Exxon Valdez Oil Spill
Restoration Project Final Report

Shoreline Assessment and Oil Removal - ADEC in Prince William Sound, Alaska

Restoration Project 94266b
Final Report

Dianne R. Munson

Alaska Department of Environmental Conservation
Division of Spill Prevention and Response
Office of Restoration and Research
555 Cordova Street
Anchorage Alaska, 99501-3451

March 1996

Shoreline Assessment and Oil Removal
in Prince William Sound

Restoration Project 94266b
Final Report

Study History: This project grew out of recommendations from the 1993 Shoreline Oiling Assessment in Prince William Sound, Restoration Project 93038. A draft report of the Shoreline Assessment was issued in 1994 by Piper, E. and Gibeaut, J. under the title 1993 Shoreline Assessment. A final report was issued in 1995 by Piper, E. and Gibeaut, J. under the title 1993 Shoreline Oiling Assessment of the *Exxon Valdez* Oil Spill. This project effort was coordinated with Restoration Project 94090, Mussel Bed Restoration and Monitoring, under the National Oceanic and Atmospheric Administration (NOAA), for the purpose of logistical and administrative savings. An annual report for the Mussel Bed Restoration project was issued in 1995 by Babcock, M., under the title Recovery Monitoring and Restoration of Oiled Mussel Beds in Prince William Sound, Alaska. A data report presenting data for the 1994 Shoreline Assessment, Oil Removal and Mussel Bed Restoration field activities in Prince William Sound was completed in 1994 by Munson, D. under the title 1994 Shoreline Assessment and Oil Removal & Mussel Bed Restoration and Monitoring Data Report. The National Biological Survey conducted shoreline assessments along the Kenai Fjords National Park and Katmai National Park and Preserve coastlines as a separate component under this project number. An annual report was issued in 1995 by Mann, D. under the title Fate and Persistence of Oil Stranded on Gulf of Alaska Shorelines during the 1989 *Exxon Valdez* Oil Spill.

Abstract: During the summer of 1994 a five person crew from the village of Chenega under the direction of an on site manager from the Alaska Department of Environmental Conservation conducted manual treatment, debris and rebar removal and ground surveys at 11 subdivisions in Prince William Sound. Fourteen sites within 4 different shoreline subdivisions with persistent surface asphalt were manually treated to accelerate natural degradation. Approximately 2000 square meters of asphalted oil were broken and tilled. Rebar and back-stakes were removed from Applegate Island. Removal of flagging and other miscellaneous shoreline debris left by cleanup and damage assessment crews was undertaken as possible. Six additional shoreline subdivisions near the village of Chenega were assessed because of the ongoing concern for subsistence and recreational resources within close proximity to the village. The six shoreline subdivisions assessed were also assessed in the 1993 Shoreline Assessment (Restoration Project 93038) and were known to have some of the heaviest oiling in the area. A comparison of the sites from 1993 to 1994 showed that little to no improvement had occurred at these sites. The same labor crew, on site manager and logistical support for the shoreline treatment and assessment tasks above were used to accomplish the Mussel Bed Restoration Project (94090) in cooperation with the National Oceanic and Atmospheric Administration (NOAA).

Key Words: *Exxon Valdez,* Prince William Sound, shoreline oiling, subdivision, asphalt, debris, manual treatment.

Citation: Munson, D. 1996. Shoreline Assessment and Oil Removal in Prince William Sound, Alaska. *Exxon Valdez* Restoration Project Final Report (Restoration Project 94266) Alaska Department of Environmental Conservation, Spill Prevention and Response, Anchorage, Alaska.

TABLE OF CONTENTS

LIST OF FIGURES

EXECUTIVE SUMMARY

A handful of shorelines that were impacted by the *Exxon Valdez* oil spill still had significant oil remaining in 1993. This project grew out of recommendations from the 1993 Shoreline Assessment in Prince William Sound (Restoration Project 93038). The 1993 Shoreline Assessment differentiated between surface and subsurface oiling. A comparison of comparable sites between 1991 and 1993 indicated that the amount of subsurface oiling had decreased by about half. However the survey showed that the remaining surface oil had become very stable. In fact there was no measurable reduction in the remaining surface asphalt and surface oil residue from 1991 to 1993.

Much of the remaining surface oil was around the community of Chenega. Residents of the area indicated that the presence of residual oil was a significant problem for the community. They expressed uncertainty about the health of subsistence resources, and that the oil affects their enjoyment and confidence in subsistence use of the shorelines. In addition, agency representatives from ADNR and U.S. Forest Service expressed concern about the visual impact of surface oil on the quality of the recreational experience. Also, recreational users had placed a high priority on removing rebar, flagging, signs, back-stakes and other shoreline debris left on shorelines by cleanup and damage assessment crews.

The overall goal of this project was to accomplish light-duty manual treatment of surface oiling (mostly asphalt) at select sites to accelerate natural degradation at those sites. A secondary objective was to remove rebar, flagging, back-stakes and other shoreline debris left by clean-up and damage assessment crews.

During the summer of 1994 a five person crew from the village of Chenega under the direction of an on site manager from the Alaska Department of Environmental Conservation conducted manual treatment, debris and rebar removal and ground surveys at 11 subdivisions in Prince William Sound. Fourteen sites within four different shoreline subdivisions with persistent surface asphalt were manually treated to accelerate natural degradation. Approximately 2000 square meters of asphalted oil were broken and tilled. Rebar and back-stakes were removed from Applegate Island. Removal of flagging and other miscellaneous shoreline debris left by cleanup and damage assessment crews was undertaken as possible. Six additional shoreline subdivisions near the village of Chenega were assessed because of the ongoing concern for subsistence and recreational resources within close proximity to the village.

The long-term effect of the manual break-up and tilling is expected to stimulate the natural degradative processes. Past experience from the clean-up and shoreline assessments had shown that manually breaking and tilling asphalted oil accelerates natural degradation. Once the asphalt was broken and tilled into small pieces, more surface area is exposed for wave energy, sunlight and microbes to enhance degradation through physical weathering, photoxidation and microbial degradation. Accelerating the degradation of the asphalt and removing rebar and other clean-up debris will speed the recovery of recreational and subsistence use of the areas treated.

The six shoreline subdivisions assessed were also assessed in the 1993 Shoreline Assessment (Restoration Project 93038) and were known to have some of the heaviest oiling in the area. A comparison of the sites from 1993 to 1994 showed that little to no improvement had occurred at these sites.

At this point there are very few beaches that would lend themselves to manual treatment with hand tools alone. There is still significant oiling near the community of Chenega and surface oiling in particular appears to be very stable. Based on conversations with village residents, it is obvious that they are not satisfied with the condition of many beaches near the village. The visual evidence of the remaining oil has been identified as having an important effect on the use of subsistence resources, both in terms of decreasing the quantity of resources used, and decreasing the confidence in the safety of the resources. There may be good policy reasons for pursuing alternative treatment technologies for beaches located within close proximity to the village. There was a small but positive economic impact on the village of Chenega that supplied the labor force.

INTRODUCTION

Shortly after midnight on March 24, 1989, the T/V *Exxon Valdez* ran aground on Bligh Reef in Prince William Sound, Alaska, spilling eleven million gallons of North Slope crude oil. That spring the oil moved along the coastline of Alaska, contaminating portions of the shoreline of Prince William Sound, the Kenai peninsula, lower Cook Inlet, the Kodiak Archipelago, and the Alaska Peninsula.

During 1989, response efforts focused on containing and removing the oil, and rescuing oiled wildlife. Workers cleaned shorelines using techniques ranging from cleaning rocks by hand to high-pressure hot-water washing. Fertilizers were applied to some oiled shorelines to increase the activity of oil-metabolizing microbes, an activity known as bioremediation. The 1989 shoreline assessment, completed after the summer cleanup, indicated that a substantial portion of the oil remained on the shorelines. In the spring of 1990, the shoreline was again surveyed in a joint effort by Exxon and the state and the federal governments, with similar results. The principal clean-up method used in 1990 was manual removal of oiled sediment, bioremediation and relocation of oiled beach material to the active surf zone were used in some areas.

Shoreline surveys and limited clean-up work occurred in 1991, 1992. In 1992, crews from Exxon and the state and federal governments visited eighty-one sites in Prince William Sound and the Kenai Peninsula. They reported that an estimated seven miles of 21.4 miles of shoreline surveyed still showed some surface oiling. The survey also indicated that subsurface oil remained at many sites that were concentrated in those areas where oil remained to a greater degree - Prince William Sound and the Kenai Peninsula.

The 1993 Shoreline Assessment in Prince William Sound, conducted by the Alaska Department of Environmental Conservation (Restoration Project 93038) reported that a handful of shoreline areas that were impacted by the oil spill still had significant surface oil remaining. This project grew out of recommendations from the 1993 Shoreline Assessment. The 1993 Shoreline Assessment differentiated between surface and subsurface oiling. A comparison of comparable sites between 1991 and 1993 indicated that the amount of subsurface oiling had decreased by about half. However the survey showed that the remaining surface oil had become very stable. In fact there was no measurable reduction in the remaining surface asphalt and surface oil residue from 1991 to 1993.

Much of the remaining surface oil was around the community of Chenega. Residents of the area indicated that the presence of residual oil was a significant problem for the community. They expressed uncertainty about the health of subsistence resources, and that the oil affects their enjoyment and confidence in subsistence use of the shorelines. In addition, agency representatives from ADNR and U.S. Forest Service expressed concern about the visual impact of surface oil on the quality of the recreational experience. Also, recreational users had placed a high priority on removing rebar, flagging, signs, back-stakes and other shoreline debris left on shorelines by cleanup and damage assessment crews.

Two practical objectives for remediation were implemented under this project: 1) Manual cleanup of select high priority sites; and 2) Clean up of debris. Fourteen sites within four different shoreline subdivisions with persistent surface asphalt were manually treated to accelerate natural degradation. Approximately 2000 square meters of asphalted oil were broken and tilled. Rebar and back-stakes were removed from Applegate Island. Removal of flagging and other miscellaneous shoreline debris left by cleanup and damage assessment crews was undertaken as possible. Past experience from the clean-up and shoreline assessments has shown that manually breaking and tilling asphalted oil accelerates natural degradation. Once the material is broken down into small pieces, more surface area is exposed to wave energy, sunlight and microbes.

In addition to the shoreline cleanup tasks above, six additional shoreline subdivisions near the village of Chenega were assessed because of ongoing concern for subsistence and recreational resources within close proximity to the village of Chenega. The six shoreline subdivisions assessed were also assessed in the 1993 Shoreline Assessment and were known to have some of the heaviest oiling in the area. A comparison of the sites from 1993 to 1994 showed that little to no improvement had occurred at these sites. Appendix A includes a glossary of field oiling classifications and survey terms used. Appendix B includes a detailed site by site presentation of the data discussed in this report including representative photographs, a general discussion of the physical setting and oiling conditions, data forms reporting oiling and treatment conducted, and field sketch maps. A data report presenting data and a more complete selection of photographs for the 1994 Shoreline Assessment, Oil Removal and Mussel Bed Restoration field activities in Prince William Sound was completed in 1994 by Munson, D. under the title 1994 Shoreline Assessment and Oil Removal & Mussel Bed Restoration and Monitoring Data Report.

This data report may be obtained from the Oil Spill Public Information Center in Anchorage, Alaska (645 G Street Anchorage, Ak. 99501: 800-478-7745 in Alaska; 800-283-7745 outside Alaska; e-mail address ospic@muskox.alaska.edu).

OBJECTIVES

A. The overall purpose of the project was to accomplish light-duty manual treatment of surface oiling (mostly asphalt) at select sites to accelerate natural degradation and help restore natural and human resources at those sites.

B. A secondary objective was to remove rebar, flagging, back-stakes and other shoreline debris left by cleanup and damage assessment crews.

METHODS

Site Selection

Fourteen sites within four different subdivision in PWS were selected for manual break up and tilling. Primary criteria for selection was recreational and subsistence use, accessibility, degree and type of oil and substrate type. There were a hand full of sites with significant surface oiling where manual work (break-up and tilling) would be feasible and where the amount of physical labor required would be low relative to time, money and effort required to accomplish it. All sites were those with oiling in the middle and upper intertidal zone. They tended to be in relatively sheltered areas with substrate varying from fine sediments to cobbles. The sites selected for manual treatment had some of the largest and most highly concentrated areas of thick asphalt in Prince William Sound.

Two sites on Applegate Island were targeted for rebar removal that had been left by damage assessment and spill study crews. Applegate Island is a popular recreational and commercial tourism use area. In addition to being unsightly, the barely exposed rebar in the middle and lower intertidal zones presented a hazard to kayaks, inflatables and skiffs coming ashore.

Restoration

Treatment methods consisted of manually breaking up asphalt and other heavily weathered materials to accelerate natural degradation. The treatment was accomplished by a five person crew from the village of Chenega under the direction of an on site manager from the Alaska Department of Environmental Conservation. The crew used tools including pick-axes, garden hoes, rakes and shovels to break and till the asphalted oil. Some of the areas of asphalted oil were more thoroughly treated than others due to inaccessibility of some of the oil amongst larger cobbles and boulders. Approximately 2000 square meters of asphalt was manually broken and tilled at 14 different sites within four different subdivisions (AE005B, KN0132B, BP004A,

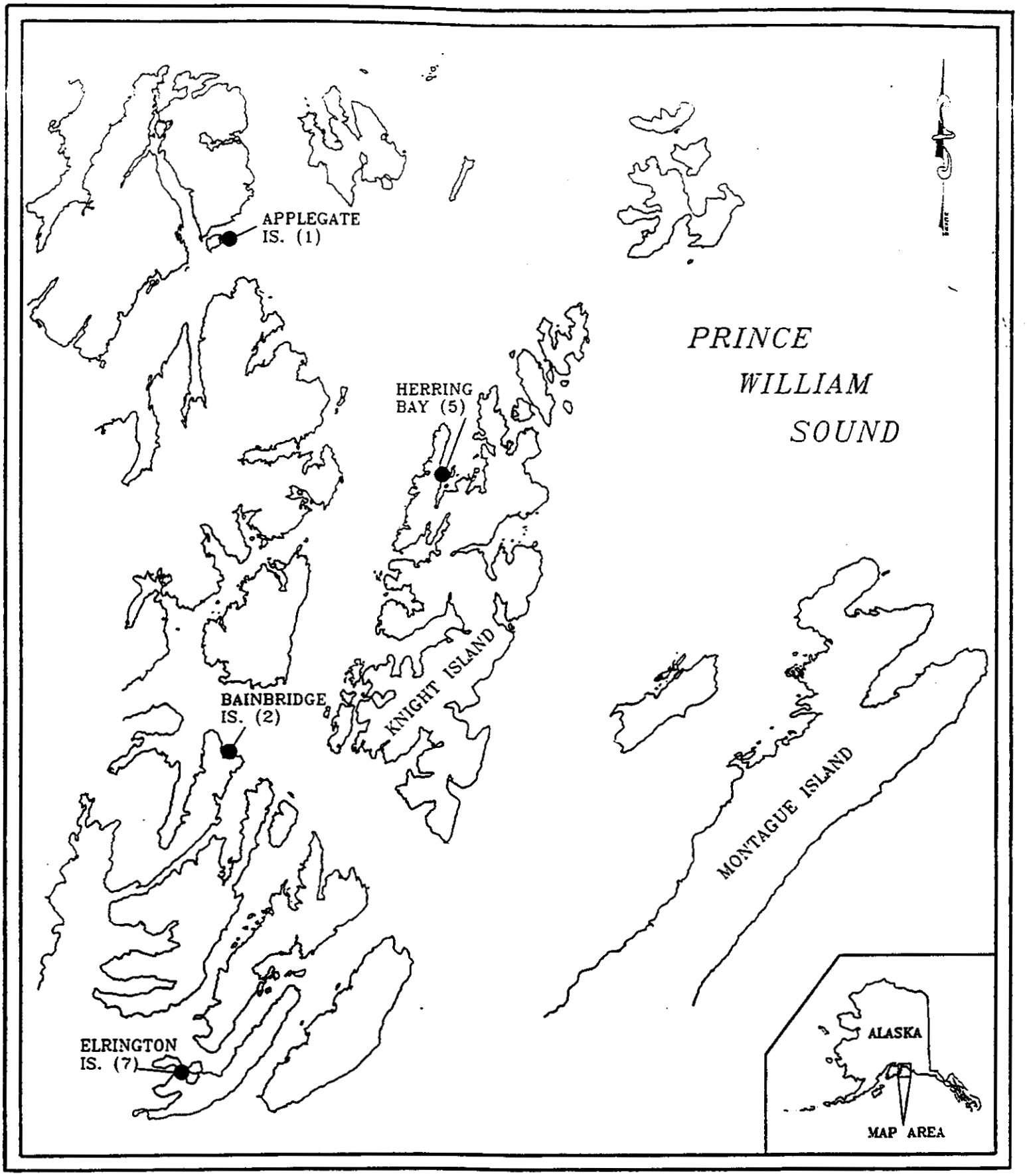


Figure 1. Manual treatment sites where asphalt type oiling was broken and tilled and rebar and debris were removed. Numbers in parentheses indicate the number of locations treated at each subdivision.

