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Section 11 of 13

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TECHNICAL SPECIFICATION
AMEC Americas Limited



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 Please replace all revised pages of this document and destroy the superseded copies.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-V-SP-010	REV. 1
PROJECT NO:	145779	HEGA FILTER SKID	
CLIENT:	AMEC E&E - Richland, Washington		

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APPENDICES

- A Control of Suspect / Counterfeit Items (TFC-ESHQ-Q_C-C-03)
- B ASME AG-1 Requirements Schedule

ATTACHMENTS

- 145579-V-DS-010.1 Carbon Filter Technical Data Sheet
- 145579-V-DS-010.2 Off Gas Polishing Filter Technical Data Sheet
- 36-PDIT-327 Differential Pressure Transmitter
- 36-PDIT-332 Differential Pressure Transmitter
- 36-PDIT-333 Differential Pressure Transmitter
- 36-PDIT-334 Differential Pressure Transmitter
- H-14-106796 Off Gas Area – FDNS Plans & Sections

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ABBREVIATIONS AND ACRONYMS

°C	Degrees Celsius
°F	Degrees Fahrenheit
µm	Micrometers
AC	Alternating current
acfm	Actual Cubic Feet per Minute
AISC	American Institute for Steel Construction
ANSI	American National Standards Institute
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASNT	American Society of Nondestructive Testing
ASTM	American Society for Testing and Materials
AWG	American wire gauge
AWS	American Welding Society
BTU	British thermal unit
CH2M HILL	CH2M HILL Hanford Group, Inc.
Ci	Curies
CO ₂	Carbon Dioxide
CoC	Certificate of Conformance
cfm	Cubic Feet per Minute
CMTR	Certified Material Test Report
CPE	Customer-provided equipment
CWI	Certified Welding Inspector
DBVS	Demonstration Bulk Vitrification System
EMT	Electrical metallic tubing
ft ³	Cubic feet
gpd	Gallons per day
gpm	Gallons per minute
HCl	Hydrochloric Acid
HEPA	High Efficiency Particulate Air

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HEGA	High Efficiency Gas Adsorber
hp	Horsepower
Hz	Hertz
ICV™ ¹	In-Container Vitrification™
IEEE	Institute of Electrical and Electronic Engineers
in. Hg	Inches of mercury
in. WG	Inches of water gauge
lb	Pound
lbm	Pound mass
mA	Milliamp
MCS	Monitoring and Control System
mph	miles per hour
MSS	Manufacture Standard Practice
NCR	nonconformance report
NDE	Nondestructive Examination
NEC	National Electrical Code
NEMA	National Equipment Manufacturers Association
NFPA	National Fire Protection Association
NOx	Oxides of Nitrogen
NPT	National Pipe Thread
NQA	Nuclear Quality Assurance
OGTS	Off Gas Treatment System
PLC	Programmable Logic Controller
ppm	Parts per million
psi	Pounds per square inch
psig	Pounds per square inch gage
PVC	Polyvinyl Chloride
QA	Quality assurance

¹ ICV™ (In-Container Vitrification™) is a trademark of AMEC Inc.

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RGS	Rigid galvanized steel
SAE	Society of Automotive Engineers
SMF	Sintered Metal Filter
SOx	Oxides of Sulfur
TBD	To be determined
TEFC	Totally enclosed fan cooled
TEMA	Tank Equipment Manufacturers Association
UBC	Uniform Building Code
UL	Underwriters Laboratories
USA	United States of America
V	Volt
vol	Volume
wt%	Weight percent

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1.0 SCOPE

1.1 PURPOSE

AMEC is part of a team that has been selected by the CH2M HILL Hanford Group, Inc. (CH2M HILL) to design, fabricate, test, and deploy a Demonstration Bulk Vitrification System (DBVS) using a process referred to as In-Container Vitrification (ICV™) to receive, dry, and immobilize waste from an underground storage tank located in the 200 West Area of the Hanford Nuclear reservation. A main subsystem of the DBVS is the Off-Gas Treatment System (OGTS). The primary function of the OGTS is to filter radioactive particulate and reduce NOx and SOx emissions produced from the ICV™ melt process.

An integral component of the OGTS is the High Efficiency Gas Absorption (HEGA) Filters (Carbon Filters) followed by the Polishing filter, installed to provide personnel and environmental protection from residual radioactive iodine from the off-gas stream. The purpose of the HEGA filter is to adsorb organics & isotopes of iodine. The purpose of the Polishing Filter is to capture any carbon element particles that may happen to detach due to HEGA Filter degradation.

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

Any discrepancies noted in this specification or between this specification and other documentation shall be noted and referred to the Buyer for resolution before proceeding with design or fabrication of the item in question.

1.2 SCOPE OF SUPPLY

The Seller's Scope of Supply shall include, but not be limited to, the design, analysis, fabrication, inspection, testing, documentation (including warranty and guarantee information), packaging, and shipping of the components associated with the HEGA Filter Skid. The following components shall be skid mounted:

High Efficiency Gas Adsorber Unit - gas adsorber type, consisting of beds filled with activated and impregnated carbon as an adsorbent, baffles and supporting structural elements.

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Polishing Filter – a medium efficiency particulate filter to ensure the carbon filter does not pass any activated carbon through the system.

Stainless Steel Filter Housing - designed to fit both HEGA filter and Polishing filter, flanged for interface to the Stainless Steel Ductwork and utilize bag-in/bag-out filter changing system. Filter Housing shall meet thermal insulation requirements in Section 3.3.1.3. Shall incorporate a space in between the HEGA filter and the polishing filter for sampling and include sampling ports as indicated on Figure 3-1. Filter Housing shall include removable drainage container below housing.

Transition Pieces – Transition from the isolation dampers to the Filter housing at both ends shall be included.

Skid – Vendor to supply a steel frame (skid) suitable for attachment to a flat, level 24" thick concrete foundation at elevation 663'-0." Including steel to support the components mounted on the skid to ensure the structural integrity of the HEGA Filter Skid as a unit.

Anchorage – Vendor shall supply anchoring details and materials to securely attach the HEGA Filter Skid to the concrete detailed in attached foundation drawing H-14-106796.

Differential Pressure Indicator/Transmitter – To measure differential pressure across HEGA Filter and Polishing Filter individually.

Bubble-Tight Isolation Dampers – to enable service and filter changes.

Any Special Tooling – spreader bars or other recommended fabricated devices for lifting shall be provided by the Seller.

Quote for additional HEGA Filters – Vendor shall supply pricing and delivery quote for supply of filter elements for Carbon Filter and Polishing Filter.

Work not included – in this specification includes the installation of the HEGA Filter Skid or any connected equipment such as ductwork.

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2.0 APPLICABLE DOCUMENTS

Documents applicable to the work scope are shown in Table 2-1 and Table 2-2. The latest issue and addenda to the documents in effect at the time of procurement (unless otherwise specified) shall apply and form a part of the basis of design for this specification to the extent specified in the applicable sections of this document. In the event of a conflict between documents referenced herein and the requirements of this specification, the requirements of this specification shall take precedence. All conflicts shall be brought to the attention of the Buyer for resolution.

2.1 GOVERNMENT DOCUMENTS

Table 2-1: Government Documents

Document No.	Title
10 CFR 830	Nuclear Safety Management, Code of Federal Regulations, as amended.
10 CFR 835	Occupational Radiation Protection
29 CFR 1910	Occupational Safety and Health Standards – Code of Federal Regulations
DOE-HDBK-1169	U.S. Dept. of Energy, Nuclear Air Cleaning Handbook

2.2 NON-GOVERNMENT DOCUMENTS

Table 2-2: Non-Government Documents

Document No.	Title
ASCE 7	American Society of Civil Engineers - Minimum Design Loads for Buildings and Other Structures
ASME AG-1	Code on Nuclear Air and Gas Treatment
ASME B18.2.1	Square and Hex Bolts and Screws, Inch Series
ASME B31.1	Power Piping
ASME N509	Nuclear Power Plant Air-Cleaning Units And Components
ASME N510	Testing of Nuclear Treatment Systems
ASME NQA-1-1994* (See note at end of table)	Quality Assurance Requirements for Nuclear Facility Applications

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Table 2-2: Non-Government Documents

Document No.	Title
ASTM A36/A36M	Standard Specification for Carbon Structural Steel, American Society of Testing and Materials, New York, New York.
ASTM A176	Standard Specification for Stainless and Heat Resisting Chromium Steel Plate, Sheet and Strip
ASTM A193	Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service
ASTM A194	Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both
ASTM A240	Standard Specification for Heat-resistant Chromium and Chromium Nickel Stainless Steel Plate, Sheet and Strip.
ASTM A354	Standard Specification for Quenched and Tempered Alloy Steel Bolts, Studs, and Other Externally Threaded Fasteners
ASTM D1056	Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber
ASTM D2854	Test method for Apparent Density of Activated Carbon
ASTM D2862	Test Method for Particle Size Distribution of Granular Activated Carbon
ASTM D3803	Standard Test Method for Nuclear-Grade Activated Carbon
AWS D1.1	Structural Welding Code – Steel
AWS D1.6	Structural Welding Code – Stainless Steel
HNF-2962	A List of Electromagnetic Interferences (EMI) & Electromagnetic Compatibility (EMC) Requirements on electromagnetic radiation
IEEE C 62.41.1	Guide on the Surge Environment in Low-Voltage (1000 V and less) AC Power Circuits
IEEE C 62.41.2	Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits
NFPA 70	National Electrical Code
SAE J429	Mechanical and Material Requirements for Externally Threaded Fasteners
TFC-ENG-STD-06	Design Loads for Tank Farm Facilities
UBC 1997	Uniform Building Code
UL 900	Underwriters Laboratories, Standard for Air Filter Units

* The relevant requirements of NQA-1 are included in Section 4.0.

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3.0 TECHNICAL REQUIREMENTS

3.1 ITEM DEFINITION

For this specification, the item is the HEGA Filter Skid that will filter the off-gas air to provide personnel and environmental protection from organics and residual radioactive iodine from the off-gas stream on the Demonstration Bulk Vitrification System (DBVS) site.

Two units, one shall operate while one functions as standby to allow for repair/replace cycles. Change over shall be done while process is running.

The HEGA filter shall be a gas phase adsorber type and shall exhibit a minimum removal efficiency of 99% when tested in accordance with the Institute of Environmental Science designation: IES RP-CC-008 *Recommended Practice for Gas Phase Adsorber Cells*. The major gas to be adsorbed is Iodine-129. The maximum airflow resistance shall be as specified in Technical Data Sheet 145579-V-DS-010.1.

The Polishing Filter shall be a medium efficiency filter type and exhibit a particulate removal efficiency of 80 to 85 percent.

The HEGA Filter Skid shall satisfy the requirements shown in the Technical Data Sheet 145579-V-DS-010.1.

All components of the items shall be detailed according to specifications supplied by the Buyer.

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3.1.1 Item Diagram

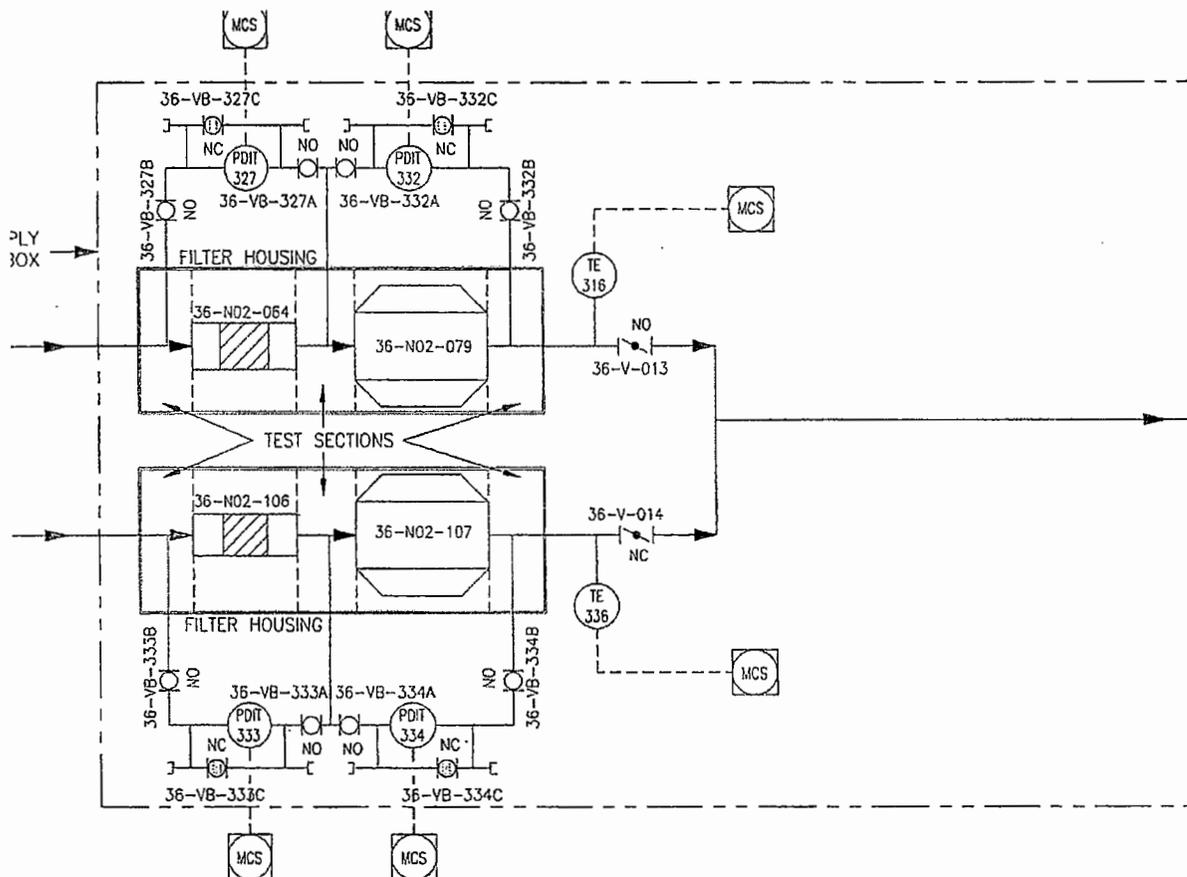


Figure 3-1: HEGA Filter Skid Item Diagram

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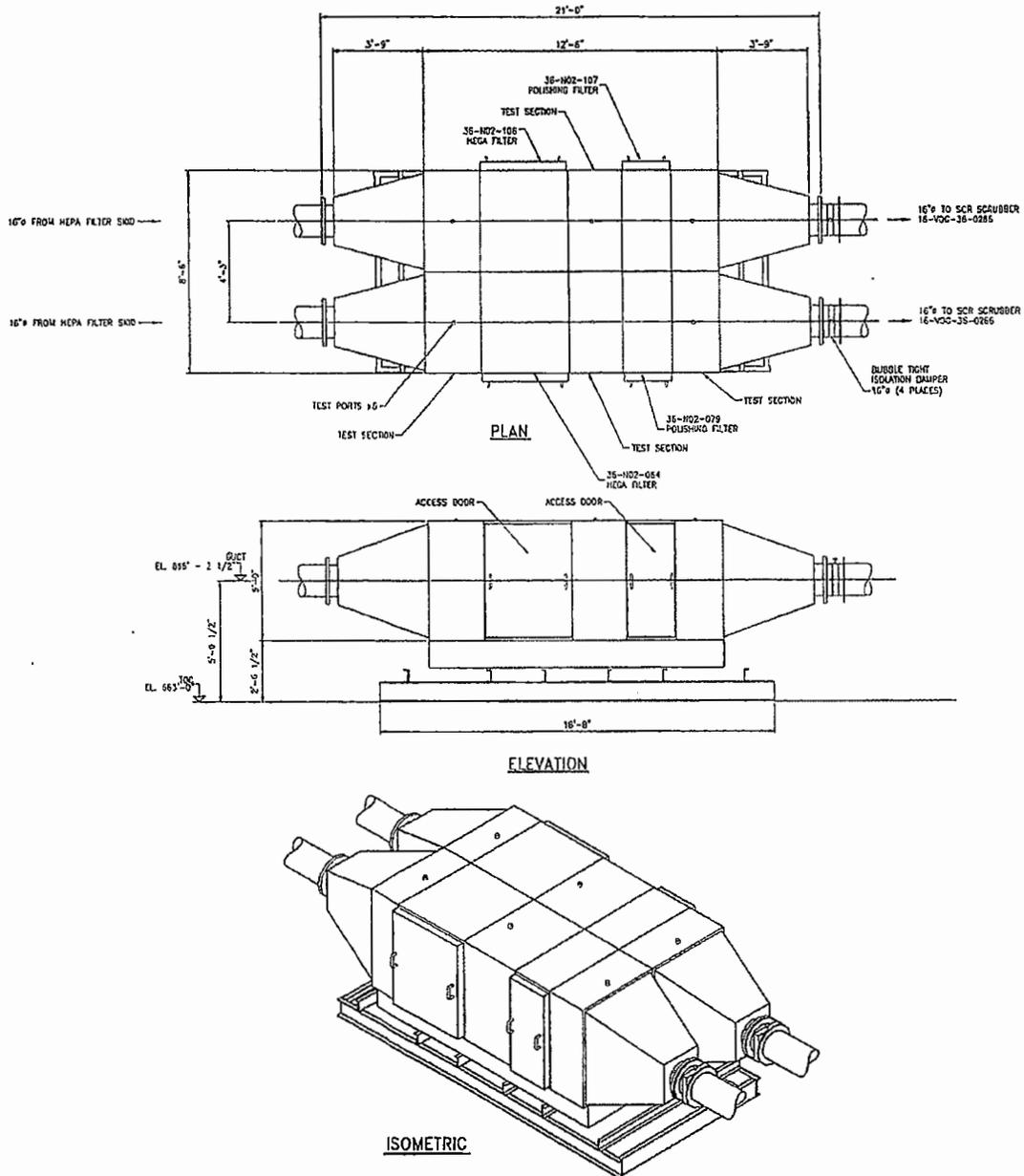


Figure 3-2: HEGA Skid General Arrangement

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3.1.2 Interface Definition

The HEGA Filter Skid will interface with equipment supplied by others at:

- Stainless Steel Ductwork – as described in data sheet 145579-V-DS-010.1
- Monitoring and Control System – as described in instrumentation data sheets 36-PDIT-327, 36-PDIT-332, 36-PDIT-333, and 36-PDIT-334
- Concrete Pad – see Figure 3-2 and Attachment B

Instrumentation shall come with a short length of wire (TSP pigtailed, no connectors) to allow for wiring to MCS by the field installation crew.

3.2 CHARACTERISTICS

The characteristics (e.g., functional, physical, performance, and environmental) with which the HEGA Filter Skid must comply with in order to satisfy the requirements of this specification are described in Sections 3.2.1 through 3.2.7.

3.2.1 Functional Characteristics

The performance range and operating conditions for the HEGA Filter Skid are described in this section and on the Technical Data Sheets, 145579-V-DS-010.1 and 145579-V-DS-10.2.

3.2.2 Physical Characteristics

All included equipment shall be skid mounted using appropriate support steel. The two filter housings shall be mounted in a side-by-side arrangement, with sufficient clearance for field connection of ductwork to isolation dampers, and to ensure easy operation of the isolation dampers, access doors and drainage port. See Figure 3-2: HEGA Skid General Arrangement.

Total weight of HEGA Filter Skid shall not exceed 17,500 lbs.

Filter Skid arrangement and overall dimensions shall be as per attached Figure 3-2: *HEGA Skid General Arrangement*.

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3.2.3 Reliability

The Bulk Vitrification plant is expected to operate 24 hours per day, 7 days per week. Service work will be done during scheduled downtimes. Service life shall be 24 months and design life shall be five years. High reliability is required.

3.2.4 Maintainability

All components shall be designed to have a minimum service life of 24 months without maintenance.

HEGA Filter Skid shall be designed for ease of service (access openings/spacing, test fixtures, etc.). The Buyer shall identify possible requirements for service (access door replacement, gasket replacement, etc.).

3.2.5 Environment

This equipment will be operated outdoors. Any equipment and related enclosures installed outside shall be designed to operate and be stored in the climatic and environmental conditions listed below, taken from HNF-SD-GN-ER-501 "Natural Phenomena Hazards, Hanford Site, Washington", TFC-ENG-STD-06 "Design Loads for Tank Farm Facilities", and UBC 1997. Ambient air temperature range is -25°F to 115°F

- (a) Relative humidity ranges from near 0 to 100%;
- (b) Maximum precipitation is 1.6 inches in a 24-hour period;
- (c) Sand and dust concentrations are 1.10×10^{-5} lbm/ft³ with a typical size of 150 μ m;
- (d) Solar radiation is expected to be a maximum 900 langleys.
- (e) Three – second gust wind velocity of 85 mph and importance factor of 1.15 and exposure category C (Table 3 of TFC-ENG-STD-06, Rev. B-1).
- (f) UBC 1997 section 1632, equation 32-2, seismic zone 2B, soil profile Sc, and occupational category 1.

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3.2.6 Transportability and Storage

Physical dimensions of the skid are shown in Figure 3-2.

The HEGA Filter Skid shall be sized for transport using local roadways and freeways (i.e., less than 14 feet tall, 8 feet 6 inches wide, and 53 feet long; while mounted on the transport trailer. Physical dimensions of the skid are shown in Figure 3-2). If disassembly is required, refer to Section 5.4 for method of marking separate items. Assembly instructions shall be provided with drawings, attached to package sealed in a watertight package.

3.2.7 Safety

The HEGA Filter Skid shall be designed to maintain the safety of operators, general public, and equipment. The equipment supplied by the Seller shall incorporate any design features to comply with the applicable subparts of 29 CFR 1910, *Occupational Safety and Health Standards* and 10 CFR 835 *Occupational Radiation Protection*.

See Table 2-1 for referenced safety codes / standards.

3.3 DESIGN AND CONSTRUCTION

The Seller shall provide all design calculations necessary for the HEGA Filter Skid. The Seller shall provide all design drawings necessary for the HEGA Filter Skid which includes, but is not limited to: dimensional drawings, erection drawings, anchor size and location details, interface drawings, rigging sketches, and as built drawings. Drawings shall be submitted to the Buyer in accordance with the Bidders Drawing and Data Commitments Sheet attached to the Technical Data Sheet, 145579-V-DS-010.1.

Seller shall provide hard and electronic copies of the following:

- Equipment Schedules
- Weights
- Name plates (locations and data to be stamped)
- Structural details and dimensions,

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- Locations of ductwork. Instruments, wiring, sizes, etc.
- Critical and/or spare parts list.

Alternative equipment designs are permissible if proven to be effective in meeting the requirements of 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 HEGA Filter Skid design.

Design and construction shall be in accordance with the structural design criteria defined in ASME AG-1, Code on Nuclear Air and Gas Treatment.

3.3.1 Parts/Materials/Processes

The HEGA Filter Skid shall be designed in accordance with the requirements of ASME N509, ASME N510 and ASME AG-1. Where conflicts occur, ASME AG-1 takes precedence.

Filter Skid arrangement and overall dimensions shall be as per attached Figure 3-2 *HEGA Skid General Arrangement*.

3.3.1.1 HEGA Filter Media

HEGA Filters shall be carbon adsorber type and shall use impregnated/activated carbon, as a filtering medium, used to absorb organic material and radioactive iodides.

The activated carbon shall be coconut shell base, 8 in. x 16 in. mesh that meets the requirements of ASME N509 *Nuclear Power Plant Air-Cleaning Units and Components, Section 5.2 "Adsorbers."*

Material type and grade shall be clearly identified on the bill of materials. Certified Material Test Reports (CMTRs) are required for all materials coming in contact with the air stream. The Seller shall identify any materials that do not have CMTRs for review, approval, and final records.

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3.3.1.2 Filter Housing

The filter Housings shall be designed in accordance with the AG-1 "Section HA Housing" and "Article AA-4000 Structural Design." The housing shall utilize bag-in/bag-out filter changing technology. The filter housing shall include transitions to the ductwork size, specified in the Technical Datasheet 145579-V-DS-010.1, in order to interface with the Vendor supplied Isolation Dampers.

The Filter Housings shall be fabricated out of 300 series, Austenitic Stainless Steel and have the physical characteristics of stainless steel.

All stainless steel used in fabrication shall conform to ASTM A176 and ASTM A240. It shall be of the 300 series, Austenitic Stainless Steel and shall meet the following material requirements of this section. All grades of stainless steel may be substituted for one another depending upon availability and providing the substitution still complies with the following specifications and has prior approval of the Buyer.

Each housing shall contain a carbon adsorber unit followed by a polishing filter.

Bag-in/bag-out filter element changing method shall be employed. This system allows the change of filter elements and preventing the operator from contacting the hazardous particles trapped by the Filters.

Access doors and doorframes shall be designed to meet the allowable leakage determined in ASME AG-1 Article HA-4500 Pressure Boundary Leakage.

Shall include a manual drainage port and a removable container to catch the drainage from the drain port.

Hangers and support steel shall be constructed using stainless steel, same materials as the housing.

3.3.1.3 Insulation

Each housing shall be insulated to a nominal thickness of 2 in. using 8-lb/ft³ mineral wool insulation (the seller shall verify insulation thickness by calculation). The insulation shall cover the sides, top, bottom, and access doors for the

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housings and shall fill, to the maximum extent practical, the external housing voids. The insulation shall be permanently sealed into the housing by welded installation of 11 or 12 gauge, ASTM A 240/A 240M, Type 300-series stainless steel false panels. All welded components shall be fabricated from Type-300 stainless steel, grade L.

3.3.1.4 Instrumentation

The housings shall be supplied with instrumentation as per Figure 3-1. Indicator/transducers shall be accessible to an operator for adjustment, reading and wiring while standing on the ground. Details regarding signals, readouts, interfaces etc. shall be as per instrumentation data sheets 36-PDIT-327, 36-PDIT-332, 36-PDIT-333, and 36-PDIT-334.

Design and installation of electrical equipment shall be in accordance with the NFPA 70 "National Electric Code (NEC)" and IEEE "Institute of Electrical and Electronics Engineers" standards. The HEGA Filter shall be labeled by a nationally recognized testing laboratory or inspected and passed by the CH2M Hill Hanford Inspector.

3.3.1.5 Adsorbent Unit and Adsorbent Bed

Each adsorbent unit shall consist of multiple beds of activated carbon and adhere to ASME AG-1 Section FF. Each bed is fabricated using uniformly spaced, perforated sheets covered in activated carbon. The sheets are assembled to a formed, non-perforated frame by welding.

Bed depth shall be recommended by Vendor, must be confirmed with buyer. Preference shall be given to a 2" bed depth if it is acceptable.

The smooth side of the perforated sheet shall be in contact with adsorbent.

3.3.1.6 Polishing Filter

The Polishing Filter shall be a Medium Efficiency Filter and adhere to the standards of ASME AG-1 Section FB. It shall have a replaceable element, be dry extended media type and certified to UL 900 "Standard for Air Filter Units, Class I."

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The Medium Efficiency Polishing Filter shall be glass fiber based, containing a binder to retain the fibers, with both fiber and binder being suitable for the environment in accordance with ASME AG-1 Article FB-4000.

Polishing filter shall be constructed to the requirements of Technical Data Sheet 145579-V-DS-10.2

3.3.1.7 Bubble-Tight Isolation Dampers

Shall be built per requirements in Technical Data Sheet 145579-V-DS-010.1 or equivalent and comply with As per ASME AG-1 Section DA.

3.3.1.8 Fasteners

Stainless-steel bolts, cap screws, and washers shall be per ASTM A193 Grade B8, and nuts shall be heavy hex nuts per ASTM A194 Grade 8. Bolts and cap screws shall be grade marked.

All graded fasteners shall conform to ASME B18.2.1, Society of Automotive Engineers (SAE) J429, and ASTM A354.

The Seller shall select fasteners where they are not specifically called out in this specification using the following guidance:

- (a) Anti-galling compound (e.g., Loctite® 8013 or 8009) shall be applied where stainless-steel bolts are used.
- (b) Stainless-steel bolts, nuts, and washers shall be used when the mating parts are stainless steel.
- (c) The Seller shall ensure that suspect/counterfeit fasteners and components are not used for the construction of the HEGA Filter system and its components. Suspect fasteners can be identified by the following inspection methods:
 - (i) Head markings are marred, missing, or appear to have been altered,
 - (ii) Threads show evidence of dressing or wear (threads should be of uniform color and finish),

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- (iii) Head markings are inconsistent with a heat lot, and
- (iv) Head markings matching one of those identified on the United States Customs Service, Suspect Headmark List (see Appendix A).

3.3.1.9 Gaskets and Seals

The Seller will supply all housing and ducting gaskets for the HEGA Filter Skid. Gasket type will depend on the interface, which is specified in the Technical Data Sheet, 145579-V-DS-010.1. AG-1 Requirements are stated as follows:

1. HEGA Filter Gaskets shall be made from closed-cell, ozone resistant, neoprene or silicone rubber sponge Grade SCE-43E1 or SCE-44E1 in accordance with ASTM D 1056 "Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber."
2. Polishing Filter Gaskets shall be made from oil resistant cellular elastomer that conforms with the requirements of ASTM D 1056 Grade 2C3 or 2C4.

3.3.1.10 Stainless Steel Handling Requirements

The Seller shall submit 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.

3.3.1.10.1 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.

3.3.1.10.2 Contact with 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. Wire brushes shall be stainless steel.

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Grinding wheels and wire brushes shall be new or used previously on stainless steel only.

3.3.1.11 Welding

Piping and housing welding shall be performed in accordance with ASME B31.1 "Power Piping."

Perform only stainless steel welding on stainless steel equipments.

Structural steel welding shall be performed by certified welders in accordance with American Welding Society (AWS) D1.6 *Structural Welding Code – Stainless Steel* or AWS D1.1 *Structural Welding Code – Steel* appropriately.

Welding Procedures, Procedure Qualification Records, and Welder Procedure Qualification Records shall be submitted for review and approval to the Buyer before welding.

3.3.1.12 Electrical

The electrical connections shall be completed to by in accordance with IEEE C 62.41.1 *Guide on the Surge Environment in Low-Voltage (1000 V and less) AC Power Circuits* and IEEE C 62.41.2 *Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits* and NPPA 70 *National Electrical Code*.

3.3.2 Industry and Government Standards

The HEGA Filter shall comply with all applicable industry and government standards called out in ASME AG-1, section HA-4000, Housing Design. For more details on loads and load combinations, see Appendix B.

3.3.3 Radiation

1. Electromagnetic - The HEGA Filter Skid shall comply with the requirements in HNF-2962 "A List of Electromagnetic Interferences (EMI) & Electromagnetic Compatibility (EMC) Requirements on electromagnetic radiation."

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2. Nuclear - The HEGA Filter Skid will be exposed to low level nuclear radiation from the process. Exposure expected is 1×10^4 rads or less over 5yr design life. This exposure must not affect its operation.

