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Versar Inc.

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TO: Dr. Durfee and 474 distribution

FROM: Donald Sargent

TRIP REPORT: General Electric Company, Hudson Falls and Fort Edward, New York, September 28, 1976. Contacts: Mr. W. R. McKenzie, Manager, Manufacturing Section and Mr. Robert Marcuis, Project Engineer, Waste Treatment and Control

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Introduction

Mrs. Gayaneh Contos visited the two General Electric capacitor manufacturing plants at Hudson Falls and Fort Edward, New York, on October 22 and 23, 1975. Her trip report of November 3, 1975 described in detail the manufacturing operations, PCB handling, plant water usage, raw wastes, treatment and housekeeping, and effluents from these two plants.

In the past year, however, since Mrs. Contos' visit, much has been announced in the press of additional PCB control measures accomplished (and committed to) by General Electric. Most recently, an agreement between G.E. and the New York State Department of Environmental Conservation was announced September 8, 1976. A return visit was therefore requested to document the technical changes at these two plants in the past year.

The first major section in this report describes the accomplishments to date in PCB control which are now on stream or in effect. The next section describes the work now in progress to which General Electric is committed, via an agreement with the New York State DEC. The target date for full implementation is May 1977.

Containment Project Accomplishments

The GE containment project has been formally progressing since 1974, with an estimated investment in the past two years of $1.0 to $1.5 million. Much of this project was described in Mrs. Contos' 1975 report. The changes in effect as of September 1976 have resulted in a reduction of PCB's discharged from 8 to 9 pounds per day in 1974, to a present value of less than one

pound per day. The present total discharge is 1.6 MGD; this is made up of process wastewaters with PCB concentrations in the 100 to 200 ppb range, and of non-contact cooling water, treated sanitary wastewater, and rainfall runoff water. The present total PCB discharge of less than one pound per day is half that reported in the October 1975 visit report.

The parts of the containment project actually completed as of September 1976 are:

1. Segregation of contaminated process wastewaters and runoff waters from non-contact cooling water. At Fort Edwards, 387,000 GPD of well water is used for non-contact cooling in manufacturing processes. At Hudson Falls, 1,002,000 GPD (90 per cent river water and 10 per cent municipal water) is used for cooling; of this, approximately 750,000 GPD is used for water-cooled plant air conditioners (all Fort Edwards air conditioners are air-cooled) and the balance is used for non-contact cooling in manufacturing operations. At Hudson Falls, the river water intake is already contaminated (up to 10 ppb) with PCBs).

   The segregation project was accomplished by a painstaking process of tracing wastewater lines, using dye studies where required, and of disconnecting the old sewer hookups which had caused mixing of process wastewater, cooling water effluents from heat exchangers, sanitary wastewaters, and storm drains.

2. Prevention of contamination of waters from spills and infiltration. This completed project includes the sealing of trenches, and the plugging of underground sewers and their replacement with overhead lines. In the manufacturing areas, drips and spills of PCBs have been reduced with drip pans under process equipment and conveyors and by work practices; open channels in these areas have all been filled. Engineering controls and work practices instituted for reducing worker exposure to PCBs are also effective in reducing the amount of PCB residuals which in the past have contaminated plant wastewater streams. Curbs and dikes have been installed around PCB transfer and storage areas (an enclosure around the PCB unloading area to prevent rain water accumulation has not as yet been installed).

3. Decrease in process wastewater volume. A water recirculation system has been installed for the Nash water-sealed vacuum pumps, with two decanters (in series) in the system for removal of oily wastes. Although a large reduction in volume has been achieved (compared to a once-through system), there is still excess water to be wasted, since

this Nash pump water includes condensed moisture and since the Nash pump is in series with the first two stages of the steam ejector system at Fort Edward. No steam ejectors are used at Hudson Falls.

Another example is in capacitor cleaning after impregnation. One detergent washing machine is being replaced with a vapor degreasing unit at a investment of $90,000. The remaining washing machines each have three independent closed water systems: prewash, wash, and rinse. The quantity of detergent has been reduced; its main function now is pH control. The water in each section is recirculated through a filter and a decant tank. There is only intermittant makeup water, and the cycle time for dumping, cleaning, and refilling is once every two months.

The decanters used in process water recirulation systems are small units with short residence times. It is GE's experience that rapid phase separation occurs.

4. Elimination of batch dumping. All intermittent contaminated process wastewaters are now collected instead of being discharged to the river. These batches of wastewater amount to 150,000 gallons per year and are shipped by a disposal contractor for incineration. In addition, of course, PCB-contaminated oily wastes from decant tanks and other sources, and PCB-contaminated solid wastes, are sent to the disposal contractor (ChemTrol in Model City, N.Y.).

   The batch wastewaters which are now collected include those from the washing machines, paint sludge, the spent phosphate baths, vacuum pump oils, catch pans, spills and wastewater from some decant tanks.

5. Treatment of sanitary wastewaters from Fort Edward (the sanitary wastes from Hudson Falls are sewered to the municipal system). A package treatment plant, consisting of sedimentation, aeration, and chlorination, is designed to achieve 85 per cent removal of both BOD and suspended solids for a flow of 25,000 GPD. The sludge is sent for incineration.

