ENGINEERING CHANGE NOTICE

Page 1 of 21. ECN 653776Proj.
ECN

2. ECN Category (mark one) Supplemental ☐ Direct Revision ☒ Change ECN ☐ Temporary ☐ Standby ☐ Supersedure ☐ Cancel/Void ☐	3. Originator's Name, Organization, MSIN, and Telephone No. Treah Nuxall, SNF CVD, R3-47, 372-3739	4. USQ Required? ☐ Yes ☒ No	5. Date 3/31/99
	6. Project Title/No./Work Order No. Spent Nuclear Fuel Cold Vacuum Drying	7. Bldg./Sys./Fac. No. CVDF	8. Approval Designator Q, S ^u
	9. Document Numbers Changed by this ECN (includes sheet no. and rev.) <u>All Rev 0</u> SNF-3876, SNF-3877, SNF-3878, SNF-3879, SNF-3880, SNF-3881, SNF-3882, SNF-3883, SNF-3884, SNF-3886, SNF-3887, SNF-3888, SNF-3890, SNF-3891, SNF-3892, SNF-3893, SNF-3894, SNF-3895, SNF-3920, SNF-3921, SNF-3922, SNF-3923, SNF-3924, SNF-3925, SNF-3926, SNF-3927, SNF-3928, SNF-3929, SNF-3930, SNF-3931, SNF-3932, SNF-3933, SNF-3934, SNF-3935, SNF-3936	10. Related ECN No(s). N/A	11. Related PO No. N/A
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14a. Justification (mark one) Criteria Change ☒ Design Improvement ☐ Environmental ☐ Facility Deactivation ☐ As-Found ☐ Facilitate Const ☐ Const. Error/Omission ☐ Design Error/Omission ☐			
14b. Justification Details Revision to SEL.			
15. Distribution (include name, MSIN, and no. of copies) <i>see attached distribution</i>		RELEASE STAMP DATE: <u>MAY 06 1999</u> STA: <u>4</u> ID: <u>2</u>	

653776

A-7900-013-3 (05/96) GEF096

FIKE MCO PRESSURE SAFETY ELEMENT

Carl Van Katwijk
Numatec Hanford, Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-96RL13200

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Abstract: Fike MCO Pressure Safety Element

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Approved for Public Release

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SNF-3936

Page 1

(2) Title

FIKE MCO PRESSURE SAFETY ELEMENT

Change Control Record

(3) Revision

(4) Description of Change - Replace, Add, and Delete Pages

Authorized for Release

(5) Cog. Engr.

(6) Cog. Mgr.

Date

1

RS

(7)

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[Signature]

[Signature] 5/6/99

Commercial Grade Item Upgrade Dedication Form

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Title: **FIKE MCO PRESSURE SAFETY ELEMENT**

Section 1 Part Information

Item No.: NA	Manufacturer:	Supplier:
Mfg. Part/Model No.:	Supplier's P/N:	
Part Description:		
End Use Description:		

Section 2a Component Information

Equipment No.: VPS-PSE-1*33	Specification No.: W-441-P4, Rev. 2	Manufacturer: Fike	Past P.O. No.: NA
Procurement and/or Model No.: HOV-UT, 1", 316SS/TEF/316SS, 30PSI, 150°C, Standard MFG Tolerances, FU-1", 316SS	Equipment Supplier (if different from manufacturer): TBD		Equip. Supplier's Part No.: NA

Component Description: **This pressure safety element is a 1 inch rupture disc used to prevent an overpressure condition in the MCO. The pressure safety element is located at the MCO and discharges to the plant vent.**

Section 2b Qualified Vendor/Supplier Survey

1. Is the Item available from a catalogue of a qualified NQA1 supplier? (coordinate with project CGI interface Engineer or BTR)
- ☐ YES (go to #2 below)
- ☒ NO (go to procedure step 5.3.2, proceed to dedicate Item.)
- If not available from a qualified NQA1 supplier, is it available from an ISO 9000 supplier? (coordinate with project CGI interface Engineer or BTR)
- ☐ YES (go to #2 below, then go to procedure step 5.3.2, proceed to dedicate Item)
- ☒ NO (go to procedure step 5.3.2, proceed to dedicate Item.)

2. List of Candidate qualified suppliers or ISO 9000 suppliers

company name and type	contact name	phone
NA		

3. Recommended Procurement Strategy (coordinate with project CGI interface Engineer or BTR):

NA

Section 2c CGI Determination

1. Question #1: Is the Item subject to design or specification requirements that are unique to nuclear facilities or activities?
- ☐ YES (the Item is not commercial grade)
- ☒ NO (continue)

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2. Question #2: Is the Item used in applications other than nuclear facilities or activities?