3.3.4 Cleanliness

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

- (a) Metallic or other dusts (shop dust), chips, turnings, and weld splatter;
- (b) Abrasive particles;
- (c) Rust and other loose corrosion particles;
- (d) Magnetic/liquid penetrant residues, dye check, etc.;
- (e) Foreign material, such as paper, tape, plastic, sand, and wood;
- (f) Cutting oils;
- (g) Excess lubrication, grease, and oil; and
- (h) Marking dyes.

The fabrication traveler shall describe the cleaning and packaging steps taken.

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

The equipment ports and pipe openings shall be temporarily capped following cleaning and drying for shipment. Packaging requirements following cleaning are documented in Section 5.2.

3.3.5 Corrosion of Parts

Filter design shall include requirements for corrosion protection, especially restrictions on dissimilar metal couples.

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3.3.6 Protective Coatings

No protective coatings are required. All exposed parts are stainless steel.

3.3.7 Interchangeability

Filter elements shall be standardized throughout the site where practical to minimize spare parts storage.

Vendor to supply price for bulk purchase of filter elements.

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 for the assembled system. Clearly mark and identify any components that are required to be removed before installation of the assembly at the Buyer's location (e.g., shipping blocks).

3.3.8.1 Equipment Labeling

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

1. Internal and external valves;
2. Instruments and gauges, tanks, and filters; and
3. Instrument enclosures, and switches.

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.

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3.3.8.2 Wire and Cable Labeling

All wires and cables shall be labeled at both terminations with the identification shown on the Seller developed fabrication drawings.

3.3.8.3 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.

3.3.8.4 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 "Hanford Site Hoisting and Rigging Manual," 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).
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.

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

3.3.9 Nameplates

Each housing shall have a, Seller provided, permanently marked, metal, nameplate with the following minimum information:

- Type of Adsorber Cell
- Manufacturer Name or Symbol
- Project number, purchase order number, assembly name and number (provided by the Buyer),
- This specification number (including revision)
- Month/Year of manufacture
- Empty weight

Each Housing shall bear a replaceable label with the following information:

- Adsorbent Manufacturers name or symbol
- Adsorbent type and grade designation, lot and batch
- Filled weight
- Adsorbent weight
- Airflow resistance at specified airflow rating
- Refrigerant leak test results
- Date of filling.

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3.3.10 Human Engineering

Human factors engineering principles and criteria shall be integrated into the design of systems and 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

Equipment supplied by the Seller shall be subject to Factory Acceptance Testing (FAT). The Seller will be expected to provide a shop simulation of the inlet conditions of their equipment under normal and transient operating conditions to demonstrate the operational efficiency of the equipment. The Seller shall provide a FAT plan for operational testing and leak testing of their equipment in their proposal.

3.3.12 Document Submittal

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.

Along with the bid submittal, the items shown on the Technical Data Sheet 145579-V-DS-010.1, Data and Document Requirements Sheet, shall be included. The drawings shall show full compliance with this specification (and the associated drawings/documents) or note any exceptions. The Seller shall allow 10 working days for the Buyer to review and state the disposition of each submittal.

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

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Submittals are divided into two types: (1) Those requiring "approval before proceeding" (i.e., weld procedures or pre-purchase 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. Re-submittal 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 upon 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.

The Bidders Drawing and Data Commitments Sheet, provides a list of the required submittals, the number of copies, schedule, and approval information for each submittal.

The Seller shall provide fabrication traveler(s) for the fabrication and testing of the above-described equipment. The fabrication traveler(s) shall include detailed procurement, fabrication, assembly, testing, shipping, and handling steps required to properly fabricate, assemble, and test the equipment in accordance with the drawings and specifications.

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

The Buyer will insert witness/hold points in the fabrication traveler during their 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, inspection, or test step.

3.3.13 Personnel and Training

The Seller's equipment and systems shall be designed so that it is operable and maintainable by the Buyer's operations and maintenance personnel.

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4.0 QUALITY ASSURANCE REQUIREMENTS

4.1 GENERAL

4.1.1 Quality Assurance Program

The Subcontractor/Supplier shall have a documented, implemented and maintained Quality Assurance Program that is based on a national standard and identifies the activities and items to which it applies. Instructions and procedures must include or reference appropriate quantitative or qualitative acceptance criteria for determining that prescribed activities have been satisfactorily accomplished. The Quality Assurance Program must address each of the areas discussed within this QA Requirements Flow-down. The Subcontractor/Supplier must submit the Quality Assurance Program to the Buyer for review prior to award of contract.

The Subcontractor/Supplier shall assess its Quality Assurance Program regularly to assure its effective implementation.

The Quality Assurance Program shall provide for indoctrination and training, as necessary, of personnel performing activities affecting quality to assure 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 upon request.

4.1.2 Design

The Subcontractor/Supplier must define, control, and verify designs developed for this contract. Design inputs must be specified on a timely basis 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.

4.1.3 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

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personnel within the Subcontractor's/Supplier's organization, and changes must be reviewed and approved by the same individuals who reviewed and approved the original procurement documents.

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

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

- Identification of the Buyer's contract or purchase order number under which the materials, equipment, component, or service is being purchased;
- Provide traceability by means of positive identification from the material, equipment, component, or service to the Certificate of Conformance;
- 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;
- Identify any procurement requirements that have not been met, together with an explanation and the means for resolving the nonconformance.

The Subcontractor's/Supplier'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 Subcontractor's/Supplier's QA Program.

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

The Subcontractor/Supplier is required to flow-down all quality assurance requirements from this contract to any sub-tier suppliers/Subcontractor/Suppliers. Any access to the sub-tier suppliers'/Subcontractor/Suppliers' facilities for verification activities will be requested through the Subcontractor/Supplier prior to access, and verification activities may be performed jointly.

The Subcontractor/Supplier 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 Subcontractor's/Supplier's facility or lower-tier subcontractor's facility. The Subcontractor/Supplier shall notify the Buyer at least 7 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 Subcontractor/Supplier shall obtain all materials to be delivered under the contract directly from the original manufacturer or an authorized manufacturer's representative. The Subcontractor/Supplier 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, shipping documentation or manufacturer invoice; each of which would identify that the materials were obtained from the original manufacturer.

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

4.1.4 Identification and Control of Items

The Subcontractor/Supplier shall establish controls to assure 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 the 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 Subcontractor/Supplier 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 Subcontractor/Supplier shall identify each item, assembly, package, container, or material, having limited shelf life, with the cure date or date of manufacture and the expiration date. The Subcontractor/Supplier shall specify any storage temperatures, humidity and environmental conditions that should be maintained. Material shall not be furnished having less than 75 percent of total shelf life available at time of shipment.

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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:

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

4.1.5 Control of Processes

The Subcontractor/Supplier shall have processes to control processes, including special processes that control or verify quality (e.g., welding, heat treating, and nondestructive examination). Special processes must be performed by qualified personnel using qualified procedures in accordance with specified requirements.

Subcontractor/Supplier personnel performing weld inspections shall be certified as a CWI in accordance with the requirements of the American Welding Society (AWS), QC-1. The following documentation shall be submitted for Buyer approval prior to the start of fabrication:

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

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Welding procedures and personnel shall be qualified in accordance with applicable AWS or ASME requirements specified in the contract. The Subcontractor/Supplier 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 prior to 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 Supplier is not authorized to begin fabrication until the following documentation has been approved by the Buyer:

- NDE personnel qualification and certification procedure;
- 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;
- NDE method procedure(s) compliant with the applicable requirements of the Buyer's contract.

NDE 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. 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 Subcontractor/Supplier 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 Subcontractor/Supplier 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.

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The Subcontractor/Supplier 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:

- Identification of applicable inspection and/or test procedure;
- Resulting data for all characteristics evaluated, as required by inspection or test procedures, including reference to information on action taken in connection with nonconformances;
- 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
- Signature of the Subcontractor/Supplier's authorized representative or agency performing the inspection or test.

4.1.7 Test Control

The Subcontractor/Supplier 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.

The Subcontractor/Supplier 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/witness notification points. The test plan shall provide the following at a minimum:

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

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

The Subcontractor/Supplier shall provide test reports that include, as a minimum:

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- Item tested,
- Date of test,
- Tester or data recorder,
- Type of observation,
- Results and acceptability,
- Action taken in connection with any deviations noted, and
- 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 Subcontractor/Supplier shall control tools, gages, instruments, and other measuring and test equipment used for activities affecting quality, and shall calibrate at specified periods and adjust to maintain accuracy within necessary limits.

The Subcontractor/Supplier 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 Supplier's representative responsible for calibration, attesting to its authenticity, and shall be identified with the following information:

- Buyer's contract number;
- Date of calibration;
- Identification of the article to which the Certificate of Calibration applies; and
- Standards used for calibration.

In addition, the Subcontractor/Supplier 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.

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The Certification of Calibration will be held on file by AMEC 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 Subcontractor/Supplier 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 Control of Nonconforming Items

The Subcontractor/Supplier 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 Subcontractor/Supplier'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:

- **Accept-as-Is:** Nonconforming materials will perform its intended function.
- **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.

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Nonconformances shall be documented by the Subcontractor/Supplier 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 Subcontractor/Supplier. 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.

4.2 QUALIFICATION VERIFICATION

The HEGA Filter, Polishing Filter and the Filter Housing shall all be tested and inspected to the requirements of ASME AG-1 and ASME N510, where ASME AG-1 holds precedence in case of disagreement between the two. Most requirements have been outlined in the following section, however all equipment supplied shall meet all ASME AG-1 testing requirements.

Items to be verified:

- (a) Pressure/vacuum integrity of HEGA Filter housing
- (b) Carbon element quality inspection
- (c) Filter element seismic testing
- (d) Carbon filter and polishing filter shall be tested for effective organic, ¹²⁹I and particle removal
- (e) All moving parts shall be tested for function (e.g. Access doors).

4.3 INSPECTIONS AND TESTS

The test plans shall be submitted to the Buyer for review and approval a minimum of 10 working days before testing. The Buyer reserves the right to witness all tests and shall be given a minimum of 10 working days written notice before each test date.

Performance testing of the equipment is required. The Seller will provide all temporary electrical equipment including wiring and instruments necessary to allow component testing. Dated calibration labels shall be visible on all test equipment. Measuring and test equipment used for acceptance inspections and

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tests shall be controlled in accordance with the Seller's QA Program and shall meet the requirements of NQA-1-1994 Basic Requirement 12 *Control of Measuring and Test Equipment*, and shall be traceable to a national measurement standard.

The results of these inspections and tests shall be documented and submitted to the Buyer for review and approval. For the hydrostatic and simulated performance test, described in Section 4.3.3 and 4.3.4 respectively, a video record shall be submitted to the Buyer with test records/documents.

4.3.1 Pressure / Vacuum Integrity of HEGA Filter Housing

Each HEGA Filter housing shall be hydrostatically or pneumatically tested in accordance with ASME AG-1 TA-3522. Results shall be recorded. A video record of the hydrostatic tests shall be submitted to the Buyer with test records/documents. Test shall be conducted separately at Max Process Temperature and Minimum Process Temperature, (Temperatures as indicated in the Technical Data Sheet). The sealed section shall be pumped to a vacuum of -130 in WG and held for 30 minutes.

4.3.2 Carbon Element Quality Inspection

HEGA filter elements shall be tested for apparent density as per ASTM D2854 and particle size distribution as per ASTM D2862.

4.3.3 Filter Element Seismic Testing

Each design of medium efficiency filter shall be qualified by testing in accordance with AG-1 Section AA-4350. At least one unit of each design shall be tested.

4.3.4 Carbon Filter and Polishing Filter

Carbon filter and polishing filter shall be tested for effective particle removal.

Each HEGA Filter shall be tested to ASME N509 and ASME AG-1 FD-5000 Standards.

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4.3.5 Acceptance Criteria

The HEGA Filter Housing shall show no signs of leakage or deformation for the hydrostatic tests or vacuum test, no deformations after the structural capability test, and leakage as per ASME AG-1 FA-5350 "Acceptance Criteria".

Testing acceptance criteria shall be as per ASME AG-1 and ASME N509 sections relevant to the aforementioned testing procedures

4.3.6 Suspect / Counterfeit Parts Inspection

The Seller shall document and submit an inspection report of all parts and components of the equipment to certify that no Suspect or Counterfeit components have been identified.

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5.0 PREPARATION FOR DELIVERY

5.1 GENERAL

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

5.1.1 Instruction Manual

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

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

A standard Owner's Manuals clause should be written for all the procurement specifications and should address the following:

- Owner's Manuals shall be bound in 3-Ring binders
- Binders shall be indexed and tabbed
- Binders shall include 11"x17" drawings, catalog cuts, addresses, e-mail addresses, telephone nos., names of contact representatives
- Recommended Spares and Spare Parts lists.
- Weights
- Tests results and Tests Certificates
- Special Instructions / Information
 - Packaging information
 - Handling information
 - Shipping information
 - Operational and maintenance procedures
 - Storage information
 - Special assembly procedures.

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- "Hard copies" and "electronic format copies"
- Training CD's and/or videos.

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 ductwork or pipe ends shall be sealed to prevent ingress of debris and vermin into the system. The assembly shall be thoroughly cleaned to remove any dirt or dust that may have accumulated on the equipment during testing per Section . Moving parts shall be secured to prevent movement during shipping.

5.3 PACKAGING

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 unpacking instructions and by labeling on the outside of the equipment.

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.

Packaging and/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.

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.

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

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used in direct contact with the item being blocked shall not have a corrosive effect on the item.

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 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.

5.4 MARKING

Packages shall be properly and clearly marked. At a minimum, the required information shall include the contract number, the name 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."

5.5 HANDLING

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

5.6 SHIPPING/TRANSPORTATION

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.

6.0 NOTES

There are no notes for this specification.

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7.0 APPENDICES

The following appendices make up part of this specification:

Appendix	Description
A	Control of Suspect / Counterfeit Items (TFC-ESHQ-Q_C-C-03)
B	ASME AG-1 Requirements Schedule

8.0 ATTACHMENTS

Document No.	Title	Rev.
145579-V-DS-010.1	Carbon Filter Technical Data Sheet	1
145579-V-DS-010.2	Off Gas Polishing Filter Technical Data Sheet	1
36-PDIT-327	Differential Pressure Transmitter	C
36-PDIT-332	Differential Pressure Transmitter	C
36-PDIT-333	Differential Pressure Transmitter	C
36-PDIT-334	Differential Pressure Transmitter	C
H-14-106796	Off Gas Area – FDNS Plans & Sections	0



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APPENDIX A

**TFC-ESHQ-Q_C-C-03, REV. B
CONTROL OF SUSPECT COUNTERFEIT ITEMS**

		USQ #03-1456-S
CH2M HILL Hanford Group, Inc.	Manual	ESHQ
	Document	TFC-ESHQ-Q_C-C-03, REV B
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	Issue Date	December 31, 2003
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1.0 PURPOSE AND SCOPE

(7.1.1, 7.1.2, 7.1.3, 7.1.4)

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/CIs 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/CIs 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 (BOM) 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 | <p>1. Report all items identified as potential S/CI in accordance with <u>TFC-OPS-OPER-C-24</u>. (7.1.1)</p> <p>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.</p> |
| S/CI Coordinator | <p>2. Notify the DOE S/CI coordinator of all occurrence reports associated with S/CIs. As appropriate, transmit copies of NCRs and applicable documentation.</p> <p>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:</p> <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 | <p>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.</p> <p>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:</p> <ul style="list-style-type: none"> 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

- | | |
|-------------------|--|
| Quality 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 414.1A, DOE O 440.1A, DOE G 440.1-6, 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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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. (Source: U. S. Department of Transportation Federal Aviation Administration Advisory Circular 21-29B, Detecting and Reporting Suspected Unapproved Parts).

Fastener (regardless of the safety classification). (Source: Fastener Quality Act, Public Law 101-592 as amended by Public Law 104-113).

- 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 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. (Source: ASME-NQA-1-1989, Quality Assurance Requirements for Nuclear Facilities).

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. (Source: DOE G 440.1-6, Implementation Guide for use with Suspect/Counterfeit Items Requirements of DOE O 440.1, Worker Protection Management; 10 CFR 830.120; and DOE 5700.6C, Quality Assurance).

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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. (Source: U.S. Department of Energy (DOE) M 232.1-1A, "Occurrence Reporting and Processing of Operations Information").

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.

(Source: DOE G 440.1-6, Implementation Guide for use with Suspect/Counterfeit Items Requirements of DOE O 440.1, "Worker Protection Management;" 10 CFR 830.120; and DOE 700.6C, "Quality Assurance").

6.0 RECORDS

No records are generated during the performance of this procedure.

7.0 SOURCES

7.1 Requirements

1. DOE-O-232.1A Part 4.f. (1), "Occurrence Reporting and Processing of Operations Information." (S/RID)
2. DOE O 414.1A, "Quality Assurance."
3. 10 CFR 830, Subpart A, "Quality Assurance Requirements."
4. DOE O 440.1A, "Worker Protection Management for DOE Federal and Contractor Employees."

7.2 References

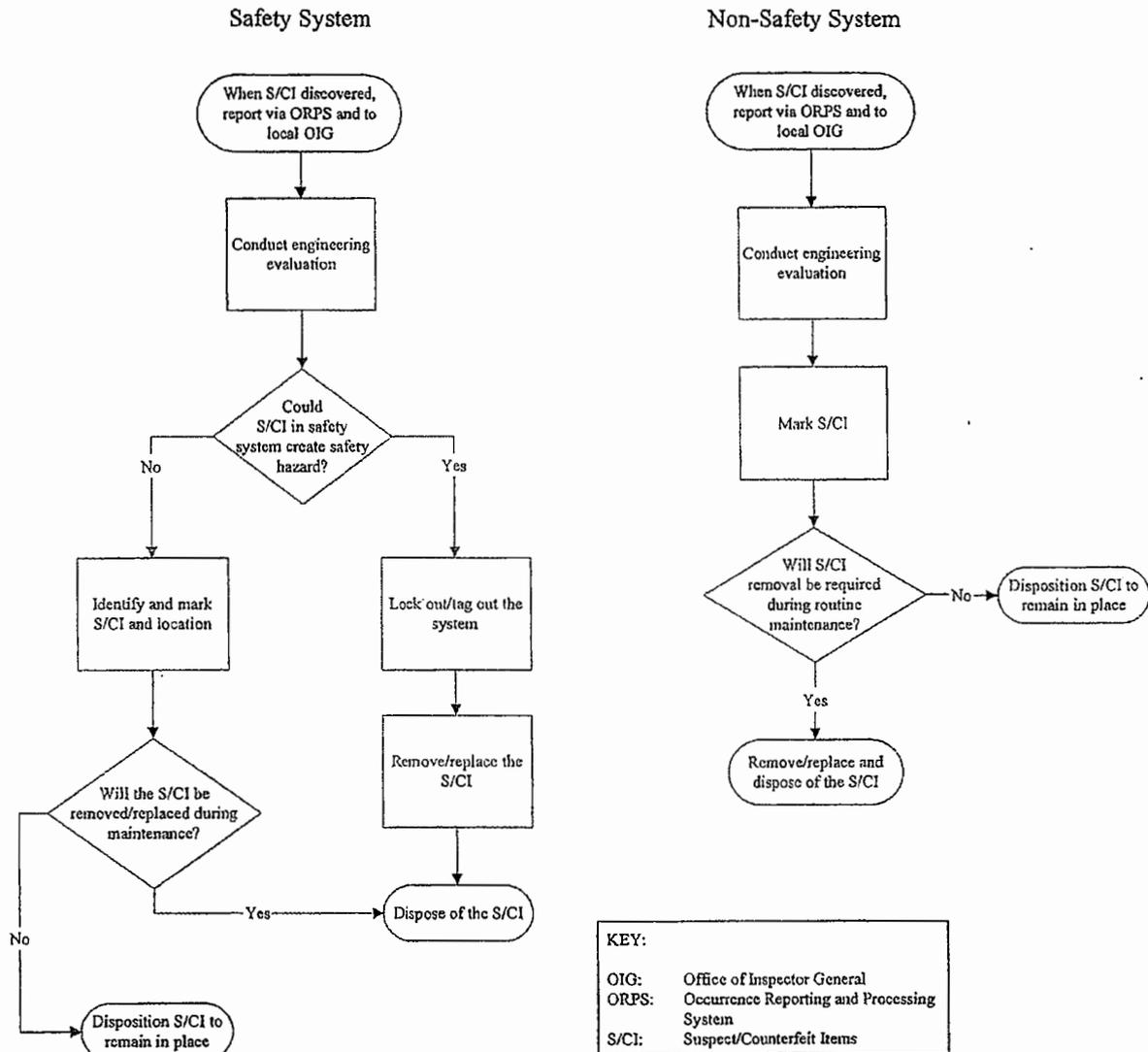
1. HNF-SD-MP-SRID-001, "Standards/Requirements Identification Document for the Tank Farm Contractor."

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2. DOE G 440.1-6, "Implementation Guide for use with Suspect/Counterfeit Items Requirements of DOE O 440.1, Worker Protection Management; 10CFR830.120; and DOE5700.6C, Quality Assurance."
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."

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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 • HMCP 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) ATS 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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ATTACHMENT A - SUSPECT COMPONENTS LIST (cont.)

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 • EHB3040 • JL3-B150 • JL3-B200 • JL3-B090 • JL3-B1000 • HF A, HFB, FA • JL3-(B)8070 • JL3-B125 • EH-2020 • FA-3035 • EH-2050 • FA-2100 • FA-2050 • HFB-3050 • JA-2225 • HLM3800T • F3100N • MA3500 • EH2015 • LA3200WL • 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

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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>
	<ul style="list-style-type: none"> • MDL#KAF • QNB3020 • QNB3030 • BA 	3 pole, 20 amp	Not Provided	<p>SENS ID #10 3-17-89 SENS ID #11 3-3-89</p>
	<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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ATTACHMENT A - SUSPECT COMPONENTS LIST (cont.)

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 • 1193 		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"> • KHL 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.)	1, & 3 pole - 30, 60 & 100 amp breakers	ANTI THEFT Systems, Inc. (DBA) ATS Circuit Breakers and AC Circuit Breaker - Electrical Supply	SENS ID. #11 3-3-89
	Jefferson (Component Examples)	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 Mid West Co.	NRC I.N. 88-46, Supp. & Attach. NRC I.N. 88-46, Supp. & Attach.
Circuit Breakers	Superior (Component Examples)	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	Venetech	E.L. Wilmot letter dated 8-1-91 H. Richardson letter HR-81-91 dated 8-15-91
Motors	Siemen & Allis (Component Examples) INP 143 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 IE	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) SFF 9140	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	
	• A201KICA		California Breakers, Inc.	
	• A201L2CA		PENCON International (DBA) General Magnetics/Electric Wholesale	
	• AN13A		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	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 (NBBI) Bulletin: Special Report, 1992, Volume 48, Number 2, The Chinese Flange Investigation
Valve Replacement Parts	Masoneilian-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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ATTACHMENT A - SUSPECT COMPONENTS LIST (cont.)

Component	Manufacturer/Type	Description	Supplier	References
Steel	Alloy & Carbon Steel Co. Inc., Atlantic Steel Co., Levingston 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) Daiichi (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	Aircon 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: sheet metal 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.

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. 87-6

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/hlaneci/hlaneci.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

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 Sleybo (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 Dael (JP)		UNY Unytite (JP)

Grade 8.2 fasteners with the following headmarks:

Mark	Manufacturer
	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.

1. 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.).

**TECHNICAL SPECIFICATION**

PROJECT:	Final DBVS Design	145579-V-SP-010
PROJECT NO.:	145579	APPENDIX B
CLIENT:	AMEC E&E - Richland, WA	ASME AG-1 REQUIREMENTS SCHEDULE

APPENDIX B**ASME AG-1 REQUIREMENTS SCHEDULE**

Requirement No.	Source	Requirement Text	Verification/Validation R-Review A-Analysis T-Test I-Inspection	Document Reference (Where is this requirement incorporated)
	ASME-AG-1	CODE ON NUCLEAR AIR AND GAS TREATMENT		
	HA	SECTION HA: HOUSINGS		
	HA-1100	Scope: This Section provides requirements for the design, construction, performance, fabrication, inspection, acceptance testing, and quality assurance for housings and housing supports in nuclear-safety related air treatment systems.		
	HA-3000	MATERIALS		
1	HA-3100 HA-3110	Allowable Materials (General Requirements): (a) Material used shall have properties and composition suitable for the application as defined by the Design Specification and the service conditions, as defined in AA-4213. Materials shall be in conformance with the ASME and the ASTM materials listed in Table HA-3100. Substitute materials shall be approved by the Owner or designee. (b) Materials that are part of the pressure boundary or equipment support shall meet the structural requirement of HA-4000. (c) Materials expressly prohibited or limited shall be explicitly described in the Design Specification		
2	HA-3111	Protective Coatings: All carbon steel surfaces shall be painted to protect against corrosion and to facilitate cleaning and decontamination. Coatings shall comply with the requirements of Section AA-6500 and ASTM D5144. Coatings shall meet radiation resistance, chemical resistance, and decontamination requirements in accordance with the Design Specification. Stainless steel (galvanized), bronze, copper, aluminum, and glass surfaces are not required to be coated.		
3	HA-3200 HA-3210 HA-3211	Special Limitations on Materials (Metals): Physical Properties: Changes in the physical properties of metals at minimum and maximum design temperatures must be recognized and factored into the design of housings		
4	HA-3212	Galvanic Corrosion: The possibility of galvanic corrosion due to the relative potentials of aluminum, copper, and their alloys should be considered when used in conjunction with each other, or with steel or other metals and their alloys.		
5	HA-3213	Corrosive Vapors: Aluminum and zinc shall not be used in the presence of corrosive vapors unless protected by coatings designed to prevent deterioration of the metal. Protective measures other than coating shall be approved by the Owner or designee.		

Requirement No.	Source	Requirement Text	Verification/Validation: R- Review A-Analysis T-Test I-Inspection	Document Reference (Where is this requirement incorporated)
6	HA-3214	<p>Nonmetallic Materials:</p> <p>The use of nonmetallic materials such as plastics, elastomers, and similar substances is permitted in the construction of housings provided that in the selection of these materials, consideration is given to:</p> <p>(a) emission of toxic vapors;</p> <p>(b) degradation of properties caused by temperature extremes, radiation exposure, chemical exposure, and aging; and.</p> <p>(c) maintainability.</p>		
7	HA-3215	<p>Deterioration of Materials in Service:</p> <p>It is the responsibility of the Owner or designee to identify the environment in which housings must operate so that the Manufacturer can select the grade of materials to meet the conditions stated in the Design Specification.</p>		
8	HA-3600	<p>Certification of Material:</p> <p>For structural and pressure boundary materials, the supplier shall make available certified test reports of chemical and physical properties. For those ASTM materials which do not have physical testing required by the ASTM specification, tensile testing shall be performed per ASTM A370. All other materials used in the construction of housings shall be provided with a manufacturer's Certificate of Compliance covering the ASME, ASTM, or other material specification, grade, and class, if applicable.</p> <p>In lieu of FTR (Factory Test Report) CFC (Certification of Compliance) is acceptable.</p>		
	HA-4000	DESIGN		
9	HA-4000	<p>General Design:</p> <p>Housings shall be designed in accordance with the requirements of AA-4000 and this Section. The design shall incorporate requirements for structural strength, rigidity, and sealing surfaces to provide leak-tightness of internal mounting frames to the housing. Decontamination requirements shall be specified in the Design Specification, by the Owner or designee.</p>		
10	HA-4200 HA-4210	<p>Design Criteria (Load Criteria):</p> <p>Loads: Loads to be considered in the structural design of housings are listed in AA-4211 with the following additions and clarifications</p>		
11	HA-4211	<p>Dead weight (DW): the weight of the housing members excluding the dead weight of internal equipment such as HEPA filters and their respective mounting frames. DW includes sheet metal panels, door panels, frame members, and stiffeners.</p>		
12	HA-4211	<p>Component load (CL): The force of the internally mounted components imposed on the housing. CL is separated into four portions: dead weight, normal operating pressure differential (NOPD) for the particular component, OBE, and SSE. Additional dynamic loads (ADL), will be provided by the Design Specification, as applicable.</p>		
13	HA-4211	<p>External load (EL): as defined in AA-4211.</p>		

Requirement No.	Source	Requirement Text	Verification/Validation R-Review A-Analysis T-Test I-Inspection	Document Reference (Where is this requirement incorporated)
14	HA-4211	Fluid momentum load (FML): as defined in AA-4211. Housing internal components shall be designed to withstand the FML resulting from air turbulence, from fan discharges into the housing. The housing portion where this load is significant is determined by the length required to regain uniform airflow as given by AMCA 204 Fig 3-3. Loading: Loads applicable for fan design are described in AA-4211 and AA-4212. Specific conditions listed in BA-4131.1 through BA-4131.4 shall be considered.		
15	HA-4211	Hydrostatic load (HL): shall be added to the dead weight (DW) as applicable. Hydrostatic loads from accumulated condensate, water deluge systems, moisture separators, and associated housing flooding. The hydrostatic load shall be established by documented analysis base on housing internal and component function.		
16	HA-4211	Live load (L): includes a construction mainload of 250 lb on the roof of the housing. Housing sheet metal floors shall be designed for at least a 50 psf live load when no other floor system is provided (e.g., grating, concrete slab).		
17	HA-4211	Normal operating pressure differential (component) (NOPD _c): the opening pressure differential across the component from upstream to downstream of the component included in the housing. See applicable Division II component sections for all component NOPD's.		
18	HA-4211	Normal operating pressure differential (housing) (NOPD _h): The maximum pressure differential between inside the housing and external to the housings. For ease of design, a housing may be designed using one pressure value that envelopes SOPT and NOPD.		
19	HA-4211	System operational pressure transient (SOPT): as defined in AA-4211 or may be enveloped with NOPD _h and NOPD _c .		
20	HA-4211	Seismic loads (SL): Loads that are the result of the envelop of the operating basis earthquake (OBE) and the safe shutdown earthquake (SSE). As an option, the OBE, and SSE may be considered separately with the OBE loads used for the Level B load combination. Both orthogonal components of horizontal and vertical components of the seismic excitation shall be applied simultaneously in the direction that will produce worst-case stresses and deflections. These components may be combined by the square root of the sum of the squares (SRSS) method..		
21	HA-4211	T and N: defined in AA-4211.		
22	HA-4211	Design pressure differential (DPD): The dynamic pressure loads resulting from a design basis accident (DBA), intermediate break accident (IBA), or small break accident (SBA). Housings should be located outside the local pipe break affected area. If housings are subjected to these loads, the Design Specification (HA-4600) shall address the specific design requirements considering a Service Level D combination.		

