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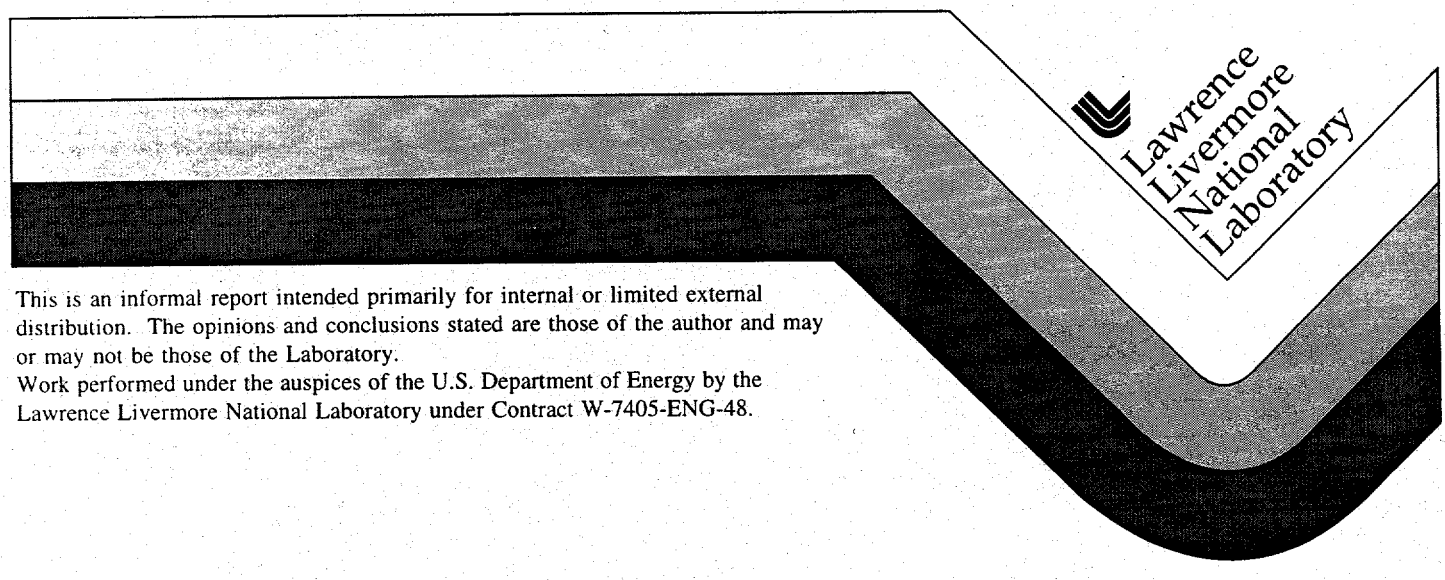
Pressure Safety Program
Lawrence Livermore National Laboratory

Chuck Borzileri
Matt Traini

October 1992



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PRESSURE SAFETY PROGRAM

LAWRENCE LIVERMORE NATIONAL

LABORATORY

October 1992

Prepared By
Chuck Borzileri, Pressure Safety Manager
Matt Traini, Pressure Inspector

Distribution:

LLNL Pressure Inspectors
LLNL Pressure Consultants
Pressure Safety Files, *3-M.E. Safety Notes*
Pressure Safety Files, *5-Pressure Vessel Codes and Standards*
M. E. Library L-129
ESD Division

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INTRODUCTION

The Lawrence Livermore National Laboratory (LLNL) is a Research and Development facility. Programs include research in: nuclear weapons, energy, environmental, biomedical, and other DOE funded programs. LLNL is managed by the University of California for the Department of Energy.

Many research and development programs require the use of pressurized fluid systems. In the early 1960's, courses were developed to train personnel to safely work with pressurized systems. These courses served as a foundation for the Pressure Safety Program.

The Pressure Safety Program is administered by the Pressure Safety Manager through the Hazards Control Department, and responsibilities include:

- Pressure Safety course development and training
- Equipment documentation, tracking and inspections/retests
- Formal and informal review of pressure systems

The program uses accepted codes and standards (Page 6) and closely follows the DOE Pressure Safety Guidelines Manual. This manual was developed for DOE by Lawrence Livermore National Laboratory.

The DOE Pressure Safety Guidelines Manual defines five (5) basic elements which constitute this Pressure Safety Program. These elements are:

1. A Pressure Safety Manual
2. A Safety Committee
3. Personnel who are trained and qualified
4. Documentation and accountability for each pressure vessel or system
5. Control of the selection and the use of high pressure hardware

A detailed description of these elements follows.

1. **A Pressure Safety Manual** outlines policies, procedures and requirements for pressure vessels and systems to be designed, procured and/or operated by any employee or contractor at LLNL. The DOE Pressure Safety Guidelines Manual fulfills this requirement at LLNL. The manual details and gives examples of :
   - Required training
   - Theory and calculations
   - Equipment specifications and requirements
   - Standards for design, testing and operational procedures
   - Examples of incidents and accidents
   - Exercises and example problems for students
   - Inspection requirements

2. **The Safety Committee** sets and reviews safety policies, addressing unusual problems or occurrences, and provides advice and assistance in pressure safety. The Mechanical Engineering Design Safety Committee provides this service at LLNL. This committee can draw upon the resources of experts and specialists in many areas.

3. **Personnel who are trained and qualified** through formal classroom courses, testing and on-the-job experience, design, build and/or operate pressure systems in a safe manner.

   - Pressure Safety courses are offered through the Hazards Control Department for all employees or contractors who require them to satisfy job requirements. (Refer to Appendix 1 for course descriptions and outlines.)
   - A list of "Authorized Individuals for Pressure Work" is maintained and distributed by the Pressure Safety Manager. (Refer to Appendix 2)
   - Requalification for Authorized Individuals is mandatory.
   - The Authorized Individuals list is updated annually.
   - A data base of all personnel who have attended formal classroom courses is maintained by the training group in the Safety Services Division of the Hazards Control Department.

4. **Documentation and accountability for each pressure vessel or system** describing the design, pressure ratings, traceability, testing, operation and maintenance requirements where applicable.

   - The Engineering Safety Note (ESN) and Operational Safety Procedures (OSP) are the formal documents that are used to describe pressure systems, vessels and their safe operation.

     A. The ESN certifies the mechanical integrity of the system and at a minimum it will include the following:

        - Description of the system
        - Hazards (i.e., stored energy)
        - Engineering calculations

- Test and Retest procedures
- Labeling (identification)
- Associated Procedures
- References
- The required signature authority

See Appendix 3 for Engineering Safety Note Guide

B. The OSP is used to identify related hazards for a system in operation and addresses how these hazards are controlled. The OSP will:

- Describe the activity
- Identify hazards
- Define control measures
- Specify responsible individuals
- Contain the required signature authority

See Appendix 4 for Operational Safety Procedure Guide.

C. Both of these documents are subject to a review process and management sign-off procedures. In order to determine if an ESN and/or an OSP is required, the LLNL Documentation Guide for pressure equipment is used as a reference. Refer to Appendix 5.

- Every vessel or system requiring an Engineering Safety Note must be inspected, tested, documented, and labeled by a qualified LLNL Pressure Inspector.

- A data base describing the status of all pressure vessels and systems under this program is maintained by the Pressure Safety Manager.

  A. In order to trace and account for pressure vessels and systems, the Mechanical Engineering Number Systems (ME#) is used. For each individual pressure vessel and system, this allows knowledge of:

  - Identification
  - Location
  - Responsible User
  - Basis for inspection and testing

  Refer to the following appendices for documentation used:

  - Appendix 8; Sample page from Log Book.
  - Appendix 9; Pressure Tests/Inspection Record (Form LL3586).
  - Appendix 10; LLNL Pressure Tested Label. Affixed by pressure Inspectors upon successful completion of documentation and testing.

  Original test documentation is stored and maintained in Building 343, Room 1001C, Inspector Reference Library.

- Vessels/systems requiring inspection or re-test are assigned to LLNL Pressure Inspectors.

  A. Inspections/re-tests are usually based on a 3/6 year cycle, respectively.

  B. Refer to Appendix 11 for sample Inspector/Retest Report from the database.

  C. Pressure Test/Inspection Record (Appendix 9) is completed by inspector. This information is used to update the data base.

D. Equipment not currently being used may be considered "stored in place." The Inspector and Responsible User will sign and complete Form LL6278 (Appendix 12).

- All relief devices are tracked and documented. Users are responsible to have them re-tested or set by an LLNL Pressure Inspector (normally every 3 years).

A. All relief devices, regardless of set pressure, require the completion of an Relief Device Form (RD Form). Each relief device is issued an RD number (similar to a serial number) and related information is stored in a computer data base. Refer to Appendix 6 for Relief Device Form.

B. For proper identification, all relief devices have an attached wire lead sealed tag stating the following information:

- Set Pressure
- Date set
- Expiration date
- RD number
- Inspector

Refer to Appendix 7 for Relief device tag.

5. **Control of the selection and the use of high pressure hardware.** This includes quality control requirements for vendors, procurement to applicable specifications, and the issuance to and assembly of high pressure components by certified installers.

   - Stores stocked components are purchased through applicable specifications i.e., Engineering Standard References (LLNL), ASME, ANSI, DOT, CGA, etc.
   - Items designated as specialty or high pressure components are "Group" controlled (Appendix 13).
   - Only Authorized Individuals can obtain Group controlled items (Appendix 2 - "Authorized Individuals for Pressure Work").
   - The Purchasing Department alerts Hazards Control or the Pressure Safety Manager to purchases of pressure equipment for review and authorization.