ER011A). Areas treated ranged in size from 4 to 600 square meters and ranged in thickness from 2 cm. to 25 cm. The crew worked the low tide windows to ensure complete access of the oil. No sheening occurred as a result of manual treatment.

All rebar and flagging were removed from the Applegate Island coves (AE005B). During the response, clean-up crews would mark areas of shoreline to be bioremediated with flagging tape wrapped around small cobbles. We removed quite a bit of this along with other miscellaneous trash that may or may not have been from Exxon's clean-up operations.

Additional Shoreline Assessments

In addition to the shoreline cleanup tasks above, six additional shoreline subdivisions near the village of Chenega were assessed because of the ongoing concern for subsistence and recreational resources within close proximity to the village of Chenega (ER020B, EV037A, EV039A, LA015C, LA015E, LA021A).

The shoreline assessments used the same techniques as those used during the 1990, 1991, 1992 and 1993 surveys as best explained in the 1991 MAYSAP survey manual (Exxon Corporation, 1991). The principal surveyor (DEC field manager) had worked the spill since 1989 and was an experienced observer of oiling in Prince William Sound. The Chenega labor crew dug pits in the beaches and turned over cobbles and boulders to reveal hidden oil. After the beaches were dug and a general reconnaissance made, the surveyor then documented the oil distribution on field sketch maps. Areas of distinct oiling were paced or measured with a tape and visual estimates made of the percentage of cover of oiling within the area. To further maintain consistency with the 1993 survey, the shoreline outlines and features from the 1993 field sketch maps were traced and used as templates for documenting oiling distribution.

RESULTS

Manual Treatment

The long-term effect of the manual break-up and tilling is expected to stimulate the natural degradative processes. Approximately 2000 square meters of asphalt was broken and tilled. Past experience from the clean-up and shoreline assessments had shown that manually breaking and tilling asphalted oil accelerates natural degradation. Once the asphalt was broken and tilled into small pieces, more surface area is exposed for wave energy, sunlight and microbes to enhance degradation through physical weathering, photoxidation and microbial degradation. No sheening occurred as a result of manual treatment. Most of the sites that were manually treated were re-visited at approximately one month after treatment as logistics allowed. The oil visually appeared more weathered and broken down. Chenega area residents reported only a trace amount of tarballs observed during the summer of 1995 at southern Elrington Island (ER011A) where about 450 square meters of asphalt was manually treated. The removal of rebar and trash was a one time effort and there is no need for follow up.

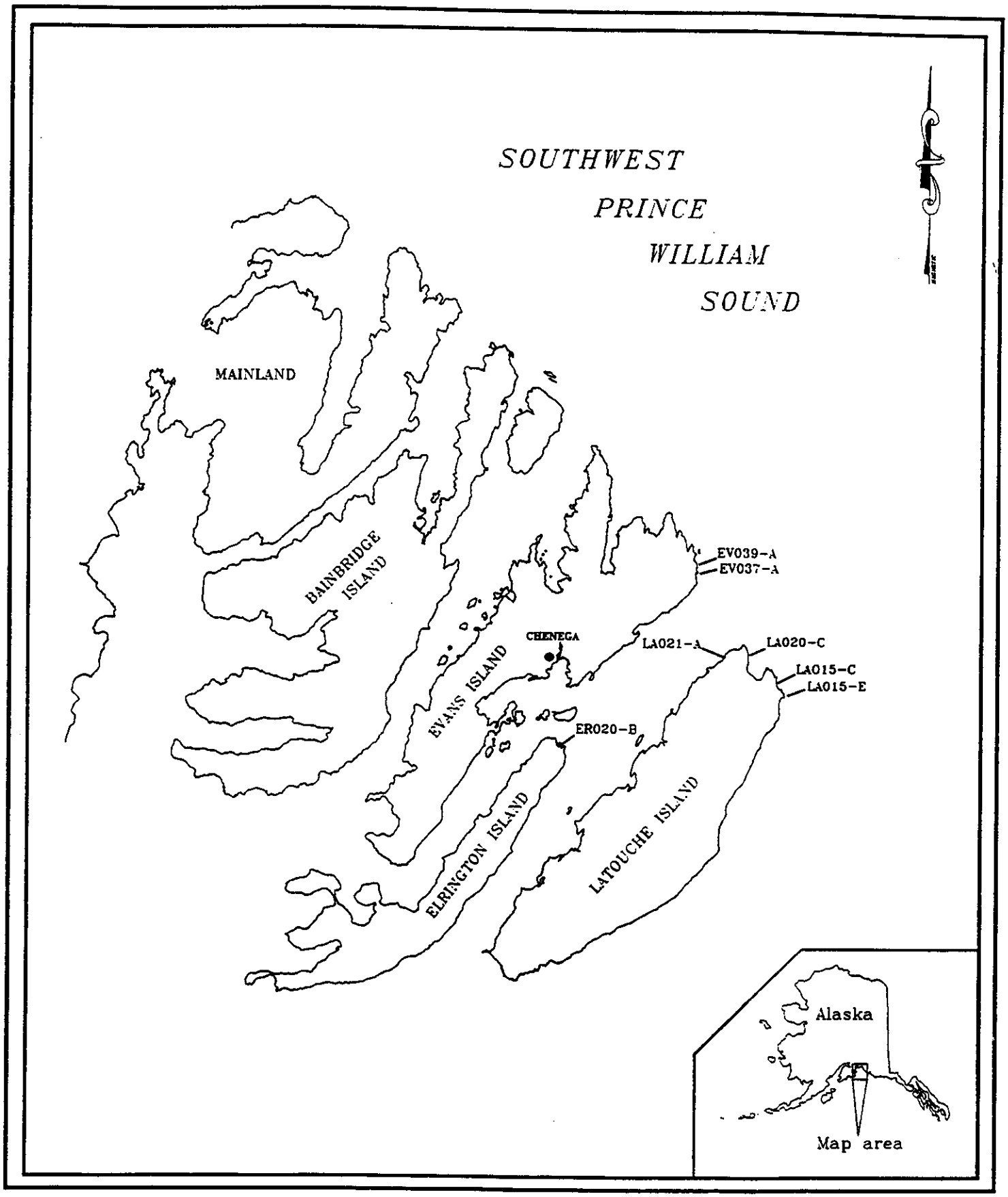


Figure 2. Shoreline subdivisions in southwestern PWS (near Chenega Bay Village) that were surveyed for persistance of residual oiling.

Shoreline Assessments

Results of the additional shoreline assessments showed that little to no improvement had occurred at these sites from 1993 to 1994. In general, the six beaches are characterized by a cobble, boulder or cobble/boulder armor covering a gravel sediment. Visually observable residual oil was found in the upper and middle intertidal zones on five of the six subdivisions. This included surface oil residue ranging from heavy to light, mousse and asphaltic pavement. Most often, the residual oil was found on, or adhering to, or below, the boulder and cobble layers, especially in sheltered crevices and the areas that are protected wave energy.

DISCUSSION

The overall scope of this project was small, as the main focus of the ADEC field manager and Chenega labor crew for the 1994 field season was implementing and conducting the restoration of mussel beds in cooperation with NOAA. There were only a hand full of sites with significant surface oiling where break-up and tilling would be simple and straight forward relative to time, money and effort required to accomplish it. The areas of asphalt oiling that were treated will weather at a faster rate than they would have without intervention. Although manual break-up, tilling and debris removal occurred at limited number of sites the work conducted should diminish the negative effect on visual quality and subsistence and recreational perception of oiling and debris at the sites treated. The additional shoreline surveys further allowed us to understand that remaining surface oil is very stable and that an alternative technology will need to be considered if further treatment is to be conducted. The participation by the village of Chenega was instrumental in identifying areas of particular concern to them. Employing the residents of Chenega had a slight positive effect on employment opportunities for the residents.

CONCLUSIONS

Accelerating the degradation of the asphalt and removing rebar and other clean-up debris will accelerate the recovery of recreational and subsistence use of the areas treated. The manual treatment conducted was very simple and cost effective.

At this point there are very few beaches that would lend themselves to manual treatment with hand tools alone. There is still significant oiling near the community of Chenega and surface oiling in particular appears to be very stable. Based on conversations with village residents, it is obvious that they are not satisfied with the condition of many beaches near the village. The visual evidence of remaining oil has been identified as having an important effect on the use of subsistence resources, both in terms of decreasing the quantity of resources used, and decreasing the confidence in the safety of the resources. There may be good policy reasons for pursuing alternative treatment technologies for beaches located within close proximity to the village. A workshop on the issue of residual oiling was conducted to allow scientists, interested subsistence and other shoreline users, and Trustee Council staff to provide information to the Trustee Council concerning the residual oiling problem and the possibility of additional treatment. A final report on workshop was issued in 1996 by B. Loefler, E. Piper and D. Munson under the title Residual Oiling Workshop, Workshop Report.

ACKNOWLEDGMENTS

Special thanks to Maleen Babcock and Patricia Harris of NOAA's, Auke Bay Laboratory. Charles Selanoff Jr., Clint Gregorioff, Sheri Boyles, Tom Sherman, Richard Kompkoff Jr., Donald Kompkoff Jr., Larry Evanoff, Janice Balluta, Pete Kompkoff Jr., Vern Totemoff and Darryl Totemoff of Chenega Village.

LITERATURE CITED

Barry, J., 1991. MAYSAP Survey, Subdivision SL001D, May Shoreline Assessment Program: Exxon USA, *Exxon Valdez* Oil Spill Response, Anchorage Alaska.

Benson, J., 1991. MAYSAP Survey, Subdivision EL011A, May Shoreline Assessment Program: Exxon USA, *Exxon Valdez* Oil Spill Response, Anchorage Alaska.

Exxon Corporation, 1991. MAYSAP Survey Manual, May Shoreline Assessment Program: Exxon USA, *Exxon Valdez* Oil Spill Response, Anchorage Alaska.

Gibeaut, J.C., E. Piper, D. Munson, J. Matthews, M. Profita, and C. Crosby, 1994. 1993 Shoreline assessment data report: volume 1 (introduction and ground surveys AE005A through EV036A), volume 2 (ground surveys EV037A through KN136A), volume 3 (ground surveys KN209A through LA015D), volume 4 (ground surveys LA015E through TB004A), volume 5 (transect surveys), *Exxon Valdez* Oil Spill Restoration Project (Restoration Project 93038), Alaska Department of Environmental Conservation, Juneau, Alaska.

Gibeaut, J.C., E. Piper, D. Munson, J. Matthews, M. Profita, and C. Crosby, 1995. 1993 Shoreline Oiling Assessment of the *Exxon Valdez* Spill: Restoration Project 93038, Final Report, Alaska Department of Environmental Conservation, Juneau, Alaska.

Loeffler, R., E. Piper, D. Munson, 1996. Residual Oiling Workshop, Workshop Report: *Exxon Valdez* Trustee Council Restoration Office, Anchorage, Alaska.

Owens, E.H. and Taylor, E., 1993, A proposed standardization of terms and definitions for shoreline oiling assessment: Proceedings of the 1993 Arctic and Marine Oil Spill Program (AMOP), Technical Seminar, Technical Seminar, Calgary, Alberta.

APPENDIX A
Glossary: Field Oiling Classification and Survey Terms

Surface Oil Types	Abbreviation	Definition
asphalt/ pavement	AP	Heavily oiled beach sediments held cohesively together.
mousse/pooled oil	MS	Any oil/water emulsion with a thickness of more than 1 cm.
tar balls/tar patties	TB	Small, distinct oil deposits lying on top of the beach surface; possibly binding debris but typically not sediments.
surface oil residue	SOR	Significantly oil coated beach sediments in the top 5 cm; sediments do not form a cohesive layer; may be described as heavy or light.
cover	CV	Oil more than 1 mm to 1 cm thick.
coat	CT	Oil more than 0.1 mm to less than or equal to 1 mm thick; can be easily scratched off with fingernail.
stain	ST	Oil less than or equal to 0.1 mm thick; cannot be easily scratched off with fingernail.
film or sheen	FL	Transparent or translucent film or sheen.
oiled debris	DB	Any oiled debris or cleanup material stranded on a shore.

Surface Oil Distribution Classes	Abbreviation	Definition
continuous	C	Area or band with 91% to 100% oil coverage.
broken	B	Area or band with 51% to 90% coverage.
patchy	P	Area or band with 11% to 50% coverage.
sporadic	S	Area or band with 1% to 10% coverage.
trace	T	Area or band with less than 1% coverage.

Subsurface Oil Types	Abbreviation	Definition
oil pore	OP	Pore space are completely filled with oil resulting in oil oozing out of sediments-water cannot penetrate OP zone.
heavy oil residue	HOR	Pore spaces partially filled with oil residue but not generally flowing out of sediments.
medium oil residue	MOR	Heavily coated sediments; pore spaces are not filled with oil - pore spaces may be filled with water.
light oil residue	LOR	Sediments lightly coated with oil.
oil film	OF	Continuous layer of sheen or film on sediments - water may bead on sediments.
trace	TR	Discontinuous film; spots of oil on sediments; an odor or tackiness with no visible evidence of oil.

Surface and Subsurface Sediment Types	Abbreviation	Definition
bedrock	R	
boulder	B	Greater than 256 millimeters.
cobble	C	64 to 256 millimeters.
pebble	P	4 to 64 millimeters.
granule	G	2 to 4 millimeters
sand	S	0.06 to 2 millimeters
mud/silt	M	Less than 0.06 millimeters.

Tidal Zones	Abbreviation	Definition
supra tidal	SU	Above the upper intertidal zone.
upper intertidal	UITZ	Upper 1/3 of active intertidal zone.
middle intertidal	MITZ	Middle 1/3 of active intertidal.
lower intertidal	LITZ	Lower 1/3 of active intertidal zone.

APPENDIX B
Field Data for 1994 Manual Treatment and Assessments in Prince William Sound

The following information is included for each subsegment of the Oil Removal and Assessment Project. Subdivisions are arranged in alphanumeric order.

- A general discussion and analysis of the physical setting and oiling conditions;
- A restoration and or oiling summary field form on which the surveyor recorded treatment conducted and surface and subsurface oiling;
- A field sketch map showing the distribution of oil and physical features keyed to the data recorded on the oiling summary form.

SEGMENT: AE 005 B

LOCATION: East side of Applegate Island.

OTHER STUDIES

PHYSICAL SETTING

Coastal Morphology and Sedimentology

Deep, protected, pocket beach. Surface sediments are cobbles, pebbles and granules. Vertically dipping fissile shale bedrock outcrops.

Environmental Sensitivity Index (ESI)

Type 7; gravel beach.
Type 8; sheltered rocky.

Fetches and Directions (kilometers)

E= 31.5; NE= 11.0; SE=26

Energy Level

Moderate overall with low and very low sites.

GENERAL BIOLOGICAL SETTING

Eagle Nest.

BEACH RESTORATION AND OILING SUMMARY

As a result of spill studies, rebar stakes were left throughout the tidal flats area. This area is a high human use area with recreational boaters and campers. The crew removed all rebar in the tidal flats area and broke up an area of persisting asphalt 2.5 meters by 14 meters that existed in the supra tidal zone amongst tall beach grass at location 'D'.

AP and SOR remain trapped in vertically dipping shale bedrock. Oil is in the upper part of the high intertidal zone. Remaining oil is similar to that observed in the 1993 survey.

No subsurface oil has been detected since 1991.

AK Dept. of Env. Conservation
1994 Beach Restoration and Shoreline Oiling Summary

Location east side of Applegate Island **Segment** AE005 **Sub-Div** B

Date 7/14/94 **Time:** 0800 **to** 0840

Tide Level: 6.0 ft. **to** 5.0 ft. **Energy Level** L-M **Weather:** Pt cloudy/calm

Nearshore Sheen: N **Photo Roll:** 1 - 2 **Frames:** 20-24 / 1-5

LOC	SURFACE OIL CHARACTER											SURFACE SEDIMENT TYPE	SHORE SLOPE	AREA		ZONE				NOTES
	AP	MS	TB	SOR	CV	CT	ST	FL	DB	NO		V H M L	WIDTH m	LENGTH m	S	UI	MI	LI	
A	T			T								RBCP	L	1	7		X			In vertical shale and Boulder crevices
B	P			P								RCP	M	4	16		X			
C						S	S					CP	L	12	27		X			
D	P											CP	L	2.5	14	X				Broke and tilled AP in tall grass at SWITZ.
E	P			P								RCP	M	17	22		X			

SEGMENT: BP 004 A

LOCATION: North Bainbridge Island, mainland side, northeast of Point Countess.

