ICMI Production Verification Protocol (Revision June 2021)

Summary Audit Report

Cyanco Houston Production Audit

2022 Re-Certification Audit

Submitted to:

The International Cyanide Management Institute
1400 I Street, NW – Suite 550
Washington, DC 20005
USA

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Operation General Information

Operations Audited:	Cyanco Alvin Cyanide Manufacturing Plant Monsanto Rd, FM 2917 Alvin, Texas 77511
Audit Scope:	Production of Sodium Cyanide for the Gold Mining Industry
Names and contact information for this facility:	Rich Bourdon Plant Manager Office: (281) 299 3185 Email: Richard. Bourdon @cyanco.com

Company Background Information

Cyanco maintains its international headquarters in Sugar Land, Texas and its production facilities in Houston, Nevada and Alvin, Texas. Distribution terminals, interim storage, and office locations are maintained in several locations in the United States and Canada.

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 is referred to as the Cyanco Houston production facility.

Cyanco was an early adopter of the International Cyanide Management Code (Cyanide Code) and was first certified in October 2006 and this operation was certified in 2013. Re-certification audits have been performed for each facility approximately every 3-4 years since initial certification.

Description of the Operation

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 Cyanide Code, Cyanco and Ascend requirements are fulfilled.

This operation was confirmed to be in **FULL COMPLIANCE** with the International Cyanide Management Code.

Auditor's Finding

The cyanide management practices for Cyanco were evaluated for Cyanide Code compliance using the 2021 version of the *ICMI Cyanide Production Verification Protocol.* Cyanco internal standards, policies, practices, and procedures regarding the management of the cyanide operations were reviewed.

The results of this re-certification audit demonstrated that Cyanco Houston production activities are in **FULL COMPLIANCE** with International Cyanide Management Code requirements.

Compliance Statement

This operation did not experience any compliance issues or significant cyanide incidents during the recertification period.

Auditor Information

Audit Company:	CN Auditing Group www.cnauditing.com
Lead / Technical Auditor:	Ralf Jurczyk, Ph.D. E-mail: rj@cnauditing.com
Dates of Audit:	October 25-27, 2022

Auditor Attestation

I attest that I meet the criteria for knowledge, experience, and conflict of interest for a Cyanide Code Certification Lead Auditor, 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 Certification Auditors.

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

Cyanco Houston Production Audit		April 5, 2023
Name of Operation	Signature of Lead Auditor	Date

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Principles and Standards of Practice - Cyanide Production Verification Protocol

Principle 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 engineeringpractices and quality control/quality assurance procedures.

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 2019 several changes were made. Management of Change records were reviewed for the changes and were found to be complete. Example changes included modifications to the hydrogen cyanide (HCN) flow control valves (changed to piston based rather than air based), vibrating conveyor belt and feed auger box upgrades, and an HCN line double block and bleed change.

Appropriate levels of engineering and environmental, health, and safety approvals were in place for the changes and pre-start up safety review records were on file, as required.

The Ascend Manufacturing Engineer was originally interviewed, and the Construction Quality Management System Manual was reviewed during the previous re-certification audit. The manual details the QA/QC inspections that took place during construction. The commissioning procedure book was also reviewed. Records were sampled and inspections were completed and addressed all parts of the facility. Original QA/QC records were retained and are readily retrievable.

QA and QC documentation for the solid sodium cyanide production area was available for review. Pre-start up safety reviews were conducted by qualified engineers and environmental, health, and safety (EHS) personnel. Records were sampled and found to be complete and acceptable.

Materials of construction for the production facilities are compatible with reagents used and processes employed. This was confirmed during the audit. Cyanco maintains documentation showing approved materials for construction and maintenance activities. Records from the facility were reviewed to confirm that construction materials match those called for in the specifications. The material specifications are maintained by Ascend in detailed "procedure-type" documents that are under document control and are updated every 5 years. Material specifications were

sampled and were up-to-date and readily retrievable.

An uninterruptible power supply (UPS) and emergency power back-up system are maintained for the Distributed Control System (DCS) in case the facility loses power. The control room is manned 24 hours a day / 7 days a week. The system is designed so that in the event of a power failure or process upset, the default settings on the process equipment go to a “safe” position to prevent releases.

Cyanco has an automatic shutdown system that will initiate if any of the upset process conditions is met. Cyanco uses management system procedures and forms to formally inspect its interlocks, process equipment, piping, and containment systems regularly to ensure functionality and integrity. Capability was tested at the end of 2020 when there was a complete power failure. There were no cyanide spills during this power upset condition.

Maintenance and inspection records were available for the recertification period to demonstrate that the equipment is being properly maintained.

The process area has a concrete surface and is contained within a dike and curbing system. This area is designed to contain a release from process equipment and run-off for up to 12 inches of rainfall. The size of the containment has a dimension to accept the content of the largest tank and the piping equipment in case of leakage without any problem. The plant has been designed for spill prevention. Loading, production, and storage areas are lined with an industrial engineered polymer material. The liners and concrete in the secondary containment and sump areas were most recently repaired and refurbished in 2019, 2020, and 2022. Surfaces were found to be in acceptable condition.