PRESSURE SAFETY CODES AND STANDARDS

- Federal OSHA

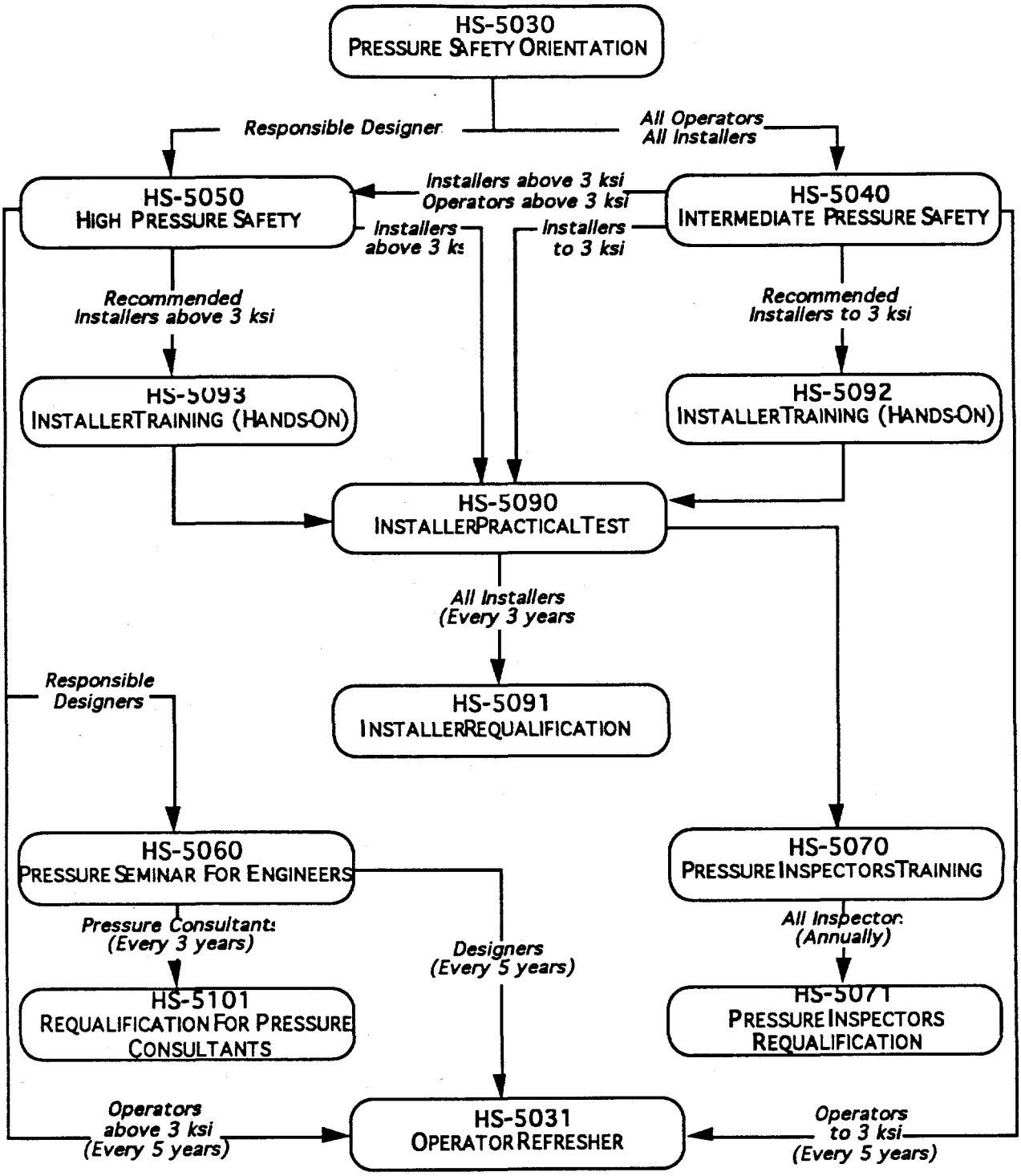
  29 CFR 1910, "General Industry Standards"

  29 CFR 1926, "Construction Standard"
- National Fire Protection Association (NFPA)
- American National Standards Institute (ANSI)
- United States Department of Transportation (DOT)
- America Society of Mechanical Engineering (ASME)
- Compressed Gas Association (CGA)
- Local/State Codes
- DOE Order 5000.3A, "Occurrence Reporting"
- DOE Order 5480.4, "Environmental Safety and Health Protection Standard"
- DOE Pressure Safety Guidelines Manual
- Lawrence Livermore National Laboratory Health and Safety Manual
- Design Safety Standards, Mechanical Engineering Department, Lawrence Livermore National Laboratory

APPENDIX 1

Hazards Control Course Descriptions & Outlines

LLNL PRESSURE TRAINING REQUIREMENTS



HS: Health & Safety
ksi: 1 ksi = 1,000 psi
Refer to Health & Safety Manual Chapter 32, "Pressure" for course description.

RESPONSIBILITIES

PRESSURE OPERATOR	An employee designated by an administrative supervisor to operate specific pressure equipment under the direction of the responsible user. Not authorized to install or modify equipment unless employee is also a Pressure Installer.
RESPONSIBLE USER	An employee responsible for the proper operation and maintenance of a system. For systems that require an ESN, ensure inspection and retesting are performed by a Pressure Inspector.
PRESSURE INSTALLER	An employee certified to assemble, install and test pressure equipment within a specified range.
PRESSURE INSPECTOR	An employee trained and qualified to inspect and test pressure equipment. Also expected to provide technical guidance to pressure installers, and Installers-in-training.
RESPONSIBLE DESIGNER	An employee responsible for designing a pressure system or vessel. Also responsible for preparing any required Engineering Safety Notes.
PRESSURE CONSULTANT	An engineer or scientist of demonstrated experience and knowledge who is appointed by the Division Leader and approved by the Department Head. Authorized to approve pressure designs, calculations and requests for pressure equipment. All pressure work done in, or for a department of program is subject to the critical review and approval of this employee.

LLNL PRESSURE SAFETY TRAINING REQUIREMENTS

RESPONSIBILITY	Basic Courses				Inspector	Installer	Hands on Installer Training		Requalifaction			
	HS-5030	HS-5040	HS-5050	HS-5060	HS-5070	HS-5090	HS-5092	HS-5093	HS-5031	HS-5071	HS-5091	HS-5101
Pressure Operators / Responsible User												
0 - 150 psi gas 0 - 1,500 psi liquid	✔								Every 5 years			
150 - 3,000 psi gas 1,500 - 5,000 psi liquid	✔	✔							Every 5 years			
above 3,000 psi gas above 5,000 psi liquid	✔	✔	✔						Every 5 years			
Pressure Installers												
0 - 3,000 psi gas 0 - 5,000 psi liquid	✔	✔				✔	Recommend				Every 3 years	
above 3,000 psi gas above 5,000 psi liquid	✔	✔	✔			✔		Recommend			Every 3 years	
Pressure Inspectors [1]	✔	✔	✔		✔	✔				Every year		
Responsible Designer	✔		✔	✔					Every 5 years			
Pressure Consultant [2]	✔		✔	✔								Every 3 years

1 Appointed by the Pressure Safety Manager.

2 Appointed by the Division Leader, and Department Head approved.

Revised 6/92

HS-5030 (formerly HS-503) Pressure Safety Orientation

A 4-hour introduction to pressure hazards and the LLNL pressure safety program, this course is recommended for all scientific, technical, and crafts personnel who work with safety-note-exempt pressure systems. It is a prerequisite for all other pressure training. Test given for successful completion. Class notes are provided.

HS-5031 Pressure Safety Requalification

This course is intended to requalify pressure operators in the low, intermediate, and high pressure ranges. Operators should take this course every five years after successful completion of HS-5030, HS-5040, and HS-5050. Operators of low, intermediate and high pressure equipment who are not Pressure Installers, Inspectors, or Consultants should attend.

HS-5040 (formerly HS-504) Intermediate Pressure Safety

This 4-hour course is required for all personnel who install or operate gas pressure systems between 150 psi and 3,000 psi or liquid systems between 1500 psi and 5,000 psi. Fluid forces, pressure relationships, equipment and required safety precautions in the intermediate pressure range are covered. After completing this training, personnel may work as pressure operators or installer-in-training in the intermediate pressure range. Pressure Safety training manual and class notes are provided. Test given for successful completion. (HS-5030 is a prerequisite for this course.)

HS-5050 (formerly HS-505) High Pressure Safety

This 4-hour course is required for all personnel who will install or operate gas pressure systems in excess of 3,000 psi or liquid pressure systems in excess of 5,000 psi. Pressure hazards, equipment, and precautions in the high-pressure range are covered. After completing this training, personnel may work as pressure operators or installers-in-training in the high pressure range. Class notes are provided. Test given for successful completion. (HS-5030 and HS-5040 are prerequisites for this course.)

HS-5060 (formerly HS-506) Pressure Seminar for Engineers

This 6-hour course is intended to give general guidelines and Laboratory policy and procedures to individuals preparing engineering safety notes. Material from HS-5030 and HS-5050 are required, and additional engineering level materials are covered. Topics include: engineering safety notes and operational procedures; limitations and safety considerations; metallurgy and fracture mechanics; hydrogen safety; and pressure vessel design. This course is required for professionals who wish to become Responsible Users, Responsible Designers, or Pressure Consultants. Problem set assigned for successful completion. (HS-5030 and HS-5050 are prerequisites for this course.)

HS-5070 (formerly HS-507) Pressure Inspectors Training

Time: As required.

HS-5071 (formerly HS-508) Pressure Inspectors Requalification

Time: As required.