OTHER STUDIES:

PHYSICAL SETTING:

Coastal Morphology and Sedimentology

Rocky headlands with bays and several pocket beaches. This subdivision is 8287 meters long.

Environmental Sensitivity Index (ESI)

Type 1; exposed rocky.
Type 7; gravel beach.
Type 8; sheltered rocky.

Fetches and Directions (kilometers)

Energy Level

Overall high with some moderate and low areas.

GENERAL BIOLOGICAL SETTING

Anadromous Stream.
Eagle Nest.

RESTORATION AND OILING SUMMARY

This subdivision was scheduled to be looked at during the 1993 restoration survey but was dropped for logistical and technical reasons. Due to the subdivisions large size, (8287 meters), time constraints and not knowing what we would find, both the survey and manual break up were done in summary form. Four seperate beach areas were surveyed and two locations with AP were manually broken up.

At beach site # 3, two areas, locations `G' and `H' had significant amounts of surface AP, SOR and TB. Most of this stable surface oil was broken and tilled by the crew while the survey was being conducted.

Four areas with substantial subsurface oil remain at beach site # 3. At locations `B', `C' and `D', OP and HOR oiling occur just under surface pebbles. This oil is easily uncovered and extremely heavy. At location `F', OP and MS was observed amongst and under boulders.

This subdivision received extensive treatment in 1990 and 1991 including manual removal, mechanical tilling and bioremediation. Of important note is that four anadromous streams exist within this subdivision.

AK Dept. of Env. Conservation
1994 Beach Restoration and Shoreline Oiling Summary

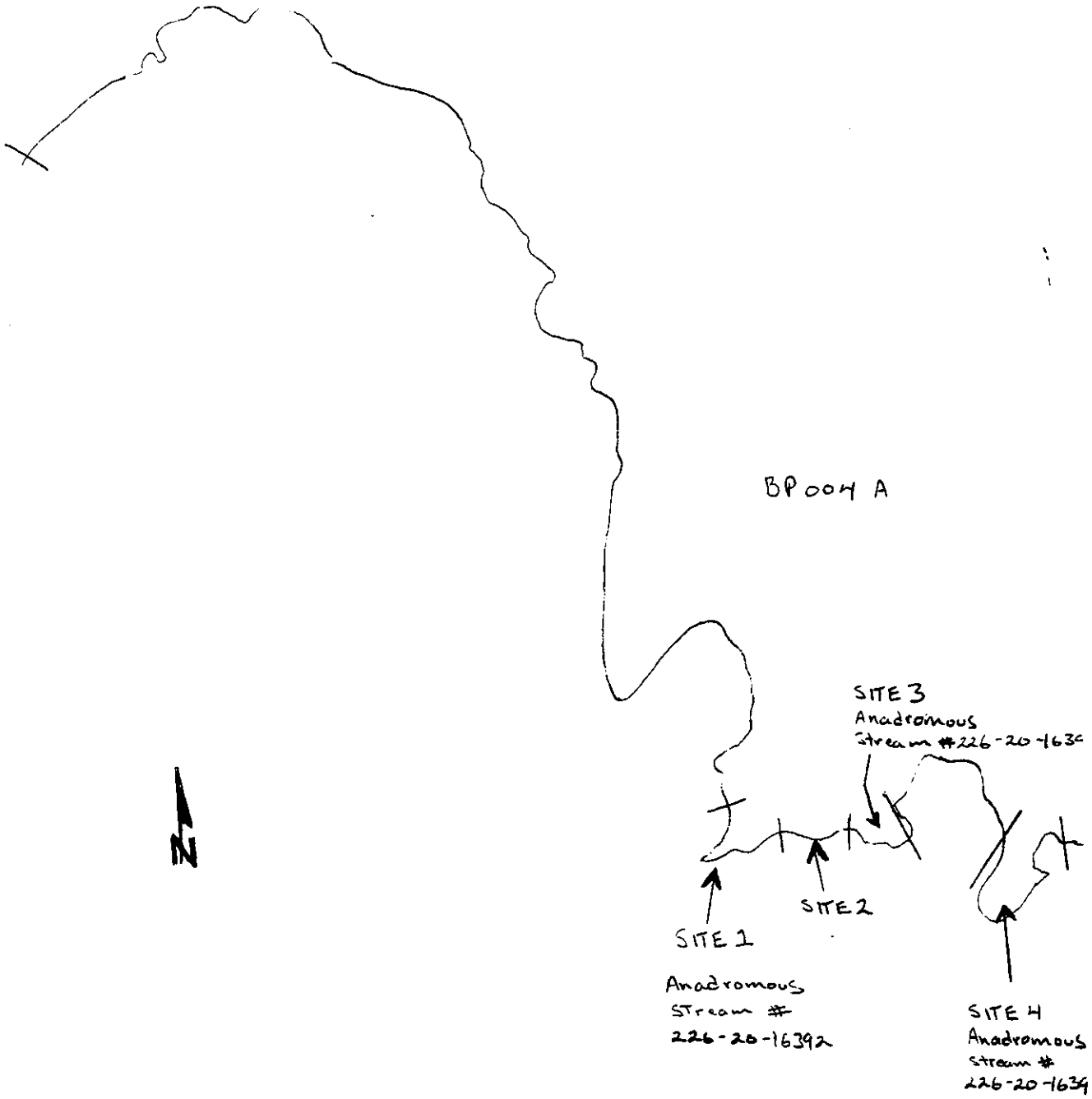
Location Point Counters North Barbara I. **Segment** BP00-4 **Sub-Div** A

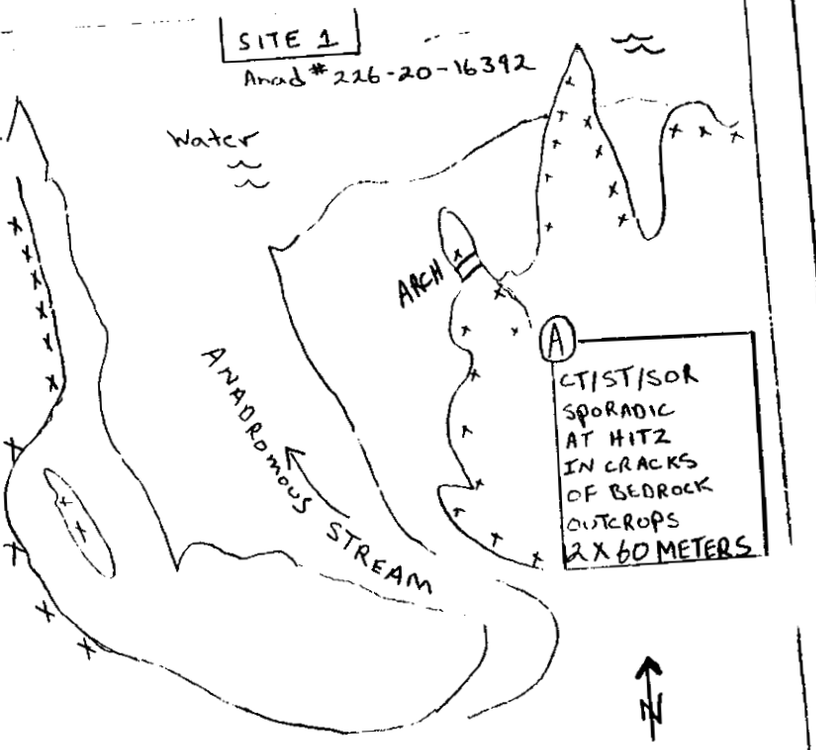
Date 7/14/94 **Time:** 1300 to 1600

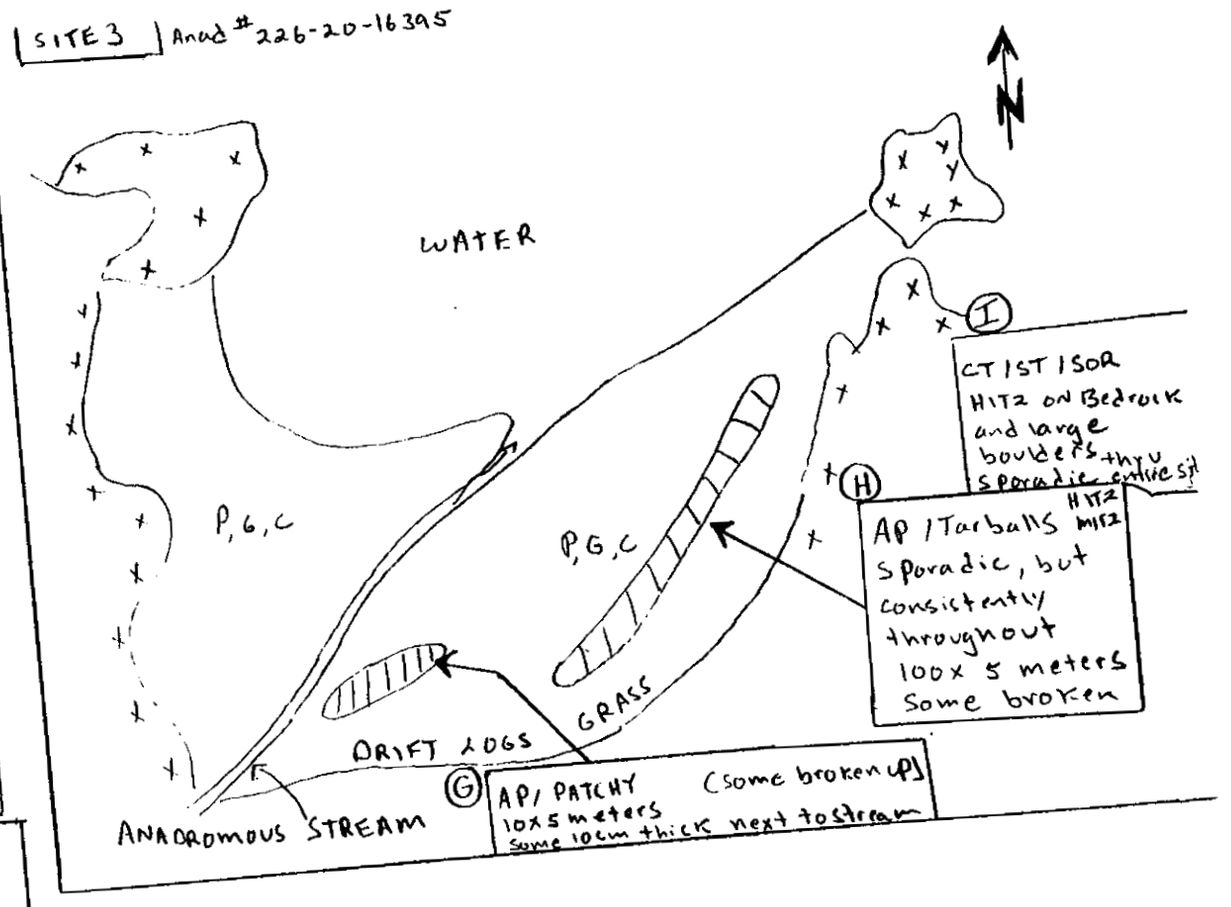
Tide Level: 0 ft. to 8.0 ft. **Energy Level** M-L **Weather:** Cloudy

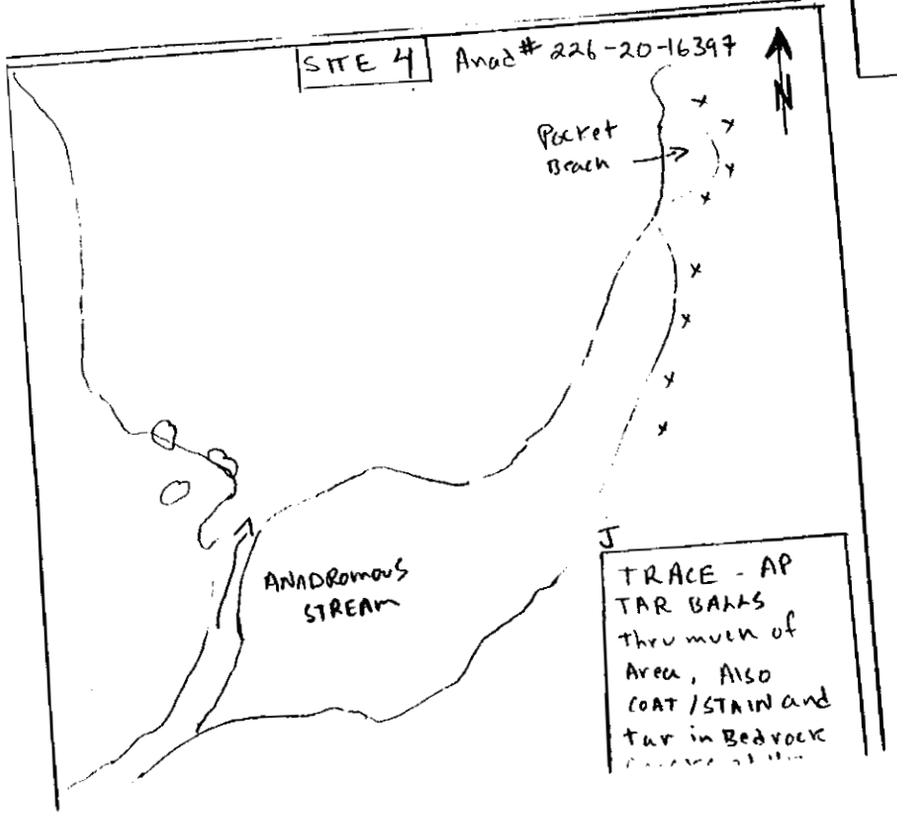
Nearshore Sheen: N **Photo Roll:** 2 - ___ **Frames:** 11-24

LOC	SURFACE OIL CHARACTER											SURFACE SEDIMENT TYPE	SHORE SLOPE	AREA		ZONE				NOTES
	AP	MS	TB	SOR	CV	CT	ST	FL	DB	NO		V H M L	WIDTH m	LENGTH m	S	UI	MI	LI	
A				C	S	S						RBC	H-M	2	60		X			In cracks of Bedrock outcrops
B												PGC	M	.5	5		X			OP sediments under pebble veneer starting at 5cm.
C												BPGC	M	2	4		X			HOR/OP sediments Amongst Boulders under Pebbles.
D													L	4	22		X			HOR/OP sediments ~5cm below pebble surface. E2 to overlap
E				S		S	S					RP	H-M	2	10		X			
F												BPGC	M	1	2		X			OP sediments Amongst Rids just under pebble surface seds
G	P											CPG	L	5	10			X		up to 10 cm thick, next to Anadromous Stream, some broken
H	S		S									PGC	L	5	100		X	X		occurs consistently throughout some broken-up.
I				S		S	S					RPCP	M	5	~200		X			occurs thru entire area
J	T		T			T	T					RBC	H-M				X			occurs in Trace amounts thru entire area

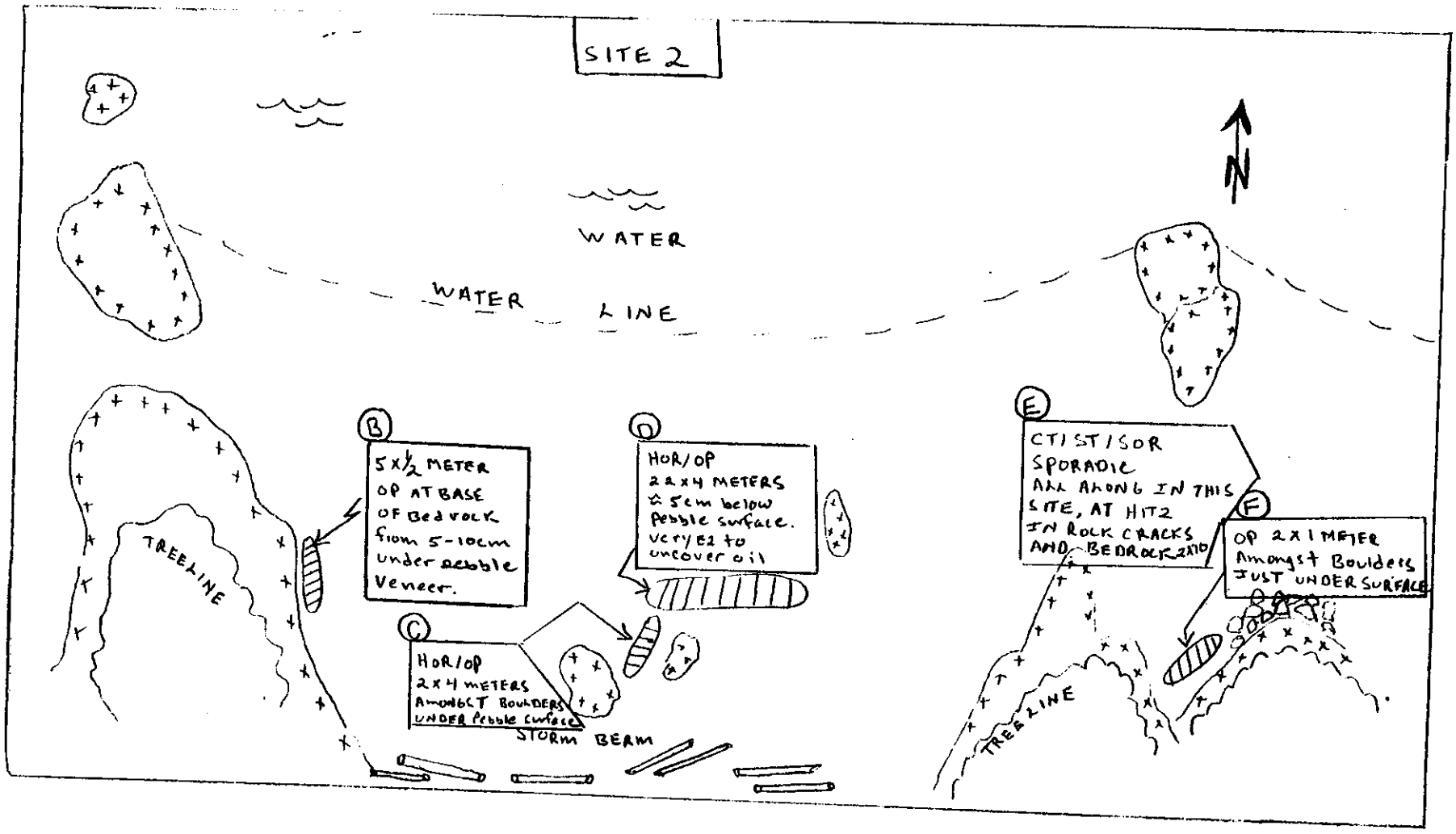

BROOM A
N
SITE 3
Anadromous
Stream #226-20-1634
SITE 2
SITE 1
Anadromous
Stream #
226-20-16392
SITE 4
Anadromous
Stream #
226-20-1639







Comments: Not an intensive survey. Basically just walked along and scraped the surface to spot check for subsurface and made quick observations and notes. Also broke-up AP patches throughout as walked along.


