HAZARD REVIEW

HAZARDOUS WASTE
332 STORAGE FACILITY

May 1988

Pacific Northwest Laboratory
Richland, Washington 99352

LOCATION

The 332 facility is situated in the northeastern corner of the 300 Area, just north of the sanitary leaching trenches and is enclosed by the fences that surround these trenches (see Figure 1).

LAYOUT

The Chemical Waste Storage Facility (332 Building) is a single story, one room metal building (20' x 20'). The facility consists of an outdoor work area (see Figure 2). The outdoor work area is a curbed concrete pad surrounded by a 6-ft chain-linked fence with a 10-ft wide gate at the west and north sides. This area is used for storage of empty DOT shipping containers used for packaging waste, packaging activities, and storage of packaged waste awaiting shipment offsite. The concrete pad is curbed to contain a spill of 10% of the total volume of the inventory of waste, or 100% of the largest container, and contain the runoff from a 24-hr rainstorm of 0.8 in./hr (19.2 in.) The interior of the facility has metal shelves used for solid waste storage, flammable liquid and acid liquid storage cabinets for liquid chemical storage. Space is available for 55-gal drum storage inside the facility in order to package inside during inclement weather. A 10-ft wide gate to the concrete platform on the north and west side of the pad and 6' x 7' double wide door into the building allows for the loading and unloading of supplies and wastes directly over the concrete pad. A 3' x 7' door is located in the east wall opposite the double door. The floor of the building is sloped to a drain which leads to a 550-gal sump. A pump can be used to empty the contents of the sump into a drum or tank truck in the event of a spill. No accumulation of waste is allowed in the sump.

DESIGN CRITERIA

The 332 Building was designed and constructed in conformance with the following standards including:

Uniform Building Code (1979) - IBCO
National Fire Codes (1982) - NFPA
National Electrical Code - NFPA 70-1981
Flammable and Combustible Liquids Code - NFPA 30-1981
Auxiliary Protective Signaling Systems for Fire Alarm Service - NFPA 72B-1979
Hanford Plant Standards, as applicable.

STORAGE EQUIPMENT

The 332 Building is equipped with four flammable liquid storage cabinets and one liquid acid storage cabinet. Five sections of open shelving are provided for solid chemical storage, and facility spill control supplies. Packaging materials are also stored inside the building.

