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October 22, 2010

Mr. Larry A. Rosenmann
New York State Department of Environmental Conservation
Bureau of Hazardous Waste & Radiation Management
Division of Solid & Hazardous Materials
625 Broadway
Albany, New York 12233-7528

Re: Carrier Corporation, Thompson Road Facility, Syracuse, New York
Corrective Action Order — Index CO 7-20051118-4
Phase 2 PCB Source Investigation Work Plan – Building TR-1 Subsurface Investigation, (Rev01)

Dear Mr. Rosenmann:

Please find enclosed one hard copy of the *Phase 2 PCB Source Investigation Work Plan – Building TR-1 Subsurface Investigation (Rev01)* for the referenced facility.

Please call me if you have any questions at (615) 255-9300.

Sincerely,

EnSafe Inc.

By: May Heflin, PE

Encl. Phase 2 PCB Source Investigation Work Plan (Rev01)

cc (electronic copy only):
Ms. MJ Peachey — NYSDEC Regional Engineer
Mr. Tim Diguilio — NYSDEC Region 7, Syracuse
Mr. James Gruppe — NYSDEC Region 7, Syracuse
Ms. Sandy Lizlovs — NYSDEC Region 7, Syracuse
Ms. Rebecca Quail — NYSDEC Bureau of Habitat, Albany
Ms. Susan Edwards — NYSDEC Division of Environmental Remediation
Mr. Dare Adelugba — NYSDEC Division of Water, Albany
Mr. Samuel Ezekwo — USEPA Region 2
Mr. William Penn — UTC
Mr. Nelson Wong — Carrier Corporation

PHASE 2 — PCB SOURCE INVESTIGATION WORK PLAN
Sub-Slab PCB Investigation in Building TR-1

UNITED TECHNOLOGIES/CARRIER
THOMPSON ROAD FACILITY
SYRACUSE, NEW YORK

EnSafe Project Number
0888809186

Revision No.: 0

Prepared for:

United Technologies Corporation
UTC Shared Remediation Services
United Technologies Building
Hartford, Connecticut 06010

Prepared by:

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October 2010

PHASE 2 — PCB SOURCE INVESTIGATION WORK PLAN
Building TR-1

UNITED TECHNOLOGIES/CARRIER
THOMPSON ROAD FACILITY
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October 2010

Prepared By:

May M. Heflin, PE

October 21, 2010
Date

Reviewed By:

Lori Goetz

October 21, 2010
Date

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Tables

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EXECUTIVE SUMMARY

Carrier Corporation, a wholly-owned subsidiary of United Technologies Corporation, is currently working through Corrective Action Order — Index CO 7-20051118-4 (order) dated February 13, 2006, with the New York State Department of Environmental Conservation Division of Solid and Hazardous Materials (NYSDEC-DSHM), to identify potential sources of polychlorinated biphenyls (PCBs) in storm water effluent at Outfall 002.

Carrier submitted a Phase 2 PCB Source Investigation Work Plan to NYSDEC-DSHM on February 24, 2010, based on comments received on the Potential PCB Sources Report (Carrier, 2009). In dialogue with the agency, the site strategy has evolved since February 2010:

- NYSDEC-DSHM, in correspondence dated April 30, 2010, commented on this work plan with requests for additional and more extensive investigations.

- Subsequent to the NYSDEC-DSHM April 30, 2010 correspondence, Carrier representatives met with NYSDEC Region 7 representatives on May 12, 2010, to discuss an overall approach to controlling storm water discharges at the Carrier facility. This approach included a combination of treatment, storage, and diversion to meet the 25-year, 24-hour storm event for the 002 outfall basin at the facility.

- Following the May 12 meeting with the NYSDEC, in which Carrier committed to compliance with the 25-year, 24 hour storm water event, Carrier met with NYSDEC representatives to discuss the April 30 comments, and how the work plan would be reevaluated in consideration of the storm water management commitment.

This work plan reflects the meetings and discussions that have occurred over the last several months.

This work plan describes Carrier's approach for continued PCB source investigations at the site, focusing on the areas with the greatest potential of being significant ongoing PCB sources. Because the investigations will occur in several areas of the campus, a work plan has been prepared separately for each, but combined in this single document for ease of reference. The three work plans included are:

- PCB Investigation — Sub-Slab PCB Investigation in Building TR-1
- PCB Investigation — Thompson Road & TR-18 Storm Line Bedding Material Excavations
- PCB Investigation — Transformer Yard Storm Line Excavation at Manhole 116 (sludge area)

A work plan addressing potential volatile organic compound releases from two former degreasers is presented under separate cover in a work plan entitled *Building TR-1 Former Degreaser Investigation* (Carrier, October 2010).

1.0 BUILDING TR-1 SUB-SURFACE PCB INVESTIGATION

The purpose of this sub-surface investigation is to determine if there are ongoing contributions to the storm water system from polychlorinated biphenyl (PCB)-containing oil (free product) released from historical operations. Therefore, Carrier will use a threshold of PCB detections in soil greater than 25 parts per million (ppm) as the basis for expanding field investigations beyond the locations cited in this work plan. This concentration represents the industrial soil cleanup objective (SCO) for PCBs listed in Table 375-6.8(b): Restricted Use Soil Cleanup Objectives of the New York State Department of Environmental Conservation (NYSDEC) Subpart 375-6: Remedial Program Soil Cleanup Objectives.

The building will be demolished and its footprint will be incorporated into the diversion component of the 25-year/24-hour storm water management compliance approach. The diversion of surface waters will be achieved by applying an asphalt cap over the existing slab, overlain by a grassed soil cap designed to divert waters to a new outfall. To ensure that the cap and diversion components are maintained and that any potential contamination underneath the TR-1 slab is not disturbed, it is anticipated that the entire building footprint will be subject to a deed restriction. Therefore, the focus of the investigation work is to assess the presence/absence of PCB-containing oils as free product underneath the slab. If free product PCB-containing oils are encountered, a removal action of these oils will be initiated.

A hazardous waste survey related to building demolition is currently in progress. As part of the survey, paint, dust, grease, wood-block flooring, caulking, and several other materials have been sampled and analyzed for PCBs. As a result of this survey, Carrier is complying with TSCA requirements and, in consultation with EPA, is preparing a Self-Implementing Remediation Plan (SIP) which will be submitted to EPA in October 2010. Carrier will provide NYSDEC with a courtesy copy when it is submitted. Data that may impact this investigation will be assessed when all the data has been received. Modifications to this work plan or an addendum may be necessary.

Of immediate relevance to this work plan is an extensive concrete core sampling effort that was performed in September 2010. One-inch diameter by three-inch deep concrete cores were obtained on a 100-ft by 100-ft grid over the entire building TR-1 floor footprint, with 5 areas chosen for biased sampling on a 25-ft by 25-ft grid. Appendix A includes a figure that summarizes the concrete core sampling locations and corresponding results. The biased sampling areas were selected based on information from the wood block sampling, prior removal actions and prior building manufacturing operations as follows:

- Two of the biased areas are the highest PCB concentrations from the wood block floor sampling. Substation G also contained some of the highest PCB concentrations during the cleanup in 1995.

- One is the location of the existing waste oil collection system (southwest corner)

- One is near the metal cutting and receiving areas (southeast)

- One is adjacent to a removal action performed in 1995 (near Substation J), chosen at random.

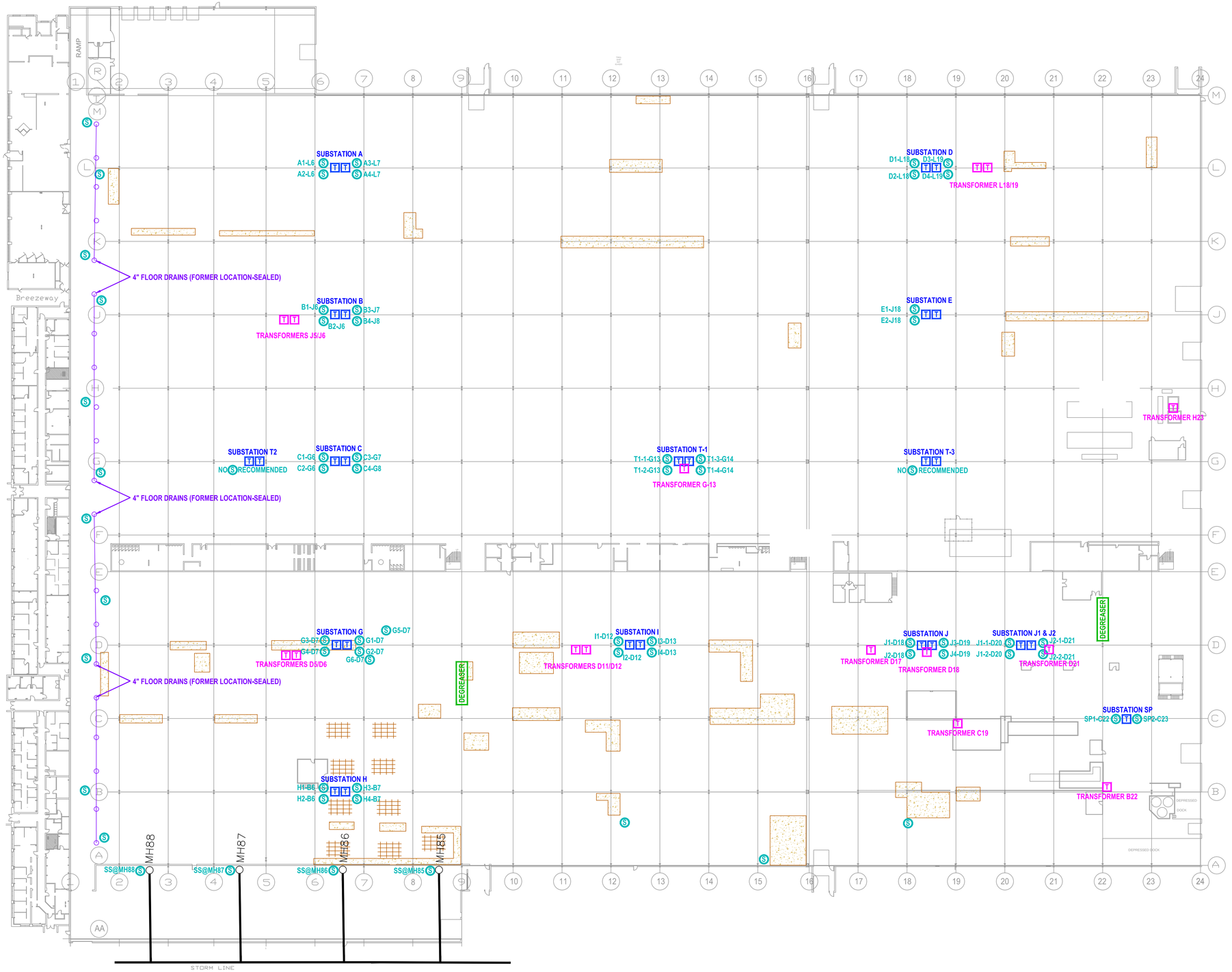
Of the 200+ concrete cores sampled, only one contained PCBs higher than 25 ppm at 62.5 ppm — near the biased sampling location at former Substation G (Substation G removal actions are discussed in Appendix B. Based on this data, a tighter 3-meter by 3-meter grid was centered on the 62.5 ppm core location, with only one sample above 25 ppm at 39 ppm. Proposed sub-slab investigation activities at Substation G are discussed in Section 1.2). This data appears to support the Carriers approach to selecting investigation areas, as presented in this work plan. This data will be presented in the SIP submitted to EPA in October 2010.

1.1 Historical Use

The TR-1 building was constructed in the early 1940s. General Electric, in partnership with the Government Defense Corporation manufactured tanks and heavy military equipment in the building. The building was sold to Carrier in the early 1950s. Carrier manufactured large air conditioning chiller units until 1997. Manufacturing processes included welding, grinding, surface preparation for painting, leak tests and testing. Since 1997 the building has been mainly empty. A small research and development laboratory is in the southwest corner and is used to test units. Other parts of the building have been used to store product and air conditioning parts for sale. Besides use in transformers, no other use of PCBs has been documented at TR-1.

1.2 Proposed Investigation Locations

Carrier will conduct a sub-surface investigation under the Building TR-1 concrete slab prior to its demolition (tentatively scheduled to begin Spring 2011). Soil samples will be obtained using direct-push technology (DPT) at locations that are known to have had or may have had a PCB release to the concrete or woodblock flooring (Figure 1-1 — Proposed Building TR-1 Subsurface Investigation Areas). The locations proposed for investigation include:



LEGEND

- FORMER TRANSFORMER LOCATIONS (SOURCE: 1982 DRAWING ON WALL OF TR-7)
- EXISTING TRANSFORMER LOCATIONS (FIELD OBSERVATION 08-17-2010) THESE TRANSFORMERS HAVE NEVER USED PCB-CONTAINING FLUIDS. SUBSURFACE WILL NOT BE INVESTIGATED
- PROPOSED DPT SOIL BORING LOCATION
- DEGREASER — FORMER DEGREASER LOCATION – APPROXIMATE
- WOOD BLOCK FLOORING – APPROXIMATE (POTENTIAL ACM UNDERLYING WOOD-BLOCK)
- WOOD EXPANSION JOINTS – APPROXIMATE

SOME COMBINATION OF WOODBLOCK AND CONCRETE REMOVAL ACTION PERFORMED AT SS A THROUGH G AND T2 AND T3 IN 1995.

NOTES

1. ALL LOCATIONS ARE APPROXIMATE

GRAPHIC SCALE

0 40 60 80

(IN FEET)
1 inch = 40 ft.

FIGURE 1
PROPOSED BUILDING TR-1
SUBSURFACE INVESTIGATION AREAS
PHASE 2 PCB WORKPLAN – AUGUST 2010
CARRIER FACILITY, THOMPSON ROAD
SYRACUSE, NEW YORK

REQUESTED BY: M.H.	
DRAWN BY: E.R.	
DWG DATE: 19OCT10	
DWG NO: 9186R007	

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- Nine of 11 former transformer locations (Substations A through J). Historical data at these 9 locations indicate that wood block and/or concrete flooring contained PCBs.

- One former substation location where no information is available to determine if an investigation occurred (Substation T1).

- Near former floor drain locations. There are no floor drains currently visible or in use. Historical information indicates that older floor drains used along the buildings northern end (column line A) were sealed.

- Near the western wall of Building TR-1 near PCB-affected manholes (MH-81, MH-82, and MH-89) along the Thompson Road storm line. Sediments in these manholes have had PCB detections.

- Proximate to the manholes at the end of leaders from the Thompson Road storm line (MH-85, MH-86, MH-87, MH-88) inside Building TR-1.

There are 11 transformer units (dual or single) currently located in Building TR-1 as indicated on Figure 1-1. The transformers were manufactured new, are silicon-based, and never contained PCBs or any other oil that might have contained PCBs. Therefore, these locations are not proposed for investigation.

Former Substations (1995 Change-Out Program Summary)

In the Spring of 1995, Carrier undertook a transformer change-out program in Building TR-1 to address 12 transformers (Substation A through J [no F] and T1 through T3).

- Each substation consisted of two PCB-containing transformers approximately 15 feet apart, with switch gear in between. (The exception is Substation T1, which consisted of a single transformer with switch gear on the side.) The three components rested on a concrete foundation, which was surrounded by wood-block flooring, underlain by concrete. The area was surrounded by a chain-link fence. The flooring consisted of a combination of concrete and wood-block flooring (underlain by concrete) outside the fenced area.

- Samples were obtained from the wood-block surrounding the substation, the concrete pad underlying the wood-block flooring, and the concrete surrounding the substation (outside the fence). Samples were not taken from the concrete pads on which the equipment rested.

- PCBs were detected up to 310,000 ppm in wood-block samples and up to 125,000 ppm in concrete surface samples.

- Concentrations in wood block and upper concrete surface may have been elevated, vertical characterization of the select concrete areas demonstrated rapid attenuation of PCB concentrations over a couple of inches.

- Where PCB contamination was detected, wood block and concrete was removed (and subsequently restored) ranging from 2-inch to 11-inch depth intervals, depending on the concentration of PCBs detected.

- Subsurface soils were not tested for PCBs; no soil removal actions were performed.

More detailed information on the action taken at each of these substations is provided in Appendix B — Historical Substations Action in Building TR-1.

The higher PCB concentrations found at nine of these substations are indicative of a release to the flooring, but not necessarily to the soils underlying the substations. The nine substations include A, B, C, D, E, G, H, I, J and T1. No documentation of a Substation F in Building TR-1 is available. Substations T2 and T3 are not proposed for investigation because the historical data does not indicate significant PCB concentrations in the adjacent flooring (less than 1,000 ppm) were found during the changeout program. No information is available on an investigation at Substation T1; therefore, this former substation location is proposed for investigation.

Carrier will advance two DPT borings near each former transformer location (4 total per substation). Borings in these locations will be biased to any obvious pathways to subsurface (cracks) or where there is evidence of a possible previous release (i.e., staining).

Sealed (Former) Floor Drains

Carrier has performed a thorough visual inspection of the floor of Building TR-1, and no open floor drains were noted. Historical information (Appendix C — Historical Information, GE Figure) indicates that former, non-Carrier related operations may have had associated floor drain use on the north end of Building TR-1 (along column line A). Therefore, Carrier will include the area of these former floor drains as part of the subsurface PCB investigation in this building. Three DPT borings will be advanced to groundwater at each series of floor drains

Western Side of Building TR-1 Near MHs 80, 81, 82 & 89

Sediment samples obtained from Thompson Road storm line manholes MH-80, MH-81, MH-82, and MH-89 have identified concentrations of PCBs up to 80 ppm (approximate). Recent investigations at the Transformer Yard area indicate that past activities and accumulated sediments in the storm lines may have washed down the Thompson Road storm line and accumulated in the manholes along the way. However, because of the historical use of PCBs in Building TR-1, Carrier will advance four DPT borings along the western wall of Building TR-1 near these affected manholes to determine whether there is a possible internal source of the PCBs found in the manholes.

At Manholes that Extend into Building TR-1 from the Thompson Road Line

Four manholes or cleanouts extend into building TR-1 in the northwest side of the building. These manholes are the terminal points from leaders from the Thompson Road storm line as shown on Figure 1-1. Due to their proximity to a former substation and their connectivity to the main Thompson Road storm line, Carrier will advance one DPT boring at each of the manhole/cleanouts.

Table 1-1 summarizes the locations proposed for investigation.

Table 1-1
Building TR-1 PCB Investigation Summary

	Potential PCB Release Location	DPT Locations/Soil Sampling	Temporary Well(s)/ GW Sampling
1.	Former Substations (1995 Change-Out Program Summary)	• 10 former substations • 2 to 4 locations per substation, except Substation G, where investigation will be expanded to cover concrete core sample location with >25ppm PCB. • Soil samples @ 2-foot intervals to groundwater • Total PCBs Method 8082 or immunoassay method	• As needed • Total PCBs Method 608
2.	Sealed (Former) Floor Drains	• 4 floor drain runs • 3 locations per floor drain run • Soil samples @ 2-foot intervals to groundwater • Total PCBs Method 8082 or immunoassay method	• As needed • Total PCBs Method 608
3.	Western Side of Building TR-1 Near MHs 80 & 81 and MHs 82 & 89	• 4 locations near affected MHs • Soil samples @ 2-foot intervals to groundwater • Total PCBs Method 8082 or immunoassay method	• As needed • Total PCBs Method 608
4.	Thompson Rd storm line leaders in Bldg TR-1	• 1 locations near each MH • Soil samples @ 2-foot intervals to groundwater • Total PCBs Method 8082 or immunoassay method	• As needed • Total PCBs Method 608

Notes:

- Decision threshold soil sample ≥25 ppm PCB in any soil sample interval (2-foot intervals proposed) → soil investigation will be expanded
- Once data are received, a hydrophobic dye test will be performed at DPT location exhibiting highest PCB concentration in 4-6 foot sample interval, if the concentration is also above 25 ppm. If test indicates potential presence of NAPL, a single temporary well will be installed and a groundwater sample obtained for PCB analysis (and confirmation of NAPL). If PCBs are not detected in 4-6 foot sample interval, no further testing will be performed.
- Decision threshold groundwater if laboratory analysis confirms groundwater sample containing NAPL → further groundwater investigation.

2.0 TECHNICAL APPROACH

DPT Soil Sampling

At each proposed DPT location, soil samples will be obtained at 2-foot intervals to groundwater (estimated 6 feet below ground surface).

- If PCBs are found in soils at concentrations less than 25 ppm, no further investigative actions are warranted. In this case, Carrier intends to propose a deed notice, environmental easement, or other mechanism used in conjunction with the planned asphalt cap and overlying soil/revegetated layer for storm water control to restrict future use of this area, as necessary.

- If PCBs in soils are found at concentrations greater than 25 ppm:

  - Carrier will conduct further investigation as necessary to define extent of PCB impact in soils. Based on this investigation, Carrier will evaluate remedial options and make a recommendation on managing the PCB-containing soils as part of a comprehensive Corrective Measures Study (CMS). The planned building demolition, asphalt cap, and revegetation of the building footprint with an associated land use restriction will be retained as an available corrective measures option.

  - To determine if historical activities have potentially resulted in a release of non-aqueous phase liquids (NAPL) to groundwater, Carrier will use an in-field hydrophobic dye test at the single DPT location (i.e. substation, floor drain, test pit, or manhole) with the highest PCB concentration in soils (exceeding the 25 ppm PCB threshold) in the deepest interval sampled (expected to be the 4-6 foot interval just above the water table).[a] Turn-around-times on soil samples will be expedited so that the dye testing can occur during the same field mobilization as the DPT investigation.

