



The CODE

The Newsletter of
the International Cyanide
Management Institute
www.cyanidecode.org

Spring 2007 Edition

What's Inside

Code Background

G8 Affirms Support for International Cyanide Management Code

Signatories and Certifications

World Map of Code Signatory Operations

Designated For Certification

ICMI Board of Directors and Officers

ICMI Activities

- Training Sessions
- Code Documents
- Translations

Code Auditors - Approved Code Auditors

Code Questions

Welcome to the inaugural issue of the International Cyanide Management Institute Newsletter. Much progress has been made since the first group of signatories to the International Cyanide Management Code (the Code) was announced in November 2005, and we thought it appropriate to take stock of where we started, summarize where we are, and reflect on where we are going. We will be putting newsletters out periodically to keep the Code's stakeholders informed about the status of the program.

Code Background

The Code is a voluntary industry program designed to assist the global gold mining industry in improving its management of cyanide. The Code is intended to reduce the potential exposure of workers and communities to harmful concentrations of cyanide, to limit releases of cyanide to the environment, and to enhance response actions in the event of an exposure or release. The Code was developed under the auspices of the United Nations Environment Programme (UNEP) and the former International Council on Metals & the Environment (ICME). A multi-stakeholder Steering Committee, comprised of representatives of gold mining companies, cyanide producers, governments, NGOs, and financial institutions, solicited input from a wide range of interest groups during a thirteen-month period in 2001-2002. With the consensus of all its diverse perspectives, the Steering Committee produced a set of best-management practice documents addressing the production, transport, use and disposal of cyanide as well as procedures for the management and administration of a compliance verification and certification program. This project represents the first time that such a multi-stakeholder group had worked cooperatively to generate an international, globally based voluntary program for improvement of an industry activity.

The International Cyanide Management Institute (ICMI) was established in 2003 to administer the Code. ICMI is a non-profit corporation with a multi-stakeholder Board of Directors. ICMI's prime responsibilities are to:

1. encourage companies to adopt the Code and bring their operations into compliance with its Principles and Standards of Practice;
2. promote the Code within the gold mining industry and with other stakeholders to foster widespread support of the Code;
3. evaluate the Code's implementation;
4. manage the certification process;
5. make information on the safe management practices for cyanide widely available; and
6. periodically review the Code and revise it as necessary to improve implementation and incorporate new advances in cyanide management.

Transparency and third-party validation are the hallmarks of the Code. Operations are evaluated for compliance with the Code through triennial on-site evaluations conducted by independent certified auditors meeting criteria for expertise, experience and conflict of interest established by ICMI and using ICMI's Verification Protocol. Summaries of the audit findings, the credentials of the auditors conducting the evaluation, and, where necessary, a Corrective Action Plan to bring the operation from substantial to full compliance, are posted in the ICMI web site, www.cyanidecode.org, for public review.

G8 Affirms Support for International Cyanide Management Code

The Code was recently recognized by the Group of Eight (G8) as one of several certification systems that are suitable instruments for “increasing transparency and good governance in the extraction and processing of mineral raw materials.”

In Article 85 of its Summit Declaration *Growth and Responsibility in the World Economy*, dated June 7, 2007 the G8 stated that:

“Certification systems can be a suitable instrument in appropriate cases for increasing transparency and good governance in the extraction and processing of mineral raw materials and to reduce environmental impacts, support the compliance with minimum social standards and resolutely counter illegal resource extraction. Therefore, we reaffirm our support for existing initiatives such as the Kimberley Process, Green Lead, the Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development, the International Council on Mining and Metals or the International Cyanide Management Code, and encourage the adaptation of the respective principles of corporate social responsibility by those involved in the extraction and processing of mineral resources,”

ICMI appreciates the G8’s recognition of the value of the Code, and of the benefits it can bring to the minerals industry.

