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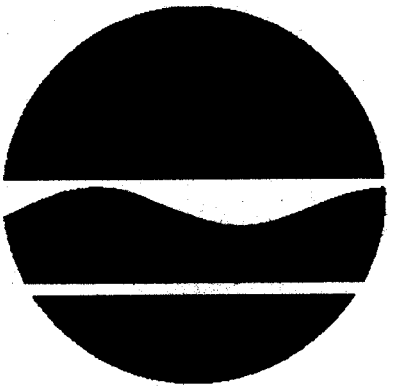
REMEDIAL INVESTIGATION and FEASIBILITY STUDY for

Operable Unit No. 2
Sediment Contamination in the Little Niagara River

BOOTH OIL SITE
North Tonawanda, Niagara County, New York
Site No. 9-32-100

January 1993
(Revised March 1993)



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New York State Department of Environmental Conservation
Division of Hazardous Waste Remediation

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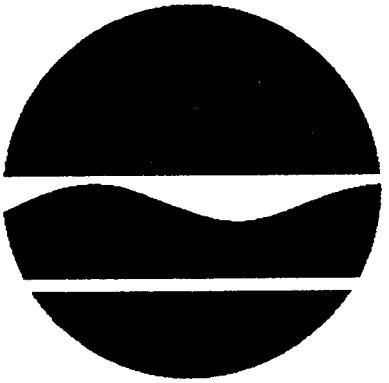

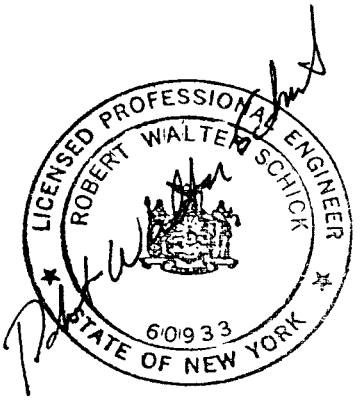

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PART I

REMEDIAL INVESTIGATION

BACKGROUND:

The Booth Oil inactive hazardous waste site is located at 76 Robinson Street in the City of North Tonawanda. A site vicinity map is included as Figure 1. Waste oils were refined at the site for more than 50 years, until the phased plant closure in the early 1980s. A storm sewer runs along Robinson Street and discharges into the Little River. During plant operations some waste oils were discharged through this storm sewer.

A Remedial Investigation (RI), initiated at the site in early 1990, identified volatile and semi-volatile compounds, PCBs, and lead at significant concentrations in the on-site soils and groundwater and in the adjacent storm sewer. These contaminants were also identified in the river sediments adjacent to the outfall. A Record of Decision (ROD) was issued for the site in March of 1992 which addressed the on-site problems and storm sewer contamination. The Little River sediment contamination, however, was designated as a second operable unit and separated from the on-site remedy so that more sediment data could be obtained to define the problem. During the RI sampling, the Little River sediments adjacent to the outfall were oily in nature and PCBs were among the major contaminants identified, with PCB detections at 4,4000 ppb and 6,300 ppb (Phase I / Phase II Remedial Investigation Report, Booth Oil Site, August 1991).

OBJECTIVE:

The objective of the RI is to determine the extent of Polychlorinated Biphenyls (PCB) contamination in the Little River resulting from a storm sewer discharge from the Booth Oil site.

SAMPLE COLLECTION:

Sampling was performed by three New York State Department of Environmental Conservation (NYSDEC) personnel and one representative from Dvirka and Bartilucci Consulting Engineers (D&B) on July 28, 1992.

Samples were collected using a ponar dredge. The ponar dredge was dropped from a rope and allowed to sink to the river bottom. Pulling up on the rope closed the bucket which entrapped sediments. The sediment was then emptied into a stainless steel bucket. River water was poured back into the river. Dedicated disposable plastic scoops were used to fill the sample jars with the sediment.,

Samples were collected from a motorized boat and off of adjacent docks. The boat was stabilized by either holding onto adjacent docks or dropping the anchor. Multiple attempts were necessary at most of the locations to obtain sufficient sediment volume to fill the sample jars. If no sediments were obtained after three attempts, the location was abandoned.

A description of the sediments obtained was recorded for each sample location, and these sample summary sheets are included in Appendix B.

DECONTAMINATION:

The ponar dredge and stainless steel bucket were deconed after each sample. Gloves and plastic scoops were disposable and did not require decontamination.

ANALYSIS:

All samples were analyzed for PCBs by the NYSDEC Mobile Laboratory in Saratoga Springs, New York. Analytical data sheets are included as Appendix A.

SAMPLE LOCATIONS:

The sample locations are shown on Figure 2. Samples were generally collected along a 100 ft. x 100 ft. grid upstream from the sewer outfall and along a 100 ft. x 50 ft. grid downstream of the outfall, although sediments were not present at some of the grid locations. Samples were also collected around the outfall and some additional samples were collected downstream from the outfall in an area where it was suspected that sediments may accumulate (SED-25 and SED-26), based on observation of river currents.

Sample locations were developed in consultation with the Division of Fish and Wildlife. Since it was anticipated that background contamination could be significant in this area, nine samples upstream of the outfall were included in the sampling plan.

DISCUSSION OF RESULTS:

Due to the rocky nature of the river bottom, sediment samples were obtained from only 16 of the 26 locations (see Figure 2). In the areas where sediments were obtained, sediment depths were shallow, consisting of at most a few inches of sediment on top of the rocky surfaces. The sediments consisted mostly of silty sands with some gravel, but some clay was also encountered. Upstream of the outfall, sediments were obtained on both sides of the river. Downstream of the outfall sediments were only obtained relatively close to the bank on the outfall side of the river. Sediments were generally not obtained from the middle sections of the river. This can be attributed to stronger river currents in the center of the river, where scouring apparently occurs. In addition, upstream of the outfall the river flows parallel to the river banks, but just past the outfall the river bends towards the west, therefore, the current tends to be stronger toward the eastern bank. Because of these currents, the stormwater from this discharge is not likely to migrate far out into the river but be forced to hug the bank. The approximate direction of river flow is depicted by the arrows on Figure 2. These were noted based on drift during anchoring at some of the sample locations.

Analytical results are presented in Table 2 and are also shown on Figure 2. PCBs were detected in all samples except for SED-16. Detected values ranged from 50 ppb to 650 ppb downstream of the outfall, and from 620 ppb to 3500 ppb upstream of the outfall.

As can be seen on Figure 2, although contaminant levels do not vary widely, the PCB levels generally decrease the further downstream the sample locations are from the outfall. The values are also significantly lower than the original RI samples (6300 ppb and 4400 ppb) which were collected close to the sewer outfall. Concentrations are generally higher at the downstream locations closest to the river bank, SED-13, SED-19 and SED-22. This, along with the fact that sediments could not be obtained further out into the river, supports the assumption that river currents force any sediments in the storm sewer discharges to deposit relatively close to the east river bank.

Results of samples collected upstream of the outfall were significantly higher than the down stream contamination. Because of this, the extent of contamination resulting from the Booth Oil site cannot be determined with any certainty. Values upgradient ranged from 620 ppb to 3500 ppb and were collected on both sides of the river. However, the PCB detected in this supplemental sampling was identified as Aroclor 1242. In the original RI, only Aroclors 1260 and 1248 were detected in the river sediments, although Aroclor 1242 was detected to a lesser degree at locations on the Booth Oil site. With values higher in the background samples than those near the outfall, and since all detections were identified as Aroclor 1242, it appears that the downstream samples actually represent background levels.

CONCLUSIONS:

- Due to strong river currents, outfall discharges were deposited close to the river bank.
- Due to strong currents, the nature of the river bottom and apparent scouring, sediment volumes are small.
- From the previous RI data, significant contamination exists in sediments immediately adjacent to the sewer outfall. This material is oily in nature.
- Contaminant levels downstream of the sewer outfall are low.
- Contaminant levels upstream of the outfall (background levels) are significantly higher than the downstream levels.
- Downstream contamination appears to be representative of sources further upstream, rather than the sewer outfall.

RECOMMENDATION:

Because of the elevated contaminant levels in the samples at the outfall taken during the RI, it is anticipated that some cleanup of sediments will occur in the immediate vicinity of the outfall, possibly in conjunction with the cleaning of the Robinson Street storm sewer. Because the contamination downstream of the sewer outfall is comparable to background levels it is recommended that no further action be taken in these areas. The options for remediation of contaminated sediments in the vicinity of the outfall are evaluated in the Feasibility Study for Operable Unit No. 2.

TABLE 1

Results of the Phase II RI
Little River Sediment Samples

Constituent Total	Concentration (ppm) LR1	Concentration (ppm) LR2
VOC	2.8	0.2
PAH	7.1	15.2
Semi-VOC	5.0	0.2
PCB	6.3	4.4
Lead	63.3	90.7

TABLE 2

Booth Oil Site
Results of the Supplemental
Little River Sediment Sampling

Sample No.	PCB Level Aroclor-1242 (ppb)
SED - 01	670
03	1200
04	620
06	1000
07	2300
09	3500
10	340
11	230
12	400
13	650
14	120
15	50
16	ND
19	460
22	330
25	40

Detection Limit 120-ppb for individual Aroclors

PART II

FEASIBILITY STUDY

INTRODUCTION

The Booth Oil inactive hazardous waste site is located at 76 Robinson Street in the City of North Tonawanda. A site vicinity map is included as Figure 1. Waste oils were refined at the site for more than 50 years, until the phased plant closure in the early 1980s. A storm sewer runs along Robinson Street and discharges into the Little River. During plant operations some waste oils were discharged through this storm sewer.

A Remedial Investigation (RI), initiated at the site in early 1990, identified volatile and semi-volatile compounds, Polychlorinated Biphenyls (PCBs), and lead at significant concentrations in the on-site soils and groundwater and in the adjacent storm sewer. These contaminants were also identified in the river sediments adjacent to the sewer outfall. A Record of Decision (ROD) which addresses the remedy for the on-site problems was issued in March of 1992. The Little River sediment contamination, however, was designated as a second operable unit and separated from the on-site remedy, so that more sediment data could be obtained. During the original RI sampling, the Little River sediments adjacent to the outfall were very oily in nature and PCBs were among the major contaminants identified, with PCB detections at 4,400 ppb and 6,300 ppb (Phase I/Phase II Remedial Investigation Report, Booth Oil Site, August 1991).

To determine the extent of this PCB contamination in the Little River sediments a second RI focussing on these sediments was performed in July of 1992. In the RI, lower levels of PCBs were identified in the sediments located further downgradient of the outfall (see Figure 2). The maximum PCB detection downgradient of the outfall is 650 ppb. However, background samples, collected upgradient of the outfall, identified PCBs at higher levels than the sediments located downgradient, which makes it unlikely that the downgradient contamination resulted from the Booth Oil site. Upgradient levels range from 620 ppb to 3,500 ppb. In addition, the specific PCB Aroclor detected in upgradient and downgradient sediments during the supplemental sampling (consistently Aroclor 1242) does not match the Aroclors detected during the original RI in the oily sediments adjacent to the outfall (Aroclor 1248 and 1260). These results indicate that the sediment contamination resulting from the Robinson Street storm sewer outfall is limited to a relatively small area of sediments in close vicinity to the outfall.

The boundary of the sediment contamination resulting from the Booth Oil site currently can only be approximated. Based on the data, for the purposes of this FS, the area requiring remediation is estimated to be a 10 ft. by 25 ft. area as depicted in Figure 2. Sediment depths in this area are believed to be limited, consisting of approximately six inches of sediment overlaying rocks. Total volume of sediments requiring remediation is, therefore, estimated to be approximately 5 to 10 cubic yards.