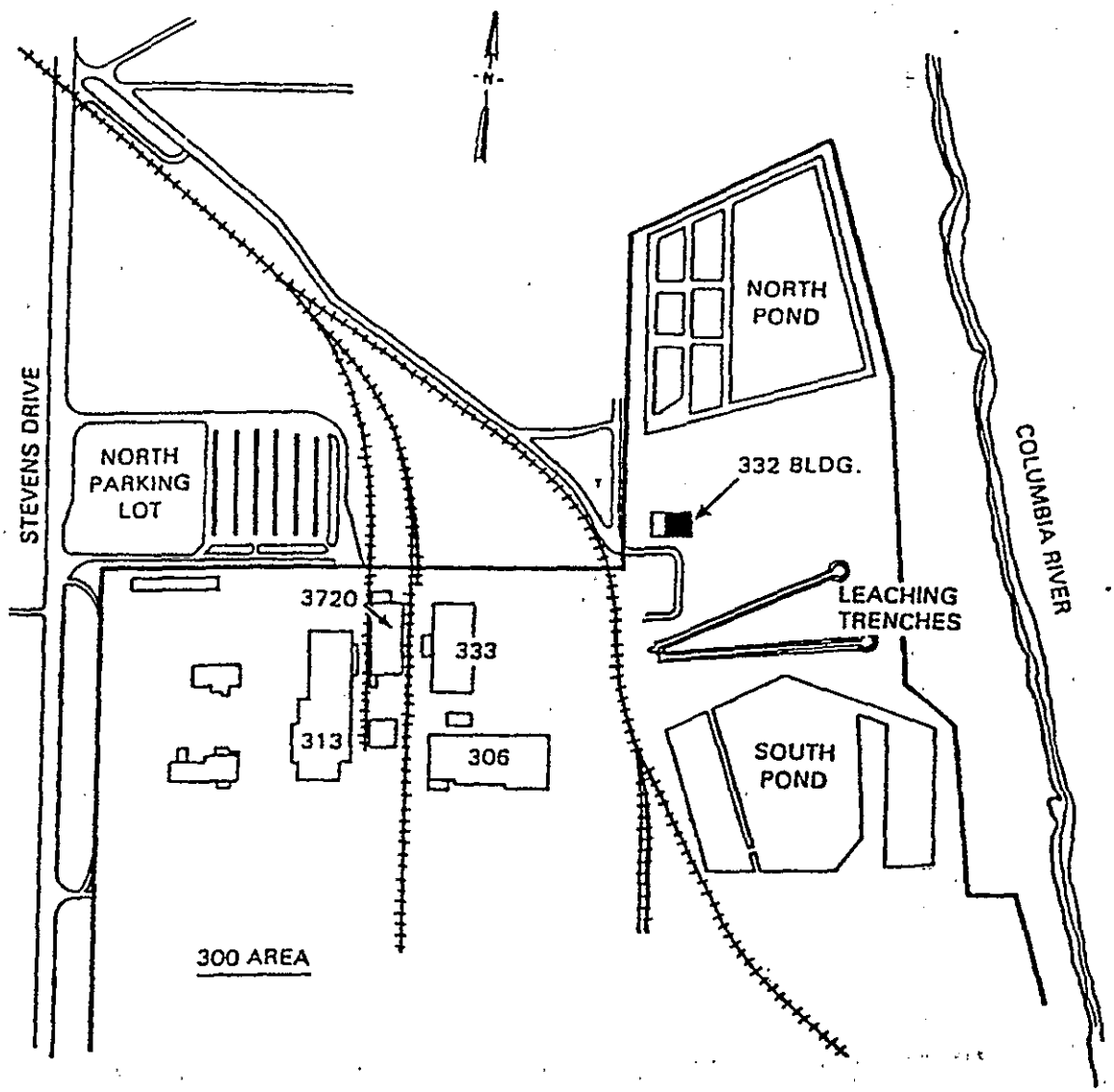

FIGURE 1. 300 Area North.

