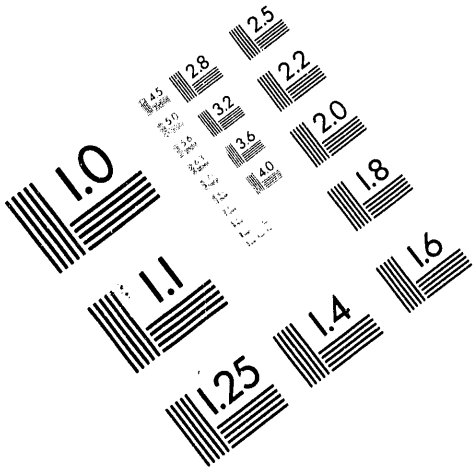

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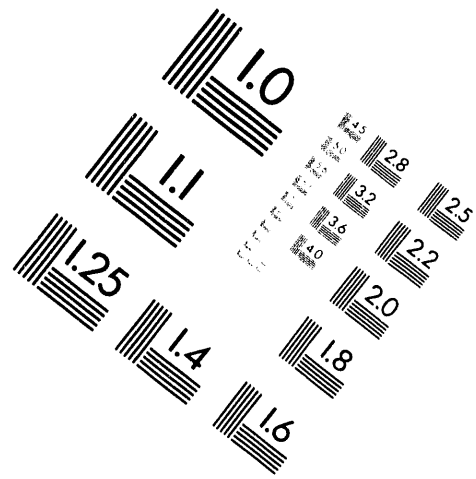

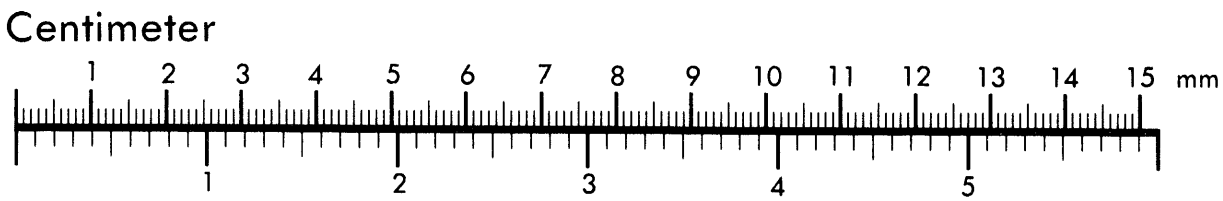

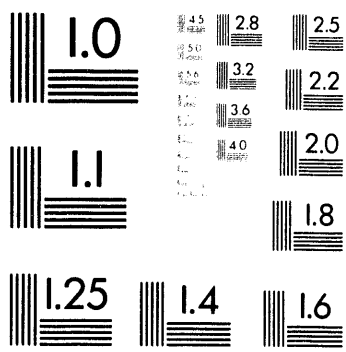

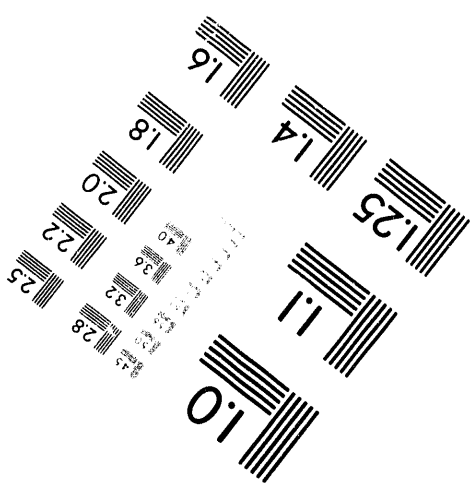

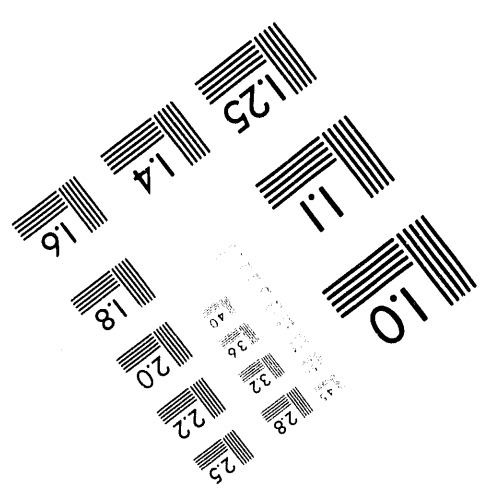

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WHC-SA-2343-FP

Pressure Relief Valve/Safety Relief Valve Testing

Prepared for the U.S. Department of Energy
Office of Environmental Restoration and
Waste Management

