CI elements.
7. Expectations are established for timeliness in determining whether nonconforming items are S/CI.
8. Protocols are established for clearly identifying S/CIs that are determined to be acceptable for use
9. Inspections for S/CI materials are incorporated into routine maintenance activities, and clear guidance is provided for the disposition of installed S/CI materials identified during routine inspections and maintenance activities.
10. Expectations for S/CI controls are integrated within existing processes, such as routine and special inspections for S/CIs in site procedures, and guidance is provided for performing such inspections.
11. Roles and responsibilities and interfaces for management of S/CIs are clearly assigned, including provisions for the handling of sensitive information and interfacing with the local Office of the Inspector General (IG), to ensure effective, consistent, and timely communication of S/CI information.
12. S/CI reporting requirements are effectively integrated into the site contractors' processes for disposition of non-conforming items, such as NCR processes, as required by appropriate DOE directives.
13. Lessons learned processes are evaluated to determine whether all available and relevant information resources, such as the Government Industry Data Exchange Program (GIDEP), are being utilized for screening S/CI and other relevant information for potential applicability to site activities.

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ATTACHMENT J – ASSESSMENT/SURVEILLANCE LINES OF INQUIRY (cont.)

14. Lessons learned processes are evaluated to ensure that significant requirements and performance expectations have been established for the documentation of applicability reviews, needed actions, and actions taken for lessons learned that require line management attention and action.
15. Lessons learned requiring line management actions are integrated with the site's corrective action management processes to ensure formal tracking, feedback, and closure of actions taken.
16. Corrective actions and management procedures include formal linkage to S/CI reporting requirements for the site office, Occurrence Reporting System (ORPS), contractor General Counsel, and the IG.
17. Site mechanisms, such as a controlled product list, are established and used to maintain current and accurate information on S/CIs. Provisions are available for making this list readily available to site personnel who have S/CI responsibilities for procurement, inspection, and other areas associated with the implementation of S/CI controls.
18. S/CI training programs include the identification of positions and associated personnel required to receive training, the processes for designating those personnel who must receive initial and refresher training, and the required frequencies for refresher training.
19. All personnel involved in design, system engineering, procurement, inspection, maintenance, and other functions involving potential S/CI materials receive S/CI process and hands-on training.
20. Training programs place special emphasis on ensuring that system engineers involved in the design, procurement, and inspection of materials and components with the potential for S/CI receive such training.
21. Subcontractors involved in the procurement or handling of potential S/CI materials and components receive initial and refresher training and are knowledgeable of site S/CI processes, procedures, requirements, and controls.
22. S/CI training addresses site-specific processes and procedures for identifying, dispositioning, and reporting S/CIs, including reporting to the IG.
23. S/CI processes are subject to regular self-assessment, consistent with site self-assessment protocol.
24. Assessments are performed for S/CI processes to evaluate significant changes to the S/CI processes and to establish a baseline for implementation where appropriate. Based on that baseline review, further assessments are tailored to the maturity of the S/CI processes.
25. S/CI lines of inquiry are considered and evaluated, as appropriate, during assessments of areas that interface with S/CI processes (procurement process, NCR process, etc.).

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ATTACHMENT K – RECENTLY IDENTIFIED S/CI ISSUES

- I. Suspect/Counterfeit Fasteners not Listed on Attachment H.
 - A. Several metric bolts with head markings of 8.8 have been identified without manufacturer's head markings. Although metric bolts are not included on the DOE Headmark List, a suspect item is defined as one in which there is an indication by visual inspection, testing, or other information that it may not conform to established government or industry-accepted specifications or national consensus standards. ASTM F 568M-04, "Standard Specification for Carbon and Alloy Steel Externally Threaded Metric Fasteners," states the following: "Bolts and screws, except those... (smaller than M5), shall be marked permanently and clearly to identify the property class and the manufacturer. The manufacturer's identification symbol shall be of his design." The property class symbols for metric bolts include 4.6, 4.8, 5.8, 8.8, 9.8, 10.9, and 12.9.

When metric bolts marked with property class symbols that do not have the manufacturer's identification symbol in accordance with ASTM F 568M-04 are identified, these bolts shall be treated as suspect.
 - B. "J," "KS," and "K" manufacturers head markings are still being received. These items still remain S/CI regardless of the position of the suspect manufacturer head markings (e.g., centered vs. off to the side).



