



**Cyanco Company, L.L.C.
Sodium Cyanide Solution Production Operations**

**ICMI International Cyanide Management Code
Re-Certification Audit**

SUMMARY AUDIT REPORT

Audit Dates: July 5 - 7, 2016

**Submitted to:
International Cyanide Management Institute
1400 I Street, NW – Suite 550
Washington, DC 20005
USA
*2016 Audit Cycle***



www.mss-team.com

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Lead Auditor

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Name and Location of Operation:	Cyanco Company, L.L.C. 5505 Cyanco Drive Winnemucca, NV 89445
Audit Scope:	Production of Sodium Cyanide Solution for the Gold Mining Industry
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Company Background Information

Cyanco has production facilities in Winnemucca, Nevada and Alvin, Texas. Cyanco also has terminal operations in Cadillac, Quebec, as well as distribution center in Hermosillo, Sonora, Mexico and offices in Montreal, Quebec, Reno, Nevada and Pearland, Texas (corporate office).

Cyanco was originally certified to the International Cyanide Management Code (ICMC) as a Signatory Production Operation in October 2006. Re-certification audits were performed in 2009, 2013 and this audit was the third ICMC re-certification audit at the facility.

Description of the Operations

Cyanco started producing liquid sodium cyanide in Winnemucca, Nevada in 1990 and operations were significantly expanded 1997. Cyanco's liquid sodium cyanide production facility is located approximately 7 miles west of Winnemucca Nevada. Cyanco also started producing solid sodium cyanide at a new production facility in Alvin, Texas in 2012. This re-certification audit is limited in scope to the Winnemucca liquid cyanide solution production facility.

The plant produces approximately a 30% sodium cyanide solution using the Andrussow process. Oxygen, methane, and ammonia are combined over a platinum catalyst where they form hydrogen cyanide gas (HCN). The HCN gas is then scrubbed using sodium hydroxide (50% caustic soda) to form liquid sodium cyanide.

The product is delivered to gold mining customers in the western US in bulk delivery tankers. Since the last re-certification audit of this operation, Cyanco started also shipping product by rail

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to customers in Canada and Mexico from the Winnemucca plant. Cyanco contracts truck delivery of the cyanide solution to the TransWood Winnemucca Terminal, a certified ICMC Signatory Company. The terminal is located just several miles from the production facility and underwent an ICMC re-certification during the same time period as the Cyanco production facility.

Auditor's Finding

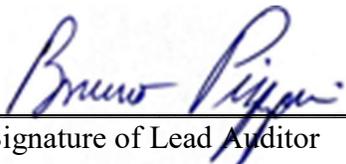
The Cyanco Winnemucca Production operation was found to be in FULL COMPLIANCE with the International Cyanide Management Code.

This operation has not experienced any significant cyanide incidents, releases, exposures, or problems with ICMC compliance since the previous ICMC re-certification audit.

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Date(s) of Audit:	July 5 - 7, 2016

I attest that I meet the criteria for knowledge, experience and conflict of interest for Code Verification Audit Team Leader, established by the International Cyanide Management Institute and that all members of the audit team meet the applicable criteria established by the International Cyanide Management Institute for Code Verification Auditors.

I attest that this Summary Audit Report accurately describes the findings of the verification audit. I further attest that the verification audit was conducted in a professional manner in accordance with the International Cyanide Management Code Verification Protocol for Cyanide Production Operations and using standard and accepted practices for health, safety and environmental audits.



Signature of Lead Auditor

1. OPERATIONS: Design, construct and operate cyanide production facilities to prevent release of cyanide.

Production Practice 1.1: Design and construct cyanide production facilities consistent with sound, accepted engineering practices and quality control/quality assurance procedures.

The operation is in full compliance with Production Practice 1.1

Summarize the basis for this Finding:

Explain the basis for the finding.

The facility was built using sound, accepted engineering practices and quality control processes. Cyanco QC & QA records regarding the original construction of the facility were audited during the original certification audit and were found to be acceptable. No significant structural or facility changes have been made since the previous re-certification audit in 2013. Acceptable materials of construction are formally defined for the facility and a review of records confirmed that materials used conform to internal requirements.

