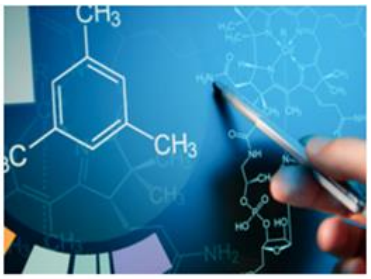
ICMI Production Verification Protocol (Revision June 2021)

Summary Audit Report

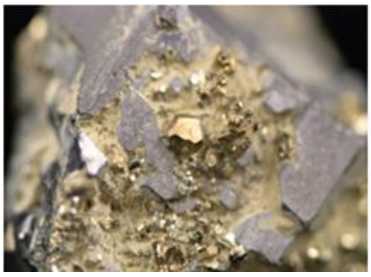
Hebei Chengxin Co. Ltd.

2022 Re-Certification Audit








Submitted to:

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Code Certification Service

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Table of Contents

Operation General Information

Name and location of Operation:	**Hebei Chengxin Co Ltd** Yuanzhao Road, Yuanshi County Shijiazhuang City, Hebei Province 051130 CHINA
Names and contact information for this facility:	Name: Jason Li Title: International Sales Department Manager E-mail: jason.li@hebeichengxin.com Tel: +86-311-66500855

Operation Description

Hebei Chengxin Co. Ltd. (herein referred to as "Chengxin") was established in 1990. It is a joint-stock enterprise with 4,000 employees. It is one of the largest production bases of cyanide and its derivatives in China. The company has been approved by the quality management system, OHSAS and environmental management system KOSHER. The company has the right for import and export. The products are sold to many countries and regions including South America, North America, Europe, Asia, Australia, South Africa.

Chengxin is located at Yuan Zhao Road, to the east of Yuanshi County railway station, 2 km east of Beijing/Guangzhou railway and No. 107 Stated Road, 3.6 km west of Beijing/Zhuhai speedway, 30 km south of the province capital Shijiazhuang City. To the north is Yuan Zhao Road (400 metres), to the west is Jingyuan Road (400 m), and to the east and south is farmland.

The site is used to manufacture many chemicals using liquid sodium cyanide as a basic feed- stock. The part of the site used to manufacture liquid sodium cyanide and then convert the liquid sodium cyanide into solid sodium cyanide is referred to in this report as 'the cyanide facility'. The term 'the site' is used in this report to refer to the entire Chengxin facility and includes several manufacturing plants which use liquid sodium cyanide as feedstock, these manufacturing plants are not subject to this report.

The cyanide facility is connected to the site's utilities including stormwater drains and the site wastewater treatment plant. The cyanide facility does not have its own wastewater treatment plant.

The cyanide facility was constructed in 2007 and replaced earlier cyanide production facilities. There have not been any major modifications to the cyanide facility since 2007. The changes since the ICMC Certification Audit in 2015 comprised:

- The replacement of cooling towers on the 810 workshop (WP 810) area for enclosed systems to meet environmental regulations and reduction in the number of tanks in the 810 work area tank farm from 23 to 16.

The feedstocks to the cyanide facility are light oil and ammonia (stored on site as liquid ammonia). The feedstocks are preheated and evaporated to produce a gaseous reaction mixture. This mixture is passed to an electric arc reactor furnace where the oil fumes are heated to approximately 1,200-1,400°C and passed over a platinum catalyst. This reduces the oil fumes to methane and coke (carbon particles). These intermediate reactants react with the ammonia in an endothermic reversible partial reduction reaction producing a raw gas that is a mixture of hydrogen cyanide and hydrogen with small quantities of methane, oil fumes, coke particles and ammonia.

The coke particles in the product gas are removed in cyclones and recycled. The gas is then cooled in a heat recovery heat exchanger to less than 100°C and passed through a bag filter. This filtered hydrogen cyanide gas is passed through a sodium hydroxide absorber, which generates sodium cyanide liquor, which is transferred via overhead pipelines to bulk storage tanks.

The liquid sodium cyanide liquor then passes through overhead pipelines to the solid sodium cyanide plant where it is concentrated by evaporation in evaporation vessels under vacuum and then crystallized in crystallization vessels to produce sodium cyanide crystals. The sodium cyanide crystals are then passed through a centrifuge to remove moisture, then through a drier to remove more moisture and passed via a cyclone to the pelletizing unit. The vapor from the evaporation unit is passed through a condenser to form condensate, which is stored in bulk above ground storage tanks at the liquid sodium cyanide tank farms prior to reuse in the absorption process.

The sodium cyanide crystals are pressed into pellets which are loaded into plastic bags in either 50 kg steel drums, 1,000 kg wooden boxes, or 1,100 kg wooden boxes. The packaged cyanide is stored in the warehouse at the cyanide facility prior to dispatch from site. The operation also provides liquid sodium cyanide to the domestic market which is transported in ISO containers.

