

Existing (including Legacy) System Documentation Requirements

Existing (including Legacy) System Documentation Requirements¹

RECORD OF REVISIONS

Rev	Date	Description	POC	RM
0	9/17/2014	Initial issue. Modification of Table 16.1 of Chapter 17, Section I, rev. 3.	Ari Ben Swartz, <i>ES-EPD</i>	Larry Goen, <i>ES-DO</i>
0.1	5/04/2016	Reference correction in Table ADMIN-1-3-1, Documentation Requirements for Existing (including Legacy) Systems, 9. Piping System Documentation.	Ari Ben Swartz, <i>ES-EPD</i>	Larry Goen, <i>ES-DO</i>

Contact the Standards POC for upkeep, interpretation, and variance issues.

Chapter 17	<u>Pressure Safety POC and Committee</u>
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Table ADMIN-1-3-1

Documentation Requirements for Existing (including Legacy) Systems

Documentation Package Item	Required When	Owner Verification	PSO Verification
1. Form 1, LANL Pressure System Certification Status Form	Every Package		
2. Form 3, Code Non-Compliance Log (Form can be printed from Pressure Safety Database by PSO)	If Applicable		
3. Form 4, Minor Non-Compliance Log (Form can be printed from Pressure Safety Database by PSO)	If Applicable		
4. System schematics (If the owner does not have a system schematic, utilize the sketch prepared by the walkdown team until such time as system schematic is prepared) ²	Every Package		

¹ The requirements for existing systems reflect the graded approach described in other sections of this Chapter, and take credit for successful operating history.

² Information required on system schematics may be documented in alternative documents or captured in controlled databases, such as the Master Equipment List (MEL) or Computerized Maintenance Management System (CMMS), but must be referenced and readily available for review. The evaluation shall be considered a record and must be managed per LANL P1020, P1020-1, and P1020-2

Existing (including Legacy) System Documentation Requirements

Documentation Package Item	Required When	Owner Verification	PSO Verification
5. Alternate Method/Variance or clarification/interpretation (if applicable).	If the system or any item of the system has an applicable alternate method/variance or clarification/interpretation to the requirements of this document		
6. Code Stamped Vessel Fabrication Documentation	If the code data report is not available, a manufacturer’s construction drawing may be used to verify the item has not been modified. If the manufacturer’s construction drawing is not available, personal knowledge may be used to establish the code stamped item has not been modified. This requires a person or persons with intimate and long term personal knowledge since original receipt and installation of the item to create a statement of compliance. This statement of compliance will be used to document the history of the item and be used as evidence the code stamped item has not been modified. This statement of compliance will be signed by the persons of record.		
7. Non-ASME code Fabricated Vessel Information (code-equivalent Documentation)	The pressure system contains Non-ASME-code stamped boilers and pressure vessels (which includes boilers, pressure vessels, heat exchangers, and accumulators)		
a. ASME code equivalent documentation for systems with pressure vessels which includes but is not limited to minimum wall thickness determination, corrosion allowance, weld efficiency rating, support structure loading, nozzle calculations. Calculations will use the material values specified in the ASME code.	A non-code boiler, pressure vessel, heat exchanger or accumulator is in the pressure system package		
b. Pressure Qualification Test Procedures and data OR in-service leak test for FS2 and FS3 as allowed in ESM Chapter 17.	Non-code boiler, pressure vessel, heat exchanger or accumulator is in the pressure system package		
c. Modification procedures/instructions	Modifications were made to non-code boilers, pressure vessels, heat exchangers or accumulators is in the pressure system package		
d. Non-Destructive Evaluation (NDE) data reports	NDE was done to non-code boilers, pressure vessels, heat exchangers or accumulators is in the pressure system package		
e. Weld examination forms as described in ESM Chapter 13.	Welding was done to non-code boilers, pressure vessels, heat exchangers or accumulators is in the pressure system package		
f. Special Calculations such as welding	Special calculations are performed for non-code boilers, pressure vessels, heat exchangers or accumulators is in the pressure system package		

Existing (including Legacy) System Documentation Requirements

Documentation Package Item	Required When	Owner Verification	PSO Verification
g. Vendor Drawings	Piece parts are used to fabricate non-code boilers, pressure vessels, heat exchangers or accumulators is in the pressure system package		
h. Vessel modification reports	Vessel is modified from the as purchased condition.		
8. Pressure Safety Devices	The pressure system contains a pressure safety device (which includes but is not limited to relief valves and rupture discs)		
a. Flow Test documentation as described in this Chapter, if required	Whenever a relief valve has been modified, or when calculations cannot be generated.		
b. Safety Relief Calculations for relief valves and/or rupture discs, in accordance with ASME requirements	Every Package, unless calculations cannot be generated, a flow test is required in place of calculations.		
c. Pressure Relief Calculations for Rupture Disks in accordance with ASME requirements	Rupture Disks are in the pressure system		
d. Certified Test Data of relief valves, e.g. steam Pressure safety valves are certified by NBIC coded shop	A PRD is modified or tested by an outside facility		
e. Documentation of relief valve modification, (for example valve repair, orifice replacement, gasket replacement,	If a relief valve has been modified		
f. Identification as a liquid lock PRD on PRV Recall Summary Sheet and pressure system Component List spread sheet; in accordance with ASME B&PV Code	PRDs are used as protection against liquid lock overpressure. See ASME B&PVC UG-128.		
9. Piping System Documentation:			
a. Provide documentation required under "Section EXIST - Legacy System Requirements [4.0 Disposition Requirements for Existing (Legacy, etc.) Pressure Systems]"	The system contains pipe, tube, or other components not classed as boilers or vessels.		
b. Code required calculations e.g. flexibility analysis, pipe supports, wind loading, and seismic loading. See specific code for additional detail. (e.g. B31.3 paragraph 319 and 321)	A pressure system package contains piping system components		
10. Flexible pressure element external visual inspection records (Form 5)	The system contains flexible hoses		

Existing (including Legacy) System Documentation Requirements

Documentation Package Item	Required When	Owner Verification	PSO Verification
11. Pump or compressor discharge pressure curves, calculation, or table (If available)	The pressure system contains pumps or compressors		
12. Oxygen System Hazard Analysis (if applicable)	Pressure system is an oxygen system		

REDUCED REQUIREMENTS (LOW RISK)

System documentation requirements of Table ADMIN-1-3-1 may be reduced for legacy systems meeting the following criteria:

1. The pressure system is not subject to low-cycle fatigue (where significant plastic straining occurs).
2. High-cycle fatigue (where stresses and strains are largely confined to the elastic region) is controlled to less than 100,000 cycles for the life of the pressure system.
3. Corrosion is not a significant factor.
4. There are no stress intensification factors for examples cracks or acute angles of pressure boundaries.
5. The system components have exhibited extensive, successful service experience under comparable conditions with similarly proportioned components of the same or like materials.
6. The pressure system is not high pressure as defined by ASME B31.3 2010 Chapter IX.
7. The pressure system fluid is not Category M fluid as defined by ASME B31.3 2010.
8. The pressure system fluid is not steam.
9. The pressure system does not operate in the creep range.
10. The pressure system is not an ASME Section I, IV, VIII, or XII stamped item or an unstamped item performing the same task (e.g. a code equivalent vessel).
11. ASME B31.3 Fluid Category Normal or D.

When the above criteria are met, the system must pass an initial service leak test at the normal system operational pressures. Then, Table ADMIN-1-3-1 items 7.b-f, 9.a-b, and 10 are not required and Table ADMIN-1-3-1 becomes Table ADMIN-1-3-1ALT as follows:

Table ADMIN-1-3-1ALT

Alternative Documentation Requirements for Existing (including Legacy) Systems³

Documentation Package Item	Required When	Owner Verification	PSO Verification
1. Form 1, LANL Pressure System Certification Status Form	Every Package		

³ The requirements for existing systems reflect the graded approach described in other sections of this Chapter, and take credit for successful operating history.

Existing (including Legacy) System Documentation Requirements

Documentation Package Item	Required When	Owner Verification	PSO Verification
2. Form 3, Code Non-Compliance Log (Form can be printed from Pressure Safety Database by PSO), or reference on Form 1 to closed PFITS issue numbers.	If Applicable		
3. Form 4, Minor Non-Compliance Log (Form can be printed from Pressure Safety Database by PSO), or reference on Form 1 to closed PFITS issue numbers	If applicable		
4. System schematics (If the owner does not have a system schematic, utilize the sketch prepared by the walkdown team until such time as system schematic is prepared) ⁴	Every package		
5. Alternate Method/Variance or clarification/interpretation (if applicable). Only include system-specific, rather than generic, alternate methods, variances, clarifications, or interpretations.	If the system or any item of the system has an applicable alternate method/variance or clarification/interpretation to the requirements of this document		
6. Code Stamped Vessel Fabrication Documentation	<p>If the code data report is not available, a manufacturer’s construction drawing may be used to verify the item has not been modified. Record the NBIC tag number.</p> <p>If the manufacturer’s construction drawing is not available, personal knowledge may be used to establish the code stamped item has not been modified. This requires a person or persons with intimate and long term personal knowledge since original receipt and installation of the item to create a statement of compliance. This statement of compliance will be used to document the history of the item and be used as evidence the code stamped item has not been modified. This statement of compliance will be signed by the persons of record.</p>		
7. Pressure Safety Devices	The pressure system contains a pressure safety device (which includes but is not limited to relief valves and rupture discs)		

⁴ Information required on system schematics may be documented in alternative documents or captured in controlled databases, such as the Master Equipment List (MEL) or Computerized Maintenance Management System (CMMS), but must be referenced and readily available for review. The evaluation shall be considered a record and must be managed per LANL P1020, P1020-1, and P1020-2

Existing (including Legacy) System Documentation Requirements

Documentation Package Item	Required When	Owner Verification	PSO Verification
a. Flow Test documentation as described in this Chapter, if required	Whenever a relief valve has been modified, or when calculations cannot be generated.		
b. Safety Relief Calculations for relief valves, in accordance with ASME requirements	Every Package, unless calculations cannot be generated, a flow test is required in place of calculations.		
c. Pressure Relief Calculations for Rupture Disks in accordance with ASME requirements	Rupture Disks are in the pressure system		
8. Certified Test Data of relief valves, e.g. steam Pressure safety valves are certified by NBIC-coded shop	A PRD is modified or tested by an outside facility		
a. Documentation of relief valve modification, if required	If a relief valve has been modified		
b. Identification as a liquid lock PRD on PRV Recall Summary Sheet and pressure system Component List spread sheet.	PRDs are used as protection against liquid lock overpressure.		
c. Pump or compressor discharge pressure curves, calculation, or table (if available)	The pressure system contains pumps or compressors		
d. Oxygen System Hazard Analysis (if applicable)	Pressure system is an oxygen system		

Qualitative Risk-Based Evaluation (QR)-based Documentation Requirements for Legacy Pressure Systems

Tables ADMIN-1-3-A through ADMIN-1-3-U

Summary

In addition to the ADMIN-1-3-1ALT option above, and unless required by the CPSO (or when required by the risk-based evaluation), no detailed design information is required for B31.3 legacy pressure system documentation for systems that meet certain evaluation categories. This includes code-required piping and support calculations (e.g. ambient effects, weight effects, dynamic effects, flexibility analysis, pipe supports, wind loading, and seismic loading) see specific code for additional detail (e.g. B31.3 paragraphs 301.4 to 301.11, 319, and 321). In addition, no examination or inspection reports are required. These exemptions do not apply to pressure vessel and relief device analyses.

It is the user’s responsibility to ensure that systems that use these general pressure system legacy risk evaluations meet all the criteria established by the QR contained in this document.

Existing (including Legacy) System Documentation Requirements

The requirements for a general legacy pressure system with the highest hazard rank shall dominate for that specific portion of the pressure system. If other portions of the pressure system are engineered differently at a lower hazard rank, then those portions of the pressure system may be evaluated to the applicable general legacy pressure system risk-based engineering evaluation.

Table 1-3-1-SUM summarizes documentation required for certification of pressure system that meet the General Legacy Pressure System Description. The “Replacement Table ADMIN-1-3-” column defines which table will replace the Table ADMIN-1-3-1 requirements.

Information required on system schematics or forms may be documented in alternative documents or captured in controlled databases such as the Master Equipment List (MEL) or Computerized Maintenance Management System (CMMS), but must be referenced and readily available for review. The information shall be considered a record and must be managed per LANL P1020, P1020-1, and/or P1020-2.

Existing (including Legacy) System Documentation Requirements

Table 1-3-1-SUM Summary of Legacy Qualitative Risk-Based Engineering Matrix Requirements

Evaluation Category	General Legacy Pressure System Description	Fluid Service	Hazard Rank	Replacement Table ADMIN-1-3-	PSO/CPSO Certification FM01	Relief Protection Calculation and FM02	ASME Vessel or Equivalent Calculations	Pipe/Tube Wall Thickness FM06	Known Component MAWP FM07	Sketch FM10	Piping and Support Design Calculations
1	High Pressure – Pneumatic	FS1	1	A	YES	YES	YES	YES	YES	YES	No
2	Toxics (Category M)	FS1	2	B	YES	YES	YES	YES	YES	YES	No
3	Steam	FS2	3	C	YES	YES	YES	YES	YES	YES	YES
4	High Pressure – Liquid High Volumetric Rate	FS1	4	D	YES	YES	YES	YES	YES	YES	No
5	Corrosive ¹	FS2, FS3	5	E	YES	YES	YES	YES	YES	YES	No
6	Brittle Failure Mode (not leak before burst)	FS2, FS3	6	F	YES	YES	YES	YES	YES	YES	No
7	Oxygen ²	FS2, FS3	7	G	YES	YES	YES	YES	YES	YES	No
8	Flammables	FS2	8	H	YES	YES	YES	YES	YES	YES	No
9	Cryogenic Liquids	FS2	9	J	YES	YES	YES	No	YES	YES	No
10	Steam Condensate	FS3	10	K	YES	YES	YES	No	No	YES	No
11	Compressed Air	FS2, FS3	11	M	YES	YES	YES	No	No	YES	No

Existing (including Legacy) System Documentation Requirements

Evaluation Category	General Legacy Pressure System Description	Fluid Service	Hazard Rank	Replacement Table ADMIN-1-3-	PSO/CPSO Certification FM01	Relief Protection Calculation and FM02	ASME Vessel or Equivalent Calculations	Pipe/Tube Wall Thickness FM06	Known Component MAWP FM07	Sketch FM10	Piping and Support Design Calculations
	with Receiver										
12	Compressed Inert Gases – DOT Cylinders	FS2, FS3	14	N	YES	YES	YES	No	No	YES	No
13	Compressed Air Without Receiver	FS2, FS3	12	P	YES	YES	No	No	No	YES	No
14	Compressed Inert Gases – Building Systems	FS3	13	R	YES	YES	YES	No	No	YES	No
15	High Pressure –Low Liquid Volume	FS1	15	S	YES	YES	No	No	No	YES	No
16	Hydronic piping	FS3	16	T	YES	YES	No	No	No	YES	No
17	Water Systems	FS3	17	U	YES	YES	No	No	No	YES	No

¹ **Corrosive Service** – A fluid service in which the internal fluid, or external environment, is expected to produce a progressive deterioration in the pressure boundary material.

