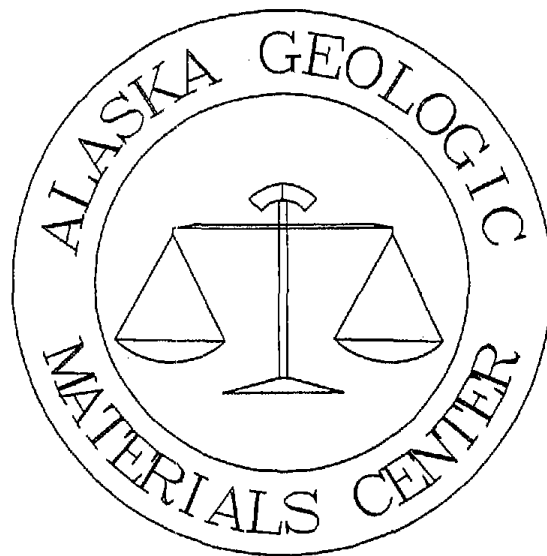


U. S. Minerals Management Service 1992 Lower Cook Inlet Mesozoic Field Program, Shelikof Strait, Alaska. The data includes various geologic features orientation diagrams, geology of Barren Island, sample registry, sample location maps, geologic measured sections, biostratigraphy, geochronology, permeability and porosity, rock-eval and total organic carbon geochemistry, and gamma ray.



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

Received 2 July 1993

Total of 151 pages in report

**Alaska Geologic Materials Center Data Report No. 215**

1  
**1992 LOWER COOK INLET  
MESOZOIC FIELD PROGRAM  
SHELIKOF STRAIT, ALASKA**

ARCO ALASKA, INC.:

Sandra Phillips  
Craig Schneider  
David Doherty

ARCOEXPLORATION  
& PRODUCTION  
TECHNOLOGY:

Scot Krueger  
Joseph McGowen

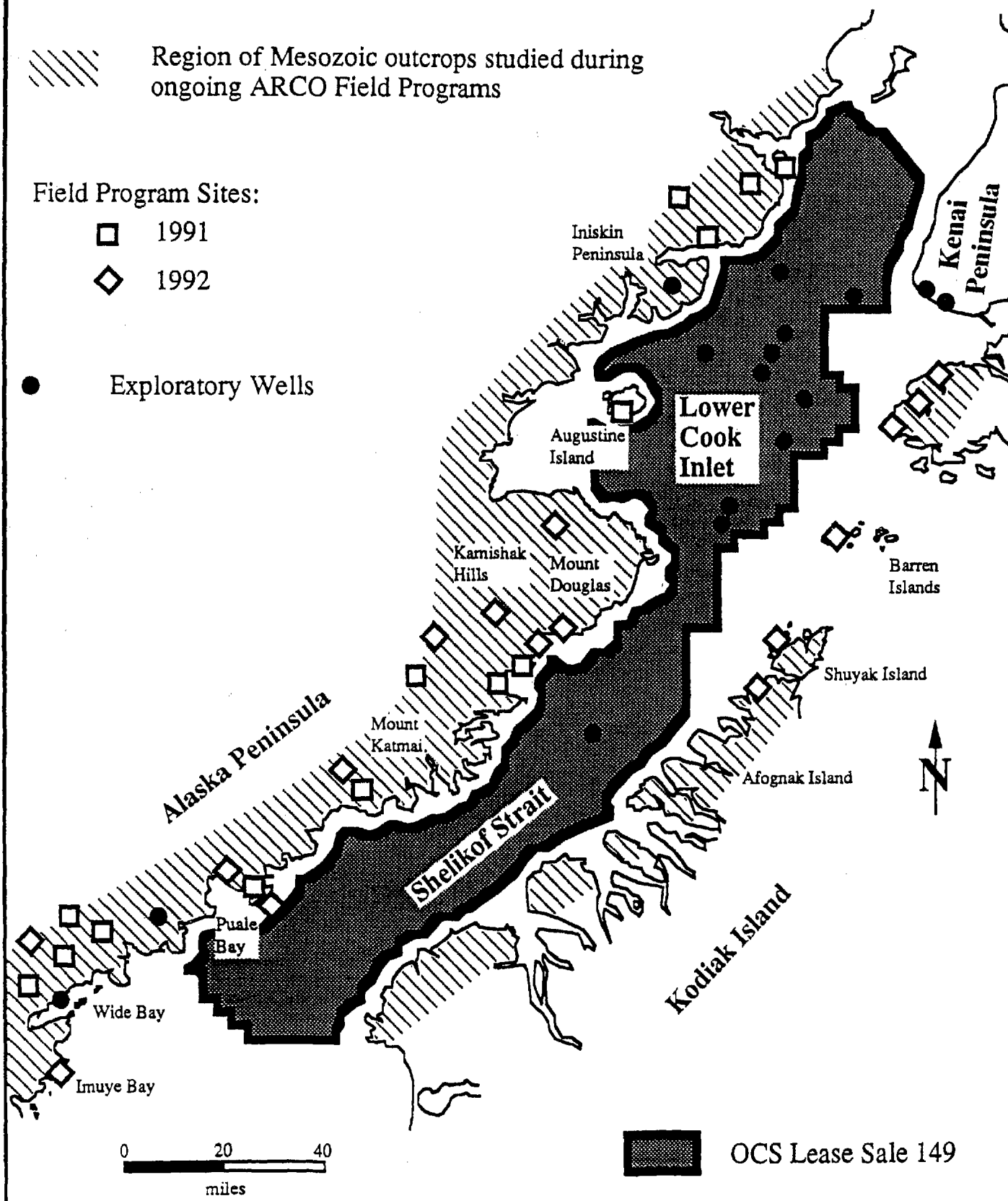
MINERALS MANAGEMENT  
SERVICE:

John Larson  
G. Martin  
Drew Comer

JULY 1, 1993



Figure 1 - FIELD STOP LOCATION MAP,  
MESOZOIC COOK INLET BASIN STUDY



STRAT COLUMN

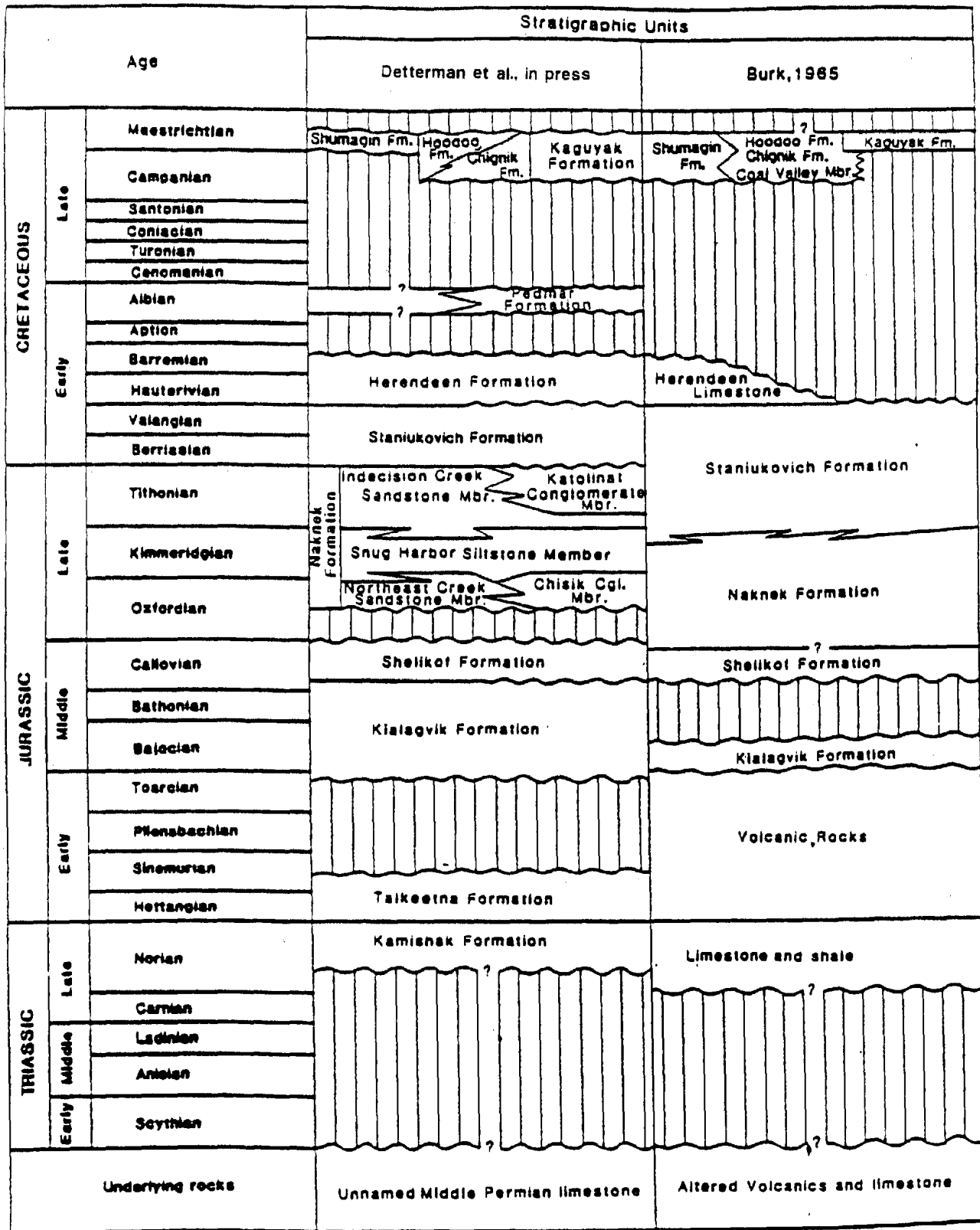


Figure 2. Correlation chart of Mesozoic stratigraphic units, Alaska Peninsula.

from Detterman et al., in press

ORIENTATION DATA

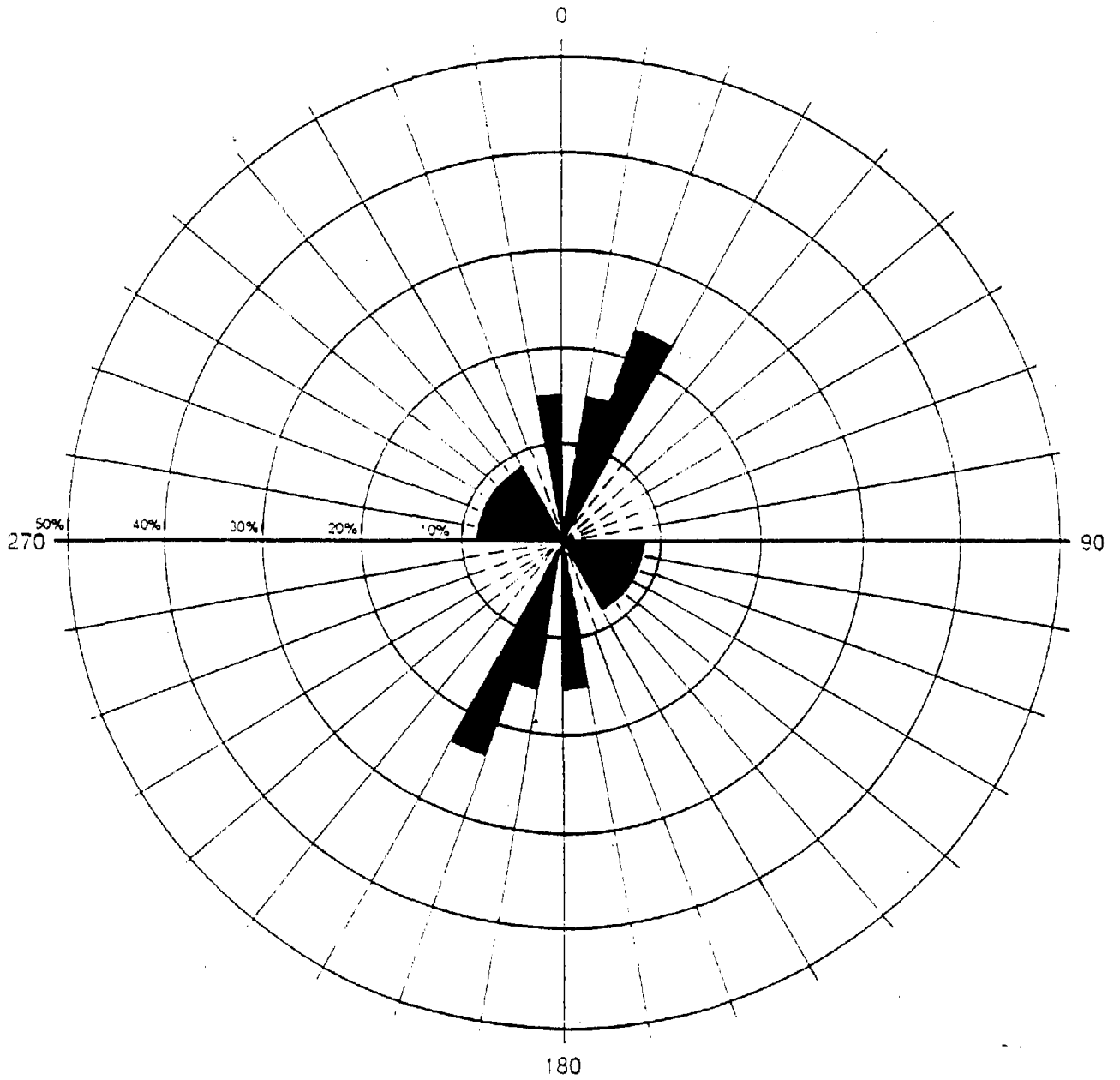


Figure 8 - Overall distribution of *Monotis* hinge line orientation, measured section MS-3, Triassic carbonates east of Puale Bay.



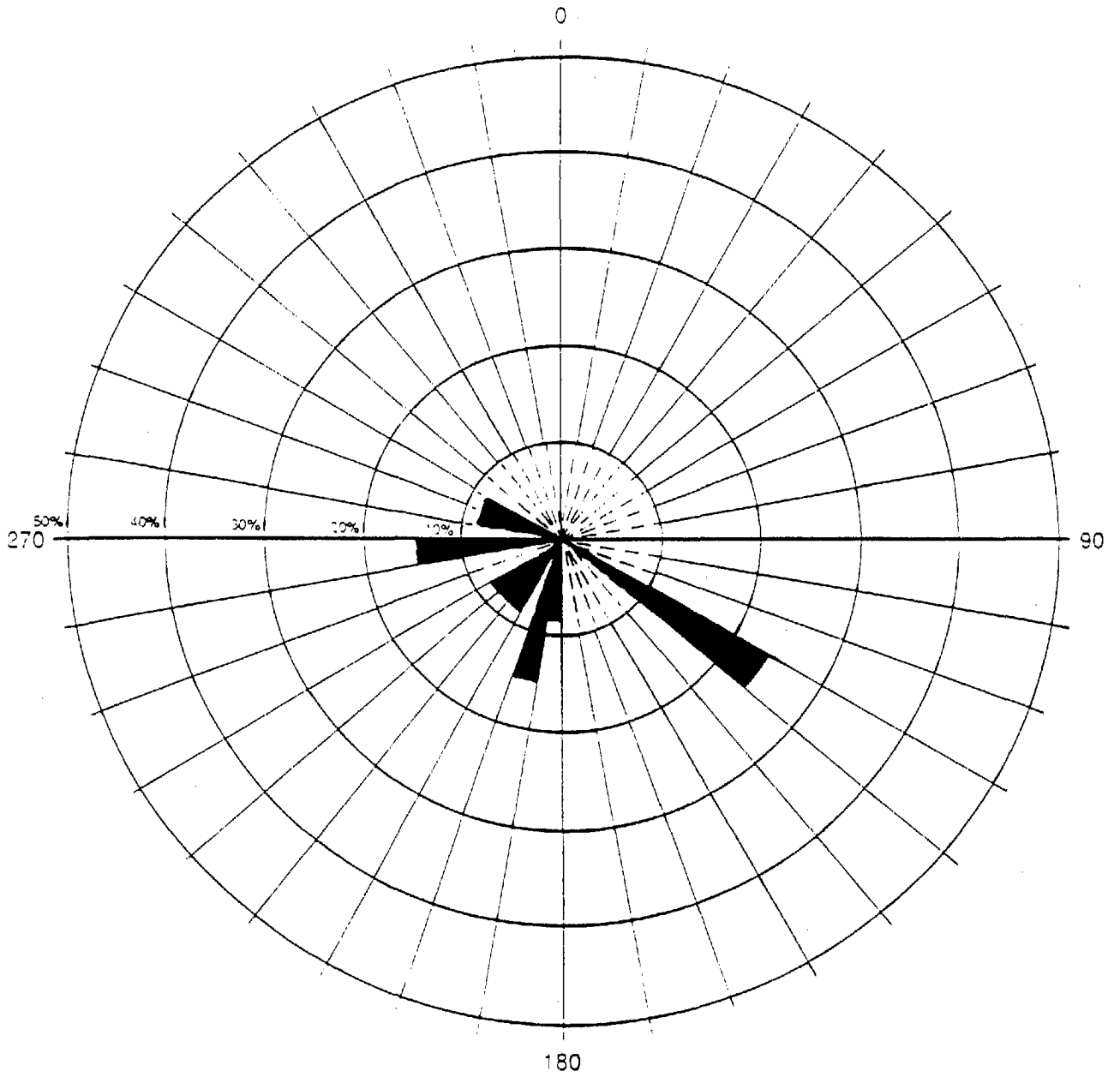


Figure 9 - Overall distribution of *Monotis umbo* orientation, measured section MS-3, Triassic carbonates east of Puale Bay.

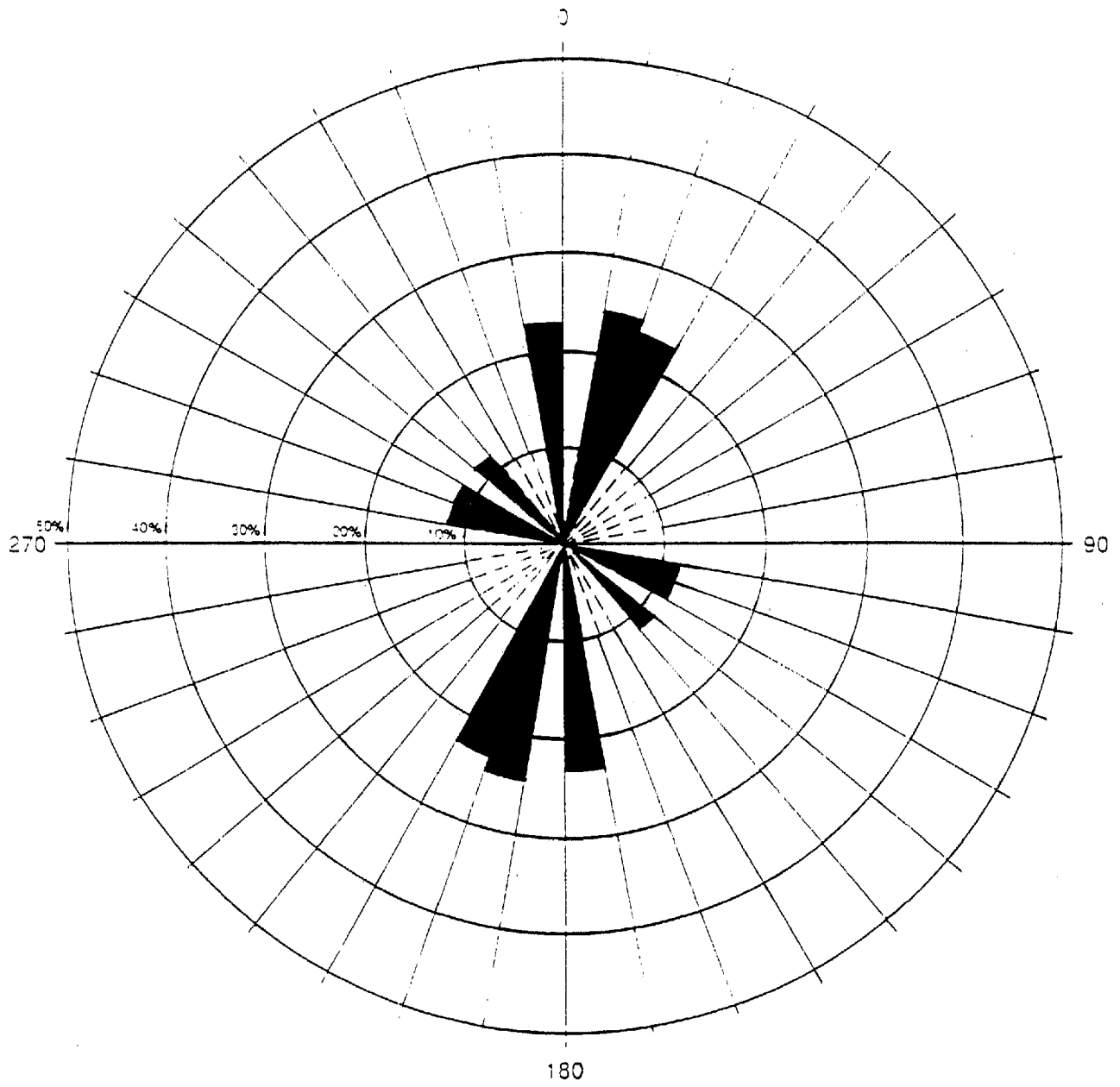


Figure 10 - Distribution of *Monotis* hinge line orientation, concave down valves only, measured section MS-3, Triassic carbonates east of Puale Bay.

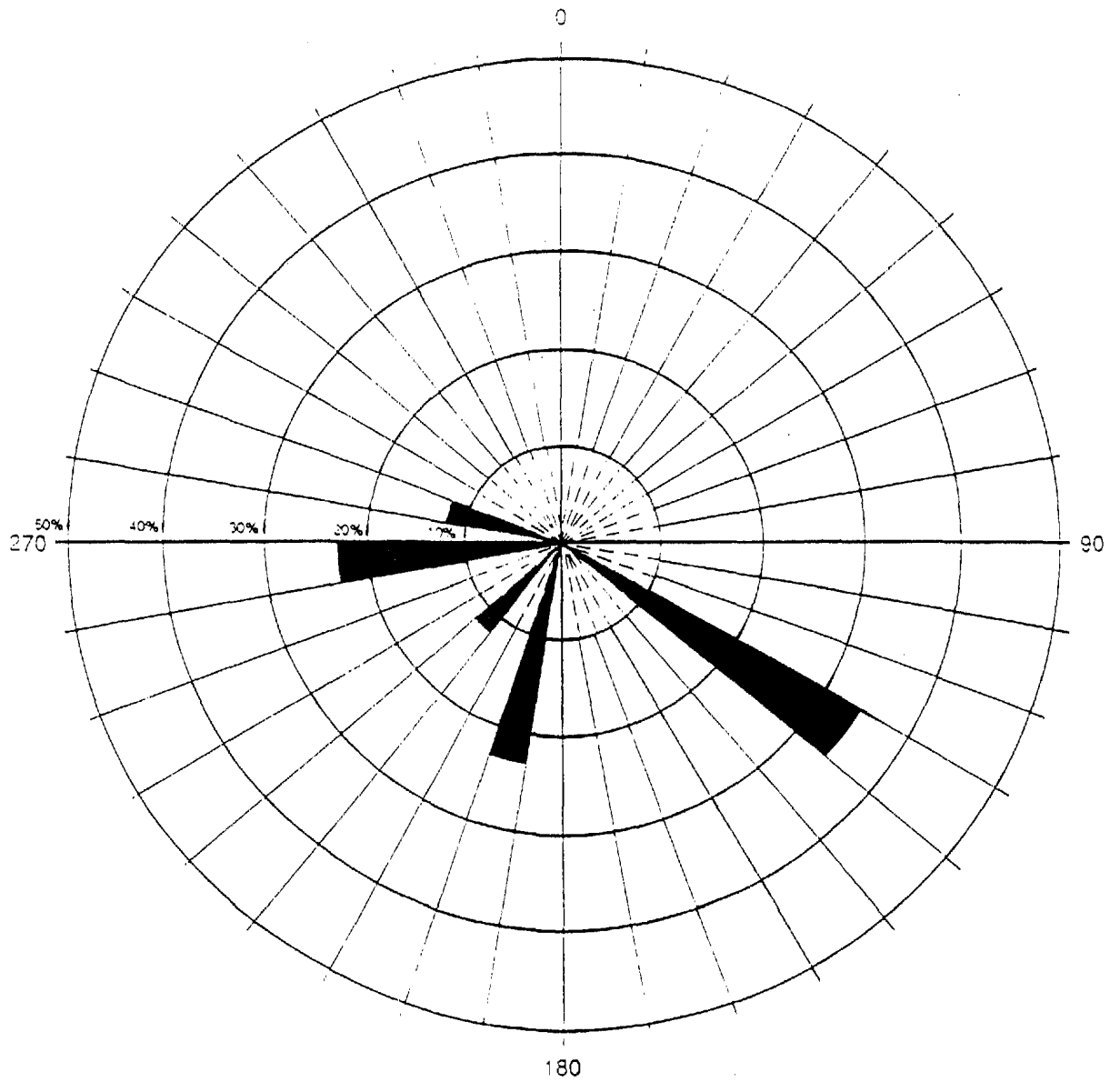


Figure 11 - Distribution of *Monotis umbo* orientation, concave down valves only, measured section MS-3, Triassic carbonates east of Puale Bay.

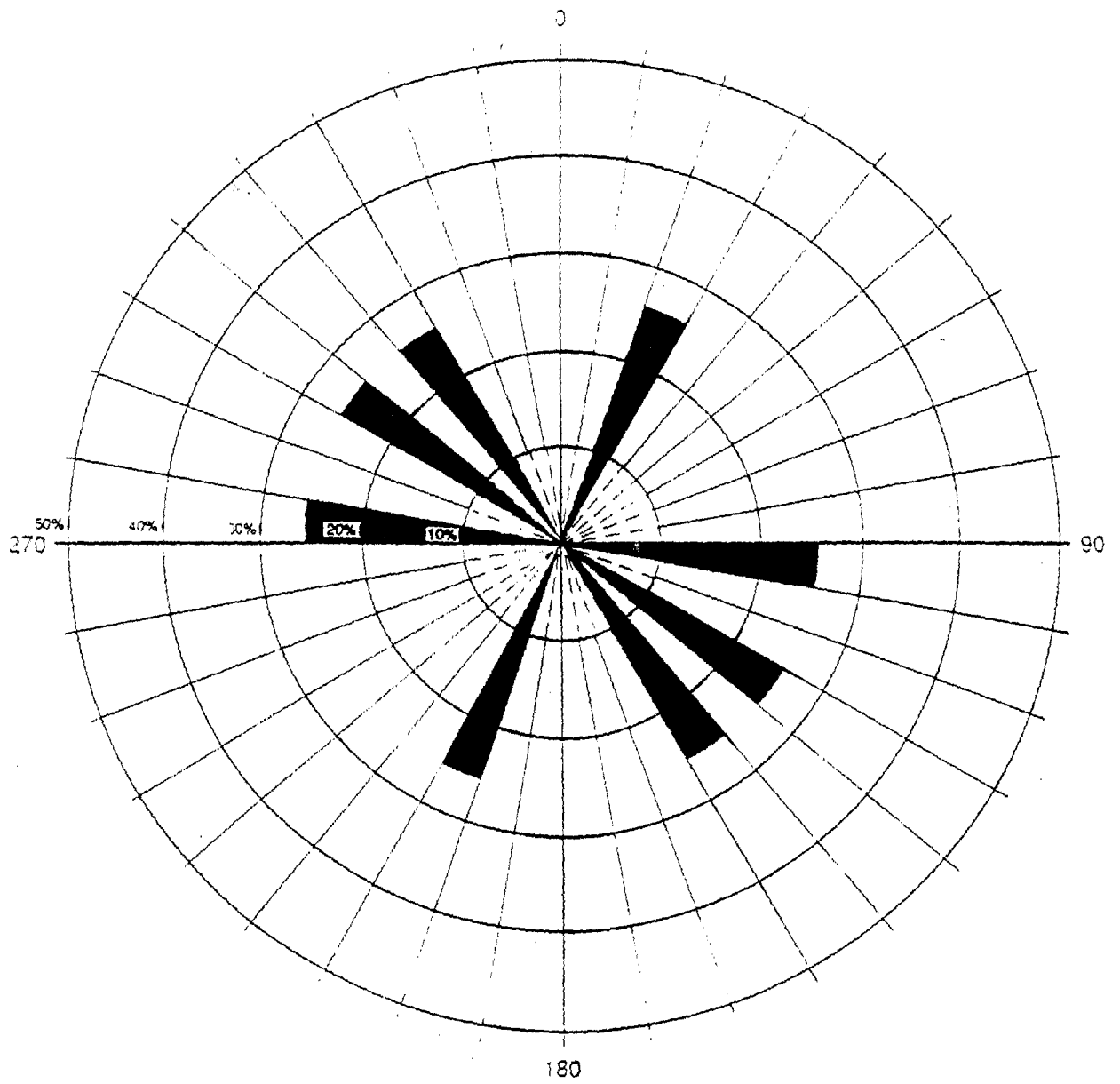


Figure 12 - Distribution of *Monotis* hinge line orientation, concave up valves only, measured section MS-3, Triassic carbonates east of Puale Bay.

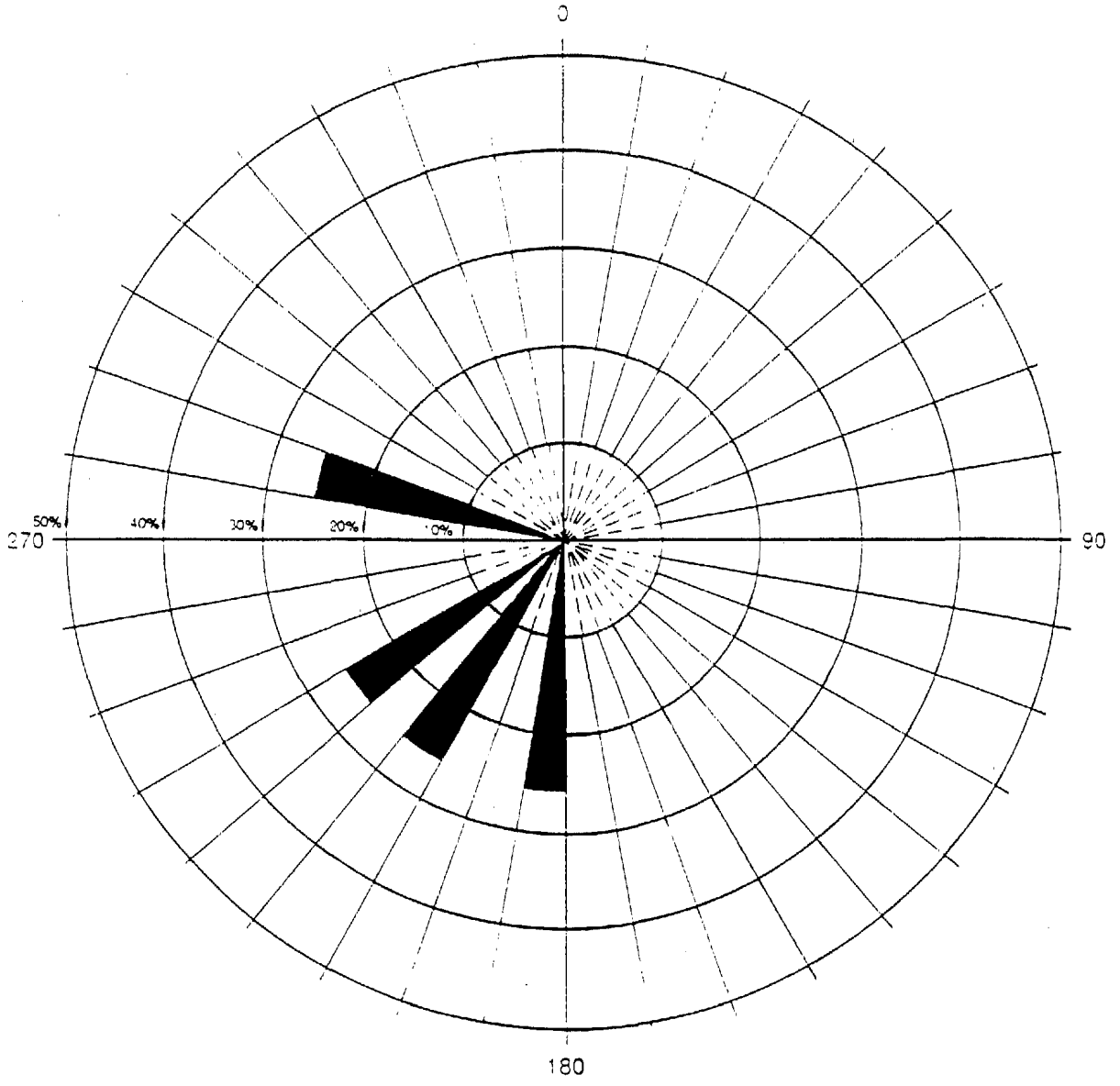


Figure 13 - Distribution of *Monotis umbo* orientation, concave up valves only, measured section MS-3, Triassic carbonates east of Puale Bay.

92WB4  
Long Axis Orientation  
Unit 2  
10' Above Base  
N = 4  
0

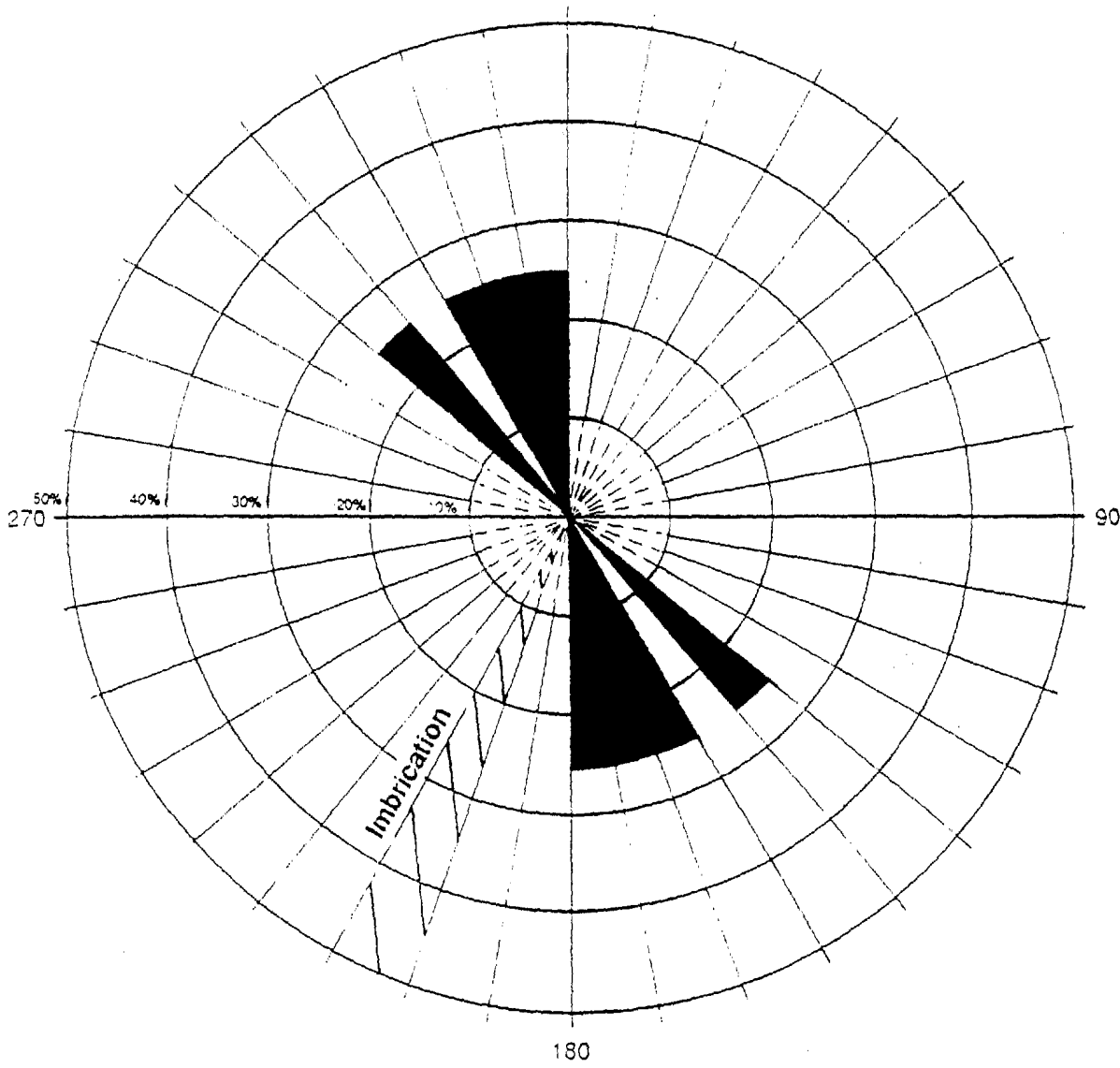


Figure 18 - Orientation of both imbricated and elongate clasts in the Naknek Formation, 10 feet from base of section MS-4, stop 92WB4, northwest of Wide Bay.

92WB4  
Clast Imbrication  
Unit 3  
30' Above Base  
N = 5

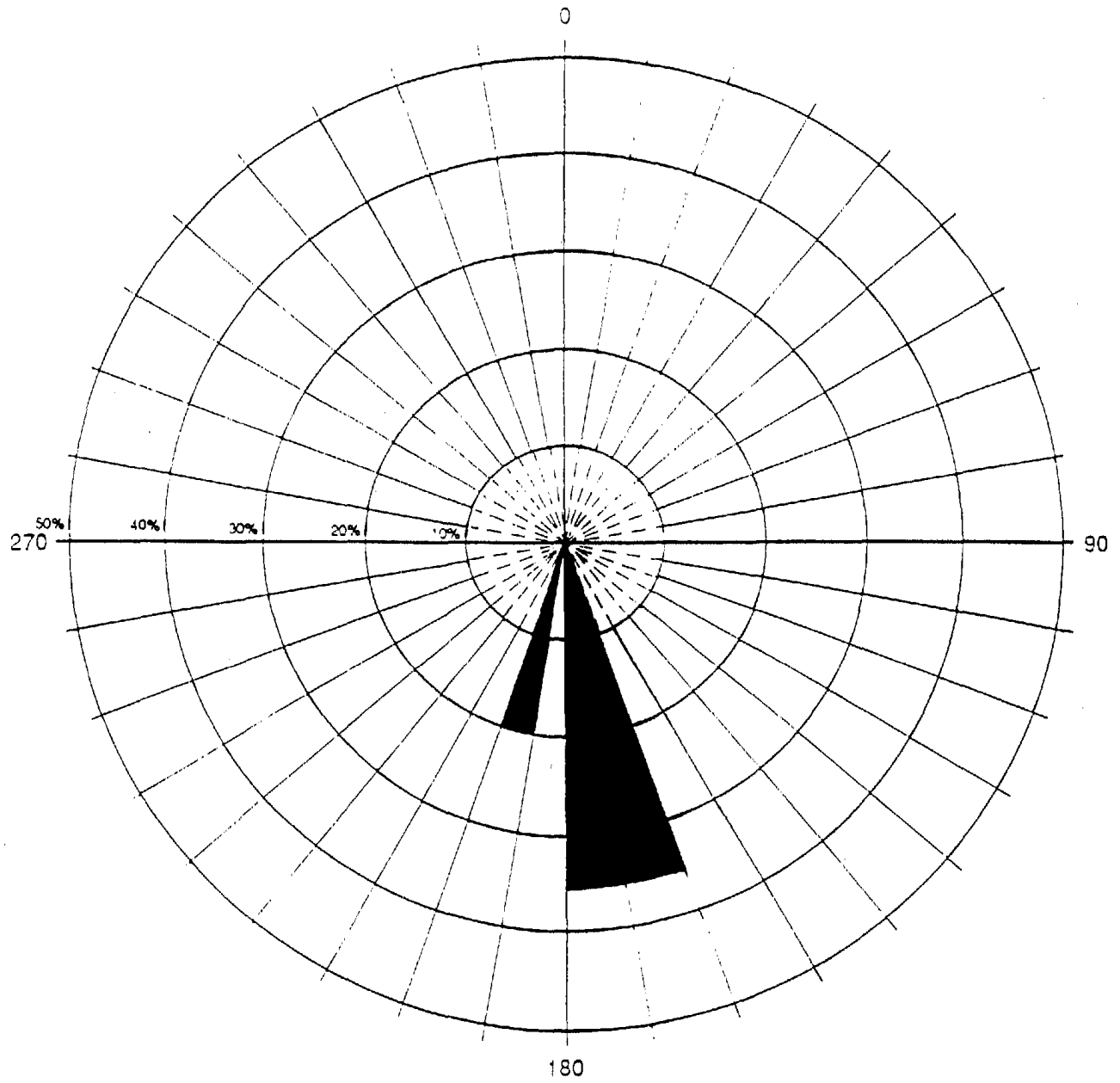


Figure 19 - Orientation of imbricated clasts in the Naknek Formation, 30 feet from base of section MS-4, stop 92WB4, northwest of Wide Bay.

92WB4  
Clast Imbrication  
Unit 4  
40' Above Base  
N = 4

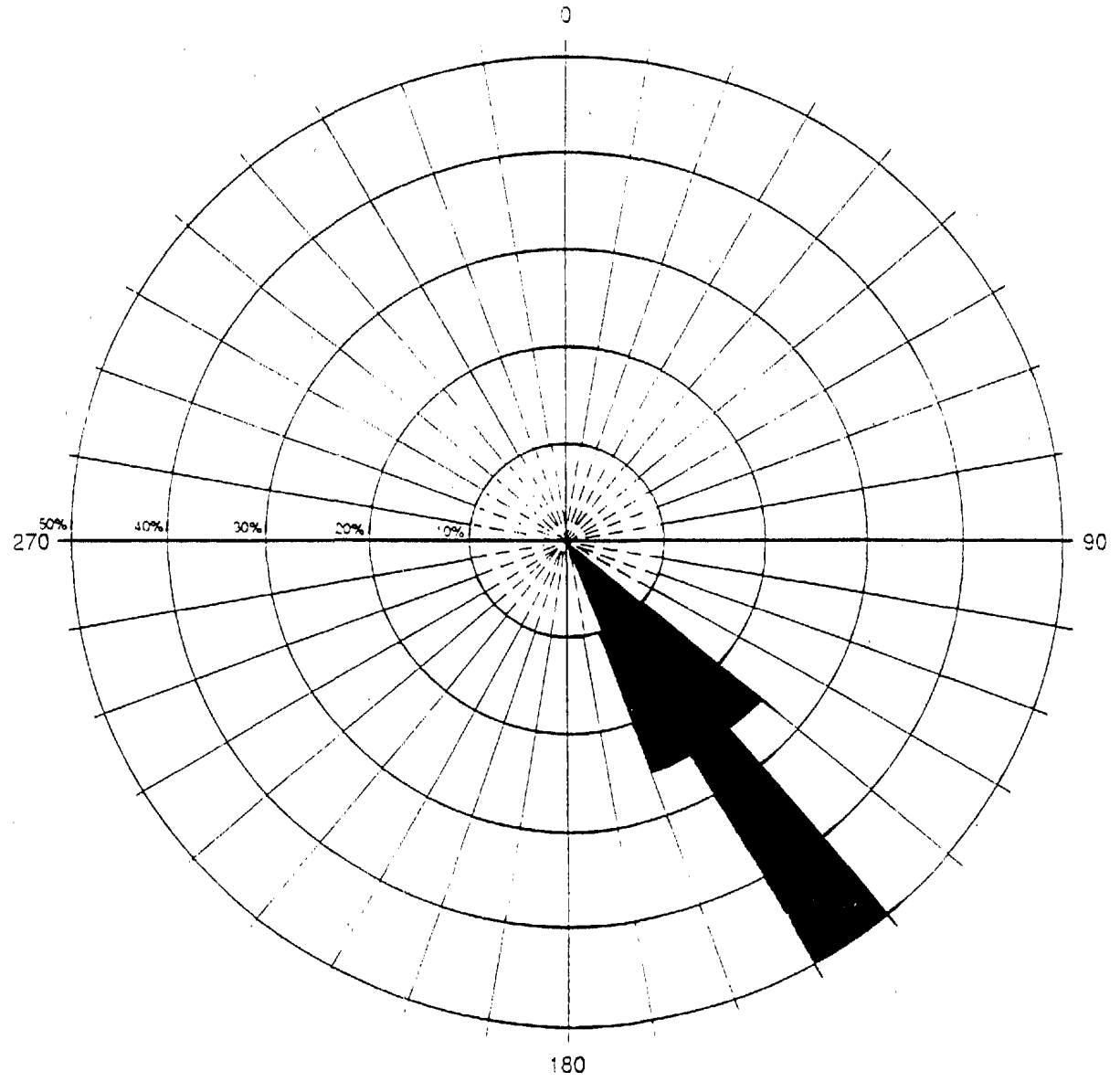


Figure 20 - Orientation of imbricated clasts in the Naknek Formation, 40 feet from base of section MS-4, stop 92WB4, northwest of Wide Bay.



92WB4  
Long Axis Orientation  
Unit 4  
40' Above Base  
N = 14

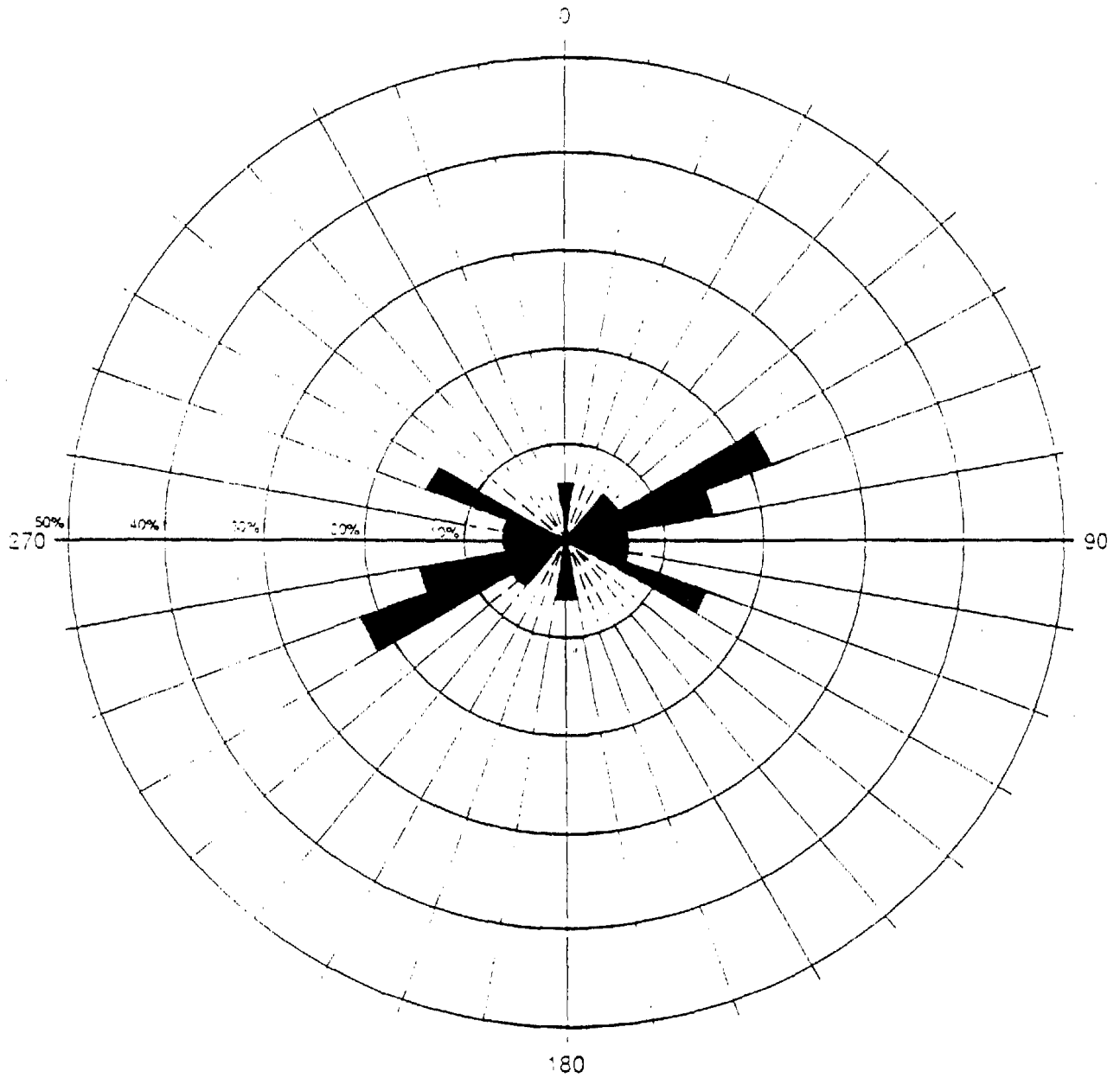


Figure 21 - Orientation of elongate clasts in the Naknek Formation, 40 feet from base of section MS-4, stop 92WB4, northwest of Wide Bay.