Requirement No.	Source	Requirement Text	Verification/Validation R-Review A-Analysis T-Test I-Inspection	Document Reference (Where is this requirement incorporated)
23	HA-4211	For other component load criteria see the following sections: (1) HEPA filters – FC-4300 (2) Type II adsorbers – FD-4400 (3) Type III adsorbers – FE-4400 (4) Mounting frames – FG-4200 (5) Dampers – DA-4000 (6) Moisture separators – FA-4000 (7) Pre-filters – FB-4000 (8) Coils – CA-4000 (9) Fans – BA-4000 (10) Ductwork – SA – 4200 (11) Type IV adsorbers – FH-4300		
24	HA-4212	Load Combinations: The applicable loads are given in Table HA-4212.		
25	HA-4213	Service Conditions: The requirements of AA-4213 <i>Service Conditions</i> apply.		
26	HA-4214	Design and Service Limits: The requirements of AA-4214 <i>Design and Service Limits</i> apply.		
27	HA-4215	Housing Supports: Housing supports shall be designed per the loads and load combinations in HA-4211 and HA-4212. The stress criteria for each load combination shall be per HA-4220. Floor mounted housing supports shall be designed to act as an integral base of the housing. Anchorage to the floor shall be designed to transfer the lateral forces without overturning or deformation of the housing unit. Units with internal mounting frames where leakage is a design consideration, shall have floor anchorages near the junction of the mounting frame and base. Small units which are typically provided with the base from the vendor's facility shall be designed for the installation/erection loads associated with a package unit. Larger units that are installed using modular construction need only consider the installation loads associated with each piece.		

Requirement No.	Source	Requirement Text	Verification/ Validation R- Review A-Analysis T-Test I-Inspection	Document Reference (Where is this requirement incorporated)
28	HA-4220	Stress Criteria: The allowable stresses for housing sheet metal material and cold		
29	HA-4230 HA-4231	Deflection Criteria (Deflection Limits): The deflection limits shall be specified in the Design Specification and shall be in accordance with AA-4231.		
30	HA-4232	Deflection Limits for Mounting Frames and Equipment Interfaces: For walk-in housings, the deflection limits for the mounting frames shall also be considered at the interface between the frame and the housing. For deflection limitations of other equipment (e.g., fans, dampers, ductwork) see the applicable Division II Code Sections.		
31	HA-4240 HA-4241	Other Criteria: Vibration Isolation: Vibration isolation requirements shall be specified by the Owner or designee in the Design Specification.		
32	HA-4242	Provisions for Relative Movement: Clearance shall be provided to allow for relative movement of the internal equipment during operation and during maintenance of the equipment.		
33	HA-4243	Tolerances: Tolerances shall be specified for all external and internal interface boundaries. Tolerances shall be specified in the design documents. Tolerances shall be accounted for in applicable design analysis (e.g., location of applied load).		
34	HA-4244	Housing Attachments: Housing attachment design shall include all Service Links and Load Combinations set forth in HA-4212 and HA-4213, or as required by the Design Specification. Attachments shall be either the welded or bolted type.		
35	HA-4245	Welded Attachments: Consideration shall be given to local stresses induced in the housing wall by integral attachments as defined in AA-4243. Attachment and housing material shall be compatible for welding. See AA-6000. The permissible types of welded joints shall be in accordance with AWS D1.1, AWS D9.1, AWS D1.3, or ASME Section IX, as applicable.		
36	HA-4246	Bolted Attachments: Consideration shall be given to bolting and local stresses induced in the housing wall by integral attachments as defined in AA-4243. The design of bolts for structural supports shall meet the requirements of AISC Specification for the Design, Fabrication, and Erection of Structural Steel, Ninth Edition, Part 4.		
37	HA-4247	Fatigue Considerations: Internal housing components subjected FML should be designed for fatigue based on cyclic loading of the element. See HA-4211 to determine the portion of the affected internal housing components. The appropriate reductions in allowable stresses are given in Section 5, Appendix B of the AISC Specification for the Design, Fabrication, and Erection of Structural Steel, Ninth Edition, Part 4.		

Requirement No.	Source	Requirement Text	Verification/Validation: R- Review A- Analysis T- Test I- Inspection	Document Reference (Where is this requirement incorporated)
38	HA-4248	Fire Protection: Fire protection requirements shall be specified by the Owner or designee commensurate with individual component requirements. Fire protection for Type III adsorbers shall be provided per FE-4620.		
39	HA-4300 HA-4310	Housing Joints and Seams (General Requirements): Selection of joints and seams used in the assembly of housing sections shall be based on the required structural integrity, leak-tightness, and the fluid flow within the system. Duct-housing interconnections shall be designed with consideration of the air distribution uniformity.		
40	HA-4320 HA-4321	Housing Joints and Seams: Acceptable Longitudinal Seams and Joints: The following longitudinal seams and joints are acceptable for use in housing sections subject to limitations of HA-4330, -4340, -4500: (a) welded lap joint (b) welded butt joint (c) welded flange fillet corner welds		
41	HA-4322	Acceptable Transverse Joints: The following types of transverse joints are acceptable for use in housing sections subject to limitations of HA-4330, -4340, -4500: (a) welded lap joint (b) welded butt joint (c) welded flange companion angle: gasketed & bolted		
42	HA-4323	Other types of Connections: Other types of rigid longitudinal and transverse connections may be acceptable provided that the design structural characteristics are qualified. Qualification shall be documented by engineering evaluation or test as specified by the Owner or designee. Qualification test shall demonstrate the joint's ability to withstand load combinations in HA-4212. Joint design qualification shall be completed prior to the start of fabrication		
43	HA-4324	Bolts and Fasteners: Connections shall be designed to sustain all loading combinations. Bolted connection and joint design shall be designed to meet allowable leakage of HA-4500.		
44	HA-4330 HA-4331	Air Cleaning Units Joints and Seams: <i>The pressure boundary joints and seams for all air cleaning unit housings shall be continuously welded.</i>		
45	HA-4332	Seals: Penetrations on housings shall be sealed by welding, with a sealant qualified for the housing's environment, or with adjustable compression or gland-type seals. Gland-type seals include but are not limited to "O" rings, gaskets, and other nonmetallic materials.		

Requirement No.	Source	Requirement Text	Verification/Validation R- Review A- Analysis T- Test I- Inspection	Document Reference (Where is this requirement incorporated)
46	HA-4333	<p>Electrical Conduits and Drains:</p> <p>All penetrations by electrical conduit and drains shall be arranged and individually sealed or valved so that bypassing of HEPA filter banks or adsorber banks cannot take place. Electrical conduit open to the inside shall be internally sealed to meet allowable leakage determined in HA-4500.</p>		
47	HA-4334	<p>Separate Mounting Frames:</p> <p>Where separate mounting frames for HEPA filters and adsorbers are required, they shall be continuously seal welded to the housing</p>		
48	HA-4340	<p>Air Conditioning and Air Handling Units Housing Joints and Seams:</p> <p>These unit joints and Seams shall be of either welded or bolted construction or other types meeting the requirements of HA-4323 and the allowable leakage criteria specified in the Design Specification.</p>		
49	HA-4341	<p>Penetrations:</p> <p>Penetrations on housings shall be sealed by welding, adjustable compression, gland-type seals, or other method capable of meeting allowable leakage criteria for the housing as determined in HA-4500.</p>		
50	HA-4400 HA-4410	<p>Accessories:</p> <p>Gaskets shall be made of materials which are compatible with the conditions of HA-4600. Gasket dimensions shall be based on joint design. An Acceptable criterion for compression of gasket material shall be established on the basis of the gasket chosen. This acceptance criterion and the service life of the gasket and joint shall be documented by evaluation or testing as determined by the Owner or designee.</p>		
51	HA-4420	<p>Access Doors and Panels:</p> <p>Construction of doors/panels and door frames shall be selected to meet the allowable leakage determined in HA-4500. Sealing surfaces between the door/panel and frame shall be designed for compression sealing. The design shall incorporate means for adjusting compression forces, gasket compression, and alignment. Spacing of hinges, latches, and bolts shall be determined by calculation or test to ensure a uniform compression of the gasket. Spacing shall enable a compression tight enough to assure leakage requirements are met (HA-4500) and provide a gasket compression uniformity of +/-20 deg. Hinged, if specified, shall be designed to minimize damage to compression seals due to friction and shear forces during opening and closing of the doors. Doors shall be designed for ease of operation by one person. Man entry housing doors shall be operable from both inside and outside the housing and be clearly labeled for open and closed latch position. Hinges and latches shall be designed such that lubrication materials shall not enter the interior of the housing. See Non-mandatory Appendix HA-B (B-1110) for additional guidance on the design of access doors</p>		

Requirement No.	Source	Requirement Text	Verification/ Validation R- Review A- Analysis T- Test I- Inspection	Document Reference (Where is this requirement incorporated)
52	HA-4430 HA-4431	Provisions for Testing and Maintenance: Test Ports: The Owner or designee shall evaluate the design function of the equipment to determine where test ports (including injection and sampling ports) are required. The penetration shall comply with HA-4332, and have a cap or plug that is suitable to meet the pressure requirements of the housing.		
53	HA-4432	Manifolds: The Owner or designee shall determine where injection and sampling manifolds are required. Injection and sampling manifolds shall be constructed of metal to minimize damage potential and to maintain manifold qualification. Sampling and injection manifolds which are required to be installed within the filter housing should be designed for permanent installation within the housing. If permanently installed manifolds cannot be provided, then manifolds shall be designed to be removable, with each manifold piece numbered, tagged, and marked for reinstalling prior to each test. Permanent manifold installation is recommended to obtain better repeatability of test results. When an air cleaning unit contains two or more HEPA filter banks or adsorber banks in series, or both, injection and sampling manifolds for the respective test agents are required for each of the filter and/or adsorber banks. General guidance for manifolds is given in Nonmandatory Appendix HA-C. Injection manifolds shall be qualified in accordance with HA-5800.		
54	HA-4433	Housing Access: Walk-in housings shall be protected and braced to prevent damage by personnel entering for inspection and maintenance. Walk-in access doors (20 in. wide by 50 in. high, minimum) shall be provided on each side of each component section when housing size permits. A permanent platform shall be installed internal to the housing to provide access to filters for filter banks greater than or equal to six ft. in height. Platform shall not interfere with filter access or air flow distribution. Space shall be provided both internal and external to the housing for equipment removal and maintenance. See Nonmandatory Appendix HA-B for additional guidance.		
55	HA-4434	Lighting: Walk-in housings shall be fitted with vapor tight lights between each bank of components. For walk-in air cleaning unit housings, fixtures shall be flush mounted and serviceable from outside of the housing. Lighting levels shall be determined based on personnel safety visual requirements as given in the Design Specification and guidance provided by IES Lighting Handbook as published by the Illuminating Engineering Society of North America		

Requirement No.	Source	Requirement Text	Verification/Validation R-Review A-Analysis T-Test I-Inspection	Document Reference (Where is this requirement incorporated)
56	HA-4440 HA-4441	<p>Miscellaneous:</p> <p>Drains: Consideration shall be given to drains depending on requirements, services, or components within each compartment. For example, drains shall be required for:</p> <ul style="list-style-type: none"> (a) fire protection systems (b) removal of decontamination liquids (c) moisture separators (d) condensing cooling coils <p>Drains form an integral part of the housing pressure boundary and are subject to air leakage requirements established in HA 4500. The size selected for each drain furnished in the housing as well as the collection point for each drain shall be documented by calculation or test as determined by the Owner or designee. For the additional guidance in the design of drains, see Nonmandatory Appendix HA-B.</p>		
57	HA-4442	<p>Insulation:</p> <ul style="list-style-type: none"> (a) Insulation shall be provided as specified by the Owner or designee to ensure air conditioning function, limit condensation, or provide acoustic noise reduction as required. (b) Acoustic linings and thermal insulation shall not be applied to the inside of housings that may become contaminated. (c) Insulation applied to the outside of housings shall not prevent access to doors, access panels, or other components requiring adjustment or maintenance. <p>The fire hazard classification of applied insulation, adhesive, and sealer shall not exceed a flame spread of 25 and smoke developed of 50 in accordance with NFPA-90A.</p>		
58	HA-4443	<p>Clamping Mechanism:</p> <p>Side access housings shall have a clamping mechanism, filter retrieval features, and filter indexing mechanisms. The clamping mechanism shall be individually adjustable for each HEPA filter or adsorber. For side access housings with fluid seals, the filter clamping mechanism shall be capable of moving the filter on and off through adequate travel to ensure the knife-edge is embedded into the pliable sealant and provides seal for the complete perimeter of each filter or adsorber. The clamping mechanism shall provide for uniform gasket compression. The clamping mechanism for walk-in housings shall be designed per Section FG.</p>		
59	HA-4500 HA-4510	<p>Pressure Boundary Leakage (General):</p> <p>Pressure boundary leakage shall be controlled to ensure satisfactory environmental conditions, either within or outside of the nuclear facility. Allowable leakage for a housing, or portion of a housing, shall be determined considering the following factors:</p> <ul style="list-style-type: none"> (a) control of airborne contamination (b) control of space pressure (c) control of space temperature <p>control of space humidity</p>		

Requirement No.	Source	Requirement Text	Verification/ Validation R- Review A- Analysis T- Test I- Inspection	Document Reference (Where is this requirement incorporated)
60	HA-4520	<p>Applicability:</p> <p>Housing pressure boundary leakage shall apply to air cleaning, air conditioning, and air handling systems. Each housing's pressure boundary shall include the following items:</p> <ul style="list-style-type: none"> (a) housing enclosure (b) access panels and doors <p>penetrations for instrumentation piping, electrical, and other utilities.</p>		
61	HA-4530 HA-4531	<p>Evaluation (Responsibility):</p> <p>The Owner or designee shall establish the allowable leakage to assure ventilation, temperature, and contamination control functions are achieved.</p>		
62	HA-4532	<p>Allowable Leakage Determination:</p> <p>The following criteria shall be utilized in the determination of allowable leakage.</p> <ul style="list-style-type: none"> (a) application of governing codes, regulations, and plant-specific requirements (b) consideration of each housing's operating mode, including anticipated system upset condition, such as rapid closure of dampers (c) normal and maximum operating pressures throughout the pressure boundary (d) system internal and external environmental conditions <p>Guidance for determination of allowable leakage is given in Section SA, Nonmandatory Appendix SA-B.</p>		
63	HA-4533	<p>Exceptions to Leakage Requirements:</p> <p>Air cleaning, air conditioning, and air handling housings exhibiting one of the following conditions need not be subjected to quantitative measurement of leakage unless otherwise required by the Design Specification.</p> <ul style="list-style-type: none"> (a) Housings in systems serving only the protected space and located only within the same protected space. (b) Housings under negative pressure which are located entirely in a clean interspace, and only provide air cooling or heating function. <p>However, the housing shall be pressurized to locate and seal all audible leaks. Reference Section SA, Nonmandatory Appendix SA-B, Figs. B-1410-1 through B-1410-3 for typical system configurations.</p>		

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64	HA-4534	<p>Documentation:</p> <p>Derivation of allowable leakage for each housing, or portion thereof, shall be documented by the Owner or designee.</p> <p>This documentation shall include the following:</p> <ul style="list-style-type: none"> (a) identification of housing or portion of housing (b) governing codes, regulations, and plant-specific requirements (c) purpose of leakage control; see HA-4510 (d) system mode of operation (e) normal and maximum operating pressure (f) method of derivation of allowable leakage test pressures and associated allowable leakage 		
65	HA-4600	<p>Design Specification:</p> <p>The Owner Design Specification shall contain the following information which is relevant to the housing and housing supports covered by this Section.</p> <ul style="list-style-type: none"> (a) Loads as defined by HA-4211. (b) Environmental conditions. <ul style="list-style-type: none"> (1) Housing external-design environmental conditions including, but not limited to pressure, temperature, relative humidity, radiation exposure, and hostile environmental factors for all plant conditions. (2) Housing internal-design environmental conditions for all system operating conditions. (c) Service conditions as defined by AA-4213. (d) Design and service limits as defined by AA-4214. (e) Allowable housing leakage as defined HA-4500. (f) System safety-related function: Identify the function of the housing for each plant condition. The function shall consist of purpose and operational parameters (i.e., flow, leakage, pressure, temperature). Plant conditions and service limits are defined by AA-4213 and AA-4214. (g) Fire protection requirements. (h) Material certification requirements. (i) Tolerance requirements. <p>Inlet and outlet configurations</p>		
	HA-5000	INSPECTION AND TESTING		
	HA-5100	General (Scope and Applicability):		
	HA-5110	This Section contains general requirements for the inspection and testing of housings and housing supports.		
66	HA-5120	<p>Responsibility for Procedures:</p> <p>When an inspection or test is required herein, written inspection or testing procedures shall be developed, by the parties performing the test or inspection, to the specific requirements of this Section. The inspection or testing shall be performed by personnel qualified in accordance with ASNT SNT-TC-1A as amended by ASME NQA-1 and AA-6433.</p>		

Requirement No.	Source	Requirement Text	Verification/Validation: R-Review A-Analysis T-Test I-Inspection	Document Reference (Where is this requirement incorporated)
67	HA-5200 HA-5210	Inspection (General Requirements): Visual inspections shall be performed in accordance with AA-5200 and TA-3410. Inspection and testing of welds shall be performed in accordance with AA-5300 and AA-6000 and means of support shall be included in the Design Specification.		
68	HA-5220	Housings: Housings shall be inspected for proper dimensions including tolerances, as specified by HA-6400 and governing construction documents.		
69	HA-5221	Joints and Seams: Joints and seams shall be visually inspected. Acceptance criteria shall be as follows. (a) Joints and seams shall comply with the requirements of HA-6400 and HA-6500. (b) Gasketed joints shall provide uniform gasket compression. Gaskets shall be installed per construction documents. (c) Longitudinal or transverse welded joints shall comply with AA-6000 requirements. Threaded fasteners shall be provided with locking devices in accordance with AA-6258.		
70	HA-5222	Stiffeners: Stiffeners shall be visually inspected to ensure compliance with the following acceptance criteria. (a) Stiffeners shall comply with the fabrication and installation requirements of HA-6000. (b) Welds shall comply with AA-6000 requirements. (c) Threaded fasteners shall be provided with locking devices in accordance with AA-6258. Removal of temporary attachments shall be verified.		
71	HA-5230	Housing Supports: Supports shall be visually inspected during installation, after installation, or both in accordance with the following acceptance criteria. (a) Supports shall comply with the fabrication and installation requirements of HA-6400. (b) Welded joints shall comply with AA-6000 requirements. (c) Threaded fasteners shall be provided with locking devices in accordance with AA-6258. (a) Removal of temporary attachments shall be verified.		
72	HA-5240	Filter Mounting Frame to Housing Weld Inspection: The housing filter mounting frame for HEPA filter and adsorbers shall be inspected using visual and nondestructive test methods per AA-6330.		

Requirement No.	Source	Requirement Text	Verification/ Validation R- Review A- Analysis T- Test I- Inspection	Document Reference (Where is this requirement incorporated)
73	HA-5300 HA-5310	Pressure Boundary Leakage Testing (General): Temporary isolation at a transverse joint shall be allowed subject to		
78	HA-5320	Allowances for Housing Leakage Rates by Sections: (a) Temporary isolation at a transverse joint shall be allowed subject to the following requirements.)		
75	HA-5330	Testing Procedures: Prior to pressure boundary leakage testing, test procedures shall be developed in accordance with TA-3330. All test equipment shall be specified with the proper range and required accuracy. Test procedures shall include acceptance criteria determined by HA – 4500, HA-5320, and HA-5350		
77	HA-5350 HA-5351	Acceptance Criteria (Quantitative Leakage Tests): Acceptance criteria for quantitative leakage tests shall comply with HA-4500 and HA-5310(c)		
78	HA-53523	Non-quantitative Leakage Tests: For non-quantitative leakage tests allowed by HA-4533, the acceptance criteria shall be that audible leaks have been sealed		

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79	HA-5400	<p>Mounting Frame to Housing Leakage Test:</p> <p>A mounting frame pressure leak test may be used to detect leaks in the HEPA filter and adsorber mounting frames that could affect the results of the in-place leak test I TA-4300. The test, if used, shall be conducted in accordance with Nonmandatory Appendix TA-A.</p>		
80	HA-5500 HA-5510	<p>Structural Capability Tests (Housing Pressure Test):</p> <p>A pressure test shall be performed at the structural capability pressure per TA-3422. This test shall be maintained for the duration of the inspection. Upon completion of this pressure test, housings exhibiting permanent distortion or breach of integrity shall be repeated after repair or replacement until no permanent distortion or breach of integrity is observed.</p>		
81	HA-5600	<p>Air Flow Distribution Tests:</p> <p>When required by the Owner, air flow distribution qualification test for housings containing more than one HEPA filter or adsorber bank shall be made in the shop in accordance with Section TA-4600. This requirement shall be specified in the Owner's Specification. Acceptance criteria shall be in accordance with TA-4600. Housings containing HEPA filter(s), adsorbers, or both shall be field tested to demonstrate adequate air flow distribution in accordance with TA-4600. Tests shall be performed with components in the housing and the housing complete (i.e., assembled). Minor items such as temperature elements, pressure taps, etc., do not need to be installed as these components do not significantly influence air flow distribution.</p>		
82	HA-5700	<p>Air-Aerosol Mixing Uniformity Tests:</p> <p>When required by the Owner or designee, air-aerosol qualification test for housings containing more than one HEPA/adsorber shall be made in the shop in accordance with TA-4600 for each manifold design. This requirement shall be specified in the Owner's Specification. Acceptance criteria shall be in accordance with TA-4600. Tests shall be performed with components in the housing and the housing complete (i.e., assembled). Minor items such as temperature elements, pressure taps, etc., do not need to be installed as these components do not significantly influence mixing. This design qualification test may be performed once and submitted to the Owner or designee for approval. This design qualification test may be performed once and submitted to the Owner or designee for approval. The design of the manifold and its location in the housing must be the same as qualified or a new aerosol mixing test is required.</p>		
83	HA-5800	<p>Sample Manifold Testing:</p> <p>Sampling manifolds shall be qualified to demonstrate that they collect a representable sample equivalent to a single point sample taken at a point at least ten duct diameters downstream of the filters. Refer to Nonmandatory Appendix D for performance test guidance. To ensure required leakage detection, acceptance criteria for sampling manifold shall be equal to or greater than the concentration detected with the single point sample.</p>		

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84	HA-5900	Air Conditioning and Air Handling Unit Testing: When required by the Owner or designee, integrated component functional acceptance testing shall be performed in the shop per TA-4000. This requirement shall be included in the Owner's Specification.		
	HA-6000	FABRICATION		
85	HA-6000	General: Air cleaning, air conditioning, and air handling unit housings and supports shall be fabricated in accordance with this Section and AA-6000		
86	HA-6120 HA-6121	Materials (Material Selection): Materials used in fabrication performed under this Section shall conform to HA-3000 requirements.		
87	HA-6122	Material Identification: Materials to be utilized in the fabrication and installation of components, parts, and appurtenances shall be identified on fabrication drawings and in the specification, as required in AA-6000..		
88	HA-6123	Repair of Material with Defects: Material with defects that are discovered or produced during the fabrication process may be used, provided the defects are repaired in accordance with the requirements of AA-8000, and for weld repairs, in accordance with AA-6300.		
89	HA-6130	Control of Installation and Fabrication Process: Quality control procedures shall be prepared and maintained current for all fabrication processes in accordance with AA-8000 requirements.		
90	HA-6140	Welding: The welding of filter housings and supports shall comply with the requirements of AWS D1.1, AWS D1.3, AWS D9.1, or ASME Boiler and Pressure Vessel Code, Section IX. Welding and brazing performed in accordance with this Section shall meet the requirements of AA-6300 and AA-6400		
	HA-6200	FABRICATION PROCESS		
91	HA-6210 HA-6211	Cutting, Forming, Bending, Aligning, and Fitting Uncoated Metal: Uncoated metal may be cut, formed, or bent by any means that does not degrade the mechanical or chemical properties of the material.		
92	HA-6212	Coated Metal: Coated metal may be cut, formed, or bent as described in HA-6211. Coating damaged by scratches, gouge marks, or the removal of coating shall be repaired in accordance with AA-6540		
93	HA-6213	Inside Bend Radii: Inside bend radii shall not be less than the values of the material grade given in the AISC Manual of Steel Construction, Allowable Stress Design.		

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94	HA-6215	<p>Joining Parts:</p> <p>Parts that are to be joined may be fitted, aligned, and retained in position during the joining operation by the use of bars, jacks, clamps, drift pins, tack welds, or other temporary attachment. The fitting and aligning process shall not damage the joined parts, or their surfaces, or enlarge bolted holes greater than the values shown in AISI, Specification for Design, Fabrication, Erection of Structural Steel for Buildings, Table 1.23.4.</p>		
95	HA-6215	<p>Temporary Attachments:</p> <p>Temporary welded attachments may be used in the fabrication process but shall be completely removed after use. Where such temporary attachments are used, they shall be subject to the following requirements.</p> <p>(a) Material shall be suitable for welding with no deduction in the structural integrity of the member to which the attachment is secured.</p> <p>(b) Attachment material shall be identified as required by HA-3000. The welder and welding procedures shall be qualified in accordance with HA-6140.</p>		
	HA-6300	MECHANICAL FASTENING		
96	HA-6310 HA-3211	<p>General:</p> <p>Nuts: Nuts for all bolts and studs shall be engaged for the full length of the nut thread. Margin shall be allotted to prevent the nut from engaging the unthreaded portion of the bolt or stud.</p>		
97	HA-6313	<p>High Strength Bolts:</p> <p>High strength bolts, used in making bolted structural joints, shall be installed in accordance with the requirements of the "Specification for Structural Joints Using A325 or A490 Bolts," AISC Code.</p>		
98	HA-6313	<p>Pins:</p> <p>Pins for securing insulation should be secured to the metal surface by welding. Other attachment methods are acceptable, if allowed by the Design Specification. Justification of the attachment method used shall be supported by evaluation or calculation as determined by the Owner or designee, considering the requirements of the Design Specification.</p>		
99	HA-6410	<p>Connecting:</p> <p>Connecting flange faces shall be free of joint crevices at corners. These defects shall be eliminated by welding or grinding</p>		
	HA-6400	FABRICATION TOLERANCES		
100	HA-6410	<p>General:</p> <p>Housing fabrication shall be accomplished within the tolerances detailed in the manufacturer's design drawings. These fabrication tolerances provide a method of quality control. For separately installed frames in walk-in housings, see Section FG.</p>		
101	HA-6420 HA-6421	<p>Side Access Housing and Gasket Seal Surfaces:</p> <p>Flatness: Each HEPA filter/adsorber housing seating surface shall be plane within 1/16 in.</p>		

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102	HA-6422	Surface Finish: Pits, roll scratches, weld spatter, and other surface defects within the sealing areas shall be ground smooth. After welding, ground areas shall merge smoothly with the surrounding base metal.		
103	HA-6430 HA-6431	Side Access Housing Filter Fluid Seal Surfaces: Flatness: The tolerance on each knife edge shall be plane within 1/8 in.		
104	HA-6500	Cleaning: All surfaces shall be cleaned per AA-6500 prior to acceptance. No halogen-bearing materials or carbon steel tools shall be used to clean housings or components constructed of stainless steel. Cleaning shall be performed in accordance with the Manufacturer's written procedures.		
	HA-7000	PACKAGING, SHIPPING, RECEIVING, STORAGE, AND HANDLING		
105	HA-7100	General: Packaging, shipping, receiving, storage, and handling requirements shall be in accordance with AA-7000 and this Section.		
106	HA-7210	Packaging (General): Air cleaning, air conditioning, and air handling unit housing packaging requirements are dependent upon the protection level as described in AA-7230. Additional clarification or exceptions are provided below.		
107	HA-7211	Packaging (Protection): Air cleaning, air conditioning, and air handling unit housings shall be protected to prevent physical damage. All openings shall be covered with wood, metal, or plastic. Waterproofing is required to exclude moisture from interior spaces and external devices. Mating surfaces shall be identified and specifically protected from damage. Protection equal to Level "D" is required for the basic unit. Protection for housing components must be equal to that required by the level of protection specified in the applicable Code section.		
108	HA-7300	Shipping: This Sub-article relates to transportation methods from the manufacturer or supplier, to the job site. Shipping shall comply with the provisions of AA-7100, AA-7200, and AA-7300.		
109	HA-7400	Receiving: Receiving at the job site or intermediate location, where additional work is to be performed or for long term storage, shall be accomplished in accordance with the provisions of AA-7000. It shall be the requirement, at any receiving point, to have adequate descriptions of items to permit suitable inspection for conformance, damage acknowledgment, and proper documentation.		

Requirement No.	Source	Requirement Text	Verification/Validation R-Review A-Analysis T-Test I-Inspection	Document Reference (Where is this requirement incorporated)
110	HA-7510	Storage (General): Housing storage requirements are dependent upon the protection level described by AA-7230. Protection equal to Level "D" is required for the basic unit. Protection for housing components must be equal to that required by the level of protection specified in the applicable Code section. These levels shall be the required storage requirements along with the requirements of HA-7511 and HA-7512.		
111	HA-7511	Storage (Drains and Vents): All housing drains or vents shall be sealed or closed as specified by the Owner or designee. Provisions may be made to use certain drains or vents for assurance that water or other objectionable material does not accumulate within the housing.		
112	HA-7512	Storage (Other Components): Components covered by other Sections of this Code, that are installed into and integral assembly which is covered by this Section, shall be stored in accordance with AA-7230		
	HA-8000	QUALITY ASSURANCE		
113	HA-8100	General: Equipment and material covered under this Section shall be manufactured, fabricated, installed, inspected, and tested in accordance with the provisions of a Quality Assurance Program meeting AA-8000 requirements.		
114	HA-8200	Material Identification: Measures shall be established for controlling and identifying material throughout the manufacturing process and during shipment in accordance with AA-8000.		
115	HA-8300	Drawings and Documentation: The Design Specification shall list the documentation requirements for the housing and list when this documentation is to be provided by the manufacturer, supplied to the Owner or designee. Housing-related items shall include, but not be limited to the following: (a) material certification and test reports; (b) housing drawings including: (1) outline drawings (2) piping and instrumentation diagrams (3) wiring diagrams (c) material list (d) welding procedures and procedure qualification records as required by applicable welding codes listed in HA-6140 (e) reports for tests and inspections required by HA-5000 (f) seismic and environmental qualification reports operating, installation, and maintenance manuals..		

