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DAMES & MOORE

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147042

**PRELIMINARY DEMOLITION PLAN
FOR
CAM-OR SITE
WESTVILLE, INDIANA
PREPARED FOR
CAM-OR SITE EXTENDED PRP GROUP**

**DAMES & MOORE PROJECT NO. 13704-031-045
November 19, 1997**

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Attachment 1 Ecology & Environment START report dated October 23, 1997

1.0 INTRODUCTION

The CAM-OR Site Extended PRP Group (Group) proposes to demolish and remove all above-ground structures on the CAM-OR Site (Site) located in Westville, Indiana.

This preliminary work plan describes the objectives of the demolition and removal action and the scope of work necessary to meet these objectives. This plan was developed based on Site visits by Dames & Moore, information provided by the United States Environmental Protection Agency (USEPA), information researched by Dames & Moore, results of tank sampling, and previous disposal characterization analytical results.

2.0 SITE DESCRIPTION

2.1 Site Location

The Site is located on the north side of the town of Westville, Indiana. The Site is bounded on the north by County Road (CR) 400 South, on the west by an abandoned railroad right-of-way (ROW), on the south by SR2, and on the east by two residences between the Site and US421. North and west of the Site are agricultural fields, and residential areas are located across Highway 2 to the south. Westville Auto Salvage is located to the south west.

2.2 Surrounding Areas

Land use in a 2-mile area around the Site is predominantly agriculture to the north, east, and west. To the south of the Site is the town of Westville, the Westville Correctional Center and an industrial park that includes trucking and warehouse facilities and light manufacturing.

2.3 Current Status

The Cam-Or Site was used as a reclaiming facility for used oil from 1934 to 1987, when it ceased operations. At present, the Site is abandoned with a six-foot high chain link fence surrounding the Site for security. The condition of the buildings on the site is deteriorating.

3.0 SITE CHARACTERIZATION

Numerous actions have been undertaken since CAM-OR ceased operations. The major efforts have been:

1. lagoon removals/modifications by USEPA;
2. lagoon contents stabilization by the Group;
3. tank contents removal by the Group;
4. northwest quadrant capping by the Group;
5. groundwater (on- and off-site) investigation by the Group and USEPA; and
6. source characterization by the Group.

Minimal volumes of waste materials are present within the limited number of tanks and buildings that have not been included in USEPA directives. No lagoons remain and the materials have been removed from all tanks identified by USEPA to be emptied.

3.1 Tanks and Pipelines

The majority of the tanks have been emptied and the contents disposed of previously in accordance with work plans submitted to the USEPA. Tanks were wipe-tested for the USEPA by Ecology and Environment for PCBs; the unvalidated results (dated October 23, 1997) are reported in Attachment I. No information is available regarding the pipelines. All results fall below the low-contact, outdoor surfaces cleanup criteria of 40 CFR §761.125. Such materials will be reclaimed, or disposed as special waste upon approval by the USEPA.

3.2 Asbestos

Asbestos-containing materials (ACMs) are known to be present on the Site based on an asbestos survey and sampling performed for the USEPA by Ecology and Environment; the results (dated October 23, 1997) are reported in Attachment 1. The ACMs are reported to be limited to approximately 10,550 square feet at three areas; wallboard in the northeast garage behind elevated heaters, in the corrugated wallboard outside the West Process Building, and on loose corrugated wallboard outside the Water Cooling Building. Most of this ACM is considered to be non-friable. Other suspected materials were shown not to be asbestos-containing. Should further untested insulation or other materials that may contain asbestos be found at the Site, they will be sampled and analyzed. ACMs will be removed in accordance with prevailing regulations and activities will be controlled to effect the proper removal, storage, and disposal prior to demolition of that area.

3.3 Site Survey

An aerial survey of the Site was performed by a qualified surveyor(s) in July, 1991 to document the topography, structure, and tank locations. Only the topography of the northwest quadrant has changed since that time. The location of manufactured and field-cut access ports, piping, and valves will be added to the survey. The data will be presented with a scale of 1" = 50'.

4.0 STATEMENT OF OBJECTIVES

The purpose of this Demolition Plan is to describe the activities proposed to achieve the objectives of this action.

The demolition is intended to remove all above-ground structures, including buildings, tanks and their contents, and piping. Actions related to potential impact of soil and ground water will not be addressed during this removal action.

Most liquids and sludges have been removed and disposed of in accordance with previous plans submitted to USEPA. Approximately 200,000 gallons of water remaining in the waste water treatment tank will be discharged to the Westville POTW. Testing has been performed and discharge acceptance is in progress. Any remaining liquids and sludges will be removed and disposed of as appropriate. Tanks, piping, and miscellaneous structures are to be emptied, if necessary, removed, and disposed. All structures will be dismantled/razed and recycled or disposed of in accordance with specifications to be prepared and as described below.

Structural materials will be segregated for disposal based on their regulatory classification, disposal characterization results, and reclamation value. Metals to be reclaimed will be melted; all other debris will be disposed of in an appropriate off-site landfill to be selected. Site materials will be segregated into:

- metal for reclamation;
- materials for landfill disposal as construction debris;
- materials for landfill disposal as regulated (special, hazardous, TSCA) waste.

5.0 SEQUENCE OF MAJOR ACTIVITIES AND SCHEDULE

The following is a listing of the tasks that will be completed as part of this action, in the general sequence in which they will be performed:

1. Repair fence at office building and west side; provide additional "No Trespassing" signage. (To be done immediately.)
2. Obtain samples and analyses of approximately 200,000 gallons of water stored in Wastewater Treatment Tank (completed). Obtain discharge permission from the Town of Westville POTW. (In progress.)
3. Obtain disposal acceptance of contents previously stored in tanks and tank wipe samples. (Completed)
4. Perform physical and chemical analyses of samples for the purpose of off-site disposal acceptance.
5. Survey location of structures and tanks (completed by 1991 air photo). Mark aboveground piping and valves, including manufactured and field-cut access ports.
6. Obtain TSCA determination letter from USEPA for scrap metal and debris (USEPA to furnish).
7. Prepare project specifications.
8. Finalize selection of contractor(s) and appropriate disposal sites for all materials.
9. Remove and properly dispose of any remaining above-ground piping and tank contents.
10. Dismantle structures, tanks, and associated piping.
11. Remove tanks, piping, and appurtenant structures for recycling or disposal.
12. Update survey with relevant information obtained during aboveground demolition work.

Due to time constraints, characterization of liquids and identification of impacted areas may be in progress concurrently with some removal and dismantling activities. The removal contractor will be advised that, although time is of the essence and the intent of the contract is to proceed in an expeditious and efficient manner, work activities may be constrained by availability of data and sequencing requirements in order to assure proper handling of materials and minimize the potential for release of hazardous materials at the Site.

The activities associated with each tank or area will proceed following a system of approvals. The purpose of the release system is to (1) control activities to avoid the improper release of materials, (2) assure proper disposition of materials, and (3) assure adequate documentation of removal activities.

Activities relative to each tank will be handled by a checklist and status report form, which will be developed prior to activities. The following tasks shall require inspection and approval sign-off prior to proceeding with the next step.

- Liquid removal procedure;
- Completion of liquid and sludge removal;
- Tank and piping dismantling and removal; and
- Water treatment and discharge.

It is estimated that six months or less will be required to complete the majority of activities included in this action.

ATTACHMENT 1

ECOLOGY & ENVIRONMENTAL START REPORTED



ecology and environment, inc.

International Specialists in the Environment

33 North Dearborn Street
Chicago, Illinois 60602
Tel. 312/578-9243, Fax: 312/578-9345

October 23, 1997

Mr. Mike Gifford
Remedial Project Manager
United States Environmental Protection Agency
77 West Jackson Boulevard
Chicago, IL 60604

Re: Cam-Or Site
Westville, La Porte County, Indiana
TDD: S05-9701-018

Dear Mr. Gifford,

The Ecology and Environment, Inc. (E&E) Superfund Technical Assessment and Response Team (START) was tasked by the United States Environmental Protection Agency (U.S. EPA) under Technical Direction Document (TDD) S05-9701-018 to complete sampling of suspected asbestos-containing material and aboveground storage tanks (ASTs) in order to determine extent of contamination in support of the Engineering Evaluation and Cost Analysis (EE/CA) for the Cam-Or site in Westville, Indiana (Figure 1 and 2).

On June 30, 1997, under the guidance of Arunas Draugelis of U.S. EPA Technical Support Division, E & E START members Steve Skare and John Sherrard collected bulk samples of suspected asbestos-containing material for asbestos analysis. Sixty-six samples were collected (Figure 2) and delivered on July 2, 1997. Samples were analyzed by Carnow, Conibear and Associates, Ltd., of Chicago, Illinois under analytical TDD S05-9707-803. Data was validated by E & E START chemist Dave Hendren. Asbestos fibers in excess of 1% were detected in nine samples collected from three areas (Table 1). Asbestos was detected in wallboard in northeast garage behind elevated heaters, in corrugated wallboard outside of West Process Building, and in loose corrugated wallboard outside of Water Cooling Building. The total quantity of asbestos material is approximately 10,550 square feet.

On July 24, 1997, START members Skare and Christianne Ottinger visited the Cam-Or site to document accessibility of tanks and volume of contents, in order to prepare for the sampling event. The Addendum to the Phase I Sampling and Analysis Plan for Cam-Or specifies the procedures and details of the sampling event. A four member sampling team working for a maximum of four days with overtime was approved by the START Project Officer, Gail Nabsny, on the basis of cost and time efficiency.

On August 25, 1997, START members Ottinger, Skare, Garth Daley, and Brendan McLennan travelled to the Cam-Or site and began the collection of liquid (Figure 3) and wipe (Figure 4 and 5) samples from the ASTs. On August 26, 1997, START member Nordine replaced Skare and the sampling event was concluded. A total of sixty wipe samples, labelled TW-xx, and seven liquid samples, labelled TL-xx, were collected during the 2-day sampling event. Samples were collected according to procedures outlined in the sampling plan with the exception of those tanks containing liquid accessible from the ground. Tanks with accessible lower hatches were sampled by scooping the liquid with decontaminated stainless steel bowls, then pouring the sample liquid into the sample containers. All samples were collected with either new, precleaned or properly decontaminated sampling equipment and personal

protective equipment (PPE). Templates used for wipe sample collection were thrown away after one use. Samplers were donned in modified Level C PPE. Collected samples were stored in ice at 4°C and hand-delivered on August 27, 1997 to American Environmental Network (AEN) of Schaumburg, Illinois via courier on for polychlorinated biphenyls (PCBs) analysis under TDD S05-9708-811. Hendren conducted data validation of all analytical results.

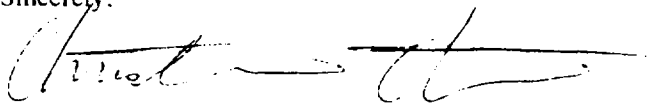
Field decisions deleted a number of tanks originally scheduled for sampling. Tanks 25, 27, and 62 did not contain adequate quantities of liquid necessary to collect a sample. Tank 20 yielded a partial sample, approximately 0.20 liters. The tanks located in the West Process Building were not sampled due to the risk associated with opening tanks of unknown contents from points of drainage with unsure closure mechanisms. In addition, many tanks had no access point through which to sample.

Several containers were assumed to be free of contamination based on their past use. Tanks labeled C, D, and E are boilers which contained water, thus are judged to be free of PCB contamination, as are furnaces B, 1A, and 4A. These tanks are also lacking points of access. Tanks WT-2 and WT-3, located in the water treatment building, were labelled caustic and not believed to contain PCBs. In addition, the tanks were judged to be full and unaccessible and thus were not sampled.

Tanks H-32, H-33, and H-34 are elevated tanks with rooms underneath. The potential oil storage area is located on the second level. Catwalks which access the oil storage area are rusted, decaying, and structurally unsound; therefore, sampling of the oil storage area was canceled. In any case, a wipe sample was collected in the lower room of H-32. The access point into Tank H-41 led to a brick room which was wipe sampled, although oil storage in this room did not appear feasible.

