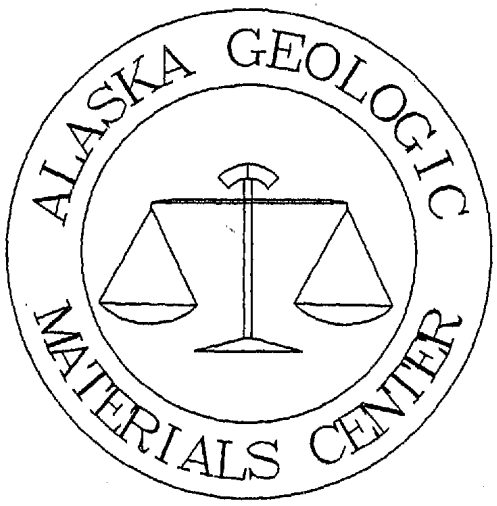
A summary of the data resulting from the 1991 MMS geologic field party in Lower Cook Inlet, Alaska. Sites visited included parts of Lake Clark Park, Katmai National Park, Katmai Bay, and Wide Bay. The data includes index maps, sample registry, porosity and permeability, igneous rock geochemistry, geochronology, paleocurrent, organic geochemistry, palynology, geologic measured sections, and element analysis.



Note: Copies of the field notes are on file at the U. S. Minerals Management Service and at the Alaska Geologic Materials Center.

Received 15 July 1992

Total of 226 pages in report

Alaska Geologic Materials Center Data Report No. 203

GMC

Also "enclosed" are rock samples and petrographic thin sections keyed to the sample locations and a set of palynological slides. This may not be the final transmittal as some things are still trickling in, but these need to be available to public so we're sending what we have. Thanks for curating them, it is a real service.

Ron

February 28, 1992

Ron Turner
U. S. Minerals Management Service
DEPARTMENT OF THE INTERIOR
949 E. 36th Street
Anchorage, AK. 99508-4302

We are pleased to transmit the data, analyses, and interpretation resulting from the 1991 MMS geological field party in Lower Cook Inlet. We are furnishing you seven copies of each of the items listed below.

ITEM	DESCRIPTION	
1. Index Maps	19 topographic maps with measured sections and geological stops highlighted (see attached listing).	pages 3 - 20
2. Sample Registry	Listing of 393 samples collected with location description, lithology and geological age.	pages 21 - 47
3. Core Analysis Report	Porosity and permeability measurements for 40 samples	pages 48 - 56
4. Igneous Rock Geochemistry	Elemental analysis of 20 samples (74 Elements and compounds)	pages 57 - 69
5. Geochronology Summary	K-AR age dating for 11 samples	pages 70 - 91
6. Paleocurrent Directions	Paleocurrent flow directions for 159 measurements	pages 92 - 106

7. Organic Geochemistry	Rock-eval measurements for 29 Samples	page 106
8. Palynology Summary	Palynologic age assignments for 193 samples	pages 108 - 113
9. Measured Sections	Drafted columnar sections for 30 measured sections. Includes descriptions of depositional environment, grain size, lithology, and sedimentary structures.	pages 114 - 220
10. Elemental Analysis	Major and trace elemental analysis of 19 igneous rocks	pages 221 - 226
11. Geological Field Notes	12 sets of geological field notes from individual field geologists with 292 pages	

We have already transmitted thin sections and duplicate samples to you. Please advise me if you require anything else.

Yours very truly,

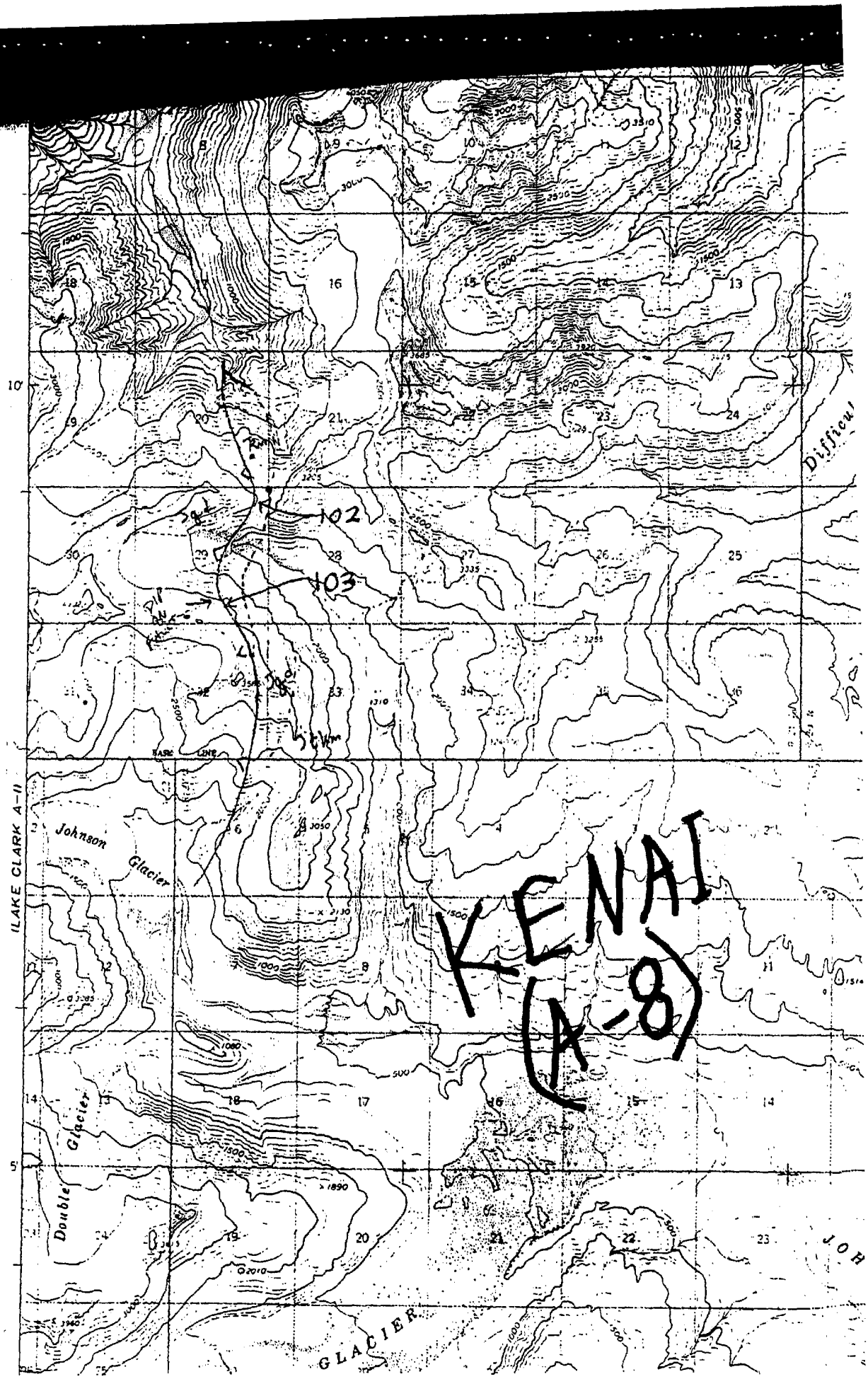
David J. Doherty
Senior Geologist

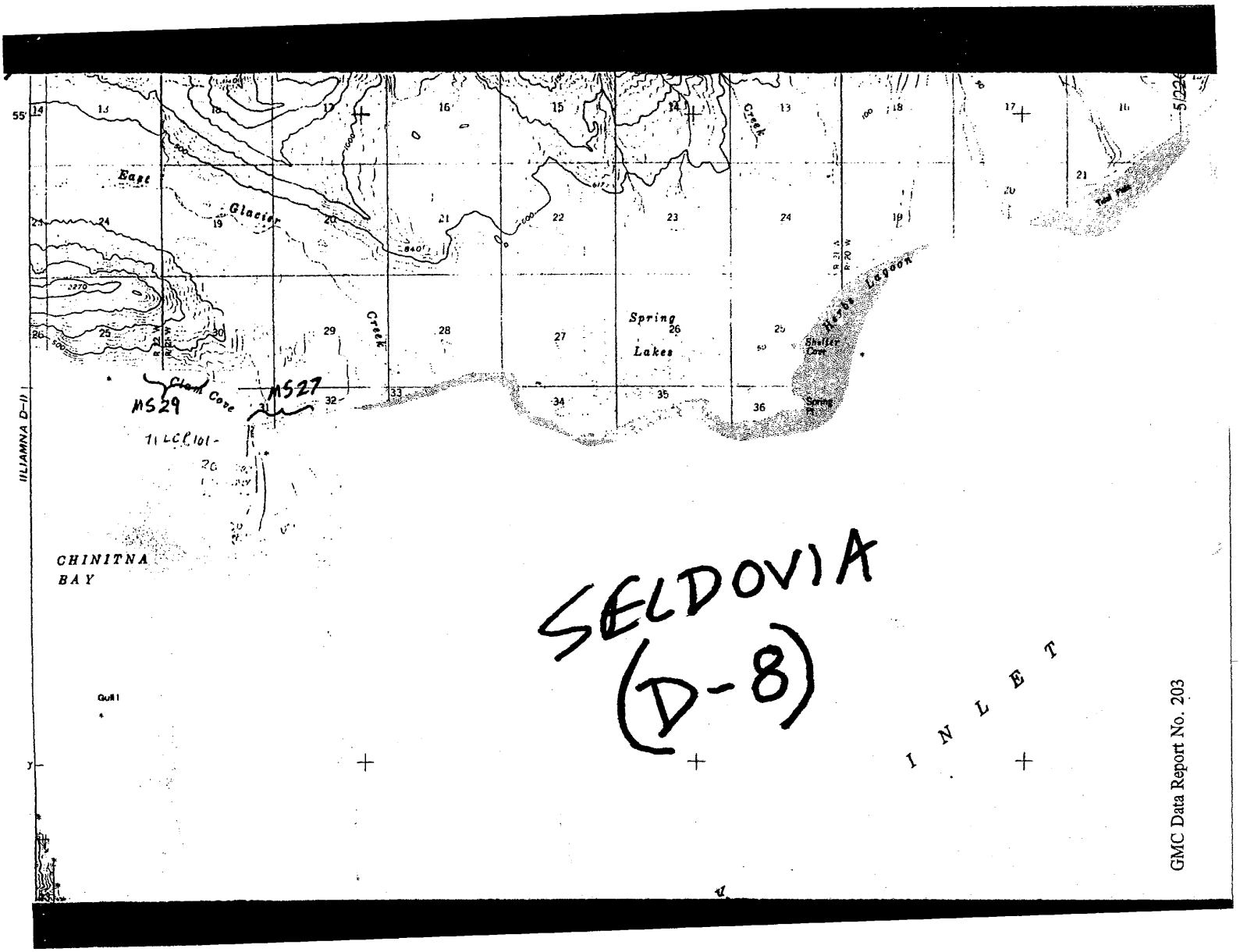
BDH/am

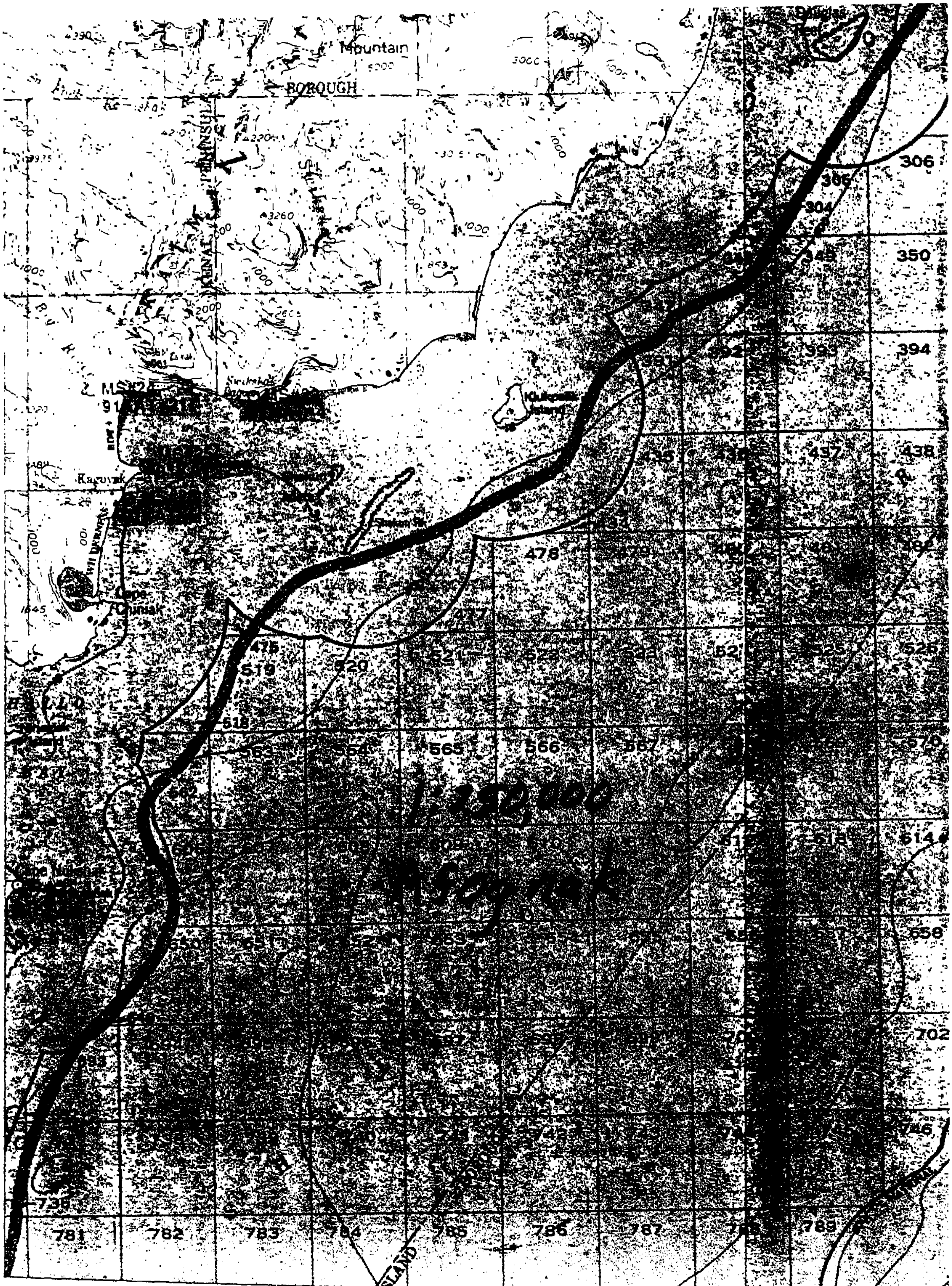
RECEIVED: Ronald E. Turner DATE: Feb 27, 1992
RON TURNER

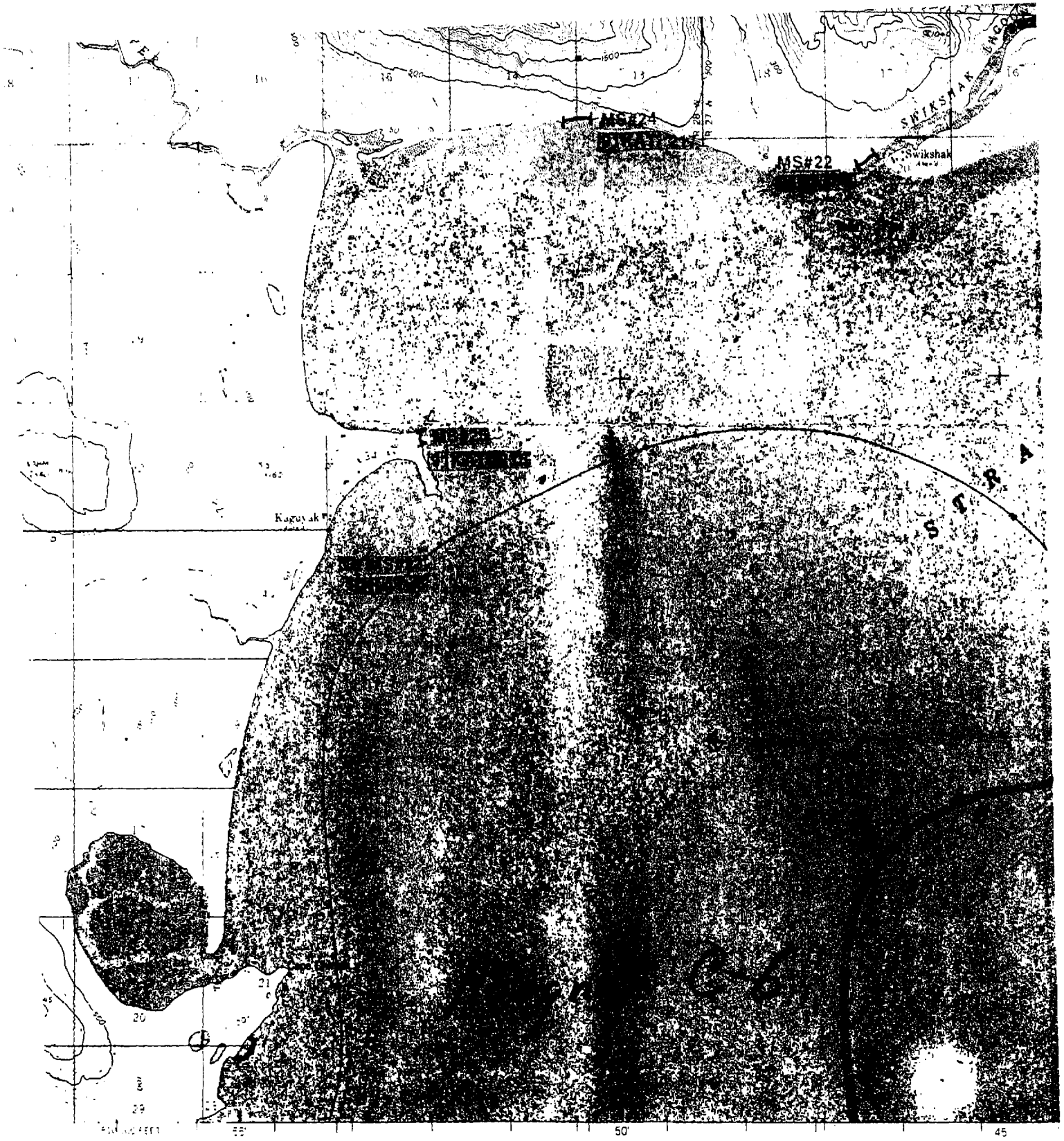
List of Index Maps

Afognak		1:250,000
Mt. Katmai		1:250,000
Ugashik		1:250,000
Karluk		1:250,000
Ugashik	B-1	1:63,360
Mt. Katmai	A-3	1:63,360
Karluk	C4 & C5	1:63,360
Karluk	C-6	1:63,360
Afognak	C-6	1:63,360
Ugashik	C-3	1:63,360
Ugashik	B-3	1:63,360
Ugashik	C-1	1:63,360
Ugashik	C-2	1:63,360
Ugashik	B-2	1:63,360
Iliamna	B-2	
Iliamna	D-1	
Seldovia	D-8	
Kenai	A-7 & A8	


102
103
Johnson Glacier
Double Glacier
GLACIER
KENAI
(K-8)


East
Glacier
Creek
Spring
Lakes
Creek
Herbst Lagoon
Shelter Cove
Spring Pt.
Tail Point
Giant Cove
MS29
MS27
TILCL101-
CHINITNA
BAY
ILIAMNA D-11
SELDOVIA
(D-8)
INLET
Gull
GMC Data Report No. 203


Mountain
BOROUGH
Cape
Chiniak
Kaguyak
306
350
394
437
438
478
519
520
565
566
567
570
614
658
702
746
781
782
783
784
785
786
787
789



by the Geological Survey

from aerial photographs

USC&GS Charts 8502 (1953) 50 000 scale), and from aerial ded for navigational purposes

SCALE 1:63 360

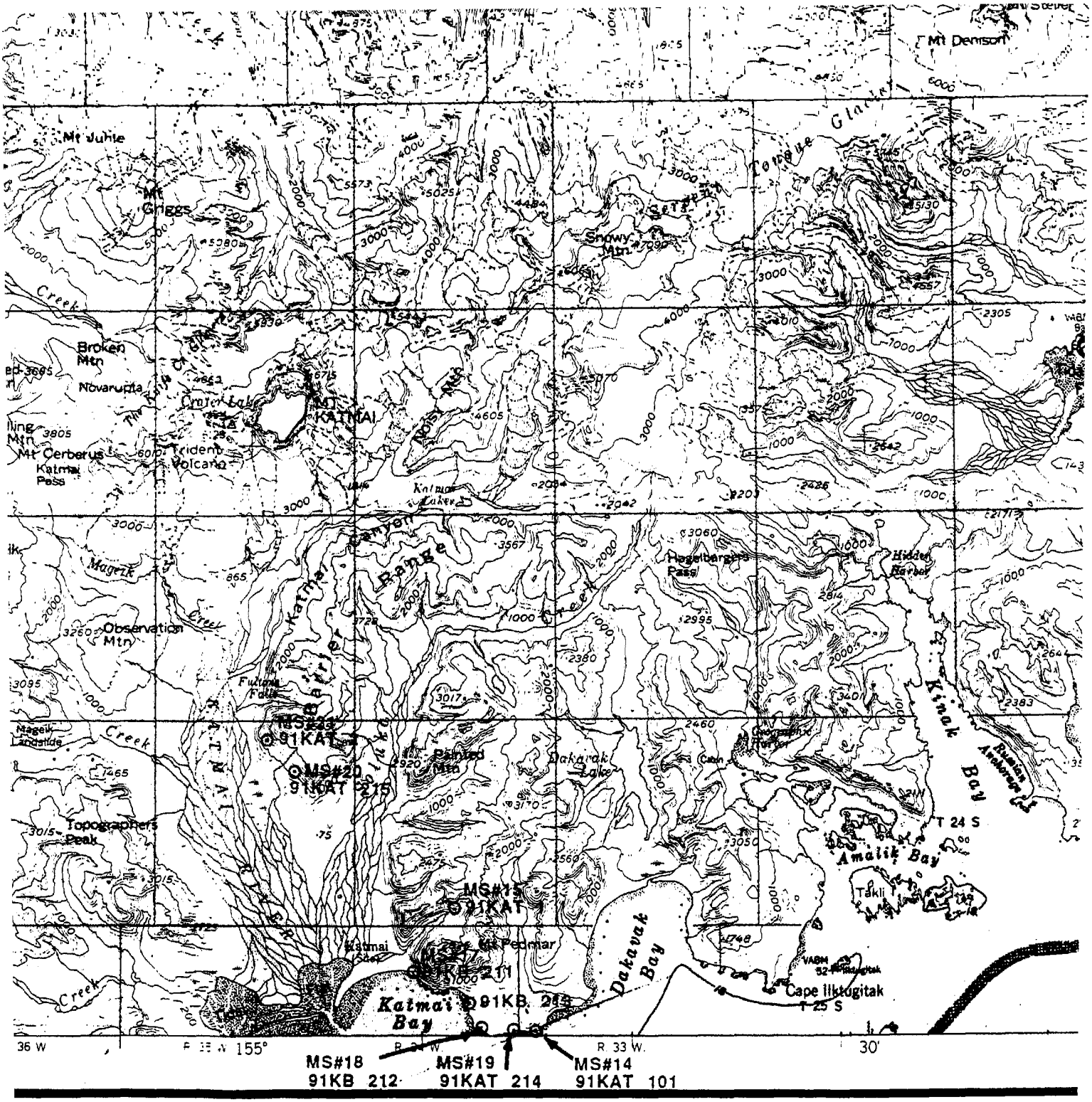
1 0 1 2 3 4 MILES

3000 0 3000 6000 9000 12000 15000 18000 21000 FEET

1 5 0 1 2 3 4 5 KILOMETERS

CONTOUR INTERVAL 100 FEET

DASHED LINES REPRESENT 50 FOOT CONTOURS



SCALE 1:250,000

Mt. Katmai

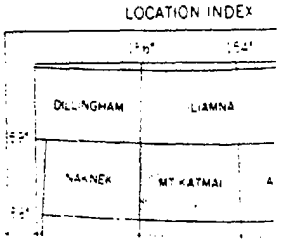
5 10 15 20 25 MILES

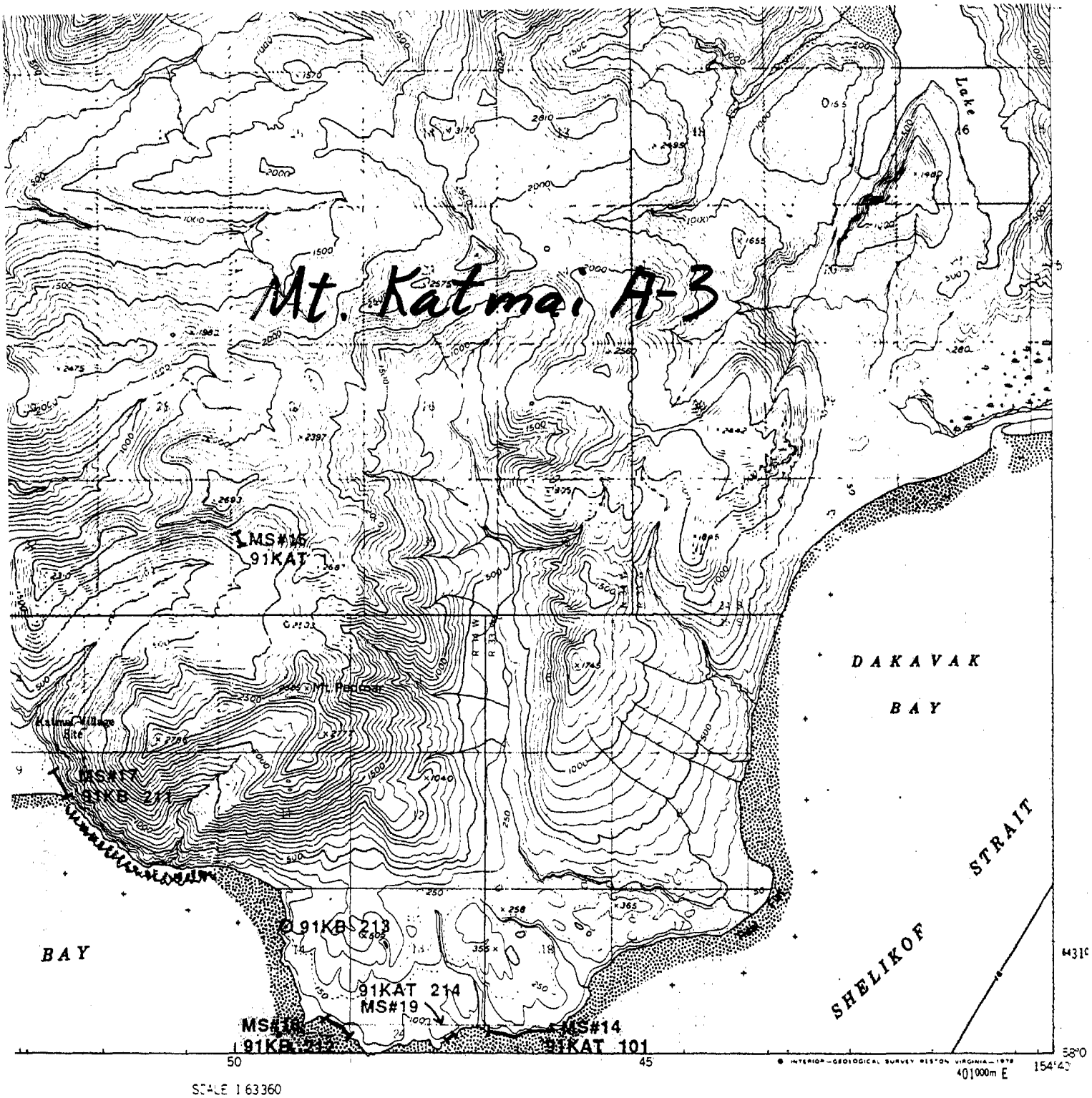
0 5 10 15 20 25 KILOMETERS

CONTOUR INTERVAL 200 FEET

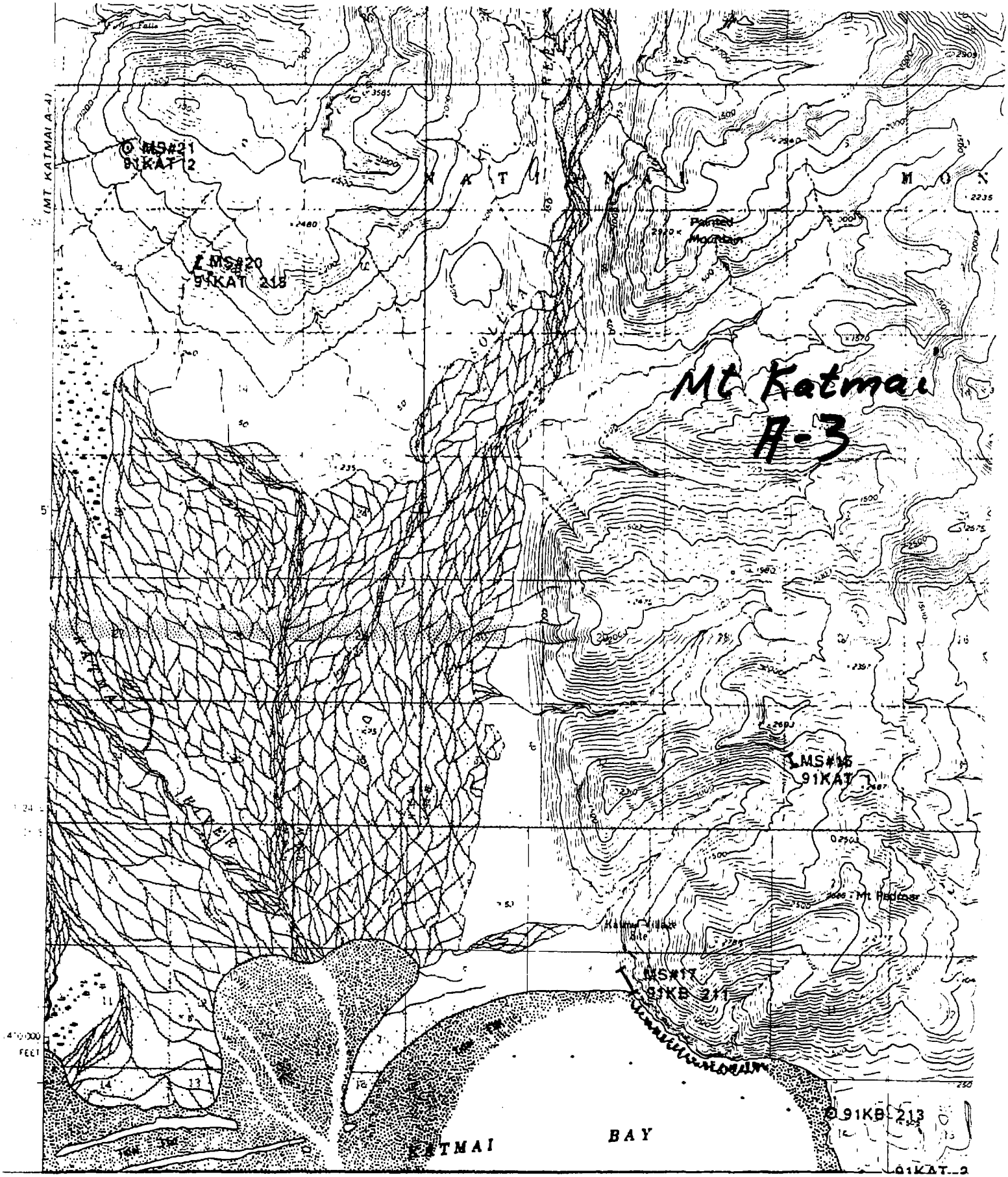
NATIONAL GEODETIC VERTICAL DATUM OF 1929

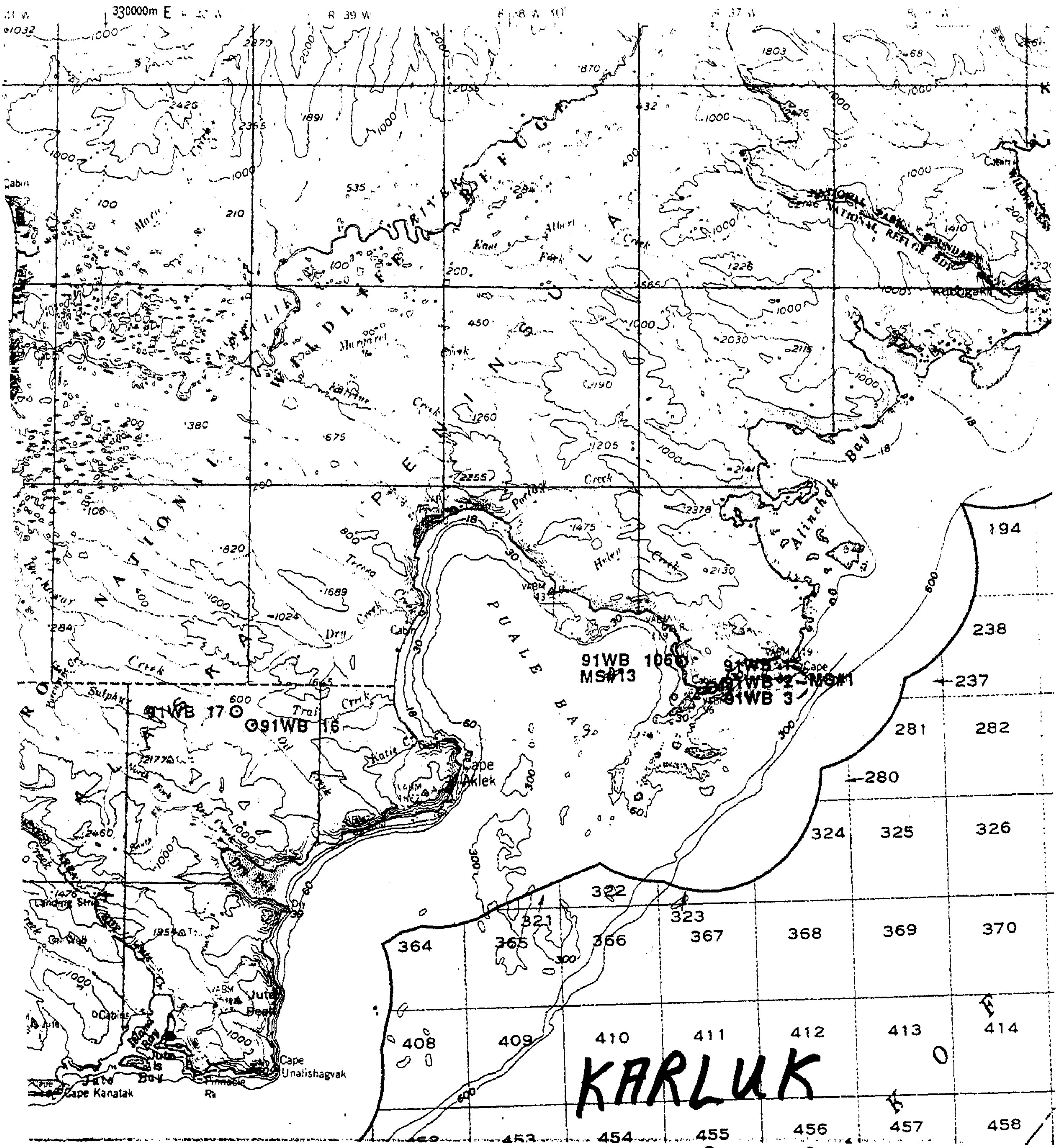
LOCATION INDEX



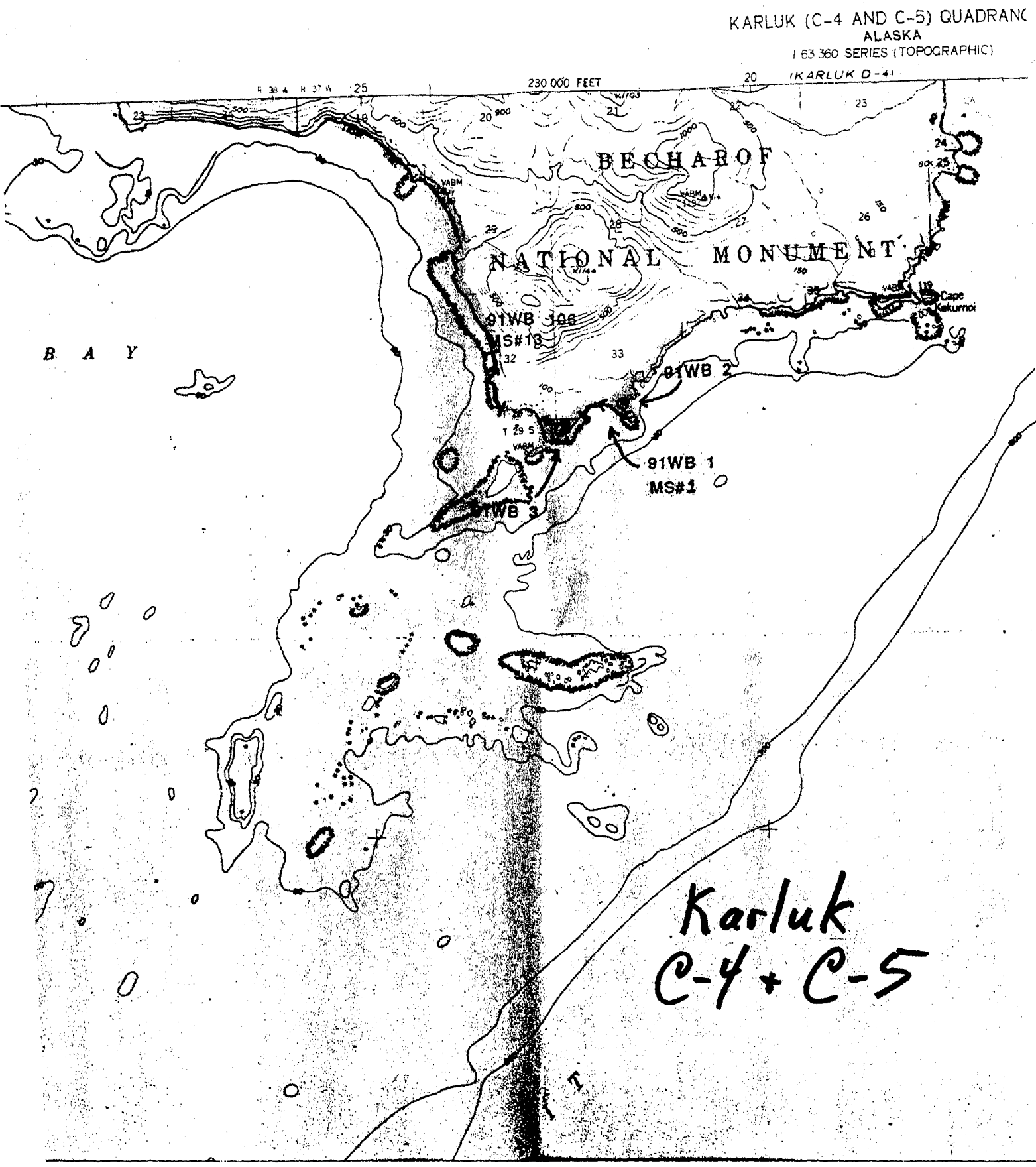


GMC Data Report No. 203

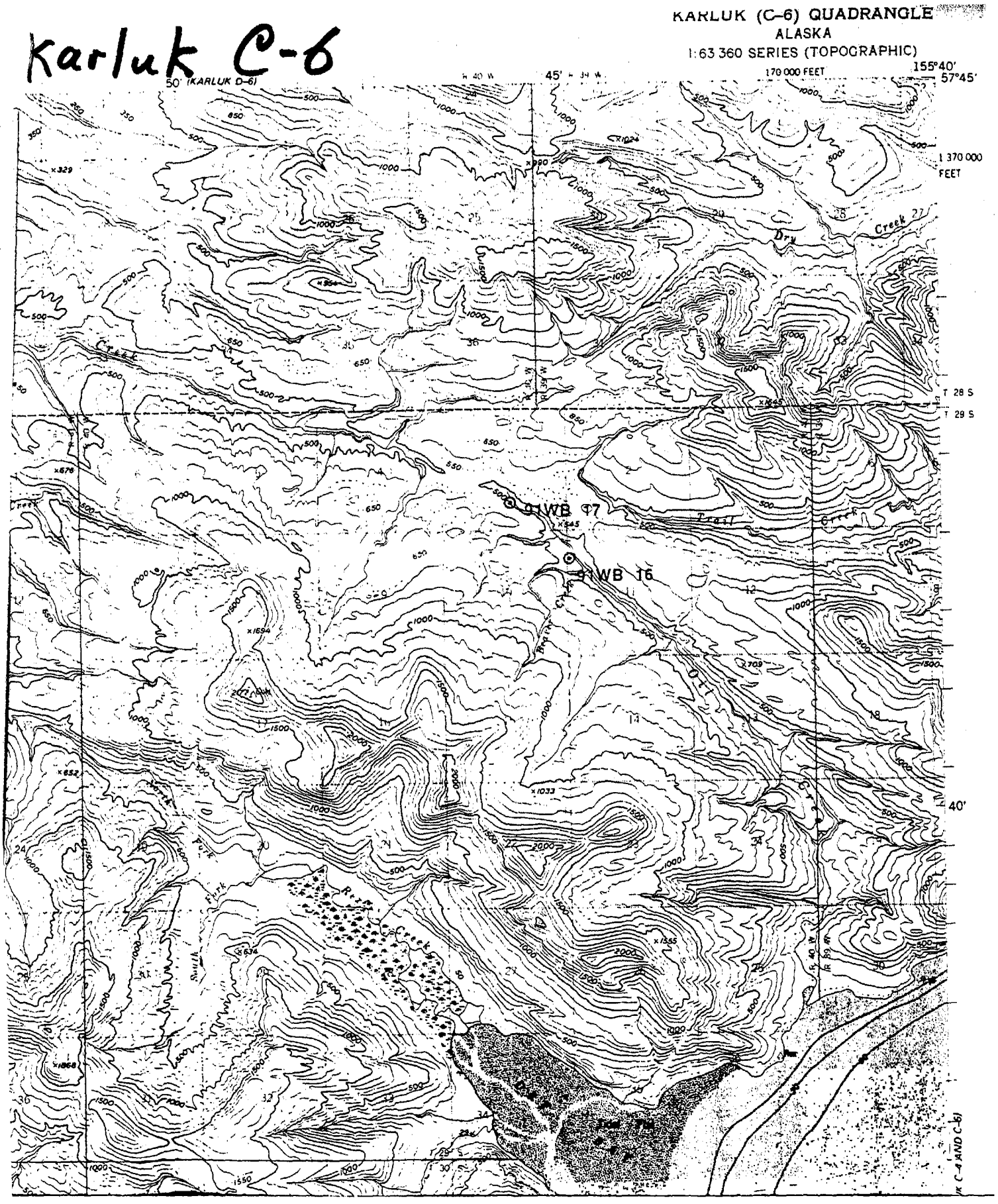

MS#21
91KAT 12
MS#20
91KAT 218
Mt Katmai
A-3
MS#16
91KAT
Mt Mageik
MS#17
91KB 211
91KB 213
BAY

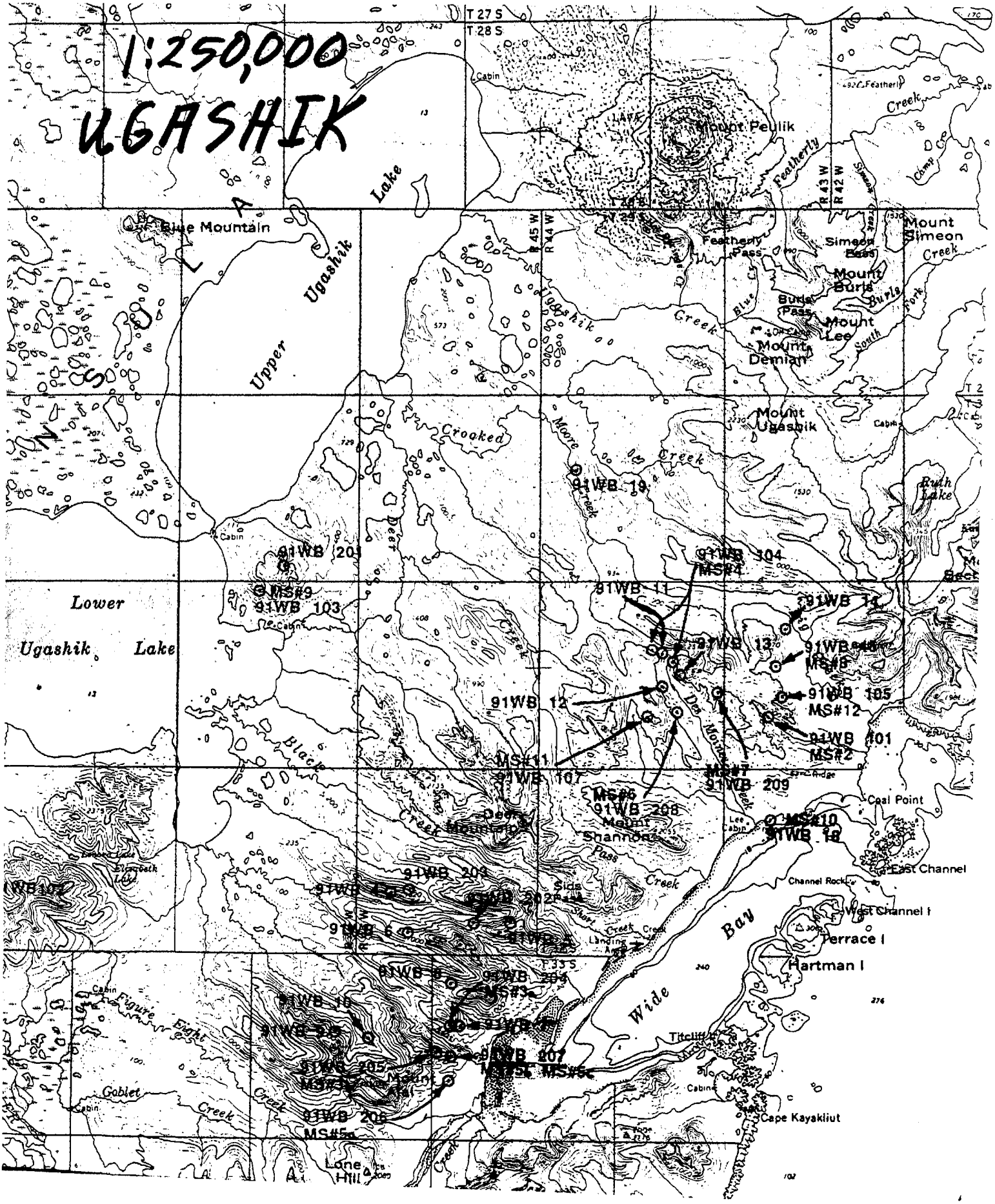

330000m E
R 39 W
91WB 106
MS#13
91WB 1
91WB 2
MS#1
91WB 3
91WB 17
91WB 16
PUALE BAY
Cape Aklek
Cape Unalishagvak
Cape Kanatak
Jute Peak
Jute Bay
Kakhonak
Cabin
KARLUK

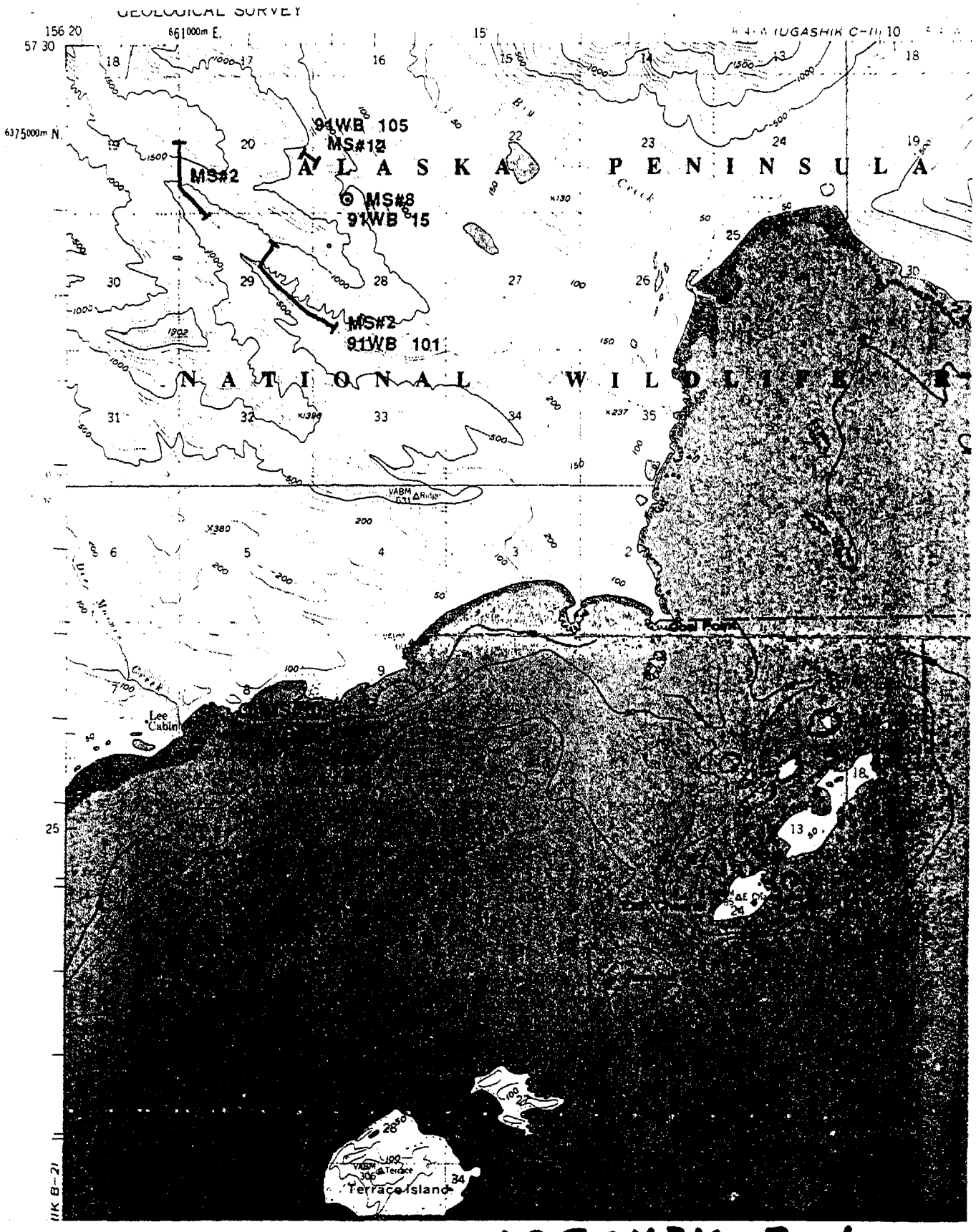
1:250,000

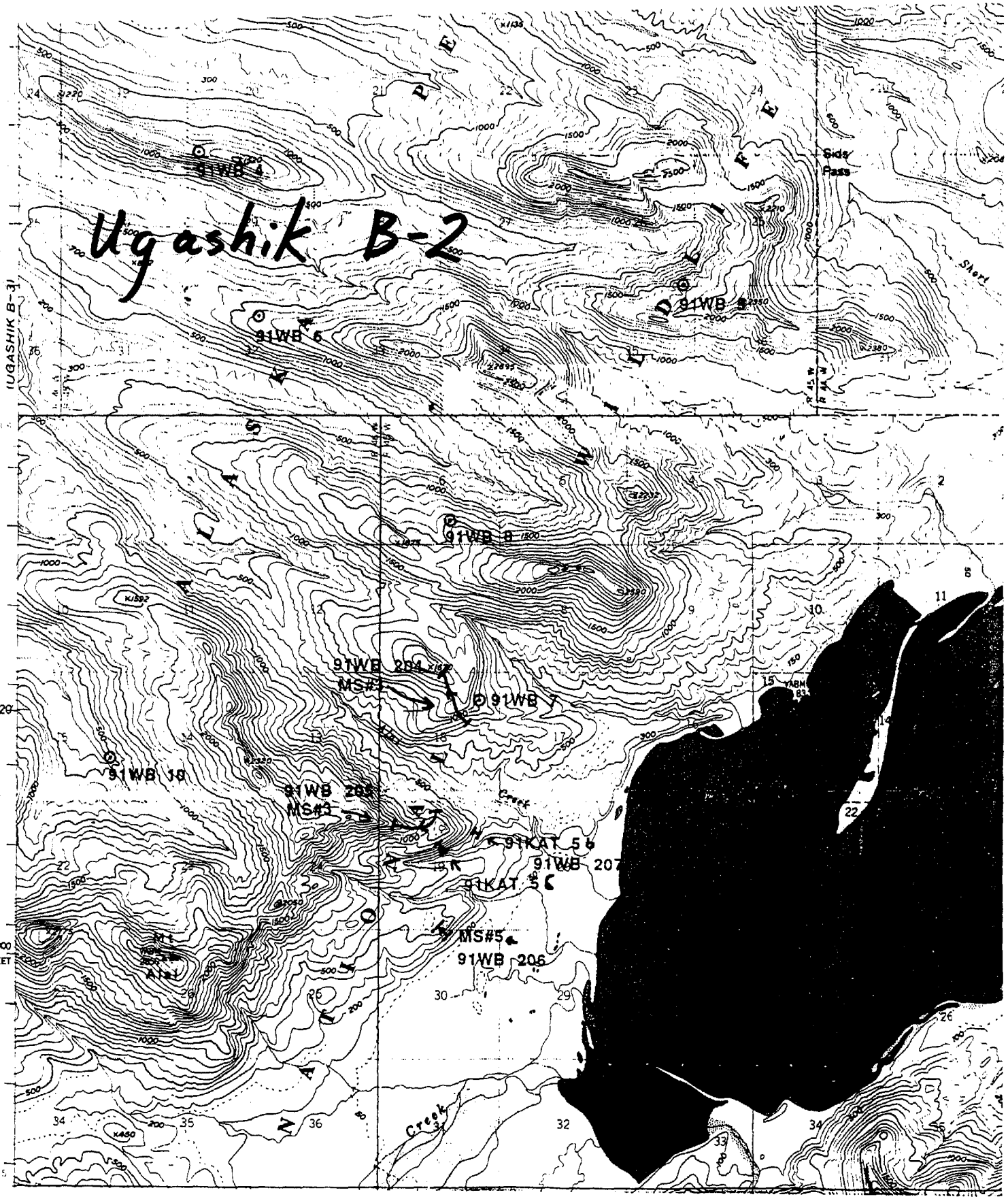

KARLUK (C-4 AND C-5) QUADRANC
ALASKA
1 63 360 SERIES (TOPOGRAPHIC)
230 000 FEET
(KARLUK D-4)
BECHAROF
NATIONAL MONUMENT
B A Y
91WB 106
MS#13
91WB 2
91WB 1
MS#1
91WB 3
Cape Kekurnoi
Karluk
C-4 + C-5

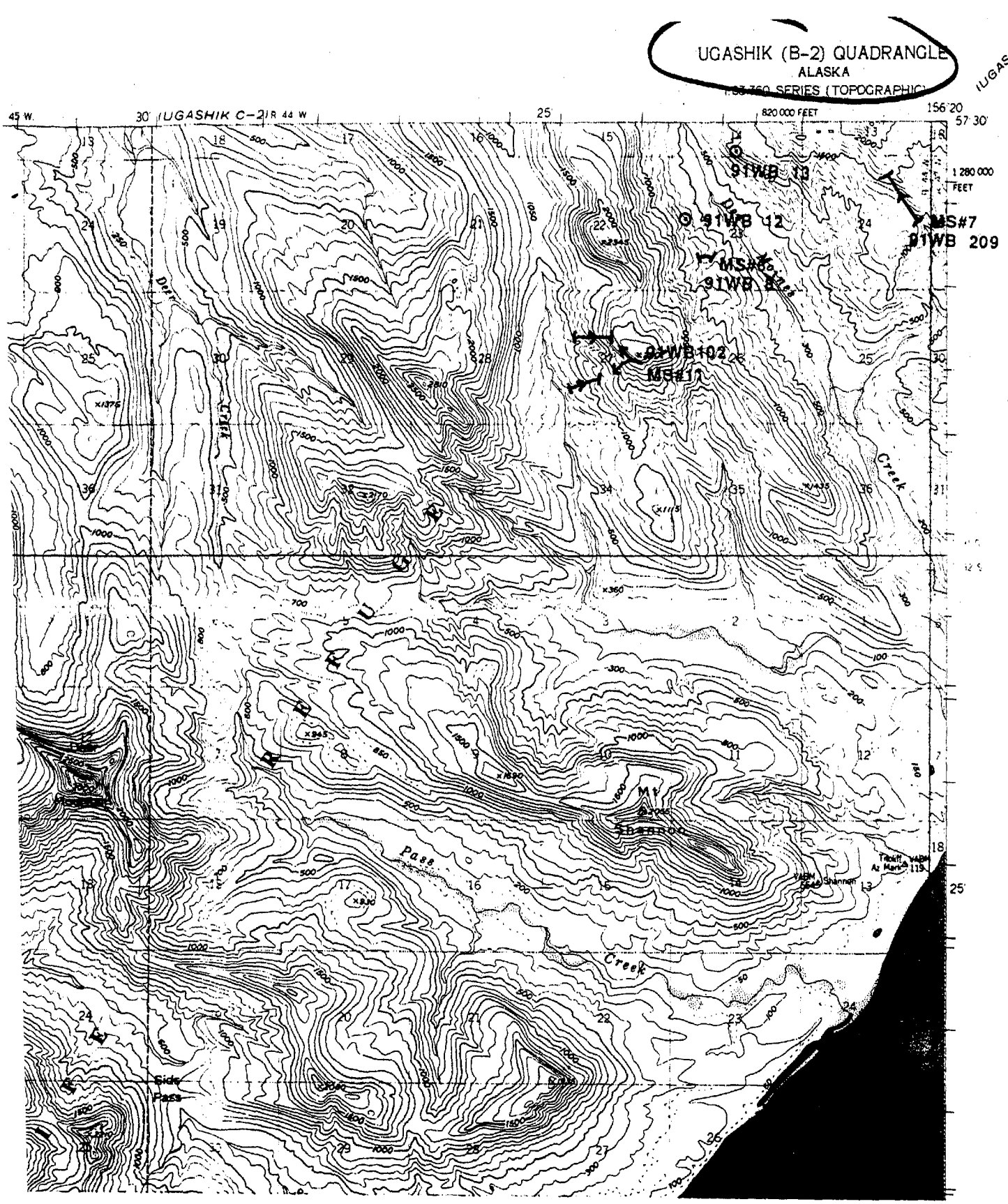
Karluk C-6

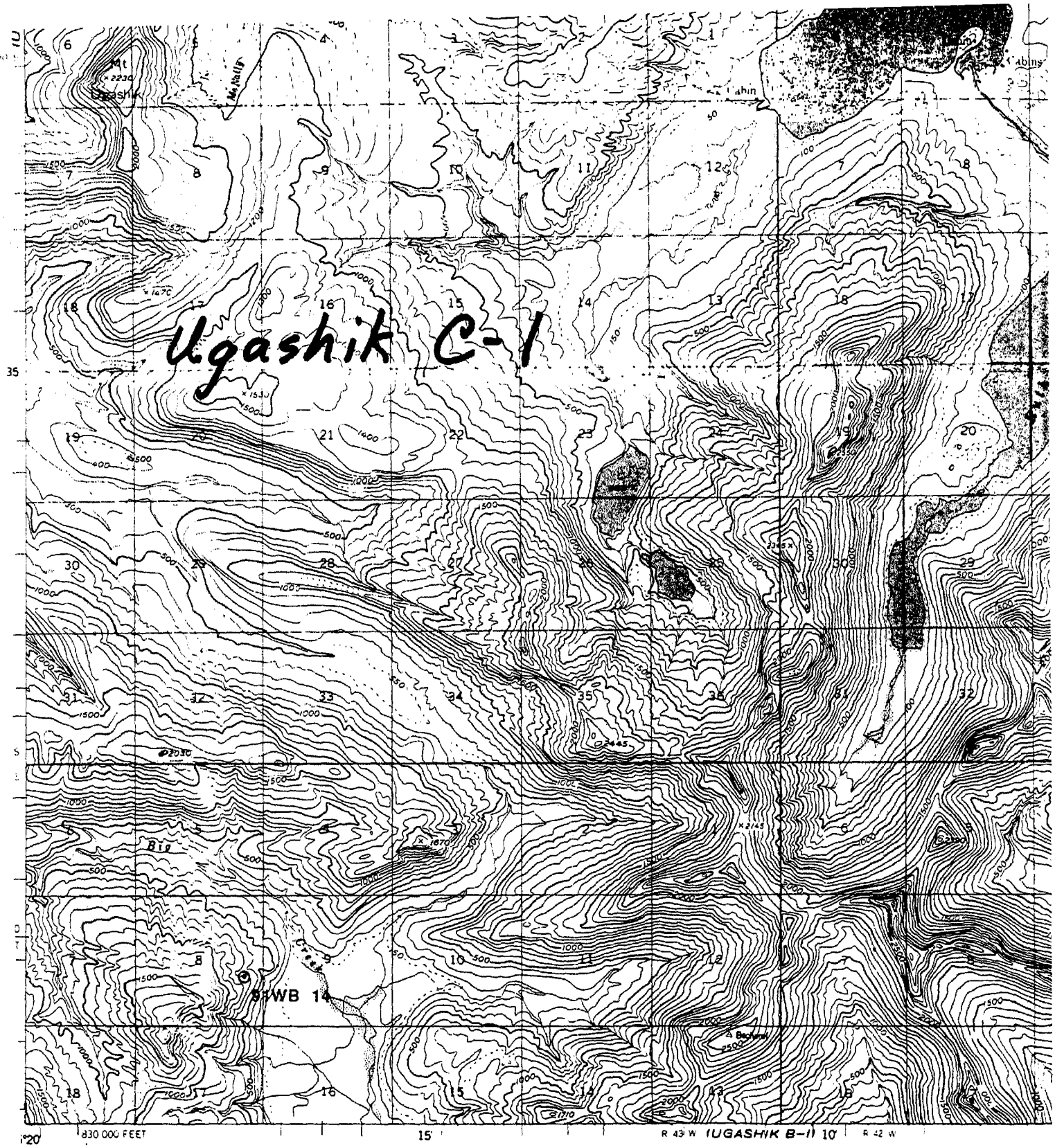

KARLUK (C-6) QUADRANGLE
ALASKA
1:63 360 SERIES (TOPOGRAPHIC)
155°40'
57°45'
1 370 000 FEET
T 28 S
T 29 S
40'
01WB 07
01WB 16
Dry Creek
Trail Creek
North Fork
South Fork
Red Creek
(KARLUK D-6)
AND C-6)


1:250,000
UGASHIK
T 27 S
T 28 S
R 45 W
R 44 W
R 43 W
R 42 W
Mount Peulik
Featherly Pass
Simeon Pass
Mount Simeon
Mount Burla
Burla Pass
Mount Lee
Mount Demian
Mount Ugashik
Blue Mountain
Upper Ugashik Lake
Lower Ugashik Lake
Ruth Lake
Crooked Creek
Moore Creek
Deer Creek
Black Creek
Dee Mountain
Mount Shannon
Pass Creek
Slide Creek
Landing Area
Coal Point
East Channel
Channel Rock
West Channel I
Terrace I
Hartman I
Wide Bay
Titcliff I
Cape Kayakliut
Mount Goblet
Goblet Creek
Lone Hill
Figure Eight Lake
Elizabeth Lake
Lee Cabin
Cabin
91WB 19
91WB 201
MS#9
91WB 103
91WB 104
MS#4
91WB 11
91WB 14
91WB 13
MS#8
91WB 105
MS#12
91WB 12
91WB 101
MS#2
MS#11
91WB 107
MS#7
91WB 209
MS#6
91WB 208
MS#10
91WB 18
91WB 204
MS#3
91WB 16
91WB 205
MS#1
91WB 206
MS#5
91WB 207
MS#5


91WB 105
MS#12
MS#2
MS#8
91WB 15
MS#2
91WB 101
ALASKA PENINSULA
NATIONAL WILDLIFE
Lee Cabin
Terrace Island
UGASHIK B-1


Ugashik B-2
91WB 4
91WB 6
91WB 5
91WB 8
91WB 7
91WB 10
91WB 204
MS#4
91WB 203
MS#3
91KAT 5b
91WB 207
91KAT 5c
MS#5
91WB 206
Side Pass
Short
Creek
Creek
Mt
Atal
210 000
FEET


UGASHIK (B-2) QUADRANGLE
ALASKA
1:63 360 SERIES (TOPOGRAPHIC)
UGASHIK C-1
UGASHIK C-2
45 W.
30'
R 44 W
25
820 000 FEET
156°20
57°30'
1 280 000 FEET
91WB 13
91WB 12
MS#7
91WB 209
MS#6
91WB 8
91WB102
MS#1
Pass
Creek
Side Pass
Shannon
Takalt YABM Az Mark 115
YABM 5649 Shannon



Mapped, edited, and published by the Geological Survey

Control by USC&GS, and USCE

Topography by photogrammetric methods from aerial photographs taken 1951. Map not field checked

Selected hydrographic data compiled from USC&GS Charts

21°

NORTH

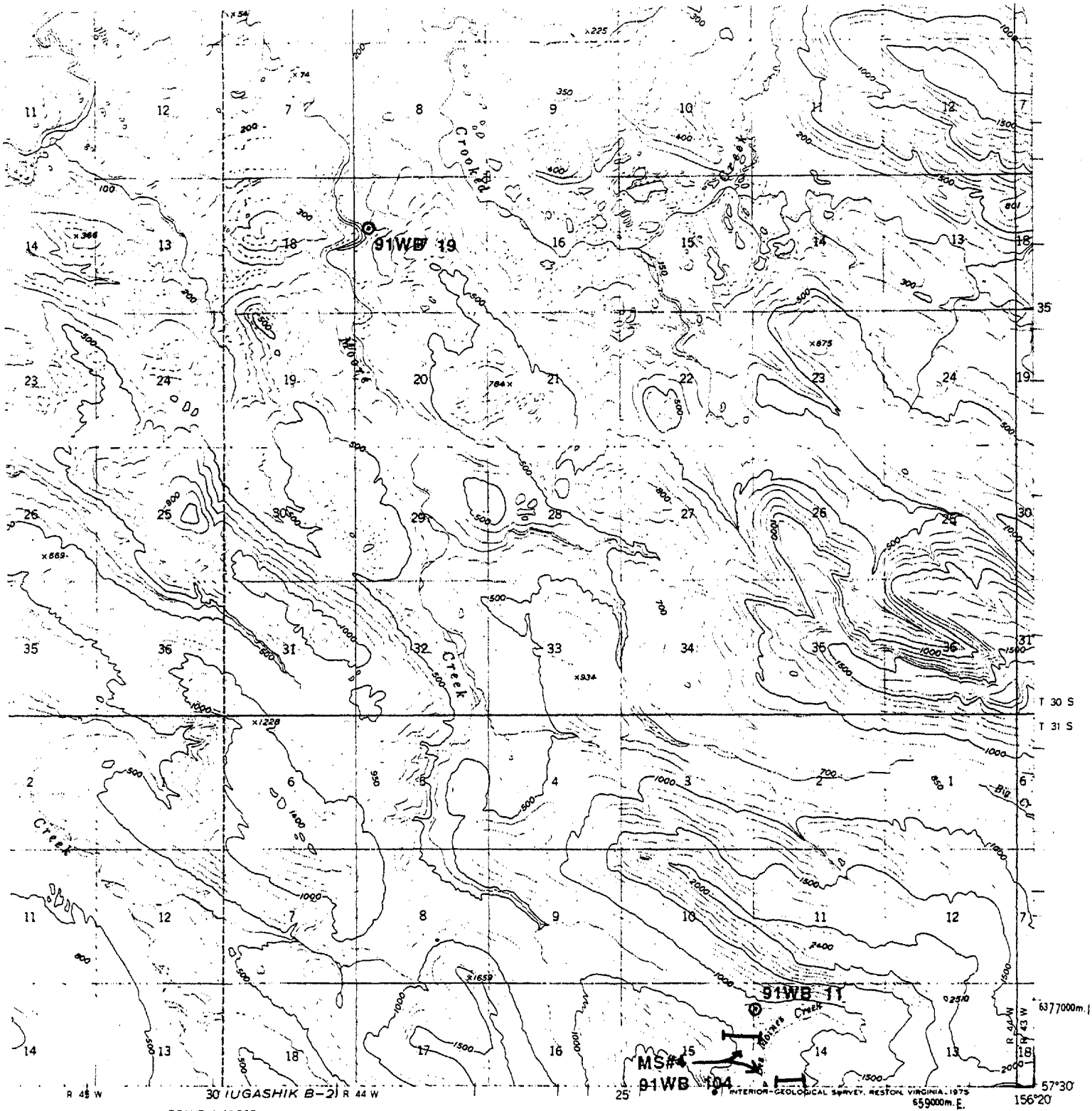
NORTH

SCALE 1:63360

1 0 1 2 3

3000 0 3000 6000 9000 12000 15000 16000

1 .5 0 1 2 3 4

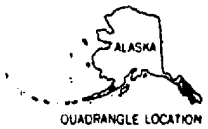


SCALE 1:63360

4 MILES
21000 FEET
5 KILOMETRES

CONTOUR INTERVAL 100 FEET
DASHED LINES REPRESENT 50 FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION
No roads or trails in this area

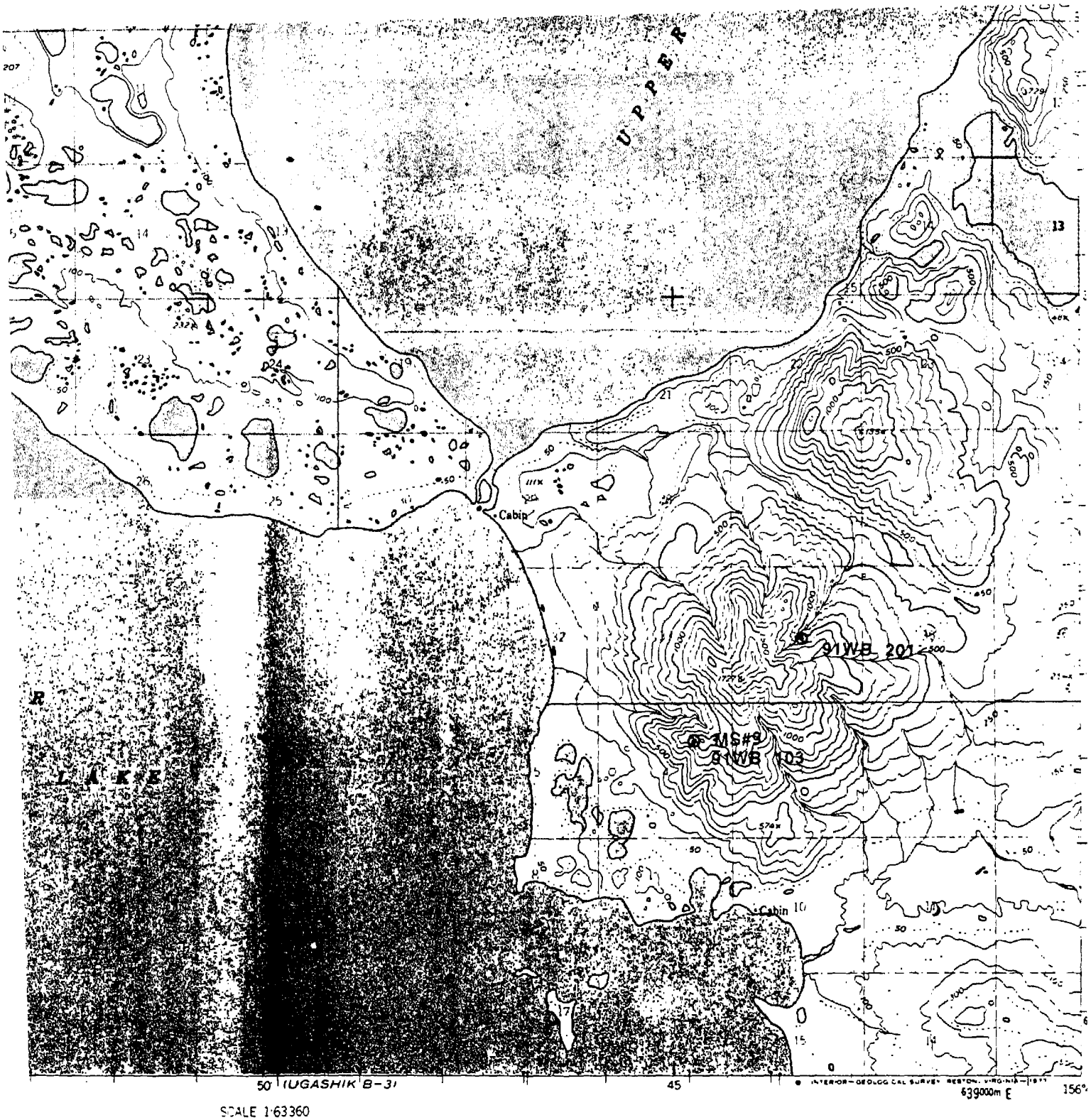


QUADRANGLE LOCATION

FOR SALE BY U. S. GEOLOGICAL SURVEY
, ALASKA 99701, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

UGASHIK (C-2), ALASKA
N5730—W15620/15X20
1951
MINOR REVISIONS 1973

GMC Data Report No. 203



SCALE 1:63360

0 1 2 3 4 MILES

0 3000 6000 9000 12000 15000 18000 21000 FEET

5 0 1 2 3 4 5 KILOMETERS

CONTOUR INTERVAL 100 FEET
DASHED LINES REPRESENT 50 FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION

No roads or trails in this area

QUADRANGLE LOCATION

UGASHIK (C-3), ALASKA
N5730—W15640/15X30
1951
MINOR REVISIONS 1975

FOR SALE BY U. S. GEOLOGICAL SURVEY
ANKS, ALASKA 99701, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
OLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

GMC Data Report No. 203

20/226

1991 Alaska Peninsula Field Program

LCP=Lake Clark Park Geologic Program

SAMPLE #	DATE	GEOGRAPHIC AREA	LAT/LONG	SEC. TWP. RNG.	QUAD	DESCRIPTION	FEET IN SECTION	COLLECTED BY	AGE/Fm.	PURPOSE	COMMENTS
91 LCP 3/1	8/3/91	NE of mouth of Horn Creek		NW 1/4, NE 1/4, SEC 33, T3S R22W	Iliamna D1	Siltstone	0 ft. ms#26	D. Doherty	Jurassic, Paveloff mbr. Chinitna Fm.	Paly Micropaleo Geochem	
91 LCP 3/2	8/3/91	NE of mouth of Horn Creek		NW 1/4, NE 1/4, SEC 33, T3S R22W	Iliamna D1	Shale / Mudstone	41 ft. ms#26	D. Doherty	Jurassic, Paveloff mbr. Chinitna Fm.	Paly Micropaleo Geochem	
91 LCP 3/3	8/3/91	NE of mouth of Horn Creek		NW 1/4, NE 1/4, SEC 33, T3S R22W	Iliamna D1	Concretion in siltstone	63 ft. ms#26	D. Doherty	Jurassic, Paveloff mbr. Chinitna Fm.	Micropaleo	
91 LCP 3/4	8/3/91	NE of mouth of Horn Creek		NW 1/4, NE 1/4, SEC 33, T3S R22W	Iliamna D1	Concretion in siltstone	94 ft. ms#26	D. Doherty	Jurassic, Paveloff mbr. Chinitna Fm.	Micropaleo Lith	
91 LCP 3/5	8/3/91	NE of mouth of Horn Creek		NW 1/4, NE 1/4, SEC 33, T3S R22W	Iliamna D1	Siltstone	127 ft. ms#26	D. Doherty	Jurassic, Paveloff mbr. Chinitna Fm.	Paly Micropaleo Geochem	
91 LCP 3/6	8/3/91	NE of mouth of Horn Creek		NW 1/4, NE 1/4, SEC 33, T3S R22W	Iliamna D1	Siltstone	215 ft. ms#26	D. Doherty	Jurassic, Paveloff mbr. Chinitna Fm.	Paly Micropaleo Geochem	
91 LCP 3/7	8/3/91	NE of mouth of Horn Creek		NW 1/4, NE 1/4, SEC 33, T3S R22W	Iliamna D1	Concretion in siltstone	285 ft. ms#26	D. Doherty	Jurassic, Paveloff mbr. Chinitna Fm.	Micropaleo	
91 LCP 3/8	8/3/91	NE of mouth of Horn Creek		NW 1/4, NE 1/4, SEC 33, T3S R22W	Iliamna D1	Sandstone	385 ft. ms#26	D. Doherty	Jurassic, Paveloff mbr. Chinitna Fm.	Lith P and P	
91 LCP 3/9	8/3/91	NE of mouth of Horn Creek		NW 1/4, NE 1/4, SEC 33, T3S R22W	Iliamna D1	Sandstone	475 ft. ms#26	D. Doherty	Jurassic, Paveloff mbr. Chinitna Fm.	Lith	
91 LCP 3/10	8/3/91	NE of mouth of Horn Creek		NW 1/4, NE 1/4, SEC 33, T3S R22W	Iliamna D1	Siltstone	537 ft. ms#26	D. Doherty	Jurassic, Paveloff mbr. Chinitna Fm.	Paly Micropaleo Geochem	
91 LCP 3/11	8/3/91	NE of mouth of Horn Creek		NW 1/4, NE 1/4, SEC 33, T3S R22W	Iliamna D1	Reworked crystal tuff	628 ft. ms#26	D. Doherty	Jurassic, Paveloff mbr. Chinitna Fm.	Lith Age	2 bags

Seen Rejected Percentage

SAMPLE #	DATE	GEOGRAPHIC AREA	LAT/LONG	SEC, TWP, RNG.	QUAD	DESCRIPTION	FEET IN	COLLECTED BY	AGE/Fm.	PURPOSE	COMMENTS
91 LCP 4/12	8/3/91	W. side of Chisik Island		NE 1/4, NW 1/4, SEC 8, T1S R19W	Kenai A7	Lt. grey, hard, conglom. sandstone	n/a	D. Doherty	Jurassic Chisik Cngl. mbr. Naknek Fm.	Lith P and P XRD	
91 LCP 4/13	8/3/91	W. side of Chisik Island		NE 1/4, NW 1/4, SEC 8, T1S R19W	Kenai A7	Parallel laminated sandstone	n/a	B. Morris	Jurassic Chisik Cngl. mbr. Naknek Fm.	Lith XRD	
91 LCP 3/14	8/4/91	NE of the mouth of Horn Creek		NW 1/4, NE 1/4, SEC 32, T3S R22W	Iliamna D1	Siltstone	645 ft. ms#26	D. Doherty	Jurassic Paveloff mbr. Chinitna Fm.	Paly Micropaleo Geochem	
91 LCP 5/15	8/5/91	Stream on w. side of Red River Valley		NE 1/4, SE 1/4, SEC1, T3S R21W	Seldovia D8	Red-brn. siltstone	22 ft. ms#30	M. Cucci	Cretaceous Saddle Mtn. mbr. Kaguyak Fm.	Paly Micropaleo Geochem	
91 LCP 5/16	8/5/91	Stream on w. side of Red River Valley		NE 1/4, SE 1/4, SEC1, T3S R21W	Seldovia D8	Dk. grey siltstone	25 ft. ms#30	J. Larson (MMS)	Cretaceous Saddle Mtn. mbr. Kaguyak Fm.	Paly Micropaleo Geochem	
91 LCP 5/17	8/5/91	Stream on w. side of Red River Valley		NE 1/4, SE 1/4, SEC1, T3S R21W	Seldovia D8	Dk. grey siltstone	27 ft. ms#30	J. Larson (MMS)	Cretaceous Saddle Mtn. mbr. Kaguyak Fm.	Paly Micropaleo Geochem	
91 LCP 5/18	8/5/91	Stream on w. side of Red River Valley		NE 1M, SE 1/4, SEC1, T3S R21W	Seldovia D8	Dk. grey siltstone	28 ft. ms#30	R. Turner (MMS)	Cretaceous Saddle Mtn. mbr. Kaguyak Fm.	Paly Micropaleo Geochem	
91 LCP 5/19	8/5/91	Stream on w. side of Red River Valley		NE 1/4, SE 1/4, SEC1, T3S R21W	Seldovia D8	Sandstone	40 ft. ms#30	B. Morris	Cretaceous Saddle Mtn. mbr. Kaguyak Fm.	Lith P and P	
91 LCP 5/20	8/5/91	Stream on w. side of Red River Valley		NE 1/4, SE 1/4, SEC1, T3S R21W	Seldovia D8	Sandstone	35 ft. ms#30	J. Larson (MMS)	Cretaceous Saddle Mtn. mbr. Kaguyak Fm.	Lith P and P	
91 LCP 5/21	8/5/91	Stream on w. side of Red River Valley		NE 1/4, SE 1/4, SEC, T3S R21W	Seldovia D8	Tuff	27.5 ft. ms#30	D. Doherty B. Morris	Cretaceous Saddle Mtn. mbr. Kaguyak Fm.	Age Inorg. geochem Lith	
91 LCP 5/22	8/5/91	Stream on w. side of Red River Valley		NE 1/4, SE 1/4, SEC1, T3S R21W	Seldovia D8	Tuff	19.5 ft. ms#30	D. Doherty B. Morris	Cretaceous Saddle Mtn. mbr. Kaguyak Fm.	Age Inorg. geochem Lith	2 bags
91 LCP 5/23	8/5/91	Stream on w. side of Red River Valley		NE 1/4, SE 1/4, SEC1, T3S R21W	Seldovia D8	Sandstone	3 ft. ms#30	M. Cucci	Top? Naknek Fm.	Lith	

SAMPLE #	DATE	GEOGRAPHIC AREA	LAT/LONG	SEC. TWP. RNG.	QUAD	DESCRIPTION	FEET IN	COLLECTED BY	AGE/Fm.	PURPOSE	COMMENTS
91 LCP 6/24		?????				Siltstone				Micropaleo paly	
91 LCP 7/25		?????				Sandstone				Lith	
91 LCP 7/26		?????				Siltstone				Paly Micropaleo Geochem Lith	
91 LCP 7/27		?????				Sandstone					
91 LCP 7/28		?????				Sandstone				Lith	
91 LCP 7/29		?????								Lith X-ray	
91 LCP 7/30	8/7/91	NE of Horn Creek		NE corner of SEC 33, T3S R22W	Seldovia D8		10 ft. ms #	B. Morris	U. Jurassic Lower Ss mbr. Naknek Fm.	K/Ar Age Inorg. geochem Lith	
91 LCP 7/31	8/7/91	NE of Horn Creek		NE corner of SEC 33, T3S R22W	Seldovia D8		29 ft. ms #	B. Morris	U. Jurassic Lower Ss mbr. Naknek Fm.	Paly Micropaleo geochem	
91 LCP 7/32	8/7/91	NE of Horn Creek		NE corner of SEC 33, T3S R22W	Seldovia D8		57 ft. ms #	B. Morris	U. Jurassic Lower Ss mbr. Naknek Fm.	lith	
91 LCP 7/33	8/7/91	NE of Horn Creek		NE corner of SEC 33, T3S R22W	Seldovia D8		111 ft. ms #	B. Morris	U. Jurassic Lower Ss mbr. Naknek Fm.	Paly Micropaleo geochem	
91 LCP 7/34	8/7/91	NE of Horn Creek		NE corner of SEC 33, T3S R22W	Seldovia D8		161 ft. ms #	B. Morris	U. Jurassic Lower Ss mbr. Naknek Fm.	Lith	
91 LCP 7/35	8/7/91	NE of Horn Creek		NE corner of SEC 33, T3S R22W	Seldovia D8		267 ft. ms #	B. Morris	U. Jurassic Lower Ss mbr. Naknek Fm.	Lith P and P	
91 LCP 7/36	8/7/91	NE of Horn Creek		NE corner of SEC 33, T3S R22W	Seldovia D8		321 ft. ms #	B. Morris	U. Jurassic Lower Ss mbr. Naknek Fm.	Paly Micropaleo	
91 LCP 7/37	8/7/91	NE of Horn Creek		NE corner of SEC 33, T3S R22W	Seldovia D8		752 ft. ms #	B. Morris	U. Jurassic Lower Ss mbr. Naknek Fm.	Lith Slab	Slab for B. Mon

SAMPLE #	DATE	GEOGRAPHIC AREA	LAT/LONG	SEC. TWP. RNG.	QUAD	DESCRIPTION	FEET IN	COLLECTED BY	AGE/Fm.	PURPOSE	COMMENTS
91 LCP 3/39	8/7/91	NE of Horn Creek		NE corner of Sec 33, T3S, R22W	Seldovia D8		840 ft. ms #	B. Morris	U. Jurassic Lower Se mbr. Naknek Fm.	K/Ar age Lith	
91 LCP 3/39	8/7/91	NE of Horn Creek		NE corner of Sec 33, T3S, R22W	Seldovia D8		842 ft. ms #	B. Morris	U. Jurassic Lower Se mbr. Naknek Fm.	K/Ar age Lith	
91 LCP 3/40	8/7/91	NE of Horn Creek		NE corner of Sec 33, T3S, R22W	Seldovia D8		843 ft. ms #	B. Morris	U. Jurassic Lower Se mbr. Naknek Fm.	Paly Micropaleo Geochem	
91 LCP 3/41	8/7/91	NE of Horn Creek		NE corner of Sec 33, T3S, R22W	Seldovia D8		923 ft. ms #	B. Morris	U. Jurassic Lower Se mbr. Naknek Fm.	Paly Micropaleo	
91 LCP 3/42	8/7/91	NE of Horn Creek		NE corner of Sec 33, T3S, R22W	Seldovia D8		926 ft. ms #	B. Morris	U. Jurassic Lower Se mbr. Naknek Fm.	Lith P and P	
91 LCP 3/43	8/7/91	NE of Horn Creek		NE corner of Sec 33, T3S, R22W	Seldovia D8		1159 ft. ms #	B. Morris	U. Jurassic Lower Se mbr. Naknek Fm.	Paly Micropaleo Geochem	
91 LCP 3/44	8/7/91	NE of Horn Creek		NE corner of Sec 33, T3S, R22W	Seldovia D8		1160 ft. ms #	B. Morris	U. Jurassic Lower Se mbr. Naknek Fm.	Lith	
91 LCP 101/201	8/3/91	Clam Cove Pt.		NE 1/4 Sec 31, NW 1/4 Sec 32, T3S, R21W	Seldovia D8	Arkosic sandstone	15 ft. ms #27	S. Krueger	U. Jurassic Pomeroy Arkose Naknek Fm.	Lith P and P	
91 LCP 101/202	8/3/91	Clam Cove Pt.		NE 1/4 Sec 31, NW 1/4 Sec 32, T3S, R21W	Seldovia D8	Siltstone	30 ft. ms #27	S. Krueger	U. Jurassic Pomeroy Arkose Naknek Fm.	Paly Micropaleo Geochem	
91 LCP 101/203	8/3/91	Clam Cove Pt.		NE 1/4 Sec 31, NW 1/4 Sec 32, T3S, R21W	Seldovia D8	Siltstone	87 ft. ms #27	S. Krueger	U. Jurassic Pomeroy Arkose Naknek Fm.	Paly Micropaleo Geochem	
91 LCP 101/204	8/3/91	Clam Cove Pt.		NE 1/4 Sec 31, NW 1/4 Sec 32, T3S, R21W	Seldovia D8	Arkosic sandstone	180 ft. ms #27	S. Krueger	U. Jurassic Pomeroy Arkose Naknek Fm.	Lith P and P	
91 LCP 101/205	8/3/91	Clam Cove Pt.		NE 1/4 Sec 31, NW 1/4 Sec 32, T3S, R21W	Seldovia D8	Arkosic sandstone	305 ft. ms #27	S. Krueger	U. Jurassic Pomeroy Arkose Naknek Fm.	Lith P and P	

SAMPLE #	DATE	GEOGRAPHIC AREA	LAT/LONG	SEC. TWP. RNG.	QUAD	DESCRIPTION	FEET IN	COLLECTED BY	AGE/Fm.	PURPOSE	COMMENTS
91 LCI 101/206	8/3/91	Clam Cove Pt.		NE 1/4 Sec 31, NW 1/4 Sec 32, T3S, R21 W	Seldovia D8	Arkosic sandstone	470 ft. ms #27	S. Krueger	U. Jurassic Pomeroy Arkose Naknek Fm.	Lith	
91 LCI 101/207	8/3/91	Clam Cove Pt.		NE 1/4 Sec 31, NW 1/4 Sec 32, T3S, R21 W	Seldovia D8	Siltstone	485 ft. ms #27	S. Krueger	U. Jurassic Pomeroy Arkose Naknek Fm.	Paly Micropaleo	
91 LCI 101/208	8/3/91	Clam Cove Pt.		NE 1/4 Sec 31, NW 1/4 Sec 32, T3S, R21 W	Seldovia D8	Arkosic sandstone	513 ft. ms #27	S. Krueger	U. Jurassic Pomeroy Arkose Naknek Fm.	Lith P and P	
91 LCI 101/209	8/3/91	Clam Cove Pt.		NE 1/4 Sec 31, NW 1/4 Sec 32, T3S, R21 W	Seldovia D8	Siltstone	697 ft. ms #27	S. Krueger	U. Jurassic Pomeroy Arkose Naknek Fm.	Paly Micropaleo Geochem	
91 LCI 101/210	8/3/91	Clam Cove Pt.		NE 1/4 Sec 31, NW 1/4 Sec 32, T3S, R21 W	Seldovia D8	Arkosic sandstone	727 ft. ms #27	S. Krueger	U. Jurassic Pomeroy Arkose Naknek Fm.	Lith	
91 LCI 102/211		NE of Johnson Glacier	60° 9' N 152° 57' W	NE 1/4 Sec 29 T1N, R21W	Kenai A8	Granodiorite	n/a	S. Krueger	Jurassic Pluton	K/Ar age AFTA	
91 LCI 102/212		NE of Johnson Glacier	60° 9' N 152° 57' W	NE 1/4 Sec 29 T1N, R21W	Kenai A8	Metalimestone-metabasalt breccia	n/a	S. Krueger	Triassic in Bruin Bay Fault	Micropaleo Lith	2 bags
91 LCI 102/213		NE of Johnson Glacier	60° 9' N 152° 57' W	NE 1/4 Sec 29 T1N, R21W	Kenai A8	Dacite dike	n/a	S. Krueger	Dike in Bruin Bay Fault	AFTA K/Ar age	
91 LCI 104/214	8/7/91	NE of Johnson Glacier	60° 8' N 152° 57' W	SW 1/4 Sec 33 T1N, R21W	Kenai A8	Mylonite (Med gr. Ss)	n/a	S. Krueger	Bruin Bay Fault	Microstructs. Lith P and P	
91 LCI 104/215	8/7/91	W of Clam Cove	59° 53' N 152° 58' W	SW 1/4, Sec 30 T5S, R22W	Seldovia D8	Andesite clasts in conglomerate	94 ft. ms #	S. Krueger	U. Jurassic Pomeroy Arkose Naknek Fm.	K/Ar age	
91 LCI 104/216	8/7/91	W of Clam Cove	59° 53' N 152° 58' W	SW 1/4, Sec 30 T5S, R22W	Seldovia D8	Sandstone	132 ft. ms #	S. Krueger	U. Jurassic Pomeroy Arkose Naknek Fm.	Lith P and P	
91 LCI 104/217	8/7/91	W of Clam Cove	59° 53' N 152° 58' W	SW 1/4, Sec 30 T3S, R22W	Seldovia D8	Mudstone	151 ft. ms #	S. Krueger	U. Jurassic Pomeroy Arkose Naknek Fm.	Paly Geochem	
91 LCI 104/218	8/7/91	W of Clam Cove	59° 53' N 152° 58' W	SW 1/4, Sec 30 T5S, R22W	Seldovia D8	Mudstone	169 ft. ms #	S. Krueger	U. Jurassic Pomeroy Arkose Naknek Fm.	Paly Geochem	

SAMPLE #	DATE	GEOGRAPHIC AREA	LAT/LONG	SEC, TWP, RNG	QUAD	DESCRIPTION	FEET IN	COLLECTED BY	AGE/Fm.	PURPOSE	COMMENTS
91 LCP 104/219	8/6/91	W of Clam Cove	59° 53' N 152° 58' W	SW 1/4 Sec. 30 T5S, R21W	Seldovia D6	Mudstone	204 ft.	S. Krueger	Pomeroy Arkose	Paly Geochem	
91 LCP 104/220	8/7/91	W of Clam Cove	59° 53' N 152° 58' W	SW 1/4 Sec. 30 T5S, R21W	Seldovia D6	Mudstone	231 ft.	S. Krueger	Pomeroy Arkose	Paly Geochem	
91 LCP 104/221	8/7/91	W of Clam Cove	59° 53' N 152° 58' W	SW 1/4 Sec. 30 T5S, R21W	Seldovia D6	Mudstone	309 ft.	S. Krueger	Pomeroy Arkose	Paly Geochem	
91 LCP 104/222	8/7/91	W of Clam Cove	59° 53' N 152° 58' W	SW 1/4 Sec. 30 T5S, R21W	Seldovia D6	Mudstone	344 ft.	S. Krueger	Pomeroy Arkose	Paly Geochem	
91 LCP 104/223	8/7/91	W of Clam Cove	59° 53' N 152° 58' W	SW 1/4 Sec. 30 T5S, R21W	Seldovia D6	Sandstone	358 ft.	S. Krueger	Pomeroy Arkose	Lith	
91 LCP 104/224	8/7/91	W of Clam Cove	59° 53' N 152° 58' W	SW 1/4 Sec. 30 T5S, R21W	Seldovia D6	Mudstone	579 ft.	S. Krueger	Pomeroy Arkose	Paly Geochem	
91 LCP 104/225	8/7/91	W of Clam Cove	59° 53' N 152° 58' W	SW 1/4 Sec. 30 T5S, R21W	Seldovia D6	Sandstone	575 ft.	S. Krueger	Pomeroy Arkose	Lith	
91 LCP 104/226	8/7/91	W of Clam Cove	59° 53' N 152° 58' W	SW 1/4 Sec. 30 T5S, R21W	Seldovia D6	Andesite Clasts in CGL (see 104/230)	572 ft.	S. Krueger	Pomeroy Arkose	K/Ar?	
91 LCP 104/227	8/7/91	W of Clam Cove	59° 53' N 152° 58' W	SW 1/4 Sec. 30 T5S, R21W	Seldovia D6	Mudstone	622 ft.	S. Krueger	Pomeroy Arkose	Paly Geochem	
91 LCP 104/228	8/7/91	W of Clam Cove	59° 53' N 152° 58' W	SW 1/4 Sec. 30 T5S, R21W	Seldovia D6	Mudstone	704 ft.	S. Krueger	Pomeroy Arkose	Paly Geochem	
91 LCP 201/401	8/7/91	W side Chisik I.		2/3 way south of N line between Sec. 8&9 T18, R19W	Kenai A7		0 ft.	Bill Morris	Siltstone Mem. Jn	Paly Micropaleo Geochem	
91 LCP 201/402	8/7/91	W side Chisik I.		2/3 way south of N line between Sec. 8&9 T18, R19W	Kenai A7		65 ft.	Bill Morris	Siltstone Mem. Jn	Paly Micropaleo Lith	
91 LCP 202/403	8/8/91	S side of Augustine		NE 1/4 of Sec 11 T10S, R25W	Iliamna B2		1 ft.	Bill Morris	Douglas Island Mbr. Naknek	Lith	
91 LCP 202/404	8/8/91	S side of Augustine		NE 1/4 of Sec 11 T10S, R25W	Iliamna B2		19 ft.	Bill Morris	Douglas Island Mbr. Naknek	Lith	
91 LCP 202/405	8/8/91	S side of Augustine		NE 1/4 of Sec 11 T10S, R25W	Iliamna B2		22.5 ft.	Bill Morris	Douglas Island Mbr. Naknek	Paly M.P. Lith	
91 LCP 202/406	8/8/91	S side of Augustine		NE 1/4 of Sec 11 T10S, R25W	Iliamna B2		87 ft.	Bill Morris	Douglas Island Mbr. Naknek	Paly M.P. Macro	
91 LCP 202/407	8/8/91	S side of Augustine		NE 1/4 of Sec 11 T10S, R25W	Iliamna B2		98 ft.	Bill Morris	Douglas Island Mbr. Naknek	Lith P and P	
91 LCP 202/408	8/8/91	S side of Augustine		NE 1/4 of Sec 11 T10S, R25W	Iliamna B2		94.5 ft.	Bill Morris	Douglas Island Mbr. Naknek	Paly M.P.	