The selected remedy for remediation of the on-site contaminated soils and wastes as presented in the March 1992 Record of Decision (ROD) is on-site treatment by separation technologies or incineration. Solid residuals will then be stabilized if necessary to immobilize heavy metals and be backfilled on-site. As part of this remedy the storm sewer system along Robinson Street will be cleaned and the sediments treated along with the on-site material. Since the materials to be treated are similar, this remedy is a remedial alternative for the remediation of the river sediments.

REMEDIAL ACTION OBJECTIVES

The overall objective of the remedial action in the Little River is to meet the applicable standards criteria and guidance (SCGs) and to mitigate the incremental risk, if any, to human health and the environment. The specific objective is to reduce further contaminant migration and fish and wildlife contact with contaminated sediments.

IDENTIFICATION OF REMEDIAL ALTERNATIVES

A. General Response Actions:

Based upon the information obtained in the RI and supplemental RI, general response actions were identified that may be taken to satisfy the remedial action objectives. These are listed in Table 1 below:

TABLE 1

General Response Action	Applicable Remedial Technology	Process Option
No Action	No Action	No Action
Containment	Capping	Stone and grout in place
Excavation/Disposal	Removal Technologies: - Excavation	Sediment Excavation
	Containment Technologies: - Capping	Soil cap, Clay cap, RCRA cap
Excavation/Treatment	Removal Technologies: - Excavation	Sediment Excavation
	Treatment Options: - Separation Options - Thermal Treatment - Stabilization - Biological Treatment	Solvent Extraction, Thermal Separation Chemical stabilization Cultured micro organisms

The inclusion of the no-action alternative is mandated by the Superfund Amendments and Reauthorization Act (SARA). Other remedial options involve excavation followed by disposal, or excavation followed by treatment and disposal. Excavation will eliminate contact with aquatic receptors and any further contaminant migration in the river. Treatment will permanently reduce the mobility and/or toxicity of the sediments. Because of the location and small volume of waste the only in-situ remedy deemed applicable is capping sediments in place. This will limit aquatic contact with sediments and limit further migration of contaminants.

B. Identification and Screening of Remedial Technologies:

Applicable remedial technologies were identified for each general response action and are also listed in Table 1. Contaminated sediment excavation is usually followed by land disposal or treatment. Contaminated sediments could be disposed of on-site and capped if remediation guidelines are met. However, treated residuals backfilled on-site must contain less than 2 ppm of PCBs, in accordance with previously established site guidelines. Since the sediments contain PCBs at levels greater than 2 ppm, untreated sediments could not be backfilled on-site. Stabilization used as a sole treatment option is, therefore, not a viable technology. Sediments, however, could be capped in place. Capping generally involves a soil or clay cover placed over the contaminated material to limit exposure to contaminants and limit the migration of contaminants into the environment. Sediments could also be disposed of off-site into a RCRA landfill in which case treatment would not be required.

Remedies involving treatment will reduce the mobility, toxicity and/or volume of the contaminated material. Treatment technologies which utilize separation include solvent extraction or thermal separation which would separate the PCBs from the sediments to reduce contaminant volumes and make handling easier. The residual would then be destroyed by an off-site incineration. On-site thermal treatment would involve incinerating the sediments resulting in the destruction of the contaminants. Biological treatment would breakdown the PCBs to reduce their toxicity, however, it is not as applicable as the other treatment options due to the small volume of material involved and will not be considered further. Separation and incineration options are viable and since the existing on-site ROD involves these options, they will also be combined as a single alternative for this FS. Treated sediments could either be disposed of on-site or off-site.

C. Definition of Remedial Action Alternatives and Initial Screening of Alternatives:

The identified technologies were combined into alternatives appropriate for addressing the contaminated sediments. These alternatives are defined below.

ALTERNATIVE 1: No Action. No action will be taken.

ALTERNATIVE 2: Cap in place. The area of sediments to be remediated will be temporarily isolated from the river and a stone covering will be placed over the sediments and grouted in place to limit further migration of contaminants and environmental contact with sediments.

ALTERNATIVE 3: Excavation/disposal off-site. Sediments will be excavated and transported and disposed of in an off-site RCRA landfill.

ALTERNATIVE 4: Excavation/treatment/on-site disposal. Sediments will be excavated followed by treatment by solvent extraction, thermal separation or incineration as dictated by the full site remediation. Treated sediments will be backfilled on-site. The isolated contaminants will be disposed of in a facility off-site.

These alternatives were then screened with respect to their effectiveness and implementability. Tables 4.1 and 4.2 of Technical Administrative Guidance Memorandum (TAGM) No. 4030

which were used to perform this evaluation are included in Appendix C. The results of this screening are summarized below:

TABLE 2

INITIAL SCREENING OF ALTERNATIVES

Remedial Alternative	Effectiveness (Max = 25)	Implementability (Max = 15)	Total (Max = 40)
1. No Action	16	13	29
2. Cap in Place	15	10	25
3. Excavation/ Disposal Off-Site	20	13	33
4. Excavation/ Treatment/On-Site Disposal	23	12	35

Of the four alternatives, Alternative 2: Capping in Place, scored the lowest since untreated sediments will be left in place. It scored lower than the no action alternative because short term risks from potential chemical releases or exposures during construction are higher. Alternative 3: Off-Site Disposal, scored as the next highest followed by the treatment Alternative 4 which scored the highest. Treatment scored high since the volume of the wastes will be permanently reduced or in the case of incineration will destroy the wastes.

DETAILED ANALYSIS OF REMEDIAL ALTERNATIVES:

In this section, the alternatives retained in the above screening process are analyzed with respect to seven evaluation criteria defined in TAGM 4030. These seven criteria are as follows:

1. Compliance with Applicable Standards, Criteria, and Guidelines (SCGs). Compliance with SCGs address whether or not a remedy will meet applicable environmental laws, regulations, standards or guidance.

2. Protection of Human Health and the Environment. This criterion is an overall assessment of protection based on a composite of all the other evaluation criteria.

3. Short-Term Impacts and Effectiveness. The adverse impacts to the community, remedial workers and the environment resulting from the implementation of each remedy are compared.

4. Long-Term Effectiveness and Permanence. This criterion address the results of a remedial action in terms of its permanence and quantity/nature of waste or residual remaining at the site after response objectives met.

5. Reduction in Toxicity, Mobility, or Volume. In the remedy selection process, preference is given to alternatives that permanently reduce the toxicity, mobility or volume of the wastes at the site.

6. Implementability. This criterion compares to the technical and administrative difficulties in implementing each alternative.

7. Cost. The total cost of each alternative are compared on a present worth basis. Costs are developed primarily for purposes of alternative comparisons, and are expected to provide an accuracy of +50 to -30 percent.

The results of the detailed analysis are discussed below and scores are summarized in Table 3. Tables 5-2 through 5-7 of TAGM 4030, which were used in this analysis, are included in Appendix C. Cost details are summarized in Table 4. The cost assumptions and calculations are contained in Appendix D.

Table 3

Summary of Results of the Detailed Analysis of Alternatives

Alternative	Compliance w/SCGs Max = 10	Protection of Human Health and Environment Max = 20	Short Term Effectiveness Max = 10	Long Term Effective -ness Max = 15	Reduction in Toxicity Mobility Volume Max = 15	Implement - ability Max = 15	Cost Max =15	TOTAL
1. No Action	6	11	10	4	0	14	15	60
2. Cap In Place	10	20	8	7	4	11	1	61
3. Excavation/ Off-Site Disposal	10	20	8	12	9	13	5	77
4. Excavation/ Treatment	10	20	8	15	15	12	5	85

A. Individual Analysis of Alternatives:

ALTERNATIVE 1: No Action: For this alternative no further action will be taken.

This alternative will not be compliant with SCGs and will not be protective of human health and the environment since contaminants are left in place, exposed. The short term effectiveness of this remedy is high since contaminants will not be handled or disturbed, however, it scores low in long term effectiveness since contaminants are left in place and is not classified as a permanent remedy. This remedy will not provide any reduction in toxicity, mobility, or volume. This remedy is, of course, easily implementable so the implementability score is high. Costs are minimal. The total score for the no action alternative is 60.

ALTERNATIVE 2: Cap in Place: This alternative involves placing stone over the contaminated area and grouting in place to limit exposure to and further migration of contaminated sediments. A temporary cofferdam would be driven around the remedial area to dewater the area during remediation. Some treatment of residual water in close contact with sediments may be required prior to capping. For cost purposes, the thickness of the stone cap is assumed to be one foot. Yearly inspection and monitoring would be required to evaluate the integrity and effectiveness of the cap. Since this remedy is not classified as permanent, an evaluation of its effectiveness will be required every five years.

This alternative is compliant with SCGs and protective of human health and the environment since contaminants will be contained. Some potential for adverse impacts to the community, workers, or environment is associated with this remedy during construction, but these impacts are considered to be easily controllable. Thus, the score for short term effectiveness is relatively high. Long term effectiveness scored lower because there are many uncertainties involved with capping, since wastes are left in place in an underwater cap. Reduction in toxicity, mobility and volume scored low since only the mobility of contaminants is reduced with this alternative. This remedy is expected to be implementable as it involves available technologies, however, due to the fact that remediation must be performed in a river, there are many uncertainties of construction. Because of this the score for implementability is reduced somewhat. Cost scored low for this remedy because the score was developed relative to the no action alternative. The capping materials are relatively low in cost, but the degree of difficulty of placing these materials within the river bed escalates the labor and equipment costs. Costs contain uncertainties since work will be performed in a riverbed. The total score for capping in place is 61.

ALTERNATIVE 3: Excavation/Off-Site Disposal: For this alternative a temporary cofferdam will be constructed around the remedial area to isolate the area from the river and expose sediments. Sediments will then be excavated and prepared for off-site disposal in a permitted landfill. An equally feasible option for sediment removal could be dredging without the use of a cofferdam. This would be evaluated during remedial design. To allow for shipment, the sediments will be treated with cement or other acceptable material to dewater the sediments.

This alternative will be compliant with SCGs and will be protective of human health and the environment. Because sediments will be excavated, handled and transported to an off-site facility, the potential for short term impacts to the community and environment during these activities exists, but these are considered to be easily controllable. Therefore, the score for short term effectiveness is relatively high. Long term effectiveness also scored high since protection with a full containment landfill is high. This alternative will not reduce the toxicity or volume of wastes but the mobility will be reduced since wastes will be removed from site. The implementability of this alternative is similar to Alternative 2, capping in place, where some uncertainties exist in construction since the river water must be controlled during sediment excavation. Dredging sediments may be more feasible than driving a cofferdam and will be evaluated during design. For cost purposes, however, cofferdaming is considered to provide the best estimate. Cost scored low for this alternative because the score was developed relative to the no action alternative. Cost estimates contain significant uncertainties since work

is within a riverbed and sediment volume is only estimated. The total score for this alternative is 77.

ALTERNATIVE 4: Excavation/On-Site Treatment: This alternative also involves the placement of a temporary cofferdam around the remedial area to isolate the area from the river and expose sediments. Sediments will then be excavated and transported to the Booth Oil site for treatment along with the other Booth Oil site soils. Pretreatment with cement or other appropriate material is likely to be necessary prior to transport to dewater sediments. On-site treatment of sediments will be by solvent extraction, thermal separation, or incineration as dictated by the full scale site remedy. Treated sediments will be backfilled on site. Any residual wastes will be transported and disposed of off site.

