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ATTACHMENT C – CHECKLIST FOR EQUIVALENT SAFETY TECHNICAL EVALUATION..... 18
1.0 PURPOSE AND SCOPE

This standard provides requirements for designs, procurement specifications, and installations in locations with potentially ignitable concentrations of flammable gas at the facilities under the control of the Tank Operations Contract (TOC).

This procedure implements National Fire Protection Association NFPA-70, National Electrical Code (NEC) in conjunction with 29 CFR 1910, “Occupational Safety and Health Act,” and other applicable industry standards. This procedure also specifies requirements for documenting equipment characteristics and proving evidence of compliance in Design documentation and in SmartPlant Foundation, as verification of ignition controls, which is required by the following Technical Safety Requirements (TSR).

From HNF-SD-WM-TSR-006, Tank Farm TSRs:

- AC 5.8.2, “Flammable Gas Controls.”
- AC 5.9.2, “Ignition Controls.”

From HNF-15279, Evaporator TSRs:

- AC 5.9.2, “Ignition Controls.”

Ignition control requirements shall be established consistent with applicable codes and standards, including National Fire Protection Association (NFPA) requirements. The Tank Operations Contractor (TOC) Chief Engineer, or delegate, shall be the approval authority for equivalency to the established ignition control requirements.

This standard does not provide requirements for work activities conducted in locations subject to Ignition Controls. Manned work activities to install equipment in the classified location must comply with TFC-ENG-FACSUP-P-17 and TFC-ENG-STD-13.

2.0 IMPLEMENTATION

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

Designs and equipment to be installed/constructed after the release date of Revision B of this standard shall both be verified compliant with this standard as required in section 3.4 of this standard, including Smartplant Foundation (SPF) data entry for equipment in classified locations.

Some applicable equivalent safety Technical Evaluations listed in Attachment A, Table 4, may require additional Technical Evaluation to document equipment test results for new installations of equipment currently existing in spare parts or pre-fabricated assemblies. For example, RPP-TE-58349, “Ball Valves,” and RPP-TE-58359, “Butterfly Valves,” are both approved conditionally based on anti-static features identified by the manufacturer, and otherwise require resistance testing to be documented before or during installation.
The following Technical Evaluations verify that equipment installed prior to Revision A1 of this standard, either complies with:

- This standard, or

- FGEAB evaluations and listings in TFC-ENG-STD-13 that were applicable at the time of the equipment installation (and shall not apply to equipment installations after the release date of Revision A1 of this standard):

  - RPP-TE-58334 – “Comprehensive Review of NFPA Classified Tank Farm Locations for Ignition Source Control Compliance.” In addition to referencing Technical Evaluations and FGEAB reports as listed in TFC-ENG-STD-13 and TFC-ENG-STD-45, RPP-TE-58334 also approves equivalent safety for:
    - Buckling Pin Relief Valve
    - Fisher DOV
    - Shield Plug, Core Sampling
    - Sludge Weight
    - Manual Tape
    - Durabla check valve
    - Dresser industries 1910-30HC-1-S4-MS-31-RF-LA Pressure Relief Valve

  - RPP-TE-58333 – “Comprehensive Evaluation of 242-A Equipment to determine Ignition Controls Applicability.” In addition to referencing Technical Evaluations and FGEAB reports as listed in TFC-ENG-STD-13 and TFC-ENG-STD-45, this document also approves equivalent safety for:
    - Transfer Pump P-B-2.

  - RPP-TE-58344 – “Comprehensive Review of SST, DCRTs and IMUST Tanks for Ignition Source Control Compliance”

  - RPP-TE-58368 – “Ignition Source Control Equivalent Safety for VTP Exhaust Equipment Installed on Waste Group A Tanks.”

- Legacy equipment identified in the above Technical Evaluations will not be initially identified in SPF at the release date of Revision B of this standard but is anticipated to be entered into SPF by December 31, 2017.

### 3.0 STANDARD

#### 3.1 General

Hazardous Area Classification (HAC) evaluation reports shall be consistent with NFPA 497, “Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas.”

The hazard classification system typically used is the traditional NFPA ‘Division’ system. NFPA also permits ‘Zone’ classifications based on European standards, providing the two different classifications never overlap in time, and do not touch in space. Generally, project designs would
more easily conform to Division classification, than Zone classification, due to the difference in North American and European marketing, product testing agencies, and equipment certifications.

For electrical systems, Division-based classification is preferred over Zone classification, unless clearly advantageous to operations, maintenance, and configuration control.