SITE 2
N
WATER
WATER LINE
TREELINE
B
5 x ½ METER
OP AT BASE
OF Bedrock
from 5-10cm
under pebble
Veneer.
C
HOR/OP
2 x 4 METERS
AMONGST BOULDERS
UNDER Pebble surface
STORM BEAM
D
HOR/OP
2 x 4 METERS
± 5cm below
pebble surface.
very EZ to
uncover oil
E
CT/ST/SOR
SPORADIC
ALL ALONG IN THIS
SITE, AT HIT2
IN ROCK CRACKS
AND BEDROCK-2X10
F
OP 2 x 1 METER
Amongst Boulders
JUST UNDER SURFACE
TREELINE

SEGMENT: ER 011 A

LOCATION: Southwestern Elrington Island.

OTHER STUDIES

PHYSICAL SETTING

Coastal Morphology and Sedimentology

Sandy prograding spit associated with a stream opening and delta. A lagoon is behind the spit. The extreme southern portion of this site is a sandy beach associated with a small stream. Along the shore to the north the sediments become boulders, cobbles, and pebbles in the lower and mid intertidal but are sandier in the upper intertidal. The northern part of the site is mixed sand and pebble gravel spit that is prograding to the south and impinging on the stream channel. Swash bars are oriented to the south and large runnels are present. Significant on shore and and offshore sediment transport occurs along this beach.

Environmental Sensitivity Index (ESI)

Type 6; mixed sand and gravel.

Fetches and Directions (kilometers)

N= 5.5

Energy Level

Low to moderate despite short fetch, much wave energy probably arrives after refraction.

GENERAL BIOLOGICAL SETTING

Fry release.
Fish harvest area.
Deer harvesting.

BEACH RESTORATION AND OILING SUMMARY

AP was the only oil type present at this site. All visible areas of AP were manually broken up and tilled at locations `A', `B', `C', `D', `E', `F' and `G'.

Subsurface oil observed in 1993 survey consisted of small amounts of buried AP in the upper intertidal zone. The work objective for this site was strictly manual break up and an extensive subsurface oiling survey was not conducted. This segment has a history of oil becoming buried one year and reappearing the next and hence some buried asphalt probably remains.

AK Dept. of Env. Conservation
1994 Beach Restoration and Shoreline Oiling Summary

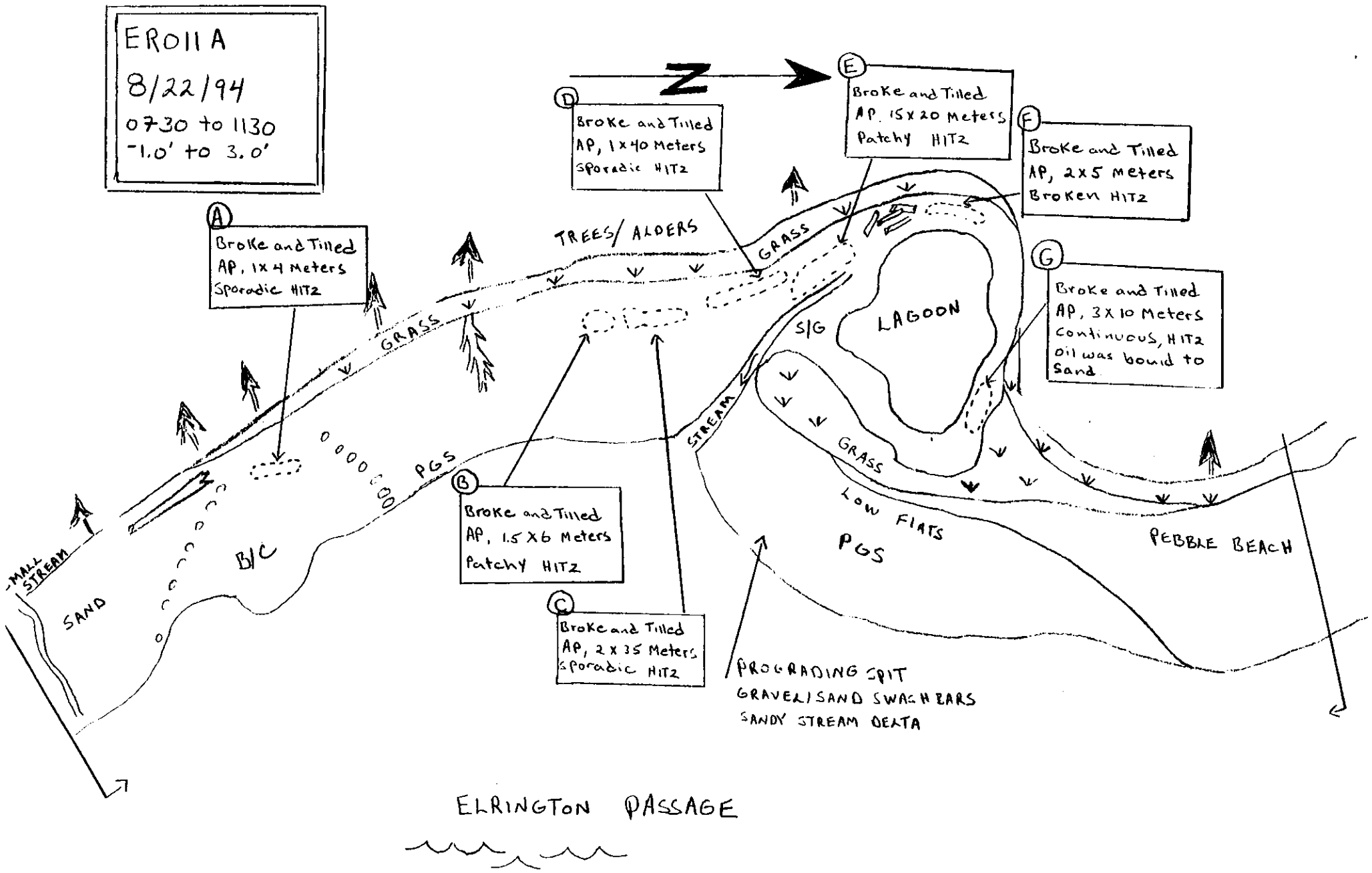
Location Southwestern Elrington Island **Segment** ER011 **Sub-Div** A

Date 8/22/94 **Time:** 0730 **to** 1130

Tide Level: -1.0 ft. **to** +.0 ft. **Energy Level** L-M **Weather:** Sun

Nearshore Sheen: N **Photo Roll:** 14 - 15 **Frames:** 18-24 / 1-24

LOC	SURFACE OIL CHARACTER										SURFACE SEDIMENT TYPE	SHORE SLOPE	AREA		ZONE				NOTES
	AP	MS	TB	SOR	CV	CT	ST	FL	DB	NO		VHML	WIDTH m	LENGTH m	S	UI	MI	LI	
A	S										BC	L	1	4		X			Broke and Tilled AP
B	P										PGS	L	1.5	6		X			Broke and Tilled AP
C	S										PGS	L	2	35		X			Broke and Tilled AP
D	S										PGS	L	1	40		X			Broke and Tilled AP
E	P										PGS	L	15	20		X			Broke and Tilled AP
F	P										PGS	L	2	5		X			Broke and Tilled AP
G	C										S	L	3	10		X			Broke and Tilled AP, oil was bound to sand


EROIIA
8/22/94
0730 to 1130
-1.0' to 3.0'
N
A
Broke and Tilled
AP, 1x4 Meters
Sporadic HITz
B
Broke and Tilled
AP, 1.5x6 Meters
Patchy HITz
C
Broke and Tilled
AP, 2x35 Meters
Sporadic HITz
D
Broke and Tilled
AP, 1x40 Meters
Sporadic HITz
E
Broke and Tilled
AP, 15x20 Meters
Patchy HITz
F
Broke and Tilled
AP, 2x5 Meters
Broken HITz
G
Broke and Tilled
AP, 3x10 Meters
Continuous, HITz
oil was bound to
Sand
TREES/ ALDERS
GRASS
GRASS
S/G
LAGOON
STREAM
GRASS
LOW FLATS
PGS
PEBBLE BEACH
PGS
SMALL STREAM
SAND
B/C
PROGRADING SPIT
GRAVEL/SAND SWASH BARS
SANDY STREAM DELTA
ELRINGTON PASSAGE

SEGMENT: ER 020 B

LOCATION: North end of Elrington Island.

OTHER STUDIES

PHYSICAL SETTING

Coastal Morphology and Sedimentology

Two adjacent pocket beaches. The beach to the west is relatively broad in shape and is partitioned by outcrops and has a tombolo behind which a mussel bed is present. A small stream cuts across the western beach on its east side. The eastern pocket beach is narrow and deep. Both beaches have angular boulders along the limbs that gradually decrease in size to more rounded small cobbles and large pebbles with a sandy, granular matrix. Sediments in the east pocket are generally coarser and less rounded than in the west pocket. Upper intertidal pebble berms are present at both sites.

Environmental Sensitivity Index (ESI)

Type 7; gravel beach.
Type 8; sheltered rocky.

Fetches and Directions (kilometers)

NE= 37

Energy Level

Moderate with some low areas.

GENERAL BIOLOGICAL SETTING

Mussel bed.
Eagle nest.
Fish harvest area.
Deer harvesting.

OILING SUMMARY

Remaining surface oil is similar to that reported in the 1993 survey. The heaviest surface oil observed was SOR around two areas of protruding bedrock at locations `F' and `H'. When dug into this oil was liquid and gooey. Moderate amounts of weathered AP and SOR occurs interstitially amongst boulders along the limbs of the pockets. Other surface oil consisted of CT and ST on bedrock outcrops and other isolated areas of AP and SOR.

Substantial amounts of subsurface oil remains including OP and HOR types. Three areas show the greatest amount observed, and occur behind the tombollo near pits 27 and 28, and at location `H' just under surface pebbles, in the central part of the eastern pocket beach in the upper intertidal zone.

This segment received a substantial amount of manual treatment in 1990 and aggressive mechanical and manual treatment in 1991.

AK Dept. of Env. Conservation
1994 Shoreline Oiling Summary

Location north end ELRINGTON ISLAND **Segment** ER020 **Sub-Div** B

Date 8/30/94 **Time:** 1220 **to** 1540

Tide Level: 5.0' **ft. to** 5.0' **ft.** **Energy Level** Moderate to LOW **Weather:** CLOUDY

Nearshore Sheen: N **Photo Roll:** 17 - 18 **Frames:** 1-24 / 1-4

LOC	SURFACE OIL CHARACTER										SURFACE SEDIMENT TYPE	SHORE SLOPE	AREA		ZONE				NOTES
	AP	MS	TB	SOR	CV	CT	ST	FL	DB	NO		VHML	WIDTH m	LENGTH m	S	UI	MI	LI	
A				P		S					BCP	M	5	10		X			
B	P			P		S					RBC	H	5	40		X			Amongst B/C
C	S			S		S	S				CB	M	20	20		X			Amongst B/C
D				S							CP	L	.5	4			X		Scattered SPOTS SOR AT LIT2
E	P			P		S	S				BC	M	5	40		X			Amongst B/C
F				P							RBC	M	5	10		X			Oil Present Around Protruding Bedrock
G	P			P	P	P	P				RBC	M-V	3	5		X			AP/SOR Amongst B/C CVICTICT on Protected sides Bedrock
H	P			P							RBCP	M	2	5			X		Around Protruding Bedrock
I	S		S	S							BC	M-H	4	15		X			Amongst B/C

ERO21B

PIT NO.	PIT DEPTH (cm)	SUBSURFACE OIL CHARACTER							OILED ZONE	CLEAN BELOW	H2O LEVEL	SHEEN COLOR	PIT ZONE				SURFACE-SUBSURFACE SEDIMENTS	NOTES
		OP	HOR	MOR	LOR	OF	TR	NO	(cm-cm)	Y/N	(cm)	B R S N	S	UI	MI	LI		
1	27							X			20-27	N				X	RCP/PG	
2	35							X			28-35	N				X	BCP/PG	
3	25			X					20-35	N					X		BCP/PG	
4	32							X			18-32	N				X	BCP/PG	
5	30							X			28-30	N			X		BCP/PG	
6	20			X					8-U	U	12-20	S B			X		CP/PG	
7	24				X				20-24	N	22-24	C B		X			CP/PG	
8	36							X			22-36	N			X		CP/PG	
9	27							X							X		CP/PG	
10	28							X			15-28	N				X	BCPG/CPG	
11	26							X			16-26	N			X		CPG/PG	
12	15		X						2-12	Y					X		CP/PG	Just beneath surface sed's
13	12		X						3-10	Y					X		CP/PG	Buried AP like oil
14	13			X					3-9	Y					X		CP/PG	very black mobile oil
15	21							X			11-21					X	CP/CPG	Friable buried oil
16	11			X					2-6	Y					X		CP/PG	
17	16	X							6-16	N	9-16	BRS			X		CP/PG	
18	28							X								X	CP/PG	
19	23							X								X	CPG/PG	