² Evaluate oxygen systems as required in ASTM G128 and other referenced ASTM standards to determine the likelihood of fire.

(***Note:** New Table Numbers “ADMIN-1-3-I”, “ADMIN-1-3-L”, “ADMIN-1-3-O”, and “ADMIN-1-3-Q” were not used to eliminate confusion)

Existing (including Legacy) System Documentation Requirements

General Legacy Pressure System Description for High Pressure – Inert Pneumatic

Evaluation Category 1

Assumptions:

Fluid Service

1. The system fluid service is a FS1 as defined by ESM Chapter 17
 - 1.1. The pressure system fluid service is high pressure as define by ASME B31.3 2010 Chapter IX.
2. Corrosion is not a significant factor.
3. Materials of construction are compatible with the system fluid service.

System Operation

1. The pressure system is not subject to low-cycle fatigue (where significant plastic straining occurs).
2. High-cycle fatigue (where stresses and strains are largely confined to the elastic region) is controlled to less than 100,000 cycles for the life of the pressure system.
3. The pressure system does not operate in the creep range.
4. There are no stress intensification factors for example cracks or acute angles of pressure boundaries.

System Hardware

1. The system components have exhibited extensive, successful service experience under comparable conditions with similarly proportioned components of the same or like material.
2. The system is equipped with a properly sized, set, and functional pressure relief device(s), if needed, to protect against single point failures. Relief device exhaust locations are properly sized and located to protect personnel.
3. There are no locations in the system that requires relief protection that may be isolated from relief protection.
4. Flexible hoses over 12 inches in length and in service pressure greater than 150 psig are restrained in accordance with ESM Chapter 17.
5. In response to the PISA on LANL Welding Program (circa 2004) representative accessible welds were visually inspected and are free from indications. Solder or braze joints are not allowed.
6. External appearance is free from corrosion or indication of leakage.

Failure Mode

1. A ductile failure mode is assumed (not brittle fracture).

Consequence of Failure

1. The result of the failure will not result in serious personnel injury.

Safety Class

1. Applicable to ML4 only.

Existing (including Legacy) System Documentation Requirements

Documentation Requirements

1. These high pressure systems shall be exempt from the requirements of having code leak test documentation.
2. These high pressure systems may continue to use unlisted components provided they are used within the temperature and pressure ratings of the manufacturer.
3. This equipment will be considered grandfathered and will not be replaced with like items. System shall be upgraded to ASME compliance as items age out of service.
4. LANL ESM Chapter 17 documentation as required by Table ADMIN-1-3-A include: certification status form (FM01), relief device (FM02), component list (FM07), and sketch (FM10).
5. Piping shall be of known or verified wall thickness (FM06).
6. These high pressure systems may continue to use non-ASME stamped vessels provided calculations are performed to verify code-equivalent ratings.
7. When vessels are included as part of the high pressure system they must be evaluated for current MAWP based on the most applicable code or standard.

Qualitative Risk Assessment

Probability: Remote

Consequence: Significant

QR Factor: 4

Table 3 Qualitative Risk (QR) Determination

		Probability					
		A	B	C	D	E	
		Frequent	Probable	Occasional	Remote	Improbable	
C o n s e q u e n c e	I	Major	1	1	1	2	3
	II	Serious	1	1	2	3	4
	III	Significant	1	2	3	4	5
	IV	Minor	2	3	4	5	6
	V	Insignificant	3	4	5	6	7

Existing (including Legacy) System Documentation Requirements

Table ADMIN-1-3-A			
General Legacy Pressure System Documentation for High Pressure – Inert Pneumatic			
Documentation Package Item	Comment	Owner Verification	PSO Verification
1. Form 1, LANL Pressure System Certification Status Form	Every Package		
2. Form 6, Piping System thickness verification	Every Package		
3. Form 7, Component List	Every Package		
4. Form 10, Form 10, System schematics (If the owner does not have a system schematic, utilize the sketch prepared by the walkdown team until such time as system schematic is prepared) ⁵	Every Package		
5. Alternate Method/Variance or clarification/interpretation (if applicable).	If the system or any item of the system has an applicable alternate method/variance or clarification/interpretation to the requirements of this document		

⁵ Information required on Form 10, System schematics may be documented in alternative documents or captured in controlled databases, such as the Master Equipment List (MEL) or Computerized Maintenance Management System (CMMS), but must be referenced and readily available for review. The evaluation shall be considered a record and must be managed per LANL P1020, P1020-1, and P1020-2

Existing (including Legacy) System Documentation Requirements

Table ADMIN-1-3-A			
General Legacy Pressure System Documentation for High Pressure – Inert Pneumatic			
Documentation Package Item	Comment	Owner Verification	PSO Verification
6. Code Stamped Vessel Fabrication Documentation	<p>If the code data report is not available, a manufacturer’s construction drawing may be used to verify the item has not been modified. Record the NBIC tag number.</p> <p>If the manufacturer’s construction drawing is not available, personal knowledge may be used to establish the code stamped item has not been modified. This requires a person or persons with intimate and long term personal knowledge since original receipt and installation of the item to create a statement of compliance. This statement of compliance will be used to document the history of the item and be used as evidence the code stamped item has not been modified. This statement of compliance will be signed by the persons of record.</p>		
a. Vessel thickness and remaining life estimate	Every Package		
7. Non-ASME code Fabricated Vessel Information (code-equivalent Documentation)	The pressure system contains Non-ASME-code stamped boilers and pressure vessels (which includes boilers, pressure vessels, heat exchangers, and accumulators)		
a. ASME code equivalent documentation for systems with pressure vessels which includes but is not limited to minimum wall thickness determination, corrosion allowance, weld efficiency rating, support structure loading, nozzle calculations. Calculations will use the material values specified in the ASME code.	A non-code boiler, pressure vessel, heat exchanger or accumulator is in the pressure system package		
b. Vessel thickness and remaining life estimate	Every Package		
8. Piping System Documentation:			

Existing (including Legacy) System Documentation Requirements

Table ADMIN-1-3-A			
General Legacy Pressure System Documentation for High Pressure – Inert Pneumatic			
Documentation Package Item	Comment	Owner Verification	PSO Verification
a. Form 06, Piping thickness and remaining life estimate	Every Package		
b. FM07	Every Package		
9. Pressure Safety Devices	The pressure system contains a pressure safety device (which includes but is not limited to relief valves and rupture discs)		
a. Safety Relief Calculations for relief valves, in accordance with ASME requirements	Every Package, unless calculations cannot be generated, a flow test is required in place of calculations.		
b. Pressure Relief Calculations for Rupture Disks in accordance with ASME requirements	Rupture Disks are in the pressure system		
c. Certified Test Data of relief valves, e.g. steam Pressure safety valves are certified by NBIC coded shop	A PRD is modified or tested by an outside facility		
10. Pump or compressor discharge pressure curves, calculation, or table (If available)	Only applicable if the pressure system contains pumps or compressors		

Existing (including Legacy) System Documentation Requirements

General Legacy Pressure System Description for Toxics

Evaluation Category 2

Assumptions:

Fluid Service

1. The system fluid service is a FS1 as defined by ESM Chapter 17
 - 1.1. The pressure system fluid service is Category M as define by ASME B31.3 2010 Chapter IX.
2. Corrosion is not a significant factor.
3. Materials of construction are compatible with the system fluid service.

System Operation

1. The pressure system is not subject to low-cycle fatigue (where significant plastic straining occurs).
2. High-cycle fatigue (where stresses and strains are largely confined to the elastic region) is controlled to less than 100,000 cycles for the life of the pressure system.
3. The pressure system does not operate in the creep range.
4. There are no stress intensification factors for example cracks or acute angles of pressure boundaries.

System Hardware

1. The system components have exhibited extensive, successful service experience under comparable conditions with similarly proportioned components of the same or like material.
2. The system is equipped with a properly sized, set, and functional pressure relief device(s), if needed, to protect against single point failures. Relief device exhaust locations are properly sized and located to protect personnel.
3. There are no locations in the system that requires relief protection that may be isolated from relief protection.
4. Flexible hoses over 12 inches in length and in service pressure greater than 150 psig are restrained in accordance with ESM Chapter 17.
5. In response to the PISA on LANL Welding Program (circa 2004) representative accessible welds were visually inspected and are free from indications. Solder or braze joints are not allowed.
6. External appearance is free from corrosion or indication of leakage.

Failure Mode

1. A ductile failure mode is assumed (not brittle fracture).

Consequence of Failure

1. The result of the failure may result in serious personnel injury

Safety Class

1. Applicable to ML4 only.

Existing (including Legacy) System Documentation Requirements

Documentation Requirements

1. These toxic pressure systems shall be exempt from the requirements of having code leak test documentation.
2. These toxic pressure systems may continue to use unlisted components provided the manufacturer’s rating is adequate.
3. This equipment will be considered grandfathered and will not be replaced with like items. System shall be upgraded to ASME compliance as items age out of service by attrition.
4. LANL ESM Chapter 17 documentation as required by Table ADMIN-1-3-B include: certification status form (FM01), relief device (FM02), component list (FM07), and sketch (FM10).
5. Piping shall be of known or verified wall thickness (FM06).
6. These toxic pressure systems may continue to use non-ASME stamped vessels provided calculations are performed to verify code-equivalent ratings.
7. When vessels are included as part of the toxic pressure system they must be evaluated for current MAWP based on the most applicable code or standard.

Qualitative Risk Assessment

Probability: Remote

Consequence: Serious

QR Factor: 3

Table 3 Qualitative Risk (QR) Determination

		Probability					
		A	B	C	D	E	
		Frequent	Probable	Occasional	Remote	Improbable	
C o n s e q u e n c e	I	Major	1	1	1	2	3
	II	Serious	1	1	2	3	4
	III	Significant	1	2	3	4	5
	IV	Minor	2	3	4	5	6
	V	Insignificant	3	4	5	6	7

Existing (including Legacy) System Documentation Requirements

Table ADMIN-1-3-B			
General Legacy Pressure System Documentation for Toxic			
Documentation Package Item	Required When	Owner Verification	PSO Verification
1. Form 1, LANL Pressure System Certification Status Form	Every Package		
2. Form 10, System schematics (If the owner does not have a system schematic, utilize the sketch prepared by the walkdown team until such time as system schematic is prepared) ⁷⁸	Every Package		
3. Alternate Method/Variance or clarification/interpretation (if applicable). See Part 10.0 of this standard.	If the system or any item of the system has an applicable alternate method/variance or clarification/interpretation to the requirements of this document		
4. Code Stamped Vessel Fabrication Documentation	If the code data report is not available, a manufacturer’s construction drawing may be used to verify the item has not been modified. If the manufacturer’s construction drawing is not available, personal knowledge may be used to establish the code stamped item has not been modified. This requires a person or persons with intimate and long term personal knowledge since original receipt and installation of the item to create a statement of compliance. This statement of compliance will be used to document the history of the item and be used as evidence the code stamped item has not been modified. This statement of compliance will be signed by the persons of record.		
a. Vessel thickness and remaining life estimate	Every Package		
5. Non-ASME code Fabricated Vessel Information (code-equivalent Documentation)	The pressure system contains Non-ASME-code stamped boilers and pressure vessels (which includes boilers, pressure vessels, heat exchangers, and accumulators)		

⁷⁸ Information required on Form 10, System schematics may be documented in alternative documents or captured in controlled databases, such as the Master Equipment List (MEL) or Computerized Maintenance Management System (CMMS), but must be referenced and readily available for review. The evaluation shall be considered a record and must be managed per LANL P1020, P1020-1, and P1020-2

Existing (including Legacy) System Documentation Requirements

Table ADMIN-1-3-B			
General Legacy Pressure System Documentation for Toxic			
Documentation Package Item	Required When	Owner Verification	PSO Verification
a. ASME code equivalent documentation for systems with pressure vessels which includes but is not limited to minimum wall thickness determination, corrosion allowance, weld efficiency rating, support structure loading, nozzle calculations. Calculations will use the material values specified in the ASME code.	A non-code boiler, pressure vessel, heat exchanger or accumulator is in the pressure system package		
b. Vessel thickness and remaining life estimate	Every Package		
6. Pressure Safety Devices	The pressure system contains a pressure safety device (which includes but is not limited to relief valves and rupture discs)		
a. Safety Relief Calculations for relief valves, in accordance with ASME requirements	Every Package, unless calculations cannot be generated, a flow test is required in place of calculations.		
b. Pressure Relief Calculations for Rupture Disks in accordance with ASME requirements	Rupture Disks are in the pressure system		
c. Certified Test Data of relief valves, e.g. steam Pressure safety valves are certified by NBIC coded shop	A PRD is modified or tested by an outside facility		
7. Piping System Documentation:			
a. Form 06, Piping thickness and remaining life estimate	Every Package		
a. FM07	Every Package		
8. Pump or compressor discharge pressure curves, calculation, or table (If available)	The pressure system contains pumps or compressors		

Existing (including Legacy) System Documentation Requirements

General Legacy Pressure System Description for Steam

Evaluation Category 3

Assumptions:

Fluid Service

1. The system fluid service is an FS2 as defined by ESM Chapter 17
 - 1.1. The pressure system fluid service is steam as define by ASME B31.1 (steam greater than 15 psig or high temperature water exceeding 160 psig).
 - 1.2. The pressure system fluid service is steam as define by ASME B31.9 (steam less than 15 psig or less, and water heating units to 160 psig)
2. Materials of construction are of known compatible with steam and an estimate of remaining life is available.