    - *"Hydrophobic dye testing uses a hydrophobic dye to determine the presence of DNAPLs in ex situ soil samples suspected of DNAPL contamination based either on OVA screening results or on MIP results that show high concentrations of total VOCs in subsurface soils. The technique is designed to*

[a] If PCBs are not detected in the 4-6 foot sample interval at any location at concentrations greater than 25 ppm, then, no further testing will be performed.

work with other analytical technologies. The sample is placed in a sample jar and a suitable dye is introduced (e.g., Sudan IV, Oil Red O). The jar is capped and vigorously shaken. A bright red coloration appears in the presence of DNAPL. The lack of a color change does not necessarily mean there is no DNAPL in the soil sample or the soil horizon from which it was taken. Sample handling during extraction of the core sample from the formation may affect results (e.g., draining while being brought to the surface), and poor dye mixing with clayey soil may mask DNAPL presence. Note that Sudan IV is highly toxic and should be carefully handled and disposed of." [b]

Groundwater Sampling (from Temporary Well) — If the hydrophobic dye test detects NAPL in this soil sample, Carrier will install a temporary well at this DPT location. Turn-around-times on soil samples will be expedited so that the temporary well installation can occur during the same field mobilization as the DPT investigation. The temporary well will be allowed to equilibrate for 24 hours after installation to allow any free product to accumulate.

- A groundwater sample will be obtained from the temporary well and analyzed for PCBs. If laboratory analysis does not confirm the presence of NAPL in groundwater, then NAPL will not be considered to be a concern at this location (i.e. substation, floor drain, test pit, or manhole). If the DPT location with highest PCB concentration in soils is not associated with a NAPL release to groundwater, then it is unlikely that soils containing lower PCB concentrations would be associated with a release, and no more temporary wells will be installed. The temporary well will be abandoned and this location will not be investigated further.

- If PCBs are confirmed via laboratory analysis in the groundwater sample, then further investigation to determine the extent of PCB impact will be performed. Based on this investigation, Carrier will evaluate remedial options and make a recommendation on managing the PCB-impacted groundwater as part of an interim action (IA) or comprehensive CMS. The planned building demolition, asphalt cap, and revegetation of the building footprint will be retained as an available corrective measures option.

[b] *Site Characterizations Technologies for DNAPL Investigations, Office of Solid Waste and EPA 542-R-04-017 Emergency Response (5102G), September 2004 http://www.epa.gov/tio http://cluin.org*

- Also, if PCBs are confirmed at this location, then a hydrophobic dye test will be performed on soil from the DPT location (i.e. substation, floor drain, test pit, manhole) exhibiting the next highest PCB concentration in the 4-6 foot sample interval (and above 25 ppm PCB). The same protocol for temporary well installation will be used.

2.1 Soil Sampling

A DPT hydraulically-powered drilling rig will be employed to conduct this subsurface investigation. At each location inside Building TR-1, the concrete building floor will be cored using a concrete coring machine to provide a clean access point. Once coring is complete, the DPT drilling rig will advance steel rods containing acetate sleeves that will allow collection of the soil column encountered. From the ground surface, the sampler is advanced 48- or 60-inches (depending on the sampling tool length) and retrieved from the borehole with the first sample. The plastic sleeve and soil core are removed, a new sleeve is installed, and the sampler is inserted back down the same hole to collect the next interval's sample. Additional information on DPT soil sampling protocol is provided in Appendix D.

Soil and Headspace Logging

The soil column will be evaluated at 2-foot intervals and split for description purposes and field screening using a photoionization detector. After the soil has been in the sealable plastic bag or glass jar for a sufficient amount of time, the volatile organic vapor concentration will be measured from the headspace of each bag or jar. The concentrations will be recorded in the field logbook or on soil boring logs for each boring. Descriptions of the soils encountered will also be placed on soil boring logs and/or recorded in the field logbook.

Field Screening Soils for PCBs — Hach Immunoassay Method

Soil samples may be screened using an in-field screening technique such as the Hach Immunoassay Method, with confirmatory samples submitted to Accutest Laboratories in Dayton, New Jersey (New York Certification 11791), for Total PCB analysis using U.S. Environmental Protection Agency (USEPA) Method 8082.

The Hach Immunoassay Method 10050, which is provided in Appendix D, has been evaluated by the USEPA[c] and was deemed to be an acceptable method for PCB screening. A summary of the procedure is as follows:

- Five grams of soil is extracted with methanol and liquid supernatant is filtered. Sample extracts, calibration standards, and reagents are added to cuvettes coated with antibodies that are specific for PCBs. Color develops and is then measured with a colorimeter. The test requires about 20 to 30 minutes for complete analysis. As many as 10 cuvettes can be run simultaneously, which equates to two standards, one blank, and seven samples in a batch. The concentration of PCB in a sample is determined by comparing the developed color intensity to that of a PCB calibration standard. The PCB concentration is inversely proportional to the color development: the lighter the color, the higher the PCB concentration. The colorimeter provides a reading in terms of absorbance and the absorbance of the samples can be compared to that of the standards analyzed in the batch.

- This method provides semi-quantitative screening based on thresholds for PCB in the following standard ranges: 1 to 5 ppm and 10 to 50 ppm. For the purposes of this excavation activity, the 10 to 50 ppm standard range will be used to assess the 25 ppm investigative action threshold.

- The following quality control samples will be analyzed during PCB screening: one blank and two standards per batch. Field duplicates will be analyzed at a frequency of one per 10. In addition, confirmation samples will be collected and analyzed by a fixed laboratory using SW-846 Method 8082 at a frequency of 1 per 10 samples collected.

2.2 Groundwater Sampling

Temporary Well Installation

As previously described, a temporary well may be installed based on the findings of the soil investigation at each location. The depth of DPT groundwater borings is not expected to exceed 15 feet as the depth to groundwater is encountered approximately 5-6 feet below ground surface in the TR-1 area. If necessary, a temporary 1-inch diameter monitoring well constructed of polyvinyl chloride (PVC) materials will be installed in the borehole approximately 5 feet below the estimated water table and will be used to collect grab groundwater samples at each location. The temporary monitoring wells will be installed with the DPT rig using a

[c] *Environmental Technology Verification Report, Immunoassay Kit, Hach Company Immunoassay Kit*, USEPA Office of Research and Development, EPA/600/R-09/110, August 1998.

double push rod system of inner and outer rods. One section of inner rod will be fitted with a drive point and inserted into a section of outer rod. The drive point on the inner rod prevents soil from entering the outer rod as the rod string is pressed into the ground. New inner and outer rods are added as the rod string is advanced into the ground. Once the target depth is reached, the inner rods will be removed, leaving the outer rods in place to hold the hole open during temporary well installation.

If the cohesiveness of the soil allows the hole to remain open when the rods are removed, single rods may be used instead of the dual-wall system. Use of single rods instead of dual wall will expedite temporary well installation.

The 1-inch diameter PVC temporary well screen and riser materials will be lowered through the outer rods to the bottom of the hole. Once the temporary well is in place, the rods are slowly pulled to approximately 2 feet above the temporary well screen, allowing the formation material to collapse around the screen. A filter sock will be used around the screen to prevent large fragments of formation material from entering the temporary well screen and increasing sample turbidity. If a filter sock is not available, a filter pack will be installed if the formation material fails to collapse.

After the rods have been pulled above the screened interval, the remaining portion of the hole will be sealed to ground surface with granulated bentonite, which will be slowly poured down the annulus as the rods are pulled from the hole. The bentonite granules in the vadose zone will be hydrated with deionized water. All temporary wells will be completed flush with ground surface and sealed with a water-tight cap. The temporary wells may be abandoned after groundwater results have been received and evaluated, in anticipation of building demolition activities.

Temporary Well Sampling

After allowing the temporary points to equilibrate overnight, an oil-water interface probe will be used to measure the depth to water and, if present, the depth to product. A groundwater sample will be collected from the well using a length of dedicated polyethylene or Teflon tubing attached to a peristaltic pump by which the water can be drawn up into the tubing. Once the tubing has been filled with water, the pump is deactivated and the tubing crimped to prevent backflow into the sampler. The tubing is pulled free from the pump and then the tube's contents are gently drained into the sample containers. If no groundwater enters the temporary well after a period of time, another location will be installed in an attempt to obtain a sample from the general area. The groundwater sample will be submitted to Accutest Laboratories in Dayton, New Jersey (New York Certification 11791), for Total PCB analysis using USEPA Method 608.

3.0 HEALTH AND SAFETY PLAN

All field activities will be conducted in compliance with the site-specific health and safety plan, to be prepared prior to conducting activities outlined in this work plan. The health and safety plan will be prepared by EnSafe specifically for the activities described herein for the facility.

4.0 IMPLEMENTATION SCHEDULE

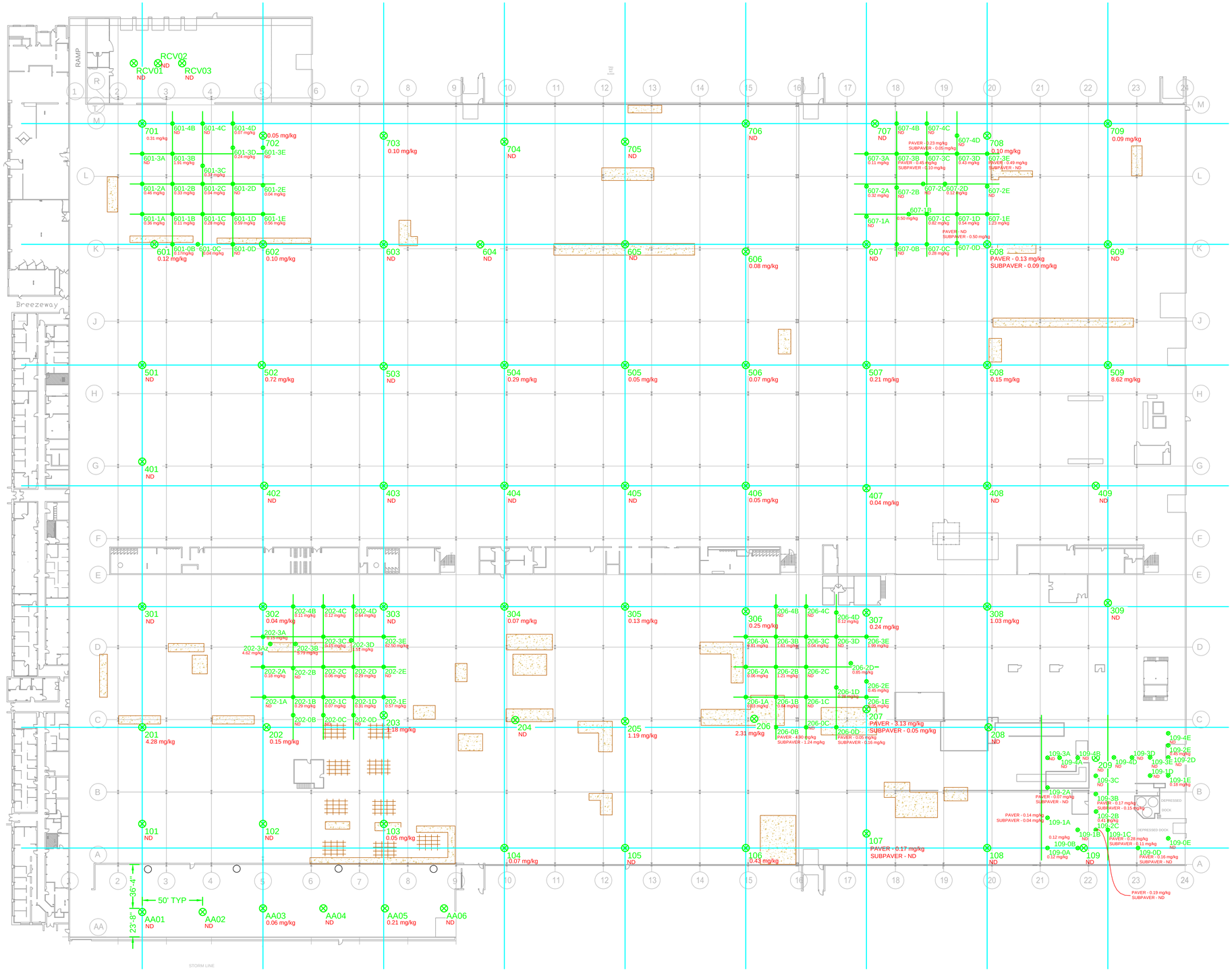
The schedule for the Building TR-1 investigation activities outlined in this work plan is as follows:

Proposed Schedule

Submit Work Plan to NYSDEC	October 13, 2010
NYSDEC Review and Approval	November 13, 2010 (approx. 30 days after submittal)
Preparation and Mobilization for Field Activities	Following NYSDEC approval of work plan
Completion of Field Investigation Activities	January 13, 2011 (approx. 60 days after NYSDEC approval of work plan)
Report generated for submittal to NYSDEC	March 13, 2011 (approx. 60 days after completion of field work, assuming no delays in completing field activities)

Note:
Dates are conditional based upon approval date of work plan, investigation findings, Bldg TR-1 abatement activities, and other factors.

Appendix A
Concrete Core Grid-Based Sample Locations (Figure), October 2010



LEGEND

- SAMPLING GRID (DIMENSIONS ARE MEASURED TO CENTER OF COLUMN GRID, ADDITIONAL DIMENSIONS MAYBE MEASURED TO WALL FOR REFERENCE AS WELL)
- BIASED GRID SAMPLE POINTS
- WOOD BLOCK FLOORING – APPROXIMATE (POTENTIAL ACM UNDERLYING WOOD–BLOCK)
- WOOD EXPANSION JOINTS – APPROXIMATE

NOTES

1. ALL LOCATIONS ARE APPROXIMATE
2. POINTS SHOWN OFF THE GRID INTERSECTIONS WERE MOVED TO ACCESS RESTRICTIONS TO THE PLANNED GRID INTERSECTIONS.

GRAPHIC SCALE

0 40 60 80

(IN FEET)

1 inch = 40 ft.

PRELIMINARY

DRAFT

ATTORNEY - CLIENT PRIVILEGED CONFIDENTIAL

BUILDING TR-1
CONCRETE GRID-BASED SAMPLING RESULTS
CARRIER FACILITY, THOMPSON ROAD
SYRACUSE, NEW YORK

REQUESTED BY:	G.O.
DRAWN BY:	A.W.
DWG DATE:	10/07/2010
DWG NO:	8989 F4

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File name: I:\2010 PROJECTS BSTI\ UTC CARRIER - SYRACUSE, NY\ MASTER FILE\8989 UTC - CARRIER - SYRACUSE, NY\PLANS\8989 TR 01 CONCRETE GRID-BASED SAMPLING RESULTS.DWG - Plotted By: EDDIE ROGERS Plot Date: 10/12/2010 11:17:12 AM

Appendix B
Historical Substation Actions in Building TR-1

Table B-1
Summary of Findings — Substations in TR-1
(1995 Removal Action)

Substation	Comments
A	➢ Substation A consists of switch gear with 1 transformer on either end. • North end of substation – Wood Block — PCB detections in wood block samples up to 64,000 ppm. – Concrete — concrete was not sampled inside the fenced area. • South end of substation – Wood Block — PCB detections in wood block samples up to 1,200 ppm. – Concrete — surface concrete samples had PCB detections up to 13,000 ppm, with concentrations decreasing with depth. • Central portion of substation – Wood Block — PCB detections in wood block at concentrations less than 200 ppm. Wood block areas outside fenced substation area had PCB concentrations ranging from 49 ppm to 200 ppm. – Concrete — outside wood block areas had PCB concentrations <3 ppm. • Removal Action – Wood Block — wood block was removed around the substation outside the fenced area, extending 2 feet to the east of the substation and 10 feet to the west of the substation. Wood block was removed on the north and south ends, to columns L6 and L7, respectively. – Concrete — a 2-inch removal action was made on both the northern and southern ends of the substation inside the fenced area. No removal action occurred in the central portion of the substation (around the switch gear).
B	➢ Substation B consists of switch gear with 1 transformer on either end. • North end of substation – Wood Block — PCB detections in wood block samples up to 64,000 ppm. – Concrete — concrete was not sampled inside the fenced area. – Removal Action — a 4-inch removal action was made on the northern end of the substation inside the fenced area. • South end of substation – Wood Block — PCB detections in wood block samples up to 310,000. – Concrete — surface concrete samples had PCB detections up to 125,000 ppm and decreasing with depth. • Central portion of substation – Wood Block — PCB detections in wood block at concentrations up to 24,000 ppm – Concrete — concrete was not sampled inside the fenced central section of the substation • Removal Action – Wood Block — wood block was removed inside the fenced area and in a small section on the north end of the substation outside the fenced area. The limits of the wood block removal extend to and around column J6. – Concrete — a 4-inch removal action was made on the northern end of the substation inside the fenced area. An 8-inch removal action was made on the southern end of the substation inside the fenced area. A 2-inch removal action was performed here and along the full eastern side of the substation, both inside and outside the fenced area. On the western side, a 2-inch removal action inside the fenced area and limited to central section.
C	➢ Substation C consists of switch gear with 1 transformer on either end. • North end of substation – Wood Block — PCB detections in wood block samples up to 100,000 ppm. – Concrete — concrete was not sampled inside the fenced area. – Outside the fenced areas, concrete samples were < 3 ppm PCB. No wood block sampled (or present) • South end of substation – Wood Block — PCB detections up to 160,000 ppm. – Concrete — concrete was not sampled inside the fenced area – Outside the fenced areas, concrete samples were < 3 ppm PCB. No wood block sampled (or present) • Central portion of the substation

Table B-1
Summary of Findings — Substations in TR-1
(1995 Removal Action)

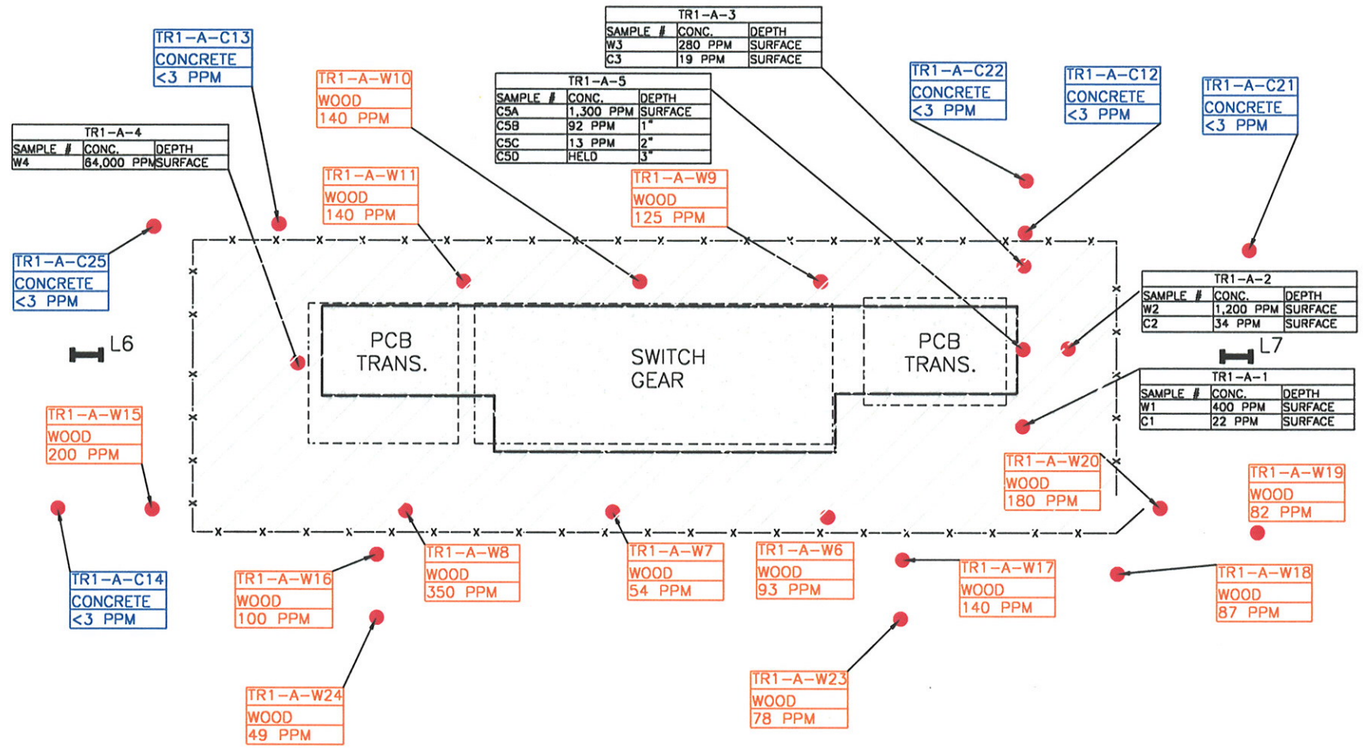
Substation	Comments
	– Wood Block — had PCB detections in wood block at concentrations up to 140 ppm. – Concrete — concrete was not sampled inside the fenced area. Concrete flooring outside wood block areas had <3 ppm PCBs. • Removal Action – Wood Block — wood block flooring was not removed. – Concrete — a 2-inch removal action was made on the northern and southern ends of the substation, inside the fenced area. No removal action was performed in the central section of the substation around the switch gear.
D	➢ Substation D consists of switch gear with 1 transformer on either end. • North end of Substation (silicon transformer) – Wood Block — PCB detections in wood block flooring up to 420 ppm. – Concrete — concrete was not sampled inside the fenced area. – Outside the fenced area, concrete samples ranged from <3 ppm to 18 ppm PCBs. No wood block sampled (or present?). • South end of this substation – Wood Block — PCB detections in wood block flooring up to 7,800 ppm. – Concrete — surface concrete flooring up to 21,000, decreasing with depth. Outside the fenced area, concrete samples ranged from < 3 ppm to 47 ppm PCBs. No wood block sampled (or present?). • Central section of substation – Wood Block — PCB detections in wood block flooring up to 1,500 ppm. – Concrete — concrete was not sampled inside the fenced area. • Removal Action – Wood Block — it appears that wood block flooring was removed inside the fenced area of the substation – Concrete — an 8-inch removal action on the south-east portion of the substation inside the fenced area was made, extending 5 feet outside the fenced area. No removal actions were made on the northern or central sections of the substation.
E	➢ Substation E consists of switch gear with 1 transformer on either end. • North end of Substation E – Wood Block — PCB detections in wood block flooring up to 10,000 ppm. – Concrete — surface concrete samples had PCB concentrations up to 134,000 ppm, decreasing with depth. – The concrete flooring outside the fenced area ranged from < 3 ppm to 16 ppm. No wood block flooring was sampled outside the fenced area (though none may have existed). • South end of substation – Wood Block — PCB detections in wood block flooring less than 1,000 ppm. – Concrete — surface concrete samples ranged from 40 ppm to 110 ppm PCBs inside the fenced area. – The wood block flooring outside the fenced area on this end ranged from 130 to 150 ppm PCBs. The concrete flooring outside the fenced area ranged from <3 ppm to 12 ppm PCBs. • Central section of substation – Wood Block — PCB detections in wood block flooring up to 780 ppm. – Concrete — concrete was not sampled inside the fenced area. • Removal Action – Wood Block — wood block flooring was removed inside the fenced area. Wood block flooring was also removed outside the fenced area on a portion of the western side of the substation and on the southern end to column J19. – Concrete — an 8-inch removal action was performed on the northern-most end of the substation, with a 2-inch removal action was made immediately surrounding the transformer. A 2-inch removal action was made inside the fenced area near this transformer. N o removal actions were made in the central section of the substation (around the switch gear).
G	➢ Substation G consists of switch gear with 1 transformer on either end. • North end of substation – Wood Block — PCB concentrations in wood block samples up to 6,000 ppm.

