INTERNATIONAL CYANIDE MANAGEMENT INSTITUTE

GUIDANCE FOR USE OF THE MINING OPERATIONS VERIFICATION PROTOCOL

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MINING GUIDANCE

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The International Cyanide Management Code (hereinafter "the Code", "Code" or "the Cyanide Code"), this document, and other documents or information sources referenced at *www.cyanidecode.org* are believed to be reliable and were prepared in good faith from information reasonably available to the drafters. However, no guarantee is made as to the accuracy or completeness of any of these other documents or information sources. No guarantee is made in connection with the application of the Code, the additional documents available or the referenced materials to prevent hazards, accidents, incidents, or injury to employees and/or members of the public at any specific site where gold or silver is extracted from ore by the cyanidation process. Compliance with this Code is not intended to and does not replace, contravene or otherwise alter the requirements of any specific national, state or local governmental statutes, laws, regulations, ordinances, or other requirements regarding the matters included herein. Compliance with this Code is entirely voluntary and is neither intended nor does it create, establish, or recognize any legally enforceable obligations or rights on the part of its signatories, supporters or any other parties.

MINING GUIDANCE

Introduction

This Guidance for Use of the Mining Operations Verification Protocol ("Mining Guidance") is issued by the International Cyanide Management Institute ("ICMI" or "the Institute") to assist mining operations in understanding their obligations in implementing the International Cyanide Management Code ("Code", "the Code" or "the Cyanide Code"), and to aid Code auditors in their evaluation of Code compliance.

Compliance is evaluated against the Code's Principles and Standards of Practice using the Mining Operations Verification Protocol. The questions in the Verification Protocol are based on the measures that typically are necessary to meet these Principles and Standards of Practice. In most cases, these measures are presented in broad terms and include multiple options to allow their flexible implementation at operations with varying site-specific environmental, social and regulatory circumstances.

Mining companies must exercise professional judgment in determining the specific controls needed at their operations, and auditors must similarly exercise professional judgment to evaluate these operations for compliance with the Code. This Mining Guidance places each Verification Protocol question in the appropriate context, describes the Code's expectations, identifies how various control measures can meet these expectations and advises operations and auditors on the factors to be considered when making these judgments. It provides a basis to evaluate alternatives to those measures typically employed to meet a Standard of Practice for compliance with the Code. This Mining Guidance also includes important information on the audit process and preparation and submission of audit reports.

General Guidance

1. Use of the Mining Verification Protocol

ICMI has prepared the Mining Verification Protocol and this Mining Guidance to address each Principle and Standard of Practice for Mining Operations and to evaluate and document an operation's compliance with the Code. This guidance is suitable for use by operations in preparing for initial certification, recertification, and pre-operational certification audits, and is suitable for use as the audit questionnaire for operations seeking initial certification, recertification and pre-operational certification. Specific guidance applicable to pre-operational certification and recertification is found in General Guidance Sections 11 and 12, respectively.

Operations preparing for Cyanide Code certification audits, either pre-operational or operational, are encouraged to use this Mining Guidance as a template in preparing a Cyanide Management Plan that would describe how the operation plans to address or already addresses each Standard of Practice and associated Verification Protocol question, referencing the existing documentation available for review. Although such a plan is not required in order to comply with the Code, it would guide the operation in ensuring that all elements required for Code compliance have been accounted for in preparation for the audit.

2. Scope

The Mining Verification Protocol and this Mining Guidance for its use apply to the management of cyanide at gold and silver mining operations. As defined in the Code's Definitions and Acronyms document, "gold and silver mining" means an "activity using cyanide to leach gold and/or silver from ore, including a facility or activity where cyanide is used as a flotation reagent to separate gold and/or silver-bearing material from other metal-bearing material, providing that flotation takes place at a site where cyanide is also used to leach gold and/or silver from ore." Other potential health, safety or environmental issues that mining may present, such as acid rock drainage or post-mining land use, are not subject to the Cyanide Code, nor are impacts of elements found in the ore, such as mercury, even if the use of cyanide increases their mobility in the environment or availability to potential receptors. Furthermore, the Code does not address the oxidation or degradation products of cyanide such as cyanate and thiocyanate.

There also are two uses of cyanide at mines that are not evaluated under the Verification Protocol. Management of cyanide used in laboratories is not addressed because of the relatively minor amounts used and the controlled laboratory setting in which it is used. Management of cyanide in refining is not included because of the great economic value of the gold-rich solutions handled in refining and the resulting highly controlled management of cyanide solutions in refineries. Because specific process facilities located inside the refinery can vary from operation to operation, the Cyanide Code does not define the limits or components of the "refinery circuit" that are excluded from evaluation. A process component located inside the highly-secured area of the refinery (sometimes referred to as the "gold room") is within the noted *highly-controlled management* area where access is limited to highly trained, authorized personnel due to the high gold content of the process solutions, and is therefore not subject to the requirements of the Cyanide Code.

It should be noted that the Code is not an engineering document. That is, the Code is not intended as an engineering guide that mandates specific engineering solutions to potential cyanide management issues. This means that Code auditors are not expected to conduct engineering-level evaluations of cyanide facilities or question professional engineers' assumptions, calculations and designs.

While the Code's requirements stand alone, operations are always expected to comply with applicable laws, regulations, permits and other governmental approvals. However, auditing of the Code is based solely on compliance with the Code and its related documents. It is therefore possible that an operation can be in full compliance with the Code but still be in violation of the requirements of its applicable jurisdiction, or be fully compliant with its permits and governmental requirements but be out of compliance with the Code. The Code was structured in this manner so that the auditor would not need to be an expert in the locally-applicable regulatory setting, and not be required to make findings involving legal interpretations.

3. Detailed Audit Findings Report

Detailed Audit Findings Reports should be organized in a sequential listing of the Principles, Standards of Practices, and Verification Protocol questions, as is found in the Mining Verification Protocol, with responses and supporting evidence for each question.

The Detailed Audit Findings Report should also include:

1) the date of the audit;
2) the names of auditors with the lead auditor and the auditing firm identified; and
3) a description of the operation, as in the description included in the Summary Audit Report, identifying the facilities included within the scope of the audit and any new facilities or facilities that have undergone substantial changes since the previous audit (in the case of a recertification audit), and indicating key operational components such as the mine type (e.g., open pit, underground), cyanide form such as briquettes or liquid, packaging and method of delivery and storage, processing methods (e.g., heap leach, milling, carbon-in-leach, Merrill-Crowe), cyanide destruction and other site-specific operational features that provide context to the reader for the responses to the verification protocol questions.

Nature of Responses:

The Detailed Audit Findings Report must include responses to each Verification Protocol question. These responses must be of sufficient detail to provide a clear justification for the resulting audit finding. A simple "yes" or "no" or "not applicable" answer, or simple repetition of the protocol question in the affirmative is not adequate. In responding to each question, the auditor must describe the evidence that supports the finding. What evidence demonstrates that the operation is in full compliance? What deficiency results in only substantial compliance? Why is a question "not applicable"? Data to support a finding, such as the cyanide concentration in operational ponds or in discharges to surface waters, should also be provided, where applicable.

Auditors are not prohibited from including recommendations or suggestions for further improvement that may not be necessary for compliance with the Code. However, auditors are requested to clearly identify these as additional measures and explain, as necessary, why they are not required for Code compliance.

Evidence:

As with any formal audit, various types of evidence are necessary to support the findings of a Cyanide Code certification audit. These include documents reviewed by the auditor, the auditor's direct observations in the field, and interviews with appropriate personnel. In many cases, the most appropriate personnel for interviews are those in the field doing the job, as these are the individuals with first-hand knowledge of what is actually done at the operation. While a supervisor will know what a procedure calls for or what is supposed to be done, this may not be what is actually done in the field. Auditors should ask the same questions to several employees in order to confirm how written procedures actually are implemented. It is

also important to record the names of each person interviewed. Useful evidence may also be found in inspection reports prepared by applicable regulatory agencies.

The supporting evidence should be identified in the response to each Verification Protocol question in the Detailed Audit Findings Report. The response also should identify the basis for any representative sampling of records, inspection reports or other documentation and should indicate the types of records reviewed in determining whether an inspection program was implemented.

Because recertification audits evaluate compliance over a three-year period, the auditor's responses and findings should indicate, where necessary, whether the operation provided evidence demonstrating continuous implementation of its procedures over the current three-year audit period. As one example, in the case of routine facility inspections, the auditor should indicate that representative inspection records were available and reviewed for the three-year period following the previous Code audit to verify whether the operation maintained continuous compliance over the entire audit cycle.

Necessary Compliance Measures:

The Verification Protocol questions are based on the measures typically necessary for Code compliance. Variations and alternatives also can be acceptable if they are demonstrated to achieve compliance with a Standard of Practice. Therefore, an operation can still be in full compliance with a Standard of Practice even if the auditor answers "no" to one of more of the Verification Protocol questions under that Standard of Practice.

The Mining Guidance places each Verification Protocol question in the appropriate context and helps the auditor understand the intent and expectation of performance for the Standard of Practice. In doing so, it allows the auditor to better evaluate any alternate measures taken by an operation to meet a Standard of Practice. Full and complete answers to Protocol questions are important in all cases, but especially so when alternative measures are used to meet a Standard of Practice, because in these cases, the operation has not implemented the typically-used measure identified in a question. The auditor must describe how and why the alternate measure meets the Standard of Practice.

Site-specific conditions and local regulatory requirements may legitimately affect how an operation chooses to meet a given Standard of Practice, and these must also be identified in the responses to the Protocol questions. However, since compliance with local regulations is separate from Code compliance, the auditor cannot simply justify a finding based only on such compliance and instead should describe substantively how or why compliance with a local regulation ensures compliance with the Code.

4. Management Plans and Procedures

Mining operations are expected to develop and implement a number of documents to comply with the Code. These typically include plans, procedures, and program documents for operational activities and systems, such as emergency response plans, operating procedures,

and training program documents that the Code expects to be implemented for safe cyanide management.

The Code does not mandate any specific form or format for these procedures, plans and systems documents. Formalized manuals, standard operating procedures, checklists, signs, work orders, training materials, or other materials all can be acceptable if they accomplish the goal of the Standard of Practice. Moreover, none of these documents need be limited solely to issues involving cyanide management. Regardless of how they are structured, an operation's management systems and procedures should demonstrate that the operation understands the controls and practices necessary to manage cyanide in a manner that prevents or limits releases and exposures.

The auditor must determine whether the necessary plan, procedure or system is in place, whether it addresses the elements identified in the Verification Protocol, and whether there is evidence that the plan, procedure or system is being implemented.

While the auditor must determine if the operation's plans, procedures and systems can reasonably be expected to meet the performance goals of the Standards of Practice based on available evidence, the auditor is neither expected nor advised to conduct an exhaustive analysis of every plan, procedure and management system to confirm every assumption and calculation. Obviously, if an assumption or calculation that may have a significant bearing on the operation's ability to comply with the Code appears to be questionable, it should be further investigated. For example, if the design precipitation event used in an operation's water balance seems to be significantly lower than expected, the auditor should follow up to determine if the value is appropriate. But the auditor's judgment should not be substituted for that of another professional when the impact of the difference will not adversely affect the ability of the plan, procedure or management system to meet the Standard of Practice.

The intent of third-party auditing of the Code is not to have the auditor judge each decision made by the operation's design engineers or planners, but to ensure that the operations' design, construction and operation are based on the reasonable assumptions and calculations of competent professionals. The question of when to accept what is presented to the auditor, and when it is necessary to dig deeper into an issue is intrinsic to every audit. The auditor's professional judgment is especially important in this regard during Code Certification audits.

5. Design, Construction and Quality Assurance/Quality Control Documentation

In several places, the Verification Protocol calls for documentation of an operation's design, construction and/or quality assurance/quality control (QA/QC) programs. As with the auditor's review of the operation's plans, procedures and management systems, review of these documents should not become an exercise in identifying arguable points, alternative approaches or minor deficiencies that do not affect the operation's compliance with the Code. For example, the point of reviewing QA/QC program records for liner construction is to confirm that such a program was undertaken, that it used a standard approach in terms of frequency

and type of testing, and that the documentation concluded that the liner installation met accepted quality standards.

In many cases, and especially at older operations, these records may not be available, either because no formal QA/QC program was conducted or because the original reports and as-built certifications cannot be located. In such cases, the operation can substitute a report prepared by an appropriately qualified person substantiating that the facility can continue to be safely operated within established parameters that are consistent with the Code's Principles and Standards of Practice. A specific discussion of the nature of this "fit for service" review is included in Verification Protocol question 5 under Standard of Practice 4.8.

6. Risk Assessments and Code Compliance

The degree of risk from managing cyanide varies from site to site. While risk assessments can play a significant role in determining the specific measures needed at a given operation, a mine's use of cyanide presents an intrinsic risk that is the starting point for compliance with the Code. This intrinsic risk, as well as the perception of risk in the minds of the public and other stakeholders, is the reason the Code exists.

To a large extent, the measures identified in the Verification Protocol are predicated on this intrinsic risk. In almost all cases, implementation of these measures is appropriate and necessary regardless of the nature of the site-specific risk at a given operation. For example, it is difficult to imagine any situation where controls such as secondary containments for reagent cyanide tanks or signage identifying a tank as containing cyanide solution would not be appropriate, based on intrinsic risks to health and the environment from release of and exposure to cyanide. Using a risk assessment to determine that such measures are simply unnecessary at a given site is generally not compatible with the intent of the Code, and may even suggest that the operation lacks a commitment to the most basic measures for protection of its workers or stewardship of its hazardous materials.

This is not to say that risks are equal at every site and therefore all operations require identical management practices. However, in developing the Code, a conscious decision was made to avoid basing all cyanide management measures on an operation's own risk assessments or that of an auditor. This was done both because of substantive and programmatic concerns.

By their nature, risk assessments can be very subjective because risk is relative and different individuals have different views on the significance of a given risk. Risk assessments can be very subjective because they require many assumptions to be made regarding various release and exposure scenarios. The perception of risk can be affected by cultural biases and regional perspectives.

Having consistent implementation and auditing of the Code at operations throughout the world is difficult enough given the degree of auditor judgment necessary to account for varying site-specific conditions. Requiring different auditors in different regions and continents to evaluate numerous risk assessments at each operation would make it nearly impossible to achieve uniform decisions regarding Code compliance.

Given these difficulties in applying risk assessments as the basic determinant of compliance, the Code takes the approach of accepting the intrinsic risks posed by use of cyanide and assuming that a pre-defined set of management practices will usually be necessary and appropriate in most situations. However, relative risk can be used in determining the specific nature of various controls that are necessary at an operation. It then becomes incumbent on that operation to justify its choices to the auditor's satisfaction.

7. Consideration of Risk in Determining Necessary Control Measures

While Code compliance cannot be solely dependent on the outcome of site-specific risk assessments, it is recognized that the level of risk present at an operation will affect how that operation implements the Code. The Code provides for a consideration of risk by identifying various options to meet each Standard of Practice and allowing operations to select the most appropriate one for its site-specific circumstances.

For example, the worker safety provisions of Standard of Practice 6.2 call for some type of signage to identify the presence of cyanide in tanks and pipelines. However, the Code does not mandate specific wording to be used, the size of lettering, or the frequency and location of signs along a pipeline. The operation will consider site-specific risk in implementing this measure, as should the auditor in evaluating it. The signage necessary within a mill building where access is restricted and all personnel are trained in the management of cyanide solutions may be different from that along an exterior heap leach solution pipeline or in other locations where untrained personnel may have access. Similarly, a pipe carrying leaching solution that is labeled as "barren solution" may be appropriate and acceptable if located such that the only personnel in the area are those trained to understand that "barren solution" contains cyanide. However, the same label on a pipe located where the public may have access would not be sufficiently descriptive to alert untrained individuals of its potential danger.

Auditors should not expect that all such decisions will be supported by formal risk assessment. Rather, the auditor should recognize that site-specific factors including risk are appropriate for consideration as an operation implements the recommended protective measures, and should evaluate these measures accordingly.

These and other examples of the flexible application of the Code, based on the consideration of site-specific risks, are discussed further under individual Protocol questions. In nearly all cases, however, some management measures will be necessary to address the intrinsic risk presented by use of cyanide regardless of site-specific risk that may exist at an operation. This is consistent with the Code's intent to promote the best practice for management of cyanide.

Another area where consideration of site-specific risk would be appropriate relates to the use of alternative management measures that are not identified in the Verification Protocol or this Mining Guidance. Since Code compliance requires meeting the Principles and Standards of Practice rather than implementing a mandated technology, operations can employ control measures other than those that are identified in the Mining Verification Protocol and this Mining Guidance. An evaluation of the relative risk posed by such an alternative compared to

that presented by the measure typically used to meet a Standard of Practice can be used in support of the alternative measure.

8. Potential Audit Findings

Auditors make separate findings for each Standard of Practice. These individual findings determine the overall finding for the operation and its certification status.

The Verification Protocol does not have a numerical score. Compliance with each Standard of Practice and with the Code itself is a "Pass/Fail" situation, but there are two passing categories: full compliance and substantial compliance.

Full compliance with any individual Standard of Practice means just what it says; there are no deficiencies in complying with any Verification Protocol questions under that Standard. A finding of full compliance with a Practice can be made if there are affirmative answers to all applicable Verification Protocol questions under that Practice, or if the operation has implemented an acceptable alternative to the measure identified in the Protocol question to achieves the Practice.

An operation is in substantial compliance with a Standard of Practice if it is not in full compliance (that is, if there are one or more negative answers to Verification Protocol questions and no alternate measures that achieve the Standard of Practice). However, the following three (3) criteria must be satisfied for an auditor to make a finding of substantial compliance, and their evaluation can require a considerable degree of professional judgment.

First, the operation must have made a good-faith effort to comply. This means that it has made a reasonable attempt to manage cyanide in a manner consistent with the Standard of Practice rather than simply ignoring a particular aspect of Code. As an example, having most but not all of the necessary operating plans could be viewed as a good-faith effort as opposed to having no plans at all. However, using an Emergency Response Plan developed for another operation without changing the facility name or other site-specific information may not constitute a good-faith effort. Failure to correct an identified issue within a reasonable amount of time may also not constitute a good-faith effort.

Second, for a finding of substantial compliance to be made, the deficiency must be readily correctable. The concept of "readily correctable" implies that the deficiency can be brought into full compliance within one year, which is the time limit for completing implementation of a Corrective Action Plan.

Third, there can be no immediate or substantial risk to health, safety or the environment from the deficiency causing a substantial compliance finding. Many deficiencies related to record-keeping or documentation would not pose an immediate or substantial risk to health, safety or the environment, and if the other two criteria are met, these types of deficiencies can often result in a finding of substantial compliance. However, a finding of substantial compliance may not be appropriate in a situation where the cyanide antidote is out-of-date or stored beyond

the temperature range marked on the packaging, as the lack of an effective antidote could present an immediate and substantial risk to worker health.

An operation may not be fully compliant with any of the Protocol questions under a given Standard of Practice, but can still be found in substantial compliance with that Standard of Practice if it met the three criteria discussed above for each of the questions.

An operation that is neither in full nor substantial compliance with a Standard of Practice is in non-compliance with that Practice. It could be that no good-faith effort was made to comply, that the deficiency is not readily correctable, or that the deficiency presents an immediate or substantial risk to health, safety or the environment.

Any deficiency that drops an operation from full to substantial compliance, or from substantial to non-compliance should only be applied to a single Standard of Practice.

9. Certification Decision

The certification status of the operation is based on the findings made for each individual Standard of Practice. For this decision, the lowest individual finding for any Standard of Practice prevails as the overall audit finding.

An operation can be found in full compliance with the Code only if all Standards of Practice are found in full compliance. Operations found in full compliance are certified in full compliance with the Code.

An operation is in substantial compliance with the Code if any Standard of Practice is found in substantial compliance and none are in non-compliance. These operations are conditionally certified subject to implementing a Corrective Action Plan and coming into full compliance.

An operation is in non-compliance with the Code if it is found in non-compliance with any Standard of Practice.

ICMI does not make a separate decision regarding an operation's certification. ICMI announces an operation's certification when it accepts an Audit Report which finds the operation in full or substantial compliance. ICMI has no independent means of determining whether an operation complies with the Code, and it therefore relies entirely on the findings of accredited professional auditors. The auditors will have observed the operation in its entirety and should evaluate what they observe within the context of the operation as a whole. While the guidance provided in this document is intended to assist auditors around the world to view and interpret the Cyanide Code's expectations from a similar perspective and reach consistent findings given the same set of facts, the professional auditors and technical experts conducting Cyanide Code certification audits must use their own professional and expert judgment to reach their own independent conclusions.

10. Submission of Audit Reports and ICMI Completeness Review

Lead auditors must submit the following documents to ICMI within 90 days of completing the site inspection portion of a Cyanide Code certification audit: Detailed Audit Findings Report; Summary Audit Report; Corrective Action Plan (for operations found in substantial compliance with the Code); Auditor Credentials Forms; and a letter from an authorized representative of the audited operation or from the signatory company for the audited operation granting ICMI permission to post the Summary Audit Report and Corrective Action Plan (if required) on the Cyanide Code website. The lead auditor's signature on the Auditor Credentials Form must be certified by notarization or its equivalent.

Upon receipt of the required information, ICMI conducts a review of the submitted documentation for "completeness." This review is intended to ensure that all necessary information has been provided. It does not address the substantive issues of Code compliance.

ICMI's "Completeness Review" of the Detailed Audit Findings Report determines whether all relevant questions have been answered and confirms that sufficient details are provided in support of the auditor's findings. The Summary Audit Report is reviewed to ensure that it accurately represents the results of the Detailed Audit Findings Report, and that it includes sufficient information to demonstrate the basis for each finding. As the Summary Audit Report is intended to be a summary of the information included in the Detailed Audit Findings Report, the Summary Audit report should include only information that is presented in the Detailed Audit Findings Report. Auditor Credentials Forms also are reviewed to confirm that the auditors met ICMI criteria at the time of the audit and that the required information and attestation is available for public review. The Corrective Action Plan, if required, is reviewed to confirm that it covers all deficiencies that resulted in findings of substantial compliance. ICMI also confirms that a letter from the audited operation is submitted authorizing ICMI to post the Summary Audit Report (and Corrective Action Plan, if required) on the Cyanide Code website.

If the documentation is complete, ICMI informs the auditor and operation and posts the Summary Audit Report, Auditor Credentials Forms, and, if required, the Corrective Action Plan on the Cyanide Code website. If the documentation is incomplete, ICMI advises the auditor and operation of the deficiencies and requests that revised documentation be submitted within 30 days. ICMI will not approve an incomplete audit report. The date of certification is the date on which ICMI makes the approved documentation available on the Cyanide Code website and announces the certification.

11. Pre-Operational Certification Audits

The Code allows for pre-operational certification of a mining operation that is not yet active but that is sufficiently advanced in its planning, design, or construction that its plans and proposed operating procedures can be audited for conformance with the Code. The same Verification Protocol used to determine compliance during an initial operational Cyanide Code certification audit also is used for a pre-operational audit, and the guidance provided in this document applies equally to both types of audits but with one significant difference. Since mines that are not yet active cannot be audited for their actual operation, pre-operational certification is

based on their commitments to design, construct and operate the mine in full compliance with the Cyanide Code's Principles and Standards of Practice.