System Operation

1. The pressure system is not subject to low-cycle fatigue (where significant plastic straining occurs).
2. High-cycle fatigue (where stresses and strains are largely confined to the elastic region) is controlled to less than 100,000 cycles for the life of the pressure system.
3. The pressure system does not operate in the creep range.
4. There are no stress intensification factors for example cracks or acute angles of pressure boundaries.

System Hardware

1. The system components have exhibited extensive, successful service experience under comparable conditions with similarly proportioned components of the same or like material.
2. The system is equipped with a properly sized, set, and functional pressure relief device(s), if needed, to protect against single point failures. Relief device exhaust locations are properly sized and located to protect personnel.
3. There are no locations in the system that requires relief protection that may be isolated from relief protection.
4. Flexible hoses over 12 inches in length and in service pressure greater than 150 psig are restrained in accordance with ESM Chapter 17.
5. In response to the PISA on LANL Welding Program (circa 2004) representative accessible welds were visually inspected and are free from indications. Solder or braze joints are not allowed.
6. External appearance is free from corrosion or indication of leakage.
7. The steam system is constructed from iron metallic materials suitable for elevated service.

Failure Mode

1. A ductile failure mode is assumed (not brittle fracture).

Consequence of Failure

1. The result of the failure may result in serious personnel injury.

Safety Class

1. Applicable to ML4 only.

Existing (including Legacy) System Documentation Requirements

Documentation Requirements

1. Existing steam pressure systems shall be exempt from the requirements of having code leak test documentation.
2. Existing steam pressure systems may continue to use unlisted components provided the manufacturer’s rating is adequate.
3. Existing steam systems equipment will be considered grandfathered and shall be upgraded to ASME requirements as items age out of service by attrition.
4. LANL ESM Chapter 17 documentation as required by Table ADMIN-1-3-C include: certification status form (FM01), relief device (FM02), component list (FM07), and sketch (FM10).
5. Piping shall be of known or verified wall thickness (FM06).
6. Existing steam pressure systems may continue to use non-ASME stamped vessels provided calculations are performed to verify code-equivalent ratings.
7. When vessels are included as part of the steam pressure system they must be evaluated for current MAWP based on the most applicable code or standard.
8. Existing steam systems must be evaluated for thermal growth if evidence exists of previous repair or damaged caused by thermal growth (rupture, bending, etc...)

Qualitative Risk Assessment

Probability: Remote

Consequence: Serious

QR Factor: 3

Table 3 Qualitative Risk (QR) Determination

C o n s e q u e n c e			Probability				
			A	B	C	D	E
			Frequent	Probable	Occasional	Remote	Improbable
I	Major	1	1	1	2	3	
II	Serious	1	1	2	3	4	
III	Significant	1	2	3	4	5	
IV	Minor	2	3	4	5	6	
V	Insignificant	3	4	5	6	7	

Existing (including Legacy) System Documentation Requirements

Table ADMIN-1-3-C			
General Legacy Pressure System Documentation for Steam			
Documentation Package Item	Required When	Owner Verification	PSO Verification
1. Form 1, LANL Pressure System Certification Status Form	Every Package		
2. Form 10, System schematics (If the owner does not have a system schematic, utilize the sketch prepared by the walkdown team until such time as system schematic is prepared) ⁷	Every Package		
3. Alternate Method/Variance or clarification/interpretation (if applicable).	If the system or any item of the system has an applicable alternate method/variance or clarification/interpretation to the requirements of this document		
4. Code Stamped Vessel Fabrication Documentation	<p>If the code data report is not available, a manufacturer's construction drawing may be used to verify the item has not been modified.</p> <p>If the manufacturer's construction drawing is not available, personal knowledge may be used to establish the code stamped item has not been modified. This requires a person or persons with intimate and long term personal knowledge since original receipt and installation of the item to create a statement of compliance. This statement of compliance will be used to document the history of the item and be used as evidence the code stamped item has not been modified. This statement of compliance will be signed by the persons of record.</p>		
a. Vessel thickness and remaining life estimate	Every Package		
a. Vessel thickness and remaining life estimate	Every Package		

⁷ Information required on Form 10, System schematics may be documented in alternative documents or captured in controlled databases, such as the Master Equipment List (MEL) or Computerized Maintenance Management System (CMMS), but must be referenced and readily available for review. The evaluation shall be considered a record and must be managed per LANL P1020, P1020-1, and P1020-2

Existing (including Legacy) System Documentation Requirements

Table ADMIN-1-3-C			
General Legacy Pressure System Documentation for Steam			
Documentation Package Item	Required When	Owner Verification	PSO Verification
7. Non-ASME code Fabricated Vessel Information (code-equivalent Documentation)	The pressure system contains Non-ASME-code stamped boilers and pressure vessels (which includes boilers, pressure vessels, heat exchangers, and accumulators)		
a. ASME code equivalent documentation for systems with pressure vessels which includes but is not limited to minimum wall thickness determination, corrosion allowance, weld efficiency rating, support structure loading, nozzle calculations. Calculations will use the material values specified in the ASME code.	A non-code boiler, pressure vessel, heat exchanger or accumulator is in the pressure system package		
b. Vessel thickness and remaining life estimate	Every Package		
8. Pressure Safety Devices	The pressure system contains a pressure safety device (which includes but is not limited to relief valves and rupture discs)		
a. Safety Relief Calculations for relief valves, in accordance with ASME requirements	Every Package, unless calculations cannot be generated, a flow test is required in place of calculations.		
b. Pressure Relief Calculations for Rupture Disks in accordance with ASME requirements	Rupture Disks are in the pressure system		
c. Certified Test Data of relief valves, e.g. steam Pressure safety valves are certified by NBIC coded shop	A PRD is modified or tested by an outside facility		
9. Piping System Documentation:			
a. Provide documentation evaluating effects of thermal growth.	If evidence of historical thermal growth problems.		
b. Form 06, Piping thickness and remaining life estimate	Every Package		
c. Form 07	Every Package		

Existing (including Legacy) System Documentation Requirements

General Legacy Pressure System Description for

High Pressure – Liquid High Volumetric Rate

Evaluation Category 4

Assumptions:

Fluid Service

1. The system fluid service is a FS1 liquid with a high flow liquid rate such that whipping of flex lines is an issue.
 - 1.1. The pressure system fluid service is high pressure as define by ASME B31.3 2010 Chapter IX.
2. Materials of construction are of known compatible with fluid and an estimate of remaining life is available.
3. Corrosion is not a significant factor.

System Operation

1. The pressure system is not subject to low-cycle fatigue (where significant plastic straining occurs).
2. High-cycle fatigue (where stresses and strains are largely confined to the elastic region) is controlled to less than 100,000 cycles for the life of the pressure system.
3. The pressure system does not operate in the creep range.
4. There are no stress intensification factors for example cracks or acute angles of pressure boundaries.

System Hardware

1. The system components have exhibited extensive, successful service experience under comparable conditions with similarly proportioned components of the same or like material.
2. The system is equipped with a properly sized, set, and functional pressure relief device(s), if needed, to protect against single point failures. Relief device exhaust locations are properly sized and located to protect personnel.
3. There are no locations in the system that requires relief protection that may be isolated from relief protection.
4. Flexible hoses over 12 inches in length and in service pressure greater than 150 psig are restrained in accordance with ESM Chapter 17.
5. In response to the PISA on LANL Welding Program (circa 2004) representative accessible welds were visually inspected and are free from indications. Solder or braze joints are not allowed.
6. External appearance is free from corrosion or indication of leakage.

Failure Mode

1. A ductile failure mode is assumed (not brittle fracture).

Consequence of Failure

2. The result of the failure will not result in serious personnel injury.

Safety Class

1. Applicable to ML4 only.

Existing (including Legacy) System Documentation Requirements

Documentation Requirements

1. The existing high pressure – liquid high volumetric rate pressure systems shall be exempt from the requirements of having code leak test documentation.
2. The existing high pressure – liquid high volumetric rate pressure systems may continue to use unlisted components provided the manufacturer’s rating is adequate.
3. The existing high pressure – liquid high volumetric rate pressure systems equipment will be considered grandfathered and shall be upgraded to ASME requirements as items age out of service by attrition.
4. LANL ESM Chapter 17 documentation as required by Table ADMIN-1-3-D include: certification status form (FM01), relief device (FM02), component list (FM07), and sketch (FM10).
5. Piping shall be of known or verified wall thickness (FM06).
6. The existing high pressure – liquid high volumetric rate pressure systems may continue to use non-ASME stamped vessels provided calculations are performed to verify code-equivalent ratings.
7. When vessels are included as part of the high pressure – liquid high volumetric rate pressure system they must be evaluated for current MAWP based on the most applicable code or standard.

Qualitative Risk Assessment

Probability: Remote

Consequence: Significant

QR Factor: 4

Table 3 Qualitative Risk (QR) Determination

		Probability					
		A	B	C	D	E	
		Frequent	Probable	Occasional	Remote	Improbable	
C o n s e q u e n c e	I	Major	1	1	1	2	3
	II	Serious	1	1	2	3	4
	III	Significant	1	2	3	4	5
	IV	Minor	2	3	4	5	6
	V	Insignificant	3	4	5	6	7

Existing (including Legacy) System Documentation Requirements

Table ADMIN-1-3-D			
General Legacy Pressure System Documentation for High Pressure – Liquid High Volumetric Rate			
Documentation Package Item	Required When	Owner Verification	PSO Verification
1. Form 1, LANL Pressure System Certification Status Form	Every Package		
2. Form 10, System schematics (If the owner does not have a system schematic, utilize the sketch prepared by the walkdown team until such time as system schematic is prepared) ⁸	Every Package		
3. Alternate Method/Variance or clarification/interpretation (if applicable).	If the system or any item of the system has an applicable alternate method/variance or clarification/interpretation to the requirements of this document		
4. Code Stamped Vessel Fabrication Documentation	If the code data report is not available, a manufacturer’s construction drawing may be used to verify the item has not been modified. If the manufacturer’s construction drawing is not available, personal knowledge may be used to establish the code stamped item has not been modified. This requires a person or persons with intimate and long term personal knowledge since original receipt and installation of the item to create a statement of compliance. This statement of compliance will be used to document the history of the item and be used as evidence the code stamped item has not been modified. This statement of compliance will be signed by the persons of record.		
a. Vessel thickness and remaining life estimate	Every Package		
5. Non-ASME code Fabricated Vessel Information (code-equivalent Documentation)	The pressure system contains Non-ASME-code stamped boilers and pressure vessels (which includes boilers, pressure vessels, heat exchangers, and accumulators)		

⁸ Information required on Form 10, System schematics may be documented in alternative documents or captured in controlled databases, such as the Master Equipment List (MEL) or Computerized Maintenance Management System (CMMS), but must be referenced and readily available for review. The evaluation shall be considered a record and must be managed per LANL P1020, P1020-1, and P1020-2

Existing (including Legacy) System Documentation Requirements

Table ADMIN-1-3-D			
General Legacy Pressure System Documentation for High Pressure – Liquid High Volumetric Rate			
Documentation Package Item	Required When	Owner Verification	PSO Verification
a. ASME code equivalent documentation for systems with pressure vessels which includes but is not limited to minimum wall thickness determination, corrosion allowance, weld efficiency rating, support structure loading, nozzle calculations. Calculations will use the material values specified in the ASME code.	A non-code boiler, pressure vessel, heat exchanger or accumulator is in the pressure system package		
b. Vessel thickness and remaining life estimate	Every Package		
6. Pressure Safety Devices	The pressure system contains a pressure safety device (which includes but is not limited to relief valves and rupture discs)		
a. Safety Relief Calculations for relief valves, in accordance with ASME requirements	Every Package, unless calculations cannot be generated, a flow test is required in place of calculations.		
b. Pressure Relief Calculations for Rupture Disks in accordance with ASME requirements	Rupture Disks are in the pressure system		
c. Certified Test Data of relief valves, e.g. steam Pressure safety valves are certified by NBIC coded shop	A PRD is modified or tested by an outside facility		
7. Piping System Documentation:			
a. Form 06, Piping thickness and remaining life estimate	Every Package		
b. FM07	Every Package		

Existing (including Legacy) System Documentation Requirements

General Legacy Pressure System Description for Corrosives

Evaluation Category 5

Assumptions:

Fluid Service

1. The system fluid service is a FS2 or FS3 as defined by ESM Chapter 17
2. The pressure system fluid service is corrosive and is defined as Fluid Category Normal by ASME B31.3 2010 Chapter IX.
3. Materials of construction are of known compatible with fluid and an estimate of remaining life is available.

System Operation

1. The pressure system is not subject to low-cycle fatigue (where significant plastic straining occurs).
2. High-cycle fatigue (where stresses and strains are largely confined to the elastic region) is controlled to less than 100,000 cycles for the life of the pressure system.
3. The pressure system does not operate in the creep range.
4. There are no stress intensification factors for example cracks or acute angles of pressure boundaries.