ERO20B

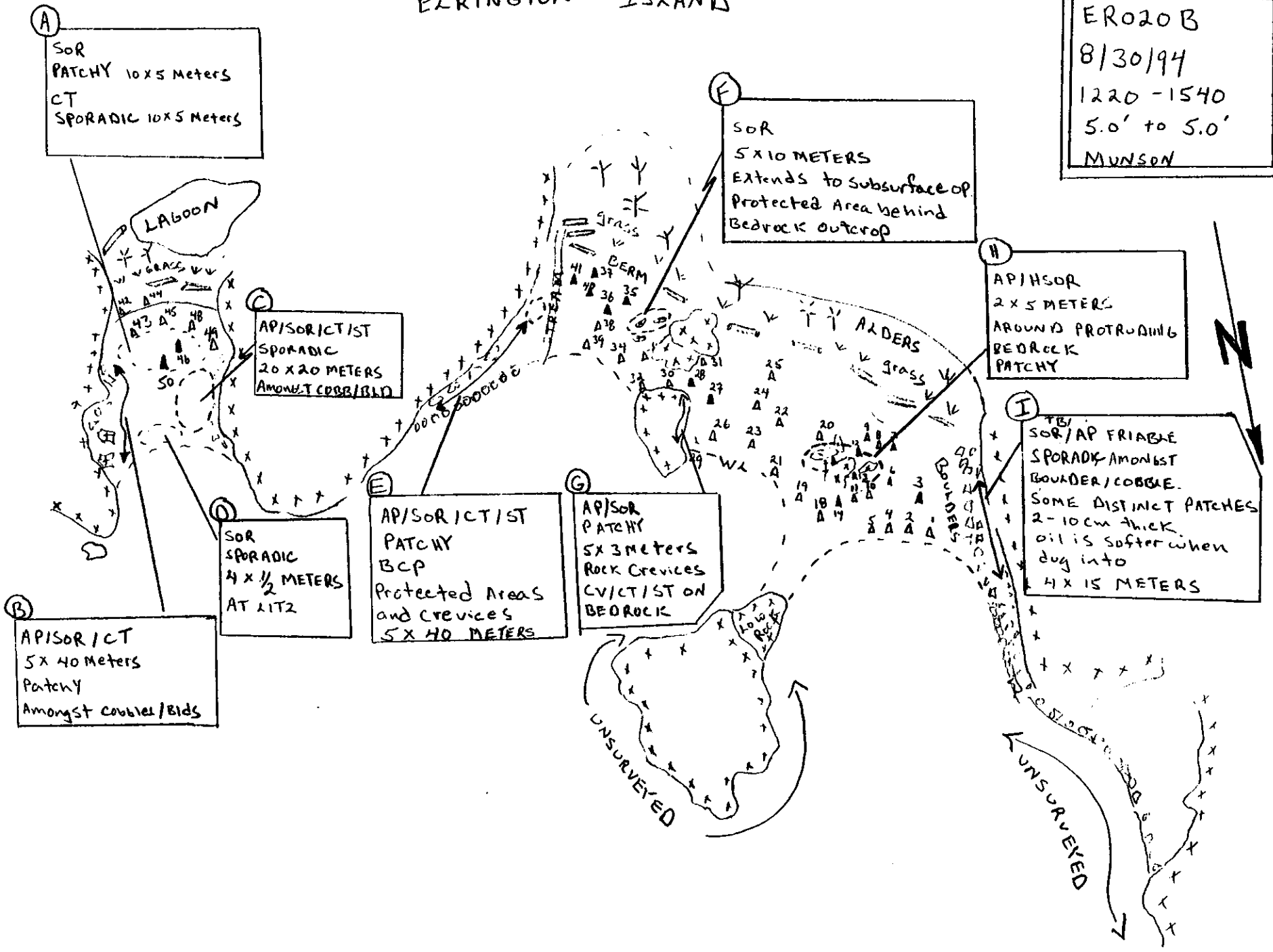
PIT NO.	PIT DEPTH (cm)	SUBSURFACE OIL CHARACTER							OILED ZONE	CLEAN BELOW	H2O LEVEL	SHEEN COLOR	PIT ZONE				SURFACE-SUBSURFACE SEDIMENTS	NOTES
		OP	HOR	MOR	LOR	OF	TR	NO	(cm-cm)	Y/N	(cm)	B R S N	S	UI	MI	LI		
20	37				X				14-U	U	28-37	S			X		CPG/PG	
21	28							X			17-28					X	CPG/PG	
22	27							X							X		CPG/PG	
23	26							X								X	CPG/PG	
24	35							X							X		CPG/PG	
25	33							X							X		CP/PG	
26	24							X									CP/PG	
27	11	X							2-11	N					X		CP/PG	
28	23	X							5-10	Y					X		CP/PG	
29	23							X								X	CP/PG	
30	29							X							X		BCP/PGS	
31	28							X							X		CP/PG	
32	27							X								X	CP/PG	Mussels
33	19							X							X		CP/PG	
34	18							X							X		CP/PG	
35	12	X							3-12	N					X		CP/PG	
36	21			X					7-16	Y					X		PG/PGS	weathered subsurface oil
37	25	X							19-24	Y					X		CPG/PGS	

ER0x CB

PIT NO.	PIT DEPTH (cm)	SUBSURFACE OIL CHARACTER							OILED ZONE	CLEAN BELOW	H2O LEVEL	SHEEN COLOR	PIT ZONE				SURFACE-SUBSURFACE SEDIMENTS	NOTES
		OP	HOR	MOR	LOR	OF	TR	NO	(cm-cm)	Y/N	(cm)	B R S N	S	UI	MI	LI		
38	24							X							X		PG/PGS	
39	22							X								X	PG/PGS	
40	34	X							25-31	Y				X			PG/PGS	
41	32		X						16-29	Y					X		PG/PGS	
42	20							X					X				CP/PGS	
43	18							X						X			CPG/PGS	organics in pit
44	31							X					X				CPG/PGS	
45	28							X						X			CPG/PGS	
46	22			X					17-U	U	14-22	S		X			PC/PG	organics
47	40							X					X				CP/PG	organics
48	22							X						X			CP/PG	organics Needles
49	18							X						X			BCP/PGS	organics
50	24					X			U-U	U	5-24	S			X		CP/PG	

ELRINGTON ISLAND

ER020B
8/30/94
1220 - 1540
5.0' to 5.0'
MUNSON



SEGMENT: EV037 A

LOCATION: Chenega Area Group, northeastern Evans Island.

OTHER STUDIES

PHYSICAL SETTING

Coastal Morphology and Sedimentology

Beach `A' is the northern area surveyed and includes two irregularly shaped pocket beaches separated by a mostly intertidal promontory. Sediments are very poorly sorted, angular, compact cobbles to large boulders with pebbles and subsurface granular matrix. Bedrock outcrops are also present.

Location `B' as designated on the sketch map is a small beach with relatively sorted, rounded, cobble gravel, and high-tide berms in the mid to upper intertidal and boulders in the mid to low intertidal. Peat underlies portions of location `B'. Beach `B' is to the south of beach `A' and is a broad pocket beach with very poorly sorted sediments similar to beach `A'. Very large boulders and bedrock dominate on the southern limb of this beach.

Environmental Sensitivity Index (ESI)

Type 1; exposed rocky.
Type 7; gravel beach.

Fetches and Directions (kilometers)

NE= 37

Energy Level

Moderate.

GENERAL BIOLOGICAL SETTING

Eagle nest.
Fish harvesting.
Deer harvesting.

OILING SUMMARY

In beach `A' one very large area, location `A' at the southern end of the site in the upper intertidal zone has a relatively high concentration of AP and SOR persisting amongst the large boulders and cobbles. Although much smaller than location `A', location `C' has heavy SOR and MS type oil persisting among and beneath boulders. In beach `B' two adjacent areas with significant AP and SOR and MS under boulders persists at locations `D' and `E'.

In beach `A' one area with significant subsurface oil remains. This area is associated with surface location `A' on the 1993 and 1994 surveys. Here the AP and SOR extends to subsurface OP among the boulders. In beach `B', subsurface oil including OP and HOR was located discontinuously throughout the main beach.

AK Dept. of Env. Conservation
1994 Shoreline Oiling Summary

Location northeastern Evans Island **Segment** EV037 **Sub-Div** A

Date 8/19/94 **Time:** 0930 **to** 1200

Tide Level: 3.0 ft. **to** 9.0 ft. **Energy Level** Moderate **Weather:** SUN

Nearshore Sheen: N **Photo Roll:** 12 - 13 **Frames:** 20-24 / 1-11

LOC	SURFACE OIL CHARACTER										SURFACE SEDIMENT TYPE	SHORE SLOPE	AREA		ZONE				NOTES
	AP	MS	TB	BOR	CV	CT	ST	FL	DB	NO		V H M L	WIDTH m	LENGTH m	S	UI	MI	LI	
A	P			P		C	S				RBCP	V-M	5-10	90		X			
B	S										BCP	M	2	5	X				
C	P			P		S	S				BCP	M	8	10		X			
D	P			P		S	S				RBC	V-M	3	6		X			
E	P			P		C	S				BC	M	5	20		X			
F	S					S	S				BCP	M	2	5	X				

EV037 A

PIT NO.	PIT DEPTH (cm)	SUBSURFACE OIL CHARACTER							OILED ZONE	CLEAN BELOW	H2O LEVEL	SHEEN COLOR	PIT ZONE				SURFACE-SUBSURFACE SEDIMENTS	NOTES
		OP	HOR	MOR	LOR	OF	TR	NO	(cm-cm)	Y/N	(cm)	B R S N	S	UI	MI	LI		
1	24				X				6-13	Y				X			BCP/PG	
2	30							X						X			BCP/PG	
3	31							X						X			BCP/PG	
4	28	X							8-U	U	25-28	S			X		BCP/PG	mousse/ oil in this Pit
5	26							X							X		BCP/PG	
6	21	X							10-U	U					X		BCP/PG	very oily/sub-surf at this line
7	24						X								X		BCP/PG	End of oil at this line
8	18	X							9-U	U	14-18	S			X		BCP/PG	
9	31						X		U-U	U	29-31	S			X		BCP/PG	very light
10	15		X						9-U	U					X		BCP/PG	
11	26	X							7-U	U	20-26	BS			X		BCP/PG	
12	23							X			19-23	N			X		BCP/PG	
13	26		X						10-U	U	20-26	S B			X		BCP/PG	
14	19							X							X		BCP/PG	
15	21			X					6-U	U	10-15	S B		X			BCP/PG	
16	27							X						X			BCP/PG	
17	18			X					8-18	N	13-18	S B		X			BCP/PG	
18	26							X						X			BCP/PG	

EV037A

PIT NO.	PIT DEPTH (cm)	SUBSURFACE OIL CHARACTER							OILED ZONE	CLEAN BELOW	H2O LEVEL	SHEEN COLOR	PIT ZONE				SURFACE-SUBSURFACE SEDIMENTS	NOTES
		OP	HOR	MOR	LOR	OF	TR	NO	(cm-cm)	Y/N	(cm)	B R S N	S	UI	MI	LI		
19	27						X		0-0					X			BCP/PG	

SKETCH "A"

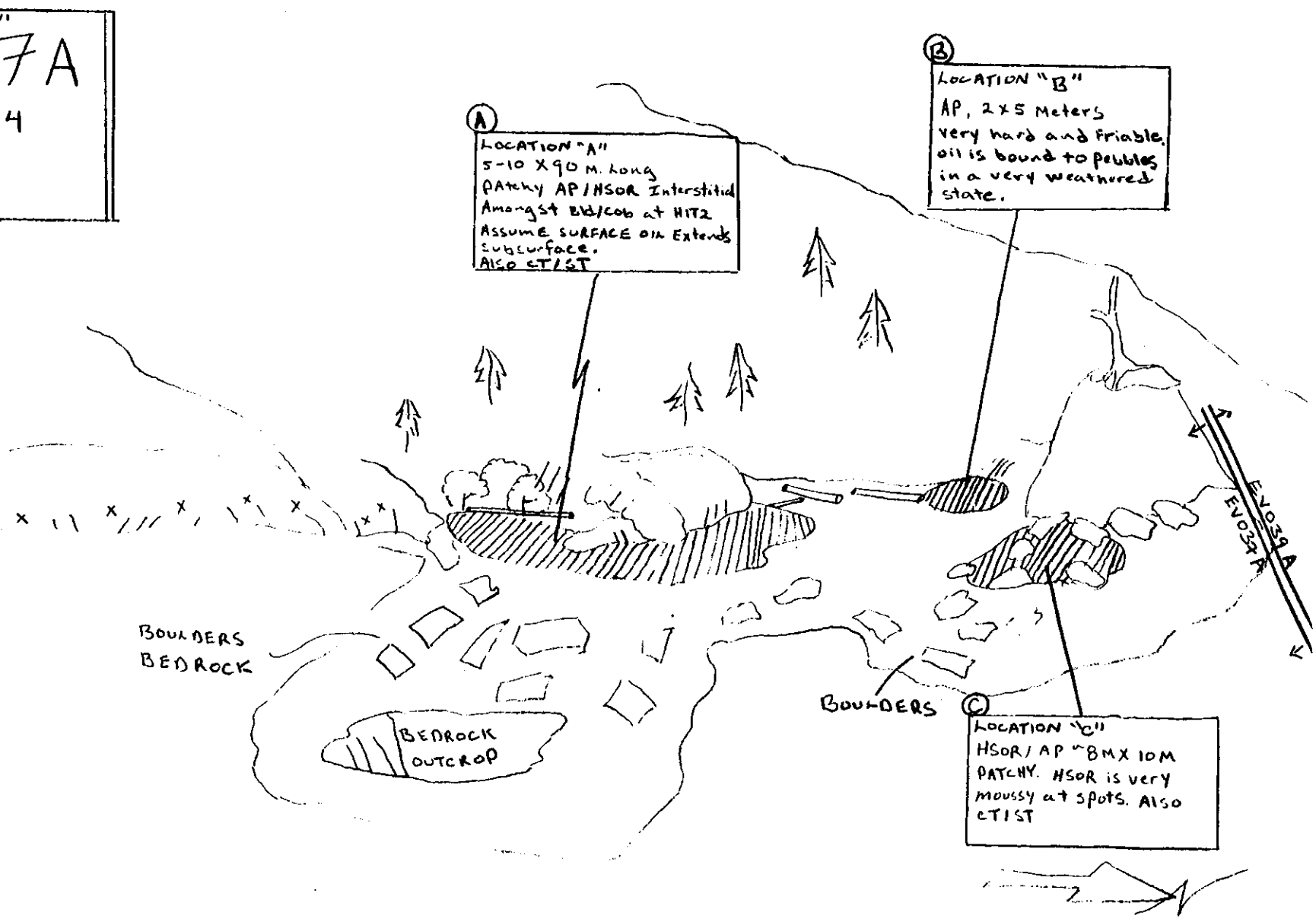
EV-37A

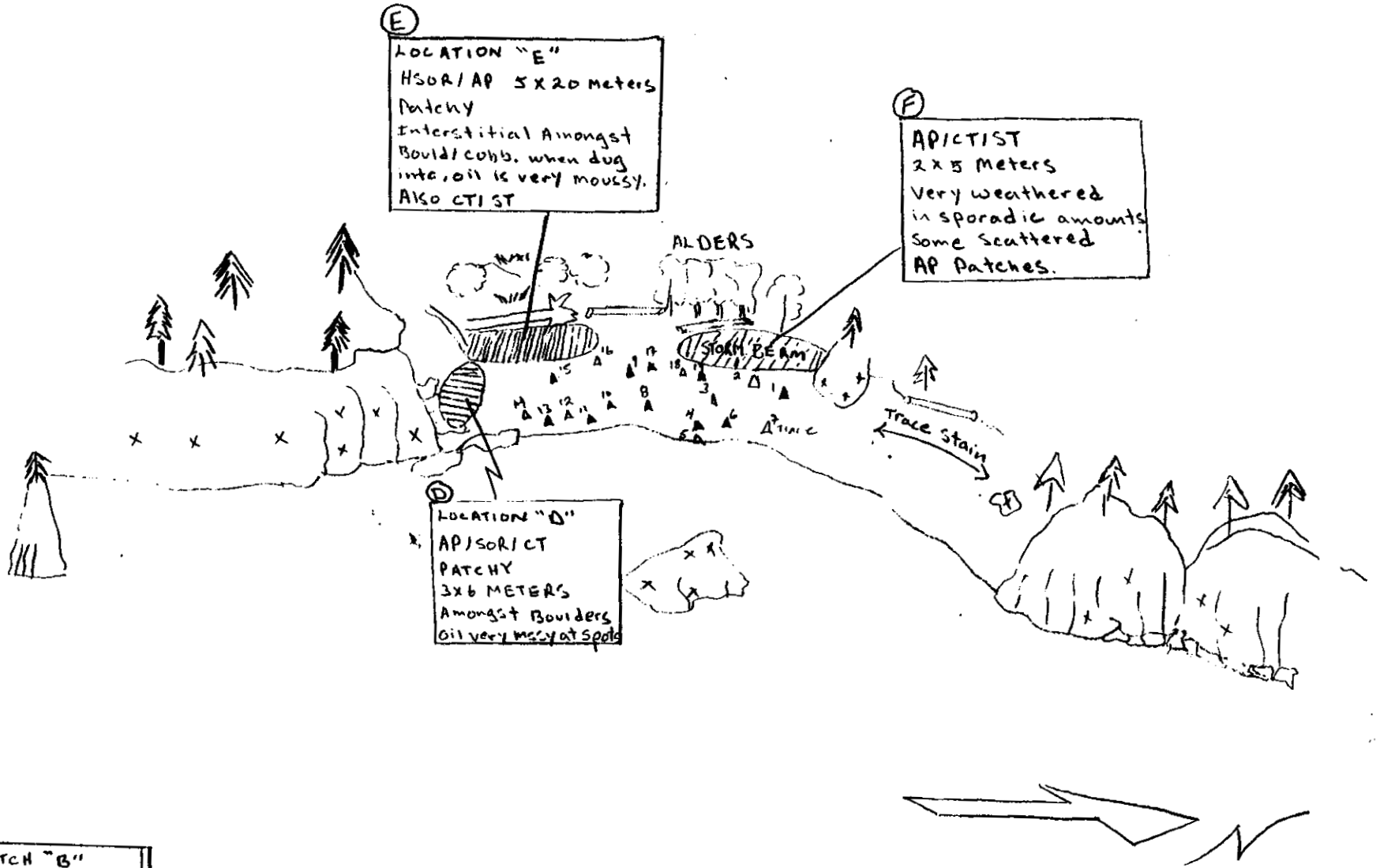
8-19-94

0930 - 1200

3.0' - 9.0'

MUNSON





SKETCH "B"

EV-37A

8-19-94

0930 - 1200

3.0' - 9.0'

MUNSON

SEGMENT: EV039A

LOCATION: Chenega Island Area Group, northeastern Evans Island.

