Open File Report 70

MINERALOGICAL ANALYSES OF CUTTINGS

FROM SANDIA WIPP

DRILL HOLE # 9

J. E. Taggart and J. Renault

Sandia Laboratories

Albuquerque, New Mexico 87115

January 10, 1977

Dr. Frank E. Kottlowski
Director
State Bureau of Mine and
Mineral Resources
Campus Station
Socorro, New Mexico 87801

Dear Frank:

The purpose of this letter is to authorize you to place on open file the results of x-ray analytical work done on cuttings from ERDA No. 9. This 2889 foot hole was drilled in Section 20, T.22S., R.31E. as part of the site evaluation program being conducted by Sandia on behalf of ERDA for the Waste Isolation Pilot Program.

Please extend our thanks to Drs. Jack Renault and Joe Taggert for the excellent work they have done for us.

Sincerely,

Wendell D. Weart
Waste Management Systems
Department 1140

WDW:dm

Copy to:
1141 L. R. Hill
5730 G. B. Griswold

This log is a summary of mineralogical analyses of cuttings from Sandia WIPP Drill hole #9 located at the SE corner of sec 20, T22s, R31e. Samples were run on a Phillips difrectometer using monochromatic CuKα x-radiation at 40 KV 20 Ma, scanning at 2° 2Θ per minute, strip chart speed 1" per minute, 0.5×10^3 to 1×10^3 counts per second full scale.

Minerals that are clearly present are noted as present; those that yield very small peaks are marked as a trace; and those that are difficult to distiguish from the background are labeled as a possible trace. Those marked as present or trace, have excellent reliability while those that are marked as possible trace should not be relied on too heavily.

Two interferences were encountered: large amounts of halite obscures the determination of feldspar. Likewise polyhalite obscures the presence of dolomite.

The reader is reminded that the samples are cuttings from a drill hole and involve sample lag time and uphole contamination.

The presence of minor amounts of quartz in the bottom half of the hole may very well be because of uphole contamination.

The depths on these anaylses are recorded exactly as received. For depth adjustments see U.S.G.S. well record of Jones, Madsen and Fuqua.

MINERALOGICAL REPORT

PROJECT: Sandia Drill Hole #9 Cuttings PAGE: 1

LOCATION: 5 to 150' DATE: 10 DEC 76

Footage and/or Sample No.	Barite	Quartz	Clays	Feldspar	Pyroxene	Garnet	Anhydrite	Gypsum	Magnesite	Calcite	MICA	Halite	Polyhalite	Dolomite	Sylvite	Kainite-Langbeinite	Carnallite	Glauberite
0-5	no sample received																	
5-10		x		x	pt					x								
10-15		x		x						x	pt							
15-20		x		pt						x	tr			x				
20-25		x	pt	x						x				x				
25-30		x	pt	x						x				x				
30-35		x		tr						x				x				
35-40		x	pt	x						x	tr			x				
40-45		x		tr						x								
45-50		x		tr						x				x				
50-55		x	x	pt						x	x			x				
55-60		x	x	x						x	x			x				
60-65		x	x	tr						pt	x			x				
65-70		x	x	x	pt						x			x				
70-75		x	x	x	pt						x			x				
75-80		x	x	x	pt						x			x				
80-85		x	x	x	pt						x			x				
85-90		x	x	x							x			x				
90-95		x	x	x	pt						x			x				
95-100		x	x	x	pt						x			x				
100-05		x	x	x	pt						x			x				
105-10		x	x	x							x			x				
110-15		x	x	x		pt				x	x			x				
115-20		x	x	x	pt						x			x				
120-25		x	x	pt	pt						x			x				
125-30		x	x	x		pt					x			x				
130-35		x	x	x							x			x				
135-40		x	x	x							x			x				
140-45		x	tr	x	pt						x			x				
145-50		x	x	x	pt						x			x				

MINERALOGICAL REPORT

PROJECT: Sandia Drill Hole #9 Cuttings

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LOCATION: 150 to 300

DATE: 10 DEC 76

Footage and/or Sample No.	Barite	Quartz	Clays	Feldspar	Pyroxene	Garnet	Anhydrite	Gypsum	Magnesite	Calcite	MICA	Halite	Polyhalite	Dolomite	Sylvite	Kainite-Langbeinite	Carnallite	Glauberite
150-155		x	x	tr	pt						x			x				
155-160		x	x	tr							x			x				
160-165		x	x	x							x			x				
165-170		x	x	x	pt						x			x				
170-175		x	x	x	pt						x			x				
175-180		x	x	x	pt					x	x			x				
180-185		x	x	x						pt	x			x				
185-190		x	x	x	pt						x			x				
190-195		x	x	x	pt						x			x				
195-200		x	x	x						pt	tr			x				
200-205		x	x	x	pt			x		pt	x			x				
205-210		x	x	x				x		pt	x			x				
210-215		x	x	x				x			x			x				
215-220		x	x	x				x			x			x				
220-225		x	x	x				x			x			x				
225-230		x	x	x				x			x			x				
230-235		x	x	x				x			x			x				
235-240		x	x	x				x			x			x				
240-245		x	x	x				x			x			x				
245-250		x	x	x				x			x			x				
250-255		x	x	x			tr	x			x			x				
255-260		x	x	x			tr	x			x			x				
260-265		x	x	x			tr	x			x			x				
265-270		x	x	x			tr	x			x			x				
270-275		x	x	x			pt	x			x			x				
275-280		x	x	x			pt	x			x			x				
280-285		x	x	x			x	x			x			x				
285-290		x	x	x			x	x			x			x				
290-295		x	x	x			x	x			x			x				
295-300		x	x	x			x	x			x			x				

