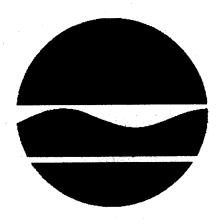
REMEDIAL INVESTIGATION and FEASIBILITY STUDY for

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)



Reported By:

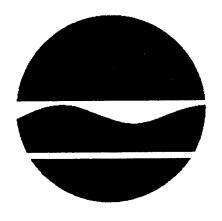
New York State Department of Environmental Conservation Division of Hazardous Waste Remediation

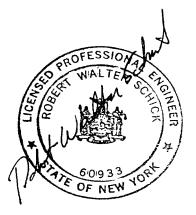
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PART I REMEDIAL INVESTIGATION

BACKGROUND:

The Booth Oil inactive hazardous waste site is located at 76 Robinson Street in the City of North ionawanda. 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 <u>Total</u>	Concentration (ppm) <u>LR1</u>	Concentration (ppm) <u>LR2</u>
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 Containment Technologies:	Sediment Excavation
	- 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. <u>Identification and Screening of Remedial Technologies:</u>

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. <u>Definition of Remedial Action Alternatives and Initial Screening of Alternatives:</u>

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.

<u>ALTERNATIVE 2</u>: 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.

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

<u>ALTERNATIVE 4</u>: 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. <u>Compliance with Applicable Standards, Criteria, and Guidelines (SCGs)</u>. Compliance with SCGs address whether or not a remedy will meet applicable environmental laws, regulations, standards or guidance.
- 2. <u>Protection of Human Health and the Environment</u>. This criterion is an overall assessment of protection based on a composite of all the other evaluation criteria.
- 3. <u>Short-Term Impacts and Effectiveness</u>. The adverse impacts to the community, remedial workers and the environment resulting from the implementation of each remedy are compared.

- 4. <u>Long-Term Effectiveness and Permanence</u>. 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. <u>Implementability</u>. This criterion compares to the technical and administrative difficulties in implementing each alternative.
- 7. <u>Cost.</u> 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	o	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. <u>Individual Analysis of Alternatives</u>:

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. <u>Comparison of Alternatives</u>:

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.

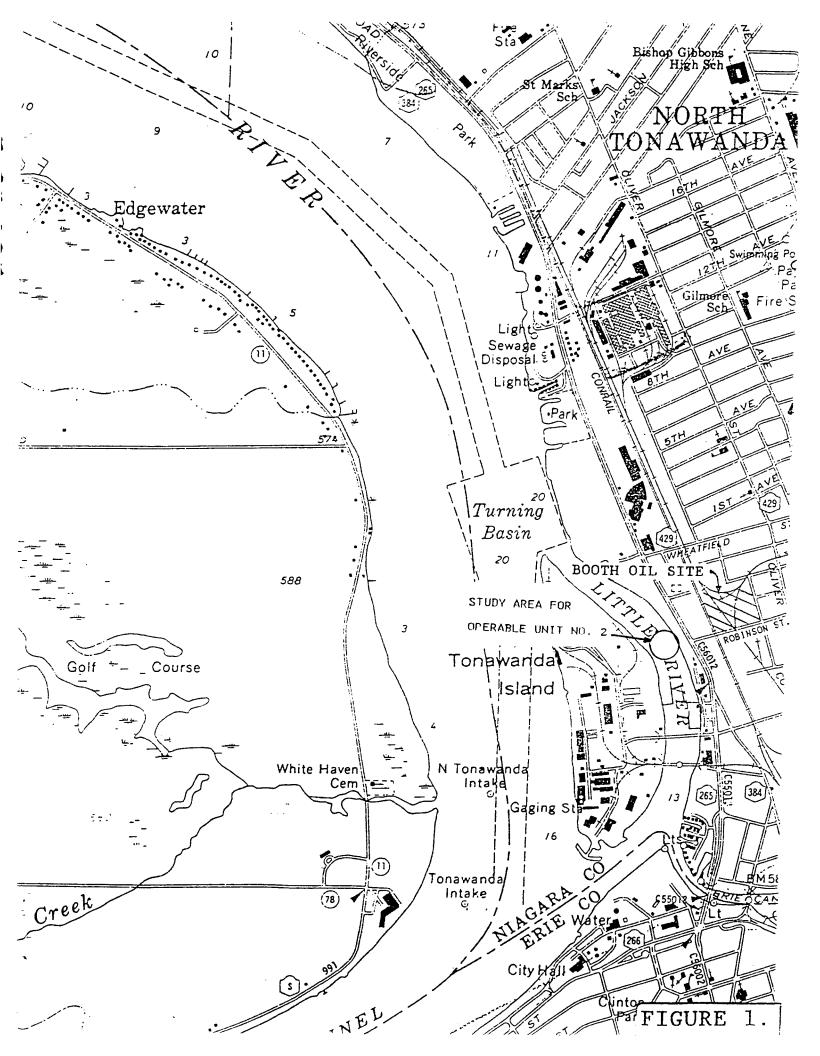
The primary characteristics of this remedy is excavation followed by on-site treatment. A more cost effective means of excavation, such as dredging which would not require a cofferdam, will be evaluated during design. Utilization of a cofferdam was used in this FS for cost estimation because a cofferdam 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.

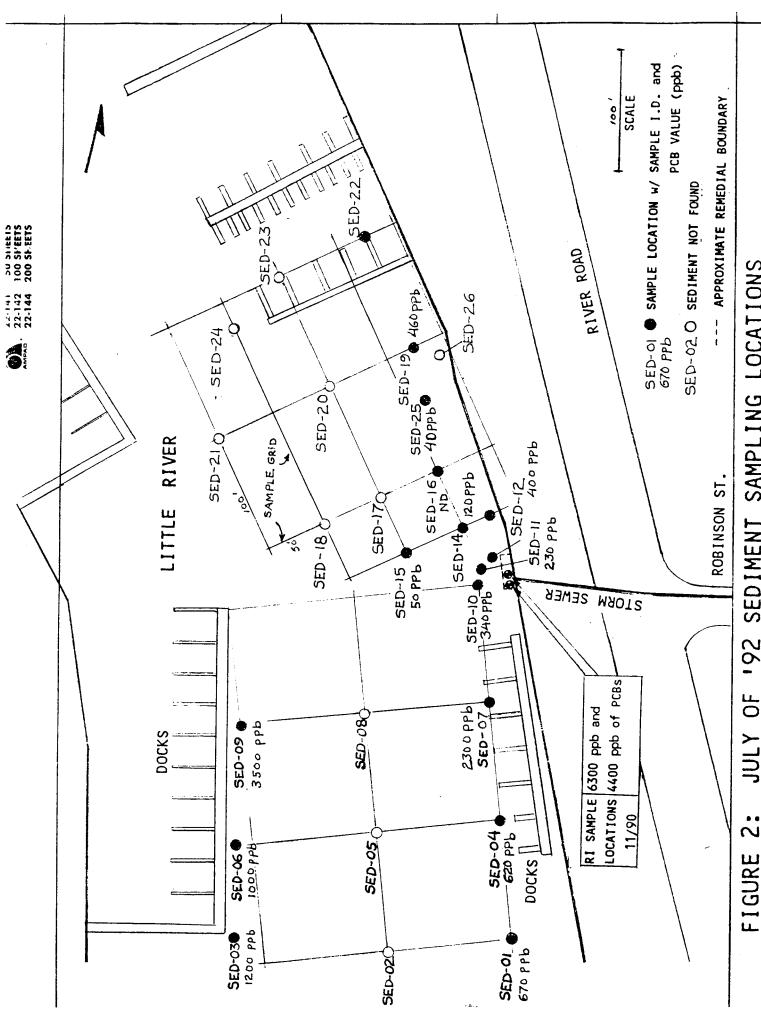
The sediment volume requiring remediation is estimated at 5 to 10 cubic yards. This remedial area will be further defined during design and/or remediation and will be based on exit sampling and visual inspection to remove all oily-type sediments in the vicinity of the outfall.

