

P+5

JAY GLENN MARKS
Consulting Geologist-Paleontologist
3900 S. Clermont Street
Englewood, Colorado 80110
(303) 759-9401

Received
DISTRICT
OIL AND GAS OFFICE

CONFIDENTIAL

JUL 18 1983

June 27, 1983

Minerals Management Service
Alaska

MOLLUSCAN FOSSILS FROM SECOND ALASKA DEEP TEST

A report for ARCO Oil and Gas Company

RE. NORTH ALEUTIAN No. 1 COST

SUMMARY

Shells of fossil mollusks in seven core pieces were prepared and analyzed for determination of age and environment of deposition. The seven samples have been described in detail in preliminary reports dated from October 31 to December 8, 1982. No information as to the name of the well, its location (except that it is in Alaska) or the depth of the samples is available to the writer. Samples are identified only by their numbers - one through seven. The youngest sample, #1, is "early Miocene or younger, most likely Holocene." Other samples could be assigned only vaguely as "early Cretaceous or younger," although to the writer they seem to have a Cenozoic aspect. Sample #1 and probably #2 were deposited in marine boreal or temperate waters, but samples #3 through #7 represent relatively warmer waters, -temperate or possibly even subtropical. Summary results of the sample examination are recorded below. Some data not in preliminary reports are given for samples #5-#7. An annotated bibliography concludes the report.

Registered
Geologist,
California,
License #10

Certified
Professional
Geological
Scientist,
AIPG #48

Ph.D.,
Stanford
University,
1951

FAUNAL CONTENT OF THE SAMPLES

Spl #1 (5979.3')

Pelecypoda

Macoma nasuta (Conrad)

Gastropod?, not determined

Age: early Miocene or younger, most likely Holocene.

Environment: marine, boreal or temperate waters probably of the inner neritic zone

Spl #2 (5981.7')

Pelecypoda

Cyclocardia? sp.

Age: not determined

Environment: marine

Turritella? sp.
Spl #3

Spl #3 (5993.0')

Gastropoda

Turritella? sp.

Age: not determined

Environment: marine, temperate or warm water of the neritic zone



x1

Spl #4 (9962.6')

Foraminifera

Triloculina? sp.

Pelecypoda

Anomia? sp.

Age: not determined

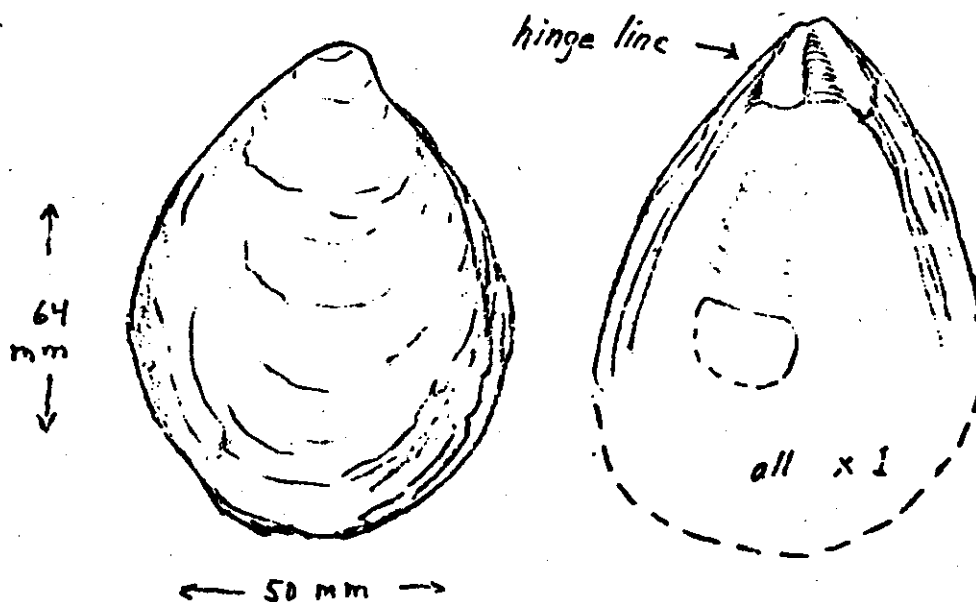
Environment: marine, temperate or warm water of the
neritic zone

Spl #5 (10326.2')

Pelecypoda

Ostrea (Crassostrea) sp.

