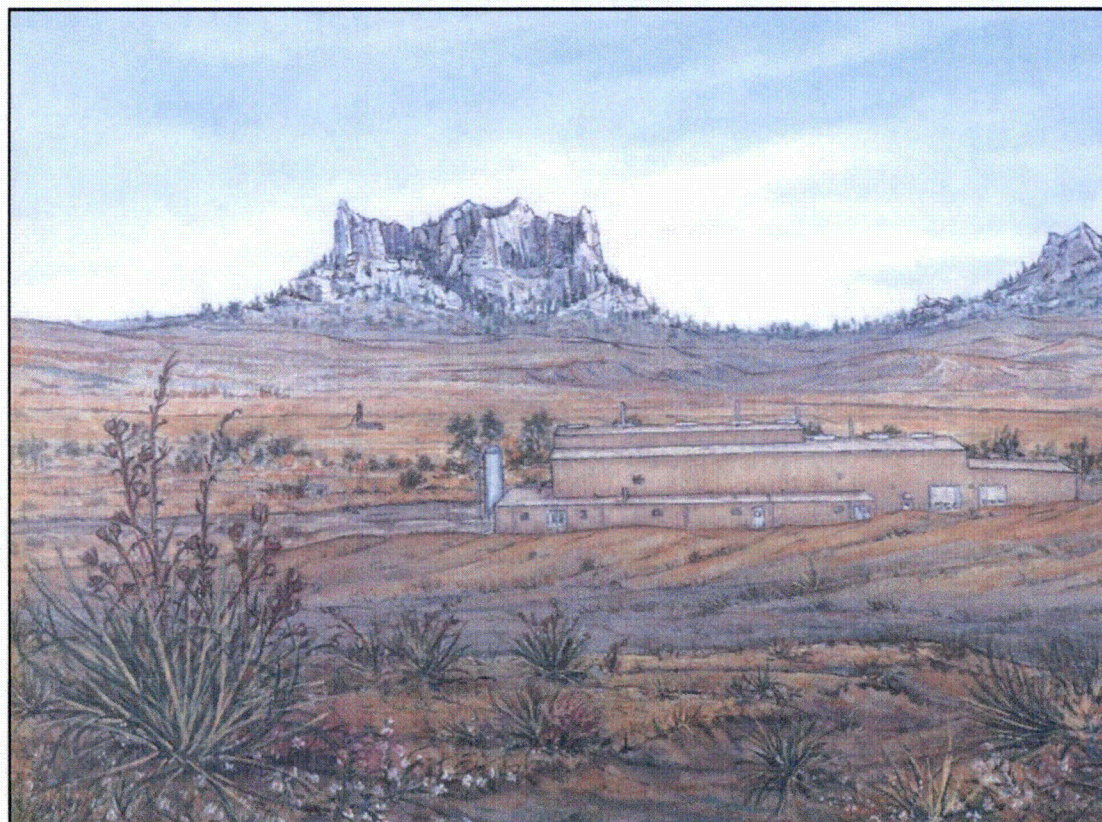


**Application for Amendment of
USNRC Source Materials License SUA-1534
Marsland Expansion Area**

Technical Report

**Volume III
Appendices A-J**

Response to Request for Additional Information (RAI) September 2015



Prepared by:
Crow Butte Resources, Inc.
86 Crow Butte Road
Crawford Nebraska 69339

Submitted: May 2012
Combined Revisions May 2012 through September 2015

CROW BUTTE RESOURCES, INC.

**Technical Report
Marshland Expansion Area**



Nuclear Regulatory Commission

Technical Report

Response to Request for Additional Information (RAI) – September 2015

Appendices A through J

[Combined Revisions May 2012 through September 2015]

Volume III

Marshland Expansion Area

September 2015

Appendix A

Water User Survey Information
[Active, Inactive, Seasonal and Abandoned Water
Supply Wells within 2.25-Mile Area of Review]

APPENDIX A
Water User Survey Information for Water Supply Wells
in 2.25 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		Brule		Chuck & Vicki Turnbull	7211 Trevett Ln.	Casper	WY	82604	16-Aug-10	Marsland	Chuck Turnbull	Chuck307- 262- 8803(M); 307-265- 2335(H)	Tatum Hlavacek	Well	livestock	active		old well	180- 200ft						submersible	galvanized	old homestea d-not inhabitabl e	1119330.5	448886.2		
0701		29	51	2		Brule		Chuck & Vicki Turnbull	7211 Trevett Ln.	Casper	WY	82604	16-Aug-10	Marsland	Chuck Turnbull	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		Brule		Chuck & Vicki Turnbull	7211 Trevett Ln.	Casper	WY	82604	16-Aug-10	Marsland	Chuck Turnbull	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 trail	1116343.1	446281.0	road, on hill by trees	
0703		29	50	30		Brule		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/livesto ck	active	10gpm	drill date- old	280ft	120ft				submersible	steel		1128170.1	428142.3			
0704		29	50	30		Unknown	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	Formatio n: estimated Arikaree/ Brule	1127118.2	428075.3			
0705		29	50	20		Arikaree		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		Unknown		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		Formatio n: estimated Arikaree/ Brule	1122016.7	427725.7			
0707		29	51	24		Unknown		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		Formatio n: estimated Arikaree/ Brule	1122999.9	431994.5			
0708		30	51	24		Brule		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		Unknown		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		Formatio n: estimated Arikaree/ Brule	1127322.8	468166.0			
0710		30	51	13		Unknown		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		Formatio n: estimated Arikaree/ Brule	1125293.1	468311.7			
0711		30	50	30		Unknown		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		Formatio n: estimated Arikaree/ Brule	1129643.0	458314.5			
0712		30	50	30		Unknown		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		Formatio n: estimated Arikaree/ Brule	1130223.6	460507.4			
0713		30	50	19		Unknown		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		Formatio n: estimated Arikaree/ Brule	1130589.8	463714.3			

APPENDIX A
Water User Survey Information for Water Supply Wells
in 2.25 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	
0714		29	51	24		Brule		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/livesto ck	active			135ft	55-60ft				submersible		steel		1121088.7	431237.4			
0715	G001417B	29	51	24		Arikaree		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	seasonal	200		135	55-60	01-Jan-56			submersible		steel	slits cut in casing for screen	1121114.7	430153.0			
0716	G001417A	29	51	24		Brule		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	seasonal	350		135	55-60	01-Jan-55			Turbine pump		steel	slits cut in casing for screen	1120822.4	430022.8			
0717		29	51	26		Arikaree/Brule		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		
0719		29	51	13		Brule		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		29	51	12	85-225	Brule/Arikaree		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	Other	active		drillers pond	240									CBO drillers pond off of Hollibaugh Rd.	1125236.9	440341.4		
0721		29	51	12		Arikaree/Brule		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	Other	active		drillers pond	360									CBO drillers pond; off Squaw Mound Rd.	112014.8	440485.1		
0722		29	51	12		Brule		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 Wellings Rental, well is behind house	1124745.2	442385.0			
0723	G100831	29	51	11	180-220	Brule		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	10		220	150	19-May-99	180	9	submersible	Chubb	pvc		1119554.2	440690.5	Bonnie Chapman #307-632- 3269		
0724		29	51	11		Unknown		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											Formatio n: estimated Arikaree/ Brule	1119753.9	440732.5	Bonnie Chapman #307-632- 3269	Wellings Rental, do not use well by corral	
0725	G-094856	29	50	7	180-240	Brule		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		1128286.3	442274.9			
0726A		29	51	12		Brule		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		abandon ed			300	70-80								abandone d-old oil test well, caved in			Bonne Chapman #307-632- 3269	
0727		29	51	1		Arikaree/Brule		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	Brule		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		Unknown		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			Formatio n: estimated Arikaree/ Brule	1128117.7	445802.1	well on 8- 24-10	leased by Tom Walters, spoke with Walters about
0730		29	50	7		Unknown		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	inactive								submersible			Formatio n: estimated Arikaree/ Brule	1126008.5	442756.2	old Cal Hollibaugh place	house used for vacation home	
0731	G090120	29	50	18	120-180	Brule		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	inactive	3		180	106	01-Jan-96	147	1	submersible	Nelson	pvc		1125370.9	438301.7			

