April 15, 2015

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of:	)	
	)	Docket No. 40-8943
CROW BUTTE RESOURCES, INC.	)	
	)	ASLBP No. 08-867-02-OLA-BD01
(License Renewal)	)	

CROW BUTTE RESOURCES' INITIAL DISCLOSURES ON NEWLY ADMITTED/AMENDED CONTENTIONS AND UPDATED WITNESS LIST

Pursuant to 10 C.F.R. § 2.336(d) and the Order (Granting NRC Staff and Crow Butte Joint Unopposed Motion for Extension of Time to Respond to Consolidated Intervenors' Additional Contentions), dated March 19, 2015, and the Order (Granting Crow Butte and NRC Staff Joint Unopposed Motion to Amend Deadline to Make Mandatory Disclosures on Newly Admitted/Amended Contentions), dated March 26, 2015, Crow Butte Resources, Inc. ("Crow Butte") hereby submits its Initial Disclosures on Newly Admitted/Amended Contentions and Updated Witness List.

A description by category of all relevant, non-privileged, non-proprietary documents and data compilations in the possession, custody, or control of Crow Butte that are relevant to the newly admitted/amended contentions and subject to disclosure under the parties' disclosure agreement is provided in Attachment A. A list of proprietary documents that are relevant to the admitted contentions and subject to disclosure under the parties' disclosure agreement is provided in Attachment B.

Crow Butte's Updated Witness List is as follows:

Witness	**Contention(s)**
Wade Beins	Contentions A, C, D, F, and 14
Bryan Soliz	Contentions A, C, D, F, and 14
Bob Lewis	Contentions A, C, D, F, 6, 9, and 14
Larry Teahon	Contentions A, C, D, F, 1, 6, 9, 12, and 14
Matt Spurlin	Contentions A, C, D, F, and 14
Doug Pavlick	Contentions 6 and 9

Each witness' statement of professional qualifications is attached hereto in Attachment C.

Respectfully submitted,

/s/ signed electronically by
Tyson R. Smith
Winston & Strawn LLP
101 California Street, 35th Floor
San Francisco, CA 94111

COUNSEL FOR CROW BUTTE RESOURCES, INC.

Dated at San Francisco, California
this 15th day of April 2015

April 15, 2015

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(License Renewal)	)	

CERTIFICATION OF INITIAL DISCLOSURES

I, Larry Teahon, do hereby state as follows:

1. I am employed as the Safety, Health, Environmental & Quality Manager at Crow Butte Resources in Crawford, Nebraska. I serve as project manager for Crow Butte's application to the Nuclear Regulatory Commission for a renewed license.

2. A search was conducted of documents, data compilations, and tangible things under the custody and control of the Crow Butte for the types of information specified in 10 C.F.R. § 2.336(a). The search was based on information and documents reasonably available to Crow Butte. The searches encompassed both electronic and paper documents.

3. I hereby certify that to the best of my knowledge, information, and belief all relevant materials required to be disclosed pursuant to 10 C.F.R. § 2.336(a) in the captioned proceeding have been disclosed, and that the disclosures are accurate and complete as of April 15, 2015.

4. I hereby certify under penalty of perjury that the foregoing is true and complete to the best of my knowledge, information, and belief.

Executed in accord with 10 C.F.R. § 2.304(d),

/s/ Larry Teahon
Larry Teahon
Safety, Health, Environmental & Quality Manager
Cameco Resources
Crow Butte Operation
86 Crow Butte Road
Crawford, NE 69339

Dated at Crawford, Nebraska
this 15th day of April 2015

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of:	)	
	)	Docket No. 40-8943
CROW BUTTE RESOURCES, INC.	)	
	)	ASLBP No. 08-867-02-OLA-BD01
(License Renewal)	)	

CERTIFICATE OF SERVICE

I hereby certify that copies of "CROW BUTTE RESOURCES' INITIAL DISCLOSURES" in the captioned proceeding have been served this 15th day of April 2015 via electronic mail to Consolidated Intervenors' counsel at davidcoryfrankel@gmail.com, Arm.legal@gmail.com, and harmonicengineering@gmail.com, and via the Electronic Information Exchange ("EIE"), which to the best of my knowledge resulted in transmittal of the foregoing to all those on the EIE Service List for the captioned proceeding other than Consolidated Intervenors.

/s/ signed electronically by
Tyson R. Smith
Winston & Strawn LLP
101 California Street, 35th Floor
San Francisco, CA 94111

COUNSEL FOR CROW BUTTE RESOURCES, INC.

Production Bates	Document Date	Desciption Title	Author	Recipients	Contention
CBR-LR-000734	9/25/1998	1999 Surety Estimate	Crow Butte Resources, Inc.	NRC	LR-INT-EC-6;LR-INT-EC-9
CBR-LR-000735	9/1/1999	2000 Surety Estimate	Crow Butte Resources, Inc.	NRC	LR-INT-EC-6;LR-INT-EC-9
CBR-LR-000736	9/29/2000	2001 Surety Estimate	Crow Butte Resources, Inc.	NRC	LR-INT-EC-6; LR-INT-EC-9
CBR-LR-000737	10/24/2001	2002 Surety Estimate - Class III-revised	Crow Butte Resources, Inc.	NRC	LR-INT-EC-6; LR-INT-EC-9
CBR-LR-000738	9/18/2001	2002 Surety Estimate - Class III	Crow Butte Resources, Inc.	NRC	LR-INT-EC-6; LR-INT-EC-9
CBR-LR-000739	9/25/2002	2003 Surety Estimate - Class III	Crow Butte Resources, Inc.	NRC	LR-INT-EC-6; LR-INT-EC-9
CBR-LR-000740	10/10/2003	2004 Surety Estimate-revised	Crow Butte Resources, Inc.	NRC	LR-INT-EC-6; LR-INT-EC-9
CBR-LR-000741	9/8/2003	2004 Surety Estimate	Crow Butte Resources, Inc.	NRC	LR-INT-EC-6; LR-INT-EC-9
CBR-LR-000742	9/22/2004	2005 Surety Estimate	Crow Butte Resources, Inc.	NRC	LR-INT-EC-6; LR-INT-EC-9
CBR-LR-000743	9/21/2005	2006 Surety Estimate	Crow Butte Resources, Inc.	NRC	LR-INT-EC-6; LR-INT-EC-9
CBR-LR-000744	12/13/2006	2007 Surety Estimate-revised	Crow Butte Resources, Inc.	NRC	LR-INT-EC-6; LR-INT-EC-9
CBR-LR-000745	9/29/2006	2007 Surety Estimate	Crow Butte Resources, Inc.	NRC	LR-INT-EC-6; LR-INT-EC-9
CBR-LR-000746	9/25/2007	2008 Surety Estimate	Crow Butte Resources, Inc.	NRC	LR-INT-EC-6; LR-INT-EC-9
CBR-LR-000747	9/29/2008	2009 Surety Estimate	Crow Butte Resources, Inc.	NRC	LR-INT-EC-6; LR-INT-EC-9
CBR-LR-000748	9/29/2009	2010 Surety Estimate	Crow Butte Resources, Inc.	NRC	LR-INT-EC-6; LR-INT-EC-9
CBR-LR-000749	9/28/2010	2011 Surety Estimate	Crow Butte Resources, Inc.	NRC	LR-INT-EC-6; LR-INT-EC-9
CBR-LR-000750	9/30/2011	2012 Surety Estimate	Crow Butte Resources, Inc.	NRC	LR-INT-EC-6; LR-INT-EC-9
CBR-LR-000751	9/28/2012	2013 Surety Estimate	Crow Butte Resources, Inc.	NRC	LR-INT-EC-6; LR-INT-EC-9
CBR-LR-000752	9/30/2013	2014 Surety Estimate	Crow Butte Resources, Inc.	NRC	LR-INT-EC-6; LR-INT-EC-9
CBR-LR-000753	9/30/2014	2015 Surety Estimate	Crow Butte Resources, Inc.	NRC	LR-INT-EC-6; LR-INT-EC-9
CBR-LR-000754	2/14/2012	Proposed February 14-15, Meeting on the Dewey-Burdock and Crow Butte Projects	Crow Butte Resources	NRC	LR-INT-EC-1
CBR-LR-000755		Santee Sioux Nation Tribal Historic Preservation Office TCP Survey Report	Crow Butte Resources	NRC	LR-INT-EC-1
CBR-LR-000758	7/31/2012	Figure 1 Crow Butte Pre-Operational Land Use within the Maximum Disturbed Area	Crow Butte Resources	NRC	LR-INT-EC-1
CBR-LR-000759	8/2/2012	Draft Scope of Work Identification of Properties of Religious and Cultural Significance	Crow Butte Resources	NRC	LR-INT-EC-1
CBR-LR-000760	3/8/2012	Draft Scope of Work Identification of Properties of Religious and Cultural Significance	Crow Butte Resources	NRC	LR-INT-EC-1
CBR-LR-000762	10/25/2011	Figure 1-1 Crow Butte Resources Inc. Current License Area and Proposed Expansion Areas	Crow Butte Resources	NRC	LR-INT-EC-1
CBR-LR-000763	7/29/1987	Section 2.4 Regional Historic, Achaeological, Architectural, Scenic & Natural Landmarks	Crow Butte Resources	NRC	LR-INT-EC-1
CBR-LR-000764	10/4/2012	Proposal for completing Section 106 Draft 10/4/2012	Crow Butte Resources	NRC	LR-INT-EC-1
CBR-LR-000765		Cameco Proposals for Visitation	Crow Butte Resources	NRC	LR-INT-EC-1

CBR-LR-000766	10/4/2012	Proposal for completing Section 106 Draft 10/4/2012	Crow Butte Resources	NRC	LR-INT-EC-1
CBR-LR-000767	10/3/2012	Alternative proposal for the four Cameco ISR properties Draft 10/3/2012	Crow Butte Resources	NRC	LR-INT-EC-1
CBR-LR-000768	4/6/2011	Cameco Resources Radiation Safety and Licensing Regulatory Contact Report	Crow Butte Resources	NRC	LR-INT-EC-1
CBR-LR-000769	6/16/2013	2003 CULTURAL RESOURCE RESOURCE INVENTORY 1	Nebraska State Historical Society	Greystone	LR-INT-EC-1
CBR-LR-000770	6/5/2003	Correspondence re Evaluative Testing of Site	Greystone	Nebraska State Historical Society	LR-INT-EC-1
CBR-LR-000773	6/7/2011	Cameco Nebraska Site Visits Tuesday June 7, 2011	Cameco		LR-INT-EC-1
CBR-LR-000774	8/30/2011	Response to NRC Request for Section 106 Information	Cameco	NRC	LR-INT-EC-1
CBR-LR-000775	12/2/2012	CBR Fieldwork	Paul Nickens	NRC, Cameco	LR-INT-EC-1
CBR-LR-000776	1/10/2012	February 14-15, 201, Meeting on the Dewey-Burdock and Crow Butte Projects	SRI Foundation	Tribal Contacts	LR-INT-EC-1
CBR-LR-000777	2/6/2012	Re: RESEND - February 14-15 meeting, Crow Butte and Dewey-Burdock Proposed Projects	Oglala Sioux Tribe	SRI Foundation	LR-INT-EC-1
CBR-LR-000778	5/7/2009	Table 2.4-1	Crow Butte Resources	NRC	LR-INT-EC-1
CBR-LR-000781	11/5/2012	Methodology	Kade Ferris	Richard Blubaugh	LR-INT-EC-1
CBR-LR-000782	3/7/2012	Figure 1 Western Nebraska/Dawes County Project Location Map	Crow Butte Resources	NRC	LR-INT-EC-1
CBR-LR-000783	7/10/2003	Evaluative Testing	Crow Butte Resources	Nebraska Department of Environmental Quality	LR-INT-EC-1
CBR-LR-000784	8/30/2011	Response to NRC Request for Section 106 Information	Cameco	NRC	LR-INT-EC-1
CBR-LR-000785	11/6/2012	FW: Discussion with Kade Ferris, KLJ	Cameco	Cameco	LR-INT-EC-1
CBR-LR-000786	12/1/2011	Nebraska's Traditional Cultural Properties in the Section 106 Process	University of Nebraska at Lincoln		LR-INT-EC-1
CBR-LR-000787	11/5/2012	Regarding - Scheduled Site Visit	Santee Sioux Nation	Kevin Hsueh	LR-INT-EC-1
CBR-LR-000788	2/20/2013	Correspondence from Tribal Historic Preservation Office Standing Rock Sioux Tribe	Standing Rock Sioux Tribe	NRC	LR-INT-EC-1
CBR-LR-000789		Rethinking the National Register Criteria For Tribal Sites	Catherine Glidden, Ben Rhodd, and Randy Withrow		LR-INT-EC-1
CBR-LR-000790		License Applications for Uranium Recovery Projects in Dawes, County Nebraska	NRC		LR-INT-EC-1
CBR-LR-000791		Attachment I Proposed Agenda for the February 14-15, 2012 Meeting on the Dewey-Burdock and Crow Butte Projects	NRC		LR-INT-EC-1