The facility employs methods and devices to prevent the overfilling of cyanide process vessels, storage vessels, and loading equipment. There are three redundant indicators on the crystallizer. Process indicators, high-level indicators and high-level alarms are placed in tanks and monitored continuously in the control room. Interviews with control room operators and observations of the Distributed Control System (DCS) control screens confirmed this practice.

Systems used to load the 1-ton bag-in-box packaging and its bulk transportation equipment such as rail hopper cars and ISO tanks utilize overfill protection devices and/or manual procedures. Loading of the packaging is done using a scale and interlock system to ensure that the packaging is not overloaded. Bulk transportation equipment loading systems also have sensors and/or visual monitoring capability combined with formal inspection / monitoring procedures for loading activities. The sensors and monitoring practices during loading ensure that the flow of product into the equipment is stopped after it is full to avoid overfilling and loss of containment.

The operation has implemented procedures for routine testing and maintenance of the instrumentation installed on the cyanide process and storage vessels, as well as loading systems, to ensure that the instrumentation is functioning properly to prevent overfilling.

All process instrumentation for the production, storage, and loading of cyanide at Cyanco has an annual preventative maintenance (PM) inspection to verify instrument span and functional test at

a minimum. Some instruments are tested as frequently as every six months. All PMs are recorded.Secondary containment areas for process and storage tanks are constructed of materials that provide a competent barrier to leakage. They are of sufficient size to hold a volume greater than that of the largest tank or vessel within the containment area, any piping draining back to the tank, and have additional capacity to allow for a storm event.

Spill prevention and containment measures were evaluated during the audit and were found to be appropriate for the operation. The process area has a concrete surface and is contained within a dike and curbing system. The plant has been designed for spill prevention.

The product inside is stored in UN-approved Flexible Intermediate Bulk Containers (FIBC) that are packed into plywood boxes under roof in a closed warehouse and kept away from the wet process area. Product is also temporarily staged in bulk ISO tanks and rails cars prior to shipment offsite by truck or rail. Transportation equipment is approved by the U.S. Department of Transportation (DOT) and the sodium cyanide is not exposed to moisture. Additionally, there is no sprinkler system in the warehouse.

All product in the warehouse is stored in sealed containers under safe conditions. The area where the cyanide is stored is well ventilated.

The site has a secure perimeter and access to the facility is tightly controlled. Security personnel are present 24/7 and make regular perimeter checks. A chain link fence surrounds the plant. Security was found to be acceptable.

Cyanide is stored in a finished goods warehouse that is only used for cyanide. No other chemicals or materials were observed as being stored in the warehouse.

Finding: Is the operation in full compliance, substantial compliance, or non-compliance with Production Practice 1.1?

☒ Full Compliance ☐ Substantial Compliance ☐ Non-Compliance

Production Practice 1.2

Develop and implement plans and procedures to operate cyanide production facilities in amanner that prevents accidental releases.

The operation has over 200 detailed procedures that outline step by step the actions necessary to operate the facility in a safe and environmentally sound manner. Procedures in the internet system were sampled. Risk-based Assessment Tool (RBET) is now being used for the review of procedures. Cyanco divides the procedures amongst the 4 shifts. Each shift reviews about 60 procedures. Procedures were found to be acceptable for ensuring that the operation is being run

in a safe and environmentally sound manner.

Procedures for upset and contingency conditions are in place and are available at the point of use at the operation. The facility has a document called the Consequence of Deviation with 4-5 line items per page detailing along with other items the operating limits, consequence of deviation, cause indicators, and corrective actions. Emergency Procedures (red book is also maintained in the control room. The types of emergencies addressed by these procedures are: power loss, steam leaks, safety shower alarm, Respond to a Cyanide Medical Emergency, etc. This is a very effective and detailed document. It tells the operator exactly what to do if there is an alarm and which valves to open, close, or settings to change.

Operations personnel were interviewed, and their awareness level of emergency and contingency procedures was very good. The control room operators showed very good knowledge of control systems, alarm systems, and shut down procedures.

The facility has a Management of Change (MOC) procedure that is used to identify risks when site operating practices change from those of the initial design to any part of the operation. The procedure requires a review and sign-off by an environmental, health, and safety professional, in addition to other signoffs.

A site wide MOC process (SPO56) is used to manage the change to any part of the operation. The site uses the MOC program called KMS (Knowledge Management System) for MOC and incident investigations. Records are maintained in electronic and hard copy with physical signoffs on any changes made to processes or equipment. The required signatures vary depending on the type of change being managed. Any changes to the operation with the potential to change environmental and/or safety performance or risk profile must be signed off by environmental and/or safety personnel, as appropriate. The auditor reviewed the MOCs performed during the recertification period. Records were found to be acceptable for all significant changes made to the cyanide process and loading equipment since the previous audit in 2019.

