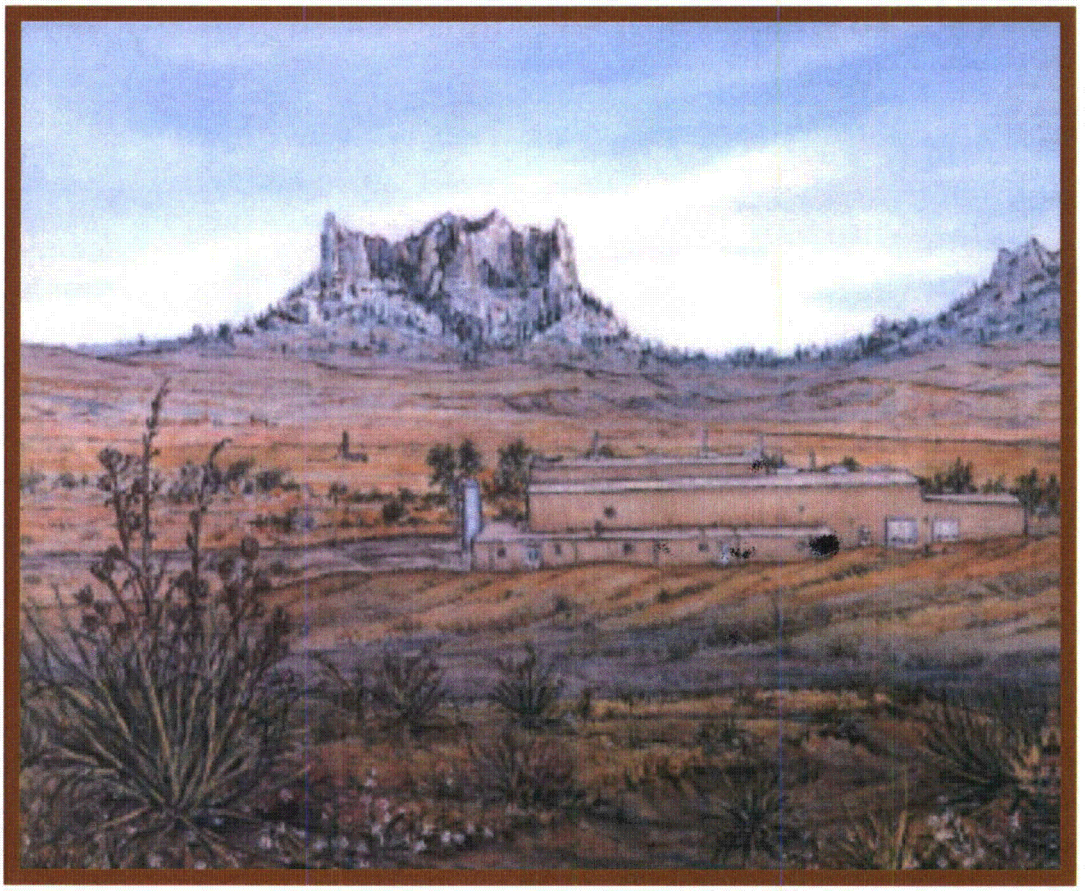
Application for Amendment of
USNRC Source Materials License SUA-1534
Marsland Expansion Area
Crawford, Nebraska

Response to Request for Additional Information (RAI)
Dated July 03, 2013
Volume II Technical Report
Appendices



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December 2013

MEA Technical Report Appendices

Appendix

APPENDIX A

Appendix A

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Water User Survey Information
for Active and Abandoned Water
Supply Wells within 2.25-Mile
Area of Review

APPENDIX A
Water User Survey Information for Water Supply Wells
in 2.2-Mile Area of Review

Well Id	DNR Registration Number	Township Location	Range Location	Section Location	Screen Interval (ft)	Name of Strata	Water Quality	Owners Name	Street Address	City Address	State Address	Zip Code Address	Date	Permit Area	Contact Person	Telephone	Interviewer	Supply Source	Water Use Type	Well Status	Estimated Rate (gpm)	History	Total Depth (ft)	Static Level (ft)	Drill Date	Casing Depth (ft)	Diameter (inches)	Pumping Method	Driller	Casing Type	Remarks	Easting	Northing	Remarks_2	Remarks_3
0700		29	51	2				Chuck & Vicki Tumbull	7211 Trevett Ln.	Casper	WY	82604	16-Aug-10	Marlsand	Chuck Tumbull	Chuck307-262-8803(M); 307-265-2335(H)	Tatum Hlavacek	Well	livestock	active		old well	180-200ft					submersible		galvanized	old homestead-not inhabitable	1116330.5	448886.2		
0701		29	51	2				Chuck & Vicki Tumbull	7211 Trevett Ln.	Casper	WY	82604	16-Aug-10	Marsland	Chuck Tumbull	Chuck307-262-8803(M); 307-265-2335(H)	Tatum Hlavacek	Well	livestock	Inactive		off; do not use well; old well	180-200ft					submersible		galvanized	follow REA (SW) line, 1/4 mile from house	1119336.8	447762.1		
0702		29	51	2				Chuck & Vicki Tumbull	7211 Trevett Ln.	Casper	WY	82604	16-Aug-10	Marsland	Chuck Tumbull	Chuck307-262-8803(M); 307-265-2335(H)	Tatum Hlavacek	Well	livestock	active		old well	180-200ft					submersible		galvanized	(W) 3/4 mile from house-follow well traveled	1116343.1	446281.0	road, on hill by trees	
0703		29	50	30				Pat and Terri Furman	3142 River Rd	Marsland	NE	69354	23-Aug-10	Marsland	Pat Furman	308-430-1817(M); 308-665-2731(H)	Tatum Hlavacek	Well	domestic/livestock	active	10gpm	drill date-old	280ft	120ft				submersible		steel		1128170.1	428142.3		
0704		29	50	30			good	Pat Furman	3142 River Rd.	Marsland	NE	69354	23-Aug-10	Marsland	Pat Furman	308-430-1817(M); 308-665-2731(H)	Tatum Hlavacek	Well	livestock	active										pvc		1127118.2	428075.3		
0705		29	50	20				Pat Furman	3142 River Rd.	Marsland	NE	69354	23-Aug-10	Marsland	Pat Furman	308-430-1817(M); 308-665-2731(H)	Tatum Hlavacek	Well	livestock	active								Windmill	Panhandle Drilling		fairly shallow	113691.0	429745.1		
0706	A004714	29	51	25				Pat Furman	3142 River Rd.	Marsland	NE	69354	23-Aug-10	Marsland	Pat Furman	308-430-1817(M); 308-665-2731(H)	Tatum Hlavacek	Well	livestock	active								solar submersible				1122016.7	427725.7		
0707		29	51	24				Pat Furman	3142 River Rd	Marsland	NE	69354	23-Aug-10	Marsland	Pat Furman	308-430-1817(M); 308-665-2731(H)	Tatum Hlavacek	Well	livestock	active								Windmill				1122999.9	431994.5		
0708		30	51	24				Pat Furman	3142 River Rd.	Marsland	NE	69354	23-Aug-10	Marsland	Pat Furman	308-430-1817(M); 308-665-2731(H)	Tatum Hlavacek	Well	livestock	active								submersible				1123856.7	465439.8		
0709		30	50	18				Pat Furman	3142 River Rd.	Marsland	NE	69354	23-Aug-10	Marsland	Pat Furman	308-430-1817(M); 308-665-2731(H)	Tatum Hlavacek	Well	livestock	active								submersible				1127322.8	468186.0		
0710		30	51	13				Pat Furman	3142 River Rd.	Marsland	NE	69354	23-Aug-10	Marsland	Pat Furman	308-430-1817(M); 308-665-2731(H)	Tatum Hlavacek	Well	livestock	active								Windmill				1125293.1	468311.7		
0711		30	50	30				Pat Furman	3142 River Rd.	Marsland	NE	69354	23-Aug-10	Marsland	Pat Furman	308-430-1817(M); 308-665-2731(H)	Tatum Hlavacek	Well	livestock	active								Windmill				1129643.0	458314.5		
0712		30	50	30				Pat Furman	3142 River Rd.	Marsland	NE	69354	23-Aug-10	Marsland	Pat Furman	308-430-1817(M); 308-665-2731(H)	Tatum Hlavacek	Well	livestock	active								Windmill				1130223.6	460507.4		
0713		30	50	19				Pat Furman	3142 River Rd.	Marsland	NE	69354	23-Aug-10	Marsland	Pat Furman	308-430-1817(M); 308-665-2731(H)	Tatum Hlavacek	Well	livestock	active								Windmill				1130589.8	463714.3		
0714		29	51	24				Tom Walters	112 Squaw Mound Rd.	Marsland	NE	69354	24-Aug-10	Marsland	Tom Walters	308-665-2303(H);308-430-5333(M)	Tatum Hlavacek	Well	domestic/livestock	active			135ft	55-60ft				submersible		steel		1121088.7	431237.4		
0715	G001417B	29	51	24				Tom Walters	112 Squaw Mound Rd.	Marsland	NE	69354	24-Aug-10	Marsland	Tom Walters	308-665-2303(H);308-430-5333(M)	Tatum Hlavacek	Well	Agricultural	active		pivot	135	55-60	01-Jan-56			submersible		steel	slits cut in casing for screen	1121114.7	430153.0		
0715	G001417B	29	51	24				Tom Walters	112 Squaw Mound Rd.	Marsland	NE	69354	24-Aug-10	Marsland	Tom Walters	308-665-2303(H) 308-430-5333(M)	Tatum Hlavacek	Well	Agricultural	active	200		135	55-60	01-Jan-56			submersible		steel	slits cut in casing for screen	1121114.7	430153.0		
0716	G001417A	29	51	24				Tom Walters	112 Squaw Mound Rd.	Marsland	NE	69354	24-Aug-10	Marsland	Tom Walters	308-665-2303(H) 308-430-5333(M)	Tatum Hlavacek	Well	Agricultural	inactive	350		135	55-60	01-Jan-55			Turbine pump		steel	slits cut in casing for screen	1120822.4	430022.8		
0717		29	51	26				Tom Walters	112 Squaw Mound Rd.	Marsland	NE	69354	24-Aug-10	Marsland	Tom Walters	308-665-2303(H) 308-430-5333(M)	Tatum Hlavacek	Well	livestock	active			160					submersible		pvc & steel	pvc slid inside old steel casing	1119281.0	427121.2	purchased from Carl Wilkins	
0718		29	51	34				June Winget	808 2nd Street	Crawford	NE	69339	24-Aug-10	Marsland	Tom Walters	308-665-2303(H) 308-430-5333(M)	Tatum Hlavacek	Well	livestock	active								submersible		steel	old abandoned homestead, through Marsland,	1111614.1	422509.8	across tracks	
0719		29	51	13				Tom Walters	112 Squaw Mound Rd.	Marsland	NE	69354	24-Aug-10	Marsland	Tom Walters	308-665-2303(H) 308-430-5333(M)	Tatum Hlavacek	Well	livestock	active			160		01-Jan-60			submersible		steel	drilled before 1962	1122515.2	440218.3		
0720	G-165283	29	51	12	79 - 225	Brule/Arikaree		Crow Butte Resources, Inc.	86 Crow Butte Rd.	Crawford	NE	69339	24-Aug-10	Marsland	Wade Beins	308-665-2215 Ext 113	Tatum Hlavacek	Well to Pond	Other (driller supply water)	active	5	drillers pond	225	50.3	29-Nov-07	79	4.95 OD	submersible	Landrill Exploration	PVC/: White Certalok	CBO drillers pond off of Hollibaugh Rd.	1125236.9	440341.4		

APPENDIX A
Water User Survey Information for Water Supply Wells
in 2.2-Mile Area of Review

Well Id	DNR Registration Number	Township Location	Range Location	Section Location	Screen Interval (ft)	Name of Strata	Water Quality	Owners Name	Street Address	City Address	State Address	Zip Code Address	Date	Permit Area	Contact Person	Telephone	Interviewer	Supply Source	Water Use Type	Well Status	Estimated Rate (gpm)	History	Total Depth (ft)	Static Level (ft)	Drill Date	Casing Depth (ft)	Diameter (inches)	Pumping Method	Driller	Casing Type	Remarks	Easting	Northing	Remarks_2	Remarks_3
0721	G-165282	29	51	12	69 - 89	Brule/Arikaree		Crow Butte Resources, Inc.	86 Crow Butte Rd.	Crawford	NE	69339	24-Aug-10	Marsland	Wade Beins	308-665-2215 Ext 113	Tatum Hlavacek	Well to Pond	Other (driller supply water)	active	5	drillers pond	89	50.4	29-Oct-06	69	4.95 OD	submersible	Landrill Exploratio n	PVC: White Certalok	CBO drillers pond, off Squaw Mound Rd.	112014.8	440485.1		
0722		29	51	12				Tom Walters	112 Squaw Mound Rd.	Marsland	NE	69354	24-Aug-10	Marsland	Tom Walters	308-665-2303(H) 308-430-5333(M)	Tatum Hlavacek	Well	livestock	active			160					submersible			follow REA poles	1124745.2	442385.0		
0723	G100831	29	51	11	180-220			Bonnie Chapman	1808 Oxford Dr.	Cheyenne	WY	82001	24-Aug-10	Marsland	Tom Walters	308-665-2303(H) 308-430-5333(M)	Tatum Hlavacek	Well	domestic/livesto ck	active	10		220	150	19-May-99	180	9	submersible	Chubb	pvc	Wellings Rental, well is behind house	1119554.2	440690.5	Bonnie Chapman #307-632-3269	
0724		29	51	11				Bonnie Chapman	1808 Oxford Dr.	Cheyenne	WY	82001	24-Aug-10	Marsland	Tom Walters	308-665-2303(H) 308-430-5333(M)	Tatum Hlavacek	Well	domestic/livesto ck	inactive											Wellings Rental, do not use well by corral	1119753.9	440732.5	Bonnie Chapman #307-632-3269	
0725	G094856	29	50	7	180-240			Bonnie Chapman	1808 Oxford Dr.	Cheyenne	WY	82001	24-Aug-10	Marsland	Tom Walters	308-665-2303(H) 308-430-5333(M)	Tatum Hlavacek	Well	livestock	active	3		240	139	01-Jan-97	240	1	Windmill	Nelson	pvc	Bonnie Chapman #307-632-3269	1128286.3	442274.9		
0726		29	51	12				Bonnie Chapman	1808 Oxford Dr.	Cheyenne	WY	82001	24-Aug-10	Marsland	Tom Walters	308-665-2303(H) 308-430-5333(M)	Tatum Hlavacek	Well		inactive			300	70-80							abandoned-old oil test well, caved in			Bonne Chapman #307-632-3269	
		29	51	10				Bonnie Chapman	1808 Oxford Dr.	Cheyenne	WY	82001	24-Aug-10	Marsland	Tom Walters	308-665-2303(H) 308-430-5333(M)	Tatum Hlavacek	Spring	livestock											Natural Springs. full since 1934				
0727		29	51	1				June Winget	808 2nd Street	Crawford	NE	69339	24-Aug-10	Marsland	Tom Walters	308-665-2303(H) 308-430-5333(M)	Tatum Hlavacek	Well	livestock	active			180					submersible/Wind mill		pvc/steel	pvc inside steel casing	1122822.4	446628.1		
0728	G088070	29	51	1	180-260			Gerladine Alloway	499 West Shore Village Rd.	Casper	WY	82601	24-Aug-10	Marsland	Tom Walters	308-665-2303(H) 308-430-5333(M)	Tatum Hlavacek	Well	livestock	active	10		260	112	01-Jan-96	200	1	submersible	Nelson	pvc		1121872.0	450812.2		
0729		29	50	6				Dewayne Hollibaugh	1343 Canyon Dr.	Chadron	NE	69337	10-Nov-10	Marsland	Dewayne Hollibaugh	308-432-6833	Tatum Hlavacek	Well	livestock	inactive	10-15			180	01-Jan-60			Windmill			leased by Tom Walters, spoke with Walters about	1128117.7	445802.1	well on 8-24-10	
0730		29	50	7										Marsland																	1126008.5	442756.2		
0730		29	50	7		Brule/Ankaree (Based on water quality)		Bonnie Chapman	1808 Oxford Dr.	Cheyenne	WY	82001	24-Aug-10	Marsland	Tom Walters	308-665-2303(H); 308-430-5333(M)	Tatum Hlavacek	Well	Domestic	active			<285 (Based on water quality)					submersible			house used for vacation home	1126008.5	442756.2	old Cal Hollibaugh place	Bonne Chapman #307-632-3269
0731	G090120	29	50	18	120-180			Geraldine Alloway	499 West Shore Village Rd	Casper	WY	82601	24-Aug-10	Marsland	Geraldine Alloway	307-237-8377(H); 307-259-0457(M)	Tatum Hlavacek	Well	livestock	active	3		180	106	01-Jan-96	147	1	submersible	Nelson	pvc	leased to Patti Hollibaugh	1125370.9	438301.7		
0732	G043958	29	50	17				Dewayne Hollibaugh	1343 Canyon Dr.	Chadron	NE	69337	10-Nov-10	Marsland	Dewayne Hollibaugh	308-432-6833	Tatum Hlavacek	Well	Agricultural	active	1300		280	78	01-Jan-74	171	8	Turbine pump				1130680.7	436970.7		
0733		29	51	13				Pat Furman	3142 River Rd.	Marsland	NE	69354	23-Aug-10	Marsland	Pat Furman	308-665-2731(H); 308-430-1817(M)	Tatum Hlavacek	Well	livestock	active								Windmill				1124205.4	435560.2		
0734	G094138	30	50	31	240-300			Geraldine Alloway	499 West Shore Village Rd.	Casper	WY	82601	24-Aug-10	Marsland	Tom Walters	308-665-2303(H); 308-430-5333(M)	Tatum Hlavacek	Well	livestock				300	1	01-Jan-98	300	9	cylinder pump	Nelson	pvc		1126994.5	453703.9		
0735	G148049	30	50	31	355-375			Patti Hollibaugh	971 Squaw Mound Rd	Crawford	NE	69339	01-Sep-10	Marsland	Dewayne Hollibaugh	308-432-6833	Tatum Hlavacek		livestock	active			375	210	01-Jan-07	375	9		Prosser	pvc	well registered in Patti Hollibaughs name;	1127652.4	450927.5	ground owned by Dewayne Hollibaugh	
0736	G068634	29	50	17	120-200			Bert & Laura Lee Oetken	360 Oetken Rd.	Crawford	NE	69339	11-Apr-13	Marsland	Greg Oetken	308-665-2520	Tatum Hlavacek	Well	Agricultural	active	900		200	115	01-Jan-68	120	8		Chase Drilling (out of business)			1133618.8	438066.8	Owner update by J. Cearley of Arcadis	NDNR Water Well Database
0737	G068635	29	50	17				Bert & Laura Lee Oetken	360 Oetken Rd..	Crawford	NE	\69339	11-Apr-13	Marsland	Greg Oetken	308-665-2520	Tatum Hlavacek	Well	Agricultural	active	1200		340	110	01-Jan-73	Unknown	8		Midwest Farm Service Gering, NE			1134975.2	437990.2	Owner update by J. Cearley of Arcadis	NDNR Water Well Database
0738	G097537	29	51	26	240-260			June Winget	808 W. 2nd Street	Crawford	NE	69339	24-Aug-10	Marsland	Tom Walters	308-665-2303(H); 308-430-5333(M)	Tatum Hlavacek	Well	livestock	active	3		260	178	01-Jan-98	240	9	Windmill	Chubb	pvc	land owned by June Winget, leased by Tom Walters;	1115236.8	425854.9	well registered in Lonnie Wilkins name	
0739	G113923	29	50	30	30-60			Bruce Troester	3143 River Rd	Marsland	NE	69354	08-Nov-10	Marsland	Bruce Troester	308-665-2353	Tatum Hlavacek	Well	livestock/garden	active	10		60	14	08-Nov-01		9	submersible	Chubb	pvc		1127342.4	425486.4		
0740	G108894	29	50	30	50-100			Bruce Troester	3143 River Rd	Marsland	NE	69354	08-Nov-10	Marsland	Bruce Troester	308-665-2353	Tatum Hlavacek	Well	Agricultural	active	850		110	8	02-Feb-01		6		Nelson	pvc		1127519.8	424396.8		
0741	G081600	29	50	29	50-170&170-190			Greg Oetken	3211 River Rd.	Marsland	NE	69354	05-Nov-10	Marsland	Greg Oetken	308-665-2520	Tatum Hlavacek	Well	domestic/livesto ck	active	20		190	42	01-Jan-94		2		Chubb	pvc	house well; between the two houses	1131600.1	425727.9		
0742	G086157	29	50	31	40-60			Bruce Troester	3143 River Rd.	Marsland	NE	69354	08-Nov-10	Marsland	Bruce Troester	308-665-2353	Tatum Hlavacek	Well	livestock	active	20		60	18	01-Jan-95		2	submersible	Chubb	pvc		1126845.0	423771.4		

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In 2.2-Mile Area of Review

Well Id	DNR Registration Number	Township Location	Range Location	Section Location	Screen Interval (ft)	Name of Strata	Water Quality	Owners Name	Street Address	City Address	State Address	Zip Code Address	Date	Permit Area	Contact Person	Telephone	Interviewer	Supply Source	Water Use Type	Well Status	Estimated Rate (gpm)	History	Total Depth (ft)	Static Level (ft)	Drill Date	Casing Depth (ft)	Diameter (inches)	Pumping Method	Driller	Casing Type	Remarks	Easting	Northing	Remarks_2	Remarks_3
0743	G106423	30	51	27	120-140			John Manning	1761 River Rd.	Marsland	NE	69354	03-Nov-10	Marsland	T.J. Manning	308-665-5333(M)	Tatum Hlavacek	Well	livestock	active			140	70	05-May-99	120	9	submersible	Chubb	pvc		1114725.2	461481.1		
0744		30	51	26				John Manning	1761 River Rd.	Marsland	NE	69354	03-Nov-10	Marsland	T.J. Manning	308-665-5333(M)	Tatum Hlavacek	Well	livestock	active			80	30	01-Jan-70	80	5	windmill/submersible	Chubb	pvc		1117989.3	459031.5		
0745		30	51	26				John Manning	1761 River Rd.	Marsland	NE	69354	03-Nov-10	Marsland	T.J. Manning	308-665-5333(M)	Tatum Hlavacek	Well	livestock	active								submersible				1118781.9	459206.3		
0746		30	51	36				John Manning	1761 River Rd.	Marsland	NE	69354	03-Nov-10	Marsland	T.J. Manning	308-665-5333(M)	Tatum Hlavacek	Well	livestock	active								Windmill			state land	1121182.9	455178.1		
0747		30	51	35		Arikaree		John Manning	1761 River Rd.	Marsland	NE	69354	03-Nov-10	Marsland	T.J. Manning	308-665-5333(M)	Tatum Hlavacek	Well	livestock	active			225	200				submersible/Windmill				1117899.2	453783.8		
0748		29	51	3				John Manning	1761 River Rd.	Marsland	NE	69354	03-Nov-10	Marsland	T.J. Manning	308-665-5333(M)	Tatum Hlavacek	Well	livestock	active								submersible				1113046.1	448639.2		
0749		30	51	34				John Manning	1761 River Rd.	Marsland	NE	69354	03-Nov-10	Marsland	T.J. Manning	308-665-5333(M)	Tatum Hlavacek	Well	livestock	inactive								Windmill				1112776.7	452017.4		
0750		30	51	34				John Manning	1761 River Rd.	Marsland	NE	69354	03-Nov-10	Marsland	T.J. Manning	308-665-5333(M)	Tatum Hlavacek	Well	livestock	active								Windmill				1112710.4	454753.1		
0751		30	51	28				John Manning	1761 River Rd.	Marsland	NE	69354	03-Nov-10	Marsland	T.J. Manning	308-665-5333(M)	Tatum Hlavacek	Well	livestock	active								Windmill				1105386.1	457186.6		
0752		29	50	29				Bert Oetken	3211 River Rd.	Marsland	NE	69354	05-Nov-10	Marsland	Greg Oetken	308-665-2520	Tatum Hlavacek	Well	domestic/livestock	active	10-20		200-300					submersible			barns	1132300.5	426415.9		
0753		29	50	29				Bert Oetken	3211 River Rd.	Marsland	NE	69354	05-Nov-10	Marsland	Greg Oetken	308-665-2520	Tatum Hlavacek	Well	domestic/livestock	active	50		200-300					submersible			by houses and barn	1130626.6	426414.2		
0754		29	50	29				Bert Oetken	3211 River Rd.	Marsland	NE	69354	05-Nov-10	Marsland	Greg Oetken	308-665-2520	Tatum Hlavacek	Well	livestock	active	10-20		200-300					submersible			by houses and barn	1131539.7	425961.1		
0755		29	50	29				Bert Oetken	3211 River Rd.	Marsland	NE	69354	05-Nov-10	Marsland	Greg Oetken	308-665-2520	Tatum Hlavacek	Well	livestock	active	10-20		200-300					submersible				1134050.4	427897.6		
0756		29	50	20				Bert Oetken	3211 River Rd.	Marsland	NE	69354	05-Nov-10	Marsland	Greg Oetken	308-665-2520	Tatum Hlavacek	Well	livestock	inactive		old windmill fell over	200-300					Pump Jack				1132462.9	432469.1		
0759		29	50	20				Bert Oetken	3211 River Rd.	Marsland	NE	69354	05-Nov-10	Marsland	Greg Oetken	308-665-2520	Tatum Hlavacek	Well	livestock	active	10-20		200-300					submersible				1133622.5	429537.5		
0760		29	50	17				Bert Oetken	3211 River Rd.	Marsland	NE	69354	05-Nov-10	Marsland	Greg Oetken	308-665-2520	Tatum Hlavacek	Well	Agricultural	active	1000							submersible				1135189.3	439343.3		
0762		29	50	16				Bert Oetken	3211 River Rd.	Marsland	NE	69354	05-Nov-10	Marsland	Greg Oetken	308-665-2520	Tatum Hlavacek	Well	livestock	active	10-20		200-300					submersible			state land	1138960.3	435635.4		
0763		29	50	16				Bert Oetken	3211 River Rd.	Marsland	NE	69354	05-Nov-10	Marsland	Greg Oetken	308-665-2520	Tatum Hlavacek	Well	livestock	active	10-20		200-300					submersible			state land	1140565.5	437331.7		
0764		29	50	9				Bert Oetken	3211 River Rd.	Marsland	NE	69354	05-Nov-10	Marsland	Greg Oetken	308-665-2520	Tatum Hlavacek	Well	livestock	active	10-20		200-300					Windmill				1140646.2	441535.3		
0765		29	50	4				Bert Oetken	3211 River Rd.	Marsland	NE	69354	05-Nov-10	Marsland	Greg Oetken	308-665-2520	Tatum Hlavacek	Well	livestock	active	10-20		200-300					Windmill				1137611.0	447306.0		
0766		29	50	4				Bert Oetken	3211 River Rd.	Marsland	NE	69354	05-Nov-10	Marsland	Greg Oetken	308-665-2520	Tatum Hlavacek	Well	livestock	active	10-20		200-300					submersible				1138031.7	449869.5		
0767		29	51	4				Bert Oetken	3211 River Rd.	Marsland	NE	69354	05-Nov-10	Marsland	Greg Oetken	308-665-2520	Tatum Hlavacek	Well	livestock	active	10-20		200-300					Windmill			not far from house	1107246.0	448328.8		
0768		29	51	4				Bert Oetken	3211 River Rd.	Marsland	NE	69354	05-Nov-10	Marsland	Greg Oetken	308-665-2520	Tatum Hlavacek	Well	Domestic	active		pumps good	200-300	60-120				submersible			house well	1107063.9	448333.0		
0769		29	51	4				Bert Oetken	3211 River Rd.	Marsland	NE	69354	05-Nov-10	Marsland	Greg Oetken	308-665-2520	Tatum Hlavacek	Well	livestock	active	10-20		200-300					Windmill				1105995.9	447845.8		
0770		29	51	5				Bert Oetken	3211 River Rd.	Marsland	NE	69354	05-Nov-10	Marsland	Greg Oetken	308-665-2520	Tatum Hlavacek	Well	livestock	active	10-20		200-300					Windmill				1102620.5	447700.3		
0771		29	51	5				Bert Oetken	3211 River Rd.	Marsland	NE	69354	05-Nov-10	Marsland	Greg Oetken	308-665-2520	Tatum Hlavacek	Well	livestock	active	10-20		200-300					Windmill				1103426.3	449697.7		
0772		29	51	9				Bert Oetken	3211 River Rd.	Marsland	NE	69354	05-Nov-10	Marsland	Greg Oetken	308-665-2520	Tatum Hlavacek	Well	livestock	active	10-20		200-300					Windmill				1108613.8	442822.8		
0773		29	51	9				Bert Oetken	3211 River Rd.	Marsland	NE	69354	05-Nov-10	Marsland	Greg Oetken	308-665-2520	Tatum Hlavacek	Well	livestock	active	10-20		200-300					Windmill				1106844.2	444555.1		
0775	G095954	30	51	33				Bert Oetken	3211 River Rd.	Marsland	NE	69354	05-Nov-10	Marsland	Greg Oetken	308-665-2520	Tatum Hlavacek	Well	livestock	active	10		220	117	06-Apr-98	200	9	submersible/Windmill	Chubb	pvc	submersible under windmill	1108495.3	454893.0		
0776		29	51	4				Bert Oetken	3211 River Rd.	Marsland	NE	69354	05-Nov-10	Marsland	Greg Oetken	308-665-2520	Tatum Hlavacek	Well	livestock	active	10-20		200-300					submersible				1105105.1	450500.5		
0777		29	50	30				Bruce Troester	3143 River Rd.	Marsland	NE	69354	08-Nov-10	Marsland	Bruce Troester	308-665-2353	Tatum Hlavacek	Well	domestic/garden	active	10-20		60					submersible				1127520.1	425634.3		
0778		29	50	30				Bruce Troester	3143 River Rd.	Marsland	NE	69354	08-Nov-10	Marsland	Bruce Troester	308-665-2353	Tatum Hlavacek	Well	livestock	inactive	10-20		60					submersible				1127537.2	426508.6		
0779		28	51	12				Bruce Troester	3143 River Rd.	Marsland	NE	69354	08-Nov-10	Marsland	Bruce Troester	308-665-2353	Tatum Hlavacek	Well	livestock	active	3		140					Windmill				1131744.1	410502.0		
0780		28	51	11				Bruce Troester	3143 River Rd.	Marsland	NE	69354	08-Nov-10	Marsland	Bruce Troester	308-665-2353	Tatum Hlavacek	Well	livestock	active	10-20		60					Windmill				1127499.1	413063.4		
0781		28	51	2				Bruce Troester	3143 River Rd.	Marsland	NE	69354	08-Nov-10	Marsland	Bruce Troester	308-665-2353	Tatum Hlavacek	Well	livestock	active	10-20		60					Windmill				1126319.7	416522.1		
0782	G134034	29	50	28				Bruce Troester	3143 River Rd.	Marsland	NE	69354	08-Nov-10	Marsland	Bruce Troester	308-665-2353	Tatum Hlavacek	Well	Agricultural	active	700		100	20	01-Jan-60			submersible	Midwest Farm Service		land bought from Chuck Turnbull	1139522.2	427841.1		
0783	G150312	29	50	28	50-70			Bruce Troester	3143 River Rd.	Marsland	NE	69354	08-Nov-10	Marsland	Bruce Troester	308-665-2353	Tatum Hlavacek	Well	Domestic	active	15		70	24	01-Jan-08	70	9	submersible	Chubb	pvc	land bought from Chuck Turnbull	1139916.9	428674.7		
0784		29	50	27				Bruce Troester	3143 River Rd.	Marsland	NE	69354	08-Nov-10	Marsland	Bruce Troester	308-665-2353	Tatum Hlavacek	Well	livestock	inactive	10-20		40-60					Windmill			useable but not being used, alnd bought from	1144451.6	427879.5	Chuck Turnbull	
0785		28	51	1				Bruce Troester	3143 River Rd.	Marsland	NE	69354	08-Nov-10	Marsland	Bruce Troester	308-665-2353	Tatum Hlavacek	Well	livestock	inactive	3		140					Windmill				1131834.3	418463.8		
0786		28	51	1				Bruce Troester	3143 River Rd.	Marsland	NE	69354	08-Nov-10	Marsland	Bruce Troester	308-665-2353	Tatum Hlavacek	Well	livestock	inactive	3		140					Windmill				1131089.0	415095.5		
0787		29	50	19				Dewayne Hollibaugh	1343 Canyon Dr.	Chadron	NE	69337	10-Nov-10	Marsland	Dewayne Hollibaugh	308-432-6833	Tatum Hlavacek	Well	livestock	inactive	10		130		01-Jan-60			Windmill		pvc		1126168.2	433468.9		

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0788		29	50	18				Dewayne Hollibaugh	1343 Canyon Dr.	Chadron	NE	69337	10-Nov-10	Marsland	Dewayne Hollibaugh	308-432-6833	Tatum Hlavacek	Well	livestock	active	10		130-140		01-Jan-40			Windmill		steel		1128858.0	438296.6		
0790		29	50	8				Dewayne Hollibaugh	1343 Canyon Dr.	Chadron	NE	69337	10-Nov-10	Marsland	Dewayne Hollibaugh	308-432-6833	Tatum Hlavacek	Well	livestock	inactive	10-20			160				Windmill		pvc		1134081.7	442038.2		
0791		29	50	9				Dewayne Hollibaugh	1343 Canyon Dr.	Chadron	NE	69337	10-Nov-10	Marsland	Dewayne Hollibaugh	308-432-6833	Tatum Hlavacek	Well	livestock	active	10-20			160-170				Windmill		steel		1137066.2	441191.8		
0792		29	50	5				Dewayne Hollibaugh	1343 Canyon Dr.	Chadron	NE	69337	10-Nov-10	Marsland	Dewayne Hollibaugh	308-432-6833	Tatum Hlavacek	Well	livestock	active	10			180				Windmill		steel	old well	1134397.3	445473.0		
0793		30	50	32				Dewayne Hollibaugh	1343 Canyon Dr.	Chadron	NE	69337	10-Nov-10	Marsland	Dewayne Hollibaugh	308-432-6833	Tatum Hlavacek	Well	livestock	active	8-10		300					Windmill		pvc	windmill is not working	1133348.7	451314.8		
0794		30	50	31				Dewayne Hollibaugh	1343 Canyon Dr.	Chadron	NE	69337	10-Nov-10	Marsland	Dewayne Hollibaugh	308-432-6833	Tatum Hlavacek	Well	domestic/livestock	active	10-15		300					submersible		pvc	well drilled between 1925-1930, house well	1129656.3	453879.2		
0795		30	50	31				Dewayne Hollibaugh	1343 Canyon Dr.	Chadron	NE	69337	10-Nov-10	Marsland	Dewayne Hollibaugh	308-432-6833	Tatum Hlavacek	Well	domestic/livestock	active	10-15		350		01-Jan-90			submersible		pvc	well drilled in the 1990's, house well	1130072.5	453722.8		
0796		30	50	31				Dewayne Hollibaugh	1343 Canyon Dr.	Chadron	NE	69337	10-Nov-10	Marsland	Dewayne Hollibaugh	308-432-6833	Tatum Hlavacek	Well	domestic/livestock	inactive	15		350		01-Jan-80			submersible		pvc	not in use, well drilled in the 1980's	1128914.6	452242.4		
0798		30	51	24				Melburn Franey	780 Perry Dr.	Chadron	NE	69337	11-Nov-10	Marsland	Marvina Franey	308-432-8384	Tatum Hlavacek	Well	livestock	active	10-20		200		01-Jan-00			submersible	Chubb	pvc	Between Anderson and Franey-share well	1121934.8	465639.5	well drilled approximately 10 yrs ago	
0799		30	51	24				Melburn Franey	780 Perry Dr.	Chadron	NE	69337	11-Nov-10	Marsland	Marvina Franey	308-432-8384	Tatum Hlavacek	Well	livestock	active	10-20		250					Windmill			1/4 mile south of Hough Rd. in middle of property,	1122179.9	462541.3	Leonard Chubb works on windmill	old well
0800		30	51	13				Jim Anderson	101 Linn Street	Crawford	NE	69339	12-Nov-10	Marsland	Jim Anderson	308-665-2395	Tatum Hlavacek	Well	livestock	active								Windmill			well is over 50 yrs old.	1122174.9	469011.5	Leased by Travis Anderson	
0801	G116402	30	50	19				Mike Graves	132 Hough Rd.	Crawford	NE	69339	11-Nov-10	Marsland	Mike Graves	308-665-1296	Tatum Hlavacek	Well	domestic/garden	active	15		220	70	06-Jul-02	220	9	submersible	Chubb	pvc		1126978.9	464282.7		
0802		30	51	25				Emmett Hale	1244 W. Belmont Rd.	Crawford	NE	69339	15-Nov-10	Marsland	Emmett Hale	308-665-1714	Tatum Hlavacek	Well	livestock	active	10-20		180-200	80				Windmill	Chubb		started out being a domestic well in 1945	1121275.9	457656.7	house and buildings torn down, livestock ever sinc	old well
0803		30	51	29				Edward Metz	211 E. Belmont Rd	Crawford	NE	6933	14-Jan-11	Marsland	Edward Metz	308-665-1546	Tatum Hlavacek	Well	livestock	active								Windmill			drilled before 1984	1104542.3	461686.1		
0804		30	51	29				Edward Metz	211 E. Belmont Rd.	Crawford	NE	69339	14-Jan-11	Marsland	Edward Metz	308-665-1546	Tatum Hlavacek	Well	domestic/livestock	active			deep					submersible	Chubb		by house	1104468.4	461791.2		
0805		30	51	29				Edward Metz	211 E. Belmont Rd.	Crawford	NE	69339	14-Jan-11	Marsland	Edward Metz	308-665-1546	Tatum Hlavacek	Well	livestock	inactive	not good		shallow					Pump Jack			by house, do not use	1104640.5	461790.0	flow not great enough to handle submersible	
0806		30	51	29				Edward Metz	211 E. Belmont Rd.	Crawford	NE	69339	14-Jan-11	Marsland	Edward Metz	308-665-1546	Tatum Hlavacek	Well	livestock	inactive								Windmill	Chubb		windmill is broken, do not use well	1104273.2	461660.7		
0807		30	51	29				David Verhage	112 Oetken Rd.	Crawford	NE	69339	14-Jan-11	Marsland	David Verhage	308-665-2702	Tatum Hlavacek	Well	domestic/livestock	active	pumps good		200-220		01-Jan-76			submersible	Chubb	not cased	house well	1103080.4	458669.3		
0808		30	51	29				Russell Finneman	114 Oetken Rd.	Crawford	NE	69339	14-Jan-11	Marsland	Russell Finneman	308-665-2756	Tatum Hlavacek	Well	domestic/livestock	active	pumps good		160	100	01-Jan-84			submersible	Chubb	galvanized	27 years old	1104002.9	458507.1		
0809		30	51	28				Adelaide Walther	361 E. Belmont Rd.	Crawford	NE	69339	14-Jan-11	Marsland	Adelaide Walther	308-665-1726	Tatum Hlavacek	Well	livestock	active	fairly good		300					Windmill			well drilled before 1947, located by barn	1109635.8	461243.9		
0810		30	51	28				Adelaide Walther	361 E. Belmont Rd.	Crawford	NE	69339	14-Jan-11	Marsland	Adelaide Walther	308-665-1726	Tatum Hlavacek	Well	domestic/livestock	active	1		>300		01-Jan-90			submersible	Prosser		well is at least 20 years old, by blue shed.	1109942.6	461542.5	house well	
0811		30	51	21				Adelaide Walther	361 E. Belmont Rd.	Crawford	NE	69339	14-Jan-11	Marsland	Adelaide Walther	308-665-1726	Tatum Hlavacek	Well	domestic/livestock	active	1/2		>300		01-Jan-90			Windmill	Panhandle Drilling		well drilled about 20 years ago	1110187.6	462030.2		
0812		30	51	21				Gary Fickel	327 E. Belmont Rd.	Crawford	NE	69339	14-Jan-11	Marsland	Gary Fickel	308-665-2439	Tatum Hlavacek	Well	domestic/livestock	active	good		260		01-Jan-71	220		submersible	Chubb		house well	1109662.5	465283.8		
0813		30	51	21				Gary Fickel	327 E. Belmont Rd.	Crawford	NE	69339	14-Jan-11	Marsland	Gary Fickel	308-665-2439	Tatum Hlavacek	Well	livestock	active			280		01-Jan-39			Windmill		steel		1109411.4	465224.8		
0814		30	51	21				Gary Fickel	327 E. Belmont Rd.	Crawford	NE	69339	14-Jan-11	Marsland	Gary Fickel	308-665-2439	Tatum Hlavacek	Well	exploration	inactive									Crow Butte		CBO exploration hole	1106915.0	466807.6		

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0815		29	51	14				Buzz Tollman	211 Squaw Mound	Marsland	NE	69354	14-Jan-11	Marsland	Buzz Tollman	308-665-2415	Tatum Hlavacek	Well	Domestic	active	5-6		140		01-Jan-55			submersible	Chubb	steel	house well, drill in 1955 or 1956	1119645.0	435833.7		
0816		29	51	14				Buzz Tollman	211 Squaw Mound	Marsland	NE	69354	14-Jan-11	Marsland	Buzz Tollman	308-665-2415	Tatum Hlavacek	Well	livestock	inactive	4-6		140					submersible		steel	old well	1119247.7	435853.5		
0817		29	51	14				Buzz Tollman	211 Squaw Mound	Marsland	NE	69354	14-Jan-11	Marsland	Buzz Tollman	308-665-2415	Tatum Hlavacek	Well	livestock	inactive	1-4		160			not cased to bottom		Windmill		steel		1119264.0	436157.5		
0818		29	51	15				Buzz Tollman	211 Squaw Mound	Marsland	NE	69354	14-Jan-11	Marsland	Buzz Tollman	308-665-2415	Tatum Hlavacek	Well	livestock	active	1-2		140		01-Jan-50			Windmill	Chubb	steel		1112421.6	439735.3		
0819		29	51	22				Buzz Tollman	211 Squaw Mound	Marsland	NE	69354	14-Jan-11	Marsland	Buzz Tollman	308-665-2415	Tatum Hlavacek	Well	livestock	active	1-2		140		02-Jan-00	cased to butte rock		Windmill	Pellren	steel	drilled in the early 1900's	1111644.7	435252.1		
0820		29	51	16				Buzz Tollman	211 Squaw Mound	Marsland	NE	69354	14-Jan-11	Marsland	Buzz Tollman	308-665-2415	Tatum Hlavacek	Well	livestock	active	1-2		140		01-Jan-55			Windmill	Chubb	steel		1107876.9	438842.8		
0821		29	51	23				Buzz Tollman	211 Squaw Mound	Marsland	NE	69354	14-Jan-11	Marsland	Buzz Tollman	308-665-2415	Tatum Hlavacek	Well	livestock	active	3		160		01-Jan-80			submersible	Peterson	pvc		1118356.5	432321.7		
0822		29	51	23				Buzz Tollman	211 Squaw Mound	Marsland	NE	69354	14-Jan-11	Marsland	Buzz Tollman	308-665-2415	Tatum Hlavacek	Well	livestock	active	6-7		140		01-Jan-60			submersible	Chubb	steel		1116025.6	432731.4		
0823		29	51	26				Buzz Tollman	211 Squaw Mound	Marsland	NE	69354	14-Jan-11	Marsland	Buzz Tollman	308-665-2415	Tatum Hlavacek	Well	livestock	active	1-2		100		01-Jan-50			Windmill	Chubb	steel		1116762.1	427344.1		
0824		29	51	35				Buzz Tollman	211 Squaw Mound	Marsland	NE	69354	14-Jan-11	Marsland	Buzz Tollman	308-665-2415	Tatum Hlavacek	Well	Domestic	active	4		100		01-Jan-67			submersible	Chubb		by house, Hack's house	1116317.9	424238.9		
0825		29	51	21				Buzz Tollman	211 Squaw Mound	Marsland	NE	69354	14-Jan-11	Marsland	Buzz Tollman	308-665-2415	Tatum Hlavacek	Well	livestock	active	1-2		140		02-Jan-00			Windmill	Pellran	steel	drilled in the 1900's	1109095.9	432413.1		
0826		30	51	32				Scott and Robbie Diehl		Chadron	NE	69337	29-Oct-08	Marsland	Robbie Diehl		Tatum Hlavacek	Well	livestock	active		inherited land from grandfather.						Pump Jack			leased by Oetkens	1102870.3	453954.3	does not know history of well	
0827		30	51	29				Scott and Robbie Diehl		Chadron	NE	69337	29-Oct-08	Marsland	Robbie Diehl		Tatum Hlavacek	Well	livestock	active		inherited land from grandfather									leased by Oetkens	1104365.7	457644.6	does not know history of well	
0828	G103966	30	51	29	140-160			Kenneth Kock	116 Oetken Rd	Crawford	NE	69339	14-Jan-11	Marsland	Kenneth Kock	308-665-1449	Tatum Hlavacek	Well	Domestic	active	10		160	31	10-Jul-99	100	9	submersible	Chubb	pvc	house well	1104688.8	458477.1		
0829		30	51	20				Alice Porter	801 1st Street	Crawford	NE	69339	15-Feb-11	Marsland	Alice Porter	308-665-3962	Tatum Hlavacek	Well	livestock	inactive								Windmill			windmill has broken, old abandoned homestead	1103921.4	462900.5		
0830	G118350	30	51	20				Alice Porter	801 1st Street	Crawford	NE	69339	15-Feb-11	Marsland	Alice Porter	308-665-3962	Tatum Hlavacek	Well	Domestic	active	10		300	145	09-Oct-02	300	9	electric	Chubb	pvc	house well, old abandoned homestead	1103884.8	463003.5		
0831		29	50	27				Dan Campbell	651 CR 63	Hemingford	NE	69348	24-Feb-11	Marsland	Deb Campbell	308-487-5330	Tatum Hlavacek	Well	Domestic	active			shallow								house well, old abandoned homestead	1144713.3	425895.6		
0832		29	50	34				Dan Campbell	651 CR 63	Hemingford	NE	69348	24-Feb-11	Marsland	Deb Campbell	308-487-5330	Tatum Hlavacek	Well	livestock	active			shallow					Windmill			old abandoned homestead	1145622.6	422166.7		
0834		30	51	23				Arlee Phillips	7600 Dodge Rd.	Hemingford	NE	69348	25-Feb-11	Marsland	Arlee Phillips	308-487-3876	Tatum Hlavacek	Well	domestic/livestock	inactive	good		300		01-Jan-76			submersible		pvc	not used	1116192.0	462067.9		
0835		30	51	23				Arlee Phillips	7600 Dodge Rd.	Hemingford	NE	69348	25-Feb-11	Marsland	Arlee Phillips	308-487-3876	Tatum Hlavacek	Well	livestock	inactive	average		300					Windmill		pvc	windmill not standing anymore	1116080.4	462504.7	not used	
0836	G100106	30	51	23	200-220			Arlee Phillips	7600 Dodge Rd.	Hemingford	NE	69348	25-Feb-11	Marsland	Arlee Phillips	308-487-3876	Tatum Hlavacek	Well	livestock	active	average		220	145	26-Mar-98		9	submersible		pvc		1120265.4	462677.2		
0837		30	51	23				Arlee Phillips	7600 Dodge Rd.	Hemingford	NE	69348	25-Feb-11	Marsland	Arlee Phillips	308-487-3876	Tatum Hlavacek	Well	livestock	active	average		300		01-Jan-69			submersible		pvc		1119802.0	465856.2		
0838		30	51	15		Arikaree		Arlee Phillips	7600 Dodge Rd.	Hemingford	NE	69348	25-Feb-11	Marsland	Arlee Phillips	308-487-3876	Tatum Hlavacek	Well	livestock	active	average		300		01-Jan-64	20-30	6	Windmill		galvanized	tubular pipe	1112499.0	467397.3		
0839		30	51	15				Arlee Phillips	7600 Dodge Rd.	Hemingford	NE	69348	25-Feb-11	Marsland	Arlee Phillips	308-487-3876	Tatum Hlavacek	Well	livestock	active	average		300		01-Jan-58			Windmill		galvanized		1112156.6	467406.7		
0840		30	51	15				Arlee Phillips	7600 Dodge Rd.	Hemingford	NE	69348	25-Feb-11	Marsland	Arlee Phillips	308-487-3876	Tatum Hlavacek	Well	livestock	active	average		300		01-Jan-73		5	Windmill	Chubb	pvc		1114985.4	467289.5		
0841	G100105	30	51	22				Arlee Phillips	7600 Dodge Rd.	Hemingford	NE	69348	25-Feb-11	Marsland	Arlee Phillips	308-487-3876	Tatum Hlavacek	Well	livestock	active	average		220	155	25-Mar-99	220	9	submersible	Chubb	pvc		1111665.6	462209.9		
0842		30	51	14				Arlee Phillips	7600 Dodge Rd.	Hemingford	NE	69348	25-Feb-11	Marsland	Arlee Phillips	308-487-3876	Tatum Hlavacek	Well	livestock	inactive	average		300							pvc	cased hole, will be used for livestock,	1118307.0	469291.8	waiting for solar	
0843		30	51	22				Arlee Phillips	7600 Dodge Rd.	Hemingford	NE	69348	25-Feb-11	Marsland	Arlee Phillips	308-487-3876	Tatum Hlavacek	Well	livestock	inactive	average		300					Windmill		pvc	well drilled before 1955	1115080.5	462090.2		
0844		29	50	35				Keri Votruba	8052 Cass Rd.	Hemingford	NE	69348	25-Feb-11	Marsland	Keri Votruba	308-760-1370(M); 308-487-5697(H)	Tatum Hlavacek	Well	livestock	active	6		170					Windmill		steel		1148015.3	418914.6		
0845		29	50	28				Steve Klaes	3333 River Rd.	Marsland	NE	69354	25-Feb-11	Marsland	Steve Klaes	308-665-1503	Tatum Hlavacek	Well	domestic/livestock	active								submersible				1137941.5	427243.4		
0846		29	50	33				Steve Klaes	3333 River Rd.	Marsland	NE	69354	25-Feb-11	Marsland	Steve Klaes	308-665-1503	Tatum Hlavacek	Well	livestock	active								Windmill				1137048.9	421179.0		

APPENDIX A
Water User Survey Information for Water Supply Wells
in 2.2-Mile Area of Review

Well Id	DNR Registration Number	Township Location	Range Location	Section Location	Screen Interval (ft)	Name of Strata	Water Quality	Owners Name	Street Address	City Address	State Address	Zip Code Address	Date	Permit Area	Contact Person	Telephone	Interviewer	Supply Source	Water Use Type	Well Status	Estimated Rate (gpm)	History	Total Depth (ft)	Static Level (ft)	Drill Date	Casing Depth (ft)	Diameter (inches)	Pumping Method	Driller	Casing Type	Remarks	Easting	Northing	Remarks_2	Remarks_3
0847		28	50	6				Steve Klaes	3333 River Rd.	Marsland	NE	69354	25-Feb-11	Marsland	Steve Klaes	308-665-1503	Tatum Hlavacek	Well	livestock	Active								Windmill				1136345.2	414127.1		
0848		28	50	6				Steve Klaes	3333 River Rd.	Marsland	NE	69354	25-Feb-11	Marsland	Steve Klaes	308-665-1503	Tatum Hlavacek	Well	livestock	active								Windmill				1138992.0	416711.3		
0849		29	50	22				Steve Klaes	3333 River Rd.	Marsland	NE	69354	25-Feb-11	Marsland	Steve Klaes	308-665-1503	Tatum Hlavacek	Well	livestock	active								submersible				1142423.3	431322.9		
0850	G022646	29	50	22				Steve Klaes	3333 River Rd.	Marsland	NE	69354	25-Feb-11	Marsland	Steve Klaes	308-665-1503	Tatum Hlavacek	Well	Agricultural	active	840		200	71	01-Jan-62		8	Turbine pump			vertical shaft	1142735.9	432181.9		
0851	G000345A	29	50	22				Steve Klaes	3333 River Rd.	Marsland	NE	69354	25-Feb-11	Marsland	Steve Klaes	308-665-1503	Tatum Hlavacek	Well	Agricultural	active	500		140	60	10-Jun-04	140	8	submersible	Kelly-Deines Irrigation			144241.1	431350.1		
0852	G000345B	29	50	22				Steve Klaes	3333 River Rd.	Marsland	NE	69354	25-Feb-11	Marsland	Steve Klaes	308-665-1503	Tatum Hlavacek	Well	Agricultural	inactive								submersible			drilled in 2003 or 2004	1145455.9	432362.8		
0853	G126273	29	50	22				Steve Klaes	3333 River Rd.	Marsland	NE	69354	25-Feb-11	Marsland	Steve Klaes	308-665-1503	Tatum Hlavacek	Well	Agricultural	active	600		150	63	01-Jan-04	140	8	Gould Pump	Kelly-Deines Irrigation			1142384.3	434389.8		
0854		30	51	14				Monty Magninnis	36 Squaw Creek Rd.	Crawford	NE	69339	01-Mar-11	Marsland	Monty Maginnis	308-665-1522	Tatum Hlavacek	Well	domestic/livestock	active	4		310		01-Jan-89			submersible	Nelson	pvc	house well	1121332.7	471839.0		
0855		30	51	11				Monty Maginnis	36 Squaw Creek Rd.	Crawford	NE	69339	01-Mar-11	Marsland	Monty Maginnis	308-665-1522	Tatum Hlavacek	Well	livestock	active	3		220		02-Jan-00			Windmill			drilled in the early 1900's	1117275.9	474044.4	may not be cased below 20-30ft	
0856		29	51	36										Marsland			Tatum Hlavacek										Windmill			state land	112255.5	420726.5		
0857		29	51	25				Thomas Poole	8713 Kendall Ct.	Arvada	CO	80003	01-Mar-11	Marsland	Thomas Poole	303-431-6049	Tatum Hlavacek	Well	domestic/livestock	inactive	10		40-50				8	submersible		galvanized	greater than 100 yrs. Old, leased by Furman's	1119931.4	424946.6	usable but inactive	
0858	G068633	29	50	15				Bert Oetken	360 Oetken Rd.	Crawford	NE	69339	01-Mar-11	Marsland	DNR Website		Tatum Hlavacek	Well	Agricultural	active	1000		200	105	01-Jan-68		8					1142168.8	437589.0		
0859		29	51	27				Marsland Cemetary	River Rd.	Marsland	NE	69354	01-Mar-11	Marsland	Buzz Tollman	308-665-2415	Tatum Hlavacek	Well	Domestic	inactive			120	no water	01-Jan-20			no pump		galvanized	cement block on top of well, cased down to butte	1114131.2	429920.5	rock, well is dry-no water	
0860		28	51	3				Robert Wehtje	291 CR 79	Hemingford	NE	69348	01-Mar-11	Marsland	Rose Wehtje	308-487-5340	Tatum Hlavacek	Well	livestock	active			500		01-Jan-70			Windmill			old oil test well	1122705.9	415992.2	filled with 2 cement plugs to bring depth up	
0861		30	50	19				Dugald Richardson	133 Hough Rd.	Crawford	NE	69339	02-Mar-11	Marsland	Dugald Richardson	308-665-1283	Tatum Hlavacek	Well	domestic/livestock/agriculture	active			40			6	6	submersible		galvanized	infomation as per certified letter				
0862	G89968	30	51	29	135-155			Nicole Stansinski	144 Oetken Rd.	Crawford	NE	69339	21-Mar-11	Marsland	as per certified letter	970-785-2560	Tatum Hlavacek	Well	domestic/livestock	active	16		155	98	06-Aug-96		4.5	submersible	Chubb	pvc		1104113.1	459435.5		

Appendix E-2

Water Well Completion Reports

Nebraska Department of Environmental Quality **Permit No. NE0122611**

Well Completion Report

Company: Crow Butte Resources. Inc
Well Type: Production/Injection ____ Monitor X
Ground Elevation: 4260.64 ft
Drilling Contractor: Landrill Exploration
Mud Products: 4 Bags Super Gel
Bit Size: 8 Inch
Drilling Begun: 9/18/2013
Completed Formation: Arikaree
Casing Diameter: 4.95 inch O.D.
Casing Depth: 59 ft.
Packer Type: Johnson K-packer
Centralizer Depths: 20,40

Project: Crow Butte
Well No. AOW-1
Wellhead Elevation: 4261.54 ft.
Driller: R. Corbin

Drilling Completed On: 9/18/2013
Depth Drilled: 131 ft.
Casing Type: White Certalok
Basket Depth: N/A ft.
Packer Depth: 51 ft.

Screen Size: 0.020
Screened Interval(s): 61 ft. - 131 ft.
ft. - ft.
Completed Formation Upper Boundary: 61 ft.
Cement Contractor: Crow Butte Resources
Estimated Cement Volume: 2.4 bbls.
Cement Density: 12.1 lbs/gal
Cement Type/Class: I/II API
Cement Circulated to Surface: 1 bbls.
Logging Contractor: Century Geophysical Corp.
Unit No.: 2008
Log Type: Gamma, SP, Resistance, Deviation
Well Deviation: 1.2 ft. at 9.0 degrees
Remarks:

Gravel Size:
ft. - ft.
ft. - ft.
Lower Boundary: 131 ft.
Operator: Klein
Actual Cement Volume Used: 3.5 bbls.
Water Volume Used: 2.5 bbls.
Additives: 37 lbs Salt 50 lbs Bentonite
Density At Surface: 12.1 lbs/gal
Operator: Dunn/Klein
Probe No.: 9057C

This report was filled out by: **Wade Beins**
Representing: **Crow Butte Resources, Inc.**
On:

Certification:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this form and all its attachments and that, based on inquiry of those individuals immediately responsible for obtaining information, I believe the information is true, accurate, and complete. Further, I certify awareness that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

By: Wade Beins
Title: Senior Geologist

Wade Beins

Date: **October 3, 2013**

Nebraska Department of Environmental Quality **Permit No. NE0122611**

Well Completion Report

Company: Crow Butte Resources. Inc.
Project: Crow Butte
Well Type: Production/Injection ____ Monitor X
Well No. AOW-3
Ground Elevation: 4351.07 ft.
Wellhead Elevation: 4352.07 ft.
Drilling Contractor: Landrill Exploration
Driller: R. Corbin
Mud Products: 4 Bags Super Gel
Bit Size: 8 Inch
Drilling Begun: 9/18/2013
Drilling Completed On: 9/18/2013
Completed Formation: Arikaree
Depth Drilled: 151 ft.
Casing Diameter: 4.95 inch O.D.
Casing Type: White Certalok
Casing Depth: 79 ft.
Basket Depth: N/A ft
Packer Type: Johnson K-packer
Packer Depth: 71 ft.
Centralizer Depths: 20,40

Screen Size: 0.020
Gravel Size:
Screened Interval(s): 81 ft. - 151 ft.
ft. - ft.
ft. - ft.
ft. - ft.
Completed Formation Upper Boundary: 81 ft.
Lower Boundary: 151 ft.
Cement Contractor: Crow Butte Resources
Operator: Klein
Estimated Cement Volume: 3.1 bbls.
Actual Cement Volume Used: 4.7 bbls.
Cement Density: 12.1 lbs/gal
Water Volume Used: 3.4 bbls.
Cement Type/Class: I/II API
Additives: 50 lbs Salt 67 lbs Bentonite
Cement Circulated to Surface: 1 bbls.
Density At Surface: 12.1 lbs/gal
Logging Contractor: Century Geophysical Corp.
Operator: Dunn/Klein
Unit No.: 2008
Probe No.: 9057C
Log Type: Gamma, SP, Resistance, Deviation
Well Deviation: 1.4 ft. at 187.0 degrees
Remarks:

This report was filled out by: Wade Beins
Representing: Crow Butte Resources, Inc.
On:

Certification:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this form and all its attachments and that, based on inquiry of those individuals immediately responsible for obtaining information, I believe the information is true, accurate, and complete. Further, I certify awareness that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

By: Wade Beins
Wade Beins
Title : Senior Geologist
Date: October 3, 2013

Nebraska Department of Environmental Quality **Permit No. NE0122611**

Well Completion Report

Company: Crow Butte Resources, Inc.
Well Type: Production/Injection ___ Monitor X
Ground Elevation: 4161.01 ft.
Drilling Contractor: Landrill Exploration
Mud Products: 4 Bags Super Gel
Bit Size: 8 Inch
Drilling Begun: 9/16/2013
Completed Formation: Arikaree
Casing Diameter: 4.95 inch O.D.
Casing Depth: 39 ft.
Packer Type: Johnson K-packer
Centralizer Depths: 20

Project: Crow Butte
Well No. AOW-4
Wellhead Elevation: 4162.01 ft.
Driller: R. Corbin

Drilling Completed On: 9/16/2013
Depth Drilled: 100 ft.
Casing Type: White Certalok
Basket Depth: N/A ft.
Packer Depth: 19 ft.