Table B-1
Summary of Findings — Substations in TR-1
(1995 Removal Action)

Substation	Comments
	– Concrete — surface concrete samples up to 8,400 ppm. • Outside the fenced area, concrete samples were < 3 ppm. No wood block flooring was sampled outside the fenced area (though none may have existed). South end of substation – Wood Block — PCB detections in wood block samples were up to 8,000 ppm. – Concrete — surface concrete samples were up to 36,000 ppm PCB, decreasing with depth. • Outside the fenced area, wood block flooring samples had PCB detections up to 3,100 ppm. Concrete samples were < 3 ppm, with one exception, which was 21 ppm. Central section of substation – Wood Block — wood block samples detected PCBs up to 720 ppm. – Concrete — concrete was not sampled inside the fenced area. • Removal Action – Wood Block Flooring — wood block flooring was removed inside the fenced area. Outside the fenced area, removal extended 5 feet outside the fenced area along the entire length of the fenced area on the eastern side and extended to the north and south some to columns D6 and D7, respectively. – Concrete Flooring — 3 inches of flooring was removed from the northern end of substation and along the western side, inside the fenced area, up to the start of the southern transformer. An 8-inch removal action was made around the southern transformer, inside the fenced area.
H	➢ Substation H consists of switch gear with 1 transformer on either end. • North end of substation – Wood Block — PCB detections in wood block flooring up to 12,000 ppm. – Concrete — surface concrete samples up to 29,000 ppm. Outside the fenced area, concrete samples ranged from 45 to 98 ppm PCBs. • South end of this substation – Wood Block — PCB detections in wood block flooring up to 26,000 ppm. – Concrete — surface concrete samples up to 1,800 ppm, decreasing with depth. Outside the fenced area, a single wood block sample was 200 ppm PCBs. Concrete flooring ranged from <3 ppm to 29 ppm. • Central section of substation – Wood Block — PCB detections in wood block flooring up to 46 ppm – Concrete — concrete flooring up to 14 ppm. • Removal Action – Wood Block — wood block flooring was removed from inside the fenced area. Wood block was also removed extending 10 feet outside the western fence and to the north and south to columns B6 and B7, respectively. – Concrete — an 8-inch removal action was made on the northern side of this transformer inside the fenced area, but not around the transformer. A 4-inch removal action was made on the southern end of the transformer, but not around the transformer. A 2-inch removal action was made on the east side of the central section, inside the fence. Concrete was also removed outside the fenced area, extending 5 feet to the north of column B6 and 5 feet to the west.
I	➢ Substation I consists of switch gear with 1 transformer on either end. • North end of substation – Oil — an oil sample was obtained from this area which contained 2,800 ppm PCBs. – Wood Block — PCB detections in wood block flooring up to 560 ppm. – Concrete — concrete was not sampled. • South end of substation – Wood Block — PCB detections in wood block flooring up to 25,000 ppm. – Concrete — concrete was not sampled. Outside the fenced area, concrete flooring ranged from <3 ppm to 90 ppm. • Central section of substation was not sampled. • Removal Action – Wood Block — it appears that wood block was removed inside the fenced area and also extending outside the fenced area 1 foot to the west, 5 feet to the east, and to the north to 2 feet beyond column D12 and to the south to column D13. – Concrete — a 4-inch removal action was taken on the northern end of the substation both

Table B-1
Summary of Findings — Substations in TR-1
(1995 Removal Action)

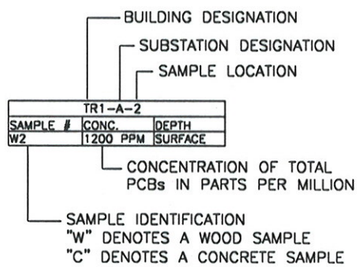
Substation	Comments
	inside and outside the fenced area. A 2-inch removal action was made on the southern end of the substation both inside and outside the fenced area. No removal action was made in the central section.
J	➢ Substation J consists of switch gear with 1 transformer on either end. • North end of Substation – Wood Block — PCB detections in wood block flooring up to 3,800 ppm. – Concrete — concrete flooring was not sampled inside the fenced area on this end. Outside the fenced area, the concrete flooring ranged from < 12 ppm to 120 ppm. No wood block flooring was sampled outside the fenced area (though none may have existed). • South end of this substation – Wood Block — PCB detections in wood block flooring up to 22,000 ppm – Concrete — surface concrete samples had PCB detections up to 19,000 ppm, decreasing with depth. The concrete flooring outside the fenced area ranged from <3 ppm to 59 ppm PCBs. Outside the fenced area, a single wood block flooring sample outside the fenced area on this end contained 220 ppm. • The central section of this substation – Wood Block — PCB detections in wood block flooring less than 500 ppm. – Concrete — concrete flooring was not sampled inside the fenced area in this section. • Removal Action – Wood Block — it appears that wood block was removed inside the fenced area. Outside the fenced area, wood block was removed extending 2 feet on the east side of the substation. – Concrete — a 2-inch removal action took place on the northern and central sections of this substation, extending 2 feet to the west, outside the fenced area and to 2 feet past column D18 on the north end. On the southern end, an approximately 11-inch removal action took place.
T1	➢ Substation T1 consists of switch gear with 1 transformer on either end. – No sampling data available on this substation. • Removal Action – Wood Block — it appears that wood block inside the fenced area was removed. – Concrete — it does not appear a concrete removal action took place at this substation.
T2	➢ Substation T2 consists of a single transformer with switch gear. – Wood Block — 2 wood block samples (1 inside fenced area and 1 outside) had PCB detections of 650 ppm and 930 ppm, respectively. All other wood blocks samples were < 50 ppm. – Concrete — concrete samples ranged from < 3 ppm to 7 ppm. • Removal Action – Wood Block — wood block flooring was removed inside the fenced area and extending to 5 feet outside the fenced area on the west side of the substation and 2 feet on the north end. – Concrete — no concrete removal actions took place at this substation.
T3	➢ Substation T3 consists of a single transformer with switch gear. – Wood Block — 3 wood block samples obtained, one of which was over 50 ppm at 60 ppm. – Concrete — 4 concrete samples were obtained, ranging from 4 ppm to 16 ppm PCBs. • Removal Action – Wood Block — wood block was removed inside the fenced area – Concrete — a 2-inch removal action was made on the southeast side of the southern transformer.



CONCENTRATION OF TOTAL PCBs IN PARTS PER MILLION
AROCLOR 1260

LEGEND

- x — EXISTING FENCING
- L7 — COLUMN LOCATION
- WOOD BLOCK/ASPHALT BLOCK FLOORING
- CONCRETE
- EQUIPMENT TO REMAIN
- EQUIPMENT TO BE REMOVED
- SIZE OF TRANSFORMERS, AS WELL AS SUBSTATION SPACING SPACING BETWEEN COLUMNS, IS APPROXIMATE



NOTE: FIGURE GENERATED FROM BB&L FIGURE 1
SUBSTATION A PCB ANALYTICAL DATA 6-29-95

0 5 10
SCALE IN FEET

FIGURE A-1: SUBSTATION A
APPENDIX A - BLDG TR-1
REMOVAL ACTION INFORMATION (1995)
SAMPLING RESULTS
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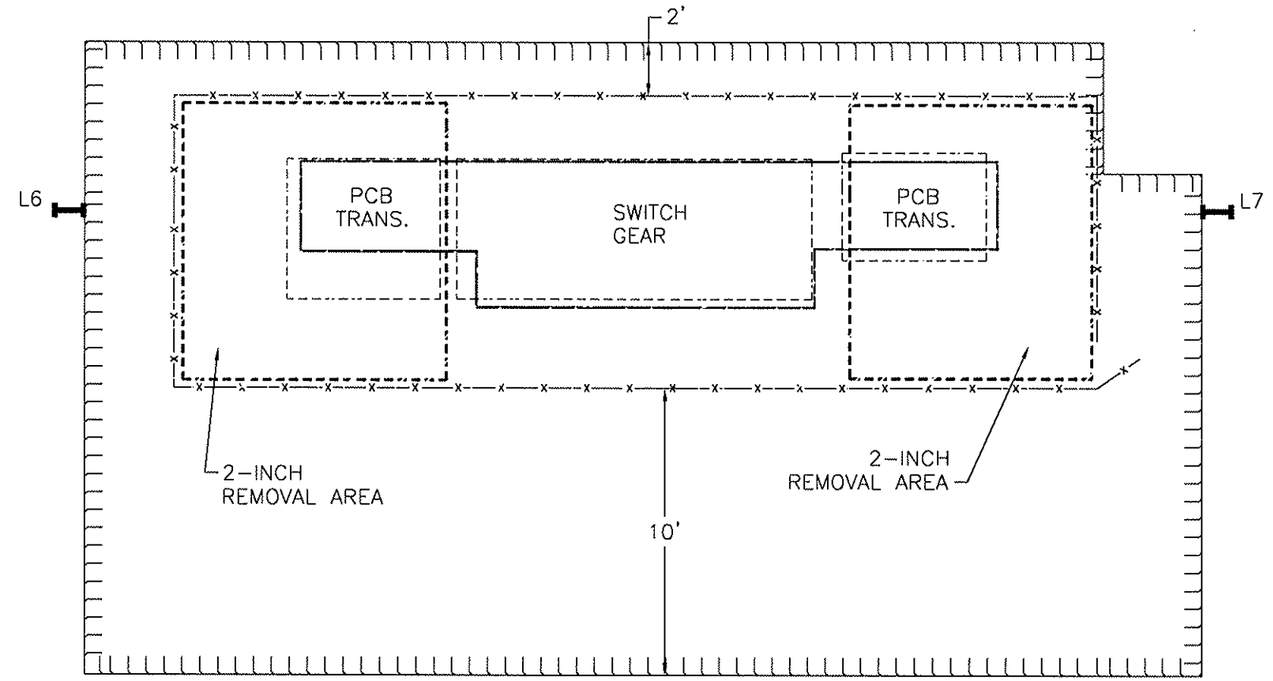

LEGEND

- x - EXISTING FENCING
- L7 - COLUMN LOCATION
- ~ WOOD BLOCK/ASPHALT BLOCK FLOORING
- ~ CONCRETE
- ~ EQUIPMENT TO REMAIN
- ~ EQUIPMENT TO BE REMOVED (BY OTHERS)
- ~ LIMITS OF WOOD BLOCK REMOVAL/RESTORATION
- ~ LIMITS OF CONCRETE REMOVAL/RESTORATION

NOTE: FIGURE GENERATED FROM BB&L FIGURE 1
PCB TRANSFORMER CHANGEOUT PROGRAM-
BUILDING TR-1, 7-95.

0 5 10
SCALE IN FEET

FIGURE A-2: SUBSTATION A
APPENDIX A - BLDG TR-1
FLOORING REMOVAL DETAILS
(1995)
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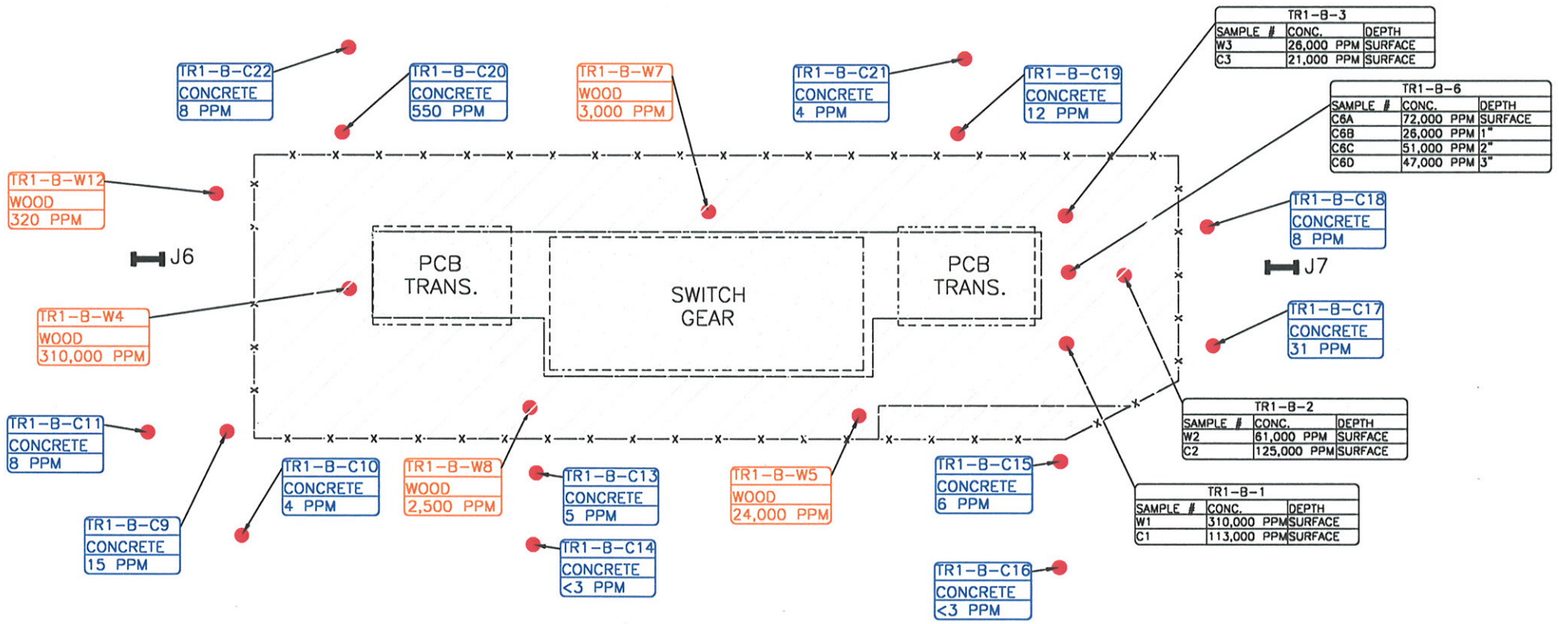


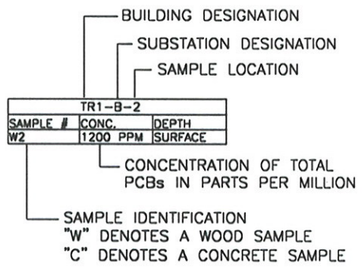
CONCENTRATION OF TOTAL PCBs IN PARTS PER MILLION
AROCLOR 1260

LEGEND

- —x— – EXISTING FENCING
- J7 – COLUMN LOCATION
- – WOOD BLOCK/ASPHALT BLOCK FLOORING
- – CONCRETE
- ——— – EQUIPMENT TO REMAIN
- – – – – – – EQUIPMENT TO BE REMOVED

– SIZE OF TRANSFORMERS, AS WELL AS SUBSTATION SPACING SPACING BETWEEN COLUMNS, IS APPROXIMATE

NOTE: FIGURE GENERATED FROM BB&L FIGURE 2
SUBSTATION B PCB ANALYTICAL DATA 6-29-95



0 5 10
SCALE IN FEET

FIGURE B-1: SUBSTATION B
APPENDIX A – BLDG TR-1
REMOVAL ACTION INFORMATION
SAMPLING RESULTS (1995)
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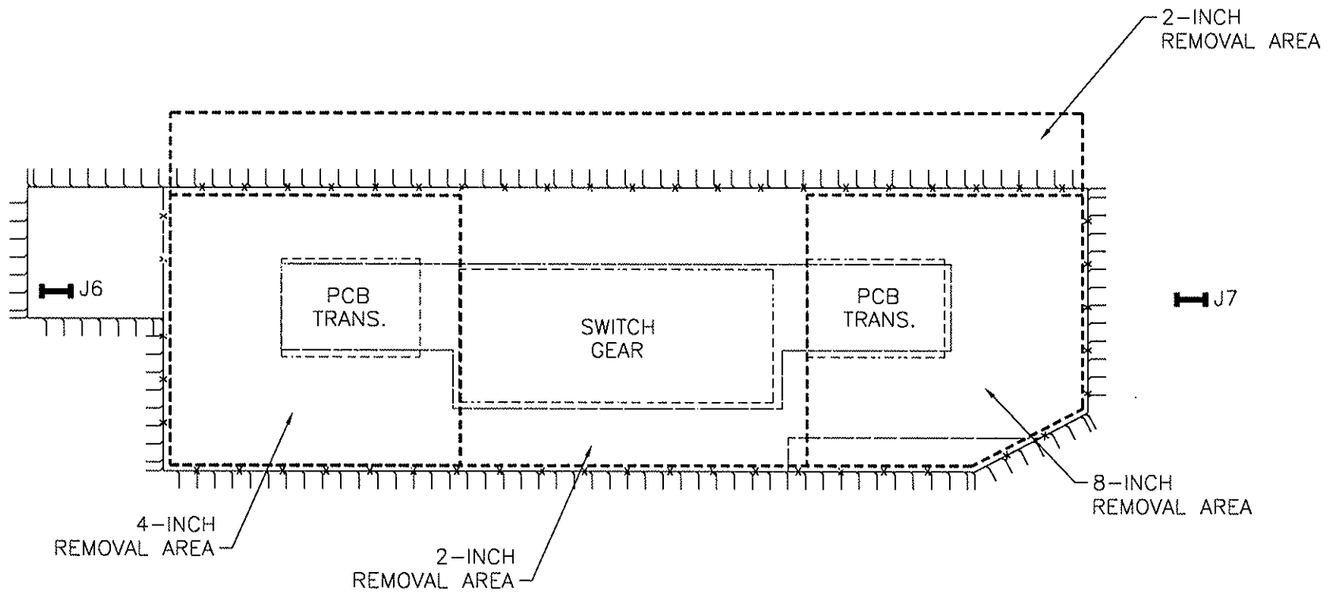

LEGEND

- EXISTING FENCING
- COLUMN LOCATION
- WOOD BLOCK/ASPHALT BLOCK FLOORING
- CONCRETE
- EQUIPMENT TO REMAIN
- EQUIPMENT TO BE REMOVED (BY OTHERS)
- LIMITS OF WOOD BLOCK REMOVAL/RESTORATION
- LIMITS OF CONCRETE REMOVAL/RESTORATION

NOTE: FIGURE GENERATED FROM BB&L FIGURE 2
PCB TRANSFORMER CHANGEOUT PROGRAM-
BUILDING TR-1, 7-95.

