

Consultants help mining firms navigate the maze of compliance and engineering requirements

By Frances Johnson

The Enterprise

Opening a mine involves more than just digging a hole in the ground. Complicated engineering requirements and environmental compliance can require help from the outside. Consulting firms are often retained by mining companies large and small to handle the details associated with their entire operations.

Firms such as [JBR Environmental Consultants](#), headquartered in Sandy with offices in St. George, Boise, Reno and Elko, enter the scene before a mine is even opened, conducting preliminary research known as a baseline study.

"What they have to do is assess the existing ecological condition," said Bob Bayer, president and managing principal of [JBR Environmental](#). "So if there's an impact from the mine, you know what it is. If you don't know what was there before, you can't know the impact."

A baseline study includes a hydrological assessment, determining the location and availability of water, as well as how the mine will affect that water supply; and a biological assessment, including the effect the mine will have on nearby animal habitats. Disturbing the habitats and lifestyles of endangered animals is becoming an increasingly important issue, Bayer said.

Environmental impact assessments are usually guided by the National Environmental Policy Act (NEPA), and compliance is becoming more complicated and more expensive, Bayer said.

"It pretty much drives the environmental work that is done or required when you're working on federal or federally owned land," he said.

Consultants with specific knowledge of laws and guidelines such as NEPA can help mining companies navigate complicated requirements, and can also advise a company when the costs of compliance on a certain piece of land would outweigh the profit the land would produce. Some land comes with more environmental liabilities than are worth taking on, Bayer said, particularly when complicated hydrology is involved.

"The area where I see more and more issues arising, escalating for the foreseeable future, is water management," Bayer said. "All the states are getting much tighter on what they base their water rights on. Managing surface water in this desert environment is tough."

A mining company might own the surface of a piece of land, but any groundwater the firm discovers during excavation and mining might belong to someone else. Problems increase for deep underground mines, such as coal mines, which often run into springs, shallow wells and natural aquifers.

A baseline study would determine the presence of groundwater, and the nature of groundwater rights, before the mine was excavated, Bayer said, and there are many

solutions to water disputes, including slightly changing the mining plan or purchasing water rights from the owning party. The baseline study would also address natural drainage, quality requirements and water management, particularly establishing a plan to keep nearby water out of the mine itself.

"Miners don't have gills," Bayer said. "You don't want water flowing into an open pit."

In addition to the actual mine, there are also processing facilities and systems that need to be planned in advance. Sandy-based CEntry Constructors and Engineers is an engineering, procurement and construction company, or EPC, that helps mining clients plan for everything that happens once the ore or material is out of the ground.

"We offer quite a range of services," said Dean Bybee, vice president of business development for CEntry.

A coal project, for example, needs a coal-handling facility, conveyor system and equipment for crushing and sizing the rock, Bybee said. CEntry engineers conduct what is known as a feasibility study that determines what equipment is needed, how much space that equipment will take up and how much it will cost, among other things.

The feasibility study sometimes reveals the project is more expensive or extensive than a company originally thought, Bybee said, and the project ends there.

"If they do a feasibility study and it looks like financially it makes sense, then they'll go forward," he said.

Permitting for mines and their accompanying facilities is the most important, and often the most challenging, step.

"Any time you're going to impact anything anymore you need a permit," Bayer said. "Separate permits are required for each of these different media, meaning air, water, soil and waste."

[JBR Environmental](#) helps clients design an operational plan that fits the established environmental requirements, including protecting groundwater, limiting emissions and disposing properly of waste. CEntry provides general arrangement drawings, materials balance flowsheets and emissions estimates documents that are submitted by the client during the permitting process. CEntry does no sampling or analyzing of its own, but uses information gathered from other sources in designing the plans and drawings.

Part of the permitting process also includes a plan for what will happen once the mine is closed, including reclamation of the area and the handling of residual chemicals and tailings.

"Closure deals with these parts of mining facilities that are more than just moved rock and soil," Bayer said.

