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Abstract Former Industrial Waste Sludge Lagoon

IBM - Kingston, NY

The Industrial Waste Treatment Facility (IWTF) is located in the northwest corner of the IBM Kingston facility, west of Neighborhood Road, approximately 600 feet east of Esopus Creek. The Former Industrial Waste Sludge Lagoon (IWSL) is located in the southwest corner of the IWTF, and the entire IWTF area is surrounded by a security fence with a controlled access gate.

The Industrial Waste Treatment Facility was placed into service in September 1955 and provided secondary biological treatment of sanitary waste and "best available-technology" treatment of industrial waste. Treatment of these wastes was carried out in separate operations within the facility.

Industrial waste treated at the plant received different levels and methods of treatment based upon the nature of the chemical waste. The addition of oxidizers and buffers either destroyed, precipitated or neutralized the toxic material. As necessary, the wastes were treated with flocculants, to induce final solids settling in the cyclator. The liquid was then taken off at the top of the cyclator and mixed with the treated sanitary waste. The supernate, settled solids and liquid were withdrawn from the bottom of cyclator and piped to the sludge lagoon. Table 1 summarizes hazardous constituents placed in the industrial waste sludge lagoon.

Table 1 Summary of Hazardous Constituents Placed in IWSL	
Arsenic	Arochlor 1243 (PCB)
Barium	Bromoform
Cadmium	Chloroform
Chromium	1,1,-Dichloroethene
Cobalt	1,2-Dichloroethene
Copper	Methylene Chloride
Cyanide	Trichloroethene
Lead	Trichlorofluoromethane
Mercury	PCBs
Nickel	Phenols
Selenium	"Organic Solvents"
Silver	
Tin	
Zinc	

The sludge lagoon was rectangular in shape, approximately 158 feet by 60 feet by 10 feet deep and covered an area of about 9,500 square feet (0.22 acres). As constructed in 1955, the lagoon was lined with a six inch layer of clay. In 1978, the sludge lagoon was reconstructed and lined with a 45 mil HYPALON membrane with nylon reinforcement. The sludge, clay liner and two feet of underlying contaminated soils in the original lagoon were cleaned out and two feet of compacted sand was placed on the bottom of the excavation. During construction, it was necessary to install a horizontal drain to control groundwater inside the excavation. The liner was placed on the compacted sand at the bottom of the lagoon (EL. 141 feet). Six inches of compacted sand was placed on the surface of the HYPALON liner as well as the under side of the side slopes of the liner.

Closure of the sludge lagoon commenced on December 1, 1984, in accordance with Closure Plan approved November 28, 1984. The supernatant liquid was pumped from the lagoon into a holding tank at the IWTF for subsequent treatment (approximately 50,000 gallons). Sludge solids were then removed utilizing a crane, bobcat tractors, vacuum and tanker trucks. During this phase of the work, the bobcats ripped the bottom liner with their rubber-tired wheels. After the sludge was removed, the six inch thick sand layer overlaying the liner was hand shoveled into the crane clam shell. The rips in the liner were located and marked prior to the removal of the liner.

On January 9, 1985, after the liner had been removed, 20 soil samples were collected from 10 locations throughout the base of the lagoon. All samples were tested for the following parameters which were major constituents in the sludge:

1. Eight metals listed under EP Toxicity test
2. Priority Pollutants PCBs
3. Cyanide
4. Chloroform, Methylene Chloride, Trichloroethylene
5. pH

The EP Toxicity results indicated four of twenty samples had elevated levels of Cadmium (max. 0.73 mg/l cadmium). The groundwater standard for chromium and lead were exceeded in one sample each. Four of the twenty samples had elevated cyanide levels (max. 9,500 ppb cyanide). Test results on the 9,500 ppb cyanide sample contained 25,000 mg/kg (ppm) of total iron and 800 ppb free cyanide, more than sufficient iron to form the suspected ferric-cyanide complex and stabilize the compound in the soil matrix.

Between February 12 to February 20, 1985, 78 soil samples were collected from 16 shallow borings inside the lagoon. Thirty-two (32) of these samples were analyzed for total cyanide and total chromium. None of the samples had detectable levels of chromium and only one sample, from the north end of lagoon had detectable levels of cyanide (2.1 mg/kg cyanide).

The contaminated soil below elevation 141 feet, beneath the liner, was left in place. Two feet of crushed limestone was placed to elevation 143 feet, to provide a working base above the groundwater and insure the pH remains slightly above base neutral. The lagoon was backfilled with clean sand to within 6 inches of finished grade. Finished grade was established at elevation 151 feet with top soil and the area seeded. The work was completed, June 4, 1985, and certification of closure provided by a licensed professional engineer, June 12, 1985.