The G8 is an international forum for the governments of Canada, France, Germany, Italy, Japan, Russia, the United Kingdom and the United States. The declaration was issued during the 6-8 June annual G8 Summit in Heiligendamm, Germany. The full declaration can be obtained by clicking *Growth and Responsibility in the World Economy* at: <http://www.g-8.de/Webs/G8/EN/G8Summit/SummitDocuments/summit-documents.html>

Signatories and Certifications

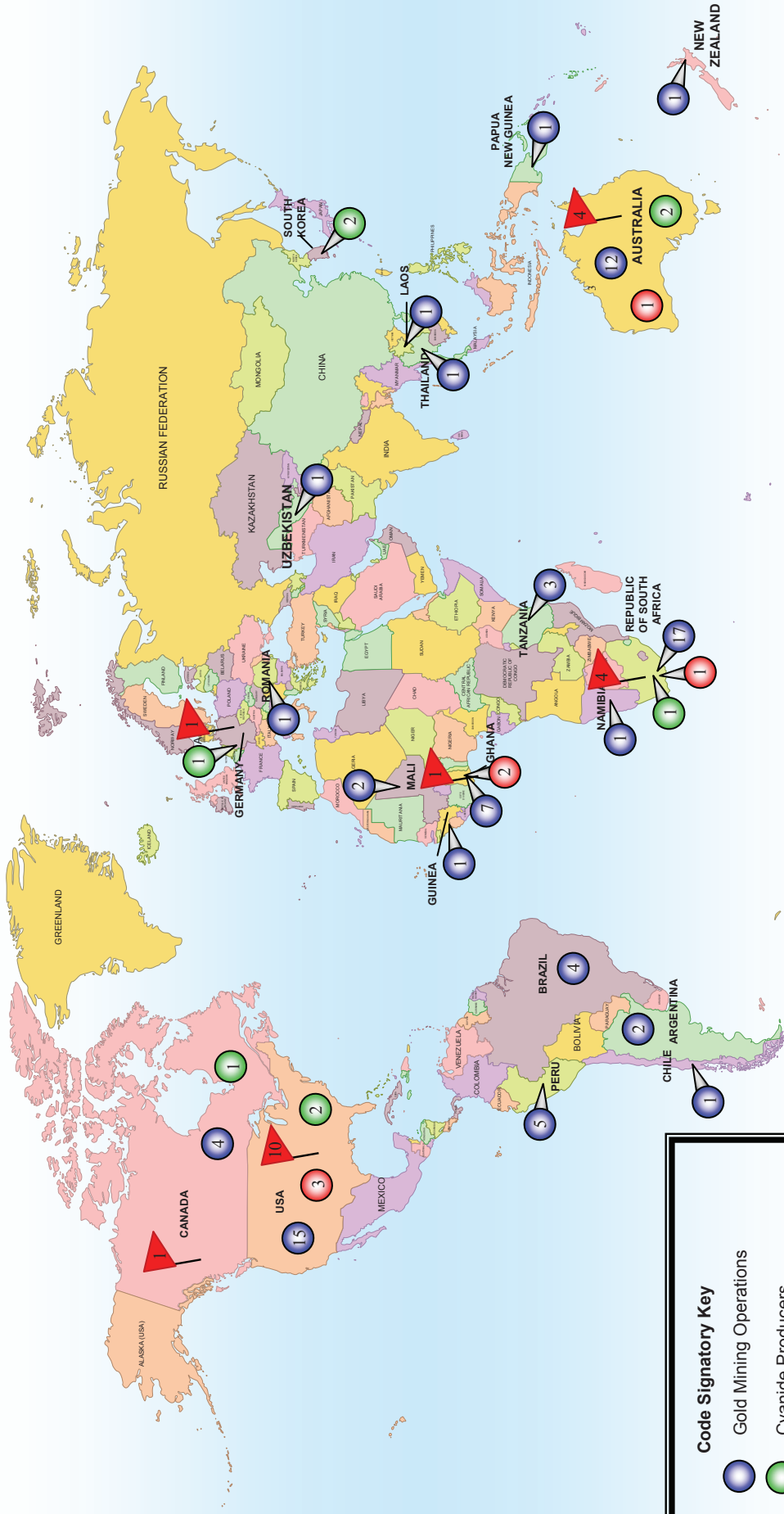
November 3, 2005 marked a turning point for the Code when 9 gold mining companies and 6 cyanide producers and transporters committed to implement the Code by becoming the first Code signatories. At the time, these 15 companies represented 83 individual facilities where the Code would be implemented and audits conducted to verify their compliance.

Over the next nineteen months, an additional 7 gold mining companies, 3 cyanide producers and 5 cyanide transporters signed the Code. During this time, mergers in the gold mining industry reduced the number of signatories and the number of operations slated for certification. As of June 15, 2007, the Code’s 28 signatory companies represent 96 individual facilities.