For non-electrical equipment, Zone-based classification does not interfere with NFPA electrical requirements. Zone classification for non-electrical equipment can be implemented via crosswalk to Division classification, and is required as the only option offering market resources that include product testing agencies and equipment certifications.

3.2 Documentation of NFPA Classified Flammable Gas Hazards

The physical extent and boundaries of flammable gas hazard locations shall be identified in detail and documented in compliance with National Fire Protection Association (NFPA) NFPA 70, National Electrical Code (NEC) Article 500.4A, Documentation, quoted as follows:

“All areas designated as hazardous (classified) locations shall be properly documented. This documentation shall be available to those authorized to design, install, inspect, maintain, or operate electrical equipment at the location.”

“Available” means readily apparent on plan drawings and detail drawings that may be used for conceptual or final design verification, installation, inspection, operations, or maintenance activities. Further details are provided below.

3.2.1 Hazardous Area Classification Evaluation Report

The Hazardous Area Classification (HAC) report documents the engineering evaluation and basis for the locations that are classified, or unclassified in some cases.

HAC evaluation reports exist for the Tank Farms and 242-A Evaporator facilities as identified below and shall be modified when appropriate for facility modifications.

- HNF-SD-WM-HC-017, “NFPA Flammable Vapor and Gas Hazard Classification for the Tank Farms.”
- RPP-RPT-58290, “NFPA Flammable Vapor and Gas Hazard Classification for the 242-A Evaporator.”

Where a facility is not included in an existing HAC report, e.g. HNF-SD-WM-HC-017 or RPP-RPT-58290, a new HAC evaluation report shall be developed for the facility.

Where the result of a facility modification is that the full scope of the HAC is not accurately depicted in an existing HAC report, the HAC report shall be revised.

Where the full scope of a facility modification is accurately depicted in an existing HAC report, no revision of the HAC report shall be required.

Illustrations in HAC reports may include flow diagrams or P&IDs to identify sections of a process system that must be included and further detailed in HAC drawings.

The following Tables 1 and 2 are summaries of existing HAC evaluation reports. The HAC reports must be consulted for full details of the basis for the classifications.
**Table 1. Summary HAC, Tank Farms.**

<table>
<thead>
<tr>
<th>Location</th>
<th>NFPA 497 Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active Waste Transfer Systems Primary Piping and Hoses</td>
<td>Class I, Division 1, Group B</td>
</tr>
<tr>
<td>SNL-5350 and SNL-5351 Primary Piping associated with the 222-S laboratory</td>
<td>Unclassified</td>
</tr>
<tr>
<td>Water piping outside of the double isolation valves where flushing ports may be attached to water supplies for flushing operations</td>
<td>Unclassified</td>
</tr>
<tr>
<td>Encasements of fiberglass or other non-metallic material, with primary pipes also constructed on non-metallic material, e.g., SNL-5350, SNL-5351, PC-5000, and Hose in Hose Transfer Lines</td>
<td>Unclassified</td>
</tr>
<tr>
<td>Encasements of Waste Transfer Lines and any associated cleanout boxes, where encasements are configured to vent to the associated pit, except SL-167 and 168 in the 241-AW Tank Farm</td>
<td>Unclassified</td>
</tr>
<tr>
<td>Unvented waste transfer line encasements and their cleanout boxes, including encasements where the encasement drain valve is not maintained in the drain position.</td>
<td>Class I, Division 1, Group B</td>
</tr>
<tr>
<td>Encasements of Waste Transfer Lines SL-167 and 168 in 241-AW Tank Farm &gt;21’ from vent or where the drain valve is not maintained in the drain position.</td>
<td>Class I, Division 1, Group B</td>
</tr>
<tr>
<td>Encasements of Waste Transfer Lines SL-167 and 168 ≤21’ from vent (e.g. the waste transfer structure opening) when the drain valve is in the drain position (see definition of drain position)</td>
<td>Unclassified</td>
</tr>
<tr>
<td>Waste Transfer Pits and Structures</td>
<td>Unclassified</td>
</tr>
<tr>
<td>DST Leak Detection Pits – Not Containing Tank Waste</td>
<td>Unclassified</td>
</tr>
<tr>
<td>DSTs (Tank Headspace)</td>
<td>Unclassified</td>
</tr>
<tr>
<td>Headspace and within three feet of Waste Group A Double Shell Tanks Headspace and their Ventilation Ducting up to the Suction Side Mixing Point</td>
<td>Class I, Division 2, Group B</td>
</tr>
<tr>
<td>SSTs (Tank Headspace)</td>
<td>Unclassified</td>
</tr>
<tr>
<td>DCRTs (Tank Headspace)</td>
<td>Unclassified</td>
</tr>
<tr>
<td>DST Annuli including those of Waste Group A tanks – Not Containing Tank Waste</td>
<td>Unclassified</td>
</tr>
<tr>
<td>Other Gas-trapping Systems and Equipment</td>
<td>Class I, Division 1, Group B</td>
</tr>
<tr>
<td>1. Inactive Tanks, Vaults, and Waste Transfer Systems, except encasements of waste transfer lines which are separately classified.</td>
<td>Class I, Division 1, Group B</td>
</tr>
</tbody>
</table>
### Table 2. Summary HAC, 242-A Evaporator.