System Hardware

1. The system components have exhibited extensive, successful service experience under comparable conditions with similarly proportioned components of the same or like material.
2. The system is equipped with a properly sized, set, and functional pressure relief device(s), if needed, to protect against single point failures. Relief device exhaust locations are properly sized and located to protect personnel.
3. There are no locations in the system that requires relief protection that may be isolated from relief protection.
4. Flexible hoses over 12 inches in length and in service pressure greater than 150 psig are restrained in accordance with ESM Chapter 17.
5. In response to the PISA on LANL Welding Program (circa 2004) representative accessible welds were visually inspected and are free from indications. Solder or braze joints are not allowed.
6. External appearance is free from corrosion or indication of leakage.

Failure Mode

1. A ductile failure mode is assumed (not brittle fracture).

Consequence of Failure

1. The result of the failure will not result in serious personnel injury.

Safety Class

1. Applicable to ML4 only.

Documentation Requirements

1. The existing corrosive pressure systems shall be exempt from the requirements of having code leak test documentation.

Existing (including Legacy) System Documentation Requirements

2. The existing corrosive pressure systems may continue to use unlisted components provided the manufacturer’s rating is adequate.
3. The existing corrosive pressure systems equipment will be considered grandfathered and shall be upgraded to ASME requirements as items age out of service by attrition.
4. LANL ESM Chapter 17 documentation as required by Table ADMIN-1-3-E include: certification status form (FM01), relief device (FM02), component list (FM07), and sketch (FM10).
5. Piping shall be of known or verified wall thickness (FM06).
6. Existing corrosive pressure systems may continue to use non-ASME stamped vessels provided calculations are performed to verify code-equivalent ratings.
7. When vessels are included as part of the corrosive pressure system they must be evaluated for current MAWP based on the most applicable code or standard.

Qualitative Risk Assessment

Probability: Remote

Consequence: Significant

QR Factor: 4

Table 3 Qualitative Risk (QR) Determination

		Probability					
		A	B	C	D	E	
		Frequent	Probable	Occasional	Remote	Improbable	
C o n s e q u e n c e	I	Major	1	1	1	2	3
	II	Serious	1	1	2	3	4
	III	Significant	1	2	3	4	5
	IV	Minor	2	3	4	5	6
	V	Insignificant	3	4	5	6	7

Existing (including Legacy) System Documentation Requirements

Table ADMIN-1-3-E			
General Legacy Pressure System Documentation for Corrosive (characteristic of fluid and boundary materials)			
Documentation Package Item	Required When	Owner Verification	PSO Verification
1. Form 1, LANL Pressure System Certification Status Form	Every Package		
2. Form 10, System schematics (If the owner does not have a system schematic, utilize the sketch prepared by the walk down team until such time as system schematic is prepared) ⁹	Every Package		
3. Alternate Method/Variance or clarification/interpretation (if applicable).	If the system or any item of the system has an applicable alternate method/variance or clarification/interpretation to the requirements of this document		
4. Code Stamped Vessel Fabrication Documentation	If the code data report is not available, a manufacturer’s construction drawing may be used to verify the item has not been modified. If the manufacturer’s construction drawing is not available, personal knowledge may be used to establish the code stamped item has not been modified. This requires a person or persons with intimate and long term personal knowledge since original receipt and installation of the item to create a statement of compliance. This statement of compliance will be used to document the history of the item and be used as evidence the code stamped item has not been modified. This statement of compliance will be signed by the persons of record.		
a. Vessel thickness and remaining life estimate	Every Package		
5. Non-ASME code Fabricated Vessel Information (code-equivalent Documentation)	The pressure system contains Non-ASME-code stamped boilers and pressure vessels (which includes boilers, pressure vessels, heat exchangers, and accumulators)		

⁹ Information required on Form 10, System schematics may be documented in alternative documents or captured in controlled databases, such as the Master Equipment List (MEL) or Computerized Maintenance Management System (CMMS), but must be referenced and readily available for review. The evaluation shall be considered a record and must be managed per LANL P1020, P1020-1, and P1020-2

Existing (including Legacy) System Documentation Requirements

Table ADMIN-1-3-E			
General Legacy Pressure System Documentation for Corrosive (characteristic of fluid and boundary materials)			
Documentation Package Item	Required When	Owner Verification	PSO Verification
a. ASME code equivalent documentation for systems with pressure vessels which includes but is not limited to minimum wall thickness determination, corrosion allowance, weld efficiency rating, support structure loading, nozzle calculations. Calculations will use the material values specified in the ASME code.	A non-code boiler, pressure vessel, heat exchanger or accumulator is in the pressure system package		
b. Vessel thickness and remaining life estimate	Every Package		
6. Pressure Safety Devices	The pressure system contains a pressure safety device (which includes but is not limited to relief valves and rupture discs)		
a. Safety Relief Calculations for relief valves, in accordance with ASME requirements	Every Package, unless calculations cannot be generated, a flow test is required in place of calculations.		
b. Pressure Relief Calculations for Rupture Disks in accordance with ASME requirements	Rupture Disks are in the pressure system		
c. Certified Test Data of relief valves, e.g. steam Pressure safety valves are certified by NBIC coded shop	A PRD is modified or tested by an outside facility		
7. Piping System Documentation:			
a. Form 06, Piping thickness and remaining life estimate	Every Package		
b. FM07	Every Package		
8. Pump or compressor discharge pressure curves, calculation, or table (If available)	The pressure system contains pumps or compressors		

Existing (including Legacy) System Documentation Requirements

General Legacy Pressure System Description for Brittle Failure Mode

Evaluation Category 6

Assumptions:

Fluid Service

1. The system fluid service is a FS2 or FS3 as defined by ESM Chapter 17
2. Materials of construction are compatible with the system fluid service.

System Operation

1. The pressure system does not operate in the creep range.
2. There are no stress intensification factors for example cracks or acute angles of pressure boundaries.
3. The system is not subject to pressure spikes for example water or steam hammer.

System Hardware

1. The system components have exhibited extensive, successful service experience under comparable conditions with similarly proportioned components of the same or like material.
2. The system is equipped with a properly sized, set, and functional pressure relief device(s), if needed, to protect against single point failures. Relief device exhaust locations are properly sized and located to protect personnel.
3. There are no locations in the system that requires relief protection that may be isolated from relief protection.
4. Flexible hoses over 12 inches in length and in service pressure greater than 150 psig are restrained in accordance with ESM Chapter 17.
5. In response to the PISA on LANL Welding Program (circa 2004) representative accessible welds were visually inspected and are free from indications. Solder or braze joints are not allowed.
6. External appearance is free from corrosion or indication of leakage.

Failure Mode

1. A brittle failure mode is assumed.

Consequence of Failure

1. The result of the failure will not result in serious personnel injury. Safe-guarding will be applied if necessary.

Safety Class

1. Applicable to ML4 only.

Documentation Requirements

1. These brittle pressure systems shall be exempt from the requirements of having code leak test documentation.
2. These brittle pressure systems may continue to use unlisted components provided they are used within the temperature and pressure ratings of the manufacturer's.
3. This equipment will be considered grandfathered and will not be replaced with like items. System shall be upgraded to ASME compliance as items age out of service by attrition.

Existing (including Legacy) System Documentation Requirements

4. LANL ESM Chapter 17 documentation as required by Table ADMIN-1-3-F include: certification status form (FM01), relief device (FM02), component list (FM07), and sketch (FM10).
5. Piping shall be of known or verified wall thickness (FM06).
6. These brittle pressure systems may continue to use non-ASME stamped vessels provided calculations are performed to verify code-equivalent ratings.
7. When vessels are included as part of the brittle pressure system they must be evaluated for current MAWP based on the most applicable code or standard.

Qualitative Risk Assessment

Probability: Remote

Consequence: Significant

QR Factor: 4

Table 3 Qualitative Risk (QR) Determination

C o n s e q u e n c e			Probability				
			A	B	C	D	E
			Frequent	Probable	Occasional	Remote	Improbable
I	Major	1	1	1	2	3	
II	Serious	1	1	2	3	4	
III	Significant	1	2	3	4	5	
IV	Minor	2	3	4	5	6	
V	Insignificant	3	4	5	6	7	

Existing (including Legacy) System Documentation Requirements

Table ADMIN-1-3-F			
General Legacy Pressure System Documentation for Brittle Failure Mode (not leak before burst)			
Documentation Package Item	Comment	Owner Verification	PSO Verification
1. Form 1, LANL Pressure System Certification Status Form	Every Package		
2. Form 6, Piping System thickness verification	Every Package		
3. Form 7, Component List	Every Package		
4. Form 10, Form 10, System schematics (If the owner does not have a system schematic, utilize the sketch prepared by the walkdown team until such time as system schematic is prepared) ¹⁰	Every Package		
5. Alternate Method/Variance or clarification/interpretation (if applicable).	If the system or any item of the system has an applicable alternate method/variance or clarification/interpretation to the requirements of this document		
6. Code Stamped Vessel Fabrication Documentation	If the code data report is not available, a manufacturer's construction drawing may be used to verify the item has not been modified. If the manufacturer's construction drawing is not available, personal knowledge may be used to establish the code stamped item has not been modified. This requires a person or persons with intimate and long term personal knowledge since original receipt and installation of the item to create a statement of compliance. This statement of compliance will be used to document the history of the item and be used as evidence the code stamped item has not been modified. This statement of compliance will be signed by the persons of record.		
a. Vessel thickness and remaining life estimate	Every Package		
7. Non-ASME code Fabricated Vessel Information (code-equivalent Documentation)	The pressure system contains Non-ASME-code stamped boilers and pressure vessels (which includes boilers, pressure vessels, heat exchangers, and accumulators)		

¹⁰ Information required on Form 10, System schematics may be documented in alternative documents or captured in controlled databases, such as the Master Equipment List (MEL) or Computerized Maintenance Management System (CMMS), but must be referenced and readily available for review. The evaluation shall be considered a record and must be managed per LANL P1020, P1020-1, and P1020-2

Existing (including Legacy) System Documentation Requirements

Table ADMIN-1-3-F			
General Legacy Pressure System Documentation for Brittle Failure Mode (not leak before burst)			
Documentation Package Item	Comment	Owner Verification	PSO Verification
a. ASME code equivalent documentation for systems with pressure vessels which includes but is not limited to minimum wall thickness determination, corrosion allowance, weld efficiency rating, support structure loading, nozzle calculations. Calculations will use the material values specified in the ASME code.	A non-code boiler, pressure vessel, heat exchanger or accumulator is in the pressure system package		
b. Vessel thickness and remaining life estimate	Every Package		
8. Pressure Safety Devices	The pressure system contains a pressure safety device (which includes but is not limited to relief valves and rupture discs)		
a. Safety Relief Calculations for relief valves, in accordance with ASME requirements	Every Package, unless calculations cannot be generated, a flow test is required in place of calculations.		
b. Pressure Relief Calculations for Rupture Disks in accordance with ASME requirements	Rupture Disks are in the pressure system		
c. Certified Test Data of relief valves, e.g. steam Pressure safety valves are certified by NBIC coded shop	A PRD is modified or tested by an outside facility		
9. Piping System Documentation:			
a. Form 06, Piping thickness and remaining life estimate	Every Package		
b. FM07	Every Package		
c. MAWP determination of brittle component	Determination of MAWP of brittle component will all loads required by code.		
10. Pump or compressor discharge pressure curves, calculation, or table (If available)	Only applicable if the pressure system contains pumps or compressors		

Existing (including Legacy) System Documentation Requirements

General Legacy Pressure System Description for Oxygen

Evaluation Category 7

Assumptions:

Fluid Service

1. The system fluid service is FS2 or FS3 as defined by ESM Chapter 17
2. Materials of construction are compatible with the oxygen at the design pressure.

System Operation

1. The pressure system does not operate in the creep range.
2. There are no stress intensification factors for example cracks or acute angles of pressure boundaries.

System Hardware

1. The system components have exhibited extensive, successful service experience under comparable conditions with similarly proportioned components of the same or like material.
2. The system is equipped with a properly sized, set, and functional pressure relief device(s), if needed, to protect against single point failures. Relief device exhaust locations are properly sized and located to protect personnel.
3. There are no locations in the system that requires relief protection that may be isolated from relief protection.
4. Flexible hoses over 12 inches in length and in service pressure greater than 150 psig are restrained in accordance with ESM Chapter 17.
5. In response to the PISA on LANL Welding Program (circa 2004) representative accessible welds were visually inspected and are free from indications. Solder or braze joints are not allowed.
6. External appearance is free from corrosion or indication of leakage.

Failure Mode

1. A ductile failure mode is assumed (leak before burst).
2. Fire is an evaluated failure mode.

Consequence of Failure

1. The result of the failure will not result in serious personnel injury. Safe-guarding will be applied if necessary.

Safety Class

1. Applicable to ML4 only.

Documentation Requirements

1. These oxygen pressure systems shall be exempt from the requirements of having code leak test documentation.
2. These oxygen pressure systems may continue to use unlisted components provided they are used within the temperature and pressure ratings of the manufacturer's.
3. This equipment will be considered grandfathered and will not be replaced with like items. System shall be upgraded to ASME compliance and cleaned as required by ESM Chapter 17 as items age out of service by attrition.

Existing (including Legacy) System Documentation Requirements

4. LANL ESM Chapter 17 documentation as required by Table ADMIN-1-3-G include: certification status form (FM01), relief device (FM02), component list (FM07), and sketch (FM10).
5. Piping shall be of known or verified wall thickness (FM06).
6. These oxygen pressure systems may continue to use non-ASME stamped vessels provided calculations are performed to verify code-equivalent ratings.
7. When vessels are included as part of the oxygen pressure system they must be evaluated for current MAWP based on the most applicable code or standard.
8. Oxygen system hazards analysis that defines the areas of potential fire and any necessary safe guarding.