HS-5090 (formerly HS-511) Pressure Installer Test

A practical test, given on an individual basis. To become pressure installers, installers-in-training must pass this test. Duration and content varies according to pressure range, usually 2-4 hours. Request from Immediate Supervisor and Division Leader certifying experience to the LLNL Pressure Safety Manager.

HS-5091 (formerly HS-509) Pressure Installers Requalification

Time: 3-hour updating course every three (3) years.

HS-5092 High Pressure Installers Training (NEW)
0 to 6,000 psi pressure range

This intensive, 20-hour hands-on training class is designed for mechanical technicians who are intending to become pressure installers. The course provides one-on-one training in various aspects of design and assembly of fluid systems which are to operate at pressures below 6000 psi.

HS-5093 High Pressure Installers Training (NEW)
6,000 to 60,000 psi pressure range

This intensive, 40-hour hands-on training class is designed for mechanical technicians who are intending to become high pressure installers. The course provides one-on-one training in various aspects of design and assembly of fluid systems which are to operate at pressures above 6000 psi.

HS-5101 (formerly HS-510) Pressure Consultant Requalification

Pressure consultants are required to attend this 3-hour updating course every three (3) years to maintain their certification.

For further details, schedules, and costs regarding HS-5092 or HS-5093, contact: Owen Parker, LLNL, (510) 423-1789.

FOR INFORMATION OR QUESTIONS REGARDING PRESSURE SAFETY TRAINING, CONTACT:

Chuck Borzileri
Pressure Safety Manager
Lawrence Livermore National Laboratory
P.O. Box 808 MS L-384
Livermore, CA 94550
(510) 422-6076

HS-5030 PRESSURE SAFETY ORIENTATION

SUBJECT OUTLINE

1. Introduction and Objectives

    - Definitions: MOP, MAWP, Safety Factor
    - Pressure Ranges vs. Training

2. Compressed Gas Safety

    - Color codes, labeling, storage, and transport
    - Cylinder relief protection, proper identification

3. Pressure Safety Program

    - Basic Elements, concept

4. Pressure Hazards and Accidents

    - Causes, severity, and recognition
    - Case studies and explanations of Accidents

5. Introduction to Safety - Manifolds and Relief Devices

    - Types and uses of regulators
    - Cautions regarding relief devices
    - Guidelines for gauge selection

6. Cryogenic Safety

    - Definitions, awareness
    - Emphasis on related hazards, pressure build-up

7. Oxyacetylene Safety

    - Use of check valves and flash arrestors
    - Guidelines and review of safety
    - Optional Film

8. Test

HS-5040 INTERMEDIATE PRESSURE SAFETY

SUBJECT OUTLINE

1. Intermediate Pressure = Definitions and Concepts

    - Pressure - Defined
      Pressure-force-area
      Units of pressure
      Types: atmospheric/gage/absolute
      Conversion charts
    - Temperature - Scales
      Conversions
    - Liquid - gas comparisons/differences
    - Stored energy of fluids

2. Regulators and Intermediate Pressure Equipment

    - Difference between pipe & tube; NPT, NPS
    - Piping: ANSI code/pressure ratings
    - Temperature considerations
    - Valve selection
    - Regulators: line, single, two stage
    - Fittings: pipe, brass, cajon, flare, compression
    - Corrosive gases - handling
      gas cabinets
    - Seals, lubricants and compatibility of materials

3. Pressure Testing

- Definitions: MAWP, MOP, test pressure
- Test measurements
- Procedures/documentation
- Inspections/retests
- Liquid vs. gases
- In-place testing
- Protection of gauges and reliefs
- Barricade requirements

Leak testing - pressure drop
bubble tests
leak detectors

4. Test

HS-5050 HIGH PRESSURE SAFETY

SUBJECT OUTLINE

1. High Pressure Theory

    - Relationships between Pressure, Temperature, and Volume.
    - Ideal gases
    - Compressibility, real gases

2. High Pressure Fittings and Equipment

    - Fittings - types/ratings/applications
    - Pump and Compressors
    - Valves - types/cleaning/maintenance
    - Vessels/pressure reliefs
    - Regulators/gauges/transducers
    - Tubing

3. High Pressure System Design

    - Pressure system defined
    - Ground rules for design and use
    - Functions of system components
    - Pressure system design problem

4. High Pressure Hydrogen Safety

    - Ignition characteristics
    - Safety design
    - Hardware and equipment

5. Test

HS-5060 PRESSURE SEMINAR FOR ENGINEERS

SUBJECT OUTLINE

1. Engineering Documentation
   - Safety notes
   - Operational safety procedures

2. High Pressure Amagat Theory
   - Ideal gas
   - Compressibility, real gases
   - Amagat definitions
   - Amagat calculations
   - Amagat: Definition
     Tables and curves
     Calculations

3. Pressure Vessel Closures
   - Bridgeman
   - "O" Ring seals
   - Other types of closures

4. Pressure Vessel Design
   - Design Definitions: Safety factor
     Vessel/system
     Manned/remote
   - Materials/welding
   - Design considerations
   - Stress analysis
   - SF x 3 vessels
   - Hydrogen embrittlement
   - Fracture - safe design
   - Example Safety Notes

5. Pressure Testing (repeat from HS-5040)
    - Definitions = MAWP, MOP, test pressure
    - Test measurements
    - Procedures/documentation
    - Inspections/retests
    - Liquid vs. gases
    - In-place testing
    - Protection of gauges and reliefs
    - Barricade requirements
    - Leak testing - Pressure drop
      Bubble tests
      Leak detectors

6. Illustrative Classroom Problems

7. Test

APPENDIX 2

List of Authorized Individuals for Pressure Work

(updated and available annually through Hazards Control Education Group, L-391, or the Pressure Safety Manager, L-384)

384

2-6076

January 15, 1992

TO: Distribution

FROM: Chuck Borzileri, Pressure Safety Manager

SUBJECT: Personnel Qualifications and Training

Attached please find the most current list of personnel and their last requalification, or the expiration date of their installer or inspector card. This list will be updated each year.

Also attached is a short description of the pressure safety courses by number. The course numbers have been changed to a four digit number; this is to comply with the Laboratory's guidelines on training courses. Please review the course numbers, description, and prerequisites to help you determine which courses are necessary for your particular needs. These courses will be offered in the quarterly LLNL Course Catalog. When the education office of Hazards Control receives an adequate number of sign-ups, the class will be scheduled.

If you have any questions about the courses, or corrections to the list, please contact me at extension 2-6076. Additional copies of this list are available through the Hazards Control Education Department (2-5158, L-391).

Chuck Borzileri
Pressure Safety Manager

CVB:cm
Attachment

Distribution:
Mail List 8
Mail List 15
Mail List 16
Mail List 31
Mail List 35
Mail List 85
File 2-4-2-1
Date File

Authorized Individuals for Pressure Work

Revised
January 1992

Chuck Borzileri, Pressure Safety Manager
Bldg. 253, L-384
Extension 2-6076

Responsibilities:

Administration of the LLNL Pressure Safety Program which includes: Pressure safety classes, requalification of Pressure Consultants, Inspectors, and Installers. Record keeping of authorized personnel, pressure vessels, systems, and pressure inspecting, or retesting of all pressure systems.

* Your qualification has expired. Please schedule a requalification course as soon as possible.

** Second Notice: Your qualification has lapsed. If you do not complete a requalification course within the next six months you will be removed from the list of authorized personnel for pressure work.

Some Building Coordinators and those personnel listed in the following pages are authorized to withdraw high pressure equipment from the High Pressure Laboratory in Building 343. TO BE USED BY QUALIFIED PERSONNEL ONLY.

PRESSURE CONSULTANTS (Re-Qualification every 3 years)

Chemistry and Materials Science (9812) — C.Gatrousis (A.D.)

	L-Code	Last Requalification
L. T. Summers	L-324	1/90
M. S. Costantino	L-369	11/91

Earth Sciences Department (9825) — L. W. Younker

M. L. Beeman	L-201	7/89

LLNL Nevada, Nevada Test Site (9761)

R. L. Dury	L-777	12/90

Mechanical Engineering, Administration (9770) — A. K. Chargin (DAD)

PRESSURE CONSULTANTS (continued)

	L-Code	Last Requalification
Energy Systems Engr. Division (9773)		**R. B. Carr**
J. M. Bowers	L-471	11/91
H. G. Patton	L-496	12/90
R. J. Foley	L-482	12/90
K. Volkman	L-460	11/91
J. D. Williams	L-467	12/90
D. L. Hipple	L-492	11/91
Applied Research Engineering (9777)		**J. N. Doggett**
** D. D. Lang	L-636	12/88
R. E. Priest	L-273	11/91
Materials Fabrication (9779)		**W. R. Ruvalcaba**
K. L. Blaedel	L-341	11/91
T. M. Vercelli	L-330	12/90
Nuclear Explosives Engineering (9772)		**A.B. Copeland**
R. P. Brown	L-122	11/89
D. C. Holten	L-122	12/90
R. R. Sandberg	L-122	11/91
F. M. Wilson	L-122	12/90
J. Brentjes	L-373	12/90
Nuclear Test Engineering (9771)		**J. P. Mahler**
E. Russell	L-197	11/91
Weapons Engineering (9775)		**R. E. Clough**
J. D. Cervelli	L-125	12/90
M. W. Wraith	L-122	12/90
Engineering Sciences Division (9776)		**G. S. Root**
** J. E. Field	L-559	1/88
** C. L. Folkers	L-362	1/88
** F. H. Magness	L-354	12/88
W. C. Miller	L-364	1/92