Barrick Gold’s Cowal Mine in Australia became the first gold mine certified as in compliance with the Code on April 10, 2006. This facility was still under construction at that time, and was certified conditionally based on its proposed design and operating practices. Pursuant to the Code’s provisions, this operation recently underwent a full, on-the-ground audit which determined that the commitments to safe management of cyanide made during its design have been implemented in the field, and Cowal is now fully certified. Newmont Mining Company’s Ahafo Mine in Ghana was also certified conditionally during its construction phase, and is subject to a similar confirmatory audit. The Glamis Marigold Mine in Nevada became the first operating mine to be certified as in compliance with the Code. Also in Nevada, Newmont Gold Corporation’s Lone Tree and Twin Creeks Mines, Barrick’s Goldstrike Mine, and the Barrick/Kinross joint venture Round Mountain Mine have been fully certified. AngloGold Ashanti Ltd’s Sunrise Dam Gold Mine in Western Australia, and its West Gold Plant - Vaal River and Kopanang Gold Plant Vaal River South in South Africa have been conditionally certified.

The following seven production cyanide facilities have also been certified: CyPlus’s Wesseling Plant in Germany and Cadillac Transloading facility in Canada; DuPont’s Memphis Plant and Carlin Transloading facility in the United States; Cyanco’s Winnemucca, Nevada plant in the United States; Orica’s Yarwum Plant in Australia, and Sasol Polymer’s Midland Plant in South Africa. Additionally, four cyanide transporters have also been certified under the Code, Transwood and Sentinel in the United States, AGR’s Western Australian transport operations, and Sasol Infrachem’s South African transport operations.

Code Signatory Operations Designated For Certification



As of July 1, 2007

ICMI Board of Directors and Officers

ICMI is governed by a multi-stakeholder Board of Directors. While the Directors have been selected to provide diverse perspectives on the use of cyanide in gold mining, they do not represent particular interest groups or constituencies. ICMI by-laws allow for up to nine Directors, and seven of these positions are currently filled.

In November 2005, when the first companies signed the Code, the ICMI Board consisted of 6 members: Fritz Balkau; Harold Barnes; Paul Bateman; Julio Bonelli; Basie Maree; and Michael Rae. Since that time, two new members, Joyce Aryee and Niclas Svenningsen, have been elected to the Board, and Mr. Barnes has resigned. Mr. Barnes, formerly with Homestake Mining and Barrick Gold, had served as the Chairman of the Steering Committee that developed the Code, and we are indebted to his vision and determination for the completion of the Code as a consensus best practice program for responsible cyanide management. Mr. Barnes also was a founding director and the first President of ICMI.

Joyce Aryee is the Chief Executive Officer of the Ghana Chamber of Mines. Ms. Aryee is a former Minister of State in Ghana, and has spent over 30 years of public life dealing with a wide range of issues including the environment, education and communications. Ms. Aryee was involved in Ghana's democratization process as a non-cabinet minister at the National Commission for Democracy, and for almost nine years, she was variously the Minister of Information, Education and Local Government. Ms. Aryee led several Government delegations to International Conferences including the Conference of Non-Aligned Ministers of Education and the UNESCO. In her career as a public relations executive, Ms. Aryee worked with Ghana's two main environmental and standard regulatory bodies in the late 1980s and participated in international conferences on behalf of these bodies.

Fritz Balkau has spent his professional career in environmental management, working in a range of government and intergovernmental organizations as well as contributing to NGO initiatives in environmental education and conservation. Between 1989 and 2005, he worked for the United Nations Environment Programme (UNEP) as Head of the Production and Consumption Branch, leading programmes to reduce environmental impact of industrial production and adoption of more sustainable consumption practices in industry and the community. Dr. Balkau was responsible for convening the UNEP workshop following the Baia Mare spill that led to the formation of the Steering Committee and ultimate development of the Cyanide Code. Now retired from the UN, he continues his involvement in international work in environmental policy and procedures concerned with pollution prevention approaches for government and industry.



Julio Bonelli holds a gold bar while Fritz Balkau discusses the refining process with site personnel at a mine in South Africa.