☐ NO (the item is not commercial grade)

☒ YES (continue)

3. Question #3: Is the Item ordered from manufacturer/supplier on the basis of specifications set forth in the Published product information (e.g., manufacturer's catalog)?

☐ NO (the Item is not commercial grade)

☒ YES (continue)

☒ All three criteria have been satisfied. The Item meets the definition of commercial grade.

Section 2d Reason for Dedication

The above described Item is being Dedicated for use in the application cited for the following reason(s):

☒ Item is being purchased from a non ESL manufacturer supplier as commercial grade to be used in a Safety Class application.

☐ Item is being purchased from a non ESL manufacturer supplier as commercial grade to be used in a Safety Significant application.

☐ Item was purchased from a non ESL manufacturer supplier as commercial grade to be used in a Safety Class application.

☐ Item was purchased from a non ESL manufacturer supplier as commercial grade to be used in a Safety Significant application.

☐ Other ('like-for-like', similar, substitution, replacement evaluation)

Section 3 Failure Effects Evaluation

A. Part/Component Safety Function:

1. **Maintains pressure boundary, prevents helium leakage from MCO or airleakage into MCO during vacuum operation, H2 explosion.**

2. **Prevents MCO over pressure, prevents thermal runaway**

3. **Maintain critical function before and after seismic event.**

B. Part/Component Functional Mode:

Safety Function #1:

☐ Active – Mechanical or Electrical change of state is required to occur for the component to perform its safety function

☒ Passive – Change of state is not required for the component to perform its safety function

Safety Function #2:

☒ Active – Mechanical or Electrical change of state is required to occur for the component to perform its safety function.

☐ Passive – Change of state is not required for the component to perform its safety function

Safety Function #3:

☐ Active – Mechanical or Electrical change of state is required to occur for the component to perform its safety function.

☒ Passive – Change of state is not required for the component to perform its safety function

C. Host Component Safety Function (if applicable): **NA**

1.

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D. Failure Mechanisms(s) and the effects on component or system safety function (see worksheet 1):

1. **Failure of the disc to rupture at its nominal burst pressure.**

2. **Fracture of the disc housing or piping attachment.**

3. **Disc ruptures or leaks at a lower pressure than its nominal burst pressure.**

4. **Upon actuation of rupture disc, pieces of disc separate and block downstream flow path and/or check valve.**

Section 4 Environmental & Natural Phenomena Hazard Design

Environmental Qualification Required:

Yes ☐

No ☒

Environmental Condition B

If yes: Environmental Qualification Requirements

Limiting Environmental Conditions:

Required Safety Functions:

Qualification Period:

Natural Phenomena Hazard (NPH) Design Required:

Yes ☒

No ☐

HNF-PRO-97, Rev. 0

W-441-P4, Rev. 2

If yes: NPH Design Requirements

Performance Category: **PC-3**

NPH Design Req'ts.: **Seismic Condition A**

Required Safety Functions: **Disc ruptures to relieve overpressure in the MCO. Pressure Boundary Integrity.**

Section 5 Component Functional Classification

☒ Safety Class (SC)

☐ General Service

☐ Safety Significant (SS)

If part/component classification is different from host component/system, document basis.

Section 6 [reserved]

Section 7 [reserved]

Section 8 References (for Functional Classification)

National Codes/Standards:

ASME B31.3

Safety Analysis Report (SAR):

HNF-SD-SNF-SAR-002, Rev. 4A

Drawings: **H-1-82161, Rev. 2**

HNF-SD-SNF-SEL-002, Rev. 6
CVDF-SSD-003

Vendor Manuals/Manufacturer/Supplier Information: **Fike Rupture Disc Application, Selection, and Specification, HOV Series**

Other:

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Section 9 Critical Characteristics				
Critical Characteristics Verification Document:: Vendor Specifications, HNF-SD-SNF-SEL-002, Rev. 6	Acceptance Criteria/Tolerances	Acceptance Method	ID	Function
1. Item Identification Critical Characteristics (necessary for reasonable assurance that the Item delivered is the Item specified)				
Component Number-Procedure and/or Model Number	HOV-UT, 1", 316SS/TEF/316SS, 30 PSI, 150°C, Standard MFG. Tolerance, FU-1", 316SS, (Per Procurement Package W-441-P4, Rev. 2, Section H, Design Data Sheet)	1,IN	X	
Nameplate - Manufacturer	Fike	1,IN	X	
Process Connection	1 Inch Butt Weld	1,IN	X	
2. Physical Critical Characteristics (necessary for reasonable assurance that the Item delivered is the Item specified)				
Material, Housing	Stainless Steel (Note 4)	1, IN 1,T	X	
Material, Process Connection	Stainless Steel (Note 4)	1, IN 1,T	X	
Material, Rupture Disc	Teflon (Note 4)	1, IN 1,T	X	
3. Performance Critical Characteristics (necessary & sufficient for reasonable assurance that the Item will perform its intended safety function(s))				
Pressure Boundary Integrity	No leakage at test pressure of 165 psig. Note 3.	1,T		X
Internal Pressure	150 psig and Full Vacuum	1,T		X
Leakage Past Rupture Disc	Pressure Test to 15 psig, leakage to bubble tight standards < 10-3 ml/sec Note 5	1,T		X
Rupture Disc Burst Pressure	Nominal 30 psig (Not to exceed 31 psig).	1,T		X
Inspect Disc after Rupture	No loose pieces from ruptured disc.	1,T		X
Environmental	Note 1			
Seismic Condition A	Note 2	1,T		X

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4. Notes and Legend:

1. The pressure safety element and rupture disc are not subject to degradation at environmental conditions of 40°F and 60% RH or 115°F and 22% RH and are suitable for Condition B application.
2. Maintain critical function before and after Seismic event. W-441-P4-Rev. 2, Appendix L, page L-20 provides a seismic testing plan for this safety class, Seismic Condition A component at a Seismic Spectra TBD. Equipment that has been shaker-table tested should not be installed in a plant (Ref. IEEE Standard 344-1984, Section 7). Consequently, the seismic test constitutes a destructive test. The industry sampling practice for destructive test is to test only one item.
3. Pressure test housing at 110% of design accident condition pressure of 150 psig. The rupture disc burst pressure is 30 psig, nominal. The rupture disc must be removed and a blank installed for this test.
4. Material verification acceptance method may be by either inspection or test.
5. During test - do not wet rupture disc (with wetting solution, e.g. Snoop type soap solution).

Acceptance Method:

1. Special Test and Inspection
1,IN for Inspection
1,T for Test
2. Commercial Grade Survey
3. Source Verification
4. Vendor/Item History

Section 10 Initial Reviews and Approvals

Approvals:

Designated Engineer: Coan / Khung 5/5/99

Design Authority: CR M 5/5/99

QA Engineer: Amish 5/4/99

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WORKSHEET 1 DETERMINATION OF FAILURE MECHANISMS/MODES

SECTION 1

Typical Failure Mechanisms	Definition	Applicable to Component under Evaluation	
Fracture	Separation of a solid accompanied by little or no macroscopic plastic deformation.	Yes [] Mode. _____	No [X]; If Yes, indicate failure Mode. _____
Corrosion	The gradual deterioration of a material due to chemical or electrochemical reactions, such as oxidation, between the material and its environment.	Yes [] Mode. _____	No [X]; If Yes, indicate failure Mode. _____
Erosion	Destruction of materials by the abrasive action of moving fluids, usually accelerated by the presence of solid particles carried with the fluid.	Yes [] Mode. _____	No [X]; If Yes, indicate failure Mode. _____
Open Circuit	An electrical circuit that is unintentionally broken so that there is no complete path for current flow.	Yes [] Mode. _____	No [X]; If Yes, indicate failure Mode. _____
Short Circuit	An abnormal connection by which an electrical current is connected to ground, or to some conducting body, resulting in excessive current flow.	Yes [] Mode. _____	No [X]; If Yes, indicate failure Mode. _____
Blockage	Clogging of a filtering medium resulting in the inability to perform its purification function or blockage of flow.	Yes [] Mode. _____	No [X]; If Yes, indicate failure Mode. _____
Seizure	Binding of a normally moving item through excessive pressure, temperature, friction, jamming.	Yes [] Mode. _____	No [X]; If Yes, indicate failure Mode. _____
Unacceptable Vibration	Mechanical oscillations produced are beyond the defined permissible limits due to unbalancing, poor support, or rotation at critical speeds.	Yes [] Mode. _____	No [X]; If Yes, indicate failure Mode. _____
Loss of Properties	A loss of mechanical and physical properties of a material due to exposure to high temperatures, radiation exposure.	Yes [] Mode. _____	No [X]; If Yes, indicate failure Mode. _____
Excess Strain	Under the action of excessive external forces the material of the part has been deformed or distorted.	Yes [] Mode. _____	No [X]; If Yes, indicate failure Mode. _____
Mechanical Creep	From prolonged exposure to high temperature and stress, the object will show a slow change in its physical (shape and dimension) and mechanical characteristics.	Yes [] Mode. _____	No [X]; If Yes, indicate failure Mode. _____
Ductile Fracture	Fracture characterized by tearing of metal accompanied by appreciable gross plastic deformation.	Yes [] Mode. _____	No [X]; If Yes, indicate failure Mode. _____