MINERALOGICAL REPORT

PROJECT: Sandia Hole #9 Cuttings

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LOCATION: 300'to 450'

DATE: 10 DEC 76

Footage and/or Sample No.	Barite	Quartz	Clays	Feldspar	Pyroxene	Garnet	Anhydrite	Gypsum	Magnesite	Calcite	MICA	Halite	Polyhalite	Dolomite	Sylvite	Kainite-Langbeinite	Carnallite	Glauberite
300-305		x	x	x			x	x			x			x				
305-310		x	x	x			x	x			x			x				
310-315		x	x	x			x	x			x			x				
315-320		x	x	x			x	x			x			x				
320-325		x	x	x			x	x			x			x				
325-330		x	x	x			x	x			x			x				
330-335		x	x	x			x	x			x			x				
335-340		x	x	tr			x	x			x			tr				
340-345		x	x	x			x	x			x			x				
345-350		x	x	x			x	x			x			x				
350-355		x	x	x			x	x			x			x				
355-360	pt	x	x	x			x	x			x			x				
360-365	pt	x	x	x			x	x			x			x				
365-370		x	x	x			x	x			x			x				
370-375		x	x	x			x	x			x			x				
375-380		x	x	x			x	x			x			x				
380-385		x	tr	x			x	x			x			x				
385-390		x	tr	tr			x	x			tr			x				
390-395		x	x	x			x	x			x			x				
395-400		x	tr	tr			x	x			x			x				
400-405		x	tr	tr			x	x			tr			x				
405-410		x	tr	x			x	x			x			x				
410-415		x	tr	x			x	x			tr			x				
415-420		x	x	x			tr	x			x			x				
420-425		x	x	x			pt				x			x				
425-430		x	x	x			tr	x			x			x				
430-435		x	tr	tr			pt	x			x			x				
435-440		x		tr			pt	x			tr			x				
440-445		x	tr	x			pt	x			x			x				
445-450		x	x	x			tr	x			x			x				

MINERALOGICAL REPORT

PROJECT: Sandia Hole #9 Cuttings

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LOCATION: 450' to 600'

DATE: 10 DEC 76

Footage and/or Sample No.	Barite	Quartz	Clays	Feldspar	Pyroxene	Garnet	Anhydrite	Gypsum	Magnesite	Calcite	MICA	Halite	Polyhalite	Dolomite	Sylvite	Kainite-Langbeinite	Carnallite	Glauberite
450-455		x	x	x			pt	x			x			x				
455-460		x	x	x			pt	x			x			x				
460-465		x	tr	x				x			x			x				
465-470		x	tr	x			pt	x			tr			x				
470-475		x	pt	pt				tr			pt			x				
475-480		x	pt	tr				x			pt			x				
480-485		x	x	x			tr	x			x			x				
485-490		x	x	x			tr	x			x			x				
490-495		x	x	x			tr	x			x			x				
495-500		x	x	x			tr	x			x			x				
500-505		x	x	x			pt	x			x			x				
505-510		x	x	x			x	x			x			x				
510-515		x	pt	tr			tr	x			tr			x				
515-520		x	pt	tr			x	x			pt			x				
520-525		x	pt	x			tr	x			tr			x				
525-530		x	x	x			tr	x			x			x				
530-535		x	x	x			x	x			x			x				
535-540		x	x	x			x	x			x			x				
540-545		x	x	x			tr	x			x			x				
545-550		x	x	x			x	x			x			x				
550-555		x	pt	x			x	x	pt		x			x				
555-560		x	tr	x			x	x			x			x				
560-565		x	pt	x			x	x			pt			x				
565-570		x		x			x	x			x			x				
570-575		x	pt	pt			x	tr			pt			tr				
575-580		x		tr			x				x			tr				
580-585		x	pt	x			x	tr			tr			pt				
585-590		x		pt			x	x			x			pt				
590-595		x	tr	x			tr	x			tr			x				
595-600		x	tr	x			x	x			x			x				

MINERALOGICAL REPORT

PROJECT: Sandia Hole #9 Cuttings

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LOCATION: 600' to 750'