Westinghouse Hanford Company Richland, Washington

Hanford Operations and Engineering Contractor for the
U.S. Department of Energy under Contract DE-AC06-87RL10930

PRESSURE RELIEF VALVE/ SAFETY RELIEF VALVE TESTING

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PRV/SRV TESTING

Pressure vessels and piping systems are protected from overpressurization by Pressure Relief Valves (PRVs)/Safety Relief Valves (SRVs). These safety features are required to be tested/inspected on some periodic basis and, in most cases, witnessed by a Third Party Inspector.

In September 1992, a scheduled third party inspection identified a number of nonconformances particularly in the area of:

- improper settings on PRVs/SRVs.
- the presence of intervening non-supervised (no positions indicated or lockout) valves between pressure source and the PRVs/SRVs.
- try levers removed from relief devices.
- no relief devices installed.

Subsequent Third Party code inspections revealed similar problems with potential sitewide consequences. Further investigation by the Third Party Inspector also revealed the problems had not been previously documented.

As a result of the Third Party findings Westinghouse Hanford Company (WHC) initiated a task team to develop a Pressure Safety Program. The first phase of this program was to identify the requirements for testing and repairing of PRVs/SRVs. The problem that surfaced was **"Who has jurisdiction?"** The State of Washington Chief Boiler Inspector, DOE or WHC?

The jurisdiction problem was resolved in a letter issued by the Department of Energy (DOE) (September 1993) which stated, in part, *".....it has been determined that the requirements of RCW 70.79.080 and its implementing regulations at WAC-296-104 do not apply as a matter of law to facilities of the United States Government."*

The letter effectively placed line management and jurisdiction of the boilers and unfired pressure vessels under the DOE Office of Assistant Manager for Administration, Site Infrastructure Division, which specifically includes the three Hanford powerhouses and their auxiliary equipment. Jurisdiction for other pressure vessels at Hanford was placed under other DOE-RL programs. The letter recommended, however, that the technical requirements of the WAC-296-104 code be followed as they reflect standard safety practice by virtually all industries to prevent steam overpressurization accidents.

With the jurisdiction and technical requirements defined WHC Central Engineering was tasked to develop a document identifying the requirements for testing and repairing PRVs/SRVs at Hanford. The result of this effort was the issuance of WHC-SD-GN-TEEM-30001, "Establishing Guidelines for Periodic Testing and Repair of Pressure Relief Valves". The applicable technical provisions of WAC-296-104 were included in this engineering document.

WHC-SD-GN-TEEM-30001 established engineering criteria for non-reactor facility PRVs/SRVs (nuclear reactor equipment under ASME Sections III and XI was excluded) at Hanford in the areas of:

- Code Equipment Definitions

  Boilers and pressure vessels constructed to the requirements of ASME Sections I, IV or VIII, and marked with the code symbol stamp in accordance with ANSI-NB-23, National Board Inspection Code (NBIC).

All others without the code symbol stamp, e.g., waters heaters, air receivers exempted from the third party inspection program, and piping systems constructed to piping codes such as ASME B31.1 or B31.3, are considered non-code.

- Testing Methods

Testing is performed on a regular basis to ensure the valves will operate as designed to provide safety in the workplace, continuity of production, or protection of equipment. ASME codes, NBIC, and 29 CFR 1910.169 all include sections on testing PRVs/SRVs but lack definitives. Based on all the methods presented the adopted methods are:

* "Try lever" actuation on valves so equipped, with the protected system at or above 75% of relief pressure.

* Pressure testing in situ or on a test stand, as applicable.