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in 2.25 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
0732	G043958	29	50	17		Brule		Dewayne Hollibaugh	1343 Canyon Dr.	Chadron	NE	69337	10-Nov-10	Marsland	Dewayne Hollibaugh	308-432- 6833	Tatum Hlavacek	Well	Agricultural	seasonal	1300		280	78	01-Jan-74	171	8	Turbine pump			pivot	1130680.7	436970.7		
0733		29	51	13		Unknown		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	inactive								Windmill			Formation: n: estimated Arikaree/ Brule	1124205.4	435560.2		
0734	G-094138	30	50	31	240-300	Brule		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	G-148049	30	50	31	355-375	Brule		Patti Hollibaugh	971 Squaw Mound Rd	Crawford	NE	69339	01-Sep-10	Marsland	Dewayne Hollibaugh	308-432- 6833	Tatum Hlavacek		livestock	inactive			375	210	01-Jan-07	375	9		Prosser	pvc	well registered in Patti Hollibaug hs name;	1127652.4	450927.5	ground owned by Dewayne Hollibaugh	
0736	G068634	29	50	17		Brule		Tomahawk Ranch & Cattle Co.	3211 River Rd.	Marsland	NE	69354	05-Nov-10	Marsland	Greg Oetken	308-665- 2520	Tatum Hlavacek	Well	Agricultural	seasonal	900		200	115	01-Jan-68	200	8					1133618.8	438066.8	pivot	
0737	G068635	29	50	17		Brule		Tomahawk Ranch & Cattle Co.	3211 River Rd.	Marsland	NE	69354	05-Nov-10	Marsland	Greg Oetken	308-665- 2520	Tatum Hlavacek	Well	livestock	seasonal	1200		340	110	01-Jan-73	340	8					1134975.2	437990.2		
0738	G097537	29	51	26	240-260	Arikaree/Brule		June Winget Bruce Troester	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	260	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	Arikaree		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	Brule		Bruce Troester	3143 River Rd	Marsland	NE	69354	08-Nov-10	Marsland	Bruce Troester	308-665- 2353	Tatum Hlavacek	Well	Agricultural	seasonal	850		110	8	02-Feb-01		6		Nelson	pvc	pivot house well; between the two houses	1127519.8	424396.8		
0741	G081600	29	50	29	50- 170&170- 190	Brule		Greg Oetken Bruce Troester	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		1131600.1	425727.9		
0742	G086157	29	50	31	40-60	Arikaree		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		
0743	G106423	30	51	27	120-140	Brule		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 windmill/submers ible	Chubb	pvc		1114725.2	461481.1		
0744		30	51	26		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			80	30	01-Jan-70	80	5		Chubb	pvc		1117989.3	459031.5		
0745		30	51	26		Brule		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		Unknown		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			Formatio n: estimated Arikaree/ Brule	1121182.9	455178.1	state land	
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/Wind mill				1117899.2	453783.8		
0748		29	51	3		Unknown		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			Formatio n: estimated Arikaree/ Brule	1113046.1	448639.2		
0749		30	51	34		Unknown		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			Formatio n: estimated Arikaree/ Brule	1112776.7	452017.4		
0750		30	51	34		Unknown		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			Formatio n: estimated Arikaree/ Brule	1112710.4	454753.1		
0751		30	51	28		Unknown		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			Formatio n: estimated Arikaree/ Brule	1105386.1	457186.6		
0752		29	50	29		Brule		Bert Oetken	3211 River Rd.	Marsland	NE	69354	05-Nov-10	Marsland	Greg Oetken	308-665- 2520	Tatum Hlavacek	Well	domestic/livesto ck	active	10-20		200-300				submersible			barns	1132300.5	426415.9			

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Water User Survey Information for Water Supply Wells
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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			
0753		29	50	29		Brule		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		Brule		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		Brule		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	427697.6				
0756		29	50	20		Brule		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		Brule		Bert Oetken	3211 River Rd.	Marsland	NE	69354	05-Nov-10	Marsland	Greg Oetken	308-665-2520	Tatum Hlavacek	Well	livestock	Inactive	10-20			200-300					submersible				1133622.5	429537.5				
0760		29	50	17		Unknown		Bert Oetken	3211 River Rd.	Marsland	NE	69354	05-Nov-10	Marsland	Greg Oetken	308-665-2520	Tatum Hlavacek	Well	livestock	seasonal	1000								submersible				1135189.3	439343.3				
0762		29	50	16		Arikaree/Brule		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		Arikaree/Brule		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		Arikaree/Brule		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		Arikaree/Brule		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				
0767		29	51	4		Arikaree/Brule		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 house well	1107246.0	448328.8				
0768		29	51	4		Arikaree/Brule		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				1107063.9	448333.0				
0769		29	51	4		Arikaree/Brule		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				
0771		29	51	5		Arikaree/Brule		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		Arikaree/Brule		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		Arikaree/Brule		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		Arikaree/Brule		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		Arikaree/Brule		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		Arikaree		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		Arikaree		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				
0781		28N	51W	2		Arikaree/Brule		Troester	3142 River Rd	Marsland	Ne	69354	08-Nov-10	Marsland		Tatum Hlavacek	Well						60					windmill										
0782	G-134034	29	50	28		Brule		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	G-150312	29	50	28	50-70	Arikaree/Brule		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		Arikaree/Brule		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		Arikaree/Brule		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		Arikaree/Brule		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		Brule		Dewayne Hollibaugh	1343 Canyon Dr.	Chadron	NE	69337	10-Nov-10	Marsland	Hollibaugh	308-432-6833	Tatum Hlavacek	Well	livestock	inactive	10			130		01-Jan-60			Windmill	pvc				1126168.2	433468.9			
0788		29	50	18		Arikaree		Dewayne Hollibaugh	1343 Canyon Dr.	Chadron	NE	69337	10-Nov-10	Marsland	Hollibaugh	308-432-6833	Tatum Hlavacek	Well	livestock	inactive	10			130-140		01-Jan-40			Windmill	steel				1128858.0	438296.6			
0790		29	50	8		Unknown		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	Formation: estimated Arikaree/Brule				1134081.7	442038.2		

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0791		29	50	9		Unknown		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	Formatio n: estimated Arikaree/ Brule	1137066.2	441191.8			
0792		29	50	5		Unknown		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	Formatio n: estimated Arikaree/ Brule	1134397.3	445473.0	old well		
0793		30	50	32		Arikaree/Brule		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		Arikaree/Brule		Dewayne Hollibaugh	1343 Canyon Dr.	Chadron	NE	69337	10-Nov-10	Marsland	Dewayne Hollibaugh	308-432- 6833	Tatum Hlavacek	Well	domestic/livesto ck	active	10-15			300				submersible		pvc	well drilled between 1925- 1930, house	1129656.3	453879.2			
0795		30	50	31		Arikaree/Brule		Dewayne Hollibaugh	1343 Canyon Dr.	Chadron	NE	69337	10-Nov-10	Marsland	Dewayne Hollibaugh	308-432- 6833	Tatum Hlavacek	Well	domestic/livesto ck	active	10-15			350		01-Jan-90			submersible		pvc	well drilled in the 1990's, house	1130072.5	453722.8		
0796		30	50	31		Arikaree/Brule		Dewayne Hollibaugh	1343 Canyon Dr.	Chadron	NE	69337	10-Nov-10	Marsland	Dewayne Hollibaugh	308-432- 6833	Tatum Hlavacek	Well	domestic/livesto ck	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		Brule		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 approximat ely 10 yrs ago	
0799		30	51	24		Brule		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		Unknown		Jim Anderson	101 Linn Street	Crawford	NE	69339	12-Nov-10	Marsland	Jim Anderson	308-665- 2395	Tatum Hlavacek	Well	livestock	active								Windmill			Formatio n: estimated Arikaree/ Brule	1122174.9	469011.5	Leased by Travis Anderson	well is over 50 yrs old.	
0801	G116402	30	50	19		Arikaree/Brule		Mike Graves	132 Hough Rd.	Crawford	NE	69339	11-Nov-10	Marsland	Mike Graves	308-665- 1296	Tatum Hlavacek	Well	domestic/garde n	active	15			220	70	06-Jul-02	220	9	submersible	Chubb	pvc	started out being a domestic well in 1945	1126978.9	464282.7	house and buildings torn down, livestock ever sinc	old well
0802		30	51	25		Brule		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							
0803		30	51	29		Unknown		Edward Metz	211 E. Belmont Rd	Crawford	NE	6933	14-Jan-11	Marsland	Edward Metz	308-665- 1546	Tatum Hlavacek	Well	livestock	active								Windmill			Formatio n: estimated Arikaree/ Brule	1104542.3	461686.1	drilled before 1984		
0804		30	51	29		Unknown		Edward Metz	211 E. Belmont Rd.	Crawford	NE	69339	14-Jan-11	Marsland	Edward Metz	308-665- 1546	Tatum Hlavacek	Well	domestic/livesto ck	active				deep					submersible	Chubb		Formatio n: estimated Arikaree/ Brule	1104468.4	461791.2	by house flow not great enough to handle	by house, do not use
0805		30	51	29		Unknown		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		Formatio n: estimated Arikaree/ Brule	1104640.5	461790.0	submersibl e	by house, do not use	