CBR-LR-000792	8/30/2012	Correspondence re August 12, 2011 letter from NRC	Cameco	NRC	LR-INT-EC-1
CBR-LR-000793		Santee Sioux Nation Tribal Historic Preservation Office	Santee Sioux Nation		LR-INT-EC-1
CBR-LR-000794	1/3/2013	Correspondence re Update of Section 106 Consultation	NRC	Tribal Historic Preservation Officer	LR-INT-EC-1
CBR-LR-000795	7/31/2012	FW: Tribal Cultural Survey Maps	Cameco	Arcadis	LR-INT-EC-1
CBR-LR-000796		Crow Butte Resources Permit Area Location	Crow Butte Resources		LR-INT-EC-1
CBR-LR-000797	7/11/2012	Native American Traditional Cultural Landscapes and the Section 106 Review Process: Questions and Answers	ACHP		LR-INT-EC-1
CBR-LR-000798	6/8/2011	NRC-Tribes visit to Crow Butte	Cameco	Cameco	LR-INT-EC-1
CBR-LR-000799	3/2/2012	One last thing for your SOW	SRI Foundation	Cameco	LR-INT-EC-1
CBR-LR-000800	#REF!	Crow Butte Commercial Site Area; Figure 4	Crow Butte Resources		LR-INT-EC-1
CBR-LR-000801	9/1/1987	A Cultural Resources Study of the Crow Butte Uranium Prospect Dawes County, Nebraska: Main Report	Nebraska State Historical Society (Bozell and Pepperl)		LR-INT-EC-1
CBR-LR-000802	9/1/1987	A Cultural Resources Study of the Crow Butte Uranium Prospect Dawes County, Nebraska: Appendices	Nebraska State Historical Society (Bozell and Pepperl)		LR-INT-EC-1
CBR-LR-000803	2/15/2012	Tirbal Consultation Meeting Sign In Sheet	NRC		LR-INT-EC-1
CBR-LR-000804		SRI Foundation Communications with Indian Tribes Regarding Dewey-Burdock and Crow Butte Projects November 4, 2011 to August 21, 2012	SRI Foundation		LR-INT-EC-1
CBR-LR-000805		Rethinking the National Register Criteria for Tribal Sites	Catherine Glidden, Ben Rhodd, and Randy Withrow		LR-INT-EC-1
CBR-LR-000806		Guidance for Developing Scope of Work to Identify Places of Religious and Cultural Significance to Indian Tribes for ISR Uranium Projects in the Northern Plains	NRC		LR-INT-EC-1
CBR-LR-000807	4/20/2012	Upcoming teleconference on April 24, 2012	NRC	NRC	LR-INT-EC-1
CBR-LR-000809	3/8/2012	Draft Scope of Work Identification of Properties and Cultural Significance	Crow Butte Resources	NRC	LR-INT-EC-1
CBR-LR-000810	10/17/2010	Wyoming State Historic Preservation Office Class III Survey Exclusion Policy	Julie Hatcher/Pronghorn	Lee Snowhite	LR-INT-EC-1
CBR-LR-000811	12/31/1997	Ltr from J Holonich, NRC, to L Sommer, NSHS, dated 12-31-1997	NRC	Nebraska State Historical Society	LR-INT-EC-1
CBR-LR-000812	6/26/1998	Ltr from J Holonich, NRC, to R Puschendorf, NSHS, dated 6-26-1998	NRC	Nebraska State Historical Society	LR-INT-EC-1

CBR-LR-000813	5/4/1998	Ltr from R Puschendorf, NSHS, to J Holonich, NRC, dated 5-04-1998	Nebraska State Historical Society	NRC	LR-INT-EC-1
CBR-LR-000814	4/3/1998	RTG Report - Survey of Traditional Cultural Properties	Resource Technologies Group, Inc.	Nebraska State Historical Society	LR-INT-EC-1
CBR-LR-000815	6/16/2003	2003 CULTURAL RESOURCE RESOURCE INVENTORY 1	Nebraska State Historical Society	Greystone	LR-INT-EC-1
CBR-LR-000816	7/10/2003	2003 Cultural Resource Resource Inventory 2	Crow Butte Resources	NRC	LR-INT-EC-1
CBR-LR-000818	1/30/2003	Mine Unit 1 Groundwater Restoration Plan Revision 2, dated January 30, 2003 - ML030420521	Crow Butte Resources	NRC	LR-INT-EC-6; LR-INT-EC-9
CBR-LR-000819	1/10/2000	Mine Unit 1 Restoration Report - ML003677938	Crow Butte Resources	NRC	LR-INT-EC-6; LR-INT-EC-9
CBR-LR-000820	2/9/2015	Monthly Restoration Monitoring Report for January 2015 - ML15062A188	Crow Butte Resources	Nebraska Department of Environmental Quality	LR-INT-EC-6; LR-INT-EC-9
CBR-LR-000821		Sample Monthly Restoration Reports	Crow Butte Resources	NRC	LR-INT-EC-6; LR-INT-EC-9
CBR-LR-000822	11/16/1993	License Amendment Authorizing Land Application	NRC	Ferret Exploration; Steve Collings	LR-INT-EC-12
CBR-LR-000823	11/16/1993	NRC Memo to File Re Land Application at Ferret Site	Joel Grimm	NRC	LR-INT-EC-12
CBR-LR-000824	6/7/1993	Application to Amend NRC License (with NPDES Permit Application)	Ferret Exploration Company of Nebraska, Inc.	NRC	LR-INT-EC-12
CBR-LR-000825	12/3/1993	FEN Response to NDEQ Questions on NPDES Permit Application	Ferret Exploration Company of Nebraska, Inc.	NRC	LR-INT-EC-12
CBR-LR-000826	4/4/1990	Wastewater Irrigation Proposal	Ferret Exploration Company of Nebraska, Inc.	NRC	LR-INT-EC-12
CBR-LR-000827	8/3/2010	[Possible SPAM] Restoration Modeling - Using commercial mains	Russel Colby	Steve Boeselager; Dave Moody	LR-INT-EC-6; LR-INT-EC-9
CBR-LR-000828	2/8/2013	corrected wells and rates	Bob Lewis	Steve Boeselager; Dennis Krotz	LR-INT-EC-6; LR-INT-EC-9
CBR-LR-000829	9/16/2013	Current flows in MU 4 & 5 and changes we would like to make	Bob Lewis	Steve Boeselager; Dennis Krotz	LR-INT-EC-6; LR-INT-EC-9
CBR-LR-000830	10/4/2011	I180P	Bob Lewis	Steve Boeselager; Dennis Krotz	LR-INT-EC-6; LR-INT-EC-9
CBR-LR-000831	1/28/2015	MU-4 6000 Well Area Restoration Results	Bob Lewis	Steve Boeselager; Dennis Krotz	LR-INT-EC-6; LR-INT-EC-9
CBR-LR-000832	7/9/2013	MU4 5 Phase I WH16 100 gpm modifications	Bob Lewis	Steve Boeselager; Dennis Krotz	LR-INT-EC-6; LR-INT-EC-9
CBR-LR-000833	8/27/2013	MU4/5 vandium issues	Bob Lewis	Steve Boeselager; Dennis Krotz	LR-INT-EC-6; LR-INT-EC-9
CBR-LR-000834	7/2/2013	MU4 and 5 Phase I Restoration Modifications	Bob Lewis	Steve Boeselager; Dennis Krotz	LR-INT-EC-6; LR-INT-EC-9
CBR-LR-000835	3/19/2015	MU5 6000 Area Restoration	Bob Lewis	Steve Boeselager; Dennis Krotz	LR-INT-EC-6; LR-INT-EC-9
CBR-LR-000836	7/20/2009	new MU2 map	Bob Lewis	Steve Boeselager; Tom Young	LR-INT-EC-6; LR-INT-EC-9
CBR-LR-000837	7/29/2010	Restoration mains - preliminary thoughts	Russel Colby	Steve Boeselager	LR-INT-EC-6; LR-INT-EC-9
CBR-LR-000838	8/30/2013	Results of Stability Modeling	Dennis Krotz	Steve Boeselager	LR-INT-EC-6; LR-INT-EC-9

CBR-LR-000839	2/20/2013	Revised MU4 5 Restoration Plan Summary	Bob Lewis	Steve Boeselager; Dennis Krotz	LR-INT-EC-6; LR-INT-EC-9
CBR-LR-000840	8/8/2013	2013-8-8 CBO NRC Restoration MU2 MU3 Aqui-Ver Report	Cameco	NRC	LR-INT-EC-6; LR-INT-EC-9
CBR-LR-000841	10/1/2006	Excerpt of NPDES Permit on Land Application	Nebraska Department of Environmental Quality		LR-INT-EC-12
CBR-LR-000842	11/24/2010	Non-Hazardous Injection well response to comments	Nebraska Department of Environmental Quality	Lee Snowhite	LR-CP-EC-F; LR-OST-EC-A; LR-OST-EC-C; LR-OST-EC-D
CBR-LR-000843		Figure 1 Marsland Pierre Shale Regional			LR-CP-EC-F; LR-OST-EC-A; LR-OST-EC-C; LR-OST-EC-D
CBR-LR-000844		Figure 2 Marsland Pierre Shale Surface Southern AOR			LR-CP-EC-F; LR-OST-EC-A; LR-OST-EC-C; LR-OST-EC-D
CBR-LR-000845	4/20/2014	Figure 3 - Crawford Basin Cross-Sections	Crow Butte Resources		LR-CP-EC-F; LR-OST-EC-A; LR-OST-EC-C; LR-OST-EC-D
CBR-LR-000846	4/29/2014	Crow Butte Operation Cross Section R0-R0 Figure 4	Crow Butte Resources		LR-CP-EC-F; LR-OST-EC-A; LR-OST-EC-C; LR-OST-EC-D
CBR-LR-000847	4/29/2014	Crow Butte Operation Cross Section R1-R1 Figure 5	Crow Butte Resources		LR-CP-EC-F; LR-OST-EC-A; LR-OST-EC-C; LR-OST-EC-D
CBR-LR-000848	4/29/2014	Crow Butte Operation Cross Section R2-R2 Figure 6	Cameco		LR-CP-EC-F; LR-OST-EC-A; LR-OST-EC-C; LR-OST-EC-D
CBR-LR-000849		CBO Spills Inventory	Crow Butte Resources		LR-OST-EC-A; LR-OST-EC-C; LR-OST-EC-D
CBR-LR-000850	8/26/2010	Excursion Evaluation - Worley Parson	Worley Parsons	Cameco	LR-OST-EC-A; LR-OST-EC-C; LR-OST-EC-D
CBR-LR-000851		Area Geology A			LR-OST-EC-A; LR-OST-EC-C; LR-OST-EC-D
CBR-LR-000852		Area Wells Cross Section	Crow Butte Resources		LR-OST-EC-A; LR-OST-EC-C; LR-OST-EC-D
CBR-LR-000853		Geologic Review A			LR-OST-EC-A; LR-OST-EC-C; LR-OST-EC-D
CBR-LR-000854		Geologic Review B			LR-OST-EC-A; LR-OST-EC-C; LR-OST-EC-D
CBR-LR-000855		Geologic Review Complete	Crow Butte Resources		LR-OST-EC-A; LR-OST-EC-C; LR-OST-EC-D
CBR-LR-000856	10/13/2014	Sample Analysis Report - I196 monitor wells	Inter Mountain Labs	Cameco	LR-OST-EC-A; LR-OST-EC-C; LR-OST-EC-D
CBR-LR-000857	10/13/2014	Sample Analysis Report - I196 monitor wells	Inter Mountain Labs	Cameco	LR-OST-EC-A; LR-OST-EC-C; LR-OST-EC-D
CBR-LR-000858	10/13/2014	Sample Analysis Report - I196 monitor wells	Inter Mountain Labs	Cameco	LR-OST-EC-A; LR-OST-EC-C; LR-OST-EC-D
CBR-LR-000859	10/13/2014	Sample Analysis Report - I196 monitor wells	Inter Mountain Labs	Cameco	LR-OST-EC-A; LR-OST-EC-C; LR-OST-EC-D