PRESSURE CONSULTANTS (continued)

	L-Code	Last Requalification
J. T. Merrill	L-354	11/89
D. I. Chambers	L-341	12/90
P. B. Mohr	L-333	12/90
J. E. Hauber	L-129	11/89
J. W. Gerich	L-354	11/91
L. L. Dibley	L-362	11/91
Plant Engineering (9700-9719)		J. W. Cook
** R. L. Frazier	L-799	1/88
R. R. Kingscott	L-395	11/89
V. C. Chu	L-541	12/90
T. A. Boock	L-211	11/91
R. H. Simonds	L-654	11/91
P. Sideris	L-654	12/90
S. Mukherji	L-654	1/92
Electronics Engineering (9785)		S. R. Trost (Acting DAD)
D. R. Ciarlo	L-156	11/91
J. A. Folta	L-156	1/90

LIST OF PRESSURE INSPECTORS*

INSPECTOR	DEPT.	BLDG.	KSI GAS	KSI LIQUID	TEL.NO.	MAIL	CARD EXPIRES
BORZILERI, Charles	ESD	253	60	60	2-6076	L-384	1/93
BOWEN, Pete	NEED	343	5	5	2-9450	L-373	1/93
CARNAHAN, Roger	NEED	343	80	120	4-4697	L-373	1/93
GIRE, Dave	NEED	343	30	30	4-4694	L-373	1/93
HAILEY,Gary	PE	511	5	5	2-9762	L-609	1/93
HAWE, Jerry	NTS	CP-60	30	30	8-575-3955	L-777	1/93
IDEKER, Ronald A.	NTS	CP-60	60	60	8-575-3955	L-777	1/93
KELLY, Brian	NEED	343	30	30	4-4684	L-373	1/93
LEVINE, Berry H.	ESED	231	60	60	3-1962	L-344	1/93
MARSHALL, Robert F.	NEED	343	30	30	4-4700	L-373	1/93
MIHOEVICH, John M.	ESED	166	150	150	3-8291	L-361	1/93
NOXON, John M.	NTED	151	5	5	2-5569	L-378	1/93
PARKER, Owen D.	NEED	343	150	200	3-1789	L-373	1/93
PARKER, Richard	NEED	261	30	30	2-2632	L-385	1/93
ROBB, Cal	Y-Div.	162	60	150	3-9369	L-249	1/93
ROBERTS, Dave H.	Y-Div.	1768	60	60	3-7185	L-250	1/93
RODRIGUEZ, Daniel C.	NEED	343	100	150	4-4687	L-373	1/93
ROSS, Timothy	NEED	343	5	5	2-9596	L-373	1/93
RUSSELL, Jerry C.	NEED	343	30	30	3-2752	L-373	1/93
SARGINSON, John D.	PE	511	5	5	2-9762	L-609	1/93
TRAINI, Matt W.	NEED	343	30	30	2-9596	L-373	1/93

CERTIFICATION COORDINATOR FOR HIGH PRESSURE HARDWARE

Romero, Emilio	NEED	343			3-2750	L-373	

* Pressure Inspectors are qualified Pressure Installers before being appointed Pressure Inspectors the Pressure Safety Manager.

PRESSURE INSTALLERS

Department	Installer	Mail	Maximum operating pressure MPa (psi) Gas		MPa (psi) Liquid		CARD EXPIRES
Electrical	D. Okubo	L-156	21	(3,000)	21	(3,000)	92
Engineering	W. Tindall	L-156	21	(3,000)	35	(5,000)	92
LLNL-Nevada	J. G. Cates	L-777	21	(3,000)	35	(5,000)	93
	F. Gorecki	L-777	21	(3,000)	35	(5,000)	92
	M. H. Newman	L-777	21	(3,000)	35	(5,000)	93
	M. Owens	L-777	21	(3,000)	35	(5,000)	93
Mechanical	T. Arnold	L-138	200	(30,000)	200	(30,000)	92
Engineering	R. E. Bell	L-332	21	(3,000)	35	(5,000)	94
	G. Bianchini	L-369	21	(3,000)	35	(5,000)	92
	W. E. Biehl	L-494	100	(15,000)	100	(15,000)	94
**	R. M. Boling	L-369	517	(75,000)	1000	(150,000)	91
	L. A. Booth	L-874	21	(3,000)	35	(5,000)	93
	D. W. Bowen	L-636	200	(30,000)	200	(30,000)	94
	W. Brocious	L-332	35	(5,000)	35	(5,000)	94
	M. A. Brooks	L-133	400	(60,000)	1000	(150,000)	93
	K. R. Brown	L-335	21	(3,000)	35	(5,000)	94
	G. R. Cameron	L-273	200	(30,000)	200	(30,000)	92
	J. J. Carbino	L-225	70	(10,000)	70	(10,000)	94
	A. W. Coombs	L-354	21	(3,000)	35	(5,000)	93
	R. R. Cross	L-435	21	(3,000)	35	(5,000)	93
	G. J. Devine	L-120	140	(20,000)	140	(20,000)	93
	R. A. Domingo	L-836	200	(30,000)	200	(30,000)	94
	M. Dovik	L-271	21	(3,000)	35	(5,000)	94

PRESSURE INSTALLERS (continued)

Department		Installer	Mail	Maximum operating pressure MPa (psi) Gas		MPa (psi) Liquid		CARD EXPIRES
Mechanical Engineering	**	T. C. Erven	L-364	21	(3,000)	35	(5,000)	91
		M. C. Evans	L-273	70	(10,000)	35	(5,000)	92
		R. Flores	L-42	35	(5,000)	35	(5,000)	94
		M. C. Fowler	L-554	21	(3,000)	35	(5,000)	94
		R. N. Garcia	L-366	70	(10,000)	70	(10,000)	94
	**	J. Gardner	L-865	21	(3,000)	35	(5,000)	91
		T. Gates	L-236	70	(10,000)	70	(10,000)	92
	**	D. E. Gilmore	L-333	400	(60,000)	400	(60,000)	91
		G. A. Gleeson	L-138	70	(10,000)	70	(10,000)	94
		F. R. Grabner	L-369	200	(30,000)	200	(30,000)	92
		R. S. Green	L-874	35	(5,000)	70	(10,000)	94
		R. Gressmann	L-138	200	(30,000)	200	(30,000)	93
		K. Haney	L-249	21	(3,000)	35	(5,000)	94
		D. R. Hathaway	L-553	21	(3,000)	35	(5,000)	92
		G. L. Hazaga	L-335	100	(15,000)	400	(60,000)	93
		G. W. Heaton	L-474	200	(30,000)	200	(30,000)	94
		G. L. Hickman	L-364	35	(5,000)	70	(10,000)	92
		D. G. Hirzel	L-865	21	(3,000)	35	(5,000)	92
		B. H. Ives	L-362	200	(30,000)	200	(30,000)	92
		W. L. Jackson	L-547	21	(3,000)	35	(5,000)	92
		R. W. Kahle	L-269	21	(3,000)	35	(5,000)	92
		B. E. Kelly	L-341	21	(3,000)	70	(10,000)	93
		P. S. Knechtli	L-335	21	(3,000)	35	(5,000)	94
		T. C. Kuklo	L-471	21	(3,000)	35	(5,000)	94
		J. E. Lietzke	L-125	200	(30,000)	200	(30,000)	92
		J. Lutz	L-340	21	(3,000)	35	(5,000)	94
		M. A. Marcon	L-563	70	(10,000)	70	(10,000)	94
		L. C. McDavid	L-138	70	(10,000)	70	(10,000)	94
		D. P. Milani	L-459	21	(3,000)	35	(5,000)	94

PRESSURE INSTALLERS (continued)

Department		Installer	Mail	Maximum operating pressure MPa (psi) Gas		MPa (psi) Liquid		CARD EXPIRES
Mechanical		J. I. Miller	L-485	200	(30,000)	200	(30,000)	94
Engineering	**	R. W. Miller	L-865	21	(3,000)	35	(5,000)	91
		M. J. Moss	L-133	35	(5,000)	35	(5,000)	92
		L. Newton	L-396	200	(30,000)	200	(30,000)	92
		M. L. Niblack	L-122	35	(5,000)	70	(10,000)	94
	**	A. E. Ormsby	L-278	21	(3,000)	35	(5,000)	91
		R. G. Patterson	L-352	400	(60,000)	400	(60,000)	94
		J. Penland	L-478	35	(5,000)	70	(10,000)	93
		S. J. Perry	L-284	41	(6,000)	41	(6,000)	92
		J. A. Phair	L-345	140	(20,000)	1400	(200,000)	92
		R. J. Poli	L-474	21	(3,000)	35	(5,000)	92
		P. B. Ramsey	L-369	70	(10,000)	70	(10,000)	94
		T. C. Reitz	L-354	200	(30,000)	200	(30,000)	93
		J. D. Robson	L-42	35	(5,000)	35	(5,000)	94
		J. E. Rubke	L-338	21	(3,000)	35	(5,000)	92
		D. G. Ruddle	L-364	207	(30,000)	207	(30,000)	94
		R. Ruiz	L-364	70	(10,000)	70	(10,000)	94
		D. E. Salmi	L-381	21	(3,000)	35	(5,000)	92
		D. Salotti	L-335	21	(3,000)	35	(5,000)	94
	**	T. L. Schaffer	L-42	35	(5,000)	35	(5,000)	91
	**	G. V. Seeley	L-563	21	(3,000)	35	(5,000)	91
		B. O. Sellick, Jr.	L-364	70	(10,000)	70	(10,000)	94
		T. D. Smith	L-332	100	(15,000)	400	(60,000)	93
		P. R. Souza	L-335	21	(3,000)	35	(5,000)	94
		N. W. Stewart	L-385	200	(30,000)	200	(30,000)	94
		N. R. Stumpf	L-138	70	(10,000)	70	(10,000)	94
		A. M. Tullis	L-444	21	(3,000)	35	(5,000)	94
		M. Wagoner	L-874	35	(5,000)	70	(10,000)	94
		L. Witt	L-474	70	(10,000)	70	(10,000)	92