<table>
<thead>
<tr>
<th>Location</th>
<th>NFPA 497 Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Evaporator vessel C-A-1</td>
<td>unclassified</td>
</tr>
<tr>
<td>3. C-A-1 Bottom Dump</td>
<td>unclassified</td>
</tr>
<tr>
<td>4. 242-A Slurry Sample Cabinet</td>
<td>unclassified</td>
</tr>
<tr>
<td>5. Waste feed transfer path from AW-102 to V-107</td>
<td>unclassified</td>
</tr>
<tr>
<td>6. Waste transfer feed path from V-107 in the AW-02E pump pit to valve HV-CA1-1 in the 242-A Pump Room (B), including associated transfer line SN-269</td>
<td>Class I, Division 1, Group B</td>
</tr>
<tr>
<td>Adjacent space external to feed, slurry and drain piping</td>
<td>unclassified</td>
</tr>
<tr>
<td>3/4”SL-131-M9 between SAMP-F-2 and HV-F2-6</td>
<td>Class I, Division 2, Group B</td>
</tr>
<tr>
<td>Wetted interior of sections of slurry piping that can be isolated from the outlet of HV-CA1-2A to valve V-214 in the AW-B pit.</td>
<td>Class I, Division 1, Group B</td>
</tr>
</tbody>
</table>

#### 3.2.2 Hazardous Area Classification Drawings

These drawings are the medium of communicating to installers and inspectors the extent and boundaries of the classified location, to support installation and inspection as well as design, operations and maintenance.

HAC drawings do not exist for all locations identified in HNF-SD-WM-HC-017 or RPP-RPT-58290.

When a project or facility modification creates a new HAC report or adds a new location to an existing HAC report, dedicated HAC drawings clearly identifying the boundaries of the classified location shall be developed.

When the full scope of a facility modification is accurately reflected in an existing HAC report, HAC drawings shall be any combination of the following:

- Dedicated HAC drawings
- Illustrations added directly to electrical or mechanical drawings or ECNs.

PI&Ds and Flow Diagrams shall not be used as HAC drawing media. HAC drawing media shall include sufficient detail of physical layout of process system to identify a classified area/region and its boundaries. Area/region details may be ‘typical of’ where geometry of the system, such as a lengthy run of pipe, makes complete coverage both impracticable and excessive, providing that all details relevant to the HAC are illustrated, such as piping penetrations or sections involving instrumentation, valves, and interfaces with other relevant systems, equipment, or structures. See Figure 1, Example HAC Drawing Detail.
Identification of classified region/area and its boundaries shall follow the illustration conventions appearing in NFPA 497 example illustrations of HAC regions/areas.

The full classification details shall be identified for each region/area, e.g. Class I, Division 2, Group B, Hydrogen. A reference to the HAC report shall be included on each HAC drawing.

HAC drawings shall be designated “Support” or “Essential”.

3.2.3 Electrical and Mechanical Plans and Details

References shall be included to any separate HAC drawings from effected electrical and mechanical drawings or ECNs.

Electrical and Mechanical Plans and Details depicting installations in HAC locations shall be designated “Support” or ‘Essential.’

3.3 Design Requirements

3.3.1 General Design Requirements

The specific classification for the location/s that are part of a project or modification shall be clearly identified in the design requirements documentation, such as Modification Traveler or Specification e.g. “Equipment to be installed in tank 241-SY-103 shall be designed to satisfy Class I, Division 2, Group B.”
3.3.2 Electrical Design Requirements

3.3.2.1 Background

As stated in earlier sections of this standard, the governing code for electrical design is National Fire Protection Association NFPA-70, National Electrical Code (NEC). Specific requirements for design for installations in potentially flammable atmospheres are contained in NEC Article 500, “Hazardous (Classified) Locations.”