CBR-LR-000860	10/13/2014	Sample Analysis Report - I196 monitor wells	Inter Mountain Labs	Cameco	LR-OST-EC-A; LR-OST-EC-C; LR-OST-EC-D
CBR-LR-000861	10/13/2014	Sample Analysis Report - I196 monitor wells	Inter Mountain Labs	Cameco	LR-OST-EC-A; LR-OST-EC-C; LR-OST-EC-D
CBR-LR-000862	10/13/2014	Sample Analysis Report - I196 monitor wells	Inter Mountain Labs	Cameco	LR-OST-EC-A; LR-OST-EC-C; LR-OST-EC-D
CBR-LR-000863	10/13/2014	Sample Analysis Report - I196 monitor wells	Inter Mountain Labs	Cameco	LR-OST-EC-A; LR-OST-EC-C; LR-OST-EC-D
CBR-LR-000864	10/13/2014	Sample Analysis Report - I196 monitor wells	Inter Mountain Labs	Cameco	LR-OST-EC-A; LR-OST-EC-C; LR-OST-EC-D
CBR-LR-000865	10/13/2014	Sample Analysis Report - I196 monitor wells	Inter Mountain Labs	Cameco	LR-OST-EC-A; LR-OST-EC-C; LR-OST-EC-D
CBR-LR-000866	10/13/2014	Sample Analysis Report - I196 monitor wells	Inter Mountain Labs	Cameco	LR-OST-EC-A; LR-OST-EC-C; LR-OST-EC-D
CBR-LR-000867	10/13/2014	Sample Analysis Report - I196 monitor wells	Inter Mountain Labs	Cameco	LR-OST-EC-A; LR-OST-EC-C; LR-OST-EC-D
CBR-LR-000868	10/13/2014	Sample Analysis Report - I196 monitor wells	Inter Mountain Labs	Cameco	LR-OST-EC-A; LR-OST-EC-C; LR-OST-EC-D
CBR-LR-000869	10/13/2014	Sample Analysis Report - I196 monitor wells	Inter Mountain Labs	Cameco	LR-OST-EC-A; LR-OST-EC-C; LR-OST-EC-D
CBR-LR-000870	10/13/2014	Sample Analysis Report - I196 monitor wells	Inter Mountain Labs	Cameco	LR-OST-EC-A; LR-OST-EC-C; LR-OST-EC-D
CBR-LR-000871	5/28/2013	Sample Spill Report	Crow Butte Resources	Crow Butte Resources	LR-OST-EC-A; LR-OST-EC-C; LR-OST-EC-D
CBR-LR-000872	12/3/2013	Chain of Custody Records	Inter Mountain Labs	Cameco	LR-OST-EC-A; LR-OST-EC-C; LR-OST-EC-D
CBR-LR-000873	1/10/2014	Chain of Custody Records	Inter Mountain Labs	Cameco	LR-OST-EC-A; LR-OST-EC-C; LR-OST-EC-D
CBR-LR-000874	3/31/2014	Chain of Custody Records	Inter Mountain Labs	Cameco	LR-OST-EC-A; LR-OST-EC-C; LR-OST-EC-D
CBR-LR-000875	7/28/2014	Chain of Custody Record	Inter Mountain Labs	Cameco	LR-OST-EC-A; LR-OST-EC-C; LR-OST-EC-D
CBR-LR-000876	10/13/2014	Chain of Custody Records	Inter Mountain Labs	Cameco	LR-OST-EC-A; LR-OST-EC-C; LR-OST-EC-D

Production Bates	Document Date	Desciption Title	Author	Recipients	Contention	Basis
CBR-LR-000756		List of Cash payments and Signatures for Travel Expenses	Crow Butte Resources	NRC	LR-INT-EC-1	Proprietary
CBR-LR-000757		Reimbursement Calculation for Feb. 2012 Tribal Consultation	Crow Butte Resources	NRC	LR-INT-EC-1	Proprietary
CBR-LR-000761	3/7/2012	Figure 2 Crow Butte Pre-Operational Land Use and Cultural Sites	Crow Butte Resources	NRC	LR-INT-EC-1	Proprietary
CBR-LR-000771	6/26/2012	Transmittal of Transcript from Teleconference Conducted on April 24, 2012	NRC	Oglala Sioux Tribe	LR-INT-EC-1	Proprietary
CBR-LR-000772		Transcript of Section 106 Meeting			LR-INT-EC-1	Proprietary
CBR-LR-000779		Crow Butte Project Boundary Figure w/o text	Crow Butte Resources	NRC	LR-INT-EC-1	Proprietary
CBR-LR-000780		Crow Butte Project Boundary Figure w/ text	Crow Butte Resources	NRC	LR-INT-EC-1	Proprietary

Attachment C: Statements of Professional Qualifications

Stuart *Bryan* Soliz, P.G.

4912 Stoneridge Way
Casper, Wyoming 82609

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SUMMARY

Director and Technical Specialist for uranium mining companies for production, new project development, and exploration. Relevant experience includes management of projects from exploration, to resource development through permitting, construction, commissioning and start-up. Specific experience includes directing technical teams in technical evaluations, mineral reserves and resources reporting, drilling programs, mine planning, scheduling, budgeting, technical studies, and strategic planning.

QUALIFIED BY

- Eighteen years of professional mining experience including 10 years in operations
- Sound managerial abilities leading technical teams
- Strong project management abilities with excellent report writing skills
- Experience leading new project development
- Sound understanding of international mineral reserves and resources reporting standards
- Demonstrate initiative and resourcefulness to get things done and demonstrate accountability for detail oriented results
- Work to continually improve personal, team and company effectiveness by applying business knowledge to achieve results
- Demonstrate the importance of people and personal integrity by following through on commitments by practicing honest and ethical behaviour and communicating effectively and openly
- Focus on continually improving work processes and practices with innovative ideas and solutions to enhance business results
- Work to continually understand, engage in and implement business changes
- Translates strategies and objectives into practical and understandable operational targets and action plans

EXPERIENCE

2015-Present Cameco Corporation, Casper, Wyoming

Cameco Corporation is one of the world's largest uranium producers providing fuel to nuclear energy plants around the world to generate one of the cleanest sources of electricity available.

Principal Geologist

Serve as a Qualified Person (QP) providing technical oversight and support for development of Cameco's Cameco Resources Inc. (CRI) and Inkai in-situ recovery (ISR) projects mineral reserves and resources.

Primary responsibilities included:

- Serve as a QP for all CRI properties and Inkai, providing oversight on all matters related to mineral reserves and resources
- Ensure adherence to mineral reserves and resources classification criteria.
- Support continued improvement and best practices with in regards to mineral reserves and resources development, sampling, disequilibrium measurements, geological interpretation and mine software utilization.
- Lead preparation of technical reports.
- Assist Inkai with geologic interpretations and modelling, resource estimation, wellfield design and reserve estimation and mine planning.
- Provide guidance in resolving technical issues potentially related to geologic interpretation, resource estimation and production planning.
- Improve the varying ISR modelling and estimation techniques.
- Provide due diligence expertise for ISR property evaluations.

2011-2015 Cameco Resources, Casper, Wyoming

Cameco Resources is a uranium mining company producing uranium by ISR technology and a wholly owned subsidiary of the world's largest uranium producer, Cameco Corporation.

Director Exploration and Development
Direct greenfield and brownfield exploration programs, and mineral resource development for Cameco Resources new projects.

Primary responsibilities included:
- Establish long-term exploration and resource development plans to achieve corporate strategies and objectives
- Create budgets and work plans for 10 Year and Life of Asset planning
- Provide technical and professional leadership to Exploration and Development team of twenty-four
- Assist with corporate development opportunities
- Oversee the management of geologic data and interpretations that support the generation of geologic and resource models
- Ensure mineral reserves and resources guidelines, policies, and procedures are adhered to throughout the company
- Generate annual mineral reserves and resources reports for public disclosure
- Serve as Qualified Person for Cameco Resources for reporting of mineral reserves and resources

2010-2011 *District Geologist*
Direct mineral resource development for Cameco Resources operating mines and new development projects.

Primary responsibilities included management of:
- Resource development and technical support team of fifteen
- Contract management of drilling and related construction services
- Development plans, schedules, and budgets
- Implementation of development drilling programs for new project development
- Coordination of drilling projects with Land and Environmental Groups
- Detailed geologic evaluations of sub-surface sedimentary environments that host uranium deposits
- Mine plan design
- Mineral reserve estimates
- Compilation of annual reserve and resource reports
- Implementation of mine plans
- Interdepartmental work with Safety Health and Environmental Group on permitting and compliance issues

2006-2010 South Texas Mining Venture, L.L.P., Corpus Christi, Texas
The South Texas Mining Venture was a joint venture partnership between Uranium One and Everest Exploration Inc., committed to the development of uranium assets in south Texas.

Chief Geologist
As the first employee of the South Texas Mining Venture, I was hired to facilitate the start up of south Texas operations. My responsibilities entailed setup of the Corpus Christi office, hiring personnel (geologic, logging, drilling, and support staff), and development and implementation of various operating procedures. As routine operations were established, daily responsibilities shifted to management of resource development for the La Palangana project and south Texas exploration.

Primary responsibilities included management of following activities:
- Resource development and technical support team of twelve
- Contract management of drilling and related construction services
- Implementation of development and exploration drilling programs at the La Palangana project
- Coordination drilling projects with Land and Environmental Departments
- Detailed geologic evaluations of sub-surface sedimentary environments that host uranium deposits
- Assessment of the quantity, quality, and physical characteristics of uranium deposits for mineral resource estimates using geostatistical and non-geostatistical techniques
- Mine planning
- Mineral reserve estimates
- Compilation of annual mineral reserve and resource reports
- Generate and assist with the implementation of mine plans
- Exploration activities and coordinate property acquisition with the Land Department
- Interdepartmental work with Safety Health and Environmental Group on permitting and compliance issues

2002-2006 Power Resources, Inc., Glenrock, Wyoming
Power Resources, Inc. was a producer of uranium by in-situ recovery (ISR) technology and a wholly owned subsidiary of the world's largest uranium producer, Cameco.

Senior Geologist/Project Geologist
Primary responsibilities included:

- Conduct detailed geologic evaluations of sub-surface sedimentary environments in the Powder River Basin, Wyoming.
- Assess the quantity, quality, and physical characteristics of uranium deposits for reserve/ resource estimates and mine planning using geostatistical and non-geostatistical techniques
- Compile annual reserve and resource reports
- Generate and assist with the implementation of mine plans
- Conduct economic evaluations using NPV and other economic indicators for mine planning
- Plan production well locations and define well depths and completions
- Coordinate development activities with Drilling, Land, and Environmental Departments
- Work with Drilling and Construction Departments preparing $3-5 million production drill schedules.
- Propose and supervise $3-5 hundred thousand development drilling programs
- Chair Development Group meetings consisting of Mine Manager, supervisors of Drilling and Construction, and Geology staff.
- Coordinate and supervise hydrologic tests and compile test reports submitted to the state regulatory agency for approval of mining operations

1996-2002 Rio Algom Mining LLC., Glenrock, Wyoming
Rio Algom Mining LLC. was a producer of uranium by in-situ leach (ISL) technology for the nuclear power industry.

Project Geologist/Staff Geologist
Primary responsibilities included

- Conducted detailed geologic evaluations of uranium bearing sedimentary environments.
- Calculated uranium resources and reserves and assisted with annual reporting
- Constructed comprehensive economic mine plans $4-6 million annually
- Planned production well locations and defined well depths and completions
- Proposed and supervised $3-5 hundred thousand drill programs and managed drilling budgets

EDUCATION

1994-1996 *Texas Tech University,* Lubbock, Texas
Master of Science in Geosciences

1990-1994 *Midwestern State University,* Wichita Falls, Texas
Bachelor of Science in Geosciences

PROFESSIONAL DEVELOPMENT

- Growing Business Acumen. The Refinery Group (2014) – Cheyenne, Wyoming.
- Expedition Coaching Program: Guiding the Journey to success – Casper, Wyoming. Diane Knoll and Deb Strong.
- National Instrument 43-101 Standards of Disclosure for Mineral Projects - Saskatoon, Saskatchewan. Dr. Greg Gosson, Technical Director for Geology and Geostatistics.
- Effective Project Management 1: Planning, Scheduling, and Control - Dean Sotiriou, President, Management Training and Development Associates. Casper, Wyoming (2010).
- Fundamentals of Geostatistics Principles and Hands-on Practice (2010) – Saskatoon, Saskatchewan. Dr. Clayton V. Deutsch.
- Goff & Associates Media Training (2009) – Austin, Texas. Christian S. Goff, Communications Consultant
- Supervision: Core Competencies (2008), Mountain States Employers Council, Inc., Management Development Center
- Program speaker MICROMINE User Conference (2007) – Perth, Western Australia. Geologic Development of the South Texas La Palangana Uranium Deposit for In-Situ Recovery using MICROMINE
- Program speaker 2007 Global Uranium Symposium – Corpus Christi, Texas. Geologic Development of the La Palangana Uranium Deposit for ISR
- Advanced MICROMINE training (2007)
- Introduction to MICROMINE (2006)

- Economic Evaluation and Investment Decision Methods. John M. Stermole. Golden, Colorado. Colorado School of Mines (2004)
- Geostatistical Ore Reserve Estimation Methods. H. Peter Knudsen, Montana Tech (2001)
- Management Excellence: It Begins With You, The Athena Group (2001)
- Quantitative Reasoning & Foundations of Accounting, University of Wyoming (2000)
- RMEC 318 Supervisors Safety Course, OSHA Training Institute
  Rocky Mountain Education Center (2000)
- Leading From Within, Mountain States Employers Council, Inc., Management
  Development Center (1999)

COMPUTER APPLICATIONS

- VULCAN, MICROMINE, Microsoft Office (i.e. Word, Excel, PowerPoint, Project), AutoCAD, Surfer, Techbase, ArcMap

AFFILIATIONS

- State of Wyoming Board of Professional Geologists License Number PG-3775
- Corpus Christi Geological Society
- Society for Mining, Metallurgy, & Exploration

REFERENCE

- Available on request

Douglas J. Pavlick

Summary of Qualifications

Twenty years' experience processing uranium and sodium carbonate ore in the western U.S. Seven years technical sales experience in design and implementation of water and wastewater treatment processes at several large industrial facilities for a specialty chemical manufacturer. Two years additional engineering experience as a hydrogeologist involved with hazardous waste site remediation, field investigation, and data interpretation.

