

William C. Maehl P.E.

President - Senior Principal Mining Engineer

AREAS OF EXPERTISE

- Abandoned Mine Reclamation
- Project Management
- Bid Specification Development
- Land Record Searches
- Accounting and Auditing

EDUCATION

B.S. Mining Engineering/Mine Management (1978), Montana College of Mineral Science and Technology.

Postgraduate studies in operations management at MSU-Billings

PROFESSIONAL HISTORY

Professional Engineer,
Registered in Montana, Wyoming, and Utah

2015 – Present. President
Spectrum Engineering and Environmental LLC,
Billings, MT

1984 – 2015. Vice-President
Spectrum Engineering Inc., Billings, MT

1978 – 1984. Senior Quality Control Engineer
Billings office of IntraSearch

1978. Exploration Engineer
Consolidation Coal Company, Billings, MT

BACKGROUND

Mr. Maehl's career includes a well-balanced combination of engineering and management. He worked his way through college supervising high school students in environmental restoration within the national forest, and provided engineering and geology assistance for the coal exploration industry. After graduation, he began his career with Consolidation Coal Company. His coal experience there included layout and field supervision of coal exploration programs, reserve calculations, coal mine feasibility studies, and ownership mapping.

He moved to IntraSearch Engineering in 1978 where he focused on helping clients with coal exploration, mine economics, and mine permitting for the new mines that were being developed in the Powder River Basin and New Mexico in the late 1970's and 1980's.

Mr. Maehl is one of the principals who formed Spectrum Engineering in 1984 when we acquired IntraSearch Engineering. He assumed the responsibility of managing Spectrum's finances and accounting, and much of the project management functions.

By 1984, many of the coal producing states began their Abandoned Mine Reclamation (AMR) programs using money generated from a tax on coal mandated by SMCRA. Mr. Maehl became project manager of most of Spectrum's AMR programs in Montana, Wyoming, and Utah, and has continued to win engineering contracts annually to engineer and manage the reclamation of over 8,300 sites to date. His projects have won the OSM Abandoned Mine Reclamation Award twice.

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REPRESENTATIVE EXPERIENCE

Abandoned Mine Reclamation and Water Treatment

Since June of 1999, Mr. Maehl has been the project manager for the reclamation effort of the bankrupt Zortman and Landusky gold mines in northeast Montana for the Montana DEQ. His duties include:

- Overseeing the efforts of specialists in the fields of surface and groundwater hydrology, acid rock drainage, reclamation cover modeling, soils and vegetation, and biological remediation.
- Managing Spectrum's Zortman staff of 6 people.
- Interaction and development of a spirit of cooperation between the MT DEQ, BLM, EPA, and the Fort Belknap Tribe.
- Securing equipment (six Cat D400 trucks, a Cat 345 excavator, a Cat 16G grader, a Cat D10 dozer, a Cat D9 dozer, and support equipment) and performing almost \$0.5 million of reclamation work each month from 2000-2004.
- Development of reclamation alternatives with costs.
- Maintaining water quality compliance and overseeing the operation of three water treatment plants treating around 400 million gallons/year.
- Maintaining water quality compliance of eleven heap leach pads and a biological treatment plant treating from 20 million to upwards of 100 million gallons/year.
- Maintaining water compliance of Swift Gulch water treatment plant with treated water flowing onto the Fort Belknap Reservation. Met with the Governor of Montana and Tribal President regarding compliance.
- Coordinating and writing a supplemental environmental impact statement (SEIS) and presenting the alternatives at public scoping meetings.
- Assisted in development of an Engineering Evaluation/Cost Analysis (EE/CA) and PRP search.
- Project Manager for the EPA/Corps Gilt Edge Water Treatment Plant, near Deadwood, SD.

Mr. Maehl has provided every facet of work associated with abandoned mine sites reclamation. The sites have included surface and underground coal mines and coal fires; open pit and underground base metal hardrock mines; surface and underground phosphate, underground uranium, underground chrome, and underground alunite mines. Tasks have included:

- Each project has required a historical records search for old maps and other pertinent data. A literature search of locations and existence for every coal mine in Montana (over 3,000) was also completed. Previously, only 400 were identified.
- Landowner interaction and securing consents.
- Mapping and data collection, field surveys, GPS, and photo documentation.
- Database compilation and engineering design for closure/abatement.
- Ownership information, claim identification and plotting, and deed research.
- Bid specification packages for numerous project areas.
- Construction inspection and construction management.
- Project management including budget tracking and quality control.

AML sites addressed include 8,655 sites in Utah, 254 sites in Wyoming and 100's of sites in Montana.

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REPRESENTATIVE EXPERIENCE (cont.)