This remedy will be compliant with applicable SCGs and will be protective of human health and the environment. The score for short term effectiveness is relatively high. Because sediments will be excavated, handled, and transported, the potential for short term impacts exists but these are considered to be easily controllable. Long term effectiveness scored high since sediments will be removed and treatment is permanent. The score for reduction in toxicity, mobility and volume is also high since all three will be reduced by the treatment process. The implementability of this alternative is similar to the other action alternatives. Cost is based on cofferdam option. As with Alternative 2 and 3, cost also scored low for this alternative because the score is relative to the no action alternative. As with the other alternatives, cost estimates contain some uncertainties since work is within a river bed and sediment volume is only an estimate. The total score for the excavation/treatment alternative is 85.

B. Comparison of Alternatives:

Of the four alternatives, the no action alternative scored lowest at 60. Capping in place scored only slightly higher than this at 61. Excavation/treatment scored the highest at 85 with excavation/off-site disposal below this at 77.

All three action alternatives would comply with applicable SCGs and provide equally for the project of human health and the environment. The no action alternative would not comply with chemical specific SCGs and the potential for exposure to environmental receptors would remain.

All action alternatives are equally effective in the short term. All short term risks during construction are expected to be easily controllable. No action is slightly more effective than the action alternatives over the short term since sediment will not be handled or exposed. In the long term no action is least effective, closely followed by capping in place since sediments are left in place and there is a potential for cap failure over the long term. The excavation/treatment alternative is the most effective in the long term since sediments will be destroyed, followed by off-site disposal which scored lower than treatment since it is not classified as a permanent remedy.

The no action and capping alternatives were not effective in reducing toxicity, mobility or volume since sediments will remain in place untreated, and capping will only reduce mobility. Off-site disposal will not reduce the toxicity and volume of wastes either. The on-site treatment alternative is very effective at reducing toxicity, mobility, and volume of contaminants.

All alternatives are considered to be implementable with only typical uncertainties in construction. However, no action and off-site disposal scored slightly higher than capping and the treatment alternatives. Treatment is more feasible than off-site disposal since the other site soils are to be treated during the full site remediation, and the

incremental increase represented by these sediments is negligible.

For cost, the no action alternative scored highest since costs for this alternative are minimal, involving only minor monitoring. The costs for off-site disposal and on-site treatment were very close at about $90,000. The cost for the capping alternative was higher at approximately $125,000 due to the level of difficulty of placing a cap in the riverbed situation.

RECOMMENDED ALTERNATIVE:

Based on this analysis, the NYSDEC recommends that Alternative 4, Excavation/On-Site Treatment, be implemented to remediate the sediments in the Little River. This action will meet SCGs and be protective of human health and the environment. This alternative is the most effective in the long term and is the only alternative that will permanently reduce the toxicity, mobility and volume of contaminants. The estimated cost to implement this alternative is $90,000.

The primary characteristics of this remedy is excavation followed by on-site treatment. A more cost effective means of excavation, such as dredging which would not require a cofferdam, will be evaluated during design. Utilization of a cofferdam was used in this FS for cost estimation because a cofferdam is likely to be necessary during the cleaning of the sewer line with which this remedy would likely be performed. The actual treatment method will be that of the full site remedy also to be more fully evaluated during design.

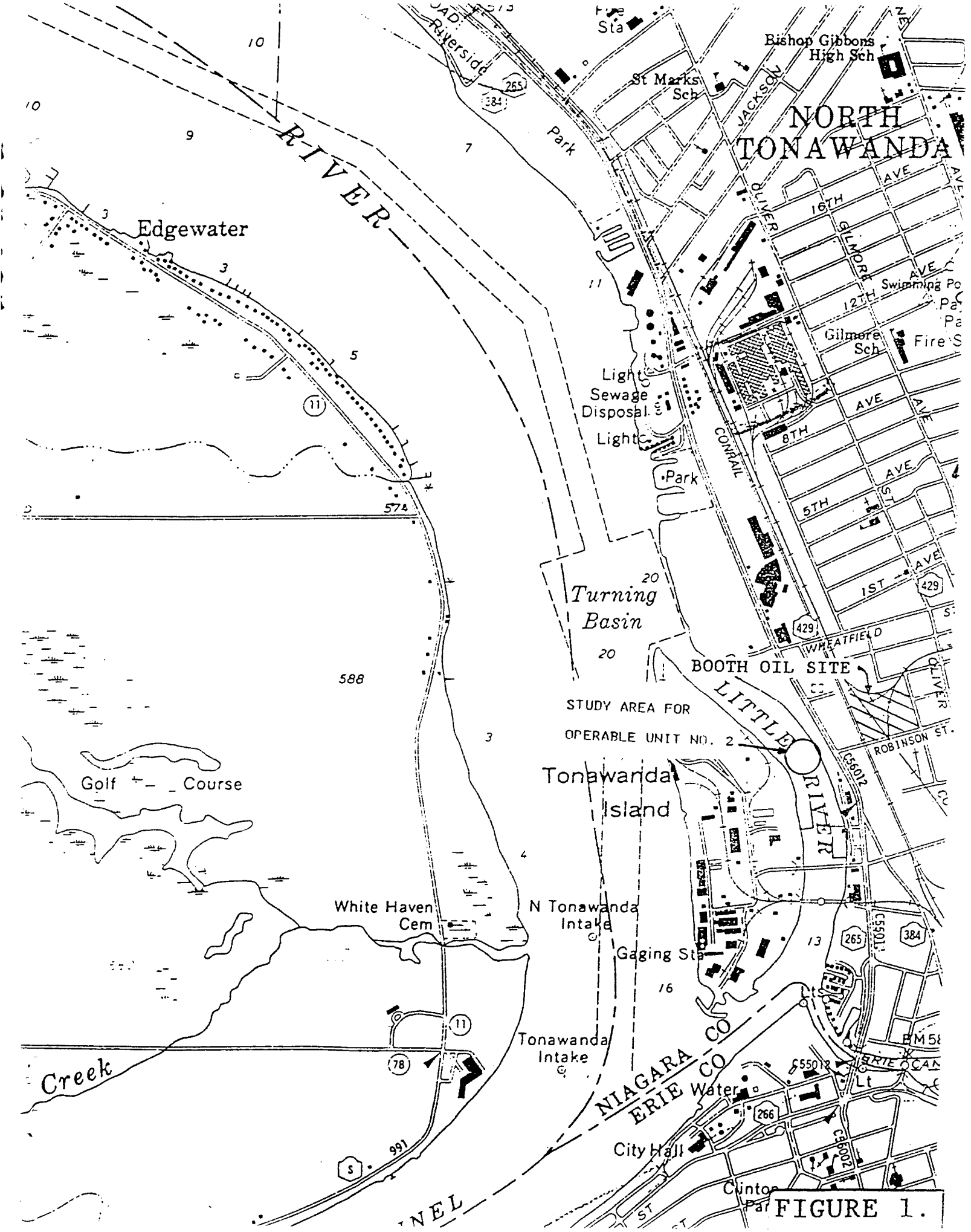
The sediment volume requiring remediation is estimated at 5 to 10 cubic yards. This remedial area will be further defined during design and/or remediation and will be based on exit sampling and visual inspection to remove all oily-type sediments in the vicinity of the outfall.

TABLE 4.

ESTIMATED COSTS FOR REMEDIAL ALTERNATIVES

ITEM/DESCRIPTION	UNIT	COST/ UNIT ($)	ALTERNATIVE							
			NO ACTION	CAP IN PLACE		EXCAVATE/OFF SITE DISPOSAL		EXCAVATE/ ON SITE TREATMENT	
			COST ($)	QTY	COST ($)	QTY	COST ($)	QTY	COST ($)
COFFERDAM: MATERIALS	SQ.FT.	19.10	0	1800	34380	1800	34380	1800	34380
LABOR & EQUIP.	DAY	4354	0	3	13062	3	13062	3	13062
WATER TREATMENT	GAL	0.20	0	3366	673	3366	673	3366	673
DROP STONE: MATERIALS	SQ.YD.	23.00	0	50	1150	0	0	0	0
LABOR & EQUIP.	DAY	5735.00	0	2	11470	0	0	0	0
GROUT STONE	CU.FT.	27.85	0	225	6266	0	0	0	0
EXCAVATION/TRANS.	DAY	2440.00	0	0	0	2	4880	2	4880
DEWATERING SEDIMENTS	SQ.YD.	11.90	0	0	0	27	321	27	321
SEDIMENT TREATMENT	CU.YD.	225.00	0	0	0	0	0	10	2250
OFF SITE DISPOSAL	CU.YD.	250.00	0	0	0	10	2500	0	0
TOTAL DIRECT COSTS			0		67001		55817		55567
25% PREMIUM FOR HAZ. WASTE			0		16750		13954		13892
CONTINGENCY (20%)			0		13400		11163		11113
ENGINEERING (15%)			0		10050		8372		8335
O&M PER YEAR			1500		1500		0		0
PRESENT WORTH OF O&M (10% OVER 30 YEARS)			14140		14140		0		0
TOTAL COST $			14140		121343		89306		88906

NOTE: COST DATA BASED ON 1993 MEANS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Bishop Gibbons High Sch
St Marks Sch
Riverside
Park
RIVER
Edgewater
Light
Sewage Disposal
Light
Park
CONRAIL
OLIVER
JACKSON
GILMORE
16TH AVE
12TH AVE
8TH AVE
5TH AVE
1ST AVE
Gilmore Sch
Fire Sta
Swimming Po
Turning Basin
WHEATFIELD
BOOTH OIL SITE
STUDY AREA FOR
OPERABLE UNIT NO. 2
LITTLE RIVER
ROBINSON ST.
Tonawanda Island
Golf Course
White Haven Cem
N Tonawanda Intake
Gaging Sta
Tonawanda Intake
Creek
NIAGARA CO
ERIE CO
ERIE Water
City Hall
Clinton
588
574
991
265
384
429
266
78
11

FIGURE 1.