Professional Experience

CAMECO RESOURCES, Casper, WY (2008 – Present)
General Manager U.S. Operations /General Manager Crow Butte / Operations Manager Crow Butte

General Manager For Cameco's U.S. ISR Mining operations responsible for oversight of three active uranium mining and U3O8 production operations with a staff of ~190 employees and ~50 contractors. Direct site activities for safety, environmental protection, regulatory compliance, and production. Oversight of restoration activities to return mine units to original class of use water quality as final step in regulatory signoff process. Lead expansion site permitting and licensing in Wyoming and Nebraska. Coordinate mining activities with NRC and NDEQ regulatory agencies for timely issuance of operating permits for existing and expansion sites.

Operations Manager responsible for processing plant production of uranium oxide from in-situ recovery (ISR) mining facility. Installation of wastewater treatment plant to recover uranium from evaporative waste ponds and resulting effluent suitable for deep well disposal. Startup and operation of low grade ore recovery circuit, increasing mine production output by 15%.

OCI CHEMICAL CORPORATION, Green River, WY (2001 – 2007)
Surface Operations Manager / Project Manager / Technical Manager

Surface Operations Manager (current position) responsible for Engineering, Environmental, Shipping, Lab and Soda Ash Manufacturing functions, overseeing 30 salaried and 104 non-union hourly personnel. Successful utilization of cost control, process capability, behavior based safety, and reliability improvements that have increased production by 15%. Project Manager for $75MM energy conversion project to convert gas fired calciners to pulverized coal. Project payback 3 years. Restructured production management staff to build future plant leadership and increase capability to meeting changing business needs.

Technical Manager overseeing six Process Engineering, two Project Engineering, Quality and Laboratory staff. Responsible for $10 – 15 MM annual Capital Budget. Lead engineering development of efficiency gains from waste reduction ($1.2MM/year savings). Restructured process engineering group to strengthen process improvement capability. Utilized Design of Experience and Multivariable Testing to accomplish significant plant efficiency and productivity gains. This includes a 50% improvement in product quality percent conformance, and 20% reduction in product losses from plant ore dissolution circuit.

FMC CORPORATION, Granger, Wyoming (1995-2001)
Production Superintendent

Production Superintendent responsible for setting and achieving business goals for safety, quality, cost, production, and employee development for the production of soda ash and caustic. Responsibilities included the management of seven salaried and 49 union hourly positions for processing ore and alkalinity bearing solutions into soda ash. Additionally, responsible for daily production scheduling and supervision of mill crew and foreman activities, cost forecasting, cost control, and shutdown planning. One year experience as mill production engineer assigned to coordinate process improvement projects with maintenance and technical departments for the soda ash and caustic plants. Two and one-half years experience as a process engineer in the technical department responsible for caustic plant and utilities area process upgrades and project work. Specific project responsibilities includes process modifications for reuse of caustic and soda ash waste streams to improve recovery, plant steam and water balance efficiency tracking, boiler fuel conversion study, acid washing method development, and shutdown contractor supervision.

BETZ LABORATORIES, Missoula, Montana (1987 – 1995)
Account Manager

Field engineering representative involved with technical support, sales and service of water treatment systems in the kraft paper, petroleum refining, wood products and mining industry. Responsible for western Montana region coordinating project work at industrial facilities. Experience with high and low pressure boiler systems, influent and effluent clarification, color removal, closed loop, once through, and open recirculating cooling systems, and heavy metal extraction. Engineering projects included wastewater treatment and reuse, optimization of process water usage and waste minimization. Betz Eagle award winner for outstanding sales performance. Responsible for design, installation, and operation of automated feed systems for various applications at customer facilities. Supervisory experience training and managing new employee activities in adjacent territories.

HYDRO-SEARCH, Inc., Golden, Colorado (1986-1987)
Hydrogeologist

Consultant involved with hazardous waste site filed investigations and groundwater contamination studies. Responsibilities included ground- and surface-water sampling, well development, recovery testing and interpretation of hydrogeologic data. Additionally, responsible for all geologic and engineering drafting. Knowledge of monitoring well design and drilling experience on government Superfund sites. Supervisory experience on drilling crews for monitoring well installation and geologic profiling.

Education

B.S., Geophysical Engineering, 1985, Montana College of Mineral Science and Technology, Butte, MT.

Additional Training

Financial Analysis, AMA, March 2002
Multivariable Testing Techniques for Chemical Processes, QualPro, May 2002
Supervisor Training, March 1997
HAZOP Training, March 1997
STOP Safety Training, June 2007
PASS Behavior Based Safety Training, March 2005
Business Acumen, June 2013

References available upon request.

Larry L. Teahon

Professional Experience

CAMECO RESOURCES, Casper, WY (2005 – Present)
Crow Butte Manager of Safety, Health, Environment and Quality (SHEQ)

Duties include: managing and supervising the Safety, Health, Environment, and Quality (SHEQ) department to ensure safe operations and compliance with regulatory requirements; ensure that the company SHEQ programs and procedures meet regulatory requirements and industry standards; ensure required regulatory reports are completed and submitted in a timely manner; ensure all sampling-monitoring programs are compliant with regulatory requirements. Manage permitting and reporting activities of the SHEQ department, other site departments, and technical consultants to meet regulatory requirements for current and future mining activities.

City of Chadron, Chadron, NE (1997 – 2005)
City Manager

Duties include: managing and supervising all departments, agencies and offices of the City to achieve goals within available resources; plan and organize workloads and staff assignments; train, motivate and evaluate assigned staff; review progress and direct change as needed. Provide leadership and direction in the development of short and long range plans; gather, interpret, and prepare data for studies, reports and recommendations; coordinate department activities with other departments and agencies as needed. Provide professional advice to the City Council and department heads; make presentations to councils, boards, commissions, civic groups and general public. See that all laws and ordinances are faithfully performed. Prepare and submit a preliminary annual City budget. Administer the adopted budget of the City.

Solid Waste Agency of Northwest Nebraska, Chadron, NE (1995-1997)
Collection Manager

Duties included planning and directing work involved in collection, transportation and maintenance of equipment and facilities; kept records as required by the agency and state and federal regulations; worked closely with regional communities and the public to establish efficient schedules and effectively resolved customer complaints; assisted the Director in development of overall agency policy and procedures.

City of Chadron, Chadron, NE (1990 – 1995)
Utilities Director

Duties included administration and technical direction of the operation and activities associated with the municipal water and wastewater systems; developed and implemented plans for maintaining and upgrading the collection, distribution and treatment facilities; made recommendations concerning hiring, promotions, demotions, and dismissal of assigned personnel; developed improvement plans and budget requests; wrote bids and specifications for materials and supplies; handled customer complaints and inquiries as needed; conducted studies and developed reports and made recommendations on proposed rate schedules, technological improvements and staffing needs; and maintained and upgraded the city computer system.

Upper Niobrara-White Natural Resources District, Chadron, NE (1980-1990)
Resources Conservation

Duties included administration of the tree planting, irrigation scheduling and chemigation programs; provided technical assistance to landowners requesting District cost share funds; maintained and upgraded District's computer system; coordinated District activities with Federal, State and local agencies.

UNITED STATES AIR FORCE, Phoenix, AZ (1973-1975)
Veterinary Specialist, Airman 1st Class

Responsibilities included sanitary inspections of food serving facilities and off-base dairy facilities; inspection of produce, dairy products and carcass beef; animal vaccinations and quarantines.

Education

Bachelor of Arts Degree, with majors in Chemistry and Biology, Chadron State College (May 1982).

Additional Training

MSHA New Miner Training, February 2005
Radiation Safety Training, February 2005
MSHA Supervisor Training, April 2005
ISO 19001 Auditors Training, March 2006
TapRoot® Investigation Training, September 2006
DOT Hazardous Materials Training, October 2006
Apparent Cause Investigation Training, August 2007
Leadership Essentials Program, October 2008
Transportation of Hazardous Materials, September 2009
Environmental Monitoring for Radioactivity, May 2011
Class Room Instructional Skills, July 2013
Business Acumen, June 2013

References available upon request.

Education
MS, Geology, University of California, Los Angeles, 2002
BS, Geology, University of Arizona, 1999

Years of Experience
Total - 14
With ARCADIS – 12

US Patents
Inventor - US Patent No. 8,596,351 (Horizontal In-Well Treatment System)

Professional Registrations
Licensed Professional Geologist: Texas

Professional Qualifications
National Science Foundation Graduate Research Fellowship
National Science Foundation Research Grants (EAR-0106677 & EAR-0337191)
University of Arizona - Department of Geosciences Research Grants
David L. Moore Memorial Scholarship
American Institute of Professional Geologists Member
Texas Association of Professional Geoscientists Member
Sustainable Remediation Forum Member
Hazardous Materials Transportation and Management Training
HAZWOPER 40-Hour Training
MSHA Training
ARCADIS Project Management Training

Matthew S. Spurlin

Senior Hydrogeologist

Building upon his core education in geology, Mr. Spurlin continues to evolve his profession by incorporating a diverse array of applied geological, hydrogeological, geophysical and visualization science techniques to provide high quality hydrogeological data interpretation. Among his skill sets, Mr. Spurlin provides an indispensable ability to combine hydrogeological data with state of the art visualization tools that have been used for a variety of applications, including communication of complex data to stakeholders and the public.

Mr. Spurlin has worked for a variety of clients including the National Science Foundation, oil & gas and mining private industry clients, and state agencies, to provide high-quality hydrogeological and visualization expertise on projects ranging from crustal strain analysis of NASA shuttle radar data to interpretation of complex geologic folding and faulting influences on local and regional hydrogeology. His responsibilities have ranged from litigation support and project management to financial accounting, contracting and technical performance. Technical skills include enhanced 3D visualization and data analysis, high-resolution investigation techniques, downhole geophysics investigations, site conceptual model development, water resource assessment, aquifer testing, design and optimization of remediation strategies, field hydrogeology and data collection. An expert in quantitative modeling tools for directing and optimizing environmental investigations, Mr. Spurlin's applied work in hydrogeology distinguishes him from competitors in this capacity and provides the best in quality hydrogeological services.

Demonstrated Experience

Technical Lead Hydrogeologist - West Lake Landfill
Exelon, Bridgeton, MO
Ongoing role as lead hydrogeologist to support litigation related to emplacement of Manhattan Project-era radiological wastes at the West Lake Landfill. Developed refined CSM for interactions between bedrock and alluvial aquifers and landfill materials. Integration of 3D visualization and modeling to support data analysis and stakeholder communication.

Principal Investigator for Development of Nuclear Magnetic Resonance (NMR) Logging Technology for Groundwater Investigations
ARCADIS Global Satellite and US Innovation Programs
Ongoing role as principal investigator for the application of NMR technology to shallow groundwater investigations by environmental practitioners. Conducted bench-scale testing of LNAPL detection capabilities at ARCADIS's Durham Lab testing facility using NMR equipment

owned by Vista Clara, Inc. and patented acquisition and processing algorithms developed and permitted for trial use by Schlumberger, Inc. Current business plan entails continued development of the technology and marketing plan for broad implementation at ARCADIS sites.

3D Data Analysis and Contaminant Mass Estimates– Ocala MGP Site
TECO Energy - Florida Natural Gas,
Developed 3D visualizations of site hydrostratigraphy, potentiometric surfaces and contaminant impacts. Estimated mass of individual site constituents using a combined Theisson polygon approach and 3D distribution of soil analytical results using EVS software. Generated a comprehensive technical memorandum summarizing the methods and conclusions to be used for remediation design planning.

Technical Lead Hydrogeologist - Multiple Upstream Gas Compressor Sites
Exxon-Mobil (XOM), South Texas and Oklahoma
Ongoing role as lead hydrogeologist to support site investigations, CSM development and reporting for LNAPL impacts at >30 upstream natural gas compressor stations located in south and west Texas and Oklahoma. Responsibilities include aquifer test planning and analysis, 3D visualization and modeling, groundwater classification, groundwater pathway evaluations, and technical report writing. Additional key responsibility of identifying and implementing new and innovative site investigation technologies (e.g., implemented nuclear magnetic resonance (NMR) logging at south and west Texas facilities for the purposes of aquifer characterization. Obtained state approval of the use of no-purge groundwater sampling as alternative to low-flow sampling will save ExxonMobil $145K over the next year at Kelsey Field site alone with significant cost savings across Texas portfolio. Ongoing site investigation and reporting responsibilities.

