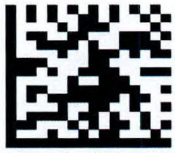


Write or Copy/Paste Document Title In This Space

Report.HW.734043.2009-09-30.Potential_PCB_Sources_Rooftop_Runoff_Rpt.PDF

POTENTIAL PCB SOURCES REPORT: ROOFTOP RUNOFF

UNITED TECHNOLOGIES/CARRIER
THOMPSON ROAD FACILITY
SYRACUSE, NEW YORK

EnSafe Project Number
0888805771, Phase 11

Revision No.: 0

Prepared for:

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

Prepared by:

EnSafe Inc.
220 Athens Way, Suite 410
Nashville, Tennessee 37228
(615) 255-9300
(800) 588-7962
www.ensafe.com

September 2009

Prepared By:

May M. Heflin, PE

September 30, 2009
Date

Reviewed By:

Thomas B. Green

September 30, 2009
Date

Table of Contents

Figures

Tables

Appendices

1.0 INTRODUCTION

Carrier Corporation (Carrier), a wholly-owned subsidiary of United Technologies Corporation, has prepared this *Potential PCB Sources Report: Rooftop Runoff*, under Corrective Action Order — Index CO 7-20051118-4 (order) dated February 13, 2006, and in response to the requests outlined in the New York State Department of Environmental Conservation's (NYSDEC) letter dated July 27, 2009, (comments on Focused CMS for PCBs in Sanders Creek sediments). In this letter, NYSDEC requested a work plan to support Carrier's State Pollution Discharge Elimination System (SPDES) permit issued to Carrier on September 14, 2007, from NYSDEC, Division of Environmental Permits, Region 7. Specifically, NYSDEC requested that a work plan be prepared, in part, to determine if any roof drains posed a continuing source of poly-chlorinated biphenyls (PCBs) to the storm drains discharging to SPDES permitted Outfall 002 and ultimately Sanders Creek.

1.1 Background

A NYSDEC sediment sampling program in 1996 and 1997 detected elevated PCB levels in Sanders Creek. Detections near the Carrier property led the NYSDEC — Division of Solid and Hazardous Materials, to request additional site investigations under the Consent Order to better ascertain and determine the potential source of PCBs in the Sanders Creek sediments.

Under its current SPDES permit (not part of the Consent Order), Carrier developed and implemented a ***PCB Storm Water Quality Study (PSWS)*** which includes data from 12 months of monitoring PCB concentrations in storm water discharges from Outfalls 001, 002, and 01A discharging to Sanders Creek. The monitoring period began mid-November 2007 and was completed mid-October 2008. A report on that study was submitted to the NYSDEC in November 2008.

During the study period, overflows at Outfall 001 occurred on 82 days, of which samples (composite, grab, or both) were collected on 26 days. Samples were also collected on another 4 days when there was no overflow, that is, all flow was pumped to the 01A treatment system. Thirty-five composite samples and 21 grab samples were collected on the 26 days when overflows at 001 occurred. Two days had PCB detections (a 7/13/08 grab sample at 0.076 µg/l and a 9/27/08 grab sample at 0.092 µg/l and composite sample at 0.083 µg/l).

This storm water will not be treated for PCBs because PSWS and PMP (Pollutant Management Plan (PMP) sampling data show the occurrence of any Aroclor greater than 0.065 µg/l is rare and the maximum concentration is on the order of 0.1 µg/l. Similarly, rooftop runoff from buildings that discharge to Outfall 001 were not considered in the *Potential PCB Source Work Plan*, September 2009.

Storm water overflows from this outfall will continue to be monitored. If data shows the frequency or magnitude of PCB concentrations in overflows from this outfall reach a level of concern, Carrier will reassess the potential for rooftop runoff as a continuing source of PCBs to Outfall 001.