Qualitative Risk Assessment

Probability: Remote

Consequence: Significant

QR Factor: 4

Table 3 Qualitative Risk (QR) Determination

C o n s e q u e n c e			Probability				
			A	B	C	D	E
			Frequent	Probable	Occasional	Remote	Improbable
I	Major	1	1	1	2	3	
II	Serious	1	1	2	3	4	
III	Significant	1	2	3	4	5	
IV	Minor	2	3	4	5	6	
V	Insignificant	3	4	5	6	7	

Existing (including Legacy) System Documentation Requirements

Table ADMIN-1-3-G			
General Legacy Pressure System Documentation for Oxygen			
Documentation Package Item	Required When	Owner Verification	PSO Verification
1. Form 1, LANL Pressure System Certification Status Form	Every Package		
2. Form 10, System schematics (If the owner does not have a system schematic, utilize the sketch prepared by the walkdown team until such time as system schematic is prepared) ⁸³	Every Package		
3. Alternate Method/Variance or clarification/interpretation (if applicable).	If the system or any item of the system has an applicable alternate method/variance or clarification/interpretation to the requirements of this document		
4. Code Stamped Vessel Fabrication Documentation	If the code data report is not available, a manufacturer’s construction drawing may be used to verify the item has not been modified. If the manufacturer’s construction drawing is not available, personal knowledge may be used to establish the code stamped item has not been modified. This requires a person or persons with intimate and long term personal knowledge since original receipt and installation of the item to create a statement of compliance. This statement of compliance will be used to document the history of the item and be used as evidence the code stamped item has not been modified. This statement of compliance will be signed by the persons of record.		
a. Vessel thickness and remaining life estimate	Every Package		
5. Non-ASME code Fabricated Vessel Information (code-equivalent Documentation)	The pressure system contains Non-ASME-code stamped boilers and pressure vessels (which includes boilers, pressure vessels, heat exchangers, and accumulators)		

⁸³ Information required on Form 10, System schematics may be documented in alternative documents or captured in controlled databases, such as the Master Equipment List (MEL) or Computerized Maintenance Management System (CMMS), but must be referenced and readily available for review. The evaluation shall be considered a record and must be managed per LANL P1020, P1020-1, and P1020-2

Existing (including Legacy) System Documentation Requirements

Table ADMIN-1-3-G			
General Legacy Pressure System Documentation for Oxygen			
Documentation Package Item	Required When	Owner Verification	PSO Verification
a. ASME code equivalent documentation for systems with pressure vessels which includes but is not limited to minimum wall thickness determination, corrosion allowance, weld efficiency rating, support structure loading, nozzle calculations. Calculations will use the material values specified in the ASME code.	A non-code boiler, pressure vessel, heat exchanger or accumulator is in the pressure system package		
b. Vessel thickness and remaining life estimate	Every Package		
6. Pressure Safety Devices	The pressure system contains a pressure safety device (which includes but is not limited to relief valves and rupture discs)		
a. Safety Relief Calculations for relief valves, in accordance with ASME requirements	Every Package, unless calculations cannot be generated, a flow test is required in place of calculations.		
b. Pressure Relief Calculations for Rupture Disks in accordance with ASME requirements	Rupture Disks are in the pressure system		
c. Certified Test Data of relief valves, e.g. steam Pressure safety valves are certified by NBIC coded shop	A PRD is modified or tested by an outside facility		
7. Piping System Documentation:			
a. Form 06, Piping thickness and remaining life estimate	Every Package		
b. FM07	Every Package		
8. Pump or compressor discharge pressure curves, calculation, or table (If available)	The pressure system contains pumps or compressors		
9. Oxygen System Hazard Analysis (if applicable)	Pressure system is an oxygen system		

Existing (including Legacy) System Documentation Requirements

General Legacy Pressure System Description for Flammables

Evaluation Category 8

Assumptions:

Fluid Service

1. The system fluid service is a FS2 as defined by ESM Chapter 17
2. The pressure system fluid service is Normal as define by ASME B31.3 2010.
3. Materials of construction are compatible with the system fluid service.
4. Flammable is defined in accordance with NFPA 55 *Compressed Gases and Cryogenic Fluids in Portable and Stationary Containers, Cylinders, and Tanks* and CGA P-23 *Standard for Categorizing Gas Mixtures Containing Flammable an Nonflammable Components*.

System Operation

1. The pressure system does not operate in the creep range.
2. There are no stress intensification factors for example cracks or acute angles of pressure boundaries.

System Hardware

1. The system components have exhibited extensive, successful service experience under comparable conditions with similarly proportioned components of the same or like material.
2. The system is equipped with a properly sized, set, and functional pressure relief device(s), if needed, to protect against single point failures. Relief device exhaust locations are properly sized and located to protect personnel.
3. There are no locations in the system that requires relief protection that may be isolated from relief protection.
4. Flexible hoses over 12 inches in length and in service pressure greater than 150 psig are restrained in accordance with ESM Chapter 17.
5. In response to the PISA on LANL Welding Program (circa 2004) representative accessible welds were visually inspected and are free from indications. Solder or braze joints are not allowed.
6. External appearance is free from corrosion or indication of leakage.

Failure Mode

1. A ductile failure mode is assumed (leak before burst).

Consequence of Failure

1. The result of the failure will not result in serious personnel injury. Safe-guarding will be applied if necessary.

Safety Class

1. Applicable to ML4 only.

Documentation Requirements

1. These flammable pressure systems shall be exempt from the requirements of having code leak test documentation.

Existing (including Legacy) System Documentation Requirements

2. These flammable pressure systems may continue to use unlisted components provided they are used within the temperature and pressure ratings of the manufacturer’s.
3. This equipment will be considered grandfathered and will not be replaced with like items. System shall be upgraded to ASME compliance as items age out of service by attrition.
4. LANL ESM Chapter 17 documentation as required by Table ADMIN-1-3-H include: certification status form (FM01), relief device (FM02), component list (FM07), and sketch (FM10).
5. Piping shall be of known or verified wall thickness (FM06).
6. These flammable pressure systems may continue to use non-ASME stamped vessels provided calculations are performed to verify code-equivalent ratings.
7. When vessels are included as part of the flammable pressure system they must be evaluated for current MAWP based on the most applicable code or standard.

Qualitative Risk Assessment

Probability: Remote

Consequence: Significant

QR Factor: 4

Table 3 Qualitative Risk (QR) Determination

		Probability					
		A	B	C	D	E	
		Frequent	Probable	Occasional	Remote	Improbable	
C o n s e q u e n c e	I	Major	1	1	1	2	3
	II	Serious	1	1	2	3	4
	III	Significant	1	2	3	4	5
	IV	Minor	2	3	4	5	6
	V	Insignificant	3	4	5	6	7

Existing (including Legacy) System Documentation Requirements

Table ADMIN-1-3-H			
General Legacy Pressure System Documentation for Flammable Gases			
Documentation Package Item	Required When	Owner Verification	PSO Verification
1. Form 1, LANL Pressure System Certification Status Form	Every Package		
2. Form 10, System schematics (If the owner does not have a system schematic, utilize the sketch prepared by the walk down team until such time as system schematic is prepared) ¹²	Every Package		
3. Alternate Method/Variance or clarification/interpretation (if applicable).	If the system or any item of the system has an applicable alternate method/variance or clarification/interpretation to the requirements of this document		
4. Code Stamped Vessel Fabrication Documentation	If the code data report is not available, a manufacturer’s construction drawing may be used to verify the item has not been modified. If the manufacturer’s construction drawing is not available, personal knowledge may be used to establish the code stamped item has not been modified. This requires a person or persons with intimate and long term personal knowledge since original receipt and installation of the item to create a statement of compliance. This statement of compliance will be used to document the history of the item and be used as evidence the code stamped item has not been modified. This statement of compliance will be signed by the persons of record.		
a. Vessel thickness and remaining life estimate	Every package		
5. Non-ASME code Fabricated Vessel Information (code-equivalent Documentation)	The pressure system contains Non-ASME-code stamped boilers and pressure vessels (which includes boilers, pressure vessels, heat exchangers, and accumulators)		

¹² Information required on Form 10, System schematics may be documented in alternative documents or captured in controlled databases, such as the Master Equipment List (MEL) or Computerized Maintenance Management System (CMMS), but must be referenced and readily available for review. The evaluation shall be considered a record and must be managed per LANL P1020, P1020-1, and P1020-2

Existing (including Legacy) System Documentation Requirements

Table ADMIN-1-3-H			
General Legacy Pressure System Documentation for Flammable Gases			
Documentation Package Item	Required When	Owner Verification	PSO Verification
a. ASME code equivalent documentation for systems with pressure vessels which includes but is not limited to minimum wall thickness determination, corrosion allowance, weld efficiency rating, support structure loading, nozzle calculations. Calculations will use the material values specified in the ASME code.	A non-code boiler, pressure vessel, heat exchanger or accumulator is in the pressure system package		
b. Vessel thickness and remaining life estimate	Every Package		
6. Pressure Safety Devices	The pressure system contains a pressure safety device (which includes but is not limited to relief valves and rupture discs)		
a. Safety Relief Calculations for relief valves, in accordance with ASME requirements	Every Package, unless calculations cannot be generated, a flow test is required in place of calculations.		
b. Pressure Relief Calculations for Rupture Disks in accordance with ASME requirements	Rupture Disks are in the pressure system		
c. Certified Test Data of relief valves, e.g. steam Pressure safety valves are certified by NBIC coded shop	A PRD is modified or tested by an outside facility		
7. Piping System Documentation:			
a. Form 06, Piping thickness and remaining life estimate	Every Package		
b. Form 07	Every Package		
8. Pump or compressor discharge pressure curves, calculation, or table (If available)	The pressure system contains pumps or compressors		

Existing (including Legacy) System Documentation Requirements

General Legacy Pressure System Description for Cryogenic Liquids (Helium, Neon, Argon, Krypton, Xenon, Nitrogen, Oxygen, Air)

Evaluation Category 9

Assumptions:

Fluid Service

1. The system fluid service is a FS2 as defined by ESM Chapter 17
2. The pressure system fluid service is Normal as define by ASME B31.3 2010.
3. Materials of construction are compatible with the system fluid service.

System Operation

1. There are no stress intensification factors for example cracks or acute angles of pressure boundaries.
2. Pressure is limited to 150 psig.

System Hardware

1. The system components have exhibited extensive, successful service experience under comparable conditions with similarly proportioned components of the same or like material.
2. The system is equipped with a properly sized, set, and functional pressure relief device(s), if needed, to protect against single point failures. Relief device exhaust locations are properly sized and located to protect personnel.
3. There are no locations in the system that may be isolated from relief protection with cryogenic liquid present.
4. System is constructed of metallic components with materials rated in the ASME B31.3 Table A-1 for the cryogenic temperatures.
5. In response to the PISA on LANL Welding Program (circa 2004) representative accessible welds were visually inspected and are free from indications. Solder or braze joints are not allowed.
6. External appearance is free from corrosion or indication of leakage.
7. Flexible elements are rated for the cryogenic temperatures.
8. Flexible hoses over 12 inches in length and in service pressure greater than 150 psig are restrained in accordance with ESM Chapter 17.
9. Insulation is adequate to preclude the formation of liquid air.

Failure Mode

1. A ductile failure mode is assumed (leak before burst).

Consequence of Failure

1. The result of the failure will not result in serious personnel injury. Safe-guarding will be applied if necessary.

Safety Class

1. Applicable to ML4 only.

Existing (including Legacy) System Documentation Requirements

Documentation Requirements

1. These cryogenic liquid pressure systems shall be exempt from the requirements of having code leak test documentation.
2. These cryogenic liquid pressure systems may continue to use unlisted components provided they are used within the temperature and pressure ratings of the manufacturer's.
3. This equipment will be considered grandfathered and will not be replaced with like items. System shall be upgraded to ASME compliance as items age out of service by attrition.
4. LANL ESM Chapter 17 documentation as required by Table ADMIN-1-3-J include: certification status form (FM01), relief device (FM02), component list (FM07), and sketch (FM10).
5. Existing cryogenic liquid systems may continue to use non-ASME stamped vessels provided calculations are performed to verify code-equivalent ratings.
6. When vessels are included as part of the cryogenic liquid pressure system they must be evaluated for current MAWP based on the most applicable code or standard.

Qualitative Risk Assessment

Probability: Remote

Consequence: Significant

QR Factor: 4

Table 3 Qualitative Risk (QR) Determination

		Probability					
		A	B	C	D	E	
		Frequent	Probable	Occasional	Remote	Improbable	
C o n s e q u e n c e	I	Major	1	1	1	2	3
	II	Serious	1	1	2	3	4
	III	Significant	1	2	3	4	5
	IV	Minor	2	3	4	5	6
	V	Insignificant	3	4	5	6	7

Existing (including Legacy) System Documentation Requirements

Table ADMIN-1-3-J			
General Legacy Pressure System Documentation for Cryogenic Liquids			
Documentation Package Item	Required When	Owner Verification	PSO Verification
1. Form 1, LANL Pressure System Certification Status Form	Every Package		
2. Form 10, System schematics (If the owner does not have a system schematic, utilize the sketch prepared by the walkdown team until such time as system schematic is prepared) ¹³	Every Package		
3. Alternate Method/Variance or clarification/interpretation (if applicable).	If the system or any item of the system has an applicable alternate method/variance or clarification/interpretation to the requirements of this document		
4. Code Stamped Vessel Fabrication Documentation	<p>If the code data report is not available, a manufacturer’s construction drawing may be used to verify the item has not been modified.</p> <p>If the manufacturer’s construction drawing is not available, personal knowledge may be used to establish the code stamped item has not been modified. This requires a person or persons with intimate and long term personal knowledge since original receipt and installation of the item to create a statement of compliance. This statement of compliance will be used to document the history of the item and be used as evidence the code stamped item has not been modified. This statement of compliance will be signed by the persons of record.</p>		
a. Vessel thickness and remaining life estimate	Every Package		
5. Non-ASME code Fabricated Vessel Information (code-equivalent Documentation)	The pressure system contains Non-ASME-code stamped boilers and pressure vessels (which includes boilers, pressure vessels, heat exchangers, and accumulators)		

¹³ Information required on Form 10, System schematics may be documented in alternative documents or captured in controlled databases, such as the Master Equipment List (MEL) or Computerized Maintenance Management System (CMMS), but must be referenced and readily available for review. The evaluation shall be considered a record and must be managed per LANL P1020, P1020-1, and P1020-2

Existing (including Legacy) System Documentation Requirements

Table ADMIN-1-3-J			
General Legacy Pressure System Documentation for Cryogenic Liquids			
Documentation Package Item	Required When	Owner Verification	PSO Verification
a. ASME code equivalent documentation for systems with pressure vessels which includes but is not limited to minimum wall thickness determination, corrosion allowance, weld efficiency rating, support structure loading, nozzle calculations. Calculations will use the material values specified in the ASME code.	A non-code boiler, pressure vessel, heat exchanger or accumulator is in the pressure system package		
a. Vessel thickness and remaining life estimate	Every Package		
6. Pressure Safety Devices	The pressure system contains a pressure safety device (which includes but is not limited to relief valves and rupture discs)		
a. Safety Relief Calculations for relief valves, in accordance with ASME requirements	Every Package, unless calculations cannot be generated, a flow test is required in place of calculations.		
b. Pressure Relief Calculations for Rupture Disks in accordance with ASME requirements	Rupture Disks are in the pressure system		
c. Certified Test Data of relief valves, e.g. steam Pressure safety valves are certified by NBIC coded shop	A PRD is modified or tested by an outside facility		
d. Identification as a liquid lock PRD on PRV Recall Summary Sheet and pressure system Component List spread sheet.	PRD's are used as protection against liquid lock overpressure		
e. Identification as vacuum insulation relief device	PRD's are used as protection against vacuum system overpressure		
7. Piping System Documentation:			
a. Form 7; Manufacturer's data indicates component is within temperature and pressure operational specifications	Every Package		
8. Pump or compressor discharge pressure curves, calculation, or table (If available)	The pressure system contains pumps or compressors		

Existing (including Legacy) System Documentation Requirements

General Legacy Pressure System Description for Steam Condensate

Evaluation Category 10

Assumptions:

Fluid Service

1. The system fluid service is a FS3 as defined by ESM Chapter 17

System Operation

1. There are no stress intensification factors for example cracks or acute angles of pressure boundaries.
2. Pressure is limited to 150 psig.