TECHNICAL SPECIFICATION

PROJECT:	Final DBVS Design	145579-D-SP-032	REV. 2
PROJECT NO.:	145579	DRIED WASTE TRANSFER SYSTEM	
CLIENT:	AMEC E&E - Richland, Washington		

Appendix E

Request for Information

(2 pages including cover)

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TECHNICAL SPECIFICATION

PROJECT:	Final DBVS Design	145579-D-SP-032	REV. 2
PROJECT NO.:	145579	DRIED WASTE TRANSFER SYSTEM	
CLIENT:	AMEC E&E - Richland, Washington		

REQUEST FOR INFORMATION		Project # RFI:XXX Rev. ____ Page 1 of 1
Contract/Project No. _____		
TO BE COMPLETED BY SUBCONTRACTOR		
Insert Title of RFI Here		
Originator (Name) & Company: _____		
Problem/Deficiency: <input type="checkbox"/> Clarification <input type="checkbox"/> Change		
Proposed Solution:		
Basis of Change:		
Note: Subcontractor to provide cost and schedule impacts associated with each discrete change line item. Response: <input type="checkbox"/> Clarification <input type="checkbox"/> Change COST <input type="checkbox"/> Yes <input type="checkbox"/> No SCHEDULE <input type="checkbox"/> Yes <input type="checkbox"/> No Required Response Date: _____		
Cost Impact _____	Schedule Impact _____	
Subcontractor (sign/date) _____		
TO BE COMPLETED BY THE BUYER		
RFI Approved <input type="checkbox"/> Yes <input type="checkbox"/> No		COMMENTS Design Lead / Proj Mgr / Date _____
CN Required: <input type="checkbox"/> - CN # _____		
CN Not Required: <input type="checkbox"/>		
As-Built documentation Required: <input type="checkbox"/>		
As-Built documentation Not Required: <input type="checkbox"/>		
Submittal Data Required: <input type="checkbox"/> Yes <input type="checkbox"/> No		

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TECHNICAL SPECIFICATION

PROJECT:	Final DBVS Design	145579-D-SP-032	REV. 2
PROJECT NO.:	145579	DRIED WASTE TRANSFER SYSTEM	
CLIENT:	AMEC E&E - Richland, Washington		

Appendix F

Instrumentation Naming and Tagging Convention

(3 pages including cover)

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TECHNICAL SPECIFICATION

PROJECT:	Final DBVS Design	145579-D-SP-032	REV. 2
PROJECT NO.:	145579	DRIED WASTE TRANSFER SYSTEM	
CLIENT:	AMEC E&E - Richland, Washington		

EQUIPMENT IDENTIFICATION NUMBER

The equipment identification number (EIN) is comprised of three fields, SYSTEM-COMPONENT-SEQUENCE. Where SYSTEM is the plant Area 00,31-37, COMPONENT is the ISA-loop function code, and SEQUENCE is the device number within the Area.

Example: Waste dryer Area 33 Instrument Junction Box 33-IJB-001.

Note: The Hanford FARM and LOCATION fields do not apply to the Demonstration Bulk Vitrification System and have been dropped from this convention.

CABLE TAGGING

Cables shall be tagged using From Source & To Destination information. The format will be "FROM-TO" or "FROM-TO-##" if more than one cable run.

Example:

Two Cables:	From	34-CAB-123 to 34-IJB-123
Cable Tag:		"34CAB123-34IJB123-C1"
Cable Tag:		"34CAB123-34IJB123-C2"

WIRE TAGGING

Wires will be tagged using the equipment tag and polarity.

Example 1: Wires connected from instrument 34-FIT-123 (24V dc)

Positive Tag "34FIT123(+)"
 Negative Tag "34FIT123(-)"

Example 2: Wires connected from instrument 34-LSH-123 (110V ac)

Positive Tag "34LSH123(H)"
 Negative Tag "34LSH123(N)"



TECHNICAL SPECIFICATION

PROJECT:	Final DBVS Design	145579-D-SP-032	REV. 2
PROJECT NO.:	145579	DRIED WASTE TRANSFER SYSTEM	
CLIENT:	AMEC E&E - Richland, Washington		

NOTES

1. Cables shall be identified with cable tag number "source-destination-type." Types will be as follows:

M = Motor Feeder Cable; L = Local Control Station Cable; MH = Motor Stator Heater; RTD = Motor Winding Temperature Detector; MA = Motor Armature Cable; MF = Motor Field Cable; C = Control Cable; F = General Feeder Cable; A = Ammeter Cable; T = Tachometer Cable; COM = Communications Cable; RS484, Ethernet, Fibre.

