Cyanco Company, L.L.C.
Houston Production Plant

ICMI International Cyanide Management Code Re-Certification Audit

SUMMARY AUDIT REPORT

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

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Name and Location of Operation:	Cyanco Alvin Cyanide Manufacturing Plant Monsanto Rd, FM 2917 Alvin, Texas 77511
Audit Scope:	Production of Sodium Cyanide for the Gold Mining Industry
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Company Background Information

This Cyanco sodium cyanide production facility first started producing product near the end of September 2012. The Cyanco plant is in the Chocolate Bayou industrial park that is operated by Ascend Performance Materials in Alvin, Texas. Alvin is located outside of Houston, Texas, and registered with the ICMC as the Cyanco Houston production operation.

In addition to this location, Cyanco also has a liquid sodium cyanide production facility in Winnemucca, Nevada. Cyanco has terminal operations in Cadillac, Quebec, as well as a distribution center in Hermosillo, Sonora, Mexico. Cyanco has offices in Montreal, Quebec (Canada), Reno, Nevada and Pearland, Texas, USA (corporate office).

Cyanco was originally certified to the International Cyanide Management Code (ICMC) as a Signatory Production Operation at its Winnemucca location in October 2006 and at this Houston location in 2013. This was the first re-certification audit of the Cyanco Houston production operation.

Description of the Operations

This operation is part of Cyanco International, LLC which belongs to the Cyanco international operating group. The co-located Ascend plant produces acrylonitrile as its main product. A co-product of the Ascend process is hydrogen cyanide which is used by Cyanco to produce its sodium cyanide. The plant produces solid sodium cyanide briquettes and ships product in ISO containers, one metric ton bag/boxes, and hopper (rail) cars.

Cyanco owns the production asset and has a leadership team, including a Plant Manager, in place at the facility. Operations personnel are Ascend employees who follow mature Ascend environmental, health, safety, and security management systems to ensure that ICMC, Cyanco and Ascend requirements are fulfilled.

Auditor's Finding

The Cyanco Houston 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 certification audit.

Audit Company:	MSS Code Certification Service, a Division of Management System Solutions, Inc. www.mss-team.com
Audit Team Leader:	Nicole Jurczyk E-mail: njurczyk@mss-team.com
Date(s) of Audit:	September 13-15, 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. Since the last re-certification audit in 2013 no significant facility changes have occurred. Management of change records were sampled for several process and material handling improvements that were made since the original ICMC audit. The Management of Change database system used at this facility was found to be "Best in Class" with multiple check points and interdisciplinary meetings held to extensively review and approve all process changes. Materials of construction for the production facilities are compatible with reagents used and processes employed.

Cyanco has an automatic shutdown system that will initiate if any of the upset process conditions is met. The process is continuously monitored and level indicators as well as high level alarms and interlocks are used throughout the process. Cyanco uses management system procedures and forms to formally inspect its 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 process and material handling areas are on concrete and areas are contained within a dike and curbing system. The size of the containment has a dimension to accept the contents of the largest tank and piping in case of leakage. This information was confirmed through observation during the audit and an assessment of documented information available for review during the audit.

<u>Production Practice 1.2</u>: 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 has over 200 detailed procedures that outline all actions necessary to operate the facility in a safe and environmentally sound manner. Extensive documentation is available to detail operating specifications, the consequences of deviations, and corrective measures to be taken in the event of an upset operating condition.

A formal management of change (MOC) process is used to manage changes to the operation. MOC records were sampled and were found to be very detailed and complete for all changes made to the cyanide process and loading equipment since 2013.

The facility has a mature maintenance program system with clearly defined requirements. A formal database is used to manage work orders and maintain records to show that required maintenance and calibration tasks were completed. Maintenance records show work order number, equipment number and description, work order description, person performing the work, and the date.

Calibrations and functional checks of instrumentation, interlocks, and HCN monitors are managed through the preventive maintenance program. Equipment, instruments, and HCN monitors are calibrated per manufacturer recommendations. Records were sampled and were found to be complete.