Age: early Cretaceous or younger

Environment: marine, temperate or warm water of the inner
neritic zoneOstrea (Crassostrea) sp. Spl #5

Spl #6 (10328.6')

Pelecypoda

Ostrea (Crassostrea) sp. (same species as in #5)

Age: early Cretaceous or younger

Environment: marine, temperate or warm water of the inner
neritic zone

Spl #7 (10333.3')

Pelecypoda

Ostrea (?) sp. (possibly an immature or dwarf Crassostrea)

Age: not determined

Environment: marine, temperate or warm water of the inner
neritic zone

REFERENCES TO LITERATURE USED IN THIS REPORT

(Note: the following references are in addition to many of those cited in the report "Molluscan fossils in core samples from a well in Alaska," September 24, 1982)

Abbott, R. T. and S. P. Dance, 1982. Compendium of seashells. Dutton, Inc., New York. Pp. 411. "A color guide to more than 4,200 of the world's marine shells." A ready reference for comparison of fossil mollusks with their living counterparts, if any.

Hatai, K. and S. Nisiyama, 1952. Check list of Japanese Tertiary marine Mollusca. Scientific Reports of Tohoku Univ., 2d series (Geology), Spec. vol. #3. Among the mollusks listed are 11 species of Ostrea, ranging in age from Late Eocene to Miocene.

Keen, A. M., 1958. Seashells of tropical West America. Stanford University Press, Stanford, California. Pp. 624, 10 pls in full color, completely illustrated, complete and of the highest scientific quality. Covers most of the marine mollusks from Lower California to Colombia. Anomia, Ostrea and Turritella are covered.

Kotaka, Tamio, 1950. Paleogene Turritella of Japan. Short Papers of the Inst. of Geology and Paleontology, Tohoku Univ., Sendai, Japan, no. 1, p. 32-41. Lists seven species ranging from Lower Eocene to Oligocene in age.

ibid, 1951. Recent Turritella of Japan. No. 3, p. 70-86, pls 11, 12. Figures eleven species and subspecies with their distribution around Japan and Korea.

MacNeil, F. S., 1973. Arctic and boreal climate at the beginning of the Pleistocene. Sci. Reports of Tohoku Univ., 2d series (Geology), Spec. vol. #6, p. 55-58. Relatively warm waters flowed northward through the Bering Strait at this time.

Merriam, Charles W., 1941. Fossil Turritellas from the Pacific coast region of North America. Univ. California Publ., Bull. Dept. Geol. Sci., vol. 26, no. 1, pp. 1-214, pls 1-41. The basic work for study of Turritella. Ecology, p. 11-17. Tachyrhynchus, p. 50, 53.

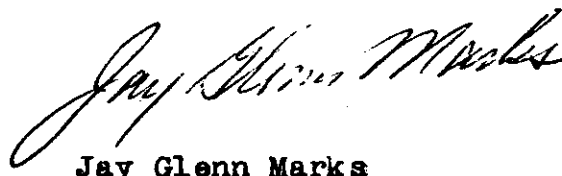
Moore, R. C., editor, 1971. Treatise on Invertebrate Paleontology, Part N, vol. 3 (of 3), Mollusca 6, Bivalvia (Oysters). University of Kansas and Geol. Soc. America, p. N 953-N1224. This text, by H. B. Stenzel, brings some order to the previously chaotic classification of the oysters. Distribution, p. 1034-1048.

Sars, G. O., 1878. Mollusca regionis arcticae Norvegiae, in Bidrag Til Kundskaben om Norges Arktiske Fauna. Christiania, Norway. Turritellopsis acicula simpsoni Dall is described on p. 186, pl. 10, fig. 14-a, 14-b. T. simpsoni is a mainly

arctic turritelloid. It was not seen in present samples.