0 5 10
SCALE IN FEET

FIGURE B-2: SUBSTATION B
APPENDIX A - BLDG TR-1
FLOORING REMOVAL DETAILS (1995)
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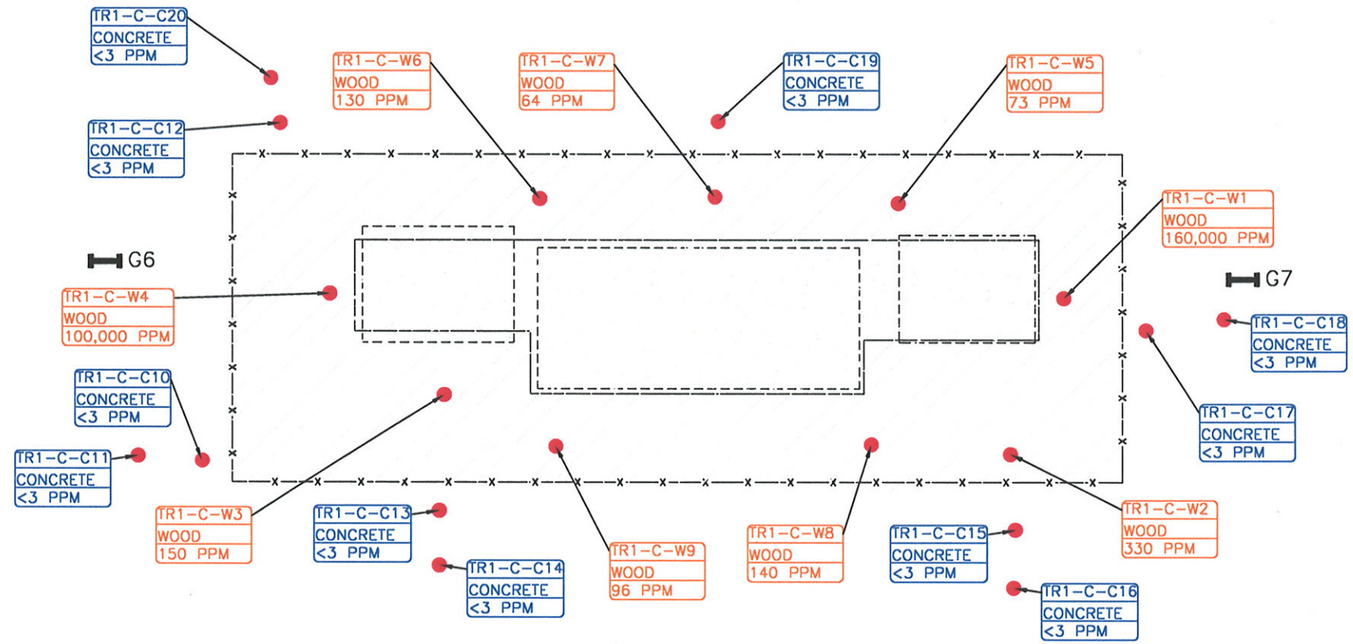
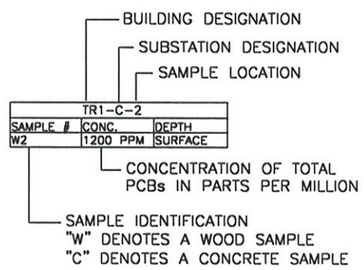


CONCENTRATION OF TOTAL PCBs IN PARTS PER MILLION
AROCLOR 1260

LEGEND

- ——x—— – EXISTING FENCING
- J7 – COLUMN LOCATION
- – WOOD BLOCK/ASPHALT BLOCK FLOORING
- – CONCRETE
- ——— – EQUIPMENT TO REMAIN
- – – – – – – EQUIPMENT TO BE REMOVED

– SIZE OF TRANSFORMERS, AS WELL AS SUBSTATION SPACING SPACING BETWEEN COLUMNS, IS APPROXIMATE



NOTE: FIGURE GENERATED FROM BB&L FIGURE 3
SUBSTATION C PCB ANALYTICAL DATA 6-29-95

0 5 10
SCALE IN FEET

FIGURE C-1: SUBSTATION C
APPENDIX A – BLDG TR-1
REMOVAL ACTION INFORMATION (1995)
SAMPLING RESULTS
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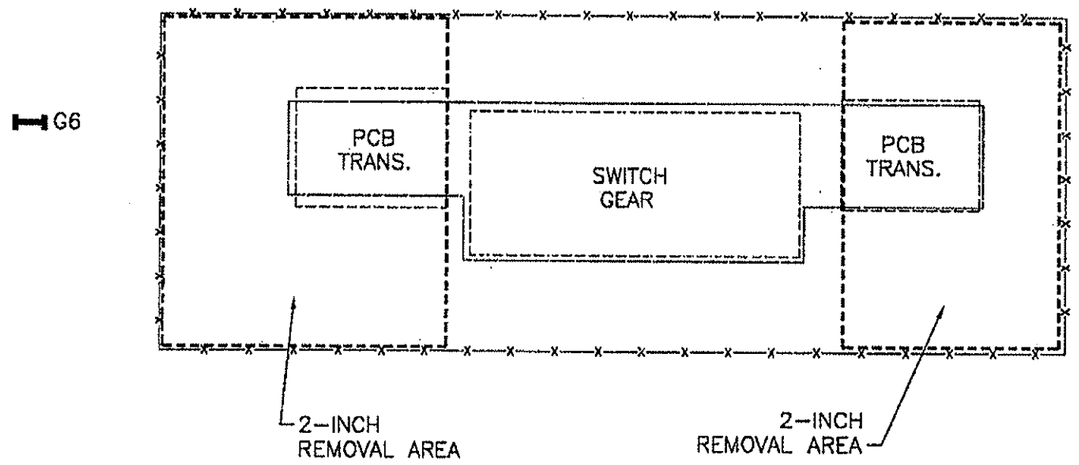

LEGEND

- ——x—— – EXISTING FENCING
- J7 – COLUMN LOCATION
- – WOOD BLOCK/ASPHALT BLOCK FLOORING
- – CONCRETE
- ———— – EQUIPMENT TO REMAIN
- - - - - - – EQUIPMENT TO BE REMOVED

NOTE: FIGURE GENERATED FROM BB&L FIGURE 3
PCB TRANSFORMER CHANGEOUT PROGRAM–
BUILDING TR-1, 7-95

0 5 10
SCALE IN FEET

FIGURE C-2: SUBSTATION C
APPENDIX A – BLDG TR-1
FLOORING REMOVAL DETAILS (1995)
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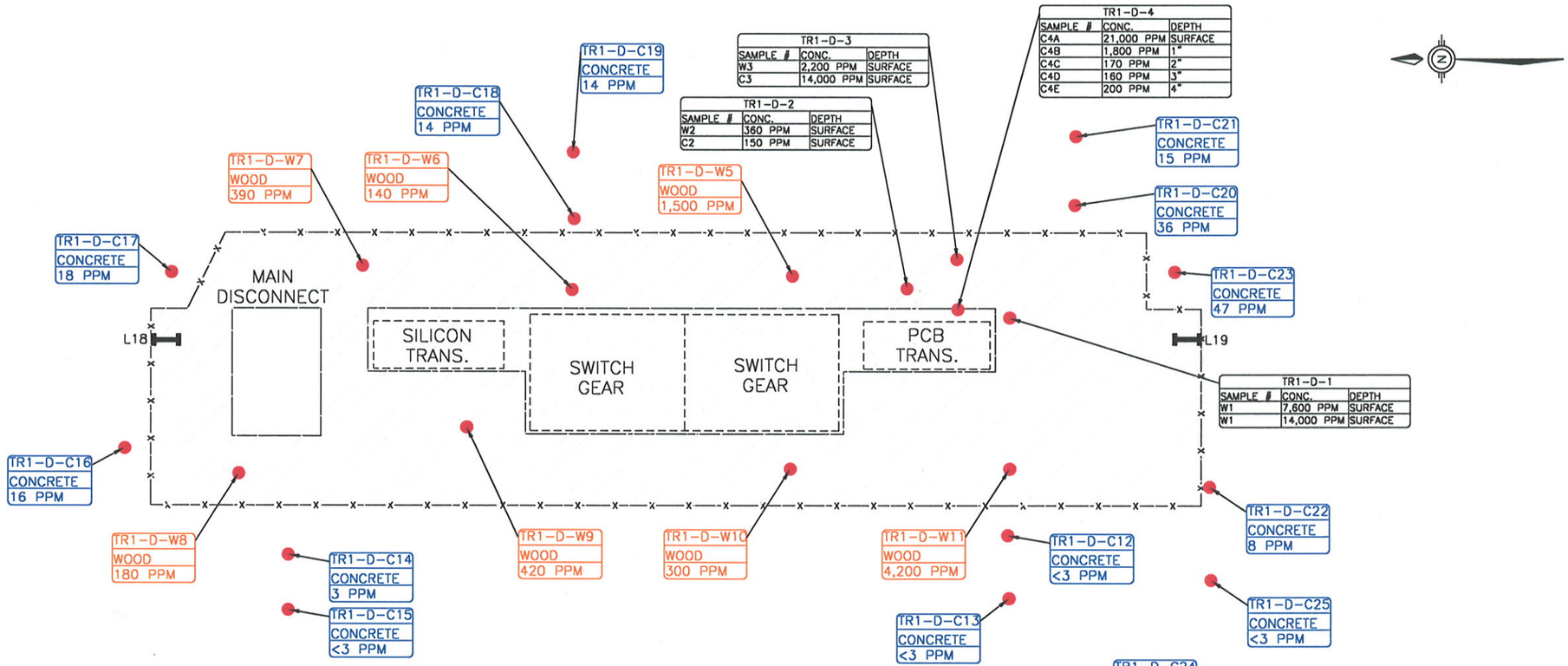


TR1-D-4

SAMPLE #	CONC.	DEPTH
C4A	21,000 PPM	SURFACE
C4B	1,800 PPM	1"
C4C	170 PPM	2"
C4D	160 PPM	3"
C4E	200 PPM	4"

TR1-D-3

SAMPLE #	CONC.	DEPTH
W3	2,200 PPM	SURFACE
C3	14,000 PPM	SURFACE

TR1-D-2

SAMPLE #	CONC.	DEPTH
W2	360 PPM	SURFACE
C2	150 PPM	SURFACE

TR1-D-1

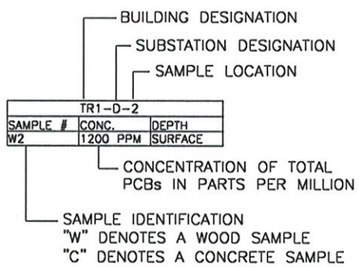
SAMPLE #	CONC.	DEPTH
W1	7,600 PPM	SURFACE
W1	14,000 PPM	SURFACE

CONCENTRATION OF TOTAL PCBs IN PARTS PER MILLION
AROCLOR 1260

LEGEND

- —x— – EXISTING FENCING
- J7 – COLUMN LOCATION
- – WOOD BLOCK/ASPHALT BLOCK FLOORING
- – CONCRETE
- ——— – EQUIPMENT TO REMAIN
- – – – – – – EQUIPMENT TO BE REMOVED

– SIZE OF TRANSFORMERS, AS WELL AS SUBSTATION SPACING SPACING BETWEEN COLUMNS, IS APPROXIMATE



NOTE: FIGURE GENERATED FROM BB&L FIGURE 4
SUBSTATION D PCB ANALYTICAL DATA 6-29-95

0 5 10
SCALE IN FEET

FIGURE D-1: SUBSTATION D
APPENDIX A – BLDG TR-1
REMOVAL ACTION INFORMATION(1995)
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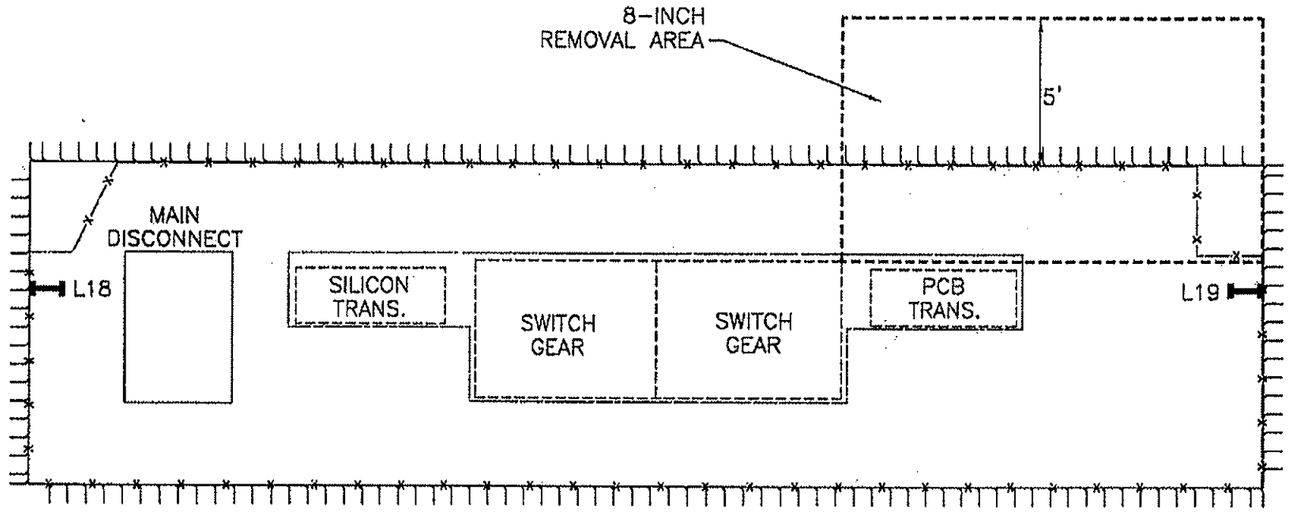

LEGEND

——x—— – EXISTING FENCING

J7 – COLUMN LOCATION

– WOOD BLOCK/ASPHALT BLOCK FLOORING

– CONCRETE

——— – EQUIPMENT TO REMAIN

- - - - - - – EQUIPMENT TO BE REMOVED

NOTE: FIGURE GENERATED FROM BB&L FIGURE 3
PCB TRANSFORMER CHANGEOUT PROGRAM–
BUILDING TR-1, 7-95

0 5 10
SCALE IN FEET

FIGURE D-2: SUBSTATION D
APPENDIX A – BLDG TR-1
FLOORING REMOVAL DETAILS (1995)
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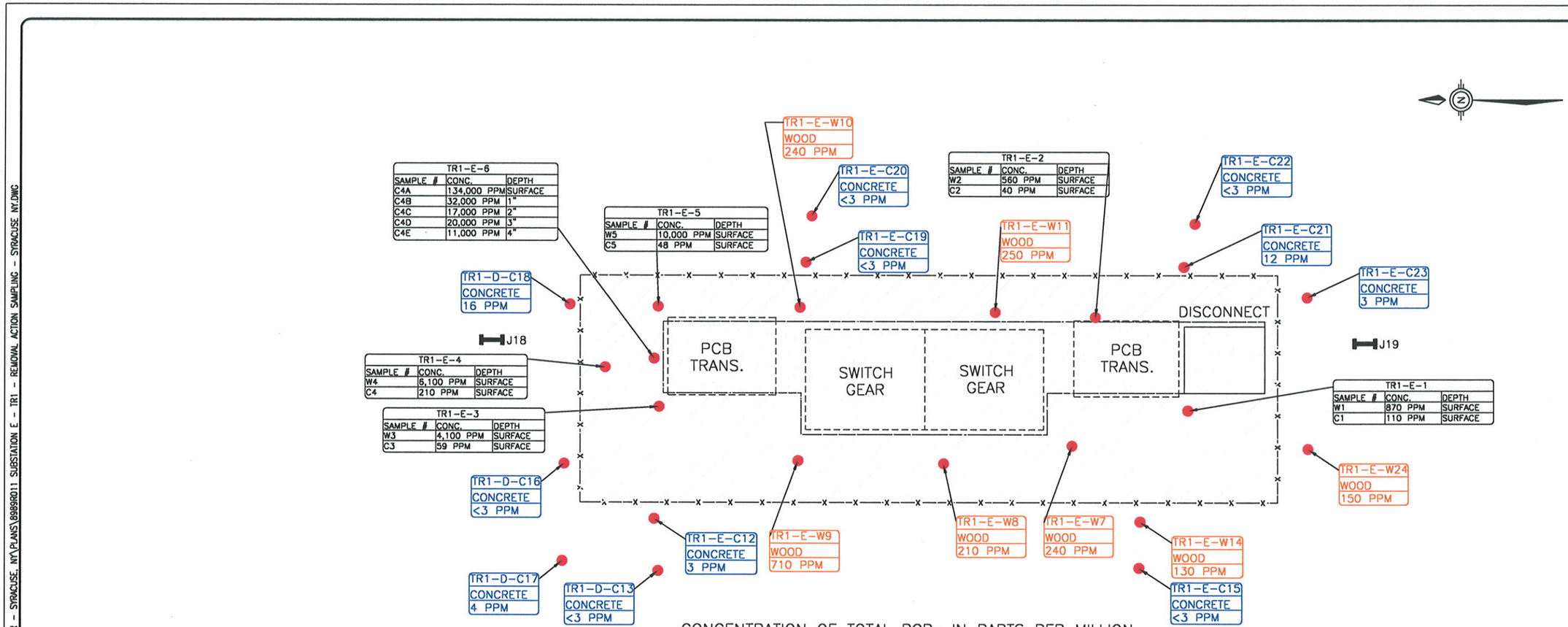
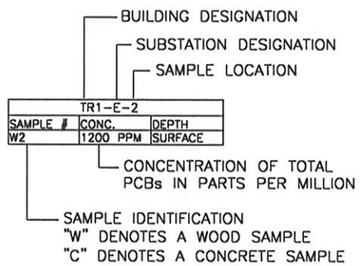


CONCENTRATION OF TOTAL PCBs IN PARTS PER MILLION
AROCLOR 1260

LEGEND

- ——x—— – EXISTING FENCING
- J7 – COLUMN LOCATION
- – WOOD BLOCK/ASPHALT BLOCK FLOORING
- – CONCRETE
- ——— – EQUIPMENT TO REMAIN
- - - - - - – EQUIPMENT TO BE REMOVED
- – SIZE OF TRANSFORMERS, AS WELL AS SUBSTATION SPACING SPACING BETWEEN COLUMNS, IS APPROXIMATE



NOTE: FIGURE GENERATED FROM BB&L FIGURE 5
SUBSTATION E PCB ANALYTICAL DATA 6-29-95

0 5 10
SCALE IN FEET

FIGURE E-1: SUBSTATION E
APPENDIX A – BLDG TR-1
REMOVAL ACTION INFORMATION (1995)
SAMPLING RESULTS
CARRIER FACILITY, THOMPSON ROAD
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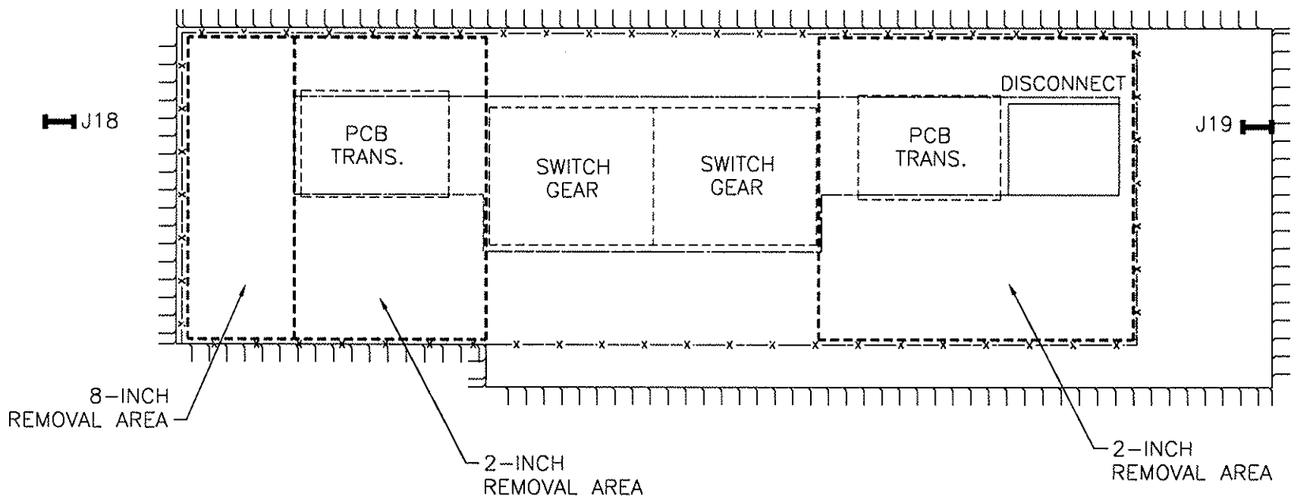

LEGEND

- EXISTING FENCING
- L7 – COLUMN LOCATION
- WOOD BLOCK/ASPHALT BLOCK FLOORING
- CONCRETE
- EQUIPMENT TO REMAIN
- EQUIPMENT TO BE REMOVED (BY OTHERS)
- LIMITS OF WOOD BLOCK REMOVAL/RESTORATION
- LIMITS OF CONCRETE REMOVAL/RESTORATION

NOTE: FIGURE GENERATED FROM BB&L FIGURE 5 PCB TRANSFORMER CHANGEOUT PROGRAM– BUILDING TR–1, 7–95.