Overflows at Outfall 002 occurred on 90 days, of which samples (composite, grab, or both) were collected on 26 days. PCBs were not detected above the PQL of 0.30 µg/l per Aroclor in any of the 36 composite samples collected over 3-hour to 24-hour periods on 22 of these days; however, 3 of 24 grab samples yielded PCB above this threshold. Fifteen of the composite samples and 16 of the grab samples had a PCB concentration above 0.065 µg/l per Aroclor. As part of preliminary discussions on a revised SPDES permit, Carrier and NYSDEC discussed (July 17 conference call) the immediate implementation of a rooftop runoff sampling program to assess possibility and practicality of diverting rooftop runoff away from Outfall 002 to a new permitted outfall. This is due to the large contribution of storm water runoff from Building TR-1 and TR-2 roofs to Outfall 002 during storm events. This sampling program was initiated on July 24, 2009, as discussed in Section 2, with a planned Rooftop Runoff Report submittal date of September 30, 2009.

After the rooftop sampling program had started, NYSDEC correspondence dated July 27, 2009 (comments referenced above), requested that Carrier prepare a Potential PCB Source Work Plan, with a specific request that roof drains (or rather runoff from the roofs) be investigated as a potential continuing source of PCBs to the storm sewer system.

2.0 POTENTIAL SOURCE: ROOFTOP RUNOFF

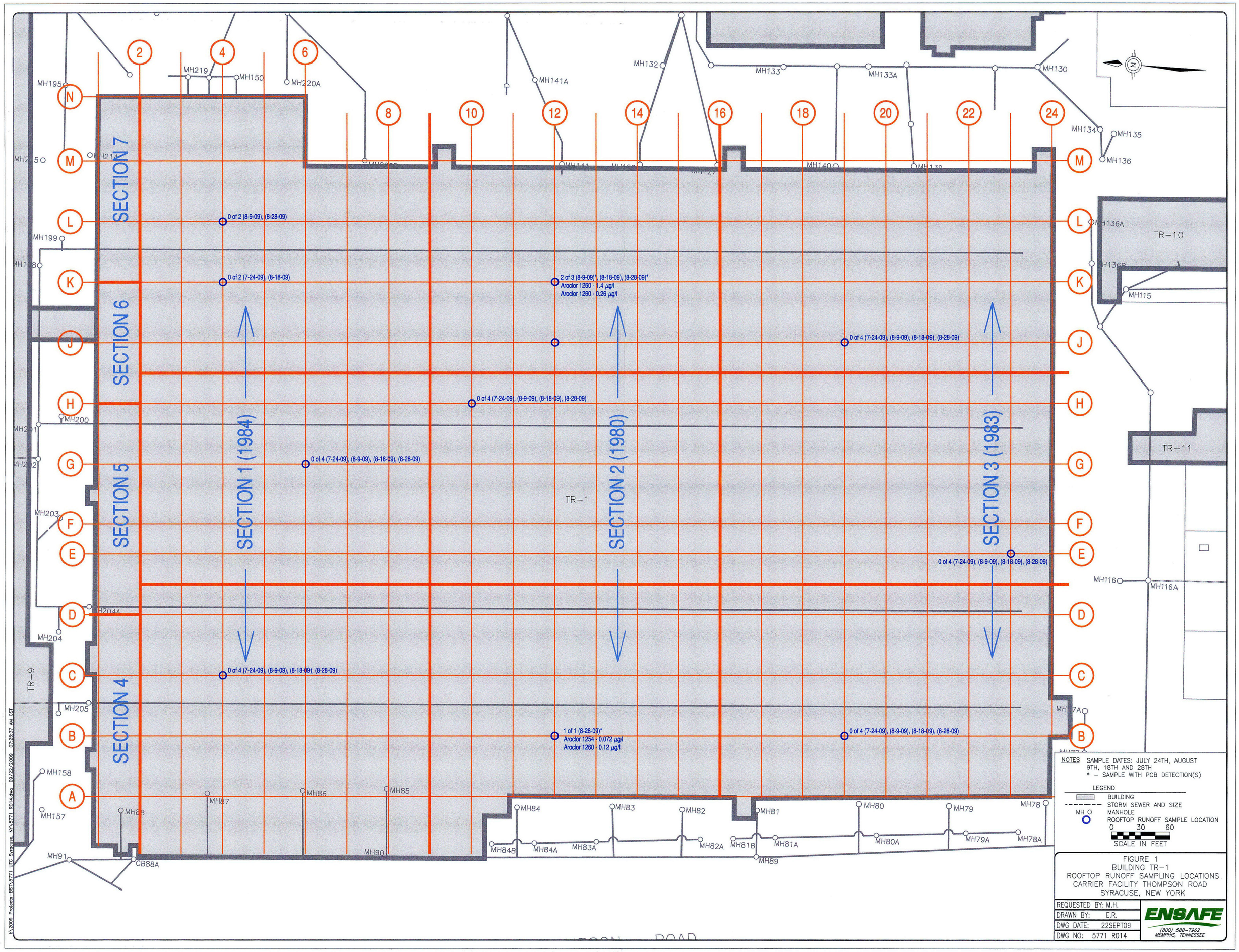
2.1 Sampling Activities

The roofs of Buildings TR-1 and TR-2 cover approximately 48% of the 002 watershed but contribute from 52% to 57% of the storm water runoff discharging at Outfall 002, depending on the storm event. Because of the large area covered by these roofs (Building TR-1 is approximately 14 acres and Building TR-2 is approximately 13.5 acres), rooftop runoff samples were obtained from select locations/drains based on:

- The age of the roof section — the assumption is that older sections are more likely to contain PCB in roofing materials than are the newer sections

- The overall area that is drained by the various inlet points on the roof — an attempt was made to sample each drainage area of a roof.

Building TR-1: The main roof has approximately 144 roof drain inlets. The most recent information on the roof construction of Building TR-1 shows the roof was replaced or re-covered in 1980 (Section 2), and 1983 (Section 3), and 1984 (Section 1). Sections 4 through 7 were recent additions that were roofs over the office area and were last replaced in 1984. Rooftop samples from each of the larger drainage sections (1 through 3) were taken on the roof at the inlet to the rooftop leader that ultimately carries roof runoff to the site-wide storm lines. Eleven locations were sampled over a 35-day period on July 24, August 9, August 18, and August 28, 2009, with some locations sampled less frequently (**Figure 1 – Building TR-1 Sample Locations**). Table 1 summarizes the data collected during this time period.



NOTES SAMPLE DATES: JULY 24TH, AUGUST 9TH, 18TH AND 28TH
* – SAMPLE WITH PCB DETECTION(S)

LEGEND
- BUILDING
- STORM SEWER AND SIZE
- MH MANHOLE
- ROOFTOP RUNOFF SAMPLE LOCATION

0 30 60
SCALE IN FEET

FIGURE 1
BUILDING TR-1
ROOFTOP RUNOFF SAMPLING LOCATIONS
CARRIER FACILITY THOMPSON ROAD
SYRACUSE, NEW YORK

REQUESTED BY:	M.H.
DRAWN BY:	E.R.
DWG DATE:	22SEPT09
DWG NO:	5771 R014

ENSAFE
(800) 588-7962
MEMPHIS, TENNESSEE

Table 1
Building TR-1 Rooftop Runoff Sample Locations
Carrier Corporation, Syracuse, New York

Sample Date →	24-Jul-09	9-Aug-09	18-Aug-09	28-Aug-09
Leader Sampled→	B-12	B-12	B-12	B-12
Aroclor ↓				
PCB-1248	NS	NS	NS	0.053 U
PCB-1254	NS	NS	NS	**0.072**
PCB-1260	NS	NS	NS	**0.12**

Sample Date →	24-Jul-09	9-Aug-09	18-Aug-09	28-Aug-09
Leader Sampled→	B-19 *	B-19 **	B-19	B-19
Aroclor ↓				
PCB-1248	0.05 U	0.27 U	0.05 U	0.052 U
PCB-1254	0.05 U	0.27 U	0.05 U	0.052 U
PCB-1260	0.05 U	0.071 J	0.05 U	0.052 U