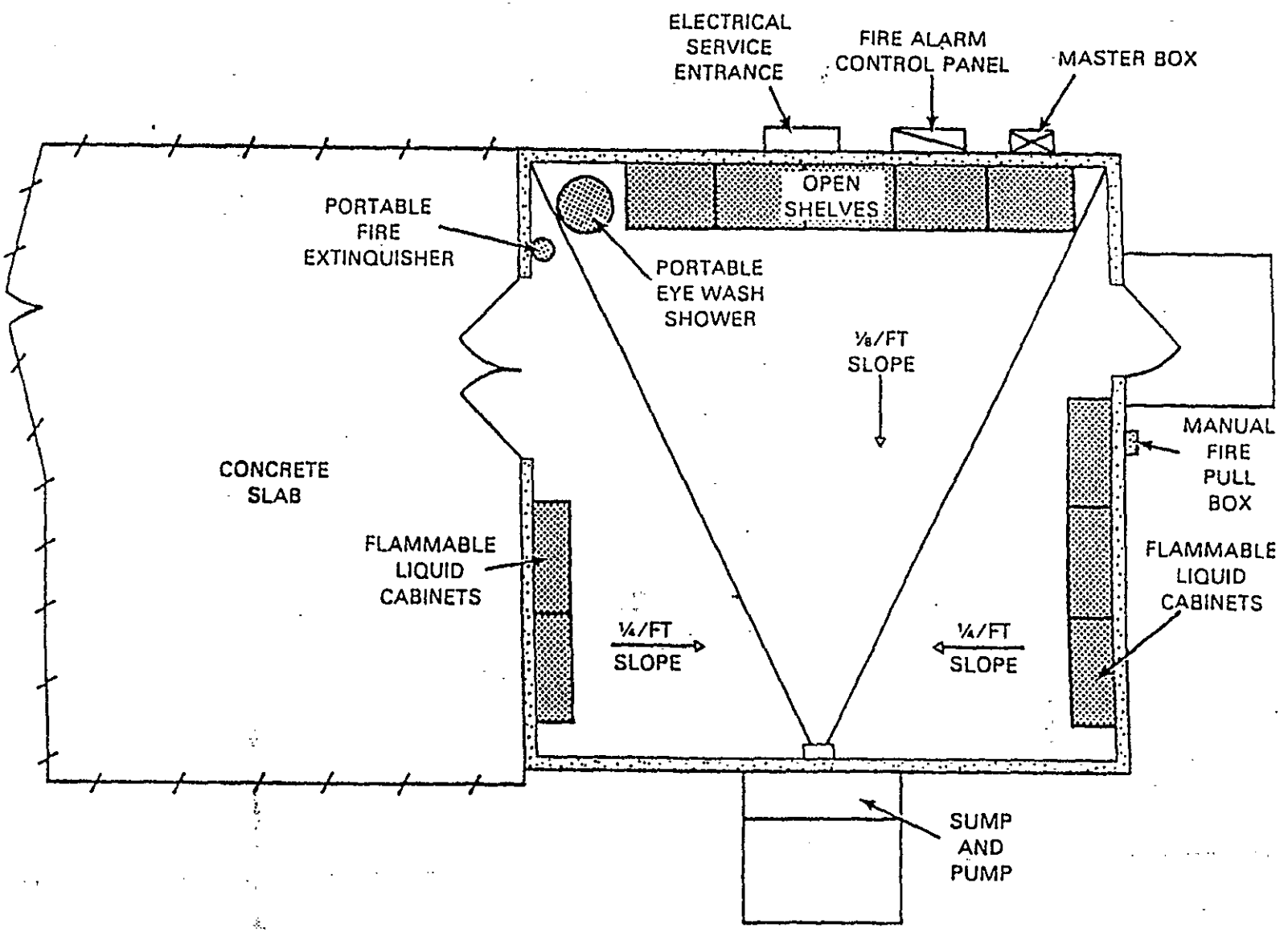

FIGURE 2. 332 Facility Layout

UTILITIES AND SERVICES

- Ventilation/Heat - The facility is heated with a wall-mounted fan forced unit. An explosion proof thermostat is used to regulate the temperature inside the building. The ventilation system includes a gravity ventilator located on the roof and a manually controlled exhaust fan on the east wall. The exhaust fan also ventilates the storage cabinets as well as a fume hood. Each door panel has a dust stop to allow movement of air.

- Electrical/Lighting - The interior of the building is lit by enclosed gasketed fluorescent light fixtures which are controlled by three-way switches located next to each entrance. Photocell-controlled mercury vapor lights are located on the outside of the building above each entrance. All electrical equipment is approved for Class I, Division 2 flammable storage operation.

- Water Supply - There is no potable water to the facility. Therefore, no potential back-siphoning contamination into water lines exists.

- Sewer Lines - There are no sewer lines to the building. Therefore, no potential spills can enter the sanitary sewer system.

FACILITY OPERATING PRINCIPLES

The evaluation of "Immediately Dangerous to Life and Health (IDLH) concentrations" is utilized by PNL to define low, moderate and high hazard facilities[a]. The IDLH is the concentration that represents a maximum level from which one could escape within 30 min without any escape-impairing symptoms or any irreversible health effects. The 332 Building stores waste chemicals in such quantities so as to be classified as a "low" hazard facility by this criteria. The inventory is controlled by operating procedures and a hazardous chemical waste inventory database management system, CHEMHAZ, which calculates the hazard index based on inventory.

Hazardous waste, recycle chemicals, and low-level radioactive mixed waste are accepted for storage in the 332 Building. Chemicals requiring refrigeration are not allowed inside the facility.

Chemicals are accepted in their original containers if they are in good condition, or in other than the original containers provided the substitute container is compatible with the chemical waste it contains. An evaluation of the container condition is performed before accepting the waste from the generator. Rejected containers may require repackaging or overpacking by the generator of the waste before acceptance into the facility. The "low" hazard index category is considered the primary criteria in the decision to accept chemicals for storage. Chemicals in storage are packaged and transferred to other permitted facilities before the inventory approaches a hazard index of 1 which is the cutoff point for a "low" hazard classification.

The storage facility interior is not designed for storage of bulk quantities, e.g., more than two or three 55-gal drums of material. It is designed for laboratory-size containers (e.g., pints, liters and gallons) which are kept in ventilated storage cabinets.

Normal operation of the facility is to store waste until accumulating sufficient quantities (~30-55 gal) to package and ship offsite to a permitted TSD facility and to recycle unused chemicals.

WASTES

Chemicals wastes are removed from generating facilities and brought into the 332 Building for storage and packaging. Compatible wastes are packaged in DOT-approved shipping containers of up to 55-gal in size. Packaging is performed in accordance with WDOE Dangerous Waste and DOT regulations. A computerized inventory data base of wastes is maintained for required storage and disposal record keeping purposes.

(a) Backman, G. E., et al. July 1986. A Hazard Classification Method for Facilities Containing Toxic Chemicals at the Pacific Northwest Laboratory.

RECYCLE

Chemicals available for recycling (unopened, usable, excess chemicals) are moved into the 332 Building for storage. A list of recyclable chemicals is published in the Waste Management and Environmental Compliance (WM&EC) bulletin which is distributed to all PNL Laboratory facilities. Chemicals which have not been recycled within ~90 days are declared waste and disposed of accordingly.

The waste and recycle inventory is maintained below the "low" hazard category inventory limit at all times.