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91 LCP 202/408	8/8/91	S side of Augustine		NE 1/4 of Sec 11 T10S, R25W	Iliamna B2		108.4 ft.	Bill Morris	Douglas Island Mbr. Naknek	Paly M.P. Geochem	
91 LCP 202/410	8/8/91	S side of Augustine		NE 1/4 of Sec 11 T10S, R25W	Iliamna B2		159 ft.	Bill Morris	Douglas Island Mbr. Naknek	Paly M.P.	
91 LCP 104/229	8/7/91	W of Clam Cove	59° 53' N 152° 58' W	SW 1/4 Sec 30 T5S, R21W	Seldovia D8	Sandstone	733 ft.	S. Krueger	Pomeroy Arkose	Lith P and P	
91 LCP 104/230	8/7/91	W of Clam Cove	59° 54' N 152° 58' W	SE 1/4 Sec. 25 T5S, R22W	Seldovia D8	Andesite Cobbles from CGL float	572 ft.	S. Krueger	Pomeroy Arkose	K/Ar AFTA	

1991 Alaska Peninsula Field program

Wide Bay = WB

SAMPLE #	*DATE*	*GEOGRAPHIC AREA*	*LAT/LONG*	*SEC. TWP. RNG.*	*QUAD.*	*DESCRIPTION*	*FEET IN SECTION*	*COLLECTED BY:*	*AGE / Fm.*	*PURPOSE*	*COMMENTS*
91 WB 1/1	4-Jun-91	E. side of Pauls Bay		SE 1/4, SW 1/4 SEC 33, T28S R37W	Karluk C4 / C5	Limestone	9 ft. ms#1	R. Curry	U. Triassic	X-ray, Lith, Macrofossil Geochem	
91 WB 1/2	4-Jun-91	E. side of Pauls Bay		SE 1/4, SW 1/4 SEC 33, T28S R37W	Karluk C4 / C5	Limestone w/ colonal coral	24 ft. ms#1	R. Curry	U. Triassic	Micropaleo Macrofossil	
91 WB 1/3	4-Jun-91	E. side of Pauls Bay		SE 1/4, SW 1/4 SEC 33, T28S R37W	Karluk C4 / C5	Silty carbonate sandstone	36 ft. ms#1	R. Curry	U. Triassic	Micropaleo Paly, Geochem Lith	
91 WB 1/4	4-Jun-91	E. side of Pauls Bay		SE 1/4, SW 1/4 SEC 33, T28S R37W	Karluk C4 / C5	Nodular limestone	50 ft. ms#1	R. Curry	U. Triassic	Geochem	
91 WB 1/5	4-Jun-91	E. side of Pauls Bay		SE 1/4, SW 1/4 SEC 33, T28S R37W	Karluk C4 / C5	Nodular limestone	65 ft. ms#1	R. Curry	U. Triassic	Geochem	
91 WB 1/6	4-Jun-91	E. side of Pauls Bay		SE 1/4, SW 1/4 SEC 33, T28S R37W	Karluk C4 / C5	Nodular limestone	110 ft. ms#1	R. Curry	U. Triassic	Geochem Micropaleo, Paly	
91 WB 1/7	4-Jun-91	E. side of Pauls Bay		SE 1/4, SW 1/4 SEC 33, T28S R37W	Karluk C4 / C5	Limestone debris flow	130 ft. ms #1	R. Curry	U. Triassic	Micropaleo Paly	
91 WB 1/8	4-Jun-91	E. side of Pauls Bay		SE 1/4, SW 1/4 SEC 33, T28S R37W	Karluk C4 / C5	Sandstone & limestone	132 ft. ms#1	R. Curry	U. Triassic	Geochem Micropaleo, Paly	
91 WB 1/9	4-Jun-91	E. side of Pauls Bay		SE 1/4, SW 1/4 SEC 33, T28S R37W	Karluk C4 / C5	Nodular limestone	157 ft. ms#1	R. Curry	U. Triassic	Geochem Micropaleo, Paly	
91 WB 1/10	4-Jun-91	E. side of Pauls Bay		SE 1/4, SW 1/4 SEC 33, T28S R37W	Karluk C4 / C5	Laminar bedded limestone	180 ft. ms#1	R. Curry	U. Triassic	Geochem Micropaleo, Paly Lith	
91 WB 1/11	4-Jun-91	E. side of Pauls Bay		SE 1/4, SW 1/4 SEC 33, T28S R37W	Karluk C4 / C5	Sandy limestone	188ft. ms#1	R. Curry	U. Triassic	Macrofossil	
91 WB 1/12	4-Jun-91	E. side of Pauls Bay		SE 1/4, SW 1/4 SEC 33, T28S R37W	Karluk C4 / C5	Muddy limestone	210 ft. ms#1	R. Curry	U. Triassic	Geochem Micropaleo	
91 WB 1/13	4-Jun-91	E. side of Pauls Bay		SE 1/4, SW 1/4 SEC 33, T28S R37W	Karluk C4 / C5	Muddy limestone	230 ft. ms#1	R. Curry	U. Triassic	Lith Geochem	
91 WB 1/14	4-Jun-91	E. side of Pauls Bay		SE 1/4, SW 1/4 SEC 33, T28S R37W	Karluk C4 / C5	Muddy limestone	260 ft. ms#1	R. Curry	U. Triassic	Geochem	
91 WB 1/15	4-Jun-91	E. side of Pauls Bay		SE 1/4, SW 1/4 SEC 33, T28S R37W	Karluk C4 / C5	Muddy limestone	277 ft ms#1	R. Curry	U. Triassic	Geochem	
91 WB 1/16	4-Jun-91	E. side of Pauls Bay		SE 1/4, SW 1/4 SEC 33, T28S R37W	Karluk C4 / C5	Muddy limestone	300 ft. ms#1	R. Curry	U. Triassic	Geochem Micropaleo, Paly	
91 WB 1/17	4-Jun-91	E. side of Pauls Bay		SE 1/4, SW 1/4 SEC 33, T28S R37W	Karluk C4 / C5	Muddy limestone	336 ft ms #1	R. Curry	U. Triassic	Geochem Micropaleo	

SAMPLE #	DATE	GEOGRAPHIC AREA	LAT/LONG	SEC. TWP. RNG.	QUAD.	DESCRIPTION	FEET IN SECTION	COLLECTED BY:	AGE / Fm.	PURPOSE	COMMENTS
91 WB 1/18	4-Jun-91	E. side of Paule Bay		SE 1/4, SW 1/4 SEC 33, T28S R37W	Kariuk C4 / C5	Muddy limestone	360 ft ms#1	R. Curry	U. Triassic	Geochem Lith	
91 WB 1/19	4-Jun-91	E. side of Paule Bay		SE 1/4, SW 1/4 SEC 33, T28S R37W	Kariuk C4 / C5	Muddy limestone	406 ft. ms#1	R. Curry	U. Triassic	Geochem Micropaleo, Paly	
91 WB 1/20	4-Jun-91	E. side of Paule Bay		SE 1/4, SW 1/4 SEC 33, T28S R37W	Kariuk C4 / C5	Bentonite	442 ft ms#1	R. Curry	U. Triassic	Age date	Send to S. Bergman PRC D 3136
91 WB 1/21	4-Jun-91	E. side of Paule Bay		SE 1/4, SW 1/4 SEC 33, T28S R37W	Kariuk C4 / C5	Bentonite and claystone	442 ft ms#1	R. Curry	U. Triassic	Paly Micropaleo Geochem	
91 WB 1/22	4-Jun-91	E. side of Paule Bay		SE 1/4, SW 1/4 SEC 33, T28S R37W	Kariuk C4 / C5	Coarse carbonate sandstone	439 ft ms#1	R. Curry	U. Triassic	Lith	check for oil
91 WB 1/23	4-Jun-91	E. side of Paule Bay		SE 1/4, SW 1/4 SEC 33, T28S R37W	Kariuk C4 / C5	Limestone	448 ft ms#1	R. Curry	U. Triassic	Insoluble residue	
91 WB 1/24	4-Jun-91	E. side of Paule Bay		SE 1/4, SW 1/4 SEC 33, T28S R37W	Kariuk C4 / C5	Clast of basaltic andesite in volc. Aglomerate	473 ft ms#1	R. Curry	U. Triassic	Age Inorganic geochem Lith	Send to S. Bergman PRC D 3136
91 WB 2/25	5-Jun-91	E. side of Paule Bay		SW corner, SE 1/4, SEC 33, T28S R37W	Kariuk C4 / C5	Micritic limestone	128 ft. ms#1	D. Doherty	U. Triassic	Lith	
91 WB 2/26	5-Jun-91	E. side of Paule Bay		SW corner, SE 1/4, SEC 33, T28S R37W	Kariuk C4 / C5	Madrich matrix of carbonate debris flow	126 ft. ms#1	D. Doherty	U. Triassic	Lith	
91 WB 2/27	5-Jun-91	E. side of Paule Bay		SW corner, SE 1/4, SEC 33, T28S R37W	Kariuk C4 / C5	Carbonate sandstone	128 ft. ms#1	D. Doherty	U. Triassic	Lith	
91 WB 2/28	5-Jun-91	E. side of Paule Bay		SW corner, SE 1/4, SEC 33, T28S R37W	Kariuk C4 / C5	Sample of clast	n/a	D. Doherty	U. Triassic	Lith	
91 WB 2/29	5-Jun-91	E. side of Paule Bay		SW corner, SE 1/4, SEC 33, T28S R37W	Kariuk C4 / C5	Siltstone w/ fossil shell	n/a	D. Doherty	U. Triassic	Paly Micropaleo	
91 WB 1/30	5-Jun-91	E. side of Paule Bay		SE 1/4, SW 1/4, SEC 33, T28S R37W	Kariuk C4 / C5	Ammonite	n/a	D. Doherty	U. Triassic	Macrofossil Micropaleo, Paly Geochem	No Ammonite but strong hydrocarbon odor
91 WB 1/31	5-Jun-91	E. side of Paule Bay		SE 1/4, SW 1/4, SEC 33, T28S R37W	Kariuk C4 / C5	Clasts of limestone & basalt	n/a	D. Doherty	U. Triassic	Lith	
91 WB 1/32	5-Jun-91	E. side of Paule Bay		SE 1/4, SW 1/4, SEC 33, T28S R37W	Kariuk C4 / C5	Volcaniclastic sandstone	n/a	D. Doherty	U. Triassic	Lith	
91 WB 1/33	5-Jun-91	E. side of Paule Bay		SE 1/4, SW 1/4, SEC 33, T28S R37W	Kariuk C4 / C5	Fossilliferous limestone	n/a	D. Doherty	U. Triassic	Micro/macro paleo Paly	
91 WB 1/34	5-Jun-91	E. side of Paule Bay		SE 1/4, SW 1/4, SEC 33, T28S R37W	Kariuk C4 / C5	Fossilliferous limestone clast	n/a	D. Doherty	U. Triassic	Micro/macro paleo Paly Lith	2 bags
91 WB 7/35	6-Jun-91	Ridge on NE side of Alel Creek		Center, NE 1/4 SEC 18, T33S R45W	Ugashik B2	Ammonite	n/a	D. Doherty	Jurassic Shelikof	Macrofossil	

SAMPLE #	DATE	GEOGRAPHIC AREA	LAT/LONG	SEC. TWP. RNG.	QUAD.	DESCRIPTION	FEET IN SECTION	COLLECTED BY:	AGE / Fm.	PURPOSE	COMMENTS
91WB 8/36	7-Jun-91	N. of Alal Creek		SW 1/4, NW 1/4, SE, 1/4 SEC 6, T33S R45W	Ugashik B2	Carbonaceous siltstone	n/a	D. Doherty	Jurassic Naknek	Paly, Geochem Foram	
91WB 12/37	9-Jun-91	Ridge on SW side of upper Des Moines Ck.		SE 1/4, SW 1/4, NW 1/4 SEC 23, T31S R44W	Ugashik B2	Olive grey siltstone w/ leaf fossil	n/a	D. Doherty	Jurassic Shelikof	Paly Macrofossil	
91 WB 13/38	9-Jun-91	Ridge on NE side of Des Moines Ck		SW corner, SE 1/4 SEC14, T31S R44W	Ugashik B2	Black, xbedded, volcanolithic sandstone	n/a	D. Doherty	Jurassic Shelikof	Lith	
91WB 15/39	10-Jun-91	E. flowing canyon w/ falls, W side Big Cr.		near center SW1/4 SEC 21, T31 R43W	Ugashik B1	Limestone clast in conglomerate (Triassic?)	n/a	D. Doherty	Jurassic Shelikof	Micropaleo Paly	
91 WB 3/40	11-Jun-91	Near S. tip of E. side of Puale Bay		NE corner SEC 5 T29S R37W	Karluk C4/C5	Volcanic agglomerate	618 ft. ms #1	D. Doherty	Triassic	Lith	
91 WB 3/41	11-Jun-91	Near S. tip of E. side of Puale Bay		NE corner SEC 5 T29S R37W	Karluk C4/C5	Pyritic zone at top of volcanic aglomerate. Possible condensed section or hydrothermal alteration	630 ft. ms #1	D. Doherty	Triassic	Micropaleo Paly	
91 WB 3/42	11-Jun-91	Near S. tip of E. side of Puale Bay		NE corner SEC 5 T29S R37W	Karluk C4/C5	Micritic limestone	650 ft. ms #1	D. Doherty	Triassic	Paly Micropaleo Geochem.	
91 WB 3/43	11-Jun-91	Near S. tip of E. side of Puale Bay		NE corner SEC 5 T29S R37W	Karluk C4/C5	Tuffaceous limestone	666 ft. ms#1	D. Doherty	Triassic	Paly Micropaleo Geochem.	
91 WB 3/44	11-Jun-91	Near S. tip of E. side of Puale Bay		NE corner SEC 5 T29S R37W	Karluk C4/C5	Dark grey micritic limestone	673 ft. ms#1	D. Doherty	Triassic	Paly Micropaleo Geochem.	
91 WB 3/45	11-Jun-91	Near S. tip of E. side of Puale Bay		NE corner SEC 5 T29S R37W	Karluk C4/C5	Sandy micritic limestone	682 ft. ms#1	D. Doherty	Triassic	Paly Micropaleo Geochem.	
91 WB 3/46	11-Jun-91	Near S. tip of E. side of Puale Bay		NE corner SEC 5 T29S R37W	Karluk C4/C5	Micritic limestone	690 ft. ms#1	D. Doherty	Triassic	Paly Micropaleo Geochem.	
91 WB 3/47	11-Jun-91	Near S. tip of E. side of Puale Bay		NE corner SEC 5 T29S R37W	Karluk C4/C5	Sandstone	700 ft. ms#1	D. Doherty	Triassic	Lith	
91 WB 3/48	11-Jun-91	Near S. tip of E. side of Puale Bay		NE corner SEC 5 T29S R37W	Karluk C4/C5	Limestone	704 ft. ms#1	D. Doherty	Triassic	Paly Micropaleo Geochem.	
91 WB 3/49	11-Jun-91	Near S. tip of E. side of Puale Bay		NE corner SEC 5 T29S R37W	Karluk C4/C5	Micritic limestone	710 ft. ms#1	D. Doherty	Triassic	Paly Micropaleo Geochem.	
91 WB 3/50	11-Jun-91	Near S. tip of E. side of Puale Bay		NE corner SEC 5 T29S R37W	Karluk C4/C5	Micritic limestone	716 ft. ms#1	D. Doherty	Triassic	Paly Micropaleo Geochem.	
91 WB 3/51	11-Jun-91	Near S. tip of E. side of Puale Bay		NE corner SEC 5 T29S R37W	Karluk C4/C5	Sandstone	722 ft. ms#1	D. Doherty	Triassic	Lith	

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91 WB 3/52	11-Jun-91	Near S. tip of E. side of Puale Bay		NE corner SEC 5 T29S R37W	Kariuk C4/C5	Micritic limestone	744 ft. ms#1	D. Doherty	Triassic	Paly Micropaleo Geochem.	
91 WB 3/53	11-Jun-91	Near S. tip of E. side of Puale Bay		NE corner SEC 5 T29S R37W	Kariuk C4/C5	Limy shale	746 ft. ms#1	D. Doherty	Triassic	Paly Micropaleo Geochem.	
91 WB 3/54	11-Jun-91	Near S. tip of E. side of Puale Bay		NE corner SEC 5 T29S R37W	Kariuk C4/C5	Micritic limestone	752 ft. ms#1	D. Doherty	Triassic	Paly Micropaleo Geochem.	
91 WB 3/55	11-Jun-91	Near S. tip of E. side of Puale Bay		NE corner SEC 5 T29S R37W	Kariuk C4/C5	Limy shale	754 ft. ms#1	D. Doherty	Triassic	Paly Micropaleo Geochem.	
91 WB 3/56	11-Jun-91	Near S. tip of E. side of Puale Bay		NE corner SEC 5 T29S R37W	Kariuk C4/C5	Limy shale	770 ft. ms#1	D. Doherty	Triassic	Paly Micropaleo Geochem.	
91 WB 3/57	11-Jun-91	Near S. tip of E. side of Puale Bay		NE corner SEC 5 T29S R37W	Kariuk C4/C5	Micritic limestone	792 ft. ms#1	D. Doherty	Triassic	Paly Micropaleo Geochem.	
91 WB 3/58	11-Jun-91	Near S. tip of E. side of Puale Bay		NE corner SEC 5 T29S R37W	Kariuk C4/C5	Micritic limestone	807 ft. ms#1	D. Doherty	Triassic	Paly Micropaleo Geochem.	
91 WB 3/59	11-Jun-91	Near S. tip of E. side of Puale Bay		NE corner SEC 5 T29S R37W	Kariuk C4/C5	Limy mudstone	814 ft. ms#1	D. Doherty	Triassic	Paly Micropaleo	
91 WB 3/60	11-Jun-91	Near S. tip of E. side of Puale Bay		NE corner SEC 5 T29S R37W	Kariuk C4/C5	Limy mudstone	830 ft. ms#1	D. Doherty	Triassic	Paly Micropaleo Geochem.	
91 WB 3/61	11-Jun-91	Near S. tip of E. side of Puale Bay		NE corner SEC 5 T29S R37W	Kariuk C4/C5	Thermally altered limestone beneath lava flow. Oriented w/ up arrow	838 ft. ms#1	D. Doherty	Triassic	Lith	
91 WB 3/62	11-Jun-91	Near S. tip of E. side of Puale Bay		NE corner SEC 5 T29S R37W	Kariuk C4/C5	Basaltic flow	850 ft. ms#1	D. Doherty	Triassic	K/Ar Inorganic geochem Lith	4 bags Send to S. Bergman PRC D 3136
91 WB 15/63	11-Jun-91	W. side of Big Creek Valley		SE 1/4 of SW 1/4 SEC 21, T31S R43W	Ugashik B1	Siltstone	4 ft. ms#8	D. Doherty	Jurassic Shelikof	Paly Micropaleo Geochem	
91 WB 15/64	11-Jun-91	W. side of Big Creek Valley		SE 1/4 of SW 1/4 SEC 21, T31S R43W	Ugashik B1	Siltstone	13 ft. ms#8	D. Doherty	Jurassic Shelikof	Paly Micropaleo Geochem	
91 WB 15/65	11-Jun-91	W. side of Big Creek Valley		SE 1/4 of SW 1/4 SEC 21, T31S R43W	Ugashik B1	Siltstone	15 ft. ms#8	D. Doherty	Jurassic Shelikof	Paly Micropaleo Geochem	
91 WB 15/66	11-Jun-91	W. side of Big Creek Valley		SE 1/4 of SW 1/4 SEC 21, T31S R43W	Ugashik B1	Siltstone	32 ft. ms#8	D. Doherty	Jurassic Shelikof	Paly Micropaleo Geochem	

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91 WB 15/67	11-Jun-91	W. side of Big Creek Valley		SE 1/4 of SW 1/4 SEC 21, T31S R43W	Ugashik B1	Sandstone	25 ft. ms#8	D. Doherty	Jurassic Shelikof	Lith. P and P	
91 WB 15/68	11-Jun-91	W. side of Big Creek Valley		SE 1/4 of SW 1/4 SEC 21, T31S R43W	Ugashik B1	Sandstone w/in conglomerate	41 ft. ms#8	D. Doherty	Jurassic Shelikof	Lith P and P	
91 WB 15/69	11-Jun-91	W. side of Big Creek Valley		SE 1/4 of SW 1/4 SEC 21, T31S R43W	Ugashik B1	Ammonites, gastropods w/in conglomerate	Float ms#8	H. Simpson	Jurassic Shelikof	Macrofossil	
91 WB 16/70	12-Jun-91	SW side of Oil Creek		NW corner SEC 11, T29S R40W	Karluk C6	Canned sample of oil from free flowing seep	n/a	D. Doherty	Jurassic	Geochem	
91 WB 16/71	12-Jun-91	SW side of Oil Creek		NW corner SEC 11, T29S R40W	Karluk C6	Asphalt from oil seep	n/a	D. Doherty	Jurassic	Geochem	
91 WB 17/72	12-Jun-91	SW side of Oil Creek near head of creek		W side of SE 1/4 SEC 3, T29S R40W	Karluk C6	Can of bubbling, dark green-brown, oil from seep	n/a	D. Doherty	Jurassic	Geochem	
91 WB 18/73	16-Jun-91	Point E. of mouth DesMoines Creek		NE corner of SW 1/4 SEC 8, T32S R43W	Ughashik B1	Siltstone	0 ft. ms#10	J. Baum	Jurassic Naknek	Paly Micropaleo Geochem	
91 WB 18/74	16-Jun-91	Point E. of mouth DesMoines Creek		NE corner of SW 1/4 SEC 8, T32S R43W	Ughashik B1	Siltstone	6 ft. ms#10	J. Baum	Jurassic Naknek	Paly Micropaleo Geochem	
91 WB 18/75	16-Jun-91	Point E. of mouth DesMoines Creek		NE corner of SW 1/4 SEC 8, T32S R43W	Ughashik B1	Siltstone	15 ft. ms#10	J. Baum	Jurassic Naknek	Paly Micropaleo Geochem	
91 WB 18/76	16-Jun-91	Point E. of mouth DesMoines Creek		NE corner of SW 1/4 SEC 8, T32S R43W	Ughashik B1	Siltstone	18 ft. ms#10	J. Baum	Jurassic Naknek	Paly Micropaleo Geochem	
91 WB 18/77	16-Jun-91	Point E. of mouth DesMoines Creek		NE corner of SW 1/4 SEC 8, T32S R43W	Ughashik B1	Siltstone	45 ft. ms#10	J. Baum	Jurassic Naknek	Paly Micropaleo Geochem	
91 WB 18/78	16-Jun-91	Point E. of mouth DesMoines Creek		NE corner of SW 1/4 SEC 8, T32S R43W	Ughashik B1	Siltstone	75 ft. ms#10	J. Baum	Jurassic Naknek	Paly Micropaleo Geochem	
91 WB 18/79	16-Jun-91	Point E. of mouth DesMoines Creek		NE corner of SW 1/4 SEC 8, T32S R43W	Ughashik B1	Bentonitic siltstone	89.5 ft. ms#10	J. Baum	Jurassic Naknek	Paly Micropaleo Age	Send to S. Bergman PRC D 3136
91 WB 18/80	16-Jun-91	Point E. of mouth DesMoines Creek		NE corner of SW 1/4 SEC 8, T32S R43W	Ughashik B1	Conglomerate	95 ft. ms#10	J. Baum	Jurassic Naknek	Lith P and P	
91 WB 18/81	16-Jun-91	Point E. of mouth DesMoines Creek		NE corner of SW 1/4 SEC 8, T32S R43W	Ughashik B1	Conglomerate	102 ft. ms#10	J. Baum	Jurassic Naknek	Lith P and P	
91 WB 19/82	16-Jun-91	E. side of Moose Cr.		SW 1/4 of NW 1/4 SEC 17, T30S R44W	Ugashik C2	Siltstone	n/a	D. Doherty	Jurassic Naknek	Paly Micropaleo Geochem	
91 WB 101/501	5-Jun-91	1st. creek S. of Big Cr., N. end of Wide Bay		SEC 28-29 T31S R43W	Ugashik B1	Siltstone	0 ft. ms#2	S. Krueger	Jurassic Shelikof	Paly Micropaleo Geochem	

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91 WB 101/502	5-Jun-91	1st. creek S. of Big Cr., N. end of Wide Bay		SEC 28-29 T31S R43W	Ugashik B1	Siltstone	130 ft. ms#2	S. Krueger	Jurassic Shelikof	Paly Micropaleo Geochem	
91 WB 101/503	5-Jun-91	1st. creek S. of Big Cr., N. end of Wide Bay		SEC 28-29 T31S R43W	Ugashik B1	Coarse volcanic lithic sandstone	280 ft. ms#2	S. Krueger	Jurassic Shelikof	Lith	
91 WB 101/504	5-Jun-91	1st. creek S. of Big Cr., N. end of Wide Bay		SEC 28-29 T31S R43W	Ugashik B1	Ammonites in cobble clast in conglomerate	290 ft. ms#2	S. Krueger	Jurassic Shelikof	Macrofossil	
91 WB 101/505	5-Jun-91	1st. creek S. of Big Cr., N. end of Wide Bay		SEC 28-29 T31S R43W	Ugashik B1	Sandstone	400 ft. ms#2	S. Krueger	Jurassic Shelikof	Lith	
91 WB 101/506	5-Jun-91	1st. creek S. of Big Cr., N. end of Wide Bay		SEC 28-29 T31S R43W	Ugashik B1	Ammonite fragments from conglomerate clasts	420 ft. ms#2	S. Krueger	Jurassic Shelikof	Macrofossil	
91 WB 101/507	5-Jun-91	1st. creek S. of Big Cr., N. end of Wide Bay		SEC 28-29 T31S R43W	Ugashik B1	Siltstone	455 ft. ms#2	S. Krueger	Jurassic Shelikof	Paly Micropaleo Geochem	
91 WB 101/508	5-Jun-91	1st. creek S. of Big Cr., N. end of Wide Bay		SEC 28-29 T31S R43W	Ugashik B1	Fine grained sandstone/siltstone	540 ft. ms#2	S. Krueger	Jurassic Shelikof	Paly Micropaleo Geochem	
91 WB 101/509	5-Jun-91	1st. creek S. of Big Cr., N. end of Wide Bay		SEC 28-29 T31S R43W	Ugashik B1	Sandstone	655 ft. ms#2	S. Krueger	Jurassic Shelikof	Lith	
91 WB 101/510	5-Jun-91	1st. creek S. of Big Cr., N. end of Wide Bay		SEC 28-29 T31S R43W	Ugashik B1	Siltstone	690 ft. ms#2	S. Krueger	Jurassic Shelikof	Paly Micropaleo Geochem	
91 WB 101/511	5-Jun-91	1st. creek S. of Big Cr., N. end of Wide Bay		SEC 28-29 T31S R43W	Ugashik B1	Siltstone	710 ft. ms#2	S. Krueger	Jurassic Shelikof	Paly Micropaleo Geochem	
91 WB 101/512	5-Jun-91	1st. creek S. of Big Cr., N. end of Wide Bay		SEC 28-29 T31S R43W	Ugashik B1	Sandstone	775 ft. ms#2	S. Krueger	Jurassic Shelikof	Lith	
91 WB 101/513	5-Jun-91	1st. creek S. of Big Cr., N. end of Wide Bay		SEC 28-29 T31S R43W	Ugashik B1	Siltstone	830 ft. ms#2	S. Krueger	Jurassic Shelikof	Paly Micropaleo Geochem	
91 WB 101/514	5-Jun-91	1st. creek S. of Big Cr., N. end of Wide Bay		SEC 28-29 T31S R43W	Ugashik B1	Ammonite from concretions in siltstone	945 ft. ms#2	S. Krueger	Jurassic Shelikof	Macrofossil	
91 WB 101/515	5-Jun-91	1st. creek S. of Big Cr., N. end of Wide Bay		SEC 28-29 T31S R43W	Ugashik B1	Siltstone	1040 ft. ms#2	S. Krueger	Jurassic Shelikof	Paly Micropaleo Geochem	
91 WB 101/516	5-Jun-91	1st. creek S. of Big Cr., N. end of Wide Bay		SEC 28-29 T31S R43W	Ugashik B1	Siltstone	1130 ft. ms#2	S. Krueger	Jurassic Shelikof	Paly Micropaleo Geochem	
91 WB 101/517	5-Jun-91	1st. creek S. of Big Cr., N. end of Wide Bay		SEC 28-29 T31S R43W	Ugashik B1	Ammonite in siltstone @ 2" below massive sandstone	1170 ft. ms#2	S. Krueger	Jurassic Shelikof	Macrofossil	
91 WB 101/518	5-Jun-91	1st. creek S. of Big Cr., N. end of Wide Bay		SEC 28-29 T31S R43W	Ugashik B1	Base of sandstone	1171 ft. ms#2	S. Krueger	Jurassic Shelikof	Lith	

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91 WB 101/519	5-Jun-91	1st. creek S. of Big Cr., N. end of Wide Bay		SEC 28-29 T31S R43W	Ugashik B1	Volcanic pebbles in conglomerate	> 1171 Ft. ms#2	S. Krueger	Jurassic Shelikof	K/Ar Inorganic-geochem	Send to S. Bergman PRC D 3136
91 WB 101/530	7-Jun-91	1st. creek S. of Big Cr., N. end of Wide Bay		SEC 28-29 T31S R43W	Ugashik B1	Siliceous siltstone	1495 ft. ms #2	M. Navolio	Jurassic Shelikof	Paly Micropaleo Geochem	
91 WB 101/531	7-Jun-91	1st. creek S. of Big Cr., N. end of Wide Bay		SEC 28-29 T31S R43W	Ugashik B1	Mudstone	1595 ft. ms #2	M. Navolio	Jurassic Shelikof	Paly Micropaleo Geochem	
91 WB 101/532	7-Jun-91	1st. creek S. of Big Cr., N. end of Wide Bay		SEC 28-29 T31S R43W	Ugashik B1	Quartzo feldspathic sandstone	1675 ft. ms #2	M. Navolio	Jurassic Shelikof	Paly Micropaleo Geochem	
91 WB 101/533	7-Jun-91	1st. creek S. of Big Cr., N. end of Wide Bay		SEC 28-29 T31S R43W	Ugashik B1	Contact of sandstone overlying siltstone both lithologies present	1695 ft. ms #2	M. Navolio	Jurassic Shelikof	Lith	cut across contact
91 WB 101/534	7-Jun-91	1st. creek S. of Big Cr., N. end of Wide Bay		SEC 28-29 T31S R43W	Ugashik B1	Buchia in sandstone concretion	1687 ft. ms #2	M. Navolio	Jurassic Shelikof	Macrofossil	
91 WB 101/535	7-Jun-91	1st. creek S. of Big Cr., N. end of Wide Bay		SEC 28-29 T31S R43W	Ugashik B1	Limy siltstone	1687 ft. ms #2	M. Navolio	Jurassic Shelikof	Paly. Micropaleo Geochem	
91 WB 101/536	7-Jun-91	1st. creek S. of Big Cr., N. end of Wide Bay		SEC 28-29 T31S R43W	Ugashik B1	Mudstone	1530 ft. ms #2	M. Navolio	Jurassic Shelikof	Paly Micropaleo Geochem	
91 WB 101/537	7-Jun-91	1st. creek S. of Big Cr., N. end of Wide Bay		SEC 28-29 T31S R43W	Ugashik B1	Siltstone/mudstone	2335 ft. ms #2	M. Navolio	Jurassic Shelikof	Paly Micropaleo Geochem	
91 WB 101/538	7-Jun-91	1st. creek S. of Big Cr., N. end of Wide Bay		SEC 28-29 T31S R43W	Ugashik B1	Volcanic clasts from conglomerate	2445 ft. ms #2	M. Navolio	Jurassic Shelikof	lith K/Ar age	
91 WB 101/539	7-Jun-91	1st. creek S. of Big Cr., N. end of Wide Bay		SEC 28-29 T31S R43W	Ugashik B1	Black, magnetite-rich sandstone	Float @2520 ft. ms #2	M. Navolio	Jurassic Shelikof	lith	
91 WB 101/540	7-Jun-91	1st. creek S. of Big Cr., N. end of Wide Bay		SEC 28-29 T31S R43W	Ugashik B1	Black, magnetite or ilmenite rich sandstone	Float @ 2520 ft. ms #2	M. Navolio	Jurassic Shelikof	lith	
91 WB 102/520	6-Jun-91	Ridge S. of Lower Ugashik lake		SW 1/4 of NW 1/4 SEC 30, T32S R47W	Ugashik B3	Arkosic sandstone	n/a	M. Navolio	Jurassic Naknek	Lith P and P	Chisik Conglomerate
91 WB 102/521	6-Jun-91	Ridge S. of Lower Ugashik lake		SW 1/4 of NW 1/4 SEC 30, T32S R47W	Ugashik B3	Conglomerate matrix and clasts	n/a	M. Navolio	Jurassic Naknek	Lith P and P	2 bags Chisik Conglomerate
91 WB 103/522	6-Jun-91	Hill SE of Ugashik Narrows		NE 1/4 SEC 4, T31S R46W	Ugashik C3	Arkosic sandstone	n/a	M. Navolio	Jurassic Naknek	Lith P and P	
91 WB 103/523	6-Jun-91	Hill SE of Ugashik Narrows		NE 1/4 SEC 4, T31S R46W	Ugashik C3	Arkosic sandstone	n/a	M. Navolio	Jurassic Naknek	Lith P and P	
91 WB 103/524	6-Jun-91	Hill SE of Ugashik Narrows		NE 1/4 SEC 4, T31S R46W	Ugashik C3	Very coarse sandstone w/conglomerate	n/a	M. Navolio	Jurassic Naknek	Lith	

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91 WB 103/525	6-Jun-91	Hill SE of Ugashik Narrows		NE 1/4 SEC 4, T31S R46W	Ugashik C3	Ironstained sandstone	n/a	M. Navolio	Jurassic Naknek	Lith	
91 WB 103/526	6-Jun-91	Hill SE of Ugashik Narrows		NE 1/4 SEC 4, T31S R46W	Ugashik C3	Laminated sandstone w/conglomerate	n/a	M. Navolio	Jurassic Naknek	Lith	
91 WB 103/527	6-Jun-91	Hill SE of Ugashik Narrows		NE 1/4 SEC 4, T31S R46W	Ugashik C3	Pink arkosic sandstone	15 ft. ms#9	S. Krueger	Jurassic Naknek	Lith	
91 WB 103/528	6-Jun-91	Hill SE of Ugashik Narrows		NE 1/4 SEC 4, T31S R46W	Ugashik C3	Arkosic sandstone	51 ft. ms#9	S. Krueger	Jurassic Naknek	Lith	
91 WB 103/529	6-Jun-91	Hill SE of Ugashik Narrows		NE 1/4 SEC 4, T31S R46W	Ugashik C3	Sandstone w/ bands of heavy minerals	59 ft. ms#9	S. Krueger	Jurassic Naknek	Lith Slab	
91 WB 104/541	9-Jun-91	DesMoines Creek, N. end of Wide Bay		SW 1/4 SEC 14, T31S R44W	Ugashik C2	Black sand	118 ft. ms #4	S. Krueger	Jurassic Shelikof	Lith Geochem	
91 WB 104/542	9-Jun-91	DesMoines Creek, N. end of Wide Bay		SW 1/4 SEC 14, T31S R44W	Ugashik C2	Mudstone	130 ft. ms #4	S. Krueger	Jurassic Shelikof	Paly, Geochem, Micropaleo	
91 WB 104/543	9-Jun-91	DesMoines Creek, N. end of Wide Bay		SW 1/4 SEC 14, T31S R44W	Ugashik C2	Arkosic sandstone	131 ft. ms #4	S. Krueger	Jurassic Shelikof	Lith P and P	
91 WB 104/544	9-Jun-91	DesMoines Creek, N. end of Wide Bay		SW 1/4 SEC 14, T31S R44W	Ugashik C2	Coal / mudstone	132 ft. ms #4	S. Krueger	Jurassic Shelikof	Paly Geochem Micropaleo	
91 WB 104/545	9-Jun-91	DesMoines Creek, N. end of Wide Bay		NW 1/4 SEC 14, T31S R44W	Ugashik C2	Arkosic sandstone	1225 ft. ms #4	S. Krueger	Jurassic Naknek	Lith	
91 WB 104/546	9-Jun-91	DesMoines Creek, N. end of Wide Bay		NW 1/4 SEC 14, T31S R44W	Ugashik C2	Mudstone w/ fern fossils	840 ft. ms #4	S. Krueger	Jurassic Naknek	Paly Geochem	
91 WB 104/547	9-Jun-91	DesMoines Creek, N. end of Wide Bay		SW 1/4 SEC 14, T31S R44W	Ugashik C2	Mudstone	35 ft. ms #4	S. Krueger	Jurassic Shelikof	Paly Geochem	
91 WB 104/548	10-Jun-91	DesMoines Creek, N. end of Wide Bay		SW 1/4 SEC 14, T31S R44W	Ugashik C2	Mudstone	875 ft. ms #4	S. Krueger	Jurassic Naknek	Paly Micropaleo Geochem	
91 WB 104/549	10-Jun-91	DesMoines Creek, N. end of Wide Bay		SW 1/4 SEC 14, T31S R44W	Ugashik C2	Dark sandstone	910 ft. ms #4	S. Krueger	Jurassic Naknek	Lith	
91 WB 104/550	10-Jun-91	DesMoines Creek, N. end of Wide Bay		SW 1/4 SEC 14, T31S R44W	Ugashik C2	Dark sandstone	915 ft. ms #4	S. Krueger	Jurassic Naknek	Lith	
91 WB 104/551	10-Jun-91	DesMoines Creek, N. end of Wide Bay		SW 1/4 SEC 14, T31S R44W	Ugashik C2	Light colored sandstone	925 ft. ms #4	S. Krueger	Jurassic Naknek	Lith	
91 WB 105/552	11-Jun-91	S. side of Big Creek, N. end of Wide Bay		SE 1/4 SEC 20, SW 1/4, SEC 21, T31S R43W	Ugashik B1	Sandstone	0 ft. ms #12	S. Krueger	Jurassic Shelikof	Lith	
91 WB 105/553	11-Jun-91	S. side of Big Creek, N. end of Wide Bay		SE 1/4 SEC 20, SW 1/4, SEC 21, T31S R43W	Ugashik B1	Siltstone	45 ft. ms #12	S. Krueger	Jurassic Shelikof	Paly Micropaleo Geochem	

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91 WB 105/554	11-Jun-91	S. side of Big Creek, N. end of Wide Bay		SE 1/4 SEC 20, SW 1/4, SEC 21, T31S R43W	Ugashik B1	Ammonite	55 ft. ms #12	S. Krueger	Jurassic Shelikof	Macrofossil	
91 WB 105/555	11-Jun-91	S. side of Big Creek, N. end of Wide Bay		SE 1/4 SEC 20, SW 1/4, SEC 21, T31S R43W	Ugashik B1	Siltstone	85 ft. ms #12	S. Krueger	Jurassic Shelikof	Paly Micropaleo Geochem	
91 WB 105/556	11-Jun-91	S. side of Big Creek, N. end of Wide Bay		SE 1/4 SEC 20, SW 1/4, SEC 21, T31S R43W	Ugashik B1	Limey concretion in fine grained sandstone	130 ft. ms #12	S. Krueger	Jurassic Shelikof	Paly Micropaleo	
91 WB 105/557	11-Jun-91	S. side of Big Creek, N. end of Wide Bay		SE 1/4 SEC 20, SW 1/4, SEC 21, T31S R43W	Ugashik B1	Ammonite	150 ft. ms #12	S. Krueger	Jurassic Shelikof	Macrofossil	
91 WB 105/558	11-Jun-91	S. side of Big Creek, N. end of Wide Bay		SE 1/4 SEC 20, SW 1/4, SEC 21, T31S R43W	Ugashik B1	Siltstone	160 ft. ms #12	S. Krueger	Jurassic Shelikof	Paly Micropaleo Geochem	
91 WB 106/559	12-Jun-91	NE Puale Bay		E1/2 SW 1/4 SEC 22, T28S R37 W	Karluk C4/C5	Micritic limestone	110 ft. ms #13	S. Krueger	U. Triassic-L. Jurassic	Paly Micropaleo Geochem	
91 WB 106/560	12-Jun-91	NE Puale Bay		E1/2 SW 1/4 SEC 22, T28S R37 W	Karluk C4/C5	Volcanic sandstone	150 ft. ms #13	S. Krueger	U. Triassic-L. Jurassic	Lith	
91 WB 106/561	12-Jun-91	NE Puale Bay		E.1/2 SW 1/4 SEC 22, T28S R37 W	Karluk C4/C5	Green volcanic mudstone	185 ft. ms #13	S. Krueger	U. Triassic-L. Jurassic	Lith	
91 WB 107/562	16-Jun-91	Creek S. of DesMoines Creek, N. Wide Bay		SE 1/4 NW 1/4 SEC 27, T31S R44W	Ugashik B2	Volcanic and plutonic cobbles	275 ft ms #11	S. Krueger	Jurassic Naknek	Lith K/Ar age	Send to S. Bergman PRC D3136
91 WB 201/600	6-Jun-91	Hill SE of Ugashik narrows		NW corner of SE 1/4, SEC 34, T30S R46W	Ugashik C3	Arkosic sandstone	n/a	D. Corner	Jurassic Naknek Chisk cong.	Lith	
91 WB 203/601	6-Jun-91	SE of Lower Ugashik Lake		NW1/4 NE1/4, SEC 29, T32S R45W	Ugashik B2	???????	?????????	R. Curry	?????	?????	
91 WB 204/602	7-Jun-91	N. of Alal Creek		Center of SEC 18, T33S R45W	Ugashik B2	Siltstone / mudstone	0 ft. ms #3a	R. Curry	Jurassic top of Kialagvik	Paly Micropaleo Geochem	
91 WB 204/603	7-Jun-91	N. of Alal Creek		Center of SEC 18, T33S R45W	Ugashik B2	Siltstone / mudstone	5 ft. ms #3a	R. Curry	Jurassic top of Kialagvik	Paly Micropaleo Geochem	
91 WB 203/604	7-Jun-91	N. of Alal Creek		Center of SEC 18, T33S R45W	Ugashik B2	Mudstone	9 ft. ms #3a	R. Curry	Jurassic top of Kialagvik	Paly Micropaleo Geochem	
91 WB 204/605	7-Jun-91	N. of Alal Creek		Center of SEC 18, T33S R45W	Ugashik B2	Siltstone	65 ft. ms #3a	R. Curry	Jurassic Shelikof	Paly Micropaleo Geochem	
91 WB 204/606	7-Jun-91	N. of Alal Creek		Center of SEC 18, T33S R45W	Ugashik B2	Siltstone	68 ft. ms #3a	R. Curry	Jurassic Shelikof	Paly Micropaleo Geochem	
91 WB 204/607	7-Jun-91	N. of Alal Creek		Center of SEC 18, T33S R45W	Ugashik B2	Quartz-rich sandstone	93 ft. ms #3a	R. Curry	Jurassic Shelikof	Lith	

SAMPLE #	DATE	GEOGRAPHIC AREA	LAT/LONG	SEC. TWP. RNG.	QUAD.	DESCRIPTION	FEET IN SECTION	COLLECTED BY:	AGE / Fm.	PURPOSE	COMMENTS
91 WB 204/608	7-Jun-91	N. of Alai Creek		Center of SEC 18, T33S R45W	Ugashik B2	Siltstone	98 ft. ms #3a	R. Curry	Jurassic Shelikof	Paly Micropaleo Geochem	
91 WB 204/609	7-Jun-91	N. of Alai Creek		Center of SEC 18, T33S R45W	Ugashik B2	Siltstone	108 ft. ms #3a	R. Curry	Jurassic Shelikof	Paly Micropaleo Geochem	
91 WB 204/610	7-Jun-91	N. of Alai Creek		Center of SEC 18, T33S R45W	Ugashik B2	Siltstone	208 ft. ms #3a	R. Curry	Jurassic Shelikof	Paly Micropaleo Geochem	
91 WB 204/611	7-Jun-91	N. of Alai Creek		Center of SEC 18, T33S R45W	Ugashik B2	Siltstone	450 ft. ms #3a	R. Curry	Jurassic Shelikof	Paly Micropaleo Geochem	
91 WB 204/612	7-Jun-91	N. of Alai Creek		Center of SEC 18, T33S R45W	Ugashik B2	Siltstone	475 ft. ms #3a	R. Curry	Jurassic Shelikof	Paly Micropaleo Geochem	
91 WB 204/613	7-Jun-91	N. of Alai Creek		Center of SEC 18, T33S R45W	Ugashik B2	Siltstone	500 ft. ms #3a	R. Curry	Jurassic Shelikof	Paly Micropaleo Geochem	
91 WB 205/614	7-Jun-91	S. of Alai Creek		NW 1/4 NE 1/4 SEC 19, T33S R45W	Ugashik B2	Siltstone	550 ft. ms #3	R. Curry	Jurassic Shelikof	Paly Micropaleo Geochem	
91 WB 205/615	7-Jun-91	S. of Alai Creek		NW 1/4 NE 1/4 SEC 19, T33S R45W	Ugashik B2	Siltstone	750 ft. ms #3	D. Comer	Jurassic Shelikof	Paly Micropaleo Geochem	
91 WB 205/616	7-Jun-91	S. of Alai Creek		NW 1/4 NE 1/4 SEC 19, T33S R45W	Ugashik B2	Siltstone	800 ft. ms #3	D. Comer	Jurassic Shelikof	Paly Micropaleo Geochem	
91 WB 205/617	7-Jun-91	S. of Alai Creek		NW 1/4 NE 1/4 SEC 19, T33S R45W	Ugashik B2	Siltstone	200 ft. ms #3	D. Comer	Jurassic Shelikof	Paly Micropaleo Geochem	
91 WB 206/618	9-Jun-91	SE side of spur between Kialagvik River and Alai Creek		NE 1/4, SEC 30, T33S R45W	Ugashik B2	Fine grained sub quartz/arkosic sandstone	40 ft, ms #5a	D. Comer	Jurassic Kialagvik	Lith	
91 WB 206/633	9-Jun-91	SE side of spur between Kialagvik River and Alai Creek		NE 1/4, SEC 30, T33S R45W	Ugashik B2	Sandstone	125 ft. ms #5a	D. Comer	Jurassic Kialagvik	Lith	
91 WB 207/619	9-Jun-91	SE side of spur between Kialagvik River and Alai Creek		NE 1/4, SEC 30, T33S R45W	Ugashik B2	Mudstone	300 ft. ms #5b	D. Comer	Jurassic Kialagvik	Paly Micropaleo Geochem	
91 WB 207/620	9-Jun-91	SE side of spur between Kialagvik River and Alai Creek		NE 1/4, SEC 30, T33S R45W	Ugashik B2	Mudstone	330 ft. ms #5b	D. Comer	Jurassic Kialagvik	Paly Micropaleo Geochem	
91 WB 207/621	9-Jun-91	SE side of spur between Kialagvik River and Alai Creek		NE 1/4, SEC 30, T33S R45W	Ugashik B2	Mudstone concretion	330 ft. ms #5b	D. Comer	Jurassic Kialagvik	Lith	Slab

SAMPLE #	DATE	GEOGRAPHIC AREA	LAT/LONG	SEC. TWP. RNG.	QUAD.	DESCRIPTION	FEET IN SECTION	COLLECTED BY:	AGE / Fm.	PURPOSE	COMMENTS
91 WB 207/622	9-Jun-91	SE side of spur between Kialagvik River and Alai Creek		NE 1/4, SEC 30, T33S R45W	Ugashik B2	Mudstone	360 ft. ms #5b	D. Comer	Jurassic Kialagvik	Paly Micropaleo Geochem	
91 WB 207/623	9-Jun-91	SE side of spur between Kialagvik River and Alai Creek		Middle of SEC 30, T33S R45W	Ugashik B2	Mudstone	370 ft. ms #5b	D. Comer	Jurassic Kialagvik	Paly Micropaleo Geochem	
91 WB 207/624	9-Jun-91	SE side of spur between Kialagvik River and Alai Creek		Middle of SEC 30, T33S R45W	Ugashik B2	Mudstone	430 ft. ms #5c	D. Comer	Jurassic Kialagvik	Paly Micropaleo Geochem	
91 WB 207/625	9-Jun-91	SE side of spur between Kialagvik River and Alai Creek		Middle of SEC 30, T33S R45W	Ugashik B2	Mudstone	490 ft. ms #5c	D. Comer	Jurassic Kialagvik	Paly Rads Geochem	
91 WB 207/626	9-Jun-91	SE side of spur between Kialagvik River and Alai Creek		Middle of SEC 30, T33S R45W	Ugashik B2	Mudstone concretion	495 ft. ms #5c	D. Comer	Jurassic Kialagvik	Paly Micropaleo	
91 WB 207/627	9-Jun-91	SE side of spur between Kialagvik River and Alai Creek		Middle of SEC 30, T33S R45W	Ugashik B2	Mudstone	555 ft. ms #5c	D. Comer	Jurassic Kialagvik	Paly Micropaleo Geochem	
91 WB 207/628	9-Jun-91	SE side of spur between Kialagvik River and Alai Creek		Middle of SEC 30, T33S R45W	Ugashik B2	Ammonite/Belemnite	585 ft. ms #5c	D. Comer	Jurassic Kialagvik	Macrofossil	
91 WB 207/629	9-Jun-91	SE side of spur between Kialagvik River and Alai Creek		Middle of SEC 30, T33S R45W	Ugashik B2	Mudstone	660 ft. ms #5c	D. Comer	Jurassic Kialagvik	Paly Micropaleo Geochem	
91 WB 207/630	9-Jun-91	SE side of spur between Kialagvik River and Alai Creek		Middle of SEC 30, T33S R45W	Ugashik B2	Sandstone	665 ft. ms #5b	D. Comer	Jurassic Kialagvik	Lith	
91 WB 207/631	9-Jun-91	SE side of spur between Kialagvik River and Alai Creek		Middle of SEC 30, T33S R45W	Ugashik B2	Mudstone	725 ft. ms #5b	D. Comer	Jurassic Kialagvik	Paly Micropaleo Geochem	
91 WB 207/632	9-Jun-91	SE side of spur between Kialagvik River and Alai Creek		Middle of SEC 30, T33S R45W	Ugashik B2	Mudstone	800 ft. ms #5b	D. Comer	Jurassic Kialagvik	Paly Micropaleo Geochem	
91 WB 208/634	10-Jun-91	SW side of DesMoines Creek		NE corner of SW 1/4 SEC 23, T31S R44W	Ugashik B2	Mudstone	1 ft. ms #6	B. Morris	Jurassic Upper Shelikof	Paly Micropaleo Geochem	
91 WB 208/635	10-Jun-91	SW side of DesMoines Creek		NE corner of SW 1/4 SEC 23, T31S R44W	Ugashik B2	Mudstone	35 ft. ms #6	B. Morris	Jurassic Upper Shelikof	Paly Micropaleo Geochem	
91 WB 208/636	10-Jun-91	SW side of DesMoines Creek		NE corner of SW 1/4 SEC 23, T31S R44W	Ugashik B2	Mudstone	90 ft. ms #6	B. Morris	Jurassic Upper Shelikof	Paly Micropaleo Geochem	
91 WB 208/637	10-Jun-91	SW side of DesMoines Creek		NE corner of SW 1/4 SEC 23, T31S R44W	Ugashik B2	Mudstone concretion	115 ft. ms #6	B. Morris	Jurassic Upper Shelikof	Paly Micropaleo	

SAMPLE #	DATE	GEOGRAPHIC AREA	LAT/LONG	SEC. TWP. RNG.	QUAD.	DESCRIPTION	FEET IN SECTION	COLLECTED BY:	AGE / Fm.	PURPOSE	COMMENTS
91WB 208/638	10-Jun-91	SW side of DesMoines Creek		NE corner of SW 1/4 SEC 23, T31S R44W	Ugashik B2	Sandstone	132 ft. ms #6	B. Morris	Jurassic Upper Shelikof	Lith P and P, Slab	
91WB 208/ 639	10-Jun-91	SW side of DesMoines Creek		NE corner of SW 1/4 SEC 23, T31S R44W	Ugashik B2	Mudstone	140 ft. ms #6	B. Morris	Jurassic Upper Shelikof	Paly Micropaleo Geochem	
91 WB 208/640	10-Jun-91	SW side of DesMoines Creek		NE corner of SW 1/4 SEC 23, T31S R44W	Ugashik B2	Mudstone	215 ft. ms #6	B. Morris	Jurassic Upper Shelikof	Paly Micropaleo Geochem	
91 WB 209/641	10-Jun-91	NE side of DesMoines Creek		NE 1/4, SEC24, T31S R44W	Ugashik B2	Mudstone	130 ft. ms #7	B. Morris	Jurassic upper Shelikof	Paly Micropaleo Geochem	
91 WB 209/642	10-Jun-91	NE side of DesMoines Creek		NE 1/4, SEC24, T31S R44W	Ugashik B2	Sandstone	160 ft. ms #7	B. Morris	Jurassic upper Shelikof	Lith	
91 WB 209/643	10-Jun-91	NE side of DesMoines Creek		NE 1/4, SEC24, T31S R44W	Ugashik B2	Mudstone	175 ft. ms #7	B. Morris	Jurassic upper Shelikof	Paly Micropaleo Geochem	
91 WB 209/644	10-Jun-91	NE side of DesMoines Creek		NE 1/4, SEC24, T31S R44W	Ugashik B2	Mudstone concretion	265 ft. ms #7	B. Morris	Jurassic upper Shelikof	Paly Micropaleo Geochem	
91 WB 209/645	10-Jun-91	NE side of DesMoines Creek		NE 1/4, SEC24, T31S R44W	Ugashik B2	Mudstone	522 ft. ms #7	B. Morris	Jurassic upper Shelikof	Paly Micropaleo Geochem	
91 WB 210/646	11-Jun-91	S. of Big Creek		SW 1/4, SEC 21 T31S R43W	Ugashik B1	Sandstone	13 ft. ms #16	B. Morris	Jurassic Shelikof	Lith P and P	
91 WB 210/647	11-Jun-91	S. of Big Creek		SW 1/4, SEC 21 T31S R43W	Ugashik B1	Sandstone	35 ft. ms #16	B. Morris	Jurassic Shelikof	Lith	
91 WB 210/648	11-Jun-91	S. of Big Creek		SW 1/4, SEC 21 T31S R43W	Ugashik B1	Sandstone	125 ft. ms #16	B. Morris	Jurassic Shelikof	Lith	

1991 Alaska Peninsula Field Program

Katmai Park = KAT,KB

SAMPLE #	*DATE*	*GEOGRAPHIC AREA*	*LAT/LONG*	*SEC. TWP. RNG.*	*QUAD.*	*DESCRIPTION*	*FEET IN SECTION*	*COLLECTED BY:*	*AGE*	*PURPOSE*	*COMMENTS*
91 KB 211/649	20-Jun-91	E. side, mouth of Katmai River		NE 1/4, SEC 9, T25 S R34W	Mt. Katmai A3	Mudstone	11 ft. ms #17	B. Morris	Jurassic Naknek	Paly Micropaleo Geochem	Samples with the 91 KB prefix are also from Katmai Park, and should be treated the same as those samples with the 91 KAT prefix
91 KB 211/650	20-Jun-91	E. side, mouth of Katmai River		NE 1/4, SEC 9, T25 S R34W	Mt. Katmai A3	Sandstone	50 ft. ms #17	B. Morris	Jurassic Naknek	Lith	
91 KB 211/651	20-Jun-91	E. side, mouth of Katmai River		NE 1/4, SEC 9, T25 S R34W	Mt. Katmai A3	Mudstone	135 ft. ms #17	B. Morris	Jurassic Naknek	Paly Micropaleo Geochem	
91 KB 211/652	20-Jun-91	E. side, mouth of Katmai River		NE 1/4, SEC 9, T25 S R34W	Mt. Katmai A3	Sandstone	223 ft. ms #17	B. Morris	Jurassic Naknek	Lith P and P	
91 KB 211/653	20-Jun-91	E. side, mouth of Katmai River		NE 1/4, SEC 9, T25 S R34W	Mt. Katmai A3	Mudstone	231 ft. ms #17	B. Morris	Jurassic Naknek	Paly Micropaleo Geochem	
91 KB 212/654	20-Jun-91	E. side of Katmai bay		SE 1/4 SE 1/4, SEC 14, T25S R34W	Mt. Katmai A3	Mudstone	2.5 ft. ms #18	B. Morris	Jurassic Naknek	Paly Micropaleo Geochem	
91 KB 212/655	20-Jun-91	E. side of Katmai bay		SE 1/4 SE 1/4, SEC 14, T25S R34W	Mt. Katmai A3	Sandstone	10 ft. ms #18	B. Morris	Jurassic Naknek	Lith	
91 KB 212/656	20-Jun-91	E. side of Katmai bay		SE 1/4 SE 1/4, SEC 14, T25S R34W	Mt. Katmai A3	Mudstone	118 ft. ms #18	B. Morris	Jurassic Naknek	Paly Micropaleo Geochem	
91 KB 212/657	20-Jun-91	E. side of Katmai bay		SE 1/4 SE 1/4, SEC 14, T25S R34W	Mt. Katmai A3	Mudstone	132 ft. ms #18	B. Morris	Jurassic Naknek	Paly Micropaleo Geochem	Slab/T.S. for B. Morris PRC
91 KB 212/658	20-Jun-91	E. side of Katmai bay		SE 1/4 SE 1/4, SEC 14, T25S R34W	Mt. Katmai A3	Shell hash layer	212 ft. ms #18	B. Morris	Jurassic Naknek	Macrofossils	
91 KB 212/659	20-Jun-91	E. side of Katmai bay		SE 1/4 SE 1/4, SEC 14, T25S R34W	Mt. Katmai A3	Mudstone and Macrofossil	222 ft. ms #18	B. Morris	Jurassic Naknek	Paly Micro/macro fossils Geochem	
91 KB 212/660	20-Jun-91	E. side of Katmai bay		SE 1/4 SE 1/4, SEC 14, T25S R34W	Mt. Katmai A3	Mudstone	335 ft. ms #18	B. Morris	Jurassic Naknek	Paly Micropaleo Geochem	
91 KB 212/661	20-Jun-91	E. side of Katmai bay		SE 1/4 SE 1/4, SEC 14, T25S R34W	Mt. Katmai A3	Sandstone	350 ft. ms #18	B. Morris	Jurassic Naknek	Lith	
91 KB 213/662	20-Jun-91	E. side of Katmai bay		W. edge of NE 1/4, SEC14, T25S R34W	Mt. Katmai A3	Mudstone	n/a	B. Morris	Jurassic Naknek	Paly Micropaleo Geochem	
91 KAT 214/663	21-Jun-91	Beach cliff between Katmai Bay and Dakavak Bay		NE 1/4, SEC 24, T25S R34W	Mt. Katmai A3	Sandstone	11 ft. ms #19	B. Morris	Jurassic Naknek	Lith	

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91 KAT 214/664	21-Jun-91	Beach cliff between Katmai Bay and Dakavak Bay		NE 1/4, SEC 24, T25S R34W	Mt. Katmai A3	Sandstone	37 ft. ms #19	B. Morris	Jurassic Naknek	Lith P and P	
91 KAT 215/665	22-Jun-91	S. end of Barrier Range		SW 1/4 NW 1/4, SEC 11, T24S R35W	Mt. Katmai A3	Sandstone	60 ft. ms #20	B. Morris	Cret. Herendeen	Macro fossils Lith	
91 KAT 215/666	22-Jun-91	S. end of Barrier Range		SW 1/4 NW 1/4, SEC 11, T24S R35W	Mt. Katmai A3	Mudstone	120 ft. ms #20	B. Morris	Cret. Herendeen	Paly Micropaleo Geochem	
91 KAT 215/667	22-Jun-91	S. end of Barrier Range		SW 1/4 NW 1/4, SEC 11, T24S R35W	Mt. Katmai A3	Sandstone	117 ft. ms #20	B. Morris	Cret. Herendeen	Lith Slab	Slab for B. Morris PRC
91 KAT 215/668	22-Jun-91	S. end of Barrier Range		SW 1/4 NW 1/4, SEC 11, T24S R35W	Mt. Katmai A3	Fossils	30 ft. ms #20	B. Morris	Cret. Herendeen	Macrofossil	
91 KAT 215/669	22-Jun-91	S. end of Barrier Range		SW 1/4 NW 1/4, SEC 11, T24S R35W	Mt. Katmai A3	Sandstone	110 ft. ms #20	B. Morris	Cret. Herendeen	Lith	
91 KAT 101/201	20-Jun-91	S. of Mt. Pedmar		NE 1/4 NW1/4, SEC 19, T25S R33W	Mt. Katmai A3	Sandstone	213 ft. ms #14	S. Krueger	Cret. Kaguyak	Lith	
91 KAT 101/202	20-Jun-91	S. of Mt. Pedmar		NE 1/4 NW1/4, SEC 19, T25S R33W	Mt. Katmai A3	Siltstone	215 ft. ms #14	S. Krueger	Cret. Kaguyak	Paly Micropaleo Geochem	
91 KAT 101/203	20-Jun-91	S. of Mt. Pedmar		NE 1/4 NW1/4, SEC 19, T25S R33W	Mt. Katmai A3	Mudstone	216 ft. ms #14	S. Krueger	Cret. Kaguyak	Paly Micropaleo Geochem	
91 KAT 101/204	20-Jun-91	S. of Mt. Pedmar		NE 1/4 NW1/4, SEC 19, T25S R33W	Mt. Katmai A3	Mudstone	219 ft. ms #14	S. Krueger	Cret. Kaguyak	Paly Micropaleo Geochem	
91 KAT 101/205	20-Jun-91	S. of Mt. Pedmar		NE 1/4 NW1/4, SEC 19, T25S R33W	Mt. Katmai A3	Mudstone	227 ft. ms #14	S. Krueger	Cret. Kaguyak	Paly Micropaleo Geochem	
91 KAT 101/206	20-Jun-91	S. of Mt. Pedmar		NE 1/4 NW1/4, SEC 19, T25S R33W	Mt. Katmai A3	Mudstone	235 ft. ms #14	S. Krueger	Cret. Kaguyak	Paly Micropaleo Geochem	
91 KAT 101/207	20-Jun-91	S. of Mt. Pedmar		NE 1/4 NW1/4, SEC 19, T25S R33W	Mt. Katmai A3	Mudstone	242 ft. ms #14	S. Krueger	Cret. Kaguyak	Paly Micropaleo Geochem	
91 KAT 101/208	20-Jun-91	S. of Mt. Pedmar		NE 1/4 NW1/4, SEC 19, T25S R33W	Mt. Katmai A3	Mudstone	255 ft. ms #14	S. Krueger	Cret. Kaguyak	Paly Micropaleo Geochem	
91 KAT 101/209	20-Jun-91	S. of Mt. Pedmar		NE 1/4 NW1/4, SEC 19, T25S R33W	Mt. Katmai A3	Volcanic sandstone	259 ft. ms #14	S. Krueger	Cret. Kaguyak	Lith	
91 KAT 101/210	20-Jun-91	S. of Mt. Pedmar		NE 1/4 NW1/4, S SEC 19, T25S R33W	Mt. Katmai A3	Volcanic sandstone	261 ft. ms #14	S. Krueger	Cret. Kaguyak	Lith	

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91 KAT 101/211	20-Jun-91	S. of Mt. Pedmar		NE 1/4 NW1/4, SEC 19, T25S R33W	Mt. Katmai A3	Mudstone	263 ft. ms #14	S. Krueger	Cret. Kaguyak	Paly Micropaleo Geochem	
91 KAT 101/212	20-Jun-91	S. of Mt. Pedmar		NE 1/4 NW1/4, SEC 19, T25S R33W	Mt. Katmai A3	Mudstone	274 ft. ms #14	S. Krueger	Cret. Kaguyak	Paly Micropaleo Geochem	
91 KAT 101/213	20-Jun-91	S. of Mt. Pedmar		NE 1/4 NW1/4, SEC 19, T25S R33W	Mt. Katmai A3	Siltstone	298 ft. ms #14	S. Krueger	Cret. Kaguyak	Paly Micropaleo Geochem	
91 KAT 101/214	20-Jun-91	S. of Mt. Pedmar		NE 1/4 NW1/4, SEC 19, T25S R33W	Mt. Katmai A3	Volcanic sandstone	342 ft. ms #14	S. Krueger	Cret. Kaguyak	Lith	
91 KAT 101/215	20-Jun-91	S. of Mt. Pedmar		NE 1/4 NW1/4, SEC 19, T25S R33W	Mt. Katmai A3	Concretion	340 ft. ms #14	S. Krueger	Cret. Kaguyak	Paly, Geochem, Micropaleo	
91 KAT 101/216	20-Jun-91	S. of Mt. Pedmar		NW 1/4 NW 1/4, SEC 19, T25S R33W	Mt. Katmai A3	Siltstone	0 ft. ms #14	S. Krueger	Cret. Albian stage	Paly Micropaleo Geochem	
91 KAT 101/217	20-Jun-91	S. of Mt. Pedmar		NW 1/4 NW 1/4, SEC 19, T25S R33W	Mt. Katmai A3	Siltstone	15 ft. ms #14	S. Krueger	Cret. Albian stage	Paly Micropaleo Geochem	
91 KAT 101/218	20-Jun-91	S. of Mt. Pedmar		NW 1/4 NW 1/4, SEC 19, T25S R33W	Mt. Katmai A3	Siltstone	25 ft. ms #14	S. Krueger	Cret. Albian stage	Paly Micropaleo Geochem	
91 KAT 101/219	20-Jun-91	S. of Mt. Pedmar		NW 1/4 NW 1/4, SEC 19, T25S R33W	Mt. Katmai A3	Siltstone	30 ft. ms #14	S. Krueger	Cret. Albian	Paly Micropaleo Geochem	
91 KAT 101/220	20-Jun-91	S. of Mt. Pedmar		NW 1/4 NW 1/4, SEC 19, T25S R33W	Mt. Katmai A3	Black Sandstone	46 ft. ms #14	S. Krueger	Cret. Albian stage	Lith	
91 KAT 101/221	20-Jun-91	S. of Mt. Pedmar		NW 1/4 NW 1/4, SEC 19, T25S R33W	Mt. Katmai A3	Black sandstone	48 ft. ms #14	S. Krueger	Cret. Albian stage	Lith	
91 KAT 101/222	20-Jun-91	S. of Mt. Pedmar		NW 1/4 NW 1/4, SEC 19, T25S R33W	Mt. Katmai A3	Sandstone	66 ft. ms #14	S. Krueger	Cret. Albian stage	Lith P and P	
91 KAT 101/223	20-Jun-91	S. of Mt. Pedmar		NW 1/4 NW 1/4, SEC 19, T25S R33W	Mt. Katmai A3	Siltstone	91 ft. ms #14	S. Krueger	Cret. Albian stage	Paly Micropaleo Geochem	
91 KAT 101/224	20-Jun-91	S. of Mt. Pedmar		NW 1/4 NW 1/4, SEC 19, T25S R33W	Mt. Katmai A3	Siltstone	105 ft. ms #14	S. Krueger	Cret. Albian stage	Paly Micropaleo Geochem	
91 KAT 101/225	20-Jun-91	S. of Mt. Pedmar		NW 1/4 NW 1/4, SEC 19, T25S R33W	Mt. Katmai A3	Bentonitic tuff	238 ft. ms #14	S. Krueger	Cret. Albian stage	K/Ar age	Send to S. Bergman PRC D3136
91 KAT 101/226	20-Jun-91	S. of Mt. Pedmar		NW 1/4 NW 1/4, SEC 19, T25S R33W	Mt. Katmai A3			S. Kruger		Paly Micropaleo	
91 KAT 101/227	20-Jun-91	S. of Mt. Pedmar		NW 1/4 NW 1/4, SEC 19, T25S R33W	Mt. Katmai A3			S. Kruger		K / Ar age	

SAMPLE #	DATE	GEOGRAPHIC AREA	LAT/LONG	SEC. TWP. RNG.	QUAD.	DESCRIPTION	FEET IN SECTION	COLLECTED BY:	AGE	PURPOSE	COMMENTS
91 KAT 1/1	20-Jun-91	S. of peak 2693, N. of Mt. Pedmar		NW 1/4 SW 1/4 NW 1/4 SEC 34, T24S R34W	Mt. Katmai A3	Quartz lithsrenite w/ bachia fragments	295 ft. ms #15	D. Doherty	Jurassic Naknek	Lith AFT	Send to S. Bergman PRC D3136
91 KAT 1/2	20-Jun-91	S. of peak 2693, N. of Mt. Pedmar		NW 1/4 SW 1/4 NW 1/4 SEC 34, T24S R34W	Mt. Katmai A3	Concretion in sandstone	287 ft. ms #15	D. Doherty	Jurassic Naknek	Lith Micropaleo Macro fossil	
91 KAT 1/3	20-Jun-91	S. of peak 2693, N. of Mt. Pedmar		NW 1/4 SW 1/4 NW 1/4 SEC 34, T24S R34W	Mt. Katmai A3	Buchia shells in sandstone	270 ft. ms #15	D. Doherty	Jurassic Naknek	Microfossil	
91 KAT 1/4	20-Jun-91	S. of peak 2693, N. of Mt. Pedmar		NW 1/4 SW 1/4 NW 1/4 SEC 34, T24S R34W	Mt. Katmai A3	Siltstone	223 ft. ms #15	D. Doherty	Jurassic Naknek	Paly Micropaleo Geochem	
91 KAT 1/5	20-Jun-91	S. of peak 2693, N. of Mt. Pedmar		NW 1/4 SW 1/4 NW 1/4 SEC 34, T24S R34W	Mt. Katmai A3	Siltstone	136 ft. ms #15	D. Doherty	Jurassic Naknek	Paly Micropaleo Geochem	
91 KAT 1/6	20-Jun-91	S. of peak 2693, N. of Mt. Pedmar		NW 1/4 SW 1/4 NW 1/4 SEC 34, T24S R34W	Mt. Katmai A3	Carbonate concretions	96 ft. ms #15	D. Doherty	Jurassic Naknek	Paly Micropaleo	
91 KAT 1/7	20-Jun-91	S. of peak 2693, N. of Mt. Pedmar		NW 1/4 SW 1/4 NW 1/4 SEC 34, T24S R34W	Mt. Katmai A3	Sandstone	93 ft. ms #15	D. Doherty	Jurassic Naknek	Lith	
91 KAT 1/8	20-Jun-91	S. of peak 2693, N. of Mt. Pedmar		NW 1/4 SW 1/4 NW 1/4 SEC 34, T24S R34W	Mt. Katmai A3	Trough x-bedded sandstone	67 ft. ms #15	D. Doherty	Jurassic Naknek	Lith	
91 KAT 1/9	20-Jun-91	S. of peak 2693, N. of Mt. Pedmar		NW 1/4 SW 1/4 NW 1/4 SEC 34, T24S R34W	Mt. Katmai A3	Shell hash in sandstone	40 ft. ms #15	D. Doherty	Jurassic Naknek	Lith	
91 KAT 1/10	20-Jun-91	S. of peak 2693, N. of Mt. Pedmar		NW 1/4 SW 1/4 NW 1/4 SEC 34, T24S R34W	Mt. Katmai A3	Siltstone	35 ft. ms #15	D. Doherty	Jurassic Naknek	Paly Micropaleo Geochem	
91 KAT 1/11	20-Jun-91	S. of peak 2693, N. of Mt. Pedmar		NW 1/4 SW 1/4 NW 1/4 SEC 34, T24S R34W	Mt. Katmai A3	Ripple x laminated sandstone	32 ft. ms #15	D. Doherty	Jurassic Naknek	Lith	
91 KAT 1/12	20-Jun-91	S. of peak 2693, N. of Mt. Pedmar		NW 1/4 SW 1/4 NW 1/4 SEC 34, T24S R34W	Mt. Katmai A3	Siltstone	28 ft. ms #15	D. Doherty	Jurassic Naknek	Paly Micropaleo Geochem	
91 KAT 1/13	20-Jun-91	S. of peak 2693, N. of Mt. Pedmar		NW 1/4 SW 1/4 NW 1/4 SEC 34, T24S R34W	Mt. Katmai A3	X-bedded sandstone and Coquina	42 ft. ms #15	D. Doherty	Jurassic Naknek	Lith	
91 KAT 1/14	22-Jun-91	S. of peak 2693, N. of Mt. Pedmar		NW 1/4 SW 1/4 NW 1/4 SEC 34, T24S R34W	Mt. Katmai A3	Sandstone ...2 bags	60 ft. ms #15	D. Doherty	Jurassic Naknek	Lith P and P	2 bags
91 KAT 2/15	22-Jun-91	W. side of Barrier Range	58° 7.55' N 154° 59.017' W	NW corner of SE 1/4, SEC 3 T24S R35W	Mt. Katmai A3	Slightly sandy calcareous mudstone	1 ft. ms #21	D. Doherty	Cret. Hoeendoen	Paly Micropaleo Geochem	
91 KAT 2/16	22-Jun-91	W. side of Barrier Range		NW corner of SE 1/4, SEC 3 T24S R35W	Mt. Katmai A3	Mudstone	14.5 ft. ms #21	D. Doherty	Cret. Hoeendoen	Paly Micropaleo Geochem	
91 KAT 2/17	22-Jun-91	W. side of Barrier Range		NW corner of SE 1/4, SEC 3 T24S R35W	Mt. Katmai A3	Mudstone	20 ft. ms #21	D. Doherty	Cret. Hoeendoen	Paly Micropaleo Geochem	

SAMPLE #	DATE	GEOGRAPHIC AREA	LAT/LONG	SEC. TWP. RNG.	QUAD.	DESCRIPTION	FEET IN SECTION	COLLECTED BY:	AGE	PURPOSE	COMMENTS
91 KAT 2/18	22-Jun-91	W. side of Barrier Range		NW corner of SE 1/4, SEC 3 T24S R35W	Mt. Katmai A3	Slightly sandy, inoceramus prism bearing, mudstone	30.5 ft. ms #21	D. Doherty	Cret. Herendeen	Paly Micropaleo Geochem	
91 KAT 2/19	22-Jun-91	W. side of Barrier Range		NW corner of SE 1/4, SEC 3 T24S R35W	Mt. Katmai A3	Mudstone	34 ft. ms #21	D. Doherty	Cret. Herendeen	Paly Micropaleo Geochem	
91 KAT 2/20	22-Jun-91	W. side of Barrier Range		NW corner of SE 1/4, SEC 3 T24S R35W	Mt. Katmai A3	Slightly sandy calcareous mudstone	42 ft. ms #21	D. Doherty	Cret. Herendeen	Paly, Lith Micropaleo Geochem	
91 KAT 2/21	22-Jun-91	W. side of Barrier Range		NW corner of SE 1/4, SEC 3 T24S R35W	Mt. Katmai A3	Calcareous mudstone w/Inoceramus prisms and Belemnites	43.5 ft. ms #21	D. Doherty	Cret. Herendeen	Paly Micropaleo Geochem	
91 KAT 2/22	22-Jun-91	W. side of Barrier Range		NW corner of SE 1/4, SEC 3 T24S R35W	Mt. Katmai A3	Clam shells	44.5 ft. ms #21	D. Doherty	Cret. Herendeen	Megafossil	
91 KAT 2/23	22-Jun-91	W. side of Barrier Range		NW corner of SE 1/4, SEC 3 T24S R35W	Mt. Katmai A3	Bioclastic calcarenite	53.5 ft. ms #21	D. Doherty	Cret. Herendeen	Lith Micropaleo, Paly	
91 KAT 2/24	22-Jun-91	W. side of Barrier Range		NW corner of SE 1/4, SEC 3 T24S R35W	Mt. Katmai A3	Mudstone	65 ft. ms #21	D. Doherty	Cret. Herendeen	Paly Micropaleo Geochem	
91 KAT 2/25	22-Jun-91	W. side of Barrier Range		NW corner of SE 1/4, SEC 3 T24S R35W	Mt. Katmai A3	Bioclastic calcarenite	67 ft. ms #21	D. Doherty	Cret. Herendeen	Lith	
91 KAT 3/26	26-Jun-91	S. of Cape Nukshak beach exposure	58° 23' N 153° 59.5' W	SEC 1, T21S R29W	Afognik B6	Dacitic massive dike	n/a	S. Bergman	Tertiary intrusives	Inorganic geochem Lith Age	Send to S. Bergman PRC D3136
91 KAT 3/27	26-Jun-91	S. of Cape Nukshak beach exposure	58° 23' N 153° 59.5' W	SEC 1, T21S R29W	Afognik B6	Matrix of explosion breccia dike	n/a	S. Bergman	Tertiary intrusives	Lith Age	Send to S. Bergman PRC D3136
91 KAT 3/28	26-Jun-91	S. of Cape Nukshak beach exposure	58° 23' N 153° 59.5' W	SEC 1, T21S R29W	Afognik B6	Flow banded dacite with explosion breccia dike	n/a	S. Bergman	Tertiary intrusives	Lith	
91 KAT 3/29	26-Jun-91	S. of Cape Nukshak beach exposure	58° 23' N 153° 59.5' W	SEC 1, T21S R29W	Afognik B6	Clast-rich vitric explosion breccia dike	n/a	S. Bergman	Tertiary intrusives	Lith	
91 KAT 4/30	26-Jun-91	NW side of mouth of Swikshak River	58° 36.5' N 153° 47' W	NE 1/4 NW 1/4, SEC 20, T18S R27W	Afognik C6	Mudstone	1 ft. ms #22	S. Moothart	Cret. Kaguyak	Paly Micropaleo Geochem	
91 KAT 4/31	26-Jun-91	NW side of mouth of Swikshak River	58° 36.5' N 153° 47' W	NE 1/4 NW 1/4, SEC 20, T18S R27W	Afognik C6	Sandstone	11.5 ft. ms #22	S. Moothart	Cret. Kaguyak	Lith	
91 KAT 4/32	26-Jun-91	NW side of mouth of Swikshak River	58° 36.5' N 153° 47' W	NE 1/4 NW 1/4, SEC 20, T18S R27W	Afognik C6	Mudstone	12.5 ft. ms #22	S. Moothart	Cret. Kaguyak	Paly Micropaleo Geochem	
91 KAT 4/33	26-Jun-91	NW side of mouth of Swikshak River	58° 36.5' N 153° 47' W	NE 1/4 NW 1/4, SEC 20, T18S R27W	Afognik C6	Sandstone	18.5 ft. ms #22	S. Moothart	Cret. Kaguyak	Lith P and P	
91 KAT 4/34	26-Jun-91	NW side of mouth of Swikshak River	58° 36.5' N 153° 47' W	NE 1/4 NW 1/4, SEC 20, T18S R27W	Afognik C6	Sandstone	25.5 ft. ms #22	S. Bergman	Cret. Kaguyak	AFTA Lith	Send to S. Bergman PRC D3136

SAMPLE #	DATE	GEOGRAPHIC AREA	LAT/LONG	SEC. TWP. RNG.	QUAD.	DESCRIPTION	FEET IN SECTION	COLLECTED BY:	AGE	PURPOSE	COMMENTS
91 KAT 4/35	26-Jun-91	NW side of mouth of Swikshak River	58° 36.5' N 153° 47' W	NE 1/4 NW 1/4, SEC 20, T18S R27W	Afognik C6	Siltstone	34 ft. ms #22	S. Moothart	Cret. Kaguyak	Paly Micropaleo Geochem	
91 KAT 4/36	26-Jun-91	NW side of mouth of Swikshak River	58° 36.5' N 153° 47' W	NE 1/4 NW 1/4, SEC 20, T18S R27W	Afognik C6	Mudstone	53 ft. ms #22	S. Moothart	Cret. Kaguyak	Paly Micropaleo Geochem	
91 KAT 4/37	26-Jun-91	NW side of mouth of Swikshak River	58° 36.5' N 153° 47' W	NE 1/4 NW 1/4, SEC 20, T18S R27W	Afognik C6	Mudstone	56.5 ft. ms #22	S. Moothart	Cret. Kaguyak	Paly Micropaleo Geochem	
91 KAT 4/38	26-Jun-91	NW side of mouth of Swikshak River	58° 36.5' N 153° 47' W	NE 1/4 NW 1/4, SEC 20, T18S R27W	Afognik C6	Sandstone	57.5 ft. ms #22	S. Moothart	Cret. Kaguyak	Lith P and P	
91 KAT 4/39	26-Jun-91	NW side of mouth of Swikshak River	58° 36.5' N 153° 47' W	NE 1/4 NW 1/4, SEC 20, T18S R27W	Afognik C6	Mudstone	74.5 ft. ms #22	S. Moothart	Cret. Kaguyak	Paly Micropaleo Geochem	
91 KAT 4/40	26-Jun-91	NW side of mouth of Swikshak River	58° 36.5' N 153° 47' W	NE 1/4 NW 1/4, SEC 20, T18S R27W	Afognik C6	Mudstone	86.5 ft. ms #22	S. Moothart	Cret. Kaguyak	Paly Micropaleo Geochem	
91 KAT 5/41	27-Jun-91	N. islet SW. of Cape Kaguyak		NW 1/4 SEC 3, T19S R28W	Afognik C6	Siltstone	0 ft. ms #23	D. Doherty	Jurassic Naknek	Paly Micropaleo Geochem	
91 KAT 5/42	27-Jun-91	N. islet SW. of Cape Kaguyak		NW 1/4 SEC 3, T19S R28W	Afognik C6	Siltstone concretion	2.5 ft. ms #23	D. Doherty	Jurassic Naknek	Paly, Rads., Micropaleo Geochem	
91 KAT 5/43	27-Jun-91	N. islet SW. of Cape Kaguyak		NW 1/4 SEC 3, T19S R28W	Afognik C6	Siltstone	2.5 ft. ms #23	D. Doherty	Jurassic Naknek	Paly Micropaleo Geochem	
91 KAT 5/44	27-Jun-91	N. islet SW. of Cape Kaguyak		NW 1/4 SEC 3, T19S R28W	Afognik C6	Siltstone	5 ft. ms #23	D. Doherty	Jurassic Naknek	Paly Micropaleo Geochem	
91 KAT 5/45	27-Jun-91	N. islet SW. of Cape Kaguyak		NW 1/4 SEC 3, T19S R28W	Afognik C6	Siltstone concretion	9.5 ft. ms #23	D. Doherty	Jurassic Naknek	Paly, Rads., Micropaleo Geochem	
91 KAT 5/46	27-Jun-91	N. islet SW. of Cape Kaguyak		NW 1/4 SEC 3, T19S R28W	Afognik C6	Siltstone	7 ft. ms #23	D. Doherty	Jurassic Naknek	Paly Micropaleo Geochem	
91 KAT 5/47	27-Jun-91	N. islet SW. of Cape Kaguyak		NW 1/4 SEC 3, T19S R28W	Afognik C6	Siltstone	13 ft. ms #23	D. Doherty	Jurassic Naknek	Paly Micropaleo Geochem	
91 KAT 5/48	27-Jun-91	N. islet SW. of Cape Kaguyak		NW 1/4 SEC 3, T19S R28W	Afognik C6	Siltstone	17 ft. ms #23	D. Doherty	Jurassic Naknek	Paly Micropaleo Geochem	
91 KAT 5/49	27-Jun-91	N. islet SW. of Cape Kaguyak		NW 1/4 SEC 3, T19S R28W	Afognik C6	Siltstone	25 ft. ms #23	D. Doherty	Jurassic Naknek	Paly Micropaleo Geochem	

SAMPLE #	DATE	GEOGRAPHIC AREA	LAT/LONG	SEC. TWP. RNG.	QUAD.	DESCRIPTION	FEET IN SECTION	COLLECTED BY:	AGE	PURPOSE	COMMENTS
91 KAT 5/50	27-Jun-91	N. islet SW. of Cape Kaguyak		NW 1/4 SEC 3, T19S R28W	Afognik C6	Siltstone	29.5 ft. ms #23	D. Doherty	Jurassic Naknek	Paly Micropaleo Geochem	
91 KAT 5/51	27-Jun-91	N. islet SW. of Cape Kaguyak		NW 1/4 SEC 3, T19S R28W	Afognik C6	Muddy calcareous sandstone	30.5 ft. ms #23	D. Doherty	Cret. Herendeen	Lith, Paly, Micropaleo Geochem	
91 KAT 5/52	27-Jun-91	N. islet SW. of Cape Kaguyak		NW 1/4 SEC 3, T19S R28W	Afognik C6	Muddy calcareous sandstone	35 ft. ms #23	D. Doherty	Cret. Herendeen	Lith, Paly, Micropaleo Geochem	
91 KAT 5/53	27-Jun-91	N. islet SW. of Cape Kaguyak		NW 1/4 SEC 3, T19S R28W	Afognik C6	Muddy calcareous sandstone	40 ft. ms #23	D. Doherty	Cret. Herendeen	Lith P and P	
91 KAT 5/54	27-Jun-91	N. islet SW. of Cape Kaguyak		NW 1/4 SEC 3, T19S R28W	Afognik C6	Muddy calcareous sandstone	45 ft. ms #23	D. Doherty	Cret. Herendeen	Lith P and P	
91 KAT 4/55	27-Jun-91	NW side of mouth of Swikshak Lagoon	58° 36.5' N 153° 47' W	NE 1/4 NW 1/4 SEC 2, T18S R27W	Afognik C6	Mudstone	97.5 ft. ms #22	B. Morris	Cret. Kaguyak	Paly Micropaleo Geochem	
91 KAT 4/56	27-Jun-91	NW side of mouth of Swikshak Lagoon	58° 36.5' N 153° 47' W	NE 1/4 NW 1/4 SEC 2, T18S R27W	Afognik C6	Sandstone	99.5 ft. ms #22	B. Morris	Cret. Kaguyak	Lith	
91 KAT 4/57	27-Jun-91	NW side of mouth of Swikshak Lagoon	58° 36.5' N 153° 47' W	NE 1/4 NW 1/4 SEC 2, T18S R27W	Afognik C6	Mudstone	125.5 ft. ms #22	B. Morris	Cret. Kaguyak	Paly Micropaleo Geochem	
91 KAT 4/58	27-Jun-91	NW side of mouth of Swikshak Lagoon	58° 36.5' N 153° 47' W	NE 1/4 NW 1/4 SEC 2, T18S R27W	Afognik C6	Mudstone	163 ft. ms #22	B. Morris	Cret. Kaguyak	Paly Micropaleo Geochem	
91 KAT 7/59	28-Jun-91	?????		???????	???	Sandstone (hornfels)	n/a	D. Doherty	Jurassic Naknek	Lith	
91 KAT 7/60	28-Jun-91	???????		????????	????	Mudstone	n/a	D. Doherty	Jurassic Naknek	Paly Micropaleo Geochem	From aprox. 8' below 7/59
91 KAT 9/61	28-Jun-91	???????		???????	?????	Hornfels	n/a	D. Doherty	?	Lith Age	Send to S. Bergman PRC D3136
91 KAT 217/676	28-Jun-91	Beach cliff W. of Swikshak Lagoon and E. of Big River		SE 1/4, SEC14, T18S R28W	Afognik C6	Mudstone	30 ft. ms #24	B. Morris	Cret. Kaguyak	Paly Micropaleo Geochem	
91 KAT 217/677	28-Jun-91	Beach cliff W. of Swikshak Lagoon and E. of Big River		SE 1/4, SEC14, T18S R28W	Afognik C6	Sandstone	46 ft. ms #24	B. Morris	Cret. Kaguyak	Lith P and P	Large sample
91 KAT 217/678	28-Jun-91	Beach cliff W. of Swikshak Lagoon and E. of Big River		SE 1/4, SEC14, T18S R28W	Afognik C6	Mudstone	82.5 ft. ms #24	B. Morris	Cret. Kaguyak	Paly Micropaleo Geochem	
91 KAT 217/679	28-Jun-91	Beach cliff W. of Swikshak Lagoon and E. of Big River		SE 1/4, SEC14, T18S R28W	Afognik C6	Mudstone	152.5 ft. ms #24	B. Morris	Cret. Kaguyak	Paly Micropaleo Geochem	

SAMPLE #	DATE	GEOGRAPHIC AREA	LAT/LONG	SEC. TWP. RNG.	QUAD.	DESCRIPTION	FEET IN SECTION	COLLECTED BY:	AGE	PURPOSE	COMMENTS
91 KAT 216/670	24-Jun-91	Kaguyak Point		NE1/4, SEC34, T18S R28W	Afognak C6	Siltstone	2.5 ft. ms #25	B. Morris	Cret. Kaguyak	Paly Micropaleo	
91 KAT 216/671	24-Jun-91	Kaguyak Point		NE1/4, SEC34, T18S R28W	Afognak C6	Sandstone	5 ft. ms #25	B. Morris	Cret. Kaguyak	Lith	
91 KAT 216/672	24-Jun-91	Kaguyak Point		NE1/4, SEC34, T18S R28W	Afognak C6	Siltstone	40 ft. ms #25	B. Morris	Cret. Kaguyak	Paly Micropaleo Geochem	Slab for B. Morris, PRC
91 KAT 216/673	24-Jun-91	Kaguyak Point		NE1/4, SEC34, T18S R28W	Afognak C6	Amonite	55 ft. ms #25	B. Morris	Cret. Kaguyak	Macrofossil	
91 KAT 216/674	24-Jun-91	Kaguyak Point		NE1/4, SEC34, T18S R28W	Afognak C6	Tuff	77.5 ft. ms #25	B. Morris	Cret. Kaguyak	K/Ar age	Send to S. Bergman PRC D3136
91 KAT 216/675	24-Jun-91	Kaguyak Point		NE1/4, SEC34, T18S R28W	Afognak C6	Tuff	130 ft. ms #25	B. Morris	Cret. Kaguyak	K/Ar age	Send to S. Bergman PRC D3136

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CORE LABORATORIES

ARCO ALASKA, INC.

CORE ANALYSIS REPORT
SURFACE SAMPLES
ALASKA PENINSULA, ALASKA
CL FILE NO. BP-3-1444

Performed by:

Core Laboratories
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Anchorage, AK 99518
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Final Report Presented
December 23, 1991

INTRODUCTION

Core Laboratories was requested to perform a core analysis study on behalf of Arco Alaska, Inc. for outcrop surface samples. Presented herein are the results of this study.

The surface samples were delivered to and processed at Core Laboratories' Anchorage facility during October of 1991. A service description and methodology are presented in section 1. The core analysis results and lithological descriptions are presented in section 2. In conjunction with the report, the tabular results of the analysis are supplied on an McIntosh compatible diskette.

We sincerely appreciate this opportunity to be of service and hope these data prove beneficial to your exploration efforts.

TABLE OF CONTENTS

SECTION 1

OUTCROP SAMPLE ANALYSIS, SERVICE DESCRIPTION

Outcrop Sample Processing

Upon arrival at Core Laboratories Anchorage facility, the sample bags were removed from their boxes, grouped by letter designation, and placed in numerical order within each group. The samples were then removed from their bags and one plug was drilled from each sample horizontal to the bedding planes (where visible). The plugs were trimmed into right cylinders and marked. The plug ends were were placed in marked bags, boxed, and stored for future shipment.

The plug samples were cleaned by soaking in toulene for a period of twenty-four hours. They were then dried in a convection oven for twelve hours at 240 degrees F.

