

1980 Gulf of Alaska sampling program, eastern Gulf of Alaska

McCoy, Scott, Jr., and Amoco Oil Co.

GMC DATA REPORT 454

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State of Alaska
Department of Natural Resources
Division of Geological & Geophysical Surveys
GEOLOGIC MATERIALS CENTER



CF-80-1002



Amoco Production Company

Denver Region
Frontier Division

AREA GULF OF ALASKA

STATE ALASKA

COUNTY CF 8010021

SUBJECT 1980 Gulf of Alaska Sampling Program

Eastern Gulf of Alaska

Geological Report No. FR-14-80

Date October, 1980

By Scott McCoy, Jr.

NO.

ENCLOSURES

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- 1. Icy Point Measured Section
- 2. Megafossil ages and environments (previous collection)
- 3. Megafossil ages and environments (1980 collections)
- 4. Source rock analyses
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October, 1980

Denver Region Geological Report
No. FR 14-80
1980 Gulf of Alaska Sampling Program
Eastern Gulf of Alaska

CF 801002

INTRODUCTION

CONCLUSIONS

ENCLOSURES

DISCUSSION

Author: S. McCoy

INTRODUCTION:

The presence of source rocks with a petroleum generating capability within the Yakutat OCS Sale 55 area scheduled for sale in October 1980 is problematical. Samples dredged from the Eocene of the continental slope south of the sale area were indicative of a poor source for dry gas, although onshore outcrop samples from the Samovar Hills northwest of the sale area were indicative of oil and gas-light oil, also from Eocene rocks. The best analyses for oil source potential in the Gulf of Alaska come from Kayak Island many miles to the west. It is conceivable that this rich source was deposited in a restricted basin which trended to the southeast through the sale area (Figure 2). The only outcrop of strata older than middle Miocene (Yakataga Formation) to occur onshore southeast of Malaspina Glacier crops out at Icy Point in Glacier Bay National Monument. Detailed preparation for the sale revealed that these strata of the Topsy Formation, upper Oligocene to lowermost Miocene in age according to the U.S.G.S. and therefore equivalent to the Poul Creek Formation had never been sampled or analyzed for hydrocarbon source potential. Management felt that sampling of these rocks was important and a one day program was mounted on September 5, 1980 by Scott McCoy and Randy Kubes of the Denver Region office.

CONCLUSIONS:

Preliminary geochemical analyses suggest that the rocks are nonsource to marginally poor sources for dry gas and thermally immature. This does not negate the possibility that the restricted basin with petroleum source rocks is present offshore between this point and the submarine exposures of the continental slope. Paleontologic studies for age control proved to be inconclusive.

ENCLOSURES:

1. Icy Point Measured Section
2. Megafossil ages and environments (previous collection)
3. Megafossil ages and environments (1980 collections)
4. Source rock analyses

DISCUSSION:

Tertiary rocks crop out in the intertidal zone along the coast on all sides of the Icy Point peninsula (Figure 1) at the entrance to Palma Bay, north of Cross Sound. Structurally they form the southwestern limb of an overturned anticline with an axis striking northwest-southeast. At Icy Point the northern limb of the structure is missing and the Fairweather Fault, a regional strike-slip fault, cuts across the structure. The fault is not exposed, but lies buried beneath the alluvium of the Kaknau Creek Valley.

The Icy Point Measured Section lies along the east and south sides of the peninsula and comprises 6621 feet of total section. The lower 2845 feet are predominantly siltstone and mudstone and comprise the Topsy Formation outcrop. The remainder of the outcrop is the Yakataga Formation. Sampling conditions were not ideal during the collection of the 1980 samples (in-coming tide and light drizzle), but a total of sixteen source rock samples were obtained from the Topsy Formation (see enclosure 1 for measured section and sample horizons). These samples were then cut in Denver for paleontology.

Due to the northwestern structural grain, similar rocks are exposed along the western side of the peninsula. These are, however, predominantly Yakataga Formation. Three additional spot samples were collected from the Yakataga (samples 17, 18 & 19: the first two for source rock analysis and the last for sandstone lithology), and one (sample 20) from the Topsy Formation.