Paul Bateman is the Chairman of the Board of Directors of the International Cyanide Management Institute and the organization's chief executive. He also is the President of Klein & Saks Group, a Washington, DC-based public affairs firm which advises companies, industry organizations and coalitions on the political, regulatory and public policy environment. As the then - President of the Gold Institute, a North American industry group, he was a participant in the first discussions in Paris about the development of a code of practice for cyanide at mining operations. Mr. Bateman subsequently galvanized the industry's involvement in the Code's development and raised the funds needed to support the multi-stakeholder process. He chaired the Industry Advisory Group that provided technical input and industry perspective to the Code's drafters. Mr. Bateman was founding director of ICMI, and became its Chairman and President in January 2005.

Julio Bonelli is an environmental and metallurgical consultant to the Peruvian mining industry, and teaches undergraduate and graduate courses at two universities in Lima. He recently left the Peruvian Ministry of Energy and Mines, where he served as a technical advisor for environmental matters from 1994 to 1996 and as the Director General for Environmental Affairs from 2000 to 2006. Previously, Mr. Bonelli conducted metallurgical research for Centromin Peru and served as its Director of Research from 1984 to 1992. He was a member of the Steering Committee that developed the Code. Mr. Bonelli graduated from the Universidad Nacional de Ingenieria in Lima, Peru in 1973 and obtained a M.Sc. degree in Metallurgical Engineering at Colorado School of Mines in 1976.

DCS (Basie) Maree is the Head of Metallurgy for all of the African operations of AngloGold Ashanti, Ltd, the largest gold producer in South Africa. He has been with AngloAshanti and its predecessor companies since 1977 in various metallurgical and management positions. Mr. Maree serves on the Boards of the Nuclear Fuels Corp of South Africa and the Morila Gold Mine in Mali. He received a National Diploma for Technicians in Extraction Metallurgy from the University of Technology in Johannesburg in 1980 and a Baccalaureus Technologia in Environmental Management from the University of Technology, Tswane in 2001. Mr. Maree served on the South African Chamber of Mines Cyanide Task Team in 2001 developing a Code of Practice for the South African gold industry, and was a member of the Steering Committee that developed the International Cyanide Management Code.

Michael Rae is the Chief Executive Officer of the Council for Responsible Jewellery Practices (CRJP), which seeks to promote responsible ethical, social and environmental practices throughout the diamond and gold jewellery supply chain, from mine to retail. Prior to taking this position in February, 2006, he worked for almost 17 years with WWF (formerly known as the World Wildlife Fund), leading WWF's international work on mining. Mr. Rae led the WWF Mining Certification Evaluation Project and has been a member of several global mining and minerals initiatives, including the IUCN Working Group on Extractive Industry and Biodiversity, the IUCN/International Council on Mining and Metals Advisory Group and the Working Group for the GRI Mining and Metals Sector Supplement. Mr. Rae served on the Cyanide Code Steering Committee.

Niclas Svenningsen is the programme officer for industry and urban development in the United Nations Environment Programme (UNEP) in the Division Office for Technology, Industry and Economics (DTIE) in Paris, France. In this capacity he is in charge of several of UNEP's programmes and projects on industrial development, including mining, sustainable consumption and production, energy efficiency, transport, environmental urgencies, and triple bottom line development strategies. Mr. Svenningsen holds a M.Sc in Civil Engineering from Lund Institute of Technology, a M.Sc in Petroleum Exploration from Chalmers Technological University, and a Diploma in Environmental Law from University of Uppsala. He has previously worked as principal technical officer at the Swedish Environmental Protection Agency, and has also been engaged both as a journalist and independent consultant in Asia.

Norm Greenwald is the Vice President and Secretary of ICMI. He was Code Manager during development of the International Cyanide Management Code, and was the primary author of the Code and its various supporting documents. He started his career in the mining industry nearly 30 years ago at Magma Copper Company and was Assistant Director of Environmental Affairs for Newmont Mining Corporation until 1987. As President of Norm Greenwald Associates, an environmental consulting firm in Tucson, Arizona, Mr. Greenwald has conducted environmental audits and prepared environmental management plans for dozens of precious and base metals mines and processing facilities in the United States and overseas. Mr. Greenwald received a Master of Science degree in soil and water chemistry from the University of Arizona in 1977.

ICMI Activities

ICMI has been extremely busy during the past 19 months promoting the Code to prospective signatories and managing the signatory and certification processes. Some of the other activities ICMI has been involved in are noted below.

Training Sessions

ICMI has conducted two training sessions in the implementation and auditing of the Code since late 2005. The first, on October 18-20, 2005, was conducted via the Internet, and reached 68 stakeholders around the world, representing the gold mining industry, cyanide producers, potential auditors, and academics. The second training session was a full-day presentation in Perth, Australia in May 2006, attended by more than 50 people. Both sessions were conducted by ICMI Vice President, Norm Greenwald.