0 5 10
SCALE IN FEET

FIGURE E–2: SUBSTATION E
APPENDIX A – BLDG TR–1
FLOORING REMOVAL DETAILS (1995)
CARRIER FACILITY, THOMPSON ROAD
SYRACUSE, NEW YORK

REQUESTED BY:	M.H.
DRAWN BY:	E.R.
DWG DATE:	08/24/2010
DWG NO:	8989R012

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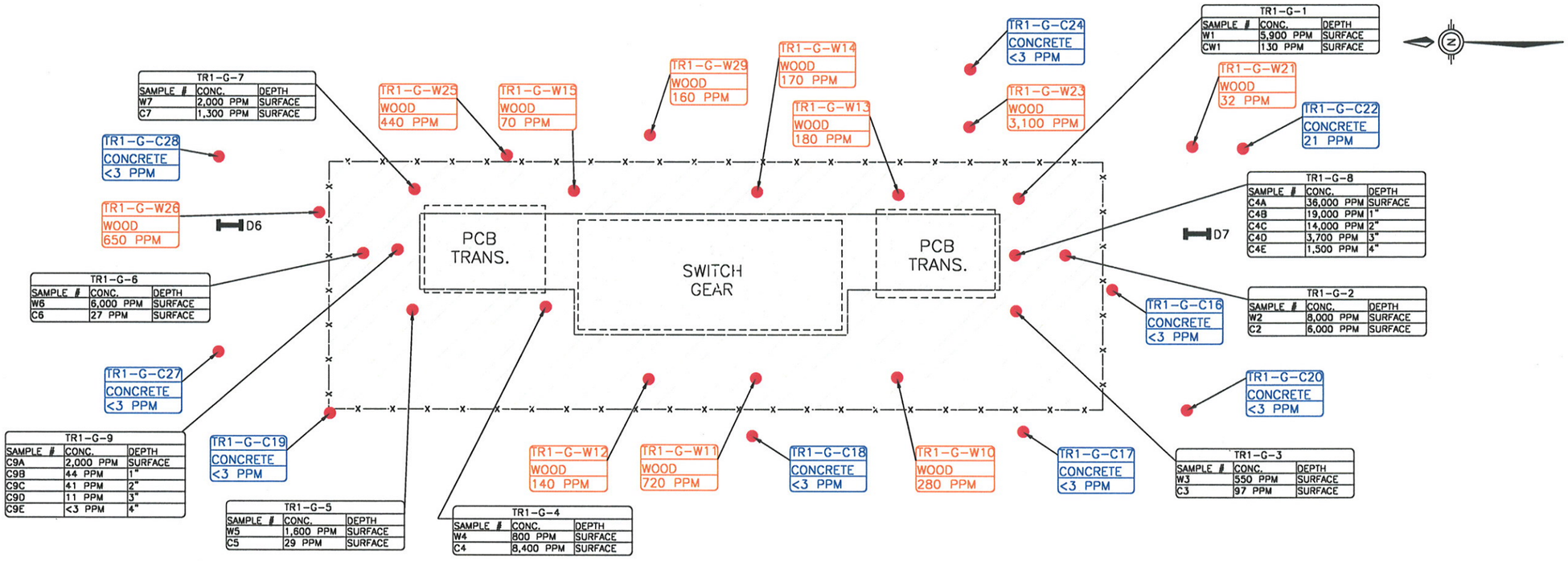
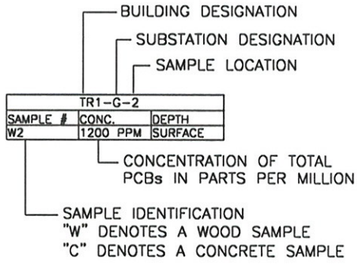


CONCENTRATION OF TOTAL PCBs IN PARTS PER MILLION
AROCLOR 1260

LEGEND

- x - EXISTING FENCING
- J7 - COLUMN LOCATION
- WOOD BLOCK/ASPHALT BLOCK FLOORING
- CONCRETE
- EQUIPMENT TO REMAIN
- EQUIPMENT TO BE REMOVED

- SIZE OF TRANSFORMERS, AS WELL AS SUBSTATION SPACING SPACING BETWEEN COLUMNS, IS APPROXIMATE



NOTE: FIGURE GENERATED FROM BB&L FIGURE 6
SUBSTATION G PCB ANALYTICAL DATA 6-29-95

0 5 10
SCALE IN FEET

FIGURE G-1: SUBSTATION G
APPENDIX A - BLDG TR-1
REMOVAL ACTION INFORMATION
SAMPLING RESULTS (1995)
CARRIER FACILITY, THOMPSON ROAD
SYRACUSE, NEW YORK

REQUESTED BY:	M.H.
DRAWN BY:	E.R.
DWG DATE:	08/24/2010
DWG NO:	8989R015

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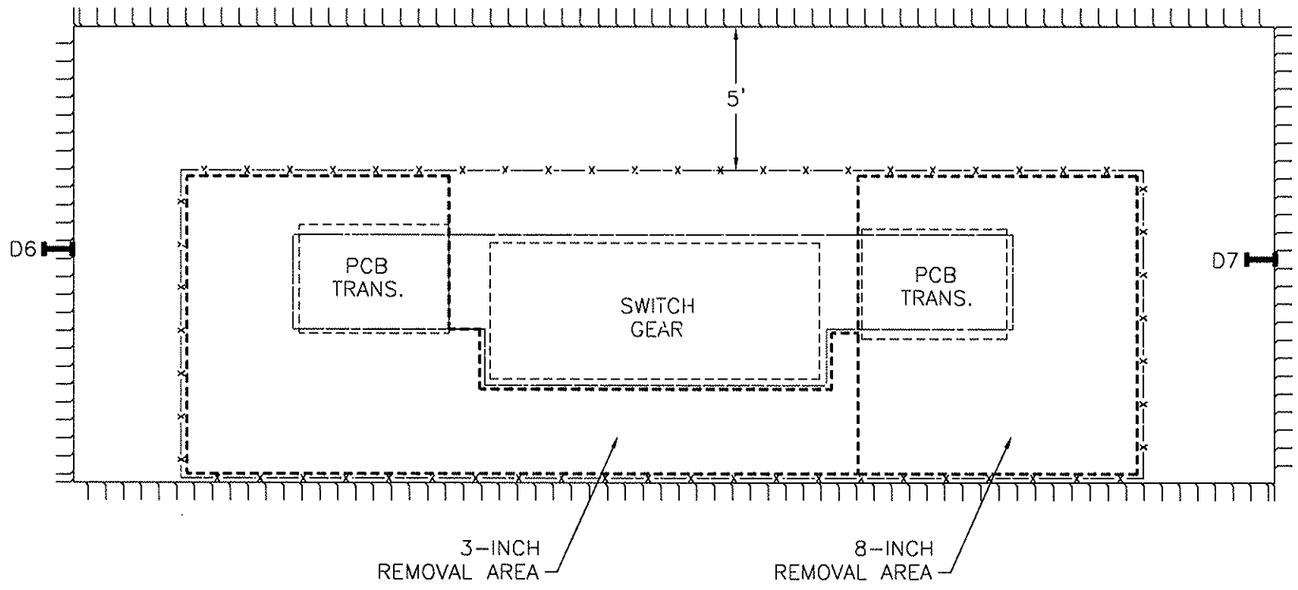

LEGEND

- EXISTING FENCING
- L7 – COLUMN LOCATION
- WOOD BLOCK/ASPHALT BLOCK FLOORING
- CONCRETE
- EQUIPMENT TO REMAIN
- EQUIPMENT TO BE REMOVED (BY OTHERS)
- LIMITS OF WOOD BLOCK REMOVAL/RESTORATION
- LIMITS OF CONCRETE REMOVAL/RESTORATION

NOTE: FIGURE GENERATED FROM BB&L FIGURE 6
PCB TRANSFORMER CHANGEOUT PROGRAM–
BUILDING TR–1, 7–95.

0 5 10
SCALE IN FEET

FIGURE G–2: SUBSTATION G
APPENDIX A – BLDG TR–1
FLOORING REMOVAL DETAILS (1995)
CARRIER FACILITY, THOMPSON ROAD
SYRACUSE, NEW YORK

REQUESTED BY:	M.H.
DRAWN BY:	E.R.
DWG DATE:	08/24/2010
DWG NO:	8989R013

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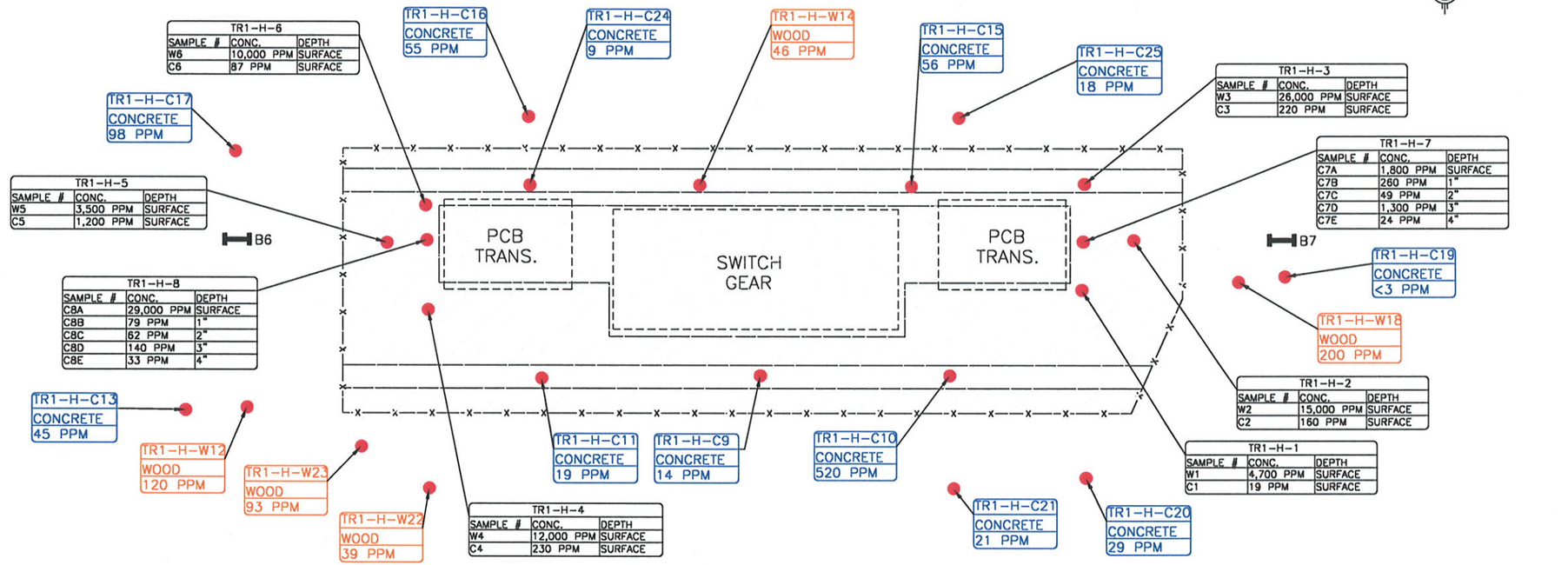
L:\2010 PROJECTS (BSTL) UTC CARRIER - SYRACUSE, NY MASTER FILE\8989 UTC - CARRIER - SYRACUSE, NY\PLANS\8989R013 SUBSTATION G - TR1 - FLOORING REMOVAL DETAILS - SYRACUSE NY.DWG



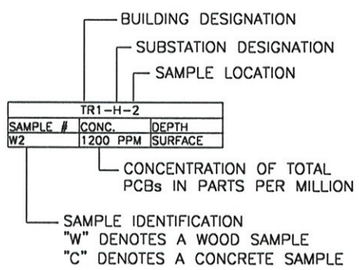
CONCENTRATION OF TOTAL PCBs IN PARTS PER MILLION
AROCLOR 1260

LEGEND

- EXISTING FENCING
- J7 – COLUMN LOCATION
- WOOD BLOCK/ASPHALT BLOCK FLOORING
- CONCRETE
- EQUIPMENT TO REMAIN
- EQUIPMENT TO BE REMOVED

– SIZE OF TRANSFORMERS, AS WELL AS SUBSTATION SPACING SPACING BETWEEN COLUMNS, IS APPROXIMATE

NOTE: FIGURE GENERATED FROM BB&L FIGURE 7
SUBSTATION H PCB ANALYTICAL DATA 6-29-95



0 5 10
SCALE IN FEET

FIGURE H-1: SUBSTATION H
APPENDIX A – BLDG TR-1
REMOVAL ACTION INFORMATION
SAMPLING RESULTS (1995)
CARRIER FACILITY, THOMPSON ROAD
SYRACUSE, NEW YORK

REQUESTED BY:	M.H.
DRAWN BY:	E.R.
DWG DATE:	08/24/2010
DWG NO:	8989R016

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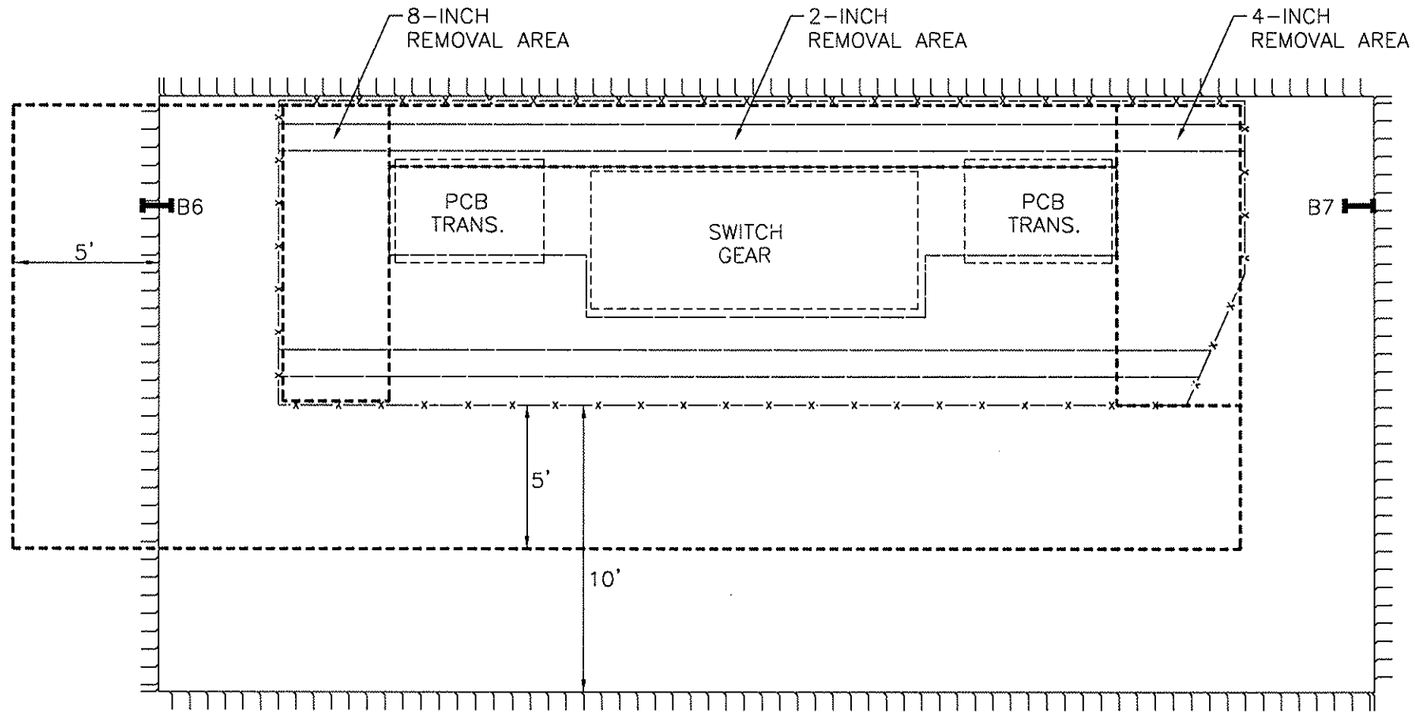

LEGEND

- EXISTING FENCING
- L7 – COLUMN LOCATION
- WOOD BLOCK/ASPHALT BLOCK FLOORING
- CONCRETE
- EQUIPMENT TO REMAIN
- EQUIPMENT TO BE REMOVED (BY OTHERS)
- LIMITS OF WOOD BLOCK REMOVAL/RESTORATION
- LIMITS OF CONCRETE REMOVAL/RESTORATION

NOTE: FIGURE GENERATED FROM BB&L FIGURE 7
PCB TRANSFORMER CHANGEOUT PROGRAM–
BUILDING TR-1, 7-95.

0 5 10
SCALE IN FEET

FIGURE H-2: SUBSTATION H
APPENDIX A – BLDG TR-1
FLOORING REMOVAL DETAILS (1995)
CARRIER FACILITY, THOMPSON ROAD
SYRACUSE, NEW YORK

REQUESTED BY:	M.H.
DRAWN BY:	E.R.
DWG DATE:	08/24/2010
DWG NO:	8989R014

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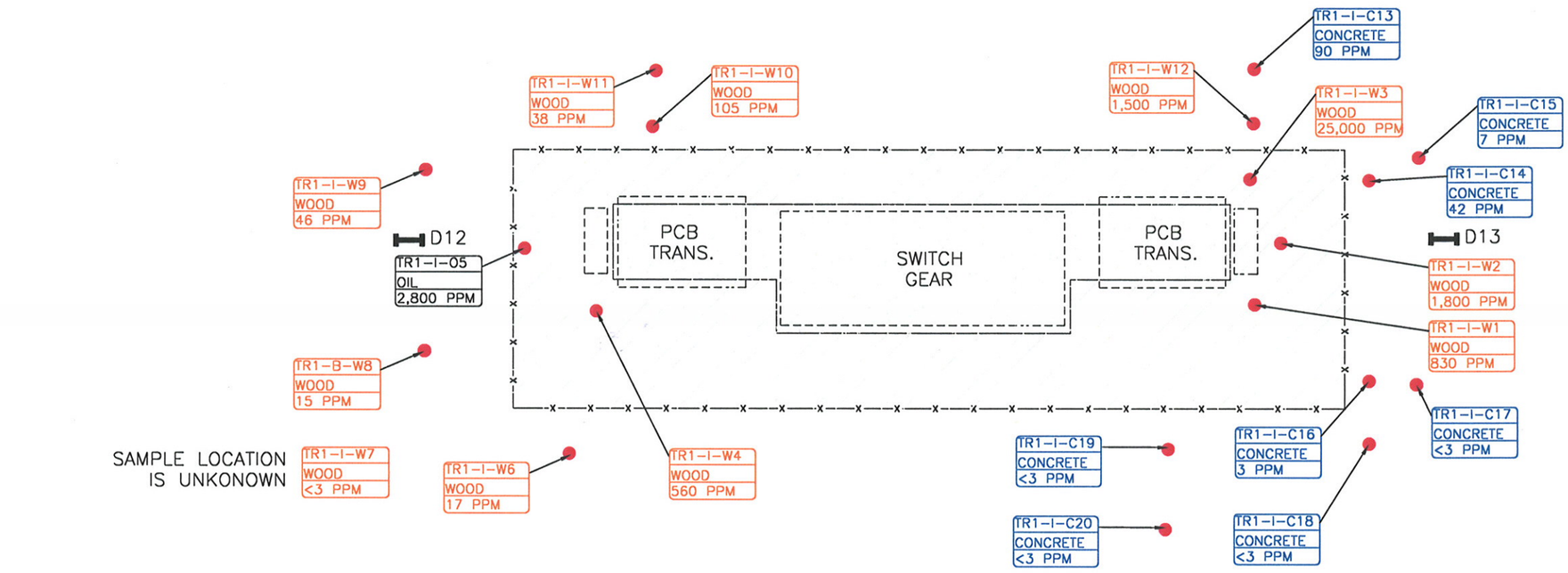
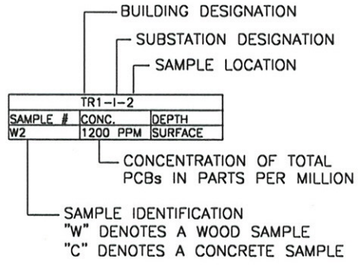


CONCENTRATION OF TOTAL PCBs IN PARTS PER MILLION
AROCLOR 1260

LEGEND

——x—— – EXISTING FENCING
J7 – COLUMN LOCATION
– WOOD BLOCK/ASPHALT BLOCK FLOORING
– CONCRETE
——— – EQUIPMENT TO REMAIN
– – – – – – – EQUIPMENT TO BE REMOVED

– SIZE OF TRANSFORMERS, AS WELL AS SUBSTATION SPACING SPACING BETWEEN COLUMNS, IS APPROXIMATE



NOTE: FIGURE GENERATED FROM BB&L FIGURE 11
SUBSTATION I PCB ANALYTICAL DATA 6-29-95

0 5 10
SCALE IN FEET

FIGURE I-1: SUBSTATION I
APPENDIX A – BLDG TR-1
REMOVAL ACTION INFORMATION
SAMPLING RESULTS (1995)
CARRIER FACILITY, THOMPSON ROAD
SYRACUSE, NEW YORK

REQUESTED BY:	M.H.
DRAWN BY:	E.R.
DWG DATE:	08/24/2010
DWG NO:	8989R028

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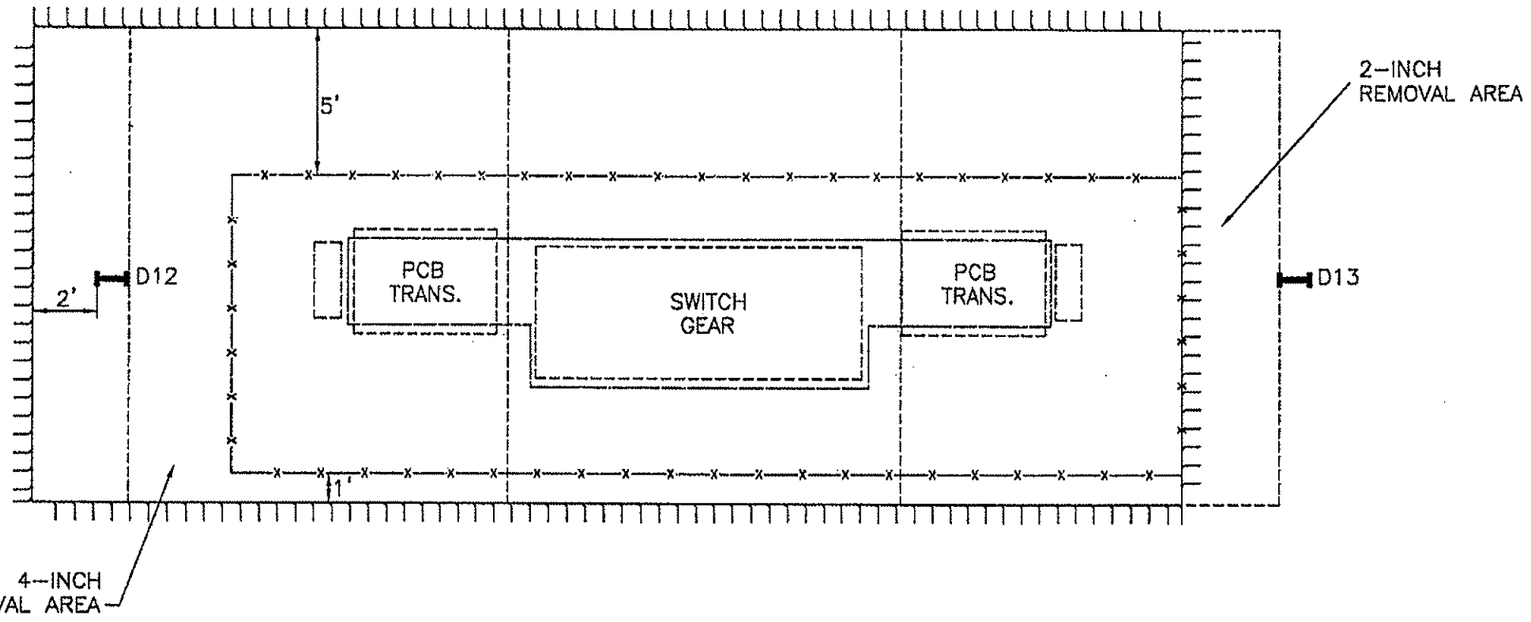