Subsurface Geologic Modeling to Support Numerical Groundwater Modeling, Remedial Design Decision-Making and Conceptual Site Model Development within Complex Glacial Till Sequence
Allan Mine, Potash Corporation, Allan, Saskatchewan, Canada
Client requested visual database management approach to 1) develop a refined hydrostratigraphic model to support numerical groundwater modeling, 2) better communicate site conditions and 3) assist with design of a proposed slurry cut-off wall expansion. High-resolution LiDAR point cloud data were composited for ground surface coverage for proposed modeling domain. Lithologic information was imported from an existing GOCAD database and formatted for EVS software. The active well network consisting of 127 individual wells were incorporated into the model framework. Subsequent hydrostratigraphic picks were developed based on 349 existing lithologic boring logs that were representative of major aquifer and aquitard units. Developed iterative approach with numerical groundwater modeling and geologic modeling software packages. Hydrostratigraphic layer boundaries were exported to Groundwater Vistas to support site water balance and future planning decisions.

Evaluation of Industrial Impacts to Offshore Sediments within the Inland Coastal Waterway of Newark Bay

Tierra Solutions, Newark Bay, New Jersey

Lead visualization expert role focused on client request's to generate a custom visualization of sediment core sampling results within Newark Bay. Assembled data input files for approximately 640 individual soil samples and 18 individual COCs. Generated 3-D composite surface using high-resolution bathymetric data for the bottom of Newark Bay. Integrated geospatial data for areas corresponding to geographic, geomorphic and navigational channel boundaries. Overlaid estimates of net depositional sediment accumulations on the bathymetric surface. Provided routine modeling updates to project team, presented the final modeling results to the client and generated customized model output for deliverable to EPA.

3-D Geological Modeling and Visualization in Support of In-Situ Remedial Strategy Development and Corrective Action Plan at Former Uranium Mill Site

Homestake Mining Company of California (Barrick), Grants, New Mexico

Client involved in groundwater restoration program regulated by the Nuclear Regulatory Commission (NRC) and the New Mexico Environmental Department (NMED) Discharge Permit at historic uranium mill site for dissolved metals impacts to alluvial and bedrock aquifers. Reviewed available borehole information (>1,480 logs), water levels and historical COC distributions and developed working model of preferred groundwater migration pathways in alluvial and bedrock aquifers at the site. Generated high-resolution 3D geologic modeling and visualizations of complex geologic folding/faulting, contaminant distributions and hydraulic framework. Assisted with evaluation of plume capture and potential use of phosphate amendments to reduce the mobility of uranium in the tailings pile and in groundwater. Assembled preliminary Access database (>108,000 records) from historic files provided by incumbent consultant, which were used to query geologic, water quality and hydraulic information to support development of 3-D site conceptual model. Currently overseeing data management of full client database (>2.4M records). Modeling support provided significant contribution to initial win of pilot testing and remedial system design for in-situ treatment of metals impacts expected to generate $1M to $2M annual revenue. Generated comprehensive CSM discussions for an updated Corrective Action Plan and Decommissioning and Reclamation Plan scheduled for submittal in early 2012.

Hydrogeological Evaluation of Proposed In-Situ Coal Gasification (ISCG) Mine

Cook Inlet Research, Inc. (CIRI), Cook Inlet, Alaska

Client requested hydrogeological services for site selection and pre-feasibility study for a remote location along the northwest coast of Cook Inlet, Alaska. Evaluated the effect of regional faults and regional hydrogeology on the current conditions at the site. Developed groundwater baseflow estimates for overlying glacial drift and groundwater flux estimates for underlying bedrock coal seams and sandstone units. Made recommendations based on possible groundwater impacts due to rubbelization of overburden resulting from the gasification process. Integrated hydrology and water quality results to assist with developing a conceptual site

model for proposed mining operations. Prepared detailed report on the hydrogeology of the target area.

3-D Geological Modeling to Evaluate Hydraulic Confinement and Groundwater-Surface Water Interactions of an Artesian Uranium-Roll Front Deposit
Crowe-Butte Resources (CAMECO), Crawford, Nebraska
Served as task manager for the preparation of three Petitions for Aquifer Exemption and supported preparation of three UIC Class III Permit Applications to the state agency on behalf of a client interested in developing additional uranium ISL mining operations. Reviewed published literature for revised regional stratigraphic nomenclature and structural geology. Provided oversight for aquifer pump tests performed at multiple sites. Performed well installations, water quality sampling and water level measurements. Performed 3-D geologic modeling of faulted and folded geologic units using Mining Visualization Software (MVS) v.9.13. Interpreted structural geology, fault kinematics and the relationship of fault displacement to synorogenic sedimentation. Developed a comprehensive site conceptual model for all three proposed mine sites. Petitions and Class III applications for the one proposed mine area were submitted to the agency and approved June and July 2009 and July and August 2010. Petitions and Class III applications for the remaining proposed mine areas are pending.

Developed Comprehensive 3D Geologic Model to Support Design and Implementation of Multiple Permeable Reactive Barriers for Proposed Landfill at Former Smelter Site
ASARCO, El Paso Former Smelter Site, Texas
Generated 3D geologic modeling of alluvium and weathered and unweathered bedrock to support project scope and planning for proposed landfill. Modeling bedrock surface at high resolution to identify an ancient buried arroyo system developed on top of eroded bedrock surface. Additionally, generated 3D visualizations for two preliminary permeable reactive boundaries that span buried arroyo and provided design specifications to design team to streamline project scoping and budgeting.

Hydrologic and Hydrogeologic Investigation for 60 km^2 Tailings Impoundment at Proposed Copper Mine
Freeport-McMoran, El Abra Mine, Chile,
Assisted with preparation of proposal with ARCADIS Chile to conduct hydrologic and hydrogeologic investigation for 60 square kilometer tailings impoundment. Hydrogeology assessment focused on mine, waste rock facilities and tailings impoundment. Preliminary data gathering will consist of borehole investigations, pump testing and baseline water quality sampling to support conceptual site model development and hydrogeologic numerical model. Numerical model will be used to support assessment of potential impacts of proposed tailings impoundment. Reporting will consist of progress reports for several investigation phases and site activities and a final report summarizing the methodology and results of the study.

Hydrogeological Investigations to Support Conceptual Site Model Development and Numerical Hydrogeological Model to Evaluate Citing for Proposed Tailings Dam
Freeport-McMoran, Candeleria Mine, Chile
Assisted with preparation of proposal with ARCADIS Chile to develop a hydrogeological conceptual site model for a pre-feasibility study of the new tailing impoundment for the Candeleria Mine. Currently, the mine will exhaust its remaining capacity in 2015 and is evaluating the feasibility of new sites for the tailings dam. Preliminary data gathering will be used to develop a comprehensive site conceptual model that accounts for surface water, surface water-groundwater interactions and the bedrock aquifer system. Following completion of the site conceptual model, a numerical hydrogeological model will be developed to evaluate potential areas for the proposed tailings dam.

IRZ Implementation and Design Related to Chlorinated Solvent Impacts to Groundwater (GRIP)
Nestle, 1964 Williams Street, San Leandro, California
ARCADIS entered contractual agreement with client as part of Guaranteed Remediation Program (GRIP) portfolio. The project initially entailed preparing an Interim Remedial Action Plan to address ~2,500 ft solvent plume. Remedial system consists of an extensive in-situ reactive zone (IRZ) network (>180 injection wells) and monitoring well network (>50 wells). Responsibilities as lead geologist are focused on site investigation activities. Three-dimensional modeling of complex hydrostratigraphy and dissolved phase concentrations was used to refine the conceptual site model and optimize an in-situ bioremediation remedy. Adaptive approach utilized in support of injection test design and remedial system optimization.

Geothermal Cooling Proposal to Support Economic Development Plan
City of Aurora, Nebraska
Client interested in developing property for marketing purposes focused on prospective data storage center. Provided groundwater modeling and conceptual site model development services in support of proof of concept for a closed-loop geothermal cooling system. Evaluated permitting requirements, detailed hydrostratigraphy and water supply potential for Ogallala Aquifer relative to engineering requirements. Compiled well construction information for onsite and offsite water supply wells within a 2-mile radius as well as water quality, water level, pumping rate and injection rate information.

EIS for Coastal Wind Energy Demonstration Project within Pamlico Sound
Duke Energy, UNC Chapel Hill, East Carolina University, USACE, Cape Hatteras, NC
Following completion of a feasibility study required by recently enacted North Carolina state law, UNC Chapel contracted with Duke Energy to design, permit, construct and operate up to 3 demonstration wind turbines. Attended meeting in Greenville, NC with academic consortium consisting of UNC Chapel Hill and East Carolina University, along with Duke Energy, to discuss NC Coastal System and siting of proposed turbines. Prepared geology, seismology and

geotechnical discussions for an EIS conducted by ARCADIS as the third-party consultant.

Best Practices Guidance Document for Fractured Bedrock Characterization and Assessment of Fate and Transport

Exxon-Mobil, Irving, Texas

At the request of the client, ARCADIS prepared best practices document presenting fundamentals and advanced methods of bedrock characterization, solute fate and transport in fractured bedrock and remediation. Prepared discussions for geologic maps, fracture trace analysis, basic data collection during drilling and fracture data plotting and evaluation.

Characterization and Delineation of 1,4-Dioxane and Chlorinated Solvent Plumes

Lockheed Martin Corporation, Tallevast, Florida

The project required a Site Assessment Report, Interim Remedial Action Plan and Remedial Action Plan, requiring a total of ~150 report figures illustrating VOC results for >250 monitoring wells and >50 private wells. Played a key role in the development of the MS Access environmental database (>175,000 sample records, >1,000 sample locations, ~2,000 water level measurements), GIS and ePrism project website during ongoing installation of 115 new monitoring wells and groundwater sampling aimed at plume delineation (>200 acre plume). Provided task leadership to the database management and GIS groups. Automated the flow of analytical data from the lab to the database management team. Organized database output to streamline the process of generating 56 report figures using ArcView 9.1. Provided QA/QC of all report figures which included multiple site and sample location figures, groundwater contour maps, isoconcentration maps and a composite plume map among others. Each report was prepared in less than three weeks from receipt of final data, submitted to the agency on schedule, and ultimately approved by the agency.

Enhanced Anaerobic Biological Oxidation Pilot Study

Chevron, CVX-Willbridge Terminal, Portland, OR

Assisted with sampling plan for data collection at 12 CPT and 12 UV Optical Screening Tool (UVOST) locations at facility impacted with petroleum hydrocarbon. Generated 3-D visualizations for cone penetrometer test (CPT) and UVOST results and interpreted site hydrostratigraphy to assist with pre-design phase soil and groundwater sampling and design of injection well array.

Single-Well Pump Test Data Analysis

Georgia Pacific, Ft. Bragg, CA

Pumping test data from 8 single well pumping tests were analyzed using the Cooper-Jacob's modified non-equilibrium time-drawdown method. Prepared technical memo to summarize field activities and analyses of single well pump testing data in support of groundwater modeling efforts for the Mill Pond Complex remediation at the mill site.

Geologic Modeling in Support of Fractured Bedrock Remedial Investigations at Superfund Site

Solvents Recovery Service of New England (SRSNE) Superfund Site, Southington, CT

Performed 3D modeling of complex hydraulic head distribution, geologic controls, secondary porosity (fractures) and extensive well network (>250 wells). Developed comprehensive visualizations to evaluate contaminant transport and streamlined visualizations for reporting purposes.

CSM Development with Integrated 3-D Visualizations to Support Remedial Design Relate d to Chromium and VOCs Impacts to Perched Groundwater (GRIP)

US Army White Sands Missile Range, White Sands, New Mexico

Client required addressing impacts to soil, anthropogenic perched groundwater and regional aquifer from multiple sources at the HELSTF and TSA facilities. Developed GIS for 438 sample locations to support CSM development and aquifer zone re-assignments for selected monitoring wells. Performed extensive review of published literature. Drafted 5 preliminary cross-sections to determine spatial distribution of specific hydrostratigraphic units. Developed comprehensive revised CSM that was incorporated into a PowerPoint presentation. Calculated a regional water budget model for entire Tularosa Basin. Composed summary of quantity/quality of available boring logs. Drafted two technical memorandums of regional geology/site hydrostratigraphy and regional hydrology/water budget based with associated figures and tables. Generated extensive 3D visualizations using MVS software v.9.2, which encompassed regional/site topography, estimate of the high-stand extent of ancient Lake Otero, interpreted hydrostratigraphy, water levels, chromium/VOC plumes and an estimate of perched groundwater volume. Prepared discussions for geology, hydrogeology, naturally occurring elements, and revised CSM for Revised Phase III RFI Report. Following responses to NMED comments, the revised RFI was submitted in Aug 2010 and is pending approval.

3-D Site Characterization and Remedial System Design and Optimization

CENCO Refinery, Santa Fe Springs, California

For this project, a Remedial Action Plan needed to be prepared as a result of chlorinated solvents and petroleum hydrocarbon impacts. Prepared comprehensive 3-D source area modeling based on soil results for 6 individual analytes. Designed and optimized an SVE and bioventing remedial system based on well design criteria and a compilation of interpolated plumes for total SVOCs, total VOCs, and total TPH. Resulting remedial system consisted of 23 injection wells and 44 SVE wells in a 4-point array within a 53 acre area.