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0806		30	51	29		Unknown		Edward Metz Russell	211 E. Belmont Rd.	Crawford	NE	69339	14-Jan-11	Marsland	Edward Metz	308-665- 1546	Tatum Hlavacek	Well	livestock	inactive								Windmill	Chubb		Formatio n: estimated Arikaree/ Brule	1104273.2	461660.7	windmill is broken, do not use well	
0808		30N	51	29		Arikaree/Brule		Finneman	114 Oetken Rd	Crawford	Ne	69339	14-Jan-11				T Hlavacek	Well	Agricultural	Active							submersible			well drilled before 1947, located by barn	1109635.8	461243.9			
0809		30	51	28		Brule		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								
0810		30	51	28		Unknown		Adelaide Walther	361 E. Belmont Rd.	Crawford	NE	69339	14-Jan-11	Marsland	Adelaide Walther	308-665- 1726	Tatum Hlavacek	Well	domestic/livesto ck	active	1		<300		01-Jan-90		submersible	Prosser		Formatio n: estimated Arikaree/ Brule	1109942.6	461542.5	house well is at least 20 years old, by blue shed		
0811		30	51	21		Unknown		Adelaide Walther	361 E. Belmont Rd.	Crawford	NE	69339	14-Jan-11	Marsland	Adelaide Walther	308-665- 1726	Tatum Hlavacek	Well	domestic/livesto ck	active	1/2		<300		01-Jan-90		Windmill	Panhandle Drilling		Formatio n: estimated Arikaree/ Brule	1110187.6	462030.2	well drilled about 20 years ago		
0812		30	51	21		Unknown		Gary Fickel	327 E. Belmont Rd.	Crawford	NE	69339	14-Jan-11	Marsland	Gary Fickel	308-665- 2439	Tatum Hlavacek	Well	domestic/livesto ck	active	good		260		01-Jan-71	220		submersible	Chubb		Formatio n: estimated Arikaree/ Brule	1109662.5	465283.8	house well	
0813		30	51	21		Unknown		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	Formatio n: estimated Arikaree/ Brule	1109411.4	465224.8			
0815		29	51	14		Brule		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		Brule		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		Brule		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		Arikaree/Brule		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		Arikaree/Brule		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			
0821		29	51	23		Brule		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		Brule		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		Arikaree/Brule		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			
0827		30	51	29		Unknown		Scott and Robbie Diehl		Chadron	NE	69337	29-Oct-08	Marsland	Robbie Diehl		Tatum Hlavacek	Well	livestock	active		inherited land from grandfath er							Formatio n: estimated Arikaree/ Brule	1104365.7	457644.6	leased by Oetkens; does not know history of well			
0828	G103966	30	51	29	140-160	Arikaree/Brule		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		
0834		30	51	23		Brule		Arlee Phillips	7600 Dodge Rd.	Hemingford	NE	69348	25-Feb-11	Marsland	Arlee Phillips	308-487- 3876	Tatum Hlavacek	Well	domestic/livesto ck	inactive	good		300		01-Jan-76			submersible		pvc	not used windmill not standing anymore	1116192.0	462067.9		
0835		30	51	23		Brule		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		1116080.4	462504.7	not used		
0836	G100106	30	51	23	200-220	Brule		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		Brule		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/Brule		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		Arikaree/Brule		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		Arikaree/Brule		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		

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0841	G100105	30	51	22		Brule		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		Arikaree/Brule		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, well drilled before 1955	1118307.0	469291.8	waiting for solar		
0843		30	51	22		Brule		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		1115080.5	462090.2			
0845		29	50	28		Unknown		Steve Klaes	3333 River Rd.	Marsland	NE	69354	25-Feb-11	Marsland	Steve Klaes	308-665-1503	Tatum Hlavacek	Well	domestic/livestock	active								submersible			Formation: estimated Arikaree/Brule	1137941.5	427243.4		
0846		29	50	33		Unknown		Steve Klaes	3333 River Rd.	Marsland	NE	69354	25-Feb-11	Marsland	Steve Klaes	308-665-1503	Tatum Hlavacek	Well	livestock	active								Windmill			Formation: estimated Arikaree/Brule	1137048.9	421179.0		
0849		29	50	22		Unknown		Steve Klaes	3333 River Rd.	Marsland	NE	69354	25-Feb-11	Marsland	Steve Klaes	308-665-1503	Tatum Hlavacek	Well	livestock	active								submersible			Formation: estimated Arikaree/Brule vertical shaft	1142423.3	431322.9		
0850	G022646	29	50	22		Arikaree/Brule		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				1142735.9	432181.9		
0851	G000345A	29	50	22		Arikaree/Brule		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		
0853	G126273	29	50	22		Arikaree/Brule		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		
0856		29	51	36		Arikaree/Brule								Marsland		Tatum Hlavacek											Windmill			Formation: estimated Arikaree/Brule	112255.5	420726.5	state land		
0857		29	51	25		Arikaree/Brule		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		Arikaree/Brule		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				cement block on top of well, cased down to butte	1142168.8	437589.0		
0859		29	51	27		Arikaree/Brule		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	rock, well is dry-no water	1114131.2	429920.5		
0861		30	50	19		Arikaree/Brule		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	information as per certified letter				
0862	G-89968	30	51	29	135-155	Arikaree/Brule		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		
0863A		29N	51W	1		Basal Chadron								Marsland					Monitoring	Abandoned			1110												
0864A		29N	51W	1		Basal Chadron								Marsland					Monitoring	Abandoned			1045												
0865A		29N	50W	18		Basal Chadron								Marsland					Monitoring	Abandoned			1010												
0866A		29N	50W	29		Basal Chadron								Marsland					Monitoring	Abandoned			935												
0867A		29N	51W	10		Arikaree		Chapman/Walters						Marsland	Bonnie Chapman		Wade Beins	Well	Domestic	Abandoned			Hand Dug	60						Filled in					
0868A		30N	51W	36										Marsland	T.J. Manning		Wade Beins	Well	Livestock	Abandoned															

Appendix B

Calibration Records for Marsland
Expansion Area Meteorological Station



AATA INTERNATIONAL, INC.

April 22, 2010

This meteorology station cost estimate was compiled using the most current prices available from Campbell Scientific, Met One Instruments, and Climatronics. Actual prices may vary depending on the ordering date. This cost estimate does not include taxes and shipping nor installation, maintenance, and repair. The estimate does not include any type of communication device such as cellular or satellite modems, but the data can be downloaded directly from the datalogger.