Preventive maintenance programs are implemented at the plant and all maintenance activities are documented for equipment and devices related to cyanide production and handling. Process equipment, tanks, and piping that contain cyanide are included in the mechanical integrity program. The preventive maintenance program is comprehensive and also includes all equipment used to move, store, and load cyanide such as solid cyanide conveyor systems and forklifts.

The facility has an excellent maintenance program system with clearly defined steps. The system also allows inspectors to give recommendations, make assignments and give deadlines. A database is used to manage work orders and maintain records to show that required maintenance and calibrations were completed. Records were reviewed in the database system and in maintenance reports from shut down events. Records were found to be complete.

Maintenance procedures were reviewed and found to be well-documented and very detailed. Maintenance registers show work order number, equipment number and description, work order description, priority, and date, among others.

Process parameters are monitored with the necessary instrumentation. Instruments are calibrated according to manufacturer's recommendations. Interviews and a review of records confirmed that the process control equipment is continuously monitored by Control Room Operators and is inspected / calibrated regularly by the maintenance department.

Procedure SP-02.74 - NaCN (PPE procedure) explains how the operators are responsible for calibrating each day before going in the field. The work orders refer to the equipment manual for proper calibration or to set it to a determined point. Records were reviewed in the database system and in maintenance reports from shut down events and were found to be acceptable.

Controls are in place to prevent unauthorized/unregulated discharge to the environment of any cyanide-contaminated water that is collected in a secondary containment area are implemented. The operation does not allow process water or water collected in the secondary containment areas to be discharged to surface water. All water that is potentially contaminated with cyanide drains to the Ascend water treatment system. 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 facility has environmentally sound procedures for the disposal of cyanide and cyanide contaminated solids. Procedure NaCN 01.84 - waste disposal procedure/waste accumulation procedure and instruction 2.74 - contaminated PPE, filters and lab waste disposal were reviewed and found to be complete and fully implemented. No inappropriately managed waste was observed during the audit.

Formal processes are in place to ensure that the cyanide is packaged and labeled as required by the political jurisdictions through which the packaged cyanide will pass. The legal and customer´s requirements are detailed in specific procedures for the different types of packaging. Packaging meets all applicable United States and international shipping requirements. Loading procedures and checklists were reviewed and are used to ensure packaging is properly loaded and sealed.

The Cyanco bag-in-box package is recertified on a regular basis. The inside bags are sealed. Records were available and complete. Inspection procedures for the sea containers are in use. Placards are placed on the sea containers. Labels on the boxes are in four languages (English, French, Spanish, and Dutch). There is also a label that is specifically designed to meet regulatory requirements in Peru.

Finding: Is the operation in full compliance, substantial compliance, or non-compliance with Production Practice 1.2?

☒ Full Compliance ☐ Substantial Compliance ☐ Non-Compliance

Production Practice 1.3

Inspect cyanide production facilities to ensure their integrity and prevent accidental releases.

This Cyanco plant was built in 2012. Many of the 10-year tank inspections came due during the recertification period. The operation chose to spread out the tank inspections and complete the necessary work 2017 through 2022. Records were sampled and were found to be complete for the recertification period. The equipment, concrete surfaces and plant in general were found to be in very good condition.

In addition to the formal American Petroleum Institute (API) inspections, 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. Drains are kept closed, but the entire production and loading part of the operation drains to the Ascend industrial water treatment system. 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 API (American Piping Institute) guidance at defined frequencies as part of the mechanical integrity program.

Cyanco maintains its own bulk transportation equipment (rail sparger cars, truck tankers, rail tank cars, and SLS ISO tanks). Equipment is inspected according to regulatory requirements. Equipment is inspected at least every three years and thickness testing is done every 10 years.

Inspection frequencies were deemed to be sufficient to ensure that equipment is functioning within design parameters. ETWP - Engineering Technology Work Practices is a set of procedures that details how inspection frequencies are set and how integrity inspections are to be performed. It is a very detailed program that adheres to PSM requirements. Inspection frequencies were found to be appropriate for the operation. Records were sampled and were found to be complete.

In addition to regular inspections, equipment shutdowns during which more extensive inspection and testing is performed, are conducted at least annually. Transportation equipment is inspected in accordance with the U.S. Department of Transportation (DOT) and U.S. Federal Railroad Administration (FRA) requirements.

Inspections are documented in the preventive maintenance database and show the date of the

inspection, the name of the inspector, and any observed deficiencies.

Formal mechanical integrity inspections are performed on a regular basis by certified Ascend inspectors or qualified third-party inspectors and the results are sent to the Cyanco Plant Manager. The Inspector was interviewed, and inspection records were sampled for the re-certification period. All records were found to fulfill Cyanide Code requirements. Emissions (AVO Audio-Visual Olifactor) monitoring is done by operators every two hours and is required to be performed every four hours by air permit conditions. Records for the recertification period were

sampled and were found to be complete.