System Hardware

1. The system components have exhibited extensive, successful service experience under comparable conditions with similarly proportioned components of the same or like material.
2. The system is equipped with a properly sized, set, and functional pressure relief device(s), if needed, to protect against single point failures. Relief device exhaust locations are properly sized and located to protect personnel.
3. There are no locations in the system that requires relief protection that may be isolated from relief protection.
4. Steam condensate systems are effectively isolated from steam lines for example steam traps.
5. System is constructed of metallic components and pipe.
6. In response to the PISA on LANL Welding Program (circa 2004) representative accessible welds were visually inspected and are free from indications. Solder or braze joints are not allowed.
7. External appearance is free from corrosion or indication of leakage.

Failure Mode

1. A ductile failure mode is assumed (leak before burst).

Consequence of Failure

1. The result of the failure will not result in serious personnel injury. Safe-guarding will be applied if necessary.

Safety Class

1. Applicable to ML4 only.

Documentation Requirements

1. These steam condensate pressure systems shall be exempt from the requirements of having code leak test documentation.
2. These steam condensate pressure systems may continue to use unlisted components,
3. This equipment will be considered grandfathered and will not be replaced with like items. System shall be upgraded to ASME compliance as items age out of service by attrition.

Existing (including Legacy) System Documentation Requirements

4. LANL ESM Chapter 17 documentation as required by Table ADMIN-1-3-K include: certification status form (FM01), relief device (FM02), component list (FM07), and sketch (FM10).
5. Existing steam condensate pressure systems may continue to use non-ASME stamped vessels provided calculations are performed to verify code-equivalent ratings.
6. When vessels are included as part of the steam condensate pressure system they must be evaluated for current MAWP based on the most applicable code or standard.

Qualitative Risk Assessment

Probability: Remote

Consequence: Minor

QR Factor: 5

Table 3 Qualitative Risk (QR) Determination

		Probability					
		A	B	C	D	E	
		Frequent	Probable	Occasional	Remote	Improbable	
C o n s e q u e n c e	I	Major	1	1	1	2	3
	II	Serious	1	1	2	3	4
	III	Significant	1	2	3	4	5
	IV	Minor	2	3	4	5	6
	V	Insignificant	3	4	5	6	7

Existing (including Legacy) System Documentation Requirements

Table ADMIN-1-3-K			
General Legacy Pressure System Documentation for Steam Condensate			
Documentation Package Item	Required When	Owner Verification	PSO Verification
1. Form 1, LANL Pressure System Certification Status Form	Every Package		
2. Form 10, System schematics (If the owner does not have a system schematic, utilize the sketch prepared by the walkdown team until such time as system schematic is prepared) ¹⁴	Every Package		
3. Alternate Method/Variance or clarification/interpretation (if applicable).	If the system or any item of the system has an applicable alternate method/variance or clarification/interpretation to the requirements of this document		
4. Code Stamped Vessel Fabrication Documentation	If the code data report is not available, a manufacturer's construction drawing may be used to verify the item has not been modified. If the manufacturer's construction drawing is not available, personal knowledge may be used to establish the code stamped item has not been modified. This requires a person or persons with intimate and long term personal knowledge since original receipt and installation of the item to create a statement of compliance. This statement of compliance will be used to document the history of the item and be used as evidence the code stamped item has not been modified. This statement of compliance will be signed by the persons of record.		
a. Vessel thickness and remaining life estimate	Every Package		
5. Non-ASME code Fabricated Vessel Information (code-equivalent Documentation)	The pressure system contains Non-ASME-code stamped boilers and pressure vessels (which includes boilers, pressure vessels, heat exchangers, and accumulators)		

¹⁴ Information required on Form 10, System schematics may be documented in alternative documents or captured in controlled databases, such as the Master Equipment List (MEL) or Computerized Maintenance Management System (CMMS), but must be referenced and readily available for review. The evaluation shall be considered a record and must be managed per LANL P1020, P1020-1, and P1020-2

Existing (including Legacy) System Documentation Requirements

Table ADMIN-1-3-K

General Legacy Pressure System Documentation for Steam Condensate

Documentation Package Item	Required When	Owner Verification	PSO Verification
a. ASME code equivalent documentation for systems with pressure vessels which includes but is not limited to minimum wall thickness determination, corrosion allowance, weld efficiency rating, support structure loading, nozzle calculations. Calculations will use the material values specified in the ASME code.	A non-code boiler, pressure vessel, heat exchanger or accumulator is in the pressure system package		
b. Vessel thickness and remaining life estimate	Every Package		
6. Pressure Safety Devices	The pressure system contains a pressure safety device (which includes but is not limited to relief valves and rupture discs)		
a. Safety Relief Calculations for relief valves, in accordance with ASME requirements	Every Package, unless calculations cannot be generated, a flow test is required in place of calculations.		
b. Pressure Relief Calculations for Rupture Disks in accordance with ASME requirements	Rupture Disks are in the pressure system		
c. Certified Test Data of relief valves, e.g. steam Pressure safety valves are certified by NBIC coded shop	A PRD is modified or tested by an outside facility		
7. Piping System Documentation:			
a. FM07; for available components	Every Package		
8. Pump or compressor discharge pressure curves, calculation, or table (If available)	The pressure system contains pumps or compressors		

Existing (including Legacy) System Documentation Requirements

General Legacy Pressure System Description for Compressed Air with Receiver

Evaluation Category 11

Assumptions:

Fluid Service

1. The system fluid service is a FS2 or FS3 as defined by ESM Chapter 17
 - 1.1. The pressure system fluid service is Normal as define by ASME B31.3 2010.
 - 1.2. The pressure systems are within the scope of ASME B31.9-2011.
2. Materials of construction are compatible with the system fluid service.

System Operation

1. There are no stress intensification factors for example cracks or acute angles of pressure boundaries.
2. Pressure is limited to 150 psig.

System Hardware

1. The system components have exhibited extensive, successful service experience under comparable conditions with similarly proportioned components of the same or like material.
2. The system is equipped with a properly sized, set, and functional pressure relief device(s), if needed, to protect against single point failures. Relief device exhaust locations are properly sized and located to protect personnel.
3. There are no locations in the system that requires relief protection that may be isolated from relief protection.
4. Flexible hoses over 12 inches in length and in service pressure greater than 150 psig are restrained in accordance with ESM Chapter 17.
5. System is constructed of metallic components, pipe, and tube.
6. In response to the PISA on LANL Welding Program (circa 2004) representative accessible welds were visually inspected and are free from indications. Solder or braze joints are not allowed.
7. External appearance is free from corrosion or indication of leakage.

Failure Mode

1. A ductile failure mode is assumed (leak before burst).

Consequence of Failure

1. The result of the failure will not result in serious personnel injury. Safe-guarding will be applied if necessary.

Safety Class

1. Applicable to ML4 only.

Documentation Requirements

1. These compressed air with receiver pressure systems shall be exempt from the requirements of having code leak test documentation.
2. These compressed air with receiver pressure systems may continue to use unlisted components provided they are used within the temperature and pressure ratings of the manufacturer's.

Existing (including Legacy) System Documentation Requirements

3. This equipment will be considered grandfathered and will not be replaced with like items. System shall be upgraded to ASME compliance as items age out of service by attrition.
4. LANL ESM Chapter 17 documentation as required by Table ADMIN-1-3-M include: certification status form (FM01), relief device (FM02), component list (FM07), and sketch (FM10).
5. Existing compressed air with receiver pressure systems may continue to use non-ASME stamped vessels provided calculations are performed to verify code-equivalent ratings.
6. When vessels are included as part of the compressed air with receiver pressure system they must be evaluated for current MAWP based on the most applicable code or standard.

Qualitative Risk Assessment

Probability: Remote

Consequence: Significant

QR Factor: 4

Table 3 Qualitative Risk (QR) Determination

		Probability					
		A	B	C	D	E	
		Frequent	Probable	Occasional	Remote	Improbable	
C o n s e q u e n c e	I	Major	1	1	1	2	3
	II	Serious	1	1	2	3	4
	III	Significant	1	2	3	4	5
	IV	Minor	2	3	4	5	6
	V	Insignificant	3	4	5	6	7

Existing (including Legacy) System Documentation Requirements

Table ADMIN-1-3-M			
General Legacy Pressure System Documentation for Compressed Air with Receiver			
Documentation Package Item	Comment	Owner Verification	PSO Verification
1. Form 1, LANL Pressure System Certification Status Form	Every Package		
2. Form 10, System schematics (If the owner does not have a system schematic, utilize the sketch prepared by the walkdown team until such time as system schematic is prepared) ¹⁵	Every Package		
3. Alternate Method/Variance or clarification/interpretation (if applicable).	If the system or any item of the system has an applicable alternate method/variance or clarification/interpretation to the requirements of this document		
4. Code Stamped Vessel Fabrication Documentation	If the code data report is not available, a manufacturer’s construction drawing may be used to verify the item has not been modified. If the manufacturer’s construction drawing is not available, personal knowledge may be used to establish the code stamped item has not been modified. This requires a person or persons with intimate and long term personal knowledge since original receipt and installation of the item to create a statement of compliance. This statement of compliance will be used to document the history of the item and be used as evidence the code stamped item has not been modified. This statement of compliance will be signed by the persons of record.		
a. Vessel thickness and remaining life estimate	Every Package		
5. Non-ASME code Fabricated Vessel Information (code-equivalent Documentation)	The pressure system contains Non-ASME-code stamped boilers and pressure vessels (which includes boilers, pressure vessels, heat exchangers, and accumulators)		

¹⁵ Information required on Form 10, System schematics may be documented in alternative documents or captured in controlled databases, such as the Master Equipment List (MEL) or Computerized Maintenance Management System (CMMS), but must be referenced and readily available for review. The evaluation shall be considered a record and must be managed per LANL P1020, P1020-1, and P1020-2

Existing (including Legacy) System Documentation Requirements

Table ADMIN-1-3-M			
General Legacy Pressure System Documentation for Compressed Air with Receiver			
Documentation Package Item	Comment	Owner Verification	PSO Verification
a. ASME code equivalent documentation for systems with pressure vessels which includes but is not limited to minimum wall thickness determination, corrosion allowance, weld efficiency rating, support structure loading, nozzle calculations. Calculations will use the material values specified in the ASME code.	A non-code boiler, pressure vessel, heat exchanger or accumulator is in the pressure system package		
b. Vessel thickness and remaining life estimate	Every Package		
6. Pressure Safety Devices	The pressure system contains a pressure safety device (which includes but is not limited to relief valves and rupture discs)		
a. Flow Test documentation as described in this Chapter, if required	Whenever a relief valve has been modified, or when calculations cannot be generated.		
b. Safety Relief Calculations for relief valves, in accordance with ASME requirements	Every Package, unless calculations cannot be generated, a flow test is required in place of calculations.		
c. Pressure Relief Calculations for Rupture Disks in accordance with ASME requirements	Rupture Disks are in the pressure system		
7. Piping System Documentation:			
a. FM07; for available components	Every Package		
8. Pump or compressor discharge pressure curves, calculation, or table (If available)	Only applicable if the pressure system contains pumps or compressors		

Existing (including Legacy) System Documentation Requirements

General Legacy Pressure System Description for Compressed Inert Gases – DOT Cylinders

Evaluation Category 12

Assumptions:

Fluid Service

1. The system fluid service is FS2 or FS3 as defined by ESM Chapter 17
 - 1.1. The pressure system fluid service is Category D as define by ASME B31.3 2010.
 - 1.2. The pressure system fluid service is Category Normal as define by ASME B31.3 2010.
2. Materials of construction are compatible with the system fluid service.

System Operation

1. There are no stress intensification factors for example cracks or acute angles of pressure boundaries.

System Hardware

1. The system components have exhibited extensive, successful service experience under comparable conditions with similarly proportioned components of the same or like material.
2. The system is equipped with a properly sized, set, and functional pressure relief device(s), if needed, to protect against single point failures. Relief device exhaust locations are properly sized and located to protect personnel.
3. There are no locations in the system that requires relief protection that may be isolated from relief protection.
4. Flexible hoses over 12 inches in length and in service pressure greater than 150 psig are restrained in accordance with ESM Chapter 17.
5. System is constructed of metallic components.
6. In response to the PISA on LANL Welding Program (circa 2004) representative accessible welds were visually inspected and are free from indications. Solder or braze joints are not allowed.
7. External appearance is free from corrosion or indication of leakage.