No process water or water collected in the secondary containment areas can be discharged to surface water. All water that is potentially contaminated with cyanide drains to the Ascend water treatment system. Cyanide and potentially contaminated solids are managed in an environmentally sound manner according to formally documented procedures. Field Operators were interviewed and training records were reviewed during the audit. Awareness of the need to follow procedures and prevent cyanide releases and/or discharges to the environment was very good.

The area where the cyanide is stored is well ventilated. Additional ventilation was installed in the bag box area and centrifuge areas in 2016. The air turnovers per hour are well above the OSHA recommended ventilation specifications. MOC records for the change were reviewed and found to be complete. The cyanide is stored under a roof. It is not exposed to moisture. The site has a secure perimeter and access is prohibited. Security personnel are present 24/7 and the perimeter

is fenced. Security, including the strict control of access to the area was found to be very acceptable. Packaging meets all applicable shipping requirements, including product information in warnings in languages required in the jurisdictions through which the shipments will pass. Loading procedures and checklists ensure packaging is properly loaded and sealed.

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:

A review of records and the results of interviews confirmed 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 is visually inspected on a quarterly basis.

Additionally, visual and thickness testing inspections of process equipment, tanks, and piping containing cyanide are performed according to American Petroleum Institute (API) guidance at defined frequencies as part of the mechanical integrity program. These formal programs are used to ensure that tanks, pipes, and process equipment are regularly inspected by competent inspectors for structural integrity and signs of corrosion.

Inspection records fulfill all ICMI requirements including the name of the inspectors, the dates of the inspections, the results of the inspections, and the resolution of any noted deficiencies. Records were available for the entire re-certification period. Inspection results were well organized and records were readily retrievable and compliant to ICMI requirements pre-established internal plans.

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. 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. Maintenance procedures are also well documented and relevant information necessary to perform maintenance tasks is incorporated into the work orders in SAP.

Cyanco utilizes a very advanced management of change program that ensures that all necessary personnel are involved in the review and approval of changes. Records were sampled for the re-certification period and were found to be very complete. Operators and engineers are involved in the management of change process and in the pre-start up safety reviews. During safety meetings in the information meetings the facility gives the workers the opportunity to give their input on improving work procedures among other topics. Employees are also involved in process hazard analyses (PHAs) and the deployment of any additional safety measures deemed necessary after the review of process hazards. Interviews during the audit confirmed this practice.

Stationary and portable HCN monitors are used throughout the operation to confirm that workers are not exposed to elevated levels of HCN or cyanide dust. Calibration records for the HCN monitors were sampled for the re-certification period (2014-2016) and found to be complete.

An industrial hygiene study was conducted to confirm that workers are not exposed to elevated levels of HCN or cyanide dust in their daily activities. Atmospheric levels of HCN gas are tested prior to any confined space entry or similar 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.

The buddy system is strictly enforced. No employees perform production, maintenance, or warehouse activities alone. The Control Room is manned 24/7 and employees are also in radio contact with each other at all times. Employees' health is evaluated upon hire and periodically thereafter. Health exams are used to evaluate the employee general health and confirm fitness for duty. Personnel who may need to wear respirators undergo fit testing to confirm that they can safely do so. An Annual spirometry test is performed for those who wear respirators as part of their job duties.

Confirmation was made during the audit that the clothing change policy for employees is being followed. It is detailed in the Safety Manual – General Safety Rules and the Personal Protection Procedure. Employees are issued uniforms that must stay at Cyanco. Clothing is washed on-site.

The operation has posted signs that limit access to the production area and require 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, 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. The site is a tobacco-free site. Smoking is not permitted within the site perimeter.

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 and includes a procedure that addresses the medical procedures to be followed in the event of a cyanide exposure.

Industrial combination shower / low-pressure eye wash stations are located throughout the facility. ABC dry chemical fire extinguishers are throughout the production areas. Safety showers and eyewash stations are tested weekly and before contractors begin work. They are monitored continuously in the control room with alarms that indicate if a shower or eye wash station is used. Fire extinguishers and fire suppression systems are tested monthly. Additional emergency response equipment is also inspected monthly.