Finding: Is the operation in full compliance, substantial compliance, or non-compliance with Production Practice 1.3?

☒ Full Compliance ☐ Substantial Compliance ☐ Non-Compliance

Principle 2 | WORKER SAFETY

Protect workers' health and safety from exposure to cyanide.

Production Practice 2.1

Develop and implement procedures to protect facility personnel from exposure to cyanide.

Cyanco has developed an extensive number of procedures to minimize worker exposure during normal plant operations from receipt of raw materials through finished product packaging and shipping. 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.

Extensive procedures are available for all aspects of operations including start-up, shut-down, and contingency plans in the event of upset conditions; maintenance procedures are also well documented and relevant information necessary to perform maintenance tasks is incorporated into the work orders in SAP.

Non-routine and emergency operations are performed by trained personnel wearing protective gear that is inspected regularly. 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 such as the requirement to decontaminate all equipment that is potentially in contact with cyanide prior to performing maintenance are detailed in the procedures. Hazardous and non-routine tasks such as confined space entry require the use of work permits to ensure that they are only performed safely. Maintenance procedures are also well documented and relevant information necessary to perform

maintenance tasks is incorporated into the work orders in SAP. Records were sampled and were found to be well-organized and complete.

Cyanco solicits worker input during the review and development of health and safety procedures.

Processors and engineers are involved in the management of change process and in the pre-start up safety reviews. During safety meetings that held each morning the facility gives the workers the opportunity to give their input on improving work procedures among other topics. There is a Daily Production Report that includes the topic that was discussed each day. They are also involved in process hazard analyses (PHAs), Management of Change (MOC), and Pre-Start Up Safety Review (PSSR) processes. Interviews during the audit and a review of records were used to confirm these practices.

Operational areas and tasks where the risk of cyanide exposure may be elevated to 4.7 ppm or above have been identified through industrial hygiene studies. None of the activities that were sampled had detectable levels of cyanide gas. Emergency response actions and maintenance activities such a line break where the risk of cyanide exposure may be elevated have been identified and PPE requirements have been defined (breathing air).

Exposure risks at this facility are generally limited to potential exposure to hydrogen cyanide gas during some maintenance activities such as confined space entry, and potential exposure to hydrogen cyanide gas during sampling and laboratory activities. Cyanide dust exposure is possible in the event of an upset condition during the loading of packages and/or transportation equipment. PPE requirements are clearly defined for all tasks and were found to be appropriate for the operation. Enclosed spaces in which cyanide is handled have a stationary HCN monitor that are monitored by the control room operator.

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 facility uses stationary and personal monitoring devices to confirm that controls are adequate to limit worker exposure to hydrogen cyanide (HCN) gas and sodium cyanide dust to 4.7 parts per million or less.

The production unit has 22 stationary MSA HCN monitors that are checked on a monthly basis (zeroed out), bump tested every 90 days, and calibrated at least every 180 days. Records were sampled from the re-certification period and were found to be complete. HCN personal monitors are used by all field personnel and are calibrated prior to going out into the field. HCN monitors were sampled, and the auditor confirmed that they are being calibrated on a regular basis and in many cases daily. The calibration equipment was checked and found to be suitable with in-date calibration span gas. The low level is set at 4.7 ppm and the high high alarm is set at 10 ppm. Personnel must evacuate the area and assess the situation remotely via cameras if either the 4.7 or 10 ppm alarms go off. The area would be ventilated, and anyone entering the area to investigate, make a repair, or clean cyanide from a surface must use a self-contained breathing apparatus (SCBA) and enter the area with another person with an SCBA as back-up.

Cyanco maintains, tests, and calibrates the cyanide monitoring equipment as directed by the manufacturer. The stationary HCN monitors are part of the computerized maintenance system that ensures they are maintained, tested, and calibrated monthly and more extensively maintained on a regular basis. Functionality checks and calibration records for the stationary and personal HCN monitors were sampled and showed that functional verifications and calibrations are performed, as required by the original equipment manufacturers. Records were sampled for the certification period and found to be complete. Records from the recertification period were available for review.

The buddy system is strictly enforced throughout the operation. No employees perform production, maintenance, or warehouse activities while alone at the operation. Personnel who are in the process area are always in radio contact with the control room operator. The control room operator is in visual contact with the field operator in many areas via video camera and is in constant radio contact as well.

The control room operator participates actively in the loading of the trucks or rail cars and has the ability to shut down the loading operation and call for help in the event of an emergency. The Buddy System is used if there is a higher risk situation such as dealing with a freeze emergency. HCN line breaks require a Safety Person that is in the same PPE be always present during the activity.

Employees' health is evaluated upon hire and annually thereafter. Health exams are used to evaluate employees' general health and confirm fitness for duty. These exams include vision and hearing checks. Personnel who may need to wear respirators undergo fit testing to confirm that they can safely do so. This is done annually. The employees are issued cards that show the next due date for fit testing. Records were available for review. An annual spirometry test is performed for those who wear respirator protection as part of their work duties.