Land Records and Title Searches

The abandoned mine reclamation work has required Mr. Maehl to develop an ability to ferret out the legal ownership for all sites going to construction. The need to secure consent from the legal landowners requires this work to be 100% accurate. The following work has been performed in 2 Wyoming counties, 11 Utah counties and 37 counties in Montana:

- Secure and cross-check title plats from the Bureau of Land Management and the U.S. Forest Service against each other and against the county records;
- Track down and secure deeds for all fractional interests in patented mining claims and other private land holdings;
- Cross-check ownership deeds with state and county tax records;
- Plot patented claims and verify against BLM/USFS title plats;
- Secure list of all unpatented mining claims and plot locations;
- Locate landowners name, address, and phone numbers, make contacts and explain program, and secure consents.
- Complete a Potential Responsible Party (PRP) search for a CERCLA site.

Geologic Investigations & Data Bases

- Obtain state and federal coal exploration permits.
- As exploration engineer for Consolidation Coal, managed several coal exploration and property evaluations in the western United States. Tasks included: drilling program layout for selected coal projects; field supervision of drilling operations and core sampling; data interpretation and geologic mapping; prepare reports detailing reserves, coal quality, property control and recommendations; and, run economic analyses.
- Development of complete geologic models for coal properties in Montana and New Mexico including data preparation for thousands of drill and core holes and computer models.
- Review of existing geologic and coal quality databases for the Black Mesa Mine for Southern California Edison.

Management Consulting/Litigation Support

Mr. Maehl has assisted utility customers in cases involving disputes with their long-term coal supply agreements. This work was performed for Detroit Edison, Commonwealth Edison, Northern States Power, Northern Indiana Public Service, and LCRA. He provides technical expertise, economic evaluations, and assistance in discovery. Tasks have included:

- Coal contract cost pass-through analyses for six coal mines including analysis of equipment costs and productivities; inflation index tracking; prepare production of documents request; discovery document review; critique of mine and reclamation plans; and, examination of historical and projected equipment productivities, costs and requirements.
- Evaluation of six proposals from coal mines for a long term utility coal supply agreement. Work included mine permit review; ownership verification; and, detailed economics.

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REPRESENTATIVE EXPERIENCE (cont.)

Mine Design & Mine Economics

- Feasibility study for a twenty-eight million tpy oil shale mine in southern Israel with tasks of subsurface mapping; preliminary mine design; mining equipment selection; volumetrics; economic studies; and, final report presentation in Israel to the Executive Board and Government Officials.
- Economic evaluation of several existing Israeli phosphate mines for Negev Phosphates Ltd., including equipment costs and productivities, and resource evaluation.
- Feasibility study for a proposed six million tpy mine in Israel's Negev Desert with tasks of subsurface mapping; exploration recommendations; volumetrics; preliminary mine design; equipment selection; and, economic studies.
- Feasibility study of a proposed underground gold property in central Idaho.
- Mine design and equipment selection for a 12,000 tpy domestic use lignite mine in Montana.
- Economic evaluation of purchasing a twenty thousand tpy coal mine in eastern Montana.
- Economic feasibility study of a six million tpy lignite mine in eastern Montana.
- Mine plan and economic evaluation of a federal coal lease (six million tpy) in Wyoming.

Permitting

- Montco surface coal mine permit application and project evaluation in Montana. Tasks included overburden chemistry modeling; coal, overburden, survey and geologic data base preparation; preliminary 12 million ton/year mine design and mine permit application; economic feasibility studies; equipment selection; and, all engineering functions.
- La Plata (New Mexico) mine permit application for a surface coal mine. Work included subsurface geologic mapping; economic feasibility studies; and, preliminary one million ton per year mine design and mine permit application.

Environmental & Hazardous Waste

- Determined lime rates and specifications for neutralization of coal slack at various sites throughout Montana. Developed contractor bid documents from these specifications and then managed the construction.
- Written NCP documents including Field Investigation Work Plans, Sampling and Analysis Plan, Community Relations Plan, and Health and Safety Plans.
- Assisted in bid document preparation for the Clark Fork Demonstration Project for the Montana Governor's office.
- Developed two Environmental Assessments (EA) for projects in Montana.
- Developed Supplemental Environmental Impact Statements (EIS) for the Zortman / Landusky hardrock gold mine and the Golden Sunlight hardrock gold mine in Montana.
- Interacted with the cultural resource personnel and the state historical preservation offices in Montana, Wyoming and Utah to ensure that project engineering met their requirements.
- Evaluated the hazardous waste concerns for the Wyoming Sunrise Iron Ore Mine. This including sampling, quantifying, and development of specifications to address the asbestos, lead based paint, volatile and semi-volatile hazardous constituents, RCRA metals, PCB's, and total petroleum hydrocarbons. Work included decommissioning 7 underground fuel tanks, landfarming 3,224 cy of volatile material, disposing of 146 cy of hazardous waste and 1,791 gallons of hazardous liquid, and disposing of 8 drums of paint chips.

