



International Cyanide Management Code Certification Audit

Production Facility – Summary Audit
Report

PREPARED FOR



Weifang Binhai Petro-Chem Co., Ltd

DATE

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REFERENCE

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Production Facility – Summary Audit Report
0782246



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ACRONYMS AND ABBREVIATIONS

Acronyms	Description
ICMC	International Cyanide Management Code
ICMI	International Cyanide Management Institute
UNEP	United Nations Environmental Program
HAZOP	Hazard and Operability Study
LOPA	Layers of Protection Analysis
DCS	Distributed Control System
SIS	Safety Instrumented System
MOC	Management of Change
WAD	Weak and Dissociable
WWTP	Wastewater Treatment Plant
SOP	Safety Operation Procedure
ERP	Emergency Response Plan

1.0 OPERATION GENERAL INFORMATION

Name of Production Facility: Weifang Binhai Petro-Chem Co., Ltd

Name of Facility Owner: Weifang Binhai Petro-Chem Co., Ltd

Name of Facility Operator: Weifang Binhai Petro-Chem Co., Ltd

Name of Responsible Manager: Wenqiang Yang

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2.0 OPERATION LOCATION DETAIL AND DESCRIPTION

Weifang Binhai Petro-Chem Co., Ltd. ("Weifang Binhai" or "the Facility") was established in 2005. It is a subsidiary of a publicly traded company-Tiande Chemical Holding Ltd with approximately 930 employees. The company has obtained ISO9001: 2015 certificate, ISO14001: 2015 certificate and ISO 45001:2018 certificate. The company has the right to import and export. The products are sold to many countries and regions, including South America, Europe, Africa, Asia and etc.

Weifang Binhai is located at No. 001001 Xiangjiang West 1st Street, Binhai Economic Development Zone, Weifang City, Shandong Province, China. And the surroundings are as below:

- East: Haifeng Road and vacant land
- South: Xiangjiang Street 1 and vacant land
- West: Shandong Fangzhou Biotechnology Co., Ltd. and Static Environmental Technology Co., Ltd.
- North: West Xiangjiang Street and Shandong Hongtian Heavy Industry Co., Ltd.

Bailang River is about 2 km east of Weifang Binhai. G18 Speedway is about 3 km south of Weifang Binhai. North Weifang Railway Station is about 25 km to the south of Weifang Binhai.

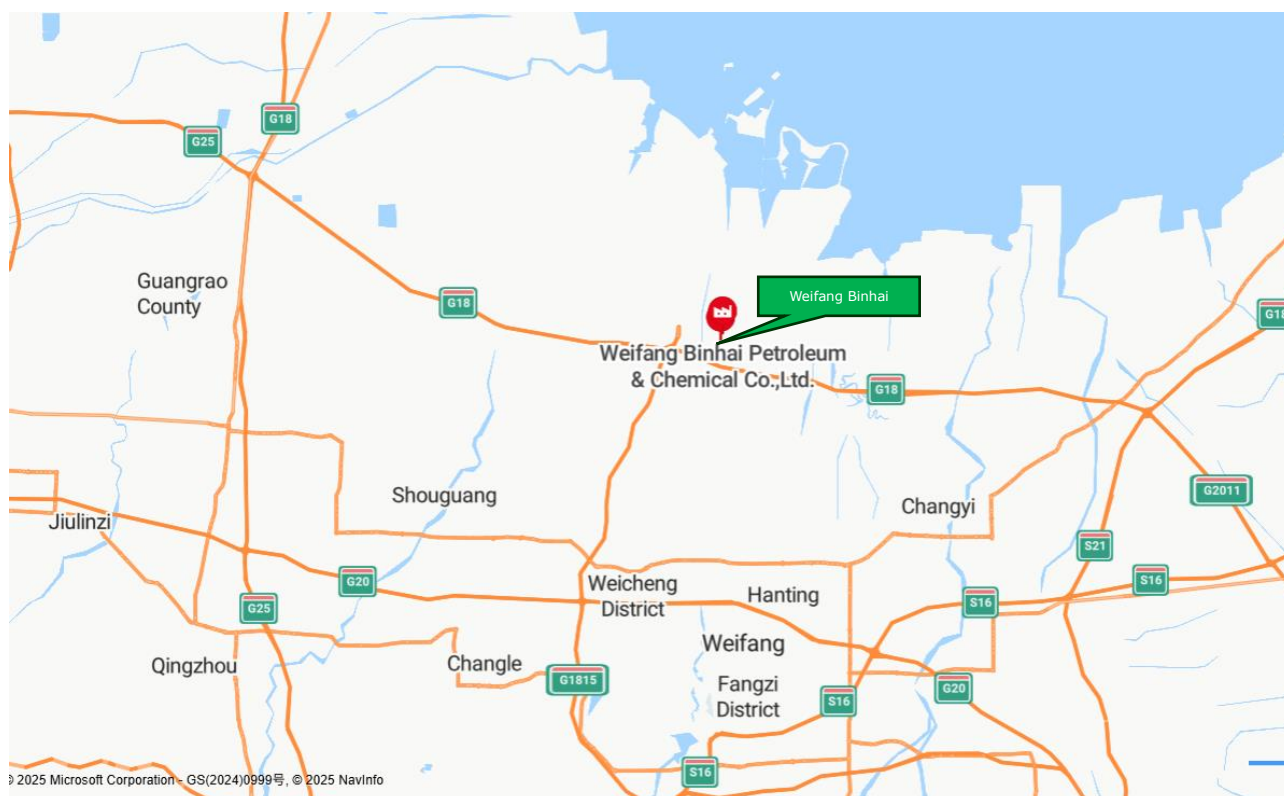


Figure 1: Regional Location Map

The part of the Site used to manufacture liquid sodium cyanide and then convert into solid sodium cyanide, which is referred to in this report as 'the cyanide production unit'. The term 'the Site' used in this report refers to the entire Weifang Binhai Facility and includes a large number of manufacturing plants, but these manufacturing plants are not subject to this report.