PRESSURE INSTALLERS (continued)

Department	Installer	Mail	Maximum operating pressure MPa (psi) Gas		MPa (psi) Liquid		CARD EXPIRES
Chemistry &	T.E. Shell	L-369	200	(30,000)	200	(30,000)	94
Mat'l Science	M. Stratman	L-351	21	(3,000)	70	(10,000)	92
Plant	J. Adams	L-606	21	(3,000)	35	(5,000)	94
Engineering	M. McCullough	L-606	21	(3,000)	35	(5,000)	94
**	E. A. McGinty	L-606	21	(3,000)	35	(5,000)	91
	G. Olsen	L-606	21	(3,000)	35	(5,000)	94
	R. Reyes	L-606	21	(3,000)	35	(5,000)	94
	G. Riehl	L-606	21	(3,000)	35	(5,000)	94
	M. L. Roberts	L-362	21	(3,000)	35	(5,000)	94
	D. Smith	L-497	21	(3,000)	35	(5,000)	94
P.E.	M. L. Conlin	L-873	21	(3,000)	35	(5,000)	92
(Site 300)	C. B. Parks	L-873	21	(3,000)	35	(5,000)	92
	W. R. Tondee	L-875	21	(3,000)	35	(5,000)	94
Earth	C. O. Boro	L-337	1000	(150,000)	1000	(150,000)	94
Science	W. E. Ralph	L-210	1000	(150,000)	1000	(150,000)	94

APPENDIX 3

Engineering Safety Note (ESN) Guide

Engineering Safety Notes

(ESN's)

for

Pressure Vessels and Systems

(A Guide)

By: Chuck Borzileri

Pressure Safety Manager

Extension 2-6076

Mail Code L-384

(Revision 2/89)

Engineering Safety Note

"A management-approved design document attesting every

practicable precaution has been taken in the design of

equipment to control all significant hazards."

- - - - -certifies mechanical integrity- - - - -

Content of Engineering Safety Note

A. Description

B. Hazards

C. Calculations

D. Pressure Testing

E. Labeling

F. Associated Procedures

G. References

H. Signature Authority

I. Distribution

A. Description

What is it?

Physical Size?

What will it be used for?

What is its pressure rating?**

Manned are or remote?

Is it an ASME coded vessel?

Is it a D.O.T. coded vessel?

Are there drawing numbers or sketches you can reference?

Where will it be located?

Building _____ **Room** _____

Responsible experimenter or user?

From your description could you find this vessel or system three (3) years from now?

** **M.A.W.P. : Relief device setting**
M.O.P.: Operating Pressure 10 - 20% below M.A.W.P.

B. Hazards

What are the hazards:

Stored energy?

Isentropic expansion of a confined gas

$$E = \frac{P_1 V_1}{K-1}\left[1 - \left(\frac{P_2}{P_1}\right)^{\frac{K-1}{K}}\right]$$

Marks Handbook
7th Edition (Pages 4-25)

K = value for nitrogen 1.4
K = value for helium 1.66
K = value for argon 1.67
K = value for hydrogen 1.41

Manned area, remote use only, radioactive, toxic/corrosive?

If your toxins are in a hood, what happens in a power outage?

B. Hazards (continued)

What are you going to do to eliminate or lessen the hazards, i.e.:

hood
barricades
protective clothing
special operating procedures?

C. Calculations:

For commercial components:

- **All components rated at or above M.A.W.P., therefore, no calculations are required.**
- **Reference manufacturer's ratings, stores catalog ratings.**
- **List of materials or part numbers.**

For vessels/structures:

Include calculations on:

- **Weld shear stress**
- **Tensile stress on bolts, plates**
- **End closures**
- **Hoop stress**
- **Thread shear**
- **Safety factor**
- **Remote operation only - calculations on the barricading or shielding used.**

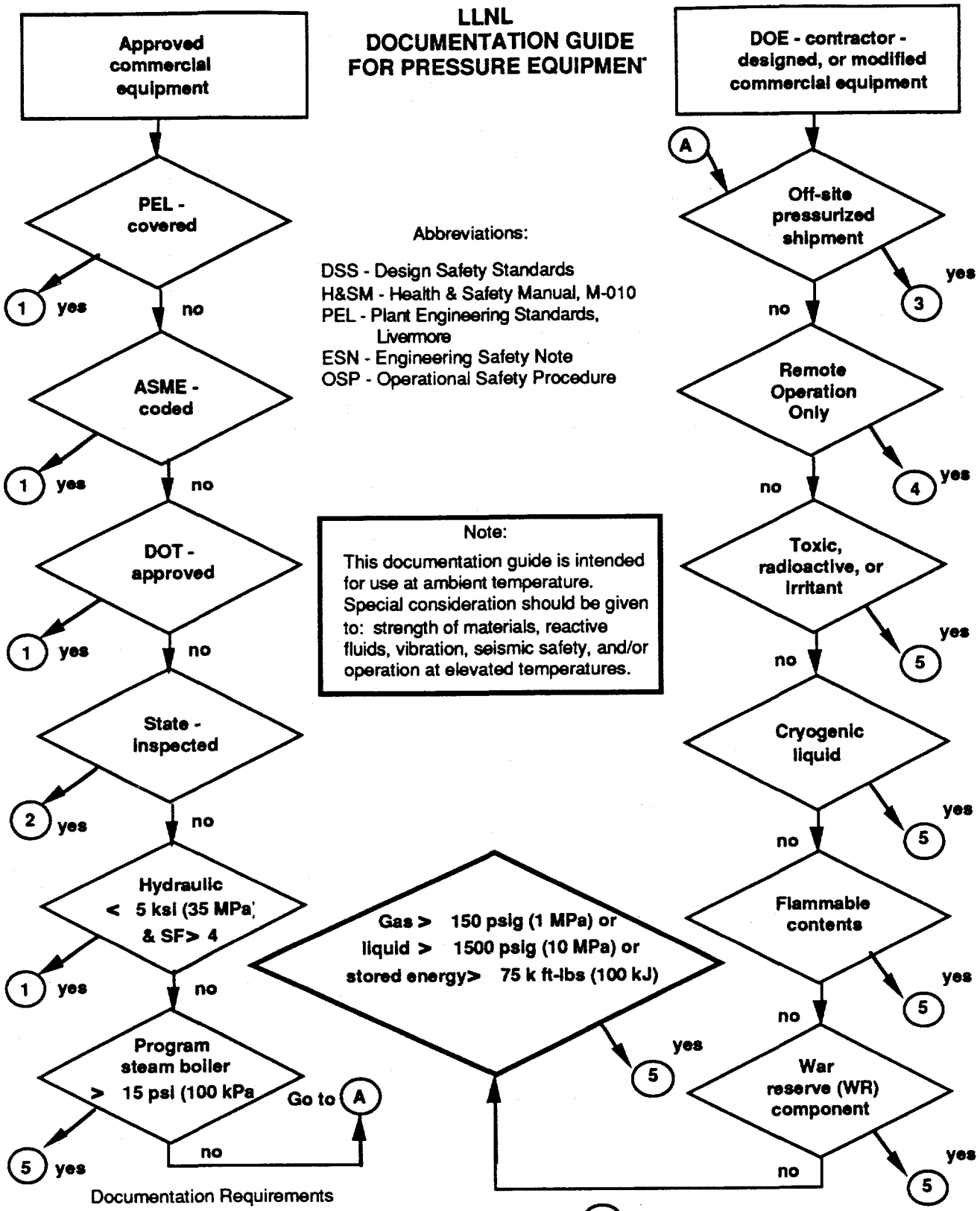
D. Pressure Testing:

All pressure testing requires a test procedure. Use this section to write the test procedure.

Specify: test sequence, test pressure, test fluid, hold time, acceptable leak rate.

