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Corrective Measure Study
Task I Report
GE Apparatus Service Shop
Tonawanda, New York

December 3, 1999

Prepared For:

General Electric Company
One River Road
Schenectady, New York

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December 3, 1999

Mr. Frank Shattuck, P.E.
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New York State Department
of Environmental Conservation
270 Michigan Avenue
Buffalo, New York 14203-2999

Re: Corrective Measure Study Task I Report
GE Apparatus Service Center
Tonawanda, New York

Dear Mr. Shattuck:

On behalf of the General Electric Company (GE), Dames & Moore has prepared the attached *Corrective Measure Study Task I Report* (*CMS Task I Report*) for the GE Apparatus Service Center in Tonawanda, New York. This *CMS Task I Report* has been prepared in response to an October 5, 1999 letter from the New York State Department of Environmental Conservation (NYSDEC) to GE. We have prepared this *CMS Task I Report* based on your October 5, 1999 letter and the terms of GE's May 1996 Part 373 Hazardous Waste Operating Permit (373 Permit).

We look forward to your comments on this report and the proposed corrective measures that will be evaluated during the remainder of the CMS. Please contact us if you have any questions or comments regarding this material.

Very truly yours,
DAMES & MOORE

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1.0 INTRODUCTION

On behalf of the General Electric Company (GE), Dames & Moore submits this *Corrective Measure Study (CMS) Task I Report* for GE's Apparatus Service Center at 175 Milens Road, Tonawanda, New York (Figure 1). This *CMS Task I Report* has been prepared in response to the October 5, 1999 letter from the New York State Department of Environmental Conservation (NYSDEC), in partial fulfillment of the terms of GE's May 1996 Part 373 Hazardous Waste Operating Permit (373 Permit) under the Resource Conservation and Recovery Act (RCRA).

This report is organized in five sections. Section 2.0 provides background information and a description of the current situation at the site. Section 3.0 discusses the corrective action objectives. Section 4.0 provides a discussion and screening of corrective measure technologies, and Section 5.0 identifies four potential corrective measure alternatives for GE's Tonawanda facility.

2.0 DESCRIPTION OF CURRENT SITUATION

This section provides background information and a description of the current situation at GE's Tonawanda facility based on the results of the April 1999 *RCRA Facility Investigation (RFI) Report*. Based on Dames & Moore's knowledge of the site, at the time of this *CMS Task I Report* there were no changes to the nature and extent of the contamination described in the *RFI Report*. The results of the *RFI Report* are summarized in this section. This section also contains a purpose statement for the CMS, which identifies the actual or potential exposure pathways to be addressed by the corrective measures.

2.1 SITE DESCRIPTION

The GE Apparatus Service Center in Tonawanda, New York is located approximately two miles east of the Niagara River and fifteen miles north of downtown Buffalo. GE's 5.3-acre property includes a 69,000 square foot one-story building (Figure 1). GE built the slab-on-grade building in 1968 and expanded the building in 1978. The site is in an urban area that includes some commercial business and other industries.

GE uses the facility, which is also known as the Buffalo Service Shop, to repair industrial equipment, including electric motors, transformers, turbines, pumps, and compressors. During these operations, GE generates hazardous wastes. Additionally, GE receives liquids, solids, and other articles containing polychlorinated biphenyls (PCBs) from customers and other GE repair facilities for repair or storage prior to their shipment off-site for disposal at Toxic Substance Control Act (TSCA) permitted facilities.

In May 1996, NYSDEC issued a Part 373 Hazardous Waste Operating Permit (373 Permit) to GE for the Buffalo Service Shop. This permit allows GE to store hazardous wastes that contain volatile organic compounds (VOCs), metals, and PCBs. There has been no treatment or disposal of hazardous or solid wastes at the site.

Module III of the 373 permit defines the following eight Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) at the facility (Figure 2):

RCRA Container Storage Area

The RCRA Container Storage Area (CSA) is an outdoor area adjacent to the east side of the building. GE has used the RCRA CSA to store 55-gallon steel drums since 1980. The maximum capacity of the storage area is approximately 36 drums. This unit consists of a six-inch thick concrete pad with a concrete curb that provides secondary containment. The floor and curbs of the storage area are sealed with epoxy. A galvanized metal roof and three fiberglass sidewalls were installed in 1986 to protect the storage area from rain. Security is provided by a locking fence surrounding three sides of the area. The building wall forms the fourth side of the RCRA CSA.

PCB Container Storage Area

GE used the PCB CSA to store 55-gallon steel drums that contained PCB materials from 1978 to 1994. The maximum capacity for the PCB CSA was 75 drums. GE used this storage area to store PCB items before they were shipped to qualified disposal sites. As shown in Figure 2, the PCB CSA was in a room in the southeast corner of the building. The storage area consisted of a six-inch-thick concrete floor with secondary containment provided by a concrete curb. A sump approximately three feet wide is just outside and north of this unit.

PCB Work Area

GE has operated the PCB Work Area inside the southeast portion of the building (Figure 2) since 1978. GE uses the unit to store PCB-containing wastes and other items. The PCB Work Area is on a concrete slab with secondary containment currently provided by a concrete curb. Prior to 1983, the trench and sink in this area drained into the former rinse water tank.

From 1978 to 1994, the PCB Work Area held three 275-gallon portable aboveground storage tanks that were used to temporarily store PCB waste oil during repairs. In 1994, GE removed these three tanks during the partial closure activities for this area. The tanks were sent off-site for disposal as PCB solid waste.

Rinse Water Tank

In June 1977, GE installed the Rinse Water Underground Storage Tank (UST) east of the building (Figure 2) to hold PCB-containing wash water from the trench drain and sink in the PCB Work Area. This tank was a 2,000-gallon carbon steel storage tank located four feet below grade. GE used the tank for approximately five and a half years. The average residence time of the liquid in the tank was one year. The tank was surrounded by pea gravel backfill and anchored to a concrete pad with tie-down straps. The tank had a cutoff valve, but had no secondary containment. The tank vessel had a manhole for access. In May 1983, GE removed and disposed the contents from the tank as PCB liquid. In December 1983, decontamination was completed when the interior of the vessel was rinsed with diesel fuel. The rinse oil was disposed off-site. On October 14, 1986, GE excavated and removed the UST and the ancillary pipes in accordance with a NYSDEC-approved Closure Plan.

Old Oil/Water Separator

According to GE, the old oil/water separator on the east side of the building is active. This unit has concrete covers. The old oil/water separator separates oil from the wastewater from floor drains and steam booths within the building. The water discharges to the Town of Tonawanda's wastewater treatment plant via the sanitary sewer. Periodically, GE checks the depth of the oil layer in this oil/water separator with a dipstick. The oil is removed periodically from the separator by a scavenger.