OTHER STUDIES

PHYSICAL SETTING

Coastal Morphology and Sedimentology

Broad irregularly shaped pocket beach bound by low-lying promontories. Sediments are poorly sorted, subangular to rounded pebbles to boulders with much bedrock outcrop. Freshwater flows across the central part of the beach and is noted as a stream in the 1993 field sketch. The northern part of this site consists of rounded large pebble gravel and high-tide berms in the upper intertidal which grades to cobbles and small boulders in the lower intertidal. The area south of the stream, which is designated in the field sketch, consists of boulders and much bedrock outcrop.

Environmental Sensitivity Index (ESI)

Type 1; exposed rocky.
Type 7; gravel beach.

Fetches and Directions (kilometers)

NE= 37

Energy Level

Overall high with some moderate areas.

GENERAL BIOLOGICAL SETTING

Eagle nest.
Fish harvesting.
Deer harvesting.

OILING SUMMARY

A substantial area of AP and SOR oiling occurs on the south part of the this site at location `C'. The AP and SOR is among boulders especially in wave shadowed or protected areas. Location `A' is much smaller with sporadic and more weathered SOR, CT, ST and TB type oiling.

Significant subsurface oiling coincides with surface AP and SOR at location `C' as described above. In addition, an isolated but very heavy area of subsurface OP was located at location `B' just under surface sediments of cobble and pebble.

This site received aggressive manual and mechanical treatment in 1991.

AK Dept. of Env. Conservation
1994 Shoreline Oiling Summary

Location Northeastern Evans Island **Segment** EV039 **Sub-Div** A

Date 8/19/94 **Time:** 0730 **to** 0930

Tide Level: 1.2 **ft. to** 3.0 **ft.** **Energy Level** Moderate **Weather:** SUN

Nearshore Sheen: N **Photo Roll:** 12 - ____ **Frames:** 1-19

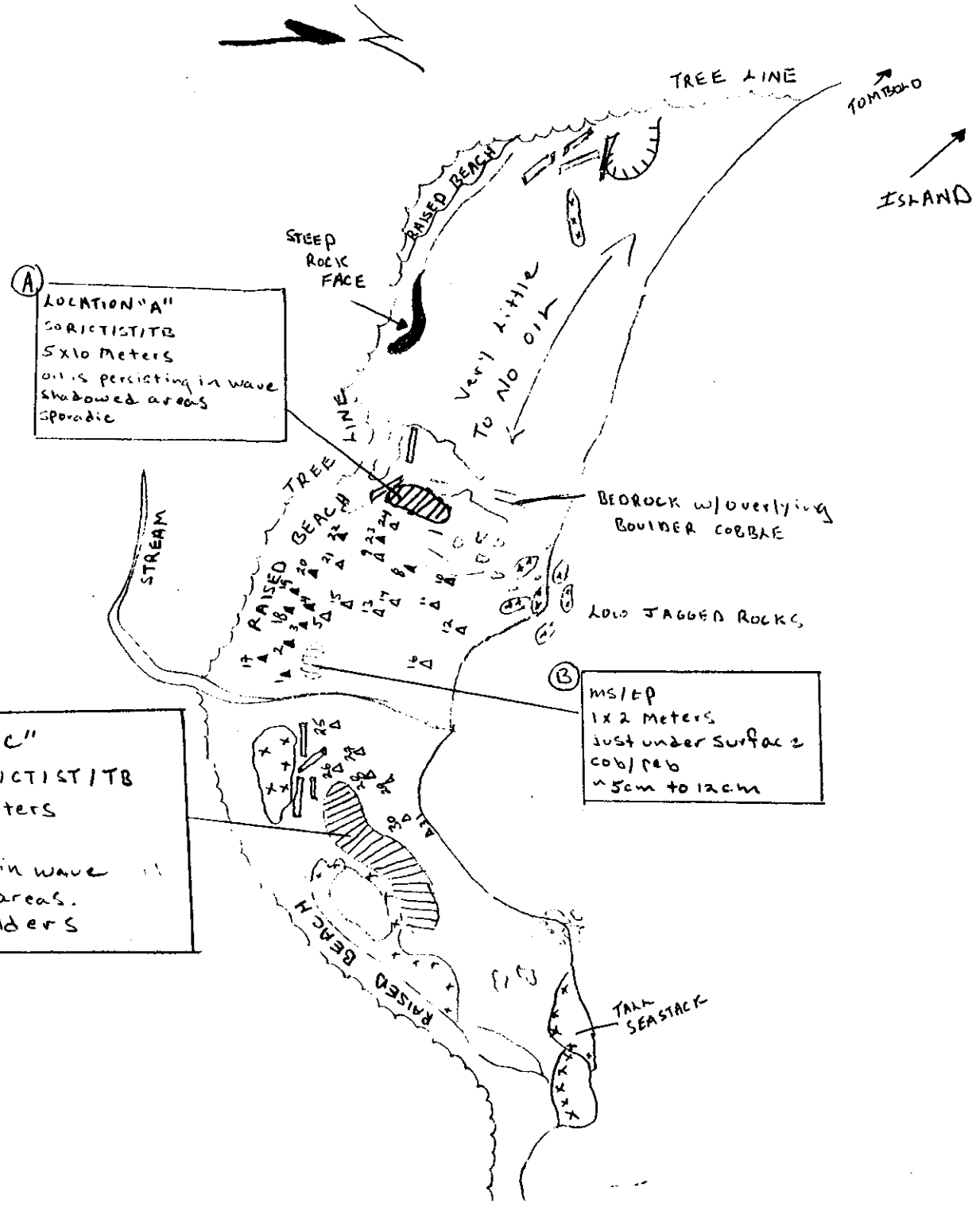
LOC	SURFACE OIL CHARACTER										SURFACE SEDIMENT TYPE	SHORE SLOPE	AREA		ZONE				NOTES
	AP	MS	TB	SOR	CV	CT	ST	FL	DB	NO		V H M L	WIDTH m	LENGTH m	S	UI	MI	LI	
A			S	S		S	S				R	M-L	5	10	X	X			
B		C									PCP	M	1	2		X			
C	P		S	P		S	S				RBC	H-M	15	60		X			

PIT NO.	PIT DEPTH (cm)	SUBSURFACE OIL CHARACTER							OILED ZONE	CLEAN BELOW	H2O LEVEL	SHEEN COLOR	PIT ZONE				SURFACE-SUBSURFACE SEDIMENTS	NOTES
		OP	HOR	MOR	LOR	OF	TR	NO	(cm-cm)	Y/N	(cm)	B R S N	S	UI	MI	LI		
1	19			X					8 - 12	Y				X			CP/PG	Hardened AP like
2	20			X					10 - 20	N				X			CP/PG	Hardened sub-surface AP like
3	20		X						9 - 14	Y				X			CP/PG	
4	18			X					10 - 15	Y				X			CP/PG	
5	13							X						X			CP/PG	
6	30			X					27 - 30	N				X			BCP/CPG	
7	31			X					12 - 18	Y				X			BCP/CPG	weathered sub-surface oil
8	27		X						10 - 17	Y				X			BCP/CPG	well defined layer
9	55							X					X				PG/G	
10	19							X							X		BCP/CPG	
11	23							X							X		BCP/CPG	
12	19							X							X		BCP/CPG	
13	27							X							X		BCP/CPG	
14	18							X							X		BCP/CPG	
15	34							X						X			BCP/PG	
16	23							X						X			BCP/PG	
17	42			X					18 - 27	Y			X				CPG/PG	Base of Storm Berm
18	31			X					13 - 19	Y			X					Base of Storm Berm

PIT NO.	PIT DEPTH (cm)	SUBSURFACE OIL CHARACTER							OILED ZONE	CLEAN BELOW	H2O LEVEL	SHEEN COLOR	PIT ZONE				SURFACE-SUBSURFACE SEDIMENTS	NOTES
		OP	HOR	MOR	LOR	OF	TR	NO	(cm-cm)	Y/N	(cm)	B R S N	S	UI	MI	LI		
19	36			X					19-25	Y				X			CPG/PG	Base of Storm Peri...
20	52			X					15-22	Y				X			CPG/PG	Base of Storm Peri...
21	46							X						X			CPG/PG	Base of Storm Peri...
22	50			X					27-35	Y				X			CPG/PG	weathered subsurface oil
23	48			X					24-30	Y				X			CPG/PG	
24	48							X						X			CPG/PG	
25	26							X							X		CPG/PG	
26	47							X						X			CPG/PG	
27	39							X							X		BCP/PGS	
28	18							X							X		BCP/PGS	
29	23							X							X		BCP/PGS	
30	24							X							X		BCP/PGS	
31	12							X							X		BCP/PGS	

EVANS ISLAND

EV039A
8/18/94
0720 - 0930
-1.2' to 3.0'
MUNSON



SEGMENT: KN 0132 B

LOCATION: West coast of Herring Bay, Knight Island.

OTHER STUDIES:

PHYSICAL SETTING

Coastal Morphology and Sedimentology

Pocket beach with a long west limb and a stream delta with sandy, granular banks and pebbly tidal flats. The stream is bounded on the west by a granular beach that grades along shore to a pebble cobble beach and then to a mostly boulder beach. The stream is banked by a rocky headland to the west.

Environmental Sensitivity Index (ESI)

Type 7; gravel beach.
Type 8: sheltered rocky.
Type 9; sheltered tidal flat.

Fetches and Directions (kilometers)

NNE= 55

Energy Level

Low to moderate.

GENERAL BIOLOGICAL SETTING

Anadromous stream.

BEACH RESTORATION AND OILING SUMMARY

This site had some of the largest and most highly concentrated areas of thick AP in Prince William Sound. All of the areas of AP that were identified in the 1993 survey were manually broken and tilled. Some areas of AP were more thoroughly treated than others due to the inaccessibility of the oil amongst cobbles and boulders. Although residual oil remains, manual break up should enhance natural weathering including microbial degradation and photoxidation of the persistent oil within this segment.

Subsurface oil was observed in association with surface AP at locations 'A' and 'D' and this oil was tilled as it was associated with the treated surface oil.

AK Dept. of Env. Conservation
1994 Beach Restoration and Shoreline Oiling Summary

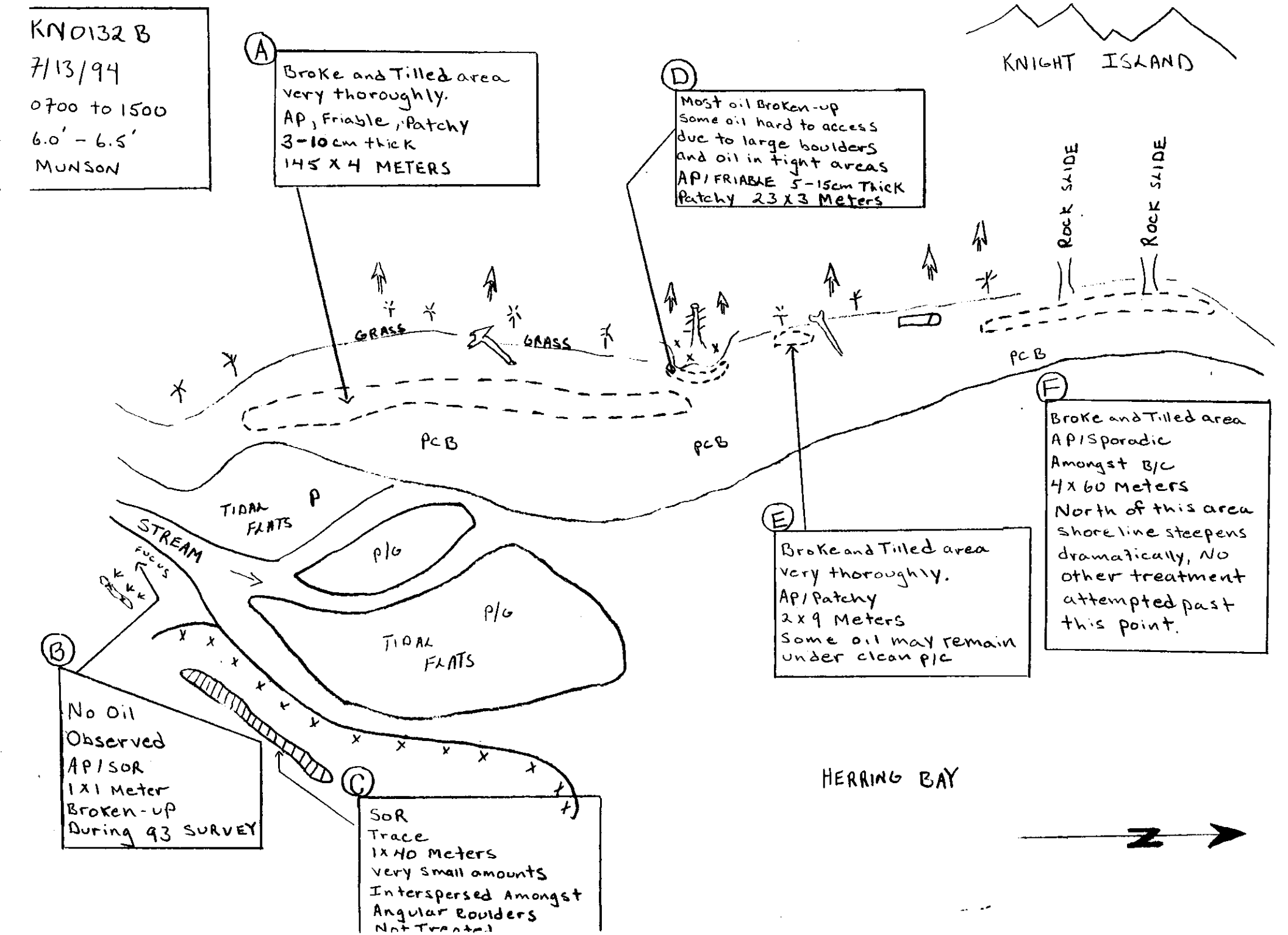
Location West Herring Bay KNIGHT ISLAND **Segment** KNO122 **Sub-Div** B

Date 7/13/94 **Time:** 0700 **to** 1500

Tide Level: 6.0 **ft. to** 6.5 **ft.** **Energy Level** L-M **Weather:** Cldy/Sunny

Nearshore Sheen: N **Photo Roll:** 1 - ____ **Frames:** 6-20

LOC	SURFACE OIL CHARACTER										SURFACE SEDIMENT TYPE	SHORE SLOPE	AREA		ZONE				NOTES
	AP	MS	TB	SOR	CV	CT	GT	FL	DB	NO		V H M L	WIDTH m	LENGTH m	S	UI	MI	LI	
A	P										BCP	M	4	145		X			Tilled and Broken
B										X	RBC	H				X			No oil observed Broken-up During 93 Survey
C				T							RB	H	1	40		X			Very small amounts of oil Amongst Angular Rock
D	P					P					RBC	M	3	23		X			AP Broken and Tilled
E	P										BCP	M	2	9		X			Broken and Tilled
F	S										RCP	H	4	60		X			Majority Broken and Tilled


KN0132B
7/13/94
0700 to 1500
6.0' - 6.5'
MUNSON
A
Broke and Tilled area
very thoroughly.
AP, Friable, Patchy
3-10cm thick
145 X 4 METERS
D
Most oil Broken-up
Some oil hard to access
due to large boulders
and oil in tight areas
AP/FRIABLE 5-15cm Thick
Patchy 23 X 3 Meters
KNIGHT ISLAND
ROCK SLIDE
ROCK SLIDE
GRASS
GRASS
PCB
PCB
PCB
F
Broke and Tilled area
AP/Sporadic
Amongst B/C
4 X 60 Meters
North of this area
shoreline steepens
dramatically, No
other treatment
attempted past
this point.
TIDAL FLATS
P
STREAM
FUCUS
P/G
P/G
TIDAL FLATS
E
Broke and Tilled area
very thoroughly.
AP/Patchy
2 X 9 Meters
Some oil may remain
under clean p/c
B
No Oil
Observed
AP/SOR
1X1 Meter
Broken-up
During 93 SURVEY
C
SOR
Trace
1X40 Meters
very small amounts
Interspersed Amongst
Angular Boulders
HERRING BAY
N

SEGMENT: LA015C

LOCATION: Northeast coast of Latouche Island.

OTHER STUDIES

NOAA transect station #N-15.

PHYSICAL SETTING

Coastal Morphology and Sedimentology

This is an asymmetric pocket beach with an anadromous stream along the eastern end. A boulder area occurs along the eastern limb. The western limb is a straight boulder beach more than 400 m long. The central part of the site is rounded cobble and boulder gravel beach with well-developed high-tide berms. Boulders increase in abundance down the beach relative to cobbles.