Analog cables from junction box to field instrument will only be tagged with the instrument tag number.

2. Cables will be tagged on both ends with the same cable tag number.
3. Equipment, motor, and instrument tag numbers shown are for illustration purposes only. Use project specific equipment, motor, and instrument tags.



TECHNICAL SPECIFICATION

PROJECT:	Final DBVS Design	145579-D-SP-032	REV. 2
PROJECT NO.:	145579	DRIED WASTE TRANSFER SYSTEM	
CLIENT:	AMEC E&E - Richland, Washington		

Appendix G

Bidder's Drawing and Data Commitments

(4 pages including cover)

Send all Vendor documentation to:

AMEC E&E

1135 Jadwin Avenue

Richland, WA 99352

Attn: Becky Knox, Vendor Document Control Coordinator

and

DMJM Technology

3250 Port of Benton Boulevard

Richland, WA 99354

Attn: Ginger Kidder, Vendor Document Control Coordinator

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TECHNICAL SPECIFICATION

PROJECT:	Final DBVS Design	145579-D-DS-032.1	REV. 2
PROJECT NO.:	145579	DRIED WASTE TRANSFER SYSTEM	
CLIENT:	AMEC E&E - Richland, Washington	EQUIPMENT NO.: N/A	

BIDDER'S DRAWING AND DATA COMMITMENTS

Vendor shall supply all drawings, manuals and documentation in the quantities indicated. Approval drawings are due within the listed number of calendar days after issue of the Purchase Order or Letter of Intent. The dates set out for drawing and data submissions are governed by the engineering design schedule of the project. The Vendor shall supply one Autocad disk file and requested number of copies within the listed number of calendar days. Final drawings must be certified as correct and bear the Vendors name, equipment number and Purchase Order Number. Drawing Transmittals listing the document numbers, revision numbers, quantities, status and document types must be included with all submissions (including electronic submittals)

SEND ALL DOCUMENTS TO:	DMJM+N, Inc. dba DMJM Technology 3250 Port of Benton Blvd Richland, WA 99354-1670 Attn: Project Records Phone: (509) 375-7856 Fax: (509) 375-5331
Submit all documents via courier service Faxed documents must be followed by the originals. Electronic E-mail or FTP transmissions of drawings & data must be copied to Document Control Always include a transmittal	

BIDDERS MUST PROVIDE ESTIMATED LEAD TIMES FOR APPROVAL DRAWINGS

Proposal	Bidder shall include this data for each item			REVIEW ITEMS DUE WITHIN (DAYS)	VENDOR COMMITMENT (DAYS)
	Review	Required before ordering or start of fabrication			
		Final	Required within 7 days prior to shipment and before final payment		
PROPOSAL	REVIEW	FINAL	DESCRIPTION		
E+3			Proof of NOA-1 or equivalent QA program		
E+3			Experience list and maintainability information		
E+3			Completed data sheet		
E+3			Subcontractor list		
E+3	E+3		Design, fabrication & delivery schedule	PO+7	
	E+3	E+6	90% Design and Fabrication Package including: - Drawings - Calculations - Completed Equipment Data Sheets - Vendor Cut Sheets/Technical Brochures - Bill of materials	PO+21	
	E+3	E+1	Test Plan/Test Procedure	PO+21	
	E+1	E+1	NDE personnel certifications	PO+21	
	E+1	E+1	Visual Weld/NDE procedures	PO+21	
	E+1	E+1	Visual weld examination procedure/weld map	Fab-10	
	E+3	E+1	Welding procedures, procedure qualification records, and welder procedure qualification records	Fab-10	
	E+3	E+1	AWS CWI certificate	Fab-10	
	E+3	E+1	Material Control Procedures	Fab-10	
	E+3	E+3	Protective coating specifications	Fab-10	
	E+3	E+1	Fabrication Travelers	Fab-10	
	E+3	E+1	Cleaning procedures	Fab-10	



TECHNICAL SPECIFICATION

PROJECT:	Final DBVS Design	145579-D-DS-032.1	REV. 2
PROJECT NO.:	145579	DRIED WASTE TRANSFER SYSTEM	
CLIENT:	AMEC E&E - Richland, Washington	EQUIPMENT NO.: N/A	