New Oil/Water Separator

The new oil/water separator is just south of the building and has manhole covers. This newer unit is inactive. GE used this unit to separate oil from the wastewater from floor drains and steam booths within the building. The water from this oil/water separator discharged to the Town of Tonawanda's wastewater treatment plant via the sanitary sewer. Periodically, GE checked the depth of the oil layer in the separator with a dipstick. The oil is removed periodically from the separator by a scavenger.

Floor Drains and Sewers

Separate stormwater and sanitary sewers service GE's Buffalo Service Shop. The original sewers were installed when the building was constructed in 1969. In 1978, some of the original sewers located under the southeastern part of the building were abandoned and GE installed additional sewer lines. The abandoned sewers were located under the east part of the building addition that was constructed in 1978. Currently, both stormwater and sanitary sewer lines run parallel on the outside of the building (Figure 2).

There were five floor drains in the building that discharged to either the active (old) or the inactive (new) oil/water separator. Four of these five drains were inside of the building, and one was along the south wall of the building, immediately west of the truck bay trench. Three of the five drains have been plugged. The two floor drains that have not been plugged are in the spray booth and steam cleaning booth in the center of the building. These two drains discharge to the active (old) oil/water separator.

As shown in Figure 2, three outdoor storm water catch basins, one west, one south, and one southwest of the building, drain to the stormwater sewer. In addition, both roof drains and the trench in the truck bay discharge to the storm sewer. The local storm sewer system ultimately discharges to Niagara River. The rest rooms and the active oil/water separator discharge to the sanitary sewer. The inactive oil/water separator formerly discharged to the sanitary sewer.

Rail Spur

The Rail Spur area is a 140-foot by 60-foot area in the northeast portion of the site with two railroad tracks. As shown in Figure 2, the railroad tracks extend east of the fence that runs along the eastern part of the site. Since 1969, GE has used the area at the northeast corner of the building to store flatbed rail cars. The area between the tracks and the adjacent road is paved with asphalt. Historically, GE has used the two railroad bays in the building to load and unload electrical equipment onto the flatbed rail cars. Drums of nonhazardous abrasive blast materials have also been stored in the Rail Spur Area. A portion of the ground surface shows signs of past spills of those blast materials.

2.2 HYDROGEOLOGY

Published background information indicates the presence of four hydrostratigraphic zones in the area around the site: the unsaturated zone, the tension-saturated zone, the saturated overburden, and the saturated bedrock. The regional ground water flow pattern beneath the site is probably toward the west-northwest, discharging toward the nearest surface water body, Two Mile Creek, which is located approximately 3,000 feet west of the site. However, a bedrock trough located beneath Two Mile Creek may influence the direction of groundwater flow in the bedrock.

Unsaturated Zone

The unsaturated zone is characterized by dry, moderate to very dense, compact glaciolacustrine sediments, predominantly clays and silts. This zone also includes the fill that is present near the building and in utility excavations. The unsaturated zone contains local zones of perched water associated predominantly with filled utility excavations. In native soils, the unsaturated zone extends to at least 15 feet below ground surface (bgs).

Tension-Saturated Zone

The capillary fringe is usually damp to moist, loose to moderately dense glaciolacustrine sediments, predominantly clays and silts. Slight changes in the degree of saturation could cause significant fluctuations in both the thickness of the capillary fringe and the water table.

This zone extends from approximately 15 to approximately 25 feet bgs. The relatively thick tension-saturated zone is caused by the fine-grained nature of the sediments.

Saturated Overburden

The saturated zone is composed of soft to moderately dense glaciolacustrine sediments, predominantly clays and silts. The water table in these native soils is at 22 to 25 feet bgs. Based on the regional hydrology and topography, the groundwater in this zone probably flows toward the west-northwest.

Saturated Bedrock

Geotechnical borings advanced by the New York State Department of Transportation indicate that the top of bedrock lies approximately 60 to 70 feet bgs. The quality and flow direction of the groundwater in the bedrock are unknown.

2.3 REGULATORY FRAMEWORK

Module III of the 373 Permit requires Corrective Action for all releases of hazardous wastes or constituents from any SWMUs or AOCs where necessary, including areas beyond the facility boundaries. The implementation of Corrective Action for a SWMU includes the RCRA Facility Assessment (RFA), the RCRA Facility Investigation (RFI) and, if needed, Corrective Measures. GE completed the RFA in 1988 and the RFI in 1998.

After the RFI is completed, the permit specifies that GE may be required to conduct Corrective Measure Studies (CMS) and to prepare a CMS Report if:

- The concentrations of hazardous constituents (if any) in the media at the site exceed their corresponding individual action levels, or

- The concentrations of hazardous constituents in the media at the site do not exceed their corresponding individual action levels, but additive exposure risk, due to the presence of multiple constituents, is not protective of human health, or

- The concentrations of hazardous constituents in the media at the site do not exceed their corresponding individual action levels, but still pose a threat to human health or the environment, given site-specific exposure conditions.

The concentrations of selected constituents (primarily PCBs) at the Tonawanda facility exceed the recommended soil cleanup objectives (RSCOs) published by the NYSDEC in TAGM HWR-94-4046. On October 5, 1999, the NYSDEC required that GE conduct a focussed CMS for the Tonawanda facility.

The CMS will evaluate alternative corrective measures for the Tonawanda facility that are technologically feasible and reliable and that effectively mitigate and minimize damage to and provide adequate protection of human health and the environment. According to GE's permit, the CMS will be developed using target cleanup levels that are considered to be protective of human health and the environment. Where available, the target cleanup levels may be promulgated standards. The cleanup objectives in Table 1 are New York State groundwater standards (6 NYCRR Part 700) and RSCOs from NYSDEC TAGM HWR-94-4046.

The CMS will consist of four tasks:

Task I: Identification and Development of the Corrective Measure Alternative or Alternatives

Task I includes a description of the current situation at the site, the establishment of corrective action objectives, the screening of corrective measure technologies, and the identification of the corrective measure alternative or alternatives for the site. The identification and development of the corrective measure alternatives are summarized in this *CMS Task I Report.*

Task II: Evaluation of the Corrective Measure Alternative or Alternatives

The corrective measure alternative or alternatives will be evaluated on the basis of technical, environmental, human health, and institutional concerns. A cost estimate will be developed for each alternative.

Task III: Justification and Recommendation of the Corrective Measure or Measures

A corrective measure or measures will be recommended for the concerns identified in the RFI and for any further concerns identified during supplemental investigations, which will be performed according to the *Supplemental Sewer Investigation Work Plan* submitted to the NYSDEC on November 17, 1999. The measure or measures will be justified on the basis of technical, human health, and environmental considerations.

Task IV: Reports

GE will provide the NYSDEC with the *CMS Final Report*, which will include all of the information gathered under the approved *CMS Work Plan*, including the results of supplemental investigations and summaries of Tasks II and III.

After the CMS is completed and the corrective measures are selected, the NYSDEC will modify GE's permit to incorporate the selected corrective measures. At that point, GE will initiate the Corrective Measure Implementation (CMI). The CMI will include the final engineering design, construction, operation, maintenance, and monitoring of the selected corrective measures.