Cyanco has an automatic shutdown system that will initiate if any of a series of process conditions is met. Cyanco uses management system procedures and forms to formally inspect their interlocks, process equipment, piping, and containment systems regularly to ensure functionality and integrity. Information and records were available to show that alarm improvements were introduced in 2015 and that inspections are performed, as planned.

All loading operations, process equipment, and storage tanks are within lined concrete secondary containment areas with lined sumps. Each area has appropriate containment systems that ensure full containment. Automatic “trip” systems that shut down operations and high-level alarms are integral parts of the design and construction of each of the two operating units.

Process indicators, high-level indicators and high-level alarms are monitored continuously in the control room. The capacity of each of secondary containment areas is sufficient to hold a volume that is greater than that of the largest tank, a storm event, and any piping that might drain back into the tank. All pipelines are over concrete or are managed with appropriate spill prevention programs.

Production Practice 1.2: Develop and implement plans and procedures to operate cyanide production facilities in a manner that prevents accidental releases.

The operation is in full compliance with Production Practice 1.2

Summarize the basis for this Finding:

Cyanco uses a document control system to manage its procedures and ensure that they are available to all personnel. Cyanco procedures define how the facility is to be operated in a safe and environmentally sound manner. Procedures for upset and contingency conditions are also maintained and are available at the point of use. Standard operating procedures are used to systematically shut-down the two production plants if there is an upset condition. Operations personnel were interviewed and their awareness level of emergency and contingency procedures was very good. The control room is manned at all times. Procedures are available in the control room in electronic and hard copy.

An MOC process is used to manage the change to any part of the operation that contains cyanide. Records were reviewed and were found to be acceptable for minor changes made to the cyanide process activities since 2013. Process equipment, tanks, and piping that contain cyanide are included in the mechanical integrity program. Maintenance instructions are maintained in a database that is used to manage work orders. Process parameters such as pH, flow rates, tank levels, temperature, chemical characteristics, etc. are monitored by the control room board operator and through testing that is done by field operators on a regular basis. Instrumentation is calibrated according to manufacturer's recommendations. The auditor sampled records from scheduled maintenance activities, field inspections, thickness testing, and calibrations. Records were found to be acceptable.

The Cyanco facility is designed to be a "zero discharge" facility, meaning that no process water or water collected in the secondary containment areas can be discharged to the environment. All process, loading, and storage equipment is in lined concrete secondary containment areas that are equipped with lined concrete or stainless steel sump pit systems. The sumps are piped into a tank that is specifically designated to accept water from the sumps and pipe clean-outs. The cyanide-containing water is mixed back into the process.

Sound procedures are used for the disposal of cyanide and cyanide-contaminated solids. All cyanide is stored in outdoor tanks. The tanks have air vents to the atmosphere. Atmospheric monitoring is done in accordance with air permit requirements to ensure that atmospheric levels remain within permitted levels. Records were available to show that permitted air emissions were not exceeded since the previous ICMC re-certification audit.

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The cyanide solution is maintained at a pH of ≈ 12.8 to limit off-gassing. Storage tanks and process equipment are designed to prevent the intrusion of rain water into the system or into any storage unit not designated for the management of rain water. The site has a secure perimeter and access is prohibited. Packaging is not used by this operation; the cyanide solution is only shipped to customers using DOT (Department of Transportation) approved tanker trucks and FRA (Federal Railroad Administration) approved railcars that are specifically designed for this type of transport. Proper placards are used and proper weight limits are observed for all jurisdictions through which the trucks and rail cars must pass.

***Production Practice 1.3:** Inspect cyanide production facilities to ensure their integrity and prevent accidental releases.*

The operation is **in full compliance with Production Practice 1.3**

Summarize the basis for this Finding:

The auditor was able to confirm that tanks, valves, pipelines, and secondary containment areas are routinely inspected for their integrity, closure of valves, presence of fluids, and deterioration. Operators were interviewed and the inspection sheets from field rounds and sump / drain inspections were reviewed. Tanks, pipes, and process equipment are visually inspected on a quarterly basis. Inspection records were sampled for the audit period. Additionally, visual and thickness testing inspections of process equipment, tanks, and piping containing cyanide are performed according to API (American Piping Institute) guidance at defined frequencies as part of the mechanical integrity program. Thickness testing records were sampled for tanks, pressure vessels, and piping.