Thiele, Johannes, 1931. Handbuch der systematische weichtierkunde, vol. 1. Gustav Fischer Pub. House, Jena, Germany. Parts 1, 2 (loricates, gastropods). Turritella, p. 181, Turritellopsis, p. 182, Tachyrhynchus, p. 181.

Weaver, C. E., 1942. Paleontology of the marine Tertiary formations of Oregon and Washington. Univ. Washington Publ., Geology, v. 5, 790 pp., 104 pls.



Jay Glenn Marks

Jay Glenn Marks

JAY GLENN MARKS
Consulting Geologist-Paleontologist
3900 S. Clermont Street
Englewood, Colorado 80110
(303) 759-9401

October 31, 1982

Mr. H. M. Simpson
ARCO Alaska, Inc.
P. O. Box 360
Anchorage, Alaska 99510

Re: Second Alaska deep test
Molluscan paleontology

Registered
Geologist,
California,
License #10

PRELIMINARY REPORT ON SPL #1 (5979.3')

Spl #1 arrived October 15, 1982. It consists of a small piece of cored sedimentary rock, -a very friable sandstone or partly clay-cemented sand. Visible are part of a carbonized plant stem and the surface of a well-preserved bivalve shell.

Certified
Professional
Geological
Scientist,
AIPG #48

FAUNA Macoma nasuta (Conrad)
Gastropod?, not determined

Ph.D.,
Stanford
University,
1951

Macoma nasuta is one of the more common and long-ranging pelecypods found along the west coast of North America. Living specimens have been taken from Kodiak Island in the north to Baja California in the south. The geologic range is Early Miocene to Recent. The specimen at hand is reddish brown in color and the fibrous material of the ligament (the "muscle" that opens the shell) is intact, suggesting that the shell is of fairly recent age. The two valves are present, still held together by the ligament. A neat round hole through one valve suggests that the cause of death was predation by a drilling animal. It seems likely that the shell was not transported before burial.

The presence of the gastropod? is recorded only by the drilled hole in the pelecypod shell. The "drills" are common occupants of nearly all seas.

AGE: early Miocene or younger, most likely Holocene.

ENVIRONMENT: marine, boreal or temperate (and probably not arctic), in waters of rather shallow depth, -probably upper neritic. (I use "neritic" to define that offshore marine environment between the near-shore zone of severe bottom disturbance and the bathyal zone, -in general, between about 50 and 600 feet).

Jay Glenn Marks

JAY GLENN MARKS
Consulting Geologist-Paleontologist
3900 S. Clermont Street
Englewood, Colorado 80110
(303) 759-9401

October 31, 1982

Mr. H. M. Simpson
ARCO Alaska, Inc.
P. O. Box 360
Anchorage, Alaska 99510

Registered
Geologist,
California,
License #10

Re: Second Alaska deep test
Mollucan paleontology

PRELIMINARY REPORT ON SPL #2 (59817')

Certified
Professional
Geological
Scientist,
AIPG #48

Spl #2 arrived 10/15/82. It is a fragment of a small
pelecypod in a loosely cemented sand matrix.

FAUNA Cyclocardia? sp.

Ph.D.,
Stanford
University,
1951

The single valve is too worn and pitted for accurate
identification. Small cardliids of similar appearance are found
living in nearly all seas, including the arctic.

AGE: not determined

ENVIRONMENT: marine

Jay Glenn Marks

NOV 29 1982

D.M. HITE

JAY GLENN MARKS
Consulting Geologist-Paleontologist
3900 S. Clermont Street
Englewood, Colorado 80110
(303) 759-9401

November 19, 1982

Mr. H. M. Simpson
ARCO Alaska, Inc.
P. O. Box 360
Anchorage, Alaska 99510

Re: Second Alaska deep test
Molluscan paleontology

Registered
Geologist,
California,
License #10

PRELIMINARY REPORT ON SPL #3 (5993.0)
North Aleutian 1

Certified
Professional
Geological
Scientist,
AIPG #48

Spl #3 arrived October 15, 1982. It consists of part of a four-inch core of poorly sorted, muddy sandstone that breaks down when wet. A single large, elongate gastropod, partly cut off by the drill bit, is exposed.

FAUNA Turritella? sp.