ICMI is in the planning stages for its next two training sessions, to be held in Accra, Ghana and Lima, Peru in the third and fourth quarters of 2007. The session in Lima will be in English with simultaneous translation into Spanish. Specific information on the dates, locations and cost will be provided on the ICMI web site several months in advance of the each session.

ICMI is also taking part in a Sodium Cyanide Conference to be held in conjunction with the Annual HCN Industry Safety Conference in Albuquerque, New Mexico on July 17, 2007. This one-day conference will include actual case studies and examples of Code implementation and auditing, and as such, it will provide the first public forum for operations and auditors who have gone through the certification process to discuss their experiences. Contact Lesli Smith at Lesli.Smith@riotinto.com for additional information on this conference.

ICMI will be conducting a short course on "Preparing for a Successful Cyanide Code Audit" on October 3 in conjunction with the Society for Mining, Metallurgy and Exploration's (SME) "Precious Metals Processing 2007" conference in Tucson, Arizona. In this half-day session, Norm Greenwald will address the Code audit process, and discuss compliance with the Code's provisions on issues such as wildlife protection, ground water quality, spill prevention and containment, quality assurance/quality control, and public involvement/stakeholder dialogue. The mine's responsibilities with respect to cyanide production and transport will also be addressed. Contact Tara Davis at davis@smenet.org for additional information.

Code Documents

One of ICMI's primary responsibilities is the development and dissemination of the necessary procedures for the Code's administration, implementation and auditing. These documents are posted on the ICMI web site. While most of these documents have remained unchanged, several have been revised. The following table, arranged under the headings used on the web site, identifies each document, the date of its initial posting, any subsequent postings of revised documents, and the nature of the revision. All these documents and revisions have been approved by the ICMI Board of Directors prior to their public dissemination.

Code Documents and Revisions

Document	Date of Initial Posting	Date of Revision	Nature of Revision
About The Code			
The Code	7/05	9/06	Clarification of effective dates for triennial verification audits
Definitions and Acronyms	7/05	-	
Dispute Resolution Process	11/05	-	
Code Review and Revision	7/05	-	
Cyanide Facts			
Cyanide Chemistry	7/05	-	
Use in Mining	7/05	-	
Environmental & Health Effects	7/05	-	
Sampling and Analysis	7/05	-	
Cyanide References	7/05	-	
Become a Signatory			
Signatory Application Form	7/05	12/06	Added incident notification provision
Implementation Guidance	7/05	11/05	Revised recommended worker exposure limit
Code Logo Policy	9/06	-	
Auditors and Auditing - Becoming An Auditor			
Auditor Criteria	7/05	1/07	Added additional acceptable lead auditor certifying organizations
Auditor Credentials Form	7/05	-	
Auditors and Auditing - Auditing The Code			
Verification Protocols:			
Gold Mining	7/05	11/05	Revised recommended worker exposure limit, and corrected cross-references
Gold Mining Pre-Operational	7/05	11/05	Revised recommended worker exposure limit and corrected cross-references
		1/07	Corrected cross-reference
Cyanide Production	7/05	-	
Cyanide Transport	7/05	-	
Guidance Documents:			
Gold Mining	5/06	9/06	Allowed substantial compliance finding during non-certification audits
Cyanide Transport	9/06	-	
Summary Audit Report Forms:			
Gold Mining	7/05	-	
Cyanide Production	7/05	-	
Cyanide Transport	7/05	-	
Corrective Action Plan	7/05	9/06	Clarification of effective dates for triennial verification audits
		4/07	Establish consistent 30-day deadline for reporting the completion of a Corrective Action Plan
Who Is ICMI?			
ICMI By-Laws	7/05	12/05	Increased Board from 7 to 9 members

Translations

Due to administrative considerations, ICMI conducts all official business in English. However, ICMI recognizes that for effective implementation and auditing around the world, the Code and its supporting documents should be available in a variety of languages. To that end, the Code and 14 principle documents, including the various guidance documents, audit protocols and reporting documents have been translated into Spanish and French. These translations are available on the ICMI web site. ICMI has also had several of these documents translated into Chinese. The need for translations into other languages will be evaluated in the future.