Retest

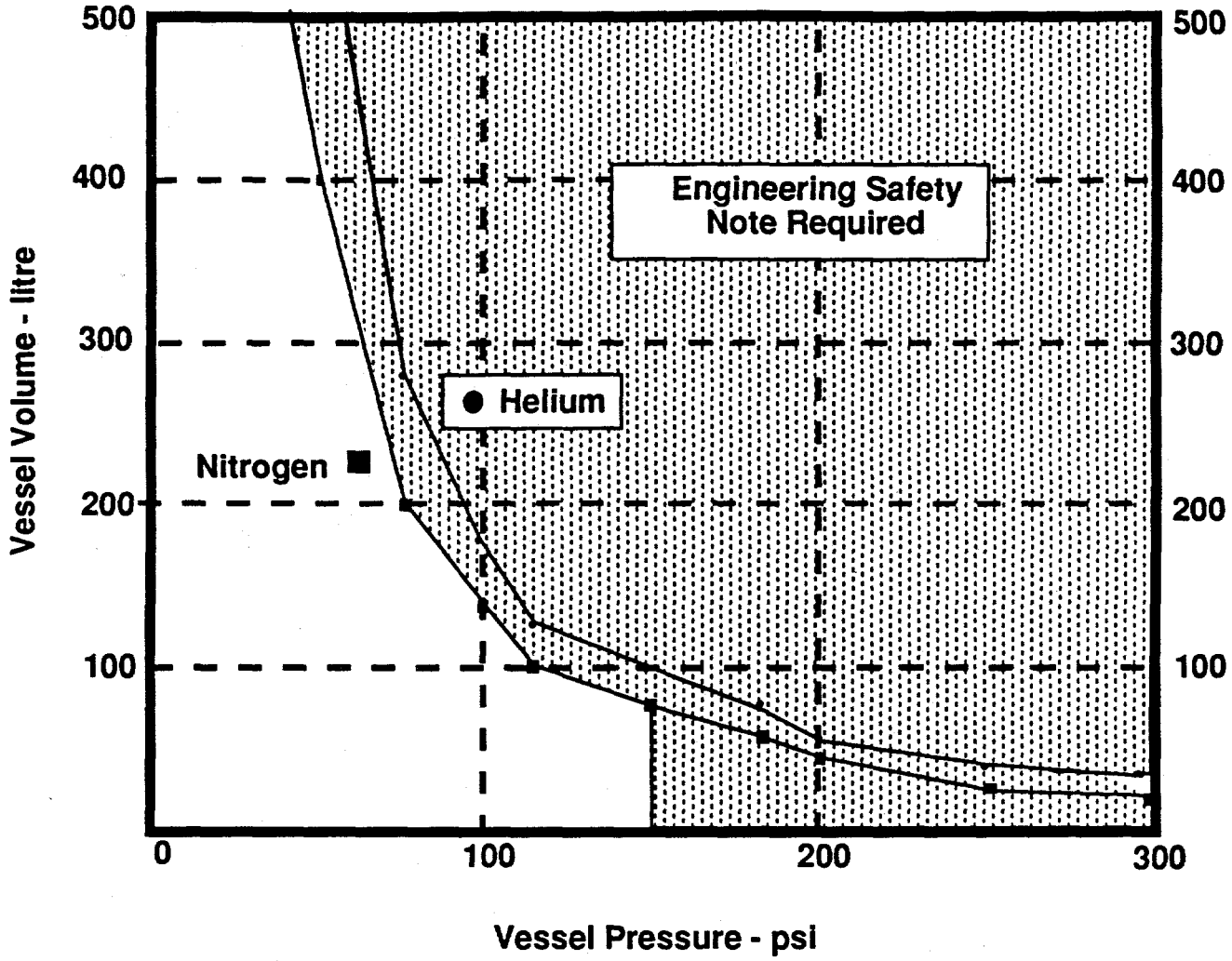
You may also want to include the retest procedure. It may be different than the original procedure. You may want to change the frequency of inspection or retest.



Documentation Requirements

1. No ESN or OSP required (documented or hazards are low). Go to (A)
2. No ESN or OSP required, but notify PE facility operations. Go to (A)
3. Requires DOT approval or DOE - SAN exemption
4. No ESN required for the pressure equipment, but comply with DSS Ch. 4. An OSP may be required by H&SM Ch. 2.

Volume / Pressure limits for a Vessel Containing 100 kJoules of Stored Energy



E. Labeling

LLNL PRESSURE TESTED
FOR MANNED AREA

ASSY.

SAFETY NOTE

M.A.W.P. PSIG

FLUID

TEMP. TO ^{o}F

REMARKS

TEST NO. T.R.

EXPIRATION DATE

BY DATE

FOR
REMOTE OPERATION
ONLY

Remote Operation Label (silver on red).

F. Associated Procedures

Building Procedure (FSP 231 - -)

Operating Procedure (OSP 231 - -)

Special Instructions (referenced)

G. References:

Examples:

1. Marks Handbook
   7th edition, (Pgs. 4-25)

2. Mechanics of Materials
   Miller and Doeringfeld,
   Chapter 16

3. M. E. Safety Note ESN 78-954
   L. L. Dibley

4. Health and Safety Manual
   Supplement 32.03, Pg. 13

5. Formulas For Stress and Strain
   Roaok, 3rd Ed.

H. Signature Authority

Prepared by: _____

Responsible Designer

Reviewed by: _____

Pressure Consultant

Approved by: _____

Division Leader

Approved by: _____

Deputy Associate Director*

***Brittle materials or S.F. of less than 3**

I. Distribution

Recommended Distribution:

Applicable management/supervisors

Pressure Consultant

Industrial Safety Representative

Pressure Safety Representative

Responsible Designer

Central Library/Files

(others concerned including Building Coordinator)

APPENDIX 4

Operational Safety Procedure (OSP) Guidelines (Chapter 2 of the LLNL Health & Safety Manual)

Preparation Guide for Operational Safety Procedures

This appendix provides guidance for writing an OSP. An OSP assigns responsibility for safe operations, describes the work to be done, identifies the hazards and environmental concerns, and specifies the controls that must be applied to the operation. In addition, and as applicable, the OSP should describe maintenance and quality assurance of safety-related systems and equipment. The ES&H team for your area can provide guidance and assistance in preparing and processing OSPs.

OSPs and their supplements shall follow the format and address the content in the manner provided in this guide, with modifications only as necessary or appropriate for the particular operation to be described. Editorial instructions are enclosed in brackets ([...]).

TITLE OF OPERATION

1.0 Reason For Issue

2.0 Work To Be Done And Location Of The Activity

3.0 Responsibilities

3.1 _____ is responsible for the safety of this operation and for assuring that all work is performed in conformance with this OSP, the FSP, and applicable sections in the *Health & Safety Manual* and *Environmental Protection Handbook*. In the absence of (the responsible individual), _____ shall assume these responsibilities.

3.2 Any changes in operations that improve or do not significantly affect safety and environmental controls may be approved by the authorizing individual for this OSP and the ES&H Team Leader. The responsible individual will ensure that this action is documented in a memorandum. Any changes in operations that increase the hazard level, introduce additional hazards, or decrease safety shall not be made until a revision of or supplement to this OSP has been reviewed and approved consistent with the review and approval process for the original OSP.

3.3 Before starting operation, the responsible individual shall verify and document that the operating personnel have read and understand the OSP and applicable sections of the FSP.

4.0 Hazards Analysis

4.1

5.0 Controls

The controls specified below will reduce risk to employees and the environment to acceptable levels.

5.1

6.0 Environmental Concerns and Controls

6.1

7.0 Training

7.1 All authorized operators shall have completed the following safety courses:

7.1.1 [#] [name] (retraining is required every years)

7.2 [If required, use the following] All personnel (LLNL and contract) who generate or handle hazardous waste shall attend the following Environmental Protection Department courses within six months of being newly hired and annually thereafter.

7.2.1 EP-0006 Hazardous Waste Handling Practices
7.2.2 EP-0056 Waste Certification

7.3 The responsible individual shall ensure that all required training, including on-the-job training if applicable, is complete and documented.

8.0 Maintenance

9.0 Quality Assurance

10.0 Emergency Response Procedures

11.0 References

12.0 Review and Approval

This OSP was reviewed by:

_____

Responsible Individual

_____

Group/Section Leader

_____

Facility Manager/Supervisor

_____

ES&H Team Leader

_____

Hazards Control Department Head

_____

Div. Leader/Dept. head for Facility

_____

Div. Ldr/Dept. Head/Program Mgr. for Program

_____

Materials Management (if appropriate)

_____

Supervisor of Matrixed personnel

_____

Peer Review Board (if explosives are used)

_____

Assurance Manager

Environmental Protection Department Head

Concurrence:

Facility AD (if different from Program AD)

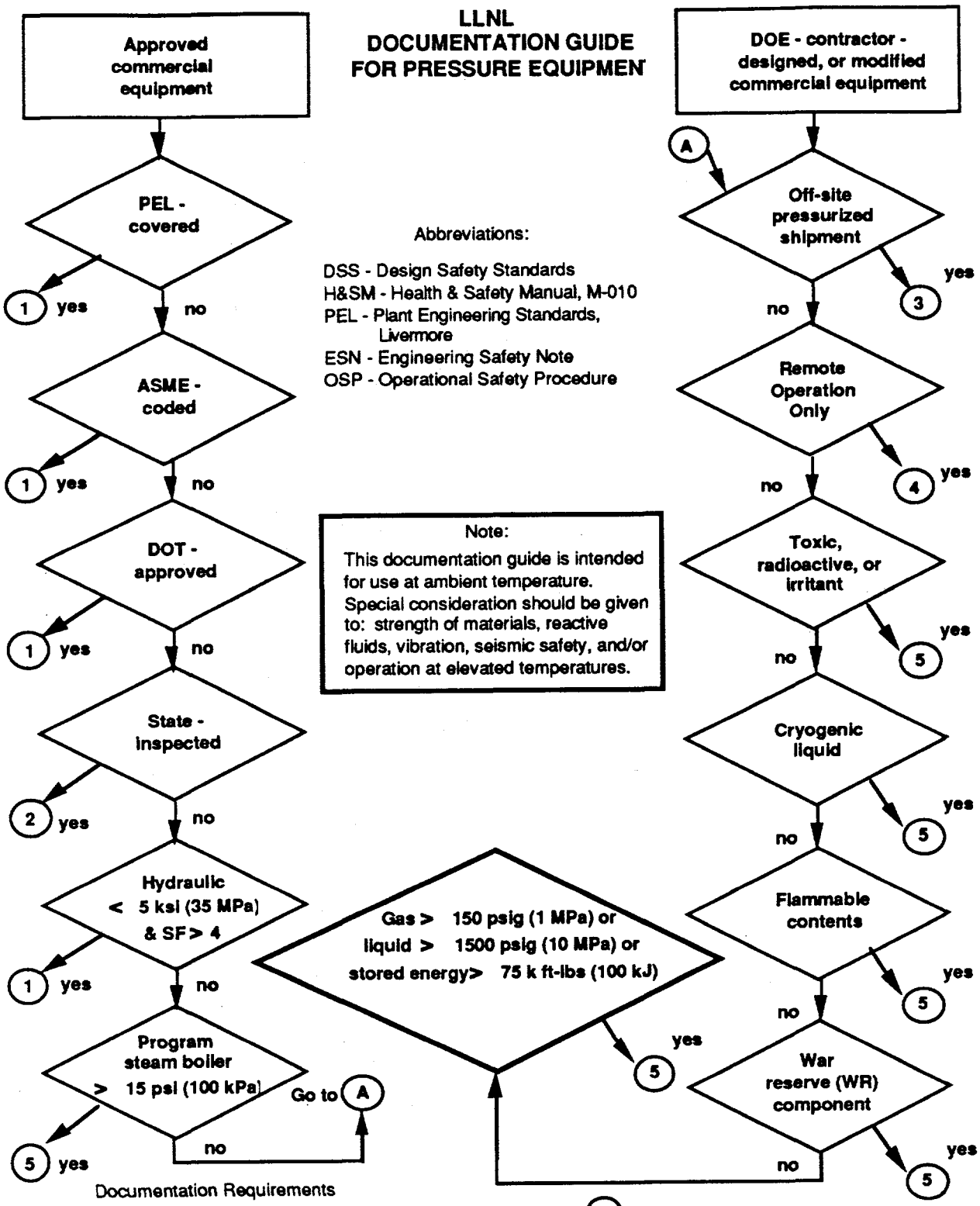
This OSP approved by:

AD for Program conducting experiment

Controlled Distribution:
Appendices

APPENDIX 5

LLNL Documentation Guide



1. No ESN or OSP required (documented or hazards are low). Go to (A)
2. No ESN or OSP required, but notify PE facility operations. Go to (A)
3. Requires DOT approval or DOE - SAN exemption
4. No ESN required for the pressure equipment, but comply with DSS Ch. 4. An OSP may be required by H&SM Ch. 2.
5. ESN, PEL, and/or OSP required by H&SM Chs. 2 & 32 & by DSS Ch. 3.

APPENDIX 6

Relief Device Request Form

RELIEF DEVICE (RD) REQUEST FORM
HIGH PRESSURE LABORATORY
Bldg. 343 Ext. 2-9569

R.D. #s _____ _____
_____ _____
_____ _____

Requested by: _____ Date: _____

Extension: _____ R.D. Location: _____ Acct. No.: _____

Requested Pressure Setting: _____ System Fluid: _____ System MAWP: _____

Applicable Eng. Safety Note: _____ Responsible User: _____

Test Fluid: ☐ INERT GAS ☐ WATER ☐ OTHER _____

Type of Relief Device:

Spring Actuated

Mfg.	Style	Port Configuration	
		IN	OUT
☐ CIRCLE SEAL	☐ VENTED	☐ 1/4 MNPT	☐ 1/4 FNPT
☐ NUPRO CPA	☐ NON-VENTED	☐ 1/4 COMP	☐ 1/4 COMP
☐ NUPRO R3A		☐ OTHER	☐ OTHER
☐ VICTOR			
☐ OTHER _____		_____	_____

Nominal Setting ** _____

**Note: For most devices the operator will be able to set the pressure to within plus or minus two or three percent of the desired value However, because of the limitations in accuracy and uncertainties of the equipment used, LLNL cannot guarantee this setting to be better than ±5%. If the manufacturer's tolerance is larger than this, the rated accuracy will prevail.

Rupture Disks

Mfg.

☐ AUTOCLAVE 1/4 ANGLE

☐ OTHER _____ Actual Rating *** _____ ± _____ %

***Note: Commercially available rupture disks are supplied by the manufacturer with a pressure rating of +6% to -3% of nominal catalog value. This rated value, at which the disk should burst, is guaranteed by the manufacturer to be within ±5%.

Setting performed by: _____ Date: _____

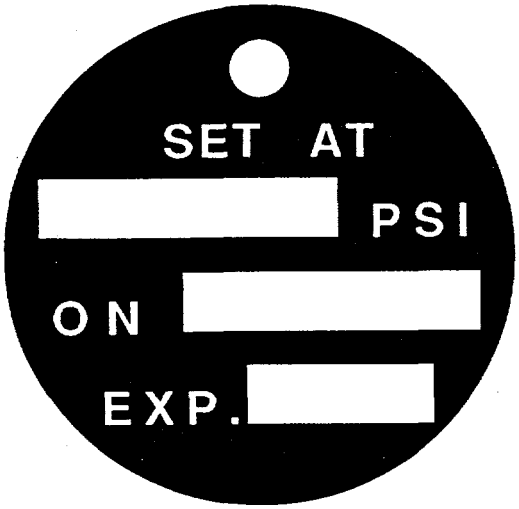
I, the requester, realize that I am responsible for pointing out to the HPL Supervisor or the Pressure Inspector any known or expected hazardous conditions or materials, such as toxic or radioactive components, associated with this relief device or system. Furthermore I understand that relief devices shall be reset every three years, and that this is to be initiated by the responsible user.

Signature of Requester: _____ Approved by: _____
Bldg. 343

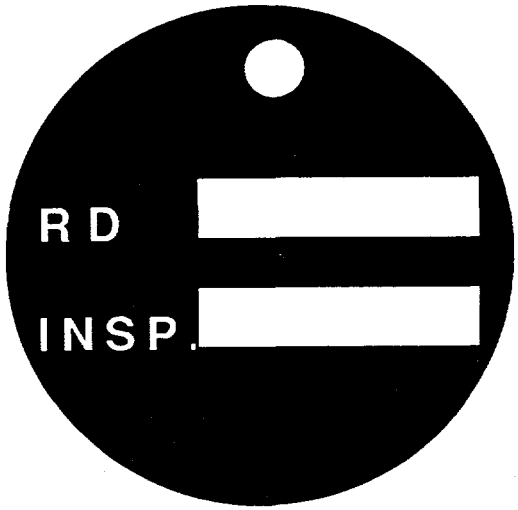
APPENDIX 7

Relief Device Tag

FRONT



BACK



APPENDIX 8

Sample page from Log Book

PRESSURE TEST LOG

TEST NUMBER	ORIG TEST	BLDG.	RM #	SAFETY NOTE NUMBER	ORIG INSPECTOR
ME1631	2/5/91	391	1314	ENE86-927	D. RODRIGUEZ
ME1632	2/7/91	131	HYBY	ENW91-905	T. ARNOLD
ME1633	2/7/91	131	HYBY	ENW91-905	T. ARNOLD
ME1634	2/7/91	131	HYBY	ENW91-905	T. ARNOLD
ME1635	2/7/91	131	HYBY	ENW91-905	T. ARNOLD
ME1636	2/7/91	131	HYBY	ENW91-905	T. ARNOLD
ME1637	2/7/91	131	HYBY	ENW91-905	T. ARNOLD
ME1638	2/21/91	298	141	ENS87-922	T. ROSS
ME1639	2/27/91	381	1532	ENS87-922	T. ROSS
ME1640	3/6/91	827	C CELL	END90-915	R. MARSHALL
ME1641	3/11/91	151	BASE	ENN79-906	R. CARNAHAN
ME1642	3/11/91	151	BASE	ENN79-906	R. CARNAHAN
ME1643	3/11/91	151	BASE	ENN79-906	R. CARNAHAN
ME1644	3/11/91	151	BASE	ENN79-906	R. CARNAHAN
ME1645	3/11/91	151	BASE	ENN79-906	R. CARNAHAN
ME1646	3/11/91	151	BASE	ENN79-906	R. CARNAHAN
ME1647	3/11/91	235	1226	END79-907	R. PARKER
ME1648	3/14/91	332	1370	ENS87-922	T. ROSS
ME1649	3/24/91	332	1370	ENW91-903	F. GREEN
ME1650	3/22/91	490	1415	ENE87-950	G. HAILEY
ME1651	2/27/91	490	HYBY	ENE91-902	B. KELLY
ME1651A	2/27/91	490	HYBY	ENE91-902	B. KELLY
ME1651B	2/27/91	490	HYBY	ENE91-902	B. KELLY
ME1652	4/1/91	332	1354	ENW91-906	D. GIRE

APPENDIX 9

Pressure Test/Inspection Record

(Form LL 3586)

Lawrence Livermore National Laboratory
PRESSURE TEST/INSPECTION RECORD

Test No. NUMBER
Date: DATE

BASIC INFORMATION: *Enter here and on original (or new) LLNL Pressure Tested label.*

LLNL PRESSURE TESTED FOR MANNED AREA	
ASSY.	
SAFETY NOTE	
M.A.W.P	PSIG
FLUID	
TEMP.	TO °F
REMARKS	
TEST NO.	T.R.
EXPIRATION DATE	
BY	DATE

Location of vessel (or system): Bldg. _____ Rm. _____

Description: _____

_____

Manned Area ____ Remote ____

Pressure Vessel ____ Pressure System ____

Pressure Inspector's name and date of test or inspection

TEST INFORMATION:

1. Test Pressure _____ PSIG.
2. Testing Fluid (oil, He, etc.) _____
3. Test temperature _____ °C (_____ °F)
4. Test Report Number (H.P. Lab only) _____
5. Responsible Designer _____ User Dept. _____ User Payroll Acct.
6. Responsible User _____ User Div. _____
7. Diameter measurements (for pressure vessel tests only)

Location (marked)	Before testing	After testing	Difference (+ or -)

INSPECTION INFORMATION:
Inspect the following and check (✓) appropriate column, explaining as required.

