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DECONTAMINATION OF THE BINGHAMTON STATE OFFICE BUILDING

Progress Report - May 1983

BACKGROUND

The Binghamton State Office Building is a 260-foot tall tower within the government complex in Binghamton, New York. The building consists of 17 office floors, a penthouse for elevator equipment, and basement and sub-basement levels (see Figure 1). The heating and ventilation is broken into three zones: sub-basement through first floor; floors two through ten; and floors eleven through penthouse.

On February 5, 1981, a fire occurred in the mechanical room on the basement level. The fire caused a transformer in the mechanical room to leak approximately 180 gallons of coolant liquid which consisted of 65% PCBs (Aroclor 1254) and 35% tri- and tetrachlorobenzenes. The fire generated a considerable amount of black soot that spread throughout the building principally via a pipe chase adjacent to the men's room on each floor; this chase extended from the basement mechanical room to the penthouse.

Emergency work was started immediately after the fire was extinguished to restore electrical power to the building and to remove the spilled transformer liquid from the floor of the mechanical room and the soot deposits from surfaces throughout the building. The cleaning work was discontinued in February when laboratory analysis of the soot indicated that it contained over one part per million 2,3,7,8-tetrachlorodibenzo-p-dioxin, as well as various polychlorinated dibenzofurans, biphenylenes, biphenyls, and other dioxins.

Rigorous cleaning to remove visible soot was resumed in October 1981, following the completion of the following facilities and procedures which assure the safety of the workers and the community:

Air pollution control: Two air filtration units were mounted on the roof of the building and connected to the air exhaust chases leading to the men's and women's restrooms. All other openings into the building were sealed. All air leaving the building is filtered through particulate and activated carbon filters in these roof mounted units. Tests performed before air was released from these units into the environment demonstrated that they were effective in removing the relatively volatile PCBs and other contaminents from the air. Periodic tests have demonstrated the continued effectiveness of these units.