The facility has water, oxygen, resuscitator, antidote and a means of communication readily available at strategic points in the plant. The antidote is maintained in the control room. Regular inspections of the safety equipment are performed to ensure that the equipment is available and in working condition, if needed. Confirmation was made during the audit that the antidote was properly stored and within date. Inspection records were reviewed and were accepted.

Safety Data Sheets (SDSs) and first aid procedures on cyanide are available to workers. SDS sheets are available in the control room and on the company intranet. First aid procedures are contained in the Emergency Response Plan. All employees speak English.

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 are outlined in the Emergency Response Plan and Contractor decontamination procedures. NaCN Unit PPE procedures detail the PPE requirements, decontamination requirements, and disposal requirements. Decontamination procedures for skin contamination are 15 minutes under a safety shower. This is taught during Cyanide Safety Training. Employees and supervisors demonstrated a good understanding of the decontamination policy and the need 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 medical team includes a nurse practitioner and trained EMTs.

The Emergency Response Procedure calls for the decontamination of a cyanide exposure victim prior to transport. Communication has been made with the local hospital and the plant is confident that hospital personnel are capable of treating cyanide exposure victims. There is a medical office on-site staffed by a full-time nurse practitioner. A doctor is brought in for physicals. At a minimum, one more advanced EMT who can do an intraveneous injection of antidote is on-site at all times. The facility has two ambulances and a helipad.

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.

Cyanco utilizes a formal incident investigation procedure for incident investigations. An action is assigned for every preventable cause and then the facility processes the actions. Records were sampled and found to be complete.

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:

Cyanco has no direct or indirect discharge of process water to surface water. All water from the Ascend site is sent to deep well injection. The water to deep well is under control (contained, managed, monitored) and is managed by the landlord (Ascend) to ensure adherence to regulatory requirements. The process is designed with secondary containments to ensure that any cyanide contaminated water is not released into the environment. The site´s industrial ground water requirements are governed under Title 30 Part 1 Chapter 350 Subchapter D of the Texas Administrative Code (TAC) otherwise known as the Texas Risk Reduction Program or TRRP.

The sodium cyanide operating unit is in the Ascend Performance Materials industrial campus which is governed by TRRP rules as well. Ascend has monitoring wells on site as per TRRP rule requirements for monitoring groundwater, including the solid sodium cyanide production unit. No known seepage or groundwater contamination has occurred at the site. If remediation were ever necessary, it would be done in consultation with authorities and remediation experts to ensure adherence to all regulatory requirements.

Atmospheric emissions are permitted by and controlled according to a Permit by Rule registered with the Texas Commission on Environmental Quality (TCEQ). Limits for atmospheric emissions are set by this permit to ensure air quality standards established by the state and EPA. According to the original ICMC certification audit report: "The Permit by Rule registration was prepared by the consulting company Environ, first registration on May 13th, 2011, and final registration and confirmation by TCEQ on Jan 24th, 2012. The registration process is based on VOC and PM (dust) emission calculations, complying on TAC §§ 106.261, 106.262 and 106.472." Environmental monitoring information was sampled for the re-certification period and was found to be acceptable.

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 six week "boot camp" training program that includes cyanide safety training prior to the start of work in areas with cyanide, and refresher training. The training program discusses cyanide hazards and safety precautions. The training program is very well organized and records are maintained in electronic format. Training records including completed tests were sampled for the years 2013 through 2016. Safety records were well organized and readily available. Additionally, employees complete hazards of cyanide training through a computer based training module prior to working with cyanide.

Employees are trained to perform normal production tasks on each SOP of their job assignment to minimize risks to personal safety and the environment. HCN training is delivered by an Ascend Engineer for a day during the six-week boot camp. Personnel complete 24-hazwoper training complete before they come into the unit. Several training sessions are offered throughout the boot camp including training on PPE, decontamination, lock out tag out, and confined space entry.

Experienced employees, professional trainers, or supervisors administer training to employees. Trainers were found to be appropriately qualified and competent. Following initial training employees go on shift and the shift lead oversees the person's training. When an employee is ready to be qualified for a specific job the person is tested and taken on a walk-through where the trainee explains the process to two people. All employees are cross trained.