TABLE 4.

ESTIMATED COSTS FOR REMEDIAL ALTERNATIVES

ITEM/DESCRIPTION	<u> </u>				ALI	ALTERNATIVE			
			NO ACTION	CAP IN	CAP IN PLACE	EXCAVATE/0FF	E/0FF	EXCAVA	EXCAVATE/ ON
	UNIT	cos1/				SITE DISPOSAL	SPOSAL	SITE T	TREATMENT
		UNIT (\$)	COST (\$)	aty	COST (\$)	QTY	(\$) ISOO	QTY	(\$) ISOO
COFFERDAM: MATERIALS	SO.FT.	19.10	0	1800	34380	1800	34380	1800	34380
LABOR & EQUIP.	DAY	4324	0	٣	13062	М	13062	M	13062
WATER TREATMENT	GAL	07.0	0	3366	673	3366	673	3366	673
	SQ.YD.	23.00	0	20	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	9929	0	0	0	0
EXCAVATION/TRANS.	DAY	2440.00	0	0	0	2	4880	2	4880
TS	Sq.YD.	11.90	0	•	0	27	321	27	321
SEDIMENT TREATMENT	CU.YD.	225.00	0	0	0	0	0	5	2250
OFF SITE DISPOSAL	cu.YD.	250.00	0	0	0	0	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 ORM (10% OVER 30 YEARS)			14140		14140		0		0
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TOTAL COST \$			14140		121343		89306		88906
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SEDIMENT SAMPLING LOCATIONS AND PROPOSED REMEDIAL ROLLINDARY JULY OF 192

APPENDIX A

Analytical Data Sheets

HER YEAR PARTHERNING OF ENGLANDING TACES FOR HER BUTTON HER BUTTON BUTTO

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OBUBLIS NOBER: FLINY MATERIAL WEIGHT WEIGHT

AF 2012年 1月1日

BOTA LEADER DE DE PARA LEAGUE DE TERMENTE DE TERMENTE LE TRES DE TRES

MARS REQUESTED RESULTS: NO.

**** PHUELUE - 122 ****

WAS THROMAIC BRADE BESUL S: NA OFTEDIEN LIMIT IND TRAKE

Mede Selfurgumenter beamines: Nic

**** WHENCE - 1237 ****

BAS CHESMACUSERAPH RESPUTE: NA DETECTION LIMIT 120 USZKG

Mass set laumeler Respects: MD

**** 45 47 47 *****

Set (HYOTA) DEMARM MESULTS: NA DETECTION LIMIT 120 LGZKG

make Settlementer Atoms to 40 Decks

**** ARCOLOR - 1248 ****

CAS HE MAINTÉAER RESIDAS: MA DETECTION LIMIT 1911 UN RG

ME 3 SEELEM PESULIS: NO

\$2000 ()F = 30564 ****

GAS (HEGDIA CONRESHE RESOLTS: NA GETECHTUN LIMIT TYN GERAG

MASS SEEDIEDIE ER HESDIELE MO

**** APROLING - 1954 ****

Die Jebborophichae egen jet No gelefilme film ich finskä

THE PROPERTY ASSESSMENT OF THE PROPERTY OF THE

High Labersening defending and expended in Aff Defix West and Laboration (Research Alberta) and the Market Affect and the Market Aff

马拉斯 电部路线 电镀铁电流电镀

erse joer Hingha

| 第299年|| 東京大学 | 1982年|| 1992年| 1994年 | 1994年 |

TOTAL PROJECT MEDICAL AND SELECTION OF CONTRACTORS AND THE TRACTORS AND THE CONTRACTORS AND THE CONTRACTOR

ORDERS SUBBRE RECENT MARKET SERVICE SERVICES

新子典的 3.更多的 4.新见的 2.说:"我说我的人们的是一种,我们就是一种,我们就是一种,我们就是一种,我们的一个,我们就会一个一个,我们的一个一个一个一个

**** AF IELDE - 1016 - ****

BASE LEET MATCH PARK REPORTE: DRIVE THE CHIEF LITTLE LITTLE (1911) 12 FOR WAY

MARS SELECTED FOR BEHALTS: NO

**** 222 ****

SAR CHROMATO PRAPER RESULTS: NA OFTECTION LIMIT TO TRAKE

MARS SHEET TRUMP THE RESIDENCE MEET

**** WHE(H)/CIE - 1237

5/45 CHECKIA COSEACH RESIDENCE: NA DETECTION L (MIT 120 USZKG

MARS RESUMETER SERVICE: MD

SAR CHROMAGOGRAPH RESULTS: MA CETECTION LIMIT 120 LOZKG

mass sestimenter essimils: 40 duzku

**** ARCCLOF - 1248 ****

KAS HER MAIDURAGE RESIDES: NA DETECTION LIMIT 150 DE EG

MACH SERFICIEL SELECTION NO.

+*** 6200 (F = 1054 ****

GRA (HEDDAGUNGRAFH RESULTS: NA LETECTION LIMIT INFORES

mass seedlegueles essible: No

- **** A-001016 - 12-0 - +***

CAR THE CONTROL PART FOR THE TOTAL THE THE LIMIT TOU UNKE

maga abadirimgira agadela: NO

THE VIEW STATE REPORT HAT THE EURO HOMOSTING (COMPENS) HAD THE EURO HOMOSTING VEHS

STOR NAME: HIELE COL

A THE CODE: MAY AM

Skimm的に対しており世界を展す。 ケラダイダイグ・アンディー (1997年 1997年 1997年

你有一个都是一句是我,我没有这种的一个一个有一个一个的一个的一个一个一个一个一个一个

មាន ទាក់ស្រាស់ ស្រុសស្ត្រីសំពេស មានសមាស្រីសាស នេះ នេះ នេះ ស្រាស់ ស្រុសសមាន សមានសម្រេច សមានមានសមាន មាន នេះ នេះ ន

**** AFTEN FOR A 1838 A ***

DAS CHERMOTOR AREA SESULIS DA LA LA FINALI DO LACITA LOS UNIONALES

Marks Resulted metal sees that

**** AROULDE - 3777 ****

GAR (FRUMA) UNROPH RÉSULTS: DA (ETECTION LIMIT) UL DEZKI.

MASS SHOUTHOMETER RESULTS: NO

**** ARU(_OR = 1230 ****

GAR CHROMATOLRAPH RESULTS: NA DETECTION LIMIT 178 UG/KG

MASS SPECIFICMETER RESULTS: NO

**** ARUDIOH - 1245 ****

GAS CHROMATOCHAPH RESULTS: NA DETECTION LIMIT 190 USZKI

MINSS SPECIFICATER PESULTS: 440 HEARL

**** ARBELOR - 1248 ****

BAS CHPUMA LUSBARE RESULTS: NA LETEULTEN LIMIT 170 LIBURG

MASS SPECIROMETER RESULTS: NO

**** ASULLOR = 1284 ****

GAS CHROMATOSRAPH RESULTS: NA DETECTION LIMIT 178 LGZKS

MARK SHEFFER RESIDENCE: No. 1

**** ARCELLIB = 125H ****

BAS CHROMOTOSHARA BEST. TS: DRIECTION LIMIT 120 UBJKG

MASS SPECIALMETER PERULIS: NO

지하는 사용하는 등 사용하는 사람들은 사용하는 하는 사용하는 사용하는 사용하는 수 있는 것이다. 등 등 등 기를 하는 사용하는 사용하는 사용하는 사용하는 기를 하는 것이다.

Eight English English to the

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MAMBOR MORNING, PRINCIPLING OF BUILDING BUILDING

TWO HE WAS BOUNDED TO AND AREAS ON FILTRE GRADE.