Ph.D.,
Stanford
University,
1951

The unique specimen consists of six incomplete whorls, - about the fifth through tenth. Nearly all of the external sculpture was worn off before deposition, hence the configuration of spiral cords and growth lines can only be estimated. Nevertheless, the general shape, whorl profile and size are those of Turritella. If complete, the specimen would be at least 65 mm long and 18 mm across the largest preserved whorl. Turritella-like genera that are now found in northern waters such as Turritellopsis and Tachyrynchus are much smaller with a more rounded whorl profile and deeper sutures. They commonly have prominent subsidiary axial sculpture. Turritellopsis acicula stimpsoni Dall, which has been recorded as living off the northwestern coast of Alaska, appears to reach a maximum length of about 42 mm and has strongly convex whorls with sparse, strong spiral cords with intercalated axial threads. Our specimen does not display these features.

AGE: not determined. The genus Turritella ranges from Triassic to Recent.

ENVIRONMENT: marine, in relatively warm water. Living Turritella inhabits warm and temperate seas. No true Turritellas are today found north of Monterey Bay, California. No Tertiary fossil Turritellas have been found north of the Yakataga district of Alaska. Living Turritellas on the western side of the Pacific occur in the Japan Sea.

Living species of Turritella are found commonly on sea bottoms of various types in the upper neritic zone. They are found rarely just below high tide level at the upper extreme and very rarely below 450 feet at the lower. The great bulk of them live in depths between 50 and 210 feet. The worn surface of our specimen suggests that it may have been transported before burial.

Jay Glenn Marks

JAY GLENN MARKS
Consulting Geologist-Paleontologist
3900 S. Clermont Street
Englewood, Colorado 80110
(303) 759-9401

November 29, 1982

Mr. H. M. Simpson
ARCO Alaska, Inc.
P. O. Box 360
Anchorage, Alaska 99510

ARCO EXPLORATION CO.
N. ALEUTIAN C.O.S.T. WELL NO.1
API No. 55-307-00001
BERING SEA, ALASKA

Re: Second Alaska deep test
Molluscan paleontology

Registered
Geologist,
California,
License #10

PRELIMINARY REPORT ON SPL #4 (9962.6')

Certified
Professional
Geological
Scientist,
AIPG #48

Spl #4 arrived 11/24/82. It is half of a 4" core piece $\frac{1}{2}$ -inch thick. Part of a bivalve shell is visible on the "horizontal" (at right angles to the sides of the core) surface. The rock is a moderately indurated sandy mudstone with poor sorting of grains up to very coarse size of non-quartzose material. A soft greenstone and gold-colored mica are distinguishable.

Ph.D.,
Stanford
University,
1951

FAUNA Foraminifera
Triloculina? sp.

Pelecypoda
Anomia? sp.

The Triloculina? is a miliolid foraminifer of benthonic habitat. Examples of the genus are found in all seas, usually in moderate depths.

The Anomia? sp. has the pearly lustre and distinctively curved shell of Anomia. The present damaged individual, if it had been found off the coast of Latin America, would unhesitantly be called Anomia sp., cf. A peruviana Orbigny, which ranges along the west coast of the Americas as far north as Monterey Bay, California. No pelecypod like this is known to me from the boreal waters or strata of the Alaskan region.

AGE: not determined, but certainly post-Jurassic.

ENVIRONMENT: marine, in relatively warm water. Like the Turritella? of Spl #3, the Anomia? sp. seems out of place in an Alaskan locality. Anomia peruviana, which our specimen is suggestive of, lives in waters from low tide level to 360 feet in depth.

RECEIVED
DISTRICT
OIL AND GAS OFFICE

DEC 9 - 1982

ANCHORAGE, ALASKA

Jay Glenn Marks

North Aleutian

JAY GLENN MARKS
Consulting Geologist-Paleontologist
3900 S. Clermont Street
Englewood, Colorado 80110
(303) 759-9401

December 8, 1982

CONFIDENTIAL

Mr. H. M. Simpson
ARCO Alaska, Inc.
P. O. Box 360
Anchorage, Alaska 99510

Re: Second Alaska deep test
Molluscan paleontology

PRELIMINARY REPORT ON SPL #5 (10326.2')

Spl #5 arrived 11/24/82. It is two-thirds of a 4" core piece about 2½ inches thick. The rock is a rather massive, moderately indurated, gray with a greenish tint, sandy mudstone consisting mostly of non-quartzose materials in grain sizes up to very coarse. The upper and lower surfaces are plastered with oyster shells and the intervening sediment contains scattered oyster shells and fragments of shells.