Additional Projects in Progress

The General Electric Company is in the process of instituting major changes and additions which are expected to reduce the quantity of PCBs discharged from the present level of less than one pound per day to a level of less than one pound per day. These projects are expected to cost $3.5 million and are to be implemented by April or May, 1977. The control and treatment projects are:

1. Recirculation of Non-Contact Cooling Water. These waters are already segregated from contaminated process wastewaters, from contaminated runoff waters, and from contaminated sanitary wastewaters. The additional effort is the construction of atmospheric cooling towers at each of the two plants, in conjunction with pumping and piping changes to convert the once-through cooling water systems to re-circulating systems. The recirculation rate for both plants is approximately 1.4 MGD; the anticipated cooling tower blowdown rate for the recirculating systems is 60,000 GPD. The makeup cooling water will be 100 per cent city water, which has non-detectable (<< 1 ppb) levels of PCBs; in contrast to 1-10 ppb in the river water presently used for intake in the once-through system. Without PCB contamination in the new intake water, it is planned that the blowdown would be directly discharged without treatment. However, it is also planned to monitor this blowdown discharge, and PCB-treatment capacity will exist to include this water should treatment be required. An additional advantage to GE of eliminating the river water intake is that the fibers and other river water contaminants, which have caused flow control difficulties via plugging, will be eliminated.

2. Consolidation of Discharges and Impoundment Basins. With the major portion of the volumetric discharge eliminated (by the recirculating cooling water systems), and with batch discharges of contaminated process waters eliminated (by their collection and eventual incineration), the remaining wastewaters then would amount to about 135,000 GPD:

Fort Edward process wastewaters	60,000 GPD
Fort Edward treated sanitary wastewaters	25,000 GPD
Fort Edward runoff and infiltration	40,000 GPD*
Hudson Falls runoff and infiltration	10,000 GPD

*Estimated from 593,000 square feet of area and 0.1 inches per day average rainfall

No process wastewaters will be discharged from the Hudson Falls plant; and the Hudson Falls sanitary wastewaters are accepted by the municipal sewer system.

These wastewater discharges will be consolidated so that they empty into three impoundment basins now being constructed (before winter). Two impoundment basins at Hudson Falls will have capacities of 160,000 and 240,000 gallons; and one at Fort Edward will have a capacity of 1,700,000 gallons. They will be 15 feet deep, bentonite-lined, and will have perimeter trenches dug to bedrock, with sumps so that basin seepage could be collected and returned. The basins have been sized to contain the runoff from a 25-year, 24-hour storm (4.9 inches of rainfall). The estimated capital costs for the basins is $250,000 to $300,000. With

a total capacity for all three basins of 2.1 million gallons, the anticipated average flow into the basins of 135,000 GPD results in an average detention time of about 15.5 days. The average suspended solids loading of the wastewaters flowing into the basins is estimated to be 100 mg/l, and it is estimated that 10 per cent of these solids would be settled in the basins. The resulting sediment would therefore be in the order of two tons per year of solids or a few inches per year of deposited sludge which would be periodically removed by suction.

The expected wastewaters to be collected in the two Hudson Falls impoundment basins is only 10,000 GPD. General Electric plans to truck these wastewaters to the large Fort Edward impoundment basin, completely consolidating all contaminated wastewaters from both plants into the single 1.7 million gallon Fort Edward basin.

3. Treatment of Impounded Waters at Fort Edward. General Electric has contracted with Calgon for the treatment of the impounded waters at Fort Edward. The Calgon system is to consist of one mixed-media (sand and coal) filter column and two activated-carbon adsorption columns in series, with auxiliary carbon and sludge holding tanks, piping, and controls. The Calgon contract includes off-site carbon regeneration, but GE will separately contract (with ChemTrol) for sludge disposal. The cost to General Electric for the leased treatment system is about $165,000 per year for a minimum of three years. The system is to be on stream by April or May of 1977, about eight months after the contracted committment of September 1976.

The Calgon system performance objective is to achieve an effluent PCBs concentration of one part per billion or less. At a wastewater flow of 135,000 GPD, this is equivalent to a total PCBs discharge of about 0.001 pounds per day (or 0.5 grams per day) or less. In comparison, the present PCBs discharge is about one pound per day for the present discharge of about 1.6 MGD.

The performance objective of the Calgon system is based upon a series of column tests performed by Calgon at General Electric, upon aliquots of the actual General Electric wastewaters. At the time of these pilot tests, the influent wastewaters contained about 400 to 600 ppb of PCBs (compared to the present and expected concentration of 100 to 200 ppb), and effluent PCBs concentrations as determined by Calgon from daily composite samples were one part per billion or less. In this pilot study, the PCBs concentration was reduced by the mixed-media prefilter to the range of 5 to 40 ppb, with the carbon adsorbers accomplishing the remaining PCB concentration reduction to 1 ppb or less.

The two carbon adsorbers to be used in series at Fort Edward will each provide about 45 minutes contact time at a nominal flow rate of about 150,000 GPD (or about 14 cubic feet per minute). The derived bed volume in each adsorber is therefore about 630 cubic feet. There will be about 20,000 pounds of carbon in each bed. The frequency of off-site regeneration is expected to be between 2 and 4 times per year for both adsorbers (or one to two times per year for each adsorber).

The mixed-media prefilter will have a pressure-drop monitor; when required, it will be backwashed into a holding tank. It is planned to periodically pass this backwash water over a load of spent carbon (which would then be sent for thermal reactivation to Calgon); the effluent from this backwash water filtration would then be returned to the Fort Edward impoundment basin.