全方面的影响性的影响是有效者。 **"解源的,每句情能特**" 例 短期**的,林**。

USA CHRIMATOLEREE PESUL'S: LA TERETINATIMATIMATIAN USAUS

MARK SHEDTHUMETER RESULTS: NO.

**** ARCCLOR - 1221 ****

CAS CHROMATUREARH RESULTS: NA DETECTION LIMIT 190 USZKO

mass specialmeter besults: NO

**** ARUDLOR - 1232 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 170 UG/KG

MASS SPECIROMETER RESULTS: NO

**** AHUILUR - 1242 ****

WAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UGZKG

MARS SPECTROMETER RESULTS: NU

**** AR 300 0R = 1248 ****

GAS LHPOMATORRAFH RESULTS: NA DESECTION LIMIT 120 UHZKĞ

MORE SPECIFFUMFIER RESULTS: NO

HAS CHRUMATOGRAPH RESULTS: NA LETETICA (MM) 128 USZKU

MASS SPECIROMETER RESULIS: ND

THAS LEMBMATOGRAPH MESULIS: NA DETELLION LIMIT 120 US/CG

MASS SERECHBER 188 RESIDENCE

THE YORK STATE OF FARMING OF FROM BURNEAU STATE WHITE MADE AND FOR A STATE OF THE PROPERTY OF

SIDE MARKS HOUSE USE

美工程 医抗性性 医大型 化抗

Sec Fit E - 14 的 1985年 - 1997年 - 1997

CHART ENDER OUR DE LE L'ARTICLE : L'ARTICLE DE L'ARTICLE

ARCHIE GUMBER: PY1325 MATELIE REDIMENT : SOLID: NO

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**** UHUETUR = 10 9 ****

SEAS CHROMOROUGHANNER RESULTS: UR (RITEDITION COMPANIED TO UN TAIL

MARK SHROTHOMETER RESULTS: NO

**** ARDIOLOR = 1221 ****

THE CHRUMATURRARM RESULTS: NA DETECTION LIMIT 178 WEAKS

THERE SEEDINGHED PROUBLE: NO

HARDELER - LIBR

NAS CHRUMATOGRAPH RESULTS: DA DETECTION LIMIT 175 UGVAG

MASS SHEDIHUMETER RESULTS: NO

SAS CHRUMATOSHAPH RESULTS: NA DETECTION _]MIT :// US//S

MASA SEED POMETER RESULTS: EU UNIXA

**** ARUCLUR - 1248 ****

WAS CHROMOTOWHAFH RESULTS: NA DETECTION LIMIT I'M USOKO

MARS REEDIRUMETER RESULTS: 10)

**** 角兒(扎工)胎 = 3.754 ****

GAS THRUMATURABH RESULTS: NA DETECTION COMPT ON CONTRACT

MARK SPECIFONELER RESIDENCE: NO.

PAS CHANNA COMPARA PARA TREE NO. 100 DECENTION LONG 120 DECKS.

TO AND THE STREET HER HELD IN THE STREET

HOTE BANGS HINGE DIL

ម រាម ស្ស e: មក្សាថា ស

Switter Franchister (1975) Sept. 1986 French (1976) Sept. 1986

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UNE CHECKMONIN SHEE BESUITS IN INC. THE TORK CONTINUE ON

MARS REPUTATIONS FOR RES LIST. 40

**** 6.8(到现的第三分类)

GRA (ERUMA)UNACHE RESULIS: NA (ElECTION LIMOT I U USAKG

MASS SMEC. FORETER RESIDIES: NO

**** ARCIDE = 1230 ****

GAR CHROMATOCRAPH RESULTS: NA DETECTION CIMIT 120 UGZKG

MASS SPECIFICMETER RESULTS: NO

44** ARUDIOF - 1242 ****

GAS CHROMAICCHAPH RESULTS: NA DETECTION LIMIT 120 UGZKS

MINSS SAFETAUMETER PESULTS: 460 HISZKG

**** ARBELOR - 1248 ****

GAS CHRUMAI JORAPH RESULTS: NA GATEUTHIN LIMIT 170 UG/KA

MASS SHELTHOMETER RESULTS: NO

GAS CHROMATOGRAPH RESULTS: NA DETECTION CIMIT 120 UG/KG

make enflicted file belonger but

**** ARCCLUB - 125H ****

SAS CHROMOTOSMATH RESULTS: NA DETECTION LIMIT 120 UC/KG

MARS SPECIECUSTER PERULIS: NO

TO HOLE TABLE PROPERTY OF ENGINEERING COMESTICATIONS TO HOLE TABLEMENTER POR ACRESSES

Still NAME: BUILD Dis

多月茶题 前月午晚: 中人说:1500

CALLS BOOK UEON INCOMES ANALYSIS DECEMBED DESCRIBE

APCHINE TURBER: POSTON MAJEST, SHIPTER MAJEST MAJEST, NO. 1900

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4944 SERIO OF - 100A ****

HAS THE STATUSFARE BESINDS: NA DETECTION LIBIT 170 US MAG

MASS SEED ROPETER RESULTS: NO

**** ARDOLDR = 1221 ****

SAS CHRUMATOGRAPH RESULTS: NA DETECTION (IMIT 198 WAZNG

mass sescrationares Pasibles: No

**** ARCCLOR - 1232 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UNZKA

MARS SHEDTRUMETER HESULIS: NO

**** ARBITOR = 1747 ****

GAS CHRUMAT(CRAPH RESULTS: NA DETECTION LIMIT 120 GARG

MASS SPECIROMETER RESULTS: ASU USZKS

**** ARCULOR - 1248 ****

GAS CHECMATOGRAPH RESULTS: NA DEJECTION LIMIT 12 CUGAKG

MARS SPECIFORETER PESULTS: NO

**** ARUUTIR - 1264 ****

GAS CHROMATOGRAPH RESULTS: NA OF ECTION LIMIT 100 GS/KG

MASS SHECTROMETER RESIDES: NO.

NAS CHEUMA CONPARE RESIDENTS: DA CETECTICA LIMIT 120 DOURS

MARKS SERVITERINETER RESIDITS: 140

NEW YORK STATE TERREPORT OF ENUIRMENTAL CURSERVALIDA MORRES LASSES PARAMENTAL AND VALUE TO SERVICE PROPERTIES

SITE NAME: BUD H OIL

名目長 (CE)床: 至5次年的。

SAMPLE (MIMPER: 897-213-97) - FIELD IN: 8EN - 12-

DOTE PACE VENUE BOX30 MYD AMALYSIS CARE: 09/11/97

GREATH GUMBER: PYINZY MATRIX: SERIMENT % SQLID: WI

- (*** ABDILIE - 1(D6 ****

1998 THEODINATOR AREA BESTUMES AND THEODISTORY OF THE THEODISTORY OF THEODISTORY

MASH SHEETACMETER RESULTA: NO

**** ARU JUDE - 1291 ****

SAS JEROMA (GARARH RESULTS: NA DETECTION LIMIT 1/0 US/KG

MORE SEECIEUMETER RESULTS: NO

**** AROCLOR = 1232 ****

GAS CHEUMATUREAPH PESULTS: NA DETECTION LIMIT 120 UG/KG

MASS SPECIALMETER RESULTS: ND

**** ARTICLOP - 1942 ****

GAS (HROMA) CORRAPH RESULTS: NA DETECTION ()M:T :20 US/KS

MASS SPECIFORN "ER RESULTS: 400 UG/KG

**** ARSELUR - 1248 ****

Was terphatograph Risults: NA OffEltion Limit 12: UbikG

MASS APROTPOMETER RESULTS: NO

**** ARLCLOR = 1254 ****

643 CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 126 UBZKG

MASS SELECTIONS TER PEST, IS: NO

**** ARTOLAR = 1260 ****

KAS CHE MA CURRAPA RESOLTS: NA DETECTION LIMIT 120 UNZKO

MERS SPECIFICATION REPUBLIES: NO

PROFESSION OF TANDERS OF THE PROPERTY OF THE P

SIDE WARE: BOOK HOUSE

HITE th 电: 95% tab

SAMPLE NUMBER: MY 1-103 11 FIELD FO: SEL - 17

DATE RECEIPED: 62030/90 ANALYSIS DATE: 05, US. 40

ARCHAE MARK: BEDIMENT % AULIO: NO

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CAS THROUGH THROUGH HER BESTUDIES: THE TABLE (MIT 10.0 DECINO)

MARK SPECESTAR OF FRAUDISE. NO.