Sample Date →	24-Jul-09	9-Aug-09	18-Aug-09	28-Aug-09
Leader Sampled→	C-4 *	C-4	C-4	C-4
Aroclor ↓				
PCB-1248	0.05 U	0.053	0.056 U	0.053 U
PCB-1254	0.047 J	0.036 J	0.045 J	0.053 U
PCB-1260	0.021 J	0.037 J	0.045 J	0.021 J

Sample Date →	24-Jul-09	9-Aug-09	18-Aug-09	28-Aug-09
Leader Sampled→	E-23 *	E-23 **	E-23 **	E-23
Aroclor ↓				
PCB-1248	0.05 U	0.27 U	0.26 U	0.051 U
PCB-1254	0.05 U	0.27 U	0.26 U	0.051 U
PCB-1260	0.05 U	0.14 J	0.26 U	0.030 J

Sample Date →	24-Jul-09	9-Aug-09	18-Aug-09	28-Aug-09
Leader Sampled→	G-6 *	G-6	G-6	G-6
Aroclor ↓				
PCB-1248	0.05 U	0.053	0.053	0.052 U
PCB-1254	0.05 U	0.053	0.053	0.052 U
PCB-1260	0.05 U	0.015 J	0.012 J	0.013 J

Table 1
Building TR-1 Rooftop Runoff Sample Locations
Carrier Corporation, Syracuse, New York

Sample Date →	24-Jul-09	9-Aug-09	18-Aug-09	28-Aug-09
Leader Sampled→	H-10 *	H-10	H-10**	H-10
Aroclor ↓				
PCB-1248	0.05 U	0.053	0.5 U	0.055 U
PCB-1254	0.05 U	0.053	0.5 U	0.055 U
PCB-1260	0.05 U	0.042 J	0.11 J	0.055 U

Sample Date →	24-Jul-09	9-Aug-09	18-Aug-09	28-Aug-09
Leader Sampled→	J-12 *	J-12	J-12	J-12
Aroclor ↓				
PCB-1248	0.05 U	NS	NS	NS
PCB-1254	0.05 U	NS	NS	NS
PCB-1260	0.05 U	NS	NS	NS

Sample Date →	24-Jul-09	9-Aug-09	18-Aug-09	28-Aug-09
Leader Sampled→	J-19 *	J-19 **	J-19	J-19
Aroclor ↓				
PCB-1248	0.05 U	0.27 U	.055 U	0.054 U
PCB-1254	0.05 U	0.27 U	.055 U	0.054 U
PCB-1260	0.05 U	0.14 J	0.015 J	0.024 J

Sample Date →	24-Jul-09	9-Aug-09	18-Aug-09	28-Aug-09
Leader Sampled→	K-4 *	K-4	K-4	K-4
Aroclor ↓				
PCB-1248	0.05 U	NS	0.059 U	NS
PCB-1254	0.05 U	NS	0.059 U	NS
PCB-1260	0.05 U	NS	0.059 U	NS

Sample Date →	24-Jul-09	9-Aug-09	18-Aug-09	28-Aug-09
Leader Sampled→	K-12	K-12 **	K-12 **	K-12
Aroclor ↓				
PCB-1248	NS	0.68 U	0.25	0.053 U
PCB-1254	NS	0.42 J	0.25	0.053 U
PCB-1260	NS	**1.4**	0.13 J	**0.26**

Table 1
Building TR-1 Rooftop Runoff Sample Locations
Carrier Corporation, Syracuse, New York

Sample Date →	24-Jul-09	9-Aug-09	18-Aug-09	28-Aug-09
Leader Sampled→	L-4	L-4	L-4	L-4
Aroclor ↓				
PCB-1248	NS	0.05 U	NS	0.052 U
PCB-1254	NS	0.05 U	NS	0.052 U
PCB-1260	NS	0.05 U	NS	0.052 U

Notes:
*These samples were received by lab with insufficient volume for full volume extraction. See laboratory data package included as Appendix A of this report.
**Due to the matrix, these samples could not be concentrated to the final method required volume. See laboratory data package included as Appendix A of this report.