Requirement No.	Source	Requirement Text	Verification/Validation R- Review A- Analysis T- Test I- Inspection	Document Reference (Where is this requirement incorporated)
	HA-9000	NAMEPLATES AND STAMPING		
116	HA-9100	General: All items manufactured under the requirements of this Section shall be identified to assure compliance with AA-9000 requirements. Records, as necessary to assure compliance with AA-8200, shall be maintained by the responsible organization in accordance with the approved quality assurance program. to Section BA and AA-9000.		
117	HA-9110	Stamping/Marking: Stamping/markings, as used herein, provides a means of maintaining identification of finished products for the purpose of retaining traceability of material.		
118	HA-9111	Housings: Housings shall be provided with nameplates, in accordance with AA-9120, which relate the housings to the applicable design and fabrication documents. Housings fabricated in multiple sections need only one nameplate. Each section shall have identification markings, observable after completed installation, which relate all sections. Nameplates shall be visible after completed installation..		
119	HA-9112	Housing Accessories: Housing accessories shall be marked, stamped, or provided with a nameplate which shall relate to the design and fabrication drawings. Identification shall be observable after completed installation.		

TECHNICAL DATA SHEET
AMEC Americas Limited



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-V-DS-010.1	REV. 1
PROJECT NO.:	145579	CARBON FILTER 1 & 2	
CLIENT:	AMEC E&E - Richland, Washington	EQUIPMENT NO. 36-N02-064 & -106	

REV. No.	ISSUED FOR	ORIGIN	DATE	INITIAL
A	Internal Review	DW	18-Oct-04	DW
B	Internal Approval	DW	02-Nov-04	DW
C	CH2M Hill Review	DW	10-Nov-04	DW
0	Bid Request	DW	14-Jan-05	DW
1	Bid Request	DW	28-Feb-05	DW

DOCUMENT APPROVAL

<p>CLIENT APPROVAL (AMEC RICHLAND) <i>Original Approvals on File</i> <i>Keith W. Taylor for Thompson</i></p> <p>Project Manager: <u><i>[Signature]</i></u></p> <p>Date: <u>3/1/05</u></p> <p>Q.A. Rep.: <u><i>[Signature]</i></u></p> <p>Date: <u>3/1/05</u></p>	<p>AMEC AMERICAS LIMITED (TRAIL) <i>Original Approvals on File</i></p> <p>Project Manager: <u><i>[Signature]</i></u></p> <p>Date: <u>Feb 28/05</u></p> <p>Discipline Lead: <u><i>[Signature]</i></u></p> <p>Date: <u>FEB. 28/05</u></p> <p>Originator: <u><i>[Signature]</i></u></p> <p>Date: <u>Feb 28, 05</u></p>
<p>CLIENT APPROVAL (CH2M HILL)</p> <p>Project Manager: <u><i>[Signature]</i></u></p> <p>Date: <u>3/1/05</u></p>	



TECHNICAL DATA SHEET

PROJECT:	Final DBVS Design	145579-V-DS-010.1	REV. 1
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REFERENCE SPECIFICATION

Document No.	Specification
145579-V-SP-010	HEGA Filter Skid

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PROJECT:		Final DBVS Design		145579-V-DS-010.1	REV. 1
PROJECT NO.:		145579		CARBON FILTER 1 & 2	
CLIENT:		AMEC E&E - Richland Washington		EQ. NO.:	36-N02-064 & -106
Data Sheet 1 of 1					
No. Required	2		Area	36	
FPD #	F-145579-00-A-0022 (Rev 0E)		Stream No.	32	
Reference Specification:	145579-V-SP-010		Quality Assurance Level	EQ	
Operating Conditions			Rev	Rev	
Location (Indoors/Outdoors)		Outdoors	Operation		- Days per year
Environmental conditions			Availability		- Hours per day
Max Operating temperature (°F)		167	Elevation (ft)		365
Min Operating/Outdoor temperature (°F)		-25	Environment		24
Operation (continuous/intermittent)		Continuous	- Radioactive		100
Max Operating Pressure (in WG)		-95.8	- Toxic		663
Operating Pressure drop (in WG)		1.75	- Corrosive		Yes
Design Flow Rate (at 167F/-91.4inWG) (ACFM)		4819	- Flammable		Yes
HEGA Filter data			Inlet Composition		
Manufacturer		Flanders	Process Fluid		Air
Model Number		AG-GG18-62-NS	Phase		Gas
Removal Efficiency (129I & organics)		99%	Design mass flow rate (lb/h)		13,924
Adsorbent material		Activated Carbon	Volumetric flow rate (ACFM)		4,819
Mesh Size			SO2 gas ppmV		2
Face Velocity (fps)			NOx gas ppmV		5,468
Rated Airflow (SCFM)			HCl gas ppmV		0.2
Internal Resistance (in WG)			137Cs Ci/hr		4.6E-10
Operating Temperature (°F)			99Tc Ci/hr		1.8E-11
Actual Size			TRU Ci/hr		2.7E-15
- Height (in)			129I Ci/hr		5.5E-11
- Width (in)			Outlet Composition		
- Length (in)			Process Fluid		Air
Filter Area (ft ²)			Phase		Gas
Casing Material			Design mass flow rate (lb/h)		13,924
Residence Time (sec)		0.25	SO2 gas ppmV		2
Depth of Carbon Bed (in)			NOx gas ppmV		5,468
Estimated Organics removal requirement (oz./hr)		0.176368	HCl gas ppmV		0.2
			137Cs Ci/hr		4.6E-10
			99Tc Ci/hr		1.8E-11
			TRU Ci/hr		2.7E-15
			129I Ci/hr		5.3E-13
Housing Data			Bubble-Tight Isolation Dampers		
Manufacturer		Flanders	Manufacturer		Flanders
Model Number		BF1-2HZW-4GGF-316L-D1	Model Number		DBTP-FB-304-16
Material		SS 316	Type		Damper
Overall Height (in)			Duct Type		Round
Overall Depth (in)			Diameter (in.)		16
Overall Width (in)			Material		SS 304
Wall Thickness (in)			Actuation		Manual
Number of Filter Access Doors					
Bag-in/Bag-out feature		req'd			
Pressure Rating (pos/-neg) (in WG)		-130			
Interface Duct Diameter (in)		16			
Duct interface		Flanged			
Differential Pressure Indicators/Transmitter					
See Appendix B					
Date	18-Oct-04	02-Nov-04	10-Nov-04	14-Jan-05	28-Feb-05
By	DW	DW	DW	DW	DW
Chkd	AP	AP	AP	AP	AP
Rev.	A	B	C	0	1



TECHNICAL DATA SHEETS

PROJECT:	Final DBVS Design	145579-V-DS-010.1	REV. 1
PROJECT NO.:	145579	CARBON FILTER 1 & 2	
CLIENT:	AMEC E&E - Richland Washington	EQ. NO.:	36-N02-064 & -106
Data Sheet 2 of 2			
No. Required	2	Area	0 36
PFD #	F-145579-00-A-0022 (Rev 0E)	Stream No.	0 32
Reference Specification:	145579-V-SP-010	Quality Assurance Level	0 EQ

Comments:

All items with an * shall be filled in by the VENDOR

Date	18-Oct-04	02-Nov-04	10-Nov-04	14-Jan-05	28-Feb-05		
By	DW	DW	DW	DW			
Chkd	AP	AP	AP	AP			
Rev.	A	B	C	0	1		

TECHNICAL DATA SHEET
AMEC Americas Limited



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-V-DS-010.2	REV. 1
PROJECT NO.:	145579	OFF GAS POLISHING FILTER	
CLIENT:	AMEC E&E - Richland, Washington	EQUIPMENT NO. 36-N02-079 & -107	

REV NO.	ISSUED FOR	ORIGIN	DATE	INITIAL
A	Internal Approval	DW	02-Nov-04	DW
B	CH2M Hill Review	DW	10-Nov-04	DW
0	Bid Request	DW	14-Jan-05	DW
1	Bid Request	DW	28-Feb-05	DW

DOCUMENT APPROVAL

<p>CLIENT APPROVAL (AMEC RICHLAND)</p> <p><i>Original Approvals on File</i> <i>Keith Winters for Leo Thompson</i></p> <p>Project Manager: <u><i>[Signature]</i></u></p> <p>Date: <u>3/1/05</u></p> <p>Q.A. Rep.: <u><i>[Signature]</i></u></p> <p>Date: <u>3/1/05</u></p>	<p>AMEC AMERICAS LIMITED (TRAIL)</p> <p><i>Original Approvals on File</i></p> <p>Project Manager: <u><i>J. Bruin</i></u></p> <p>Date: <u>Feb 28/05</u></p> <p>Discipline Lead: <u><i>G. Jones</i></u></p> <p>Date: <u>FEB. 28/05</u></p> <p>Originator: <u><i>[Signature]</i></u></p> <p>Date: <u>Feb 28, 05</u></p>
<p>CLIENT APPROVAL (CH2M HILL)</p> <p><i>DW</i></p> <p>Project Manager: <u><i>[Signature]</i></u></p> <p>Date: <u>3/1/05</u></p>	



TECHNICAL DATA SHEET

PROJECT:	Final DBVS Design	145579-V-DS-010.2	REV. 1
PROJECT NO.:	145579	OFF GAS POLISHING FILTER	
CLIENT:	AMEC E&E - Richland, Washington	EQUIPMENT NO.	36-N02-079 & -107

REFERENCE SPECIFICATION

Document No.	Specification
145579-V-SP-010	HEGA Filter Skid

CONTENTS

Data Sheets 1 Page
 Bidders Drawing & Data Commitments Sheet 1 Page



TECHNICAL DATA SHEETS

PROJECT:		Final DBVS Design		145579-V-DS-010.2		REV. 1	
PROJECT NO.:		145579		OFF GAS POLISHING FILTER			
CLIENT:		AMEC E&E - Richland Washington		EQ. NO.:		36-N02-079 & -107	
Data Sheet 1 of 1							
No. Required		2		Area		36	
PPD #		F-145579-00-A-0022 (Rev 0E)		Stream No.		38	
Reference Specification:		145579-V-SP-010		Quality Assurance Level		EQ	
Operating Conditions				Rev		Rev	
Location (Indoors/Outdoors)		Outdoors		Operation		- Days per year	
Environmental conditions				Operation		- Hours per day	
Max Operating temperature (°F)		167		Availability		%	
Min Operating temperature (°F)		-25		Elevation (ft)		663	
Operation (continuous/intermittent)		Continuous		Environment		- Radioactive	
Operating Pressure (in WG)		-95.8		Environment		- Toxic	
Operating Pressure drop (in WG)		0.85		Environment		- Corrosive	
Design Flow Rate (at 167F/-91.4i (ACFM)		4819		Environment		- Flammable	
				Inlet Composition			
				Process Fluid		Air	
				Phase		Gas	
Manufacturer		Flanders		Design mass flow rate		(lb/h)	
Model Number		PCBL85-6006D-GD-FD**		Volumetric flow rate		(ACFM)	
Removal Efficiency (carbon particulate)		80-85%					
Adsorbent material		*		SO2 gas		ppmV	
Mesh Size		*		NOx gas		ppmV	
Face Velocity		(fps) *		HCl gas		ppmV	
Rated Airflow		(SCFM) *		137Cs		Ci/hr	
Initial Resistance		(in WG) *		99Tc		Ci/hr	
Rated final resistance		(in WG) *		TRU		Ci/hr	
Design Pressure		(in WG) *		129I		Ci/hr	
Average atmospheric dust spot efficiency as measured by ANSI/ASHRAE 52.1		(%) *		0			
Dust holding capacity		(lb) *		0			
Frame Dimensions		0		Outlet Composition			
				Process Fluid		Air	
				Phase		Gas	
				Design mass flow rate		(lb/hr)	
				SO2 gas		ppmV	
				NOx gas		ppmV	
				HCl gas		ppmV	
Filter Area		(ft^2) *		137Cs		Ci/hr	
Casing Material		*		99Tc		Ci/hr	
				TRU		Ci/hr	
				129I		Ci/hr	
Comments:							
All items with an * shall be filled in by the VENDOR							
** or Equivalent							
Date	03-Nov-04	10-Nov-04	14-Jan-05	28-Feb-05			
By	DW	DW	DW				
Chkd	AP	AP	AP				
Rev.	A	B	0	1			



TECHNICAL DATA SHEETS

PROJECT:	Final DBVS Design	145579-V-DS-010.2	REV. 1
PROJECT NO.:	145579	OFF GAS POLISHING FILTER	
CLIENT:	AMEC E&E - Richland, Washington	EQ. NO.: 36-N02-079 & -107	

**Final DBVS Design
BIDDERS 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 Review 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)

<p>SEND ALL DOCUMENTS TO:</p> <p>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</p>	<p>AMEC Americas Limited 1385 Cedar Avenue Trail, BC, Canada VIR 4C3 Attn: Document Control Phone: (250) 368-2400 Fax: (250) 368-2401</p>
--	--

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 (SEE NOTE 4) (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		
1			QA Program that satisfies the requirements of NQA-1-1994	Bid	
1			Experience list and maintainability information	Bid	
E+3	E+3		Design, fabrication & delivery schedule	PO+7	
	E+3	E+6	90% Design and Fabrication & delivery package including: -Drawings -Calculations -Completed Equipment Data Sheets -Vender Cut Sheets/Technical Brochures -Bill of Materials	PO+21	
E+3	E+3	E+6	Outline drawings and layout drawings indicating weights and dimensions	PO+14	
E+3	E+3	E+6	Technical brochures on purchased components	PO+21	
	E+3	E+6	Calculations	PO+21	
	E+1	E+6	Spare parts list	Del-14	
	E+1	E+6	Set of installation and maintenance manuals c/w technical literature for all equipment and devices	Del-14	
		6	Site commissioning record & test results	COM+14	

THE TIMELY RECEIPT OF THE VENDOR DOCUMENTS IS CRITICAL TO THIS PROJECT

I agree to provide the listed documentation and data and the dates shown above.	
_____	_____
Vendor Signature	Date

		AMEC E&C Services Limited Trail, BC Canada		Instrumentation Data Sheet		
TAG NUMBER: 36-PDIT-327						
SUBJECT:		DIFFERENTIAL PRESSURE TRANSMITTER				
SERVICE:		Carbon Filter #1 - Differential Pressure				
SUPPLIER:		Yokogawa (Note 3) Or Equivalent	PIC No.:	525		
MAKE:		*	P.O. No.:			
MODEL:		*	P&ID No.:	F-145579-36-A-0107		
TRANSMITTER						
Type:		Differential Pressure	Power Supply:	24 Vdc		
Range:		*	Output:	4-20 mA		
Calibration:		0" - 5" WC	Conduit Connect:	½" FNPT		
Enclosure Material:		Epoxy Coated Aluminum	Local Indication:	Yes (LCD Display)		
Enclosure Type:		*	Mounting Bracket:	2" Pipe Bracket		
Enclosure Class:		Nema 4X	I/O Isolation:	Req'd		
CERTIFICATION:		UL	Relay Output:	N/A		
ELEMENT						
Service Type:		Differential Pressure	Process Connection:	½" NPT		
Element Type:		Diaphragm	Chemical Seal Type:	N/R		
Element Material:		316SS	Process Mounting:	N/A		
Wetted Parts Material:		316SS	Capillary Length:	N/A		
Body Rating:		*	Armour:	N/A		
			Flushing Connection:	N/A		
			Valve Isolation:	3 Way Manifold		
316SS Tag permanently affixed to instrument						
SERVICE CONDITIONS:						
Line/Vessel		36-NO2-064 - Carbon Filter #1	Max. Velocity:			
Fluid:		Off-Gas	Spec. Gravity:	1.0		
Flow Oper.:		4622 ACFM	Acidity:	*		
Flow Max.:			Percent Solids:	0.03		
Temp Min.:		-25 °F	Material Build-Up:	N/A		
Temp Max.:		167 °F	Vibration:	Minimal		
Press Oper.:		-87.5" WC	Line Material:	316 SS		
Press Max.:		Atmospheric	Agitator:			
NOTES:						
<ol style="list-style-type: none"> All items with an * shall be filled in by the VENDOR Manifold shall be a 3-way type constructed from 316 SS The buyer has reviewed the transmitters offered and found that the following ordering information from Yokogawa, Model EJA may be suitable. The final selection the component is the responsibility of the Seller as this is provided for information only. 						
By: DRJ		Chk: <i>AW</i>	Appd. <i>[Signature]</i>	Date: 28-Jan-05	Project: 145579	Rev: C

amec		AMEC E&C Services Limited Trail, BC Canada		Instrumentation Data Sheet	
TAG NUMBER: 36-PDIT-332					
SUBJECT:		DIFFERENTIAL PRESSURE TRANSMITTER			
SERVICE:		Off-Gas Polishing Filter #1- Differential Pressure			
SUPPLIER:		Yokogawa (Note 3) Or Equivalent	PIC No.:	525	
MAKE:		*	P.O. No.:		
MODEL:		*	P&ID No.:	F-145579-36-A-0107	
TRANSMITTER					
Type:	Differential Pressure	Power Supply:	24 Vdc		
Range:	*	Output:	4-20 mA		
Calibration:	0" - 5" WC	Conduit Connect:	1/2" FNPT		
Enclosure Material:	Epoxy Coated Aluminum	Local Indication:	Yes (LCD Display)		
Enclosure Type:	*	Mounting Bracket:	2" Pipe Bracket		
Enclosure Class:	Nema 4X				
CERTIFICATION:	UL				
ELEMENT					
Service Type:	Differential Pressure	Process Connection:	1/2" NPT		
Element Type:	Diaphragm	Chemical Seal Type:	N/R		
Element Material:	316SS	Process Mounting:	N/A		
Wetted Parts Material:	316SS	Capillary Length:	N/A		
Body Rating:	*	Armour:	N/A		
		Flushing Connection:	N/A		
		Valve Isolation:	3 Way Manifold		
316SS Tag permanently affixed to instrument					
SERVICE CONDITIONS:					
Line/Vessel	36-NO2-079	Max. Velocity:			
Fluid:	Off-Gas	Spec. Gravity:	1.0		
Flow Oper.:	4622 ACFM	Acidity:	*		
Flow Max.:		Percent Solids:	0.03		
Temp Min.:	-25 °C	Material Build-Up:	N/A		
Temp Max.:	167 °C	Vibration:	Minimal		
Press Oper.:	-89" WC	Line Material:	Ducting - Mild Steel		
Press Max.:	Atmospheric	Agitator:			
NOTES:					
1. All items with an * shall be filled in by the VENDOR					
2. Manifold shall be a 3-way type constructed from 316 SS					
3. The buyer has reviewed the transmitters offered and found that the following ordering information from Yokogawa, Model EJA may be suitable. The final selection the component is the responsibility of the Seller as this is provided for information only.					
By: DRJ	Chk: <i>[Signature]</i>	Appd. <i>[Signature]</i>	Date: 28-Jan-05	Project: 145579	Rev: C

	AMEC E&C Services Limited Trail, BC Canada	Instrumentation Data Sheet	
TAG NUMBER: 36-PDIT-333			
SUBJECT: DIFFERENTIAL PRESSURE TRANSMITTER			
SERVICE: Carbon Filter #2 - Differential Pressure			
SUPPLIER: Yokogawa (Note 3) Or Equivalent		PIC No.: 525	
MAKE: *		P.O. No.:	
MODEL: *		P&ID No.: F-145579-36-A-0107	
TRANSMITTER			
Type:	Differential Pressure	Power Supply:	24 Vdc
Range:	*	Output:	4-20 mA
Calibration:	0" - 5" WC	Conduit Connect:	½" FNPT
Enclosure Material:	Epoxy Coated Aluminum	Local Indication:	Yes (LCD Display)
Enclosure Type:	*	Mounting Bracket:	2" Pipe Bracket
Enclosure Class:	Nema 4X	I/O Isolation:	Req'd
CERTIFICATION:	UL	Relay Output:	N/A
ELEMENT			
Service Type:	Differential Pressure	Process Connection:	¾" NPT
Element Type:	Diaphragm	Chemical Seal Type:	N/R
Element Material:	316SS	Process Mounting:	N/A
Wetted Parts Material:	316SS	Capillary Length:	N/A
Body Rating:	*	Armour:	N/A
		Flushing Connection:	N/A
		Valve Isolation:	3 Way Manifold
316SS Tag permanently affixed to instrument			
SERVICE CONDITIONS:			
Line/Vessel	36-NO2-106 - Carbon Filter #2	Max. Velocity:	
Fluid:	Off-Gas	Spec. Gravity:	1.0
Flow Oper.:	4622 ACFM	Acidity:	*
Flow Max.:		Percent Solids:	0.03
Temp Min.:	-25 °F	Material Build-Up:	N/A
Temp Max.:	167 °F	Vibration:	Minimal
Press Oper.:	-87.5" WC	Line Material:	316 SS
Press Max.:	Atmospheric	Agitator:	
NOTES:			
1. All items with an * shall be filled in by the VENDOR 2. Manifold shall be a 3-way type constructed from 316 SS 3. The buyer has reviewed the transmitters offered and found that the following ordering information from Yokogawa, Model EJA may be suitable. The final selection the component is the responsibility of the Seller as this is provided for information only.			
By: DRJ <i>[Signature]</i>	Chk: <i>[Signature]</i>	Appd. <i>[Signature]</i>	Date: 28-Jan-05
		Project: 145579	Rev: C

amec		AMEC E&C Services Limited Trail, BC Canada		Instrumentation Data Sheet	
TAG NUMBER: 36-PDIT-334					
SUBJECT:		DIFFERENTIAL PRESSURE TRANSMITTER			
SERVICE:		Off-Gas Polishing Filter #2 - Differential Pressure			
SUPPLIER:		Yokogawa (Note 3) Or Equivalent	PIC No.:	525	
MAKE:		*	P.O. No.:		
MODEL:		*	P&ID No.:	F-145579-36-A-0107	
TRANSMITTER					
Type:	Differential Pressure	Power Supply:	24 Vdc		
Range:	*	Output:	4-20 mA		
Calibration:	0" - 5" WC	Conduit Connect:	1/2" FNPT		
Enclosure Material:	Epoxy Coated Aluminum	Local Indication:	Yes (LCD Display)		
Enclosure Type:	*	Mounting Bracket:	2" Pipe Bracket		
Enclosure Class:	Nema 4X				
CERTIFICATION:	UL				
ELEMENT					
Service Type:	Differential Pressure	Process Connection:	1/2" NPT		
Element Type:	Diaphragm	Chemical Seal Type:	N/R		
Element Material:	316SS	Process Mounting:	N/A		
Wetted Parts Material:	316SS	Capillary Length:	N/A		
Body Rating:	*	Armour:	N/A		
		Flushing Connection:	N/A		
		Valve Isolation:	3 Way Manifold		
316SS Tag permanently affixed to instrument					
SERVICE CONDITIONS:					
Line/Vessel	36-NO2-107	Max. Velocity:			
Fluid:	Off-Gas	Spec. Gravity:	1.0		
Flow Oper.:	4622 ACFM	Acidity:	*		
Flow Max.:		Percent Solids:	0.03		
Temp Min.:	-25 °C	Material Build-Up:	N/A		
Temp Max.:	167 °C	Vibration:	Minimal		
Press Oper.:	-89" WC	Line Material:	Ducting - Mild Steel		
Press Max.:	Atmospheric	Agitator:			
NOTES:					
1. All items with an * shall be filled in by the VENDOR					
2. Manifold shall be a 3-way type constructed from 316 SS					
3. The buyer has reviewed the transmitters offered and found that the following ordering information from Yokogawa, Model EJA may be suitable. The final selection the component is the responsibility of the Seller as this is provided for information only.					
By: DRJ	Chk: BAW	Appd. JEM	Date: 28-Jan-05	Project: 145579	Rev: C

145579-V-SP-011



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-V-SP-011	REV. 1
PROJECT NO:	145579	OFF-GAS CHILLER PUMP SKID	
CLIENT:	AMEC E&E - Richland, Washington		

REV NO	ISSUED FOR	ORIGIN	DATE	INITIAL
A	Internal Review	DW	02-Nov-04	DW
B	Internal Approval	DW	11-Jan-05	DW
C	CH2M Hill Review	DW	17-Jan-05	DW
0	Bid Request	DW	14-Feb-05	DW
1	Bid Request	DW	10-Mar-05	<i>DW</i>

DOCUMENT APPROVAL

<p>CLIENT APPROVAL (AMEC RICHLAND)</p> <p style="text-align: center;"><i>Original Approvals on File</i></p> <p>Project Manager: <u><i>[Signature]</i></u> (for B. Bishop)</p> <p>Date: <u>3/21/05</u></p> <p>Q.A. Rep.: <u><i>[Signature]</i></u></p> <p>Date: <u>3/11/05</u></p>	<p>AMEC AMERICAS LIMITED (TRAIL)</p> <p style="text-align: center;"><i>Original Approvals on File</i></p> <p>Project Manager: <u><i>J. Beum</i></u></p> <p>Date: <u>Mar 11 /05</u></p> <p>Discipline Lead: <u><i>[Signature]</i></u></p> <p>Date: <u>Mar 11/05</u></p>
<p>CLIENT APPROVAL (CH2M HILL) with comment</p> <p><i>DBS</i></p> <p>Project Manager: <u><i>[Signature]</i></u></p> <p>Date: <u>3/29/05</u></p>	<p>Originator: <u><i>[Signature]</i></u></p> <p>Date: <u>March 10, 2005</u></p>

* Revise page 21, section 3.3.1.3 to replace reference to B31.5 to B31.3 to be consistent with section 3.3.1.2. *DBS 3/28/05*

TECHNICAL SPECIFICATION
AMEC Americas Limited



PROJECT:	Final DBVS Design	145579-V-SP-011	REV. 1
PROJECT NO.:	145579	OFF-GAS CHILLER PUMP SKID	
CLIENT:	AMEC E&E – Richland, WA		

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APPENDICES

A Control of Suspect/ Counterfeit Items (TFC-ESHQ-Q_C-C-03)

ATTACHMENTS

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145579-V-DS-011.2	Off Gas Chiller Surge Tank Technical Data Sheet
36-FIT-815	Flow Transmitter Instrument Data Sheet
36-LSLL-816	Level Switch – Vibration Instrument Data Sheet
36-PI-817	Pump Pressure Indicator Instrument Data Sheet
36-LSH-819	Level Switch Vibration Instrument Data Sheet
36-LSL-820	Level Switch-Vibration Instrument Data Sheet
36-TE-821	Resistance Temperature Detector Instrumentation Data Sheet
F-145579-36-A-0106	Bulk Vitrification Off-Gas Treatment Chilled Water Treatment

TECHNICAL SPECIFICATION
AMEC Americas Limited



PROJECT:	Final DBVS Design	145579-V-SP-011	REV. 1
PROJECT NO.:	145579	OFF-GAS CHILLER PUMP SKID	
CLIENT:	AMEC E&E – Richland, WA		

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TECHNICAL SPECIFICATION
AMEC Americas Limited



PROJECT:	Final DBVS Design	145579-V-SP-011	REV. 1
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CLIENT:	AMEC E&E – Richland, WA		

ABBREVIATIONS AND ACRONYMS

°C	Degrees Celsius
°F	Degrees Fahrenheit
µm	Micrometers
AC	Alternating Current
AISC	American Institute for Steel Construction
ANSI	American National Standards Institute, Inc.
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASNT	American Society of Nondestructive Testing
ASTM	American Society for Testing and Materials
AWG	American Wire Gauge
AWS	American Welding Society
CFR	Code of Federal Regulations
CH2M HILL	CH2M HILL Hanford Group, Inc.
CoC	Certificate of Conformance
CMTR	Certified Material Test Report
DBVS	Demonstration Bulk Vitrification System
DOE	Department of Energy
ft ³	Cubic Feet
hp	Horsepower
Hz	Hertz
IEEE	Institute of Electrical and Electronic Engineers
lb	Pound
lbm	Pound Mass
mA	Milliamp
MCS	Monitoring and Control System
mph	Miles Per Hour
NDE	Nondestructive Examination
NEC	National Electrical Code
NEMA	National Equipment Manufacturers Association
NFPA	National Fire Protection Association
NIST	National Institute of Standards and Technology
NQA	Nuclear Quality Assurance
NRTL	Nationally Recognized Testing Laboratory

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OGCPS	Off-Gas Chiller Pump Skid
OGTS	Off-Gas Treatment System
P&ID	Piping and Instrumentation Diagram
psig	Pounds Per Square Inch Gauge
QA	Quality Assurance
RSC	Rigid Steel Conduit
SAE	Society of Automotive Engineers
UBC	Uniform Building Code
UL	Underwriters Laboratories
V	Volt

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1.0 SCOPE

1.1 PURPOSE

AMEC is part of a team that has been selected by the CH2M HILL Hanford Group, Inc. (CH2M HILL) to design, fabricate, test, and deploy a Demonstration Bulk Vitrification System (DBVS) to receive, dry, and immobilize waste from an underground storage tank located in the 200 West Area of the Hanford Nuclear reservation. A main subsystem of the DBVS is the Off-Gas Treatment System (OGTS). A component of the OGTS is the Off-Gas Chiller Pump Skid (OGCPS) that will supply the fluid (mixture of water and glycol) required for the off gas cooling. Throughout this specification, Contract Responder shall act as the Seller and AMEC shall act as the Buyer.

Any discrepancies noted in this specification or between this specification and other documentation shall be noted and referred to the Buyer for resolution before proceeding with design or fabrication of the item in question.

1.2 WORK INCLUDED IN SCOPE

This specification provides the minimum requirements for the fabrication and assembly of the OGCPS including any special handling equipment required for shipping and deployment to the Buyer's Site.

The scope of work included in this specification consists of:

Pump Skid – Including coolant pump, mounting base, motor, coupling, valves, piping, surge tank, anchors and fasteners.

Pump Skid Design – To include: detail and assembly drawings, analysis, fabrication, inspection, testing, documentation, packaging and shipping.

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,

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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.

Any discrepancies noted in this specification or between this specification and other documentation shall be noted and referred to the Buyer for resolution before proceeding with design or fabrication of the item in question.

Work not included in the Seller Scope of Supply – interconnecting hoses, hose supports, piping spool pieces, the installation of the unit for integrated testing, the procurement of the air cooled scroll liquid chiller, and the design and manufacture of support systems external to the assembly. Others will provide outdoor area lighting. Motor starters (located in a remote motor control center) will be by others. Connection to Buyer's MCS by others.

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2.0 APPLICABLE DOCUMENTS

Documents applicable to the work scope are shown in Table 2-1 and Table 2-2. The latest issue and addenda to the documents in effect at the time of procurement (unless otherwise specified) shall apply and form a part of the basis of design for this specification to the extent specified in the applicable sections of this document. In the event of a conflict between documents referenced herein and the requirements of this specification, the requirements of this specification shall take precedence. All conflicts shall be brought to the attention of the Buyer for resolution.

2.1 GOVERNMENT DOCUMENTS

Table 2-1: Applicable Government Documents

Government Documents	Title
29 CFR 1910	Occupational Safety and Health Standards – Code of Federal Regulations, as amended.
47 CFR 15	Radio Frequency Devices, Code of Federal Regulations, as amended.
DOE/RL-92-32	Hanford Site Hoisting and Rigging Manual, U.S. Department of Energy, Richland, Washington.