Screen Size: 0.020
Screened Interval(s): 39 ft. - 99 ft.
ft. - ft.
Completed Formation Upper Boundary: 39 ft.
Cement Contractor: Crow Butte Resources
Estimated Cement Volume: 1.6 bbls.
Cement Density: 12.8 lbs/gal
Cement Type/Class: I/II API
Cement Circulated to Surface: 1 bbls.
Logging Contractor: Century Geophysical Corp.
Unit No.: 2008
Log Type: Gamma, SP, Resistance, Deviation
Well Deviation: 0.4 ft. at 32.0 degrees
Remarks:

Gravel Size:
ft. - ft.
ft. - ft.
Lower Boundary: 99 ft.
Operator: Klein
Actual Cement Volume Used: 2.4 bbls.
Water Volume Used: 1.7 bbls.
Additives: 25 lbs Salt 35 lbs Bentonite
Density At Surface: 12.8 lbs/gal
Operator: Dunn/Klein
Probe No.: 9057C

This report was filled out by: Wade Beins
Representing: Crow Butte Resources, Inc.
On:

Certification:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this form and all its attachments and that, based on inquiry of those individuals immediately responsible for obtaining information, I believe the information is true, accurate, and complete. Further, I certify awareness that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

By: Wade Beins
Wade Beins

Title: Senior Geologist

Date: October 3, 2013

Nebraska Department of Environmental Quality **Permit No.** _____

Well Completion Report

Company: Crow Butte Resources. Inc.
Project: Crow Butte
Well Type: Production/Injection ____ Monitor X
Well No. AOW-5
Ground Elevation: 4124.32 ft.
Wellhead Elevation: 4125.52 ft.
Drilling Contractor: Landrill Exploration
Driller: R. Corbin
Mud Products: 18 Bags Super Gel
Bit Size: 8 Inch
Drilling Begun: 9/17/2013
Drilling Completed On: 9/17/2013
Completed Formation: Arikaree
Depth Drilled: 101 ft.
Casing Diameter: 4.95 inch O.D.
Casing Type: White Certalok
Casing Depth: 39 ft.
Basket Depth: N/A ft.
Packer Type: Johnson K-packer
Packer Depth: 31 ft.
Centralizer Depths: 20

Screen Size: 0.020
Gravel Size:
Screened Interval(s): 41 ft. - 101 ft.
ft. - ft.
ft. - ft.
ft. - ft.
Completed Formation Upper Boundary: 41 ft.
Lower Boundary: 101 ft.
Cement Contractor: Crow Butte Resources
Operator: Klein
Estimated Cement Volume: 1.6 bbls.
Actual Cement Volume Used: 2.4 bbls
Cement Density: 12.2 lbs/gal
Water Volume Used: 1.7 bbls.
Cement Type/Class: I/II API
Additives: 25 lbs Salt 33 lbs Bentonite
Cement Circulated to Surface: 1 bbls.
Density At Surface: 12.2 lbs/gal
Logging Contractor: Century Geophysical Corp.
Operator: Dunn/Klein
Unit No.: 2008
Probe No.: 9057C
Log Type: Gamma, SP, Resistance, Deviation
Well Deviation: 0.3 ft. at 175.4 degrees
Remarks:

This report was filled out by: Wade Beins
Representing: Crow Butte Resources, Inc.
On:

Certification:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this form and all its attachments and that, based on inquiry of those individuals immediately responsible for obtaining information, I believe the information is true, accurate, and complete. Further, I certify awareness that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

By: Wade Beins
Wade Beins
Title: Senior Geologist
Date: October 3, 2013

Nebraska Department of Environmental Quality **Permit No. NE0122611**

Well Completion Report

Company: Crow Butte Resources. Inc.
Well Type: Production/Injection ____ Monitor X
Ground Elevation: 4067.60 ft.
Drilling Contractor: Landrill Exploration
Mud Products: 10 Bags Super Gel
Bit Size: 8 Inch
Drilling Begun: 9/17/2013
Completed Formation: Arikaree
Casing Diameter: 4.95 inch O.D.
Casing Depth: 29 ft.
Packer Type: Johnson K-packer
Centralizer Depths: 20

Project: Crow Butte
Well No. AOW-6
Wellhead Elevation: 4068.50 ft.
Driller: R. Corbin

Drilling Completed On: 9/17/2013
Depth Drilled: 80 ft.
Casing Type: White Certalok
Basket Depth: N/A ft.
Packer Depth: 19 ft.

Screen Size: 0.020
Screened Interval(s): 29 ft. - 79 ft.
ft. - ft.
Completed Formation Upper Boundary: 29 ft.
Cement Contractor: Crow Butte Resources
Estimated Cement Volume: 1.2 bbls.
Cement Density: 12.2 lbs/gal
Cement Type/Class: I/II API
Cement Circulated to Surface: 1 bbls.
Logging Contractor: Century Geophysical Corp.
Unit No.: 2008
Log Type: Gamma, SP, Resistance, Deviation
Well Deviation: 0.1 ft. at 236.4 degrees
Remarks:

Gravel Size:
ft. - ft.
ft. - ft.
Lower Boundary: 79 ft
Operator: Klein
Actual Cement Volume Used: 1.8 bbls.
Water Volume Used: 1.3 bbls.
Additives: 19 lbs Salt 25 lbs Bentonite
Density At Surface: 12.2 lbs/gal
Operator: Dunn/Klein
Probe No : 9057C

This report was filled out by: Wade Beins
Representing: Crow Butte Resources, Inc.
On:

Certification:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this form and all its attachments and that, based on inquiry of those individuals immediately responsible for obtaining information, I believe the information is true, accurate, and complete. Further, I certify awareness that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

By: Wade Beins
Wade Beins

Title : Senior Geologist

Date: October 3, 2013

Nebraska Department of Environmental Quality **Permit No. NE0122611**

Well Completion Report

Company: Crow Butte Resources. Inc.
Project: Crow Butte
Well Type: Production/Injection ____ Monitor X
Well No. AOW-7
Ground Elevation: 4242.94 ft.
Wellhead Elevation: 4243.94 ft.
Drilling Contractor: Landrill Exploration
Driller: R. Corbin
Mud Products: 4 Bags Super Gel
Bit Size: 8 Inch
Drilling Begun: 9/19/2013
Drilling Completed On: 9/19/2013
Completed Formation: Arikaree
Depth Drilled: 150 ft.
Casing Diameter: 4.95 inch O.D.
Casing Type: White Certalok
Casing Depth: 39 ft.
Basket Depth: N/A ft.
Packer Type: Johnson K-packer
Packer Depth: 30 ft
Centralizer Depths: 20

Screen Size: 0.020
Gravel Size:
Screened Interval(s): 40 ft. - 150 ft.
ft. - ft.
ft. - ft.
Completed Formation Upper Boundary: 40 ft
Lower Boundary: 150 ft.
Cement Contractor: Crow Butte Resources
Operator: Klein
Estimated Cement Volume: 1.6 bbls.
Actual Cement Volume Used: 2.4 bbls.
Cement Density: 13.1 lbs/gal
Water Volume Used: 1.7 bbls.
Cement Type/Class: I/II API
Additives: 25 lbs Salt 35 lbs Bentonite
Cement Circulated to Surface: 1 bbls.
Density At Surface: 13.1 lbs/gal
Logging Contractor: Century Geophysical Corp.
Operator: Dunn/Klein
Unit No.: 2008
Probe No.: 9057C
Log Type: Gamma, SP, Resistance, Deviation
Well Deviation: 0.2 ft. at 23.0 degrees
Remarks:

This report was filled out by: Wade Beins
Representing: Crow Butte Resources, Inc.
On:

Certification:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this form and all its attachments and that, based on inquiry of those individuals immediately responsible for obtaining information, I believe the information is true, accurate, and complete. Further, I certify awareness that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

By: Wade Beins
Title: Senior Geologist

Wade Beins

Date: October 3, 2013

Nebraska Department of Environmental Quality **Permit No. NE0122611**

Well Completion Report

Company: Crow Butte Resources. Inc
Well Type: Production/Injection ____ Monitor X
Ground Elevation: 4364.22 ft.
Drilling Contractor: Landrill Exploration
Mud Products: 4 Bags Super Gel
Bit Size: 8 Inch
Drilling Begun: 9/18/2013
Completed Formation: Arikaree
Casing Diameter: 4.95 inch O.D.
Casing Depth: 79 ft.
Packer Type: Johnson K-packer
Centralizer Depths: 20,40

Project: Crow Butte
Well No. AOW-8
Wellhead Elevation: 4365.12 ft.
Driller: R. Corbin

Drilling Completed On: 9/18/2013
Depth Drilled: 151 ft.
Casing Type: White Certalok
Basket Depth: N/A ft.
Packer Depth: 30 ft.

Screen Size: 0.020
Screened Interval(s): 81 ft. - 151 ft.
ft. - ft.
Completed Formation Upper Boundary: 81 ft.
Cement Contractor: Crow Butte Resources
Estimated Cement Volume: 3.1 bbls.
Cement Density: 12.1 lbs/gal
Cement Type/Class: I/II API
Cement Circulated to Surface: 1 bbls.
Logging Contractor: Century Geophysical Corp.
Unit No.: 2008
Log Type: Gamma, SP, Resistance, Deviation
Well Deviation: 1.9 ft. at 73.9 degrees
Remarks:

Gravel Size:
ft. - ft.
ft. - ft.
Lower Boundary: 151 ft.
Operator: Klein
Actual Cement Volume Used: 4.7 bbls.
Water Volume Used: 3.4 bbls.
Additives: 50 lbs Salt 67 lbs Bentonite
Density At Surface: 12.1 lbs/gal
Operator: Dunn/Klein
Probe No.: 9057C

This report was filled out by: Wade Beins
Representing: Crow Butte Resources, Inc.
On:

Certification:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this form and all its attachments and that, based on inquiry of those individuals immediately responsible for obtaining information, I believe the information is true, accurate, and complete. Further, I certify awareness that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

By: Wade Beins Title: Senior Geologist

/s/ Wade Beins Date: October 3, 2013

Nebraska Department of Environmental Quality **Permit No. NE0122611**

Well Completion Report

Company: Crow Butte Resources. Inc.
Well Type: Production/Injection ____ Monitor X
Ground Elevation: 4145.31 ft.
Drilling Contractor: Landrill Exploration
Mud Products: 9 Bags Super Gel
Bit Size: 8 Inch
Drilling Begun: 9/16/2013
Completed Formation: Arikaree
Casing Diameter: 4.95 inch O.D.
Casing Depth: 29 ft.
Packer Type: Johnson K-packer
Centralizer Depths: 20

Project: Crow Butte
Well No. AOW-9
Wellhead Elevation: 4146.41 ft.
Driller: R. Corbin

Drilling Completed On: 9/16/2013
Depth Drilled: 115 ft.
Casing Type: White Certalok
Basket Depth: N/A ft.
Packer Depth: 19 ft.

Screen Size: 0.020
Screened Interval(s): 29 ft. - 109 ft.
ft. - ft.
Completed Formation Upper Boundary: 29 ft.
Cement Contractor: Crow Butte Resources
Estimated Cement Volume: 1.2 bbls.
Cement Density: 12.8 lbs/gal
Cement Type/Class: I/II API
Cement Circulated to Surface: I bbls.
Logging Contractor: Century Geophysical Corp.
Unit No.: 2008
Log Type: Gamma, SP, Resistance, Deviation
Well Deviation: 0.8 ft. at 274.6 degrees
Remarks:

Gravel Size:
ft. - ft.
ft. - ft.
Lower Boundary: 109 ft.
Operator: Klein
Actual Cement Volume Used: 1.8 bbls.
Water Volume Used: 1.3 bbls.
Additives: 18 lbs Salt 25 lbs Bentonite
Density At Surface: 12.8 lbs/gal
Operator: Dunn/Klein
Probe No.: 9057C

This report was filled out by: Wade Beins
Representing: Crow Butte Resources, Inc.
On:

Certification:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this form and all its attachments and that, based on inquiry of those individuals immediately responsible for obtaining information, I believe the information is true, accurate, and complete. Further, I certify awareness that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

By: Wade Beins
Wade Beins

Title: **Senior Geologist**

Date: **October 3, 2013**

Nebraska Department of Environmental Quality **Permit No. NE0122611**

Well Completion Report

Company: Crow Butte Resources. Inc.
Well Type: Production/Injection ____ Monitor X
Ground Elevation: 4197.70 ft.
Drilling Contractor: Landrill Exploration
Mud Products: 4 Bags Super Gel
Bit Size: 8 Inch
Drilling Begun: 9/19/2013
Completed Formation: Arikaree
Casing Diameter: 4.95 inch O.D.
Casing Depth: 39 ft.
Packer Type: Johnson K-packer
Centralizer Depths: 20

Project: Crow Butte
Well No. AOW-10
Wellhead Elevation: 4198.60 ft.
Driller: R. Corbin

Drilling Completed On: 9/19/2013
Depth Drilled: 141 ft.
Casing Type: White Certalok
Basket Depth: N/A ft.
Packer Depth: 31 ft.

Screen Size: 0.020
Screened Interval(s): 41 ft. - 141 ft.
ft. - ft.
Completed Formation Upper Boundary: 41 ft.
Cement Contractor: Crow Butte Resources
Estimated Cement Volume: 1.6 bbls.
Cement Density: 13.1 lbs/gal
Cement Type/Class: I/II API
Cement Circulated to Surface: 1 bbls.
Logging Contractor: Century Geophysical Corp.
Unit No.: 2008
Log Type: Gamma, SP, Resistance, Deviation
Well Deviation: 0.3 ft. at 189.1 degrees
Remarks:

Gravel Size:
ft. - ft.
ft. - ft.
Lower Boundary: 141 ft.
Operator: Klein
Actual Cement Volume Used: 2.4 bbls.
Water Volume Used: 1.7 bbls.
Additives: 25 lbs Salt 33 lbs Bentonite
Density At Surface: 13.1 lbs/gal
Operator: Dunn/Klein
Probe No.: 9057C

This report was filled out by: Wade Beins
Representing: Crow Butte Resources, Inc.
On:

Certification:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this form and all its attachments and that, based on inquiry of those individuals immediately responsible for obtaining information, I believe the information is true, accurate, and complete. Further, I certify awareness that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

By: Wade Beins
Wade Beins

Title: Senior Geologist

Date: October 3, 2013

Nebraska Department of Environmental Quality **Permit No. NE0122611**

Well Completion Report

Company: Crow Butte Resources. Inc.
Project: Crow Butte
Well Type: Production/Injection ____ Monitor X
Well No. AOW-11
Ground Elevation: 4090.22 ft.
Wellhead Elevation: 4091.22 ft.
Drilling Contractor: Landrill Exploration
Driller: R. Corbin
Mud Products: 8 Bags Super Gel
Bit Size: 8 Inch
Drilling Begun: 9/17/2013
Drilling Completed On: 9/17/2013
Completed Formation: Arikaree
Depth Drilled: 70 ft.
Casing Diameter: 4.95 inch O.D.
Casing Type: White Certalok
Casing Depth: 29 ft.
Basket Depth: N/A ft.
Packer Type: Johnson K-packer
Packer Depth: 16 ft.
Centralizer Depths: 20

Screen Size: 0.020
Gravel Size:
Screened Interval(s): 26 ft. - 66 ft.
ft. - ft.
ft. - ft.
Completed Formation Upper Boundary: 26 ft.
Lower Boundary: 66 ft.
Cement Contractor: Crow Butte Resources
Operator: Klein
Estimated Cement Volume: 1.2 bbls.
Actual Cement Volume Used: 1.8 bbls.
Cement Density: 12.2 lbs/gal
Water Volume Used: 1.3 bbls.
Cement Type/Class: I/II API
Additives: 18 lbs Salt 25 lbs Bentonite
Cement Circulated to Surface: 1 bbls.
Density At Surface: 12.2 lbs/gal
Logging Contractor: Century Geophysical Corp.
Operator: Dunn/Klein
Unit No.: 2008
Probe No.: 9057C
Log Type: Gamma, SP, Resistance, Deviation
Well Deviation: 0.5 ft. at 25.8 degrees
Remarks:

This report was filled out by: Wade Beins
Representing: Crow Butte Resources, Inc.
On:

Certification:

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By: Wade Beins
Title: Senior Geologist

Wade Beins
Date: October 3, 2013

Nebraska Department of Environmental Quality **Permit No. NE0122611**

Well Completion Report

Company: Crow Butte Resources. Inc.
Project: Crow Butte
Well Type: Production/Injection ___ Monitor X
Well No. BOW-2010-1
Ground Elevation: 4259 ft.
Wellhead Elevation: 4260 ft.
Drilling Contractor: Landrill Exploration
Driller: J. Lemmon
Mud Products: 6 Bags Super Gel 2 Quart Polymer 2 Bags Lost Circulation Material
Bit Size: 8 Inch
Drilling Begun: 8/24/2010
Drilling Completed On: 8/26/2010
Completed Formation: Brule
Depth Drilled: 420 ft.
Casing Diameter: 4.95 inch O.D.
Casing Type: White Certalok
Casing Depth: 279 ft.
Basket Depth: N/A ft.
Packer Type: Johnson K-packer
Packer Depth: 275 ft.
Centralizer Depths: 20, 40, 100, 160, 220 Ft

Screen Size: 3 inch by .020 inch
Gravel Size:
Screened Interval(s): 285 ft. - 365 ft.
ft. - ft.
ft. - ft.
ft. - ft.
Completed Formation Upper Boundary: 270 ft.
Lower Boundary: 400 ft.
Cement Contractor: Crow Butte Resources
Operator: Klein
Estimated Cement Volume: 10.8 bbls.
Actual Cement Volume Used: 16.2 bbls.
Cement Density: 12.4 lbs/gal
Water Volume Used: 11.6 bbls.
Cement Type/Class: I/II API
Additives: 500 lbs. Salt 500 lbs. Bentonite
Cement Circulated to Surface: 0 bbls.
Density At Surface: 9 lbs/gal
Logging Contractor: Century Geophysical Corp.
Operator: Dunn
Unit No.: 0001
Probe No.: 9055C
Log Type: Gamma, SP, Resistance, Deviation
Well Deviation: 1.2 ft. at 342.2 degrees
Remarks: Tremmied 4 bbls to surface

This report was filled out by: Wade Beins
Representing: Crow Butte Resources, Inc.
On:

Certification:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this form and all its attachments and that, based on inquiry of those individuals immediately responsible for obtaining information, I believe the information is true, accurate, and complete. Further, I certify awareness that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

By: Wade Beins Wade Beins Title : Senior Geologist

Date: May 27, 2011

Nebraska Department of Environmental Quality **Permit No. NE0122611**

Well Completion Report

Company: Crow Butte Resources. Inc.
Project: Crow Butte
Well Type: Production/Injection ____ Monitor X
Well No. BOW-2010-2
Ground Elevation: 4322 ft.
Wellhead Elevation: 4323 ft.
Drilling Contractor: Landrill Exploration
Driller: J. Lemmon
Mud Products: 7 Bags Super Gel 2 Quart Polymer 1 Bags Lost Circulation Material
Bit Size: 8 Inch
Drilling Begun: 8/25/2010
Drilling Completed On: 8/27/2010
Completed Formation: Brule
Depth Drilled: 420 ft.
Casing Diameter: 4.95 inch O.D.
Casing Type: White Certalok
Casing Depth: 339 ft.
Basket Depth: N/A ft.
Packer Type: Johnson K-packer
Packer Depth: 328 ft.
Centralizer Depths: 20, 40, 100, 160, 220, 280 Ft

Screen Size: 3 inch by .020 inch
Gravel Size:
Screened Interval(s): 338 ft. - 398 ft.
ft. - ft.
ft. - ft.
ft. - ft.
Completed Formation Upper Boundary: 330 ft.
Lower Boundary: 410 ft.
Cement Contractor: Crow Butte Resources
Operator: Klein
Estimated Cement Volume: 13.1 bbls.
Actual Cement Volume Used: 19.6 bbls.
Cement Density: 12.3 lbs/gal
Water Volume Used: 14.1 bbls.
Cement Type/Class: I/II API
Additives: 500 lbs. Salt 500 lbs. Bentonite
Cement Circulated to Surface: 0 bbls.
Density At Surface: 9.4 lbs/gal
Logging Contractor: Century Geophysical Corp.
Operator: Dunn
Unit No.: 0001
Probe No.: 9055C
Log Type: Gamma, SP, Resistance, Deviation
Well Deviation: 2.7 ft. at 300.1 degrees
Remarks: Tremmied 3 bbls to surface

This report was filled out by: Wade Beins
Representing: Crow Butte Resources, Inc.
On:

Certification:

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By: Wade Beins Wade Beins Title : Senior Geologist

Date: May 27, 2011

Nebraska Department of Environmental Quality **Permit No. NE0122611**

Well Completion Report

Company: Crow Butte Resources. Inc.
Project: Crow Butte
Well Type: Production/Injection ___ Monitor X
Well No. BOW-2010-3
Ground Elevation: 4350 ft.
Wellhead Elevation: 4350 ft.
Drilling Contractor: Landrill Exploration
Driller: L. Corbin
Mud Products: 6 Bags Super Gel 1 Quart Polymer
2 Bags Lost Circulation Material
Bit Size: 8 Inch
Drilling Begun: 8/20/2010
Drilling Completed On: 8/24/2010
Completed Formation: Brule
Depth Drilled: 450 ft.
Casing Diameter: 4.95 inch O.D.
Casing Type: White Certalok
Casing Depth: 339 ft.
Basket Depth: N/A ft.
Packer Type: Johnson K-packer
Packer Depth: 336 ft.
Centralizer Depths: 20, 40, 100, 160, 220, 280 Ft

Screen Size: 3 inch by .020 inch
Gravel Size:
Screened Interval(s): 346 ft. - 416 ft.
ft. - ft.
ft. - ft.
ft. - ft.
Completed Formation Upper Boundary: 330 ft.
Lower Boundary: 440 ft.
Cement Contractor: Crow Butte Resources
Operator: Klein
Estimated Cement Volume: 13.1 bbls.
Actual Cement Volume Used: 19.6 bbls.
Cement Density: 12.2 lbs/gal
Water Volume Used: 14.1 bbls.
Cement Type/Class: I/II API
Additives: 500 lbs. Salt 500 lbs. Bentonite
Cement Circulated to Surface: 4 bbls.
Density At Surface: 12.2 lbs/gal
Logging Contractor: Century Geophysical Corp.
Operator: Dunn
Unit No.: 0001
Probe No.: 9055C
Log Type: Gamma, SP, Resistance, Deviation
Well Deviation: 3.6 ft. at 320.7 degrees
Remarks:

This report was filled out by: Wade Beins
Representing: Crow Butte Resources, Inc.
On:

Certification:

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By: Wade Beins Wade Beins Title : Senior Geologist

Date: May 27, 2011

Nebraska Department of Environmental Quality **Permit No. NE0122611**

Well Completion Report

Company: Crow Butte Resources. Inc.
Well Type: Production/Injection ___ Monitor X
Ground Elevation: 4162 ft.
Drilling Contractor: Landrill Exploration
Mud Products: 6 Bags Super Gel
Bit Size: 8 Inch
Drilling Begun: 9/10/2010
Completed Formation: Brule
Casing Diameter: 4.95 inch O.D.
Casing Depth: 249 ft.
Packer Type: Johnson K-packer
Centralizer Depths: 20, 40, 100, 160, 220 Ft

Project: Crow Butte
Well No. BOW-2010-4
Wellhead Elevation: 4163 ft.
Driller: J. Lemmon
1 Bags Lost Circulation Material

Drilling Completed On: 9/13/2010
Depth Drilled: 310 ft.
Casing Type: White Certalok
Basket Depth: N/A ft.
Packer Depth: 240 ft.

Screen Size: 3 inch by .020 inch
Screened Interval(s): 250 ft. - 310 ft.
ft. - ft.
Completed Formation Upper Boundary: 240 ft.
Cement Contractor: Crow Butte Resources
Estimated Cement Volume: 9.6 bbls.
Cement Density: 12.3 lbs/gal
Cement Type/Class: I/II API
Cement Circulated to Surface: 3 bbls.
Logging Contractor: Century Geophysical Corp.
Unit No.: 0001
Log Type: Gamma, SP, Resistance, Deviation
Well Deviation: 18 ft. at 68 degrees
Remarks:

Gravel Size:
ft. - ft.
ft. - ft.
Lower Boundary: 300 ft.
Operator: Klein
Actual Cement Volume Used: 14.4 bbls.
Water Volume Used: 10.4 bbls.
Additives: 500 lbs. Salt 500 lbs. Bentonite
Density At Surface: 11.6 lbs/gal
Operator: Dunn
Probe No.: 9055C

This report was filled out by: Wade Beins
Representing: Crow Butte Resources, Inc.
On:

Certification:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this form and all its attachments and that, based on inquiry of those individuals immediately responsible for obtaining information, I believe the information is true, accurate, and complete. Further, I certify awareness that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

By: Wade Beins Wade Beins Title : Senior Geologist

Date: May 27, 2011

Nebraska Department of Environmental Quality **Permit No. NE0122611**

Well Completion Report

Company: Crow Butte Resources. Inc.
Project: Crow Butte
Well Type: Production/Injection ___ Monitor X
Well No. BOW-2010-4A
Ground Elevation: 4162 ft.
Wellhead Elevation: . 4163 ft.
Drilling Contractor: Landrill Exploration
Driller: S. Osmotherly
Mud Products: 5 Bags Super Gel 1 Quart Polymer
1 Bags Lost Circulation Material
Bit Size: 8 Inch
Drilling Begun: 3/15/2011
Drilling Completed On: 3/17/2011
Completed Formation: Brule
Depth Drilled: 400 ft.
Casing Diameter: 4.95 inch O.D.
Casing Type: White Certalok
Casing Depth: 249 ft.
Basket Depth: N/A ft.
Packer Type: Johnson K-packer
Packer Depth: 241 ft.
Centralizer Depths: 20, 40, 100, 160, 220 Ft

Screen Size: 3 inch by .020 inch
Gravel Size:
Screened Interval(s): 261 ft. - 311 ft.
ft. - ft.
ft. - ft.
ft. - ft.
Completed Formation Upper Boundary: 240 ft.
Lower Boundary: 390 ft.
Cement Contractor: Crow Butte Resources
Operator: Klein
Estimated Cement Volume: 9.6 bbls.
Actual Cement Volume Used: 14.4 bbls.
Cement Density: 12.1 lbs/gal
Water Volume Used: 10.4 bbls.
Cement Type/Class: I/II API
Additives: 500 lbs. Salt 500 lbs. Bentonite
Cement Circulated to Surface: 1/2 bbls.
Density At Surface: 10 lbs/gal
Logging Contractor: Century Geophysical Corp.
Operator: Dunn
Unit No.: 0001
Probe No.: 9055C
Log Type: Gamma, SP, Resistance, Deviation
Well Deviation: 9.8 ft. at 244.2 degrees
Remarks: Tremmied 5 bbls to surface

This report was filled out by: Wade Beins
Representing: Crow Butte Resources, Inc.
On:

Certification:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this form and all its attachments and that, based on inquiry of those individuals immediately responsible for obtaining information, I believe the information is true, accurate, and complete. Further, I certify awareness that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

By: Wade Beins Wade Beins Title : Senior Geologist

Date: May 27, 2011

Nebraska Department of Environmental Quality **Permit No. NE0122611**

Well Completion Report

Company: Crow Butte Resources. Inc.
Well Type: Production/Injection ___ Monitor X
Ground Elevation: 4125 ft.
Drilling Contractor: Landrill Exploration
Mud Products: 22 Bags Super Gel
Bit Size: 8 Inch
Drilling Begun: 9/28/2010
Completed Formation: Brule
Casing Diameter: 4.95 inch O.D.
Casing Depth: 169 ft.
Packer Type: Johnson K-packer
Centralizer Depths: 20, 40, 100 Ft

Project: Crow Butte
Well No. BOW-2010-5
Wellhead Elevation: 4126 ft.
Driller: G. Krotz
8 Bags Lost Circulation Material

Drilling Completed On: 9/30/2010
Depth Drilled: 340 ft.
Casing Type: White Certalok
Basket Depth: N/A ft.
Packer Depth: 157 ft.

Screen Size: 3 inch by .020 inch
Screened Interval(s): 177 ft. - 237 ft.
ft. - ft.
Completed Formation Upper Boundary: 160 ft.
Cement Contractor: Crow Butte Resources
Estimated Cement Volume: 6.6 bbls.
Cement Density: 12.3 lbs/gal
Cement Type/Class: I/II API
Cement Circulated to Surface: 3 bbls.
Logging Contractor: Century Geophysical Corp.
Unit No.: 0001
Log Type: Gamma, SP, Resistance, Deviation
Well Deviation: 5.3 ft. at 87 degrees
Remarks:

Gravel Size:
ft. - ft.
ft. - ft.
Lower Boundary: 330 ft.
Operator: Klein
Actual Cement Volume Used: 9.8 bbls.
Water Volume Used: 7.1 bbls.
Additives: 500 lbs. Salt 500 lbs. Bentonite
Density At Surface: 11.7 lbs/gal
Operator: Dunn
Probe No.: 9055C

This report was filled out by: Wade Beins
Representing: Crow Butte Resources, Inc.
On:

Certification:

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By: Wade Beins Wade Beins Title : Senior Geologist

Date: May 27, 2011

Nebraska Department of Environmental Quality **Permit No. NE0122611**

Well Completion Report

Company: Crow Butte Resources. Inc.
Project: Crow Butte
Well Type: Production/Injection ___ Monitor X
Well No. BOW-2010-6
Ground Elevation: 4099 ft.
Wellhead Elevation: 4101 ft.
Drilling Contractor: Landrill Exploration
Driller: G. Krotz
Mud Products: 7 Bags Super Gel 2 Quart Polymer 2 Bags Lost Circulation Material
Bit Size: 8 Inch
Drilling Begun: 9/24/2010
Drilling Completed On: 9/28/2010
Completed Formation: Brule
Depth Drilled: 300 ft.
Casing Diameter: 4.95 inch O.D.
Casing Type: White Certalok
Casing Depth: 159 ft.
Basket Depth: N/A ft.
Packer Type: Johnson K-packer
Packer Depth: 150 ft.
Centralizer Depths: 20, 40, 100 Ft

Screen Size: 3 inch by .020 inch
Gravel Size:
Screened Interval(s): 160 ft. - 220 ft.
ft. - ft.
ft. - ft.
ft. - ft.
Completed Formation Upper Boundary: 150 ft.
Lower Boundary: 300 ft.
Cement Contractor: Crow Butte Resources
Operator: Klein
Estimated Cement Volume: 6.2 bbls.
Actual Cement Volume Used: 9.3 bbls.
Cement Density: 12 lbs/gal
Water Volume Used: 6.7 bbls.
Cement Type/Class: I/II API
Additives: 500 lbs. Salt 500 lbs. Bentonite
Cement Circulated to Surface: 0 bbls.
Density At Surface: 8.9 lbs/gal
Logging Contractor: Century Geophysical Corp.
Operator: Dunn
Unit No.: 0001
Probe No.: 9055C
Log Type: Gamma, SP, Resistance, Deviation
Well Deviation: 4.3 ft. at 158.1 degrees
Remarks: Tremmied 8 bbls to surface

This report was filled out by: Wade Beins
Representing: Crow Butte Resources, Inc.
On:

Certification:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this form and all its attachments and that, based on inquiry of those individuals immediately responsible for obtaining information, I believe the information is true, accurate, and complete. Further, I certify awareness that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

By: Wade Beins Wade Beins Title : Senior Geologist

Date: May 27, 2011

Nebraska Department of Environmental Quality **Permit No. NE0122611**

Well Completion Report

Company: Crow Butte Resources. Inc.
Project: Crow Butte
Well Type: Production/Injection ____ Monitor X
Well No. BOW-2010-7
Ground Elevation: 4248 ft.
Wellhead Elevation: 4248 ft.
Drilling Contractor: Landrill Exploration
Driller: L. Corbin
Mud Products: 13 Bags Super Gel
1 Bags Lost Circulation Material
Bit Size: 8 Inch
Drilling Begun: 3/21/2011
Drilling Completed On: 3/23/2011
Completed Formation: Brule
Depth Drilled: 380 ft.
Casing Diameter: 4.95 inch O.D.
Casing Type: White Certalok
Casing Depth: 259 ft.
Basket Depth: N/A ft.
Packer Type: Johnson K-packer
Packer Depth: 247 ft.
Centralizer Depths: 20, 40, 100, 160, 220 Ft

Screen Size: 3 inch by .020 inch
Gravel Size:
Screened Interval(s): 267 ft. - 347 ft.
ft. - ft.
ft. - ft.
ft. - ft.
Completed Formation Upper Boundary: 260 ft.
Lower Boundary: 370 ft.
Cement Contractor: Crow Butte Resources
Operator: Klein
Estimated Cement Volume: 10.0 bbls.
Actual Cement Volume Used: 15.0 bbls.
Cement Density: 13.6 lbs/gal
Water Volume Used: 10.8 bbls.
Cement Type/Class: I/II API
Additives: 500 lbs. Salt 500 lbs. Bentonite
Cement Circulated to Surface: 3 bbls.
Density At Surface: 13.1 lbs/gal
Logging Contractor: Century Geophysical Corp.
Operator: Dunn
Unit No.: 0001
Probe No.: 9055C
Log Type: Gamma, SP, Resistance, Deviation
Well Deviation: 5.7 ft. at 111.8 degrees
Remarks:

This report was filled out by: Wade Beins
Representing: Crow Butte Resources, Inc.
On:

Certification:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this form and all its attachments and that, based on inquiry of those individuals immediately responsible for obtaining information, I believe the information is true, accurate, and complete. Further, I certify awareness that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

By: Wade Beins Wade Beins Title : Senior Geologist

Date: May 27, 2011

Nebraska Department of Environmental Quality **Permit No. NE0122611**

Well Completion Report

Company: Crow Butte Resources. Inc.
Project: Crow Butte
Well Type: Production/Injection ____ Monitor X
Well No. BOW-2010-8
Ground Elevation: 4366 ft.
Wellhead Elevation: 4367 ft.
Drilling Contractor: Landrill Exploration
Driller: L. Corbin
Mud Products: 5 Bags Super Gel 1 Quart Polymer
1 Bags Lost Circulation Material
Bit Size: 8 Inch
Drilling Begun: 3/22/2011
Drilling Completed On: 3/24/2011
Completed Formation: Brule
Depth Drilled: 420 ft.
Casing Diameter: 4.95 inch O.D.
Casing Type: White Certalok
Casing Depth: 349 ft.
Basket Depth: N/A ft.
Packer Type: Johnson K-packer
Packer Depth: 336 ft.
Centralizer Depths: 20, 40, 100, 160, 220, 280 Ft

Screen Size: 3 inch by .020 inch
Gravel Size:
Screened Interval(s): 356 ft. - 416 ft.
ft. - ft.
ft. - ft.
ft. - ft.
Completed Formation Upper Boundary: 410 ft.
Lower Boundary: 410 ft.
Cement Contractor: Crow Butte Resources
Operator: Klein
Estimated Cement Volume: 13.5 bbls.
Actual Cement Volume Used: 20.2 bbls.
Cement Density: 12.3 lbs/gal
Water Volume Used: 14.5 bbls.
Cement Type/Class: I/II API
Additives: 500 lbs. Salt 500 lbs. Bentonite
Cement Circulated to Surface: 5 bbls.
Density At Surface: 12 lbs/gal
Logging Contractor: Century Geophysical Corp.
Operator: Dunn
Unit No.: 0001
Probe No.: 9055C
Log Type: Gamma, SP, Resistance, Deviation
Well Deviation: 10.1 ft. at 352.9 degrees
Remarks:

This report was filled out by: Wade Beins
Representing: Crow Butte Resources, Inc.
On:

Certification:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this form and all its attachments and that, based on inquiry of those individuals immediately responsible for obtaining information, I believe the information is true, accurate, and complete. Further, I certify awareness that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

By: Wade Beins Wade Beins Title : Senior Geologist

Date: May 27, 2011

Nebraska Department of Environmental Quality **Permit No. NE0122611**

Well Completion Report

Company: Crow Butte Resources. Inc.
Well Type: Production/Injection ___ Monitor X
Ground Elevation: 4144.90 ft.
Drilling Contractor: Landrill Exploration
Mud Products: 12 Bags Super Gel
Bit Size: 8 Inch
Drilling Begun: 9/16/2013
Completed Formation: Brule
Casing Diameter: 4.95 inch O.D.
Casing Depth: 119 ft
Packer Type: Johnson K-packer
Centralizer Depths: 20,40,100

Project: Crow Butte
Well No. BOW-9
Wellhead Elevation: 4146.30 ft.
Driller: R. Corbin

Drilling Completed On: 9/16/2013
Depth Drilled: 220 ft.
Casing Type: White Certalok
Basket Depth: N/A ft.
Packer Depth: 110 ft.

Screen Size: 0.020
Screened Interval(s): 120 ft. - 220 ft.
ft. - ft.
Completed Formation Upper Boundary: 120 ft.
Cement Contractor: Crow Butte Resources
Estimated Cement Volume: 4.7 bbls.
Cement Density: 12.8 lbs/gal
Cement Type/Class: I/II API
Cement Circulated to Surface: 1 bbls.
Logging Contractor: Century Geophysical Corp.
Unit No.: 2008
Log Type: Gamma, SP, Resistance, Deviation
Well Deviation: 1.7 ft. at 262.5 degrees
Remarks:

Gravel Size:
ft. - ft.
ft. - ft
Lower Boundary: 220 ft.
Operator: Klein
Actual Cement Volume Used: 7.0 bbls.
Water Volume Used: 5.0 bbls.
Additives: 75 lbs Salt 100 lbs Bentonite
Density At Surface: 12.8 lbs/gal
Operator: Dunn/Klein
Probe No.: 9057C

This report was filled out by: Wade Beins
Representing: Crow Butte Resources, Inc.
On:

Certification:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this form and all its attachments and that, based on inquiry of those individuals immediately responsible for obtaining information, I believe the information is true, accurate, and complete. Further, I certify awareness that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

By: Wade Beins
Wade Beins

Title: **Senior Geologist**

Date: **October 3, 2013**

Nebraska Department of Environmental Quality **Permit No. NE0122611**

Well Completion Report

Company: Crow Butte Resources. Inc.
Well Type: Production/Injection ____ Monitor X
Ground Elevation: 4196.74 ft.
Drilling Contractor: Landrill Exploration
Mud Products: 13 Bags Super Gel
Bit Size: 8 Inch
Drilling Begun: 9/19/2013
Completed Formation: Brule
Casing Diameter: 4.95 inch O.D.
Casing Depth: 159 ft.
Packer Type: Johnson K-packer
Centralizer Depths: 20,40,100

Project: Crow Butte
Well No. BOW-10
Wellhead Elevation: 4197.94 ft.
Driller: R. Corbin

Drilling Completed On: 9/19/2013
Depth Drilled: 270 ft.
Casing Type: White Certalok
Basket Depth: N/A ft.
Packer Depth: 158 ft.

Screen Size: 0.020
Screened Interval(s): 168 ft. - 268 ft.
ft. - ft.
Completed Formation Upper Boundary: 168 ft.
Cement Contractor: Crow Butte Resources
Estimated Cement Volume: 6.2 bbls
Cement Density: 13.1 lbs/gal
Cement Type/Class: I/II API
Cement Circulated to Surface: 1 bbls.
Logging Contractor: Century Geophysical Corp.
Unit No.: 2008
Log Type: Gamma, SP, Resistance, Deviation
Well Deviation: 4.1 ft. at 159.4 degrees
Remarks:

Gravel Size:
ft. - ft.
ft. - ft.
Lower Boundary: 268 ft
Operator: Klein
Actual Cement Volume Used: 9.3 bbls
Water Volume Used: 6.7 bbls.
Additives: 99 lbs Salt 134 lbs Bentonite
Density At Surface: 13.1 lbs/gal
Operator: Dunn/Klein
Probe No.: 9057C

This report was filled out by: Wade Beins
Representing: Crow Butte Resources, Inc.
On:

Certification:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this form and all its attachments and that, based on inquiry of those individuals immediately responsible for obtaining information, I believe the information is true, accurate, and complete. Further, I certify awareness that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

By: Wade Beins Title: Senior Geologist

Wade Beins

Date: October 3, 2013

Nebraska Department of Environmental Quality **Permit No. NE0122611**

Well Completion Report

Company: Crow Butte Resources. Inc.
Well Type: Production/Injection ____ Monitor X
Ground Elevation: 4090.97 ft.
Drilling Contractor: Landrill Exploration
Mud Products: 9 Bags Super Gel
Bit Size: 8 Inch
Drilling Begun: 9/17/2013
Completed Formation: Brule
Casing Diameter: 4.95 inch O.D.
Casing Depth: 89 ft.
Packer Type: Johnson K-packer
Centralizer Depths: 20,40

Project: Crow Butte
Well No. BOW-11
Wellhead Elevation: 4092.07 ft.
Driller: R. Corbin

Drilling Completed On: 9/17/2013
Depth Drilled: 180 ft.
Casing Type: White Certalok
Basket Depth: N/A ft.
Packer Depth: 81 ft.

Screen Size: 0.020
Screened Interval(s): 91 ft. - 171 ft.
ft. - ft.
Completed Formation Upper Boundary: 91 ft.
Cement Contractor: Crow Butte Resources
Estimated Cement Volume: 3.5 bbls.
Cement Density: 12.2 lbs/gal
Cement Type/Class: I/II API
Cement Circulated to Surface: 1 bbls.
Logging Contractor: Century Geophysical Corp.
Unit No.: 2008
Log Type: Gamma, SP, Resistance, Deviation
Well Deviation: 0.2 ft. at 111.5 degrees
Remarks:

Gravel Size:
ft. - ft.
ft. - ft.
Lower Boundary: 171 ft.
Operator: Klein
Actual Cement Volume Used: 5.2 bbls.
Water Volume Used: 3.8 bbls.
Additives: 56 lbs Salt 75 lbs Bentonite
Density At Surface: 12.2 lbs/gal
Operator: Dunn/Klein
Probe No.: 9057C

This report was filled out by: Wade Beins
Representing: Crow Butte Resources, Inc.
On:

Certification:

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By: Wade Beins Title: Senior Geologist

Wade Beins

Date: October 3, 2013

Nebraska Department of Environmental Quality **Permit No. NE0122611**

Well Completion Report

Company: Crow Butte Resources. Inc.
Project: Crow Butte
Well Type: Production/Injection ___ Monitor X
Well No. Walters 2-720
Ground Elevation: 4205 ft.
Wellhead Elevation: 4205 ft.
Drilling Contractor: Landrill Exploration
Driller: S. Osmotherly
Mud Products:
Bit Size: 8 Inch
Drilling Begun: 6/29/2007
Drilling Completed On: 7/1/2007
Completed Formation: Brule/Arikare
Depth Drilled: 240 ft.
Casing Diameter: 4.95 inch O.D.
Casing Type: White Certalok
Casing Depth: 79 ft.
Basket Depth: N/A ft.
Packer Type: Johnson K-packer
Packer Depth: 75 ft.
Centralizer Depths: 20,40,60

Screen Size: 3 inch by .020 inch
Gravel Size:
Screened Interval(s): 85 ft. - 225 ft.
ft. - ft.
ft. - ft.
ft. - ft.
Completed Formation Upper Boundary: 80 ft.
Lower Boundary: 224 ft.
Cement Contractor: Crow Butte Resources
Operator: Klein
Estimated Cement Volume: 3.1 bbls.
Actual Cement Volume Used: 4.7 bbls.
Cement Density: Not Ava lbs/gal
Water Volume Used: 3.4 bbls.
Cement Type/Class: I/II API
Additives: 500 lbs. Salt 500 lbs. Bentonite
Cement Circulated to Surface: Not Ava bbls.
Density At Surface: Not Availa lbs/gal
Logging Contractor: Century Geophysical Corp.
Operator: Dunn
Unit No.: 0001
Probe No.: 9055C
Log Type: Gamma, SP, Resistance, Deviation
Well Deviation: 0.01 ft. at 0 degrees
Remarks:

This report was filled out by: Wade Beins
Representing: Crow Butte Resources, Inc.
On:

Certification:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this form and all its attachments and that, based on inquiry of those individuals immediately responsible for obtaining information, I believe the information is true, accurate, and complete. Further, I certify awareness that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

By: Wade Beins Wade Beins Title : Senior Geologist

Date: September 28, 2011

Nebraska Department of Environmental Quality **Permit No. NE0122611**

Well Completion Report

Company: Crow Butte Resources. Inc.
Project: Crow Butte
Well Type: Production/Injection ___ Monitor X
Well No. Walters 1-721
Ground Elevation: 4245 ft.
Wellhead Elevation: 4246 ft.
Drilling Contractor: Landrill Exploration
Driller: S. Osmotherly
Mud Products:
Bit Size: 8 Inch
Drilling Begun: 7/4/2006
Drilling Completed On: 7/6/2006
Completed Formation: Brule .
Depth Drilled: 360 ft.
Casing Diameter: 4.95 inch O.D.
Casing Type: White Certalok
Casing Depth: 79 ft.
Basket Depth: N/A ft.
Packer Type: Johnson K-packer
Packer Depth: 75 ft.
Centralizer Depths: 20,40,60

Screen Size: 3 inch by .020 inch
Gravel Size:
Screened Interval(s): 85 ft. - 225 ft.
ft. - ft.
ft. - ft.
ft. - ft.
Completed Formation Upper Boundary: 80 ft.
Lower Boundary: 228 ft.
Cement Contractor: Crow Butte Resources
Operator: Klein
Estimated Cement Volume: 3.1 bbls.
Actual Cement Volume Used: 4.7 bbls.
Cement Density: Not Ava lbs/gal
Water Volume Used: 3.4 bbls.
Cement Type/Class: I/II API
Additives: 500 lbs. Salt 500 lbs. Bentonite
Cement Circulated to Surface: Not Ava bbls.
Density At Surface: Not Availa lbs/gal
Logging Contractor: Century Geophysical Corp.
Operator: Dunn
Unit No.: 0001
Probe No.: 9055C
Log Type: Gamma, SP, Resistance, Deviation
Well Deviation: 0.01 ft. at 0 degrees
Remarks:

This report was filled out by: Wade Beins
Representing: Crow Butte Resources, Inc.
On:

Certification:

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By: Wade Beins Wade Beins Title : Senior Geologist

Date: September 28, 2011

Nebraska Department of Environmental Quality **Permit No. NE0122611**

Well Completion Report

Company: Crow Butte Resources. Inc.
Project: Crow Butte
Well Type: Production/Injection ___ Monitor X
Well No. CPW-2010-1
Ground Elevation: 4260 ft.
Wellhead Elevation: 4262 ft.
Drilling Contractor: Landrill Exploration
Driller: L. Corbin
Mud Products: 11 Bags Super Gel 4 Quart Polymer 2 Bags Lost Circulation Material
Bit Size: 8 Inch
Drilling Begun: 8/31/2010
Drilling Completed On: 9/2/2010
Completed Formation: Chadron
Depth Drilled: 1070 ft.
Casing Diameter: 4.95 inch O.D.
Casing Type: White Certalok
Casing Depth: 1009 ft.
Basket Depth: N/A ft.
Packer Type: Johnson K-packer
Packer Depth: 995 ft.
Centralizer Depths: 20, 40, 100, 160, 220, 280, 340, 400, 460, 520, 580, 640, 700, 760, 820, 880, 940 Ft

Screen Size: 3 inch by .020 inch
Gravel Size:
Screened Interval(s): 1015 ft. - 1048 ft.
ft. - ft.
ft. - ft.
ft. - ft.
Completed Formation Upper Boundary: 1016 ft.
Lower Boundary: 1046 ft.
Cement Contractor: Crow Butte Resources
Operator: Klein
Estimated Cement Volume: 38.8 bbls.
Actual Cement Volume Used: 58.2 bbls.
Cement Density: 12.4 lbs/gal
Water Volume Used: 41.7 bbls.
Cement Type/Class: I/II API
Additives: 500 lbs. Salt 500 lbs. Bentonite
Cement Circulated to Surface: 5 bbls.
Density At Surface: 11.6 lbs/gal
Logging Contractor: Century Geophysical Corp.
Operator: Dunn
Unit No.: 0001
Probe No.: 9055C
Log Type: Gamma, SP, Resistance, Deviation
Well Deviation: 4.1 ft. at 203.5 degrees
Remarks:

This report was filled out by: Wade Beins
Representing: Crow Butte Resources, Inc.
On:

Certification:

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By: Wade Beins Wade Beins Title : Senior Geologist

Date: May 27, 2011

Nebraska Department of Environmental Quality **Permit No. NE0122611**

Well Completion Report

Company: Crow Butte Resources. Inc.
Project: Crow Butte
Well Type: Production/Injection ____ Monitor X
Well No. CPW-2010-1A
Ground Elevation: 4261 ft.
Wellhead Elevation: 4263 ft.
Drilling Contractor: Landrill Exploration
Driller: S. Osmotherly
Mud Products: 7 Bags Super Gel 2 Quart Polymer 3 Bags Lost Circulation Material
Bit Size: 8 Inch
Drilling Begun: 3/14/2011
Drilling Completed On: 3/16/2011
Completed Formation: Chadron
Depth Drilled: 1080 ft.
Casing Diameter: 4.95 inch O.D.
Casing Type: White Certalok
Casing Depth: 1019 ft.
Basket Depth: N/A ft.
Packer Type: Johnson K-packer
Packer Depth: 1005 ft.
Centralizer Depths: 20, 40, 100, 160, 220, 280, 340, 400, 460, 520, 580, 640, 700, 760, 820, 880, 940 Ft

Screen Size: 3 inch by .020 inch
Gravel Size:
Screened Interval(s): 1025 ft. - 1055 ft.
ft. - ft.
ft. - ft.
ft. - ft.
Completed Formation Upper Boundary: 1024 ft.
Lower Boundary: 1050 ft.
Cement Contractor: Crow Butte Resources
Operator: Klein
Estimated Cement Volume: 39.2 bbls.
Actual Cement Volume Used: 58.8 bbls.
Cement Density: 12.3 lbs/gal
Water Volume Used: 42.1 bbls.
Cement Type/Class: I/II API
Additives: 500 lbs. Salt 500 lbs. Bentonite
Cement Circulated to Surface: 4 bbls.
Density At Surface: 11 lbs/gal
Logging Contractor: Century Geophysical Corp.
Operator: Dunn
Unit No.: 0001
Probe No.: 9055C
Log Type: Gamma, SP, Resistance, Deviation
Well Deviation: 24.9 ft. at 153.3 degrees
Remarks:

This report was filled out by: Wade Beins
Representing: Crow Butte Resources, Inc.
On:

Certification:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this form and all its attachments and that, based on inquiry of those individuals immediately responsible for obtaining information, I believe the information is true, accurate, and complete. Further, I certify awareness that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

By: Wade Beins Wade Beins Title : Senior Geologist

Date: May 27, 2011

Nebraska Department of Environmental Quality **Permit No. NE0122611**

Well Completion Report

Company: Crow Butte Resources. Inc.
Project: Crow Butte
Well Type: Production/Injection ___ Monitor X
Well No. Monitor 1
Ground Elevation: 4101 ft.
Wellhead Elevation: 4102 ft.
Drilling Contractor: Landrill Exploration
Driller: G. Land
Mud Products:
Bit Size: 8 Inch
Drilling Begun: 4/3/1989
Drilling Completed On: 4/5/1989
Completed Formation: Chadron
Depth Drilled: 968 ft.
Casing Diameter: 4.95 inch O.D.
Casing Type: White Certalok
Casing Depth: 905 ft.
Basket Depth: N/A ft.
Packer Type: Johnson K-packer
Packer Depth: 900 ft.
Centralizer Depths: 20, 40, 100, 160, 220, 280, 340, 400, 460, 520, 580, 640, 700, 760, 820, 880, 940 Ft

Screen Size: 3 inch by .020 inch
Gravel Size:
Screened Interval(s): 905 ft. - 940 ft.
ft. - ft.
ft. - ft.
ft. - ft.
Completed Formation Upper Boundary: 900 ft.
Lower Boundary: 936 ft.
Cement Contractor: Crow Butte Resources
Operator: Klein
Estimated Cement Volume: 34.8 bbls.
Actual Cement Volume Used: 52.2 bbls.
Cement Density: Not Ava lbs/gal
Water Volume Used: 37.4 bbls.
Cement Type/Class: I/II API
Additives: 500 lbs. Salt 500 lbs. Bentonite
Cement Circulated to Surface: Not Ava bbls.
Density At Surface: Not Availa lbs/gal
Logging Contractor: Century Geophysical Corp.
Operator: Dunn
Unit No.: 0001
Probe No.: 9055C
Log Type: Gamma, SP, Resistance, Deviation
Well Deviation: 16.4 ft. at 116 degrees
Remarks:

This report was filled out by: Wade Beins
Representing: Crow Butte Resources, Inc.
On:

Certification:

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By: Wade Beins Wade Beins Title : Senior Geologist

Date: September 28, 2011

Nebraska Department of Environmental Quality **Permit No. NE0122611**

Well Completion Report

Company: Crow Butte Resources. Inc.
Project: Crow Butte
Well Type: Production/Injection ___ Monitor X
Well No. Monitor 2
Ground Elevation: 4197 ft.
Wellhead Elevation: 4198 ft.
Drilling Contractor: Landrill Exploration
Driller: G. Land
Mud Products:
Bit Size: 8 Inch
Drilling Begun: 4/7/1989
Drilling Completed On: 4/9/1989
Completed Formation: Chadron
Depth Drilled: 1030 ft.
Casing Diameter: 4.95 inch O.D.
Casing Type: White Certalok
Casing Depth: 974 ft.
Basket Depth: N/A ft.
Packer Type: Johnson K-packer
Packer Depth: 974 ft.
Centralizer Depths: ###

Screen Size: 3 inch by .020 inch
Gravel Size:
Screened Interval(s): 980 ft. - 1015 ft.
ft. - ft.
ft. - ft.
ft. - ft.
Completed Formation Upper Boundary: 974 ft.
Lower Boundary: 1015 ft.
Cement Contractor: Crow Butte Resources
Operator: Klein
Estimated Cement Volume: 37.5 bbls.
Actual Cement Volume Used: 56.2 bbls.
Cement Density: Not Ava lbs/gal
Water Volume Used: bbls.
Cement Type/Class: I/II API
Additives: 500 lbs. Salt 500 lbs. Bentonite
Cement Circulated to Surface: Not Ava bbls.
Density At Surface: Not Availa lbs/gal
Logging Contractor: Century Geophysical Corp.
Operator: Dunn
Unit No.: 0001
Probe No.: 9055C
Log Type: Gamma, SP, Resistance, Deviation
Well Deviation: 14.6 ft. at 128 degrees
Remarks:

This report was filled out by: Wade Beins
Representing: Crow Butte Resources, Inc.
On:

Certification:

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By: Wade Beins Wade Beins Title : Senior Geologist

Date: May 27, 2011

Nebraska Department of Environmental Quality **Permit No. NE0122611**

Well Completion Report

Company: Crow Butte Resources. Inc.
Project: Crow Butte
Well Type: Production/Injection ___ Monitor X
Well No. Monitor 3
Ground Elevation: 4260 ft.
Wellhead Elevation: 4261 ft.
Drilling Contractor: Landrill Exploration
Driller: G. Land
Mud Products:
Bit Size: 8 Inch
Drilling Begun: 4/14/1989
Drilling Completed On: 4/18/1989
Completed Formation: Chadron
Depth Drilled: 1070 ft.
Casing Diameter: 4.95 inch O.D.
Casing Type: White Certalok
Casing Depth: 1008 ft.
Basket Depth: N/A ft.
Packer Type: Johnson K-packer
Packer Depth: 1008 ft.
Centralizer Depths: ###

Screen Size: 3 inch by .020 inch
Gravel Size:
Screened Interval(s): 1015 ft. - 1050 ft.
ft. - ft.
ft. - ft.
ft. - ft.
Completed Formation Upper Boundary: 1014 ft.
Lower Boundary: 1046 ft.
Cement Contractor: Crow Butte Resources
Operator: Klein
Estimated Cement Volume: 38.8 bbls.
Actual Cement Volume Used: 58.1 bbls.
Cement Density: Not Ava lbs/gal
Water Volume Used: bbls.
Cement Type/Class: I/II API
Additives: 500 lbs. Salt 500 lbs. Bentonite
Cement Circulated to Surface: Not Ava bbls.
Density At Surface: Not Availa lbs/gal
Logging Contractor: Century Geophysical Corp.
Operator: Dunn
Unit No.: 0001
Probe No.: 9055C
Log Type: Gamma, SP, Resistance, Deviation
Well Deviation: 13.8 ft. at 72 degrees
Remarks:

This report was filled out by: Wade Beins
Representing: Crow Butte Resources, Inc.
On:

Certification:

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By: Wade Beins Wade Beins Title : Senior Geologist

Date: May 27, 2011

Nebraska Department of Environmental Quality **Permit No. NE0122611**

Well Completion Report

Company: Crow Butte Resources. Inc.
Project: Crow Butte
Well Type: Production/Injection ___ Monitor X
Well No. Monitor 4A
Ground Elevation: 4326 ft.
Wellhead Elevation: 4328 ft.
Drilling Contractor: Landrill Exploration
Driller: L. Corbin
Mud Products: 6 Bags Super Gel 3 Quart Polymer
Bit Size: 8 Inch
Drilling Begun: 11/3/2010
Drilling Completed On: 11/5/2010
Completed Formation: Chadron
Depth Drilled: 1140 ft.
Casing Diameter: 4.95 inch O.D.
Casing Type: White Certalok
Casing Depth: 1079 ft.
Basket Depth: N/A ft.
Packer Type: Johnson K-packer
Packer Depth: 1060 ft.
Centralizer Depths: 20, 40, 100, 160, 220, 280, 340, 400, 460, 520, 580, 640, 700, 760, 820, 880, 940, 1000 Ft

Screen Size: 3 inch by .020 inch
Gravel Size:
Screened Interval(s): 1080 ft. - 1110 ft.
ft. - ft.
ft. - ft.
ft. - ft.
Completed Formation Upper Boundary: 1081 ft.
Lower Boundary: 1109 ft.
Cement Contractor: Crow Butte Resources
Operator: Klein
Estimated Cement Volume: 41.5 bbls.
Actual Cement Volume Used: 62.2 bbls.
Cement Density: 12.5 lbs/gal
Water Volume Used: 44.6 bbls.
Cement Type/Class: I/II API
Additives: 500 lbs. Salt 500 lbs. Bentonite
Cement Circulated to Surface: 8 bbls.
Density At Surface: 11.9 lbs/gal
Logging Contractor: Century Geophysical Corp.
Operator: Dunn
Unit No.: 0001
Probe No.: 9055C
Log Type: Gamma, SP, Resistance, Deviation
Well Deviation: 11.3 ft. at 53.7 degrees
Remarks:

This report was filled out by: Wade Beins
Representing: Crow Butte Resources, Inc.
On:

Certification:

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By: Wade Beins Wade Beins Title : Senior Geologist

Date: May 27, 2011

Nebraska Department of Environmental Quality **Permit No. NE0122611**

Well Completion Report

Company: Crow Butte Resources. Inc.
Project: Crow Butte
Well Type: Production/Injection ____ Monitor X
Well No. Monitor 5
Ground Elevation: 4337 ft.
Wellhead Elevation: 4340 ft.
Drilling Contractor: Landrill Exploration
Driller: J. Lemmon
Mud Products: 8 Bags Super Gel 7 Quart Polymer 3 Bags Lost Circulation Material
Bit Size: 8 Inch
Drilling Begun: 8/30/2010
Drilling Completed On: 9/1/2010
Completed Formation: Chadron
Depth Drilled: 1140 ft.
Casing Diameter: 4.95 inch O.D.
Casing Type: White Certalok
Casing Depth: 1069 ft.
Basket Depth: N/A ft.
Packer Type: Johnson K-packer
Packer Depth: 1060 ft.
Centralizer Depths: 20, 40, 100, 160, 220, 280, 340, 400, 460, 520, 580, 640, 700, 760, 820, 880, 940, 1000 Ft