The effectiveness of the cyanide training is confirmed through testing, through observation by a qualified person, and through a walk-through where the trainee explains the process to two people. Records reviewed for employees hired between 2013 and 2016 were readily available and showed conformance to internal procedures.

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. Records were available for drills that included worker exposure scenarios for 2014, 2015, and 2016. 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 from July 2013 through June 2016. 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 Integrated Contingency Plan (ICP) was reviewed and was found to be appropriate for the operation. The ICP is reviewed and updated at least annually. Potential failure scenarios considered in the ICP include atmospheric release of hydrogen cyanide, releases during loading / unloading, releases during fire, pipe and/or tank ruptures, power outages / equipment failures, and the potential overfilling of tanks.

The emergency response plan fulfills ICMC requirements. Specific information is provided in the emergency plans to address the potential need for evacuation of the areas, community notifications, the response to exposure victims, control of the release at its source, and the overall containment, and mitigation of environmental impact in the event of a release.

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 Environmental, Health, and Safety (EH&S) staff are involved in the Local Emergency Planning Committee (LEPC) in Alvin. The EH&S Manager regularly meets with stakeholders. Records of community and emergency planning activities were available for each year since the previous ICMC audit. Additionally, there is a mutual aid agreement with the plants nearby. They will help each other in the case of an emergency. CAP meets every 2 months and the mutual aid group of partners meet with the LEPC at least annually.

Employees who are part of the Emergency Response Team are also involved in the emergency planning process. Ascend and Cyanco have strong communication and relationships with the city of Alvin. According to interviews, stakeholder input is incorporated into the ICP to ensure that the plan addresses any changing circumstances and/changing risks in the area. The ICP was last updated in 2015.

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 ICP confirmed that all ICMC Code requirements are appropriately addressed. ICP Core Response Plan Section V describes the emergency response responsibilities. The Core Response Plan also describes the Response Team structure, including the roles and authorities of the primary and backup emergency coordinators. Specific training requirements for the team are defined in the emergency planning information. The emergency phone directory includes 24-hour contact information for all necessary personnel and stakeholders and was last updated in June 2016. The information was found to be up-to-date.

All Emergency Responders receive formal hazardous materials training and training in the Emergency Response Plan. Training records were readily retrievable. Call-out procedures are detailed in the plan and 24-hour contact information is on the Quick Reference sheet. Emergency equipment that is maintained on-site is listed and it is inspected at defined frequencies to ensure that it is available, if needed. Equipment was observed during the audit and inspection records

were reviewed. The types of emergency equipment and the frequency at which equipment is inspected were found to be suitable. The roles of Ascend emergency responders and responders who are external to the plant are detailed in the emergency planning information. Outside responders are invited to emergency response drills and are aware of their role in the emergency response at the site through regular meetings and interactions between Ascend, Cyanco, and the LEPC.

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:

Notifications to community and on-site contacts are described in the Integrated Contingency Plan - Section II. All necessary numbers, including telephone numbers of management, regulatory agencies, the environmental response company, and medical facilities is included in the emergency planning information.

If community notifications are required during an emergency event, a computerized telephone dialing system known as the Community Alert Network (FirstCall) would be used. The ESH Team Lead is the public information lead in case there is media coverage or questions from the general public.

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 ICP discusses the steps to be taken in the event of a cyanide release to ground or water. Neutralization of soil is discussed, although 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. The plan addresses the need for remediation and sampling in the event of a release to the environment. Cyanco would work closely with authorities and its environmental contractor to ensure complete and compliant remediation and sampling efforts are undertaken.

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:

Emergency planning information is reviewed at least annually to ensure that the information is up-to-date and accurate. Cyanco also conducts periodically emergency drills, holds drill critiques, and evaluates the need for further training or adjustment to the emergency procedures at least annually. Records were available to show that drills with external stakeholders were conducted and critiqued, as planned, during the re-certification period. Emergency plans were evaluated and revised as necessary in response to drill critiques since the previous ICMC audit.