DATE: 10 DEC 76

Footage and/or Sample No.		Barite	Quartz	Clays	Feldspar	Pyroxene	Garnet	Anhydrite	Gypsum	Magnesite	Calcite	MICA	Halite	Polyhalite	Dolomite	Sylvite	Kainite-Langbeinite	Carnallite	Glauberite
600-605			x	x	x			x	x			x			x				
605-610			x	tr	x			x	x			x			x				
610-615			x		x			x	x			x			x				
615-620			x	x	x			x	x			x			x				
620-625			x	pt	pt			x	x			tr			x				
625-630			x					x	x						x				
630-635		no sample received																	
635-640		no sample received																	
640-645			x		pt			x	x						x				
645-650		no sample received																	
650-655		no sample received																	
655-660		no sample received																	
660-665								x	x						x				
665-670			x					x	x						x				
670-675			x					x	x						x				
675-680			x	x	pt			x	x						x				
680-685			x	x	x			x	x	x		x			x				
685-690			x	x	x			x	x	x		x			x				
690-695		no sample received																	
695-700		no sample received																	
700-705			x	pt	tr			x	x	tr		pt			x				
705-710			x					x	x						x				
710-715			x					x	x						x				
715-720			x	tr				x	x			tr			x				
720-725			x	pt				x	x			tr			x				
725-730			x	tr				x	x			x			x				
730-735			x	x	pt			x	x			x			x				
735-740			x	pt				x	x			x			x				
740-745			x					x	x						x				
745-750			x	pt				x	x						x				

MINERALOGICAL REPORT

PROJECT: Sandia Hole #9 Cuttings

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LOCATION: 750' to 900'

DATE: 10 DEC 76

Footage and/or Sample No.		Barite	Quartz	Clays	Feldspar	Pyroxene	Garnet	Anhydrite	Gypsum	Magnesite	Calcite	MICA	Halite	Polyhalite	Dolomite	Sylvite	Kainite-Langbeinite	Carnallite	Glauberite
750-755		pt	tr	tr				x	x			tr		pt	x				
755-760			x	tr	pt			x	x			tr			x				
760-765			x	pt	tr			x	x			pt			x				
765-770			x	pt	pt			x	x			pt			x				
770-775			x	pt	pt			x	x			pt			x				
775-780			x	pt				x	x			tr			x				
780-785			x		x			x	x			x			x				
785-790			x	pt	pt			x	x	pt		x			x				
790-795			x	pt	pt			x	x			x			x				
795-800			x	tr	x			x	x			x	pt		x				
800-805			x	x	x			x	x	pt		x			x				
805-810			x	tr	x			x	x			x			x				
810-815			x	x	x			x	x			x			x				
815-820			x	x	x			x	x			x			x				
820-825			x	x	x			x	x			x			x				
825-830			x	x	x			x	x			x			x				
830-835			x	x	x			x	x			x			x				
835-840			x	x	x			x	x	x		x	tr		tr				
840-845			x	x	x			x	x	x		x			tr				
845-850			x	x	x			x	x	x		x			x				
850-855			x	pt	pt			x	x	pt		t			t				
855-860			x	x	pt			x	x	pt		x							
860-865			x	x	x			x	x	pt		x			pt				
865-870			x	x	tr			x	x			x			pt				
870-875			x	x	x			x	x	pt		x		x	pt				
875-880			x	x	x			x	x			x		pt	t				
880-885			x	x	x			x	x			x		pt	x				
885-890			x		x			x	x			x			x				
890-895			x	x	x			x	x		t	x		pt	x				
895-900			x	x	x			x	x			x	pt	pt	x				

MINERALOGICAL REPORT

PROJECT: Sandia Hole #9 Cuttings

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LOCATION: 900' to1050'

DATE: 10 DEC 76

Footage and/or Sample No.	Barite	Quartz	Clays	Feldspar	Pyroxene	Garnet	Anhydrite	Gypsum	Magnesite	Calcite	MICA	Halite	Polyhalite	Dolomite	Sylvite	Kainite-Langbeinite	Carnallite	Glauberite
900-905		x	t	x			x	x			x		pt	x				
905-910		x	t	x			x	x			x		pt	x				
910-915		x	x	x			x	x			x		pt	x				
915-920		x	x	x			x	x			x		pt	x				
920-925		x	x	x			x	x			x	pt	pt	x				
925-930		x	x	x			x	x			x		x	x				
930-935		x	pt				x	x			pt		x	x				
935-940		x	tr	x			x	x			x		x	tr				
940-945		x	x				x	x			x		x	tr				
945-950		x	x				x	x			tr		x	tr				
950-955		x	t				x	x			tr		x	pt				
955-960		t	pt				x	x			tr		x					
960-965		t	pt				x	x	x		pt		x	pt				
965-970		x	pt	x			x	x			tr		x	pt				
970-975		x	x				x	x	pt		x		x					
975-980		x	pt				x	x			tr		x	pt				
980-985		x	t				x	x	x		x	pt	x	pt				
985-990		t					x	x				pt	x	pt				
990-995		t					x	x			pt	pt	x	pt				
995-1000		t					x	x					x					
1000-05		pt					x	x			pt		x					
1005-10		pt					x	x					x	pt				
1010-15		pt					x	x	pt		pt		x					
1015-20		pt					x	x	x				x	pt				
1020-25		pt					x	x	x				x					
1025-30	no sample received																	
1030-35	"	"		"														
1035-40	"	"		"														
1040-45	"	"		"														
1045-50	"	"		"														