Meteorology Station Cost Estimate

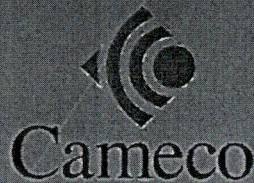
Item Description	Cost
10 meter tower with base, cross arms, and guy wires	\$1,382.00
CR100 datalogger, enclosure, and hand display	\$2,060.00
Computer software (Loggernet)	\$599.00
70 Watt solar panel, regulator, and batteries	\$1000.00
Delta-T temperature sensors at 2 and 10 meters	\$525.00
Delta-T radiation shields	\$1,125.00
Relative humidity sensor and shield	\$670.00
Pyrhometer and mount	\$485.00
Rain gage	\$396.00
Wind direction and speed	\$825.00
Consumables (zip ties, tape, poles, bolts, etc.)	\$100.00
Total	\$9,167.00

International Environmental Consultants

2240 Blake Street, Suite 210, Denver, Colorado 80205
Phone: 720-974-2550 Fax: 303-223-1333 Internet: <http://www.aata.com>

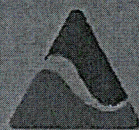
Meteorological Monitoring Station Calibration Report

Prepared for:

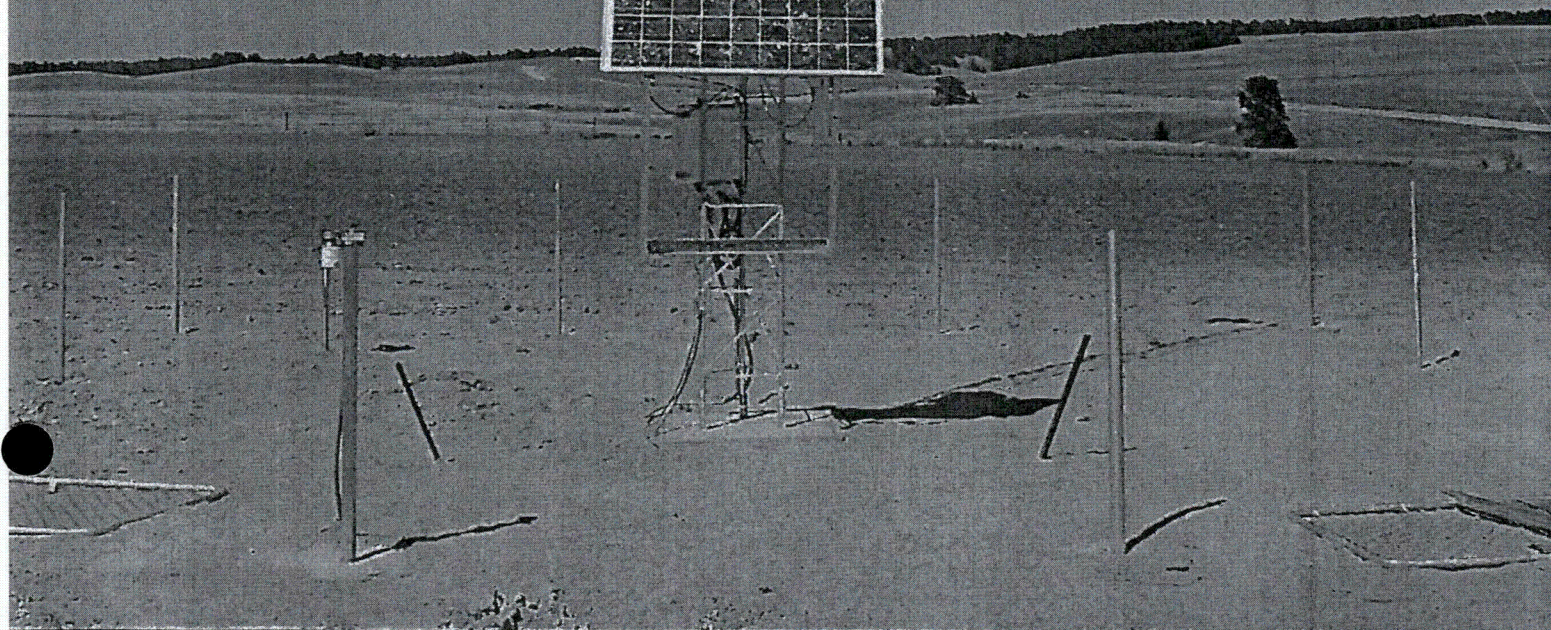
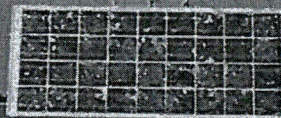


**Crow Butte Resources Inc.
Crawford Nebraska**

Prepared by:



**AATA International, Inc.
Denver and Fort Collins, Colorado, USA**



WIND DIRECTION SENSOR CALIBRATION REPORT

PART A: ANCILLARY INFORMATION

Project: Crow Butte Date: 8/21/2010 Check One:
Location: Crawford Nebraska Start: 15:22 8/21/2010 As Found: ✓
Technician: Ethan Brown End: 10:20 8/23/2010 As Left:

SENSOR INFORMATION

Make: Met One Operating Range: 0 to 360 degrees
Model: 034B Height Above Ground: 10 meters
SN: K15391

CALIBRATION TEST EQUIPMENT

Item: Brunton pocket transit compass SN: 5080610049
Item: R.M.Young, Model 18331, vane torque measurement device SN: NA
Item: R.M.Young, Model 18112, vane angle fixture SN: NA

PART B: CALIBRATION TEST RESULTS

Local Magnetic Declination: 8.4 degrees east

(<http://www.ngdc.noaa.gov/geomagmodels/Declination.jsp>)

Sensor Starting Threshold: 5.0 ,equal to 0.37 Pass? / Fail?: PASS
gm-cm mps ≤ 0.50 mps

Test Input Deg.	Accuracy Test Response		
	Output Deg.	Error Deg.	Pass? Fail?
2	0	-2	PASS
92	89	-3	PASS
182	179	-3	PASS
272	269	-3	PASS

Test Input Deg.	Linearity Test Response		
	Output Deg.	Nrmld* Deg.	Pass? Fail?
0	0	NA	NA
30	28	-2	PASS
60	58	0	PASS
90	89	1	PASS
120	118	-1	PASS
150	148	0	PASS
180	178	0	PASS
210	209	1	PASS
240	239	0	PASS
270	269	0	PASS
300	300	1	PASS
330	330	0	PASS

COMMENTS

- The crossarm was measured at 272 degrees to true north on 8/23/2010. The accuracy test response was measured against the crossarm, and therefore is off by 2 degrees. This is reflected in the "Test Input Deg." category.

* Normalized error in degrees.

To PASS, the sensor must have... 1) Starting Torque Threshold = ≤ 0.50 mps
2) Accuracy Test Error = $\leq \pm 5$ degrees per test point
3) Linearity Test Error = $\leq \pm 3$ degrees per test point

WIND SPEED SENSOR CALIBRATION REPORT

PART A: ANCILLARY INFORMATION

Project: Crow Butte Date: 8/21/2010 Check One:
Location: Crawford Nebraska Start: 15:22 8/21/2010 As Found: ✓
Technician: Ethan Brown End: 10:20 8/22/2010 As Left:

SENSOR INFORMATION

Make: Met One Propeller SN: NA
Model: 034B Operating Range: 0 to 75 mps
SN: K15391 Height Above Ground: 10 meters

CALIBRATION TEST EQUIPMENT

Item: Variable motor. R.M.Young, 18820A/18830A (200 to 15,000 rpm) SN: CA03277
Item: Variable motor. R.M.Young, 18820A/18831A (0 to 300 rpm) SN: CA03277
Item: Torque disk device. R.M.Young, 18312 SN: NA

PART B: CALIBRATION TEST RESULTS

Sensor Starting Threshold: 0.2 ,equal to 0.38 Pass? / Fail?: Pass
gm-cm mps ≤ 0.50 mps

Known Input		Observed Data Logger Response					
Motor rpm	Motor mps	Output mps	Error mps	Error %	Limit mps	Limit %	Pass? Fail?
0.0	0.00	0.00	0.00	NA	NA	NA	NA
150	4.27	4.28	0.01	0.1	$\leq \pm 0.20$	---	PASS
300	8.27	8.27	0.00	0.0	---	$\leq \pm 5\%$	PASS
700	18.92	19.06	0.14	0.7	---	$\leq \pm 5\%$	PASS
1,300	34.90	35.63	0.73	2.1	---	$\leq \pm 5\%$	PASS

COMMENTS

- 1,300 was the highest RMP obtained with the drive unit available. 35 mps is equivalent to 78 miles per hour.
- Need to get wind speed attachment for 034B.
- Accomplished starting threshold by marking the wind speed arm and placing screw on arm.