Inspection frequencies were deemed to be sufficient to assure that equipment is functioning within design parameters. In addition to regular inspections, equipment shut downs with extensive maintenance activities are conducted at least annually.

Inspections are documented and show the date of the inspection, the name of the inspector, and any observed deficiencies. An overall action list is generated from the quarterly equipment inspections. Issues that are readily resolved are noted as such on the inspection report. Work orders are opened for issues that require corrective maintenance actions. Inspection records and records of resulting corrective measures were reviewed and were found to be acceptable.

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2. WORKER SAFETY: Protect workers' health and safety from exposure to cyanide.

Production Practice 2.1: Develop and implement procedures to protect plant personnel from exposure to cyanide.

The operation is in full compliance with Production Practice 2.1

Summarize the basis for this Finding:

Worker exposure to cyanide is minimized through properly engineered systems, the use of detailed standard operating procedures, and proper use of personal protective equipment (PPE) where necessary. The minimum PPE requirements are defined in each procedure. Operators, maintenance personnel, and laboratory personnel were interviewed. Personnel showed good awareness of PPE requirements associated with different types of tasks. Emergency procedures are defined in the site emergency response plan. Maintenance procedures exist for repetitive tasks that have the potential for worker exposure to cyanide. PPE requirements and safety precautions are defined. Hazardous and non-routine tasks such as confined space entry require the use of work permits to ensure that they are performed safely.

Management of Change (MOC) and Pre-Start-Up-Safety Review (PSSR) procedures are used to evaluate the potential safety, health, and environmental impact of proposed and implemented operational changes and modifications. Operators, engineers, and EHS personnel are involved in the management of change process and in the PSSRs. They are also involved in process hazard analyses (PHAs).

Stationary HCN monitors are used in indoor areas that have the potential for having elevated cyanide levels and personal HCN monitors are used by employees for tasks that have the potential for cyanide exposure. The stationary monitors and the personal monitors are part of the computerized maintenance system to ensure that they are maintained, tested, and calibrated on a monthly basis. Records were available to show that necessary calibrations had been completed since the 2013 ICMC audit.

Operations where the risk of cyanide exposure may be elevated have been identified and PPE requirements have been defined. PPE requirements are clearly defined for all tasks and enclosed spaces in which cyanide is handled. HCN monitors that are monitored by the control room operator. Atmospheric levels of HCN gas are tested prior to any confined space entry or similar

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maintenance activity. Work permits are used for these types of tasks to ensure that the area is safe and that proper PPE is being utilized. Several permitted maintenance operations were observed during the audit. Management personnel provided a high level of oversight to the completion of all permitted maintenance work observed during the audit.

The buddy system is used for all tasks that are potentially hazardous. Employees' health is evaluated upon hire and periodically thereafter. Health exams are used to evaluate the employee general health and confirm fitness for duty. The clothing change policy for employee is detailed in the Safety Manual and in a Personal Protection Procedure. Employees are issued uniforms that must stay at Cyanco. Clothing is washed on-site.

Visitor PPE requirements are stated on the Visitor Registration form, which is signed by the visitor upon arrival at the site.

The operation has posted signs that limit access to the production area and requires that visitors enter through the main office. PPE signs were also visible. Signs warning of potential hazards due to the presence of cyanide were also posted. Eating, drinking, smoking, and open flames are prohibited where there is a potential for cyanide contamination. Employees showed very good awareness of the restrictions and of the potential dangers of not following the rules. Eating is allowed in a designated lunchroom area and in offices. Smoking is restricted to a designated smoking area.

Production Practice 2.2: Develop and implement plans and procedures for rapid and effective response to cyanide exposure.

The operation is in full compliance with Production Practice 2.2

Summarize the basis for this Finding:

Cyanco maintains a comprehensive Emergency Response Plan. The plan is reviewed regularly with its most recent revision occurring in January 2015. Industrial combination shower / low-pressure eye wash stations are located throughout the facility. ABC dry chemical fire extinguishers are located in production areas and any areas that potentially have cyanide in them. Safety showers and Eyewash stations are tested weekly. Fire extinguishers and fire suppression systems are tested monthly. The facility has water, oxygen, resuscitator, antidote and a means of communication readily available at strategic points in the plant. Emergency equipment is inspected on a monthly basis as part of the general housekeeping and safety inspection process.