Weifang Binhai solid sodium cyanide manufacturing processes are described as below:

- Mixture and preheat – 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.
- Reaction 1 – The mixture is passed to an electric arc reactor furnace where the oil fumes are heated to approximately 1,450°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.
- Reaction 2 –The gas is then cooled in a heat recovery heat exchanger to approximately 130°C and passed through a bag filter. This filtered hydrogen cyanide gas is passed through a sodium hydroxide absorber, which generates sodium cyanide liquor.
- Evaporation and Crystallization – Liquid sodium cyanide is pumped into liquid cyanide volume measuring tanks, then be pumped into the vacuum evaporator to remove water and the concentrate is fed to the crystallizer.

- Centrifuge – Wet crystals are generated by continuous solid-liquid separation of the concentrated crystal pulp.
- Drying – The sodium cyanide crystals are heated in the dryer to evaporate the residual water, and the crystals are dried into dry powder.
- Moulding – Dry sodium cyanide powders are moulded into “pillows”.
- Packaging – Sodium cyanides are delivered to the tablet tank through an oscillatory conveyor and then weighted in the weighing and packing machine. Products are tested by random sampling, and the qualified products are packed in 50 kg drums, 650 kg, 1,000 kg, 1200kg timber boxes with inner polyethylene liners, plastic bags within recycling metal boxes or 1000 kg plastic bags within timber intermediate bulk containers (IBCs). The packaged cyanide is stored in the warehouse at the cyanide facility prior to despatch from the Site.

The liquid cyanide facility was constructed in 2011 and expanded in 2018 and 2022. The solid cyanide facility was constructed in 2024. One modification to the liquid cyanide medium tanks replacement of Liquid Cyanide Production Unit occurred in 2024.

The infrastructure at the cyanide facility comprises:

- Liquid Ammonia Tank Farm.
- Light Oil Storage Tank Farm
- Sodium hydroxide tank farm.
- Liquid sodium cyanide production unit.
- Solid sodium cyanide production unit.
- Liquid sodium cyanide storage tank farm.
- A products warehouse for storage of packaged solid sodium cyanide.

The facilities are paved with concrete. The liquid sodium cyanide medium tanks and storage tanks in Liquid Cyanide Production Unit are located within concrete bunded areas. The solid sodium cyanide production building and warehouse are both self-bunded with concrete floors, concrete walls, and bunds at each doorway. The cyanide facilities are connected to the Site's utilities including stormwater drains and the Site's Wastewater Treatment Plant. All cyanide contained wastewater is collected within cyanide production units and returned to the liquid cyanide production processes after pre-treatment, hence no wastewater containing cyanide is sent to the onsite wastewater treatment plant (WWTP) for treatment.

The first 15-minute flush stormwater is piped to a first 15-minute flush system comprising three confined concrete pits with total capability of 2800 m³ in total (1200 m³+1600 m³) which services the entire site (i.e. all the other chemical manufacturing plants of Weifang Binhai). Also, a confined concrete tank with 4000 m³ for emergency response of incident wastewater collection has been set up.

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

No cyanide exposure incidents occurred during the audit period.

3.0 AUDITOR'S FINDING

This operation is

- ☒ in full compliance
☐ in substantial compliance
☐ not in compliance

with the International Cyanide Management Code.

4.0 AUDITOR INFORMATION

Audit Company: ERM (Shanghai) Limited

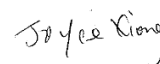
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Names and Signatures of Other Auditors:

Auditor Trainee:

Joyce Xiong



Name

Signature

Dates of Audit:

29 July to 1 August 2025

5.0 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 Cyanide Code Auditors.

I attest that this Summary Audit Report accurately describes the findings of the certification audit. I further attest that the 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.

6.0 PRINCIPLES AND STANDARDS OF PRACTICE

PRINCIPLE 1 | OPERATIONS

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

STANDARD OF PRACTICE 1.1

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

☒ in full compliance with

The operation is ☐ in substantial compliance with Standard of Practice 1.1

☐ not in compliance with

Summarize the basis for this Finding/Deficiencies Identified:

The Facility is in FULL COMPLIANCE with Production Practice 1.1 requiring cyanide production facilities to be designed and constructed consistent with sound, accepted engineering practices and quality control/quality assurance procedures.

The cyanide facility is mainly comprised of four units as below:

- Liquid Cyanide Production Unit: Phase 1-3
- Solid Cyanide Production Unit: Phase 1-2
- Liquid Cyanide Tank Farm
- Solid Cyanide Warehouse

Quality control and quality assurance programs have been implemented during construction and modification of cyanide production and storage facilities. The quality control and assurance records have been retained. Qualified personnel from the accredited third party have reviewed the facility's construction and provided documentation confirming that it has been constructed as proposed and approved.

According to the regulations of China, chemical plant shall be designed and constructed by qualified agency or company. Also, an independent construction management company shall be assigned to project management of QA/QC, health safety and environment, schedule control, and cost control. In the Construction Acceptance Reports for the Liquid Cyanide Production Unit and Solid Cyanide Production Unit, the project's outcome is certified. These reports have been signed and stamped by the relevant companies, including Weifang Binhai, design company, construction company, design review firm, interdependent construction management company.