To PASS, the sensor must have... 1) Starting Torque Threshold = ≤ 0.50 mps
2) Wind speed input ≤ 5.0 mps = $\leq \pm 0.20$ mps error
3) Wind speed input > 5.0 mps = $\leq \pm 5\%$ of input speed

TEMPERATURE / Δ TEMPERATURE CALIBRATION REPORT

PART A: ANCILLARY INFORMATION

Project: Crow Butte Date: 8/22/2010 Check One:
Location: Crawford Nebraska Start: 10:20 As Found: ✓
Technician: Ethan Brown End: 11:20 As Left:

SENSOR INFORMATION

Make: Met One 2-Meter Probe SN: K13981 (1 of 2)
Model: 062 MP 10-Meter Probe SN: K13981 (2 of 2)
Operating Range: -50 to +50 C

CALIBRATION TEST EQUIPMENT

Item: Ertco-Eutechnics Thermistor Model 4400 (139000-45RS) SN: 306433
Item: Insulated water baths with mechanical stirring. SN: NA

PART B: CALIBRATION TEST RESULTS

Temperature Probe Calibration

Known Input		Observed Data Logger Response					
Water Bath	Temp. °C	2-m °C	2-m Error °C	Pass? Fail?	10-m °C	10-m Error °C	Pass? Fail?
Ice	0.28	0.28	0.00	PASS	0.28	0.00	PASS
Cool	25.74	25.70	-0.04	PASS	25.70	-0.04	PASS
Hot	49.53	49.52	-0.01	PASS	49.52	-0.01	PASS

Temperature Difference System Calibration

Known Input		Observed Response		
Water Bath	ΔT °C	2-10 ΔT °C	2-10 ΔT Error °C	Pass? Fail?
Ice	0.00	0.00	0.00	PASS
Cool	0.00	0.00	0.00	PASS
Hot	0.00	0.00	0.00	PASS

(NOTE: The water baths were constantly agitated with mechanical stirring during the calibration tests.)

(NOTE: During the ΔT calibration, both probes were placed together in the same bath.)

COMMENTS

To PASS, the temperature probes must have... Accuracy error = $\leq \pm 0.50$ °C per test point

To PASS, the ΔT system must have... Accuracy error = $\leq \pm 0.10$ °C per test point

PRECIPITATION GAUGE CALIBRATION REPORT

PART A: ANCILLARY INFORMATION

Project: Crow Butte Date: 8/22/2010 Check One:
Location: Crawford Nebraska Start: 9:32 As Found: ✓
Technician: Ethan Brown End: 10:00 As Left:

SENSOR INFORMATION

Make: Met One Gauge Type: Tipping Bucket
Model: TE525WS Operating Range: NA
SN: NA Height Above Ground: 0.91 meters

CALIBRATION TEST EQUIPMENT

Item: Distilled water, graduated cylinders, drip device SN: NA

PART B: CALIBRATION TEST RESULTS

KNOWN INPUT		OBSERVED RESPONSE			
		DAS	Error	Error	Pass?
ml, H ₂ O	mm	mm	mm	%	Fail? ¹
250	7.60	7.37	-0.23	-3.1	PASS

COMMENTS

- Need to obtain serial number from unit.

To PASS, the sensor must have... 1) Percent Error = $\leq 10\%$

Prepared 8/5/2010

SOLAR RADIATION SENSOR CALIBRATION REPORT

PART A: ANCILLARY INFORMATION

Project: Crow Butte Date: 8/21/2010 Check One:
Location: Crawford Nebraska Start: 15:22 8/21/2010 As Found: ✓
Technician: Ethan Brown End: 11:00 8/23/2010 As Left:

SENSOR INFORMATION

Make: LiCor Operating Range: 0 to 1,400 W/m²
Model: 200 Pyranometer Height Above Ground: 1.3 meters
SN: PY68828

CALIBRATION TEST EQUIPMENT

Item: Kipp & Zonen CM-3 pyranometer SN: 58211
Item: Fluke, Model 289, digital multimeter (4.5 digits, True RMS) SN: 96210097

PART B: CALIBRATION TEST RESULTS

Known Input		Observed DAS Response				
Period hhmm	Value W/m ²	DAS W/m ²	Error W/m ²	Error %	Error % F.S.	Pass? Fail? ⁴
Covered	0.0	0	0	NA	NA	NA
17:00	438	443	5	1.1	0.4	PASS
16:51	469	472	3	0.6	0.2	PASS
16:43	484	492	8	1.7	0.6	PASS
14:33	762	766	4	0.5	0.3	PASS
12:26	842	836	-6	-0.8	-0.5	PASS

Calibration Curve Results ⇒ Slope: ¹ 0.9960 PASS
Intercept: ² 4.302 PASS
Corr. Coeff: ³ 0.9999 PASS

COMMENTS

- It was difficult to get a large range of values because of constant clear skies. The pyranometer performed very well against the CM-3

To PASS, the sensor must have...
¹ Slope = 1.0 ± 0.05
² Intercept = $\leq 1\%$ of Full Scale
³ Correlation Coefficient = ≥ 0.9950
⁴ Error per test point = $\pm 5\%$ of observed

RELATIVE HUMIDITY SENSOR CALIBRATION REPORT

PART A: ANCILLARY INFORMATION

Project: Crow Butte Date: 8/22/2010 - 8/23/2010 Check One:
Location: Crawford Nebraska Start: 12:54 As Found: ✓
Technician: Ethan Brown End: 10:00 As Left: _____

SENSOR INFORMATION

Make: Vaisala Operating Range: 0-100%
Model: HMP45AC Height Above Ground: 2 meters
SN: F2450239

CALIBRATION TEST EQUIPMENT

Item: Fisher Scientific Traceable Hygrometer, Thermometer, Dew Point SN: 72366727

PART B: CALIBRATION TEST RESULTS

KNOWN INPUT		OBSERVED RESPONSE		
		DAS	Error	Pass?
Test	%RH	%RH	%RH	Fail? ¹
Ambient	46.9	47.1	0.2	PASS
Chmbr.	55.2	55.7	0.5	PASS

COMMENTS

- Could not get chamber higher than 60 % relative humidity. The Vaisala sensor comes with a calibration certificate. Even though it passed this audit, a new chamber will need to be used for the 6 month calibration. Suggest using salts instead of the Fisher Scientific Hygrometer.