Screen Size: 3 inch by .020 inch
Gravel Size:
Screened Interval(s): 1070 ft. - 1120 ft.
ft. - ft.
ft. - ft.
ft. - ft.
Completed Formation Upper Boundary: 1066 ft.
Lower Boundary: 1116 ft.
Cement Contractor: Crow Butte Resources
Operator: Klein
Estimated Cement Volume: 41.1 bbls.
Actual Cement Volume Used: 61.7 bbls.
Cement Density: 12.2 lbs/gal
Water Volume Used: 44.2 bbls.
Cement Type/Class: I/II API
Additives: 500 lbs. Salt 500 lbs. Bentonite
Cement Circulated to Surface: 3 bbls.
Density At Surface: 11.5 lbs/gal
Logging Contractor: Century Geophysical Corp.
Operator: Dunn
Unit No.: 0001
Probe No.: 9055C
Log Type: Gamma, SP, Resistance, Deviation
Well Deviation: 27 ft. at 142.1 degrees
Remarks:

This report was filled out by: Wade Beins
Representing: Crow Butte Resources, Inc.
On:

Certification:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this form and all its attachments and that, based on inquiry of those individuals immediately responsible for obtaining information, I believe the information is true, accurate, and complete. Further, I certify awareness that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

By: Wade Beins Wade Beins Title : Senior Geologist

Date: May 27, 2011

Nebraska Department of Environmental Quality **Permit No. NE0122611**

Well Completion Report

Company: Crow Butte Resources. Inc.
Project: Crow Butte
Well Type: Production/Injection ___ Monitor X
Well No. Monitor 6
Ground Elevation: 4214 ft.
Wellhead Elevation: 4215 ft.
Drilling Contractor: Landrill Exploration
Driller: L. Corbin
Mud Products: 13 Bags Super Gel 8 Quart Polymer 4 Bags Lost Circulation Material
Bit Size: 8 Inch
Drilling Begun: 8/16/2010
Drilling Completed On: 8/18/2010
Completed Formation: Chadron
Depth Drilled: 1050 ft.
Casing Diameter: 4.95 inch O.D.
Casing Type: White Certalok
Casing Depth: 989 ft.
Basket Depth: N/A ft.
Packer Type: Johnson K-packer
Packer Depth: 982 ft.
Centralizer Depths: 20, 40, 100, 160, 220, 280, 340, 400, 460, 520, 580, 640, 700, 760, 820, 880, 940 Ft

Screen Size: 3 inch by .020 inch
Gravel Size:
Screened Interval(s): 992 ft. - 1025 ft.
ft. - ft.
ft. - ft.
ft. - ft.
Completed Formation Upper Boundary: 982 ft.
Lower Boundary: 1023 ft.
Cement Contractor: Crow Butte Resources
Operator: Klein
Estimated Cement Volume: 38.1 bbls.
Actual Cement Volume Used: 57.1 bbls.
Cement Density: 12 lbs/gal
Water Volume Used: 40.9 bbls.
Cement Type/Class: I/II API
Additives: 500 lbs. Salt 500 lbs. Bentonite
Cement Circulated to Surface: 3 bbls.
Density At Surface: 10 lbs/gal
Logging Contractor: Century Geophysical Corp.
Operator: Dunn
Unit No.: 0001
Probe No.: 9055C
Log Type: Gamma, SP, Resistance, Deviation
Well Deviation: 17.1 ft. at 37.3 degrees
Remarks:

This report was filled out by: Wade Beins
Representing: Crow Butte Resources, Inc.
On:

Certification:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this form and all its attachments and that, based on inquiry of those individuals immediately responsible for obtaining information, I believe the information is true, accurate, and complete. Further, I certify awareness that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

By: Wade Beins Wade Beins Title : Senior Geologist

Date: May 27, 2011

Nebraska Department of Environmental Quality **Permit No. NE0122611**

Well Completion Report

Company: Crow Butte Resources. Inc.
Project: Crow Butte
Well Type: Production/Injection ___ Monitor X
Well No. Monitor 7
Ground Elevation: 4243 ft.
Wellhead Elevation: 4244 ft.
Drilling Contractor: Landrill Exploration
Driller: L. Corbin
Mud Products: 6 Bags Super Gel 6 Quart Polymer 3 Bags Lost Circulation Material
Bit Size: 8 Inch
Drilling Begun: 8/20/2010
Drilling Completed On: 8/23/2010
Completed Formation: Chadron
Depth Drilled: 1080 ft.
Casing Diameter: 4.95 inch O.D.
Casing Type: White Certalok
Casing Depth: 999 ft.
Basket Depth: N/A ft.
Packer Type: Johnson K-packer
Packer Depth: 993 ft.
Centralizer Depths: 20, 40, 100, 160, 220, 280, 340, 400, 460, 520, 580, 640, 700, 760, 820, 880, 940 Ft

Screen Size: 3 inch by .020 inch
Gravel Size:
Screened Interval(s): 1003 ft. - 1046 ft.
ft. - ft.
ft. - ft.
ft. - ft.
Completed Formation Upper Boundary: 1007 ft.
Lower Boundary: 1044 ft.
Cement Contractor: Crow Butte Resources
Operator: Klein
Estimated Cement Volume: 38.4 bbls.
Actual Cement Volume Used: 57.6 bbls.
Cement Density: 11.7 lbs/gal
Water Volume Used: 41.3 bbls.
Cement Type/Class: I/II API
Additives: 500 lbs. Salt 500 lbs. Bentonite
Cement Circulated to Surface: 2 bbls.
Density At Surface: 10.2 lbs/gal
Logging Contractor: Century Geophysical Corp.
Operator: Dunn
Unit No.: 0001
Probe No.: 9055C
Log Type: Gamma, SP, Resistance, Deviation
Well Deviation: 32.2 ft. at 159.9 degrees
Remarks:

This report was filled out by: Wade Beins
Representing: Crow Butte Resources, Inc.
On:

Certification:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this form and all its attachments and that, based on inquiry of those individuals immediately responsible for obtaining information, I believe the information is true, accurate, and complete. Further, I certify awareness that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

By: Wade Beins Wade Beins Title : Senior Geologist

Date: May 27, 2011

Nebraska Department of Environmental Quality **Permit No. NE0122611**

Well Completion Report

Company: Crow Butte Resources. Inc.
Project: Crow Butte
Well Type: Production/Injection ____ Monitor X
Well No. Monitor 8
Ground Elevation: 4352 ft.
Wellhead Elevation: 4354 ft.
Drilling Contractor: Landrill Exploration
Driller: L. Corbin
Mud Products: 10 Bags Super Gel 4 Quart Polymer 4 Bags Lost Circulation Material
Bit Size: 8 Inch
Drilling Begun: 8/27/2010
Drilling Completed On: 8/30/2010
Completed Formation: Chadron
Depth Drilled: 1150 ft.
Casing Diameter: 4.95 inch O.D.
Casing Type: White Certalok
Casing Depth: 1079 ft.
Basket Depth: N/A ft.
Packer Type: Johnson K-packer
Packer Depth: 1067 ft.
Centralizer Depths: 20, 40, 100, 160, 220, 280, 340, 400, 460, 520, 580, 640, 700, 760, 820, 880, 940, 1000 Ft

Screen Size: 3 inch by .020 inch
Gravel Size:
Screened Interval(s): 1087 ft. - 1127 ft.
ft. - ft.
ft. - ft.
ft. - ft.
Completed Formation Upper Boundary: 1085 ft.
Lower Boundary: 1123 ft.
Cement Contractor: Crow Butte Resources
Operator: Klein
Estimated Cement Volume: 41.5 bbls.
Actual Cement Volume Used: 62.2 bbls.
Cement Density: 12.8 lbs/gal
Water Volume Used: 44.6 bbls.
Cement Type/Class: I/II API
Additives: 500 lbs. Salt 500 lbs. Bentonite
Cement Circulated to Surface: 5 bbls.
Density At Surface: 11.5 lbs/gal
Logging Contractor: Century Geophysical Corp.
Operator: Dunn
Unit No.: 0001
Probe No.: 9055C
Log Type: Gamma, SP, Resistance, Deviation
Well Deviation: 38.5 ft. at 173.6 degrees
Remarks:

This report was filled out by: Wade Beins
Representing: Crow Butte Resources, Inc.
On:

Certification:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this form and all its attachments and that, based on inquiry of those individuals immediately responsible for obtaining information, I believe the information is true, accurate, and complete. Further, I certify awareness that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

By: Wade Beins Wade Beins Title : Senior Geologist

Date: May 27, 2011

Nebraska Department of Environmental Quality **Permit No. NE0122611**

Well Completion Report

Company: Crow Butte Resources. Inc.
Project: Crow Butte
Well Type: Production/Injection ___ Monitor X
Well No. Monitor 9
Ground Elevation: 4365 ft.
Wellhead Elevation: 4366 ft.
Drilling Contractor: Landrill Exploration
Driller: S. Osmotherly
Mud Products: 5 Bags Super Gel 2 Quart Polymer 2 Bags Lost Circulation Material
Bit Size: 8 Inch
Drilling Begun: 10/20/2010
Drilling Completed On: 10/22/2010
Completed Formation: Chadron
Depth Drilled: 1170 ft.
Casing Diameter: 4.95 inch O.D.
Casing Type: White Certalok
Casing Depth: 1099 ft.
Basket Depth: N/A ft.
Packer Type: Johnson K-packer
Packer Depth: 1080 ft.
Centralizer Depths: 20, 40, 100, 160, 220, 280, 340, 400, 460, 520, 580, 640, 700, 760, 820, 880, 940, 1000, 1060 Ft

Screen Size: 3 inch by .020 inch
Gravel Size:
Screened Interval(s): 1110 ft. - 1140 ft.
ft. - ft.
ft. - ft.
ft. - ft.
Completed Formation Upper Boundary: 1116 ft.
Lower Boundary: 1137 ft.
Cement Contractor: Crow Butte Resources
Operator: Klein
Estimated Cement Volume: 42.3 bbls.
Actual Cement Volume Used: 63.4 bbls.
Cement Density: 11.8 lbs/gal
Water Volume Used: 45.4 bbls.
Cement Type/Class: I/II API
Additives: 500 lbs. Salt 500 lbs. Bentonite
Cement Circulated to Surface: 1 bbls.
Density At Surface: 10 lbs/gal
Logging Contractor: Century Geophysical Corp.
Operator: Dunn
Unit No.: 0001
Probe No.: 9055C
Log Type: Gamma, SP, Resistance, Deviation
Well Deviation: 20.8 ft. at 124.6 degrees
Remarks:

This report was filled out by: Wade Beins
Representing: Crow Butte Resources, Inc.
On:

Certification:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this form and all its attachments and that, based on inquiry of those individuals immediately responsible for obtaining information, I believe the information is true, accurate, and complete. Further, I certify awareness that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

By: Wade Beins Wade Beins Title : Senior Geologist

Date: May 27, 2011

Nebraska Department of Environmental Quality **Permit No. NE0122611**

Well Completion Report

Company: Crow Butte Resources. Inc.
Project: Crow Butte
Well Type: Production/Injection ___ Monitor X
Well No. Monitor 10
Ground Elevation: 4160 ft.
Wellhead Elevation: 4161 ft.
Drilling Contractor: Landrill Exploration
Driller: J. Lemmon
Mud Products: 4 Bags Super Gel 6 Quart Polymer 1 Bags Lost Circulation Material
Bit Size: 8 Inch
Drilling Begun: 9/10/2010
Drilling Completed On: 9/13/2010
Completed Formation: Chadron
Depth Drilled: 1000 ft.
Casing Diameter: 4.95 inch O.D.
Casing Type: White Certalok
Casing Depth: 929 ft.
Basket Depth: N/A ft.
Packer Type: Johnson K-packer
Packer Depth: 915 ft.
Centralizer Depths: 20, 40, 100, 160, 220, 280, 340, 400, 460, 520, 580, 640, 700, 760, 820, 880 Ft

Screen Size: 3 inch by .020 inch
Gravel Size:
Screened Interval(s): 935 ft. - 970 ft.
ft. - ft.
ft. - ft.
ft. - ft.
Completed Formation Upper Boundary: 931 ft.
Lower Boundary: 979 ft.
Cement Contractor: Crow Butte Resources
Operator: Klein
Estimated Cement Volume: 35.7 bbls.
Actual Cement Volume Used: 53.6 bbls.
Cement Density: 11.7 lbs/gal
Water Volume Used: 38.4 bbls.
Cement Type/Class: I/II API
Additives: 500 lbs. Salt 500 lbs. Bentonite
Cement Circulated to Surface: 0 bbls.
Density At Surface: 9.8 lbs/gal
Logging Contractor: Century Geophysical Corp.
Operator: Dunn
Unit No.: 0001
Probe No.: 9055C
Log Type: Gamma, SP, Resistance, Deviation
Well Deviation: 11.2 ft. at 252.6 degrees
Remarks: Tremmied 5 bbls to surface

This report was filled out by: Wade Beins
Representing: Crow Butte Resources, Inc.
On:

Certification:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this form and all its attachments and that, based on inquiry of those individuals immediately responsible for obtaining information, I believe the information is true, accurate, and complete. Further, I certify awareness that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

By: Wade Beins Wade Beins Title : Senior Geologist

Date: May 27, 2011

Nebraska Department of Environmental Quality **Permit No. NE0122611**

Well Completion Report

Company: Crow Butte Resources. Inc.
Project: Crow Butte
Well Type: Production/Injection ____ Monitor X
Well No. Monitor 11
Ground Elevation: 4124 ft.
Wellhead Elevation: 4126 ft.
Drilling Contractor: Landrill Exploration
Driller: G. Krotz
Mud Products: 10 Bags Super Gel 5 Quart Polymer 6 Bags Lost Circulation Material
Bit Size: 8 Inch
Drilling Begun: 10/4/2010
Drilling Completed On: 10/6/2010
Completed Formation: Chadron
Depth Drilled: 980 ft.
Casing Diameter: 4.95 inch O.D.
Casing Type: White Certalok
Casing Depth: 899 ft.
Basket Depth: N/A ft.
Packer Type: Johnson K-packer
Packer Depth: 892 ft.
Centralizer Depths: 20, 40, 100, 160, 220, 280, 340, 400, 460, 520, 580, 640, 700, 760, 820 Ft

Screen Size: 3 inch by .020 inch
Gravel Size:
Screened Interval(s): 902 ft. - 947 ft.
ft. - ft.
ft. - ft.
ft. - ft.
Completed Formation Upper Boundary: 901 ft.
Lower Boundary: 948 ft.
Cement Contractor: Crow Butte Resources
Operator: Klein
Estimated Cement Volume: 34.6 bbls.
Actual Cement Volume Used: 51.9 bbls.
Cement Density: 12.1 lbs/gal
Water Volume Used: 37.2 bbls.
Cement Type/Class: I/II API
Additives: 500 lbs. Salt 500 lbs. Bentonite
Cement Circulated to Surface: 3 bbls.
Density At Surface: 10.5 lbs/gal
Logging Contractor: Century Geophysical Corp.
Operator: Dunn
Unit No.: 0001
Probe No.: 9055C
Log Type: Gamma, SP, Resistance, Deviation
Well Deviation: 21.9 ft. at 155.2 degrees
Remarks:

This report was filled out by: Wade Beins
Representing: Crow Butte Resources, Inc.
On:

Certification:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this form and all its attachments and that, based on inquiry of those individuals immediately responsible for obtaining information, I believe the information is true, accurate, and complete. Further, I certify awareness that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

By: Wade Beins Wade Beins Title : Senior Geologist

Date: May 27, 2011

Appendix G-1

Mineralogical and Particles Size Distribution Analyses (2011)

MINERALOGY, INC.

Test Report

Client:	PTS Laboratories, Inc.	MI#:	11182
PTS File #	41269; Marsland Core Project	Sample Type:	Sediment samples
PO#	11-133	Date:	06.06.11

Contact	Rachel Spitz
Address	PTS Laboratories
	8100 Secura Way
	Santa Fe Springs, CA 90670
E-mail	rspitz@ptsgeolabs.com
Phone	562-347-2500
PO #	11-133
Test Methods	XRD (Bulk & Clay Fraction analysis) (n=8)
Project ID	PTS File # 41269
	Marsland Core Project
Calibration Date	06.06.11
MI Lab Supervisor	Timothy B. Murphy

CONDITIONS AND QUALIFICATIONS

Mineralogy, Inc. will endeavor to provide accurate and reliable laboratory measurements of the samples provided by the client. The results of any x-ray diffraction, petrographic or core analysis test are necessarily influenced by the condition and selection of the samples to be analyzed. It should be recognized that geological samples are commonly heterogeneous and lack uniform properties. Mineralogical, geochemical and/or petrographic data obtained for a specific sample provides compositional data pertinent to that specific sampling location. Such "site-specific data" may fail to provide adequate characterization of the range of compositional variability possible within a given project area, thus the "projection" of these laboratory findings and values to adjoining, "untested" areas of the formation or project area is inherently risky, and exceeds the scope of the laboratory work request. Hence, Mineralogy, Inc. shall not assume any liability risk or responsibility for any loss or potential failure associated with the application of "site or sample-specific laboratory data" to "untested" areas of the formation or project area. Unless otherwise directed, the samples selected for analysis will be chosen to reflect a visually representative portion of the bulk sample submitted for analysis. Where provided, the interpretation of x-ray diffraction, petrographic or core analysis results constitutes the best geological judgment of Mineralogy, Inc., and is subject to the sampling limitations described above, and the detection limits inherent to semi-quantitative and/or qualitative mineralogical and microscopic analysis. Mineralogy, Inc. assumes no responsibility nor offers any guarantee of the productivity, suitability or performance of any oil or gas well, hydrocarbon recovery process, dimension stone, and/or ore material based upon the data or conclusions presented in this report.

MINERALOGY, INC.

TABLE I

X-RAY DIFFRACTION ANALYSIS

Client:	PTS Laboratories, Inc.	MI#:	11182
PTS File #	41269; Marsland Core Project	Sample Type:	Sediment samples
PO#	11-133	Date:	06.06.11

X-Ray Diffraction Results

	Sample ID	M1454c				M1624c			
	Run #	Run 1	Run 2	Run 3	Run 4	Run 1	Run 2	Run 4	Run 5
	Lab ID	11182-01	11182-02	11182-03	11182-04	11182-05	11182-06	11182-07	11182-08
Mineral Constituents	Chemical Formula	Relative Abundance (%)							
Quartz	SiO_2	15	11	63	29	15	14	54	23
Plagioclase Feldspar	$(Na,Ca)AlSi_3O_8$	9	8	4	5	11	10	4	5
K-Feldspar	$KAlSi_3O_8$	2	2	8	5	5	3	8	4
Calcite	$CaCO_3$	47	35	trc		13	1	1	
Dolomite	$(Ca,Mg)(CO_3)_2$				3			2	
Siderite	$FeCO_3$			1					
Pyrite	FeS_2			1					1
Magnetite	alpha-Fe_3O_4		1	trc		2			
Magnesium Vanadium Oxide	beta-$Mg(VO_3)$			2					
Kaolinite	$Al_2Si_2O_5(OH)_4$			1	2			trc	2
Chlorite	$(Fe,Al,Mg)_6(Si,Al)_4O_{10}(OH)_8$				2		trc		2
Illite/Mica	$KAl_2(Si_3AlO_{10})(OH)_2$	2	5	2	6	5	12	3	8
Mixed-Layered Illite/Smectite	$K_{0.5}Al_2(Si,Al)_4O_{10}(OH)_2 \cdot 2H_2O$		38	18	48	49	60	28	55
Montmorillonite	$Na_{0.3}(Al,Mg)_2Si_4O_{10}(OH)_2 \cdot xH_2O$	25							
TOTAL		100	100	100	100	100	100	100	100
% Illite Layers in ML Illite/Smectite	(+/- 5%)		45%	10%	25%	10%	25%	15%	20%

3228 EAST 15TH STREET • TULSA, OKLAHOMA 74104 • 918.744.8284 (O) • 918.743.7460 (F) • www.mineralogy.com

PTS Laboratories, Inc.

Crow Butte Resources, Inc.
PTS File No: 41269

PARTICLE SIZE SUMMARY

(METHODOLOGY: ASTM D422/D4464M)

PROJECT NAME: Marsland Core
PROJECT NO: N/A

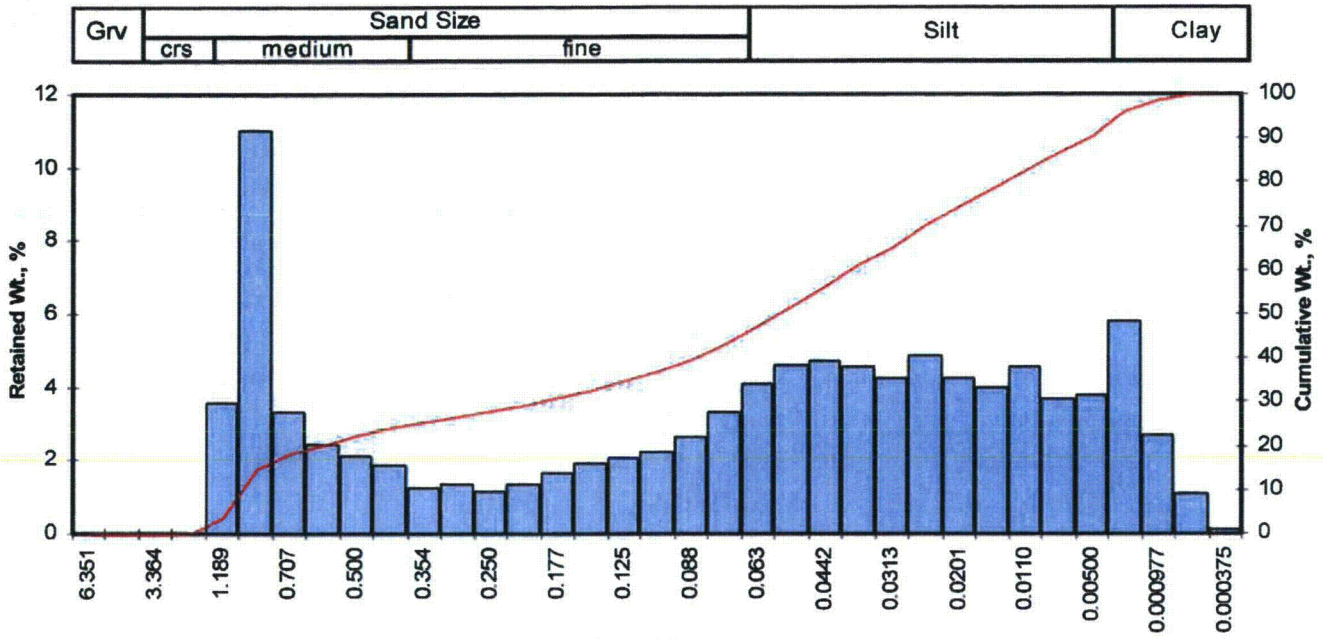
Sample ID	Depth, ft.	Median Grain Size mm	Particle Size Distribution, wt. percent						Silt & Clay
			Gravel	Sand Size			Silt	Clay	
				Coarse	Medium	Fine			
M-1454c Run 1	N/A	0.056	0.00	0.00	24.31	18.80	47.25	9.64	56.89
M-1454c Run 2	N/A	0.027	0.00	0.00	8.58	24.41	46.36	20.65	67.01
M-1454c Run 3	N/A	0.075	0.00	0.00	2.74	47.49	29.85	19.92	49.77
M-1454c Run 4	N/A	0.007	0.00	0.00	0.00	0.45	60.15	39.40	99.55
M-1624c Run 1	N/A	0.049	0.00	0.00	7.50	29.12	54.65	8.73	63.38
M-1624c Run 2	N/A	0.065	0.00	0.00	26.37	22.12	34.96	16.54	51.50
M-1624c Run 4	N/A	0.711	0.00	0.00	69.05	14.89	11.56	4.50	16.06
M-1624c Run 5	N/A	0.005	0.00	0.00	0.00	1.28	50.88	47.85	98.72

(1) Based on Mean from Trask

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Crow Butte Resources, Inc.	**PTS File No:**	41269
Project:	Marsland Core	**Sample ID:**	M-1454c Run 1
Project No:	N/A	**Depth, ft:**	N/A



Opening		Phi of	U.S.	Sample Weight,	Increment Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	3.58	3.58	3.58
0.0331	0.841	0.25	20	11.00	11.00	14.59
0.0278	0.707	0.50	25	3.31	3.31	17.90
0.0234	0.595	0.75	30	2.42	2.42	20.32
0.0197	0.500	1.00	35	2.14	2.14	22.46
0.0166	0.420	1.25	40	1.85	1.85	24.31
0.0139	0.354	1.50	45	1.22	1.22	25.53
0.0117	0.297	1.75	50	1.34	1.34	26.87
0.0098	0.250	2.00	60	1.13	1.13	28.00
0.0083	0.210	2.25	70	1.36	1.36	29.36
0.0070	0.177	2.50	80	1.63	1.63	30.99
0.0059	0.149	2.75	100	1.89	1.89	32.88
0.0049	0.125	3.00	120	2.06	2.06	34.94
0.0041	0.105	3.25	140	2.23	2.23	37.17
0.0035	0.088	3.50	170	2.62	2.62	39.80
0.0029	0.074	3.75	200	3.31	3.31	43.11
0.0025	0.063	4.00	230	4.09	4.09	47.20
0.0021	0.053	4.25	270	4.59	4.59	51.79
0.00174	0.0442	4.50	325	4.73	4.73	56.52
0.00146	0.0372	4.75	400	4.54	4.54	61.06
0.00123	0.0313	5.00	450	4.23	4.23	65.30
0.000986	0.0250	5.32	500	4.87	4.87	70.17
0.000790	0.0201	5.64	635	4.23	4.23	74.40
0.000615	0.0156	6.00		3.98	3.98	78.38
0.000435	0.0110	6.50		4.53	4.53	82.91
0.000308	0.00781	7.00		3.67	3.67	86.58
0.000197	0.00500	7.65		3.77	3.77	90.36
0.000077	0.00195	9.00		5.78	5.78	96.14
0.000038	0.000977	10.00		2.69	2.69	98.83
0.000019	0.000488	11.00		1.08	1.08	99.91
0.000015	0.000375	11.38		0.09	0.09	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight	Phi	Particle Size	
percent	Value	Inches	Millimeters
5	-0.19	0.0448	1.137
10	0.04	0.0383	0.972
16	0.36	0.0307	0.781
25	1.39	0.0150	0.381
40	3.52	0.0034	0.087
50	4.15	0.0022	0.056
60	4.69	0.0015	0.039
75	5.69	0.0008	0.019
84	6.65	0.0004	0.010
90	7.58	0.0002	0.005
95	8.73	0.0001	0.002

Measure	Trask	Inman	Folk-Ward
Median, phi	4.15	4.15	4.15
Median, in.	0.0022	0.0022	0.0022
Median, mm	0.056	0.056	0.056
Mean, phi	2.32	3.50	3.72
Mean, in.	0.0079	0.0035	0.0030
Mean, mm	0.200	0.088	0.076
Sorting	4.443	3.146	2.924
Skewness	1.526	-0.207	-0.090
Kurtosis	0.187	0.418	0.849
Grain Size Description (ASTM-USCS Scale)		Fine sand (based on Mean from Trask)	

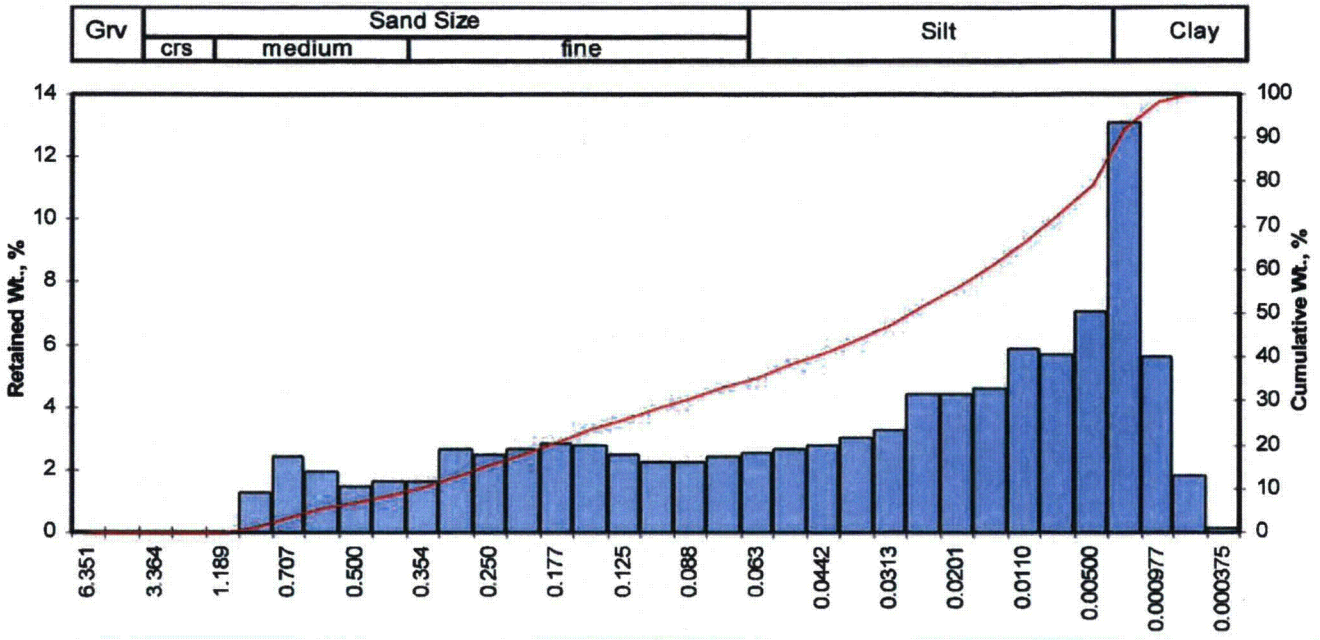
Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	24.31
Fine Sand	200	18.80
Silt	>0.005 mm	47.25
Clay	<0.005 mm	9.64
	Total	**100**

Phone: (562) 907-3607 Fax: (562) 907-3610

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Crow Butte Resources, Inc.	**PTS File No:**	41269
Project:	Marsland Core	**Sample ID:**	M-1454c Run 2
Project No:	N/A	**Depth, ft:**	N/A



Opening		Phi of	U.S.	Sample	Increment	Cumulative
Inches	Millimeters	Screen	No.	Weight, grams	Weight, percent	Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	1.24	1.24	1.24
0.0278	0.707	0.50	25	2.40	2.40	3.64
0.0234	0.595	0.75	30	1.92	1.92	5.56
0.0197	0.500	1.00	35	1.42	1.42	6.98
0.0166	0.420	1.25	40	1.60	1.60	8.58
0.0139	0.354	1.50	45	1.64	1.64	10.22
0.0117	0.297	1.75	50	2.63	2.63	12.85
0.0098	0.250	2.00	60	2.46	2.46	15.31
0.0083	0.210	2.25	70	2.67	2.67	17.98
0.0070	0.177	2.50	80	2.82	2.82	20.80
0.0059	0.149	2.75	100	2.77	2.77	23.57
0.0049	0.125	3.00	120	2.49	2.49	26.06
0.0041	0.105	3.25	140	2.26	2.26	28.32
0.0035	0.088	3.50	170	2.26	2.26	30.58
0.0029	0.074	3.75	200	2.41	2.41	32.99
0.0025	0.063	4.00	230	2.55	2.55	35.54
0.0021	0.053	4.25	270	2.63	2.63	38.17
0.00174	0.0442	4.50	325	2.80	2.80	40.97
0.00146	0.0372	4.75	400	3.04	3.04	44.01
0.00123	0.0313	5.00	450	3.28	3.28	47.29
0.000986	0.0250	5.32	500	4.40	4.40	51.69
0.000790	0.0201	5.64	635	4.43	4.43	56.12
0.000615	0.0156	6.00		4.61	4.61	60.73
0.000435	0.0110	6.50		5.86	5.86	66.59
0.000308	0.00781	7.00		5.69	5.69	72.28
0.000197	0.00500	7.65		7.07	7.07	79.35
0.000077	0.00195	9.00		13.10	13.10	92.45
0.000038	0.000977	10.00		5.63	5.63	98.08
0.000019	0.000488	11.00		1.79	1.79	99.87
0.000015	0.000375	11.38		0.13	0.13	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size	
		Inches	Millimeters
5	0.68	0.0246	0.625
10	1.47	0.0142	0.362
16	2.06	0.0094	0.239
25	2.89	0.0053	0.135
40	4.41	0.0018	0.047
50	5.20	0.0011	0.027
60	5.94	0.0006	0.016
75	7.25	0.0003	0.007
84	8.13	0.0001	0.004
90	8.75	0.0001	0.002
95	9.45	0.0001	0.001

Measure	Trask	Inman	Folk-Ward
Median, phi	5.20	5.20	5.20
Median, in.	0.0011	0.0011	0.0011
Median, mm	0.027	0.027	0.027
Mean, phi	3.82	5.10	5.13
Mean, in.	0.0028	0.0012	0.0011
Mean, mm	0.071	0.029	0.029
Sorting	4.523	3.031	2.845
Skewness	1.091	-0.034	-0.032
Kurtosis	0.178	0.448	0.826
Grain Size Description (ASTM-USCS Scale)		Silt (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	8.58
Fine Sand	200	24.41
Silt	>0.005 mm	46.36
Clay	<0.005 mm	20.65
	Total	**100**

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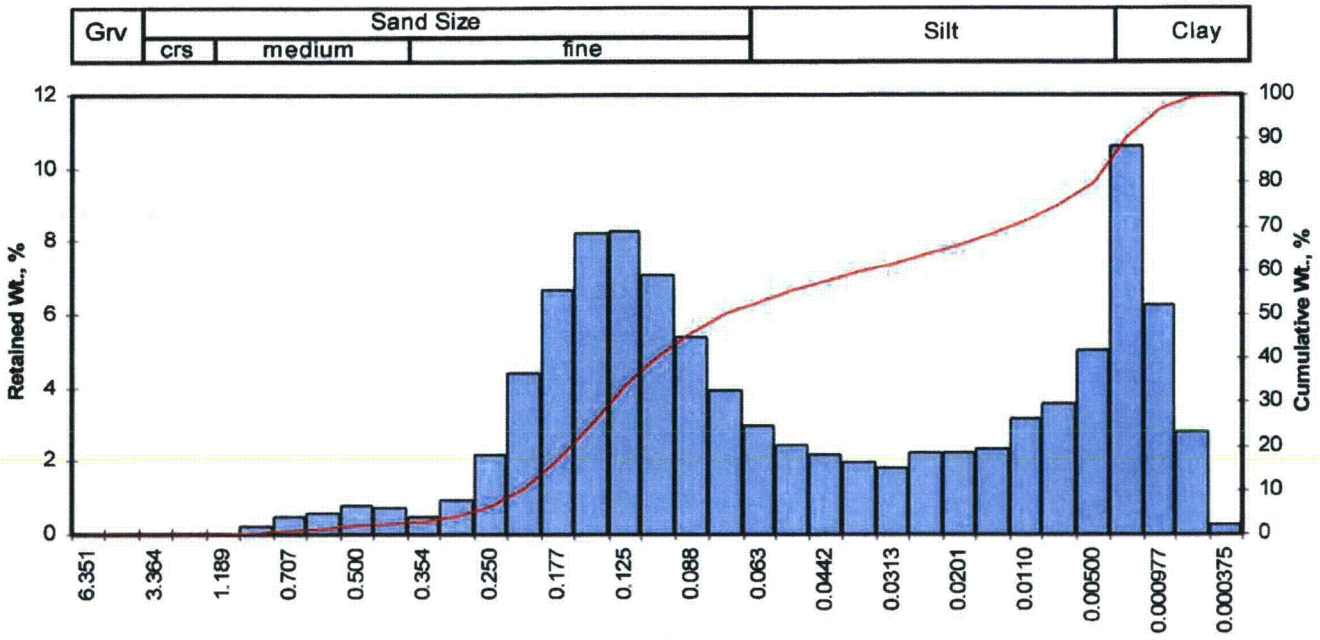
PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Crow Butte Resources, Inc.	**PTS File No:**	41269
Project:	Marsland Core	**Sample ID:**	M-1454c Run 3
Project No:	N/A	**Depth, ft:**	N/A



Opening		Phi of	U.S.	Sample Weight,	Increment Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.23	0.23	0.23
0.0278	0.707	0.50	25	0.47	0.47	0.70
0.0234	0.595	0.75	30	0.59	0.59	1.29
0.0197	0.500	1.00	35	0.75	0.75	2.04
0.0166	0.420	1.25	40	0.70	0.70	2.74
0.0139	0.354	1.50	45	0.45	0.45	3.19
0.0117	0.297	1.75	50	0.94	0.94	4.13
0.0098	0.250	2.00	60	2.16	2.16	6.29
0.0083	0.210	2.25	70	4.38	4.38	10.67
0.0070	0.177	2.50	80	6.68	6.68	17.35
0.0059	0.149	2.75	100	8.23	8.23	25.59
0.0049	0.125	3.00	120	8.27	8.27	33.86
0.0041	0.105	3.25	140	7.07	7.07	40.93
0.0035	0.088	3.50	170	5.38	5.38	46.31
0.0029	0.074	3.75	200	3.92	3.92	50.23
0.0025	0.063	4.00	230	2.97	2.97	53.20
0.0021	0.053	4.25	270	2.45	2.45	55.65
0.00174	0.0442	4.50	325	2.16	2.16	57.81
0.00146	0.0372	4.75	400	1.94	1.94	59.75
0.00123	0.0313	5.00	450	1.81	1.81	61.56
0.000986	0.0250	5.32	500	2.24	2.24	63.80
0.000790	0.0201	5.64	635	2.21	2.21	66.01
0.000615	0.0156	6.00		2.32	2.32	68.33
0.000435	0.0110	6.50		3.13	3.13	71.46
0.000308	0.00781	7.00		3.58	3.58	75.05
0.000197	0.00500	7.65		5.03	5.03	80.08
0.000077	0.00195	9.00		10.60	10.60	90.68
0.000038	0.000977	10.00		6.28	6.28	96.96
0.000019	0.000488	11.00		2.80	2.80	99.76
0.000015	0.000375	11.38		0.24	0.24	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight	Phi	Particle Size	
percent	Value	Inches	Millimeters
5	1.85	0.0109	0.277
10	2.21	0.0085	0.216
16	2.45	0.0072	0.183
25	2.73	0.0059	0.150
40	3.22	0.0042	0.108
50	3.74	0.0030	0.075
60	4.78	0.0014	0.036
75	6.99	0.0003	0.008
84	8.15	0.0001	0.004
90	8.91	0.0001	0.002
95	9.69	0.0000	0.001

Measure	Trask	Inman	Folk-Ward
Median, phi	3.74	3.74	3.74
Median, in.	0.0030	0.0030	0.0030
Median, mm	0.075	0.075	0.075
Mean, phi	3.66	5.30	4.78
Mean, in.	0.0031	0.0010	0.0014
Mean, mm	0.079	0.025	0.036
Sorting	4.379	2.849	2.612
Skewness	0.458	0.549	0.534
Kurtosis	0.334	0.376	0.754
Grain Size Description (ASTM-USCS Scale)		Fine sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	2.74
Fine Sand	200	47.49
Silt	>0.005 mm	29.85
Clay	<0.005 mm	19.92
	Total	**100**

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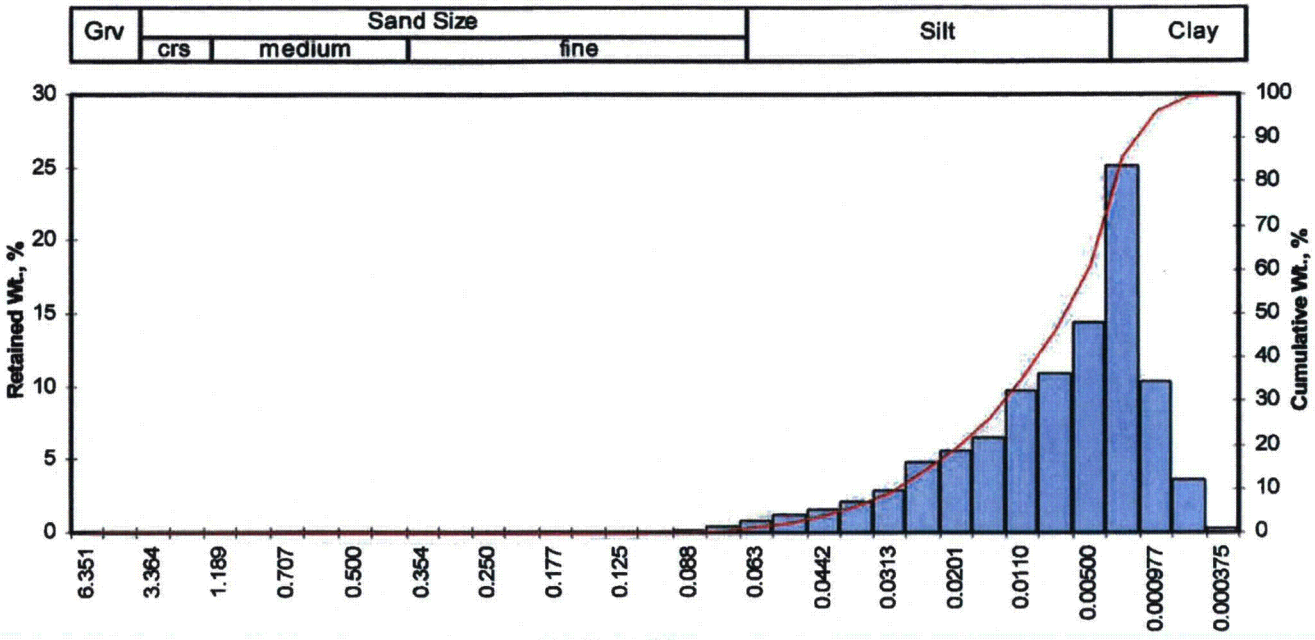
PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Crow Butte Resources, Inc.	**PTS File No:**	41269
Project:	Marsland Core	**Sample ID:**	M-1454c Run 4
Project No:	N/A	**Depth, ft:**	N/A



Opening		Phi of	U.S.	Sample Weight,	Increment Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.00	0.00	0.00
0.0117	0.297	1.75	50	0.00	0.00	0.00
0.0098	0.250	2.00	60	0.00	0.00	0.00
0.0083	0.210	2.25	70	0.00	0.00	0.00
0.0070	0.177	2.50	80	0.00	0.00	0.00
0.0059	0.149	2.75	100	0.00	0.00	0.00
0.0049	0.125	3.00	120	0.00	0.00	0.00
0.0041	0.105	3.25	140	0.00	0.00	0.00
0.0035	0.088	3.50	170	0.08	0.08	0.09
0.0029	0.074	3.75	200	0.36	0.36	0.45
0.0025	0.063	4.00	230	0.77	0.77	1.22
0.0021	0.053	4.25	270	1.14	1.14	2.36
0.00174	0.0442	4.50	325	1.55	1.55	3.91
0.00146	0.0372	4.75	400	2.10	2.10	6.01
0.00123	0.0313	5.00	450	2.87	2.87	8.88
0.000986	0.0250	5.32	500	4.78	4.78	13.66
0.000790	0.0201	5.64	635	5.62	5.62	19.28
0.000615	0.0156	6.00		6.45	6.45	25.73
0.000435	0.0110	6.50		9.67	9.67	35.40
0.000308	0.00781	7.00		10.90	10.90	46.30
0.000197	0.00500	7.65		14.30	14.30	60.60
0.000077	0.00195	9.00		25.10	25.10	85.70
0.000038	0.000977	10.00		10.40	10.40	96.10
0.000019	0.000488	11.00		3.62	3.62	99.72
0.000015	0.000375	11.38		0.28	0.28	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight	Phi	Particle Size	
percent	Value	Inches	Millimeters
5	4.63	0.0016	0.040
10	5.08	0.0012	0.030
16	5.45	0.0009	0.023
25	5.96	0.0006	0.016
40	6.71	0.0004	0.010
50	7.17	0.0003	0.007
60	7.62	0.0002	0.005
75	8.42	0.0001	0.003
84	8.91	0.0001	0.002
90	9.41	0.0001	0.001
95	9.89	0.0000	0.001

Measure	Trask	Inman	Folk-Ward
Median, phi	7.17	7.17	7.17
Median, in.	0.0003	0.0003	0.0003
Median, mm	0.007	0.007	0.007
Mean, phi	6.72	7.18	7.18
Mean, in.	0.0004	0.0003	0.0003
Mean, mm	0.009	0.007	0.007
Sorting	2.348	1.727	1.661
Skewness	0.984	0.008	0.022
Kurtosis	0.233	0.524	0.876
Grain Size Description (ASTM-USCS Scale)		Silt (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	0.45
Silt	>0.005 mm	60.15
Clay	<0.005 mm	39.40
	Total	**100**

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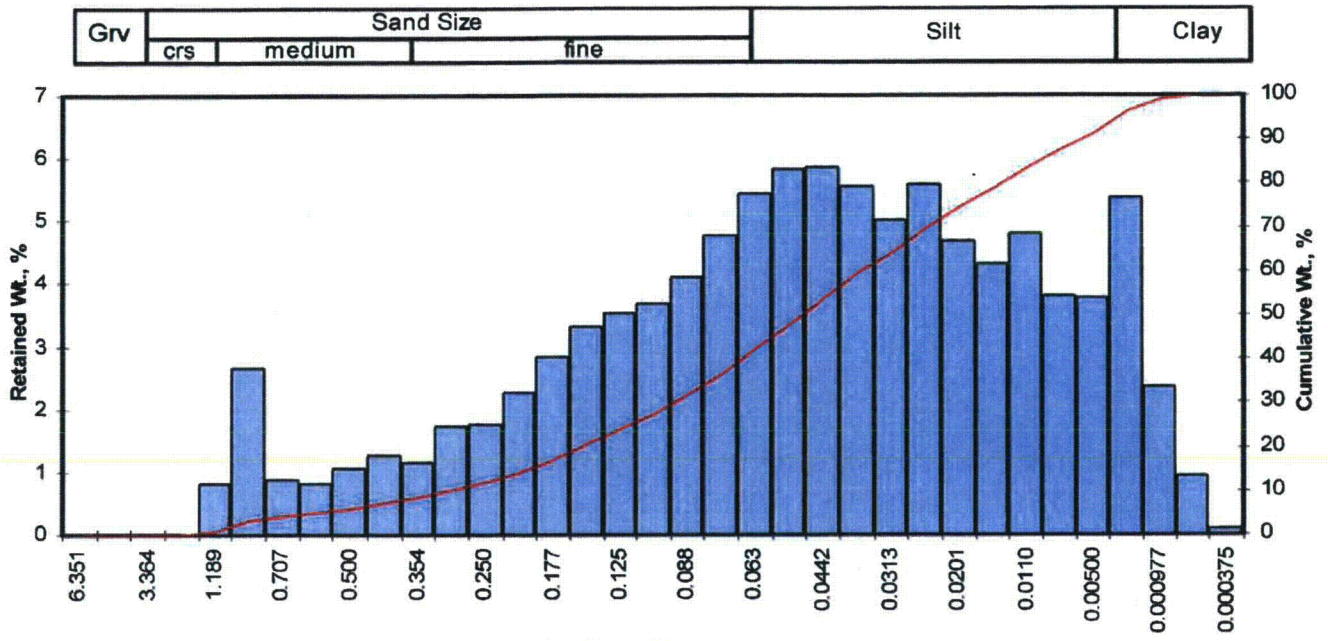
PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Crow Butte Resources, Inc.	**PTS File No:**	41269
Project:	Marsland Core	**Sample ID:**	M-1624c Run 1
Project No:	N/A	**Depth, ft:**	N/A



Opening		Phi of	U.S.	Sample Weight,	Increment Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.81	0.81	0.81
0.0331	0.841	0.25	20	2.66	2.66	3.47
0.0278	0.707	0.50	25	0.89	0.89	4.36
0.0234	0.595	0.75	30	0.81	0.81	5.17
0.0197	0.500	1.00	35	1.05	1.05	6.22
0.0166	0.420	1.25	40	1.28	1.28	7.50
0.0139	0.354	1.50	45	1.16	1.16	8.66
0.0117	0.297	1.75	50	1.72	1.72	10.38
0.0098	0.250	2.00	60	1.76	1.76	12.14
0.0083	0.210	2.25	70	2.25	2.25	14.39
0.0070	0.177	2.50	80	2.84	2.84	17.23
0.0059	0.149	2.75	100	3.32	3.32	20.54
0.0049	0.125	3.00	120	3.52	3.52	24.06
0.0041	0.105	3.25	140	3.69	3.69	27.75
0.0035	0.088	3.50	170	4.10	4.10	31.85
0.0029	0.074	3.75	200	4.77	4.77	36.62
0.0025	0.063	4.00	230	5.44	5.44	42.06
0.0021	0.053	4.25	270	5.83	5.83	47.89
0.00174	0.0442	4.50	325	5.87	5.87	53.75
0.00146	0.0372	4.75	400	5.54	5.54	59.29
0.00123	0.0313	5.00	450	5.02	5.02	64.31
0.000986	0.0250	5.32	500	5.58	5.58	69.89
0.000790	0.0201	5.64	635	4.69	4.69	74.58
0.000615	0.0156	6.00		4.33	4.33	78.91
0.000435	0.0110	6.50		4.81	4.81	83.72
0.000308	0.00781	7.00		3.79	3.79	87.50
0.000197	0.00500	7.65		3.77	3.77	91.27
0.000077	0.00195	9.00		5.38	5.38	96.65
0.000038	0.000977	10.00		2.34	2.34	98.99
0.000019	0.000488	11.00		0.93	0.93	99.92
0.000015	0.000375	11.38		0.08	0.08	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight	Phi	Particle Size	
percent	Value	Inches	Millimeters
5	0.70	0.0243	0.616
10	1.70	0.0122	0.309
16	2.39	0.0075	0.191
25	3.06	0.0047	0.120
40	3.91	0.0026	0.067
50	4.34	0.0019	0.049
60	4.79	0.0014	0.036
75	5.68	0.0008	0.020
84	6.54	0.0004	0.011
90	7.43	0.0002	0.006
95	8.58	0.0001	0.003

Measure	Trask	Inman	Folk-Ward
Median, phi	4.34	4.34	4.34
Median, in.	0.0019	0.0019	0.0019
Median, mm	0.049	0.049	0.049
Mean, phi	3.84	4.46	4.42
Mean, in.	0.0027	0.0018	0.0018
Mean, mm	0.070	0.045	0.047
Sorting	2.472	2.073	2.231
Skewness	0.980	0.060	0.068
Kurtosis	0.165	0.902	1.238
Grain Size Description (ASTM-USCS Scale)		Silt (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	7.50
Fine Sand	200	29.12
Silt	>0.005 mm	54.65
Clay	<0.005 mm	8.73
	Total	**100**

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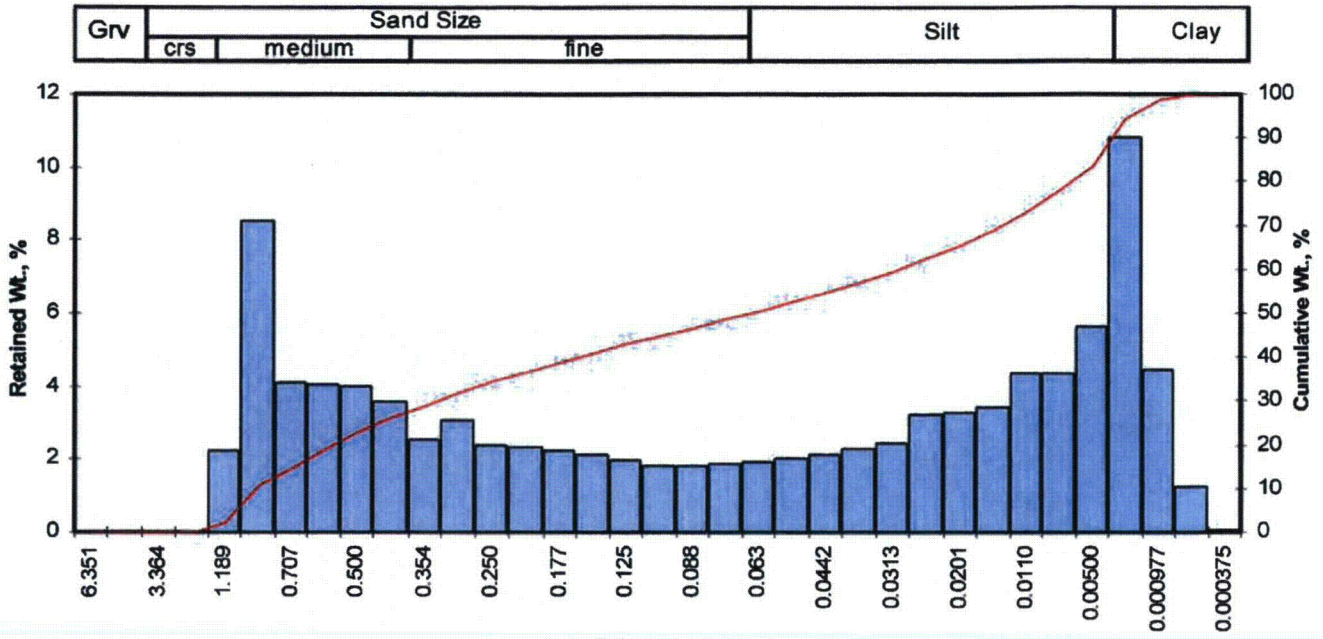
PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Crow Butte Resources, Inc.	**PTS File No:**	41269
Project:	Marsland Core	**Sample ID:**	M-1624c Run 2
Project No:	N/A	**Depth, ft:**	N/A



Opening		Phi of	U.S.	Sample Weight,	Increment Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	2.23	2.23	2.23
0.0331	0.841	0.25	20	8.51	8.51	10.74
0.0278	0.707	0.50	25	4.07	4.07	14.81
0.0234	0.595	0.75	30	4.04	4.04	18.85
0.0197	0.500	1.00	35	3.97	3.97	22.82
0.0166	0.420	1.25	40	3.55	3.55	26.37
0.0139	0.354	1.50	45	2.54	2.54	28.91
0.0117	0.297	1.75	50	3.04	3.04	31.95
0.0098	0.250	2.00	60	2.40	2.40	34.35
0.0083	0.210	2.25	70	2.31	2.31	36.66
0.0070	0.177	2.50	80	2.24	2.24	38.91
0.0059	0.149	2.75	100	2.14	2.14	41.05
0.0049	0.125	3.00	120	1.98	1.98	43.03
0.0041	0.105	3.25	140	1.83	1.83	44.86
0.0035	0.088	3.50	170	1.79	1.79	46.65
0.0029	0.074	3.75	200	1.85	1.85	48.50
0.0025	0.063	4.00	230	1.93	1.93	50.43
0.0021	0.053	4.25	270	2.00	2.00	52.43
0.00174	0.0442	4.50	325	2.13	2.13	54.56
0.00146	0.0372	4.75	400	2.28	2.28	56.84
0.00123	0.0313	5.00	450	2.43	2.43	59.27
0.000986	0.0250	5.32	500	3.22	3.22	62.49
0.000790	0.0201	5.64	635	3.24	3.24	65.73
0.000615	0.0156	6.00		3.39	3.39	69.12
0.000435	0.0110	6.50		4.36	4.36	73.48
0.000308	0.00781	7.00		4.35	4.35	77.83
0.000197	0.00500	7.65		5.63	5.63	83.46
0.000077	0.00195	9.00		10.80	10.80	94.26
0.000038	0.000977	10.00		4.44	4.44	98.70
0.000019	0.000488	11.00		1.22	1.22	99.92
0.000015	0.000375	11.38		0.08	0.08	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight	Phi	Particle Size	
percent	Value	Inches	Millimeters
5	-0.09	0.0418	1.062
10	0.21	0.0341	0.867
16	0.57	0.0265	0.672
25	1.15	0.0177	0.450
40	2.63	0.0064	0.162
50	3.94	0.0026	0.065
60	5.07	0.0012	0.030
75	6.67	0.0004	0.010
84	7.71	0.0002	0.005
90	8.47	0.0001	0.003
95	9.17	0.0001	0.002

Measure	Trask	Inman	Folk-Ward
Median, phi	3.94	3.94	3.94
Median, in.	0.0026	0.0026	0.0026
Median, mm	0.065	0.065	0.065
Mean, phi	2.12	4.14	4.08
Mean, in.	0.0090	0.0022	0.0023
Mean, mm	0.230	0.057	0.059
Sorting	6.777	3.570	3.187
Skewness	1.022	0.056	0.092
Kurtosis	0.255	0.296	0.687
Grain Size Description (ASTM-USCS Scale)		Fine sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	26.37
Fine Sand	200	22.12
Silt	>0.005 mm	34.96
Clay	<0.005 mm	16.54
	Total	**100**

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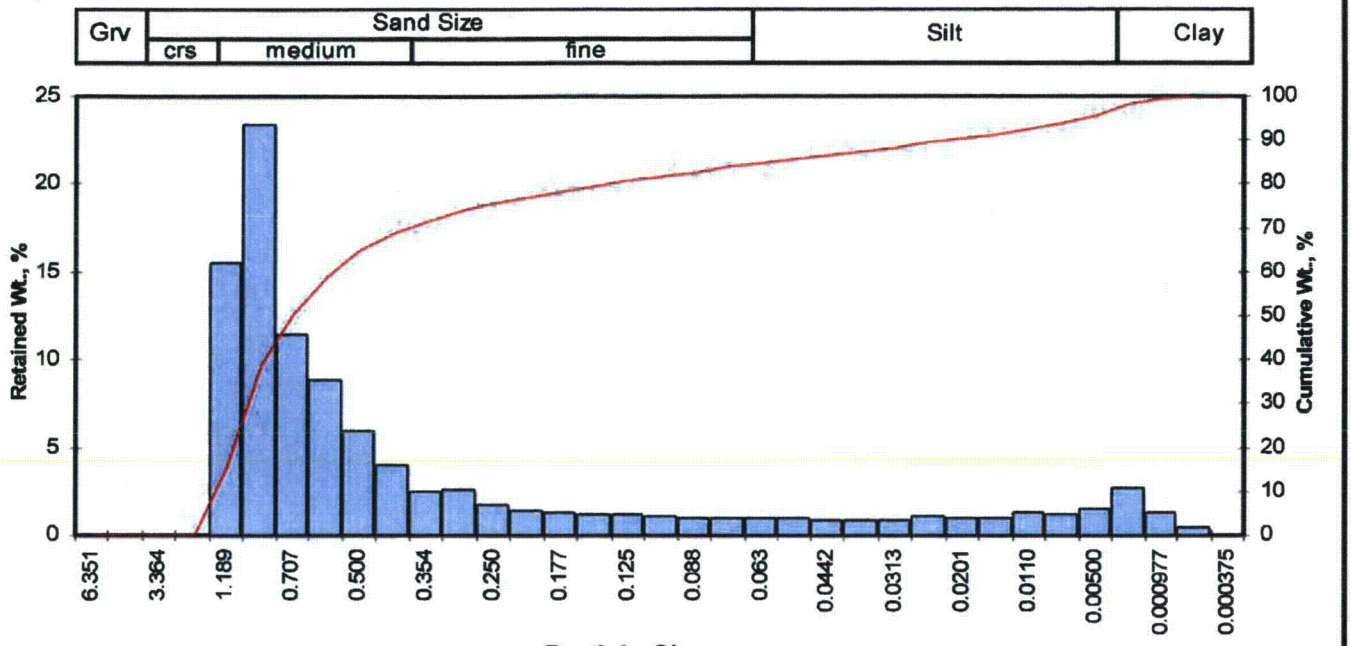
PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Crow Butte Resources, Inc.	**PTS File No:**	41269
Project:	Marsland Core	**Sample ID:**	M-1624c Run 4
Project No:	N/A	**Depth, ft:**	N/A



Opening		Phi of	U.S.	Sample	Increment	Cumulative
Inches	Millimeters	Screen	No.	Weight, grams	Weight, percent	Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	15.50	15.51	15.51
0.0331	0.841	0.25	20	23.40	23.41	38.92
0.0278	0.707	0.50	25	11.40	11.41	50.33
0.0234	0.595	0.75	30	8.81	8.82	59.14
0.0197	0.500	1.00	35	5.92	5.92	65.07
0.0166	0.420	1.25	40	3.98	3.98	69.05
0.0139	0.354	1.50	45	2.47	2.47	71.52
0.0117	0.297	1.75	50	2.62	2.62	74.14
0.0098	0.250	2.00	60	1.71	1.71	75.85
0.0083	0.210	2.25	70	1.39	1.39	77.24
0.0070	0.177	2.50	80	1.26	1.26	78.51
0.0059	0.149	2.75	100	1.22	1.22	79.73
0.0049	0.125	3.00	120	1.14	1.14	80.87
0.0041	0.105	3.25	140	1.05	1.05	81.92
0.0035	0.088	3.50	170	1.01	1.01	82.93
0.0029	0.074	3.75	200	1.01	1.01	83.94
0.0025	0.063	4.00	230	0.99	0.99	84.93
0.0021	0.053	4.25	270	0.95	0.95	85.88
0.00174	0.0442	4.50	325	0.91	0.91	86.79
0.00146	0.0372	4.75	400	0.88	0.88	87.67
0.00123	0.0313	5.00	450	0.85	0.85	88.52
0.000986	0.0250	5.32	500	1.03	1.03	89.55
0.000790	0.0201	5.64	635	0.99	0.99	90.54
0.000615	0.0156	6.00		1.01	1.01	91.55
0.000435	0.0110	6.50		1.25	1.25	92.80
0.000308	0.00781	7.00		1.21	1.21	94.01
0.000197	0.00500	7.65		1.48	1.48	95.50
0.000077	0.00195	9.00		2.68	2.68	98.18
0.000038	0.000977	10.00		1.33	1.33	99.51
0.000019	0.000488	11.00		0.46	0.46	99.97
0.000015	0.000375	11.38		0.03	0.03	100.00
TOTALS				**99.90**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size	
		Inches	Millimeters
5	-0.76	0.0666	1.691
10	-0.52	0.0563	1.430
16	-0.24	0.0465	1.181
25	-0.05	0.0407	1.033
40	0.27	0.0326	0.827
50	0.49	0.0280	0.711
60	0.79	0.0228	0.580
75	1.88	0.0107	0.273
84	3.77	0.0029	0.074
90	5.46	0.0009	0.023
95	7.43	0.0002	0.006

Measure	Trask	Inman	Folk-Ward
Median, phi	0.49	0.49	0.49
Median, in.	0.0280	0.0280	0.0280
Median, mm	0.711	0.711	0.711
Mean, phi	0.61	1.76	1.34
Mean, in.	0.0257	0.0116	0.0156
Mean, mm	0.653	0.295	0.395
Sorting	1.947	2.002	2.242
Skewness	0.747	0.634	0.664
Kurtosis	0.270	1.044	1.745
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

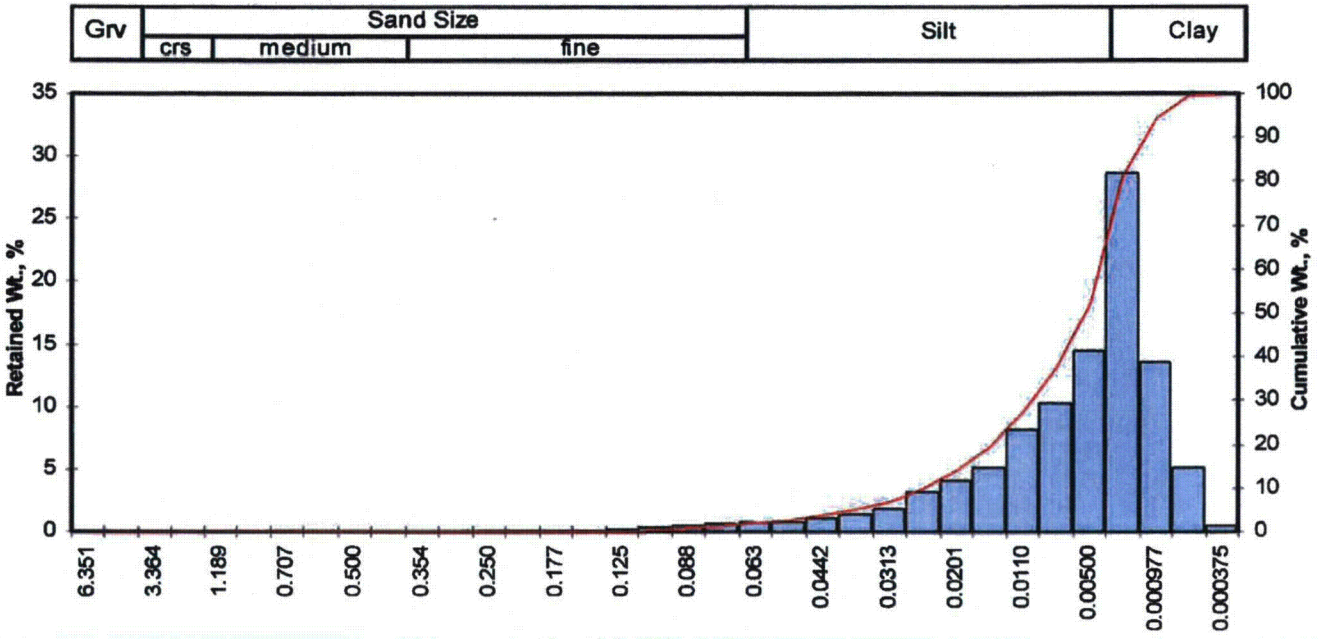
Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	69.05
Fine Sand	200	14.89
Silt	>0.005 mm	11.56
Clay	<0.005 mm	4.50
	Total	**100**

Phone: (562) 907-3607 Fax: (562) 907-3610

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Crow Butte Resources, Inc.	**PTS File No:**	41269
Project:	Marsland Core	**Sample ID:**	M-1624c Run 5
Project No:	N/A	**Depth, ft:**	N/A



Opening		Phi of	U.S.	Sample Weight,	Increment Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.00	0.00	0.00
0.0117	0.297	1.75	50	0.00	0.00	0.00
0.0098	0.250	2.00	60	0.00	0.00	0.00
0.0083	0.210	2.25	70	0.00	0.00	0.00
0.0070	0.177	2.50	80	0.00	0.00	0.00
0.0059	0.149	2.75	100	0.01	0.01	0.01
0.0049	0.125	3.00	120	0.08	0.08	0.09
0.0041	0.105	3.25	140	0.24	0.24	0.33
0.0035	0.088	3.50	170	0.39	0.39	0.72
0.0029	0.074	3.75	200	0.56	0.56	1.28
0.0025	0.063	4.00	230	0.70	0.70	1.98
0.0021	0.053	4.25	270	0.81	0.81	2.79
0.00174	0.0442	4.50	325	0.99	0.99	3.78
0.00146	0.0372	4.75	400	1.31	1.31	5.09
0.00123	0.0313	5.00	450	1.80	1.80	6.89
0.000986	0.0250	5.32	500	3.15	3.15	10.03
0.000790	0.0201	5.64	635	4.11	4.11	14.14
0.000615	0.0156	6.00		5.11	5.11	19.25
0.000435	0.0110	6.50		8.22	8.22	27.47
0.000308	0.00781	7.00		10.20	10.20	37.66
0.000197	0.00500	7.65		14.50	14.49	52.15
0.000077	0.00195	9.00		28.70	28.69	80.84
0.000038	0.000977	10.00		13.60	13.59	94.43
0.000019	0.000488	11.00		5.15	5.15	99.58
0.000015	0.000375	11.38		0.42	0.42	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight	Phi	Particle Size	
percent	Value	Inches	Millimeters
5	4.73	0.0015	0.038
10	5.32	0.0010	0.025
16	5.77	0.0007	0.018
25	6.35	0.0005	0.012
40	7.10	0.0003	0.007
50	7.55	0.0002	0.005
60	8.02	0.0002	0.004
75	8.72	0.0001	0.002
84	9.23	0.0001	0.002
90	9.67	0.0000	0.001
95	10.11	0.0000	0.001

Measure	Trask	Inman	Folk-Ward
Median, phi	7.55	7.55	7.55
Median, in.	0.0002	0.0002	0.0002
Median, mm	0.005	0.005	0.005
Mean, phi	7.10	7.50	7.52
Mean, in.	0.0003	0.0002	0.0002
Mean, mm	0.007	0.006	0.005
Sorting	2.277	1.731	1.680
Skewness	1.008	-0.027	-0.037
Kurtosis	0.207	0.553	0.928
Grain Size Description (ASTM-USCS Scale)		Silt (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	1.28
Silt	>0.005 mm	50.88
Clay	<0.005 mm	47.85
	Total	100

Phone: (562) 907-3607 Fax: (562) 907-3610

PTS Laboratories, Inc.