Failure Mode

1. A ductile failure mode is assumed (leak before burst).

Consequence of Failure

1. The result of the failure will not result in serious personnel injury. Safe-guarding will be applied if necessary.

Safety Class

1. Applicable to ML4 only.

Documentation Requirements

1. These Compressed Inert Gases – DOT Cylinders pressure systems shall be exempt from the requirements of having code leak test documentation.

Existing (including Legacy) System Documentation Requirements

2. These Compressed Inert Gases – DOT Cylinders pressure systems may continue to use unlisted components provided they are used within the temperature and pressure ratings of the manufacturer’s.
3. This equipment will be considered grandfathered and will not be replaced with like items. System shall be upgraded to ASME compliance as items age out of service by attrition.
4. LANL ESM Chapter 17 documentation as required by Table ADMIN-1-3-N include: certification status form (FM01), relief device (FM02), component list (FM07), and sketch (FM10).
5. Existing Compressed Inert Gases – DOT Cylinders pressure systems may continue to use non-ASME stamped vessels provided calculations are performed to verify code-equivalent ratings.
6. When vessels are included as part of the Compressed Inert Gases – DOT Cylinders pressure system they must be evaluated for current MAWP based on the most applicable code or standard.

Qualitative Risk Assessment

Probability: Remote

Consequence: Significant

QR Factor: 5

Table 3 Qualitative Risk (QR) Determination

C o n s e q u e n c e			Probability				
			A	B	C	D	E
			Frequent	Probable	Occasional	Remote	Improbable
I	Major	1	1	1	2	3	
II	Serious	1	1	2	3	4	
III	Significant	1	2	3	4	5	
IV	Minor	2	3	4	5	6	
V	Insignificant	3	4	5	6	7	

Existing (including Legacy) System Documentation Requirements

Table ADMIN-1-3-N			
General Legacy Pressure System Documentation for Compressed Inert Gases – DOT Cylinders			
Documentation Package Item	Required When	Owner Verification	PSO Verification
1. Form 1, LANL Pressure System Certification Status Form	Every Package		
2. Form 10, System schematics (If the owner does not have a system schematic, utilize the sketch prepared by the walkdown team until such time as system schematic is prepared) ¹⁶	Every Package		
3. Alternate Method/Variance or clarification/interpretation (if applicable).	If the system or any item of the system has an applicable alternate method/variance or clarification/interpretation to the requirements of this document		
4. Code Stamped Vessel Fabrication Documentation	If the code data report is not available, a manufacturer’s construction drawing may be used to verify the item has not been modified. If the manufacturer’s construction drawing is not available, personal knowledge may be used to establish the code stamped item has not been modified. This requires a person or persons with intimate and long term personal knowledge since original receipt and installation of the item to create a statement of compliance. This statement of compliance will be used to document the history of the item and be used as evidence the code stamped item has not been modified. This statement of compliance will be signed by the persons of record.		
a. Vessel thickness and remaining life estimate	Every Package		
5. Non-ASME code Fabricated Vessel Information (code-equivalent Documentation)	The pressure system contains Non-ASME-code stamped boilers and pressure vessels (which includes boilers, pressure vessels, heat exchangers, and accumulators)		

¹⁶ Information required on Form 10, System schematics may be documented in alternative documents or captured in controlled databases, such as the Master Equipment List (MEL) or Computerized Maintenance Management System (CMMS), but must be referenced and readily available for review. The evaluation shall be considered a record and must be managed per LANL P1020, P1020-1, and P1020-2

Existing (including Legacy) System Documentation Requirements

Table ADMIN-1-3-N			
General Legacy Pressure System Documentation for Compressed Inert Gases – DOT Cylinders			
Documentation Package Item	Required When	Owner Verification	PSO Verification
a. ASME code equivalent documentation for systems with pressure vessels which includes but is not limited to minimum wall thickness determination, corrosion allowance, weld efficiency rating, support structure loading, nozzle calculations. Calculations will use the material values specified in the ASME code.	A non-code boiler, pressure vessel, heat exchanger or accumulator is in the pressure system package		
b. Vessel thickness and remaining life estimate	Every Package		
6. Pressure Safety Devices	The pressure system contains a pressure safety device (which includes but is not limited to relief valves and rupture discs)		
a. Safety Relief Calculations for relief valves, in accordance with ASME requirements	Every Package, unless calculations cannot be generated, a flow test is required in place of calculations.		
b. Pressure Relief Calculations for Rupture Disks in accordance with ASME requirements	Rupture Disks are in the pressure system		
c. Certified Test Data of relief valves, e.g. steam Pressure safety valves are certified by NBIC coded shop	A PRD is modified or tested by an outside facility		
7. Piping System Documentation:			
b. FM07; for available components	Every Package		
8. Pump or compressor discharge pressure curves, calculation, or table (If available)	The pressure system contains pumps or compressors		

Existing (including Legacy) System Documentation Requirements

General Legacy Pressure System Description for Compressed Air without Receiver

Evaluation Category 13

Assumptions:

Fluid Service

1. The system fluid service is FS2 or FS3 as defined by ESM Chapter 17
 - 1.1. The pressure system fluid service is Category D as define by ASME B31.3 2010.
 - 1.2. The pressure system fluid service is Category Normal as define by ASME B31.3 2010.
 - 1.3. The pressure systems are within the scope of ASME B31.9-2011.
2. Materials of construction are compatible with the system fluid service.

System Operation

1. There are no stress intensification factors for example cracks or acute angles of pressure boundaries.

System Hardware

1. The system components have exhibited extensive, successful service experience under comparable conditions with similarly proportioned components of the same or like material.
2. The system is equipped with a properly sized, set, and functional pressure relief device(s), if needed, to protect against single point failures. Relief device exhaust locations are properly sized and located to protect personnel.
3. There are no locations in the system that requires relief protection that may be isolated from relief protection.
4. Flexible hoses over 12 inches in length and in service pressure greater than 150 psig are restrained in accordance with ESM Chapter 17.
5. System is constructed of metallic components.
6. In response to the PISA on LANL Welding Program (circa 2004) representative accessible welds were visually inspected and are free from indications. Solder or braze joints are not allowed.
7. External appearance is free from corrosion or indication of leakage.

Failure Mode

1. A ductile failure mode is assumed (leak before burst).

Consequence of Failure

1. The result of the failure will not result in serious personnel injury. Safe-guarding will be applied if necessary.

Safety Class

1. Applicable to ML4 only.

Documentation Requirements

1. These compressed air pressure systems shall be exempt from the requirements of having code leak test documentation.

Existing (including Legacy) System Documentation Requirements

2. These compressed air pressure systems may continue to use unlisted components provided they are used within the temperature and pressure ratings of the manufacturer's.
3. This equipment will be considered grandfathered and will not be replaced with like items. System shall be upgraded to ASME compliance as items age out of service by attrition.
4. LANL ESM Chapter 17 documentation as required by Table ADMIN-1-3-P include: certification status form (FM01), relief device (FM02), component list (FM07), and sketch (FM10).

Qualitative Risk Assessment

Probability: Remote

Consequence: Minor

QR Factor: 4

Table 3 Qualitative Risk (QR) Determination

		Probability					
		A	B	C	D	E	
		Frequent	Probable	Occasional	Remote	Improbable	
C o n s e q u e n c e	I	Major	1	1	1	2	3
	II	Serious	1	1	2	3	4
	III	Significant	1	2	3	4	5
	IV	Minor	2	3	4	5	6
	V	Insignificant	3	4	5	6	7

Existing (including Legacy) System Documentation Requirements

Table ADMIN-1-3-P			
General Legacy Pressure System Description for Compressed Air without Receiver			
Documentation Package Item	Required When	Owner Verification	PSO Verification
1. Form 1, LANL Pressure System Certification Status Form	Every Package		
2. Form 10, System schematics (If the owner does not have a system schematic, utilize the sketch prepared by the walkdown team until such time as system schematic is prepared) ⁸⁹	Every Package		
3. Alternate Method/Variance or clarification/interpretation (if applicable).	If the system or any item of the system has an applicable alternate method/variance or clarification/interpretation to the requirements of this document		
4. Pressure Safety Devices	The pressure system contains a pressure safety device (which includes but is not limited to relief valves and rupture discs)		
a. Safety Relief Calculations for relief valves, in accordance with ASME requirements	Every Package, unless calculations cannot be generated, a flow test is required in place of calculations.		
b. Pressure Relief Calculations for Rupture Disks in accordance with ASME requirements	Rupture Disks are in the pressure system		
c. Certified Test Data of relief valves, e.g. steam Pressure safety valves are certified by NBIC coded shop	A PRD is modified or tested by an outside facility		
5. Piping System Documentation:			
a. FM07; for available components	Every Package		
6. Pump or compressor discharge pressure curves, calculation, or table (If available)	The pressure system contains pumps or compressors		

⁸⁹ Information required on Form 10, System schematics may be documented in alternative documents or captured in controlled databases, such as the Master Equipment List (MEL) or Computerized Maintenance Management System (CMMS), but must be referenced and readily available for review. The evaluation shall be considered a record and must be managed per LANL P1020, P1020-1, and P1020-2

Existing (including Legacy) System Documentation Requirements

General Legacy Pressure System Description for Compressed Inert Gases – Building Systems

Evaluation Category 14

Assumptions:

Fluid Service

1. The system fluid service is a FS3 as defined by ESM Chapter 17
 - 1.1. The pressure system fluid service is Category D as define by ASME B31.3 2010.
 - 1.2. The pressure system fluid service is Category Normal as define by ASME B31.3 2010. (liquids)
 - 1.3. The pressure systems are within the scope of ASME B31.9-2011.
2. Materials of construction are compatible with the system fluid service.

System Operation

1. There are no stress intensification factors for example cracks or acute angles of pressure boundaries.

System Hardware

1. The system components have exhibited extensive, successful service experience under comparable conditions with similarly proportioned components of the same or like material.
2. The system is equipped with a properly sized, set, and functional pressure relief device(s), if needed, to protect against single point failures. Relief device exhaust locations are properly sized and located to protect personnel.
3. There are no locations in the system that requires relief protection that may be isolated from relief protection.
4. System is constructed of metallic components.
5. In response to the PISA on LANL Welding Program (circa 2004) representative accessible welds were visually inspected and are free from indications. Solder or braze joints are not allowed.
6. External appearance is free from corrosion or indication of leakage.

Failure Mode

1. A ductile failure mode is assumed (leak before burst).

Consequence of Failure

1. The result of the failure will not result in serious personnel injury. Safe-guarding will be applied if necessary.

Safety Class

1. Applicable to ML4 only.

Documentation Requirements

1. These Compressed Inert Gases – Building pressure systems shall be exempt from the requirements of having code leak test documentation.
2. These Compressed Inert Gases – Building pressure systems may continue to use unlisted components provided they are used within the temperature and pressure ratings of the manufacturer's.

Existing (including Legacy) System Documentation Requirements

3. This equipment will be considered grandfathered and will not be replaced with like items. System shall be upgraded to ASME compliance as items age out of service by attrition.
4. LANL ESM Chapter 17 documentation as required by Table ADMIN-1-3-R include: certification status form (FM01), relief device (FM02), component list (FM07), and sketch (FM10).
5. Existing Compressed Inert Gases – Building pressure systems may continue to use non-ASME stamped vessels provided calculations are performed to verify code-equivalent ratings.
6. When vessels are included as part of the Compressed Inert Gases – Building pressure system they must be evaluated for current MAWP based on the most applicable code or standard.

Qualitative Risk Assessment

Probability: Remote

Consequence: Minor

QR Factor: 5

Table 3 Qualitative Risk (QR) Determination

		Probability					
		A	B	C	D	E	
		Frequent	Probable	Occasional	Remote	Improbable	
C o n s e q u e n c e	I	Major	1	1	1	2	3
	II	Serious	1	1	2	3	4
	III	Significant	1	2	3	4	5
	IV	Minor	2	3	4	5	6
	V	Insignificant	3	4	5	6	7

Existing (including Legacy) System Documentation Requirements

Table ADMIN-1-3-R			
General Legacy Pressure System Documentation for Compressed Inert Gases - Buildings			
Documentation Package Item	Required When	Owner Verification	PSO Verification
1. Form 1, LANL Pressure System Certification Status Form	Every Package		
2. Form 10, System schematics (If the owner does not have a system schematic, utilize the sketch prepared by the walkdown team until such time as system schematic is prepared) ¹⁸	Every Package		
3. Alternate Method/Variance or clarification/interpretation (if applicable).	If the system or any item of the system has an applicable alternate method/variance or clarification/interpretation to the requirements of this document		
4. Code Stamped Vessel Fabrication Documentation	<p>If the code data report is not available, a manufacturer’s construction drawing may be used to verify the item has not been modified.</p> <p>If the manufacturer’s construction drawing is not available, personal knowledge may be used to establish the code stamped item has not been modified. This requires a person or persons with intimate and long term personal knowledge since original receipt and installation of the item to create a statement of compliance. This statement of compliance will be used to document the history of the item and be used as evidence the code stamped item has not been modified. This statement of compliance will be signed by the persons of record.</p>		
a. Vessel thickness and remaining life estimate	Every Package		

¹⁸ Information required on Form 10, System schematics may be documented in alternative documents or captured in controlled databases, such as the Master Equipment List (MEL) or Computerized Maintenance Management System (CMMS), but must be referenced and readily available for review. The evaluation shall be considered a record and must be managed per LANL P1020, P1020-1, and P1020-2

Existing (including Legacy) System Documentation Requirements

Table ADMIN-1-3-R			
General Legacy Pressure System Documentation for Compressed Inert Gases - Buildings			
Documentation Package Item	Required When	Owner Verification	PSO Verification
5. Non-ASME code Fabricated Vessel Information (code-equivalent Documentation)	The pressure system contains Non-ASME-code stamped boilers and pressure vessels (which includes boilers, pressure vessels, heat exchangers, and accumulators)		
a. ASME code equivalent documentation for systems with pressure vessels which includes but is not limited to minimum wall thickness determination, corrosion allowance, weld efficiency rating, support structure loading, nozzle calculations. Calculations will use the material values specified in the ASME code.	A non-code boiler, pressure vessel, heat exchanger or accumulator is in the pressure system package		
b. Vessel thickness and remaining life estimate	Every Package		
6. Pressure Safety Devices	The pressure system contains a pressure safety device (which includes but is not limited to relief valves and rupture discs)		
a. Safety Relief Calculations for relief valves, in accordance with ASME requirements	Every Package, unless calculations cannot be generated, a flow test is required in place of calculations.		
b. Pressure Relief Calculations for Rupture Disks in accordance with ASME requirements	Rupture Disks are in the pressure system		
c. Certified Test Data of relief valves, e.g. steam Pressure safety valves are certified by NBIC coded shop	A PRD is modified or tested by an outside facility		
7. Piping System Documentation:			
a. FM07; for available components	Every Package		
8. Pump or compressor discharge pressure curves, calculation, or table (If available)	The pressure system contains pumps or compressors		

Existing (including Legacy) System Documentation Requirements

General Legacy Pressure System Description for High Pressure – Low Liquid Volume

Evaluation Category 15

Assumptions:

Fluid Service

1. The system fluid service is a FS1 liquid with a low flow liquid rate such that whipping of flex lines is not an issue.
 - 1.1. The pressure system fluid service is High Pressure as define by ASME B31.3 2010.
 - 1.2. The fluid used is not toxic, corrosive, or immediately dangerous to humans.
2. Materials of construction are compatible with the system fluid service.