2.4 SUMMARY OF RCRA FACILITY INVESTIGATION

Eight Solid Waste Management Units (SWMUs) or Areas of Concern (AOCs) were identified in GE's 373 Permit for the Tonawanda facility. These were:

- RCRA Container Storage Area;
- PCB Container Storage Area;
- PCB Work Area;
- Rinse Water Tank;
- Old Oil/Water Separator;
- New Oil/Water Separator;
- Floor Drains and Sewers;
- Rail Spur.

The locations of these areas are shown in Figure 2. The analytical results from the soil and groundwater samples collected during the RFI were compared to the criteria in Table 1 to evaluate whether the soil and groundwater near the SWMUs had been impacted. The relevant criteria included recommended soil cleanup objectives (RSCOs) from NYSDEC's TAGM HWR-94-4046 and New York State groundwater standards.

The general objectives of the RFI were to further evaluate the nature and extent of the contaminants that had previously been found in the backfill, native soils, perched water and groundwater near the eight SWMUs and AOCs at the site; further evaluate the direction and estimated rate of migration of contaminants in site media; and generate sufficient data to evaluate corrective measure alternatives. The RFI results for each of the eight SWMUs or AOCs are summarized in the following sections.

2.4.1 RCRA Container Storage Area

Based on the analytical results from the four soil borings installed near the RCRA CSA during the RFI, the soils surrounding the RCRA CSA do not appear to have been significantly impacted by either PCBs or VOCs. Therefore, no additional investigative work was recommended.

Only traces of PCBs were detected in the subsurface soils from four soil borings located near the RCRA Container Storage Area (CSA). PCBs were detected in subsurface soils at concentrations less than the NYSDEC's RSCO of 10 mg/kg. Concentrations of PCBs in surface soils samples also did not exceed the RSCO for surface soil of 1 mg/kg.

Although VOC concentrations up to 20 mg/kg had been detected in soils near the RCRA CSA during previous investigations, during the RFI only one VOC (1,1-DCA) was found at one location from six to eight feet below the ground surface near the RCRA CSA. The reported concentration (5.9 µg/kg) of 1,1-DCA was less than the Soil Action Level for 1,1-DCA (7.7 µg/kg). The concentration of 1,1-DCA in the duplicate sample from the same location was 8.3 µg/kg. No other VOCs were found near the RCRA CSA.

2.4.2 PCB Container Storage Area

The soils south and southeast of the PCB CSA do not appear to have been significantly impacted by PCBs. Therefore, no additional investigative work was deemed necessary in this area.

Low concentrations of PCBs were found in the soil samples collected from a depth of two feet near the southeast corner of the building outside the PCB CSA. In a surface soil sample from near the southeast corner of the building, the PCB concentration was 0.32 mg/kg, which is less than the RSCO of 1.0 mg/kg. Only traces of PCBs, less than 0.2 mg/kg, were found in subsurface soils near the south side of the building.

2.4.3 PCB Work Area

Dames & Moore recommended that the area outside the PCB Work area, east of the building near the old oil/water separator and the former rinse water tank, be included in the focused CMS.

During the RFI, PCBs were found in soil and groundwater samples from one location outside the PCB Work Area east of the building along the sewer lines. During previous investigations near the PCB Work Area, PCBs were detected in surface soils east of the building, between the old oil/water separator and the former rinse water tank.

2.4.4 Former Rinse Water Tank Excavation

Based on the results of previous investigations and the RFI, Dames & Moore recommended that a focused CMS be performed at the former rinse water tank excavation.

During the RFI, soil and water samples were collected both within and outside of the former rinse water tank excavation, which was approximately 10 to 12 feet deep. Within the former tank pit excavation, the PCB concentration in a sample of the fill from four to six feet below grade was 66 mg/kg, which exceeds the RSCO of 10 mg/kg for subsurface soils. The chlorobenzene concentration in this soil sample was 34 mg/kg, which exceeded the Soil Action Level of 2 mg/kg. However, the soil sample from 10 to 11 feet in the same location had a PCB concentration of 2.99 mg/kg and a chlorobenzene concentration of 0.03 mg/kg, which suggests that both PCB and chlorobenzene concentrations in the soil decrease with depth.

The soil quality outside of the former rinse water tank excavation was further evaluated using the results from six soil borings located around the former tank excavation. PCBs were not detected in soil samples from five of the six borings. The total concentration of PCBs in the sixth soil boring from 10 to 12 feet below the ground surface was 0.25 mg/kg, which is less than the RSCO of 10 mg/kg.

Both VOCs and PCBs were detected in the perched groundwater in the former rinse water tank excavation at concentrations that exceeded the NYSDEC's groundwater standards. However, PCBs and VOCs were not detected in the groundwater sample from a deep monitoring well located outside the former tank excavation. Therefore, the subsurface soils and groundwater outside of the former tank pit do not appear to be impacted by PCBs and VOCs found within the former tank pit.

2.4.5 Old Oil/Water Separator

Based on the results of the RFI, Dames & Moore concluded that the old oil/water separator may have been a source of the PCBs found in soil and groundwater samples collected along the sewer line south of the old oil/water separator. Thus, Dames & Moore recommended that the old oil/water separator be included in a focused CMS.

In a soil boring located near the old oil/water separator, only traces of PCBs were present down to a depth of approximately four feet. The maximum PCB concentration detected was 3.1 mg/kg, which is below the RSCO of 10 mg/kg for subsurface soils. PCBs were not detected in samples collected below four feet, and no VOCs were detected in the soil at this location. However, a soil sample taken from two to four feet below grade near the sewer lines approximately 50 feet south and downgradient of the old oil/water separator contained 33 mg/kg PCBs.

2.4.6 New Oil/Water Separator

Based on the RFI results, the new oil/water separator does not appear to have significantly impacted the surrounding soil and groundwater quality. No additional investigative work was recommended.

No VOCs were detected in the soil downgradient of the new oil/water separator. Traces of PCBs (2.5 mg/kg) were found at a depth of six to eight feet in a soil boring located west and downgradient of the new oil/water separator. The soil PCB concentrations at another soil boring located downgradient of the new oil/water separator were less than the RSCOs.

No PCBs were detected in the groundwater downgradient of the new oil/water separator. The only VOCs detected in the groundwater downgradient of the new oil/water separator were chloroform and methylene chloride. The detected levels (1.9 µg/L chloroform and 0.56 µg/L methylene chloride) were below groundwater standards.

2.4.7 Drains and Sewers

Based on the results of the RFI, the exterior drains in the truck bay trench and sump on the south side of the building and the sewers on the east side of the building appear to have been impacted by PCBs. Dames & Moore recommended that they be included in a focused CMS.

All of the floor drains in the building have been plugged with the exception of floor drains in the spray booth and the steam cleaning booth located in the northeast part of the building. The active floor drains inside the building lead to the active old oil/water separator.