Conceptual Site Model Development and Excavation Planning using EVS at Former Pesticide Formulation Facility

Chevron/Texaco Corporation, Orlando, Florida

Unforeseen offsite migration of pesticides in shallow groundwater from former pesticide formulation warehouse with potential for discharge to nearby lake. Reviewed all existing site documentation and groundwater model produced by previous consultant. Provided

revised understanding of site conceptual model to explain offsite migration, evaluated performance of permeable reactive barrier (PRB) at downgradient well locations, calculated offsite COC mass flux and COC half lives, proposed optimization of existing PRB system and future tracer testing, as well as an alternative granulated active carbon (GAC) PRB. Developed 3-D visualizations of total BHC and beta-BHC distributions using MVS software version 9.2 . Utilized visualization tool to estimate COC volume and assist in planning of proposed soil excavations.

Vapor Well Installations and Calculation of Hydrocarbon Phase Partitioning
ARAMARK, Mesa Verde National Park, Colorado
The site is entered into the Colorado Department of Labor and Employment (CDLE), Oil and Public Safety (OPS), LUST Reimbursement Program (State Fund) and required an Interim Remedial Action Plan to address an ~3,000 ft solvent. Installed and sampled six nested vapor wells in source area. Performed phase partitioning calculations for lower than expected source area sampling results to confirm equilibrium partitioning with elevated dissolved phase concentrations and absence of NAPL in the source zone.

Monitoring Well Installations and Soil Sampling During Phase II UST Site Investigation and Site Closure Activities
BNSF Railway, Loveland, Colorado
Site activities included well installations, sampling and continued monitoring as part of voluntary site investigation related to petroleum hydrocarbon impacts. Site may eventually be entered into the CDLE OPS LUST Reimbursement Program.

3-D Visualization Support for Characterization and Delineation of 1,4-Dioxane and Chlorinated Solvent Plumes
Raytheon, St. Petersburg, Florida
The client requested preparation of an Interim Remedial Action Plan to address an ~3,000 ft solvent plume. Played a key role in the development of 3-D hydrostratigraphic and geochemical visualizations, requiring a total of 47 report figures and 31 4DIMs illustrating VOC results for 116 monitoring wells. The report was prepared in less than two weeks from receipt of final data, submitted to the agency on schedule, and is pending approval by the agency.

Hydrostratigraphic Modeling of Ogallala Fm (GRIP)
Former Reese AFB, Lubbock, Texas
Long-term groundwater remediation GRIP project of a 3-mile VOC groundwater plume beneath Area 3 of the Former Reese Air Force Base. Modeled hydrostratigraphic units along six borehole transects using Rockworks 2006 in order to gain preliminary understanding of the hydrostratigraphic controls on solute fate and transport. Remediation project is ongoing.

Expert Witness for Alternative Source Investigations of 1,4-Dioxane and Chlorinated Solvent Plumes (Multiple Class Action Lawsuits)

Crowell & Moring LLP, Tallevast, Florida

Served as project manager and expert consulting witness for Lockheed Martin Corporation's outside legal counsel in multiple class action lawsuits related to a >200 acre solvent plume. Reviewed historical aerial photography, Sanborn fire insurance maps and documents obtained during discovery to identify potential offsite source areas. Supported forensic analyses using concentration ratios, concentration trend analyses and quantitative groundwater calculations.

2-D and 3-D Source Area Investigations of a Chlorinated Solvent Plume Impacting Overburden and Bedrock Groundwater

Confidential Client, Downers Grove, Illinois

Client of a confidential litigation project was named as Potentially Responsible Party (PRP) in multiple class action lawsuits as a result of the migration of a dissolved chlorinated solvent plume (>500 acre plume) from the Ellsworth Industrial Park into fractured bedrock beneath the residential community of Downers Grove. Developed Access database (>20,000 sample records, ~500 sample locations) from analytical results, water level data and well information obtained through detailed document review. Provided GIS support using ArcView 9.1. GIS products included: contaminant distribution maps; development and evaluation of land cover polygons for contaminant mass-flux calculations (using the 3D Analyst extension) and historical maximum concentration maps. Collaborated with external members of client PRP group to combine GIS and database resources. Developed a 3-D model of geology and VOC concentrations in soil and groundwater using MVS 9.13. The model was used to produce 3-D visualizations and animations of soil and groundwater VOC concentrations over time within the industrial park. Following review of >260 boring logs, developed a 3D hydrostratigraphic model in July 2008. Provided litigation support to allow testifying expert to quickly and efficiently view and analyze all of the data. Client reached settlement agreement in one class action lawsuit while other lawsuits are still pending.

Forensic Analysis of Co-mingled Chlorinated Solvent Plumes

Confidential Client, Cadillac, Michigan

Client of a confidential litigation project was liable for co-mingled chlorinated solvent plumes that impacted a residential neighborhood and a local well field. More than 20 years of quarterly groundwater monitoring data from ~150 monitoring wells was provided in a large Access database (>26,000 sample records, >5,000 water level measurements, ~1,900 sample locations) that needed to be analyzed and presented. Integrated more recent 2002-2004 analytical data into the database. Provided litigation support to a testifying expert as a GIS task leader. Supported forensic analysis using chemical concentration ratios and 2-D krigging interpolations of contaminant concentrations presented in ArcView 9.0. Due to the strength of the technical argument, the plaintiff withdrew their lawsuit and our client was awarded attorney's fees.

Forensic Analysis of Historical Releases of LNAPL from Gasoline Retailer
Chevron/Texaco Corporation, Chillum, Maryland
Client formerly leased a property used to operate as a gas retailer and was named as a PRP in two class action lawsuits. Client was potentially liable for groundwater contamination that migrated >1000 feet underneath residential areas. More than 4,000 gallons of liquid petroleum hydrocarbons have been removed by a pump and treat system. Provided litigation support of a non-testifying expert. Innovative use of GIS tools and an Access analytical database (>9,000 sample records, 2,200 water level measurements, >300 sample locations) to quickly and efficiently provide forensic analysis of former releases of petroleum hydrocarbons. Determined substantial undocumented releases had occurred after the end of the client's lease. The lawsuit for property damage was settled out of court. The liability lawsuit is still pending.

Forensic Analysis of Historical Releases of Petroleum Hydrocarbons from Multiple Gasoline Retailers
Fireman's Fund Insurance Company, Astoria, Oregon
Client involved as plaintiff in lawsuit with former owner of 8 gas retail stations with petroleum hydrocarbons impacts to shallow soil and groundwater from leaking gasoline USTs. Performed document review of 12 boxes of documents (>30,000 bates stamped pages) and forensic analyses in support of testifying expert's opinion to evaluate the timing of historical releases with respect to the insured period.

Cost Analyses of Remedial Action at Southern Wood Piedmont Wood Treatment Plants
Fireman's Fund Insurance Company, Multiple Locations
Client involved as plaintiff in lawsuit with former property owner of three wood treatment plants with pentachlorophenol, creosote and arsenic impacts to shallow soil and groundwater at three former plant operations in North Carolina, Georgia and Tennessee. Performed document review and summary of 8 boxes of documents (>20,000 bates stamped pages) for cost analyses.

GIS-Based Evaluation of Gaining Conditions in Four Ephemeral Streams
Pratt & Whitney-Rocketdyne, (United Technologies Corporation), San Jose, California
Project entailed preparing a Gaining Conditions Report with 29 report figures illustrating hydraulic gradients over a 6-month monitoring period for 18 surface water depth gauging station-piezometer pairs that span a 5,200 acre area. Water level and creek level data along with survey data were used to generate an Access geodatabase (~500 water level measurements). Used ArcView 9.0 to rapidly analyze hydraulic heads and hydraulic gradients between gauging stations and associated piezometers, as well as to streamline preparation of 26 weekly time-series maps, 2 gaining conditions summary maps, and a map comparing results of this study with previous investigations, among other responsibilities of drafting text, tables and appendices. The report was submitted to the agency on schedule, preparation costs were under budget and the report was ultimately approved by the agency.

GIS Mapping of Shallow Soil Sampling Network in the Coyote Hills Oil Field
Chevron/Texaco Corporation, Fullerton, California
The client needed to accurately represent the locations of >200 shallow soil sample locations that were initially mapped at incorrect locations. Evaluated the root cause of the problem and implemented a coordinate transformation from State Plane (CCS83) to a local coordinate system using ArcView 3.2 to correct the sample locations. Generated oversize sample location map that was submitted to the agency.

Semi-Annual Groundwater Monitoring at Former UST Area
General Motors Corporation, Saginaw, Michigan
Quarterly monitoring conducted as part of Interim Response Action implemented to monitor and confirm the effectiveness of natural attenuation processes for remediating gasoline chemicals near a former leaking gasoline UST. Coordinated 7 field investigations and prepared 7 semi-annual groundwater monitoring reports between fall 2003 and the present. Agency recently approved removal of three monitoring wells from quarterly sampling as a result of continued decreasing trends in water quality data below commercial water quality standards.

Evaluation of SVE System
General Motors Corporation, Milford Proving Grounds, Michigan
Client requested an evaluation of effectiveness monitoring data collected to assess the need for continued operation of SVE system installed to remediate a subsurface chlorinated solvent NAPL and gasoline mixture. Conducted BTX concentration ratio trend analyses which indicated the occurrence of enhanced in-situ biodegradation of gasoline chemicals. Performed partitioning calculations using soil vapor concentration measurements which determined that the SVE system had removed most, if not all, of the site COCs from the subsurface. Generated BTX ternary diagrams that supported other evidence of enhanced in-situ biodegradation of gasoline chemicals. Performed quantitative calculations to determine >8,800 gallons gasoline was removed by SVE system to date. Prepared technical memorandum recommending that the SVE system be stopped for one year and that effectiveness monitoring data be collected in the interim.

Supplemental Remedial Investigation
Elmira Manufactured Gas Plant, Elmira, New York
A Supplemental Remedial Investigation report needed to be prepared as a result of MGP-related impacts of BTEX and PAHs to site soil and groundwater. Conducted concentration trend analyses that indicated stable or decreasing trends in plume stability at all 8 site monitoring wells. Calculated retardation factors and remediation rates using linear regression analyses for site COCs. Performed redox zone analyses that demonstrated in-situ biodegradation processes were occurring onsite. The report was prepared and submitted to the agency on schedule and ultimately approved by the agency.

Evaluation of Monitored Natural Attenuation in Groundwater
Beazer/Koppers Corporation, Superior, Wisconsin
Constructed groundwater contours for 4 aquifer units. Performed 20 concentration trendline analyses and 16 Mann Whitney statistical tests. Evaluated MNA indicator parameter data along a conceptual groundwater flowpath and determined the presence of in-situ biodegradation and redox processes occurring at the site. Determined the potential for in-situ biodegradation by evaluating PLFA biomass at 5 sampling locations. Prepared and submitted to the agency a technical memorandum that summarized the results of the MNA evaluation and provided sufficient technical justification that natural attenuation processes would continue to reduce site COCs in the future.

Evaluation of Historical Site Activities
Northwestern Corporation, Aberdeen, South Dakota
Reviewed Sanborn fire insurance maps and historical aerial photographs of the site between 1898 and 1997 to identify historical site features related potentially related to soil and groundwater impacted with BTEX and NAPL. Successfully identified 3 underground oil tanks, one crude oil tank, 11 above ground gas tanks with >36,000 gallons of total storage capacity and 3 gasometers with >180,000 cubic feet of storage capacity.

Phase II Remedial Investigation of On-site and Offsite Chlorinated Solvent Plumes
Former Tect-Danzig Drum Disposal Site, Northvale, New Jersey
A Phase II Remedial Investigation Report with >30 figures illustrating VOC results for >50 monitoring wells was prepared for the client. Provided task leadership for report preparation. Contributed to development of site conceptual model. Report was submitted on time to the agency and is pending review.

Feasibility Study for Operable Unit No. 1 – Onsite Groundwater
Evor Philips Leasing Corporation, Old Bridge, New Jersey
Prepared a Feasibility Study for onsite groundwater impacted by VOCs. Performed >127 Mann-Whitney tests and 166 time-series linear regression analyses. The report was subsequently submitted on time to the agency and is pending review.

Environmental Analyst
Test America Laboratories (Severn Trent Laboratories), Arvada, CO
Prepared and analyzed soil and water samples for metals analyses by inductively-coupled plasma (ICP), ICP-Trace, inductively-coupled plasma mass spectrometry (ICP-MS) (EPA Methods 200.7, 200.8, 6010, 6010B and 6020), graphite (EPA Method 200.9) and Hg (EPA Method 245.1) analyses.