Analytical results for wipe and liquid samples taken from ASTs are given in Table 2 and Table 3, respectively. Tanks exceeding the 10 micrograms per 100 squared centimeters ($\mu\text{g}/\text{cm}^2$) Toxic Substance Control Act (TSCA) wipe sample limit for PCBs are bolded. Ten samples exceeded the TSCA limit. Analysis of some duplicate samples detected PCB concentrations above and below the TSCA limit for the same tank, in particular Tank 14, Tank 19, and Tank 20. The analytical results reflect the variable presence of PCB contamination within the tanks. For tanks with one opening (Tanks M, 14, 74), duplicate samples were collected side by side. At tanks with multiple accessible openings (one at the top and one at the base of the tank) (Tanks 19 and 20), duplicate samples were collected at each opening. The north, middle section of the site has the largest number of tanks which exceed the TSCA limit. Of the six tanks in that region with concentrations greater than $10 \mu\text{g}/\text{cm}^2$, four tanks are part of the single row of vertical tanks aligned from north to south. No liquid samples exceeded the 50 parts per million (ppm) action level.

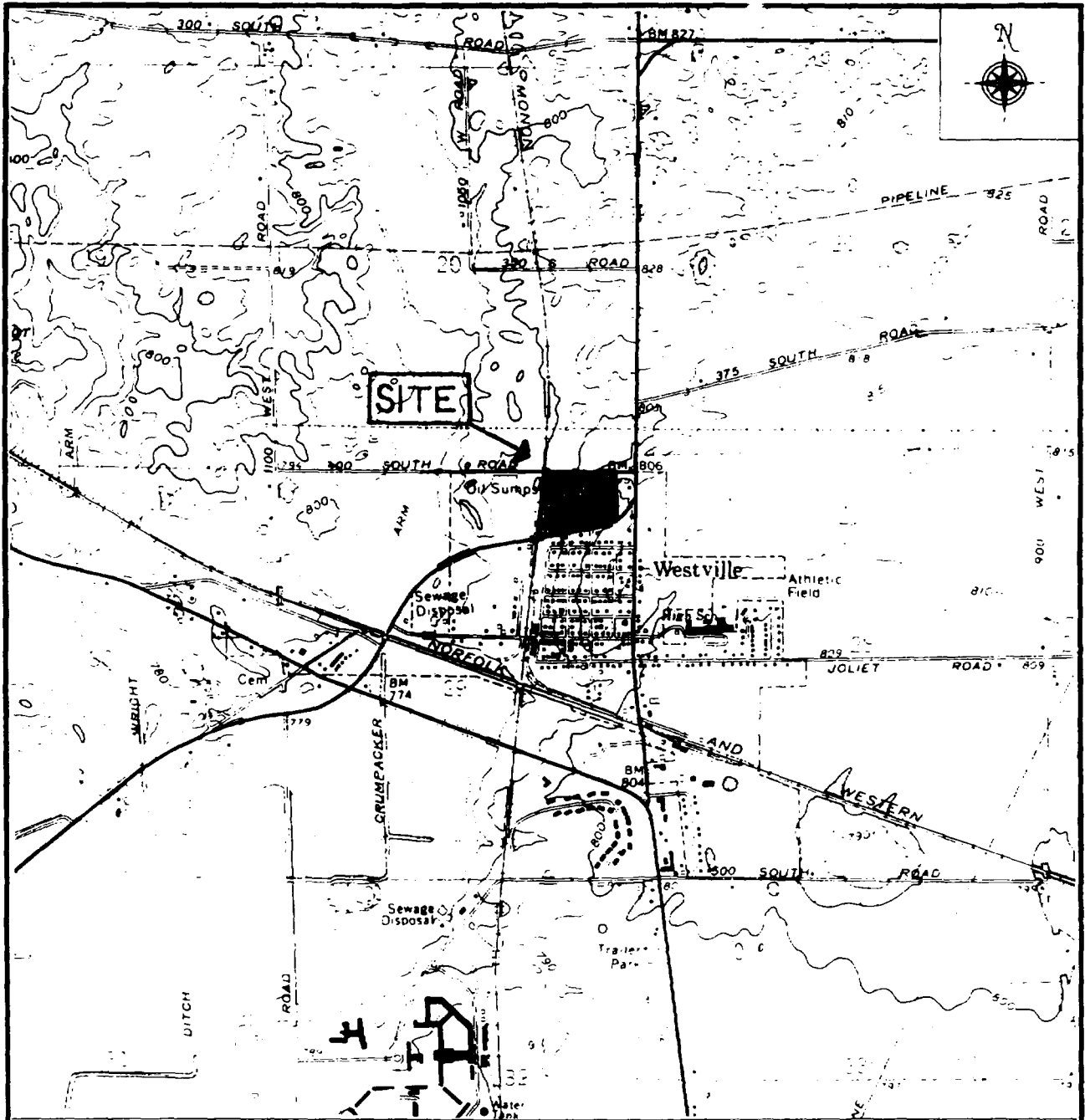
Sincerely,



Christianne Ottinger
START Project Manager

Attachments

- Attachment 1: Analytical Results and Quality Assurance Memorandum
- Attachment 2: Laboratory Certification
- Attachment 3: Laboratory Analytical Procedures



Site Location



Indiana

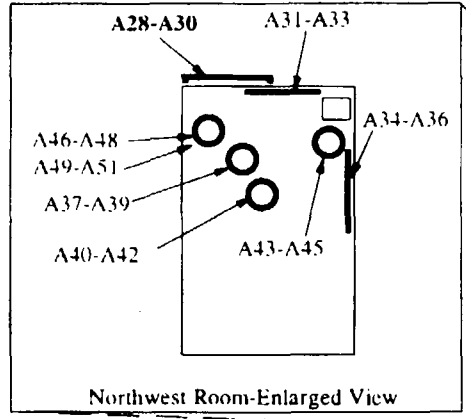
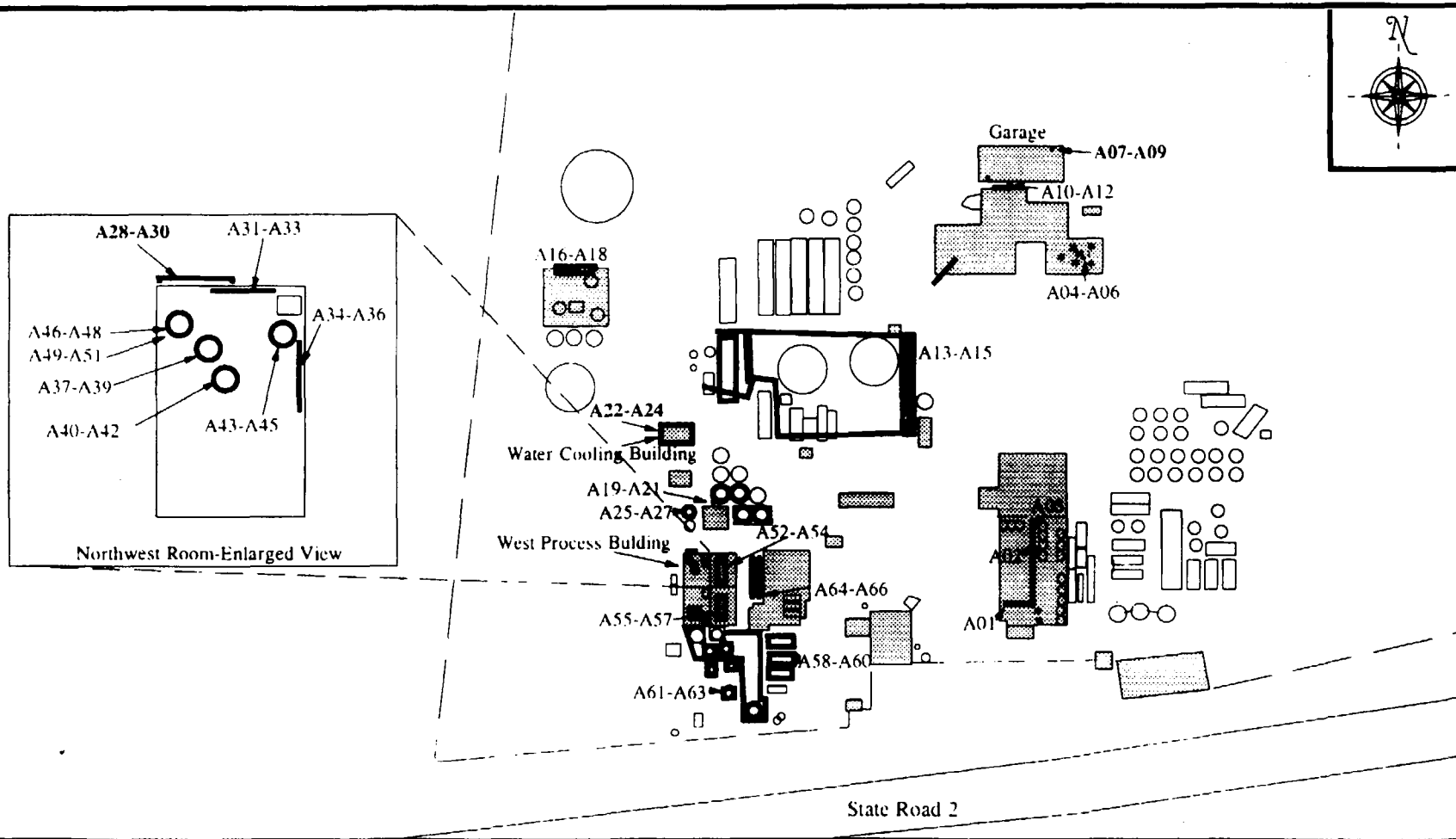


ecology and environment, inc.

Superfund Technical Assessment and Response Team
Region V


33 North Dearborn Street, Suite 900, Chicago, Illinois 60602

TITLE	Site Location Map	FIGURE #	1
SITE	CAM-OR	SCALE	1:24,000
CITY	Westville	STATE	Indiana
SOURCE	USGS Topographic Map, 7.5 Minute Series - Westville, IN Quadrangle	TDD#	S05-9701-018
		DATE	1969
		PHOTOINSPECTED	1977



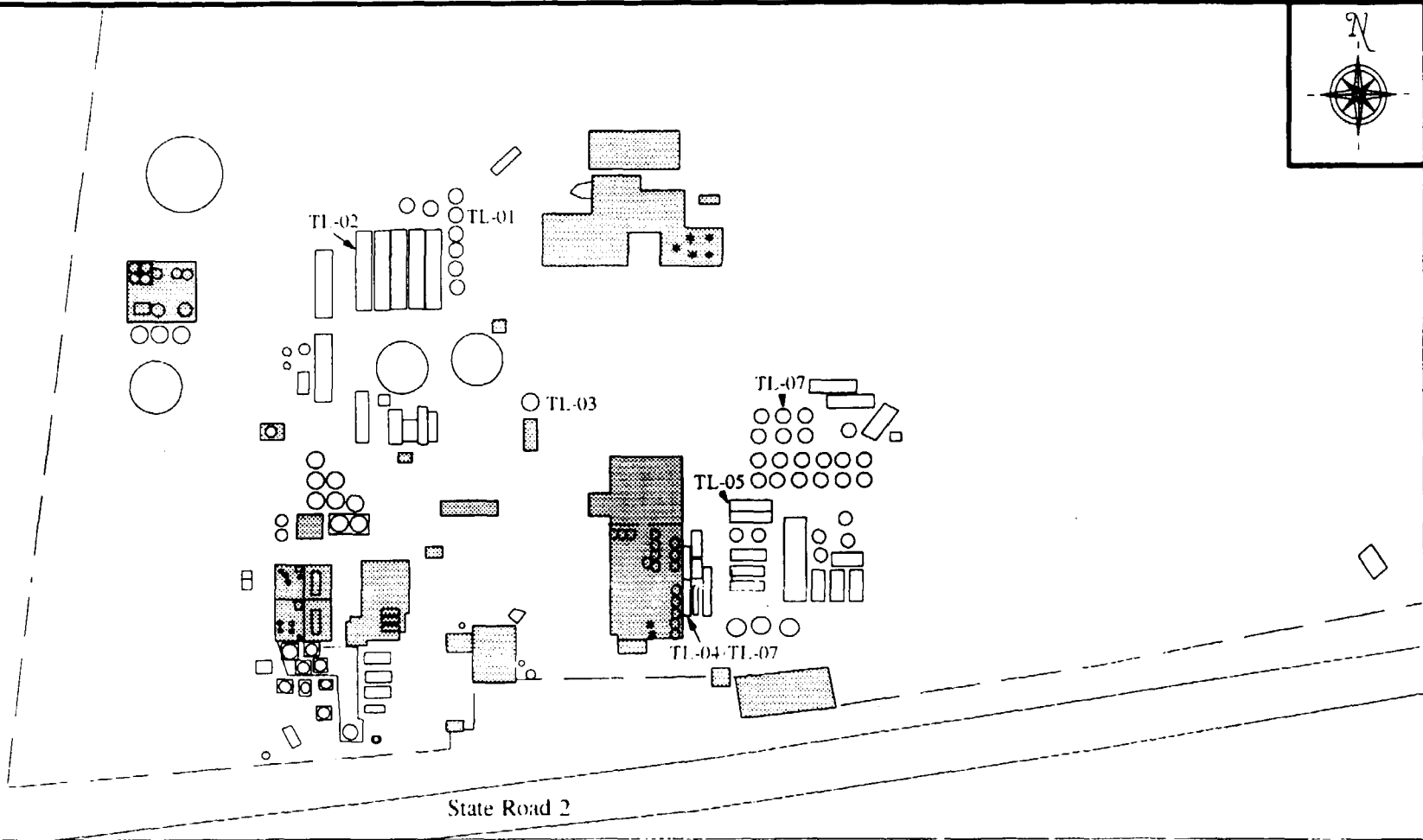
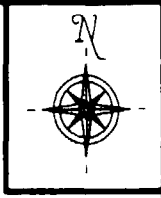
Legend

	Vertical Tank		Fence
	Elevated Tank		Drum
	Horizontal Tank		Building
	Suspected Asbestos		Sample Point



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 Region V
 33 North Dearborn Street, Chicago, Illinois 60602

TITLE	Bulk Asbestos Sample Location Map	FIGURE	2
SITE	CAM-OR	TDD #	S05-9701-018
CITY	Westville	SCALE	Not to Scale
STATE	Indiana	DATE	6/22/97
SOURCE	Dames & Moore/Ecology and Environment, Inc.		