Phase 2 of Solid Cyanide Production Unit is in commissioning. As reported, the Facility plans to complete the acceptance for environmental protection facilities acceptance by the end of 2025. Construction Acceptance Reports on Safety Facilities and Environmental Protection Facilities for the rest facilities has also concluded that the certification of these facilities.

Quality control and quality assurance records for the construction structure and foundation have been incorporated into the Construction Acceptance Reports for Liquid Cyanide Production Unit and Solid Cyanide Production Unit, which mainly include details of:

- Excavation depth, length and width deviation from design
- Soil type and quality tests
- Level of the compacted surface compared to design
- Moisture content of compacted soil
- Survey of position and height of each floor of the building
- Specification, spacing and connections of reinforcing steel in concrete foundations and slab
- Concrete formwork location for the walls and floors
- Concrete surface condition following pours
- Concrete structure dimensions, deviation from design
- Brick strength compared to specification
- Roof impermeability experiment
- Brick wall dimensions
- Cement render quality
- Elevator installation test
- Lightning and grounding test

Quality control and quality assurance records for the construction and installation of the Cyanide Facility have been included in the Construction Acceptance Report for Cyanide Facility which mainly includes details of:

- Qualification verification for the special operation: such as welding operator, NDT personnel
- Verification of facility, pipelines installation work method
- Materials qualification and certification verification
- Valve testing.
- Safety valve testing.
- X-ray testing. and
- Pressure testing.

Equipment List of Cyanide Production Units has been updated in 2025 to include the equipment number, specification, producer, and installation location.

The quality assurance document of tanks and vessels with normal pressure has been retained for each tank and vessel confirming adequacy of construction. For the pressure tanks, vessels and pipelines, the quality assurance document has been retained with design details, Usage Registration Certificate, Usage Verification Certificate, Safety Function Supervision and Testing Certificate, periodically verification report.

Quality control and quality assurance documentation is available for the cyanide facilities.

The materials used for construction of cyanide production facilities are compatible with the reagents used and processes employed. No changes to the materials or processes employed have been undertaken during the audit period. The materials used for the cyanide facilities comprise the following:

- Pipe work – 304 grade stainless steel
- Reactor – 304 grade stainless steel
- Liquid cyanide tank – 304 grade stainless steel
- Filter – 304 grade stainless steel
- Evaporators – 304 grade stainless steel
- Crystallizers – 304 grade stainless steel
- Centrifuge – 316 grade stainless steel

These materials are recognized as being compatible with the chemicals used to manufacture and store cyanide.

There are automatic systems or “interlocks” in place to shut down production systems and prevent releases due to power outages or equipment failures.

The cyanide facilities are supplied with electricity by two separate power supply circuits. In the event of failure of one power supply, the other power supply can fulfill facilities’ needs. The facility is also equipped with a UPS to address emergency power outages, which will automatically sustain power to the facilities for approximately 2.5 hours to shut down production systems and prevent releases.

The controls established of equipment failure generally comprise alarms to signal the detection of HCN gas or high levels in tanks/vessels. When the alarm is activated, the control room operator switches off the associated part of the process. The system will remain inactive until the cause of the problem has been investigated and resolved.

The Facility has established the Distributed Control System (DCS) and Safety Instrumented System (SIS) for the cyanide production processes.

The main elements of the Liquid Cyanide Production Unit connected to the DCS and SIS are:

- High and high-high, low and low-low alarm for light oil liquid level
- High and high-high alarm for light oil regulator vessel liquid level
- High and high-high alarm for ammonia gasifier outlet pressure
- High and high-high alarm for ammonia gas regulator vessel liquid level
- High and high-high alarm for cracking furnace outlet pressure

Some other key elements of the Liquid Cyanide Production Unit that have also been connected to DCS are:

- High and high-high alarm for flammable gas in light oil tanks area
- High and high-high alarm for light oil gasifier liquid level
- High and high-high, low and low-low alarm for ammonia storage tank liquid level
- High and high-high, low and low-low alarm liquid NaOH liquid level

Some other key elements of the Liquid Cyanide Production Unit that have also been connected to SIS are:

- High and high-high alarm for flammable gas in light oil unloading area
- High and high-high alarm for light oil gasifier liquid level
- High alarm (7m) for ammonia storage tank liquid level
- High alarm for ammonia storage tank pressure
- High-high alarm for gas-liquid separation tank pressure

The main elements of the Solid Cyanide Production Units connected to the DCS are:

- High and high-high, low and low-low alarm for evaporative condensate storage tank liquid level
- High and high-high, low and low-low alarm for mother liquor dilution tank
- High and high-high, low and low-low alarm for heat tracing water tank temperature
- High alarm for liquid cyanide outlet pump pressure
- High alarm for flash distillation unit temperature

In the event of failure of both power supplies, the liquid or gas in the process will remain in place, posing environment risk. The critical area of the plant is the reactor. If the plant needs to be shut down, the cyanide facility's emergency response procedure will be initiated. The procedure states that in the event of a power failure, UPS will be automatically activated to supply power to the control system, facilitating the safety shut down of the production process.

In conclusion, in the event of power failure or equipment failure, the contents of each vessel and pipe will remain within the vessel or pipe and will not leak into the environment. There has not been a simultaneous failure of both power supplies to the cyanide facility in the past three years.

In the event of equipment failures, the operators shut down the associated part of the plant. The Cyanide Production Unit has not experienced any incidents requiring a shutdown of the plant (either manually or automatically) in the past three years, aside from planned maintenance.

