Gold Mining with Cyanide

REPORT ON I-147

Repeal of the Ban on Cyanide Heap Leaching in Gold Mining

WHAT IS CYANIDE AND WHAT DOES IT DO IN THE ENVIRONMENT

Cyanide is a general term, referring to various specific cyanide compounds. Cyanide (CN) itself is a simple, organic anion (negatively charged ion) consisting of carbon and nitrogen. Despite often-heard references to “pure cyanide,” it actually exists only as an anion, so is only a component of other compounds.

Even though cyanide is a poison, trace amounts of cyanide compounds occur naturally in our bodies and in many foods. Even over a lifetime of exposure, trace amounts pose no threat to human health. Cyanide does not build up in the body. The liver removes it. As one might expect, cyanide compounds are used in certain herbicides. But some common drugs—including the pain reliever ibuprofen and the anti-inflammatory agent naproxen—also contain cyanide compounds, or are derived directly from them.

Today, U.S. chemical manufacturing industries consume more than 10 times the amount of cyanide compounds than are used in domestic gold mining to manufacture products like nylon and other polyamides, acrylics and certain plastics. Cyanide compounds are also used to harden steel and to electroplate copper and precious metals.

Cyanide heap leach solutions are very alkaline because at a ph of 8 or below CN vaporizes into the air. In the air, the poison is quickly dispersed and would only be dangerous in a very small area close to the vaporizing solution. Therefore if these solutions do escape into surface water, they will be diluted by the lower ph surface water and soon dissipate into the air, becoming harmless.

Other natural elements including sunlight also degrade cyanide into harmless compounds:

> “Various species of bacteria, fungi, algae, yeasts and plants, along with their associated enzymes and amino acids, are known to oxidize cyanide naturally.”[i]

HOW DOES CYANIDE LEACHING WORK

A weak solution containing a quantity of sodium cyanide (0.015 percent average) is percolated over crushed ore to dissolve the gold. The leach solutions are carefully buffered with an alkali (usually lime) to prevent the possible generation of hazardous hydrogen cyanide gas. The gold bearing solution is collected and the gold removed. The leaching solution is then reused. The whole process takes place on top of an impermeable, double or triple layered liner to collect all of the valuable gold and prevent the escape of dangerous CN.

POLITICAL HISTORY OF CYANIDE LEACHING

In 1996, environmental groups headed by MEIC from Missoula launched an attack on mining through the initiative process. Miners defended their industry and I-122 was defeated. A great deal of out of state money was spent on this campaign by both sides. There was another ballot issue that year: I-125, sponsored by MontPIRG which is a Nader group that percolated up from the Univerity of Montana campus at Missoula. I-125 prevented businesses spending ANY money to defend themselves against ballot issues. In the heated battle over I-122, this seemingly innocuous ballot issue was overlooked by business and the public. I-125 did not put any limitations on spending by non-profit groups on Montana ballot issues. I-125 passed in 1996.

After the passage of the business spending ban, I-125, MEIC decided that they had a good chance to pass an anti-mining bill in the next election because the miners could not fight back. They said as much on their website. This time they sensationalized the issue by concentrating on cyanide. Just two weeks before the election the Montana Supreme Court ruled that the ban on business spending in ballot issue elections was unconstitutional but it was too late for the miners to mount an effective defense. I-137 passed in 1998.

No other state in America bans the use of cyanide in mining.

BENEFITS

Mining in Montana has rapidly declined in recent years due to the regulatory climate in the state. Since cyanide leaching is the only economic means of recovering many of Montana's most important gold and silver deposits, repealing the cyanide ban will go a long way towards improving that climate thus helping to diversify our economy.

Canyon Resources lists the economic losses to Montana from the passage of the cyanide ban just related for their projects alone.