MINERALOGICAL REPORT

PROJECT: Sandia Hole #9 Cuttings

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LOCATION: 1050' to 1300'

DATE: 10 DEC 76

Footage and/or Sample No.	Barite	Quartz	Clays	Feldspar	Pyroxene	Garnet	Anhydrite	Gypsum	Magnesite	Calcite	MICA	Halite	Polyhalite	Dolomite	Sylvite	Kainite-Langbeinite	Carnallite	Glauberite
1050-55	no sample received																	
1055-60	"	"		"														
1060-65	"	"		"														
1065-70	"	"		"														
1070-76	"	"		"														
1076-80	p	x										x						
1080-90	p	x					p					x				p	tr	
1090-100		x						x				x						
1100-110	p	x										x				p	tr	
1110-120	p	x					p					x	p			tr	tr	
1120-130		x										x						
1130-140		x	x				x					x						
1140-150		tr					x					x						
1150-160		p					x					x				x		
1160-170		x					x					x	p			p		
1170-180							x					x	p			p		
1180-190							x					x	x			p		
1200-210												x	p					
1210-220		x					x					x	p					
1220-230							p					x						
1230-240												x						
1240-250							x					x						
1250-260							x					x						
1260-270												x				p		
1270-280		x										x						
1280-290		p					x					x						
1290-300		x										x				p		

MINERALOGICAL REPORT

PROJECT: Sandia Hole #9 Cuttings

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LOCATION: 1300' to 1600'

DATE: 10 DEC 76

Footage and/or Sample No.		Barite	Quartz	Clays	Feldspar	Pyroxene	Garnet	Anhydrite	Gypsum	Magnesite	Calcite	MICA	Halite	Polyhalite	Dolomite	Sylvite	Kainite-Langbeinite	Carnallite	Glauberite
1300-310													x				p		
1310-320			p										x						
1320-330			x										x				p	p	
1330-340			tr										x				p		
1340-350								p					x	p					
1350-360			x					p					x						
1360-370			x										x						
1370-380			x										x						
1380-390			x										x						
1390-400			x										x						
1400-410			x										x						
1410-420			x										x						
1420-430													x	x					
1430-440								p					x	x					
1440-450			p					p					x	x					
1450-460			x					p					x	x					
1460-470													x	p	p				
1470-480													x	x					
1480-490			tr										x	x					
1490-500			x					x					x	x	x				
1500-510	✓																		
1510-520								p					x	x		tr	p		
1520-530	✓																		
1530-540	✓																		
1540-550	✓																		
1550-560			tr					tr					x						
1560-570								p					x	p					
1570-580			tr					tr					x	p			tr		
1580-590								tr					x						
1590-600			p					x					x	tr		p	p		

MINERALOGICAL REPORT

PROJECT: Sandia Hole #9 Cuttings

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LOCATION: 1600' to 1900'

DATE: 10 DEC 76

Footage and/or Sample No.	Barite	Quartz	Clays	Feldspar	Pyroxene	Garnet	Anhydrite	Gypsum	Magnesite	Calcite	MICA	Halite	Polyhalite	Dolomite	Sylvite	Kainite-Langbeinite	Carnallite	Glauberite
1600-610		p					x					x	x					
1610-620							p					x						
1620-630		p					p					x	x		tr	p		
1630-640		x					x					x	x					
1640-650		p					p					x	x					
1650-660												x	x			p	p	
1660-670												x	x			p		
1670-680		p					p					x	p			p		
1680-690							p	p				x	p			p		
1690-700	✓																	
1700-710		x					p					x						
1710-720		p										x						
1720-730								x				x			p			
1730-740												x						
1740-750		x										x				p		
1750-760												x	p					
1760-770												x	p					
1770-780		x										x	x					
1780-790												x						
1790-800		x										x	x					
1800-810												x	tr			p		
1810-820		tr										x	p			p		
1820-830												x	x			p		
1830-840							p					x						
1840-850		x										x	tr					
1850-860							p					x						
1860-870		p					p					x	p			p		
1870-880		p										x						
1880-890		p										x						
1890-900												x	tr			p		