Also, Weifang Binhai conducts HAZOP every three years to assess the process risk of cyanide production facilities.

The cyanide production unit areas are paved with concrete.

The Solid Cyanide Warehouse has a concrete floor and has been observed to be in good condition.

Most of the ground under transfer pipelines for cyanide solutions are paved with concrete. There are three areas present with flange or valve of the transfer pipelines for cyanide solutions from Liquid Cyanide Tank Farm to Solid Cyanide Production Unit, and secondary containments under the flange or valve of the transfer pipelines were constructed with good condition.

The concrete surface comprises roadways and pedestrian paths, which were observed to be in fair condition. The first 15-minute flush system comprises two confined concrete pits with 2800

m³ in total. These concrete pits can only be emptied by switching on a transfer pump (both automatic and manual) to transfer the contents to the wastewater treatment plant which serves the entire site (not just the cyanide facility).

The Facility does employ, inspect, test, and maintain systems -- such as level indicators and high-level alarms -- to prevent the overfilling of cyanide process and storage vessels.

The Facility does have regular inspection for the control system, which includes the indicators and alarms as well as secondary containments the vessels are stored in. Also, the Facility conducts the annual testing for the DCS and SIS System. The test results have shown that the systems are in good condition.

The filling process of each tank or vessel is overseen by the control room operator, who can deactivate the relevant transfer pump upon activation of an alarm.

Secondary containments for process storage tanks and containers are constructed using materials that provide a competent barrier to leakage and are sized to hold a volume greater than that of the largest tank and container of cyanide solutions within the containment and any piping draining back to the tank, and with additional capacity for the design storm event.

The liquid cyanide produced from Liquid Cyanide Production Unit is pumped into liquid cyanide tanks. Secondary containments for process tanks and containers are constructed of concrete and concrete-rendered brickwork. The secondary containment of the liquid cyanide tanks is sized to contain at least 110% of the volume of the largest tanks and is paved with concrete. The secondary containments are constructed of concrete and have been observed to be in fair condition.

In the event of a loss beyond the bund of the liquid cyanide tanks the facility would rely upon the concrete pavement stormwater first 15-minute flush system to contain the loss. The area outside of the bund comprises concrete paved pedestrian way and roadway, which drain into the site's stormwater systems first 15-minute flush pits. The cyanide facility would rely upon the first 15-minute flush system to contain a loss from the tank. The capacity of two first 15-minute flush pits is 2800m³ in total. The first 15-minute flush from cyanide production units are collected and recycled within the production process

The wastewater treatment plant uses sodium hypochlorite to break down the cyanide when required.

Spill prevention or containment measures are provided for all cyanide solution pipelines.

The cyanide production unit areas are paved with concrete.

Most of the ground under transfer pipelines for cyanide solutions are paved with concrete. There are three areas with flanges or valves of the transfer pipelines for cyanide solutions from Liquid Cyanide Tank Farm to Solid Cyanide Production Unit, secondary containments have been constructed under the flanges and valves.

Cyanide labels and glow direction signs are in place on the pipelines. Daily inspection is carried out every day to observe whether there is leakage from the transfer pipelines.

There are no leak alarms on the cyanide pipelines.

Regular inspections are undertaken to include pipe work, flanges, pumps, high level alarms and tanks to identify leaks. Records of the inspections are kept.

In the event of loss from a pipeline within a bunded area, the spill would drain to a sump from where the liquid would be pumped to the Emergency Storage Tank and return to the process.

The cyanide facility undertakes inspection of the pipe wall thicknesses annually. The inspection records reflect the integrity of the pipe and support structures. The results indicate all pipelines meet the standard requirement.

Cyanide is stored under conditions to prevent or minimize the potential for moisture exposure, along with adequate ventilation to prevent the build-up of hydrogen cyanide gas and cyanide dust.

Solid cyanide is stored in three sizes:

- 50 kg plastic bags within steel drums, and
- 1000 kg plastic bags within timber intermediate bulk containers (IBCs).
- 650 kg, 1000 kg and 1200 kg plastic bags within recycling metal boxes.

The drums, IBCs and metal boxes are stored inside a smart warehouse which is transported from the package area to the smart warehouse by automated conveyor belt. The smart warehouse is enclosed with concrete floors, walls and roofs to prevent exposure of cyanide to moisture. The smart warehouse is secured with two locks, and the keys are held by two designated individuals. No safety showers or any other water systems in the cyanide storage Warehouse.

No fixed HCN monitors have been installed in the smart warehouse. Normally, no personnel shall be allowed to enter the smart warehouse except for the maintenance tasks of the smart warehouse system. If any maintenance needs to be performed in the smart warehouse, a Permit to Work will be applied. And the maintenance operator must carry portable HCN detectors.

The warehouse building is located within the facility boundaries. The site is surrounded by a concrete/brick wall. Access to the site is only via a manned security gate. Public access is prohibited. The cyanide warehouse features 32 windows, providing adequate ventilation to prevent the build-up of hydrogen cyanide gas.

Only solid cyanide stored in the warehouse which is separately from incompatible materials.

The liquid cyanide solution is stored in tanks within an open tank farm, where is located in a secure area separate from incompatible materials, with appropriate barriers. Access to the tank farm is only via locked gate. Fixed HCN monitors have been installed in the tank farm.

STANDARD OF PRACTICE 1.2

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

☒ in full compliance with

The operation is ☐ in substantial compliance with Standard of Practice 1.2

☐ not in compliance with

Summarize the basis for this Finding/Deficiencies Identified:

The Facility is in FULL COMPLIANCE with Production Practice 1.2 requiring development and implementation of plans and procedures to operate cyanide production facilities in a manner that prevents accidental releases.