> *"The imposition of I-137, with its total ban on the use of the only economically viable technology to recover gold and silver from the*

McDonald and Seven-Up Pete deposits, has deprived the citizens of Montana, local communities and their workers, and the State of Montana of the following otherwise available assets:

a. Royalty payments of more than $89 million ($6,357,142 annually for 14 years) to the State School Trust System, primarily designated for Montana Tech

b. Long-term jobs at wages approximately twice the current average income in Montana

c. Severance and local taxes of at least $56 million

d. More than $1 billion (average of $75 million/year) in purchases of goods and services during operations

e. More than $40 million in site construction work at startup"[ii]

With the lifting of the ban Canyon and other companies would resume exploration in Montana and new projects as well as old ones that have been put on hold will strengthen our economy with royalties, taxes, jobs and sales for related businesses. The $ 89 million royalty from the Seven Up Pete project alone spread over 14 years will amount to 10% of the total current yearly income for Montana schools from state trust lands

DRAWBACKS

There are no drawbacks - only risks that can be managed. Like bleach and gasoline, Cyanide (CN) is a deadly poison when a toxic amount is present in the blood of mammals and fish. Therefore extra care must be taken in the handling and containment of cyanide solutions. I-147 mandates a high level of environmental protection.

Since cyanide degrades into non-toxic substances fairly easily and is quickly dispersed and diluted in the natural environment the damage from escaped cyanide though it can be significant is thankfully short term. Humans who ingest a non-fatal dose of cyanide quickly recover and there is no evidence of long-term consequences or buildup of cyanide in the body. There has never been a human fatality in Montana caused by cyanide used in mining.

There have been fish kills due to accidental releases of cyanide from mining. Most of these incidents have been minor and none of them have long lasting effects. Our research found no major fish kills in Montana. The fish stocks are repopulated from unaffected downstream fisheries. The mining industry and the agencies that regulate them have learned from these incidents and are better equipped to prevent them.

PRECAUTIONS

The steps required by I 147 to ensure the safe containment of cyanide in mining include but are not limited to:

- All ponds and impoundments must be large enough to contain 100 year flood event in addition to normal processing fluids
- And they must have a double liner and a system for detecting leaks.
- There must be a contingency system if a leak does occur
- All vats, tanks and containers for cyanide solutions must have a standby containment system 25% larger than the main system
- There must be a monitoring program
- The state may impose additional requirements

ENVIRONMENTALISTS ALLEGATIONS ABOUT CYANIDE LEACHING

Clark Fork Coalition

."However, in underground water, cyanide may persist for a long time"

True, but in most likely in a compound that has "little health risk because the cyanide almost always complexes with iron which renders it harmless (i.e. iron cyanide is an anti-caking ingredient in table salt that we use daily)".[iii]

"that between 1992 and 1998, In Montana, for example, the Dept. of Environmental Quality reports there were 62 spills or leaks of cyanide, some of which killed fish and wildlife."

FALSE. "Most if not all were within the containament areas at their respective mines and had no release to the area surrounding the mine."[iv]

."A double-liner also hasn't prevented a single leach facility from leaking cyanide solution and other pollutants into groundwater."

FALSE. "I am unaware of any cyanide leaks to the groundwater through a properly constructed double (or single) liner system."[v]

Montana Environmental Information Center

Canyon claims it has an approved plan to reclaim the Kendall mine and wants to begin work. MEIC claims Canyon does not have an approved plan and pressured DEQ to stop them from reclamation while at the same time criticizing Canyon for not reclaiming the mine. DOES CANYON HAVE AN APPROVED PLAN OR NOT?

"Before a mine can start operations it is required to have an **approved** operating and reclamation plan. The bond is calculated on that plan. . It has been a common practice in recent years of the DEQ to ignore the reclamation plan upon closure…" and insist on a new plan "more focused on restoration than reclamation and consequently the bond will rarely cover the cost."[vi] In short DEQ changes the rules after the game is over.

MEIC and others always point to problems at other Montana mines to convince citizens to vote against cyanide/mining. WHAT IS THE REAL STORY AT THE BEAL, KENDALL, ZORTMAN, GOLDEN SUNLIGHT MINES?