**** APPENDING = 17781 ****

SAS CHROMA CORAPH RESULTS: DA DESENTION : [MIT 196 DEVICE

MASS SPECIFIED SERVER SERVER TS: NO.

THE CHECKET PRECETS: NO LETERATE (1917 | 1918 KE

MARS RESUTERING FOR PERHOTS: 140

Service Held Community and American Service Community and the service of the property of the community and the

如海生化 医中间 医视频性多条环 异二氢铁 医囊炎 化二二二烷基胺 建筑工作化

***** 人名意格特 电电影交换器 人名英格兰

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 $W_{n} = \frac{1}{2} \left(\frac{1} \left(\frac{1}{2} \left(\frac{1}{2} \left(\frac{1}{2} \left(\frac{1}{2} \left(\frac{1}{2} \left(\frac{1}$

(1997년 - 1997년 - 1997

tors (HEUMATIACHARH FERMITS: NA OFTECTIOL(IMIT)?D (ASAKA)

CONSTRUCTED THE PROPERTY OF THE

MARK SPECIES FETER FREELIS: AND

PART AND STATES OF EPARTHEOT OF ENGINEERING WHAT CONSERVATIONS AND AND THE SAME AND ASSESSED.

SIDE TAME: WHITH DIE

表生()+ (1) (4) (4) (5) (5)

THE PRINCIPLE BOOKS ME. SHOWS PROPERTY (SHEET BROWNING)

estalus Nomasa: Pyrono maisio: Sannen % salup: No

ARREST CONTRACTOR SAFER

THE CHEEK COMMONER PERSON INC. 184 CONTRACTOR FOR THE POST IN 1845.

OBSES SHEET IN BOTHER FOR SUCH SEC. 1880.

多分离者 - 在中国人的时间,他们是自己的一个一个多年。

who (Bernsteinerer Bernstein Ba Delen jum 1991) 170 pg//g

to A SHEET STORT FOR BESIEF TEXT ME.

- * * * * * - AF 1/2/2 - 1/32 - * * * * * *

BAS DESIGN DISEASE SESTION (5: NA DETECTION LIMIT 1) BOUNCE

MARS SEFFICIALMETTA RESULTS: NO

GAS CHECKAICHEACH GESTLIS: DA DETECTION LIMIT 170 DGZKG

mass Sagrist males pasults: 340 lugzkG

**** ARCICLOR = 1248 ****

USS THE METOLEAPH RESULTS: NA DETECTION LIMIT 120 HOAKG

MAKS SPECIAUMETER RESULTS: ND

**** 科尼斯斯 1254 ****

SAR (AROMA)OSRAPH PESULIS: NA DETECTION LIMIT 170 USAGE

MARK SPECIFORMELE PERSON IS: NO.

**** ARICEUR - 1268 ****

UAS THRUMATURADER RESULTS. NA DETECTION (MIT 199 (BURG

THE S SHEETHOUSETER RESULTS: NO

THE VERY BIFIE DEPORTMENT OF ENUMERMENT DURING PROPERTY. MUSICAL CONTRACTORS FOR ANALYSIS.

SPE WME: WELL DE

等 【新 · 自然的语言》中国人自由的

HAMINER FORMEREN: PROPERTY OF THE ELECTRIC RELIGIOUS

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ARRON SERVICE MEDICAL TRANSPORT SERVICES (SEE SECTION 1997)

**** P# 1221 ****

MGS THE (MATCHEAPER RESULTS: LA DETECTION LIMIT 126 USAKS

CHASS SEED HIME TER RESULTED IN

**** AFOOLUR - 1232 ****

GAS CHEDMATHGRAPH RESULTS: NO DETECTION CIMIT 198 UNIVER

MORS SHEDIRUMETER MESHLIS: NO

**** 每尺拱头 自民 二 1/247 *****

GAS CHRUMATURARE RESULTS: NA DETECTION LIMIT 170 UG/KG

MARK SPECIALINETER BERUKTS: 3900 UNIVER

**** ARCULOR - 1248 ****

585 THROMATOLROPH RESULTS: NA DETELTION LIMIT 124 UNIVER

MARS SACCIRUMETER RESULTS: NO

**** APPLISH = 1754 ****

LOS (HEUMA)OCEARH R-SOLTS: NA DETECTION FIMIT 120 DEVIG

MASS SEEDI KIMSTEE BESILIS: 180

**** ARITELIA 1260 ****

CAS CHECHA (1999AFB B-S0119: NA DETELTION CIMIT 100 URVKG

MASS SPACIFORETER RESOLTS: NO

NEW TORK RIDGE DEFINE THE DESCRIPTION OF ELECTRONS OF THE STATE OF THE

Sire part: Sir H (H)

SEPTEMBER 1981

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· **** 网络红色 电 二、 等等 * *

NOS BERMAINICH ES ESBITTE DE MODE L'ETE COMPLIANTE DE MASSE

NOWS SE CIRCUFIER RESULTS: NO ADDITION

**** AP(N LOE = 192) ****

DAS DEFERRATORSANA PESULTS: NA DETECTION LIMIT 120 NG/KG

mass sectioners Pesults: NO

**** AF(1)L(PH = 3)/32 ****

CAS CHEDMA HERBARH RESULTS: NA DETECTION LIMIT 120 UNIXG

MARS SPECIFOMETER RESULTA: NO

**** (4800 OB = 3742 ****

GAS CHROMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UGZKS

MASS SEEDI-UMETER RESULTS: 23HD HGZKG

**** APGULOR - 1248 ****

KAS CHROMATUGROPH RESULTS: NA DETECTION LIMIT 120 UNIKG

mass serpialmeter results: ND

- 李承華等 - 在民(町) 日辰 - [1]野山 - 李季華等

KAS CHRIMA (URBARH RESULTS: NA DEJECTION LIMIT 100 URBARG

DESCRIPTION OF THE PROPERTY OF THE

**** 78日11年日 - 1250 ****

KAS DEROPATIONEDER RESULTS: NA DETECTION LIMIT 120 DEVICE.

MARS SPECIFORETER RESULTS: NO

- NEW YORK RIGHE (FRARIMENT OF ENGLAGRATING COMSFROATING) TOBLO LASCHATTRY PLS ADAL 519

Sile ware: Shoit On

ATTE COME POST

September 4: 992-213- 2 FiEtO 10: 8-6 - 95

CONTRACTOR OF THE CONTRACTOR AND AND THE TAX OF THE CONTRACTOR

WARRENT SEDIMENT % SOLIO: AC

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SAS CHRIMA PERAPER RESULTS: NA DETECTION LIBERAL

MONAS SEELIKOMETER HESELIKE: 141

**** ARUDIUR - 1021 ****

GAS CHROMATOGRAPH RESULTS: INA DETECTION LIMIT 100 DG/KG

MARK SPECIFIMETER REPUTE: NO

**** ARCCLUB = 1537 ****

6/5 CHRIMATOGRAPH REBUITS: NA DETECTION LIMIT 120 ULARI

MARS SPECIALWEITER PERMITS: NO

**** APPLEATER - 1842

FROM (MONOMATE REPORTED RESIDENCE NA DELE, THIN LIMIT 199 HG.// C

MUSE SPECIFIME EF BESUL'S: 1000 UGZKG

-**** AHQCLOR - 1948 ****

CAR THROMAN GURARM RESULTE: NO DETECTION LIMIT INT UNIVE

muse erectrometer RESULTS: MD

***** AHTELLIN = 1.754 ****

GAS CHRUMATORRAPH RESULTS: DA DETECTION LIMIT 170 USZKG

MORE SPECIFOREISK PRAUDISK NO.