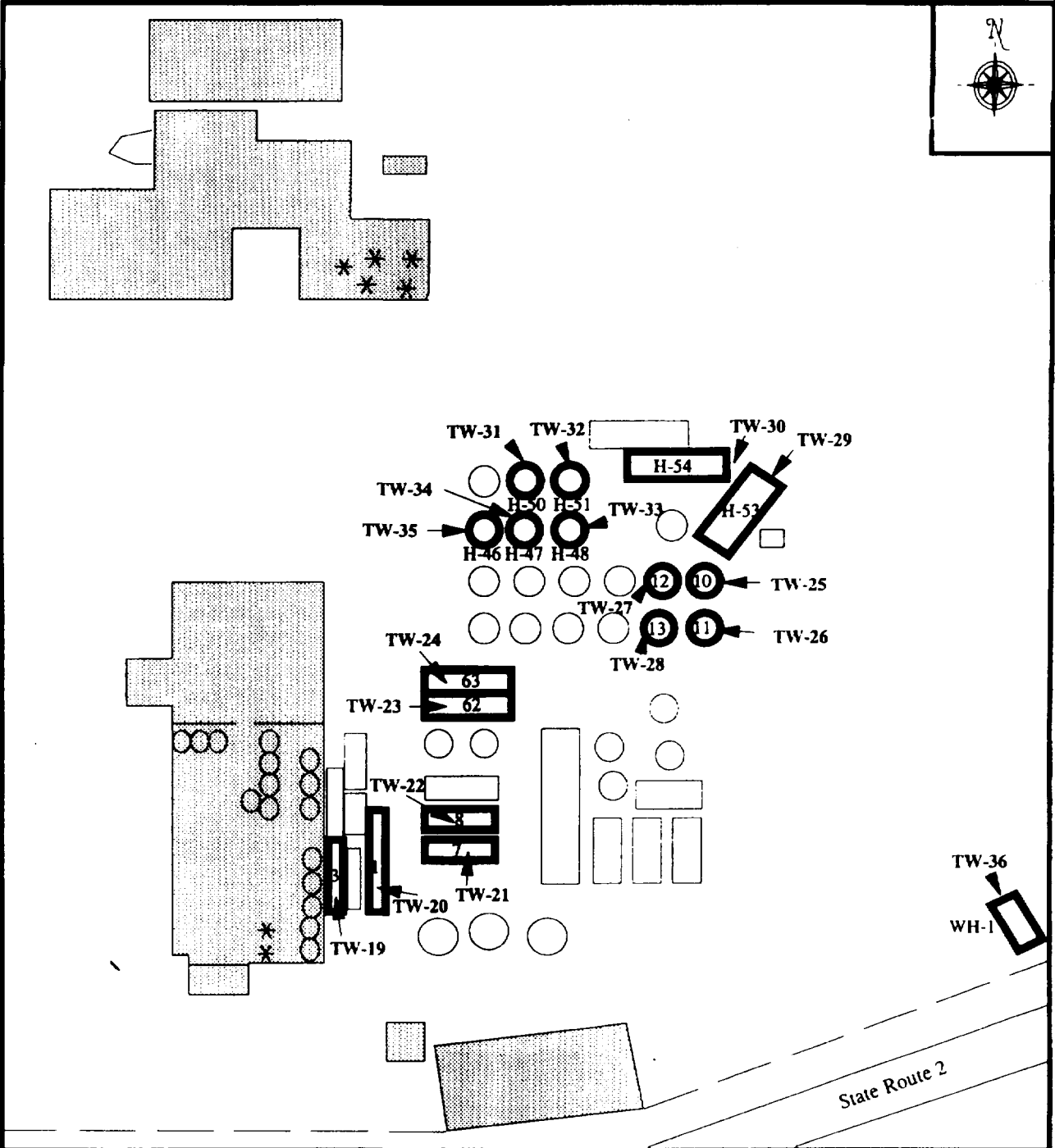
Legend

- Vertical Tank
- Elevated Tank
- Horizontal Tank
- TL-xx Sample Point
- Fence
- Drum
- Building



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 33 North Dearborn Street, Chicago, Illinois 60602

TITLE	Tank Liquid Sampling Location Map	FIGURE	3
SITE	CAM-OR	TDD #	S05-9701-018
CITY	Westville	STATE	Indiana
SOURCE	Dames & Moore/Ecology and Environment, Inc.	DATE	6/22/97

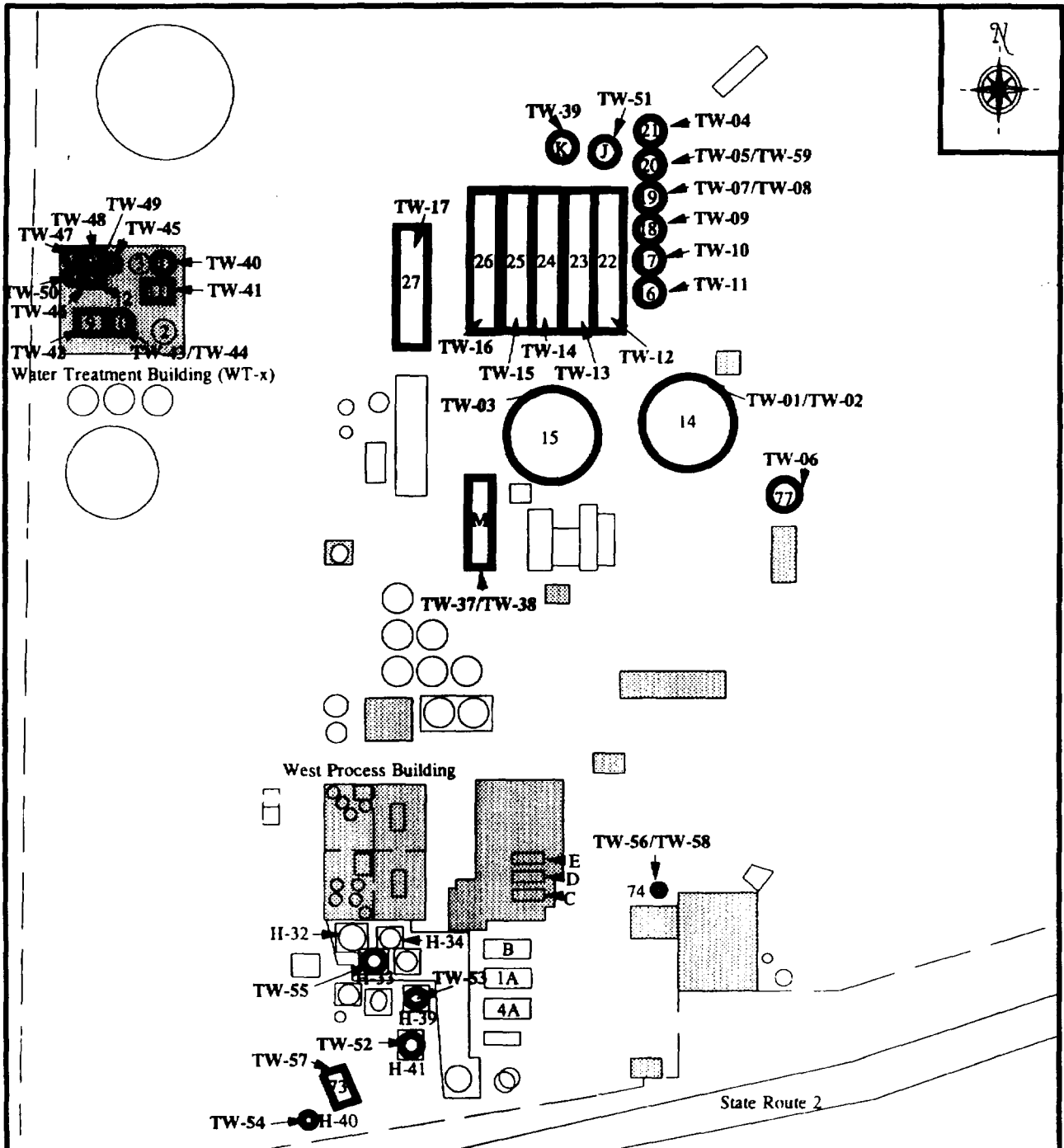


Legend

	Vertical Tank		Fence
	Horizontal Tank		Building
	Drum		
	Sampled Tanks		
TW-xx	Sample Number		

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 Region V
 33 North Dearborn Street, Chicago, Illinois 60602

TITLE East Tank Area Wipe Sample Location Map		FIGURE # 4
SITE CAM-OR		SCALE Not to scale
CITY Westville	STATE Indiana	FDD # S05-9701-018



Legend

	Vertical Tank		Fence
	Elevated Tank		Building
	Horizontal Tank		
	Sampled Tanks		
TW-xx	Sample Number		

<p>ecology and environment, inc. Superfund Technical Assessment And Response Team Region V 33 North Dearborn Street, Chicago, Illinois 60602</p>		FIGURE #
		5
TITLE		SCALE
West Tank Area Wipe Sample Location Map		Not to scale
SITE		TDD #
CAM-OR		S05-9701-018
CITY	STATE	
Westville	Indiana	

Table I

Analytical Results for Bulk Asbestos
 Cam-Or Site, Westville, Indiana
 June 30, 1997

Sample	A01	A02	A03	A04	A05	A06	A07	A08	A09	A10	A11
Asbestos Detected	N	N	N	N	N	N	Y	Y	Y	N	N
% Asbestos Fibers	N/A	N/A	N/A	N/A	N/A	N/A	45-50%	45-50%	45-50%	N/A	N/A
Sample	A12	A13	A14	A15	A16	A17	A18	A19	A20	A21	A22
Asbestos Detected	N	N	N	N	N	N	N	N	N	N	Y
% Asbestos Fibers	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	10-15%
Sample	A23	A24	A25	A26	A27	A28	A29	A30	A31	A32	A33
Asbestos Detected	Y	Y	N	N	N	Y	Y	Y	N	N	N
% Asbestos Fibers	10-15%	10-15%	N/A	N/A	N/A	20-25%	20-25%	20-25%	N/A	N/A	N/A
Sample	A34	A35	A36	A37	A38	A39	A40	A41	A42	A43	A44
Asbestos Detected	N	N	N	N	N	N	N	N	N	N	N
% Asbestos Fibers	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sample	A45	A46	A47	A48	A49	A50	A51	A52	A53	A54	A55
Asbestos Detected	N	N	N	N	N	N	N	N	N	N	N
% Asbestos Fibers	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sample	A56	A57	A58	A59	A60	A61	A62	A63	A64	A65	A66
Asbestos Detected	N	N	N	N	N	N	N	N	N	N	N
% Asbestos Fibers	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Key: N/A = Not Applicable

N = Not detected

Bolded sample number indicates asbestos in excess of 1% was detected.