To PASS, the sensor must have... 1) Percent Error = $\leq 10\%$

Prepared 8/5/2010

Meteorological Monitoring Station Calibration Report

December 2010 and May 2011

Prepared for:



Crow Butte Resources Inc.
Crawford Nebraska

Prepared by:



AATA International, Inc.
Denver and Fort Collins, Colorado, USA



WIND DIRECTION SENSOR CALIBRATION REPORT

PART A: ANCILLARY INFORMATION

Project: Crow Butte Date: 12/01/2010 Check One:
Location: Crawford Nebraska Start: 10:30 12/01/2010 As Found: ✓
Technician: Ethan Brown End: 13:00 12/01/2010 As Left: ✓

SENSOR INFORMATION

Make: Met One Operating Range: 0 to 360 degrees
Model: 034B Height Above Ground: 10 meters
SN: K18760

CALIBRATION TEST EQUIPMENT

Item: Brunton pocket transit compass SN: 5080610049
Item: R.M.Young, Model 18331, vane torque measurement device SN: NA
Item: R.M.Young, Model 18112, vane angle fixture SN: NA

PART B: CALIBRATION TEST RESULTS

Local Magnetic Declination: 8.4 degrees east

(<http://www.ngdc.noaa.gov/geomagmodels/Declination.jsp>)

Sensor Starting Threshold: 5.0 ,equal to 0.37 Pass? / Fail?: PASS
gm-cm mps ≤ 0.50 mps

Test Input Deg.	Accuracy Test Response		
	Output Deg.	Error Deg.	Pass? Fail?
2	0	-2	PASS
92	91	-1	PASS
182	182	0	PASS
272	270	-3	PASS

Test Input Deg.	Linearity Test Response		
	Output Deg.	Nrmld* Deg.	Pass? Fail?
0	2	NA	NA
30	33	1	PASS
60	62	-1	PASS
90	94	1	PASS
120	122	-2	PASS
150	151	-1	PASS
180	182	1	PASS
210	212	0	PASS
240	243	1	PASS
270	273	0	PASS
300	302	0	PASS
330	333	1	PASS

COMMENTS

- The crossarm was measured at 272 degrees to true north on 12/01/2010. The accuracy test response was measured against the crossarm, and therefore is off by 2 degrees. This is reflected in the "Test Input Deg." category.

* Normalized error in degrees.

To PASS, the sensor must have... 1) Starting Torque Threshold = ≤ 0.50 mps
2) Accuracy Test Error = $\leq \pm 5$ degrees per test point
3) Linearity Test Error = $\leq \pm 3$ degrees per test point

WIND SPEED SENSOR CALIBRATION REPORT

PART A: ANCILLARY INFORMATION

Project: Crow Butte Date: 12/01/2010 Check One:
Location: Crawford Nebraska Start: 10:30 12/01/2010 As Found: ✓
Technician: Ethan Brown End: 13:00 12/01/2010 As Left: ✓

SENSOR INFORMATION

Make: Met One Propeller SN: NA
Model: 034B Operating Range: 0 to 75 mps
SN: K18760 Height Above Ground: 10 meters

CALIBRATION TEST EQUIPMENT

Item: Variable motor. R.M.Young, 18820A/18830A (200 to 15,000 rpm) SN: CA03277
Item: Variable motor. R.M.Young, 18820A/18831A (0 to 300 rpm) SN: CA03277
Item: Torque disk device. R.M.Young, 18312 SN: NA

PART B: CALIBRATION TEST RESULTS

Sensor Starting Threshold: 0.2 ,equal to 0.38 Pass? / Fail?: Pass
gm-cm mps ≤ 0.50 mps

Known Input		Observed Data Logger Response					
Motor rpm	Motor mps	Output mps	Error mps	Error %	Limit mps	Limit %	Pass? Fail?
0.0	0.00	0.00	0.00	NA	NA	NA	NA
150	4.27	4.28	0.01	0.1	$\leq \pm 0.20$	---	PASS
300	8.27	8.27	0.00	0.0	---	$\leq \pm 5\%$	PASS
700	19.06	19.06	0.00	0.0	---	$\leq \pm 5\%$	PASS
1,300	35.04	35.63	0.59	1.7	---	$\leq \pm 5\%$	PASS

COMMENTS

- 1,300 was the highest RMP obtained with the drive unit available. 35 mps is equivalent to 78 miles per hour.
- Need to get wind speed attachment for 034B.
- Accomplished starting threshold by marking the wind speed arm and placing screw on arm.

To PASS, the sensor must have... 1) Starting Torque Threshold = ≤ 0.50 mps
2) Wind speed input ≤ 5.0 mps = $\leq \pm 0.20$ mps error
3) Wind speed input > 5.0 mps = $\leq \pm 5\%$ of input speed

WIND DIRECTION SENSOR CALIBRATION REPORT

PART A: ANCILLARY INFORMATION

Project: Crow Butte Date: 5/27/2011 Check One:
Location: Crawford Nebraska Start: 10:20 5/27/2011 As Found: ✓
Technician: Ethan Brown End: 13:55 5/27/2011 As Left: _____

SENSOR INFORMATION

Make: Met One Operating Range: 0 to 360 degrees
Model: 034B Height Above Ground: 10 meters
SN: K18760

CALIBRATION TEST EQUIPMENT

Item: Brunton pocket transit compass SN: 5080610049
Item: R.M.Young, Model 18331, vane torque measurement device SN: NA
Item: R.M.Young, Model 18112, vane angle fixture SN: NA

PART B: CALIBRATION TEST RESULTS

Local Magnetic Declination: 8.4 degrees east

(<http://www.ngdc.noaa.gov/geomagmodels/Declination.jsp>)

Sensor Starting Threshold: 2.0 , equal to 0.23 Pass? / Fail?: PASS
gm-cm mps ≤ 0.50 mps

Test Input Deg.	Accuracy Test Response		
	Output Deg.	Error Deg.	Pass? Fail?
0	0	0	PASS
90	91	1	PASS
180	181	1	PASS
270	269	-1	PASS

Test Input Deg.	Linearity Test Response		
	Output Deg.	Nrmlzd* Deg.	Pass? Fail?
0	0	NA	NA
30	29	-1	PASS
60	58	-1	PASS
90	90	1	PASS
120	119	0	PASS
150	149	0	PASS
180	179	0	PASS
210	209	0	PASS
240	240	1	PASS
270	269	-1	PASS
300	299	0	PASS
330	329	0	PASS
350	350	1	PASS
360	360	0	PASS

COMMENTS

- The crossarm was measured at 270 degrees to true north on 5/27/2011.

* Normalized error in degrees.

To PASS, the sensor must have... 1) Starting Torque Threshold = ≤ 0.50 mps
2) Accuracy Test Error = $\leq \pm 5$ degrees per test point
3) Linearity Test Error = $\leq \pm 3$ degrees per test point

WIND SPEED SENSOR CALIBRATION REPORT

PART A: ANCILLARY INFORMATION

Project: Crow Butte Date: 5/27/2011 Check One:
Location: Crawford Nebraska Start: 10:20 5/27/2011 As Found: ✓
Technician: Ethan Brown End: 13:55 5/27/2011 As Left:

SENSOR INFORMATION

Make: Met One Propeller SN: NA
Model: 034B Operating Range: 0 to 75 mps
SN: K18760 Height Above Ground: 10 meters

CALIBRATION TEST EQUIPMENT

Item: Variable motor. R.M.Young, 18820A/18830A (200 to 15,000 rpm) SN: CA03277
Item: Variable motor. R.M.Young, 18820A/18831A (0 to 300 rpm) SN: CA03277
Item: Torque disk device. R.M.Young, 18312 SN: NA

PART B: CALIBRATION TEST RESULTS

Sensor Starting Threshold: 0.2 ,equal to 0.38 Pass? / Fail?: Pass
gm-cm mps ≤ 0.50 mps

Known Input		Observed Data Logger Response					
Motor rpm	Motor mps	Output mps	Error mps	Error %	Limit mps	Limit %	Pass? Fail?
0.0	0.00	0.00	0.00	NA	NA	NA	NA
150	4.27	4.27	0.00	-0.1	$\leq \pm 0.20$	---	PASS
300	8.27	8.27	0.00	0.0	---	$\leq \pm 5\%$	PASS
700	18.92	19.05	0.13	0.7	---	$\leq \pm 5\%$	PASS
1,300	34.90	34.63	-0.27	-0.8	---	$\leq \pm 5\%$	PASS

COMMENTS

- 1,300 was the highest RMP obtained with the drive unit available. 35 mps is equivalent to 78 miles per hour.
- Accomplished starting threshold by marking the wind speed arm and placing screw on arm.