GAS CHRUMATURKAPH BESULTS: NA DETECTION COME 120 CHZKI.

mees seedleareter results: No

NED YEEK STATE DEPARTMENT OF ELWIPHIMENTAL (UNSERVAL) IN MOBILS LARGER FOR ANALYSIS

SITE NATE: FORCE OFF

海上海 机分析: 57711111

BOMPL - MUMBER: PRINZ 4-18 FIFTD I : SEL - 14

CALS BELLETANED: TONOUNDER ON AMETRICAS (MOSE: TENDER ON

- PROPERTIES THE PROPERTY OF THE PROPERTY OF

APP DELINE = TUTE #***

TOS CHROMACOCRARA RESULTS: NA DETENTION COMPT 120 DE EL

MASE SPECIALMETER WESHLIS: NO

**** #FOREDER = 1201 ****

BAS CHRUMA COMARM RESULTS: NO DETECTION COMPT 170 UGZKS

MASS SPROTECTS THE RESULTS: NO

**** 68000000 = 1232 ****

GAR CHROMADUSHARH RESULTS: NA DETECTION LIMIT 120 UK KG

MUSA SPOCTACMETER RESULTS: NO

- * * * * - AR JOHN - 3 242 * * * * * * * *

GAS CHROMATUSVARR PERSONS: MA DESCRIPTION COURS OF

MARRY BREETERSHETER BREEDINGS: ACCUMENTED

**** AMOUNT OF - 1748 ****

LOG CHOMMATINGHER PARTIES. TO DATE OF SPECIAL COMMITTERS OF DE-

어리님은 동안된 기원(MSP) [유율 등문공원 (1941)

ARRA (LAND THE - TORC) ARRA

TO BE THE THIN LIMIT 128 BUSINESS

MONEY SHEWARD OF BROWN BROWN ME.

THE CENTRAL AND LEASED RESERVED TO THE CONTROL LAND THE CONTROL LAND TO THE CONTROL LAND THE CONTROL

MANN SHELLHOMETER PERULTS: NO

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多一点,1985年,在1985年中1985年中,1985年1985年(1985年) - 1985年 - 1

mers seechemente essum is: in

**** AHILLIH - 1 121 - ****

GSS CHPDMAT(GSSGPB RESULTS: NA CETECTION LIMIT 170 USZGC

MARY SEECIROME EE R BUILTS: NO

**** ARUCLOR - 1030 ****

SAS CHEUMATOGRAPH RESULTS: NA DETECTION LIMIT 120 UCIKG

MARKS SERICARIME FROM THE . NO.

**** ABOUNTE - 1949 - ****

COS CHROMOTOGRAPH PERGLIS: NA DETECTION LIMIT 120 DGZKG

MASS SHELLER MELLER RESIDETS: 1900 URZKE.

**** ABUULUR - 1248 ****

HAS THEIMACHBRORE RESULTS: NA DETERMICA LIMIT 128 NG MY

m AS SPACEROMETER RESULTS: NO

**** APTELLIN = 1284 ****

SKS CHROMF FÜSRAPH REPULTS: NA DEJELTION LIMIT 170 US KG

MASS SHECTSOMETHA RESULTS: NO

**** 6度以及11度 = 1968 ****

GAS CHARGE TOWARD PASCULS: NA GATEUTION LIMIT 110 USAGE

MORE SHEDIROFFIER RESULTS: NO

THE YORK RIGHT FRANCH OF ENUIRONMENTAL CONSERVATION MUSICE CARRESTORY POR ANALYSIS

SIS WARE: BOOTH OU

馬利特 自拉克斯 皇 经制度

MAMPLE NUMBER: PRZ-1:5/14 FIELD 10: SED - 11

DOTE RECEIVED: 07/3 /90 AMALYSIS (ATE: 09/08/99)

aBO HIVE NUMBER: PVI3:4 MAIRIX: SEDIMENT % SULID: DC

A. 我是不见你的意思我们的现在分词,我们可以对外就是对,你没有自己的。 我也就能也没有的的,我们就就是没有的的,我也是我也是我们的,我们就是这些我们的。

**** 2.64.2 [1] [1] - [1] (1) - (1) ****

GON CHROMATORROPH FERD TS: NO OF FROTTON LONG 178 USING

MASE SHECOROMETER REPUBLIS: NO

**** GHITLIGH = (22) ****

GRS CHRUMATOGRAPH MESONIS: NA DETECTION LIMIT 190 CHANG

MARK SAFO(BUMBUFF BERUTE: NO

**** ARTICLUR - 1232 ****

GAS CHROMATOGRAPH RESETTS: NA DETERTION LIMIT 126 UKZKU.

MASS SPECTHOMETHR RESULTS: NO

**** APDOLIF - 1747 ****

WAS CHROMATCORAPH RESULTS: NA DETECTION LIMIT 170 UG/KU

MASS SEFCIENCETER RESULTS: 420 UNIXED

**** AROCLOR - 1248 ****

RAS CHRIMATORARA RESULTS. NA DETECTION LIMIT 120 UG/KG

MESS SERVITEURELER PESULIS: 10

· **** APPRING - 1204 ****

GOS CHROMATORRAPH RESULTS: NA DETECTION : IMIT 1/0 DG/DG

MASS SHED TRIMETER RESULTS: No.

**** 商權的 自由 工食者目 ****

GAS CHRIMATUSHA H BISULTS: NA (BIELITUL (MIT 190 UKK)

MARK SESSI KOMETSE HERD IN: NO

APPENDIX B

Sample Summary Sheets

Site Name: Booth Oil Site

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 SERWEED
Sample Containers: / SOIL JAR (Volume & No.)
Notes: OBTAINED SEDIMENT ON IST ATTEMPT
NOT MUCH CURRENT HERE
RIVER DEPTH 13.5 FT

Sampling Date: 7/28/92 Time: 0945

Site Name: Booth Oil Site

Personnel:	
	KEVIN GLASER RICK BORNER
Sample ID:	SED-02
Sample Loca	ation: UPGNADIENT AT CENTER
	OF RIVER
	-
Type: G	rab Composite
Matrix: W	Vater Soil Sediment Waste
Sample Desc	cription: (NO SAMPLE COLLECTED)
Sample Con (Volume &	tainers:
Notes: Th	TREE ATTEMPTS - ONLY SOME GRAVEL
	TRONG CURRENT HERE
<u>Rì</u>	VER DEPTH 15-16

Site Name: Booth Oil Site

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: / 5014 JAR (Volume & No.)
Notes: REQUIRED TWO ATTEMPTS TO OBTAIN
SUFFICIENT SAMPLE VOLUME
MODERATE CURRENT. DEPTH 14'.

Site Name: <u>Booth Oil Site</u>	
Site No.: <u>9-32-100</u>	
Sampling Date: 7/28/92	Time: <u>(043</u>
Personnel: DAVE CAMP	BRIAN HENEVELD
KEVIN GLASER	RICK BORNER

Sample ID: SED- O Y
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: / 5014 JAR (Volume & No.)
Notes: River DEPTH 18 FT.
REQUIRED ONLY ONE ATTEMPT TO
OBTAIN SUPPICIENT SAMPLE VOLUME.

Sampling Date: 7/28/92 Time: 1055

Site Name: Booth Oil Site

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 SEDMENT.
RIVER DEPTH 17 FT.