Geologic Mapping, Isotopic Dating and Geochemical Analyses in Eastern Tibet
Qinghai Province (Tibet), People's Republic of China
Geologic mapping, isotopic dating and geochemical analyses of a 200-km wide Tertiary fold-thrust belt. Characterized first-order geologic relationships in a remote and geologically complex region of the Tibetan plateau during three field expeditions between 1998 and 2001. Conducted $^{40}Ar/^{39}$ Ar Thermochronology analyses on biotite and U-Pb Secondary Ion Mass Spectrometry (SIMS) analyses on zircons. Generated regional-scale geologic maps and cross-sections. Presented results and tectonic interpretations at national and international conferences and published the findings in a major scientific journal.

Radiometric Isotope Studies on Single Detrital Zircons Using ID-TIMS
University of Arizona, Tucson, Arizona
Collected single detrital zircons and performed U-Pb isotope dating using Isotope Dilution and Thermal Ionization Mass Spectrometry (ID-TIMS) as a Research Assistant in a clean-lab environment. Interpreted detrital zircon ages for provenance and paleogeography studies. Field study localities include Nepal, Mexico, Alaska, Nevada and California. All findings were published individually in major scientific journals.

Monitoring Well Installation and Geologic Logging
Lockheed Martin Corporation, Tallevast, Florida
Client requested installation of >100 monitoring wells (installed 10 to 300 ft below ground surface) in order to delineate a >200 acre solvent plume in preparation for Site Assessment Report. Supervised Rotosonic drilling activities. Conducted soil logging and soil and groundwater sampling for VOC analyses during well installations. Monitoring wells were installed on time, enabling a successful groundwater sampling program and delineation of the solvent plume.

Strategic Soil Sampling and Vertical Profiling using Geoprobe and Hollow Stem Auger Methods
Pratt & Whitney-Rocketdyne, (United Technologies Corporation), San Jose, California
In preparation for future site decommissioning activities, the client requested initial site characterization of a subset of building stations at the site. Conducted geologic soil logging and soil sampling to a depth of 100 feet below ground surface at multiple stations at the site.

Well Abandonment Activities
Pratt & Whitney-Rocketdyne, (United Technologies Corporation), San Jose, California
Client requested that two inactive water supply wells at the site be abandoned in order to bring them into compliance with county and state regulations. Supervised well abandonment activities for one well cased to a depth of ~50 feet below ground surface and a second well cased to a depth of ~150 feet below ground surface. Assisted in preparation of water supply well destruction report that was subsequently submitted and approved by the agency.

Site Supervision of Soil Boring, Monitoring Well Installation and Sampling
Chevron/Texaco Corporation, Denver, Colorado
Client requested site characterization at Former Texaco Bulk Facility to evaluate the property for potential resale. Conducted geologic soil logging and installed three monitoring wells to a depth of 20 feet below ground surface. Developed the 3 monitoring wells using a surge block while collecting water quality parameters using flow-through cell technology. Collected 3 groundwater samples for analyses of lead (EPA Method 6010B), PAHs (EPA Method 8310) and BTEX (EPA Method 8260B).

Semi-Annual Groundwater Monitoring
United Parcel Service, Commerce City, Colorado
Semi-Annual Groundwater Monitoring in Sand Creek Wetlands at Denver Hub. Quarterly monitoring performed as a result of shallow soil and groundwater impacted with BTEX and MTBE from leaking former UST beneath a dispenser island. Performed 3 quarters of groundwater monitoring at 8 monitoring well locations. Collected 4 groundwater samples for analysis of BTEX and MTBE (EPA Method 8021). Generated groundwater contour maps and evaluated concentration trends of BTEX and MTBE over time.

Semi-Annual Groundwater Monitoring
Holcim Portland Cement Plant, Florence, Colorado
Onsite quarry and cement plant required to perform quarterly groundwater monitoring as a result of disposal of cement kiln dust into previously mined sections of the site. Conducted 6 rounds of groundwater monitoring for 7 monitoring wells and 8 piezometers in 2003-2004. Used GIS as a new and innovative method to draft site location and groundwater contour maps using ArcView 3.2. Collected 90 groundwater samples for analysis of metals (EPA Method 200.8) and standard water quality parameters including total dissolved solids, fluoride, chloride, nitrate, nitrate-nitrite, nitrite, hardness ($CaCO_3$) and sulfate.

Installation of Temporary Monitoring Wells and Groundwater Sampling
Temple Inland Plant, Antioch, California
Conducted Geoprobe soil boring investigations to 20 feet below ground surface, geologic logging and core descriptions, low-flow groundwater sampling and soil sampling.

Monitoring Well Abandonment
Kerr-McGee/Tronox, LLC, Naperville, Illinois
Monitoring well abandonment as part of Kress Creek/West DuPage River Remediation. A network of monitoring wells and piezometers were installed in Reach 1 for short term pumping tests in the spring of 2005 and were subsequently abandoned. Supervised the well abandonment of 2 monitoring wells and 12 piezometers installed to a depth of 20 feet below ground surface.

Phase II Site Investigation at High Altitude Test Lab
General Motors Corporation, Denver, Colorado
Property owner conducted UST investigation as a result of potential property acquisition. Supervised Geoprobe soil boring activities at 14 locations down to 20 feet below ground surface. Conducted geologic logging and soil sample collection and analyses for VOCs (EPA Method 8260), BTX (EPA Method 8021), TPH (EPA Method 418.1), PAHs (EPA Method 8010) and 8 RCRA metals.

Multiple Phase I Environmental Site Assessments
General Motors Corporation, Multiple US Locations
Conducted Phase I site assessments at 9 property locations in Denver, Frederick, Glenwood Springs and Longmont, Colorado, as well as St. George, UT. All Phase I ESA's were related to property acquisitions by a potential buyer. Environmental concerns included confirmed asbestos tiling and impacts to soil and groundwater by petroleum hydrocarbons.

Detailed Analyses of Multispectral Satellite Imagery and Shuttle Radar Data Crustal Strain Analysis
UCLA / Caltech / NASA Jet Propulsion Laboratories, Death Valley, California
Performed detailed analyses of NASA shuttle radar data (SRTM and SIR-C) and multispectral satellite imagery (MASTER, ASTER, TIMS, LANDSAT) using ENVI 2.0 software in preparation for a joint field trip with UCLA, Caltech and NASA's Jet Propulsion Laboratories aimed at visually enhancing neo-tectonic features and evaluating Quaternary alluvial fan development.

Crustal Strain Analysis
UCLA, Mojave Desert, California
Constructed a 1200 square mile array of GPS receivers designed to collect 24- to 72-hour continuous GPS data as part of an ongoing study of tectonic post-seismic deformation associated with 1992 Landers and 1999 Hector Mine earthquakes.

Selected Publications

Spurlin, M., Cross, B., Barker, B., Divine, C., Kochiss, C., and Gefell, M. 2014. Nuclear Magnetic Resonance – A New Tool for Enhanced Environmental Investigations. 2014 National Ground Water Association Groundwater Summit, Denver, CO. May 5.

Spurlin, M.S., Cross, B.B., and Divine, C.E. 2014. Nuclear Magnetic Resonance – Field Applications of a New Tool for Enhanced Environmental Investigations. Symposium on the Application of Geophysics to Engineering and Environmental Problems, Boston, MA. March 17.

O'Fallon, T., Divine, C.E., Spurlin, M. 2013. Modeling Horizontal Wells: Source Zone By-Pass of Clean Water In-Situ Treatment for Mass Reduction. The 29th Annual International Conference on Soils, Sediments, Water, and Energy, University of Massachusetts, Amherst, MA, October.

Spurlin, Matthew S.; Rogoff, Eric; Cichy, Dan M.; Divine, Craig E., 2013: Enhanced 3-D Visualization as a Powerful Data Analysis and Stakeholder Communication Tool During Mine Closure. – In: Brown, A.; Figueroa, L. & Wolkersdorfer, Ch.: Reliable Mine Water Technology (Vol II). – p. 1125 – 1131; Denver, Colorado, USA

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Armstrong, M., Divine, C.E., Spurlin, M., Burnell, S, Griffin, A. and Potter S., 2012. Use of Next-Generation Characterization Tools and Three-Dimensional Visualization to Enhance Remedy Performance. 8th International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Monterey, California, May 2012.

Divine, C.E., Leone, G., Gillow, J., Roth, T., Spurlin, M., Rigsby, T. and Potter, S., 2012. Modeling Analyses and Laboratory Evaluation of the Horizontal Reactive Well: A New Sustainable Passive In Situ Remediation Concept. 8th International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Monterey, California, May 2012.

Divine, C.E., Leone, G., Gillow, J., Roth, T., Brenton, H. and Spurlin, M.., 2011. Horizontal In-Well Treatment System and Source Area Bypass System and Method For Groundwater Remediation. U.S. Patent Application #13085434.

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Straten, M., Spurlin, M., Divine, C.E., Griffin, A.C., and Houston, K.S. 2011. Enhanced 3D Visualizations to Support CSM Development and Remedial System Optimization. 2011 Ground Water Summit. National Ground Water Association. May.

Divine, C.E., Leone, G., Roth, T., Spurlin, M., Gillow, J. and Potter, S. 2011. Modeling Analyses of Horizontal Reactive Media Treatment (HRX) Wells; A New Concept for Sustainable Passive In-Situ Remediation. Conference Proceedings pp 535-539. MODFLOW and More 2011: Integrated Hydrologic Modeling, Golden, Colorado.

Leone, G., et al., 2011. Horizontal In-Well Treatment, Modeling Analyses of A New Concept for Sustainable Passive In Situ Remediation. NGWA Annual Ground Water Summit, May 1-5, 2011, Baltimore, MD.

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Spurlin, M.S. and Divine, C.E. 2010. Enhanced 3D Visualization as a Data Analysis Tool in Remediation Hydrogeology. National Ground Water Association. Proceedings of the 2010 NGWA Ground Water Summit, Denver, Colorado; April.

Spurlin, M.S., A. Yin, T.M. Harrison, B.K. Horton, J. Zhou, J., and J. Wang. 2005. Structural evolution of the Yushu-Nangquian region and its relationship to syncollisional igneous activities, east-central Tibet. Geological Society of American Bulletin. 117 (9-10): 1293-1317.

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Horton, B.K., A. Yin, M.S. Spurlin, J. Zhou, and J. Wang. 2000. Paleogene syn-contractional sedimentary basins in the eastern Tibetan plateau. *EOS, Transactions, AGU* 81 (48).

Manning, C.E., P. Kapp, A. Yin, M. Murphy, T.M. Harrison, M.S. Spurlin, Ling Ding, and Xi-Guang Deng. 1998. Metamorphism and exhumation of Mesozoic mélange in north central Tibet. EOS, Transactions, AGU 79: F815.

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Robert Lewis, PG: Principal Hydrogeologist

Mr. Lewis is owner and Principal Hydrogeologist of AquiferTek LLC, providing specialized hydrogeologic and environmental consulting services to mining companies, oil and gas companies, attorneys, water purveyors, municipalities, consultants, and others. Mr. Lewis has over 27 years of experience as a groundwater scientist and environmental consultant, and is a registered Professional Geologist in Wyoming. Mr. Lewis has been involved in more than 300 consulting projects and environmental investigations worldwide. He has broad experience, with expertise in the areas of groundwater flow and transport modeling, mine hydrology, soil and groundwater contamination investigation and remediation, fate and transport of organic, inorganic, and radiological constituents, and water resource development. Robert has provided expert witness testimony and litigation support on numerous occasions. He has significant project management experience, and has served as manager in charge of technical and professional development. Mr. Lewis has authored technical papers, peer-reviewed journal articles, and book chapters concerning mine hydrology and water quality, groundwater modeling, and water resource evaluation. He has served as Associate Editor of *Ground Water* journal, and has been a member of ASTM subcommittees D.18.04 (Determination of Hydrogeological Parameters) and D18.21.10 (Ground Water Modeling).