92WB4  
Clast Imbrication  
Unit 5  
60' Above Base  
N = 6  
0

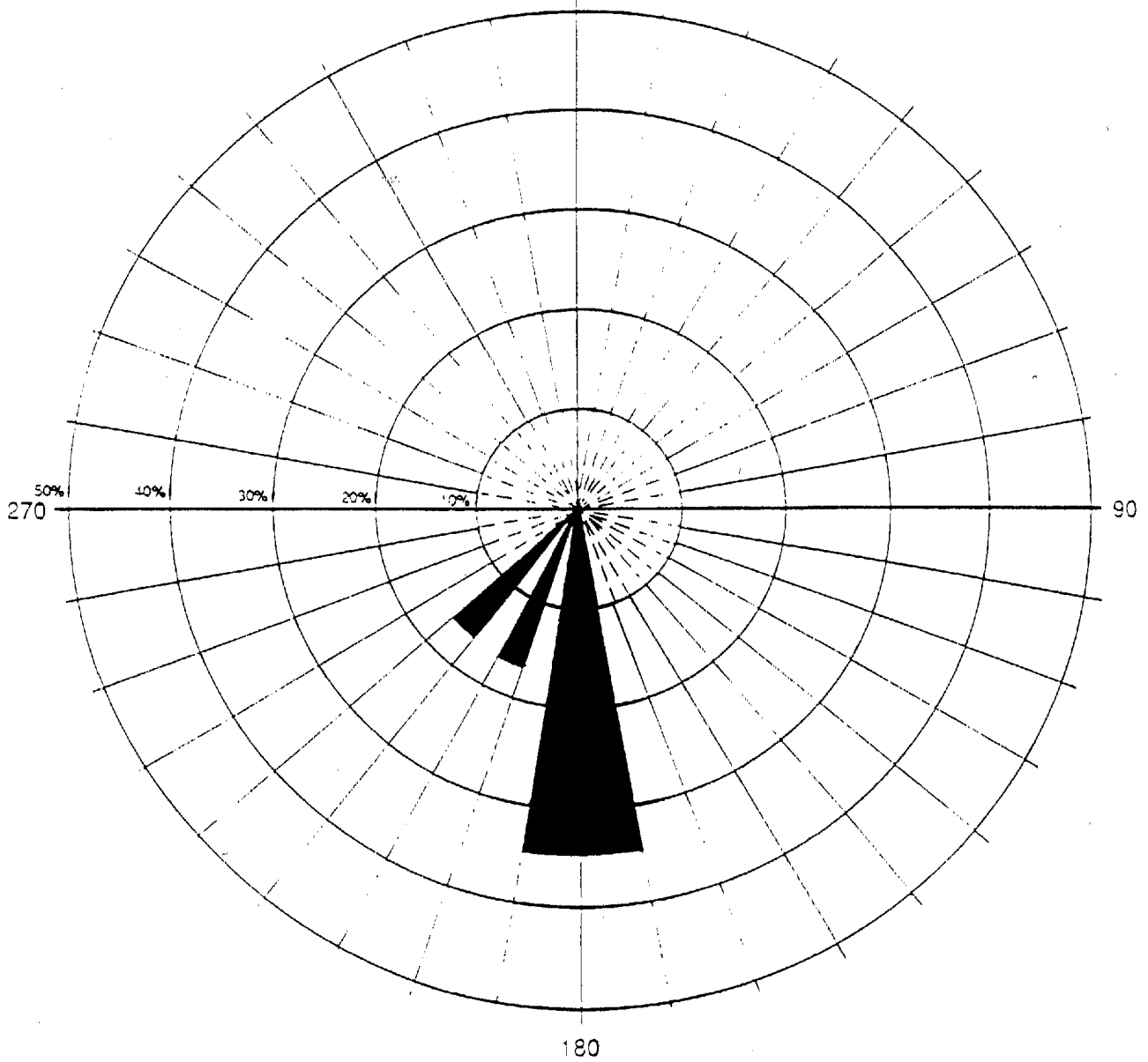


Figure 22 - Orientation of imbricated clasts in the Naknek Formation, 60 feet from base of section MS-4, stop 92WB4, northwest of Wide Bay.

92WB4  
Long Axis Orientation  
Unit 5  
60' Above Base  
N = 8

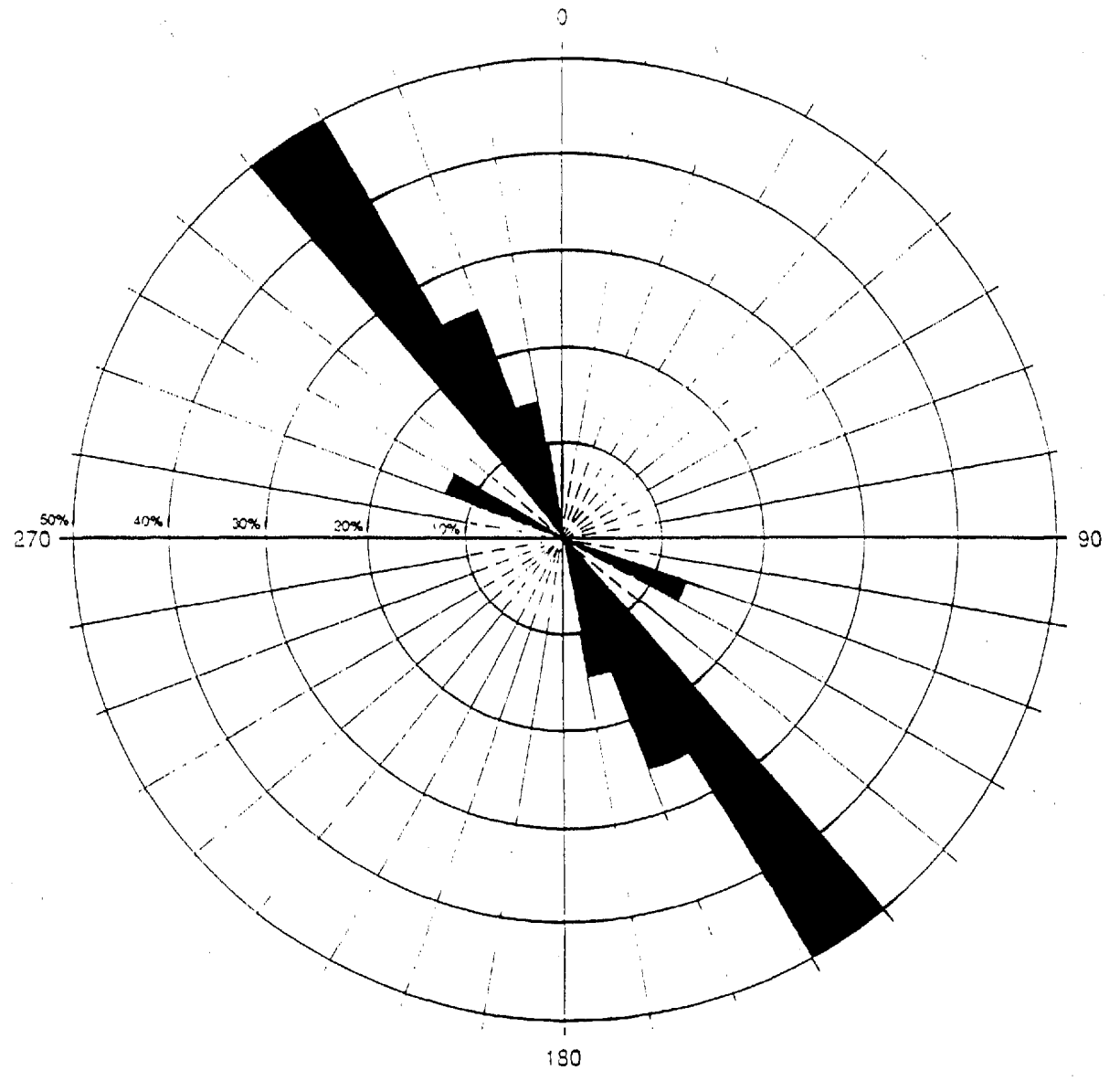


Figure 23 - Orientation of elongate clasts in the Naknek Formation, 60 feet from base of section MS-4, stop 92WB4, northwest of Wide Bay.

92WB4  
Clast Imbrication  
Unit 6  
85' Above Base  
N = 5

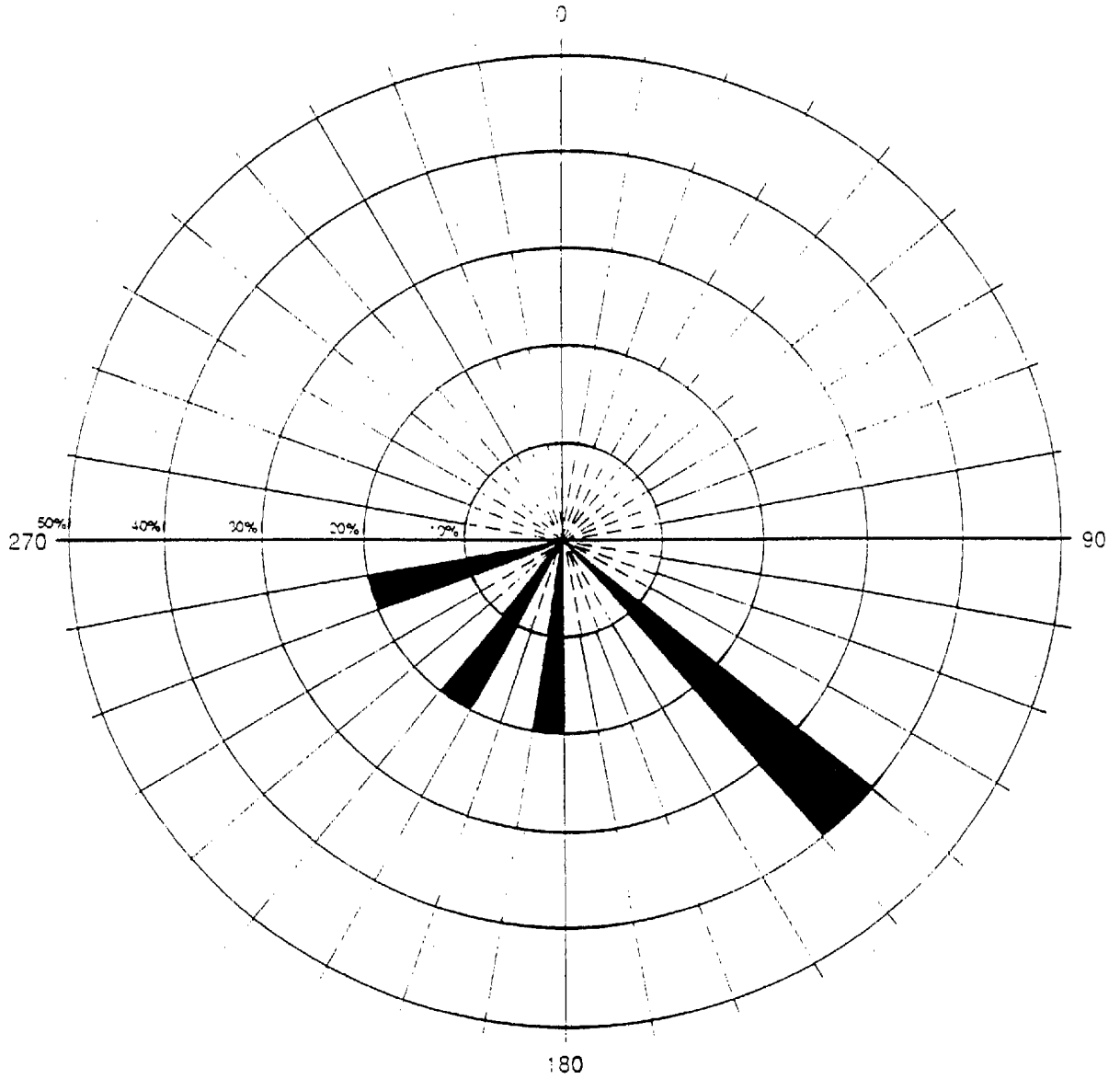


Figure 24 - Orientation of imbricated clasts in the Naknek Formation, 85 feet from base of section MS-4, stop 92WB4, northwest of Wide Bay.

92WB4  
Long Axis Orientation  
Unit 6  
85' Above Base  
N = 18  
0

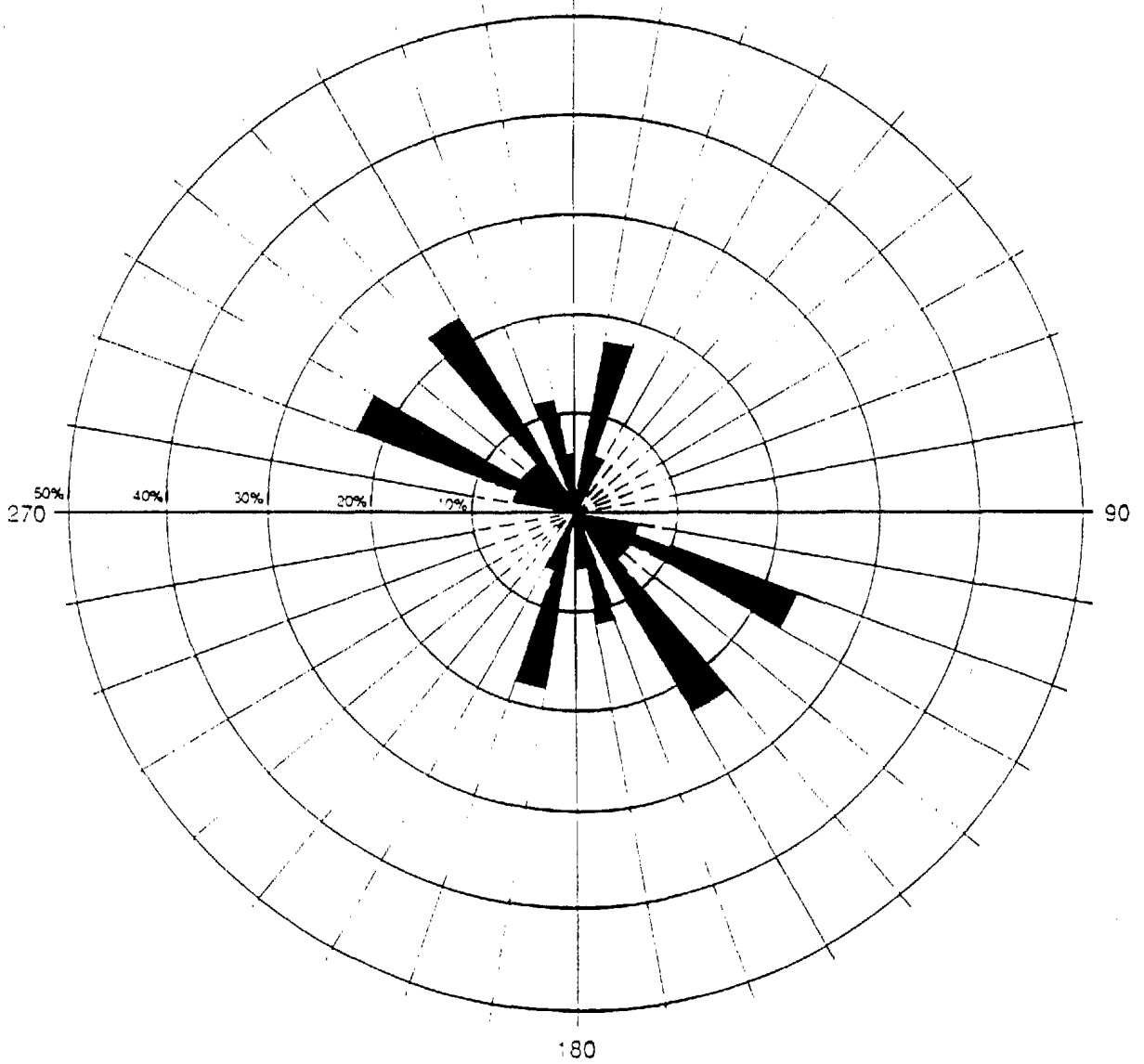


Figure 25 - Orientation of elongate clasts in the Naknek Formation, 85 feet from base of section MS-4, stop 92WB4, northwest of Wide Bay.

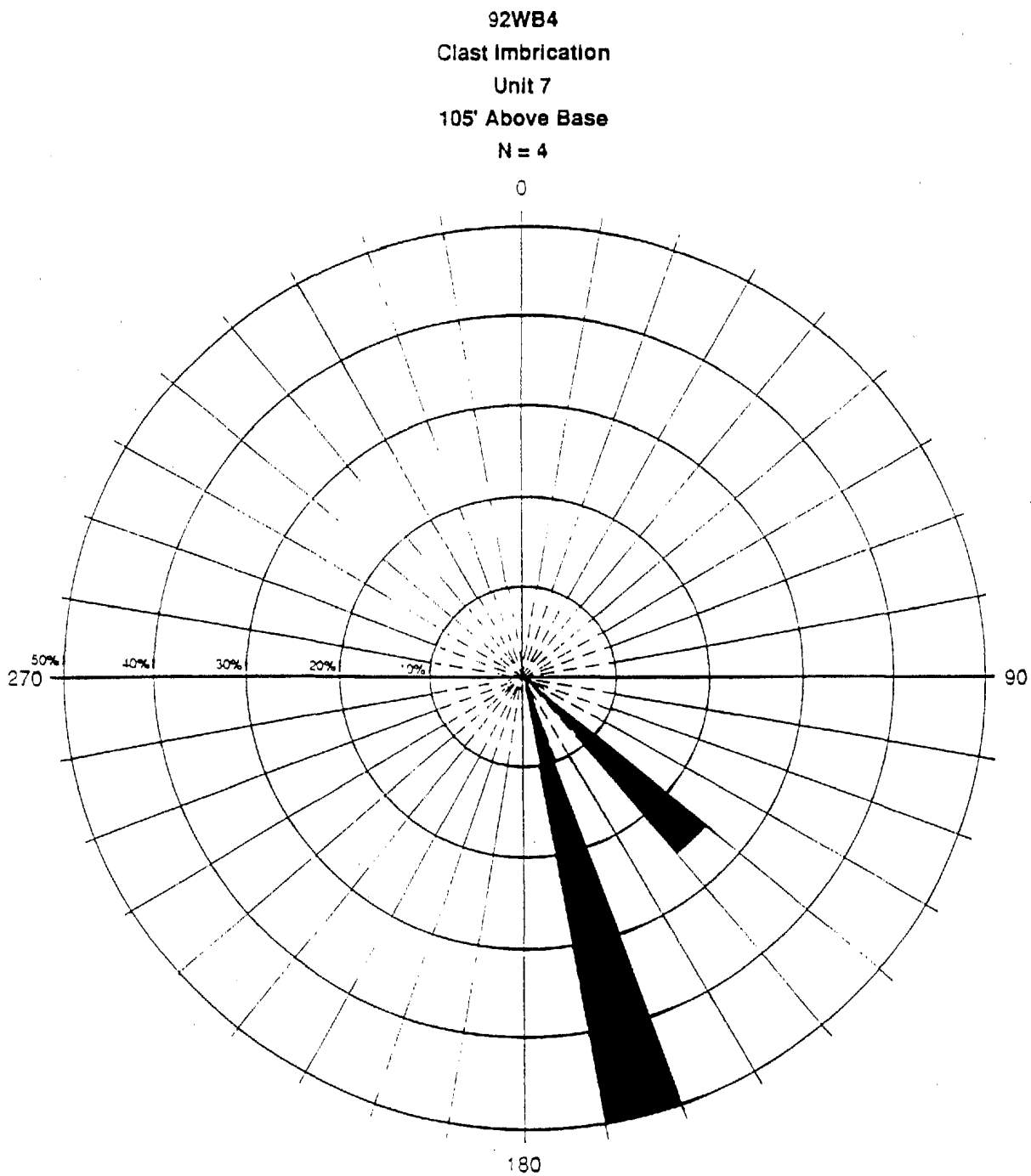


Figure 26 - Orientation of imbricated clasts in the Naknek Formation, 105 feet from base of section MS-4, stop 92WB4, northwest of Wide Bay.

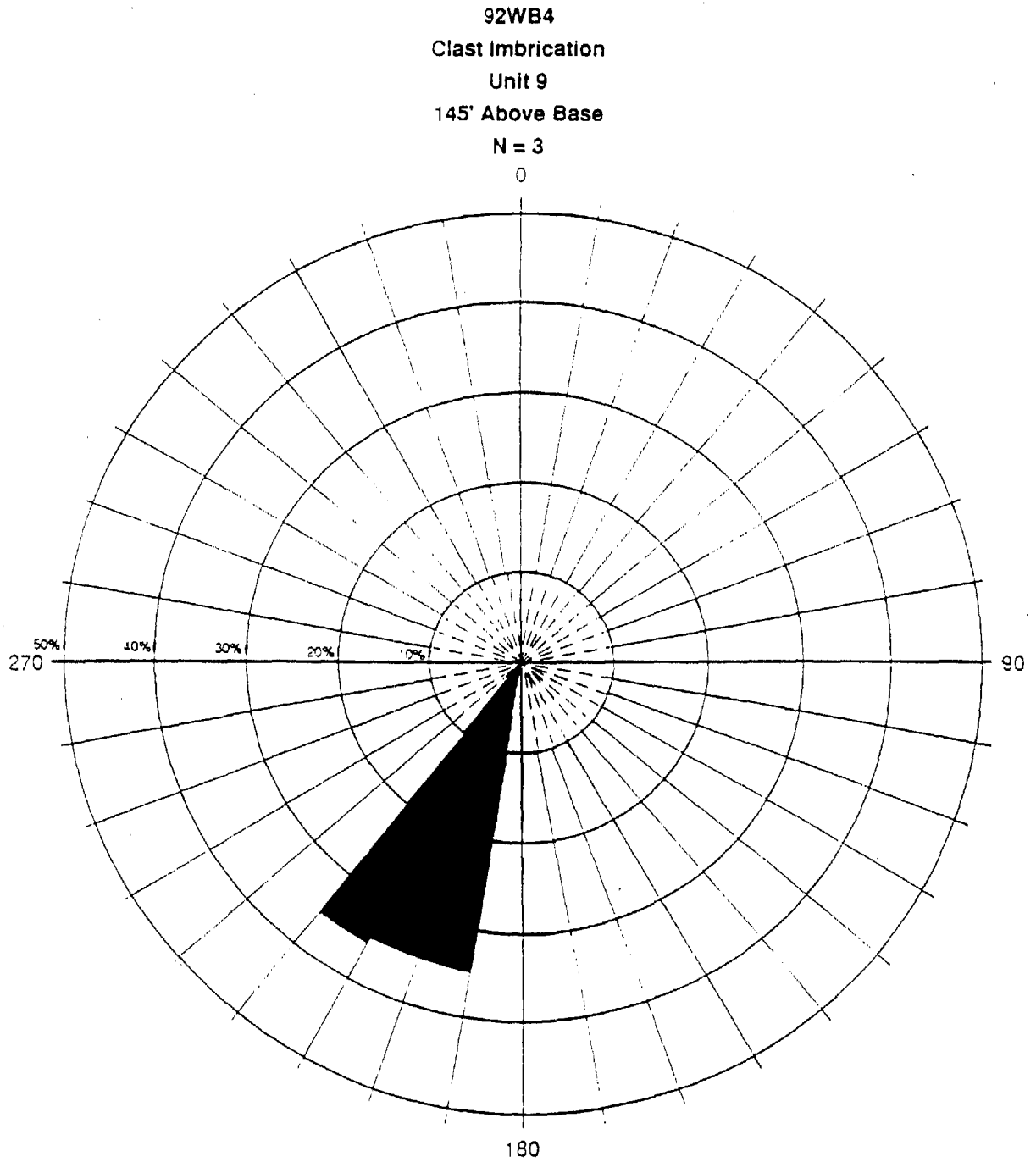


Figure 27 - Orientation of imbricated clasts in the Naknek Formation, 145 feet from base of section MS-4, stop 92WB4, northwest of Wide Bay.

92WB4  
Long Axis Orientation  
Unit 9  
145' Above Base  
N = 3

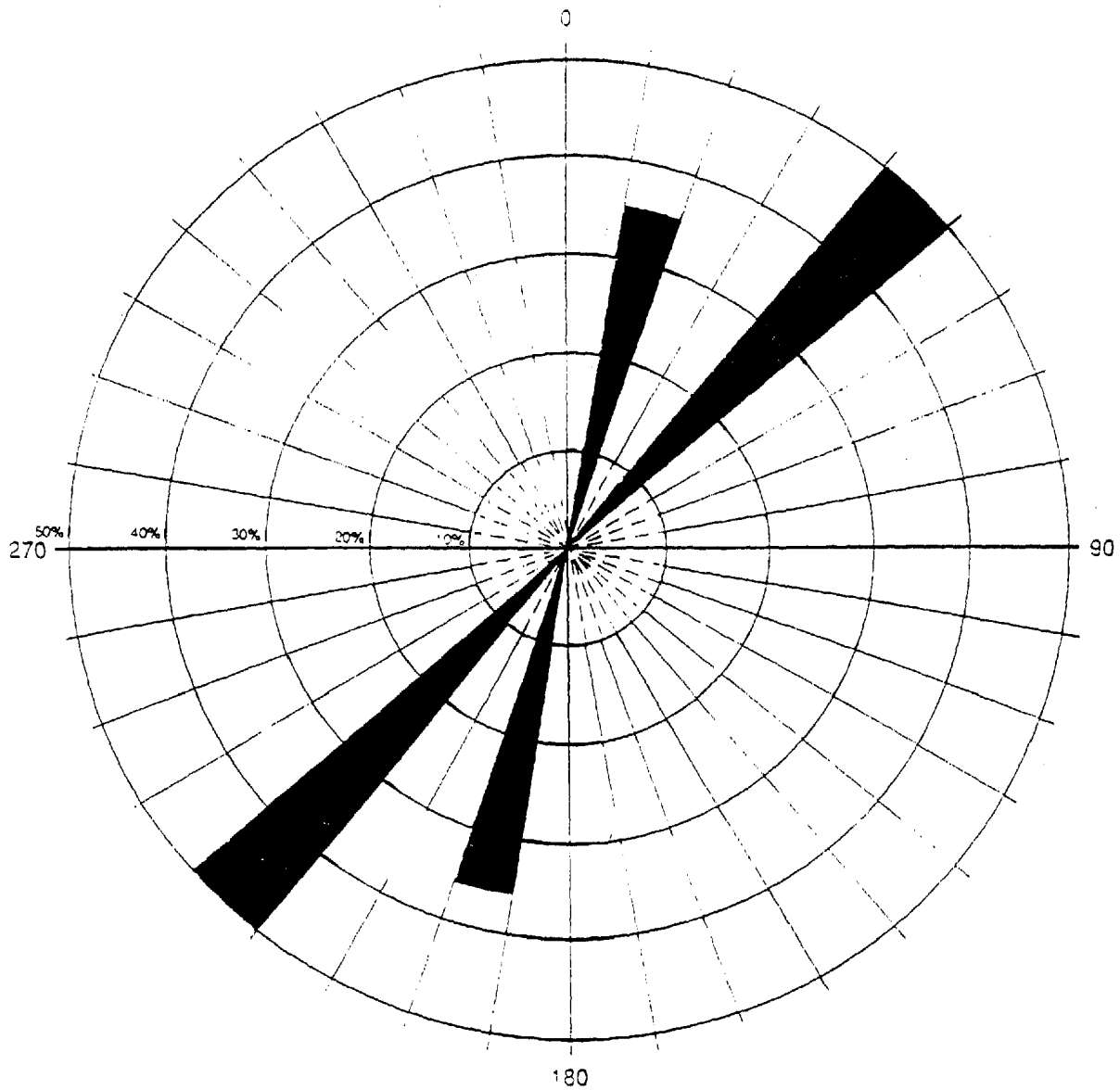


Figure 28 - Orientation of elongate clasts in the Naknek Formation, 145 feet from base of section MS-4, stop 92WB4, northwest of Wide Bay.



92WB4  
Clast Imbrication  
Unit 11  
184' Above Base  
N = 4

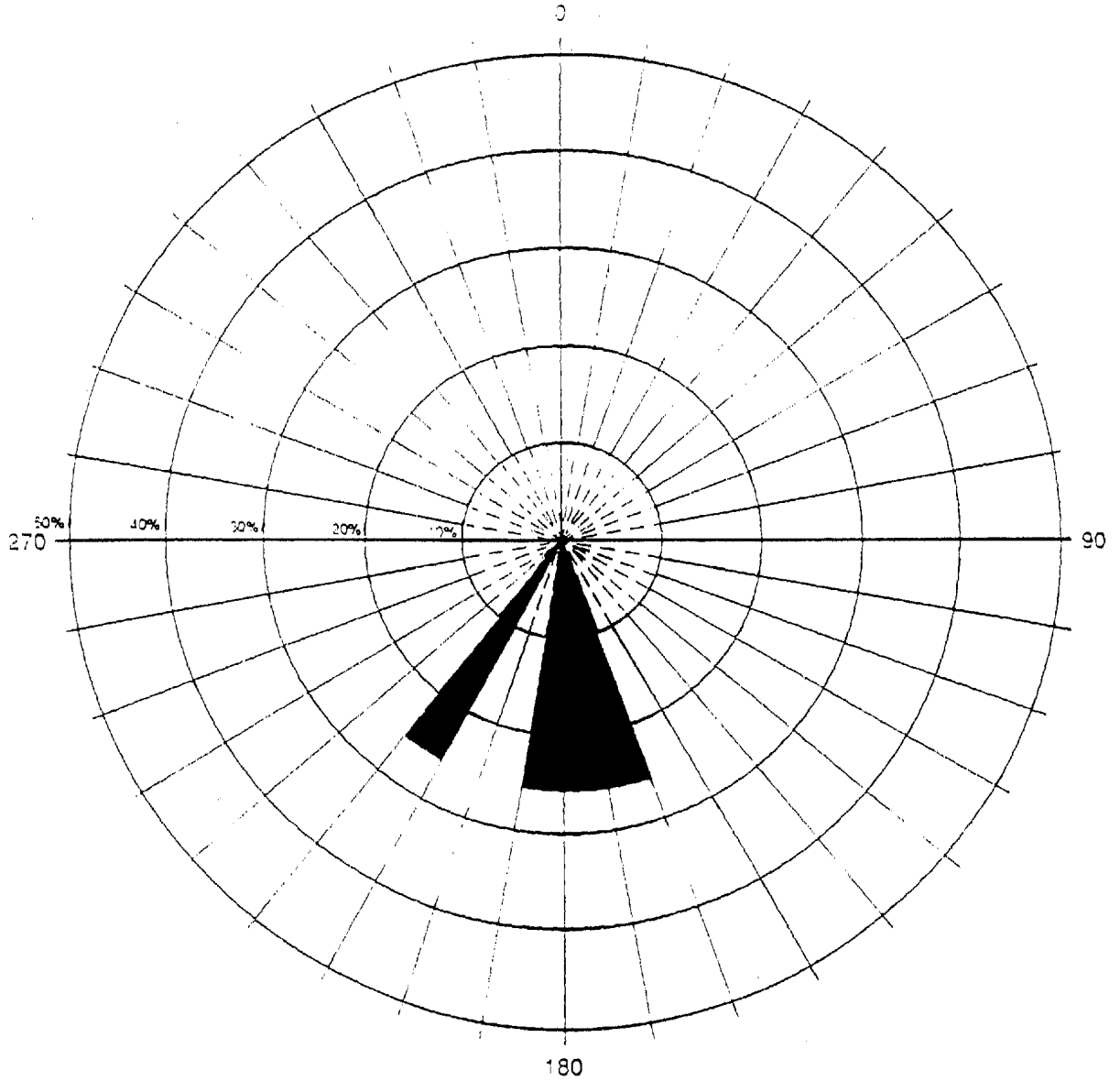


Figure 29 - Orientation of imbricated clasts in the Naknek Formation, 184 feet from base of section MS-4, stop 92WB4, northwest of Wide Bay.

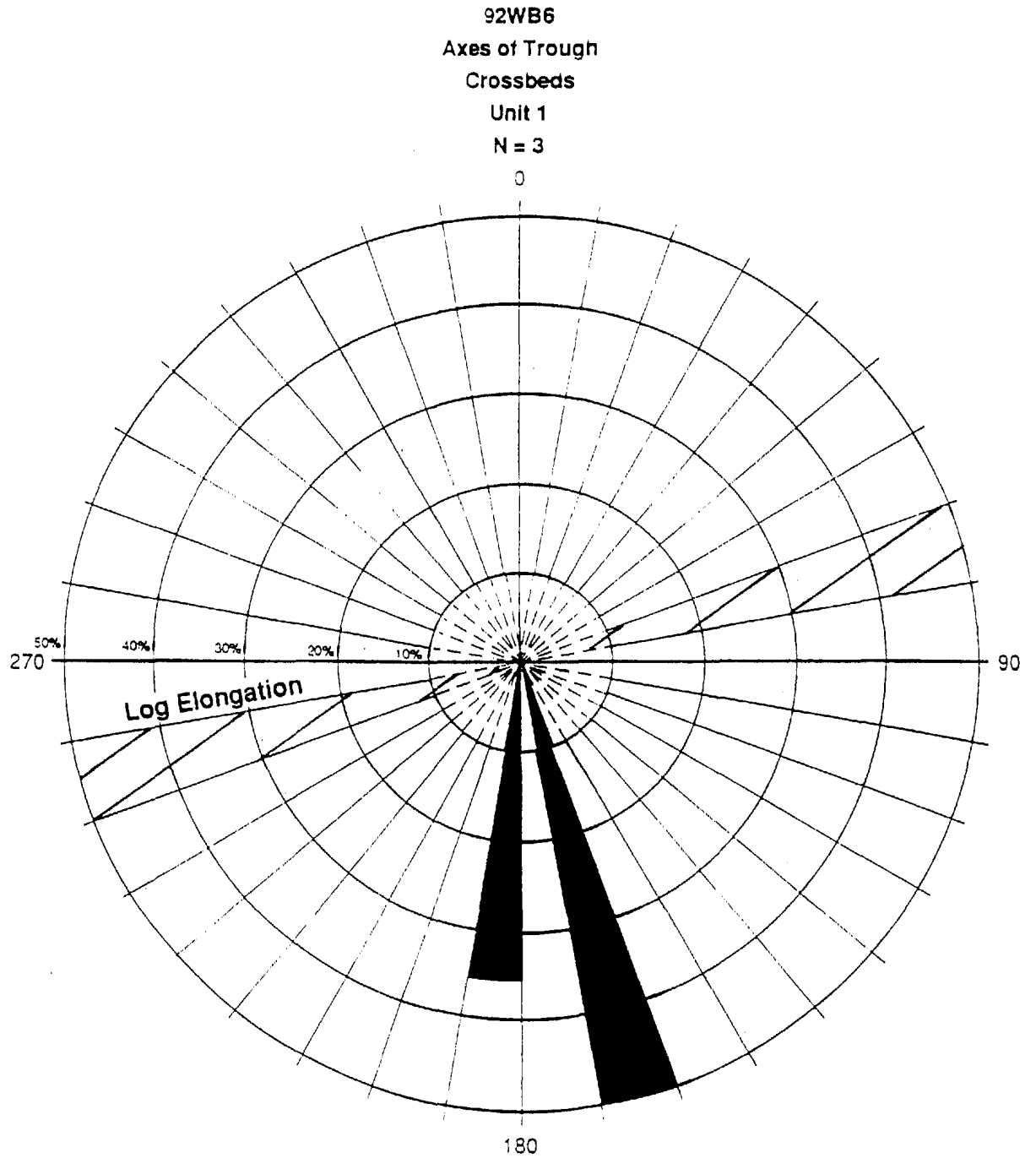


Figure 30 - Orientation of trough crossbeds in the Naknek Formation, lower 60 feet of section at stop 92WB, northeast of Puale Bay.

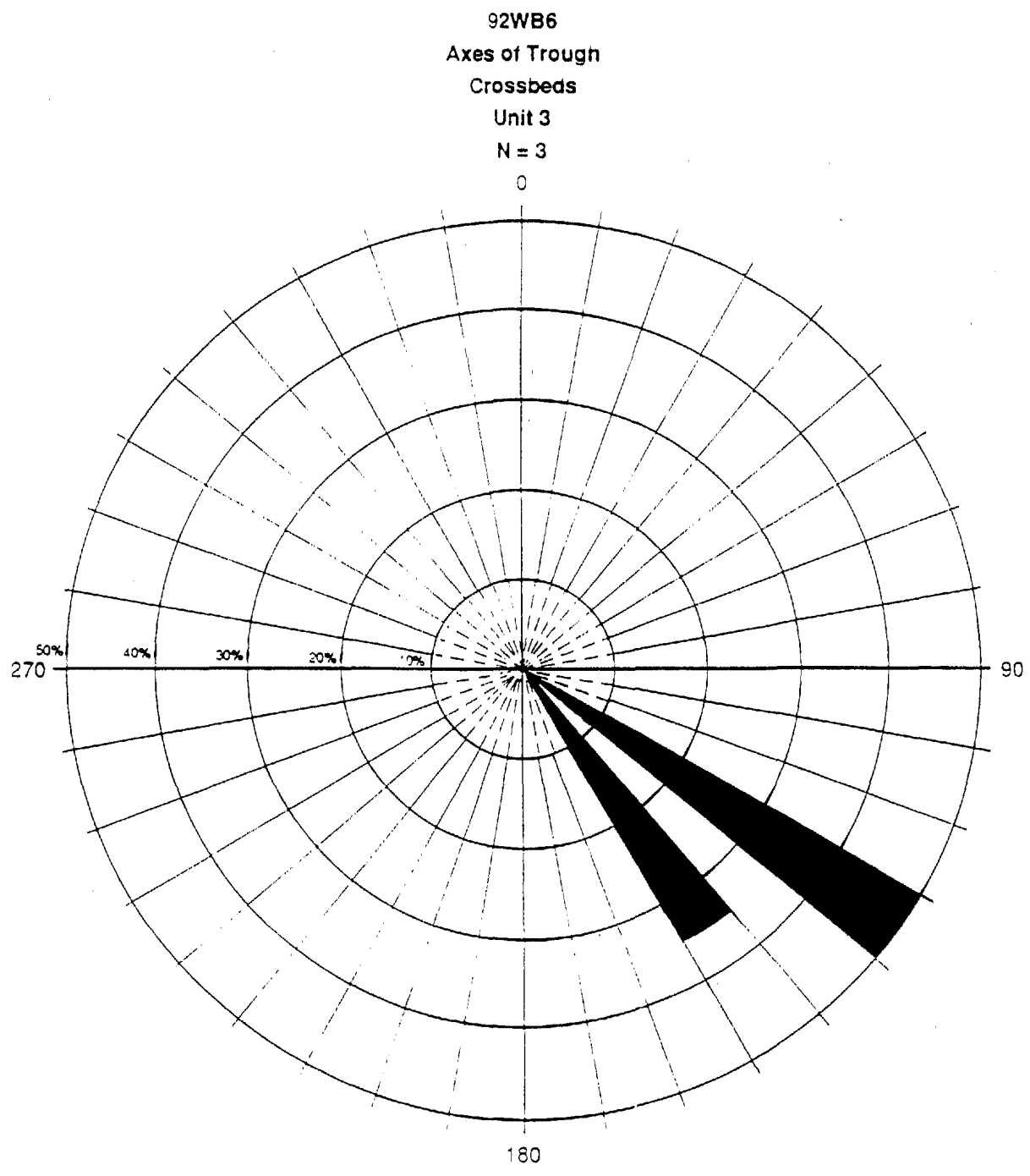


Figure 31 - Orientation of trough crossbeds in the Naknek Formation, between 110 and 160 feet in section at stop 92WB, northeast of Puale Bay.

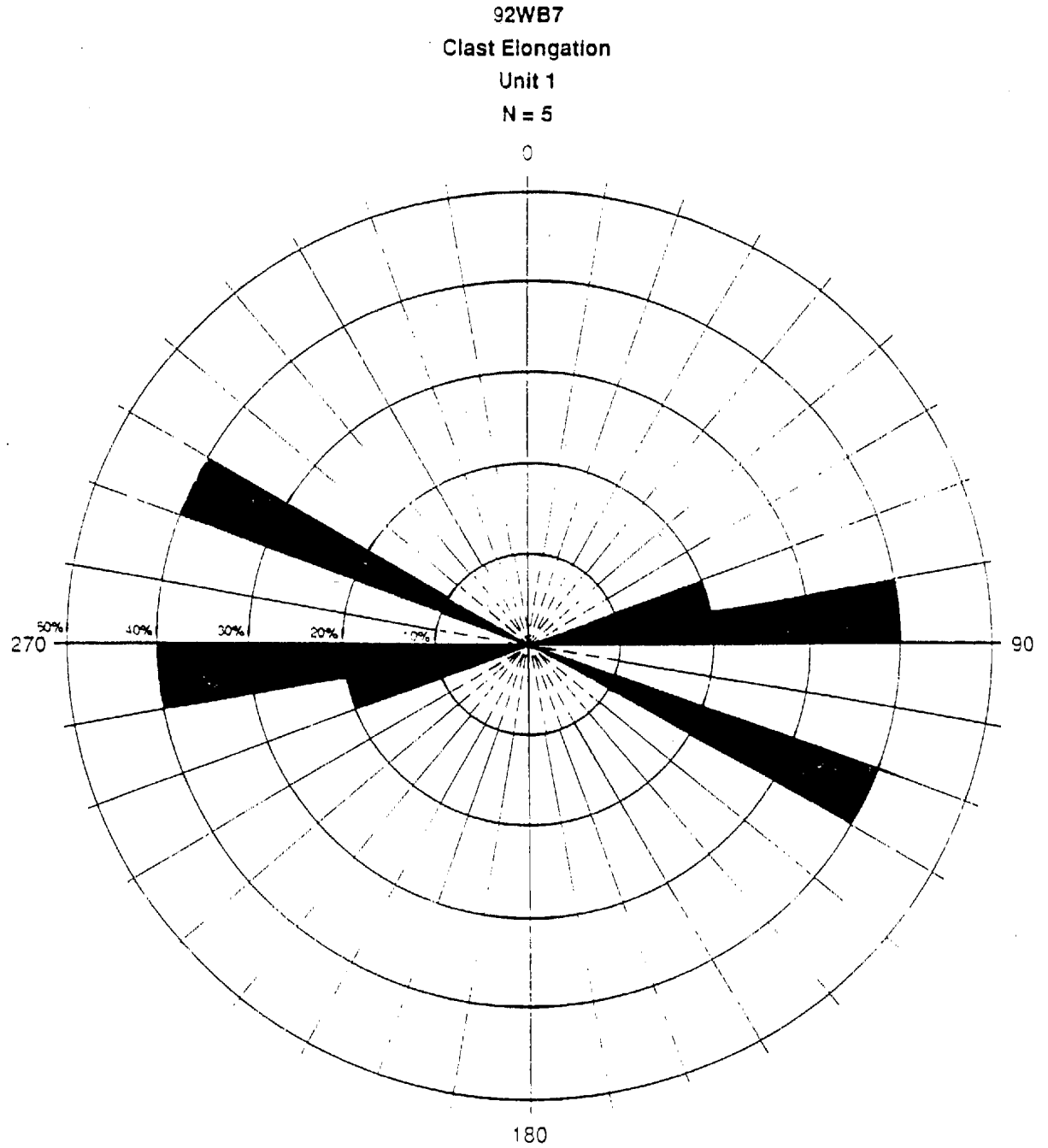


Figure 34 - Orientation of elongate clasts in the Naknek Formation, basal 2 feet of section MS-6, stop 92WB7, north shore of Imuye Bay.

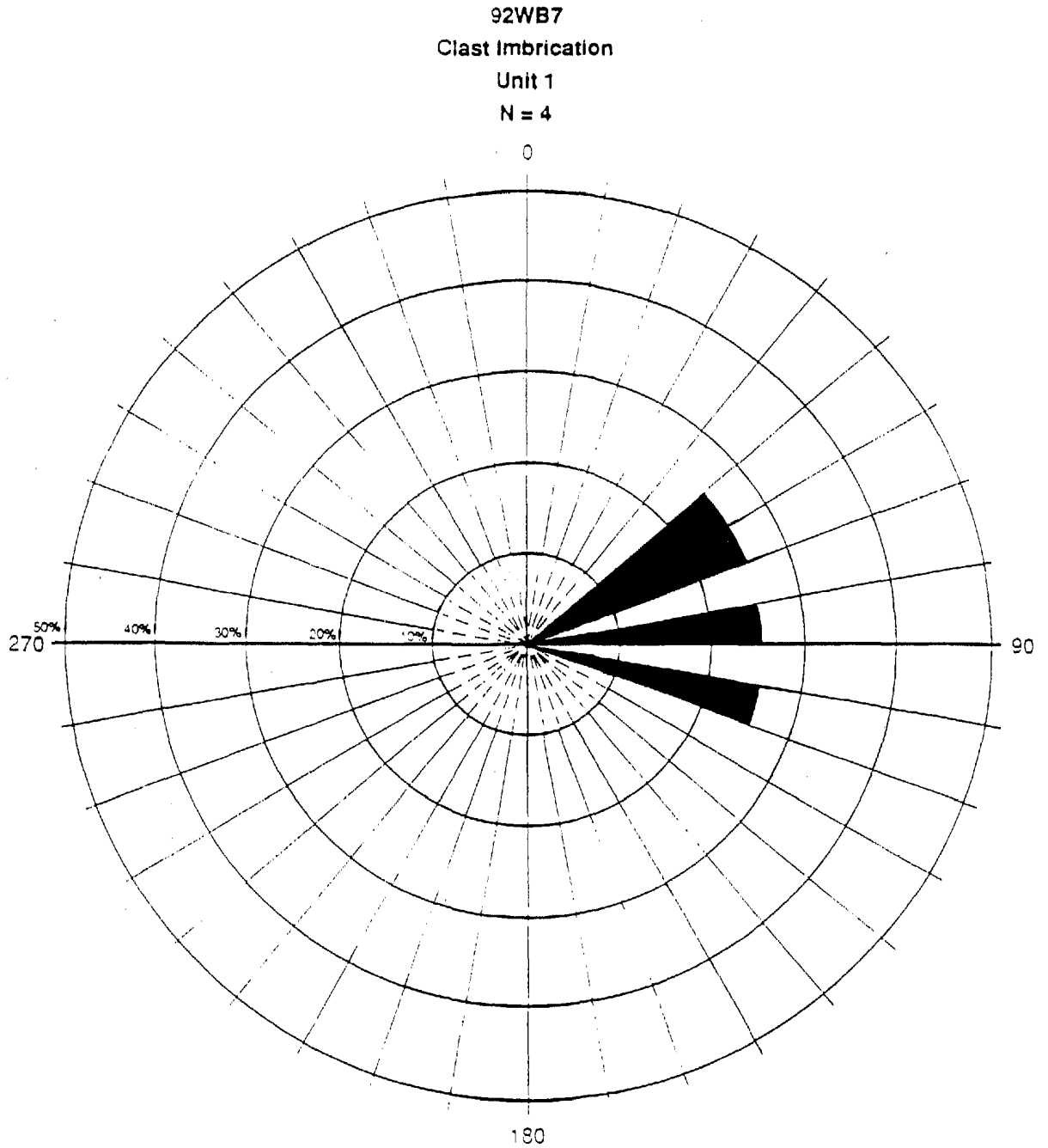


Figure 35 - Orientation of imbricated clasts in the Naknek Formation, basal 2 feet of section MS-6, stop 92WB7, north shore of Imuye Bay.

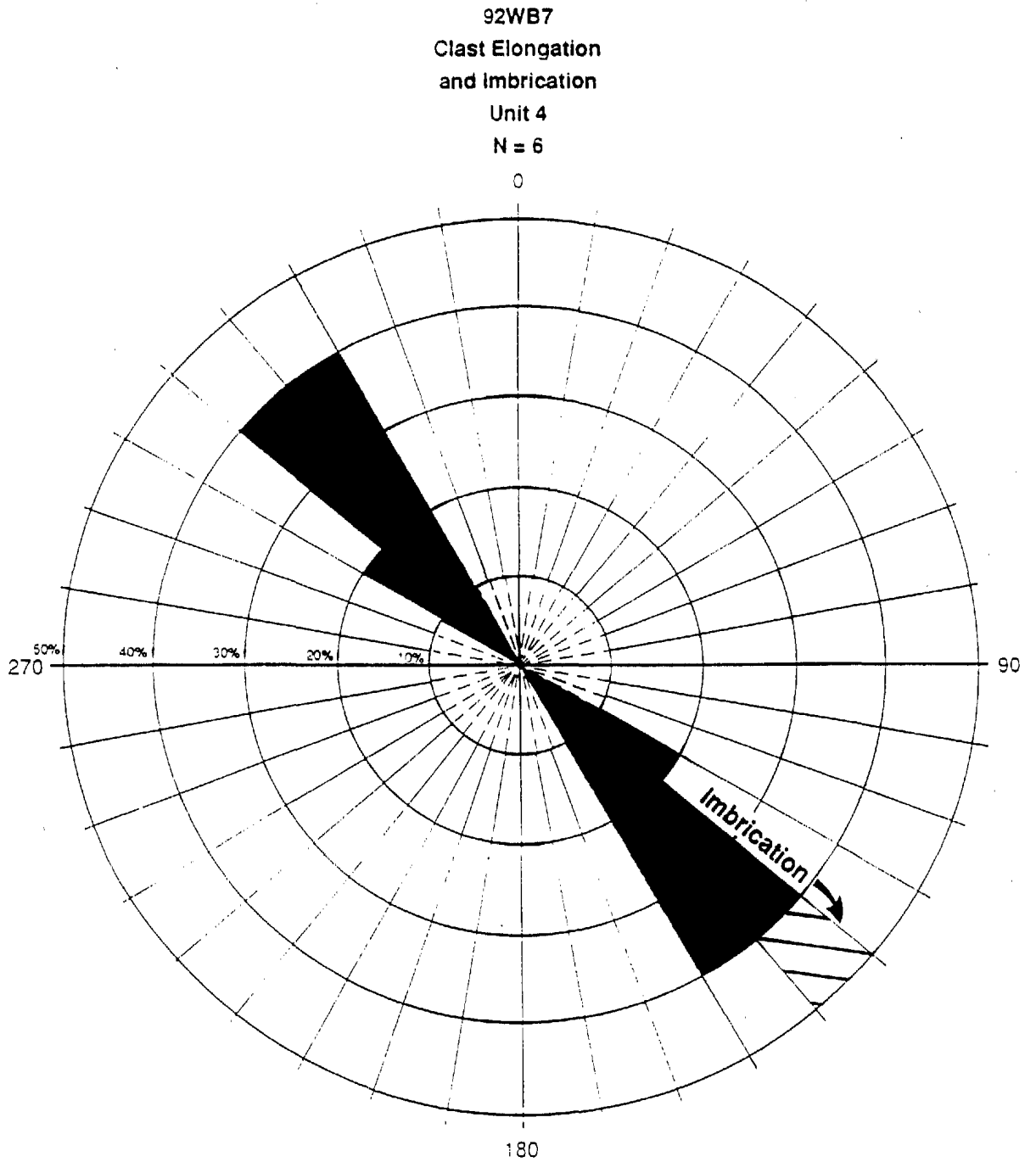


Figure 36 - Orientation of both imbricated and elongate clasts in the Naknek Formation, 4-10 feet from base of section MS-6, stop 92WB7, north shore of Imuye Bay.