Auditors of mines seeking pre-operational certification must determine if the operation can reasonably be expected to be in full compliance with the Code's Principles and Standards of Practices once its plans are implemented and it becomes active. The auditor therefore should review materials such as design drawings, draft operating procedures, draft emergency response plans, draft training plans and other written documents. If detailed draft plans and procedures are not yet available, an operation may provide written commitments to develop and implement measures consistent with the Code. Such commitments can be in form of process descriptions, cyanide management plans, and other written statements of intent which conclusively demonstrate that, when constructed and in operation, the mine will fully comply with the Code. The commitment must include sufficient detail for the auditor to be confident in such a finding.

When using the Verification Protocol to evaluate pre-operational compliance of a mine that has not yet been constructed, the Protocol questions should be applied prospectively. For example, a question such as "Are cyanide tanks and pipelines constructed of materials compatible with cyanide and high pH conditions?" should be applied as "Based on the operation's design drawings or other written commitments, will cyanide tanks and pipelines be constructed with materials that are compatible with cyanide and high pH conditions?" Similarly, a question such as "Does the operation inspect its first aid equipment regularly to ensure that it is available when needed?" should be applied as "Based on the operation's draft plans and procedures or other written commitments, will the operation develop and implement procedures to inspect its first aid equipment regularly to ensure that it is available when needed?"

Some mining operations seeking pre-operational certification may have already been partially or fully constructed and may have in place and implemented some of the documents, systems, and controls called for by the Verification Protocol. In such cases the auditor should note in the audit reports the items that are already in place and implemented and should audit them on that basis. For example, if a facility has already been constructed, the auditor should review available QA/QC program documents and other construction documents rather than reviewing the facility's commitment to comply with this requirement.

A finding of full compliance is required for pre-operational certification; if found in substantial compliance, the operation must revise its plans and procedures such that it is reasonably expected to be in full compliance with all Principles and Standards of Practice. A pre-operational facility found in full compliance is conditionally certified, subject to an on-site audit to confirm that the operation has been constructed and is being operated in compliance with the Code.

12. Recertification Audits

While the guidance provided in this document applies to both initial certification audits and subsequent recertification audits, the fact that recertification audits evaluate compliance over a

three-year period results in some different considerations from those of an initial audit. More broadly, if a mine has experienced potential deficiencies in compliance between its previous audit and its recertification audit, the auditor must consider a range of additional issues. Two types of situations merit special mention: 1) where design and construction documentation of facilities has been evaluated during previous audits, and 2) when cyanide facilities have been added or modified since a mine's most recent audit.

Previously Existing Facilities:

Standard of Practice 4.8 requires implementation of a QA/QC program with certain specified attributes during construction of cyanide facilities. However, conformation in the previous audit report that the operation conducted an appropriate QA/QC program to satisfy Standard of Practice 4.8 would be sufficient evidence of compliance with this provision, and the auditor would not need to review these records again for the same portions of the facility for which QA/QC program documentation had been found acceptable in a previous audit. A recertification audit still must confirm under Verification Protocol Question 4.8.3 that a mine has retained its QA/QC records for facilities that were reviewed during the previous audit(s).

New and modified cyanide facilities or procedures:

One of the first questions an auditor should ask during a recertification audit is whether there have been changes to the operation, its cyanide facilities or its cyanide management procedures since its previous audit. Certified operations are expected to maintain Code compliance throughout the three-year period between audits. If there have been no changes, the audit simply revisits all the same facilities that were previously evaluated. However, if new cyanide facilities were constructed or existing facilities were modified, the audit must evaluate documentation for the design and construction of these facilities and their related operating, training and emergency response procedures for Code compliance. Significantly, the audit also must determine if the mine followed the provisions of Standard of Practice 4.1 regarding management of change to ensure compliance both during the new construction or modification and once these facilities became operational.

All cyanide facilities that have been constructed or substantially modified since the previous audit should be clearly identified as such in the "description of operation" sections of the Detailed Audit Findings Report and the Summary Audit Report, and their compliance with the Code should be discussed in the Detailed Audit Findings Report and Summary Audit Report in response to the applicable Verification Protocol questions.

Another situation where an auditor may encounter issues not addressed in the prior audit involves mines that have established a site-specific alternative to the 50 mg/l WAD cyanide wildlife protection limit for open waters through the peer-reviewed scientific study discussed in this Mining Guidance under Standard of Practice 4.4. If alternate numerical standard(s) and/or tailings management procedures have been accepted by ICMI during the three years preceding a recertification audit, or if previously-accepted alternative wildlife protection measures have been modified during this period, the auditor should confirm that the practices required in the supporting scientific study have been implemented.

Potential compliance deficiencies between audits:

A certified mine may experience various types of potential compliance deficiencies during the three years between certification audits. Potential deficiencies can range from missing documentation required by the Code (e.g., inspection reports, monitoring data, training records) to cyanide exposure resulting in worker fatality or cyanide releases that adversely impact the environment. Since an operation is expected to maintain compliance over the entire period between audits, auditors will need to evaluate the significance of any compliance deficiencies or potential non-compliance situations that may have occurred but have been corrected by the time of the recertification audit, in determining if any such deficiencies and/or situations should be identified in the audit report and how they affect the mine's compliance status.

Two types of compliance deficiencies or potential non-compliance situations should always be evaluated during a recertification audit and discussed in the Detailed Audit Findings Report and Summary Audit Report regardless of their effect on compliance. Signatory companies are required to notify ICMI of the occurrence of any "significant cyanide incidents," as defined in the Code's *Definitions and Acronyms*. Signatory mining companies also are required to notify ICMI if they purchase "non-certified cyanide" (i.e., cyanide that was not produced by a Code-certified producer or was not transported by a Code-certified transporter). The nature and cause of such incidents, as well as the operation's responses and the measures it has taken to prevent their reoccurrence should be described, and the auditor's rationale for the resulting finding and compliance determination should be provided, based on the factors discussed below.

Auditors must use their professional judgment to determine if potential compliance deficiencies or non-compliance situations, other than those requiring notification to ICMI, merit inclusion in a recertification audit report. It may be appropriate for the Detailed Audit Findings Report to document those situations which appear insignificant but which by themselves or in combination with other items may indicate a trend that should be identified to subsequent auditors. For example, less than perfect implementation of an inspection program may appear as a few isolated instances. While deficiencies such as these may not be significant enough to merit discussion in the Summary Audit Report, the auditor should consider documenting such deficiencies in the Detailed Audit Findings Report (along with the rationale for the resulting finding) so that similar deficiencies found in the next audit can be evaluated in the proper context.

Specific guidance regarding how a certified mine's purchase or transport of non-certified cyanide should be evaluated during a recertification audit is provided within this Mining Guidance under Standards of Practice 1.1 and 2.2. An auditor's findings and resulting compliance determinations regarding other potential compliance deficiencies or non-compliance situations similarly depend primarily on the cause and duration of the problem and the nature of the mine's response.

Cause:

Potential compliance deficiencies or non-compliance situations can be separated into those that are isolated incidents and those that represent programmatic failures. Isolated incidents can include anything from a single missing monthly inspection form from three years of inspections to a one-time upset in a cyanide destruction system that causes a discharge of tailings in excess of 50 mg/l WAD cyanide to a tailings impoundment. If these situations are quickly corrected, measures are taken to prevent their reoccurrence, and the operation has demonstrated that it can maintain compliance, then the mine may be found in full compliance.

Similarly, incidents that are directly attributable to worker error can be viewed as isolated incidents beyond the operation's control as long as the mine had maintained its standard operating procedures and task training programs in full compliance with the Code and had a rapid and effective response to the incident. An operation experiencing a release or exposure resulting from a pipe rupture or other equipment failure also may be found in full compliance if the operation had conducted QA/QC or fit-for-service programs, had implemented inspection and preventive maintenance procedures that fully complied with the Code, and had responded quickly and appropriately.

However, if these same incidents were due a mine's failure to properly implement the underlying management systems on which its certification was based, then the auditor should find that their prevention was within the mine's control. Not conducting documented inspections of cyanide facilities, failing to train personnel or conduct preventive maintenance, or not being able to promptly or adequately respond to an emergency situation are evidence that the mine allowed these systems to fail. Such programmatic failures could result in a finding of substantial or even non-compliance depending on the specific scenario and the mine's efforts to maintain the systems necessary for safe cyanide management.

Duration:

The duration of a potential compliance deficiency or non-compliance situation also must be considered when making an audit finding. While situations that present significant risks to workers, communities and the environment obviously require as immediate a response and correction as practical, operations are expected to take prompt action to remedy all deficiencies regardless of the risk they present, in order to demonstrate the operation's good-faith efforts to comply with the Code. It therefore is possible for a relatively minor deficiency such as failure to maintain required documentation to result in a finding of substantial or even non-compliance if allowed to go on for an unreasonably long time, while a full compliance finding could result from a more serious problem that was identified and corrected immediately.

Response:

Regardless of the cause of a deficiency or the severity of an impact, a rapid and effective response is necessary for an operation to be found in full compliance. This should include corrective actions to address the immediate deficiency, a determination of the root cause of the deficiency, the implementation of measures to prevent its reoccurrence, and follow-up evaluations as needed to ensure that the remedy remains effective.

On-going compliance efforts:

An operation's efforts to maintain full compliance are indicative of its commitment to manage cyanide responsibly, and may therefore provide context with respect to a deficiency. An operation that identifies a deficiency during a three-year audit cycle as part of an interim audit or review of its Code compliance is more likely to be viewed as fully compliant than one that evaluates its compliance only immediately before or during a recertification audit. Although not required by the Code, mines that conduct their own internal or third-party audits or program reviews demonstrate to their workforce that responsible cyanide management is an integral part of the operation rather than something that needs attention only every three years. This focus can enhance worker support for the Code and the mine's compliance. These audits or reviews also can identify potential problems before they occur and prevent a slow, incremental deterioration of the operation's cyanide management programs that may otherwise go unnoticed until a serious incident occurs. As a result, the operation may maintain full compliance with the Code rather than falling into substantial compliance. Interim assessments should eliminate the need for a major compliance effort immediately prior to a recertification audit and create a record of continuous compliance, which then provides context to any isolated deficiencies that may be observed during the next Cyanide Code certification audit. Most importantly, interim reviews and audits conducted between certification audits help meet the Code's ultimate goal of enhanced protection of workers, communities and the environment.

Other factors:

Another factor for the auditor's consideration is the point in the three-year audit cycle at which the deficiency occurred. A finding of full compliance is more easily justified when a deficiency that occurred early in the audit cycle has not reoccurred, because it suggests that the operation's response has adequately addressed the root cause of the deficiency. However, if the same problem had occurred just prior to a recertification audit, the adequacy of the response may be less clear, and a finding of substantial compliance may be more appropriate to allow the operation additional time to demonstrate its full control of the situation.

While the specific cause and duration of the incident, as well as the operation's response, are critical factors in determining the operation's compliance status, a secondary consideration in determining the compliance of a mine that has experienced a significant cyanide incident or received non-certified cyanide is whether it provided the required notice to ICMI within 24 hours of the incident. Compliance with the notification requirements indicates that the operation is focused on its responsibilities under the Code and the identification of out-of-compliance situations, while the lack of the necessary notification suggests that Code compliance is not a high priority for the operation. Auditors therefore should determine whether an operation that has had an incident requiring notification to ICMI has done so.

Findings, Compliance Status and Summary Audit Report:

Once a deficiency has been fully corrected, a finding of substantial compliance loses its significance because there is no need for a Corrective Action Plan. Therefore, an operation that has corrected a deficiency and has had sufficient time to demonstrate that its remedy is effective, should typically be found in full compliance and be fully certified.

However, if the operation's response to a past deficiency was not complete or effective, or the deficiency was sufficiently recent that the auditor cannot be certain of the effectiveness of the response, a finding of substantial compliance should be made and the mine should be found and certified in substantial compliance, subject to implementation of a Corrective Action Plan. The same three criteria for a finding of substantial compliance during an initial audit also apply to a recertification audit: the mine must have made a good-faith effort to comply with the Code; the deficiency must be correctable within one year; and the situation cannot present an immediate or substantial risk to health or the environment. If any of these three criteria are not met, the mine must be found in non-compliance and cannot be recertified.

Compliance Statement:

The Summary Audit Report of a recertification audit must include one additional statement that is not required in the Summary Audit Report for an initial certification. For a mine found in full compliance with the Code, the report must indicate whether the operation had any significant cyanide incidents or other compliance issues since its previous certification and identify where in the report such information can be found. For a mine found in substantial compliance or non-compliance, the report must identify the Standard of Practice(s) on which the finding was based.

One of the following two statements must be included directly following the overall compliance finding for an operation found in full compliance during a recertification audit:

> "This operation has not experienced any compliance issues during the previous three-year audit cycle."
>
> or
>
> "This operation has experienced compliance issues during the previous three-year audit cycle which are discussed in this report under Standard(s) of Practice _____."

The following statement should be included directly following the overall compliance finding for an operation found in substantial compliance during a recertification audit:

> "This operation was found in substantial compliance with the Cyanide Code based on the audit findings discussed in this report under Standard(s) of Practice _____."

The following statement should be included directly following the overall compliance finding for an operation found in non-compliance during a recertification audit:

> "This operation was found in non-compliance with the Cyanide Code based on the audit findings discussed in this report under Standard(s) of Practice _____."

Mining Guidance

Principle 1 | PRODUCTION AND PURCHASE

Encourage responsible cyanide manufacturing by purchasing from manufacturers that operate in a safe and environmentally protective manner.

Standard of Practice 1.1

Purchase cyanide from certified manufacturers employing appropriate practices and procedures to limit exposure of their workforce to cyanide, and to prevent releases of cyanide to the environment.

1. Is the cyanide purchased by the mine manufactured at a facility or facilities certified as being in compliance with the Code?

   Cyanide production facilities, including warehouses for cyanide storage and distribution and cyanide repackaging operations, demonstrate that they operate in a safe and environmentally protective manner through Cyanide Code certification. The auditor should be able to compare the operation's purchase agreement or chain of custody documentation with the listing of certified cyanide production facilities on the Cyanide Code website to confirm that the cyanide was, in fact, produced by a certified operation. A mine's use of stockpiled cyanide that was not produced at a certified facility, but which was purchased prior to the mine's initial audit, is not considered in determining its compliance status.

   If cyanide is purchased from an independent distributor(s), the distributor(s) must be able to provide evidence that the cyanide shipped to the mining operation is from a manufacturer(s) that is certified in compliance with the Code. In such a case, the mine should have:

   - a statement from the distributor identifying the manufacturer(s) of cyanide sold to the mine; and
   - chain of custody or other documentation showing that the cyanide delivered to the mine was produced at the identified facility or facilities.

   If the facility that manufactured the cyanide is fully certified, a finding of full compliance with Standard of Practice 1.1 should be made.

   If the cyanide production facility was found in substantial compliance during its Code certification audit, then the mine would be in substantial compliance with this Standard of Practice, and, assuming that it is in either full or substantial compliance with all other Standards of Practice, it must develop a Corrective Action Plan to bring this (and other Standards of Practice found in substantial compliance) into full compliance.

   The mining operation's Corrective Action Plan could include such measures as:

- periodic monitoring of the status of the cyanide producer in becoming fully certified (that is, monitoring the producer's implementation of its own Corrective Action Plan); and
- arranging for purchase of cyanide from a producer that is fully certified.

However, if the production facility is not certified in either full or substantial compliance, then the mine is purchasing "non-certified cyanide" and is not in compliance with this Standard of Practice.

It is possible that during the three-year period between certification audits, a certified mining operation's supply of cyanide manufactured by a certified producer may be disrupted. The mine is not expected to cease operations if it cannot immediately contract with another certified cyanide producer, nor is it necessarily in non-compliance with the Code. In such a case, the auditor's finding depends on the nature of the disruption and the mine's response. The auditor should consider the following factors when determining whether the mining operation was in full, substantial or non-compliance with Standard of Practice 1.1 during the preceding three-year audit cycle:

- What caused the disruption in the supply from the certified producer?
- How did the mine operator respond when its certified supply was disrupted?
- Did the mine operator re-establish a certified cyanide supply as soon as reasonably practical?

In general, full or substantial compliance could be indicated when a) the disruption was due to forces beyond the mine's control, b) the mine made a good-faith effort to purchase cyanide from another certified supplier, but was unable to do so, and/or c) the mine re-established its certified supply in a reasonable period of time. Substantial or non-compliance may result when a) the mine elected to use a non-certified producer due to the higher cost of certified cyanide production, b) the mine depleted a large stockpile of certified cyanide before it sought an alternate certified supply, and was then forced to use non-certified vendors because it had not made arrangements to receive certified cyanide in a timely manner, and/or c) the mine continued to use a non-certified producer for a prolonged period even though a certified producer was available.

The auditor's decision is highly dependent on the specific circumstances of the disruption and the operation's response, and should be well supported in the Detailed Audit Findings Report and Summary Audit Report. Mining operations that experience such disruptions should document their circumstances and responses to provide a basis for the auditor's finding.

Principle 2 | TRANSPORTATION

Protect communities and the environment during cyanide transport.

Standard of Practice 2.1

Require that cyanide is safely managed through the entire transportation and delivery process from the production facility to the mine by use of certified transport with clear lines of responsibility for safety, security, release prevention, training and emergency response.

1. Does the operation have chain of custody records or other documentation identifying all transporters and supply chains responsible transporting cyanide from the producer to the operation?

   Chain of custody records or other documentation must be reviewed to identify each transporter, supply chain, and supply chain component that participate in transporting cyanide at any point on the route from the producer to the operation, so that the auditor can confirm that each of these parties is certified or is part of a certified supply chain. The intent of this question is to ensure that each link in the supply chain is identified to the auditors so that their review of the transporter's certification will be complete. Since transporters may change during a mine's three-year audit cycle, a mine's recertification audit reports should identify all transporters that have been active since its previous audit and indicate the date(s) that any new carriers initiated cyanide transport activities. Although the transporter is required to have inventory controls and/or chain of custody documentation to prevent loss of cyanide during shipment, this is evaluated during the audit of the transporter or supply chain, not the audit of the mine.

2. Are all identified transporters individually certified in compliance under the Code or included in certified supply chain(s)?

   Cyanide transporters demonstrate that they protect communities and the environment during cyanide transport through Cyanide Code certification. The auditor should be able to compare the operation's purchase or transport agreement or chain of custody records with the listing of certified cyanide transporters on the Cyanide Code website to confirm that the cyanide was transported by a certified transporter. A mine's use of stockpiled cyanide that was not transported by a certified transporter, but which was delivered prior to an initial audit, is not considered in determining its compliance status.

   If the transporter is fully certified under the Code, then a finding of full compliance with Standard of Practice 2.1 can be made and no further evidence is needed.

   If the cyanide transporter was found in substantial compliance during a Code certification audit, then the mine would be in substantial compliance with this Standard of Practice, and assuming that it is in either full or substantial with all other Standards of Practice, it must develop a Corrective Action Plan to bring this (as well as any other Standards of Practice found in substantial compliance) into full compliance.

The Corrective Action Plan for the mine could include such measures as:

- periodic monitoring of the status of the cyanide transporter in becoming fully certified (that is, monitoring the transporter's implementation of its own Corrective Action Plan);
- providing assistance to the transporter in implementing its Corrective Action Plan; or
- making alternate arrangements for transport of cyanide using a transporter that is fully certified.

If the transporter is not certified either fully or conditionally, then the mine cannot be in compliance with this Standard of Practice.

It is possible that during the three-year period between Code certification audits, a certified mining operation's supply of cyanide transported by certified transporters may be disrupted. The mine is not expected to cease operations if it cannot immediately contract with another certified cyanide transporter, nor is it necessarily in non-compliance with the Code. In such a case, the auditor's finding depends on the nature of the disruption and the mine's response. The auditor should consider the following factors when determining whether the mining operation was in full, substantial or non-compliance with Standards of Practice 2.2 during the current three-year audit cycle:

- What caused the disruption in the supply from the certified transporter?
- How did the mine operator respond when its certified supply was disrupted?
- Did the mine operator re-establish a certified cyanide supply as soon as reasonably practical?

In general, full or substantial compliance could be indicated when the following conditions apply: a) the disruption was due to forces beyond the mine's control; b) the mine made good-faith efforts to use another certified transporter but was unable to do so; and c) the mine re-established its certified supply in a reasonable period of time. Substantial or non-compliance may result when at least one of the following applies: a) the mine elected to use a non-certified transporter due to the higher cost of certified cyanide transportation; b) the mine depleted a large stockpile of certified cyanide before it sought an alternate certified transporter, and was then forced to use non-certified transporter because it had not made arrangements for certified cyanide transport in a timely manner; or c) the mine continued to use a non-certified transporter for a prolonged period even though a certified transporter was available.

The auditor's decision is highly dependent on the specific circumstances and the operation's response, and should be well supported in the Detailed Audit Findings Report and Summary Audit Report. Mining operations that experience such disruptions are expected to notify ICMI and should document their circumstances and responses to provide a basis for the auditor's finding.

Principle 3 | HANDLING AND STORAGE

Protect workers and the environment during cyanide handling and storage.

At some operations, reagent cyanide handling systems, such as tank isotainer offloading systems and storage and mixing facilities and tanks, are owned by the cyanide supplier or are otherwise under the supplier's operational control rather than the mine's. Reagent handling procedures, such as those for offloading solid cyanide and transferring liquid cyanide from tanker trucks and isotainers to storage tanks, may be those of transporters and suppliers. The implementation of these procedures, including monitoring of tank levels and maintenance of tank level controls as well as inspections of these facilities and systems, also may be the responsibility of the cyanide supplier. The auditor will need to determine which entity is responsible for implementing various activities, indicate this in report and review the records and interview personnel of all entities having responsibilities for these facilities to evaluate compliance with this Principle.

A variety of engineered process controls and systems are necessary to prevent cyanide releases, such as tank level sensors, interlock systems, detection and alarm systems, and non-destructive testing. Many of these controls and systems are expected for Code compliance. However, operations are encouraged to include engineered process controls to prevent releases in the design and construction of high-strength cyanide facilities. Existing operations are encouraged to implement a process to evaluate the need for any additional engineered controls to prevent cyanide incidents or mitigate the results of cyanide incidents.

Standard of Practice 3.1

Design and construct unloading, storage and mixing facilities consistent with sound, accepted engineering practices, quality control/quality assurance procedures, spill prevention and spill containment measures.

1. Have facilities for unloading, storing and mixing cyanide been designed and constructed in accordance with cyanide producers' guidelines, applicable jurisdictional rules, or other sound and accepted engineering practices for these facilities?

   The Code requires that unloading, mixing and storage facilities for reagent-strength cyanide be professionally designed and constructed. The type of evidence to demonstrate this requirement includes:

   - design specifications and as-built drawings stamped by a certified professional engineer;
   - documentation of the use of designs and construction specifications developed by cyanide producers;
   - records of the review and approval of design and construction documents by regulatory agencies; and
   - a report from an evaluation or audit of these facilities by experts such as professional engineers or representatives of the cyanide producer.