ENGINEERED SAFETY FEATURES

The engineered safety features incorporated into the 332 facility include heat/fire detection, sump, eye wash/shower, fences and locked gates.

HEAT/FIRE DETECTION

The 332 Building is equipped with two heat detectors (~200°F) and a manual pull station. An alarm or supervisory (trouble) signal is transmitted to a fire alarm control panel. This panel sends a signal to the master box radio alarm transmitter which transmits a signal to the Hanford Fire Department. On an alarm signal, a bell and a red indicator light are also activated. The supervisory signal will also assist in detecting power failures.

The building is equipped with two 10-lb ABC fire extinguishers.

SUMP

The floor of the 332 Building is sloped to a drain at the south end of the facility. The sump has a capacity of approximately 550 gal. A pump lined with chemically resistant material is in place to drain the sump. The sump is intended to contain liquids from spills. In the event of an accident, such as a liquid spill, the liquid will be immediately pumped out and disposed. No hazardous materials are allowed to accumulate in the sump.

EYE WASH/SHOWER

The facility is equipped with a self-contained eye wash/shower, which is inspected weekly, and serviced on a 6-month basis.

ADDITIONAL FEATURES

The outdoor curbed work area is surrounded by a fence with gates that are lockable. The gates and both entrances to the building are kept locked when personnel are not present. The facility is located within a larger fenced area. This fence is also kept locked when the facility is unoccupied. Warning signs and emergency information are posted outside the facility in accordance with state and federal TSD regulations.

ADMINISTRATIVE CONTROLS

The manager, WM&EC section of the Laboratory Safety Department, is responsible for the operation of the 332 facility, including environmental and occupational safety and regulation compliance.

The operation of the 332 facility is conducted in accordance with WAC-173-303 interim status standards as well as UBC, NFPA and DOE requirements. Various operational and administrative documents that establish formal PNL programs to ensure compliance with applicable DOE Directives and Orders are also adhered to. When necessary, specific procedures and protocols are prepared for the operation of the facility.

GENERAL PNL CONTROLS

PNL policy and standard practices with respect to the operation of a chemical waste storage facility are set forth in PNL manuals and guides. Compliance with the following documents is required for operational control of the 332 facility:

- PNL Management Guide
- Off-Normal Event Reporting System, PNL-MA-7
- Waste Management, PNL-MA-8
- Emergency Preparedness, PNL-MA-11
- Safety Guides, PNL-MA-43
- Quality Assurance Manual, PNL-MA-70
- Hazardous Material Shipping Manual, PNL-MA-81
- Operational Readiness Review System, PNL-MA-97.

SPECIFIC CONTROLS FOR 332

Operations in the 332 Building is performed according to written procedures approved by the responsible management. The following administrative controls are consistent with and implement the requirements of the PNL manuals listed above. These administrative controls are specific to the 332 facility and its operation:

- Safe Operating Procedures (SOP)
- Building Emergency Plan (BEP)
- Personnel Training Program
- Carcinogen Protocol
- Waste Management Procedures
- RCRA Storage Facility Compliance Guidelines.

TRAINING

Operating personnel are required to have the following training specific for their activities:

- Waste Management
- Fire Extinguisher Handling
- Respiratory Protection and Mask Fit
- Chemical Safety
- Operating Procedures
- Emergency Preparedness
- Vehicle Safety
- 40-hr OSHA Hazardous Materials Training.

SAFETY EVALUATION

The potential hazards concerning the 332 facility fall into three categories: leaks/spills, fires/explosions and natural disasters.

LEAKS/SPILLS

Leaks and spills could occur due to several causes: container failure due to age, corrosion, or contents expansion; human error such as dropping a container.

The magnitude of the hazard of a leak/spill is dependent on the chemical and its properties (e.g., solid, liquid, gas, toxicity, reactivity, volatility, flammability, etc.). The hazard to personnel depends on whether or not they are present when the loss of containment occurs and on the hazardous environment that the chemical might create.

For example, if the operator drops a bottle and the contents are released, the operator is aware of the problem. Proper action can be taken, such as evacuation of the building, use of the eye wash/shower, and/or contacting Industrial Health & Safety (IH&S) or emergency personnel. If the operator enters the building and a bottle has been leaking, the atmosphere inside the building could possibly be hazardous. However, this is unlikely since liquids are stored in approved cabinets which have secondary containment and are mechanically ventilated to the outside. In addition, gravity exhaust and an exhaust fan also ventilate the interior of the building. These controls greatly reduce any possibility of atmospheric contamination inside the facility.