Code Auditors

Code auditors must meet criteria for experience, expertise and lack of conflict of interest. ICMI reviews the qualifications of Code auditors upon receipt of the Auditor Qualifications Form accompanying Verification Audit reports. Auditors may also elect to submit their credentials for ICMI approval prior to conducting a Code audit.

The following individuals have submitted their credentials to ICMI and, at the time of submission, were determined to meet ICMI's criteria for lead and/or technical expert auditors. ICMI cannot guarantee that these individuals have maintained their professional certification or otherwise continue to meet the applicable requirements. Moreover, compliance with ICMI's conflicts of interest provisions can only be evaluated with respect to an auditor's work for a specific company, and therefore cannot be assured based solely on their professional certification, experience and expertise. This information is provided to assist companies in identifying potential auditors and is not intended as an endorsement of any individual auditor. The Auditor List is posted on the ICMI web site at <http://www.cyanidecode.org/pdf/AuditorList.pdf>.

A company hiring an auditor for a Code Verification Audit is fully responsible for ensuring that its auditor(s) meet all applicable ICMI criteria at the time the audit is conducted. Audits conducted by individuals that do not meet these criteria will not be accepted for verification purposes regardless of an auditor's inclusion on this list.

International Cyanide Management Code Auditors June 20, 2007

Name	Company	Location	Contact	Type of Auditor			
				Lead	Mining	CN Prod	CN Prod
Eric Adair	Management System Solutions, Inc.	United States	Phone: +1-610-765-1259 Fax: +1-610-765-1451 eadair@mss-team.com				X
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Name	Company	Location	Contact	Type of Auditor			
				Lead	Mining	CN Prod	CN Prod
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John McKenna	McKenna Associates	Australia	Phone: +61-7-4097-2129 Fax: +61-7-4097-1129 mckennaassocs@yahoo.com.au		X		
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				Lead	Mining	CN Prod	CN Prod
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Code Questions

ICMI periodically receives questions on Code implementation and auditing. Examples of some of these questions, along with responses, are compiled below. These responses are intended to illuminate existing guidance found in the Gold Mining and Cyanide Transportation Auditor Guidance documents, and do not supersede said guidance.

Question 1 (Regarding Standard of Practice 1.1)

In anticipation of its upcoming Verification Audit, a mine has changed its cyanide supplier from a non-signatory manufacturer to one that is certified under the Code. However, the mine has a stockpile of cyanide on site that was produced at a facility that was neither Code-certified nor has undergone a non-certification audit. Will the presence of this “non-certified” cyanide on site during the audit prevent the mine from being in compliance with Standard of Practice 1.1? Does this cyanide have to be returned to the manufacturer or otherwise removed from the site?

Answer

No, the mine can still be in compliance with Standard of Practice 1.1 even if there is “non-certified” cyanide on the site. The mine is not expected to have been in compliance with the Code prior to its Verification Audit, so its past purchase of “non-certified” cyanide is not evaluated during the audit. The stockpile of “non-certified” cyanide can be used in the process.

Question 2, (Regarding Standard of Practice 2.2)

What is the role of a mine's auditor with respect to reviewing the status of the various individual links in the supply chain transporting cyanide from its point of manufacture to the mine site? Is the auditor expected to perform a substantive review of a consignor's due diligence investigation of a rail or ocean transporter, or the audit report of a non-signatory transporter?

Answer

The role of a mine auditor is to confirm that transport of cyanide to the mine is conducted by responsible transporters. Therefore, he first must identify each of the individual carriers involved in the supply chain so that each can be appropriately evaluated.

By definition, a transporter that has been certified under the Code is a responsible transporter, and the mine auditor requires no other evidence than the current certification of the transporter on the ICMI web site.

With respect to non-certification audits of transporters that are not Code signatories, mine auditors should confirm that the transport auditor(s) meets ICMI auditor criteria, that the audit was conducted within the prior 3 years, and that it has used ICMI's Transportation Verification Protocol (or equivalent). Similarly, where a consignor has conducted a due diligence investigation of a rail or overseas carrier, the mine auditor should confirm that the investigation has been conducted within the previous 3 years and has been prepared or reviewed by an auditor(s) meeting ICMI criteria for a technical expert transport auditor. In both these cases, the transport auditor must have concluded that the carrier implements programs, practices and procedures consistent with ICMI's Cyanide Transportation Audit Protocol, or similar language indicating compliance with the Code.