Table 2								
Wipe Sample Analytical Results for Polychlorinated Biphenyls								
Cam-Or Site, Westville, Indiana								
August 24 - 25, 1997								
units = $\mu\text{g}/\text{cm}^2$								
Sample	Tank	Results	Sample	Tank	Results	Sample	Tank	Results
TW-01	14	17.8	TW-21	7	10.7	TW-41	WT-11	BDL
TW-02	14	8.4	TW-22	8	BDL	TW-42	WT-9	BDL
TW-03	15	BDL	TW-23	62	BDL	TW-43	WT-10	BDL
TW-04	21	2.3	TW-24	63	BDL	TW-44	WT-10	BDL
TW-05	20	BDL	TW-25	10	5.2	TW-45	WT-4	BDL
TW-06	77	BDL	TW-26	11	6.8	TW-46	WT-12	BDL
TW-07	19	2.4	TW-27	12	10.7	TW-47	WT-7	BDL
TW-08	19	10.5	TW-28	13	BDL	TW-48	WT-5	BDL
TW-09	18	15.3	TW-29	H-53	BDL	TW-49	WT-6	BDL
TW-10	17	4.68	TW-30	H-54	BDL	TW-50	WT-8	BDL
TW-11	16	35.0	TW-31	H-50	BDL	TW-51	J	BDL
TW-12	22	16.0	TW-32	H-51	BDL	TW-52	H-41	BDL
TW-13	23	4.4	TW-33	H-48	7.9	TW-53	H-39	BDL
TW-14	24	3.5	TW-34	H-47	BDL	TW-54	H-40	BDL
TW-15	25	BDL	TW-35	H-46	BDL	TW-55	H-33	BDL
TW-16	26	BDL	TW-36	WH-1	18.9	TW-56	74	BDL
TW-17	27	BDL	TW-37	M	BDL	TW-57	73	BDL
TW-18	Blank	BDL	TW-38	M	BDL	TW-58	74	BDL
TW-19	3	5.7	TW-39	K	BDL	TW-59	20	13
TW-20	1	12.1	TW-40	WT-1	BDL	TW-60	Blank	BDL

Key: $\mu\text{g}/\text{cm}^2$ = micrograms of total PCBs per 100 squared centimeters of surface area
 TW-18 and TW-60 are blank samples.

BDL = Below Detectable Limits

Bolded tank number indicates tanks with PCB concentrations greater than $10 \mu\text{g}/100\text{cm}^2$.

Table 3

**Liquid Sample Analytical Results for Polychlorinated Biphenyls
Cam-Or Site, Westville, Indiana
August 24 - 25, 1997**

units = $\mu\text{g/L}$

Sample	TL-01	TL-02	TL-03	TL-04	TL-04	TL-05	TL-06	TL-07
Tank	20	26	77	3	3	63	3	H-50
Dilution Factor	10	4	1.07	20	80	2	20	1.28
Result	48	130	BDL	980E	1420	5.7	640	BDL

Key: $\mu\text{g/L}$ = micrograms of total PCBs per liter of oil-water liquid.
BDL = Below Detectable Limits

Attachment 1
Analytical Results



ecology and environment. inc.

International Specialists in the Environment

33 North Dearborn Street
Chicago, Illinois 60602
Tel 312/578-9243, Fax: 312/578-9345

M E M O R A N D U M

DATE: July 29, 1997

TO: Steve Skare, START Project Manager, E & E, Chicago, Illinois

FROM: David Hendren, START Analytical Services Manager, E & E, Chicago, Illinois

THROUGH: Mary Jane Ripp, Assistant START Program Manager, E & E, Chicago, Illinois

SUBJECT: Generic Data Quality Review for Asbestos Using Polarized Light Microscopy, Cam-Or, Westville, La Porte County, Indiana

REFERENCE: Project TDD S05-9701-018 Analytical TDD S05-9707-803
Project PAN 7J1801REXX Analytical PAN 7UAC01TAXX

The data quality assurance (QA) review of 66 solid samples collected from the Cam-Or site is complete. The samples were collected on June 30, 1997, by the Superfund Technical Assessment and Response Team (START) contractor, Ecology and Environment, Inc. (E & E). The samples were submitted to Carnow, Conibear, and Associates, Ltd., Chicago, Illinois, for analysis. The laboratory analyses were performed according to the United States Environmental Protection Agency U.S. EPA Method 8000M4-82-020.

Sample Identification

<u>START Identification No.</u>	<u>Laboratory Identification No.</u>
A1	97-BA-03290
A2	97-BA-03291
A3	97-BA-03292
A4	97-BA-03293
A5	97-BA-03294
A6	97-BA-03295
A7	97-BA-03296
A8	97-BA-03297
A9	97-BA-03298
A10	97-BA-03299
A11	97-BA-03300
A12	97-BA-03301

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Analytical TDD S05-9701-018
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START
Identification No.

Laboratory
Identification No.

A13	97-BA-03302
A14	97-BA-03303
A15	97-BA-03304
A16	97-BA-03305
A17	97-BA-03306
A18	97-BA-03307
A19	97-BA-03308
A20	97-BA-03309
A21	97-BA-03310
A22	97-BA-03311
A23	97-BA-03312
A24	97-BA-03313
A25	97-BA-03314
A26	97-BA-03315
A27	97-BA-03316
A28	97-BA-03317
A29	97-BA-03318
A30	97-BA-03319
A31	97-BA-03320
A32	97-BA-03321
A33	97-BA-03322
A34	97-BA-03323
A35	97-BA-03324
A36	97-BA-03325
A37	97-BA-03326
A38	97-BA-03327
A39	97-BA-03328
A40	97-BA-03329
A41	97-BA-03330
A42	97-BA-03331
A43	97-BA-03332
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A45	97-BA-03334
A46	97-BA-03335
A47	97-BA-03336
A48	97-BA-03337
A49	97-BA-03338
A50	97-BA-03339
A51	97-BA-03340
A52	97-BA-03341
A53	97-BA-03342
A54	97-BA-03343
A55	97-BA-03344
A56	97-BA-03345
A57	97-BA-03346

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<u>START</u> <u>Identification No.</u>	<u>Laboratory</u> <u>Identification No.</u>
A58	97-BA-03347
A59	97-BA-03348
A60	97-BA-03349
A61	97-BA-03350
A62	97-BA-03351
A63	97-BA-03352
A64	97-BA-03353
A65	97-BA-03354
A66	97-BA-03355

Data Qualifications:

I. Sample Holding Time: Acceptable

The samples were collected on June 30, 1997, and analyzed on July 3, 1997. The Office of Solid Waste and Emergency Response (OSWER) Directive 9360.4 does not specify holding time criteria for this parameter.

II. Overall Assessment of Data for Use: Acceptable

The overall usefulness of the data is based on criteria for QA Level II as outlined in the OSWER Directive 9360.4-01 (April 1990), Data Validation Procedures, Section 9.0, Generic Data Validation Procedures. Based upon the information provided, the data are acceptable for use.

07/07/97

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Laboratory and Sample Number Date Analyzed	Note	Asbestos Detected	Type Asbestos Detected	Estimated Percent	Friable	Color	Homogeneous Number of Layers	Other Fibers Present	Estimated Percent	% Binders & Fillers
97-BA-03290 E&E-06/30/97-001 ANT-07/03/97		N	NA		Y	WHITE	Y 1	Cellulose	35-40%	55-60%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A01, PIPING/SOUTH ROOM OF CANNERY										
97-BA-03291 E&E-06/30/97-002 ANT-07/03/97		N	NA		Y	WHITE	Y 1	Cellulose	35-40%	55-60%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A02, PIPING/SOUTH ROOM OF CANNERY										
97-BA-03292 E&E-06/30/97-003 ANT-07/03/97		N	NA		Y	WHITE	Y 1	Cellulose	55-60%	35-40%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A03, PIPING/SOUTH ROOM OF CANNERY										
97-BA-03293 E&E-06/30/97-004 ANT-07/03/97		N	NA		Y	WHITE	Y 1	Cellulose	35-40%	55-60%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A04, INSULATION/INSULATION BOX STORAGE ROOM										
97-BA-03294 E&E-06/30/97-005 ANT-07/03/97		N	NA		Y	WHITE	Y 1	Cellulose	35-40%	55-60%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A05, INSULATION/INSULATION BOX STORAGE ROOM										
97-BA-03295 E&E-06/30/97-006 ANT-07/03/97		N	NA		Y	WHITE	Y 1	Cellulose	35-40%	55-60%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A06, INSULATION/INSULATION BOX STORAGE ROOM										
97-BA-03296 E&E-06/30/97-007 ANT-07/03/97		Y	Chrysotile	45-50%	N	GREY	N 1			45-50%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A07, WALLBOARD/DRUM STORAGE BUILDING										
97-BA-03297 E&E-06/30/97-008 ANT-07/03/97		Y	Chrysotile	45-50%	N	GREY	Y 1			45-50%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A08, WALLBOARD/DRUM STORAGE BUILDING										



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97-BA-03298 E&E-06/30/97-009 ANT-07/03/97		Y	Chrysotile	45-50%	N	GREY	Y 1			45-50%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A09, WALLBOARD/DRUM STORAGE BUILDING										
97-BA-03299 E&E-06/30/97-010 ANT-07/03/97		N	NA		Y	GREY	Y 1			100%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A10, PIPING/SOUTH OF DRUM STORAGE BUILDING										
97-BA-03300 E&E-06/30/97-011 ANT-07/03/97		N	NA		Y	GREY	Y 1			100%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A11, PIPING/SOUTH OF DRUM STORAGE BUILDING										
97-BA-03301 E&E-06/30/97-012 ANT-07/03/97		N	NA		Y	GREY	Y 1			100%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A12, PIPING/SOUTH OF DRUM STORAGE BUILDING										
97-BA-03302 E&E-06/30/97-013 ANT-07/03/97		N	NA		Y	WHITE	Y 1	Cellulose	35-40%	55-60%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A13, PIPING/EAST OF TANK 14										
97-BA-03303 E&E-06/30/97-014 ANT-07/03/97		N	NA		Y	WHITE	Y 1	Cellulose	35-40%	55-60%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A14, PIPING/EAST OF TANK 14										
97-BA-03304 E&E-06/30/97-015 ANT-07/03/97		N	NA		Y	BEIGE	Y 1	Cellulose	35-40%	55-60%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A15, PIPING/EAST OF TANK 14										
97-BA-03305 E&E-06/30/97-016 ANT-07/03/97		N	NA		Y	GREY	Y 1	Fibrous Glass	15-20%	80-85%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A16, PIPE JOINT/WATER TREATMENT BUILDING										



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Laboratory and Sample Number · Note Date Analyzed	Asbestos Detected	Type Asbestos Detected	Estimated Percent	Friable	Color	Homogeneous Number of Layers	Other Fibers Present	Estimated Percent	% Binders & Fillers
97-BA-03306 E&E-06/30/97-017 ANT-07/03/97	N	NA		Y	GREY	Y 1	Fibrous Glass	15-20%	80-85%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A17, PIPE JOINT/WATER TREATMENT BUILDING									
97-BA-03307 E&E-06/30/97-018 ANT-07/03/97	N	NA		Y	GREY	Y 1	Fibrous Glass	15-20%	80-85%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A18, PIPE JOINT/WATER TREATMENT BUILDING									
97-BA-03308 E&E-06/30/97-019 ANT-07/03/97	N	NA		Y	BEIGE	Y 1	Cellulose	5-10%	90-95%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A19, LOOSE INSULATION/SOUTH OF TANK 69									
97-BA-03309 E&E-06/30/97-020 ANT-07/03/97	N	NA		Y	BEIGE	Y 1	Cellulose	5-10%	90-95%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A20, LOOSE INSULATION/SOUTH OF TANK 69									
97-BA-03310 E&E-06/30/97-021 ANT-07/03/97	N	NA		Y	BEIGE	Y 1	Cellulose	5-10%	90-95%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A21, LOOSE INSULATION/SOUTH OF TANK 69									
97-BA-03311 E&E-06/30/97-022 ANT-07/03/97	Y	Chrysotile	10-15%	N	GREY	Y 1			85-90%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A22, WALLBOARD/WATER COOLING TOWER									
97-BA-03312 E&E-06/30/97-023 ANT-07/03/97	Y	Chrysotile	10-15%	N	GREY	Y 1			85-90%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A23, WALLBOARD/WATER COOLING TOWER									
97-BA-03313 E&E-06/30/97-024 ANT-07/03/97	Y	Chrysotile	10-15%	N	GREY	Y 1			85-90%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A24, WALLBOARD/WATER COOLING TOWER									