LEGEND

- EXISTING FENCING
- J7 – COLUMN LOCATION
- WOOD BLOCK/ASPHALT BLOCK FLOORING
- CONCRETE
- EQUIPMENT TO REMAIN
- EQUIPMENT TO BE REMOVED

NOTE: FIGURE GENERATED FROM BB&L FIGURE 3
PCB TRANSFORMER CHANGEOUT PROGRAM–
BUILDING TR-1, 7-95

0 5 10
SCALE IN FEET

FIGURE 1-2: SUBSTATION I
APPENDIX A – BLDG TR-1
FLOORING REMOVAL DETAILS (1995)
CARRIER FACILITY, THOMPSON ROAD
SYRACUSE, NEW YORK

REQUESTED BY:	M.H.
DRAWN BY:	E.R.
DWG DATE:	08/24/2010
DWG NO:	8989R025

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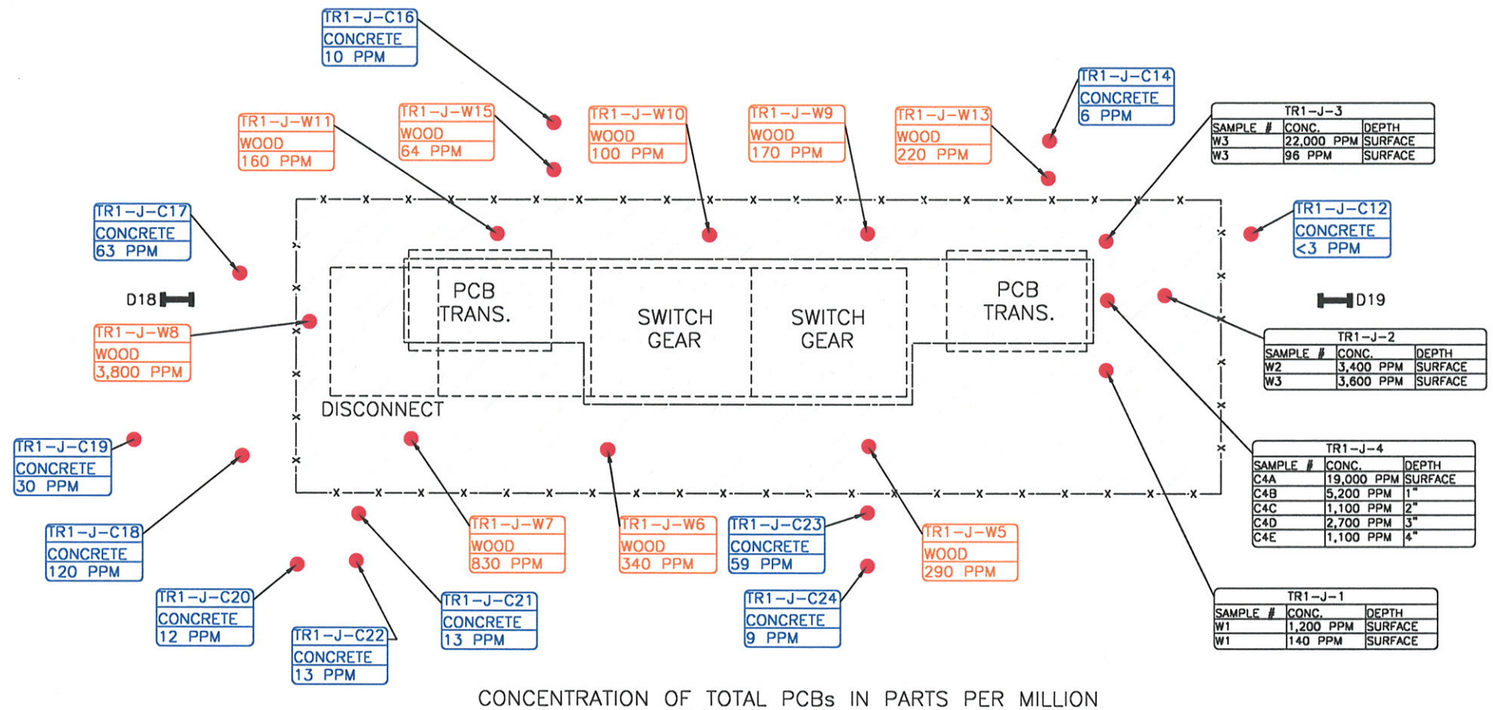


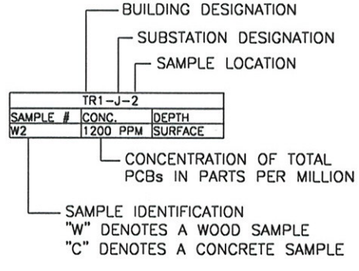
CONCENTRATION OF TOTAL PCBs IN PARTS PER MILLION
AROCLOR 1260

LEGEND

——x—— – EXISTING FENCING
J7 – COLUMN LOCATION
– WOOD BLOCK/ASPHALT BLOCK FLOORING
– CONCRETE
——— – EQUIPMENT TO REMAIN
- - - - - - – EQUIPMENT TO BE REMOVED

– SIZE OF TRANSFORMERS, AS WELL AS SUBSTATION SPACING SPACING BETWEEN COLUMNS, IS APPROXIMATE

NOTE: FIGURE GENERATED FROM BB&L FIGURE 8
SUBSTATION J PCB ANALYTICAL DATA 6-29-95



0 5 10
SCALE IN FEET

FIGURE J-1: SUBSTATION J
APPENDIX A – BLDG TR-1
REMOVAL ACTION INFORMATION
SAMPLING RESULTS (1995)
CARRIER FACILITY, THOMPSON ROAD
SYRACUSE, NEW YORK

REQUESTED BY:	M.H.
DRAWN BY:	E.R.
DWG DATE:	08/24/2010
DWG NO:	8989R017

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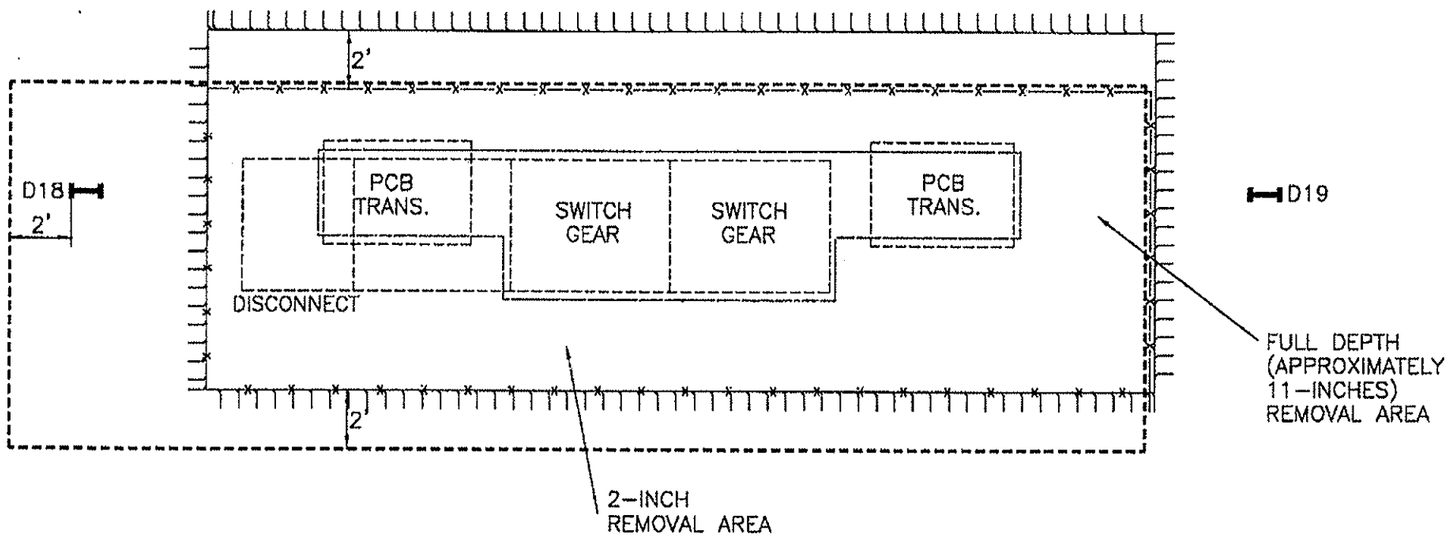

LEGEND

- —x— – EXISTING FENCING
- J7 – COLUMN LOCATION
- – WOOD BLOCK/ASPHALT BLOCK FLOORING
- – CONCRETE
- ——— – EQUIPMENT TO REMAIN
- – – – – – – EQUIPMENT TO BE REMOVED

NOTE: FIGURE GENERATED FROM BB&L FIGURE 3
PCB TRANSFORMER CHANGEOUT PROGRAM-
BUILDING TR-1, 7-95

0 5 10
SCALE IN FEET

FIGURE J-2: SUBSTATION J
APPENDIX A - BLDG TR-1
FLOORING REMOVAL DETAILS (1995)
CARRIER FACILITY, THOMPSON ROAD
SYRACUSE, NEW YORK

REQUESTED BY:	M.H.
DRAWN BY:	E.R.
DWG DATE:	08/24/2010
DWG NO:	8989R026

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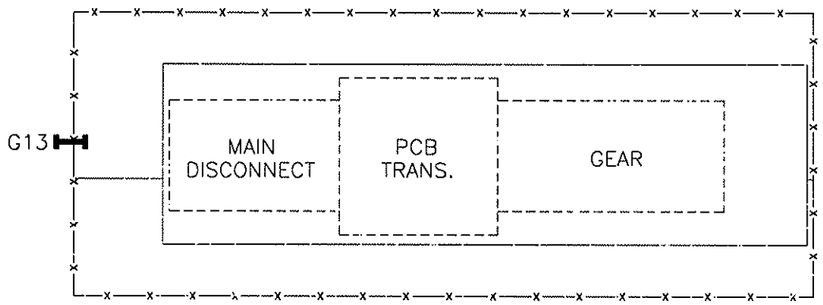

CONCENTRATION OF TOTAL PCBs IN PARTS PER MILLION
AROCLOR 1260

LEGEND

—x— – EXISTING FENCING
J7 – COLUMN LOCATION
– WOOD BLOCK/ASPHALT BLOCK FLOORING
– CONCRETE
——— – EQUIPMENT TO REMAIN
– – – – – – – – – EQUIPMENT TO BE REMOVED

– SIZE OF TRANSFORMERS, AS WELL AS SUBSTATION SPACING SPACING BETWEEN COLUMNS, IS APPROXIMATE

NOTE: FIGURE GENERATED FROM BB&L FIGURE 12
SUBSTATION T1 PCB ANALYTICAL DATA 6-29-95

BUILDING DESIGNATION
SUBSTATION DESIGNATION
SAMPLE LOCATION

TR1-T1-2		
SAMPLE #	CONC.	DEPTH
W2	1200 PPM	SURFACE

CONCENTRATION OF TOTAL PCBs IN PARTS PER MILLION

SAMPLE IDENTIFICATION
"W" DENOTES A WOOD SAMPLE
"C" DENOTES A CONCRETE SAMPLE

0 5 10
SCALE IN FEET

FIGURE T1-1: SUBSTATION T1
APPENDIX A – BLDG TR-1
FLOORING REMOVAL DETAILS (1995)
CARRIER FACILITY, THOMPSON ROAD
SYRACUSE, NEW YORK

REQUESTED BY:	M.H.
DRAWN BY:	E.R.
DWG DATE:	08/24/2010
DWG NO:	8989R018

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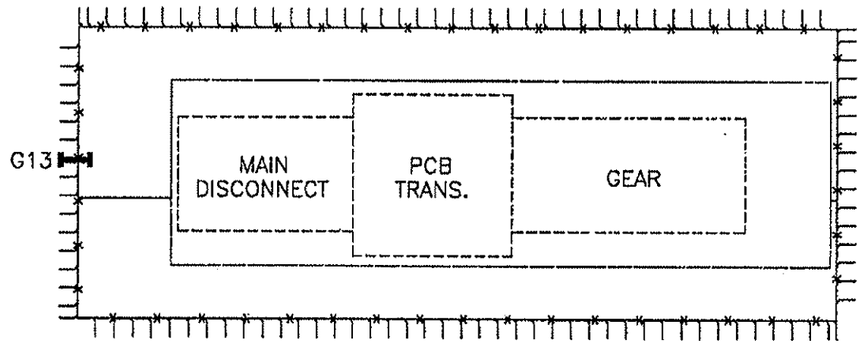

LEGEND

——x—— – EXISTING FENCING

J7 – COLUMN LOCATION

– WOOD BLOCK/ASPHALT BLOCK FLOORING

– CONCRETE

———— – EQUIPMENT TO REMAIN

- - - - - - – EQUIPMENT TO BE REMOVED

NOTE: FIGURE GENERATED FROM BB&L FIGURE 3
PCB TRANSFORMER CHANGEOUT PROGRAM–
BUILDING TR–1, 7–95

0 5 10
SCALE IN FEET

FIGURE T1–2: SUBSTATION T1
APPENDIX A – BLDG TR–1
FLOORING REMOVAL DETAILS (1995)
CARRIER FACILITY, THOMPSON ROAD
SYRACUSE, NEW YORK

REQUESTED BY:	M.H.
DRAWN BY:	E.R.
DWG DATE:	08/24/2010
DWG NO:	8989R027

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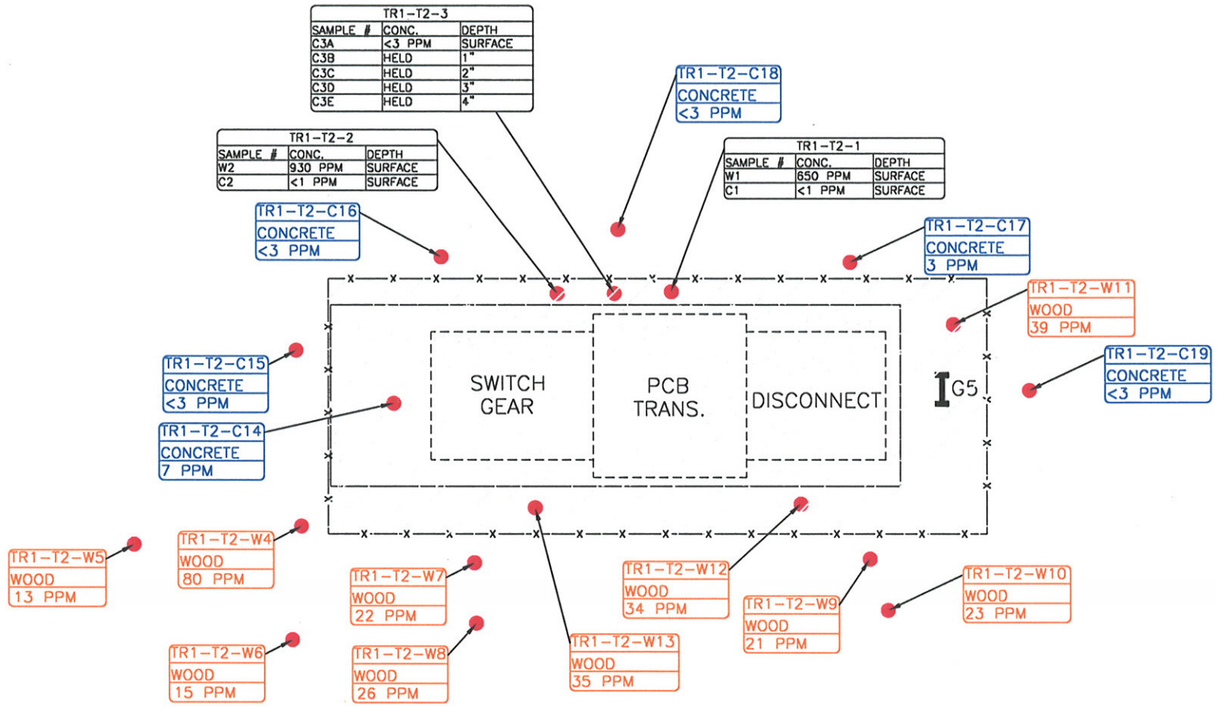
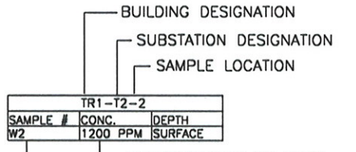


CONCENTRATION OF TOTAL PCBs IN PARTS PER MILLION
AROCLOR 1260

LEGEND

- EXISTING FENCING
- J7 – COLUMN LOCATION
- WOOD BLOCK/ASPHALT BLOCK FLOORING
- CONCRETE
- EQUIPMENT TO REMAIN
- EQUIPMENT TO BE REMOVED
- SIZE OF TRANSFORMERS, AS WELL AS SUBSTATION SPACING SPACING BETWEEN COLUMNS, IS APPROXIMATE



NOTE: FIGURE GENERATED FROM BB&L FIGURE 9
SUBSTATION T2 PCB ANALYTICAL DATA 6-29-95

0 5 10
SCALE IN FEET

FIGURE T2-1: SUBSTATION T2
APPENDIX A – BLDG TR-1
REMOVAL ACTION INFORMATION
SAMPLING RESULTS (1995)
CARRIER FACILITY, THOMPSON ROAD
SYRACUSE, NEW YORK

REQUESTED BY:	M.H.
DRAWN BY:	E.R.
DWG DATE:	08/24/2010
DWG NO:	8989R019

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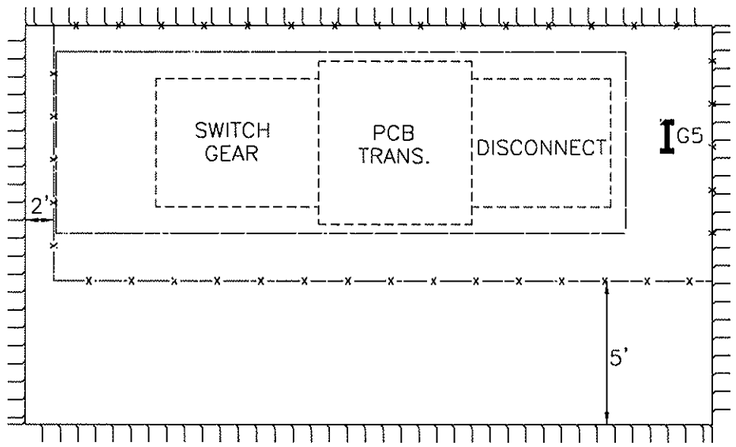

LEGEND

- EXISTING FENCING
- L7 – COLUMN LOCATION
- WOOD BLOCK/ASPHALT BLOCK FLOORING
- CONCRETE
- EQUIPMENT TO REMAIN
- EQUIPMENT TO BE REMOVED (BY OTHERS)
- LIMITS OF WOOD BLOCK REMOVAL/RESTORATION
- LIMITS OF CONCRETE REMOVAL/RESTORATION

NOTE: FIGURE GENERATED FROM BB&L FIGURE 9 PCB TRANSFORMER CHANGEOUT PROGRAM– BUILDING TR–1, 7–95.