PCB-containing sediments were found in the truck bay trench (240 mg/kg) and the sump in the truck bay area (24 mg/kg) on the south side of the building. The precipitation that accumulates in the trench discharges to the storm sewer, and the sump is periodically pumped out.

Although PCBs were found along the sewer lines, the concentrations did not exceed RSCOs along the southern part of the building or near where the sewer lines exit the site. On the east side of the building, especially between the building and the former rinse water tank excavation, the concentrations of PCBs in the soils (53.5 mg/kg) near the sewer lines exceed RSCOs. Some PCB-containing soils may be under the building in this area. However, because any PCBs that may be in the soil under the building are expected to be isolated and the depth to groundwater exceeds 25 feet, the potential for contaminant migration from under the building is low.

Only trace concentrations of two VOCs (1.9 µg/L chloroform and 0.56 µg/L methylene chloride) was detected in the July 1998 groundwater sampling event at a monitoring well located near where the sewer lines exit the site. These concentrations did not exceed the groundwater standards. In December 1998, VOCs were not detected in groundwater from the same location. PCBs were not detected at this monitoring well during either of the two sampling events.

The soils that surround the sewer lines contain some PCBs, predominantly at a depth of two to six feet. The elevated levels of PCBs are concentrated on the east side of the building, near the former rinse water tank. It does not appear that significant amounts of PCBs and VOCs migrate along the sewer line backfill. No additional investigative work was recommended.

2.4.8 Rail Spur Area

The surface soils near the rail spur in the northeast part of the site contain concentrations of PCBs (up to 142 mg/kg) that exceed the RSCO of 1.0 mg/kg. However, the concentrations of PCBs in subsurface soils are less than the RSCO of 10 mg/kg. Dames & Moore recommended a focused CMS for the surface soils at the rail spur area.

The region of PCB-impacted surface soil in the northeast part of the site encompasses the area of the railroad tracks within the fence and extends east of the fence. These PCB-containing soils encompass approximately 18,000 square feet. A soil mound north of the railroad tracks also contains PCB concentrations above RSCOs to a depth of approximately two to three feet. The extent of PCB-impacted soils in the rail spur appears to be delineated. The volume of soil that exceeds RSCOs is estimated to be approximately 1,000 to 1,200 cubic yards.

2.4.9 Summary of RFI Results

Based on the findings of the RFI, Dames & Moore concluded that a focused CMS would be appropriate for these five areas at the site, shown in Figure 2:

- The former rinse water tank excavation;
- The sewer lines east of the building and near the former rinse water tank;
- The truck bay trench and sump;
- The area around the old oil/water separator; and
- The surface soils near the rail spur.

All five areas contain elevated concentrations of PCBs in surface soils, subsurface soils, or sediments. Subsurface soil in the former rinse water tank excavation also contains elevated concentrations of chlorobenzene. Samples of the perched groundwater from the former rinse water tank elevation exhibit concentrations of PCBs and VOCs that exceed groundwater standards.

In their letter dated October 5, 1999, the NYSDEC agreed that a focused CMS is appropriate for these five areas. The NYSDEC requested that the CMS include an effort to evaluate whether there have been any historical releases of PCBs from the building to the soil adjacent to the building. The NYSDEC also requested that GE sample the sediments in the catch basins and manholes of the storm water sewers. The *Supplemental Work Plan* describing the additional sediment sampling was submitted to the NYSDEC on November 18, 1999. Additional information that becomes available as a result of this supplemental inspection and sampling will be used in the Corrective Measure Study (CMS).

2.5 PURPOSE OF CORRECTIVE ACTIONS

Based on the results of the RFI, corrective actions at GE's Tonawanda facility should address these four potential exposure pathways:

- Direct contact with sediments, surface soils, subsurface soils, and perched groundwater contaminated with PCBs and VOCs;
- Off-site transport of PCB-contaminated sediments and soils;
- Infiltration through contaminated soil; and
- Migration of contaminated perched groundwater.

3.0 CORRECTIVE ACTION OBJECTIVES

Table 1 lists the New York State groundwater standards (6 NYCRR Part 700) and recommended soil cleanup objectives (RSCOs) (NYSDEC TAGM HWR-94-4046) that will be used as cleanup criteria for the PCBs and VOCs detected in the soil, sediments, and perched groundwater at the Tonawanda facility. Based on the RFI results and Dames & Moore's understanding of site conditions, the corrective action objectives for the Tonawanda facility are:

- Remove or prevent contact with and off-site transport of sediments containing PCBs at concentrations greater than the RSCO of 1 mg/kg;

- Remove or prevent contact with, off-site transport of, and infiltration through surface soils containing PCBs at concentrations greater than the RSCO of 1 mg/kg;

- Remove or prevent contact with and infiltration through subsurface soils containing PCBs or VOCs at concentrations greater than the RSCOs listed in Table 1; and

- Prevent or control the migration of perched groundwater containing PCBs or VOCs at concentrations exceeding New York State groundwater standards.

4.0 SCREENING OF CORRECTIVE MEASURE TECHNOLOGIES

This section focuses on identifying and screening corrective measure technologies that may be appropriate for GE's Tonawanda facility in light of the results of the RFI. The descriptions of many of the technologies are summarized from the *Pre-Investigation Evaluation of Corrective Measures Technologies* submitted to the NYSDEC by ERM-Northeast on August 29, 1996. Those technologies that are deemed to be inappropriate because of site characteristics, waste characteristics, or technology limitations are eliminated from consideration.

The technologies included in ERM's preliminary screening were selected for their ability to contain, remove, or treat soil, perched groundwater, and sediment containing elevated concentrations of VOCs and PCBs. Based on a review of the *Pre-Investigation Evaluation of Corrective Measures Technologies*, Dames & Moore has included two additional technologies, monitoring and lining sewers, in the evaluation of potential technologies. Thus, the technologies reviewed in this section are:

- No Action;
- Institutional Actions;
- Monitoring
- Surface Capping;
- Surface Controls;
- Dust Controls;
- Excavation and Removal;
- Lining Sewers;
- On-Site Disposal;
- Off-Site Disposal;
- Pretreatment (Dewatering and Solid Separation);
- Thermal Treatment;
- Chemical Treatment;
- Immobilization and Physical Treatment; and
- In-Situ Treatment.

No Action

The no-action alternative involves allowing the site to remain in its current condition and taking no action to address the issues of soil, sediment, and groundwater contamination. The site characteristics, waste characteristics, or technology limitations do not preclude the implementation of the no action alternative. This approach will not be effective in controlling the risk to human health posed by the presence of PCBs and VOCs in the soil and groundwater. It will not reduce toxicity, mobility, or volume of contamination. However, this option will be considered as an alternative for the purpose of comparison.

