TABLE 2.1.1

REGULATIONS AND STANDARDS FOR
DESIGN OF NUCLEAR FACILITIES

Regulations (Mandatory)

1) Title 10, Atomic Energy, Code of Federal Regulations, Part 20 (10 CFR 20). "Standards for Protection Against Radiation".

2) Title 10, Atomic Energy, Code of Federal Regulations, Part 50 (10 CFR 50). "Licensing of Production and Utilization Facilities".

3) Title 10, Atomic Energy, Code of Federal Regulations, Part 100. "Reactor Site Criteria" and Appendix A to Part 100, "Seismic and Geologic Siting Criteria for Nuclear Power Plants".

Standards (Not Mandatory)

1) Uniform Building Code

2) Atomic Energy Commission Regulatory Guides:

Reg Guide 1.12	Instrumentation for Earthquakes (Rev 1, April 1974)
Reg Guide 1.20	Vibration Measurements on Reactor Internals
Reg Guide 1.29	Seismic Design Classification (Rev 1, August 1973)
Reg Guide 1.48	Design Limits and Loading Combinations for Seismic Category I Fluid System Components
Reg Guide 1.60	Design Response Spectra for Seismic Design of Nuclear Power Plants (Rev 1, December 1973)
Reg Guide 1.61	Damping Values for Seismic Design of Nuclear Power Plants

TABLE 2.1.1 (cont'd)

Reg Guide 1.70	Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants (Rev 1, October 1972)
Reg Guide 3.17	Earthquake Instrumentation for Fuel Reprocessing Plants

3) American National Standards Institute (ANSI)

ANSI N 18.5-1974 (ANS-2.2)	Earthquake Instrumentation Criteria for Nuclear Power Plants
ANSI N-XXX (ANS-2.1)	Operating Basis Earthquake Vibratory Ground Motion for Nuclear Power Plant Sites
ANSI N 41.7	Seismic Qualification of Class IE Electric Equipment for Nuclear Power Generating Stations

4) American Society of Mechanical Engineers (ASME)

ASME Boiler and Pressure Vessel Code, Section III, "Rules for Construction of Nuclear Plant Components".

5) American Society for Testing and Materials (ASTM)

ASTM Part 45-"Nuclear Standards," 1974 ANNUAL BOOK OF ASTM STANDARDS

6) American Concrete Institute (ACI)

ACI-318-71 "Standards for Building Code Requirements for Reinforced Concrete".

7) American Institute of Steel Construction (AISC)

AISC Manual of Steel Construction (Seventh Edition) 1970.

8) American Petroleum Institute (API)

API 620 Recommended Rules for Design and Construction of Large, Welded, Low-Pressure Storage Tanks, 1970.