CHAIN OF CUSTODY RECORD

PAGE 1 OF 1

COMPANY	Crow Butte Resources, Inc
ADDRESS / CITY / ZIP CODE	86 Crow Butte Rd Crawford, NE 69339
PROJECT MANAGER	Wade Beins 308 665 2215 ext 113
PROJECT NAME / PHONE NUMBER	Marsland Core 308 665 2341
~~PROJECT NUMBER~~ email / FAX NUMBER	wade_beins@cameco.com
SITE LOCATION	
SAMPLER SIGNATURE	Wade Beins

PO# 5337

TURNAROUND TIME
24 HOURS ☐ 5 DAYS ☐
48 HOURS ☐ NORMAL ☐
72 HOURS ☐
OTHER: _____

SAMPLE INTEGRITY (CHECK):
INTACT ✓ ON ICE ____

PTS QUOTE NO.

PTS FILE: 41269

ANALYSIS REQUEST

SAMPLE ID NUMBER	DATE	TIME	DEPTH, FT	NUMBER OF SAMPLES	SOIL PROPERTIES PACKAGE	HYDRAULIC CONDUCTIVITY PACKAGE	PORE FLUID SATURATIONS PACKAGE	TCEQ/TNRCC PROPERTIES PACKAGE	CAPILLARITY PACKAGE	FLUID PROPERTIES PACKAGE	PHOTOLOG: CORE PHOTOGRAPHY	MOISTURE CONTENT, ASTM D2216	POROSITY: TOTAL, API RP40	POROSITY: EFFECTIVE, ASTM D425M	SPECIFIC GRAVITY, ASTM D854	BULK DENSITY (DRY), API RP40 or ASTM D2937	AIR PERMEABILITY, API RP40	HYDRAULIC CONDUCTIVITY, EPA9100, API RP40, D5084	GRAIN SIZE DISTRIBUTION, ASTM D422/4464M	TOC: WALKLEY-BLACK	ATTERBERG LIMITS, ASTM D4318	Petrography XRD - Rolle & Fine				COMMENTS
M-1454c Run1	3/22/11																		X			X				
M-1454c Run2	3/22/11																		X			X				
M-1454c Run3	3/22/11																		X			X				
M-1454c Run4	3/22/11																		X			X				
M-1624c Run1	3/25/11																		X			X				
M-1624c Run2	3/25/11																		X			X				Note - There is not a sample for Run 3
M-1624c Run4	3/25/11																		X			X				
M-1624c Run5	3/25/11																		X			X				

1. RELINQUISHED BY	2. RECEIVED BY	3. RELINQUISHED BY	4. RECEIVED BY
Wade Beins	[signature]		
COMPANY: Crow Butte Resources, Inc	COMPANY: PTS Labs Inc	COMPANY	COMPANY
DATE / TIME: 4-20-11 11:00 AM	DATE / TIME: 4-25-11 1517	DATE / TIME	DATE / TIME

ENERGY LABORATORIES
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ANALYTICAL SUMMARY REPORT

June 10, 2011

Crow Butte Resources
86 Crow Butte Rd
Crawford, NE 69339

Workorder No.: C11040735

Project Name: Not Indicated

Energy Laboratories, Inc. Casper WY received the following 14 samples for Crow Butte Resources on 4/22/2011 for analysis.

Sample ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
C11040735-001	M1454c-Run3-Sample 1	03/22/11 0:00	04/22/11	Core	Metals by ICP/ICPMS, Total Digestion, Total Metals for Core Samples Gamma Sample Preparation Uranium by Gamma
C11040735-002	M1454c-Run3-Sample 2	03/22/11 0:00	04/22/11	Core	Same As Above
C11040735-003	M1454c-Run3-Sample 3	03/22/11 0:00	04/22/11	Core	Same As Above
C11040735-004	M1454c-Run3-Sample 4	03/22/11 0:00	04/22/11	Core	Same As Above
C11040735-005	M1454c-Run3-Sample 5	03/22/11 0:00	04/22/11	Core	Same As Above
C11040735-006	M1624c-Run3-Sample 1	03/25/11 0:00	04/22/11	Core	Same As Above
C11040735-007	M1624c-Run3-Sample 2	03/25/11 0:00	04/22/11	Core	Same As Above
C11040735-008	M1624c-Run3-Sample 3	03/25/11 0:00	04/22/11	Core	Same As Above
C11040735-009	M1624c-Run3-Sample 4	03/25/11 0:00	04/22/11	Core	Same As Above
C11040735-010	M1624c-Run4-Sample 1	03/25/11 0:00	04/22/11	Core	Same As Above
C11040735-011	M1624c-Run4-Sample 2	03/22/11 0:00	04/22/11	Core	Same As Above
C11040735-012	M1624c-Run4-Sample 3	03/22/11 0:00	04/22/11	Core	Same As Above
C11040735-013	M1624c-Run4-Sample 4	03/22/11 0:00	04/22/11	Core	Same As Above
C11040735-014	M1624c-Run4-Sample 5	03/22/11 0:00	04/22/11	Core	Same As Above

This report was prepared by Energy Laboratories, Inc., 2393 Salt Creek Hwy., Casper, WY 82601. Any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

The results as reported relate only to the item(s) submitted for testing.

If you have any questions regarding these test results, please call.

Report Approved By: Stephanie D. Waldrop

Stephanie D. Waldrop
Reporting Supervisor

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CLIENT: Crow Butte Resources
Project: Not Indicated
Sample Delivery Group: C11040735

Report Date: 06/10/11

CASE NARRATIVE

ORIGINAL SAMPLE SUBMITTAL(S)
All original sample submittals have been returned with the data package.

SAMPLE TEMPERATURE COMPLIANCE: 4°C (±2°C)
Temperature of samples received may not be considered properly preserved by accepted standards. Samples that are hand delivered immediately after collection shall be considered acceptable if there is evidence that the chilling process has begun.

GROSS ALPHA ANALYSIS
Method 900.0 for gross alpha and gross beta is intended as a drinking water method for low TDS waters. Data provided by this method for non potable waters should be viewed as inconsistent.

SOIL/SOLID SAMPLES
All samples reported on an as received basis unless otherwise indicated.

SUBCONTRACTING ANALYSIS
Subcontracting of sample analyses to an outside laboratory may be required. If so, ENERGY LABORATORIES will utilize its branch laboratories or qualified contract laboratories for this service. Any such laboratories will be indicated within the Laboratory Analytical Report.

BRANCH LABORATORY LOCATIONS
eli-b - Energy Laboratories, Inc. - Billings, MT
eli-g - Energy Laboratories, Inc. - Gillette, WY
eli-h - Energy Laboratories, Inc. - Helena, MT
eli-r - Energy Laboratories, Inc. - Rapid City, SD
eli-t - Energy Laboratories, Inc. - College Station, TX

CERTFICATIONS:
USEPA: WY00002; FL-DOH NELAC: E87641; California: 02118CA
Oregon: WY200001; Utah: 3072350515; Virginia: 00057; Washington: C1903

ISO 17025 DISCLAIMER:
The results of this Analytical Report relate only to the items submitted for analysis.

ENERGY LABORATORIES, INC. - CASPER,WY certifies that certain method selections contained in this report meet requirements as set forth by the above accrediting authorities. Some results requested by the client may not be covered under these certifications. All analysis data to be submitted for regulatory enforcement should be certified in the sample state of origin. Please verify ELI's certification coverage by visiting www.energylab.com

ELI appreciates the opportunity to provide you with this analytical service. For additional information and services visit our web page www.energylab.com.

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LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Crow Butte Resources
Project: Not Indicated
Workorder: C11040735

Report Date: 06/10/11
Date Received: 04/22/11

	Analysis	U Chemical	U3O8 Chemical	U Gamma	U3O8 Gamma
	Units	%	%	%	%
Sample ID	Client Sample ID	Results	Results	Results	Results
C11040735-001	M1454c-Run3-Sample 1	< 0.005	< 0.006	0.038	0.045
C11040735-002	M1454c-Run3-Sample 2	0.013	0.015	0.109	0.129
C11040735-003	M1454c-Run3-Sample 3	0.259	0.305	0.370	0.436
C11040735-004	M1454c-Run3-Sample 4	1.51	1.74	1.04	1.22
C11040735-005	M1454c-Run3-Sample 5	1.12	1.24	0.715	0.842
C11040735-006	M1624c-Run3-Sample 1	0.009	0.010	0.003	0.004
C11040735-007	M1624c-Run3-Ssuple 2	< 0.005	< 0.006	0.004	0.004
C11040735-008	M1624c-Run3-Sample 3	< 0.005	< 0.006	0.003	0.004
C11040735-009	M1624c-Run3-Sample 4	< 0.005	< 0.006	0.003	0.004
C11040735-010	M1624c-Run4-Sample 1	< 0.005	< 0.006	0.004	0.005
C11040735-011	M1624c-Run4-Sample 2	< 0.005	< 0.006	0.002	0.003
C11040735-012	M1624c-Run4-Sample 3	0.024	0.028	0.022	0.026
C11040735-013	M1624c-Run4-Sample 4	< 0.005	< 0.006	0.016	0.019
C11040735-014	M1624c-Run4-Sample 5	0.032	0.037	0.028	0.033

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources
Project: Not Indicated

Report Date: 06/10/11
Work Order: C11040735

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E901.1										**Batch: R146661**
Sample ID: LCS-R146661		Laboratory Control Sample				Run: GAM-NAI_110606A				06/06/11 12:16
Radium 226		8.00	pCi/g-dry	2.0	92	80	120			
Sample ID: MB-R146661	2	Method Blank				Run: GAM-NAI_110606A				06/06/11 12:16
Uranium by Gamma		ND	mg/kg-dry							U
U3O8 by Gamma		ND	mg/kg-dry							U
Sample ID: C11040735-010ADUP	2	Sample Duplicate				Run: GAM-NAI_110606A				06/06/11 12:16
Uranium by Gamma		43.3	mg/kg-dry	6.0				3.6	20	
U3O8 by Gamma		51.1	mg/kg-dry	7.1				3.6	20	

Qualifiers:

RL - Analyte reporting limit.
ND - Not detected at the reporting limit.
U - Not detected at minimum detectable concentration

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources
Project: Not Indicated

Report Date: 06/10/11
Work Order: C11040735

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020										Batch: 29668
Sample ID: MB-29668		Method Blank				Run: ICPMS2-C_110429A			04/30/11 08:13	
Uranium		0.02	mg/kg-dry	0.002						
Sample ID: LCS3-29668		Laboratory Control Sample				Run: ICPMS2-C_110429A			04/30/11 08:34	
Uranium		106	mg/kg-dry	0.50	106	54.2	183			
Sample ID: C11040735-014AMS3		Sample Matrix Spike				Run: ICPMS2-C_110429A			04/30/11 10:26	
Uranium		404	mg/kg-dry	0.50		75	125			A
Sample ID: C11040735-014AMSD		Sample Matrix Spike Duplicate				Run: ICPMS2-C_110429A			04/30/11 10:30	
Uranium		411	mg/kg-dry	0.50		75	125	1.8	20	A
Method: SW6020										Batch: 29668
Sample ID: MB-29668		Method Blank				Run: ICPMS2-C_110502A			05/03/11 00:52	
Uranium		0.2	mg/kg-dry	0.002						
Sample ID: LCS3-29668		Laboratory Control Sample				Run: ICPMS2-C_110502A			05/03/11 01:18	
Uranium		126	mg/kg-dry	0.50	126	54.2	183			
Sample ID: C11040735-014AMS3		Sample Matrix Spike				Run: ICPMS2-C_110502A			05/03/11 01:50	
Uranium		431	mg/kg-dry	0.50		75	125			A
Sample ID: C11040735-014AMSD		Sample Matrix Spike Duplicate				Run: ICPMS2-C_110502A			05/03/11 01:55	
Uranium		443	mg/kg-dry	0.50		75	125	2.7	20	A

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

Energy Laboratories Inc
Workorder Receipt Checklist

C11040735

Crow Butte Resources

Login completed by: Corinne Wagner

Date Received: 4/22/2011

Reviewed by: BL2000\emcpike

Received by: ckw

Reviewed Date: 4/25/2011

Carrier name: Ground

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature:	N/A°C		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☐	Not Applicable ☑

Contact and Corrective Action Comments:

None

Chain of Custody and Analytical Request Record

PLEASE PRINT- Provide as much information as possible.

Company Name: Crow Butte Resources, Inc	Project Name, PWS, Permit, Etc.	Sample Origin State:Nebraska	EPA/State Compliance: Yes ☐ No ☐
Report Mail Address: PO Box 169	Contact Name: Wade Beins — Phone/Fax: 308 665 2215 ext 113	Email: Wade_Beins@cameco.com	Sampler: (Please Print) Wade Beins
Invoice Address: PO Box 169	Invoice Contact & Phone: Terri Anderson 308 665 2215 ext 110	Purchase Order: 5450	Quote/Bottle Order:

Special Report/Formats – ELI must be notified prior to sample submittal for the following:

☐ DW ☐ A2LA
☐ GSA ☐ EDD/EDT (Electronic Data) Format:_____
☐ POTW/WWTP
☐ State:_____ ☐ LEVEL IV
☐ Other:_____ ☐ NELAC

Number of Containers
Sample Type: A Air W Water S Soils/Solids V Vegetation B Bioassay O Other

ANALYSIS REQUESTED

SEE ATTACHED

Normal Turnaround (TAT)

RUSH

Contact ELI prior to RUSH sample submittal for charges and scheduling – See Instruction Page

Comments:

Shipped by: UPS-G
Cooler ID(s): Box
Receipt Temp N/A °C
On Ice: Yes (No)
Custody Seal Y (N) Intact Y N Signature Match Y N

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Chemical Uranium	Closed Can Uranium
1	M1454c-Run3-Sample 1	3/22/11	NA	S	X	X
2	M1454c-Run3-Sample 2	3/22/11	NA	S	X	X
3	M1454c-Run3-Sample 3	3/22/11	NA	S	X	X
4	M1454c-Run3-Sample 4	3/22/11	NA	S	X	X
5	M1454c-Run3-Sample 5	3/22/11	NA	S	X	X
6	M1624c-Run3-Sample 1	3/25/11	NA	S	X	X
7	M1624c-Run3-Sample 2	3/25/11	NA	S	X	X
8	M1624c-Run3-Sample 3	3/25/11	NA	S	X	X
9	M1624c-Run3-Sample 4	3/25/11	NA	S	X	X
10	M1624c-Run4-Sample 1	3/25/11	NA	S	X	X

LABORATORY USE ONLY C1104035

Custody Record MUST be Signed

	Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
1	Wade Beins	4/20/11	Wade Beins			
2						
3	Sample Disposal: Return to Client: Yes	Lab Disposal: _____		Received by Laboratory:	Date/Time: 4/22/11 930	

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested.
This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.
Visit our web site at www.energylab.com for additional information, downloadable fee schedule, forms, and links.

Chain of Custody and Analytical Request Record

PLEASE PRINT- Provide as much information as possible.

Company Name: Crow Butte Resources, Inc	Project Name, PWS, Permit, Etc.	Sample Origin State:Nebraska	EPA/State Compliance: Yes ☐ No ☐
Report Mail Address: PO Box 169	Contact Name: Wade Beins — Phone/Fax: 308 665 2215 ext 113	Email: Wade_Beins@cameco.com	Sampler: (Please Print) Wade Beins
Invoice Address: PO Box 169	Invoice Contact & Phone: Terri Anderson 308 665 2215 ext 110	Purchase Order: 5450	Quote/Bottle Order:

Special Report/Formats – ELI must be notified prior to sample submittal for the following:

☐ DW ☐ A2LA
☐ GSA ☐ EDD/EDT(Electronic Data)
☐ POTW/WWTP Format:_____
☐ State: _____ ☐ LEVEL IV
☐ Other: _____ ☐ NELAC

Number of Containers
Sample Type: A W S V B O
Air Water Soils/Solids Vegetation Bioassay Other

ANALYSIS REQUESTED

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Chemical Uranium	Closed Can Uranium								SEE ATTACHED	Normal Turnaround (TAT)
1	M1624c-Run4-Sample 2	3/22/11	NA	S	X	X									
2	M1624c-Run4-Sample 3	3/22/11	NA	S	X	X									
3	M1624c-Run4-Sample 4	3/22/11	NA	S	X	X									
4	M1624c-Run4-Sample 5	3/22/11	NA	S	X	X									
5															
6															
7															
8															
9															
10															

RUSH

Contact ELI prior to RUSH sample submittal for charges and scheduling – See Instruction Page

Comments:

Shipped by: UPS-G
Cooler ID(s): Box
Receipt Temp: N/A °C
On Ice: Yes (No)
Custody Seal Y (N)
Intact Y N
Signature Match Y N

LABORATORY USE ONLY
C1104735

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Wade Beins	4/20/11	Wade Beins			
Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Sample Disposal: Return to Client: Yes		Lab Disposal: _____	Received by Laboratory:	Date/Time: 4/22/11 930	Signature:

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested.
This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.
Visit our web site at www.energylab.com for additional information, downloadable fee schedule, forms, and links.

Appendix G-2

Mineralogical and Particles Size Distribution Analyses (2013)

PTS Laboratories, Inc.

8100 Secura Way • Santa Fe Springs, CA 90670
Telephone (562) 347-2500 • Fax (562) 907-3610

October 10, 2013

Wade Beins
Crow Butte Resources, Inc.
PO Box 169
Crawford, NE 69339

Re: PTS File No: 43570
Physical Properties Data
Marsland Core

Dear Mr. Beins:

Please find enclosed report for Physical Properties analyses conducted upon samples received from your Marsland Core project. All analyses were performed by applicable ASTM, EPA, or API methodologies. An electronic version of the report has previously been sent to your attention via the internet. The samples are currently in storage and will be retained for thirty days past completion of testing at no charge. Please note that the samples will be disposed of at that time. You may contact me regarding storage, disposal, or return of the samples.

PTS Laboratories appreciates the opportunity to be of service. If you have any questions or require additional information, please contact Rachel Spitz at (562) 347-2504.

Sincerely,
PTS Laboratories, Inc.

Michael Mark Brady, P.G.
District Manager

Encl.

PTS Laboratories

Project Name: Marsland Core
Project Number: N/A

PTS File No: 43570
Client: Crow Butte Resources, Inc.

TEST PROGRAM - 20130829

CORE ID	Depth ft.	Core Recovery ft.	Grain Size Analysis	*X-Ray Diffraction Proprietary			Notes
		Plugs:	Grab	Bulk			
Date Received: 20130829							
M-533C Run 1, Sample 1	63.9-64.9	N/A	X	X			
M-533C Run 1, Sample 2	68.8-69.8	N/A	X	X			
M-533C Run 3, Sample 1	299.0-300.0	N/A	X	X			
M-533C Run 3, Sample 2	306.0-307.0	N/A	X	X			
M-533C Run 5, Sample 1	1052.5-1053.0	N/A	X	X			
M-1635C Run 1, Sample 1	70.0-70.5	N/A	X	X			
M-1635C Run 1, Sample 2	79.5-80.0	N/A	X	X			
M-1635C Run 2, Sample 1	197.0-197.5	N/A	X	X			
M-1635C Run 2, Sample 2	206.5-207.0	N/A	X	X			
M-1635C Run 3, Sample 1	530.0-530.5	N/A	X	X			
M-1635C Run 6, Sample 1	993.0-994.0	N/A	X	X			
M-1912C Run 1, Sample 1	63.0-64.0	N/A	X	X			
M-1912C Run 2, Sample 1	130.7-131.7	N/A	X	X			
M-1912C Run 3, Sample 1	255.0-255.5	N/A	X	X			
M-1912C Run 3, Sample 2	260.4-260.9	N/A	X	X			
M-1912C Run 4, Sample 1	974.5-975.0	N/A	X	X			
M-1912C Run 4, Sample 2	968.7-969.7	N/A	X	X			
M-1956C Run 1, Sample 1	42.0-43.0	N/A	X	X			
M-1956C Run 3, Sample 1	78.0-79.0	N/A	X	X			
M-1956C Run 4, Sample 1	196.5-197.1	N/A	X	X			
M-1956C Run 4, Sample 2	202.0-202.5	N/A	X	X			
M-1956C Run 5, Sample 1	425.6-426.2	N/A	X	X			
M-1956C Run 5, Sample 2	431.0-431.6	N/A	X	X			
M-1956C Run 6, Sample 1	1011.8-1012.4	N/A	X	X			

PTS Laboratories

Project Name: Marsland Core
Project Number: N/A

PTS File No: 43570
Client: Crow Butte Resources, Inc.

TEST PROGRAM - 20130829

CORE ID	Depth ft.	Core Recovery ft.	Grain Size Analysis	*X-Ray Diffraction Proprietary			Notes
		Plugs:	Grab	Bulk			
M-2169C Run 1, Sample 1	110.0-110.5	N/A	X	X			
M-2169C Run 2, Sample 3	156.5-157.2	N/A	X	X			
M-2169C Run 3, Sample 1	355.0-356.0	N/A	X	X			
M-2169C Run 4, Sample 1	470.0-470.5	N/A	X	X			
M-2169C Run 5, Sample 1	608.9-609.5	N/A	X	X			
M-2169C Run 7, Sample 1	1135.5-1136.0	N/A	X	X			
TOTALS:	30 bags		30	30			30

Laboratory Test Program Notes
Contaminant identification: _____

PTS Laboratories, Inc.

Crow Butte Resources, Inc.
PTS File No: 43570

PARTICLE SIZE SUMMARY

(METHODOLOGY: ASTM D422/D4464M)

PROJECT NAME: Marsland Core
PROJECT NO: N/A

Sample ID	Depth, ft.	Mean Grain Size Description (1)	Median Grain Size mm	Particle Size Distribution, wt. percent						Silt & Clay
				Gravel	Sand Size			Silt	Clay	
					Coarse	Medium	Fine			
M-533C Run 1, Sample 1	63.9-64.9	Fine sand	0.238	0.00	0.00	18.42	71.95	8.22	1.41	9.63
M-533C Run 1, Sample 2	68.8-69.8	Silt	0.033	0.00	0.00	0.00	20.53	63.04	16.44	79.47
M-533C Run 3, Sample 1	299.0-300.0	Silt	0.034	0.00	0.00	0.00	12.97	81.45	5.57	87.03
M-533C Run 3, Sample 2	306.0-307.0	Silt	0.051	0.00	0.00	0.00	26.00	70.23	3.77	74.00
M-533C Run 5, Sample 1	1052.5-1053.0	Clay	0.003	0.00	0.00	0.00	0.00	34.81	65.19	100.00
M-1635C Run 1, Sample 1	70.0-70.5	Silt	0.046	0.00	0.00	0.00	27.88	60.57	11.55	72.12
M-1635C Run 1, Sample 2	79.5-80.0	Silt	0.063	0.00	0.00	0.00	39.61	53.90	6.50	60.39
M-1635C Run 2, Sample 1	197.0-197.5	Silt	0.041	0.00	0.00	0.00	13.73	81.80	4.47	86.27
M-1635C Run 2, Sample 2	206.5-207.0	Silt	0.055	0.00	0.00	0.00	29.24	67.17	3.59	70.76
M-1635C Run 3, Sample 1	530.0-530.5	Silt	0.040	0.00	0.00	2.83	25.96	61.01	10.20	71.21
M-1635C Run 6, Sample 1	993.0-994.0	Clay	0.003	0.00	0.00	0.00	0.00	24.05	75.95	100.00
M-1912C Run 1, Sample 1	63.0-64.0	Fine sand	0.135	0.00	0.00	3.85	76.54	17.60	2.01	19.61
M-1912C Run 2, Sample 1	130.7-131.7	Fine sand	0.087	0.00	0.00	7.84	49.02	36.10	7.03	43.14
M-1912C Run 3, Sample 1	255.0-255.5	Fine sand	0.072	0.00	0.00	4.42	43.67	48.95	2.96	51.91

(1) Based on Mean from Trask

PTS Laboratories, Inc.

Crow Butte Resources, Inc.
PTS File No: 43570

PARTICLE SIZE SUMMARY
(METHODOLOGY: ASTM D422/D4464M)

PROJECT NAME: Marsland Core
PROJECT NO: N/A

Sample ID	Depth, ft.	Mean Grain Size Description (1)	Median Grain Size mm	Particle Size Distribution, wt. percent						Silt & Clay
				Gravel	Sand Size			Silt	Clay	
					Coarse	Medium	Fine			
M-1912C Run 3, Sample 2	260.4-260.9	Silt	0.062	0.00	0.00	0.00	36.63	59.98	3.40	63.37
M-1912C Run 4, Sample 1	974.5-975.0	Clay	0.003	0.00	0.00	0.00	0.00	28.79	71.21	100.00
*M-1912C Run 4, Sample 2	968.7-969.7	Clay	0.003	0.00	0.00	0.00	0.00	27.94	72.06	100.00
*M-1912C Run 4, Sample 2 Rerun	968.7-969.7	Silt	0.004	0.00	0.00	0.00	5.35	36.27	58.38	94.65
*M-1912C Run 4, Sample 2 Rerun 2	968.7-969.7	Medium sand	0.850	0.00	0.00	74.30	6.83	7.90	10.97	18.87
M-1956C Run 1, Sample 1	42.0-43.0	Fine sand	0.266	0.00	0.00	16.97	79.36	2.75	0.92	3.67
M-1956C Run 3, Sample 1	78.0-79.0	Silt	0.054	0.00	0.00	1.00	32.36	60.43	6.21	66.64
M-1956C Run 4, Sample 1	196.5-197.1	Silt	0.062	0.00	0.00	2.22	37.09	56.30	4.39	60.69
M-1956C Run 4, Sample 2	202.0-202.5	Silt	0.052	0.00	0.00	0.00	27.65	67.34	5.00	72.35
M-1956C Run 5, Sample 1	425.6-426.2	Silt	0.029	0.00	0.00	0.00	12.54	73.63	13.84	87.46
M-1956C Run 5, Sample 2	431.0-431.6	Silt	0.046	0.00	0.00	3.76	28.81	60.64	6.79	67.43
M-1956C Run 6, Sample 1	1011.8-1012.4	Clay	0.004	0.00	0.00	0.00	0.00	39.14	60.86	100.00
M-2169C Run 1, Sample 1	110.0-110.5	Silt	0.037	0.00	0.00	0.00	20.58	65.73	13.69	79.42
M-2169C Run 2, Sample 3	156.5-157.2	Silt	0.059	0.00	0.00	0.00	37.21	54.28	8.51	62.79

(1) Based on Mean from Trask

PARTICLE SIZE SUMMARY

(METHODOLOGY: ASTM D422/D4464M)

PROJECT NAME: Marsland Core
PROJECT NO: N/A

Sample ID	Depth, ft.	Mean Grain Size Description (1)	Median Grain Size mm	Particle Size Distribution, wt. percent						Silt & Clay
				Gravel	Sand Size			Silt	Clay	
					Coarse	Medium	Fine			
M-2169C Run 3, Sample 1	355.0-356.0	Silt	0.036	0.00	0.00	0.00	15.97	74.53	9.51	84.03
M-2169C Run 4, Sample 1	470.0-470.5	Silt	0.040	0.00	0.00	1.05	24.67	64.33	9.95	74.28
M-2169C Run 5, Sample 1	608.9-609.5	Fine sand	0.050	0.00	0.00	13.87	23.80	52.86	9.46	62.33
M-2169C Run 7, Sample 1	1135.5-1136.0	Silt	0.004	0.00	0.00	0.00	0.00	45.40	54.60	100.00

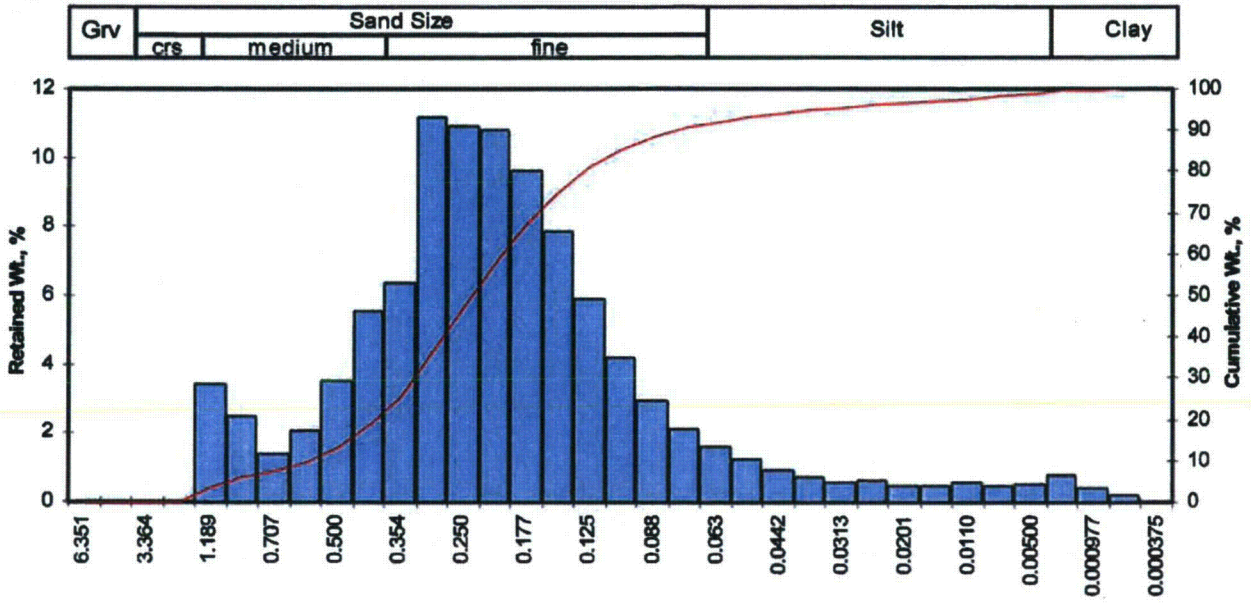
*Note: Sample M-1912C Run 4, Sample 2 is a heterogenous core consisting of clay with entrained sand. The small amount of sample volume required for LPSA (~1 gm) can over-represent the lithology depending on sample location and composition. Visual estimation of sand contained is 10-20%. MMB 20131008

(1) Based on Mean from Trask

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Crow Butte Resources, Inc.	**PTS File No:**	43570
Project:	Marsland Core	**Sample ID:**	M-533C Run 1, Sample 1
Project No:	N/A	**Depth, ft:**	63.9-64.9



Opening		Phi of	U.S.	Sample Weight,	Increment Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	3.42	3.42	3.42
0.0331	0.841	0.25	20	2.47	2.47	5.89
0.0278	0.707	0.50	25	1.42	1.42	7.31
0.0234	0.595	0.75	30	2.07	2.07	9.38
0.0197	0.500	1.00	35	3.50	3.50	12.87
0.0166	0.420	1.25	40	5.55	5.55	18.42
0.0139	0.354	1.50	45	6.39	6.39	24.81
0.0117	0.297	1.75	50	11.20	11.20	36.01
0.0098	0.250	2.00	60	10.90	10.90	46.90
0.0083	0.210	2.25	70	10.80	10.80	57.70
0.0070	0.177	2.50	80	9.65	9.65	67.34
0.0059	0.149	2.75	100	7.85	7.85	75.19
0.0049	0.125	3.00	120	5.92	5.92	81.11
0.0041	0.105	3.25	140	4.21	4.21	85.32
0.0035	0.088	3.50	170	2.94	2.94	88.25
0.0029	0.074	3.75	200	2.12	2.12	90.37
0.0025	0.063	4.00	230	1.60	1.60	91.97
0.0021	0.053	4.25	270	1.23	1.23	93.20
0.00174	0.0442	4.50	325	0.95	0.95	94.15
0.00146	0.0372	4.75	400	0.74	0.74	94.89
0.00123	0.0313	5.00	450	0.58	0.58	95.47
0.000986	0.0250	5.32	500	0.60	0.60	96.07
0.000790	0.0201	5.64	635	0.49	0.49	96.56
0.000615	0.0156	6.00		0.47	0.47	97.03
0.000435	0.0110	6.50		0.56	0.56	97.59
0.000308	0.00781	7.00		0.48	0.48	98.07
0.000197	0.00500	7.65		0.52	0.52	98.59
0.000077	0.00195	9.00		0.80	0.80	99.39
0.000038	0.000977	10.00		0.39	0.39	99.78
0.000019	0.000488	11.00		0.20	0.20	99.98
0.000015	0.000375	11.38		0.02	0.02	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight	Phi	Particle Size	
percent	Value	Inches	Millimeters
5	0.07	0.0375	0.952
10	0.79	0.0227	0.577
16	1.14	0.0179	0.453
25	1.50	0.0139	0.353
40	1.84	0.0110	0.279
50	2.07	0.0094	0.238
60	2.31	0.0079	0.202
75	2.74	0.0059	0.149
84	3.17	0.0044	0.111
90	3.71	0.0030	0.077
95	4.80	0.0014	0.036

Measure	Trask	Inman	Folk-Ward
Median, phi	2.07	2.07	2.07
Median, in.	0.0094	0.0094	0.0094
Median, mm	0.238	0.238	0.238
Mean, phi	1.99	2.16	2.13
Mean, in.	0.0099	0.0088	0.0090
Mean, mm	0.251	0.224	0.229
Sorting	1.537	1.016	1.224
Skewness	0.964	0.083	0.118
Kurtosis	0.203	1.327	1.562
Grain Size Description (ASTM-USCS Scale)		Fine sand (based on Mean from Trask)	

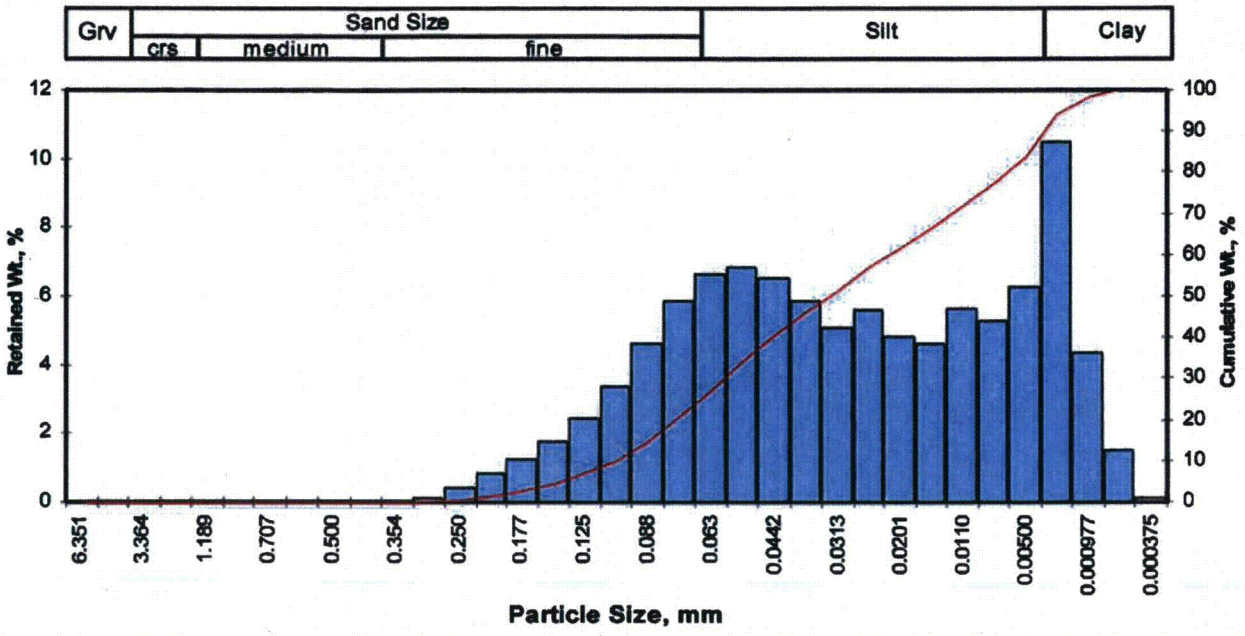
Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	18.42
Fine Sand	200	71.95
Silt	>0.005 mm	8.22
Clay	<0.005 mm	1.41
	Total	100

Phone: (562) 907-3607 Fax: (562) 907-3610

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Crow Butte Resources, Inc.	**PTS File No:**	43570
Project:	Marsland Core	**Sample ID:**	M-533C Run 1, Sample 2
Project No:	N/A	**Depth, ft:**	68.8-69.8



Opening		Phi of	U.S.	Sample Weight,	Increment Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.00	0.00	0.00
0.0117	0.297	1.75	50	0.11	0.11	0.11
0.0098	0.250	2.00	60	0.41	0.41	0.52
0.0083	0.210	2.25	70	0.83	0.83	1.35
0.0070	0.177	2.50	80	1.24	1.24	2.59
0.0059	0.149	2.75	100	1.75	1.75	4.34
0.0049	0.125	3.00	120	2.41	2.41	6.75
0.0041	0.105	3.25	140	3.35	3.35	10.10
0.0035	0.088	3.50	170	4.59	4.59	14.69
0.0029	0.074	3.75	200	5.84	5.84	20.53
0.0025	0.063	4.00	230	6.64	6.64	27.17
0.0021	0.053	4.25	270	6.82	6.82	33.99
0.00174	0.0442	4.50	325	6.51	6.51	40.49
0.00146	0.0372	4.75	400	5.84	5.84	46.33
0.00123	0.0313	5.00	450	5.09	5.09	51.42
0.000986	0.0250	5.32	500	5.57	5.57	56.99
0.000790	0.0201	5.64	635	4.80	4.80	61.79
0.000615	0.0156	6.00		4.61	4.61	66.40
0.000435	0.0110	6.50		5.64	5.64	72.04
0.000308	0.00781	7.00		5.27	5.27	77.31
0.000197	0.00500	7.65		6.26	6.26	83.56
0.000077	0.00195	9.00		10.50	10.50	94.06
0.000038	0.000977	10.00		4.34	4.34	98.40
0.000019	0.000488	11.00		1.49	1.49	99.89
0.000015	0.000375	11.38		0.11	0.11	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight	Phi	Particle Size	
percent	Value	Inches	Millimeters
5	2.82	0.0056	0.142
10	3.24	0.0042	0.106
16	3.56	0.0033	0.085
25	3.92	0.0026	0.066
40	4.48	0.0018	0.045
50	4.93	0.0013	0.033
60	5.52	0.0009	0.022
75	6.78	0.0004	0.009
84	7.70	0.0002	0.005
90	8.48	0.0001	0.003
95	9.22	0.0001	0.002

Measure	Trask	Inman	Folk-Ward
Median, phi	4.93	4.93	4.93
Median, in.	0.0013	0.0013	0.0013
Median, mm	0.033	0.033	0.033
Mean, phi	4.73	5.63	5.40
Mean, in.	0.0015	0.0008	0.0009
Mean, mm	0.038	0.020	0.024
Sorting	2.697	2.073	2.006
Skewness	0.748	0.337	0.338
Kurtosis	0.277	0.543	0.916
Grain Size Description (ASTM-USCS Scale)		Silt (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	20.53
Silt	>0.005 mm	63.04
Clay	<0.005 mm	16.44
	Total	**100**

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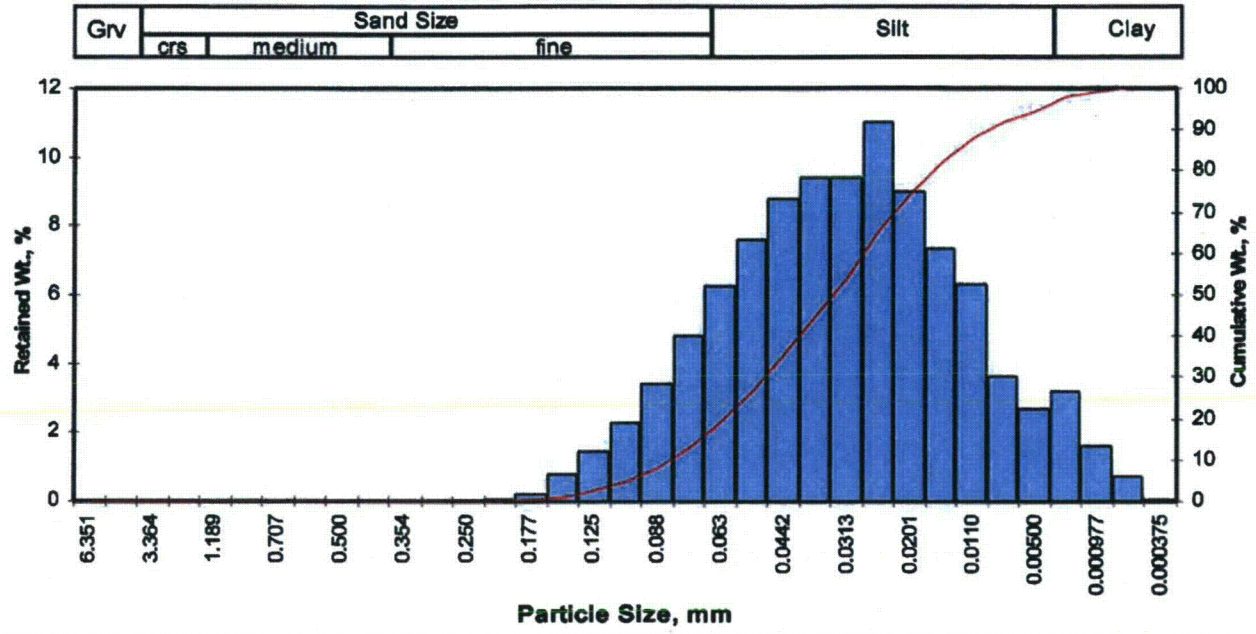
PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Crow Butte Resources, Inc.	**PTS File No:**	43570
Project:	Marsland Core	**Sample ID:**	M-533C Run 3, Sample 1
Project No:	N/A	**Depth, ft:**	299.0-300.0



Opening		Phi of	U.S.	Sample Weight,	Increment Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.00	0.00	0.00
0.0117	0.297	1.75	50	0.00	0.00	0.00
0.0098	0.250	2.00	60	0.00	0.00	0.00
0.0083	0.210	2.25	70	0.03	0.03	0.03
0.0070	0.177	2.50	80	0.23	0.23	0.26
0.0059	0.149	2.75	100	0.75	0.75	1.01
0.0049	0.125	3.00	120	1.43	1.43	2.44
0.0041	0.105	3.25	140	2.30	2.30	4.74
0.0035	0.088	3.50	170	3.43	3.43	8.17
0.0029	0.074	3.75	200	4.80	4.80	12.97
0.0025	0.063	4.00	230	6.25	6.25	19.22
0.0021	0.053	4.25	270	7.61	7.61	26.84
0.00174	0.0442	4.50	325	8.79	8.79	35.63
0.00146	0.0372	4.75	400	9.40	9.40	45.04
0.00123	0.0313	5.00	450	9.40	9.40	54.44
0.000986	0.0250	5.32	500	11.00	11.00	65.44
0.000790	0.0201	5.64	635	9.01	9.01	74.46
0.000615	0.0156	6.00		7.36	7.36	81.82
0.000435	0.0110	6.50		6.32	6.32	88.14
0.000308	0.00781	7.00		3.60	3.60	91.74
0.000197	0.00500	7.65		2.68	2.68	94.43
0.000077	0.00195	9.00		3.23	3.23	97.66
0.000038	0.000977	10.00		1.58	1.58	99.24
0.000019	0.000488	11.00		0.70	0.70	99.94
0.000015	0.000375	11.38		0.06	0.06	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	3.27	0.0041	0.104
10	3.60	0.0033	0.083
16	3.87	0.0027	0.068
25	4.19	0.0022	0.055
40	4.62	0.0016	0.041
50	4.88	0.0013	0.034
60	5.16	0.0011	0.028
75	5.67	0.0008	0.020
84	6.17	0.0005	0.014
90	6.76	0.0004	0.009
95	7.89	0.0002	0.004

Measure	Trask	Inman	Folk-Ward
Median, phi	4.88	4.88	4.88
Median, in.	0.0013	0.0013	0.0013
Median, mm	0.034	0.034	0.034
Mean, phi	4.75	5.02	4.98
Mean, in.	0.0015	0.0012	0.0013
Mean, mm	0.037	0.031	0.032
Sorting	1.668	1.151	1.275
Skewness	0.969	0.121	0.211
Kurtosis	0.239	1.006	1.281
Grain Size Description (ASTM-USCS Scale)		Silt (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	12.97
Silt	>0.005 mm	81.45
Clay	<0.005 mm	5.57
	Total	100

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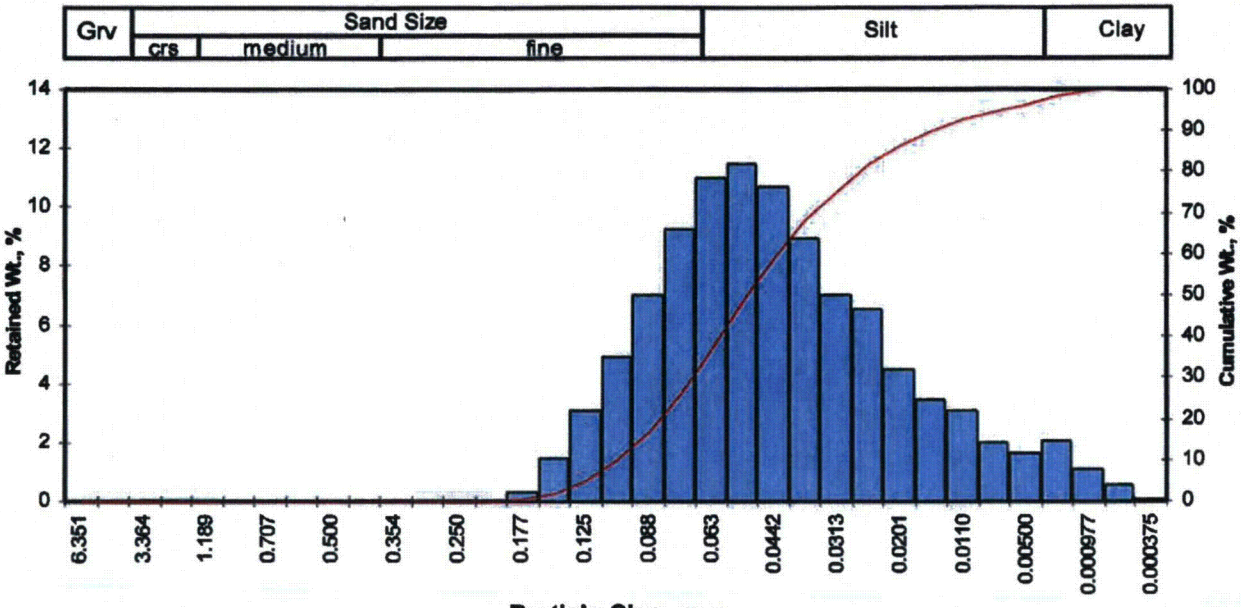
PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Crow Butte Resources, Inc.	**PTS File No:**	43570
Project:	Marsland Core	**Sample ID:**	M-533C Run 3, Sample 2
Project No:	N/A	**Depth, ft:**	306.0-307.0



Opening		Phi of	U.S.	Sample Weight,	Increment Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.00	0.00	0.00
0.0117	0.297	1.75	50	0.00	0.00	0.00
0.0098	0.250	2.00	60	0.00	0.00	0.00
0.0083	0.210	2.25	70	0.02	0.02	0.02
0.0070	0.177	2.50	80	0.32	0.32	0.34
0.0059	0.149	2.75	100	1.46	1.46	1.80
0.0049	0.125	3.00	120	3.09	3.09	4.89
0.0041	0.105	3.25	140	4.89	4.89	9.77
0.0035	0.088	3.50	170	6.99	6.98	16.76
0.0029	0.074	3.75	200	9.25	9.24	26.00
0.0025	0.063	4.00	230	11.00	10.99	36.99
0.0021	0.053	4.25	270	11.50	11.49	48.48
0.00174	0.0442	4.50	325	10.70	10.69	59.16
0.00146	0.0372	4.75	400	8.92	8.91	68.08
0.00123	0.0313	5.00	450	6.98	6.97	75.05
0.000986	0.0250	5.32	500	6.53	6.52	81.57
0.000790	0.0201	5.64	635	4.48	4.48	86.05
0.000615	0.0156	6.00		3.45	3.45	89.50
0.000435	0.0110	6.50		3.10	3.10	92.59
0.000308	0.00781	7.00		1.98	1.98	94.57
0.000197	0.00500	7.65		1.66	1.66	96.23
0.000077	0.00195	9.00		2.08	2.08	98.31
0.000038	0.000977	10.00		1.08	1.08	99.39
0.000019	0.000488	11.00		0.56	0.56	99.95
0.000015	0.000375	11.38		0.06	0.05	100.00
TOTALS				**100.10**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight	Phi	Particle Size	
percent	Value	Inches	Millimeters
5	3.01	0.0049	0.125
10	3.26	0.0041	0.105
16	3.47	0.0035	0.090
25	3.72	0.0030	0.076
40	4.07	0.0024	0.060
50	4.29	0.0020	0.051
60	4.52	0.0017	0.043
75	5.00	0.0012	0.031
84	5.49	0.0009	0.022
90	6.08	0.0006	0.015
95	7.17	0.0003	0.007

Measure	Trask	Inman	Folk-Ward
Median, phi	4.29	4.29	4.29
Median, in.	0.0020	0.0020	0.0020
Median, mm	0.051	0.051	0.051
Mean, phi	4.22	4.48	4.42
Mean, in.	0.0021	0.0018	0.0018
Mean, mm	0.054	0.045	0.047
Sorting	1.556	1.010	1.136
Skewness	0.949	0.196	0.290
Kurtosis	0.248	1.059	1.337
Grain Size Description (ASTM-USCS Scale)		Silt (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	26.00
Silt	>0.005 mm	70.23
Clay	<0.005 mm	3.77
	Total	**100**

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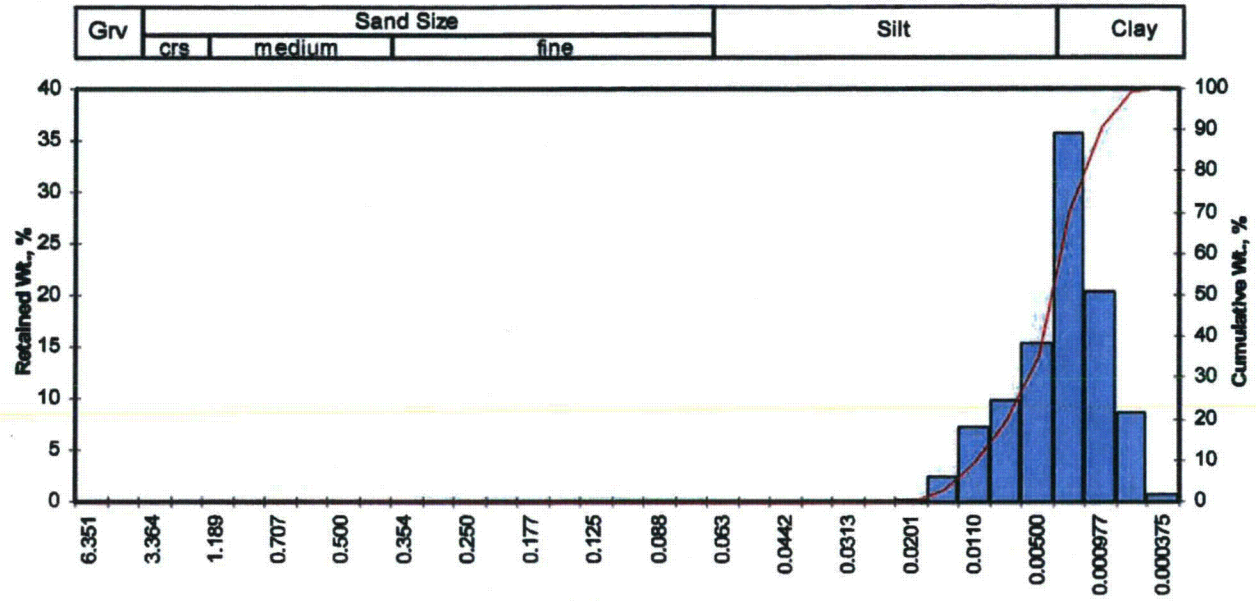
PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Crow Butte Resources, Inc.	**PTS File No:**	43570
Project:	Marsland Core	**Sample ID:**	M-533C Run 5, Sample 1
Project No:	N/A	**Depth, ft:**	1052.5-1053.0