Building TR-2: The most recent information on the roof construction of Building TR-2 shows the roof was replaced or re-covered in up to 18 sections from 1966 to 2007, using tar and pebble construction, a single-ply synthetic membrane, or tar paper only. This roof has approximately 100 roof drain inlets and manholes that ultimately carry rooftop runoff to the site-wide storm lines. The drainage sections associated with these inlets are not readily apparent. Initial runoff sampling focused on the sections of the roof constructed of tar and pebble in the central portion (north/south) of the TR-2 roof. Samples were taken at the inlet to the roof leader. Six locations were sampled over a 35-day period on July 24, August 9, August 18, and August 28, 2009, with some locations sampled less frequently (**Figure 2 – Building TR-2 Sample Locations**). Table 2 summarizes the data collected during this time period.

OUTFALL 002

SANDERS CREEK

ROUTE 298

N

W9 W8 W7 W6 W5 W4 W3 W2 W1 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26

T S R Q P O N M L K J I H G F E D C B A

SECTION 1 (1966) TAR & PEBBLE

SECTION 5 (1989) TAR & PEBBLE

SECTION 10 (1989) TAR & PEBBLE

0 of 2 (7-24-09), (8-28-09)

SECTION 14 (1994) TAR PAPER

SECTION 2 (2007) MEMBRANE

SECTION 6 (2008) MEMBRANE

SECTION 11 (1988) TAR & PEBBLE

0 of 1 (8-28-09)

SECTION 15 (2007) MEMBRANE

SECTION 3 (1966) TAR & PEBBLE

SECTION 8 (2008) MEMBRANE

SECTION 7 (2008) MEMBRANE

SECTION 12 (1980) TAR & PEBBLE

SECTION 12 (1980) TAR & PEBBLE

SECTION 16 (2007) MEMBRANE

SECTION 4 (1966) TAR & PEBBLE

SECTION 9 (2007) MEMBRANE

SECTION 13 (1988) TAR & PEBBLE

SECTION 13 (1988) TAR & PEBBLE

SECTION 17 (2007) MEMBRANE

SECTION 18 (2007) MEMBRANE

0 of 2 (7-24-09), (8-28-09)

1 of 2 (7-24-09), (8-9-09)* Aroclor 1260 - 0.63 µg/l

1 of 2 (8-18-09), (8-28-09)* Aroclor 1260 - 0.24 µg/l

0 of 2 (7-24-09), (8-28-09)

0 of 2 (7-24-09), (8-28-09)

MH12 MH154 MH155 MH156 MH91 MH157 MH88 CB88A MH87 MH205 MH204 MH204A MH203 MH202 MH201 MH200 MH198 MH199 MH215 MH214 MH195 MH194 MH196 MH197 MH147 MH145 MH146 MH218 MH148 MH219 MH203 MH192 MH191 MH193 MH196B MH196A MH196C MH196D MH196E MH002A MH202B MH202C MH202D MH202E CB202A

TR-2B TR-9 TR-1 TR-2 TR-18

NOTES

SAMPLE DATES: JULY 24TH, AUGUST 9TH, 18TH AND 28TH

* – SAMPLE WITH PCB DETECTION(S)

LEGEND

BUILDING

STORM SEWER AND SIZE

MH MANHOLE

ROOFTOP RUNOFF SAMPLE LOCATION

0 30 60

SCALE IN FEET

FIGURE 2
BUILDING TR-2
ROOFTOP RUNOFF SAMPLING LOCATIONS
CARRIER FACILITY, THOMPSON ROAD
SYRACUSE, NEW YORK

REQUESTED BY:	M.H.
DRAWN BY:	E.R.
DWG DATE:	22SEPT09
DWG NO:	5771 R015

ENSAFE (800) 588-7962 MEMPHIS, TENNESSEE

I:\2009 Projects-BST\5771 UTC Syracuse, NY\5771 R015.dwg 09/22/2009 07:29:37 AM CST