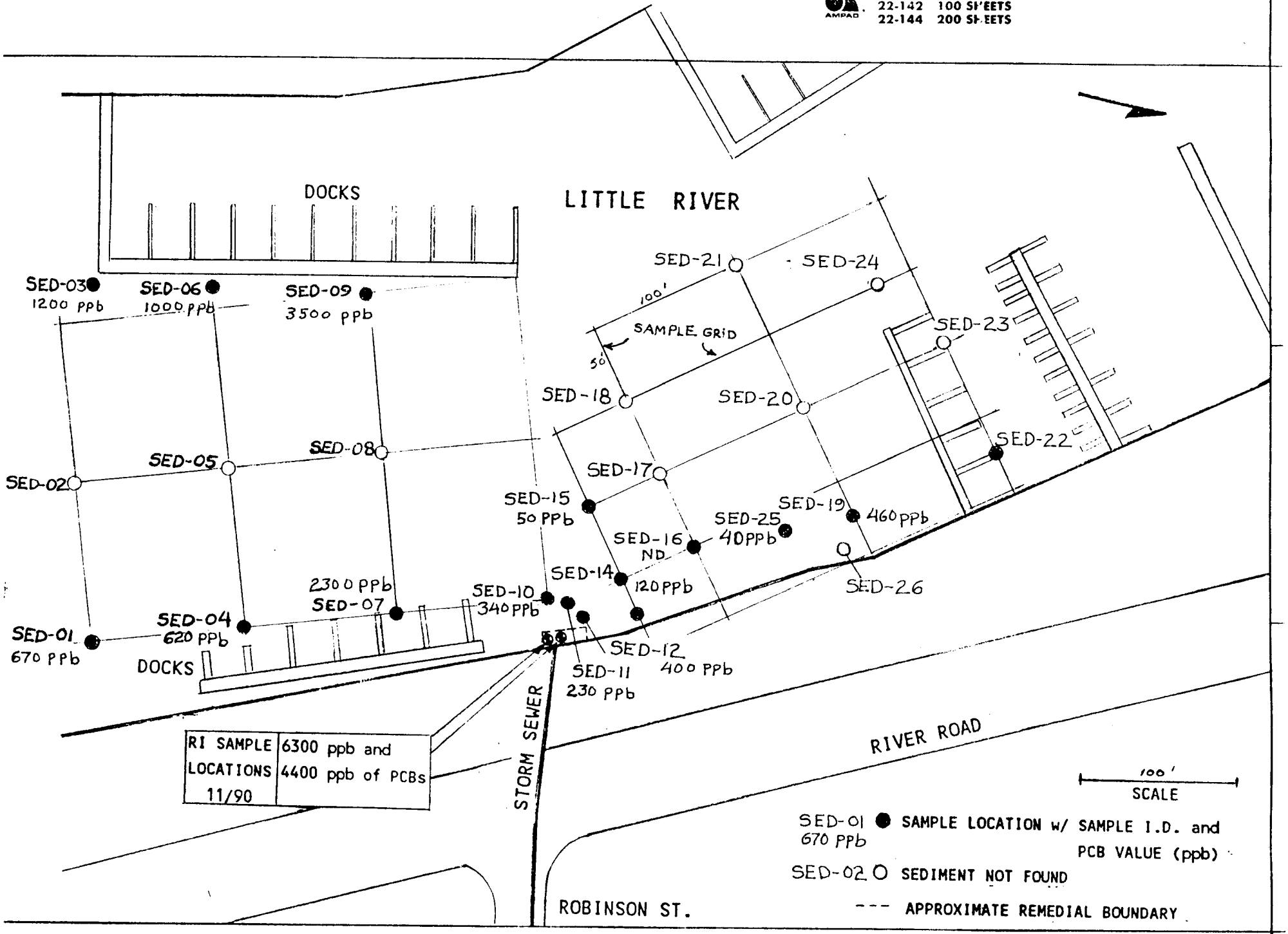


FIGURE 2: JULY OF '92 SEDIMENT SAMPLING LOCATIONS AND PROPOSED REMEDIAL BOUNDARY

APPENDIX A

Analytical Data Sheets

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
MOBILE LABORATORY REPORT

SITE NAME: HOOKER 102

SAMPLE NUMBER: [illegible] RECEIVED: DEC - 05

DATE RECEIVED: [illegible] ANALYSIS DATE: [illegible]

ANALYST: [illegible] MATRIX: SEDIMENT % SOLID: 100

**** AROCLOR - 1016 ****

GAS CHROMATOGRAPH RESULTS: ND DETECTION LIMIT [illegible]

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1221 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 100 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1232 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 100 UG/KG

MASS SPECTROMETER RESULTS: 40 UG/KG

**** AROCLOR - 1242 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 100 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1254 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 100 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1260 ****

GAS CHROMATOGRAPH RESULTS: ND DETECTION LIMIT 100 UG/KG

MASS SPECTROMETER RESULTS: ND

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
MOBILE LABORATORY PCB ANALYSIS

SITE NAME: [illegible]

SITE [illegible]: [illegible]

SAMPLE NUMBER: [illegible]   FIELD ID: SED - 25

DATE RECEIVED: [illegible]   ANALYSIS DATE: [illegible]

ANALYSIS NUMBER: [illegible]   MATRIX: SEDIMENT   % SOLID: NC

**** AROCLOR - 1016 ****

GAS CHROMATOGRAPH RESULTS: NA   DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1221 ****

GAS CHROMATOGRAPH RESULTS: NA   DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1232 ****

GAS CHROMATOGRAPH RESULTS: NA   DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1242 ****

GAS CHROMATOGRAPH RESULTS: NA   DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: 40 UG/KG

**** AROCLOR - 1248 ****

GAS CHROMATOGRAPH RESULTS: NA   DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1254 ****

GAS CHROMATOGRAPH RESULTS: NA   DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1260 ****

GAS CHROMATOGRAPH RESULTS: ND   DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

[illegible]

[illegible]

FILE NAME: [illegible]

FILE DATE: [illegible]

SAMPLE NUMBER: [illegible] FIELD ID: [illegible]

SAMPLE MATRIX: [illegible] ANALYSIS DATE: [illegible]

DILUTION NUMBER: [illegible] MATRIX: [illegible] % MOISTURE: [illegible]

[illegible]

**** AROCLOR - [illegible] ****

GAS CHROMATOGRAPH RESULTS: NA [illegible]

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - [illegible] ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT [illegible]

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - [illegible] ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT [illegible]

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - [illegible] ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT [illegible]

MASS SPECTROMETER RESULTS: 440 UG/KG

**** AROCLOR - [illegible] ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT [illegible]

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - [illegible] ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT [illegible]

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - [illegible] ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT [illegible]

MASS SPECTROMETER RESULTS: ND

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

**** [illegible] ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: NO

**** AROCLOR - 1221 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: NO

**** ARUCLOR - 1232 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: NO

**** ARUCLOR - 1242 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: NO

**** ARUCLOR - 1248 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: NO

**** ARUCLOR - 1254 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: NO

**** ARUCLOR - 1260 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: NO

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
MOBILE LABORATORY PCB ANALYSIS

SITE NAME: [illegible] OIL

SITE CODE: [illegible]

SAMPLE NUMBER: [illegible]   FIELD ID: [illegible]

DATE RECEIVED: [illegible]   ANALYSIS DATE: [illegible]

ANALYSIS NUMBER: [illegible]   MATRIX: SEDIMENT   % SOLID: NC

**** AROCLOR - 1016 ****

GAS CHROMATOGRAPH RESULTS: NA   DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1221 ****

GAS CHROMATOGRAPH RESULTS: NA   DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1232 ****

GAS CHROMATOGRAPH RESULTS: NA   DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1242 ****

GAS CHROMATOGRAPH RESULTS: NA   DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: [illegible]0 UG/KG

**** AROCLOR - 1248 ****

GAS CHROMATOGRAPH RESULTS: NA   DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1254 ****

GAS CHROMATOGRAPH RESULTS: NA   DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1260 ****

GAS CHROMATOGRAPH RESULTS: NA   DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

[illegible]

FILE NAME: [illegible]

A TF [illegible]

NUMBER NUMBER: [illegible] PERIOD TO: AED - 19

[illegible] DATE(UE): [illegible] ANALYSIS DATE: [illegible]

AE MINE NUMBER: [illegible] MATRIX: EQUIPMENT % [illegible]

[illegible]

**** AROCLOR - [illegible] ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT [illegible]

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1221 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 1?0 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1?2? ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1242 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: 480 UG/KG

**** AROCLOR - 1248 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1254 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1260 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
MINIATURE LABORATORY PCB ANALYSIS

SITE NAME: [illegible]

SITE CODE: [illegible]

SAMPLE NUMBER: [illegible] FIELD ID: SED - 4

DATE SAMPLE TAKEN: [illegible] ANALYSIS DATE: [illegible]

APPLICATOR NUMBER: [illegible] MATRIX: SEDIMENT % SOLID: [illegible]

**** AROCLOR - 1016 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 100 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1221 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 100 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1232 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 100 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1242 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 100 UG/KG

MASS SPECTROMETER RESULTS: 650 UG/KG

**** AROCLOR - 1248 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 100 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1254 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 100 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1260 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 100 UG/KG

MASS SPECTROMETER RESULTS: ND

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
MOBILE LABORATORY FOR ANALYSIS

SITE NAME: BOG A OIL

SITE CODE: 915700

SAMPLE NUMBERS: MW 213 02 FIELD ID: SED - 02

DATE RECEIVED: 07/31/91 ANALYSIS DATE: 08/11/91

CHAIN OF CUSTODY NUMBER: M01107 MATRIX: Sediment % SOLID: NC

**** AROCLOR - 1016 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1221 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1232 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1242 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: 400 UG/KG

**** AROCLOR - 1248 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1254 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1260 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
MOBILE LABORATORY PCB ANALYSIS

SITE NAME: [illegible]

SITE CODE: [illegible]

SAMPLE NUMBER: [illegible] FIELD ID: SED-[illegible]

DATE RECEIVED: [illegible] ANALYSIS DATE: [illegible]

ARCHIVE NUMBER: [illegible] MATRIX: SEDIMENT % SOLID: NA

**** AROCLOR - 1016 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 1[illegible] UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1221 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 1[illegible] UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1232 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT [illegible] UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1242 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT [illegible] UG/KG

MASS SPECTROMETER RESULTS: [illegible] UG/KG

**** AROCLOR - 1248 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1254 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 1[illegible] UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1260 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 1[illegible] UG/KG

MASS SPECTROMETER RESULTS: ND

[illegible] STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
[illegible] LABORATORY PCB ANALYSIS

[illegible] NAME: [illegible]

[illegible]

SAMPLE NUMBER: [illegible] FILE ID: REG - 10

[illegible] RECOVERY: [illegible] ANALYSIS DATE: [illegible]

WORKSHEET NUMBER: PW1 [illegible] MATRIX: SEDIMENT % SOLID: NO

**** AROCLOR - 1016 ****

[illegible] CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 1/0 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1221 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 1/0 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1232 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 1/0 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1242 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: 340 UG/KG

**** AROCLOR - 1248 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1254 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1260 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
MOBILE LABORATORY FOR ANALYSIS

SITE NAME: [illegible]

SITE CODE: [illegible]

SAMPLE NUMBER: [illegible] [illegible]

[illegible] [illegible]

[illegible] [illegible]

[illegible]

**** AROCLOR - 1016 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1221 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1232 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1242 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: 3900 UG/KG

**** AROCLOR - 1248 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1254 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1260 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT [illegible] UG/KG

MASS SPECTROMETER RESULTS: ND

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
[illegible]

SITE NAME: [illegible]

SITE ID: [illegible]

SAMPLE NUMBER: [illegible] FIELD ID: SED - 12

DATE RECEIVED: [illegible] MATRIX: [illegible]

SAMPLE TYPE: [illegible] MATRIX: SEDIMENT % SOLID: 80

[illegible]

**** ANALYSIS - 1126 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: NO

**** ANALYSIS - 1221 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: NO

**** ANALYSIS - 1242 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: NO

**** ANALYSIS - 1248 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: NO

**** ANALYSIS - 1254 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: NO

**** ANALYSIS - 1260 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: NO

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
MOBILE LABORATORY PCB ANALYSIS

SITE NAME: BOOTH OIL

SITE CODE: 932[illegible]

SAMPLE NUMBER: 932-[illegible]   FIELD ID: SED - [illegible]

DATE RECEIVED: 10/3[illegible]   ANALYSIS DATE: 1[illegible]

ARCHIVE NUMBER: [illegible]   MATRIX: SEDIMENT   % SOLIDS: NC

****** AROCLOR - 1016 ******

GAS CHROMATOGRAPH RESULTS: NA   DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

****** AROCLOR - 1221 ******

GAS CHROMATOGRAPH RESULTS: NA   DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

****** AROCLOR - 1232 ******

GAS CHROMATOGRAPH RESULTS: NA   DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

****** AROCLOR - 1242 ******

GAS CHROMATOGRAPH RESULTS: NA   DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: 1000 UG/KG

****** AROCLOR - 1248 ******

GAS CHROMATOGRAPH RESULTS: NA   DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

****** AROCLOR - 1254 ******

GAS CHROMATOGRAPH RESULTS: NA   DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

****** AROCLOR - 1260 ******

GAS CHROMATOGRAPH RESULTS: NA   DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
MOBILE LABORATORY PCB ANALYSIS

SITE NAME: ROUCH OIL

SITE CODE: [illegible]