Opening		Phi of	U.S.	Sample Weight,	Increment Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.00	0.00	0.00
0.0117	0.297	1.75	50	0.00	0.00	0.00
0.0098	0.250	2.00	60	0.00	0.00	0.00
0.0083	0.210	2.25	70	0.00	0.00	0.00
0.0070	0.177	2.50	80	0.00	0.00	0.00
0.0059	0.149	2.75	100	0.00	0.00	0.00
0.0049	0.125	3.00	120	0.00	0.00	0.00
0.0041	0.105	3.25	140	0.00	0.00	0.00
0.0035	0.088	3.50	170	0.00	0.00	0.00
0.0029	0.074	3.75	200	0.00	0.00	0.00
0.0025	0.063	4.00	230	0.00	0.00	0.00
0.0021	0.053	4.25	270	0.00	0.00	0.00
0.00174	0.0442	4.50	325	0.00	0.00	0.00
0.00146	0.0372	4.75	400	0.00	0.00	0.00
0.00123	0.0313	5.00	450	0.00	0.00	0.00
0.000986	0.0250	5.32	500	0.00	0.00	0.00
0.000790	0.0201	5.64	635	0.09	0.09	0.09
0.000615	0.0156	6.00		2.33	2.33	2.42
0.000435	0.0110	6.50		7.27	7.27	9.69
0.000308	0.00781	7.00		9.81	9.81	19.50
0.000197	0.00500	7.65		15.30	15.30	34.81
0.000077	0.00195	9.00		35.60	35.61	70.41
0.000038	0.000977	10.00		20.30	20.30	90.72
0.000019	0.000488	11.00		8.56	8.56	99.28
0.000015	0.000375	11.38		0.72	0.72	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight	Phi	Particle Size	
percent	Value	Inches	Millimeters
5	6.18	0.0005	0.014
10	6.52	0.0004	0.011
16	6.82	0.0003	0.009
25	7.23	0.0003	0.007
40	7.84	0.0002	0.004
50	8.22	0.0001	0.003
60	8.60	0.0001	0.003
75	9.23	0.0001	0.002
84	9.67	0.0000	0.001
90	9.96	0.0000	0.001
95	10.50	0.0000	0.001

Measure	Trask	Inman	Folk-Ward
Median, phi	8.22	8.22	8.22
Median, in.	0.0001	0.0001	0.0001
Median, mm	0.003	0.003	0.003
Mean, phi	7.91	8.25	8.24
Mean, in.	0.0002	0.0001	0.0001
Mean, mm	0.004	0.003	0.003
Sorting	1.996	1.424	1.367
Skewness	0.996	0.016	0.035
Kurtosis	0.251	0.518	0.888
Grain Size Description (ASTM-USCS Scale)		Clay (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	0.00
Silt	>0.005 mm	34.81
Clay	<0.005 mm	65.19
	Total	**100**

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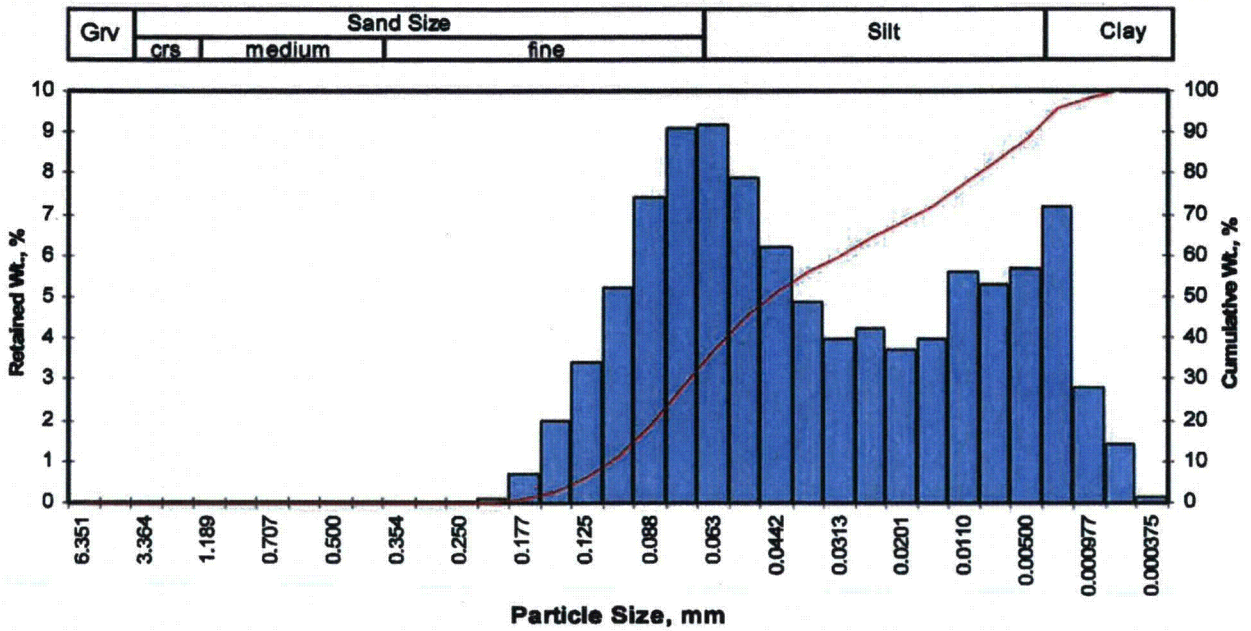
PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Crow Butte Resources, Inc.	**PTS File No:**	43570
Project:	Marsland Core	**Sample ID:**	M-1635C Run 1, Sample 1
Project No:	N/A	**Depth, ft:**	70.0-70.5



Opening		Phi of	U.S.	Sample Weight,	Increment Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.00	0.00	0.00
0.0117	0.297	1.75	50	0.00	0.00	0.00
0.0098	0.250	2.00	60	0.00	0.00	0.00
0.0083	0.210	2.25	70	0.08	0.08	0.08
0.0070	0.177	2.50	80	0.67	0.67	0.75
0.0059	0.149	2.75	100	1.98	1.98	2.73
0.0049	0.125	3.00	120	3.41	3.41	6.14
0.0041	0.105	3.25	140	5.23	5.23	11.37
0.0035	0.088	3.50	170	7.43	7.43	18.80
0.0029	0.074	3.75	200	9.08	9.08	27.88
0.0025	0.063	4.00	230	9.18	9.18	37.06
0.0021	0.053	4.25	270	7.90	7.90	44.97
0.00174	0.0442	4.50	325	6.22	6.22	51.19
0.00146	0.0372	4.75	400	4.87	4.87	56.06
0.00123	0.0313	5.00	450	3.96	3.96	60.02
0.000986	0.0250	5.32	500	4.21	4.21	64.23
0.000790	0.0201	5.64	635	3.69	3.69	67.92
0.000615	0.0156	6.00		3.96	3.96	71.88
0.000435	0.0110	6.50		5.59	5.59	77.47
0.000308	0.00781	7.00		5.31	5.31	82.78
0.000197	0.00500	7.65		5.67	5.67	88.45
0.000077	0.00195	9.00		7.19	7.19	95.64
0.000038	0.000977	10.00		2.79	2.79	98.43
0.000019	0.000488	11.00		1.43	1.43	99.86
0.000015	0.000375	11.38		0.14	0.14	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight	Phi	Particle Size	
percent	Value	Inches	Millimeters
5	2.92	0.0052	0.132
10	3.18	0.0043	0.110
16	3.41	0.0037	0.094
25	3.67	0.0031	0.079
40	4.09	0.0023	0.059
50	4.45	0.0018	0.046
60	5.00	0.0012	0.031
75	6.28	0.0005	0.013
84	7.14	0.0003	0.007
90	7.94	0.0002	0.004
95	8.88	0.0001	0.002

Measure	Trask	Inman	Folk-Ward
Median, phi	4.45	4.45	4.45
Median, in.	0.0018	0.0018	0.0018
Median, mm	0.046	0.046	0.046
Mean, phi	4.45	5.27	5.00
Mean, in.	0.0018	0.0010	0.0012
Mean, mm	0.046	0.026	0.031
Sorting	2.470	1.867	1.837
Skewness	0.696	0.439	0.462
Kurtosis	0.310	0.597	0.937
Grain Size Description (ASTM-USCS Scale)		Silt (based on Mean from Trask)	

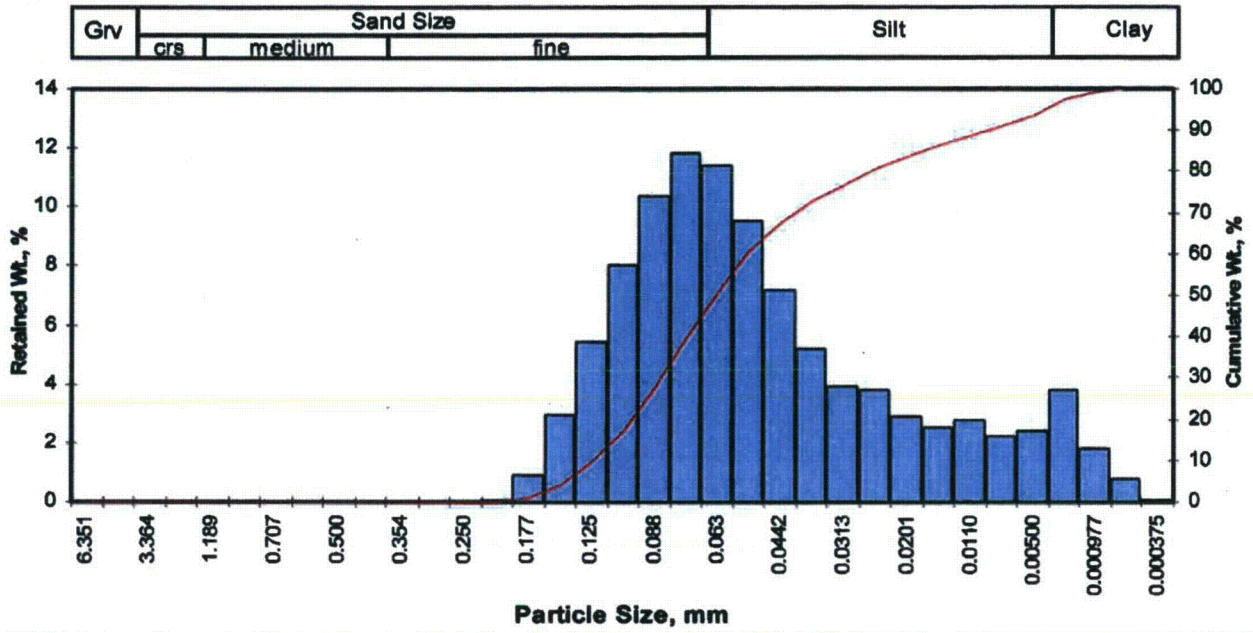
Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	27.88
Silt	>0.005 mm	60.57
Clay	<0.005 mm	11.55
	Total	**100**

Phone: (562) 907-3607 Fax: (562) 907-3610

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Crow Butte Resources, Inc.	**PTS File No:**	43570
Project:	Marsland Core	**Sample ID:**	M-1635C Run 1, Sample 2
Project No:	N/A	**Depth, ft:**	79.5-80.0



Opening		Phi of	U.S.	Sample Weight,	Increment Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.00	0.00	0.00
0.0117	0.297	1.75	50	0.00	0.00	0.00
0.0098	0.250	2.00	60	0.00	0.00	0.00
0.0083	0.210	2.25	70	0.09	0.09	0.09
0.0070	0.177	2.50	80	0.88	0.88	0.97
0.0059	0.149	2.75	100	2.96	2.96	3.93
0.0049	0.125	3.00	120	5.43	5.43	9.36
0.0041	0.105	3.25	140	8.03	8.03	17.40
0.0035	0.088	3.50	170	10.40	10.41	27.80
0.0029	0.074	3.75	200	11.80	11.81	39.61
0.0025	0.063	4.00	230	11.40	11.41	51.01
0.0021	0.053	4.25	270	9.55	9.55	60.57
0.00174	0.0442	4.50	325	7.16	7.16	67.73
0.00146	0.0372	4.75	400	5.21	5.21	72.94
0.00123	0.0313	5.00	450	3.91	3.91	76.86
0.000986	0.0250	5.32	500	3.82	3.82	80.68
0.000790	0.0201	5.64	635	2.89	2.89	83.57
0.000615	0.0156	6.00		2.52	2.52	86.09
0.000435	0.0110	6.50		2.77	2.77	88.86
0.000308	0.00781	7.00		2.25	2.25	91.11
0.000197	0.00500	7.65		2.39	2.39	93.50
0.000077	0.00195	9.00		3.82	3.82	97.33
0.000038	0.000977	10.00		1.80	1.80	99.13
0.000019	0.000488	11.00		0.80	0.80	99.93
0.000015	0.000375	11.38		0.07	0.07	100.00
TOTALS				100.00	100.00	100.00

Cumulative Weight Percent greater than			
Weight	Phi	Particle Size	
percent	Value	Inches	Millimeters
5	2.80	0.0057	0.144
10	3.02	0.0049	0.123
16	3.21	0.0043	0.108
25	3.43	0.0036	0.093
40	3.76	0.0029	0.074
50	3.98	0.0025	0.063
60	4.24	0.0021	0.053
75	4.88	0.0013	0.034
84	5.70	0.0008	0.019
90	6.75	0.0004	0.009
95	8.18	0.0001	0.003

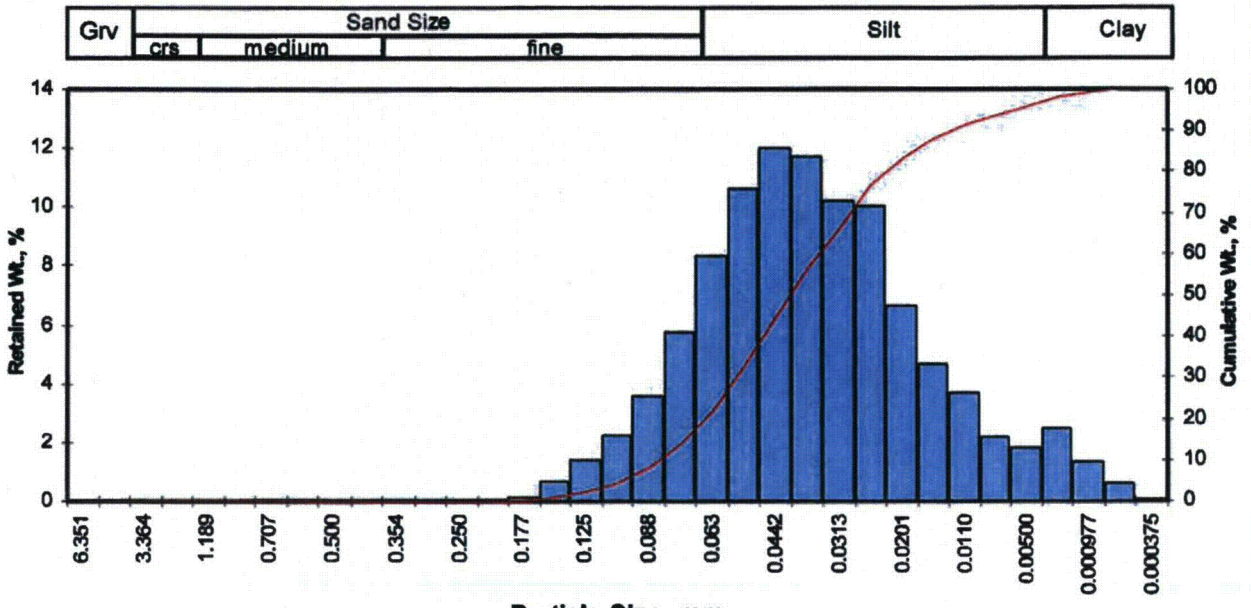
Measure	Trask	Inman	Folk-Ward
Median, phi	3.98	3.98	3.98
Median, in.	0.0025	0.0025	0.0025
Median, mm	0.063	0.063	0.063
Mean, phi	3.98	4.45	4.30
Mean, in.	0.0025	0.0018	0.0020
Mean, mm	0.063	0.046	0.051
Sorting	1.652	1.247	1.438
Skewness	0.883	0.382	0.472
Kurtosis	0.257	1.155	1.521
Grain Size Description (ASTM-USCS Scale)		Silt (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	39.61
Silt	>0.005 mm	53.90
Clay	<0.005 mm	6.50
	Total	100

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Crow Butte Resources, Inc.	**PTS File No:**	43570
Project:	Marsland Core	**Sample ID:**	M-1635C Run 2, Sample 1
Project No:	N/A	**Depth, ft:**	197.0-197.5



Opening		Phi of	U.S.	Sample Weight,	Increment Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.00	0.00	0.00
0.0117	0.297	1.75	50	0.00	0.00	0.00
0.0098	0.250	2.00	60	0.00	0.00	0.00
0.0083	0.210	2.25	70	0.00	0.00	0.00
0.0070	0.177	2.50	80	0.11	0.11	0.11
0.0059	0.149	2.75	100	0.66	0.66	0.77
0.0049	0.125	3.00	120	1.41	1.41	2.18
0.0041	0.105	3.25	140	2.24	2.24	4.42
0.0035	0.088	3.50	170	3.58	3.58	8.00
0.0029	0.074	3.75	200	5.73	5.73	13.73
0.0025	0.063	4.00	230	8.34	8.34	22.07
0.0021	0.053	4.25	270	10.60	10.60	32.67
0.00174	0.0442	4.50	325	12.00	12.00	44.67
0.00146	0.0372	4.75	400	11.70	11.70	56.37
0.00123	0.0313	5.00	450	10.20	10.20	66.57
0.000986	0.0250	5.32	500	10.00	10.00	76.57
0.000790	0.0201	5.64	635	6.66	6.66	83.23
0.000615	0.0156	6.00		4.67	4.67	87.90
0.000435	0.0110	6.50		3.67	3.67	91.57
0.000308	0.00781	7.00		2.16	2.16	93.73
0.000197	0.00500	7.65		1.80	1.80	95.53
0.000077	0.00195	9.00		2.48	2.48	98.01
0.000038	0.000977	10.00		1.30	1.30	99.31
0.000019	0.000488	11.00		0.63	0.63	99.94
0.000015	0.000375	11.38		0.06	0.06	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight	Phi	Particle Size	
percent	Value	Inches	Millimeters
5	3.29	0.0040	0.102
10	3.59	0.0033	0.083
16	3.82	0.0028	0.071
25	4.07	0.0023	0.060
40	4.40	0.0019	0.047
50	4.61	0.0016	0.041
60	4.84	0.0014	0.035
75	5.27	0.0010	0.026
84	5.70	0.0008	0.019
90	6.29	0.0005	0.013
95	7.45	0.0002	0.006

Measure	Trask	Inman	Folk-Ward
Median, phi	4.61	4.61	4.61
Median, in.	0.0016	0.0016	0.0016
Median, mm	0.041	0.041	0.041
Mean, phi	4.55	4.76	4.71
Mean, in.	0.0017	0.0015	0.0015
Mean, mm	0.043	0.037	0.038
Sorting	1.516	0.941	1.101
Skewness	0.962	0.154	0.259
Kurtosis	0.239	1.214	1.421
Grain Size Description (ASTM-USCS Scale)			Silt (based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	13.73
Silt	>0.005 mm	81.80
Clay	<0.005 mm	4.47
	Total	**100**

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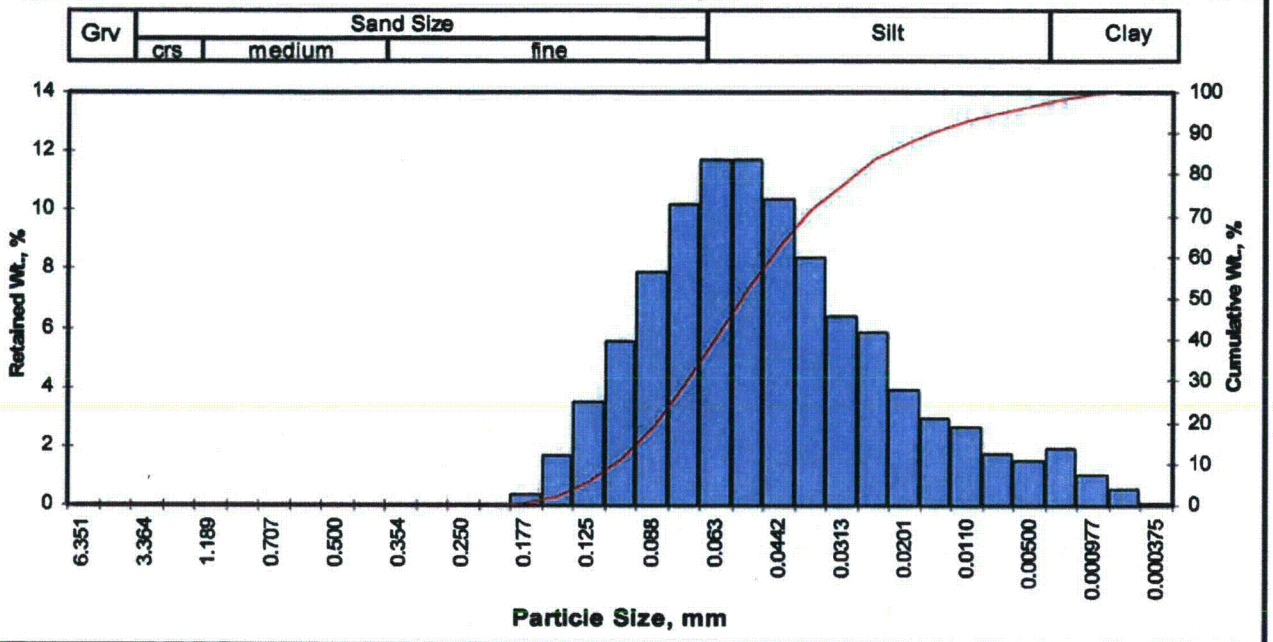
Particle Size Analysis - ASTM D4464M

Client:	Crow Butte Resources, Inc.	**PTS File No:**	43570
Project:	Marsland Core	**Sample ID:**	M-1635C Run 2, Sample 2
Project No:	N/A	**Depth, ft:**	206.5-207.0



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.00	0.00	0.00
0.0117	0.297	1.75	50	0.00	0.00	0.00
0.0098	0.250	2.00	60	0.00	0.00	0.00
0.0083	0.210	2.25	70	0.03	0.03	0.03
0.0070	0.177	2.50	80	0.39	0.39	0.42
0.0059	0.149	2.75	100	1.67	1.67	2.09
0.0049	0.125	3.00	120	3.49	3.49	5.58
0.0041	0.105	3.25	140	5.56	5.56	11.14
0.0035	0.088	3.50	170	7.91	7.91	19.04
0.0029	0.074	3.75	200	10.20	10.20	29.24
0.0025	0.063	4.00	230	11.70	11.70	40.94
0.0021	0.053	4.25	270	11.70	11.70	52.63
0.00174	0.0442	4.50	325	10.40	10.40	63.03
0.00146	0.0372	4.75	400	8.38	8.38	71.41
0.00123	0.0313	5.00	450	6.39	6.39	77.79
0.000986	0.0250	5.32	500	5.85	5.85	83.64
0.000790	0.0201	5.64	635	3.93	3.93	87.57
0.000615	0.0156	6.00		2.97	2.97	90.54
0.000435	0.0110	6.50		2.65	2.65	93.19
0.000308	0.00781	7.00		1.73	1.73	94.92
0.000197	0.00500	7.65		1.49	1.49	96.41
0.000077	0.00195	9.00		1.96	1.96	98.37
0.000038	0.000977	10.00		1.03	1.03	99.40
0.000019	0.000488	11.00		0.55	0.55	99.95
0.000015	0.000375	11.38		0.05	0.05	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	2.96	0.0051	0.129
10	3.20	0.0043	0.109
16	3.40	0.0037	0.094
25	3.65	0.0031	0.080
40	3.98	0.0025	0.063
50	4.19	0.0022	0.055
60	4.43	0.0018	0.046
75	4.89	0.0013	0.034
84	5.35	0.0010	0.025
90	5.93	0.0006	0.016
95	7.04	0.0003	0.008

Measure	Trask	Inman	Folk-Ward
Median, phi	4.19	4.19	4.19
Median, in.	0.0022	0.0022	0.0022
Median, mm	0.055	0.055	0.055
Mean, phi	4.14	4.38	4.32
Mean, in.	0.0022	0.0019	0.0020
Mean, mm	0.057	0.048	0.050
Sorting	1.539	0.973	1.104
Skewness	0.950	0.188	0.291
Kurtosis	0.249	1.096	1.342
Grain Size Description (ASTM-USCS Scale)		Silt (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	29.24
Silt	>0.005 mm	67.17
Clay	<0.005 mm	3.59
	Total	**100**

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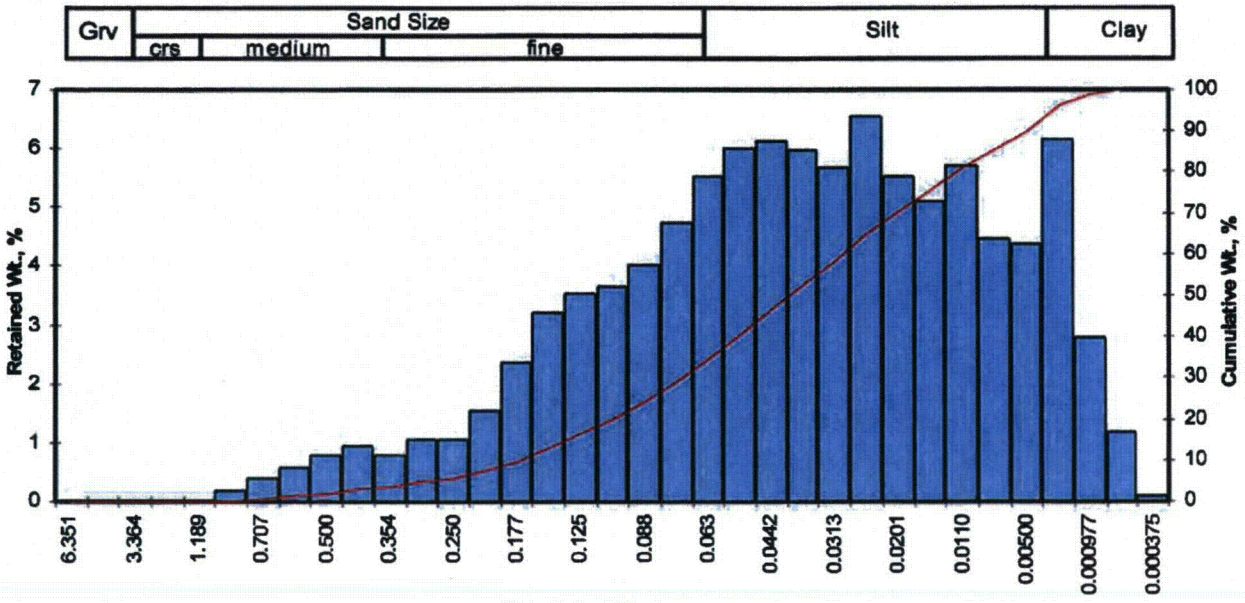
Particle Size Analysis - ASTM D4464M

Client:	Crow Butte Resources, Inc.	**PTS File No:**	43570
Project:	Marsland Core	**Sample ID:**	M-1635C Run 3, Sample 1
Project No:	N/A	**Depth, ft:**	530.0-530.5



Opening		Phi of	U.S.	Sample	Increment	Cumulative
Inches	Millimeters	Screen	No.	Weight, grams	Weight, percent	Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.17	0.17	0.17
0.0278	0.707	0.50	25	0.40	0.40	0.57
0.0234	0.595	0.75	30	0.56	0.56	1.13
0.0197	0.500	1.00	35	0.77	0.77	1.90
0.0166	0.420	1.25	40	0.93	0.93	2.83
0.0139	0.354	1.50	45	0.79	0.79	3.62
0.0117	0.297	1.75	50	1.07	1.07	4.69
0.0098	0.250	2.00	60	1.05	1.05	5.74
0.0083	0.210	2.25	70	1.53	1.53	7.27
0.0070	0.177	2.50	80	2.36	2.36	9.63
0.0059	0.149	2.75	100	3.19	3.19	12.82
0.0049	0.125	3.00	120	3.54	3.54	16.36
0.0041	0.105	3.25	140	3.66	3.66	20.02
0.0035	0.088	3.50	170	4.02	4.02	24.04
0.0029	0.074	3.75	200	4.75	4.75	28.79
0.0025	0.063	4.00	230	5.53	5.53	34.32
0.0021	0.053	4.25	270	5.99	5.99	40.31
0.00174	0.0442	4.50	325	6.12	6.12	46.43
0.00146	0.0372	4.75	400	5.98	5.98	52.41
0.00123	0.0313	5.00	450	5.68	5.68	58.09
0.000986	0.0250	5.32	500	6.54	6.54	64.63
0.000790	0.0201	5.64	635	5.53	5.53	70.16
0.000615	0.0156	6.00		5.10	5.10	75.26
0.000435	0.0110	6.50		5.70	5.70	80.96
0.000308	0.00781	7.00		4.47	4.47	85.43
0.000197	0.00500	7.65		4.37	4.37	89.80
0.000077	0.00195	9.00		6.15	6.15	95.95
0.000038	0.000977	10.00		2.77	2.77	98.72
0.000019	0.000488	11.00		1.18	1.18	99.90
0.000015	0.000375	11.38		0.10	0.10	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	1.82	0.0111	0.282
10	2.53	0.0068	0.173
16	2.97	0.0050	0.127
25	3.55	0.0034	0.085
40	4.24	0.0021	0.053
50	4.65	0.0016	0.040
60	5.09	0.0012	0.029
75	5.98	0.0006	0.016
84	6.84	0.0003	0.009
90	7.69	0.0002	0.005
95	8.79	0.0001	0.002

Measure	Trask	Inman	Folk-Ward
Median, phi	4.65	4.65	4.65
Median, in.	0.0016	0.0016	0.0016
Median, mm	0.040	0.040	0.040
Mean, phi	4.31	4.91	4.82
Mean, in.	0.0020	0.0013	0.0014
Mean, mm	0.051	0.033	0.035
Sorting	2.322	1.933	2.022
Skewness	0.922	0.134	0.161
Kurtosis	0.206	0.802	1.174
Grain Size Description (ASTM-USCS Scale)		Silt (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	2.83
Fine Sand	200	25.96
Silt	>0.005 mm	61.01
Clay	<0.005 mm	10.20
	Total	**100**

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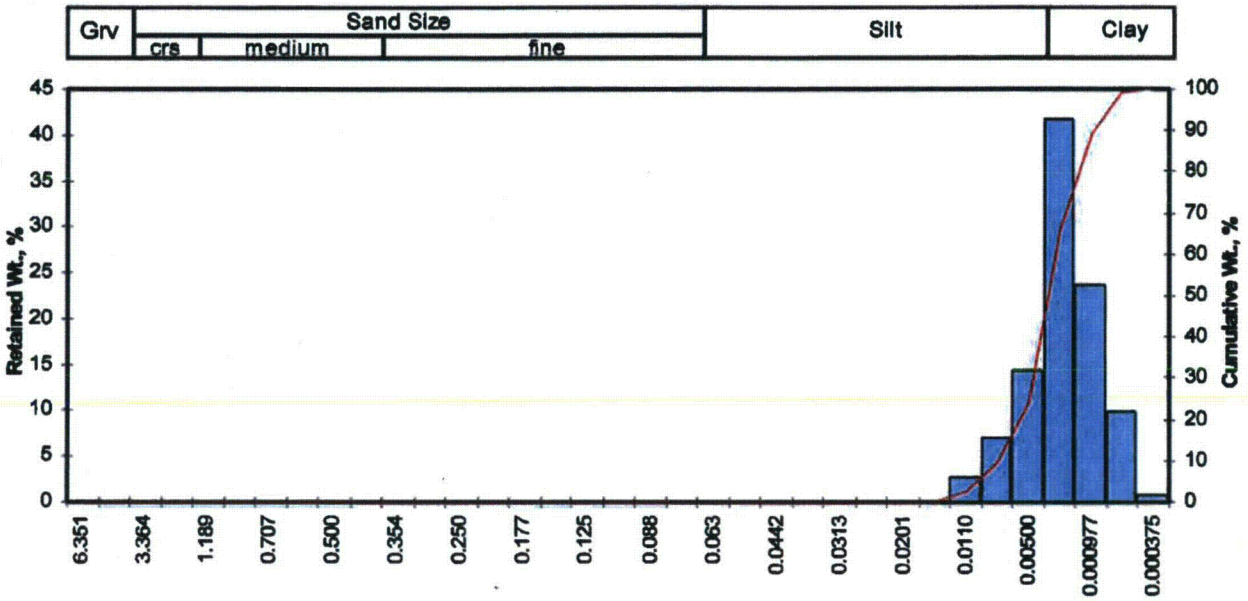
PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Crow Butte Resources, Inc.	**PTS File No:**	43570
Project:	Marsland Core	**Sample ID:**	M-1635C Run 6, Sample 1
Project No:	N/A	**Depth, ft:**	993.0-994.0



Particle Size, mm

Opening		Phi of	U.S.	Sample	Increment	Cumulative
Inches	Millimeters	Screen	No.	Weight, grams	Weight, percent	Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.00	0.00	0.00
0.0117	0.297	1.75	50	0.00	0.00	0.00
0.0098	0.250	2.00	60	0.00	0.00	0.00
0.0083	0.210	2.25	70	0.00	0.00	0.00
0.0070	0.177	2.50	80	0.00	0.00	0.00
0.0059	0.149	2.75	100	0.00	0.00	0.00
0.0049	0.125	3.00	120	0.00	0.00	0.00
0.0041	0.105	3.25	140	0.00	0.00	0.00
0.0035	0.088	3.50	170	0.00	0.00	0.00
0.0029	0.074	3.75	200	0.00	0.00	0.00
0.0025	0.063	4.00	230	0.00	0.00	0.00
0.0021	0.053	4.25	270	0.00	0.00	0.00
0.00174	0.0442	4.50	325	0.00	0.00	0.00
0.00146	0.0372	4.75	400	0.00	0.00	0.00
0.00123	0.0313	5.00	450	0.00	0.00	0.00
0.000986	0.0250	5.32	500	0.00	0.00	0.00
0.000790	0.0201	5.64	635	0.00	0.00	0.00
0.000615	0.0156	6.00		0.06	0.06	0.06
0.000435	0.0110	6.50		2.68	2.68	2.75
0.000308	0.00781	7.00		6.89	6.89	9.64
0.000197	0.00500	7.65		14.40	14.41	24.05
0.000077	0.00195	9.00		41.60	41.62	65.67
0.000038	0.000977	10.00		23.60	23.61	89.28
0.000019	0.000488	11.00		9.86	9.87	99.15
0.000015	0.000375	11.38		0.85	0.85	100.00
TOTALS				**99.90**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	6.66	0.0004	0.010
10	7.02	0.0003	0.008
16	7.28	0.0003	0.006
25	7.68	0.0002	0.005
40	8.16	0.0001	0.003
50	8.49	0.0001	0.003
60	8.82	0.0001	0.002
75	9.40	0.0001	0.001
84	9.78	0.0000	0.001
90	10.07	0.0000	0.001
95	10.58	0.0000	0.001

Measure	Trask	Inman	Folk-Ward
Median, phi	8.49	8.49	8.49
Median, in.	0.0001	0.0001	0.0001
Median, mm	0.003	0.003	0.003
Mean, phi	8.29	8.53	8.52
Mean, in.	0.0001	0.0001	0.0001
Mean, mm	0.003	0.003	0.003
Sorting	1.814	1.246	1.216
Skewness	0.969	0.033	0.050
Kurtosis	0.250	0.572	0.934
Grain Size Description (ASTM-USCS Scale)		Clay (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	0.00
Silt	>0.005 mm	24.05
Clay	<0.005 mm	75.95
	Total	**100**

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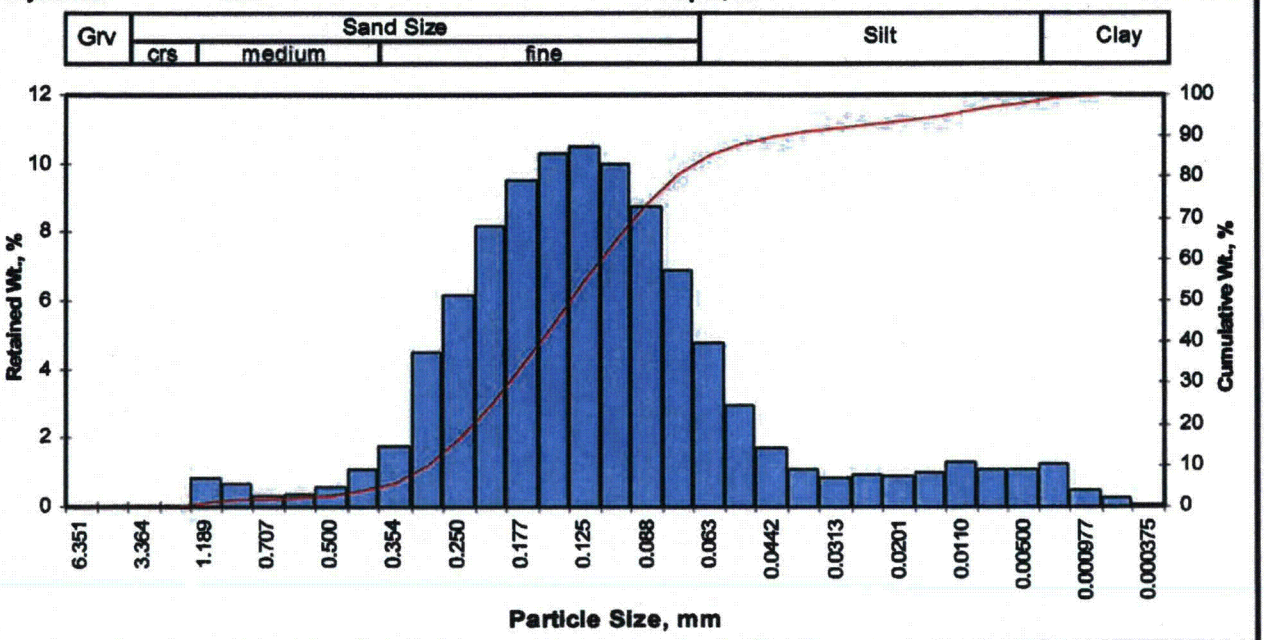
PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Crow Butte Resources, Inc.	**PTS File No:**	43570
Project:	Marsland Core	**Sample ID:**	M-1912C Run 1, Sample 1
Project No:	N/A	**Depth, ft:**	63.0-64.0



Opening		Phi of	U.S.	Sample Weight,	Increment Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.82	0.82	0.82
0.0331	0.841	0.25	20	0.69	0.69	1.51
0.0278	0.707	0.50	25	0.32	0.32	1.83
0.0234	0.595	0.75	30	0.35	0.35	2.18
0.0197	0.500	1.00	35	0.56	0.56	2.74
0.0166	0.420	1.25	40	1.11	1.11	3.85
0.0139	0.354	1.50	45	1.76	1.76	5.61
0.0117	0.297	1.75	50	4.49	4.49	10.11
0.0098	0.250	2.00	60	6.17	6.17	16.28
0.0083	0.210	2.25	70	8.15	8.16	24.44
0.0070	0.177	2.50	80	9.52	9.53	33.96
0.0059	0.149	2.75	100	10.30	10.31	44.27
0.0049	0.125	3.00	120	10.50	10.51	54.77
0.0041	0.105	3.25	140	9.99	10.00	64.77
0.0035	0.088	3.50	170	8.74	8.75	73.52
0.0029	0.074	3.75	200	6.87	6.87	80.39
0.0025	0.063	4.00	230	4.77	4.77	85.16
0.0021	0.053	4.25	270	2.95	2.95	88.11
0.00174	0.0442	4.50	325	1.73	1.73	89.85
0.00146	0.0372	4.75	400	1.11	1.11	90.96
0.00123	0.0313	5.00	450	0.83	0.83	91.79
0.000986	0.0250	5.32	500	0.92	0.92	92.71
0.000790	0.0201	5.64	635	0.88	0.88	93.59
0.000615	0.0156	6.00		0.97	0.97	94.56
0.000435	0.0110	6.50		1.28	1.28	95.84
0.000308	0.00781	7.00		1.09	1.09	96.93
0.000197	0.00500	7.65		1.06	1.06	97.99
0.000077	0.00195	9.00		1.22	1.22	99.21
0.000038	0.000977	10.00		0.49	0.49	99.70
0.000019	0.000488	11.00		0.27	0.27	99.97
0.000015	0.000375	11.38		0.03	0.03	100.00
TOTALS				**99.90**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight	Phi	Particle Size	
percent	Value	Inches	Millimeters
5	1.41	0.0148	0.376
10	1.74	0.0118	0.299
16	1.99	0.0099	0.252
25	2.26	0.0082	0.208
40	2.65	0.0063	0.160
50	2.89	0.0053	0.135
60	3.13	0.0045	0.114
75	3.55	0.0034	0.085
84	3.94	0.0026	0.065
90	4.53	0.0017	0.043
95	6.17	0.0005	0.014

Measure	Trask	Inman	Folk-Ward
Median, phi	2.89	2.89	2.89
Median, in.	0.0053	0.0053	0.0053
Median, mm	0.135	0.135	0.135
Mean, phi	2.77	2.96	2.94
Mean, in.	0.0058	0.0050	0.0051
Mean, mm	0.147	0.128	0.130
Sorting	1.563	0.975	1.209
Skewness	0.984	0.079	0.230
Kurtosis	0.241	1.440	1.513
Grain Size Description (ASTM-USCS Scale)		Fine sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	3.85
Fine Sand	200	76.54
Silt	>0.005 mm	17.60
Clay	<0.005 mm	2.01
	Total	100

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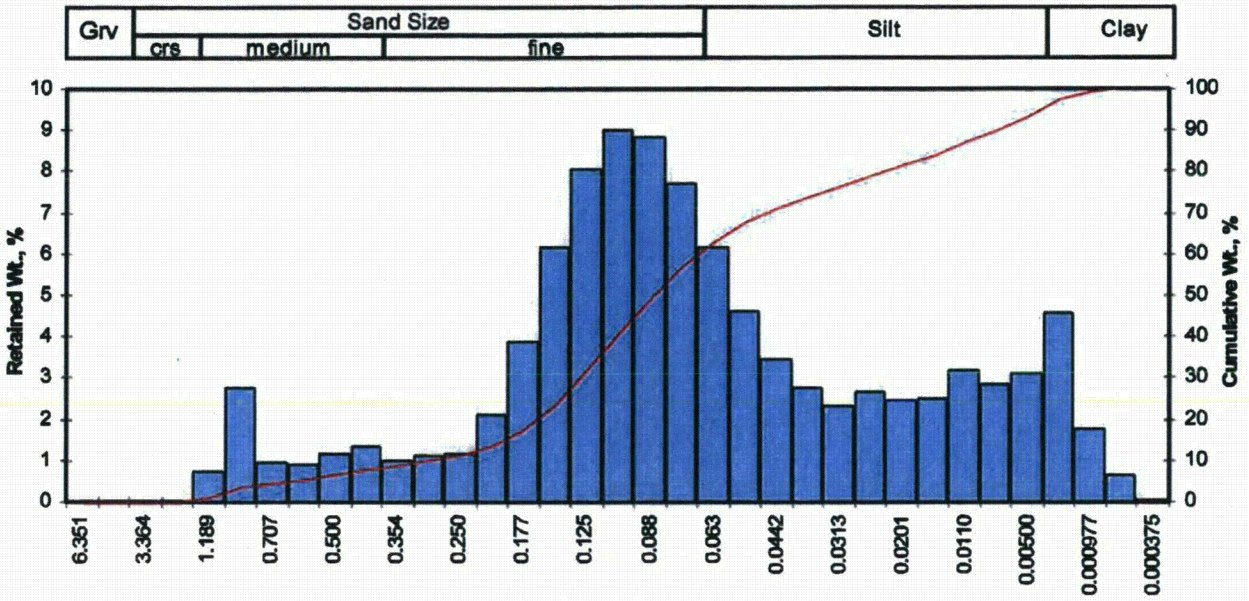
PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Crow Butte Resources, Inc.	**PTS File No:**	43570
Project:	Marsland Core	**Sample ID:**	M-1912C Run 2, Sample 1
Project No:	N/A	**Depth, ft:**	130.7-131.7



Opening		Phi of	U.S.	Sample Weight,	Increment Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.74	0.74	0.74
0.0331	0.841	0.25	20	2.75	2.75	3.49
0.0278	0.707	0.50	25	0.96	0.96	4.45
0.0234	0.595	0.75	30	0.89	0.89	5.34
0.0197	0.500	1.00	35	1.17	1.17	6.51
0.0166	0.420	1.25	40	1.33	1.33	7.84
0.0139	0.354	1.50	45	0.98	0.98	8.82
0.0117	0.297	1.75	50	1.10	1.10	9.92
0.0098	0.250	2.00	60	1.17	1.17	11.09
0.0083	0.210	2.25	70	2.13	2.13	13.22
0.0070	0.177	2.50	80	3.87	3.87	17.09
0.0059	0.149	2.75	100	6.15	6.15	23.24
0.0049	0.125	3.00	120	8.05	8.05	31.29
0.0041	0.105	3.25	140	9.01	9.01	40.30
0.0035	0.088	3.50	170	8.83	8.83	49.13
0.0029	0.074	3.75	200	7.73	7.73	56.86
0.0025	0.063	4.00	230	6.16	6.16	63.02
0.0021	0.053	4.25	270	4.63	4.63	67.65
0.00174	0.0442	4.50	325	3.46	3.46	71.11
0.00146	0.0372	4.75	400	2.74	2.74	73.86
0.00123	0.0313	5.00	450	2.34	2.34	76.20
0.000986	0.0250	5.32	500	2.67	2.67	78.87
0.000790	0.0201	5.64	635	2.44	2.44	81.31
0.000615	0.0156	6.00		2.50	2.50	83.81
0.000435	0.0110	6.50		3.19	3.19	87.00
0.000308	0.00781	7.00		2.85	2.85	89.85
0.000197	0.00500	7.65		3.12	3.12	92.97
0.000077	0.00195	9.00		4.56	4.56	97.53
0.000038	0.000977	10.00		1.77	1.77	99.30
0.000019	0.000488	11.00		0.65	0.65	99.95
0.000015	0.000375	11.38		0.05	0.05	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight	Phi	Particle Size	
percent	Value	Inches	Millimeters
5	0.65	0.0250	0.635
10	1.77	0.0116	0.294
16	2.43	0.0073	0.186
25	2.80	0.0056	0.143
40	3.24	0.0042	0.106
50	3.53	0.0034	0.087
60	3.88	0.0027	0.068
75	4.87	0.0013	0.034
84	6.03	0.0006	0.015
90	7.03	0.0003	0.008
95	8.25	0.0001	0.003

Measure	Trask	Inman	Folk-Ward
Median, phi	3.53	3.53	3.53
Median, in.	0.0034	0.0034	0.0034
Median, mm	0.087	0.087	0.087
Mean, phi	3.50	4.23	4.00
Mean, in.	0.0035	0.0021	0.0025
Mean, mm	0.089	0.053	0.063
Sorting	2.047	1.800	2.051
Skewness	0.806	0.390	0.317
Kurtosis	0.190	1.109	1.505
Grain Size Description (ASTM-USCS Scale)		Fine sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	7.84
Fine Sand	200	49.02
Silt	>0.005 mm	36.10
Clay	<0.005 mm	7.03
	Total	100

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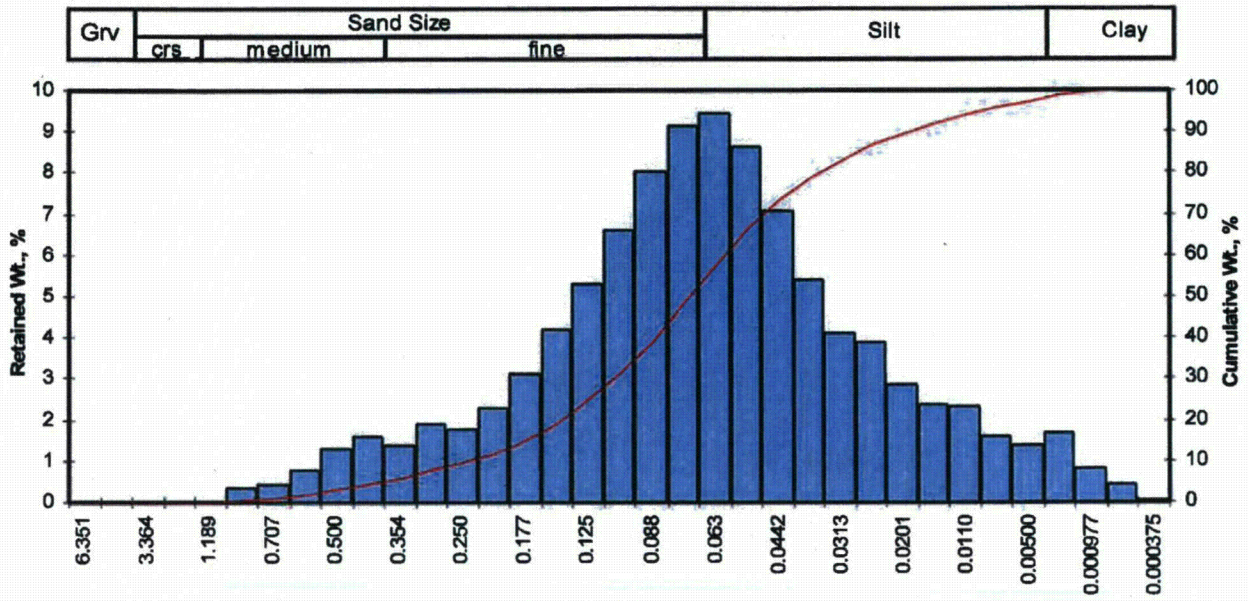
PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Crow Butte Resources, Inc.	**PTS File No:**	43570
Project:	Marsland Core	**Sample ID:**	M-1912C Run 3, Sample 1
Project No:	N/A	**Depth, ft:**	255.0-255.5



Opening		Phi of	U.S.	Sample	Increment	Cumulative
Inches	Millimeters	Screen	No.	Weight, grams	Weight, percent	Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.02	0.02	0.02
0.0331	0.841	0.25	20	0.35	0.35	0.37
0.0278	0.707	0.50	25	0.41	0.41	0.78
0.0234	0.595	0.75	30	0.78	0.78	1.56
0.0197	0.500	1.00	35	1.28	1.28	2.84
0.0166	0.420	1.25	40	1.58	1.58	4.42
0.0139	0.354	1.50	45	1.38	1.38	5.80
0.0117	0.297	1.75	50	1.89	1.89	7.69
0.0098	0.250	2.00	60	1.77	1.77	9.46
0.0083	0.210	2.25	70	2.28	2.28	11.74
0.0070	0.177	2.50	80	3.12	3.12	14.86
0.0059	0.149	2.75	100	4.20	4.20	19.06
0.0049	0.125	3.00	120	5.30	5.30	24.36
0.0041	0.105	3.25	140	6.58	6.58	30.94
0.0035	0.088	3.50	170	8.00	8.00	38.94
0.0029	0.074	3.75	200	9.15	9.15	48.09
0.0025	0.063	4.00	230	9.44	9.44	57.53
0.0021	0.053	4.25	270	8.62	8.62	66.15
0.00174	0.0442	4.50	325	7.06	7.06	73.21
0.00146	0.0372	4.75	400	5.39	5.39	78.60
0.00123	0.0313	5.00	450	4.08	4.08	82.68
0.000986	0.0250	5.32	500	3.90	3.90	86.58
0.000790	0.0201	5.64	635	2.85	2.85	89.43
0.000615	0.0156	6.00		2.36	2.36	91.79
0.000435	0.0110	6.50		2.31	2.31	94.10
0.000308	0.00781	7.00		1.58	1.58	95.68
0.000197	0.00500	7.65		1.36	1.36	97.04
0.000077	0.00195	9.00		1.66	1.66	98.70
0.000038	0.000977	10.00		0.82	0.82	99.52
0.000019	0.000488	11.00		0.44	0.44	99.96
0.000015	0.000375	11.38		0.04	0.04	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	1.35	0.0154	0.391
10	2.06	0.0094	0.240
16	2.57	0.0066	0.169
25	3.02	0.0048	0.123
40	3.53	0.0034	0.087
50	3.80	0.0028	0.072
60	4.07	0.0023	0.059
75	4.58	0.0016	0.042
84	5.11	0.0011	0.029
90	5.73	0.0007	0.019
95	6.79	0.0004	0.009

Measure	Trask	Inman	Folk-Ward
Median, phi	3.80	3.80	3.80
Median, in.	0.0028	0.0028	0.0028
Median, mm	0.072	0.072	0.072
Mean, phi	3.60	3.84	3.83
Mean, in.	0.0032	0.0028	0.0028
Mean, mm	0.082	0.070	0.071
Sorting	1.716	1.270	1.458
Skewness	0.998	0.030	0.064
Kurtosis	0.184	1.138	1.428
Grain Size Description (ASTM-USCS Scale)		Fine sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	4.42
Fine Sand	200	43.67
Silt	>0.005 mm	48.95
Clay	<0.005 mm	2.96
	Total	100

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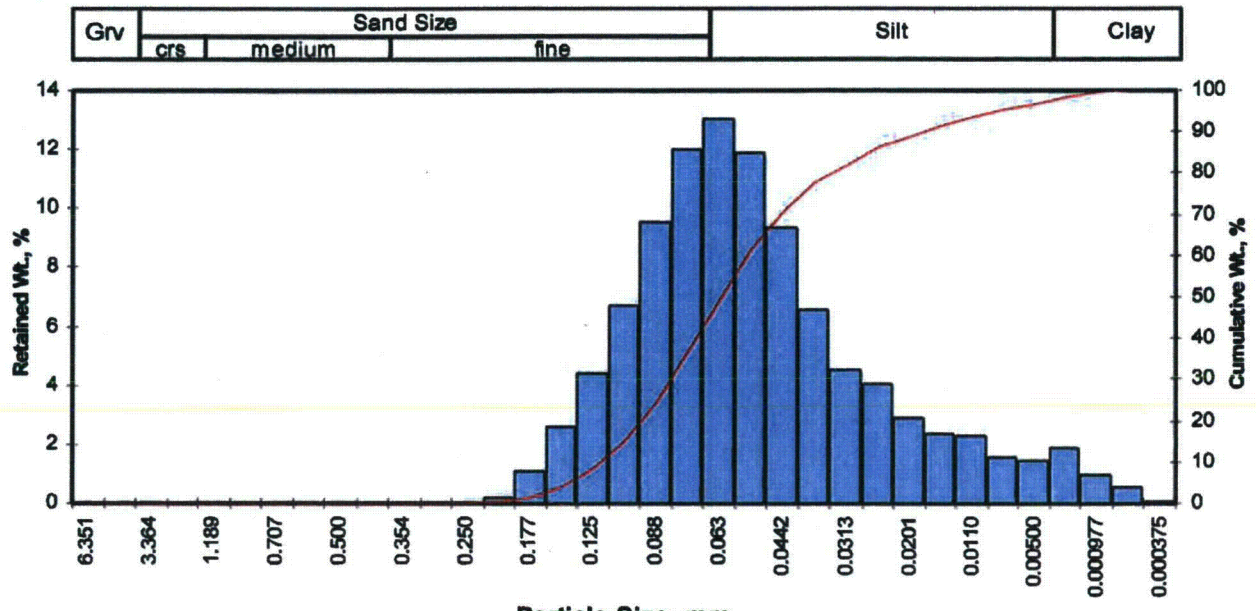
PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Crow Butte Resources, Inc.	**PTS File No:**	43570
Project:	Marsland Core	**Sample ID:**	M-1912C Run 3, Sample 2
Project No:	N/A	**Depth, ft:**	260.4-260.9



Opening		Phi of	U.S.	Sample Weight,	Increment Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.00	0.00	0.00
0.0117	0.297	1.75	50	0.00	0.00	0.00
0.0098	0.250	2.00	60	0.01	0.01	0.01
0.0083	0.210	2.25	70	0.21	0.21	0.22
0.0070	0.177	2.50	80	1.09	1.09	1.31
0.0059	0.149	2.75	100	2.62	2.62	3.93
0.0049	0.125	3.00	120	4.42	4.42	8.36
0.0041	0.105	3.25	140	6.72	6.73	15.08
0.0035	0.088	3.50	170	9.52	9.53	24.61
0.0029	0.074	3.75	200	12.00	12.01	36.63
0.0025	0.063	4.00	230	13.00	13.01	49.64
0.0021	0.053	4.25	270	11.90	11.91	61.55
0.00174	0.0442	4.50	325	9.34	9.35	70.90
0.00146	0.0372	4.75	400	6.58	6.59	77.49
0.00123	0.0313	5.00	450	4.53	4.53	82.02
0.000986	0.0250	5.32	500	4.03	4.03	86.05
0.000790	0.0201	5.64	635	2.87	2.87	88.93
0.000615	0.0156	6.00		2.36	2.36	91.29
0.000435	0.0110	6.50		2.30	2.30	93.59
0.000308	0.00781	7.00		1.59	1.59	95.18
0.000197	0.00500	7.65		1.42	1.42	96.60
0.000077	0.00195	9.00		1.87	1.87	98.48
0.000038	0.000977	10.00		0.95	0.95	99.43
0.000019	0.000488	11.00		0.52	0.52	99.95
0.000015	0.000375	11.38		0.05	0.05	100.00
TOTALS				99.90	100.00	100.00

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size	
		Inches	Millimeters
5	2.81	0.0056	0.143
10	3.06	0.0047	0.120
16	3.27	0.0041	0.103
25	3.51	0.0035	0.088
40	3.81	0.0028	0.071
50	4.01	0.0024	0.062
60	4.22	0.0021	0.054
75	4.66	0.0016	0.040
84	5.16	0.0011	0.028
90	5.80	0.0007	0.018
95	6.94	0.0003	0.008

Measure	Trask	Inman	Folk-Ward
Median, phi	4.01	4.01	4.01
Median, in.	0.0024	0.0024	0.0024
Median, mm	0.062	0.062	0.062
Mean, phi	3.97	4.22	4.15
Mean, in.	0.0025	0.0021	0.0022
Mean, mm	0.064	0.054	0.056
Sorting	1.488	0.942	1.097
Skewness	0.950	0.221	0.321
Kurtosis	0.237	1.194	1.476
Grain Size Description (ASTM-USCS Scale)		Silt (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	36.63
Silt	>0.005 mm	59.98
Clay	<0.005 mm	3.40
	Total	100