To PASS, the sensor must have... 1) Starting Torque Threshold = ≤ 0.50 mps
2) Wind speed input ≤ 5.0 mps = $\leq \pm 0.20$ mps error
3) Wind speed input > 5.0 mps = $\leq \pm 5\%$ of input speed

TEMPERATURE / Δ TEMPERATURE CALIBRATION REPORT

PART A: ANCILLARY INFORMATION

Project: Crow Butte Date: 5/27/2011 Check One:
Location: Crawford Nebraska Start: 10:20 5/27/2011 As Found: ✓
Technician: Ethan Brown End: 13:55 5/27/2011 As Left:

SENSOR INFORMATION

Make: Met One 2-Meter Probe SN: K13981 (1 of 2)
Model: 062 MP 10-Meter Probe SN: K13981 (2 of 2)
Operating Range: -50 to +50 C

CALIBRATION TEST EQUIPMENT

Item: Dostmann Electronic GmbH P650-PT SN: 65010081147
Item: Insulated water baths with mechanical stirring. SN: NA

PART B: CALIBRATION TEST RESULTS

Temperature Probe Calibration

Known Input		Observed Data Logger Response					
Water Bath	Temp. °C	2-m °C	2-m Error °C	Pass? Fail?	10-m °C	10-m Error °C	Pass? Fail?
Ice	-0.15	-0.02	0.13	PASS	-0.03	0.12	PASS
Cool	18.12	18.09	-0.03	PASS	18.04	-0.08	PASS
Hot	36.09	36.06	-0.03	PASS	36.06	-0.03	PASS

Temperature Difference System Calibration

Known Input		Observed Response		
Water Bath	ΔT °C	2-10 ΔT °C	2-10 ΔT Error °C	Pass? Fail?
Ice	0.00	0.02	0.02	PASS
Cool	0.00	0.05	0.05	PASS
Hot	0.00	0.00	0.00	PASS

(NOTE: The water baths were constantly agitated with mechanical stirring during the calibration tests.)

(NOTE: During the ΔT calibration, both probes were placed together in the same bath.)

COMMENTS

To PASS, the temperature probes must have... Accuracy error = $\leq \pm 0.50$ °C per test point
To PASS, the ΔT system must have... Accuracy error = $\leq \pm 0.10$ °C per test point

PRECIPITATION GAUGE CALIBRATION REPORT

PART A: ANCILLARY INFORMATION

Project: Crow Butte Date: 5/27/2011 Check One:
Location: Crawford Nebraska Start: 09:30 5/27/2011 As Found: ✓
Technician: Ethan Brown End: 11:04 5/27/2011 As Left:

SENSOR INFORMATION

Make: Met One Gauge Type: Tipping Bucket
Model: TE525WS Operating Range: NA
SN: 44745-710 Height Above Ground: 0.91 meters

CALIBRATION TEST EQUIPMENT

Item: Distilled water, graduated cylinders, drip device SN: NA

PART B: CALIBRATION TEST RESULTS

KNOWN INPUT		OBSERVED RESPONSE			
		DAS	Error	Error	Pass?
ml, H ₂ O	mm	mm	mm	%	Fail? ¹
500	15.10	13.97	-1.13	-7.5	PASS

COMMENTS

To PASS, the sensor must have... 1) Percent Error = $\leq 10\%$

SOLAR RADIATION SENSOR CALIBRATION REPORT

PART A: ANCILLARY INFORMATION

Project: Crow Butte Date: 5/27/2011 Check One:
Location: Crawford Nebraska Start: 10:20 5/27/2011 As Found: ✓
Technician: Ethan Brown End: 13:55 5/27/2011 As Left:

SENSOR INFORMATION

Make: LiCor Operating Range: 0 to 1,400 W/m²
Model: 200 Pyranometer Height Above Ground: 1.3 meters
SN: PY68828

CALIBRATION TEST EQUIPMENT

Item: Kipp & Zonen CM-3 pyranometer SN: 58211
Item: Fluke, Model 289, digital multimeter (4.5 digits, True RMS) SN: 96210097

PART B: CALIBRATION TEST RESULTS

Known Input		Observed DAS Response				
Period hhmm	Value W/m ²	DAS W/m ²	Error W/m ²	Error %	Error % F.S.	Pass? Fail? ⁴
10:51	0.0	0	0	NA	NA	NA
10:03	933	941	7	0.8	0.5	PASS
10:32	973	944	-29	-3.0	-2.1	PASS
11:27	1153	1125	-28	-2.4	-2.0	PASS
11:28	1167	1142	-25	-2.1	-1.8	PASS
11:49	1020	988	-32	-3.1	-2.3	PASS

Calibration Curve Results ⇨ Slope: ¹ 0.9769 PASS
Intercept: ² 2.552 PASS
Corr. Coeff: ³ 0.9995 PASS

COMMENTS

- It was difficult to get a large range of values because of constant clear skies. The pyranometer performed very well against the CM-3

To PASS, the sensor must have...
¹ Slope = 1.0 ± 0.05
² Intercept = $\leq 1\%$ of Full Scale
³ Correlation Coefficient = ≥ 0.9950
⁴ Error per test point = $\pm 5\%$ of observed

RELATIVE HUMIDITY SENSOR CALIBRATION REPORT

PART A: ANCILLARY INFORMATION

Project: Crow Butte Date: 5/27/2011 Check One:
Location: Crawford Nebraska Start: 10:20 5/27/2011 As Found: ✓
Technician: Ethan Brown End: 13:55 5/27/2011 As Left: _____

SENSOR INFORMATION

Make: Vaisala Operating Range: 0-100%
Model: HMP45AC Height Above Ground: 2 meters
SN: F2450239

CALIBRATION TEST EQUIPMENT

Item: Fisher Scientific Traceable Hygrometer, Thermometer, Dew Point SN: 102060060

PART B: CALIBRATION TEST RESULTS

KNOWN INPUT		OBSERVED RESPONSE		
		DAS	Error	Pass?
Test	%RH	%RH	%RH	Fail? ¹
Ambient	38.6	34.4	-4.2	PASS
Chmbr.	100.0	96.5	-3.5	PASS

COMMENTS

To PASS, the sensor must have... 1) Percent Error = $\leq 10\%$

Prepared 8/5/2010



CALIBRATION PROCEDURE
18802/18811 ANEMOMETER DRIVE

DWG: CP18802(C)

REV: C101107

PAGE: 4 of 4

BY: TJT

DATE: 10/11/07

CHK: JC

W.C. GAS-12

CERTIFICATE OF CALIBRATION AND TESTING

R. M. Young Company certifies that the equipment listed below was inspected and calibrated prior to shipment in accordance with established manufacturing and testing procedures. Standards established by R.M. Young Company for calibrating the measuring and test equipment used in controlling product quality are traceable to the National Institute of Standards and Technology.

MODEL: ☐ 18802 / ☒ 18811

SERIAL NUMBER: CA03277

(18802 Comprised of Models 18820A Control Unit & 18830A Motor Assembly)

(18811 Comprised of Models 18820A Control Unit & 18831A Motor Assembly)

Nominal Motor RPM	27106D Output Frequency (Hz) - (1)	Calculated Rpm (1)	Indicated Rpm (2)
18802		☒ CW / CCW rotation verified	
300	50	300	300
2700	450	2700	2700
5100	850	5100	5100
7500	1250	7500	7500
10,200	1700	10200	10200
12,600	2100	12600	12600
15,000	2500	15000	15000
18811		☒ CW / CCW rotation verified	
30.0	5	30.0	30.0
150.0	25	150.0	150.0
300.0	50	300.0	300.0
450.0	75	450.0	450.0
600.0	100	600.0	600.0
750.0	125	750.0	750.0
990.0	165	990.0	990.0

- (1) Measured frequency output of RM Young Model 27106D standard anemometer attached to motor shaft - 27106D produces 10 pulses per revolution of the anemometer shaft.
(2) Indicated on the Control Unit LCD display.