2.2 NON-GOVERNMENT DOCUMENTS

Table 2-2: Applicable Non-Government Documents

Code/Standard	Title
AISC	Manual of Steel Construction – Allowable Stress Design, Ninth Edition, American Institute of Steel Construction, Chicago, Illinois.
AISC	Manual of Steel Construction – Load and Resistance Factor Design, Third Edition, American Institute of Steel Construction, Chicago, Illinois.
ANSI/AWS D1.3	Structural Welding Code – Sheet Steel, American Welding Society, Miami, Florida.
ANSI C63.16	American National Standard Guide for Electrostatic Discharge Test Methodologies and Criteria for Electronic Equipment, American National Standards Institute, Washington, D.C.

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Table 2-2: Applicable Non-Government Documents

Code/Standard	Title
ANSI Y14.1	Drawing Sheet Size and Format, American National Standards Institute, Inc., New York, New York.
ANSI Y14.5M	Dimensioning and Tolerancing, American National Standards Institute, New York, New York.
ASHRAE Fundamentals Handbook	2001 ASHRAE Handbook – Fundamentals, American Society of Heating, Refrigeration, and Air Conditioning Engineers, Atlanta, Georgia.
ASCE 4-98	Seismic Analysis of Safety-Related Nuclear Structures, American Society of Civil Engineers, Reston, Virginia.
ASCE 7-98	Minimum Design Loads for Buildings and Other Structures, American Society of Civil Engineers, Reston, Virginia.
ASME B&PV Code	ASME Boiler and Pressure Vessel Code, American Society of Mechanical Engineers, New York, New York. Section VIII, "Rules for Construction of Pressure Vessels" Section IX, "Welding and Brazing Qualifications"
ASME B16.5	Pipe Flanges and Flanged Fittings, American Society of Mechanical Engineers, New York, New York.
ASME B16.9	Factory-Made Wrought Steel Butt Welding Fittings, American Society of Mechanical Engineers, New York, New York.
ASME B16.11	Forged Fittings, Socket Welding and Threaded, American Society of Mechanical Engineers, New York, New York.
ASME B18.2.1	Square and Hex Bolts and Screws Inch Series, American Society of Mechanical Engineers, New York, New York.
ASME B18.2.2	Square and Hex Nuts, American Society of Mechanical Engineers, New York, New York.
ASME B31.3	Process Piping, American Society of Mechanical Engineers, New York, New York.
ASME NQA-1-1994* (See note at end of table)	Quality Assurance Program Requirements for Nuclear Facilities, American Society of Mechanical Engineers, New York, New York.
ASME PCC-1	Guidelines for Pressure Boundary Bolted Flange Joint Assembly, American Society of Mechanical Engineers, New York, New York.
ASNT SNT-TC-1A	Recommended Practice, American Society of Nondestructive Testing, Columbus Ohio.

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Table 2-2: Applicable Non-Government Documents

Code/Standard	Title
ASTM A36/A36M	Standard Specification for Carbon Structural Steel, American Society of Testing and Materials, New York, New York.
ASTM A53/A53M	Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless, American Society of Testing and Materials, New York, New York.
ASTM A105/A105M	Standard Specification for Carbon Steel Forgings for Piping Applications, American Society for Testing and Materials, West Conshohocken, Pennsylvania.
ASTM A106	Standard Specification for Carbon Steel Forgings for Piping Applications, American Society for Testing and Materials, West Conshohocken, Pennsylvania.
ASTM A108	Standard Specification for Steel Bars, Carbon, Cold-Finished, Standard Quality, American Society for Testing and Materials, West Conshohocken, Pennsylvania.
ASTM A193/A193M	Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service, American Society for Testing and Materials, West Conshohocken, Pennsylvania.
ASTM A194/A194M	Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure and High Temperature Service, or Both, American Society for Testing and Materials, West Conshohocken, Pennsylvania.
ASTM A234/A234M	Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service, American Society for Testing and Materials, West Conshohocken, Pennsylvania.
ASTM A307	Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength, American Society for Testing and Materials, West Conshohocken, Pennsylvania.
ASTM A325	Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength, American Society for Testing and Materials, West Conshohocken, Pennsylvania.
ASTM A354	Standard Specification for Quenched and Tempered Alloy Steel, Bolts, Studs, and other Externally Threaded Fasteners.
ASTM A500	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.

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Table 2-2: Applicable Non-Government Documents

Code/Standard	Title
ASTM A563a	Standard Specification for Carbon and Alloy Steel Nuts, American Society for Testing and Materials, West Conshohocken, Pennsylvania.
ASTM A569	Standard Specification for Steel, Carbon (0.15 Maximum, Percent), Hot-Rolled Sheet and Strip Commercial, American Society for Testing and Materials, West Conshohocken, Pennsylvania.
AWS D1.1/D1.1M	Structural Welding Code – Steel, American Welding Society, Miami, Florida.
AWS D1.6	Structural Welding Code – Stainless Steel, American Welding Society, Miami, Florida.
HNF-2962	A List of EMI/EMC Requirements, Rev. 0, Numatec Hanford Corporation for Fluor Daniel Hanford, Inc., Richland, Washington.
HNF-SD-GN-ER-501	Natural Phenomena Hazards, Hanford Site, Washington, Revision 1B, Westinghouse Hanford Company, Richland, Washington.
IEC 61000-4-2	Electromagnetic Compatibility (EMC) – Part 4-2: Testing and Measurement Techniques – Electrostatic Discharge Immunity Test, International Engineering Consortium, Chicago, Illinois.
IEEE Std 141	IEEE Recommended Practice for Electric Power Distribution for Industrial Plants, Institute of Electrical and Electronics Engineers, New York, New York.
IEEE Std 242	IEEE Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems, Institute of Electrical and Electronics Engineers, New York, New York.
IEEE Std 519	Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems, Institute of Electrical and Electronics Engineers, New York, New York.
IEEE Std C37.90.2	IEEE Standard for Withstand Capability of Relay Systems to Radiated Electromagnetic Interference from Transceivers, Institute of Electrical and Electronics Engineers, New York, New York.
IEEE C62.41.1	IEEE Guide on the Surge Environment in Low-Voltage (1000 V and less) AC Power Circuits
IEEE C62.41.2	IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits

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Table 2-2: Applicable Non-Government Documents

Code/Standard	Title
NEMA MG-1	Motors and Generators, National Electrical Manufacturers Association, Rosslyn, Virginia.
NFPA 70	National Electrical Code, 2002 Edition, National Fire Protection Association, Quincy, Massachusetts.
UBC, 1997	1997 Uniform Building Code, International Conference of Building Officials, Whittier, California.
UL 508A	Standard for Industrial Control Panels, Underwriters Laboratories, Inc., Northbrook, Illinois.

* The relevant requirements of NQA-1 are included in section 4.0.

3.0 TECHNICAL REQUIREMENTS

The following is a description of the required procedures taken on by the OGCPs. The Seller shall provide a similar documentation stating the ability of their equipment to comply with the necessary procedures.

3.1 ITEM DEFINITION

The major components of the pump skid are the surge tank, one pump and associated valves, piping and instrumentation as illustrated in the item diagram Figure 3-1.

3.1.1 Item Diagram

The piping and interface sketch shown in Figure 3-1 depicts the OGCPs and interfaces to be provided by the Seller.

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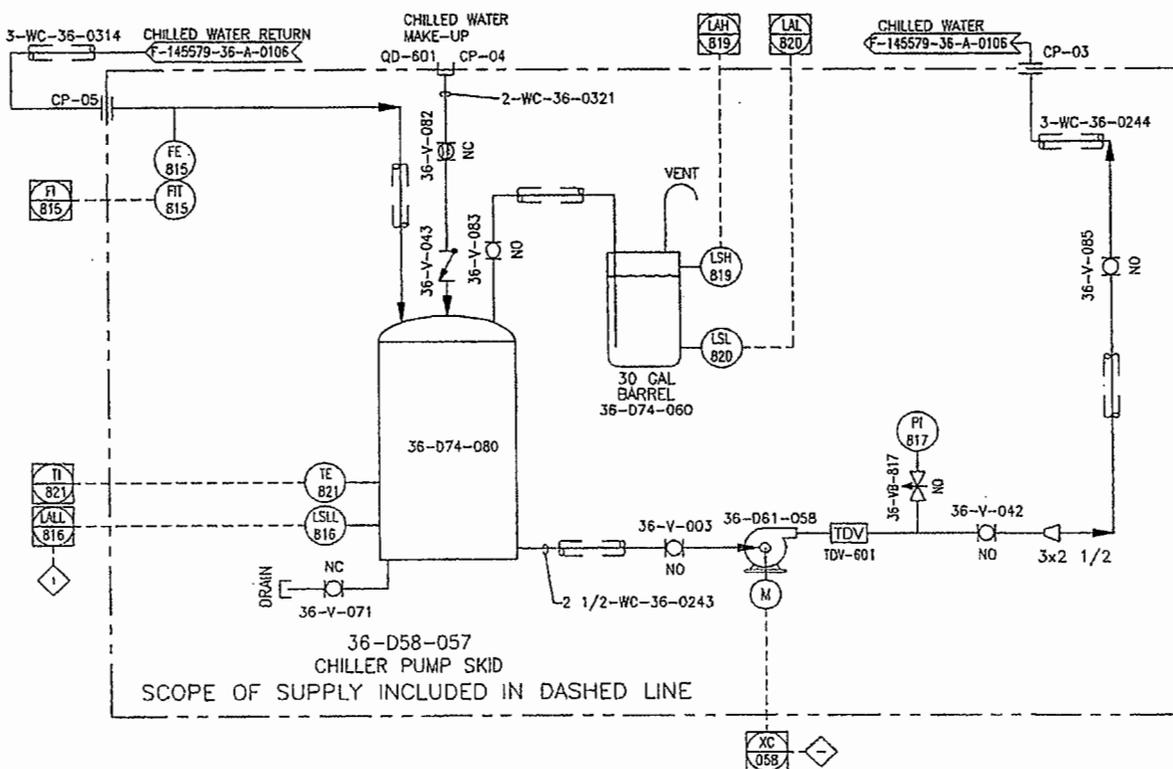


Figure 3-1: Item Diagram

3.1.2 Interface Definition

3.1.2.1 Mechanical Interface

The chiller pump skid will be installed as part of the Demonstration Bulk Vitrification System (DBVS) and will interface with flow to the air-cooled scroll liquid chiller unit and return flow from the DBVS off-gas trailer. These interfaces can be seen on the attached process and instrumentation diagram (P&ID), Figure 3-1, and are summarized in Table 3-1.

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Table 3-1: Mechanical Interfaces

Connection Point	Connection Type	Location
Cp-03	150-lbraised face flange	Pump skid outlet to chiller
CP-04	Quick disconnect	Chilled water make-up inlet
CP-05	150-lb raised face flange	Pump skid inlet from off-gas trailer

3.1.2.2 Electrical Connection

The pump skid shall receive 480 VAC, 3-phase power from an external source, and the interface point shall be a non-fused disconnect switch. See Section 3.3.1.11.6 for disconnect switch details. All terminals in terminal boxes shall be rated for 194°F (90°C).

A grounding lug shall be provided on the outside frame of the skid to facilitate attachment of the #4/0 awg skid-grounding electrode (by others). The location of the grounding lug shall be shown on the shop drawings. See Section 3.3.1.10.3 for grounding requirements.

3.2 CHARACTERISTICS

The characteristics (e.g., functional, physical, performance, and environmental) that the OGCPs must comply with to satisfy the requirements of this specification are described in the following sections and in the Technical Data Sheets.

3.2.1 Functional Characteristics

The chiller pump skid is comprised of a skid frame mounted with a pump, tanks, piping, valves, and instrumentation. Functionally, the chiller pump skid will provide a reservoir to feed the air-cooled scroll liquid chiller, which will supply the off-gas trailer with chilled water. The skid contains instruments to monitor the pressure and flow rate of the fluid. The function of the skid frame is to provide primary support for transportation and movement. The fluid medium shall be 50 percent propylene glycol, 50 percent water to prevent freezing.

3.2.2 Physical Characteristics

Physical Characteristics can be found in data sheet, 145579-V-DS-011.1.

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3.2.3 Reliability

All OGCPs assembly equipment including, but not limited to, the piping, pump and motor, casings, shafts, valves, filters, bearings, seals, and fasteners shall have a *minimum service life of 24 months and a design life of five years*. Documentation to demonstrate this requirement is met shall be collected and prepared by the Seller. Documentation shall be submitted to and verified by the Buyer before fabrication.

3.2.4 Maintainability

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

1. Maintenance and Repair Cycles. The Seller shall specify frequency or availability requirements for maintenance of the component (e.g., scheduled maintenance every 40-operating hours).
2. Service and Access. The Seller shall specify requirements for ease of service (access openings/spacing, self-test capability, inspection windows, test fixtures, sealed bearings, etc.). Include requirements for service (remove and replace only, bench repair, special tools, remote handling/maintenance, etc.) and for capability of the item to be drained, connected, discharged, etc. Adequate working space shall be provided around all electrical equipment in accordance with the NEC® (NFPA 70) "National Electrical Code." Critical equipment, instrumentation, or high maintenance items shall be accessible for ease of inspection and removal and replacement. Adequate space and 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. Spares and Spare Parts. The Seller shall specify identification of recommended spares and spare parts and provide a listing to the Buyer.

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4. **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 also indicate if the tool is required for assembly, disassembly, installation, startup, operation, maintenance, or adjustment. The Seller shall provide detailed drawings or procurement information for the special tools.

5. **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. Components shall also be designed so they can be removed and replaced in a modular manner.

6. **Lock and Tag.** Both mechanical and electrical systems shall be designed to be locked out and tagged out 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.

7. **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.

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3.2.5 Environment

This equipment is to be operated outdoors. Any equipment and related enclosures installed outside shall be designed to operate and be stored in the climatic and environmental conditions listed below, taken from HNF-SD-GN-ER-501 "Natural Phenomena Hazards, Hanford Site, Washington":

1. Ambient air temperature range is -25°F to 115°;
2. Relative humidity ranges from near 0 to 100%;
3. Hail diameter less than or equal to 0.75 inches.
4. Maximum precipitation is 1.6 inches in a 24-hour period;
5. Sand and dust concentrations are 1.10×10^{-5} lbm/ft³ 150 μ m;
6. Solar radiation is expected to be a maximum 900 Langleys over a 12hr period.

3.2.6 Transportability and Storage

The assembled system shall be designed to facilitate 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.
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).

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5. The assembled system shall be stored and operated outside, five years maximum, and will be exposed to the environmental conditions found at the Hanford Site as identified in Section 3.2.5.

3.2.7 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 "Occupational Safety and Health Standards".

3.3 DESIGN AND CONSTRUCTION

3.3.1 Parts/Materials/Processes

The Seller shall procure and use components with the characteristics listed in the Technical Data Sheet 145579-V-DS-011.1. When allowed by the data sheet (i.e., specific part number not provided or specific manufacturer not provided), 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.

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.

All components shall be installed in accordance with applicable codes and 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.

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

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 Components

3.3.1.1.1 Surge Tank

The surge tank characteristics can be found in Technical Data Sheet 145579-V-DS-011.2.

3.3.1.1.2 Overflow Drum

The overflow drum shall have a nominal capacity of 30 gal. The drum shall contain a 2-in and 3/4" in female national pipe thread bung opening for filling and venting of the overflow drum. The overflow drum shall be transparent to the extent that the liquid level is easily determined

3.3.1.1.3 Pump

Pump characteristics can be found in Technical Data Sheet 145579-V-DS-011.1. The Seller is to provide calculation(s) verifying final size and total dynamic head of the pump.

3.3.1.2 Piping - Design

Piping systems shall be fabricated, inspected, and tested in accordance with ASME B31.3 "Process Piping". The minimum design pressure for the pump skid piping and components, including instrumentation shall be determined by the Seller. The design pressure shall be based on the pump sizing calculation and include a safety factor identified by the Seller and reviewed by the Buyer. Piping systems include all piping components and supports.

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3.3.1.3 Piping – Line Routing

The Seller shall develop drawings showing pipe routing consistent with the requirements of this specification. Additional considerations for the pipe routing are listed as follows:

1. Elbows and pipe bends not manufactured in accordance with listed standards in ASME B31.5 (Table 526.1) may be provided in accordance with ASME B31.5 (Paragraphs 504.2 and 532).
2. The material shall be suitable for the bending process.
3. The wall thickness after bending shall not be less than minimum wall thickness considering corrosion-erosion and mill under-run tolerance.
4. The minimum wall thickness of the bend intrados and extrados shall not be less than that calculated by equations listed in ASME B31.5 (Paragraph 504.2).
5. Bend flattening (the difference between maximum and minimum diameters at any cross section) shall not exceed 8 percent of nominal outside diameter for internal pressure. Metal shall not be removed to achieve these requirements.
6. The proposed assembly layouts shall meet the requirements of ASME B31.5.

3.3.1.4 Piping – Vents and Drains

High-point vent(s) shall be installed as required for venting air in preparation for testing or operation. Low-point drain(s) shall be installed as required for draining the system before maintenance or lay-up. Eliminate low spots to minimize freestanding liquids in the piping. Gravity draining of the piping system is preferred. The Seller shall provide basis for draining method if other than gravity draining.

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3.3.1.5 Piping – Pipe and Equipment Supports

Piping attached to equipment shall be installed with fasteners made finger-tight until alignment is achieved, at which time all fasteners shall be tightened. Tightening torque shall be the gasket manufacturer recommended torque values for the gasket system used. Flange assembly and bolting shall be performed in accordance with ASME PCC-1 "Guidelines for Pressure Boundary Bolted Flange Joint Assembly". Piping support bolting shall be installed and torqued in accordance with manufacturer's recommendations. Inspection documentation shall be provided as evidence of proper bolt torquing.

Piping and equipment shall be supported by pipe supports attached to a support frame using struts. The Seller shall develop detailed fabrication drawings of the required piping and equipment supports, including welding details. Location of frames members and supports shall be based on analyses performed by the Seller (see Section 3.3.1 for required analyses).

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 support the pipe and avoid forced piping deflections at support points.

The Seller shall provide detailed fabrication drawings of the required piping supports, including welding details, for review and approval.

3.3.1.6 Pump Skid Structure

The chiller pump skid frame is intended to be placed on a concrete pad foundation measuring 5 ft x 8 ft x 24" thick. The skid will be secured to the pad using drilled and grouted ASTM-A36 threaded rods. Seller shall provide a drawing showing the size and location of all required anchors.

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3.3.1.7 Piping Materials

Piping components shall be listed components in accordance with ASME B31.5 (Table 523.1).

The Seller shall select materials based on acceptable lifetime performance of materials subjected to the 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. The Seller shall provide Certified Material Test Reports (CMTR) for material used for structural supports. A Certificate of Conformance (CoC) shall be provided for all other piping material. Should a CMTR not be available for a material from a supplier, a CoC shall be obtained.

3.3.1.7.1 Screwed Pipe Fittings

Screwed pipe fittings shall be in accordance with ASME B16.11 "*Forged Fittings, Socket Welding and Threaded*". Close or butt nipples are not permitted. For all male-tapered pipe threads, use Loctite®¹ PST, or equivalent. Screwed fittings are acceptable for instrumentation taps, drains, and vents; but shall not be used for main pipe runs.

3.3.1.7.2 Flanged Pipe Fittings

Flanges for pipe greater than 1/2 in. shall be standard 150-lb raised-face flanges in accordance with ASME B16.5 "*Pipe Flanges and Flanged Fittings*" and shall be made from the same type of steel as the pipe to which it will be welded. Flange assembly and bolting shall be performed in accordance with ASME PCC-1.

3.3.1.7.3 Socket Welded Pipe Fittings

Socket welded pipe fittings shall be in accordance with ASME B16.11. Socket welds shall be avoided for main pipe runs.

¹ Loctite® is a registered trademark of Henkel Corporation.

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3.3.1.7.4 Butt-Welded Fittings

Butt-welded fittings shall be in accordance with ASME B16.9 "*Factory-Made Wrought Steel Buttwelding Fittings*". Welded laterals, if used, shall be in compliance with ASME B31.3 "*Process Piping*".

3.3.1.7.5 Carbon-Steel Pipe Materials

Carbon-steel pipe having a diameter of 1-1/2 in. and smaller shall be ASTM A 106 "*Standard Specification for Carbon Steel Forgings for Piping Applications*", Grade B. Carbon-steel pipe having a diameter of 2 in. and greater shall be ASTM A 53/A 53M "*Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless*", Type S, Grade B. Carbon-steel pipe flanges and flanged, socket weld, or screwed fittings shall be ASTM A 105/A 105M "*Standard Specification for Carbon Steel Forgings for Piping Applications*". Material for butt-welded fittings shall be ASTM A 234/A 234M "*Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service*", Grade A WPB.

3.3.1.8 Structural Materials

3.3.1.8.1 Weld Studs

Weld studs shall be metallurgically compatible with the material in which they are welded. Weld studs shall be made from stock material that meets the requirements of ASTM A 108 "*Standard Specification for Steel Bars, Carbon, Cold-Finished, Standard Quality*" for mild carbon steel.

3.3.1.8.2 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 "*Standard Specification for Carbon Structural Steel*". Carbon-steel sheet shall be provided in accordance with ASTM A 569 "*Standard Specification for Steel, Carbon (0.15 Maximum, Percent)*".

3.3.1.8.3 Carbon-Steel Shapes

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

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3.3.1.8.4 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.

3.3.1.8.5 Carbon-Steel Structural Rectangular Tube

Structural carbon-steel, rectangular tubing shall conform to the requirements of ASTM A 500 "Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes", Grade B.

3.3.1.9 Fasteners

The Seller shall select fasteners, when they are not specifically called out in this specification, using the following guidelines:

1. Carbon-steel bolts, nuts, and washers shall be used where mating parts are not stainless steel;
2. Pipe flange bolting components shall be listed in ASME B31.3 (Table 326.1) meeting the requirements of ASME B18.2.1 "Square and Hex Bolts and Screws Inch Series" and ASME B18.2.2 "Square and Hex Nuts".
3. 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 they remain intact. Double-nutting is not an acceptable method of securing fasteners. Low-chloride, Loctite® threadlock may be used where applicable.
4. General purpose carbon-steel bolts shall be ASTM A 307 "Standard Specification for Carbon Steel Bolts and Studs 60 000 PSI Tensile Strength" or better, depending on strength and torque requirements. Carbon-steel nuts shall be ASTM A 563a "Standard Specification for Carbon and Alloy Steel Nuts". Bolts and cap screws shall be grade marked.
5. Structural bolts and cap screws shall be grade-marked and shall conform to ASTM A 325.

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6. Copies of CMTRs shall be provided for all fasteners used for piping, pipe supports, or component support structures.
7. All graded fasteners shall conform to ASME B18.2.1, SAE J429, and ASTM A 354.
8. The Seller shall ensure that suspect or counterfeit fasteners and components are not used. Suspect fasteners can be identified by the following inspection methods:
 - (a) Head markings are marred, missing, or appear to have been altered;
 - (b) Threads show evidence of dressing or wear (threads should be of uniform color and finish);
 - (c) Head markings are inconsistent with a heat lot; and
 - (d) Head markings matching one of those identified on the U.S. Customs Service Suspect Fastener Headmark List (Appendix A).

3.3.1.10 Electrical – Design and Component Selection

3.3.1.10.1 General

Install conduit, duct, wiring, cables, connectors, instrumentation, and devices in accordance with manufacturer's written instructions, applicable requirements of the NEC® (NFPA 70) and National Electrical Contractor Association's "Standard of Installation," and with recognized industry practices. All electrical panels shall meet UL 508A "Standard for Industrial Control Panels" listings, when required.

All electrical equipment supplied as a part of this specification shall be listed, or labeled, by a Nationally Recognized Testing Laboratory (NRTL) such as Underwriters Laboratories, Inc. (UL).

Coordination and selection of overcurrent protective devices shall be in accordance with the NEC® (NFPA 70) and IEEE Std 242 "IEEE Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems".

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Design and operation of the assembled system shall meet the requirements of IEEE Std 519 "Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems" and IEEE Std 141 "IEEE Recommended Practice for Electric Power Distribution for Industrial Plants" for harmonics and flicker.

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.

3.3.1.10.2 Electrical – Routing

The Seller shall select the routing of conduits between devices and the power and instrumentation and control enclosures. Care shall be taken to run conduit along the frame members where they can be mounted. Care shall be taken to select routes where conduit does not interfere with maintenance or replacement access to devices such as pumps or valves. Sketches of the routing locations shall be submitted to the Buyer for review and approval before proceeding with the work.

3.3.1.10.3 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 frame, enclosures, raceways, covers, and enclosure doors shall be attached to the 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.
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 to the skid and any point in the ground circuit shall be less than 0.1 ohm as measured with a calibrated ohm meter.

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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.

3.3.1.10.4 Electrical – Conduit Fill

The sum of the cross-sectional areas of all contained conductors shall not exceed the interior cross-sectional area of the raceway as calculated in the tables in Chapter 9 of the NEC® (NFPA 70) for raceway fill.

3.3.1.10.5 Electrical – Strain Relief

Strain relief shall be provided for all cables. The strain relief device shall comply with the following:

Strength - The device shall be capable of withstanding a 35 lb pull for one minute (from any direction) without allowing movement of the raceway or cable that could damage the conductor insulation or strain the conductor terminations.

3.3.1.10.6 Electrical – Conduit Support

Conduit shall be supported by attachment to the frame. The Seller shall provide rigid brackets or additional frame members for attaching conduit when frame members are not in a convenient location. Attachment shall be on regular intervals per NEC® (NFPA 70). Attachment shall be made using "U" clips which may be connected to the frame using either weld studs and nuts or bolts or approved NEC® method.

3.3.1.10.7 Electrical – Segregation of Control and Power Wiring

Power circuit wiring and control circuit signal wiring shall be run in separate conduits. Signal wiring that transmits alternating current signals shall be run in separate conduits from signal wiring that transmits direct current signals.

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3.3.1.10.8 Electrical – Splicing

No splicing is allowed. The Seller shall provide junction boxes with terminal blocks for connection of devices such as valves and instrument sensors that are provided with pigtail leads.

3.3.1.10.9 Electrical – Enclosure Wiring

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

3.3.1.10.10 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.

3.3.1.11 Electrical Materials

3.3.1.11.1 Conduit

1. Rigid steel conduit (RSC) 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 metal 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 standard steel threaded, liquid-tight, type RSC fittings.

3.3.1.11.2 Wire and Cable

1. Conductors shall be stranded copper for all sizes of wire and cable unless specifically designated otherwise on the drawings.

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2. Wire insulation shall be Type THHN (heat resistant thermoplastic) / THWN (moisture and heat resistant thermoplastic) for all 600V conductors unless specifically noted otherwise on the drawings.
3. Minimum size of power conductors, 600V and below, shall be No. 12 AWG. Conductors shall be de-rated as required by NFPA 70 for proximity to heated equipment and summer outdoor ambient conditions specified in Section 3.2.5.
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 National Electric Code (NEC).
5. Power wiring for single phase systems (120/240 V) shall have color coded insulation as follows: Hot = Black, Brown; Neutral = White or Gray; Ground = Green or Bare.
6. Power wiring for 3-phase systems (480 / 277 V A, B, C) shall have color-coded insulation as follows: Red, Yellow, Blue; Ground = Green or Bare, Neutral = White or Gray.
7. Instrumentation cable shall be 600V, multi-conductor for discrete signals, flame retardant, jacketed cable suitable for installation in wet or dry locations. Conductors shall be #18 AWG stranded, copper, in twisted pairs/triads with ethylene propylene insulation. Each pair/triad shall be shielded with a drain wire and metallic tape. Multi-pair 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 194°F. Each pair/triad shall be numbered for simplified termination.
8. Control and power multi-conductor cable shall be 600V, flame resistant, radiation resistant, jacketed cable suitable for wet or dry locations. Conductors shall be stranded copper with cross-linked polyethylene ethylene propylene insulation with a temperature rating of 194°F.

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3.3.1.11.3 Receptacles

A 15-amp, GFCI receptacle, with gasketed weatherproof cover, shall be on the outside of the skid at approximately 2 ft 0 in. from the base.

3.3.1.11.4 Electrical Motors

1. Motors shall be designed and tested by the manufacturer in accordance with NEMA MG-1 "Motors and Generators." Certificates of compliance 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 and NEMA MG 1-12.07.
 - (d) High potential test results in accordance with NEMA MG 1-12.03.
 - (e) 1000V dc Megger test for one minute, phase to ground.
2. Motors 1 HP and greater shall be three-phase.
3. Motors shall have a minimum service factor of 1.15.
4. Motors shall have a minimum insulation class of F, as defined in NEMA MG-1.

3.3.1.11.5 Electrical Enclosures

Unless otherwise noted, outdoor enclosures shall be rated NEMA 4. If a NEMA 4 enclosure is not available due to equipment design or ventilation requirements, then a NEMA 3R enclosure may be used. Conduit entries into the tops and sides of outdoor enclosures shall use watertight hubs.

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3.3.1.11.6 Main Electrical Disconnect Switch

A 480V ac, 3-pole, non-fused disconnect switch shall be provided as the main power disconnect for the skid; all power on the skid shall be derived from this point. Provide 194°F rated terminals in the disconnect switch.

3.3.1.11.7 120V ac Power Distribution

120V ac shall be derived from a transformer and distribution panel or other NEC® approved means. If appropriate, the distribution panel and transformer may be combined as a single unit (e.g., Square D Mini Power-Zone®²). Circuit breakers shall be used for branch circuit overcurrent protection. The 120V ac source of supply shall be of adequate size to allow power tools to be run from the skid GFCI receptacle during normal operations.

3.3.1.11.8 Pushbutton Station

Local pushbutton station shall be provided for the pump and motor and shall be located in a readily accessible location within sight of the equipment. Pushbutton wiring shall be routed to the Monitoring and Control System (MCS) terminal box. Further detail for the pushbutton station is provided in Technical Data Sheet 145579-V-DS-011.1.

3.3.1.12 Drawings

The Seller shall provide all design drawings necessary for the OGCP assembly which includes, but is not limited to, drawing outlines, interface drawings, electrical wiring diagrams, control wiring diagrams, pipe support drawings, dimensional drawings, rigging sketches, and as-built drawings. Drawings shall be submitted to the Buyer for review and approval.

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

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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 and include all components specified on the attached drawing, F-144579-36-A-0106. 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. 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 "Drawing Sheet Size and Format". 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, ASTM, federal, or other specifications. As-built drawings shall be verified in accordance with Quality Assurance (QA) Program Controls before submittal, and shall be in accordance with Buyer-supplied drawing procedures.

Drawings shall be prepared using AutoCAD®³ 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.