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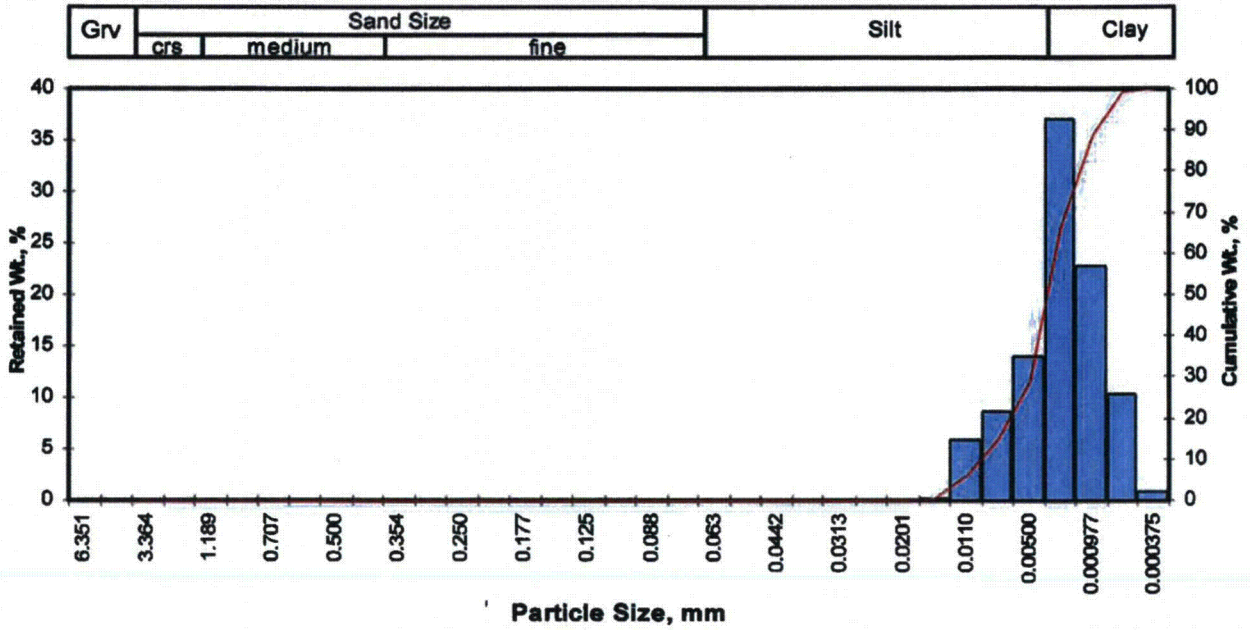
PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Crow Butte Resources, Inc.	**PTS File No:**	43570
Project:	Marsland Core	**Sample ID:**	M-1912C Run 4, Sample 1
Project No:	N/A	**Depth, ft:**	974.5-975.0



Opening		Phi of	U.S.	Sample Weight,	Increment Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.00	0.00	0.00
0.0117	0.297	1.75	50	0.00	0.00	0.00
0.0098	0.250	2.00	60	0.00	0.00	0.00
0.0083	0.210	2.25	70	0.00	0.00	0.00
0.0070	0.177	2.50	80	0.00	0.00	0.00
0.0059	0.149	2.75	100	0.00	0.00	0.00
0.0049	0.125	3.00	120	0.00	0.00	0.00
0.0041	0.105	3.25	140	0.00	0.00	0.00
0.0035	0.088	3.50	170	0.00	0.00	0.00
0.0029	0.074	3.75	200	0.00	0.00	0.00
0.0025	0.063	4.00	230	0.00	0.00	0.00
0.0021	0.053	4.25	270	0.00	0.00	0.00
0.00174	0.0442	4.50	325	0.00	0.00	0.00
0.00146	0.0372	4.75	400	0.00	0.00	0.00
0.00123	0.0313	5.00	450	0.00	0.00	0.00
0.000986	0.0250	5.32	500	0.00	0.00	0.00
0.000790	0.0201	5.64	635	0.00	0.00	0.00
0.000615	0.0156	6.00		0.22	0.22	0.22
0.000435	0.0110	6.50		5.93	5.93	6.15
0.000308	0.00781	7.00		8.65	8.65	14.80
0.000197	0.00500	7.65		14.00	14.00	28.79
0.000077	0.00195	9.00		37.10	37.09	65.89
0.000038	0.000977	10.00		22.80	22.80	88.68
0.000019	0.000488	11.00		10.40	10.40	99.08
0.000015	0.000375	11.38		0.92	0.92	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight	Phi	Particle Size	
percent	Value	Inches	Millimeters
5	6.40	0.0005	0.012
10	6.72	0.0004	0.009
16	7.06	0.0003	0.008
25	7.47	0.0002	0.006
40	8.05	0.0001	0.004
50	8.42	0.0001	0.003
60	8.78	0.0001	0.002
75	9.40	0.0001	0.001
84	9.79	0.0000	0.001
90	10.13	0.0000	0.001
95	10.61	0.0000	0.001

Measure	Trask	Inman	Folk-Ward
Median, phi	8.42	8.42	8.42
Median, in.	0.0001	0.0001	0.0001
Median, mm	0.003	0.003	0.003
Mean, phi	8.13	8.43	8.42
Mean, in.	0.0001	0.0001	0.0001
Mean, mm	0.004	0.003	0.003
Sorting	1.952	1.370	1.322
Skewness	0.989	0.004	0.022
Kurtosis	0.243	0.535	0.893
Grain Size Description (ASTM-USCS Scale)		Clay (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	0.00
Silt	>0.005 mm	28.79
Clay	<0.005 mm	71.21
	Total	**100**

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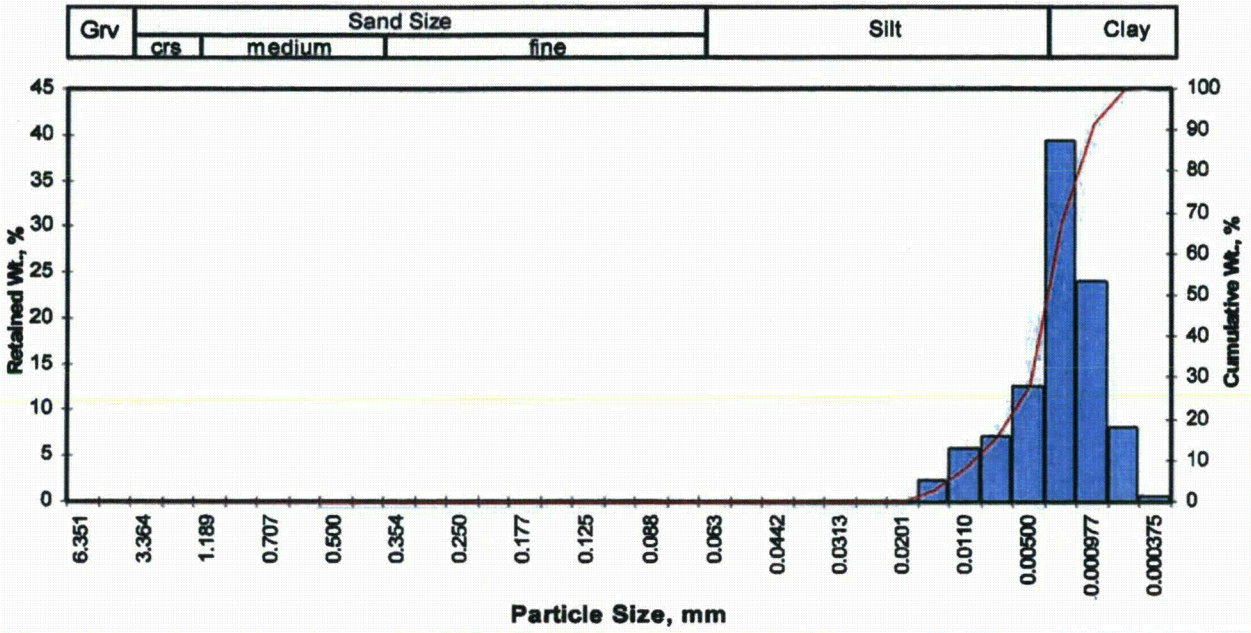
PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Crow Butte Resources, Inc.	**PTS File No:**	43570
Project:	Marsland Core	**Sample ID:**	M-1912C Run 4, Sample 2
Project No:	N/A	**Depth, ft:**	968.7-969.7



Opening		Phi of	U.S.	Sample Weight,	Increment Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.00	0.00	0.00
0.0117	0.297	1.75	50	0.00	0.00	0.00
0.0098	0.250	2.00	60	0.00	0.00	0.00
0.0083	0.210	2.25	70	0.00	0.00	0.00
0.0070	0.177	2.50	80	0.00	0.00	0.00
0.0059	0.149	2.75	100	0.00	0.00	0.00
0.0049	0.125	3.00	120	0.00	0.00	0.00
0.0041	0.105	3.25	140	0.00	0.00	0.00
0.0035	0.088	3.50	170	0.00	0.00	0.00
0.0029	0.074	3.75	200	0.00	0.00	0.00
0.0025	0.063	4.00	230	0.00	0.00	0.00
0.0021	0.053	4.25	270	0.00	0.00	0.00
0.00174	0.0442	4.50	325	0.00	0.00	0.00
0.00146	0.0372	4.75	400	0.00	0.00	0.00
0.00123	0.0313	5.00	450	0.00	0.00	0.00
0.000986	0.0250	5.32	500	0.00	0.00	0.00
0.000790	0.0201	5.64	635	0.10	0.10	0.10
0.000615	0.0156	6.00		2.33	2.33	2.42
0.000435	0.0110	6.50		5.79	5.79	8.21
0.000308	0.00781	7.00		7.14	7.14	15.35
0.000197	0.00500	7.65		12.60	12.59	27.94
0.000077	0.00195	9.00		39.40	39.38	67.32
0.000038	0.000977	10.00		24.00	23.99	91.30
0.000019	0.000488	11.00		8.14	8.14	99.44
0.000015	0.000375	11.38		0.56	0.56	100.00
TOTALS				100.10	100.00	100.00

Cumulative Weight Percent greater than			
Weight	Phi	Particle Size	
percent	Value	Inches	Millimeters
5	6.22	0.0005	0.013
10	6.63	0.0004	0.010
16	7.03	0.0003	0.008
25	7.49	0.0002	0.006
40	8.06	0.0001	0.004
50	8.40	0.0001	0.003
60	8.75	0.0001	0.002
75	9.32	0.0001	0.002
84	9.70	0.0000	0.001
90	9.95	0.0000	0.001
95	10.45	0.0000	0.001

Measure	Trask	Inman	Folk-Ward
Median, phi	8.40	8.40	8.40
Median, in.	0.0001	0.0001	0.0001
Median, mm	0.003	0.003	0.003
Mean, phi	8.14	8.36	8.38
Mean, in.	0.0001	0.0001	0.0001
Mean, mm	0.004	0.003	0.003
Sorting	1.883	1.331	1.307
Skewness	0.998	-0.030	-0.030
Kurtosis	0.218	0.590	0.950
Grain Size Description (ASTM-USCS Scale)		Clay (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	0.00
Silt	>0.005 mm	27.94
Clay	<0.005 mm	72.06
	Total	100

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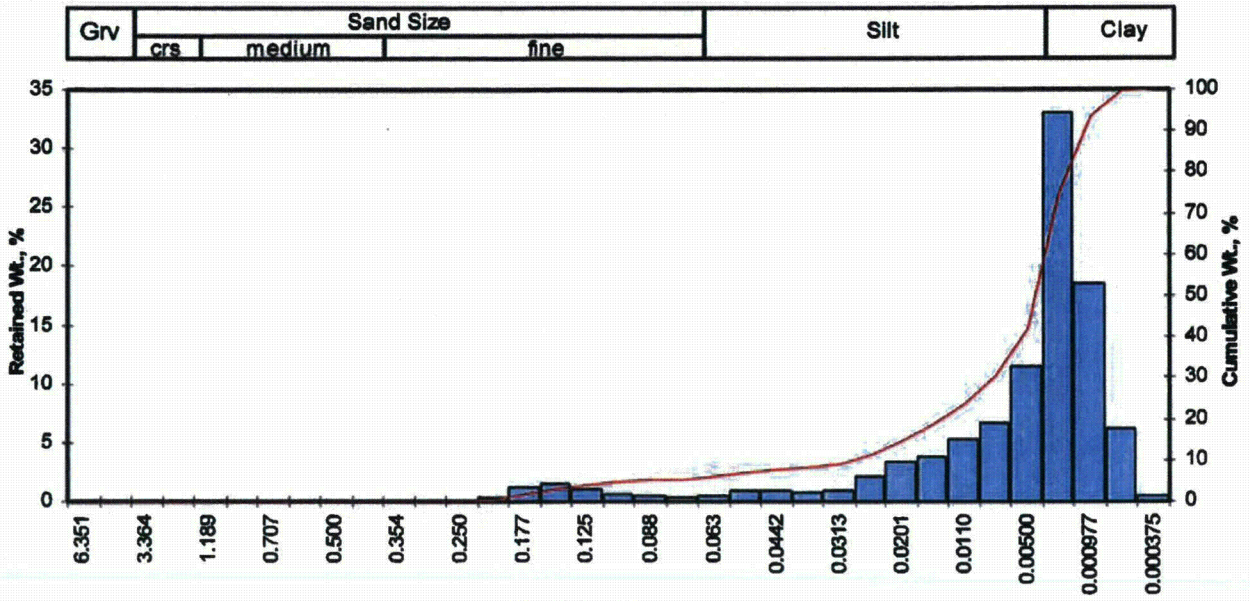
PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Crow Butte Resources, Inc.	**PTS File No:**	43570
Project:	Marsland Core	**Sample ID:**	M-1912C Run 4, Sample 2 Rerun
Project No:	N/A	**Depth, ft:**	968.7-969.7



Opening (Inches)	Opening (Millimeters)	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.00	0.00	0.00
0.0117	0.297	1.75	50	0.00	0.00	0.00
0.0098	0.250	2.00	60	0.02	0.02	0.02
0.0083	0.210	2.25	70	0.33	0.33	0.35
0.0070	0.177	2.50	80	1.18	1.18	1.53
0.0059	0.149	2.75	100	1.48	1.48	3.01
0.0049	0.125	3.00	120	1.03	1.03	4.04
0.0041	0.105	3.25	140	0.63	0.63	4.67
0.0035	0.088	3.50	170	0.39	0.39	5.06
0.0029	0.074	3.75	200	0.29	0.29	5.35
0.0025	0.063	4.00	230	0.48	0.48	5.83
0.0021	0.053	4.25	270	0.86	0.86	6.69
0.00174	0.0442	4.50	325	0.91	0.91	7.60
0.00146	0.0372	4.75	400	0.71	0.71	8.31
0.00123	0.0313	5.00	450	0.86	0.86	9.17
0.000986	0.0250	5.32	500	2.12	2.12	11.29
0.000790	0.0201	5.64	635	3.31	3.31	14.60
0.000615	0.0156	6.00		3.78	3.78	18.38
0.000435	0.0110	6.50		5.24	5.24	23.62
0.000308	0.00781	7.00		6.60	6.60	30.22
0.000197	0.00500	7.65		11.40	11.40	41.62
0.000077	0.00195	9.00		33.10	33.10	74.72
0.000038	0.000977	10.00		18.60	18.60	93.32
0.000019	0.000488	11.00		6.24	6.24	99.56
0.000015	0.000375	11.38		0.44	0.44	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size (Inches)	Particle Size (Millimeters)
5	3.46	0.0036	0.091
10	5.13	0.0011	0.029
16	5.77	0.0007	0.018
25	6.60	0.0004	0.010
40	7.55	0.0002	0.005
50	7.99	0.0002	0.004
60	8.40	0.0001	0.003
75	9.02	0.0001	0.002
84	9.50	0.0001	0.001
90	9.82	0.0000	0.001
95	10.27	0.0000	0.001

Measure	Trask	Inman	Folk-Ward
Median, phi	7.99	7.99	7.99
Median, in.	0.0002	0.0002	0.0002
Median, mm	0.004	0.004	0.004
Mean, phi	7.36	7.64	7.75
Mean, in.	0.0002	0.0002	0.0002
Mean, mm	0.006	0.005	0.005
Sorting	2.306	1.863	1.963
Skewness	1.131	-0.189	-0.259
Kurtosis	0.151	0.827	1.157
Grain Size Description (ASTM-USCS Scale)		**Silt (based on Mean from Trask)**	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	5.35
Silt	>0.005 mm	36.27
Clay	<0.005 mm	58.38
	Total	**100**

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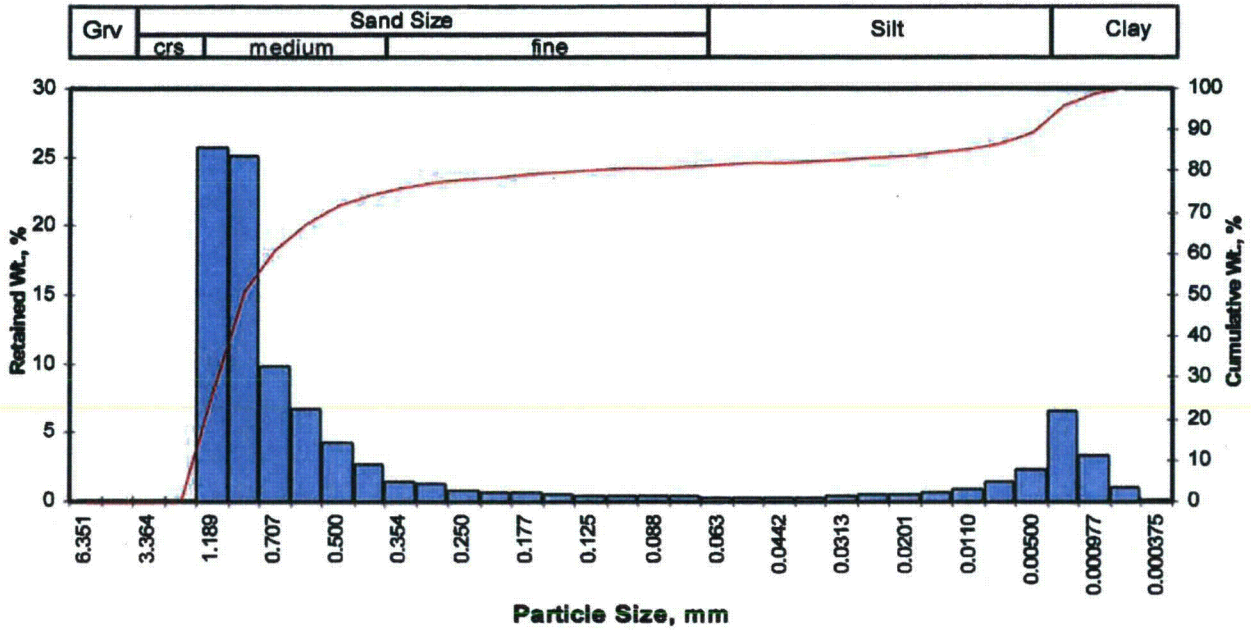
PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Crow Butte Resources, Inc.	**PTS File No:**	43570
Project:	Marsland Core	**Sample ID:**	M-1912C Run 4, Sample 2 Rerun 2
Project No:	N/A	**Depth, ft:**	968.7-969.7



Opening		Phi of	U.S.	Sample	Increment	Cumulative
Inches	Millimeters	Screen	No.	Weight, grams	Weight, percent	Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	25.70	25.70	25.70
0.0331	0.841	0.25	20	25.10	25.10	50.81
0.0278	0.707	0.50	25	9.82	9.82	60.63
0.0234	0.595	0.75	30	6.77	6.77	67.40
0.0197	0.500	1.00	35	4.24	4.24	71.64
0.0166	0.420	1.25	40	2.66	2.66	74.30
0.0139	0.354	1.50	45	1.46	1.46	75.76
0.0117	0.297	1.75	50	1.33	1.33	77.09
0.0098	0.250	2.00	60	0.82	0.82	77.91
0.0083	0.210	2.25	70	0.70	0.70	78.61
0.0070	0.177	2.50	80	0.59	0.59	79.20
0.0059	0.149	2.75	100	0.48	0.48	79.68
0.0049	0.125	3.00	120	0.40	0.40	80.08
0.0041	0.105	3.25	140	0.37	0.37	80.45
0.0035	0.088	3.50	170	0.35	0.35	80.80
0.0029	0.074	3.75	200	0.33	0.33	81.13
0.0025	0.063	4.00	230	0.31	0.31	81.44
0.0021	0.053	4.25	270	0.30	0.30	81.74
0.00174	0.0442	4.50	325	0.30	0.30	82.04
0.00146	0.0372	4.75	400	0.31	0.31	82.35
0.00123	0.0313	5.00	450	0.33	0.33	82.68
0.000986	0.0250	5.32	500	0.48	0.48	83.16
0.000790	0.0201	5.64	635	0.56	0.56	83.72
0.000615	0.0156	6.00		0.63	0.63	84.35
0.000435	0.0110	6.50		0.94	0.94	85.29
0.000308	0.00781	7.00		1.36	1.36	86.65
0.000197	0.00500	7.65		2.38	2.38	89.03
0.000077	0.00195	9.00		6.53	6.53	95.56
0.000038	0.000977	10.00		3.35	3.35	98.91
0.000019	0.000488	11.00		1.02	1.02	99.93
0.000015	0.000375	11.38		0.07	0.07	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size	
		Inches	Millimeters
5	-0.85	0.0712	1.808
10	-0.71	0.0643	1.634
16	-0.53	0.0570	1.447
25	-0.27	0.0475	1.206
40	0.03	0.0384	0.976
50	0.23	0.0335	0.850
60	0.48	0.0281	0.715
75	1.37	0.0152	0.387
84	5.80	0.0007	0.018
90	7.85	0.0002	0.004
95	8.88	0.0001	0.002

Measure	Trask	Inman	Folk-Ward
Median, phi	0.23	0.23	0.23
Median, in.	0.0335	0.0335	0.0335
Median, mm	0.850	0.850	0.850
Mean, phi	0.33	2.63	1.83
Mean, in.	0.0314	0.0063	0.0110
Mean, mm	0.797	0.161	0.281
Sorting	1.766	3.166	3.058
Skewness	0.803	0.758	0.767
Kurtosis	0.251	0.538	2.433
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	74.30
Fine Sand	200	6.83
Silt	>0.005 mm	7.90
Clay	<0.005 mm	10.97
	Total	**100**

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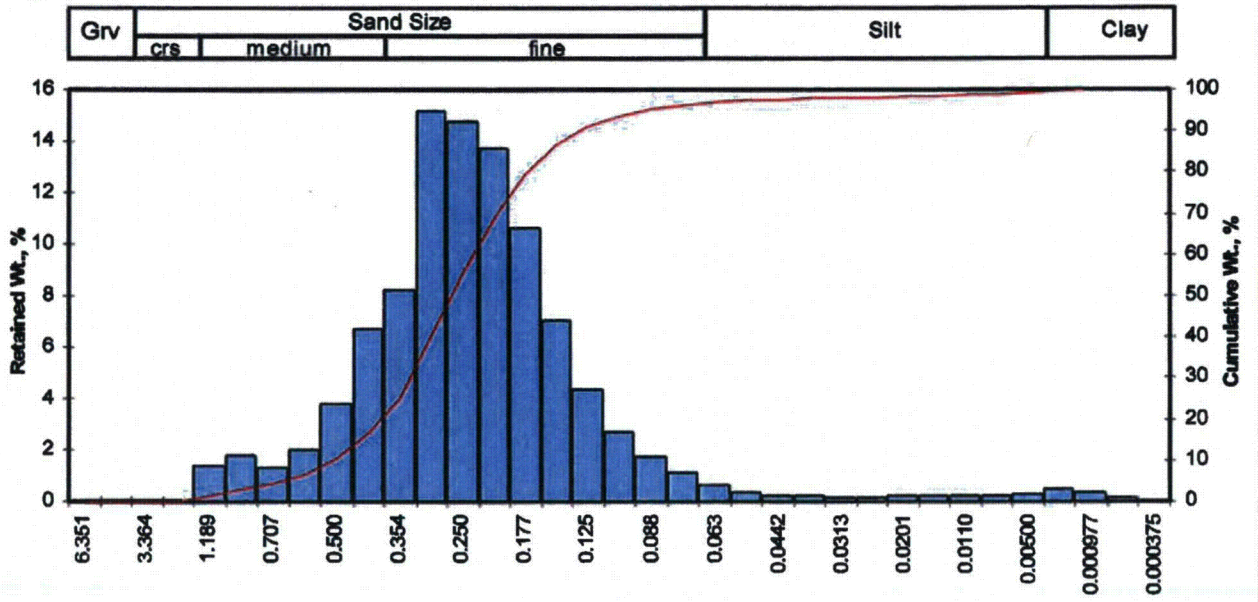
PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Crow Butte Resources, Inc.	**PTS File No:**	43570
Project:	Marsland Core	**Sample ID:**	M-1956C Run 1, Sample 1
Project No:	N/A	**Depth, ft:**	42.0-43.0



Particle Size, mm

Opening		Phi of	U.S.	Sample Weight,	Increment Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	1.37	1.37	1.37
0.0331	0.841	0.25	20	1.79	1.79	3.16
0.0278	0.707	0.50	25	1.31	1.31	4.47
0.0234	0.595	0.75	30	2.02	2.02	6.49
0.0197	0.500	1.00	35	3.82	3.82	10.30
0.0166	0.420	1.25	40	6.67	6.67	16.97
0.0139	0.354	1.50	45	8.24	8.24	25.20
0.0117	0.297	1.75	50	15.20	15.19	40.40
0.0098	0.250	2.00	60	14.80	14.79	55.19
0.0083	0.210	2.25	70	13.70	13.69	68.88
0.0070	0.177	2.50	80	10.60	10.59	79.47
0.0059	0.149	2.75	100	7.02	7.02	86.49
0.0049	0.125	3.00	120	4.36	4.36	90.85
0.0041	0.105	3.25	140	2.69	2.69	93.53
0.0035	0.088	3.50	170	1.72	1.72	95.25
0.0029	0.074	3.75	200	1.08	1.08	96.33
0.0025	0.063	4.00	230	0.62	0.62	96.95
0.0021	0.053	4.25	270	0.34	0.34	97.29
0.00174	0.0442	4.50	325	0.22	0.22	97.51
0.00146	0.0372	4.75	400	0.18	0.18	97.69
0.00123	0.0313	5.00	450	0.15	0.15	97.84
0.000986	0.0250	5.32	500	0.17	0.17	98.01
0.000790	0.0201	5.64	635	0.18	0.18	98.19
0.000615	0.0156	6.00		0.19	0.19	98.38
0.000435	0.0110	6.50		0.23	0.23	98.61
0.000308	0.00781	7.00		0.21	0.21	98.82
0.000197	0.00500	7.65		0.26	0.26	99.08
0.000077	0.00195	9.00		0.47	0.47	99.55
0.000038	0.000977	10.00		0.32	0.32	99.87
0.000019	0.000488	11.00		0.13	0.13	100.00
0.000015	0.000375	11.38		0.00	0.00	100.00
TOTALS				**100.10**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight	Phi	Particle Size	
percent	Value	Inches	Millimeters
5	0.57	0.0266	0.676
10	0.98	0.0200	0.507
16	1.21	0.0170	0.431
25	1.49	0.0140	0.355
40	1.74	0.0118	0.299
50	1.91	0.0105	0.266
60	2.09	0.0093	0.235
75	2.39	0.0075	0.190
84	2.66	0.0062	0.158
90	2.95	0.0051	0.129
95	3.46	0.0036	0.091

Measure	Trask	Inman	Folk-Ward
Median, phi	1.91	1.91	1.91
Median, in.	0.0105	0.0105	0.0105
Median, mm	0.266	0.266	0.266
Mean, phi	1.87	1.94	1.93
Mean, in.	0.0107	0.0103	0.0103
Mean, mm	0.273	0.261	0.263
Sorting	1.366	0.724	0.801
Skewness	0.978	0.035	0.053
Kurtosis	0.218	1.001	1.318
Grain Size Description (ASTM-USCS Scale)		Fine sand (based on Mean from Trask)	

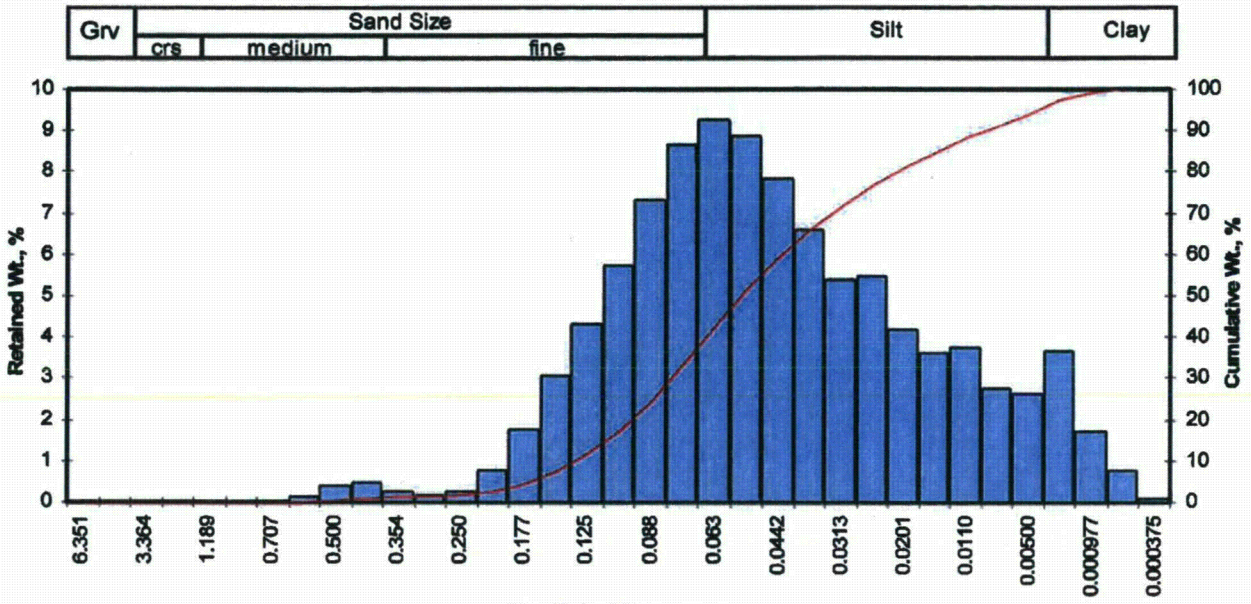
Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	16.97
Fine Sand	200	79.36
Silt	>0.005 mm	2.75
Clay	<0.005 mm	0.92
	Total	100

Phone: (562) 907-3607 Fax: (562) 907-3610

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Crow Butte Resources, Inc.	**PTS File No:**	43570
Project:	Marsland Core	**Sample ID:**	M-1956C Run 3, Sample 1
Project No:	N/A	**Depth, ft:**	78.0-79.0



Particle Size, mm

Opening		Phi of	U.S.	Sample Weight,	Increment Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.01	0.01	0.01
0.0234	0.595	0.75	30	0.14	0.14	0.15
0.0197	0.500	1.00	35	0.39	0.39	0.54
0.0166	0.420	1.25	40	0.46	0.46	1.00
0.0139	0.354	1.50	45	0.27	0.27	1.27
0.0117	0.297	1.75	50	0.19	0.19	1.46
0.0098	0.250	2.00	60	0.25	0.25	1.71
0.0083	0.210	2.25	70	0.78	0.78	2.49
0.0070	0.177	2.50	80	1.77	1.77	4.26
0.0059	0.149	2.75	100	3.04	3.04	7.30
0.0049	0.125	3.00	120	4.33	4.33	11.63
0.0041	0.105	3.25	140	5.74	5.74	17.37
0.0035	0.088	3.50	170	7.32	7.32	24.69
0.0029	0.074	3.75	200	8.67	8.67	33.36
0.0025	0.063	4.00	230	9.27	9.27	42.63
0.0021	0.053	4.25	270	8.89	8.89	51.52
0.00174	0.0442	4.50	325	7.85	7.85	59.37
0.00146	0.0372	4.75	400	6.58	6.58	65.95
0.00123	0.0313	5.00	450	5.41	5.41	71.36
0.000986	0.0250	5.32	500	5.49	5.49	76.84
0.000790	0.0201	5.64	635	4.19	4.19	81.03
0.000615	0.0156	6.00		3.60	3.60	84.63
0.000435	0.0110	6.50		3.74	3.74	88.37
0.000308	0.00781	7.00		2.78	2.78	91.15
0.000197	0.00500	7.65		2.64	2.64	93.79
0.000077	0.00195	9.00		3.67	3.67	97.46
0.000038	0.000977	10.00		1.71	1.71	99.17
0.000019	0.000488	11.00		0.76	0.76	99.93
0.000015	0.000375	11.38		0.07	0.07	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight	Phi	Particle Size	
percent	Value	Inches	Millimeters
5	2.56	0.0067	0.170
10	2.91	0.0053	0.133
16	3.19	0.0043	0.110
25	3.51	0.0035	0.088
40	3.93	0.0026	0.066
50	4.21	0.0021	0.054
60	4.52	0.0017	0.043
75	5.21	0.0011	0.027
84	5.94	0.0006	0.016
90	6.79	0.0004	0.009
95	8.09	0.0001	0.004

Measure	Trask	Inman	Folk-Ward
Median, phi	4.21	4.21	4.21
Median, in.	0.0021	0.0021	0.0021
Median, mm	0.054	0.054	0.054
Mean, phi	4.12	4.56	4.44
Mean, in.	0.0023	0.0017	0.0018
Mean, mm	0.057	0.042	0.046
Sorting	1.805	1.373	1.525
Skewness	0.899	0.259	0.332
Kurtosis	0.245	1.014	1.330
Grain Size Description (ASTM-USCS Scale)		Silt (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	1.00
Fine Sand	200	32.36
Silt	>0.005 mm	60.43
Clay	<0.005 mm	6.21
	Total	**100**

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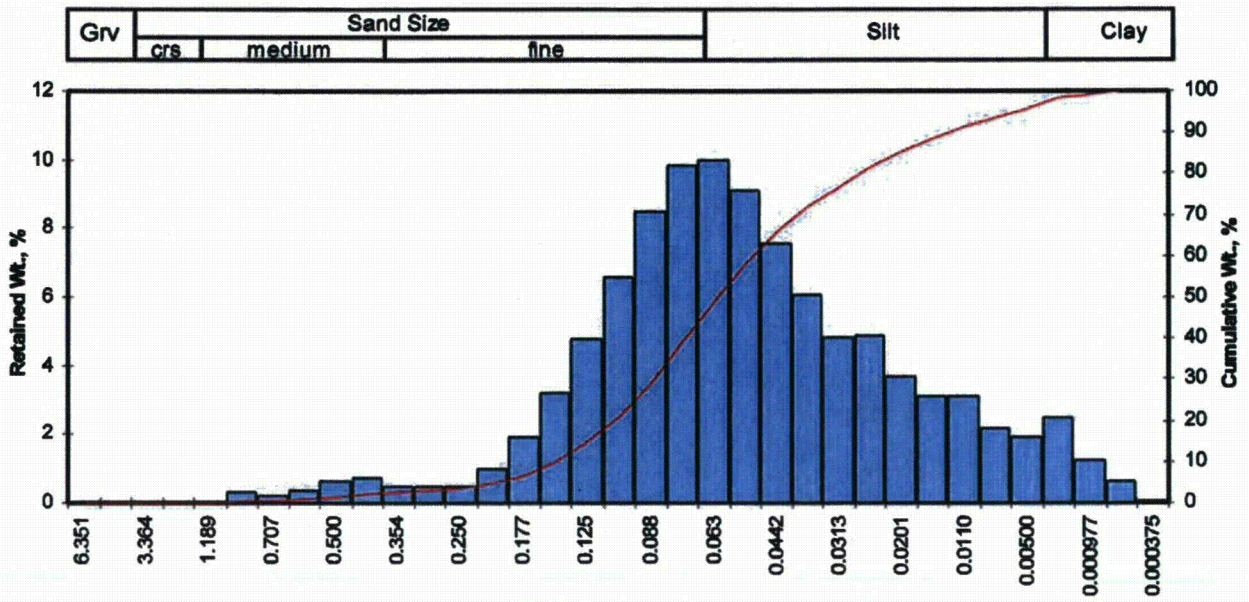
PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Crow Butte Resources, Inc.	**PTS File No:**	43570
Project:	Marsland Core	**Sample ID:**	M-1956C Run 4, Sample 1
Project No:	N/A	**Depth, ft:**	196.5-197.1



Opening		Phi of	U.S.	Sample Weight,	Increment Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.03	0.03	0.03
0.0331	0.841	0.25	20	0.30	0.30	0.33
0.0278	0.707	0.50	25	0.19	0.19	0.52
0.0234	0.595	0.75	30	0.34	0.34	0.86
0.0197	0.500	1.00	35	0.64	0.64	1.50
0.0166	0.420	1.25	40	0.72	0.72	2.22
0.0139	0.354	1.50	45	0.48	0.48	2.70
0.0117	0.297	1.75	50	0.46	0.46	3.16
0.0098	0.250	2.00	60	0.47	0.47	3.63
0.0083	0.210	2.25	70	0.97	0.97	4.60
0.0070	0.177	2.50	80	1.90	1.90	6.50
0.0059	0.149	2.75	100	3.20	3.20	9.70
0.0049	0.125	3.00	120	4.74	4.74	14.44
0.0041	0.105	3.25	140	6.58	6.58	21.02
0.0035	0.088	3.50	170	8.47	8.47	29.50
0.0029	0.074	3.75	200	9.81	9.81	39.31
0.0025	0.063	4.00	230	10.00	10.00	49.31
0.0021	0.053	4.25	270	9.08	9.08	58.40
0.00174	0.0442	4.50	325	7.55	7.55	65.95
0.00146	0.0372	4.75	400	6.03	6.03	71.98
0.00123	0.0313	5.00	450	4.83	4.83	76.81
0.000986	0.0250	5.32	500	4.86	4.86	81.68
0.000790	0.0201	5.64	635	3.68	3.68	85.36
0.000615	0.0156	6.00		3.10	3.10	88.46
0.000435	0.0110	6.50		3.08	3.08	91.54
0.000308	0.00781	7.00		2.15	2.15	93.69
0.000197	0.00500	7.65		1.92	1.92	95.61
0.000077	0.00195	9.00		2.50	2.50	98.11
0.000038	0.000977	10.00		1.22	1.22	99.33
0.000019	0.000488	11.00		0.61	0.61	99.94
0.000015	0.000375	11.38		0.06	0.06	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight	Phi	Particle Size	
percent	Value	Inches	Millimeters
5	2.30	0.0080	0.203
10	2.77	0.0058	0.147
16	3.06	0.0047	0.120
25	3.37	0.0038	0.097
40	3.77	0.0029	0.073
50	4.02	0.0024	0.062
60	4.30	0.0020	0.051
75	4.91	0.0013	0.033
84	5.52	0.0009	0.022
90	6.25	0.0005	0.013
95	7.44	0.0002	0.006

Measure	Trask	Inman	Folk-Ward
Median, phi	4.02	4.02	4.02
Median, in.	0.0024	0.0024	0.0024
Median, mm	0.062	0.062	0.062
Mean, phi	3.94	4.29	4.20
Mean, in.	0.0026	0.0020	0.0021
Mean, mm	0.065	0.051	0.054
Sorting	1.705	1.231	1.394
Skewness	0.922	0.221	0.276
Kurtosis	0.237	1.086	1.368
Grain Size Description (ASTM-USCS Scale)		Silt (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	2.22
Fine Sand	200	37.09
Silt	>0.005 mm	56.30
Clay	<0.005 mm	4.39
	Total	100

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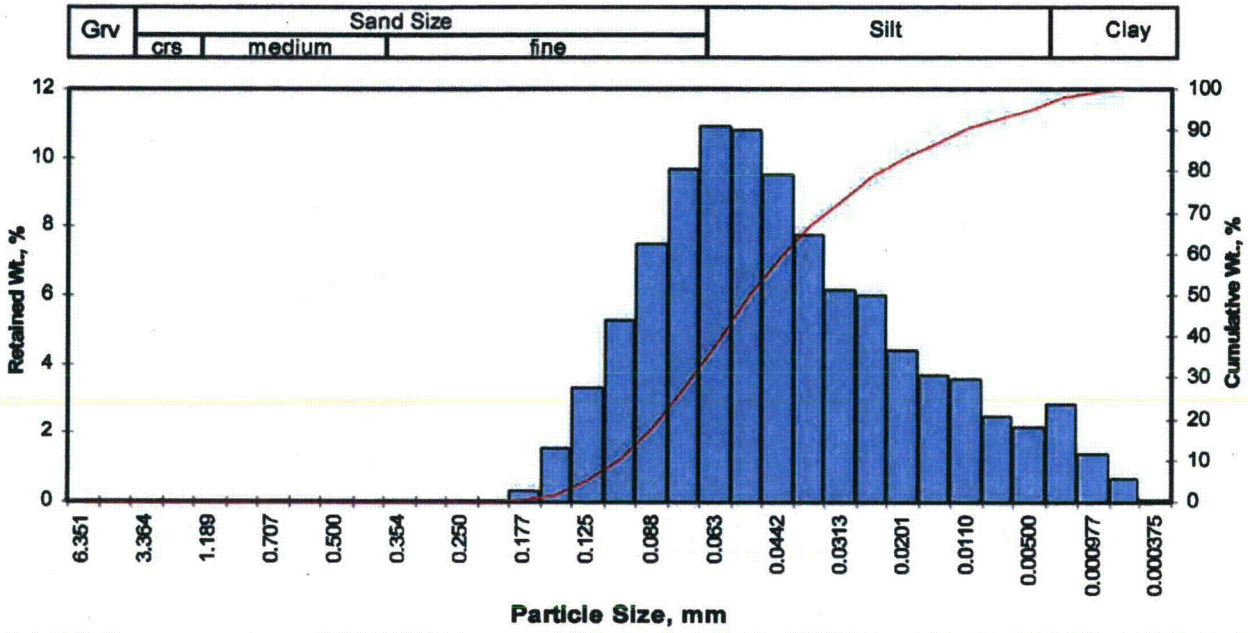
PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Crow Butte Resources, Inc.	**PTS File No:**	43570
Project:	Marsland Core	**Sample ID:**	M-1956C Run 4, Sample 2
Project No:	N/A	**Depth, ft:**	202.0-202.5



Opening		Phi of	U.S.	Sample	Increment	Cumulative
Inches	Millimeters	Screen	No.	Weight, grams	Weight, percent	Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.00	0.00	0.00
0.0117	0.297	1.75	50	0.00	0.00	0.00
0.0098	0.250	2.00	60	0.00	0.00	0.00
0.0083	0.210	2.25	70	0.02	0.02	0.02
0.0070	0.177	2.50	80	0.32	0.32	0.34
0.0059	0.149	2.75	100	1.54	1.54	1.88
0.0049	0.125	3.00	120	3.30	3.30	5.18
0.0041	0.105	3.25	140	5.27	5.27	10.45
0.0035	0.088	3.50	170	7.51	7.51	17.96
0.0029	0.074	3.75	200	9.69	9.69	27.65
0.0025	0.063	4.00	230	10.90	10.90	38.56
0.0021	0.053	4.25	270	10.80	10.80	49.36
0.00174	0.0442	4.50	325	9.50	9.50	58.86
0.00146	0.0372	4.75	400	7.74	7.74	66.60
0.00123	0.0313	5.00	450	6.13	6.13	72.73
0.000986	0.0250	5.32	500	5.99	5.99	78.72
0.000790	0.0201	5.64	635	4.42	4.42	83.14
0.000615	0.0156	6.00		3.66	3.66	86.80
0.000435	0.0110	6.50		3.57	3.57	90.37
0.000308	0.00781	7.00		2.46	2.46	92.83
0.000197	0.00500	7.65		2.16	2.16	95.00
0.000077	0.00195	9.00		2.84	2.84	97.84
0.000038	0.000977	10.00		1.41	1.41	99.25
0.000019	0.000488	11.00		0.69	0.69	99.94
0.000015	0.000375	11.38		0.06	0.06	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size	
		Inches	Millimeters
5	2.99	0.0050	0.126
10	3.23	0.0042	0.107
16	3.43	0.0036	0.092
25	3.68	0.0031	0.078
40	4.03	0.0024	0.061
50	4.27	0.0020	0.052
60	4.54	0.0017	0.043
75	5.12	0.0011	0.029
84	5.72	0.0007	0.019
90	6.45	0.0005	0.011
95	7.65	0.0002	0.005

Measure	Trask	Inman	Folk-Ward
Median, phi	4.27	4.27	4.27
Median, in.	0.0020	0.0020	0.0020
Median, mm	0.052	0.052	0.052
Mean, phi	4.23	4.58	4.48
Mean, in.	0.0021	0.0016	0.0018
Mean, mm	0.053	0.042	0.045
Sorting	1.647	1.145	1.279
Skewness	0.911	0.273	0.362
Kurtosis	0.258	1.036	1.327
Grain Size Description (ASTM-USCS Scale)		Silt (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	27.65
Silt	>0.005 mm	67.34
Clay	<0.005 mm	5.00
	Total	**100**

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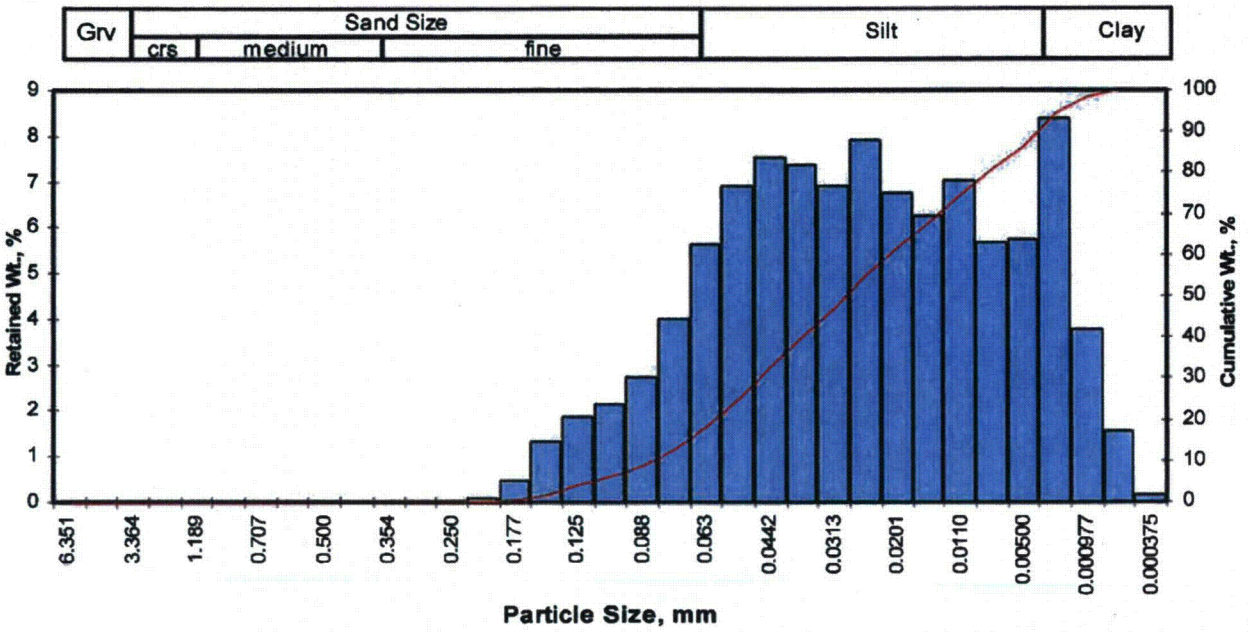
Particle Size Analysis - ASTM D4464M

Client:	Crow Butte Resources, Inc.	**PTS File No:**	43570
Project:	Marsland Core	**Sample ID:**	M-1956C Run 5, Sample 1
Project No:	N/A	**Depth, ft:**	425.6-426.2



Opening		Phi of	U.S.	Sample Weight,	Increment Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.00	0.00	0.00
0.0117	0.297	1.75	50	0.00	0.00	0.00
0.0098	0.250	2.00	60	0.00	0.00	0.00
0.0083	0.210	2.25	70	0.07	0.07	0.07
0.0070	0.177	2.50	80	0.48	0.48	0.55
0.0059	0.149	2.75	100	1.31	1.31	1.86
0.0049	0.125	3.00	120	1.85	1.85	3.71
0.0041	0.105	3.25	140	2.13	2.13	5.84
0.0035	0.088	3.50	170	2.72	2.72	8.56
0.0029	0.074	3.75	200	3.98	3.98	12.54
0.0025	0.063	4.00	230	5.62	5.62	18.15
0.0021	0.053	4.25	270	6.92	6.92	25.07
0.00174	0.0442	4.50	325	7.52	7.52	32.59
0.00146	0.0372	4.75	400	7.36	7.36	39.95
0.00123	0.0313	5.00	450	6.89	6.89	46.84
0.000986	0.0250	5.32	500	7.90	7.90	54.74
0.000790	0.0201	5.64	635	6.75	6.75	61.49
0.000615	0.0156	6.00		6.26	6.26	67.75
0.000435	0.0110	6.50		7.04	7.04	74.78
0.000308	0.00781	7.00		5.65	5.65	80.43
0.000197	0.00500	7.65		5.73	5.73	86.16
0.000077	0.00195	9.00		8.38	8.38	94.54
0.000038	0.000977	10.00		3.76	3.76	98.30
0.000019	0.000488	11.00		1.56	1.56	99.86
0.000015	0.000375	11.38		0.14	0.14	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight	Phi	Particle Size	
percent	Value	Inches	Millimeters
5	3.15	0.0044	0.113
10	3.59	0.0033	0.083
16	3.90	0.0026	0.067
25	4.25	0.0021	0.053
40	4.75	0.0015	0.037
50	5.13	0.0011	0.029
60	5.57	0.0008	0.021
75	6.52	0.0004	0.011
84	7.40	0.0002	0.006
90	8.27	0.0001	0.003
95	9.12	0.0001	0.002

Measure	Trask	Inman	Folk-Ward
Median, phi	5.13	5.13	5.13
Median, in.	0.0011	0.0011	0.0011
Median, mm	0.029	0.029	0.029
Mean, phi	4.98	5.65	5.48
Mean, in.	0.0013	0.0008	0.0009
Mean, mm	0.032	0.020	0.022
Sorting	2.197	1.749	1.779
Skewness	0.838	0.300	0.319
Kurtosis	0.262	0.707	1.077
Grain Size Description (ASTM-USCS Scale)		Silt (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	12.54
Silt	>0.005 mm	73.63
Clay	<0.005 mm	13.84
	Total	**100**

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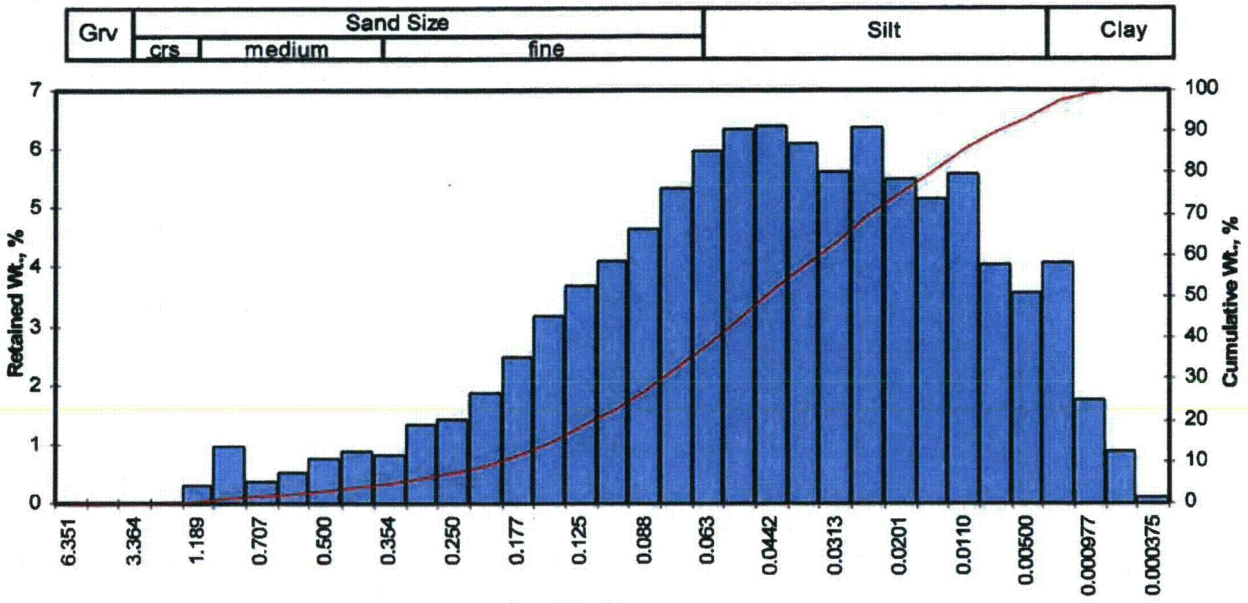
PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Crow Butte Resources, Inc.	**PTS File No:**	43570
Project:	Marsland Core	**Sample ID:**	M-1956C Run 5, Sample 2
Project No:	N/A	**Depth, ft:**	431.0-431.6



Opening		Phi of	U.S.	Sample	Increment	Cumulative
Inches	Millimeters	Screen	No.	Weight, grams	Weight, percent	Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.30	0.30	0.30
0.0331	0.841	0.25	20	0.96	0.96	1.26
0.0278	0.707	0.50	25	0.36	0.36	1.62
0.0234	0.595	0.75	30	0.50	0.50	2.12
0.0197	0.500	1.00	35	0.75	0.75	2.87
0.0166	0.420	1.25	40	0.89	0.89	3.76
0.0139	0.354	1.50	45	0.81	0.81	4.57
0.0117	0.297	1.75	50	1.32	1.32	5.89
0.0098	0.250	2.00	60	1.42	1.42	7.31
0.0083	0.210	2.25	70	1.86	1.86	9.17
0.0070	0.177	2.50	80	2.47	2.47	11.64
0.0059	0.149	2.75	100	3.17	3.17	14.81
0.0049	0.125	3.00	120	3.67	3.67	18.48
0.0041	0.105	3.25	140	4.09	4.09	22.57
0.0035	0.088	3.50	170	4.65	4.65	27.22
0.0029	0.074	3.75	200	5.35	5.35	32.57
0.0025	0.063	4.00	230	5.98	5.98	38.55
0.0021	0.053	4.25	270	6.34	6.34	44.89
0.00174	0.0442	4.50	325	6.40	6.40	51.29
0.00146	0.0372	4.75	400	6.10	6.10	57.39
0.00123	0.0313	5.00	450	5.62	5.62	63.01
0.000986	0.0250	5.32	500	6.38	6.38	69.39
0.000790	0.0201	5.64	635	5.50	5.50	74.89
0.000615	0.0156	6.00		5.15	5.15	80.04
0.000435	0.0110	6.50		5.57	5.57	85.61
0.000308	0.00781	7.00		4.05	4.05	89.66
0.000197	0.00500	7.65		3.55	3.55	93.21
0.000077	0.00195	9.00		4.08	4.08	97.29
0.000038	0.000977	10.00		1.76	1.76	99.05
0.000019	0.000488	11.00		0.87	0.87	99.92
0.000015	0.000375	11.38		0.08	0.08	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size	
		Inches	Millimeters
5	1.58	0.0132	0.334
10	2.33	0.0078	0.198
16	2.83	0.0055	0.141
25	3.38	0.0038	0.096
40	4.06	0.0024	0.060
50	4.45	0.0018	0.046
60	4.87	0.0013	0.034
75	5.65	0.0008	0.020
84	6.36	0.0005	0.012
90	7.06	0.0003	0.007
95	8.24	0.0001	0.003

Measure	Trask	Inman	Folk-Ward
Median, phi	4.45	4.45	4.45
Median, in.	0.0018	0.0018	0.0018
Median, mm	0.046	0.046	0.046
Mean, phi	4.11	4.59	4.55
Mean, in.	0.0023	0.0016	0.0017
Mean, mm	0.058	0.041	0.043
Sorting	2.194	1.762	1.890
Skewness	0.956	0.082	0.110
Kurtosis	0.199	0.889	1.204
Grain Size Description (ASTM-USCS Scale)		Silt (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	3.76
Fine Sand	200	28.81
Silt	>0.005 mm	60.64
Clay	<0.005 mm	6.79
	Total	**100**

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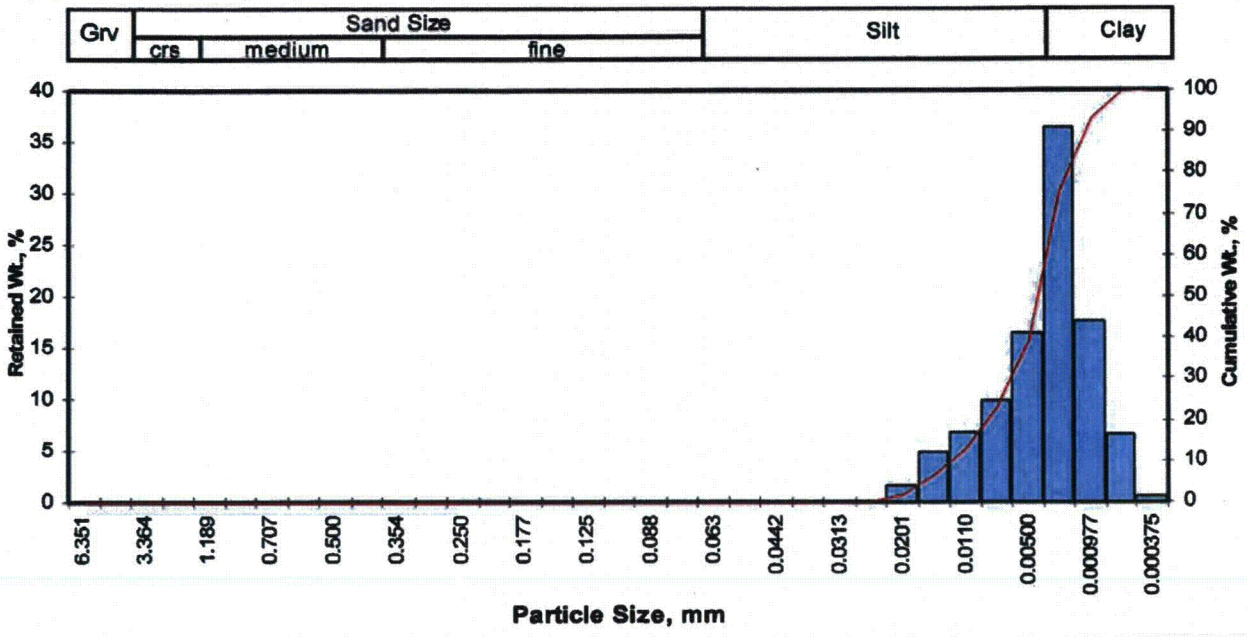
PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Crow Butte Resources, Inc.	**PTS File No:**	43570
Project:	Marsland Core	**Sample ID:**	M-1956C Run 6, Sample 1
Project No:	N/A	**Depth, ft:**	1011.8-1012.4



Opening		Phi of	U.S.	Sample	Increment	Cumulative
Inches	Millimeters	Screen	No.	Weight, grams	Weight, percent	Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.00	0.00	0.00
0.0117	0.297	1.75	50	0.00	0.00	0.00
0.0098	0.250	2.00	60	0.00	0.00	0.00
0.0083	0.210	2.25	70	0.00	0.00	0.00
0.0070	0.177	2.50	80	0.00	0.00	0.00
0.0059	0.149	2.75	100	0.00	0.00	0.00
0.0049	0.125	3.00	120	0.00	0.00	0.00
0.0041	0.105	3.25	140	0.00	0.00	0.00
0.0035	0.088	3.50	170	0.00	0.00	0.00
0.0029	0.074	3.75	200	0.00	0.00	0.00
0.0025	0.063	4.00	230	0.00	0.00	0.00
0.0021	0.053	4.25	270	0.00	0.00	0.00
0.00174	0.0442	4.50	325	0.00	0.00	0.00
0.00146	0.0372	4.75	400	0.00	0.00	0.00
0.00123	0.0313	5.00	450	0.00	0.00	0.00
0.000986	0.0250	5.32	500	0.02	0.02	0.02
0.000790	0.0201	5.64	635	1.49	1.49	1.51
0.000615	0.0156	6.00		4.74	4.74	6.25
0.000435	0.0110	6.50		6.64	6.64	12.90
0.000308	0.00781	7.00		9.83	9.84	22.73
0.000197	0.00500	7.65		16.40	16.41	39.14
0.000077	0.00195	9.00		36.30	36.32	75.46
0.000038	0.000977	10.00		17.50	17.51	92.97
0.000019	0.000488	11.00		6.51	6.51	99.48
0.000015	0.000375	11.38		0.52	0.52	100.00
TOTALS				**99.90**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight	Phi	Particle Size	
percent	Value	Inches	Millimeters
5	5.90	0.0007	0.017
10	6.28	0.0005	0.013
16	6.66	0.0004	0.010
25	7.09	0.0003	0.007
40	7.68	0.0002	0.005
50	8.05	0.0001	0.004
60	8.42	0.0001	0.003
75	8.98	0.0001	0.002
84	9.49	0.0001	0.001
90	9.83	0.0000	0.001
95	10.31	0.0000	0.001