The infrastructure at the cyanide facility comprises:

- Underground light oil storage tanks.
- Liquid ammonia storage tanks, located within an open concrete lined pit.
- Sodium hydroxide tank farm.
- Two cracking plants – each containing two cracking units with eight absorption tanks.
- Two liquid sodium cyanide tank farms – North Tank Farm and South Tank Farm.
- Two solid sodium cyanide production buildings, each containing a full solid sodium cyanide production facility.
- A products warehouse for storage of packaged solid sodium cyanide.
- Liquid cyanide loading facilities (platform and fill lines).

The facility is paved with concrete. The vessels and tanks containing liquid sodium cyanide, such as the absorption tanks, liquid sodium cyanide tanks and condensate tanks are located within concrete bunded areas. The solid sodium cyanide production buildings are both self-bunded with concrete floors, concrete walls and bunds at each doorway. The cyanide facility does not generate any wastewater. The first flush stormwater is piped to a first flush system comprising two open concrete pits at the wastewater treatment plant which services the entire site (i.e. all the other chemical manufacturing plants of Chengxin).

The facility operates on 12-hour shifts, 24 hours per day, seven days per week, with three production teams.

There were no cyanide exposure incidents notes as occurring during the audit period.

Audit Implementation and Conclusions

This re-certification audit was conducted through on-site observations; reviews of records and procedures; and interviews with senior management, operations management, engineering, and environmental, health & safety (EH&S) staff. Chengxin. personnel were involved in the audit. The audit team used the 2021 *ICMI Cyanide Production Verification Protocol* to evaluate International Cyanide Management Code (Cyanide Code) compliance.

Procedures, site conditions, and records were evaluated during this audit. The assessment was based on random samples of information and therefore deficiencies may exist which have not been identified. The depth to which records, and data were sampled was typical of an environmental, health and safety (EH&S) management system audit. Although legally required records were sampled to evaluate Cyanide Code compliance, legal compliance with federal, regional, and local regulations was not part of the scope of this evaluation.

The following individuals were audit participants:

Name	Role
Chen, Jianxin	Safety department, Dept Head
Chen, Shaoqiang	Workshop 810, Production Supervisor
Jin, Jinyan	International Trading, Business Manager
Li, Dan	Production, Executive Officer
Li, Weidong	International Trading, Dept. Manager
Liang, Liqiang	Production, Person-in-Charge of Management Systems
Sun, Yanqing	Environmental department, Executive Officer
Yuan, Zhiwen	Production, Vice General Manager

The audit was performed by an independent third-party audit team that fulfills all ICMI Cyanide Code Lead Auditor and Technical Auditor requirements for cyanide production operations.

All aspects of the cyanide operations were included in this Cyanide Code Re-Certification Audit. The operation was found to be in FULL COMPLIANCE with Cyanide Code Cyanide Production requirements.

Auditor's Finding

This operation is in **FULL COMPLIANCE** with the International Cyanide Management Code.

The Chengxin cyanide safety performance for the re-certification period was excellent, there were no cyanide-related safety incidents, accidents, spills, or exposures. The cyanide management practices for Chengxin were evaluated for Cyanide Code compliance using the 2021 version of the *ICMI Cyanide Production Verification Protocol.* Chengxin internal standards, policies, practices, and procedures regarding the management of the cyanide operations were reviewed.

The results of this re-certification audit demonstrate that the Hebei Chengxin Co. Ltd. cyanide-related production activities are in **FULL COMPLIANCE** with International Cyanide Management Code requirements.

Compliance Statement

This operation has not experienced any compliance issues or significant cyanide incidents during the three-year audit cycle.

Auditor Information

Audit Company:	MSS Code Certification Service, a division of: Management System Solutions, Inc. www.mss-team.com
Lead / Technical Auditor:	Nicole Jurczyk E-mail: njurczyk@mss-team.com
Technical Auditor:	Liu Yun E-mail: yun.liu@mss-team.com
Date of Audit:	December 12-14, 2022

Auditor Attestation

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

I attest that this Summary 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.

Hebei Chengxin Co. Ltd.		February 20, 2023
Name of Operation	Signature of Lead Auditor	Date

Hebei Chengxin Co. Ltd.		February 20, 2023
Name of Operation	Signature of Lead Auditor	Date

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 engineering practices and quality control/quality assurance procedures.

Chengxin maintains records of the construction plans, structural calculations, compatibility of construction materials, and approval records from professional construction engineers showing that the facility was reviewed and approved by appropriately qualified professionals. A detailed review of the construction records was performed during the prior certification and recertification audits.

No significant changes to the facility were made during the recertification period.

The materials used for construction of the cyanide production facilities are compatible with the reagents used and processes employed. No changes to the materials or processes employed were made during the recertification period. The auditor team confirmed through field observations of the facility that materials used are compatible for use with sodium cyanide.

Individual critical process vessels / tanks operated in the liquid production area (WP801) and the solid production area (WP810) are equipped with alarms in terms of level, flowrate, pressure and have corresponding interlocks. The process areas have stationary hydrogen cyanide (HCN) monitors which are linked to the respective control rooms. The production areas are equipped with a backup power supply so that in the case of a power outage, the standby system would be activated to ensure the continuation of normal operations. This was confirmed through a review of documentation and an interview with the Solids Workshop Manager. Hydrogen cyanide (HCN) monitors and process instrumentation also have their own uninterruptible power supplies (UPS) which can supply 30 minutes of power for operation / process recovery in the event of power outage. Both liquid and solid cyanide systems are designed so that in the event of a complete failure of power supply and backup power that the cyanide-containing liquid/solid and/or gas would remain within the closed process vessels or tanks with no release to the environment.