² Square D® is a registered trademark of Square D Company Corporation.

³ AutoCAD® is a registered trademark of Autodesk, Inc., Sausalito, California.

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3.3.1.13 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.

3.3.1.14 Welding Process

Welding of all piping shall be performed in accordance with ASME B31.5. Certified welders shall perform welding of all structural steel in accordance with AWS D1.1/D1.1M "*Structural Welding Code – Steel*" for carbon steel or AWS D1.6 "*Structural Welding Code – Stainless Steel*" for stainless steel. Welding for sheet steel shall be in accordance with ANSI/AWS D1.3 "*Structural Welding Code – Sheet Steel*". Visual and nondestructive examination (NDE) procedures shall be prepared by the Seller. Welding Procedures, Procedure Qualification Records, and Welder Procedure Qualification Records shall be submitted for review and approval.

3.3.1.14.1 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 "*Boiler and Pressure Vessel Code*", Section IX "*Welding and Brazing Qualifications*", AWS D1.1/D1.1M, AWS D1.6, or ANSI/AWS D1.3, as applicable.

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.

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3.3.1.14.2 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.

3.3.1.14.3 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.

3.3.1.14.4 Welding Materials

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

3.3.1.14.5 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.

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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 CMTRs.

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

3.3.1.15 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 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.

The Buyer will insert witness/hold points in the fabrication traveler during their 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, inspection, or test step. Final fabrication traveler shall include final hold point for Buyer walkdown for final article acceptance before shipment.

3.3.1.16 Monitoring and Control System

The MCS is not part of this contract; therefore, the Seller shall provide a termination panel that the Buyer will use to access components on the assembled system. The termination panel readily accessible, shall be located on the outside of the container (skid), be rated for the outside environmental condition, of the panel location, located in an area away from the process lines if possible; shall be easily accessible for maintenance (approximately 60 in. high from the ground); and shall meet NEC® (NFPA 70) requirements for working clearances. The

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exact location of the panel will be determined based on minimization of wiring, skid interferences, and connection routing.

Only local instruments and components are required to be wired and terminated to the termination panel. The local instruments and components⁴ 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 voltage 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.

Twisted Shielded Pair 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.

3.3.1.17 Instrument Calibration and Characteristics

All solenoids shall be 24VDC. All instrument transmitters shall provide an isolated 4-20-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 4-20-mA control signal from the MCS and provide position indication to the MCS. 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 standing on the floor at the entry access point to the pump skid assembly freight container. The Buyer shall provide guidance with positioning based on best available knowledge of the configuration.

⁴ 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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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, the as-found and as-left data, and the calibration expiration date.

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 datasheet 145579-V-DS-011.1 and 011.2 Bidder's Drawings and Data Commitment sheets.

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3.3.1.18 Mechanical Assembly Requirements

All equipment shall be assembled to the structural frame observing the equipment manufacturer's recommended assembly instructions. Equipment shall be checked to ensure that it is provided with adequate amounts of fresh lubricants of the proper selection.

3.3.1.19 Workmanship

1. General: Remove all burrs and break all sharp edges.
2. Drawings:
 - (a) Dimensioning and tolerancing shall be interpreted per ANSI Y14.5M "Dimensioning and Tolerancing" and
 - (b) Tolerances not specified on drawings shall be as shown in Table 3-2.

Table 3-2: Standard Drawing Dimension Tolerances

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

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3. Welding to ball valves:
 - (a) Ball valves shall be disassembled before welding to the valve body.
4. Piping and components:
 - (a) Pipe flange, man-way, 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 housing 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 2.0. Sections within this document 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.

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 "A List of EMI/EMC Requirements" 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 "Radio Frequency Devices", 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 a Federal Communications Commission-accepted international standard.

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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 "*IEEE Standard for Withstand Capability of Relay Systems to Radiated Electromagnetic Interference from Transceivers*".

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 *IEEE Guide on the Surge Environment in Low-Voltage (1000 V and less) AC Power Circuits* and IEEE C62.41.2 *IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits, Category B*. 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 "*American National Standard Guide for Electrostatic Discharge Test Methodologies and Criteria for Electronic Equipment*" or IEC 61000-4-2 "*Electromagnetic Compatibility (EMC) – Part 4-2: Testing and Measurement Techniques – Electrostatic Discharge Immunity Test*". The test 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

Not applicable to the OGCPs.

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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.

The fabrication traveler shall describe the cleaning and packaging steps taken.

The OGCPs assembly equipment ports and pipe openings shall be temporarily capped following cleaning and drying for shipment. Packaging requirements following cleaning are documented in Section 5.1.1.

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.

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

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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 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.

3.3.6.3 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.

3.3.6.4 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.

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

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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 the Buyer's 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 valves, instruments, and mechanical equipment in accordance with this specification. Equipment to be labeled shall include, as a minimum:

1. Internal and external valves;
2. Instruments and gauges, pumps, motors, tanks, compressors, and filters; and
3. Power panels, instrument enclosures, and switches.
4. Junction boxes shall follow the labeling convention below:
 - (a) Instrument (24V dc): 36-IJB-1##
 - (b) Electrical (110V ac): 36-EJB-1##
 - (c) Power (110V ac): 36-PJB-1##

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

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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 "PROCESS," "COMPRESSED AIR," or "FILTERED WATER," as applicable. Text shall be all capital letters. The label background and lettering colors shall be as follows:

1. Process fluid piping shall be yellow field with black letters,
2. Compressed air piping shall be blue field with white letters, and
3. Filtered water piping shall be green field with white letters.
4. Labels shall be made from self-sticking polyester or vinyl (Electromark part number P400 series or Buyer-approved equivalent). 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 3-3.

Table 3-3: Pipe Greater than 3/4 In. in Dia.

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.

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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. Wire label material requirements and color-coding are given in Section 3.3.1.11.2.

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.

3.3.8.5 Conduit Labeling

- 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

- 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.

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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 "Hanford Site Hoisting and Rigging Manual", 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).
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).

3.3.8.7 Electric Motor Labeling

The markings on all motors shall be in accordance with the NEC® (NFPA 70) and NEMA MG-1. Care should be taken when painting such that the motor nameplates, lifting eyes, or lifting swivel manufacture nameplates are not to be painted.

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).

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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. Clear and unobstructed access shall be provided to each system component for operation and maintenance.

3.3.11 Qualification

The drawings, calculations, and associated design media shall show full compliance with this specification and Buyer-approved exceptions or modifications. The Seller's design media (drawings and calculations) shall be prepared by, or under the supervision of, a *Professional Engineer* licensed in the State of Washington. The responsibilities of the assigned Professional Engineer for preparation and control of each deliverable shall be in accordance with the engineering practice laws and regulations of the State of Washington. Portions of drawings originated by others, such as as-built vendor information on P&IDs, shall be clearly identified. If the Seller cannot meet these requirements through utilization of existing registered Washington State Professional Engineers or certifying Professional Engineers through comity in the State of Washington, the Seller shall inform the Buyer so that a resolution can be reached.

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).
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,

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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) "1997 Uniform Building Code" and ASCE 7-98 "Minimum Design Loads for Buildings and Other Structures", 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. The calculations shall also show that the skid will not tip over nor slide, the use of a friction factor shall be either justified or conservatively not allowed.

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.

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,

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rain load, earthquake load, flood load, or dead load. Live loads are produced by operations, maintenance workers, and equipment.

1. Live loads shall not be 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) or ASCE 4-98 "*Seismic Analysis of Safety-Related Nuclear Structures*".

The soil profile type as defined by UBC (1997) (Section 1636.2) is taken as SE for conservatism.

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 Official. 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* and *Manual of Steel Construction—Load and Resistance Factor Design*. 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

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total weight, the center of gravity, and the lift points and rigging methods necessary for lifting each component. Lift points 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 B31.5. As a minimum, calculation shall include the following subjects:

1. Pipe wall thickness calculations and selection of piping components schedule or class for pressure and temperature requirements (ASME B31.5, Paragraph 504.1.2, Chapter II, Part 2).
2. Stress calculations for sustained loads because of pressure, dead load and any other sustained loads (ASME B31.5, Paragraph 5.02.3.2, Chapter II, Part 5).
3. Stress calculations for displacement stresses, such as thermal loads. (ASME B31.5, Paragraph 5.02.3.2, Chapter II, Part 5).
4. Stress calculations for occasional load such as pressure, dead weight, other sustained loads and earthquake loads (ASME B31.5, Paragraph 5.02.3.3, Chapter II, Part 5).
5. Hanger stress calculations for wind, deadweight, thermal and seismic loads.

Additional calculations that shall be performed include head loss (for pump sizing) and valve actuator sizing.

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.

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2. Wire sizing calculation for all power conductors, with all assumptions regarding duty cycle clearly stated.
3. Equipment sizing/selection calculation (transformers, panelboards, 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

3.3.12.1 General Requirements

Information to be supplied with the bid, for review, and as final is shown on the Bidder's Drawings and Data Commitments sheet (Technical Data Sheet 145579-V-DS-011.1). 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.

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

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 pre-purchase 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.

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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 resubmittal 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. 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

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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

The Seller shall provide fabrication traveler(s) for the fabrication and testing of the above described equipment. The fabrication traveler(s) shall include detailed procurement, fabrication, assembly, testing, shipping, and handling steps required to properly fabricate, assemble, and test the equipment in accordance with the drawings and specifications.

The Buyer will insert witness/hold points in the fabrication traveler during their 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, inspection, or test steps.

3.3.12.3 Schedule and Component Lead Time

A proposed schedule of fabrication, inspection, and testing of all waste transfer pump skid assembly equipment shall be submitted for review with the bid and approval with the submittal of the fabrication traveler(s).

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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.

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

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3.3.12.5 Final Data Package

The Seller shall not ship the pump skid assembly and ancillary hardware 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 in data sheets 145579-V-DS-011.1 and 011.2 Bidder's Drawing and Data Commitments.

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 B31.5 at a minimum for piping and pipe supports and per AWS D1.1/D1.1M for structural steel. An ASME B31.5 weld examiner shall meet the code requirements. An AWS-Certified Welding Inspector shall perform visual inspections; and examiners, certified to ASNT SNT-TC-1A "Recommended Practice", shall perform NDE. Welded connections on the lifting components shall be 100 percent visual and 100 percent Dye-Penetrant Test or Magnetic-Particle Test inspected.

Visual and NDE weld inspection procedures shall be submitted along with the personnel certifications to the Buyer for review and approval, before performance of the inspections and examinations. Weld inspection procedures and Examiner/Inspector Qualification Records shall be submitted for review and approval.

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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.

3.3.13.4 Testing

The Seller shall qualify, and document qualifications of, Test Personnel performing acceptance testing.

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4.0 QUALITY ASSURANCE REQUIREMENTS

4.1 GENERAL

4.1.1 Quality Assurance Program

The Subcontractor/Supplier shall have a documented, implemented and maintained Quality Assurance Program that is based on a national standard and identifies the activities and items to which it applies. Instructions and procedures must include or reference appropriate quantitative or qualitative acceptance criteria for determining that prescribed activities have been satisfactorily accomplished. The Quality Assurance Program must address each of the areas discussed within this QA Requirements Flow-down. The Subcontractor/Supplier must submit the Quality Assurance Program to the Buyer for review prior to award of contract.

The Subcontractor/Supplier shall assess its Quality Assurance Program regularly to assure its effective implementation.

The Quality Assurance Program shall provide for indoctrination and training, as necessary, of personnel performing activities affecting quality to assure 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 upon request.

4.1.2 Design

The Subcontractor/Supplier must define, control, and verify designs developed for this contract. Design inputs must be specified on a timely basis 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.

4.1.2.1 Design Certification

The Seller's design media, such as drawings and calculations, shall be prepared by or under the supervision of a Professional Engineer licensed in the State of

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Washington. The responsibilities of the assigned Professional Engineer for preparation and control of each deliverable shall be in accordance with the engineering practice laws and regulations of the State of Washington. Portions of drawings originated by others, such as as-built vendor information on P&IDs shall be clearly identified. If the Seller cannot meet these requirements through utilization of existing registered Washington State Professional Engineers or certifying Professional Engineers through comity in the State of Washington, the Seller shall inform the Buyer so that a resolution can be reached.

4.1.2.2 Design and Fabrication Verification

Equipment supplied by the Seller shall be subject to Factory Acceptance Test (FAT). The Seller shall provide a FAT plan for operational testing and leak testing of their equipment. The FAT shall be in accordance with the verification, inspection, and test requirements specified in Sections 4.2 and 4.3

4.1.3 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 Subcontractor's/Supplier's organization, and changes must be reviewed and approved by the same individuals who reviewed and approved the original procurement documents.

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

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

- Identification of the Buyer's contract or purchase order number under which the materials, equipment, component, or service is being purchased;
- Provide traceability by means of positive identification from the material, equipment, component, or service to the Certificate of Conformance;
- 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;
- Identify any procurement requirements that have not been met, together with an explanation and the means for resolving the nonconformance.

The Subcontractor's/Supplier'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 Subcontractor's/Supplier's QA Program.

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

The Subcontractor/Supplier is required to flow-down all quality assurance requirements from this contract to any sub-tier suppliers/Subcontractor/Suppliers. Any access to the sub-tier suppliers'/Subcontractor/Suppliers' facilities for verification activities will be requested through the Subcontractor/Supplier prior to access, and verification activities may be performed jointly.

The Subcontractor/Supplier shall warrant that all items furnished under the contract are genuine (i.e., new, not refurbished, not counterfeit) and match the

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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 Subcontractor's/Supplier's facility or lower-tier subcontractor's facility. The Subcontractor/Supplier shall notify the Buyer at least 7 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 Subcontractor/Supplier shall obtain all materials to be delivered under the contract directly from the original manufacturer or an authorized manufacturer's representative. The Subcontractor/Supplier 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, shipping documentation or manufacturer invoice; each of which would identify that the materials were obtained from the original manufacturer.

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

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4.1.4 Identification and Control of Items

The Subcontractor/Supplier shall establish controls to assure 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 the 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 Subcontractor/Supplier 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 Subcontractor/Supplier shall identify each item, assembly, package, container, or material, having limited shelf life, with the cure date or date of manufacture and the expiration date. The Subcontractor/Supplier shall specify any storage temperatures, humidity and environmental conditions that should be maintained. Material shall not be furnished having less than 75 percent of total shelf life available at time of shipment.

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:

- Product Description – specification(s), codes, type of material, etc.;
- Actual results of chemical analysis/mechanical testing in accordance with the provisions of the code, standard, and/or specification;
- The specification and material grade;
- Traceability to the item tested (e.g., heat number, lot number, etc.);
- Name and address of manufacturer (may be identified by letterhead, logo, etc.);

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- Manufacturer's ASME certificate number and expiration date;
- Buyer's contract number and item number to which the report applies;
- The report shall be signed by an authorized representative of the manufacturer.

4.1.5 Control of Processes

The Subcontractor/Supplier shall have processes to control processes, including special processes that control or verify quality (e.g., welding, heat treating, and nondestructive examination). Special processes must be performed by qualified personnel using qualified procedures in accordance with specified requirements.

Subcontractor/Supplier personnel performing weld inspections shall be certified as a CWI in accordance with the requirements of the American Welding Society (AWS), QC-1. The following documentation shall be submitted for Buyer approval prior to the start of fabrication:

- Current AWS CWI certification;
- Current/valid visual acuity examination (must be given every 3 years); and
- 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 Subcontractor/Supplier 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 prior to 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 Supplier is not authorized to begin fabrication until the following documentation has been approved by the Buyer:

- NDE personnel qualification and certification procedure;
- Level I, II, and/or III personnel qualification and certification records, including objective evidence of NDE training, formal education, examination,

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experience, date of hire and current visual acuity exam;

- NDE method procedure(s) compliant with the applicable requirements of the Buyer's contract.

NDE 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. 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 Handling, Storage, and Shipping

The Subcontractor/Supplier 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.

4.1.7 Inspection, Test, and Operating Status

The Subcontractor/Supplier shall have a process to identify the status of inspection and activities on items or in documents traceable to the items, and to assure that items which have not passed the required inspections and tests are not inadvertently 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 Subcontractor/Supplier must specify the authority for application and removal of tags, markings, labels, and stamps.

4.1.8 Control of Nonconforming Items

The Subcontractor/Supplier must have a process to control items that do not conform to specified requirements to prevent inadvertent installation or use.

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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 Subcontractor/Supplier'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:

- **Accept-as-Is:** Nonconforming materials will perform its intended function.
- **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 Subcontractor/Supplier 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 Subcontractor/Supplier. 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.

4.1.9 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):

- Fasteners shall exhibit grade marks and manufacturers identification symbols (headmarks) as required in the specifications referenced in the contract.
- When requested by the Buyer, the Subcontractor/Supplier shall provide legible

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and reproducible copies of the manufacturers Certified Material Test Report (CMTR). These CMTR's shall report the values of the actual chemical and physical tests performed on the represented fastener lot/material heat number. Fastener packaging and labeling shall be traceable by lot number or other means to the CMTR.

- 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 QUALIFICATION VERIFICATION

Qualification verification will be performed through review of records submittals.

Test and inspection plans shall be submitted to the Buyer for review and approval a minimum of ten working days before testing. The Buyer reserves the right to witness all tests and shall be given a minimum of ten working days written notice before each test date.

The results of these inspections and tests shall be documented and submitted to the Buyer for review and approval.

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

4.3 INSPECTIONS AND TESTS

Factory Acceptance Testing of the equipment is required. Factory Acceptance Test specifications, procedures, and documentation of test results shall be prepared and submitted. All temporary electrical equipment including wiring and instruments necessary to allow component testing will be provided by the Seller.

Water used for hydrostatic testing 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

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accordance with the Seller's QA Program and shall meet the requirements of ASME NQA-1 (1994), Basic Requirement 12 "Control of Measuring and Test Equipment," 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.

4.3.1 Electrical Testing

The following sections detail the requirements for electrical testing.

4.3.1.1 Motor Test

All motors shall be given a routine test to demonstrate that the motors are free from mechanical and electrical defects. Motor tests shall be performed in accordance with the Seller's standard practice. Jog the pump motors and verify that the rotation direction is correct. If it is not, reverse two of the temporary connection leads.

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 and NEMA MG 1-12.07;
 - (d) High potential test results in accordance with NEMA MG 1-12.03; and

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- (e) 1000V dc Megger test for one minute, phase to ground.
2. Motors shall be checked for correct rotation and incoming power terminals shall be labeled by phase for proper rotation.

4.3.1.2 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. Megger tests are required for all electrical power wiring;
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.

4.3.2 Instrumentation Testing

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 cannot be verified without the MCS hardware and program, provided later.

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.

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4.3.3 Pressure-Leak Test

The OGCPs equipment shall be pressure leak tested in accordance with ASME B31.5 or ASME B&PV Code, Section VIII "Rules for Construction of Pressure Vessels", as applicable, at 1-1/2 times maximum operating pressure. Components that could be damaged during the test shall be isolated or removed and the outlet flanged, capped, or plugged. Results shall be recorded. A video record of the hydrostatic tests shall be submitted to the Buyer with test records/documents.

4.3.4 Acceptance Criteria

Acceptance criteria will be defined after process testing at the Seller's facilities. It is expected that a standard factory acceptance test will be used to accept the OGCPs. As a minimum, and not limited to, the Seller shall perform the tests listed below:

1. Verify pump flow and head as per data sheet 145579-V-DS-011.1
2. Verify skid features are functioning properly.

4.3.5 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. Electrical equipment installation and wiring practices will be subject to review by NEC® Inspectors.

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5.0 PREPARATION FOR DELIVERY

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.

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 information, handling information, shipping information, storage information, operational procedures, maintenance procedures, and special assembly procedures. The instruction manual(s) shall be submitted to the Buyer for approval before shipment.

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. Schematic and wiring diagrams,
2. Illustrated parts lists with manufacturer catalog numbers,
3. Certified copy of factory test results,
4. Recommended maintenance schedule,

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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 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.

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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.
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.

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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 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.

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- (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."

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.

TECHNICAL SPECIFICATION
AMEC Americas Limited



PROJECT:	Final DBVS Design	145579-V-SP-011	REV. 1
PROJECT NO.:	145579	OFF-GAS CHILLER PUMP SKID	
CLIENT:	AMEC E&E – Richland, WA		

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 (see Technical Data Sheet 145579-V-DS-011.1).

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

6.0 NOTES

There are no notes for this specification.

TECHNICAL SPECIFICATION
AMEC Americas Limited



PROJECT:	Final DBVS Design	145579-V-SP-011	REV. 1
PROJECT NO.:	145579	OFF-GAS CHILLER PUMP SKID	
CLIENT:	AMEC E&E - Richland, WA		

7.0 APPENDICES

Appendix	Description
A	Control of Suspect/ Counterfeit Items (TFC-ESHQ-Q_C-C-03)

8.0 ATTACHMENTS

Document No.	Description	Rev.
145579-V-DS-011.1	Off Gas Chiller Pump Skid Technical Data Sheet	1
145579-V-DS-011.2	Off Gas Chiller Surge Tank Technical Data Sheet	1
36-FIT-815	Flow Transmitter Instrument Data Sheet	B
36-LSLL-816	Level Switch - Vibration Instrument Data Sheet	A
36-PI-817	Pump Pressure Indicator Instrument Data Sheet	A
36-LSH-819	Level Switch Vibration Instrument Data Sheet	A
36-LSL-820	Level Switch-Vibration Instrument Data Sheet	A
36-TE-821	Resistance Temperature Detector Instrumentation Data Sheet	A
F-145579-36-A-0106	Bulk Vitrification Off-Gas Treatment Chilled Water Treatment	F

**TECHNICAL SPECIFICATION**

PROJECT:	Final DBVS Design	145579-V-SP-011
PROJECT NO.:	145579	APPENDIX A
CLIENT:	AMEC E&E – Richland, WA	TFC-ESHQ-Q_C-C-03 (REV. B)

APPENDIX A**TFC-ESHQ-Q_C-C-03, REV. B
CONTROL OF SUSPECT COUNTERFEIT ITEMS**

USQ #03-1456-S

CH2M HILL Hanford Group, Inc.	Manual	ESHQ
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DOCUMENT OWNER:		J. L. Logston

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1.0 PURPOSE AND SCOPE

(7.1.1, 7.1.2, 7.1.3, 7.1.4)

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/CIs 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/CIs 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 (BOM) 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 TFC-OPS-OPER-C-24. (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:

- 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><i>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.</i></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

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

Quality Assurance

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 414.1A, DOE O 440.1A, DOE G 440.1-6, 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

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."
 - 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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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. (Source: U. S. Department of Transportation Federal Aviation Administration Advisory Circular 21-29B, Detecting and Reporting Suspected Unapproved Parts).

Fastener (regardless of the safety classification). (Source: Fastener Quality Act, Public Law 101-592 as amended by Public Law 104-113).

- 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 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. (Source: ASME-NQA-1-1989, Quality Assurance Requirements for Nuclear Facilities).

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. (Source: DOE G 440.1-6, Implementation Guide for use with Suspect/Counterfeit Items Requirements of DOE O 440.1, Worker Protection Management; 10 CFR 830.120; and DOE 5700.6C, Quality Assurance).

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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. (Source: U.S. Department of Energy (DOE) M 232.1-1A, "Occurrence Reporting and Processing of Operations Information").

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.

(Source: DOE G 440.1-6, Implementation Guide for use with Suspect/Counterfeit Items Requirements of DOE O 440.1, "Worker Protection Management;" 10 CFR 830.120; and DOE 700.6C, "Quality Assurance").

6.0 RECORDS

No records are generated during the performance of this procedure.

7.0 SOURCES

7.1 Requirements

1. DOE-O-232.1A Part 4.f. (1), "Occurrence Reporting and Processing of Operations Information." (S/RID)
2. DOE O 414.1A, "Quality Assurance."
3. 10 CFR 830, Subpart A, "Quality Assurance Requirements."
4. DOE O 440.1A, "Worker Protection Management for DOE Federal and Contractor Employees."

7.2 References

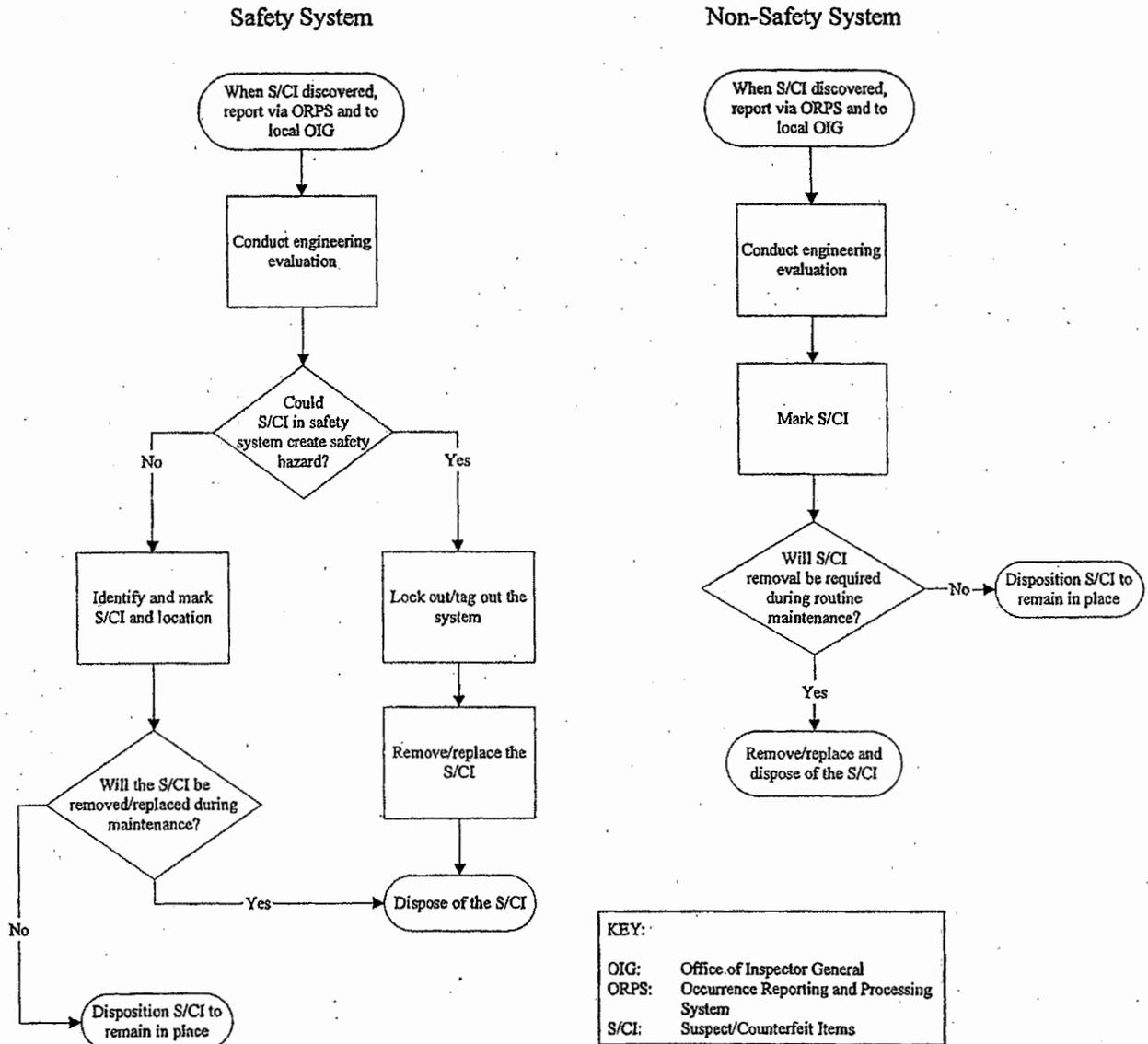
1. HNF-SD-MP-SRID-001, "Standards/Requirements Identification Document for the Tank Farm Contractor."

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2. DOE G 440.1-6, "Implementation Guide for use with Suspect/Counterfeit Items Requirements of DOE O 440.1, Worker Protection Management; 10CFR830.120; and DOE5700.6C, Quality Assurance."
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-O 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."

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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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COUNTERFEIT ITEMS****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 • HMCP 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) ATS 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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ATTACHMENT A - SUSPECT COMPONENTS LIST (cont.)

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 • EHB3040 • JL3-B150 • JL3-B200 • JL3-B090 • JL3-B1000 • HFA, HFB, FA • JL3-(B)8070 • JL3-B125 • EH-2020 • FA-3035 • EH-2050 • FA-2100 • FA-2050 • HFB-3050 • JA-2225 • HLM3800T • F3100N • MA3500 • EH2015 • LA3200WL • 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

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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 	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	Not Provided	NRC I.N. 88-46 Supp. & Attach.
	<ul style="list-style-type: none"> • MDL#KAF • QNB3020 • QNB3030 • BA 	3 pole, 20 amp	Not Provided	SENS ID #10 3-17-89 SENS ID #11 3-3-89
	<ul style="list-style-type: none"> • BA • BA 			
	<ul style="list-style-type: none"> • E3060 			
	<ul style="list-style-type: none"> • F3020 			SENS Report ID #12 10-19-88 NRC I.N. 88-46
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	General Circuit Breaker & Electrical Supply	NRC I.N. 88-46, Supplements and Attachments
			HLC Electrical Supply	

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ATTACHMENT A - SUSPECT COMPONENTS LIST (cont.)

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 • 1193 		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"> • KHL 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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ATTACHMENT A - SUSPECT COMPONENTS LIST (cont.)

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 Molded Case Circuit Breakers	DOE Letter 8-26-91 Reprinted NuVEP: Bulletin 7-26-91	
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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ATTACHMENT A - SUSPECT COMPONENTS LIST (cont.)

Component	Manufacturer/Type	Description	Supplier	References
Circuit Breakers	Fed. Pacific (Component Examples) (cont.)	1, & 3 pole - 30, 60 & 100 amp breakers	ANTI THEFT Systems, Inc. (DBA) ATS Circuit Breakers and AC Circuit Breaker - Electrical Supply	SENS ID. #11 3-3-89
	Jefferson (Component Examples)		General Circuit Breaker & Electrical Supply	NRC I.N. 88-46, Supp. & Attach.
Circuit Breakers	Superior (Component Examples)	Not Provided	HLC Electric Supply	NRC I.N. 88-46, Supp. & Attach.
			California Breakers, Inc.	
Circuit Breakers	Superior (Component Examples)	Not Provided	PENCON International (DBA) General Magnetics/electric Wholesale	NRC I.N. 88-46, Supp. & Attach.
			ANTI THEFT Systems, Inc. (DBA) ATS Circuit Breakers and AC Circuit Breaker - Electrical Supply	
Circuit Breakers	Superior (Component Examples)	Not Provided	Mid West Co.	NRC I.N. 88-46 Supp. & Attach.
			General Circuit Breaker & Electrical Supply	
Circuit Breakers	Superior (Component Examples)	Not Provided	Rosen Electric	NRC I.N. 88-46 Supp. & Attach.
			HLC Electric Supply	
Circuit Breakers	Superior (Component Examples)	Not Provided	California Breakers, Inc.	NRC I.N. 88-46 Supp. & Attach.
			PENCON International (DBA) General Magnetics/Electric Wholesale	
Circuit Breakers	Superior (Component Examples)	Not Provided	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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ATTACHMENT A - SUSPECT COMPONENTS LIST (cont.)