Also, the mine auditor should confirm that a Corrective Action Plan is available for any transporter in the supply chain that is found in substantial compliance.

Mine auditors should not evaluate the results of a non-certification audit or a review of a consignor's due diligence investigation for substantive issues, nor should they conduct a "completeness review" such as is done by ICMI.

Question 3, (Regarding Standard of Practice 4.6)

A mine uses an external lined pond for secondary containment of its mill and leach tanks. Does the Code require that the pond be equipped with a leak-detection system?

Answer

No, the Code does not require any specific control measures for protection of ground water. Compliance is based on whether the beneficial or actual use of ground water is protected, and not on implementation of a specific technology. This Standard of Practice applies to all "cyanide facilities," including leach pads and all impoundments, as well as tanks and pipelines. The need for spill prevention and/or containment, which may include secondary containment and/or leak detection systems, applies only to process solution tanks and pipelines, not impoundments, pursuant to Standard of Practice 4.7.

Question 4, (Regarding Standard of Practice 4.7)

The Auditor Guidance for Use of the Gold Mining Operations Verification Protocol states that “Tanks installed on ring beams with no concrete or other impermeable barrier between them and the ground do not have competent secondary containment. Alternatives such as leak collection and recovery systems, either within or beneath the tank, would be acceptable as long as they allowed for identification and remediation of leakage through the bottom of the tank.” (Page 42, in reference to question 1 under Standard of Practice 4.7) A similar statement is made on Page 20 of the Guidance in reference to question 6 under Standard of Practice 3.1 regarding containment for reagent cyanide storage and mixing tanks.

Further guidance is requested on whether any of the following options for leak detection without removal of the tanks would be acceptable under the Code:

1. Install monitoring bores adjacent or partly under the tanks to assist in detecting leaks from the group of tanks. This would not differentiate which tank were leaking if anything is detected, it would at best alert you to the issue and then arguably you would take tanks off line one by one to investigate.
2. Install horizontal drains through the base of the ring beam to detect and capture leaks from the base of the tanks.
3. Carry out laboratory testing and numerical modelling to estimate the likely flow paths and risk of environmental contamination that may result from a leak.
4. Pump silica (or similar material) into the sand below the tanks to reduce the permeability, increasing the chance of horizontal flows, which can be tested by carrying out Option 3 above.

Answer

As discussed on page 42 of the Guidance document, the intent of this provision is to allow for identification and remediation of leakage through the bottom of a tank containing cyanide process solution. Depending on the system’s design and the site-specific circumstances, any of the 4 proposed options can meet Standards of Practice 3.1 and 4.7.

Option 4, pumping a material into the sand within the ring beam, would be identical to a competent concrete containment if the permeability of the resulting mixture approached that of concrete. Permeability greater than that of concrete could still be adequate if a preferential flow path were present that allowed leakage through the bottom of the tank to be detected before a significant release to the environment occurred. An operation using such a control method would have to demonstrate to the auditor’s satisfaction that the system will contain the release.

Option 2 would meet the Standards of Practice, as it would create a preferential flow path for the leakage to be identified before it entered the environment. Option 3 could also be acceptable if the material within the ring beam is sufficiently impermeable that leakage would be observed before a significant amount of process solution entered the subsurface environment. However, while the risk to the environment is a consideration, it cannot be the definitive criteria, because the intent of both Standards of Practice is to contain releases rather than simply to allow them to the point that they affect ground water uses. It is the Code’s expectation that solutions released from tanks be contained such that they can be remediated without risk to the environment.

The acceptability of Option 1, monitoring bores, depends on the specifics of the design as well as on the operation’s planned response to the monitoring results. Since the bores must reasonably be expected to identify leakage from the tank, angled drilling would likely be more appropriate. Moreover, monitoring should be in the unsaturated zone to identify a release in time to prevent impacts on ground water uses and quality.

Systems without secondary containment, especially those such as Option 1 where release identification occurs after it has entered the environment, must be linked to procedures to remediate the release. The necessary clean-up need not be immediate as long as the leakage plume will not migrate significantly. However, the response procedure should call for stopping the continued leakage as soon as practical. Similarly, where ground water is shallow and monitoring in the unsaturated zone is not feasible, monitoring of the ground water could be acceptable if the identification of a release triggers pumping of the bore and withdrawal of affected ground water, as well as halting the continuing release of the process solution.