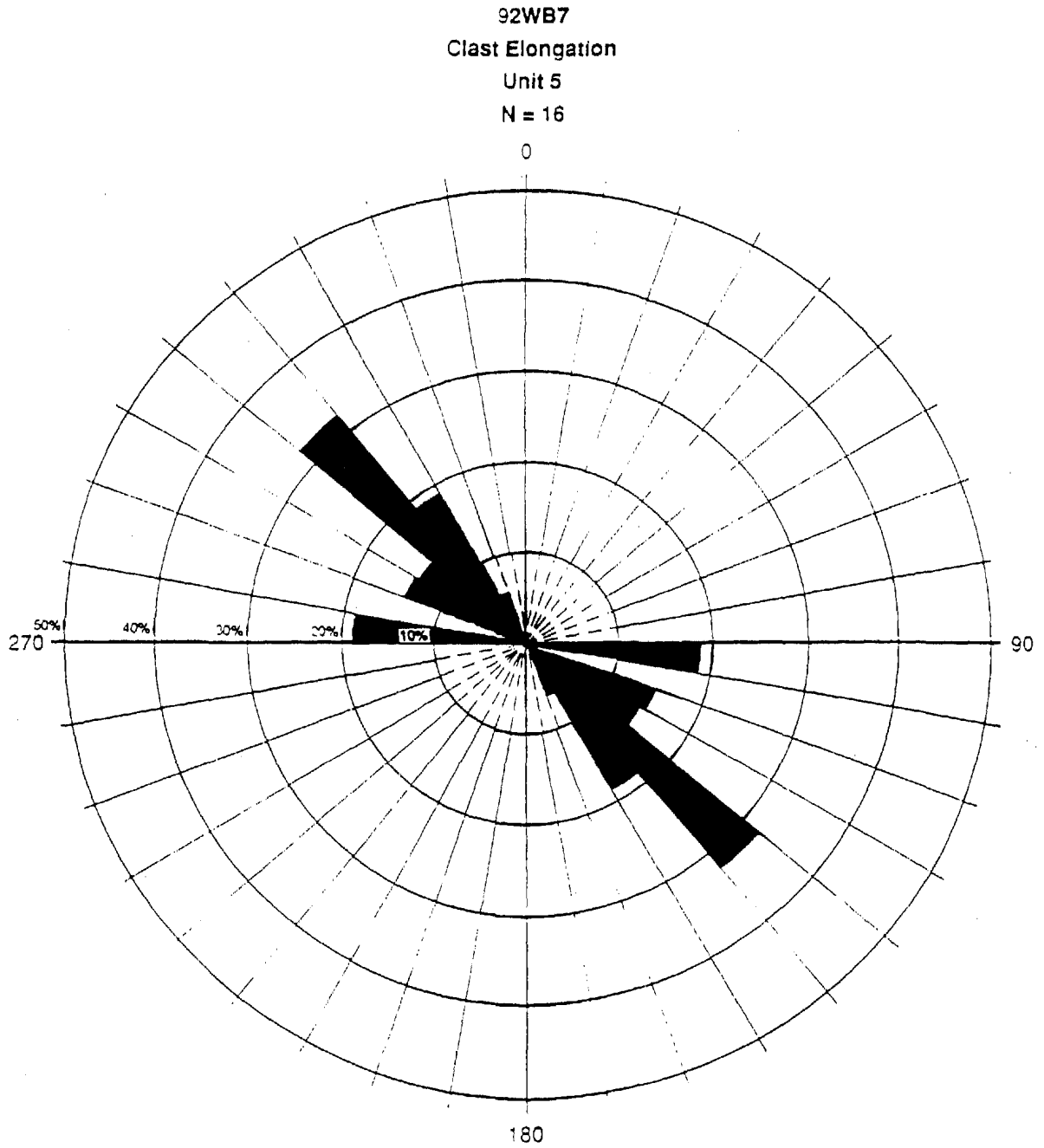


Figure 37 - Orientation of elongate clast in the Naknek Formation, 4-10 feet from base of section MS-6, stop 92WB7, north shore of Imuye Bay.

92WB7  
Clast Imbrication  
Unit 19  
N = 3  
0

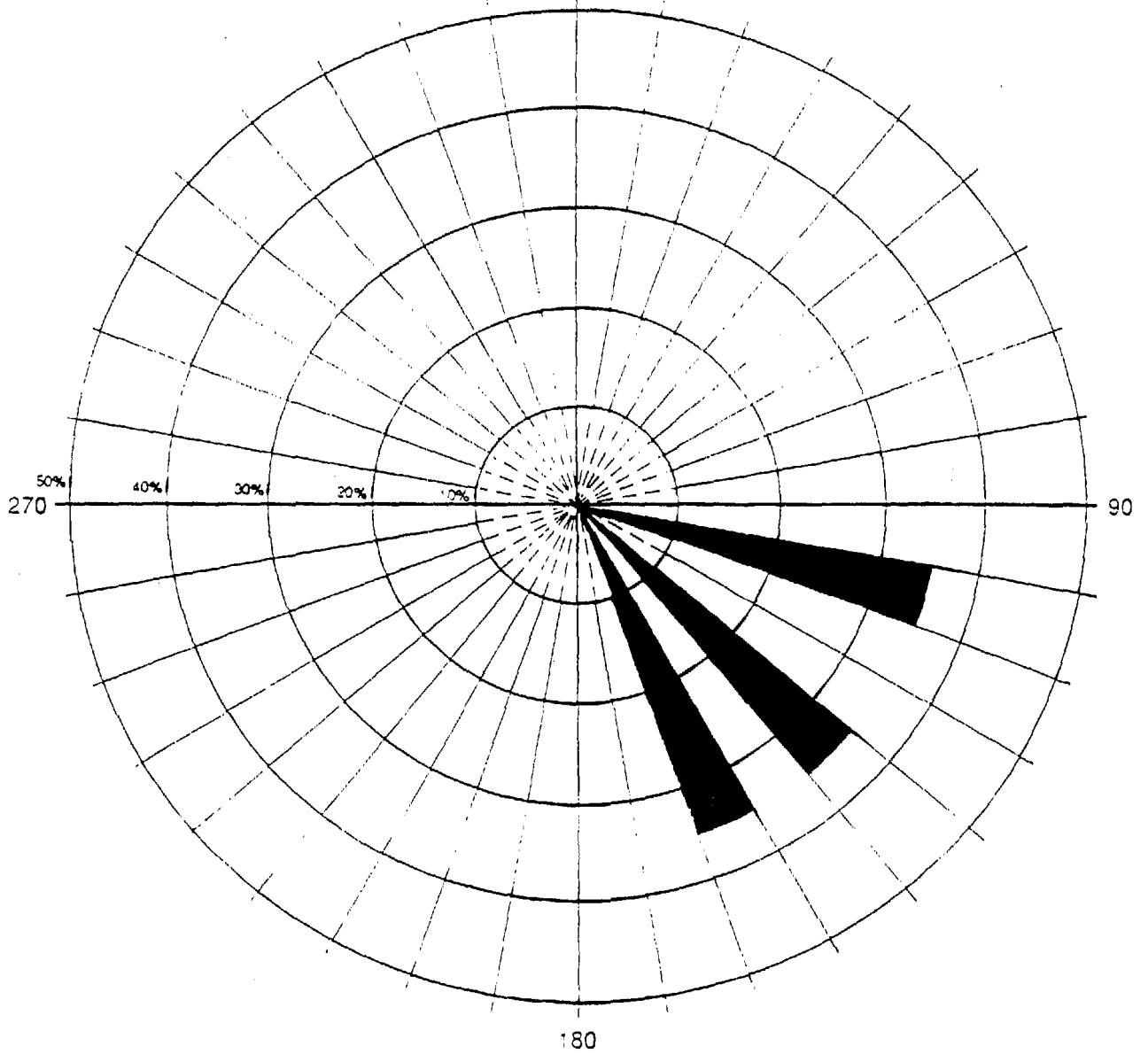


Figure 38 - Orientation of imbricated clasts in the Naknek Formation, 180-185 feet from base of section MS-6, stop 92WB7, north shore of Imuye Bay.



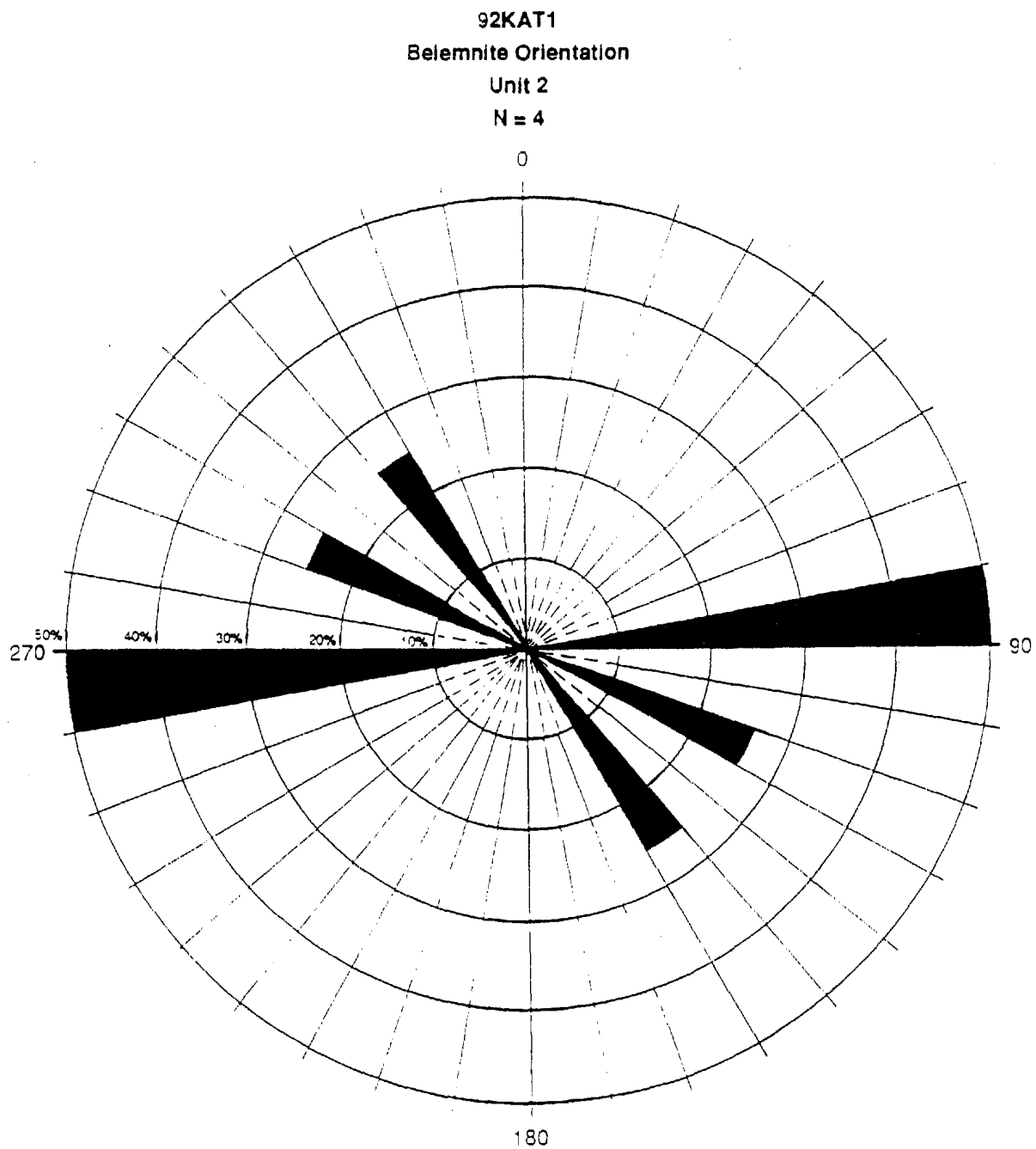


Figure 44 - Orientation of long axes of belemnites in the Herendeen Formation, 90-100 feet above the base of measured section MS-7, at stop 92KAT1, Barrier Range, Katmai National Monument.

92KAT1  
Belemnite-Gastropod  
Orientation  
Unit 25  
N = 4

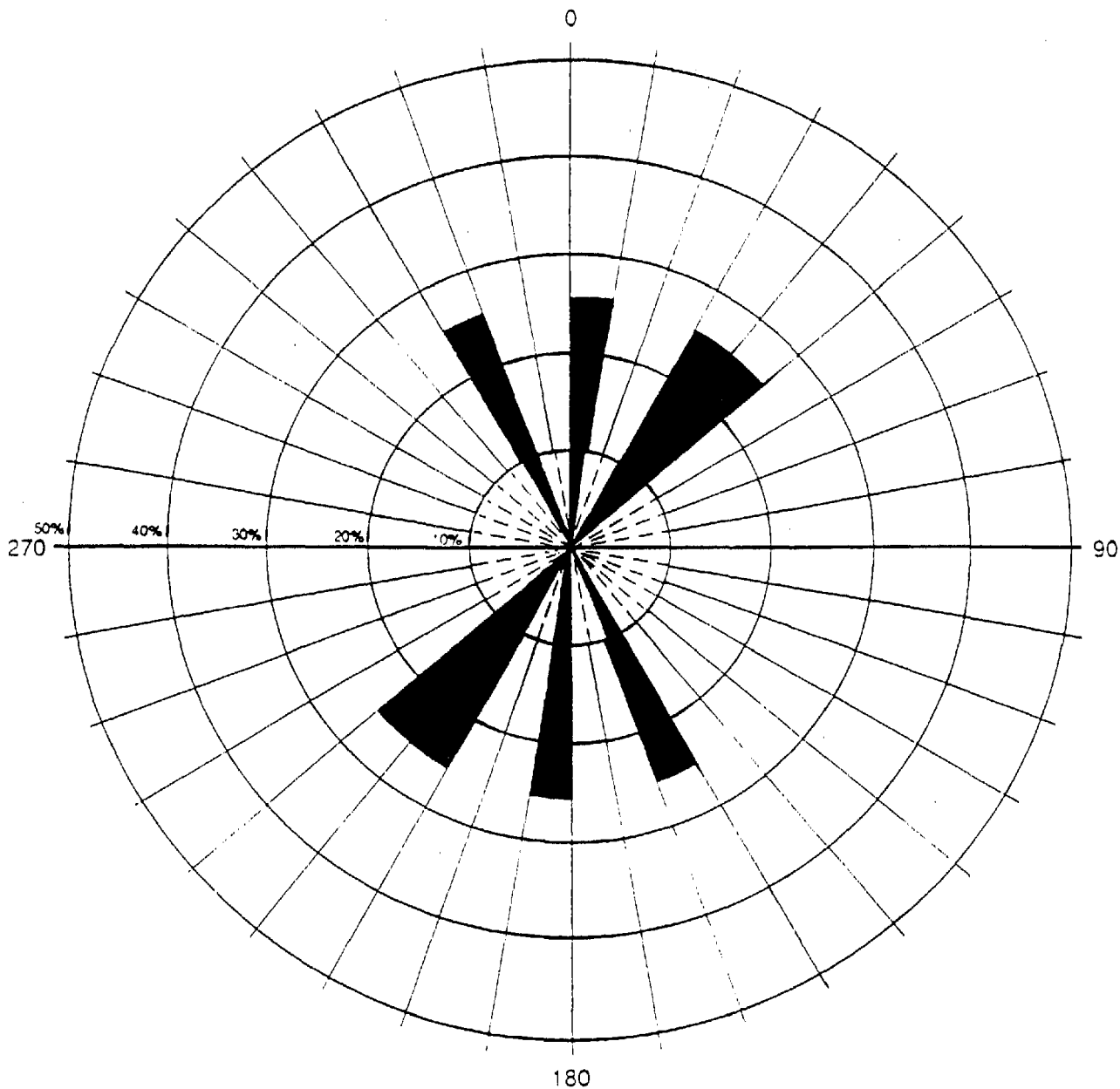


Figure 45 - Orientation of long axes of belemnites in the Herendeen Formation, 177-180 feet above the base of measured section MS-7, at stop 92KAT1, Barrier Range, Katmai National Monument.

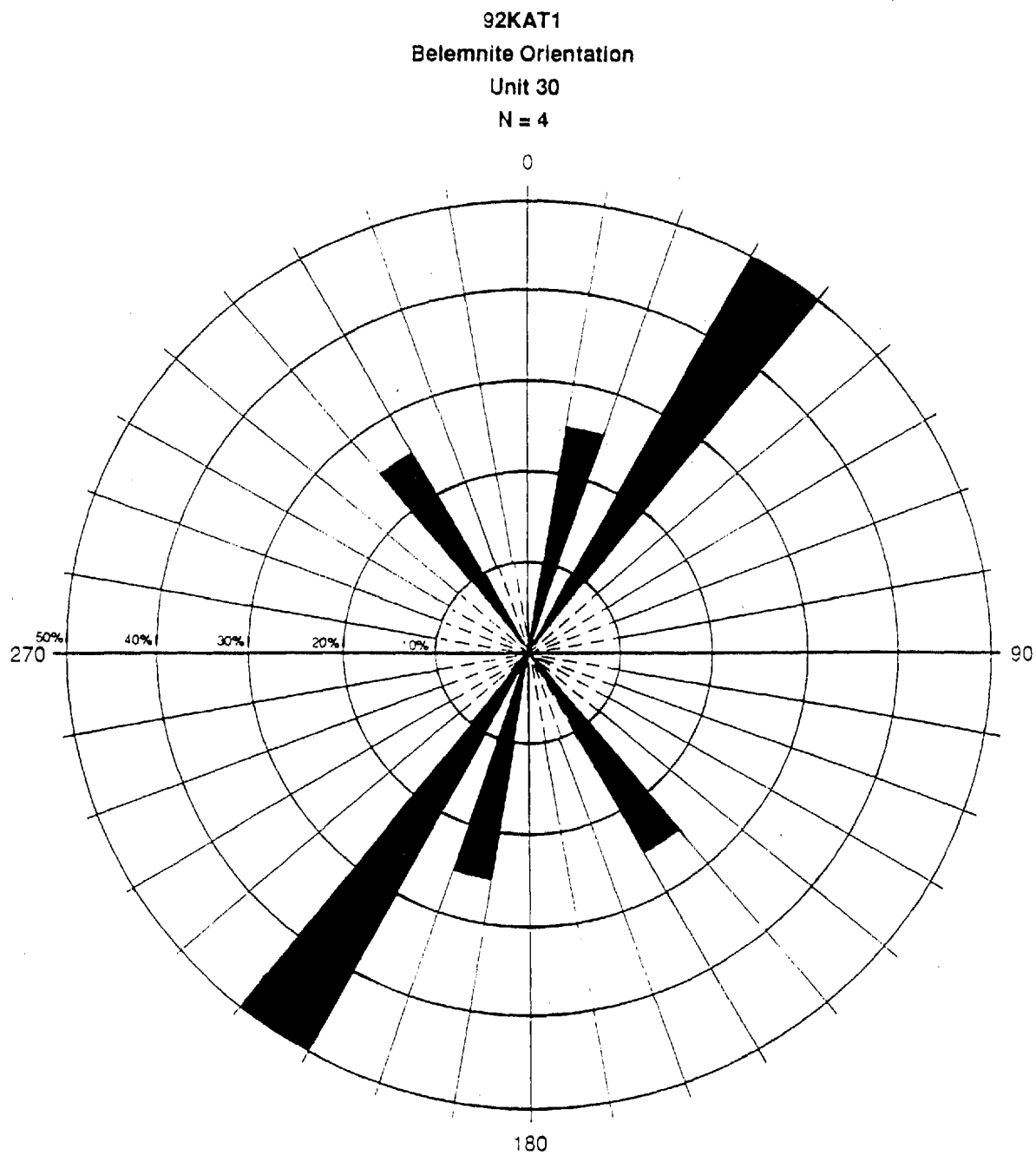


Figure 46 - Orientation of long axes of belemnites in the Herendeen Formation, 202 feet above the base of measured section MS-7, at stop 92KAT1, Barrier Range, Katmai National Monument.

92KAT1  
Belemnite Elongation  
Unit 33  
N = 6

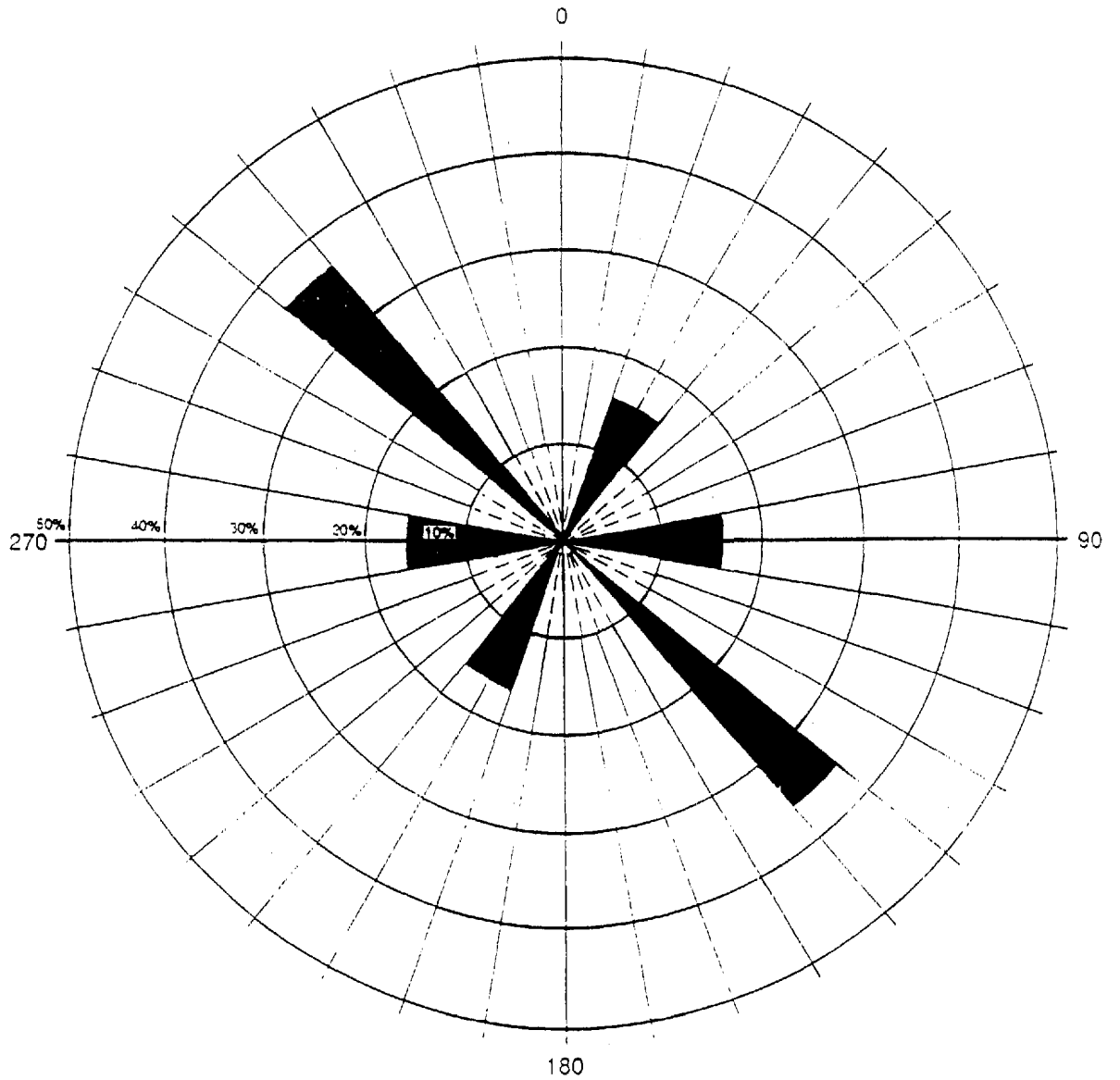


Figure 47 - Orientation of long axes of belemnites in the Herendeen Formation, 212 feet above the base of measured section MS-7, at stop 92KAT1, Barrier Range, Katmai National Monument.

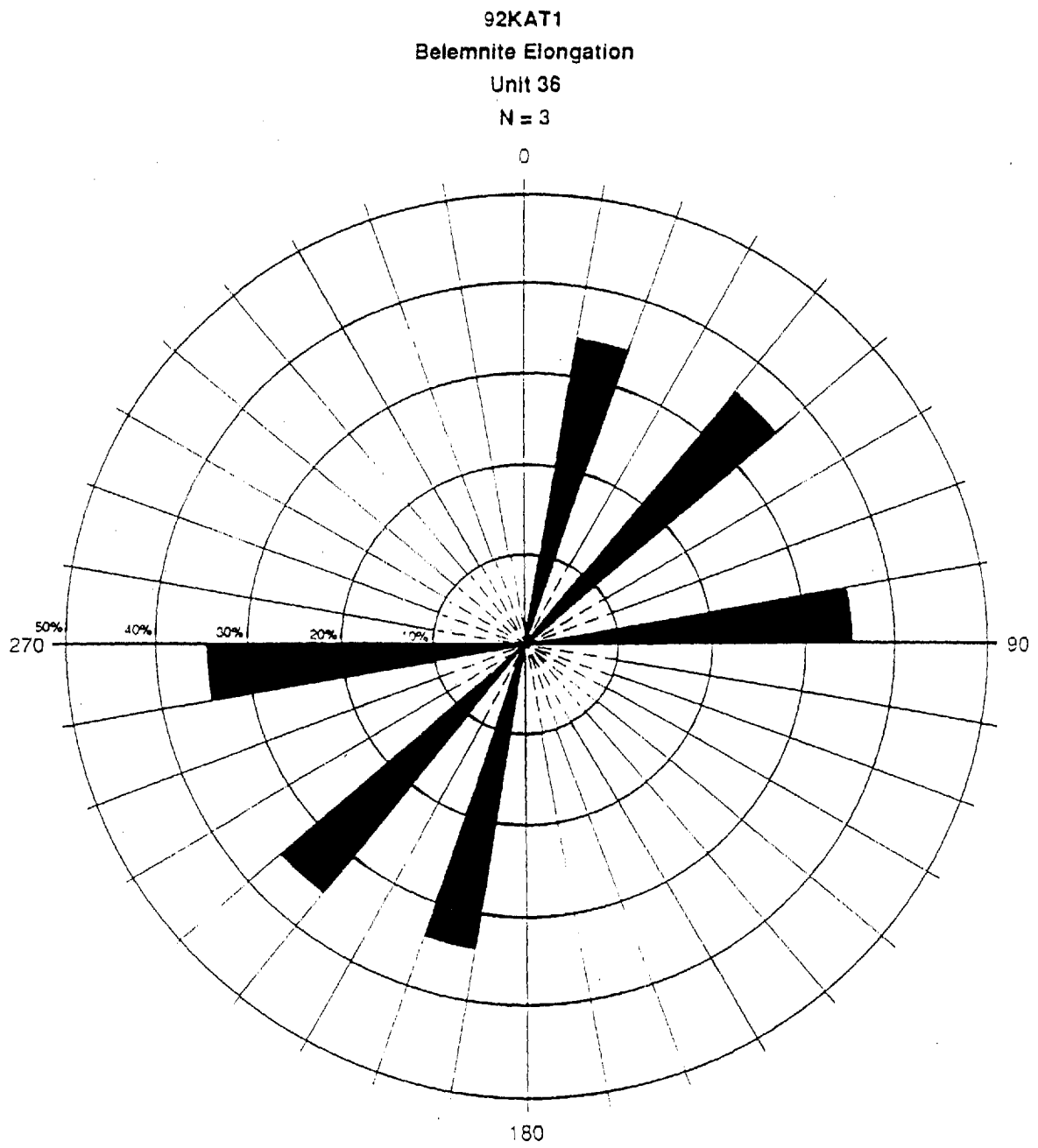


Figure 48 - Orientation of long axes of belemnites in the Herendeen Formation, 217 feet above the base of measured section MS-7, at stop 92KAT1, Barrier Range, Katmai National Monument.

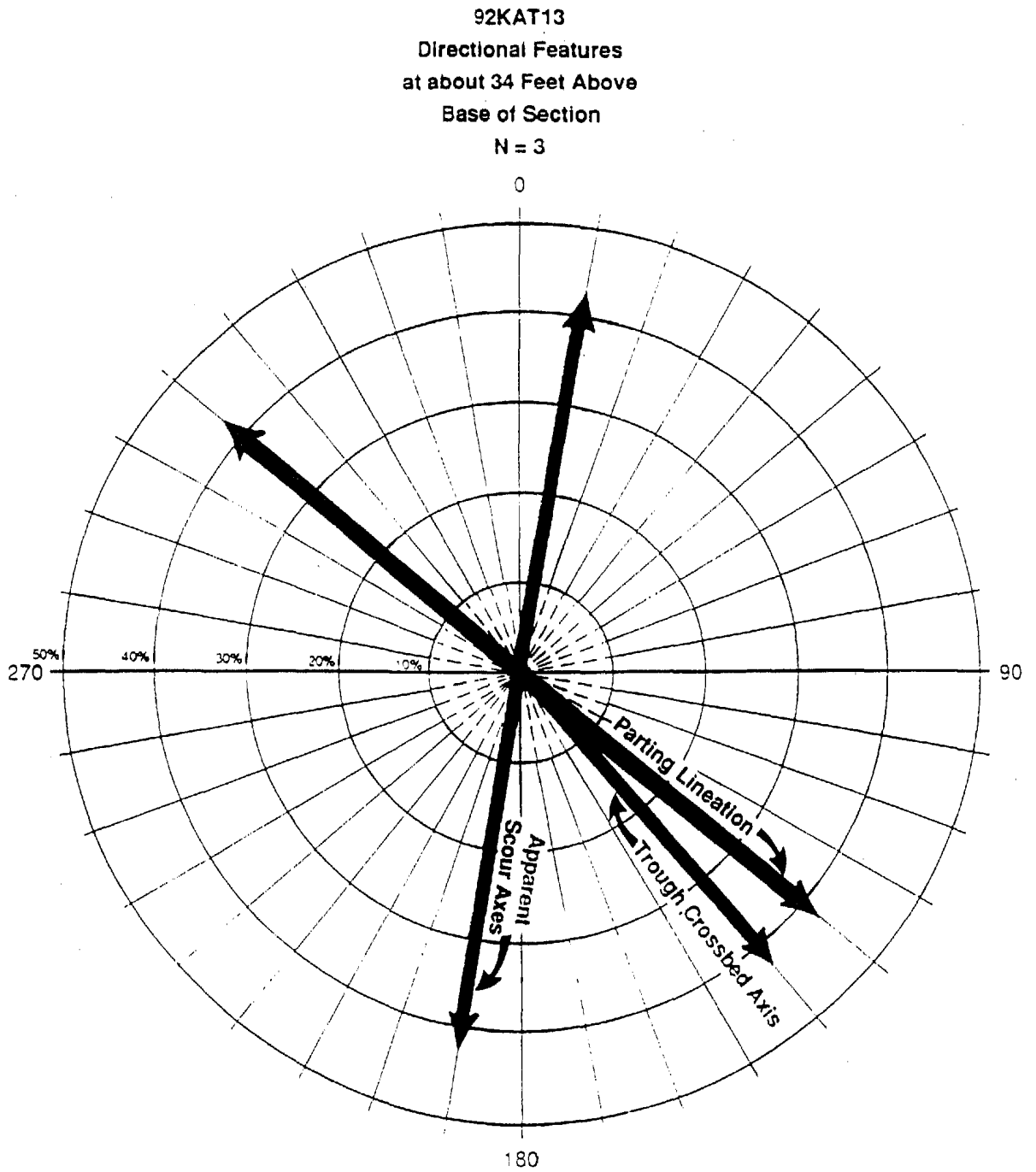


Figure 50 - Orientation of scour axes, parting lineations, and crossbeds in the Herendeen Formation, 34 feet above the base of measured section MS-10, at stop 92KAT13, small island south of Cape Kaguyak, Katmai National Monument.

92KAT13  
Belemnite Elongation  
at about 40 Feet Above  
Base of Section  
N = 6  
0

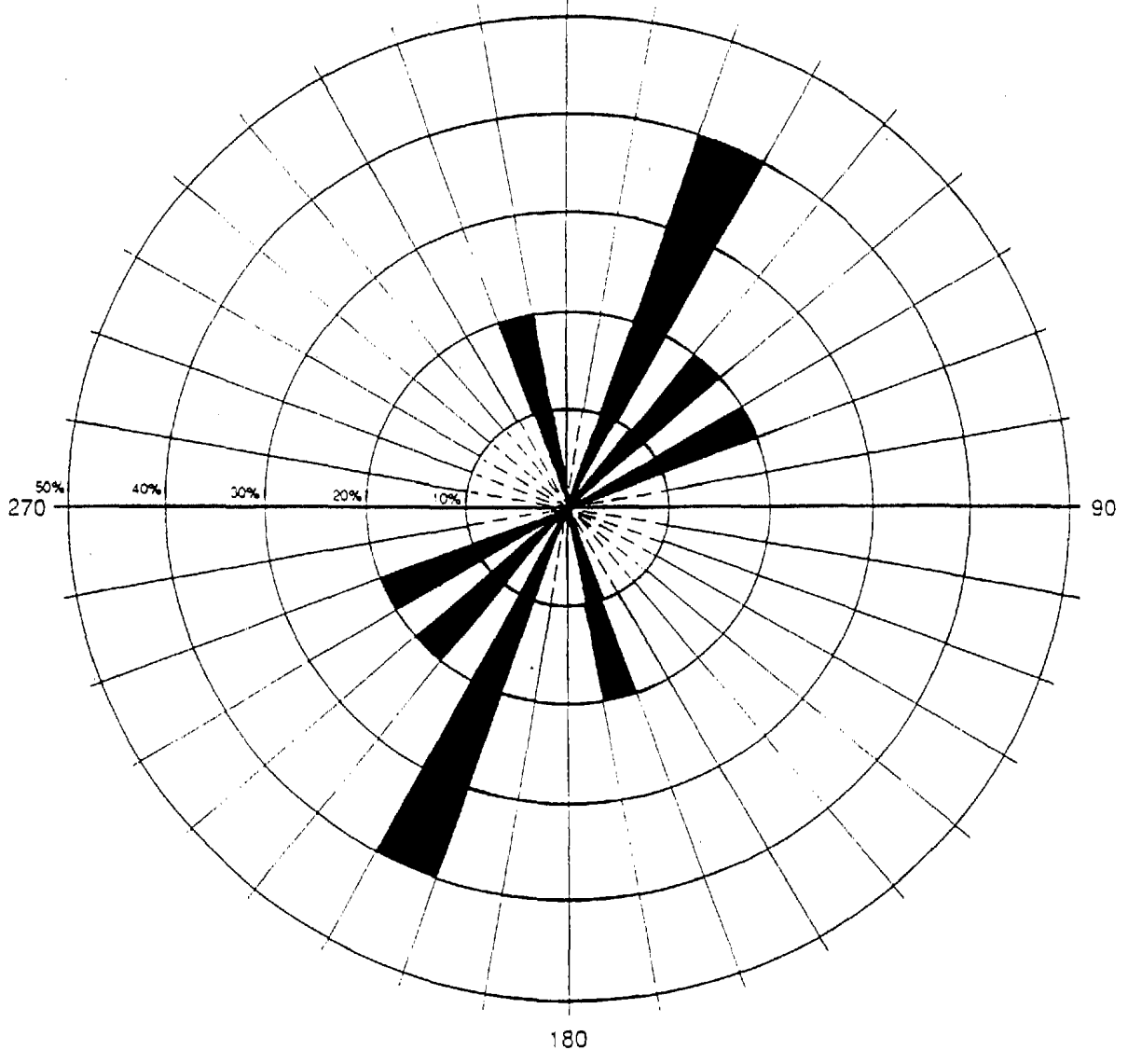


Figure 51 - Orientation of belemnite elongations in the Herendeen Formation, 40 feet above the base of measured section MS-10. at stop 92KAT13, small island south of Cape Kaguyak, Katmai National Monument.

92KAT13  
Belemnite Elongation  
and Trough Crossbed Axis  
at about 50 Feet Above  
Base of Section  
N = 35  
0

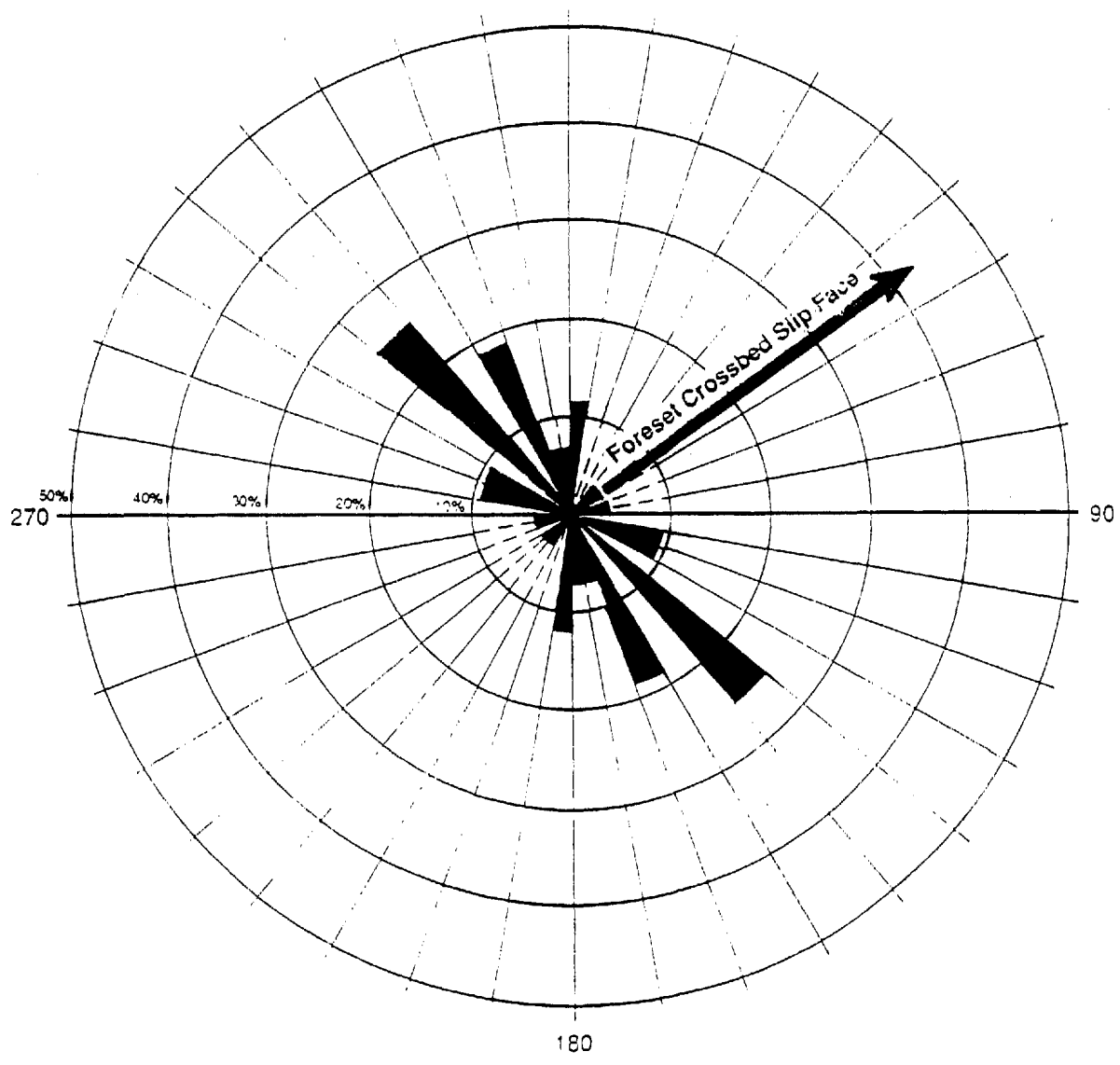


Figure 52 - Orientation of belemnite elongations and foreset dips in the Herendeen Formation, 50 feet above the base of measured section MS-10, at stop 92KAT13, small island south of Cape Kaguyak, Katmai National Monument.



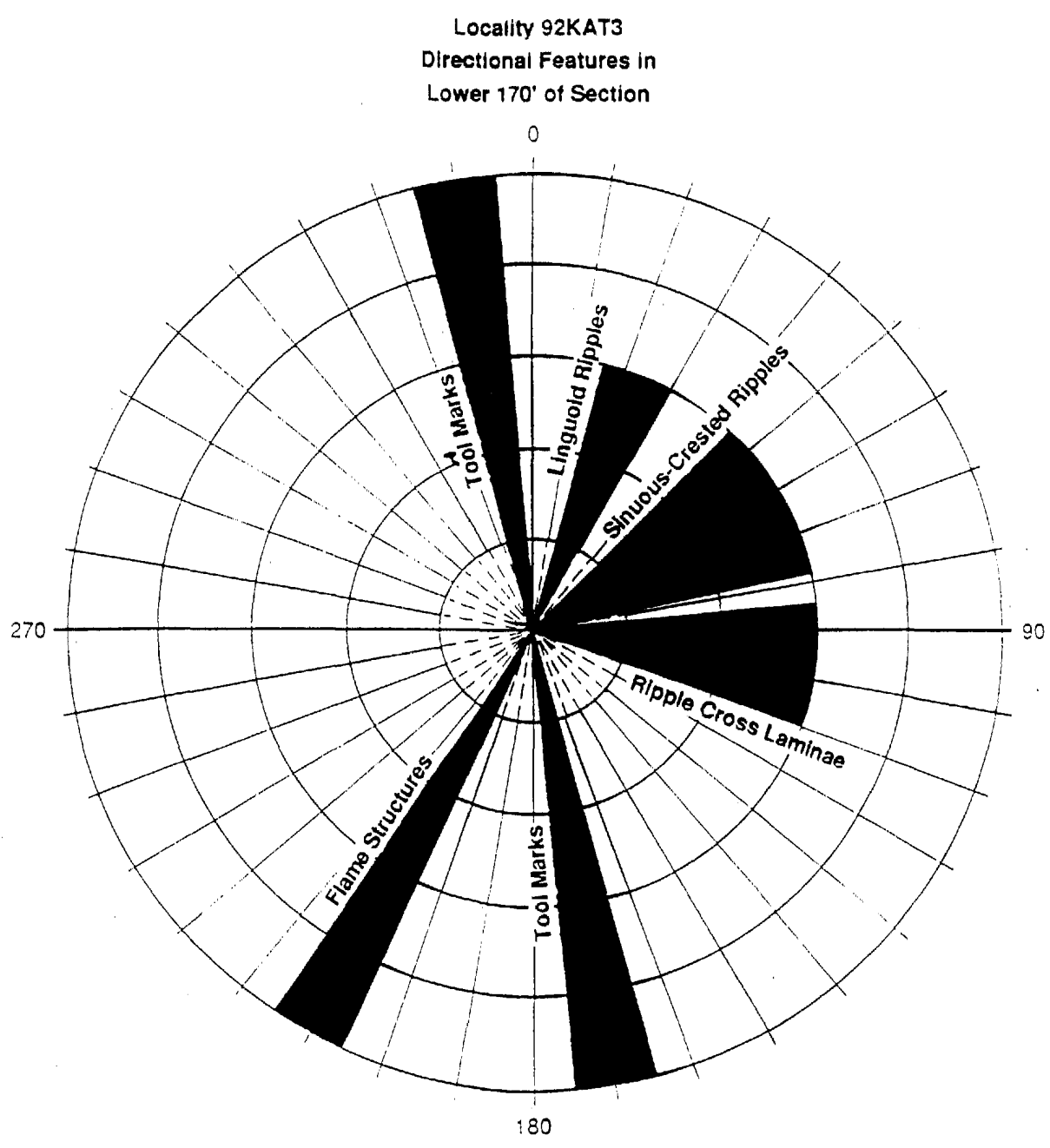


Figure 58 - Orientation of tool marks and flame structures in the lower turbidite section of the Kaguyak Formation at the type locality, stop 92KAT 3, north of Kaguyak Bay, Katmai National Monument.

**GEOLOGY BARREN IS.**

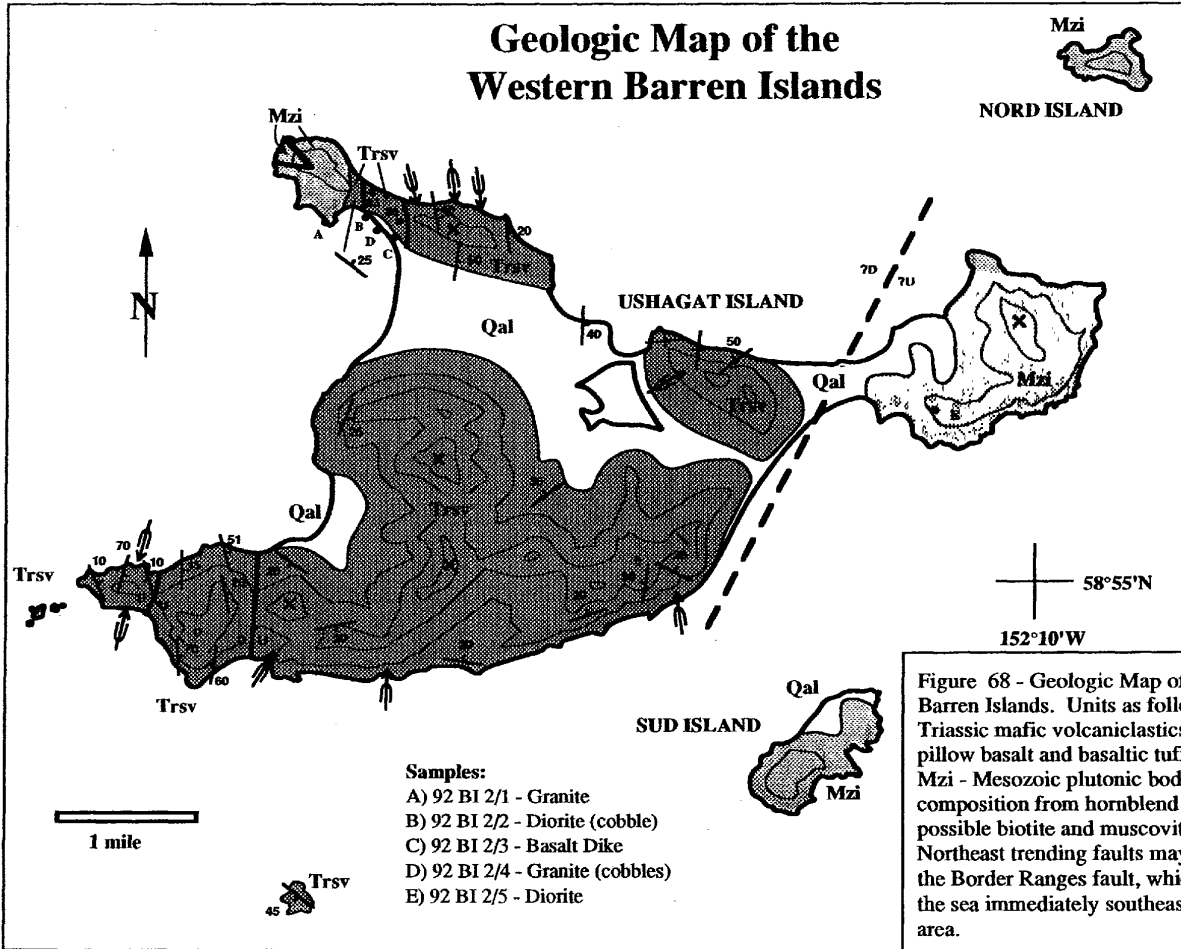


Figure 68 - Geologic Map of the western Barren Islands. Units as follows: Trsv - Triassic mafic volcanics with minor pillow basalt and basaltic tuff at base; Mzi - Mesozoic plutonic bodies ranging in composition from hornblende diorite to possible biotite and muscovite granite. Northeast trending faults may be splays of the Border Ranges fault, which lies beneath the sea immediately southeast of the map area.