DISCUSSION (Continued)

The samples cut for paleontology were processed and then examined by Earl Armstrong for foraminifera and Dave Wall for palynology. No foraminifera were found. The samples were observed to be highly slickensided. Deformation associated with the close proximity of the Fairweather Fault possibly destroyed the foraminifera originally present. Weathering in the intertidal zone may also have been a contributing factor in their removal. A few megafossil fragments were observed. Palynological studies also proved to be inconclusive. No age diagnostic forms were found, but those present suggest a possible age younger than that of the offshore dredge samples (upper Eocene). Organic material was almost entirely structured and at a thermal maturation state of 4.

Megafossils, predominantly irregular echinoids, were collected at several horizons; but have not been studied to date. Their analysis will be added as enclosure 3 of this report when completed. Megafossil studies with age and environmental interpretations by Scott McCoy of collections made in prior years from the upper part (Yakataga Formation) of the measured section is included as enclosure 2. Megafossils were also collected with the grab samples from the west side of the peninsula.

A U.S.G.S. collection (D186 = 75 Apr 43-D = M6527) from the northermost outcrop along the west side of the peninsula (Location: isolated outcrop 3-1/2 miles north of Icy Point, 2400 feet south, 100 feet east of the northwest corner of Section 10, T40S, R50E, Mt. Fairweather B-4...E & R 12/11/75) contains the following fauna: Echinophoria apta; Colus sp.; Calyptraea sp.; Lucinoma acutilineata; Polinices ramonensis; Neptunea sp. (possible kannoi). The presence of E. apta indicates an upper Oligocene of lowermost Miocene age for the Topsy Formation and is the only absolute proof for the equivalence of these strata with the Poul Creek Formation of the Yakataga area.

Detailed source rock studies and thermal evolution analysis for the samples are not yet available. When completed these will be added as enclosure 4 of this report. Preliminary results for eight samples indicate organic carbon content of .5 to 1.2%, nonsource to poor source quality, and a generative capability of dry gas.

Thermal evolution analyses for two samples were as follows:

<u>SAMPLE</u>	<u>VOLATILE</u> <u>HC ppm</u>	<u>GENERATED</u> <u>HC ppm</u>	<u>THERMAL</u> <u>MATURITY</u>	<u>SOURCE ROCK POT.</u>
SM 80-12	40	248	immature	nonsource
SM 80-15	29	645	immature	marginally poor

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Icy Point Measured Section

- IP 44-70 Yakataga Formation - collection from unit 34, about 4450 feet above the base of the measured section.
Bivalvia: Solena sp. (fragments)
Age and Environment: Material nondiagnostic for age or temperature determination, inner neritic (water depth intertidal (mud flat) to 80 meters).
- IP 41B-70 Yakataga Formation - collection from unit 40, about 4800 feet above the base of the measured section.
Bivalvia: Kytilus adulis Linné
Echinoidea: unidentified clypeasteroid echinoid
Age and Environment: Material nondiagnostic for age or temperature determination, intertidal.
- IP 41A-70 Yakataga Formation - collection from unit 41 about 4850 feet above the base of the measured section.
Bivalvia: Acila (Truncacila) cf. A. (T.) conradi (Meek)
Crassatella? sp.
Echinoidea: unidentified echinoid fragments
Age and Environment: Middle or late Miocene (middle Miocene by inference), inner neritic (water depth probably 10 meters or less), warm temperate?
- IP 41-70 Yakataga Formation - collection from the top of unit 42 about 4950 feet above the base of the measured section.
Bivalvia: Acila (Truncacila) conradi (Meek)
Gastropoda: Colus cf. C. jordani Dall
gastropod (indeterminate)
Age and Environment: Middle or late Miocene (middle Miocene by inference), material nondiagnostic for water depth (deeper than 20 meters) or temperature determination.
- IP 40D-70 Yakataga Formation - collection from unit 43 about 4960 feet above the base of the measured section.
Bivalvia: Acila cf. A. gettysburgensis (Reagan)
Macoma inquinata (Deshayes)
bivalve (indeterminate)
Age and Environment: Middle Miocene? (A. gettysburgensis is typical of the late Oligocene and early Miocene and has not been found in younger strata. The presence of a single specimen which does not appear to be reworked and the associated forms which are no older than middle Miocene suggest a minimum age of middle Miocene), material nondiagnostic for water depth or temperature determination.