Analysis Techniques

Sequence of Measurements

The plug samples were measured for porosity, permeability, and grain density at ambient and 5000 psig. The sequence of laboratory proceedures was as follows:

1. Ambient Grain Volumes
2. Permeability at 400 psig
3. Mercury Bulk Volumes
4. Permeabilty at 5000 psig
5. Drying in convection over for twelve hours at 240 degrees F.
6. Grain Volumes at 5000 psig
7. Pore Volumes at 5000 psig

Calculations

Grain Density

Grain volume determinations were measured on all samples according to Boyle's Law utilizing the Extended Range Helium Porosimeter. Grain densities were calculated using Equation 1.

$$Dg = Mg/Vg \qquad (1)$$

Where: Dg = Grain Density
Vg = Grain Volume
Mg = Grain Mass

Atmospheric Porosity

The horizontal plug samples were measured for bulk volume by mercury displacement at ambient conditions. The grain volume was measured using the Extended Range Helium Porosimeter. Porosity was calculated using Equation 2.

$$P = [(Vb-Vg) / Vb)] \times 100 \qquad (2)$$

Where:
- P = Porosity, Percent
- Vb = Bulk Volume
- Vg = Grain Volume

Overburden Porosity

The plug samples were also measured for pore volume at a confining pressure of 5000 psig. Pore volumes and grain volumes were obtained using the Extended Range Helium Porosimeter. Overburden porosity was calculated using Equation 3.

$$P = [Vp / (Vp+Vg)] \times 100 \qquad (3)$$

Where:
- P = Porosity, Percent
- Vp = Pore Volume
- Vg = Grain Volume

Permeability to Air

Horizontal permeabilities were measured in a Hassler type core holder at a confining pressures of 400 psig. A hydrostatic holder was used to produce a confining pressure of 5000 psig. Permeability calculations were performed as defined by Darcy's Equation for compressible fluids, Equation 4.

$$K = \frac{Pa \times v \times 1000}{\frac{(P1 - P2)(P1 + P2)}{2}} \times \frac{Qa \times L \times L}{Vb} \qquad (4)$$

Where:
- K = Permeability
- v = Gas Viscosity
- $P1 - P2$ = Differential Pressure
- $\frac{P1 + P2}{2}$ = Mean Pressure
- Pa = Atmospheric Pressure
- Qa = Flow Rate
- L = Length
- Vb = Bulk Volume

SECTION 2

OUTCROP SAMPLE ANALYSIS, TABULAR RESULTS

GMC Data Report No. 203

CORE LABORATORIES

Company: ARCO ALASKA, INC. Field: File No: BP-3-1444

Wells: SURFACE SAMPLES County: ALASKA PENINSULA Date: 27-Nov-91

CORE ANALYSIS RESULTS

SAMPLE NUMBER	PERMEABILITY TO AIR (md) 400 psig	PERMEABILITY TO AIR (md) 5000 psig	POROSITY (HELIUM) % 400 psig	POROSITY (HELIUM) % 5000 psig	GRAIN DENSITY	DESCRIPTION
91WB 15/67	0.8698	0.0483	7.82	5.70	2.68	SS-ltbrngy,m-vcgr,pred mgr,wsrtd,sbang,mod cmt,qtz,wh fspr,blk mafic.
91WB 15/68	0.6253	0.0529	9.39	8.37	2.72	SS-ltbrngy,vf-vcgr,pred fgr,modsrtd,sbang,mod cmt,qtz,wh fspr,blk mafic.
91WB 18/80	0.3901	0.0555	4.31	3.97	2.82	CONG-mltgy,m-c pbl in f-csd mtx,sb-wrnd,vwcmt,qtz,dk ang gr,pyr,calc cmt.
91WB 18/81	0.0355	0.0027	5.60	4.72	2.74	SS-mgy,m-vcgr,pred cgr,modsrtd,sbang,vwcmt,qtz,glau,calc cmt.
91WB 101/505	0.2744	0.0217	6.89	4.29	2.67	SYENITE-ltgy,fgr,mass.hd,wh fspr,pyroxene,tr lim.
91WB 102/520	0.4571	0.0183	6.42	5.19	2.63	GRANITE-ltgy,f-mgr,hd,wh fspr,pyroxene,tri biot,qtz.
91WB 102/521	43.6213	0.0112	8.32	NA	2.66	SS-vltgy,fsd-fpbl,vpsrtd,vang-wrnd,modcmt,wh mty,qtz,lith gr,biot.
91WB 103/522	0.4348	0.0073	5.40	5.35	2.55	GRANITE-ltgy,f-mgr,hd,wh fspr,pyroxene,tri biot,qtz.
91WB 103/523	0.0322	0.0033	4.46	4.40	2.69	SS-mgy,fgr,vwsrtd,f lam,sbrnd,vwcmt,qtz,mafic gr.
91WB 103/524	1.7746	0.1493	6.05	4.09	2.68	Cgl-ltbrngy,fsd-cpbl,vpsrtd,sbang-wrnd,qtz,lith & mafic gr,wh ool.
91WB 104/543	0.1051	0.0122	6.08	4.19	2.59	SS-mltgy,vf-fgr,pred fgr,bnd,wsrtd,sbang,vwcmt,qtz,mafic gr,tr bit,calc.
91WB 105/552	0.1606	0.0164	6.81	6.27	2.58	SS-mltgy,vf-fgr,pred fgr,wsrtd,sbrnd,wcmt,qtz,mafic gr,tr hem.
91WB 208/838	0.1150	0.0060	6.07	5.46	2.71	SS-mltgy,vf-mgr,pred fgr,wsrtd,sbrnd,wcmt,qtz,mafic gr,fspr,calc.
91WB 209/642	0.0303	0.0024	6.76	5.73	2.68	SS-ltbrngy,f-mgr,pred fgr,wsrtd,sbrnd,wcmt,qtz,mafic gr,fspr.
91WB 210/546	1.0917	0.0597	7.65	4.93	2.64	SS-mltgy,f-vcgr,pred mgr,mod srtd,sbrnd,mod cmt,fspr,qtz,lith gr.
91LCP 3/8	0.0055	0.0006	2.88	0.72	2.61	SYENITE-ltgy,fgr,equigranular,mass,wh fspr,blk pyroxene,tr bio.
91LCP 3/35	0.0086	0.0008	1.88	1.45	2.75	SYENITE-ltgy,fgr,equigranular,mass,wh fspr,blk pyroxene & amphibole.
91LCP 3/42	0.4552	0.0691	7.08	4.90	2.75	SS-mdkgy,m-vcgr,pred cgr,wsrtd,sbang,mod cmt,qtz,fspr,dk gy cly,tr calc.
91LCP 4/12	0.0102	0.0028	2.05	1.72	2.59	SYENITE-vltgy,mgr,mass,hd,wh fspr,pyroxene,biot,xenolith,tr calc.
91LCP 5/19	0.0097	0.0034	4.21	3.36	2.63	SYENITE-ltgy,f-mgr,mass,hd,wh fspr,pyroxene,xenolith,tr hem & calc.

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GMC Data Report No. 203

CORE LABORATORIES

Company: ARCO ALASKA, INC. Field: File No: BP-3-1444

Wells: SURFACE SAMPLES County: ALASKA PENINSULA Date: 27-Nov-91

CORE ANALYSIS RESULTS

SAMPLE NUMBER	PERMEABILITY TO AIR (md) 400 psig	PERMEABILITY TO AIR (md) 5000 psig	POROSITY (HELIUM) % 400 psig	POROSITY (HELIUM) % 5000 psig	GRAIN DENSITY	DESCRIPTION
91LCP 5/20	0.5809	0.0059	7.87	7.28	2.52	SYENITE-ltgy,mgr,mass,hd wh fspr,pyroxene.
91LCP 101/201	0.0093	0.0034	3.46	3.13	2.57	SS-mltgy,f-cgr,pred mgr,wsrtd,wh fspr,qtx,pyroxene.
91LCP 101/204	0.0210	0.0043	5.36	4.66	2.56	SYENITE-ltgy,fgr,mass,hd,wh fspr,pyroxene.
91LCP 101/205	0.0063	0.0008	3.14	3.08	2.60	SYENITE-ltgy,fgr,mass,hd,wh fspr,pyroxene,occ xenolith.
91LCP 101/206	0.0452	0.0077	3.25	2.82	2.59	SYENITE-ltgy,fgr,mass,hd,wh fspr,pyroxene.
91LCP 101/208	0.0118	0.0059	3.31	2.60	2.59	SYENITE-ltgy,fgr,mass,hd,wh fspr,pyroxene,biot.
91LCP 104/214	0.0136	0.0026	2.96	2.42	2.57	SYENITE-ltgy,fgr,mass,hd,wh fspr,pyroxene,occ xenolith.
91LCP 104/229	0.0115	0.0019	2.72	2.31	2.63	SYENITE-ltgy,fgr,mass,hd,wh fspr,pyroxene,occ xenolith.
91LCP 104/216	0.0085	0.0019	1.79	0.69	2.55	SYENITE-ltgy,equigranular,mass,wh fspr,blk pyroxene,tr bio.
91LCP 104/223	0.0054	0.0007	2.27	1.86	2.57	SYENITE-ltgy,fgr,equigranular,mass,wh fspr,blk pyroxene & amphibole.
91LCP 104/255	0.0129	0.0009	2.53	2.05	2.60	SYENITE-ltgy,fgr,equigranular,mass,wh fspr,blk pyroxene & amphibole.
91LCP 202/407	7.3515	0.4563	12.52	9.80	2.72	SS-ltgy,f-mgr,pred fgr,wsrtd,ang,mod cmt,qtz,calc cmt,dk gy arg gr.
91KAT 1/14	0.0276	0.0015	4.07	4.54	2.72	SS_ltgy,f-mgr,pred fgr,wsrtd,sbang,vwcmt,qtz,occ mafic gr.
91KAT 4/56	0.0953	0.0081	8.14	7.57	2.73	SS-mgy,f-mgr,pred mgr,wsrtd,sbang,vwcmt,qtz,mafic gr,fld,calc,tr pyr.
91KAT 5/53	0.0098	0.0009	3.38	2.35	2.73	SS-mgr,vfgr,vwsrtd,sbrnd,vwcmt,qtz,calc cmt,mafic gr,shl frag.
91KAT 101/222	0.2737	0.0858	15.26	14.02	2.68	SS-mltgy,vf-vcgr,psrtd,ang,wcmt,qtz,ltgy cly,tr biot.
91KAT 214/664	0.0274	0.0102	10.87	10.11	2.58	SS-ltolvgy,vf-fgr,pred fgr,wsrtd,sbang,wcmt,fld,qtz,mafic gr,tr chlor & hem.
91KAT 5/54	0.0114	0.0026	2.73	2.21	2.71	LS-mltgy,fxl,hd,occ biot.
91KAT 217/677	0.0228	0.0021	3.68	3.09	2.73	SS-mltgy,f-mgr,pred fgr,wsrtd,sbang,vwcnt,qtz & calc cmt.
91KB 211/652	0.1718	0.0124	5.14	4.06	2.72	SS-ltgy,f-cgr,mod srtd,sbang,vwcmt,qtz,calc,occ biot.

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SAMPLE	AU PPB	H2O+ %	H2O- %	LI PPM	BE PPM	B PPM	CO2 %	F PPM	S PPM
91KAT 4/31	4	2.3	.3	33	2	73	1.27	310	150
91KAT 9/61	2	.9	.3	16	3	14	.01	360	160
91KAT 101/225	1	6.5	9.1	193	2	74	.08	230	2970
91WB 1/24	2	2.1	2.1	8	2	13	.30	200	148
91WB 3/62	4	2.8	.9	9	3	26	2.27	260	169
91WB 107/562D	1	1.7	.2	16	4	33	.04	220	112
91LCP 3/11	<1	2.3	1.7	20	4	20	.66	230	23200
91LCP 4/12	<1	3.3	1.2	8	3	15	.06	240	300
91LCP 4/13	4	2.4	1.2	6	3	49	<.01	270	151
91LCP 5/21	3	5.1	2.4	7	3	30	.01	270	<50
91LCP 5/22	<1	3.5	2.1	7	2	57	.23	290	<50
91LCP 3/30	3	2.1	1.4	26	3	41	.11	280	343
91LCP 3/38	<1	1.7	1.0	20	2	28	.03	270	1260
91LCP 3/39	3	2.0	1.7	19	2	29	.05	360	1030
91LCP 102/211	2	.5	.1	7	1	22	.06	200	<50
91LCP 102/213	7	.8	.2	25	<1	18	<.01	61	<50
91LCP 104/215	<1	3.7	1.4	12	4	36	<.01	250	74
91LCP 104/226	2	3.1	1.4	12	2	25	.01	250	74
91LCP 104/230	2	1.6	.7	10	3	55	.01	270	--
91SR 3A									

C - QUALITY CONTROL STANDARD
D - QUALITY CONTROL DUPLICATE

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SAMPLE	SO4 %	CL PPM	SC PPM	V PPM	CR PPM	FEO %	CO PPM	NI PPM	CU PPM
91KAT 4/31	.5	<100	11.9	132	82	3.2	23	62	51.0
91KAT 9/61	1.0	653	23.2	188	95	5.0	33	97	76.6
91KAT 101/225	.9	<100	15.0	52	37	2.9	9	68	52.3
91WB 1/24	1.6	<100	44.2	359	360	4.1	39	121	196.
91WB 3/62	.9	388	50.8	394	150	6.7	42	72	182.
91WB 107/5620	1.8	388	22.5	189	36	4.2	23	22	75.8
91LCP 3/11	1.0	<100	10.5	224	23	2.5	12	12	49.6
91LCP 4/12	.6	1140	9.13	150	29	2.2	16	17	52.4
91LCP 4/13	.5	<100	12.0	172	24	2.6	18	17	80.3
91LCP 5/21	.6	385	8.32	133	14	1.2	10	25	166.
91LCP 5/22	.7	<100	8.94	81	17	.8	4	16	58.3
91LCP 3/30	1.3	409	14.4	207	28	2.3	13	16	60.3
91LCP 3/38	.9	156	15.8	147	24	2.6	15	14	28.2
91LCP 3/39	1.7	<100	17.3	179	14	2.1	15	13	65.0
91LCP 102/211	1.2	<100	5.70	26	11	.8	2	8	19.6
91LCP 102/213	1.4	<100	5.42	31	2	.5	<1	2	7.6
91LCP 104/215	1.0	155	9.09	141	8	1.7	12	7	61.6
91LCP 104/226	.9	160	9.72	126	10	1.7	14	5	60.6
91LCP 104/230	.9	<100	8.53	116	8	.8	12	13	53.8

C - QUALITY CONTROL STANDARD
D - QUALITY CONTROL DUPLICATE

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SAMPLE	ZN PPM	GA PPM	GE PPM	AS PPM	SE PPM	BR PPM	RB PPM	Y PPM	ZR PPM
91KAT 4/31	89.4	11.8	<10	9.4	<.5	<1	45	--	124
91KAT 9/61	71.4	22.0	21	3.1	<.5	<1	44	--	102
91KAT 101/225	106.	23.0	12	2.2	<.5	<1	18	--	432
91WB 1/24	111.	17.7	19	1.1	<.5	<1	6	--	38
91WB 3/62	79.3	21.0	20	.3	<.5	1	8	--	50
91WB 107/562D	96.8	21.0	10	12.0	<.5	<1	37	--	135
91LCP 3/11	124.	24.6	<10	50.0	<.5	<1	32	10	69
91LCP 4/12	72.7	19.8	14	.9	<.5	3	22	8	57
91LCP 4/13	88.7	19.8	19	.8	<.5	<1	11	--	91
91LCP 5/21	75.6	19.1	<10	2.4	<.5	<1	22	9	86
91LCP 5/22	45.3	17.3	17	1.7	<.5	<1	18	--	57
91LCP 3/30	101.	19.0	11	4.9	<.5	1	30	--	90
91LCP 3/38	76.5	18.7	<10	10.0	<.5	<1	27	13	102
91LCP 3/39	81.4	24.5	<10	4.5	<.5	<1	29	--	79
91LCP 102/211	37.2	14.3	<10	6.9	<.5	<1	40	--	105
91LCP 102/213	32.7	15.6	<10	37.0	<.5	<1	38	--	76
91LCP 104/215	72.5	25.1	<10	1.2	<.5	<1	22	8	63
91LCP 104/226	75.5	27.0	<10	.7	<.5	<1	20	9	62
91LCP 104/230	72.8	17.9	12	1.7	<.5	<1	40	8	--
91CP 2A									

C - QUALITY CONTROL STANDARD
D - QUALITY CONTROL DUPLICATE

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SAMPLE	NB PPM	MO PPM	PD PPB	AG PPM	CD PPM	IN PPM	SN PPM	SB PPM	CS PPM
91KAT 4/31	8	<1	3	<.1	<.2	<.5	3	1.0	2
91KAT 9/61	8	<1	4	<.1	<.2	<.5	<2	.4	1
91KAT 101/225	23	<1	2	.8	<.2	<.5	<2	.7	1
91WB 1/24	5	<1	14	<.1	<.2	<.5	6	.3	1
91WB 3/62	3	<1	13	<.1	<.2	<.5	10	<.2	<1
91WB 107/562D	10	<1	2	.3	<.2	<.5	2	4.1	1
91LCP 3/11	5	2	2	<.1	<.2	<.5	<2	.9	1
91LCP 4/12	6	<1	<1	.2	<.2	<.5	<2	.2	1
91LCP 4/13	8	1	<1	<.1	<.2	<.5	<2	.1	1
91LCP 5/21	5	<1	<1	<.1	<.2	<.5	2	.3	1
91LCP 5/22	6	<1	3	<.1	<.2	<.5	<2	.1	1
91LCP 3/30	4	1	3	<.1	<.2	<.5	<2	.5	1
91LCP 3/38	5	<1	<1	<.1	<.2	<.5	6	.4	2
91LCP 3/39	4	<1	5	.3	<.2	<.5	<2	.3	1
91LCP 102/211	5	<1	2	<.1	<.2	<.5	<2	.1	2
91LCP 102/213	3	<1	<1	.3	<.2	<.5	<2	.5	<1
91LCP 104/215	5	<1	3	<.1	<.2	<.5	<2	.2	<1
91LCP 104/226	4	<1	2	<.1	<.2	<.5	2	.1	<1
91LCP 104/230	5	<1	3	<.1	<.2	<.5	<2	.2	1

C - QUALITY CONTROL STANDARD
D - QUALITY CONTROL DUPLICATE

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SAMPLE	LA PPM	CE PPM	PR PPM	ND PPM	SM PPM	EU PPM	GD PPM	TB PPM
91KAT 4/31	20.3	38.0	4.3	17.6	3.5	.93	3.2	.5
91KAT 9/61	12.3	25.5	3.2	15.5	3.7	1.10	4.4	.7
91KAT 101/225	27.8	70.4	10.2	54.2	12.9	3.46	13.4	2.1
91WB 1/24	6.2	15.0	2.2	11.6	3.4	1.06	3.8	.6
91WB 3/62	4.3	11.8	1.9	11.0	3.3	1.21	4.3	.7
91WB 107/562D	16.1	34.0	4.2	18.5	4.1	1.21	4.8	.7
91LCP 3/11	7.3	15.8	2.0	9.0	2.0	.77	2.3	.4
91LCP 4/12	8.6	17.3	2.2	10.2	2.3	.77	2.0	.3
91LCP 4/13	8.4	18.5	2.5	12.6	2.8	.98	3.0	.4
91LCP 5/21	6.7	16.7	2.2	10.4	2.4	.77	2.4	.3
91LCP 5/22	9.4	21.3	2.7	12.1	2.5	.83	2.5	.3
91LCP 3/30	9.0	19.6	2.4	10.7	2.3	.77	2.0	.4
91LCP 3/38	9.4	21.1	2.7	12.5	3.0	.92	2.8	.5
91LCP 3/39	10.8	21.6	2.5	11.1	2.6	.87	2.6	.4
91LCP 102/211	12.3	26.3	3.0	13.2	2.7	.75	2.5	.4
91LCP 102/213	8.2	17.7	2.0	9.5	1.8	.51	2.0	.3
91LCP 104/215	8.4	18.0	2.3	10.1	2.1	.75	1.8	.3
91LCP 104/226	8.6	18.9	2.3	10.8	2.2	.80	2.0	.3
91LCP 104/230	11.7	23.7	2.8	12.4	2.4	.77	1.8	.3

C - QUALITY CONTROL STANDARD
D - QUALITY CONTROL DUPLICATE

XRAL

SAMPLE	DY PPM	HO PPM	ER PPM	TM PPM	YB PPM	LU PPM	HF PPM	TA PPM
91KAT 4/31	2.5	.47	1.4	.2	1.0	.14	3.0	<1
91KAT 9/61	4.5	.85	2.9	.4	2.5	.38	3.2	<1
91KAT 101/225	11.6	2.20	6.5	.9	5.3	.83	10.0	1
91WB 1/24	3.8	.75	2.3	.3	1.8	.27	1.5	<1
91WB 3/62	4.1	.76	2.4	.3	1.9	.30	1.1	<1
91WB 107/562D	4.1	.84	2.7	.4	2.2	.34	4.1	<1
91LCP 3/11	2.0	.37	1.3	.2	1.1	.17	2.2	<1
91LCP 4/12	1.6	.29	1.0	.2	.8	.12	1.8	<1
91LCP 4/13	2.0	.38	1.4	.2	1.0	.13	2.9	<1
91LCP 5/21	1.5	.29	1.0	.2	.7	.10	2.6	<1
91LCP 5/22	1.7	.28	1.0	.1	.9	.14	2.1	<1
91LCP 3/30	1.8	.37	1.3	.2	1.1	.17	3.1	<1
91LCP 3/38	2.5	.51	1.6	.2	1.3	.20	3.0	<1
91LCP 3/39	2.3	.48	1.5	.3	1.6	.23	2.3	<1
91LCP 102/211	2.1	.35	1.1	.2	1.1	.17	3.8	<1
91LCP 102/213	1.7	.34	1.0	.2	1.0	.17	2.3	<1
91LCP 104/215	1.5	.30	.9	.2	.9	.13	2.1	<1
91LCP 104/226	1.6	.30	.9	.2	.8	.12	2.3	<1
91LCP 104/230	1.5	.28	.9	.1	.8	.12	1.7	<1

C - QUALITY CONTROL STANDARD
D - QUALITY CONTROL DUPLICATE

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SAMPLE	W PPM	PT PPB	HG PPB	TL PPM	PB PPM	BI PPM	TH PPM	U PPM
91KAT 4/31	1	10	54	.4	<2	<1	4.1	2.2
91KAT 9/61	<1	<10	11	.3	<2	<1	2.5	.9
91KAT 101/225	<1	10	22	.2	<2	<1	5.6	4.0
91WB 1/24	<1	30	5	<.1	<2	<1	<.5	.4
91WB 3/62	<1	30	5	<.1	<2	<1	<.5	.3
91WB 107/562D	<1	<10	5	.2	<2	<1	3.9	1.8
91LCP 3/11	<1	<10	15	.3	<2	<1	2.0	1.2
91LCP 4/12	<1	<10	5	.1	<2	<1	1.0	.4
91LCP 4/13	<1	<10	10	.2	<2	<1	.7	.4
91LCP 5/21	<1	<10	31	.2	<2	<1	.9	.4
91LCP 5/22	<1	<10	10	.2	<2	<1	1.1	.5
91LCP 3/30	<1	<10	15	.2	<2	<1	1.9	1.2
91LCP 3/38	<1	<10	5	.2	<2	<1	1.6	.9
91LCP 3/39	2	<10	5	.2	<2	<1	1.6	1.5
91LCP 102/211	<1	<10	10	.2	<2	<1	2.9	1.8
91LCP 102/213	<1	<10	13	.3	<2	<1	1.2	.8
91LCP 104/215	<1	<10	5	<.1	<2	<1	1.0	.5
91LCP 104/226	2	<10	5	<.1	<2	<1	1.1	.4
91LCP 104/230	<1	<10	5	.1	<2	<1	.9	.6

C - QUALITY CONTROL STANDARD
D - QUALITY CONTROL DUPLICATE

XRAL

XRF - WHOLE ROCK ANALYSIS 31-JAN-92 REPORT 18121 REFERENCE FILE 11505 PAGE 8 of 9

SAMPLE \ %	SIO2	AL2O3	CAO	MGO	NA2O	K2O	FE2O3	MNO	TIO2	P2O5	LOI	SUM
91KAT 4/31	69.0	12.6	2.31	1.76	2.97	1.55	4.54	.09	.614	.18	3.77	99.5
91KAT 9/61	61.0	15.7	4.95	3.66	3.44	1.59	7.21	.13	.750	.16	.70	99.4
91KAT 101/225	49.7	17.4	2.48	4.26	1.27	.74	7.40	.07	.698	.18	15.9	100.3
91WB 1/24	47.5	16.3	10.0	7.56	3.13	.25	9.74	.15	1.11	.18	4.16	100.2
91WB 3/62	46.0	14.8	11.6	7.44	2.65	.35	10.4	.14	1.17	.14	5.31	100.1
91WB 107/562D	60.6	15.1	6.13	2.99	2.87	1.38	8.20	.19	.941	.15	1.77	100.4
91LCP 3/11	50.3	16.3	5.32	2.64	3.56	1.50	13.0	.10	.506	.15	6.08	99.6
91LCP 4/12	57.5	17.8	5.36	1.84	5.11	.92	5.74	.09	.680	.17	4.70	100.1
91LCP 4/13	55.5	17.4	5.66	2.57	4.98	.98	7.00	.12	.776	.19	4.85	100.2
91LCP 5/21	57.1	17.3	7.02	1.69	2.83	.61	4.50	.12	.541	.25	8.00	100.2
91LCP 5/22	59.1	17.2	6.33	1.77	3.82	1.01	3.21	.08	.343	.27	6.85	100.2
91LCP 3/30	61.0	15.8	4.62	2.87	3.77	1.55	6.61	.09	.630	.16	3.16	100.4
91LCP 3/38	58.1	17.5	6.12	2.94	3.97	1.12	6.51	.11	.589	.14	2.54	99.8
91LCP 3/39	56.6	17.4	5.37	3.06	4.35	1.49	6.46	.10	.599	.27	3.85	99.7
91LCP 102/211	74.0	13.6	1.87	.60	4.70	1.99	2.17	.10	.259	.07	.77	100.2
91LCP 102/213	73.5	14.2	.72	.81	5.87	1.97	1.81	.08	.199	.08	1.08	100.5
91LCP 104/215	54.3	18.6	6.11	2.46	4.90	1.21	5.68	.11	.529	.19	5.85	100.1
91LCP 104/226	55.5	18.6	6.06	2.45	4.78	1.20	5.48	.11	.521	.19	5.54	100.6
91LCP 104/230	59.6	17.6	3.22	1.77	6.68	2.22	5.01	.10	.477	.21	2.54	99.6

XRAL

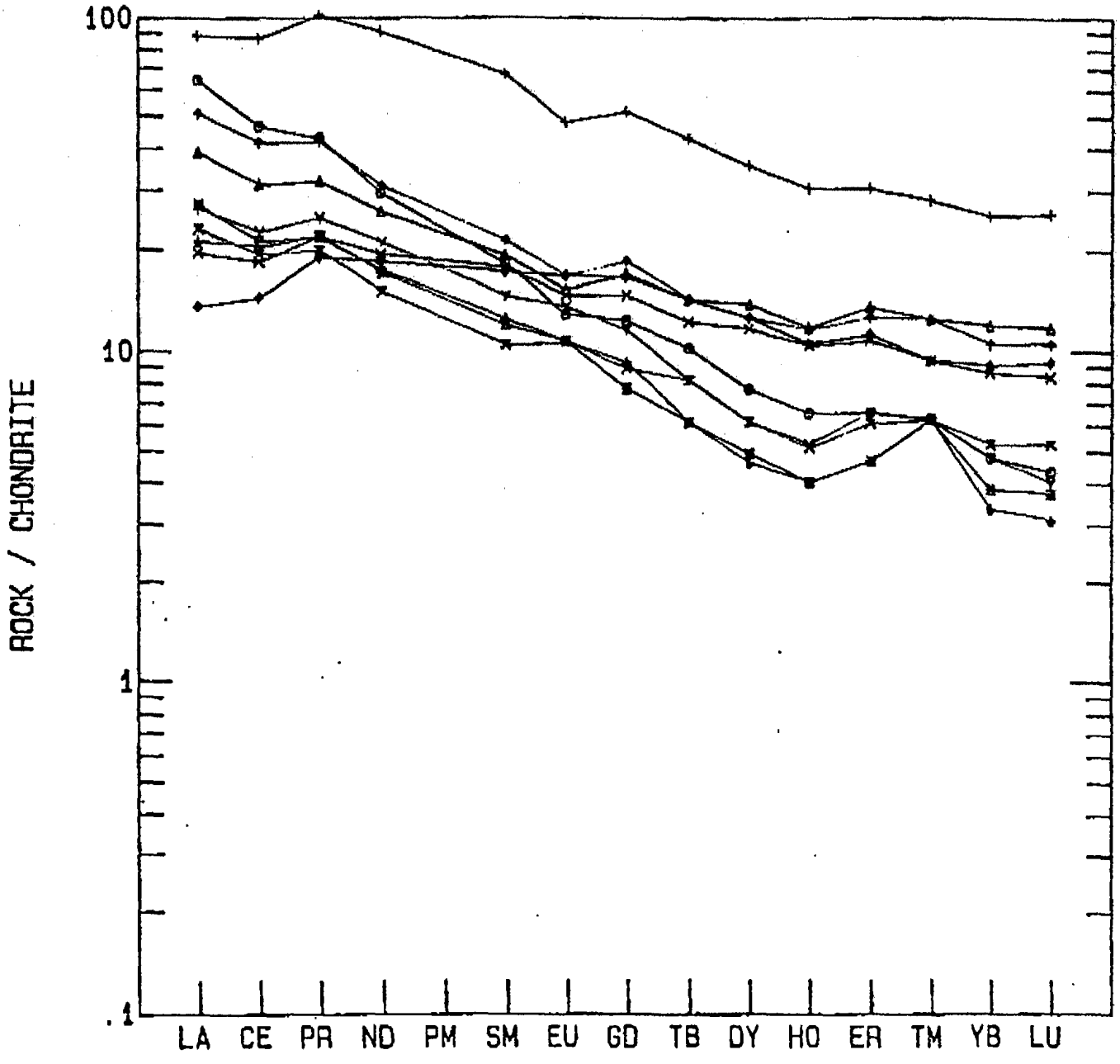
XRF - WHOLE ROCK ANALYSIS 31-JAN-92 REPORT 18121 REFERENCE FILE 11505 PAGE 9 of 9

SAMPLE \ PPM	SR	Y	BA
91KAT 4/31	289	24	797
91KAT 9/61	306	23	825
91KAT 101/225	609	76	1030
91WB 1/24	511	15	270
91WB 3/62	397	22	502
91WB 107/562D	289	20	762
91LCP 3/11	424	---	668
91LCP 4/12	1120	---	606
91LCP 4/13	1180	15	617
91LCP 5/21	1310	---	721
91LCP 5/22	1230	15	799
91LCP 3/30	518	14	599
91LCP 3/38	660	---	518
91LCP 3/39	556	1[illegible]	695
91LCP 102/211	138	28	892
91LCP 102/213	317	20	1160
91LCP 104/215	1100	---	532
91LCP 104/226	1070	---	521
91LCP 104/230	582	---	989

X-RAY ASSAY LABORATORIES 28-JAN-92
RARE EARTH CHONDRITE PLOTS

ARCO OIL & GAS COMPANY
(REF# 11505)

- 91KAT 4/31
- 91KAT 9/61
- 91KAT 101/225
- 91WB 1/24
- 91WB 3/62
- 91WB 107/562D
- 91LCP 3/11
- 91LCP 4/12
- 91LCP 4/13
- 91LCP 5/21



XRAL

-RAY ASSAY LABORATORIES 28-JAN-92 ARCO OIL & GAS COMPANY (REF# 11505) CHONDRITE NORMALIZED VALUES

AMPLE	LA	CE	PR	ND	SM	EU	GD	TB	DY	HO	ER	TM	YB	LU
91KAT 4/31	64.4	46.7	43.0	29.5	18.2	12.9	12.4	10.2	7.7	6.5	6.6	6.3	4.8	4.3
91KAT 9/61	39.0	31.4	32.0	26.0	19.3	15.2	17.0	14.3	13.8	11.8	13.6	12.5	12.0	11.8
91KAT 101/225	88.3	86.6	102.0	90.8	67.2	47.9	51.7	42.9	35.7	30.6	30.5	28.1	25.4	25.7
91WB 1/24	19.7	18.5	22.0	19.4	17.7	14.7	14.7	12.2	11.7	10.4	10.8	9.4	8.6	8.4
91WB 3/62	13.7	14.5	19.0	18.4	17.2	16.8	16.6	14.3	12.6	10.6	11.3	9.4	9.1	9.3
91WB 107/562D	51.1	41.8	42.0	31.0	21.4	16.8	18.5	14.3	12.6	11.7	12.7	12.5	10.5	10.5
91LCP 3/11	23.2	19.4	20.0	15.1	10.4	10.7	8.9	8.2	6.2	5.1	6.1	6.3	5.3	5.3
91LCP 4/12	27.3	21.3	22.0	17.1	12.0	10.7	7.7	6.1	4.9	4.0	4.7	6.3	3.8	3.7
91LCP 4/13	26.7	22.8	25.0	21.1	14.6	13.6	11.6	8.2	6.2	5.3	6.6	6.3	4.8	4.0
91LCP 5/21	21.3	20.5	22.0	17.4	12.5	10.7	9.3	6.1	4.6	4.0	4.7	6.3	3.3	3.1

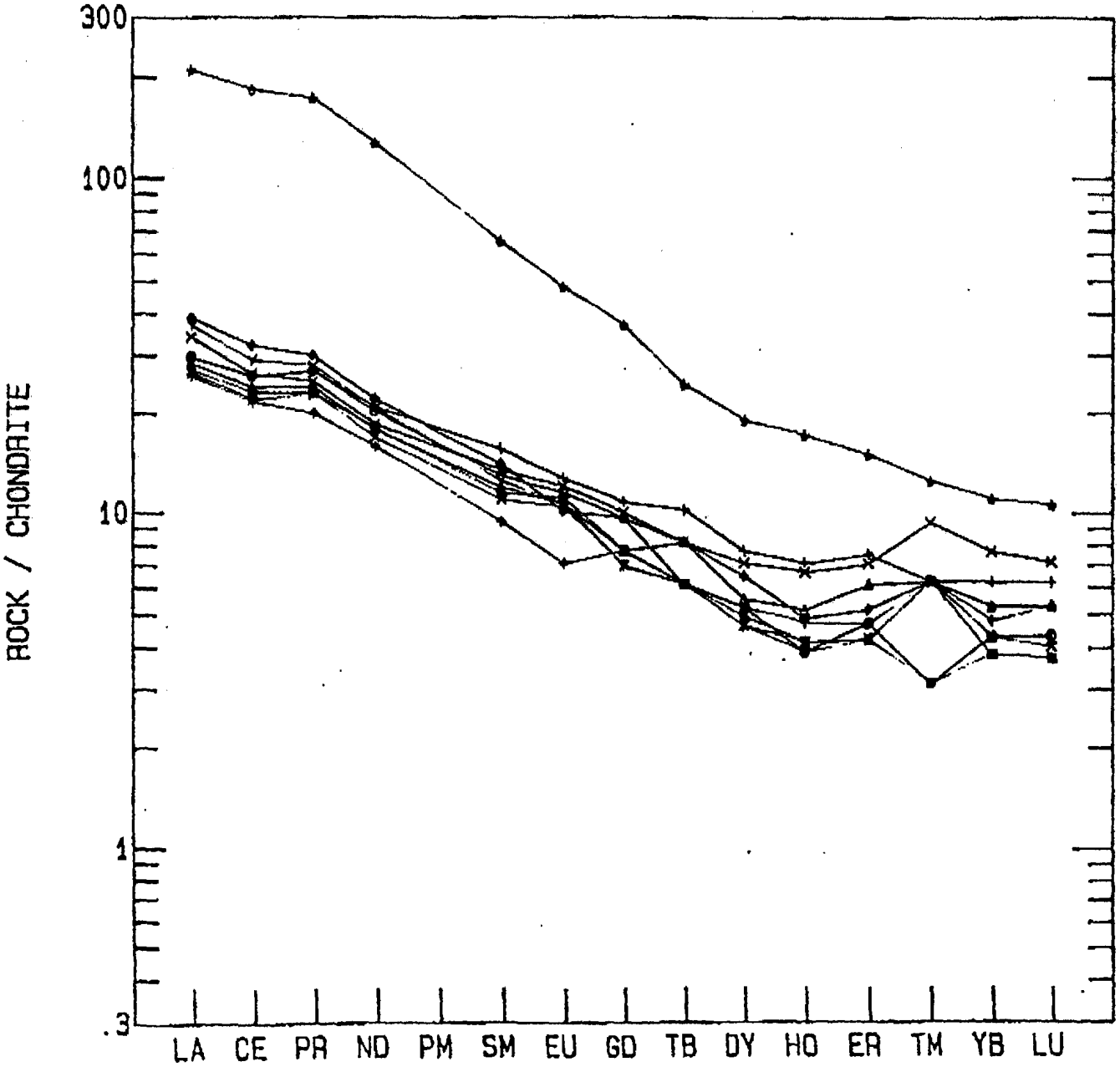
CHONDRITE RARE EARTH ELEMENT FACTORS USED TO NORMALIZE THE SAMPLE DATA :

LA .3150 CE .8130 PR .1000 ND .5970 SM .1920 EU .0722 GD .2590
TB .0490 DY .3250 HO .0720 ER .2130 TM .0320 YB .2090 LU .0323

X-RAY ASSAY LABORATORIES 28-JAN-92
RARE EARTH CHONDRITE PLOTS

ARCO OIL & GAS COMPANY
(REF# 11505)

- 91LCP 5/22
- 91LCP 3/30
- 91LCP 3/38
- 91LCP 3/39
- 91LCP 102/211
- 91LCP 102/213
- 91LCP 104/215
- 91LCP 104/226
- 91LCP 104/230
- 91SB 3A



XRAL

X-RAY ASSAY LABORATORIES 28-JAN-92 ARCO OIL & GAS COMPANY (REF# 11505) CHONDRITE NORMALIZED VALUES

SAMPLE	LA	CE	PR	ND	SM	EU	GD	TB	DY	HO	ER	TM	YB	LU
91LCP 5/22	29.8	26.2	27.0	20.3	13.0	11.5	9.7	6.1	5.2	3.9	4.7	3.1	4.3	4.3
91LCP 3/30	28.6	24.1	24.0	17.9	12.0	10.7	7.7	8.2	5.5	5.1	6.1	6.3	5.3	5.3
91LCP 3/38	29.8	26.0	27.0	20.9	15.6	12.7	10.8	10.2	7.7	7.1	7.5	6.3	6.2	6.2
91LCP 3/39	34.3	26.6	25.0	18.6	13.5	12.0	10.0	8.2	7.1	6.7	7.0	9.4	7.7	7.1
91LCP 102/211	39.0	32.3	30.0	22.1	14.1	10.1	9.7	8.2	6.5	4.9	5.2	6.3	5.3	5.3
91LCP 102/213	26.0	21.8	20.0	15.9	9.4	7.1	7.7	6.1	5.2	4.7	4.7	6.3	4.8	5.3
91LCP 104/215	26.7	22.1	23.0	16.9	10.9	10.4	6.9	6.1	4.6	4.2	4.2	6.3	4.3	4.0
91LCP 104/226	27.3	23.2	23.0	18.1	11.5	11.1	7.7	6.1	4.9	4.2	4.2	6.3	3.8	3.7
91LCP 104/230	37.1	29.2	28.0	20.8	12.5	10.7	6.9	6.1	4.6	3.9	4.2	3.1	3.8	3.7
91SB 3A	210.8	184.5	173.0	127.1	65.1	48.1	37.1	24.5	19.1	17.2	15.0	12.5	11.0	10.5

CHONDRITE RARE EARTH ELEMENT FACTORS USED TO NORMALIZE THE SAMPLE DATA :.

LA .3150	CE .8130	PR .1000	ND .5970	SM .1920	EU .0722	GD .2590	
TB .0490	DY .3250	HO .0720	ER .2130	TM .0320	YB .2090	LU .0323	

Partial Listing: K-Ar data for 1991 Cook Inlet Mesozoic Field Samples										
more data to follow										
sample #	phase	K (%)	40Ar* ppm	%rad 40Ar	Age (Ma)	lithology	formation	location	comments	
91KAT9/61	hbl	0.38	0.000847	22	31.9±1.6	ss hornfels/migm	Meta Naknek	NE L Grosvenor/@Bruin Bay Flt	age reset by fluids	
91KAT9/61	biot	7.175	0.01863	67	37.1±1.0	ss hornfels/migm	Meta Naknek	NE L Grosvenor/@Bruin Bay Flt	intrusion age of pluton	
91KAT101/227	hbl	0.632	0.006784	52	149±4	volc. conglom.	K Kaguyak	S Mt Pednar	age of provenance	
91LCP4/12	hbl	0.299	0.00313	63	145±5	andes. tuff turb.	Jr Naknek?	Iniskin Penn?	approx. depositional age	
91LCP4/13	hbl	0.255	0.002527	57	138±5	andes. tuff turb.	Jr Naknek?	Iniskin Penn?	slightly reset depos. age	
91WB1/24	wr	0.165	0.001464	50	124±5	basalt clasts	U. Triassic	Puale Point	reset age	
91WB3/62	wr	0.176	0.001363	57	109±5	basalt flow	U. Triassic	Puale Point	reset age	
91WB3/62	plag	0.58	0.00354	74	86.0±2.9	basalt flow	U. Triassic	Puale Point	reset age	
91WB101/519A	hbl	0.401	0.004777	64	164±6	granodior. clast	Jr Shelikof	Cr S Big Cr	approx. depositional age	
91WB101/538	hbl	0.226	0.002289	57	140±5	volc. conglom.	Jr Shelikof	Cr S Big Cr	slightly reset age	
91WB107/562D	hbl	0.481	0.005586	64	160±5	granodior. clasts	Jr Naknek	Cr S DesMoines Cr	approx. depositional age	
26-Feb-92										
revision 1										
please review &										
notify SB										
of errors										
thanks										

KRUEGER ENTERPRISES, INC.
GEOCHRON LABORATORIES DIVISION
24 BLACKSTONE STREET • CAMBRIDGE, MASSACHUSETTS 02139 • (617) 876-3691

POTASSIUM-ARGON AGE DETERMINATION — REPORT OF ANALYTICAL WORK

Our Sample No. R-9613 — Date Received: 12/18/91

Your Reference: Letter of 12/16/91 — Date Reported: 2/21/92

Submitted by: Steven C. Bergman
ARCO Resources Technology
2300 West Plano Parkway, PRC D3136
Plano, TX 75075

Sample Description & Locality: Sample #91WB 3/62, basalt.

Material Analyzed: Whole rock, -80/+200 mesh.
Treated with dilute HF and HNO_3.

$^{40*}Ar/^{40}K$ = .006501 — AGE = 109 +/- 5 M.Y.

Argon Analyses:

$^{40*}Ar$, ppm	$^{40*}Ar$/Total ^{40}Ar	Ave. $^{40*}Ar$, ppm
.001328	.528	.001363
.001398	.600	

Potassium Analyses:

% K	Ave. % K	^{40}K, ppm
0.160	0.176	0.210
0.170		
0.195		
0.178		

Constants Used:

$\lambda_\beta = 4.962 \times 10^{-10}$/year

$\lambda_e + \lambda'_e = 0.581 \times 10^{-10}$/year

$^{40}K/K = 1.193 \times 10^{-4}$ g/g

$$AGE = \frac{1}{\lambda_\beta + (\lambda_e + \lambda'_e)} \ln \left[\frac{\lambda_\beta + (\lambda_e + \lambda'_e)}{(\lambda_e + \lambda'_e)} \times \frac{^{40*}Ar}{^{40}K} + 1 \right]$$

KRUEGER ENTERPRISES, INC.
GEOCHRON LABORATORIES DIVISION
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POTASSIUM-ARGON AGE DETERMINATION — REPORT OF ANALYTICAL WORK

Our Sample No. F-9613 — Date Received: 12/18/91

Your Reference: Letter of 12/16/91 — Date Reported: 2/21/92

Submitted by: Steven C. Bergman
ARCO Resources Technology
2300 West Plano Parkway, PRC D3136
Plano, TX 75075

Sample Description & Locality: Sample #91WB 3/62, basalt.

Material Analyzed: Plagioclase concentrate, -80/+200 mesh.
Treated with dilute HF and HNO_3.

$^{40*}Ar/^{40}K$ = .005116 — AGE = 86.0 +/- 2.9 M.Y.

Argon Analyses:

$^{40*}Ar$, ppm	$^{40*}Ar$/Total ^{40}Ar	Ave. $^{40*}Ar$, ppm
.003516	.781	.003540
.003564	.696	

Potassium Analyses:

% K	Ave. % K	^{40}K, ppm
0.581	0.580	0.692
0.579		

Constants Used:

$\lambda_\beta = 4.962 \times 10^{-10}$/year

$\lambda_e + \lambda'_e = 0.581 \times 10^{-10}$/year

$^{40}K/K = 1.193 \times 10^{-4}$ g/g

$$AGE = \frac{1}{\lambda_\beta + (\lambda_e + \lambda'_e)} \ln \left[\frac{\lambda_\beta + (\lambda_e + \lambda'_e)}{(\lambda_e + \lambda'_e)} \times \frac{^{40*}Ar}{^{40}K} + 1 \right]$$

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POTASSIUM-ARGON AGE DETERMINATION — REPORT OF ANALYTICAL WORK

Our Sample No. R-9612 — Date Received: 12/18/91

Your Reference: Letter of 12/16/91 — Date Reported: 2/21/92

Submitted by: Steven C. Bergman
ARCO Resources Technology
2300 West Plano Parkway, PRC D3136
Plano, TX 75075

Sample Description & Locality: Sample #91WB 1/24, basalt.

Material Analyzed: Whole rock, -80/+200 mesh.
Treated with dilute HF and HNO_3.

$^{40*}Ar/^{40}K$ = .007460 — AGE = 124 +/- 5 M.Y.

Argon Analyses:

$^{40*}Ar$, ppm	$^{40*}Ar$/Total ^{40}Ar	Ave. $^{40*}Ar$, ppm
.001433	.437	.001464
.001495	.561	

Potassium Analyses:

% K	Ave. % K	^{40}K, ppm
0.165	0.165	0.196
0.164		

Constants Used:

$\lambda_\beta = 4.962 \times 10^{-10}$/year

$(\lambda_e + \lambda'_e) = 0.581 \times 10^{-10}$/year

$^{40}K/K = 1.193 \times 10^{-4}$ g/g

$$AGE = \frac{1}{\lambda_\beta + (\lambda_e + \lambda'_e)} \ln \left[\frac{\lambda_\beta + (\lambda_e + \lambda'_e)}{(\lambda_e + \lambda'_e)} \times \frac{^{40*}Ar}{^{40}K} + 1 \right]$$

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POTASSIUM-ARGON AGE DETERMINATION — REPORT OF ANALYTICAL WORK

Our Sample No. A-9608 — Date Received: 12/18/91

Your Reference: Letter of 12/16/91 — Date Reported: 2/21/92

Submitted by: Steven C. Bergman
ARCO Resources Technology
2300 West Plano Parkway, PRC D3136
Plano, TX 75075

Sample Description & Locality: Sample #91LCP 4/13, andesitic tuff turbidite.

Material Analyzed: Hornblende concentrate -80/+200 mesh.
Treated with dilute HF and HNO_3.

$^{40*}Ar/^{40}K$ = .008321 — AGE = 138 +/- 5 M.Y.

Argon Analyses:

$^{40*}Ar$, ppm	$^{40*}Ar$/Total ^{40}Ar	Ave. $^{40*}Ar$, ppm
.002480	.662	.002527
.002573	.494	

Potassium Analyses:

% K	Ave. % K	^{40}K, ppm
0.258	0.255	0.304
0.251		

Constants Used:

$\lambda_\beta = 4.962 \times 10^{-10}$/year

$(\lambda_e + \lambda_e') = 0.581 \times 10^{-10}$/year

$^{40}K/K = 1.193 \times 10^{-4}$ g/g

$$AGE = \frac{1}{\lambda_\beta + (\lambda_e + \lambda_e')} \ln \left[\frac{\lambda_\beta + (\lambda_e + \lambda_e')}{(\lambda_e + \lambda_e')} \times \frac{^{40*}Ar}{^{40}K} + 1 \right]$$

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POTASSIUM-ARGON AGE DETERMINATION — REPORT OF ANALYTICAL WORK

Our Sample No. A-9607 — Date Received: 12/18/91

Your Reference: Letter of 12/16/91 — Date Reported: 2/21/92

Submitted by: Steven C. Bergman
ARCO Resources Technology
2300 West Plano Parkway, PRC D3136
Plano, TX 75075

Sample Description & Locality: Sample #91LCP 4/12, andesitic tuff turbidite.

Material Analyzed: Hornblende concentrate -80/+200 mesh.
Treated with dilute HF and HNO_3.

$^{40*}Ar/^{40}K$ = .008788 — AGE = 145 +/- 5 M.Y.

Argon Analyses:

$^{40*}Ar$, ppm	$^{40*}Ar$/Total ^{40}Ar	Ave. $^{40*}Ar$, ppm
.003228	.550	.003130
.003031	.706	

Potassium Analyses:

% K	Ave. % K	^{40}K, ppm
0.300	0.299	0.356
0.297		

Constants Used:

$\lambda_\beta = 4.962 \times 10^{-10}$/year

$(\lambda_e + \lambda_e') = 0.581 \times 10^{-10}$/year

$^{40}K/K = 1.193 \times 10^{-4}$ g/g

$$AGE = \frac{1}{\lambda_\beta + (\lambda_e + \lambda_e')} \ln \left[\frac{\lambda_\beta + (\lambda_e + \lambda_e')}{(\lambda_e + \lambda_e')} \times \frac{^{40*}Ar}{^{40}K} + 1 \right]$$

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POTASSIUM-ARGON AGE DETERMINATION — REPORT OF ANALYTICAL WORK

Our Sample No. A-9606 — Date Received: 12/18/91

Your Reference: Letter of 12/16/91 — Date Reported: 2/21/92

Submitted by: Steven C. Bergman
ARCO Resources Technology
2300 West Plano Parkway, PRC D3136
Plano, TX 75075

Sample Description & Locality: Sample #91WB 107/562D, granodiorite clasts.

Material Analyzed: Hornblende concentrate -80/+200 mesh.
Treated with dilute HF and HNO_3.

$^{40}*Ar/^{40}K$ = .009734 — AGE = 160 +/- 5 M.Y.

Argon Analyses:

$^{40}*Ar$, ppm	$^{40}*Ar$/Total ^{40}Ar	Ave. $^{40}*Ar$, ppm
.005602	.703	.005586
.005569	.578	

Potassium Analyses:

% K	Ave. % K	^{40}K, ppm
0.483	0.481	0.574
0.479		

Constants Used:

$\lambda_\beta = 4.962 \times 10^{-10}$/year

$(\lambda_e + \lambda'_e) = 0.581 \times 10^{-10}$/year

$^{40}K/K = 1.193 \times 10^{-4}$ g/g

$$AGE = \frac{1}{\lambda_\beta + (\lambda_e + \lambda'_e)} \ln \left[\frac{\lambda_\beta + (\lambda_e + \lambda'_e)}{(\lambda_e + \lambda'_e)} \times \frac{^{40}*Ar}{^{40}K} + 1 \right]$$

KRUEGER ENTERPRISES, INC.
GEOCHRON LABORATORIES DIVISION
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POTASSIUM-ARGON AGE DETERMINATION — REPORT OF ANALYTICAL WORK

Our Sample No. A-9605 — Date Received: 12/18/91

Your Reference: Letter of 12/16/91 — Date Reported: 2/21/92

Submitted by: Steven C. Bergman
ARCO Resources Technology
2300 West Plano Parkway, PRC D3136
Plano, TX 75075

Sample Description & Locality: Sample #91WB 101/538, volcanic conglomerate.

Material Analyzed: Hornblende concentrate -80/+200 mesh.
Treated with dilute HF and HNO_3.

$^{40*}Ar/^{40}K$ = .008488 — AGE = 140 +/- 5 M.Y.

Argon Analyses:

$^{40*}Ar$, ppm	$^{40*}Ar$/Total ^{40}Ar	Ave. $^{40*}Ar$, ppm
.002276	.554	.002289
.002301	.580	

Potassium Analyses:

% K	Ave. % K	^{40}K, ppm
0.227	0.226	0.270
0.225		

Constants Used:

$\lambda_\beta = 4.962 \times 10^{-10}$/year

$(\lambda_e + \lambda'_e) = 0.581 \times 10^{-10}$/year

$^{40}K/K = 1.193 \times 10^{-4}$ g/g

$$AGE = \frac{1}{\lambda_\beta + (\lambda_e + \lambda'_e)} \ln \left[\frac{\lambda_\beta + (\lambda_e + \lambda'_e)}{(\lambda_e + \lambda'_e)} \times \frac{^{40*}Ar}{^{40}K} + 1 \right]$$

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GEOCHRON LABORATORIES DIVISION
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POTASSIUM-ARGON AGE DETERMINATION — REPORT OF ANALYTICAL WORK

Our Sample No. A-9604 — Date Received: 12/18/91

Your Reference: Letter of 12/16/91 — Date Reported: 2/21/92

Submitted by: Steven C. Bergman
ARCO Resources Technology
2300 West Plano Parkway, PRC D3136
Plano, TX 75075

Sample Description & Locality: Sample #91WB 101/519A, granodiorite clast.

Material Analyzed: Hornblende concentrate -80/+200 mesh.
Treated with dilute HF and HNO_3.

$^{40*}Ar/^{40}K$ = .009986 — AGE = 164 +/- 6 M.Y.

Argon Analyses:

$^{40*}Ar$, ppm	$^{40*}Ar$/Total ^{40}Ar	Ave. $^{40*}Ar$, ppm
.004457	.698	.004777
.004751	.757	
.005124	.463	

Potassium Analyses:

% K	Ave. % K	^{40}K, ppm
0.399	0.401	0.478
0.403		

Constants Used:

$\lambda_\beta = 4.962 \times 10^{-10}$/year

$\lambda_e + \lambda'_e = 0.581 \times 10^{-10}$/year

$^{40}K/K = 1.193 \times 10^{-4}$ g/g

$$AGE = \frac{1}{\lambda_\beta + (\lambda_e + \lambda'_e)} \ln \left[\frac{\lambda_\beta + (\lambda_e + \lambda'_e)}{(\lambda_e + \lambda'_e)} \times \frac{^{40*}Ar}{^{40}K} + 1 \right]$$

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POTASSIUM-ARGON AGE DETERMINATION — REPORT OF ANALYTICAL WORK

Our Sample No. A-9603 — Date Received: 12/18/91

Your Reference: Letter of 12/16/91 — Date Reported: 2/21/92

Submitted by: Steven C. Bergman
ARCO Resources Technology
2300 West Plano Parkway, PRC D3136
Plano, TX 75075

Sample Description & Locality: Sample #91KAT 101/227, andesitic volcanic conglomerate.

Material Analyzed: Hornblende concentrate from matrix, -80/+200 mesh. Treated with dilute HF and HNO_3.

$^{40*}Ar/^{40}K$ = .008997 — AGE = 149 +/- 4 M.Y.

Argon Analyses:

$^{40*}Ar$, ppm	$^{40*}Ar$/Total ^{40}Ar	Ave. $^{40*}Ar$, ppm
.006806	.461	.006784
.006761	.585	

Potassium Analyses:

% K	Ave. % K	^{40}K, ppm
0.622	0.632	0.754
0.642		

Constants Used:

$\lambda_\beta = 4.962 \times 10^{-10}$/year

$\lambda_e + \lambda_e' = 0.581 \times 10^{-10}$/year

$^{40}K/K = 1.193 \times 10^{-4}$ g/g

$$AGE = \frac{1}{\lambda_\beta + (\lambda_e + \lambda_e')} \ln \left[\frac{\lambda_\beta + (\lambda_e + \lambda_e')}{(\lambda_e + \lambda_e')} \times \frac{^{40*}Ar}{^{40}K} + 1 \right]$$

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POTASSIUM-ARGON AGE DETERMINATION — REPORT OF ANALYTICAL WORK

Our Sample No. B-9602 — Date Received: 12/18/91

Your Reference: Letter of 12/16/91 — Date Reported: 2/21/92

Submitted by: Steven C. Bergman
ARCO Resources Technology
2300 West Plano Parkway, PRC D3136
Plano, TX 75075

Sample Description & Locality: Sample #91KAT 9/61, andesitic tuff turbidite.

Material Analyzed: Biotite concentrate, -80/+200 mesh.

$^{40*}Ar/^{40}K$ = .002177 — AGE = 37.1 +/- 1.0 M.Y.

Argon Analyses:

$^{40*}Ar$, ppm	$^{40*}Ar$/Total ^{40}Ar	Ave. $^{40*}Ar$, ppm
.01845	.510	.01863
.01882	.827	

Potassium Analyses:

% K	Ave. % K	^{40}K, ppm
7.233	7.175	8.560
7.117		

Constants Used:

$\lambda_\beta = 4.962 \times 10^{-10}$/year

$\lambda_e + \lambda'_e = 0.581 \times 10^{-10}$/year

$^{40}K/K = 1.193 \times 10^{-4}$ g/g

$$AGE = \frac{1}{\lambda_\beta + (\lambda_e + \lambda'_e)} \ln \left[\frac{\lambda_\beta + (\lambda_e + \lambda'_e)}{(\lambda_e + \lambda'_e)} \times \frac{^{40*}Ar}{^{40}K} + 1 \right]$$

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POTASSIUM-ARGON AGE DETERMINATION — REPORT OF ANALYTICAL WORK

Our Sample No. A-9602 — Date Received: 12/18/91

Your Reference: Letter of 12/16/91 — Date Reported: 2/21/92

Submitted by: Steven C. Bergman
ARCO Resources Technology
2300 West Plano Parkway, PRC D3136
Plano, TX 75075

Sample Description & Locality: Sample #91KAT 9/61, andesitic tuff turbidite.

Material Analyzed: Hornblende concentrate, -80/+200 mesh.
Treated with dilute HF and HNO_3.

$^{40*}Ar/^{40}K$ = .001867 — AGE = 31.9 +/- 1.6 M.Y.

Argon Analyses:

$^{40*}Ar$, ppm	$^{40*}Ar$/Total ^{40}Ar	Ave. $^{40*}Ar$, ppm
.000646	.145	.000847
.001059	.198	
.000837	.283	

Potassium Analyses:

% K	Ave. % K	^{40}K, ppm
0.373	0.380	0.454
0.403		
0.365		

Constants Used:

$\lambda_\beta = 4.962 \times 10^{-10}$/year

$(\lambda_e + \lambda'_e) = 0.581 \times 10^{-10}$/year

$^{40}K/K = 1.193 \times 10^{-4}$ g/g

$$AGE = \frac{1}{\lambda_\beta + (\lambda_e + \lambda'_e)} \ln\left[\frac{\lambda_\beta + (\lambda_e + \lambda'_e)}{(\lambda_e + \lambda'_e)} \times \frac{^{40*}Ar}{^{40}K} + 1\right]$$

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POTASSIUM-ARGON AGE DETERMINATION — REPORT OF ANALYTICAL WORK

Our Sample No. F-9740 — Date Received: 12/18/91

Your Reference: Letter of 12/16/91 — Date Reported: 5/11/92

Submitted by: Steven C. Bergman
ARCO Resources Technology
2300 West Plano Parkway, PRC D3136
Plano, TX 75075

Sample Description & Locality: Sample #91SB4C, bentonite.

Material Analyzed: Feldspar concentrate, -270 mesh.
Treated with dilute HF and HNO_3.

$^{40*}Ar/^{40}K$ = .01701 — AGE = 271 +/- 6 M.Y.

Argon Analyses:

$^{40*}Ar$, ppm	$^{40*}Ar$/Total ^{40}Ar	Ave. $^{40*}Ar$, ppm
.06297	.962	.06299
.06301	.962	

Potassium Analyses:

% K	Ave. % K	^{40}K, ppm
3.059	3.104	3.703
3.149		

Constants Used:

$\lambda_\beta = 4.962 \times 10^{-10}$/year

$(\lambda_e + \lambda'_e) = 0.581 \times 10^{-10}$/year

$^{40}K/K = 1.193 \times 10^{-4}$ g/g

$$AGE = \frac{1}{\lambda_\beta + (\lambda_e + \lambda'_e)} \ln \left[\frac{\lambda_\beta + (\lambda_e + \lambda'_e)}{(\lambda_e + \lambda'_e)} \times \frac{^{40*}Ar}{^{40}K} + 1 \right]$$

Note: $^{40*}Ar$ refers to radiogenic ^{40}Ar.
M.Y. refers to millions of years

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POTASSIUM-ARGON AGE DETERMINATION — REPORT OF ANALYTICAL WORK

Our Sample No. B-9739 — Date Received: 12/18/91

Your Reference: Letter of 12/16/91 — Date Reported: 5/11/92

Submitted by: Steven C. Bergman
ARCO Resources Technology
2300 West Plano Parkway, PRC D3136
Plano, TX 75075

Sample Description & Locality: Sample #91SB 3A.

Material Analyzed: Biotite concentrate -80/+200 mesh.

$^{40*}Ar/^{40}K$ = .006623 — AGE = 111 +/- 3 M.Y.

Argon Analyses:

$^{40*}Ar$, ppm	$^{40*}Ar$/Total ^{40}Ar	Ave. $^{40*}Ar$, ppm
.04874	.902	.04986
.05098	.906	

Potassium Analyses:

% K	Ave. % K	^{40}K, ppm
6.409	6.310	7.528
6.190		
6.331		

Constants Used:

$\lambda_\beta = 4.962 \times 10^{-10}$/year

$(\lambda_e + \lambda'_e) = 0.581 \times 10^{-10}$/year

$^{40}K/K = 1.193 \times 10^{-4}$ g/g

$$AGE = \frac{1}{\lambda_\beta + (\lambda_e + \lambda'_e)} \ln \left[\frac{\lambda_\beta + (\lambda_e + \lambda'_e)}{(\lambda_e + \lambda'_e)} \times \frac{^{40*}Ar}{^{40}K} + 1 \right]$$

Note: $^{40*}Ar$ refers to radiogenic ^{40}Ar.
M.Y. refers to millions of years

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POTASSIUM-ARGON AGE DETERMINATION — REPORT OF ANALYTICAL WORK

Our Sample No. A-9739 — Date Received: 12/18/91

Your Reference: Letter of 12/16/91 — Date Reported: 5/11/92

Submitted by: Steven C. Bergman
ARCO Resources Technology
2300 West Plano Parkway, PRC D3136
Plano, TX 75075

Sample Description & Locality: Sample #91SB 3A.

Material Analyzed: Amphibole concentrate -80/+200 mesh.
Treated with dilute HF and HNO_3.

$^{40*}Ar/^{40}K$ = .006314 — AGE = 106 +/- 4 M.Y.

Argon Analyses:

$^{40*}Ar$, ppm	$^{40*}Ar$/Total ^{40}Ar	Ave. $^{40*}Ar$, ppm
.001993	.429	.002000
.002007	.525	

Potassium Analyses:

% K	Ave. % K	^{40}K, ppm
0.266	0.266	0.317
0.265		

Constants Used:

$\lambda_\beta = 4.962 \times 10^{-10}$/year

$(\lambda_e + \lambda'_e) = 0.581 \times 10^{-10}$/year

$^{40}K/K = 1.193 \times 10^{-4}$ g/g

$$AGE = \frac{1}{\lambda_\beta + (\lambda_e + \lambda'_e)} \ln \left[\frac{\lambda_\beta + (\lambda_e + \lambda'_e)}{(\lambda_e + \lambda'_e)} \times \frac{^{40*}Ar}{^{40}K} + 1 \right]$$

Note: $^{40*}Ar$ refers to radiogenic ^{40}Ar.
M.Y. refers to millions of years

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POTASSIUM-ARGON AGE DETERMINATION — REPORT OF ANALYTICAL WORK

Our Sample No. A-9738 — Date Received: 12/18/91

Your Reference: Letter of 12/16/91 — Date Reported: 5/11/92

Submitted by: Steven C. Bergman
ARCO Resources Technology
2300 West Plano Parkway, PRC D3136
Plano, TX 75075

Sample Description & Locality: Sample #91LCP 104/230.

Material Analyzed: Hornblende concentrate -80/+200 mesh.
Treated with dilute HF and HNO_3.

$^{40*}Ar/^{40}K$ = .008686 — AGE = 144 +/- 5 M.Y.

Argon Analyses:

$^{40*}Ar$, ppm	$^{40*}Ar$/Total ^{40}Ar	Ave. $^{40*}Ar$, ppm
.002665	.672	.002731
.002796	.491	

Potassium Analyses:

% K	Ave. % K	^{40}K, ppm
0.263	0.264	0.314
0.264		

Constants Used:

$\lambda_\beta = 4.962 \times 10^{-10}$/year

$(\lambda_e + \lambda'_e) = 0.581 \times 10^{-10}$/year

$^{40}K/K = 1.193 \times 10^{-4}$ g/g

$$AGE = \frac{1}{\lambda_\beta + (\lambda_e + \lambda'_e)} \ln \left[\frac{\lambda_\beta + (\lambda_e + \lambda'_e)}{(\lambda_e + \lambda'_e)} \times \frac{^{40*}Ar}{^{40}K} + 1 \right]$$

Note: $^{40*}Ar$ refers to radiogenic ^{40}Ar.
M.Y. refers to millions of years

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POTASSIUM-ARGON AGE DETERMINATION — REPORT OF ANALYTICAL WORK

Our Sample No. A-9737 — Date Received: 12/18/91

Your Reference: Letter of 12/16/91 — Date Reported: 5/11/92

Submitted by: Steven C. Bergman
ARCO Resources Technology
2300 West Plano Parkway, PRC D3136
Plano, TX 75075

Sample Description & Locality: Sample #91LCP 104/226.

Material Analyzed: Hornblende concentrate -80/+200 mesh.
Treated with dilute HF and HNO_3.

$^{40*}Ar/^{40}K$ = .008520 — AGE = 141 +/- 5 M.Y.

Argon Analyses:

$^{40*}Ar$, ppm	$^{40*}Ar$/Total ^{40}Ar	Ave. $^{40*}Ar$, ppm
.002977	.682	.003029
.003081	.703	

Potassium Analyses:

% K	Ave. % K	^{40}K, ppm
0.295	0.298	0.356
0.301		

Constants Used:

$\lambda_\beta = 4.962 \times 10^{-10}$/year

$(\lambda_e + \lambda'_e) = 0.581 \times 10^{-10}$/year

$^{40}K/K = 1.193 \times 10^{-4}$ g/g

$$AGE = \frac{1}{\lambda_\beta + (\lambda_e + \lambda'_e)} \ln \left[\frac{\lambda_\beta + (\lambda_e + \lambda'_e)}{(\lambda_e + \lambda'_e)} \times \frac{^{40*}Ar}{^{40}K} + 1 \right]$$

Note: $^{40*}Ar$ refers to radiogenic ^{40}Ar.
MY refers to millions of years

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POTASSIUM-ARGON AGE DETERMINATION — REPORT OF ANALYTICAL WORK

Our Sample No. A-9736 — Date Received: 12/18/91

Your Reference: Letter of 12/16/91 — Date Reported: 5/11/92

Submitted by: Steven C. Bergman
ARCO Resources Technology
2300 West Plano Parkway, PRC D3136
Plano, TX 75075

Sample Description & Locality: Sample #91LCP 104/215.

Material Analyzed: Hornblende concentrate -80/+200 mesh.
Treated with dilute HF and HNO_3.

$^{40*}Ar/^{40}K$ = .008594 — AGE = 142 +/- 5 M.Y.

Argon Analyses:

$^{40*}Ar$, ppm	$^{40*}Ar$/Total ^{40}Ar	Ave. $^{40*}Ar$, ppm
.002771	.696	.002722
.002673	.542	

Potassium Analyses:

% K	Ave. % K	^{40}K, ppm
0.266	0.266	0.317
0.265		

Constants Used:

$\lambda_\beta = 4.962 \times 10^{-10}$/year

$(\lambda_e + \lambda'_e) = 0.581 \times 10^{-10}$/year

$^{40}K/K = 1.193 \times 10^{-4}$ g/g

$$AGE = \frac{1}{\lambda_\beta + (\lambda_e + \lambda'_e)} \ln \left[\frac{\lambda_\beta + (\lambda_e + \lambda'_e)}{(\lambda_e + \lambda'_e)} \times \frac{^{40*}Ar}{^{40}K} + 1 \right]$$

Note: $^{40*}Ar$ refers to radiogenic ^{40}Ar.
M.Y. refers to millions of years

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POTASSIUM-ARGON AGE DETERMINATION — REPORT OF ANALYTICAL WORK

Our Sample No. B-9735 — Date Received: 12/18/91

Your Reference: Letter of 12/16/91 — Date Reported: 5/11/92

Submitted by: Steven C. Bergman
ARCO Resources Technology
2300 West Plano Parkway, PRC D3136
Plano, TX 75075

Sample Description & Locality: Sample #91LCP 102/211.

Material Analyzed: Biotite concentrate -80/+200 mesh.

$^{40*}Ar/^{40}K$ = .01047 — AGE = 172 +/- 4 M.Y.

Argon Analyses:

$^{40*}Ar$, ppm	$^{40*}Ar$/Total ^{40}Ar	Ave. $^{40*}Ar$, ppm
.08412	.955	.08394
.08376	.961	

Potassium Analyses:

% K	Ave. % K	^{40}K, ppm
6.641	6.721	8.018
6.800		

Constants Used:

$\lambda_\beta = 4.962 \times 10^{-10}$/year

$(\lambda_e + \lambda'_e) = 0.581 \times 10^{-10}$/year

$^{40}K/K = 1.193 \times 10^{-4}$ g/g

$$AGE = \frac{1}{\lambda_\beta + (\lambda_e + \lambda'_e)} \ln \left[\frac{\lambda_\beta + (\lambda_e + \lambda'_e)}{(\lambda_e + \lambda'_e)} \times \frac{^{40*}Ar}{^{40}K} + 1 \right]$$

Note: $^{40*}Ar$ refers to radiogenic ^{40}Ar.
M.Y. refers to millions of years

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POTASSIUM-ARGON AGE DETERMINATION — REPORT OF ANALYTICAL WORK

Our Sample No. B-9729 — Date Received: 12/18/91

Your Reference: Letter of 12/16/91 — Date Reported: 5/11/92

Submitted by: Steven C. Bergman
ARCO Resources Technology
2300 West Plano Parkway, PRC D3136
Plano, TX 75075

Sample Description & Locality: Sample #91WB 1/20.

Material Analyzed: Biotite concentrate -80/+200 mesh.

$^{40*}Ar/^{40}K$ = .01264 — AGE = 205 +/- 4 M.Y.

Argon Analyses:

$^{40*}Ar$, ppm	$^{40*}Ar$/Total ^{40}Ar	Ave. $^{40*}Ar$, ppm
.05978	.864	.05979
.05980	.688	

Potassium Analyses:

% K	Ave. % K	^{40}K, ppm
3.881	3.966	4.731
4.051		

Constants Used:

$\lambda_\beta = 4.962 \times 10^{-10}$/year

$(\lambda_e + \lambda'_e) = 0.581 \times 10^{-10}$/year

$^{40}K/K = 1.193 \times 10^{-4}$ g/g

$$AGE = \frac{1}{\lambda_\beta + (\lambda_e + \lambda'_e)} \ln \left[\frac{\lambda_\beta + (\lambda_e + \lambda'_e)}{(\lambda_e + \lambda'_e)} \times \frac{^{40*}Ar}{^{40}K} + 1 \right]$$

Note: $^{40*}Ar$ refers to radiogenic ^{40}Ar.
M.Y. refers to millions of years

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POTASSIUM-ARGON AGE DETERMINATION — REPORT OF ANALYTICAL WORK

Our Sample No. B-9728 — Date Received: 12/18/91

Your Reference: Letter of 12/16/91 — Date Reported: 5/11/92

Submitted by: Steven C. Bergman
ARCO Resources Technology
2300 West Plano Parkway, PRC D3136
Plano, TX 75075

Sample Description & Locality: Sample #91KAT 4/34.

Material Analyzed: Biotite concentrate -80/+200 mesh.

$^{40*}Ar/^{40}K$ = INSUFFICIENT POTASSIUM — AGE = N.A. M.Y.

Argon Analyses:

$^{40*}Ar$, ppm	$^{40*}Ar$/Total ^{40}Ar	Ave. $^{40*}Ar$, ppm

Potassium Analyses:

% K	Ave. % K	^{40}K, ppm
0.971		

Constants Used:

$\lambda_\beta = 4.962 \times 10^{-10}$/year

$(\lambda_e + \lambda'_e) = 0.581 \times 10^{-10}$/year

$^{40}K/K = 1.193 \times 10^{-4}$ g/g

$$AGE = \frac{1}{\lambda_\beta + (\lambda_e + \lambda'_e)} \ln \left[\frac{\lambda_\beta + (\lambda_e + \lambda'_e)}{(\lambda_e + \lambda'_e)} \times \frac{^{40*}Ar}{^{40}K} + 1 \right]$$

Note: $^{40*}Ar$ refers to radiogenic ^{40}Ar.
M.Y. refers to millions of years

5/13/92.

Dave -
copies of the most recent 91 field dat
for yo
perm
repo

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POTASSIUM-ARGON AGE DETERMINATION — REPORT OF ANALYTICAL WORK

Our Sample No. B-9727 — Date Received: 12/18/91

Your Reference: Letter of 12/16/91 — Date Reported: 5/11/92

Submitted by: Steven C. Bergman
ARCO Resources Technology
2300 West Plano Parkway, PRC D3136
Plano, TX 75075

Sample Description & Locality: Sample #91KAT 4/31.

Material Analyzed: Biotite concentrate -80/+200 mesh.

$^{40*}Ar/^{40}K$ = INSUFFICIENT POTASSIUM — AGE = N.A. M.Y.

Argon Analyses:

$^{40*}Ar$, ppm	$^{40*}Ar$/Total ^{40}Ar	Ave. $^{40*}Ar$, ppm

Potassium Analyses:

% K	Ave. % K	^{40}K, ppm
1.021		

Constants Used:

$\lambda_\beta = 4.962 \times 10^{-10}$/year

$(\lambda_e + \lambda'_e) = 0.581 \times 10^{-10}$/year

$^{40}K/K = 1.193 \times 10^{-4}$ g/g

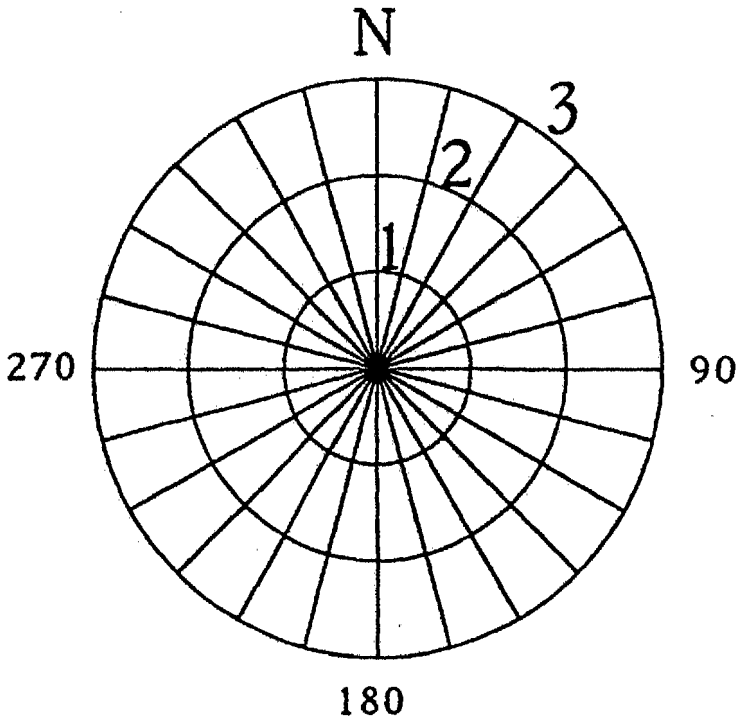
$$AGE = \frac{1}{\lambda_\beta + (\lambda_e + \lambda'_e)} \ln \left[\frac{\lambda_\beta + (\lambda_e + \lambda'_e)}{(\lambda_e + \lambda'_e)} \times \frac{^{40*}Ar}{^{40}K} + 1 \right]$$

Note: $^{40*}Ar$ refers to radiogenic ^{40}Ar.
MY refers to millions of years

PRELIMINARY IN-HOUSE WORKUP -SWK

7/15/91

Flow direction indicators from S. W. Krueger's notes:

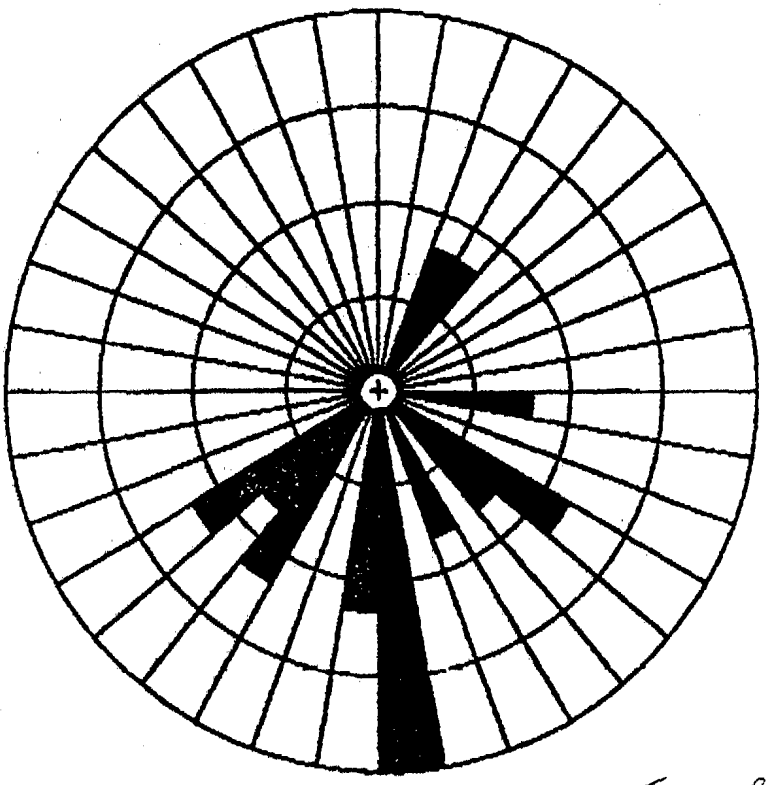


basal Naknek CGL
Wide Bay
n = 8
imbrications:
40,60,110,110,115,
130,160
channel edge:
150 (SE chosen over NW)

Naknek CGL
S of Lake Ugashik
n = 5
channel bar X-beds:
79,94,124,128,155
SE chosen over NW

ENTERED

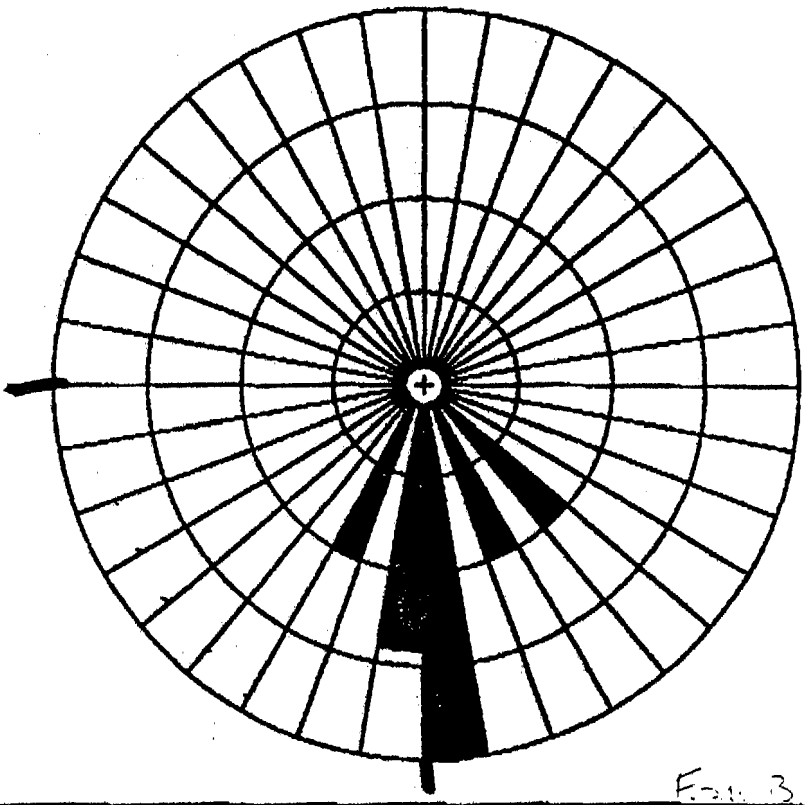
Kaguyak CGL
S Mount Pedmar
n = 7
elongate pebbles:
115,120,130,135,
145,155,160
SE chosen over NW



Fax B. Morris

91LSP202Kaknek Douglas Island member	Statistics
N = 20	Vector Mean = 169.8
Class Interval = 10 degrees	Std. Error = 12.32
Maximum Percentage = 30.0	R Magnitude = 0.609
Mean Percentage = 9.09 Standard Deviation = 7.35	Rayleigh = 0.0002

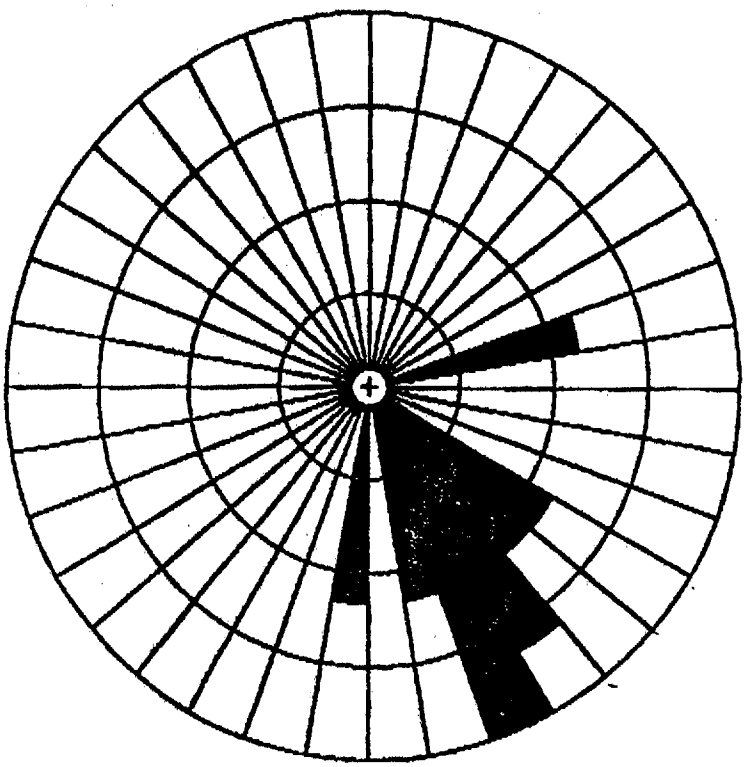
NE 1/4 of SEC 11 T10S R25W Augustine Isl



From 3 miles

91LSP201Naknek Snug Harbor member	Statistics
N = 9	Vector Mean = 173.0
Class Interval = 10 degrees	Std. Error = 6.10
Maximum Percentage = 44.4	R Magnitude = 0.952
Mean Percentage = 20.00 Standard Deviation = 14.48	Rayleigh = 0.0002

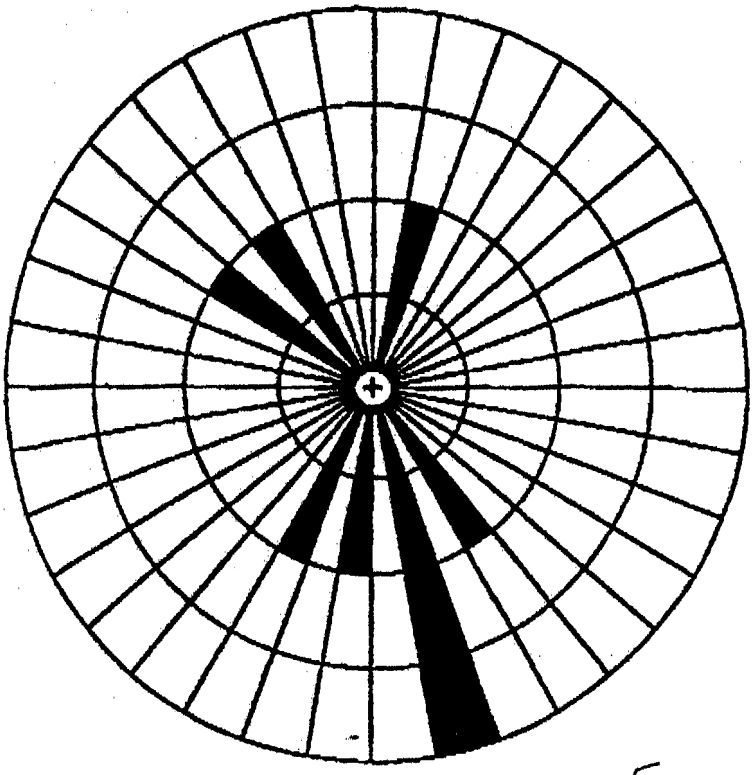
2/3 way [illegible] of N line between Sec 9 & 10 T1S R19W



Fran B. Morris

91LSP104Naknek Pomeroy Arkose	Statistics
N = 10	Vector Mean = 143.8
Class Interval = 10 degrees	Std. Error = 8.71
Maximum Percentage = 30.0	R Magnitude = 0.889
Mean Percentage = 14.28 Standard Deviation = 7.86	Rayleigh = 0.0003

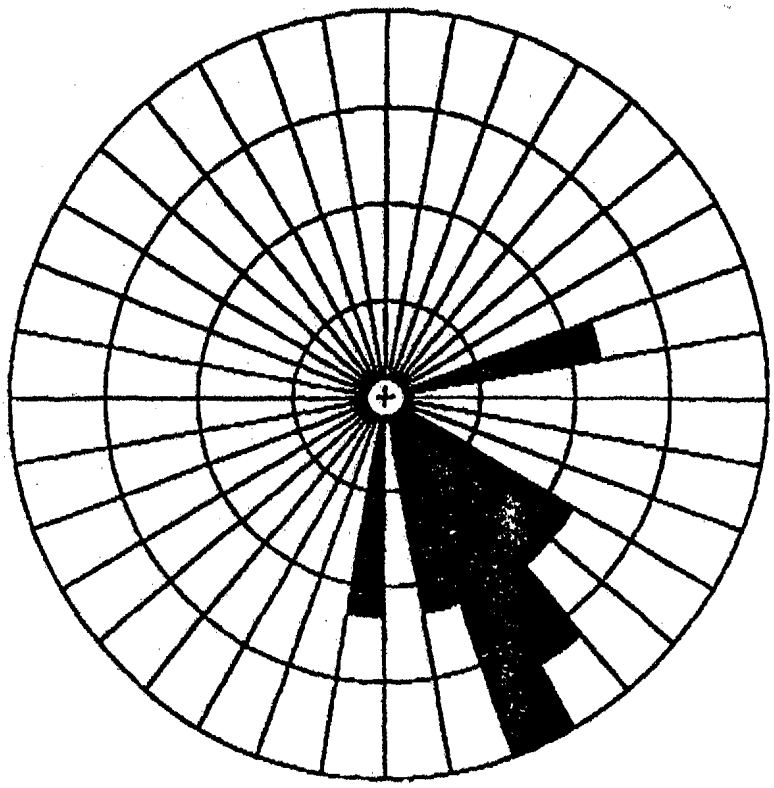
SW 1/4 Sec 30 T5S, R2W.