Observations during the field audit confirmed that all process tanks and valves are constructed on concrete and inside secondary containment. The solution pipeline is on the pipeline corridor which is over concrete. The transfer piping used in the production between cyanide in liquid into solid form is also over concrete. The concrete surfaces were observed to be in good condition with no apparent cracks or damage.

Process indicators, high- and high-high- level indicators, and corresponding level alarms on cyanide-containing liquid tanks are linked to the respective control rooms and monitored by Distributed Control

System (DCS) operators. Several indicators were sampled to check their alarm setpoints in the DCS. Interlocks are regularly inspected and tested to confirm functionality.

The annual equipment inspection plan was reviewed during the audit. The registers of the inspection and testing results for the alarms and corresponding interlocks of both production areas were also reviewed. The registers for the recertification period were verified by the auditor. The inspection and testing records indicate the date of the inspection or test, the person who performed the inspection or test, the results, and the corrections if deficiencies were found. All inspections are signed off and approved by the supervisor.

A perimeter trench channels water into a sump from where it is pumped into the wastewater collection tank. A stormwater pond also provides emergency backup capacity should the tank fill. From there, the wastewater is fed to a wastewater treatment plant operated by Chengxin Corporation. Effluent from the wastewater treatment plant is sent to the municipal wastewater system. All process equipment is located within the drainage footprint of the containment area. The tank farm also has secondary containment with appropriate capacity which provides a competent barrier to leakage.

A review of maps and site operations and interviews confirmed that site design is capable of properly directing and managing all types of spills and/or storm events. The design of the site itself ensures that there is a competent barrier to the environment and that drainage from the largest tank, associated piping and a storm event would properly flow into the site wastewater treatment system.

All process tanks and valves are constructed on concrete and inside secondary containment; the liquids pipeline is within the pipeline corridor which is over concrete; and transfer from liquid to solid is over concrete. All process equipment is located within the drainage footprint of the containment area.

The cyanide-bearing pipes and tanks are part of the mechanical integrity program with defined intervals of inspection and thickness testing performed by qualified inspectors. Records of the inspections and maintenance activities for the recertification period were sampled and found to be complete.

The solid cyanide is stored separately from other materials in a high-risk area that is under roof to avoid potential for contact with moisture and is strictly controlled with only limited access. Field observations of the warehouse confirmed that the cyanide is stored inside with adequate ventilation and HCN monitors. There is a high level of security to prevent any unauthorized people from entering the area. There is also a logging system to record visitors to the area and security cameras are also in use. There is no storage of other chemicals in the warehouse.

The liquid cyanide tank farm is surrounded by a fence with locked security gates. An intruder alarm system and facial scanning technology prevents unauthorized access to the tank farm. There are no chemicals in the cyanide tank farm.

The operation is:	☒ In full compliance with ☐ In substantial compliance with ☐ Not in compliance with	Standard of Practice 1.1

Production Practice 1.2

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

The solid and liquid cyanide operations have detailed standard operating procedures that describe which actions are necessary to operate the facility in a safe and environmentally sound manner. A sampling of operational control and maintenance procedures was reviewed during this re-certification audit and found to be appropriate for the operation and up to date. Safe practices and cautionary statements are listed throughout the documents.

The "Response Measures to Abnormal Operating Situations" procedures (contingency plans) are very detailed and outline the steps to be taken during non-standard operating situations. These procedures specify risks associated with respective operating tasks, troubleshooting steps, and response actions to be used to cope with deviations from normal operations. The procedures also address emergency response for each work position. Procedures were sampled during the audit and were found to be sufficiently detailed and accurate for guiding activities in the event of an upset condition in the operations.

A Management of Change (MOC) procedure and "Management of Changes of Equipment & Facilities" procedure are used to manage the change to any part of the operation and associated documentation, including changes to equipment, technology, and the MOC process. The environmental and safety departments are involved in the evaluation of risk and the procedures require the sign-off of environmental and safety personnel on changes.

There were no cyanide-related changes during the recertification period that needed to be processed with these procedures. An MOC processed for a non-cyanide facility was reviewed to confirm that the environmental and safety personnel participated in the evaluation and properly signed off on the MOC.

There is an "Annual Equipment Inspection and Maintenance Plan" which lists the equipment name, number, model, location, in service date, and annual inspection plan. The 2022 plan and corresponding inspection and maintenance records were sampled, and it was confirmed that the preventive maintenance (PM) program has been appropriately implemented and documented.

Warehouse (WP810) forklifts are operated by qualified operators and annually inspected by third parties. Forklift annual inspection certificates were checked and found to be current. The qualifications for a sample of forklift operators were checked and their operating certificates were found to be valid.

There are several procedures in the Site's Manual that specify the requirements associated with equipment management. These were sampled during the audit.

Interviews and a review of records from the recertification period confirmed that the process control equipment is continuously monitored by Operators and is inspected / calibrated regularly.