NEC permits a number of options for design methods to provide ignition controls. These are each listed in Article 500.7, “Protection Techniques.” Each invokes a variety of other code requirements to be met, depending on physical attributes of the location and environment, the characteristics of the electrical system involved, and numerous other options for that protection technique. Selection from among these acceptable protection techniques, generally involves compromises in complexity and cost of design, installation, maintenance and operation. To assure that the design methodology is amenable to configuration control without reverse engineering, the Protection Technique shall be overtly identified in the technical baseline as indicated below.

3.3.2.2 Requirements

Electrical design and installation shall comply with NEC Article 500, “Hazardous (Classified) Locations,” and corresponding NFPA/OSHA recognized equipment safety testing laboratories.

The applicable protection techniques from NEC Article 500.7, as listed below, shall be identified in procurement documents and on electrical plans or details for each instance of electrical equipment or wiring in a classified location:

A. Explosion Proof Equipment
B. Dust Ignitionproof (Not applicable to gas or vapor, Class I)
C. Dusttight (Not applicable to gas or vapor, Class I)
D. Purged and Pressurized
E. Intrinsic Safety
F. Nonincendive Circuit
G. Nonincendive Equipment
H. Nonincendive Component
I. Oil Immersion
J. Hermetically Sealed
K. Combustible Gas Detection System
L. Other Protection Techniques

Design verification shall include identification of protection techniques for all facility modifications where electrical equipment is installed in a classified location. Facility modifications that use a Design Requirements Compliance Matrix shall include identification and verification of protection techniques in the Matrix.

Installation details (e.g. conduit seals, wiring separation) shall be clearly identified on drawings in sufficient level of detail to verify compliance with all NEC requirements for the applicable protection methods.

Equipment carrying a standard label of a National Recognized Testing Laboratory (NRTL) is approved without a separate Technical Evaluation, if it meets the following label standards.
(Manned work activity to install the equipment in the classified location must comply with TFC-ENG-FACSUP-P-17 and TFC-ENG-STD-13):

<table>
<thead>
<tr>
<th>NRTL Label</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Class I, Division 1, Group B; T2,3,4,5, 6, or no temperature marking</td>
<td></td>
</tr>
<tr>
<td>Class I, Division 2, Group B; T2,3,4,5, 6, or no temperature marking</td>
<td></td>
</tr>
</tbody>
</table>

Electrical and electrical-mechanical equipment requires the NRTL label. An ATEX label is insufficient for electrical or electrical-mechanical equipment.

Deviation from NEC Article 500 compliance, equivalent safety, shall require preparation of a Technical Evaluation prepared in accordance with Section 3.5 and approved by both the NFPA 70 Authority Having Jurisdiction and Nuclear Safety Engineering, in advance of any procurement activity.

### 3.3.3 Non-Electrical Design Requirements

#### 3.3.3.1 Background

There is no comprehensive North-American standard for ignition controls for non-electrical equipment in potentially flammable atmospheres. However, American manufacturers often market equipment conforming to equivalent European standards that are approved by NFPA as consistent with the system of hazard classifications and controls originating in NFPA 70, National Electrical Code (NEC). These European standards approved by NFPA include the International Electrotechnical Commission (IEC) system of hazard classification for potentially flammable atmospheres and requirements for controls, as well as electrical equipment that conforms to associated IEC equipment standards.

NEC does not address non-electrical equipment. However, European standards have recently been developed for non-electrical equipment in explosive atmospheres (ATEX), and do conform to the same IEC classifications and requirements for controls that have been approved by NEC for electrical equipment. Inasmuch as available, the ATEX approval of non-electrical equipment assures a more thorough analysis and testing of potential ignition sources and failure modes than would generally be possible with Tank Operations Contract (TOC) resources, and virtually eliminates the complications and delays of a project having to conduct such analysis and validation.

For ATEX certified non-electrical equipment, the crosswalk in Table 3 is consistent with NEC Article 505, “Zone 0, 1, and 2 Locations,” and Article 500.5 “Classifications of Locations.” However, equipment qualified for Zone 1 and not for Zone 0 shall never be installed in a Division 1 location that could be Zone 0. Division 1 locations at TOC shall be assumed equivalent to Zone 0 unless stated otherwise in the HAC report, because the duration of the flammable atmosphere in these locations is generally indefinite.

For additional information about the crosswalk in Table 3 below, see Attachment B – Use of Zone Classified Mechanical Equipment in Division Classified Locations.