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) <ul style="list-style-type: none"> • 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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ATTACHMENT A - SUSPECT COMPONENTS LIST (cont.)

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	Venetech	E.L. Wilmot letter dated 8-1-91 H. Richardson letter HR-81-91 dated 8-15-91
Motors	Siemen & Allis (Component Examples) INP 143 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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ATTACHMENT A - SUSPECT COMPONENTS LIST (cont.)

Component	Manufacturer/Type	Description	Supplier	References
Relays	Potter & Brumfield (Component Examples) MDR-138, 173-1 134-1, 142-1	Not-latching rotary	Stokely Enterprises Spectronics, Inc. Nutherm International The Martin Co.	NRC I.N. 90-57 & Attach.
	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) • 12HGA-11S52 • NX 400	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.
	Manufacturer not provided • FSC-5945	Not Provided	Stokely Enterprises	DOE Letter 8-26-91 Reprinted NuVEP: Bulletin 7-26-91
	Amerace (or Agastat) (Component Examples) Models: E7024 E7022 A through L Series Model 7032	Electro Pneumatic Timing Relays PRB	Amerace Control Components Supply	SENS ID #1 11-1-91 NRC I.N. 92-24

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ATTACHMENT A - SUSPECT COMPONENTS LIST (cont.)

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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ATTACHMENT A - SUSPECT COMPONENTS LIST (cont.)

Component	Manufacturer/Type	Description	Supplier	References
Semiconductors	Solid State Devices Inc. (SSDI) SFF 9140	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	
	• A201KICA		California Breakers, Inc.	
	• A201L2CA		PENCON International (DBA) General Magnetics/Electric Wholesale	
	• AN13A		ANTI THEFT Systems, Inc. (DBA) ATS Circuit Breakers and AC Circuit Breaker - Electrical Supply	

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ATTACHMENT A - SUSPECT COMPONENTS LIST (cont.)

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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ATTACHMENT A - SUSPECT COMPONENTS LIST (cont.)

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	CMA & IMA Valve Refurbisher	NRC I.N. 88-48, Supp. & Attach.

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ATTACHMENT A - SUSPECT COMPONENTS LIST (cont.)

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 (NBBI) Bulletin: Special Report, 1992, Volume 48, Number 2, The Chinese Flange Investigation
Valve Replacement Parts	Masonilian-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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ATTACHMENT A - SUSPECT COMPONENTS LIST (cont.)

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 A 193 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 693C.

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/CJ Point of Contact (POC) for instructions. The POC list is on the Hanford Intranet at: <http://doce.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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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 Sleybo (JP)		KY Kyoel 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	Manufacturer
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.

1. 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.

- 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.
- Do not rely completely on dealing with authorized dealers for protection from purchasing refurbished molded-case circuit breakers.
- Approve formal procedures for inspecting circuit breakers that are received and installed according to the indicators of refurbished breakers listed above.
- 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.

ESHQ	Document	TFC-ESHQ-Q_C-C-03, REV B
	Page	51 of 52
CONTROL OF SUSPECT/ COUNTERFEIT ITEMS	Effective Date	December 31, 2003

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.

ESHQ	Document	TFC-ESHQ-Q_C-C-03, REV B
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CONTROL OF SUSPECT/ COUNTERFEIT ITEMS	Effective Date	December 31, 2003

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.).

TECHNICAL DATA SHEET
AMEC Americas Limited



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-V-DS-011.1	REV. 1
PROJECT NO.:	145579	OFF GAS CHILLER PUMP SKID	
CLIENT:	AMEC E&E - Richland, Washington	EQUIPMENT NO.	36-D61-058

REV NO	ISSUED FOR	ORIGIN	DATE	INITIAL
A	Internal Review	DW	02-Nov-04	DW
B	Internal Approval	DW	11-Jan-05	DW
C	CH2M Hill Review	DW	17-Jan-05	DW
0	Bid Request	DW	10-Feb-05	DW
1	Bid Request	DW	10-Mar-05	DW

DOCUMENT APPROVAL

CLIENT APPROVAL (AMEC RICHLAND)
Original Approvals on File

Project Manager: *[Signature]* (for B. Bishop)
 Date: 3/21/05
 Q.A. Rep.: *[Signature]*
 Date: 3/11/05

AMEC AMERICAS LIMITED (TRAIL)
Original Approvals on File

Project Manager: *[Signature]*
 Date: Mar 11, 05
 Discipline Lead: *[Signature]*
 Date: Mar 10/05
 Originator: *[Signature]*
 Date: March 10, 2005

CLIENT APPROVAL (CH2M HILL)

Project Manager: *[Signature]*
 Date: 3/29/05



TECHNICAL DATA SHEET

PROJECT:	Final DBVS Design	145579-V-DS-011.1	REV. 1
PROJECT NO.:	145579	OFF GAS CHILLER PUMP SKID	
CLIENT:	AMEC E&E - Richland, Washington	EQUIPMENT NO.	36-D61-058

REFERENCE ATTACHMENT

Document No.	Specification
145579-V-SP-011	Off-Gas Chiller Pump Skid

CONTENTS

Chiller Pump & Misc 2 Pages

Bidders Drawing & Data Commitments Sheet 1 Page



TECHNICAL DATA SHEETS

PROJECT:		Final DBVS Design		145579-V-DS-011.1		REV. 1	
PROJECT NO.:		145579		OFF GAS CHILLER PUMP SKID			
CLIENT:		AMEC E&E - Richland Washington		EQ. NO.:		36-D61-058	
Sheet 1 of 2							
No. Required		1		Area		36	
P&ID#		F-145579-36-A-0106		Stream No.		n/a	
Reference Specification:		145579-V-SP-011		Quality Assurance Level			EQ
Operating Conditions				Rev			
Location (Indoors/Outdoors)		Outdoors		Environmental Conditions			
Operation (Continuous / Intermittent)		Intermittent		Ambient Temperature Range		°F -25 to 115	
Days per year		365		Relative Humidity Range		(%): 0 to 100 B	
Hours per day		24		Hail Diameter		(in): < or = 0.75	
Min Outdoor Operational Service		2 yrs		Sand and dust concentrations		(lbm/ft ³): 1.1 x 10 ⁻⁵	
Max Outdoor Operational Time		5 yrs		- Typical Size		(mm): 0.15 0	
Site Elevation		(ft) 663		Solar Radiation (12-hour period)		(langley): 900	
Fluid Composition				Availability		(%) 95	
- water (%)		50 0		Environment - Radioactive		No	
- propylene glycol (%)		50 0		- Toxic		No	
				- Corrosive		No	
				- Flammable		No	
Chiller Pump Information							
General				Pump inlet conditions			
Manufacturer (or approved equal)		Bell & Gossett		Entering Fluid Temperature		°F 50	
Pump Series		* B		Entering Fluid Absolute Pressure		(psia) 15	
Pump Size		2.5x2.5x9.5		Pump outlet conditions			
Suction Port Size		(in) 2.5		Exit Fluid Absolute Pressure		(psia) 28	
Discharge Port Size		(in) 2.5		Pressure Increase			
Frame Assembly		*		(psi)		13	
Pump Assy Overall Length		(in) *					
Overall Height		(in) *					
Impeller Shaft		*					
Pump case material		carbon steel					
Pump Performance				Electrical Properties			
Operating RPM		(RPM) 1750 1		- Single-point non-fused disconnect switch		Yes	
Operating total dynamic head		(ft H2O) 50 0		- Wye delta starter		No B	
Operating Flow Rate		(GPM) 120 1		- Voltage/Phase/Hertz		(V/Ph/Hz) 480/3/60	
Operating HP		(HP) 3 1		- Interface options for client control system		yes	
Shipping Weight		(lbs) *		(monitoring and remote stop)			
Operating Weight		(lbs) *					
Communication with MCS		B					
- Remote status indication (on/off)		Yes					
- Remote alarm status		Yes					
- Remote stop/start		Yes					
Comments:							
Items marked with an * shall be filled by VENDOR							
Pump Based on calculation 145579-V-CA-004							
Date	02-Nov-04	11-Jan-05	17-Jan-05	15-Feb-05	10-Mar-05		
By	DW	DW	DW	AP	<i>[Signature]</i>		
Chked	AP	AP	AP	DW	<i>[Signature]</i>		
Rev.	A	B	C	0	1		



TECHNICAL DATA SHEETS

PROJECT:	Final DBVS Design	145579-V-DS-011.1	REV. 1
PROJECT NO.:	145579	OFF GAS CHILLER PUMP SKID	
CLIENT:	AMEC E&E - Richland Washington	EQ. NO.:	36-DB1-05B

Sheet 2 of 2

Quick Disconnect		QD-606		Rev	Full Port Ball Valve		36-V-042		Rev
Type		"Andrews"	B		Manufacturer (or approved equal)		Flowtek	B	
Material		SS	B		Model No.		Series 7000	B	
Manufacturer (or approved equal)		Dixon Valve	B		Rated Flow		(gpm) *		1
Model No.		200-A-SS	B		Connection		(in)	2.5" Flange	1
Size	(in)	2" Flanged	0		Actuation			manual	B
Overall length	(in) *				Pressure Rating		*		
Adapter Length	(in) *				Material			A216 Carbon	B
P&ID Tag		QD-606	0		P&ID Tag			36-V-042	B
Full Port Ball Valve		36-V-085			Check Valve		36-V-043		
Manufacturer (or approved equal)		Flowtek	B		Manufacturer (or approved equal)		Dixon Valve		
Model No.		Series 7000	B		Model No.		*		B
Rated Flow	(gpm) *		1		Rated Flow		(gpm) *		1
Connection	(in)	3" Flanged	0		Connection		(in)	2" Flanged	0
Actuation		manual	B		Pressure Rating		*		
Pressure Rating	*				Material			SS	B
Material		A216 Carbon	B		P&ID Tag			36-V-043	B
P&ID Tag		36-V-085	0						
Instrument Plug Valve		36-VB-817			Full Port Ball Valve		36-V-082		
Manufacturer (or approved equal)		Flowtek	B		Manufacturer (or approved equal)		Flowtek	1	
Model No.		Series 7000	B		Model No.		Series 7000	1	
Rated Flow	(gpm) *		1		Rated Flow		(gpm) *	1	
Connection	(in) *				Connection		(in)	2" Flanged	1
Actuation		manual	B		Actuation			manual	1
Pressure Rating	*				Pressure Rating		*	1	
Material		A216 Carbon	B		Material			A216 Carbon	1
P&ID Tag		36-VB-817	B		P&ID Tag			36-V-082	1
Full Port Ball Valve		36-V-071			Full Port Ball Valve		36-V-003		
Manufacturer (or approved equal)		Flowtek	B		Manufacturer (or approved equal)		Flowtek	1	
Model No.		Series 7000	B		Model No.		Series 7000	1	
Rated Flow	(gpm) *		1		Rated Flow		(gpm) *	1	
Connection	(in)	1" Flanged	0		Connection		(in)	2.5" Flange	1
Actuation		manual	B		Actuation			manual	1
Pressure Rating	*				Pressure Rating		*	1	
Material		A216 Carbon	B		Material			A216 Carbon	1
P&ID Tag		36-V-071	B		P&ID Tag			36-V-003	1

Comments:

Items marked with an * shall be filled by VENDOR

Date	02-Nov-04	11-Jan-05	17-Jan-05	15-Feb-05	10-Mar-05			
By	DW	DW	DW	DW	<i>DW</i>			
Chked	AP	AP	AP	AP				
Rev.	A	B	C	0	1			

TECHNICAL DATA SHEET
 AMEC Americas Limited


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-V-DS-011.2	REV. 1
PROJECT NO.:	145579	OFF GAS CHILLER SURGE TANK	
CLIENT:	AMEC E&E - Richland, Washington	EQUIPMENT NO.	36-D74-080

REV NO	ISSUED FOR	ORIGIN	DATE	INITIAL
A	Internal Review	DW	02-Nov-04	DW
B	Internal Approval	DW	11-Jan-05	DW
C	CH2M Hill Review	DW	17-Jan-05	DW
0	Bid Request	DW	10-Feb-05	DW
1	Bid Request	DW	10-Mar-05	DW

DOCUMENT APPROVAL

CLIENT APPROVAL (AMEC RICHLAND) <i>Original Approvals on File</i> Project Manager: <u><i>[Signature]</i></u> Date: <u>3/21/05</u> Q.A. Rep.: <u><i>[Signature]</i></u> Date: <u>3/11/05</u>	AMEC AMERICAS LIMITED (TRAIL) <i>Original Approvals on File</i> Project Manager: <u><i>[Signature]</i></u> Date: <u>Mar 11, 05</u> Discipline Lead: <u><i>[Signature]</i></u> Date: <u>Mar 11/05</u> Originator: <u><i>[Signature]</i></u> Date: <u>March 10, 2005</u>
CLIENT APPROVAL (CH2M HILL) Project Manager: <u><i>[Signature]</i></u> Date: <u>3/29/05</u>	



TECHNICAL DATA SHEET

PROJECT:	Final DBVS Design	145579-V-DS-011.2	REV. 1
PROJECT NO.:	145579	OFF GAS CHILLER SURGE TANK	
CLIENT:	AMEC E&E - Richland, Washington	EQUIPMENT NO.	36-D74-080

REFERENCE ATTACHMENT

Document No.	Specification
145579-V-SP-011	Off-Gas Chiller Pump Skid

CONTENTS

Surge Tank 1 Page

Bidders Drawing & Data Commitments Sheet 1 Page



TECHNICAL DATA SHEETS

PROJECT:		Final DBVS Design		145579-V-DS-011.2		REV. 1	
PROJECT NO.:		145579		Off Gas Chiller Surge Tank			
CLIENT:		AMEC E&E - Richland Washington		EQ. NO.:		36-D74-080	
No. Required		1		Area		36	
P&ID#		F-145579-36-A-0106		Stream No.			
Reference Specification:		145579-V-SP-011		Quality Assurance Level		EQ	
Operating Conditions				Rev		Rev	
Location (Indoors/Outdoors)		Outdoors		Environmental Conditions			
Operation (Continuous / Intermittent)		Intermittent		Ambient Temperature Range		°F -25 to 115	
Days per year		365		Relative Humidity Range		% 0 to 100 B	
Hours per day		24		Hail Diameter		(in) < or = 0.75	
Min Outdoor Operational Service		2 yrs		Sand and dust concentrations		(lbm/ft ³) 1.1 x 10 ⁻³	
Max Outdoor Operational Time		5 yrs		- typical size		(mm) 0.15	
Site Elevation		(ft) 663		Solar Radiation (12 hr period)		(langleys) 900	
Fluid Composition				Availability		%	
- water (%)		50		Environment		- Radioactive	
- propylene glycol (%)		50				- Toxic	
						- Corrosive	
						- Flammable	
						No	
						No	
						No	
						No	
Vertical Storage Tank				30 Gal Surge Tank Overflow Barrel			
Manufacturer (or approved equal)		Niles Steel Tanks		Manufacturer		Lab Safety Supply B	
Model Number		NST28-225H/V		Model #			
Height		(in) 72		Capacity		(gal) 30 B	
Diameter		(in) 28		Height		(in) 28 1/2 B	
Baffles		No		Diameter		(in) 22 B	
Holding Capacity		(usg) 225		Material		Polyethylene B	
Legs		4		Inlet		2" Flanged B	
Lifting Lugs		two on top		Outlet		2" candycane vent B	
Interior Coating		(epoxy/rubber/glav/glass) *		Drain Port		lowest point	
Exterior Coating		(epoxy/rubber/glav/glass) *				1" Flanged 0	
Working Pressure		(psi) Vented to atm					
Operating Temperature		°F -25 to 115					
Level sensor port, opposite outlet		3/4" NPT					
Temp sensing port near level sensor		2" Flanged					
Inlet Port		at top 3" Flanged					
Outlet Port		side, near bottom 2.5" Flanged					
Make up Port		at top 2" Flanged					
Surge Tank Port		at top 2" Flanged					
Drain Port		lowest point 1" Flanged					
Temperature Port		1"NPT					
Tank elevation off floor		(in) *					
Shipping Weight		(lbs) *					
Comments:							
Items marked with an * shall be filled by VENDOR							
Date	02-Nov-04	11-Jan-05	17-Jan-05	15-Feb-05	10-Mar-05		
By	DW	DW	DW	DW	<i>[Signature]</i>		
Chked	AP	AP	AP	AP	<i>[Signature]</i>		
Rev.	A	B	C	0	1		

amec 		AMEC E&C Services Limited Trail, BC Canada		INSTRUMENTATION DATA SHEET	
TAG NUMBER: 36-LSLL-816					
SUBJECT:	LEVEL SWITCH - VIBRATION				
SERVICE:	Off-Gas Chiller Surge Tank Low Level Pump Shutdown Switch				
SUPPLIER:	*	P.I.C. No.:	253		
MAKE:	VEGASWING 60 or Equivalent		P.O. No.:		
MODEL:	*	P&ID No.:	F-145579-36-A-0106		
SWITCH					
Type:	Vibrating Fork	Power Supply:	24 Vdc		
Range:	*	Output:	8mA free 16mA Covered		
Calibration:	*	Conduit Connect:	1/2" FNPT		
Enclosure Material:	*	Local Indication:	N/A		
Enclosure Class:	NEMA 4X	Mounting Bracket:	N/A		
Certification:	UL	I/O Isolation:	N/A		
Sensor					
Service Type:	Tank Low Level Switch	Process Connection:	N/A		
Element Type:	Vibrating Fork	Chemical Seal Type:	N/A		
Element Material:	*	Model No.:	61		
Wetted Parts Material:	*	Extension Length:	N/A		
Body Rating:	*	Armour:	N/A		
Process Connection:	3/4" NPT	Flushing Connection:	N/A		
Insertion Length:	Standard	Valve Isolation:	N/A		
316SS Tag permanently affixed to instrument					
SERVICE CONDITIONS:					
Vessel No.:	36-D74-080	Sensor Offset:	N/A		
Fluid:	Water/Glycol 50/50 mix	Blocking Distance:	N/A		
Fluid pH:	N/A	Level Offset:	N/A		
Temp Oper.:	50°F	Specific Gravity:	1.06		
Temp Max:	115°F	Dielectric:	-		
Press Min:	Atmospheric	Vibration:	N/A		
Press Oper:	Atmospheric	Vessel Material:	N/A		
Press Max:	Atmospheric	Heater:	N/A		
NOTES: 1. All items with an * shall be filled in by the VENDOR					
By: DRJ 	Chk: 	Appd.: 	Date: 08-Mar-05	Project: 145579	Rev: A

amec [®]		AMEC E&C Services Limited Trail, BC Canada		Instrumentation Data Sheet	
TAG NUMBER: 36-PI-817					
SUBJECT:	PRESSURE GAUGE				
SERVICE:	Off-Gas Chiller Pump Pressure				
SUPPLIER:		PIC No.:	238		
MAKE:	*	P.O. No.:			
MODEL:	*	P&ID No.:	F-145579-36-A-0106		
GENERAL					
Type:	Liquid Filled				
Housing:	IEC IP66				
Case:	PHENOLIC BLACK				
Size:	100 mm				
Connection:	1/2" NPT at bottom				
Range:	*				
Bourdon:	316L Stainless Steel				
Siphon:	N/R				
Accuracy:	+/- 0.5% full scale				
CHEMICAL SEAL -Not Required					
Size:					
Type:					
Material Wetted Parts:					
Connection (bottom, back):					
316SS Tag permanently affixed to instrument					
SERVICE CONDITIONS:					
Line/Vessel No.:	36-D61-058	Max. Velocity:	N/A		
Fluid:	Water	Spec. Gravity:	1.0		
Flow Oper.:	N/A	pH:	-7.0		
Flow Max.:	N/A	Percent Solids:	N/A		
Temp Oper.:	40°F	Viscosity:	N/A		
Temp Max.:	115°F	Material Build-Up:	N/A		
Press Oper.:	*	Vibration:	Minimal		
Press Max.:	*				
NOTES. 1. All items with an * shall be filled in by the VENDOR.					
By: RPH <i>RPH</i>	Chk: <i>[Signature]</i>	Appd. <i>[Signature]</i>	Date: 1-Nov-04	Project No.: 145579	Rev: A

amec		AMEC E&C Services Limited Trail, BC Canada		INSTRUMENTATION DATA SHEET	
TAG NUMBER: 36-LSH-819					
SUBJECT:		<u>LEVEL SWITCH - VIBRATION</u>			
SERVICE:		<u>Off-Gas Chiller Expansion Tank High Level Switch</u>			
SUPPLIER:		<u>*</u>	P.I.C. No.:	<u>253</u>	
MAKE:		<u>VEGASWING 60 or Equivalent</u>		P.O. No.:	
MODEL:		<u>*</u>	P&ID No.:	<u>F-145579-36-A-0106</u>	
SWITCH					
Type:	<u>Vibrating Fork</u>	Power Supply:	<u>24 Vdc</u>		
Range:	<u>*</u>	Output:	<u>8mA free 16mA Covered</u>		
Calibration:	<u>*</u>	Conduit Connect:	<u>1/2" FNPT</u>		
Enclosure Material:	<u>*</u>	Local Indication:	<u>N/A</u>		
Enclosure Class:	<u>NEMA 4X</u>	Mounting Bracket:	<u>N/A</u>		
Certification:	<u>UL</u>	I/O Isolation:	<u>N/A</u>		
Sensor					
Service Type:	<u>Tank High Level Switch</u>	Process Connection:	<u>N/A</u>		
Element Type:	<u>Vibrating Fork</u>	Chemical Seal Type:	<u>N/A</u>		
Element Material:	<u>*</u>	Model No.:	<u>61</u>		
Wetted Parts Material:	<u>*</u>	Extension Length:	<u>N/A</u>		
Body Rating:	<u>*</u>	Armour:	<u>N/A</u>		
Process Connection:	<u>3/4" NPT</u>	Flushing Connection:	<u>N/A</u>		
Insertion Length:	<u>Standard</u>	Valve Isolation:	<u>N/A</u>		
316SS Tag permanently affixed to instrument					
SERVICE CONDITIONS:					
Vessel No.:	<u>36-D74-060</u>	Sensor Offset:	<u>N/A</u>		
Fluid:	<u>Water/Glycol 50/50 mix</u>	Blocking Distance:	<u>N/A</u>		
Fluid pH:	<u>N/A</u>	Level Offset:	<u>N/A</u>		
Temp Oper.:	<u>50°F</u>	Specific Gravity:	<u>1.06</u>		
Temp Max:	<u>115°F</u>	Dielectric:	<u>-</u>		
Press Min:	<u>Atmospheric</u>	Vibration:	<u>N/A</u>		
Press Oper:	<u>Atmospheric</u>	Vessel Material:	<u>N/A</u>		
Press Max:	<u>Atmospheric</u>	Heater:	<u>N/A</u>		
NOTES: 1. All items with an * shall be filled in by the VENDOR					
By: DRJ <i>DRJ</i>	Chk: <i>HW</i>	Appd. <i>SA</i>	Date: 08-Mar-05	Project: 145579	Rev: A


 AMEC E&C Services Limited
 Trail, BC Canada

INSTRUMENTATION DATA SHEET

TAG NUMBER: 36-LSL-820

SUBJECT:	LEVEL SWITCH - VIBRATION		
SERVICE:	Off-Gas Chiller Expansion Tank Low Level Switch		
SUPPLIER:	*	P.I.C. No.:	253
MAKE:	VEGASWING 60 or Equivalent	P.O. No.:	
MODEL:	*	P&ID No.:	F-145579-36-A-0106

SWITCH

Type:	Vibrating Fork	Power Supply:	24 Vdc
Range:	*	Output:	8mA free 16mA Covered
Calibration:	*	Conduit Connect:	½" FNPT
Enclosure Material:	*	Local Indication:	N/A
Enclosure Class:	NEMA 4X	Mounting Bracket:	N/A
Certification:	UL	I/O Isolation:	N/A

Sensor

Service Type:	Tank Low Level Switch	Process Connection:	N/A
Element Type:	Vibrating Fork	Chemical Seal Type:	N/A
Element Material:	*	Model No.:	61
Wetted Parts Material:	*	Extension Length:	N/A
Body Rating:	*	Armour:	N/A
Process Connection:	¾" NPT	Flushing Connection:	N/A
Insertion Length:	Standard	Valve Isolation:	N/A

316SS Tag permanently affixed to instrument

SERVICE CONDITIONS:

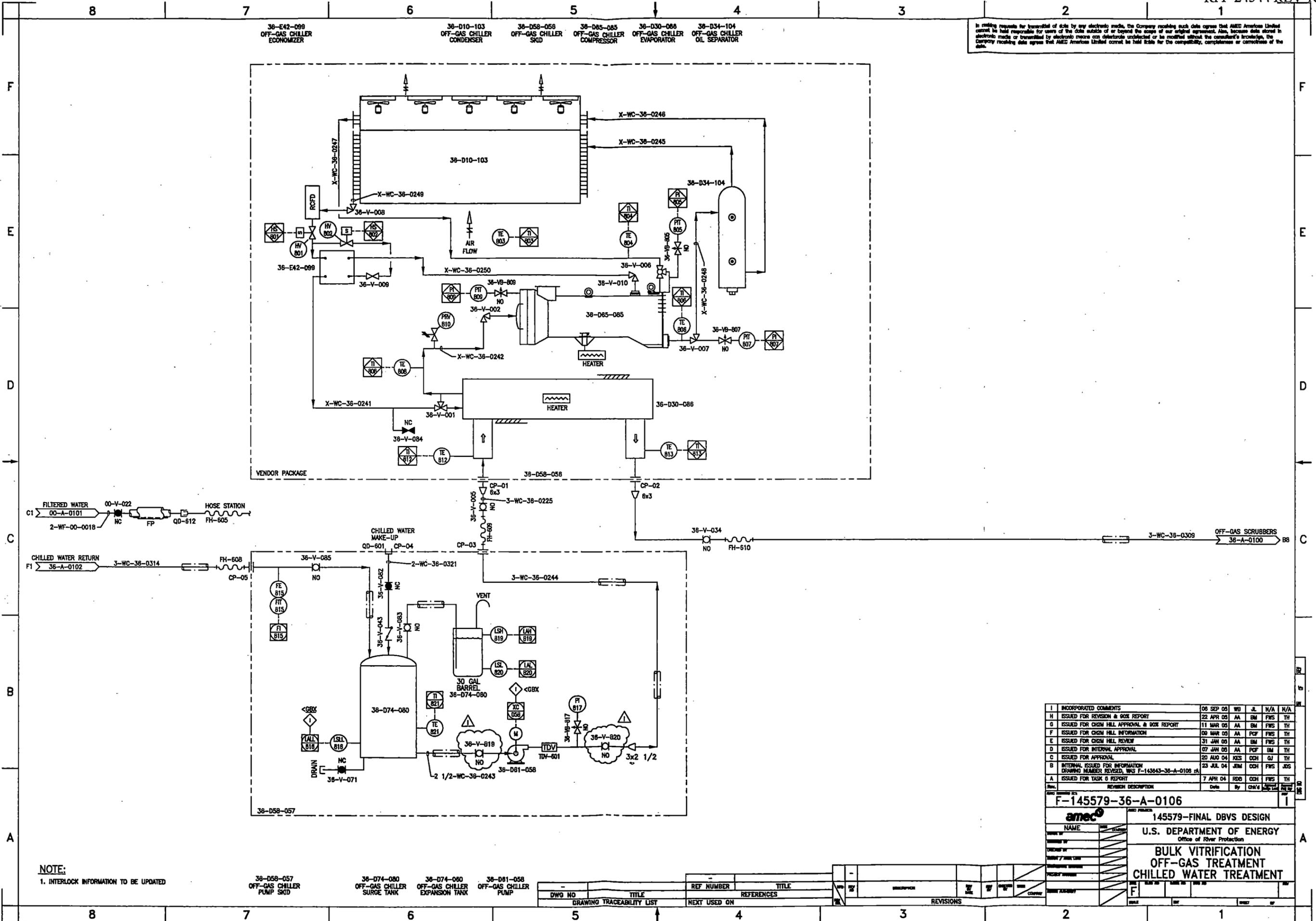
Vessel No.:	36-D74-060	Sensor Offset:	N/A
Fluid:	Water/Glycol 50/50 mix	Blocking Distance:	N/A
Fluid pH:	N/A	Level Offset:	N/A
Temp Oper.:	50°F	Specific Gravity:	1.06
Temp Max:	115°F	Dielectric:	-
Press Min:	Atmospheric	Vibration:	N/A
Press Oper:	Atmospheric	Vessel Material:	N/A
Press Max:	Atmospheric	Heater:	N/A

NOTES: 1. All items with an * shall be filled in by the VENDOR

By: DRJ <i>DRJ</i>	Chk: <i>glw</i>	Appd: <i>[Signature]</i>	Date: 08-Mar-05	Project: 145579	Rev: A
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amec		AMEC E&C Services Limited Trail, BC Canada	INSTRUMENTATION DATA SHEET		
TAG NUMBER: 36-TE-821					
SUBJECT:	RESISTANCE TEMPERATURE DETECTOR (RTD) - 100 OHM PLATINUM and WELL				
SERVICE:	Off-Gas Chiller Surge Tank Temperature				
SUPPLIER:	*	PIC No.:	253		
MAKE:	*	P.O. No.:			
MODEL:	*	P&ID No.:	F-145579-36-A-0106		
WELL: 36-TW-821			ELEMENT: 36-TE-821		
Material:	316 SS	Type:	Dual 100 ohm Platinum RTD		
Construction:	Tapered	Calibration:	Din 43760(0.00385 ohm/ohm/deg C)		
Dim: Mfg. Std.:	*	Leads:	Hermetically Sealed		
Tip O/D:	1/2" Dia.	Mounting Threads:	1/2" NPT		
Bore I/D:	.260"	Connection:	6 Terminal Ceramic Block		
Internal Thread:	1/2" NPT	Sheath Mat'l:	316L SS		
Process Connection:	1" NPT	Sheath O/D:	1/4"		
Length Overall:	*	Probe Length:	To Suit Well, spring loaded		
"U" Insertion Dim:	4"	Other:	1/2" NPT to Accept Head		
"T" Lagging Extn:	N/A				
HEAD:					
Cover:	Aluminium	Nipple Size:	1/2" NPT C.S.		
Enclosure Rating:	NEMA 4X	Dimension "A":	4" (Nipple/Union/Nipple)		
Material:	Aluminium	Union:	1/2" NPT C.S.		
Termination:	Std. Terminal Block	Conduit Conn.:	1/2" NPT		
FEATURES:					
316SS Tag permanently affixed to RTD Head					
SERVICE CONDITIONS:					
Vessel No.:	36-D74-080	Sensor Offset:	N/A		
Fluid:	Water/Glycol 50/50 mix	Blocking Distance:	N/A		
Fluid pH:	N/A	Level Offset:	N/A		
Temp Oper.:	50°F	Specific Gravity:	1.06		
Temp Max:	115°F	Dielectric:	-		
Press Min:	Atmospheric	Vibration:	N/A		
Press Oper:	Atmospheric	Vessel Material:	N/A		
Press Max:	Atmospheric	Heater:	N/A		
NOTES: 1. All items with an * shall be filled in by the VENDOR					
By: DRJ	Chk: [Signature]	Appd: [Signature]	Date: 08-Mar-05	Project No. 145579	Rev: A

In making requests for transmittal of data by any electronic media, the Company receiving such data agrees that AMEC Americas Limited cannot be held responsible for users of the data outside of or beyond the scope of our original agreement. Also, because data stored in electronic media or transmitted by electronic means can deteriorate undetected or be modified without the consultant's knowledge, the Company receiving data agrees that AMEC Americas Limited cannot be held liable for the compatibility, completeness or correctness of the data.