* Indicates out of tolerance

☒ No Calibration Adjustments Required

☐ As Found

☐ As Left

Traceable frequency meter used in calibration Model: 5740 SN: 4863

Date of inspection 27 Apr 2010
Inspection Interval One Year

Tested By EC



CALIBRATION PROCEDURE
18802/18811 ANEMOMETER DRIVE

DWG: CP18802(C)

REV: C101107

PAGE: 4 of 4

BY: TJT

DATE: 10/11/07

CHK: JC

W.C. GAS-12

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SERIAL NUMBER: CA03277

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Nominal Motor RPM	27106D Output Frequency (Hz) - (1)	Calculated Rpm (1)	Indicated Rpm (2)
18802		☒ CW / CCW rotation verified	
300	50	300	300
2700	450	2700	2700
5100	850	5100	5100
7500	1250	7500	7500
10,200	1700	10200	10200
12,600	2100	12600	12600
15,000	2500	15000	15000
18811		☒ CW / CCW rotation verified	
30.0	5	30.0	30.0
150.0	25	150.0	150.0
300.0	50	300.0	300.0
450.0	75	450.0	450.0
600.0	100	600.0	600.0
750.0	125	750.0	750.0
990.0	165	990.0	990.0

- (1) Measured frequency output of RM Young Model 27106D standard anemometer attached to motor shaft - 27106D produces 10 pulses per revolution of the anemometer shaft.
(2) Indicated on the Control Unit LCD display.

* Indicates out of tolerance

☒ No Calibration Adjustments Required

☐ As Found

☐ As Left

Traceable frequency meter used in calibration Model: DP5740 SN: 4862

Date of inspection 30 JUN 2011

Inspection Interval One Year

Tested By EC



10 Millpond Drive, Unit 2, Lafayette, NJ 07848
T: 973-300-9100 F: 973-255-1000

NIST TRACEABLE CALIBRATION CERTIFICATE

Calibration Report No.	A6017	Calibration Date	12/15/2010	Calibration Due Date	12/2011
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Customer	AATA International Inc.
Test References	ASTM: E644-06 Standard test methods for Resistance Thermometers ASTM E-1137 Resistance versus Temperature.

NIST Traceable Calibration Instrument	Model Number & Serial Number	Test Interval NIST GMP-11 Table 4	Calibration Date	Calibration Due Date	Expanded Uncertainty ($\pm$ °C) k=2 (95 % conf.)
Hart Scientific PRT Module	Model 1562 SN: A56655	Annual	8/13/2010	8/13/2011	-0.01mOhms @100Ohms
Burns 100ohm PRT	Model 5626-15 SN: 1085/1086/1095	Annual	8/13/2010	8/13/2011	3.0 mk@0.00°C

Description of Calibration:

The NIST traceable calibration instruments listed above were used to calibrate the resistance thermometer listed below at the noted test temperatures by a comparison method. A liquid bath was maintained at $\pm 0.03^\circ\text{C}$ during calibration. The physical integrity of the thermometer was verified and the accuracy of this system calibration is the root sum square of the sensor and meter. Any abnormalities are noted in this report. The temperature conditions at the time of test 22.5C 50%RH

Calibration Results:

Thermometer Description	Therm ID	Scale error, max (°C)	Previous Calibration Test Temp / Therm. Reading (°C)		New Calibration Test Temp / Therm. Reading (°C)		Correction $\pm$ (°C)
ACCD650PD6F Platinum PT100	65010081147 Meter/ probe# 100841	$\pm 0.03^\circ\text{C} / 0.05^\circ\text{F}$	N/A	N/A	-20.00 0.00 4.00 37.00 50.00	-20.01 0.01 4.01 37.01 50.01	+0.01 -0.01 -0.01 -0.01 -0.01

Calibration Technician

**AccuFLUX**

Accurate Light & Thermal Flux Measurement

80 Orville Dr., Suite 100
Bohemia, NY 11716
www.accuflux.comT: 631-796-2308
F: 631-567-0611
E: info@accuflux.com

CERTIFICATE OF CALIBRATION

PYRANOMETER CALIBRATION DATA:

Model: CM3 (Kipp & Zonen)
Serial No: 058211
Sensitivity: 14.16 $\mu\text{V}/\text{Wm}^{-2}$
Calibration Date: April 30, 2010

CALIBRATION PROCEDURE:

The above pyranometer has been calibrated indoors in accordance with the ISO-9847 standard, "Calibration of Field Pyranometers By Comparison to a Reference Pyranometer". The calibration conditions are: $800 \text{ W/m}^2 \pm 1\%$ at normal irradiance, 20° C ambient nominal. The CM3 calibration transfer standard pyranometer is traceable to the WRR.

NOTICE:

It is advised to review the manufacturer's instructions manual prior to instrument installation and operation. The manufacturer's suggested calibration cycle for the CM3 model pyranometer is every two years. Calibration recertification per manufacturer recommendations is advised to ensure optimal sensor performance and measurement accuracy.

Signature: _____

Date: 4/30/2010



Calibration
Certificate No. 1750.01

Calibration complies with ISO 9001 ISO/IEC 17025 AND ANSI/NCSL Z540-1



Cert. No.: 4085-3268814

Traceable® Certificate of Calibration for Digital Hygrometer

Manufactured for and distributed by: Fisher Scientific, P.O. Box 1768, Pittsburgh, PA 15230

Instrument Identification:

Model: 11-661-7B

S/N: 102060060

Manufacturer: Control Company

Standards/Equipment:

Description	Serial Number	Due Date	NIST Traceable Reference
Digital Thermometer	90969500	7/21/11	4000-3180177
Chilled Mirror Hygrometer	31874/H2048MCR	7/26/11	8493

Certificate Information:

Technician: 61

Procedure: CAL-18

Cal Date: 11/02/10

Cal Due: 11/02/12

Test Conditions: 23.5°C 41.0 %RH 1013 mBar

Calibration Data: (New Instrument)

Unit(s)	Nominal	As Found	In Tol	Nominal	As Left	In Tol	Min	Max	±U	TUR
%RH		N.A.		20.510	20.58	Y	19.01	22.01	0.870	1.7:1
%RH		N.A.		46.310	46.65	Y	44.81	47.81	0.870	1.7:1
%RH		N.A.		74.210	74.47	Y	72.71	75.71	0.870	1.7:1
°C		N.A.		27.056	27.05	Y	26.66	27.46	0.059	>4:1

This instrument was calibrated using instruments traceable to National Institute of Standards and Technology.

A Test Uncertainty Ratio of at least 4:1 is maintained unless otherwise stated and is calculated using the expanded measurement uncertainty. Uncertainty evaluation includes the instrument under test and is calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement" (GUM). The uncertainty represents an expanded uncertainty using a coverage factor k=2 to approximate a 95% confidence level. In tolerance conditions are based on test results falling within specified limits with no reduction by the uncertainty of the measurement. The results contained herein relate only to the item calibrated. This certificate shall not be reproduced except in full, without written approval of Control Company.

Nominal=Standard's Reading; As Left=Instrument's Reading; In Tol=In Tolerance; Min/Max=Acceptance Range; ±U=Expanded Measurement Uncertainty; TUR=Test Uncertainty Ratio; Accuracy=±(Max-Min)/2; Min = Nominal(Rounded) - Tolerance; Max = Nominal(Rounded) + Tolerance; Date=MM/DD/YY

Nicol Rodriguez
Nicol Rodriguez, Quality Manager

Wallace Berry
Wallace Berry, Technical Manager

Maintaining Accuracy:

In our opinion once calibrated your Digital Hygrometer should maintain its accuracy. There is no exact way to determine how long calibration will be maintained. Digital Hygrometers change little, if any at all, but can be affected by aging, temperature, shock, and contamination.

Recalibration:

For factory calibration and re-certification traceable to National Institute of Standards and Technology contact Control Company.

CONTROL COMPANY 4455 Rex Road Friendswood, TX 77546 USA
Phone 281 482-1714 Fax 281 482-9448 service@control3.com www.control3.com

Control Company is an ISO 17025 2005 Calibration Laboratory Accredited by (A2LA) American Association for Laboratory Accreditation, Certificate No. 1750.01.
Control Company is ISO 9001:2008 Quality Certified by (DNV) Det Norske Veritas, Certificate No. CERT-01805-2006-AQ-HOU-ANAB.
International Laboratory Accreditation Cooperation (ILAC) - Multilateral Recognition Arrangement (MRA).