The “Monitoring and Measuring Equipment Management Procedure" requires that calibrations of instruments are conducted according to the planned frequency. Each instrument bears a sticker which indicates the last and current calibration dates. An Instrument Calibration Plan is established annually, with the Instrumentation Workshop responsible for the plan execution. The Instrument Calibration Plans and a sampling of calibration reports from the recertification period were reviewed by the auditor and were found to be in order. Records reviewed included those for portable and stationary HCN Gas Detectors.

The production processes including storage tanks are provided with necessary instruments that are linked to the corresponding Distributed Control Systems (DCSs) for monitoring the operating parameters. The parameters and their setpoints of cracking furnaces, absorption vessels, liquid cyanide storage tanks, evaporators, off-gas caustic scrubbers (level indicators) as well as stationary HCN gas detectors were randomly checked on the DCSs versus the calibration records. All records were found to be complete and were readily retrievable.

Due to the design of the facility, it is not possible to divert wastewater from secondary containment trenches to the environment. This is described in the "Site Water Pollution Prevention Control Procedure" established to define the roles and responsibilities for the wastewater treatment plant operations. All stormwater runoff also goes to the wastewater treatment facility. Therefore, there is no requirement for Chengxin to analyze rainwater collected in the secondary containment areas. Rainwater is pumped to the wastewater treatment plant.

Procedures exist for the disposal of cyanide and cyanide-contaminated materials. Cyanide waste is incinerated onsite by Chengxin Corporation. The hazardous waste incineration permit was reviewed and was determined to be appropriate for the wastes generated and current. The only cyanide contaminated wastes generated by the operation are contaminated personal protective equipment (PPE) and some packaging materials used in temporary containers in production. All cyanide contaminated waste is sent for onsite incineration. Chengxin Corporation is the permit holder for the Hazardous Waste Disposal Facilities. The permit was verified and confirmed that the permit covers the types of the hazardous wastes generated by both workshops.

The Cyanide Packaging Procedure in the Workshop Operations Manual (Section 16) specifies that the solid cyanides are packaged in accordance with the Chinese national standard GB 19268 "Solid Cyanide Package". Procedures require that packaging is appropriate for the jurisdictions through which the load will pass.

Each solid cyanide container stored in the warehouse was observed to be labelled in both Chinese and English (at minimum) with global harmonized system GHS pictograms and UN number. Some of the containers bore an additional label in Russian or Spanish, subject to customer's request. Language labels are applied in the production area.

A packing inspection is conducted for international shipments by the Hebei Entry-Exit Inspection and Quarantine Bureau (a government authority) and a performance certificate is issued for each batch of the containers.

Packaging and labelling procedures and implementation were found to be acceptable.

The operation is:	☒ In full compliance with ☐ In substantial compliance with ☐ Not in compliance with	Standard of Practice 1.2

Production Practice 1.3

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

A review of records and results of interviews confirmed that tanks, valves, pipelines, and containments are routinely inspected for their integrity, proper operation, deterioration, and appropriate signage. Field operators on each shift regularly inspect operational areas and tank farms. Secondary containments and trenches are checked multiple times each shift and discharged to the wastewater treatment plant. Field inspection sheets from the recertification period were reviewed and found to be complete and included the area inspected, inspection date, inspection results, and inspector signature.

Inspections of the process equipment and piping as well as thickness measurement of tank walls are carried out every 180 – 365 days depending on the equipment and service. Records demonstrated that the integrity and wall thickness of the tanks and pipelines sampled were acceptable. Inspection records were reviewed for the re-certification period and were found to be complete.

The containers and trucks belong to the Chengxin Transportation Company who is responsible for the integrity inspection of the containers and trucks. The producer has no responsibilities for maintaining the trucks. The "Sodium Cyanide Container Loading Checklist" is completed prior to loading the truck and includes driver and vehicle information, as well as wheel chock, loading pump, and hose inspection.

Inspections are done each shift and records indicate the date of inspection, name of inspector, and any observed deficiencies. The inspection frequencies are sufficient to ensure equipment is functioning within design parameters.

The actions taken to resolve deficiencies are noted on the log sheets. If more significant actions are required, the corrective action system is used. Records of inspections for the recertification period were reviewed and found to be complete.

The operation is:	☒ In full compliance with ☐ In substantial compliance with ☐ Not in compliance with	Standard of Practice 1.3

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.

The operation has established various management procedures and standard operating procedures (SOPs) for cyanide-related activities that address normal operations, non-routine and emergency operations, and maintenance related activities. Personal protective equipment (PPE) requirements are specified in standard operating procedures for each area.

The standard operating procedures (SOPs) developed by both production areas WP 801 and 810 also have sections for each job task detailing the personal safety and health precautions to be taken during normal and emergency situations. The WP 810's SOP specifically identifies high-exposure-risk activities that require changing clothes and taking a shower following the activity.