0 5 10
SCALE IN FEET

FIGURE T2–2: SUBSTATION T2
APPENDIX A – BLDG TR–1
FLOORING REMOVAL DETAILS (1995)
CARRIER FACILITY, THOMPSON ROAD
SYRACUSE, NEW YORK

REQUESTED BY:	M.H.
DRAWN BY:	E.R.
DWG DATE:	08/24/2010
DWG NO:	8989R020

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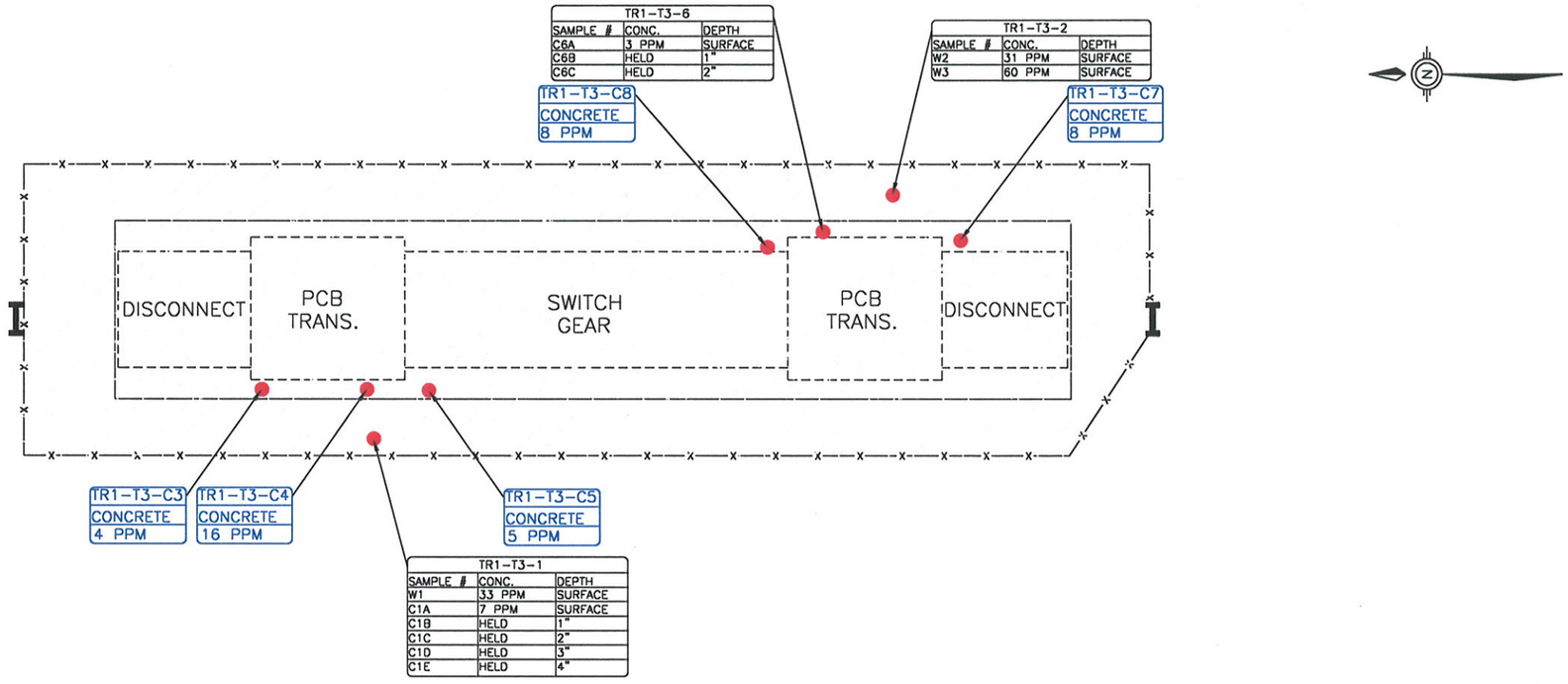
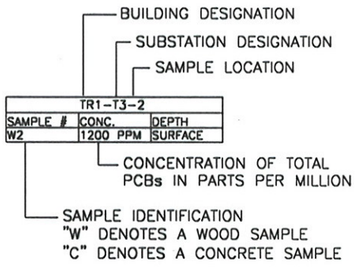


CONCENTRATION OF TOTAL PCBs IN PARTS PER MILLION
AROCLOR 1260

LEGEND

- ——x—— – EXISTING FENCING
- J7 – COLUMN LOCATION
- – WOOD BLOCK/ASPHALT BLOCK FLOORING
- – CONCRETE
- ——— – EQUIPMENT TO REMAIN
- – – – – – – EQUIPMENT TO BE REMOVED

– SIZE OF TRANSFORMERS, AS WELL AS SUBSTATION SPACING SPACING BETWEEN COLUMNS, IS APPROXIMATE



NOTE: FIGURE GENERATED FROM BB&L FIGURE 10
SUBSTATION T3 PCB ANALYTICAL DATA 6-29-95

0 5 10
SCALE IN FEET

FIGURE T3-1: SUBSTATION T3
APPENDIX A – BLDG TR-1
REMOVAL ACTION INFORMATION
SAMPLING RESULTS (1995)
CARRIER FACILITY, THOMPSON ROAD
SYRACUSE, NEW YORK

REQUESTED BY:	M.H.
DRAWN BY:	E.R.
DWG DATE:	08/24/2010
DWG NO:	8989R022

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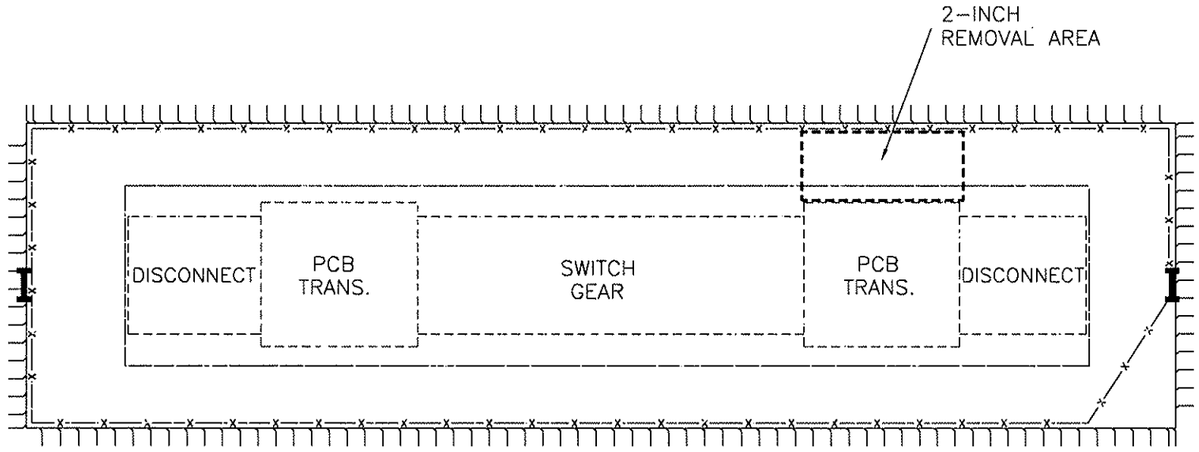

LEGEND

- EXISTING FENCING
- COLUMN LOCATION
- WOOD BLOCK/ASPHALT BLOCK FLOORING
- CONCRETE
- EQUIPMENT TO REMAIN
- EQUIPMENT TO BE REMOVED (BY OTHERS)
- LIMITS OF WOOD BLOCK REMOVAL/RESTORATION
- LIMITS OF CONCRETE REMOVAL/RESTORATION

NOTE: FIGURE GENERATED FROM BB&L FIGURE 10
PCB TRANSFORMER CHANGEOUT PROGRAM-
BUILDING TR-1, 7-95.

0 5 10
SCALE IN FEET

FIGURE T3-2: SUBSTATION T3
APPENDIX A - BLDG TR-1
FLOORING REMOVAL DETAILS (1995)
CARRIER FACILITY, THOMPSON ROAD
SYRACUSE, NEW YORK

REQUESTED BY:	M.H.
DRAWN BY:	E.R.
DWG DATE:	08/24/2010
DWG NO:	8989R021

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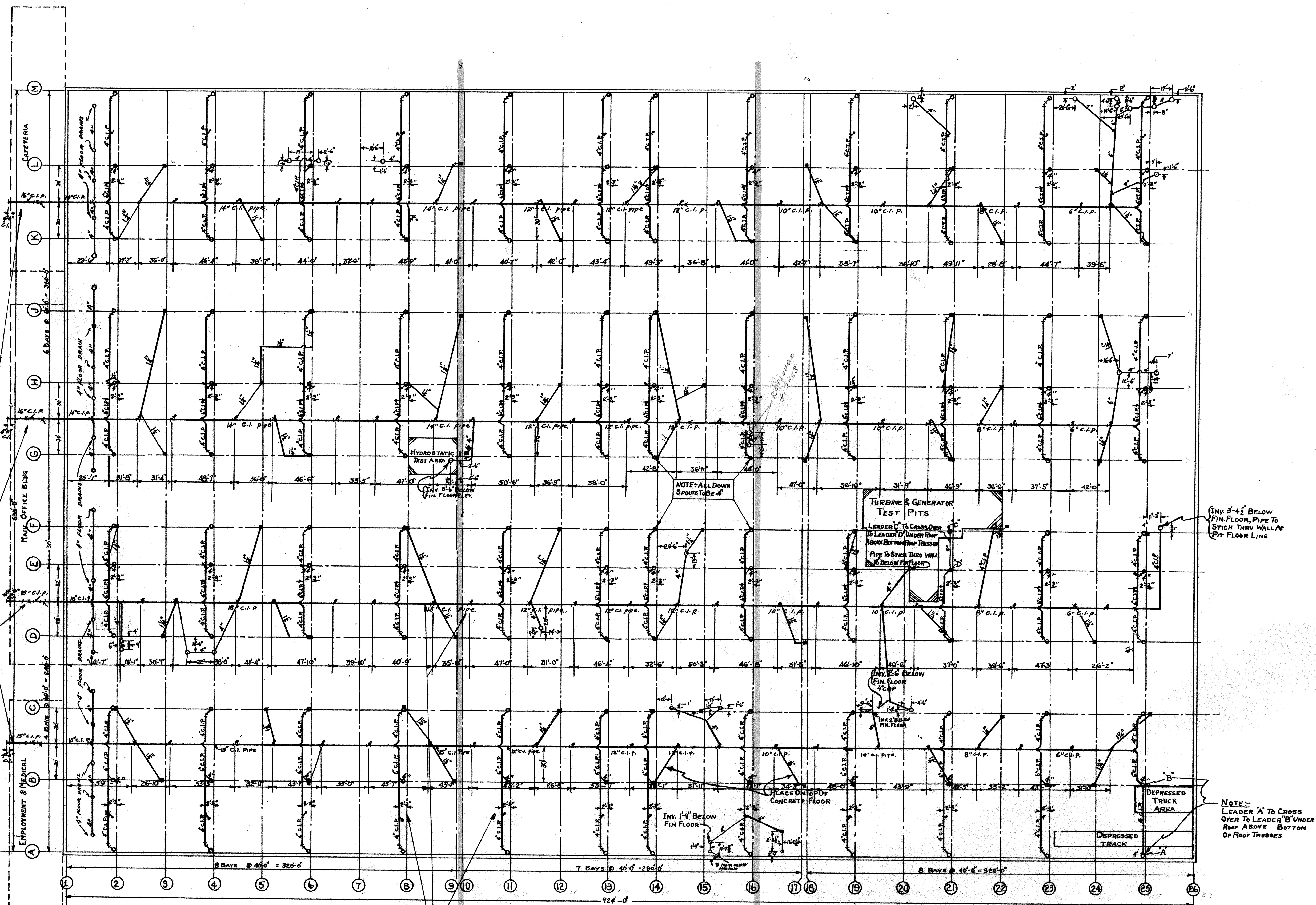
Appendix C
Historical Information, GE Figure



PLAN
SCALE 1/32" = 1FT.

Section 1
48 roof drains

Section 2
48 roof drains

Section 3
48 roof drains

SYMBOLS:-
■ - DRINKING FOUNTAIN
O - ROOF OR MACHINE DRAIN

NOTE:-
FOR LAYOUT OF ACID DRAIN UNDER FLOOR SEE DRAWING B-583

APPROVED FOR DEFENSE PLANT CORPORATION
BY S. Lwittal DATE 4-10-43

APPROVED FOR GENERAL ELECTRIC COMPANY
BY W.W. Finlay DATE 2-23-43

ISSUE No	DRAWN BY	CHECKED BY	INTER. DIV CHECK	DEF PLANT CORP. CHECK	G.E.CO. CHECK	APPROVAL OF ENGINEER	DATE
9	LOCATED ABANDONED DRAIN IN B19					H L BATES (APPROVED)	
5	ADDED DIMENSIONS OF DRAINS F.A.P.	JM				X.R.C.	7/16/42
6	ADDED DIMENSIONS AS NOTED F.A.P.	JM				X.R.C.	7/17/42
7	Added dimensions & relocated branches to conform to as built locations G.V.N.						5/31/43
8	ADDED LINES AT A15 AND C15 HELMINCH						12/20/43

RECORD OF ISSUES AND REVISIONS

ISSUE NO.	DRAWN BY	CHECKED BY	INTER DIV. CHECK	DEF. PLANT CORP. CHECK	G. E. CO. CHECK	APPROVAL OF ENGINEER	DATE
1	R. MC J.F.						5/13/42
2	GENERALLY REVISED F.A.P.	F.X.B.				X.R.C.	6/4/42
3	ADDED NOTE, DEPRESSED & TEST AREAS. F.A.P.	F.X.B.				X.R.C.	6/6/42
4	ADDED DRINKING FOUNTAIN & MACHINE DRAINS F.A.P.	JM				X.R.C.	7/9/42

B-10-9

TURBINE - GENERATOR B'L'D'G
ROOF DRAINAGE PLAN SHOWING UNDERFLOOR LEADER & FACTORY WASTE WATER PIPING.

TURBINE - GENERATOR PLANT - SYRACUSE, NEW YORK
DEFENSE PLANT CORPORATION
GENERAL ELECTRIC COMPANY, LESSEE

THE J. G. WHITE ENGINEERING CORPORATION
80 BROAD ST., NEW YORK

RESIDENT ENGINEER

SCALE 1/32" = 1FT.
DATE 5/13/42

B-10-9

PEP-TI-159-E B-10-9

Appendix D

DPT Soil Sampling Procedures

Hach Immunoassay Method 10050/Field Screening Using DR 2800

DPT Soil Sampling Procedures

DIRECT PUSH TECHNOLOGY (DPT) SAMPLING STEPS

DPT uses percussion hammers and hydraulic slide systems to advance clear plastic acetate liners into the subsurface to collect relatively undisturbed soil samples from selected depths.

These procedures include using DPT methods for boring advancement and sampling to a maximum depth of 4 feet below ground surface or to groundwater, headspace screening, logging, selection of samples for laboratory analysis, and transportation of selected samples to a NYSDEC-certified laboratory under chain-of-custody control. In areas where contamination is observed while drilling, or in areas where deeper contamination is considered more likely (e.g., near the underground storage tanks and septic field), borings will be advanced to deeper depths. Following sample collection, each boring will be abandoned by placing bentonite pellets or chips in the boring and hydrating. Upon sample retrieval, the acetate liner will be cut open lengthwise to allow soil collection for laboratory analysis and for headspace screening using the following procedures:

- The acetate liner will be cut open with a cutting tool.

- Soil will be described and visually classified and logged by a Professional or Registered Geologist.

- Prior to drilling at a particular location, the invert elevation of the storm line at the nearest manhole to the drilling location will be measured. Samples will be collected beginning approximately at the top of the pipe depth over a 2-foot interval. The diameter of the storm line in this area is not expected to exceed 24 inches. If it does, a second 2-foot interval will be sampled, with care to ensure that the bedding material just below the pipe is sampled. Samples will be screened for headspace readings by placing a portion of the soil into a re-sealable plastic bag so that any volatile organic vapors in the soil will collect in the bag. Headspace will then be measured using a photoionization detector (PID) and recorded.

- A second portion of the soil sample will be collected and immediately placed in predetermined, laboratory-cleaned sample containers for potential laboratory analysis.

- The samples will be subsequently placed on ice for preservation and transport to a NYSDEC-certified laboratory under chain-of-custody control.

- Following sample collection, borings will be abandoned by placing bentonite pellets or chips in the each boring and hydrating with water.

BASIC SURFACE SOIL SAMPLING STEPS

Before Sampling:

1. Don personal protective clothing and equipment as required by the site-specific health and safety plan.

2. Stake the location(s) to be sampled. The locations of the soil borings will be determined based on the site-specific SAP.

3. Clear vegetation and debris from the ground surface.

4. Set up a decontamination area for sampling equipment, if required.

During Sampling:

1. Screen breathing zone and/or sample with a PID or flame ionization detector (FID) as necessary.

2. Remove surface debris from the sample location.

3. Use the appropriate decontaminated or disposable sampling device to advance the soil boring and collect the volume of soil needed to fill the sample container(s).

4. Remove the sample from the sampler by pushing or scraping the soil with an appropriate pre-cleaned utensil into a pre-cleaned tray or onto aluminum foil (remove any portion of the sample that has been disturbed and discard).

5. ***For Grab Samples***: Completely fill the sample containers directly from the sampling device, avoiding twigs, large rocks, and grass. Some vegetative matter is expected due to the nature of the sample being collected (i.e. surface soil from 0 to 6 inches). Fill the sample container so there is zero or minimal headspace.

6. ***For Composite Samples***: Follow the appropriate USEPA procedures for collecting composite samples.

7. Secure container with Teflon-lined cap.

8. Label the samples in accordance with SOP FD-01-00.

9. Preserve the samples collected at 4 °C.

10. Decontaminate sampling equipment as needed in accordance with SOP FC-01-00.

11. Describe sample lithology on soil boring logs or in field log book based on field observations.

After Sampling:

1. Backfill the hole with excess cuttings or neat cement grout, or install a well or piezometer as stipulated by the site-specific work plan.

2. Place used plastic sheeting and other disposable sampling equipment in the designated drum for disposal.

3. Record all relevant information in the field logbook before leaving the site.

INVESTIGATION DERIVED WASTES

Investigation derived wastes (IDW) generated during the field activities will be placed in Department of Transportation-approved drums, logged, properly labeled, and stored on the Site. Analytical data from the investigation will be used for characterization, as practicable.

Hach Immunoassay Method 10050/Field Screening Method DR 2800

PCB (Polychlorinated Biphenyls)

Method 10050

Immunoassay Method[1]

Scope and Application: For soil

[1] This test is semi-quantitative. Results are expressed as greater or less than the threshold value used.

Test Preparation

This method analyzes for PCB that has been extracted from soil samples. Sample extracts, calibrators, and reagents are added to cuvettes coated with PCB-specific antibodies. The color that develops is then measured and compared with the color measurements of the calibrators. The test requires about 20 minutes for complete analysis. As many as 10 cuvettes can be run simultaneously.

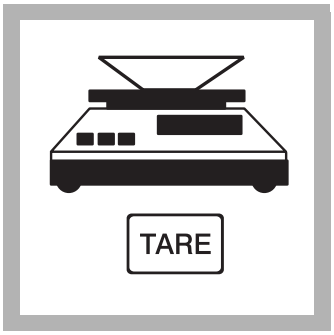
Before starting the test:

Read the entire procedure before starting. Identify and make ready all the necessary reagents, cuvettes, and other apparatus before beginning the analysis.
Timing is critical; follow instructions carefully.
A consistent technique when mixing the cuvettes is critical to this test. The best results come from using the cuvette rack and mixing as described in Using the 1-cm MicroCuvette Rack on page 6. Cuvettes can be mixed individually, but test results may not be as consistent.
Handle the cuvettes carefully. Scratches on the inside or outside may cause erroneous results. Carefully clean the outside of the cuvettes with a clean absorbent cloth or tissue before placing them into the instrument.
Antibody cuvettes and enzyme conjugate are made in matched lots. Do not mix reagent lots.
To avoid damaging the Color Developing Solution, do not expose it to direct sunlight.
There are two protocols in this procedure, one for levels of 1 ppm and 5 ppm, and another for 10 ppm and 50 ppm. Each uses a different quantity of calibrator and sample extract See PCB Protocols on page 5 for more information.
Store the reagents at 4 °C when they are not in use. Allow the reagents to reach room temperature before using them in an analysis. Actual testing may be done at temperatures ranging from 1– 38 °C.
The Soil Extractant contains methyl alcohol which is poisonous and flammable. Before using this and other reagents, read the Material Safety Data Sheet (MSDS) for proper use of protective equipment and other safety information.
Protective nitrile gloves are recommended for this procedure.

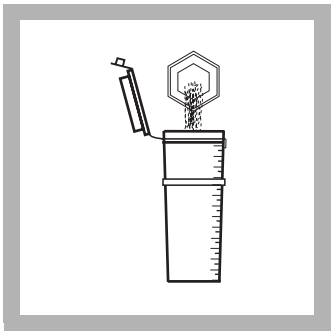
Collect the following items	Quantity
PCB Reagent Set	1
Water, deionized	varies
Caps, flip spout	1
Marker, laboratory	1
Rack, for 1-cm Micro Cuvettes	1
Wipes, disposable	1
Pipet, TenSette®, 0.1–1.0 mL and pipet tips	1
Soil Extraction Kit and Soil Scoop	1

Note: *Reorder information for consumables and replacement items is on page 9.*

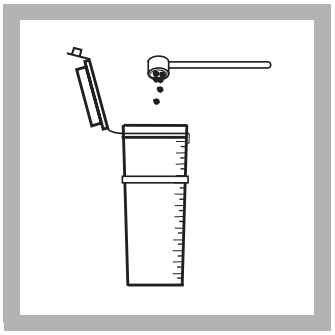
Soil Extraction Procedure



1. Weigh out 5 g of soil in the plastic weighing boat.

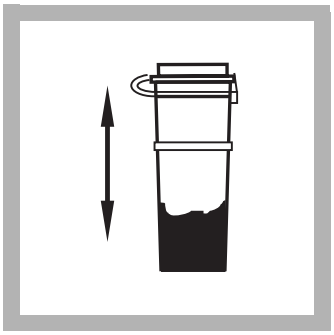


2. Carefully pour the soil into an extraction vial.



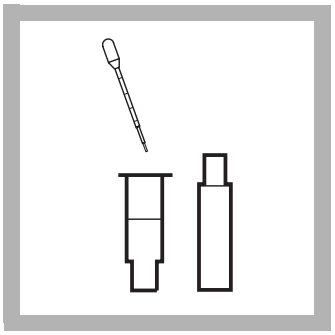
3. Use the 5-gram scoop to add one scoop of sodium sulfate to the extraction vial.

