

**EHS&L Document**

**SNM-1227 - Chapter 6  
Chemical Process Safety**

**Nature of Changes**

Item	Paragraph	Description	Justification
1.	Entire Document	Changed AREVA Inc. with Framatome Inc.	Company Name Change
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
List Below any Documents, including Forms & Operator Aids which must be issued concurrently with this document revision:			

This Document contains a total of 7 pages excluding the signature page.

### DOCUMENT REVIEW/APPROVAL/DELETION CHECKLIST

All new and/or revised procedures shall be approved by the change author, cognizant manager(s) of areas affected by the changes, and by applicable manager(s) of any function that approved the previous revision of the document unless responsibility for such approval has been transferred to another organization. Also, the procedure shall be approved by manager(s) of functional organizations that provide technical reviews with the exception of the Training Department. Finally, Document Control shall verify that the required approvals have been properly obtained and that any documents that must be issued concurrently are ready to be issued.

Document Reviews			Document Approvals	
Purpose/Function of Review	Specify Reviewer(s) (Optional except for change author)	(Check all that apply)	Title of Approver	(Check all that Apply)
Document Control (Automatic)		<input checked="" type="checkbox"/>	Document Control (Automatic)	<input checked="" type="checkbox"/>
Change Author	CD Manning	<input checked="" type="checkbox"/>	Author	<input checked="" type="checkbox"/>
Independent Technical Review		<input type="checkbox"/>		
Operability Review(s)			Mgr, Richland Operations <sup>(1)</sup>	<input type="checkbox"/>
Conversion		<input type="checkbox"/>	Mgr, Uranium Conversion & Recovery Operations <sup>(1)</sup>	<input type="checkbox"/>
Recovery		<input type="checkbox"/>	Mgr, Ceramic Operations <sup>(1)</sup>	<input type="checkbox"/>
Ceramics		<input type="checkbox"/>	Mgr, Rods & Bundles <sup>(1)</sup>	<input type="checkbox"/>
Rods		<input type="checkbox"/>	Mgr, Component Fabrication <sup>(1)</sup>	<input type="checkbox"/>
Bundles		<input type="checkbox"/>	Mgr, Maintenance <sup>(1)</sup>	<input type="checkbox"/>
Components		<input type="checkbox"/>	Mgr, Production Support <sup>(1)</sup>	<input type="checkbox"/>
Maintenance Review		<input type="checkbox"/>	Mgr, Ops Strategy & Supply Chain	<input type="checkbox"/>
Lab Review		<input type="checkbox"/>	Mgr, EHS&L <sup>(2)</sup>	<input checked="" type="checkbox"/>
Transportation		<input type="checkbox"/>	Mgr, Nuclear Safety <sup>(2)</sup>	<input type="checkbox"/>
EHS&L Review(s)			Mgr, Safety <sup>(2)</sup>	<input type="checkbox"/>
Criticality		<input type="checkbox"/>	Mgr, Security & Emergency Preparedness <sup>(2)</sup>	<input type="checkbox"/>
Radiation Protection		<input type="checkbox"/>		
Safety	SD Wright	<input checked="" type="checkbox"/>	Mgr, Licensing & Compliance <sup>(2)</sup>	<input type="checkbox"/>
Security/Emergency Prep.		<input type="checkbox"/>	Mgr, Mechanics Richland	<input type="checkbox"/>
Fire Safety		<input type="checkbox"/>	Mgr, Thermal-Hydraulics Richland	<input type="checkbox"/>
MC&A		<input type="checkbox"/>	Mgr, Materials & Therm-Mechs	<input type="checkbox"/>
Transportation		<input type="checkbox"/>	Mgr, Project & Reliability Eng.	<input type="checkbox"/>
Environmental		<input type="checkbox"/>	Mgr, Richland Site Quality	<input type="checkbox"/>
Mechanics Richland Review		<input type="checkbox"/>	Mgr, PP&CPC	<input type="checkbox"/>
Mechanics Lynchburg Review		<input type="checkbox"/>	Mgr, Richland Site/Other	<input type="checkbox"/>
Thermal-Hydraulics Richland Review		<input type="checkbox"/>	Richland Records Management	<input type="checkbox"/>
Thermal-Mechanics Richland Review		<input type="checkbox"/>	Training & Employee Dev. <sup>(3)</sup>	<input type="checkbox"/>
Project & Reliability Review		<input type="checkbox"/>		
Quality Review		<input type="checkbox"/>		
Purchasing Review		<input type="checkbox"/>		
Others:		<input type="checkbox"/>		
Document Control		<input type="checkbox"/>		
Training & Employee Dev.: <sup>(3)</sup>		<input type="checkbox"/>		

<sup>(1)</sup>Note: If approvals include 2 or more product center managers, the Operations manager can be substituted for the applicable product center managers.