Worker exposure to cyanide is minimized by using personal protective equipment (PPE) and through the safe operation of equipment and management of materials, from the production areas through to the storage and shipping areas. The "PPE Provision, Use and Maintenance Management Procedure" summarizes the potential risks (including cyanide exposure) and PPE requirements based on nature of each job task (such as Cracking, Cyanide Loading, Evaporation, Warehousing). The highest-risk cyanide exposure task (Packaging task in the WP 810 solids production area) requires full protection (full-face mask, full-body coverall).

Non-routine tasks such as maintenance work or field response to an abnormal situation require a portable HCN gas detector to be carried. Equipment is decontaminated prior to performing maintenance, testing, or inspection activities. This practice is required by procedure and was confirmed with maintenance personnel. The Permit to Work System is used to manage non-routine tasks to ensure that hazards and precautions are evaluated prior to commencing work.

Very detailed emergency response procedures are maintained in the Emergency Response Plans (ERPs) that include PPE requirements to ensure the risk of human exposure to cyanide is minimized.

A worker review period is established when there are changes proposed to the procedures. A review of records confirmed the participation of workers in the review of procedures.

The facility has identified specific job tasks like maintenance work that have the potential for exposure to cyanide above 10 ppm instantaneous or 4.7 ppm over an 8-hour period. The operators use portable HCN monitors when conducting these specific job tasks. The need for a personal HCN monitor is stated in the safe work permit for the specific job. There are also jobs that require the use of respirators. The tasks requiring respirators, the proper use of the respirators, and the maintenance and testing of the respirators

are detailed in several procedures and were found to be appropriate for the operation. Examples of safe work permits with potential for cyanide exposure were reviewed and the personal HCN monitor requirement was identified. The facility also has multiple stationary HCN detectors.

There are 96 stationary HCN gas detectors installed in the liquid operations area (WP 801), 25 in the solids area (WP810), and six in the warehouse of solid cyanide finished products. The stationary HCN gas detectors are set to alarm at 2.5 ppm (Response Level I) and 5 ppm (Response Level II). Alarms are monitored by the Control Room / Distributed Control System (DCS) operators using the Gas Detection System (GDS). The portable HCN gas detectors are set to alarm at 5 ppm and used for specific tasks such as maintenance work.

When the Level I alarm is triggered, an operator puts on a portable detector and goes into the operations area to investigate the issue. When the Level II alarm is triggered, the facility is evacuated immediately, and the Site's ERP is activated. These activities are recorded in the "Record Form of Fixing GDS Alarming Issues". Records from the solids area (WP810) were reviewed and were found to be complete.

HCN monitors are calibrated by a third party annually and are also inspected by facility employees monthly to verify functionality. Calibration records for the HCN monitors for the recertification period were reviewed and were found to be complete.

Chengxin requires that the buddy system be used when cyanide operations are carried out. This means that at least two workers must be present in the work area where cyanide is located. Operational areas and the liquid loading area have cameras. Operators were interviewed in the liquid production area, solid production area, warehouse, and shipping. Interviews with employees confirmed that the buddy system is used throughout the operation.

"Occupational Hygiene Management Procedures - Management of Employee's Occupational Health Monitoring and Filing of Medical Documents" describes the health assessment procedures for employees.

All workers have a medical examination initially and annually thereafter at the local hospital (Yuanshi County) to assess the worker's health and fitness for the job. The medical exam includes the evaluation of basic health parameters, including fitness for wearing a respirator when required by the job position. Records of the annual medical examination reports were available for review and found to be complete.

The Manual of Management Procedures "Clothes Changing and Shower Management Procedure", specifies it is applicable to personnel performing the tasks associated with lab analysis, packaging, warehousing, maintenance, operations of evaporation/ centrifuge/ drying/ modelling. Requirements are to take off disposable shoes, take a shower, and change clothes when they exit the area.

The operators and supervisor performing the packaging of solid cyanide were interviewed. There was good alignment between answers given during interview and written procedures.

Warning signs that cyanide is present, which PPE is required to be worn in which area, and the name of the responsible person are posted at appropriate locations throughout the operation. Posting locations were observed as including entrances to the production areas, tank farms, and the warehouse.

Signs prohibiting smoking, eating, drinking, and open flames are posted in multiple locations. The auditors concluded that signage was appropriate and compliant with Cyanide Code requirements.		
The operation is:	☒ In full compliance with ☐ In substantial compliance with ☐ Not in compliance with	Standard of Practice 2.1

Production Practice 2.2

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

The "Environmental Incident Emergency Response Plan" and the "Specific Environmental Incident Emergency Response Plan of Hazardous Wastes" detail actions to be taken in the event of a cyanide spill or exposure. Procedures provide information on using antidote and what to do with an exposed person (decontamination, remove to fresh air, steps to take if the person is conscious or unconscious, etc.). Interviews with operators confirmed awareness of steps to be taken in the event of exposure. The clinic doctor was also interviewed and reported that the onsite clinic has the knowledge and primary capability of medical rescue if the exposure victim's symptoms are not too severe. If severe symptoms are experienced, the victim is transported to the hospital.

Safety shower, eye wash stations, and dry powder fire extinguishers are provided at appropriate locations throughout the facility. Inspection checklists confirm that safety showers, eye wash stations, and fire extinguishers are routinely checked and maintained appropriately. The functionality of select safety showers and eye wash stations was confirmed through testing during the field audit. Inspection records were available for review.