Institutional Actions

Institutional actions involve placing access restrictions on areas that contain contaminated media. These actions may be legal, such as the placement of deed restrictions, or physical, such as the posting of signs and the installation of fencing. Institutional controls can limit human exposure to materials remaining on site. No site characteristics, waste characteristics, or technology limitations would hinder the imposition of such controls at the Tonawanda facility. Institutional actions are effective when used in conjunction with containment, treatment, or removal technologies. They are easily implemented but do not reduce toxicity, mobility, or volume of contamination. Institutional actions will be considered.

Monitoring

Groundwater monitoring at wells within and at the perimeter of a site is used to track the movement or degradation of contaminants in the groundwater. Monitoring alone does not reduce the toxicity, mobility, or volume of contamination. It is useful in evaluating the effectiveness of other remedial technologies. There are no site characteristics, waste characteristics, or technology limitations that would prevent groundwater monitoring at the Tonawanda facility. Groundwater monitoring will be considered.

Surface Capping

Surface capping involves the placement of covers constructed of materials such as synthetic membranes, asphalt, concrete, clay, bentonite, and soil. Caps serve as barriers to prevent contact with contaminated soil. They may also be used to limit surface water infiltration, thereby lessening the impact of soil contamination on groundwater quality. Surface caps are effective when used in conjunction with groundwater controls and institutional actions. This technology will be considered.

Surface Controls

Surface controls include slope grading and diversion and collection ditches to control the flow of surface water. Erosion controls limit the transport of contaminated surface soil. Surface controls are a method for containing contamination and are effective when used with treatment or removal technologies. No site characteristics, waste characteristics, or technology limitations would affect the use of surface controls. This technology will be considered.

Dust Controls

Dust controls, including revegetation, capping, and watering, help to reduce contaminant transport through airborne particulate material. Dust controls are effective when used in conjunction with treatment or removal technologies. No site characteristics, waste characteristics, or technology limitations would affect the use of dust controls, and they will be considered.

Excavation and Removal

The excavation and removal of contaminated soil and sediments involves excavating, loading, and transporting the soil to an on-site or off-site facility for treatment or disposal. The excavated areas are usually backfilled with clean material. Excavation can also include the removal of sediments from structures such as catch basins, manholes, and sewers. There do not appear to be any site characteristics, waste characteristics, or technology limitations that would prevent the excavation and removal of soil, although excavation may be difficult in areas near the building and the sanitary and storm sewers. Excavation and removal increase the amount of exposure to contaminants received by workers and the public. However, when used in conjunction with dust and surface controls, this established technology is effective at removing contaminated media. This technology will be considered.

Lining Sewers

Lining sewer pipes after they have been cleaned will prevent infiltration into the pipes from contaminated subsurface soil or groundwater. Site characteristics, waste characteristics, and technology limitations will not prevent the lining of the sewers at the Tonawanda facility. This technology will be considered.

On-Site Disposal

On-site disposal of soil or sediment takes place at a new or existing on-site landfill. The landfill must be constructed in accordance with the Federal and State regulations governing the disposal of solid, hazardous, and toxic wastes. On-site disposal is an effective means of containment, although it does not permanently destroy or reduce the toxicity of the waste. GE's Tonawanda facility currently has neither a landfill nor the space to construct one. The cost, effort, and risk of worker injury involved in constructing an on-site landfill are not justified by the type and volume of contaminated soil found at the facility. On-site disposal will not be considered.

Off-Site Disposal

Off-site disposal takes placed at a properly licensed off-site facility to which the waste material must be transported. Off-site disposal is an effective means of containment, although it does not permanently destroy or reduce the toxicity of the waste. The risks of public and worker exposure are increased because of the handling and transportation required to move the soil to its disposal site. The risk of transportation-related injury increases with the distance to the disposal facility. There are no site characteristics, waste characteristics, or technology limitations to prevent off-site disposal. This technology will be considered.

Pretreatment

The treatment or disposal of contaminated soils and sediments may require pretreatment such as dewatering or solids separation. Methods of dewatering include centrifuging, gravity thickening, and filtration. Both the solids and the water must be treated or disposed appropriately. There are no site characteristics, waste characteristics, or technology limitations that would make pretreatment difficult. Pretreatment is effective when used in conjunction with removal or treatment technologies and will be considered.

Thermal Treatment

Thermal treatment is used to destroy or desorb organic contaminants from soil. Thermal soil aeration or desorption involves heating contaminated soil or sediment to a temperature at which volatile and semi-volatile organic compounds volatilize. Incineration involves heating the soil to the point of combustion in order to oxidize organic material, including contaminants. The off-gases from thermal treatment are treated to remove the organic compounds and particulate matter. Both thermal desorption and incineration are effective for treating soil that contains PCBs and VOCs. These technologies will be considered.

Chemical Treatment

Chemical treatment can be used to immobilize, extract, or detoxify contaminants. Chemical treatment technologies include soil washing, solvent extraction, and chemical detoxification.

In soil washing, contaminated soil or sediment is mixed with a washing fluid such as water, organic solvents, chelating agents, surfactants, acids, or bases. The washing fluid can remove contaminants from the soil. Soil washing also separates the fines from the coarser soil grains. Adsorbed contaminants are generally concentrated in the fine-grained portion of the soil, which is then properly disposed.

Solvent extraction is similar to soil washing with a solvent as the washing fluid. Contaminants become dissolved in the solvent, which is then treated appropriately. Solvent extraction with triethylamine, for example, has been shown to remove more than 99 percent of PCBs from sediments with PCB concentrations between 10 and 500 mg/kg.

Chemical detoxification involves the use of techniques like neutralization, hydrolysis, oxidation, reduction, or enzymatic degradation to destroy, degrade, or reduce the toxicity of contaminants. Chemical dehalogenation techniques, for example, can be used to remove the chlorine atoms from PCBs.

Soil washing, solvent extraction, and chemical detoxification are all technically feasible methods for treating the PCB-contaminated soil from GE's Tonawanda facility. These methods are more technologically complex than the option of off-site landfilling of contaminated soil. However, unlike land disposal, these methods will result in a permanent reduction in contaminant volume or toxicity. Chemical treatment methods will be considered further.

Physical Treatment

Physical treatment methods include solidification and stabilization, encapsulation, and volatilization. Solidification and stabilization involves mixing waste with a solidifying agent, producing a solid matrix in which contaminants are mechanically fixed. Encapsulation methods seal contaminants within an organic binder or resin. Volatilization of contaminants can be accomplished through mechanical aeration or thermal treatment. Solidification and stabilization and encapsulation techniques generally increase the volume of contaminated material. Mechanical aeration alone is not efficient at removing PCBs from soil. With the exception of thermal desorption and volatilization, which are discussed above in the *Thermal Treatment* section, physical treatment methods will not be considered.

Immobilization

Immobilization methods, which include precipitation, chelation, and polymerization, bind contaminants, making them less mobile. Immobilization techniques tend to be applied to inorganic contaminants (i.e. metals) rather than organic compounds like PCBs and VOCs. These techniques will not be considered.