The intent of this provision is to evaluate whether the operation took the necessary and appropriate measures in designing and constructing these facilities rather than to substitute the auditor's judgement for that of the professionals who designed and constructed them.

2. Are cyanide unloading, mixing and storage facilities located away from people and surface waters? If not, has the operation evaluated the potential for releases to surface water and/or human exposure, and implemented precautions to minimize these potentials?

   This provision is intended to reduce risks to workers and adjacent communities and to surface water quality in the event of a release of reagent-strength cyanide or cyanide gas during unloading, storage and mixing activities. Although no minimum distance is recommended, and it is recognized that this can only be implemented to the extent practical, operations and auditors should evaluate the risks to people and surface water that exist based on factors such as the distance of unloading, mixing and storage areas from work areas and surface waters and the nature of the cyanide present and how it is stored.

   If reagent-strength cyanide unloading, storage and mixing facilities are located near an office or shop where many workers congregate, near communities that may adjoin the operation, or near surface water bodies, then the auditor should evaluate whether the appropriate controls are in place, such as:

   - a hydrogen cyanide gas monitor equipped with visual and/or audible alarms;
   - enhanced or additional containment structures and security measures, as appropriate for the specific location of these facilities; and/or
   - specific emergency procedures for notification, evacuation, response and remediation, as appropriate for the situation.

3. Is liquid cyanide unloaded on a concrete or other surface that can minimize seepage to the subsurface and is the unloading area designed and constructed to contain, recover or allow remediation of any leakage from the tanker truck or isotainer system?

   This question addresses the need for some type of pad on which a tanker truck or isotainer would park while transferring liquid cyanide to the operation. An alternative to concrete could be any material that is impermeable and structurally adequate to withstand the load.

   Although loss of the entire load may be possible, it is much more likely that minor and localized spills may occur, particularly when hose connections are made and broken. As such, the Code does not require a full secondary containment system for the entire capacity of a tanker truck or isotainer. Although such a system is certainly acceptable, an operation could have a pad that prevents minor drips and spills from reaching the ground, coupled with procedures to recover lost solution and remediate the land surface as necessary to protect surface and groundwater quality.

4. Are there systems in place to prevent overfilling of cyanide storage tanks, and are the systems tested and maintained on a routine basis?

Cyanide storage tanks should be equipped with functioning overfill protection, such as automatic level indicators, high-level alarms, integrated tank and tanker valve-shutdown devices or dual level indicators, such as an ultrasonic and a mechanical gauge, which can be compared to confirm that they are both functioning. Operations should implement procedures for routinely inspecting, maintaining and testing overfill protection equipment and instrumentation to ensure it is functioning properly.

The auditor should confirm this equipment is in place and functional through inspection of the operation and review of the inspection, testing and maintenance records.

5. Are cyanide mixing and storage tanks located on a concrete or other surface that can prevent seepage to the subsurface?

   Cyanide storage and mixing tanks containing free cyanide solutions of 10,000 mg/l (1%) or greater should be installed with a concrete or other similarly impermeable barrier between the tank bottom and the ground that will prevent seepage to the subsurface environment. As the bottom of a tank is typically not available for inspection, visual observation or review of as-built drawings or other construction documentation are the expected evidence to answer this question. The auditor should describe the foundation or support systems for tanks containing high-strength cyanide solution, definitively indicating whether the tanks rest on an impermeable barrier.

   Alternatives to concrete would be acceptable if they are structurally adequate and prevent releases to the subsurface. Alternatives to impermeable barriers, such as leak collection and recovery systems, either within or beneath the tank, are not acceptable under the Code for tanks containing free cyanide solutions of 10,000 mg/l or greater regardless of whether the tank is new or existing at the time the operation becomes subject to the Code.

6. Are secondary containments for cyanide storage and mixing tanks constructed of materials that provide a competent barrier to leakage?

   Secondary containments for cyanide storage and mixing tanks should be constructed with concrete, asphalt, plastic or other materials demonstrated to provide a competent barrier to leakage. Containments should be free of cracks and other breeches that compromise their ability to effectively contain releases. Unlined earthen containment is not acceptable for reagent-strength cyanide tanks. Secondary containment systems can include multiple containments connected by piping, or systems designed to overflow from one containment to another containment. Where such connections between containments are made, subsurface piping should also be constructed with leak control, such as through use of pipe-in-pipe systems that drain to daylight and allow easy detection of small leaks, and should be routinely inspected.

7. Is cyanide stored:

a) Under a roof, off the ground or with other measures to minimize the potential for contact of solid cyanide with water?
b) With adequate ventilation to prevent the build-up of hydrogen cyanide gas?
c) In a secure area where public access is prohibited, such as within the fenced boundary of the plant or within a separate fenced and locked area?
d) Separately from incompatible materials such as acids, strong oxidizers and explosives and apart from foods, animal feeds and tobacco products with berms, bunds, walls or other appropriate barriers that will prevent mixing?

The storage of reagent-strength cyanide in both solid and liquid form is subject to a number of provisions. Auditors should verify storage issues by observation of the storage facilities.

Solid cyanide should be stored in buildings or other roofed and enclosed structures to prevent contact with precipitation. Water systems for potable use, safety showers or any other purpose that are present in cyanide storage areas should be designed such that leaks or other potential releases will not come in contact with cyanide containers.

While storage in a warehouse may be adequate to prevent contact of solid cyanide with water, use of containers, such as maritime shipping containers and isotainers designed for transportation and outside storage, is also adequate for this purpose.

Determining the adequacy of ventilation is not intended to require an engineering-level evaluation, but rather a simple confirmation that enclosed storage areas such as a warehouse filled with crates of solid sodium cyanide are, in fact, ventilated in the event that the cyanide comes in contact with water. Ventilation of tanks containing reagent-strength liquid cyanide and the areas where those tanks are located should also be evaluated, where such tanks are located indoors.

For overall security purposes, both solid and liquid reagent-strength cyanide should be stored to prevent access by the public. This could be within its own fenced and locked area or within the boundary of the plant if the plant is fenced and access is controlled. Factors to consider include whether valves related to storage of liquid cyanide are locked and whether solid cyanide is stored in sealed metal bins or in boxes and bags.

Separation of incompatible materials is a necessary practice in the management of all hazardous materials including cyanide. The main materials of concern with respect to incompatibility with cyanide are acids, strong oxidizers like chlorine, and explosives. Other concerns include food, drinking water, animal feeds, and tobacco products. The auditor should check the flow path a released material would take to determine whether releases from the separate areas may commingle, for example in a drain or culvert common to both storage areas.

Standard of Practice 3.2

Operate unloading, storage and mixing facilities using inspections, preventive maintenance and contingency plans to prevent or contain releases and control and respond to worker exposures.

The unloading, storage and mixing of cyanide at an operation involves concentrated solutions of cyanide and solid cyanide salts and therefore presents the potential for worker exposure and environmental releases involving potentially toxic concentrations of cyanide. Employing appropriate practices and procedures during these activities is critical to protect worker health and safety, prevent releases, and effectively respond to any exposures or releases.

1. With respect to empty cyanide containers, are procedures in place and implemented to:

    a) Prevent empty cyanide containers from being used for any purpose other than holding cyanide?
    b) Rinse empty cyanide drums, plastic bags and liners with water three times and add the rinse water to the cyanidation process or otherwise dispose of it in an environmentally sound manner?
    c) Crush empty cyanide drums prior to disposal in a landfill and burn or otherwise dispose of empty wooden crates in an environmentally sound manner?
    d) Clean any cyanide residue from the outside of cyanide containers that are returned to the vendor and securely close them for shipment, including the hose connections and couplings on tanker trucks and isotainers?

    Regardless of how rigorous an operation's procedure for rinsing may be, the reuse of cyanide drums for purposes other than holding cyanide will always present a risk to human health. Similarly, there is no known effective method of ensuring that wooden cyanide crates are free of all cyanide residue. Therefore, no alternative measures for management of these empty containers are known to achieve the Standard of Practice.

    The Code's expectation for management of empty reagent cyanide containers is both for some type of formalized procedure and for evidence that the procedure is being implemented. The procedure can be documented as a Standard Operating Procedure, a sign posted at a mixing or offload station where drums, bags, tankers or isotainers are emptied, and/or part of a worker training program.

    The evidence of implementation could be observation of employees performing these tasks, or field interviews with personnel responsible for performing them.

2. Has the operation developed and implemented plans or procedures to prevent exposures and releases during cyanide unloading and mixing activities such as:

    a) Operation and maintenance of all hoses, valves and couplings for unloading liquid cyanide and mixing solid or liquid cyanide;
    b) Handling cyanide containers without rupturing or puncturing;
    c) Limiting the height of stacking of cyanide containers;

d) Timely cleanup of any spills of cyanide during mixing and transfer of liquid cyanide from tanker trucks and isotainers;
e) Providing for safe unloading of liquid cyanide and manual mixing of solid cyanide by requiring appropriate personal protective equipment and having a second individual observe from a safe area, or observe remotely by video.
f) Addition of colorant dye to solid cyanide prior to or at the point of mixing into solution and/or provisions for the addition of colorant dye to high-strength liquid cyanide prior to delivery at the mining operation?

The Code's expectation with respect to unloading and mixing activities is for written procedures as well as evidence that these procedures are being implemented. Procedures for these tasks may be in any form, including Operating Manuals, Standard Operating Procedures, training documents, signs, checklists or other written formats.

The operation's procedures need not be limited to or specific to the management of cyanide. For example, the procedure to prevent rupturing or puncturing of cyanide containers may actually be part of the training document for forklift operators.

Where the operation receives cyanide in solid form and mixes it into solution on site, the resultant high-strength cyanide solution should contain colorant dye at a concentration which provides for clear visual identification and clear differentiation from other solutions or rainwater that may be present. The auditor should inspect the mixing area for evidence of spillage, such as dyed cyanide solution outside of the mix tank, or cyanide flakes or briquettes on top of mix tank or in gratings of adjacent platforms or walkways, to confirm that clean-up procedures are being implemented.

An operation that receives liquid or solid cyanide in tanker trucks or isotainers should arrange to have the cyanide producer add colorant dye to the cyanide prior to delivery at the mining operation.

Having an observer present and ready to assist or summons help in the event of a cyanide release and exposure is necessary for safe management of reagent-strength cyanide. Observation by video is an acceptable alternative for on-site observation only where there is some evidence, such as a written procedure, that the observer actually will be viewing the process. An acceptable option for operations that receive cyanide in liquid form, or where solid cyanide is mixed with water in an isotainer and then transferred into the operation's storage tank, is having the observer present only when the various connections are made and broken, rather than during the entire time the tanker is mixing and/or off-loading the reagent.

Implementation of all these procedures can be verified by observation and/or interviews with the personnel responsible for performing these tasks.

Principle 4 | OPERATIONS

Manage cyanide process solutions and waste streams to protect human health and the environment.

Standard of Practice 4.1

Implement management and operating systems designed to protect human health and the environment including contingency planning and inspection and preventive maintenance procedures.

1. Have written management and operating plans or procedures been developed for cyanide facilities including unloading, mixing and storage facilities, process plants, heap leach operations, tailings impoundments, and cyanide treatment, regeneration and disposal systems?

   An operation is expected to have written management systems, plans and/or procedures for operating its cyanide facilities in a manner which protects its workers and the environment. The term "cyanide facilities" is defined in the *Definitions and Acronyms* document on the Cyanide Code website as: "(1) A storage, production, waste management or regeneration unit for managing cyanide or Process Solution. (2) A pollution control device, equipment or installation used to prevent, control or minimize the risk of a cyanide release."

   Since the Code defines Process Solution as any solution with a concentration of 0.5 mg/l WAD cyanide or greater, the following would likely be cyanide facilities at most operations:

   - Reagent-strength cyanide storage tanks and solid cyanide storage facilities;
   - Secondary containments associated with cyanide storage and production facilities;
   - Leaching facilities, including leach vessels, and leach heaps, pads and associated ponds;
   - Flotation cells using cyanide;
   - Counter-current decantation plants;
   - Merrill-Crowe plants;
   - Carbon washing, stripping and handling facilities;
   - Cyanide treatment, destruction or regeneration units;
   - Tailings storage facilities;
   - Most milling equipment where cyanidation tailings reclaim water is used;
   - All pumps, piping and appurtenances connecting these facilities; and
   - Surface water diversions that protect these facilities from run-on.

   However, while all these may meet the Code's definition of "cyanide facilities," there are two factors that should be considered in determining what Standard Operating Procedures are necessary at a given mining operation. First, operating procedures are not required for those cyanide facilities that are not actually "operated." For example, there will not be operating procedures for surface water diversions, individual pumps and piping, or secondary containments (although inspections and maintenance activities are considered in

protocol questions 7 and 9). The auditor will have to use professional judgment with regard to other equipment or installations that may meet the definition of cyanide facilities but are not "operated" and therefore, which cannot reasonably be expected to have "operating procedures."

The second factor is related to the goal of this Standard of Practice, which in this context is to implement procedures designed to protect human health and the environment. It is the responsibility of the operation to identify those tasks that, if not performed properly, have the potential to cause cyanide exposures or releases. The operation should then develop and implement the management systems and procedures needed to protect health and the environment. Standard Operating Procedures unrelated to potential cyanide releases and exposures are not within the scope of the Code.

The issue of the adequacy of these plans is addressed in the other questions under this Standard of Practice, which identify specific items that these management systems should address. This question focuses only on the existence and implementation of these plans, procedures and systems.

Many different models for these management systems are available, including, as of this writing:

- ISO 14000;
- British Standards BS 7750;
- the European Community's Eco-Management & Audit Scheme (EMAS); and
- the Organization for Economic Cooperation and Development's (OECD) Guidelines for Multinational Enterprises.

The Code does not require the use of any single approach or framework for a management system nor does it accept any of these systems in lieu of the development and implementation of the plans and procedures identified in the Code. As with all the provisions calling for written plans, the Code does not require that the documents be limited to cyanide or mandate any specific format, and they can be in various forms such as operating manuals, operating procedures, training documents, signs, and checklists. Regardless of their form, however, these written procedural documents should demonstrate that the operation understands and has implemented the procedures and controls critical to managing cyanide in a manner that prevents or controls releases to the environment and exposures to workers and the community.

Auditors should review the operation's written operating plans and procedural documents to confirm that they address the safe operation of all cyanide facilities. Implementation of plans and procedures should be confirmed through inspection of these activities and interviews with the personnel responsible for performing these activities, and review of available documentation.

2. Do the operation's plans or procedures identify and account for the assumptions and parameters on which the facility design was based and any applicable regulatory requirements as necessary to prevent or control cyanide releases and exposures consistent with applicable requirements?

   A facility's management systems provide the link between its design and the necessary operational practices. The site's operating plans and procedures, therefore, should incorporate or reference the assumptions and parameters on which the design was based, as well as applicable regulatory requirements related to prevention of cyanide releases and exposures. In this way, the operation can keep track of why it is operating according to a specific plan.

   For example, an operation may have been designed to operate its leach pad below 50 mg/l WAD cyanide, and therefore it has not been necessary to implement any measures to prevent the access of wildlife to its process solution ponds. The Standard Operating Procedure for the pond or other management documentation should note what the target concentration is in the leach solution, as necessary for wildlife protection, so there is recognition of the reason that no protective measures such as fencing, netting or bird balls are necessary.

   The Code's expectation is only for major parameters to be included in operating plans and procedures, such as:

   - the design or required freeboard for ponds and impoundments;
   - the concentration of cyanide discharged to and allowed in surface water;
   - the concentration of WAD cyanide in open water contained in tailings impoundments and in heap leach facilities, such as ponds, pads and conveyance channels; and
   - the design storm events for process solution ponds and impoundments.

   The necessary evidence will be inclusion of major parameters such as these in the facility's operating plans and procedures.

3. Do the operation's plans or procedures describe the standard practices necessary for the safe and environmentally sound operation of the facility including the specific measures needed for compliance with the Code, such as water management, inspections and preventive maintenance activities?

   The operation's management system should address those aspects of the operation that are necessary for protection of workers, communities and the environment. Specific items that should be addressed in operating plans or procedures include:

   - water management procedures, such as how and when heap leach and/or tailings solutions must be managed to retain the design storage capacity in these facilities;
   - inspection programs for cyanide facilities such as process tanks and pipelines, leach facilities and tailings impoundments; and

- preventive maintenance programs for critical equipment.

These management systems need not be in the form of Standard Operating Procedures. For example, the only documentation of a preventive maintenance program may be the work orders produced automatically by a computerized system, and the system itself.

4. Does the operation implement procedures to review proposed changes to production processes, operating practices, or cyanide facilities to determine if they may increase the potential for cyanide releases and worker exposures, and incorporate any measures necessary to protect worker health and safety and the environment?

   Mining operations should have some formalized procedure for managing changes to the production processes or operating practices. The procedure should identify changes to the facility or its operating practices that may increase the potential for cyanide releases and worker exposures before such changes are implemented so that they can be evaluated and addressed as necessary. For example, an operation may dispose of tailings with a low enough WAD cyanide concentration so that no additional wildlife protection measures are needed. If the mine encounters ore with a high copper content, the increased cyanide concentrations required for efficient leaching may result in a tailings solution that is harmful to birds. An effective change management procedure would alert the operation to the exposure of birds to a toxic concentration of cyanide and allow it to prevent such an outcome through blending of ore types, use of a cyanide destruction or regeneration plant, or otherwise proactively address the issue.

   A written procedure requiring written notification to environmental and safety personnel and sign offs by these departments before the change can be instituted is the best way to address this. Verification would be through a review of the procedure as well as completed forms that have been signed off by environmental and health and safety personnel.

   Some operations have multiple processes for change management, such as Authorization for Expenditure systems for changes requiring large expenditures, and other systems for changes below some capital threshold. Auditors should ensure that a mine's systems for change management addresses projects of all sizes. If a mine relies on a corporate change management system, the auditor should ensure that the system requires notification and agreement by appropriate site personnel.

   Regular discussion of all proposed changes at a formal weekly staff meeting may be acceptable for small mines provided it is supported by a policy statement or procedure requiring that such changes be evaluated by environmental and health and safety personnel prior to implementation. Auditor judgment based on interviews with management and field personnel will be necessary to determine whether an unwritten change management procedure is being effectively implemented.

5. Does the operation have cyanide management contingency procedures for non-standard operating situations that may present a potential for cyanide exposures and releases, such as:

   a) an upset in the operational water balance that presents a risk of exceeding the design containment capacity;
   b) problems identified by facility monitoring or inspection; and
   c) temporary closure or cessation of operations due to situations such as work stoppages, lack of ore or other essential materials, economics, civil unrest, or legal or regulatory actions?

   An operation's management system should include contingency plans for non-standard operating situations. While the operation cannot plan for every eventuality, some situations are sufficiently likely that pre-planned responses can and should be developed. These include measures to be taken in response to:

   - an upset in the operational water balance that presents a risk of exceeding the design containment capacity;
   - problems identified by facility monitoring or inspection; and
   - temporary closure or cessation of operations due to situations such as work stoppages, lack of ore or other essential materials, economics, civil unrest, or legal or regulatory actions.

   The lines between what is a considered to be a standard occurrence, one that requires a contingency plan and one that should be addressed in an emergency response plan are not exact. Contingency actions for some non-standard operating situations and operational upsets, such as upsets in the operational water balance, or for an identified leak in a process solution pond liner, for example, may be included in a facility's operating plans rather than in a separate contingency plan. The nature of the documentation does not matter for purposes of Code compliance, only that the operation's planned responses to the potential issues are addressed.

   6. Does the operation inspect the following at unloading, storage, mixing and process areas, as applicable to the site?

   a) Tanks holding cyanide solutions for structural integrity and signs of corrosion and leakage.
   b) Secondary containments provided for tanks and pipelines for physical integrity, the presence of fluids and available capacity, and to ensure that any drains are closed and, if necessary, locked, to prevent accidental releases to the environment.
   c) Leak detection and collection systems at leach pads and ponds, as required in the design documents.
   d) Pipelines, pumps and valves for deterioration and leakage.
   e) Ponds and impoundments for the parameters identified in their design documents as critical to their containment of cyanide and solutions and maintenance of the water balance, such as available freeboard and integrity of surface water diversions.

Operations should inspect surface water diversion structures to confirm their integrity and continued ability to prevent precipitation falling on the upgradient watershed from flowing on to process facilities and exceeding their containment capacity. Inspections should be conducted periodically and after major storms to ensure proper function during a design storm event.

Although specific formats or questions to be used for an inspection checklist are not mandated, inspections should be focused rather than general, and inspection forms should direct the inspector to evaluate specific items. Inspection forms that require only a single check-off or yes/no answer that an item is in good operating order invite complacency, as the inspector is neither prompted to actually look at the specific items that need to be evaluated (e.g., the presence of cracking on the floor of a secondary containment) nor reminded of the expectation to be met (e.g., no accumulation of precipitated salt on a cyanide reagent pump).

Inspections of cyanide facilities should be focused on items of potential concern such as those identified in this question. Inspection forms should reflect this focus and direct the inspector to evaluate these specific items. Auditor judgment will be necessary to determine if a specific inspection form provides sufficient detail regarding what to look for or what condition is acceptable.

The auditor's own inspection of these facilities will provide evidence of whether the facility's inspections are identifying potentially hazardous conditions. For example, if the auditor observes precipitated salts on a cyanide solution pump, and the operation's inspection form only included a check-off box to indicate whether this part of the facility was inspected, it may suggest that the inspection and the form were deficient.

Depending on other factors, an observation of salts may lead to different findings with respect to the operation's compliance status. An isolated observation of salt formation at an operation where it appears that inspections are adequate could result in a finding of full or substantial compliance, especially where the salt accumulation is minor and may have occurred between formal inspections. Alternatively, widespread accumulations and/or a major encrustation may indicate a programmatic deficiency, and could lead to a finding of substantial or even non-compliance if it appears that inspections are not picking up these releases. This may be the case particularly where the inspection forms are vague and neither focus the inspector on specific items nor suggest what expectations are appropriate.

7. Does the operation inspect cyanide facilities on an established frequency sufficient to ensure and document that they are functioning within design parameters?

   Facility inspections need to be conducted frequently enough to identify potential problems before they present a risk of cyanide release or exposure, but the Code does not specify the frequency of necessary facility inspections. Auditors must use professional judgment to determine if inspection frequency is sufficient to ensure and document that equipment and features necessary for safe cyanide management are functioning within design parameters,

and must provide their professional opinion in both the Detailed Audit Findings Report and the Summary Audit Report as to whether inspection frequencies are sufficient to ensure that equipment is functioning within design parameters.

8. Are inspections documented?

   a) Does the documentation identify specific items to be observed and include the date of the inspection, the name of the inspector, and any observed deficiencies?
   b) Are the nature and date of corrective actions documented, and are records retained?