#### 3.3.3.2 Requirements

Non-electrical equipment design and installation shall comply with ATEX equipment certification.
Equipment carrying a standard ATEX label is approved without a separate Technical Evaluation, if it meets the following label standards. (Manned work activity to install the equipment in the classified location must comply with TFC-ENG-FACSUP-P-17 and TFC-ENG-STD-13):

<table>
<thead>
<tr>
<th>ATEX Label</th>
<th>Approved for</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group IIC, Category 1G; T2,3,4,5, or 6</td>
<td>Class I, Division 1, Group B</td>
</tr>
<tr>
<td>Group IIC, Category 1G, 2G, or 3G; T2,3,4,5, or 6</td>
<td>Class I, Division 2, Group B</td>
</tr>
</tbody>
</table>

The protection method for ATEX non-electrical equipment is integral to the equipment certification and labeling, and does not require coordination with other system elements, as does NEC compliant electrical equipment. As such, the ATEX protection method does not need to be documented in design plans or details.

Design verification shall include ATEX qualification for all facility modifications where non-electrical equipment is installed in a classified location. Facility modifications that use a Design Requirements Compliance Matrix shall include ATEX qualifications in the matrix for any non-electrical equipment in a classified location.

**Table 3. Non-Electrical Zone to Division Classification Crosswalk.**

<table>
<thead>
<tr>
<th>IEC Zone</th>
<th>Description of zone or division</th>
<th>In a word</th>
<th>ATEX Category</th>
<th>North American Division</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>An area in which an explosive mixture is continuously present or present for long periods</td>
<td>Continuous</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>An area in which an explosive mixture is likely to occur in normal operation and maintenance.</td>
<td>Frequent</td>
<td>2</td>
<td>Division 1 &amp; NOT Zone 0</td>
</tr>
<tr>
<td>2</td>
<td>An area in which an explosive mixture is not likely to occur in normal operation, but if it occurs it will exist only for a short time.</td>
<td>Accidental</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

Where ATEX certified equipment is not available, or otherwise not considered practical to procure, an equivalent safety a Technical Evaluation prepared in accordance with Section 3.5 and approved by the Mechanical Engineering Discipline Lead and Nuclear Safety Engineering shall be prepared.

The following documents provide guidance on design methods that may be applicable to equipment assemblies and system design requirements, e.g. bonding or grounding:

- NFPA 77, “Recommended Practice on Static Electricity”
- Applicable elements of American Petroleum Institute (API) API-2003, “Protection Against Ignitions Arising out of Static, Lightning, and Stray Currents”
- Air Movement and Control Association (AMCA) 99-0401, “Classification for Spark Resistant Construction”
3.3.4 Specific Design Considerations

3.3.4.1 Design of Equipment to be Operated During Limiting Conditions for Operation (LCO) and other Unusual Circumstances

In addition to HAC locations, ignition controls are also required in some locations that are Unclassified by NFPA 497 due to unusual circumstance in which a flammable atmosphere might occur – that NFPA calls catastrophic process failure. In such locations, in the event of such circumstance, installed equipment shall either be de-energized or compliant with Division 2 classification for ignition controls.

Designs and equipment intended to be operational in such circumstances shall be qualified Class I, Division 2, Group B, for the following events/locations:

- Technical Safety Requirements, LCOs involving flammable atmospheres.
- More than 15 inches of waste in a tank annulus.
- Tank waste in a DST leak detection pit.

Designs and equipment intended to be operational in the following circumstances shall be qualified Class I, Division 1, Group B:

- Equipment installed in a tank annulus that will become gas trapping with waste in the annulus at less than 15 inches (e.g. equipment intended to pump waste from tank annulus).

3.3.4.2 Design of Equipment to be Installed in Waste Transfer Line Encasements

New equipment to be installed in the encasement of any waste transfer line shall be specified as Class I, Division 1, Group B. (Note: The actual classification of each line depends on which lines are subject to periodic operations surveillance of vent/drain valve position, and for every instance, is intended to be converted to Class I Division 1 as soon as any existing equipment in that location can be de-energized and the surveillance for that valve/line discontinued.)

3.4 Verification Requirements

Documentation of HAC on applicable drawings in compliance with NEC 500.4A, and electrical protection methods, and non-electrical equipment qualifications, shall all be verified during design review in accordance with TFC-ENG-DESIGN-P-17.