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97-BA-03314 E&E-06/30/97-025 ANT-07/03/97		N	NA		Y	BROWN	Y 1	Fibrous Glass	10-15%	85-90%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A25, INSULATION/TANK 76										
97-BA-03315 E&E-06/30/97-026 ANT-07/03/97		N	NA		Y	BROWN	Y 1	Fibrous Glass	10-15%	85-90%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A26, INSULATION/TANK 76										
97-BA-03316 E&E-06/30/97-027 ANT-07/03/97		N	NA		Y	BROWN	Y 1	Fibrous Glass	10-15%	85-90%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A27, INSULATION/TANK 76										
97-BA-03317 E&E-06/30/97-028 ANT-07/03/97		Y	Chrysotile	20-25%	N	GREY	Y 1			75-80%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A28, WALLBOARD/WEST PROCESS BUILDING										
97-BA-03318 E&E-06/30/97-029 ANT-07/03/97		Y	Chrysotile	20-25%	N	GREY	Y 1			75-80%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A29, WALLBOARD/WEST PROCESS BUILDING										
97-BA-03319 E&E-06/30/97-030 ANT-07/03/97		Y	Chrysotile	20-25%	N	GREY	Y 1			75-80%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A30, WALLBOARD/WEST PROCESS BUILDING										
97-BA-03320 E&E-06/30/97-031 ANT-07/03/97		N	NA		Y	GREY	Y 1	Cellulose	15-20%	80-85%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A31, NORTH PIPE/NW ROOM OF WEST PROCESS BUILDING										
97-BA-03321 E&E-06/30/97-032 ANT-07/03/97		N	NA		Y	GREY	Y 1	Cellulose	15-20%	80-85%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A32, NORTH PIPE/NW ROOM OF WEST PROCESS BUILDING										



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97-BA-03322 E&E-06/30/97-033 ANT-07/03/97		N	NA		Y	GREY	Y 1	Cellulose	15-20%	80-85%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A33, NORTH PIPE/NW ROOM OF WEST PROCESS BUILDING										
97-BA-03323 E&E-06/30/97-034 ANT-07/03/97		N	NA		Y	GREY	Y 1	Cellulose	1-5%	95-99%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A34, EAST PIPE/NW ROOM OF WEST PROCESS BUILDING										
97-BA-03324 E&E-06/30/97-035 ANT-07/03/97		N	NA		Y	GREY	Y 1	Cellulose	5-10%	90-95%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A35, EAST PIPE/NW ROOM OF WEST PROCESS BUILDING										
97-BA-03325 E&E-06/30/97-036 ANT-07/03/97		N	NA		Y	GREY	Y 1	Cellulose	15-20%	80-85%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A36, EAST PIPE/NW ROOM OF WEST PROCESS BUILDING										
97-BA-03326 E&E-06/30/97-037 ANT-07/03/97		N	NA		Y	BEIGE	Y 1	Cellulose	15-20%	80-85%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A37, BOILER B1/NW ROOM OF WEST PROCESS BUILDING										
97-BA-03327 E&E-06/30/97-038 ANT-07/03/97		N	NA		Y	BEIGE	Y 1	Cellulose	15-20%	80-85%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A38, BOILER B1/NW ROOM OF WEST PROCESS BUILDING										
97-BA-03328 E&E-06/30/97-039 ANT-07/03/97		N	NA		Y	BEIGE	Y 1	Cellulose	1-5%	95-99%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A39, BOILER B1/NW ROOM OF WEST PROCESS BUILDING										
97-BA-03329 E&E-06/30/97-040 ANT-07/03/97		N	NA		Y	WHITE/BRWN	N 2	Cellulose	1-5%	95-99%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A40, BOILER B2/NW ROOM OF WEST PROCESS BUILDING										



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Laboratory and Sample Number Date Analyzed	Note	Asbestos Detected	Type Asbestos Detected	Estimated Percent	Triable	Color	Homogeneous Number of Layers	Other Fibers Present	Estimated Percent	% Binders & Fillers
97-BA-03330 E&E-06/30/97-041 ANT-07/03/97		N	NA		Y	WHITE	Y 1	Cellulose	1-5%	95-99%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A41, BOILER B2/NW ROOM OF WEST PROCESS BUILDING										
97-BA-03331 E&E-06/30/97-042 ANT-07/03/97		N	NA		Y	WHITE	Y 1	Cellulose	1-5%	95-99%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A42, BOILER B2/NW ROOM OF WEST PROCESS BUILDING										
97-BA-03332 E&E-06/30/97-043 ANT-07/03/97		N	NA		Y	WHITE	Y 1	Cellulose	10-15%	85-90%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A43, BOILER B3/NW ROOM OF WEST PROCESS BUILDING										
97-BA-03333 E&E-06/30/97-044 ANT-07/03/97		N	NA		Y	WHITE	Y 1	Cellulose	10-15%	85-90%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A44, BOILER B3/NW ROOM OF WEST PROCESS BUILDING										
97-BA-03334 E&E-06/30/97-045 ANT-07/03/97		N	NA		Y	WHITE	Y 1	Cellulose	10-15%	85-90%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A45, BOILER B3/NW ROOM OF WEST PROCESS BUILDING										
97-BA-03335 E&E-06/30/97-046 ANT-07/03/97		N	NA		Y	WHITE	Y 1	Cellulose	5-10%	90-95%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A46, BOILER B4(BOTTOM)/NW ROOM OF WEST PROCESS BUILDING										
97-BA-03336 E&E-06/30/97-047 ANT-07/03/97		N	NA		Y	WHITE	Y 1	Cellulose	5-10%	90-95%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A47, BOILER B4(BOTTOM)/NW ROOM OF WEST PROCESS BUILDING										
97-BA-03337 E&E-06/30/97-048 ANT-07/03/97		N	NA		Y	WHITE	Y 1	Cellulose	5-10%	90-95%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A48, BOILER B4(BOTTOM)/NW ROOM OF WEST PROCESS BUILDING										



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Laboratory and Sample Number Date Analyzed	Note	Asbestos Detected	Type Asbestos Detected	Estimated Percent	Friable	Color	Homogeneous Number of Layers	Other Filers Present	Estimated Percent	% Binders & Fillers
97-BA-03338 E&E-06/30/97-049 ANT-07/03/97		N	NA		Y	GREY	Y 1	Cellulose Fibrous Glass	1-5% 5-10%	85-90%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A49, BOILER B4(JACKET)/NW ROOM OF WEST PROCESS BUILDING										
97-BA-03339 E&E-06/30/97-050 ANT-07/03/97		N	NA		Y	BEIGE	Y 1	Cellulose	10-15%	85-90%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A50, BOILER B4(JACKET)/NW ROOM OF WEST PROCESS BUILDING										
97-BA-03340 E&E-06/30/97-051 ANT-07/03/97		N	NA		Y	BEIGE	Y 1	Cellulose	10-15%	85-90%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A51, BOILER B4(JACKET)/NW ROOM OF WEST PROCESS BUILDING										
97-BA-03341 E&E-06/30/97-052 ANT-07/03/97		N	NA		Y	BEIGE	Y 1			100%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A52, PIPE JOINT/BOILER IN NE ROOM OF W.PROCESS BUILDING										
97-BA-03342 E&E-06/30/97-053 ANT-07/03/97		N	NA		Y	BEIGE	Y 1			100%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A53, PIPE JOINT/BOILER IN NE ROOM OF W.PROCESS BUILDING										
97-BA-03343 E&E-06/30/97-054 ANT-07/03/97		N	NA		Y	BEIGE	Y 1			100%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A54, PIPE JOINT/BOILER IN NE ROOM OF W.PROCESS BUILDING										
97-BA-03344 E&E-06/30/97-055 ANT-07/03/97		N	NA		Y	GREY	Y 1	Fibrous Glass	5-10%	90-95%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A55, BOILER JACKET/SE ROOM OF WEST PROCESS BUILDING										
97-BA-03345 E&E-06/30/97-056 ANT-07/03/97		N	NA		Y	GREY	Y 1	Fibrous Glass	5-10%	90-95%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A56, BOILER JACKET/SE ROOM OF WEST PROCESS BUILDING										



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Laboratory and Sample Number Date Analyzed	Note	Asbestos Detected	Type Asbestos Detected	Estimated Percent	Friable	Color	Homogeneous Number of Layers	Other Fibers Present	Estimated Percent	Binders & Fillers
97-BA-03346 E&E-06/30/97-057 ANT-07/03/97		N	NA		Y	GREY	Y 1	Fibrous Glass	5-10%	90-95%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A57, BOILER JACKET/SE ROOM OF WEST PROCESS BUILDING										
97-BA-03347 E&E-06/30/97-058 ANT-07/03/97		N	NA		Y	BEIGE	Y 1	Cellulose	5-10%	90-95%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A58, ELBOW JOINT OF FURNACE/S.OF EAST PROCESS BUILDING										
97-BA-03348 E&E-06/30/97-059 ANT-07/03/97		N	NA		Y	BEIGE	Y 1	Cellulose	10-15%	85-90%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A59, ELBOW JOINT OF FURNACE/S.OF EAST PROCESS BUILDING										
97-BA-03349 E&E-06/30/97-060 ANT-07/03/97		N	NA		Y	GREY	Y 1			100%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A60, ELBOW JOINT TO FURNACE/S.OF EAST PROCESS BUILDING										
97-BA-03350 E&E-06/30/97-061 ANT-07/03/97		N	NA		N	BROWN	Y 1	Fibrous Glass	1-5%	95-99%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A61, LOOSE FIREBRICK TO DRYER/S.OF WEST PROCESS BLDG.										
97-BA-03351 E&E-06/30/97-062 ANT-07/03/97		N	NA		N	BROWN	Y 1	Fibrous Glass	1-5%	95-99%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A62, LOOSE FIREBRICK TO DRYER/S.OF WEST PROCESS BLDG.										
97-BA-03352 E&E-06/30/97-063 ANT-07/03/97		N	NA		N	BROWN	Y 1			100%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A63, LOOSE FIREBRICK TO DRYER/S.OF WEST PROCESS BLDG.										
97-BA-03353 E&E-06/30/97-064 ANT-07/03/97		N	NA		Y	BEIGE	Y 1			100%
E&E PROJECT#KJ5102 CAM-OR 505-9707-803 SAMPLE#A64, PIPING/BETWEEN WEST AND EAST PROCESS BUILDINGS										




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Laboratory and Sample Number Date Analyzed	Note	Asbestos Detected	Type Asbestos Detected	Estimated Percent	Friable	Color	Homogeneous Number of Layers	Other Fibers Present	Estimated Percent	% Binders & Fillers
97-BA-03354 E&E-06/30/97-065 ANT-07/03/97		N	NA		Y	BEIGE	Y 1			100%
E&E PROJECT#KJ5102 CAN-OR 505-9707-803 SAMPLE#A65, PIPING/BETWEEN WEST AND EAST PROCESS BUILDINGS										
97-BA-03355 E&E-06/30/97-066 ANT-07/03/97		N	NA		Y	BEIGE	Y 1			100%
E&E PROJECT#KJ5102 CAN-OR 505-9707-803 SAMPLE#A66, PIPING/BETWEEN WEST AND EAST PROCESS BUILDINGS										




ALEKSEY POROSIN
Analyst



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M E M O R A N D U M

DATE: October 1, 1997

TO: Christianne Ottinger, START Project Manager, E & E,
Chicago, Illinois

FROM: David Hendren, START Analytical Services Manager,
E & E, Chicago, Illinois

THROUGH: Mary Jane Ripp, START Assistant Program Manager,
E & E, Chicago, Illinois

SUBJECT: Data Quality Review for Polychlorinated Biphenyls
(PCBs), Cam-Or, Westville, La Porte County, Indiana

REFERENCE: Project TDD S05-9701-018 Analytical TDD S05-9708-811
Project PAN 7J1801REXX Analytical PAN 7UAC01TAXX

The data quality assurance (QA) review of seven water and 60 wipe samples collected from the Cam-Or site is complete. The samples were collected on August 25-27, 1997, by the Superfund Technical Assessment and Response Team (START) contractor, Ecology and Environment, Inc. (E & E). The samples were submitted to American Environmental Network, Inc., Schaumburg, Illinois. The laboratory analyses were performed according to the United States Environmental Protection Agency (U.S. EPA) Solid Waste 846 Method 8081.