   Facility inspections should be documented on inspection forms, in logbooks or by other means, and should include the date of the inspection, the name of the inspector, and any observed deficiencies. One caution with the use of logbooks is that deficiencies often are recorded by exception only. That is, when no deficiencies are noted, there may be no record that inspections were conducted. In these cases, the record would not provide evidence of continuous compliance unless there was some type of written procedure and additional records of training to substantiate that the personnel performing the inspection and making the logbook notations were trained to observe specific items, evaluate them against the appropriate expectation, and then to make a logbook entry only when a deficiency is identified.

   Where inspections are done remotely, such as inspection of tailings pipelines or dam faces by drone aircraft, the operation should document what the viewer is looking for and whether any videos were viewed in real-time or after recording.

   The nature and date of corrective actions also should be documented along with the record of the inspection. However, corrective actions may be documented in maintenance records or work orders rather than on the inspection forms that identified the problem. The auditor should review the operation's inspection records and maintenance records to verify that this information is recorded.

9. Are preventive maintenance programs implemented and activities documented to ensure that equipment and devices function as necessary for safe cyanide management?

   An operation should have a preventive maintenance program for its cyanide facilities where a failure can result in a cyanide release or exposure. Pumps, pipelines, cyanide treatment and destruction and/or regeneration equipment are examples of facilities that should be included in a preventive maintenance program. However, operations may have redundant pumps installed and ready to run, or spare equipment or parts on hand in lieu of including a specific item under a preventive maintenance system. These can be acceptable approaches as long as the operation has determined which equipment is critical in preventing or controlling releases and exposures and has prepared for its possible failure through preventive maintenance, redundancy or some other manner.

The frequency of various preventive maintenance activities is not specified in the Code, but the Code does expect that these activities be scheduled and documented, along with the basis for the maintenance frequency, such as hours of operation, or set time periods between maintenance. The Code does not prescribe the specific nature of preventive maintenance activities. This will depend on the type of equipment and its maintenance history and is not within the scope of a Code certification audit.

Auditors should inspect cyanide facilities, review maintenance records and interview employees to determine compliance with this provision.

10. Does the operation have necessary emergency power resources to operate pumps and other equipment to prevent unintentional releases and exposures in the event its primary source of power is interrupted?

Operations should have emergency generators to power pumps and other equipment, as necessary to prevent unintentional releases and exposures in the event its primary source of power is interrupted. The auditor should review maintenance records to verify that the operation maintains and tests this equipment as necessary to ensure that it is functional if and when needed.

It may not be necessary to have this equipment on site if it is available within the time allowed for in the facility's design. For example, operations size their pregnant process solution ponds with capacity for a specified volume of drain-down from a heap leach pad. The operation may be in compliance with this provision if it can acquire, install, and activate power generating equipment from other nearby operations or from commercial vendors and get it into operation before the pond capacity is exceeded.

It is also possible that a facility's design may be such that little or no back-up power generating capability is necessary. For example, a mill and tailings impoundment may be designed so that all transfers of cyanide slurry and solution require pumping. If no portion of the facility allows gravity flow, then a power outage may not result in a release or exposure. Similarly, a leach facility may have storage capacity in its process solution ponds adequate to contain the amount of solution in inventory in its leach pad, and not require emergency power to keep solution circulating.

In evaluating the need for back-up power, it should be noted that the scenario to be considered involves a power outage only, not one that occurs simultaneously with other equipment failures such as a break in a pipeline or during the design storm event. However, containment capacity for the design storm event must always be available and cannot be used in lieu of providing back-up power.

Standard of Practice 4.2

Introduce management and operating systems to minimize cyanide use, thereby limiting concentrations of cyanide in mill tailings.

Standard of Practice 4.2 applies solely to cyanidation milling operations and co-located flotation facilities using cyanide as a depressant. The intent of this Standard of Practice is to limit the use of cyanide to the optimal level for economic recovery of gold and/or silver so that the cyanide concentration in the waste tailings material is as low as practical. If the operation does not have a mill, the auditor should note that the Standard of Practice is "not applicable" and state the reason in the Detailed Audit Findings Report and the Summary Audit Report.

1. Does the operation implement a program to evaluate cyanide use in the mill and adjust the addition rate to minimize its use?

   Limiting cyanide use to the greatest extent practicable has both environmental and economic benefits. Lower cyanide concentrations reduce risks to wildlife from exposures to tailings and to water quality from potential seepage. Additionally, lower cyanide use reduces a mine's costs for the reagent and its transport to the site and limits the potential for releases and exposures during transport.

   Mines should have ongoing programs to determine if the standard rate of cyanide addition in an ore processing facility is sufficient, but no greater than that required, to optimize gold and/or silver recovery. The auditor's job is to determine if the operation implements such a program. Determining what dosing rate is "optimal" is the responsibility of the operation.

   The procedure should identify anticipated changes in the characteristics of the ore fed to the mill and modify the cyanide addition rate accordingly. The operation should implement a program of manual or automated sampling and analysis of tailings to determine residual cyanide levels and to allow for the adjustment of addition rates in real time as necessary to maintain optimal dosing. A system for real-time adjustment of the cyanide dosing rate would not be required if the mine can demonstrate that its ore characteristics are constant and its standard addition rate is appropriate to minimize its cyanide use.

Standard of Practice 4.3

Implement a comprehensive water management program to protect against unintentional releases.

Standard of Practice 4.3 addresses the facility's water balance.

An adequate water balance model is one of the most important tools for preventing potentially catastrophic releases of cyanide at mine sites. While the water balance characterizes current conditions, its greatest utility is as a predictive tool that allows the mine to manage cyanide solutions in real time to account for reasonably foreseeable precipitation events. Therefore, auditors should confirm that a water balance has been prepared, that it has reasonably considered the appropriate factors, and that the site implements the necessary practices to

maintain the balance on an ongoing basis. However, Code auditors are not expected to revisit each issue involved in an operation's water balance and substitute their own judgment in place of the engineers and hydrologists that prepared the model. Code auditors have neither the time nor the expertise for this.

Also, it is important to keep in mind that although this Standard of Practice addresses the operation's water balance, the Code's intent is to prevent overtopping of ponds and impoundments and it is not concerned with the water supply side of the balance.

1. Has the operation developed a comprehensive, probabilistic water balance model?

   An operation's water balance model is comprehensive if it has considered the factors necessary for such an evaluation, including, as applicable

   - solution application rates;
   - tailings deposition rates;
   - precipitation, evaporation and seepage rates;
   - undiverted run-on from upgradient areas;
   - impacts of freezing and thawing;
   - potential power outages; and
   - the capacity and availability of any treatment systems for surface discharges.

   To be probabilistic, the water balance model must take into account the uncertainty and variability inherent in the prediction of precipitation patterns. The frequency and distribution of precipitation events needs to be considered along with extremes and seasonal variations, not just average conditions.

2. Does the water balance consider the following in a reasonable manner and as appropriate for the facilities and environment?

   a) The rates at which solutions are applied to leach pads and the rates at which tailings are deposited into tailings storage facilities.
   b) A design storm duration and storm return interval that provides a sufficient degree of probability that overtopping of the pond or impoundment can be prevented during the operational life of the facility.
   c) The quality of existing precipitation and evaporation data in representing actual site conditions.
   d) The amount of precipitation entering a pond or impoundment resulting from surface run-on from any upgradient watershed, including adjustments as necessary to account for differences in elevation and for infiltration of the runoff into the ground.
   e) Effects of potential freezing and thawing conditions on the accumulation of precipitation within the facility and any upgradient watershed.
   f) Solution losses in addition to evaporation, such as the capacity of decant, drainage and recycling systems, allowable seepage to the subsurface, and allowable discharges to surface water.

g) The effects of potential power outages or pump and other equipment failures on the draindown from a leach pad or the emergency removal of water from a facility.
h) Where solution is discharged to surface waters, the capacity and on-line availability of necessary cyanide treatment, destruction or regeneration systems.
i) Other aspects of facility design that can affect the water balance, such as the assumed phreatic surface in a tailings storage facility.

While the first question under this Standard of Practice asks if the water balance considers the necessary factors, this question asks if the factors have been addressed appropriately. The auditor should review the balance to identify fatal flaws, assumptions that are questionable or other significant issues, but the auditor's judgment should not be substituted for that of the professionals that prepared the water balance unless the discrepancy has material bearing on the adequacy of the balance.

The factors to review are listed in this question. The significance of these factors will vary depending on the facility's environment, including both temperature and precipitation. It is also dependent on the nature of its operations, and many of these parameters are much more critical for heap leach operations than for milling and tailings disposal.

3. Are ponds and impoundments designed and operated with adequate freeboard above the maximum design storage capacity determined to be necessary from water balance calculations?

   The water balance or design documents for ponds and impoundments should be reviewed to confirm that a minimum freeboard over the design storage capacity is specified. Although the Code does not mandate a specific freeboard, one-half to one meter is a typical freeboard for tailings impoundments, while a larger freeboard is typically necessary for heap leach process solution ponds due to their much smaller ratio of surface area to drainage area.

   The operation's inspection records should be reviewed to verify that these facilities are operated with adequate freeboard.

4. Do the operating procedures incorporate inspection and monitoring activities to implement the water balance and prevent overtopping of ponds and impoundments and unplanned discharge of cyanide solutions to the environment?

   The inspection and monitoring activities necessary to ensure that the operation follows its water balance should be included in its operating plans. This should include items such as monitoring of the freeboard or solution volume in ponds and impoundments and inspecting surface water diversion structures for run-on from upgradient watersheds.

   Verification would be based on a review of the facility's operating plans and procedures and inspection records to verify inspection and monitoring activities are being conducted.

5. Does the operation measure precipitation, compare the results to design assumptions and revise operating practices as necessary?

   The operation should measure precipitation at the site and routinely compare it to the design assumptions used to develop the water balance model. The operation may need to revise its operating practices if it finds that actual precipitation deviates from that assumed for the facility design. This may be very important for operations in remote areas that do not have a long history of precipitation records. It is also recognized that an operation need not monitor on-site precipitation if an established weather station is sufficiently close and at comparable topographic conditions such that its precipitation data is representative of conditions at the site.

   Operations with heap leach facilities have the greatest need to evaluate precipitation data and use it as necessary to update a water balance or revise operating practices, since water management is an ongoing and critical part of operating these facilities. In some cases, however, updates to the water balance or changes to operating practices may be of little benefit. For example, where a tailings impoundment has been designed to contain a 100-year, 24-hour event and there is minimal undiverted upgradient watershed, a slight increase in the amount of precipitation will have minimal effect on the water elevation in the impoundment. Updating the water balance may also be of limited value where an operation has only been active for a short time and has collected a small amount of data, or when the data is consistent with that used for the initial calculations.

   The operation should be able to provide monitoring records for the auditor's review. Review of precipitation data and any resulting changes to operating practices may be documented as updates to the water balance or to Standard Operating Procedures. If there is no written record of such comparison and updating, then interviews with operations personnel may be the only available evidence.

Standard of Practice 4.4

Implement measures to protect birds, other wildlife and livestock from adverse effects of cyanide process solutions.

1. Has the operation implemented measures (i.e., fencing, filling in collection ditches with gravel, and covering or netting solution in ponds and impoundments) to restrict access by wildlife and livestock to all open waters where WAD cyanide exceeds 50 mg/l?

   One of the few numerical guidelines included in the Code is a 50 mg/l WAD cyanide limit for exposure of birds, other wildlife and livestock. This recommended limit is based on evidence that solutions with up to 50 mg/l WAD cyanide are typically non-lethal to wildlife. Operations that restrict access by birds and other wildlife to open waters above this level are typically in full compliance with this Standard of Practice.

   This recommended limit applies solely to water in tailings impoundments, heap leach facilities and other open ponds and impoundments to which wildlife has access. Since

certain types of birds commonly drink tailings water as it flows across the beach of an impoundment, the 50 mg/l limit applies at the discharge to the impoundment in areas where such birds are present. This recommended limit also applies to process solution ponds and open solution trenches or channels at a heap leach pad, as well as leach solution ponded on the surface of a heap due to poor infiltration.

The 50 mg/l limit does not apply to open-topped process tanks and vessels such as carbon-in-leach (CIL) tanks or to catchment ponds and containments that collect process solutions in an emergency but which are cleaned up as soon as practical. It also is not intended for protection of insects and small animals such as mice that cannot be excluded from ponds and impoundments with most fencing or netting.

Operations must implement measures to prevent access by wildlife where the WAD cyanide concentration exceeds 50 mg/l regardless of whether they have experienced wildlife mortality. In many cases, operations have maintained open ponds with toxic concentrations of cyanide for years with few wildlife mortalities. However, such "good luck" is not sufficient for Code compliance, and operations are required to take positive measures to prevent wildlife mortality. Hazing techniques such as the use of air cannons typically are not adequate to meet this Standard of Practice.

The auditor will need to inspect leach facilities and tailings impoundments where the concentration of WAD cyanide exceeds 50 mg/l to observe wildlife deterrent systems. These systems may include netting of impoundments, ponded areas on pads, and solution collection ditches, covering ponds with netting or bird balls, and filling in open solution ditches with gravel or rock to submerge the flow. Fencing should be adequate to discourage the type of terrestrial animals that are in the area from accessing the solution, but it is recognized that absolute prevention of access by some animals may not be practical. Wildlife mortality not attributable to cyanide (e.g., birds caught in netting) is not considered a violation of the Code.

Alternative compliance measures:

It may also be possible for operations to use alternative methods to meet this Standard of Practice. For example, a mine could demonstrate that wildlife would be protected from tailings water exceeding 50 mg/l WAD cyanide because its salinity was sufficiently high to render it unsuitable as a source of drinking water for wildlife.

However, making such a demonstration to the auditor's satisfaction will not, and should not, be easy. Anecdotal evidence such as "we've never seen any bird mortality" is not sufficient, although any assertion that the 50 mg/l limit is unnecessary must be supported with comprehensive, daily inspection records demonstrating that there are no mortalities. The operation must also present the scientific rationale for the lack of mortality at a cyanide concentration that would otherwise be toxic. This could be a study by an appropriately qualified person concluding, for example, that no wading or shore birds are known to be in the area, or that the local population of birds and wildlife will not drink the mine's tailings solution due to its extreme salinity. Such a study must be peer-reviewed and sufficiently

rigorous that a causal relationship is established. Like any competent scientific study, the results must be independently reproducible and predictive.

In addition to establishing the scientific basis for the protective mechanism(s) at work at the site, the study also should clearly and comprehensively identify all specific management practices, control measures, monitoring programs, or other actions deemed necessary by the study's authors to ensure that these mechanisms continue to be effective in preventing wildlife mortalities. The study's "recommendations" for maintaining these protective measures become the requirements for compliance with this Standard of Practice. The recommendations should be clear, unambiguous, specific and quantifiable so that their implementation can be evaluated during the mine's next Code certification audit.

Where appropriate, recommendations can be drafted to be self-limiting. For example, a monitoring requirement could be structured to allow the operation to cease data collection if the average or maximum concentration of some parameter measured over a one-year period meets a pre-established value. Under this approach, the peer reviewers would be able to evaluate both the requirement and the conditions that would allow for its deletion.

A study recommendation may be revised or deleted using a process similar to that of the original study. The scientists who conducted the original study, or other scientists with comparable credentials if the original individuals are no longer available, must evaluate the proposed change and determine that the recommendation is no longer necessary to meet the intent of the Code. This determination must be reviewed and approved by the same peer reviewers that evaluated the study, or by other qualified peer reviewers if the original reviewers are not available. These opinions must be documented in writing for presentation to the auditor at the next audit, and must also be included with the recertification audit report.

Proposals for alternative compliance measures and for modifications of existing study recommendations, as well as the supporting scientific studies and peer reviews can be submitted to ICMI at any time, and need not wait until an operation's next certification audit. ICMI will review all documentation for completeness and to confirm that procedural requirements (e.g., appropriate credentials for the individuals conducting the scientific study and peer review) have been adequately addressed. ICMI does not evaluate the study's technical merits. A mine can implement study recommendations in lieu of otherwise applicable Code requirements once it has been advised by ICMI that the documentation is complete.

Peer review:

For purposes of compliance with this Standard of Practice, peer review is an independent, documented evaluation of scientific research for competence and validity. The review checks the assumptions, calculations, extrapolations, alternate interpretations, methodology, and conclusions of the research to ensure that the science is sound and the conclusions are well founded. When necessary, the peer review process suggests ways to clarify assumptions, findings and conclusions, filters out possible biases, identifies

oversights, omissions and inconsistencies, and encourages authors to acknowledge limitations and uncertainties more fully.

Peer reviewers must have technical expertise in the subject matter to be reviewed (or a subset of the subject matter to be reviewed) to a degree at least equivalent to that needed for the original work. Reviewers cannot be involved as a participant, supervisor, technical reviewer, or advisor in the work being reviewed, and must be free of conflicts of interest as defined in ICMI's Auditor Criteria document.

A single peer reviewer is not adequate. Peer review is typically conducted by a panel of three or more independent experts. At a minimum, however, research should be evaluated by at least two independent experts. If these experts disagree on any significant aspects of the study, then a third reviewer should be engaged to resolve the issue.

Peer review often occurs when a research paper is submitted for publication in a technical or professional journal. However, it is recognized that not all the scientific studies conducted in support of alternative measures for Code compliance will be published. Therefore, reviewers may be contracted and compensated to conduct a peer review of research that is not submitted for publication in a technical or professional journal.

The author(s) of the scientific study must address the comments of the peer review panel either by revising the study, its conclusions and/or its recommendations, as appropriate, or explaining why a comment has been rejected.

The substantive issues involving a scientific study and its peer review are beyond the scope and expertise of the Code auditor. The auditor's responsibility is strictly procedural. The auditor confirms that the scientific study addresses the appropriate issue of Code compliance and the resulting report has concluded that the study supports the operation's proposed alternative means of achieving the Standard of Practice. If the auditor determines that these requirements are satisfied and that the mine is implementing the study recommendations, the mine should be found in compliance with the applicable Standard of Practice.

Even though an initial Code certification audit evaluates current compliance at the time of the audit, an operation that has established an alternative compliance measure through the process discussed above must have historical data available for the auditor's review demonstrating its effectiveness in meeting the Standard of Practice.

2. Can the operation demonstrate that the cyanide concentration in open water in Tailings Storage Facilities, leach facilities and ponds does not exceed 50 mg/l WAD cyanide?

   Operations must present analytical data demonstrating that any open solution contains 50 mg/l WAD cyanide or less. The amount of data necessary for an auditor to make a finding will require judgment. Since the initial Code certification audit is a snapshot in time and the operation may not have been in compliance with the Code before it became a signatory, it

may not be useful to review long-term historical data for an initial audit. However, it is not unreasonable to expect the operation to be able to show that it has recently been managing its solutions in compliance with the Code, and therefore, the auditor should question a situation where the 50 mg/l level has been exceeded with any regularity prior to the audit but is below this level the day the auditors arrive. For example, it may be appropriate for the operation to have data demonstrating that its open solutions consistently meet this recommended limit for at least three to six months prior to the initial audit.

If the facility has just implemented procedures to lower its WAD cyanide concentration for purposes of Code compliance and does not have historical data demonstrating that it can meet this new commitment, the auditor may need to make a finding of substantial compliance subject to submission of additional confirmatory data over the next several months.

3. Is maintaining a WAD cyanide concentration of 50 mg/l or less in open water effective in preventing significant wildlife mortality?

   In most cases, an operation that implements all the measures identified in the Code as typically necessary to meet a Standard of Practice, should be found in full compliance with that Standard. However, with respect to the wildlife protection provision of Standard of Practice 4.4, that may not be the case.

   While 50 mg/l WAD cyanide is assumed to be protective, this Standard of Practice calls on operations to protect birds, other wildlife and livestock. This means that an operation that still has significant wildlife mortality from contact with open water containing 50 mg/l WAD cyanide or less is not in compliance with this Standard of Practice.

   The auditor must determine if such wildlife mortality is "significant." Generally, isolated cases involving a few bird mortalities annually would not be considered to be "significant" and would not trigger a requirement to further reduce WAD cyanide levels or for measures to restrict access to the solution. If, however, bird mortality due to ingestion of cyanide was a routine and continuing occurrence, even if the number of birds was not great, the auditor could find that the operation may not be in full or even substantial compliance with this Standard of Practice. The specific finding would depend on whether the operation was taking any further action to determine why a concentration below 50 mg/l WAD cyanide was lethal to birds, or was implementing other measures that indicated its "good-faith efforts" to comply with this Standard of Practice.

   Mines will need to inspect cyanide facilities and record wildlife mortalities related to contact with and ingestion of cyanide solutions in order to demonstrate compliance with this Standard of Practice. Although an operation may claim that wildlife mortalities due to cyanide do not occur, the auditor cannot verify this without documentation that the operation conducts regular inspections for wildlife mortalities. Inspections for wildlife mortality typically are necessary on a daily basis where solutions approach or exceed 50

mg/l WAD cyanide to confirm that wildlife is protected and that controls such as bird balls are functioning as designed.

While not specifically required, the best approach would be use of a daily inspection checklist for each pond or impoundment that includes a check-off for observation of wildlife and wildlife mortality. Although not recommended, an alternative of only recording mortality when observed, but never documenting its absence, could be acceptable if, for example, a written training program or procedure for these inspections specifically included observation for wildlife mortality as one of the necessary components of a daily inspection.

4. Does the operation apply leach solutions in a manner designed to avoid significant ponding on the heap surface and limit overspray of solution off the heap leach pad liner?

   The fines content of some ore will restrict infiltration and promote ponding of leach solution on the surface of a heap leach facility. While this cannot always be completely eliminated, and some level of ponding can be expected, operations should take appropriate measures to limit excessive ponding that provides an attractive water source for birds and other wildlife.

   The Code does not establish a numerical standard for what level of ponding is considered to be excessive, but each operation should determine this itself. Where the nature of the ore is such that ponding may occur, operations should routinely inspect active leach cells and have procedures for ripping the surface of a heap as needed to increase its permeability and enhance infiltration of leach solution into the heap, and/or reducing or suspending solution application if excessive ponding is observed.

   Temporarily covering ponded solution with netting or by other means to protect wildlife is encouraged while an operation is resolving the issue. Excess ponding should be avoided regardless of the WAD cyanide concentration of the leach solution because it can cause saturation of the ore and resulting instability of the heap.

   The auditor should inspect active leach cells to determine if solution is ponding on the heap surface. Written procedures for inspection and remediation of excessive ponding would provide evidence that the operation is addressing the issue, but may not be necessary where the ore is free-draining and ponding is not experienced. Interviews with pad operators would also provide suitable evidence that ponding was being identified and addressed, especially where the ponding is minimal and no written inspection or remediation procedures have been developed.

   Overspray of leach solution off the lined area of a leach pad should also be avoided regardless of the cyanide concentration, simply from the perspective of chemical stewardship. Auditors should inspect heap leach operations to verify that overspray is minimized to the extent practical.

Standard of Practice 4.5

Implement measures to protect fish and wildlife from direct and indirect discharges of cyanide process solutions to surface water.