Site Name: Booth Oil Site

Sampling Date: 7/28/92 Time: 10/4
Personnel: DAVE CAMP BRIAN HENEVELD
KEVIN GLASER RICK BORNER
Sample ID: 5F0-06
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 STACKS (REMOVED)
Sample Containers: / 5014 JAR (Volume & No.)
Notes: REQUIRED MANY ATTEMPTS TO OBTAIN
ADEQUATE SAMPLE VOLUME.
RIVER DEPTH 15 FT.

Site Name: Booth Oil Site

Sampling Date: 7/28/92 Time: 1050
Personnel: DAVE CAMP BRIAN HENEVELD
KEVIN GLASER RICK BORNER
Sample ID: <u>SED-07</u>
Sample Location: UPGRADIENT ON EAST DOCKS.
STH RED DOCK FROM SOUTH
Type: Grab Composite
Matrix: Water Soil Sediment Waste
Sample Description: SANDY DARK SEPIMENT
Sample Containers: / 5014 JAR (Volume & No.)
Notes: OBTATUED ADEQUATE SEDIMENT ON
FIRST ATTEMPT
RVER PERAY 17 FT.

Site Name: Booth Oil Site

Site No.: <u>9-32-100</u>
Sampling Date: 7/28/92 Time: 1100
Personnel: <u>DAVE CAMP</u> <u>BRIAN HENEVELD</u>
KEVIN GLASER RICK BORNER
Sample ID: SED - 08
Sample Location: UPGRADIENT, RIVER
CEVIER
Type: Grab Composite
Matrix: Water Soil Sediment Waste
Sample Description: (NO SAMPLE COLLECTED)
Sample Containers: (Volume & No.)
Notes: THREE ATTEMTS BUT ONLY BOCKS.
RIVER DEPTH 17 FT.

Site Name: Booth Oil Site

Sampling Date	9: 7/28/92	Time:
Personnel:	DAVE CAMP	BRIAN HENEVELD
_	KEVIN GLASER	RICK BORNER
Sample ID:	5F0-09	
Sample Location	on: UPGRAPTENT	OFF WEST
	DOCK . CENTE	R OF 7 TH
	BOAT PORT	
Type: Gra	b Composite	
Matrix: Wat	ter Soil Sediment	t) Waste
Sample Descrip	ption: Sicty sa	NDY SEDIMENT.
	DARK GRE	y in color
Sample Contai (Volume & No	ners: <u>/ 5014</u> <i>574</i> o.)	12
Notes: RE	outhing only on	E ATTEMPT TO
0377	IN SUFFICIENT	SAMPLE YOLVINE.
Riva	ER DEPTH 15	FT.

Site Name: <u>Booth Oil Site</u>	
Site No.: <u>9-32-100</u>	
Sampling Date: 7/28/92	Time:
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-
LIKÉ SEDI MENT.
Sample Containers: / 5014 JAR (Volume & No.)
Notes: REQUIRED SEVERAL ATT EMTS, BUT
LOCATION HAD MUCH SEDIMENT
RIVER DEPTH 16 FT

Site Name: Booth Oil Site

Site No.: <u>9-32-100</u>	
Sampling Date: 7/28/92 Time: \130	
Personnel: DAVE CAMP BRIAN HENEVELD	
KEVIN GLASER RICK BORNER	
Sample ID: SED- II	
Sample Location: immediately Across FROM	
OUT FALL ABOUT 20 FT	
057.	
Type: Grab Composite	
Matrix: Water Soil Sediment Waste	
Sample Description: SILTY - CLAY CAEY WITH	
MANY ROCKS	
Sample Containers: / 5014 JAR (Volume & No.)	
Notes: CURRENT FAIRLY STRONG, SIMLAR	
TO OTHER SAMPLES COLLECTED	
NEAR BANK . RIVER DEPORT 14 PT.	

Site Name: Booth Oil Site

Sampling Date: 7/28/92 Time: //30
Personnel: DAVE CAMP BRIAN HENEVELD
KEVIN GLASER RICK BORNER
Sample ID: SED- /2
Sample Location: NEAR SEWER OUTFALL.
ABOUT 10 PT DOWN GRADIENT
FROM SED-11 LOCATION
Type: Grab Composite
Matrix: Water Soil Sediment Waste
Sample Description: (SIMILAR TO SED-11)
(ONLY 03TAINED 1/2 JAR)
Sample Containers: / 50/2 JAR (Volume & No.)
Notes: REQUIRED MANY ATTEMPTS TO
OBTAIN ADEQUATE SAMPLE VOLUME.
RNER DEPTH 14 FT.

Sampling Date: 7/28/92 Time: 1238

Site Name: Booth Oil Site

Personnel: DAVE CAMP BRIAN HENEVELD
KEVIN GLASER RICK BORNER
Sample ID: SED- 13
Sample Location: JUST DOWNGRADIENT
OF OUTFALL 15 PT IN
Type: Grab Composite
Matrix: Water Soil Sediment Waste
Sample Description: VERY ROCKY WITH
FINE GRAVEL . DARK GREY
Sample Containers: / 5014 JAR (Volume & No.)
Notes: REQUIRED MANY ATTEMPTS TO
OBTAIN ADEQUATE SAMPLE VOLUME.
RIVER DEATH 13 ET.

Site Name: Booth Oil Site

Sampling Date: 7/28/92 Time: 1250	
Personnel: DAVE CAMP BRIAN HENEVELO	
KEVIN GLASER RICK BORNER	
Sample ID: SED- / 4	
Sample Location: DOWNGRADIENT, ABOUT	
50 FT FROM SHORE.	
Type: Grab Composite	
Matrix: Water Soil Sediment Waste	
Sample Description: Sicty SED: MENT W/TH	
MANY FIRE ROCKS.	
Sample Containers: / SOIL JAR (Volume & No.)	
Notes: STROWGER CURRENT HERE . MANY	
ATTEMPTS AND SNLY OSTAINED 'K JAR.	
RIVER DEPTH 18.5 FT.	

Sampling Date: 7/28/92 Time: 1322

Personnel: DAVE CAMP BRIAN HENEVELO

Site Name: Booth Oil Site

KEVIN GLASER RICK BORNER
Sample ID: <u>SED- 15</u>
Sample Location: DOWNGRADIENT ACROSS
FROM SED-14 LABOUT
50 FT).
Type: Grab Composite
Matrix: Water Soil Sediment Waste
Sample Description: REO-BROWN CLAY WITH
SOME ROCKS . SOFT CLAY
Sample Containers: / 5014 JAR (Volume & No.)
Notes: SAMPLE TAKEN FROM STATULESS
STEEL BOAT ANCHOR.

Site Name: Booth Oil Site	
Site No.: <u>9-32-100</u>	
Sampling Date: 7/28/92	Time: _1300_
Personnel: DAVE CAMP	BRIAN HENEVELO
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: / 5014 JAR (Volume & No.)
Notes: SEVERAL AFTENTS NECESSARY TO OBTAN
ADEQUATE SAMPLE VOLVME. (TWO
DIFFERENT SEDIMENT TYPES HERE: BLACK
MUCK AND RED-BROWN CLAY).
RIVER DEPTH 19 FT.

Sampling Date: 7/28/92 Time: 1330

Site Name: Booth Oil Site

Personnel: DAVE CAMP BRIAN HENEVELD		
KEVIN GLASER RICK BORNER		
Sample ID: SED - 17		
Sample Location: Downergoient ABOUT		
SO 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 VNSUCCESSFUL.		
RIVER DEPTH 19 FT.		