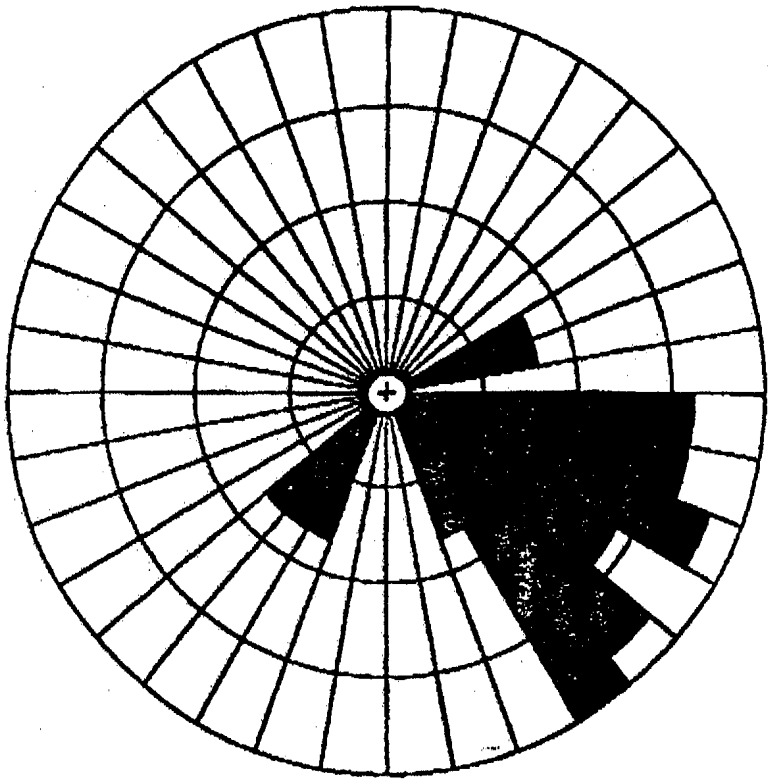
From B Morris

91LSP3Naknec Lower ss member	Statistics
N = 10	Vector Mean = 182.6
Class Interval = 10 degrees	Std. Error = 28.25
Maximum Percentage = 40.0	R Magnitude = 0.430
Mean Percentage = 14.28 Standard Deviation = 11.33	Rayleigh = 0.1562

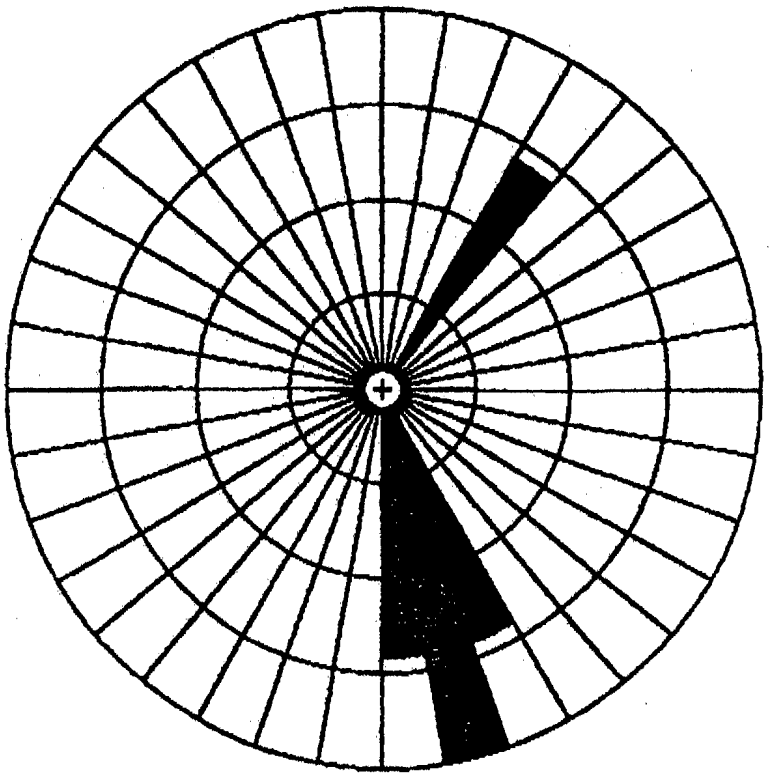
NE Corner of Sec 33 T3S R22W NE Horn Crk



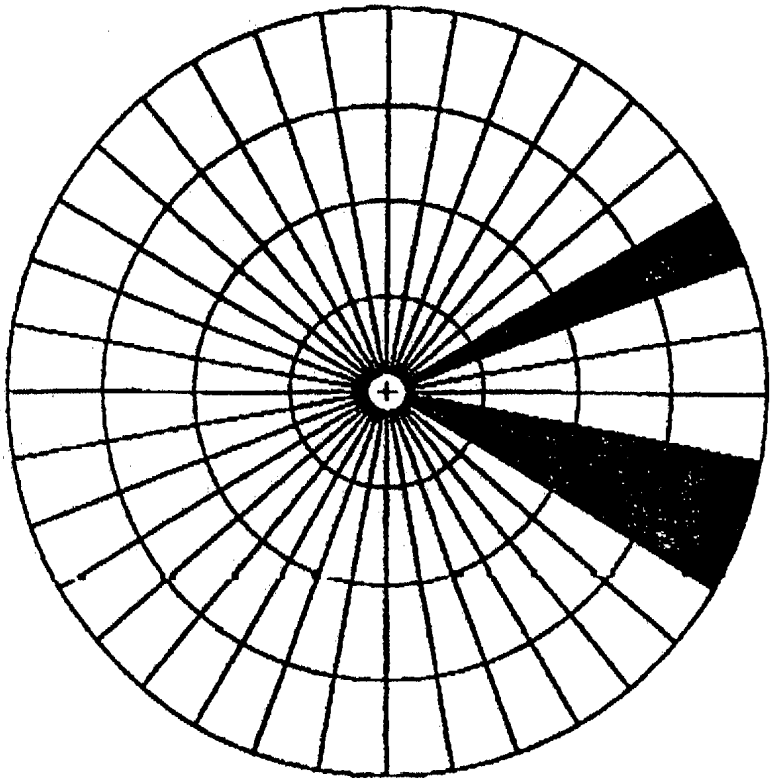
91LCP3Paveloff	Statistics
N = 10	Vector Mean = 143.8
Class Interval = 10 degrees	Std. Error = 8.71
Maximum Percentage = 30.0	R Magnitude = 0.889
Mean Percentage = 14.28 Standard Deviation = 7.86	Rayleigh = 0.0003



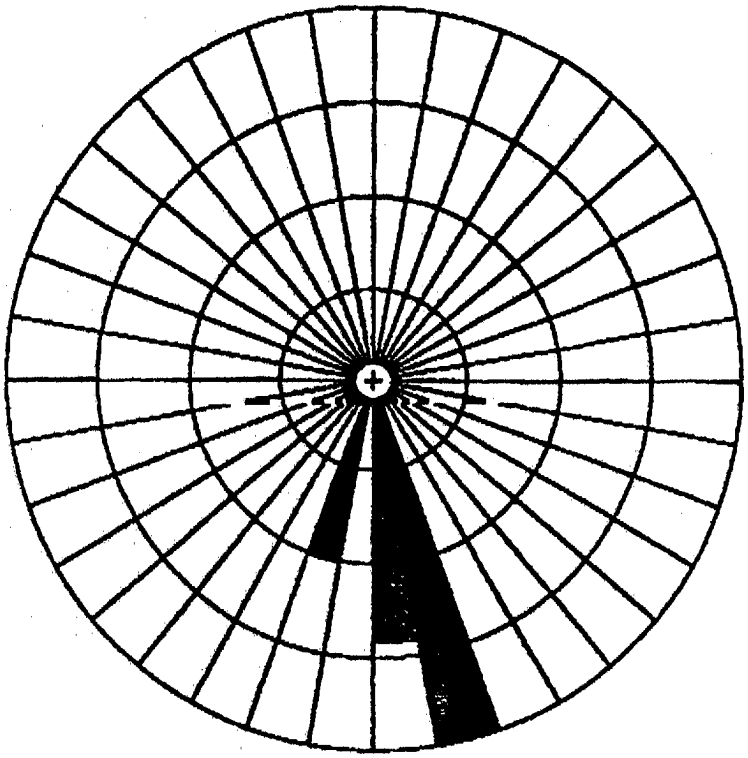
Her. Fm Site 4	Statistics
N = 33	Vector Mean = 124.6
Class Interval = 10 degrees	Std. Error = 5.65
Maximum Percentage = 18.1	R Magnitude = 0.846
Mean Percentage = 8.33 Standard Deviation = 5.93	Rayleigh = 0.0000



Shellkof Site 204	Statistics
N = 5	Vector Mean = 150.6
Class Interval = 10 degrees	Std. Error = 22.08
Maximum Percentage = 40.0	R Magnitude = 0.689
Mean Percentage = 25.00 Standard Deviation = 10.00	Rayleigh = 0.0930

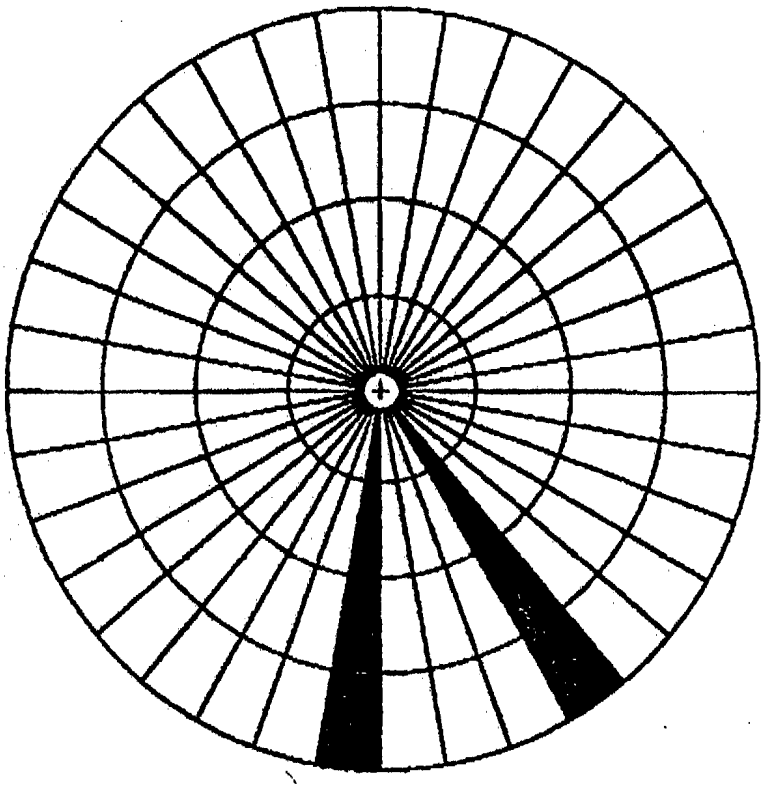


Shellkof Fm Sites 208 & 209	Statistics
N = 3	Vector Mean = 92.6
Class Interval = 10 degrees	Std. Error = 12.58
Maximum Percentage = 33.3	R Magnitude = 0.930
Mean Percentage = 33.33 Standard Deviation = 0.00	Rayleigh = 0.0744



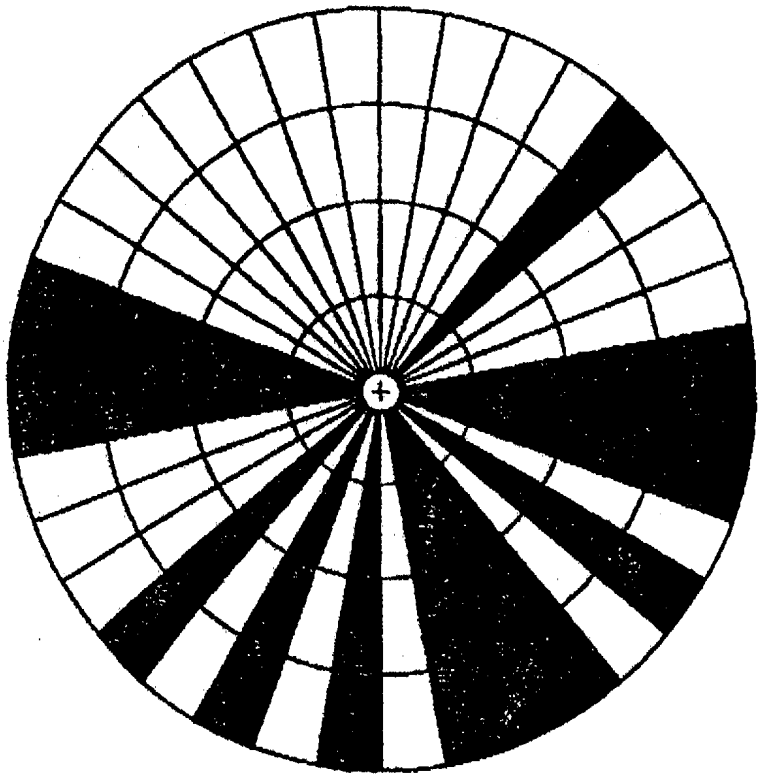
Shellkof Fm Site 210	Statistics
N = 7	Vector Mean = 169.8
Class Interval = 10 degrees	Std. Error = 4.34
Maximum Percentage = 57.1	R Magnitude = 0.984
Mean Percentage = 33.33 Standard Deviation = 21.82	Rayleigh = 0.0011

MS # 17

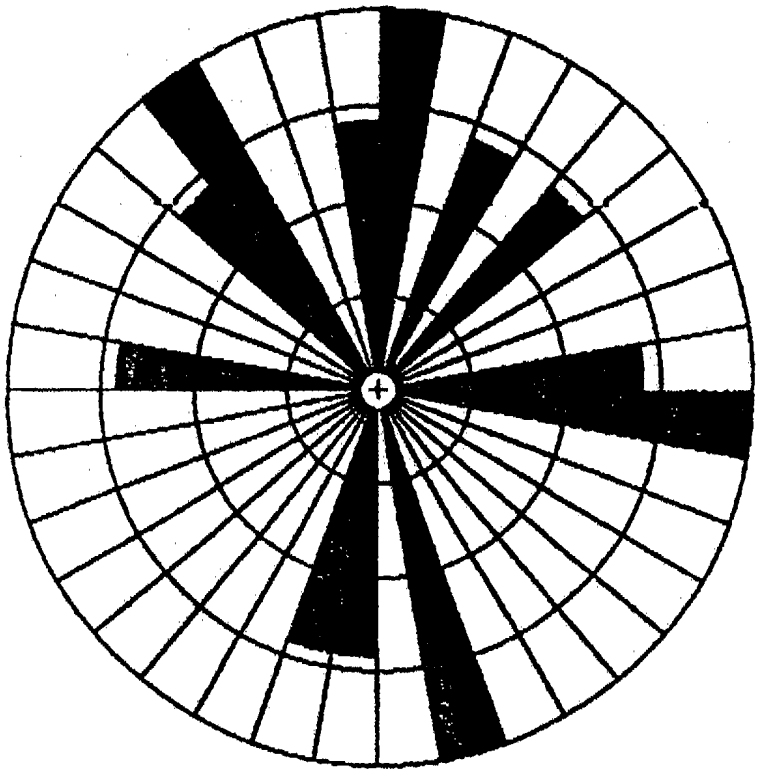


Naknek Fm Site 211	Statistics
N = 2	Vector Mean = 162.5
Class Interval = 10 degrees	Std. Error = 12.94
Maximum Percentage = 50.0	R Magnitude = 0.953
Mean Percentage = 50.00 Standard Deviation = 0.00	Rayleigh = 0.1621

MS #13



Naknek Fm Site 212	Statistics
N = 14	Vector Mean = 161.5
Class Interval = 10 degrees	Std. Error = 27.36
Maximum Percentage = 7.1	R Magnitude = 0.380
Mean Percentage = 7.14 Standard Deviation = -2147	[illegible]



Her. Fm. Site 217	Statistics
N = 16	Vector Mean = 24.7
Class Interval = 10 degrees	Std. Error = 47.33
Maximum Percentage = 12.5	R Magnitude = 0.213
Mean Percentage = 8.33 Standard Deviation = 3.07	Rayleigh = 0.4833

PRELIMINARY IN-HOUSE WORK UP - SWK 7/15/91

Pebble counts from S. W. Krueger's notes:

SW of Lake Ugashik (stop 91WB102) Naknek clasts in float

	(> 6 inches)		(< 6 inches)	
Granite/granodiorite	87	78.4%	12	26.7%
Diorite	4	3.6	9	20.0
Gabbro			2	4.4
Granitic gneiss	10	9.0	6	13.3
Felsite gneiss	1	0.9		
Diorite gneiss	3	2.7		
Felsite	3	2.7		
Andesite/dacite	1	0.9	6	13.3
Basalt (altered)			1	2.2
Serpentine/harzburgite	1	0.9		
Chert (red)	1	0.9	4	8.9
Mafic pebble sand			2	4.4
Arkosic pebble sand			1	2.2
Metasandstone (graywacke)			1	2.2
Vein quartz			1	2.2
	111	100.0%	45	99.8%

SW of Lake Ugashik (stop 91WB102) Naknek outcrop w/ X-beds

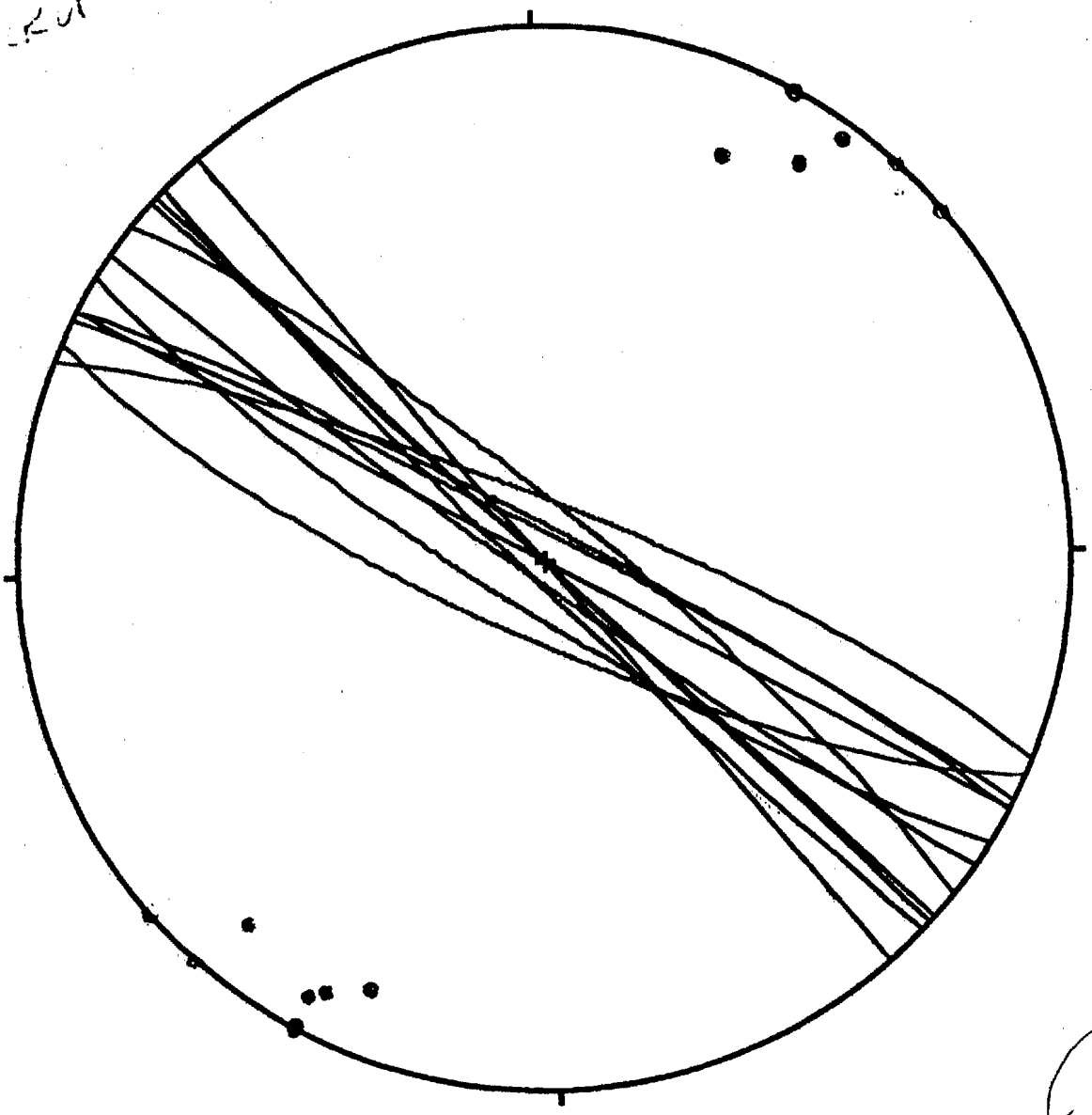
Granite/granodiorite	33	31.7%	24	22.4%
Diorite	4	3.8	6	5.6
Felsic volcanics	18	17.3	28	2.6
Andesite/dacite	36	34.6	24	22.4
Serpentine/harzburgite	2	1.9		
Granitic gneiss	5	4.8	7	6.5
Gabbroic gneiss	1	1.0		
Greenschist	2	1.9		
Sandstone			1	0.9
Chert (red)	3	2.9	17	15.9
	104	99.9%	107	100.0%

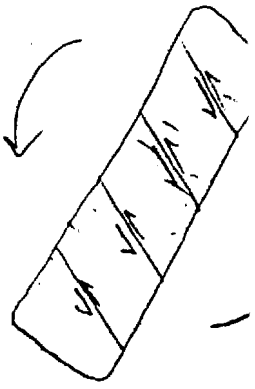
DesMoines Creek (MS4) Naknek outcrop

Granite	40	26.1%
Felsite	1	0.7
Andesite/dacite	61	39.9
Chert (gray>green>red)	49	32.0
Sandstone	1	0.7
Vein quartz	1	0.7
	153	100.1%

PRELIMINARY IN-HOUSE WORK-UP

WIDE BAY FAULTS





BLUE = LARGE OFFSETS (n=3) AVE: N43W

RED = SMALL OFFSETS (n=9) AVE = N57W

ALL FAULTS NEAR VERTICAL, PROBABLY STRIKE-SLIP. IF FAULTS WITH SMALL OFFSETS ARE R_1 RIEDEL SHEARS TO THE FAULTS WITH LARGE OFFSET THEN THE SYSTEM IS A SERIES OF NW TRENDING LEFT-LATERAL FAULTS. THESE MAY HAVE BEEN PRODUCED BY (OR MAY HAVE CAUSED) A COUNTER-CLOCKWISE ROTATION OF THE ALASKA PENINSULA.

– SWK 106/226 7/15/9

sample labnum	WELL	TYPE	OCNUM	TOC X-C	S1 mgHC/gRK	S2 mgHC/gRK	S3 mgHC/gRK	HI mgHC/gOC	OI mgCO2/gOC	TMAX degrees C	VR %
91R1415	SOUTH ALASKA OUTCROP STUDY	OC	91WB 1/1	0.15							
91R1416	SOUTH ALASKA OUTCROP STUDY	OC	91WB 1/3	0.38							
91R1417	SOUTH ALASKA OUTCROP STUDY	OC	91WB 1/4	0.34							
91R1418	SOUTH ALASKA OUTCROP STUDY	OC	91WB 1/6	0.10							
91R1419	SOUTH ALASKA OUTCROP STUDY	OC	91WB 1/8	0.29							
91R1420	SOUTH ALASKA OUTCROP STUDY	OC	91WB 1/10	0.63							
91R1421	SOUTH ALASKA OUTCROP STUDY	OC	91WB 1/13	1.62	0.80	7.70	0.12	475.3	7.4	433	
91R1422	SOUTH ALASKA OUTCROP STUDY	OC	91WB 1/14	1.71	0.60	7.49	0.11	438.0	6.4	437	
91R1423	SOUTH ALASKA OUTCROP STUDY	OC	91WB 1/15	1.63	0.75	8.74	0.49	536.2	30.1	435	
91R1424	SOUTH ALASKA OUTCROP STUDY	OC	91WB 1/16	0.83							
91R1425	SOUTH ALASKA OUTCROP STUDY	OC	91WB 1/17	1.99	0.88	11.60	0.29	582.9	14.6	436	
91R1426	SOUTH ALASKA OUTCROP STUDY	OC	91WB 1/18	2.21	1.06	13.85	0.37	626.7	16.7	432	
91R1427	SOUTH ALASKA OUTCROP STUDY	OC	91WB 1/19	3.38	2.06	20.89	0.32	618.0	9.5	429	
91R1428	SOUTH ALASKA OUTCROP STUDY	OC	91WB 1/22	0.06							
91R1429	SOUTH ALASKA OUTCROP STUDY	OC	91WB 3/44	1.01	0.62	3.58	0.21	354.5	20.8	430	
91R1430	SOUTH ALASKA OUTCROP STUDY	OC	91WB 3/45	1.18	0.67	7.15	0.24	605.9	20.3	432	
91R1431	SOUTH ALASKA OUTCROP STUDY	OC	91WB 3/46	3.62	1.93	25.77	1.15	711.9	31.8	431	
91R1432	SOUTH ALASKA OUTCROP STUDY	OC	91WB 3/48	2.08	1.05	13.13	0.68	631.3	32.7	433	
91R1433	SOUTH ALASKA OUTCROP STUDY	OC	91WB 3/49	3.15	1.64	22.41	0.60	711.4	19.0	431	
91R1434	SOUTH ALASKA OUTCROP STUDY	OC	91WB 3/50	0.19							
91R1435	SOUTH ALASKA OUTCROP STUDY	OC	91WB 3/52	0.33							
91R1436	SOUTH ALASKA OUTCROP STUDY	OC	91WB 3/53	2.11	0.70	12.02	0.39	569.7	18.5	432	
91R1437	SOUTH ALASKA OUTCROP STUDY	OC	91WB 3/54	2.64	1.21	15.83	0.48	599.6	18.2	433	
91R1438	SOUTH ALASKA OUTCROP STUDY	OC	91WB 3/55	2.40	1.10	16.13	0.45	672.1	18.8	433	
91R1439	SOUTH ALASKA OUTCROP STUDY	OC	91WB 3/56	0.76							
91R1440	SOUTH ALASKA OUTCROP STUDY	OC	91WB 3/57	1.07	0.56	5.71	0.47	533.6	43.9	431	
91R1441	SOUTH ALASKA OUTCROP STUDY	OC	91WB 3/58	1.08	0.52	6.42	0.52	594.4	48.2	432	
91R1442	SOUTH ALASKA OUTCROP STUDY	OC	91WB 3/59	3.00	1.65	21.41	0.84	713.7	28.0	434	
91R1443	SOUTH ALASKA OUTCROP STUDY	OC	91WB 3/60	1.76	0.99	9.97	0.43	568.5	24.4	434	

Table I Palynologic age assignment of 1991 Alaska Peninsula Field Samples

Section/Sample #	Stratigraphic Unit (Field)	Age
E. Side Puale Bay		
91 WB 1/21	Triassic	Indeterminate
91 WB 1/19	Triassic	Indeterminate
91 WB 1/17	Triassic	Indeterminate
91 WB 1/16	Triassic	Indeterminate
91 WB 1/12	Triassic	Indeterminate
91 WB 1/10	Triassic	Indeterminate
91 WB 1/9	Triassic	Indeterminate
91 WB 1/8	Triassic	Indeterminate
91 WB 1/6	Triassic	Indeterminate
91 WB 1/2	Triassic	Indeterminate
E. Side Puale Bay		
91 WB 2/29	Triassic	Indeterminate
E. Side Puale Bay		
91 WB 1/34	Shelikof	Indeterminate
91 WB 1/33	Triassic	Indeterminate
91 WB 1/30	Triassic	Indeterminate
North of Alai Creek		
91 WB 8/36	Naknek	Indeterminate
SW Upper Des Moines Creek		
91 WB 12/37	Shelikof	Jurassic
South Tip, East Side Puale Bay		
91 WB 3/60	Triassic	Indeterminate
91 WB 3/59	Triassic	Indeterminate
91 WB 3/58	Triassic	Indeterminate
91 WB 3/57	Triassic	Indeterminate
91 WB 3/56	Triassic	Indeterminate
91 WB 3/55	Triassic	Indeterminate
91 WB 3/54	Triassic	Indeterminate
91 WB 3/53	Triassic	Indeterminate
91 WB 3/52	Triassic	Indeterminate
91 WB 3/50	Triassic	Indeterminate
91 WB 3/49	Triassic	Indeterminate
91 WB 3/48	Triassic	Indeterminate
91 WB 3/46	Triassic	Indeterminate
91 WB 3/45	Triassic	Indeterminate
91 WB 3/44	Triassic	Indeterminate
91 WB 3/43	Triassic	Indeterminate
91 WB 3/42	Triassic	Indeterminate
91 WB 3/41	Triassic	Indeterminate

Table I Palynologic age assignment of 1991 Alaska Peninsula Field Samples

West Side, Big Creek Valley		
91 WB 15/66	Shelikof	l. Callovian / e. Oxfordian
91WB 15/65	Shelikof	Indeterminate
91 WB 15/64	Shelikof	Callovian
91 WB 15/63	Shelikof	Callovian
East of Mouth, Des Moines Creek		
91 WB 18/78	Naknek	Oxfordian / or older
91 WB 18/77	Naknek	Oxfordian / or older
91 WB 18/76	Naknek	Oxfordian / or older
91 WB 18/75	Naknek	Oxfordian / or older
91 WB 18/74	Naknek	Oxfordian / or older
91 WB 18/73	Naknek	Oxfordian / or older
East Side, Moore Creek		
91 WB 19/82	Naknek	Indeterminate
1st Creek, South of Big Creek, North Wide Bay		
91 WB 101/537	Shelikof	Callovian / Oxfordian
91 WB 101/536	Shelikof	Callovian / Oxfordian
91 WB 101/535	Shelikof	Callovian / Oxfordian
91 WB 101/532	Shelikof	Indeterminate
91 WB 101/531	Shelikof	Callovian / Oxfordian
91 WB 101/530	Shelikof	Indeterminate
91 WB 101/516	Shelikof	Callovian / e. Oxfordian
91 WB 101/515	Shelikof	Indeterminate
91 WB 101/513	Shelikof	Callovian
91 WB 101/511	Shelikof	Indeterminate
91 WB 101/510	Shelikof	Callovian
1st Creek, South of Big Creek, North Wide Bay (Continued)		
91 WB 101/508	Shelikof	Indeterminate
91 WB 101/507	Shelikof	l. Callovian / e. Oxfordian
91 WB 101/502	Shelikof	Callovian
91 WB 101/501	Shelikof	Callovian
Des Moines Creek, North Wide Bay		
91 WB 104/546	Naknek	Jurassic
91 WB 104/544	Shelikof	Jurassic
91 WB 104/542	Shelikof	Jurassic
91 WB 104/547	Shelikof	Jurassic
South Side of Big Creek, North Wide Bay		
91 WB 105/558	Shelikof	Callovian / Oxfordian
91 WB 105/556	Shelikof	Callovian
91 WB 105/555	Shelikof	Callovian
91 WB 105/553	Shelikof	Callovian
NE Puale Bay		
91 WB 104/559	U Trias./L. Jur.	Indeterminate

Table I Palynologic age assignment of 1991 Alaska Peninsula Field Samples

Section/Sample #	Stratigraphic Unit (Field)	Age
North of Alnai Creek		
91 WB 204/613	Shelikof	Callovian / Oxfordian
91 WB 204/611	Shelikof	Jurassic
91 WB 204/609	Shelikof	Callovian
91 WB 204/608	Shelikof	Callovian
91 WB 204/606	Shelikof	Indeterminate
91 WB 204/605	Shelikof	Bathonian / Callovian
91 WB 204/604	Kialagvik	Bathonian / Callovian
91 WB 204/603	Kialagvik	Bathonian / Callovian
91 WB 204/602	Kialagvik	Bathonian / Callovian
South of Alnai Creek		
91 WB 205/617	Shelikof	Callovian
91 WB 205/616	Shelikof	Callovian / Oxfordian
91 WB 205/615	Shelikof	Callovian / Oxfordian
91 WB 205/614	Shelikof	Callovian / Oxfordian
SE Side of Spur between Kialagvik River and Alnai Creek		
91 WB 207/631	Kialagvik	l.Bajocian / Bathonian
91 WB 207/629	Kialagvik	Indeterminate
91 WB 207/627	Kialagvik	Callovian or older
91 WB 207/626	Kialagvik	Callovian or older
91 WB 207/624	Kialagvik	Indeterminate
91 WB 207/623	Kialagvik	Bathonian / Callovian
91 WB 207/622	Kialagvik	Oxfordian or older
91 WB 207/620	Kialagvik	Indeterminate
91 WB 207/619	Kialagvik	Jurassic
South West Side, Des Moines Creek		
91 WB 208/640	Shelikof	Jurassic
91 WB 208/639	Shelikof	Jurassic
91 WB 208/637	Shelikof	Oxfordian / or older
91 WB 208/636	Shelikof	Jurassic
91 WB 208/635	Shelikof	Callovian
91 WB 208/634	Shelikof	Indeterminate
North East Side , Des Moines Creek		
91 WB 208/645	Shelikof	Jurassic
91 WB 208/644	Shelikof	Jurassic
91 WB 208/643	Shelikof	Callovian
91 WB 208/641	Shelikof	Oxfordian or Older
East Side, Mouth of Katmai River		
91 KB 211/653	Naknek	Indeterminate
91 KB 211/651	Naknek	ndeterminate
91 KB 211/649	Naknek	Indeterminate

Table I Palynologic age assignment of 1991 Alaska Peninsula Field Samples

Section/Sample #	Stratigraphic Unit (Field)	Age
East Side, Katmai Bay		
91 KB 213/662	Naknek	Kimmeridgian
East Side of Katmai Bay		
91 KB 212/660	Naknek	Kimmeridgian
91 KB 212/659	Naknek	Kimmeridgian
91 KB 212/657	Naknek	Kimmeridgian
91 KB 212/656	Naknek	Indeterminate
91 KB 212/654	Naknek	Kimmeridgian
South of Mt. Pedmar		
91 KAT 101/213	Kaguyak	Indeterminate
91 KAT 101/212	Kaguyak	Indeterminate
91 KAT 101/211	Kaguyak	l. Campanian
91 KAT 101/207	Kaguyak	Indeterminate
91 KAT 101/215	Kaguyak	l. Campanian
91 KAT 101/226	Kaguyak	Campanian / e. Maastrichtian
91 KAT 101/206	Kaguyak	Campanian / Maastrichtian
91 KAT 101/205	Kaguyak	Indeterminate
91 KAT 101/204	Kaguyak	Indeterminate
91 KAT 101/203	Kaguyak	Indeterminate
91 KAT 101/202	Kaguyak	Campanian/Maastrichtian
91 KAT 101/224	Albian	Indeterminate
91 KAT 101/223	Albian	Campanian / Maastrichtian
91 KAT 101/219	Albian	Senonian
91 KAT 101/218	Albian	Albian?
91 KAT 101/217	Albian	Albian?
91 KAT 101/216	Albian	Albian?
South of Peak 2693, North of Mt. Pedmar		
91 KAT 1/4	Naknek	Indeterminate
91 KAT 1/5	Naknek	Indeterminate
91 KAT 1/10	Naknek	Indeterminate
91 KAT 1/12	Naknek	Indeterminate
West Side of Barrier Range		
91 KAT 2/15	Herendeen	Indeterminate
91 KAT 2/16	Herendeen	Indeterminate
91 KAT 2/17	Herendeen	Indeterminate
91 KAT 2/18	Herendeen	Indeterminate
91 KAT 2/19	Herendeen	Indeterminate
91 KAT 2/20	Herendeen	Indeterminate
91 KAT 2/21	Herendeen	Indeterminate
91 KAT 2/23	Herendeen	Indeterminate
91 KAT 2/25	Herendeen	Indeterminate

Table I Palynologic age assignment of 1991 Alaska Peninsula Field Samples

Section/Sample #	Stratigraphic Unit (Field)	Age
North Inlet, SW of Cape Kaguyak		
91 KAT 5/52	Herendeen	Hauterivian
91 KAT 5/51	Herendeen	Indeterminate
91 KAT 5/50	Naknek	Indeterminate
91 KAT 5/49	Naknek	Indeterminate
91 KAT 5/48	Naknek	Indeterminate
91 KAT 5/47	Naknek	Indeterminate
91 KAT 5/46	Naknek	Indeterminate
91 KAT 5/45	Naknek	Indeterminate
91 KAT 5/44	Naknek	Tithonian
91 KAT 5/43	Naknek	Indeterminate
91 KAT 5/42	Naknek	Indeterminate
91 KAT 5/41	Naknek	Tithonian
Beach Cliff SW of Swikshak Lagoon, E. of Big River		
91 KAT 217/679	Kaguyak	Indeterminate
91 KAT 217/678	Kaguyak	Indeterminate
NW side of Swikshak Lagoon		
91 KAT 4/55	Kaguyak	Indeterminate
NE of mouth, Horn Creek		
91 LCP 3/16	Chinitna Fm, Paveloff Slts Mbr.	Jurassic
91 LCP 3/10	Chinitna Fm, Paveloff Slts Mbr.	Jurassic
91 LCP 3/6	Chinitna Fm, Paveloff Slts Mbr.	Jurassic
91 LCP 3/5	Chinitna Fm, Paveloff Slts Mbr.	Callovian
91 LCP 3/4	Chinitna Fm, Paveloff Slts Mbr.	Jurassic
91 LCP 3/2	Chinitna Fm, Paveloff Slts Mbr.	Jurassic
91 LCP 3/1	Chinitna Fm, Paveloff Slts Mbr.	Callovian.
NE of Horn Creek		
91 LCP 3/41	Naknek Fm, Lower Ss Mbr.	Jurassic
91 LCP 3/40	Naknek Fm, Lower Ss Mbr	Indeterminate
91 LCP 3/36	Naknek Fm, Lower Ss Mbr	Jurassic
91 LCP 3/33	Naknek Fm, Lower Ss Mbr	Jurassic
91 LCP 3/31	Naknek Fm, Lower Ss Mbr	Jurassic
West Side of Red River Valley		
91 LCP 5/18	Kaguyak Fm, Saddle Mtn Mbr.	Indeterminate
91 LCP 5/17	Kaguyak Fm, Saddle Mtn Mbr	Indeterminate
91 LCP 5/16	Kaguyak Fm, Saddle Mtn Mbr	Indeterminate
91 LCP 5/15	Kaguyak Fm, Saddle Mtn Mbr	Indeterminate
?????????????		
91 LCP 6/24		Tertiary-Late Miocene?
?????????????		
91 LCP 7/26		Indeterminate

Table II Palynologic age assignment of 1991 Cook Inlet Field Samples

Section/Sample #	Stratigraphic Unit (Field)	Age
Clam Cove Point		
91 LCP 101/209	Naknek Fm, Pomeroy Arkose Mbr.	Indeterminate
91 LCP 101/207	Naknek Fm, Pomeroy Arkose Mbr	Oxfordian
91 LCP 101/203	Naknek Fm, Pomeroy Arkose Mbr	Indeterminate
91 LCP 101/202	Naknek Fm, Pomeroy Arkose Mbr	Oxfordian
West of Clam Cove		
91 LCP 104/228	Naknek Fm, Pomeroy Arkose Mbr	Indeterminate
91 LCP 104/227	Naknek Fm, Pomeroy Arkose Mbr	Oxfordian
91 LCP 104/224	Naknek Fm, Pomeroy Arkose Mbr	Oxfordian
91 LCP 104/222	Naknek Fm, Pomeroy Arkose Mbr	Oxfordian
91 LCP 104/221	Naknek Fm, Pomeroy Arkose Mbr	Oxfordian
91 LCP 104/220	Naknek Fm, Pomeroy Arkose Mbr	Oxfordian
91 LCP 104/219	Naknek Fm, Pomeroy Arkose Mbr	Callovian / Kimmeridgian
91 LCP 104/218	Naknek Fm, Pomeroy Arkose Mbr	Oxfordian
91 LCP 104/217	Naknek Fm, Pomeroy Arkose Mbr	Oxfordian
West Side, Chisik Island		
91 LCP 201/402	Naknek Fm, Snug Harbor Slt. Mbr.	Oxfordian / Kimmeridgian
91 LCP 201/401	Naknek Fm, Snug Harbor Slt. Mbr.	Jurassic
South side of St. Augustine Island		
91 LCP 202/410		Oxfordian / e. Kimmeridgian
91 LCP 202/409		Callovian / e. Kimmeridgian
91 LCP 202/408		Indeterminate
91 LCP 202/406		Oxfordian / e. Kimmeridgian
91 LCP 202/405		Jurassic

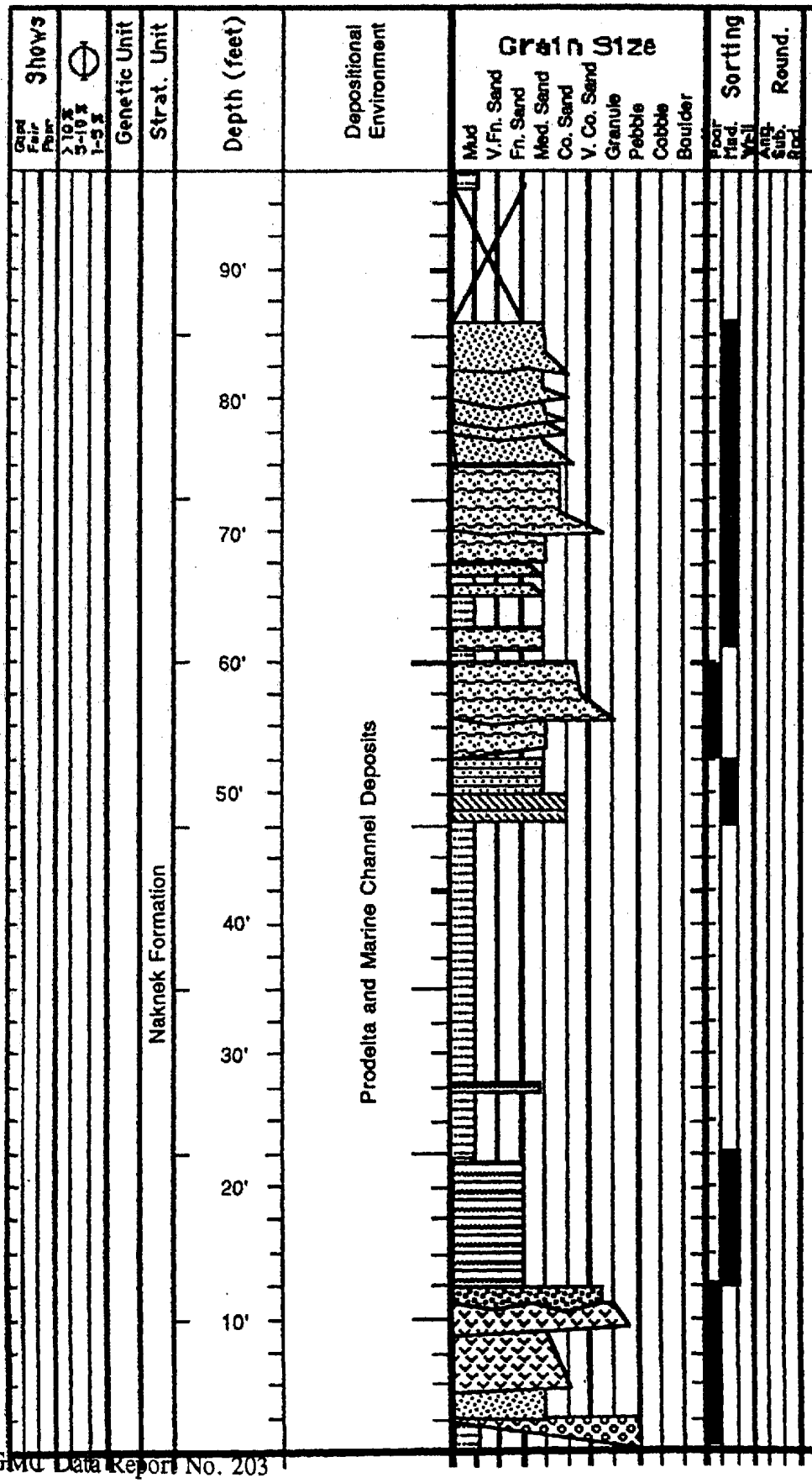
MS #26 91LCP 3

ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program Mesozoic Cook Inlet Stop No. Site 3 Formations Naknek

Measured Section Number 26 continued Date August 7, 1991

Location N.E. Sec. 33, T3S R21W Seldovia Quad D-8 Described By William Morris



Sedimentary Structures and Descriptions

Covered

Normal-graded sandstone

Normal-graded overlain by swaley cross-bedding
Swaley cross-bedded

91LCP3-32

Massive overlain by horizontal laminations
Trough cross-bedding

Interbedded mudstone and sandstone. Sandstone, very thin, ripple laminated

91LCP3-31
Tbc

Ripple and horizontal laminated sandstone with thin mud drapes
Massive granule sandstone
Lithic tuff 91LCP3-30

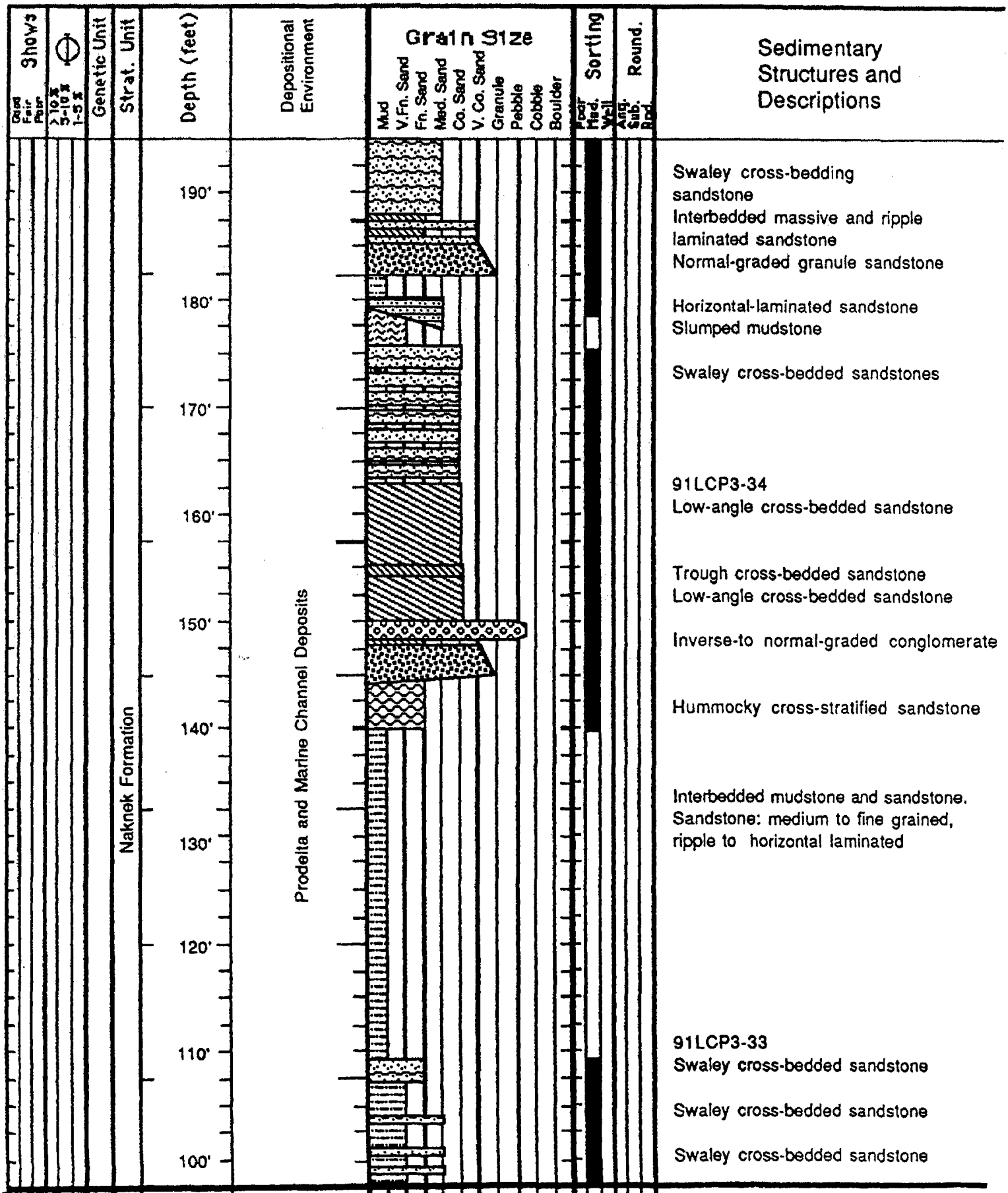
Pumice lithic tuff
Massive sandstone

ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program: Mesozoic Cook Inlet Stop No.: Site 3 Formations: Naknek

Measured Section: Number 26 continued Date: August 7, 1991

Location: N.E. Sec. 33, T3S R21W Seldovia Quad D-8 Described By: William Morris

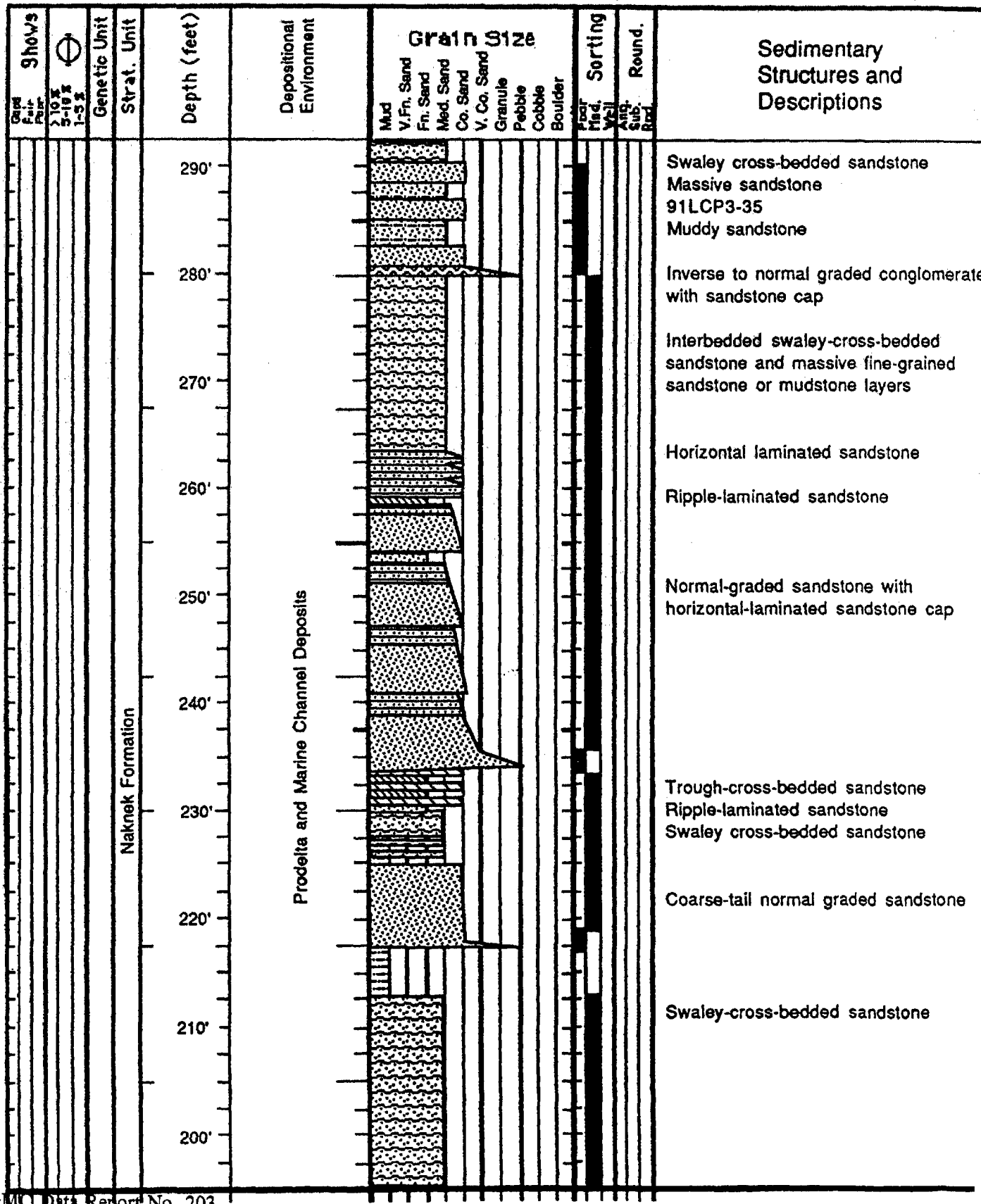


ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program Mesozoic Cook Inlet Stop No. Site 3 Formations Naknek

Measured Section Number 26 continued Date August 7, 1991

Location N.E. Sec. 33, T3S R21W Seldovia Quad D-8 Described By William Morris



Swaley cross-bedded sandstone
Massive sandstone
91LCP3-35
Muddy sandstone

Inverse to normal graded conglomerate with sandstone cap

Interbedded swaley-cross-bedded sandstone and massive fine-grained sandstone or mudstone layers

Horizontal laminated sandstone

Ripple-laminated sandstone

Normal-graded sandstone with horizontal-laminated sandstone cap

Trough-cross-bedded sandstone
Ripple-laminated sandstone
Swaley cross-bedded sandstone

Coarse-tail normal graded sandstone

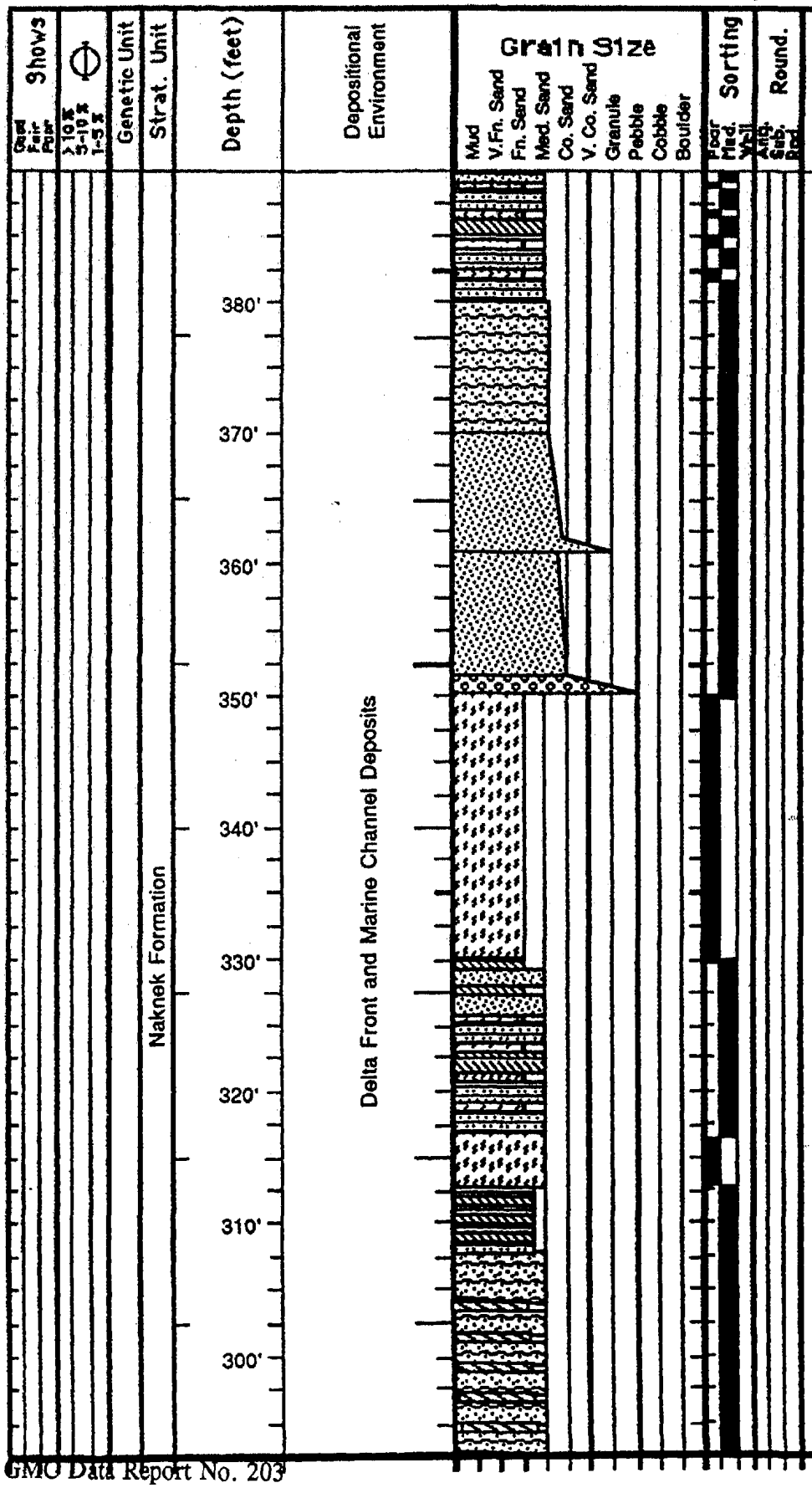
Swaley-cross-bedded sandstone

Sedimentary Structures and Descriptions

Field Program: Mesozoic Cook Inlet Stop No.: Site 3 Formations: Naknek

Measured Section: Number 26 continued Date: August 7, 1991

Location: N.E. Sec. 33, T3S R21W Seldovia Quad D-8 Described By: William Morris



Sedimentary Structures and Descriptions

Interbedded horizontal to cross-bedded sandstones and bioturbated fine-grained sandstone

Swaley cross-bedded sandstone

Normal-graded sandstone

Visual estimates from 350' to 380'

Bioturbated sandstone

Interbedded massive and ripple-laminated sandstones

Interbedded horizontal to cross-bedded sandstones and bioturbated fine-grained sandstone 91LCP3-36

Bioturbated sandstone
Interbedded horizontal and ripple-laminated sandstone

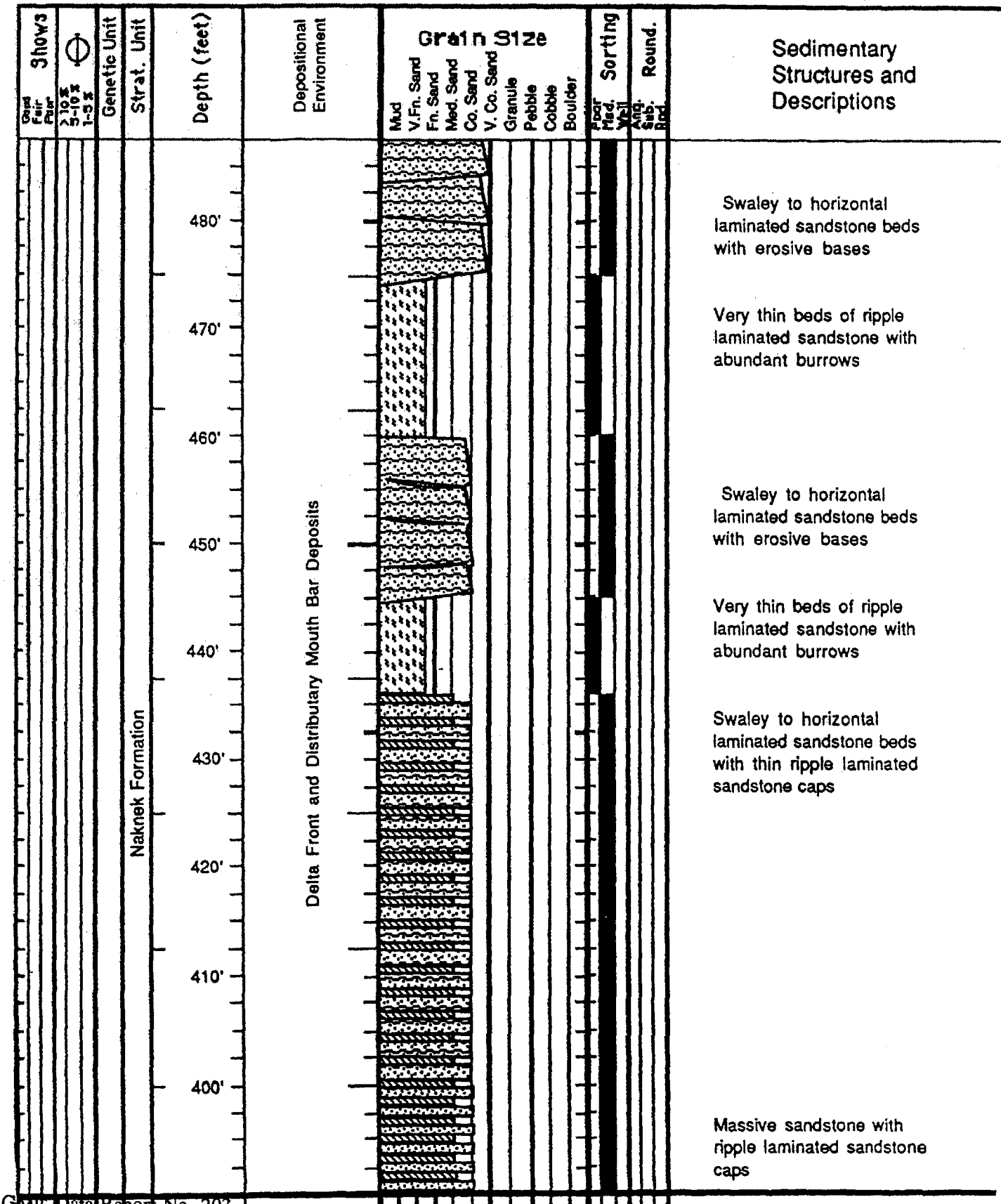
Swaley-cross-bedded sandstone

ARCO Alaska, Inc. **MEASURED SECTION FORM**

Field Program Mesozoic Cook Inlet Stop No. Site 3 Formations Naknek

Measured Section Number 26 continued Date August 7, 1991

Location N.E. Sec. 33, T3S R21W Seldovia Quad D-8 Described By William Morris

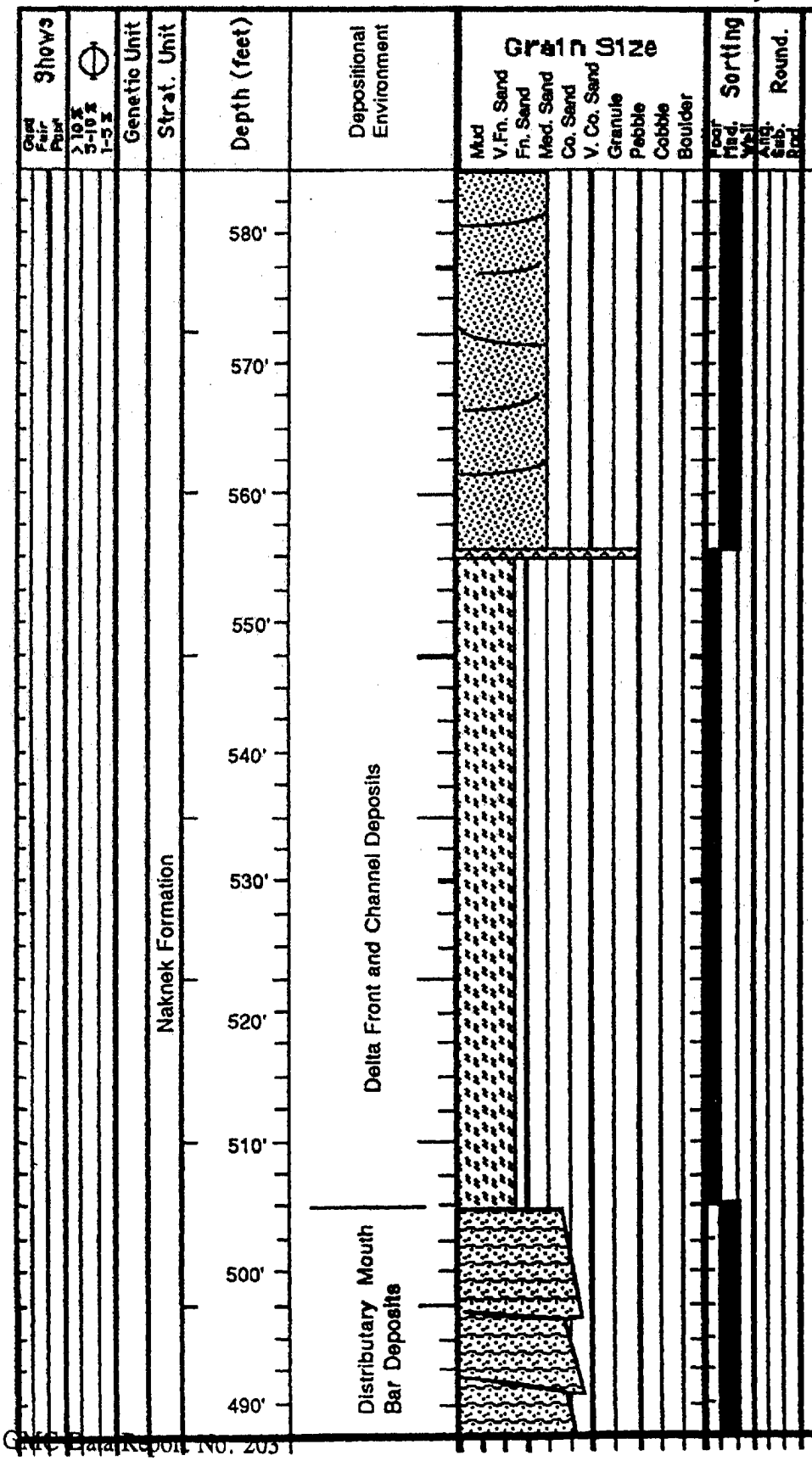


ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program: Mesozoic Cook Inlet Stop No.: Site 3 Formations: Naknek

Measured Section: Number 26 continued Date: August 7, 1991

Location: N.E. Sec. 33, T3S R21W Seldovia Quad D-8 Described By: William Morris

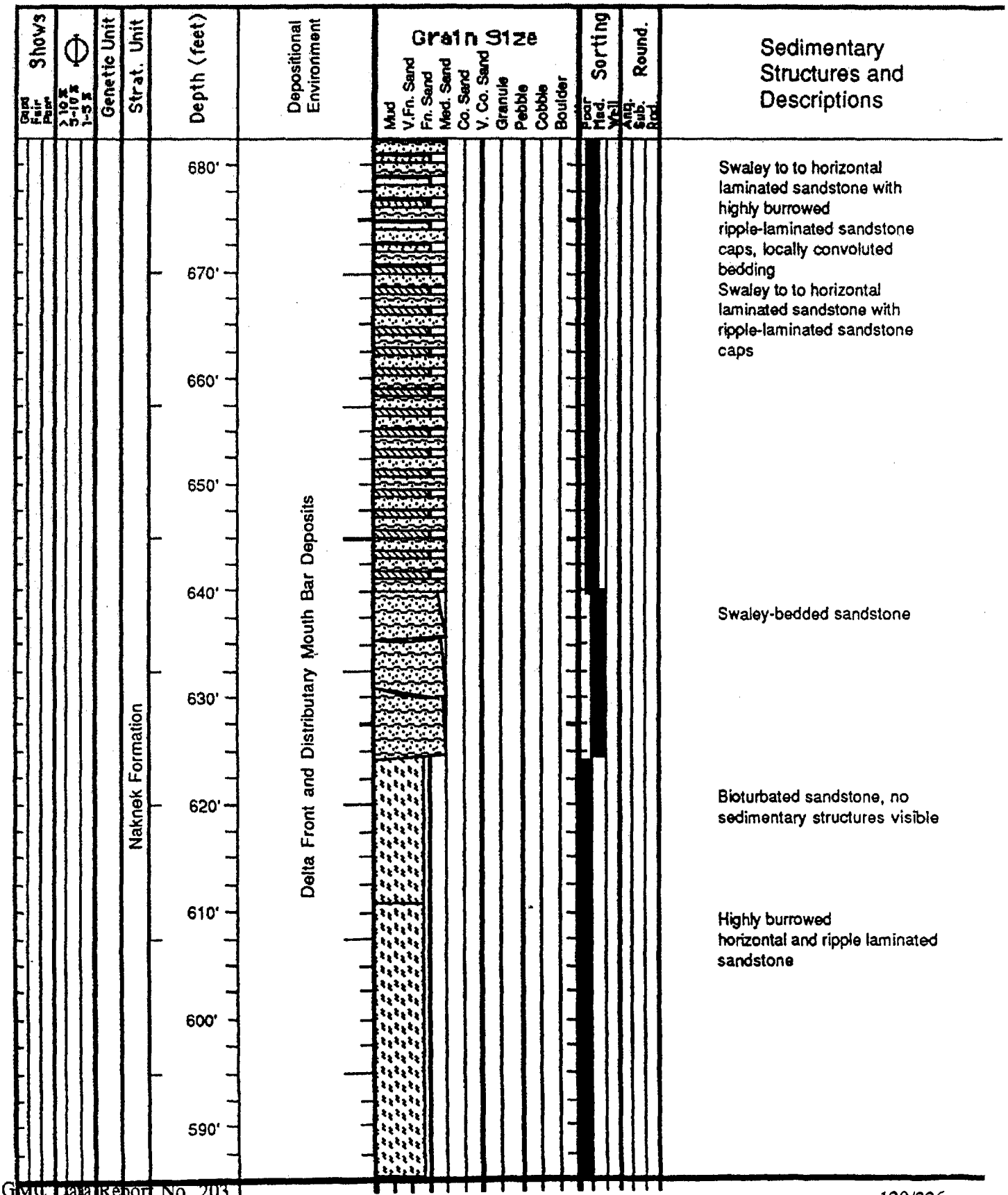


ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program Mesozoic Cook Inlet Stop No. Site 3 Formations Naknek

Measured Section Number 26 continued Date August 7, 1991

Location N.E. Sec. 33, T3S R21W Seldovia Quad D-8 Described By William Morris

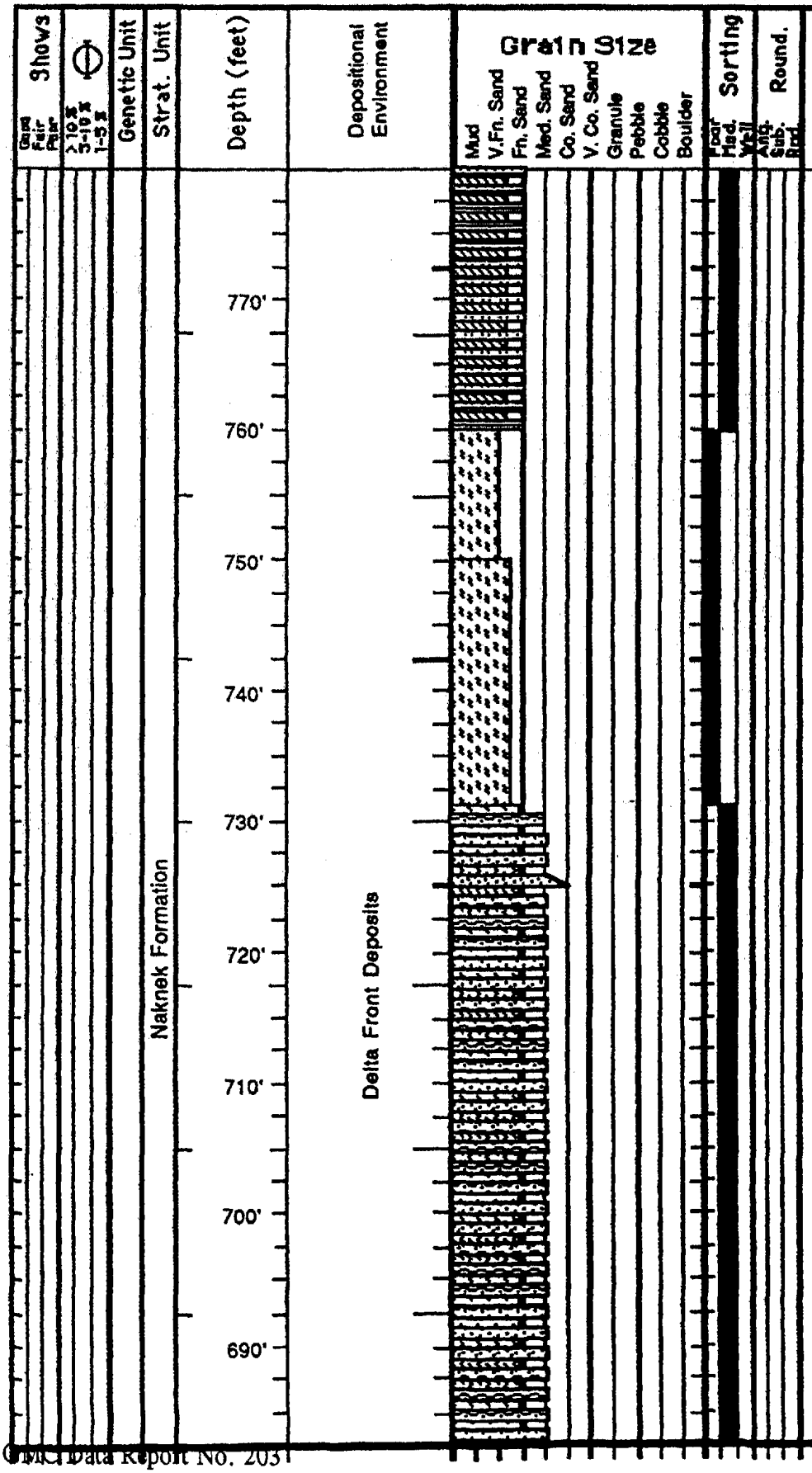


ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program Mesozoic Cook Inlet Stop No. Site 3 Formations Naknek

Measured Section Number 26 continued Date August 7, 1991

Location N.E. Sec. 33, T3S R21W Seldovia Quad D-8 Described By William Morris



Sedimentary Structures and Descriptions

Interbedded horizontal and ripple laminated sandstone. Locally burrowed

Bioturbated very-fine grained sandstone, locally ripple-laminations or mudstone layers
91LCP3-37**

Bioturbated fine-grained sandstone with some horizontal laminations

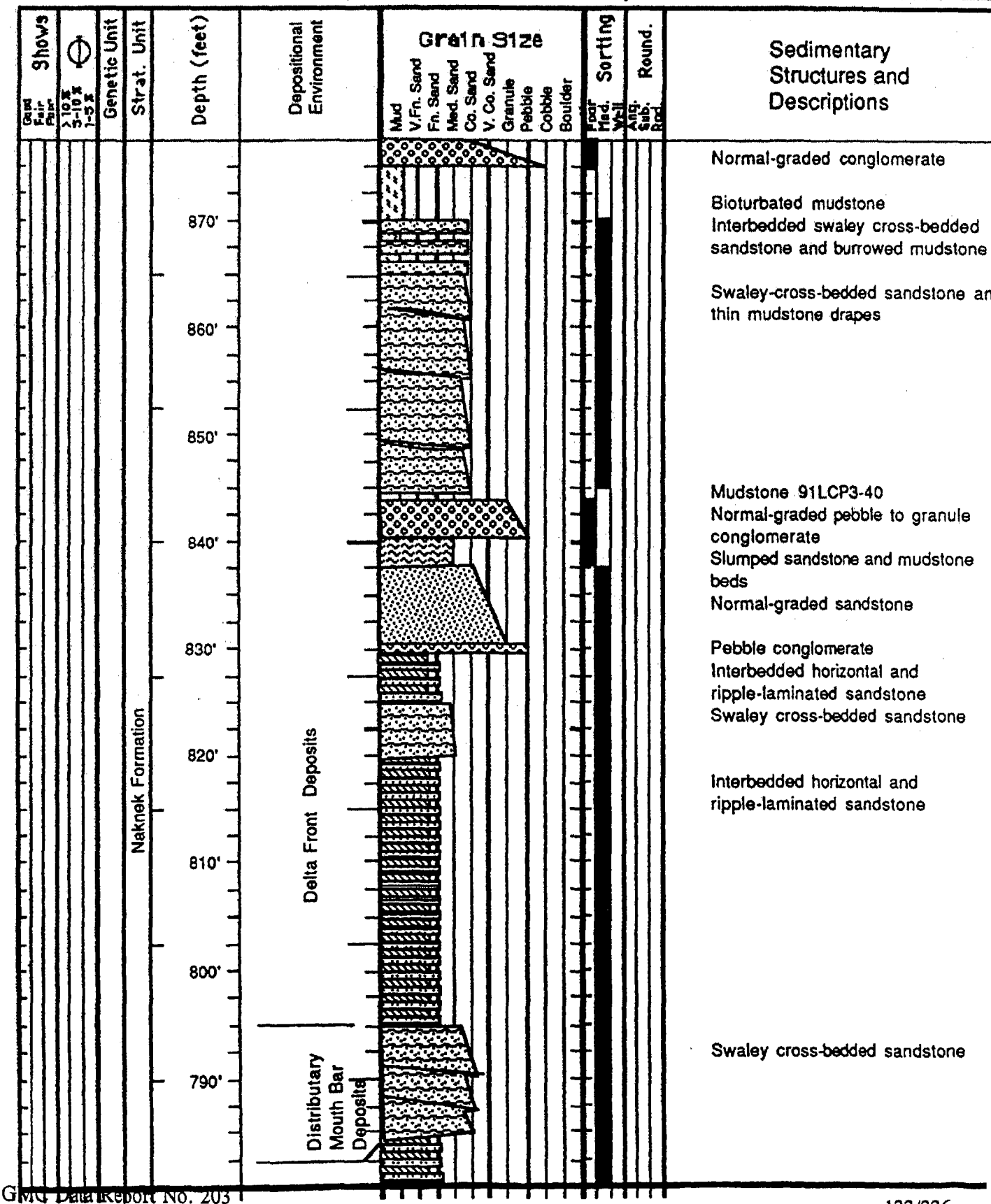
Swaley to horizontal laminated sandstone with burrowed ripple-laminated sandstone cap

ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program Mesozoic Cook Inlet Stop No. Site 3 Formations Naknek

Measured Section Number 26 continued Date August 7, 1991

Location N.E. Sec. 33, T3S R21W Seldovia Quad D-8 Described By William Morris

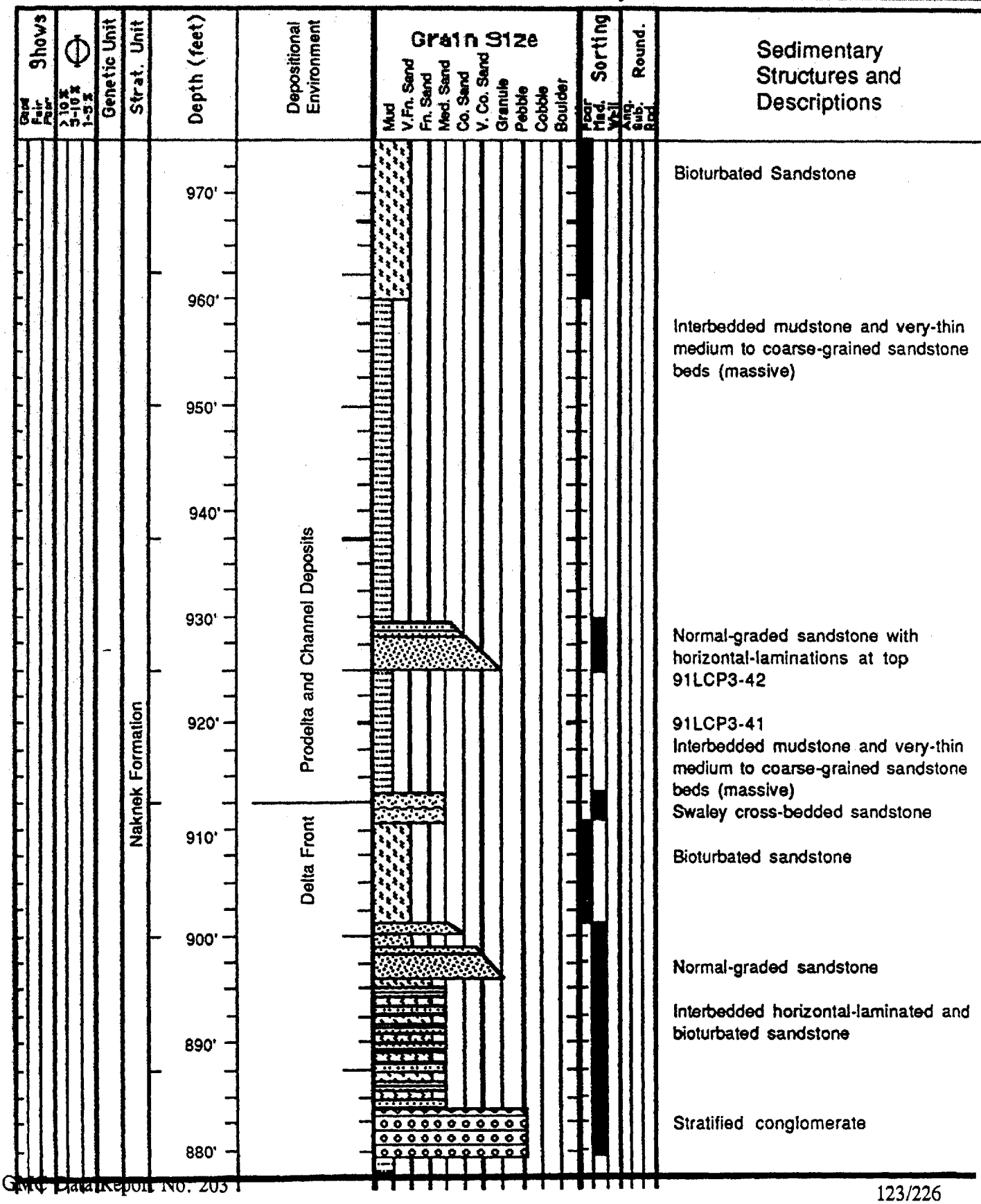


ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program: Mesozoic Cook Inlet Stop No.: Site 3 Formations: Naknek

Measured Section: Number 26 continued Date: August 7, 1991

Location: N.E. Sec. 33, T3S R21W Seldovia Quad D-8 Described By: William Morris

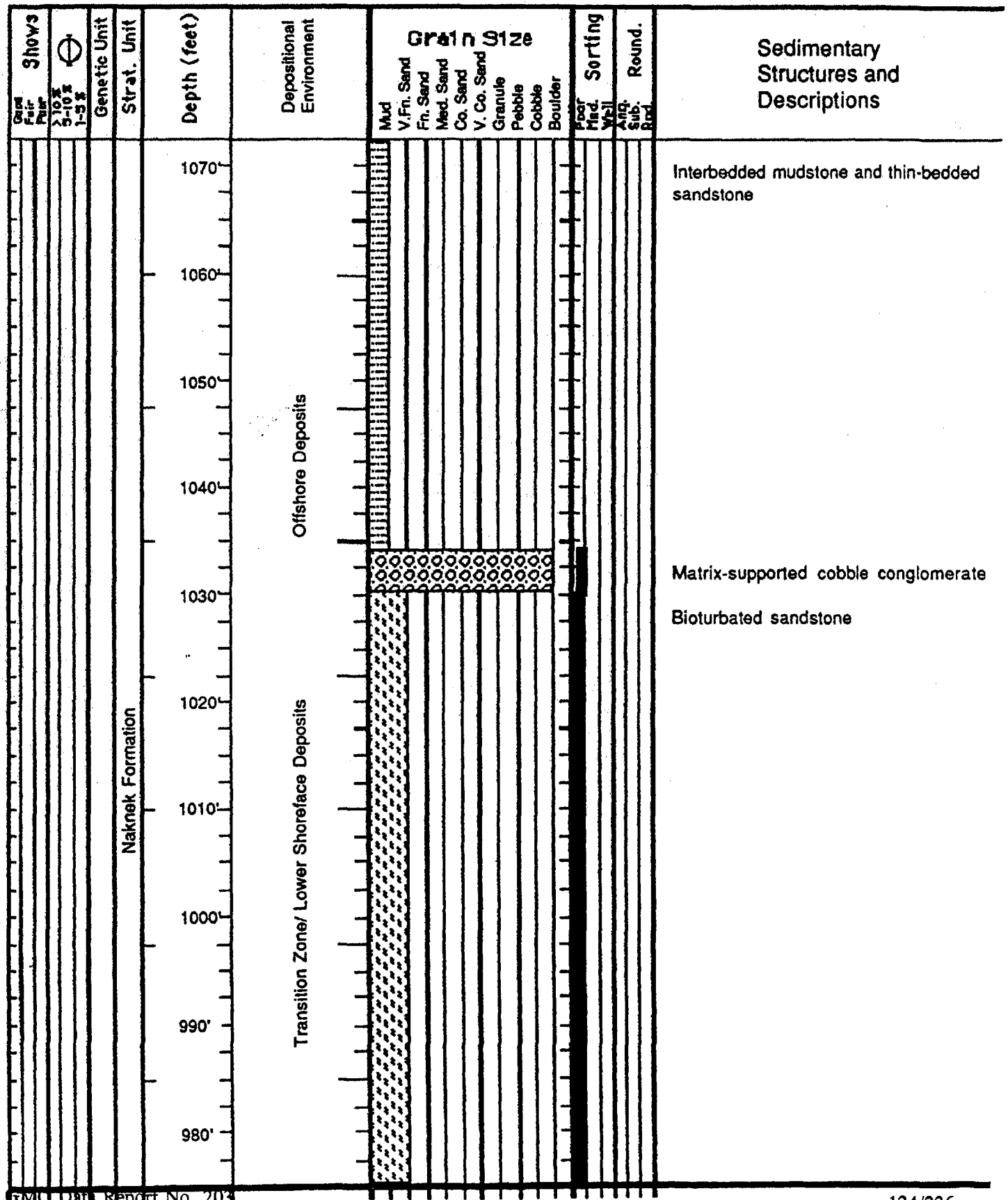


ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program: Mesozoic Cook Inlet Stop No.: Site 3 Formations: Naknek

Measured Section: Number 26 continued Date: August 7, 1991

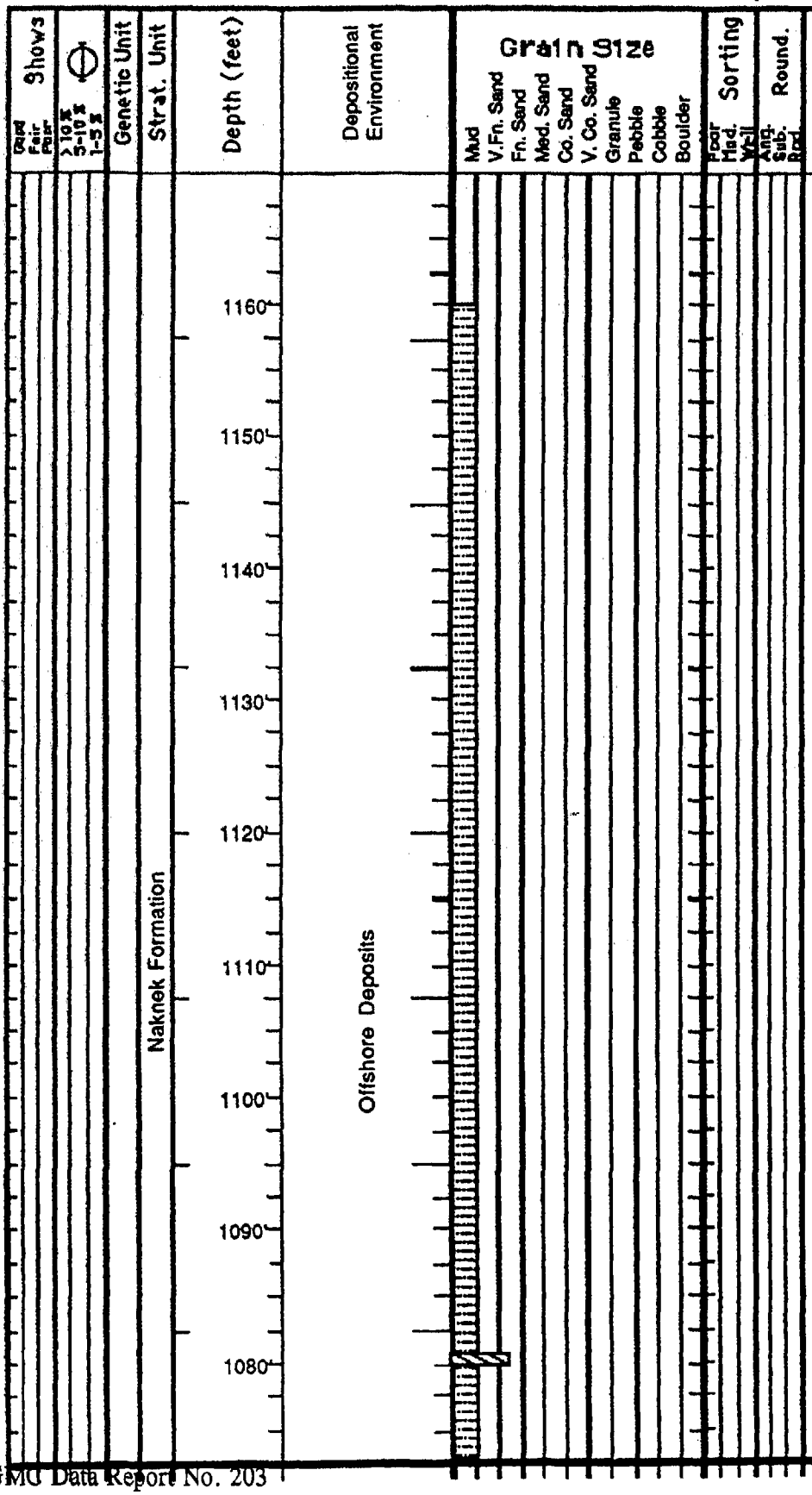
Location: N.E. Sec. 33, T3S R21W Seldovia Quad D-8 Described By: William Morris



Field Program Mesozoic Cook Inlet Stop No. Site 3 Formations Naknek

Measured Section Number 26 continued Date August 7, 1991

Location N.E. Sec. 33, T3S R21W Seldovia Quad D-8 Described By William Morris



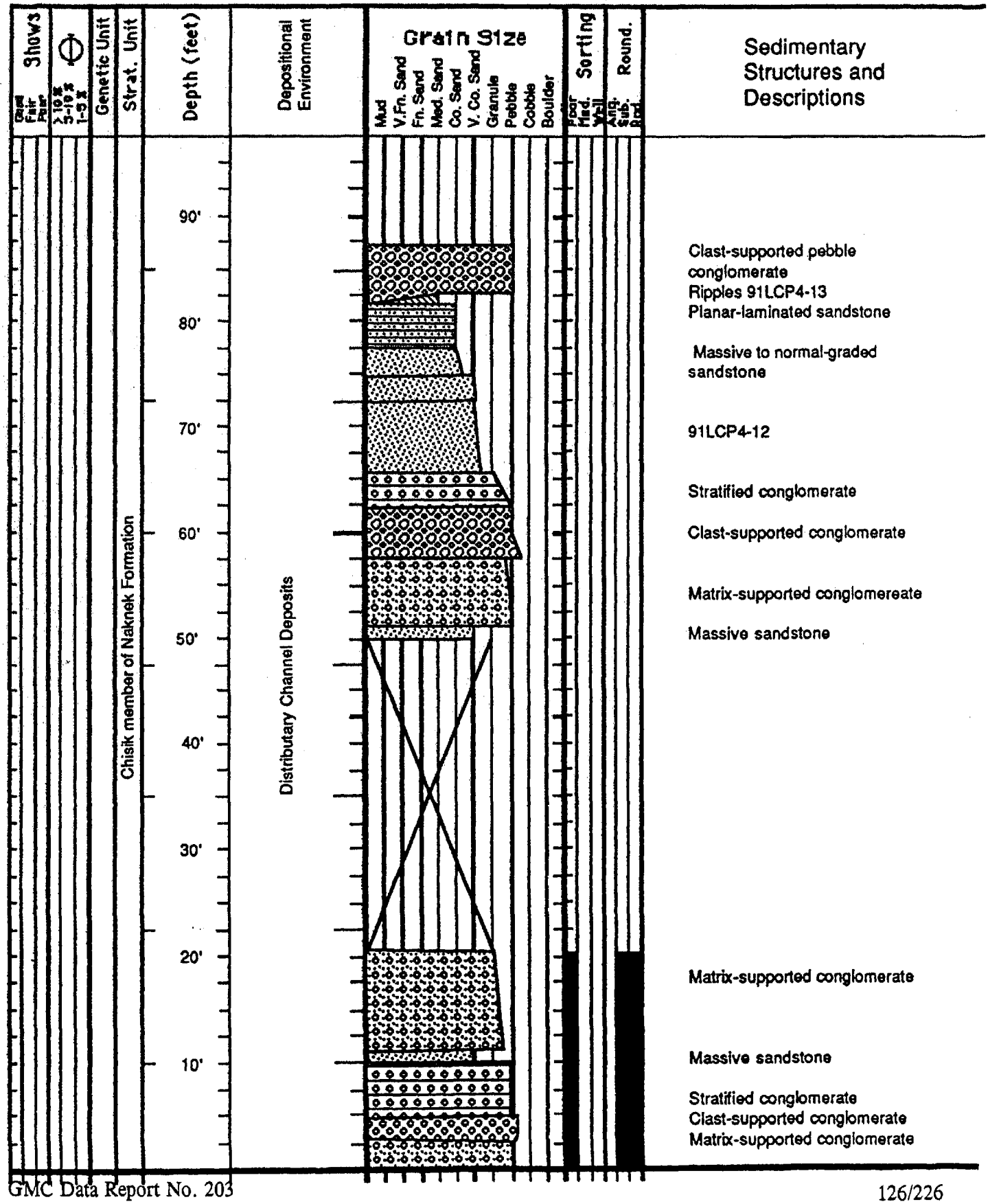
MS 28 LC?

ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program: Mesozoic Cook Inlet Stop No. Site 4 91LCP4 Formations: Nacnek

Measured Section: Number 28 91LCP4 Date: August 3 and 6, 1991

Location: N.W. Sec. 8, T1S R19W Kenia Quad A-7 Described By: William Morris



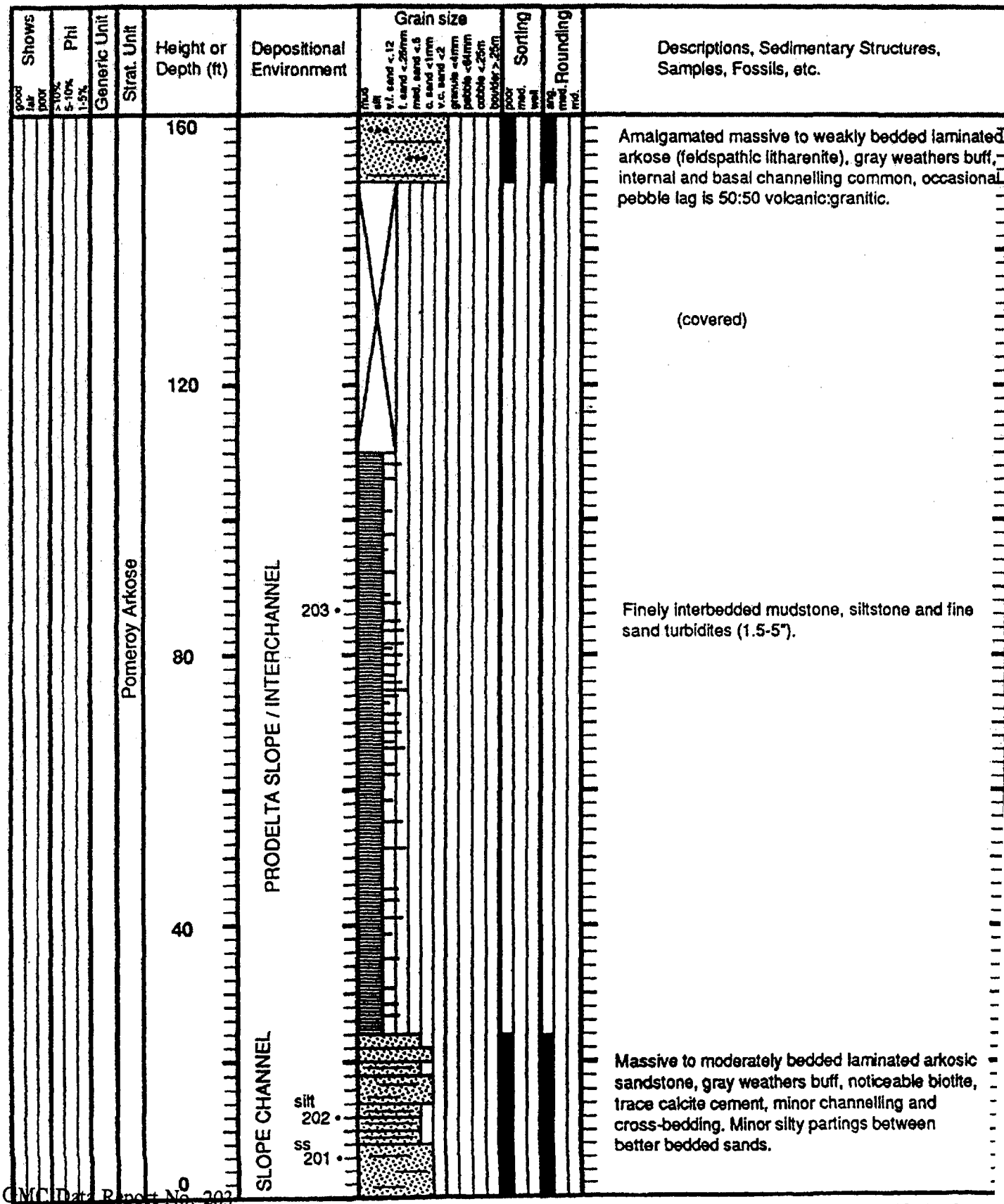
ARCO Alaska, Inc.

MEASURED SECTION FORM

Field Program 1991 Mesozoic Cook Inlet Stop No. 91LCP101 Formation(s) Pomeroy Arkose

Location Chinitna Bay (Seldovia D-8 Quad, secs 31,32,T3S,R21W) Described by S. W. Krueger

Measured Section MS 27 Pomeroy Arkose, Chinitna Bay, Alaska Peninsula Date 20-22 June 1991



Amalgamated massive to weakly bedded laminated arkose (feldspathic litharenite), gray weathers buff, internal and basal channelling common, occasional pebble lag is 50:50 volcanic:granitic.

(covered)

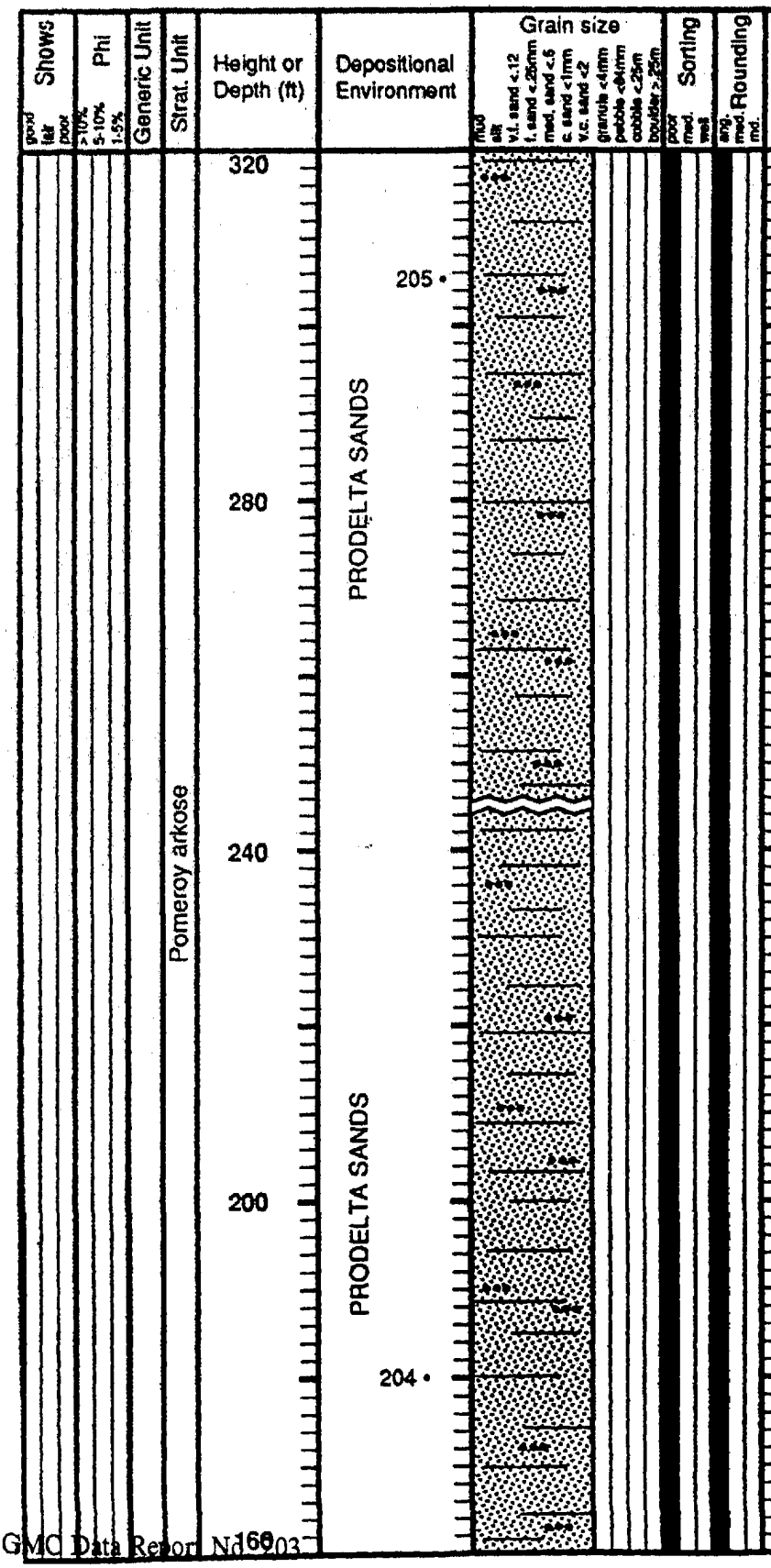
Finely interbedded mudstone, siltstone and fine sand turbidites (1.5-5").

Massive to moderately bedded laminated arkosic sandstone, gray weathers buff, noticeable biotite, trace calcite cement, minor channelling and cross-bedding. Minor silty partings between better bedded sands.