For instance, sodium cyanide is used in a process known as heap leaching to

remove gold and silver from rock. While the mine is open, engineered stacks of ore rest on a lined pad and the sodium cyanide is applied. Even after the mine is closed, Bayer said, a residue of cyanide remains on the pads and mining companies need a plan to contain or dispose of it. The containment of tailings, left over from the milling of metallic ores, is also based on specific engineering.

"All the engineering and science that goes into that has to be planned before," Bayer said.

Some mining companies also request third-party operational compliance audits, he said, to help maintain compliance while the mine is operating.

"We'll help them comply with permits in general, whether they have an action taken against them or whether they're just concerned," he said.

Enlisting the help of a consulting or engineering firm to design the actual process or operation can often make compliance easier, Bybee said.

"Process engineering is where you're actually putting together what the process is," he said.

Process engineering answers questions such as How will the ore be taken? How will it be crushed? How will it be processed? What facilities and equipment will be needed to do all that?

The next step offered by CEntry is known as detailed engineering, and includes detailed engineering drawings of all those elements, including foundations, structural steel designs, piping and equipment layout and drawings of the building, if one is needed to house the equipment. All the drawings are designed by one of CEntry's 110 engineers and designers, and all drawings are dimensional, Bybee said.

Once the process is designed and all the necessary elements are determined, CEntry can also be retained to procure all those elements, particularly the engineered equipment.

"We go out and spec it, we get it quoted and we buy the best one," Bybee said. "A lot of the equipment we buy, we specify the size and go out and have it, in some ways you could say, custom built."

As an EPC firm, CEntry can also provide all the construction services needed to build the necessary structures and install the equipment, including labor, supervisors and safety personnel. There are currently about 150 employees on the construction side of CEntry, though that number fluctuates depending on the work load, Bybee said.

Some companies may only turn to CEntry for one or two of the services, rather than all three. A company might procure its own equipment, for example, or might contract with a different construction firm. CEntry can bid on an entire job or just do part of a job and charge for time and materials, based on the

cost of materials and an agreed-upon mark-up.

"A lot of companies will be just an engineering company or a construction company, but we can do it all," Bybee said. "If you take those initials, EPC, we do any combination of them."

Going to one source for all services often saves money. If a piece of equipment breaks, a company doesn't have to pay one party to figure out what's wrong and another party to actually fix it.

"When you do EPC you take total responsibility," Bybee said.

Having the same firm handling engineering and construction also helps condense the schedule, Bybee said. With two separate firms, construction can't begin until the engineering plans are nearly 100 percent complete. With one company handling both elements, construction can go forward when engineering is only about 60 percent done, Bybee said.

Paying for consulting services also makes more financial sense than paying for in-house experts in any number of specialty areas. A consulting firm can provide experts in hydrology and geochemistry, air quality and botany, Bayer said. In the end, it is usually cheaper to contract with such specialists than to keep them on staff.

Engineering and science professionals are also increasingly difficult to come by, Bayer said.

"We see that in hiring and so do the mines," he said.

The demand for engineering and science professionals, however, is heating up as increased mining activity is bringing more and more business to related consultants. Mining and natural resources currently account for 35 to 40 percent of [JBR's](#) total revenue.

"There's just so much demand, and mineral deposits are tough to find and more expensive to mine as they get deeper," Bayer said. "This is the first time that we're seeing the price of all these commodities at high levels, very often record levels."

Demand from developing countries, such as China and India, is driving growth, Bayer said, and increased interest in different types of mines, particularly lime and limestone mines, is also bringing more business to the table.

Business is also booming with oil refineries, natural gas and power generation companies, which account for some of CEntry's client base. And business shows no signs of letting up.

"It seems like they're all busy right now," Bybee said. "Five years ago things were kind of slow. It was hard to find work. It probably started three years ago that things started getting busy. The past two years have been really busy and that's projected to continue for the next couple of years."