The facility maintains appropriate emergency response equipment, including oxygen, resuscitator, antidote and a means of communication or emergency notification. Injection antidotes are kept at critical locations throughout the facility. The weekly antidote inspection records confirming number of antidotes and expiration dates were found to be complete. The antidotes observed were within the expiry dates specified in the labels and were being stored according to manufacturer storage requirements.

The weekly "(Medical) Oxygen Cylinder Inspection Records" were available for the auditor's verification. The acceptable pressure range of the cylinders (10-14.5MPa) was checked and recorded.

Interviews confirmed that walkie-talkies are used for mutual communications and emergency alerts.

The equipment was found to be well maintained and readily available for use.

The facility appropriately maintains the equipment and medicines to ensure their availability during an emergency. Injection antidotes are kept at critical locations throughout the facility. Fire extinguishers are routinely inspected at all locations, and the stand-alone emergency equipment storeroom in the WP 801 production area is inspected monthly.

Safety Data Sheets (SDS) and procedures are in Chinese, the language of the workforce. The SDS structure is developed based on the Chinese national standard B/T 16483 which is consistent with the global harmonized system (GHS) requirements.

Safety signage with warning icons is also used in the area. The SDSs for sodium cyanide and potassium cyanide were observed as posted on a wall of the solid cyanide warehouse (WP 810). Operators indicated that they have ready access to SDSs if they feel they need to review information.

The direction of flow is marked on the pipes using a color-coded arrow designation aligned with the Chinese National Standard GB 7231 "Industrial Pipelines Color Codes and Signage". Although the word “cyanide” does not appear on the pipes, interviews and procedures confirmed alignment and understanding in the workforce that a black arrow indicates that cyanide is contained in a pipe. The arrow indicates the direction of flow. Storage and process tanks containing cyanide were clearly labeled on the tank walls.

Chapter 10 in the Manual of Management Procedures, the "Clothes Changing and Shower Management Procedure", specifies it is applicable to personnel performing the tasks associated with lab analysis, packaging, warehousing, maintenance, operations of evaporation/ centrifuge/ drying/ modelling. Requirements are to take off disposable shoes, take a shower, and change clothes when they exit the area.

Contractors and visitors are issued appropriate PPE prior to entering the field. PPE required will depend on the area of the plant being visited. When exiting, they remove the PPE (overalls, laboratory coat and/or shoe covers) so it can be washed and then incinerated. Hand washing is required upon exit from any area that contains cyanide.

The facility has a medical clinic capable of providing 24/7 first aid and medical assistance. The onsite doctor was interviewed during the audit. Awareness of emergency actions and use of antidote was excellent.

If there is an exposure victim, the person would first be treated in the on-site clinic. If additional care is needed, the Chinese emergency number (120) will be called, and the exposure victim will be sent to the local hospital for further treatment.

A formalized agreement with the Chinese Medical Hospital in Hebei dated January 5, 2021, is in effect and is valid is for three years. The agreement was reviewed during the audit. Both parties agree that the facility will call the hospital immediately so they can prepare the professionals and antidotes. There is also a requirement for the company to train the medical staff annually on cyanide exposure response. The hospital agrees to treat cyanide exposure victims, provide onsite guidance and comments during mock exposure drills, and have an emergency contact number available 24-hours a day. Records of the last

annual training for hospital medical staff were available for review.

The "Production Safety Incident Reporting, Investigation and Actions Procedure" defines the incident classification, reporting, and investigation process. The Incident Investigation Report includes details of an incident, root cause analysis, corrective actions, responsible person(s) and timeline. If an incident were to occur, the Emergency Response Plan is to be reviewed and revised as needed. There have been no cyanide exposure or cyanide release incidents since the last audit.

The operation is:	☒ In full compliance with ☐ In substantial compliance with ☐ Not in compliance with	Standard of Practice 2.2

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.

There is no direct discharge from the facility to surface water. The stormwater and contaminated process water are collected and pumped to the wastewater treatment facility operated by Chengxin Corporation. There are no environmental receptors, such as surface water bodies, near the cyanide facility or site.

Groundwater is monitored in four monitoring wells on the site that are placed according to the flow direction of the groundwater (upgradient and downgradient). Groundwater quality is analyzed by a third party annually. The site environmental department is responsible for monitoring plan implementation and engagement of third parties to conduct lab analyses and generate monitoring reports.

The effluent quality of the wastewater treatment plant is sampled at the discharge point DW001 and analyzed by a third party for cyanide content monthly. The testing reports from the recertification period showed that there was no detectable cyanide in the samples.

According to the groundwater withdrawal permit, the site is allowed to utilize the groundwater for producing their process water and potable water. The June 2022 testing report demonstrated that the Total Cyanide in the groundwater was non-detect (ND = 0.05 mg/L). This in compliance with the regulatory limit of 0.05 mg/L cyanide set for Grade III Waters per Chinese National Standard GB/T 14848-2017 Standard for Groundwater Quality.

There is no known seepage or contamination of the ground water at the facility. The site is strictly

regulated and frequently inspected by the Chinese government to ensure that controls and facility infrastructure continue to be appropriate and protective of the environment.