Measure	Trask	Inman	Folk-Ward
Median, phi	8.05	8.05	8.05
Median, in.	0.0001	0.0001	0.0001
Median, mm	0.004	0.004	0.004
Mean, phi	7.75	8.07	8.07
Mean, in.	0.0002	0.0001	0.0001
Mean, mm	0.005	0.004	0.004
Sorting	1.928	1.415	1.375
Skewness	1.010	0.016	0.021
Kurtosis	0.228	0.557	0.954
Grain Size Description (ASTM-USCS Scale)		Clay (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	0.00
Silt	>0.005 mm	39.14
Clay	<0.005 mm	60.86
	Total	100

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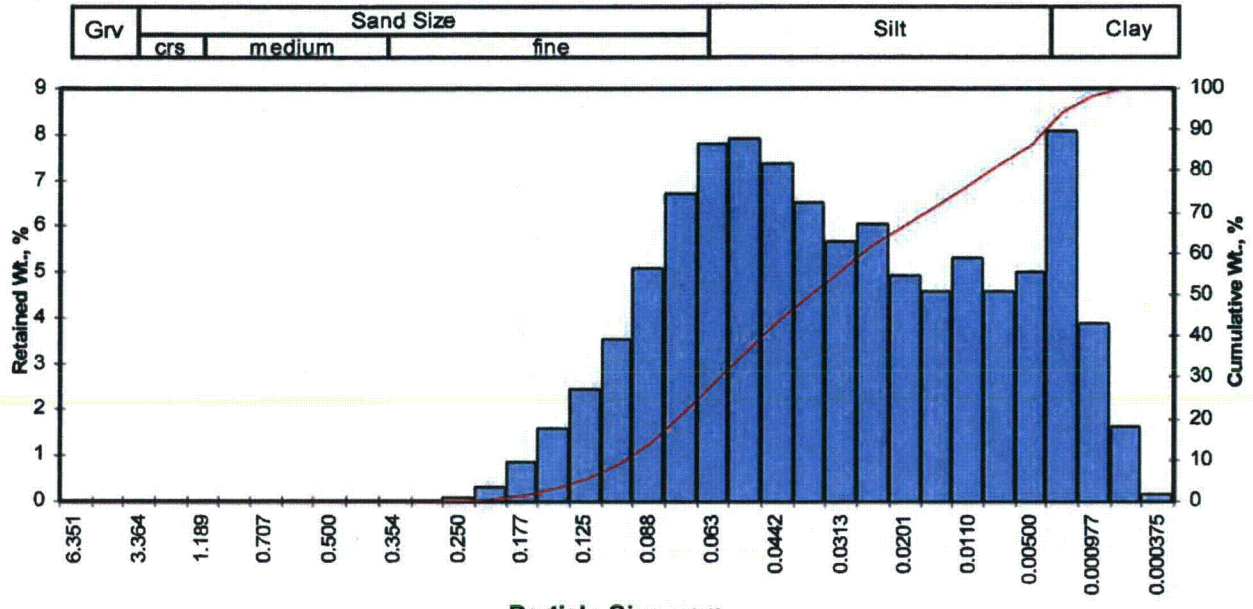
Particle Size Analysis - ASTM D4464M

Client:	Crow Butte Resources, Inc.	**PTS File No:**	43570
Project:	Marsland Core	**Sample ID:**	M-2169C Run 1, Sample 1
Project No:	N/A	**Depth, ft:**	110.0-110.5



Opening		Phi of	U.S.	Sample	Increment	Cumulative
Inches	Millimeters	Screen	No.	Weight, grams	Weight, percent	Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.00	0.00	0.00
0.0117	0.297	1.75	50	0.00	0.00	0.00
0.0098	0.250	2.00	60	0.06	0.06	0.06
0.0083	0.210	2.25	70	0.32	0.32	0.38
0.0070	0.177	2.50	80	0.85	0.85	1.23
0.0059	0.149	2.75	100	1.60	1.60	2.83
0.0049	0.125	3.00	120	2.43	2.43	5.26
0.0041	0.105	3.25	140	3.54	3.54	8.80
0.0035	0.088	3.50	170	5.07	5.07	13.87
0.0029	0.074	3.75	200	6.71	6.71	20.58
0.0025	0.063	4.00	230	7.79	7.79	28.37
0.0021	0.053	4.25	270	7.92	7.92	36.29
0.00174	0.0442	4.50	325	7.37	7.37	43.66
0.00146	0.0372	4.75	400	6.51	6.51	50.17
0.00123	0.0313	5.00	450	5.65	5.65	55.82
0.000986	0.0250	5.32	500	6.07	6.07	61.89
0.000790	0.0201	5.64	635	4.94	4.94	66.83
0.000615	0.0156	6.00		4.56	4.56	71.39
0.000435	0.0110	6.50		5.32	5.32	76.71
0.000308	0.00781	7.00		4.59	4.59	81.30
0.000197	0.00500	7.65		5.01	5.01	86.31
0.000077	0.00195	9.00		8.07	8.07	94.38
0.000038	0.000977	10.00		3.87	3.87	98.25
0.000019	0.000488	11.00		1.61	1.61	99.86
0.000015	0.000375	11.38		0.14	0.14	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Millimeters
5	2.97	0.0050	0.127
10	3.31	0.0040	0.101
16	3.58	0.0033	0.084
25	3.89	0.0027	0.067
40	4.38	0.0019	0.048
50	4.74	0.0015	0.037
60	5.22	0.0011	0.027
75	6.34	0.0005	0.012
84	7.35	0.0002	0.006
90	8.26	0.0001	0.003
95	9.16	0.0001	0.002

Measure	Trask	Inman	Folk-Ward
Median, phi	4.74	4.74	4.74
Median, in.	0.0015	0.0015	0.0015
Median, mm	0.037	0.037	0.037
Mean, phi	4.65	5.46	5.22
Mean, in.	0.0016	0.0009	0.0011
Mean, mm	0.040	0.023	0.027
Sorting	2.335	1.884	1.880
Skewness	0.773	0.382	0.405
Kurtosis	0.282	0.642	1.036
Grain Size Description (ASTM-USCS Scale)		Silt (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	20.58
Silt	>0.005 mm	65.73
Clay	<0.005 mm	13.69
	Total	**100**

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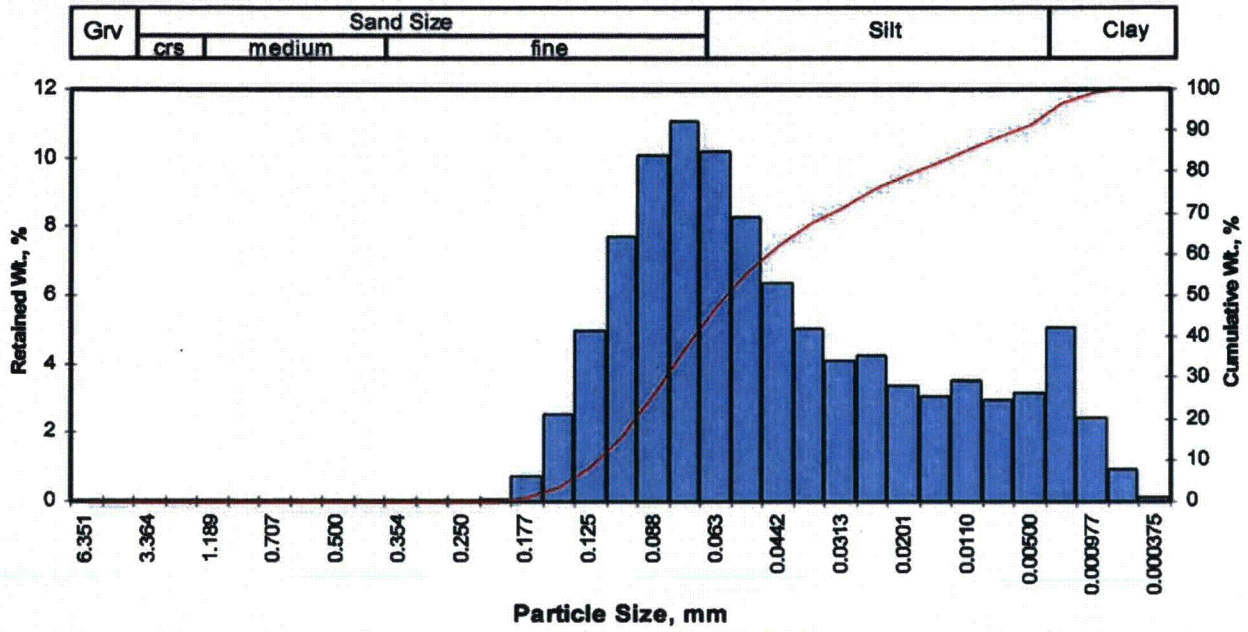
Particle Size Analysis - ASTM D4464M

Client:	Crow Butte Resources, Inc.	**PTS File No:**	43570
Project:	Marsland Core	**Sample ID:**	M-2169C Run 2, Sample 3
Project No:	N/A	**Depth, ft:**	156.5-157.2



Opening		Phi of	U.S.	Sample Weight,	Increment Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.00	0.00	0.00
0.0117	0.297	1.75	50	0.00	0.00	0.00
0.0098	0.250	2.00	60	0.00	0.00	0.00
0.0083	0.210	2.25	70	0.07	0.07	0.07
0.0070	0.177	2.50	80	0.73	0.73	0.80
0.0059	0.149	2.75	100	2.55	2.55	3.35
0.0049	0.125	3.00	120	4.98	4.98	8.33
0.0041	0.105	3.25	140	7.70	7.70	16.02
0.0035	0.088	3.50	170	10.10	10.09	26.12
0.0029	0.074	3.75	200	11.10	11.09	37.21
0.0025	0.063	4.00	230	10.20	10.19	47.40
0.0021	0.053	4.25	270	8.30	8.29	55.70
0.00174	0.0442	4.50	325	6.38	6.38	62.08
0.00146	0.0372	4.75	400	5.02	5.02	67.09
0.00123	0.0313	5.00	450	4.11	4.11	71.20
0.000986	0.0250	5.32	500	4.26	4.26	75.46
0.000790	0.0201	5.64	635	3.36	3.36	78.81
0.000615	0.0156	6.00		3.06	3.06	81.87
0.000435	0.0110	6.50		3.52	3.52	85.39
0.000308	0.00781	7.00		2.95	2.95	88.34
0.000197	0.00500	7.65		3.15	3.15	91.49
0.000077	0.00195	9.00		5.08	5.08	96.56
0.000038	0.000977	10.00		2.41	2.41	98.97
0.000019	0.000488	11.00		0.95	0.95	99.92
0.000015	0.000375	11.38		0.08	0.08	100.00
TOTALS				**100.10**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight	Phi	Particle Size	
percent	Value	Inches	Millimeters
5	2.83	0.0055	0.140
10	3.05	0.0047	0.120
16	3.25	0.0041	0.105
25	3.47	0.0035	0.090
40	3.82	0.0028	0.071
50	4.08	0.0023	0.059
60	4.42	0.0018	0.047
75	5.29	0.0010	0.026
84	6.30	0.0005	0.013
90	7.34	0.0002	0.006
95	8.58	0.0001	0.003

Measure	Trask	Inman	Folk-Ward
Median, phi	4.08	4.08	4.08
Median, in.	0.0023	0.0023	0.0023
Median, mm	0.059	0.059	0.059
Mean, phi	4.11	4.78	4.54
Mean, in.	0.0023	0.0014	0.0017
Mean, mm	0.058	0.037	0.043
Sorting	1.875	1.527	1.634
Skewness	0.812	0.457	0.512
Kurtosis	0.282	0.883	1.300
Grain Size Description (ASTM-USCS Scale)		Silt (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	37.21
Silt	>0.005 mm	54.28
Clay	<0.005 mm	8.51
	Total	**100**

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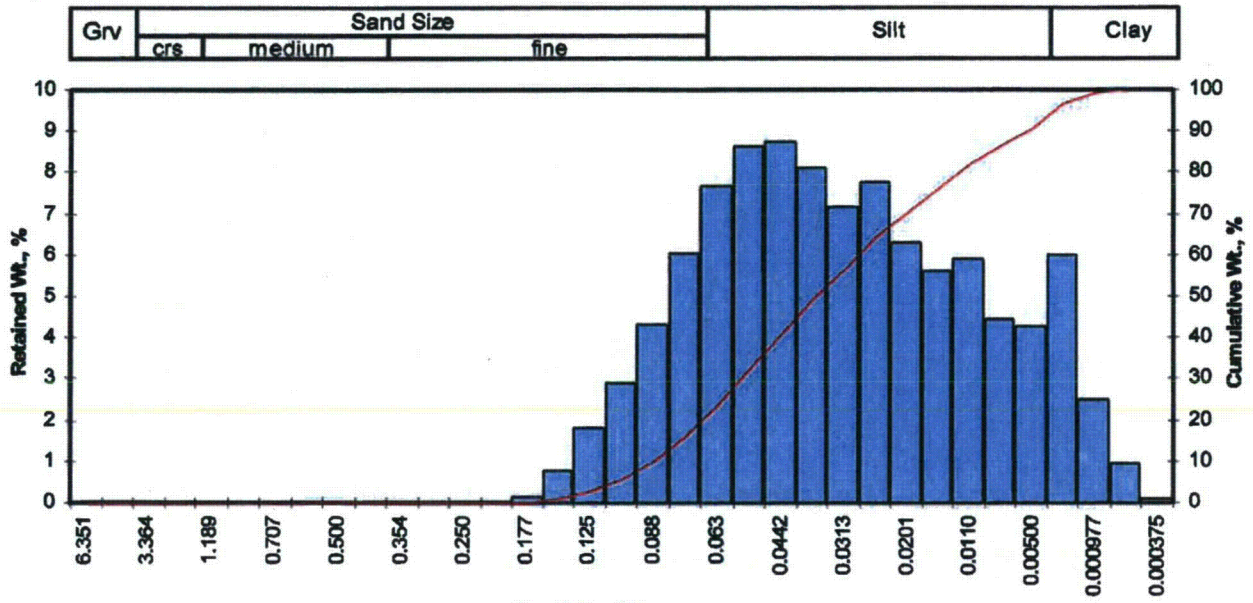
PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Crow Butte Resources, Inc.	**PTS File No:**	43570
Project:	Marsland Core	**Sample ID:**	M-2169C Run 3, Sample 1
Project No:	N/A	**Depth, ft:**	355.0-356.0



Opening		Phi of	U.S.	Sample	Increment	Cumulative
Inches	Millimeters	Screen	No.	Weight, grams	Weight, percent	Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.00	0.00	0.00
0.0117	0.297	1.75	50	0.00	0.00	0.00
0.0098	0.250	2.00	60	0.00	0.00	0.00
0.0083	0.210	2.25	70	0.00	0.00	0.00
0.0070	0.177	2.50	80	0.13	0.13	0.13
0.0059	0.149	2.75	100	0.79	0.79	0.92
0.0049	0.125	3.00	120	1.80	1.80	2.73
0.0041	0.105	3.25	140	2.90	2.90	5.63
0.0035	0.088	3.50	170	4.30	4.30	9.93
0.0029	0.074	3.75	200	6.04	6.04	15.97
0.0025	0.063	4.00	230	7.67	7.67	23.64
0.0021	0.053	4.25	270	8.62	8.62	32.26
0.00174	0.0442	4.50	325	8.74	8.74	41.00
0.00146	0.0372	4.75	400	8.10	8.10	49.10
0.00123	0.0313	5.00	450	7.16	7.16	56.26
0.000986	0.0250	5.32	500	7.75	7.75	64.01
0.000790	0.0201	5.64	635	6.28	6.28	70.29
0.000615	0.0156	6.00		5.59	5.59	75.88
0.000435	0.0110	6.50		5.90	5.90	81.78
0.000308	0.00781	7.00		4.43	4.43	86.21
0.000197	0.00500	7.65		4.28	4.28	90.49
0.000077	0.00195	9.00		5.97	5.97	96.46
0.000038	0.000977	10.00		2.52	2.52	98.98
0.000019	0.000488	11.00		0.94	0.94	99.92
0.000015	0.000375	11.38		0.08	0.08	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	3.20	0.0043	0.109
10	3.50	0.0035	0.088
16	3.75	0.0029	0.074
25	4.04	0.0024	0.061
40	4.47	0.0018	0.045
50	4.78	0.0014	0.036
60	5.15	0.0011	0.028
75	5.94	0.0006	0.016
84	6.75	0.0004	0.009
90	7.57	0.0002	0.005
95	8.67	0.0001	0.002

Measure	Trask	Inman	Folk-Ward
Median, phi	4.78	4.78	4.78
Median, in.	0.0014	0.0014	0.0014
Median, mm	0.036	0.036	0.036
Mean, phi	4.70	5.25	5.09
Mean, in.	0.0015	0.0010	0.0012
Mean, mm	0.039	0.026	0.029
Sorting	1.934	1.500	1.579
Skewness	0.865	0.313	0.367
Kurtosis	0.269	0.824	1.178
Grain Size Description (ASTM-USCS Scale)		Silt (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	15.97
Silt	>0.005 mm	74.53
Clay	<0.005 mm	9.51
	Total	**100**

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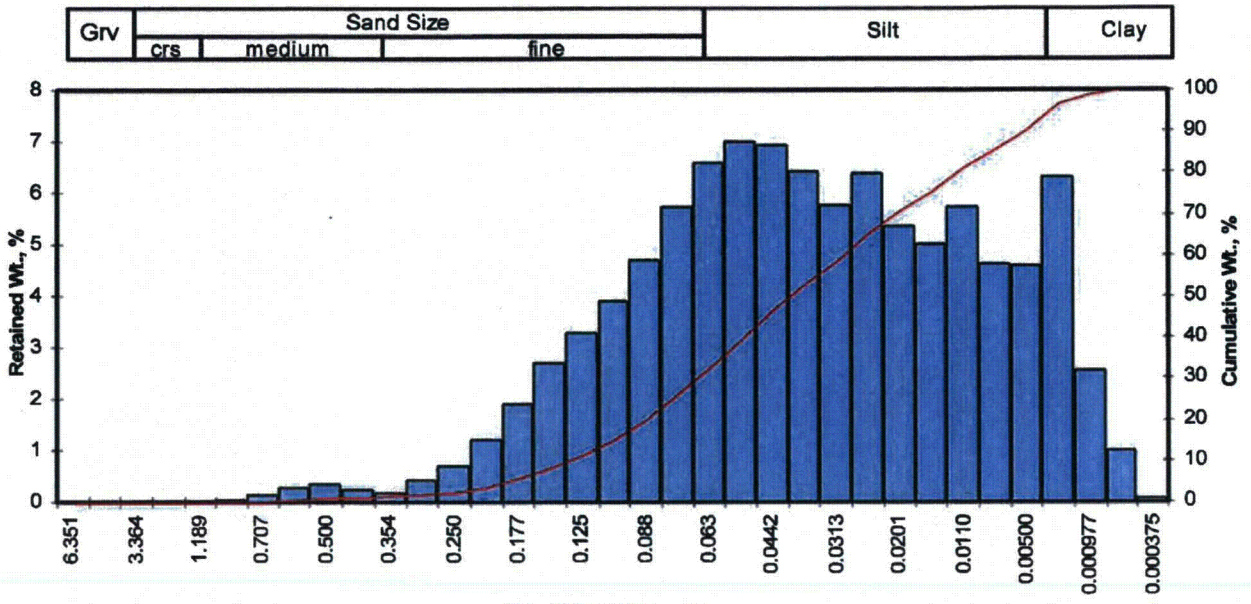
PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Crow Butte Resources, Inc.	**PTS File No:**	43570
Project:	Marsland Core	**Sample ID:**	M-2169C Run 4, Sample 1
Project No:	N/A	**Depth, ft:**	470.0-470.5



Particle Size, mm

Opening		Phi of	U.S.	Sample Weight,	Increment Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.05	0.05	0.05
0.0278	0.707	0.50	25	0.15	0.15	0.20
0.0234	0.595	0.75	30	0.28	0.28	0.48
0.0197	0.500	1.00	35	0.33	0.33	0.81
0.0166	0.420	1.25	40	0.24	0.24	1.05
0.0139	0.354	1.50	45	0.18	0.18	1.23
0.0117	0.297	1.75	50	0.40	0.40	1.63
0.0098	0.250	2.00	60	0.69	0.69	2.32
0.0083	0.210	2.25	70	1.21	1.21	3.53
0.0070	0.177	2.50	80	1.91	1.91	5.44
0.0059	0.149	2.75	100	2.69	2.69	8.13
0.0049	0.125	3.00	120	3.29	3.29	11.42
0.0041	0.105	3.25	140	3.88	3.88	15.30
0.0035	0.088	3.50	170	4.70	4.70	20.00
0.0029	0.074	3.75	200	5.72	5.72	25.72
0.0025	0.063	4.00	230	6.60	6.60	32.32
0.0021	0.053	4.25	270	7.00	7.00	39.32
0.00174	0.0442	4.50	325	6.92	6.92	46.24
0.00146	0.0372	4.75	400	6.41	6.41	52.65
0.00123	0.0313	5.00	450	5.75	5.75	58.40
0.000986	0.0250	5.32	500	6.37	6.37	64.77
0.000790	0.0201	5.64	635	5.34	5.34	70.11
0.000615	0.0156	6.00		4.99	4.99	75.10
0.000435	0.0110	6.50		5.73	5.73	80.83
0.000308	0.00781	7.00		4.62	4.62	85.45
0.000197	0.00500	7.65		4.60	4.60	90.05
0.000077	0.00195	9.00		6.31	6.31	96.36
0.000038	0.000977	10.00		2.56	2.56	98.92
0.000019	0.000488	11.00		1.00	1.00	99.92
0.000015	0.000375	11.38		0.08	0.08	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than

Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	2.44	0.0072	0.184
10	2.89	0.0053	0.135
16	3.29	0.0040	0.102
25	3.72	0.0030	0.076
40	4.27	0.0020	0.052
50	4.65	0.0016	0.040
60	5.08	0.0012	0.030
75	5.99	0.0006	0.016
84	6.84	0.0003	0.009
90	7.64	0.0002	0.005
95	8.71	0.0001	0.002

Measure	Trask	Inman	Folk-Ward
Median, phi	4.65	4.65	4.65
Median, in.	0.0016	0.0016	0.0016
Median, mm	0.040	0.040	0.040
Mean, phi	4.45	5.07	4.93
Mean, in.	0.0018	0.0012	0.0013
Mean, mm	0.046	0.030	0.033
Sorting	2.200	1.778	1.838
Skewness	0.865	0.235	0.266
Kurtosis	0.232	0.762	1.129
Grain Size Description (ASTM-USCS Scale)		**Silt** (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	1.05
Fine Sand	200	24.67
Silt	>0.005 mm	64.33
Clay	<0.005 mm	9.95
	Total	**100**

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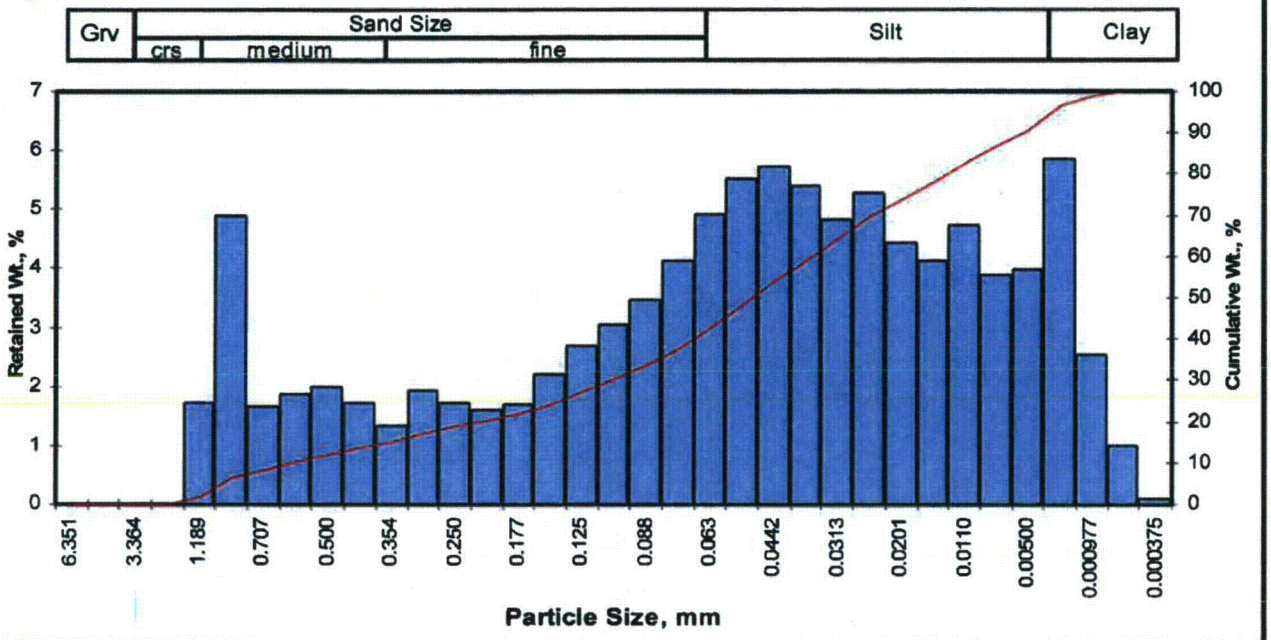
PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Crow Butte Resources, Inc.	**PTS File No:**	43570
Project:	Marsland Core	**Sample ID:**	M-2169C Run 5, Sample 1
Project No:	N/A	**Depth, ft:**	608.9-609.5



Opening (Inches)	Opening (Millimeters)	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	1.72	1.72	1.72
0.0331	0.841	0.25	20	4.90	4.90	6.62
0.0278	0.707	0.50	25	1.67	1.67	8.29
0.0234	0.595	0.75	30	1.86	1.86	10.15
0.0197	0.500	1.00	35	1.99	1.99	12.14
0.0166	0.420	1.25	40	1.73	1.73	13.87
0.0139	0.354	1.50	45	1.32	1.32	15.19
0.0117	0.297	1.75	50	1.94	1.94	17.13
0.0098	0.250	2.00	60	1.71	1.71	18.84
0.0083	0.210	2.25	70	1.60	1.60	20.44
0.0070	0.177	2.50	80	1.70	1.70	22.14
0.0059	0.149	2.75	100	2.19	2.19	24.33
0.0049	0.125	3.00	120	2.70	2.70	27.03
0.0041	0.105	3.25	140	3.05	3.05	30.08
0.0035	0.088	3.50	170	3.46	3.46	33.54
0.0029	0.074	3.75	200	4.13	4.13	37.67
0.0025	0.063	4.00	230	4.92	4.92	42.59
0.0021	0.053	4.25	270	5.52	5.52	48.11
0.00174	0.0442	4.50	325	5.73	5.73	53.84
0.00146	0.0372	4.75	400	5.41	5.41	59.25
0.00123	0.0313	5.00	450	4.83	4.83	64.08
0.000986	0.0250	5.32	500	5.28	5.28	69.36
0.000790	0.0201	5.64	635	4.42	4.42	73.78
0.000615	0.0156	6.00		4.14	4.14	77.92
0.000435	0.0110	6.50		4.75	4.75	82.67
0.000308	0.00781	7.00		3.88	3.88	86.56
0.000197	0.00500	7.65		3.98	3.98	90.54
0.000077	0.00195	9.00		5.84	5.84	96.38
0.000038	0.000977	10.00		2.54	2.54	98.92
0.000019	0.000488	11.00		1.00	1.00	99.92
0.000015	0.000375	11.38		0.08	0.08	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size (Inches)	Particle Size (Millimeters)
5	0.08	0.0371	0.943
10	0.73	0.0237	0.603
16	1.60	0.0129	0.329
25	2.81	0.0056	0.142
40	3.87	0.0027	0.068
50	4.33	0.0020	0.050
60	4.79	0.0014	0.036
75	5.75	0.0007	0.019
84	6.67	0.0004	0.010
90	7.56	0.0002	0.005
95	8.68	0.0001	0.002

Measure	Trask	Inman	Folk-Ward
Median, phi	4.33	4.33	4.33
Median, in.	0.0020	0.0020	0.0020
Median, mm	0.050	0.050	0.050
Mean, phi	3.63	4.14	4.20
Mean, in.	0.0032	0.0022	0.0021
Mean, mm	0.081	0.057	0.054
Sorting	2.764	2.533	2.569
Skewness	1.038	-0.077	-0.033
Kurtosis	0.104	0.697	1.201
Grain Size Description (ASTM-USCS Scale)		Fine sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	13.87
Fine Sand	200	23.80
Silt	>0.005 mm	52.86
Clay	<0.005 mm	9.46
	Total	**100**

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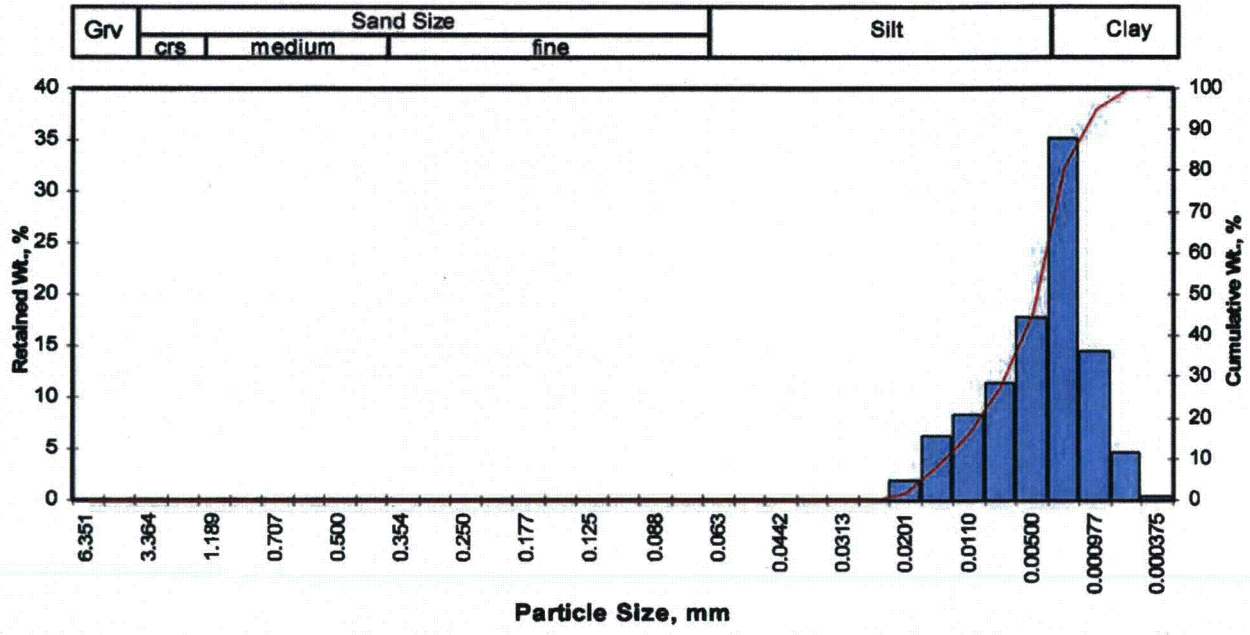
PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Crow Butte Resources, Inc.	**PTS File No:**	43570
Project:	Marsland Core	**Sample ID:**	M-2169C Run 7, Sample 1
Project No:	N/A	**Depth, ft:**	1135.5-1136.0



Opening		Phi of	U.S.	Sample	Increment	Cumulative
Inches	Millimeters	Screen	No.	Weight, grams	Weight, percent	Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.00	0.00	0.00
0.0117	0.297	1.75	50	0.00	0.00	0.00
0.0098	0.250	2.00	60	0.00	0.00	0.00
0.0083	0.210	2.25	70	0.00	0.00	0.00
0.0070	0.177	2.50	80	0.00	0.00	0.00
0.0059	0.149	2.75	100	0.00	0.00	0.00
0.0049	0.125	3.00	120	0.00	0.00	0.00
0.0041	0.105	3.25	140	0.00	0.00	0.00
0.0035	0.088	3.50	170	0.00	0.00	0.00
0.0029	0.074	3.75	200	0.00	0.00	0.00
0.0025	0.063	4.00	230	0.00	0.00	0.00
0.0021	0.053	4.25	270	0.00	0.00	0.00
0.00174	0.0442	4.50	325	0.00	0.00	0.00
0.00146	0.0372	4.75	400	0.00	0.00	0.00
0.00123	0.0313	5.00	450	0.00	0.00	0.00
0.000986	0.0250	5.32	500	0.02	0.02	0.02
0.000790	0.0201	5.64	635	1.86	1.86	1.88
0.000615	0.0156	6.00		6.16	6.16	8.05
0.000435	0.0110	6.50		8.34	8.34	16.39
0.000308	0.00781	7.00		11.30	11.30	27.69
0.000197	0.00500	7.65		17.70	17.70	45.40
0.000077	0.00195	9.00		35.10	35.11	80.50
0.000038	0.000977	10.00		14.40	14.40	94.91
0.000019	0.000488	11.00		4.73	4.73	99.64
0.000015	0.000375	11.38		0.36	0.36	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size	
		Inches	Millimeters
5	5.82	0.0007	0.018
10	6.12	0.0006	0.014
16	6.48	0.0004	0.011
25	6.88	0.0003	0.008
40	7.45	0.0002	0.006
50	7.82	0.0002	0.004
60	8.21	0.0001	0.003
75	8.79	0.0001	0.002
84	9.24	0.0001	0.002
90	9.66	0.0000	0.001
95	10.02	0.0000	0.001

Measure	Trask	Inman	Folk-Ward
Median, phi	7.82	7.82	7.82
Median, in.	0.0002	0.0002	0.0002
Median, mm	0.004	0.004	0.004
Mean, phi	7.54	7.86	7.85
Mean, in.	0.0002	0.0002	0.0002
Mean, mm	0.005	0.004	0.004
Sorting	1.936	1.383	1.327
Skewness	0.992	0.027	0.037
Kurtosis	0.236	0.518	0.902
Grain Size Description (ASTM-USCS Scale)		Silt (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	0.00
Silt	>0.005 mm	45.40
Clay	<0.005 mm	54.60
	Total	100

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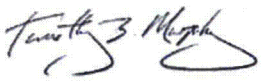
MINERALOGY, INC.

Final Test Report

Client:	PTS Laboratories, Inc.	MI#:	13383
Project:	Marsland Core / PTS# 43570	Sample Type:	Conventional Core
PO#:	13-349	Date:	10.03.13

Contact	Rachel Spitz
Address	PTS Laboratories, Inc.
	8100 Secura Way
	Santa Fe Springs, CA 90670
E-mail	rspitz@ptslabs.com
Phone	562.347.2500
Project ID:	Marsland Core / PTS# 43570 / PO# 13-349
Test Methods	XRD (B&C) (x30)
Calibration Date	10.03.13
MI Lab Supervisor	
	Timothy B. Murphy

CONDITIONS AND QUALIFICATIONS

Mineralogy, Inc. will endeavor to provide accurate and reliable laboratory measurements of the samples provided by the client. The results of any x-ray diffraction, petrographic or core analysis test are necessarily influenced by the condition and selection of the samples to be analyzed. It should be recognized that geological samples are commonly heterogeneous and lack uniform properties. Mineralogical, geochemical and/or petrographic data obtained for a specific sample provides compositional data pertinent to that specific sampling location. Such "site-specific data" may fail to provide adequate characterization of the range of compositional variability possible within a given project area, thus the "projection" of these laboratory findings and values to adjoining, "untested" areas of the formation or project area is inherently risky, and exceeds the scope of the laboratory work request. Hence, Mineralogy, Inc. shall not assume any liability risk or responsibility for any loss or potential failure associated with the application of "site or sample-specific laboratory data" to "untested" areas of the formation or project area. Unless otherwise directed, the samples selected for analysis will be chosen to reflect a visually representative portion of the bulk sample submitted for analysis. Where provided, the interpretation of x-ray diffraction, petrographic or core analysis results constitutes the best geological judgment of Mineralogy, Inc., and is subject to the sampling limitations described above, and the detection limits inherent to semi-quantitative and/or qualitative mineralogical and microscopic analysis. Mineralogy, Inc. assumes no responsibility nor offers any guarantee of the productivity, suitability or performance of any oil or gas well, hydrocarbon recovery process, dimension stone, and/or ore material based upon the data or conclusions presented in this report.

MINERALOGY, INC.

TABLE I-1
X-RAY DIFFRACTION ANALYSIS

Client: PTS Laboratories, Inc. **MI#:** 13383
Project ID: Marsland Core / PTS# 43570 / PO# 13-349 **Sample Type:** Conventional Core

X-Ray Diffraction Results

	Sample ID	M-533C.Run 1.S1	M-533C.Run 1.S2	M-533C.Run 3.S1	M-533C.Run 3.S2	M-533C.Run 5.S1
	Lab ID	13383-01	13383-02	13383-03	13383-04	13383-05
Mineral Constituents	Chemical Formula	Relative Abundance (%)				
Quartz	SiO_2	63	17	4	9	29
Plagioclase Feldspar	$(Na_{0.26}Ca_{0.24})Al_{0.735}Si_{1.266}O_4$	27	12	4	11	6
K-Feldspar - Microcline	$KAlSi_3O_8$	7	5	1	2	4
Calcite	$CaCO_3$				6	
Ferroan Dolomite	$Ca(Mg_{0.67}Fe_{0.33})(CO_3)_2$	trc				
Siderite	$FeCO_3$					
Halite	NaCl			trc		
Fluorapatite	$Ca_5F(PO_4)_3$		1		1	1
Augite	$Ca(Fe,Mg)Si_2O_6$	trc		trc		1
Hornblende	$Ca_2(Mg,Fe)_5(Si,Al)_8O_{22}(OH)_6$	trc				trc
Gypsum	$CaSO_4 \cdot 2H_2O$					
Goethite	alpha-FeOOH	trc				
Clinoptilolite	$(Na,K,Ca)_6(Si,Al)_{36}O_{72} \cdot 20H_2O$		trc			1
Kaolinite	$Al_2Si_2O_5(OH)_4$					1
Chlorite	$(Mg,Al)_6(Si,Al)_4O_{10}(OH)_8$	trc	trc			2
Illite/Mica	$KAl_2(Si_3AlO_{10})(OH)_2$	trc	5	1	1	4
Montmorillonite	$(Na,Ca)_{0.3}(Al,Mg)_2Si_4O_{10}(OH)_2 \cdot xH_2O$				7	
Mixed-Layered Illite/Smectite	$K_{0.5}Al_2(Si,Al)_4O_{10}(OH)_2 \cdot 2H_2O$	3	30	8		33
Amorphous			30	82	63	18
TOTAL		100	100	100	100	100
% Illite Layers in ML Illite/Smectite	+/- 5%	10%	10%	10%		10%

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TABLE I-2
X-RAY DIFFRACTION ANALYSIS

Client: PTS Laboratories, Inc. MI#: 13383
Project ID: Marsland Core / PTS# 43570 / PO# 13-349 Sample Type: Conventional Core

X-Ray Diffraction Results

	Sample ID	M-1635C.Run 1.S1	M-1635C.Run 1.S2	M-1635C.Run 2.S1	M-1635C.Run 2.S2	M-1635C.Run 3.S1
	Lab ID	13383-06	13383-07	13383-08	13383-09	13383-10
Mineral Constituents	Chemical Formula	Relative Abundance (%)				
Quartz	SiO_2	12	15	4	9	9
Plagioclase Feldspar	$(Na_{0.26}Ca_{0.24})Al_{0.735}Si_{1.266}O_4$	9	13	3	11	9
K-Feldspar - Microcline	$KAlSi_3O_8$	3	3	1	3	2
Calcite	$CaCO_3$	50	46			15
Ferroan Dolomite	$Ca(Mg_{0.67}Fe_{0.33})(CO_3)_2$					trc
Siderite	$FeCO_3$					
Halite	NaCl					
Fluorapatite	$Ca_5F(PO_4)_3$					
Augite	$Ca(Fe,Mg)Si_2O_6$					
Hornblende	$Ca_2(Mg,Fe)_5(Si,Al)_8O_{22}(OH)_6$					
Gypsum	$CaSO_4 \cdot 2H_2O$					
Goethite	alpha-FeOOH					
Clinoptilolite	$(Na,K,Ca)_6(Si,Al)_{36}O_{72} \cdot 20H_2O$					
Kaolinite	$Al_2Si_2O_5(OH)_4$					
Chlorite	$(Mg,Al)_6(Si,Al)_4O_{10}(OH)_8$	1		1		trc
Illite/Mica	$KAl_2(Si_3AlO_{10})(OH)_2$	1	1	1	1	3
Montmorillonite	$(Na,Ca)_{0.3}(Al,Mg)_2Si_4O_{10}(OH)_2 \cdot xH_2O$			6	9	34
Mixed-Layered Illite/Smectite	$K_{0.5}Al_2(Si,Al)_4O_{10}(OH)_2 \cdot 2H_2O$	8	5			
Amorphous		16	17	84	67	28
TOTAL		100	100	100	100	100
% Illite Layers in ML Illite/Smectite	+/- 5%	5%	10%			

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MINERALOGY, INC.

TABLE I-3
X-RAY DIFFRACTION ANALYSIS

Client: PTS Laboratories, Inc. MI#: 13383
Project ID: Marsland Core / PTS# 43570 / PO# 13-349 Sample Type: Conventional Core

X-Ray Diffraction Results

	Sample ID	M-1635C.Run 6.S1	M-1912C.Run 1.S1	M-1912C.Run 2.S1	M-1912C.Run 3.S1	M-1912C.Run 3.S2
	Lab ID	13383-11	13383-12	13383-13	13383-14	13383-15
Mineral Constituents	Chemical Formula	Relative Abundance (%)				
Quartz	SiO_2	21	50	40	17	16
Plagioclase Feldspar	$(Na_{0.26}Ca_{0.24})Al_{0.735}Si_{1.266}O_4$	5	22	27	17	14
K-Feldspar - Microcline	$KAlSi_3O_8$	2	9	7	5	5
Calcite	$CaCO_3$					9
Ferroan Dolomite	$Ca(Mg_{0.67}Fe_{0.33})(CO_3)_2$	1	1			
Siderite	$FeCO_3$					
Pyrite	FeS_2					1
Fluorapatite	$Ca_5F(PO_4)_3$	trc				
Augite	$Ca(Fe,Mg)Si_2O_6$					
Hornblende	$Ca_2(Mg,Fe)_5(Si,Al)_8O_{22}(OH)_6$		1		1	
Gypsum	$CaSO_4 \cdot 2H_2O$					
Goethite	alpha-FeOOH					
Clinoptilolite	$(Na,K,Ca)_6(Si,Al)_{36}O_{72} \cdot 20H_2O$					
Kaolinite	$Al_2Si_2O_5(OH)_4$					
Chlorite	$(Mg,Al)_6(Si,Al)_4O_{10}(OH)_8$	5			trc	
Illite/Mica	$KAl_2(Si_3AlO_{10})(OH)_2$	4	trc	1	1	1
Montmorillonite	$(Na,Ca)_{0.3}(Al,Mg)_2Si_4O_{10}(OH)_2 \cdot xH_2O$					
Mixed-Layered Illite/Smectite	$K_{0.5}Al_2(Si,Al)_4O_{10}(OH)_2 \cdot 2H_2O$	42	5	7	27	20
Amorphous		20	12	18	32	34
TOTAL		100	100	100	100	100
% Illite Layers in ML Illite/Smectite	+/- 5%	20%	20%	20%	20%	20%

3321 EAST 27TH STREET * TULSA, OKLAHOMA 74114 * 918 744 9284 (O) * 918 743 7460 (F) * www.mineralogy.com

MINERALOGY, INC.

TABLE I-4
X-RAY DIFFRACTION ANALYSIS

Client: PTS Laboratories, Inc.
Project ID: Marsland Core / PTS# 43570 / PO# 13-349

MI#: 13383
Sample Type: Conventional Core

X-Ray Diffraction Results

	Sample ID	M-1912C.Run 4.S1	M-1912C.Run 4.S2	M-1956C.Run 1.S1	M-1956C.Run 3.S1	M-1956C.Run 4.S1
	Lab ID	13383-16	13383-17	13383-18	13383-19	13383-20
Mineral Constituents	Chemical Formula	Relative Abundance (%)				
Quartz	SiO_2	22	38	64	13	13
Plagioclase Feldspar	$(Na_{0.26}Ca_{0.24})Al_{0.735}Si_{1.268}O_4$	4	8	22	13	14
K-Feldspar - Microcline	$KAlSi_3O_8$	3	10	9	5	1
Calcite	$CaCO_3$		1	1	1	9
Ferroan Dolomite	$Ca(Mg_{0.67}Fe_{0.33})(CO_3)_2$	1	trc	1		
Siderite	$FeCO_3$					
Pyrite	FeS_2					
Fluorapatite	$Ca_5F(PO_4)_3$					
Augite	$Ca(Fe,Mg)Si_2O_6$					
Hornblende	$Ca_2(Mg,Fe)_5(Si,Al)_8O_{22}(OH)_6$			trc	trc	
Gypsum	$CaSO_4 \cdot 2H_2O$					
Goethite	alpha-FeOOH			trc		
Clinoptilolite	$(Na,K,Ca)_6(Si,Al)_{36}O_{72} \cdot 20H_2O$					
Kaolinite	$Al_2Si_2O_5(OH)_4$					
Chlorite	$(Mg,Al)_6(Si,Al)_4O_{10}(OH)_8$	1				
Illite/Mica	$KAl_2(Si_3AlO_{10})(OH)_2$	4	3	trc	5	1
Montmorillonite	$(Na,Ca)_{0.3}(Al,Mg)_2Si_4O_{10}(OH)_2 \cdot xH_2O$					22
Mixed-Layered Illite/Smectite	$K_{0.5}Al_2(Si,Al)_4O_{10}(OH)_2 \cdot 2H_2O$	45	25	3	21	
Amorphous		20	15		42	40
TOTAL		100	100	100	100	100
% Illite Layers in ML Illite/Smectite	+/- 5%	10%	10%	10%	15%	

3321 EAST 27TH STREET * TULSA, OKLAHOMA 74114 * 918 744 8284 (O) * 918 743 7460 (F) * www.mineralogy-inc.com

MINERALOGY, INC.

TABLE I-5

X-RAY DIFFRACTION ANALYSIS

Client: PTS Laboratories, Inc. MI#: 13383

Project ID: Marsland Core / PTS# 43570 / PO# 13-349 Sample Type: Conventional Core

X-Ray Diffraction Results

	Sample ID	M-1956C.Run 4.S2	M-1956C.Run 5.S1	M-1956C.Run 5.S2	M-1956C.Run 6.S1	M-2169C.Run 1.S1
	Lab ID	13383-21	13383-22	13383-23	13383-24	13383-25
Mineral Constituents	Chemical Formula	Relative Abundance (%)				
Quartz	SiO_2	12	12	4	22	7
Plagioclase Feldspar	$(Na_{0.26}Ca_{0.24})Al_{0.735}Si_{1.266}O_4$	15	12	5	4	8
K-Feldspar - Microcline	$KAlSi_3O_8$	1	3	1	1	2
Calcite	$CaCO_3$		10	58	trc	56
Ferroan Dolomite	$Ca(Mg_{0.67}Fe_{0.33})(CO_3)_2$					1
Siderite	$FeCO_3$					
Halite	NaCl					
Fluorapatite	$Ca_5F(PO_4)_3$					
Augite	$Ca(Fe,Mg)Si_2O_6$					
Hornblende	$Ca_2(Mg,Fe)_5(Si,Al)_8O_{22}(OH)_6$	1				
Gypsum	$CaSO_4 \cdot 2H_2O$					
Goethite	alpha-FeOOH					
Clinoptilolite	$(Na,K,Ca)_6(Si,Al)_{36}O_{72} \cdot 20H_2O$					
Kaolinite	$Al_2Si_2O_5(OH)_4$				2	
Chlorite	$(Mg,Al)_6(Si,Al)_4O_{10}(OH)_8$				2	
Illite/Mica	$KAl_2(Si_3AlO_{10})(OH)_2$	1	2	1	10	1
Montmorillonite	$(Na,Ca)_{0.3}(Al,Mg)_2Si_4O_{10}(OH)_2 \cdot xH_2O$		29			
Mixed-Layered Illite/Smectite	$K_{0.5}Al_2(Si,Al)_4O_{10}(OH)_2 \cdot 2H_2O$	25		9	37	10
Amorphous		45	32	22	22	15
TOTAL		100	100	100	100	100
% Illite Layers in ML Illite/Smectite	+/- 5%	20%		10%	30%	15%

3321 EAST 27TH STREET * TULSA, OKLAHOMA 74114 * 918 744 8284 (O) * 918 743-7460 (F) * www.mineralogy.com

MINERALOGY, INC.

TABLE I-6
X-RAY DIFFRACTION ANALYSIS

Client: PTS Laboratories, Inc.
Project ID: Marsland Core / PTS# 43570 / PO# 13-349

MI#: 13383
Sample Type: Conventional Core

X-Ray Diffraction Results

	Sample ID	M-2169C.Run 2.S3	M-2169C.Run 3.S1	M-2169C.Run 4.S1	M-2169C.Run 5.S1	M-2169C.Run 7.S1
	Lab ID	13383-26	13383-27	13383-28	13383-29	13383-30
Mineral Constituents	Chemical Formula	Relative Abundance (%)				
Quartz	SiO_2	21	5	12	13	24
Plagioclase Feldspar	$(Na_{0.26}Ca_{0.24})Al_{0.735}Si_{1.265}O_4$	16	7	11	13	4
K-Feldspar - Microcline	$KAlSi_3O_8$	3	1	2	2	4
Calcite	$CaCO_3$	trc	2	6	11	trc
Ferroan Dolomite	$Ca(Mg_{0.67}Fe_{0.33})(CO_3)_2$					2
Siderite	$FeCO_3$					
Halite	NaCl		trc			
Fluorapatite	$Ca_5F(PO_4)_3$					
Augite	$Ca(Fe,Mg)Si_2O_6$					
Hornblende	$Ca_2(Mg,Fe)_5(Si,Al)_8O_{22}(OH)_6$	trc	trc			
Gypsum	$CaSO_4 \cdot 2H_2O$		trc			
Goethite	alpha-FeOOH					
Clinoptilolite	$(Na,K,Ca)_6(Si,Al)_{36}O_{72} \cdot 20H_2O$					
Kaolinite	$Al_2Si_2O_5(OH)_4$					2
Chlorite	$(Mg,Al)_6(Si,Al)_4O_{10}(OH)_8$					2
Illite/Mica	$KAl_2(Si_3AlO_{10})(OH)_2$	2	1	1	1	4
Montmorillonite	$(Na,Ca)_{0.3}(Al,Mg)_2Si_4O_{10}(OH)_2 \cdot xH_2O$		19	28	25	
Mixed-Layered Illite/Smectite	$K_{0.5}Al_2(Si,Al)_4O_{10}(OH)_2 \cdot 2H_2O$	13				30
Amorphous		45	65	40	35	28
TOTAL		100	100	100	100	100
% Illite Layers in ML Illite/Smectite	+/- 5%	10%				10%

3321 EAST 27TH STREET * TULSA, OKLAHOMA 74114 * 918 744 8284 (O) * 918 743 7460 (F) * www.mineralogy-inc.com

PTS Laboratories, Inc. CHAIN OF CUSTODY RECORD PAGE 1 OF 3

COMPANY
PTS Laboratories, Inc.

ADDRESS CITY ZIP CODE
8100 Secura Way, Santa Fe Springs, CA 90670

PROJECT MANAGER
Rachel Spitz

PROJECT NAME
Marsland Core PHONE NUMBER 562-347-2500

PROJECT NUMBER
N/A FAX NUMBER 562-279-1150

SITE LOCATION
N/A

SAMPLER SIGNATURE

ANALYSIS REQUEST

PO# 13-349

TURNAROUND TIME
24 HOURS 5 DAYS
48 HOURS **NORMAL**
72 HOURS
OTHER:

SAMPLE INTEGRITY (CHECK):
INTACT ON ICE

PTS QUOTE NO.

PTS FILE:
43570

SAMPLE ID NUMBER	DATE	TIME	DEPTH, FT	NUMBER OF SAMPLES	XRD	COMMENTS
M-533C Run 1, Sample 1	20130812	N/A	63.9-64.9	1	X	
M-533C Run 1, Sample 2	20130812	N/A	68.8-69.8	1	X	
M-533C Run 3, Sample 1	20130812	N/A	299.0-300.0	1	X	
M-533C Run 3, Sample 2	20130812	N/A	306.0-307.0	1	X	
M-533C Run 5, Sample 1	20130812	N/A	1052.5-1053.0	1	X	
M-1635C Run 1, Sample 1	20130822	N/A	70.0-70.5	1	X	
M-1635C Run 1, Sample 2	20130822	N/A	79.5-80.0	1	X	
M-1635C Run 2, Sample 1	20130822	N/A	197.0-197.5	1	X	
M-1635C Run 2, Sample 2	20130822	N/A	206.5-207.0	1	X	
M-1635C Run 3, Sample 1	20130822	N/A	530.0-530.5	1	X	
M-1635C Run 6, Sample 1	20130822	N/A	993.0-994.0	1	X	

1. RELINQUISHED BY	2. RECEIVED BY	3. RELINQUISHED BY	4. RECEIVED BY
COMPANY PTS CARS	COMPANY	COMPANY	COMPANY
DATE TIME 9/9/13 16:30	DATE TIME	DATE TIME	DATE TIME

PTS Laboratories, Inc.

CHAIN OF CUSTODY RECORD PAGE 2 OF 3

COMPANY
PTS Laboratories, Inc.

ADDRESS CITY ZIP CODE
8100 Secura Way, Santa Fe Springs, CA 90670

PROJECT MANAGER
Rachel Spitz

PROJECT NAME
Marsland Core

PHONE NUMBER 562-347-2500

PROJECT NUMBER
N/A

FAX NUMBER 562-279-1150

SITE LOCATION
N/A

SAMPLER SIGNATURE

ANALYSIS REQUEST

PO# 13-349

TURNAROUND TIME
24 HOURS 5 DAYS
48 HOURS **NORMAL**
72 HOURS
OTHER:

SAMPLE INTEGRITY (CHECK):
INTACT ON ICE

PTS QUOTE NO.

PTS FILE:
43570

SAMPLE ID NUMBER	DATE	TIME	DEPTH, FT	NUMBER OF SAMPLES	XRD	COMMENTS
M-1912C Run 1, Sample 1	20130814	N/A	63.0-64.0	1	X	
M-1912C Run 2, Sample 1	20130814	N/A	130.7-131.7	1	X	
M-1912C Run 3, Sample 1	20130814	N/A	255.0-255.5	1	X	
M-1912C Run 3, Sample 2	20130814	N/A	260.4-260.9	1	X	
M-1912C Run 4, Sample 1	20130814	N/A	974.5-975.0	1	X	
M-1912C Run 4, Sample 2	20130814	N/A	968.7-969.7	1	X	
M-1956C Run 1, Sample 1	20130819	N/A	42.0-43.0	1	X	
M-1956C Run 3, Sample 1	20130819	N/A	78.0-79.0	1	X	
M-1956C Run 4, Sample 1	20130819	N/A	196.5-197.1	1	X	
M-1956C Run 4, Sample 2	20130819	N/A	202.0-202.5	1	X	
M-1956C Run 5, Sample 1	20130819	N/A	425.6-426.2	1	X	

1. RELINQUISHED BY	2. RECEIVED BY	3. RELINQUISHED BY	4. RECEIVED BY
COMPANY PTS CABS	COMPANY	COMPANY	COMPANY
DATE TIME 9/9/13 16:30	DATE TIME	DATE TIME	DATE TIME

PTS Laboratories, Inc.

CHAIN OF CUSTODY RECORD PAGE 3 OF 3

COMPANY
PTS Laboratories, Inc.

ADDRESS CITY ZIP CODE
8100 Secura Way, Santa Fe Springs, CA 90670

PROJECT MANAGER
Rachel Spitz

PROJECT NAME
Marsland Core

PHONE NUMBER 562-347-2500

PROJECT NUMBER
N/A

FAX NUMBER 562-279-1150

SITE LOCATION
N/A

SAMPLER SIGNATURE

ANALYSIS REQUEST

PO# 13-349

TURNAROUND TIME
24 HOURS 5 DAYS
48 HOURS **NORMAL**
72 HOURS
OTHER:

SAMPLE INTEGRITY (CHECK):
INTACT ON ICE

PTS QUOTE NO.

PTS FILE:
43570

SAMPLE ID NUMBER	DATE	TIME	DEPTH, FT	NUMBER OF SAMPLES	XRD	COMMENTS
M-1956C Run 5, Sample 2	20130819	N/A	431.0-431.6	1	X	
M-1956C Run 6, Sample 1	20130819	N/A	1011.8-1012.4	1	X	
M-2169C Run 1, Sample 1	20130806	N/A	110.0-110.5	1	X	
M-2169C Run 2, Sample 3	20130806	N/A	156.5-157.2	1	X	
M-2169C Run 3, Sample 1	20130806	N/A	355.0-356.0	1	X	
M-2169C Run 4, Sample 1	20130806	N/A	470.0-470.5	1	X	
M-2169C Run 5, Sample 1	20130806	N/A	608.9-609.5	1	X	
M-2169C Run 7, Sample 1	20130806	N/A	1135.5-1136.0	1	X	

1. RELINQUISHED BY	2. RECEIVED BY	3. RELINQUISHED BY	4. RECEIVED BY
COMPANY PTS Labs	COMPANY	COMPANY	COMPANY
DATE TIME 9/9/13 16:30	DATE TIME	DATE TIME	DATE TIME

PTS Laboratories, Inc.

CHAIN OF CUSTODY RECORD

PAGE 1 OF 1

COMPANY	Crow Butte Resources,
ADDRESS	86 Crow Butte Rd
CITY	Crawford, NE
ZIP CODE	69339
PROJECT MANAGER	Wade Reins
PHONE NUMBER	(308) 665-2215 x 113
PROJECT NAME	Marsland
PHONE NUMBER	(308) 665-2341
PROJECT NUMBER	
FAX NUMBER	
SITE LOCATION	M-533C
SAMPLER SIGNATURE	Wade Reins

ANALYSIS REQUEST

SAMPLE ID NUMBER	DATE	TIME	DEPTH, FT	NUMBER OF SAMPLES	SOIL PROPERTIES PACKAGE	HYDRAULIC CONDUCTIVITY PACKAGE	PORE FLUID SATURATIONS PACKAGE	TCEQ/TNRCC PROPERTIES PACKAGE	CAPILLARITY PACKAGE	FLUID PROPERTIES PACKAGE	PHOTOLOG: CORE PHOTOGRAPHY	MOISTURE CONTENT, ASTM D2216	POROSITY: TOTAL, API RP40	POROSITY: EFFECTIVE, ASTM D425M	SPECIFIC GRAVITY, ASTM D854	BULK DENSITY (DRY), API RP40 or ASTM D2937	AIR PERMEABILITY, API RP40	HYDRAULIC CONDUCTIVITY, EPA9100, API RP40, D5084	GRAIN SIZE DISTRIBUTION, ASTM D422/4464M	TOC: WALKLEY-BLACK	ATTERBERG LIMITS, ASTM D4318	XRD			
M-533C Run 1, Sample 1	8-12-13	—	63.9' - 64.9'	1															✓		✓				
M-533C Run 1, Sample 2	8-12-13	—	68.8' - 69.8'	1															✓		✓				
M-533C Run 3, Sample 1	8-12-13	—	299.0' - 300.0'	1															✓		✓				
M-533C Run 3, Sample 2	8-12-13	—	306.0' - 307.0'	1															✓		✓				
M-533C Run 5, Sample 1	8-12-13	—	1052.5' - 1053.0'	1															✓		✓				

TURNAROUND TIME
24 HOURS ☐ 5 DAYS ☐
48 HOURS ☐ NORMAL ☑
72 HOURS ☐
OTHER: _____

SAMPLE INTEGRITY (CHECK):
INTACT X ON ICE ____

PTS QUOTE NO.

PTS FILE: 43570

COMMENTS

1. RELINQUISHED BY	2. RECEIVED BY	3. RELINQUISHED BY	4. RECEIVED BY
Wade Reins			
COMPANY: Crow Butte Resources	COMPANY: PTS LABS	COMPANY	COMPANY
DATE: 8/29/13 TIME: 11:30 AM	DATE: 8/29/13 TIME: 16:35	DATE TIME	DATE TIME

PTS Laboratories, Inc.