The Facility holds ISO certifications for safety, environment and quality management systems.

The Facility has established Standard Operational Procedures, Safety Management Procedures and Emergency Response Plans to manage the EHS risks of Cyanide.

Standard Operational Procedures are integrated procedures addressing the full production process, included for:

- Raw gas purification
- Reaction
- Ammonia clearance
- Liquid Cyanide
- Desulfurization
- Loading and unloading
- Cycle water
- Evaporation
- Dry
- Forming
- Packaging
- Laboratory test
- Centrifugation
- Forklift
- Discharging.

The procedures do describe the necessary operating practices including pre-start checks, personal protective equipment and contingency measures.

The Facility has contingency plans for non-standard operating situations that may present potential for cyanide exposures or releases.

The plant is automated and operated via DCS with separate control rooms for the liquid plant and solid plant. Emergency shutdown and interlocks are built into the plant design and managed via the DCS.

The Standard Operational Procedures for Cyanide Production Units include details of the DCS for cyanide production process and details of the measures to be taken should an upset occur. There are interlocks built into the system to shut down the process if necessary. And the facility also has UPS for emergency power outage situations, which will automatically power the facilities for approximate 3 hours, allowing for the safe shut down of production systems and prevent releases.

Should there be a cyanide exposure or release, the situation is managed via the site's Emergency Response Plans that provide details on the response actions.

The Facility has a procedure to identify when there are changes to cyanide facilities or operating practices that differ from the initial design and operating practices standards. This process requires a review and sign-off by environment, health, and safety management.

The MOC Procedure details the changes that require MOC process. It details the types of work that must be reviewed and by whom, with process changes requiring review by both the

department supervisor and the safety engineer, as well as representatives from the environment, health and safety department. Safety equipment changes require review by the safety management department. Changes involving facility process, new project, expansion project, renovation project must be reviewed and approved by the Chairman. The procedure details execution of the change, inspection, acceptance, commissioning and review after work, together with training and communication.

A minor modification to the cyanide plant has been undertaken during the audit period which involved the replacement of liquid cyanide medium tanks in Liquid Cyanide Production Units. Records of Management of Change (MOC), along with qualifications or certifications of the liquid cyanide medium tanks have been provided for review.

Preventive maintenance programs are implemented, and activities are documented for equipment and devices necessary for cyanide production and handling.

The Facility Operations and Maintenance Procedure is an integrated procedure that documents the routine inspection and preventative maintenance requirements for the cyanide facility, which includes the requirements as below:

- Annual Facilities Maintenance Plan must be prepared and submitted for approval before Chinese New Year every year.
- The maintenance for key facilities (which may cause termination of production) maintenance must be prepared and submitted for approval one month in advance at least.
- For the normal facilities maintenance, work permit is applicable to the task.
- Maintenance frequency of key facilities.

The Equipment Maintenance Plans list and describe the maintenance requirements of the equipment by items. Equipment maintenance plans for cyanide facilities were reviewed for the audit period and aligned with the description of maintenance activities provided by site engineers.

The Facility will shut down for approximately a week to conduct overhaul in September or October annually.

Process parameters are monitored with necessary instrumentation that is calibrated according to manufacturer's recommendations.

The procedure requires that the calibration should be conducted according to the planned frequency. Following calibration, a label must be placed on the equipment. The Facility maintains annual calibration lists detailing the instruments in the plant needing calibration throughout the year. These instruments include high pressure gauges, vacuum pressure gauges, numerical temperature displays and flow meters.

The calibrations are undertaken by an independent externally qualified company. Equipment was sampled at random and the corresponding calibration records were available with valid period. And the calibration records for the instrumentation used to monitor process

Parameters are required to be retained for three years.

Procedures are in place and being implemented to prevent unauthorized/unregulated discharge of any cyanide solution or cyanide-contaminated water to the environment from the secondary containment area.

Water collected within the secondary containment structures cannot leave the structure unless it is pumped out or otherwise intentionally removed.

Wastewater and first 15-minute flush from cyanide production units are collected and recycled within the production process. After the initial 15-minute first flush, stormwater from the Liquid Cyanide Production Unit will be switched to the storm water drainage system and discharge into the nearest storm water receiving creek through two storm water discharge outfalls, i.e. DW005, DW007.

The first 15-minute flush outside of the cyanide production units was collected in two initial storm water collection tanks, from where were pumped to onsite WWTP for further treatment.

The Emergency Response Plan for Environmental accidents require that contaminated water collected within the secondary containment areas is pumped, via a manually switched pump, and a dedicated wastewater pipe to the wastewater treatment plant.

The Facility has environmentally sound procedures for management and/or disposal of cyanide waste or cyanide-contaminated materials.

The streams of cyanide waste and cyanide-contaminated materials include:

- Waste active carbon generated from the decolorizing process of liquid sodium cyanide.
- Sludge from the frame filters of wastewater from the wastewater collection tanks in cyanide production units.
- Cyanide contaminated waste, including packaging materials, PPEs, wastes from lab etc.

Cyanide contaminated wastes will be decontaminated by soaking in sodium hypochlorite (NaClO₃) solution and washing before transferred out of Cyanide Production Units. Cleaning wastewater is collected in the underground wastewater collection tank and returned to the liquid cyanide process.

All cyanide waste will be transferred to the designated hazardous waste storage warehouses before incineration onsite or disposal.