- Testing Frequency for PRVs/SRVs on Code Equipment

Requires cognizant system engineer perform a rating analysis based on the Shelley System proposed in 1989, which assigns a numerical value of 1 to 10 in four different categories to determine which of several pre-set test intervals is appropriate for a given PRV/SRV. The categories analyzed are:

* **Type of Service**
* **Previous History**
* **Importance of Equipment**
* **Consequences of Failure**

Based on total score the test intervals are:

TOTAL SCORE	TEST INTERVAL
1 - 10	10 years
11 - 20	5 years
21 - 30	2 years
31 - 35	1 year
36 - 40	6 months

- Repairs

As defined in NBIC.

Performed by a "VR" stamp holder, or in defined instances directed by stamp holder if trained, qualified non-stamp holder personnel perform the defined repairs.

Replace instead of repair in some cases.

- Records

WHC-CD-TEEM-30001 recommends certain records be required, to support testing and repair programs:

* Valve design parameters
* Design and operating parameters of the protected equipment
* Valve inspection records
* In-service valve operational history records
* Valve test records
* Valve repair records

PRV/SRV TESTING

Responsibility for inspection and maintenance applicable to non-code equipment was placed in the hands of respective facility cognizant engineers, with WHC-CD-TEEM-30001 providing guidance.

As an adjunct to the development of WHC-CD-TEEM-30001, WHC-CM-4-3, Industrial Safety Manual, Standard PS-1, "ASME Sanction Pressure Systems", and WHC-CM-8-7, Operations Support Services, Section 801, "Third Party Inspection", were revised to reference and reflect the supporting engineering document.

To further refine the engineering criteria, WHC-CM-8-7, Section 801, redefines the inspection recommendations, which may include valve testing, to:

* Power boilers - every 12 months

* Heating boilers - every twelve months

* Pressure vessels - every 24 months

Defined as exempt from inspections are:

* Air receivers with volume $\leq$ 5 ft^3 and pressure $\leq$ 250 psi

* Electric domestic hot water heaters
  - o having approved pressure relief valve
  - o having water capacity $\leq$ 120 gal
  - o having heat $\leq$ 200,000 btu/hr
  - o used for hot water at pressure $\leq$ 160 psig or less and at a temperature $\leq$ 200 °F

* Unfired pressure vessels designed for pressure $<$ 15 psi

PRV/SRV TESTING

Development of a working level maintenance procedure, 1314, Third Party Inspection and Relief Valve Testing, was initiated and completed for direction of craft activities.

PROGRAM DEVELOPMENT

The DOE Pressure Safety Group, including representation from WHC in the person of Donald Green, and under the lead of Lawrence Livermore National Laboratories (LLNL), developed the draft DOE Pressure Safety Manual which will require certain actions by the various GOCO contractor organizations. The draft DOE Pressure Safety Manual is expected to be the basis for a yet-to-be-issued DOE Directive.

One of the actions expected is the establishment of GOCO site Pressure Safety Committees. At Hanford, such a committee has already been formed. The Hanford Pressure Safety Committee is charged with implementation of the anticipated DOE Order by developing a site program.

To begin program implementation at Hanford three informational meetings were held for key plant operations and engineering personnel, as part of which they were tasked with:

- Identifying individuals within their organization to be cognizant of pressure system equipment and PRVs/SRVs.

- Developing inventories of the code and non-code vessels, equipment and PRVs/SRVs.

- Determining PRV/SRV testing frequency and test status.

Initiating actions as appropriate to test, repair, or replace PRVs/SRVs.

To assist in these efforts, tags/seals and the services of a NBIC "VR" Certified Stamp Holder are being procured for availability in early 1994. Purchase of two mobile test facilities is also in the proposal process.

Although this is an on-going effort, immediate results were observable as application of the guidelines enabled the 242-A evaporator to demonstrate compliance with PRV/SRV testing requirements allowing DOE-RL to close several readiness review questions. This result contrasts with earlier experience at the UO_3 Plant where replacement of most PRVs/SRVs was used to resolve similar questions.

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WAC-296-104, Board of Boiler Rules

WHC-SD-GN-TEEM-30001,"Establishing Guidelines for Periodic Testing and Repair of Pressure Relief Valves."

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