Sample Identification

<u>START</u> <u>Identification No.</u>	<u>Laboratory</u> <u>Identification No.</u>
TW-01	L72972075-001
TW-02	L72972075-002
TW-03	L72972075-003
TW-04	L72972075-004
TW-05	L72972075-005
TW-06	L72972075-006
TW-07	L72972075-007
TW-08	L72972075-008
TW-09	L72972075-009
TW-10	L72972075-010
TW-11	L72972075-011
TW-12	L72972075-012
TW-13	L72972075-013

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Project TDD S05-9701-018
Analytical TDD S05-9708-811
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Sample Identification

<u>START</u> <u>Identification No.</u>	<u>Laboratory</u> <u>Identification No.</u>
TW-14	L72972075-014
TW-15	L72972075-015
TW-16	L72972075-016
TW-17	L72972075-017
TW-18	L72972075-018
TW-19	L72972075-019
TW-20	L72972075-020
TW-21	L72972075-021
TW-22	L72972075-022
TW-23	L72972075-023
TW-24	L72972075-024
TW-25	L72972075-025
TW-26	L72972075-026
TW-27	L72972075-027
TW-28	L72972075-028
TW-29	L72972075-029
TW-30	L72972075-030
TW-31	L72972075-031
TW-32	L72972075-032
TW-33	L72972075-033
TW-34	L72972075-034
TW-35	L72972075-035
TW-36	L72972075-036
TW-37	L72972075-037
TW-38	L72972075-038
TW-39	L72972075-039
TW-40	L72972075-040
TW-41	L72972075-041
TW-42	L72972075-042
TW-43	L72972075-043
TW-44	L72972075-044
TW-45	L72972075-045
TW-46	L72972075-046
TW-47	L72972075-047
TW-48	L72972075-048
TW-49	L72972075-049
TW-50	L72972075-050
TW-51	L72972075-051
TW-52	L72972075-052
TW-53	L72972075-053
TW-54	L72972075-054
TW-55	L72972075-055

Sample Identification

<u>START Identification No.</u>	<u>Laboratory Identification No.</u>
TW-56	L72972075-056
TW-57	L72972075-057
TW-58	L72972075-058
TW-59	L72972075-059
TW-60	L72972075-060
TL-01	L72972075-061
TL-02	L72972075-062
TL-03	L72972075-063
TL-04	L72972075-064
TL-05	L72972075-065
TL-06	L72972075-066
TL-07	L72972075-067

Data Qualifications:

I. Sample Holding Time: Acceptable

The samples were collected on August 25-27, 1997, extracted on August 28, 1997 and September 5, 1997, and analyzed between September 5 and 11, 1997. This is within the 14-day holding time limit, from collection to extraction, and 40-day limit from extraction to analysis.

II. Instrument Performance: Acceptable

The chromatographic resolution was adequate in the standard and sample chromatograms. Surrogate retention times were consistent in the samples and standards.

III. Calibrations:

• Initial Calibration: Acceptable

A five-point initial calibration was performed prior to analysis. The percent relative standard deviations (%RSDs) between response factors were less than 20% for detected PCBs.

• Continuing Calibration: Acceptable

The percent differences of the average response factors of the continuing calibration analyses were less than 15%.

Cam-Or
Project TDD S05-9701-018
Analytical TDD S05-9708-811
PCBs
Page 4

IV. Blank: Acceptable

A method blank was analyzed with the sample. PCBs were not detected in the blank.

V. Compound Identification: Acceptable

The retention times of the chromatographic peaks of the identified PCBs matched those found in the standards. The identification of PCBs was confirmed using secondary column analysis.

VI. Additional OC Checks: Acceptable

The recoveries of the surrogates used in the samples were within acceptable laboratory limits.

VII. Overall Assessment of Data for Use: Acceptable

The overall usefulness of the data is based on criteria for QA Level II as outlined in the Office of Solid Waste and Emergency Response (OSWER) Directive 9360.4-01 (April 1990), Data Validation Procedures, Section 6.0, Pesticides/PCBs. Based upon the information provided, the data are acceptable for use.

Client: Ecology & Environment
 IEA Job#: L72972075
 Project ID: 505-9701-018
 Matrix: Water
 Method: 8081

RCRA/TCL
 PCB's
 µg/L

Analyte	Dilution Factor	10	4	1.07	20	80	Lower Limits of Detection (LLD) with no Dilution*
	Method Blank	PW0828	PW0828	PW0828	PW0828	PW0828	
	Client ID	TL-01	TL-02	TL-03	TL-04	TL-04	
	Lab ID	061	062	063	064	064	
Aroclor - 1016		UD	UD	U	UD	UD	1.0
Aroclor - 1221		UD	UD	U	UD	UD	2.0
Aroclor - 1232		UD	UD	U	UD	UD	1.0
Aroclor - 1242		UD	UD	U	UD	UD	1.0
Aroclor - 1248		24	67	U	860 E	730	1.0
Aroclor - 1254		UD	UD	U	UD	UD	1.0
Aroclor - 1260		24	63	U	120 E	690	1.0
Date Sampled		8/25/97	8/25/97	8/25/97	8/25/97	8/25/97	
Date Extracted		8/28/97	8/28/97	8/28/97	8/28/97	8/28/97	
Date Analyzed		9/11/97	9/11/97	9/11/97	9/11/97	9/11/97	

*MDL (Minimum Detection Limit) = LLD x DF

Analyte	Dilution Factor	2	20	1.28	1	Lower Limits of Detection (LLD) with no Dilution*
	Method Blank	PW0828	PW0828	PW0828	PW0828	
	Client ID	TL-05	TL-06	TL-07	METHOD BLANK	
	Lab ID	065	066	067	PW0828	
Aroclor - 1016		UD	UD	U	U	1.0
Aroclor - 1221		UD	UD	U	U	2.0
Aroclor - 1232		UD	UD	U	U	1.0
Aroclor - 1242		UD	UD	U	U	1.0
Aroclor - 1248		2.0	330	U	U	1.0
Aroclor - 1254		UD	UD	U	U	1.0
Aroclor - 1260		3.7	310	U	U	1.0
Date Sampled		8/25/97	8/25/97	8/25/97	---	
Date Extracted		8/28/97	8/28/97	8/28/97	8/28/97	
Date Analyzed		9/11/97	9/11/97	9/11/97	9-5-97	

000003

Client: Ecology & Environment
 IEA Job#: L72972075
 Project ID: 505-9701-018
 Matrix: Wipe
 Method: 8081

RCRA/TCL
 PCB's
 µg

Dilution Factor	2	1	1	1	1	Lower Limits of Detection (LLD) with no Dilution*
Method Blank	PS0828	PS0828	PS0828	PS0828	PS0828	
Client ID	TW-01	TW-02	TW-03	TW-04	TW-05	
Analyte Lab ID	001	002	003	004	005	
Aroclor - 1016	U	U	U	U	U	1.0
Aroclor - 1221	U	U	U	U	U	2.0
Aroclor - 1232	U	U	U	U	U	1.0
Aroclor - 1242	U	U	U	U	U	1.0
Aroclor - 1248	9.1	5.5	U	U	U	1.0
Aroclor - 1254	U	U	U	U	U	1.0
Aroclor - 1260	8.7	2.9	U	2.3	U	1.0
Date Sampled	8/25/97	8/25/97	8/25/97	8/25/97	8/25/97	
Date Extracted	8/28/97	8/28/97	8/28/97	8/28/97	8/28/97	
Date Analyzed	9/11/97	9/6/97	9/6/97	9/6/97	9/6/97	

*MDL (Minimum Detection Limit) = LLD x DF

Dilution Factor	1	1	1	1	1	Lower Limits of Detection (LLD) with no Dilution*
Method Blank	PS0828	PS0828	PS0828	PS0828	PS0828	
Client ID	TW-06	TW-07	TW-08	TW-09	TW-10	
Analyte Lab ID	006	007	008	009	010	
Aroclor - 1016	U	U	U	U	U	1.0
Aroclor - 1221	U	U	U	U	U	2.0
Aroclor - 1232	U	U	U	U	U	1.0
Aroclor - 1242	U	U	U	U	U	1.0
Aroclor - 1248	U	U	6.6	8.1	1.5	1.0
Aroclor - 1254	U	U	U	U	U	1.0
Aroclor - 1260	U	2.4	3.9	7.2	3.3	1.0
Date Sampled	8/25/97	8/25/97	8/25/97	8/25/97	8/25/97	
Date Extracted	8/28/97	8/28/97	8/28/97	8/28/97	8/28/97	
Date Analyzed	9/6/97	9/7/97	9/6/97	9/6/97	9/6/97	

Client: Ecology & Environment
 IEA Job#: L72972075
 Project ID: 505-9701-018
 Matrix: Wipe
 Method: 8081

RCRA/TCL
 PCB's
 µg

Analyte	Dilution Factor	1	1	1	1	1	Lower Limits of Detection (LLD) with no Dilution*
	Method Blank	PS0828	PS0828	PS0828	PS0828	PS0828	
	Client ID	TW-11	TW-12	TW-13	TW-14	TW-15	
	Lab ID	011	012	013	014	015	
Aroclor - 1016		U	U	U	U	U	1.0
Aroclor - 1221		U	U	U	U	U	2.0
Aroclor - 1232		U	U	U	U	U	1.0
Aroclor - 1242		U	U	U	U	U	1.0
Aroclor - 1248		15	12	U	1.9	U	1.0
Aroclor - 1254		U	U	U	U	U	1.0
Aroclor - 1260		20	4.0	4.4	1.6	U	1.0
Date Sampled		8/25/97	8/25/97	8/25/97	8/25/97	8/25/97	
Date Extracted		8/28/97	8/28/97	8/28/97	8/28/97	8/28/97	
Date Analyzed		9/8/97	9/8/97	9/8/97	9/8/97	9/8/97	

*MDL (Minimum Detection Limit) = LLD x DF

Analyte	Dilution Factor	1	1	1	1	1	Lower Limits of Detection (LLD) with no Dilution*
	Method Blank	PS0828	PS0828	PS0828	PS0828	PS0828	
	Client ID	TW-16	TW-17	TW-18	TW-19	TW-20	
	Lab ID	016	017	018	019	020	
Aroclor - 1016		U	U	U	U	U	1.0
Aroclor - 1221		U	U	U	U	U	2.0
Aroclor - 1232		U	U	U	U	U	1.0
Aroclor - 1242		U	U	U	U	U	1.0
Aroclor - 1248		U	U	U	2.0	10	1.0
Aroclor - 1254		U	U	U	U	U	1.0
Aroclor - 1260		U	U	U	3.7	2.1	1.0
Date Sampled		8/25/97	8/25/97	8/25/97	8/26/97	8/26/97	
Date Extracted		8/28/97	8/28/97	8/28/97	8/28/97	8/28/97	
Date Analyzed		9/8/97	9/8/97	9/8/97	9/8/97	9/8/97	

Client: Ecology & Environment
 IEA Job#: L72972075
 Project ID: 505-9701-018
 Matrix: Wipe
 Method: 8081

RCRA/TCL
 PCB's
 µg

Analyte	Dilution Factor	1	1	1	1	1	Lower Limits of Detection (LLD) with no Dilution*
	Method Blank	PS0828	PS0828	PS0828	PS0828	PS0828	
	Client ID	TW-21	TW-22	TW-23	TW-24	TW-25	
	Lab ID	021	022	023	024	025	
Aroclor - 1016		U	U	U	U	U	1.0
Aroclor - 1221		U	U	U	U	U	2.0
Aroclor - 1232		U	U	U	U	U	1.0
Aroclor - 1242		U	U	U	U	U	1.0
Aroclor - 1248		6.5	U	U	U	2.0	1.0
Aroclor - 1254		U	U	U	U	U	1.0
Aroclor - 1260		4.2	U	U	U	3.2	1.0
Date Sampled		8/26/97	8/26/97	8/26/97	8/26/97	8/26/97	
Date Extracted		8/28/97	8/28/97	8/28/97	8/28/97	8/28/97	
Date Analyzed		9/8/97	9/8/97	9/8/97	9/8/97	9/9/97	