MINERALOGICAL REPORT

PROJECT: Sandia Hole #9 Cuttings PAGE: 11

LOCATION: 1900' to 2200' DATE: 10 DEC 76

Footage and/or Sample No.	Barite	Quartz	Clays	Feldspar	Pyroxene	Garnet	Anhydrite	Gypsum	Magnesite	Calcite	MICA	Halite	Polyhalite	Dolomite	Sylvite	Kainite-Langbeinite	Carnallite	Glauberite
1900-910		x										x	p					
1910-920																		
1920-930												x	x					
1930-940												x	p					
1940-950							p					x	tr			p		
1950-960		x										x	x					
1960-970							x					x	x					
1970-980		p					x					x	x		p			
1980-990		tr										x						
1990-2000		x					x		tr			x	tr					
2000-10		x					x					x	tr		tr			
2010-20												x	tr		p			
2020-30		tr					x					x	x					
2030-40		x					x					x	x					
2040-50							tr					x	x					
2050-60							x					x	x					
2060-70		x					x					x	x					
2070-80		x					x					x						
2080-90		x					x					x						
2090-100		tr					tr					x	tr					
2100-110		x					x					x			tr			
2110-120							x					x						
2120-130							tr					x						
2130-40												x						
2140-50												x						
2150-60							tr					x						
2160-70	p						p					x			tr			
2170-80							tr					x						
2180-90		tr										x			tr			
2190-200		x										x						

MINERALOGICAL REPORT

PROJECT: Sandia Hole #9 Cuttings

PAGE: 12

LOCATION: 2200' to 2500'

DATE: 10 DEC 76

Footage and/or Sample No.	Barite	Quartz	Clays	Feldspar	Pyroxene	Garnet	Anhydrite	Gypsum	Magnesite	Calcite	MICA	Halite	Polyhalite	Dolomite	Sylvite	Kainite-Langbeinite	Carnallite	Glauberite
2200-210							p					x						
2210-220							p					x	p					
2220-230		p										x						
2230-240		p					x					x						
2240-250		tr					x					x						p
2250-260		x					x					x						
2260-270		x					x					x	tr					
2270-280							x					x						
2280-290							tr					x						
2290-300							tr					x						
2300-310		p					p					x	p					
2310-320							tr					x	tr		tr			
2320-330												x						
2330-340		tr					p					x	tr					
2340-350							x					x	p					
2350-360												x						
2360-370		tr					x					x		tr				
2370-380							tr					x						
2380-390												x						
2390-400												x						
2400-410							tr					x						
2410-420		tr					x					x	p		p			
2420-430							x					x						
2430-440							x					x						
2440-450		tr					x					x	p					
2450-460		x					x					x						
2460-470		tr					x					x						
2470-480							x					x						
2480-490							x					x						
2490-500		tr					x					x						

MINERALOGICAL REPORT

PROJECT: Sandia Hole #9 Cuttings

PAGE: 13

LOCATION: 2500' to 2800'

DATE: 10 DEC 76

Footage and/or Sample No.	Barite	Quartz	Clays	Feldspar	Pyroxene	Garnet	Anhydrite	Gypsum	Magnesite	Calcite	MICA	Halite	Polyhalite	Dolomite	Sylvite	Kainite-Langbeinite	Carnallite	Glauberite
2500-510		tr					x					x						
2510-520		pt					x					x						
2520-530		tr					tr					x						
2530-540							tr					x						
2540-550	pt	pt					tr					x						
2550-560							tr					x						
2560-570							x					x						
2570-580		pt					x					x						
2580-590							tr					x						
2590-600							x					x						
2600-610							tr					x						
2610-620							tr					x						
2620-630							tr					x						
2630-640							x					x						
2640-650							x					x						
2650-660							tr					x						
2660-670							x					x						
2670-680							x					x						
2680-690		pt					x					x						
2690-700							x					x						
2700-710							x					x						
2710-720							x					x						
2720-730							x					x						
2730-740							x					x						
2740-750							x					x						
2750-760							x					x						
2760-770							x					x						
2770-780							x					x						
2780-790		pt					x					x						
2790-800							x					x						

MINERALOGICAL REPORT

PROJECT: Sandia Hole #9 Cuttings

PAGE: 14

LOCATION:

DATE: 10 DEC 76

Footage and/or Sample No.	Barite	Quartz	Clays	Feldspar	Pyroxene	Garnet	Anhydrite	Gypsum	Magnesite	Calcite	MICA	Halite	Polyhalite	Dolomite	Sylvite	Kainite-Langbeinite	Carnallite	Glauberite
2800-810							x					x						
2810-820		tr	pt				x					x						
2820-830							x					x						
2830-840							x					x						
2840-850		pt					x					x						
2850-860		pt					x					x						

This is a summary of mineralogical analysis of insoluble residues of cuttings from Sandia WIPP Drill hole #9 located at the SE corner of sec. 20. T. 22 S., R. 31 E. Samples were run on a Phillips X-ray diffractometer using monochromatic CuK-Alpha radiation, 40 KV and 20 Ma, 2° 2θ per minute scan speed, 1" per minute chart speed, 0.5×10^3 to 1×10^3 counts per second full scale, and divergence, antiscatter, and receiving slits of 1°, 4° and 1° respectively.

Identification becomes more difficult as the number of different phases increases in the sample. The technique is routine up to 7 or 9 phases. Because of various sources of contamination, some samples have as many as 11 phases. At present contamination levels only the trace phases are affected.

Minerals that are clearly present are noted as present; those that yield very small peaks are marked as a trace; and those that are difficult to distinguish from the background are labeled as a possible trace. Those marked as present or trace, have excellent reliability while those that are marked as possible trace should not be relied on too heavily.