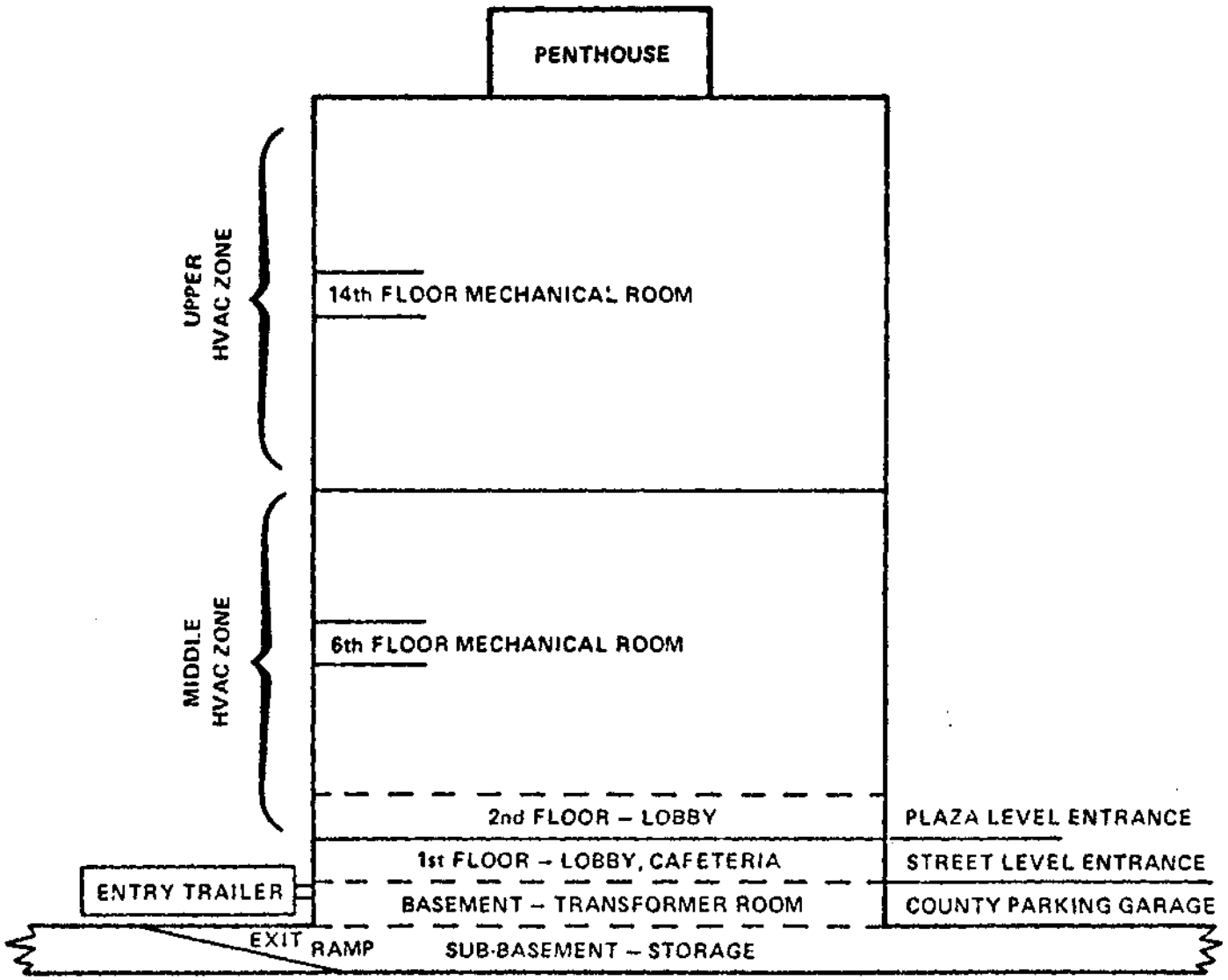

FIGURE 1. BINGHAMTON STATE OFFICE BUILDING

Personnel entry facilities: An entry portal was installed at the basement level to allow entry of personnel into the building through a passage where the flow of air is controlled to always be into the building. The entry portal contains showers, facilities for maintenance of respirators and protective clothing, lunchroom, locker, and toilet facilities. Industrial hygiene samples that have been collected in this entry portal each month indicate that these facilities have remained free of any contamination.

Standard operating procedures: Procedures were established before the work resumed in the building to specify the details of building security, protective equipment, a medical surveillance program which includes all people who enter the building, industrial hygiene sampling, and emergency response procedures. There have been no cases of personnel being contaminated while working in or entering the building.

STATUS OF CLEANUP

The goal of the very extensive preliminary cleanup has been to remove all visible soot from the building. This phase of the cleanup is now complete except extensive cleaning for the basement and sub-basement levels. The following list summarizes the cleaning that has been performed above the first floor:

Office furniture and equipment: stored in sub-basement.
Misc. office items: disposed.
Rugs and curtains: disposed.
Paper (contents of all file cabinets, desks, and cabinets): baled and disposed.
Suspended ceiling panels (painted metal): stored in sub-basement.
Ceiling lighting fixtures: vacuumed* and washed.
Fireproofing insulation above suspended ceiling: vacuumed.
Windows, painted walls, vinyl walls: vacuumed and washed.
Vinyl and ceramic (washroom) flooring: vacuumed and washed, then removed and disposed.
Air ducts: fiberglass removed.
Peripheral air terminal boxes: disassembled; fiberglass removed; vacuumed and washed.
Elevator shafts: vacuumed.
Air conditioning cooling coils: vacuumed and washed.
Air handling chases (cement block): access gained by opening holes thru walls on every floor; vacuumed; men's room chase coated with cement base coating.
Other equipment and fixtures: vacuumed and washed.

*High efficiency vacuum cleaners equipped with stiff bristle brushes were used throughout.

A double airlock was built into the sub-basement to enable waste material to be removed from the building without compromising the control of air movement through the building. Approximately 1782 cubic yards of bulk material and 1377 steel drums (55 gallons) have been disposed of in a secure landfill approved by EPA for the disposal of PCBs. Three automobiles that were parked in the sub-basement at the time of the fire were washed and buried in an approved hazardous waste landfill.

All washing was done with a 1% solution of nonionic detergent (Triton X-100) in water. This detergent was known to be non-volatile and non-toxic. Performance test of a number of commercial cleaning materials on vinyl flooring indicated that the Triton X was as good or better than any alternative material. All water generated during the preliminary cleanup, including condensate from air conditioning coils and seepage of groundwater into the sub-basement, has been treated in the building by filtration through activated carbon before being discharged to the Binghamton sanitary sewers. Periodic chemical analysis have demonstrated that the treated water has met the discharge permit requirements of less than one part per billion PCBs.

