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NEWS RELEASE

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UMass Lowell Institute Provides Technical Assistance to Eliminate Cyanide with Novel, Safer Industrial Process

LOWELL – A Woburn-based company has demonstrated the feasibility of replacing cyanide – a highly toxic chemical – with safer iodine-based compounds with the assistance of the Toxics Use Reduction Institute (TURI) Laboratory. Cyanide is used widely in industrial etching applications and is a mainstay of the gold mining industry.

TURI's Surface Solutions Laboratory (SSL) provided an assessment of Union Etchants International's **GoldEX Kit™**, a one-of-a-kind test kit demonstrating the iodine technology for etching and gold extraction applications. In manufacturing, etching is a process in which an image is chemically incised onto a surface, usually a metal plate.

"More than 80% of the world's approx. 1.5 million tons of hydrogen cyanide (HCN) is produced annually for a full range of industrial uses like surface finishing. Almost all of the other HCN is chemically converted for use in the extraction of precious metals, including gold. GoldEX shows that we might also be able to replace cyanide in these mining applications in the not-too-distant future," reports Carole LeBlanc, SSL director.

The environmental and health hazards of cyanide are well known. Exposure to high levels of cyanide causes brain and heart damage, and may lead to coma and death. Exposure to lower levels may result in breathing difficulties, heart pains, vomiting, blood changes, headaches, and enlargement of the thyroid gland. Cyanide has been found in at least 471 of the 1,647 National Priorities List sites identified by the U. S. Environmental Protection Agency (EPA). At high concentrations, cyanide is also toxic to soil micro-organisms and, since these microorganisms can no longer convert cyanide into other

chemical forms, the cyanide can pass through soil and into underground water reserves, according to the U.S. Agency for Toxic Substances and Disease Registry.

"It remains to be seen how many occupational illnesses associated with exposure to this chemical can be avoided by eliminating its use in the U.S. alone. How many other lives could be saved in the mining industry worldwide?" says LeBlanc. In contrast, iodine is an essential micronutrient for human health.

The Technical Challenges and the Role of the Toxics Use Reduction Institute

Nevertheless, cyanide-containing compounds offer an effective, readily available and inexpensive method to perform these kinds of industrial practices. One of the challenges facing Union Etchants International (UEI) was to determine how much of an impact their patent-pending process would have on other upstream processes, that is, the use of more traditional etching-related chemicals. "Because of our customer base, we knew what was being used in the industry," says UEI's Robert Union, President and CEO. "We felt that if we got the technology into the hands of the end-users, we could convince people to give it a try; that they didn't have to give up performance to do the job safer."

And that's where TURI's Lab came in. SSL first provided the technical expertise to select and validate the cleaning performance of the process' pre-treatment phase. This was important, since etching results can be negatively impacted by the presence of surface contaminants such as fingerprints, light oils and greases, and dust. Next, LeBlanc worked with the company to develop the kit's directions. "Obviously, the hazards associated with cyanide are not new," says LeBlanc. "What *is* new are companies like UEI's willingness and ability to respond with environmentally-friendlier processes to meet increasing demands for greener products."

Finally, the test kit was piloted by SSL Manager, Jason Marshall. "Similar to microscale chemistry, the ability to miniaturize an industrial process is extremely useful because it provides manufacturers with the information they need, without generating a lot of waste," reports Marshall.

For the Future

UMass Lowell professor and author of the book, *Materials Matter: Toward a Sustainable Materials Policy* (MIT 2001), Dr. Kenneth Geiser says, "The mining of

precious metals throughout the globe and, in particular, in developing nations is extremely hazardous. It would be a tremendous accomplishment to reduce the occupational risks associated with the mining industry. Furthermore, the ability to re-use gold that would otherwise be lost to various waste streams would reduce the depletion of already strained natural resources." Plans are accordingly underway to explore the invention's ability to reclaim the gold found in electronic waste streams.

For more information about UMass Lowell Toxics Use Reduction Institute's Surface Solutions Laboratory, visit: www.turi.org or call Carole LeBlanc at 978-934-3249. For more information about etching products and related cyanide-free processes, visit: www.unionetchants.com or call Robert Union at 781-935-8878.

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