Process parameters on the cyanide scrubber are monitored every two hours to ensure proper operation and stack testing is performed quarterly by a third party. Records of stack testing, process parameters, and analytical data for the recertification period were available for review and were found to be complete. Results were compliant with the local environmental emission limit.

Monitoring frequencies were determined to be adequate for the operation.

The operation is:	☒ In full compliance with ☐ In substantial compliance with ☐ Not in compliance with	Standard of Practice 3.1

Principle 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 facility in a manner that minimizes the potential for cyanide exposures and releases.

Site personnel are trained to understand the hazards of cyanide through 3 levels of training: company specific, area specific, and shift specific. The 3-day training courses are given by either workshop (production) managers or external experts, and participants are required to pass an exam with at least an 80% score for each level. The initial three-day orientation training is given before employees work with cyanide. The training topics include relevant regulations, safety risk/unsafe sources identification and evaluation, preventive measures, PPE use and maintenance, awareness of dangerous chemicals, prevention of fire and explosion, safety signage, emergency responses to typical incident scenarios, and SOPs. Examinations are used to confirm training effectiveness. New employees are trained upon hire prior to working with cyanide and an annual training plan is used to manage refresher training for existing employees.

Employee training records were sampled and were found to be in order.

The annual training addresses PPE use and maintenance. The workers receive training on SOPs initially and then annually at the area level. The SOPs include a section for each job task detailing the relevant EHS hazards.

The workers receive training on SOPs initially and then annually at the area level. The SOPs include a section for each job task detailing the relevant EHS hazards. The training elements necessary for each job

are contained in the SOPs. Training records were sampled and were found to be complete and acceptable. Qualified personnel provide the training to operators. The Manager of each department is the trainer in that department. The doctor trains employees on the use of antidote through a hands-on demonstration. Examinations are used to confirm training effectiveness. Records for the recertification period were reviewed and were found to be complete.

The operation is:	☒ In full compliance with ☐ In substantial compliance with ☐ Not in compliance with	Standard of Practice 4.1

Production Practice 4.2
Train employees to respond to cyanide exposures and releases.
The "Environmental Incident Emergency Response Plan" and the "Specific Environmental Incident Emergency Response Plan of Hazardous Wastes" detail action steps to be taken in the event of a cyanide spill or exposure. Procedures provide information on using antidote and what to do with an exposed person (decontamination, remove to fresh air, steps to take if the person is conscious or unconscious, etc.). The workers receive training initially and then annually thereafter. Interviews with operators confirmed awareness of steps to be taken in the event of exposure or release. An "Enterprise Employee Safety Education and Training File" has been established for every employee since 2015 and includes the orientation training and annual refresher training organized by the Corporation/Safety Department from the on-boarding date of a new-hire throughout his/her employment. Training details recorded include topic, employee and trainer name, training date, and method of evaluating comprehension (typically by exam). Employee training records were sampled and were found to be in order.

The operation is:	☒ In full compliance with ☐ In substantial compliance with ☐ Not in compliance with	Standard of Practice 4.2

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.

The site has several emergency response procedures that are required by the Ministry of Emergency Response.

The "Response Plan" is in place to address the potential releases of cyanide that may occur. The document covers all the operations on the site. It includes a section describing the sodium cyanide characteristics, emergency organization, emergency assessment levels, scenario-specific instructions, and communications protocol.

"Specific Emergency Response Plan of Major Hazard Source - #2 Solid Sodium (Potassium) Cyanide Warehouse" addresses a spill of solid cyanide, personnel exposure, fire, and explosion scenarios. The plan indicates that the sodium cyanide is inflammable, and that wastewater needs to be managed carefully.

The "Specific Emergency Response Plan of Major Hazard Source - Sodium (Potassium) Cyanide Tank farm at South West" addresses a release of liquid cyanide, human exposure, fire and explosion scenarios.

These plans provide specific response actions to cope with the identified scenarios.

The "Environmental Incident Emergency Response Plan" which includes 12 risk scenarios based on fire/explosion/release, includes the sodium cyanide tank farm and the solid cyanide warehouse.

In case of a fire, the emergency response plan calls for the use of sand or powder. Power outages are addressed in the contingency plans for upset conditions. Interlocks would shut the plant down in a safe configuration.

The "Specific Environmental Incident Emergency Response Plan of Hazardous Wastes" includes 12 risk scenarios based on fire/explosion/release including the sodium cyanide tank farm and the solid cyanide warehouse. This plan describes the emergency response process from the reporting of the incident to closure.

The potential failure scenarios addressed in the ERPs were found to be appropriate for the organization.

The emergency response plans have instructions for the evacuation of site personnel and for notifications and escalations, depending on the type of emergency. The plans detail the use of cyanide antidotes and first aid measures for cyanide exposure; specific response actions to deal with small- and large-scale leaks; evacuation alarms and evacuation routes.

Incidents are investigated using the "Production Safety Incident Reporting, Investigation and Actions Procedure" which requires incident assessment and mitigation based on root cause analyses results.		
The operation is:	☒ In full compliance with ☐ In substantial compliance with ☐ Not in compliance with	Standard of Practice 5.1

Production Practice 5.2

Involve site personnel and stakeholders in the planning process.