WORK LOG

DATE	GEOLOGISTS	GEOGRAPHIC AREA	STOP #	COMMENTS
7/23/92	---	Homer	---	Mobilize field program out of Homer.
7/24/92	D. Doherty J. McGowen S. Phillips C. Schneider D. Waters W. Leslie D. Comer G. Martin M. Lynch	S. of spit NW of Seldovia Bay.	92SKP1	Examine Jurassic volcanoclastics
7/25/92	D. Doherty J. McGowen D. Waters (AM)	outside NW corner of Seldovia Bay	92SKP1	Finish 92SKP1 and examine Triassic at Port Graham.
	S. Phillips D. Waters C. Schneider(AM) W. Leslie(AM) D. Comer(AM) G. Martin M. Lynch	Selenie Lagoon	92SKP2	Sketch section of Jurassic
	D. Doherty J. McGowen S. Phillips D. Waters W. Leslie C. Schneider S. Krueger D. Comer G. Martin M. Lynch	Port Graham	92SKP3	Describe Triassic section

DATE	GEOLOGISTS	GEOGRAPHIC AREA	STOP #	COMMENTS
7/26/92	---	Wide Bay	---	Move to <i>Maritime Maid</i> to begin the Wide Bay segment of the program.
7/27/92	D. Doherty J. McGowen S. Phillips D. Waters C. Schneider W. Leslie D. Comer G. Martin S. Krueger	Hike Island	92WB1	Examine Triassic carbonates
	D. Doherty J. McGowen S. Phillips D. Waters C. Schneider W. Leslie D. Comer G. Martin	Puale Bay	92WB2	Begin measuring and describing MS-3
	S. Krueger D. Waters	Cape Kekurnoi	92WB3	Examined Permian (?)
7/28/92	D. Doherty J. McGowen S. Phillips S. Krueger D. Waters C. Schneider W. Leslie D. Comer G. Martin	Ridge NE of Black Creek	92WB4	Begin describing MS-4

DATE	GEOLOGISTS	GEOGRAPHIC AREA	STOP #	COMMENTS
7/29/92	D. Doherty(AM) J. McGowen(AM) S. Phillips(AM) D. Waters C. Schneider(AM) K. Thompson S. Krueger(AM) D. Comer(AM) G. Martin	N Puale Bay	92WB5	Describe Upper Triassic Carbonates
	D. Doherty J. McGowen S. Phillips C. Schneider	N. Puale Bay	92WB6	Measure MS-5 in Jurassic Naknek
	S. Krueger D. Comer G. Martin	Jute Bay	---	Examining oil seep location
7/30/92	D. Doherty J. McGowen S. Phillips C. Schneider K. Thompson S. Krueger D. Comer G. Martin	Imuya Bay	92WB7	Measure and describe MS-6 in the Naknek Fm.
7/31/92	D. Doherty J. McGowen S. Phillips C. Schneider K. Thompson S. Krueger D. Comer G. Martin J. Larson	Puale Bay	92WB2	Finish measuring and describing MS-3

DATE	GEOLOGISTS	GEOGRAPHIC AREA	STOP #	COMMENTS
8/01/92	D. Doherty J. McGowen S. Phillips C. Schneider K. Thompson S. Krueger D. Comer G. Martin J. Larson	S. flank Barrier Range	92KAT1	Begin Katmai Park Segment examining Neocomian sequence, MS-7
8/02/92	D. Doherty J. McGowen S. Phillips C. Schneider K. Thompson S. Krueger(PM) D. Comer(PM) G. Martin J. Larson	SW flank Barrier Range	92KAT1	Continue measuring and describing Neocomian sequence, MS-7
	S. Krueger(AM) D. Comer(AM)	E-side Puale Bay	92WB1	Photographing MS-3 and MS-5
8/03/92	---	Maritime Maid	---	Lost 1/4 day to weather
	D. Doherty J. McGowen S. Phillips K. Thompson C. Schneider G. Martin J. Larson	SW flank Barrier Range	92KAT1	Continue measuring and describing Neocomian sequence, MS-7
	S. Krueger D. Comer	Barrier Range	92KAT2	reconnaissance geology around the Barrier Range (Cut short by helicopter failure - Generator failure light)

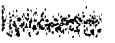


DATE	GEOLOGISTS	GEOGRAPHIC AREA	STOP #	COMMENTS
8/04/92	---	Maritime Maid	---	Lost day to bad weather/moving ship
8/05/92	S. Phillips C. Schneider G. Martin S. Krueger D. Comer T. Hillegeist	Swikshak-Kaguyak Bay	92KAT3	Begin measuring and describing MS-8
	D. Doherty J. McGowen J. Larson J. Alderson		92KAT4	Begin Measuring and describing MS-9
8/06/92	S. Phillips C. Schneider G. Martin S. Krueger D. Comer T. Hillegeist	Swikshak-Kaguyak Bay	92KAT3	Continue measuring and describing MS-8
	D. Doherty J. Larson J. McGowen J. Alderson		92KAT4	Finish measuring and describing MS-9
8/07/92	S. Phillips C. Schneider G. Martin D. Doherty J. Larson J. McGowen J. Alderson	Swikshak-Kaguyak Bay	92KAT4	Continue measuring and describing MS-9
	S. Krueger D. Comer J. Alderson	Interior of Katmai Park	92KAT---	Regional reconnaissance, Naknek conglomerates, Bruin Bay fault, Photos of Swikshak outcrops.

DATE	GEOLOGISTS	GEOGRAPHIC AREA	STOP #	COMMENTS
8/08/92	D. Doherty C. Schneider G. Martin J. McGowen T. Hillegeist S. Krueger (AM) D. Comer (AM)	Swikshak-Kaguyak Bay	92KAT4	Continue measuring and describing MS-9
	S. Krueger (PM) D. Comer (PM) Willie	Cape Kaguyak	----	Kaguyak Formation
8/09/92	D. Doherty J. McGowen C. Schneider T. Hillegeist G. Martin	Swikshak-Kaguyak Bay	92KAT4	Continuing MS-9
	S. Krueger D. Comer	Interior of Katmai Park	-----	Reconnaissance geology, Naknek conglomerates, Kaguyak photos.
8/10/92	D. Doherty J. McGowen C. Schneider G. Martin S. Krueger	Unnamed inlet S. of Cape Kaguyak and Cape Kaguyak	92KAT11 92KAT10	Measuring and Describing Naknek Herendeen transition in MS-10 on islet. Measure and describe basin-plain facies of Kaguyak Fm. in MS-11 on Cape Kaguyak.
	T. Hillegeist D. Comer			
8/11/92	---	Kodiak	---	Refuel and Resupply in transit to Shuyak Island

DATE	GEOLOGISTS	GEOGRAPHIC AREA	STOP #	COMMENTS
8/12/92	D. Doherty J. McGowen C. Schneider S. Krueger T. Hillegeist G. Martin D. Comer R. Ranger B. Hare R. Turner K. Waugh	Unnamed cove on W. side of Shuyak Island.	92SI1	Measure and describe Triassic section.
8/13/92	D. Doherty J. McGowen C. Schneider S. Krueger T. Hillegeist G. Martin D. Comer B. Hare R. Turner K. Waugh	Cape S. on Islet "Tom" on W. side of Afognak Island.	92SI2	Measure and describe Triassic section.
8/14/92	D. Doherty J. McGowen C. Schneider S. Krueger T. Hillegeist(AM) G. Martin D. Comer B. Hare(AM) R. Turner(AM) K. Waugh		92SI3	Measure and describe Triassic section.

DATE	GEOLOGISTS	GEOGRAPHIC AREA	STOP #	COMMENTS
8/15/92	---	Ushagat Is.	---	Lost most of day to weather  Reconnaissance Geology
	D. Doherty (PM) J. McGowen (PM) C. Schneider (PM) S. Krueger (PM) G. Martin D. Comer			
8/16/92	---	Ushagat Is.	---	Lost most of day to weather
	S. Krueger	NW Ushagat Is.	92BI2	Geologic mapping and field checking existing maps in literature. PM move to Port Graham.
8/17/92	J. McGowen C. Schneider S. Krueger G. Martin D. Comer	N. side of bay across from Port Graham	92SKP3	Examine Triassic carbonates
	D. Doherty D. Ince K. Waugh	Southwestern Kenai Peninsula	---	Examine Triassic outcrops  (PM) Move to Homer
8/18/92	J. McGowen S. Krueger C. Schneider K. Waugh A. Miller	Homer	---	Demobilization
	A. Miller C. Schneider	---	---	Drive back to Anchorage with field gear.



'92 LCI SAMPLE LOG

GMC

SAMPLE #	DATE	GEOGRAPHIC AREA	SEC. TWP. RNG.	QUAD.	FT IN SECTION	DESCRIPTION	COLLECTED BY:	AGE	PURPOSE/COMMENTS
92SKP1/1	7/24/92	Outside NW side of mouth of Seldovia Bay	NW1/4,S38,T8S,R15W	Seldovia B-5	---	volc ss	D. Doherty	Talkootna	Lith.
92SKP1/2	"	"	"	"	---	volc ss w/ fossils	"	"	Macro and Micro fossil
92SKP1/3	"	"	"	"	---	volc ss	"	"	Lith
92SKP1/4	"	"	"	"	---	volc ss ??	"	"	Lith ??
92SKP1/5	"	"	"	"	---	volc ss	"	"	Lith
92SKP2/6	7/25/92	Northcentral shore Port Graham	NE1/4,S33,T9S,R15W	"	---	volc ss	"	Triassic	Lith
92SKP2/7	"	Selenie Spit/Lagoon	SE1/4,S19,T9S,R15W	"	---	VLC. Se	???	Jurassic	Lith
92SKP3/8	"	Northcentral shore Port Graham	NE1/4,S33,T9S,R15W	"	---	Limestone	W. Leslie	Triassic	Lith, Micro, Geochem
92SKP3/9	"	"	"	"	---	Carbonate	"	"	Lith, Micro, Geochem
92SKP3/10	"	"	"	"	---	Limestone	"	"	Lith, Micro, Geochem
92SKP3/11	"	"	"	"	---	Black Limestone	"	"	Lith, Micro, Geochem
92SKP3/12	"	"	"	"	---	Mudstone	"	"	Lith, Micro, Geochem
92SKP3/13	"	"	"	"	---	Black Limestone	"	"	Lith, Micro, Geochem
92SKP4/14	"	Point Bede	S21,T10S,R16W	Seldovia B-8?	---	Diorite	S. Krueger	Jurassic?	K-Ar, Lith.
92SKP3/15	8/19/92	Port Graham	NE1/4,S33,T9S,R15W	Seldovia B-5	---	Calc. ltharenite	S. Schneider	Tr	Lith
92SKP3/16	"	" 1/4 ml. E	"	"	---	Diabase	S. Krueger	"	Lith, K-Ar
92SKP3/17	"	" 1/4 ml. E	"	"	---	"	"	"	Lith, K-Ar
92SKP3/18	"	" 1/4 ml. W	"	"	---	"	"	"	Lith
92SKP3/19	"	" 1/4 ml. W	"	"	---	Manganiferous Chert	"	"	Lith, Micro
92SKP3/20	"	" 1/4 ml. W	"	"	---	Siliceous Mudstone	"	"	Paly, Micro, Geochem
92WB1/1	7/27/92	Hika Island, Puale Bay	NE1/4, sec. 5, T29S, R37W	Karluk C4, C5	---	Altered Px Basalt	S. Krueger	U Tr	Lith, K-Ar, Px Chem
92WB1/2	"	"	"	"	---	Bivalve	Waters/Phillips	"	Macropaleo
92WB2/3	"	E-side of Puale Bay	SE1/4, sec.32,T28S, R37W	"	5' MS-3	Bentonite	S. Phillips	"	K-Ar, Paly
92WB3/4	"	Cape Kekumoi	NE1/4, sec. 35, T28S, R37W	"	---	Conglomerate	S. Krueger	Triassic ?	Lith (Mapped as Permian)
92WB7/5	7/30/92	N. side of Imuya Bay	SE cor, SW 1/4, Sec 10, T34S, R44W	Ugashik B-2	10' MS-6	Ss	D. Doherty	UJ Naknek	Lith, P&P
92WB7/6	"	"	"	"	27' MS-6	Siltstone Burrowed	"	"	Paly, Micro, Geochem
92WB7/7	"	"	"	"	50' MS-6	"	"	"	Paly, Micro, Geochem
92WB7/8	"	"	"	"	81' MS-6	"	"	"	Paly, Micro, Geochem
92WB7/9	"	"	"	"	140' MS-6	"	"	"	Paly, Micro, Geochem
92WB4/10	7/28/92	1500' ele. on ridge to NE of Black Creek	SW 1/4, NE 1/4, sec. 5, T32S, R45W	Ugashik B-2	---	Granite Cobble in MS-4 (Float)	S. Krueger	UJ Naknek	Lith, K-Ar
92WB4/11	"	"	"	"	41' MS-4	Ss	D. Doherty	UJ Naknek	Lith
92WB4/12	"	"	"	"	60' MS-4	Siltstone	Waters/Doherty	UJ Naknek	Paly, Micro
92WB5/13	7/29/92	unnamed point between Hika Island and Cape Kekumoi	SW cor, SE 1/4 sec 33, T28S, R37W	Karluk C4/C5	---	Tuff	S. Krueger	Jr	Paly, Micro, K-Ar
92WB8/14	"	Ridge S. of Portage Ck., E. side of Puale Bay	SE cor. sec 9, T28S, R38W	Karluk D-5	3' MS-5	Ss.	Schneider/Doherty	Jnc	Lith, P&P
92WB8/15	"	"	"	"	52' MS-5	Siltstone: rip-up clast in Ss	D. Doherty	Jnc	Paly, Micro
92WB8/16	"	"	"	"	125' MS-5	Ss	D. Doherty	Jnc	Lith

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SAMPLE #	DATE	GEOGRAPHIC AREA	SEC. TWP. RNG.	QUAD.	FT IN SECTION	DESCRIPTION	COLLECTED BY:	AGE	PURPOSE/COMMENTS
92WB5/17	"	unnamed point between Hike Island and Cape Kekumol	SW cor, SE 1/4 sec 33, T28S, R37W	Karluk C4/C5	---	xl ash-similar if not same as 92WB5/13	D. Waters	UTr	Lith, K-Ar
92WB5/18	"	"	"	"	---	Boundstone	"	"	Lith, Micro
92WB5/19	"	"	"	"	---	Volcaniclastic Ss in Tr	"	"	Lith
92WB7/20	7/30/92	N. side of Imuya Bay	SE cor, SW 1/4, sec10, T34S, R44W	Ugaahk B-2	181' MS-6	Siltstone	Krueger/Doherty	UUr	Paly, Micro, Geochem.
92WB7/21	"	"	"	"	119' MS-6	Ss	"	"	Lith
92WB7/22	"	"	"	"	approx. 70' MS-6	"	"	"	Lith
92WB7/23	"	"	"	"	203' MS-6	"	D. Doherty	"	Lith, P&P
92WB7/24	"	"	"	"	180' MS-6	Limestone clast in Cngl. Probably Tr	J. McGowen	"	Lith, Micro, Paly
92WB7/25	"	"	"	"	200' MS-6	matrix of Conglomerate	S. Schneider	"	Lith
92WB7/26	"	"	"	"	248' MS-6	Ss	D. Doherty	"	Lith
92WB2/27	7/31/92	E-side Puale Bay	SE1/4, sec 32, T28S, R37W	Karluk C4/C5	71-71.5 MS-3	Bentonite	"	UTr	K-Ar, Micro
92WB2/28	"	"	"	"	80' MS-3	ol brn. mudstone w/ calc. concr.	"	"	Paly, Micro, Geochem
92WB2/29	"	"	"	"	85' MS-3	dk gry micrite/limey mudstone	"	"	Paly, Rad, Conodont, Geo
92WB2/30	"	"	"	"	107' MS-3	pale gm silicified tuff	"	"	Paly, Ig Geo., Micro, Lith
92WB2/31	"	"	"	"	109' MS-3	Tuff	"	"	Ig Geo, Lith
92WB2/32	"	"	"	"	108.5 MS-3	xl Tuff w/qtz & plag phenocrysts	"	"	Ig Geo, Lith
92WB2/33	"	"	"	"	109.5 MS-3	Tuff	"	"	Ig Geo, Lith
92WB2/34	"	"	"	"	145' MS-3	fi-med. gr., silicified calc sit	"	"	Paly, Micro, Geo.
92WB2/35	"	"	"	"	approx. 135' MS-3	ol gy, slightly calcitic, xl Tuff	"	"	Ig. Geo., Lith
92WB2/36	"	"	"	"	151.3 MS-3	calcitic tuffaceous Silt	"	"	Paly, Micro, Geo.
92WB2/37	"	"	"	"	151.5 MS-3	volcaniclastic Ss	"	"	Lith
92WB2/38	"	"	"	"	213' MS-3	ol gy clay/shale (Bentonite?)	"	"	Micro, Rads, Paly
92WB2/39	"	"	"	"	235' MS-3	fi med gry, red-brn weathering, Ss	"	"	Lith., P&P
92WB2/40	"	"	"	"	---	Ammonite	"	"	Macro
92WB2/41	"	"	"	"	---	tuffaceous shale	"	"	Paly, Micro(Rads), Geo.
92WB2/42	"	"	"	"	40' above base of Talkeetna	matrix of Lithic Tuff	"	"	Lith
92WB3/43	7/27/92	unnamed point between Hike Island and Cape Kekumol	SW cor, SE 1/4 sec 33, T28S, R37W	"	3' above reefal limestone	Sandstone	S. Krueger	UTr	Lith (Should be 92WB5, not 92WB3!!!)
92KAT1/1	8/1/92	SW flank of the Barrier Range, Katmai National Park	NE cor, sec 15, T24S, R35W	Mt. Katmai A3	20' MS-7	Calcareous concretion in Siltstone	"	Naknek?	Lith, Paly, Micro, Mega
92KAT1/2	"	"	"	"	30' MS-7	Siltstone	"	"	Micro, Paly, Geo, VR
92KAT1/3	"	"	"	"	45' MS-7	Concretion in Siltstone	"	"	Lith, Micro, Paly, Geo
92KAT1/4	"	"	"	"	73' MS-7	Concretion in Siltstone	"	"	Micro, Paly, Geo, VR
92KAT1/5	"	"	"	"	80' MS-7	Siltstone	"	"	Micro, Paly, Geo, VR
92KAT1/6	"	"	"	"	87.3' MS-7	Siltstone below unconformity	"	"	Micro, Paly, Geo, VR
92KAT1/7	"	"	"	"	87.7' MS-7	Siltstone above unconformity	"	"	Micro, Paly, Geo, VR
92KAT1/8	"	"	"	"	87.9' MS-7	Bentonitic Clay	"	"	Paly, Micro, K-Ar
92KAT1/9	"	"	"	"	89' MS-7	Sandstone	"	Harendeem??	Lith, P&P

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SAMPLE #	DATE	GEOGRAPHIC AREA	SEC. TWP. RNG.	QUAD.	FT IN SECTION	DESCRIPTION	COLLECTED BY:	AGE	PURPOSE/COMMENTS
92KAT1/10	*	*	*	*	91' MS-7	Belemnite	*	*	Macropaleo
92KAT1/11	*	*	*	*	98' MS-7	Sandstone	*	*	Lith
92KAT1/12	*	*	*	*	114' MS-7	Well-sorted, planar-laminated ss	*	*	Lith, P&P
92KAT1/13	*	*	*	*	148' MS-7	Ammonite (to MMS for dating)	John??	*	meagalossil
92KAT1/14	*	*	*	*	139' MS-7	hummocky cross-stratified ss	D. Doherty	*	Lith, P&P
92KAT1/15	8/2/92	*	*	*	143' MS-7	*	*	*	Lith, P&P
92KAT1/16	*	*	*	*	162' MS-7	*	*	*	Lith, P&P
92KAT1/17	*	*	*	*	170' MS-7	Sandstone	*	*	Lith, P&P
92KAT1/18	*	*	*	*	176' MS-7	Sandstone	*	*	Lith, P&P
92KAT1/19	*	*	*	*	171' MS-7	Inoceramus shell in place	*	*	Magafossil
92KAT1/20	*	*	*	*	185' MS-7	Siltstone	*	*	Paly, Micro, Geo
92KAT1/21	8/3/92	*	*	*	190.5' MS-7	Dk. gy. Ino.-rich Calcitic Slt	*	*	Lith, Paly, Micro, Geo
92KAT1/22	*	*	*	*	200' MS-7	Dk. gy. Ino.-rich Calcitic Sdy Slt	*	*	Lith, Paly, Micro, Geo
92KAT1/23	*	*	*	*	202' MS-7	Siltstone	*	*	Paly, Micro, Geo
92KAT1/24	*	*	*	*	213' MS-7	Siltstone	*	*	Paly, Micro, Geo
92KAT1/25	*	*	*	*	218' MS-7	Grainstone (Oriented)	*	*	Lith, P&P
92KAT1/26	*	*	*	*	218' MS-7	Belemnite	John Larson	*	Macro
92KAT1/27	*	*	*	*	215.5' MS-7	Grainstone	D. Doherty	*	Paly, Micro, Geo
92KAT1/28	*	*	*	*	240' MS-7	Siltstone	*	*	Paly, Micro, Geo
92KAT1/29	*	*	*	*	305' MS-7	Siltstone	*	*	Paly, Micro, Geo
92KAT1/30	*	*	*	*	320' MS-7	Volcaniclastic Litharenite, w/ euhedral Hbl	*	*	Lith, K-A??
92KAT2/31	*	*	NE1/4, Sec10, T24S, R35W	*	---	Sandstone	S. Krueger	Kaguyak	Lith
92KAT2/32	*	*	*	*	---	Calcarenlite	*	Herendeen	Lith
92KAT2/33	*	*	*	*	---	Siltstone	*	Herendeen	Paly, Micro, Geo
92KAT3/34	8/5/92	Swikshak, Kaguyak Bay	SE1/4 of SE 1/4, sec14, T18S, R28W	Alognak C-8	1' MS-8	Siltstone	D. Comer	Kaguyak	Paly, Micro, Geo
92KAT3/35	*	*	*	*	7' MS-8	Lithic Sandstone	*	*	Lith
92KAT3/36	*	*	*	*	13' MS-8	Siltstone	*	*	Paly, Micro, Geo
92KAT3/37	*	*	*	*	28' MS-8	Siltstone	*	*	Paly, Micro, Geo
92KAT3/38	*	*	*	*	31' MS-8	Lithic Sandstone	*	*	Lith
92KAT3/39	*	*	*	*	41' MS-8	Siltstone	*	*	Paly, Micro, Geo
92KAT3/40	*	*	*	*	66' MS-8	Siltstone	*	*	Paly, Micro, Geo
92KAT3/41	*	*	*	*	80' MS-8	Lithic Sandstone	*	*	Lith
92KAT3/42	8/6/92	*	*	*	89' MS-8	Siltstone	*	*	Paly, Micro, Geo
92KAT3/43	*	*	*	*	102' MS-8	Siltstone	*	*	Paly, Micro, Geo
92KAT3/44	*	*	*	*	78' MS-8	Siltstone	*	*	Paly, Micro, Geo
92KAT3/45	*	*	*	*	112' MS-8	Sandstone	*	*	Lith., P&P
92KAT3/46	*	*	*	*	122' MS-8	Siltstone	*	*	Paly, Micro, Geo
92KAT3/47	*	*	*	*	132' MS-8	Sandstone	*	*	Lith., P&P
92KAT3/48	*	*	*	*	138' MS-8	Siltstone	*	*	Paly, Micro, Geo
92KAT3/49	*	*	*	*	150' MS-8	Siltstone	*	*	Paly, Micro, Geo



'92 LCI SAMPLE LOG

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SAMPLE #	DATE	GEOGRAPHIC AREA	SEC. TWP. RNG.	QUAD.	FT IN SECTION	DESCRIPTION	COLLECTED BY:	AGE	PURPOSE/COMMENTS
92KAT4/50	8/5/92	"	"	"	5' MS-9	Sandstone	D. Doherty	"	Lith
92KAT4/51	"	"	"	"	17' MS-9	Sandstone	"	"	Lith
92KAT4/52	"	"	"	"	24' MS-9	Siltstone	"	"	Paly, Micro, Geo
92KAT4/53	"	"	"	"	42' MS-9	Siltstone	"	"	Paly, Micro, Geo
92KAT4/54	"	"	"	"	50' MS-9	Sandstone	"	"	Lith, P&P
92KAT4/55	"	"	"	"	124' MS-9	Sandstone	"	"	Lith
92KAT4/56	8/6/92	"	"	"	135' MS-9	Siltstone	"	"	Paly, Micro, Geo
92KAT4/57	"	"	"	"	159' MS-9	Sandstone (Calcite Concretion)	"	"	Lith
92KAT4/58	"	"	"	"	162' MS-9	Siltstone	"	"	Paly, Micro, Geo
92KAT4/59	8/7/92	"	"	"	182' MS-9	Siltstone	"	"	Paly, Micro, Geo
92KAT4/60	"	"	"	"	218' MS-9	SS???	"	"	Lith
92KAT4/61	"	"	"	"	223' MS-8	Silty Shale	T. Hillegeist	"	Paly, Micro, Geo
92KAT4/62	"	"	"	"	300' MS-8	Shale/Siltstone	"	"	Paly, Micro, Geo
92KAT4/63	"	"	"	"	293' MS-8	Sandstone	"	"	Lith
92KAT4/64	"	"	"	"	248' MS-8	Sandstone	"	"	Lith, P&P
92KAT4/65	"	"	"	"	348.5' MS-8	Sandstone	"	"	Lith, P&P
92KAT8/66	"	NE of Murray Lake	NW1/4,S15,T18S,R34W	Mt Katmal D3	---	granodiorite intrusion	S. Krueger	Tv	Lith, K-Ar
						Into Bruin Bay Fault			
92KAT9/67	"	Hill 4370 NE of Murray Lake	NW1/4,S23,T18S,R34W	Mt Katmal D3	---	Meta-Naknek (Mapped by USGS as Herendeen)	"	Naknek	Lith
92KAT9/68	"	Hill 4370 NE of Murray Lake	NW1/4,S23,T18S,R34W	Mt Katmal D3	---	Tertiary Silt in Naknek (USGS mapped as Herendeen)	"	Tv	Lith, K-Ar
92KAT9/69	"	Hill 4370 NE of Murray Lake	NW1/4,S23,T18S,R34W	Mt Katmal D3	---	Meta-Naknek (Mapped by USGS as Herendeen)	"	Naknek	Lith
92KAT10/70	"	Cape Kaguyak	NE1/4,S34,T18S,R28W	Afognak C8	---	Ammonite	"	Kaguyak	Park Service
92KAT4/71	"	Swikahak-Kaguyak Bay	SW1/4, SE1/4, sec 13, T18S, R28W	Afognak C-6	234' MS-9	Ss: calcite concretion	D. Doherty	"	Lith
92KAT4/72	"	"	"	"	250' MS-9	Siltstone: High Gamma Ray	"	"	Paly, Micro, Geo
92KAT4/73	"	"	"	"	277' MS-9	Siltstone	"	"	Paly, Micro, Geo
92KAT5/74	"	"	"	"	300' MS-9	concretion in siltstone	"	"	Paly, Micro, Geo
92KAT5/75	"	"	"	"	303' MS-9	Siltstone: High Gamma Ray	"	"	Paly, Micro, Geo
92KAT5/76	"	"	"	"	315' MS-9	Mudstone	"	"	Paly, Micro, Geo
92KAT5/77	8/8/92	"	"	"	245' MS-9	Siltstone	"	"	Paly, Micro, Geo
92KAT5/78	"	"	"	"	248.5' MS-9	Siltstone	"	"	Paly, Micro, Geo
92KAT5/79	"	"	"	"	260' MS-9	Siltstone: High Gamma Ray	"	"	Paly, Micro, Geo
92KAT5/80	"	"	"	"	261.5' MS-9	Micrite concretion	"	"	Paly, Micro, Geo
92KAT5/81	"	"	"	"	271' MS-9	Micrite concretion	"	"	Paly, Micro, Geo
92KAT5/82	"	"	"	"	280' MS-9	Bentonite	"	"	Lith, Ig. Geo., K-Ar
92KAT5/83	"	"	"	"	281' MS-9	Siltstone	"	"	Paly, Micro, Geo
92KAT5/84	"	"	"	"	310.5' MS-9	Tuff	"	"	Lith, Ig. Geo., K-Ar
92KAT5/85	"	"	"	"	311' MS-9	Siltstone	"	"	Paly, Micro, Geo
92KAT5/86	"	"	"	"	330' MS-9	Siltstone	"	"	Paly, Micro, Geo

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'92 LCI SAMPLE LOG

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SAMPLE #	DATE	GEOGRAPHIC AREA	SEC. TWP. RNG.	QUAD.	FT IN SECTION	DESCRIPTION	COLLECTED BY:	AGE	PURPOSE/COMMENTS
92KAT5/87	-	-	-	-	335' MS-9	Ss	-	-	Ss
92KAT5/88	-	-	-	-	350' MS-9	Siltstone	-	-	Paly, Micro, Geo
92KAT1/89	8/2/92	SW flank of the Barrier Range, Kaitmai National Park	NE cor, sec 15, T24S, R35W	Mt. Kaitmai A3	148' MS-7	Broken Ammonite	-	Herendeen	Megafossil
92KAT7/90	8/9/92	Kamishak Hills	S19,T14S,R28W	Mt Kaitmai D1	---	Ammonite	S. Krueger	Kaguyak	Park Service
92KAT12/91	8/9/92	NW of Swikshak	SE1/4,S23,T17S,R29W	Mt Kaitmai C1	---	Meta-Limestone lens in Kh	-	Herendeen	Lith
92KAT11/92	8/7/92	South Kamishak Hills	SW1/4,S16,T17S,R33W	Mt Kaitmai C3	---	Sandstone	-	Naknek	Lith
92KAT7/93	8/9/92	North Kamishak Hills	S19,T14S,R28W	Mt Kaitmai D1	---	Inoceramus shells	-	Kaguyak	Park Service
92KAT13/94	8/10/92	Islet S. of Cape Kaguyak	NW1/4,S3,T19S,R28W	Afognak C-8	1' MS-10	Siltstone	D. Doherty	Naknek	Megafossils
92KAT13/95	-	-	-	-	-10' MS-10	Ss	Doherty/Krueger	-	Lith, P&P
92KAT13/96	-	-	-	-	1' MS-10	Siltstone	-	-	Paly, Micro, Paleo
92KAT13/97	-	-	-	-	24' MS-10	Siltstone	-	-	Paly, Micro, Paleo
92KAT13/98	-	-	-	-	27' MS-10	Ss (Base of Herendeen)	-	Herendeen	Lith, P&P
92KAT13/99	-	-	-	-	30' MS-10	Sandstone	-	-	Lith, P&P
92KAT13/100	-	-	-	-	51' MS-10	Sandstone	-	-	Lith, P&P
92KAT14/101	-	N. side of Cape Kaguyak	NE1/4,S34,T18S,R28W	-	n/a	Siltstone (High Gamma Ray)	Schneider	Kaguyak	Paly, Micro, Geo
92S11/1	8/12/92	Unnamed Bay N. of Big Bay, Shuyak Island	SE cor Sec 30, T18S, R20W	Afognak C2,3	1' MS-12	Sandstone	Doherty/Hillegeist	UTr	Lith
92S11/2	-	-	-	-	6' MS-12	Sandstone w/corals	-	-	Lith, Megafossil
92S11/3	-	-	-	-	34' MS-12	Tuffaceous mudstone	-	-	Paly, Micro, Geo
92S11/4	-	-	-	-	54' MS-12	Laminated siltstone/mudstone	-	-	Lith, Paly, Micro, Geo
92S11/5	-	-	-	-	88' MS-12	Tuffaceous mudstone (HI Gamma)	-	-	Lith, Paly, Micro, Geo
92S11/6	-	-	-	-	96.5' MS-12	Tuffaceous mudstone (HI Gamma)	-	-	Paly, Micro, Geo
92S11/7	-	-	-	-	141' MS-12	Sandstone	-	-	Lith
92S11/8	-	-	-	-	231' MS-12	Tuff/Tuffaceous siltstone	-	-	Lith, Micro, K-Ar
92S11/9	-	-	-	-	263' MS-12	Tuffaceous Mudstone	-	-	Paly, Micro, Geo
92S11/10	-	-	-	-	268' MS-12	Tuffaceous Mudstone (HI Gamma)	-	-	Paly, Micro
92S11/11	-	-	-	-	276' MS-12	Crystal Tuff (?)	-	-	Lith
92S12/12	8/13/92	Cape S. of Islet "Tom", W. Side of Afognak Island	SW 1/4, sec18, T20S, R21W	Afognak B-9	2' MS-13	Volcanic Sandstone	-	-	Lith
92S12/13	-	-	-	-	23' MS-13	Sandstone	-	-	Lith, P&P
92S12/14	-	-	-	-	34' MS-13	Mudstone	-	-	Paly, Micro, Geo, Lith
92S12/15	-	-	-	-	33.5' MS-13	Sandstone	-	-	Lith
92S12/16	-	-	-	-	33.75' MS-13	Tuff	-	-	Lith, K-Ar
92S12/17	-	-	-	-	44' MS-13	Tuff	-	-	Lith, K-Ar
92S12/18	-	-	-	-	60' MS-13	Siltstone	-	-	Paly, Micro, Geo
92S12/19	-	-	-	-	63.8' MS-13	normally graded Sandstone	-	-	Lith
92S12/20	-	-	-	-	64' MS-13	rippled Tuff/Mudstone	-	-	Lith
92S12/21	-	-	-	-	64.6' MS-13	Sandstone: Base of channel fill	-	-	Lith
92S12/22	-	-	-	-	66' MS-13	Tuff	-	-	Paly, Micro, Geo
92S12/23	-	-	-	-	72' MS-13	Sandstone	-	-	Lith

7/1/11 57/151

'92 LCI SAMPLE LOG

GMC Data 15

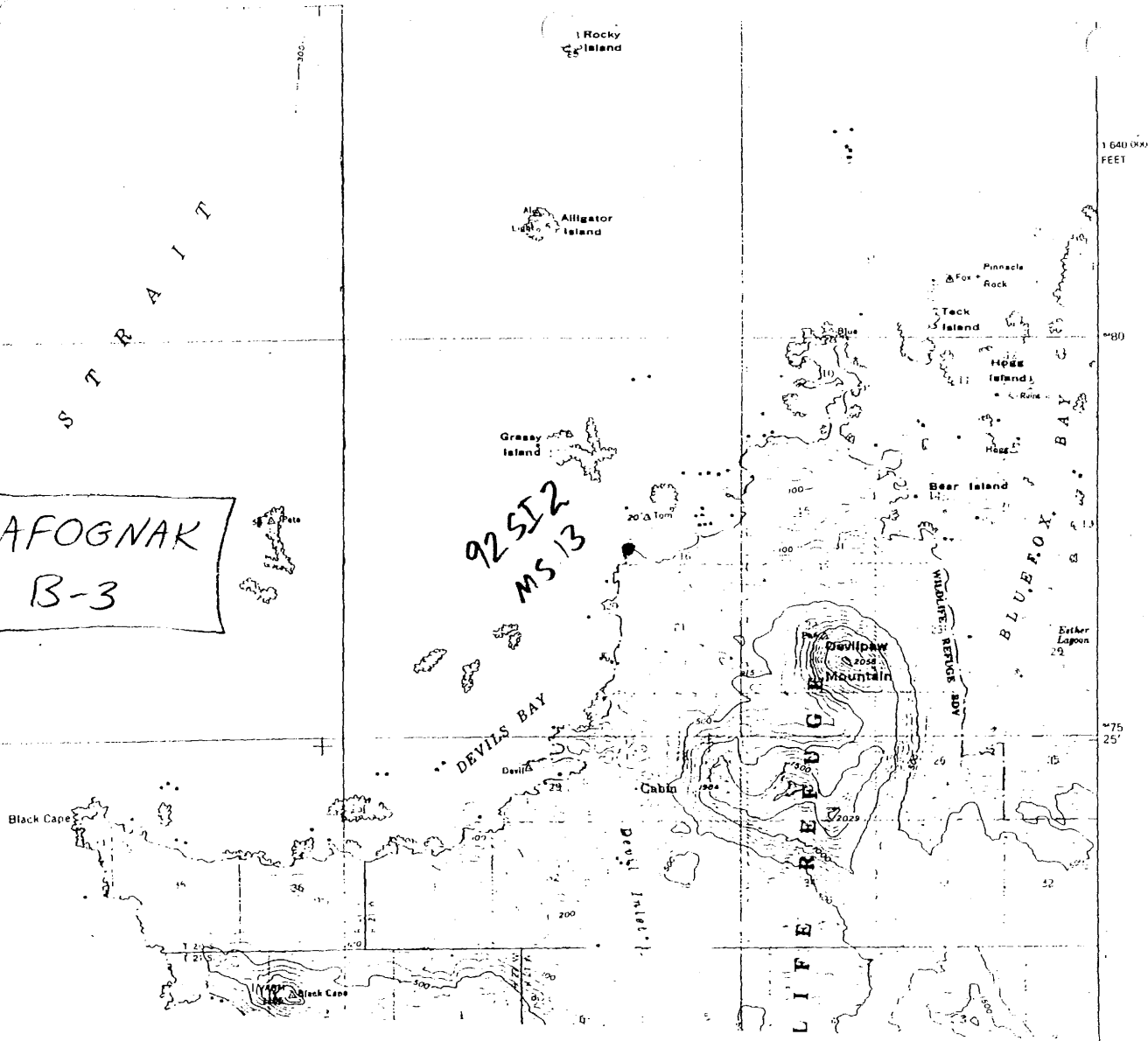
SAMPLE #	DATE	GEOGRAPHIC AREA	SEC. TWP. RNG.	QUAD.	FT IN SECTION	DESCRIPTION	COLLECTED BY:	AGE	PURPOSE/COMMENTS
82B14/24	8/14/92	S. Latax Rocks	58.870N,152.517W (lat/lon)	Alognak C2,3	---	Metabasalt, pillowed	S. Krueger	Trsv	Lith, XRF
82B12/1	8/18/92	Ushagat Is.	NE1/4,S20,T14S,R18W	Alognak D1	---	Granite	*	No name	Lith, K-Ar
82B12/2	"	NW Ushagat Is.	NW1/4,S21,T14S,R18W	"	---	Diorite	*	Ja(?)	Lith, K-Ar
82B12/3	"	NW Ushagat Is.	NW1/4,S21,T14S,R18W	"	---	Metabasalt	*	Tr sv	Lith, XRF
82B12/4	"	NW Ushagat Is.	NW1/4,S21,T14S,R18W	"	---	Muscovite Granite	*	No name	Lith, K-Ar
82B12/5	8/17/92	E. Ushagat Is.	SW1/4,S30,T14S,R17W	"	---	Diorite	*	Ja	Lith, K-Ar

58/151

SAMPLE LOC. MAPS.

AFOGNAK  
B-3

92512  
MS 13



92 SI 4/24

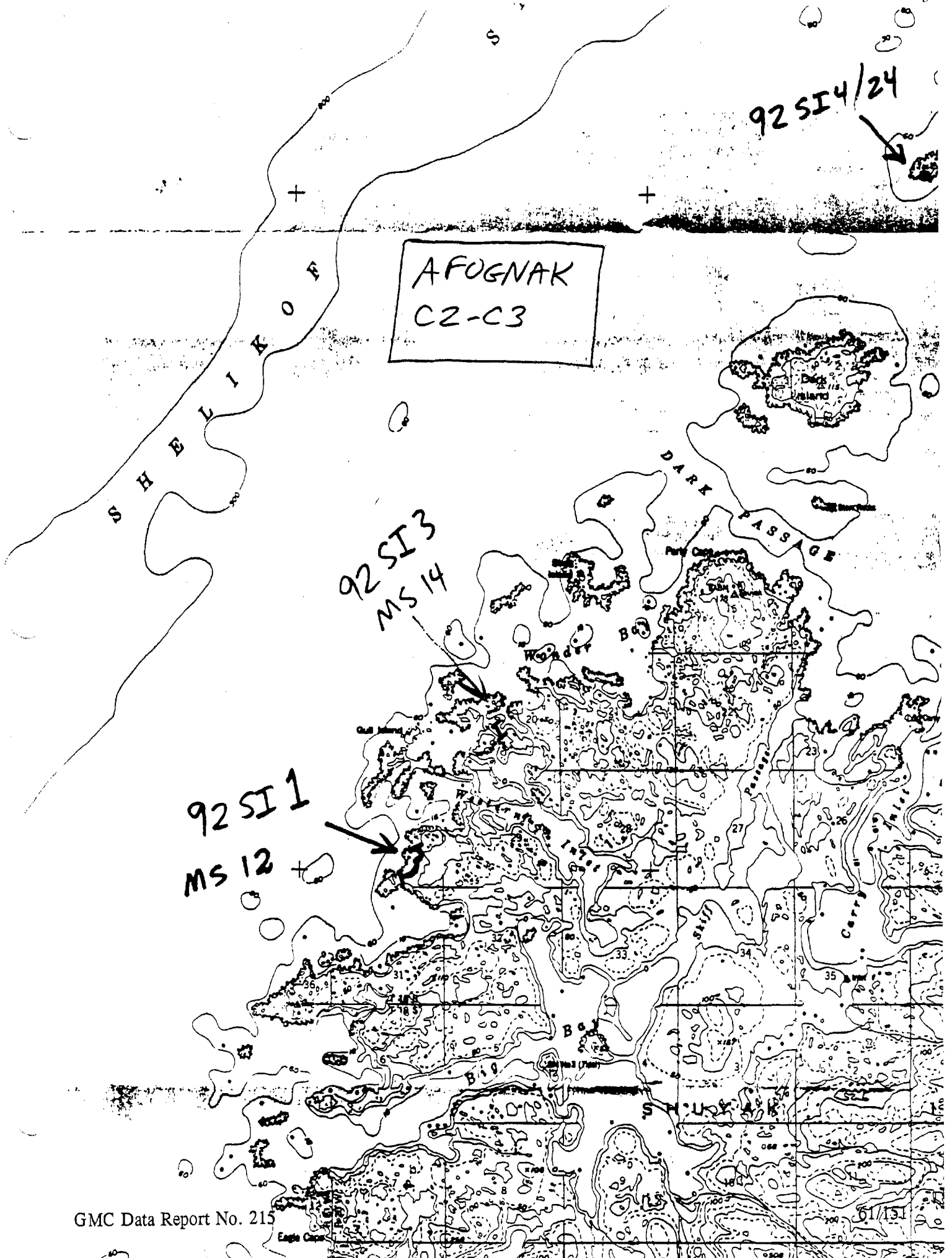
AFUGNAK  
C2-C3

SHELLY BAY

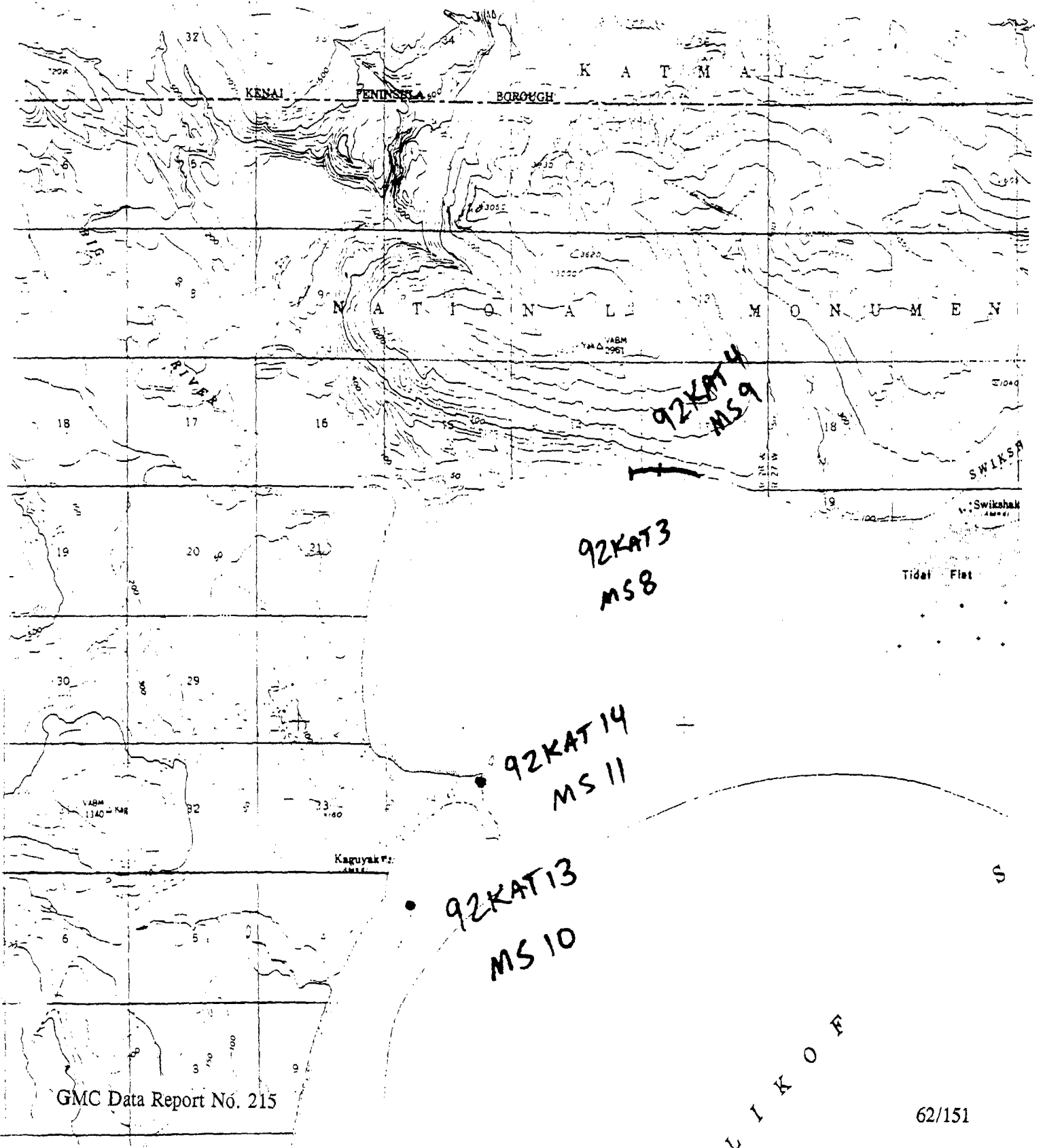
DARK PASSAGE

92 SI 3  
MS 14

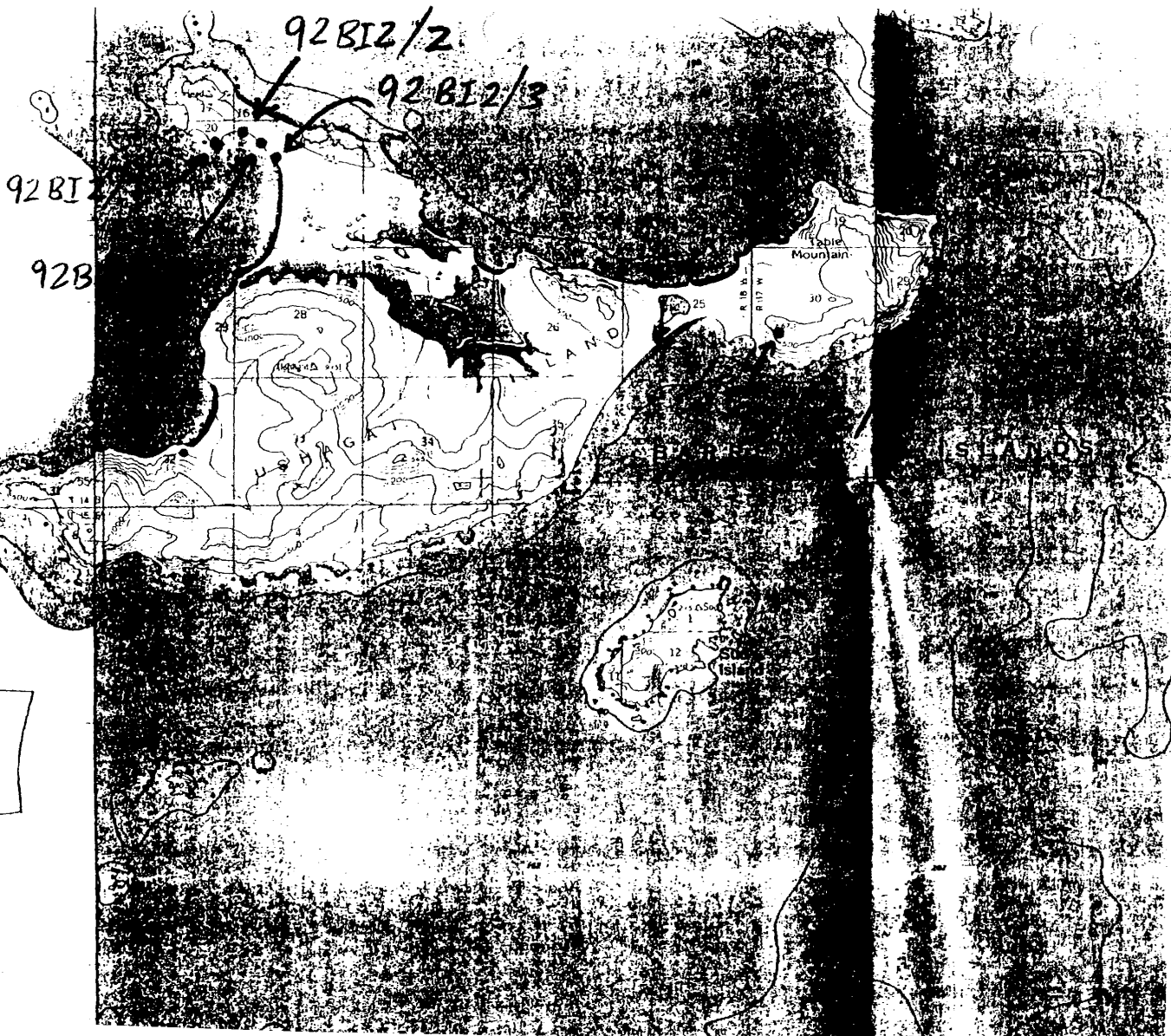
92 SI 1  
MS 12



AFOGNAK  
C-6



L I K O F





KARLUK (C-4 AND C-5) QUADRANGLE  
ALASKA

63 360 SERIES (TOPOGRAPHIC)