Section 2 Additional Failure Modes Applicable to the Component Under Evaluation

1. Failure of the disc to rupture at its nominal burst pressure.
2. Fracture of the disc housing or piping attachment.
3. Disc ruptures at a lower pressure than its nominal burst pressure.
4. Disk ruptures at burst pressure and fragments potentially block downstream equipment.
5. Leakage past rupture disc in disc holder.

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CHECKLIST 1

ACCEPTANCE METHOD 1

SPECIAL TEST/INSPECTION VERIFICATION

SECTION 1	
Item Description: MCO Pressure Safety Element System #: 07	Equip #: VPS- PSE-1*33 Procurement and/or Model #: HOV-UT, 1", 316SS/TEF/316SWS, 30 PSI, 150°C, Standard MFG Tolerance, FU-1", 316SS
Manufacturer (Address/Phone): Fike Company P.O. #	Supplier (Address/Phone):

SECTION 2 CRITICAL CHARACTERISTICS TO BE VERIFIED BY METHOD 1

Insp	Test	Post-Test	
☒	☐	☐	1. Component Number-Procurement and/ or Model Number
☒	☐	☐	2. Nameplate - Manufacturer
☒	☐	☐	3. Process Connection
☒	☒	☐	4. Material, Rupture Disc (Verification may be by either inspection or test)
☒	☒	☐	5. Material, Housing (Verification may be by either inspection or test)
☒	☒	☐	6. Material, Process Connection (Verification may be by either inspection or test)
☐	☒	☐	7. Pressure Boundary Integrity
☐	☒	☐	8. Internal Pressure
☐	☒	☐	9. Leakage, Rupture Disc
☐	☒	☐	10. Rupture Disc Burst Pressure
☐	☒	☐	11. Inspect Disc after Rupture
☐	☒	☐	12. Seismic Condition A

SECTION 3 BY INSPECTION

* See Attachment G of Desk Instruction for Sampling Size

Characteristic: **Component Number-Procurement and/ or Model Number**

Sample Size*: **All Items**

Acceptance Criteria: **HOV-UT, 1", 316SS/TEF/316SS/ 30 PSI, 150°C, Standard MFG Tolerance, FU-1", 316SS, (Per Procurement Package W-441-P4, Rev. 2, Section H, Design Data Sheet)**

Receipt Inspection Plan / Report #: _____

References (see Section 7): **Fike Rupture Disc Application, Selection, and Specification, HOV Series**

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Title: **FIKE MCO PRESSURE SAFETY ELEMENT**Characteristic: **Nameplate - Manufacturer**Sample Size*: **All Items**Acceptance Criteria: **Fike**

Receipt Inspection Plan / Report #: _____

References (see Section 7): _____

Characteristic: **Process Connection**Sample Size*: **All Items**Acceptance Criteria: **1 Inch Butt Weld**

Receipt Inspection Plan / Report #: _____

References (see Section 7): _____

Characteristic: **Material, Housing**Sample Size*: **Normal Sampling Size**Acceptance Criteria: **Stainless Steel**

Receipt Inspection Plan / Report #: _____

References (see Section 7): _____

Characteristic: **Material, Process Connection**Sample Size*: **Normal Sampling Size**Acceptance Criteria: **Stainless Steel**

Receipt Inspection Plan / Report #: _____

References (see Section 7): _____

Characteristic: **Material, Rupture Disc**

Sample Size*: **This is a destructive test since the disc may suffer damage during test for testing. Utilize the disc that has been ruptured for the burst pressure test to test the material. Test only one item.**

Acceptance Criteria: **Teflon**

Receipt Inspection Plan / Report #: _____

References (see Section 7): _____

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SECTION 4 BY SPECIAL TEST

* See Attachment G of Desk Instruction for Sampling Size

Test To Be Performed by:

☐ Purchaser

☐ Supplier/Manufacturer**

☐ Other

Number of Items to be Tested:

Test/Inspection Location:

Characteristic for Test: **Pressure Boundary Integrity**

Acceptance Criteria: **No Leakage at Process Test Pressure of 165 psig**

Sample Size*: **Normal Sampling Size**

Actual Test Value:

Test Plan and Report #: _____ References (see Section 7): _____

Characteristic for Test: **Internal Pressure**

Acceptance Criteria: **150 psig and full vacuum**

Sample Size*: **Normal Sampling Size**

Actual Test Value:

Test Plan and Report #: _____ References (see Section 7): _____

Characteristic for Test: **Leakage Past Rupture Disc**

Acceptance Criteria: **At 15 psig, leakage to bubble type standards < 10-3 ml/sec (do not wet disc with liquid solution, e.g. Snoop).**

Sample Size*: **Normal Sampling Size**

Actual Test Value:

Test Plan and Report #: _____ References (see Section 7): _____

Characteristic for Test: **Rupture Disc Burst Pressure**

Acceptance Criteria: **Nominal 30 psig (not to exceed 31 psig).**

Sample Size*: **Destructively Test Only One Item. After burst, use this disc for material test.**

Actual Test Value:

Test Plan and Report #: _____ References (see Section 7): _____

Characteristic for Test: **Inspect Disc after Rupture**

Acceptance Criteria: **No loose pieces from ruptured disc.**

Sample Size*: **Destructively test only one item. Examining the disc used for the burst pressure test.**

Actual Test Value:

Test Plan and Report #: _____ References (see Section 7): _____

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Title: **FIKE MCO PRESSURE SAFETY ELEMENT**

Characteristic for Test: **Seismic Condition A**

Acceptance Criteria: **Maintain Critical Function Before and After Seismic Event**

Sample Size*: **Destructively Test Only One Item**

Actual Test Value:

Test Plan and Report #: _____ References (see Section 7): _____

**If Supplier/Manufacturer or Other, Refer to CGI Checklist-2 for Support Information

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Section 5 Test/Inspection Summary (Acceptance Method 1)

1. SUMMARY OF VERIFIED CRITICAL CHARACTERISTICS, THEIR VERIFICATION METHODS, AND RESULTS

ITEM DESCRIPTION:

Critical Characteristics				Verification Results							
Critical Characteristics	Acceptance Criteria/Tolerances	ID	Function	Method T, IN	Procedure or RR#	Check- list ID	Number Tested	Number Failed	Verifying Organization	Printed Name Signature	Date
Component Number- Procurement and/or Model Number	HOV-UT, 1" , 316SS/TEF/316SS, 30 PSI, 150°C, Standard MFG. Tolerances, FU- 1" , 316SS, (Per Procurement Package W-441-P4, Rev. 2, Section G, Design Data Sheet)	X									
Nameplate - Manufacturer	Fike	X									
Process Connection	1 Inch Butt Weld	X									
Material, Rupture Disc	Teflon	X									
Material, Housing	Stainless Steel	X									
Material, Process Connection	Stainless Steel	X									
Pressure Boundary Integrity	No Leakage at Test Pressure of 165 psig		X								
Internal Pressure	150 psig and full vacuum		X								
Leakage Past Rupture Disc	Pressure Test to 15 psig, leakage to bubble tight standards <10-3 ml/sec		X								
Rupture Disc Burst Pressure	Nominal 30 psig (not to exceed 31 psig).		X								

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Section 6 Contacts/Phone Numbers

Name	Phone
Design Authority	()
QA	()
QC	()
Cog - Engineer	()
CGI Engineer	()
Procurement Engineer	()
Other	()

Section 7 Supporting Documentation for this Checklist

Initial Procurement Documents	For Critical Characteristics
☐ Drawings:	
☐ Manuals (specify type & number):	
☐ Design Calculations	
☐ Installation Instructions	
☐ Operation Instructions	
☐ Calibration Instructions	
☐ Manufacturer's Recommended Spare Parts List	
☐ Other:	
Procurement Documents	
☐ Certificate of Conformance/Compliance	
☐ Seismic Qualification Certificate	
☐ Environmental Qualification Certificate	
☐ Test Report (s):	
☐ Inspection Report (s):	
☐ CMTRs for ASME Pressure Retaining Materials	
☐ Valve Seat Leakage Report	
☐ Weld Records	
☐ Material Tracability Record	
☐ Other:	