The problems at Beal, Kendall, Zortman/Landusky are not cyanide related but have to do with naturally occurring minerals in the county rock. At Beal the source of the mineral, Selenium is not known and may not be related to mining at all. The same may be true at Kendall. Zortman is an Acid Rock Drainage (ARD) problem. Since the Zortman closure, "significant advancements in ARD prediction have been developed. Ore is routinely tested for ARD potential to allow for preventative planning…. The problem at Golden Sunlight was with an approved plan that was incorrectly applied. The second pond utilized a liner system to prevent that from happening in the future. In all cases, the companies were operating under approved plans that had some unexpected results. None of the problems are impossible to fix and none were caused by cyanide or the technology associated with it."[vii]

Other Questions about Cyanide

Can we construct a leak-proof, puncture proof liner that will contain cyanide (and other pollutants)?

> "The technology today has advanced so far that the rare pad leaks of 10 years ago would be extremely unlikely. In fact, the technology is also successfully used in municipal garbage dumps…"[viii]

Can we construct containment ponds large enough to contain 50 year runoff and flood events? 100 year?

> 'A pond designed to contain the amount that would fall on the tailings pond or heap is no significant task; nor is the cost."[ix] In fact this is a requirement of I-147

Will there be stream monitoring with I 147?

> ." Not only stream but spring and ground-water monitoring as well."[x]

Do we know enough about neutralizing the leach water to be able to clean it all up after mine shutdown?

> "Yes without any problems"[xi]

Aren't there other methods that can be used besides cyanide?

> "Yes. However each method is only applicable to specific ores and conditions. Coarse gold ores do not leach in a reasonable period of time. Recoveries will be low. The other leach methods are very expensive, have lower recovery rates, are bioaccumulating (deadly to man and animals over time), and have much higher environmental risk. Cyanide is easily managed and has been used for nearly 100 years in the mining sector without incident although one suspect case has been reported in CO."[xii]

Was I-137 about cyanide?

> " No. Cyanide was a scare tactic used to stop open-pit mining. Similar laws passed elsewhere, including countries like Turkey, have since repealed them because of their harm to the economies."[xiii]

SUMMARY

Cyanide occurs naturally in the environment, in our food and in our bodies. It is harmless unless we get a toxic dose all at once. It cannot accumulate or build up in a system until it reaches a toxic level. Large quantities of cyanide compounds are used safely every day to make common products for our use.. Cyanide in the environment is diluted and degraded into harmless substances by natural processes.

There are huge economic benefits for Montana that come with a healthy, productive mining industry. In order to realize these benefits, we must allow cyanide leaching because it is the only economical way many of our most important mineral deposits can be recovered.

The dangers inherent in the use of cyanide are real. But they are dealt with safely by industry every day all over the world. I-147 includes new statutory safeguards. It also includes the provision that the state can require additional controls if the need arises.

The environmental conflict industry does not want mining in Montana. They are willing to use scare tactics and manipulate the truth in order to get what they want. The 1998 ballot initiative was not a true indication of the will of the people of Montana because the whole truth about cyanide leaching in gold and silver mining was kept from them.

What we need is an informed, careful, thoughtful decision by the voters that balances the risks with the benefits.

List of Sources Used

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[i] **CYANIDE REMEDIATION: CURRENT AND PAST TECHNOLOGIES,** *C.A. Young§ and T.S. Jordan, Department of Metallurgical Engineering, Montana Tech, Butte, MT 59701* Presented at the 10th Annual Conference on Hazardous Waste Research http://www.engg.ksu.edu/HSRC/95Proceed/young.pdf

[ii] http://www.canyonresources.com/press/18aug00.html

[iii] Personal correspondence with Robin McCulloch, Associate Research Mining Engineer with Montana Bureau of Mines and Geology and Dr. Courtney Young, chairman of the Metallurgy Dept. at Montana Tech.

[iv] McCuilloch and Young

[v] McCulloch and Young

[vi] McCulloch and Young

[vii] McCulloch and Young

[viii] McCulloch and Young

[ix] McCulloch and Young

[x] McCulloch and Young

[xi] McCulloch and Young

[xii] McCulloch and Young

[xiii] McCulloch and Young