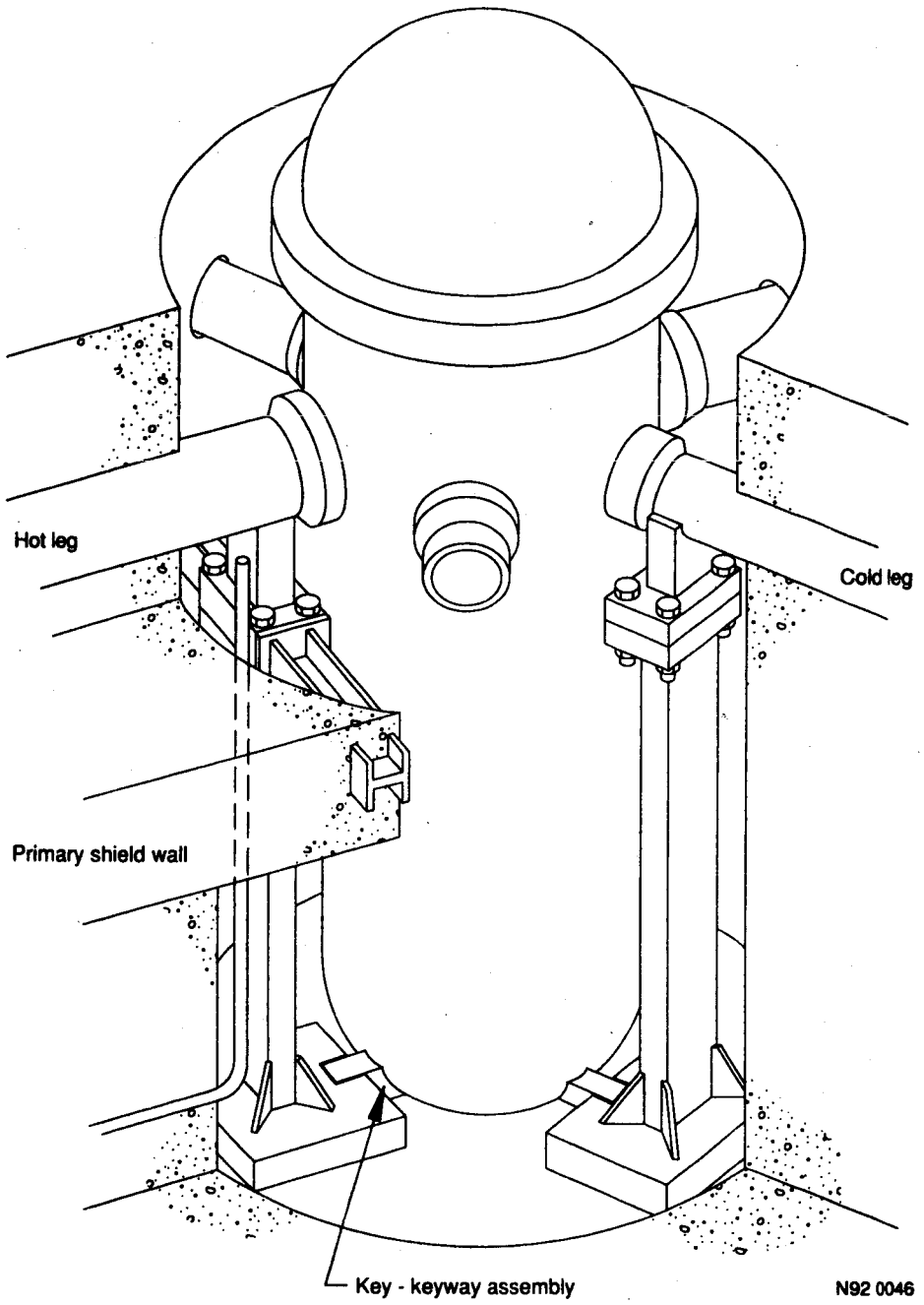


Figure 14-4. Long column-type reactor pressure vessel support (USNRC Technical Training Center).

Figure 14-5 shows a perspective and elevation view of a bracket type PWR vessel supports. The vertical loads pass from the vessel nozzle through radially keyed shoes to short pedestals anchored on the bottom surfaces to the biological shield. The horizontal lateral loads are resisted by bending and shear stresses in the shoes and pedestal weldments. The brackets are located well above the reactor core region and are, therefore, not particularly susceptible to radiation damage.