Environmental Sensitivity Index (ESI)

Type 7; gravel beach.

Fetches and Directions (kilometers)

NE= 110

Energy Level

High.

GENERAL BIOLOGICAL SETTING

Anadromous stream.
Eagle nest.
Deer harvesting.

OILING SUMMARY

One area of significant oiling seems to be persisting. Location 'A' is located along the boulder beach on the western limb of the pocket. High concentrations of AP and SOR occur interstitially between large immobile boulders and bedrock in the upper and mid intertidal zones. Little to no measurable improvement has occurred at these sites, but it is emphasized that the survey methods can only detect rather large changes and reductions have probably occurred. Nonetheless, considerable oil remains.

A small amount of subsurface oil was detected and was most prevalent in the mid to upper intertidal zones and towards the northern half of the main beach.

The main beach area received extensive mechanical treatment including storm berm relocation during the response phase.

AK Dept. of Env. Conservation
1994 Shoreline Oiling Summary

Location Northeast coast Latouche Island **Segment** LA015 **Sub-Div** C **Site** ____

Date 8/20/94 **Time:** 0740 **to** 0930

Tide Level: -1.6 **ft. to** 0 **ft.** **Energy Level** HIGH **Weather:** CLOUDS

Nearshore Sheen: N **Photo Roll:** 13 - ____ **Frames:** 12-24

LOC	SURFACE OIL CHARACTER										SURFACE SEDIMENT TYPE	SHORE SLOPE	AREA		ZONE				NOTES
	AP	MS	TB	SOR	CV	CT	ST	FL	DB	NO		V H M L	WIDTH m	LENGTH m	S	UI	MI	LI	
A	S	T		P	S	S	S				RBCP	M	5	150		X	X		Amongst large boulder/cobble
B			T	T		T	T				BCP	M	4	15		X			South side of Stream

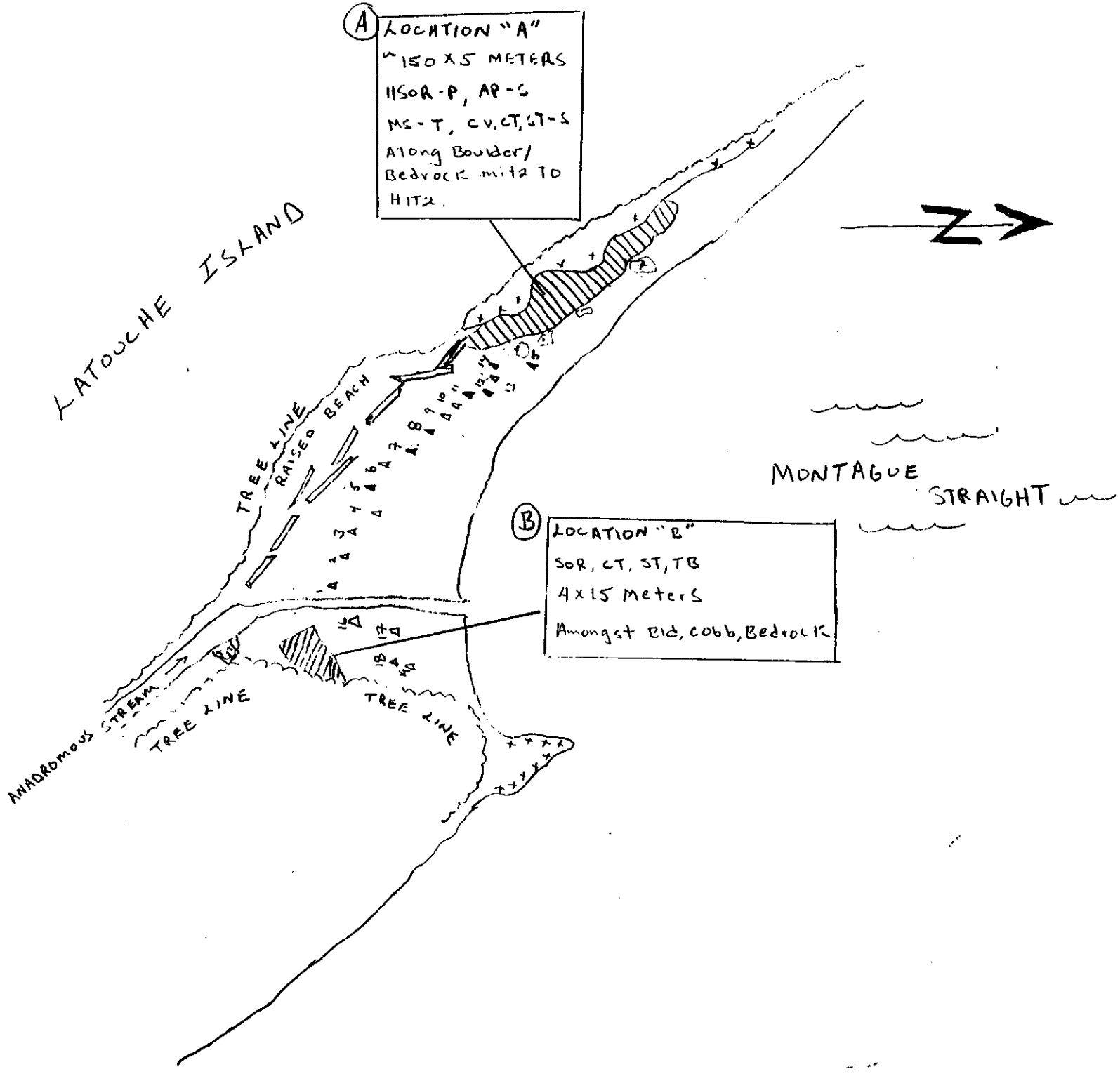
LAC 15 C

PIT NO.	PIT DEPTH (cm)	SUBSURFACE OIL CHARACTER							OILED ZONE	CLEAN BELOW	H2O LEVEL	SHEEN COLOR	PIT ZONE				SURFACE-SUBSURFACE SEDIMENTS	NOTES
		OP	HOR	MOR	LOR	OF	TR	NO	(cm-cm)	Y/N	(cm)	B R S N	S	UI	MI	LI		
1	33							X							X		CP/CPG	
2	47							X							X		CP/CPG	
3	36							X							X		BCP/BCPG	
4	44							X							X		BCP/BCPG	
5	42			X					22-38	Y				X			BCP/CPG	
6	40							X							X		BCP/CPG	
7	37						X		U-U	U					X		BCP/CPG	
8	37						X		U-U	U					X		BCP/CPG	
9	40							X						X			BCP/CPG	
10	52							X						X			BCP/CPG	
11	47			X					19-U	U	42-47	BS			X		BCP/CPG	
12	38				X				14-U	U	32-38	BS			X		BCP/PGS	
13	39							X							X		BCP/PGS	
14	33		X						24-U	U	29-33	B			X		BCP/CPG	
15	37				X				10-U	U	29-37	B				X	BCPG/CPGS	
16	35							X							X		CP/CP	
17	28							X							X		BCP/PGS	
18	36							X							X		BCP/PGS	

/ AC15C

PIT NO.	PIT DEPTH (cm)	SUBSURFACE OIL CHARACTER							OILED ZONE	CLEAN BELOW	H2O LEVEL	SHEEN COLOR	PIT ZONE				SURFACE-SUBSURFACE SEDIMENTS	NOTES
		OP	HOR	MOR	LOR	OF	TR	NO	(cm-cm)	Y/N	(cm)	B R S N	S	UI	MI	LI		
19	31							X							X		BCP/PGS	

LA015C
8/20/94
0740 0930
-1.6' to 0'
MUNSON



SEGMENT: LA 015 E

LOCATION: Northeastern shore of Latouche Island.

OTHER STUDIES

PHYSICAL SETTING

Coastal Morphology and Sedimentology

Irregular headland, wave-cut platform, and gravel beach shoreline. Rounded pebble and large cobble beach in the northern part of the site is protected by prominent seaward outcrops. Subsurface matrix sediment is sandy granules. Large angular boulders occur near outcrops and in the high intertidal of the southern part of the site.

Environmental Sensitivity Index (ESI)

Type 1; rocky coast.
Type 2; exposed wave-cut platform.
Type 7; gravel beach.

Fetches and Directions (kilometers)

NE= 110

Energy Level

High with some moderate locations behind seaward outcrops.

GENERAL BIOLOGICAL SETTING

Oiled mussel bed.
Eagle nest.
Fish harvest area.

OILING SUMMARY

Three moderate sized areas, locations `E', `J' and `G' have relatively unweathered areas of AP and SOR persisting. These three locations are in areas where large boulders or outcrops provide protection from waves. In many cases MS was observed oozing out from beneath the boulders. There are several other locations within this site with substantial areas of weathered surface oil.

Subsurface oil was observed discontinuously through the main beach area. In some cases the unweathered surface oil above extends to subsurface OP. An oiled mussel bed of approximately 30 by 40 meters exists at location `D'.

AK Dept. of Env. Conservation
1994 Shoreline Oiling Summary

Location northeastern shore Katoushe Island **Segment** LA015 **Sub-Div** E **Site** ___

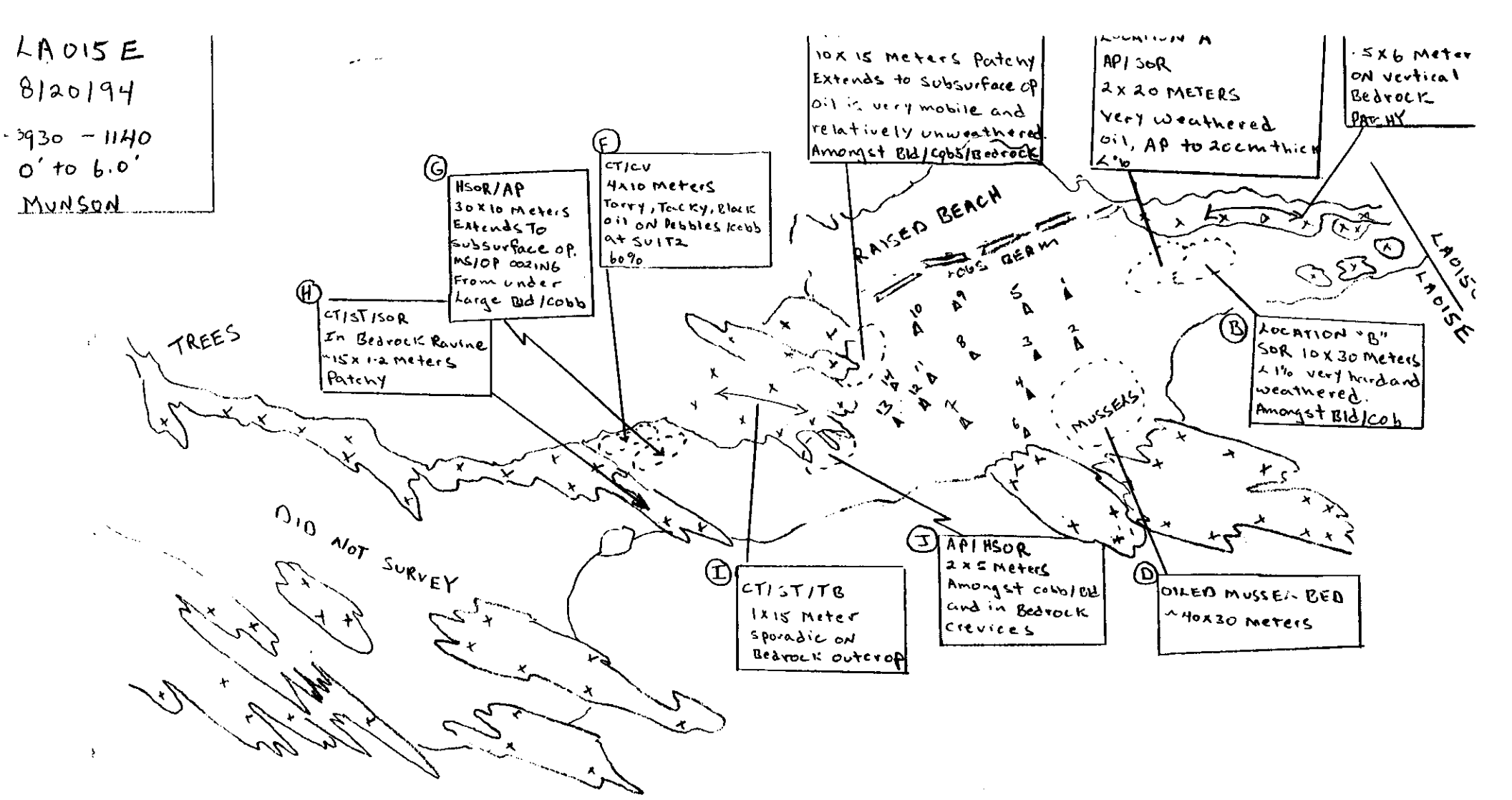
Date 8/20/94 **Time:** 0930 **to** 1140

Tide Level: 0 **ft. to** 6.0 **ft.** **Energy Level** H **Weather:** RAIN, CLOUDS

Nearshore Sheen: N **Photo Roll:** 14 - ___ **Frames:** 1-16

LOC	SURFACE OIL CHARACTER										SURFACE SEDIMENT TYPE	SHORE SLOPE	AREA		ZONE				NOTES
	AP	MS	TB	SOR	CV	CT	ST	FL	DB	NO		V H M L	WIDTH m	LENGTH m	S	UI	MI	LI	
A	T			T							BC	M	2	20		X			
B				T							BC	M	10	30		X			
C						P	P				R	V	.5	6		X			
D											BCP	L	30	40			X		Mussel Bed w/subsurface oil
E	P			P							BC	H-M	10	15		X			
F					B	B					CP	M	4	10	X				
G	P			P		S	S				RBC	H-M	10	30		X			oil oozing from Rocks
H				P		S	S				RBC	H-M	2	15		X			
I			S			S	S				R	V	1	15		X			
J	S			S							BC	H-M	2	5		X			

PIT NO.	PIT DEPTH (cm)	SUBSURFACE OIL CHARACTER							OILED ZONE	CLEAN BELOW	H2O LEVEL	SHEEN COLOR	PIT ZONE				SURFACE-SUBSURFACE SEDIMENTS	NOTES
		OP	HOR	MOR	LOR	OF	TR	NO	(cm-cm)	Y/N	(cm)	B R S N	S	UI	MI	LI		
1	19						X		U - U	U	17-19	S			X		BCP/PGS	
2	24							X							X		BCP/PGS	
3.	29						X		U - U		26-29	S			X		BCP/PGS	
4	20	X							6 - 11	Y	16-20	C B			X		BCP/PGS	
5	27							X							X		BCP/PGS	
6	28							X								X	BCP/PGS	
7	30							X							X		BCP/PGS	
8	29							X						X			BCP/PGS	
9	32							X						X			BCP/PGS	
10	29							X						X			BCP/PGS	
11	22							X							X		BCP/PGS	
12	29							X							X		BCP/PGS	
13	20	X							3 - U		17-20	B		X			BCP/PGS	
14	19						X		U - U	U				X			BCP/PGS	


LA015E
8/20/94
3930 - 1140
0' to 6.0'
MUNSON
10X 15 meters Patchy
Extends to subsurface oil is very mobile and relatively unweathered
Amongst Bld/Cobb/Bedrock
AP/SOR
2x20 METERS
Very weathered
oil, AP to 20cm thick
.5x6 Meter
ON vertical
Bedrock
PATCHY
F
CT/CV
4x10 meters
Torry, Tacky, Black
oil ON Pebbles/cobb
at SUIT2
60%
G
HSOR/AP
30x10 Meters
Extends To
subsurface oil.
MS/OP OOZING
From under
Large Bld/Cobb
H
CT/ST/SOR
In Bedrock Ravine
~15x1-2 meters
Patchy
RAISED BEACH
CBBS BEAM
TREES
LAOISE
B
LOCATION "B"
SOR 10x30 Meters
~1% very hvirdand
weathered.
Amongst Bld/Cob
MUSSELS
DO NOT SURVEY
I
CT/ST/TB
1x15 Meter
sporadic ON
Bedrock outcrop
J
AP/HSOR
2x5 Meters
Amongst cobb/Bld
and in Bedrock
crevices
D
OILED MUSSEL BED
~40x30 Meters

1SEGMENT: LA 020 C

LOCATION: Chenega Island Area Group, north end of Latouche Island, west shoreline of Sleepy Bay.

OTHER STUDIES

PHYSICAL SETTING

Coastal Morphology and Sedimentology

Linear boulder and cobble beach about 900 m long. The beach is gently sloping with bedrock near the surface and exposed in places. The entire beach contains boulders but in some areas very large boulders are present. A cobble and drift log storm berm is present along the shoreline. Sediments are subangular to subrounded and at depth a granular matrix occurs. In some areas a clayey sediment is present at depth (pits #17-22). A low rocky promontory projects from the beach at one location behind which bedrock outcrop occurs.