SAMPLE NUMBER: [illegible]   FIELD ID: [illegible]

DATE RECEIVED: [illegible]   ANALYSIS DATE: [illegible]

ARCHIVE NUMBER: [illegible]   MATRIX: SEDIMENT   % SOLID: [illegible]

**** AROCLOR - 1016 ****

GAS CHROMATOGRAPH RESULTS: NA   DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1221 ****

GAS CHROMATOGRAPH RESULTS: NA   DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1232 ****

GAS CHROMATOGRAPH RESULTS: NA   DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1242 ****

GAS CHROMATOGRAPH RESULTS: NA   DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: [illegible] UG/KG

**** AROCLOR - 1248 ****

GAS CHROMATOGRAPH RESULTS: NA   DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - [illegible] ****

GAS CHROMATOGRAPH RESULTS: NA   DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1260 ****

GAS CHROMATOGRAPH RESULTS: NA   DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

[illegible]

**** [illegible] ****

[illegible] NA [illegible]

[illegible] ND

**** [illegible] ****

[illegible] NA DETECTION LIMIT 120 UG/KG

[illegible] ND

**** [illegible] ****

[illegible] NA DETECTION LIMIT 120 UG/KG

[illegible] ND

**** [illegible] ****

[illegible] NA DETECTION LIMIT 120 UG/KG

[illegible] 1200 UG/KG

**** [illegible] ****

[illegible] NA DETECTION LIMIT 120 UG/KG

[illegible] ND

**** [illegible] ****

[illegible] NA DETECTION LIMIT 120 UG/KG

[illegible] ND

**** [illegible] ****

[illegible] NA DETECTION LIMIT 120 UG/KG

[illegible] ND

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
MOBILE LABORATORY FOR ANALYSIS

SITE NAME: BOOTH OIL

SITE CODE: 9 [illegible]

SAMPLE NUMBER: 92-[illegible]13-14 FIELD ID: SED - [illegible]

DATE RECEIVED: [illegible] ANALYSIS DATE: 09/08/92

ARCHIVE NUMBER: P[illegible]1314 MATRIX: SEDIMENT % SOLID: [illegible]

**** AROCLOR - 1016 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1221 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1232 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1242 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: 420 UG/KG

**** AROCLOR - 1248 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1254 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

**** AROCLOR - 1260 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UG/KG

MASS SPECTROMETER RESULTS: ND

APPENDIX B

Sample Summary Sheets

SAMPLING SUMMARY SHEET

Site Name: Booth Oil Site

Site No.: 9-32-100

Sampling Date: 7/28/92 Time: 0930

Personnel: DAVE CAMP BRIAN HENEVELD

KEVIN GLASER RICK BORNER

Sample ID: SED-01

Sample Location: UPGRADIENT NEXT TO RIVER BANK NEAR RED TAVERN, 25' OFF DOCK

Type: (Grab) Composite

Matrix: Water Soil (Sediment) Waste

Sample Description: BLACK/GREY, SILTY SEDIMENT SOME SEAWEED

Sample Containers: (Volume & No.) 1 SOIL JAR

Notes: OBTAINED SEDIMENT ON 1ST ATTEMPT NOT MUCH CURRENT HERE RIVER DEPTH 13.5 FT

SAMPLING SUMMARY SHEET

Site Name: Booth Oil Site

Site No.: 9-32-100

Sampling Date: 7/28/92 Time: 0945

Personnel: DAVE CAMP BRIAN HENEVELD

KEVIN GLASER RICK BORNER

Sample ID: SED-02

Sample Location: UPGRADIENT AT CENTER OF RIVER

Type: Grab Composite

Matrix: Water Soil Sediment Waste

Sample Description: (NO SAMPLE COLLECTED)

Sample Containers: —
(Volume & No.)

Notes: THREE ATTEMPTS - ONLY SOME GRAVEL

STRONG CURRENT HERE

RIVER DEPTH 15-16'

SAMPLING SUMMARY SHEET

Site Name: Booth Oil Site

Site No.: 9-32-100

Sampling Date: 7/28/92 Time: 1000

Personnel: DAVE CAMP BRIAN HENEVELD

KEVIN GLASER RICK BORNER

Sample ID: SED-03

Sample Location: UPGRADIENT, 10' OFF WEST DOCK

Type: (Grab) Composite

Matrix: Water Soil (Sediment) Waste

Sample Description: SANDY SEDIMENT & SEAWEED

Sample Containers: (Volume & No.) 1 SOIL JAR

Notes: REQUIRED TWO ATTEMPTS TO OBTAIN SUFFICIENT SAMPLE VOLUME

MODERATE CURRENT. DEPTH 14'.

SAMPLING SUMMARY SHEET

Site Name: Booth Oil Site

Site No.: 9-32-100

Sampling Date: 7/28/92 Time: 1043

Personnel: DAVE CAMP BRIAN HENEVELD

KEVIN GLASER RICK BORNER

Sample ID: SED-04

Sample Location: UPGRADIENT, OFF EAST DOCKS. (SECOND RED DOCK FROM SOUTH)

Type: (Grab) Composite

Matrix: Water Soil (Sediment) Waste

Sample Description: SANDY SEDIMENT - DARK. SOME OIL SHEEN IN WATER.

Sample Containers: (Volume & No.) 1 SOIL JAR

Notes: RIVER DEPTH 18 FT. REQUIRED ONLY ONE ATTEMPT TO OBTAIN SUFFICIENT SAMPLE VOLUME.

SAMPLING SUMMARY SHEET

Site Name: Booth Oil Site

Site No.: 9-32-100

Sampling Date: 7/28/92 Time: 1055

Personnel: DAVE CAMP BRIAN HENEVELD

KEVIN GLASER RICK BORNER

Sample ID: SED-05

Sample Location: UPGRADIENT. CENTER OF RIVER

Type: Grab Composite

Matrix: Water Soil Sediment Waste

Sample Description: (NO SAMPLE COLLECTED)

Sample Containers: —
(Volume & No.)

Notes: THREE ATTEMPTS BUT NO SEDIMENT. RIVER DEPTH 17 FT.

SAMPLING SUMMARY SHEET

Site Name: Booth Oil Site

Site No.: 9-32-100

Sampling Date: 7/28/92 Time: 1014

Personnel: DAVE CAMP BRIAN HENEVELD

KEVIN GLASER RICK BORNER

Sample ID: SED-06

Sample Location: UPGRADIENT, WEST SIDE.

CENTER OF 3RD BOAT

PORT FROM SOUTH.

Type: (Grab) Composite

Matrix: Water Soil (Sediment) Waste

Sample Description: GRAVEL AND SAND

SEAWEED/STICKS (REMOVED)

Sample Containers: 1 SOIL JAR
(Volume & No.)

Notes: REQUIRED MANY ATTEMPTS TO OBTAIN

ADEQUATE SAMPLE VOLUME.

RIVER DEPTH 15 FT.

SAMPLING SUMMARY SHEET

Site Name: Booth Oil Site

Site No.: 9-32-100

Sampling Date: 7/28/92 Time: 1050

Personnel: DAVE CAMP BRIAN HENEVELD

KEVIN GLASER RICK BORNER

Sample ID: SED-07

Sample Location: UPGRADIENT ON EAST DOCKS.

5TH RED DOCK FROM SOUTH

Type: (Grab) Composite

Matrix: Water Soil (Sediment) Waste

Sample Description: SANDY DARK SEDIMENT

Sample Containers: 1 SOIL JAR
(Volume & No.)

Notes: OBTAINED ADEQUATE SEDIMENT ON

FIRST ATTEMPT.

RIVER DEPTH 12 FT.

SAMPLING SUMMARY SHEET

Site Name: Booth Oil Site

Site No.: 9-32-100

Sampling Date: 7/28/92 Time: 1100

Personnel: DAVE CAMP BRIAN HENEVELD

KEVIN GLASER RICK BORNER

Sample ID: SED-08

Sample Location: UPGRADIENT, RIVER CENTER

Type: Grab Composite

Matrix: Water Soil Sediment Waste

Sample Description: (NO SAMPLE COLLECTED)

Sample Containers: —
(Volume & No.)

Notes: THREE ATTEMTS, BUT ONLY ROCKS.
RIVER DEPTH 17 FT.

SAMPLING SUMMARY SHEET

Site Name: Booth Oil Site

Site No.: 9-32-100

Sampling Date: 7/28/92 Time: 1030

Personnel: DAVE CAMP BRIAN HENEVELD

KEVIN GLASER RICK BORNER

Sample ID: SED-09

Sample Location: UPGRADIENT OFF WEST DOCK. CENTER OF 7TH BOAT PORT.

Type: (Grab) Composite

Matrix: Water Soil (Sediment) Waste

Sample Description: SILTY SANDY SEDIMENT. DARK GREY IN COLOR

Sample Containers: 1 SOIL JAR
(Volume & No.)

Notes: REQUIRED ONLY ONE ATTEMPT TO OBTAIN SUFFICIENT SAMPLE VOLUME. RIVER DEPTH 15 FT.

SAMPLING SUMMARY SHEET

Site Name: Booth Oil Site

Site No.: 9-32-100

Sampling Date: 7/28/92 Time: 1115

Personnel: DAVE CAMP BRIAN HENEVELD

KEVIN GLASER RICK BORNER

Sample ID: SED-10

Sample Location: SLIGHTLY UPGRADIENT FROM OUTFALL OFF OF RED DOCK.

Type: (Grab) Composite

Matrix: Water Soil (Sediment) Waste

Sample Description: ROCKS WITH SOME CLAY-LIKE SEDIMENT.

Sample Containers: 1 SOIL JAR
(Volume & No.)

Notes: REQUIRED SEVERAL ATTEMPTS, BUT LOCATION HAD MUCH SEDIMENT

RIVER DEPTH 16 FT

SAMPLING SUMMARY SHEET

Site Name: Booth Oil Site

Site No.: 9-32-100

Sampling Date: 7/28/92 Time: 1130

Personnel: DAVE CAMP BRIAN HENEVELD

KEVIN GLASER RICK BORNER

Sample ID: SED-11

Sample Location: IMMEDIATELY ACROSS FROM OUTFALL ABOUT 20 FT OUT.

Type: (Grab) Composite

Matrix: Water Soil (Sediment) Waste

Sample Description: SILTY-CLAY, GREY WITH MANY ROCKS

Sample Containers: 1 SOIL JAR
(Volume & No.)

Notes: CURRENT FAIRLY STRONG, SIMILAR TO OTHER SAMPLES COLLECTED NEAR BANK. RIVER DEPTH 1 FT.

SAMPLING SUMMARY SHEET

Site Name: Booth Oil Site

Site No.: 9-32-100

Sampling Date: 7/28/92 Time: 1130

Personnel: DAVE CAMP BRIAN HENEVELD

KEVIN GLASER RICK BORNER

Sample ID: SED-12

Sample Location: NEAR SEWER OUTFALL.

ABOUT 10 FT DOWNGRADIENT

FROM SED-11 LOCATION

Type: (Grab) Composite

Matrix: Water Soil (Sediment) Waste

Sample Description: (SIMILAR TO SED-11)

(ONLY OBTAINED 1/2 JAR)

Sample Containers: 1 SOIL JAR
(Volume & No.)

Notes: REQUIRED MANY ATTEMPTS TO

OBTAIN ADEQUATE SAMPLE VOLUME.

RIVER DEPTH 14 FT.