Three major interferences were encountered: halite obscures the determination of feldspar, bassanite obscures the determination of calcite, and mica in large amounts obscures the determination of small amounts of barite. In addition the cuttings have been contaminated up to 75% with materials from outside the drill hole. This material is minor until concentrated in the insoluble portion of the sample. The contamination consists mostly of fiberous material (what appears to be pulp fiber, cotton fiber, and thread) with traces of insects, paint chips and rust flakes. It is believed that the fiberous material is responsible

[illegible] the amorphous phase identified on the X-ray patterns. The presence of talc in some of the residues could be natural, but may also be from the sizing used during the manufacture of cloth sample bags.

The presence of significant amounts of bassanite in the insoluble residues was unexpected. While it is very possible that the bassanite is natural, I think that there is a strong possibility that it was produced from anhydrite when the soluble phases were disolved. Under reduced pressure and slightly elevated temperature in a brine, bassanite may be an equilibrium phase. If this question is important I suggest that some of the samples with reported bassanite be treated at standard temperature and pressure with an excess of water. The insoluble residue could then be X-rayed to determine if bassanite is present.

Martin Water Lab #6/6169 (1076' to 1470')

Footage and/or Sample No.		Barite	Quartz	Clays	Feldspar	Pyroxene	Garnet	Anhydrite	Gypsum	Magnesite	Calcite	Mica	Halite	Polyhalite	Dolomite	Amorphous	Kainite-Langbeinite	Bassanite
076-1080	1	X	X	X	PT			X			PT	X						
1080-1090	2	X	X	X	Tr			X			PT	X						
1090-1100	3	X	X	X				X			PT	X						
1100-1110	4	X	X	X				X			PT	X						
1110-1120	5	X	X	X				X			PT	X						
1120-1130	6	X	X	X				X			PT	X						
1130-1140	7	X	X	X				X	X			X						
1140-1150	8	X	X	X				X			PT	X						
1150-1160	9	X	X					X			PT							
1160-1170	10	X	X	X				X			PT							
1170-1180	11	X	X	PT				X			PT							
1180-1190	12	X	Tr					X			PT	PT						
1190-1200	13	Tr	X	X				PT				X						
1200-1210	14	X	X	X				X			PT	X						
1210-1220	15	Tr	X	X				X		X	Tr	X						
1220-1230	16	Tr	X	X				X		X	Tr	X						
1230-1240	17	X	X	X				PT		X	Tr	X						
1240-1250	18	X	X	X				X		X	Tr	X			PT			
1250-1260	19	X	X	X				X		X	X	X			PT			
1260-1270	20	X	X	Tr				X	X	X	Tr	X						
1270-1280	21	Tr	X	X				X	PT	Tr	X	X						
1280-1290	22	X	X	X				X	Tr	Tr	X	X						
1290-1300	23	Tr	X					X		X	X							

Footage and/or Sample No.	Barite	Quartz	Clays	Feldspar	Pyroxene	Garnet	Anhydrite	Gypsum	Magnesite	Calcite	Mica	Halite	Polyhalite	Dolomite	Amorphous	Kainite-Langbeinite	Bassanite
1300-1310 24	Tr	Tr	PT				X		Tr	PT							
1310-1320 25	Tr						Tr		PT	PT							
1320-1330 26	X						X			PT							
1330-1340 27	Tr	X	X				X	PT	X	X	X						
1340-1350 28	Tr	X	X				X	X	X	X	X	X					
1350-1360 29	Tr	X	X	X			X		X		X						
1360-1370 30		X	X	X			X				X						
1370-1380 31	Tr	X	X	X			X		PT	PT	X	X					
1380-1390 32	PT	X	X	X			Tr	PT	PT	PT	X						
1390-1400 33	PT	X	X	X			X		PT	PT	X	Tr					
1400-1410 34	PT	X	X	X			PT		X		X						
1410-1420 35	Tr	X	X	PT			Tr	X	X		X						
1420-1430 36	PT	X	X	PT			TR		X		X						
1420-1440 37	PT	X	X	PT			X		PT		X		X				
1440-1450 38		X	X	PT			X		PT		X						
1450-1460 39	PT	X	X				X		PT	PT	X						
1460-1470 40		X	X	Tr			X			PT	X						
1470-1480 1		X	X	PT			X	PT	X		X				X		
1480-1490 2	PT	X	X	X			X	X	X		X				PT		
1490-1500 3	PT	X	X	X			X		X	Tr	X				PT		
1500-1510 4	PT	Tr	X				X	X	Tr		Tr						
1510-1520 5	PT	Tr	X				X	X	PT						PT		
1520-1530	no sample received																
1530-1540	no sample received																
1540-1550	no sample received																
1550-1560 6	Tr	X	X	PT			X		X		PT						
1560-1570 7	Tr	X	X	PT			X		X		PT						
1570-1580 8	PT	X	TR	PT			X		X						PT		X
1580-1590 9	Tr	X	X	PT			X		X		Tr				PT		
1590-1600 10	X	X	X	PT			X	TR	X	PT	X		TR		PT		X