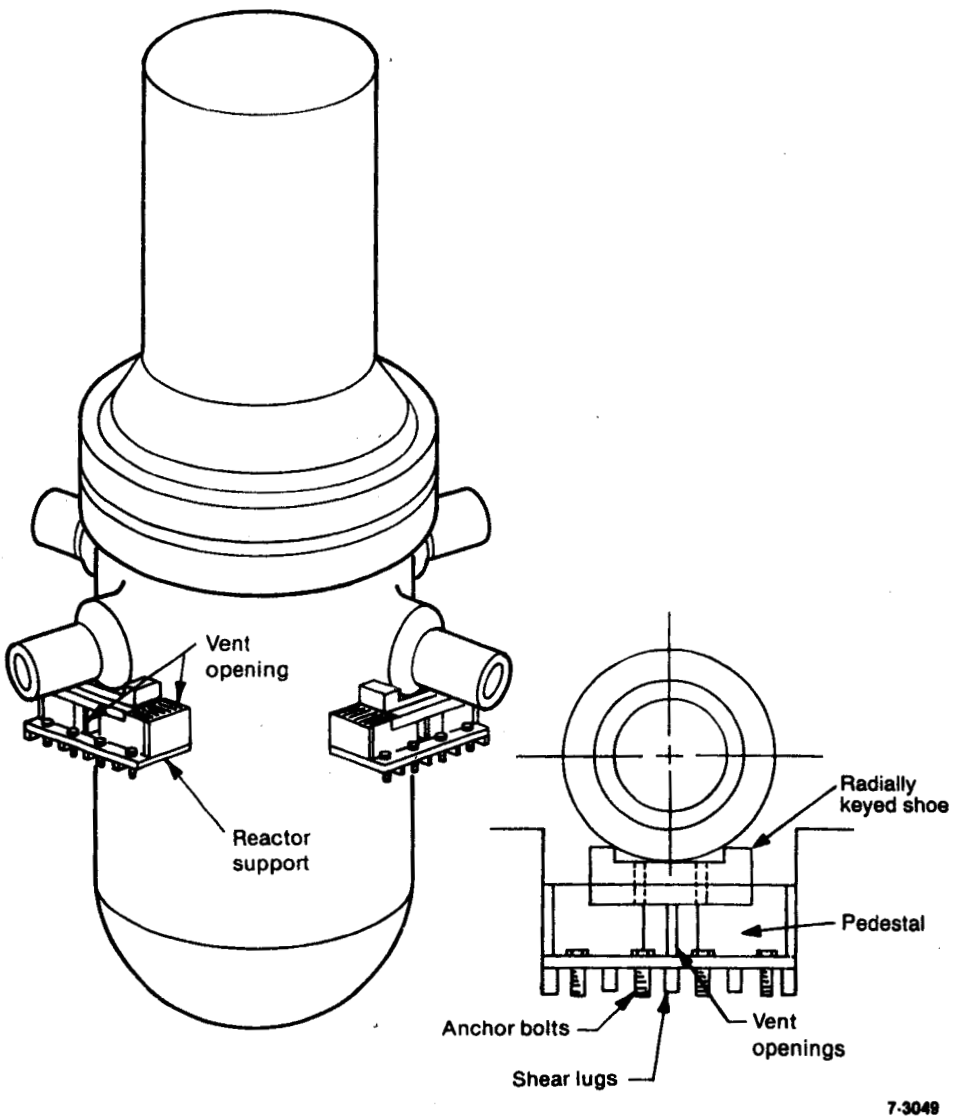
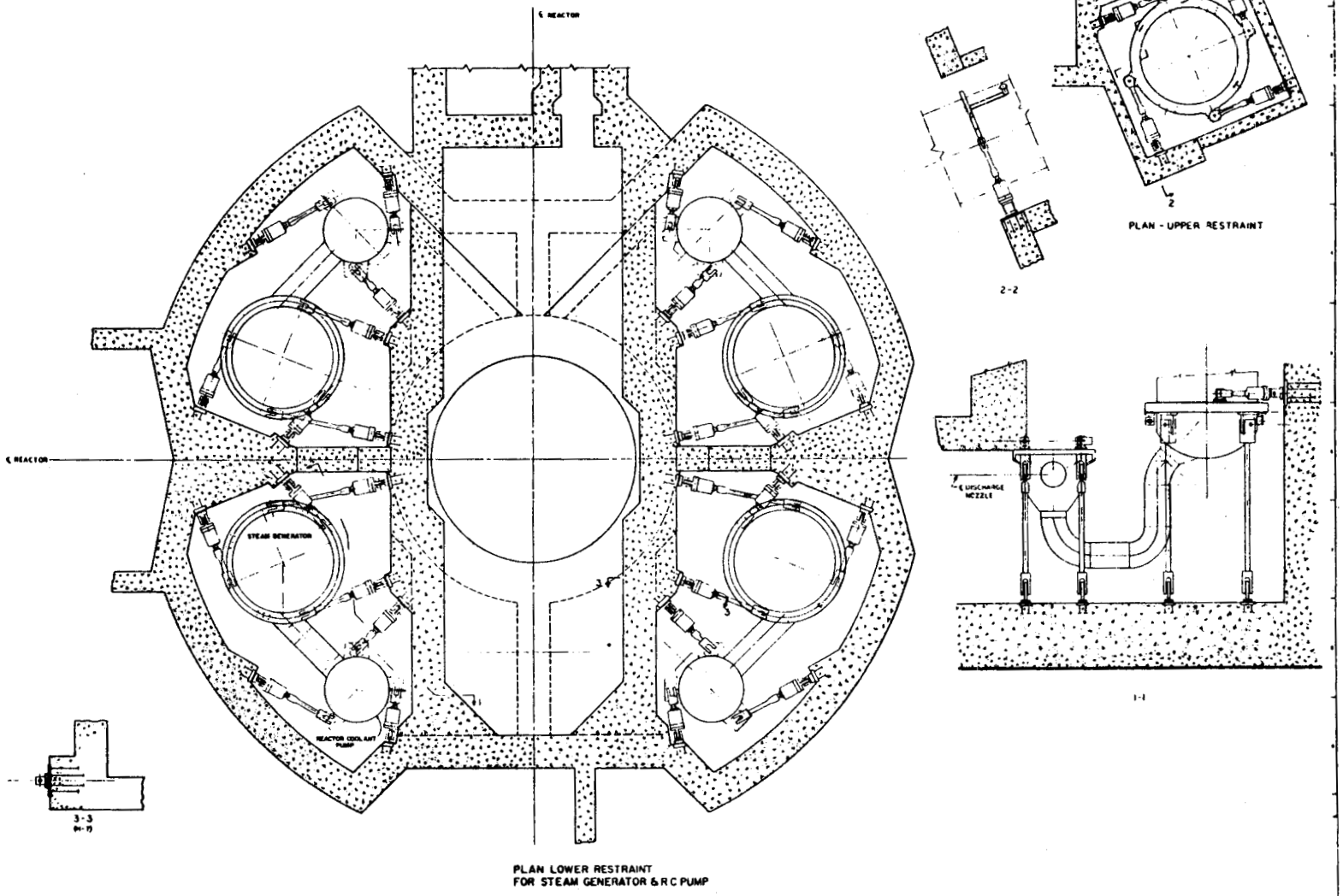