Process solutions are sometimes discharged directly or indirectly to surface waters. A discharge of tailings water to a stream via a pipe or other designed conveyance is a direct discharge, while seepage from a tailings impoundment that flows on the surface or through the subsurface and enters a stream is an indirect discharge. Operations should implement measures to manage both direct and indirect discharges so that the resulting cyanide concentration in the receiving water body is not harmful to fish and wildlife.

1. Does the operation have a direct discharge to surface water and if so, is it no greater than 0.5 mg/l WAD cyanide?

   An operation with a direct discharge to surface water should have analytical data available for the auditor's review demonstrating that the WAD cyanide concentration is 0.5 mg/l or less in the discharge stream. The auditor can verify the lack of discharge through observation of the facility. If there is no direct discharge, and no surface water or drainages that can be adversely affected by the operation, then it can be stated as such in the audit report.

2. Does the operation monitor for cyanide in surface water downgradient of the site and can the operation demonstrate that direct discharges to surface water do not cause the concentration of free cyanide in the receiving water to exceed 0.022 mg/l downstream of any established mixing zone?

   The Code recommends a free cyanide concentration of 0.022 mg/l or less in surface water for protection of aquatic life. Operations discharging to surface water should provide analytical data demonstrating that this value is achieved as well as QA/QC and Method Detection Limit information for the analysis. The auditor must also describe the mine's program for monitoring surface water quality.

   The Code does not establish mixing zones but recognizes that some political jurisdictions have established them. Without such a mixing zone, the 0.022 mg/l free cyanide concentration must be achieved at the point of discharge, effectively applying this value to the discharge itself. If the facility has a mixing zone established by the applicable regulatory agency, then the limit of 0.022 mg/l free cyanide concentration would apply immediately beyond the zone.

   It is frequently necessary to neutralize or otherwise treat cyanide in solution prior to its discharge in order to meet the 0.022 mg/l free cyanide limit. Treatment may be passive (allowing sufficient residence time in an impoundment for natural processes to reduce cyanide concentrations or use of wetlands) or active (utilizing any of the various available technologies to oxidize cyanide or to regenerate hydrogen cyanide for reuse in production). It should be noted that some treatment methods could increase the concentration of

cyanide degradation products (such as cyanate, ammonia and nitrate) in the discharge. These substances can themselves be harmful to fish and wildlife. Although control of these substances is not covered by the Code, operations utilizing such treatment systems should evaluate the effects of cyanide degradation products on exposed fish and wildlife and take measures necessary for their protection.

Since analysis of free cyanide at the low parts per billion level can be problematic for some operations, the Code offers other options. If the operation discharges to an authorized mixing zone, it may be able to analyze the higher concentration discharge and calculate the in-stream concentration based on the dilution from the natural stream flow. The operation could also determine the WAD cyanide concentration, which is easier to analyze at low levels. The WAD cyanide concentration could be used as a surrogate for free cyanide (that is, assume that all WAD cyanide exists as free cyanide), or the operation may be able to establish a fairly constant ratio between free and WAD cyanide in its discharge.

Operations can also demonstrate protection of aquatic life through biotoxicity testing using species and techniques accepted by the applicable jurisdiction. If biotoxicity test results are accepted by the applicable jurisdiction, Code compliance would not be dependent on the measured cyanide concentration.

It is important to note that the auditable provisions of the Code are its Principles and Standards of Practice and not the recommended numerical standards that typically are necessary to achieve these goals. In a situation where environmental factors such as steepness of terrain or naturally-occurring water quality may preclude aquatic life, then meeting the Code's numerical limits in that section of a receiving stream may not be necessary.

Similarly, where a stream segment has been designated for a use other than as aquatic habitat by the applicable jurisdiction, then the Code would not require the operation to meet a numerical limit intended for protection of aquatic life. It is also possible that the aquatic life in a surface water body receiving a discharge from a mine may be more resistant to the effects of cyanide than more sensitive organisms that may have been used to develop the numerical standards. In these situations, it is incumbent on the operation to demonstrate to the auditor's satisfaction that there are no aquatic resources to protect in the receiving water, or that the specific organisms present are able to tolerate a higher free cyanide concentration.

An operation's assertion that there are no aquatic resources to protect can be supported by the applicable jurisdiction's designation of a beneficial use less restrictive than aquatic habitat, along with data demonstrating that such resources, in fact, are not present. Support for a higher allowable cyanide concentration could be done through biotoxicity testing as previously mentioned or possibly using academic studies of the existing populations and their sensitivity to cyanide.

The necessary support for such alternate means of achieving this Standard of Practice is identical to that discussed under Standard of Practice 4.4, question 1, above. Additionally, even where a less stringent cyanide concentration can be adequately supported for the surface water segment receiving a discharge, the operation must be able to demonstrate that aquatic life is protected at whatever point downstream such life, or more sensitive populations, actually do exist.

3. Can the mine demonstrate that indirect discharges to surface water do not cause the in-stream concentration of free cyanide to exceed 0.022 mg/l downstream of any established mixing zone?

   Seepage from a tailings impoundment or other cyanide management facility also can enter surface waters as an indirect discharge. Operations that do not have direct discharges should ensure that indirect discharges are not adversely affecting aquatic life.

   Operations should determine if indirect discharges are occurring by inspecting their facilities for visible seepage that may enter surface waters and/or by routinely monitoring downstream surface water quality to ensure that the aquatic life is protected. Operations presenting analytical data to demonstrate that the free cyanide concentration is no greater than 0.022 mg/l or less also should provide QA/QC and Method Detection Limit information for the analysis. However, the auditor must evaluate the need for such inspection or monitoring with a consideration of the distance to surface waters, and the physical condition of primary and secondary containment.

4. If indirect discharges from the operation have caused cyanide concentrations in surface water to rise above levels protective of a designated beneficial use for aquatic life, is the operation engaged in remedial activity to prevent further degradation and restore beneficial use?

   Operations that have adversely impacted surface water quality are not necessarily out of compliance with the Code. For example, in a case where the designated beneficial use of a surface water is for support of aquatic life, such an operation can be in full compliance if it is engaged in a remedial action to prevent further degradation and restore the water use as aquatic habitat.

   Necessary evidence would include an initial investigation of the specific cause of the contamination, a plan for its remediation, observation of the plan implementation, and analytical results demonstrating that the plan is working as designed.

Standard of Practice 4.6

Implement measures designed to manage seepage from cyanide facilities to protect the beneficial uses of groundwater.

This Standard of Practice is one of the few Code provisions that is directly linked to how the applicable jurisdiction has decided to protect its resources. Compliance with the Code requires

that the operation protect the actual beneficial use of groundwater, or the beneficial use established by the applicable regulatory agency, rather than achieving a use or level of protection presumed necessary by the Code or by implementing specific design, construction and operational methods.

1. Does the operation implement specific water management or other measures to manage seepage to protect the beneficial use(s) of groundwater beneath and/or immediately downgradient of the operation?

   Although the Code does not recommend or require specific methods for protecting groundwater quality, operations are expected to implement measures to accomplish this goal. These may include but are not limited to full or partial lining of tailings impoundments with natural or synthetic materials, tailings deposition and pond management techniques, lining of leach pads and ponds with synthetic materials, and installation of leachate collection and recovery systems between process solution pond liners.

   This question seeks information regarding the methods the operation employs to protect groundwater. Auditors should review the operation's solution management features and systems, such as pad and pond liner systems, secondary containment systems and solution recovery systems. Auditors should also review the associated operating practices, interview site personnel and provide descriptions of the measures used to protect beneficial uses of groundwater.

2. Does the operation monitor for cyanide in groundwater downgradient of the site and can the operation demonstrate that concentrations of WAD cyanide (or other species of cyanide for which there is a numerical standard established by the applicable jurisdiction) in groundwater at compliance points below or downgradient of the facility are at or below levels that are protective of identified beneficial uses of the groundwater?

   This question asks about the beneficial use of the groundwater and the concentration of cyanide measured in the groundwater. To respond fully, the auditor must determine the beneficial use of the groundwater beneath and/or immediately downgradient of the operation's cyanide facilities. For purposes of the Code, this must either be a use designated by the applicable jurisdiction or an actual use, such as a source of drinking water for humans or livestock.

   Compliance with the beneficial use standard is measured either at the point of compliance established by the regulatory jurisdiction or, if there is no designated use or compliance point, at the point of actual groundwater withdrawal for an actual use.

   Where a beneficial use is designated or actual use exists but no numerical standard has been established for protection of that use, then the auditor should apply an appropriate standard for that use based on standards from the political jurisdiction of the operation's owner or from technical literature. If no actual use exists, but the jurisdiction has designated a beneficial use but not a point of compliance, then the auditor should indicate

that this question does not apply and explain the reason. Further, unless the next question applies to the operation, this entire Standard of Practice would not be applicable.

If an actual use exists or a beneficial use is designated, the auditor must also describe the operation's program for monitoring groundwater quality, including groundwater quality results.

3. If the operation uses mill tailings as underground backfill, have the potential impacts to worker health and groundwater been evaluated and have measures been implemented as necessary to address them?

   The requirement for protection of the beneficial use of the groundwater also applies to the use of tailings as backfill in underground mines. Operations engaging in this activity should determine the short and long term effects of residual cyanide present in the tailings and implement measures to reduce cyanide levels, stabilize the tailings or otherwise limit the potential for release of cyanide as necessary to protect the beneficial use of the groundwater.

   Operations also should evaluate the impacts of backfilling on the health and safety of personnel working in the mine, and implement measures to ensure that evolution of hydrogen cyanide gas does not result in worker exposure exceeding the limits identified under Standard of Practice 6.2.

4. If seepage from the operation has caused cyanide concentrations of groundwater to rise above levels protective of beneficial use, is the operation engaged in remedial activity to prevent further degradation and restore beneficial use?

   An operation that has adversely impacted the beneficial use of groundwater is not necessarily out of compliance with the Code. Such an operation can be in full compliance if it is engaged in a remedial activity to prevent further degradation and restore the beneficial use at the point(s) of compliance or use.

   The Code does not define the term "remedial activity." Hydrogeologic studies to determine the cause of the problem and potential responses, as well as modeling to predict the outcomes of various approaches, clearly can be part of an operation's remedial measures. However, studies and modeling alone do not accomplish the goal of this Standard, which is both to protect existing beneficial uses and to restore beneficial uses that have been adversely impacted. Further, while extracting the contaminated groundwater at the compliance well may be part of the remediation, this alone does not restore the beneficial use at that point nor does it necessarily prevent future adverse impacts at this or other points of compliance.

   Necessary evidence for the auditor to review would include the initial investigation of the specific cause of the contamination, a plan for its remediation, observation of the plan implementation, and analytical results demonstrating that the plan is working as designed.

Standard of Practice 4.7

Provide spill prevention or containment measures for process tanks and pipelines.

1. Are spill prevention or containment measures provided for all cyanide unloading, storage, mixing and process solution tanks?

   Secondary containment is expected for tanks containing cyanide solution, including leach tanks, tailings thickeners, and other process solution tanks and vessels with 0.5 mg/l or greater WAD cyanide concentrations.

   Containments may be a single area or multiple containments as long as they are adequately sized and are connected such that they can convey solution to the next containment without overflowing and without relying on pumps. This question also implies that the containments are competent; that is, a concrete secondary containment that is cracked and would not hold solution is not considered adequate containment.

   Tanks installed on ring beams with no concrete or other impermeable barrier between the tank bottom and the ground do not have competent secondary containment. An impermeable barrier between the tank bottom and the ground is expected for all tanks, including tanks on ring beams, constructed after the operation's owner became a signatory to the Code. For tanks on ring beams constructed prior to the company becoming a signatory and containing solutions with free cyanide concentrations less than 10,000 mg/l (1%), alternatives such as leak collection and recovery systems within the ring or the tank itself are acceptable as long as the systems allow for identification and remediation of leakage through the bottom of the tank before it enters the environment.

   Existing tanks on ring beams, constructed prior to the company becoming a signatory, that are not monitored for leakage within the tank or ring beam can use a combination of monitoring in the environment (e.g., in groundwater or the unsaturated zone) and a risk-based inspection (RBI) program in lieu of leak collection and recovery systems and full and competent secondary containment. RBI programs use a formal and documented evaluation of the risk of a release from a tank and the consequence of a release to develop an inspection program appropriate for the site-specific situation. Inspection frequencies and techniques are based on the findings of an initial detailed inspection of the tank, and subsequent inspections are used to determine if the tank is performing as expected or if changes in the inspection program are needed.

   For purposes of Code compliance, the evaluation of the potential consequences of a release must be predicated on the goal of preventing any impacts on health and the environment regardless of site-specific environmental factors. While estimation of the risk of a release occurring should be based on the various factors affecting corrosion (e.g., the physical and chemical properties of the solution and the conditions of the tank), the estimation of the consequences of a leak should consider any release to the environment as being significant and to be prevented. Existing environmental conditions such as poor-quality groundwater cannot be used to justify a less rigorous inspection program or frequency than would

otherwise be appropriate for good-quality groundwater. The nature of the monitoring program should also be considered, as the inspection program may differ if monitoring occurs in the unsaturated zone directly beneath a tank, at some distance from the tank, or in the groundwater.

A number of methodologies can be used to evaluate the initial condition of a tank on a ring beam and to develop the appropriate RBI program. The American Petroleum Institute's (API) Recommended Practice 580, and other methodologies that provide a similarly rigorous procedure, can all be acceptable. Code auditors should review the methodology used, the results of the initial tank inspection, the inspection program that is developed, and the results of subsequent inspections, to confirm that the program can reasonably be expected to prevent releases.

At operations constructed prior to becoming signatory, an acceptable alternative to a secondary containment surrounding tanks containing process solution with free cyanide concentrations less than 10,000 mg/l (1%) may be an external containment where leakage from the tanks can be directed. See question 4, below, for additional information.

The release scenario addressed in this question is a slow leak rather than a catastrophic failure or a hole in the tank that would be subject to pressure from the solution above it. Therefore, the Code does not apply a standard typical for pressurized tanks specifying the height of the containment wall or its distance from the tank as necessary to account for a pressurized stream of released solution that would shoot over the containment wall.

Verification for this question will typically be by observation of the facilities and review of design drawings.

2. Are secondary containments for cyanide unloading, storage, mixing and process tanks sized to hold a volume greater than that of the largest tank within the containment and any piping draining back to the tank, and with additional capacity for the design storm event?

   Secondary containments must have adequate capacity to hold the volume of the largest tank within the containment as well as solution from any piping that would drain back to the tank and additional capacity for the design storm event.

   As with the Standard of Practice regarding the water balance, the Code does not specify a design storm event, and the auditor must determine if the storm used by the operation is reasonable for the site's environment.

   A factor of 110% of the volume of the largest tank can usually be used as a rule of thumb for the adequacy of secondary containment. However, this approximation may not be adequate where the volume of the largest tank is relatively small and the size of the containment (or in the case discussed in question 4, below, the drainage area collected by the containment) is large.

While the adequacy of a containment's capacity in some cases may be obvious from a visual inspection, auditors should review data on tank size and calculations of the containment's available volume to confirm this, accounting for the volume occupied by the tanks themselves or any other equipment and/or associated foundations. The auditor should also verify through visual observation that there are no materials stored within the containment that compromise this capacity.

3. Are procedures in place and being implemented to prevent discharge to the environment of any cyanide solution or cyanide-contaminated water that is collected in a secondary containment area?

   Water found in a secondary containment may be from precipitation or leakage from the tank. The operation should have a written procedure describing how this water is handled, how the operation determines if the water contains cyanide or not, and what is done with the water.

   If water collected in a containment is discharged to the environment, criteria for this decision should be documented and the procedure should require that the water be sampled and analyzed prior to discharge. Records of these analyses should be available for the auditor's review.

   Alternatively, no written procedure would be necessary if the system is be designed with sumps and dedicated pumps and piping to return all such water to the production process; however, inspections and preventive maintenance would be necessary.

4. For cyanide process tanks without secondary containment, are there procedures for remediation of any contaminated soil such that adverse impacts on surface or groundwater are prevented?

   This question applies only to process tanks constructed prior to the operation's owner becoming a signatory to the Code. Competent and complete secondary containment is expected for all tanks constructed after the operation's owner became a signatory to the Code.

   Older operations may have been constructed with minimal or no containment around CIL tanks and/or tailings reclaim water tanks. Some of these operations have lined or unlined external ponds to which a release from these tanks could be routed. Flow to the ponds is typically through a lined or unlined ditch or over a graded land surface. If the entire system is lined, then it is equivalent to a competent secondary containment system and would be evaluated under question 2, above. However, if the impoundment, ditch and/or flow pathway are unlined, then these systems can be acceptable under the Code only if they are managed as emergency situations. They cannot be used for routine operational purposes (e.g., emptying a CIL tank for maintenance), and the operation must implement a written procedure to respond and remediate the release such that adverse impacts to surface and groundwater are protected.

The procedure should include a rapid response and removal of as much standing solution as practical, neutralization and/or excavation of all impacted soil, and proper management and disposal of the soil, such as in a tailings storage facility or on a leach pad. The operation should implement a written procedure for sampling the subsurface after the initial excavation and for continued excavation and sampling until a predetermined clean-up concentration of cyanide has been achieved.

Additionally, the system must be designed to contain the release, and is subject to the same capacity requirement discussed in question 2, above. That is, the release must be collected in an impoundment or catch basin rather than simply flowing across the ground, and the system must be sized to contain the volume of the largest tank within the drainage area, any piping that would drain back to the tank, and the volume of precipitation collected from the drainage area during the design storm event.

Unlike the groundwater protection provision of Standard of Practice 4.6, which is related to protection of a particular beneficial use, the concept in this Standard of Practice is chemical stewardship and prevention of contamination. As an alternative to competent secondary containment, this release response is intended to prevent any impact to groundwater regardless of existing groundwater quality.

The auditor should visually inspect these facilities and review the operation's response and remediation procedures. Review of the calculation of the system's containment capacity is especially critical, as the drainage area flowing to the external pond may be large and the technique of approximating the necessary containment capacity by using 110% of the largest tank volume may not be valid in these cases.

5. Are spill prevention or containment measures provided for all cyanide process solution pipelines to collect leaks and prevent releases to the environment?

   Spill prevention measures include a number of techniques. Preventive maintenance programs such as pipe wall thickness testing and rotation of tailings pipelines are used to prevent excessive wear on one side of a pipe. Interlock systems that automatically shut down upstream pumps when a downstream pump goes out of service can prevent overflows of intermediate ponds or tanks. Pressure and/or flow monitoring with alarms or automatic shut-offs can identify and control pipeline leaks, although it must be noted that these systems are effective for identifying a major leak or pipe failure but do not typically identify smaller leaks.

   Documented, routine formal inspections are another preventive measure, and are typically necessary in all cases regardless of what other measures are in place. The frequency of inspections should be related to capacity of any containment system to prevent releases. Informal inspection programs or situations where an operation maintains that "there are always people around the area who would observe a leak if it occurs" are not sufficient for full compliance. If these are the only pipeline inspections that are conducted, then

interviews with site personnel would be the auditor's only evidence verifying that inspections were being conducted. Therefore, inspections should be documented.

Buildings, concrete secondary containments, lined or unlined ditches and double-walled pipe or pipe-in-pipe systems are examples of typical containments. Ditches may also include lined or unlined catchment areas located strategically along a pipeline to collect solution released from the pipe.

Buried pipelines can be problematic. At some operations, HDPE pipes are buried to minimize movement as they expand and contract due to temperature variations. Depending on how deep they are buried, the characteristics of the soil and the rate of leakage from these pipes, leakage from the pipeline may or may not surface and be identified during inspections. Where a significant length of pipe is buried or where pipes are buried at significant depth, the operation should be prepared to present evidence demonstrating that slow leaks will surface and be detected. This could include case histories where such a leak was identified accompanied by an estimation of the leakage rate and total volume, as well as data on the permeability of the soil and the depth to groundwater. Installation of a synthetic membrane beneath buried pipelines, pipe-in-pipe systems or other measures that allow rapid identification of leakage, may be appropriate if there is no reason to believe that slow leaks will be detected.

Release prevention and containment systems must be evaluated in their totality, and with consideration of their environmental context. It is important to note that this Standard of Practice calls for "spill prevention or containment measures" but not necessarily both. For example, lined pipeline containments would be more appropriate with higher-strength solutions, less frequent inspections, and/or relatively shallow groundwater. Unlined pipeline containments may be acceptable where solution strengths are low, groundwater is deep and/or of very poor quality, the frequency of inspections and preventive maintenance is high or the lines are equipped with pressure or flow sensors and automatic shutoffs.

Observations and interviews would be used to verify compliance with this question.

6. Have areas where cyanide pipelines present a risk to surface water been evaluated for special protection needs?

   Evaluation of the adequacy of spill prevention or containment measures for pipelines must be based on the entire system and the environment. The Code specifically identifies the proximity to surface water as a significant factor in determining the necessary control measures.

   Where a release from a pipeline can reach surface water, such as where a pipeline crosses a stream or runs in close proximity to a surface water body, pipe-in-pipe systems or lined secondary containments with provisions for collection of leakage, alarms, or other special protective measures should be used.

An auditor's observation that such measures are in place is sufficient evidence that the operation evaluated the situation and acted appropriately. If it appears to the auditor that such special measures may be necessary, and the operation has not implemented them, then the operation would not be in full compliance, or possibly even substantial compliance unless it had conducted and documented an evaluation that reasonably concluded that no special precautions were necessary. This could lead to a finding of substantial compliance if the evaluation was reasonable but the auditor believed that special controls were, in fact, necessary and appropriate.

7. Are cyanide tanks and pipelines constructed of materials compatible with cyanide and high pH conditions?

   The auditor should describe the materials of the process tanks and pipelines. Generally speaking, use of materials such as HDPE and mild or stainless steel is necessary for cyanide tanks and pipelines. Where other materials are used, the operation should provide documentation of the material's compatibility with cyanide and high pH conditions.

Standard of Practice 4.8

Implement quality control/quality assurance procedures to confirm that cyanide facilities are constructed according to accepted engineering standards and specifications.

1. Were quality assurance and quality control programs implemented during construction and substantial modification of all cyanide facilities?

   This question simply asks whether quality assurance/quality control (QA/QC) programs were implemented during construction and substantial modification of "cyanide facilities." The term "cyanide facilities" is defined in the Code's *Definitions and Acronyms* to include "storage, production, waste management or regeneration units for managing cyanide or cyanide containing Process Solution, and pollution control devices, equipment or installations used to prevent, control or minimize the risk of a cyanide release." Cyanide process solutions include all reagent and in-process solution such as leach solution and tailings reclaim water but exclude solution containing less than 0.5 mg/l WAD cyanide.

   QA/QC programs may not have been implemented for some cyanide facilities, such as a surface water diversion used to prevent water from an upstream watershed from entering a tailings impoundment or process solution pond. The Code is more concerned with QA/QC for major installations such as tailings impoundments, leach pad and pond liner construction, process buildings and equipment, reagent-strength cyanide tanks, and the concrete containments, supports and piping related to these facilities.