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TRAINING AND CONTINUING EDUCATION

- OSHA 29CFR1910.120 40-hour hazardous material handling training (Hazwoper) and yearly 8-hour refresher training.
- OSHA 29CFR1910.120 8-hour supervisor training (Hazwoper).
- 24-hour MSHA training and annual 8-hour refresher training.
- 15-hour mine design, operations and closure conference in 2000, 2001, and 2004 - 2015.
- 8-hour mine water treatment -- technologies, case studies, and costs short course (2015)
- 8-hour estimating costs of reclamation short course (2009)
- 8-hour principles and practices of water management short course (2008)
- 21-hour NEPA/AWN short course by the Shipley Group (2006)
- 8-hour landforms that function like natural systems short course (2006).
- 8-hour conventional and wetland treatment technology short course (2005).
- 8-hour environmental modeling short course (2005).
- 8-hour mine discharge water treatment short course (2004).
- 8-hour caps and covers mine waste short course (2004).
- 8-hour revegetation within a tight budget short course (2001).
- 8-hour ecological restoration of plant-soil systems short course (2001).
- 8-hour reclamation caps/cover design short course (2000).
- 2.5-hour seminar on GCL liner use and application by Roscoe Steel (1999).
- 40-hour acid mine drainage & its management course sponsored by University of MT (1999).
- 8-hour fundamentals of concrete seminar by the Montana Contractor's Association (1998).
- 24-hour GPS fundamentals, theory and practice short course (1998).
- 11-hour lessons in leadership, Rocky Mountain College continuing education (1997).
- 42-hour Dale Carnegie course on management and leadership skills, problem-solving, and people interaction skills (1997).
- 4-hour seminar on erosion and sedimentation control by Roscoe Steel (1996).
- 7-hour AML public presentation short course by WY AML (1995).
- AutoCAD Level I Training (1995).
- 8-hour symposium on precious metals issues in MT sponsored by Montana Tech (1988).
- 12-hour decision economic analysis seminar for the construction industry (1987).
- 8-hour workshop on business writing skills conducted by National Career Workshops (1987).
- 16-hour contract management and administration seminar sponsored by MT DSL (1985).
- 8-hour economic evaluation and investment decision methods by Colorado School of Mines, Frank Stermole (1982).
- 24-hour equipment design, selection, utilization in surface coal mining course by Colorado School of Mines (1979).
- Corporate Ethics Plan, Code of Business Conduct, Training
- Harassment Prevention Training

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AWARDS

- 1998 National Office of Surface Mining Abandoned Mine Land Reclamation Award – Wyoming Sunrise Mining District Reclamation.
- 2012 National Office of Surface Mining Abandoned Mine Reclamation Award - Utah Maclean 3 Coal Fire Small Project Winner.

PUBLICATIONS

“Electro-Biochemical Reactor (EBR) Technology for Treatment of Leach Pad Waters at the Landusky Mine”, Opara, Peoples, Adams, & Maehl. 2014 Mine Design, Operations and Closure Conference, Fairmont, Montana.

“A Free Wind Turbine for Zortman/Landusky - What Could Go Wrong”, McCullough and Maehl. 2014 Mine Design, Operations and Closure Conference, Fairmont, Montana.

“Zortman: Dealing with Extreme Weather Events”, McCullough, Jepson, & Maehl. 2012 Mine Design, Operations and Closure Conference, Fairmont, Montana.

“Maiden Rock Phosphate Mine Complex”, Maehl. 2010 Mine Design, Operations and Closure Conference, Fairmont, Montana.

“Electrical Resistivity Characterization of a Reclaimed Gold Mine to Delineate Acid Rock Drainage Pathways”, Rucker, Glaser, Osborne, & Maehl. 2009 Mine Water Environ Technical Article, On-line Publication.

“Bioremediation at Zortman/Landusky”, Maehl. 2004 Mine Design, Operations and Closure Conference, Polson, Montana.

“Zortman and Landusky with 20/20 Hindsight”, Maehl. 2002 National Association of Abandoned Mine Lands Conference, Park City, Utah.

“Review of the Multiple Accounts Analysis Alternatives Evaluation Process Completed for the Reclamation of the Zortman/Landusky Mine Sites”, Shaw, Robertson, Maehl, Haight and Kuipers. 2001 National Association of Abandoned Mine Lands Conference, Athens, Ohio.

“Material Characterization and Prioritization of Remediation Measures at the Zortman/Landusky Mine Sites”, Shaw, Robertson and Maehl. 2000 Billings Reclamation Symposium.

AFFILIATIONS

National Society of Professional Engineers
Society of Mining Engineers
Tau Beta Pi National Engineering Honor Society