The facility has a clothing change policy for employees, contractors, and visitors to areas with the potential for cyanide contamination of clothing.

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.

Visitor PPE requirements are limited to hard hat, side shield safety glasses and safety shoes for general operations areas. The Contractor Safety Requirements and Hazard Training procedure states that any clothing that might have come into contact with chemicals must be decontaminated prior to leaving the facility. The safety council performs unit level training.

Warning signs that advise workers of potential hazards due to the presence of cyanide and that suitable personal protective equipment must be worn are posted in appropriate locations in the production areas. There is also signage throughout the facility reminding personnel that eating, drinking, and smoking is prohibited in the process areas.

The operation has posted signs that limit access to the production area and require that visitors

enter through the main office. This ensures that people who enter the area are aware of necessary warnings prior to proceeding into the process areas.

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. The site is a tobacco-free site. Smoking is not permitted within the site perimeter.

Finding: Is the operation in full compliance, substantial compliance, or non-compliance with Production Practice 2.1?

☒ Full Compliance ☐ Substantial Compliance ☐ Non-Compliance

Production Practice 2.2

Develop and implement plans and procedures for rapid and effective response to cyanide exposure.

Cyanco maintains a comprehensive Emergency Response Plan. The plan is reviewed regularly and includes procedure NaCN 03.44 that covers the medical procedure for responding to a victim.

Industrial combination shower / low-pressure eye wash stations are located strategically throughout the facility. ABC dry chemical fire extinguishers are in production areas and any areas that potentially have cyanide in them. Safety showers and eyewash stations are tested weekly and before contractors begin work. They are all hooked up to alarms in the control room. Fire extinguishers and fire suppression systems are tested monthly. Additional emergency response equipment is also inspected monthly. Records for the recertification period were found to be complete.

The facility has water, oxygen, resuscitator, antidote, and a means of communication readily available at strategic points in the plant.

The antidote on hand is a CyanoKit. One person on the plant site is trained to administer the antidote. If this person is unavailable, then the plan is for the antidote to be administered by an external emergency responder.

Oxygen is maintained in the control room and the emergency response trailer. The check of the antidote and oxygen is part of the monthly inspection checklist. Records were available for review. Radios are used in the operation and were observed as being in use at the time of the audit.

Cyanco inspects its first aid equipment regularly to ensure that it is available when needed.

Emergency equipment is inspected on a monthly basis. Additionally, interviews with operators indicate that safety showers are tested prior to drawing cyanide samples and certain other activities. This practice is also documented in the Cyanide sampling procedure. Emergency response equipment is stored and tested according to manufacturer's recommendations. Cyanide antidote Cyanokit is stored centrally inside under conditions such as controlled temperature, as recommended by the manufacturer. Records were found to be complete and storage conditions were found to be appropriate. Safety Data Sheets (SDSs) and first aid procedures for cyanide exposure are available to workers. SDSs 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. Following the audit, SDSs were also made available in Spanish for Spanish-speaking visitors and/or contractors.

Storage tanks, process tanks, containers and piping containing cyanide are properly identified to alert employees of their contents. Piping and tanks markings with contents and direction of flow were improved following the audit. Photos of the process piping and tanks were submitted for review and were accepted by the auditor.

The facility has decontamination procedures for employees, contractors and visitors leaving areas with the potential for skin exposure to cyanide. Visitors are always escorted and instructed on the proper donning of PPE and decontamination process following process area field visits.

Decontamination procedures for employees are outlined in the Emergency Response Plan and contractor decontamination procedures. NAaCN 02.74 - NaCN Unit PPE procedure details 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 Class. 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. Employees receive training in cyanide safety which includes first aid procedures for cyanide exposures. Employees in process areas are trained to administer oxygen. Records were available to demonstrate this. One person on the ERT is qualified to administer the antidote. If this person is unavailable, then emergency personnel (ambulance) will administer the antidote.

Two complete first aid bags are available, one in the control room and the other in the emergency trailer. These bags contain oxygen, blood pressure, resuscitator, and CPR equipment, among others. The Ascend Emergency Response Team has a few different types of response suits and equipment that would enable them to respond to any emergency at the site.

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 can treat cyanide exposure victims.

The plant has had contact with local emergency responders and medical facilities to confirm that the local hospital has the capability to treat a potential cyanide exposure victim. Ascend also trains processors (operators) to become EMTs. 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 intravenous injection of antidote is present. The facility has two ambulances and a helipad.

The Integrated Contingency Plan (ICP) for the site states that there are mutual aid agreements in place with the Sheriff's Department, Fire Department, and two local hospitals.

The plant maintains an Incident Investigation Procedure. The Knowledge Management System database is used for incident investigation. An action is assigned for every preventable cause that is identified during the investigation and then the facility processes the actions. Records were sampled. No cyanide-related incidents occurred during the recertification period.

Finding: Is the operation in full compliance, substantial compliance, or non-compliance with Production Practice 2.2?