In-Situ Treatment

In-situ treatment technologies include bioremediation, heating, soil flushing, vitrification, and soil vapor extraction. Bioremediation utilizes microorganisms that dwell in the soil to degrade and/or reduce the toxicity of contaminants. In-situ heating methods such as steam injection and radio frequency heating remove organic contaminants through vaporization, thermal decomposition, and distillation. Soil flushing is an in-situ form of soil washing in which liquid is pumped through the soil and recovered to remove contaminants. In-situ vitrification is a solidification technique in which the soil is heated to a temperature at which the soil particles fuse. Contaminants are immobilized within the fused mass. In soil vapor extraction, air is drawn through contaminated soil to volatilize contaminants. The off-gas is treated to remove the contaminants from the air stream.

In-situ treatment technologies in general are not practical for this site. Because all of the media to be addressed by the CMS contain PCBs, which are neither volatile nor readily biodegradable, in-situ bioremediation and soil vapor extraction would not be viable treatment options for this site. In-situ vitrification, in-situ heating, and soil flushing are generally appropriate only when ex-situ treatment is financially or technically infeasible, usually because the contaminated soil is inaccessible or vast in extent. In situ treatment methods will not be considered.

5.0 IDENTIFICATION OF CORRECTIVE MEASURE ALTERNATIVES

Five corrective measure alternatives for GE's Tonawanda facility have been assembled from the corrective measure technologies that passed the screening process. These alternatives, which have been designed to address the site-specific corrective action objectives in Section 3.0, will be evaluated in Task II of the CMS.

Chemical treatment techniques do not appear in a corrective measure alternative, although the technology passed the screening process. The objective of chemical treatment is the removal of contaminants from site soil and sediments to reduce the volume of contaminated material. This end can also be achieved by physical treatment methods, such as high-temperature thermal desorption (HTTD). Chemical treatment is expected to be more complicated to implement than HTTD. Thus, HTTD appears to be a more appropriate treatment method to consider for remediation of contaminated soil and sediments at the Tonawanda facility.

The five corrective measure alternatives for GE's Tonawanda facility are described in the following sections.

5.1 ALTERNATIVE 1: NO ACTION WITH ACCESS CONTROLS AND MONITORING

- Institutional actions
  - Fences and signs
  - Deed restrictions
- Groundwater monitoring

The no action alternative is presented for the purpose of comparison. In this alternative, the existing fence would be extended to enclose the area around the rail spur where surface soil PCB concentrations greater than 1 mg/kg have been found. Signs would be posted along the fence line. The deed to the property would be amended to restrict future use of the land to reduce the risk of human contact with contaminants. The groundwater would be monitored throughout the site, but no remedial action would be taken.

5.2 ALTERNATIVE 2: SEDIMENT REMOVAL, SURFACE SOIL EXCAVATION, AND OFF-SITE DISPOSAL

- Institutional actions
  - Fences and signs
  - Deed restrictions
- Surface soil excavation and backfill
  - Rail spur
  - East of building
- Sediment removal
  - Truck bay trench and sump
  - Storm sewer manholes and catch basins, if necessary
- Off-site disposal of soil and sediment
- Sewer lining
- Groundwater monitoring

In this alternative, surface soil with PCB concentrations above the RSCO of 1 mg/kg would be excavated and confirmatory samples would be collected. The rail spur would be removed to facilitate soil excavation and replaced after the area is backfilled. An estimated 18,000 square-foot area around the rail spur and an estimated 2,000 square-foot area near the east side of the building would be excavated, yielding approximately 1,200 cubic yards of soil. The excavations would be backfilled with clean material imported from off-site, graded, and seeded or paved to prevent erosion. Sediments would be removed from the truck bay trench and sump, and contaminated sediments (if present) in the storm sewer manholes or catch basins would be removed as well. The excavated soil and sediments would be transported off-site for disposal. Soil and sediments with PCB concentrations below 50 mg/kg could be placed in a solid waste landfill. Soil and sediments with PCB concentrations of 50 mg/kg or greater would be placed in a TSCA landfill.

A fence would be erected to restrict access to the area surrounding the former rinse water tank excavation, where soil and perched groundwater containing elevated concentrations of PCBs and VOCs would remain. Signs would be posted along the fence. The deed to the property would be amended to restrict the future use of the area around the former tank excavation.

The storm sewer catch basins and manholes would be cleaned at locations from which contaminated sediments had been removed. Both the storm and sanitary sewers would be cleaned to remove residual contamination. In the region near the old oil/water separator and the former rinse water tank excavation, both sewers would be lined to prevent infiltration of perched groundwater. The groundwater would be monitored throughout the site.

5.3 ALTERNATIVE 3: SEDIMENT REMOVAL AND ASPHALT CAP OVER SURFACE SOIL

- Institutional actions
  - Fences and signs
  - Deed restrictions
- Surface soil excavation and backfill
  - East of building
- Sediment removal
  - Truck bay trench and sump
  - Storm sewer manholes and catch basins, if necessary
- Off-site disposal of soil and sediment
- Sewer lining
- Asphalt cap around rail spur
- Groundwater monitoring

Alternative 3 is similar to Alternative 2 except in the manner in which surface soil would be handled. While the sediments from the truck bay trench and sump and the storm sewer catch basins and manholes would still be disposed off-site, the surface soil would remain on-site.

Surface soil near the east side of the building with PCB concentrations greater than 1 mg/kg would be excavated and placed in the rail spur area. An asphalt cap would be constructed over the rail spur area where PCB concentrations greater than 1 mg/kg have been found. The rail spur would be left in place, and the cap would be constructed around the rails.

5.4 ALTERNATIVE 4: SEDIMENT REMOVAL, SURFACE AND SUBSURFACE SOIL EXCAVATION, AND OFF-SITE DISPOSAL

- Institutional actions
    - Fences and signs
    - Deed restrictions
- Surface soil excavation and backfill
    - Rail spur
    - East of building
- Subsurface soil excavation and backfill
    - Former rinse water tank excavation
- Sediment removal
    - Truck bay trench and sump
    - Storm sewer manholes and catch basins, if necessary
- Off-site disposal of soil and sediment
- Groundwater monitoring

Alternative 4 is similar to Alternative 2 except in the treatment of subsurface contamination in the area near the old oil/water separator and the former rinse water tank excavation. In Alternative 4, subsurface soil with PCB concentrations greater than the RSCO of 10 mg/kg would be excavated and disposed off-site. The excavated soil would include soil shown to be contaminated during the RFI as well as any impacted soil in the areas where former sewer or drain lines or bedding material exit the building. Confirmatory samples would be collected following the excavation. The portions of the storm and sanitary sewers that pass through contaminated subsurface soil or perched groundwater would be removed and replaced. Soil excavated from regions saturated with perched groundwater would be dewatered prior to disposal, and the water would be treated and disposed off-site as well. The excavated areas would be backfilled with clean material imported from off-site, which would be graded and seeded or paved to prevent erosion.