Figure 14-5. Bracket-type reactor pressure vessel support (Hopkins 1987).

FIGURE 3.2.1: TYPICAL DETAILS, STEAM GENERATOR AND REACTOR COOLANT PUMP SUPPORTS



SOURCE: Stone and Webster Engineering Co., "PWR Standard Plant Safety Analysis Report"

TABLE 3.4.1

SUMMARY OF PIPING DESIGN PARAMETERS*

Physical Problem Magnitude and Characteristics

120 Systems

120,000 feet of Safety Class Pipe one inch or larger in diameter

45% operates at temperatures above 150°F (Hot Systems)

70% greater than 2 1/2 inches in diamter

Pipe Restraints/Supports in Low Seismic Zones

- 12,000 Total Restraints and Supports
- 9,000 Separate Installations
- 2000-4000 Seismic Supports
- 6000 Dead Weight Supports (passive restraints)
- 300-400 Pipe Break Supports
- 300-400 Snubbers (active restraints)

Analytical Problem Magnitude

Analysis of Hot Systems: 0.4-0.6 man-hours/foot of pipe

Dynamic Analysis of Hot Systems: 0.2-0.4 man-hours/foot of pipe (additional to Hot System Analysis)

Dynamic Analysis of Cold Lines: 0.5-0.8 man-hours/foot of pipe

Simplified Equivalent Static Analysis of Pipe System: 0.1-0.2 man-hours/foot of pipe (must be done anyway for initial layout purposes)

Total Analytical Effort for Piping Systems: ∿75,000 man-hours

*Personal communication, J.D. Stevenson, Case Western Reserve University, Cleveland, Ohio, December 1974.