Large spills of greater than 55-gal are not practical. The building is designed to contain 10% of the total liquid inventory or 100% of the largest container stored in the building. The quantity of material is limited to the cabinet and shelf space available and most containers stored in the building are laboratory-size containers.

Leak/spill cleanup can be accomplished in two ways. For small spills, spill cleanup kits and absorbent which are kept on hand can be used for cleanup. Should a larger or extremely hazardous spill occur, the contaminated area can be washed into the sump.

Procedures for coping with leaks are in place and personnel using the facility are trained in the employment of written procedures.

The facility will be operated within a chemical inventory that allows the facility to be categorized as a "low" hazard category. The "low" hazard inventory, by definition, allows less than 10% of the IDLH value to reach the public in the event of a release. Therefore, if the maximum postulated release occurred, i.e., all possible chemicals dispersed via fire, explosion, etc., the affect to the public would be 10% or less of the IDLH.

FIRES/EXPLOSIONS

Fires and explosions may be caused by an explosive atmosphere or by unstable or shock-sensitive chemicals. A fire could be caused by electrical malfunctions, strong oxidizers, spontaneous combustion, or explosions with combustible materials present.

An explosive atmosphere is prevented by the continuous mechanical ventilation of the storage cabinets, the use of the exhaust fan, and the gravity ventilator. Unstable or shock-sensitive chemicals are specifically handled to minimize their explosion potential, stored in a specified flammable storage cabinet and disposed of in a prompt manner. Once disposal arrangements have been made these items are shipped directly offsite to a licensed facility equipped to handle these types of materials specifically.

All flammable liquids are stored in approved flammable liquid storage cabinets or in approved DOT shipping containers, and are inspected weekly. Chemicals such as strong acids capable of causing fires when brought in contact with combustible materials, are handled in secondary containment and stored in specific acid cabinets to minimize contact with other items in the facility. During transportation and transfer from the vehicle to the facility, plastic storage bins are used to provide containment and to prevent contact between combustible materials and the chemical waste.

The safe storage of flammable liquids, oxidizers, and strong acids is the function of this facility; therefore, the hazard that they present is accepted with the appropriate procedures to minimize the risk.

Reactive solids and other water-reactive chemicals may be stored in the facility. The absence of any water, including sprinklers, precludes the possibility of accidental reaction.

NATURAL DISASTERS

The construction of this facility meets the requirements of the Hanford Standard Design Criteria 4.1, Rev. 7 and, therefore, is designed according to the Uniform Building Code for Seismic Zone 2 on the Seismic Probability Map, implying a potential for moderate damage from earthquakes.

In the event of an earthquake, there could be a local spread of solids. Liquids released from cabinets would drain into the sump. If the liquids which drained into the sump leaked out due to cracks caused by the earthquake, contaminated soil around the sump can be removed and disposed of accordingly.

Some tornados are freaks and act in a totally unpredictable manner. However, tornadoes are considered to be rare in this area, and there has never been any reported damage from them. In the case of a large tornado, some of the liquids can be expected to be dispersed in much the same manner as with an earthquake. Solids would be dispersed over a large area if building containment were lost.

The U.S. Army Corps of Engineers estimates the 100-yr maximum Columbia River flow to be 440,000 cfs which would produce a river elevation ~356 ft above mean sea level (msl). The probable Maximum Flood is estimated to have a flow of 1,440,000 cfs. The river elevation would be 382 ± 4 ft msl at the 300 Area. The elevation of the 332 Building is 381.5 ± 0.5 ft. That is 25 ft above the estimated 100-yr flood level and equal to the estimated level of the probable maximum flood. In this severe flood situation, the building's total volume could be released. Due to the volume of water associated with the flood, the dilution of chemicals would be sufficient to eliminate any hazard.

Termination of the basaltic flows in the Pasco Basin occurred about eight million years ago. The nearest active volcanic area is in the Cascade Mountain range, located approximately 100 miles west of the Hanford Site. The Mount St. Helens eruption of May 1980 resulted in a 4-in. maximum ash deposit at a distance of 100-150 miles from the mountain. Based on previous volcanic activity of the Cascade range, ashfalls at Hanford in excess of trace amounts are expected less than twice per century. Lava and mud flows, both of which are associated with active volcanoes, present no problems. No lava or mud flow from any event in the Cascade volcanoes has moved more than 15 miles from its source, and no valleys lead from the Cascade volcanoes to Hanford.

Due to the infrequency of the natural occurrences and the lack of severe consequences, i.e., public exposure would not exceed 10% of the IDLH, the associated risk is acceptable.

CONCLUSION

It is concluded that the storage operation is conducted with no undue risk to the health and safety of PNL staff, the general public, or the environment.