CHAIN OF CUSTODY RECORD

PAGE 1 OF 1

COMPANY	Crow Butte Resources,
ADDRESS / CITY / ZIP CODE	86 Crow Butte Rd Crawford, NE 69339
PROJECT MANAGER	Wade Beins
PHONE NUMBER	(308) 665-2215 x113
PROJECT NAME	Marsland
PHONE NUMBER	(308) 665-2341
PROJECT NUMBER	
FAX NUMBER	
SITE LOCATION	M-1635C
SAMPLER SIGNATURE	Wade Beins

PO#

TURNAROUND TIME
24 HOURS ☐ 5 DAYS ☐
48 HOURS ☐ NORMAL ☑
72 HOURS ☐
OTHER: _____

SAMPLE INTEGRITY (CHECK):
INTACT X ON ICE ____ 79°

PTS QUOTE NO.

PTS FILE: 43570

ANALYSIS REQUEST

SAMPLE ID NUMBER	DATE	TIME	DEPTH, FT	NUMBER OF SAMPLES	SOIL PROPERTIES PACKAGE	HYDRAULIC CONDUCTIVITY PACKAGE	PORE FLUID SATURATIONS PACKAGE	TCEQ/TNRCC PROPERTIES PACKAGE	CAPILLARITY PACKAGE	FLUID PROPERTIES PACKAGE	PHOTOLOG: CORE PHOTOGRAPHY	MOISTURE CONTENT, ASTM D2216	POROSITY: TOTAL, API RP40	POROSITY: EFFECTIVE, ASTM D425M	SPECIFIC GRAVITY, ASTM D854	BULK DENSITY (DRY), API RP40 or ASTM D2937	AIR PERMEABILITY, API RP40	HYDRAULIC CONDUCTIVITY, EPA9100, API RP40, D5084	GRAIN SIZE DISTRIBUTION, ASTM D422/4464M	TOC; WALKLEY-BLACK	ATTERBERG LIMITS, ASTM D4318	XRD	COMMENTS
M-1635C Run 1, Sample 1	8-22-13	—	70.0' - 70.5	1										✓					✓			✓	
M-1635C Run 1, Sample 2	8-22-13	—	79.5' - 80.0	1															✓			✓	
M-1635C Run 2, Sample 1	8-22-13	—	197.0 - 197.5	1															✓			✓	
M-1635C Run 2, Sample 2	8-22-13	—	206.5 - 207.0	1															✓			✓	
M-1635C Run 3, Sample 1	8-22-13	—	530.0 - 530.5	1															✓			✓	
M-1635C Run 6, Sample 1	8-22-13	—	993.0' - 994.0'	1															✓			✓	

1. RELINQUISHED BY	2. RECEIVED BY	3. RELINQUISHED BY	4. RECEIVED BY
Wade Beins			
COMPANY: Crow Butte Resources	COMPANY: PTS LABS	COMPANY	COMPANY
DATE: 8/23/13 TIME: 11:30 AM	DATE: 8/29/13 TIME: 16:35	DATE TIME	DATE TIME

PTS Laboratories, Inc.

CHAIN OF CUSTODY RECORD

PAGE 1 OF 1

COMPANY	Crow Butte Resources,
ADDRESS / CITY / ZIP CODE	86 Crow Butte Rd Crawford, NE 69339
PROJECT MANAGER / PHONE NUMBER	Wade Beins (308) 665-2215 x 113
PROJECT NAME / PHONE NUMBER	Marsland (308) 665-2341
PROJECT NUMBER / FAX NUMBER	
SITE LOCATION	M-1912c
SAMPLER SIGNATURE	Wade Beins

ANALYSIS REQUEST

SAMPLE ID NUMBER	DATE	TIME	DEPTH, FT	NUMBER OF SAMPLES	SOIL PROPERTIES PACKAGE	HYDRAULIC CONDUCTIVITY PACKAGE	PORE FLUID SATURATIONS PACKAGE	TCEQ/TNRCC PROPERTIES PACKAGE	CAPILLARITY PACKAGE	FLUID PROPERTIES PACKAGE	PHOTOLOG: CORE PHOTOGRAPHY	MOISTURE CONTENT, ASTM D2216	POROSITY: TOTAL, API RP40	POROSITY: EFFECTIVE, ASTM D425M	SPECIFIC GRAVITY, ASTM D854	BULK DENSITY (DRY), API RP40 or ASTM D2937	AIR PERMEABILITY, API RP40	HYDRAULIC CONDUCTIVITY, EPA9100, API RP40, D5084	GRAIN SIZE DISTRIBUTION, ASTM D422/4464M	TOC: WALKLEY-BLACK	ATTERBERG LIMITS, ASTM D4318	XRD				COMMENTS
M-1912c Run 1, Sample 1	8-14-13	—	63.0' to 64.0'	1															✓			✓				
M-1912c Run 2, Sample 1	8-14-13	—	130.7' - 131.7'	1															✓			✓				
M-1912c Run 3, Sample 1	8-14-13	—	255.0' - 255.5	1															✓			✓				
M-1912c Run 3, Sample 2	8-14-13	—	260.4' - 260.9'	1															✓			✓				
M-1912c Run 4, Sample 1	8-14-13	—	974.5' - 975.0'	1															✓			✓				
M-1912c Run 4, Sample 2	8-14-13	—	968.7' - 969.7'	1															✓			✓				

TURNAROUND TIME
24 HOURS ☐ 5 DAYS ☐
48 HOURS ☐ NORMAL ☑
72 HOURS ☐
OTHER: _____

SAMPLE INTEGRITY (CHECK):
INTACT X ON ICE ____ 74°

PTS QUOTE NO.

PTS FILE: 43570

1. RELINQUISHED BY	2. RECEIVED BY	3. RELINQUISHED BY	4. RECEIVED BY
Wade Beins			
COMPANY: Crow Butte Resources	COMPANY: PTS LABS	COMPANY	COMPANY
DATE / TIME: 8/29/13 11:30 AM	DATE / TIME: 8/29/13 16:35	DATE / TIME	DATE / TIME

PTS Laboratories, Inc.

CHAIN OF CUSTODY RECORD

PAGE 1 OF 1

COMPANY	Crow Butte Resources,
ADDRESS / CITY / ZIP CODE	86 Crow Butte Rd Crawford, NE 69339
PROJECT MANAGER	Wade Beins
PHONE NUMBER	(308) 665-2215 x113
PROJECT NAME	Marsland
PHONE NUMBER	(308) 665-2341
PROJECT NUMBER	
FAX NUMBER	
SITE LOCATION	M-1956C
SAMPLER SIGNATURE	Wade Beins

ANALYSIS REQUEST

PO#

TURNAROUND TIME
24 HOURS ☐ 5 DAYS ☐
48 HOURS ☐ NORMAL ☑
72 HOURS ☐
OTHER: _____

SAMPLE INTEGRITY (CHECK):
INTACT X ON ICE ____ 74°

PTS QUOTE NO.

PTS FILE: 43570

SAMPLE ID NUMBER	DATE	TIME	DEPTH, FT	NUMBER OF SAMPLES	SOIL PROPERTIES PACKAGE	HYDRAULIC CONDUCTIVITY PACKAGE	PORE FLUID SATURATIONS PACKAGE	TCEQ/TNRCC PROPERTIES PACKAGE	CAPILLARITY PACKAGE	FLUID PROPERTIES PACKAGE	PHOTOLOG: CORE PHOTOGRAPHY	MOISTURE CONTENT, ASTM D2216	POROSITY: TOTAL, API RP40	POROSITY: EFFECTIVE, ASTM D425M	SPECIFIC GRAVITY, ASTM D854	BULK DENSITY (DRY), API RP40 or ASTM D2937	AIR PERMEABILITY, API RP40	HYDRAULIC CONDUCTIVITY, EPA9100, API RP40, D5084	GRAIN SIZE DISTRIBUTION, ASTM D422/4464M	TOC: WALKLEY-BLACK	ATTERBERG LIMITS, ASTM D4318	XRD				COMMENTS
M-1956C Run 1, Sample 1	8-19-13	–	42.0' - 43.0'	1														✓		✓						
M-1956C Run 3, Sample 1	8-19-13	–	78.0' - 79.0'	1														✓		✓						
M-1956C Run 4, Sample 1	8-19-13	–	196.5' - 197.1'	1														✓		✓						
M-1956C Run 4, Sample 2	8-19-13	–	202.0' - 202.5'	1														✓		✓						
M-1956C Run 5, Sample 1	8-19-13	–	425.6' - 426.2'	1														✓		✓						
M-1956C Run 5, Sample 2	8-19-13	–	431.0' - 431.6'	1														✓		✓						
M-1956C Run 6, Sample 1	8-19-13	–	1011.8' - 1012.4'	1														✓		✓						

1. RELINQUISHED BY	2. RECEIVED BY	3. RELINQUISHED BY	4. RECEIVED BY
Wade Beins			
COMPANY: Crow Butte Resources	COMPANY: PTS LABS	COMPANY	COMPANY
DATE: 8/23/13 TIME: 11:30 AM	DATE: 8/29/13 TIME: 16:35	DATE TIME	DATE TIME

PTS Laboratories, Inc.

CHAIN OF CUSTODY RECORD

PAGE 1 OF 1

COMPANY	Crow Butte Resources,
ADDRESS	86 Crow Butte Rd
CITY	Crawford, NE
ZIP CODE	69339
PROJECT MANAGER	Wade Beins
PHONE NUMBER	(308) 665-2215 x 113
PROJECT NAME	Marsland
PHONE NUMBER	(308) 665-2341
PROJECT NUMBER	
FAX NUMBER	
SITE LOCATION	M-2169c
SAMPLER SIGNATURE	Wade Beins

PO#

TURNAROUND TIME
24 HOURS ☐ 5 DAYS ☐
48 HOURS ☐ NORMAL ☑
72 HOURS ☐
OTHER: _____

SAMPLE INTEGRITY (CHECK):
INTACT X ON ICE ____ T4°C

PTS QUOTE NO.

PTS FILE: 43570

ANALYSIS REQUEST

SAMPLE ID NUMBER	DATE	TIME	DEPTH, FT	NUMBER OF SAMPLES	SOIL PROPERTIES PACKAGE	HYDRAULIC CONDUCTIVITY PACKAGE	PORE FLUID SATURATIONS PACKAGE	TCEQ/TNRCC PROPERTIES PACKAGE	CAPILLARITY PACKAGE	FLUID PROPERTIES PACKAGE	PHOTOLOG: CORE PHOTOGRAPHY	MOISTURE CONTENT, ASTM D2216	POROSITY: TOTAL, API RP40	POROSITY: EFFECTIVE, ASTM D425M	SPECIFIC GRAVITY, ASTM D854	BULK DENSITY (DRY), API RP40 or ASTM D2937	AIR PERMEABILITY, API RP40	HYDRAULIC CONDUCTIVITY, EPA9100, API RP40, D5084	GRAIN SIZE DISTRIBUTION, ASTM D422/4464M	TOC: WALKLEY-BLACK	ATTERBERG LIMITS, ASTM D4318	XRD				COMMENTS
Run #1, Sample 1	8/6/13	—	110.0' – 110.5'	1														✓		✓	✓					
Run #2, Sample 3	8/6/13	—	156.5' – 157.2'	1														✓		✓	✓					
Run #3, Sample 1	8/6/13	—	355.0' – 356.0'	1														✓		✓	✓					
Run #4, Sample 1	8/6/13	—	470.0' – 470.5'	1														✓		✓	✓					
Run #5, Sample 1	8/6/13	—	608.9' – 609.5'	1														✓		✓	✓					
Run #7, Sample 1	8/6/13	—	1135.5' – 1136.0'	1														✓		✓	✓					

1. RELINQUISHED BY	2. RECEIVED BY	3. RELINQUISHED BY	4. RECEIVED BY
Wade Beins			
COMPANY: Crow Butte Resources	COMPANY: PTS LABS	COMPANY	COMPANY
DATE: 8/29/13 TIME: 11:30 AM	DATE: 8/29/13 TIME: 16:35	DATE TIME	DATE TIME

Appendix M

Deleted: M

MILDOS Analysis

MILDOS-AREA
RADIATION DOSES FROM
CAMECO RESOURCES
MARSLAND EXPANSION AREA
IN-SITU URANIUM RECOVERY OPERATION

By
Noel Savignac, Ph.D.

September 24, 2013

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EXECUTIVE SUMMARY

Radiation dose rates were determined using the Nuclear Regulatory Commission (NRC) computer code MILDOS-AREA for the Cameco Resources, Crow Butte Resources Marsland Expansion Area (MEA) in-situ uranium recovery (ISR) facility near Marsland Nebraska. Conceptually the operation is expected to have 11 mine units (MUs), with approximately 30 years required to complete restoration.

The MILDOS-AREA evaluation of radiation dose rates from the MEA MU 1-5 and the other ISR operations within 80 km of the MEA showed the following combined doses:

- All dose rates to the public at the property boundaries, the cities and towns within an 80-km radius from the MEA, and at the nearest residence were below the 100 mrem/yr limit specified in 10 CFR 20 (total effective dose equivalent).
- The highest boundary dose rate was 65 mrem/yr at the south property boundary.
- The highest dose rate at a residence occupied at the time of application was 21 mrem/yr at residence #1.
- The dose rate at the nearest occupiable residence (#1)was 25 mrem/yr.
- The highest dose rate at cities and towns within an 80- km radius from the MEA was 6 mrem/yr at the town of Crawford.
- The average dose rate from the nearby ISR facilities was 2 mrem/yr.
- The 10 CFR 190 dose rate was 0 mrem/yr which was below the 10 mrem/yr dose rate limit for emissions that exclude radon and its progeny.
- The total population effective dose rate was 3,060 person-rem/yr.

For MU A-F, which will be placed in operation after MU 1-5, all dose rate to the public at the property boundaries, the cities and towns within an 80-km radius from the MEA, and at the nearest residence were below the 100 mrem/yr limit specified in 10 CFR 20 (total effective dose equivalent).

For comparison naturally occurring background radiation, from cosmic and terrestrial sources, is approximately 365 mrem/yr.

Different distributions of radon released on site had only minor affects on the calculated radiation doses.

The maximum 2000 hour/yr occupational dose rate was 43 mrem/yr at MU-2 which is within the 5000 mrem/yr limit in 10 CFR 20.

Dose rates were calculated for a waste water flow rate of 315 gallons per minute and a radon distribution of 25% of the radon released at the well heads and 75% released at the satellite plant which uses sealed fixed bed down-flow ion exchange columns and tanks, and a deep disposal well to manage waste water.

OBJECTIVE

Determine the radiation doses to members of the public within an 80-km radius of the Marsland Expansion Area (MEA) using the Nuclear Regulatory Commission (NRC) computer code MILDOS-AREA. Determine the additional radiation dose from nearby uranium extraction facilities. Determine the potential annual dose rate to workers on the site. Determine the sensitivity of radon release points on the MILDOS-AREA estimates of radiation dose.

PROJECT DESCRIPTION

The MEA is located in northwestern Nebraska in Dawes County near Crawford Nebraska. See Figure 1.

Figure 2 is the site layout map of the MEA which shows Mine Units (MU)s 1 through 5 and A through F.

The wells in each mine unit will pump oxygenated water through the underground ore zone to extract uranium. The pregnant lixiviant is then pumped to an ion exchange column for removal of the uranium, and then back underground to extract additional uranium. The resin from the MEA will be trucked to the Crow Butte Resources Central Processing facility near Crawford, Nebraska for removal of the uranium from the resin, after which the resin is returned to the MEA.

RADIOACTIVE EFFLUENTS

Radon-222 gas and its decay products are the only radioactive effluents from the MEA under normal operating conditions. Radon is released into the atmosphere at the following locations:

- New Well Fields - When wells are drilled into the ore body, ore cuttings are transported to the ground surface in the drilling mud. The cuttings are temporarily stored in mud pits where radon-222 is released from the radium-226 in the cuttings. The quantity of radon-222 released from new well fields is much less than 1% of the radon-222 released during well field production.
- Production Well Fields - Radon-222 is released from the well fields in each mining units and from the satellite ventilation stack.
- Restoration Well Fields – Radon is released during restoration of the well fields.
- Land Application – The MEA site does not use land application or evaporation ponds.

Figure 1. Significant Population Centers within 80-km (50-mile) Radius of the Marsland Site

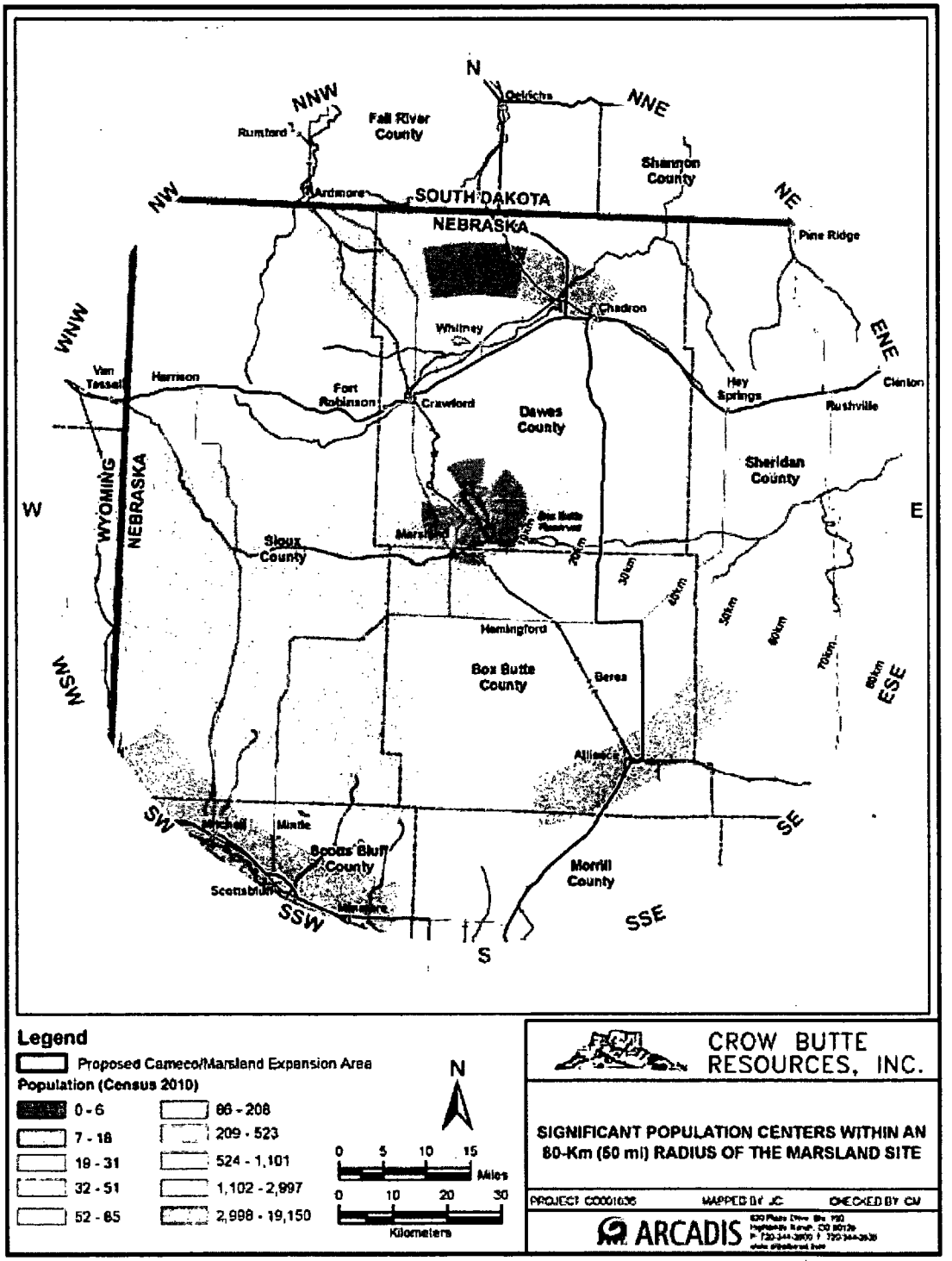
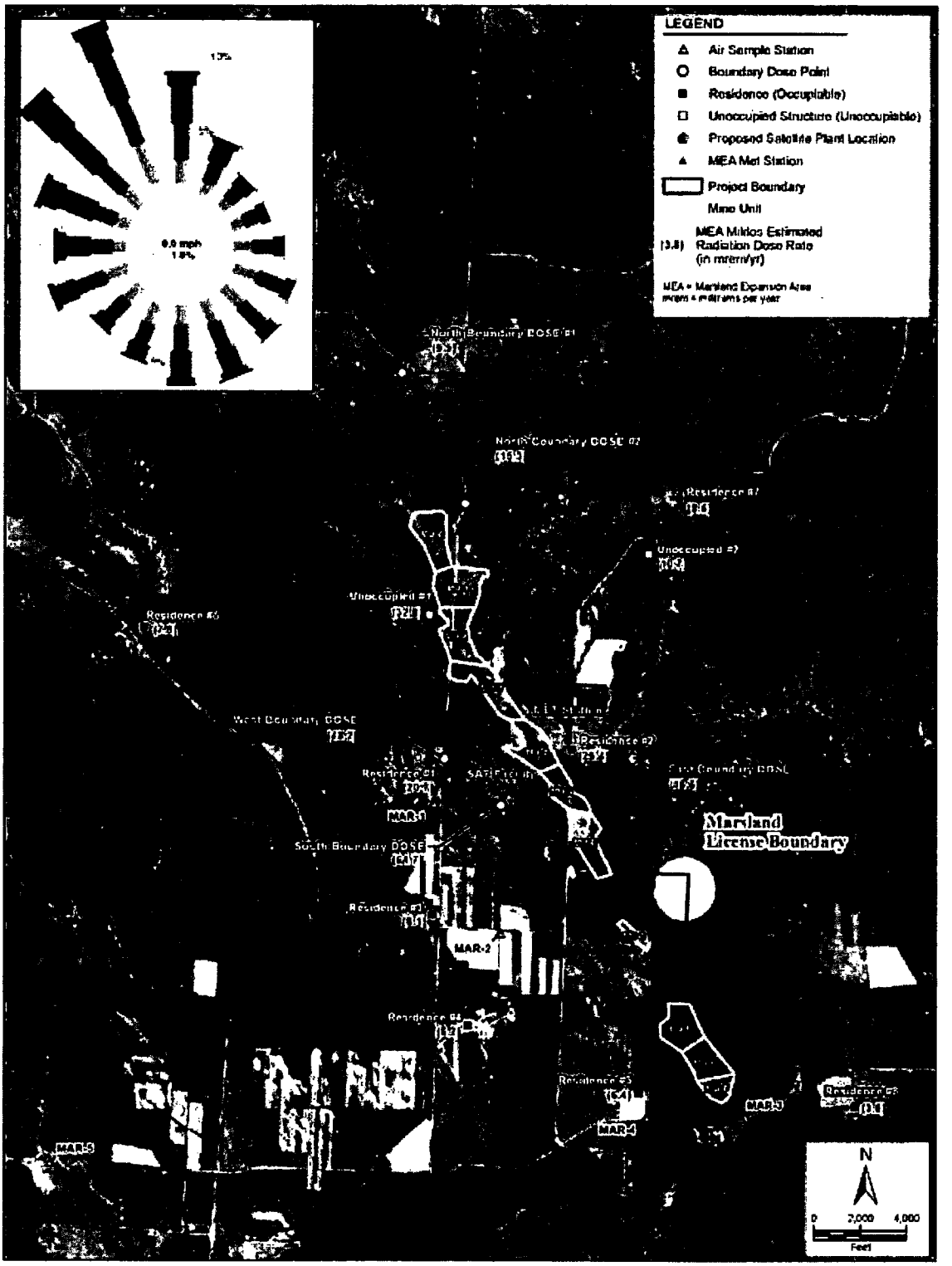


Figure 2 Marsland Expansion Area Map



Under accident conditions where process water escapes from the process piping and/or tanks, uranium and radium-226 are released on the ground and radon into the air. Those releases are anticipated to be within the process area, are cleaned up locally, and release small amounts of radon similar in magnitude to the radon released by drill cuttings from new well installations.

MARSLAND EXPANSION AREA OPERATIONS

Eleven mining units are planned for the MEA. MUs 1 through 5 and then A through F will be brought into production sequentially. Details are presented in the Application for Amendment of USNRC Source Materials License SUA 1534, Marsland Expansion Area, Crawford Nebraska (31 May, 2012). Radon production was calculated for MU 1-5 by MILDOS-AREA and then for MU A-F. Consistent with the water balance presented in the application, the maximum impact for each set of mine units at the MEA is in years 9-20 when the waste flow peaks at 315 gpm.

MILDOS-AREA

The computer code MILDOS-AREA was used to determine the impact of radon-222 release on the surrounding populations. The code was originally designed to address the impacts of uranium mill operations but was subsequently updated in 1998 to include the impacts of uranium in-situ leaching operations using a MS Windows format. The code was developed by Argonne National Laboratory for the NRC to assess the radiological impacts and regulatory compliance of a release. The code is a Gaussian-plumb, air-dispersion model which utilizes user-provided wind frequency data. Mechanisms such as radioactive decay and ingrowth of daughter radionuclides are included in the code. The code calculates the radiation doses at any location within an 80-km radius in 16 compass directions for up to 10 radiological sources.

MILDOS-AREA INPUT – WEATHER DATA

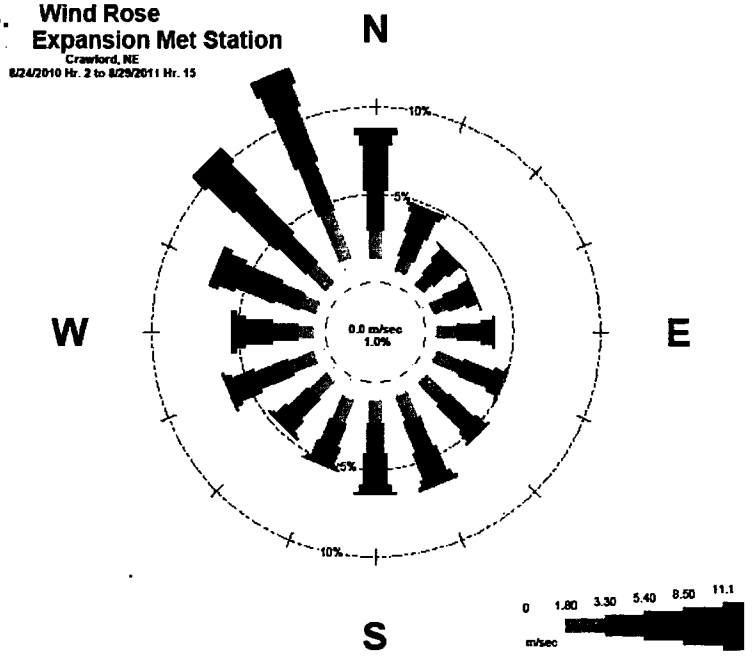
The MEA is located in northwestern Nebraska in Dawes County near Crawford, Nebraska. Weather data was collected onsite from 8/24/2010 to 8/29/2011.

"The High Plains are a subregion of the Great Plains mostly in the Western United States, but also partly in the Midwest states of Nebraska, Kansas, and South Dakota, generally encompassing the western part of the Great Plains before the region reaches the Rocky Mountains. From east to west, the High Plains rise in elevation from around 1,160 feet (350 m) to over 7,800 feet (2,400 m). The High Plains are semi-arid, receiving between 10–20 inches (250–510 mm) of precipitation annually. Shortgrass prairie, prickly pear cacti and scrub vegetation cover the region, with occasional buttes or other rocky outcrops. Agriculture in the forms of cattle ranching and the growing of

wheat, cotton and sunflowers is the primary economic activity in the region. The High Plains has one of the lowest population densities of any region in the continental United States. Due to low moisture and high elevation, the High Plains commonly experiences wide ranges and extremes in temperature. The temperature range from day to night commonly exceeds 59 °F (15 °C), and 24-hour temperature shifts of 68 to 77 °F (20 to 25 °C) are not unknown. The region is known for the steady, and sometimes intense, winds that prevail from the west. [At the MEA the prevailing wind direction is from the NNW.] The winds add a considerable wind chill factor in the winter. The development of wind farms in the High Plains is one of the newest areas of economic development." (Wikipedia)

The MEA weather data were collected using an on-site meteorological station consistent with NRC Regulatory Guide 3.63 and converted to the STAR (STBability ABay) format using the NRC speed classes for seasonal-wind-frequency distributions. Radiation doses were calculated by MILDOS-AREA using that MEA weather data. (See Appendix A).

Figure 3. **Wind Rose**
Expansion Met Station
Crawford, NE
8/24/2010 Hr. 2 to 8/29/2011 Hr. 15



MILDOS-AREA INPUT – OPERATIONAL DATA FROM MEA

The MEA operational data are presented in Table 1. The mine unit locations are presented as a grid system with the MEA satellite facility as the center, km east as positive values, km west as negative values, km north as positive values, km south as negative values, meters elevation as positive values, and meters depression as negative values. The circulation volume is the volume of the entire extraction circuit from the injection well to the IX column and return.

MILDOS-AREA calculates the amount of radon released from the MEA facility using the parameters listed in Table 1. One of those parameters is the rate of radon venting which is the "fractional daily rate of radon release due to occasional venting from well heads, valves and leaking transport piping during circulation," (MILDOS-AREA User's Guide, Argonne National Laboratory, 1998). The rate of radon venting in Table 1 is 0.01per day or the release of 1% of the radon in the uranium extraction circuit each day. (The 1% value is specified in the User's Guide and in "MILDOS-AREA: An Update with Incorporation of *In Situ* Leach Uranium Recovery Technology" by E. R. Faillace, el. al.).

Where and how is the radon released? The 1% radon is released from two locations, at the mine well field header houses and at the satellite plant.

A down-flow ion exchange system and deep disposal wells will be used at the MEA. In the down-flow system radon enters the lixiviant in the ore body, and is transported in the lixiviant to the ion exchange columns. The lixiviant is then piped back to the ore body to extract more uranium. Radon that is dissolved in the lixiviant will be released in small amounts from leaks, resin changes, and repairs because the down-flow ion exchange system and the deep disposal well circuit are pressurized enclosed piping systems. (See Section 2.7.1 of NUREG-1910).

The one percent of the radon in the lixiviant is released from the down-flow uranium extraction circuit as follows:

25% is released from the mine well field header houses, and
75% is released from the satellite plant.

The waste water flow rate of 315 gallons per minute is used for normal operations of the down-flow system.

MILDOS-AREA uses the amount of radon released at each release point, the annual average atmospheric conditions; and the direction and distance to the exposed person to calculate the radiation dose to that person.

MILDOS-AREA INPUT – ADJACENT URANIUM SITES

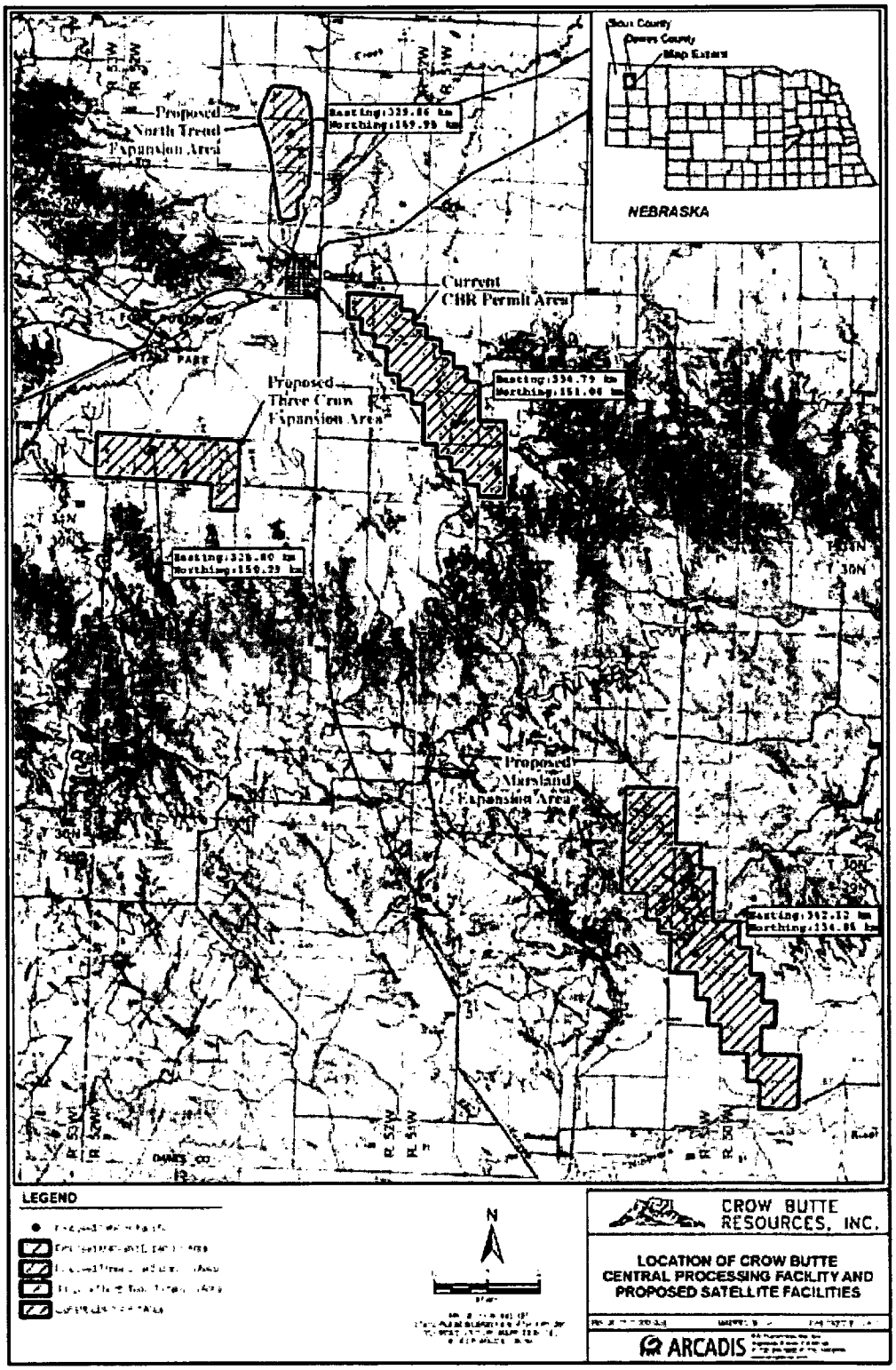
Three in-situ uranium recovery (ISR) facilities and MEA are within 80 km of the MEA as shown in Figure 4.

Table 1 Operational Data for Marsland Mine Units 1–5 and A-F

Location	X km	Y km	Z m *	Ra pCi/g	Em FR	Thick m	Den g/cm^3	Area m^2	Fr Rn	Col Vol L	Rn vent/d	Col Util	Por	Op days	Cir Vol L	Purg L/d
MU-1	-0.56	2.23	27	481	0.25	7.6	1.89	3.02E+05	0.8	1.41E+05	0.01	5.00E-01	0.29	365	3.40E+08	315
MU-2	-0.55	1.65	16	481	0.25	7.6	1.89	2.70E+05	0.8	1.41E+05	0.01	5.00E-01	0.29	365	3.40E+08	315
MU-3	-0.15	0.95	13	481	0.25	7.6	1.89	1.71E+05	0.8	1.41E+05	0.01	5.00E-01	0.29	365	3.40E+08	315
MU-4	0.43	0.13	-4	481	0.25	7.6	1.89	2.43E+05	0.8	1.41E+05	0.01	5.00E-01	0.29	365	3.40E+08	315
MU-5	0.84	-0.45	-14	481	0.25	7.6	1.89	1.82E+05	0.8	1.41E+05	0.01	5.00E-01	0.29	365	3.40E+08	315
MU-A	-0.86	2.88	45	481	0.25	7.6	1.89	2.66E+05	0.8	1.41E+05	0.01	5.00E-01	0.29	365	3.40E+08	315
MU-B	1.12	-1.02	-15	481	0.25	7.6	1.89	2.48E+05	0.8	1.41E+05	0.01	5.00E-01	0.29	365	3.40E+08	315
MU-C	1.74	-2.33	-25	481	0.25	7.6	1.89	4.58E+04	0.8	1.41E+05	0.01	5.00E-01	0.29	365	3.40E+08	315
MU-D	2.42	-3.56	-36	481	0.25	7.6	1.89	2.45E+05	0.8	1.41E+05	0.01	5.00E-01	0.29	365	3.40E+08	315
MU-E	2.74	-3.98	-42	481	0.25	7.6	1.89	2.08E+05	0.8	1.41E+05	0.01	5.00E-01	0.29	365	3.40E+08	315
MU-F	2.90	-4.30	-47	481	0.25	7.6	1.89	1.06E+05	0.8	1.41E+05	0.01	5.00E-01	0.29	365	3.40E+08	315

X = Km from Marsland satellite (+) = East, (-) = West
Y = Km from Marsland satellite (+) = North, (-) = South
Z = m elevation (+) = above the satellite, (-) = below the satellite
Ra = Radium concentration
EM. FR = Radon emanation fraction
THICK = Thickness of ore in m
DEN = Density of ore in g/cm^3
AREA = Area of well unit
FR Rn = Fraction of Radon in process water
COL VOL = Ion-Exchange column volume in L
Rn VENT = Rate of Radon venting from well heads, valves and leaking transport piping during circulation
Col Util = Ion-Exchange column unloading rate
POR = Porosity of ion exchange resin
Op Days = Days of operation in days
CIR VOL = Volume of process water in circulation in L
PURG = Treated water purge rate in L/d = waste water flow rate
* = MILDOS-AREA accepts heights -20 to 30

Figure 4 MEA and Adjacent In-Situ Uranium Recovery Sites



FF

Table 2 presents the location of each ISR on an X-Y-Z coordinate system with Marsland at the center, and the radon emissions from each site as documented in the licensing documents and technical reports. The radon emissions were modeled as a satellite-plant-stack point source from the central location within each mine unit with a stack exit velocity of 10 m/sec.

Table 2 In-Situ Uranium Recovery Sites within 80 km of the MEA.

ISR Site	East-West km	North-West km	Height m	Radon Emission in Ci/yr
North Trend Expansion Area	-12.3	25.3	0	8885
Crow Butte Resources Permit Area	-7.3	16.2	0	7223
Three Crow Expansion Area	-16.5	15.4	0	7662

MILDOS-AREA INPUT - RADIATION DOSE LOCATIONS DATA

Radiation doses were calculated using MILDOS-AREA at:

- Cities and towns within 80 km radius of MEA.
- The north, south, east and west boundaries of MEA using the grid system with the center point at the MEA satellite facility.
- The northern boundary dose location #1 in Figure 2 is on the northern most property line above MU-A.
- The northern boundary dose location #2 in Figure 2 is on the access road at the license boundary northeast of MU-A.
- Eight residences on the MEA. Residence 2 was the nearest downwind residence.
- Two unoccupied structures on the MEA

The X, Y, and Z coordinates in for each of those locations with MEA at the center are shown in Table 3.

Table 3 Radiation Dose Locations From MEA Central Location

Location	X (km)	Y(km)	Z (m)*
Alliance	30.0	-45.4	-50
Berea	21.5	-32.6	-50
Chadron	22.3	35.8	-50
Clinton	75.4	26.5	-50
Crawford	-12.1	20.8	-50
Harrison	-50.5	22.9	-50
Hay Springs	47.1	18.8	-50
Hemmingford	14.3	-20.4	36
Marsland	-3.8	-6.1	-50
Minatare	-23.4	-75.6	-41.
Mitchell	-48.5	-60.0	-50
Oelrichs	4.9	75.3	-50
Rushville	66.0	22.0	-50
Scottsbluff	-36.3	-68.9	-50
Van Tassell	-67.5	21.0	49
Whitney	1.2	31.4	-50
Residence 1	-0.9	-0.6	3
Residence 2	1.0	0.3	-4
Residence 3	-0.8	-1.9	-16
Residence 4	0.4	-3.4	-31
Residence 5	1.9	-4.2	-36
Residence 6	-4.7	1.9	22
Residence 7	2.4	3.6	76
Residence 8	4.7	-4.4	-50
Unoccupied 1	-0.9	1.9	16
Unoccupied 2	2.0	2.8	69
N Boundary #1	-1.3	5.1	35
N Boundary #2	-0.5	3.3	20
E Boundary	1.7	0.0	-3
S Boundary	0.0	-0.6	13
W boundary	-0.7	0.0	12
North Trend	-12.3	25.3	0

*Minimum value for MILDOS-AREA is -50 m.

MILDOS-AREA INPUT – VEGETATION PATHWAY

The vegetation pathway of radiation exposure was assessed using the agricultural values in Table 4 from the Crow Butte Resources Permit Area license application.

Table 4 MEA Agricultural Pathway Parameters

Vegetables	FPR(1)	8700 Kg/yr per km^2
Meat	FRP(2)	4000 Kg/yr per km^2
Milk	FRP(3)	0
Individual Pasture Grass*	FFORI	0.9
Individual Hay*	FHAYI	0.1
Population Pas*ture Grass	FFORP	0.9
Population Hay*	FHAYP	0.1

* Fraction of total annual livestock feed requirement.

The radiation dose assessment by MILDOS-AREA uses annual average meteorological data to calculate annual exposures. The growing season for agricultural products is within and shorter than the annual exposure period

MILDOS-AREA INPUT - POPULATION PARAMETERS

Table 4 presents the population within an 80-km radius of the MEA. The largest values in Table 4 designate cities, e.g., Scottsbluff is approximately 80 km SSW of the MEA.

The fraction of radon from offsite sources (FRADON) = 1 because Casper, WY is closer to the Marsland site than Falls City TX, Grants, NM, or Wellpinit, WA. FRADON 2, 3, and 4 = 0.
PAJUST is the ratio of U.S. population during each time step to that during the base year. PAJUST is not used when only one time step is used.

MILDOS-AREA INPUT - OCCUPATIONAL DOSE RATE

Occupational dose rates at MEA were evaluated using the following criteria:

- Radon is the main source of radiation.
- Radon is released at the header house for each mine unit and from the satellite vent stack.
- The header houses are continuously vented using fans.
- Locations 0.1 km east of the header houses and 0.1 km east of the satellite plant are locations on site where radon from the header houses and satellite plant vent stack mix. These locations are considered representative of the radon concentration present on the MEA.

Table 5 Population Distribution Within 80 km Radius of the Site

Compass Directions	N 0	NNE 22.5	NE 45	ENE 67.5	E 90	ESE 112.5	SE 135	SSE 157.5	S 180	SSW 202.5	SW 225	WSW 247.5	W 270	WNW 292.5	NW 315	NNW 337.5
Kilometers																
1.0 - 2.0																
2.0 - 3.0																
3.0 - 4.0																
4.0 - 5.0																
5.0 - 10.0																
10.0 - 20.0																
20.0 - 30.0							993									1107
30.0 - 40.0	87															
40.0 - 50.0		5634														
50.0 - 60.0				652				8959						279		
60.0 - 70.0				999												
70.0 - 80.0	145		14	30						15542	1831			19		
0-80.0	**232**	**5634**	**14**	**1681**	**0**	**0**	**993**	**8959**	**0**	**15542**	**1831**	**0**	**0**	**298**	**0**	**1107**

MILDOS-AREA OUTPUT – RADIATION DOSE RATES FROM MEA AND THE NEARBY ISR OPERATIONS

Table 6 presents the dose rates from MU 1-5 calculated for the major cities and towns within 80-km radius of the MEA, 8 residences, 2 unoccupied structures, and for the north, south, east, and west property boundaries. The dose rates were calculated using the MEA weather data and using a waste water flow rate of 315 gallon per minute for the down-flow, closed, and pressurized uranium extraction and deep disposal well circuit used at the MEA site. Table 6 column 2 presents the doses from the 25% well field and 75% satellite radon distribution from MU 1-5. Table 6 column 3 presents the doses from the 3 in-situ uranium recovery (ISR) operations within the 80-km radius of the MEA. Those facilities were all modeled as being in full operation emitting radon from the satellite stacks at 10 m/sec. Table 6 column 4 presents the combined doses from MU 1-5 and the ISR operations and is the TOTAL DOSE to the locations listed in column 1.

Conclusions from Table 6 and the MILDOS-AREA calculations are:

- All dose rates from mine units MU 1-5 and the nearby ISR operations to the public at the property boundaries, the cities and towns within an 80-km radius from the MEA, and at the nearest residence were below the 100 mrem/yr limit specified in 10 CFR 20 (total effective dose equivalent).
- The highest boundary dose rate was 65 mrem/yr at the south property boundary.
- The highest dose rate at a residence occupied at the time of application was 21 mrem/yr at residence #1.
- The highest dose rate at the nearest occupiable residence #2 was 25 mrem/yr.
- The highest dose rate at cities and towns within an 80- km radius from the MEA was 6 mrem/yr at the town of Crawford.
- The average dose rate from the nearby ISR facilities was 2 mrem/yr.
- The 10 CFR 190 dose rate was 0 mrem/yr which was below the 10 mrem/yr dose rate limit for emissions that exclude radon and its progeny.
- The total population effective dose rate was 3,060 person-rem/yr.

For comparison naturally occurring background radiation, from cosmic and terrestrial sources, is approximately 365 mrem/yr.

The dose rate at residences #1 and #2 were 21 and 25 mrem/yr respectively. Those dose rates were higher than the dose rates at residences 3-8. Those high dose rates were likely the result of those residences being close to both the satellite plant and MUs 1-5. Residence #1 was occupied whereas residence #2 was not.

Table 7 presents the radiation dose rates calculated for MU A-F which are scheduled to go into operation sequentially after restoration is completed at each mine unit MU 1-5. The data in Table 7 is very similar to the data in Table 6.

MILDOS-AREA OUTPUT – DOSE DISTRIBUTION

Table 8 demonstrates the effect of using different radon distributions in the MILDOS-AREA dose calculations. Table 8 column 1 presents the radiation doses from MU 1-5 distributed as 0.25 from the well field and 0.75 from the satellite plant stack plus the dose from the nearby ISRs. Table 8 column 2 presents the radiation doses from MU 1-5 distributed as 0.10 from the well field and 0.90 from the satellite plant stack plus the dose from the nearby ISRs. The averages and standard deviations the two different radon distributions are very similar.

Table 6 MEA Radiation Dose Rates from MU 1-5 and Nearby ISR Operations.

Radon Sources Dose Distribution	MEA MU 1-5 0.25+0.75 mrem/yr	Nearby ISR mrem/yr	MEA MU 1-5 +ISR 0.25+0.75+ISR mrem/yr
Alliance	0.3	0.7	1.0
Berea	0.5	0.9	1.4
Chadron	0.3	0.9	1.2
Clinton	0.1	0.3	0.4
Crawford	0.5	5.5	6.0
Harrison	0.2	0.7	0.9
Hay Springs	0.2	0.5	0.7
Hemingford	1.0	1.4	2.4
Marsland	1.0	2.2	3.2
Minatare	0.1	0.5	0.6
Mitchell	0.1	0.3	0.4
Oelrichs	0.2	0.6	0.8
Rushville	0.2	0.4	0.6
Scottsbluff	0.1	0.5	0.6
Van Tassell	0.2	0.5	0.7
Whitney	0.4	1.8	2.2
Residence 1	17.3	3.4	20.7
Residence 2	22.3	3.1	25.4
Residence 3	5.1	3.0	8.1
Residence 4	3.6	2.6	6.2
Residence 5	4.1	2.3	6.4
Residence 6	3.6	4.2	7.8
Residence 7	5.5	3.1	8.6
Residence 8	1.9	1.9	3.8
Unoccupied 1	29.0	3.8	32.8
Unoccupied 2	7.5	3.2	10.7
N Boundary #1	5.0	4.5	9.5
N Boundary #2	11.4	3.9	15.3
East Boundary	13.5	3.1	16.6
South Boundary	61.4	3.3	64.7
West boundary	44.6	3.6	48.2
Average	7.8	2.2	9.9
Std, Dev,	14.2	1.5	14.9

Table 7 MEA Radiation Dose Rates from MU A-F and Nearby ISR Operations

Radon Sources Dose Distribution	MEA MU A-F 0.25+0.75 mrem/yr	Nearby ISR mrem/yr	MEA Total Dose 0.25+0.75+ISR mrem/yr
Alliance	*0.3*	*0.7*	*1.0*
Berea	*0.4*	*0.9*	*1.3*
Chadron	*0.2*	*0.9*	*1.1*
Clinton	*0.1*	*0.3*	*0.4*
Crawford	*0.4*	*5.5*	*5.9*
Harrison	*0.1*	*0.7*	*0.8*
Hay Springs	*0.2*	*0.5*	*0.7*
Hemingford	*0.8*	*1.4*	*2.2*
Marsland	*0.8*	*2.2*	*3.0*
Minatare	*0.1*	*0.5*	*0.6*
Mitchell	*0.1*	*0.3*	*0.4*
Oelrichs	*0.1*	*0.6*	*0.7*
Rushville	*0.1*	*0.4*	*0.5*
Scottsbluff	*0.1*	*0.5*	*0.6*
Van Tassell	*0.1*	*0.5*	*0.6*
Whitney	*0.3*	*1.8*	*2.1*
Residence 1	*8.4*	*3.4*	*11.8*
Residence 2	*10.8*	*3.1*	*13.9*
Residence 3	*3.9*	*3.0*	*6.9*
Residence 4	*3.2*	*2.6*	*5.8*
Residence 5	*5.6*	*2.3*	*7.9*
Residence 6	*2.8*	*4.2*	*7.0*
Residence 7	*4.0*	*3.1*	*7.1*
Residence 8	*2.1*	*1.9*	*4.0*
Unoccupied 1	*10.9*	*3.8*	*14.7*
Unoccupied 2	*5.3*	*3.2*	*8.5*
N Boundary #1	*3.7*	*4.5*	*8.2*
N Boundary #2	*8.4*	*3.9*	*12.3*
East Boundary	*7.5*	*3.1*	*10.6*
South Boundary	*29.1*	*3.3*	*32.4*
West boundary	*22.4*	*3.6*	*26.0*
Average	*4.3*	*2.2*	*6.4*
Std, Dev,	*6.7*	*1.5*	*7.6*

Table 8 Effect of Different Radon Distributions on MEA Radiation Dose Rates

Radon Sources Dose Distribution	MEA MU 1-5 +ISR 0.25+0.75+ISR mrem/yr	MEA + MU 1-5 + ISR 0.01+0.9+ISR mrem/yr
Alliance	1.0	1.0
Berea	1.4	1.4
Chadron	1.2	1.2
Clinton	0.4	0.4
Crawford	6.0	6.0
Harrison	0.9	0.9
Hay Springs	0.7	0.7
Hemingford	2.4	2.4
Marsland	3.2	3.1
Minatare	0.6	0.6
Mitchell	0.4	0.4
Oelrichs	0.8	0.8
Rushville	0.6	0.6
Scottsbluff	0.6	0.6
Van Tassell	0.7	0.7
Whitney	2.2	2.2
Residence 1	20.7	21.3
Residence 2	25.4	20.4
Residence 3	8.1	7.6
Residence 4	6.2	6.0
Residence 5	6.4	6.2
Residence 6	7.8	7.8
Residence 7	8.6	8.4
Residence 8	3.8	3.7
Unoccupied 1	32.8	24.2
Unoccupied 2	10.7	10.4
N Boundary #1	9.5	9.2
N Boundary #2	15.3	13.4
East Boundary	16.6	15.4
South Boundary	64.7	70.6
West boundary	48.2	52.1
Average	9.9	9.7
Std, Dev,	14.9	15.5

MILDOS-AREA OUTPUT – OCCUPATIONAL RADIATION DOSE RATES

The occupational dose rates at MEA were calculated for exposures of 2000 hours per year. The calculations were based on:

- Waste water flow rate of 315 gallons per minute for a down-flow ion exchange system with a deep disposal well.
- Twenty five percent of the radon is vented by continuously operating fans from the header house for each mine unit. Seventy five percent of the radon is released at the satellite plant vent stack.
- Doses from these two sources were calculated at locations 0.1 km east of the header houses, 0.1 km east of the site boundaries, and 0.1 km east of the satellite vent stack as being representative of the radon/radon progeny doses onsite.
- The occupational factor for being present onsite one hour is equal (1hr / 8760 hours in a year) or 1.14E-4.
- Doses include the contribution from the adjacent ISR facilities within 80 km of MEA.

Table 9 shows the occupational dose rate for working 2000 hours per year at the MEA. The maximum occupational dose rate was 43 mrem/yr at MU-2. All dose rates are within the 5000 mrem/yr limit in 10 CFR 20.

Table 9 Occupational Dose Rates for 2000 hours per year at MEA

Radon Source Location of Dose	MU 1-5 0.25+.075+ISR mrem/yr	Occupancy Factor per hr	Occupational mrem/2000 hrs/yr
N Boundary #1	9.5	1.14E-04	2.2
N Boundary #2	15.3	1.14E-04	3.5
E Boundary	16.6	1.14E-04	3.8
S Boundary	64.7	1.14E-04	14.8
W Boundary	48.2	1.14E-04	11.0
MU-1	113.4	1.14E-04	25.9
MU-2	186.7	1.14E-04	42.6
MU-3	141.8	1.14E-04	32.3
MU-4	161.3	1.14E-04	36.8
MU-5	113.1	1.14E-04	25.8
Satellite	137.5	1.14E-04	31.3
Average			20.9
Std. Dev.			14.5

APPENDIX A - MEA WEATHER DATA IN STAR FORMAT

Column	1	Blank
	2-4	Wind Direction
	5	Blank
	6	Stability Category
	7	Blank
	8	Start of the Wind Speed Categories (knots)
	8-14	Wind Speed 1-3 (knots)
	15-21	Wind Speed 4-6 (knots)
	22-28	Wind Speed 7-10 (knots)
	29-35	Wind Speed 11-16 (knots)
	36-42	Wind Speed 17-21 (knots)
	43-49	Wind Speed >21 (knots)

The MEA weather data used for dose evaluation (8-24-2010/8-29-2011) is printed below:

```
  N A 0.001410.002360.000000.000000.000000.00000
NNE A 0.000240.001530.000000.000000.000000.00000
 NE A 0.000710.001890.000000.000000.000000.00000
ENE A 0.000820.001770.000000.000000.000000.00000
  E A 0.000940.001770.000000.000000.000000.00000
ESE A 0.001300.002590.000000.000000.000000.00000
 SE A 0.001060.002000.000000.000000.000000.00000
SSE A 0.002120.002120.000000.000000.000000.00000
  S A 0.001770.002120.000000.000000.000000.00000
SSW A 0.003540.002590.000000.000000.000000.00000
 SW A 0.001410.002240.000000.000000.000000.00000
WSW A 0.000940.004010.000000.000000.000000.00000
  W A 0.001180.001180.000000.000000.000000.00000
WNW A 0.000820.001180.000000.000000.000000.00000
 NW A 0.000590.002000.000000.000000.000000.00000
NNW A 0.000590.002120.000000.000000.000000.00000
  N B 0.000000.002000.000240.000000.000000.00000
NNE B 0.000000.002240.000000.000000.000000.00000
 NE B 0.000000.002470.000120.000000.000000.00000
ENE B 0.000000.001770.000000.000000.000000.00000
  E B 0.000000.001770.000120.000000.000000.00000
ESE B 0.000350.002470.000350.000000.000000.00000
 SE B 0.000120.003420.000350.000000.000000.00000
SSE B 0.000470.002470.000240.000000.000000.00000
  S B 0.000470.002360.000710.000000.000000.00000
SSW B 0.000940.003180.000590.000000.000000.00000
 SW B 0.000120.003060.000000.000000.000000.00000
WSW B 0.000000.002590.000470.000000.000000.00000
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W B 0.000120.001300.000240.000000.000000.00000
WNW B 0.000120.001650.000120.000000.000000.00000
NW B 0.000000.002360.000710.000000.000000.00000
NNW B 0.000000.002120.000470.000000.000000.00000
N C 0.000120.000590.010250.000000.000000.00000
NNE C 0.000000.000590.004710.000000.000000.00000
NE C 0.000000.000590.002950.000000.000000.00000
ENE C 0.000000.000820.003420.000000.000000.00000
E C 0.000000.001180.003300.000000.000000.00000
ESE C 0.000000.001770.005540.000000.000000.00000
SE C 0.000350.001890.004120.000000.000000.00000
SSE C 0.000120.001530.004360.000000.000000.00000
S C 0.000350.001530.004950.000000.000000.00000
SSW C 0.000240.001410.004360.000000.000000.00000
SW C 0.000120.001890.005660.000000.000000.00000
WSW C 0.000000.000820.006600.000000.000000.00000
W C 0.000000.000710.004360.000000.000000.00000
WNW C 0.000000.000470.004710.000000.000000.00000
NW C 0.000000.000590.008130.000000.000000.00000
NNW C 0.000000.000940.007780.000000.000000.00000
N D 0.000240.007310.019090.017800.004120.00141
NNE D 0.000240.004710.010720.008600.002240.00012
NE D 0.000000.001890.009190.003060.000120.00000
ENE D 0.000000.003060.007310.002000.000000.00012
E D 0.000120.005770.010370.003180.000120.00000
ESE D 0.000470.008840.009190.003060.000240.00012
SE D 0.000240.010490.012140.003890.000350.00000
SSE D 0.000120.007540.016500.009550.003420.00012
S D 0.000120.005190.013080.013790.002830.00012
SSW D 0.000120.003890.008960.006720.001180.00000
SW D 0.000240.004830.007900.003650.001410.00000
WSW D 0.000120.005070.014610.008720.002470.00024
W D 0.000000.004120.012730.012610.002950.00236
WNW D 0.000120.003770.014850.019560.007190.00295
NW D 0.000120.006840.019090.030050.016970.00589
NNW D 0.000710.013550.023690.028170.012370.00448
N E 0.001530.002360.000470.000000.000000.00000
NNE E 0.000710.001300.000350.000000.000000.00000
NE E 0.000000.001650.000240.000000.000000.00000
ENE E 0.000000.002000.000470.000000.000000.00000
E E 0.000590.001530.000590.000000.000000.00000
ESE E 0.000350.003060.000240.000000.000000.00000
SE E 0.000820.002000.000240.000000.000000.00000
SSE E 0.000710.002470.000470.000000.000000.00000
S E 0.000350.002710.000240.000000.000000.00000
SSW E 0.000000.002000.000240.000000.000000.00000

SW E 0.000350.002950.000590.000000.000000.00000
WSW E 0.000350.002830.001060.000000.000000.00000
W E 0.000120.002000.000940.000000.000000.00000
WNW E 0.000710.001300.000820.000000.000000.00000
NW E 0.000590.003540.001410.000000.000000.00000
NNW E 0.000940.009660.001890.000000.000000.00000
N F 0.009780.007070.000000.000000.000000.00000
NNE F 0.006950.002830.000000.000000.000000.00000
NE F 0.006360.001180.000000.000000.000000.00000
ENE F 0.005420.002590.000000.000000.000000.00000
E F 0.004480.003540.000000.000000.000000.00000
ESE F 0.005190.003180.000000.000000.000000.00000
SE F 0.006720.003420.000000.000000.000000.00000
SSE F 0.006130.004830.000000.000000.000000.00000
S F 0.007540.003420.000000.000000.000000.00000
SSW F 0.006600.004950.000000.000000.000000.00000
SW F 0.005770.004360.000000.000000.000000.00000
WSW F 0.007310.004710.000000.000000.000000.00000
W F 0.005660.002950.000000.000000.000000.00000
WNW F 0.005770.005540.000000.000000.000000.00000
NW F 0.006720.004600.000000.000000.000000.00000
NNW F 0.013320.008370.000000.000000.000000.00000

APPENDIX B - RADIATION DOSE RATES FROM MILDOS-AREA

Appendix B contains the print out from the computer program MILDOS-AREA in the following order:

Appendix	Title	Radon Source	Weather Data	Waste Water Flow Rate
B1	MARMU315	MU 1-5	MEA	315
B2	MARST315	SATELLITE 1-5	MEA	315
B3	MARISR	NORTH TREND CROW BUTTE RES THREE CROW	MEA	315
B4	MARMU A-F	MU A-F	MEA	315
B5	MARST A-F	SATELLITE A-F	MEA	315
B6	MAROCMU	MU 1-5 OCCUPATIONAL	MEA	315
B7	MAROCST	SATELLITE 1-5 OCCUPATIONAL	MEA	315
B8	MAROCISR	ISR OCCUPATIONAL	MEA	315