System Operation

1. There are no stress intensification factors for example cracks or acute angles of pressure boundaries.

System Hardware

1. The system components have exhibited extensive, successful service experience under comparable conditions with similarly proportioned components of the same or like material.
2. The system is equipped with a properly sized, set, and functional pressure relief device(s), if needed, to protect against single point failures. Relief device exhaust locations are properly sized and located to protect personnel.
3. There are no locations in the system that requires relief protection that may be isolated from relief protection.
4. Flexible hoses over 12 inches in length and in service pressure greater than 150 psig are restrained in accordance with ESM Chapter 17 only in locations where adequate volume is present to present a whipping problem.
5. Pumping rates are low enough to preclude hose whipping and fluid jetting from leaks.
6. System is constructed of metallic components.
7. In response to the PISA on LANL Welding Program (circa 2004) representative accessible welds were visually inspected and are free from indications. Solder or braze joints are not allowed.
8. External appearance is free from corrosion or indication of leakage.

Failure Mode

1. A ductile failure mode is assumed (leak before burst).

Consequence of Failure

1. The result of the failure will not result in serious personnel injury. Safe-guarding will be applied if necessary.

Safety Class

1. Applicable to ML4 only.

Existing (including Legacy) System Documentation Requirements

Documentation Requirements

1. These High Pressure – Low Liquid Volume pressure systems shall be exempt from the requirements of having code leak test documentation.
2. These High Pressure – Low Liquid Volume pressure systems may continue to use unlisted components provided they are used within the temperature and pressure ratings of the manufacturer’s.
3. This equipment will be considered grandfathered and will not be replaced with like items. System shall be upgraded to ASME compliance as items age out of service by attrition.
4. LANL ESM Chapter 17 documentation as required by Table ADMIN-1-3-S include: certification status form (FM01), relief device (FM02), component list (FM07), and sketch (FM10).

Qualitative Risk Assessment

Probability: Remote

Consequence: Significant

QR Factor: Insignificant

Table 3 Qualitative Risk (QR) Determination

		Probability					
		A	B	C	D	E	
		Frequent	Probable	Occasional	Remote	Improbable	
C o n s e q u e n c e	I	Major	1	1	1	2	3
	II	Serious	1	1	2	3	4
	III	Significant	1	2	3	4	5
	IV	Minor	2	3	4	5	6
	V	Insignificant	3	4	5	6	7

Existing (including Legacy) System Documentation Requirements

Table ADMIN-1-3-S			
General Legacy Pressure System Documentation for High Pressure – Low Liquid Volume			
Documentation Package Item	Required When	Owner Verification	PSO Verification
1. Form 1, LANL Pressure System Certification Status Form	Every Package		
2. Form 10, System schematics (If the owner does not have a system schematic, utilize the sketch prepared by the walk down team until such time as system schematic is prepared) ¹⁹	Every Package		
3. Alternate Method/Variance or clarification/interpretation (if applicable).	If the system or any item of the system has an applicable alternate method/variance or clarification/interpretation to the requirements of this document		
4. Pressure Safety Devices	The pressure system contains a pressure safety device (which includes but is not limited to relief valves and rupture discs)		
a. Safety Relief Calculations for relief valves, in accordance with ASME requirements	Every Package, unless calculations cannot be generated, a flow test is required in place of calculations.		
b. Pressure Relief Calculations for Rupture Disks in accordance with ASME requirements	Rupture Disks are in the pressure system		
c. Certified Test Data of relief valves, e.g. steam Pressure safety valves are certified by NBIC coded shop	A PRD is modified or tested by an outside facility		
5. Piping System Documentation:			
a. FM07; for available components	Every Package		
6. Pump or compressor discharge pressure curves, calculation, or table (If available)	The pressure system contains pumps or compressors		

¹⁹ Information required on Form 10, System schematics may be documented in alternative documents or captured in controlled databases, such as the Master Equipment List (MEL) or Computerized Maintenance Management System (CMMS), but must be referenced and readily available for review. The evaluation shall be considered a record and must be managed per LANL P1020, P1020-1, and P1020-2

Existing (including Legacy) System Documentation Requirements

General Legacy Pressure System Description for Hydronic Piping

Evaluation Category 16

Assumptions:

Fluid Service

1. The system fluid service is FS3 as defined by ESM Chapter 17
 - 1.1. The pressure system fluid service is Category D as define by ASME B31.3 2010.
 - 1.2. The pressure systems are within the scope of ASME B31.9-2011.

System Operation

1. There are no stress intensification factors for example cracks or acute angles of pressure boundaries.

System Hardware

1. The system components have exhibited extensive, successful service experience under comparable conditions with similarly proportioned components of the same or like material.
2. The system is equipped with a properly sized, set, and functional pressure relief device(s), if needed, to protect against single point failures. Relief device exhaust locations are properly sized and located to protect personnel.
3. There are no locations in the system that requires relief protection that may be isolated from relief protection.
4. System is constructed of metallic components.
5. In response to the PISA on LANL Welding Program (circa 2004) representative accessible welds were visually inspected and are free from indications. Solder or braze joints are not allowed.
6. External appearance is free from corrosion or indication of leakage.

Failure Mode

1. A ductile failure mode is assumed (leak before burst).

Consequence of Failure

1. The result of the failure will not result in serious personnel injury. Safe-guarding will be applied if necessary.

Safety Class

1. Applicable to ML4 only.

Documentation Requirements

1. These hydronic pressure systems shall be exempt from the requirements of having code leak test documentation.
2. These hydronic pressure systems may continue to use unlisted components provided they are used within the temperature and pressure ratings of the manufacturer's.
3. This equipment will be considered grandfathered and will not be replaced with like items. System shall be upgraded to ASME compliance as items age out of service by attrition.

Existing (including Legacy) System Documentation Requirements

- LANL ESM Chapter 17 documentation as required by Table ADMIN-1-3-T include: certification status form (FM01), relief device (FM02), component list (FM07), and sketch (FM10).

Qualitative Risk Assessment

Probability: Remote

Consequence: Minor

QR Factor: 5

Table 3 Qualitative Risk (QR) Determination

		Probability					
		A	B	C	D	E	
		Frequent	Probable	Occasional	Remote	Improbable	
C o n s e q u e n c e	I	Major	1	1	1	2	3
	II	Serious	1	1	2	3	4
	III	Significant	1	2	3	4	5
	IV	Minor	2	3	4	5	6
	V	Insignificant	3	4	5	6	7

Existing (including Legacy) System Documentation Requirements

Table ADMIN-1-3-T			
General Legacy Pressure System Documentation for Hydronic Piping			
Documentation Package Item	Required When	Owner Verification	PSO Verification
1. Form 1, LANL Pressure System Certification Status Form	Every Package		
2. Form 10, System schematics (If the owner does not have a system schematic, utilize the sketch prepared by the walkdown team until such time as system schematic is prepared) ²⁰	Every Package		
3. Alternate Method/Variance or clarification/interpretation (if applicable).	If the system or any item of the system has an applicable alternate method/variance or clarification/interpretation to the requirements of this document		
4. Pressure Safety Devices	The pressure system contains a pressure safety device (which includes but is not limited to relief valves and rupture discs)		
a. Safety Relief Calculations for relief valves, in accordance with ASME requirements	Every Package, unless calculations cannot be generated, a flow test is required in place of calculations.		
b. Pressure Relief Calculations for Rupture Disks in accordance with ASME requirements	Rupture Disks are in the pressure system		
c. Certified Test Data of relief valves, e.g. steam Pressure safety valves are certified by NBIC coded shop	A PRD is modified or tested by an outside facility		
5. Piping System Documentation:			
a. FM07; for available components	Every Package		
6. Pump or compressor discharge pressure curves, calculation, or table (If available)	The pressure system contains pumps or compressors		

²⁰ Information required on Form 10, System schematics may be documented in alternative documents or captured in controlled databases, such as the Master Equipment List (MEL) or Computerized Maintenance Management System (CMMS), but must be referenced and readily available for review. The evaluation shall be considered a record and must be managed per LANL P1020, P1020-1, and P1020-2

Existing (including Legacy) System Documentation Requirements

General Legacy Pressure System Description for Water Systems

Evaluation Category 17

Assumptions:

Fluid Service

1. The system fluid service is FS3 as defined by ESM Chapter 17
 - 1.1. The pressure system fluid service is Category D as define by ASME B31.3 2010.
 - 1.2. The pressure systems are within the scope of ASME B31.9-2011.

System Operation

1. There are no stress intensification factors for example cracks or acute angles of pressure boundaries.

System Hardware

1. The system components have exhibited extensive, successful service experience under comparable conditions with similarly proportioned components of the same or like material.
2. The system is equipped with a properly sized, set, and functional pressure relief device(s), if needed, to protect against single point failures. Relief device exhaust locations are properly sized and located to protect personnel.
3. There are no locations in the system that requires relief protection that may be isolated from relief protection.
4. System is constructed of metallic components.
5. External appearance is free from corrosion or indication of leakage.
6. In response to the PISA on LANL Welding Program (circa 2004) representative accessible welds were visually inspected and are free from indications. Solder or braze joints are not allowed.
7. External appearance is free from corrosion or indication of leakage.

Failure Mode

1. A ductile failure mode is assumed (leak before burst).

Consequence of Failure

1. The result of the failure will not result in serious personnel injury. Safe-guarding will be applied if necessary.

Safety Class

1. Applicable to ML4 only.

Documentation Requirements

1. These water pressure systems shall be exempt from the requirements of having code leak test documentation.
2. These water pressure systems may continue to use unlisted components provided they are used within the temperature and pressure ratings of the manufacturer's.

Existing (including Legacy) System Documentation Requirements

3. This equipment will be considered grandfathered and will not be replaced with like items. System shall be upgraded to ASME compliance as items age out of service by attrition.
4. LANL ESM Chapter 17 documentation as required by Table ADMIN-1-3-U include: certification status form (FM01), relief device (FM02), component list (FM07), and sketch (FM10).

Qualitative Risk Assessment

Probability: Remote

Consequence: Insignificant

QR Factor: 6

Table 3 Qualitative Risk (QR) Determination

		Probability					
		A	B	C	D	E	
		Frequent	Probable	Occasional	Remote	Improbable	
C o n s e q u e n c e	I	Major	1	1	1	2	3
	II	Serious	1	1	2	3	4
	III	Significant	1	2	3	4	5
	IV	Minor	2	3	4	5	6
	V	Insignificant	3	4	5	6	7

Existing (including Legacy) System Documentation Requirements

Table ADMIN-1-3-U			
General Legacy Pressure System Documentation for Water Systems			
Documentation Package Item	Comment	Owner Verification	PSO Verification
1. Form 1, LANL Pressure System Certification Status Form	Every Package		
2. Form 7, Component List	Every Package		
3. Form 10, System schematics (if the owner does not have a system schematic, utilize the sketch prepared by the walkdown team until such time as system schematic is prepared) ²¹	Every Package		
4. Alternate Method/Variance or clarification/interpretation (if applicable).	If the system or any item of the system has an applicable alternate method/variance or clarification/interpretation to the requirements of this document		
5. Pressure Safety Devices	The pressure system contains a pressure safety device (which includes but is not limited to relief valves and rupture discs)		
a. Safety Relief Calculations for relief valves, in accordance with ASME requirements	Every Package, unless calculations cannot be generated, a flow test is required in place of calculations.		
b. Pressure Relief Calculations for Rupture Disks in accordance with ASME requirements	Rupture Disks are in the pressure system		
c. Certified Test Data of relief valves, e.g. steam Pressure safety valves are certified by NBIC coded shop	A PRD is modified or tested by an outside facility		
6. Piping System Documentation:			
a. FM07; for available components			
7. Pump or compressor discharge pressure curves, calculation, or table (If available)	The pressure system contains pumps or compressors		

²¹ Information required on Form 10, System schematics may be documented in alternative documents or captured in controlled databases, such as the Master Equipment List (MEL) or Computerized Maintenance Management System (CMMS), but must be referenced and readily available for review. The evaluation shall be considered a record and must be managed per LANL P1020, P1020-1, and P1020-2