*MDL (Minimum Detection Limit) = LLD x DF

Analyte	Dilution Factor	1	1	1	1	1	Lower Limits of Detection (LLD) with no Dilution*
	Method Blank	PS0828	PS0828	PS0828	PS0828	PS0828	
	Client ID	TW-16	TW-27	TW-28	TW-29	TW-30	
	Lab ID	026	027	028	029	030	
Aroclor - 1016		U	U	U	U	U	1.0
Aroclor - 1221		U	U	U	U	U	2.0
Aroclor - 1232		U	U	U	U	U	1.0
Aroclor - 1242		U	U	U	U	U	1.0
Aroclor - 1248		4.4	4.4	U	U	U	1.0
Aroclor - 1254		U	U	U	U	U	1.0
Aroclor - 1260		2.4	6.3	U	U	U	1.0
Date Sampled		8/26/97	8/26/97	8/26/97	8/26/97	8/26/97	
Date Extracted		8/28/97	8/28/97	8/28/97	8/28/97	8/28/97	
Date Analyzed		9/9/97	9/9/97	9/9/97	9/9/97	9/9/97	

Client: Ecology & Environment
 IEA Job#: L72972075
 Project ID: 505-9701-018
 Matrix: Wipe
 Method: 8081

RCRA/TCL
 PCB's
 µg

Analyte	Dilution Factor	1	1	1	1	1	Lower Limits of Detection (LLD) with no Dilution*
	Method Blank	PS0828	PS0828	PS0828	PS0828	PS0828	
	Client ID	TW-31	TW-32	TW-33	TW-34	TW-35	
	Lab ID	031	032	033	034	035	
Aroclor - 1016		U	U	U	U	U	1.0
Aroclor - 1221		U	U	U	U	U	2.0
Aroclor - 1232		U	U	U	U	U	1.0
Aroclor - 1242		U	U	U	U	U	1.0
Aroclor - 1248		U	U	U	U	U	1.0
Aroclor - 1254		U	U	U	U	U	1.0
Aroclor - 1260		U	U	7.9	U	U	1.0
Date Sampled		8/26/97	8/26/97	8/26/97	8/26/97	8/26/97	
Date Extracted		8/28/97	8/28/97	8/28/97	8/28/97	8/28/97	
Date Analyzed		9/9/97	9/9/97	9/9/97	9/9/97	9/9/97	

*MDL (Minimum Detection Limit) = LLD x DF

Analyte	Dilution Factor	1	1	1	1	1	Lower Limits of Detection (LLD) with no Dilution*
	Method Blank	PS0828	PS0828	PS0828	PS0828	PS0828	
	Client ID	TW-36	TW-37	TW-38	TW-39	TW-40	
	Lab ID	036	037	038	039	040	
Aroclor - 1016		U	U	U	U	U	1.0
Aroclor - 1221		U	U	U	U	U	2.0
Aroclor - 1232		U	U	U	U	U	1.0
Aroclor - 1242		U	U	U	U	U	1.0
Aroclor - 1248		10	U	U	U	U	1.0
Aroclor - 1254		U	U	U	U	U	1.0
Aroclor - 1260		8.9	U	U	U	U	1.0
Date Sampled		8/26/97	8/26/97	8/26/97	8/26/97	8/26/97	
Date Extracted		8/28/97	8/28/97	8/28/97	8/28/97	8/28/97	
Date Analyzed		9/9/97	9/9/97	9/9/97	9/9/97	9/9/97	

Client: Ecology & Environment
 IEA Job#: L72972075
 Project ID: 505-9701-018
 Matrix: Wipe
 Method: 8081

RCRA/TCL
 PCB's
 µg

Analyte	Dilution Factor	1	1	2	2	1	Lower Limits of Detection (LLD) with no Dilution*
	Method Blank	PS0905	PS0905	PS0905	PS0905	PS0905	
	Client ID	TW-41	TW-42	TW-43	TW-44	TW-45	
	Lab ID	041	042	043	044	045	
Aroclor - 1016		U	U	UD	UD	U	1.0
Aroclor - 1221		U	U	UD	UD	U	2.0
Aroclor - 1232		U	U	UD	UD	U	1.0
Aroclor - 1242		U	U	UD	UD	U	1.0
Aroclor - 1248		U	U	UD	UD	U	1.0
Aroclor - 1254		U	U	UD	UD	U	1.0
Aroclor - 1260		U	U	UD	UD	U	1.0
Date Sampled		8/26/97	8/26/97	8/26/97	8/26/97	8/26/97	
Date Extracted		9/5/97	9/5/97	9/5/97	9/5/97	9/5/97	
Date Analyzed		9/10/97	9/10/97	9/11/97	9/11/97	9/10/97	

*MDL (Minimum Detection Limit) = LLD x DF

Analyte	Dilution Factor	1	1	1	1	1	Lower Limits of Detection (LLD) with no Dilution*
	Method Blank	PS0905	PS0905	PS0905	PS0905	PS0905	
	Client ID	TW-46	TW-47	TW-48	TW-49	TW-50	
	Lab ID	046	047	048	049	050	
Aroclor - 1016		U	U	U	U	U	1.0
Aroclor - 1221		U	U	U	U	U	2.0
Aroclor - 1232		U	U	U	U	U	1.0
Aroclor - 1242		U	U	U	U	U	1.0
Aroclor - 1248		U	U	U	U	U	1.0
Aroclor - 1254		U	U	U	U	U	1.0
Aroclor - 1260		U	U	U	U	U	1.0
Date Sampled		8/26/97	8/26/97	8/26/97	8/26/97	8/26/97	
Date Extracted		9/5/97	9/5/97	9/5/97	9/5/97	9/5/97	
Date Analyzed		9/10/97	9/10/97	9/10/97	9/10/97	9/10/97	

Client: Ecology & Environment
 IEA Job#: L72972075
 Project ID: 505-9701-018
 Matrix: Wipe
 Method: 8081

RCRA/TCL
 PCB's
 µg

Analyte	Dilution Factor	1	1	1	1	1	Lower Limits of Detection (LLD) with no Dilution*
	Method Blank	PS0905	PS0905	PS0905	PS0905	PS0905	
	Client ID	TW-51	TW-52	TW-53	TW-54	TW-55	
	Lab ID	051	052	053	054	055	
Aroclor - 1016		U	U	U	U	U	1.0
Aroclor - 1221		U	U	U	U	U	2.0
Aroclor - 1232		U	U	U	U	U	1.0
Aroclor - 1242		U	U	U	U	U	1.0
Aroclor - 1248		U	U	U	U	U	1.0
Aroclor - 1254		U	U	U	U	U	1.0
Aroclor - 1260		U	U	U	U	U	1.0
Date Sampled		8/26/97	8/26/97	8/26/97	8/26/97	8/26/97	
Date Extracted		9/5/97	9/5/97	9/5/97	9/5/97	9/5/97	
Date Analyzed		9/10/97	9/10/97	9/10/97	9/10/97	9/10/97	

*MDL (Minimum Detection Limit) = LLD x DF

Analyte	Dilution Factor	1	1	1	1	1	Lower Limits of Detection (LLD) with no Dilution*
	Method Blank	PS0905	PS0905	PS0905	PS0905	PS0905	
	Client ID	TW-56	TW-57	TW-58	TW-59	TW-60	
	Lab ID	056	057	058	059	060	
Aroclor - 1016		U	U	U	U	U	1.0
Aroclor - 1221		U	U	U	U	U	2.0
Aroclor - 1232		U	U	U	U	U	1.0
Aroclor - 1242		U	U	U	U	U	1.0
Aroclor - 1248		U	U	U	U	U	1.0
Aroclor - 1254		U	U	U	U	U	1.0
Aroclor - 1260		U	U	U	13	U	1.0
Date Sampled		8/26/97	8/26/97	8/26/97	8/26/97	8/26/97	
Date Extracted		9/5/97	9/5/97	9/5/97	9/5/97	9/5/97	
Date Analyzed		9/10/97	9/10/97	9/10/97	9/10/97	9/10/97	

Attachment 2
Laboratory Certification



American Environmental Network

126 West Center Court • Schaumburg, IL 60195 • (847) 705-0740 • Fax (847) 705-1567 • 1-800-933-2580

- Memorandum -

Date: Monday, September 22, 1997
To: Christine Ottinger
From: Cheryl K. Randle

Christine -

Here is the SOP information that you requested. I have also included a copy of our certification for Illinois. Please note, however, that Illinois only certifies for drinking water.

Hope this helps. Let me know if there is anything else you need.

Sincerely,

A handwritten signature in cursive script, appearing to read "Cheryl Randle", is written over the typed name.

Cheryl Randle

STATE OF ILLINOIS
ENVIRONMENTAL PROTECTION AGENCY

AWARDS THIS
CERTIFICATE OF APPROVAL
TO

IEA, Inc.

126 West Center Court

Schaumburg, Illinois 60195

FOR THE FOLLOWING CHEMICAL ANALYSES OF ENVIRONMENTAL SAMPLES:

EPA Method 524.2, Rev. 4.0: Regulated VOCs (including vinyl chloride), TTHMs and Unregulated VOCs;

EPA Method 504.1, 1993: Ethylene dibromide (EDB) and 1,2-Dibromo-3-chloropropane (DBCP);

EPA Method 200.7, Rev. 4.4: Aluminum, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Copper, Manganese, Silver, Sodium, Zinc, Preliminary for Nickel and Iron;

EPA Method 200.9, Rev. 2.2: Arsenic, Lead, Selenium; *EPA Method 245.1, Rev. 3.0:* Mercury; *SM18-4500-F-C:* Fluoride;

SM18-2540C: TDS; *SM18-2320B:* Total Alkalinity; *SM18-2510B:* Conductivity; and

EPA Method 150.1, MCAWW 1983: pH

in potable water.

CERTIFICATE NUMBER : 100238

DATE OF ISSUE : 05/09/97 Update

ON-SITE EVALUATION: 04/17/97

DATE OF EXPIRATION : 04/30/98



DIRECTOR

CERTIFICATION OFFICER

DIVISION MANAGER

United States Department of Commerce
National Institute of Standards and Technology

NVLAP[®]

ISO/IEC GUIDE 25:1990
ISO 9002:1987

Certificate of Accreditation



CARNOW, CONIBEAR & ASSOCIATES LTD.
CHICAGO, IL

is recognized under the National Voluntary Laboratory Accreditation Program for satisfactory compliance with criteria established in Title 15, Part 285 Code of Federal Regulations. These criteria encompass the requirements of ISO/IEC Guide 25 and the relevant requirements of ISO 9002 (ANSI/ASQC Q92-1987) as suppliers of calibration or test results. Accreditation is awarded for specific services, listed on the Scope of Accreditation for:

BULK ASBESTOS FIBER ANALYSIS

September 30, 1997

Effective through

A handwritten signature in black ink, appearing to read "James L. Galt".

For the National Institute of Standards and Technology
NVLAP Lab Code: 101039-0

Attachment 3

Laboratory Analytical Procedures



CARNOW, CONIBEAR & ASSOC., LTD.

Occupational and Environmental Health Consultants

33 West Wacker Drive, Suite 1400, Chicago, IL 60606. 312 782-4486

**RE: POLARIZED LIGHT MICROSCOPICAL ANALYSIS OF BULK
SAMPLES FOR ASBESTOS**

To whom it may concern:

This report summarizes the analytical results for the bulk material samples submitted to Carnow, Conibear & Associates, Ltd for asbestos identification.

Analysis of bulk samples was performed in accordance with the USEPA Interim Method #EPA-600/M4-82-020 (December, 1982), NIOSH Method 7403. These methods utilize polarized light microscopy with dispersion staining. This test report reflects only samples actually analyzed.

Quality assurance samples are analyzed in compliance with NIOSH, and EPA methods.

Should you have any questions or need additional information, please feel free to contact me.

Sincerely,

CARNOW, CONIBEAR & ASSOCIATES, LTD.

Denise Springfield
Microscopist

United States
Environmental Protection
Agency

Environmental Monitoring Systems
Laboratory
Research Triangle Park NC 27711

Research and Development

EPA-600/M4-82-020 Dec. 1982



Test Method

Interim Method for the Determination of Asbestos in Bulk Insulation Samples*

1. Polarized Light Microscopy

1.1 Principle and Applicability

Bulk samples of building materials taken for asbestos identification are first examined for homogeneity and preliminary fiber identification at low magnification. Positive identification of suspect fibers is made by analysis of subsamples with the polarized light microscope.