KARLUK D

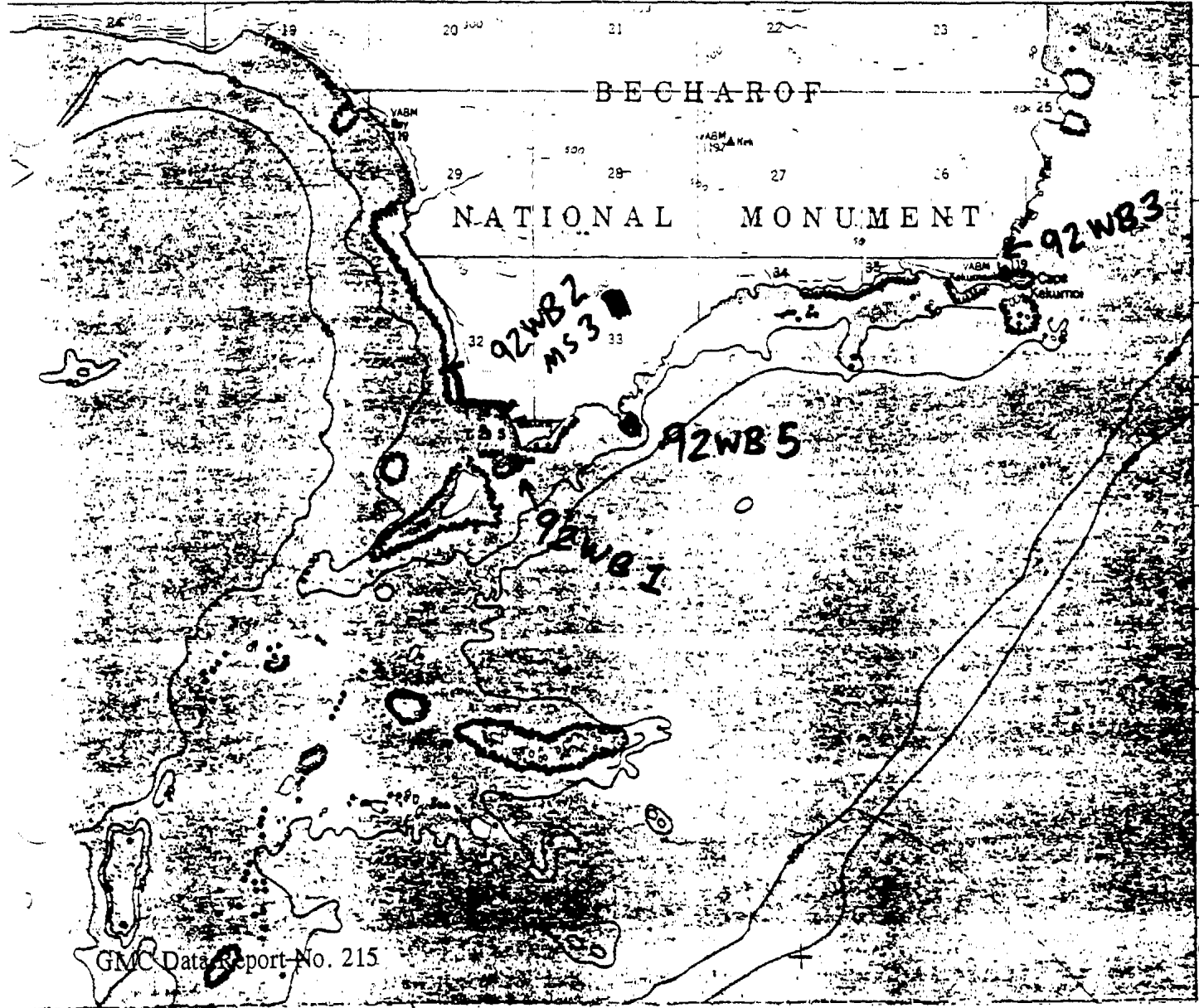
38 W R 37 N 25

230 000 FEET

20

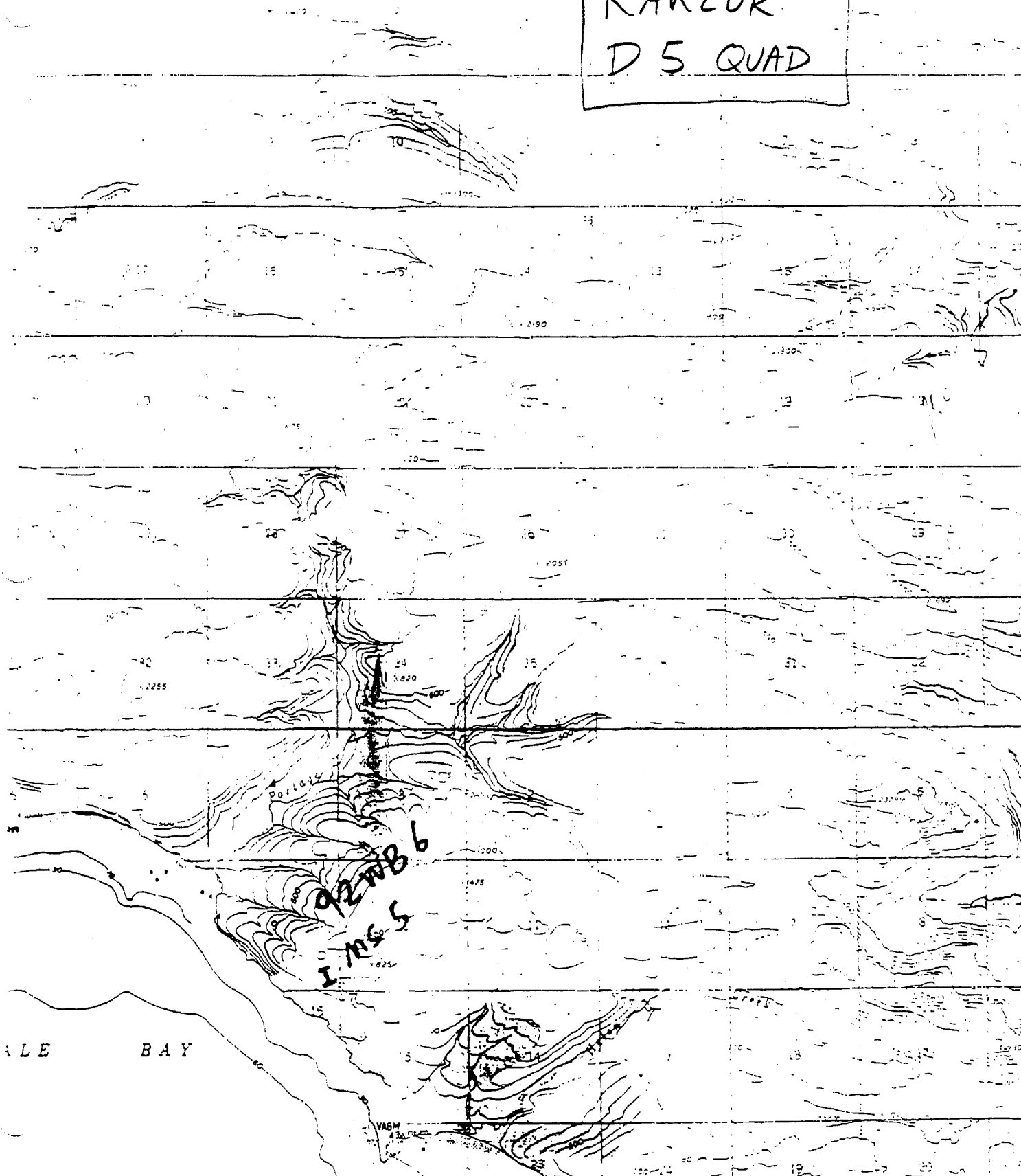
KARLUK D-41

155°16'06"  
57°45'



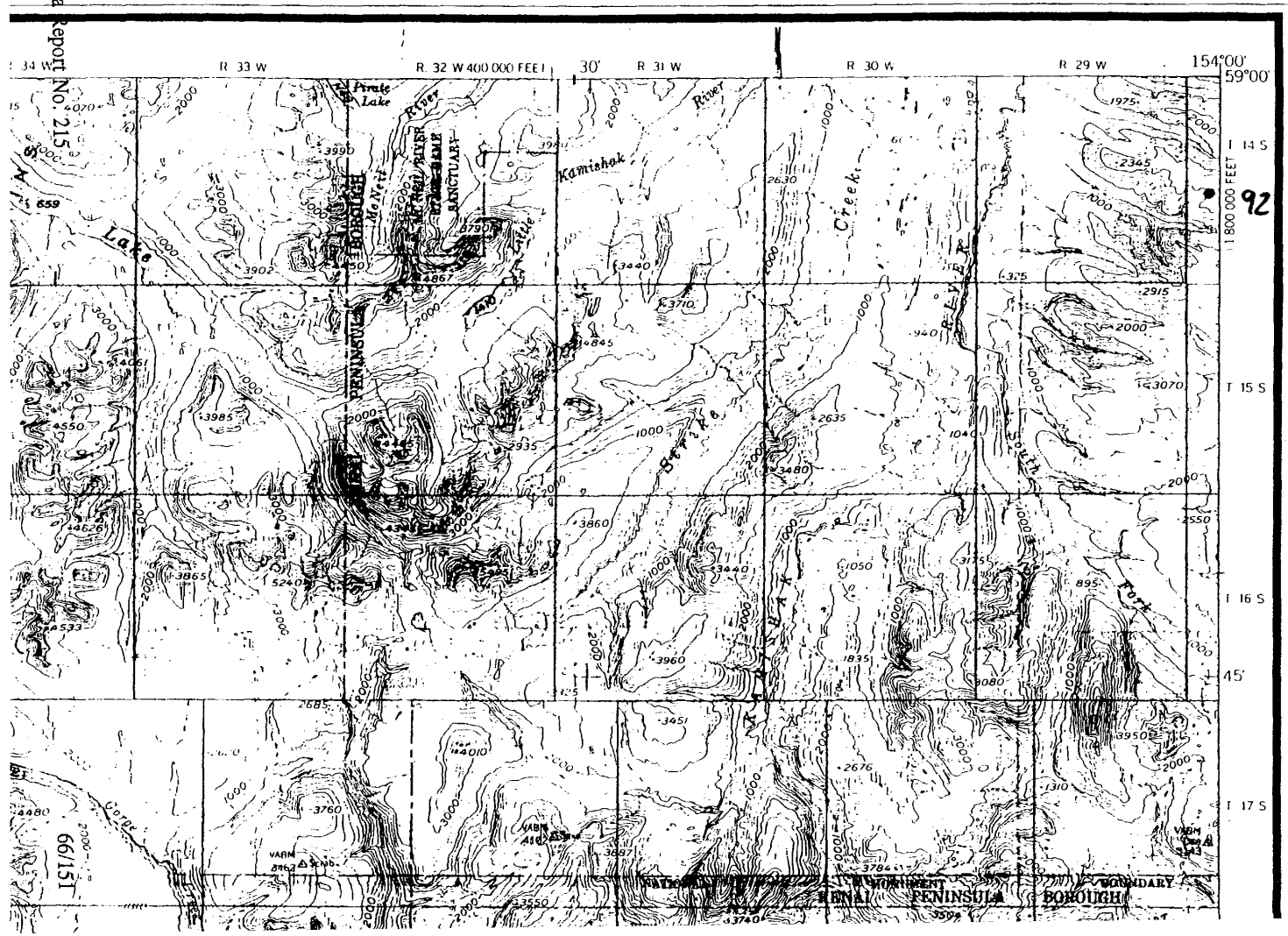
1 370 000  
FEET

KARLUK  
D 5 QUAD



MT KATMAI 1° X 2° SHEET

ALASKA  
TOPOGRAPHIC SERIES



GM Data  
Report No. 215

92 KAT 7

12  
Fillon Falls

36

37

33

35

92 KAT 2

92 KAT 1  
MS 7

N A T I O N A L M O

Painted  
Mountain

MT KATMAI  
A-3

2666 Mt Redner

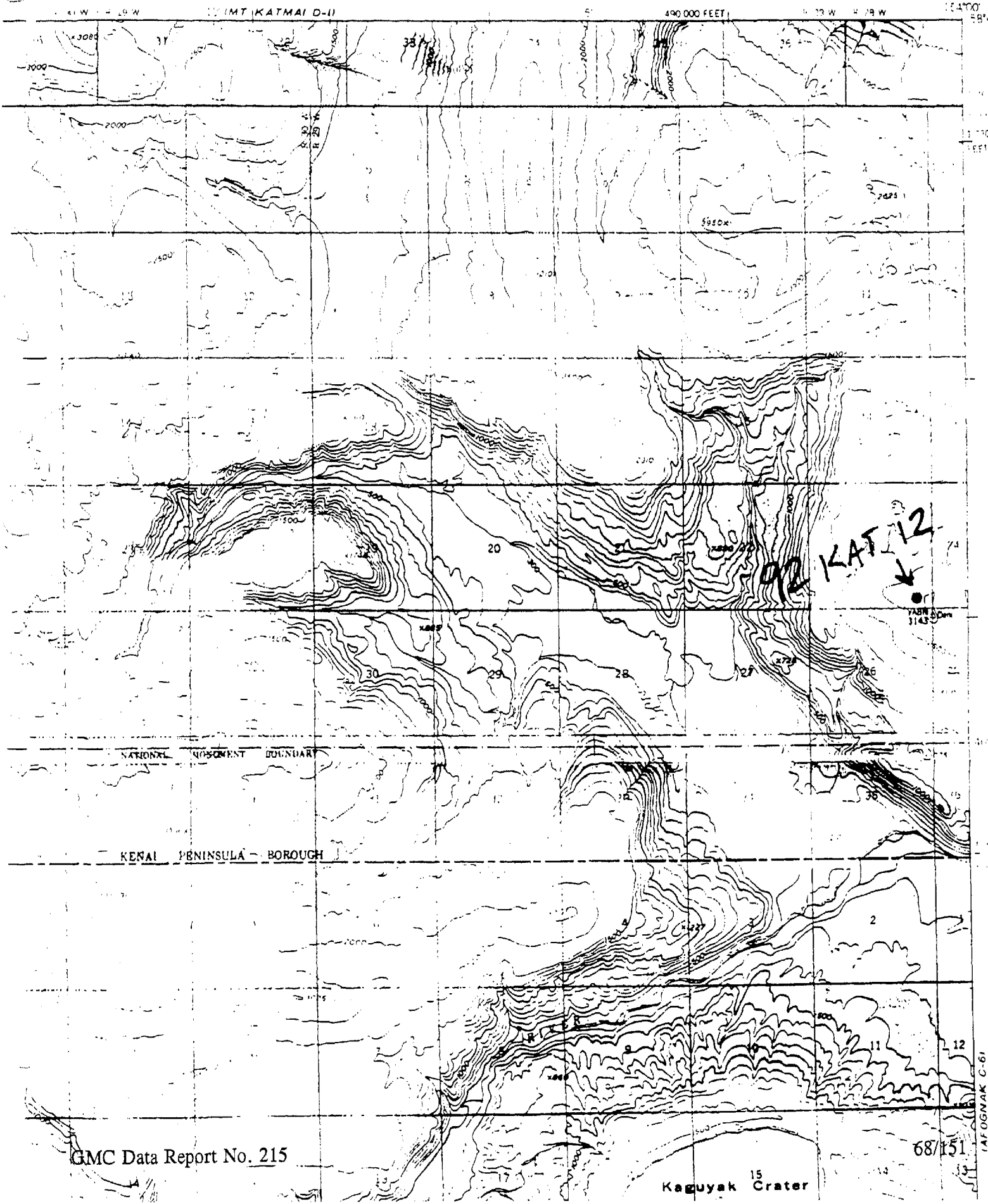
Katmai Village Site

KATMAI

BAY

MT. KATMAI (C-1) QUADRANGLE  
ALASKA

1:50,000 SERIES (TOPOGRAPHIC)



KENNA

PENINSULA BOR.

1730 000  
FEET

MT KAT  
C3

92 KAT 11

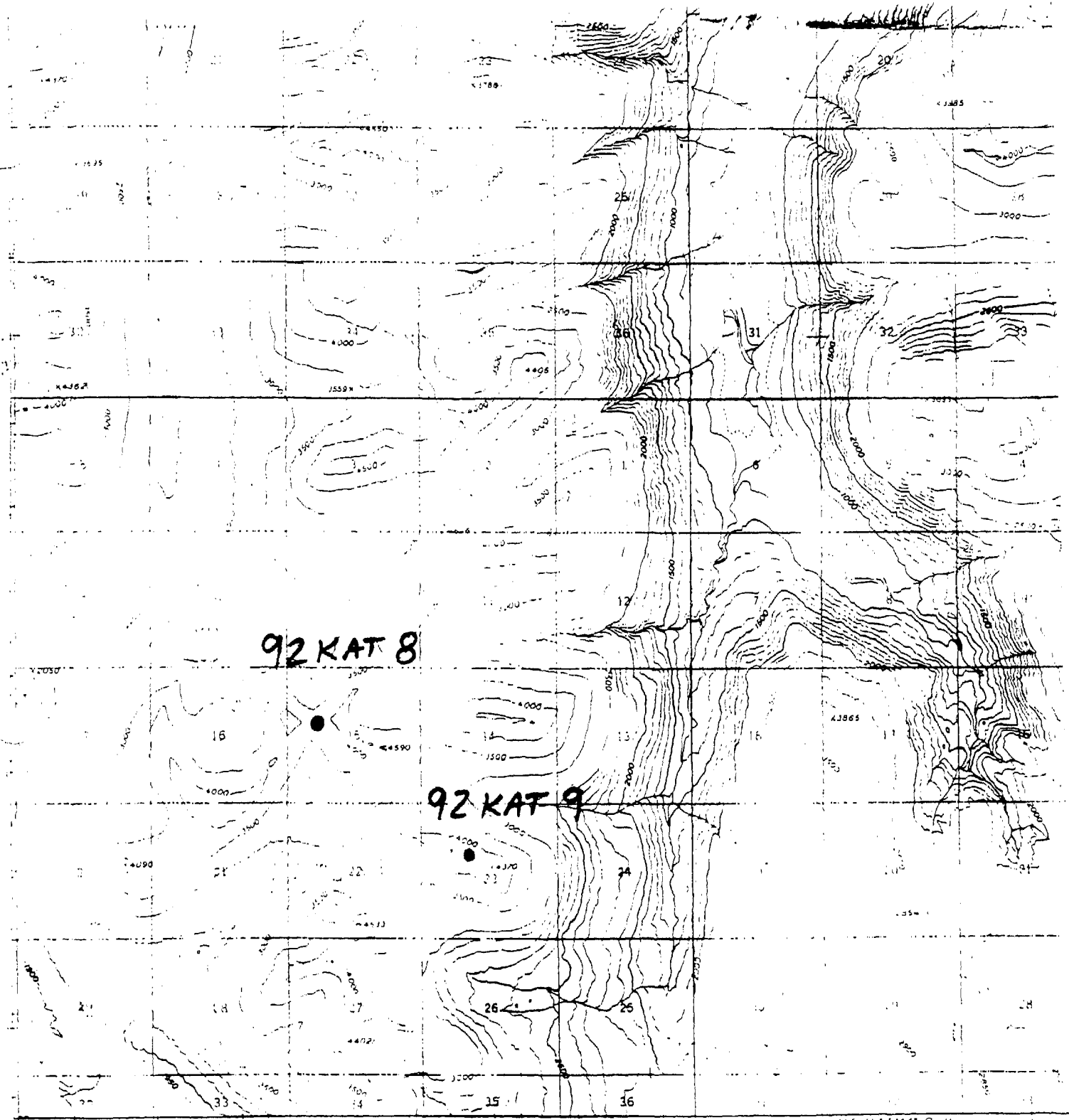
YAGM L. SCLAB  
3462

NATIONAL MONUMENT BOUNDARY (APPROXIMATE)

Hardscr

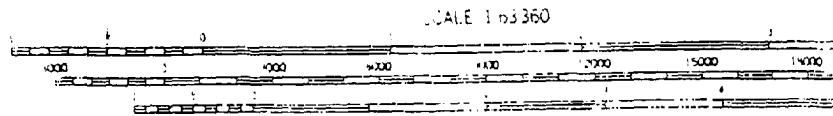
reek

MT. KATMAI C-2



Mapped, edited, and published by the Geological Survey

by USGS  
 by photogrammetric methods from aerial photographs  
 (MSP). Map not held checked  
 Transverse Mercator projection, 1927 North American datum  
 6300-foot grid based on Alaska coordinate system, zone D  
 6300-meter universal Transverse Mercator grid ticks  
 are shown in blue  
 Dots represent unsurveyed and unmarked locations  
 named by the Bureau of Land Management  
 and S. W. Seward Meridian  
 Shaded areas indicate only the wetter areas  
 of low relief as interpreted from aerial photographs



CONTour INTERVAL 100 FEET  
 Contour interval is 100 feet, except where indicated

APPROXIMATE MEAN  
 DECLINATION 1951

FOR SALE BY U. S. GEOLOGICAL SURVEY  
 FAIRBANKS, ALASKA 99701, DENVER, COLORADO 80225, OR WASHINGTON, D.C. 2024  
 A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

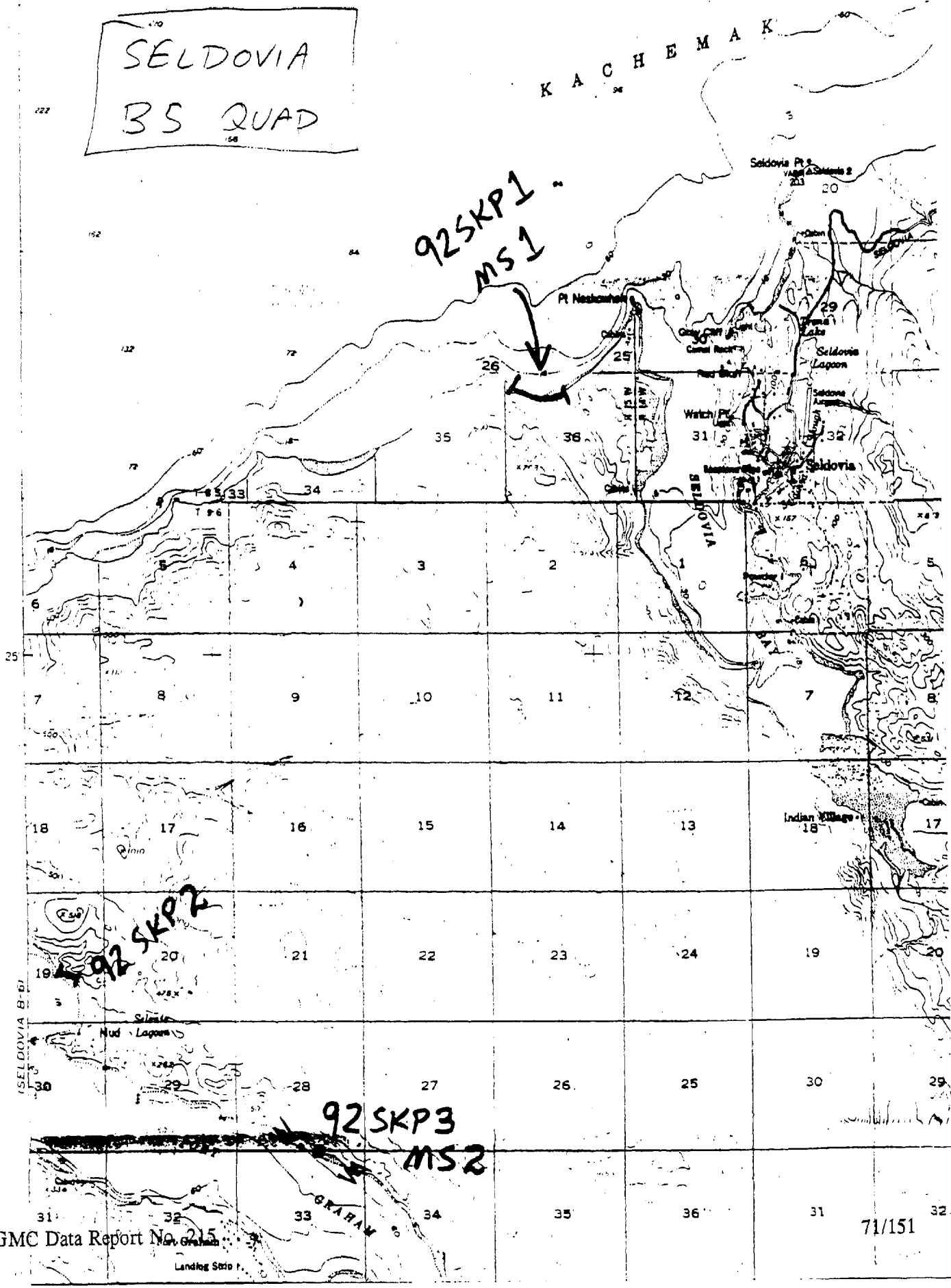
AT KAT 70/151/A  
 DR 2 QUAD

165000m N 1

SELDOVIA  
BS QUAD

KACHEMAK

92SKP1  
MS1





92 SKP 4/14

Point Bede

POINT BEDE

Magnet Rock

Rock

BEDE

FLAT ISLAND

Flat Islands

\* Rock

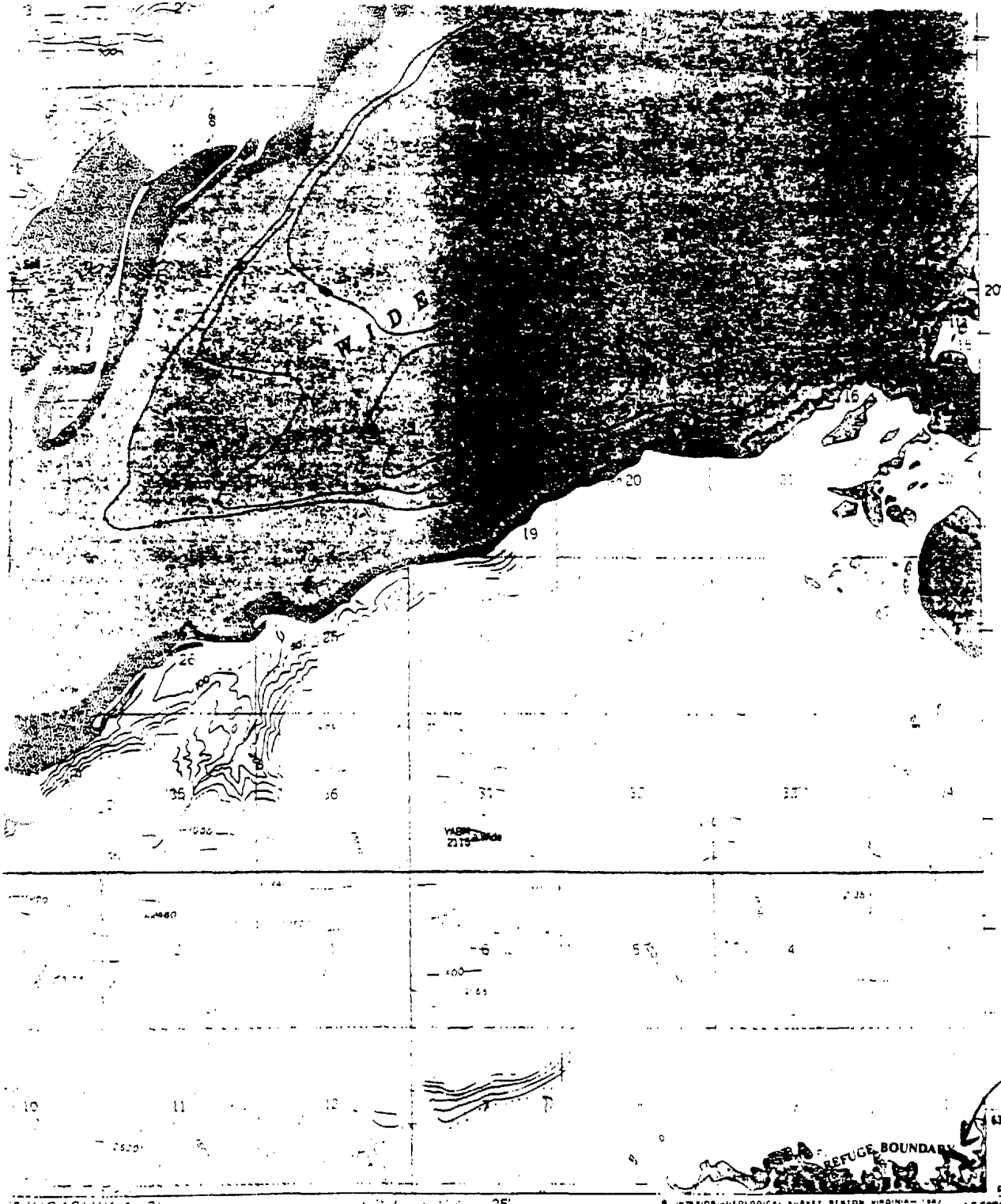
Rocks

Rocks

Rocks

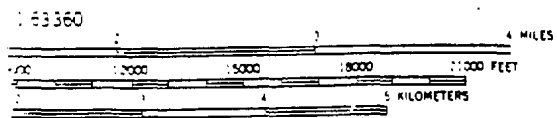
BERON

SELDOVIA  
B6



92WB7  
MS 6

UGASHIK A-21



ROAD CLASSIFICATION  
No roads or trails in this area

INTERVAL 100 FEET  
CONTOUR 50 FOOT CONTOURS  
VERTICAL DATUM OF 1929  
M.S. IS MEAN LOWER LOW WATER  
APPROXIMATE LINE OF MEAN HIGH WATER  
TIDE IS APPROXIMATELY 10 FEET

GEOLOGICAL SURVEY  
ROAD 80225, OR RESTON, VIRGINIA 22092  
SYMBOLS IS AVAILABLE ON REQUEST



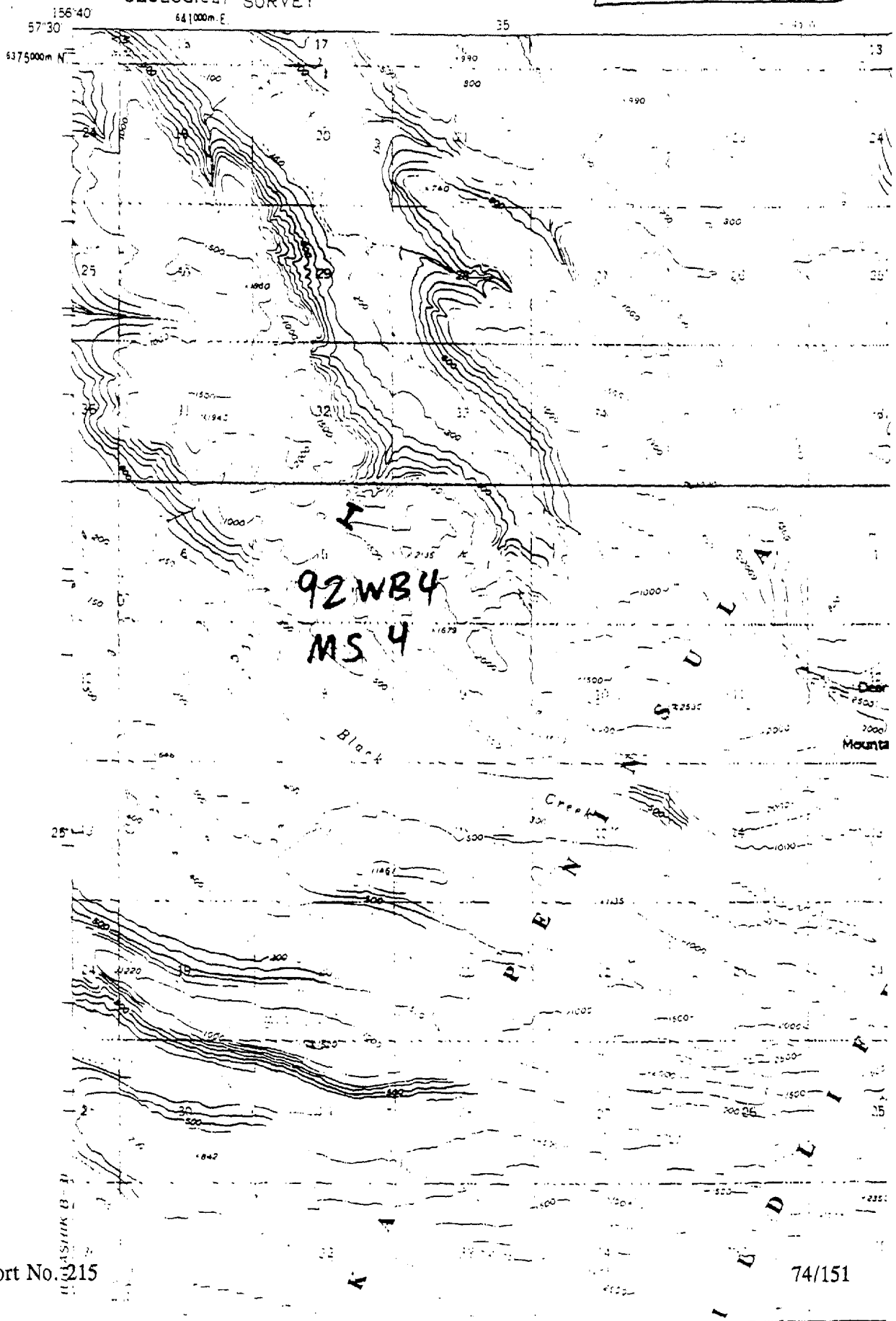
QUADRANGLE LOCATION

UGASHIK (B-2), ALASKA  
N5715—W15620/15X20  
1951  
LIMITED REVISIONS 1981

UGASHIK 31

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY

UGASHIK  
B 2 QUAD



MEASURED SECTIONS

'92 MS list, part

MS#	Stop #'s	Formation(s)	Location	Quad	Status
1	92SKP1	Talkeetna Volcanics	W of mouth of Seldovia Bay	Seldovia B5	not drafted
2	92SKP3	Triassic limestone	opposite Port Graham	Seldovia B5	done
3	92WB2	Triassic/Jurassic	E side of Puale Bay	Karluk C4-C5	done
4	92WB4	Naknek	Ridge NE of Black Creek	Ugashik B2	done
5	92WB6	Naknek	E side of Puale Bay	Karluk D5	done
6	92WB7	Naknek	N side of Imuye Bay	Ugashik B2	done
7	92KAT1	Naknek\Herendeen	W side of Barrier Range	Mt Katmai A3	done
8	92KAT3	Kaguyak	W of Swikshak (type locality)	Afognak C6	done
9	92KAT4-6	Kaguyak	W of Swikshak (type locality)	Afognak C6	done
10	92KAT13	Herendeen	Islet S of Cape Kaguyak	Afognak C6	done
11	92KAT14	Kaguyak	N side of Cape Kaguyak	Afognak C6	not drafted
12	92SI1	Shuyak	Bay N of Big Bay, Shuyak Island	Afognak C2-C3	not drafted
13	92SI2	Shuyak	Cape S of Islet Tom, Afognak Island	Afognak B3	not drafted
14	92SI3	Shuyak	W coast of Shuyak Island	Afognak C2-C3	not drafted

**MS-2, Unnamed Triassic, Port Graham (stop 92SKP3)**

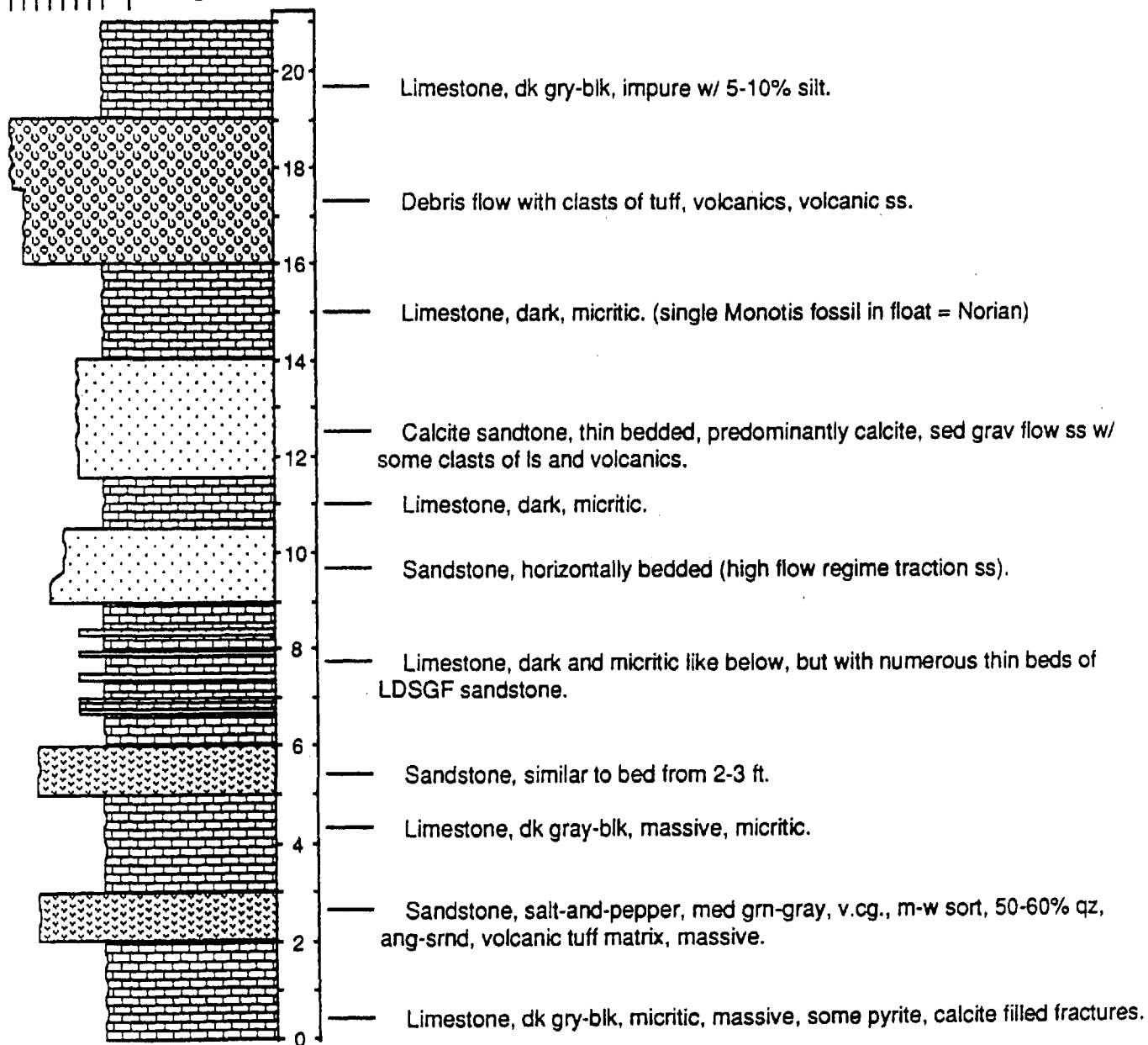
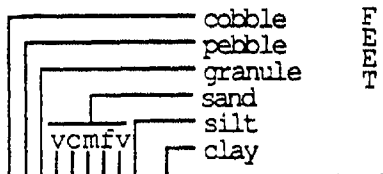
Date logged: July 25, 1992

Logged by: S. Phillips

Datum Elevation: 0.00 ft

Remarks: Compiled by S. Krueger

**GRAIN SIZE**



# ARCO Alaska Inc.

Subsidiary of AtlanticRichfieldCompany

**Measured Stratigraphic Section: WBMS #3**














**State: Alaska      Geographic Location: Northeast side of Puale Bay.**

Center of SE 1/4 of Section 32, T28S, R37W, Karluk C-4 / C-5 Quadrangle

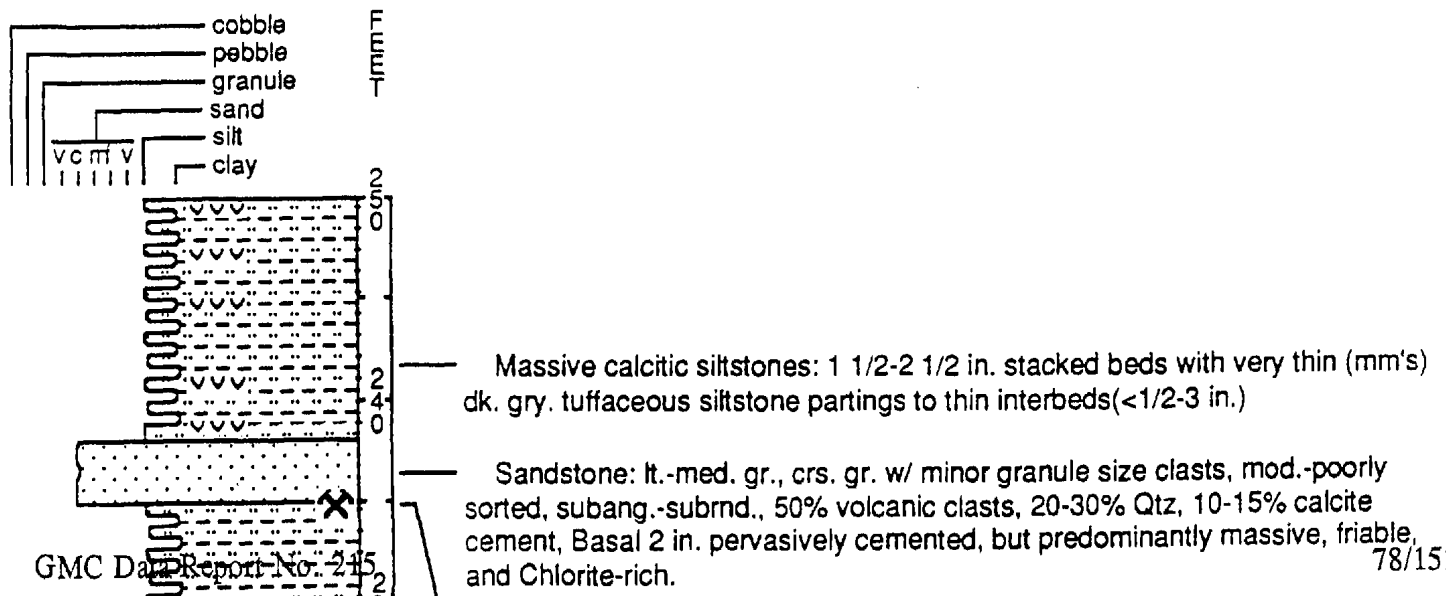
**Sample Numbers: 92WB2/3, 92WB2/28-39**

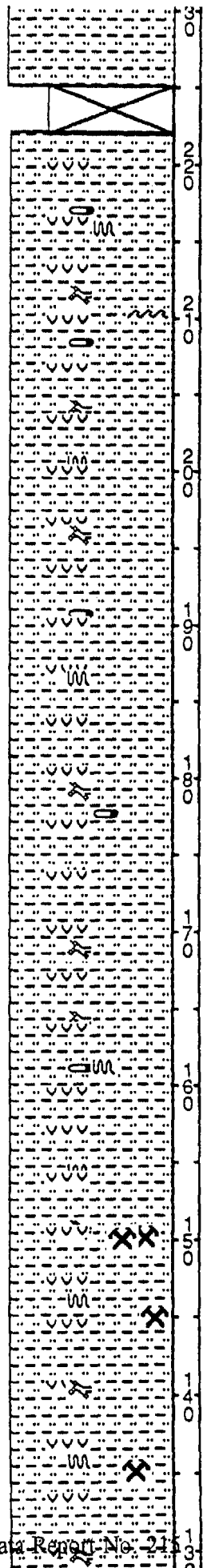
**Date: 7/27/92, 7/31/92      Logged By: D. J. Doherty, J. McGowen, S. Phillips**

**Formation: Triassic Kamishak/Jurassic Talkeetna**

	Sandstone		Minotis		Tuff, tuffaceous siltstone, or bentonite
	Siltstone		Thalassinoides		Convolute Bedding
	Interbedded volcaniclastic litharenite, siltstone, tuffaceous siltstone, tuff, and silicified tuff		Helmintoida		Concretion
	Limestone		Planolites		Sample
			undifferentiated vertical burrow		

## GRAIN SIZE





**92WB2/39 (Lith, P&P)**  
 Calcitic Siltstone: massive, vfg., well indurated, Top and Basal contacts are sharp, platy-fissile.

Bentonite, ol. gry., clay rich, no crystalline grains

**92WB2/38 (Paly, Micropaleo)**

2 vfg. sandstone beds with sl. calcitic siltstone drapes (1/4 in. thick), Tbd, Tbd.  
 Apparent direction of underlying flame structure: 250

Thinly interbedded lt. gry., calcitic siltstones, impure silty micrites show sharp top and bottom contacts, The beds are typically burrowed (Helmintoida, Planolites, Thalassinoides), thickness varies from 1-8 in., volcaniclastic litharenite; mod. to poorly sorted, massive to graded, med.-crs. gr., Drk. gry., platy weathering, tuffaceous siltstone, olive green -drk. gry., silicified tuff or bentonite.

Thinly interbedded calcitic siltstone, Tuffs, and med.-crs. gr., volcaniclastic litharenite.

Abundant Thalassinoides on bedding plane surfaces.

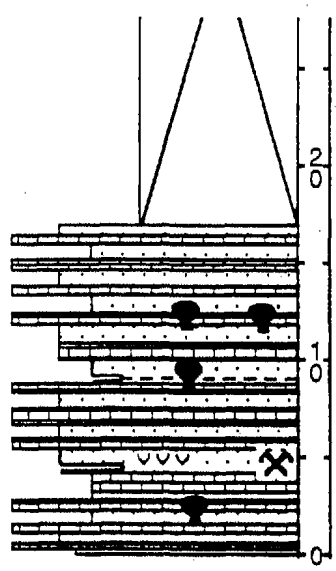
**92WB2/37 (Lith)**  
**92WB2/36 (Paly, Micropaleo, Geochem)**  
 Volcaniclastic Litharenite: med. gry., crs. gr., mod. sorted, subrnd.-rnd., dk. gry. grains (poss. obsidian), abund. Pyrite.

**92WM2/34 (Paly, Micropaleo, Geochem)**

**92WB2/35 (Lith, Igneous Geochem, K/Ar)**







Sandstone: med. gry., mg.-vfg., med.-poorly sorted, calcitic, subang., subarkose with abun. gy. volc. lithics, commonly amalgamated, (HDSGF)

Bentonite: red. or-pl. grn., soft, ferruginous weathering, clay-rich  
**92WB2/3 (K-Ar, Paly)**

Siltstone: brn., calcitic., planar laminated, slight petroliferous odor., carbonized plant debris, (Suspension Deposit)

Grainstone: Dusky Brn., vfg. ss-slst., well sorted, v. sl. petroliferous odor, simple horizontal burrows on bed tops (Planolites?), occ. Minotis molds, (Slurry Deposit).

### MS4, Naknek Formation, W of Wide Bay (stop 92WB4)

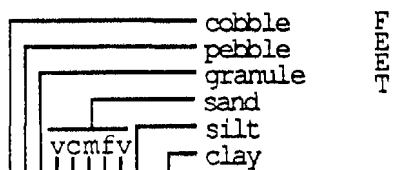
Date logged: July 28, 1992

Logged by: McGowen, Doherty, Phillips, Krueger

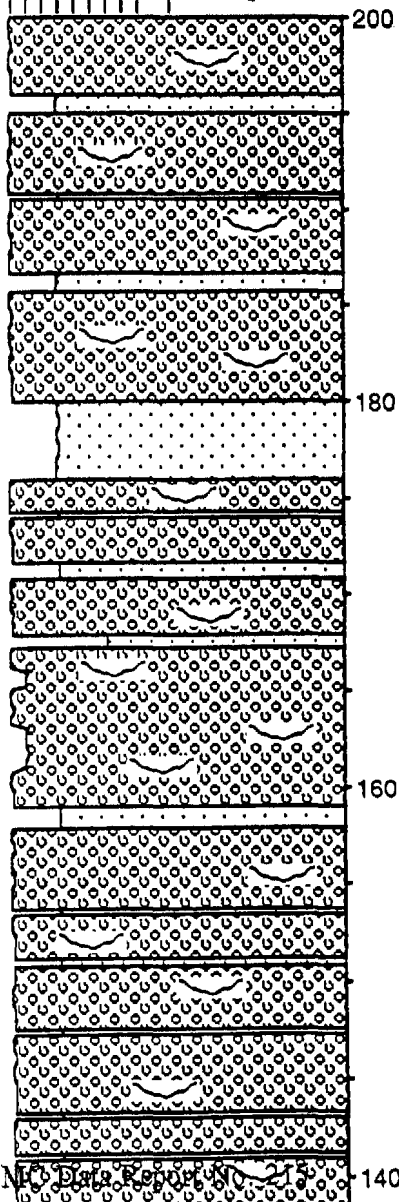
Datum Elevation: 0.00 ft

Remarks: Compiled by S. Krueger

#### GRAIN SIZE



Feet

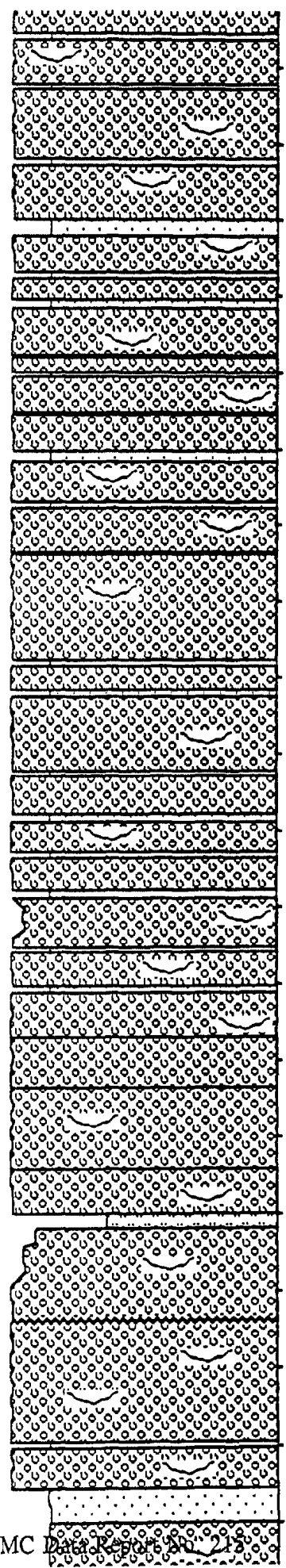


Amalgamated conglomerate, largely cobbles, some boulders and pebbles, clast supported, coarse sandy matrix, interbedded sandstone lenses, feldspathic to volcanofeldspathic, cobbles largely intermediate plutonics, some gabbro and rare granite clasts, sands weakly cemented to friable. Section considered typical of the thousands of feet of conglomerate exposed in the Naknek Formation near Ugashik Lakes. Interpreted as braided stream deposits on steep, wet alluvial fan, coarse material suggests proximity to active scarp of Bruin Bay fault.