SAMPLING SUMMARY SHEET

Site Name: Booth Oil Site

Site No.: 9-32-100

Sampling Date: 7/28/92 Time: 1238

Personnel: DAVE CAMP BRIAN HENEVELD

KEVIN GLASER RICK BORNER

Sample ID: SED-13

Sample Location: JUST DOWNGRADIENT OF OUTFALL, 15 FT. IN FRONT OF TUG BOAT. 10 FT OFF SHORE / 10 FT FROM OUTFALL.

Type: (Grab) Composite

Matrix: Water Soil (Sediment) Waste

Sample Description: VERY ROCKY WITH FINE GRAVEL. DARK GREY

Sample Containers: (Volume & No.) 1 SOIL JAR

Notes: REQUIRED MANY ATTEMPTS TO OBTAIN ADEQUATE SAMPLE VOLUME. RIVER DEPTH 13 FT.

SAMPLING SUMMARY SHEET

Site Name: Booth Oil Site

Site No.: 9-32-100

Sampling Date: 7/28/92 Time: 1250

Personnel: DAVE CAMP BRIAN HENEVELD

KEVIN GLASER RICK BORNER

Sample ID: SED-14

Sample Location: DOWNGRADIENT, ABOUT 50 FT FROM SHORE.

Type: (Grab) Composite

Matrix: Water Soil (Sediment) Waste

Sample Description: SILTY SEDIMENT WITH MANY FINE ROCKS.

Sample Containers: (Volume & No.) 1 SOIL JAR

Notes: STRONGER CURRENT HERE. MANY ATTEMPTS AND ONLY OBTAINED ½ JAR.

RIVER DEPTH 18.5 FT.

SAMPLING SUMMARY SHEET

Site Name: Booth Oil Site

Site No.: 9-32-100

Sampling Date: 7/28/92 Time: 1322

Personnel: DAVE CAMP BRIAN HENEVELD

KEVIN GLASER RICK BORNER

Sample ID: SED-15

Sample Location: DOWNGRADIENT ACROSS FROM SED-14 (ABOUT 50 FT).

Type: (Grab) Composite

Matrix: Water Soil (Sediment) Waste

Sample Description: RED-BROWN CLAY WITH SOME ROCKS. SOFT CLAY

Sample Containers: (Volume & No.) 1 SOIL JAR

Notes: SAMPLE TAKEN FROM STAINLESS STEEL BOAT ANCHOR.

SAMPLING SUMMARY SHEET

Site Name: Booth Oil Site

Site No.: 9-32-100

Sampling Date: 7/28/92 Time: 1300

Personnel: DAVE CAMP BRIAN HENEVELD

KEVIN GLASER RICK BORNER

Sample ID: SED-16

Sample Location: DOWN GRADIENT, OFF CENTER OF TUG BOAT LOCATION.

Type: (Grab) Composite

Matrix: Water Soil (Sediment) Waste

Sample Description: VERY CLAY-LIKE, RED-BROWN SOME ROCKS

Sample Containers: 1 SOIL JAR
(Volume & No.)

Notes: SEVERAL ATTEMTS NECESSARY TO OBTAIN ADEQUATE SAMPLE VOLUME. (TWO DIFFERENT SEDIMENT TYPES HERE: BLACK MUCK AND RED-BROWN CLAY).
RIVER DEPTH 19 FT.

SAMPLING SUMMARY SHEET

Site Name: Booth Oil Site

Site No.: 9-32-100

Sampling Date: 7/28/92 Time: 1330

Personnel: DAVE CAMP BRIAN HENEVELD

KEVIN GLASER RICK BORNER

Sample ID: SED-17

Sample Location: DOWNGRADIENT ABOUT 50 FT ACROSS FROM TUG BOAT.

Type: Grab Composite

Matrix: Water Soil Sediment Waste

Sample Description: (NO SAMPLE COLLECTED)

Sample Containers: —
(Volume & No.)

Notes: STRONG CURRENT HERE, MANY ATTEMPTS UNSUCCESSFUL.

RIVER DEPTH 19 FT.

SAMPLING SUMMARY SHEET

Site Name: Booth Oil Site

Site No.: 9-32-100

Sampling Date: 7/28/92 Time: 1350

Personnel: DAVE CAMP BRIAN HENEVELD

KEVIN GLASER RICK BORNER

Sample ID: SED-18

Sample Location: ACROSS FROM TUG BOAT — IN CENTER OF RIVER

Type: Grab Composite

Matrix: Water Soil Sediment Waste

Sample Description: (NO SAMPLE COLLECTED)

Sample Containers: —
(Volume & No.)

Notes: MANY ATTEMPTS, BUT ONLY SOME GRAVEL.

RIVER DEPTH 17 FT

SAMPLING SUMMARY SHEET

Site Name: Booth Oil Site

Site No.: 9-32-100

Sampling Date: 7/28/92 Time: 1400

Personnel: DAVE CAMP BRIAN HENEVELD

KEVIN GLASER RICK BORNER

Sample ID: SED-19

Sample Location: DOWNGRADIENT ABOUT 25 FT OFF SHORE.

Type: (Grab) Composite

Matrix: Water Soil (Sediment) Waste

Sample Description: FINE SAND AND CLAY. DARK GREY IN COLOR

Sample Containers: (Volume & No.) 1 SOIL JAR

Notes: SEVERAL ATTEMPTS WERE NECESSARY, BUT PLENTY OF FINE SEDIMENT HERE. RIVER DEPTH 15 FT.

SAMPLING SUMMARY SHEET

Site Name: Booth Oil Site

Site No.: 9-32-100

Sampling Date: 7/28/92 Time: 1345

Personnel: DAVE CAMP BRIAN HENEVELD

KEVIN GLASER RICK BORNER

Sample ID: SED-20

Sample Location: DOWNGRADIENT 100 FT

FROM SED-17 LOCATION

Type: Grab Composite

Matrix: Water Soil Sediment Waste

Sample Description: (NO SAMPLE COLLECTED)

Sample Containers: —
(Volume & No.)

Notes: FIVE ATTEMPTS, BUT NO SEDIMENT

OBTAINED. ONLY SMALL ROCKS.

VERY STRONG CURRENT HERE.

RIVER DEPTH 16 FT.

SAMPLING SUMMARY SHEET

Site Name: Booth Oil Site

Site No.: 9-32-100

Sampling Date: 7/28/92 Time: 1500

Personnel: DAVE CAMP BRIAN HENEVELD

KEVIN GLASER RICK BORNER

Sample ID: SED-21

Sample Location: DOWN GRADIENT NEAR CENTER OF RIVER.

Type: Grab Composite

Matrix: Water Soil Sediment Waste

Sample Description: (NO SAMPLE COLLECTED)

Sample Containers: —
(Volume & No.)

Notes: FOUR ATTEMPTS, BUT NO SEDIMENT OBTAINED. GRAVEL RIVER DEPTH 16 FT.

SAMPLING SUMMARY SHEET

Site Name: Booth Oil Site

Site No.: 9-32-100

Sampling Date: 7/28/92 Time: 1435

Personnel: DAVE CAMP BRIAN HENEVELD

KEVIN GLASER RICK BORNER

Sample ID: SED-22

Sample Location: DOWNGRADIENT. OFF END OF DOCK CLOSEST TO SHORE.

Type: (Grab) Composite

Matrix: Water Soil (Sediment) Waste

Sample Description: FINE SAND AND GRAVEL. DARK GREY.

Sample Containers: 1 SOIL JAR
(Volume & No.)

Notes: SEVERAL ATTEMTS NECESSARY AND ONLY OBTAINED 1/2 JAR.

RIVER DEPTH 17 FT.

SAMPLING SUMMARY SHEET

Site Name: Booth Oil Site

Site No.: 9-32-100

Sampling Date: 7/28/92 Time: 1445

Personnel: DAVE CAMP BRIAN HENEVELD

KEVIN GLASER RICK BORNER

Sample ID: SED-23

Sample Location: DOWNGRADIENT OFF END OF 4TH DOCK FROM SHORE

Type: Grab Composite

Matrix: Water Soil Sediment Waste

Sample Description: (NO SAMPLE COLLECTED)

Sample Containers: —
(Volume & No.)

Notes: MANY ATTEMPTS, BUT NO SEDIMENT AT ALL.

SAMPLING SUMMARY SHEET

Site Name: Booth Oil Site

Site No.: 9-32-100

Sampling Date: 7/28/92 Time: 1510

Personnel: DAVE CAMP BRIAN HENEVELD

KEVIN GLASER RICK BORNER

Sample ID: SED-24

Sample Location: DOWN GRADIENT - CENTER OF RIVER

Type: Grab Composite

Matrix: Water Soil Sediment Waste

Sample Description: (NO SAMPLE COLLECTED)

Sample Containers: —
(Volume & No.)

Notes: THREE ATTEMPTS, BUT ONLY SOME GRAVEL.

RIVER DEPTH 17 FT.

SAMPLING SUMMARY SHEET

Site Name: Booth Oil Site

Site No.: 9-32-100

Sampling Date: 7/28/92 Time: 1408

Personnel: DAVE CAMP BRIAN HENEVELD

KEVIN GLASER RICK BORNER

Sample ID: SED-25

Sample Location: DOWNGRADIENT. NEAR PIER BEHIND TUG BOAT 50 FT FROM SHORE.

Type: (Grab) Composite

Matrix: Water Soil (Sediment) Waste

Sample Description: BLACK/GREY, LOTS OF VEGETATION/MUCK AND FINE SAND.

Sample Containers: (Volume & No.) 1 SOIL JAR

Notes: THIS LOCATION CHOSEN DUE TO CURRENT AND PROBABLE SEDIMENT DEPOSIT POINT.

TOOK SEVERAL ATTEMPTS TO OBTAIN ADEQUATE SAMPLE VOLUME.

RIVER DEPTH 15 FT.

SAMPLING SUMMARY SHEET

Site Name: Booth Oil Site

Site No.: 9-32-100

Sampling Date: 7/28/92 Time: 1431

Personnel: DAVE CAMP BRIAN HENEVELD

KEVIN GLASER RICK BORNER

Sample ID: SED-26

Sample Location: DOWNGRADIENT. JUST OFF SHORE

Type: Grab Composite

Matrix: Water Soil Sediment Waste

Sample Description: (NO SAMPLE COLLECTED)

Sample Containers: —
(Volume & No.)

Notes: THREE ATTEMPTS, BUT JUST ROCK

EXTRA LOCATION BASED ON CURRENT/ OUTFALL VICINITY.

RIVER DEPTH 11 FT.