<sup>(2)</sup>Note: If approvals include 2 or more EHS&L functional managers, the EHS&L manager can be substituted for the applicable EHS&L functional managers.

<sup>(3)</sup>Note: Training department review is required for all procedures that require or affect a Learning Plan and if additional training materials or curriculum must be revised before issuing procedure.

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EHS&L CHANGE IMPACT EVALUATION FORM			
<p>The scope and content of this document have been determined by EHS&amp;L to not impact the safety disciplines checked below. Future revisions do not require review by those EHS&amp;L component(s) unless the scope changes such that a previously excluded safety discipline may be impacted.</p> <p> <input type="checkbox"/> Criticality   <input type="checkbox"/> Radiation Protection   <input type="checkbox"/> Safety/Security   <input type="checkbox"/> Emergency Preparedness   <input type="checkbox"/> MC&amp;A   <input type="checkbox"/> Transportation   <input type="checkbox"/> Environmental </p>			
DOCUMENT VERSION:	EHS&L REVIEW COMPONENT:	EVALUATION DATE:	CHANGE EVALUATOR*:
			2 <sup>ND</sup> PARTY APPROVAL*:

<p>The scope and content of this document have been determined by EHS&amp;L to not directly impact the safe handling of licensed materials (enriched uranium). Future revisions to this document do not require the <b>10CFR 70.72</b> change evaluation unless the scope of the document changes such that it directly impacts the handling of licensed materials.</p>			<input type="checkbox"/>
DOCUMENT / ECN No**:	EVALUATION DATE:	CHANGE EVALUATOR:	
E10-08-006	1/19/18	CD Manning	
Does the change potentially impact Criticality Alarm System (CAS) coverage?			<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
<b>EVALUATION OF NRC PRE-APPROVAL:</b>			
<b>IS NRC PRE-APPROVAL ( LICENSE AMENDMENT ) NEEDED?</b> <ul style="list-style-type: none"> <li>➤ Based on "YES" answer to any of five questions below.</li> <li>➤ Based on "NO" answer to all five questions below.</li> </ul>			<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
1. Does the change create new types of accident sequences that, unless mitigated or prevented, would exceed the performance requirements of <b>10 CFR 70.61</b> (create high or intermediate consequence events) and that have not previously been described in Framatome's ISA Summary?			<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
2. Does the change use new processes, technologies, or control systems for which Framatome has no prior experience?			<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
3. Does the change remove, without at least an equivalent replacement of the safety function an item relied on for safety ( <b>IROFS</b> ) that is listed in the ISA Summary?			<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
4. Does the change alter any item relied on for safety, listed in the ISA Summary, that is the sole item preventing or mitigating an accident sequence of high or intermediate consequences?			<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
5. Does the change qualify as a change specifically prohibited by NRC regulation, order or license condition?			<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
<b>Evaluation of Actions Required <u>PRIOR TO OR CONCURRENT</u> with Change Implementation:</b>			
6. Modification / Addition to CAS system or system coverage documentation			<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
7. Acquire NRC pre-approval (LICENSE AMENDMENT)			<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
8. Conduct/modify ISA			<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
9. Modify / update the following:	<input checked="" type="checkbox"/> None <input type="checkbox"/> Other	<input type="checkbox"/> ISA Database <input type="checkbox"/> Red-Line Drawings/P&ID	<input type="checkbox"/> NCSA <input type="checkbox"/> NCSS
		<input type="checkbox"/> NCSP <input type="checkbox"/> PHA	<input type="checkbox"/> RHA <input type="checkbox"/> FHA
			<input type="checkbox"/> ChHA <input type="checkbox"/> Procedures
<b>Evaluation of Actions Required <u>SUBSEQUENT TO</u> Change Implementation:</b>			
10. Modify / update the following:	<input checked="" type="checkbox"/> None <input type="checkbox"/> Other	<input type="checkbox"/> ISA Database <input type="checkbox"/> AS-Built Drawings/P&ID	<input type="checkbox"/> NCSA <input type="checkbox"/> NCSS
		<input type="checkbox"/> NCSP <input type="checkbox"/> PHA	<input type="checkbox"/> RHA <input type="checkbox"/> FHA
			<input type="checkbox"/> ChHA <input type="checkbox"/> Procedures
<p>Justification Section for "YES" preceding Questions 1 – 8 or other for 9, 10: Being prepared as part of a License Amendment, however pre-approval of the amendment prior to issuing is not required.</p>			

(\*) Only required if one or more of the boxes to exclude a particular safety discipline review is checked.

(\*\*) If this form exists as a part of a document, the document number is not required.