Martin Water Lab #776132 (1470' to 2300')

Footage and/or Sample No.		Barite	Quartz	Clays	Feldspar	Pyroxene	Garnet	Anhydrite	Gypsum	Magnesite	Calcite	Mica	Halite	Polyhalite	Dolomite	Amorphous	Kainite-Langbeinite	Bassanite
1600-1610	11		X	X				X	X		PT					X		
1610-1620	12	X	X	X	PT			X		X	X	PT				X		X
1620-1630	13		X	X	X			X	X	PT						X		
1630-1640	14		X	X	X			X	X							X		
1640-1650	15	PT	X	X				X	X	PT						X		
1650-1660	16	X	X	X				X	Tr	X	PT	PT	X			X		X
1660-1670	17	X	X	X				X	Tr	X	PT		X	Tr		X		X
1670-1680	18		X	X				X		X	Tr	X				X		
1680-1690	19	X	X	X				X	PT	X			X			PT		X
1690-1700	20		X	X				X		X		PT				X		PT
1700-1710	21	X	X	Tr				X	PT	X	PT	Tr	PT			X		PT
1710-1720	22	PT	X	X				X		X	PT	X	X			PT		PT
1720-1730	23		X	X				X		X	PT	X	PT			X		PT
1730-1740	24	Tr	X	X				X		X		X	X			X		Tr
1740-1750	25	X	X	X				X		X	PT	X	X			X		X
1750-1760	26	X	X	X				X		X		X	X			X		X
1760-1770	27	X	X	X				X	Tr	X		Tr	X			X		X
1770-1780	28	Tr	X	X				X		X	PT	X	Tr			X		PT
1780-1790	29		X	X				X		X		X	X			X		PT
1790-1800	30	PT	X	X				X		X	PT	X	X	PT		X		X
1800-1810	31	PT	X	X				X		X	PT	X	X			X		Tr
1810-1820	32		X	X				X		X	PT	X	X	PT		X		X
1820-1830	33	X	X	X				X		X	PT	X	X	PT		X		X
1830-1840	34	PT	X	X				X		X		X	X			X		Tr
1840-1850	35		X	X				X		X		Tr	X			X		X
1850-1860	36		X	X	PT			X		X		X				X		X
1860-1870	37		X	X				X		X		X	X			X		Tr
1870-1880	38		X	X				X		X	PT	X	PT			X		PT
1880-1890	39		X	X				X		X		X	X			X		PT
1890-1900	40		X	X				X	PT	X		X	X			X		Tr

Martin Water Lab #776132 (1470' to 2300')

Footage and/or Sample No.		Barite	Quartz	Clays	Feldspar	Pyroxene	Garnet	Anhydrite	Gypsum	Magnesite	Calcite	Mica	Halite	Polyhalite	Dolomite	Amorphous	Kainite-Langbeinite	Bassanite	
1900-1910	41		X	X				X	X	X		X	X			X		PT	
1910-1920		no sample received																	
1920-1930	42		X	PT	(poor pattern small sample)			X		X		PT	X			PT			
1930-1940	43		X	PT	"		"	X		X		PT	X			PT			
1940-1950	44		X	X				X		X		X	X			X		PT	
1950-1960	45		X	X	PT			X		X		X				Tr		PT	PT
1960-1970	46		X	X				X		X		X	X			X		PT	
1970-1980	47		X	X				X	PT	X		X	X			X		PT	
1980-1990	48		X	Tr				X	PT	X		PT	Tr			Tr		PT	
1990-2000	49		X	X				X	PT	X		X	PT			Tr			
2000-2010	50		X	X	PT			X		X		X	PT			Tr		PT	
2010-2020	51		X	X	PT			X	PT	X		X	Tr			Tr		PT	
2020-2030	52		X	PT				X		X		PT	PT			X		PT	
2030-2040	53		X	Tr				X		X		PT				PT		X	
2040-2050	54		X	X				X		X		X	X			Tr		X	
2050-2060	55		X	X				X		X		PT				Tr			
2060-2070	56		X	X				X		X		X	X			Tr			P
2070-2080	57		X	X				X	PT	X		X	X			PT			
2080-2090	58		X	X				X	PT	X		X				Tr			P
2090-2100	59		X	X				X		X		X	X			Tr		X	
2100-2110	60		X	X	PT			X		X		X	X			PT		Tr	
2110-2120	61		X					X		Tr		PT	PT						
2120-2130	62		X	Tr				X		X		PT	X			X		Tr	
2130-2140	63		X	X				X		Tr	Tr	X	PT			X			
2140-2150	64		X	X				X		X	X	X	X			X			
2150-2160	65		X	X				X		X	X	X	X			Tr			
2160-2170	66		X	X				X		X	X	X	X			X			
2170-2180	67		X	X				X		X	X	X	X			X			
2180-2190	68		X	X				X		X	X	X	X			X		Tr	
2190-2200	69		X	X				X		X	X	X	X			Tr		X	