BIDDER'S DRAWING AND DATA COMMITMENTS

Vendor shall supply all drawings, manuals and documentation in the quantities indicated. Approval drawings are due within the listed number of calendar days after issue of the Purchase Order or Letter of Intent. The dates set out for drawing and data submissions are governed by the engineering design schedule of the project. The Vendor shall supply one Autocad disk file and requested number of copies within the listed number of calendar days. Final drawings must be certified as correct and bear the Vendors name, equipment number and Purchase Order Number. Drawing Transmittals listing the document numbers, revision numbers, quantities, status and document types must be included with all submissions (including electronic submittals)

SEND ALL DOCUMENTS TO:	DMJM+N, Inc. dba DMJM Technology 3250 Port of Benton Blvd Richland, WA 99354-1670 Attn: Project Records Phone: (509) 375-7856 Fax: (509) 375-5331
Submit all documents via courier service Faxed documents must be followed by the originals. Electronic E-mail or FTP transmissions of drawings & data must be copied to Document Control Always include a transmittal	

BIDDERS MUST PROVIDE ESTIMATED LEAD TIMES FOR APPROVAL DRAWINGS

Proposal	Bidder shall include this data for each item			REVIEW ITEMS DUE WITHIN (DAYS)	VENDOR COMMITMENT (DAYS)
	Review	Required before ordering or start of fabrication			
		Final	Required within 7 days prior to shipment and before final payment		
PROPOSAL	REVIEW	FINAL	DESCRIPTION	(DAYS)	(DAYS)
	E+3	E+6	100% Design and Fabrication Package including: - Drawings - Calculations - Completed Equipment Data Sheets - Vendor Cut Sheets/Technical Brochures - Bill of materials	PO+21	
	E+3	E+1	NCR's	When identified +3	
	E+3	E+3	Fabrication red-line changes	When identified	
	E+3	E+1	Packaging and Shipping Plan	Del-21	

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APPENDIX H4

DRIED WASTE HANDLING SYSTEM

Title	Page
Technical Specifications: <i>Dried Waste Transfer System</i> (145579-D-SP-032, Rev 0)– A Corrosion Review, February 5, 2005	H4-3
Technical Specifications: <i>Ancillary Waste Transfer Enclosure (AWTE)</i> (145579-D-SP-017, Rev 2), <i>AWTE Data Sheet</i> (145579-D-DS-017.1, Rev C), <i>Dried Waste & Top-off Soil Airlock Assemblies</i> (145579-D-SP-018, Rev 1), and <i>Top-off Soil Discharge Nozzle Assembly</i> (145579-D-DS-020.2, Rev C) – A Corrosion Review, March 14, 2005	H4-5
DBVS-LDS-014, <i>Response to Corrosion Review for the Dried Waste Transfer System</i>	H4-7

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Your single source for Chemical, Materials, and Environmental Technology

February 5, 2005

Charles E. Grenard
DMJM Technologies
3250 Port of Benton Blvd
Richland, WA 99354-1670

Dear Mr Grenard

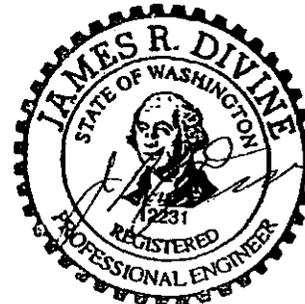
Technical Specifications: Dried Waste Transfer System (145579-D-SP-032, Rev 0) – A Corrosion Review

No specific concerns were noted. There are two general comments of which only one has a direct bearing on corrosion/erosion.

- A close look at the erosion situation should be taken after the velocities of the solids, feed and mixed waste, are determined,
- Although it is not really a corrosion concern so much as much as a quantity of condensate produced, the moisture content of Hanford soil should be evaluated. It was listed as only about 1.5%. This seems low unless it is only surface soil taken during the summer. During the winter and down 10-15 feet, higher values are likely.

Sincerely,

James R. Divine, PhD, PE
NACE Corrosion Specialist, #867
Chief Engineer



EXPIRES: 3-11-06

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Your single source for Chemical, Materials, and Environmental Technology

March 14, 2005

Charles E. Grenard
DMJM Technologies
3250 Port of Benton Blvd
Richland, WA 99354-1670

Dear Mr Grenard

Technical Specifications: Ancillary Waste Transfer Enclosure (AWTE) (145579-D-SP-017, Rev 2), AWTE Data Sheet (145579-D-DS-017.1, Rev C), Dried Waste & Top-off Soil Airlock Assemblies (145579-D-SP-018, Rev 1), and Top-off Soil Discharge Nozzle Assembly) (145579-D-DS-020.2, Rev C) – A Corrosion Review

This document presents a limited number of general remarks about corrosion in the specifications and recommendations.