According to the nature of the site's operations and chemicals used, the site is identified by the Chinese authorities as a major-hazard-source company. The site is therefore required to submit its ERPs to the local Bureau of Emergency Response and the Bureau of Ecology and Environment for review and approval every three years.

The site Emergency Response Plans and safety procedures were prepared by site personnel. The site Emergency Response Team is actively involved in the response planning process through training, drills, and response activities. The operation engages with local communities by inviting representatives from surrounding villages to have a plant tour and discuss the ERPs. Although the three-year review and approval was done during the recertification period, there were no plant tours during the COVID pandemic. This situation was clearly unavoidable and was accepted by the audit team.

The ERPs identify the roles and responsibilities of the relevant authorities including local fire brigades and hospital.

The operation is:	☒ In full compliance with ☐ In substantial compliance with ☐ Not in compliance with	Standard of Practice 5.2

Production Practice 5.3

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

The facility clearly designates full responsibility and authority for managing an emergency in the facility ERP and defines the organization, roles, and responsibilities with primary and alternate response coordinators identified. Emergency response numbers are listed including the Emergency Response Team (ERT) members. ERT members receive appropriate training, respirator fit tests, and participate in regular meetings and/or drills. Records of training for emergency responders for the recertification period were

sampled and were found to be acceptable.

The ERP includes a list of emergency response equipment maintained in the emergency response equipment room was available for review. ER equipment is inventoried and inspected monthly.

The ERPs identify the roles and responsibilities of the relevant authorities including local fire brigades and hospital. The external parties are invited to participate in mock drills and participate when possible.

A review of drill reports indicated external entities have participated in mock drills. According to the agreement with the hospital, the operation is obligated to train hospital staff on cyanide exposure victim treatment and the use of the antidote on an annual basis. The site doctor was interviewed, and records were available from the recertification period. Although there was a gap in physical interactions during the pandemic, records show that this training of hospital staff is being done again.

The operation is:	☒ In full compliance with ☐ In substantial compliance with ☐ Not in compliance with	Standard of Practice 5.3

Production Practice 5.4

Develop procedures for internal and external emergency notification and reporting.

The ERPs have a detailed list of internal and external stakeholders who need to be notified, as appropriate, depending on the nature of the emergency. The call lists include members of management, regulatory agencies, external responders, and medical facilities. The management / incident commander is notified first to make the decision on requesting assistance from external entities.

The exact emergency contact information and telephone numbers that need to be in the ERP are strictly controlled by the Chinese authorities. ERP emergency notification information was found to be compliant with local reguations.

The format for the ERP is provided by the government and includes all necessary contact information for local responders and government agencies that have the responsibility for community protection.

The site procedures regarding incident classification, reporting and investigation include the requirement to notify ICMI of any significant cyanide incidents.

The operation is:	☒ In full compliance with ☐ In substantial compliance with ☐ Not in compliance with	Standard of Practice 5.4

Production Practice 5.5

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

The ERPs include details on remediation measures including steps to be taken for recovery and neutralization of solutions or solids, decontamination of soil and cleanup materials, disposal of spill clean-up debris, and environmental monitoring. Extensive descriptions of necessary action steps depending on the incident scenario are clearly outlined in the procedures.

Due to secondary containments and stormwater networks in the facility being treated at the wastewater treatment plant, the facility area being fully paved with concrete, and no surface water near the site, the facility believes that there is no reasonable expectation of cyanide release into surface water. Therefore, the language that use of chemicals such as sodium hypochlorite, ferrous sulfate, and hydrogen peroxide to treat cyanide is prohibited does not exist in their ERPs. This was accepted by the audit team.

The "Environmental Incident Emergency Response Plan" and the "Specific Environmental Incident Emergency Response Plan of Hazardous Wastes" include the relevant steps to address these issues. Since there are no water bodies near the site, only the air would need to be monitored. This would be done with portable and fixed cyanide detectors.

The operation is:	☒ In full compliance with ☐ In substantial compliance with ☐ Not in compliance with	Standard of Practice 5.5

Production Practice 5.6

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

The site is required to submit its ERPs to the local Bureau of Emergency Response and the Bureau of Ecology and Environment for review and approval every three years. All ERPs reviewed were current with a three-year review cycle.

Emergency response drills are conducted monthly. The scenarios vary and are all hands-on. External responders are invited to participate in drills and records indicate the local fire brigade and hospital participated in a 2021 drill involving a rescue situation. The variety of scenarios and frequency of drills were found to be appropriate and effective for evaluating the operation's plans, training, resources, and preparedness for response to cyanide releases and to cyanide exposures of workers.

The drill record includes section for evaluation, corrective action, responsibility, and timeline. The sampled

records found the evaluations done and the actions closed. No specific revisions to the plan were needed following the drills, but minor revisions appear to have been made after each 3-year formal review cycle with the government.		
The operation is:	☒ In full compliance with ☐ In substantial compliance with ☐ Not in compliance with	Standard of Practice 5.6