☒ Full Compliance ☐ Substantial Compliance ☐ Non-Compliance

Principle 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.

Cyanco has no direct or indirect discharge of process water to surface water or groundwater. 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.

The facility disposes of cyanide wastewater in a permitted deep well. There are no beneficial use options for the groundwater in this industrial area. 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. Environmental monitoring information was sampled for the re-certification period and was found to be acceptable.

Fixed cyanide gas monitors are used at the site in the laboratory and process areas; all are monitored by the Control Room Operators.

Monitoring is conducted at frequencies adequate to characterize the medium being monitored and to identify changes in a timely manner.

Environmental monitoring records were sampled. All environmental monitoring is done in accordance with permit requirements and was deemed to be acceptable by the auditor.

Finding: Is the operation in full compliance, substantial compliance, or non-compliance with Production Practice 3.1?

☒ Full Compliance ☐ Substantial Compliance ☐ Non-Compliance

Principle 4 | TRAINING

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

Production Practice 4.1

Train employees to operate the facility in a manner that minimizes the potential for cyanide exposures and releases.

The facility trains its workers to understand the hazards of cyanide and refresher training is conducted annually.

Cyanco has a formal six-week “boot camp” training program that includes cyanide safety training prior to the start of work 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 recertification period. Additionally, employees complete “hazards of cyanide” training through a computer-based training module prior to working with cyanide.

The facility trains its workers in the use of personal protective equipment on when and where this equipment is required. Personnel are trained on the use of personal protective equipment as part of the initial six-week boot camp and again during the on-the-job training done by supervisors. Tests are given and employees are observed to confirm that they thoroughly understand PPE

requirements and proper use requirements prior to starting work in an area.

The facility trains employees to perform their normal production tasks with minimum risk to health and safety and in a manner that prevents unplanned cyanide releases. Employees are trained to perform normal production tasks on each SOP of their job assignment to minimize risks to personal safety and the environment. Personnel are trained procedure by procedure and tests are given to confirm competence.

HCN training is delivered by an Ascend Engineer for a day during the six-week boot camp. Personnel complete 24-hazwoper training 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.

The operation requires extensive training prior to allowing employees to work with cyanide. All employees get boot camp training and then a week-long classroom process hazard training in the sodium cyanide unit prior to working with cyanide. All records reviewed showed that training occurred immediately upon hire. Interviews with operators confirmed this practice.

The plant follows established U.S. Occupational Health and Safety Administration (OSHA) Process Safety Management (PSM) regulations regarding re-training frequency on process-related operating procedures. Employees are re-trained at least every three years on normal production tasks and are re-tested to confirm continued competence. Cyanide safety training and emergency response training is refreshed every year. Records were reviewed and were found to be acceptable.

Employees first train on warehouse and material handling procedures, then staging boxes. The Unit Curriculum Model - Initial Outside Training was reviewed and was found to be an excellent training manual.

Training is provided by appropriately qualified personnel. 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. There are four positions: Warehouse Processor, Bag Box Processor/Loader, Field Processor, Board Processor. 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. Based on the tests and skills demonstration results, Cyanco determines if employees must be retrained or if they can be authorized to work independently. Records reviewed for the recertification period were readily available and showed conformance to internal procedures.

Finding: Is the operation in full compliance, substantial compliance, or non-compliance with Production Practice 4.1?

☒ Full Compliance ☐ Substantial Compliance ☐ Non-Compliance

Production Practice 4.2

Train employees to respond to cyanide exposures and releases.

All employees are trained in 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 known as the Integrated Contingency Plan (ICP). Each SOP indicates the necessary pre-requisite training as for example Cyanide Loading. The facility train workers in hazard recognition awareness. If an employee sees a release or that something has spilled, they must go into alert level. Emergency response drills are also conducted to ensure that the Emergency Response Team fully understands its responsibilities and refreshes its skills. Interviews were conducted and training materials were reviewed. Operators showed a good level of awareness of what steps to take if a cyanide release is discovered.

Cyanco trains its workers to respond to worker exposure to cyanide and cyanide releases. Routine drills are used to test and improve their response skills. The plant performed several mock drills during the recertification period to test and improve employee response skills. Employees are trained on how to respond to a worker exposure to cyanide and cyanide releases and drills are conducted annually to ensure that the Emergency Response Team refreshes its skills.

Detailed training records are retained in each employee file including training tests and were sampled during the audit. Records are maintained for at least as long as the employee is working at the site. All records pertaining to cyanide safety were sufficiently detailed to be found compliant to Cyanide Code and internal requirements.

Finding: Is the operation in full compliance, substantial compliance, or non-compliance with Production Practice 4.2?

☒ Full Compliance ☐ Substantial Compliance ☐ Non-Compliance

Principle 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.

Ascend, the landlord entity at the site maintains a detailed emergency preparedness program, the Integrated Contingency Plan (ICP), last revised in 2022. In addition, there are NaCN emergency procedures/abnormal operations maintained in the manual.