Ancillary Waste Transfer Enclosure (AWTE) (145579-D-SP-017, Rev 2) and AWTE Data Sheet (145579-D-DS-017.1, Rev C)

1. Abbreviations and Acronyms, p 5ff – As a chemical engineer, I would like to see proper use of nomenclature and symbols for the chemical species. For example, Al³⁺ should be Al³⁺ and is aluminum ion, not aluminum. This is for future reference because it need not be changed; but is confusing.
2. Section 3.1.11 – 880 °F is approaching the scaling temperature of carbon steel in air. The possible presence of other species, NO_x and SO_x, may increase the potential for scaling as will periodic temperature cycles.
3. Section 3.1.13 – if the elastomeric components at the 180 °F glove ports are subject to a combination of temperature and radiation there could a synergistic interaction to reduce the lifetime of the elastomer.

There were no comments on the data sheet.

Dried Waste & Top-off Soil Airlock Assemblies (145579-D-SP-018, Rev 1)

No specific comments are made though there is some question about the life of bearing surfaces in a corrosive/erosive environment.

Top-off Soil Discharge Nozzle Assembly) (145579-D-DS-020.2, Rev C)

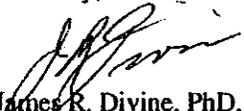
No specific comments are made though there is some question about the life of bearing surfaces in a corrosive/erosive environment.

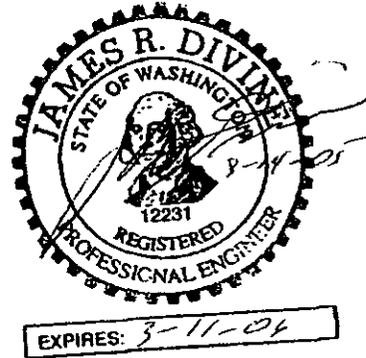
General Recommendations

After the design is far enough along to be able to determine velocities and mass loadings, the effects of erosion of the soil and dried waste should be reviewed.

In addition, the scaling temperature of carbon steel in air is about 900 °F. Scaling increases rapidly above this temperature, and is strongly affected by impurities in the gasses. Rather than use an ordinary carbon steel, one with chromium and molybdenum will raise the scaling temperature. One possible material is A387 (UNS 41545) with about 5% Cr and 0.5% Mo – the scaling temperature would increase to about 1150 °F. Other, more expensive alloys are available. Ideally, your melter vendor will have a complete list of suitable alloys on hand – they may even be able to demonstrate that the existing material is satisfactory.

Sincerely,


James R. Divine, PhD, PE
NACE Corrosion Specialist, #867
Chief Engineer





3250 Port of Benton Blvd
MSIN H0-50
Richland, WA 99354-1670
T 509.375.7774
F 509.375.5331

April 15, 2005

DBVS-LDS-014

Mr. James R. Divine
ChemMet, Ltd. PC
P.O. Box 4068
West Richland, Washington 99353

- References:
- 1) Technical Specifications: *Dried Waste Transfer System* (145579-D-SP-032, Rev 0)–A Corrosion Review, dated February 5, 2005.
 - 2) Technical Specifications: *Ancillary Waste Transfer Enclosure (AWTE)* (145579-D-SP-017, Rev 2), *AWTE Data Sheet* (145579-D-DS-017.1, Rev C), *Dried Waste & Top-off Soil Airlock Assemblies* (145579-D-SP-018, Rev 1), and *Top-off Soil Discharge Nozzle Assembly* (145579-D-DS-020.2, Rev C)–A Corrosion Review, dated March 14, 2005.

SUBJECT: RESPONSE TO CORROSION REVIEW FOR THE DRIED WASTE TRANSFER SYSTEM

Dear Mr. Divine,

DMJMH+N, Inc. (dba DMJM Technology) recently contracted with ChemMet, Ltd. to conduct a corrosion review on various systems and components for the Demonstration Bulk Vitrification System (DBVS) Project.

Table 1 denotes our planned actions to address your comments, issues, and concerns stated in your review of the DBVS equipment specifications.

Thank you for your corrosion review on the DBVS Dried Waste Handling System.

Respectfully,

Kurt J. McCracken
Chief Engineer

James R. Fredrickson
DBVS Project Manager

cc: DMJM Technology CH2M HILL Hanford Group, Inc.