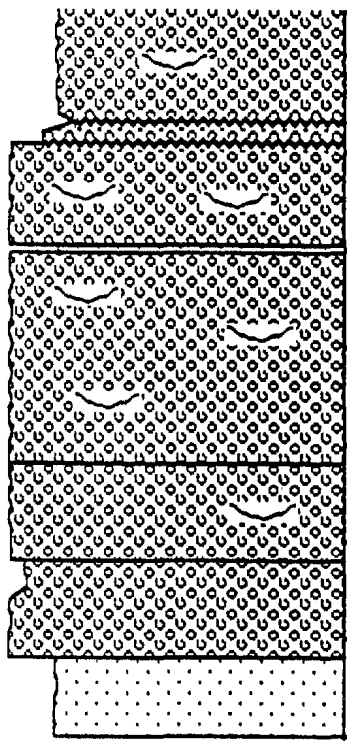
Sandstone, olive gray, pebbly to conglomeratic, well rounded clasts, discrete pebble trains in lower 1/2, grades up to clast supported conglomerate in upper 1/2.

Imbrications: 186, 173, 210, 160.

Thick-bedded, amalgamated conglomerate beds with occasional 1/2-1 1/2 foot thick lenticular sandstone interbeds, interpreted as braided stream deposits on a steep alluvial fan.



- Transport direction indicators - long axes: 220, 190, 220; imbrications: 215, 205, 190.
- Amalgamated conglomerates and occasional coarse sand lenses, conglomerates largely cobble sized, but some more pebbly and some quite boulder rich, clast supported, sandy matrix, volcanofeldspathic to arkosic, fabric largely chaotic without preferred orientation, extensive scour and fill, interpreted as braided stream deposits on a steep alluvial fan.
- Some of the more boulder rich zones suggest hyperconcentrated stream flow deposition.
- Conglomerate, unsorted, granules to boulders, amalgamated scour and fill units, occasional lenses of coarse sandstone, conglomerate is clast supported, matrix is coarse sand, interpreted as braided stream deposits.
- Amalgamation of cobble to pebble conglomerates and interbedded lenses of coarse sandstone, interpreted as braided stream deposits on a steep alluvial fan, flow direction indicators - long axes: 180, 194, 190, 170; imbrications: 218; channel trend: 120.
- Boulder to pebble conglomerates, amalgamated scour and fill channels, some sandy lenses, unit from 71-80' weakly graded overall, some boulders near base, mostly pebbles near top, clast supported, coarse sandy matrix, mostly plutonic clasts, interpreted as braided stream deposits.
- Boulder to cobble conglomerate.
- Boulder to cobble conglomerate, interp. as hyperconcentrated stream flows, direction indicators - long axes: 137, 110, 145, 142, 140, 263, 120, 148, 115, 118, 115, 160, 204, 160; imbrications: 250, 182, 135, 130.
- Boulder to cobble conglomerate.
- Pebbly siltstone, med olive grn, tuffaceous, thinly bedded, floating pebbles and granules, interpreted as a volcanic debris flow unit.
- Conglomerate, amalgamated series of upwardly fining conglomerates, cobbles at base to pebbles at top, abundant scour and fill, 174 degree azimuth on one channel.
- Flow direction indicators - long axes: 115, 140, 148, 140, 145, 155, 155, 160; imbrications: 220, 208, 183, 172, 170, 185.
- Sandstone, discontinuous, lenticular bodies of coarse sandstone.
- Sandstone, lt olive-gray, poorly sorted.



- Cobble conglomerate, some pebbly stringers, lt to med brn-grn, salt-and-pepper, arkosic to subarkosic sandy matrix, clast supported, clasts = (diorite, gabbro, granodiorite, andesite, granite, silicic tuff, vein qtz), lots of scour and fill, interpreted as braided channels.
- Sediment transport indicators: long axes of clasts: 227, 188, 259, 266, 284, 292, 249, 270, 240, 173, 290, 249, 235; imbrication directions: 140, 142, 161, 137 degrees azimuth.
- 20 — Graded conglomerate/sandstone, salt-and-pepper arkose, lt grn-brn, granule to cobble clasts at base, poor sorting.
- Sandstone, coarse arkosic "granite wash", thin sandstone lens embedded in massive conglomerate sequence.
- Cobble conglomerate. Clast supported, interpreted as braided stream deposits, probably as part of a steep alluvial fan.
- Cobble conglomerate.
- Cobble conglomerate.
- Sandy conglomerate, lt olive gry, friable, pebble to cobble clasts, clast supported, sandy matrix, clasts largely composed of mafic to intermediate plutonics and rare granodiorite and granite.
- 0 — Sandstone, feldspathic litharenite, massive, friable, some well rounded pebbles in lower part.

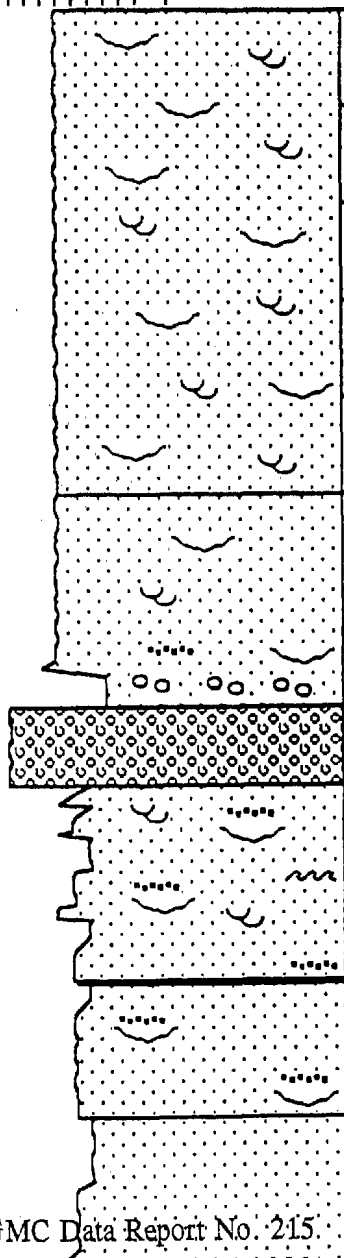
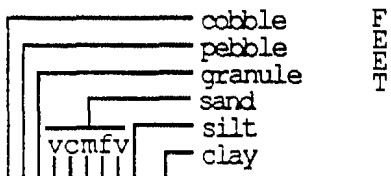
# MS-5, Naknek Formation, East Puale Bay 9-28S-38W SE corner (on Karluk D-5 quad)

Date logged: July 29, 1992

Logged by: Doherty, McGowen, Phillips

Remarks: Compiled by S. Krueger

### GRAIN SIZE



Feet

200

180

160

Depositional setting: MS-5 is a thick sequence of amalgamated non-marine sandstones, dominantly medium to very coarse grained, trough cross stratified, braided stream deposits. Distal alluvial fan setting, progradational, upward coarsening - comprised of stacked braided stream and channel deposits.

Sandstone, trough cross bedding, low angle foresets.

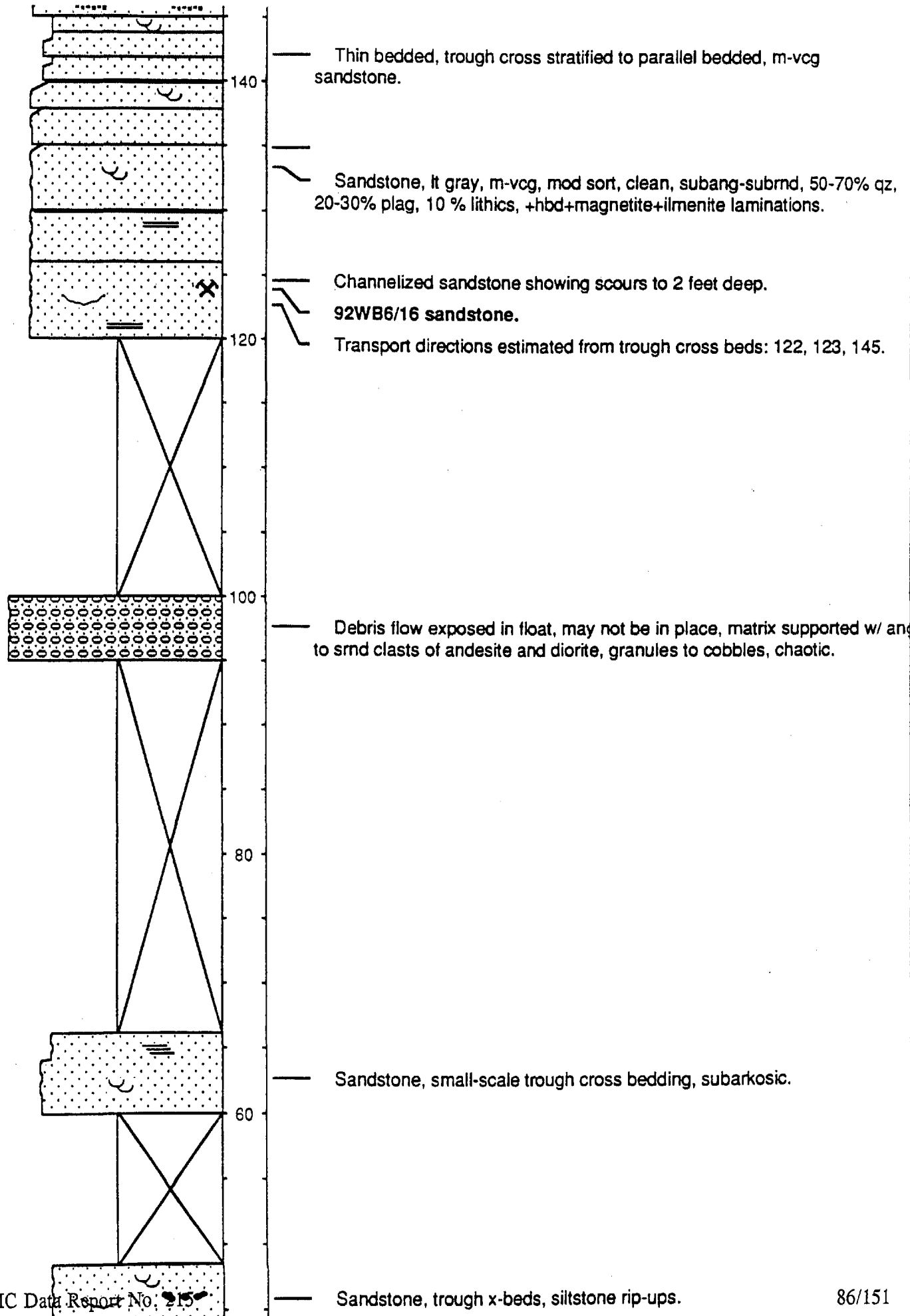
Sandstone, lt gray brown, mod sort, feldspathic quartz sandstone, massive, amalgamated, boulders up to 18 feet at base represent hyperconcentrated stream flow.

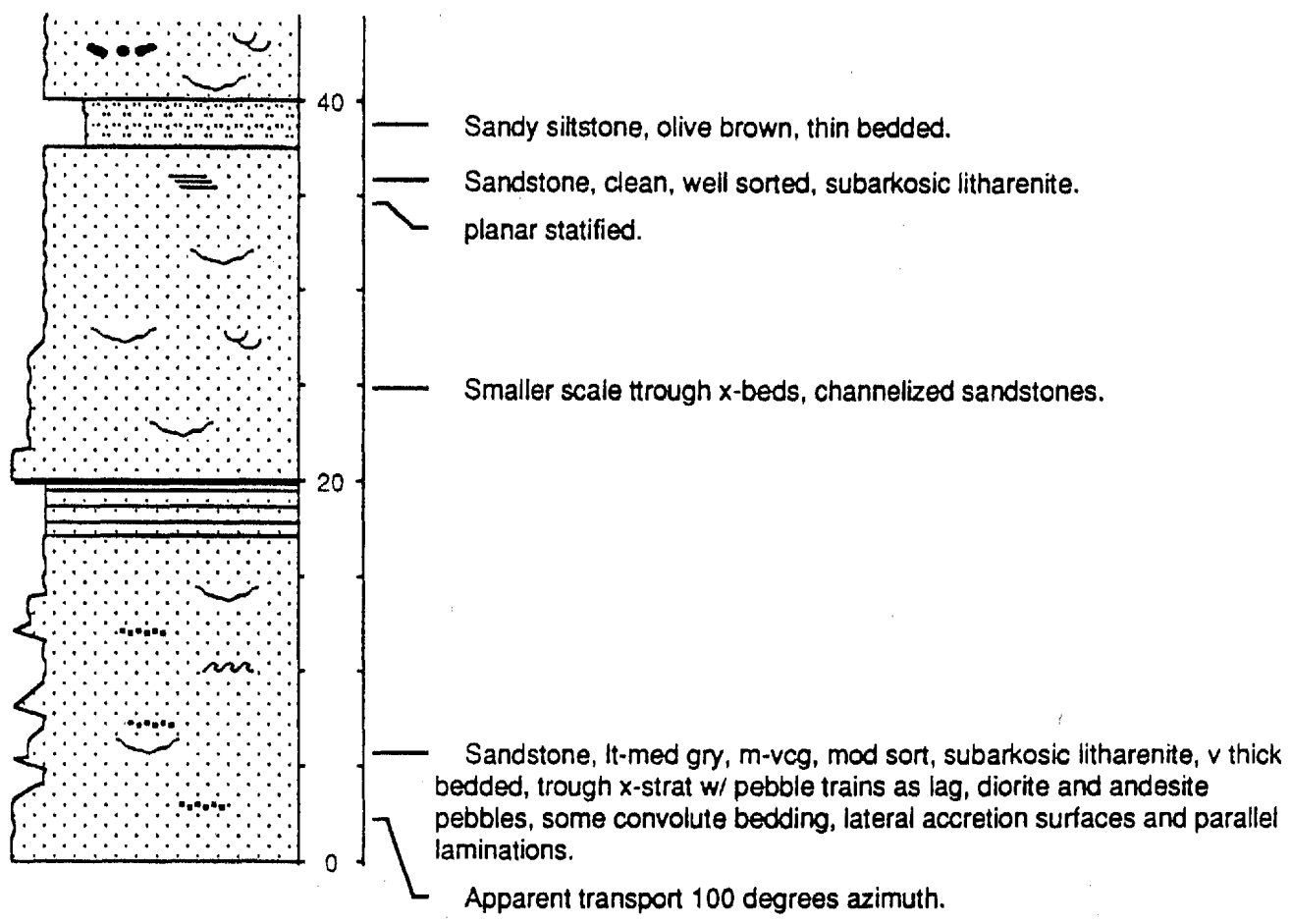
Conglomerate, matrix supported, pebbles to large cobbles, submd-subang, diorite and andesite clasts, lesser granodiorite and vein quartz.

Sandstone, lt gray, m-vcg, quartzo-feldspathic, 60% qz, 20 Plag, 10-20% lithic, hbl+magn+ilm, some large woody debris and logs, apparent transport: 100 degrees azimuth.

Multiple scour surfaces, pebble and cobbles lag w/ clasts to 4", some convolute bedding, low angle foresets, parallel bedding.

Sandstone, lt gray, m-vcg, mod sort, massive, thin pebble lag at base of unit, interpreted as hyperconcentrated stream flow.







# ARCO Alaska Inc.

Subsidiary of AtlanticRichfieldCompany

Measured Stratigraphic Section: WBMS #6

State: Alaska Geographic Location: Northside of Imuya Bay,

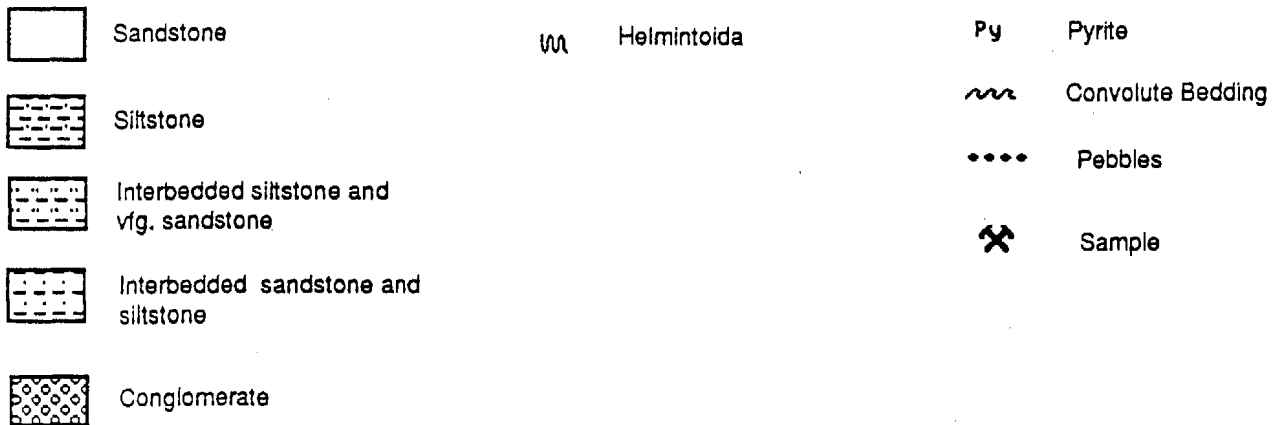
SE corner of SW 1/4 of Section 10, T34S, R44W, Ugashik B-2 Quadrangle

Sample Numbers: 92WB7/5-9, 92WB7/20-26

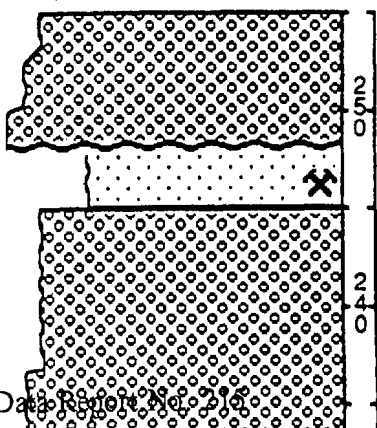
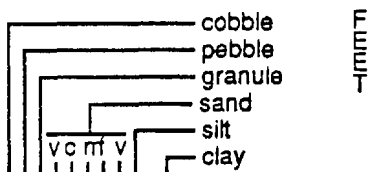
Date: 7/30/92

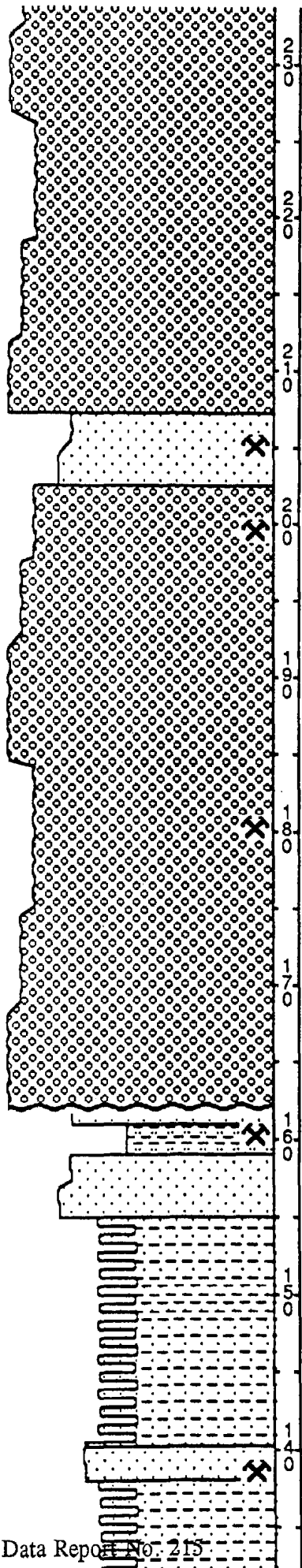
Logged By: D. J. Doherty, J. McGowen, S. Phillips

Formation: Jurassic Naknek Formation



### GRAIN SIZE





— Sandstone: brn. gry., med.-crs. gr., mod.-well sorted, subang.-subrnd., massive, subarkosic quartzarenite.  
**92WB7/23 (Lith, P&P)**

— **92WB7/25 (Lith)**

— Conglomerate: brn., amalgamated, mostly pebble-cobble but local boulders, clast-supported, poorly sorted, subang.-well rounded, clasts predominantly plutonics and volcanics with rare carbonate. The sand matrix is medium grained and well sorted.  
 Imbrication: 110, 145

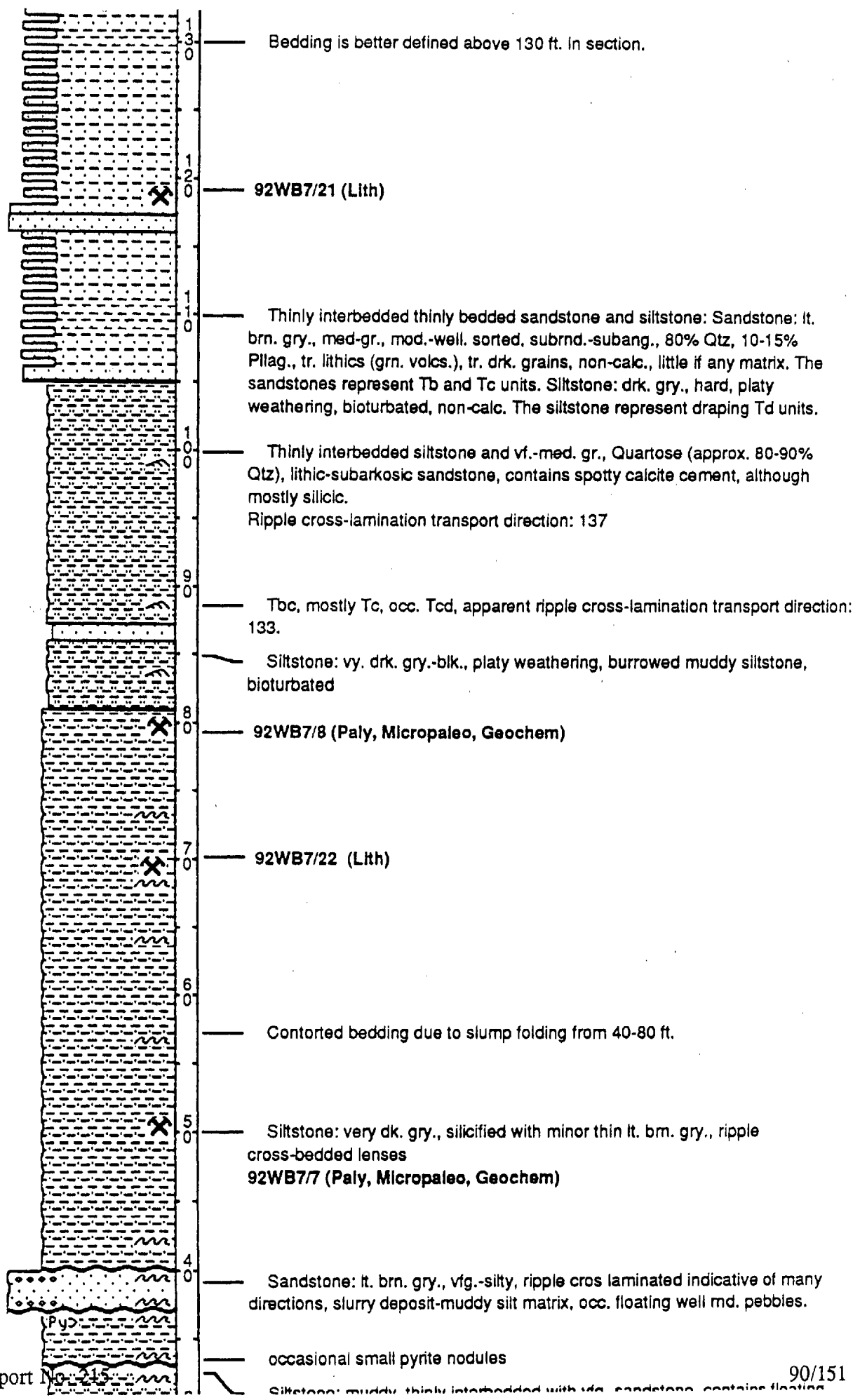
— **92WB7/24 (Lith, Micropaleo)**

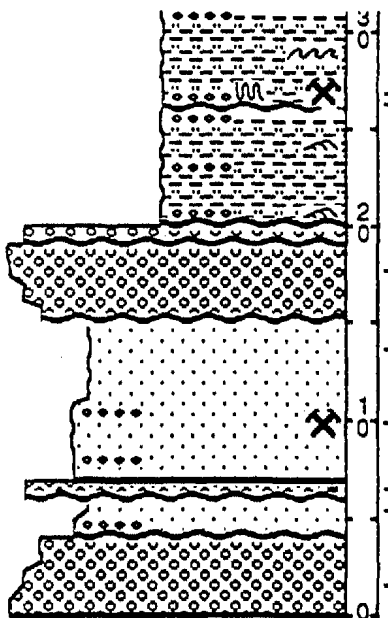
— **92WB7/20 (Paly, Micropaleo, Geochem)**

— Sandstone: lt. gry., massive, med.-crs. gr., mod.-poorly sorted, subang.-rnd., occ. well rnd., 60% Qtz, 15-20% Fldsp., w/ large Bio., zeolite(?) matrix, silicic cement.

— Well developed parallel interbedded sandstone and siltstone. Sandstones range in thickness from 1-10 in. and consists of thin basal (Tb) parallel laminated sandstone covered by a thicker ripple cross-laminated sandstone (Tc). The siltstone consists of occasional parallel laminated (Td) beds where they are not completely bioturbated.

— **92WB7/9 (Play, Micropaleo, Geochem)**





Siltstone, muddy, thinly interbedded with vfg. sandstone, contains floating pebbles and occ. cobbles. This unit appears to have slid downslope. Lination in the siltstone: 120. Measurement of listric normal faults yield a pull-apart direction of 150.

**92WB7/6 (Paly, Micropaleo, Geochem)**

Siltstone showing Helminthoida burrowing

Conglomerate: grey, crudely inverse graded, cobble-boulder (boulders up to 3 ft. diameter), matrix supported (gravel and med.-crs. gr. sand), well rnd.-subang., clast elongations: 136, 149, 96, 163, 142, 134, 127, 136, 133, 114, 130, 116, 90, 92, 121, 145, 150.

Sandstone: lt. brn. gry., amalgamated, med.-crs. gr., occ. granules and pebbles, poor-mod. sorted, subrnd.-rnd., noncalc. matrix, mud rip-ups throughout.

**92WB7/5 (Lith, P&P)**

Imbrication: 137; Clast elongation: 133, 145, 133, 128, 144

Sandstone: lt. dl. gry.- lt. gry., coarse-tail graded, med.-crs. gr., mod. sorted, subang.- subrnd., litharenite, contains platy pebbles and cobbles and siltstone rip-ups at the base, occ. granule-size Qtz. and volc. clasts.

Conglomerate: clast supported, lithic-rich (silicified volcanics) med.-crs. gr. matrix, normally graded, boulder to cobble, well-rnd.-rnd. Imbrication directions: 81, 56, 63, 105 Clast elongations: 87, 81, 74, 115, 116

# ARCO Alaska Inc.

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Measured Stratigraphic Section: KATMS #7





















State: Alaska      Geographic Location: West side of the Barrier Range.

SE corner of SE 1/4 of Section 10, T24S, R35W, Mount Katmai A-3 Quadrangle

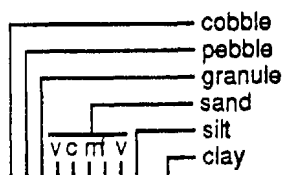
Sample Numbers: 92KAT1/1-30

Date: 8/1-3/92      Logged By: D. J. Doherty, J. McGowen, S. Phillips

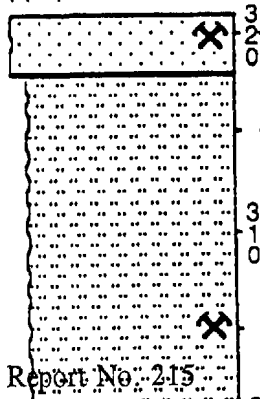
Formation: Naknek/Herendeen (as mapped by the United States Geological Survey)

	Sandstone		Ammonite		Convolute Bedding
	Siltstone		Belemnite		Parallel Lamination
	Sandy siltstone		Inoceramus Prism		Carbonized Plant Debris
	Interbedded Sandstone and Siltstone		Gastropod		Hummocky Cross-Stratification
	Igneous intrusive		Pelecypod		Ripple Cross-Laminae
			Chondrites		Glauconite
			undifferentiated vertical burrow		Concretion
					Sample

**GRAIN SIZE**



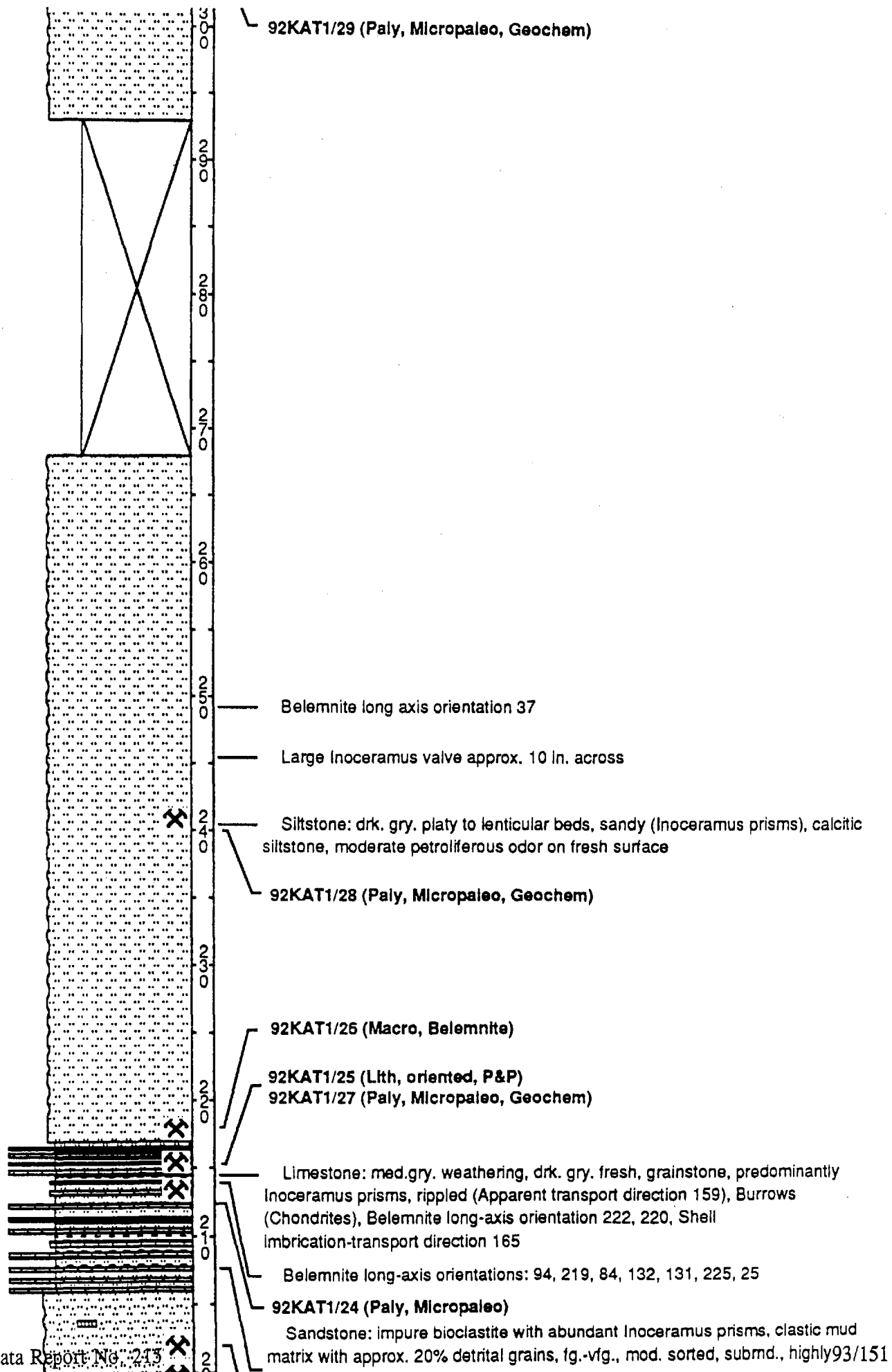
1m  
10cm  
10mm

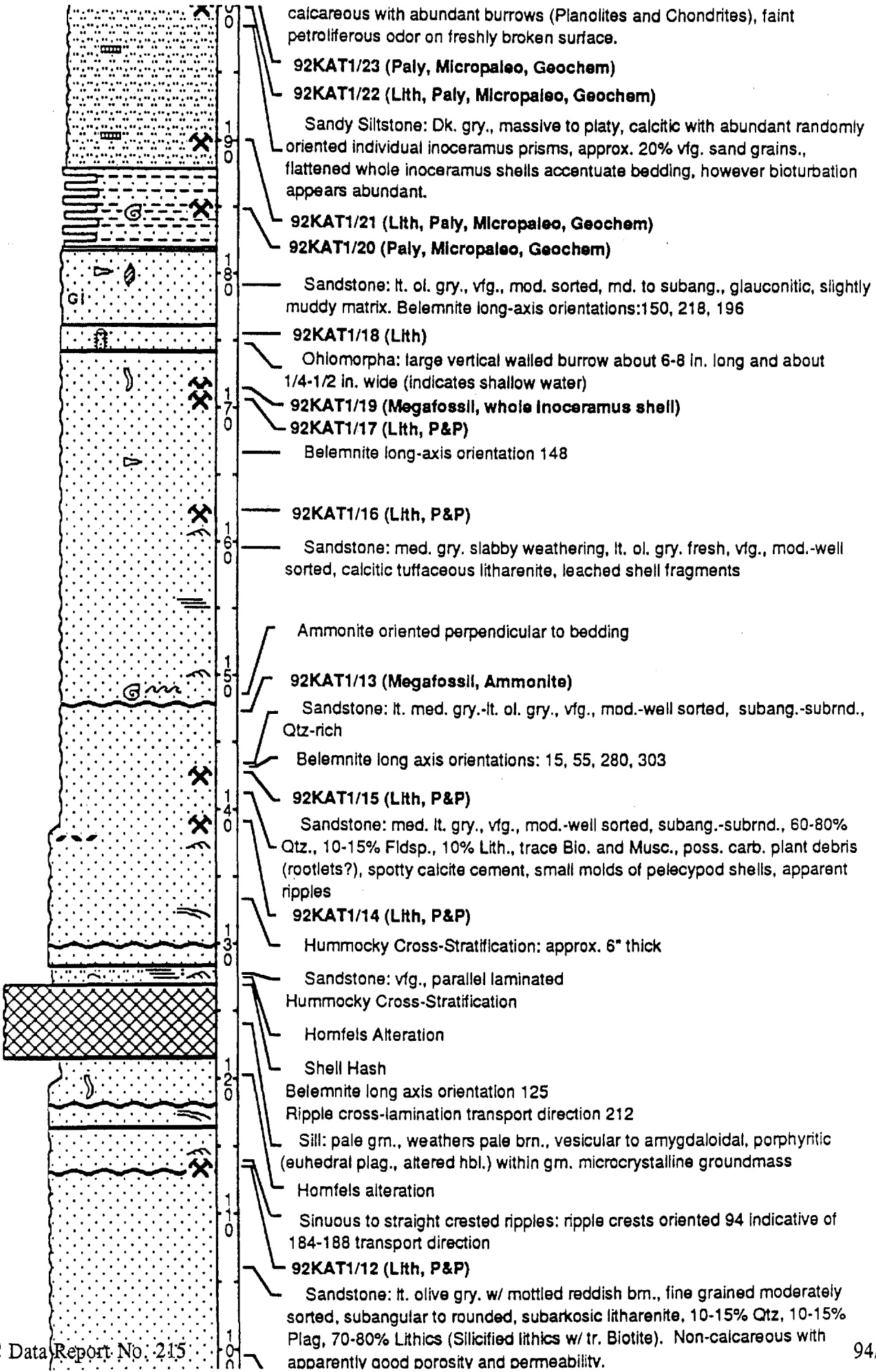


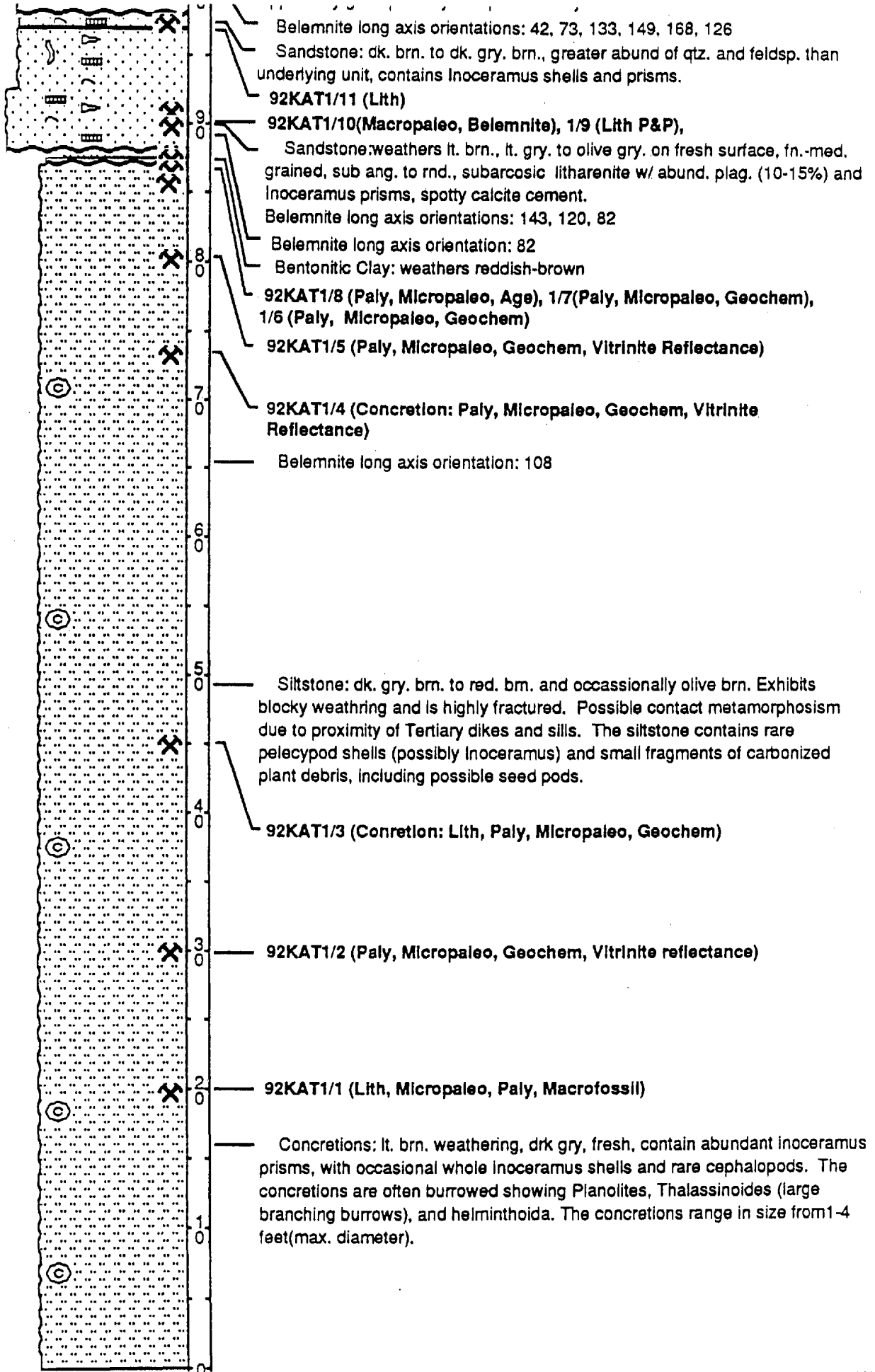
Sandstone: dk. ol. gry., muddy volcaniclastic lith arenite (Hbl and Plag crystals), abundant Inoceramus prisms and shell fragments. Helminthoida

92KAT1/30 (Lith, Hbl age)

Siltstone: ol. gry., silicic, spotty calcite cement, abundant large Inoceramus shell fragments.









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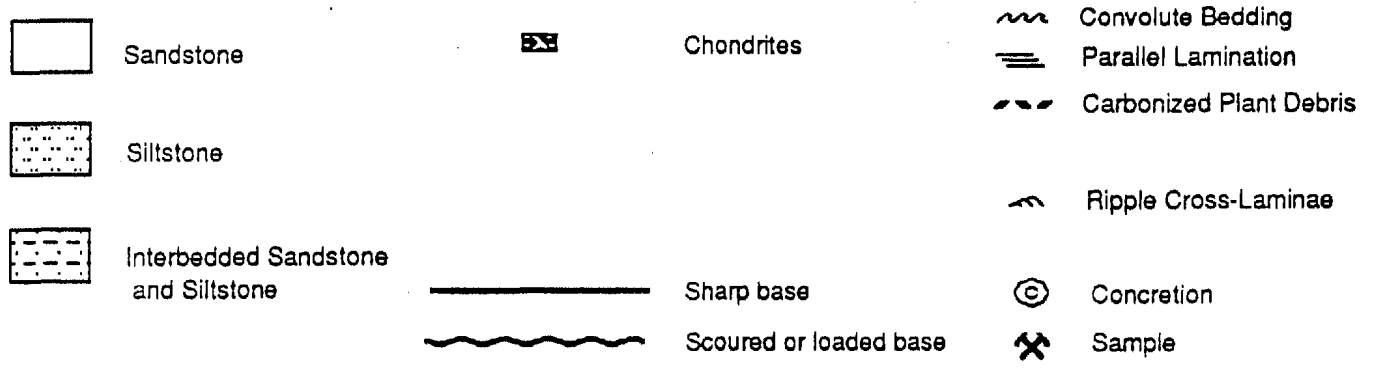
Measured Stratigraphic Section: KATMS #8

State: Alaska      Geographic Location: 2 1/2 mi. West of Swikshak Lagoon,  
SW corner of SW 1/4 of Section 13, T18S, R28W, Afognak C-6 Quadrangle

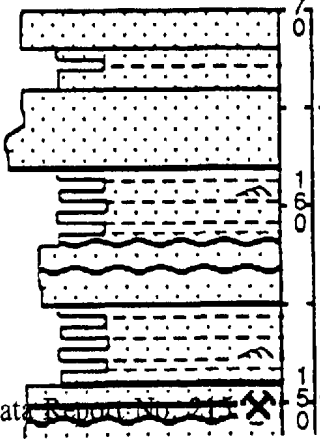
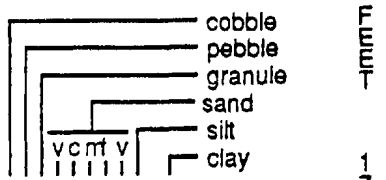
Sample Numbers: 92KAT3/34-49

Date: 8/4-7/92      Logged By: S. Phillips

Formation: Late Cretaceous, Kaguyak



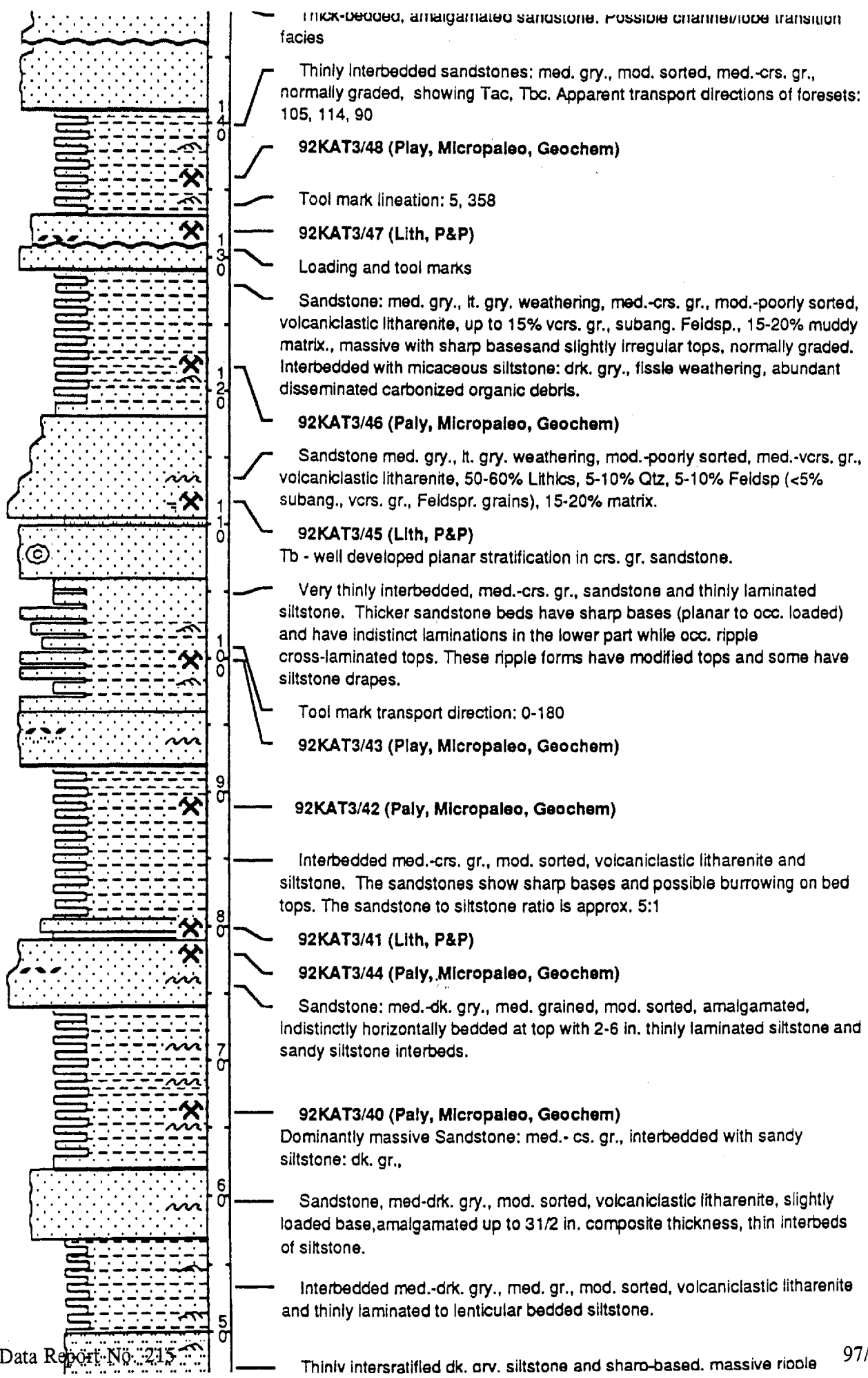
### GRAIN SIZE

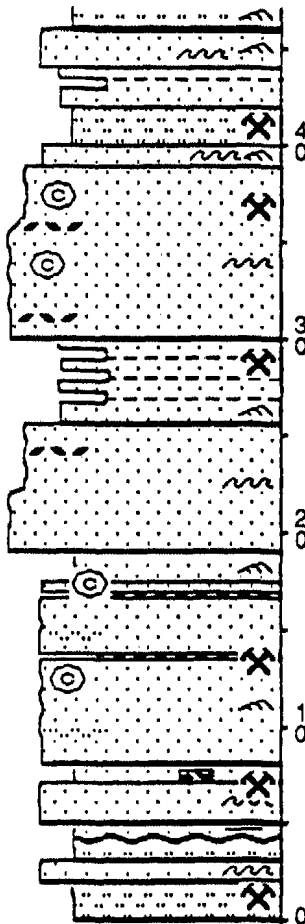


Sandstone: med.-dk. gry., lt. gry.-bm. weathering, med.-crs. gr., mod.-poorly sorted, volcanioclastic litharenite, 60% Lithics, 10-20% Feldsp., 10-20% matrix (prob. laumontite-rich), massive to parallel laminated at top.

Sandstone: dk. gry., mod.-poorly sorted, med. gr., lithic rich, >20% muddy matrix. abund. carbonized woody debris

92KAT3/49 (Paly, Micro, Geochem)





cross-laminated, fn.-med. gr. sandstone.

**92KAT3/39 (Paly, Micropaleo, Geochem)**

**92KAT3/38 (Lith, P&P)**

Sandstone: drk. gry., crs.-med. gr., mod. sorted, volcanoclastic litharenite, 60% Lithics, 5-10% Feld., 10-15% Qtz., 10-20% matrix, massive, amalgamated, sharp planar to loaded base. Numerous internal bedding surfaces marked by shale rip-up clasts, typically dk. gry., elongated to irregular shaped, laminated siltstone

Very thinly interstratified siltstone and ripple cross-laminated sandstone. Apparent transport direction on multidirectional foresets: 85, 25, 123, 43, 66, 52, 78, 72, 94. Possible tidal influence

**92KAT3/37 (Paly, Micropaleo, Geochem)**

Apparent transport direction on ripple foresets: 100, 85

Silty shale: dk. gry.-blk., sl. micaceous, fissile, platy weathering, finely laminated.