The ICP was reviewed and was found to be appropriate for the operation. Potential failure scenarios considered in the ICP include atmospheric release of hydrogen cyanide, release of solutions during truck loading, releases during fire, releases due to pipe ruptures, power outages, and overtopping of tanks. The main part of the ICP has the general response information and a series of appendices are used to manage information that changes more frequently such as telephone numbers.

The Ascend NaCN Unit emergency procedures are appropriately detailed and address all Cyanide Code requirements (a thru d). The ICP has instructions for the evacuation of site personnel and for notifications to the community and/or State agencies, depending on the type of emergency. There are no communities immediately adjacent to the site that would require evacuation. The use of the cyanide antidote and first aid measures for cyanide exposure are addressed in the plan. Although all employees are trained to decontaminate the victim and administer oxygen, just one person is trained to administer the antidote (EMT Intermediate certification is required to administer intravenous antidote). The plan discusses the role of the Control Board Operator who can shut down the operation using an emergency switch ("punching out the plant") in the event of a significant release event. Containment and mitigation measures are also described in the plan that if the cyanide were to spill out onto the ground an earthen dike is to be constructed if possible. The contact information for a remediation firm is also in the plan if there is a release which cannot be managed internally.

Finding: Is the operation in full compliance, substantial compliance, or non-compliance with Production Practice 5.1?

☒ Full Compliance ☐ Substantial Compliance ☐ Non-Compliance

Production Practice 5.2

Involve site personnel and stakeholders in the planning process.

The facility has involved its workforce and stakeholders, including potentially affected communities, in the emergency response planning process.

Ascend works with local responders, hospitals, and neighboring manufacturing plants on mutual aid plans. Confirmation has been made in the past year that local hospitals have necessary capability. 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 the recertification period. Additionally, there is a mutual aid agreement with the plants nearby, this was last updated during the recertification period. They will help each other in the case of an emergency. The Community Advisory Panel (CAP) meets every 2 months, and the mutual aid group of partners meet with the LEPC at least annually.

The facility has made potentially affected communities aware of the nature of the risks associated with accidental cyanide releases and consulted with them regarding communication and response actions.

Ascend Environmental, Health, and Safety (EH&S) staff are involved in the Local Emergency Planning Committee (LEPC) in Alvin. The EH&S Manager periodically meets with stakeholders. Additionally, there is a mutual aid agreement with a manufacturing plant nearby.

The facility has involved local response agencies as outside responders and medical facilities in the emergency planning and response process.

The Ascend Environmental, Health, and Safety (EH&S) staff are involved in the Local Emergency Planning Committee (LEPC) in Alvin. Ascend works with local responders, hospitals, and neighboring manufacturing plants on mutual aid plans. Confirmation has been made in the past year that local hospitals have the necessary capability.

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/or changing risks in the area. The ICP and procedures were found to be up-to-date.

The operation has regular communication with stakeholders to ensure that the ERP addresses current conditions and risks.

Ascend 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. Additionally, there is a mutual aid agreement with the manufacturing plant nearby. They will help each other in the case of an emergency.

Finding: Is the operation in full compliance, substantial compliance, or non-compliance with Production Practice 5.2?

☒ Full Compliance ☐ Substantial Compliance ☐ Non-Compliance

Production Practice 5.3

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

A review of the ICP confirmed that all 5.3.1 Code requirements are appropriately addressed. ICP Core Response Plan Section V describes the emergency response responsibilities. The Core Response Plan - section II - describes the SAFE Response Team structure.

Training requirements for the Emergency Response Team are defined a training matrix document entitled “Safety Training Requirements” and in the “Emergency Response Team Handbook.” All Emergency Responders receive formal hazardous materials training and training in the Cyanco Emergency Response Plan. For chemical releases, the Hazardous Materials Technician would play a primary role. This individual is required to take a 24-hour certified training course.

Safety training at Cyanco was found to be very well organized and records were readily retrievable in a computer database and in hard copy files. Call-out procedures are detailed in the plan and 24-hour contact information is on the Quick Reference sheet. Call numbers for outside responders are contained within the plan. 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.

Cyanco also participates in combined drills with the transportation company, mine sites and local responders to ensure that roles between organizations are understood.

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.

Section 18 of the Integrated Contingency Plan (ICP) for the site states that there are mutual aid agreements in place with the Sheriff’s Department, Fire Department, and two local hospitals.

The facility confirmed that outside entities included in the ERP are aware of their involvement and

that they are included in mock drills or implementation exercises, when possible.

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. Cyanco also participates in combined drills with the transportation company and local responders to ensure that roles between organizations are understood.

Finding: Is the operation in full compliance, substantial compliance, or non-compliance with Production Practice 5.3?

☒ Full Compliance ☐ Substantial Compliance ☐ Non-Compliance

Cyanco complies with all applicable elements of Production Practice 5.3. Cyanco has developed procedures for internal and external emergency notification and reporting.

Production Practice 5.4

Develop procedures for internal and external emergency notification and reporting.