Design verification shall include verification of the following:

1. HAC plan drawings and details, and procurement specifications or other equipment qualification
2. Classification details are clear in requirements documentation and HAC drawings – Class, Division, Group, Hydrogen
3. Protection techniques for NEC compliance are identified and appropriate
4. Verification that wiring methods are appropriate for electrical equipment and protection technique:
   - Conduit seals or equivalent equipment features as flammable gas can migrate
- Energy barriers where required for intrinsically-safe or non-incendive protection
- Wire separation where required for intrinsically-safe or non-incendive protection
- Calculations where required for intrinsically-safe or non-incendive protection

5. ATEX qualifications for any non-electrical equipment

6. Equivalent safety Technical Evaluation has been prepared and approved where requirements cannot be met.

Design verification shall include the above items 1-6 for all facility modifications in a classified location. Facility modifications that use a Design Requirements Compliance Matrix shall include above applicable items 1-6 in the Matrix.

Electrical and mechanical equipment specifications for classified locations:

- Shall clearly specify verifiable requirements for equipment in classified locations
- Shall be identified and verifiable in the design media
- Shall be verified in design reviews, and
- Such specifications shall be readily available for entry into Smartplant Foundation as follows.

Equipment Hazardous Area Classification, e.g., Class I Division 1 Group B and temperature code, shall be documented in Smartplant Foundation, together with an explanation of or reference to the basis for the classification (e.g. HAC report), as well as links to drawings that show the HAC location details, and engineering documentation that demonstrates equipment qualification, e.g., equipment specification and/or catalog cut-sheets or photograph of equipment label, demonstrating one of the following:

- Equipment was appropriately specified,
- Electrical equipment is listed by an OSHA recognized Test Lab for this HAC, or
- Non-electrical equipment is registered with an ATEX notification body in accordance with International Electro-technical Commission, or
- Non-standard equipment is approved as ‘equivalent safety’, consistent with NFPA provisions for code compliance exceptions, by a WRPS Technical Evaluation or Report.

### 3.5 Design Deviations from Standards

For electrical design, design agents may be independently held accountable to Washington State engineering regulation and licensing law, for compliance with NEC requirements. Should compliance be impossible due to functional requirements that are unique to TOC, then at minimum, clear and concise documentation of rational for ‘equivalent safety’ is required, with approval of the NEC Authority Having Jurisdiction.

For any equipment that deviates from specified standards and is not listed in Attachment A as ‘verified’, an equivalent Technical Evaluation shall be provided for approval of Chief Engineer or designated SME. The required SME approvals include as appropriate to the technical discipline of the installation, either an electrical SME or a non-electrical SME, or both, and Nuclear Safety Engineering. See Attachment C – Checklist of information for equivalent safety Technical Evaluations.
For non-electrical equipment, equivalent safety Technical Evaluation shall demonstrate that the equipment does not represent a source of ignition from sources such as, but not limited to the following considerations listed in (ATEX) EN 13463-1, as applicable:

6.2 Hot surfaces
6.3 Flames and hot gases (including hot particles)
6.4 Mechanically generated sparks
6.5 Electrical ignition source [Not applicable for non-electrical equipment]
6.6 Stray electric currents, cathodic corrosion protection
6.7 Static electricity
6.11 Ionizing radiation
6.12 Ultrasonics
6.13 Adiabatic compression and shock waves
6.14 Exothermic reactions, including self-ignition of dusts

Approved Technical Evaluations shall be listed in Attachment A with a description of equipment approved, and any conditions of approval with which the equipment must comply, when this standard is revised.

3.6 Equipment Listed in TFC-ENG-STD-13

Some equipment previously installed at TOC facilities had been evaluated by an advisory board (Flammable Gas Equipment Advisory Board (FGEAB)) and listed in TFC-ENG-STD-13, as compliant with requirements for ignition source control, or “equivalent safety.” Most of these listings are up to twenty years old or more, and not many are readily verifiable from the reference documents provided, particularly as manufacturers typically modify equipment designs without necessarily changing the equipment model designation.

Technical Evaluations required by section 3.5 may refer to FGEAB reports as an information source, and shall supply additional information sufficient for the Chief Engineer or designated Subject Matter Expert to verify equivalent safety. See Attachment C – Checklist of information for equivalent safety Technical Evaluations.

4.0 DEFINITIONS

AMCA. Air Movement and Control Association.

API. American Petroleum Institute.

ATEX. Appareils destinés à être utilisés en ATmosphères EXplosives.

5.0 SOURCES

5.1 Requirements

2. HNF-15279, “Tank Farms Technical Safety Requirements.”
5.2 References

1. AMCA 99-0401, “Classification for Spark Resistant Construction.”

2. API RP-2003, “Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents.”

   c. Part 3: Protection by Flameproof Enclosure (d).
   d. Part 5: Protection by Constructional Safety (c).
   e. Part 6: Protection by Control of Ignition Sources (b).
   f. Part 8: Protection by Liquid Immersion (k).