NOTE:
1. INTERLOCK INFORMATION TO BE UPDATED

REV.	REVISION DESCRIPTION	DATE	BY	CHK'D	APP'D
I	INCORPORATED COMMENTS	06 SEP 05	WB	JL	N/A
H	ISSUED FOR REVISION & BOX REPORT	22 APR 05	AA	BM	FWS
G	ISSUED FOR CH2M HILL APPROVAL & BOX REPORT	11 MAR 05	AA	BM	FWS
F	ISSUED FOR CH2M HILL INFORMATION	00 MAR 05	AA	PCF	FWS
E	ISSUED FOR CH2M HILL REVIEW	31 JAN 05	AA	BM	FWS
D	ISSUED FOR INTERNAL APPROVAL	07 JAN 05	AA	PCF	BM
C	ISSUED FOR APPROVAL	20 AUG 04	KES	CCH	GJ
B	INTERNAL ISSUED FOR INFORMATION DRAWING NUMBER REVISED, WAS F-145579-36-A-0106	23 JUL 04	JEM	CCH	FWS
A	ISSUED FOR TASK 6 REPORT	7 APR 04	ROB	CCH	FWS

amec
145579-FINAL DBVS DESIGN
U.S. DEPARTMENT OF ENERGY
 Office of River Protection
BULK VITRIFICATION
OFF-GAS TREATMENT
CHILLED WATER TREATMENT

DWG NO	TITLE	REF NUMBER	TITLE

TECN 023.000



TECHNICAL ENGINEERING CHANGE NOTICE (TECN)

145579 FINAL DBVS DESIGN

TECN No.: **023.000**

DOCUMENT(S) AFFECTED BY CHANGE

Document No. of affected Docs.	Rev	Title:
145579-V-SP-011	1	Off-Gas Chiller Pump Skid
145579-V-SP-011.1	1	Off-Gas Chiller Pump Skid (Equipment No.: 36-D61-058)
145579-V-SP-011.2	1	Off-Gas Chiller Surge Tank (Equipment No.: 36-D74-080)

Originator: Dan Williamson

Date: March 10, 2005

BASIS OF CHANGE:

Documents were changed to reflect comments in RCR 145579-V-SP-011 (Rev. 0) and Calculation 145579-V-CA-004 (Rev. 1).

DESCRIPTION OF CHANGE:

Piping standard changed from ASME B31.5 "Refrigerated Piping Procedures" to B31.3 "Process Piping".
Pump capacity changed from 150 GPM @ 50ft WC to 120 GPM @ 50 ft WC.

AREA/DISC. LEAD:

A. Howarth

DATE: 10 MAR 05

TRL ENG. MNGR. (JDS/TH):

J. Beim

DATE: 11 Mar 05

AMEC E&E (M. Lucas):

DATE: _____

CLIENT APPROVAL:

DATE: _____

TECN 023.001



TECHNICAL ENGINEERING CHANGE NOTICE (TECN)

145579 FINAL DBVS DESIGN

 TECN No.: **023.001**

DOCUMENT(S) AFFECTED BY CHANGE

Document No. of affected Docs.	Rev	Title:
145579-V-SP-011	1	Off-Gas Chiller Pump Skid

 Originator: Antoaneta Prljincevic

 Date: March 30, 2005

BASIS OF CHANGE:

Documents were changed to reflect comments in approval issued for 145579-V-SP-011 (Rev.1). All references to B31.5 have been changed to B31.3.

DESCRIPTION OF CHANGE:

Section 3.3.1.3 Piping – Line Routing

1. Changed paragraph to read "Elbows and pipe bends shall be manufactured in accordance with ASME 31.3.
4. Replaced "ASME 31.5 (Paragraph 504.2)" with "ASME B31.3."

Section 3.3.1.7 Welding Process

Changed reference to "ASME B31.5" to "ASME B31.3".

Section 3.3.1.14 Welding Process

Changed reference to "ASME B31.5" to "ASME B31.3".

Section 3.3.11.2 Mechanical Calculations

Removed all references to "ASME B31.5" and replaced with "ASME B31.3".

Section 3.3.13.2 Weld Examination

Removed all references to "ASME B31.5" and replaced with "ASME B31.3".

Section 4.3.3 Pressure-Leak Test

Removed all references to "ASME B31.5" and replaced with "ASME B31.3".

AREA/DISC. LEAD:

DATE:

30 MARCH 2005

TRL ENG. MNGR. (JDS/TH):

DATE:

30 March 2005

AMEC E&E (M. Lucas):

DATE:

CLIENT APPROVAL:

DATE:

TECN-V-SP-011.R01.2

TECHNICAL ENGINEERING CHANGE NOTICE (TECN)

145579 FINAL DBVS DESIGN

TECN No.:

V-SP-011.R01.2

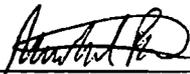
Previous TECN 023.001

DOCUMENT(S) AFFECTED BY CHANGE

Document No. of affected Docs.	Rev	Title:
145579-V-SP-011	1	Off-Gas Chiller Pump Skid
145579-V-DS-011.1	1	Off-Gas Chiller Pump Skid (Equipment No.: 36-D61-058)
145579-V-DS-011.2	1	Off-Gas Chiller Surge Tank (Equipment No.: 36-D74-080)

Originator:

Michael Paul



Date:

April 14, 2005

BASIS OF CHANGE:

- 145579-V-SP-011: Revised instrument data sheets to match F-145579-36-A-0106 and 145579-V-SP-011.
- 145579-V-DS-011.1 & 145579-V-DS-011.2: Revised D&D sheets to match specification.

DESCRIPTION OF CHANGE:

145579-V-SP-011: Revised and moved instrument data sheets from section 8.0 to section 7.0 under "Appendix B". Data sheets were revised to match F-145579-36-A-0105 and 145579-V-SP-011 (see attached pages).

Instrument Data Sheets:

36-FIT-816

- Specific gravity changed to "~1.0".

36-PI-817

- Line/vessel No. changed to "3-WC-36-0244".
- Fluid changed to "water/glycol 50/50 mix".
- Specific gravity changed to "~1.0".
- PIC No. changed to "253".

36-LSH-819

- Specific gravity changed to "~1.0".

36-TE-821

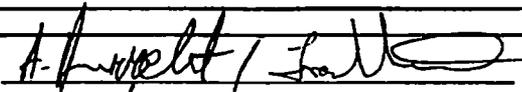
- Specific gravity changed to "~1.0".

36-LSL-820

- Specific gravity changed to "~1.0".

Total attached pages: 10.

AREA/DISC. LEAD:



DATE:

APRIL 14, 2005

TRL ENG. MNGR. (JDS/TH):



DATE:

Apr 14, 2005

AMEC E&E (M. Lucas):

DATE:

CLIENT APPROVAL:

DATE:

TECHNICAL SPECIFICATION
AMEC Americas Limited



PROJECT:	Final DBVS Design	TECN: V-SP-011.R01.2
PROJECT NO.:	145579	OFF-GAS CHILLER PUMP SKID
CLIENT:	AMEC E&E – Richland, WA	

7.0 APPENDICES

Appendix	Description
A	Control of Suspect/ Counterfeit Items (TFC-ESHQ-Q_C-C-03)
<u>B</u>	<u>Instrument Data Sheets</u>
	<u>36-FIT-815 Flow Transmitter (Rev. 1)</u>
	<u>36-LSLL-816 Level Switch – Vibration (Rev. 0)</u>
	<u>36-PI-817 Pump Pressure Indicator (Rev. 0)</u>
	<u>36-LSH-819 Level Switch Vibration (Rev. 0)</u>
	<u>36-LSL-820 Level Switch-Vibration (Rev. 0)</u>
	<u>36-TE-821 Resistance Temperature Detector (Rev. 0)</u>

8.0 ATTACHMENTS

Document No.	Description	Rev.
145579-V-DS-011.1	Off Gas Chiller Pump Skid Technical Data Sheet	1
145579-V-DS-011.2	Off Gas Chiller Surge Tank Technical Data Sheet	1
_____ 36-FIT-815	_____ Flow Transmitter Instrument Data Sheet	_____
_____ 36-LSLL-816	_____ Level Switch – Vibration Instrument Data Sheet	_____
_____ 36-PI-817	_____ Pump Pressure Indicator Instrument Data Sheet	_____
_____ 36-LSH-819	_____ Level Switch Vibration Instrument Data Sheet	_____
_____ 36-LSL-820	_____ Level Switch Vibration Instrument Data Sheet	_____
_____ 36-TE-821	_____ Resistance Temperature Detector Instrumentation Data Sheet	_____
F-145579-36-A-0106	Bulk Vitrification Off-Gas Treatment Chilled Water Treatment	F

TECHNICAL SPECIFICATION
AMEC Americas Limited



PROJECT:	Final DBVS Design	TECN: V-SP-011.R01.2
PROJECT NO.:	145579	APPENDIX B INSTRUMENT DATA SHEETS
CLIENT:	AMEC E&E – Richland, WA	

**APPENDIX B
INSTRUMENT DATA SHEETS**

DOCUMENT NO.	TITLE	REV. NO.	NO. OF PAGES
36-FIT-815	Flow Transmitter	1	1
36-LSLL-816	Level Switch – Vibration	0	1
36-PI-817	Pump Pressure Indicator	0	1
36-LSH-819	Level Switch Vibration	0	1
36-LSL-820	Level Switch Vibration	0	1
36-TE-821	Resistance Temperature Detector	0	1

		AMEC E&C Services Limited Trail, BC Canada		Instrumentation Data Sheet	
TAG NUMBER: 36-FIT-815					
SUBJECT: FLOW TRANSMITTER					
SERVICE: Off-Gas Chiller Return Water Flow					
SUPPLIER: *		PIC No.: 253			
MAKE: *		P.O. No.:			
Flow Tube: *		P&ID No.: F-145579-36-A-0106			
Transmitter: *					
TRANSMITTER:					
Range: *		Power Supply: 24 V DC			
Calibration: 0-300 USGPM		Output: 4-20 mA			
Enclosure Class: NEMA 4X		Conduit Connect: 1/2" NPT			
Type: *		Location Indication: Yes (LCD Display)			
		Mounting Bracket: 2" Pipe Bracket			
Certification: UL		Signal Cable Length: *			
FLOW TUBE:					
Line/Size/Schedule: 4" 150# RF Flange		Connection Type: RF Flange			
Line Material: Carbon Steel		F-F Dimension: *			
Enclosure Class: NEMA 4					
OPTIONS:					
Quantity:					
Material:					
316SS Tag permanently affixed to instrument					
SERVICE CONDITIONS:					
Line/Vessel No.: 3-WC-36-0314		pH: N/A			
Fluid: Water/Glycol 50/50 mix		S.G.: -1.0			
Flow Oper.: 0-150 USGPM		Acidity: N/A			
Flow Max.: -		Percent Solids: N/A			
Temp Min.: 40°F		% Solids Max.: N/A			
Temp Max.: 115°F		Material Build-Up: N/A			
Press Oper.: 28 psia		Vibration: Minimal			
Press Max.: -		Min. Conductivity: N/A			
NOTES: 1. All items with an * shall be filled in by the VENDOR					
By: DRJ		Chk: MAP		Date: 13-Apr-05	
Appd. [Signature]		Project No.: 145579		Rev: 1	

		AMEC E&C Services Limited Trail, BC Canada	Instrumentation Data Sheet		
TAG NUMBER: 36-LSLL-816					
SUBJECT:		LEVEL SWITCH - VIBRATION			
SERVICE:		Off-Gas Chiller Surge Tank Low Level Pump Shutdown Switch			
SUPPLIER:		* _____	P.I.C. No.:	253	
MAKE:		VEGASWING 60 or Equivalent		P.O. No.:	
MODEL:		* _____	P&ID No.:	F-145579-36-A-0106	
SWITCH					
Type:	Vibrating Fork	Power Supply:	24 Vdc		
Range:	*	Output:	8mA free 16mA Covered		
Calibration:	*	Conduit Connect:	½" FNPT		
Enclosure Material:	*	Local Indication:	N/A		
Enclosure Class:	NEMA 4X	Mounting Bracket:	N/A		
Certification:	UL	I/O Isolation:	N/A		
Sensor					
Service Type:	Tank Low Level Switch	Process Connection:	N/A		
Element Type:	Vibrating Fork	Chemical Seal Type:	N/A		
Element Material:	*	Model No.:	61		
Wetted Parts Material:	*	Extension Length:	N/A		
Body Rating:	*	Armour:	N/A		
Process Connection:	¾" NPT	Flushing Connection:	N/A		
Insertion Length:	Standard	Valve Isolation:	N/A		
316SS Tag permanently affixed to instrument					
SERVICE CONDITIONS:					
Vessel No.:	36-D74-080	Sensor Offset:	N/A		
Fluid:	Water/Glycol 50/50 mix	Blocking Distance:	N/A		
Fluid pH:	N/A	Level Offset:	N/A		
Temp Oper.:	50°F	Specific Gravity:	~1.0		
Temp Max:	115°F	Dielectric:	-		
Press Min:	Atmospheric	Vibration:	N/A		
Press Oper:	Atmospheric	Vessel Material:	N/A		
Press Max:	Atmospheric	Heater:	N/A		
NOTES: 1. All items with an * shall be filled in by the VENDOR					
By: DRJ	Chk: MGP	Appd. [Signature]	Date: 13-Apr-05	Project: 145579	Rev: 0

		AMEC E&C Services Limited Trail, BC Canada		Instrumentation Data Sheet	
TAG NUMBER: 36-PI-817					
SUBJECT:		PRESSURE GAUGE			
SERVICE:		Off-Gas Chiller Pump Pressure			
SUPPLIER:		PIC No.:		253	
MAKE:		P.O. No.:			
MODEL:		P&ID No.:		F-145579-36-A-0106	
GENERAL					
Type:	Liquid Filled				
Housing:	IEC IP66				
Case:	PHENOLIC BLACK				
Size:	100 mm				
Connection:	1/2 " NPT at bottom				
Range:	*				
Bourdon:	316L Stainless Steel				
Siphon:	N/R				
Accuracy:	+/- 0.5% full scale				
CHEMICAL SEAL		-Not Required			
Size:					
Type:					
Material Wetted Parts:					
Connection (bottom, back):					
316SS Tag permanently affixed to instrument					
SERVICE CONDITIONS:					
Line/Vessel No.:	3-WC-36-0244	Max. Velocity:	N/A		
Fluid:	Water/Glycol 50/50 Mix	Spec. Gravity:	~1.0		
Flow Oper.:	N/A	pH:	N/A		
Flow Max.:	N/A	Percent Solids:	N/A		
Temp Oper.:	40°F	Viscosity:	N/A		
Temp Max.:	115°F	Material Build-Up:	N/A		
Press Oper.:	*	Vibration:	Minimal		
Press Max.:	*				
NOTES. 1. All items with an * shall be filled in by the VENDOR.					
By: DRJ	Chk: <i>MMA</i>	Appd. <i>HTJ</i>	Date: 13-Apr-05	Project No.: 145579	Rev: 0

		AMEC E&C Services Limited Trail, BC Canada		Instrumentation Data Sheet	
TAG NUMBER: 36-LSH-819					
SUBJECT:		LEVEL SWITCH - VIBRATION			
SERVICE:		Off-Gas Chiller Expansion Tank High Level Switch			
SUPPLIER:		* _____		P.I.C. No.: <u>253</u>	
MAKE:		VEGASWING 60 or Equivalent		P.O. No.: _____	
MODEL:		* _____		P&ID No.: <u>F-145579-36-A-0106</u>	
SWITCH					
Type:		Vibrating Fork		Power Supply: <u>24 Vdc</u>	
Range:		* _____		Output: <u>8mA free 16mA Covered</u>	
Calibration:		* _____		Conduit Connect: <u>½" FNPT</u>	
Enclosure Material:		* _____		Local Indication: <u>N/A</u>	
Enclosure Class:		NEMA 4X		Mounting Bracket: <u>N/A</u>	
Certification:		UL		I/O Isolation: <u>N/A</u>	
Sensor					
Service Type:		Tank High Level Switch		Process Connection: <u>N/A</u>	
Element Type:		Vibrating Fork		Chemical Seal Type: <u>N/A</u>	
Element Material:		* _____		Model No.: <u>61</u>	
Wetted Parts Material:		* _____		Extension Length: <u>N/A</u>	
Body Rating:		* _____		Armour: <u>N/A</u>	
Process Connection:		¾" NPT		Flushing Connection: <u>N/A</u>	
Insertion Length:		Standard		Valve Isolation: <u>N/A</u>	
316SS Tag permanently affixed to instrument					
SERVICE CONDITIONS:					
Vessel No.:		36-D74-060		Sensor Offset: <u>N/A</u>	
Fluid:		Water/Glycol 50/50 mix		Blocking Distance: <u>N/A</u>	
Fluid pH:		N/A		Level Offset: <u>N/A</u>	
Temp Oper.:		50°F		Specific Gravity: <u>~1.0</u>	
Temp Max:		115°F		Dielectric: <u>-</u>	
Press Min:		Atmospheric		Vibration: <u>N/A</u>	
Press Oper:		Atmospheric		Vessel Material: <u>N/A</u>	
Press Max:		Atmospheric		Heater: <u>N/A</u>	
NOTES: 1. All items with an * shall be filled in by the VENDOR					
By: DRJ 		Chk: 		Appd. 	
Date: 13-Apr-05		Project: 145579		Rev: 0	

		AMEC E&C Services Limited Trail, BC Canada	Instrumentation Data Sheet		
TAG NUMBER: 36-TE-821					
SUBJECT: RESISTANCE TEMPERATURE DETECTOR (RTD) - 100 OHM PLATINUM and WELL					
SERVICE: Off-Gas Chiller Surge Tank Temperature					
SUPPLIER: *		PIC No.:		253	
MAKE: *		P.O. No.:			
MODEL: *		P&ID No.:		F-145579-36-A-0106	
WELL: 36-TW-821			ELEMENT: 36-TE-821		
Material:		316 SS		Type: Dual 100 ohm Platinum RTD	
Construction:		Tapered		Calibration: Din 43760(0.00385 ohm/ohm/deg C)	
Dim: Mfg. Std.:		*		Leads: Hermetically Sealed	
Tip O/D:		1/2" Dia.		Mounting Threads: 1/2" NPT	
Bore I/D:		.260"		Connection: 6 Terminal Ceramic Block	
Internal Thread:		1/2" NPT		Sheath Mat'l: 316L SS	
Process Connection:		1" NPT		Sheath O/D: 1/4"	
Length Overall:		*		Probe Length: To Suit Well, spring loaded	
"U" Insertion Dim:		4"		Other: 1/2" NPT to Accept Head	
"T" Lagging Extn:		N/A			
HEAD:					
Cover:		Aluminium		Nipple Size: 1/2" NPT C.S.	
Enclosure Rating:		NEMA 4X		Dimension "A": 4" (Nipple/Union/Nipple)	
Material:		Aluminium		Union: 1/2" NPT C.S.	
Termination:		Std. Terminal Block		Conduit Conn.: 1/2" NPT	
FEATURES:					
316SS Tag permanently affixed to RTD Head					
SERVICE CONDITIONS:					
Vessel No.:		36-D74-080		Sensor Offset: N/A	
Fluid:		Water/Glycol 50/50 mix		Blocking Distance: N/A	
Fluid pH:		N/A		Level Offset: N/A	
Temp Oper.:		50°F		Specific Gravity: ~1.0	
Temp Max:		115°F		Dielectric: -	
Press Min:		Atmospheric		Vibration: N/A	
Press Oper:		Atmospheric		Vessel Material: N/A	
Press Max:		Atmospheric		Heater: N/A	
NOTES: 1. All items with an * shall be filled in by the VENDOR					
By: DRJ		Chk: <i>MSR</i>		Appd. <i>RSW</i>	
Date: 13-Apr-05		Project No. 145579		Rev: 0	



TECHNICAL DATA SHEETS

PROJECT:	Final DBVS Design	TECN: V-SP-011.R01.2 (V-DS-011.1)
PROJECT NO.:	145579	OFF GAS CHILLER PUMP SKID
CLIENT:	AMEC E&E - Richland, Washington	EQ. NO.: 36-D61-058

BIDDERS 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, revisions numbers, quantities, status and document types must be included with all submissions (including electronic submittals).

SEND ALL DOCUMENTS TO:				AMEC Americas Limited	
Submit all documents via courier service				1385 Cedar Avenue	
Faxed documents must be followed by the originals.				Trail, BC, Canada	
Electronic E-mail or FTP transmissions of drawings & data must be copied to Document Control				V1R 4C3	
Always include a transmittal				Attn: Document Control	
				Phone: (250) 368-2400	
				Fax: (250) 368-2401	
BIDDERS MUST PROVIDE ESTIMATED LEAD TIMES FOR APPROVAL DRAWINGS					
Proposal	Bidder shall include this data for each item			REVIEW ITEMS DUE WITHIN	VENDOR COMMITMENT (SEE NOTE 4)
	Review	Required before ordering or start of fabrication			
		Final	Required within 7 days prior to shipment and before final payment	(DAYS)	(DAYS)
PROPOSAL	REVIEW	FINAL	DESCRIPTION		
1			Experience list and maintainability information	Bid	
E+3	E+3		Design, fabrication, inspection, testing & delivery schedule	PO+7	
E+3	E+3	E+6	Outline drawings and layout drawings indicating weights and dimensions	PO+10	
E+3	E+3	E+6	Technical brochures on purchased components	PO+14	
	E+3	E+6	Calculations	PO+21	
	E+1	E+6	Spare parts and special tools list	Del-14	
	E+1	E+6	Set of installation and maintenance manuals c/w technical literature for all equipment and devices	Del-14	
		6	NEC inspection certificate & electromagnetic interference test results	Del-7	
		6	U/L and motor lists	Del-7	
		6	Site commissioning record & test results	COM+14	
	E+1	E+1	NDE personnel certification	PO+7	
	E+1	E+1	Visual weld/NDE procedures	PO+7	
	E+3	E+1	Welding procedures, weld map, procedure qualification records and welder qualification records.	PO+7	
	E+3	E+1	AWS CWI certificate	PO+7	
	E+3	E+1	Shipping and packaging plan	PO+7	
	E+3	E+6	Electrical schematic drawings and wiring diagrams	PO+21	
	E+3	E+1	Factory acceptance test plan	PO+7	
	E+3	E+1	NCR's	When Identified +3	
	E+3	E+1	CoC's / CMTR's	Del-10	
	E+3	E+1	As built drawings	Del-10	
	E+3	6	Certificate of calibration	Del-7	
Legend: E = Electronic Copy; PO +/- = Due within +/- calendar days of P.O. Issuance; Del +/- = Due within +/- calendar days of delivery; COM +/- = Due within +/- calendar days of commissioning.					

**THE TIMELY RECEIPT OF THE VENDOR DOCUMENTS IS CRITICAL TO THIS PROJECT
BUYER COMMITS TO A 10 WORKING DAY TURNAROUND ON REVIEW ITEMS**

I agree to provide the listed documentation and data and the dates shown above.	
_____	_____
Vendor Signature	Date



TECHNICAL DATA SHEETS

PROJECT:	Final DBVS Design	TECN: V-SP-011.R01.2 (V-DS-011.2)
PROJECT NO.:	145579	OFF GAS CHILLER SURGE TANK
CLIENT:	AMEC E&E - Richland, Washington	EQ NO.: 36-D74-080

BIDDERS 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, revisions numbers, quantities, status and document types must be included with all submissions (including electronic submittals).

SEND ALL DOCUMENTS TO:				AMEC Americas Limited	
Submit all documents via courier service				1385 Cedar Avenue	
Faxed documents must be followed by the originals.				Trail, BC, Canada	
Electronic E-mail or FTP transmissions of drawings & data must be copied to Document Control				V1R 4C3	
Always include a transmittal				Attn: Document Control	
				Phone: (250) 368-2400	
				Fax: (250) 368-2401	
BIDDERS MUST PROVIDE ESTIMATED LEAD TIMES FOR APPROVAL DRAWINGS					
Proposal	Bidder shall include this data for each item			REVIEW ITEMS DUE WITHIN	VENDOR COMMITMENT (SEE NOTE 4)
	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)
1			Experience list and maintainability information	Bid	
E+3	E+3		Design, fabrication, inspection, testing & delivery schedule	PO+7	
E+3	E+3	E+6	Outline drawings and layout drawings indicating weights and dimensions	PO+10	
E+3	E+3	E+6	Technical brochures on purchased components	PO+14	
	E+3	E+6	Calculations	PO+21	
	E+1	E+6	Spare parts and special tools list	Del-14	
	E+1	E+6	Set of installation and maintenance manuals c/w technical literature for all equipment and devices	Del-14	
		6	NEC inspection certificate & electromagnetic interference	Del-7	
		6	U/L and motor lists	Del-7	
		6	Site commissioning record & test results	COM+14	
	E+1	E+1	NDE personnel certification	PO+7	
	E+1	E+1	Visual weld/NDE procedures	PO+7	
	E+3	E+1	Welding procedures, weld map, procedure qualification	PO+7	
	E+3	E+1	AWS CWI certificate	PO+7	
	E+3	E+1	Shipping and packaging plan	PO+7	
	E+3	E+6	Electrical schematic drawings and wiring diagrams	PO+21	
	E+3	E+1	Factory acceptance test plan	PO+7	
	E+3	E+1	NCR's	When identified +3	
	E+3	E+1	CoC's / CMTR's	Del-10	
	E+3	E+1	As built drawings	Del-10	
	E+3	6	Certificate of calibration	Del-7	
<small>Legend E = Electronic Copy; PO +/- = Due within +/- calendar days of P.O. issuance; Del +/- = Due within +/- calendar days of delivery; COM +/- = Due within +/- calendar days of commissioning.</small>					

**THE TIMELY RECEIPT OF THE VENDOR DOCUMENTS IS CRITICAL TO THIS PROJECT
BUYER COMMITS TO A 10 WORKING DAY TURNAROUND ON REVIEW ITEMS**

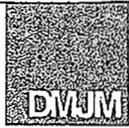
I agree to provide the listed documentation and data and the dates shown above.

Vendor Signature

Date

145579-011-CN-005

		<h2 style="margin: 0;">CHANGE NOTICE</h2>				CN No. 145579-011-CN-005					
		Page 1 of 2									
Change Notice (CN) Category (Check One) Supplemental <input checked="" type="checkbox"/> Direct Revision <input type="checkbox"/> Cancel <input type="checkbox"/> Quality Program Procedure Change <input type="checkbox"/>		Originator's Name and Signature Kevin M. Jones <i>Kevin M. Jones</i>				Date 01/03/2006					
Affects Cost? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>		Project Title/ Project No. Demonstration Bulk Vitrification System / 145579		Design Verification Required (Independent Review) Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>		Safety Class (If Rq'd) N/A					
Affects Schedule? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>		Primary Document Changed by this CN (Include sheet no. and rev) Off-Gas Chiller Pump Skid Specification 145579-V-SP-011, Rev. 1		Affected Documents Superseded Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>		Contract No.					
Other Documents Affected by this CN: Technical Data Sheet 145579-V-DS-011.2, Rev. 1											
Reason for Change: The subject specification for the off-gas chiller pump skid and the related technical data sheet, 145579-V-DS-011.2, are not in agreement concerning the requirements for the overflow drum. Per the response to MCE-RFI-5562-003, a change notice is required.											
Detailed Description of Change (Use Continuation Sheet as Applicable): 145579-V-SP-011: Section 3.3.1.1.2: Revise paragraph to read, "The overflow drum characteristics can be found in Technical Data Sheet 145579-V-DS-011.2." Section 3.3.1.5: Change reference in last sentence of second paragraph from 3.3.1 to 3.3.11. Section 3.3.1.6: Revise second sentence to read, "See Section 3.3.11.1.7 for skid anchorage requirements." Section 3.3.11.1.8: Revise first sentence to read, "...AISC Manual of Steel Construction – Allowable Stress Design or Manual of Steel Construction – Load and Resistance Factor Design."											
Review/Approval Authorities: A = Approval, R = Review, I = Information (Check where applicable for change notice)											
Printed Name/Signature		Date	R	A	I	Printed Name/Signature		Date	R	A	I
Project Manager: Jim Frederickson <i>Jim Frederickson</i>		1/4/06	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Independent Review* NA			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Program Director: NA			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	AMEC E&E PM or designee <i>JEFF JEFFERS</i>		1/4/06	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Engineering Manager: Ja-Kael Luey <i>Ja-Kael Luey</i>		1/5/06	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	AMEC E&E QA or designee <i>HANK CHASTIN</i>		01/04/06	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Quality Assurance: <i>Mena B. Marshall</i>		1/4/06	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	CH2M HILL Environmental or designee			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other:			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	CH2M HILL PM or designee <i>[Signature]</i>		1/4/06	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
* Design Verification per EP 3.9 required? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Assign Independent Reviewer											
CN Incorporated? PM or designee sign and date: _____											



DMJM technology

CONTINUATION SHEET CHANGE NOTICE

CN No. 145579-011-CN-005

Page 2 of 2

Detailed Description of Change (Continuation Sheet):

145579-V-DS-011.2:

Revise the Section titled, "30 Gal Surge Tank Overflow Barrel" as follows:

Manufacturer – from Lab Safety Supply to *

Height – from 28 ½ to *

Diameter – from 22 to *

Drain Port – from 1" flanged to Not required

Note: As indicated on the technical data sheet, items marked with a * are to be filled in by the vendor.