Notifications to community and on-site contacts are described in the Integrated Contingency Plan - Section II, Attachment II.4.3. All necessary numbers, including telephone numbers of management, regulatory agencies, the environmental response company, and medical facilities is included in the emergency planning information. This information was last updated in June 2022.

There is a computerized telephone dialing system known as the Community Alert Network (FirstCall). The ESH Team Lead is the public information lead. There are at least 7 ERT members on-site at any given time. The information was found to be current.

Notifications to community and on-site contacts are described in the Integrated Contingency Plan - Section II, last updated in June 2022. The Plan also details procedures and contact information for notifying potentially affected communities and for communication with the media. There is a computerized telephone dialing system known as the Community Alert Network (FirstCall). The ESH Team Lead is the public information lead.

The ICMI significant cyanide incident criteria were added to the Cyanco GTERP Tab 01-V4.3, Injury/Chemical Release Reporting Matrix with the instructions that ICMI must be notified within 24 hours if there is a significant cyanide incident.

There were no significant cyanide incidents experienced by this operation during the recertification period.

Finding: Is the operation in full compliance, substantial compliance, or non-compliance with Production Practice 5.4?

☒ Full Compliance ☐ Substantial Compliance ☐ Non-Compliance

Production Practice 5.5

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

The ERP describes specific remediation measures for recovery and neutralization of solutions and solids, decontamination of soils or other contaminated media, management, and disposal of spill clean-up debris. The need to include a provision for an alternate drinking water supply was not deemed necessary. There are no surface or ground water vulnerable locations near this site.

The ICP discusses the steps to be taken in the event of a cyanide release. 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.

Decontamination of surfaces, soil, and equipment is done using a 50/50 hydrogen peroxide solution, as described in the site decontamination policy SM-26. Equipment is to be soaked in this decontamination solution for approximately an hour. Spills inside containment are managed using existing transfer infrastructure to collect the cyanide back into storage before any decontamination of contaminated surfaces. This ensures that the maximum amount of cyanide can be recovered instead of needing to be disposed of as hazardous waste. The storage and handling for the hydrogen peroxide is defined in the procedure. A Cyanco procedure on this topic is detailed and described the mixing, ratio, and safe handling considerations.

Contaminated soil is recovered and contained in drums. In the event of a spill, the contaminated materials are collected until samples show that cyanide is no longer detectable. According to Cyanco procedures, a low-level cyanide test method called CYN3 is required to be carried out until a non-detect limit is reached (CYN3 concentration is less than 0.2 mg/l). Sampling details, including how samples are to be taken and the analysis to be performed are described in the procedures.

Contaminated material is offered to customers to be used on their leach pads. Contaminated waste which is not suitable for the customer use is managed by an external contractor that is authorized for hazardous waste transport and disposal by incineration. Cyanco policy PO-4 (solid waste management) is very detailed and describes how hazardous waste is managed. Interviews with personnel confirmed that there is a very good understanding at the site as to how cyanide waste is to be managed.

The remediation management contractor procedure was reviewed. The document includes language that addresses decontamination, management, and disposal of cyanide-contaminated materials. The ultimate destination for the materials is under the control of Cyanco, as per the procedures summarized above. Useable cyanide is offered to customers, contaminated materials are sent offsite as hazardous waste, which is incinerated with an authorized hazardous waste disposal company.

The ICP prohibits 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 could reasonably be expected to enter surface water. Cyanco has confirmed that its remediation contractor's procedures also ban the use of cyanide destruction chemicals in surface water.

According to interviews and the ICP, a monitoring plan would be developed on a case-by-case basis.

Finding: Is the operation in full compliance, substantial compliance, or non-compliance with Production Practice 5.5?

☒ Full Compliance ☐ Substantial Compliance ☐ Non-Compliance

Production Practice 5.6

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

Section XV of the ICP calls for the plan to be reviewed annually. Records were available to show that this was done, as planned, during the recertification period.

Mock emergency drills are conducted periodically as part of the ICP evaluation process.

The operation periodically conducts emergency drills, holds drill critiques, and evaluates the need for further training or adjustment to the emergency procedures. Records were available to show that drills were conducted and critiqued during the recertification period. The sodium cyanide drills are run at least twice per year, as detailed in Section 7.0 of ICP XIII, dated September 2022. Records were available for physical exposure and spill drills for the recertification period.

There are provisions to evaluate the ERP after any emergency that requires its implementation, for revising it as necessary after drills and actual emergencies.

The operation periodically conducts emergency drills, holds drill critiques, and evaluates the need for further training or adjustment to the emergency procedures. Records were available to show that drills with external stakeholders were conducted during the recertification period. Drills including a worker exposure scenario were available for each shift for each year. The emergency plans were evaluated and revised as necessary in response to drill critiques and incidents since the previous Cyanide Code audit.

Finding: Is the operation in full compliance, substantial compliance, or non-compliance with Production Practice 5.6?

☒ Full Compliance ☐ Substantial Compliance ☐ Non-Compliance