Field Program 1991 Mesozoic Cook Inlet Stop No. 91LCP101 Formation(s) Pomeroy Arkose

Location Chinitna Bay (Seldovia D-8 Quad, secs 31,32,T3S,R21W) Described by S. W. Krueger

Measured Section MS 27 Pomeroy Arkose, Chinitna Bay, Alaska Peninsula Date 20-22 June 1991



ARCO Alaska, Inc. **MEASURED SECTION FORM**

Field Program 1991 Mesozoic Cook Inlet Stop No. 91LCP101 Formation(s) Pomeroy Arkose

Location Chinitna Bay (Seldovia D-8 Quad, secs 31,32,T3S,R21W) Described by S. W. Krueger

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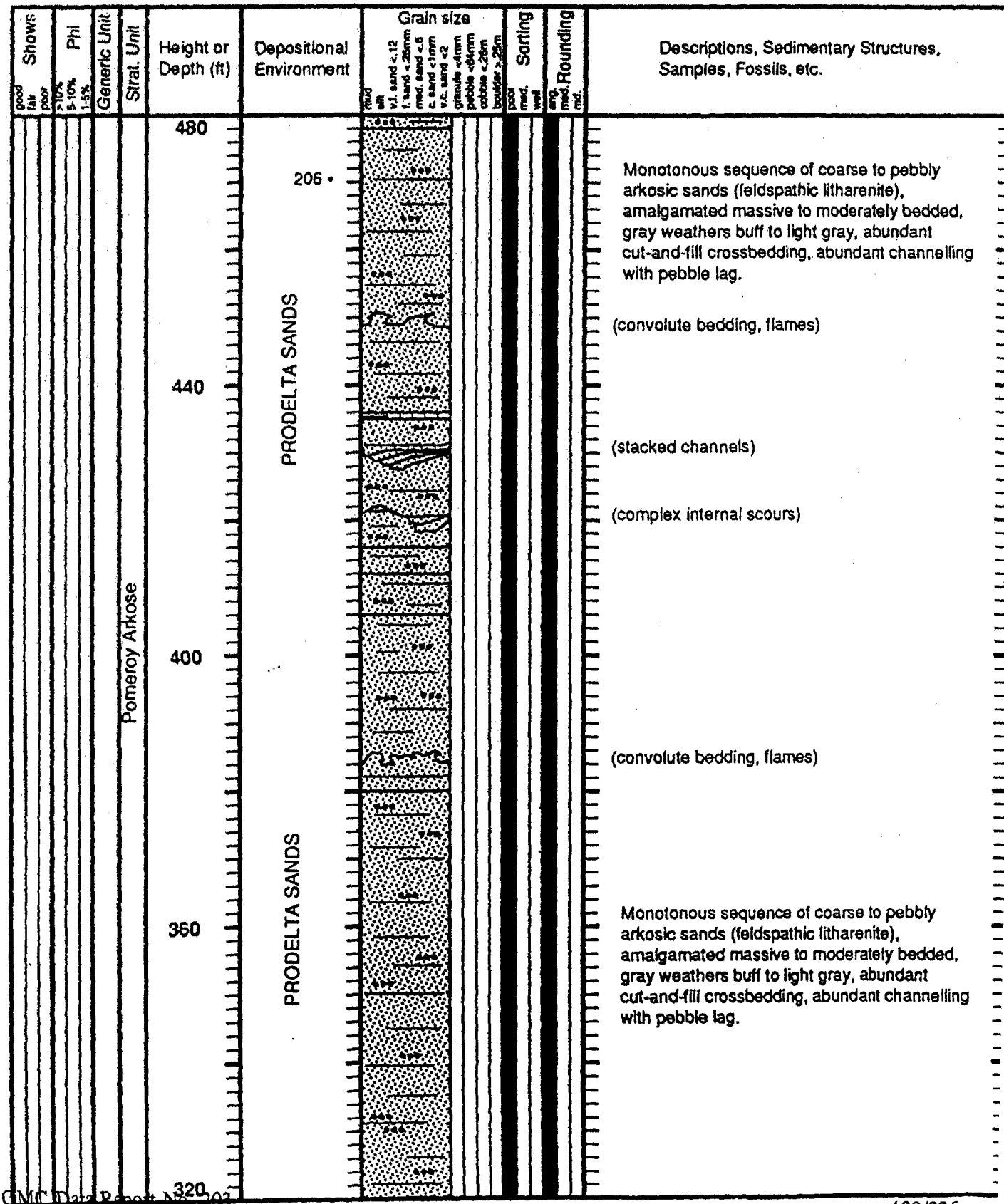

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Location Chinitna Bay (Seldovia D-8 Quad, secs 31,32,T3S,R21W) Described by S. W. Krueger

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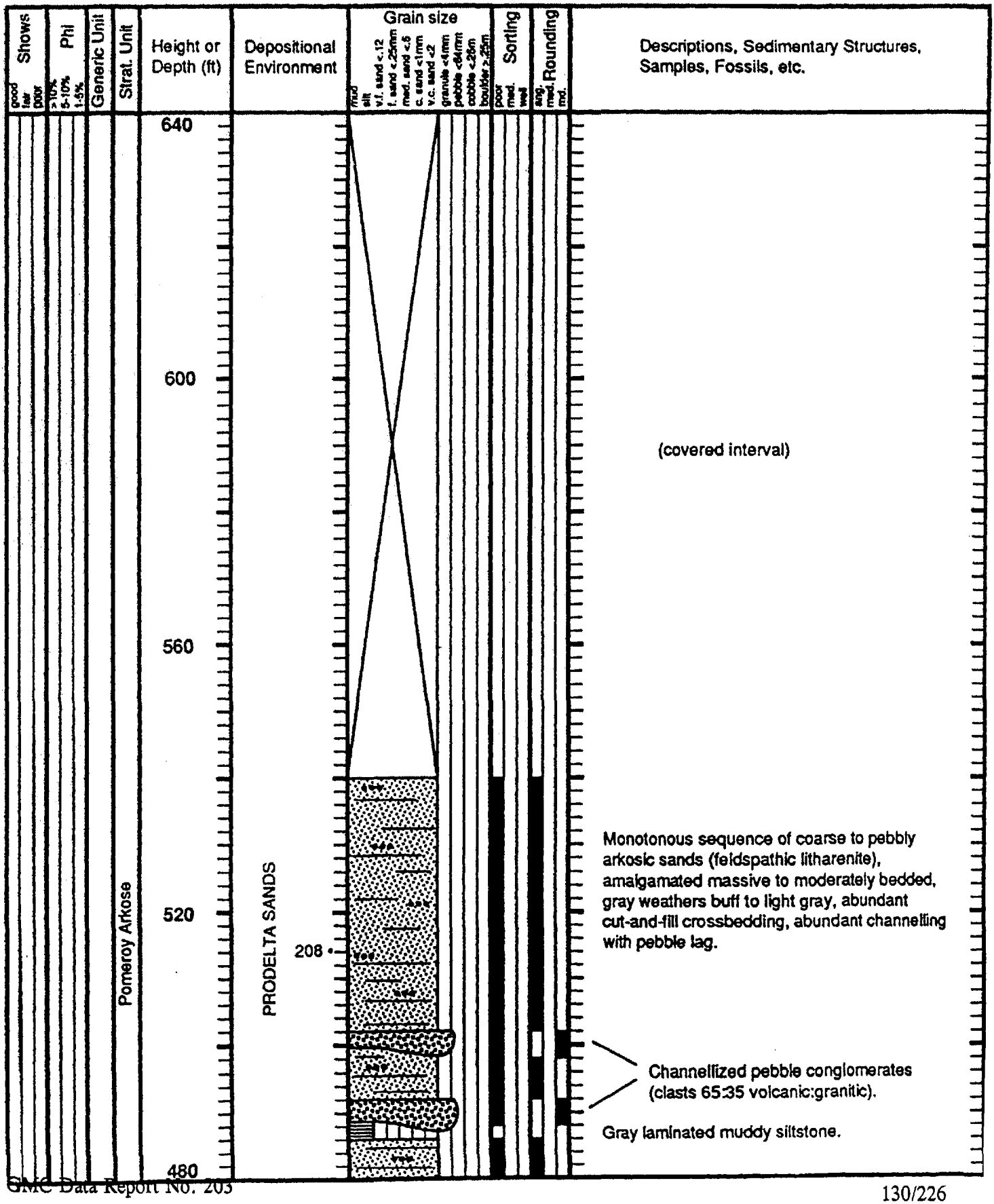

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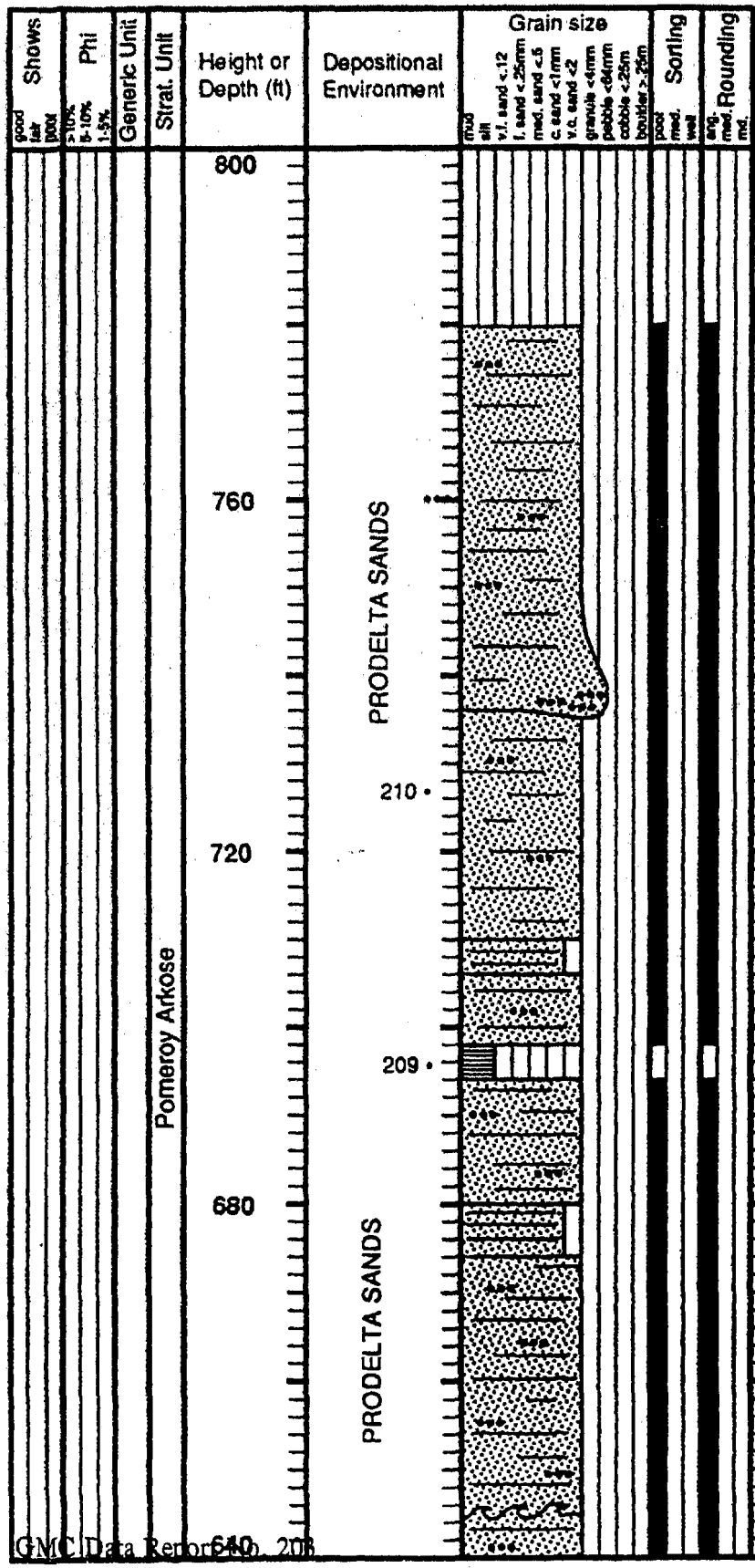


Descriptions, Sedimentary Structures, Samples, Fossils, etc.

(top of section at low tide obstacle point)

Monotonous sequence of coarse to pebbly arkosic sands (feldspathic litharenite), amalgamated massive to moderately bedded, gray weathers buff to light gray, abundant cut-and-fill crossbedding, abundant channelling with pebble lag.

Gray muddy siltstone.

Monotonous sequence of coarse to pebbly arkosic sands (feldspathic litharenite), amalgamated massive to moderately bedded, gray weathers buff to light gray, abundant cut-and-fill crossbedding, abundant channelling with pebble lag.

(convolute bedding, flames pointing N90E.)

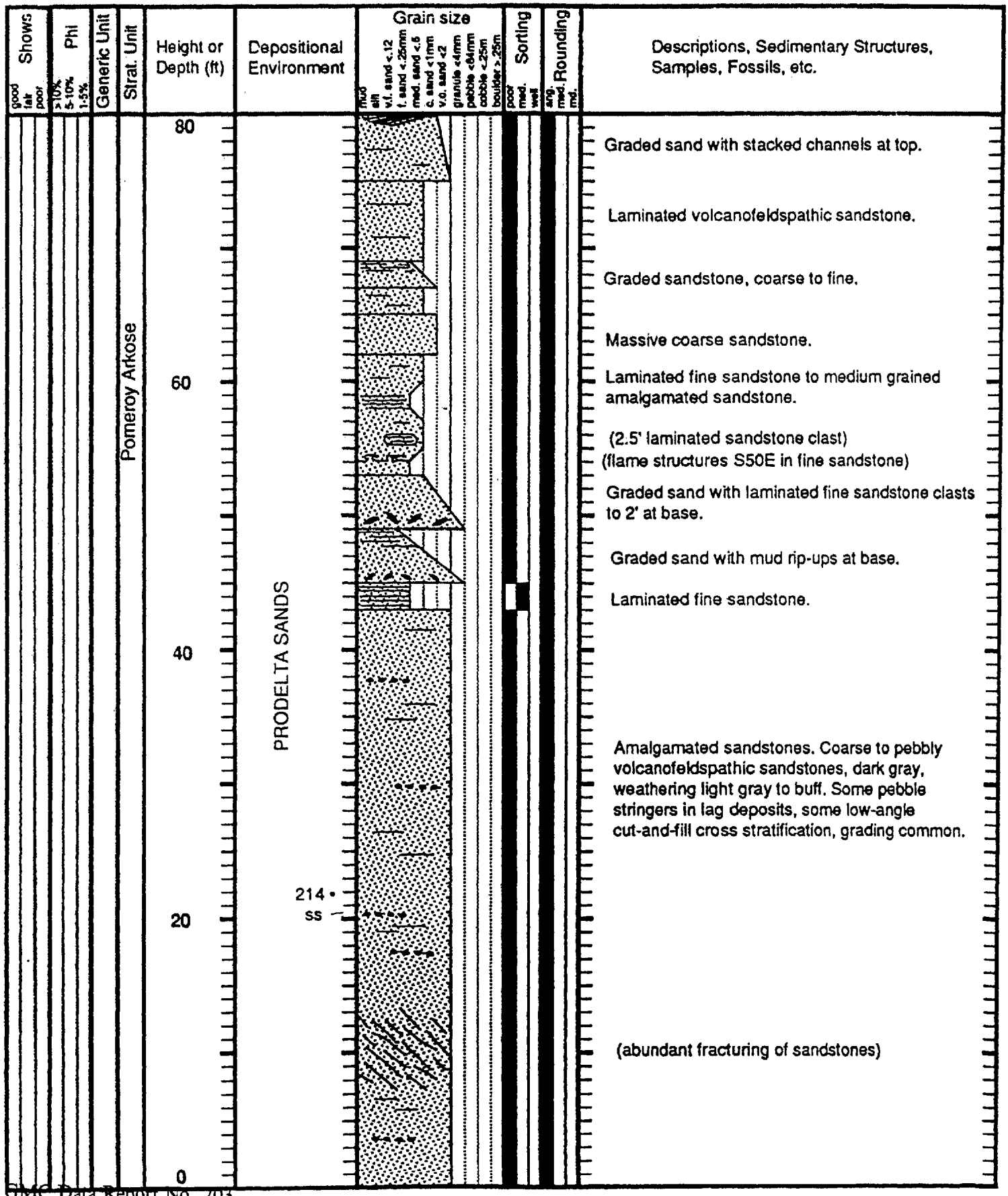
ARCO Alaska, Inc.

MEASURED SECTION FORM

Field Program 1991 Mesozoic Cook Inlet Stop No. 91LCP104 Formation(s) Pomeroy Arkose

Location Clam Cove, Chinitna Bay (Seldovia D-8 Quad, sec 30,T3S,R21W) Described by S. W. Krueger

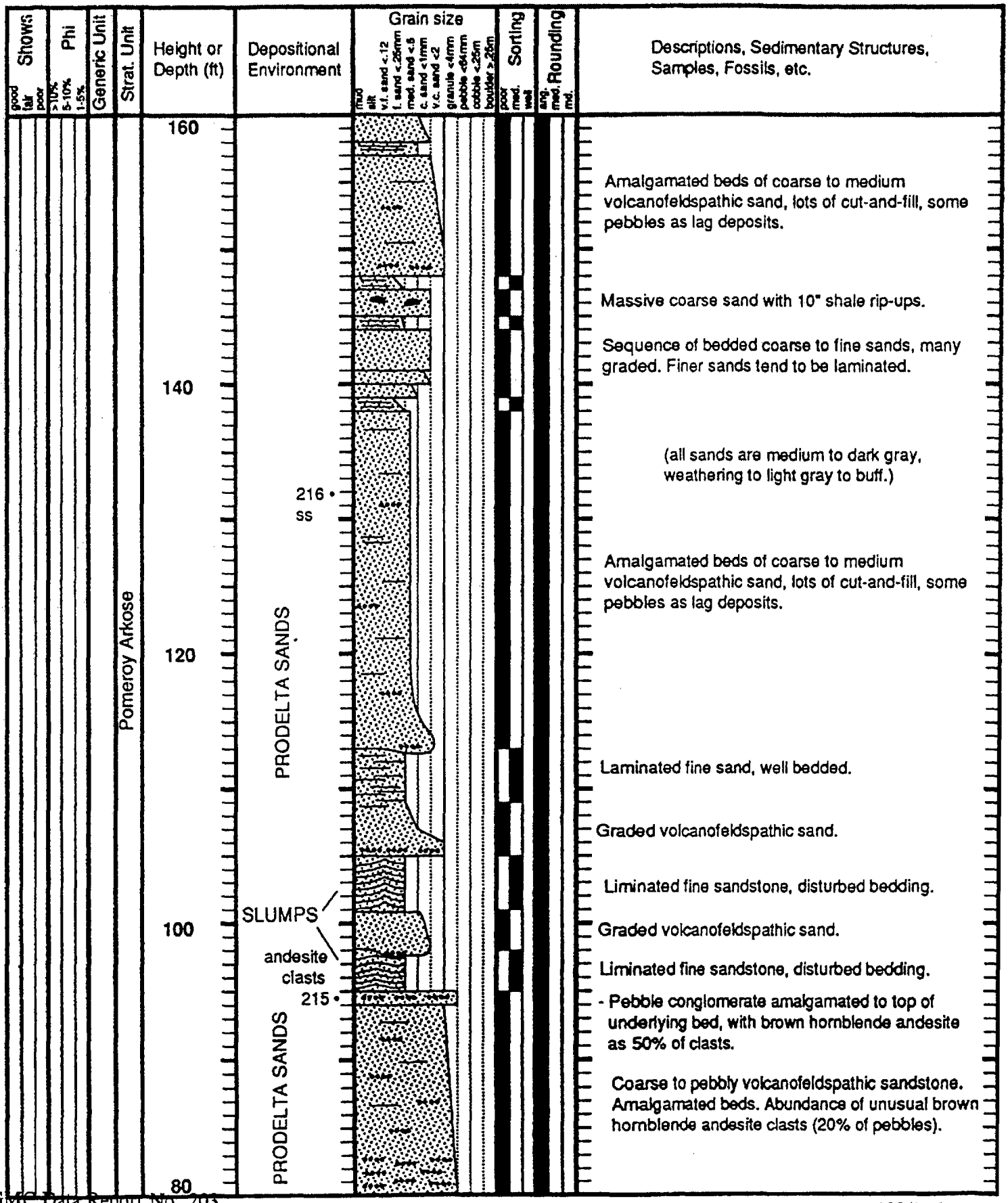
Measured Section MS 29 Pomeroy Arkose, Chinitna Bay, Alaska Peninsula Date 4 August 1991



Field Program 1991 Mesozoic Cook Inlet Stop No. 91LCP104 Formation(s) Pomeroy Arkose

Location Clam Cove, Chinitna Bay (Seldovia D-8 Quad, sec 30,T3S,R21W) Described by S. W. Krueger

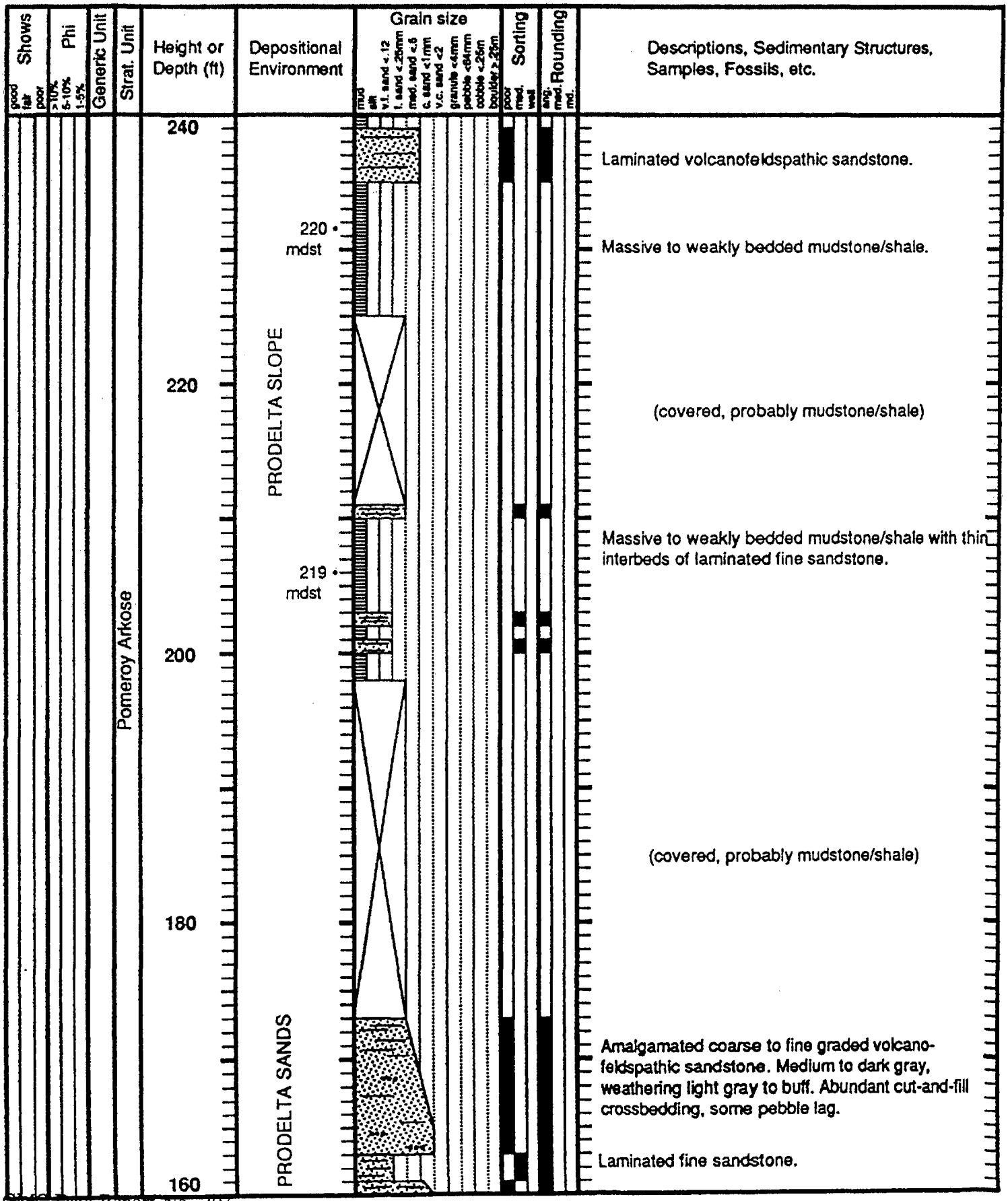
Measured Section MS 29 Pomeroy Arkose, Chinitna Bay, Alaska Peninsula Date 4 August 1991



Field Program 1991 Mesozoic Cook Inlet Stop No. 91LCP104 Formation(s) Pomeroy Arkose

Location Clam Cove, Chinitna Bay (Seldovia D-8 Quad, sec 30,T3S,R21W) Described by S. W. Krueger

Measured Section MS 29 Pomeroy Arkose, Chinitna Bay, Alaska Peninsula Date 4 August 1991



ARCO Alaska, Inc.

MEASURED SECTION FORM

Field Program 1991 Mesozoic Cook Inlet Stop No. 91LCP104 Formation(s) Pomeroy Arkose

Location Clam Cove, Chinitna Bay (Seldovia D-8 Quad, sec 30,T3S,R21W) Described by S. W. Krueger

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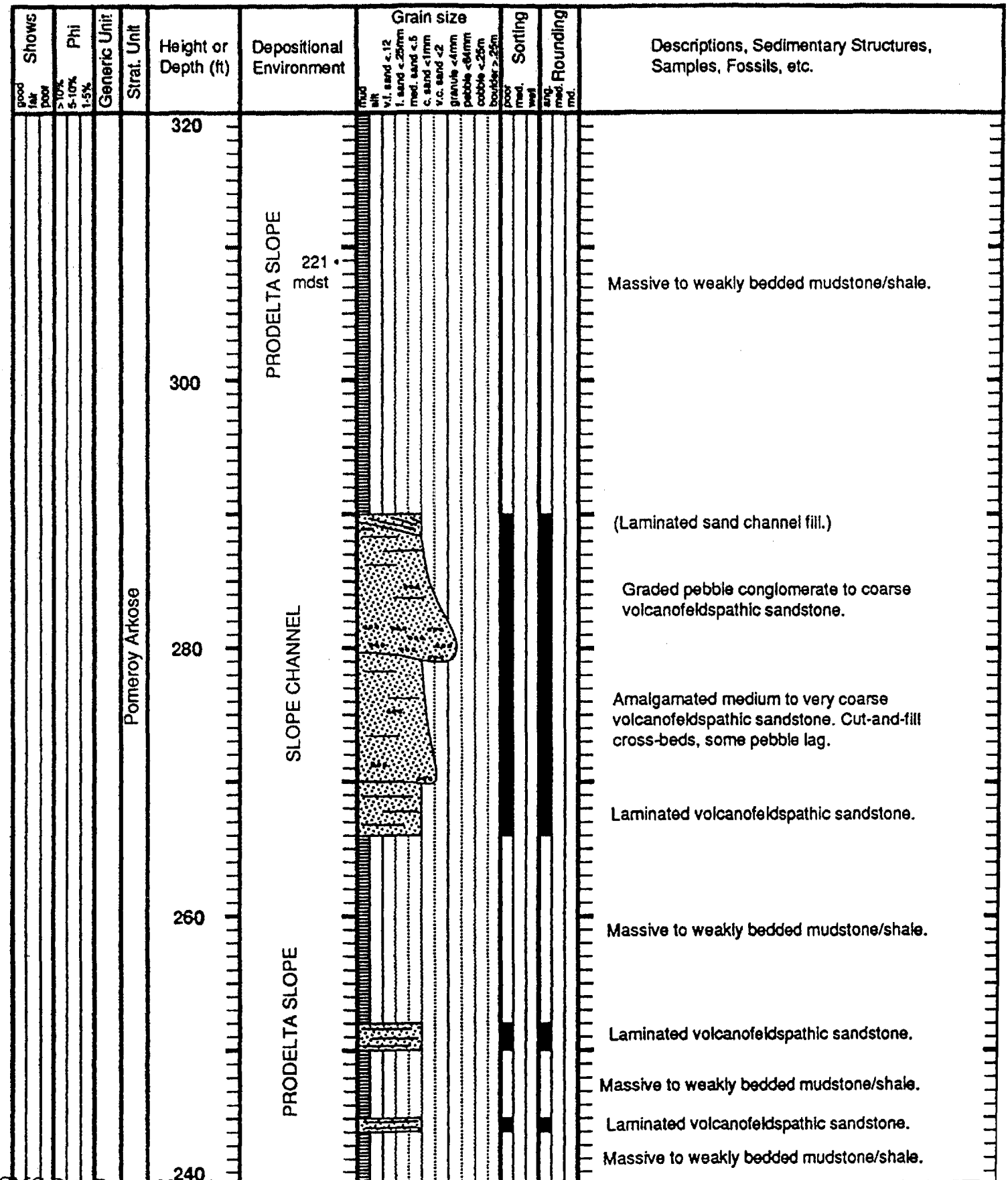
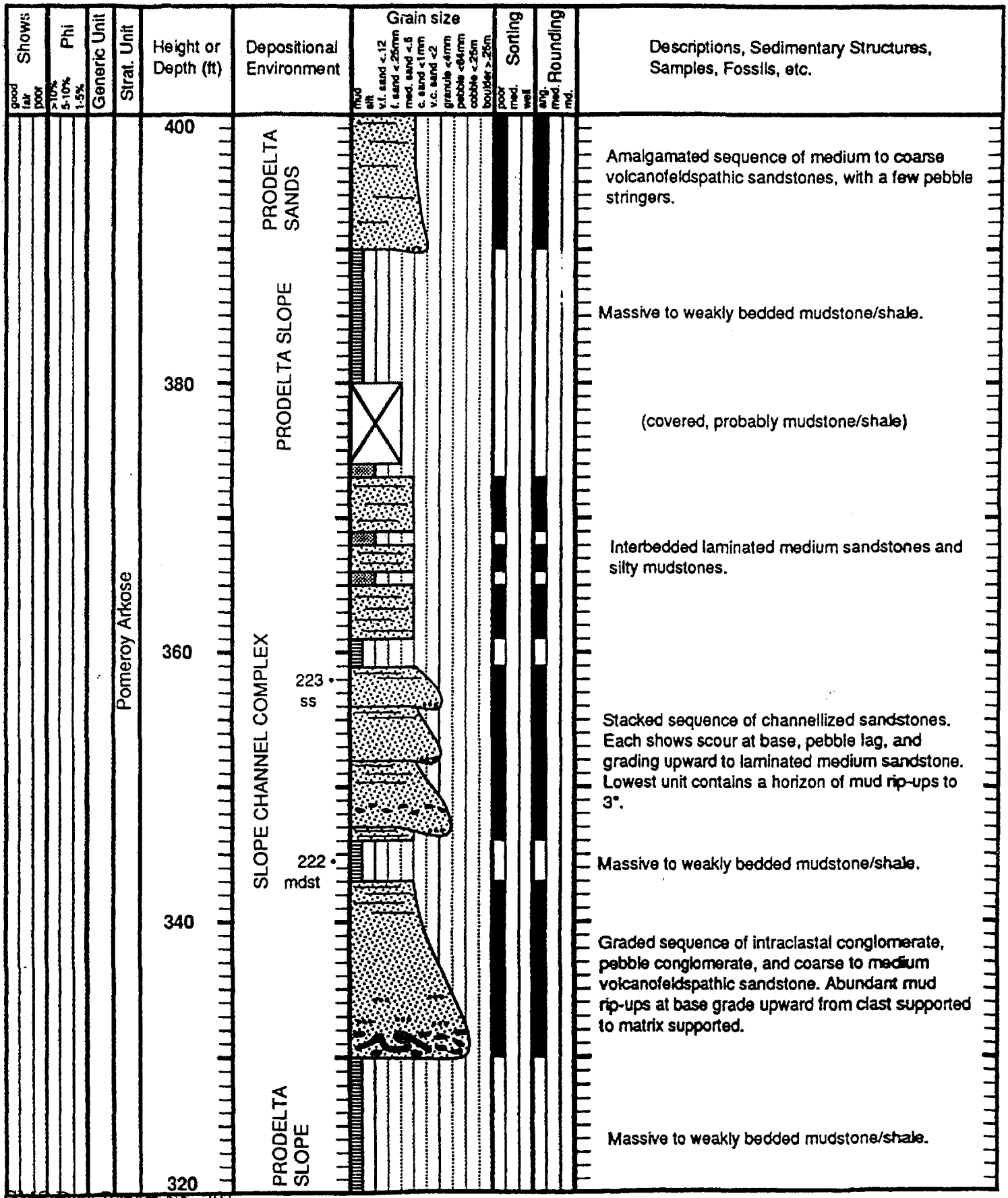


Field Program 1991 Mesozoic Cook Inlet Stop No. 91LCP104 Formation(s) Pomeroy Arkose

Location Clam Cove, Chinitna Bay (Seldovia D-8 Quad, sec 30,T3S,R21W) Described by S. W. Krueger

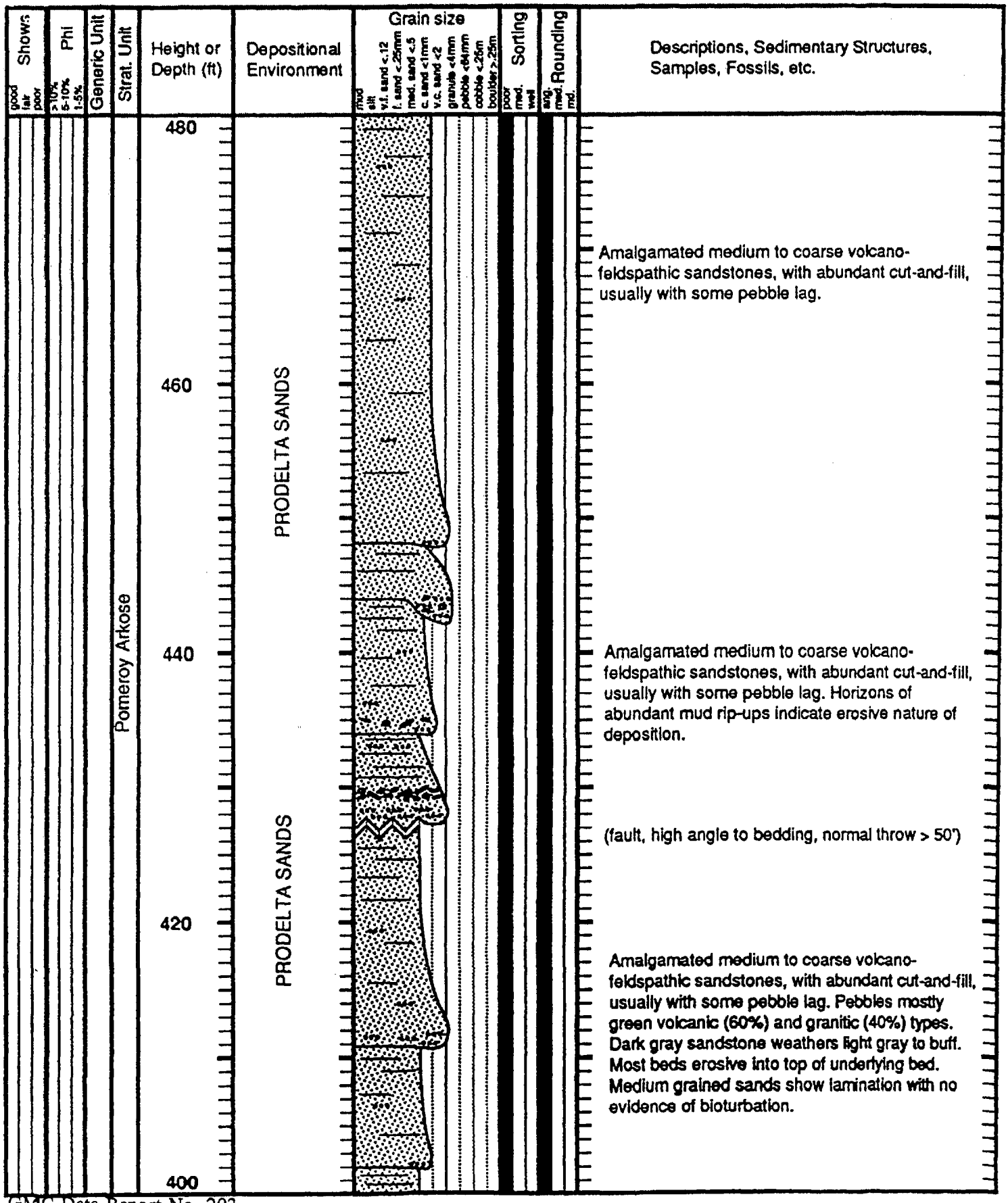
Measured Section MS 29 Pomeroy Arkose, Chinitna Bay, Alaska Peninsula Date 4 August 1991



Field Program 1991 Mesozoic Cook Inlet Stop No. 91LCP104 Formation(s) Pomeroy Arkose

Location Clam Cove, Chinitna Bay (Seldovia D-8 Quad, sec 30,T3S,R21W) Described by S. W. Krueger

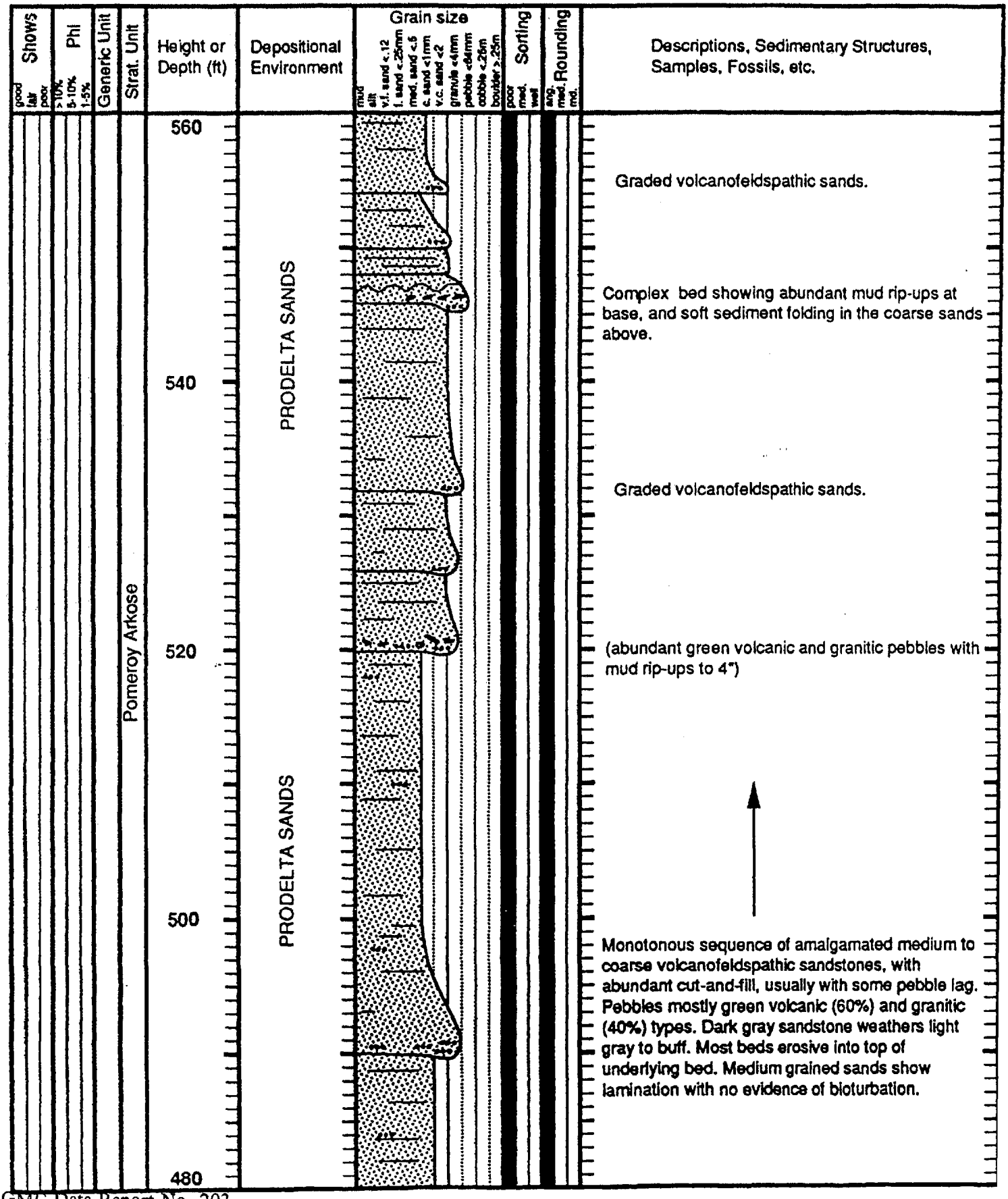
Measured Section MS 29 Pomeroy Arkose, Chinitna Bay, Alaska Peninsula Date 4 August 1991



Field Program 1991 Mesozoic Cook Inlet Stop No. 91LCP104 Formation(s) Pomeroy Arkose

Location Clam Cove, Chinitna Bay (Seldovia D-8 Quad, sec 30,T3S,R21W) Described by S. W. Krueger

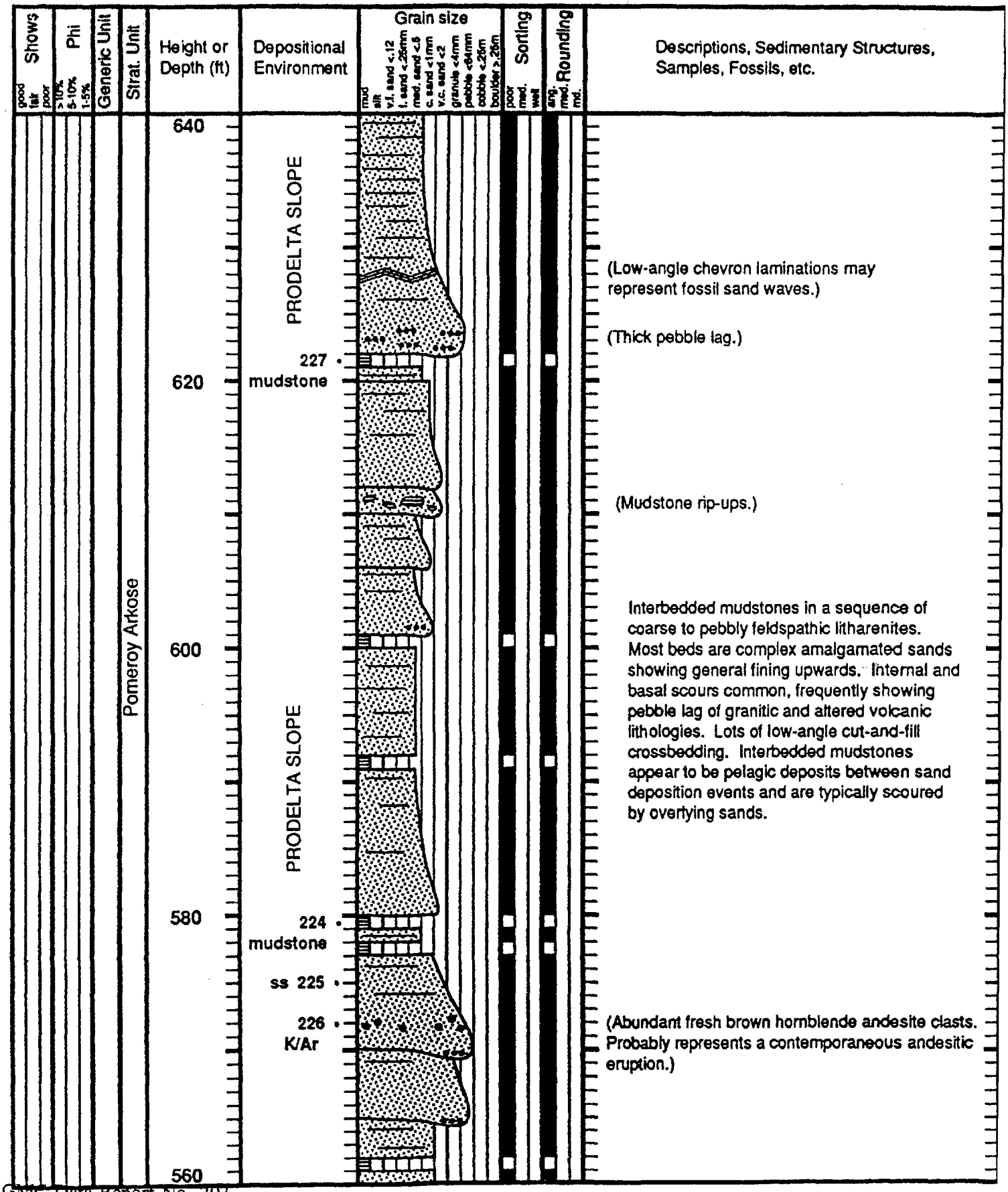
Measured Section MS 29 Pomeroy Arkose, Chinitna Bay, Alaska Peninsula Date 4 August 1991



Field Program 1991 Mesozoic Cook Inlet Stop No. 91LCP104 Formation(s) Pomeroy Arkose

Location Clam Cove, Chinitna Bay (Seldovia D-8 Quad, sec 30,T3S,R21W) Described by S. W. Krueger

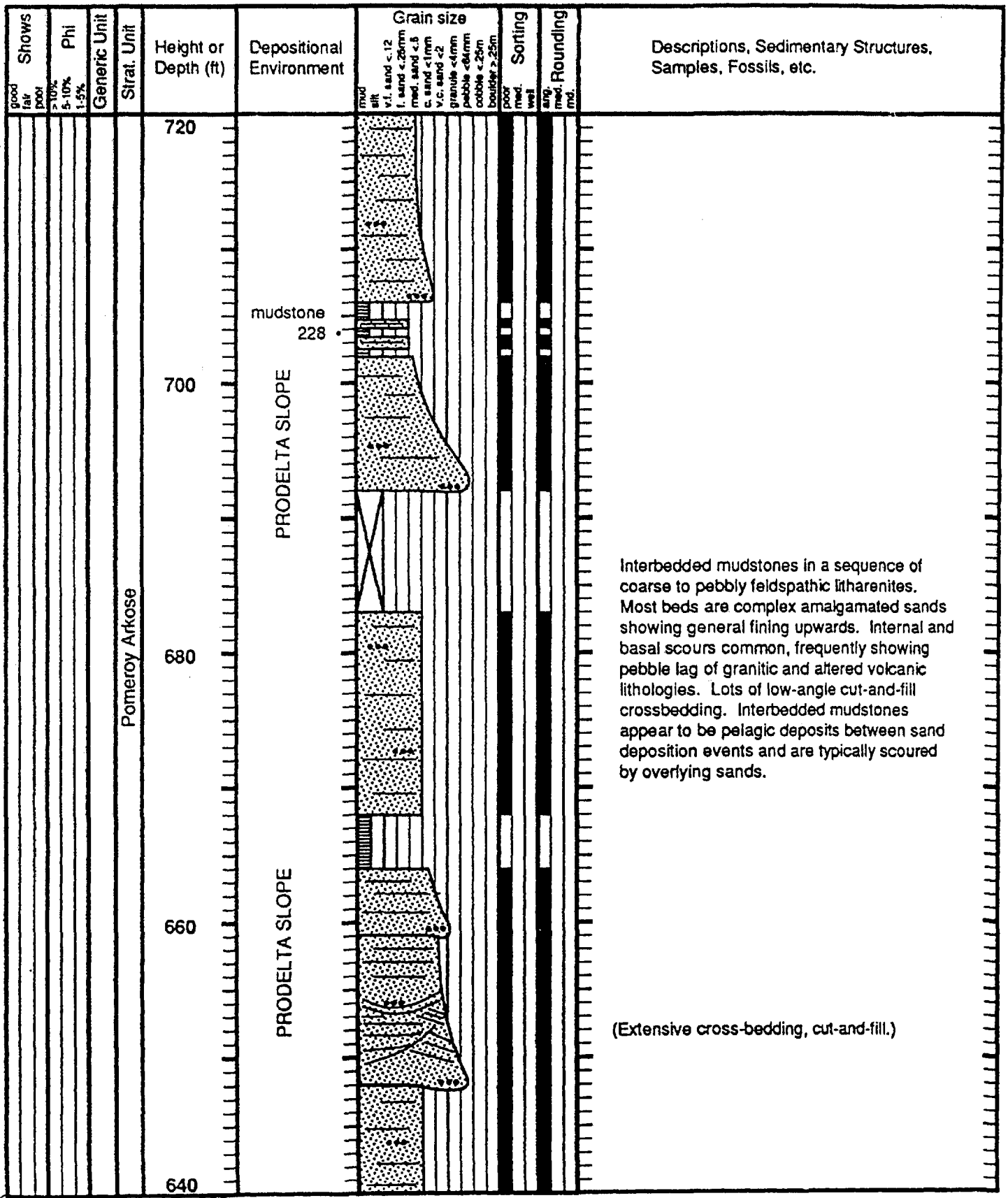
Measured Section MS 29 Pomeroy Arkose, Chinitna Bay, Alaska Peninsula Date 4 August 1991



Field Program 1991 Mesozoic Cook Inlet Stop No. 91LCP104 Formation(s) Pomeroy Arkose

Location Clam Cove, Chinitna Bay (Seldovia D-8 Quad, sec 30,T3S,R21W) Described by S. W. Krueger

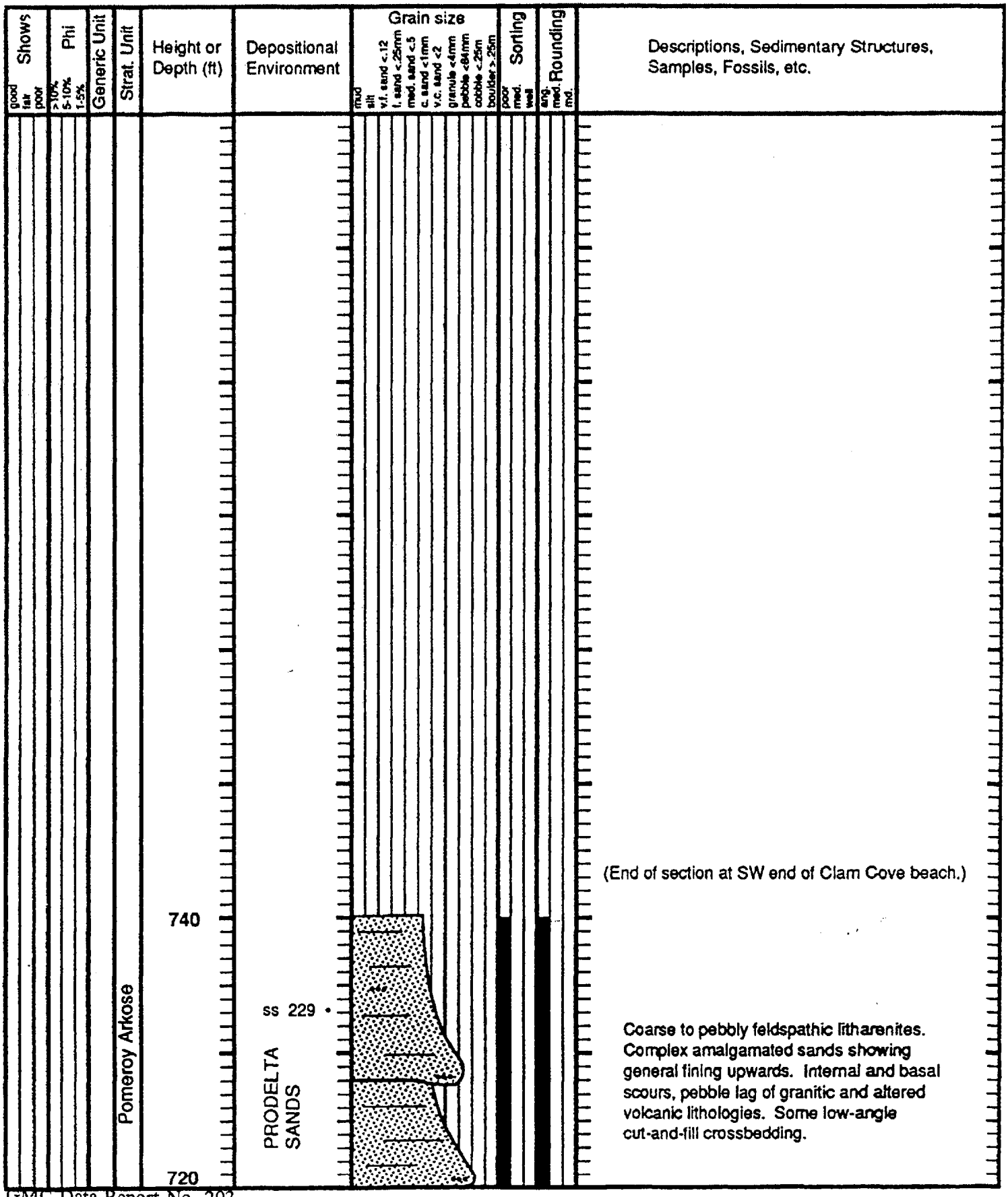
Measured Section MS 29 Pomeroy Arkose, Chinitna Bay, Alaska Peninsula Date 4 August 1991



Field Program 1991 Mesozoic Cook Inlet Stop No. 91LCP104 Formation(s) Pomeroy Arkose

Location Clam Cove, Chinitna Bay (Seldovia D-8 Quad, sec 30,T3S,R21W) Described by S. W. Krueger

Measured Section MS 29 Pomeroy Arkose, Chinitna Bay, Alaska Peninsula Date 4 August 1991



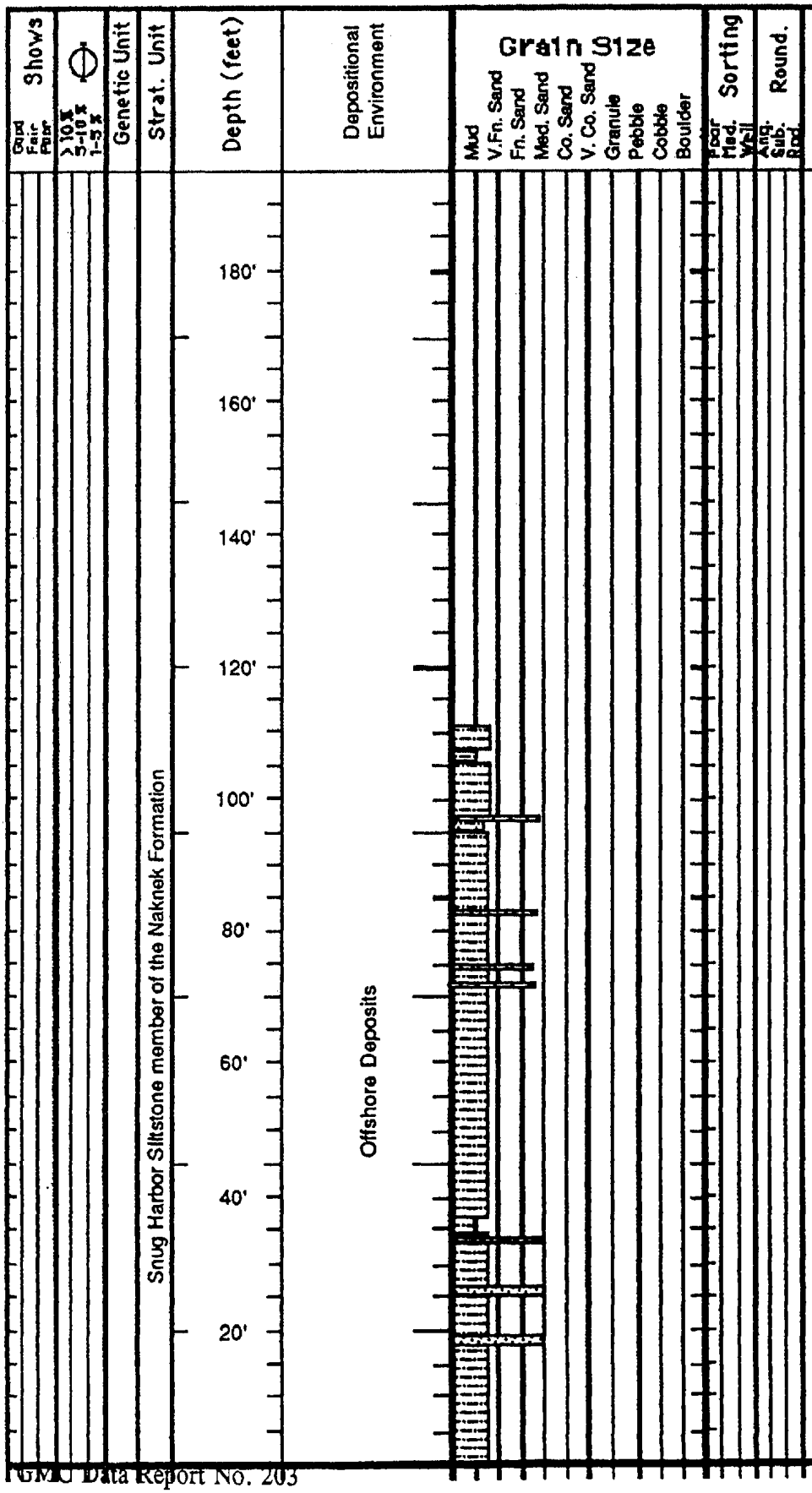
91 LCP 201

ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program: Mesozoic Cook Inlet Stop No.: Site 201 Formations: Naknek

Measured Section: Number Date: August 6, 1991

Location: Sec. line 8/9, T1S R19W Kenai Quad A-7 Described By: William Morris



91LCP201-402
Sandstone bed do not have erosive bases.

Normal-graded sandstone
Claystone
Symetrical ripples
Rare horizontal and vertical burrows
Normal-graded sandstone
Pyrite nodules
Current ripples

Black mudstone rip-ups layers
91LSP201-402
Siltstone to very fine-grained sandstone. Structures commonly not visible. Locally ripple, horizontal laminated or massive, burrows are rare

Current ripples

Tabc turbidite

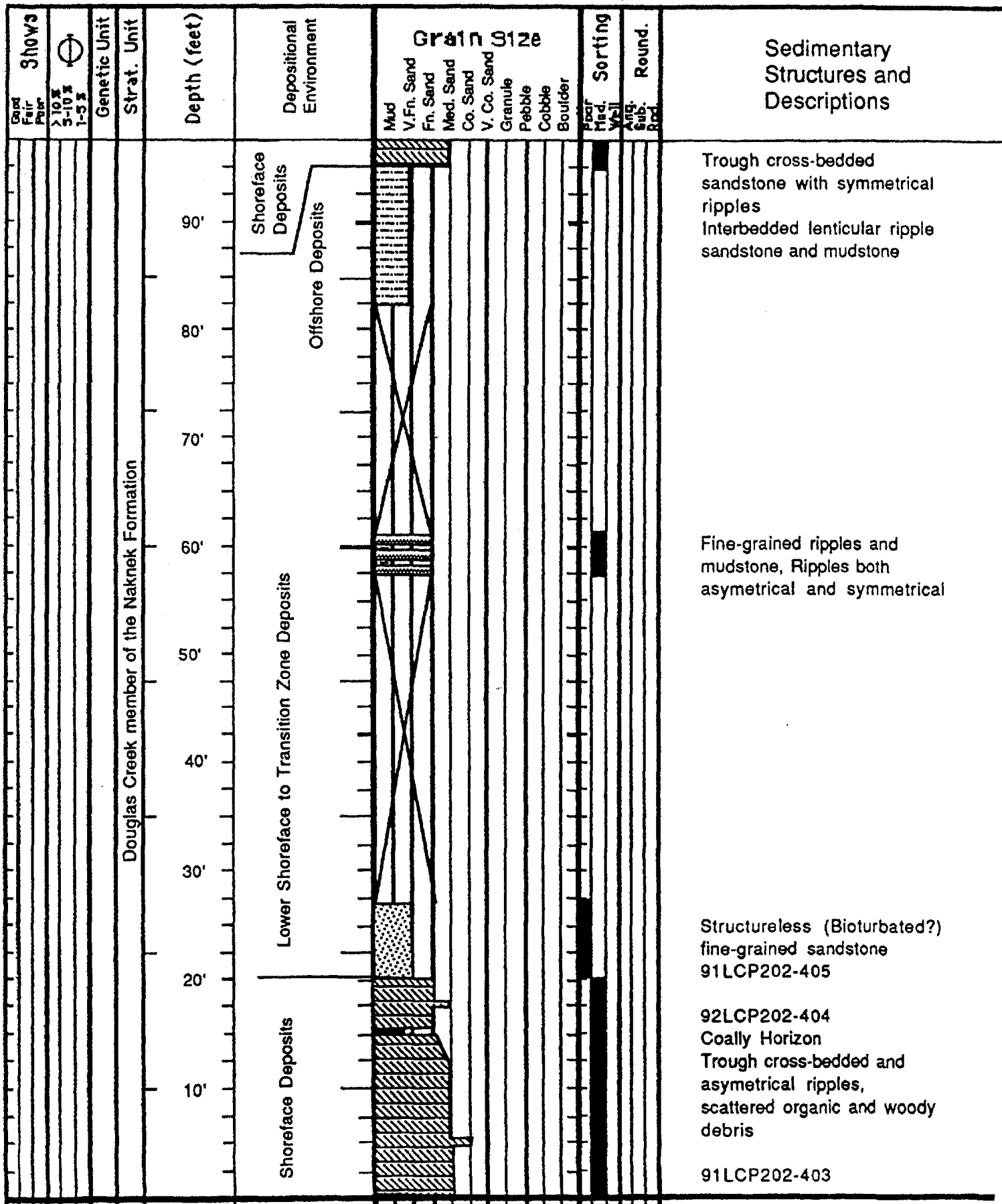
Tbc turbidite

ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program: Mesozoic Cook Inlet Stop No.: Site 202 Formations: Naknek

Measured Section: Number Date: August 8, 1991

Location: N.E. Sec. 11, T10S R25W Iliamna Quad B-2 Described By: William Morris



91 LCP 202

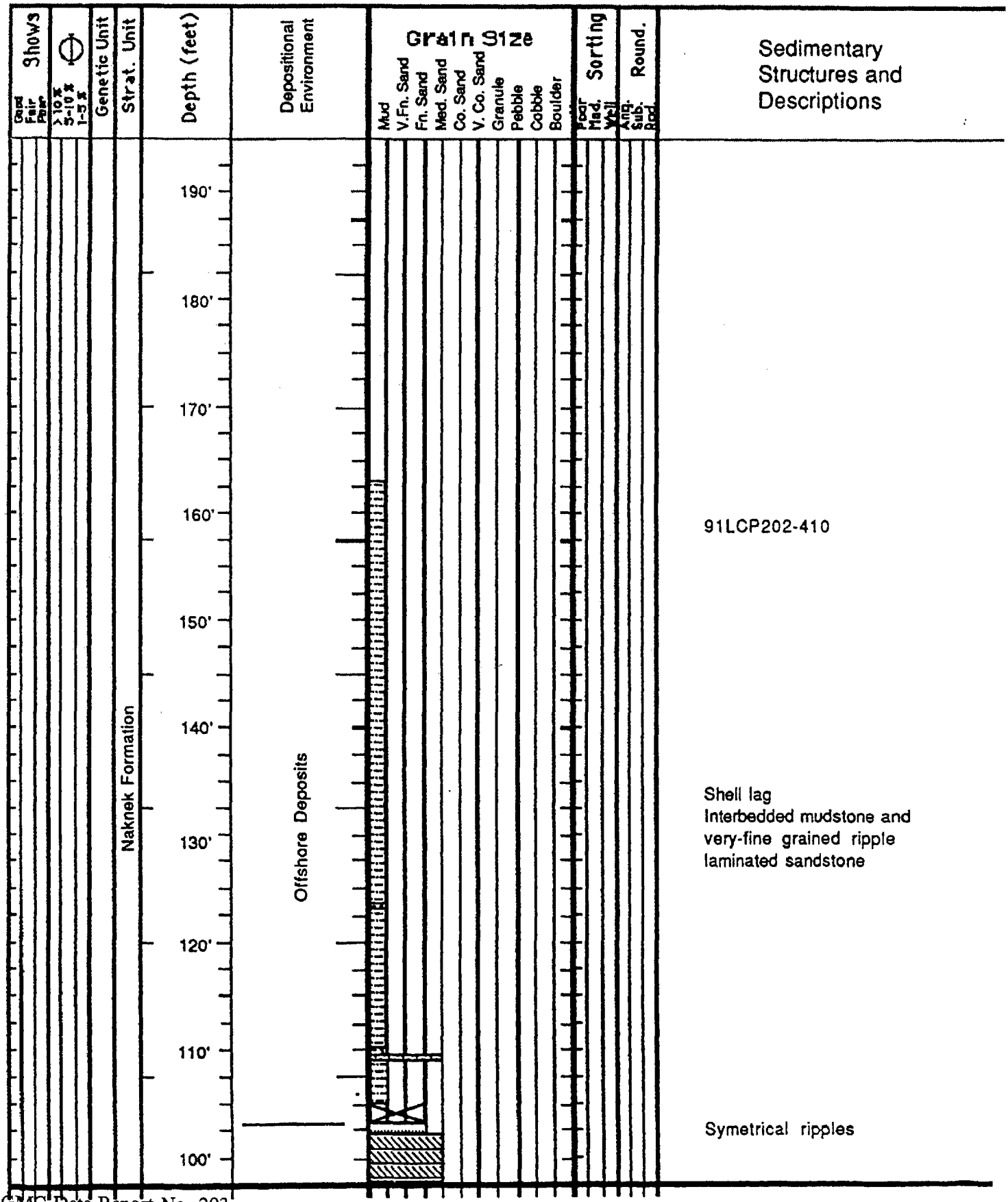
ARCO Alaska, Inc. MEASURED SECTION FORM

Page 2 of 2

Field Program: Mesozoic Cook Inlet Stop No.: ~~Site202~~ 91 LCP 202 Formations: Naknek

Measured Section: Number Date: August 8, 1991

Location: N.E. Sec.11, T10S R25W Iliamna Quad B-2 Described By: William Morris



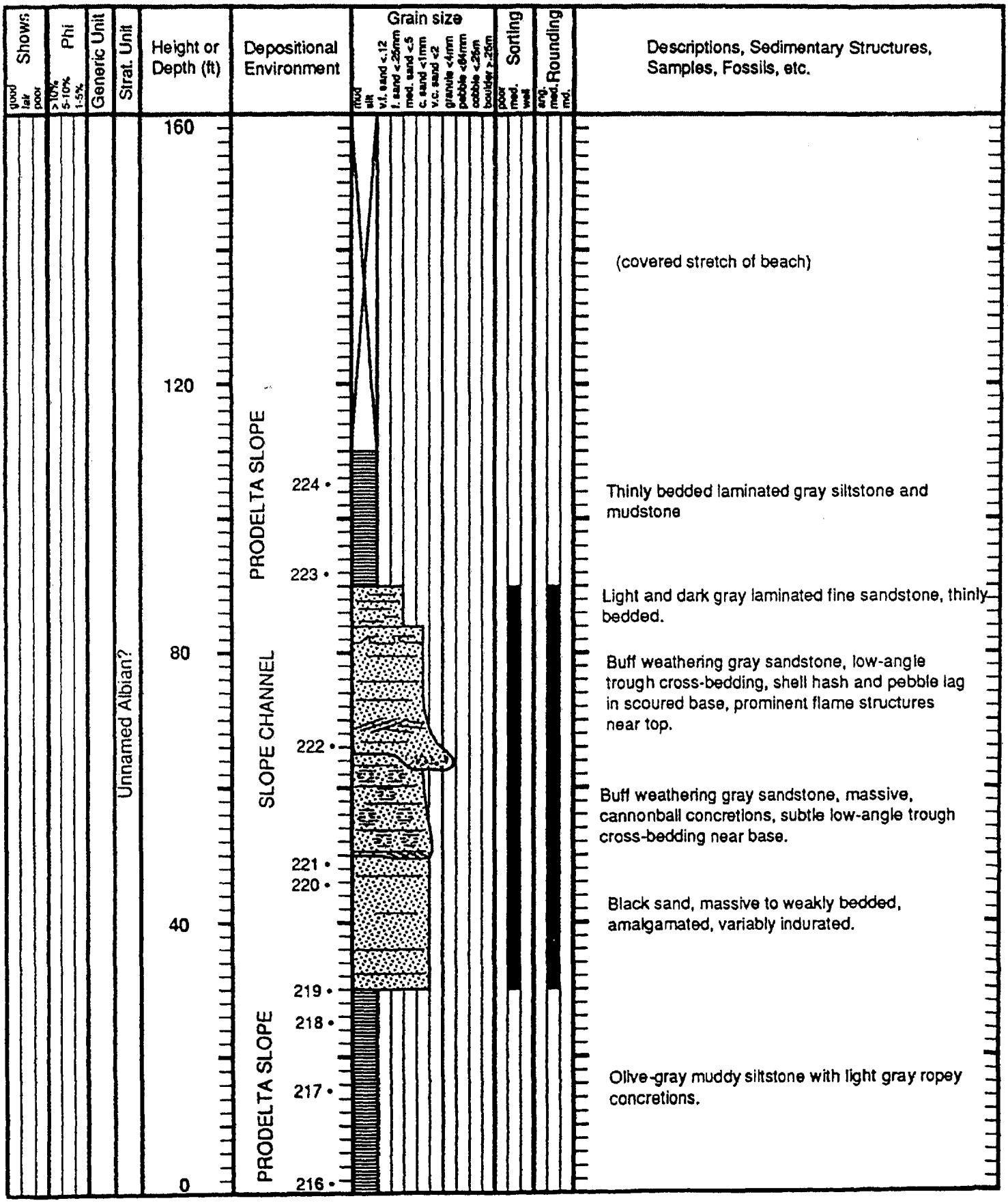
ARCO Alaska, Inc.

MEASURED SECTION FORM

Field Program 1991 Mesozoic Cook Inlet Stop No. 91KAT101 Formation(s) Kaguyak Fmn/Unnamed Albian

Location Mt Pedmar seacliffs (Mt Katmai A-3 Quad, sec 19,T25S,R33W) Described by S. W. Krueger

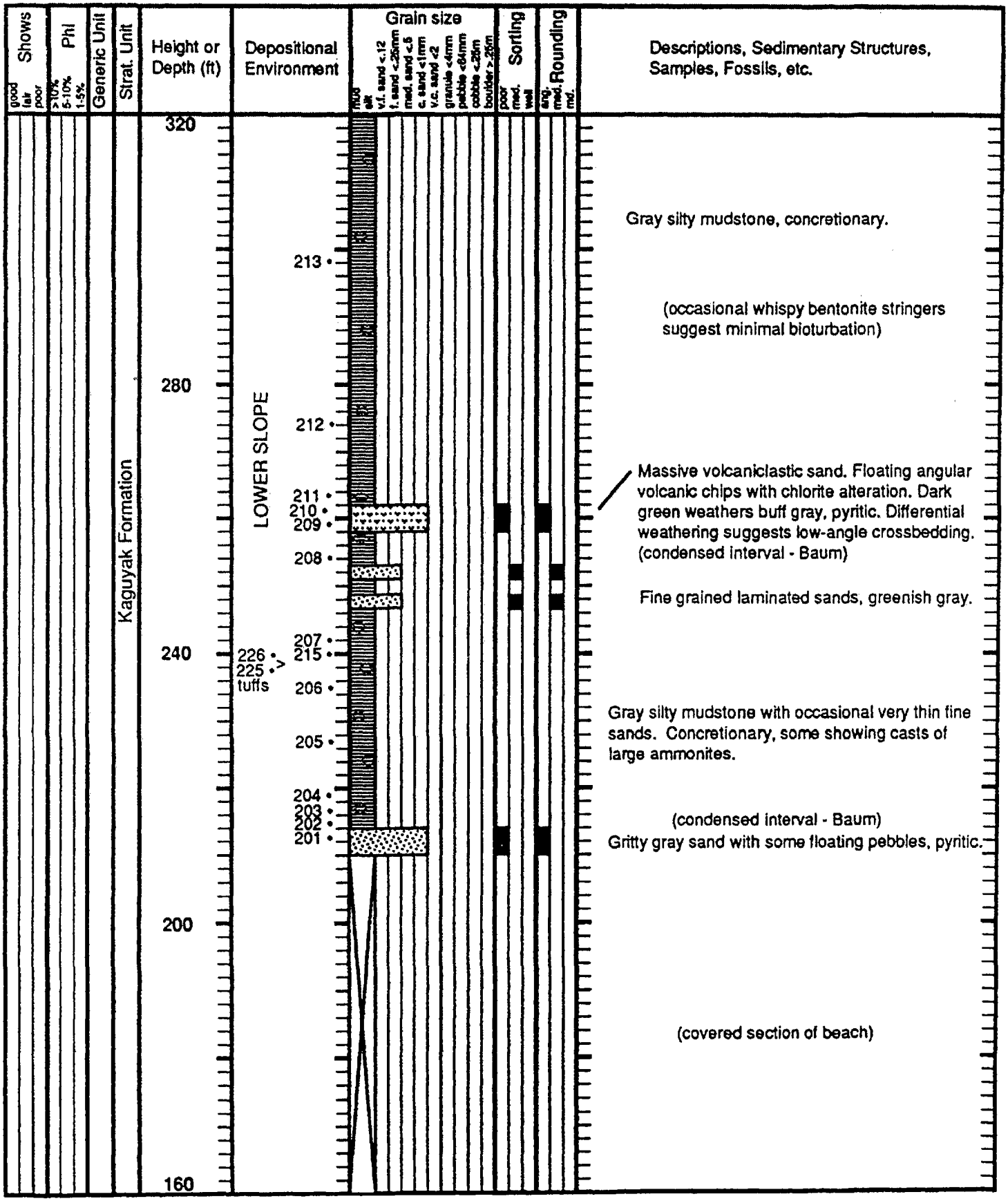
Measured Section MS 14 Kaguyak/Albian, Mt Pedmar Seacliffs, Alaska Peninsula Date 20-22 June 1991



Field Program **1991 Mesozoic Cook Inlet** Stop No. **91KAT101** Formation(s) **Kaguyak Fmn/Unnamed Albian**

Location **Mt Pedmar seacliffs (Mt Katmai A-3 Quad, sec 19,T25S,R33W)** Described by **S. W. Krueger**

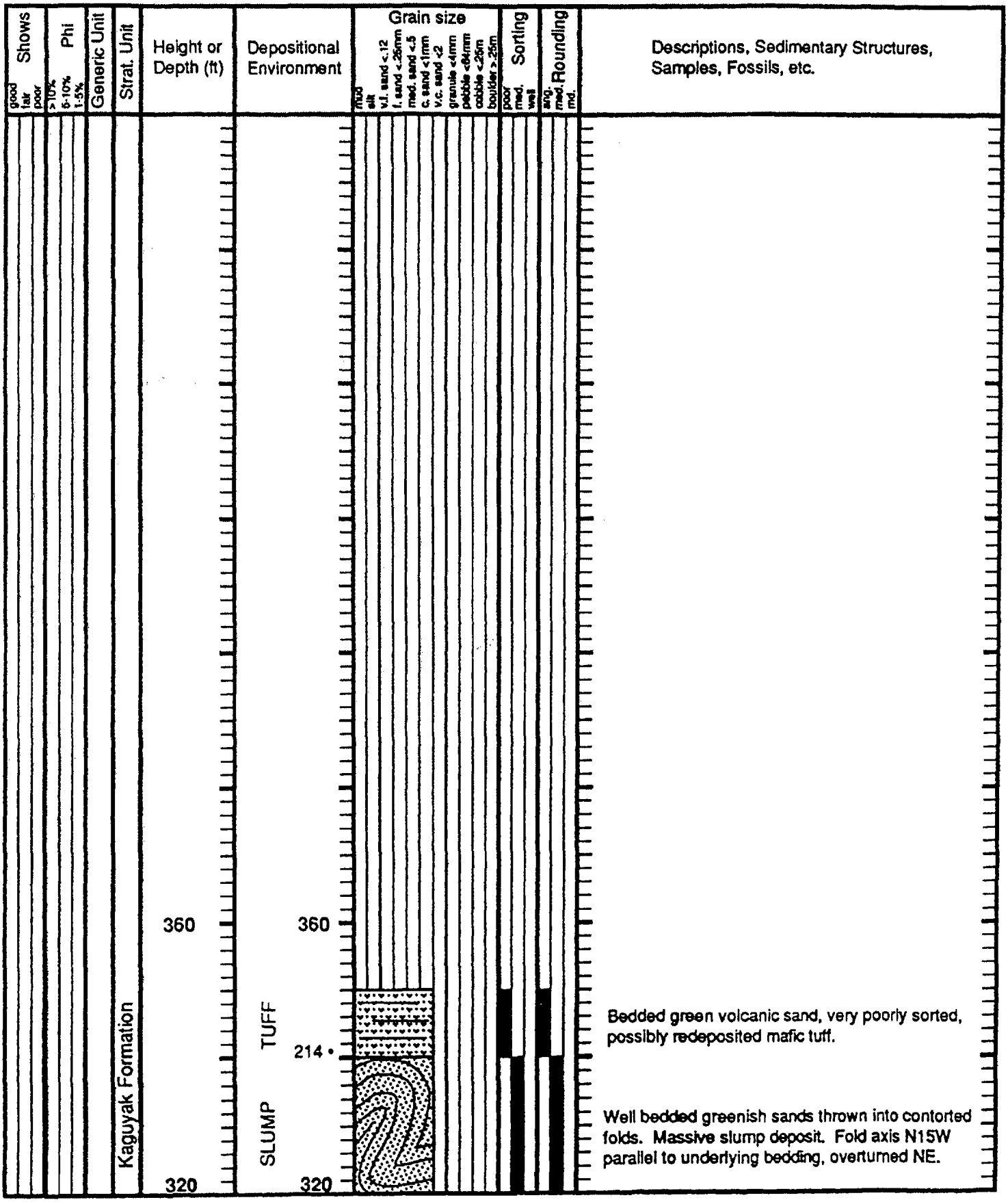
Measured Section **MS 14 Kaguyak/Albian, Mt Pedmar Seacliffs, Alaska Peninsula** Date **20-22 June 1991**



Field Program 1991 Mesozoic Cook Inlet Stop No. 91KAT101 Formation(s) Kaguyak Fmn/Unnamed Albian

Location Mt Pedmar seacliffs (Mt Katmai A-3 Quad, sec 19,T25S,R33W) Described by S. W. Krueger

Measured Section MS 14 Kaguyak/Albian, Mt Pedmar Seacliffs, Alaska Peninsula Date 20-22 June 1991

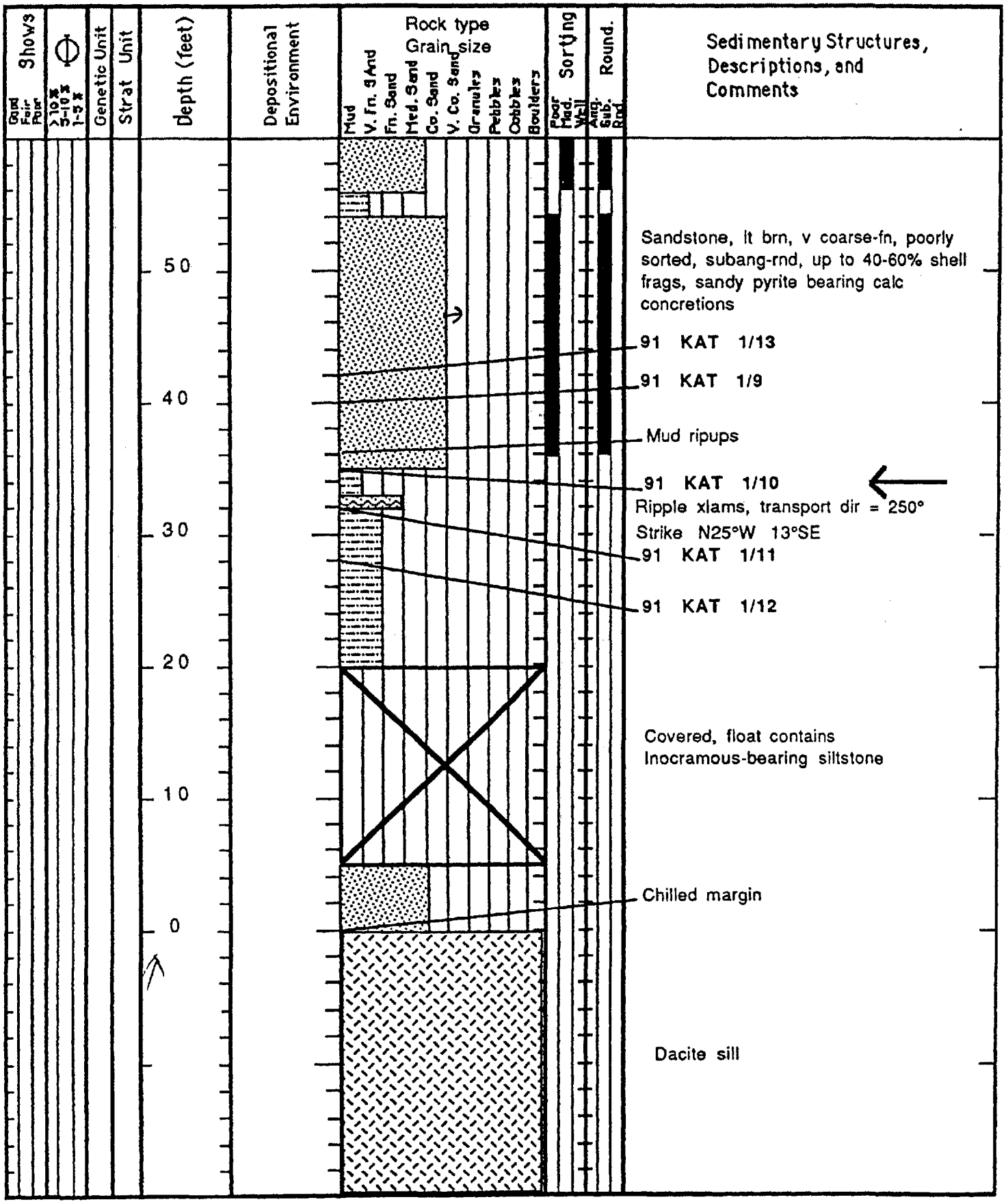


ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program 1991 Alaska Peninsula Stop No. 91 KAT 1 Formations Naknek

Measured Section #15 Date 6/20/91

Location NW1/4 SW1/4 NW1/4 SEC34, T24S R34W Described By D. Doherty



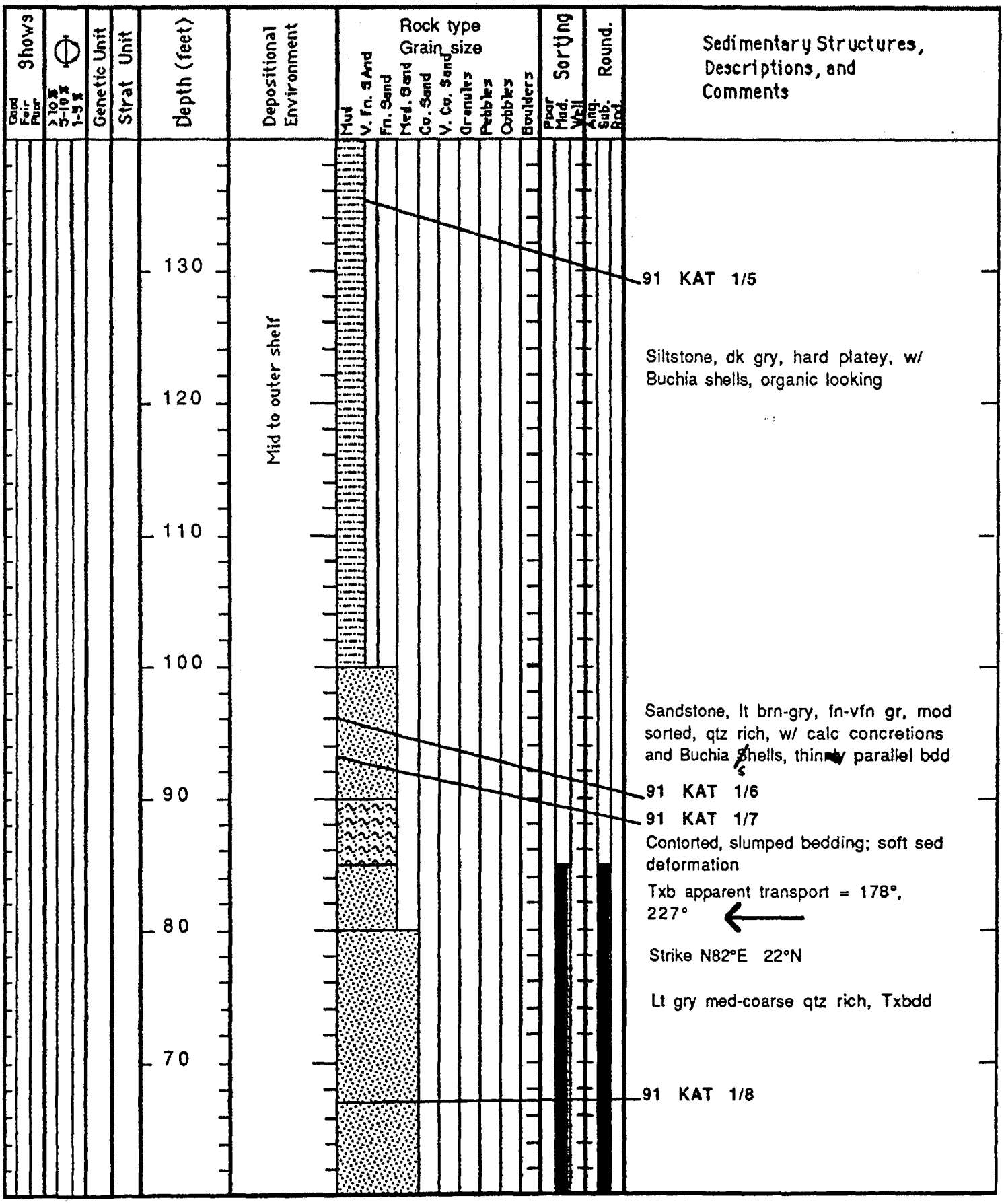
ARCO Alaska, Inc. MEASURED SECTION FORM

Page 2 of 4

Field Program 1991 Alaska Peninsula Stop No. 91 WB 15 Formations Naknek

Measured Section #15 Date 6/20/91

Location NW1/4 SW1/4 NW1/4, SEC 34, T24S Described By D. Doherty



ARCO Alaska, Inc. MEASURED SECTION FORM Page 3/2 of 4

Field Program 1991 Alaska Peninsula Stop No. 91 WB 15 Formations Naknek

Measured Section #15 Date 6/20/91

Location NW1/4 SW1/4 NW1/4, SEC34, T24S R34W Described By D. Doherty

Shows (Good, Fair, Poor)	Porosity (>10%, 5-10%, 1-5%)	Genetic Unit	Strat Unit	Depth (feet)	Depositional Environment	Rock type / Grain size (Mud, V. Fn. Sand, Fn. Sand, Med. Sand, Co. Sand, V. Co. Sand, Granules, Pebbles, Cobbles, Boulders)	Sorting (Poor, Mod., Well)	Round. (Ang., Sub., Rnd.)	Sedimentary Structures, Descriptions, and Comments
				210					
				200					Siltstone, dk gry, hard platey, w/ Buchia shells, organic looking
				190	Mid to outer shelf				
				180					
				170					
				160					
				150					

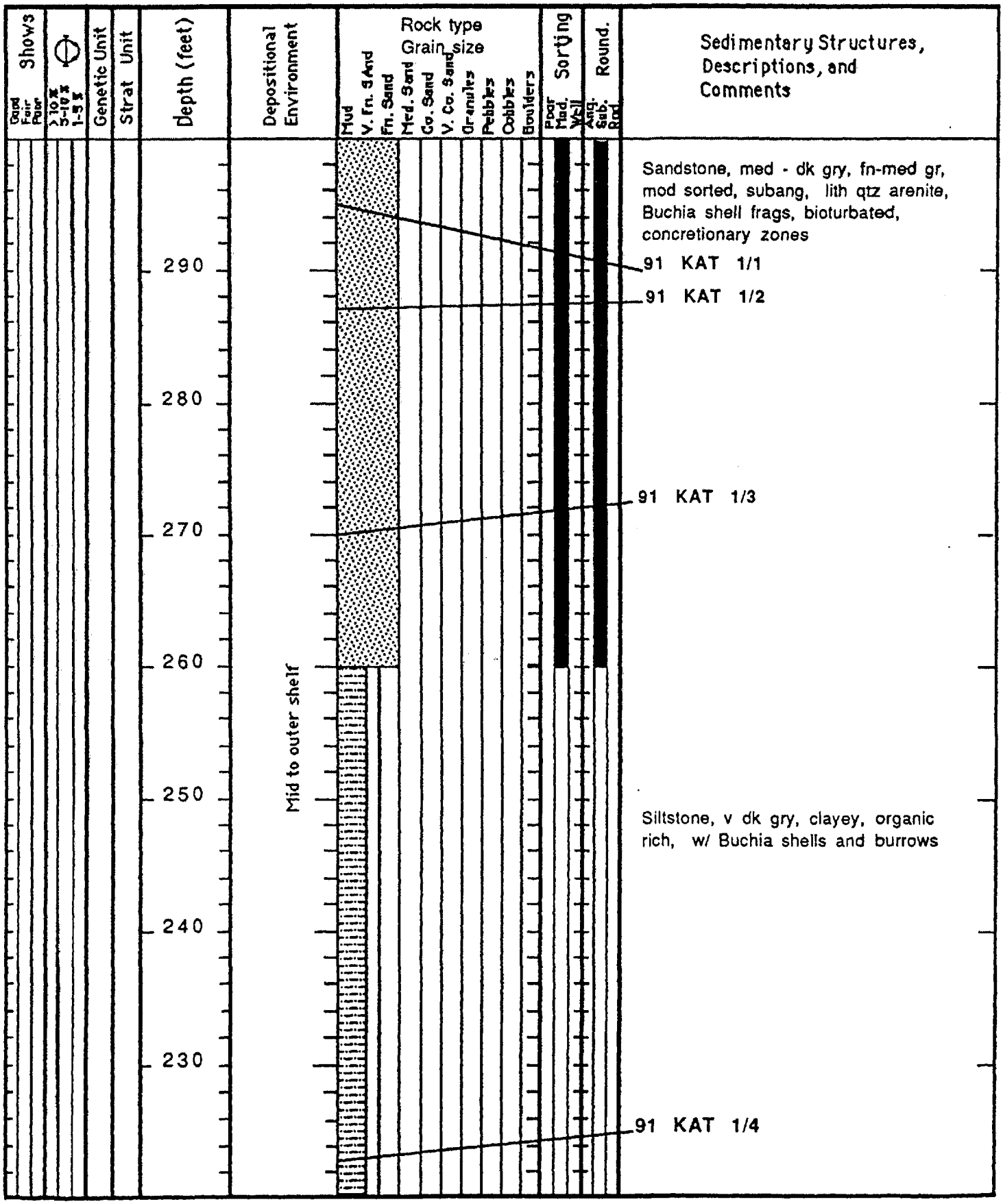
ARCO Alaska, Inc. MEASURED SECTION FORM

Page 4 of 4

Field Program 1991 Alaska Peninsula Stop No. 91 KAT 1 Formations Naknek

Measured Section #15 Date 6/20/91

Location NW1/4 SW1/4 NW1/4, SEC 34, T24S R34W Described By D. Doherty

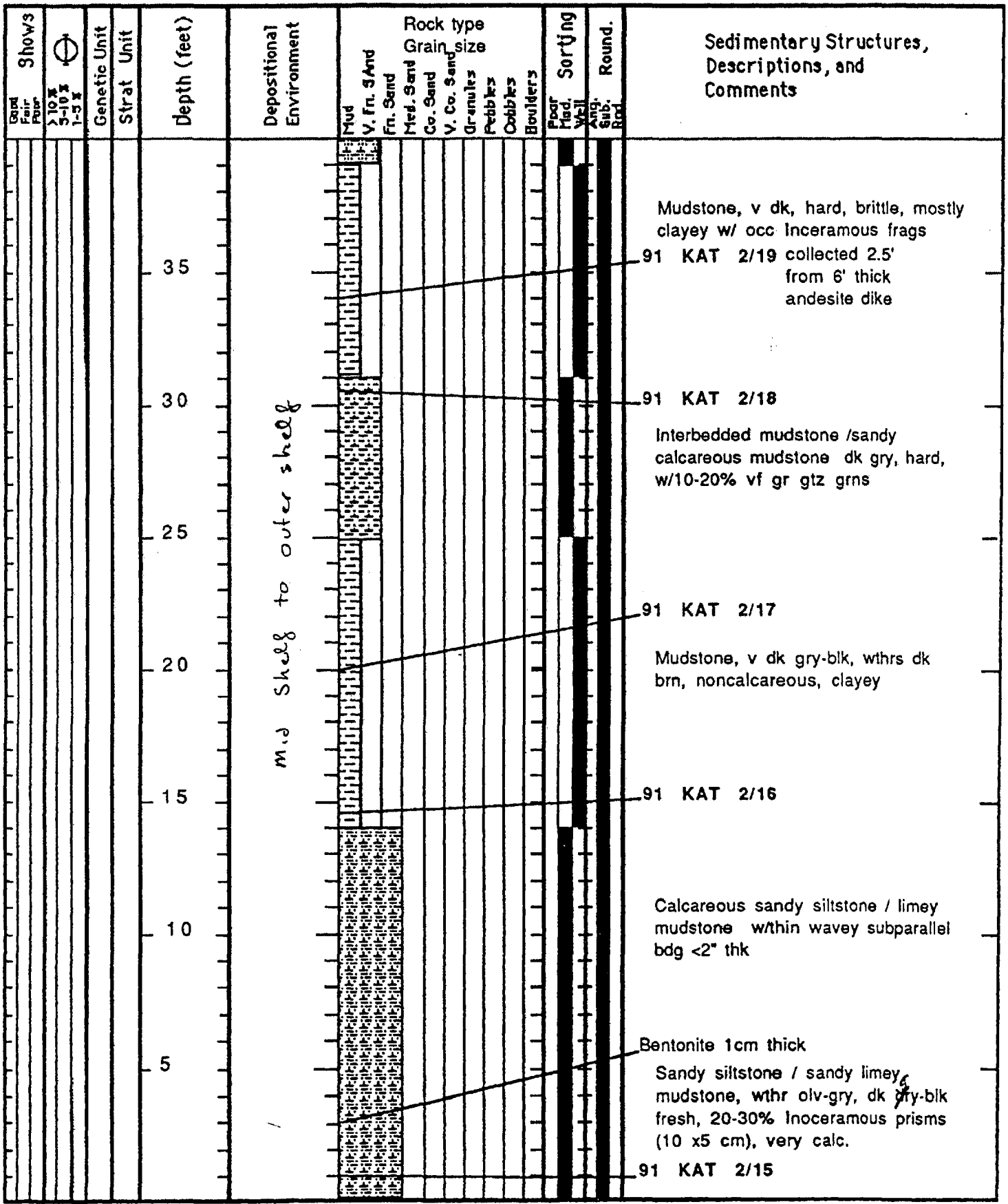


ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program 1991 Alaska Peninsula Stop No. 91 KAT 2 Formations Herendeen

Measured Section #21 Date 6/22/91

Location NW1/4 SE1/4, SEC 3, T24S R35W Described By D. Doherty

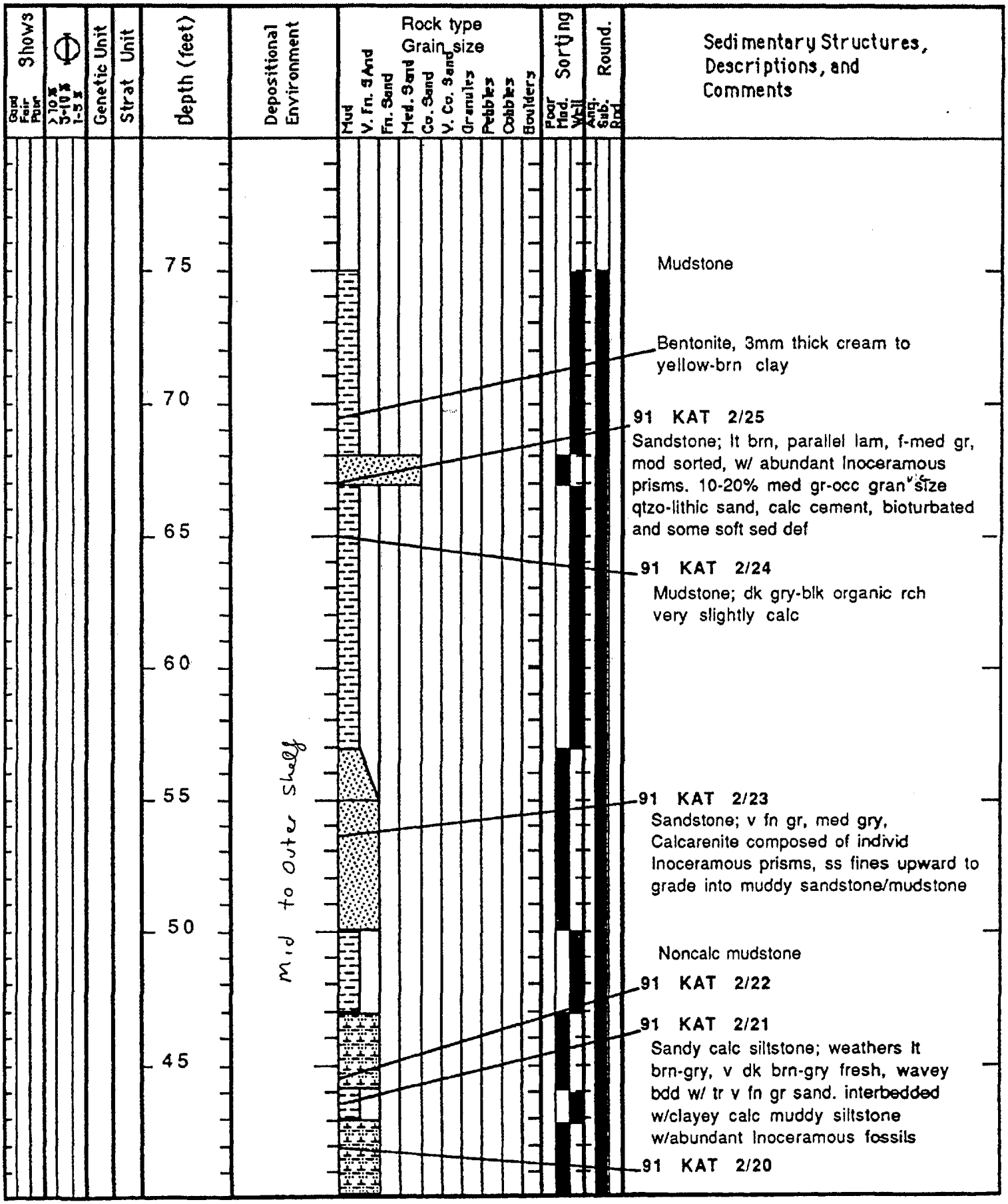


ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program 1991 Alaska Peninsula Stop No. 91 KAT 2 Formations Herendeen