EFFECTIVENESS OF PRELIMINARY CLEANUP

The internal air circulating systems were modified during the preliminary cleanup so that all of the air in the building circulated repeatedly through high efficiency particulate filters. Tests performed in May 1982 indicated a total particulate concentration of 16 to 20 micrograms per cubic meter in the air in the building. The concentration of PCBs in the air has slowly decreased from 1.48 micrograms per cubic meter shortly after the fire to 0.5 micrograms per cubic meter in February 1982 to about 0.25 micrograms per cubic meter in March 1983. (EPA has reported levels of 0.1 to 0.5 ug/m^3 PCBs in air in normal homes and offices.) Air samples collected in December 1982 showed the presence of 7 to 16 pg/m^3 2,3,7,8-TCDF and no detectable (less than 1.3 pg/m^3) of 2,3,7,8-TCDD. Larger air samples have recently been collected from the two air handling zones above the first floor, and these samples are presently being analyzed for PCDDs, PCDFs, and PCBs.

Approximately 300 wet wipe samples were taken to define the levels of PCBs on all surfaces after completion of the preliminary cleanup of the 9th floor. The results showed levels of about one to four micrograms of PCBs per square meter on glass and hard-painted surfaces; the levels on vinyl and painted wall surfaces were 15 to 45 ug/m^2; and the levels on vinyl and ceramic floor tile exceeded 300 ug/m^2. The floor tiles have since been removed and disposed of. Samples have recently been taken from a number of vinyl wall surfaces and are being analyzed for PCDDs, PCDFs, and PCBs.

The structural ceilings above the false ceilings were all sprayed with a coating of inorganic fireproofing material when the building was constructed. All of this insulation has been vacuumed while being scrubbed with a stiff brush to remove the surface of the coating and any loose soot or other material that might be adhering to it. Core samples of the cleaned insulation were analyzed and found to contain 2.6 to 13 parts per million PCBs by weight. Additional core samples were collected recently and are being analyzed for PCDDs and PCDFs.

PLANNED FUTURE ACTIVITIES

The preliminary cleanup of the building above the basement levels has achieved its goal of removing all of the visible soot. The final cleaning and reoccupancy of the building will depend on first defining and then achieving a level of cleanliness that will be safe for long-term, normal use of the building. Now that the preliminary cleanup has been completed in the upper portion of the building, the next step will be to resume normal ventilation of the cleaned areas. Air samples collected in December, 1982, indicated that the concentration of toxic chemicals in the air in the building had been reduced to very low levels. Since air released from the building from the ventilating openings on the sixth and fourteenth floors will be diluted by a factor of at least 200 before reaching ground level, the effect of releasing air from these points should have no significant effect on the quality of the air around the building if care is taken to prevent air from the basement from mixing with the air that will be released directly. This process of dividing the building between the first and second floors can easily be accomplished, and the air from the basement will be drawn through a metal duct to the air treatment units on the roof of the building. The decision to allow normal ventilation will not be made until a careful analysis has demonstrated that no people will be exposed to unsafe levels of contaminants.

All cleaning performed so far has used cleaning materials that do not contain volatile organic solvents because the release of solvents would interfere with the activated carbon treatment of the air that is being released from the building. Normal ventilation of the upper portion of the building will enable the final cleaning to be done using materials that generate organic solvent vapors if necessary. In addition, achieving a level of air cleanliness in the building that meets the exposure requirements may allow changes in the protective equipment requirements that would reduce the incidents of heat stress and related problems during the hot summer weather.

The first step in the final cleanup of the upper portion of the building will be an additional thorough cleaning to remove the last traces of construction debris. This will be followed by additional cleaning and testing as necessary to achieve and demonstrate the required level of cleanliness. After this portion of the building is clean, considerable renovation work will still be necessary to replace the air handling ducts, ceilings, walls, lighting fixtures, floors, and other components that have been removed during the preliminary cleanup of the building.

Final reoccupancy of the building would follow completion of the final cleanup of the entire building, including the basement and sub-basement parking areas, and final testing to assure that the building has been completely and adequately cleaned.