Environmental Sensitivity Index (ESI)

Type 2; exposed wave-cut rock platform.
Type 7; gravel beach.

Fetches and Directions (kilometers)

N= 14; NE= 110

Energy Level

High with some moderate areas.

GENERAL BIOLOGICAL SETTING

Eagle nest.
Deer harvesting.

OILING SUMMARY

As reported in the 1993 survey, four large areas of significant oiling occur at this site. Locations `A' and `B' are two very large areas with moderate concentrations of AP and SOR primarily amongst cobbles and boulders in the mid and upper intertidal zones. Location `C' which is located in the upper intertidal zone behind a low lying promontory has a substantial amount of SOR in vertical bedrock. Much of the oil in location `C' is very hard and weathered. At the north end of the site, location `D' also contains a high concentration of AP and SOR. Surface oil in location `D' often extends subsurface.

Three significant areas of subsurface oil remains at this site. Location `ZA' is amongst the very large boulders of surface location `A'. Location `ZB' is coincident with surface location `B', the surface oil at this location often extends subsurface. The largest concentration of subsurface oil observed was within location `ZD'.

Much manual removal occurred at these locations in 1991 and 1992.

AK Dept. of Env. Conservation
1994 Shoreline Oiling Summary

Location West Shoreline Sleepy Bay **Segment** LA020 **Sub-Div** C **Site** ___

Date 8/21/94 **Time:** 0730 **to** 1140

Tide Level: -1.6 **ft. to** 5.0 **ft.** **Energy Level** H **Weather:** Rain

Nearshore Sheen: None **Photo Roll:** 014 - 015 **Frames:** 17-24 / 1-17

LOC	SURFACE OIL CHARACTER										SURFACE SEDIMENT TYPE	SHORE SLOPE	AREA		ZONE				NOTES
	AP	MS	TB	SOR	CV	CT	ST	FL	DB	NO		V H M L	WIDTH m	LENGTH m	S	UI	MI	LI	
A	P			P		S	S				BC	H	15	100		X	X		
B	P			P		S	S				BC	H	20	200		X	X		
C	P			P		S	S				RBC	M	5	150		X			
D	P			P		S	S				BC	M	10	200		X	X		

PIT NO.	PIT DEPTH (cm)	SUBSURFACE OIL CHARACTER							OILED ZONE	CLEAN BELOW	H2O LEVEL	SHEEN COLOR	PIT ZONE				SURFACE-SUBSURFACE SEDIMENTS	NOTES
		OP	HOR	MOR	LOR	OF	TR	NO	(cm-cm)	Y/N	(cm)	B R S N	S	LI	MI	LI		
1	19	X							1-17	Y					X		BcP/cPG	see Photo
2	42			X					15-40	Y				X			BcP/cPG	
3	22				X				15-U	U	17-22	B, S		X			BcP/cPG	
4	22	X							3-U	U	18-22	B			X		BcP/cPG	
5	13				X				11-U	U	8-11	S		X			BcP/cPG	
6	39							X						X			Bc/Bc	Large bld/cobb
7	23		X						1-6	Y				X			BcP/cPG	Extension of surface oil
8	33							X						X			BcP/cPG	
9	31	X							1-31	N				X			BcP/cPG	surface HSOR Extends subsurface
10	27							X						X			BcP/cPG	
11	31							X							X		BcP/cPG	
12	14		X						1-12	Y				X			BcP/cPG	1x2M HSOR
13	32			X					5-28	Y					X		BcP/cPG	
14	38	X							10-37	Y	36-38	B		X			BcP/cPG	
15	28							X			18-28	N			X		BcP/cPG	
16	26							X							X		BcP/cPG	
17	22							X		N	15-22	N			X		BcP/cPG	
18	17							X			15-17	N		X			BcP/cPG	

PIT NO.	PIT DEPTH (cm)	SUBSURFACE OIL CHARACTER							OILED ZONE	CLEAN BELOW	H2O LEVEL	SHEEN COLOR	PIT ZONE				SURFACE-SUBSURFACE SEDIMENTS	NOTES
		OP	HOR	MOR	LOR	OF	TR	NO	(cm-cm)	Y/N	(cm)	B R S N	S	UI	MI	LI		
19	21							X			17-21	N			X		BCP/CPG	
20	28							X						X			BCP/CPG	
21	19							X							X		BCP/CPG	
22	26							X							X		BCP/CPG	
23	36							X							X		BCP/CPG	
24	28							X						X			BCP/CPG	
25	31							X							X		BCP/CPG	
26	27							X							X		BCP/CPG	
27	30							X						X			BCP/CPG	old customblem Pellets in Pit
28	37			X					25-36	Y				X			BCPG/CPG	clay at bottom
29	28						X								X		BCPG/CPG	
30	14				X				U-U					X			CPG/PG	
31	10	X							1-10	N			X				CPG/PG	HSOR Extends Subsurface
32	22						X		U-U						X		CPG/PG	clay at bottom
33	23							X						X			CPG/PG	clay at bottom
34	29							X			22-29	N		X			BCP/CPG	
35	30		X						6-U	U	16-30	B			X		BCP/CPG	very oily
36	16				X				2-16					X			BCPG/CPG	
37	25							X						X			BCP/BCP	

PIT NO.	PIT DEPTH (cm)	SUBSURFACE OIL CHARACTER							OILED ZONE	CLEAN BELOW	H2O LEVEL	SHEEN COLOR	PIT ZONE				SURFACE-SUBSURFACE SEDIMENTS	NOTES
		OP	HOR	MOR	LOR	OF	TR	NO	(cm-cm)	Y/N	(cm)	BRSN	S	UI	MI	LI		
38	19	X							2-U	U	9-19	B			X		BC P/C PG	Thick black oil on interstitial H_2O
39	21		X						6-U	U	11-21	B			X		BC P/C P G	Thick black oil on interstitial H_2O
40	26	X							3-26	N	22-[illegible]	B		X			BC P/C PG	Thick black oil on interstitial H_2O
41	19			X					2-19	N			X				C P/P	Black Tarry oil coating Pebbles
42	21							X						X			BC P/PG	
43	41			X					20-41	N				X			BC P/C P G	
44	28				X				11-28	N					X		BC P/PG	
45	25	X							14-25	N				X			BC P/PC	
46	23		X						12-23	N				X			BC P/PC	
47	25		X						3-25	N					X		BC P/ PC	
48	28			X					15-28	N				X			BC PG/C PG	
49	33		X						25-U	U	26-33	B			X		BC PG/C P[illegible]	
50	22		X						8-U	U	16-22	B			X		BC PG/C P[illegible]	
51	28				X				U-U	U					X		BC P G/C P[illegible]	
52	27						X		U-U	U					X		BC PG/C PG	
53	38							X							X		BC PG/C PG	
54	26							X							X		BC PG/C PG	
55	30							X							X		BC PG/C PG	

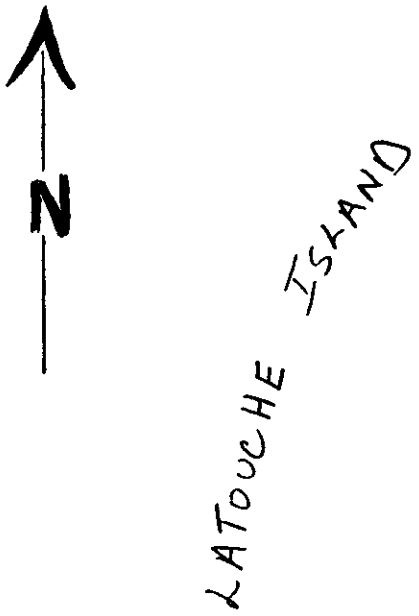
AD20C

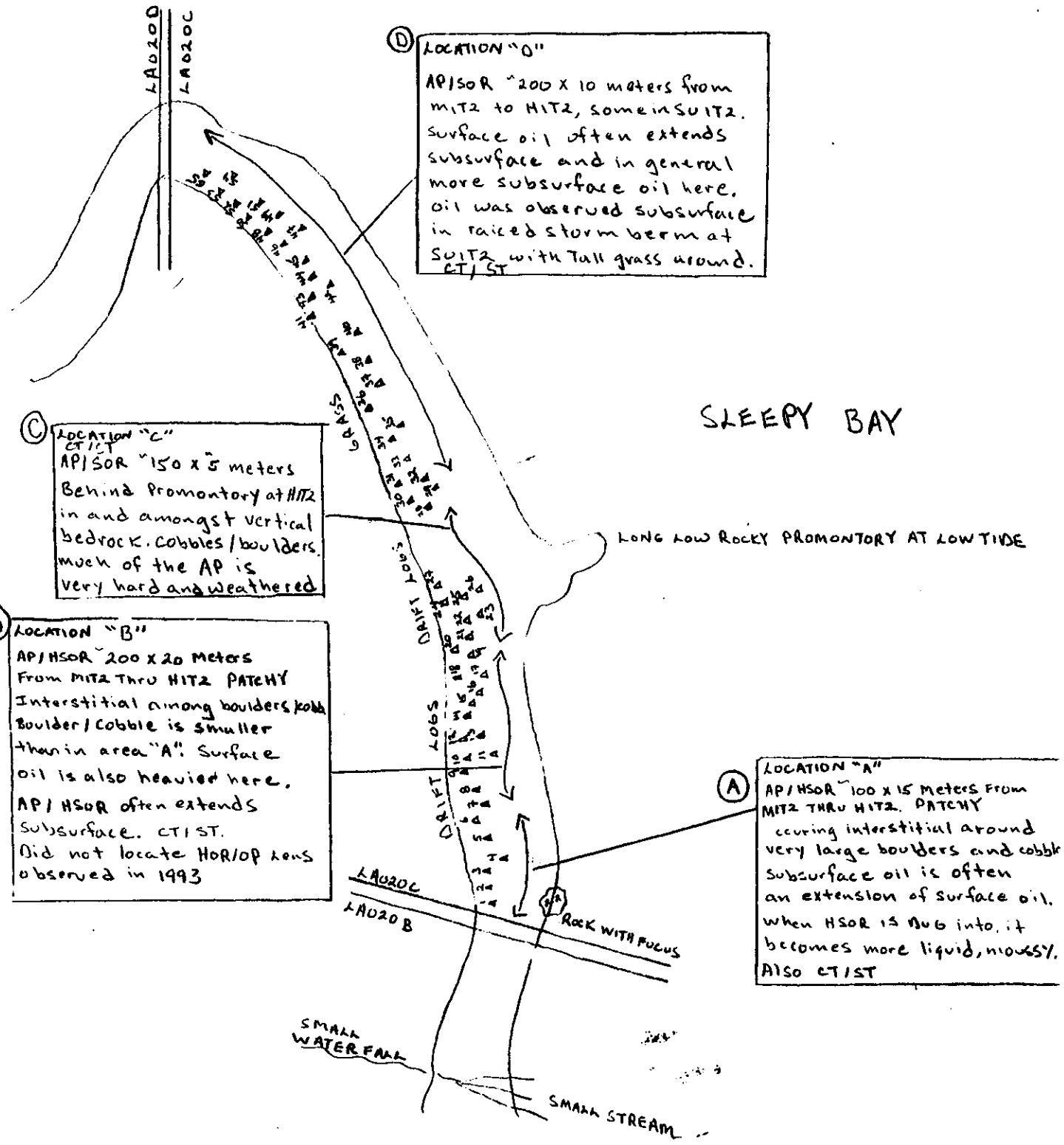
8/21/94

730 - 1130

1.6' to 5.0'

JUNSON





(D) LOCATION "D"
AP/SOR ~200 X 10 meters from MIT2 to HIT2, some in SUIT2. surface oil often extends subsurface and in general more subsurface oil here. oil was observed subsurface in raised storm berm at SUIT2 with tall grass around. CT/ST

(C) LOCATION "C"
CT/ST
AP/SOR ~150 x 5 meters Behind Promontory at HIT2 in and amongst vertical bedrock. Cobbles/boulders. much of the AP is very hard and weathered

(B) LOCATION "B"
AP/HSOR ~200 x 20 meters From MIT2 Thru HIT2 PATCHY Interstitial among boulders/cobb Boulder/Cobble is smaller than in area "A". Surface oil is also heavier here. AP/HSOR often extends subsurface. CT/ST. Did not locate HOR/OP seen observed in 1993

(A) LOCATION "A"
AP/HSOR ~100 x 15 meters From MIT2 THRU HIT2. PATCHY occuring interstitial around very large boulders and cobble subsurface oil is often an extension of surface oil. when HSOR is dug into, it becomes more liquid, mousse. Also CT/ST

SEGMENT: LA 021 A

LOCATION: Northwestern shore of Latouche Island.

OTHER STUDIES

PHYSICAL SETTING

Coastal Morphology and Sedimentology

This is a 200 m long gently sloping boulder cobble beach overlying a shallow bedrock platform. A few prominent outcrops occur. Sediments are subangular to subrounded boulders and large cobbles on the surface with pebbles in the interstices and a granular matrix in the subsurface. A gravel and drift log storm berm is present.

Environmental Sensitivity Index (ESI)

Type 2; exposed wave-cut rock platform.
Type 7; gravel beach.

Fetches and Directions (kilometers)

N= 16; NW= 23; W= 4

Energy Level

Moderate.

GENERAL BIOLOGICAL SETTING

Eagle nest.
Deer harvesting.

OILING SUMMARY

Oiling observed was limited to one area of AP and SOR in the upper intertidal zone. Coverage was sporadic, in an area 5 m by 25 m. The survey was conducted at a tidal level of 5.0 ft to 6.0 ft and this did not allow for an adequate survey. Oil observed in the 1993 survey was located at a much lower tide level between 1.0 ft and 4.0 ft. For future reference this segment should be surveyed at a tide level of 3.0 ft or lower.

AK Dept. of Env. Conservation
1994 Shoreline Oiling Summary

Location northwestern shore Latouche Island **Segment** LA021 **Sub-Div** A

Date 8/31/94 **Time:** 1300 **to** 1620

Tide Level: 6.0' **ft. to** 5.0' **ft.** **Energy Level** M **Weather:** CLOUDY

Nearshore Sheen: N **Photo Roll:** 18 - ____ **Frames:** 5-18

LOC	SURFACE OIL CHARACTER										SURFACE SEDIMENT TYPE	SHORE SLOPE	AREA		ZONE				NOTES
	AP	MS	TB	SOR	CV	CT	ST	FL	DB	NO		VHML	WIDTH m	LENGTH m	S	UI	MI	LI	
A	S			S							BC	M	5	25		X			

LA021A

PIT NO.	PIT DEPTH (cm)	SUBSURFACE OIL CHARACTER							OILED ZONE	CLEAN BELOW	H2O LEVEL	SHEEN COLOR	PIT ZONE				SURFACE-SUBSURFACE SEDIMENTS	NOTES
		OP	HOR	MOR	LOR	OF	TR	NO	(cm-cm)	Y/N	(cm)	B R S N	S	UI	MI	LI		
1	28							X			22-28	N			X		BCP/PG	
2	19							X			10-19	N			X		BCP/PGM	New "small" mussels
3	32							X			31-32	N			X		BCP/PG	
4	14							X			9-14	N			X		BCP/PGM	"New small" mussels
5	21							X			13-21	N			X		BCP/PGM	"
6	22							X			17-22	N			X		BCP/PGM	"
7	17							X			10-17	N			X		BCP/PGM	"
8	18			X					7-U	U	10-18	BSR			X		BCP/PGM	"
9	23							X							X		BCP/PGM	"
10	19							X							X		BCP/PGM	"
11	21							X			17-21				X		BCP/PGM	"
12	27							X							X		BCP/PGM	"
13	30							X			15-30				X		BCP/PGM	"
14	26							X									BCP/PG	
15	21							X			14-21						BCP/PGM	"
16	26							X									BCP/PGM	"
17	24					X					20-24	S		X			BCP/PGM	"
18	28							X						X			BCP/PGS	

PIT NO.	PIT DEPTH (cm)	SUBSURFACE OIL CHARACTER							OIL ZONE:	CLEAN BELOW	H2O LEVEL	SHEEN COLOR	PIT ZONE				SURFACE-SUBSURFACE SEDIMENTS	NOTES
		OP	HOR	MOR	LOR	OF	TR	NO	(cm-cm)	Y/N	(cm)	B R S N	S	UI	MI	LI		
19	26							X							X		BCP/PGS	
20	24							X							X		BCP/PGS	
21	21							X						X			BCP/PGS	
22	17							X							X		BCP/PGS	
23	25							X									BCP/PGS	
24	29							X							X		BCP/PGS	
25	22							X						X			BCP/PGS	
26	32							X						X			BCP/PGS	
27	30							X			16-30	N			X		BCP/PGS	
28	31							X			25-31	N			X		BCP/PGS	

LATOUCHE IS
LA021A
8/31/94
1300 to 1620
6.0' to 5.0'