APPENDIX C

TAGM Scoring Sheets

TAGM TABLES 4.1 AND 4.2
1. SHORT-TERM/LONG-TERM EFFECTIVENESS
(Maximum Score =25)

ALTERNATIVE 1 : NO ACTION
ALTERNATIVE 2 : CAP IN PLACE
ALTERNATIVE 3 : EXCAVATION / OFF SITE DISPOSAL
ALTERNATIVE 4 : EXCAVATION / TREATMENT ON SITE

			Alternatives			
Analysis Factor	**Basis for Evaluation**	**Weight**	1	2	3	4
1. Protection of community during remedial actions.	- Are there significant short-term risks to the community that must be addressed? **(If answer is no, go to Factor 2.)**	Yes ___ 0 No ___ 4	4	0	0	0
	- Can the short-term risk be easily controlled?	Yes ___ 1 No ___ 0		1	1	1
Subtotal (maximum = 4)	- Does the mitigative effort to control short-term risk impact the community life-style?	Yes ___ 0 No ___ 2		2	2	2
2. Environmental Impacts	- Are there significant short-term risks to the environment that must be addressed? **(If answer is no, go to Factor 3.)**	Yes ___ 0 No ___ 4	4	0	0	0
Subtotal (maximum = 4)	- Are the available mitigative measures reliable to minimize potential impacts?	Yes ___ 3 No ___ 0		3	3	3
3. Time to implement the remedy.	- What is the required time to implement the remedy?	≤ 2 yr. __ 1 > 2 yr. __ 0	1	1	1	1
Subtotal (maximum = 2)	- Required duration of the mitigative effort to control short-term risk.	≤ 2 yr. __ 1 > 2 yr. __ 0	1	1	1	1
4. On-site or off-site treatment or land disposal. **Subtotal (maximum = 3)** * treatment is defined as destruction or separation/ treatment or solidification/ chemical fixation of inorganic wastes.	- On-site treatment * - Off-site treatment * - On-site or off-site land disposal	3 1 0			0	3
5. Permanence of the remedial alternatives. **Subtotal (maximum = 3)**	- Will the remedy be classified as permanent in accordance with Section 2.1(a), (b), or (c). **(If answer is yes, go to Factor 7.)**	Yes ___ 3 No ___ 0	0	0	0	3

1. SHORT-TERM/LONG-TERM EFFECTIVENESS (Cont.)
(Maximum Score =25)

Analysis Factor	Basis for Evaluation	Weight	Alternatives 1	2	3	4
6. Lifetime of remedial actions. **Subtotal (maximum = 3)**	- Expected lifetime or duration of effectiveness of the remedy.	25-30 yr.__3 20-25 yr.__2 15-20 yr.__1 <15 yr.__ 0	0	2	3	
7. Quantity and nature of waste or residual left at the site after remediation.	i. Quantity of untreated hazardous waste left at the site.	None __ 3 ≤ 25% __ 2 25-50% __ 1 > 50% __ 0	0	0	3	3
	ii. Is there treated residual left at the site? **(If answer is no, go to Factor 8.)**	Yes ___ 0 No ___ 2	2	2	2	0
Subtotal (maximum = 5)	iii. Is the treated residual toxic?	Yes ___ 0 No ___ 1				1
	iv. Is the treated residual mobile?	Yes ___ 0 No ___ 1				1
8. Adequacy and reliability of controls.	i. Operation and maintenance required for a period of:	< 5 yr. __ 1 > 5 yr. __ 0	1	1	0	0
	ii. Are environmental controls required as a part of the remedy to handle potential problems? **(If answer is no, go to "iv".)**	Yes ___ 0 No ___ 1	1	0	0	0
Subtotal (maximum = 4)	iii. Degree of confidence that controls can adequately handle potential problems.	Moderate to very confident - 1 Somewhat to not confident - 0		1	1	1
	iv. Relative degree of long-term monitoring required **Compare with other remedial alternatives)**	Minimum - 2 Moderate - 1 Extensive - 0	2	1	2	2
TOTAL (maximum = 25)			16	15	20	23

IF THE TOTAL IS LESS THAN 10, PROJECT MANAGER MAY REJECT THE REMEDIAL ALTERNATIVE FROM FURTHER CONSIDERATION.

2. IMPLEMENTABILITY
(Maximum Score = 15)

Analysis Factor	Basis for Evaluation	Weight	Alternatives 1	2	3	4
1. Technical Feasibility a. Ability to construct technology.	i. Not difficult to construct. No uncertainties in construction.	3	3		3	
	ii. Somewhat difficult to construct. No uncertainties in construction.	2		2		2
	iii. Very difficult to construct and/or significant uncertainties in construction.	1				
b. Reliability of technology.	i. Very reliable in meeting the specified process efficiencies or performance goals.	3			3	3
	ii. Somewhat reliable in meeting the specified process efficiencies or performance goals.	2	2	2		
c. Schedule of delays due to technical problems.	i. Unlikely	2	2			
	ii. Somewhat likely	1		1	1	1
d. Need of undertaking additional remedial action, if necessary. **Subtotal (maximum =10)**	i. No future remedial actions may be anticipated.	2	2			
	ii. Some future remedial actions may be necessary.	1		1	1	1
2. Administrative Feasibility a. Coordination with other agencies. **Subtotal (maximum = 2)**	i. Minimal coordination is required.	2	2			
	ii. Required coordination is normal.	1		1	1	1
	ii. Extensive Coordination is required.	0				
3. Availability of Services and Materials a. Availability of prospective technologies.	i. Are technologies under consideration generally commercially available for the site-specific application?	Yes ___ 1 No ___ 0	1	1	1	1
	ii. Will more than one vendor be available to provide a competitive bid?	Yes ___ 1 No ___ 0	1	1	1	1
b. Availability of necessary equipment and specialists. **Subtotal (maximum = 3)**	i. Additional equipment and specialists may be available without significant delay.	Yes ___ 1 No ___ 0	1	1	1	1
TOTAL (maximum = 15)			13	10	13	12

IF THE TOTAL IS LESS THAN 8, PROJECT MANAGER MAY REJECT THE REMEDIAL ALTERNATIVE FROM FURTHER CONSIDERATION.

TAGM TABLES 5.2 TO 5.7
1. COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE NEW YORK STATE STANDARDS CRITERIA AND GUIDELINES (SCGs)
(Relative Weight = 10)

ALTERNATIVE 1 : NO ACTION
ALTERNATIVE 2 : CAP IN PLACE
ALTERNATIVE 3 : EXCAVATION / OFF SITE DISPOSAL
ALTERNATIVE 4 : EXCAVATION / TREATMENT ON SITE

			Alternatives			
Analysis Factor	**Basis for Evaluation**	**Weight**	1	2	3	4
1. Compliance with chemical-specific SCGs	Meets chemical specific SCGs such as groundwater standards.	Yes ___ 4 No ___ 0	0	4	4	4
2. Compliance with action-specific SCGs.	Meets SCGs such as technology standards for incineration or landfill.	Yes ___ 3 No ___ 0	3	3	3	3
3. Compliance with location-specific SCGs.	Meets location-specific SCGs such as Freshwater Wetlands Act.	Yes ___ 3 No ___ 0	3	3	3	3
TOTAL (maximum = 10)			6	10	10	10

2. PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT
(Relative Weight = 20)

ALTERNATIVE 1 : NO ACTION
ALTERNATIVE 2 : CAP IN PLACE
ALTERNATIVE 3 : EXCAVATION / OFF SITE DISPOSAL
ALTERNATIVE 4 : EXCAVATION / TREATMENT ON SITE

Analysis Factor	Basis for Evaluation	Weight	Alternatives 1	2	3	4
1. Use of the site after remediation.	Unrestricted use of the land and water. **(If answer is yes, go to the end of the Table.)**	Yes ___ 20 No ___ 0	0	0	20	0
2. Human health and the environment exposure after the remediation.	i. Is the exposure to contaminants via air route acceptable?	Yes ___ 3 No ___ 0	3	3		3
	ii. Is the exposure to contaminants via groundwater/surface water acceptable?	Yes ___ 4 No ___ 0	4	4		4
Subtotal (maximum = 10)	iii. Is the exposure to contaminants via sediments/soils acceptable?	Yes ___ 3 No ___ 0	0	3		3
3. Magnitude of residual public health risks after the remediation.	i. Health risk	≤1 in 1,000,000 ___ 5 ≤1 in 1,000,000 ___ 2	5	5		5
Subtotal (maximum = 5)						
4. Magnitude of residual environmental risks after the remediation.	i. Less than acceptable	___ 5		5		5
	ii. Slightly greater than acceptable	___ 3				
	iii. Significant risk still exists	___ 0	0			
Subtotal (maximum = 5)						
TOTAL (maximum = 20)			11	20	20	20

3. SHORT-TERM EFFECTIVENESS
Relative Weight = 10)

ALTERNATIVE 1 : NO ACTION
ALTERNATIVE 2 : CAP IN PLACE
ALTERNATIVE 3 : EXCAVATION / OFF SITE DISPOSAL
ALTERNATIVE 4 : EXCAVATION / TREATMENT ON SITE

Analysis Factor	Basis for Evaluation	Weight	Alternatives 1	2	3	4
1. Protection of community during remedial actions.	- Are there significant short-term risks to the community that must be addressed? **(If answer is no, go to Factor 2.)**	Yes ___ 0 No ___ 4	4	0	0	0
	- Can the risk be easily controlled?	Yes ___ 1 No ___ 0		1	1	1
Subtotal (maximum = 4)	- Does the mitigative effort to control risk impact the community life-style?	Yes ___ 0 No ___ 2		2	2	2
2. Environmental Impacts-Are there significant short-term risks to the environment that must be addressed? **(If answer is no, go to Factor 3.)**	- Are there significant short-term risks to the environment that must be addressed? **(If answer is no, go to Factor 3.)**	Yes ___ 0 No ___ 4	4	0	0	0
Subtotal (maximum = 4)	- Are the available mitigative measures reliable to minimize potential impacts?	Yes ___ 3 No ___ 0		3	3	3
3. Time to implement the remedy.	- What is the required time to implement the remedy?	≤ 2 yr. __ 1 > 2 yr. __ 0	1	1	1	1
Subtotal (maximum = 2)	- Required duration of the mitigative effort to control short-term risk.	≤ 2 yr. __ 1 > 2 yr. __ 0	1	1	1	1
TOTAL (maximum = 10)			10	8	8	8

4. LONG-TERM EFFECTIVENESS AND PERMANENCE
Relative Weight = 15)

ALTERNATIVE 1 : NO ACTION
ALTERNATIVE 2 : CAP IN PLACE
ALTERNATIVE 3 : EXCAVATION / OFF SITE DISPOSAL
ALTERNATIVE 4 : EXCAVATION / TREATMENT ON SITE

Analysis Factor	Basis for Evaluation	Weight	Alternatives			
			1	2	3	4
1. On-site or off-site treatment or land disposal. **Subtotal (maximum = 3)** * treatment is defined as destruction or separation/ treatment or solidification/ chemical fixation of inorganic wastes.	- On-site treatment *	3				3
	- Off-site treatment *	1			0	
	- On-site or off-site land disposal	0				
2. Permanence of the remedial alternative. **Subtotal (maximum = 3)**	- Will the remedy be classified as permanent in accordance with Section 2.1(a), (b), or (c). **(If answer is yes, go to Factor 4.)**	Yes ___ 3 No ___ 0	0	0	0	3
3. Lifetime of remedial actions. **Subtotal (maximum = 3)**	- Expected lifetime or duration of effectiveness of the remedy.	25-30 yr __3 20-25 yr __2 15-20 yr __1 < 15 yr __0	0	3	3	
4. Quantity and nature of waste or residual left at the site after remediation. **Subtotal (maximum = 5)**	i. Quantity of untreated hazardous waste left at the site.	None ___ 3 ≤25% ___ 2 25-50% __ 1 ≥50% ___ 0	0	0	3	3
	ii. Is there treated residual left at the site? **(If answer is no, go to Factor 5.)**	Yes ___ 0 No ___ 2	0	2	2	0
	iii. Is the treated residual toxic?	Yes ___ 0 No ___ 1	0			1
	iv. Is the treated residual mobile?	Yes ___ 0 No ___ 1	0			1

4. LONG-TERM EFFECTIVENESS AND PERMANENCE (CONT.)
Relative Weight = 15)

Analysis Factor	Basis for Evaluation	Weight	Alternatives 1	2	3	4
5. Adequacy and reliability of controls.	i. Operation and maintenance required for a period of:	< 5 yr __ 1 > 5 yr __ 0	1	0	1	1
	ii. Are environmental controls required as a part of the remedy to handle potential problems? **(If answer is no, go to "iv".)**	Yes ___ 0 No __ 1	1	1	0	0
Subtotal (maximum = 4)	iii. Degree of confidence that controls can adequately handle potential problems.	Moderate to very confident __ 1 Somewhat to not confident __ 0				1
	iv. Relative degree of long-term monitoring required **compare with other remedial alternatives).**	Minimum __ 2 Moderate __ 1 Extensive __ 0	2	1	2	2
TOTAL (maximum = 15)			4	7	12	15