   For operations undergoing a Code recertification audit, confirmation in the previous audit reports that the operation had all appropriate QA/QC documentation would be sufficient evidence for facilities constructed prior to the current audit cycle. However, the operation must also demonstrate that QA/QC programs were implemented for any facilities constructed or substantially modified during the period since the previous audit.

2. Have quality control and quality assurance programs addressed the suitability of materials and adequacy of soil compaction for earthworks such as tank foundations and earthen liners, the installation of synthetic membrane liners used in ponds and leach pads, and for construction of cyanide storage and process tanks?

   The auditor is not expected to conduct an engineering level evaluation of QA/QC records, but rather review them to see if they generally address the items identified in this question, as applicable to the facilities at the operation.

3. Have quality control and quality assurance records been retained for cyanide facilities?

   An operation must retain QA/QC information for all active cyanide facilities, and if such QA/QC records are available, verification will be rather straight-forward. Accordingly, a Code recertification audit must confirm that an operation has retained its QA/QC records for all active cyanide facilities that were constructed prior to the initial Code certification audit, as well as for any facilities substantially modified since the initial audit. However, if records cannot be located or are incomplete, an alternate demonstration as discussed in question 5, below, will be necessary for compliance with this Standard of Practice.

4. Has an appropriately qualified person reviewed cyanide facility construction and provided documentation that the facility has been built as proposed and approved?

   Construction records should also include a sign-off by an appropriately qualified person that the facilities have been built in accordance with the design drawings and specifications. The term “appropriately qualified person” is defined in the Code’s *Definitions and Acronyms*. The required qualifications for individuals engaged in QA/QC for construction of cyanide facilities would typically consist of an engineering degree with a professional registration and previous experience with QA/QC and construction practices.

5. Where there is no available quality control and quality assurance documentation or as-built certification for cyanide facility construction, has an appropriately qualified person inspected those facilities and issued a report concluding that their continued operation within established parameters will protect against cyanide exposures and releases?

   Where QA/QC records cannot be located, or where no such program was implemented during facility construction, the Code offers the option of having the operation’s cyanide facilities evaluated by an appropriately qualified person, such as a registered professional engineer to determine if they are “fit for service” and can continue to be safely operated according to their existing procedures.

   Equipment including cyanide tanks, vessels, pipelines, pumps and associated valves and fittings, concrete and/or steel structures supporting this equipment, and secondary containments of process solution tanks and vessels should be evaluated to determine whether, from a stability and/or containment perspective, as appropriate, this equipment is fit to continue functioning as currently operated. Any records that the operation can

provide regarding the maintenance and testing of this equipment should also be considered in this evaluation.

Based on a visual inspection and a review of its operating, maintenance and testing history, an appropriately qualified professional may determine that a cyanide facility can continue to be operated safely according to existing procedures and that no further testing or evaluation is necessary. Where the inspection, age and history of the equipment is not sufficient for such a determination, pressure-testing, wall-thickness testing or other means may be necessary to confirm the integrity or suitability of the equipment. The evaluation may result in recommendations to address a situation either immediately or within some specified time period, that operating practices should be revised based on the condition of the facilities, or that the equipment is fit for continued operation without additional testing or revision of existing operating practices but should be re-evaluated at some time in the future.

This same engineering evaluation could also be used to address question 1 under Standard of Practice 3.1 regarding the design basis of unloading, storage and mixing facilities. That is, operations that lack the original documentation demonstrating that these facilities were designed and constructed in accordance with cyanide producers' guidelines, applicable jurisdictional rules and/or other sound and accepted engineering practices can use the same engineering evaluation as alternative evidence both for acceptable design and construction and for the QA/QC provision.

With respect to cyanide facilities such as liner systems in impoundments or heap leach pads where inspections are not feasible, the only indication that the facility was constructed properly is its performance. For example, in lieu of QA/QC records showing that the liner of a process solution pond was properly installed, the auditor should review records of leakage into a leak collection and recovery system (if present), along with groundwater quality data to determine if the liner system is functioning properly. While this performance evaluation may be adequate for a leach facility, however, the original QA/QC for construction of a tailings impoundment would also have addressed the placement of embankment materials. Therefore, an alternative engineering review of tailings storage facilities should also include an evaluation of the dam's physical integrity and stability.

If a fit-for-service inspection was previously used as an alternative to the original QA/QC program records and the evaluation included recommendations for subsequent evaluations or repairs, then a new evaluation consistent with those recommendations would be required.

Standard of Practice 4.9

Implement monitoring programs to evaluate the effects of cyanide use on wildlife, and surface and groundwater quality.

1. Has the operation developed written standard procedures for monitoring activities?

This question simply asks if the operation has written cyanide monitoring plans or procedures for wildlife and water quality. Verification consists of identifying the documentation.

2. Have sampling and analytical protocols been developed by an appropriately qualified person?

   Sampling procedures can be developed by operational personnel or by external parties as long as they are meet the Code's definition of "appropriately qualified person." The term is defined in the Code's *Definitions and Acronyms* document, which with specific reference to preparing environmental monitoring and analysis plans, notes that "a degree in an appropriate scientific discipline and experience with sampling and analytical techniques typically would be required."

   In some cases, an operation's sampling plan is based on generic procedures taken from manuals prepared by governmental agencies or consultants and revised by company personnel as necessary to account for site-specific conditions. While the government employee or consultant who initially developed the actual sampling procedures is considered to be an appropriately qualified person, the individual adapting it to the mine site should also meet this requirement. If the sampling manual was developed or adapted by site personnel, it may not identify the author, and it may be necessary for the auditor to rely on interviews with site personnel to determine the origin of these procedures. The auditor should describe the qualified person's credentials, such as education, training, expertise and experience.

3. Do procedures specify how and where samples should be taken, sample preservation techniques, chain of custody procedures, shipping instructions, cyanide species to be analyzed and quality assurance and quality control requirements for cyanide analyses?

   The auditor should review the sampling and sample handling procedures to determine if they include information identified in this question. It is not necessary for all this information to be in a single document, as long as it is all available in some form.

4. Are sampling conditions (for example weather, livestock/wildlife activity, anthropogenic influences) and procedures documented in writing?

   The operation should have some type of field report, which could be a sampling logbook or checklist, where sampling conditions that may affect the analysis are recorded. The auditor should review completed documents, rather than a blank form, to verify that the operation actually records this information.

5. Is monitoring conducted at frequencies adequate to characterize the medium being monitored and to identify changes in a timely manner?

The Code does not mandate the frequency of monitoring activities, and the auditor must use professional judgment to evaluate the adequacy of the operation's monitoring frequencies and provide a professional opinion in both the detailed and summary audit reports regarding the adequacy. Factors that may be appropriate to consider include the amount of existing data, the stability of the parameters being monitored, and for groundwater, the depth to groundwater and the rate of movement.

Unless an operation's monitoring frequency appears to be inappropriate or unreasonable, and would have a significant bearing on its compliance with the Code, the auditor's judgment should not be substituted for that of the operation.

Principle 5 | DECOMMISSIONING

Protect communities and the environment from cyanide through development and implementation of decommissioning plans for cyanide facilities.

Standard of Practice 5.1

Plan and implement procedures for effective decommissioning of cyanide facilities to protect human health, wildlife, livestock, and the environment.

1. Has the operation developed written procedures to decommission cyanide facilities at the cessation of operations?

   This question requires the auditor to confirm that the operation has a decommissioning plan. This need not be a single or separate plan specifically for cyanide facilities but could be within a closure plan for the entire operation or as separate procedures to achieve what the Code defines as "decommissioning."

   Decommissioning is that aspect of closure that addresses the cyanide remaining on site upon cessation of production activities and prepares the site for its closure and post closure period. The term is defined in the Code's *Definitions and Acronyms* document, and generally refers to "treating, neutralizing or otherwise managing cyanide and cyanide containing process solutions remaining in storage and production facilities in preparation for closure so that they do not present a risk to people, wildlife or the environment due to their cyanide content."

   Decommissioning includes activities such as:

   - decontamination of equipment;
   - removal of residual cyanide reagents;
   - neutralization of process solutions;
   - rinsing of heap leach pads (if part of the operation's closure plan); and
   - installation of measures necessary for control or management of surface or groundwater such as pumping and treatment systems that would operate during the facility's closure period.

Decommissioning does not include activities such as:

- physical stabilization or recontouring of tailings storage facilities or heaps;
- reclamation, rehabilitation or revegetation of disturbed land;
- long-term management of seepage from leaching facilities or tailings storage facilities; and
- environmental monitoring.

An operation is in full compliance with this question if it has written plans to conduct the necessary activities, as applicable to its cyanide facilities.

2. Does the plan include an implementation schedule for decommissioning activities?

   The operation's decommissioning plans and procedures should include a schedule for carrying out its proposed activities. The schedule need not be linked to a specific date, but rather can simply show the order in which the planned activities will be conducted and the duration of each activity starting from the point in time the operation ceases production or an individual cyanide facility is no longer in use.

3. Does the operation review its decommissioning procedures for cyanide facilities during the life of the operation and revise them as needed?

   Decommissioning plans should be reviewed and revised during the active life of the operation to keep them current and applicable to the actual ongoing operation as it changes over time. The Code does not prescribe a frequency, but the operation should update its plans with sufficient frequency to reflect changes in the operation as they affect decommissioning, as well as changes in planned decommissioning techniques and measures.

   The auditor should indicate whether the mine's decommissioning plan or other documents include a provision requiring its periodic review and revision, and provide the date of the most recent plan revision or otherwise confirm that the current plan addresses all expansions and modifications to the operation that materially affect the plan and its estimated cost. It is also possible that the operation has not been active long enough to require a review and revision to its decommissioning plans. In such a case, the auditor can only evaluate the operation's intent to do so, as shown in a written policy or procedure calling for such review and revision.

Standard of Practice 5.2

Establish a financial assurance mechanism capable of fully funding cyanide-related decommissioning activities.

1. Has the operation developed an estimate of the cost to fully fund third-party implementation of the cyanide-related decommissioning measures as identified in its site decommissioning or closure plan?

The rationale for financial assurance contemplates a situation where the operation lacks the financial resources to execute its decommissioning plan. Therefore, the "cost to fully fund the plan" is the cost for a third-party contractor to mobilize, conduct the planned activities, and demobilize from the site, rather than the cost for in-house implementation of the plan.

The operation should have such a cost estimate either prepared by an outside contractor or based on rates quoted by or applicable to an outside contractor. Ideally, the cost estimate will include line items for site cyanide-related decommissioning activities and corresponding costs. However, it is likely that some or all of the cyanide-related decommissioning activities and costs may be included within broader activities being planned for complete site closure. This may require a careful examination of the cost estimate to confirm that it includes estimated costs for cyanide-related decommissioning activities.

2. Does the operation review and update the cost estimate at least every five years and when revisions to the decommissioning plan are made that effect cyanide-related decommissioning activities?

   Decommissioning cost estimates should be reviewed and updated at least every five years, and also when changes are made to the plan that effect cyanide-related decommissioning activities and costs.

   This question would not apply to operations that have been in operation less than five years and which have not changed their decommissioning plans. It may also be difficult to verify that cost estimates have been updated unless previous plans are still available. Policy or procedural documentation requiring such a review and update, or interviews of site personnel may be the only reasonably available evidence for the auditor's response to this question.

3. Has the operation established a financial mechanism approved by the applicable jurisdiction to cover the estimated costs for cyanide-related decommissioning activities as identified in its decommissioning and closure strategy? If so, no further demonstration is required to comply with this Standard of Practice.

   If the political jurisdiction in which the operation is located requires financial assurance for closure or decommissioning, and the operation has provided it in a manner satisfactory to that jurisdiction, then the operation is in compliance with this part of the Standard of Practice regardless of the nature of the mechanism, as long as the amount is sufficient to cover its proposed decommissioning activities.

   It is recognized that if full closure activities are covered by this financial instrument, its amount will be significantly larger than is required for cyanide-related decommissioning. In such a case, the Code does not require that funding for the cyanide-related decommissioning activities be somehow separated from the overall closure funds.

The necessary evidence for the auditor would be documentation from the applicable jurisdiction that the operation has met its requirements for financial assurance in an amount no less than the operation's estimate of cyanide-related third-party decommissioning costs.

4. If the applicable jurisdiction does not require financial guarantees, has the operation established a mechanism other than self-insurance or self-guarantee to cover estimated costs for the cyanide-related decommissioning activities as identified in its decommissioning and closure strategy? If so, no further demonstration is required to comply with this Standard of Practice.

   If not required by the applicable political jurisdiction, then the operation must establish a financial assurance mechanism independently to comply with the Code. This question addresses situations where the operation has provided financial assurance in the form of cash, a bond, a letter of credit or insurance provided by an external entity.

   The auditor should review the operation's documentation that the financial assurance mechanism is in place and in an amount that at least covers its estimated cyanide-related third-party decommissioning costs.

5. If the operation has established self-insurance or self-guarantee as a financial assurance mechanism, has the operation provided a statement by a qualified financial auditor that it has sufficient financial strength to fulfill this obligation as demonstrated by an accepted financial evaluation methodology?

   Operations that use self-insurance or self-guarantee as a financial assurance mechanism for closure or decommissioning must provide the Code auditor with a statement from a qualified financial auditor that it has sufficient financial strength to fulfill this obligation. The financial evaluation must use the most recent audited financial data available for the company, which in no case can be more than one year old, and the estimated cost of decommissioning must reflect the most recent plan revision.

   The evaluation must be based on an accepted financial evaluation methodology such as those described in the U.S. Code of Federal Regulations at 40 CFR 264.143(f), 30 CFR 800.23, 10 CFR 30, Appendix A, or at Sections 13 through 20 of Ontario Regulations 240/00, Mineral Development and Closure, under Part VII of the Ontario Mining Act. Other financial tests can be used if they are considered acceptable by professional financial auditors.

   Verification by the Code auditor would require review of the statement from the financial auditor and confirmation that the self-insurance or self-guarantee was calculated for an amount that covers the operation's estimated cyanide-related decommissioning cost. Additionally, evidence of the financial auditor's professional certification must be provided to the Cyanide Code auditor.

It must be noted that this question applies only where the political jurisdiction has no requirement for financial assurance. If the political jurisdiction requires financial assurance and allows self-insurance or self-guarantee, then the operation is subject to the first of the three financial assurance options discussed under question 3, above.

Principle 6 | WORKER SAFETY

Protect workers' health and safety from exposure to cyanide.

Standard of Practice 6.1

Identify potential cyanide exposure scenarios and take measures as necessary to eliminate, reduce and control them.

Job functions and tasks should be evaluated to determine possible exposure scenarios and pathways. Process changes or engineering controls should be developed and implemented to eliminate these exposures and reduce or control them when they cannot be eliminated.

1. Has the operation developed procedures describing how cyanide-related tasks such as unloading, mixing, plant operations, entry into confined spaces, and equipment decontamination prior to maintenance should be conducted to minimize worker exposure?

   The operation should have written procedures for the tasks identified in this question, as well as others that require management of cyanide. Procedures can be in the form of Standard Operating Procedures, Work Instructions, training materials, posted signs, or other types of documents.

   The same operational procedures as those reviewed in question 1 under Standard of Practice 4.1, which focused on operations, typically would be sufficient for this question and the related safety issues may be addressed either explicitly or implicitly. That is, the procedures can be operational as long as they describe safe practices. Alternately, the operation may have separate safety-related procedures. The level of detail in these procedures should be commensurate with the risks involved with the task.

   The auditor should review these procedures to determine if they describe cyanide-related safe work practices.

2. Do the procedures require, where necessary, the use of personal protective equipment and address pre-work inspections?

   Use of appropriate personal protective equipment such as respirators, personal hydrogen cyanide gas monitors, eye protection, protective gloves, coveralls or suits should be included in written procedures. Use of personal protective equipment may be addressed in operating procedures, safety policies or procedures, safety training programs, signs posted in specific work areas or otherwise disseminated to the employees. Procedures should also

include provisions for conducting pre-work inspections to identify safety issues or concerns, as appropriate and necessary for the operation.

3. Does the operation solicit and actively consider worker input in developing and evaluating health and safety procedures?

   The operation should have some method of obtaining employee input regarding its health and safety procedures and should consider this input in developing and evaluating its procedures. Methods could consist of formal safety meetings, informal pre-work safety sessions, suggestion boxes, involvement of work crews in developing or reviewing Standard Operating Procedures, or other methods.

   The auditor's evidence may include a written procedure calling for such meetings, observation of meetings, presence and use of suggestion boxes, documentation of formal safety meetings or worker suggestions, and interviews with personnel.

Standard of Practice 6.2

Operate and monitor cyanide facilities to protect worker health and safety and periodically evaluate the effectiveness of health and safety measures.

1. Has the operation determined the appropriate pH for limiting the evolution of hydrogen cyanide gas during mixing and production activities?

   The pH of a solution containing cyanide significantly affects the amount of evolved hydrogen cyanide and the potential for workers to be exposed to toxic concentrations of hydrogen cyanide gas. In aqueous solution, the cyanide ion hydrolyzes to form hydrogen cyanide. At a pH of approximately 9.3 to 9.5, the cyanide ion, and hydrogen cyanide are at equilibrium. Higher pH conditions result in greater concentrations of the cyanide ion. At a pH of 10.0, 88% will be in the form of the cyanide ion and when the pH is increased to 11.0, more than 99% will be in the ionic form. Below a pH of approximately 9.3 to 9.5, hydrogen cyanide will be the predominant form of cyanide. While aqueous hydrogen cyanide is soluble in water, it volatilizes rapidly under the temperature and pressure conditions typically found in cyanidation operations. Therefore, maintaining process solutions at a sufficiently high pH is necessary to effectively prevent evolution of significant amounts of hydrogen cyanide gas. In highly saline water or when processing certain ore types, solution chemistry limits how high the pH can be adjusted. Operations should evaluate their solutions to determine the appropriate pH for limiting the evolution of hydrogen cyanide gas and should develop operating procedures and controls to reduce risks to its workforce.

   The operation's target pH may be stated in its general operating plans and procedures or may be within its mixing or dilution procedures. The auditor should also confirm that the operation implements its procedures to maintain the necessary pH of its process solutions. This may include monitoring pH at various points in the production process and adding reagents as necessary to maintain the proper pH conditions.

Evidence may be found in Standard Operating Procedures, records of results from automated pH sensors, daily operator logs and through interviews.

2. Has the operation identified areas and activities where workers may be exposed to hydrogen cyanide gas or cyanide dust in excess of 10 parts per million (ppm) (11 mg/m^3) on an instantaneous basis and 4.7 ppm (5 mg/m^3) continuously over an 8-hour period, as cyanide, and require use of appropriate personal protective equipment in these areas or when performing these activities?

   Operations should limit worker exposure to hydrogen cyanide gas and cyanide dust to 10 ppm (11 mg/m^3) as cyanide on an instantaneous basis. This value is used by the United States Occupational Safety and Health Administration, the Australian National Occupational Health and Safety Commission, the South African Department of Minerals and Energy and the World Bank as an 8-hour time-weighted average, but is recommended as a ceiling or instantaneous limit.

   Additionally, workers should not be exposed to hydrogen cyanide gas and cyanide dust at concentrations exceeding 4.7 ppm (5 mg/m^3) as cyanide for a period of eight consecutive hours or more. This value is recommended by the American Conference of Governmental Industrial Hygienists (ACGIH) as a Ceiling Limit and by the United States National Institute for Occupational Safety and Health (NIOSH) as a 15-minute short-term exposure limit.

   Exposure to cyanide concentrations exceeding these levels is not a usual occurrence at most operations. However, these cyanide concentrations may be experienced at some operations or under some conditions, such as where hypersaline process water makes it difficult to maintain a high pH, and/or when metallurgical conditions require leaching with very high-strength cyanide solutions. Concentrations of cyanide dust in excess of 4.7 ppm may occur during mixing of solid cyanide or in cyanide storage areas. Operations should identify those areas and activities that may expose its workers to these cyanide concentrations and require that cyanide-specific personal protective equipment be worn where process, engineering, or administrative controls are not practicable or effective in limiting worker exposures to these levels.

   Workers should be alerted to the need for necessary personal protective equipment through use of signage, operating procedures, and training. Limits should be established on the length of time workers are allowed in areas or to perform activities that may reasonably be anticipated to continuously expose them to more than 4.7 ppm cyanide.

   The auditor should confirm that the operation has determined the areas and activities where such exposures may occur and require appropriate personal protective equipment or use administrative controls, as necessary. The auditor also should observe and/or interview workers to confirm that these protective measures are being implemented.

3. Does the facility use monitoring devices in process areas and for activities involving management of cyanide to confirm that workers are not exposed to hydrogen cyanide gas

or cyanide dust exceeding 10 ppm on an instantaneous basis or 4.7 ppm continuously over an 8-hour period, as cyanide?

Areas and tasks at mines that may typically present a risk of exposing workers to concentrations of hydrogen cyanide gas or cyanide dust exceeding 10 ppm on an instantaneous basis or 4.7 ppm continuously over an 8-hour period, include:

- reagent unloading and storage areas;
- mixing facilities;
- points where high-strength cyanide solution is introduced into process circuits (dosing areas);
- carbon stripping, washing and regeneration areas;
- the tops of process tanks that are enclosed in buildings;
- CIL screen-cleaning activities; and
- cyanide treatment, destruction and recovery systems.

Operations should have fixed hydrogen cyanide monitors in these locations or use personnel monitors to confirm that workers are not being exposed to excess cyanide levels in these areas or when performing these tasks. The monitors should be alarmed to alert workers of potential instantaneous exposure to 10 ppm and potential exposure to 4.7 ppm over an 8-hour period.

Operations also should have written procedures identifying the actions that will be taken in the event that an alarm is triggered, such as evacuations, donning of appropriate personal protective equipment, restrictions on entry, and investigations on cause.

The auditor can confirm this by observation of monitoring equipment, employee interviews and review of records of monitoring results.

4. Is hydrogen cyanide monitoring equipment maintained, tested and calibrated as directed by the manufacturer, and are records retained for at least three years?

   The operation must maintain, test and calibrate its fixed and personal hydrogen cyanide monitoring equipment as recommended by the manufacturer. Records of these activities must be retained for at least three years and available for review by the auditor. Records must include the actual calibration information rather than simply show that a work order for equipment calibration was completed.

5. Have warning signs been placed where cyanide is used advising workers that cyanide is present, of any necessary personal protective equipment that must be worn, and that smoking, open flames and eating and drinking are not allowed?

   Workers should be alerted to the presence of cyanide and reminded of the various prohibitions regarding its use. The Code does not mandate specific locations, sizes and wording of these signs. Signs can be on doors or other entrances leading to a mill or other

process buildings, posted at storage warehouses and process tank installations, or on gates entering an operation.

Cyanide is also present at heap leach pads and ponds and at tailings impoundments, and this provision also applies to these facilities. The adequacy of posted signs should be evaluated in conjunction with the overall safety training program at the operation, other existing prohibitions, the educational level of the workforce, and other parameters that may affect the need for signage.

For example, signs near every cyanide process tank prohibiting eating may not be necessary if eating is allowed only in designated areas of an operation and this prohibition is part of the operation's written training program. Similarly, the prohibition on open flames is more appropriate in the vicinity of high-strength reagent cyanide than dilute process solutions, as hydrogen cyanide gas is highly flammable, while cyanide salts or solutions are not.