4. HNF-SD-WM-HC-017, “NFPA Flammable Vapor and Gas Hazard Classification for the Tank Farms.”

5. NFPA 77, “Recommended Practice on Static Electricity.”

6. NFPA 497, “Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas.”

7. RPP-RPT-58290, “NFPA Flammable Vapor and Gas Hazard Classification for the 242-A Evaporator.”

8. TFC-ENG-DESIGN-P-17, “Design Verification”

9. TFC-ENG-FACSUP-P-17, “Flammable Gas Activities Ignition Source Control.”

10. TFC-ENG-STD-13, “Ignition Source Controls for Work Controls in Potentially Flammable Atmospheres.”
### ATTACHMENT A – TABLE 4. VERIFIED EQUIVALENT SAFETY

<table>
<thead>
<tr>
<th>Component</th>
<th>Div</th>
<th>Conditions</th>
<th>Technical Evaluation or Report</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste Intruding Transfer Pump</td>
<td>1</td>
<td>Approved only when subject to HNF-SD-WM-TSR-006, Technical Safety Requirements, Administrative Control 5.9.3 Key Element 1, which requires that cover blocks be in place when operating the pump.</td>
<td>RPP-TE-58246</td>
</tr>
<tr>
<td>Pipe, vessels, tanks, spools, flanges, orifice plates, blanks, adapters,</td>
<td>1</td>
<td>Applies only to components as stripped of all removable parts, and that as installed are not themselves moving parts of any larger assembly, and are not exposed to temperatures exceeding 400 °C.</td>
<td>RPP-TE-58251</td>
</tr>
<tr>
<td>connectors, thermal wells.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrically conductive bolted metal flanged joints with non-conductive</td>
<td>1</td>
<td>Applies only to assemblies of conductive metal process bodies using containment sealing gaskets, O-rings, joint thread sealing compounds, lubricants, sealants and adhesives, under the condition that the conductive metal process bodies are electrically bonded by conductive metal joint fasteners made sufficiently tight to comply with industry standard installation for prevention of leakage under full design pressure at the joint, or by a bonding jumper installation that is both identified on drawing/details and is approvable by the electrical Authority Having Jurisdiction.</td>
<td>RPP-TE-58251</td>
</tr>
<tr>
<td>or conductive gaskets, lubricants, sealants and adhesives, under the</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>condition that the conductive metal process bodies are electrically</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>bonded by conductive metal joint fasteners made sufficiently tight to</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>comply with industry standard installation for prevention of leakage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>under full design pressure at the joint, or by a bonding jumper</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>installation that is both identified on drawing/details and is approvable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>by the electrical Authority Having Jurisdiction.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Process wetted interior only of piping jumpers with attached PUREX</td>
<td>1</td>
<td>Applies only to wetted internal volume of process bodies with attached equipment that is external to the process containment boundary, and that does not penetrate the process body containment boundary, and that does not contain a heat source capable of exceeding 400 °C, and that is not exposed to a heat source capable of exceeding 400 °C. Does not apply to any region outside of process containment boundary.</td>
<td>RPP-TE-58251</td>
</tr>
<tr>
<td>connectors, coriolis flow sensing elements; piping bodies with attached</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ultrasonic flow sensors, temperature sensing devices in thermal wells,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>other process bodies and vessels with equipment attached that cannot</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>exceed 400 °C.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flexible pipe connections to vibrating equipment.</td>
<td>1</td>
<td>Applies only to flexible process piping that has been fabricated of static dissipative material, or is less than ten diameters in length and is entirely bridged by an electrical bonding jumper installation that is both identified on drawing/details and is approvable by the electrical Authority Having Jurisdiction.</td>
<td>RPP-TE-58251</td>
</tr>
<tr>
<td>Safety significant hose-in-hose transfer line that is fabricated with</td>
<td>1</td>
<td>Applies only to flexible process piping that has been fabricated with material certified by manufacturer as static dissipative or electrically conductive, and that is verified as a critical characteristic of commercial grade dedication.</td>
<td>RPP-TE-58251</td>
</tr>
<tr>
<td>static dissipative material that is verified as a critical characteristic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>of commercial grade dedication.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mobile Arm Retrieval System</td>
<td>1</td>
<td>Approved only for Waste Tank Group C</td>
<td>RPP-RPT-47650</td>
</tr>
<tr>
<td>Mechanical Pressure Gauge Ashcroft 1000 series bourdon tube</td>
<td>1</td>
<td>Approval is limited to process wetted surfaces.</td>
<td>TOC-ENG-FGEAB-50003</td>
</tr>
</tbody>
</table>
### ATTACHMENT A – TABLE 4. VERIFIED EQUIVALENT SAFETY (cont.)