**92KAT3/36 (Paly, Micropaleo, Geochem)**

Sandstone: med.-dk. gry., fn.-med. gr., mod. sorted, volcanoclastic litharenite, 10% matrix, massive, amalgamated, with thinly laminated siltstones, clasts and partings.

Thinly interbedded ripple cross-stratified, f.-med, gr., Sandstone and dk. gry. siltstones. Apparent transport direction on foresets: 50.

**92KAT3/35 (Lith, P&P)**

Sandstone: med. ol. gry., med. gr., mod. sorted, volcanoclastic litharenite, loading at base, parallel laminations at top.

**92KAT3/34 (Micropaleo, Paly, Geochem)**

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Measured Stratigraphic Section: KATMS #9
























State: Alaska Geographic Location: 1/2 mi. West of Swickshak Lagoon.

SE corner of SE 1/4 of Section 10, T24S, R35W, Mount Katmai A-3 Quadrangle

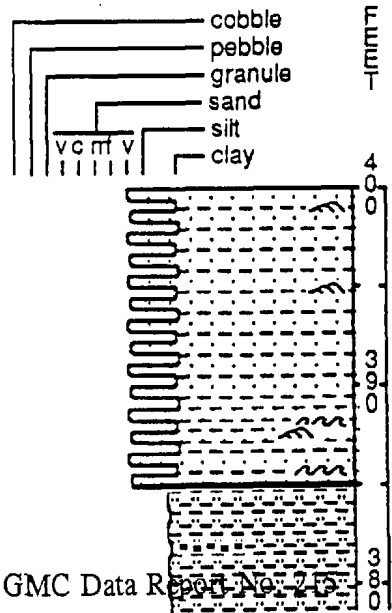
Sample Numbers: 92KAT4/50-60, 71-88

Date: 8/5-9/92 Logged By: D. J. Doherty, J. McGowen

Formation: Upper Cretaceous, Kaguyak

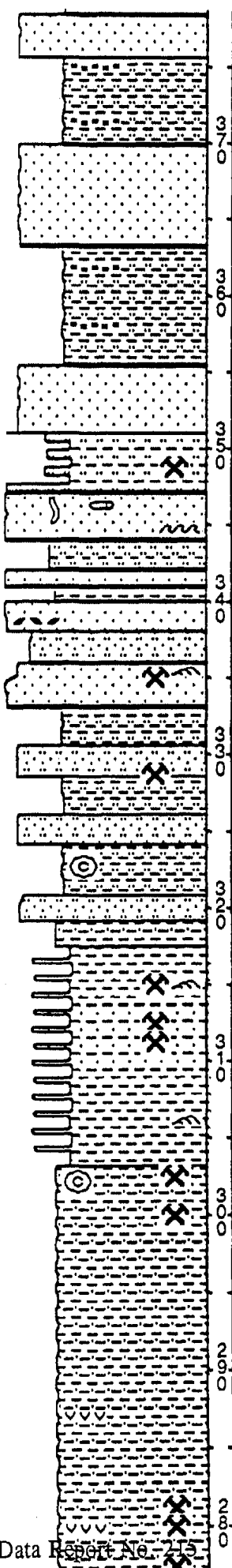
	Muddy Siltstone		undifferentiated vertical burrow		Convolute Bedding
	Siltstone		undifferentiated horizontal burrow		Parallel Lamination
	Sandy siltstone		Carbonized Plant Debris		Undulating bedform
	Siltstone with thin sandy interbeds		Mudstone or siltstone rip-up clasts		Ripple Cross-Laminae
	Sandstone		Bentonite or tuffaceous interbed		Scouring
	Interbedded Sandstone and Siltstone		Shale interbed		Imbrication
	Igneous Intrusive		Silty shale interbed		Normal grading
					Concretion
					Sample

### GRAIN SIZE

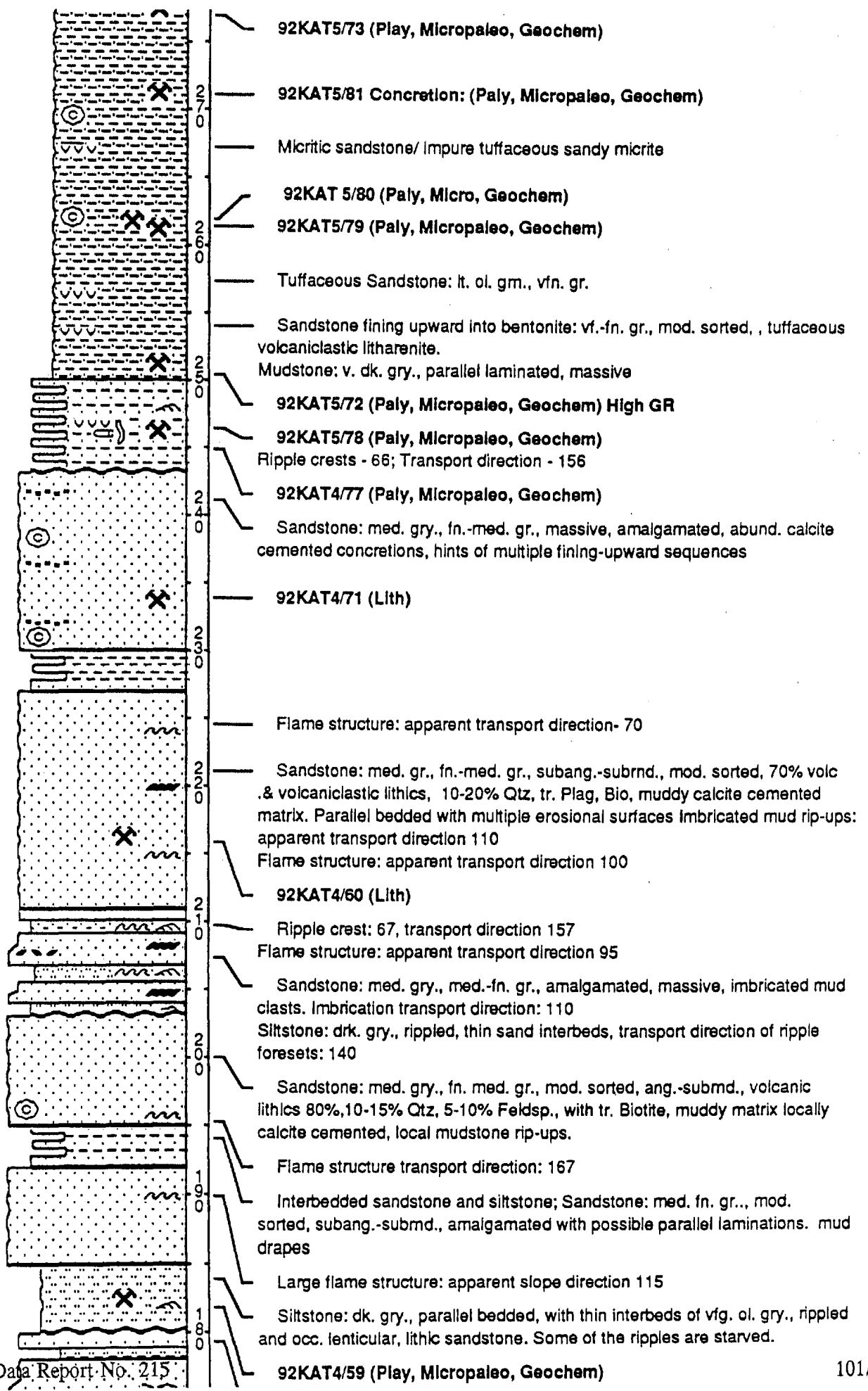


Sandstone: lt. med. gry., fn.-med. gr., with 2 in. fining upward sequence at base. Apparent ripple transport direction range, 115-78.  
Ripple cross-lamination foreset: true transport direction - 133

Interbedded Sandstone and carbonaceous muddy Sandstone and Siltstone: Sandstone: lt. gry., fn.-med. gr., mod.-poorly sorted, 20-30% Qtz, 50% Lithics, 10% Feldspar, tr. Bio., Musc., non-calcareous, normally graded, massive to rippled, locally inverse graded.  
Flame structure: apparent flow direction - 127  
Ripple cross-lamination: direction of forsets - 125



- 92KAT5/88 (Paly, Micropaleo, Geochem)
- Sandstone: lt. ol. gry., med. gr., mod.-poorly sorted, subang.-subrnd., 30-40% Qtz, 10% Plag, 50% Lithics, tr. Bio. and Musc., abundant branching vertical and horizontal burrows. Flame structures: apparent flow directions: 185, 135; True direction: 177
- Sandstone: med. gry.-brn. gry., vf.-med. gr., poorly sorted, muddy with large mud clasts: Debris flow deposit
- 92KAT5/87 (Lith, P&P)
- Sandstone: med. gry., lt. red. brn weathering, fn.-med. gr., mod. sorted, subrnd.-subang., volcanoclastic subarkosic, litharenite, approx 20% Qtz, calcite cement
- 92KAT5/86 (Paly, Micropaleo, Geochem)
- 92KAT5/76 (Paly, Micropaleo, Geochem)
- 92KAT5/85 (Paly, Micropaleo, Geochem)
- 92KAT5/84 Tuff: (Micropaleo, Geochem, Age)
- Siltstone: v. dk. gry., hard, platy weathering, thin interbedded normally graded, sharp based sandstones that grade into the siltstone. Ripple foresets: transport direction - 310
- 92KAT5/75 (Paly, Micropaleo, Geochem)
- 92KAT5/74 (Paly, Micropaleo, Geochem)
- Thinly interbedded siltstone and ripple-laminated vf.-fn. gr. sandstone. The sandstones are very thin and often occur as starved ripples.
- Bentonitic Tuff
- 92KAT5/83 (Paly, Micropaleo, Geochem)
- 92KAT5/82 Bentonitic Ash: (Lith, Igneous Geochem, Age)



92KAT5/73 (Play, Micropaleo, Geochem)

92KAT5/81 Concretion: (Paly, Micropaleo, Geochem)

Micritic sandstone/ Impure tuffaceous sandy micrite

92KAT 5/80 (Paly, Micro, Geochem)

92KAT5/79 (Paly, Micropaleo, Geochem)

Tuffaceous Sandstone: lt. ol. gm., vfn. gr.

Sandstone fining upward into bentonite: vf.-fn. gr., mod. sorted, , tuffaceous volcanoclastic litharenite.

Mudstone: v. dk. gry., parallel laminated, massive

92KAT5/72 (Paly, Micropaleo, Geochem) High GR

92KAT5/78 (Paly, Micropaleo, Geochem)

Ripple crests - 66; Transport direction - 156

92KAT4/77 (Paly, Micropaleo, Geochem)

Sandstone: med. gry., fn.-med. gr., massive, amalgamated, abund. calcite cemented concretions, hints of multiple fining-upward sequences

92KAT4/71 (Lith)

Flame structure: apparent transport direction- 70

Sandstone: med. gr., fn.-med. gr., subang.-subrnd., mod. sorted, 70% volc. & volcanoclastic lithics, 10-20% Qtz, tr. Plag, Bio, muddy calcite cemented matrix. Parallel bedded with multiple erosional surfaces Imbricated mud rip-ups: apparent transport direction 110

Flame structure: apparent transport direction 100

92KAT4/60 (Lith)

Ripple crest: 67, transport direction 157

Flame structure: apparent transport direction 95

Sandstone: med. gry., med.-fn. gr., amalgamated, massive, imbricated mud clasts. Imbrication transport direction: 110

Siltstone: drk. gry., rippled, thin sand interbeds, transport direction of ripple foresets: 140

Sandstone: med. gry., fn. med. gr., mod. sorted, ang.-subrnd., volcanic lithics 80%,10-15% Qtz, 5-10% Feldsp., with tr. Biotite, muddy matrix locally calcite cemented, local mudstone rip-ups.

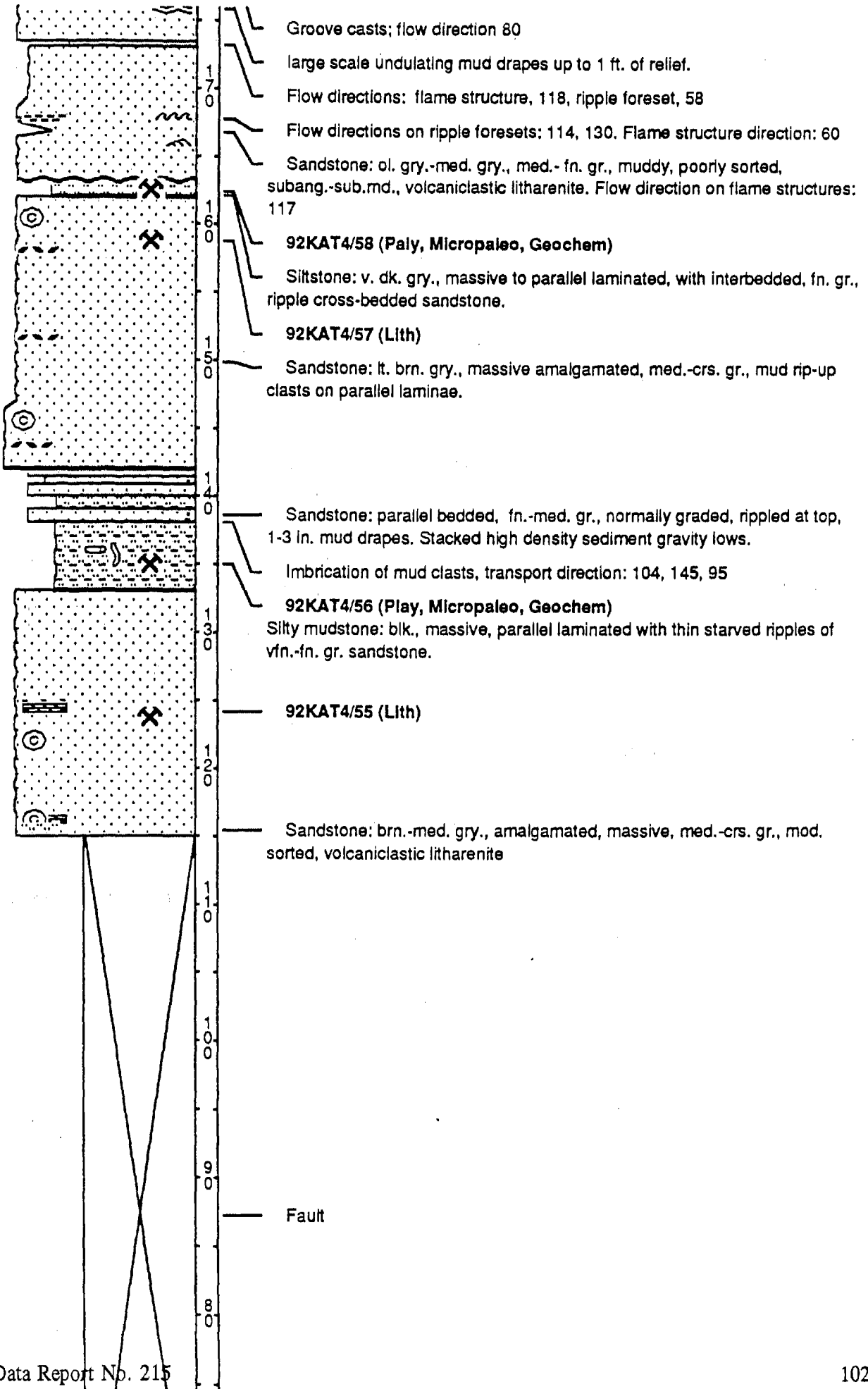
Flame structure transport direction: 167

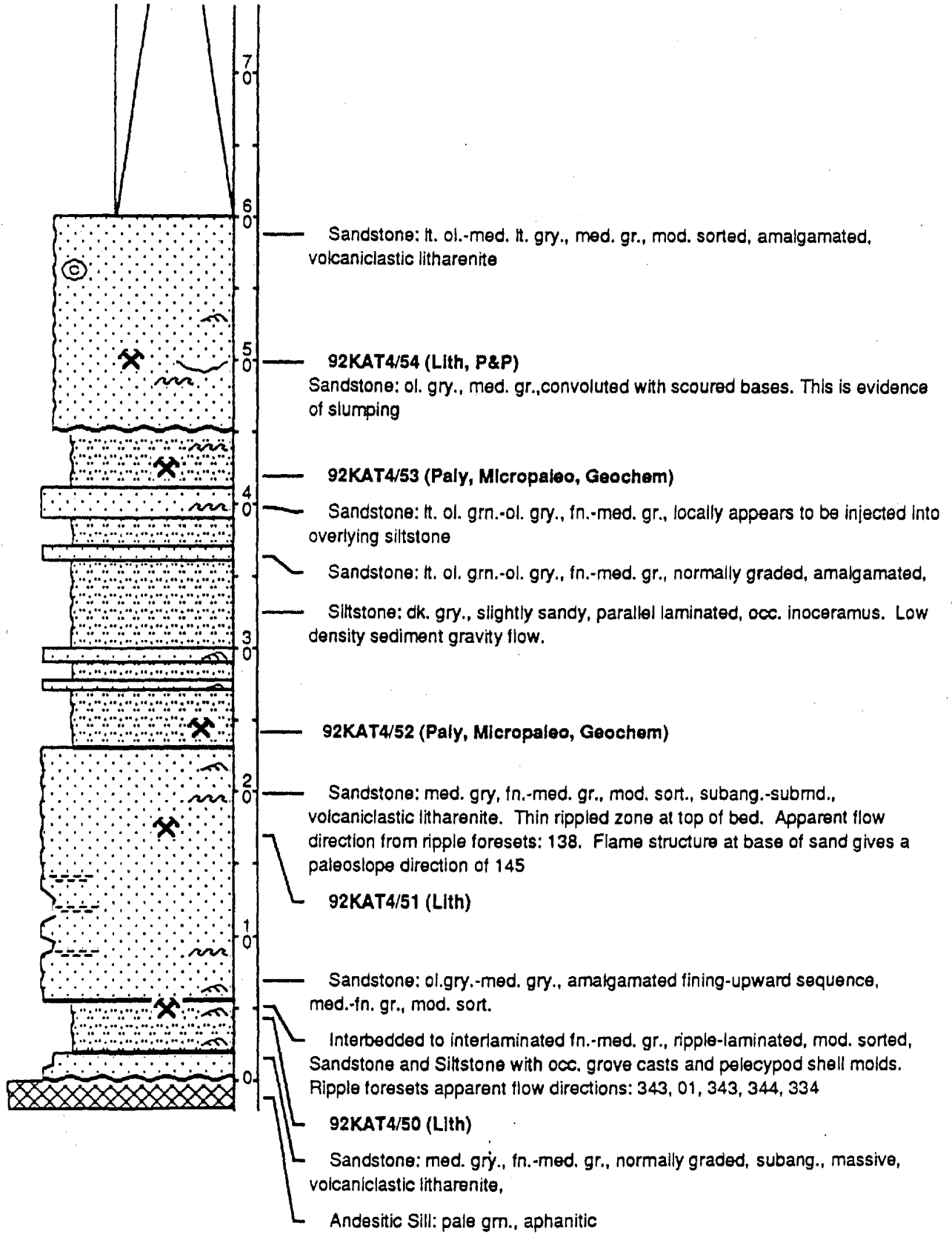
Interbedded sandstone and siltstone; Sandstone: med. fn. gr., mod. sorted, subang.-subrnd., amalgamated with possible parallel laminations. mud drapes

Large flame structure: apparent slope direction 115

Siltstone: dk. gry., parallel bedded, with thin interbeds of vfg. ol. gry., rippled and occ. lenticular, lithic sandstone. Some of the ripples are starved.

92KAT4/59 (Play, Micropaleo, Geochem)







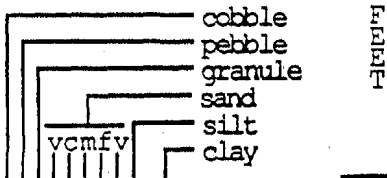
# MS-10, Herendeen/Naknek, Island S of Cape Kaguyak

Date logged: August 8, 1992

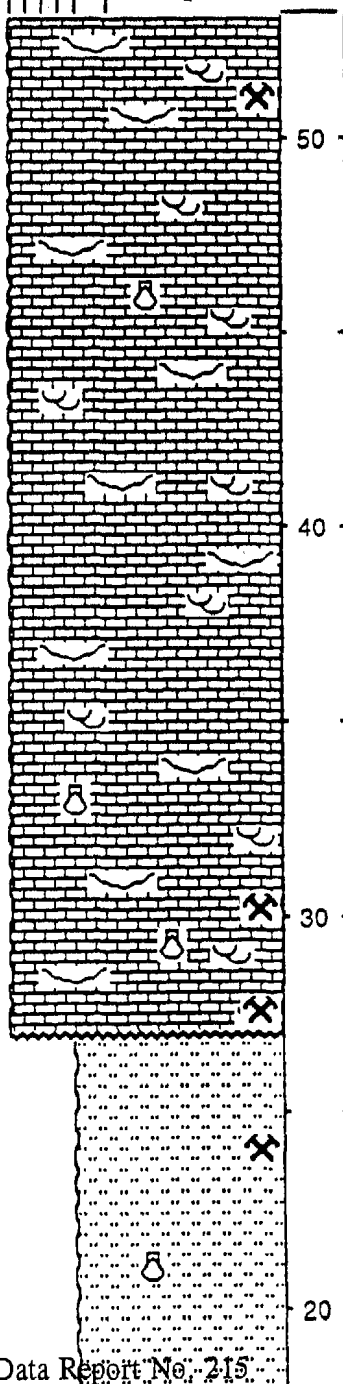
Logged by: McGowen, Doherty, Phillips, Krueger

Remarks: Compiled by S. Krueger

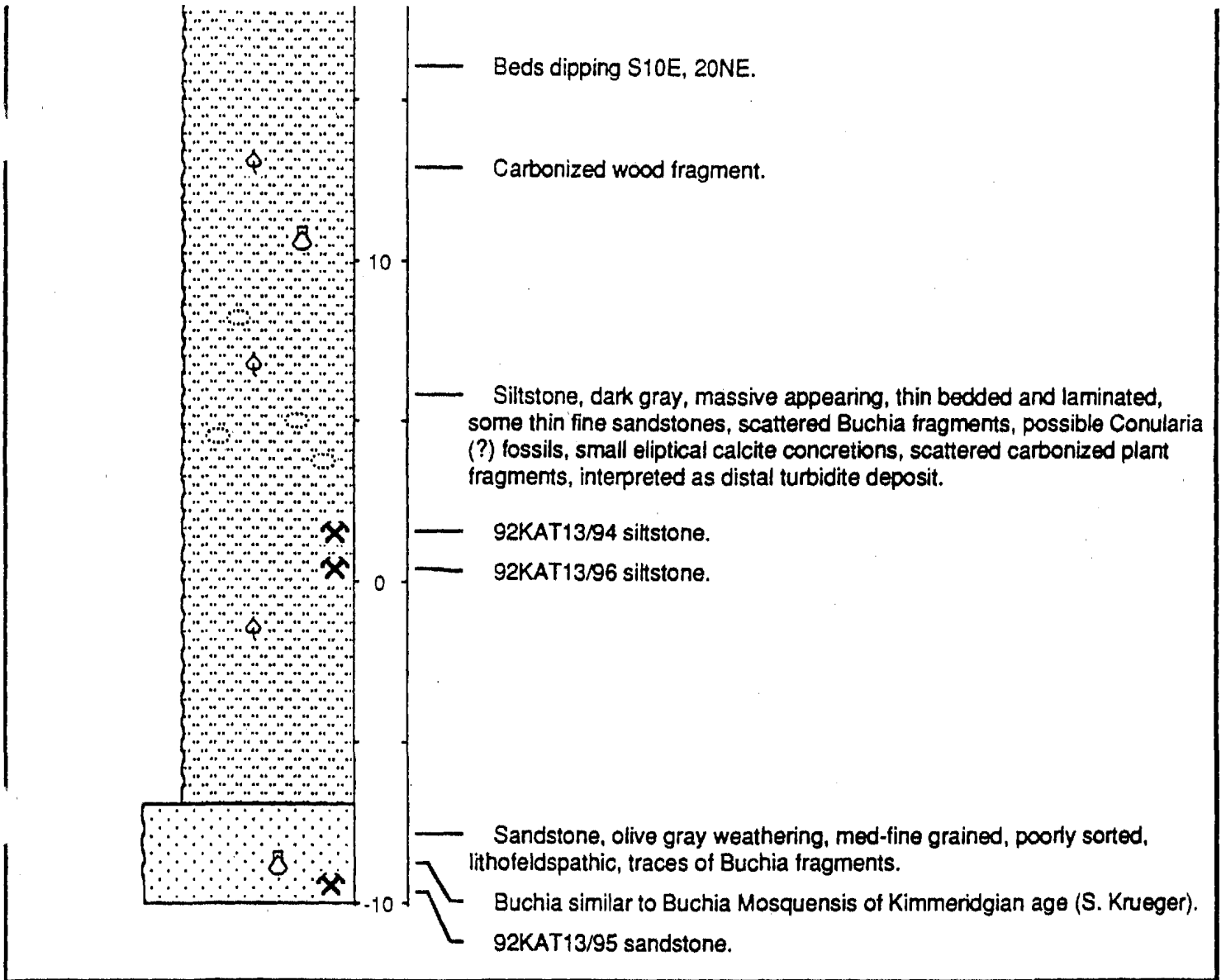
### GRAIN SIZE



Herendeen calcarenites are interpreted to be emplaced by strong, unidirectional traction currents. Some evidence for storm events, i.e. hummocky cross stratification. Upper flow regime structures. Depositional environment is interpreted to be a shallow seaway with strong along-shore currents.



- 92KAT13/100 calcarenite.
- Crossbed dip directions: 55, 80, 100, 140 azimuth
- Common belemnites give flow orientation data - apex orientations: 50, 136, 285, 334, 315, 255, 282, 133, 136, 345, 274, 319, 155, 283, 248, 338, 355, 251, 51, 168, 235, 315, 317, 144, 110, 229, 292, 5, 5, 334, 8, 335, 268, 152, 127.
- Amalgamated calcarenite, medium to light gray, weathers brownish gray, medium to coarse grained, moderately to well sorted, sand grains mostly calcite with subordinate qtz+plag+lithics, calcite seems to be small needles and prisms from disaggregated Inoceramus shells, abundant Inoceramus fragments, dominantly parallel laminated with some low-angle wedge sets, some irregular erosion surfaces, large-scale scour-and-fill, abundant low-angle truncation surfaces.
- 92KAT13/99 Calcarenite.
- 92KAT13/98 Calcarenite.
- Pronounced erosional unconformity.
- 92KAT13/97 Siltsone.
- Vertical burrows, tapered at base to 3/4", up to 6" high, roughly cylindrical walled, micrite filled, occur in groups.
- Helmenthoida burrows.



**BIOSTRATIGRAPHY**

## '92 LCI P&amp;P DATA

SAMP_NUM	M_POR	S_POR	M_PRM	S_PRM	S_KLG
92BI 2/1	1.1				
92BI 2/2	1.5				
92BI 2/3	0.5		0.06		0.00
92BI 2/4	1.0				
92BI 3/5	1.7		0.02		0.00
92KAT 1/1	0.1		0.12		0.00
92KAT 1/3	0.1		0.14		0.00
92KAT 1/9	8.8		3.19		0.13
92KAT 1/11	4.1		1.91		0.06
92KAT 1/12	3.5		0.00		0.00
92KAT 1/14	7.1		0.01		0.00
92KAT 1/15	2.9		93.94		23.92
92KAT 1/16	4.1		0.26		0.02
92KAT 1/17	7.7		0.01		0.00
92KAT 1/18	5.3		0.26		0.02
92KAT 1/21	3.4		0.65		0.04
92KAT 1/22	4.0		9.29		1.55
92KAT 1/25	0.5		0.05		0.00
92KAT 1/30	1.2		0.08		0.00
92KAT 2/31	3.6		0.64		0.05
92KAT 2/32	1.3		0.12		0.00
92KAT 3/35	3.3		1.09		0.02
92KAT 3/38	2.2		0.22		0.01
92KAT 3/41	3.7		0.16		0.01
92KAT 3/45	3.7		0.44		0.02
92KAT 3/47	3.7		0.19		0.01
92KAT 3/62	1.5				
92KAT 3/63	0.3		0.16		0.00
92KAT 3/64	6.1		0.92		0.05
92KAT 3/65	4.0		51.16		2.65
92KAT 4/39	10.7		10.31		1.09
92KAT 4/50	2.2		639.40		38.46
92KAT 4/51	4.5		0.12		0.00
92KAT 4/54	5.2		0.04		0.01
92KAT 4/55	2.0		0.06		0.00
92KAT 4/57	2.1		0.02		0.00
92KAT 4/60	4.3		0.15		0.00
92KAT 4/71	2.5		0.04		0.00
92KAT 5/82	13.5				
92KAT 5/84	3.7				
92KAT 5/87	0.4		0.05		0.00

'92 LCI P&P DATA

SAMP_NUM	M_POR	S_POR	M_PRM	S_PRM	S_KLG
SAMP_NUM	M_POR	S_POR	M_PRM	S_PRM	S_KLG
92KAT 8/66	1.4				
92KAT 9/67	1.3		0.07		0.00
92KAT 9/68	0.7		0.05		0.00
92KAT 9/69	0.3		1.08		0.35
92KAT 11/92	5.4		7.28		0.57
92KAT 12/91	0.2		0.25		0.01
92KAT 13/95	5.3		0.71		0.04
92KAT 13/98	3.7		0.07		0.00
92KAT 13/98	3.5		0.05		0.00
92KAT 13/99	2.9		0.19		0.01
92KAT 13/99	2.1		0.03		0.00
92KAT 13/100	1.7		0.09		0.00
92SI 1/1	2.3				
92SI 1/2	0.7		0.12		0.00
92SI 1/4	0.3		1.05		0.00
92SI 1/5	0.7		0.01		0.00
92SI 1/7	0.0		0.07		0.00
92SI 1/11	2.2		234.81		57.57
92SI 2/12	0.1		0.10		0.00
92SI 2/13	3.8				
92SI 2/14	1.1		2.11		0.12
92SI 2/15	0.3		3.20		0.41
92SI 2/16	0.6		4.63		0.01
92SI 2/17	0.5				
92SI 2/19	5.8				
92SI 2/20	0.5				
92SI 2/21	5.2				
92SI 2/23	0.8		0.14		0.00
92SI 4/24	0.0		0.08		0.00
92SKP 1/1	0.5		0.21		0.00
92SKP 1/3	2.2		34.23		14.54
92SKP 1/4	0.4		0.00		0.00
92SKP 1/5	0.8		0.07		0.00
92SKP 3/6	0.3		0.16		0.00
92SKP 3/8	0.0		0.18		0.00
92SKP 3/9	2.3		60.84		5.31
92SKP 3/10	0.0		0.03		0.00
92SKP 3/11	1.0		2.88		0.25
92SKP 3/12	0.4		0.01		0.00
92SKP 3/13	0.1		0.04		0.00

'92 LCI P&P DATA

SAMP_NUM	M_POR	S_POR	M_PRM	S_PRM	S_KLG
SAMP_NUM	M_POR	S_POR	M_PRM	S_PRM	S_KLG
92SKP 3/15	1.9		32.11		3.71
92SKP 3/16	0.1		0.02		0.00
92SKP 3/17	0.6		0.11		0.00
92SKP 3/18	0.2		0.07		0.00
92SKP 3/19	1.3				
92SKP 4/14	0.7				
92WB 1/1	1.9		0.63		0.01
92WB 2/30	1.8		0.10		0.00
92WB 2/31	6.2		0.02		0.00
92WB 2/32	1.2		0.09		0.00
92WB 2/33	0.5		0.02		0.00
92WB 2/35	0.4		0.04		0.00
92WB 2/37	5.8		0.33		0.03
92WB 2/39	10.2				
92WB 2/42	5.5				
92WB 3/4	6.5		62.05		20.25
92WB 3/43	4.1		0.37		0.06
92WB 4/11	9.1				
92WB 5/17	8.0				
92WB 5/18	1.3				
92WB 5/19	2.5		4.29		0.16
92WB 6/14	4.3		32.81		2.51
92WB 6/16	4.9		46.61		11.37
92WB 7/5	1.0		99.58		16.33
92WB 7/8	1.2		5.90		1.86
92WB 7/21	7.8		0.23		0.02
92WB 7/22	3.0		0.09		0.01
92WB 7/23	10.5				
92WB 7/24	0.5		6.06		1.63
92WB 7/25	4.1		3.59		0.68
92WB 7/26	5.7		109.13		15.56

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SAMPLE #	lab sample #	[ S1 ]	[ S2 ]	[ TOC ]	[ TMAX ]	[ HI ]	[ OI ]	[ S3 ]	[ HC ]	VR
92SKP3/8	92R4962	0.03	0.1	1.57	404	6.4	8.3	0.13	1.9	
92SKP3/9	92R4963			0.12						
92SKP3/10	92R4964	0.01	0.01	1.04	294	1	14.4	0.15	1	
92SKP3/11	92R4965	0.02	0.04	1.58	310	2.5	13.9	0.22	1.3	
92SKP3/12	92R4966	0.03	0.06	1.57	311	3.8	7.6	0.12	1.9	
92SKP3/13	92R4967	0.01	0.03	0.73	322	4.1	17.8	0.13	1.4	
92SKP3/20	92R4968			0.17						
92WB7/6	92R4969			0.2						
92WB7/7	92R4970			0.25						
92WB7/8	92R4971	0.01	0.04	0.54	274	7.4	29.6	0.16	1.9	
92WB7/9	92R4972			0.2						
92WB7/20	92R4973			0.14						
92WB2/28	92R4974	0	0	0.08	341	0	150	0.12	0	
92WB2/29	92R4975	0.16	1.71	0.5	434	342	32	0.16	32	
92WB2/34	92R4976			0.26						
92WB2/36	92R4977	0.09	1.64	0.62	432	264.5	25.8	0.16	14.5	
92WB2/41	92R4978			0.14						
92KAT1/2	92R4979			0.42						1.07
92KAT1/3	92R4980			0.3						
92KAT1/4	92R4981			0.15						indeterminate
92KAT1/5	92R4982			0.31						1.17
92KAT1/6	92R4983			0.23						indeterminate
92KAT1/7	92R4984			0.27						Indeterminate
92KAT1/20	92R4985			0.21						
92KAT1/21	92R4986			0.19						
92KAT1/22	92R4987			0.16						
92KAT1/23	92R4988			0.48						
92KAT1/24	92R4989			0.21						
92KAT1/27	92R4990			0.38						
92KAT1/28	92R4991			0.18						
92KAT1/29	92R4992			0.1						

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SAMPLE #	lab sample #	[ S1 ]	[ S2 ]	[ TOC ]	[ TMAX ]	[ HI ]	[ OI ]	[ S3 ]	[ HC ]	VR
92KAT2/33	92R4993			0.2						
92KAT3/34	92R4994	0.01	0	0.6	325	0	35	0.21	1.7	
92KAT3/36	92R4995	0.01	0	1.2	243	0	14.2	0.17	0.8	
92KAT3/37	92R4996	0.01	0	0.64	214	0	28.1	0.18	1.6	
92KAT3/39	92R4997	0.01	0	0.65	322	0	30.8	0.2	1.5	
92KAT3/40	92R4998	0.05	0.01	0.67	307	1.5	32.8	0.22	7.5	
92KAT3/42	92R4999	0.02	0	0.73	243	0	21.9	0.16	2.7	
92KAT3/43	92R5000	0	0	0.81	249	0	16	0.13	0	
92KAT3/44	92R5001	0.02	0	0.81	238	0	18.5	0.15	2.5	
92KAT3/46	92R5002	0.01	0	0.86	425	0	32.6	0.28	1.2	
92KAT3/48	92R5003	0	0.01	1.31	428	0.8	6.9	0.09	0	
92KAT3/49	92R5004	0.01	0	0.84	344	0	8.3	0.07	1.2	
92KAT4/52	92R5005	0.03	0.01	0.65	253	1.5	10.8	0.07	4.6	
92KAT4/53	92R5006	0.02	0.01	0.75	274	1.3	5.3	0.04	2.7	
92KAT4/56	92R5007	0.02	0.04	0.71	352	5.6	2.8	0.02	2.8	
92KAT4/58	92R5008			0.47						
92KAT4/59	92R5009	0.02	0.07	0.76	376	9.2	6.6	0.05	2.6	
92KAT4/61	92R5010	0.02	0.04	0.84	311	4.8	9.5	0.08	2.4	
92KAT4/62	92R5011	missing sample								
92KAT4/72	92R5012	0.03	0.08	0.57	320	14	8.8	0.05	5.3	
92KAT4/73	92R5013	0.03	0.08	0.75	356	10.7	4	0.03	4	
92KAT5/74	92R5014	0.04	0.06	0.54	307	11.1	37	0.2	7.4	
92KAT5/75	92R5015	0.06	0.1	0.74	336	13.5	10.8	0.08	8.1	
92KAT5/76	92R5016	0.04	0.13	0.82	379	15.9	7.3	0.06	4.9	
92KAT5/77	92R5017	0.02	0.03	0.35	313	8.6	11.4	0.04	5.7	
92KAT5/78	92R5018	0.06	0.06	0.68	358	8.8	7.3	0.05	8.8	
92KAT5/79	92R5019	0.06	0.1	0.7	302	14.3	14.3	0.1	8.6	
92KAT5/80	92R5020	0.05	0.04	0.49	313	8.2	36.7	0.18	10.2	
92KAT5/81	92R5021	0.12	0.09	0.52	274	17.3	144.2	0.75	23.1	
92KAT5/83	92R5022	0.03	0.1	0.86	307	11.6	17.4	0.15	3.5	

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SAMPLE #	lab sample #	[ S1 ]	[ S2 ]	[ TOC ]	[ TMAX ]	[ HI ]	[ OI ]	[ S3 ]	[ HC ]	VR
92KAT5/85	92R5023	0.09	0.18	0.77	370	23.4	23.4	0.18	11.7	
92KAT5/86	92R5024	0.03	0.1	0.85	427	11.8	23.5	0.2	3.5	
92KAT5/88	92R5025	0.07	0.1	0.81	361	12.4	12.4	0.1	8.6	
92KAT14/101	92R5026			0.17						
92SI1/3	92R5027			0.14						
92SI1/4	92R5028			0.19						
92SI1/5	92R5029			0.2						
92SI1/6	92R5030			0.14						
92SI1/9	92R5031			0.29						
92SI2/14	92R5032			0.35						
92SI2/18	92R5033			0.4						
92SI2/22	92R5034			0.19						



1992 LCI xral data

SAMPLE 92:		BI 2/3	SI 1/8	SI 2/16	SI 2/17	SI 4/24	SKP 3/17	KAT 1/30	KAT 5/82	KAT 5/84	WB 1/1	WB 2/30	WB 2/32	WB 2/33	WB 2/35
Li	PPM	7	5	7	2	11	6	48	8	6	6	11	23	18	14
Pb	PPM	18	29	3	4	3	8	21	110	19	9	21	27	32	26
Cs	PPM	<1	<1	<1	<1	1	<1	1	4	<1	<1	9	1	1	1
Sr	PPM	205	232	134	50	232	395	914	405	193	346	178	748	1380	145
Ba	PPM	169	1360	41	<10	<10	285	722	1980	266	50	623	2140	3790	357
Y	PPM	27	37	33	16	12	27	16	47	63	17	21	17	25	14
La	PPM	7.8	8.6	9.1	6.5	0.7	5.1	10.9	23.1	44.3	4.1	8	8.7	13.1	9.9
Ce	PPM	18.7	21	17.5	14.5	2.1	13.2	21	46.8	72.7	11.1	17.2	12.8	18.3	11.6
Pr	PPM	2.3	2.8	2.1	1.7	0.3	1.8	2.6	4.8	6.6	1.6	2.4	1.9	2.8	2.1
Nd	PPM	11.3	14.1	10.2	8	2	8.9	10.9	19.9	27.1	8.3	11.3	8.6	12.7	9.2
Sm	PPM	3.4	4.3	3.3	2.3	0.9	3	2.7	5.3	5.6	2.8	3.4	2.2	3.3	2.2
Eu	PPM	1.14	1.51	1.18	0.86	0.36	1.13	0.9	1.66	1.57	0.98	1.17	0.95	1.35	0.64
Gd	PPM	4.4	5.8	4.8	2.8	1.5	4.2	3.1	6.2	8.1	3.4	4	2.8	4	2.6
Tb	PPM	0.6	0.8	0.7	0.3	0.2	0.6	0.4	0.8	1	0.4	0.5	0.4	0.5	0.3
Dy	PPM	4.5	5.9	5.3	2.5	1.9	4.4	2.6	5.7	7.4	3	3.7	2.7	3.7	2.2
Er	PPM	2.5	3.2	3	1.2	1.1	2.5	1.4	2.9	4.4	1.6	2.1	1.4	2.3	1.1
Tm	PPM	0.4	0.5	0.5	0.2	0.2	0.4	0.2	0.4	0.6	0.2	0.3	0.2	0.4	0.2
Yb	PPM	2.6	3.3	3.3	1.5	1.4	2.8	1.6	2.7	4.5	1.7	2.6	1.6	2.7	1.3
Lu	PPM	0.42	0.46	0.49	0.28	0.23	0.5	0.35	0.43	0.72	0.26	0.49	0.27	0.43	0.2
Th	PPM	0.7	0.6	<0.5	0.9	<0.5	0.5	1.6	8.6	1.1	<0.5	7.2	1.1	1.5	0.8
U	PPM	0.7	0.6	0.5	0.8	0.4	0.2	1.3	4.2	0.6	0.1	3.5	0.9	0.9	1
Zr	PPM	69	96	74	74	31	66	95	494	69	47	191	57	68	56
Hf	PPM	1.4	2.4	2.2	1.7	<0.5	1.3	2.4	13	1.7	1.4	5.5	1.2	1.5	1.1
Nb	PPM	8	7	5	5	5	6	8	15	5	5	8	5	7	4
Ta	PPM	<1	<1	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1
W	PPM	<1	2	<1	4	<1	<1	<1	5	<1	4	<1	<1	<1	3
Sc	PPM	47.8	28.8	34.3	14.3	34.9	38.3	15.6	26.3	3.67	49.9	11.3	16.8	19.3	12.9
V	PPM	416	52	101	26	194	348	116	69	12	358	60	109	147	97
Cr	PPM	10	10	5	6	850	7	41	10	<2	150	11	22	27	18
Co	PPM	30	9	20	4	50	24	8	15	3	35	2	8	7	7
Ni	PPM	5	<1	<1	<1	361	2	20	7	<1	49	2	12	13	16
Cu	PPM	216	84.5	46.3	35.7	90.4	67.3	48.2	17.2	2.1	123	16.8	40.6	41.5	45

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1992 LCI xral data

SAMPLE 92:		BI 2/3	SI 1/8	SI 2/16	SI 2/17	SI 4/24	SKP 3/17	KAT 1/30	KAT 5/82	KAT 5/84	WB 1/1	WB 2/30	WB 2/32	WB 2/33	WB 2/35
Pb	PFM	<2	<2	<2	<2	<2	<2	<2	10	3	<2	<2	<2	<2	<2
Zn	PFM	144	91.1	77.9	59.4	70.4	94.7	75	212	31.5	76.5	68.9	88.5	81	87.1
Hg	PFB	23	11	126	31	<5	<5	<5	246	43	<5	30	64	65	57
Mo	PFM	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
As	PFM	3.7	<0.1	6.2	1.8	<0.1	<0.1	0.8	57	11	<0.1	1.9	2.3	3.8	3.1
Se	PFM	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	0.9	<0.5	<0.5	0.9	1	0.9	0.9
Br	PFM	3	2	2	5	4	3	3	2	2	2	3	2	4	3
Sn	PFM	12	10	4	12	8	8	7	4	11	7	6	4	6	12
Tl	PFM	0.1	0.2	<0.1	<0.1	<0.1	<0.1	0.2	0.8	0.2	<0.1	<0.1	<0.1	0.1	0.1
Sb	PFM	0.5	0.3	0.7	0.3	0.3	0.2	0.3	2.7	0.8	0.1	0.5	0.5	0.5	0.8
Ag	PFM	<0.1	0.7	0.1	<0.1	0.1	<0.1	<0.1	1.7	<0.1	<0.1	<0.1	0.2	0.6	0.3
Au	PFB	2	<1	3	3	7	<1	<1	4	<1	5	2	<1	1	3
Pt	PFB	<10	<10	<10	<10	14	<10	<10	<10	<10	11	<10	<10	<10	17
Pd	PFB	4	2	<1	3	10	2	3	2	<1	12	3	<1	4	4
In	PFM	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ga	PFM	18	15	18	10	12	18	15	19	5	16	16	14	14	7
Ge	PFM	12	29	<10	<10	<10	<10	<10	14	31	13	<10	<10	<10	<10
Be	PFM	5	4	3	2	3	4	3	3	2	3	3	3	3	2
B	PFM	18	21	23	21	30	38	34	274	47	23	19	27	25	16
SUM	wt%	100.2	99.2	100.2	100.4	99.6	100.6	99.8	99.1	100.1	99.6	100.3	97.2	98.5	98.3

GAMMA RAY

## WBMS-3 Gamma

FEET	COUNTS 1	COUNTS 2	COUNTS 3	COUNTS	FEET
0	119	112	113	115	0
2	127	123	130	127	2
2.5	99	109	103	104	2.5
4.5	120	128	126	125	4.5
5	121	125	119	122	5
8	128	124	127	126	8
12	111	113	114	113	12
15	114	132	128	125	15
45	95	91	94	93	45
46	137	140	133	137	46
48	114	111	112	112	48
52.5	132	131	130	131	52.5
55	115	113	121	116	55
57	102	104	110	105	57
57.5	121	124	117	121	57.5
58	106	111	107	108	58
59.5	130	128	130	129	59.5
62	125	128	126	126	62
64	110	111	117	113	64
69	142	138	144	141	69
71	129	125	132	129	71
72	128	123	130	127	72
79	106	103	106	105	79
82	117	117	117	117	82
84	105	109	112	109	84
90	78	89	90	86	90
95	106	99	104	103	95
100	101	102	96	100	100
102	95	92	95	94	102
105	97	97	98	97	105
108	88	91	91	90	108
109	96	100	101	99	109
111	117	115	116	116	111
112	96	98	91	95	112
116	97	98	95	97	116
119	109	112	105	109	119
120	98	85	85	89	120
125	92	99	99	97	125
130	113	104	110	109	130
135	96	96	99	97	135
137	115	117	116	116	137
138	94	101	101	99	138
140	90	89	92	90	140
144	131	124	120	125	144
150	115	113	118	115	150

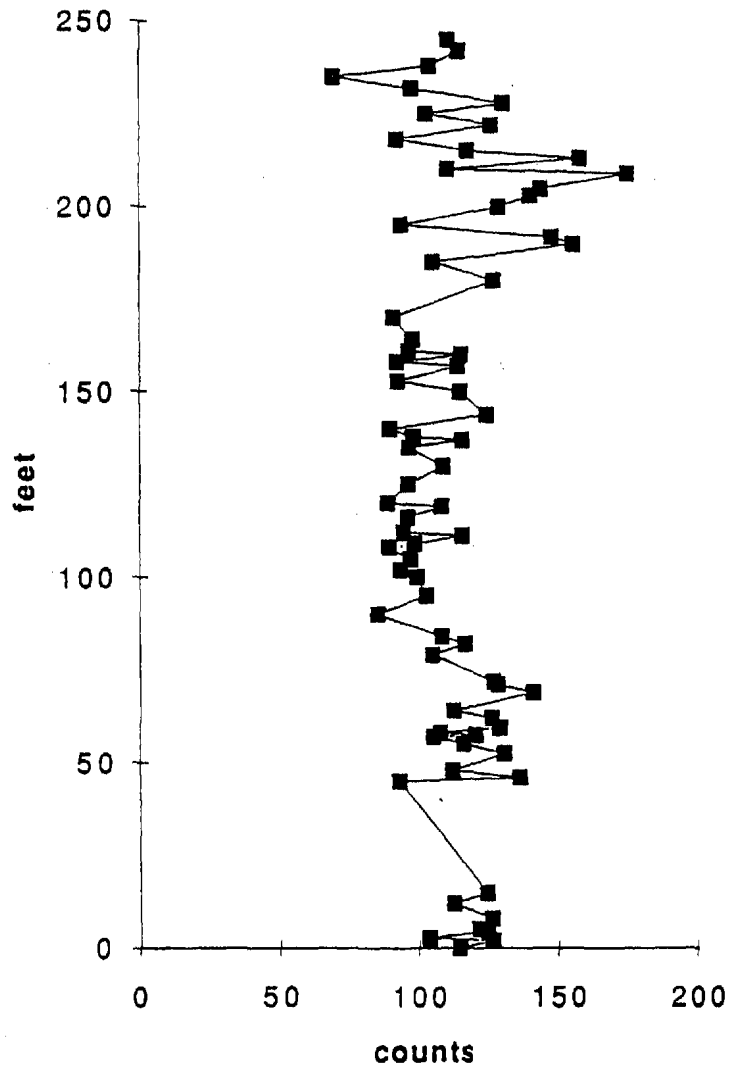
WBMS-3 Gamma

153	95	95	89	93	153
157	114	112	117	114	157
158	94	90	94	93	158
160	113	118	116	116	160
161	101	92	98	97	161
164	101	96	98	98	164
170	93	91	91	92	170
180	132	124	127	128	180
185	109	102	105	105	185
190	161	156	151	156	190
192	153	141	151	148	192
195	91	95	97	94	195
200	128	132	128	129	200
203	138	145	140	141	203
205	142	147	145	145	205
209	180	177	170	176	209
210	110	108	115	111	210
213	159	155	161	158	213
215	116	122	116	118	215
218	97	91	90	93	218
222	131	122	127	127	222
225	102	103	104	103	225
228	133	128	132	131	228
232	101	95	98	98	232
235	72	70	67	70	235
238	102	109	102	104	238
242	109	119	117	115	242
245	111	113	109	111	245