4. Use the graduated cylinder to transfer 10 mL of Soil Extractant into the extraction vial.



5. Cap the extraction vial tightly and shake vigorously for one minute.

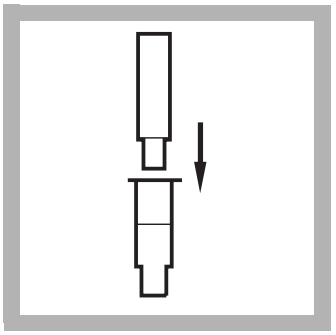
6. Allow to settle for at least one minute. Carefully open the extraction vial.



7. Using the disposable bulb pipet, withdraw 1.0–1.5 mL from the liquid layer at the top of the extraction vial.

Transfer it into the filtration barrel (the bottom part of the filtering assembly into which the plunger inserts).

Do not use more than 1.5 mL. The bulb is marked in 0.25-mL increments.

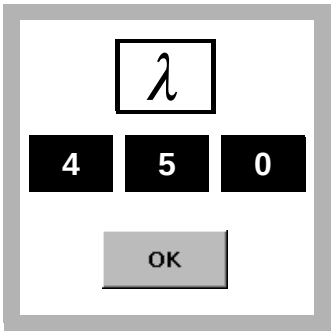


8. Insert the filtration plunger into the filtration barrel. Press firmly on the plunger until the sample extract is forced upward into the center of the plunger.

Use the resultant filtrate for the immunoassay in the Immunoassay for Soil Extracts on page 3.

It may be necessary to place the filtration assembly on a table and press down on the plunger.

Immunoassay for Soil Extracts

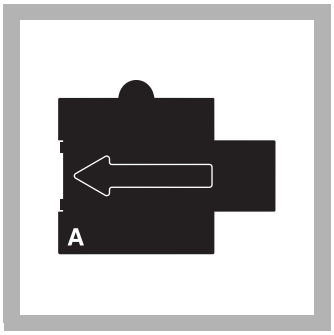


1. Press

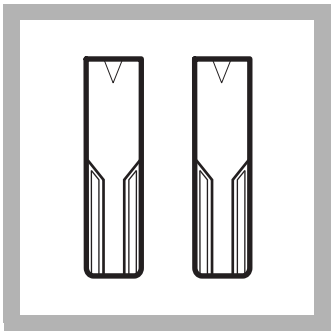
SINGLE WAVELENGTH

Press **OPTIONS** and press the λ button. Type in

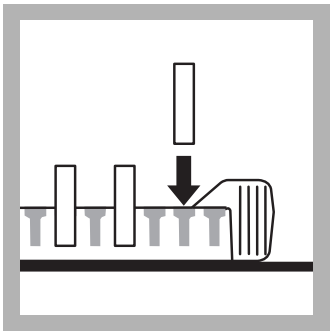
450 nm and press **OK.**



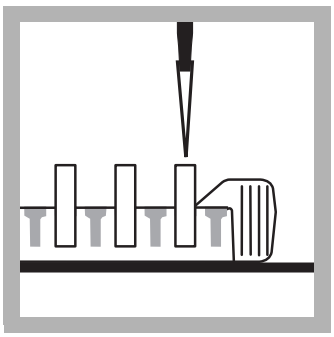
2. Insert Adapter A.



3. Label an Antibody Cuvette for each calibrator and each sample to be tested.

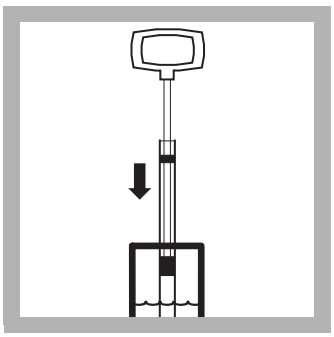


4. Insert the cuvettes into the rack snugly.



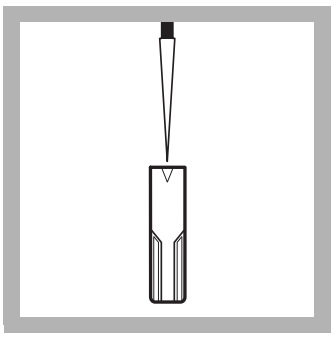
5. Pipet 0.5 mL of each Diluent Solution into the appropriately labeled cuvette.

Use a new pipette tip for each calibrator.
Important Note: *Have the necessary apparatus at hand for the next four steps; they must be done without delay.*

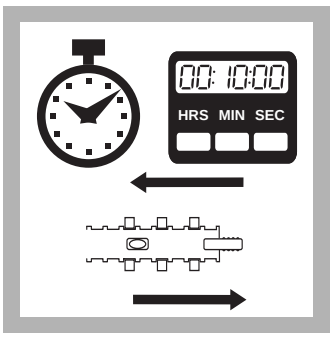


6. Use a Wiretrol® pipet to transfer the appropriate volume of calibrator or sample extract into each cuvette (see Table 1 on page 5).

Use a separate capillary tube for each solution.

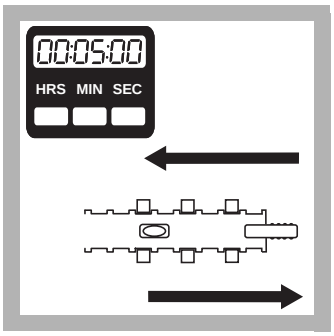


7. Immediately pipet 0.5 mL of PCB Enzyme Conjugate into each calibrator and sample cuvette. The same pipette tip can be used to add the enzyme conjugate to each cuvette.

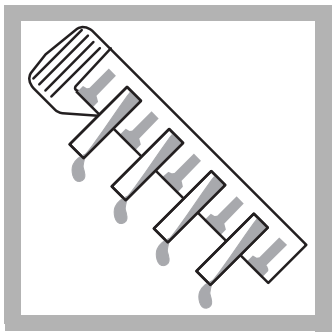


8. Press **OPTIONS**. Press **TIMER**. Enter 10:00 minutes and press **OK.**

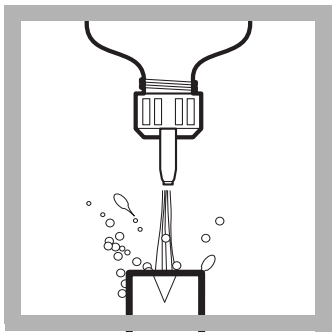
A 10-minute reaction time will begin. Immediately begin mixing the cuvettes for 30 seconds. See Using the 1-cm MicroCuvette Rack on page 6.



9. After 5 minutes mix the contents of the rack for 30 seconds (Using the 1-cm MicroCuvette Rack on page 6.)



10. At the end of the 10-minute period, discard the contents of all the cuvettes into an appropriate waste container.

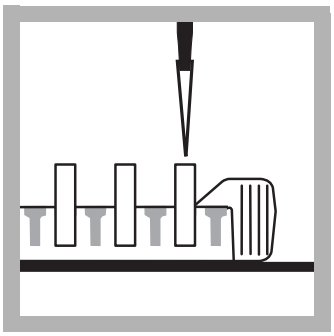


11. Wash each cuvette forcefully and thoroughly four times with deionized water. Empty the rinse water into the waste container.

Ensure that most of the water is drained from the cuvettes by turning the cuvettes upside down and tapping them lightly on a paper towel.

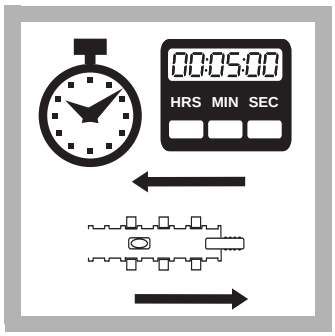
Color Development

Important Note: *Timing is critical. Follow instructions carefully.*



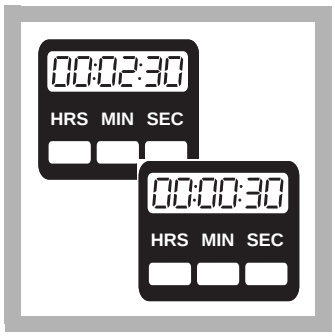
12. With the cuvettes still held snugly in the rack, pipet 0.5 mL of Color Developing Solution into each Antibody Cuvette.

Use a new pipette tip for each cuvette.

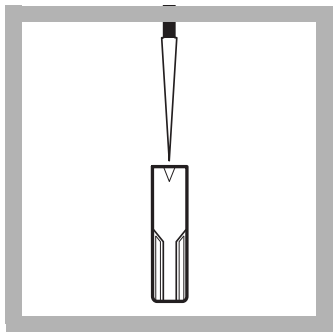


13. Press **OPTIONS**. Press **TIMER**. Enter 05:00 minutes and press **OK.**

A reaction period will begin. Mix, using the instructions in Using the 1-cm MicroCuvette Rack on page 6.



14. After 2.5 minutes, mix the contents of the rack a second time for a period of 30 seconds using the same technique.

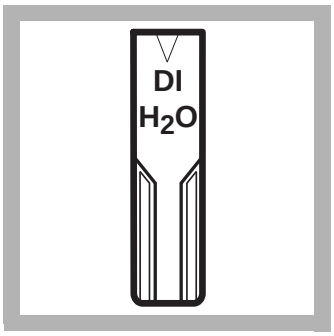


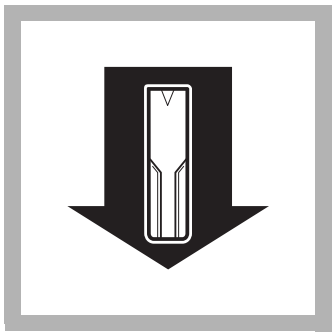
15. At the end of the 5-minute reaction period, pipette 0.5 mL of Stop Solution into each cuvette in the same order as the Color Developing Solution was added in step 12. Use the same pipette tip repeatedly for this step.

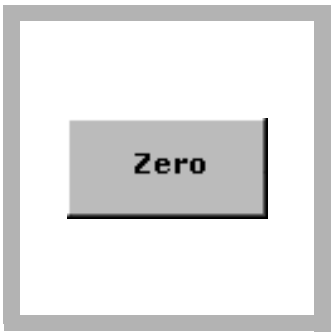
Slide the rack for 20 seconds (Using the 1-cm MicroCuvette Rack on page 6.)

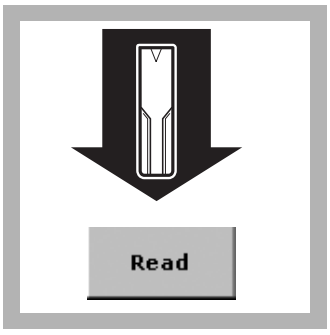
Blue solutions will turn yellow with the addition of the Stop Solution.

Measuring the Color









16. Label and fill a Zeroing Cuvette with deionized water. Wipe the outside of all the cuvettes with a tissue to remove water, smudges, and fingerprints.

17. Insert the filled zeroing cuvette into the cell holder with the arrow pointing to the right.

Orient the arrow in the same direction for all cuvettes.

18. Press **ZERO**.

The display will show:

0.000 Abs

19. Insert the first calibrator into the cell holder.

Press **READ**. The display will give an absorbance reading. Record the results for each calibrator and sample.

Repeat this step for all remaining calibrators and samples.

See Interpreting and Reporting Results on page 7 for help with interpretation of results.

PCB Protocols

There are two protocols in this procedure, one for levels of 1 ppm and 5 ppm, and another for 10 ppm and 50 ppm. Each uses a different quantity of calibrator and sample extract (Table 1).

Table 1 PCB Protocols

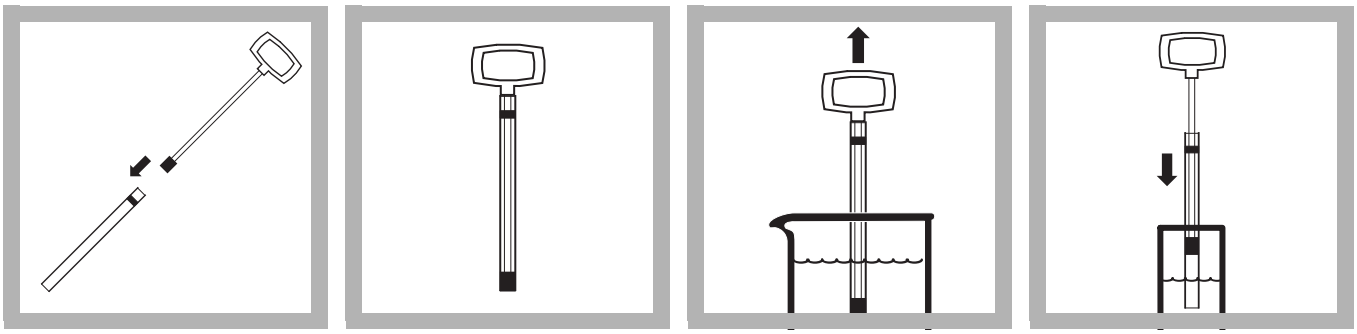
Range (as Arochlor 1248)	Volume of calibrator and sample extract used
1 ppm and 5 ppm	50 µL
10 ppm and 50 ppm	10 µL

To test across ranges, such as 1 and 50 ppm, test the lower concentration first. If the result is positive then test at the higher level. If the result of the test at the lower concentration is negative, the higher range test will be negative also, and need not be performed.

The same filtered extract can be used for both protocols if it is tightly capped between assays. The maximum time between assays cannot exceed one-half hour.

Using the Wiretrol®* Pipet

The Wiretrol Pipet can accurately measure small quantities of liquids. It consists of two parts: a Teflon®-tipped plunger and a calibrated capillary tube. The plunger can be reused; the capillary tubes must be discarded after one use.



1. Wet the orange Teflon® tip of the Wiretrol plunger in the sample and carefully insert it into the end of the capillary tube with the colored band.

2. Push the tip to the other end of the capillary tube until it barely extends beyond the end of the capillary tube.

3. Submerge the capillary tube below the surface of the liquid to be pipetted. Slowly and smoothly draw the Wiretrol plunger up until the bottom of the plunger tips reaches the appropriate volume line.

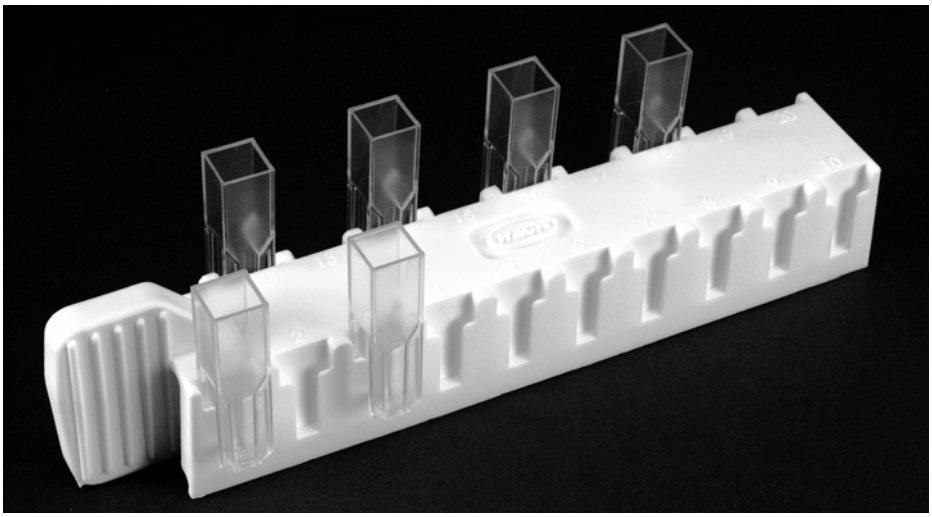
Touch the end of the tube to the side of the vessel to release remaining drops on the capillary tube tip.

4. To discharge the pipet, place the tip of the capillary tube below the surface of the solution and push the Wiretrol plunger down in one smooth motion. Change capillary tubes for each calibrator and sample.

Using the 1-cm MicroCuvette Rack

This rack (Figure 1) has been designed specifically to aid in achieving precise and accurate results when using the immunoassay technique to analyze several samples at the same time.

Figure 1 The 1-cm MicroCuvette Rack



* Wiretrol is a registered trademark of Drummond Scientific.

Loading the Rack—The cuvette rack is designed so that it may be inverted with the cuvettes in place. Identify each cuvette with a sample or calibrator number and insert all the cuvettes in the rack before beginning the procedure. Fit the cuvettes snugly into the rack, but do not force them or they may be difficult to remove and their contents may spill. The cuvettes should remain in place when the rack is inverted and tapped lightly.

Mixing—Set the rack on a hard, flat surface that is at least twice the length of the rack. Hold the rack by one end and vigorously slide it back and forth along its long axis for 30 seconds. The rack should move through a distance equal to its own length in each direction.

Interpreting and Reporting Results

There is an inverse relationship between the concentration of PCB and the reading. In other words, the higher the reading, the lower the concentration of PCB.

Table 2 Relative PCB Concentration

If the sample reading is...	the sample PCB Concentration is...
…less than calibrator reading	…greater than the calibrator concentration
…greater than calibrator reading	…less than the calibrator concentration

Example
Readings:

1 ppb PCB Calibrator: **0.775 Abs**

5 ppb PCB Calibrator: **0.430 Abs**

Sample #1: **0.200 Abs**

Sample #2: **0.600 Abs**

Sample #3: **0.900 Abs**

Interpretation for a Soil Sample

Sample #1—Sample reading is less than the readings for both calibrators. Therefore the sample concentration of PCB is greater than both 1 ppm and 5 ppm as Aroclor 1248.

Sample #2—Sample reading is between the readings for the 1 ppm and 5 ppm PCB calibrators. Therefore the sample concentration of PCB is between 1 ppm and 5 ppm as Aroclor 1248.

Sample #3—Sample reading is greater than the readings for both calibrators. Therefore the sample concentration of PCB is less than both 5 ppm and 1 ppm as Aroclor 1248.

Storing and Handling Reagents

- Wear protective gloves and eyewear.
- When storing reagent sets for extended periods of time, keep them out of direct sunlight. Store reagents at a temperature of 4 °C when not in use.
- Keep the foil pouch containing the Antibody Cuvettes sealed when not in use.
- If Stop Solution comes in contact with eyes, wash thoroughly for 15 minutes with cold water and seek immediate medical help.

Sensitivity

The PCB immunoassay cannot differentiate between the various Aroclors, but it detects their presence in differing degrees.

Table 3 Various PCBs in Soil

Compound	Concentration (ppm) to give a positive result at			
	1 ppm	5 ppm	10 ppm	50 ppm
1248	1	5	10	50
1016	2	9	20	67
1242	1.2	6	14	50
1254	1.4	4.6	11	28
1260	1.1	4.9	11	38

Table 4 Compounds Not Detectable At 1000 ppm

Biphenyl	2,4,6-trichlorophenyl	1,3-dichlorobenzene
2,4-dicholorophenyl	pentachlorophenol	1,4-dichlorobenzene
2,4,5-trichlorphenyl	1,2-dichlorobenzene	1,2,4-trichlorobenzene

Sample Collection and Storage

Analyze the samples as soon as possible after collection. If the samples must be stored, collect them in glass or Teflon® containers that have been washed with soap and water and rinsed with methanol. The container should be capped with a Teflon-lined cap. If a Teflon cap is not available, aluminum foil rinsed in methanol may be used as a substitute cap liner.

Summary of Method

Immunoassay tests use antigen/antibody reactions to test for specific organic compounds in water and soil. Antibodies specific for PCB are attached to the walls of plastic cuvettes. They selectively bind and remove PCB from complex sample matrices. A prepared sample and a reagent containing enzyme-conjugate molecules (analyte molecules attached to molecules of an enzyme) are added to the Antibody Cuvettes. During incubation, enzyme-conjugate molecules and PCB compete for binding sites on the antibodies. Samples with higher levels of analyte will have more antibody sites occupied by PCB and fewer antibody sites occupied by the enzyme-conjugate molecules.

After incubation, the sample and unbound enzyme conjugate are washed from the cuvette and a color-development reagent is added. The enzyme in the conjugate catalyzes the development of color. Therefore, there is an inverse relationship between color intensity and the amount of PCB in the sample. The resulting color is then compared with a calibrator to determine whether the PCB concentration in the sample is greater or less than the threshold levels. The PCB concentration is inversely proportional to the color development: the lighter the color, the higher the PCB concentration. Test results are measured at 450 nm.

Consumables and Replacement Items

Required Reagents

Description	Unit	Cat. No.
PCB Reagent Set[1]	20 cuvettes	27735-00
Deionized Water	500 mL	242-49

[1] Immunoassay components are manufactured by Beacon Analytical Systems, Inc.

Required Apparatus

Description	Unit	Cat. No.
Adapter, 1-cm square cell	each	
Caps, flip spout	2/pkg	25818-02
Marker, laboratory	each	20920-00
Rack, for 1-cm Micro Cuvettes	each	48799-00
Wipes, disposable	box	20970-00
Pipet, TenSette®, 0.1–1.0 mL	each	19700-01
Pipet Tips, for TenSette Pipet 19700-01	1000/pkg	21856-28

Soil Extraction Reagents and Apparatus

Description	Unit	Cat. No.
Soil Scoop, 5-g, 4.25-cc	each	26572-05
Soil Extraction Refill Kit, includes:	each	27752-00
Dropper, LDPE, 0.5 and 1.0-mL	20/pkg	21247-20
Filter and Barrel Assembly	20/pkg	25676-20
Sodium Sulfate, anhydrous	250 g	7099-29
Soil Extractant Solution	200 mL	25677-29
Soil Sample Container	20/pkg	25929-20
Weighing Boat, 8.9-cm square	20/pkg	21790-20
Spatula, disposable	2/pkg	25693-20

Optional Reagents and Apparatus

Description	Cat. No.
Gloves, disposable nitrile, medium[1]	25505-02
Pipet Tips, for TenSette Pipet 19700-01	21856-96

[1] Other sizes available.

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