Sampling Date: 7/28/92 Time: 1350

Site Name: Booth Oil Site

Personnel: <u>DAVE CAMP</u> <u>BRIAN HENEVELD</u>
KEVIN GLASER RICK BORNER
Sample ID: SED-18
Sample Location: ACROSS FROM TUE 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

Site Name: <u>Booth Oil Site</u>	
Site No.: <u>9-32-100</u>	
Sampling Date: 7/28/92	Time:
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: / SOIL JAR (Volume & No.)
Notes: SEVERAL ATTEMPTS WERE NECESSARY,
BUT PLENTY OF FINE SEDMENT HERE.
RIVER DEPTH 15 FT.

Site Name: Booth Oil Site

Sampling Date: 7/28/92 Time: 7343	
Personnel: <u>DAVE CAMP</u> <u>BRIAN HENEVELD</u>	
KEVIN GLASER RICK BORNER	
Sample ID: SED-20	
Sample Location: DOWN GRADIENT 100 FT	
FROM SED-17 LOCATION	
Type: Grab Composite	
Matrix: Water Soil Sediment Waste	
Sample Description: (NO SAMPLE COLLECTED)	
Sample Containers: (Volume & No.)	
Notes: FINE ATTEMPTS, BUT NO SEDIMENT	
OBTAINED. ONLY SMALL ROCKS.	
VERY STRONG CURRENT HERE.	
RIVER DERTH 14 ET	

Sampling Date: 7/28/92 Time: /500

Site Name: Booth Oil Site

Personnel: DAVE CAMP BRIAN HENEVELD
KEVIN GLASER RICK BORNER
Sample ID: SED - 2 I
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 . CANEL
RNER DEPTH 16 FT.

Site Name: Booth Oil Site

Sampling Date: 7/28/92 Time: 1435
Personnel: DAVE CAMP BRIAN HENEVELD
KEVIN GLASER RICK BORNER
Sample ID: SED-22
Sample Location: DOWN GRADIENT. 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: / SOIL JAR (Volume & No.)
Notes: SEVERAL ATTEMTS IVECESSARY AND
ONLY OBTAINED 1/2 TAR.
RIVER DEPTH 17 FT.

Sampling Date: 7/28/92 Time: /445

Site Name: Booth Oil Site

Personnel: <u>DAVE CAMP</u> <u>BRIAN HENEVELD</u>
KEVIN GLASER RICK BORNER
Sample ID: SED - 23
Sample Location: <u>DOWNGRADIENT</u> 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 , DUT 150
SEDIMENT AT ALL.

Site Name: Booth Oil Site

Sampling Date: 7/28/92 Time: 1510
Personnel: <u>DAVE CAMP</u> <u>BRIAN HENEVELD</u>
KEVIN GLASER RICK BORNER
Sample ID:
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.

Site Name: Booth Oil Site

Site No.: 9-32-100

Sampling Date: 7/28/92 Time: 1408

Personnel: DAVE CAMP BRIAN HENEVELO

KEVIN GLASER RICK BORNER

Sample ID: 5ED-25

Sample Location: DOWNGRADIENT . NEAR

PIER REHIND TUG BOAT

50 PT FROM SHORE.

Type:

(Grab)

Composite

Matrix:

Water Soil

(Sediment) Waste

Sample Description: BLACK / GREY , LOTS

OF VEGETATION / MUCK AND FINE SAND.

Sample Containers: / 5014 JAR

(Volume & No.)

Notes: THIS LOCATION CHOSEN DUE TO CURRENT

AND PROBABLE SEDIMENT DEPOSIT POINT.

TOOK SEVERAL ATTEMPTS TO OBTAIN ADEBUATE SAMPLE VOLUME. RIVER DEPTH IS FT.

Sampling Date: 7/28/92 Time: /43/

Site Name: Booth Oil Site

Personnel: DAVE CAMP BRIAN HENEVELD
KEVIN GLASER RICK BORNER
Sample ID: SED - 26
Sample Location: DOWN GRADIENT. 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 DENTH 11 FT.

APPENDIX C

TAGM Scoring Sheets

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

					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.	- On-site treatment * - Off-site treatment *	3				3			
*	Subtotal (maximum = 3) treatment is defined as destruction or separation/ treatment or solidification/ chemical fixation of inorganic wastes.	- On-site or off-site land disposal	O			0				
5. S	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)

					Alternatives				
Analysis Factor		Basis for Evaluation	Weight	1	2	3	4		
6. Lifetime of remedial actions. Subtotal (maximum = 3)	-	Expected lifetime or duration of effectiveness of the remedy.	25-30 yr3 20-25 yr2 15-20 yr1 <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		
	ü.	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)

			Alternatives				
Analysis Factor	Basis for Evaluation	Weight	1	2	3	4	
Technical Feasibility A bility to construct	Not difficult to construct. No uncertainties in construction.	3	3		3		
a. Ability to construct technology.	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.	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.	i. No future remedial actions may be anticipated.	2	2				
Subtotal (maximum =10)	ii. Some future remedial actions may be necessary.	1		1	1	1	
2. Administrative Feasibility	i. Minimal coordination is required.	2	2				
a. Coordination with other agencies.	ii. Required coordination is normal.	1		1	1	1	
Subtotal (maximum = 2)	ii. Extensive Coordination is required.	0					
Availability of Services and Materials a. Availability of prospective technologies.	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	
 Availability of necessary equipment and specialists. 	Additional equipment and specialists may be available without significant delay.	Yes 1 No 0	1	1	1	1	
Subtotal (maximum = 3)							
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)

					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)

				Alter	natives	
Analysis Factor	Basis for Evaluation	Weight	1	2	3	4
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
Human health and the environment exposure after	i. Is the exposure to contaminants via air route acceptable?	Yes 3 No 0	3	3		3
the remediation.	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
 Magnitude of residual public health risks after the remediation. 	i. Health risk	≤1 in 1,000,000 5	5	5		5
Subtotal (maximum = 5)		≤1 in 1,000,000 — 2				
4. Magnitude of residual environmental risks after the	i. Less than acceptable	5		5		5
remediation.	ii. Slightly greater than acceptable	3				
Subtotal (maximum = 5)	iii. Significant risk still exists	°	0			
TOTAL (maximum = 20)			11	20	20	20

3. SHORT-TERM EFFECTIVENESS Relative Weight = 10)

			Alternatives					
Analysis Factor	Basis for Evaluation	Weight	1	2	3	4		
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.) Subtotal (maximum = 4)	- 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		
	- Are the available mitigative measures reliable to minimize potential impacts?	Yes 3 No 0		3	3	3		
 Time to implement the remedy. Subtotal (maximum = 2) 	- What is the required time to implement the remedy?	≤ 2 yr1 > 2 yr0	1	1	1	1		
	 Required duration of the mitigative effort to control short-term risk. 	≤ 2 yr1 > 2 yr0	1	1	1	1		
TOTAL (maximum = 10)			10	8	8	8		

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

Analysis Factor	Basis for Evaluation				Alternati	ives	==
On-site or off-site treatm or land disposal.	ent - On-site treatment *	Weig	ght	1	2	3	4
Subtotal (maximum = 3)	1	3					3
* treatment is defined as destruction or separation/ treatment or solidification/ chemical fixation of inorganic wastes.	- On-site or off-site land dispe	osal 0					
Permanence of the remedial alternative.	permanent in account		-				
Subtotal (maximum = 3)	Section 2.1(a), (b), or (c). (If answer is yes, go to Factor 4	l No n	0	0	0	3	
Lifetime of remedial actions.	- Expected lifetime						
Subtotal (maximum = 3)	effectiveness of the remedy.	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$!	3	3		\exists
Quantity and nature of waste or residual left at the site after remediation.	 Quantity of untreated hazardous waste left at the site. 	< 15 yr _0 None _ 3	0	-			
remediation.	telt at the site.	$ \leq 25\% $ $ \leq 25-50\% $ $ \leq 25-50\% $ $ \leq 25\% $			3	3	1
1	ii. Is there treated residual left at	≥50%0 Yes0	0	0			
ubtotal (maximum = 5)	the site? (If answer is no, go to Factor 5.)	No2	0	2	2	0	
F-	is the treated residual toxic?	Yes 0 No 1	0				
	is the treated residual mobile?	Yes 0 No 1	0			11	