MS3

### MS3 Outcrop Gamma Log



## MS4 Gamma

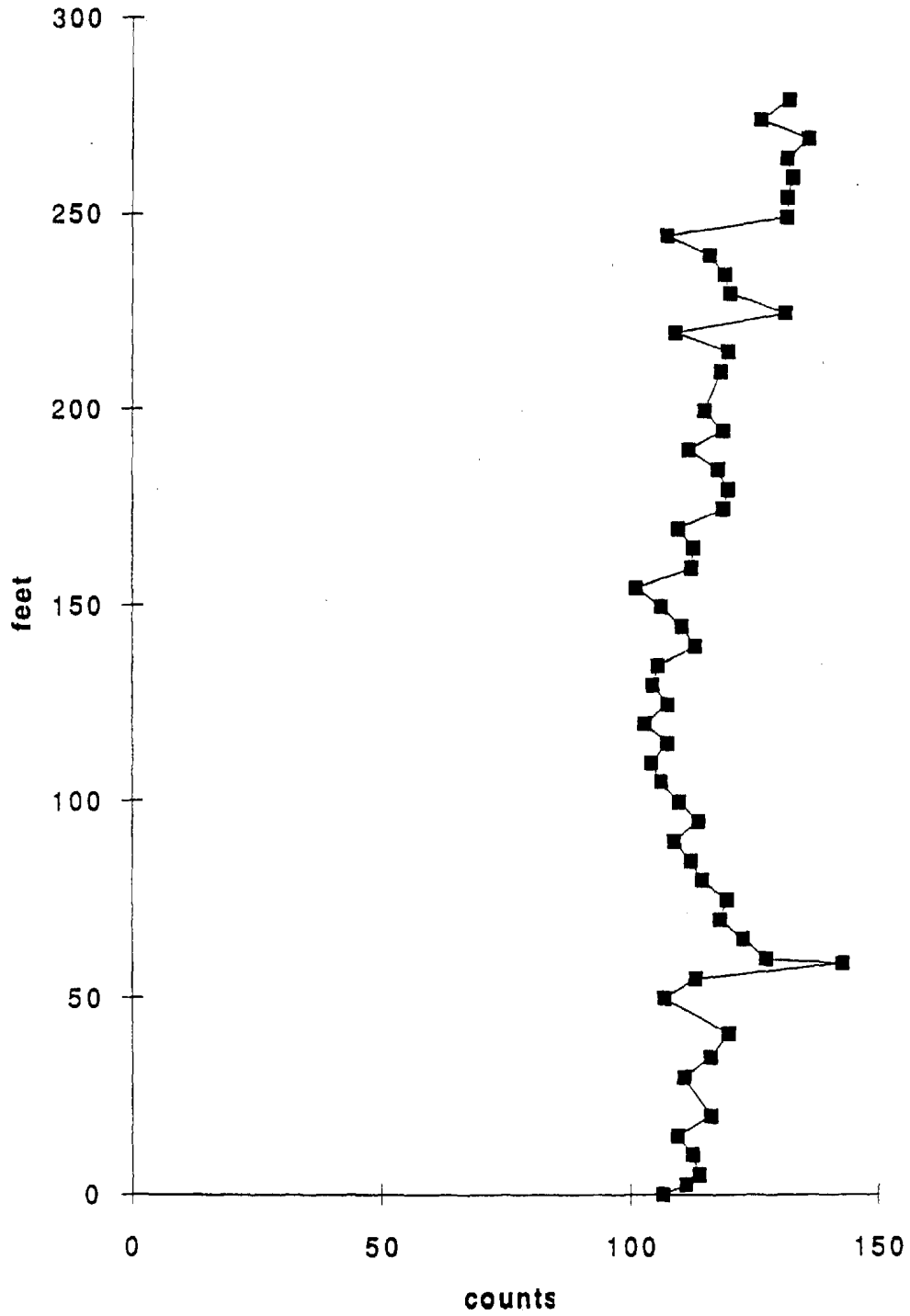
FEET	COUNTS 1	COUNTS 2	COUNTS 3	FEET	COUNTS	FEET
0	103	110	107	0	107	0
2.5	111	112	111	2.5	111	2.5
5	109	121	112	5	114	5
10	110	116	112	10	113	10
15	108	107	114	15	110	15
20	118	114	117	20	116	20
30	114	112	107	30	111	30
35	119	117	113	35	116	35
41	124	122	114	41	120	41
50	104	108	109	50	107	50
55	114	114	112	55	113	55
59	152	141	136	59	143	59
60	122	130	131	60	128	60
65	119	122	128	65	123	65
70	117	121	117	70	118	70
75	122	116	121	75	120	75
80	115	111	118	80	115	80
85	117	107	113	85	112	85
90	108	107	112	90	109	90
95	114	112	116	95	114	95
100	111	104	115	100	110	100
105	105	105	109	105	106	105
110	98	110	105	110	104	110
115	110	107	106	115	108	115
120	101	103	105	120	103	120
125	108	103	112	125	108	125
130	104	105	105	130	105	130
135	108	101	108	135	106	135
140	118	114	108	140	113	140
145	111	112	109	145	111	145
150	108	107	104	150	106	150
155	102	98	104	155	101	155
160	110	112	116	160	113	160
165	116	108	115	165	113	165
170	109	111	110	170	110	170
175	123	117	117	175	119	175
180	123	122	115	180	120	180
185	122	113	119	185	118	185
190	114	112	110	190	112	190
195	117	122	118	195	119	195
200	114	115	117	200	115	200
210	117	122	117	210	119	210
215	118	124	118	215	120	215
220	111	108	109	220	109	220
225	134	133	128	225	132	225

## MS4 Gamma

230	127	120	114	230	120	230
235	117	122	119	235	119	235
240	116	114	119	240	116	240
245	104	111	108	245	108	245
250	138	128	130	250	132	250
255	131	129	136	255	132	255
260	134	129	136	260	133	260
265	130	130	136	265	132	265
270	138	142	129	270	136	270
275	126	131	123	275	127	275
280	130	135	132	280	132	280

Chart1

### MS4 Outcrop Gamma Log



## MS6 Gamma

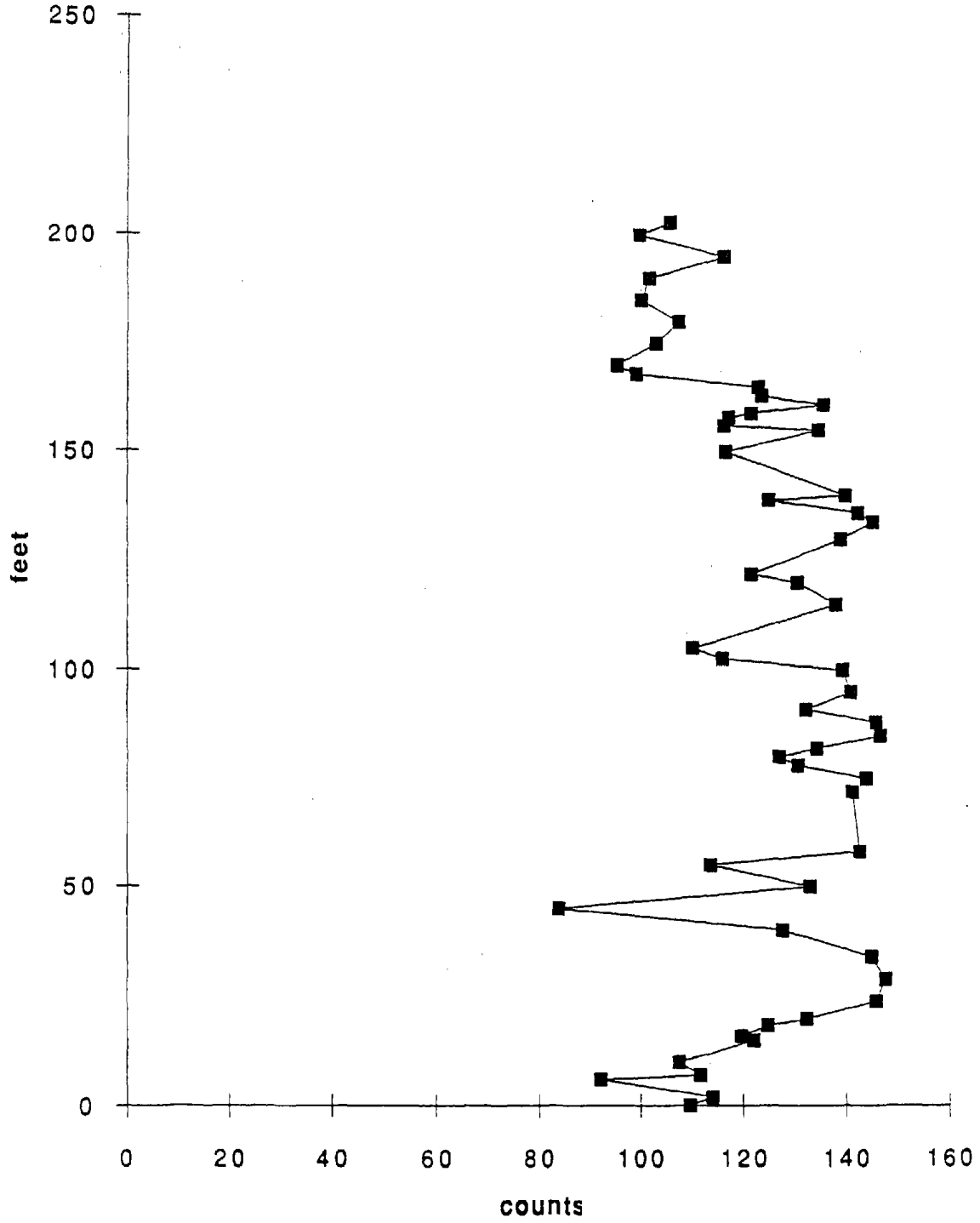
FEET	COUNTS 1	COUNTS 2	COUNTS 3	COUNTS	FEET
0	117	108	104	110	0
2	117	109	116	114	2
6	89	94	94	92	6
7	110	110	115	112	7
10	105	106	112	108	10
15	122	124	120	122	15
16	114	127	118	120	16
18.5	122	121	131	125	18.5
20	130	131	136	132	20
24	141	150	147	146	24
29	145	147	151	148	29
34	146	148	141	145	34
40	130	125	128	128	40
45	19	119	114	84	45
50	132	133	134	133	50
55	114	117	110	114	55
58	142	143	143	143	58
72	140	142	142	141	72
75	141	146	145	144	75
78	131	129	132	131	78
80	131	125	125	127	80
82	138	135	130	134	82
85	145	146	149	147	85
88	150	142	146	146	88
91	130	136	131	132	91
95	141	144	138	141	95
100	141	135	142	139	100
102.5	117	111	120	116	102.5
105	111	110	110	110	105
115	136	140	138	138	115
120	129	129	134	131	120
122	124	121	120	122	122
130	142	137	138	139	130
134	145	141	150	145	134
136	138	145	144	142	136
139	122	129	124	125	139
140	141	140	139	140	140
150	115	116	119	117	150
155	134	132	138	135	155
156	117	117	115	116	156
158	120	114	118	117	158
159	119	123	123	122	159
161	139	138	130	136	161
163	128	121	122	124	163
165	125	121	123	123	165

MS6 Gamma

168	99	97	102	99	168
170	96	93	98	96	170
175	99	107	104	103	175
180	106	112	105	108	180
185	101	105	95	100	185
190	104	101	101	102	190
195	115	119	115	116	195
200	98	101	101	100	200
203	106	107	105	106	203

MS6

MS6 Outcrop Gamma Log



MS7 Gamma

FEET	COUNTS 1	COUNTS 2	COUNTS 3	COUNTS	FEET	
0	140	138	130	136	0	
5	134	134	138	135	5	
10	129	136	133	133	10	
15	132	126	131	130	15	
20	136	127	138	134	20	
25	148	144	147	146	25	
30	132	131	132	132	30	
35	136	138	137	137	35	
40	134	133	141	136	40	
45	137	141	149	142	45	
50	135	126	136	132	50	
55	138	132	140	137	55	
60	141	147	141	143	60	
65	128	130	132	130	65	
70	136	133	135	135	70	
75	131	130	130	130	75	
80	126	128	127	127	80	
85	140	136	137	138	85	
88	142	140	135	139	88	
89	105	107	103	105	89	
95	121	121	121	121	95	
98	119	115	123	119	98	
101	106	103	108	106	101	
100	100	102	103	102	100	
105	95	100	100	98	105	
110	96	88	92	92	110	
113	97	98	98	98	113	
115	91	94	97	94	115	
120	101	99	100	100	120	
122	94	94	90	93	122	
123	81	82	75	79	123	
128	71	67	71	70	128	
129	84	87	89	87	129	
130	99	98	101	99	130	
135	99	96	100	98	135	
137	96	93	97	95	137	
140	87	85	92	88	140	
145	88	91	91	90	145	
149	85	97	90	91	149	
150	106	106	97	103	150	
155	85	88	88	87	155	
160	89	92	90	90	160	
165	93	88	92	91	165	
169	93	93	91	92	169	
170	107	104	97	103	170	Section moved W along strike

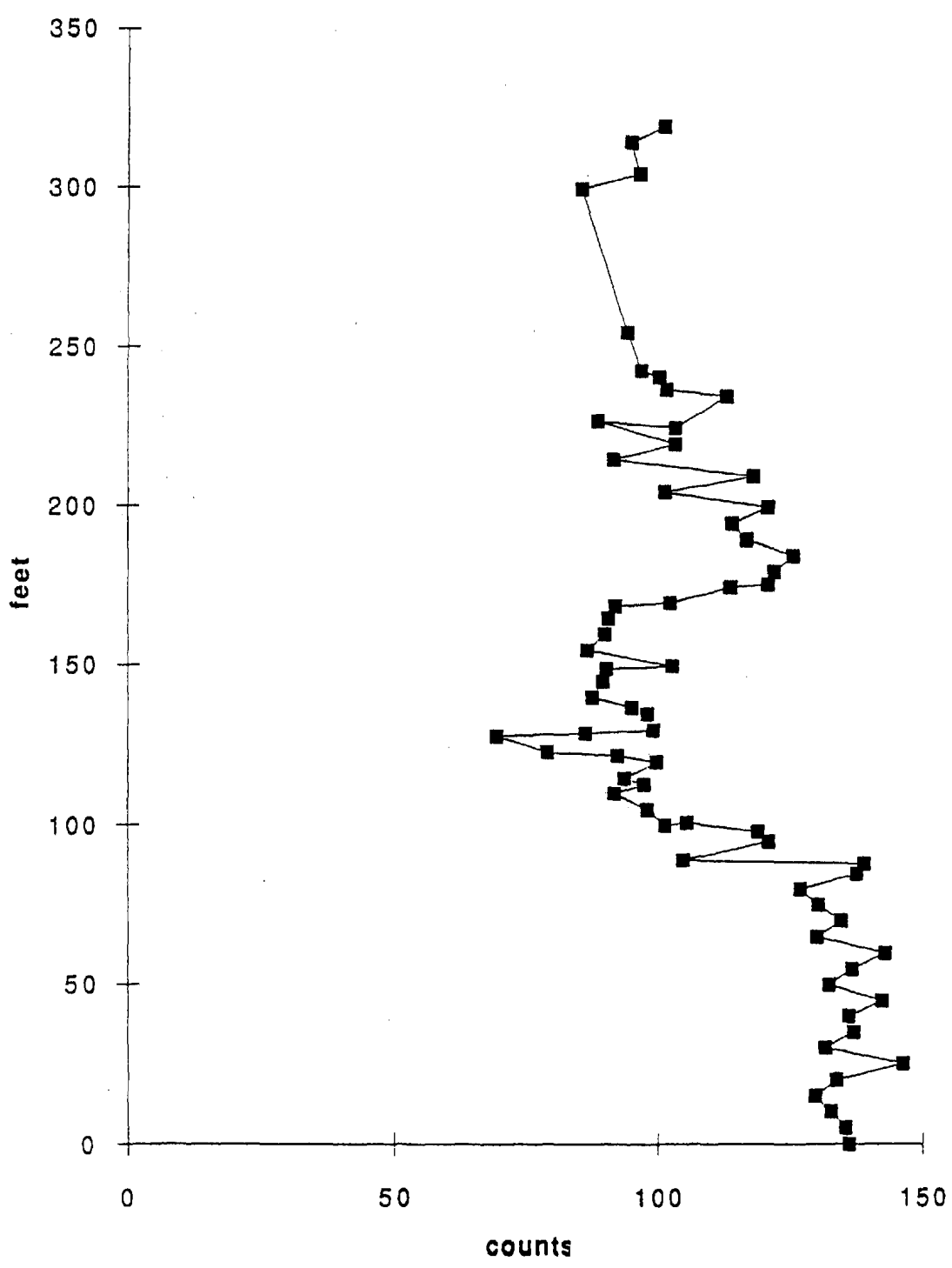


## MS7 Gamma

175	118	113	111	114	175
176	123	116	124	121	176
180	122	121	123	122	180
185	124	128	125	126	185
190	122	118	111	117	190
195	114	115	114	114	195
200	119	126	118	121	200
205	102	101	102	102	205
210	118	120	117	118	210
215	96	91	89	92	215
220	101	106	104	104	220
227	88	88	91	89	227
225	105	101	105	104	225
235	118	110	112	113	235
237	104	100	102	102	237
241	99	101	102	101	241
243	94	98	100	97	243
255	95	92	97	95	255
300	88	84	86	86	300
305	100	95	96	97	305
315	98	95	93	95	315
320	98	104	103	102	320

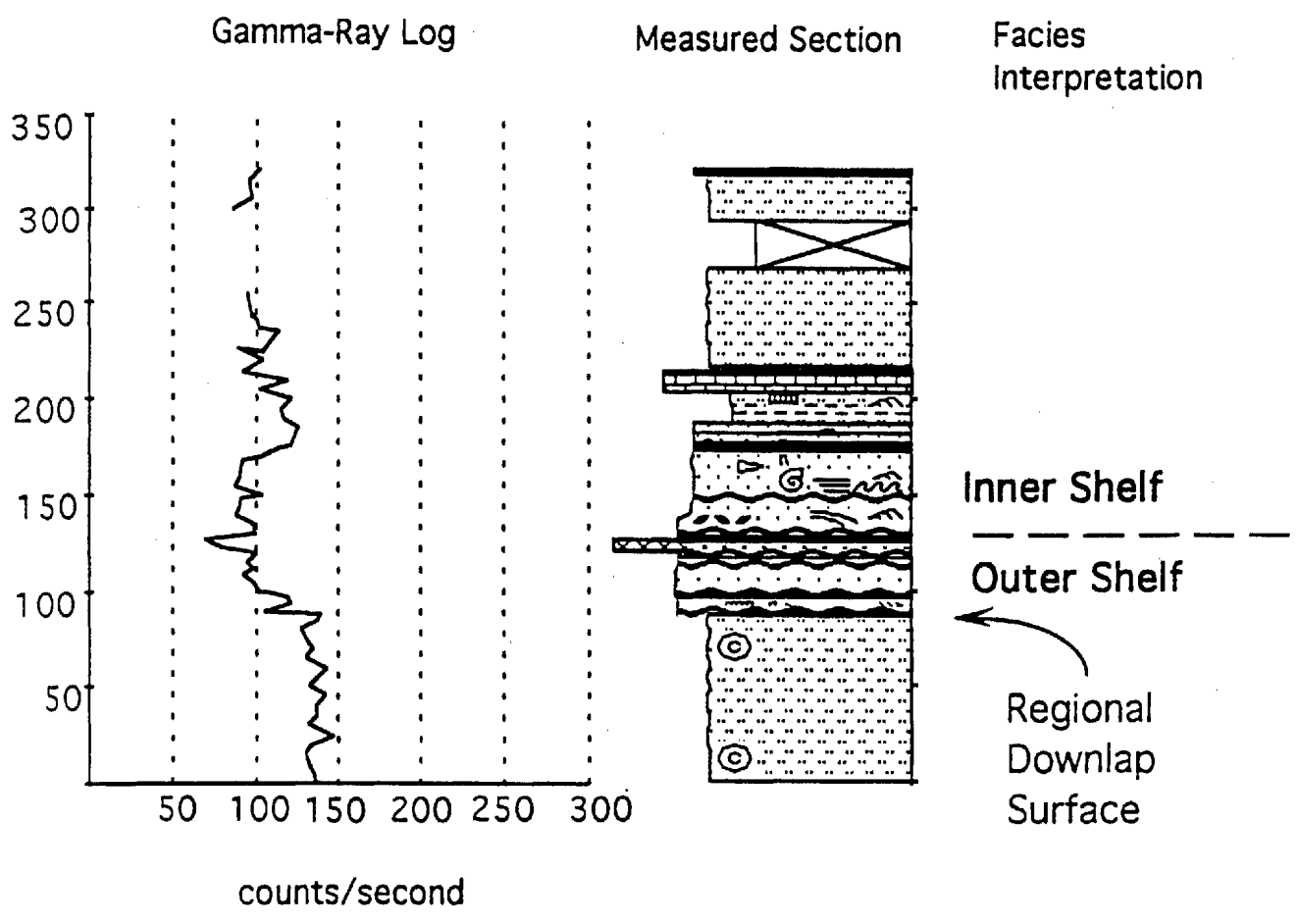
Chart4

MS7 Outcrop Gamma Log



# KATMS-7

## "Base of Herendeen"



MS-8,9 gamma

	FEET	COUNTS 1	COUNTS 2	COUNTS 3	Counts	FEET	
	0.0	215	219	215	216	0	
	2.5	190	194	194	193	2.5	
	3.0	202	201	208	204	3	
	3.5	190	191	188	190	3.5	
	5.0	180	175	188	181	5	
	7.0	166	173	165	168	7	
	8.0	191	193	199	194	8	
	10.0	180	178	180	179	10	
	12.0	195	196	197	196	12	
	13.0	154	150	149	151	13	
	15.0	160	164	155	160	15	
	17.0	191	189	191	190	17	fault
	20.0	167	163	161	164	20	
	21.0	168	174	168	170	21	
	23.0	149	156	151	152	23	
	27.0	220	222	217	220	27	
	28.0	174	178	172	175	28	
	29.5	204	208	215	209	29.5	
	31.0	180	173	174	176	31	
	35.0	156	151	155	154	35	
	39.0	153	158	157	156	39	
	41.0	190	186	187	188	41	
	43.0	205	217	206	209	43	
	45.0	158	155	152	155	45	
	55.0	186	189	183	186	55	
	60.0	198	197	192	196	60	
	62.0	177	161	166	168	62	
	63.0	181	186	189	185	63	
	65.0	198	196	203	199	65	
	67.0	187	187	184	186	67	
	69.0	211	217	205	211	69	
	71.0	198	189	197	195	71	
	73.0	205	206	206	206	73	
	75.0	190	187	187	188	75	
	77.0	194	199	196	196	77	
	79.0	174	176	171	174	79	
	81.0	169	166	170	168	81	
	89.0	246	244	243	244	89	
	90.0	219	220	227	222	90	
	93.0	176	194	184	185	93	
	95.0	196	194	191	194	95	
	97.0	214	212	213	213	97	
	99.5	213	219	216	216	99.5	
	100.0	221	230	219	223	100	
	102.0	196	182	191	190	102	

## MS-8,9 gamma

	103.5	206	200	199	202	103.5	
	105.0	215	224	214	218	105	
	106.0	183	175	182	180	106	
	111.0	201	195	186	194	111	
	112.0	198	203	196	199	112	
	113.0	159	154	162	158	113	
	115.0	176	170	163	170	115	
	117.0	185	188	184	186	117	
	120.0	207	207	212	209	120	
	122.0	216	213	204	211	122	
	125.0	225	229	226	227	125	
	130.0	191	185	190	189	130	
	133.0	183	190	182	185	133	
	135.0	200	192	178	190	135	
	139.0	193	191	197	194	139	
	140.0	184	182	180	182	140	
	144.0	165	175	166	169	144	
	147.0	159	162	162	161	147	
	148.0	199	208	201	203	148	
	152.0	161	167	177	168	152	
	153.0	206	202	197	202	153	
	154.0	175	163	167	168	154	
	155.0	180	174	174	176	155	
	160.0	176	198	197	190	160	
	164.0	215	218	220	218	164	
	165.0	195	182	195	191	165	
	167.0	209	212	213	211	167	
	170.0	215	209	211	212	170	
	173.0	188	181	189	186	173	
	176.0	243	251	250	248	176	
	178.0	197	196	203	199	178	
	185.0	195	198	210	201	185	
	190.0	186	167	174	176	190	
	195.0	207	220	220	216	195	
	200.0	209	227	216	217	200	
	205.0	176	173	175	175	205	
	210.0	191	194	188	191	210	
	215.0	213	210	215	213	215	
	220.0	154	144	159	152	220	
	225.0	159	143	153	152	225	
	240.0	153	149	153	152	240	
	245.0	159	173	164	165	245	
	250.0	157	164	160	160	250	
	255.0	156	152	154	154	255	
	265.0	180	184	191	185	265	
	280.0	165	157	161	161	280	

MS-8,9 gamma

	283.0	203	207	199	203	283	
	285.0	219	210	208	212	285	
	290.0	195	191	199	195	290	
	295.0	197	196	196	196	295	
	300.0	224	230	215	223	300	
	305.0	229	223	226	226	305	
	310.0	199	192	190	194	310	
	315.0	184	168	180	177	315	
	320.0	240	240	235	238	320	
	335.0	212	215	218	215	335	
	340.0	228	222	225	225	340	
	345.0	198	194	198	197	345	
	350.0	196	188	189	191	350	
	355.0	203	208	205	205	355	
	360.0	148	146	143	146	360	
	365.0	167	171	178	172	365	
	370.0	165	172	174	170	370	
	375.0	205	195	193	198	375	
0	380.0	106	101	109	105	380	MS-9
0.5	380.5	148	142	142	144	380.5	
1	381.0	196	193	197	195	381	
1.5	381.5	197	206	202	202	381.5	
2	382.0	219	222	219	220	382	
4	384.0	218	220	214	217	384	
5	385.0	234	238	232	235	385	
6	386.0	180	186	186	184	386	
7.5	387.5	175	182	178	178	387.5	
9	389.0	170	170	169	170	389	
11	391.0	168	173	173	171	391	
15	395.0	171	185	173	176	395	
20	400.0	173	182	180	178	400	
22	402.0	193	184	198	192	402	
23	403.0	217	212	202	210	403	
23.5	403.5	219	209	214	214	403.5	
25	405.0	224	215	201	213	405	
27	407.0	201	203	194	199	407	
28	408.0	233	233	224	230	408	
29.5	409.5	196	191	195	194	409.5	
32	412.0	236	234	244	238	412	
33.5	413.5	216	220	219	218	413.5	
34.5	414.5	181	195	196	191	414.5	
36	416.0	219	208	223	217	416	
39	419.0	210	204	204	206	419	
41	421.0	239	233	244	239	421	
44	424.0	195	202	205	201	424	
44.5	424.5	210	213	224	216	424.5	

MS-8,9 gamma

45	425.0	181	188	187	185	425	
50	430.0	170	176	171	172	430	
54	434.0	201	203	190	198	434	
55	435.0	180	178	187	182	435	
60	440.0	181	176	185	181	440	
114	494.0	194	202	198	198	494	
115	495.0	196	192	190	193	495	
116	496.0	171	173	172	172	496	
120	500.0	190	182	181	184	500	
124	504.0	196	191	185	191	504	
126	506.0	180	181	183	181	506	
127	507.0	175	184	178	179	507	
130	510.0	206	197	203	202	510	
133	513.0	242	232	235	236	513	
135	515.0	235	243	234	237	515	
138	518.0	189	184	191	188	518	
139	519.0	202	204	204	203	519	
140	520.0	186	184	179	183	520	
140.5	520.5	190	186	189	188	520.5	
141	521.0	199	200	198	199	521	
142	522.0	170	167	172	170	522	
145	525.0	162	162	160	161	525	
150	530.0	180	180	174	178	530	
152.5	532.5	168	164	165	166	532.5	
155	535.0	171	163	177	170	535	
160	540.0	162	171	170	168	540	
161.5	541.5	182	178	173	178	541.5	
162.5	542.5	216	205	217	213	542.5	
163	543.0	173	173	171	172	543	
166	546.0	167	164	172	168	546	
170	550.0	163	167	168	166	550	
172	552.0	174	185	178	179	552	
173	553.0	190	196	192	193	553	
174	554.0	184	191	186	187	554	
175	555.0	172	181	179	177	555	
177	557.0	218	230	232	227	557	
178	558.0	190	208	200	199	558	
178.5	558.5	211	202	208	207	558.5	
179	559.0	226	220	223	223	559	
180	560.0	226	225	231	227	560	
183	563.0	220	216	214	217	563	
184	564.0	211	207	209	209	564	
185	565.0	179	182	187	183	565	
187	567.0	174	171	169	171	567	
190	570.0	177	179	176	177	570	
193	573.0	153	159	165	159	573	

## MS-8,9 gamma

194	574.0	187	189	181	186	574
195	575.0	166	168	166	167	575
197	577.0	151	150	154	152	577
199.5	579.5	154	156	152	154	579.5
201	581.0	162	164	152	159	581
202	582.0	172	175	163	170	582
202.5	582.5	168	171	162	167	582.5
203	583.0	182	177	173	177	583
204	584.0	159	151	162	157	584
205	585.0	167	179	171	172	585
207	587.0	177	180	170	176	587
209	589.0	166	160	162	163	589
210	590.0	169	170	173	171	590
213	593.0	164	174	161	166	593
215	595.0	156	161	160	159	595
216	596.0	160	159	155	158	596
220	600.0	163	164	166	164	600
221	601.0	169	163	167	166	601
225	605.0	162	163	151	159	605
227	607.0	155	159	154	156	607
230	610.0	163	167	161	164	610
231	611.0	161	163	163	162	611
235	615.0	162	169	159	163	615
237	617.0	159	154	160	158	617
240	620.0	155	154	159	156	620
243	623.0	164	169	165	166	623
244	624.0	187	184	190	187	624
246	626.0	209	210	205	208	626
247.5	627.5	226	247	225	233	627.5
250	630.0	249	251	251	250	630
253	633.0	203	200	203	202	633
254	634.0	231	221	218	223	634
255	635.0	209	221	211	214	635
260	640.0	231	230	232	231	640
263	643.0	195	198	197	197	643
265	645.0	215	206	212	211	645
267	647.0	193	182	191	189	647
272	652.0	209	211	214	211	652
278	658.0	219	230	230	226	658
284	664.0	212	203	217	211	664
287	667.0	191	192	187	190	667
288	668.0	201	194	191	195	668
290	670.0	189	195	190	191	670
294	674.0	183	184	178	182	674
297	677.0	178	175	186	180	677
303	683.0	235	231	237	234	683



MS-8,9 gamma

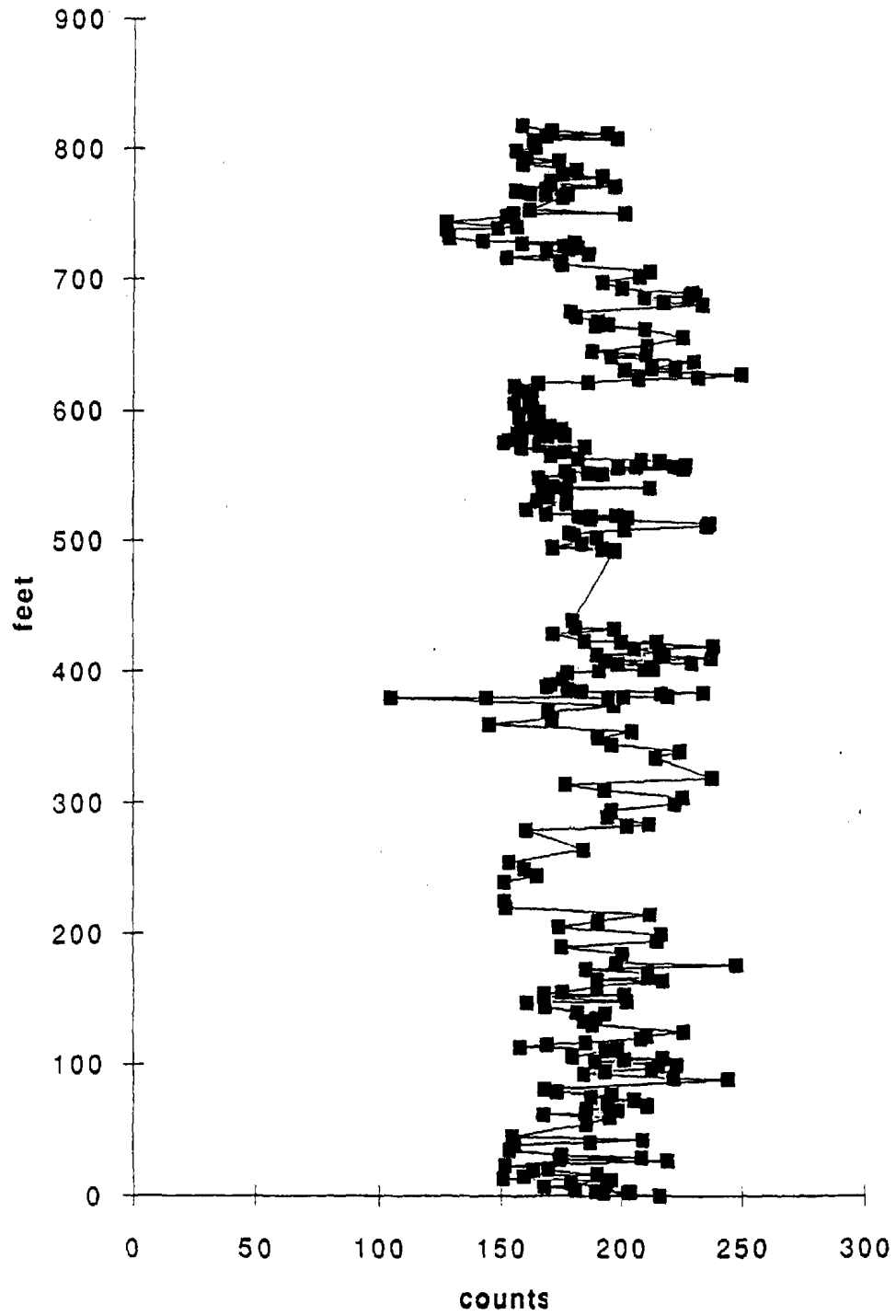
305	685.0	214	220	221	218	685
308	688.0	210	205	216	210	688
310	690.0	231	230	233	231	690
310.5	690.5	231	226	230	229	690.5
312	692.0	227	225	238	230	692
315	695.0	204	198	201	201	695
320	700.0	195	194	189	193	700
324	704.0	206	209	210	208	704
328	708.0	214	207	217	213	708
333	713.0	178	173	177	176	713
335	715.0	175	176	174	175	715
338	718.0	154	151	153	153	718
341	721.0	192	181	188	187	721
343	723.0	168	173	167	169	723
345	725.0	176	183	176	178	725
346	726.0	178	186	183	182	726
347	727.0	182	176	172	177	727
348	728.0	177	180	187	181	728
349	729.0	160	160	157	159	729
350	730.0	176	181	186	181	730
351	731.0	139	146	143	143	731
352.5	732.5	127	127	133	129	732.5
355	735.0	131	128	127	129	735
359.5	739.5	129	125	129	128	739.5
361	741.0	140	147	160	149	741
362	742.0	160	163	148	157	742
365	745.0	125	129	129	128	745
370	750.0	155	151	152	153	750
372	752.0	151	157	159	156	752
373	753.0	202	201	203	202	753
375	755.0	163	160	164	162	755
385	765.0	175	170	184	176	765
387	767.0	169	168	171	169	767
387.5	767.5	185	169	180	178	767.5
388	768.0	167	158	163	163	768
389.5	769.5	157	155	158	157	769.5
391	771.0	166	170	171	169	771
393.5	773.5	195	208	191	198	773.5
395	775.0	175	171	168	171	775
397	777.0	174	170	169	171	777
401	781.0	191	200	187	193	781
402	782.0	178	176	174	176	782
406	786.0	177	186	182	182	786
410	790.0	161	162	155	159	790
413	793.0	175	175	173	174	793
415	795.0	166	161	156	161	795

## MS-8,9 gamma

420	800.0	159	153	158	157	<b>800</b>	
424	804.0	159	167	168	165	<b>804</b>	
429	809.0	166	164	162	164	<b>809</b>	
430	810.0	200	201	196	199	<b>810</b>	
432	812.0	167	169	172	169	<b>812</b>	
434.5	814.5	198	195	192	195	<b>814.5</b>	
436	816.0	168	171	176	172	<b>816</b>	
440	820.0	158	157	163	159	<b>820</b>	

Chart5

MS8,9 Outcrop Gamma Log

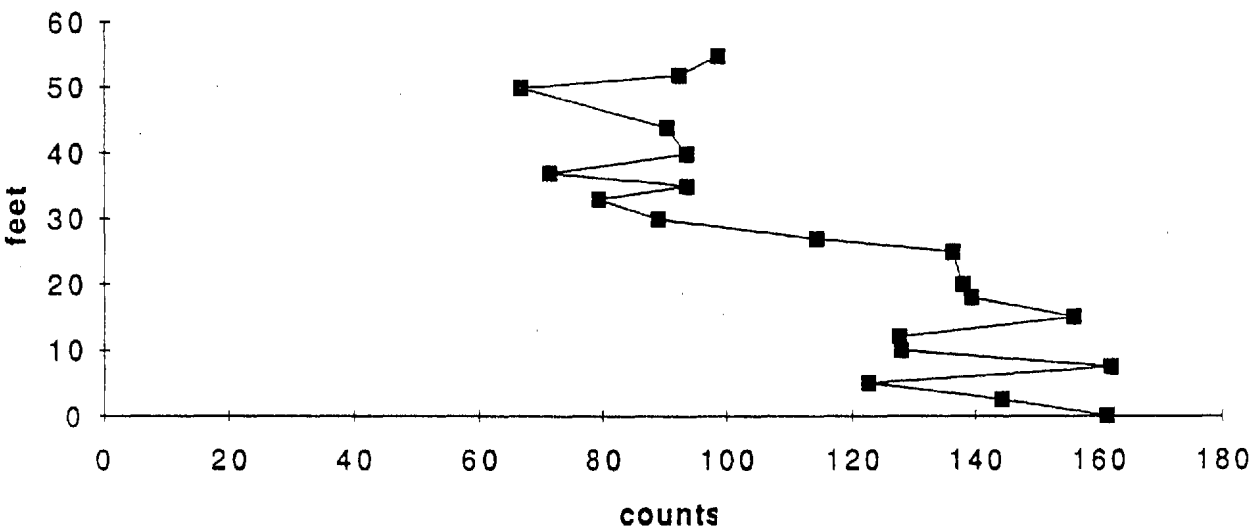


MS10 Gamma

FEET	COUNTS 1	COUNTS 2	COUNTS 3	COUNTS	FEET
0	160	157	167	161	0
2.5	143	148	142	144	2.5
5	120	121	127	123	5
7.5	163	161	162	162	7.5
10	126	133	125	128	10
12	130	128	125	128	12
15	157	152	159	156	15
18	143	134	141	139	18
20	136	144	134	138	20
25	133	135	141	136	25
27	118	114	111	114	27
30	87	89	91	89	30
33	82	73	83	79	33
35	95	91	95	94	35
37	72	73	69	71	37
40	91	92	98	94	40
44	90	96	85	90	44
50	64	69	67	67	50
52	92	92	93	92	52
55	102	96	98	99	55

MS10

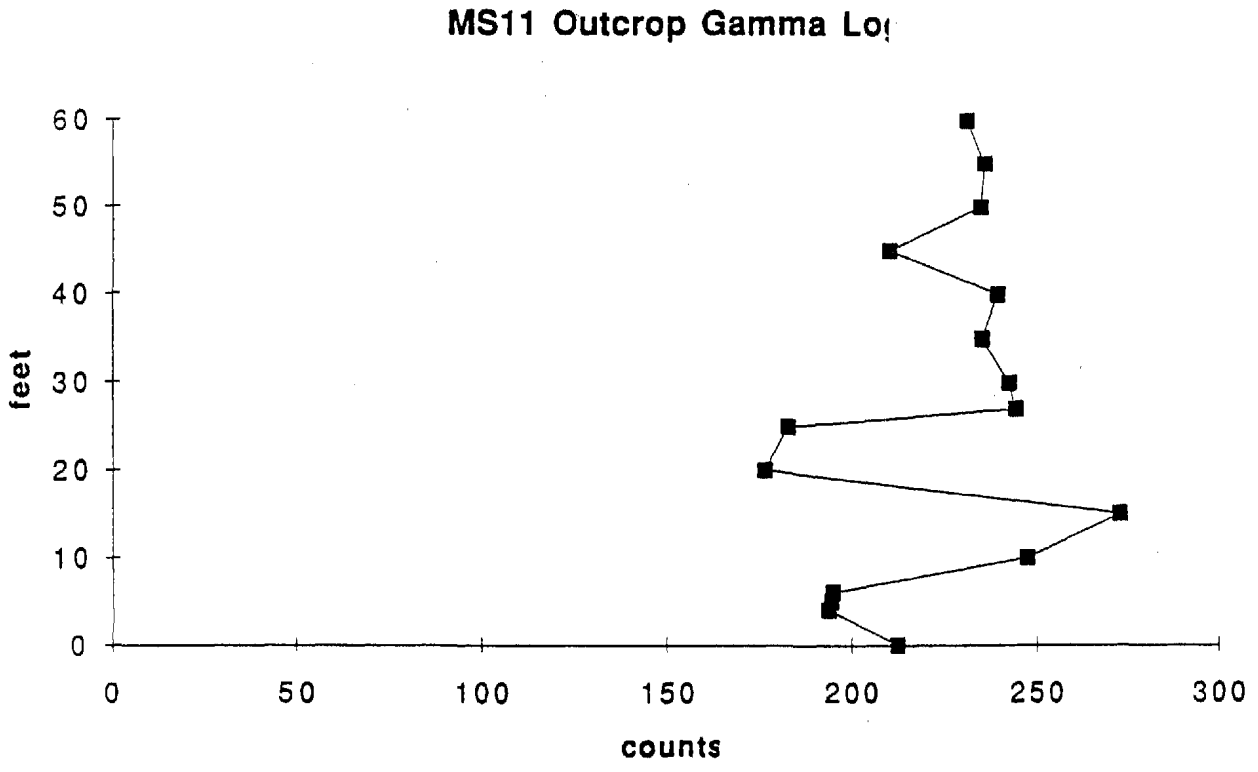
MS10 Outcrop Gamma Log



## MS11 Gamma

FEET	COUNTS 1	COUNTS 2	COUNTS 3	COUNTS	FEET
0	217	206	215	213	0
4	188	192	201	194	4
5	193	192	199	195	5
6	194	195	196	195	6
10	240	246	256	247	10
15	268	275	275	273	15
20	176	173	181	177	20
25	183	187	179	183	25
27	246	244	243	244	27
30	241	245	242	243	30
35	235	234	237	235	35
40	232	246	241	240	40
45	208	215	209	211	45
50	231	232	242	235	50
55	235	237	236	236	55
60	229	227	238	231	60

Chart7



## MS12 Gamma

FEET	COUNTS 1	COUNTS 2	COUNTS 3	COUNTS	FEET
0	55	59	55	56	0
2.5	53	55	49	52	2.5
5	44	45	40	43	5
7.5	44	46	45	45	7.5
10	42	43	42	42	10
12	64	58	63	62	12
15	52	55	57	55	15
17	49	48	55	51	17
20	41	42	39	41	20
25	43	41	45	43	25
27	42	37	39	39	27
30	37	34	38	36	30
35	41	43	39	41	35
36	48	51	46	48	36
38	59	59	58	59	38
40	41	43	45	43	40
44	44	47	47	46	44
49	68	75	68	70	49
53	62	59	56	59	53
55	51	55	49	52	55
60	50	52	53	52	60
63	58	55	61	58	63
65	47	53	48	49	65
68	64	63	66	64	68
69	67	68	70	68	69
71	84	82	77	81	71
74	55	56	61	57	74
76	48	50	56	51	76
80	57	50	58	55	80
85	51	52	51	51	85
90	46	47	44	46	90
92	59	61	64	61	92
95	121	120	121	121	95
100	46	53	50	50	100
109	47	49	52	49	109
115	53	49	51	51	115
121	54	49	51	51	121
122	83	81	80	81	122
127	44	40	43	42	127
128	63	66	65	65	128
129.5	61	66	66	64	129.5
133	45	50	44	46	133
140	48	49	43	47	140
145	38	34	39	37	145
146	57	56	66	60	146

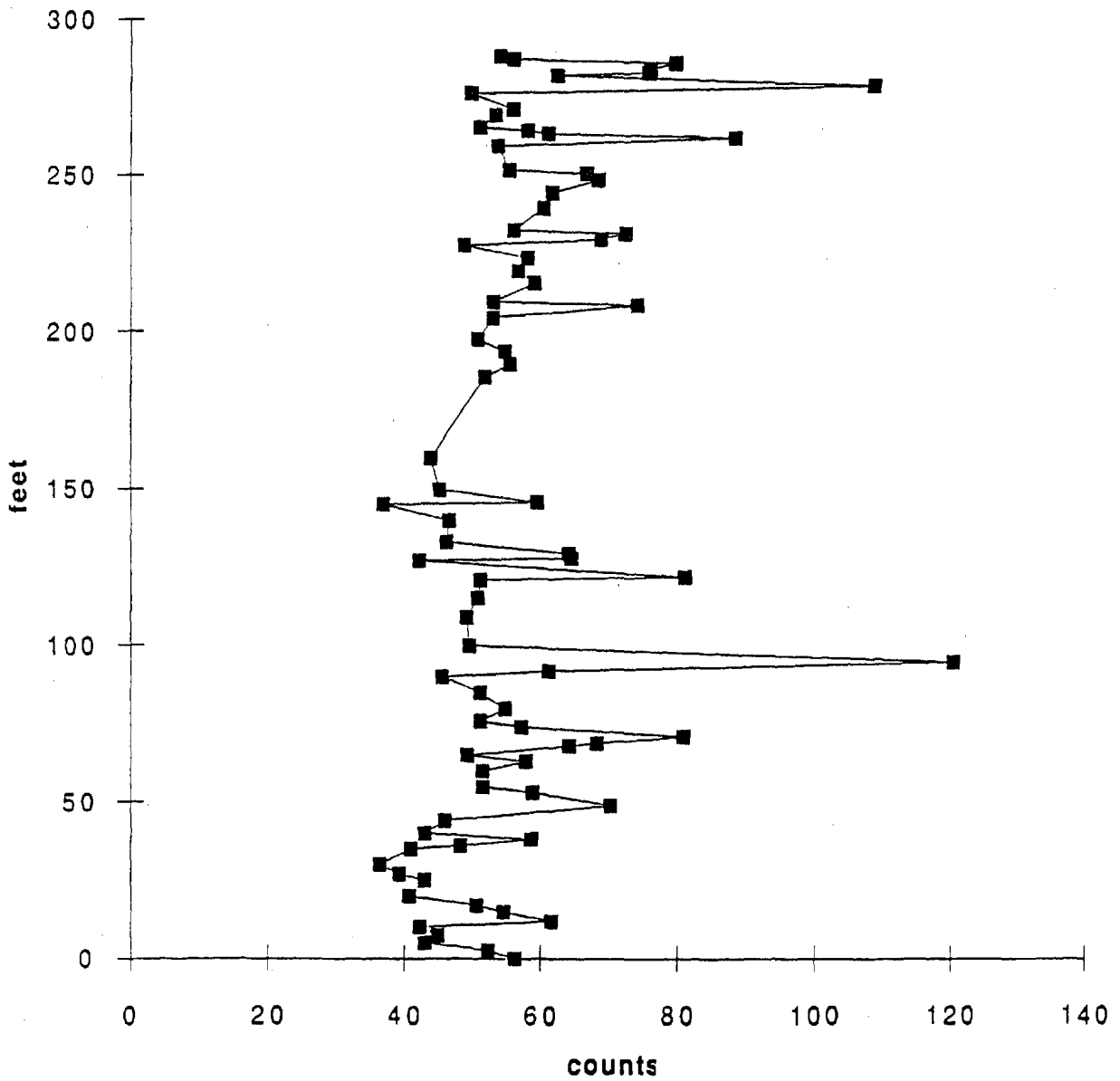


## MS12 Gamma

150	45	45	46	45	150
160	41	45	46	44	160
186	52	51	53	52	186
190	53	54	60	56	190
194	53	57	55	55	194
198	50	52	51	51	198
205	49	52	59	53	205
209	74	75	74	74	209
210	50	59	51	53	210
216	61	60	57	59	216
220	59	56	56	57	220
224	62	56	57	58	224
228	48	52	47	49	228
230	71	69	67	69	230
232	74	73	71	73	232
233	54	63	52	56	233
240	59	65	58	61	240
245	60	64	62	62	245
249	71	68	67	69	249
251	66	66	69	67	251
252	59	53	55	56	252
260	55	54	53	54	260
263	88	91	87	89	263
264	60	61	63	61	264
265	56	61	58	58	265
266	51	53	50	51	266
270	56	51	54	54	270
272	56	57	56	56	272
277	49	52	49	50	277
280	109	112	106	109	280
283	62	64	62	63	283
284	77	75	76	76	284
285	78	74	77	76	285
287	82	77	81	80	287
288	53	59	57	56	288
289	53	56	54	54	289

MS12

MS12 Outcrop Gamma Log



MS11

MS11 Outcrop Gamma Log