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## 6.0 Chemical Process Safety

### 6.1 *Richland Facility Safety Program*

Framatome Inc. (Framatome) has established, and will maintain, a safety program for the Richland facility that includes chemical process safety. With respect to NRC oversight, the program will address chemical risks of licensed materials, risks of chemicals produced from licensed materials, and chemical risks of plant conditions that could affect the safety of licensed materials. Chemical safety is an element of the Integrated Safety Analysis (ISA) process set forth in Chapter 3, Integrated Safety Analysis (ISA) and ISA Summary.

Framatome has developed, and will maintain, approved written procedures to assure effective implementation of its facility safety program.

### 6.2 *Application of Chemical Safety Controls*

The relative effectiveness and reliability of controls are considered during the chemical safety analysis process. Passive engineered controls to ensure chemical containment are preferred over other system controls and are utilized when practical and appropriate. Active engineered controls are the next preferred method of control followed by administrative controls.

Passive Engineered Controls are physical restraints or features that maintain chemical safety in a static manner (e.g., pipe and tank integrity, barriers to prevent collisions with pipes and tanks, etc.). Beyond appropriate initial installation, passive engineered controls require no action or other response to be effective when called upon to ensure safety. Assurance is maintained through periodic inspections or verification measurement(s) as appropriate.

Active Engineered Controls are a means of control involving active hardware (e.g., electrical, mechanical, hydraulic) that protect against chemical release/exposure. These devices act by providing automatic action to secure the system to a safe condition or to remove chemicals before they enter the environment, e.g., shutting off tank input prior to overfilling, scrubbing chemicals prior to release. Assurance is maintained through specific periodic functional testing as appropriate. Active engineered controls that are provided with fail-safe conditions (e.g., the failure of the control results in a safe condition) are the preferred type of active engineered control.

Enhanced Administrative Controls involve human intervention augmented by warning devices or other automated prompts and are preferred over simple procedural requirements for a specific action.

Administrative Controls are controls, typically imposed via procedures, that rely on actions, judgment, and responsible actions of people for their implementation. Their use is primarily limited to situations where passive and active engineered controls are not practical. Assurance is maintained through training, experience, and audit.

### 6.3 *Process Chemical Risk and Accident Sequences*

#### 6.3.1 Provision of Process Descriptions

A general process description for the primary production operations on the Richland site is provided in Section 1.1 of Chapter 1, General Information, of this license application. This is

supplemented by more detailed process system-by-process system descriptions in the Richland facility's ISA Summary.

#### 6.3.2 Identification and Evaluation of Chemical Accident Sequences

Potential accident sequences involving chemical hazards are addressed as part of the Richland site ISA. Accident sequence identification, consequence determination, likelihood determination, and risk evaluation are further described in the Richland site ISA Summary.

The Richland ISA considers chemical risks of licensed materials, risks of chemicals derived from licensed materials, and chemical risks imparted by plant conditions that in turn could potentially affect the safety of licensed materials. Assumptions consider maximum foreseeable inventories at specific use locations; cover routine, non-routine, and abnormal operational scenarios; and conservatively consider the physical properties of the pertinent chemicals. Results of the evaluations are compared to the performance criteria in 10 CFR 70.61 and documented in the site ISA Summary.

#### 6.3.3 Vapor Dispersion Modeling

Vapor dispersion models may be utilized to assess the consequences of chemical release accident scenarios, within the applicability of the ISA, for comparison to the performance criteria in 10 CFR 70.61. Source term input shall be conservative and underlying assumptions shall be documented. Dispersion evaluation approach and capabilities of the model shall be appropriate for the chemical species under evaluation. Preference will be given to models specifically validated for the pertinent chemical species.

#### 6.3.4 Chemical Exposure Standards

In support of the evaluation of chemical consequences under the ISA, Framatome identified quantitative chemical exposure standards in accordance with 10 CFR 70.65(b). These exposure standards are documented in the Richland site ISA Summary.

### 6.4 ***IROFS and Management Measures***

Chemical hazards pertinent to NRC oversight are addressed as part of the Richland site ISA. Consequences of unmitigated chemical accident sequences are compared to the performance criteria of 10 CFR 70.61.

For unmitigated chemical accident sequences not meeting 10 CFR 70.61 performance criteria, items relied on for safety (IROFS) are identified and implemented to establish compliance with those criteria. The accident sequences, their associated consequences and likelihoods, and IROFS, as applicable, are documented in the Richland site ISA Summary.

Management measures shall be identified and implemented as required to assure that engineered and administrative IROFS are available and reliable to perform their functions when called upon. Framatome's management measures programs are addressed in Chapter 11, Management Measures.

### 6.5 ***Requirements for New Facilities/New Processes***

For planned new facilities and/or new processes at the Richland site meeting the 10 CFR 70.72 criteria for a license amendment, facility/process design shall address the baseline design criteria (BDC) of 10 CFR 70.64 as they apply to control of chemical hazards. Application of the

BDC may be limited to those chemical safety controls that are identified as items relied on for safety per the applicable ISA.