Measured Section #21 Date 6/22/91

Location NW1/4 SE1/4, SEC 3, T24S R35W Described By D. Doherty

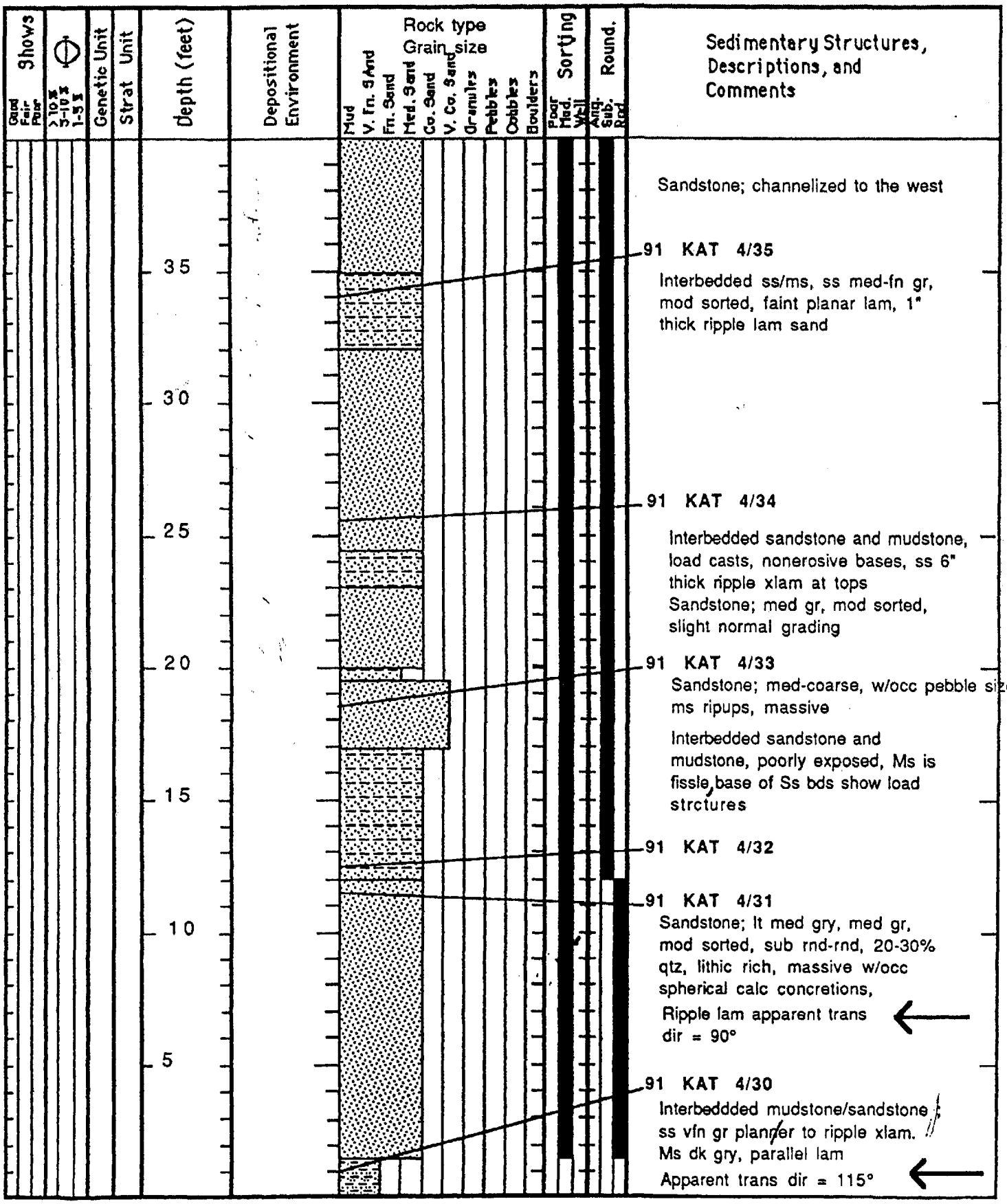


ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program 1991 Alaska Peninsula Stop No. 91 KAT 4 Formations Kaguyak

Measured Section #22 Date 6/26/91

Location NE1/4 NW1/4, SEC 20, T18S R27W Described By D. Doherty

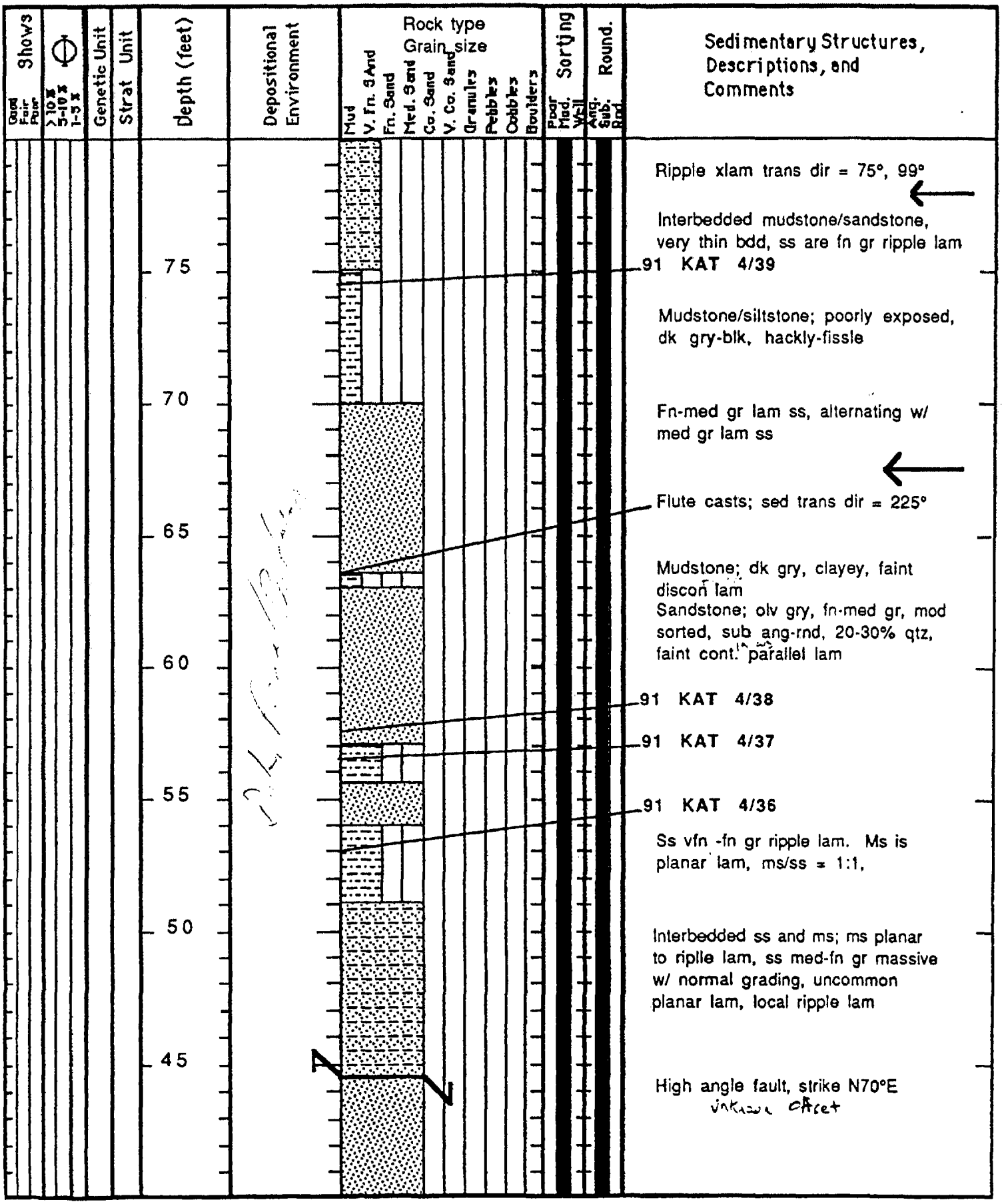


ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program 1991 Alaska Peninsula Stop No. 91 KAT 4 Formations Kaguyak

Measured Section #22 Date 6/26/91

Location NE1/4 NW1/4, SEC 20, T18S R27W Described By D. Doherty

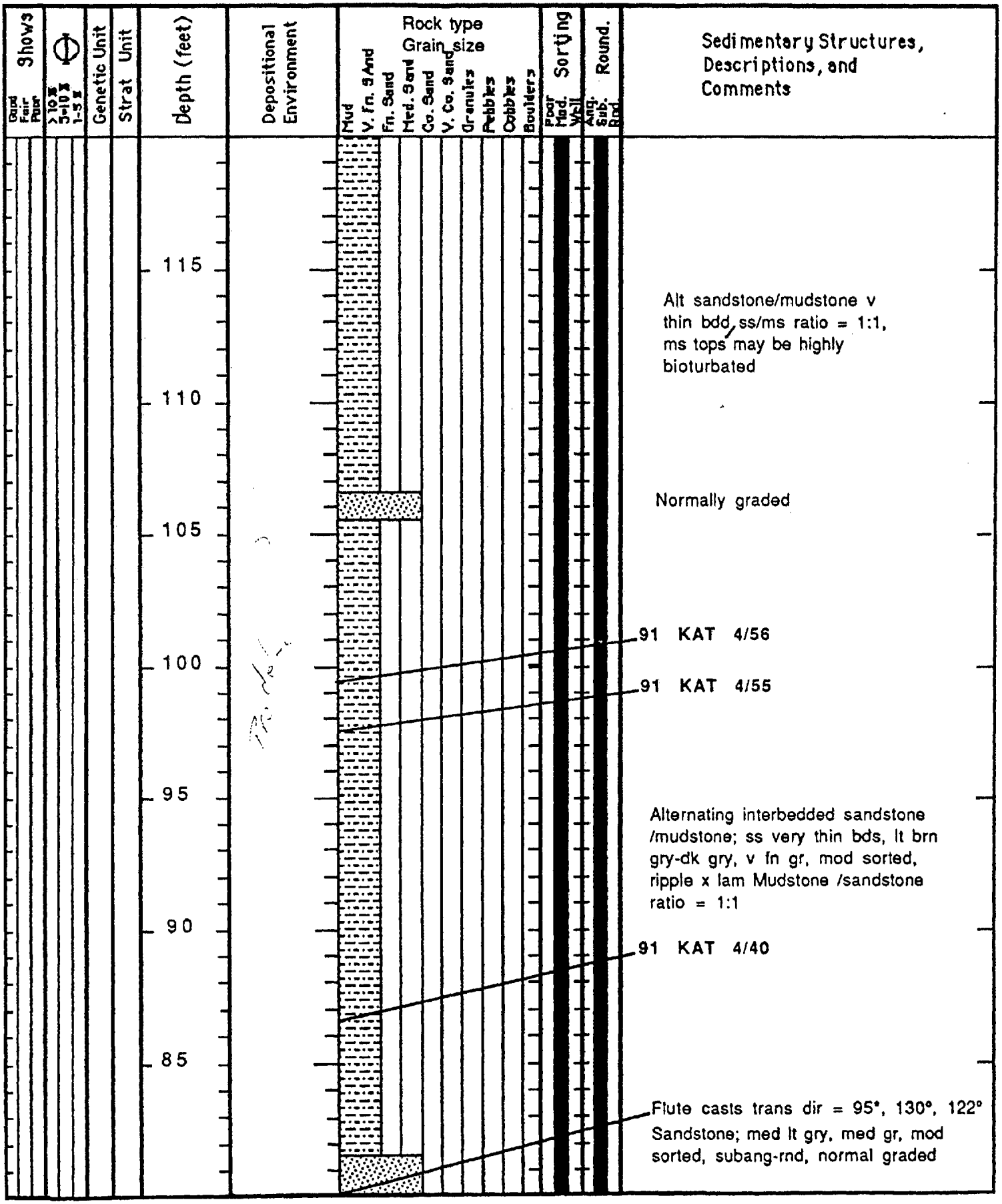


ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program 1991 Alaska Peninsula Stop No. 91 KAT 4 Formations Kaguyak

Measured Section #22 Date 6/26/91

Location NE1/4 NW1/4, SEC 20, T18S R27W Described By D. Doherty

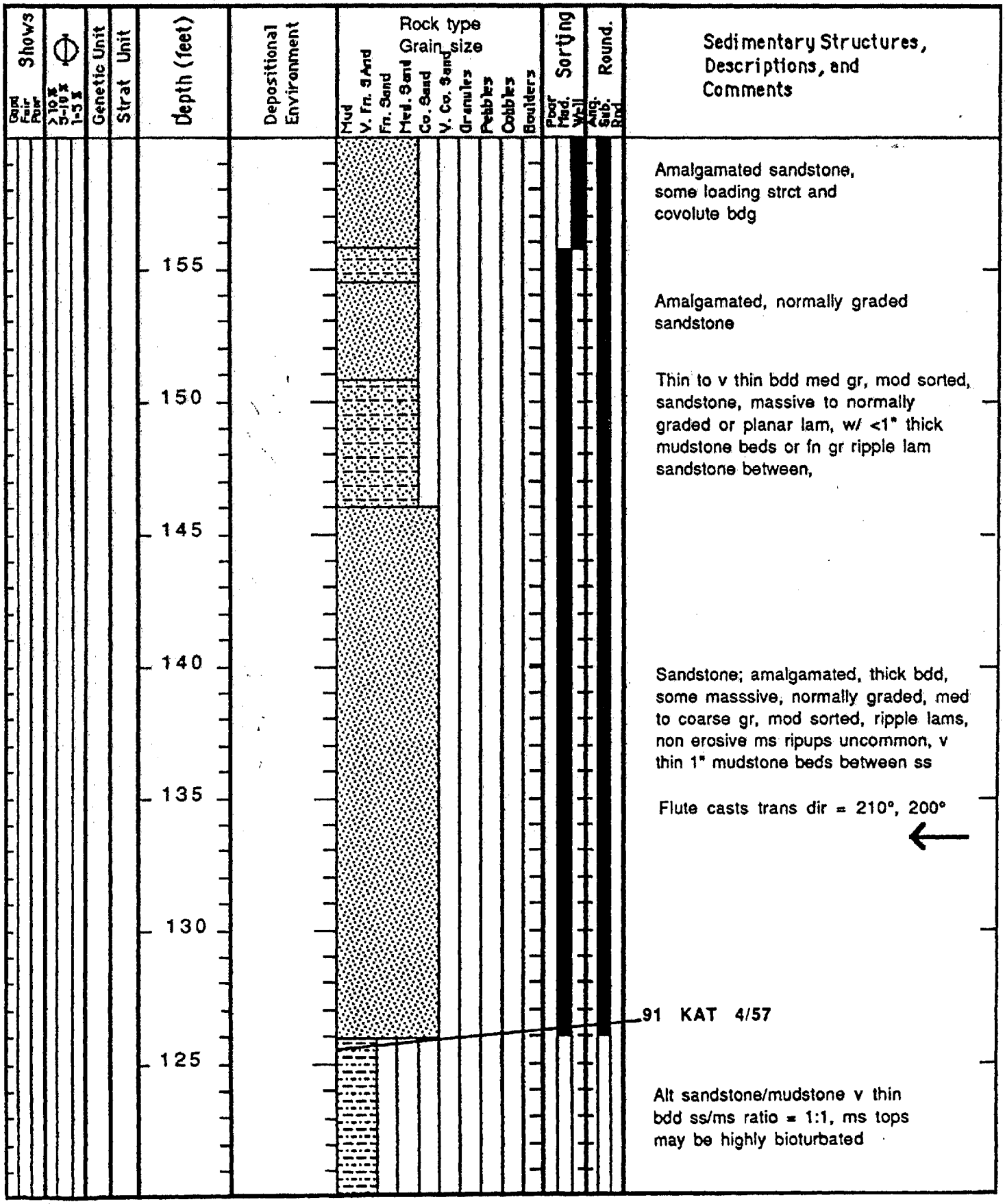


ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program 1991 Alaska Peninsula Stop No. 91 KAT 4 Formations Kaguyak

Measured Section #22 Date 6/26/91

Location NE1/4 NW1/4, SEC 20, T18S R27W Described By Doherty/Morris

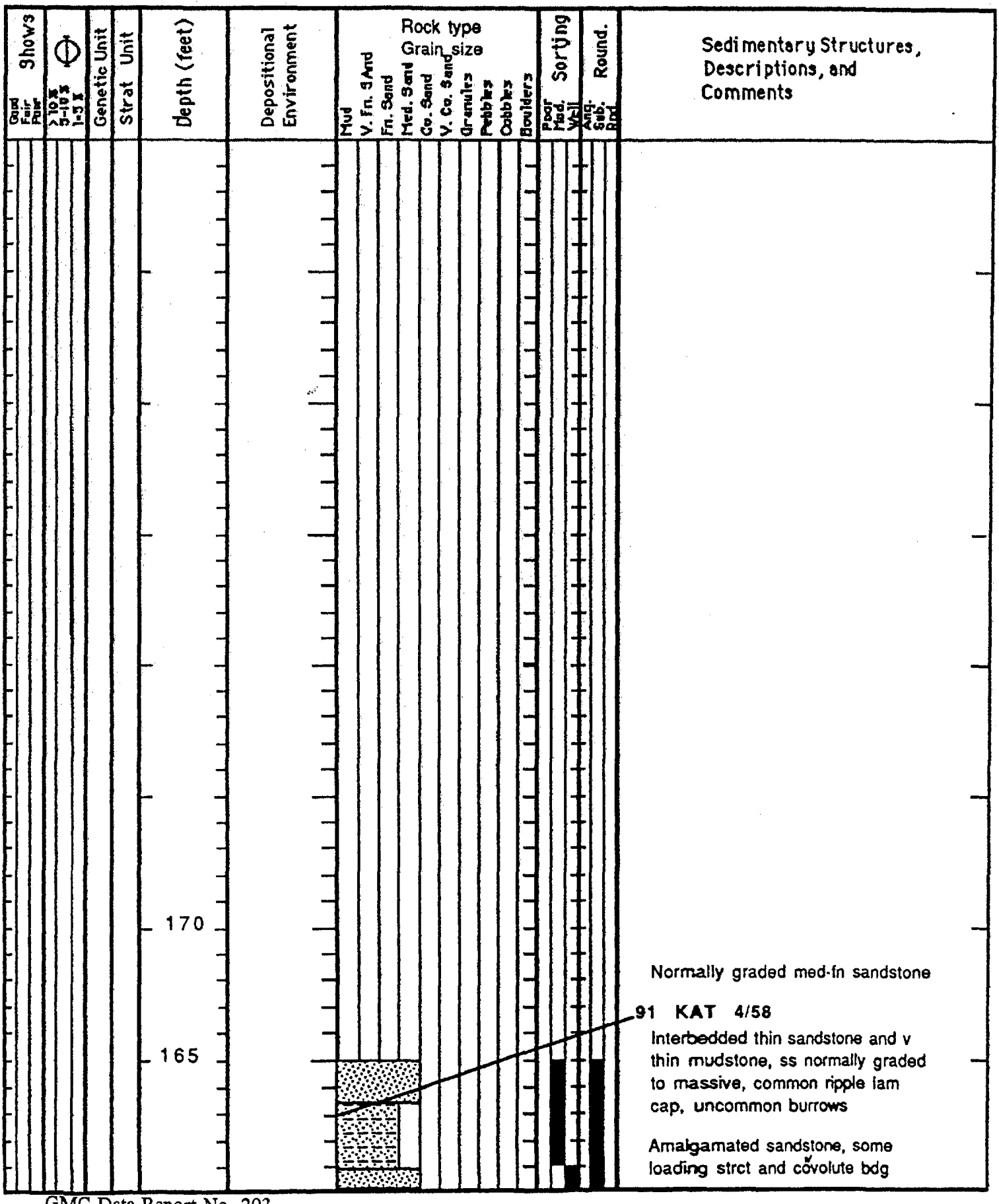


ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program 1991 Alaska Peninsula Stop No. 91 KAT 4 Formations ~~Kaguyak~~

Measured Section #22 Date 6/26/91

Location NE1/4 NW1/4, SEC 20, T18S R27W Described By Doherty/Morris

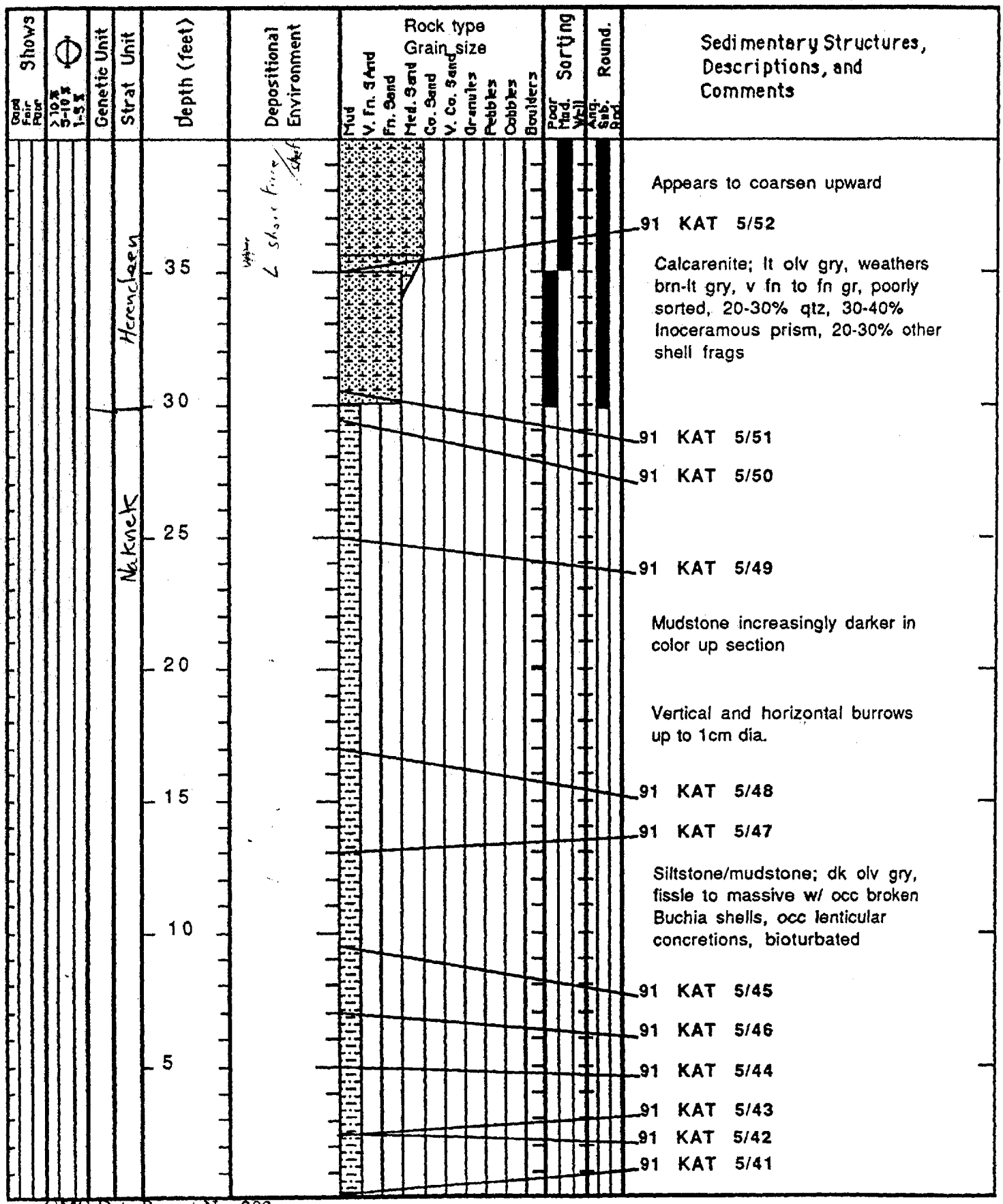


ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program 1991 Alaska Peninsula Stop No. 91 KAT 5 Formations Naknek/Herendeen

Measured Section #23 Date 6/27/91

Location NW1/4 SEC 3, T19S R28W Described By D. Doherty

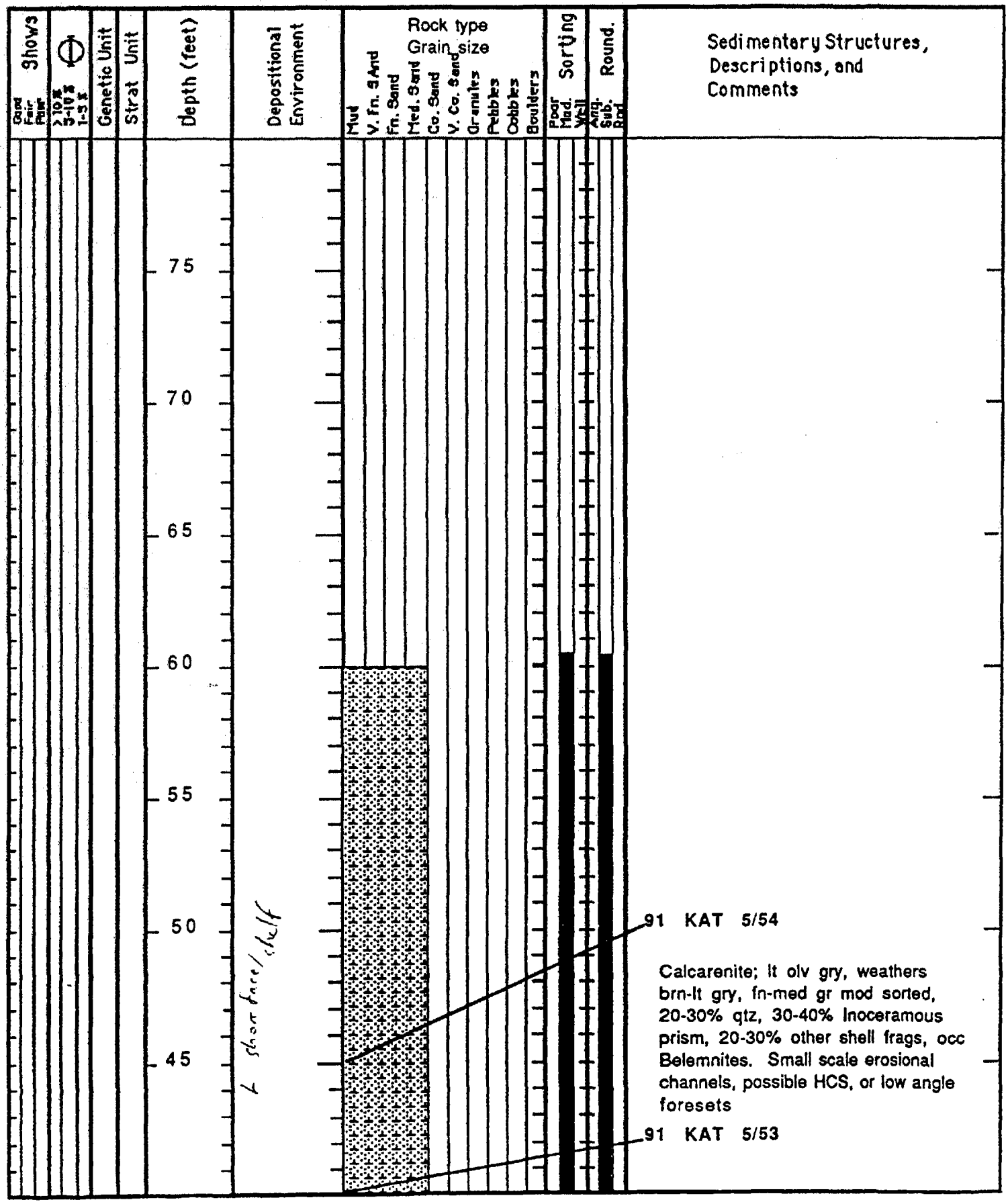


ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program 1991 Alaska Peninsula Stop No. 91 KAT 5 Formations Naknek/Herendeen

Measured Section #23 Date 6/27/91

Location NW1/4 SEC 3, T19S R28W Described By D. Doherty

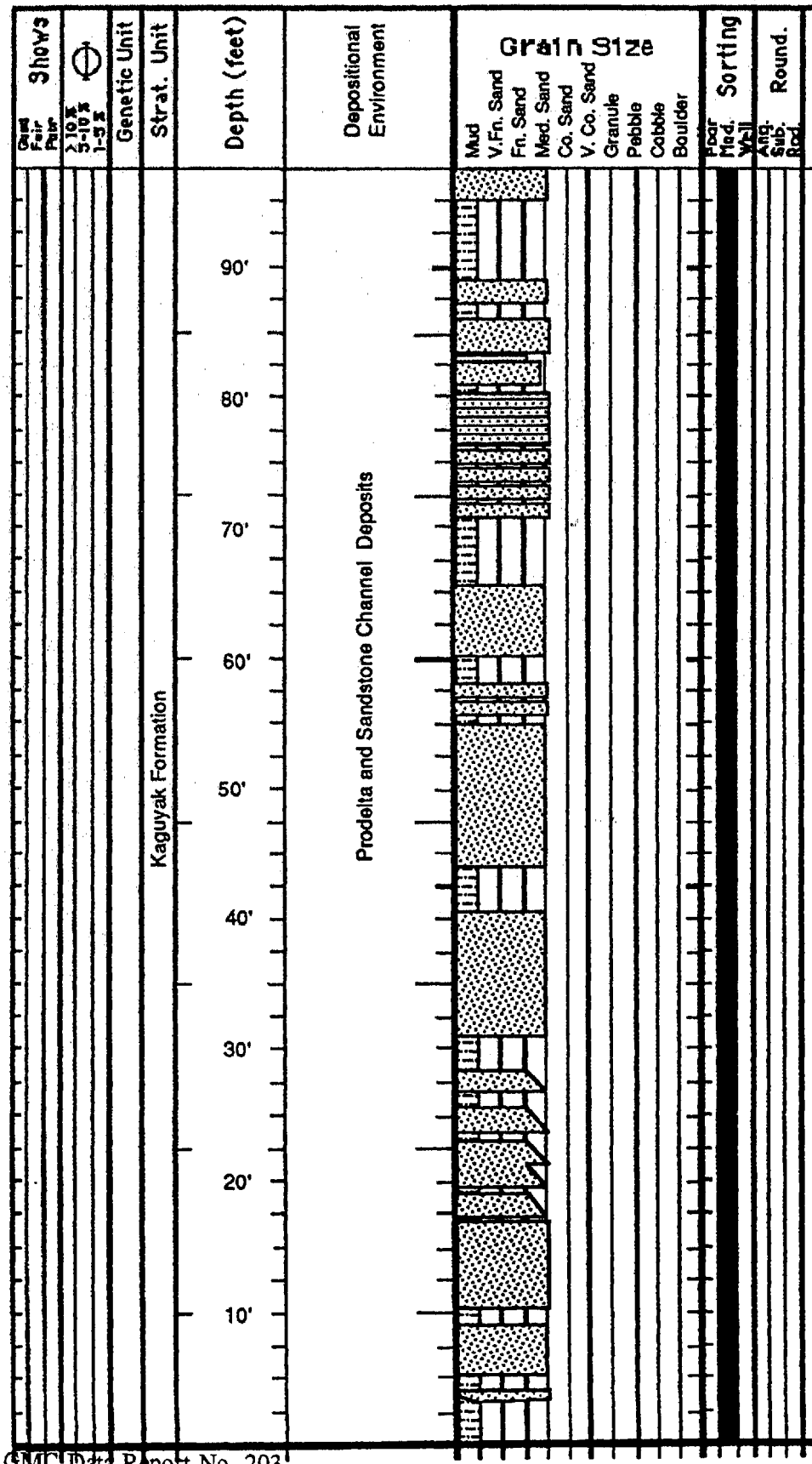


ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program: Mesozoic Cook Inlet Stop No.: Site 217 Formations: Kaguyak

Measured Section: Number 24 Date: June 28, 1991

Location: S.E. Sec. 14,T18S R28W Afognak Quad C-6 Described By: William Morris



Sedimentary Structures and Descriptions

Massive sandstone
Interbedded sandstone and mudstone. Ss massive to ripple

91KB217-678
Ripple laminations

Faint planar laminations

Interbedded sandstone and mudstone with starved ripples, rare burrows

Massive sandstone with fine-grain ripples capping each bed
91KB217-677

Ripples show bidirection paleocurrents
Massive sandstone with fine-grain ripples capping each bed
Mudstone rip up clasts
91KB217-676
Normal graded sandstone

Erosively based massive sandstone

Black mudstone with Inocerames prisms

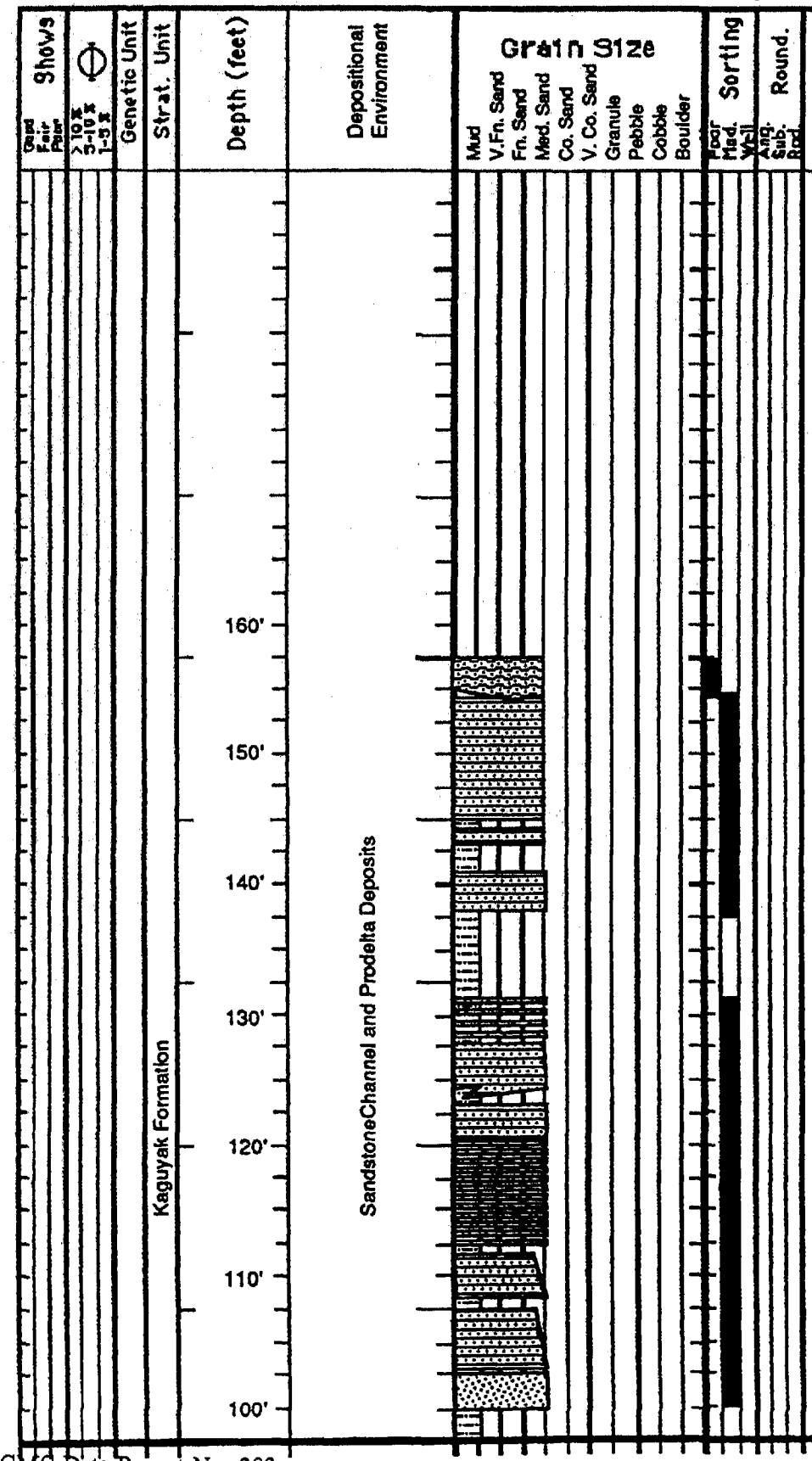
91KAT217

ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program: Mesozoic Cook Inlet Stop No.: Site 217 Formations: Kaguyak

Measured Section: Number 24 Date: June 28, 1991

Location: S.E. Sec. 14,T18S R28W Afognak Quad C-6 Described By: William Morris



Sedimentary Structures and Descriptions

91KB217-679
Planar to swaley cross-bedded in a small erosional channel

Faint planar laminated sandstone, normal graded laminations

Interbedded sandstone and mudstone. Medium thick, massive to planar laminated sandstone with very thin mudstone beds

Interbedded sandstone and mudstone. Sandstone is thin to medium, massive beds

Massive base, horizontal laminated upward (alternating med and fine grain laminations).

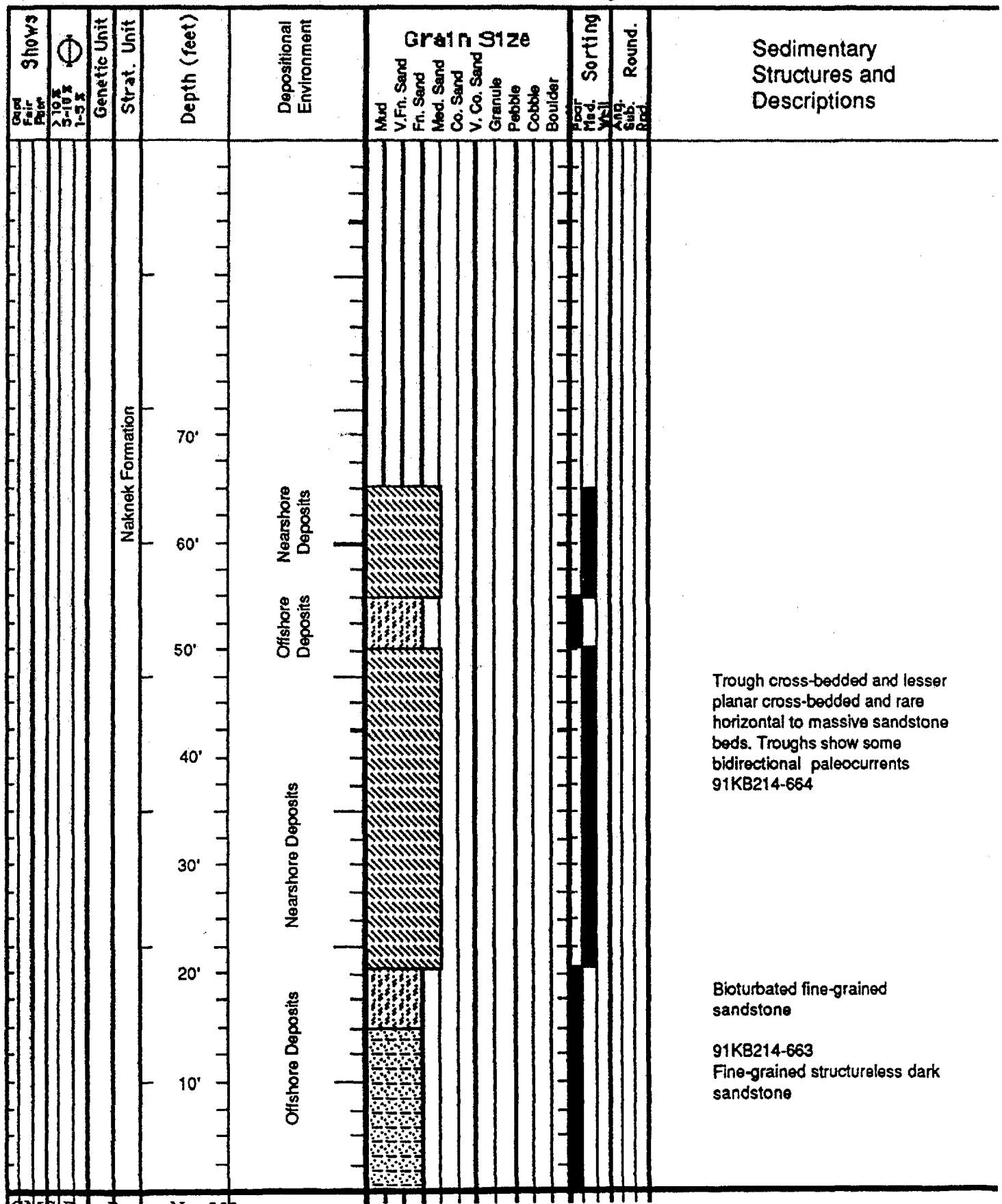
MS#19 91KMT 214-

ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program Mesozoic Cook Inlet Stop No. Site 214 Formations Naknek

Measured Section Number 19 Date June 21, 1991

Location N.E. Sec. 24, T25S R34W Katmi Quad A-3 Described By William Morris



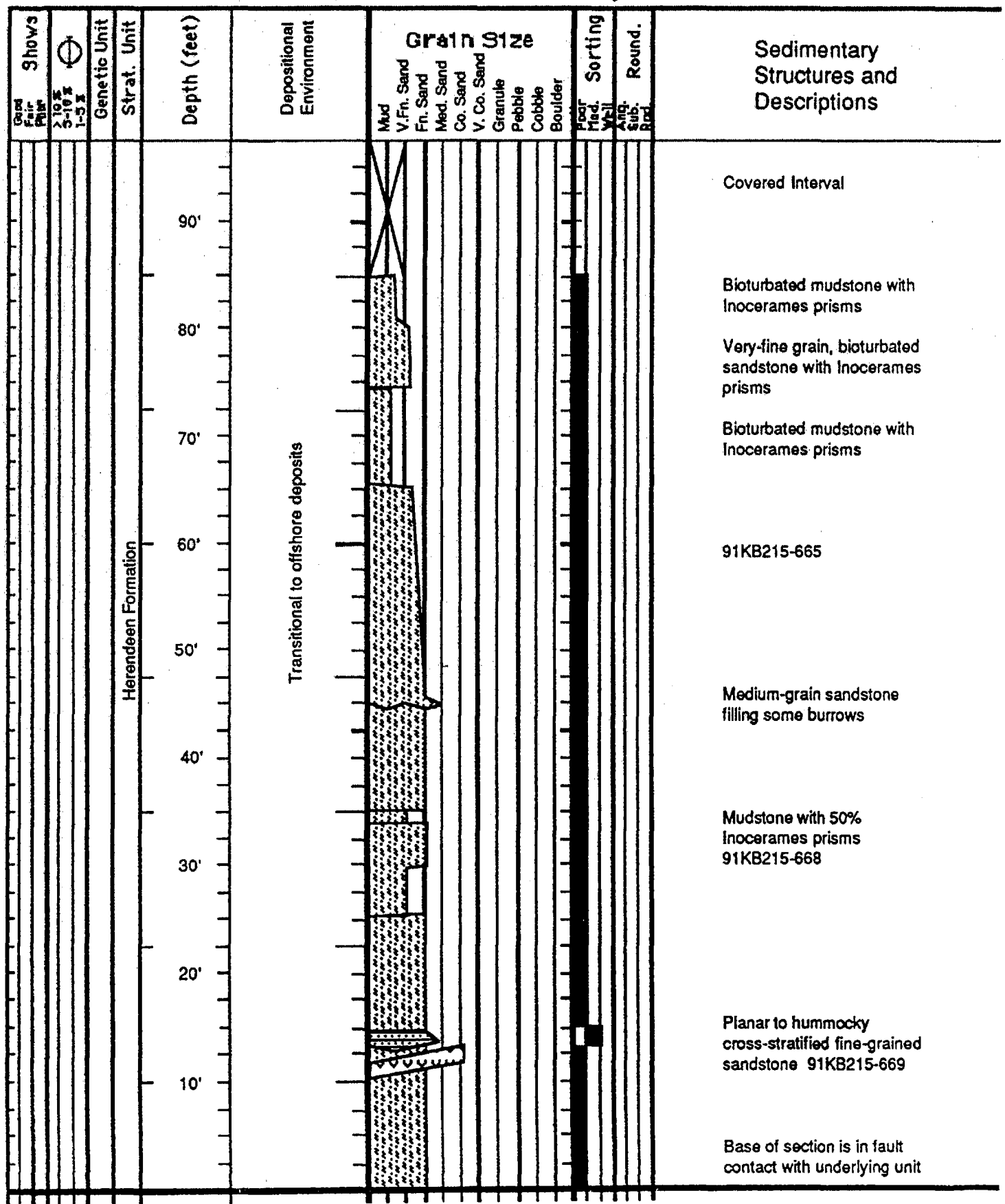
91KAT215

ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program: Mesozoic Cook Inlet Stop No.: Site 215 Formations: Herendeen

Measured Section: Number Date: June 22, 1991

Location: N.W. Sec. 11, T24S R35W Mt.Katmai Qd A-3 Described By: William Morris



Sedimentary Structures and Descriptions

Covered Interval

Bioturbated mudstone with Inocerames prisms

Very-fine grain, bioturbated sandstone with Inocerames prisms

Bioturbated mudstone with Inocerames prisms

91KB215-665

Medium-grain sandstone filling some burrows

Mudstone with 50% Inocerames prisms
91KB215-668

Planar to hummocky cross-stratified fine-grained sandstone 91KB215-669

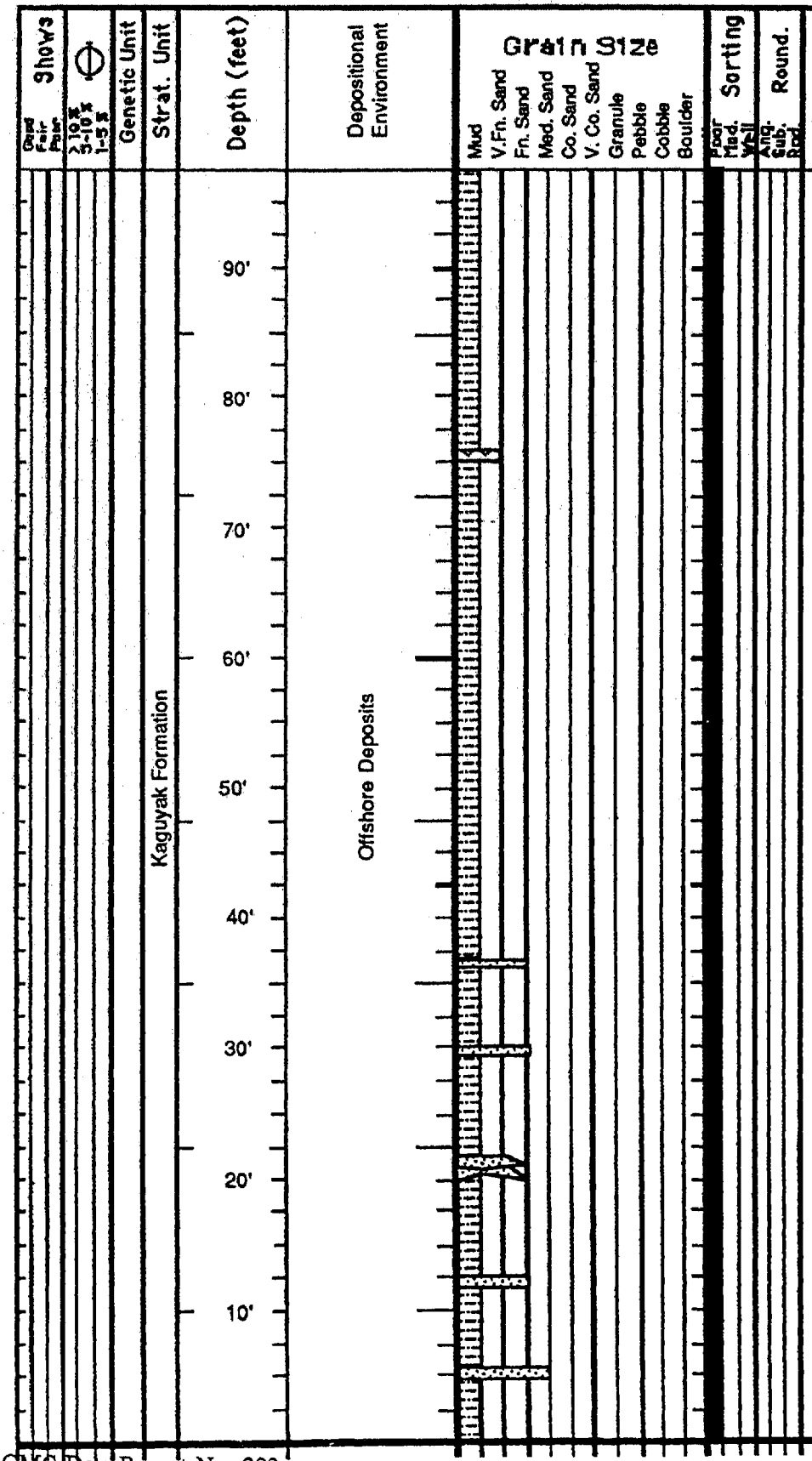
Base of section is in fault contact with underlying unit

ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program: Mesozoic Cook Inlet Stop No.: Site 216 Formations: Kaguyak

Measured Section: Number Date: June 24, 1991

Location: N.E. Sec. 34,T18S R28W Afognak Quad C-6 Described By: William Morris



Sedimentary Structures and Descriptions

Ammonite

Lateral is a ball structure filled with conglomerate

Tuff layer 91KB216-674

Mudstone: black very fine grained sandstone to mudstone that is structureless, locally burrows are visible. Tops of sandstones are heavily burrowed

91KB216-673 Ammonite

Ammonite
91KB216-672

Bucia fossil cast
Erosionally based fine-grain bioturbated sandstone with wood fragments

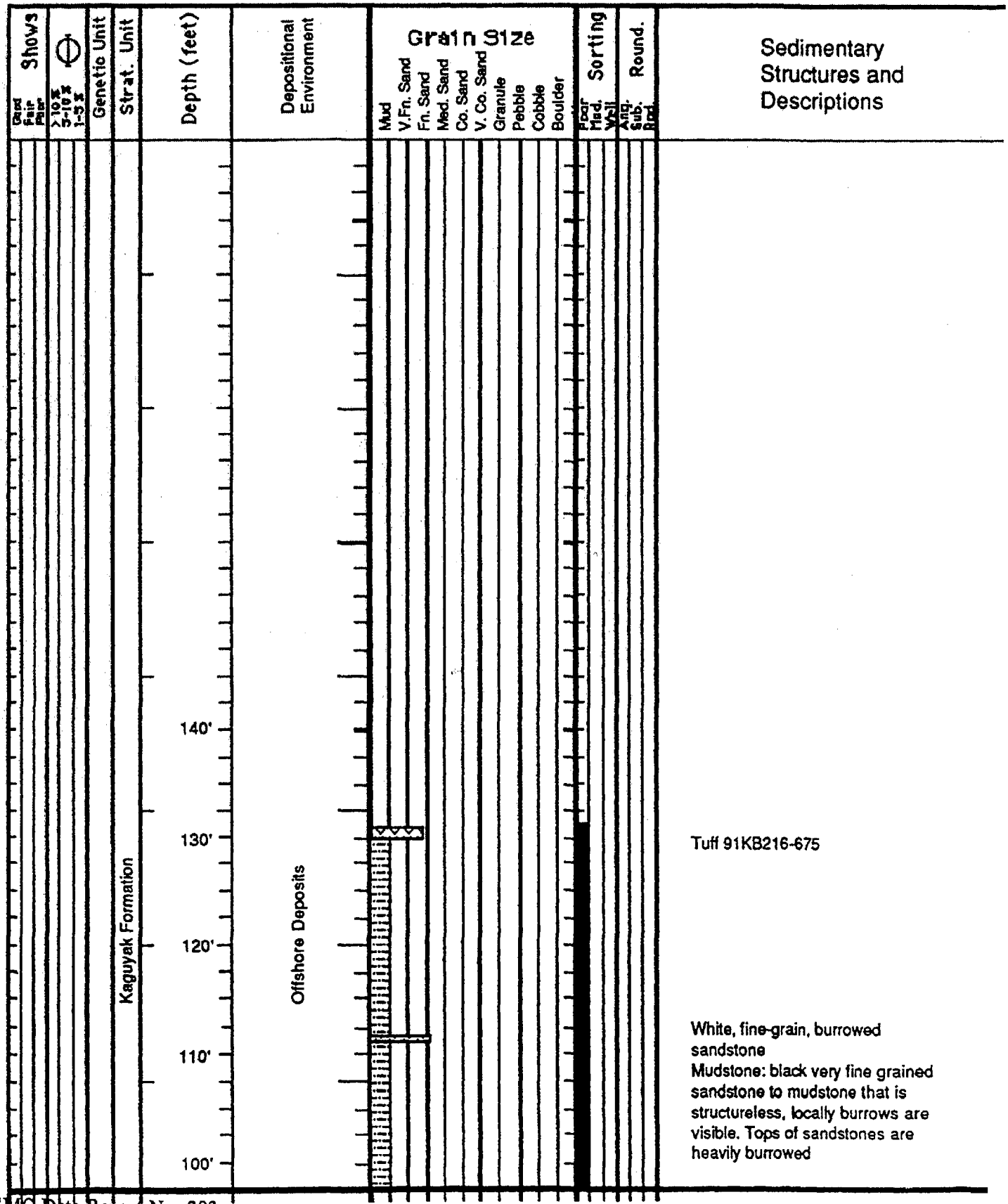
Pebbly sandstone 91KB216-671
91KB216-670

ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program: Mesozoic Cook Inlet Stop No.: Site 216 Formations: Kaguyak

Measured Section: Number Date: June 24, 1991

Location: N.E. Sec. 34,T18S R28W Afognak Quad C-6 Described By: William Morris

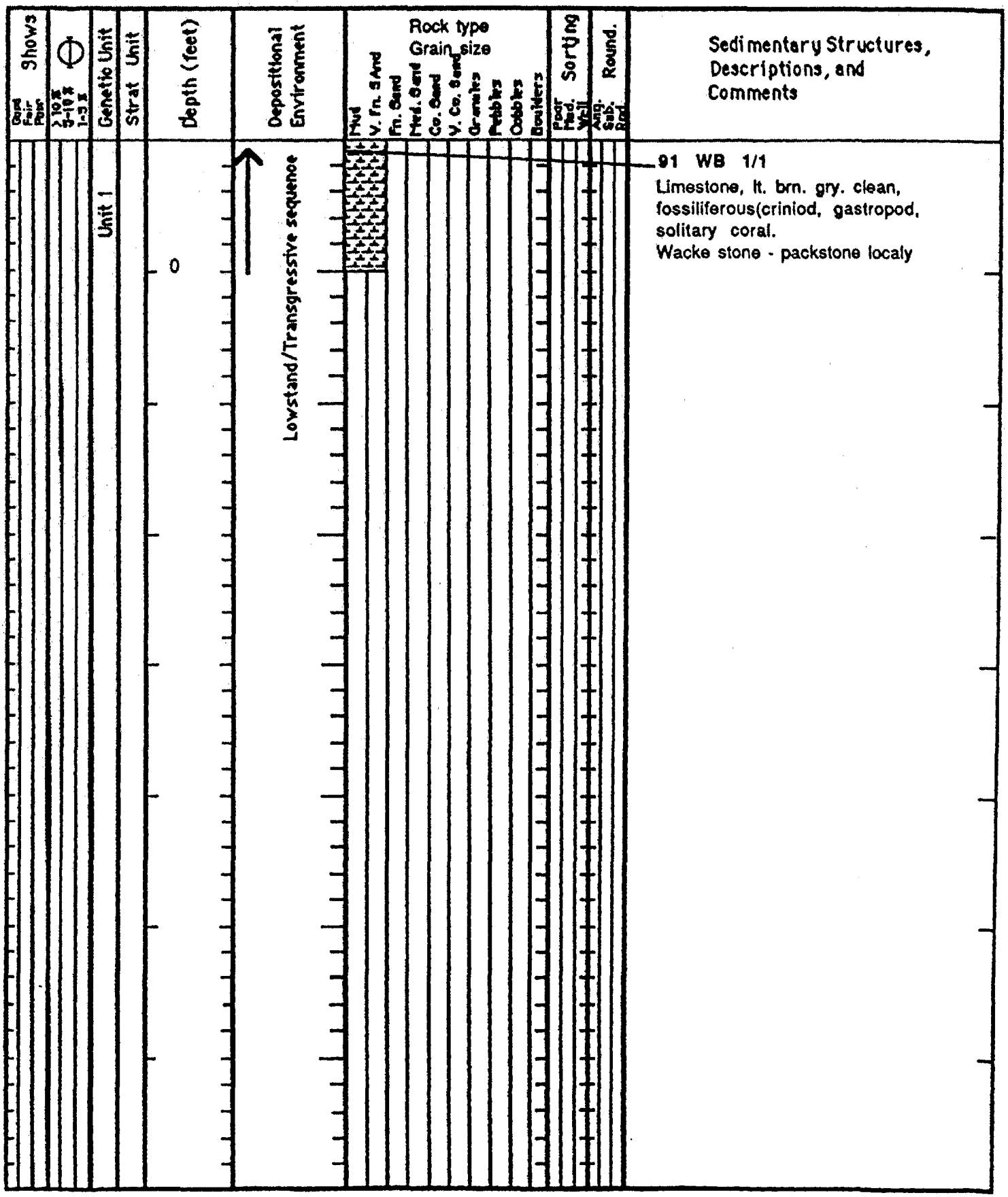


ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program 1991 Alaska Peninsula Stop No. 91 WB 1 Formations Unamed Triassic

Measured Section 1 Date 6/4/91

Location SE1/4 SW1/4, SEC 33, T28S R37W Described By D. Doherty

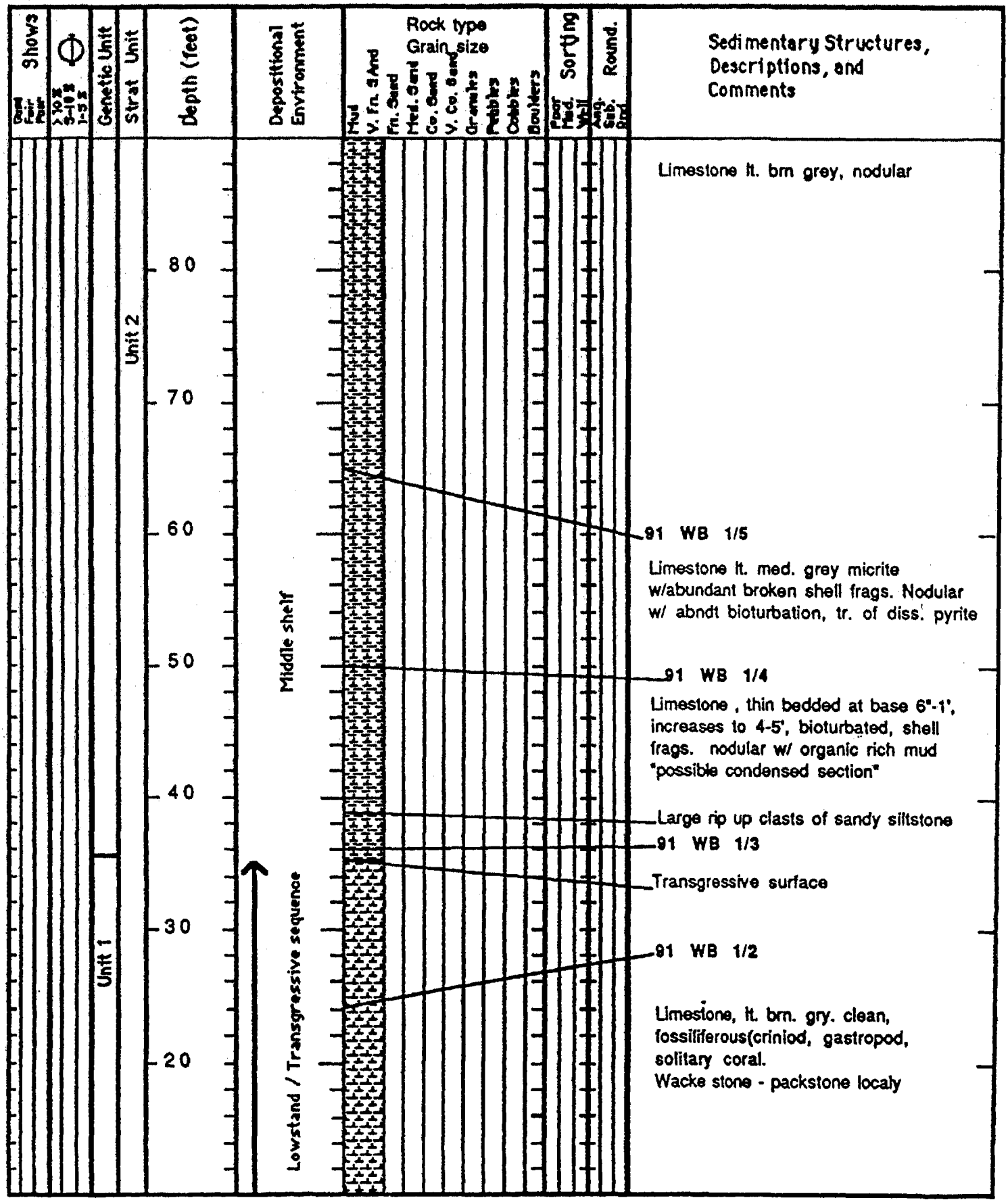


ARCO Alaska, Inc. **MEASURED SECTION FORM** Page 2 of ___

Field Program 1991 Alaska Peninsula Stop No. 91 WB 1 Formations Unamed Triassic

Measured Section # 1 Date 6/4/91

Location SE1/4 SW1/4, SEC 33, T28S R37W Described By D. Doherty

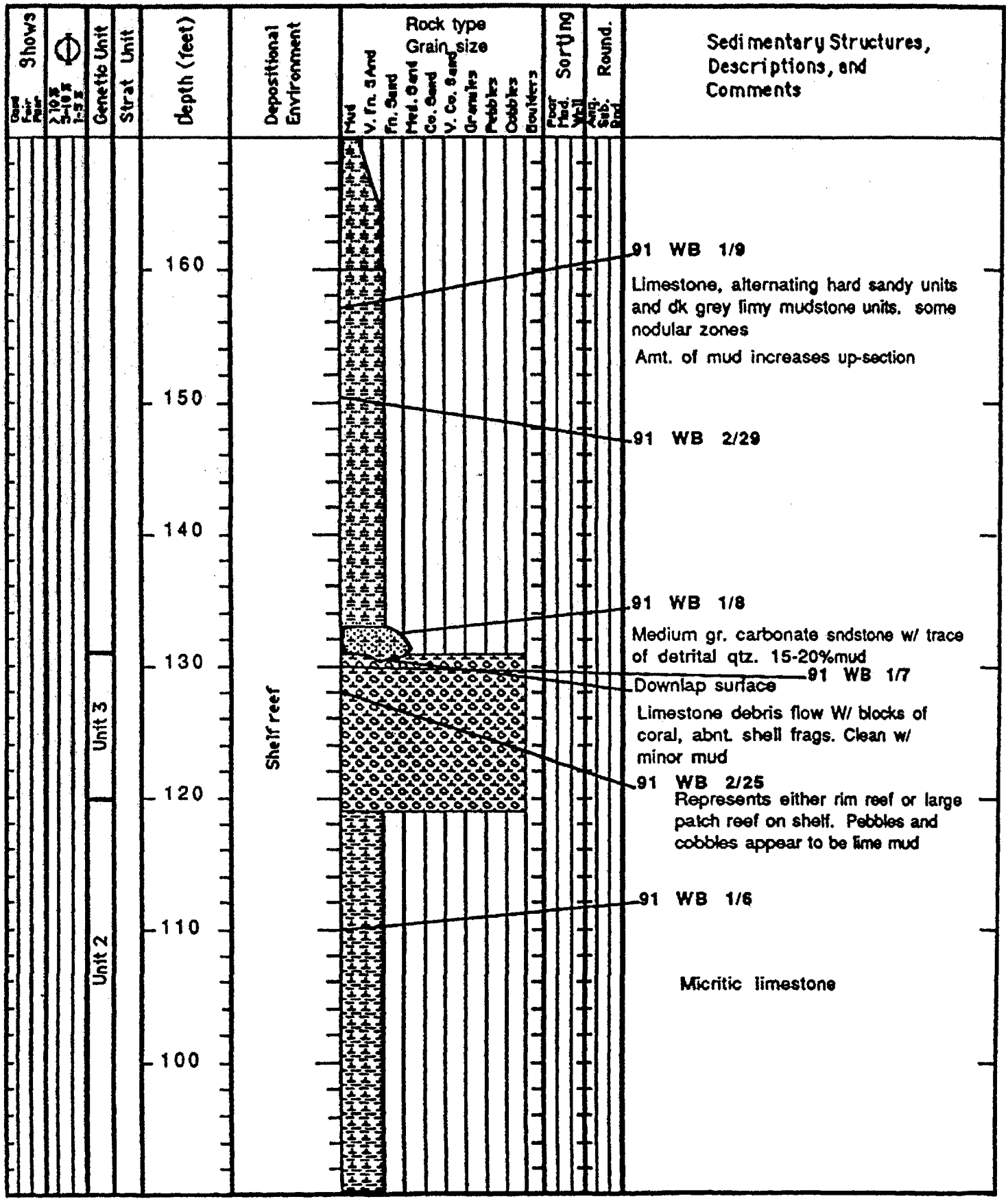


ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program 1991 Alaska Peninsula Stop No. 91 WB 1 Formations Unamed Triassic

Measured Section # 1 Date 6/4/91

Location SE1/4 SW1/4, SEC 33, T28S R37W Described By D. Doherty

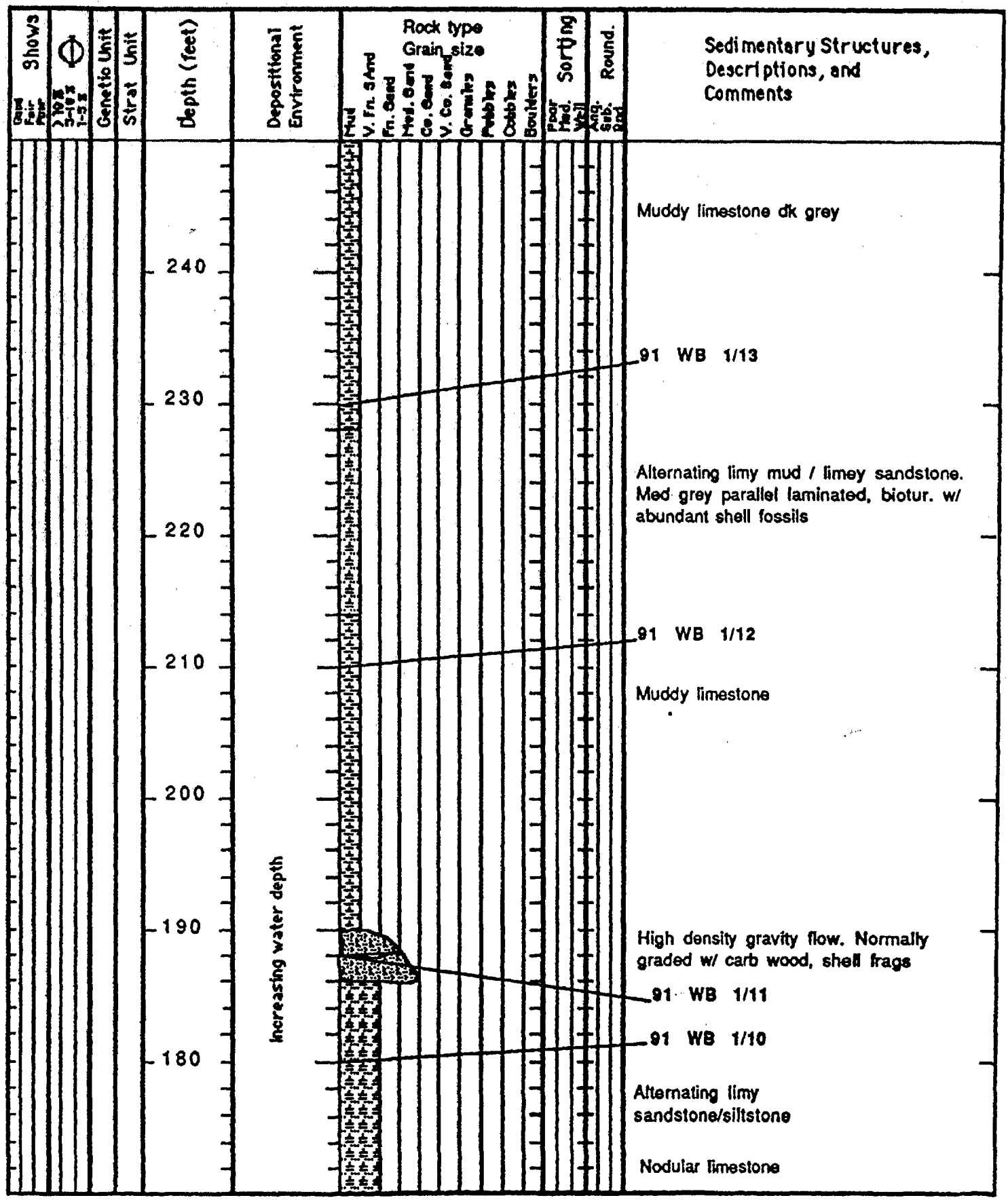


ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program 1991 Alaska Peninsula Stop No. 91 WB 1 Formations Unamed Triassic

Measured Section # 1 Date 6/4/91

Location SE1/4 SW1/4, SEC 33, T28S R37W Described By D. Doherty

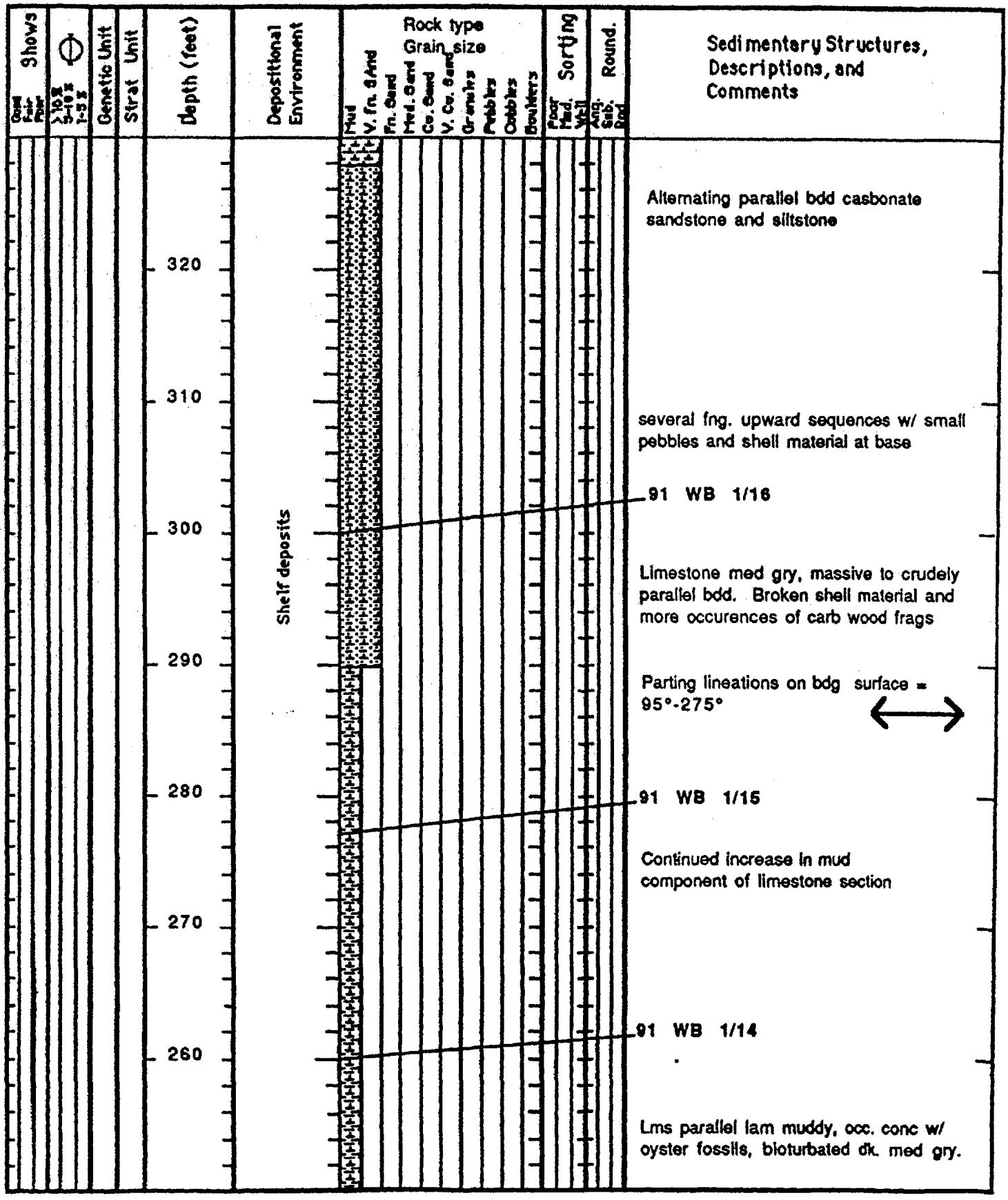


ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program 1991 Alaska Peninsula Stop No. 91 WB 1 Formations Unamed Triassic

Measured Section # 1 Date 6/4/91

Location SE1/4 SW1/4, SEC 33, T28S R37W Described By D. Doherty

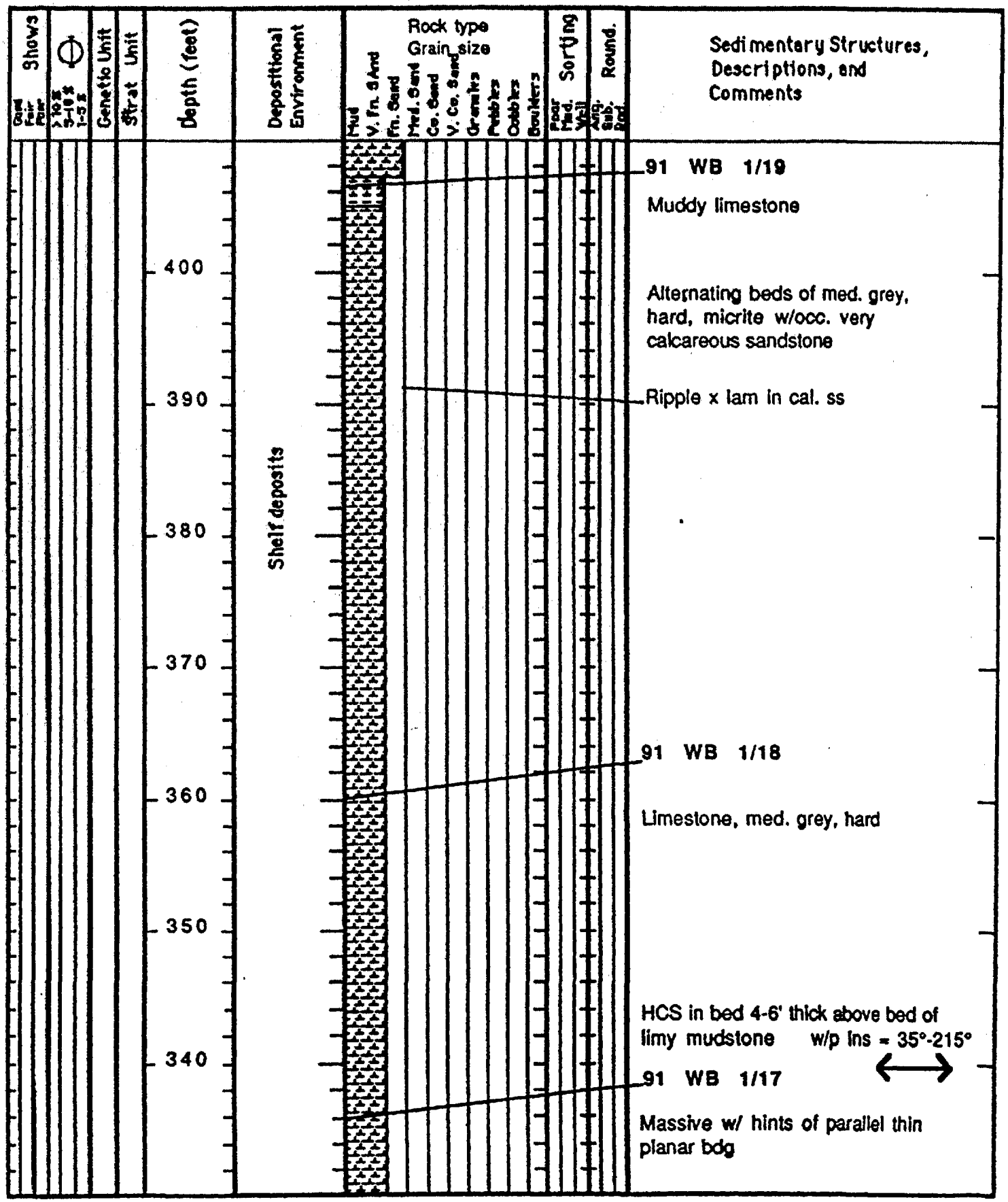


ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program 1991 Alaska Peninsula Stop No 91 WB 1 Formations Unamed Triassic

Measured Section 1 Date 6/4/91

Location SE1/4 SW1/4, SEC 33, T28S R37W Described By D. Doherty

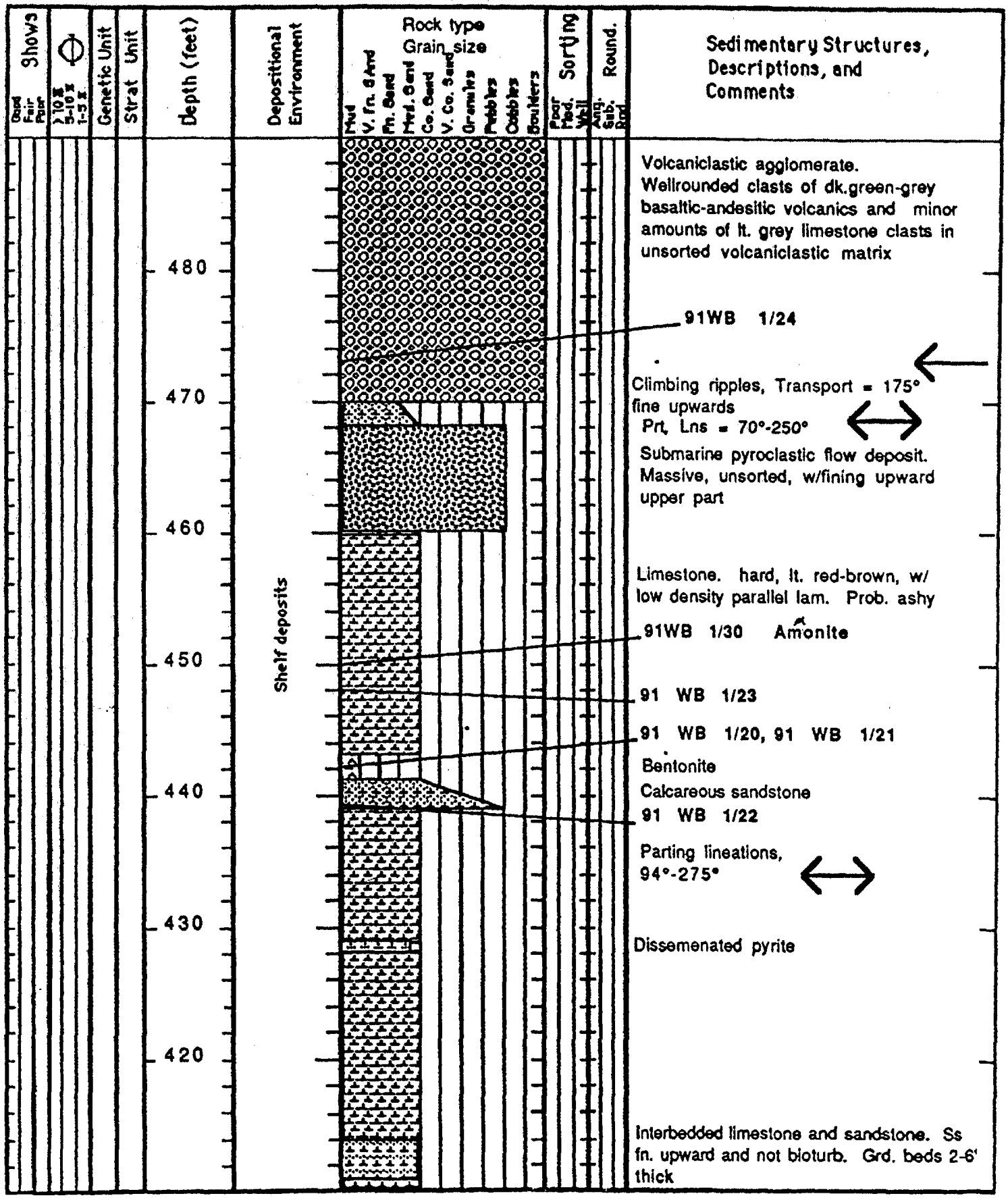


ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program 1991 Alaska Peninsula Stop No. 91 WB 1 Formations Unamed Triassic

Measured Section # 1 Date 6/4/91

Location SE1/4 SW1/4, SEC 33, T28S R37W Described By D. Doherty



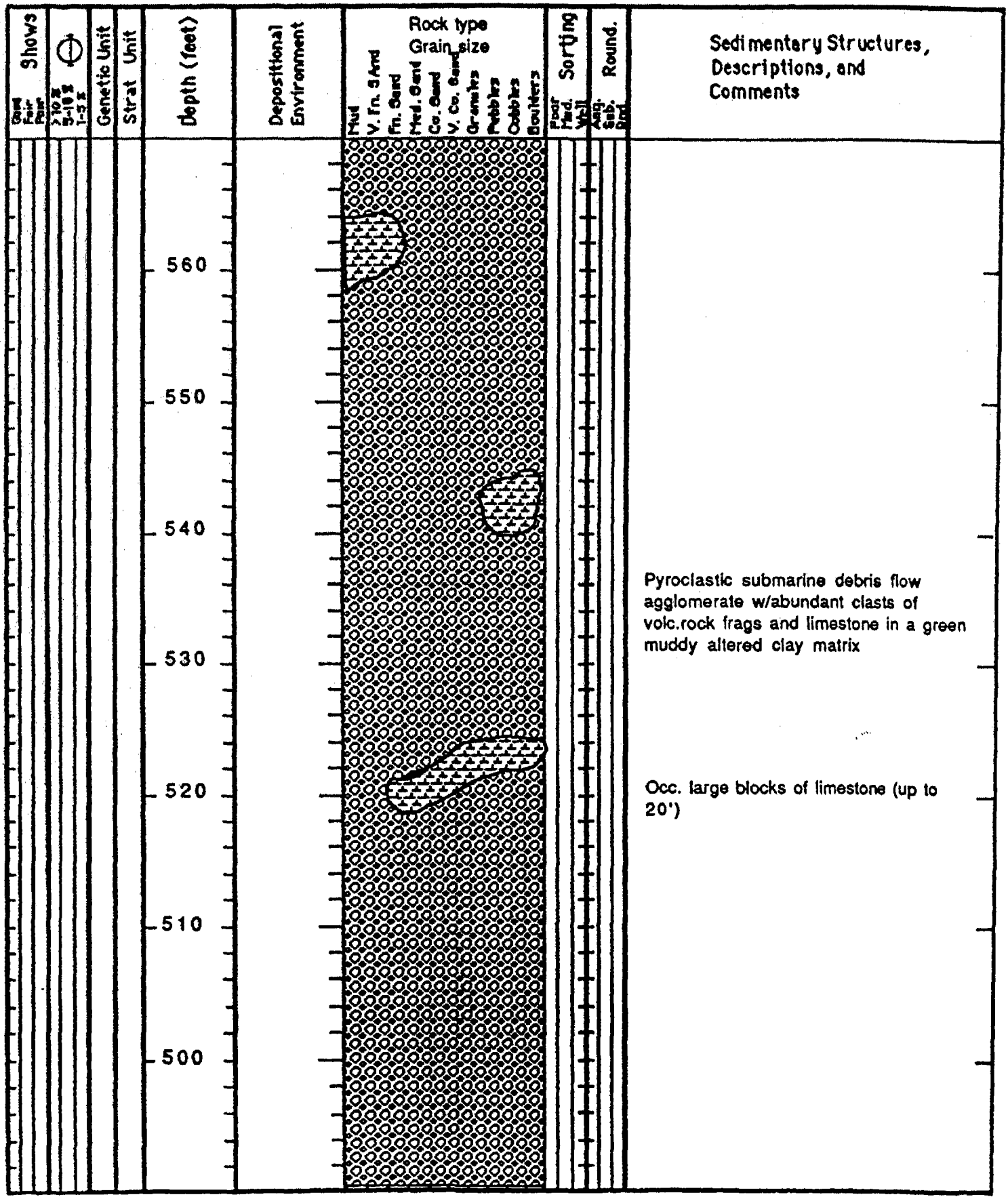
GMC Data Report No. 203

ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program 1991 Alaska Peninsula Stop No. 91 WB 3 Formations Unamed Triassic

Measured Section # 1 Date 6/4/91

Location SE1/4 SW1/4, SEC 33, T28S R37W Described By D. Doherty

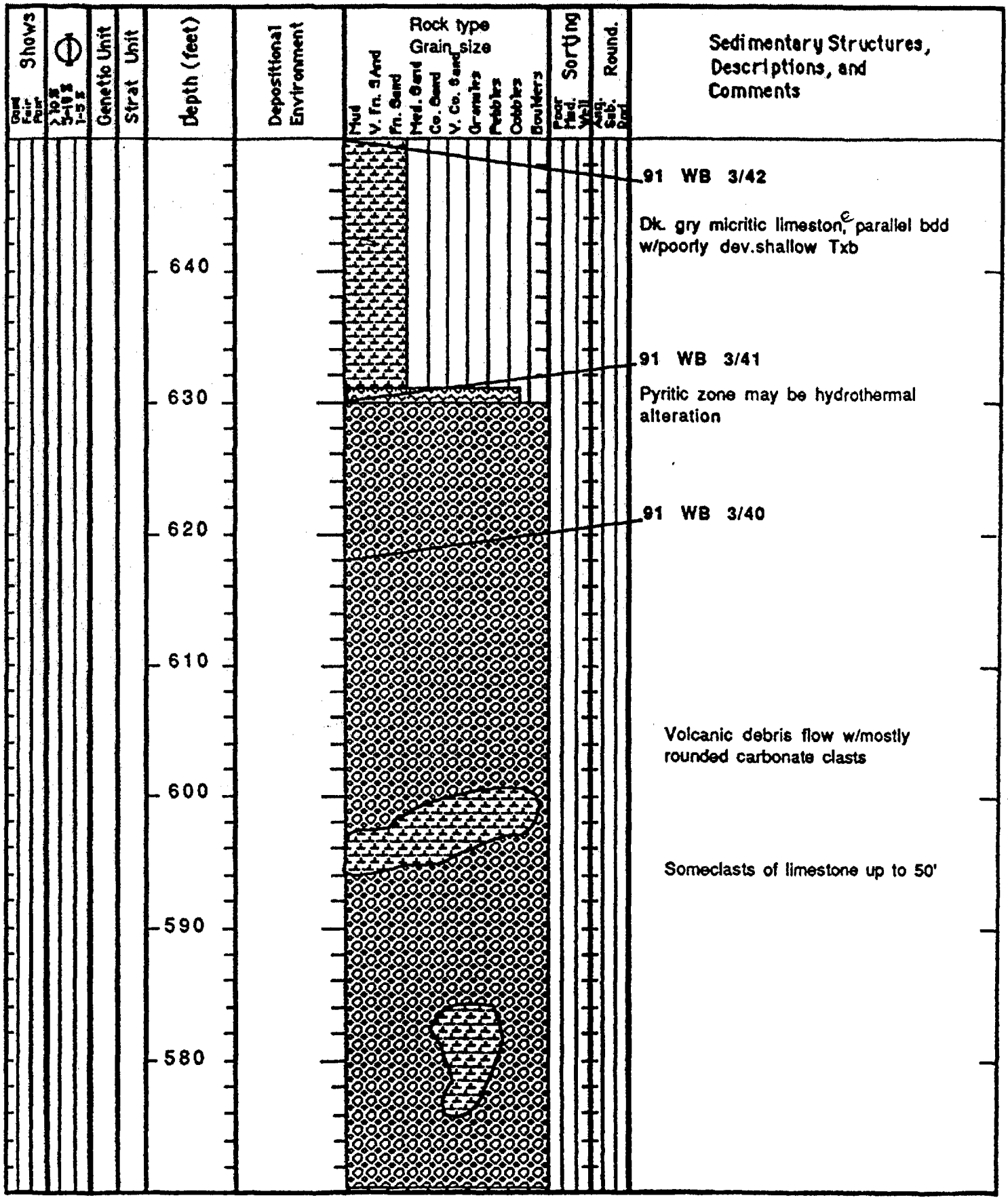


ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program 1991 Alaska Peninsula Stop No. 91 WB 3 Formations Unamed Triassic

Measured Section # 1 Date 6/4/91

Location SE1/4 SW1/4, SEC 33, T28S R37W Described By D. Doherty

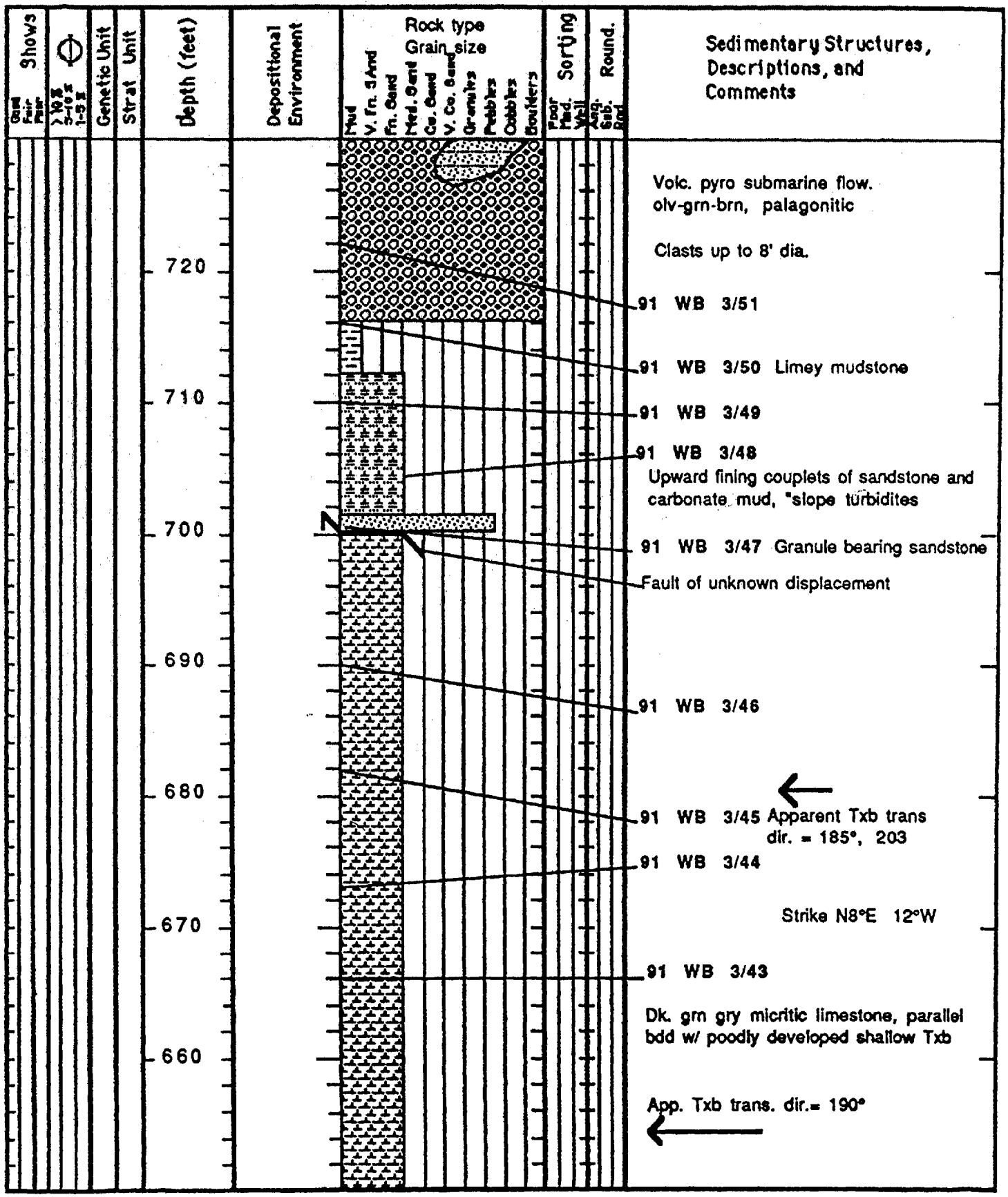


ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program 1991 Alaska Peninsula Stop No. 91 WB 3 Formations Unamed Triassic