The removal of the contaminated subsurface soil is expected to eliminate the source of the contamination in the perched groundwater near the east side of the building. The groundwater would be monitored to confirm this. Because the perched groundwater would no longer contain elevated PCB or VOC concentrations, it would not be necessary to line the sewers as in Alternatives 2 and 3.

5.5 ALTERNATIVE 5: ON-SITE THERMAL DESORPTION

- Institutional actions
  - Fences and signs
  - Deed restrictions
- Surface soil excavation and backfill
  - Rail spur
  - East of building
- Subsurface soil excavation and backfill
  - Former rinse water tank excavation
- Sediment removal
  - Truck bay trench and sump
  - Storm sewer manholes and catch basins, if necessary
- On-site thermal desorption
- Groundwater monitoring

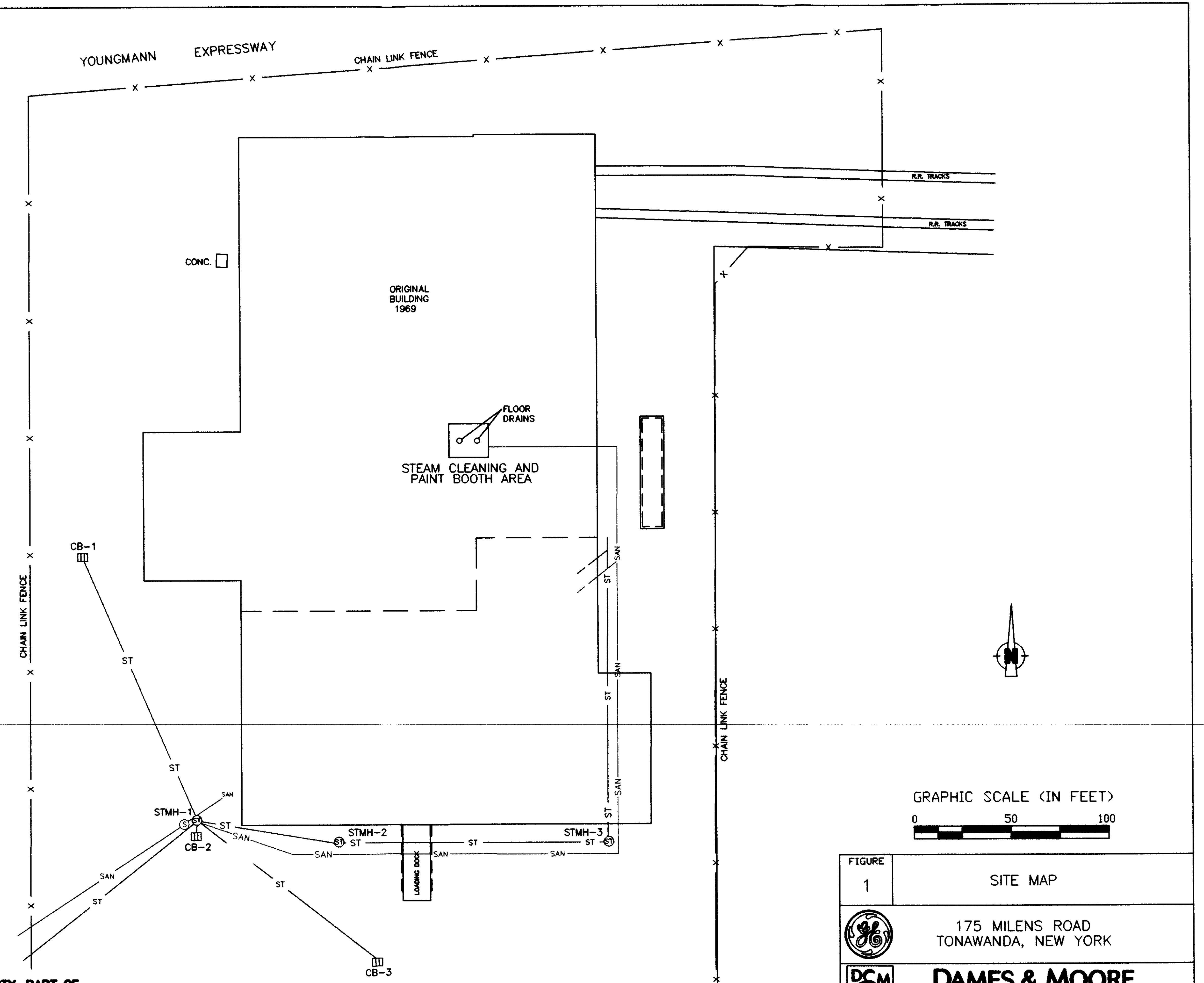
Alternative 5 would include all of the elements of Alternative 4 with the exception of off-site soil and sediment disposal. Instead, the excavated soil and sediment would be treated on-site using high-temperature thermal desorption (HTTD). Portable equipment would be mobilized to the site to heat the excavated soil and sediments to desorb and volatilize VOCs and PCBs. The off-gas from the HTTD system would be treated to destroy the volatilized VOCs and

PCBs. Following thermal desorption, samples of the treated soil would be analyzed to confirm that VOCs and PCBs had been removed. The clean soil would then be used to backfill the excavated areas.

TABLE 1
CLEANUP OBJECTIVES FOR COMPOUNDS DETECTED IN SOIL AND GROUNDWATER
JULY 1998 THROUGH DECEMBER 1998
GE APPARATUS SERVICE CENTER
175 MILENS ROAD
TONAWANDA, NEW YORK

	Soil and Sediment				Groundwater			
Compound	Number of Samples Analyzed[1,2]	Number of Detections	Maximum Concentration Detected (mg/kg)	Cleanup Objective[3] (mg/kg)	Number of Samples Analyzed[1]	Number of Detections	Maximum Concentration Detected (µg/L)	Cleanup Objective[4] (µg/L)
PCBs	**Surface Soil and Sediment/Subsurface Soil**							
Aroclor 1248	49/48	0/1	ND/0.21	1/10	7	3	21	0.09
Aroclor 1254	49/48	18/11	240/6.3	1/10	7	2	42	0.09
Aroclor 1260	49/48	45/21	160/110	1/10	7	4	100	0.09
Total PCBs (Lab)	49/48	45/23	240/116.3	1/10	7	4	142	0.1
Total PCBs (Test Kit)	59/71	43/33	379.9/53.47	1/10	NA	NA	NA	0.1
VOCs	**Subsurface Soil**							
Benzene	19	0	ND	0.06	7	2	11	1
Chlorobenzene	19	2	34	1.7	7	2	540	5
Chloroform	19	0	ND	0.3	7	3	1.9	7
1,2-Dichlorobenzene	19	1	0.0027	7.9	7	1	3.5	3
1,3-Dichlorobenzene	19	3	6.4	1.6	7	4	50	3
1,4-Dichlorobenzene	19	4	1.1	8.5	7	4	48	3
1,1-Dichloroethane	19	1	0.0083	0.2	7	2	4.2	5
1,1-Dichloroethene	19	0	ND	0.4	7	2	6.4	5
cis-1,2-Dichloroethene[5]	19	0	ND	0.3	7	1	0.61	5
Ethylbenzene	19	0	ND	5.5	7	2	5.2	5
Methylene chloride	19	0	ND	0.1	7	1	0.56	5
Toluene	19	0	ND	1.5	7	1	1.2	5
1,1,1-Trichloroethane	19	0	ND	0.8	7	1	3.3	5
m-, p-Xylenes[6]	19	2	0.0012	1.2	7	2	25	5
o-Xylene[6]	19	0	ND	1.2	7	3	5	5
Total VOCs	19	6	34.78	10	7	5	626	NS