Table 2
Building TR-2 Rooftop Runoff Sample Locations
Carrier Corporation, Syracuse, New York

Sample Date →	24-Jul-09	9-Aug-09	18-Aug-09	28-Aug-09
Leader Sampled→	B-9	B-9	B-9	B-9
Aroclor ↓				
PCB-1248	0.05 U	0.051 U	NS	NS
PCB-1254	0.05 U	0.051 U	NS	NS
PCB-1260	0.028 J	0.019 J	NS	NS

Sample Date →	24-Jul-09	9-Aug-09	18-Aug-09	28-Aug-09
Leader Sampled→	F-4	F-4	F-4	F-4
Aroclor ↓				
PCB-1248	NS	NS	0.05 U	0.050 U
PCB-1254	NS	NS	0.05 U	0.043 J
PCB-1260	NS	NS	0.05 U	0.039 J

Sample Date →	24-Jul-09	9-Aug-09	18-Aug-09	31-Aug-09
Leader Sampled→	H-9 **	H-9 **	H-9	H-9
Aroclor ↓				
PCB-1248	1.2 U	0.62 U	NS	NS
PCB-1254	1.2 U	0.62 U	NS	NS
PCB-1260	0.76 J	**0.63**	NS	NS

Sample Date →	24-Jul-09	9-Aug-09	18-Aug-09	28-Aug-09
Leader Sampled→	H-10	H-10	H-10	H-10
Aroclor ↓				
PCB-1248	NS	NS	0.051 U	0.10 U
PCB-1254	NS	NS	0.051 U	0.10 U
PCB-1260	NS	NS	0.051 U	**0.24**

Sample Date →	24-Jul-09	9-Aug-09	18-Aug-09	28-Aug-09
Leader Sampled→	N-9	N-9	N-9	N-9
Aroclor ↓				
PCB-1248	NS	NS	0.05 U	0.053 U
PCB-1254	NS	NS	0.05 U	0.053 U
PCB-1260	NS	NS	0.05 U	0.026 J

Table 2
Building TR-2 Rooftop Runoff Sample Locations
Carrier Corporation, Syracuse, New York

Sample Date →	24-Jul-09	9-Aug-09	18-Aug-09	28-Aug-09
Leader Sampled→	R-7	R-7 **	R-7	R-7
Aroclor ↓				
PCB-1248	0.05 U	0.05 U	NS	NS
PCB-1254	0.05 U	0.05 U	NS	NS
PCB-1260	0.019 J	0.017 J	NS	NS

Notes:
*These samples were received by lab with insufficient volume for full volume extraction. See laboratory data package included as Appendix A of this report.
**Due to the matrix, these samples could not be concentrated to the final method required volume. See laboratory data package included as Appendix A of this report.

3.0 CONCLUSIONS

3.1 Building TR-1

Rooftop runoff samples collected over a 35-day period found PCBs at concentrations above Carrier's SPDES Permit discharge goal (MDL) of 0.065 µg/L in 3 of 28 samples collected. The 3 detections were found at 2 sample locations, both in Section 2 of the TR-1 roof. None of the detections was above the permit discharge limit of 0.3 µg/L per Aroclor. These permit limits and goals do not apply directly to individual rooftop runoff discharges to the site-wide storm lines, but they provide a basis for evaluation of the data.

One of the goals of the rooftop runoff sampling program was to determine the feasibility of diverting runoff and discharging it directly to Sanders Creek. Segregation would reduce total runoff volume and peak flows, and thus overflows, at Outfall 002. Rooftop runoff samples from Sections 1 and 3 did not yield any PCB Aroclor above 0.065 µg/L, making these areas possible candidates for storm water diversion. However, 16 of the 28 samples, representing all but one drainage section (Section 1, samples K4 and L4) of the roof, were J-flagged in the laboratory report, indicating PCB was detected but not at a concentration that could be reliably quantified. Further evaluation of the data is required prior to determining if diversion would lessen the likelihood of PCBs being discharged to Sanders Creek. This evaluation is only the first step in the overall process for determining the feasibility and practicality of segregating this storm water for ultimate discharge to a new outfall. Other considerations include:

- Impact of diversion on Outfall 002 overflow frequency
- Impact (cost and construction feasibility) on end-of-pipe treatment system
- Cost of diversion project
- Permitting implications

Samples from Section 2 of Building TR-1 found PCBs above the SPDES permit discharge goal at 2 of 5 sample locations (3 of 8 samples). Runoff from this section of TR-1 will not be diverted unless the PCB is mitigated. Carrier will evaluate future actions for this section of the roof. Consideration will be given to the following:

- Additional runoff samples to determine the source of PCBs in the rooftop runoff (e.g., erosion of roofing materials or past use of portions of the roofing section).

- Roofing construction (i.e., specific materials used) and samples from roofing materials

- Impact of Section 2 runoff on overflows and end-of-pipe treatment system

A second goal of the rooftop sampling program was to determine the feasibility of remediating the roofing materials. The evaluations for the sections of roof mentioned above will aid in future decisions regarding the handling of rooftop runoff.

3.2 Building TR-2

Rooftop runoff samples collected over a 35-day period found PCBs at concentrations above Carrier's SPDES Permit discharge goal of 0.065 µg/L in 2 of 12 samples collected. The 2 detections were found at 2 sample locations, both in Section 13 of the TR-2 roof. One of the 2 detections was above the permit discharge limit of 0.3 µg/L per Aroclor at 0.63 µg/L (sample location H9). Rooftop runoff samples from Sections 10, 11, and the southern portion of Section 13 (sample locations F4 and B9), did not detect an Aroclor above 0.065 µg/L, making these areas possible candidates for storm water diversion. However, 7 samples, representing all sections sampled except Section 13 of the roof, were J-flagged. Further evaluation of the data is required prior to determining if diversion would lessen the likelihood of PCBs being discharged to Sanders Creek. This evaluation is only the first step in the overall process for determining the feasibility and practicality of segregating this storm water for ultimate discharge to a new outfall. Other considerations include:

- Impact of diversion on Outfall 002 overflow frequency
- Impact (cost and construction feasibility) on end-of-pipe treatment system
- Cost of diversion project
- Permitting implications

Two of 4 samples from the northern portion of Section 13 (sample locations H9 and H10) of Building TR-2 yielded an Aroclor above 0.065 µg/L. Runoff from this section of TR-2 will not be diverted, unless mitigation can be implemented. Carrier will evaluate future actions for this section of the roof. Consideration will be given to the following:

- Additional runoff samples to determine the source of PCBs in the rooftop runoff (e.g., erosion of roofing materials or past use of portions of the roofing section).

- Additional runoff samples from older sections of the roof constructed of tar and pebble materials

- Roofing construction (i.e., specific materials used) and samples from roofing materials
- Impact of Section 13 runoff on overflows and end-of-pipe treatment system
- Additional runoff samples from Sections 1 through 9 and Sections 14 through 18, to determine if runoff from these portions of the rooftop can be considered for diversion

A second goal of the rooftop sampling program was to determine the feasibility of remediating the roofing materials. The evaluations for the sections of roof mentioned above will aid in future decisions regarding the handling of rooftop runoff.

3.3 Additional Rooftop Sampling Program

As mentioned in Sections 3.1 and 3.2, additional runoff samples will be obtained from Buildings TR-1 and TR-2 to either determine the source of PCBs in the runoff (Building TR-1) or to better define portions of the rooftop that may be candidates for diversion or remediation (Building TR-2).

Because PCBs were found in runoff from these buildings, Carrier will expand the sampling program to include other buildings whose rooftop runoff discharges to Outfall 002. These buildings include TR-18, TR-18S, TR-6, TR-7, TR-8, TR-10, TR-11, TR-12, TR-13, TR-14, and TR-23.

Appendix A
Rooftop Runoff Laboratory Data

July 24, 2009
August 9, 2009
August 18, 2009
August 28, 2009