Martin Water Lab #776132 (1470' to 2300')
Martin Water Lab #9761 (2300' to 2860')

Footage and/or Sample No.	Barite	Quartz	Clays	Feldspar	Pyroxene	Garnet	Anhydrite	Gypsum	Magnesite	Calcite	Mica	Halite	Polyhalite	Dolomite	Amorphous	Kainite-Langbeinite	Bassanite
2200-2210 70		X	X				X		X	PT	X	PT			Tr		Tr
2210-2220 71		X	X	PT			X		Tr	PT	X	Tr			X		
2220-2230 72		X	X				X		X		X	Tr			X		
2230-2240 73		X	X	PT			X		X	PT	X				X		
2240-2250 74		X	X				X		X						X		
2250-2260 75		X	X				X		X	X	X	X			PT		Tr
2260-2270 76		X	X				X		X		X				PT		
2270-2280 77		X	X				X		X		X	X			Tr		
2280-2290 78		X	X				X		X		X	X			X		
2290-2300 79		X	X				X		X	PT	X	X			X		
2300-2310 80		X	X				X		X		X	Tr	Tr		X		Tr
2310-2320 81		X	X	X			X		X	PT	X				X		
2320-2330 82		X	X				X		X	PT	X	PT			X		
2330-2340 83		X	X				X		X	PT	X	X			X		X
2340-2350 84		X					X		X						X		
2350-2360 85		X	X				X		X		X	X			X		Tr
2360-2370 86		X	PT				X		X	TR	PT	PT			X		
2370-2380 87		X					X		X			X			X		X
2380-2390 88		X	PT				X		X		PT	X	PT		X		Tr
2390-2400 89		X	X				X	X	X		X	X	PT		PT		X
2400-2410 90		X	X				X		X		X	X			X		Tr
2410-2420 91		X	X				X		X		X	X			X		X
2420-2430 92		X	X	PT			X		X		X	PT			X		X
2430-2440 93		X	X				X		X		X				X		Tr
2440-2450 94		X					X		X						Tr		PT
2450-2460 95		X	Tr				X		X		PT				X		
2460-2470 96		X	PT				X		X						X		
2470-2480 97		X	Tr				X		X		Tr				X		
2480-2490 98		X	X				X		X		X				X		
2490-2500 99		X					X		X						X		

Martin Water Lab #9761 (2300' to 2860')

Footage and/or	Sample No.	Barite	Quartz	Clays	Feldspar	Pyroxene	Garnet	Anhydrite	Gypsum	Magnesite	Calcite	Mica	Halite	Polyhalite	Dolomite	Amorphous	Kainite-Langbeinite	Bassanite
2500-2510	100		X	PT				X		X						X		
2510-2520	101		PT					X		X						Tr		
2520-2530	102		X	X				X		X		X				X		
2530-2540	103		X	PT				X		X						X		
2540-2550	104	X	X					X		X	PT					X		
2550-2560	105	X	Tr					X		PT	X		X			PT		
2560-2570	106	X	X					X		PT	X		X					
2570-2580	107	X	X					X		X	PT					PT		
2580-2590	108		X	PT				X		PT	PT		Tr			Tr		
2590-2600	109		PT	PT				X		Tr						Tr		
2600-2610	110		X	X				X		X	PT		X			X		
2610-2620	111		X	X				X		X	PT		PT			X		
2620-2630	112		X	X				X		X	PT		X			X		PT
2630-2640	113		X	X	X			X		X	X					X		
2640-2650	114		X	X				X		X	PT		X			X		Tr
2650-2660	115		X					X		X	PT		X			X		
2660-2670	116		Tr	X				X		X	PT		X			X		
2670-2680	117		X					X		X						X		
2680-2690	118		Tr	PT				X		X						X		
2690-2700	119			PT				X		PT						Tr		
2700-2710	120		PT	PT				X		Tr						X		
2710-2720	121		PT					X		Tr						Tr		
2720-2730	122		PT					X		Tr						Tr		
2730-2740	123		Tr					X		X						X		
2740-2750	124		X					X		X	X					PT		
2750-2760	125		X					X		Tr	PT					Tr		
2760-2770	126		Tr					X		Tr						PT		
2770-2780	127		X					X		Tr	PT					PT		
2780-2790	128		PT					X		PT						PT		
2790-2800	129		PT					X		PT						PT		

2800' to 2860'

Martin Water Lab #9761 (2300' to 2860')

Footage and/or Sample No.	Barite	Quartz	Clays	Feldspar	Pyroxene	Garnet	Anhydrite	Gypsum	Magnesite	Calcite	Mica	Halite	Polyhalite	Dolomite	Amorphous	Kainite-Langbeinite	Bassanite
2800-2810	130	PT					X		PT						PT		
2810-2820	131	Tr					X		PT						PT		
2820-2830	132	PT					X		PT						PT		
2830-2840	133	X					X		PT		PT						
2840-2850	134	Tr					X		PT								
2850-2860	135	X					X										