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

			Alternatives			
Analysis Factor	Basis for Evaluation	Weight	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 confident0				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

1. Volume of hazardous waste reduced (reduction in volume or toxicity). If Factor 1 is not applicable, go to Factor 2. Subtotal (maximum = 10) If subtotal = 10, go to Factor 3 Description of hazardous waste on the maximum = 5) Subtotal (maximum = 5) Subtotal (maximum = 5) Factor 1 is not applicable, go to Factor 2. Iii. Are there untreated or concentrated hazardous waste on the maximum of the maximum o	Analysis Factor				Alternatives			
i. Quantity of hazardous waste reduced (reduction in volume or toxicity). If Factor 1 is not applicable, go to Factor 2. Subtotal (maximum = 10) If subtotal = 10, go to Factor 3 Subtotal (maximum = 10) If subtotal = 10, go to Factor 3 Subtotal (maximum = 10) If subtotal = 10, go to Factor 3 ii. Are there untreated or concentrated hazardous waste produced as a result of (ii)? If answer is no, go to Factor 2. iii. After remediation, how is the untreated, residual hazardous waste material disposed? iii. After remediation, how is the untreated, residual hazardous waste material disposed? 2. Reduction in mobility of hazardous waste. ii. Quality of Available Waste Immobilized After Destruction/Treatment iii. Method of Immobilization — 3 Subtotal (maximum = 5) If welfood of Immobilization — 3 If welfood of Immobilization — 3 Irreversibility of the destruction or treatment trechnologies. Lireversibility of the destruction or treatment or immobilization of hazardous waste constituents. Subtotal (maximum = 5) Subtotal (maximum = 5) Reversible for most of the hazardous waste constituents. Subtotal (maximum = 5) Reversible for most of the hazardous waste constituents. Reversible for most of the hazardous waste constituents. Reversible for most of the hazardous waste constituents.		Basis for Evaluation	Weight	1		2	3	
Subtotal (maximum = 10) If subtotal = 10, go to Factor 3 If subtotal = 10, go to Factor 2 If subtotal = 1	reduced (reduction in volume or toxicity). If Factor 1 is not applicable	destroyed or treated. Immobilization technologies d	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$					
iii. After remediation, how is the untreated, residual hazardous waste material disposed? Off-site land disposal 0 On-site land disposal 1 Off-site land disposal 2 Off-site land disposal 1 Off-site land disposal 2 Off-site land disposal 2 Off-site land disposal 2 Off-site land disposal 1 Off-site land disposal 2 Off	Subtotal (maximum = 10) If subtotal = 10, go to Factor	concentrated hazardous waste produced as a result of (i)? If					0	
i. Quality of Available Waste Immobilized After Destruction/Treatment Subtotal (maximum = 5) ii. Method of Immobilization — 0 — 3 — 0 0 0 3 Reduced mobility by containment - Reduced mobility by alternative treatment technologies. Irreversibility of the destruction or treatment or immobilization of hazardous waste. Completely irreversible for most of the hazardous waste constituents. Irreversible for only some of the hazardous waste constituents. Subtotal (maximum = 5) Reversible for most of the hazardous waste constituents. Subtotal (maximum = 5) Reversible for most of the hazardous waste constituents.		iii. After remediation, how is the untreated, residual hazardous	disposal 0 On-site land disposal 1 Off-site destruction or treatment					
Subtotal (maximum = 5) - Reduced mobility by containment - Reduced mobility by alternative treatment technologies. Irreversibility of the destruction or treatment or immobilization of hazardous waste. Completely irreversible - 5 Irreversible for most of the hazardous waste constituents. Irreversible for only some of the hazardous waste constituents. Subtotal (maximum = 5) Reversible for most of the hazardous waste constituents.	TOO IN IN MOUNTY OF	Immobilized After Destruction/Treatment	90-100% _ 2 60-90% _ 1		2	2		
Irreversibility of the destruction or treatment or immobilization of hazardous waste. Completely irreversible5	Subtotal (maximum = 5)	- Reduced mobility by containment - Reduced mobility by alternative treatment			0	0	3	
Subtotal (maximum = 5) Reversible for most of the hazardous wastes constituents. O 0	destruction or treatment or immobilization of hazardous	Completely irreversible Irreversible for most of the hazardous				5	5	
		Reversible for most of the hazardous			0			
	TOTAL (maximum = 15)							

7. COST (Relative Weight = 15)

			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

APPROXIMATE AREA TO BE LEMEDIATED:

10'

AILEA.

10' x = 5 = 250 F72

VOLUME: 250 FT x 0.5FT = 125 CV FT.

125 CU FT X CUYO - 5 CU 72.

SAY 5 70 10 CU. YO 1.

22-141 50 SHEETS 22-142 100 SHEETS 22-144 200 SHEETS

BOOTH die STIE COST DATA COFFER DAM A. DIAGRAM ___SHOPE HICH WATER 151 - KIUER LUTTOM 101 30' COFFERALM QUANTITY OF COFFERDAM: i i REMEDIAL ACEA 10'x25' CUFFELLOAM LENGTH 2×15' + 30' = 60 FT CUFFEROAM REGULAED /Sp. FT.) 30 1 x 60' = 1800 SAFT C. COST: () (From 193 MEHIS, Pf 33, 704-0010) PRICE: \$ 9.55 / SOFT FOR MATERIALS X2 = 19.10 /50 FT DUE TO STRUNG RIVER CURRENTS AND HIGHER PRITE ON SMALL JOB. COST = \$ 19.10/ × 1800 SH. 15 = \$34,380.00 11) LABOR AND EQUIPMENT FOR CREW B-40 FUR 3 DAYS WORK / 2 DAYS INSTAULATION AND I DEMOGRETATION. \$4354 /pay x 3 0ATS =\$13062 TOTAL CUSTS 34,380 + 13 062 = \$47442

CREW B- S : \$3434.35/144 x 25045 = \$6969 (MINUS THE CRANE (OP.) 7 5734.15/mm × 2 DAVS = \$ 11 469

(iii) TOTAL COST: MATI + EQUIP & LAKUR. 7150.00 + 11 469.00=\$ 12 619

= 1 FT x 450 FT2

= 450 FT3 7.48000-

= 3366 GALS

TREATMENT: 3366 GAL X \$0-20/GAL = \$673

FXCAUATION! BOOTH OIL STIE COST DATA A Volume a SEDINENT: 0.5 FT × 1154 = 0.5 FT × 250 FT2 = 125 == 27 === = 5 (0.49 SO SHEETS 200 SHEETS 200 SHEETS COS ALEETS C 5A4 MAX 10 CU. 45. ASSUME TWO DATS TO MERFORN WORK WITH CREWS B-12I PEXCAMP, ON AUD B-16/TRANSMATERIONII. 15-122 \$ 1052.55/DAY X 2 DAYS = 8 2105-16 B-16 \$ 1388-20/604 x 2 0x12 = \$2775.40 \$ 2440.75 \$ 4881.50 SA1 \$ 5000 6) DEWATERING EXCAVATED SEDIMENTS (PRE-TREATMENT): ADD CEMENT TO SEDIMENTS: A) DAUTIT = RENESIAL AREA = 250 FT2/ 402
9FT2 = 27 54.40. 31 COST (FROM '93 MENS, Pg 45, 412-1020) PRICE FOR 4% CEMENT 6" DEEP = \$5.95/59 40. X 2 DUE 70 SMALL JUB = 11.90 /50 45 COST =\$11.90/50.40 × 27 50-10 =\$ 320

 $= 1500 \times 9.42 = $ 14.130$

141 142 144

22-1

AMPAD D