James Frederickson	Mike Leonard
Kurt McCracken	Dave Shuford
Ja-Kael Luey	
DMJM File/LB	

AMEC Earth and Environmental

Leo Thompson
Mark Lucas

Mr. James R. Divine
 DBVS-LDS-014
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Table 1. Dried Waste Transfer System. (2 sheets)

Item	Section	Comment or Recommendation	Disposition or Planned Action
Technical Specification 145579-D-SP-032, Rev. 0, Dried Waste Transfer System			
1.	General	A close look at the erosion situation should be taken after the velocities of the solids, feed and mixed waste, are determined	Per the specification, the Seller is responsible for determining if an allowance is required for wear. The Seller submittals will be reviewed to determine if components and critical areas (such as elbows) are designed to account for wear and/or can be readily replaced.
2.	General	Although it is not really a corrosion concern as much as a quantity of condensate produced, the moisture content of Hanford soil should be evaluated. It was listed as only about 1.5%. This seems low unless it is only surface soil taken during the summer. During the winter and down 10-15 feet, higher values are likely.	The Dried Waste Transfer System will handle material discharged from the waste dryer and thus have low moisture content as the result of processing.
Technical Specification 145579-D-SP-017, Rev. 2, Ancillary Waste Transfer Enclosure (AWTE) and 145579-D-DS-017.1, Rev. C, AWTE Data Sheet			
3.	Abbreviations and Acronyms, p 5ff	As a chemical engineer, I would like to see proper use of nomenclature and symbols for the chemical species. For example, Al ³⁺ should be Al ³⁺ and is aluminum ion, not aluminum. This is for future reference because it need not be changed; but is confusing.	Acknowledged. No change made.
4.	Section 3.1.11	880 °F is approaching the scaling temperature of carbon steel in air. The possible presence of other species, NOx and SOx, may increase the potential for scaling as will periodic temperature cycles.	Material specification for chutes and ducting inside AWTE are being revised to 316L stainless steel in response to earlier comments from CH2M Hill regarding corrosion concerns due to acids etc.
5.	Section 3.1.13	If the electrometric components at the 180 °F glove ports are subject to a combination of temperature and radiation there could be a synergistic interaction to reduce the lifetime of the elastomer.	Glove material is to be selected by the Vendor based on operating conditions provided, i.e. temperature and radiation levels. Glove material selected will be reviewed and approved by AMEC/DMJM H+N.
		There were no comments on the data sheet.	

Mr. James R. Divine
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Table 1. Dried Waste Transfer System. (2 sheets)

Item	Section	Comment or Recommendation	Disposition of Planned Action
Technical Specification 15579 D DS-018, Rev. A, Dried Waste & Top-off Soil Airlock Assembly			
6.	N/A	No specific comments are made though there is some question about the life of bearing surfaces in a corrosive/erosive environment.	See Item #8.
Data Sheet 15579 D DS-020, Rev. C, Top-off Soil Discharge Nozzle Assembly			
7.	N/A	No specific comments are made though there is some question about the life of bearing surfaces in a corrosive/erosive environment.	See Item #8.
General Recommendations			
8.	N/A	<p>After the design is far enough along to be able to determine velocities and mass loadings, the effects of erosion of the soil and dried waste should be reviewed.</p> <p>In addition, the scaling temperature of carbon steel in air is about 900 °F. Scaling increases rapidly above this temperature, and is strongly affected by impurities in the gasses. Rather than use an ordinary carbon steel, one with chromium and molybdenum will raise the scaling temperature. Once possible material is A387 (UNS 41545) with about 5% Cr and 0.5% Mo – the scaling temperature would increase to about 1150 °F. Other, more expensive alloys are available. Ideally, your melter vendor will have a complete list of suitable alloys on hand – they may even be able to demonstrate that the existing material is satisfactory.</p>	<p>Erosion of chutes from soil is not a major concern. Velocities will be low in comparison to the vacuum transfer system, there are no elbows, only vertical sections which will not run full of material since they are oversized. Only concern is the cone valve, which will be directly in the path of the soil/waste. For other reasons, such as waste material sticking and melting onto cone valve, coating of the base material is being considered. Testing of various coatings is being undertaken and will likely be some form of ceramic material, erosion will be considered in the coating selection.</p> <p>Material specification for the nozzle is currently 316L stainless steel. A coating to prevent the waste sticking is also under review as noted above.</p>

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