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Emergency response equipment is stored and tested according to manufacturer's recommendations. Cyanide antidote medicine is stored centrally in the control room. Material Safety Data Sheets (MSDSs) and first aid procedures on cyanide are available to workers. MSDSs are available in the control room and on the company intranet. First aid procedures are contained in the Emergency Response Plan. Storage tanks, process tanks, containers and piping containing cyanide are properly identified to alert employees of their contents. All piping observed during the audit was very well marked and showed the direction of flow.

Decontamination procedures for employees and contractors are outlined in formal procedures. Cyanide safety training is given annually and employees and supervisors demonstrated a very good understanding of the decontamination policy and the need for to take safety precautions. The plant has an emergency response team that provides first aid assistance to workers who may be exposed to cyanide. The Emergency Response Plan calls for the decontamination of a cyanide exposure victim prior to transport. Communications between plant personnel and the local community are very strong and formal communications are sent out to the local hospital every two years. The operation is located in a mining community and local hospitals and emergency personnel are qualified for treating cyanide exposure victims. The operation conducts mock emergency drills, holds a drill critique, and evaluates the need for further training or adjustment to the emergency procedures each year. Full incident investigation reports are filled out in the event that one occurs. Records were available to show involvement of management, identification of root cause factors, and implementation of recommendations.

3. MONITORING: Ensure that process controls are protective of the environment.

Production Practice 3.1: Conduct environmental monitoring to confirm that planned or unplanned releases of cyanide do not result in adverse impacts.

The operation is in full compliance with Production Practice 3.1

Summarize the basis for this Finding:

The facility does not discharge directly or indirectly to surface water. The nearest surface water is a river that is located about one mile south of the plant. The operation is a "zero discharge" facility. Groundwater is monitored up-gradient and down-gradient of the site as per permit requirements. No cyanide has been detected in groundwater.

Stationary atmospheric cyanide monitors are used to perform air monitoring at the site perimeter, as required by the site air quality permit. Calculations are used to determine the amount of cyanide

released to the environment. Air and groundwater monitoring is done in accordance with state permitting requirements and was found to be appropriate.

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

Production Practice 4.1: Train employees to operate the plant in a manner that minimizes the potential for cyanide exposures and releases.

The operation is in full compliance with Production Practice 4.1

Summarize the basis for this Finding:

Cyanco has a formal training program that includes cyanide safety training prior to the start of work and annual refresher training. The training program discusses cyanide hazards and safety precautions. The training program is very well organized and records are maintained in hard copy and electronic format. Training records, including completed tests, were sampled for the years 2013 through 2016. Safety training records were readily available and complete.

Personnel are trained on the use of personal protective equipment as part of the safety training and again during the on-the-job training done by supervisors. Employees are trained to perform normal production tasks to minimize risks to personal safety and the environment. Each procedure has a test associated with it and employees who use the procedure are required to demonstrate competency through testing. A training curriculum exists for each job type. Experienced employees, professional trainers, or supervisors administer training to employees. The operation requires extensive training prior to allowing employees to work with cyanide. The effectiveness of the cyanide training is confirmed through testing and through observation by a qualified person.

Production Practice 4.2: Train employees to respond to cyanide exposures and releases.

The operation is in full compliance with Production Practice 4.2

Summarize the basis for this Finding:

Employees are trained on what to do if a cyanide release is discovered. This is part of the cyanide safety training and the training on the emergency response plan. Employees are trained on how to respond to a worker exposure to cyanide and drills are conducted annually to ensure that the

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Emergency Response Team refreshes its skills. Corrective actions are processed and emergency procedures are revised as necessary following drill critiques. Training records are maintained in each employee file. Records are maintained for at least as long as the employee is working at the site. Records were sampled for the re-certification audit period. All records pertaining to cyanide safety were sufficiently detailed to be found compliant to ICMC and internal requirements.

5. EMERGENCY RESPONSE: Protect communities and the environment through the development of emergency response strategies and capabilities.

Production Practice 5.1: Prepare detailed emergency response plans for potential cyanide releases.