- IP 40C-70 Yakataga Formation - collection from unit 43 about 5010 feet above the base of the measured section.
 Bivalvia: Macoma sp. (fragment)
Mya sp. (fragment)
Acila (Truncacila) conradi (Meek)
Solen sp.
 Age and Environment: Middle or late Miocene (middle Miocene by inference), inner neritic (water depth 10 to 40 meters), material nondiagnostic for temperature determination.
- IP 40A-70 Yakataga Formation - collection from unit 43 about 5210 feet above the base of the measured section.
 Bivalvia: Spisula (Mactromeris) albaria (Conrad)
 Age and Environment: Middle Miocene (by inference), inner neritic (water depth intertidal to 50 meters), material nondiagnostic for temperature determination.
- IP 39-70 Yakataga Formation - collection from 100 feet below the top of unit 45 about 5525 feet above the base of the measured section.
 Bivalvia: Mya truncata Linne
 Age and Environment: Material nondiagnostic for age (middle Miocene or younger) or temperature determination, inner neritic (water depth 4 to 35 meters).
- IP 37A-70 Yakataga Formation - collection from unit 47 about 5730 feet above the base of the measured section.
 Bivalvia: Thyasira bisecta Conrad
 Gastropoda: Colus sp.
 Age and Environment: Material nondiagnostic for age, water depth (deeper than 20 meters) or temperature determination.
- IP 37-70 Yakataga Formation - collection from the base of unit 49 about 5760 feet above the base of the measured section.
 Bivalvia: Acila (Truncacila) empirensis Howe
 Gastropoda: Volutopsius cf. V. stefanssoni Dall
 Echinoidea: clypeasteroid echinoid fragments (indeterminate)
 Age and Environment: Late Miocene or early Pliocene (late Miocene by inference), inner neritic (water depth very shallow, probably around 10 meters), cool temperate.
- IP 36C-70 Yakataga Formation - collection from 20 feet above the base of unit 50 about 5333 feet above the base of the measured section.
 Bivalvia: Acila (Truncacila) empirensis Howe
 Age and Environment: Late Miocene (by inference), material nondiagnostic for water depth or temperature determination.

- IP 36B-71 Yakataga Formation - collection from 30 feet above the base of unit 50 about 5843 feet above the base of the measured section.
 Bivalvia: Acila (Truncacila) empirensis Howe
Thyasira bisecta Conrad
Macoma inquinata Deshayes
 Brachiopoda: Terebratalia sp. (internal mold)
 Age and Environment: Late Miocene (by inference), material nondiagnostic for depth determination (deeper than 10 meters), cool temperate.
- SIP01 50-81 Yakataga Formation - collection from 81 feet above the base of unit 50 about 5894 feet above the base of the measured section.
 Gastropoda: Volutopsius cf. V. stefanssoni Dall
 Age and Environment: Late Miocene (by inference), material nondiagnostic for water depth or temperature determination.
- IP 36A-71 Yakataga Formation - collection from 130 feet above the base of unit 50 about 5944 feet above the base of the measured section.
 Bivalvia: Nuculana aff. N. chehalisensis (Weaver)
Thyasira bisecta Conrad
Acila (Truncacila) empirensis Howe
Macoma inquinata Deshayes
 Gastropoda: Natica (Cryptonatica) sp.
Volutopsius cf. V. stefanssoni Dall
Megasurcula sp.
 Age and Environment: Late Miocene (by inference), material nondiagnostic for water depth determination (the forms have a minimum depth of about 20 meters. Because of the close proximity of IP 36, I would infer that sedimentation took place in about 20-25 meters of water), cool temperate.
- IP 36-71 Yakataga Formation - collection from 20 feet below the top of unit 50 about 6024 feet above the base of the measured section.
 Bivalvia: Spisula (Mactromeris) albaria (Conrad)
 Age and Environment: Late Miocene (by inference), inner neritic (water depth intertidal to 50 meters), cool temperate.
- IP 35-71 Yakataga Formation - collection from unit 52 about 6090 feet above the base of the measured section.
 Bivalvia: Macoma sp.
 bivalve (indeterminate fragments)
 Age and Environment: Indeterminate
- IP 34-71 Yakataga Formation - collection from the upper 40 feet of unit 53 about 6200 feet above the base of the measured section.

Bivalvia: Spisula (Mactromeris) albaria (Conrad)
Macrocallista sp.
Echinoidea: Scutellaster sp.
Age and Environment: Early Pliocene, inner neritic (water
depth intertidal to 10 meters), cool temperate.

SIP01 54 Yakataga Formation - collection from unit 54 about 6300 feet
above the base of the measured section.

