E. WASTE MANAGEMENT

Enabling objective

5.13 Briefly describe major features of waste management for:

a) Liquid waste;
b) Solid waste.

LIQUID WASTE MANAGEMENT

Like any large facility, a CANDU station has an extensive network of floor drains to collect spills and drainage from its various processes. Because of the nature of the business, it is necessary to subdivide the drainage system into:

- inactive drainage,
- active drainage.

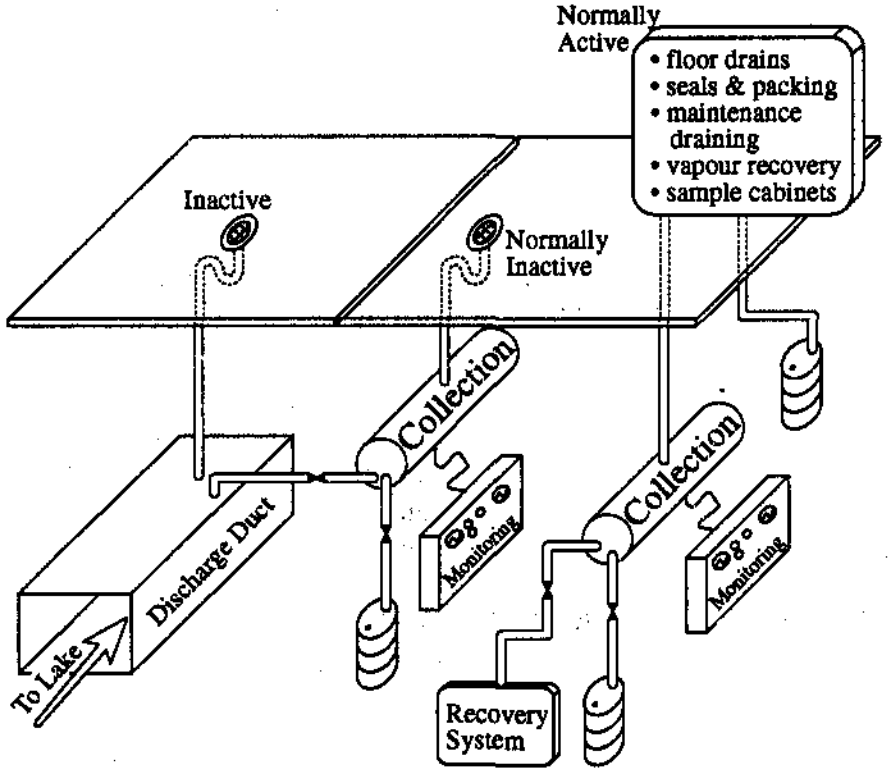

Figure 5.6
Drainage

INACTIVE DRAINAGE

The inactive drainage system collects drainage from the conventional side of the station. The waste discharges to the condensor cooling water discharge channel or intake channel depending on the location. Clean drains such as leakage collection from the main steam blowdown pipe trenches are returned to the lake through yard drains. The resin regenerant waste effluent from the water treatment plant is monitored for pH and discharged under controlled conditions to the condenser cooling water discharge channel.

ACTIVE DRAINAGE

The active drainage system collects drainage from the reactor side of the station. Because the volume of water from these areas is quite large, the system further segregates the drainage into **normally inactive drainage** and **normally active drainage** to minimize the amount of water requiring treatment prior to disposal.

Normally Inactive Drainage

This drainage contains very little or no activity, but it is collected prior to discharge to ensure that it can be treated if contamination occurs. The major sources are reactor building floor drains, laundry drains, and non-active laboratory sinks and floor drains.

Normally Active Drainage

This drainage is expected to have activity so it is collected and sampled to determine the required treatment prior to release. The major sources of normally active waste are the reactor auxiliary bay floor drains, irradiated fuel bay drainage, spent ion exchange resin slurry water, auxiliary irradiated fuel bay drainage, active chemical laboratory drains, decontamination centre drains, fuelling machine maintenance shop drains, laundry first rinse cycle drains, and decontamination shower drains.

Reactor building drains are diverted to the reactor building liquid recovery system to recover heavy water.

SOLID WASTE MANAGEMENT

IRRADIATED FUEL STORAGE

Our stations do not produce large amounts of high level radioactive waste. In 1988, approximately 4 boxcars would hold all the irradiated fuel used in Ontario Hydro's nuclear power production since 1960. This is true even though nuclear power produced more electricity in the last decade than water power and coal.

Irradiated fuel is stored in pools of demineralized light water called **Irradiated Fuel Bays** (IFB). The water provides cooling, shielding for personnel, and visibility, and it also allows easy handling without removal. In the short to medium term the IFBs at each station are more than adequate to handle the irradiated fuel, but in time there may be a need to move the older fuel into dry storage on site. This is feasible because over time, the radiation levels and heat produced by the fuel drops off significantly. Following decommissioning of Douglas Point Nuclear Generating Station, its IFB was emptied and the fuel transferred to dry storage on site. This has proved an effective means of storing the fuel in the longer term because it is still on the BNPD site where an effective security system is in place.

WASTE VOLUME REDUCTION AND STORAGE

The BNPD **Waste Volume Reduction Facility** (WVRF) is designed to reduce, either by incineration or compacting, the volume of waste that requires storage. The facility handles both low and medium level radioactive waste from all Ontario Hydro CANDU stations.

Radioactive waste is trucked to the facility in specially designed metal containers. If possible the waste is incinerated and the radioactive ash loaded into 200 litre drums with a volume reduction about 20 to 1. Waste that cannot be burnt because of metal content or high radioactivity is compacted with a volume reduction about 4 to 1.

After treatment the radioactive waste is reclassified as either low, medium or high level. Low level waste is stored in a warehouse. Medium level waste is stored in deep trenches. High level waste is stored in deep tile holes.

Examples of radioactive wastes are:

- rags and protective clothing (low, medium or high level);
- equipment components or tools (medium or high level);
- and, neutron activated components from the reactor core (high level).

ASSIGNMENT

1. Why is irradiated fuel stored in deep pools of water?

2. Why is it important to reduce the volume of solid wastes?