Measured Section # 1 Date 6/4/91

Location SE1/4 SW1/4, SEC 33, T28S R37W Described By D. Doherty

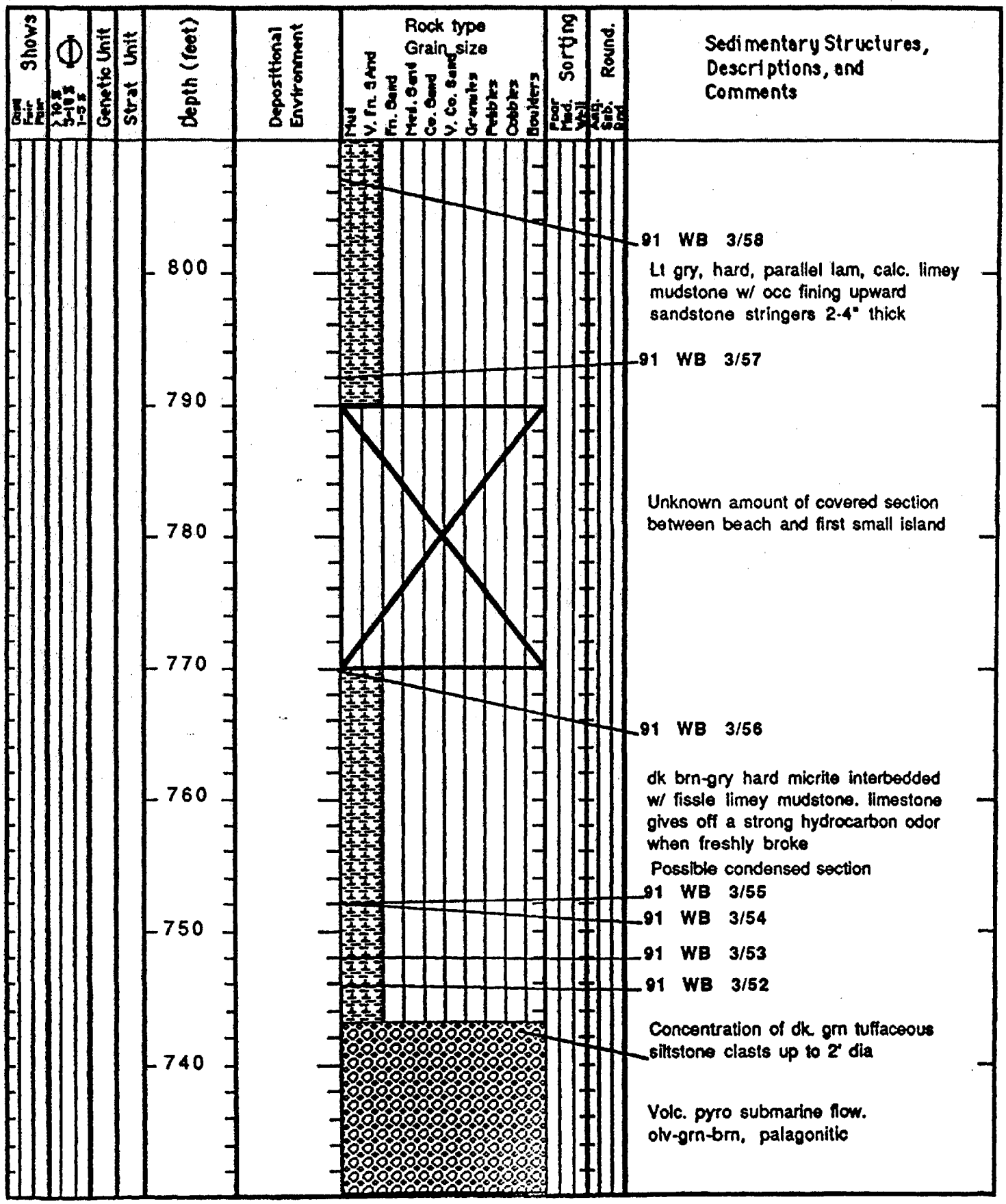


ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program 1991 Alaska Peninsula Stop No. 91 WB 3/1 Formations Unamed Triassic

Measured Section #1 Date 6/4/91

Location SE1/4 SW1/4, SEC 33, T28S R37W Described By D. Doherty



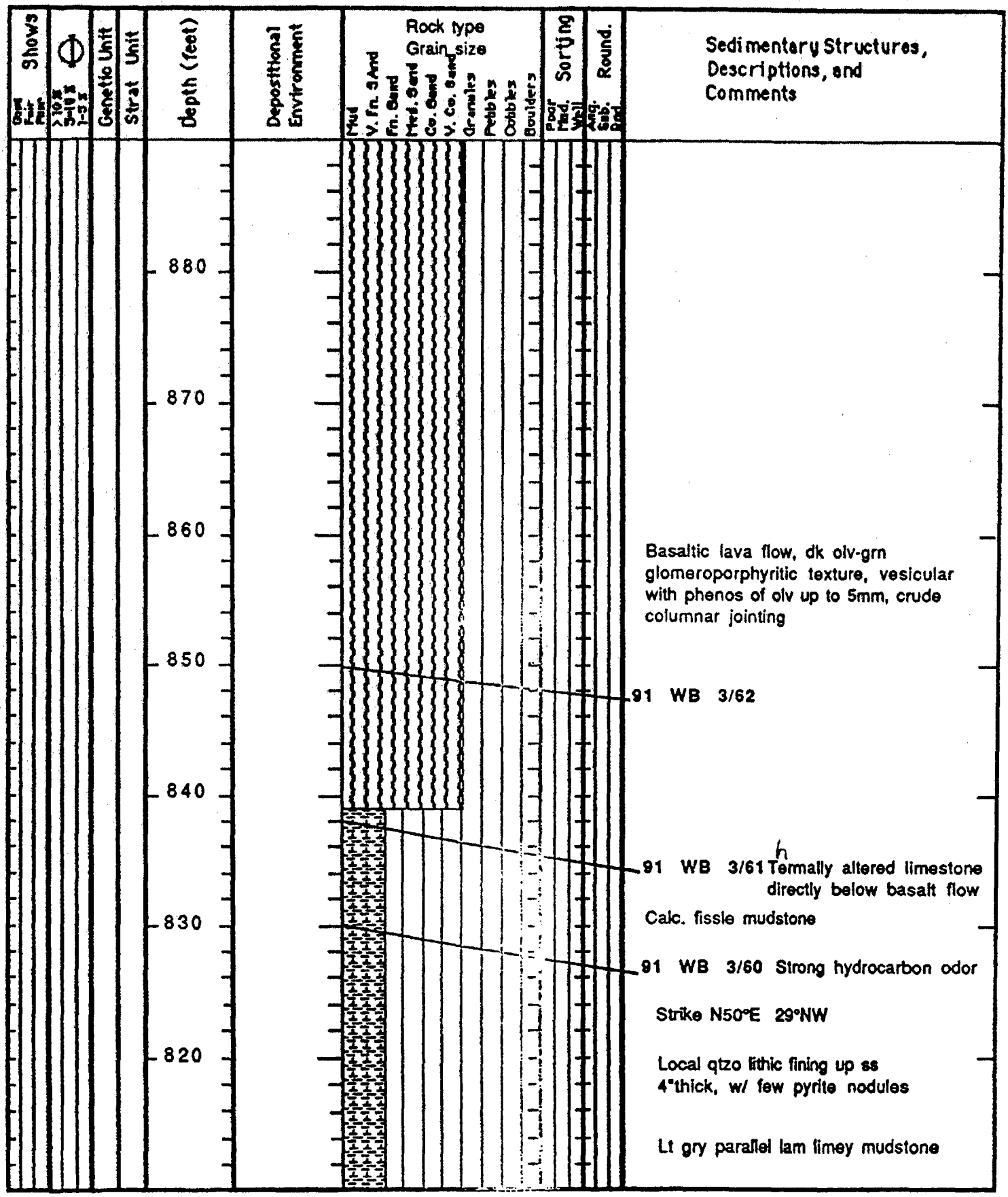
ARCO Alaska, Inc. MEASURED SECTION FORM

Page 1 of 2

Field Program 1991 Alaska Peninsula Stop No. 91 WB 3 Formations Unamed Triassic

Measured Section #1 Date 6/4/91

Location SE1/4 SW1/4, SEC 33, T28S R37W Described By D. Doherty

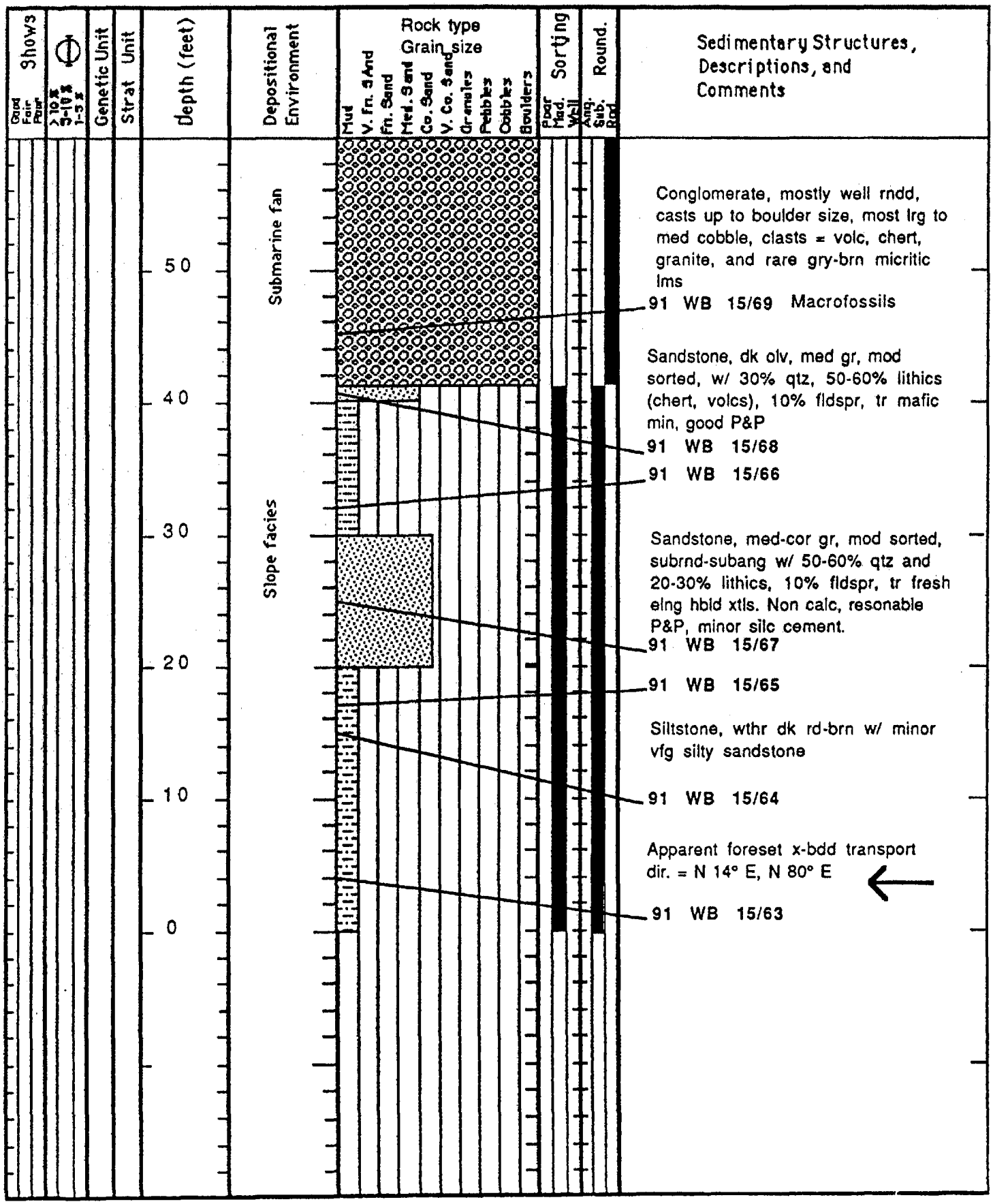


ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program 1991 Alaska Peninsula Stop No. 91 WB 15 Formations Shelikof

Measured Section #8 Date 6/11/91

Location SE1/4 SW1/4, SEC 21, T31S R43W Described By D. Doherty

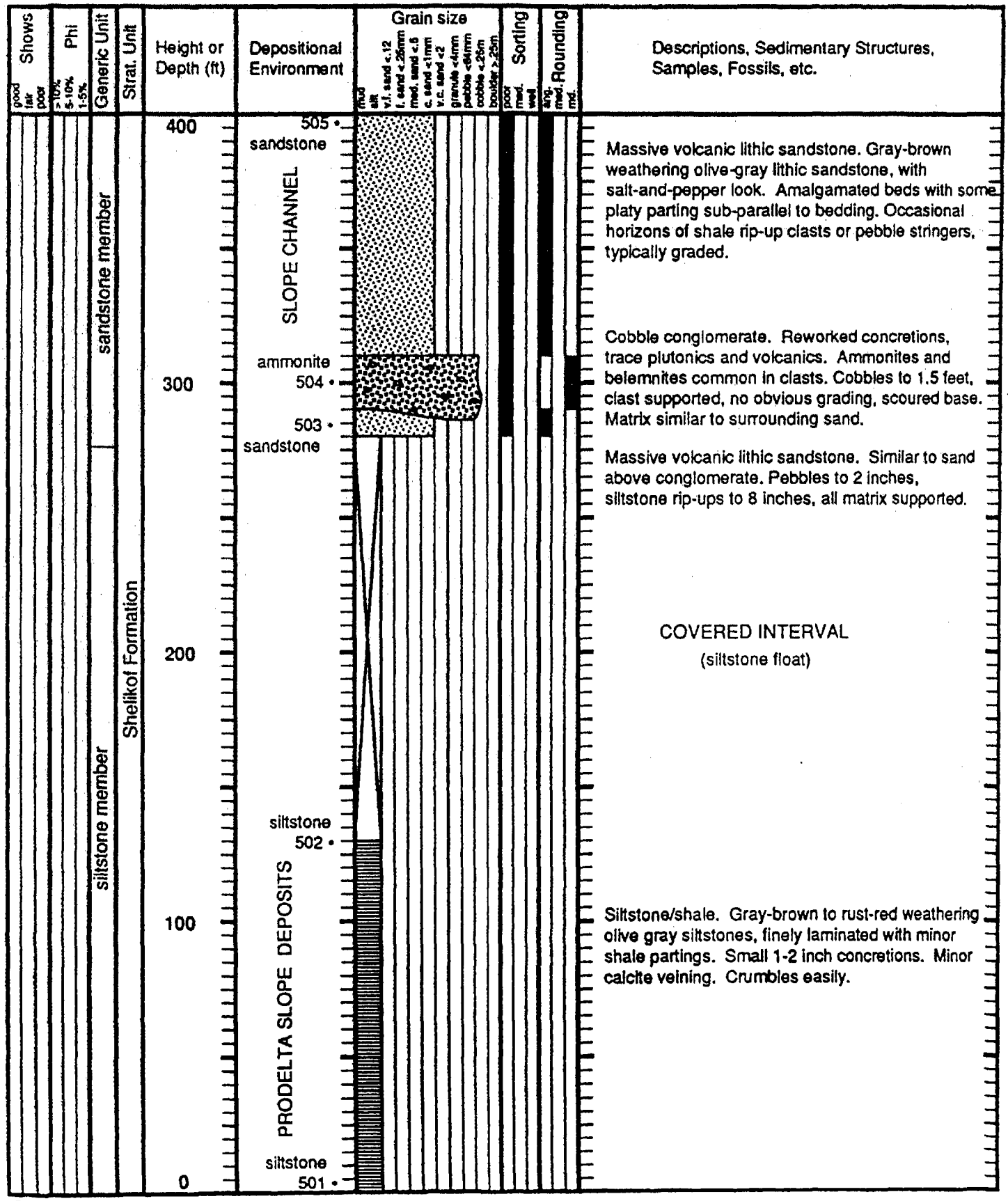


ARCO Alaska, Inc. **MEASURED SECTION FORM**

Field Program 1991 Mesozoic Cook Inlet Stop No. 91WB101 Formation(s) Shelikof Formation

Location North Wide Bay (Ugashik B-1 quad, secs 20,28,29,T31S,R43W) Described by S. W. Krueger

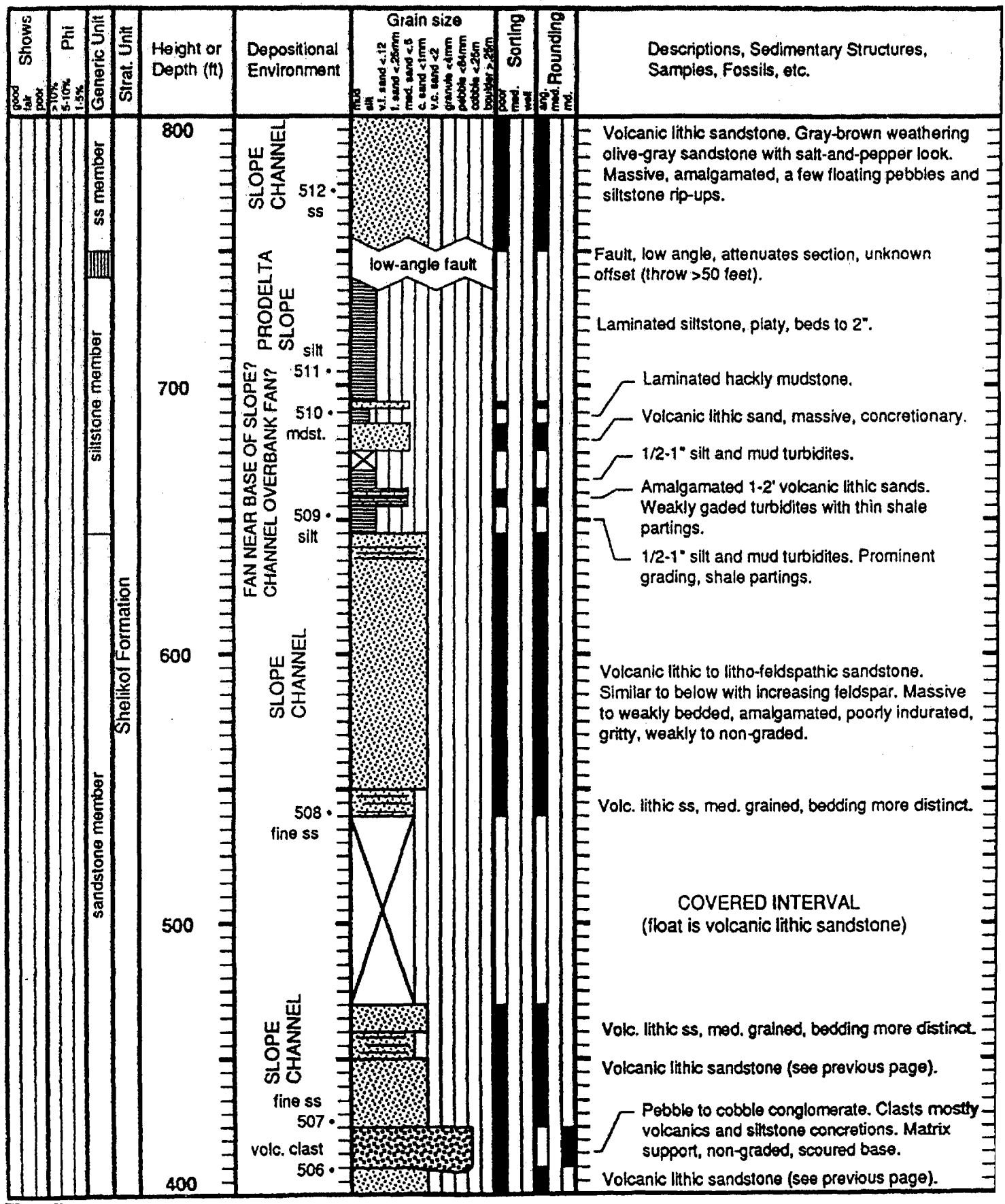
Measured Section MS 2 Shelikof Formation, Wide Bay, Alaskan Peninsula Date 5,7 June 1991



Field Program 1991 Mesozoic Cook Inlet Stop No. 91WB101 Formation(s) Shelikof Formation

Location North Wide Bay (Ugashik B-1 quad, secs 20,28,29,T31S,R43W) Described by S. W. Krueger

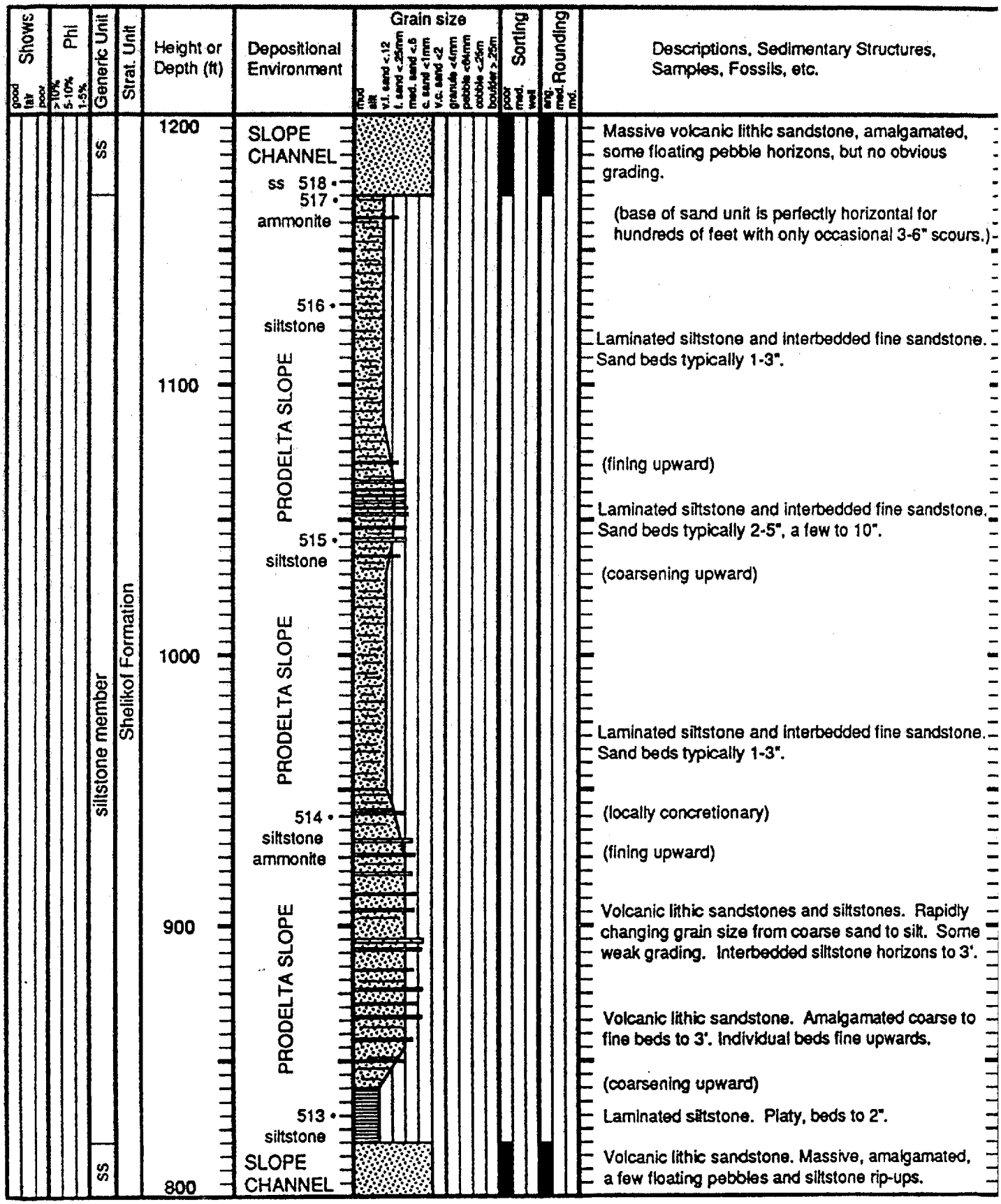
Measured Section MS 2 Shelikof Formation, Wide Bay, Alaskan Peninsula Date 5,7 June 1991



Field Program 1991 Mesozoic Cook Inlet Stop No. 91WB101 Formation(s) Shelikof Formation

Location North Wide Bay (Ugashik B-1 quad, secs 20,28,29,T31S,R43W) Described by S. W. Krueger

Measured Section MS 2 Shelikof Formation, Wide Bay, Alaskan Peninsula Date 5,7 June 1991

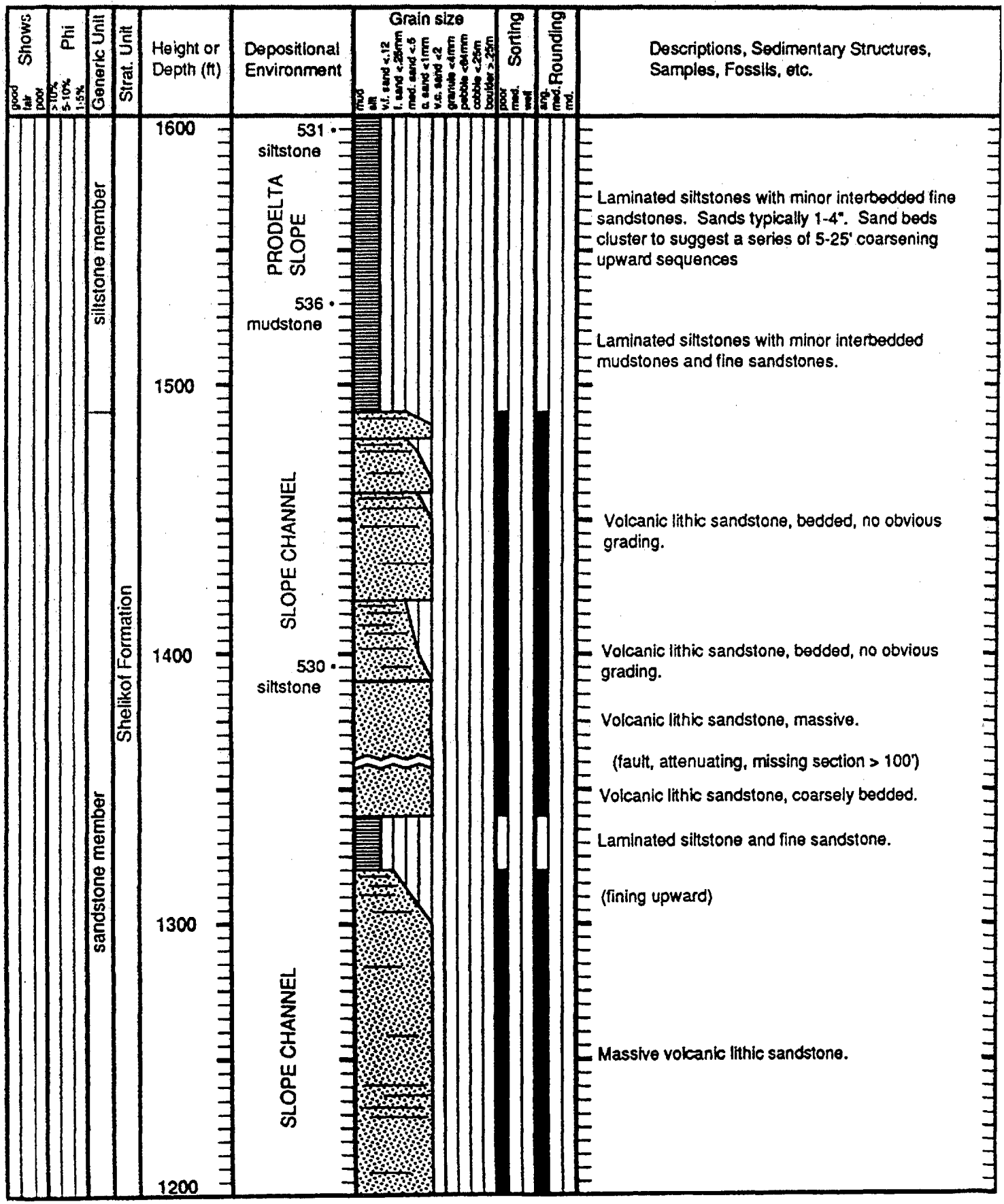


ARCO Alaska, Inc. **MEASURED SECTION FORM** Page 4 of 7

Field Program 1991 Mesozoic Cook Inlet Stop No. 91WB101 Formation(s) Shelikof Formation

Location North Wide Bay (Ugashik B-1 quad, secs 20,28,29,T31S,R43W) Described by S. W. Krueger

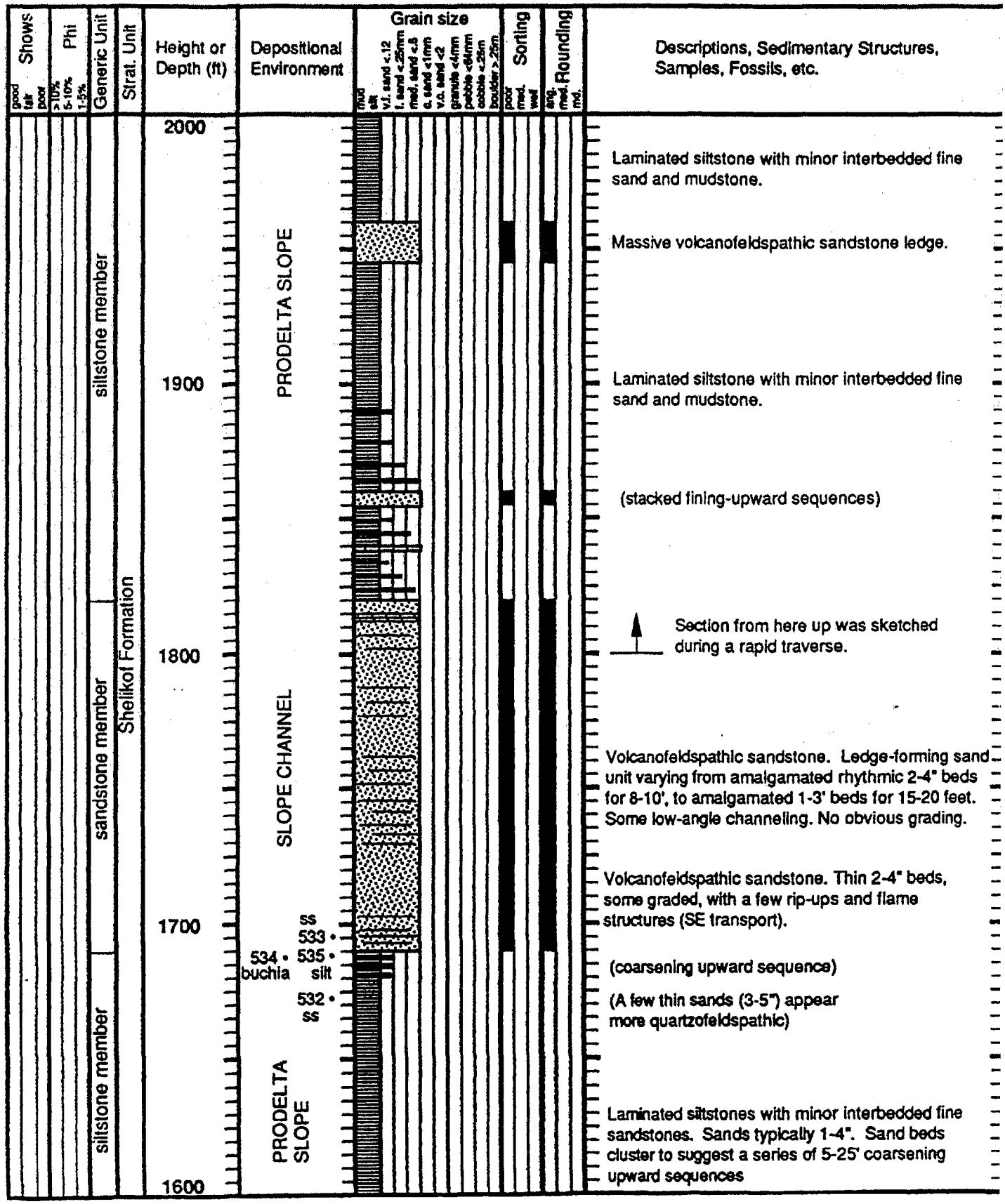
Measured Section MS 2 Shelikof Formation, Wide Bay, Alaskan Peninsula Date 5,7 June 1991



Field Program 1991 Mesozoic Cook Inlet Stop No. 91WB101 Formation(s) Shelikof Formation

Location North Wide Bay (Ugashik B-1 quad, secs 20,28,29,T31S,R43W) Described by S. W. Krueger

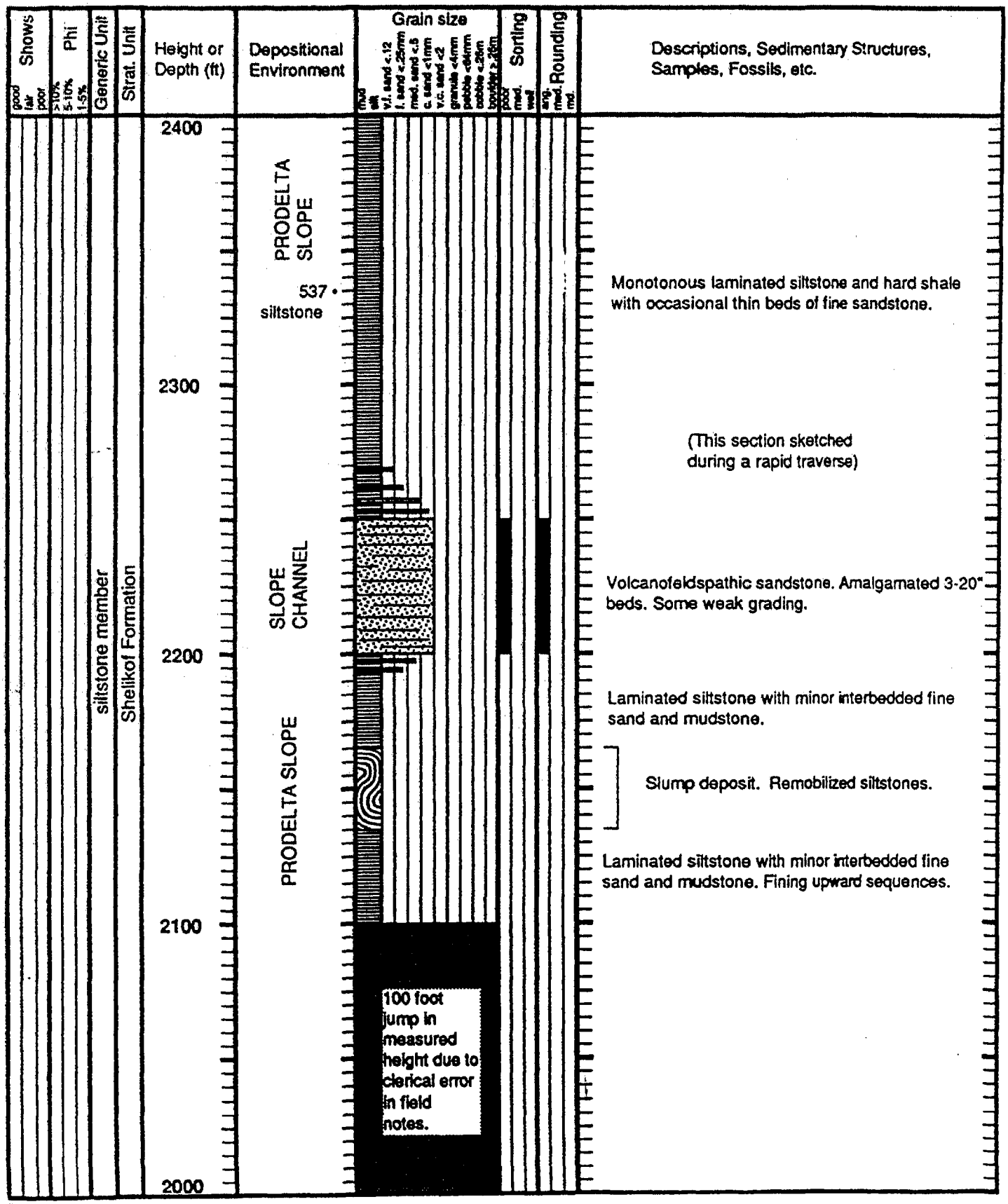
Measured Section MS 2 Shelikof Formation, Wide Bay, Alaskan Peninsula Date 5,7 June 1991



Field Program 1991 Mesozoic Cook Inlet Stop No. 91WB101 Formation(s) Shelikof Formation

Location North Wide Bay (Ugashik B-1 quad, secs 20,28,29,T31S,R43W) Described by S. W. Krueger

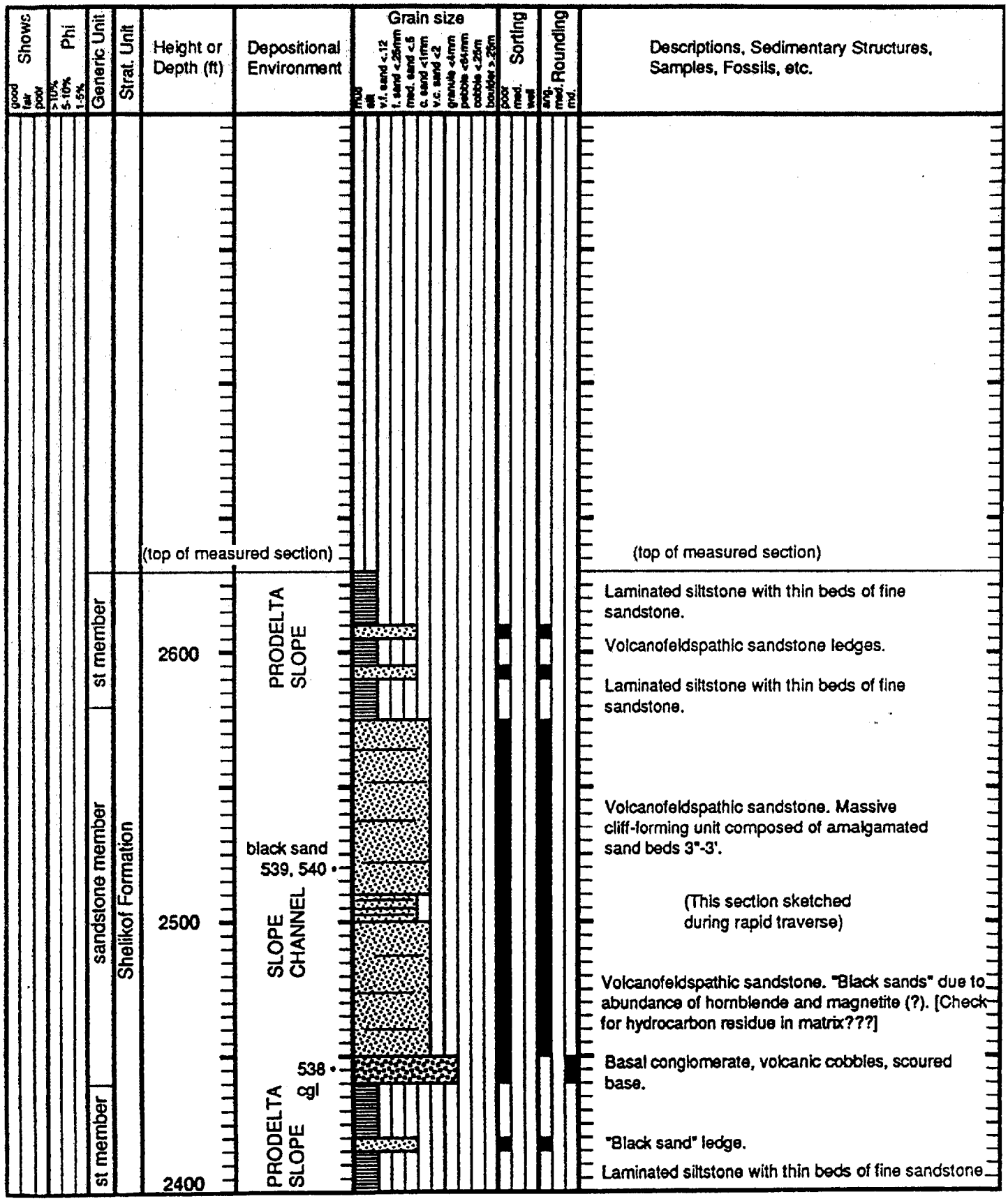
Measured Section MS 2 Shelikof Formation, Wide Bay, Alaskan Peninsula Date 5,7 June 1991



Field Program 1991 Mesozoic Cook Inlet Stop No. 91WB101 Formation(s) Shelikof Formation

Location North Wide Bay (Ugashik B-1 quad, secs 20,28,29,T31S,R43W) Described by S. W. Krueger

Measured Section MS 2 Shelikof Formation, Wide Bay, Alaskan Peninsula Date 5,7 June 1991

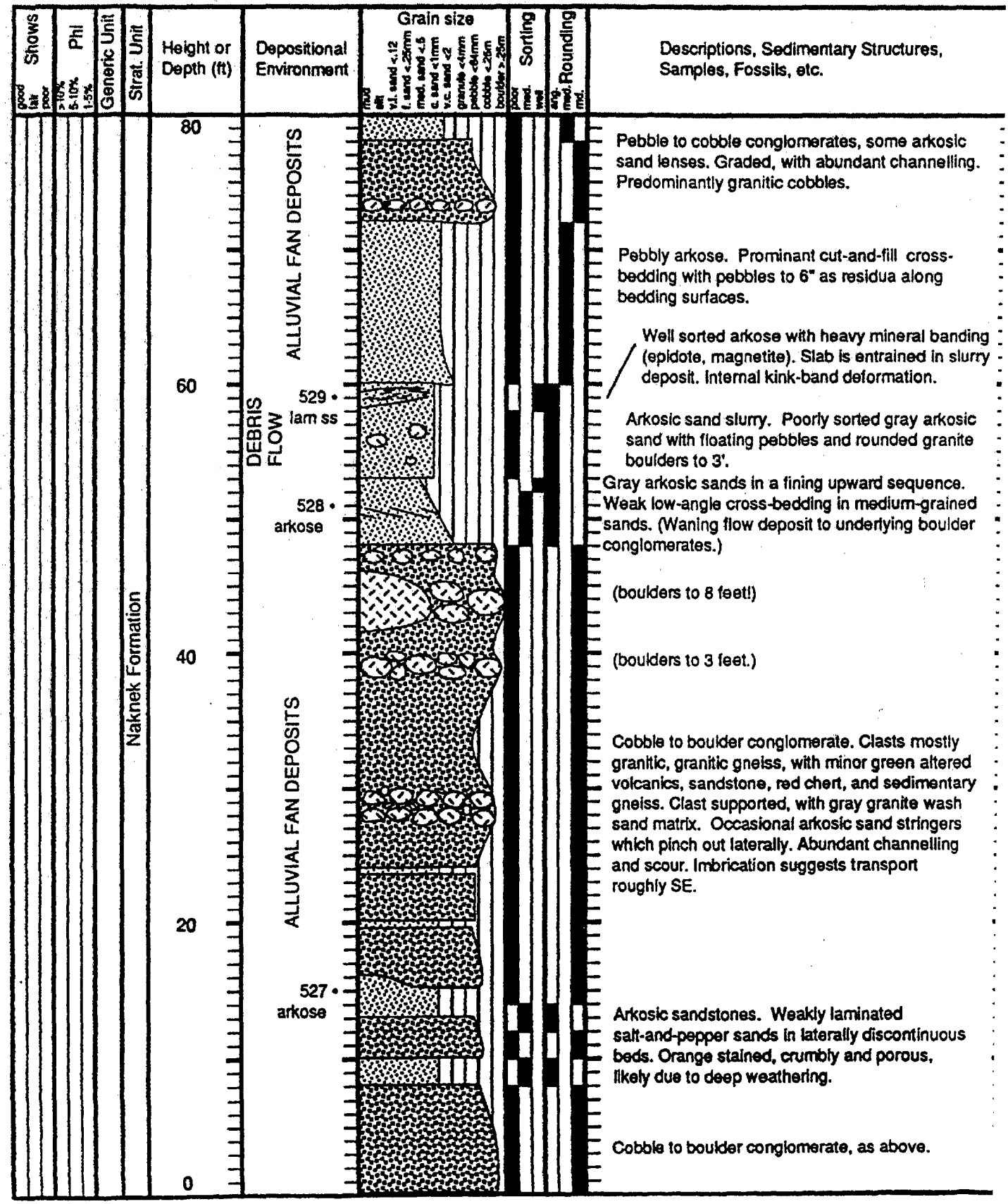


ARCO Alaska, Inc. **MEASURED SECTION FORM**

Field Program 1991 Mesozoic Cook Inlet Stop No. 91WB103 Formation(s) Naknek Formation

Location Ugashik Narrows (Ugashik C-3 Quad., sec 4,T31S,R46W) Described by S. W. Krueger

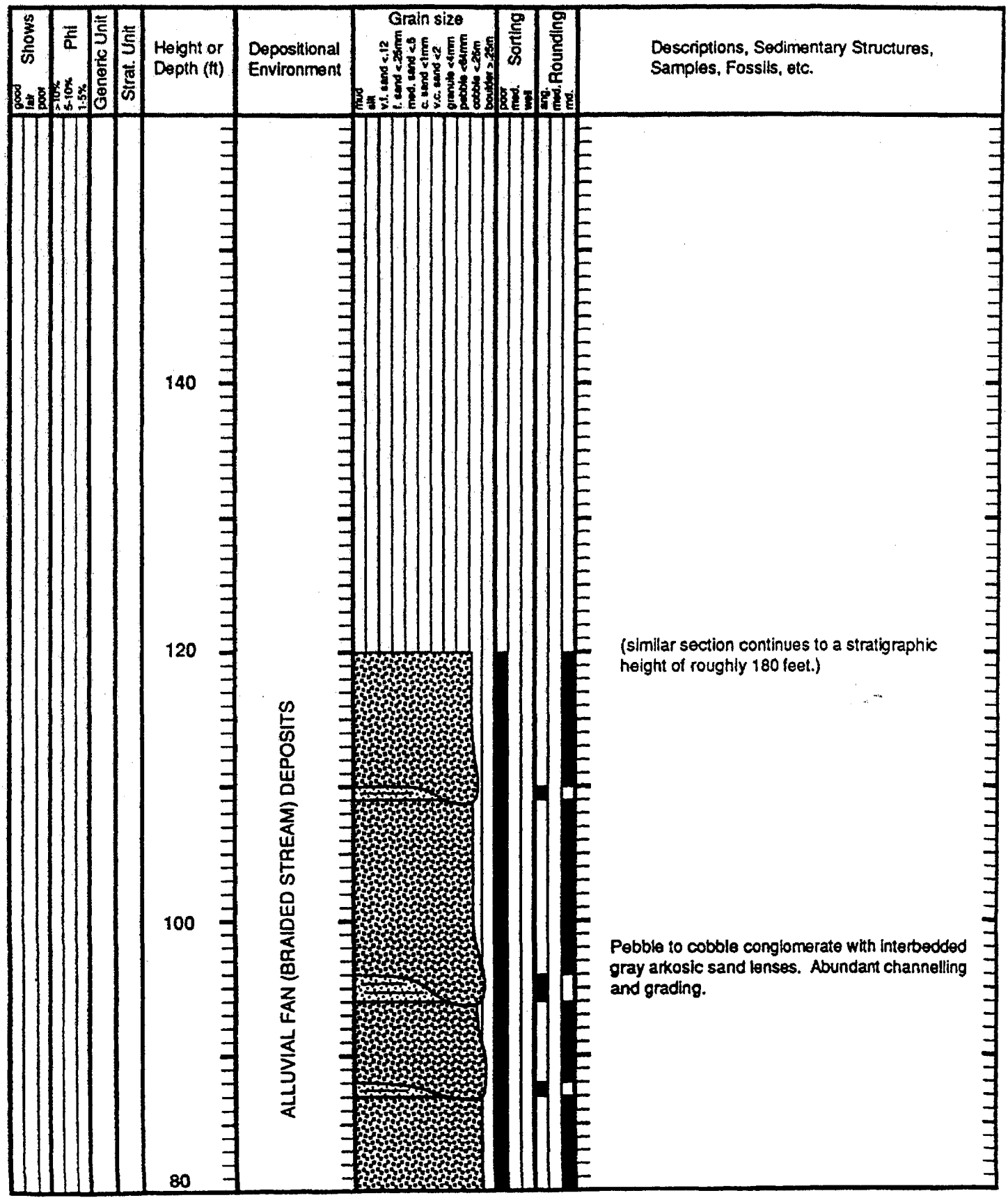
Measured Section MS 9 Naknek Formation, Ugashik Narrows, Alaskan Peninsula Date 6 June 1991



Field Program **1991 Mesozoic Cook Inlet** Stop No. **91WB103** Formation(s) **Naknek Formation**

Location **Ugashik Narrows (Ugashik C-3 Quad., sec 4,T31S,R46W)** Described by **S. W. Krueger**

Measured Section **MS 9 Naknek Formation, Ugashik Narrows, Alaskan Peninsula** Date **6 June 1991**

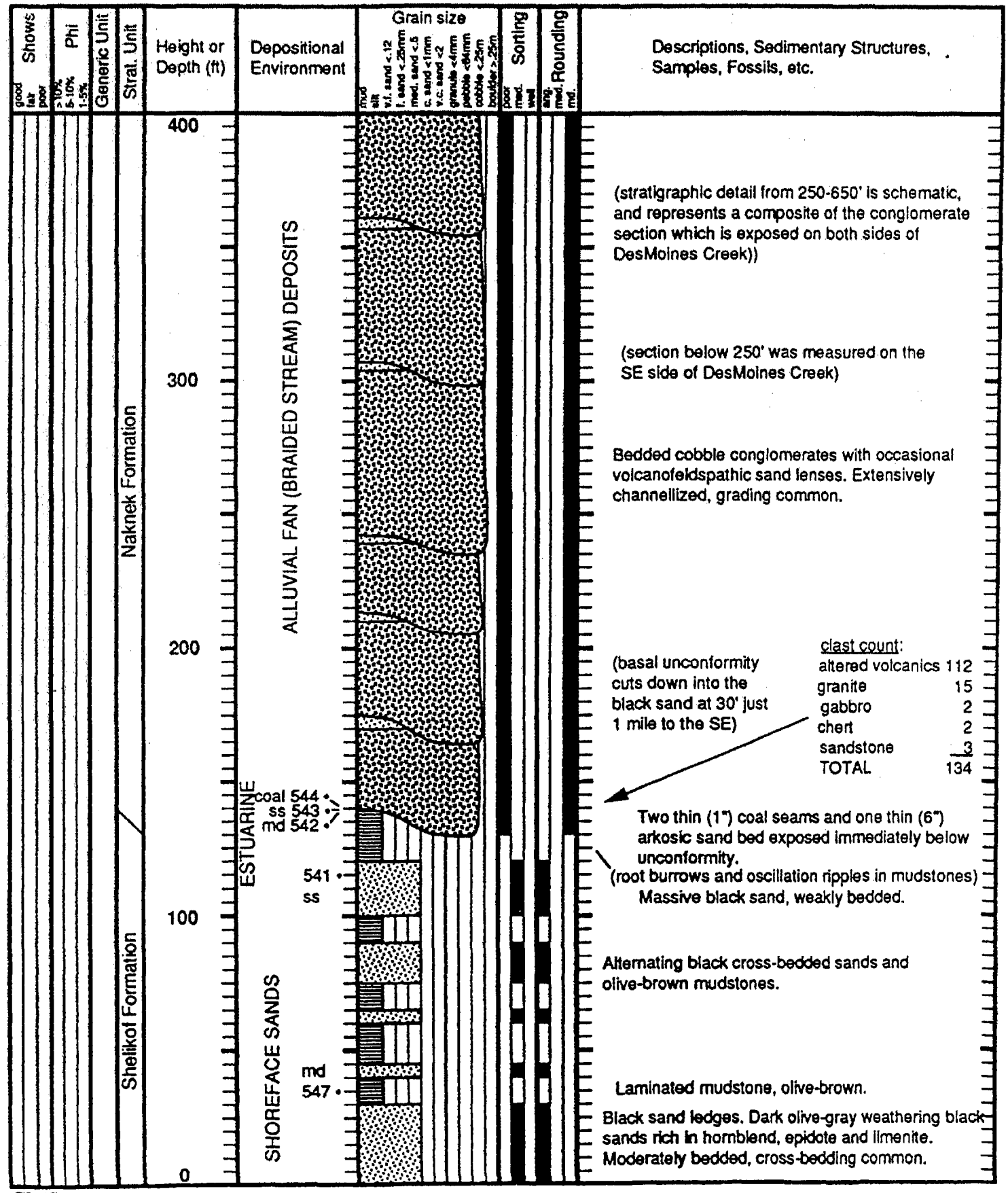


ARCO Alaska, Inc. **MEASURED SECTION FORM**

Field Program 1991 Mesozoic Cook Inlet Stop No. 91WB104 Formation(s) Naknek and Shelikof Fms.

Location North Wide Bay (Ugashik C-2 quad, secs 14,15, T31S,R44W) Described by S. W. Krueger

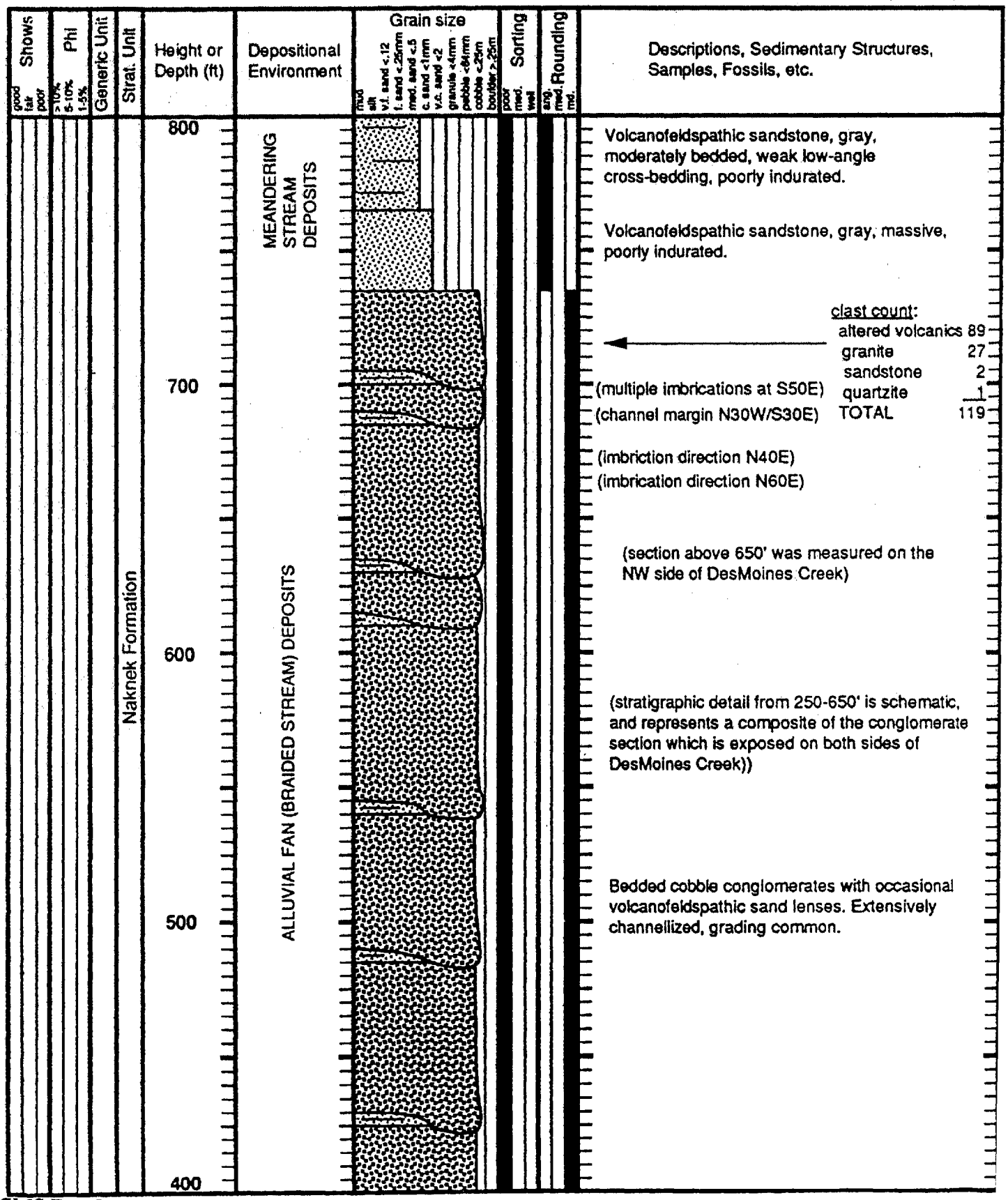
Measured Section MS 4 Naknek & Shelikof Formations, Wide Bay, Alaskan Peninsula Date 9 June 1991



Field Program 1991 Mesozoic Cook Inlet Stop No. 91WB104 Formation(s) Naknek and Shelikof Fms.

Location North Wide Bay (Ugashik C-2 quad, secs 14,15, T31S,R44W) Described by S. W. Krueger

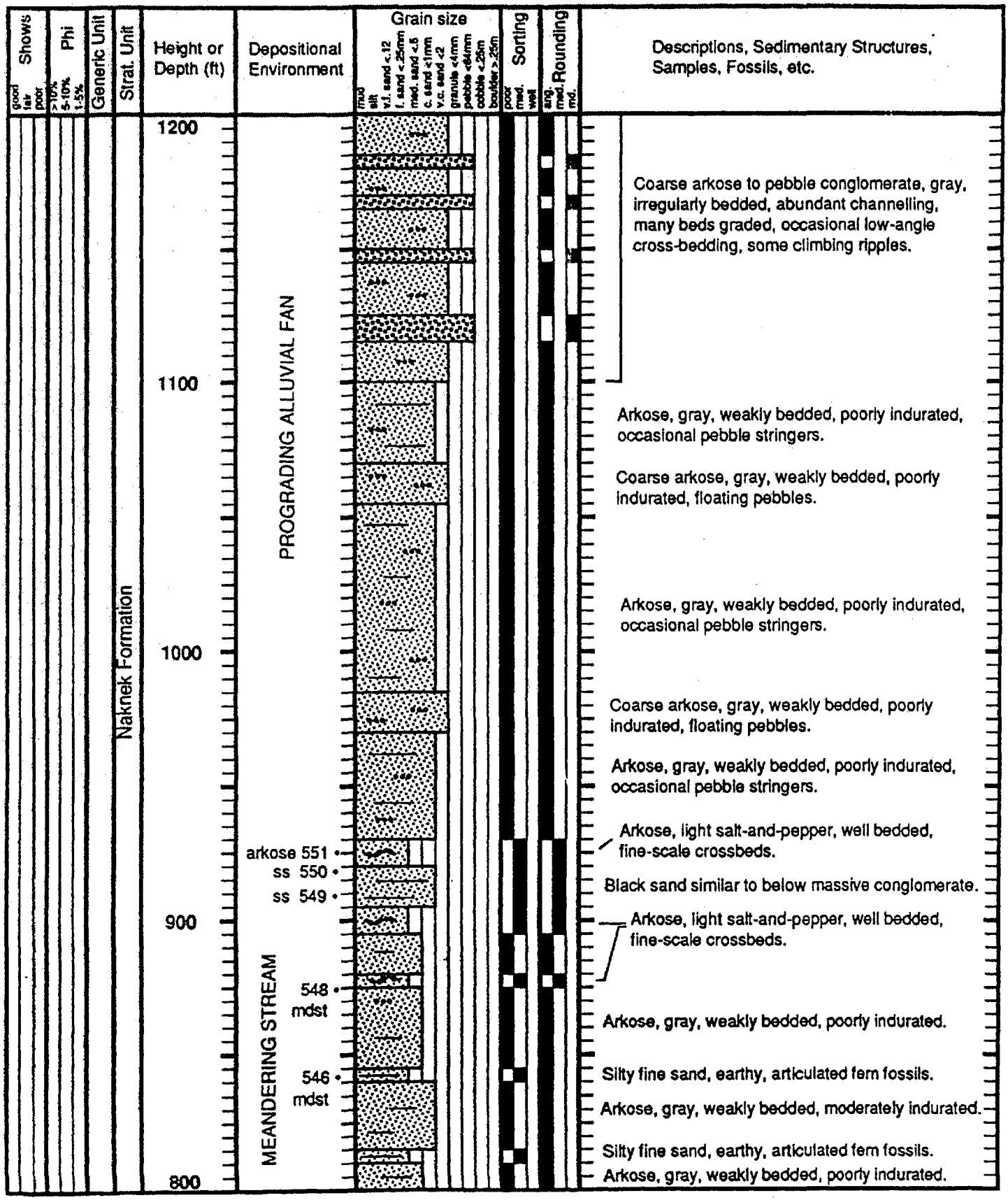
Measured Section MS 4 Naknek & Shelikof Formations, Wide Bay, Alaskan Peninsula Date 9 June 1991



Field Program 1991 Mesozoic Cook Inlet Stop No. 91WB104 Formation(s) Naknek and Shelikof Fms.

Location North Wide Bay (Ugashik C-2 quad, secs 14,15, T31S,R44W) Described by S. W. Krueger

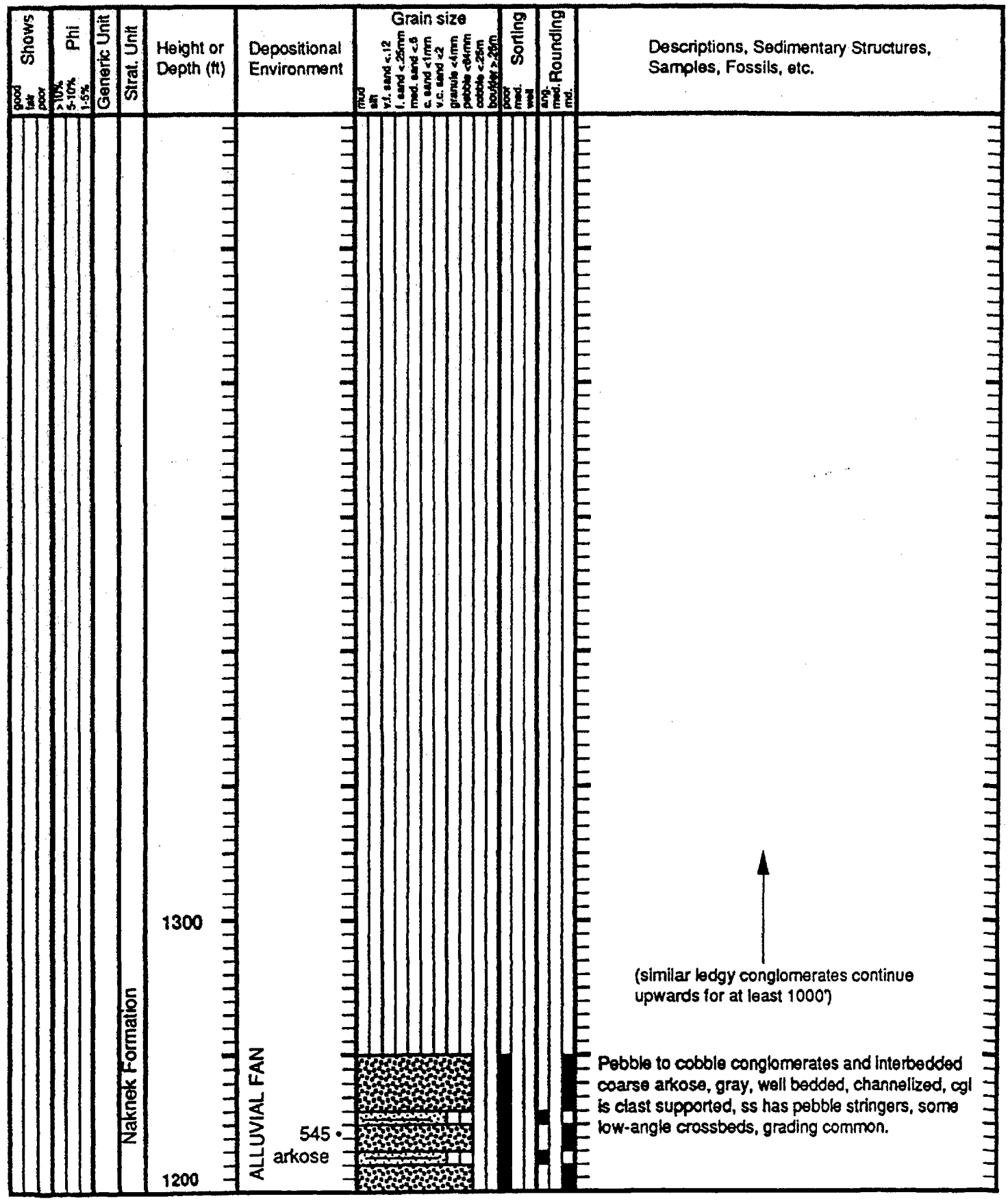
Measured Section MS 4 Naknek & Shelikof Formations, Wide Bay, Alaskan Peninsula Date 9 June 1991



Field Program 1991 Mesozoic Cook Inlet Stop No. 91WB104 Formation(s) Naknek and Shelikof Fms.

Location North Wide Bay (Ugashik C-2 quad, secs 14,15, T31S,R44W) Described by S. W. Krueger

Measured Section MS 4 Naknek & Shelikof Formations, Wide Bay, Alaskan Peninsula Date 9 June 1991

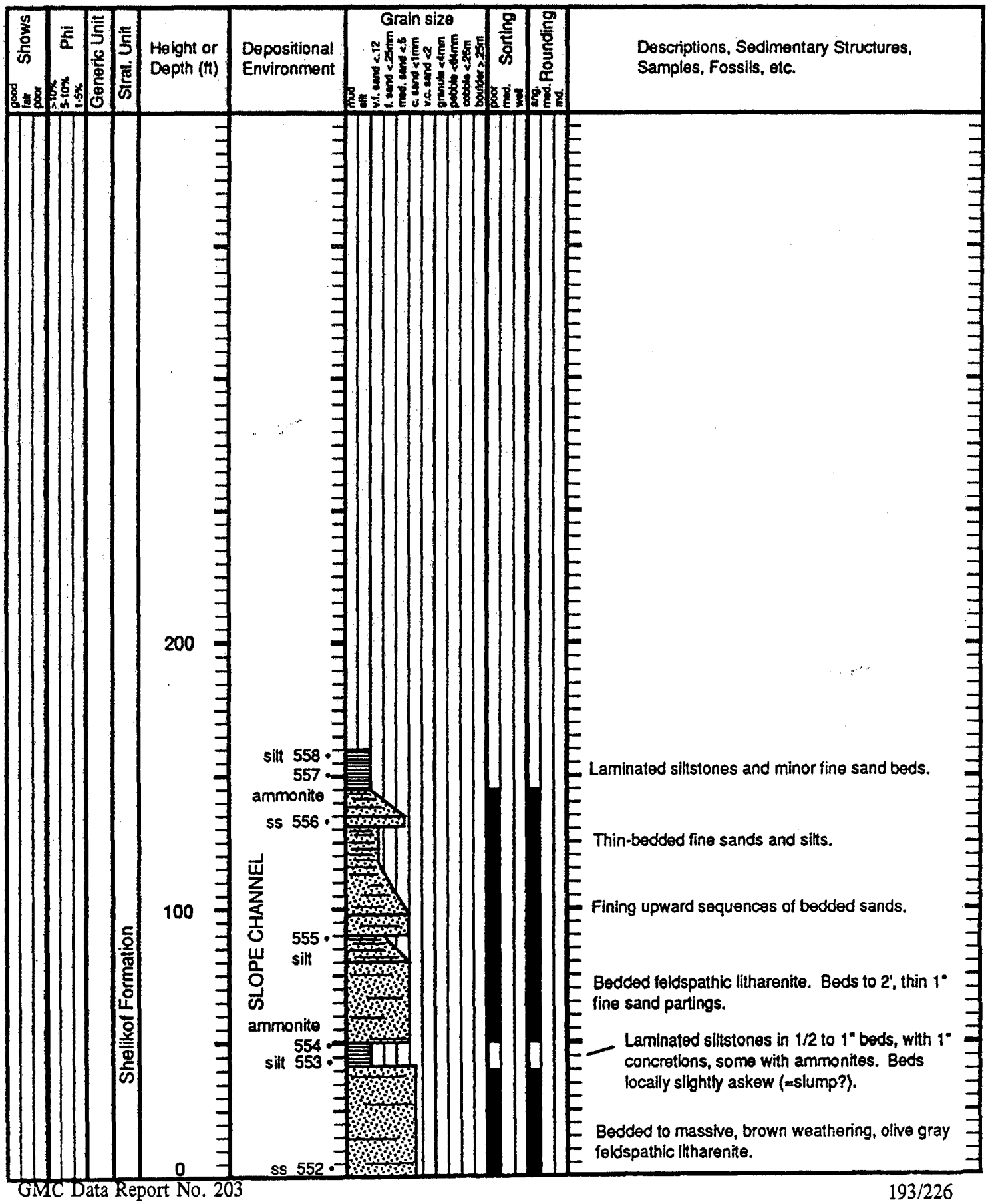


ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program 1991 Mesozoic Cook Inlet Stop No. 91WB105 Formation(s) Shelikof Formaton

Location North Wide Bay (Ugashik B-1 quad, secs 20,21, T31S,R43W) Described by S. W. Krueger

Measured Section MS 12 Shelikof Formations, Wide Bay, Alaskan Peninsula Date 11 June 1991



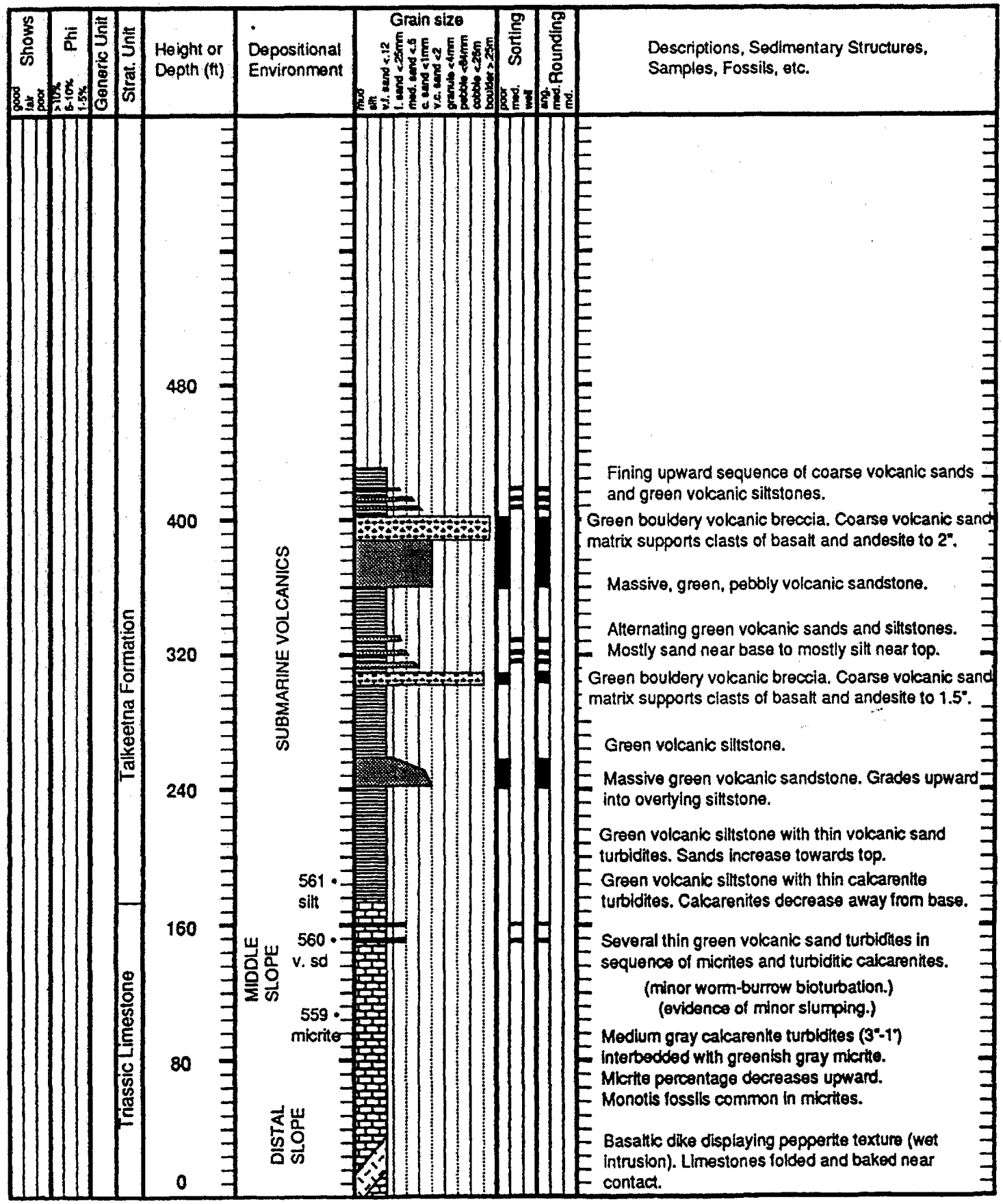
ARCO Alaska, Inc.

MEASURED SECTION FORM

Field Program 1991 Mesozoic Cook Inlet Stop No. 91WB106 Formation(s) Triassic limestone/Talkeetna Fm

Location East Puale Bay (Karluk C-4/5 Quad, sec 22,T28S,R37W) Described by S. W. Krueger

Measured Section MS 13 Triassic limestone/Talkeetna Fm, Puale Bay, Alaska Peninsula Date 12 June 1991



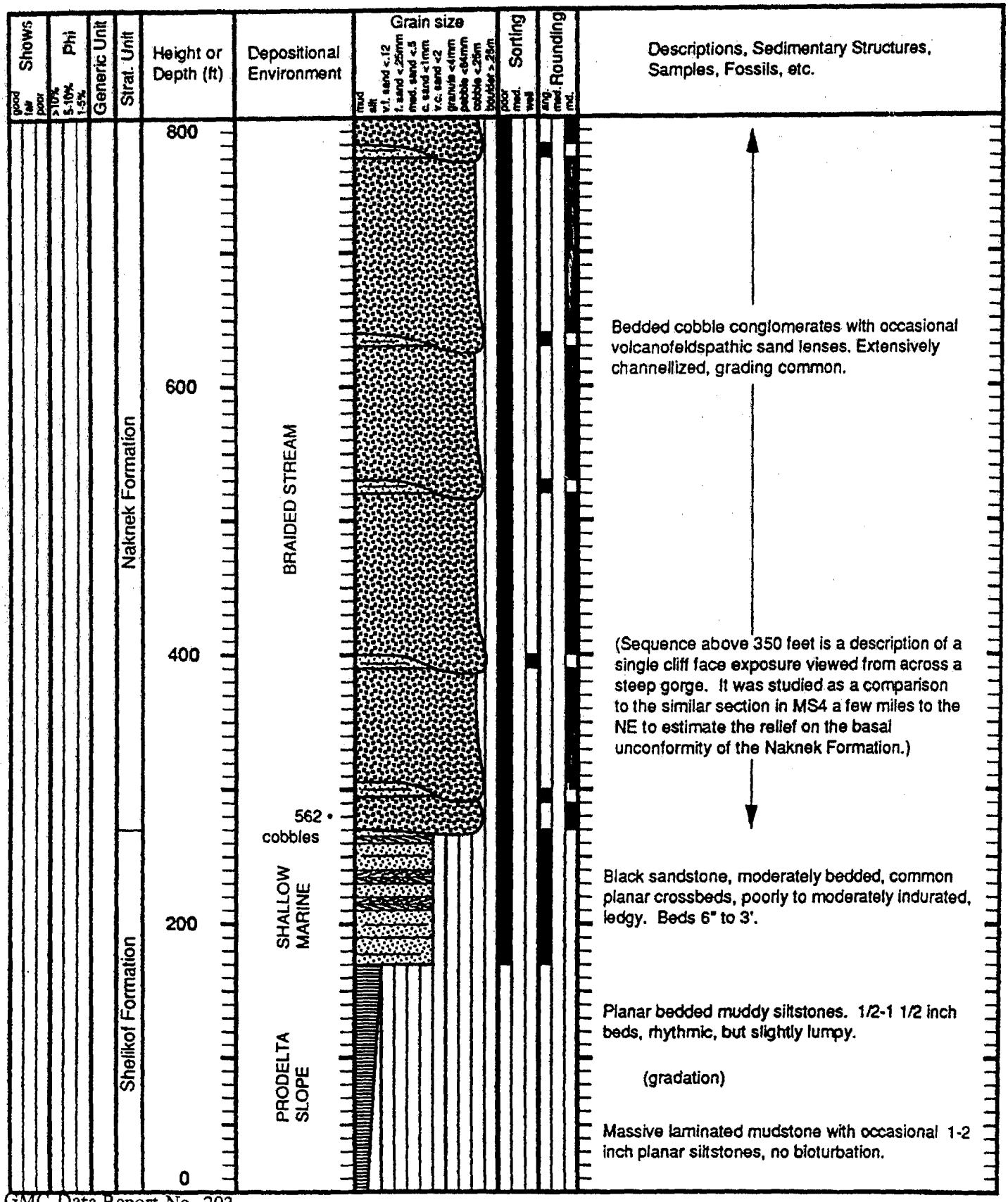
ARCO Alaska, Inc.

MEASURED SECTION FORM

Field Program 1991 Mesozoic Cook Inlet Stop No. 91WB107 Formation(s) Naknek and Shelikof Fms.

Location North Wide Bay (Ugashik B-2 quad, sec 27, T31S,R44W) Described by S. W. Krueger

Measured Section MS 11 Naknek & Shelikof Formations, Wide Bay, Alaskan Peninsula Date 10 June 1991

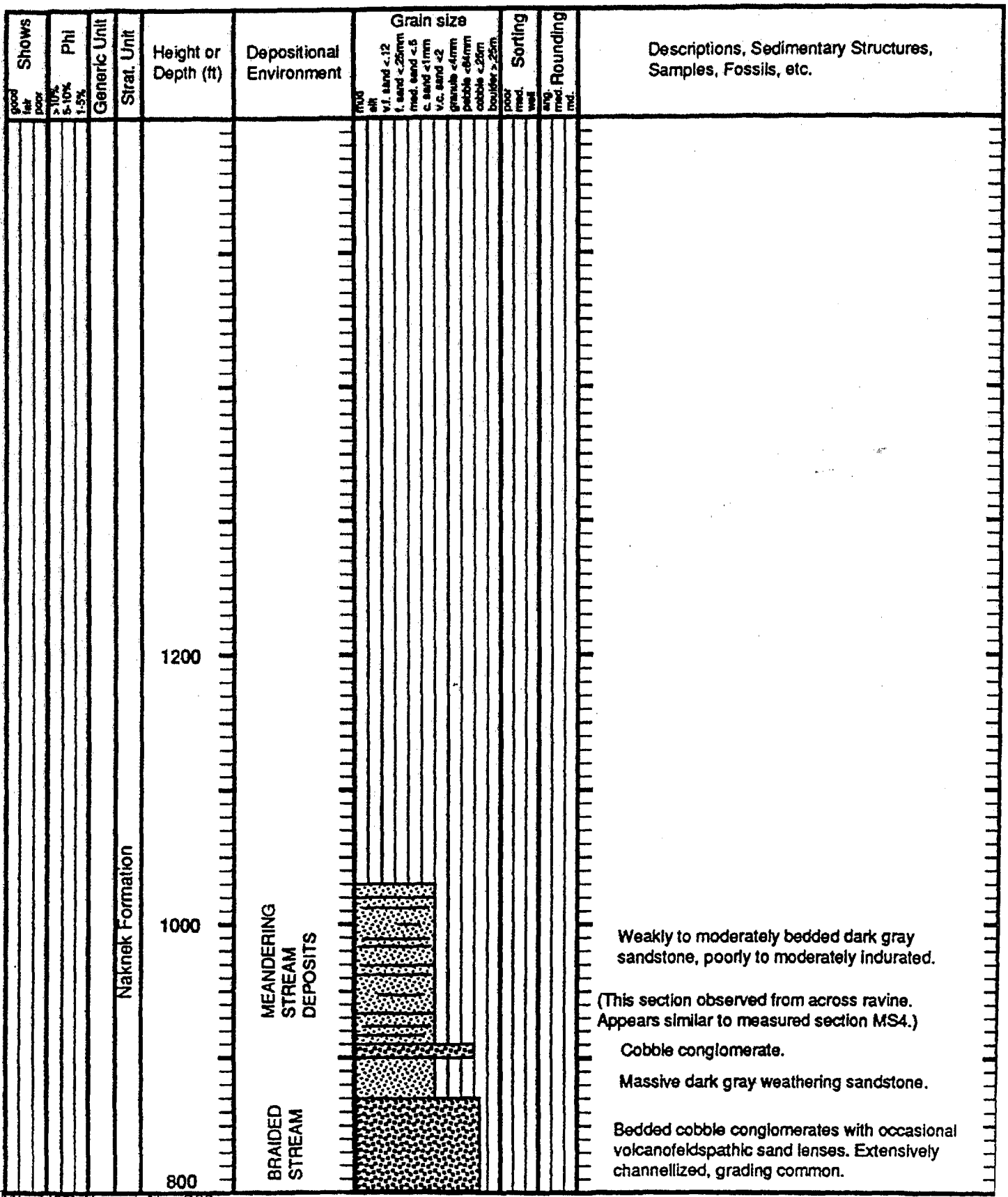


ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program 1991 Mesozoic Cook Inlet Stop No. 91WB107 Formation(s) Naknek and Shelikof Fms.

Location North Wide Bay (Ugashik B-2 quad, sec 27, T31S,R44W) Described by S. W. Krueger

Measured Section MS 11 Naknek & Shelikof Formations, Wide Bay, Alaskan Peninsula Date 10 June 1991



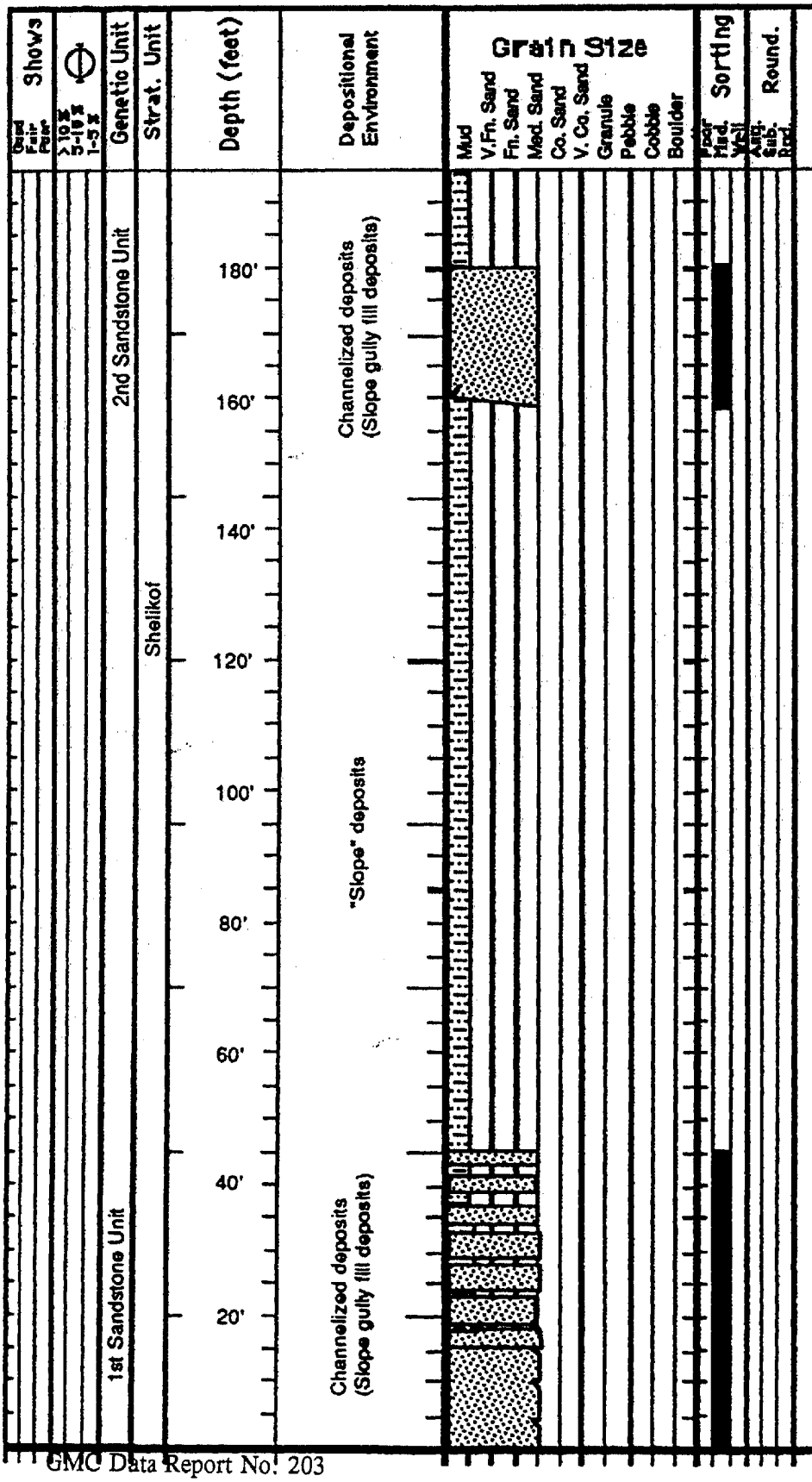
91WB 204, 205

ARCO Alaska, MEASURED SECTION FORM

Field Program: Mesozoic Cook Inlet Stop No.: 91WB 204, 205 Formations: Shelikof

Measured Section: Number Date: June 7, 1991

Location: N.E. Sec. 18, T33S R45W Ugashi Quad B-2 Described By: William Morris



Sedimentary Structures and Descriptions

Amalgamated sandstone beds, section is poorly exposed, but appears to consist dominantly opf massive sandone beds. Wood fragments are common

Interbedded mudstone and sandstone, Sandstone-thin to very-thin bedded. Section is very poorly exposed. Slumps, slump scars and channel like features filled with the fine-grained deposits are locally common.

Interbedded sandstone & mudstone (1:1). Sandstone-appears massive, but poorly exposed

Interbedded sandstone & mudstone (4:1). Sandstone-dominantly massive, mudstone clasts commmon

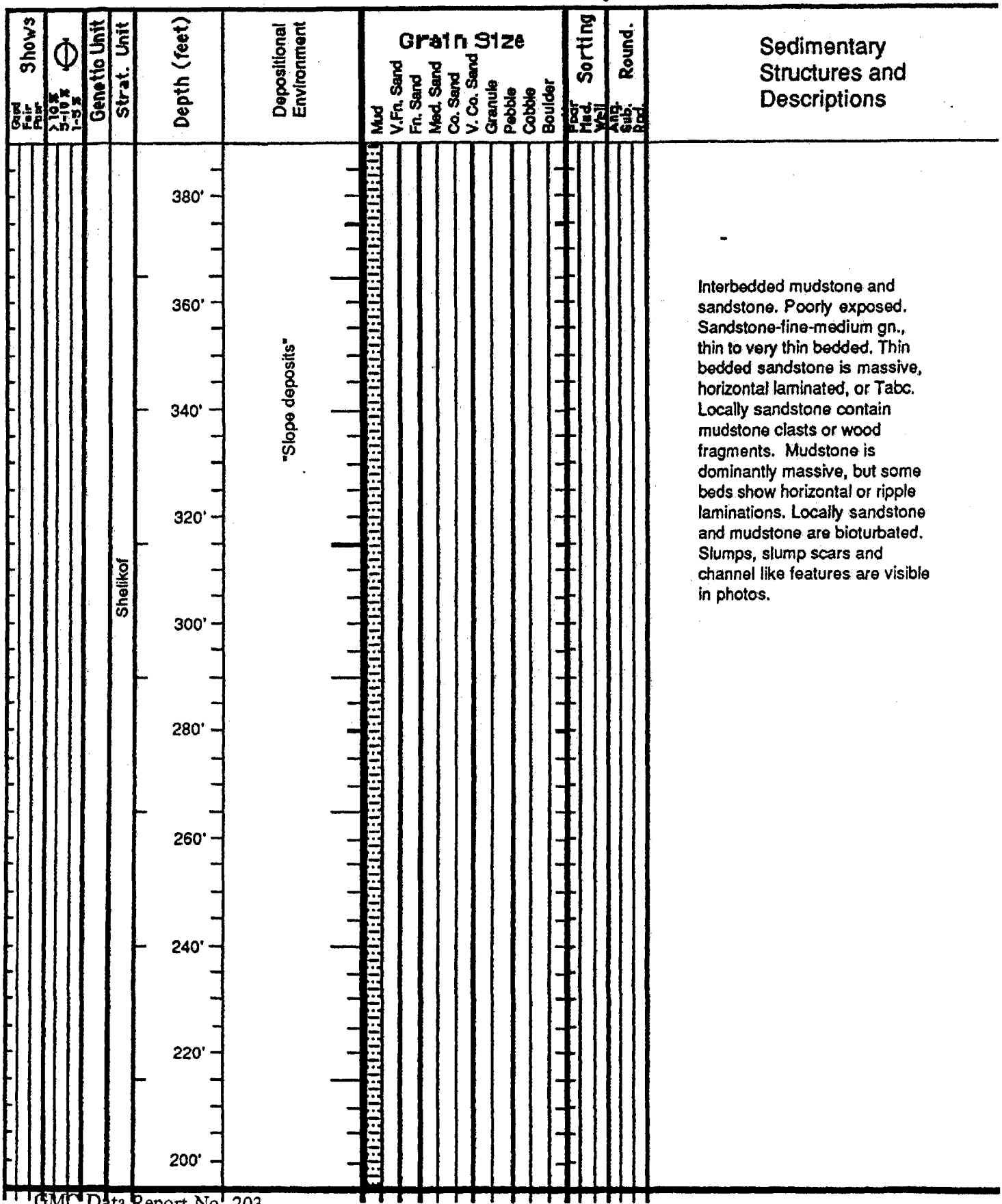
Dominantly massive, lesser normal grading, rare Tabc. Erosive bases. Rare coarse-grained sandstone beds.

ARCO Alaska, Inc. **MEASURED SECTION FORM**

Field Program Mesozoic Cook Inlet Stop No. Sites 204 & 205 Formations Shelikof

Measured Section Number Date June 7, 1991

Location N.E. Sec. 18, T33S R45W Ugashi Quad B-2 Described By William Morris

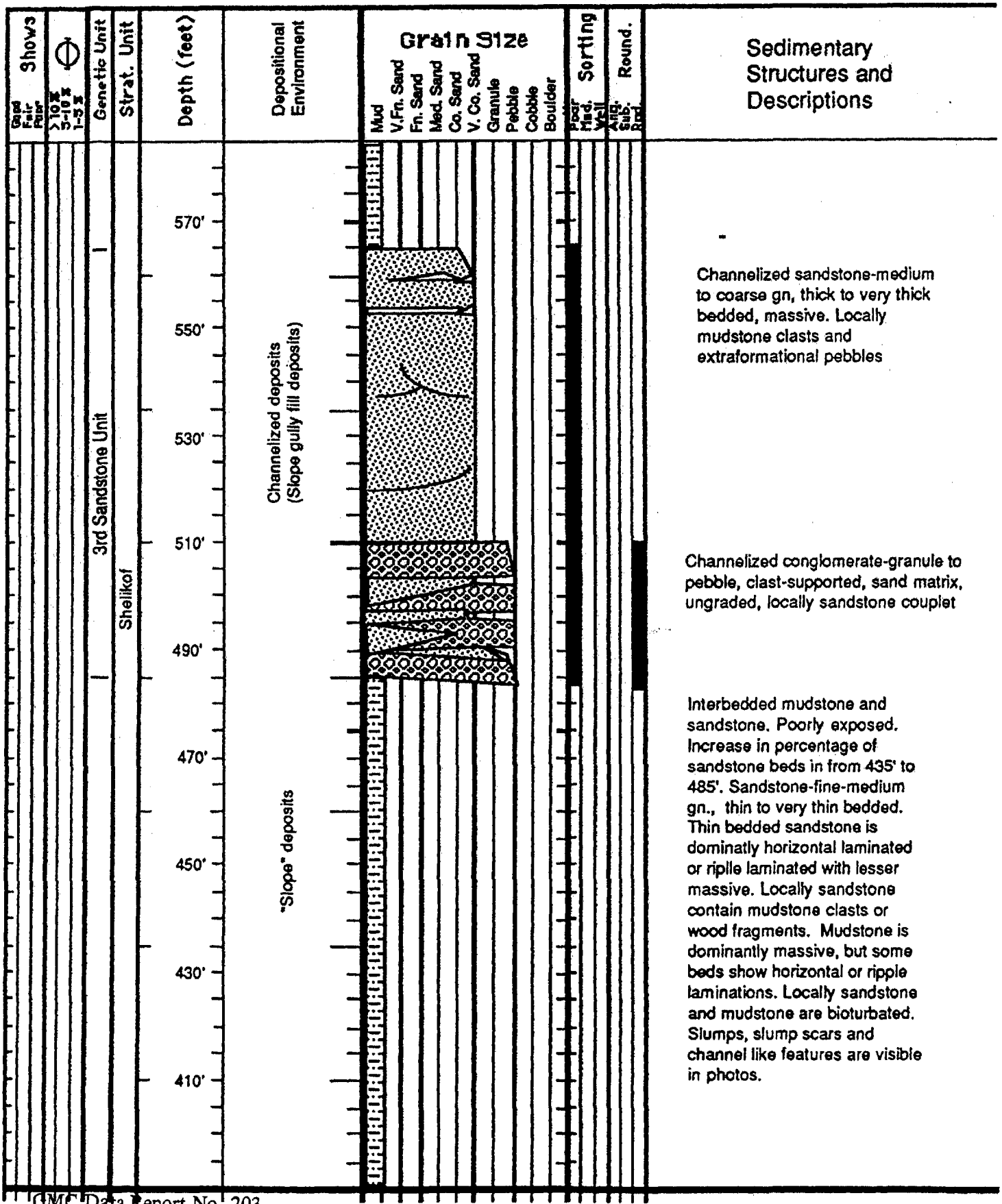


ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program Mesozoic Cook Inlet Stop No. Sites 204 &205 Formations Shelikof

Measured Section Number Date June 7, 1991

Location N.E. Sec. 18, T33S R45W Ugashi Quad B-2 Described By William Morris



ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program Mesozoic Cook Inlet Stop No. Sites 204 &205 Formations Shelikof

Measured Section Number Date June 7, 1991

Location N.E. Sec. 18, T33S R45W Ugashi Quad B-2 Described By William Morris

Shows: Oil, Gas, Water

Genetic Unit

Strat. Unit: Shelikof

Depth (feet): 760', 740', 720', 700', 680', 660', 640', 620', 600'

Depositional Environment: "Slope deposits"

Grain Size: Mud, V.Fn. Sand, Fn. Sand, Med. Sand, Co. Sand, V. Co. Sand, Granule, Pebble, Cobble, Boulder

Sorting: Poor, Mod., Well

Round.: Ang., Sub., Rnd.