Bivalvia: Acila (Truncacila) empirensis Howe
Malacostraca: crab (indeterminate fragment)
Age and Environment: Early Pliocene, inner neritic (by
inference), cool temperate.

Note: The fossil collections below 5760 feet (IP 37-70) all
have an age range of middle or late Miocene and those
above late Miocene or early Pliocene. In all cases I
have assumed the older age to be correct because of
the occurrence of the "primitive" A. gettysburgensis
in IP 40D-70. The Pliocene age call at the top of the
section is based on the presence of the clypeasterid
echinoid Scutellaster which is considered to be a
Pliocene form in California.

District: Lituya
Location: Sec 13, 23, 24 T40S R50E CRM
Quadrangle: Mt. Fairweather (B-4) 1:63,360
Aerial Photo:

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Section: Icy Point - resample

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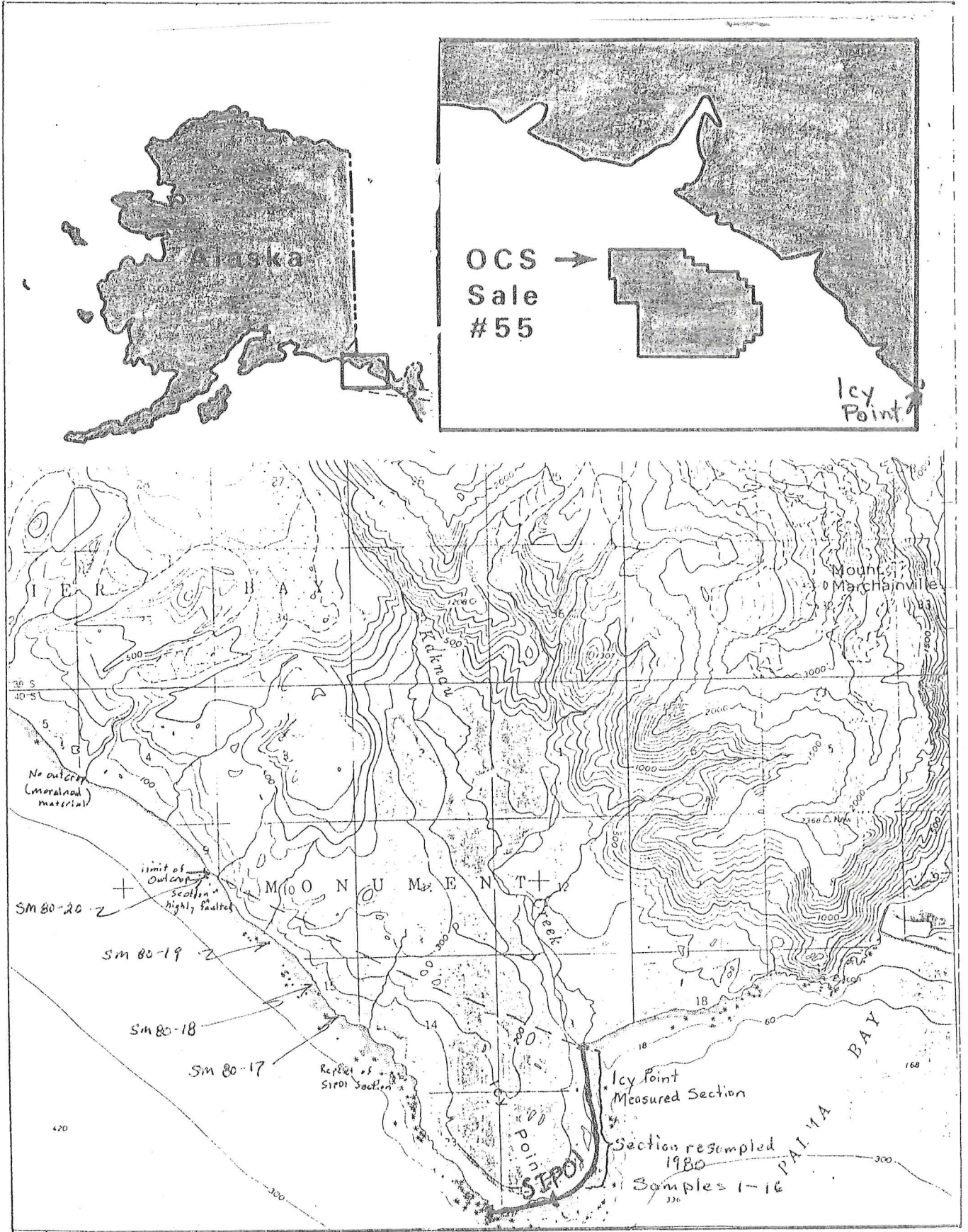