FAUNA Ostrea sp.

This is an oyster of moderate size (about 2½ inches long). It is quite distinctive, but I can find no species in the American literature that closely resembles it. Final determination will have to await the arrival of ordered books and an opportunity to examine the Japanese literature.

AGE: not determined. Preservation of shell material suggests a (geologically) short period of burial.

ENVIRONMENT: marine, upper (inner) neritic zone, forming part of or adjacent to an oyster bed, in relatively warm water. "Ostrea ... is a typical shallow dweller of tropical to temperate waters" (Kanno, 1971, p. 59). One species, O. lurida, is found as far north as Sitka, Alaska at about 57° N., in waters that must be considered boreal.

Registered
Geologist,
California,
License #10

Certified
Professional
Geological
Scientist,
AIPG #48

Ph.D.,
Stanford
University,
1951

Jay G. Marks

RECEIVED
DISTRICT
OIL AND GAS OFFICE

DEC 23 1982

STAMP

JAY GLENN MARKS
Consulting Geologist-Paleontologist
3900 S. Clermont Street
Englewood, Colorado 80110
(303) 759-9401

North Aleutian

December 8, 1982

Mr. H. M. Simpson
ARCO Alaska, Inc.
P. O. Box 360
Anchorage, Alaska 99510

CONFIDENTIAL

Re: Second Alaska deep test
Molluscan paleontology.

PRELIMINARY REPORT ON SPL #6 (10328.6')

Spl #6 arrived 11/24/82. It is one-half of a 4" core piece one to 2½ inches thick. The rock is very similar to that of Spl #5. Portions of scattered oyster shells are apparent.

FAUNA Ostrea sp.

This is the same species of moderate size that occurs in Spl #5.

AGE: not determined. Preservation of shell material suggests a (geologically) short period of burial.

ENVIRONMENT: marine, upper (inner) neritic zone, in relatively warm water. (See remarks under Spl #5).

Jay G. Marks

RECEIVED
DISTRICT
OIL AND GAS OFFICE

DEC 23 1982

ANCHORAGE, ALASKA

Registered
Geologist,
California,
License #10

Certified
Professional
Geological
Scientist,
AIPG #48

Ph.D.,
Stanford
University,
1951

JAY GLENN MARKS
Consulting Geologist-Paleontologist
3900 S. Clermont Street
Englewood, Colorado 80110
(303) 759-9401

North Alentian

December 8, 1982

Mr. H. M. Simpson
ARCO Alaska, Inc.
P. O. Box 360
Anchorage, Alaska 99510

CONFIDENTIAL

Re: Second Alaska deep test
Molluscan paleontology

PRELIMINARY REPORT ON SPL #7 (10333.3')

Spl #7 arrived 11/24/82. It is one-half of a 4" core piece about two inches thick. The rock is a slightly muddy sandstone, light green, moderately indurated, very slightly friable, moderately well sorted in the medium- to coarse grain range, of about 80% non-quartzose materials. Numerous cross-sections of white bivalve shells are visible.

FAUNA Ostrea sp.

This is a very small oyster with a distinctly curved beak. Maximum length is less than one inch. As with the larger Ostrea of Spl #5 and #6, I can find no species in the American literature that closely resembles it. Research on it will continue.

AGE: not determined. Preservation of shell material suggests a (geologically) short period of burial.

ENVIRONMENT: marine, upper (inner) neritic zone, in relatively warm water. (See remarks under Spl #5).

Jay G Marks

RECEIVED
DISTRICT
OIL AND GAS OFFICE

DEC 23 1982

ANCHORAGE, ALASKA

Registered
Geologist,
California,
License #10

Certified
Professional
Geological
Scientist,
AIPG #48

Ph.D.,
Stanford
University,
1951