<table>
<thead>
<tr>
<th>Component</th>
<th>Div</th>
<th>Conditions</th>
<th>Technical Evaluation or Report</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumatic Pressure Transmitter, Foxboro 13A-1 and 15A-1</td>
<td>1</td>
<td>Approval is limited to process wetted surfaces.</td>
<td>TOC-ENG-FGEAB-50003</td>
</tr>
<tr>
<td>Rotary/Push Mode Core Sampling Drill String</td>
<td>2</td>
<td>Approved with all restrictions and conditions, including purge or water head, identified in TOC-ENG-FGEAB-0009, and one additional condition that, maximum permissible operating temperature is 400 °C, not 416 °C, since NFPA 70 limits temperature to 80% of auto-ignition temperature in °C, which auto-ignition temperature is listed in NFPA 497 as 500 °C.</td>
<td>RPP-7859 and TOC-ENG-FGEAB-00009</td>
</tr>
<tr>
<td>Ball Valves</td>
<td>1</td>
<td>With anti-static feature identified by the manufacturer or documented conductivity test.</td>
<td>RPP-TE-58349</td>
</tr>
<tr>
<td>Butterfly Valves</td>
<td>1</td>
<td>With anti-static feature identified by the manufacturer or documented conductivity test.</td>
<td>RPP-TE-58359</td>
</tr>
</tbody>
</table>
ATTACHMENT B – USE OF ZONE CLASSIFIED MECHANICAL EQUIPMENT IN DIVISION CLASSIFIED LOCATIONS

Electrical equipment may be labeled with markings that are consistent with IEC and are acceptable for NEC compliance. However, ATEX markings for non-electrical labels are not by themselves relevant to NEC, not approvable for electrical equipment. Both markings may appear on labels for electromechanical equipment.

Protection methods approvable for IEC Zone classification are not approvable for North American Division classification. However, for Class I excluding Zone 0 (gas and vapor, and not continuously present) the criteria for Zone and division are essentially identical, give or take an occasional word or phrase – for example, Division 1 vapors “can exist” under specific circumstance, whereas Zone 1 vapors “are likely to exist” for the identical circumstance. Engineering responsibility to interpret those words safely, covers far more latitude than a slight difference in the wording that is easily attributed to significant language differences throughout the domain of European standards.
ATTACHMENT C – CHECKLIST FOR EQUIVALENT SAFETY TECHNICAL EVALUATION

The following information may be required by the electrical AHJ for justification for equivalent safety in lieu of code compliance, as well as demonstration of equivalent safety. Much of this information may also be required by the mechanical SME.

The following is a checklist, not all of which might be applicable in every instance. For example, information regarding the essential functions as basis for selecting an item of equipment might not be especially useful if the equipment is well known and understood equipment already in TOC service. However, the information requirement for these Evaluations must meet the requirements of the Subject Matter Expert (SME) responsible to approve the document. The appropriate SME should be contacted to discuss this checklist when developing an equivalent safety Technical Evaluation.

Justification for non-compliance with code requirements

Essential functions that cannot be met with compliant system and/or components

- What is the required function? Provide a detailed narrative description.
- Why is this a required function? Identify as:
  - Safety or integrity of process, safety of personnel, critical information, other contractual obligation
  - Citation of requirement sources – list the requirements documents
  - Provide a narrative explanation of these requirements
- Details of standard that cannot be met.
  - Identify the specific standard that cannot be met
  - Provide listing of sources exhausted in attempt to comply with the standard
    - Manufacturers and manufacturers’ associates
    - Vendors and distributors
    - Consultants, product safety laboratories, other service providers
  - Summarize responses from sources reviewed

Demonstration of Equivalent Safety

Characteristics of the proposed system and/or components that meet or exceed safety standards.

- Citation of information sources
- Specific detail of safety standard met or exceeded
- Characteristics that meet or exceed safety standard
- Measures capable of assuring characteristics are met
  - Inherent to product/system
  - Protected by other third party testing and quality assurance, manufacturer’s exposure to liability, product certifications
  - Validation by periodic testing, inspection, or replacement
  - Explanation
  - Mechanism required to implement these measures