EDUCATION & CERTIFICATIONS

* Certified Professional Geologist, Wyoming, 1991 (#522)
* M.S., Geology (Hydrogeology), Colorado School of Mines, 1988
* B.S., Geology, University of Colorado, Boulder, 1985
* OSHA 40-Hour and 8-Refersher HazwoperTraining Certifications
* ExxonMobil Loss Prevention Training

ACADEMIC AND PROFESSIONAL HONORS

* Associate Editor, *Ground Water Journal* (AGWSE/NGWA), 1998-2001
* Association of Ground Water Scientists and Engineers Distinguished Service Award
* ASTM Committee D18 (Hydrologic Modeling/Parameter Estimation), 1997-1998

PROFESSIONAL WORK HISTORY

* 1/2014 to Present, AquiferTek LLC, Golden, Colorado: Owner and Principal Hydrogeologist

* 10/2010 – 1/2014, Aqui-Ver, Inc., Golden, Colorado: Principal Hydrogeologist
* 2001 - 2010 - WorleyParsons/Komex, Principal Hydrogeologist, Golden, Colorado
* 1998 - 2001 - Independent Consultant - Westminster, Colorado
* 1995 - 1998 - Associate Hydrogeologist - Denver, Colorado
* 1991 - 1994 - Senior Hydrogeologist - Lakewood, Colorado
* 1990 - 1991 - Project Hydrogeologist - Denver, Colorado
* 1988 - 1990 - Project Hydrogeologist - Irvine, California
* 1985 - Geologist - Boulder, Colorado

REPRESENTATIVE PROJECT EXPERIENCE

* Provided consulting support on more than 100 projects involving aquifer restoration, hydrologic impact analyses, mine permitting, and stability monitoring at in-situ uranium mines in Wyoming and Nebraska over the last 17 years.
* Served as project manager and primary technical investigator in support of mine restoration plan development at an in-situ uranium mine in northwest Nebraska. Work included groundwater flow and transport modeling of 11 separate mine units and optimization of ISR wellfield restoration plans.
* Served as project manager for aquifer test plan preparation, test performance, and technical report preparation at planned uranium ISR mine near Marsland, Nebraska.
* Served as project manager and primary technical investigator in the development of an industrial water supply for petroleum development company located in eastern Utah. Work included installation of a 2,600-foot test well and large-diameter water supply well, aquifer testing, and long-term water supply planning including the development and application of a regional groundwater flow model.
* Served as project manager and primary technical investigator supporting the development of Aquifer Exemption Boundaries (AEBs) for 27 existing and planned mine units at an operating uranium ISR facility in Carbon County, Wyoming. Work included the development and application of a groundwater flow and transport model to simulate the movement and recovery of a hypothetical release (excursion) from an operating commercial ISR wellfield.
* Served as project manager and primary technical investigator in the performance of a Cumulative Hydrologic Impact Assessment at a uranium ISR mine in Carbon County, Wyoming. Work involved development and application of a regional-scale groundwater flow model to predict the aquifer drawdown impacts due to ISR uranium mining and other industrial developments within a 10-mile radius of the ISR facility.
* Served as project manager and primary technical investigator in the performance of a Cumulative Hydrologic Impact Assessment at a satellite uranium ISR facility in Campbell County, Wyoming. Work involved development and application of a regional-scale

groundwater flow model to predict the aquifer drawdown impacts due to ISR uranium mining and other industrial developments within a 10-mile radius of the ISR facility.

* Served as project manager and primary technical investigator in the performance of a Cumulative Hydrologic Impact Assessment at a satellite uranium ISR facility in the Gas Hills, Wyoming. Work involved development and application of a regional-scale groundwater flow model to predict the aquifer drawdown impacts due to ISR uranium mining within a 10-mile radius of the ISR facility.
* Provided litigation support on behalf of various public utilities and law firms. Work included groundwater flow and transport modeling to support insurance recovery for environmental damages at more than 55 former Manufactured Gas Plant (MGP) sites in Georgia, Wisconsin, Indiana, Illinois, Iowa, Delaware, and Michigan.
* Provided expert witness testimony and prepared an expert report concerning the probability of structural leakage at five former Manufactured Gas Plant (MGP) sites in Michigan.
* Provided expert witness testimony and prepared an expert report concerning the probability of structural leakage at six former Manufactured Gas Plant (MGP) sites in Indiana.
* Provided oversight of ground water sampling and monitoring program at a rare earth element mine in California and Nevada. Work included quarterly groundwater sampling, data analysis, and report preparation.
* Served as project manager and primary investigator of hydrogeologic study to predict the impacts of open-pit mine dewatering and filling on the local and regional aquifer system at a mine site in Carbon County, Wyoming. Work involved development and application of a three-dimensional groundwater flow and transport model to predict the impacts of pit dewatering and filling.
* Served as project manager and primary technical investigator providing restoration plan development support for an in-situ uranium mine in the Powder River Basin, Wyoming. Work included groundwater flow and transport modeling of 10 separate mine units and optimization of ISR wellfield restoration plans.
* Served as project manager for confidential study to develop in-situ groundwater bioremediation methods for dissolved uranium and heavy metals.
* Provided oversight of deep bedrock well installation and conducted aquifer testing of a fractured rock aquifer at the former BHP Billiton (Rio Algom) Lisbon uranium mill site in La Sal, Utah.
* Served as project manager in support of bond surety support and updates for Power Resources, Inc. Highland Uranium Project (HUP).
* Served as project manager and principal investigator in the preparation of an Alternate Concentration Limits (ACL) permit application for the Rio Algom Mining Corporation (RAMC) uranium mill tailings facility in La Sal, Utah.
* Served as project manager and principal investigator in the preparation of an Alternate

Concentration Limits (ACL) permit application for former uranium mine and mill tailings site in the Shirley Basin, Wyoming.

* Served as primary technical investigator in the preparation of an aquifer restoration cost estimate report for the former Petrotomics uranium mill tailings facility in the Shirley Basin, Wyoming.
* Served as primary investigator and project coordinator in the preparation of a groundwater modeling and ACL feasibility report for the Rio Algom Mining Corporation (RAMC) Lisbon uranium mill in La Sal, Utah.
* Served as primary technical investigator in the evaluation of the groundwater Corrective Action Program (CAP) at the RAMC Lisbon uranium mine and tailings facility.
* Served as project coordinator and technical investigator for a background water quality assessment at the Rio Algom Mining Corporation (RAMC) Lisbon uranium mill facility in La Sal, Utah.
* Prepared an expert opinion report concerning the source of elevated sulfates in shallow groundwater at the Crow Butte Resources (CBR) in-situ leach (ISL) uranium mine in Crawford, Nebraska.
* Conducted technical review and provided recommendations to improve the groundwater Corrective Action Program at a former uranium mine and mill tailings site in the Gas Hills, Wyoming.
* Provided technical oversight and conducted peer-review of transport modeling conducted in support of an ACL application at a former uranium mill tailings site in the Sweetwater River Basin, Wyoming.
* Managed and performed CERCLA Site Investigations (SIs), Preliminary Assessments (PAs), and Feasibility Studies (FSs) at U.S. DoE and DoD facilities containing high-level and low-level nuclear and radioactive wastes and source materials, including projects at the Dugway Proving Ground (Utah) and the Rocky Flats Plant (Colorado).
* Served as project manager supervising the preparation of a Soil Decommissioning Plan for a former uranium mill tailings site in New Mexico. The facility contained extensive areas of windblown tailings containing radioactive elements and source material. Work included the performance of regional and site-scale radiological surveys, fate and transport assessment, benchmark dose modeling, closure planning, and preparation of a soil remediation plan.
* Performed computer simulations involving the fate and transport of radiological constituents in soil and groundwater in support of citing and permitting of a proposed nuclear reactor in Illinois.
* Conducted a third-party review of groundwater quality data at the Minera Yanacocha, SRL gold mine in Cajamarca, Peru – the second largest gold mine in the world.
* Supervised and conducted hydrogeologic investigations in support of a successful solution mining permit application for a large underground copper mine in the Upper Peninsula of Michigan. Performed numerical and analytical groundwater flow modeling to predict the

rate of mine filling, and the rate of mine discharge. Models were used to assess the effectiveness of various engineering controls to reduce uncontrolled mine discharge.

* Conducted technical review of groundwater flow and contaminant transport modeling and provided strategic recommendations in support of litigation at an operational gold and copper mine in Arizona.

* Supervised and performed CERCLA Preliminary Assessments (PA's) and Site Investigations (SI's) at U.S. Army facilities in Colorado, Utah, and Montana.

* Supervised and conducted groundwater flow and solute transport modeling in support of CERCLA Remedial Investigations/Feasibility Studies (RI/FS) at U.S. DoD facilities in California, Missouri, and Massachusetts. Modeling included detailed conceptual design of remedial well fields for VOC removal and containment. Work included the performance and analysis of aquifer tests at production well locations in support of modeling efforts.

* Conducted three-dimensional groundwater flow and transport modeling of TCE transport at an U.S. Army Depot in Northern California. Modeling was used to assist in the selection of remedial alternatives and the proper location of potable supply wells.

* Supervised and performed numerous remedial investigations and remedial actions at landfills, railroad maintenance facilities, and Underground Storage Tank (UST) sites. Field investigations involved monitor well installation, soil and groundwater sampling, geophysical surveys, aquifer testing, and soil gas sampling and analysis.

* Designed soil vapor extraction and groundwater sparging remediation system at former petroleum UST site. Design included the performance of in-situ air permeability and aquifer tests.

* Conducted geologic hazard assessment at former U.S. Naval base in northern California. Work included detailed seismic hazard assessment, including mapping of recent faults, computer modeling of strong ground motion, and estimation of liquefaction potential resulting from a hypothetical earthquake with a 50-year return period.

AFFILIATIONS

* National Ground Water Association
* Colorado Ground Water Association
* Geological Society of America (GSA)
* Society of Mining Engineers (SME)

PUBLICATIONS

Mr. Lewis has prepared hundreds of written project reports, and has authored professional papers, book chapters, and presentations concerning the following:

* Groundwater and solute transport modeling
* Mine hydrology
* Contaminant fate and transport in heterogeneous media
* General water resources and environmental issues

The following is a list of publications and presentations:

* Lewis, R. L. (2001). Ground Water Resources of South Park, Colorado, in The Colorado Ground-Water Atlas, Chapter 21, pp. 111-116, Colorado Ground Water Association.
* Lewis, R.L. (1999). Predicting the Steady-State Water Quality of Pit Lakes, in Mining Engineering, Society for Mining, Metallurgy, and Exploration (SME), October 1999. SME reprint number 98-28.
* Lewis, R.L., Isobel R. McGowan, Joseph I. Hershman, and Jochen Tilk (1997). Numerical Simulation of Bulkheads to Reduce Uncontrolled Discharge from an Underground Copper Mine, in Mining Engineering, Magazine of the Society for Mining, Metallurgy, and Exploration (SME), April, 1997, pp. 68-72.
* Schramke, J. A., S. F. Murphy, R. L. Lewis, R. L. Medlock, and M. J. Franko (1997). Natural Attenuation of Ground Water Constituents at a Uranium Mill Tailings Site, Shirley Basin, Wyoming, in Tailings and Mine Waste '97, Balkema Publishing, pp. 499-508.
* Lewis, R.L., Joseph I. Hershman, and Isobel R. McGowan (1996). Numerical Simulation of Low-Flow Bulkheads to Reduce Uncontrolled Discharge from an Underground Copper Mine, in Proceedings of the Second International Conference on Tailings and Mine Waste, 1996, Fort Collins, Colorado, A. A. Balkema Publishing, pp. 331-340.
* Lewis, R.L., Michael D. Gard, Donald H. Koch, and Dennis W. Bower (1994). Simulation of TCE Transport in a Complex Alluvial Aquifer System: A Case Study Comparison of Two Popular Solute Transport Models, in Proceedings of the 1994 Groundwater Modeling Conference, Colorado State University Press, pp. 287-296.
* Lewis, R.L., Donald H. Koch, Isobel R. McGowan, Craig MacPhee, and Dennis W. Bowser (1993). Remedial Well-Field Design Using MODFLOW and RAND3D, DDRW Sharpe Site, Lathrop, California, in Proceedings of the 1993 Federal Environmental Restoration Conference and Exhibition, Hazardous Materials Control Resources Institute, pp. A17-A18.
* Lewis, R. L. (1988). Late Quaternary Faulting in the Northeastern Tahoe Basin and Northern Carson Range, Nevada, in EOS, Transactions of the American Geophysical Union.
* Lewis, R.L. (1988). Geology, Neotectonics, and Geologic Hazards of the Mount Rose 7.5-Minute Quadrangle, Northern Tahoe Basin, Nevada, Nevada Bureau of Mines and Geology Open File Report.

* Lewis, R.L. (1988). Geologic Map of the Mount Rose 7.5-Minute Quadrangle, Northern Tahoe Basin, Nevada, Nevada Bureau of Mines and Geology Open File Map.
* Lewis, R.L. (1988). Geologic Hazards Map of the Mount Rose 7.5-Minute Quadrangle, Northern Tahoe Basin, Nevada, Nevada Bureau of Mines and Geology Open File Map.

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EDUCATION

Chadron State College, Chadron, Nebraska — B.S., May 1995
Bachelor of Science Degree — G.P.A. - 3.41
Secondary Education
Physical Science Field Endorsement (Geology, Chemistry, Physics)

WORK EXPERIENCE	DATES	DUTIES
Geologic Technician Crow Butte Resources, Inc. Crawford, Nebraska 69339	1995 – 1997	Lithologic description of drill hole data, GIS mapping, drill hole staking/survey, geologic database entry.
Staff Geologist Crow Butte Resources, Inc. Crawford, Nebraska 69339	1997 – 2000	Geophysical log correlation, drilling program oversight, assist with resource calculation, review of regulatory documents
Project Geologist Crow Butte Resources, Inc. Crawford, Nebraska 69339	2000 – 2006	Supervision of wellfield installation personnel, geologic mapping and ore zone interpretation, geophysical interpretation, preparation of department regulatory documents.
Senior Geologist Crow Butte Resources, Inc. Crawford, Nebraska 69339	2006 – Present	Department manager, budgeting and planning, wellfield design and layout, geologic interpretation, management of all geologic data, exploration and development drilling, reclamation, regulatory reporting.

CERTIFICATES

Mountain States Employers Council Management Training, October 2000
Leadership Essentials Program, December 2007
Nebraska Well Drilling Contractor License #19286