Notes:
1. Laboratory analysis by EPA Methods 8082 (PCBs) and 8021 (VOCs)
2. Field screening by RaPID Immunoassay PCB Test Kit
3. Recommended Soil Cleanup Objectives (RSCOs) from NYSDEC TAGM HWR-94-4046
4. NYS Groundwater Standard (6 NYCRR Part 700), Division of Water TOGS, June 1998
5. Soil standards for trans-1,2-DCE
6. Standards for total xylenes
7. NA = Not Analyzed; ND = Not Detected; NS = No Standard



EXPLANATION

Ⓢ︎T	-STORM MANHOLE
Ⓢ	-SANITARY MANHOLE
▥	-CATCH BASIN
— ST —	-STORM SEWER LINE
— SAN —	-SANITARY SEWER LINE

SOURCE: "MAP OF GENERAL ELECTRIC SERVICE CENTER PROPERTY, PART OF LOT 45, TOWNSHIP 12, RANGE 8, TOWN OF TONAWANDA, ERIE COUNTY, NEW YORK" KRIEBEL ASSOCIATES, JULY 29, 1998.

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FIGURE
1

SITE MAP

175 MILENS ROAD
TONAWANDA, NEW YORK

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY
LATHAM, NEW YORK

EXPLANATION

- ⓢⓣ – STORM MANHOLE
- ⓢ – SANITARY MANHOLE
- ▥ – CATCH BASIN
- — ST — – STORM SEWER LINE
- — SAN — – SANITARY SEWER LINE
- ☐ – FOCUSED CMS AREA
- ▨ – SWMU/AOC

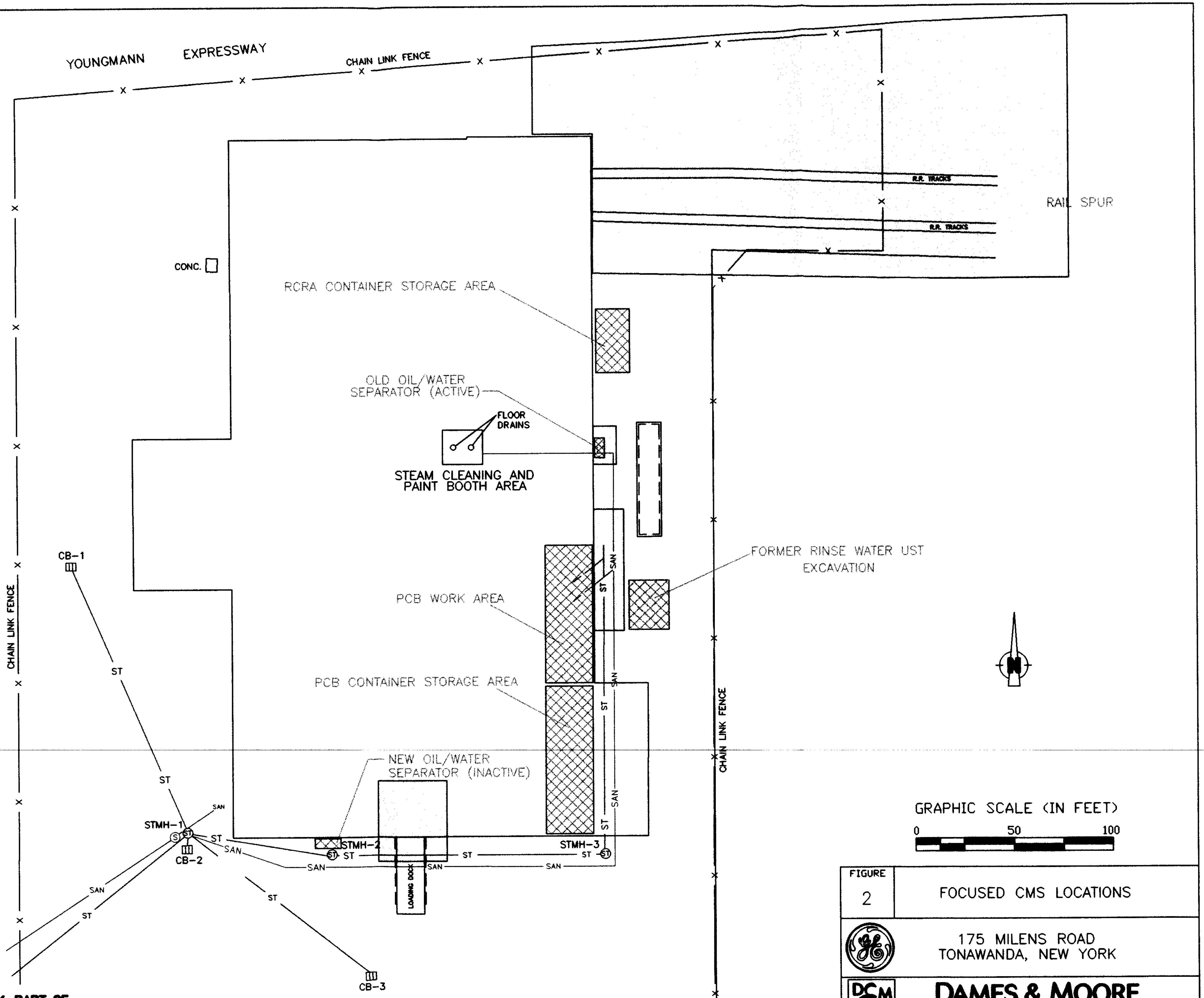

FIGURE 2

FOCUSED CMS LOCATIONS

175 MILENS ROAD
TONAWANDA, NEW YORK

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY
LATHAM, NEW YORK

SOURCE: "MAP OF GENERAL ELECTRIC SERVICE CENTER PROPERTY, PART OF LOT 45, TOWNSHIP 12, RANGE 8, TOWN OF TONAWANDA, ERIE COUNTY, NEW YORK" KRIEBEL ASSOCIATES, JULY 29, 1998.

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