Partial waste active carbon and sludge are incinerated in an onsite hazardous waste incinerator. The capacity of the incinerator is 6000ton/year, with 950-1000°C temperature to destruct the wastes (cyanide). The ashes after incineration will be disposed of as hazardous waste by qualified companies.

Except for the hazardous wastes incinerated onsite, the facility has engaged several vendors to dispose of the hazardous wastes. The following 4 qualified hazardous waste disposal vendors were mainly engaged to dispose of cyanide waste.

Samples review the transfer manifest records of 15 batches of cyanide wastes indicated the onsite ledgers and transfer records are consistent, accurate and well retained.

The hazardous waste vendor must provide qualifications for the disposal of cyanide-contaminated waste prior to contract signing. Additionally, the Environment Impact Assessment Report of the vendor is publicly available to include specific provisions for decontamination, management, and disposal, as well as the ultimate destination of the disposed material, which complies with local regulations.

There are procedures to ensure that the cyanide is packaged and labelled as required by the political jurisdictions through which the packaged cyanide will pass.

The Facility packages cyanide in accordance with the Chinese standards. Classification and Code of Dangerous Goods (GB 6944-2025) is developed to align with the requirements of the United Nations Recommendation on the Transport of Dangerous Goods – Model Regulations, (2023).

The Standards of GB 19268-2021 and GB 6944-2025 specify the requirements for packing cyanide for export, including the packaging materials and method for inspecting the packaging. The facility sources their drums and IBCs from a third party that obtains compliance certificates with each supply of the packaging.

Standard Operational Procedure for Solid Cyanide Production Unit specifies the packaging requirements, including that the packaging must meet the Standard for Packing of Solid Cyanide.

Weifang Customs Bureau has inspected the cyanide facility's packaging systems for each supply consignment during the audit period (2022-2025) and approved the packaging systems for international transport of the cyanide.

Stored cyanide was observed to be labelled in Chinese and English with global harmonized system GHS pictograms and a UN number that identifies the product.

STANDARD OF PRACTICE 1.3

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

☒ in full compliance with

The operation is ☐ in substantial compliance with Standard of Practice 1.3

☐ not in compliance with

Summarize the basis for this Finding/Deficiencies Identified:

The Facility is in FULL COMPLIANCE with Production Practice 1.3 requiring inspection of cyanide production facilities to ensure their integrity and prevent accidental releases.

The Facility conducts routine inspections of tanks, valves, pipelines, containments and other cyanide production and storage facilities, including:

- Tanks holding cyanide solutions for structural integrity and signs of corrosion and leakage
- Secondary containments for their integrity, the presence of fluids and their available capacity, and to ensure that any drains are closed and, if necessary, locked, to prevent accidental releases to the environment
- Pipelines, pumps and valves for deterioration and leakage
- Containers used for transportation, where the producer is responsible for their integrity

Tanks and vessels

The Facility maintains a register of tanks and vessels and identifies which ones contain cyanide solutions. Inspections on the integrity of the tanks are completed via regular inspections on the cyanide storage tanks, including pipe work, flanges, pumps, high level alarms and tanks to identify deterioration and leaks.

The inspection records are dated and detail the results of the inspection including the following items:

- Tank foundation stability
- Insulation and corrosion prevention materials

Weifang Binhai Petro-Chem Co., Ltd

Name of Facility



Signature of Lead Auditor

14 November 2025

Date

- Stairs and fences
- Bund
- Tank volume indicator
- High level alarms
- Tank valves
- Tanks signage
- Pipeline connection integrity
- Flanges and valve condition
- Wastewater collection facilities
- Presence of tank corrosion or leakage.

In addition to the regular inspections, the wall thickness of the vessels is tested annually.

Secondary containments

A site inspection confirmed that secondary containments are in reasonable condition, with evidence of periodic maintenance and patching observed. The facility has updated its inspection process to clearly define the criteria for secondary containments.

Minor defects in liquid cyanide loading area and NaOH tank farms were rectified during the audit.

Discharge from the secondary containment is via a manually operated pump, which discharges to the stormwater first 15-minute flush containment tanks at the site's wastewater treatment plant, or in the case of a concentrated liquid cyanide spill, to a mobile tanker for re-use at the cyanide facility. Therefore, there is no need to ensure that drains are closed or locked to prevent accidental releases to the environment.

Pipes – Annual Pipe Wall Thickness Testing

The wall thickness of cyanide carrying pipes is checked every six months. The inspection records document the integrity of the pipe and supporting structures. The inspection records are dated. Records were reviewed for selected pipelines from 2022 to 2025.

Weifang Binhai is not responsible for cyanide transportation. Instead, a qualified dangerous chemicals transportation supplier will be engaged to handle cyanide transportation, and this supplier shall be responsible for ensuring the integrity of the transportation containers.

Based on interviews, facility inspection and a review of the inspection records, the frequencies are deemed adequate to ensure that the equipment operates within its design specifications. The Facility retains records of inspections that are documented. The documentation outlines specific items to be observed and includes the date of the inspection, the name of the inspector, and observed deficiencies. The details and date of corrective actions have been recorded and retained.

PRINCIPLE 2| WORKER SAFETY

Protect workers' health and safety from exposure to cyanide.

STANDARD OF PRACTICE 2.1

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

☒ in full compliance with

The operation is

☐ in substantial compliance with Standard of Practice 2.1

☐ not in compliance with

Summarize the basis for this Finding/Deficiencies Identified:

The Facility is in FULL COMPLIANCE with Production Practice 2.1 requiring the Facility to develop and implement procedures to protect plant personnel from exposure to cyanide.