	Satisfactory	Unsatisfactory	Remarks
1. General appearance of system (or vessel)			
2. Relief devices are: a. Properly set (have them checked; reset)			
b. Properly sealed			
c. Pointed in safe direction or safely vented			
3. All fittings and vessel seals are leak tight			
4. Replaced/added fittings, gauges, valves, (and piping*) are properly rated			
5. All system components are adequately secured			
6. Valve packing nuts are tight, and locked (if locking type)			
7. Oil is not apparent on or in* gas (especially oxygen) systems			
8. The outside surface of the vessel shows no evidence of strain, damage, or corrosion			
9. The inside surface of the vessel shows no evidence of strain,			
10. Lined vessel vent path is unobstructed: Check with helium			
11. Vessel or system seals are leak-tight. Have replaced as required			
12. The vessel or system is safe for continuing operation			
13. Vessel or system was pressure tested within the last 6 years, or as required by the safety note. (If not, and certified for manned-area operation, retest it and submit a Pressure Test Record.)			

* *Consider assurance by the Responsible User as satisfactory verification*

_____

APPENDIX 10

LLNL Pressure Tested Label

LLNL PRESSURE TESTED
FOR MANNED AREA

ASSY.

SAFETY NOTE

M.A.W.P. PSIG

FLUID

TEMP. °C °F

REMARKS

TEST NO. T.R.

EXPIRATION DATE

BY DATE

APPENDIX 11

Sample Inspection/Retest Report

Building: 131 M.E. Test Number: ME0931

Room: HIBY

Description: S/STEEL TUBING AND ONE MONEL TUBE AND Y BLOCK ASSEMBLY
Last Tested: 06/14/89 Last Inspected 6/14/89 Status: U
Test Report Number: 6892 Safety Note Number: ENW89-907 Test Interval: 0
Type of System: V Manned or Remote: M M.A.W.P.: 475 Fluid: INERT GAS
RD Number: Payroll Acct: 9772
Designer: T. CHOW User: J. LIETZKE Inspector: R. HAMPTON

Building: 131 M.E. Test Number: ME0939

Room: 2373

Description: SOLID STATE DEVICE FACILITY GAS SUPPLY SYSTEMS
Last Tested: 12/13/82 Last Inspected 1/13/91 Status: U
Test Report Number: Safety Note Number: ENS82-904 Test Interval: 1
Type of System: S Manned or Remote: M M.A.W.P.: 100 Fluid: O2
RD Number: Payroll Acct: 9785
Designer: M. MAYR User: D. CIARLO Inspector: M. TRAINI

Building: 131 M.E. Test Number: ME0939

Room: ND

Description: SOLID STATE DEVICE FACILITY FOR SUPPLY SYSTEM
Last Tested: 12/13/82 Last Inspected 1/31/91 Status: U
Test Report Number: 6892 Safety Note Number: ENS82-904 Test Interval: 1
Type of System: S Manned or Remote: M M.A.W.P.: 100 Fluid: SIH4+15%N2
RD Number: Payroll Acct: 9772
Designer: M. MAYR User: D. CIARLO Inspector: M. TRAINI

APPENDIX 12

Stored-In-Place Record

(Form LL 6278)

Lawrence Livermore National Laboratory
PRESSURE TEST/INSPECTION RECORD

Test No. NUMBER
Date: DATE

BASIC INFORMATION: *Enter here and on original (or new) LLNL Pressure Tested label.*

LLNL PRESSURE TESTED FOR MANNED AREA			
ASSY.	XXXXXXX		
SAFETY NOTE	XXXXXXXXXXXX		
M.A.W.P	XXXXXXXXXXXXXX	PSIG	
FLUID	XXXXXXXXXXXXXXXXXXX		
TEMP.	XXXXXX	TO XXXXX	°F
REMARKS	XXXXXXXXXXX		
TEST NO.	XXXXXX	T.R. XXXXX	
EXPIRATION DATE	XXXXXXX		
BY	XXXXXX	DATE XXXXXXXX	

Location of vessel (or system): Bldg:___ Rm. ___

Description: _____

_____

Manned Area ___ Remote _____

Pressure vessel___ Pressure System_____

(Check applicable boxes)

= Pressure Inspector's name and date of test or inspection.

COMMENTS:

Responsible User Please Read and Sign

As a person responsible for the safe operation of this equipment, I agree that before this equipment is put back into use, I will notify the pressure inspectors at Bldg. 343. I will arrange with them to have the system reinspected, tested, tagged and a new LLNL pressure tested label attached before re-use of the equipment. If I am transferred or leave the area, I will inform the next responsible user as to the requirements for reinstatement of this equipment.

This equipment is out of service and is considered stored in place as of _____

Signature of Responsible User_____

Building_____Rm._____Ext._____

Date taken out of service_____

_____
Pressure Inspector

LL6278
Send this completed form to the LLNL Pressure Inspector, L-384

APPENDIX 13

Group Controlled Items - Stock Catalog

STOCK CATALOG

Lawrence Berkeley Laboratory
Lawrence Livermore National Laboratory
University of California

4620

Catalog No.	Description	Unit

GROUP 46 HIGH PRESSURE COMPONENTS

GROUP-CLASS 4620 HIGH PRESSURE FITTINGS

ADAPTER, 316SS, 9/16 IN. FEMALE SF562CX/LF9,
WITH GLAND AND COLLAR

		INCH	CONNECTION	KSI	MFR.NO.	
G	4620-60097	1/8	MNPT	10	AE 6M29M6	EA
G	4620-60098	1/4	MNPT	10	AE 6M49M6	EA
G	4620-60099	3/8	MNPT	10	AE 6M69M6	EA
G	4620-60100	1/2	MNPT	20	AE 6M489M6	EA
G	4620-60103	3/4	MALE SF750CX	20	AE 20M129K6	EA

ADAPTER, 316SS, 1/4 IN. FEMALE F250C,
WITHOUT GLAND AND COLLAR, 10KSI

		INCH	CONNECTION	MFR.NO.	
G	4620-15841	1/8	FNPT	AE 6F2483	EA
G	4620-15849	1/8	MNPT	AE 6M24N3	EA
G	4620-60491	1/8	MALE	AE 6M24C3	EA
G	4620-15842	1/4	FNPT	AE 6F4483	EA
G	4620-15850	1/4	MNPT	AE 6M44N3	EA
G	4620-15844	1/2	FNPT	AE 6F8483	EA
G	4620-15852	1/2	MNPT	AE 6M84N3	EA
G	4620-15851	3/8	MNPT	AE 6M64N3	EA

ADAPTER, 316SS, 1/4 IN. MALE F250C,
WITHOUT GLAD AND COLLAR, 10KSI

		INCH	CONNECTION	MFR.NO.	
G	4620-59962	1/8	FNPT	AE 6M42B8	EA
G	4620-59963	1/4	FNPT	AE 6M44B8	EA
G	4620-59964	3/8	FNPT	AE 6M46B8	EA
G	4620-59986	3/8	FEM. F375C	AE 60M46B3	EA
G	4620-59965	1/2	FNPT	AE 6M48B8	EA
G	4620-59989	9/16	FEM. F375C	AE 60M49B3	EA

ADAPTER, 316SS, 3/8 IN. FEMALE F375 CONNECTION,
WITHOUT GLAND AND COLLAR, 10KSI

		INCH	CONNECTION	MFR.NO.	
G	4620-59992	1/4	MNPT	AE 6M46N3	EA
G	4620-59993	3/8	MNPT	AE 6M66N3	EA
G	4620-59994	1/2	MNPT	AE 6M86N3	EA

ADAPTER, 316SS, 3/8 IN. MALE F375 CONNECTION,
WITHOUT GLAND AND COLLAR

		INCH	CONNECTION	KSI	MFR.NO.	
G	4620-59967	1/4	FNPT	10	AE 6M64B8	EA
G	4620-59982	1/4	FEM. F250C	60	AE 60M64B3	EA
G	4620-59968	3/8	FNPT	10	AE 6M66B8	EA

ADAPTER, 316SS, 1/8 IN. FEMALE W125 CONNECTION,
WITHOUT GLAND, COLLAR OR SLEEVES

		INCH	CONNECTION	KSI	MFR.NO.	
G	4620-60057	1/8	MNPT	10	AE 6M22N1	EA
G	4620-60053	1/4	FNPT	10	AE 6F42B1	EA
G	4620-60058	1/4	MNPT	10	AE 6M42N1	EA
G	4620-60054	1/4	FEM. F250C	11	AE 15F2413	EA
G	4620-60059	1/4	MALE F250C	11	AE 15M42B1	EA
G	4620-60055	3/8	FEM. F375C	11	AE 15F2613	EA

APPENDIX 14

Pressure Safety Codes and Standards

PRESSURE SAFETY CODES AND STANDARDS

- Federal OSHA
  - 29 CFR 1910, "General Industry Standards"
  - 29 CFR 1926, "Construction Standard"
  - 49 CFR 173, "Transportation"
- National Fire Protection Association (NFPA)
- American National Standards Institute (ANSI)
- United States Department of Transportation (DOT)
- America Society of Mechanical Engineering (ASME)
- Compressed Gas Association (CGA)
- Local/State Codes
- DOE Order 5000.3A, "Occurrence Reporting"
- DOE Order 5480.4, "Environmental Safety and Health Protection Standard
- DOE Pressure Safety Guidelines Manual
- Lawrence Livermore National Laboratory Health and Safety Manual
- Design Safety Standards, Mechanical Engineering Department, Lawrence Livermore National Laboratory