The auditor's observation of signage around the facility would be the primary means of verification. Interviews with site personnel and review of the overall safety and training programs with respect to cyanide safety may also be important in determining whether the workforce has been adequately alerted to the presence and risks of cyanide.

6. Is high-strength cyanide solution dyed for clear identification?

   High-strength cyanide solutions must contain colorant dye for clear identification when observed out of proper containment and for clear differentiation with other solutions or rainwater that may be present. Dye should be added at a concentration that provides a clear visual indicator of the presence of high-strength cyanide solution. For adding dye, high-strength cyanide solution is defined as having a minimum free cyanide concentration of 150,000 mg/l (15%). Dye should be added to solid cyanide prior to or at the time of mixing, either in tanks or in isotainers, so that the resultant cyanide solution is dyed. When liquid cyanide is delivered to an operation, the cyanide producer should dye the solution prior to delivery. If dye is added to solid or liquid cyanide at the operation, the process for dye addition should be clearly identified in operational procedures.

7. Are showers, low-pressure eyewash stations and dry powder or non-acidic sodium bi-carbonate fire extinguishers located at strategic locations throughout the operation and are they maintained, inspected and tested on a regular basis?

   As with warning signage, the Code does not mandate specific numbers and locations of safety showers, eyewash stations or fire extinguishers. In general, this equipment should be available at reagent cyanide off-loading, mixing and storage areas, the tops of CIL tanks, and other areas where personnel may be exposed to cyanide in the normal course of their work.

   The auditor should spot-check safety shower and eyewash stations to confirm they are operating properly. Since water at line pressure can drive contaminants into the eye, the auditor should confirm that the water pressure at eyewash stations is not too high. Safety

showers should be not be located within solid cyanide storage areas unless the system is designed, constructed and maintained to minimize the potential for water to come into contact with cyanide containers or cyanide released from containers during handling. Similarly, portable eyewash stations should be used in these areas to minimize the potential for leaks from water lines to come into contact with cyanide and expose workers to hydrogen cyanide gas.

Carbon dioxide fire extinguishers cannot be used where cyanide is present due to their acidic nature. The auditor should evaluate whether dry powder or non-acidic sodium bi-carbonate fire extinguishers are available where necessary.

The operation should also be able to present maintenance, testing and/or inspection records to the auditor demonstrating that this safety equipment has been routinely evaluated to ensure it is available if needed.

8. Are unloading, storage, mixing and process tanks and piping containing cyanide solution identified to alert workers of their contents, and is the direction of cyanide flow in pipes designated?

   Operations should identify tanks and pipes that contain cyanide solution. The Code does not call for specific terminology, size of signs and labels, or the location and frequency of such identification. These variables are intentionally left to the discretion of the operation, and the auditor must use professional judgment to determine if their implementation at a given operation is adequate.

   The intent of this provision is to ensure that individuals that may come into contact with cyanide or cyanide solutions (including employees involved in maintenance, and any other individual that may be exposed to released solution) be alerted to its presence. Labeling must be evaluated on its functionality; that is, does it provide workers and others with notice that a dangerous material is present as necessary to protect their health and safety. The nature, frequency and specifics of the necessary signage are also related to the operation's overall safety and training programs.

   Labeling on a pipe where access is restricted to trained employees could use words such as "barren solution" rather than "cyanide" if the workers are trained that barren solution contains cyanide and the training is documented. Where the general public may have greater access, a more descriptive label specifically identifying the presence of cyanide or, more generically, a hazardous, poisonous or toxic chemical would be more appropriate.

   The size and frequency of pipeline labeling should allow personnel to track the line and identify its contents, but such labels need not be located to be visible or legible from great distances or from all angles and perspectives. Labels are typically most appropriate at or near pipe junctions, valves, or other locations where releases are most likely or which may require frequent maintenance. Also, labeling of pipes within a tailings impoundment or

heap leach pad would not be necessary if these facilities themselves had signs identifying the presence of cyanide.

A color-coding system can also be used to identify the presence of cyanide (and other chemicals), but only where access is restricted to the workforce, signage provides a key to the color code and there is evidence that workers are trained to understand the significance of color-coded piping.

The direction of flow in pipes carrying cyanide solution should be indicated to reduce the potential for releases and exposures during maintenance. Since the intent of this Standard of Practice is protection of worker health and safety, identifying the flow direction on individual pipes may not be necessary if cyanide concentrations are sufficiently low. A WAD cyanide concentration of approximately 10 to 15 mg/l may be an appropriate cut-off for the need to label individual pipes and this provision may be met by putting signs only on the outside of the mill building identifying that cyanide may be present in all tanks and pipes. This means that in many cases where tailings decant water is recycled back to a mill, it may not be necessary to indicate the direction of flow in every individual pipe carrying mill water.

Verification of this question will entail an observation of the cyanide piping and tanks at the facility, which would include following the reagent pipeline from the off-loading or mixing tank to the locations that the cyanide is added to the production circuit. It may also be necessary to review analytical data to confirm that unlabeled pipes or tanks, or those without the flow direction indicated, contain process solutions with cyanide concentrations that do not pose a threat to worker health and safety.

9. Are Safety Data Sheets, first aid procedures or other informational materials on cyanide safety written in the language of the workforce and available in areas where cyanide is managed?

   Employees should have access to Safety Data Sheets and/or other information on cyanide first aid in areas where cyanide is used. Access to this information is particularly important where reagent-strength cyanide is managed. All safety information provided by the operation should be in the language of the workforce.

   The auditor should observe that safety or warning signage, Safety Data Sheets, first aid procedures and other safety information are available in the language of the workforce in areas where cyanide is used. However, the Code does not specify exact locations, and the auditor must evaluate the need for and availability of this information within the context of the operation's overall safety and training programs. Facilities that have SDS information on their computer system may have SDS available only in control rooms or other areas with computers. In that case the auditor should evaluate the accessibility of the appropriate SDS or other cyanide emergency informational materials to emergency responders in a timely fashion. In many cases, having first aid information available with the cyanide first aid kits and/or where reagent-strength cyanide is managed will be sufficient.

10. Are procedures in place and being implemented to investigate and evaluate cyanide exposure incidents to determine if the operation's programs and procedures to protect worker health and safety and to respond to cyanide exposures are adequate or need to be revised?

    The operation should have a written procedure for investigating and evaluating cyanide exposure incidents that is designed to determine if the operation's policies and programs to prevent such incidents are adequate or whether they need to be revised. This procedure need not be specific to cyanide incidents.

    The auditor should review the written procedure as well as records of past investigations. If there have not been any cyanide-related incidents, then records of other accidents or incidents should be reviewed to confirm that the operation is implementing the general program for incident investigation. If the operation does not have any written records indicating that procedures have been revised in response to a previous incident, then the auditor must rely on interviews with workers and safety personnel as evidence.

Standard of Practice 6.3

Develop and implement emergency response plans and procedures to respond to worker exposure to cyanide.

Although every effort must be made to eliminate risks to workers from exposure to cyanide, operations must nonetheless be prepared for such exposures with effective response procedures and trained personnel.

1. Does the operation have oxygen, a resuscitator, antidote kits and a radio, telephone, alarm system or other means of communication or emergency notification readily available for use at cyanide unloading, storage and mixing locations and elsewhere in the plant?

   The auditor must determine if the operation has the necessary equipment for emergency response to a worker exposure to cyanide. The auditor should verify that the operation has a manual resuscitator available or a CPR face mask that can be used with medical oxygen to resuscitate patients that are not breathing. Any reliable means of emergency communication or notification (radio, alarm system, or telephone) is equally acceptable.

   It must be noted that allowable antidotes for cyanide poisoning differ between various political jurisdictions, and in some cases, no antidote other than oxygen is permitted. Intravenous antidotes such as sodium nitrite, sodium thiosulfate, and 4-dimethylaminophenol (DMAP) are typically administered only by certified medical personnel, while amyl nitrite is inhaled, and can be administered by trained non-medical personnel. However, all antidotes other than oxygen can themselves be harmful depending on the dose and the patient's overall health and must be administered with great care and with an understanding of the patient's pre-existing medical condition.

2. Does the operation inspect its first aid equipment regularly to ensure that it is available when needed, and are materials such as cyanide antidotes stored and tested as directed by their manufacturer and replaced on a schedule to ensure that they will be effective when needed?

   Where antidotes are available on site, they must be maintained within the prescribed temperature range and labeled expiration date. Oxygen cylinders must be maintained full and the oxygen washer kept free of cracks, dirt, grease and oil.

   The operation should inspect its cyanide first aid equipment regularly and have inspection records for the auditor's review. The auditor should observe the dates on antidotes to ensure they have not expired, and determine if they are stored within the temperature range specified by their manufacturer. The operation is not required to place a recording thermometer with the antidote to verify the temperature range to which is it exposed; this can be estimated from ambient conditions or the general range of temperature-controlled areas.

3. Has the operation developed specific written emergency response plans or procedures to respond to cyanide exposures?

   The operation should have a written procedure detailing the necessary response to cyanide exposure through ingestion, inhalation and absorption through the skin and eyes. The procedure can be on signs that are posted at strategic locations, included in the cyanide first aid kits, in an Emergency Response Plan, or included in Standard Operating Procedures, Safety Procedures or other documentation.

4. Does the operation have its own on-site capability to provide first aid or medical assistance to workers exposed to cyanide?

   The operation should have some type of on-site capability to respond to cyanide exposures. This could be trained medical personnel, emergency medical technicians, or, at a minimum, operations personnel who are trained in cyanide first aid. Where antidotes are used that require intravenous administration or injection and must be administered by specially-trained personnel, such as medical professionals or nurses, the auditor should confirm that the operation has evaluated the response time necessary for a qualified responder to reach and treat a potential victim.

   For other than doctors and nurses, the auditor should be able to review training records demonstrating that designated response personnel have received specific training in cyanide first aid, including administration of oxygen and use of antidotes (where allowed). When on-site capabilities are relied upon, auditors should ascertain that the on-site capabilities are available during all working shifts.

5. Has the operation developed procedures to transport workers exposed to cyanide to locally available qualified off-site medical facilities?

Depending on the operation's location, transport to an off-site medical facility may be as simple as a quick trip by vehicle or as elaborate as evacuation by plane or helicopter. Operations should have a written procedure in the event that an exposed worker requires treatment at an off-site medical facility unless the operation has the necessary medical capabilities and equipment on-site and does not rely on external medical facilities.

6. Has the operation informed local medical facilities of the potential need to treat patients for cyanide exposure? Is the operation confident that the medical facility has adequate, qualified staff, equipment and expertise to respond to cyanide exposures?

   Operations that may need to transport a cyanide exposure victim to an off-site medical facility for treatment should have made some type of formalized arrangement with that facility. At a minimum, the operation should have made the facility aware in writing that it may be asked to treat a victim of cyanide poisoning, and the operation should have determined if the medical facility has adequate and qualified staff, equipment and expertise to provide treatment for cyanide exposure. The operation is not expected to conduct an exhaustive investigation into the qualifications of the medical staff. Rather, the operation should at least be sufficiently familiar with the facility to know that is has the equipment and expertise necessary to provide a patient with the appropriate treatment.

Principle 7 | EMERGENCY RESPONSE

Protect communities and the environment through the development of emergency response strategies and capabilities.

Standard of Practice 7.1

Prepare detailed emergency response plans for potential cyanide releases.

1. Has the operation developed an Emergency Response Plan to address potential accidental releases of cyanide and cyanide exposure incidents?

   This question asks if there is an Emergency Response Plan. Details of the Plan are addressed in subsequent questions and Standards of Practice. The Code does not require that the necessary information be complied in a specialized document addressing cyanide only, or in any particular format. Emergency response information also may be included in Standard Operating Procedures, Operating Plans, Contingency Plans, First Aid or Safety Procedures, or other documents.

2. Does the Plan consider the potential cyanide failure scenarios appropriate for its site-specific environmental and operating circumstances, including the following, as applicable:

   a) Catastrophic release of hydrogen cyanide from storage, process or regeneration facilities?
   b) Transportation accidents occurring on site or in close proximity to the operation?
   c) Cyanide releases during unloading and mixing?
   d) Cyanide releases during fires and explosions?

e) Pipe, valve and tank ruptures?
f) Overtopping of ponds and impoundments?
g) Power outages and pump failures?
h) Uncontrolled seepage?
i) Failure of cyanide treatment, destruction or recovery systems?
j) Failure of tailings impoundments, heap leach facilities and other cyanide facilities?

The Plan should be a well-thought-out document that addresses the potential release scenarios at the site in a realistic manner and with an appropriate degree of specificity. In particular, auditors should ensure that plan adequately describes how response actions are to be accomplished, and that response actions are site specific and are not described generically.

Although formal risk assessments, dam break analyses or other documented evaluations all can be used to determine the potential release scenarios appropriate for consideration in the Emergency Response Plan, such detailed and documented approaches are not required for Code compliance. If the scenarios addressed in the emergency planning documents are appropriate, the method used by the operation to identify them is not relevant to Code compliance.

The operation's Emergency Response Plan and/or related documentation should focus on site-specific circumstances and responses, at least with respect to cyanide. The auditor should determine if these documents address those release scenarios that may reasonably be expected to occur and result in significant impacts to its workers, community and environment, as applicable to the site-specific features of the operation and its environmental setting. However, compliance with the Code does not require that each scenario be separately addressed under its own heading; rather, the response actions included in the Plans should be appropriate for the applicable scenarios.

Note that this specific question is focused on whether the Emergency Response Plan considers appropriate release scenarios, and not on whether the responses are appropriate, which is addressed in question 4, below.

3. Has planning for response to transportation-related emergencies considered transportation route(s), physical and chemical form of the cyanide, method of transport (e.g., rail, truck), the condition of the road or railway, and the design of the transport vehicle (e.g., single or double walled, top or bottom unloading)?

   Operations will typically need to address releases during transport of reagent cyanide to the site, even if this is limited to that portion of the delivery route that takes place within the operation's property. This may also include areas in proximity to the site if the operation would assist the producer and/or transporter or if the operation is responsible for such a response. Although not an auditable Code requirement, it is a good practice for operations to enter into mutual aid agreements with other mines or entities located nearby or on its cyanide transport routes.

The factors identified in this question should be considered and directly addressed in the Plan to the extent that they affect the nature and location of the release and the necessary response action.

4. Does the Plan describe:

   a) Specific response actions (as appropriate for the anticipated emergency situations) such as clearing site personnel and potentially affected communities from the area of exposure?
   b) Use of cyanide antidotes and first aid measures for cyanide exposure?
   c) Control of releases at their source?
   d) Containment, assessment, mitigation and future prevention of releases?

   Emergency response planning documents should address the types of releases and responses that may reasonably be expected to occur at the operation and include sufficient details so that personnel know the specific actions they are expected to take in response to the emergency. It is not the intent of the Code to require infinite details for every conceivable release scenario and variation, or for the operation to generate lengthy and complex response plans that do not provide useful information. At a minimum, emergency response planning documents should address the types of releases and responses that may reasonably be expected to occur at the site. The degree of detail and specificity needed in the Plans will depend on the environmental setting of the operation, the nature of potential receptors, and the controls in place at the facility.

   In complex terrain or at locations with surface water or nearby or downstream communities, it may be appropriate to identify the flow path for spills from specific segments of a process solution pipeline, and to provide specific response actions such as shutting off a particular pump to stop the flow or constructing an emergency dike at a pre-determined location to prevent the release from entering the water body.

   In other cases where all releases from a site would be to adjacent soil only, there may be little need to specify each potential release scenario or to differentiate between response actions.

   The Plan itself does not necessarily need to identify all possible scenarios if they all lead to the same response. For example, a Plan could indicate that potential releases fall into the following categories: release of high-strength cyanide solution, release of low-strength cyanide solution, releases during dry conditions and releases during wet conditions. Responses could then address each situation and if the specific location of the release does not change the response, (for example, all releases can only go to the soil), then no further detail would be necessary. In such a case, or where all facilities and pipelines are within secondary containment, it may not be necessary for the Emergency Response Plan to identify specific valves, switches or pumps that must be used to stop the flow. Similarly, if the operation's procedure is to notify a control room operator of the release and for the operator to shut-down the appropriate equipment and cease the flow of released material,

then the identification within the Plan of specific valves, switches or pumps would not be necessary.

However, when addressing high-strength cyanide solutions, it typically will more be appropriate to identify critical valves, switches or pumps so that worker exposure to reagent-strength cyanide can be halted as soon as possible.

The auditor's evaluation of the Emergency Response Plan and related documents should consider these factors of environmental setting, potential receptors, and the facility's overall response strategy (that is, whether the first responder is expected to halt the release or is this the responsibility of operations personnel) in determining if its level of detail is appropriate. This may be an area where an auditor finds the operation in full compliance but still recommends that additional details be added.

Standard of Practice 7.2

Involve site personnel and stakeholders in the planning process.

1. Has the operation involved its workforce and external stakeholders, including potentially affected communities, in the cyanide emergency response planning process?

   The operation should involve its own site personnel in the emergency planning process. Site personnel have the best knowledge of the operation, so they frequently can best identify potential release scenarios, available resources, and workable responses. While a site may use a consultant to prepare its response plan or may base its Plan on one originally developed for use at another facility, input from or review by site personnel will result in a Plan that better reflects the site-specific circumstances of the operation and results in enhanced protection of workers, communities and the environment.

   This question also applies to external entities having direct emergency response roles, such as fire departments, or those providing other support and services during emergencies, such as ambulance services and local hospitals. Potentially affected communities should also be involved in the emergency planning process to the extent that they may be affected by an emergency or are part of response actions called for in the Plan. If, for example, the Plan calls for evacuation of a nearby community, then that community or its representatives should be included in the planning process.

   The evidence for the necessary involvement in plan preparation may not be well documented. The plan itself may not state how it was prepared, and there may be no written record of consultation with external stakeholders. In such a case, the auditor must rely on interviews with site personnel and off-site stakeholders as well as information in the Plan itself to answer this question.

   Involvement of external stakeholders in the emergency planning process may not be necessary for Code compliance if no external stakeholders have designated responsibilities under the Plan. For example, a remote operation may not have nearby residents or

communities that might be impacted, and may not have direct involvement from any external responders, such that no external entities would need to be involved in the emergency planning process.

2. Has the operation made potentially affected communities aware of the nature of their risks associated with accidental cyanide releases, and consulted with them directly or through community representatives regarding appropriate communications and response actions?

   Even when a nearby community has not been assigned a designated role in emergency response, it still may be necessary to make the community aware of the potential risk and advise it of any actions that may be required. An operation should have consulted with the community or its representatives as necessary to identify the risks of any release scenarios that may affect it, and to advise the community of how the operation will communicate with it.

   In some cases, the operation will also need to advise the community as to what it must do in the event of a release. An example of this would be a situation where the operation has identified a spill to a nearby river as a potential release scenario and where a community downgradient of the operation uses the river water for drinking. In such a case, the operation should advise the community and its water authority of the potential for a release, the alarm system or procedure that would be used to alert them in the event of a release, and the need to close the intake of its water supply system. This consultation could be in the form of open town meetings, briefings for community leaders, coordination with the water authorities, or other forms.

   This question would not be applicable if there is not a community that may potentially be affected.

3. Has the operation identified external entities having emergency response roles, and involved those entities in the cyanide emergency response planning process?

   If an Emergency Response Plan designates specific response roles for external responders or medical facilities, then at a minimum, those responders and medical facilities should be involved in the emergency planning process. The nature of such involvement depends on the role the external responder would play. Involvement may be as simple as reviewing the Emergency Response Plan to confirm that the external responder can fulfill its designated role. Alternatively, if the Emergency Response Plan calls for an external fire department or hazmat team to respond to an on-site release or an external medical facility to respond to an on-site exposure, then the responders should have first-hand knowledge of the site and the available resources and should provide their input to the specific procedures to be used.

   However, no such involvement would be necessary if, for example, the medical facility was expected to treat cyanide exposure victims when brought to the facility, but would not itself be part of the actual on-site response. It is also possible that no local response agencies

would be involved with a cyanide release from the operation. In such a case where the operation takes full responsibility for response to a release, this question would not apply.

There may be little documentation that the auditor can use as evidence of external involvement. If records of meetings or other involvement in emergency response planning are not available, the auditor's finding must be based on interviews with on-site and off-site personnel.

4. Does the operation engage in consultation or communication with stakeholders to keep the Emergency Response Plan current?

   Continuing consultation with stakeholders regarding emergency response may be appropriate in some cases. The frequency and nature of this consultation will depend on the nature of the Emergency Response Plan and the involvement of stakeholders such as external responders and communities.

   Periodic dialogue with external responders would be appropriate when these stakeholders have specific responsibilities in the Plan or the operation's response actions are dependent on the actions of these responders. It is possible that no continuing consultation would be needed if the Plan does not designate any responsibilities to stakeholders such as external responders and communities.

   The necessary consultation may be difficult to verify if the operation has not documented the process. If records of meetings or other consultation are not available, the auditor's findings must be based on interviews with on-site and off-site personnel.

Standard of Practice 7.3

Designate appropriate personnel and commit necessary equipment and resources for emergency response.

1. Do the cyanide-related elements of the Emergency Response Plan:

   a) Designate primary and alternate emergency response coordinators who have explicit authority to commit the resources necessary to implement the Plan?
   b) Identify Emergency Response Teams?
   c) Require appropriate training for emergency responders?
   d) Include call-out procedures and 24-hour contact information for the coordinators and response team members?
   e) Specify the duties and responsibilities of the coordinators and team members?
   f) List emergency response equipment, including personal protection gear, available on-site?
   g) Include procedures to inspect emergency response equipment to ensure its availability?
   h) Describe the role of external responders, medical facilities and communities in the emergency response procedures?

The Emergency Response Plan should address each of the items identified in this question regarding response to a cyanide release or exposure. The auditor should review the operation's documentation to ensure that each item is addressed as appropriate for the operation. This information need not be in a specific document called an Emergency Response Plan.

2. Has the operation confirmed that external entities with roles and responsibilities identified in the Emergency Response Plan are aware of their involvement and are included as necessary in mock drills or implementation exercises?

   External responders should be made aware of the roles assigned to them in the Emergency Response Plan and should be part of any mock response drills that simulate a cyanide release or exposure which would trigger their involvement.

   The evidence needed to verify this would include records of meetings, confirmation that these entities were sent copies of the Emergency Response Plan, and interviews with on-site and off-site personnel, as well as documentation of mock drills indicating the various parties that participated in the drills.

Standard of Practice 7.4

Develop procedures for internal and external emergency notification and reporting.

1. Does the Plan include procedures and contact information for notifying management, regulatory agencies, external response providers and medical facilities of the cyanide emergency?

   The auditor should review the Emergency Response Plan and/or other documentation to verify that contact information for each of the entities listed in this question is available and up to date. Regarding external responders, the Plan need only provide contact information for those responders with designated responsibilities to implement the Plan.

2. Does the Plan include procedures and contact information for notifying potentially affected communities of the cyanide related incident and any necessary response measures, and for communication with the media?