The Facility has developed formal procedures to minimize worker exposure during:

- a) Normal plant operations from receipt of raw materials through finished product packaging and shipping
- b) Non-routine and emergency operations
- c) Maintenance related activities

Standard Operational Procedures are integrated procedures covering the whole cyanide production and packaging operation. The procedures cover normal and non-routine operations, and the production facility is managed via DCS in the control rooms Furthermore, there are DCS and SIS systems for liquid cyanide and solid cyanide.

In addition to the operating procedures there is an online permit to work system that covers:

- Working at heights
- Confined space
- Lifting
- Digging
- Machinery maintenance
- On-site road route change
- Flow isolation plate
- Hot work
- Temporary electricity, and
- Equipment dismantling and scrapping

The procedure specified that the PPE must be worn, and operators must undertake a field level risk assessment prior to commencing work as well as using a lock out/tag out system for working on all cyanide plants. Decontamination of equipment must be completed prior to its maintenance. It also requires that the maintenance team must communicate with the local cyanide department prior to the work commencing and report any unsafe conditions to the department supervisor.

The safety permit requires a field level risk assessment to be undertaken prior to the work commencing, the use of a buddy system, records of tagging out, checking of PPE, undertaking

flammable and toxicity tests. The permit is signed by the operator, the safety manager and department manager.

The Facility does solicit and considers workers' input in developing and evaluating health and safety procedures.

Employees can make suggestions to the procedures via 'written suggestions' that they can submit in suggestion boxes, hand to their shift leader for forwarding to the supervisor, or directly to the cyanide department safety manager. Workers interviewed have confirmed that they have opportunities to share their input.

The Standard Operational Procedures for the Cyanide Production Units details the locations where the risk of hydrogen cyanide and cyanide dust is considered high, and must use PPE, including either a respirator equipped with a filter (suitable for cyanide) or one that provides oxygen.

All the cyanide production areas with HCN release risk have been identified. In total 164 fixed HCN detectors have been installed in these areas, which include liquid cyanide production areas, liquid cyanide storage tank farm, liquid cyanide loading areas, and solid cyanide production areas, laboratories. The high alarm threshold for the fixed HCN detector is set at 2.3 ppm and the high-high alarm threshold is set at 4.6 ppm.

During inspections of the facilities workers were observed to be wearing PPE as outlined in the procedures and signage displayed in the work area.

The Facility uses monitoring devices and associated alarms to confirm that controls are adequate to limit worker exposure to hydrogen cyanide gas and/or cyanide dust exceeding 10 parts per million (ppm) on an instantaneous basis or 4.7 parts per million continuously over 8-hour, as cyanide.

A combination of fixed and portable monitors is used at the facility. The fixed monitors are set at 2.3 ppm for high alarm and 4.6 ppm for high-high alarm. The portable monitors are set to alarm at 4.7 ppm. Portable monitors are used for task specific activities, and the fixed monitors are to provide detection of an issue with the process.

When HCN gas concentrations trigger the 2.3 ppm alarm threshold, the workers in this area shall evacuate to a safe place immediately and the site operator shall wear the filter gas mask for short time operation and inspection, when HCN gas concentrations trigger the 4.7 ppm alarm threshold or more than two HCN gas detectors concentrations trigger the 2.3 ppm alarm threshold, the workers in this area shall evacuate to a safe place immediately, the emergency treatment personnel must wear Self-Contained Breathing Apparatus and wear heavy protective clothing to the site to find out the leakage source and block the leakage.

The HCN monitoring equipment is maintained, tested and calibrated according to manufacturer's recommendations, and records are retained for five years. There are fixed detectors within the plant area and portable detectors used for task specific activities. Calibration certificates were reviewed for this monitoring equipment.

The Facility has a buddy system which requires employees to work in pairs for positions involving cyanide exposure. All operators are equipped with explosion-proof radio or explosion-proof mobile phones to communicate with the associated process control room.

The Facility assesses the health of employees to determine their fitness to perform their specified tasks.

All workers have a medical examination every year at the local hospital (Huanghua City). The medical examination includes a variety of checks, including blood pressure, lung capacity, electrocardiography (ECG), blood, urine, liver scan, nervous system, ear examination, nose and pharynx, blood eosinophil count, pure hearing threshold test air conduction, skin examination. depending on the working location and duration of the service.

The Site has retained records for each worker detailing the date of the examination and whether they are fit to perform their specified tasks.

Additionally, the site conducts fitness tests before using respirators to ensure that individuals are suitable for the half-face respirator, full-face respirator, and Self-Contained Breathing Apparatus (SCBA).

In Solid Cyanide and Liquid Cyanide Safety Management Procedures have detailed clothing change requirements for employees, contractors and visitors to areas with the potential for cyanide contamination of clothing has been specified.

The procedures state that all employees and contractors must enter the exchange room and exchange clothes before work, after the shift they must exchange clothes.

Before getting off work, employees must go to the workshop locker room to replace and clean the protective equipment they wear on duty and put it in the designated area.

It is forbidden to wear labor supplies home, and the issued protective equipment is not allowed to be resold or discarded. The used labor insurance must be returned to the recycling box designated by the workshop, and the workshop will handle it uniformly. All employees in the cyanide department have their clothes washed for them on site by the department.

Visitors are supplied with laboratory coats for use while visiting the facility.

Additional PPE is required in the packaging area including the use of coveralls, gloves and full-face respirators. Personnel leaving the packaging facility must head via changing room for shower and clothes change.

Warning signs advocating the present of cyanide and use of suitable PPE are posted throughout the Facility.