FIGURE 1

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10y Point

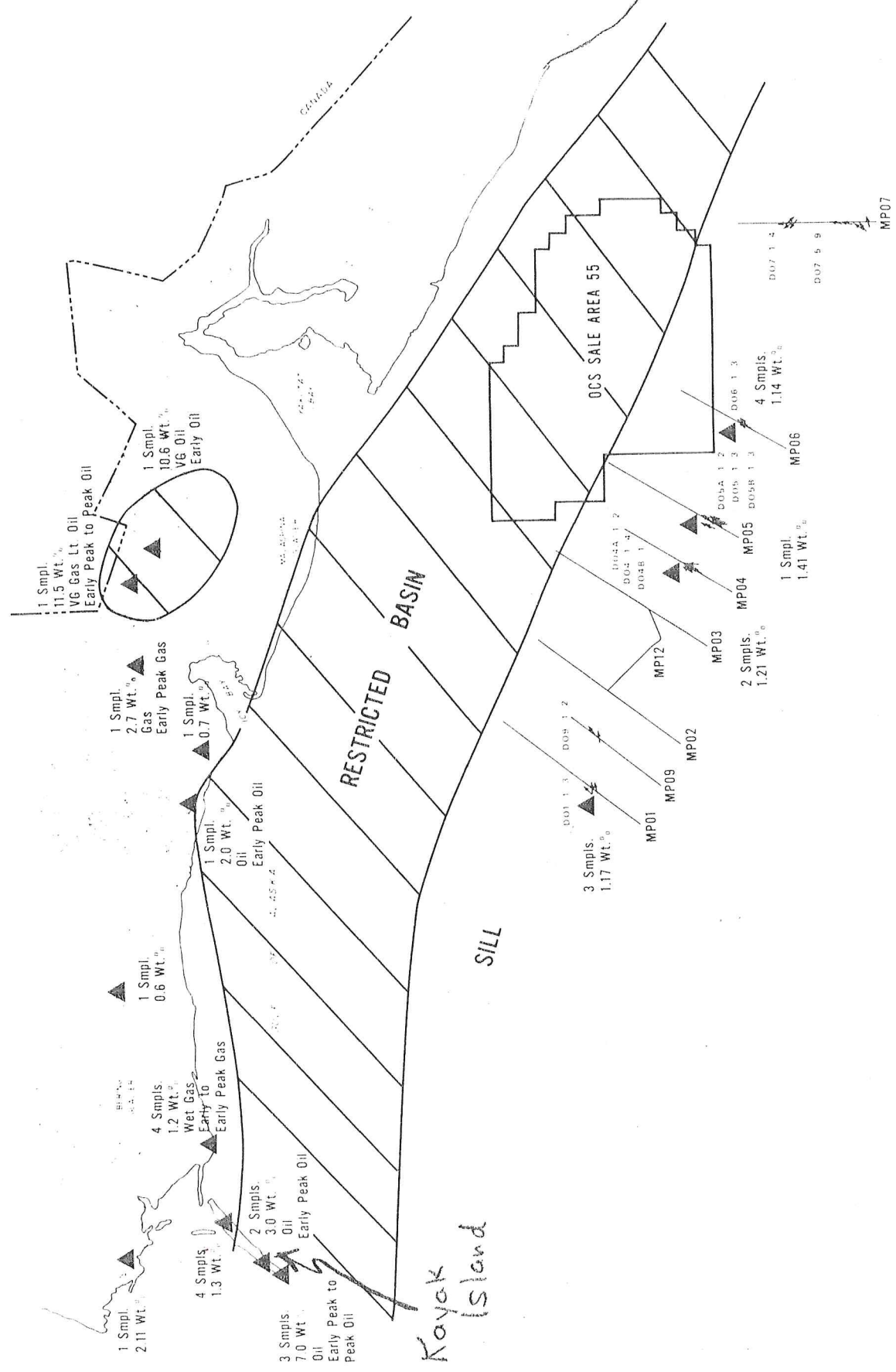


FIGURE 2
Possible Zone of Enriched Petroleum Source Rock