The principles of optical mineralogy are well established.^{1,2} A light microscope equipped with two polarizing filters is used to observe specific optical characteristics of a sample. The use of plane polarized light allows the determination of refractive indices along specific crystallographic axes. Morphology and color are also observed. A retardation plate is placed in the polarized light path for determination of the sign of elongation using orthoscopic illumination. Orientation of the two filters such that their vibration planes are perpendicular (crossed polars) allows observation of the birefringence and extinction characteristics of anisotropic particles.

Quantitative analysis involves the use of point counting. Point counting is a standard technique in petrography for determining the relative areas occupied by separate minerals in thin sections of rock. Background information on the use of point counting³ and the interpretation of point count data³ is available.

*An interim method is carefully drafted from available source information. The method is still under investigation and therefore is subject to revision.

This method is applicable to all bulk samples of friable insulation materials submitted for identification and quantitation of asbestos components.

1.2 Range

The point counting method may be used for analysis of samples containing from 0 to 100 percent asbestos. The upper detection limit is 100 percent. The lower detection limit is less than 1 percent.

1.3 Interferences

Fibrous organic and inorganic constituents of bulk samples may interfere with the identification and quantitation of the asbestos mineral content. Spray-on binder materials may coat fibers and affect color or obscure optical characteristics to the extent of masking fiber identity. Fine particles of other materials may also adhere to fibers to an extent sufficient to cause confusion in identification. Procedures that may be used for the removal of interferences are presented in Section 1.7.2.2.

1.4 Precision and Accuracy

Adequate data for measuring the accuracy and precision of the method for samples with various matrices are not currently available. Data obtained for samples containing a single asbestos type in a simple matrix are available in the EPA report *Bulk Sample Analysis for Asbestos Content: Evaluation of the Tentative Method*.⁴

1.5 Apparatus

1.5.1 Sample Analysis

A low-power binocular microscope, preferably stereoscopic, is used to

Examine the bulk insulation sample as received.

- **Microscope:** binocular, 10-45X (approximate)
- **Light Source:** incandescent or fluorescent
- **Forceps, Dissecting Needles, and Probes**
- **Glassine Paper or Clean Glass Plate**

Compound microscope requirements: A polarized light microscope complete with polarizer, analyzer, port for wave retardation plate, 360° graduated rotating stage, substage condenser, lamp, and lamp iris.

- **Polarized Light Microscope:** described above
- **Objective Lenses:** 10X, 20X, and 40X or near equivalent
- **Dispersion Staining Objective Lens (optional)**
- **Ocular Lens:** 10X minimum
- **Compensator Plate:** 550 millimicron retardation

1.5.2 Sample Preparation

Sample preparation apparatus requirements will depend upon the type of insulation sample under consideration. Various physical and/or chemical means may be employed for an adequate sample assessment.

Ventilated Hood or negative pressure glove box

- **Microscope Slides**
- **Coverslips**
- **Mortar and Pestle:** agate or porcelain (optional)
- **Wylie Mill (optional)**
- **Beakers & assorted glassware (optional)**
- **Centrifuge (optional)**
- **Filtration apparatus (optional)**
- **Low temperature asher (optional)**

1.6 Reagents

1.6.1 Sample Preparation

- **Distilled Water (optional)**
- **Dilute CH₃COOH:** ACS reagent grade (optional)
- **Dilute HCl:** ACS reagent grade (optional)
- **Sodium metaphosphate (NaPO₃):** (optional)

1.6.2 Analytical Reagents

- **Refractive Index Liquids:** 1.490-1.570, 1.590-1.720 in increments of 0.002 or 0.004
- **Refractive Index Liquids for Dispersion Staining:** high-dispersion series, 1.550, 1.605, 1.630 (optional)

JICC Asbestos Reference Sample Set: Available from: UICC MRC

Pneumoconiosis Unit, Llandough Hospital, Penarth, Glamorgan CF6 1XW, UK, and commercial distributors

- **Tremolite-asbestos** (source to be determined)
- **Actinolite-asbestos** (source to be determined)

1.7 Procedures

Note: Exposure to airborne asbestos fibers is a health hazard. Bulk samples submitted for analysis are usually friable and may release fibers during handling or matrix reduction steps. All sample and slide preparations should be carried out in a ventilated hood or glove box with continuous airflow (negative pressure). Handling of samples without these precautions may result in exposure of the analyst and contamination of samples by airborne fibers.

1.7.1 Sampling

Samples for analysis of asbestos content shall be taken in the manner prescribed in Reference 5 and information on design of sampling and analysis programs may be found in Reference 6. If there are any questions about the representative nature of the sample, another sample should be requested before proceeding with the analysis.

1.7.2 Analysis

1.7.2.1 Gross Examination

Bulk samples of building materials taken for the identification and quantitation of asbestos are first examined for homogeneity at low magnification with the aid of a stereomicroscope. The core sample may be examined in its container or carefully removed from the container onto a glassine transfer paper or clean glass plate. If possible, note is made of the orientation of top and bottom surfaces. When discrete strata are identified, each is treated as a separate material so that fibers are first identified and quantified in that layer only, and then the results for each layer are combined to yield an estimate of asbestos content for the whole sample.

1.7.2.2 Sample Preparation

Bulk materials submitted for asbestos analysis involve a wide variety of matrix materials. Representative subsamples may not be readily obtainable by simple means in heterogeneous materials, and various steps may be required to alleviate the difficulties encountered. In most cases, however, the best preparation is made by using forceps to sample at several places from the bulk material. Forcep samples are immersed in a refractive index liquid on a microscope slide.

leased apart, covered with a cover glass, and observed with the polarized light microscope.

Alternatively, attempts may be made to homogenize the sample or eliminate interferences before further characterization. The selection of appropriate procedures is dependent upon the samples encountered and personal preference. The following are presented as possible sample preparation steps.

A mortar and pestle can sometimes be used in the size reduction of soft or loosely bound materials, though this may cause marring of some samples. Such samples may be reduced in a Wiley mill. Apparatus should be clean and extreme care exercised to avoid cross-contamination of samples. Periodic checks of the particle sizes should be made during the grinding operation so as to preserve any fiber bundles present in an identifiable form. These procedures are not recommended for samples that contain amphibole minerals or vermiculite. Grinding of amphiboles may result in the separation of fiber bundles or the production of cleavage fragments that have aspect ratios greater than 3:1 and will be classified as asbestos fibers. Grinding of vermiculite may also produce fragments with aspect ratios greater than 3:1.

Acid treatment may occasionally be required to eliminate interferences. Calcium carbonate, gypsum, and bassanite (plaster) are frequently present in sprayed or trowelled insulations. These materials may be removed by treatment with warm dilute acetic acid. Warm dilute hydrochloric acid may also be used to remove the above materials. If acid treatment is required, wash the sample at least twice with distilled water, being careful not to lose the particulates during decanting steps. Centrifugation or filtration of the suspension will prevent significant fiber loss. The pore size of the filter should be 0.45 micron or less. *Caution: prolonged acid contact with the sample may alter the optical characteristics of chrysotile fibers and should be avoided.*

Coatings and binding materials adhering to fiber surfaces may also be removed by treatment with sodium metaphosphate. Add 10 mL of 10 g/L sodium metaphosphate solution to a small (0.1 to 0.5 mL) sample of bulk material in a 15-mL glass centrifuge tube. For approximately 15 seconds each, stir the mixture on a vortex mixer, place in an ultrasonic bath and then shake by hand. Repeat the series.

Collect the dispersed solids by centrifugation at 1000 rpm for 5 minutes. Wash the sample three times by suspending in 10 mL distilled water and recentrifuging. After washing, resuspend the pellet in 5 mL distilled water, place a drop of the suspension on a microscope slide, and dry the slide at 110°C.

In samples with a large portion of cellulosic or other organic fibers, it may be useful to ash part of the sample and examine the residue. Ashing should be performed in a low temperature asher. Ashing may also be performed in a muffle furnace at temperatures of 500°C or lower. Temperatures of 550°C or higher will cause dehydroxylation of the asbestos minerals, resulting in changes of the refractive index and other key parameters. If a muffle furnace is to be used, the furnace thermostat should be checked and calibrated to ensure that samples will not be heated at temperatures greater than 500°C.

Ashing and acid treatment of samples should not be used as standard procedures. In order to monitor possible changes in fiber characteristics, the material should be viewed microscopically before and after any sample preparation procedure. Use of these procedures on samples to be used for quantitation requires a correction for percent weight loss.

1.7.2.3 Fiber Identification

Positive identification of asbestos requires the determination of the following optical properties.

- Morphology
- Color and pleochroism
- Refractive indices
- Birefringence
- Extinction characteristics
- Sign of elongation

Table 1-1 lists the above properties for commercial asbestos fibers. Figure 1-1 presents a flow diagram of the examination procedure. Natural variations in the conditions under which deposits of asbestiform minerals are formed will produce exceptions to the published values and differences from the UICC standards. The sign of elongation is determined by use of the compensator plate and crossed polars. Refractive indices may be determined by the Becke line test. Alternatively, dispersion staining may be used. Inexperienced operators may find that the dispersion staining technique is more easily learned, and should consult Reference 9 for guidance. Central stop dispersion staining colors are presented in Table

1-2. Available high-dispersion (HCl) liquids should be used.

1.7.2.4 Quantitation of Asbestos Content

Asbestos quantitation is performed by a point-counting procedure. An ocular reticle (cross-hair or point array) is used to visually superimpose a point or points on the microscope field of view. Record the number of points positioned directly above each kind of particle or fiber of interest. Score only points directly over asbestos fibers or nonasbestos matrix material. Do not score empty points for the closest particle. If an asbestos fiber and a matrix particle overlap so that a point is superimposed on their visual intersection, a point is scored for both categories. Point counting provides a determination of the area percent asbestos. Reliable conversion of area percent to percent of dry weight is not currently feasible unless the specific gravities and relative volumes of the materials are known.

For the purpose of this method, "asbestos fibers" are defined as having an aspect ratio greater than 3:1 and being positively identified as one of the minerals in Table 1-1.

A total of 400 points superimposed on either asbestos fibers or nonasbestos matrix material must be counted over at least eight different preparations of representative subsamples. Take eight forcép samples and mount each separately with the appropriate refractive index liquid. The preparation should not be heavily loaded. The sample should be uniformly dispersed to avoid overlapping particles and allow 25-50 percent empty area within the fields of view. Count 50 nonempty points on each preparation, using either

- A cross-hair reticle and mechanical stage; or

- A reticle with 25 points (Chalkley Point Array) and counting at least 2 randomly selected fields.

For samples with mixtures of isotropic and anisotropic materials present, viewing the sample with slightly uncrossed polars or the addition of the compensator plate to the plane polarized light path will allow simultaneous discrimination of both particle types. Quantitation should be performed at 100X or at the lowest magnification of the polarized light microscope that can effectively distinguish the sample components. Confirmation of the quantitation result by a second analyst on some percentage of analyzed samples should be used as standard quality control procedure.

The percent asbestos is calculated as follows:

$$\% \text{ asbestos} = (a/n) \cdot 100\%$$

where

a = number of asbestos counts.
n = number of nonempty points counted (400).

If a = 0, report "No asbestos detected." If 0 < a ≤ 3, report "<1% asbestos."

The value reported should be rounded to the nearest percent.

1.8 References

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3. F. Cheves, *Petrographic Modal Analysis: An Elementary Statistical Appraisal*, New York: John Wiley & Sons, 1958.
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5. U.S. Environmental Protection Agency, *Asbestos-Containing Materials in School Buildings: A Guidance Document, Parts 1 and 2*, EPA/OIS No. C00090, March 1978.
6. D. Lucas, T. Hartwell, and A. V. Rao, *Asbestos-Containing Materials in School Buildings: Guidance for Asbestos Analytical Programs*, EPA-560/13-80-017A, U.S. Environmental Protection Agency, December 1980.
7. D. H. Taylor and J. S. Bloom, Hexametaphosphate pretreatment of insulation samples for identification of fibrous constituents, *Microscope*, 28, 1980.
8. W. J. Campbell, R. L. Blake, L. L. Brown, E. E. Cather, and J. J. Sjöberg, *Selected Silicate Minerals and Their Asbestiform Varieties: Mineralogical Definitions and Identification-Characterization*, U.S. Bureau of Mines Information Circular 8751, 1977.
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