Sedimentary Structures and Descriptions

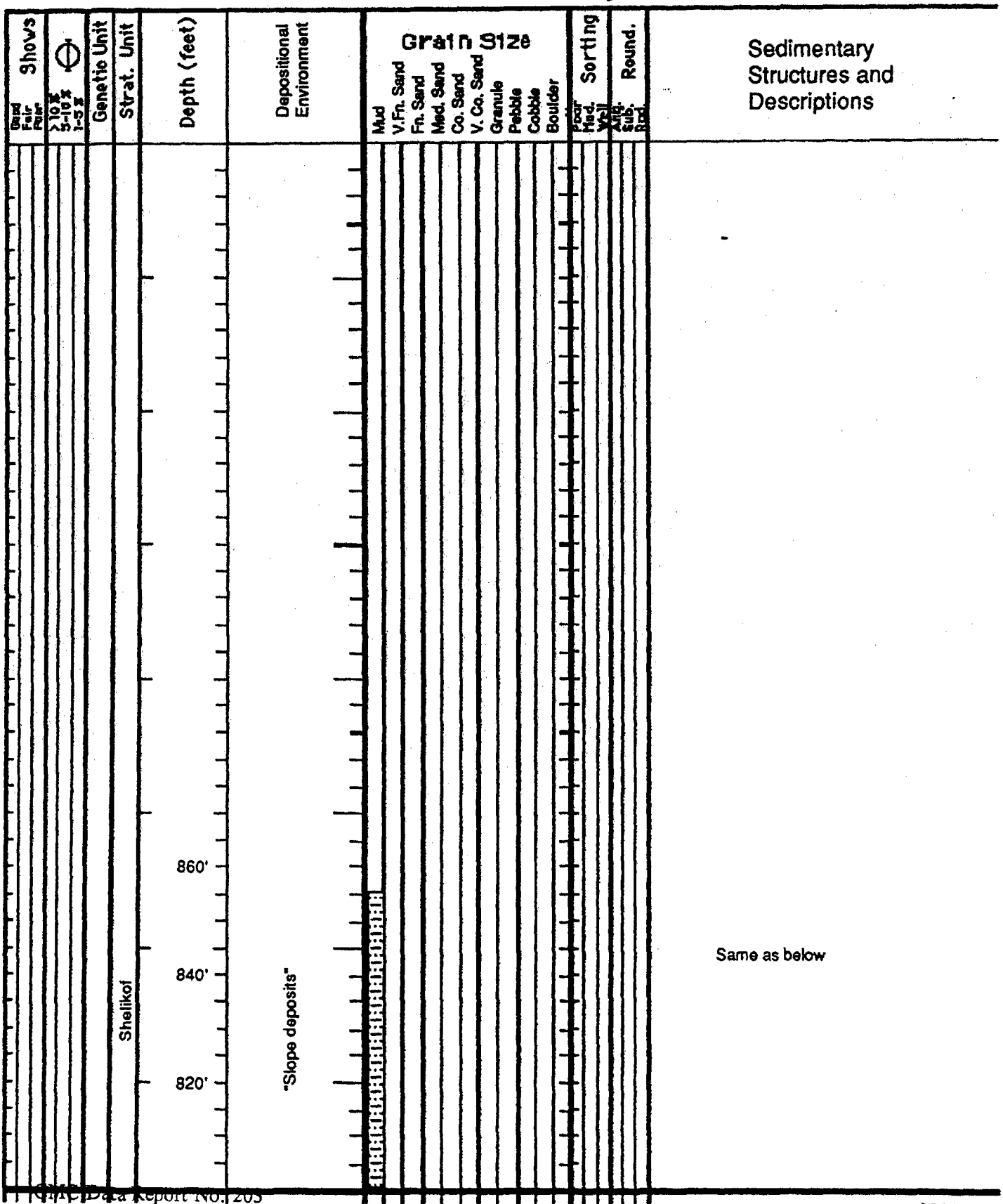
Interbedded mudstone and sandstone. Poorly exposed. Sandstone-fine-medium gn., thin to very thin bedded. Thin bedded sandstone is massive, planar laminated, or Tabc. Locally sandstone contain mudstone clasts or wood fragments. Mudstone is dominantly massive, but some beds show horizontal or ripple laminations, rare siltstone slurry beds. Locally sandstone and mudstone are bioturbated. Slumps, slump scars and channel like features are visible in photos.

ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program Mesozoic Cook Inlet Stop No. Sites 204 &205 Formations Shelikof

Measured Section Number Date June 7, 1991

Location N.E. Sec. 18, T33S R45W Ugashi Quad B-2 Described By William Morris



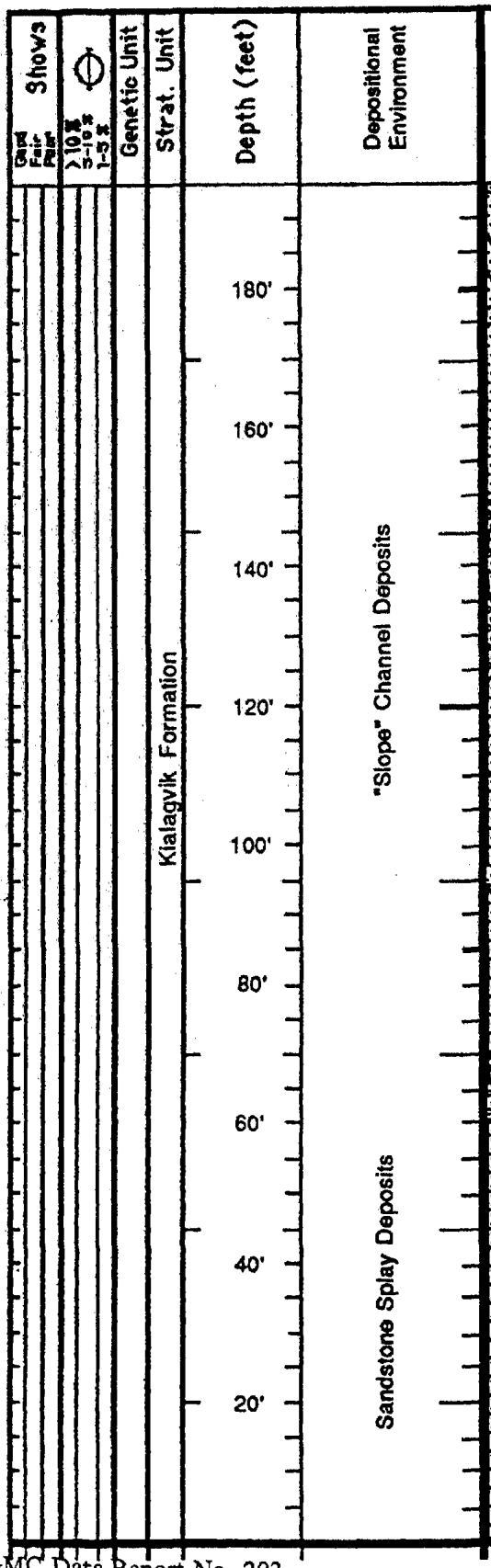
INS 5A, 5B, 5C 91WB206-207

ARCO Alaska, Inc. MEASURED SECTION FORM 91WB206-207 Page 1 of 5

Field Program: Mesozoic Cook Inlet Stop No.: ~~Sites 206 & 207~~ Formations: Kialagvik

Measured Section: Number 5A, 5B & 5C Date: June 9, 1991

Location: N.E. Sec. 30, T33S R45W Ugashi Quad B-2 Described By: William Morris



Sedimentary Structures and Descriptions

Med to Co. gn., massive sandstone, bedding indistict

Med to granule massive sandstone, bedding indistinct

Alternating pebbly sandstone and granule to coarse grained, normal graded or massive bedded sandstone couplets.

91WB206-633

Coarse to fine grained, normal to massive, med to thick bedded sandstone

Granule to med. gn., massive sandstone, litharenite

Pebbly sandstone with med to co. gn. sandstone couplets, quartz rich

91WB206-618

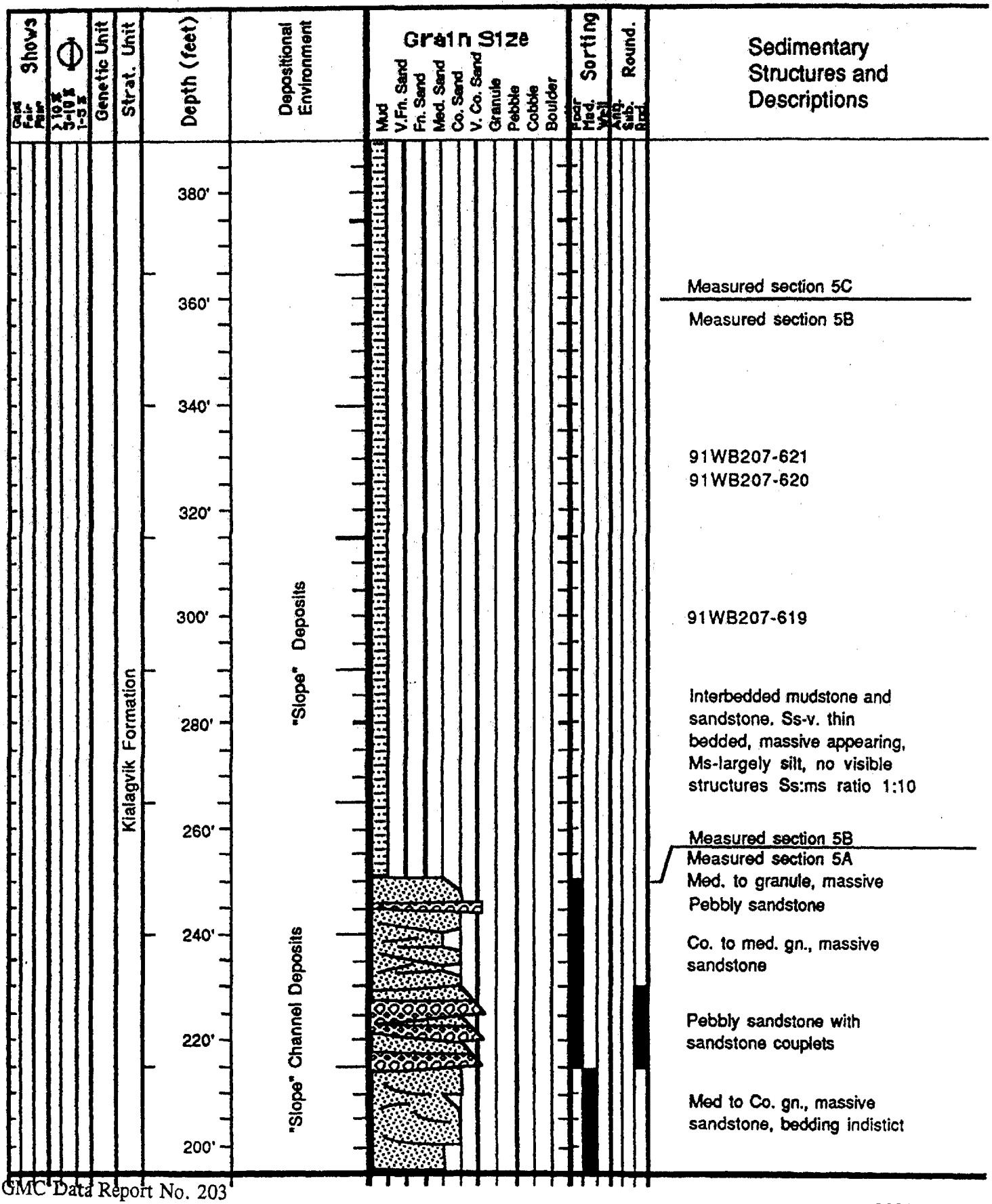
Fn. grained massive to normal graded, med. to thick bedded sandstone, some organics and mudstone clasts. Base of sandstone beds is non-erosive and beds are lateraly continuous. Quartz rich.

ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program: Mesozoic Cook Inlet Stop No.: Sites 206 & 207 Formations: Kialagvik

Measured Section: Number 5A, 5B & 5C Date: June 9, 1991

Location: N.E. Sec. 30, T33S R45W Ugashi Quad B-2 Described By: William Morris

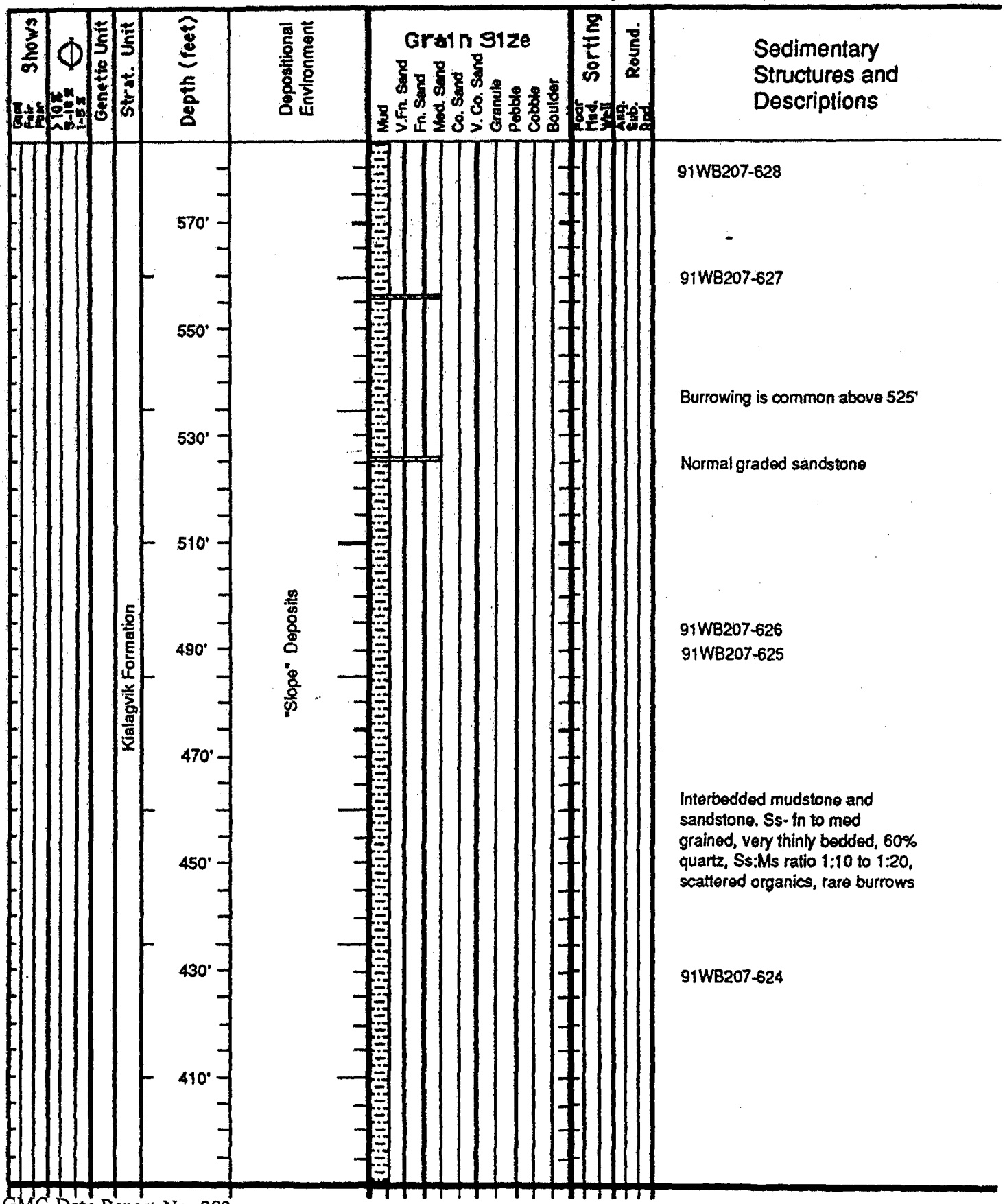


ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program: Mesozoic Cook Inlet Stop No.: Sites 206 & 207 Formations: Kialagvik

Measured Section: Number 5A, 5B & 5C Date: June 9, 1991

Location: N.E. Sec. 30, T33S R45W Ugashi Quad B-2 Described By: William Morris



Sedimentary Structures and Descriptions

91WB207-628

91WB207-627

Burrowing is common above 525'

Normal graded sandstone

91WB207-626

91WB207-625

Interbedded mudstone and sandstone. Ss- fn to med grained, very thinly bedded, 60% quartz, Ss:Ms ratio 1:10 to 1:20, scattered organics, rare burrows

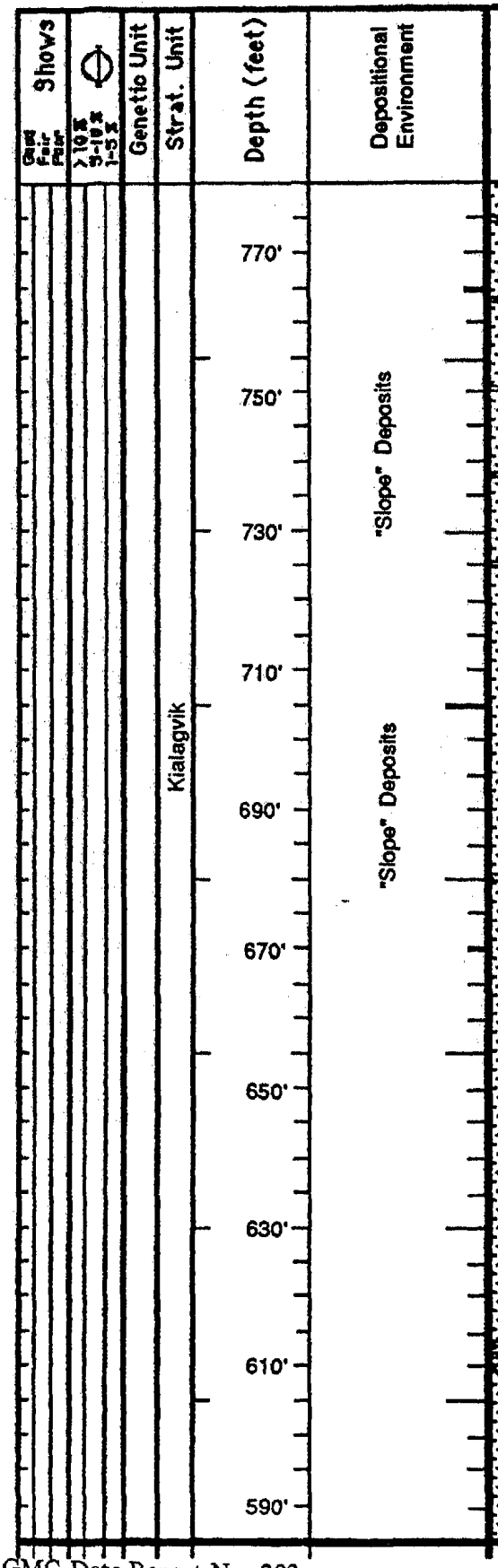
91WB207-624

ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program: Mesozoic Cook Inlet Stop No.: Sites 206 & 207 Formations: Kialagvik

Measured Section: Number 5A, 5B & 5C Date: June 9, 1991

Location: N.E. Sec. 30, T33S R45W Ugashi Quad B-2 Described By: William Morris



Sedimentary Structures and Descriptions

Interval is dominatly bioturbated, belemenite and other fossils are commmon.

91WB207-631
Above 725' thin to medium bedded, normal graded sandstone beds occur about 1 per 8' and increase of v. fn sandstone beds relative to siltstone beds

Med to Co. grain, normal bedded sandstone with mudstone clasts and belemenites

at 660' are a series of sandstone dikes striking 353-75E

91WB207-630
91WB207-629

Interbedded mudstone and sandstone. Ss- fn to med grained, very thinly bedded, thin to medium thick bedded sandstones are normal, massive or Tbc. Ss:Ms ratio 1:10 to 1:20, scattered organics, common burrows

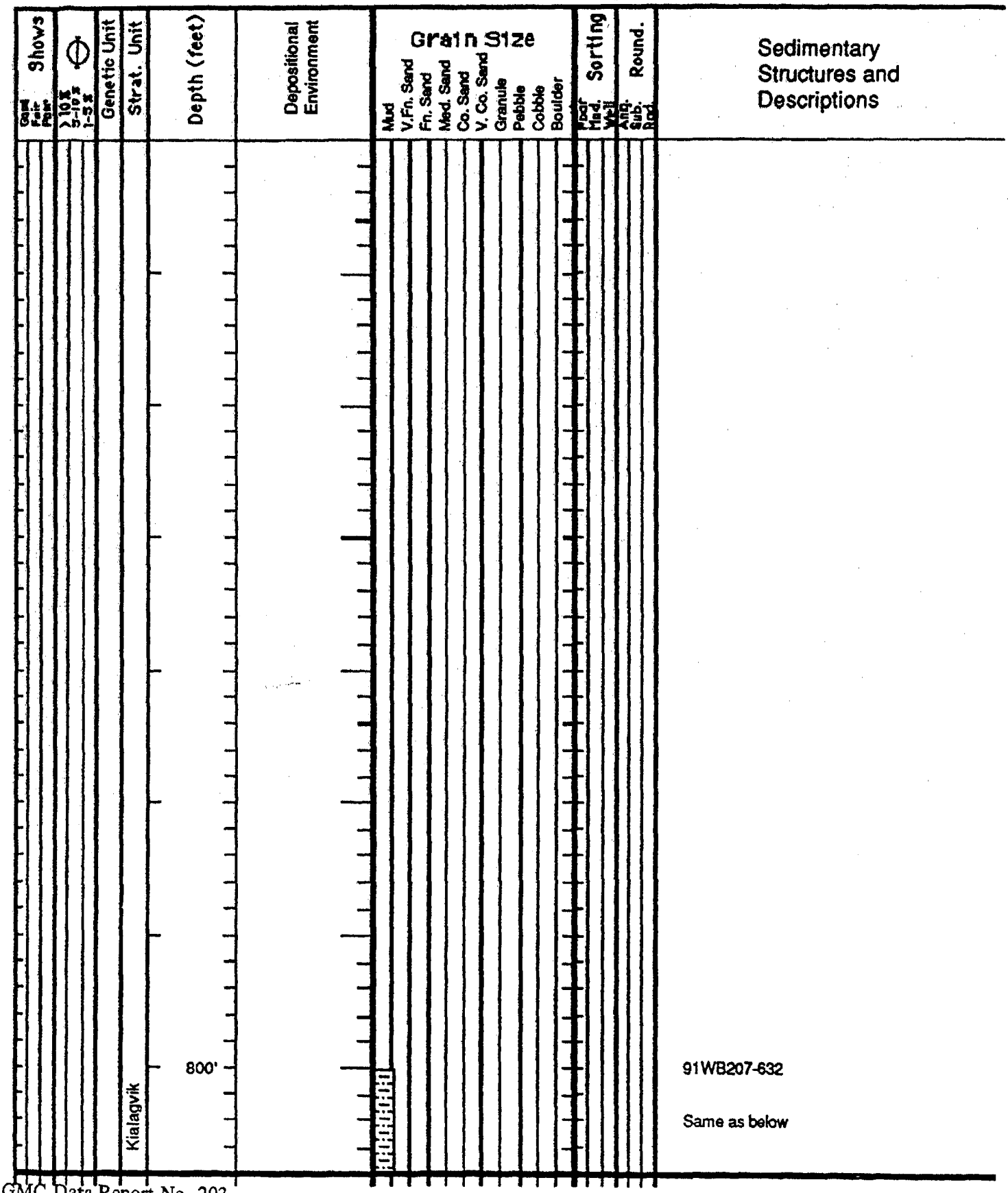
Tbc

ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program Mesozoic Cook Inlet Stop No. Sites 206 & 207 Formations Kialagvik

Measured Section Number 5A, 5B & 5C Date June 9, 1991

Location N.E. Sec. 30, T33S R45W Ugashi Quad B-2 Described By William Morris



MS 6 91WB 208

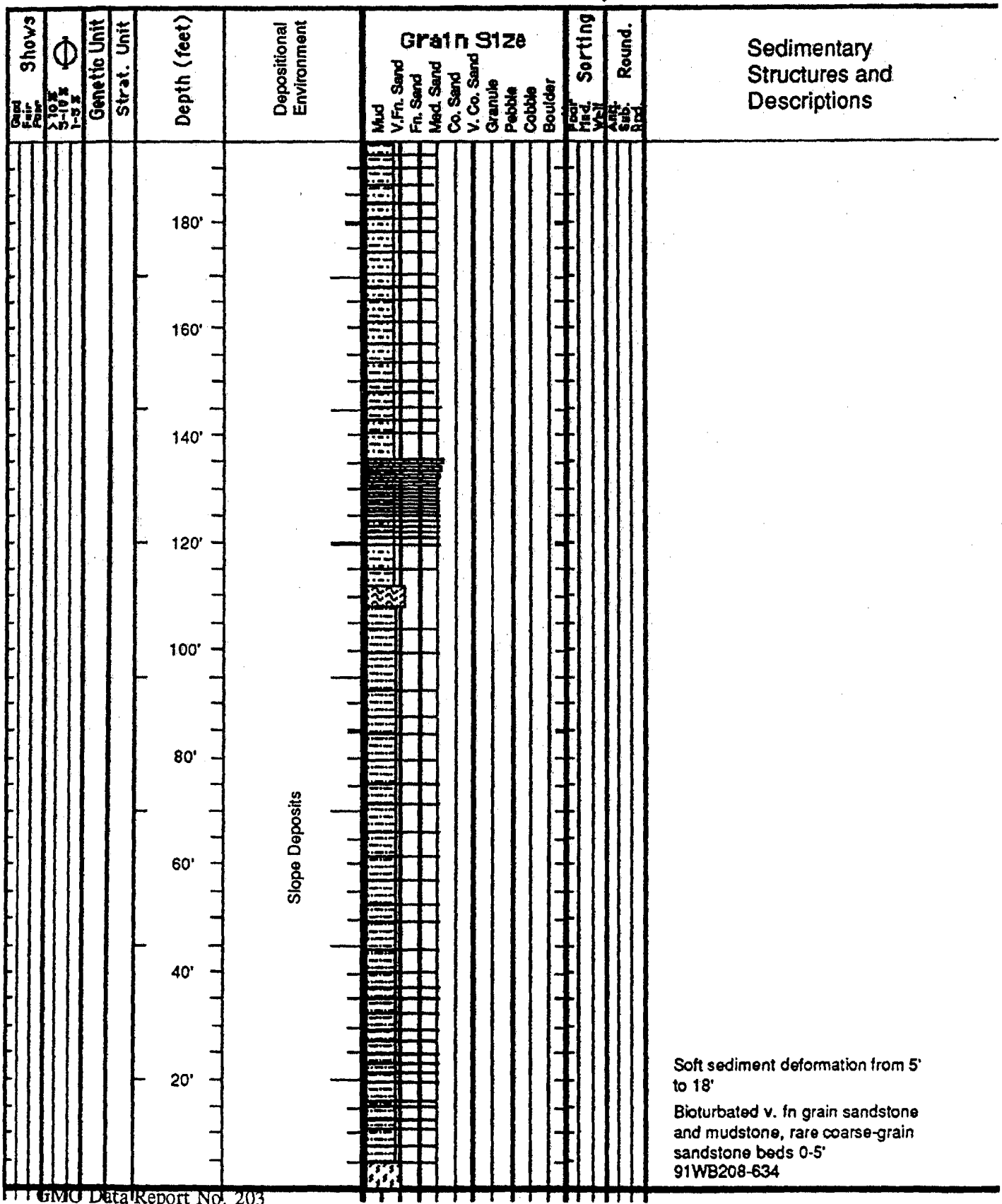
ARCO Alaska, Inc. MEASURED SECTION FORM

91WB 208

Field Program Mesozoic Cook Inlet Stop No. ~~Sites~~ 208 Formations Shelikof

Measured Section Number 6 Date June 10, 1991

Location SW Sec. 23, T31S R44W Ugashi Quad B-2 Described By William Morris

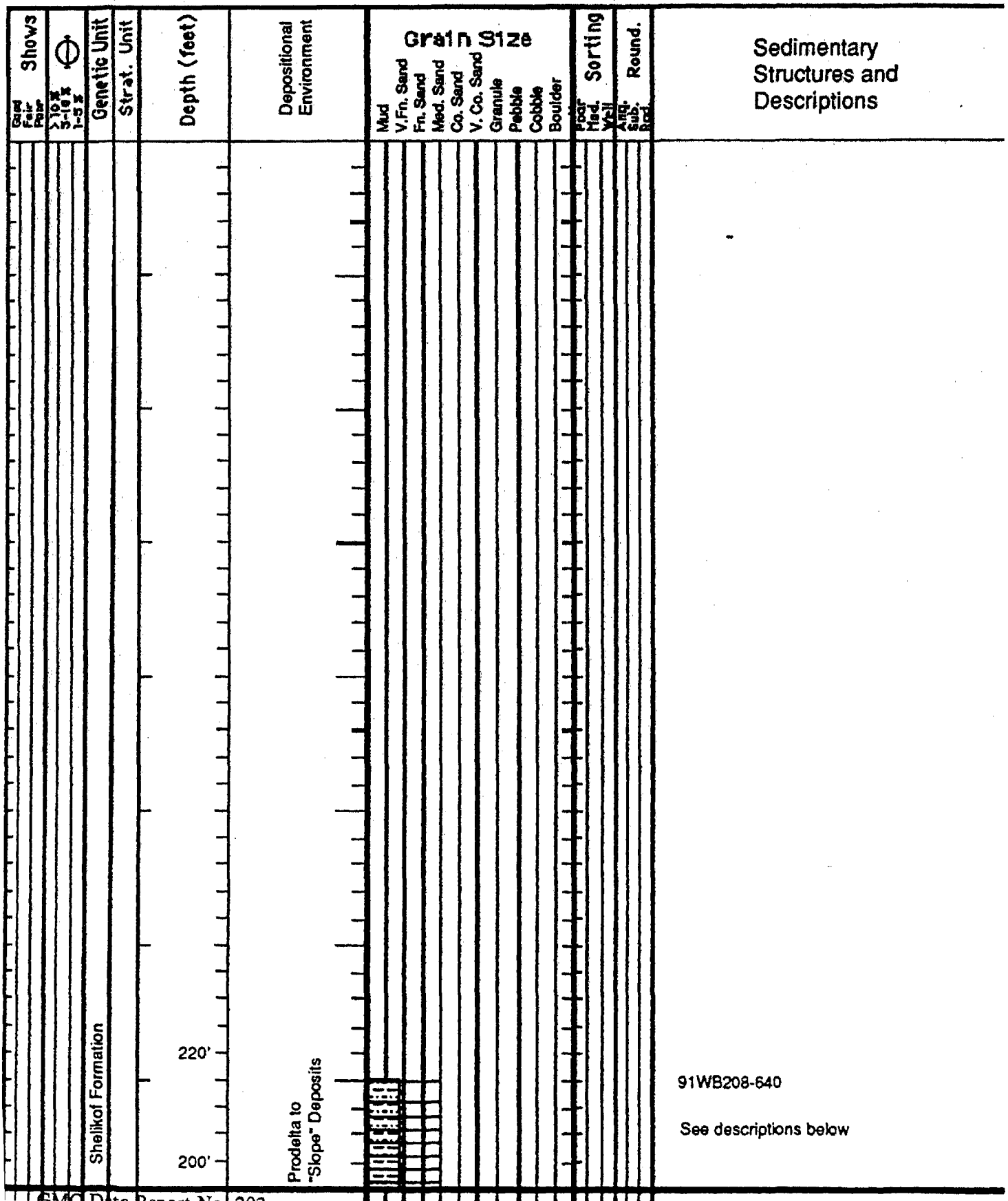


ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program: Mesozoic Cook Inlet Stop No.: Sites 208 Formations: Shelikof

Measured Section: Number 6 Date: June 10, 1991

Location: SW Sec. 23, T31S R44W Ugashi Quad B-2 Described By: William Morris



11WB C(1)

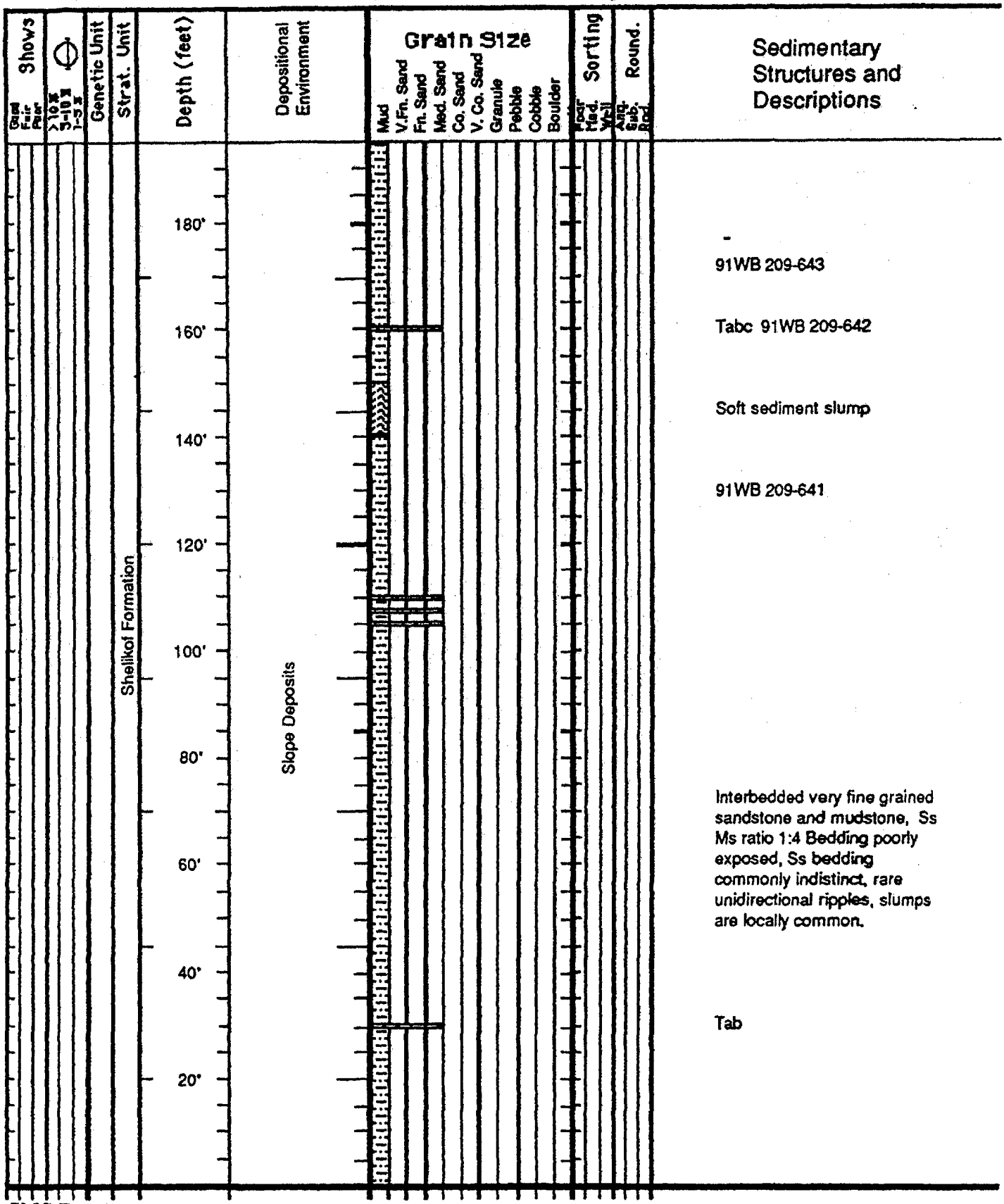
ARCO Alaska, Inc. MEASURED SECTION FORM

11WB 209

Field Program Mesozoic Cook Inlet Stop No. ~~Site 209~~ Formations Shelikof

Measured Section Number 7 Date June 10, 1991

Location N.E. S. 28, T31S, R44W, Ugashi Quad B-2 Described By William Morris

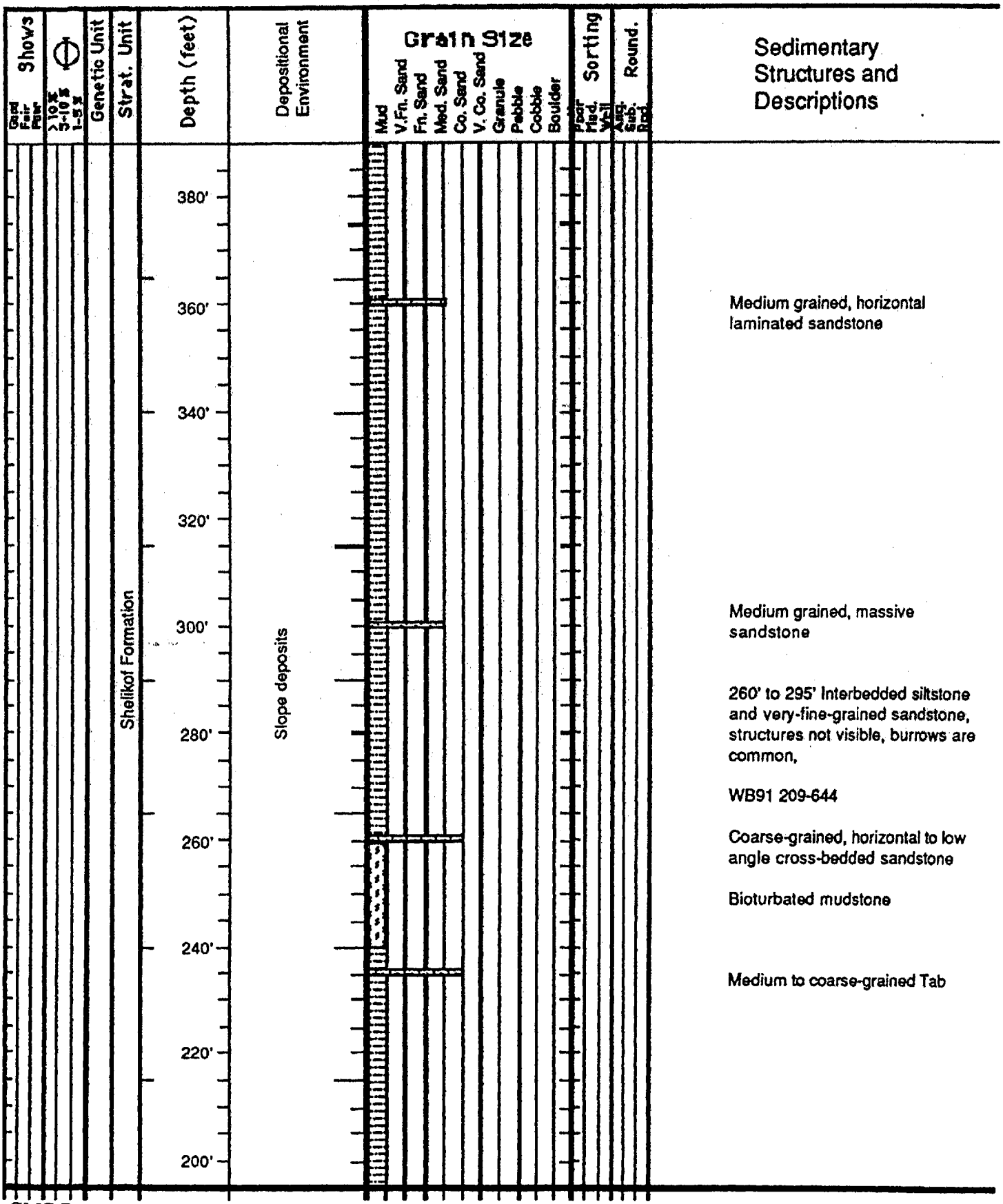


ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program: Mesozoic Cook Inlet Stop No.: Site 209 Formations: Shelikof

Measured Section: Number 7 Date: June 10, 1991

Location: N.E. Sec. 24, T31S R44W Ugashi Quad B-2 Described By: William Morris



Sedimentary Structures and Descriptions

Medium grained, horizontal laminated sandstone

Medium grained, massive sandstone

260' to 295' Interbedded siltstone and very-fine-grained sandstone, structures not visible, burrows are common,

WB91 209-644

Coarse-grained, horizontal to low angle cross-bedded sandstone

Bioturbated mudstone

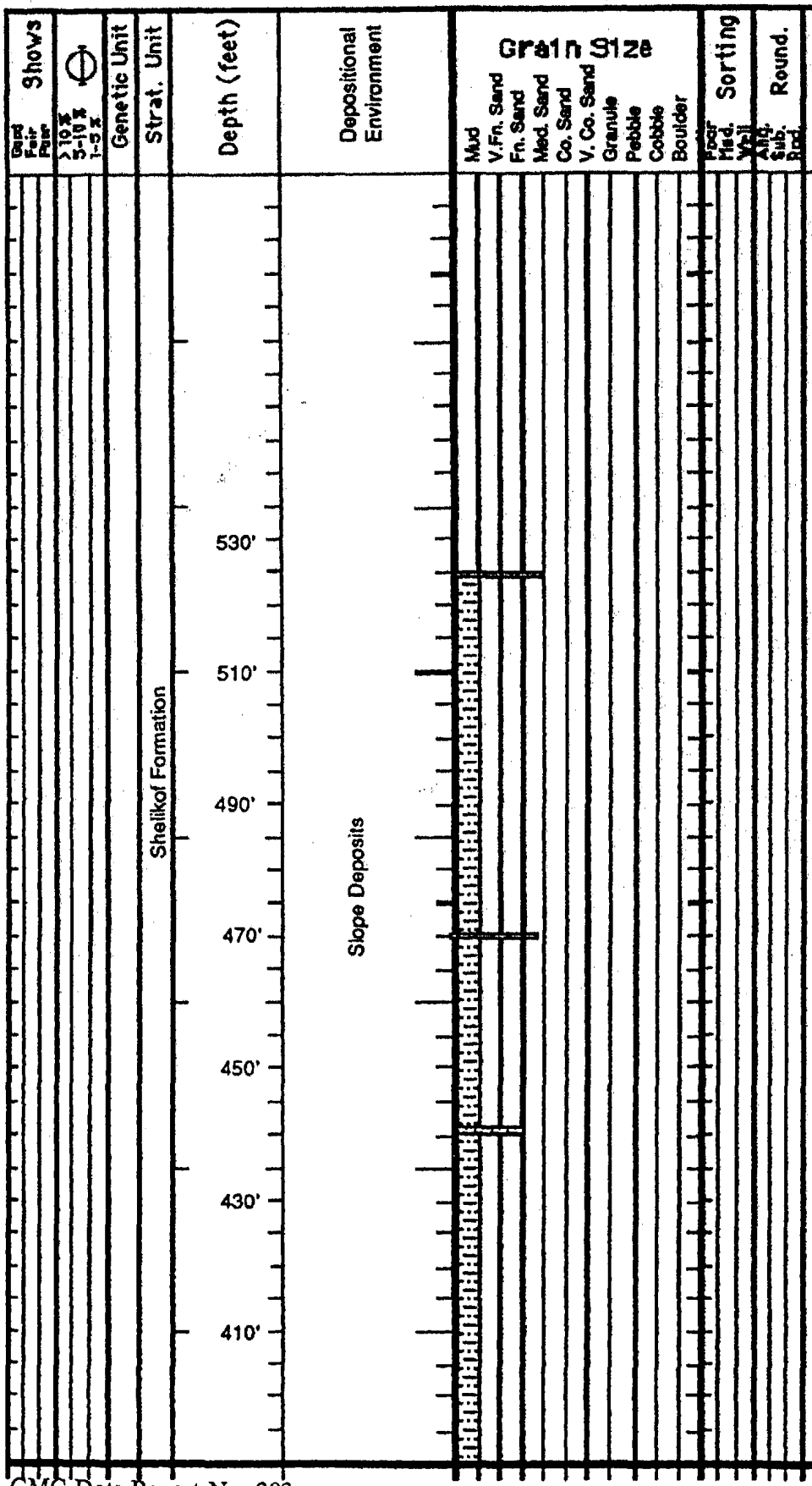
Medium to coarse-grained Tab

ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program: Mesozoic Cook Inlet Stop No.: Site 209 Formations: Shelikof

Measured Section: Number 7 Date: June 10, 1991

Location: N.E. S. 28, T31S, R44W, Ugashi Quad B-2 Described By: William Morris



Sedimentary Structures and Descriptions

Lateral to this measured section are a series of stacked sandstone filled channels, similar in dimensions and thickness to channel deposits described in earlier sections

91WB 209-645

500 to 520' Interbedded very fine grained sandstone and siltstone, ratio 1:4, structures not visible

470 to 500' Increase in sandstone mudstone ratio to 1:2. Sandstone is fine to medium grained,very thin, horizontal laminated beds

Medium grained, horizontal laminated sandstone bed

Fine grained massive sandstone bed with abundant broken fossil fragments

Interbedded very fine grained sandstone and mudstone, Ss Ms ratio 1:4 Bedding poorly exposed, Ss bedding commonly indistinct, rare unidirectional ripples, slumps are locally common.

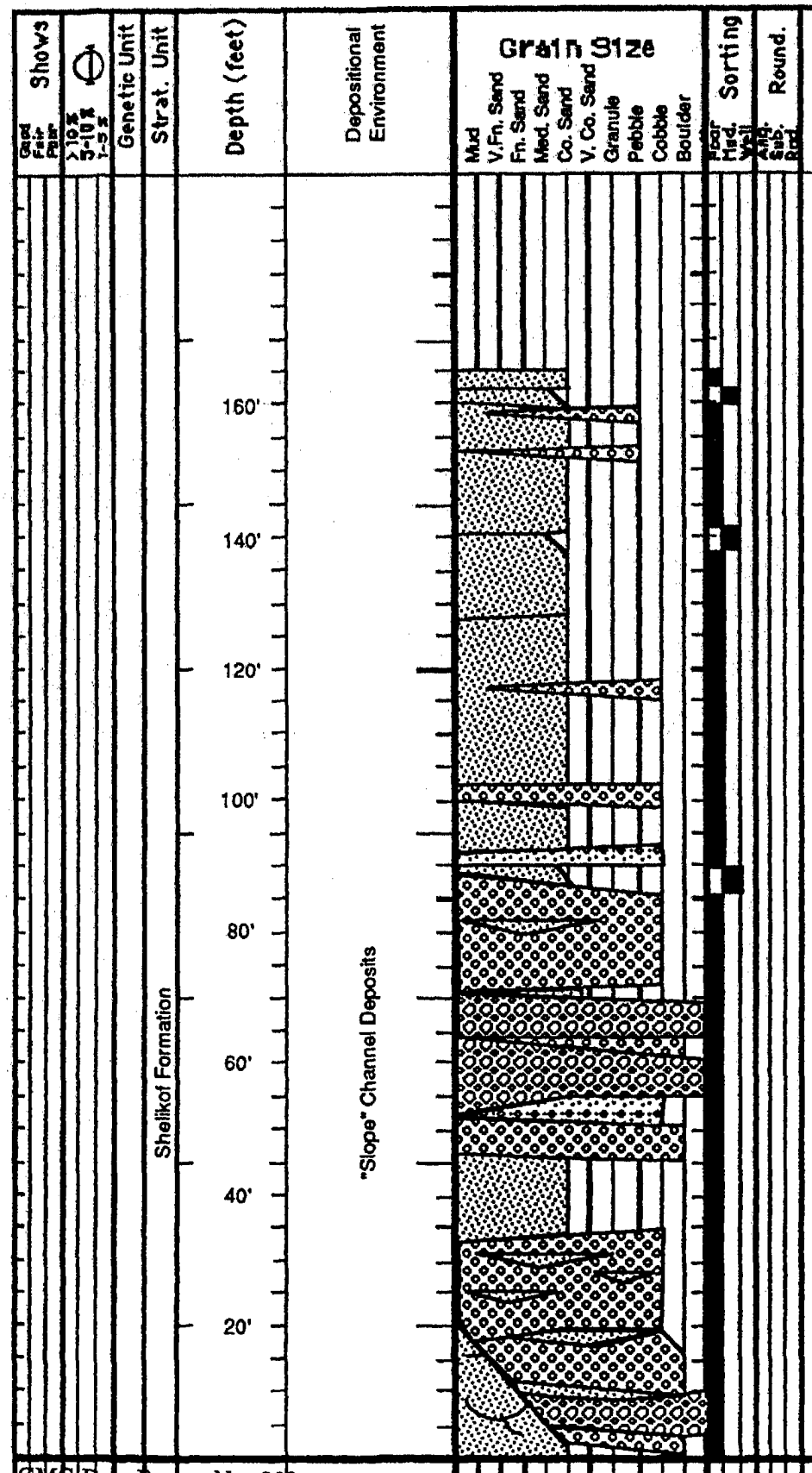
MST 16 T11WB C1U

ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program: Mesozoic Cook Inlet Stop No.: Site 210 Formations: Shelikof

Measured Section: Number 16 Date: June 11, 1991

Location: SW. Sec. 21, T31S R43W Ugashi QuadC-1 Described By: William Morris



Sedimentary Structures and Descriptions

Sandstone: medium-to coarse-grained, very poorly sorted, massive to lesser normal graded, rare fluid escape structures. Locally pockets of granules, pebbles or mudstone clasts

WB91 210-648

Pebbly sandstone

Conglomerate: pebble to boulder, poor to moderate sorting, clast supported to lesser matix supported, sands matrix, disorganized or lesser normal graded

WB91 210-647

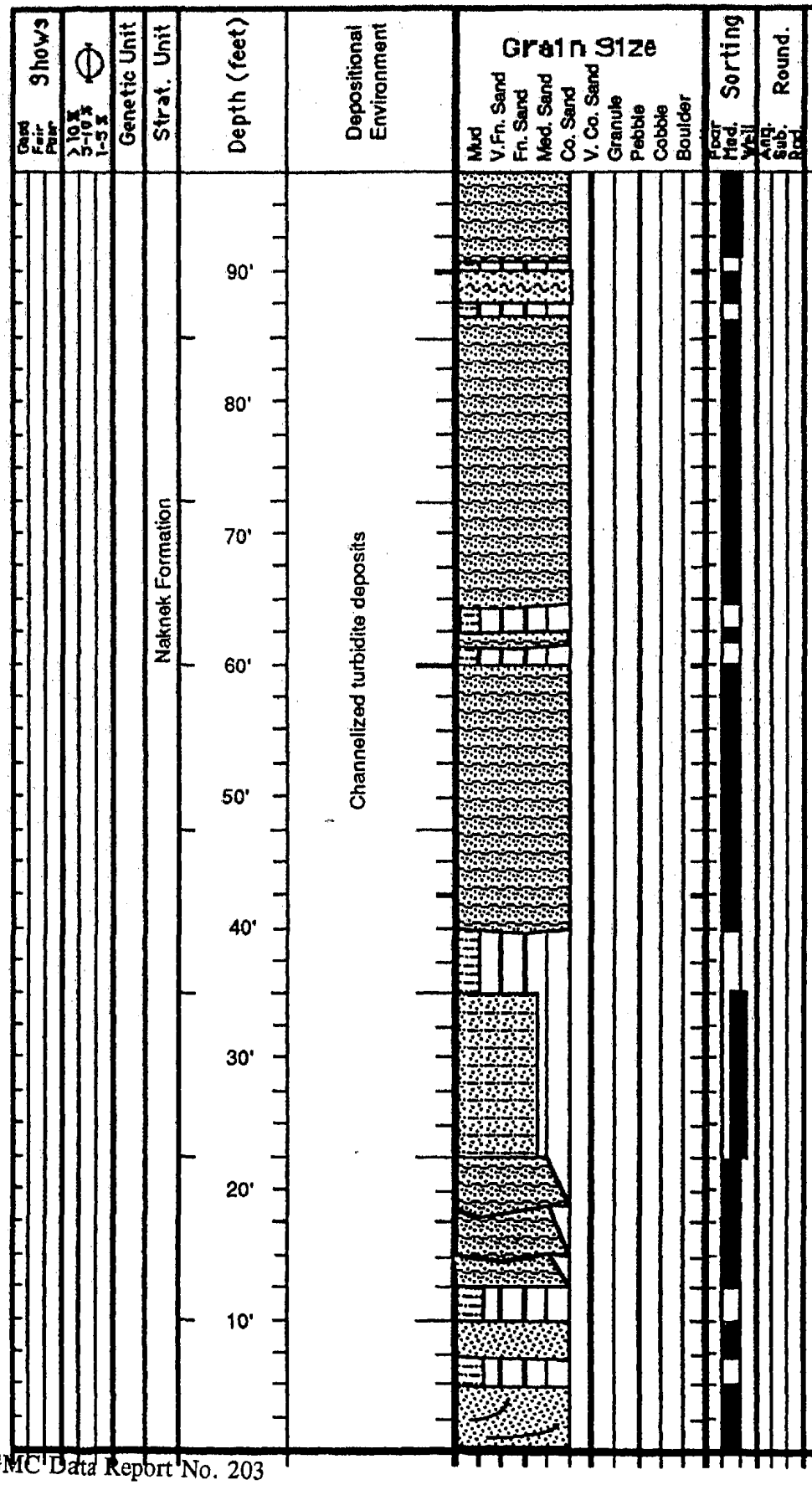
Base of channel cuts over down over 40' into underlying sandstone and mudstone

ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program: Mesozoic Cook Inlet Stop No.: Site 211 Formations: Naknek

Measured Section: Number 17 Date: June 20, 1991

Location: N.E. Sec. 9, T25S R34W Katmi Quad A-3 Described By: William Morris



Planar to swaly cross-bedded sandstone, fn grained ripple caps

Same as sandstone below except it is slumped

Medium-to coarse-grained, massive to swaly cross-bedded sandstone. Commonly erosionally based

Medium-to coarse-grained, massive to swaly cross-bedded sandstone. Commonly erosionally based, some load structures
91KB211-650

Black massive mudstone with fine grainedhorizontal laminated sandstone

Tab, Tabc turbidites

Tabce turbidites

Normal graded, swaly cross-bedded sandstone

Massive sandstone

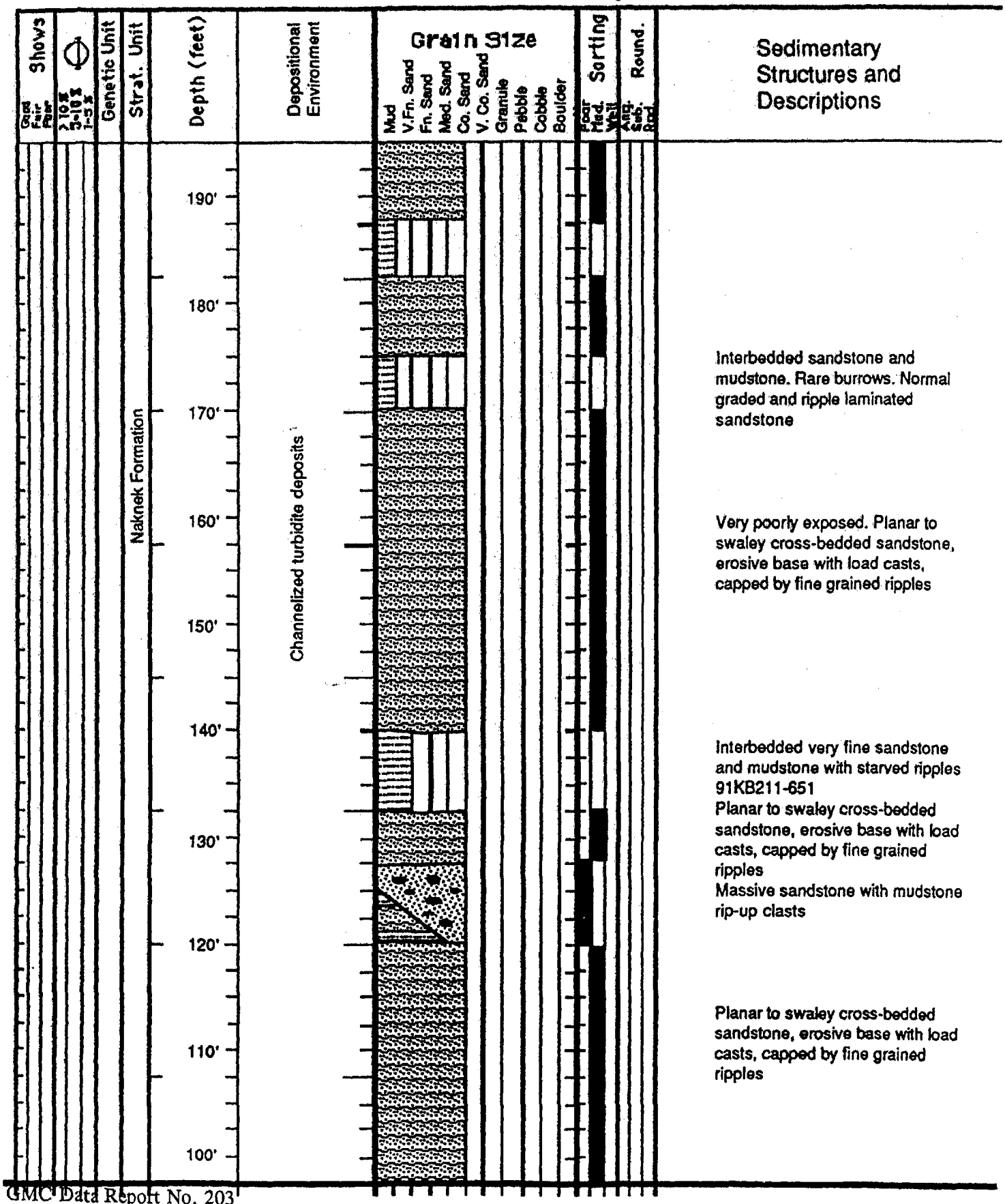
Massive sandstone

ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program Mesozoic Cook Inlet Stop No. Site 211 Formations Naknek

Measured Section Number 17 Date June 20, 1991

Location N.E. Sec. 9, T25S R34W Katmi Quad A-3 Described By William Morris

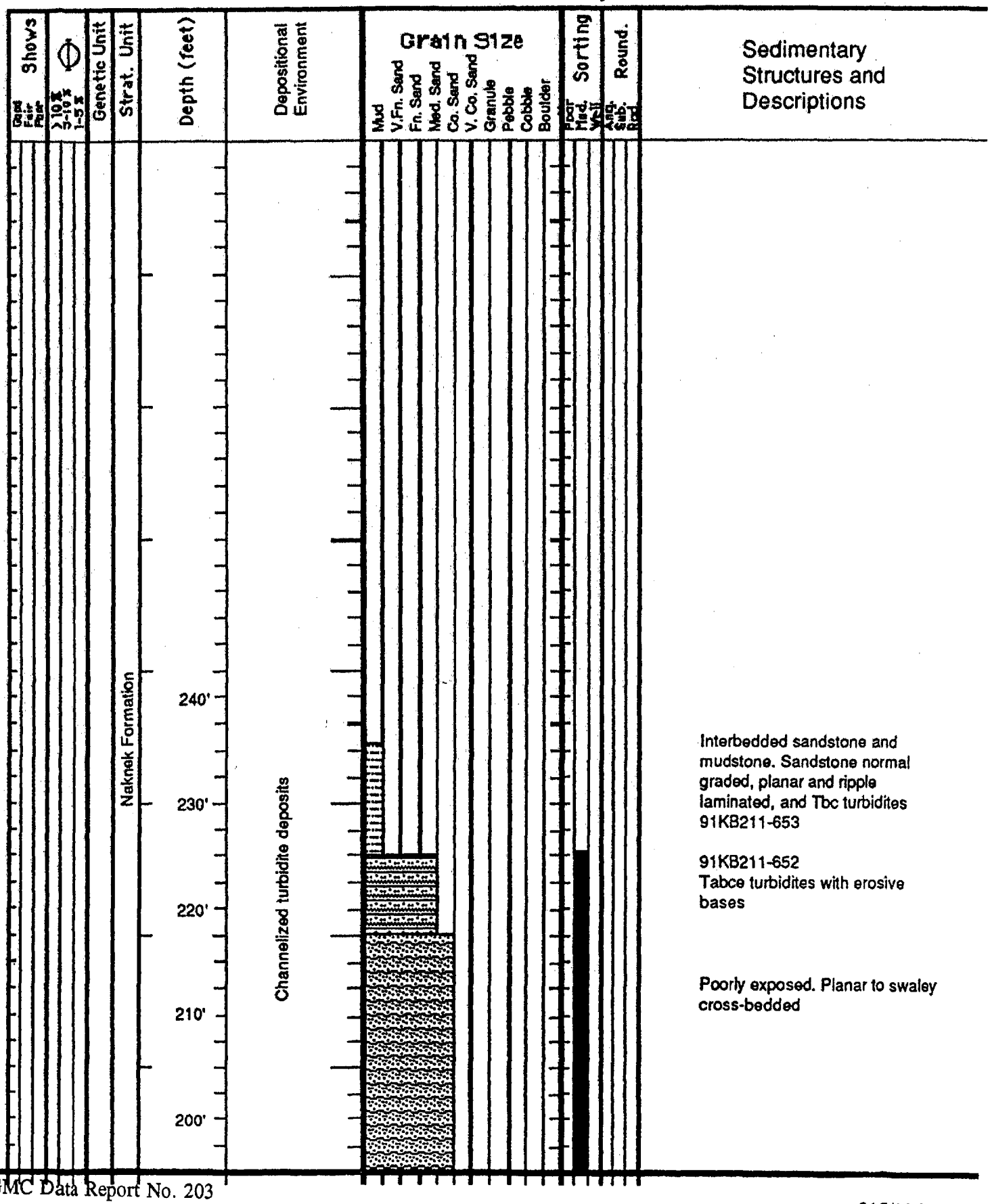


ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program: Mesozoic Cook Inlet Stop No.: Site 211 Formations: Naknek

Measured Section: Number 17 Date: June 20, 1991

Location: N.E. Sec. 9, T25S R34W Katmi Quad A-3 Described By: William Morris



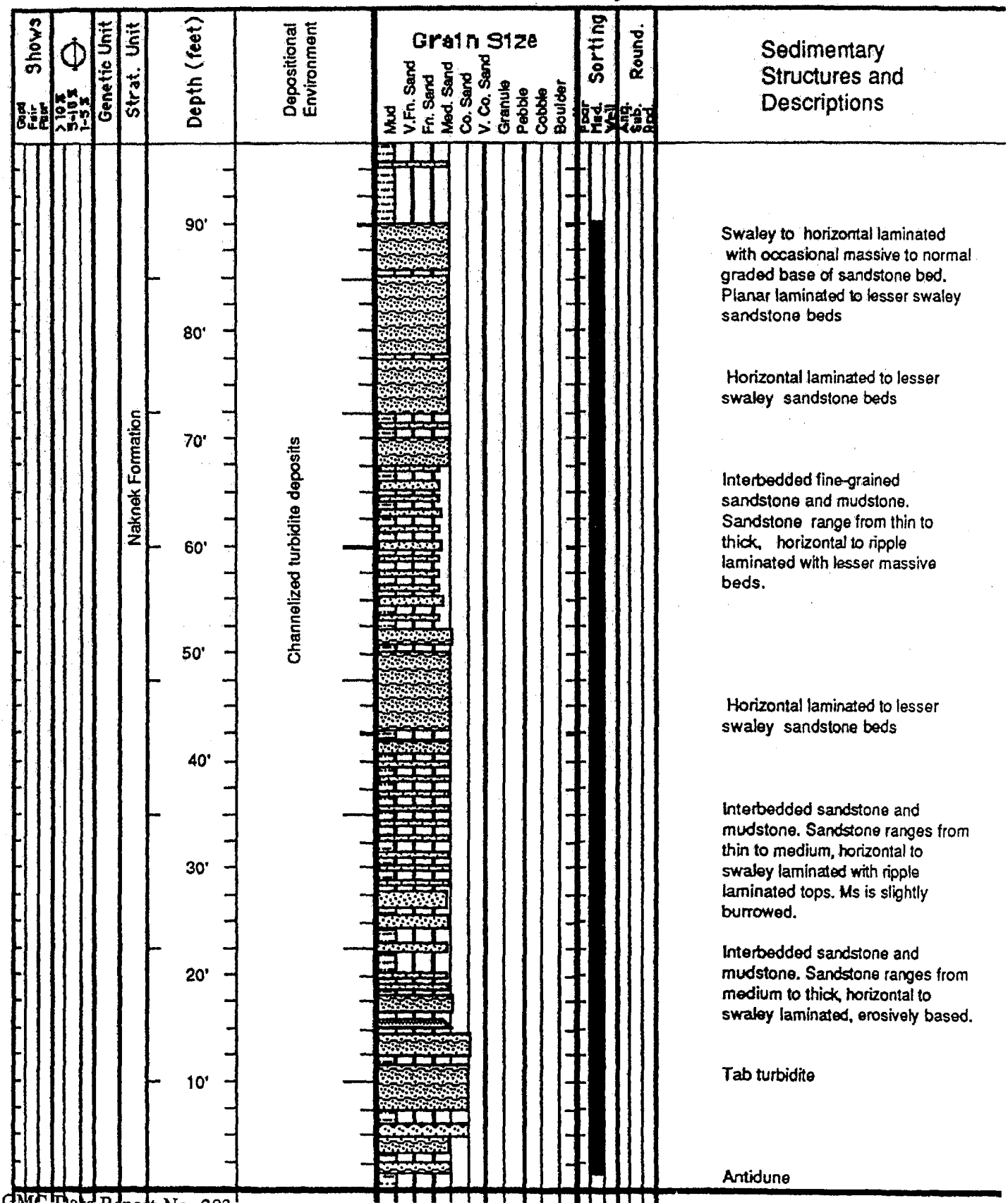
MS#18

ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program: Mesozoic Cook Inlet Stop No.: Site 212 Formations: Naknek

Measured Section: Number 18 Date: June 20, 1991

Location: S.E. Sec. 14, T25S R34W Katmi Quad A-3 Described By: William Morris

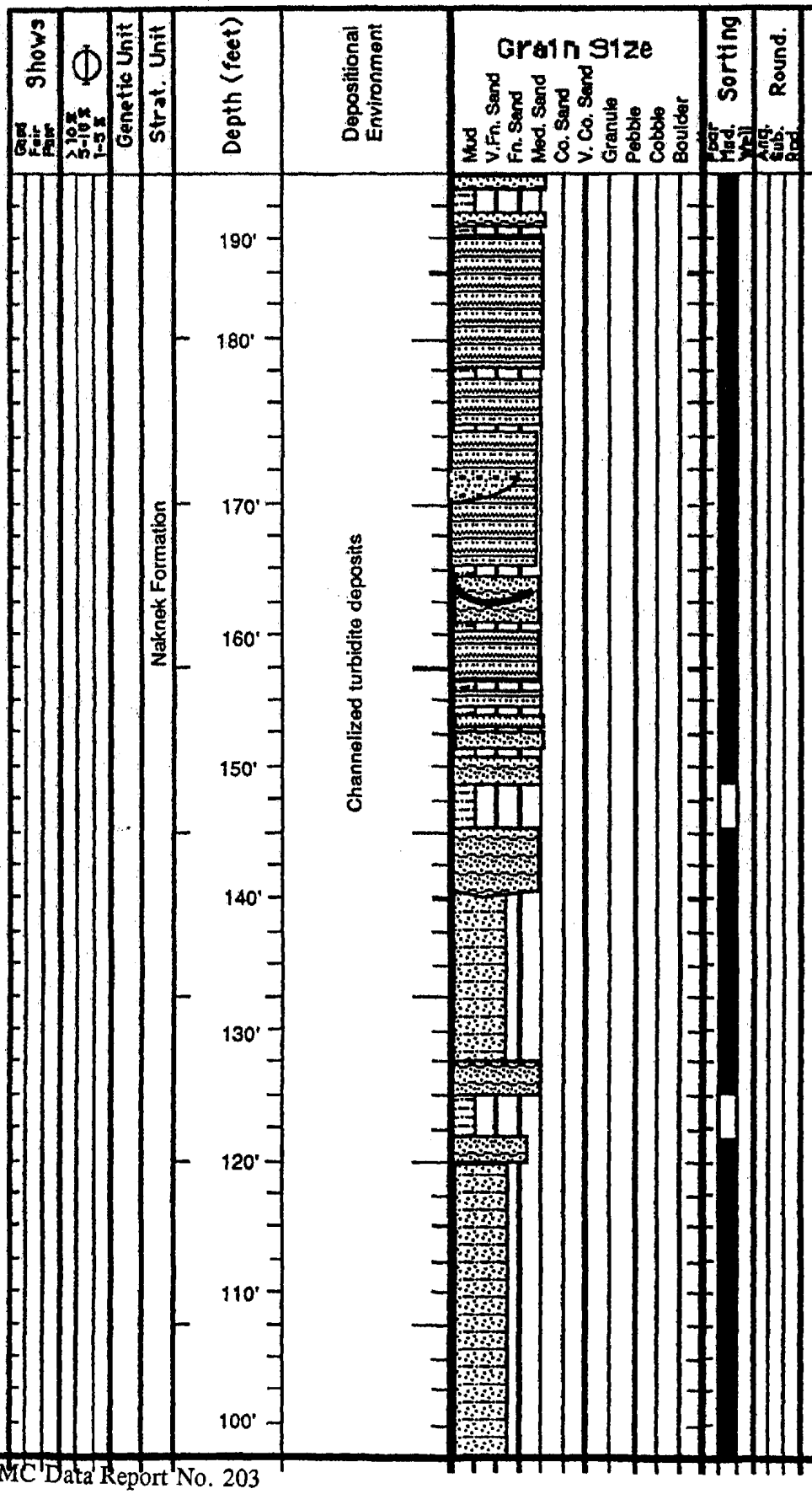


ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program: Mesozoic Cook Inlet Stop No.: Site 212 Formations: Naknek

Measured Section: Number 18 Date: June 20, 1991

Location: S.E. Sec. 14, T25S R34W Katmi Quad A-3 Described By: William Morris



Sedimentary Structures and Descriptions

Granule to coarse-grained layer overlain by horizontal or swaley laminations then ripple laminations

Mud-lined scour
Granule to coarse-grained layer overlain by horizontal then ripple laminations
Tbc turbidite
Tbc turbidite

Swaley cross-bedded sandstone

Very fine-grained massive sandstone

WB
91KB212-657 **

Horizontal to swaley cross-bedded sandstone

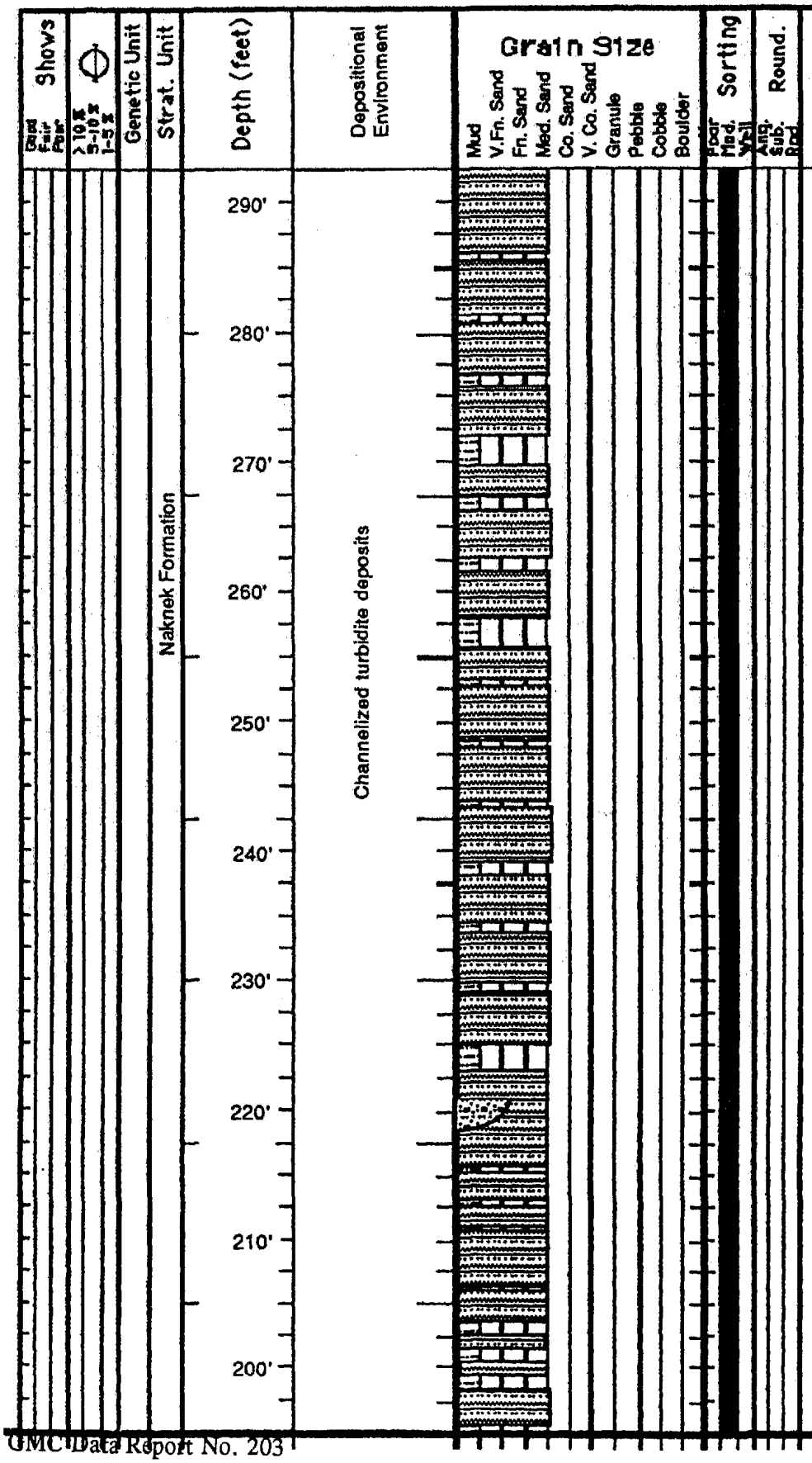
Horizontal to swaley cross-bedded sandstone
91KB212-656
Poorly exposed. Massive fine to very fine grained sandstone and rare mudstone and medium to coasre grained sandstone

ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program Mesozoic Cook Inlet Stop No. Site 212 Formations Naknek

Measured Section Number 18 Date June 20, 1991

Location S.E. Sec. 14, T25S R34W Katmi Quad A-3 Described By William Morris



Sedimentary Structures and Descriptions

230' to 295' Schematic section

Sandstone consists of medium to lesser coarse grained sandstone, massive or normal base grading up into horizontal or swaley laminations and then ripple lamination. Base of sandstone is locally erosive.

Mudstone consists of interbedded mudstone and very fine to fine grained sandstone. Ss is ripple to horizontal laminated some starved ripples. Ms is massive to laminated

WB
91[illegible]212-659

Cut and fill with massive sandstone

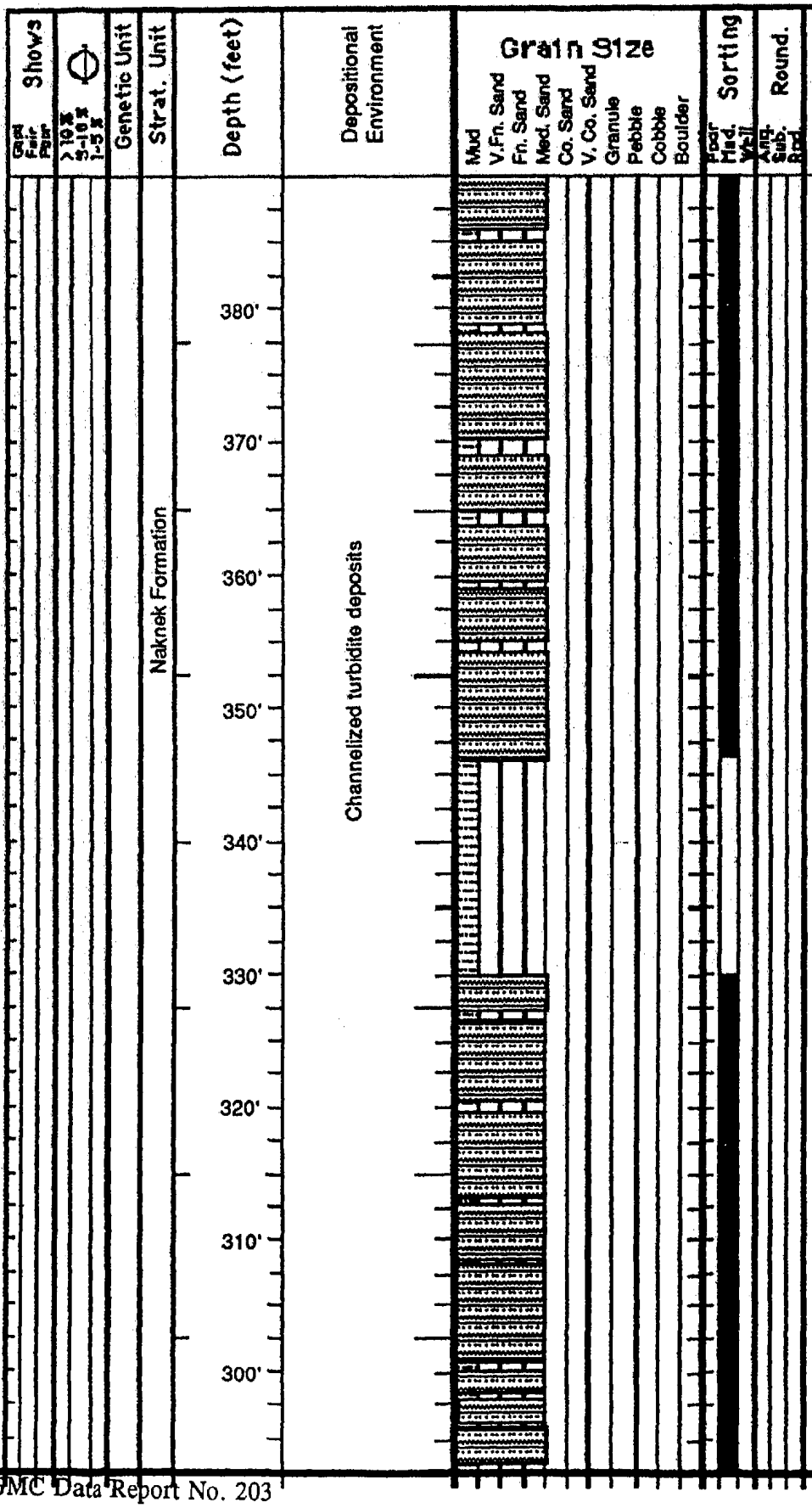
WB
91[illegible]212-658
Tbc turbidite
Sandstone slurry bed

ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program: Mesozoic Cook Inlet Stop No.: Site 212 Formations: Naknek

Measured Section: Number 18 Date: June 20, 1991

Location: S.E. Sec. 14, T25S R34W Katmi Quad A-3 Described By: William Morris



Sedimentary Structures and Descriptions

Soft sediment thrust fault

Sandstone consists of medium to lesser coarse grained sandstone, massive or normal base with rare fluid escape structures grading up into horizontal or swaley laminations and then ripple lamination. Convolutions and soft sediment deformation are common.

WB
91KB212-661

Mudstone consists of interbedded mudstone and very fine to fine grained sandstone. Ss is ripple to horizontal laminated some starved ripples. Ms is massive to laminated
91KB212-660

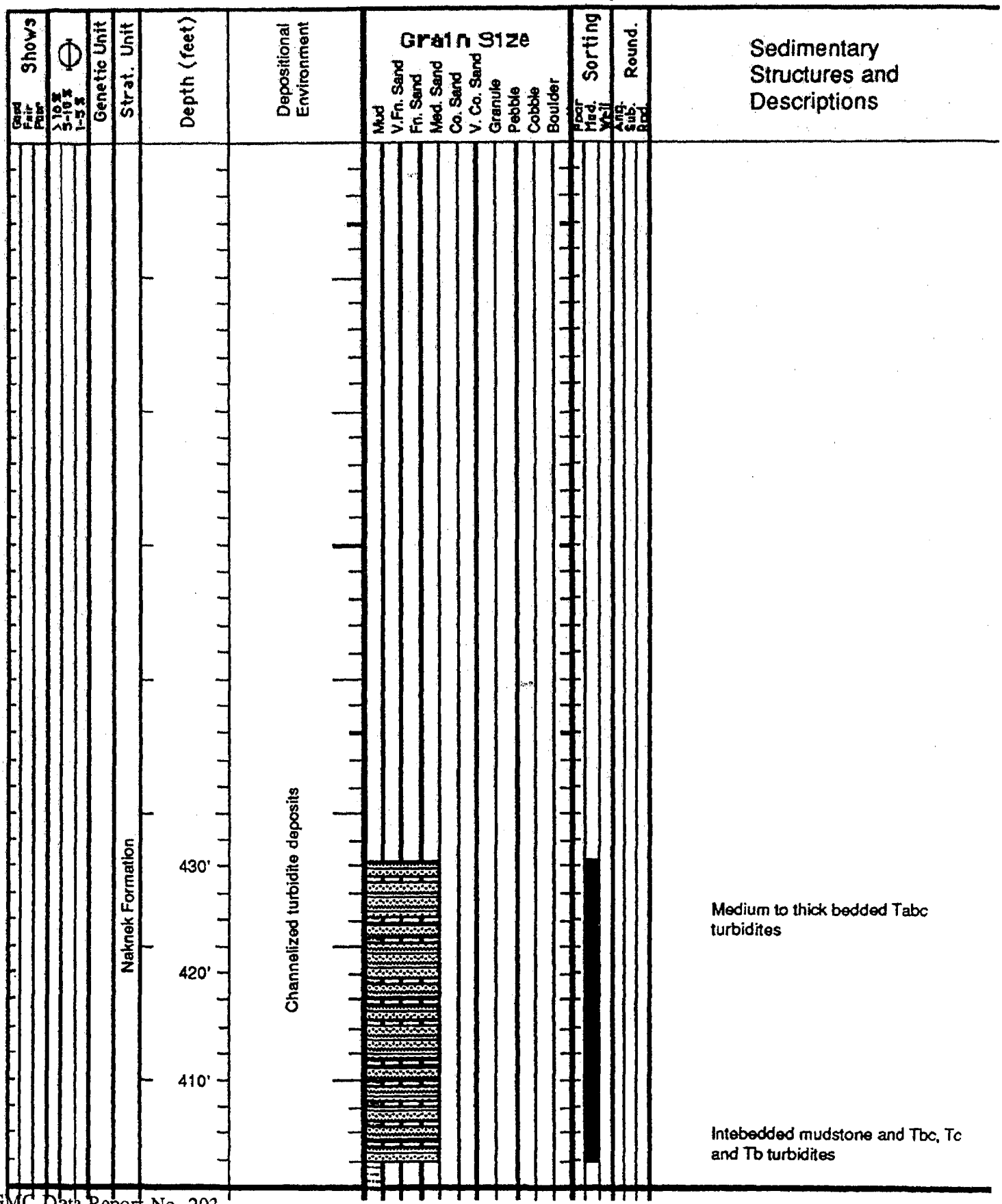
Sandstone consists of medium to lesser coarse grained sandstone, massive or normal base grading up into horizontal or swaley laminations and then ripple lamination. Base of sandstone is locally erosive.

ARCO Alaska, Inc. MEASURED SECTION FORM

Field Program: Mesozoic Cook Inlet Stop No.: Site 212 Formations: Naknek

Measured Section: Number 18 Date: June 20, 1991

Location: S.E. Sec. 14, T25S R34W Katmi Quad A-3 Described By: William Morris



ELMNTS	AU	H2O+	H2O-	LI	BE	B	CO2	F	NA2O	MGO	AL2O3	SIO2
UNITS	PPB	%	%	PPM	PPM	PPM	%	PPM	%	%	%	%
91KAT 4/31	4	2.3	0.3	33	2	73	1.27	310	2.97	1.76	12.6	69
91KAT 9/61	2	0.9	0.3	16	3	14	0.01	360	3.44	3.66	15.7	61
91KAT 101/225	1	6.5	9.1	193	2	74	0.08	230	1.27	4.26	17.4	49.7
91WB 1/24	2	2.1	2.1	8	2	13	0.3	200	3.13	7.56	16.3	47.5
91WB 3/62	4	2.8	0.9	9	3	26	2.27	260	2.65	7.44	14.8	46
91WB 107/562D	1	1.7	0.2	16	4	33	0.04	220	2.87	2.99	15.1	60.6
91LCP 3/11	-1	2.3	1.7	20	4	20	0.66	230	3.56	2.64	16.3	50.3
91LCP 4/12	-1	3.3	1.2	8	3	15	0.06	240	5.11	1.84	17.8	57.5
91LCP 4/13	4	2.4	1.2	6	3	49	-0.01	270	4.98	2.57	17.4	55.5
91LCP 5/21	3	5.1	2.4	7	3	30	0.01	270	2.83	1.69	17.3	57.1
91LCP 5/22	-1	3.5	2.1	7	2	57	0.23	290	3.82	1.77	17.2	59.1
91LCP 3/30	3	2.1	1.4	26	3	41	0.11	280	3.77	2.87	15.8	61
91LCP 3/38	-1	1.7	1	20	2	28	0.03	270	3.97	2.94	17.5	58.1
91LCP 3/39	3	2	1.7	19	2	29	0.05	360	4.35	3.06	17.4	56.6
91LCP 102/211	2	0.5	0.1	7	1	22	0.06	200	4.7	0.6	13.6	74
91LCP 102/213	7	0.8	0.2	25	-1	18	-0.01	61	5.87	0.81	14.2	73.5
91LCP 104/215	-1	3.7	1.4	12	4	36	-0.01	250	4.9	2.46	18.6	54.3
91LCP 104/226	2	3.11	1.4	12	2	25	0.01	250	4.78	2.45	18.6	55.5
91LCP 104/230	2	1.6	0.7	10	3	55	0.01	270	6.68	1.77	17.6	59.6

P2O5	S	SO4	CL	K2O	CAO	SC	TIO2	V	CR	MNO	FEO	FE2O3	CO	NI
%	PPM	%	PPM	%	%	PPM	%	PPM	PPM	%	%	%	PPM	PPM
0.18	150	0.5	-100	1.55	2.31	11.9	0.614	132	82	0.09	3.2	4.54	23	62
0.16	160	1	653	1.59	4.95	23.2	0.75	188	95	0.13	5	7.21	33	97
0.18	2970	0.9	-100	0.74	2.48	15	0.698	52	37	0.07	2.9	7.4	9	68
0.18	148	1.6	-100	0.25	10	44.2	1.11	359	360	0.15	4.1	9.74	39	121
0.14	169	0.9	388	0.35	11.6	50.8	1.17	394	150	0.14	6.7	10.4	42	72
0.15	112	1.8	388	1.38	6.13	22.5	0.941	189	36	0.19	4.2	8.2	23	22
0.15	23200	1	-100	1.5	5.32	10.5	0.506	224	23	0.1	2.5	13	12	12
0.17	300	0.6	1140	0.92	5.36	9.13	0.68	150	29	0.09	2.2	5.74	16	17
0.19	151	0.5	-100	0.98	5.66	12	0.776	172	24	0.12	2.6	7	18	17
0.25	-50	0.6	385	0.61	7.02	8.32	0.541	133	14	0.12	1.2	4.5	10	25
0.27	-50	0.7	-100	1.01	6.33	8.94	0.343	81	17	0.08	0.8	3.21	4	16
0.16	543	1.3	409	1.55	4.62	14.4	0.63	207	28	0.09	2.3	6.61	13	16
0.14	1260	0.9	156	1.12	6.12	15.8	0.589	147	24	0.11	2.6	6.51	15	14
0.27	1030	1.7	-100	1.49	5.37	17.3	0.599	179	14	0.1	2.1	6.46	15	13
0.07	-50	1.2	-100	1.99	1.87	5.7	0.259	26	11	0.1	0.8	2.17	2	8
0.08	-50	1.4	-100	1.97	0.72	5.42	0.199	31	2	0.08	0.5	1.81	-1	2
0.19	74	1	155	1.21	6.11	9.09	0.529	141	8	0.11	1.7	5.68	12	7
0.19	74	0.9	160	1.2	6.06	9.72	0.521	126	10	0.11	1.7	5.48	14	5
0.21	-50	0.9	-100	2.22	3.22	8.53	0.477	116	8	0.1	0.8	5.01	12	13

CU	ZN	GA	GE	AS	SE	BR	RB	SR	Y	Y	ZR	NB	MO	PD	AG
PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPB	PPM
51	89.4	11.8	-10	9.4	-0.5	-1	45	289	24	-999	124	8	-1	3	-0.1
76.6	71.4	22	21	3.1	-0.5	-1	44	306	23	-999	102	8	-1	4	-0.1
52.3	106	23	12	2.2	-0.5	-1	18	609	76	-999	432	23	-1	2	0.8
196	111	17.7	19	1.1	-0.5	-1	6	511	15	-999	38	5	-1	14	-0.1
182	79.3	21	20	0.3	-0.5	1	8	397	22	-999	50	3	-1	13	-0.1
75.8	96.8	21	10	12	-0.5	-1	37	289	20	-999	135	10	-1	2	0.3
49.6	124	24.6	-10	50	-0.5	-1	32	424	-999	10	69	5	2	2	-0.1
52.4	72.7	19.8	14	0.9	-0.5	3	22	1120	-999	8	57	6	-1	-1	0.2
80.3	88.7	19.8	19	0.8	-0.5	-1	11	1180	15	-999	91	8	1	-1	-0.1
166	75.6	19.1	-10	2.4	-0.5	-1	22	1310	-999	9	86	5	-1	-1	-0.1
58.3	45.3	17.3	17	1.7	-0.5	-1	18	1230	15	-999	57	6	-1	3	-0.1
60.3	101	19	11	4.9	-0.5	1	30	518	14	-999	90	4	1	3	-0.1
28.2	76.5	18.7	-10	10	-0.5	-1	27	660	-999	13	102	5	-1	-1	-0.1
65	81.4	24.5	-10	4.5	-0.5	-1	29	556	12	-999	79	4	-1	5	0.3
19.6	37.2	14.3	-10	6.9	-0.5	-1	40	138	28	-999	105	5	-1	2	-0.1
7.6	32.7	15.6	-10	37	-0.5	-1	38	317	20	-999	76	3	-1	-1	0.3
61.6	72.5	25.1	-10	1.2	-0.5	-1	22	1100	-999	8	63	5	-1	3	-0.1
60.6	75.5	27	-10	0.7	-0.5	-1	20	1070	-999	9	62	4	-1	2	-0.1
53.8	72.8	17.9	12	1.7	-0.5	-1	40	582	-999	9	73	5	-1	3	-0.1

CD	IN	SN	SB	CS	BA	LA	CE	PR	ND	SM	EU	GD	TB	DY
PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM
-0.2	-0.5	3	1	2	797	20.3	38	4.3	17.6	3.5	0.93	3.2	0.5	2.5
-0.2	-0.5	-2	0.4	1	825	12.3	25.5	3.2	15.5	3.7	1.1	4.4	0.7	4.5
-0.2	-0.5	-2	0.7	1	1030	27.8	70.4	10.2	54.2	12.9	3.46	13.4	2.1	11.6
-0.2	-0.5	6	0.3	1	270	6.2	15	2.2	11.6	3.4	1.06	3.8	0.6	3.8
-0.2	-0.5	10	-0.2	-1	502	4.3	11.8	1.9	11	3.3	1.21	4.3	0.7	4.1
-0.2	-0.5	2	4.1	1	762	16.1	34	4.2	18.5	4.1	1.21	4.8	0.7	4.1
-0.2	-0.5	-2	0.9	1	668	7.3	15.8	2	9	2	0.77	2.3	0.4	2
-0.2	-0.5	-2	0.2	1	606	8.6	17.3	2.2	10.2	2.3	0.77	2	0.3	1.6
-0.2	-0.5	-2	0.1	1	617	8.4	18.5	2.5	12.6	2.8	0.98	3	0.4	2
-0.2	-0.5	2	0.3	1	721	6.7	16.7	2.2	10.4	2.4	0.77	2.4	0.3	1.5
-0.2	-0.5	-2	0.1	1	799	9.4	21.3	2.7	12.1	2.5	0.83	2.5	0.3	1.7
-0.2	-0.5	-2	0.5	1	599	9	19.6	2.4	10.7	2.3	0.77	2	0.4	1.8
-0.2	-0.5	6	0.4	2	518	9.4	21.1	2.7	12.5	3	0.92	2.8	0.5	2.5
-0.2	-0.5	-2	0.3	1	695	10.8	21.6	2.5	11.1	2.6	0.87	2.6	0.4	2.3
-0.2	-0.5	-2	0.1	2	892	12.3	26.3	3	13.2	2.7	0.73	2.5	0.4	2.1
-0.2	-0.5	-2	0.5	-1	1160	8.2	17.7	2	9.5	1.8	0.51	2	0.3	1.7
-0.2	-0.5	-2	0.2	-1	532	8.4	18	2.3	10.1	2.1	0.75	1.8	0.3	1.5
-0.2	-0.5	2	0.1	-1	521	8.6	18.9	2.3	10.8	2.2	0.8	2	0.3	1.6
-0.2	-0.5	-2	0.2	1	989	11.7	23.7	2.8	12.4	2.4	0.77	1.8	0.3	1.5

HO	ER	TM	YB	LU	HF	TA	W	PT	HG	TL	PB	BI	TH	U	LOI
PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPB	PPB	PPM	PPM	PPM	PPM	PPM	%
0.47	1.4	0.2	1	0.14	3	-1	1	10	54	0.4	-2	-1	4.1	2.2	3.77
0.85	2.9	0.4	2.5	0.38	3.2	-1	-1	-10	11	0.3	-2	-1	2.5	0.9	0.7
2.2	6.5	0.9	5.3	0.83	10	1	-1	10	22	0.2	-2	-1	5.6	4	15.9
0.75	2.3	0.3	1.8	0.27	1.5	-1	-1	30	5	-0.1	-2	-1	-0.5	0.4	4.16
0.76	2.4	0.3	1.9	0.3	1.1	-1	-1	30	5	-0.1	-2	-1	-0.5	0.3	5.31
0.84	2.7	0.4	2.2	0.34	4.1	-1	-1	-10	5	0.2	-2	-1	3.9	1.8	1.77
0.37	1.3	0.2	1.1	0.17	2.2	-1	-1	-10	15	0.3	-2	-1	2	1.2	6.08
0.29	1	0.2	0.8	0.12	1.8	-1	-1	-10	5	0.1	-2	-1	1	0.4	4.7
0.38	1.4	0.2	1	0.13	2.9	-1	-1	-10	10	0.2	-2	-1	0.7	0.4	4.85
0.29	1	0.2	0.7	0.1	2.6	-1	-1	-10	31	0.2	-2	-1	0.9	0.4	8
0.28	1	0.1	0.9	0.14	2.1	-1	-1	-10	10	0.2	-2	-1	1.1	0.5	6.85
0.37	1.3	0.2	1.1	0.17	3.1	-1	-1	-10	15	0.2	-2	-1	1.9	1.2	3.16
0.51	1.6	0.2	1.3	0.2	3	-1	-1	-10	5	0.2	-2	-1	1.6	0.9	2.54
0.48	1.5	0.3	1.6	0.23	2.3	-1	2	-10	5	0.2	-2	-1	1.6	1.5	3.85
0.35	1.1	0.2	1.1	0.17	3.8	-1	-1	-10	10	0.2	-2	-1	2.9	1.8	0.77
0.34	1	0.2	1	0.17	2.3	-1	-1	-10	13	0.3	-2	-1	1.2	0.8	1.08
0.3	0.9	0.2	0.9	0.13	2.1	-1	-1	-10	5	-0.1	-2	-1	1	0.5	5.85
0.3	0.9	0.2	0.8	0.12	2.3	-1	2	-10	5	-0.1	-2	-1	1.1	0.4	5.54
0.28	0.9	0.1	0.8	0.12	1.7	-1	-1	-10	5	0.1	-2	-1	0.9	0.6	2.54

SUM
%
99.51
99.421
100.295
100.172
100.106
100.443
99.581
100.11
100.236
100.196
100.22
100.39
99.775
99.694
100.248
100.489
100.128
100.616
99.606