5. REDUCTION OF TOXICITY, MOBILITY OR VOLUME

Relative Weight = 15)

ALTERNATIVE 1 : NO ACTION
ALTERNATIVE 2 : CAP IN PLACE
ALTERNATIVE 3 : EXCAVATION / OFF SITE DISPOSAL
ALTERNATIVE 4 : EXCAVATION / TREATMENT ON SITE

Analysis Factor	Basis for Evaluation	Weight	Alternatives 1	2	3	4
1. Volume of hazardous waste reduced (reduction in volume or toxicity). **If Factor 1 is not applicable, go to Factor 2.**	i. Quantity of hazardous waste destroyed or treated. **Immobilization technologies do not score under Factor 1.**	99-100% __ 8 90-99% __ 7 80-90% __ 6 60-80% __ 4 40-60% __ 2 20-40% __ 1 < 20% __ 0				7
Subtotal (maximum = 10) **If subtotal = 10, go to Factor 3**	ii. Are there untreated or concentrated hazardous waste produced as a result of (i)? **If answer is no, go to Factor 2.**	Yes ___ 0 No ___ 2		0 2	0 2	0
	iii. After remediation, how is the untreated, residual hazardous waste material disposed?	Off-site land disposal __ 0 On-site land disposal __ 1 Off-site destruction or treatment __ 2				2
2. Reduction in mobility of hazardous waste.	i. Quality of Available Waste Immobilized After Destruction/Treatment	90-100% __2 60-90% __1 <60% __0		2	2	2
Subtotal (maximum = 5)	ii. Method of Immobilization - Reduced mobility by containment - Reduced mobility by alternative treatment technologies.	___ 0 ___ 3		0	0	3
3. Irreversibility of the destruction or treatment or immobilization of hazardous waste.	Completely irreversible Irreversible for most of the hazardous waste constituents. Irreversible for only some of the hazardous waste constituents. Reversible for most of the hazardous wastes constituents.	___ 5 ___ 3 ___ 2 ___ 0		0	5	5
Subtotal (maximum = 5)						
TOTAL (maximum = 15)			0	4	9	15

7. COST
(Relative Weight = 15)

ALTERNATIVE 1 : NO ACTION
ALTERNATIVE 2 : CAP IN PLACE
ALTERNATIVE 3 : EXCAVATION / OFF SITE DISPOSAL
ALTERNATIVE 4 : EXCAVATION / TREATMENT ON SITE

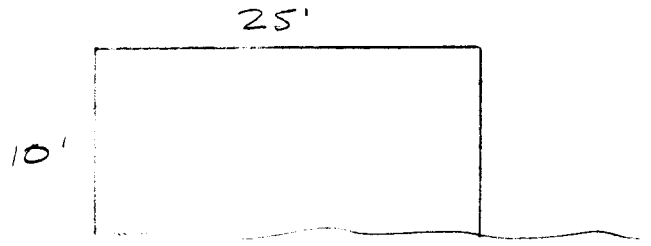
			Alternatives			
Factor	**Basis for Evaluation**	**Weight**	1	2	3	4
Overall Cost **(Maximum = 15)**	Scored on a linear scale with 0 and 15 assigned to the highest and the least cost alternatives respectively.	Lowest - 15 to Highest - 0	15	1	5	5
TOTAL SCORE			60	61	77	85

APPENDIX D

Calculations of Remedial Cost Estimates

BOOTH OIL SITE

APPROXIMATE AREA TO BE REMEDIATED:



AREA: $10' \times 25' = 250\ FT^2$

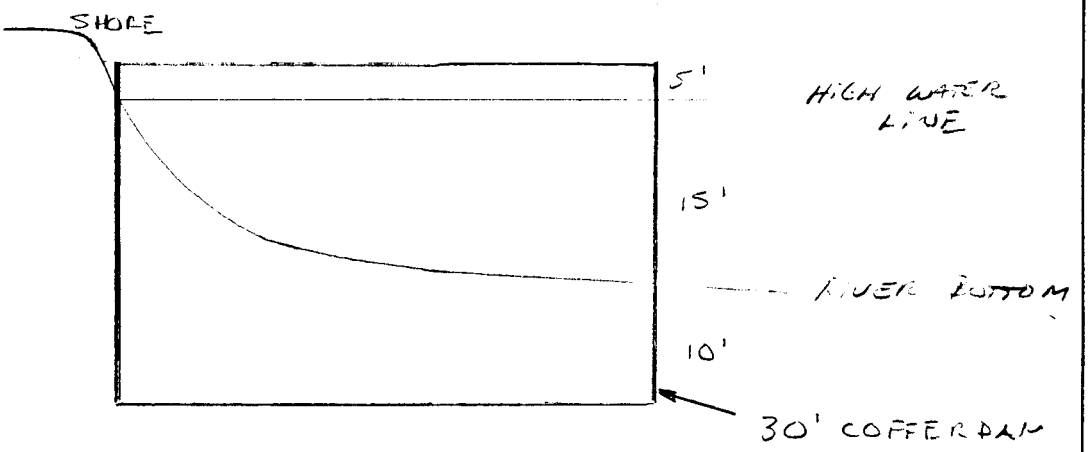
VOLUME: $250\ FT^2 \times 0.5\ FT = 125\ CU\ FT.$

$125\ CU\ FT \times \frac{CU\ YD}{27\ CU\ FT} = 5\ CU\ YD.$

SAY 5 TO 10 CU. YDS. OF MATERIAL

1.	COFFERDAM	BOOTH OIL SITE	COST DATA

A. DIAGRAM



B. QUANTITY OF COFFERDAM:

REMEDIAL AREA 10'x25'

COFFERDAM LENGTH 2x15' + 30' = 60 FT

COFFERDAM REQUIRED (SQ. FT.) 30'x60' = 1800 SQFT

C. COST:

(i) (FROM '93 MEANS, PG 33, 204-0010)

PRICE: $ 9.55 / SQ FT FOR MATERIALS

X 2 = 19.10 / SQ FT DUE TO STRONG RIVER CURRENTS AND HIGHER PRICE ON SMALL JOB.

COST = $ 19.10 / SQ. FT x 1800 SQ. FT = $34,380.00

(ii) LABOR AND EQUIPMENT FOR CREW B-40 FOR 3 DAYS WORK / 2 DAYS INSTALLATION AND / DEMOB INCLUDING MOBILIZATION AND DEMOBILIZATION.

$4354 / DAY x 3 DAYS = $13062

TOTAL COSTS 34,380 + 13062 = $47442

C.	DROP STONE	BOOTH OIL SITE	COST DATA

A. QUANTITY OF STONE:

QUANTITY = REMEDIAL AREA = 15' x 30' , 1 FT DEEP CAP

= 450 FT^2,

= 50 SQ. YD.

B. COST:

(FROM '93 MEANS, PG 119, R-0000)

(i) MATERIALS

RATE: $23.00 / SQ YARD FOR 12" DEEP CAISSONS STONE FILLED, MATERIALS ONLY.

COST = $23.00/SQ YD x 50 SQ YD = $1150.00

(ii) EQUIPMENT AND LABOR:

BECAUSE THIS WORK INVOLVES A RIVER BED TWO WORKDAYS IS CONSIDERED TO BE NECESSARY AND AN ADDITIONAL CREW FOR STONE MANAGEMENT ON THE SHORE (CREW B-9).

CREW C-17: $2299.50/DAY x 2 DAYS = $4600

CREW B-9: $3434.35/DAY x 2 DAYS = $6869

(MINUS THE CRANE & OP.)

$5734.15/DAY x 2 DAYS = $11 469

(iii) TOTAL COST: MAT'L + EQUIP & LABOR.

1150.00 + 11 469.00 = $12 619

A) QUANTITY OF GROUT.

QUANTITY = PLANAR AREA × 0.5 FT

= 450 SQ FT × 0.5 FT

= 225 CU.FT.

B) COST:

(FROM '93 MEANS, pg 45, #08-0400/0500)

(1) AVG. PRICE FOR BASE MATERIALS, NO EQUIPMENT IS 19.20 + 36.50/2 = $27.95/CU.FT.

COST = $27.95/CU.FT × 225 CU.FT = $6266

4.) WATER TREATMENT:
TO TREAT REMAINING WATER IN CLOSE CONTACT WITH SEDIMENTS DURING DE-WATERING.

WATER VOLUME = 1 FT DEEP × AREA

= 1 FT × 450 FT²

= 450 FT³ × 7.48 GAL/1 FT³

= 3366 GALS

TREATMENT: 3366 GAL × $0.20/GAL = $673

5. EXCAVATION / TRANSPORTATION	BOOTH AVE SITE	COST DATA

A. VOLUME OF SEDIMENT:

$0.5\ FT \times AREA = 0.5\ FT \times 250\ FT^2$

$= 125\ FT^3 \quad \frac{CU\ YD}{27\ FT^3}$

$= 5\ CU.YD.$

SAY MAX 10 CU. YD.

B. COST

ASSUME TWO DAYS TO PERFORM WORK WITH CREWS B-12I (EXCAVATION) AND B-16 (TRANSPORTATION).

B-12I $ 1052.55/DAY X 2 DAYS = $ 2105.10

B-16 $ 1388.20/DAY X 2 DAYS = $ 2776.40

$ 2440.75 $ 4881.50

SAY $5000

6) DEWATERING EXCAVATED SEDIMENTS (PRE-TREATMENT):

ADD CEMENT TO SEDIMENTS:

A) QUANTITY = REMEDIAL AREA = $250\ FT^2 / \frac{YD^2}{9\ FT^2}$

$= 27\ SQ.YD.$

B) COST (FROM '93 MEANS, Pg 45, 412-1020)

PRICE FOR 4% CEMENT 6" DEEP = $5.95/SQ YD.

X 2 DUE TO SMALL JOB = 11.90/SQ YD.

COST = $11.90/SQ.YD X 27 SQ.YD

= $320

TREATMENT OF SEDIMENTS ON-SITE UTILIZING TREATMENT METHOD USED FOR FULL SITE REMEDIATION.

TREATMENT COSTS FROM FS REPORT:

$100 - $225 / CU YD

COST =

$100 - 225 / CU YD × 10 CU YD

= $1000 - $2250

SAY $2250

8) OFF-SITE DISPOSAL:
$250.00 / CU YD TAKEN FROM JULY 1991 CHEM WASTE MANAGEMENT COST DATA FOR PCB/TOXIC SOILS.

9) OPERATION AND MAINTENANCE (O&M):

i) O&M WOULD BE REQUIRED FOR CAPPING IN PLACE ONLY AND WOULD INVOLVE INSPECTION AND MONITORING YEARLY. IT IS ASSUMED THAT INSPECTION/MONITORING WILL BE PERFORMED BY 2 PERSONS AND 2 SAMPLES WOULD BE COLLECTED AND ANALYZED FOR PCBs.

COST:

FIELDWORK	2 PERSONS × $25/hr × 8 hr	=	$400
ADMINISTRATIVE	2 PERSONS × $25/hr × 12 hrs	=	$600
ANALYSIS	2 SAMPLES × $250	=	$500
			$1500

ii) PRESENT WORTH:

$$P.W. = R \frac{1-(1+i)^{-n}}{i} \qquad i = 10\% \quad n = 30 \text{ YEARS}$$

$$= 1500 \frac{1-(1+0.1)^{-30}}{0.1}$$

$$= 1500 \times 9.42 = \$14130$$