   This question is similar to question 1, above, but addresses notification to the public and communication with the media. The necessary information should be available for the auditor's review in the Emergency Response Plan or other documentation. Procedures and contact information regarding potentially affected communities is necessary only when there is such a community. Communities may have responsibility for their own protection in terms of evacuations or avoidance of contaminated water. If appropriate, a back-up contingency communication system should be considered.

   Operations should have contact information and written procedures for communicating with the media regarding cyanide incidents.

3. Does the operation have a procedure for notifying ICMI of any significant cyanide incidents, as defined in ICMI's *Definitions and Acronyms* document? Have all such significant cyanide incidents that have occurred been reported to ICMI?

   A cyanide emergency that constitutes a "significant cyanide incident" as defined in the Code's *Definitions and Acronyms* document requires notification to ICMI pursuant to Section VI.A. of the Code's *Signatory and Certification Process* and as agreed to by the signatory company in ICMI's *Signatory Application Form*.

   The Emergency Response Plan or other documentation should include a requirement and details to notify ICMI of any significant cyanide incidents, as defined in ICMI's *Definitions and Acronyms* document. Operations should have evidence that ICMI has been notified when such incidents have occurred. Any incidents meeting the definition for significant cyanide incidents that have not been reported should be reported to ICMI prior to submission of the draft audit reports to ICMI.

Standard of Practice 7.5

Incorporate remediation measures and monitoring elements into response plans and account for the additional hazards of using cyanide treatment chemicals.

1. Does the Plan describe specific remediation measures as appropriate for the likely cyanide release scenarios, such as:

   a) Recovery or neutralization of solutions or solids?
   b) Decontamination of soils or other contaminated media?
   c) Management and/or disposal of spill clean-up debris?
   d) Provision of an alternate drinking water supply?

   The Emergency Response Plan or other documentation should address each of the remediation issues in this question, although the potential provision of an alternate drinking water supply will only be applicable where a release from the operation can adversely impact a drinking water supply. Simple generic statements such as "clean up the spilled material" or "neutralize with sodium hypochlorite" are not sufficient, as they do not provide any guidance on how these tasks are to be accomplished.

   Procedures for recovery of released cyanide solution or solids should specify where these materials are to be taken or disposed. Procedures for neutralization or decontamination of cyanide spills should, to some degree:

   - identify what treatment chemical is to be used and where it is stored;
   - describe how the treatment chemical is to be prepared to the appropriate concentration; and
   - define the end point of the remediation, including how samples will be taken, what analysis will be performed, and what final concentration will be allowed in residual soil as evidence that the release has been completely cleaned up.

Where an operation relies on contracted external entities, such as firms specializing in emergency response, or management of hazardous material and hazardous wastes, auditors should ensure that the procedures of the contracted entity include language that address decontamination, management, and disposal of cyanide-contaminated materials, including the ultimate destination of any disposed material.

2. Does the Plan prohibit the use of chemicals such as sodium hypochlorite, ferrous sulfate and hydrogen peroxide to treat cyanide that has been released into surface water or that has the potential to reach surface water?

   The two major chemical treatment methods used to remediate cyanide in the environment are oxidation (using chemicals such as sodium hypochlorite and hydrogen peroxide or biological treatment) and complexation (using ferrous sulfate). Although both can be effective in reducing the impacts of cyanide released onto the land, it must be recognized that there are no safe and effective options to treat cyanide once it has entered natural surface waters such as streams and lakes.

   Sodium hypochlorite and ferrous sulfate must never be used to treat cyanide that has been released into natural surface water bodies. Both of these chemicals are toxic to aquatic life. Treatment with sodium hypochlorite can produce cyanogen chloride (ClCN), which is hazardous to humans and aquatic life. Moreover, these chemicals have very limited effectiveness in treating cyanide at the pH of natural surface waters. Their utility is further reduced by the practical difficulty of adding them to surface water in a manner that allows for adequate contact and mixing with a cyanide plume, especially in a flowing stream or river. Although hydrogen peroxide is a less toxic and persistent oxidant than sodium hypochlorite, it is also harmful to aquatic life and its effectiveness is similarly limited by the lack of a means to mix it with the cyanide.

   This prohibition on the use of treatment chemicals in surface water also applies to normally dry drainages since these may flow in response to precipitation and deposit residual treatment chemicals into downstream surface water. The operation's Emergency Response Plan or other documentation should include a specific prohibition on such use of treatment chemicals. This prohibition is not necessary where a release would not reasonably be expected to enter surface water because there are no surface water bodies in the immediate vicinity of the operation.

   Chemicals such as hydrogen peroxide, sodium hypochlorite and ferrous sulfate can be used to treat releases of cyanide to land. Ferrous sulfate binds cyanide in an insoluble complex but does not chemically convert it to a less toxic substance. The complex formed is susceptible to photodecomposition and can release cyanide back to the environment if it is not properly managed. Application of hypochlorite to neutralize a cyanide spill on land will oxidize the cyanide to the less toxic cyanate, which breaks down to ammonia and carbon dioxide. Hypochlorite and ferrous sulfate both must be used carefully to avoid their introduction into aquatic systems, and soil contaminated with these chemicals should be excavated and disposed of in compliance with the Code and applicable requirements (i.e.,

with mill tailings or on a leach pad). Biological treatment of contaminated soil is also possible but is much slower than chemical treatment.

Although it may not be possible to detail all remediation actions in advance of an actual release, procedures should include sufficient information to provide a basis for decision-making during an emergency.

Where an operation relies on an external entity for emergency response or remediation, such as a spill response company, the auditor should ensure that the contracted entity has a copy of the operation's procedure prohibiting use of these chemicals in surface waters, or includes this prohibition in its own procedures.

3. Does the Plan address the potential need for environmental monitoring to identify the extent and effects of a cyanide release, and include sampling methodologies, parameters and, where practical, possible sampling locations?

   To the extent practical, an operation should plan for the necessary monitoring activities in the event of a release. Based on the potential release scenarios identified in its Emergency Response Plan, the operation should determine the sampling and analytical methodologies it will use if cyanide is released to the land surface or to surface water.

   In some cases, it may also be feasible to determine the necessary sampling locations. For example, if the potential flow path of a release can be predicted from the site's topography, then sampling locations can be established at the point of entry into a surface water as well as upstream and downstream. To the extent practical, this type of information, which may also address the sampling associated with remediation activities, should be included in the Emergency Response Plan or other documentation.

   Alternately, sampling locations could be identified in a more generic manner. For example, the Emergency Response Plan could call for sampling of the released material, sampling immediately downstream of the point where the release enters a river, and sampling at specified distances upstream and downstream from the point where the release enters the river.

Standard of Practice 7.6

Periodically evaluate response procedures and capabilities and revise them as needed.

1. Does the operation review and evaluate the cyanide related elements of its Emergency Response Plan for adequacy on a regular basis?

   The Code sets no specific time frame for a review of the cyanide-related elements of the Emergency Response Plan. Information such as the names and contact information for Emergency Response Coordinators and Emergency Response Team members should be updated as needed to ensure its accuracy. A requirement for this review and revision should be included within the Plan itself or some other policy or procedural document.

The evidence that such a review and revision has been conducted may be in the form of a recently-dated update to the Emergency Response Plan and records of previous plan versions. It may be necessary to verify that the operation has performed a review through interviews with site personnel if not otherwise documented within the Plan itself.

2. Are mock cyanide emergency drills conducted periodically?

   Mock emergency drills are invaluable for testing and evaluating an operation's procedures for response to cyanide releases and exposures and testing and evaluating the training provided to response personnel. Provisions for conducting drills should be included in emergency response plans. Operations should conduct at least one mock emergency drill each calendar year. Drills should be field exercises (i.e., not tabletop exercises) that closely simulate actual cyanide release and exposure incidents and should be designed to test the adequacy of the Emergency Response Plan and the operation's response capabilities and preparation, including training and equipment availability.

   The specific nature of the events simulated in drills is up to the operation. However, it is critical that the entire cyanide emergency response process, from the initial emergency call-out notification through to the close-out of the response process, be tested annually. This may be accomplished as a single, comprehensive drill, or as multiple drills, each testing different components of the response process. For example, a mock drill simulating a liquid cyanide release with dermal exposure of a maintenance worker could be conducted as two separate drills; one drill addressing the spill and one drill addressing first aid treatment and medical care. During the three-year period drills should include a variety of potential release scenarios such as release of hydrogen cyanide gas, liquid cyanide, or solid cyanide, and should include a variety of worker exposure scenarios, such as inhalation, ingestion, and dermal exposure as applicable to the operation. The operation should avoid testing the same release and exposure scenarios from year to year.

   All personnel that may be expected to provide emergency response should take part in response drills to ensure they are able to perform response tasks when required. Additionally, the operation should invite external responders that are identified as having response roles, such as fire departments or ambulance services, and potentially affected communities to participate in simulations when appropriate, as this can enhance the benefits of the exercise by testing the entire response process, creating a more realistic event, and familiarizing all potential participants with the operation. The operation should make formal contact such as by written correspondence with these external entities and should maintain records demonstrating that they were formally invited to participate in emergency mock drills.

   The operation should document and evaluate the drills conducted to determine the adequacy of its planned response procedures and its training of response personnel. Revisions to the Emergency Response Plan and/or the response training program should be made based on the lessons learned from the simulation.

Auditors should review records and interview response personnel to confirm that mock drills 1) are conducted at least annually; 2) address release and exposure scenarios appropriate for the operation; 3) involve on-site and external personnel that may be expected to respond to cyanide incidents; 4) are evaluated to determine the adequacy of the planned actions and training of responders; and 5) result in improvements to the operation's response plans and training programs, as necessary.

3. Are provisions in place to evaluate and revise the Emergency Response Plan, as necessary, following mock drills and following an actual cyanide-related emergency requiring its implementation? Have such evaluations been conducted?

   The Emergency Response Plan itself or other procedural documentation should call for an evaluation of the Plan following emergency mock drills and any emergency that required its implementation.

   The evidence of such a review may be in the form of a recently-dated update to the Emergency Response Plan and copies of previously revised plans. It may be necessary to verify the response to this question based on interviews with site personnel if not documented within the Plan itself. The auditor should indicate whether reviews of the plan were conducted following mock drills and any actual cyanide emergencies that occurred during the audit period.

Principle 8 | TRAINING

Train workers and emergency response personnel to manage cyanide in a safe and environmentally protective manner.

Standard of Practice 8.1

Train workers to understand the hazards associated with cyanide use.

1. Does the operation train all personnel who may encounter cyanide in cyanide hazard recognition?

   The operation should have written training programs or training materials that provide all personnel who may encounter cyanide with training in recognizing the cyanide materials present at the operation, the health effects of cyanide, the symptoms of cyanide exposure, and the procedures to follow in the event of exposure.

   The auditor should review training materials and records and interview employees to verify that cyanide hazards are adequately addressed and personnel who may encounter cyanide receive this training.

2. Is cyanide hazard recognition refresher training periodically conducted?

   Periodic refresher training in cyanide hazard recognition should be provided to all employees who may encounter cyanide.

The auditor should verify that refresher training is being conducted by reviewing training materials and training records and interviewing personnel in the field.

3. Are cyanide training records retained?

   The operation should retain training records pertaining to cyanide hazard recognition, and be able to demonstrate that personnel received both initial and refresher training in cyanide hazard recognition.

Standard of Practice 8.2

Train appropriate personnel to operate the facility according to systems and procedures that protect human health, the community and the environment.

1. Does the operation train workers to perform their normal production tasks, including unloading, mixing, production and maintenance, with minimum risk to worker health and safety and in a manner that prevents unplanned cyanide releases?

   All personnel involved in the management of cyanide should be trained to perform their assigned tasks in a safe and environmentally sound manner. However, task training need not be focused on safety issues or protection of communities and the environment. Rather, task training is intended to instruct new employees on how to accomplish their assigned tasks safely, and implicit in this is that the required procedures are designed such that the tasks are accomplished in a manner that prevents exposures and releases.

   This question asks if such training is given, and the answer is not dependent on how formalized the training may be.

   Verification would be through interviews with field personnel engaged in cyanide management activities and review of the operation's training materials.

2. Are the training elements necessary for each job involving cyanide management identified in training materials?

   The operation's training program should identify the specific cyanide management elements that each employee must be trained in to properly perform the required tasks. Training based on the written Standard Operating Procedures discussed in question 1 under Standard of Practice 4.1 should typically comply with this Standard of Practice. Compliance does not require that detailed step-by-step task training documents be used, but at a minimum there be some type of list or identification of the important items or elements that must be conveyed to an employee regarding how various cyanide-related tasks must be performed.

   Operations that rely solely on experienced personnel to train new employees may not be in compliance with this Standard of Practice unless there is a written list of the important

elements of each job to verify that the training addresses the necessary cyanide-related issues.

3. Is task training related to cyanide management activities provided by an appropriately qualified person?

   Employee task training should be conducted by individuals with knowledge of the specific tasks to be accomplished and with experience in effective communication techniques. This could include dedicated trainers with knowledge of the necessary tasks or supervisory or line personnel with experience in training. If operations personnel conduct the training, verification may include interviews with trainers to determine their level of expertise in operating the facilities and in training.

4. Are employees trained prior to working with cyanide?

   Employees should have received their task training before being allowed to work with cyanide in an unsupervised manner. This may be a standard practice, but where an operation has not included it in a policy or procedural document, verification would be by interview with field and supervisory personnel.

5. Is refresher training on cyanide management provided to ensure that employees continue to perform their jobs in a safe and environmentally protective manner?

   Refresher training on cyanide management is one way for an operation to ensure that employees continue to perform their jobs in a safe and environmentally protective manner. Such training should be specific to the assigned cyanide-related work tasks and may also address cyanide safety.

   As an alternative to refresher task training, an operation could conduct formal or informal evaluations of how well employees perform their assigned tasks. Formal evaluations can be verified by a review of the evaluation record, but if evaluations are informal observations, then interviews with supervisory personnel will be the primary evidence.

6. Does the operation evaluate the effectiveness of cyanide training by testing, observation or other means?

   Operations should evaluate the effectiveness of their task training. Evaluation methods could be testing at the completion of training, observation of employees performing their tasks after initial training, or some other method of evaluation.

   The auditor's verification of such evaluation would be through a review of records for formally documented evaluations or from interviews with site personnel.

7. Are records retained throughout an individual's employment documenting the training they receive? Do the records include the names of the employee and the trainer, the date of

training, the topics covered, and if the employee demonstrated an understanding of the training materials?

While verification solely through interviews can be appropriate for some of the training aspects, the Code expects operations to retain records of task training. Records of personnel interviewed in the field should be compared with verbal information to verify that:

- workers have received initial task training;
- the task training addresses the critical elements of safe performance of tasks;
- qualified personnel provide the training;
- personnel are trained prior to working with cyanide in an unsupervised manner; and
- the operation evaluates the effectiveness of task training.

However, the auditor must recognize that many employees will have worked at the operation for years and may have received their task training prior to the operation seeking certification under the Code. Since there can be no expectation that the operation was Code-compliant when these employees were trained, documentation of initial and refresher task training cannot be expected for these employees. Therefore, not all employees may have undergone a formalized and documented task training program so that the auditor may have to focus on the task training program itself rather than its implementation in the past, especially during initial Code certification audits.

Standard of Practice 8.3

Train appropriate workers and personnel to respond to worker exposures and environmental releases of cyanide.

1. Are all cyanide unloading, mixing, production and maintenance personnel trained in the procedures to be followed if cyanide is released, including decontamination and first aid procedures?

   Employees working in areas where cyanide is present should be trained in what to do if they observe a cyanide release or exposure. Employees involved in reagent handling and production activities are the most likely to be the first on the scene if a release occurs and should be trained to perform the response tasks assigned to them in the operation's response procedures. However, the Code does not require that these employees necessarily be designated and trained as emergency responders. The operation may address emergency response by requiring personnel observing an exposure incident to call for the assistance of a designated Emergency Response Team rather than providing every employee with cyanide spill response and first aid training and expecting them to respond.

   The auditor should review the operation's training program, safety program or other policies, procedures and plans to determine how the operation's response program is structured and if personnel involved in unloading and mixing cyanide, cyanidation processes, and maintenance of cyanide facilities have received training regarding roles in

response to cyanide releases and exposures. Verification of the implementation of this provision would be through interviews with field personnel and review of training records.

2. Are Emergency Response Coordinators and members of the Emergency Response Team trained in the procedures included in the Emergency Response Plan regarding cyanide, including the use of necessary response equipment?

   Designated responders must be familiar with their response roles as described in the Emergency Response Plan, or other applicable emergency response procedures, as well as with the use of the necessary response equipment (e.g., Self-Contained Breathing Apparatus). Question 1 under Standard of Practice 7.3 asked if the Plan included the necessary training requirements for response personnel. This question focuses on the implementation of that provision, and verification would be through interviews with these personnel and review of training records.

3. Has the operation made external responders, such as local fire brigades and emergency medical services familiar with those elements of the Emergency Response Plan related to cyanide?

   Coordination with external responders is only necessary to the extent that they are designated with specific duties or responsibilities in the Emergency Response Plan.

   Unless the operation has retained notes of meetings and/or correspondence with external responders, the auditor will have to rely on interviews with site and off-site personnel to verify that this has been done.

4. Is refresher training for response to cyanide exposures and releases regularly conducted?

   This question applies to all employees with designated roles or responsibilities in the event of a cyanide exposure or release. Whether the operation requires the observer of an exposure to make the necessary notifications but not necessarily to respond, or has trained all personnel in response procedures, personnel should be given regular refresher training to remind them of the required procedures.

   Verification would be through interviews with these personnel and review of training records.

5. Are records retained documenting the cyanide emergency response training, including the names of the employee and the trainer, the date of training, the topics covered, and how the employee demonstrated an understanding of the training materials?

   The operation should retain records of emergency response training including the information identified in this question. This documentation will provide the auditor with additional evidence that the operation:

- provided initial and refresher training in response to cyanide exposures and releases for appropriate personnel;
- made designated response personnel familiar with implementation of the Emergency Response Plan; and
- required designated responders to demonstrate their understanding of the training material.

Operations may also provide responders with training by third-party contractors specializing in hazmat response, emergency response and/or first aid. This can provide broader training than may be applicable on site, but does not substitute for site-specific training on the types of releases and defined responses that are addressed in the operation's own Emergency Response Plan or other applicable procedures.

Principle 9 | DIALOGUE AND DISCLOSURE

Engage in public consultation and disclosure.

Standard of Practice 9.1

Promote dialogue with stakeholders regarding cyanide management and responsibly address identified concerns.

1. Does the operation provide stakeholders with information on its cyanide management practices and engage with them regarding their concerns?

   An open dialogue between a mining operation and its stakeholders regarding the safe management of cyanide is necessary in establishing a mine's social license to operate. The frequency and format for dialogue with stakeholders is not specified by the Code, but should be appropriate for the issues discussed and the nature of the concerns.

   Mines can disseminate this information and promote interaction with stakeholders through a variety of means, including:

   - having an "open-door" policy for responding to inquiries, with designated staff available to respond to stakeholder questions;
   - advertising the availability of site tours for interested parties whereby stakeholders can learn how cyanide is managed to protect workers, communities and the environment;
   - advertising a phone number or email address that interested parties can use to ask questions of site personnel regarding the operation's cyanide management practices; and
   - developing newsletters and briefing papers on their cyanide management practices and making them available to stakeholders and other interested parties.

   More formalized processes for stakeholder input and community dialogue include the creation of citizen's advisory panels and hosting periodic public meetings for local communities or community leaders. These may be focused solely on cyanide management

or may address the mine's relationship with local communities and stakeholders more broadly.

Opportunities for public input may also be available during the development and review of environmental assessments, or reviews of permits and licenses required by applicable jurisdictions. However, input in response to environmental assessments and permits may only occur before operations are initiated and sporadically thereafter, and are not typically sufficient as the only opportunity for stakeholders to communicate issues of concern.

In evaluating this question, the auditor must consider the location of the operation and its potential stakeholders. The options available to an operation located in close proximity to a local population will be significantly greater than for an operation where there is no local population and the workforce is flown into the site and lives in an on-site company camp.

Regardless of the manner of interaction, mines should document them through methods such as logs of inquiries and responses, tour advertisements and signup sheets of tour participants, notices of public meetings, records of public meetings, agendas and notes of advisory panel meetings, or other means.

If there is no formal documentation of the manner in which the operation provides these opportunities for stakeholder input, the auditor must rely on interviews with site personnel and/or stakeholders to verify compliance with this provision. In such a situation, an operation may be found in full compliance, but the auditor may still recommend that the mine document its interactions with stakeholders.

Standard of Practice 9.2

Make appropriate operational and environmental information regarding cyanide available to stakeholders.

1. Has the operation developed written descriptions of how their activities are conducted and how cyanide is managed? Are these descriptions available to communities and other stakeholders?

   Operations should develop written descriptions of cyanide management activities in appropriate local languages, and make these descriptions available to communities and stakeholders. The level of technical detail should be appropriate for the intended audience. The information can be disseminated through brochures, newsletters or other educational materials at the operation or at locations in local communities, at public forums or meetings, libraries, local government offices, on websites, or through other means.

   This information should be available for the auditor's review.

2. Has the operation disseminated information on cyanide in verbal form where a significant percentage of the local population is illiterate?

Where a significant percentage of the local population is illiterate, operations should provide information through presentations or direct, regular consultations with communities or community leaders. The Code does not specify what constitutes "a significant percentage," and the auditor must use professional judgment to determine if verbal dissemination of information is necessary.

3. Does the operation make information publicly available on the following confirmed cyanide release or exposure incidents?

   a) Cyanide exposure resulting in hospitalization or fatality
   b) Cyanide releases off the mine site requiring response or remediation
   c) Cyanide releases on or off the mine site resulting in significant adverse effects to health or the environment
   d) Cyanide releases on or off the mine site requiring reporting under applicable regulations
   e) Releases that cause applicable limits for cyanide to be exceeded

   This question is focused on periodic public reporting of spills and other similar unintentional releases. It does not require immediate public reporting of emergency incidents or reporting of permitted releases other than those that exceed permit or other regulatory conditions. Reporting of releases such as cyanide in seepage from a tailings impoundment would not be required under this provision unless it was required by the applicable political jurisdiction. In those cases, the report submitted to the governmental agency would be sufficient for purposes of this question as long as the information is available to the public.

   Only releases confirmed to meet the listed criteria need be reported, so that operations can fully evaluate an incident and be sure that reporting is necessary. Many operations notify governmental agencies of a release as soon as it occurs to ensure compliance with reporting regulations, only to determine after subsequent sampling or evaluation that the release did not exceed the applicable regulatory threshold. Such a release would not be subject to reporting under this question because it was not confirmed as requiring reporting under applicable regulations.

   An operation can make the necessary information publicly available in a variety of ways, including in a company's or corporation's Annual Report or Health, Safety and Environmental report, on a company's own website, or as part of applicable governmental reporting requirements, as long as these reports are public information.

   The auditor should review the information to verify that it addresses the items listed in this question and is publicly available.