The operation is in full compliance with Production Practice 5.1

Summarize the basis for this Finding:

The Emergency Response Plan (ERP) was reviewed and was found to be appropriate for the operation. The ERP is reviewed and updated at least annually. The last revision was made in 2015. Potential failure scenarios considered in the ERP include atmospheric release of hydrogen cyanide, release of solutions during truck loading, releases during fire, releases due to tank and pipe ruptures, power outages, and overtopping of tanks. The emergency response plan fulfills ICMC requirements.

Production Practice 5.2: Involve site personnel and stakeholders in the planning process.

The operation is in full compliance with Production Practice 5.2

Summarize the basis for this Finding:

Cyanco Safety and Health Staff staff are involved in the Local Emergency Planning Committee (LEPC) in Winnemucca. The H&S Manager regularly meets with stakeholders. Records of community and emergency planning activities were available for each year since the previous ICMC audit. Stakeholders included people from Humboldt General (hospital), mining customers, Humboldt County School District, Humboldt County Commission, Bureau of Land Management, and the City of Winnemucca.

Cyanco employees who are part of the Emergency Response Team are also involved in the emergency planning process. Cyanco has strong communications and relationships with the city of Winnemucca. According to interviews with the S&H Manager, stakeholder input is incorporated into the ERP to ensure that the plan addresses any changing circumstances and changing risks in the area.

Production Practice 5.3: Designate appropriate personnel and commit necessary equipment and resources for emergency response.

The operation is in full compliance with Production Practice 5.3

Summarize the basis for this Finding:

A review of the ERP confirmed that all 5.3.1 Code requirements are appropriately addressed. The Control Board Operator is the Incident Commander during any emergency until relieved by a Lead Operator or an authorized member of management. Emergency Response Team members are designated using red font on the Quick Reference contact list sheet that is part of the ERP binder. Call-out procedures are detailed in the plan and 24-hour contact information is on the Quick Reference sheet. Emergency Response Members also stated that all emergency numbers are programmed into their cell phones. Emergency Equipment that is necessary is listed in general terms in the Emergency Response Plan and in more detailed terms in the Emergency Preparedness Plan and the Monthly Checklist that is used to inspect the equipment. Emergency Equipment is inspected regularly. Records were sampled for the re-certification audit period and were found to be complete. Most of the equipment is maintained in two trailers that can be used either on-site or off-site. Equipment was found to be well organized and in excellent condition. Call numbers for outside responders are contained within the plan. Cyanco participates in combined drills with the transporter, mine sites, and local responders to ensure that roles between organizations are understood.

Production Practice 5.4: Develop procedures for internal and external emergency notification and reporting.

The operation is in full compliance with Production Practice 5.4

Summarize the basis for this Finding:

The ERP has a list of internal and external stakeholders that need to be notified depending on the nature of the emergency. The call lists include numbers for management, regulatory agencies,

outside responders, and medical facilities. Appendix B of the ERP – Media Relations and Crisis Communications – gives additional guidance and information with regards to communications with external stakeholders.

Production Practice 5.5: Incorporate into response plans and remediation measures monitoring elements that account for the additional hazards of using cyanide treatment chemicals.

The operation is in full compliance with Production Practice 5.5

Summarize the basis for this Finding:

The ERP discusses the steps to be taken in the event of a cyanide release to ground or water. Neutralization of soil is discussed and the plan also lists the name and telephone number of a commercial remediation management contractor who would be called to assist with any large-scale remediation effort. The hazards experienced with a cyanide release to water are also discussed in the plan. The ERP also prohibits the use of sodium hypochlorite and other treatment chemicals in surface water.

Production Practice 5.6: Periodically evaluate response procedures and capabilities and revise them as needed.

The operation is in full compliance with Production Practice 5.6

Summarize the basis for this Finding:

Cyanco conducts emergency drills, holds drill critiques, and evaluates the need for further training or adjustment to the emergency procedures each year. Records were available to show that drills with external stakeholders were conducted in 2013 and 2014. Shortly after the audit Cyanco conducted a mock drill of an employee exposure on July 28, 2016. Cyanco sent the drill summary, pictures, and critique. The drill report was evaluated by the auditor and was found to be effective. The audit finding was closed with no further corrective actions required. The emergency plans were evaluated and revised as necessary in response to drill critiques and incidents since the previous ICMC audit.