Warning signs for both sodium cyanide and hydrogen cyanide are placed in all process and storage areas. The signs include PPE requirements.

Warning signs were present at Liquid Cyanide Production Unit work areas, Solid Cyanide Production Unit work areas and Solid Cyanide Warehouse.

All personnel are prohibited from smoking, eating and drinking, and using open flames in areas where there is a risk of cyanide contamination. There is also a CCTV for tool box meeting

room where employees drink water. All process and storage areas have signs stating no smoking, no eating or drinking and no open flames.

STANDARD OF PRACTICE 2.2

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

☒ in full compliance with

The operation is ☐ in substantial compliance with Standard of Practice 2.2

☐ not in compliance with

Summarize the basis for this Finding/Deficiencies Identified:

The Facility is in FULL COMPLIANCE with Production Practice 2.2 requiring the development and implementation of plans and procedures for rapid and effective response to cyanide exposure.

The Facility has developed specific Emergency Response Plans to respond to cyanide exposures.

Emergency Response Plans for cyanide exposures and an On-site Disposal Plan to illustrate detailed treatment procedure after a spill or exposure. The detailed response processes have been specified to cyanide exposure through ingestion, inhalation, and absorption through the skin and eyes in these documents.

The people interviewed were aware of these actions, including relocating exposed individual offsite, removing contaminated clothes, administering cyanide resistant injections, rinsing the contaminated area with flowing water, and contacting the first-aid clinic and hospital for emergency assistance.

Showers, low-pressure eye wash stations and non-acidic fire extinguishers are located at strategic locations throughout the Facility with good condition. They are maintained and inspected monthly. The inspection and maintenance details have been specified in Safety Facility Management Procedure. The maintenance items include water supply pressure, water spray pattern, tidiness of the stations.

The Facility has an annual preventative maintenance and inspection programme.

Dry powder fire extinguishers were observed throughout the Facility with good condition. No carbon dioxide fire extinguishers were observed throughout the cyanide facility areas.

The Facility is equipped with oxygen, resuscitators, antidotes and communication system or emergency notification method that is readily accessible for use.

Onsite inspection of the facility confirmed that operators are equipped with explosion-proof radio communication devices or explosion-proof mobile phones, and antidotes are stored strategically throughout the plant. Oxygen and resuscitator are available in the medical room on the site. Water is available around the plant through safety showers and fire hydrates.

Personnel interviewed were aware of the location of antidotes and the emergency notification process. Inspection records sampled during the audit period were found to be well organized.

The Facility inspects its first aid equipment regularly to ensure that it is accessible when needed. The first aid and emergency response equipment (including oxygen kits) are stored and tested in accordance with the manufacturer's instructions and replaced as scheduled to ensure their effectiveness at the time of use.

The antidote of Cyanide Antidote Injection produced by China People Army Medicine Science Institute, has instructions that state that it should be stored at room temperature and out of the sun. The antidote of Isopentyl Nitrite Inhalant is kept by each personnel who work in the Cyanide Production Units. The antidote of Sodium Thiosulfate is stored in the emergency room. During the visit, the antidotes were stored appropriately and remained within their expiry date.

Fire extinguishers are sent in rotation to an off-site facility and refilling as required by the manufacturer. Fire extinguishers have been confirmed to be within their service dates.

Safety Data Sheets, first aid procedures or other informational materials regarding cyanide safety are provided in the local language understood by the workforce and are available to workers in areas where cyanide is handled.

All signages and procedures are in Chinese, the official language. The SDS has been developed in compliance with global harmonized system (GHS) requirements.

Information boards have been erected at the cyanide handling areas of the plant that detail hazards and precautions. The drum and IBC labels also provide information on cyanide hazards.

Storage tanks, process tanks, containers and piping containing cyanide are identified to be labelled clearly to alert workers of their contents.

The flow direction of the pipes is clearly shown.

The Facility has a decontamination policy or procedure for employees, contractors and visitors leaving the areas with the potential for skin exposure to cyanide.

The Procedures state the cloth changing and showering procedures for workers undertaking work in areas where they may be exposed to cyanide. This procedure applies to personnel in the laboratory, packaging, evaporation, maintenance personnel, centrifuge, drying, modelling and cyanide storage areas. They are required to change clothes and shower when they exit the work area. Visitors are asked to put on a lab coat when they enter the production area, take them off when they leave the production area, and wash their hands. Interviews and site inspection confirmed that the decontamination procedure is implemented and followed.

The Facility has its own on-site capability to provide first aid, but not higher-level medical assistance to workers exposed to cyanide. The Site has two certified first aiders by Red Cross to provide first aid or medical assistance to workers exposed to cyanide. And the Site also provides training to the emergency response team members to provide first aid or medical assistance to workers exposed to cyanide.

The Facility has provided training on the proper use of cyanide antidotes to employees who may be exposed to cyanide. Based on random interviews with on-site personnel, it has been confirmed that these employees are familiar with the proper use of such antidotes.

The Facility has developed a procedure to transport exposed workers to nearby accredited local medical facilities.

The Emergency Response Plan for Production Safety Accident details the procedure to transport workers to local medical facilities. The Site would use either their own cars or in case of serious injury or exposure they would call the emergency services at the nearest hospital (Weifang Binhai Economic and Technological Development Zone Traditional Chinese Medicine Hospital) located approximately 10 minutes' drive from the Site.

The Facility has made formalized arrangements with local medical facilities of the potential need to treat patients for cyanide exposure, and the Facility is confident that the medical provider has adequate, qualified staff, equipment, and expertise to respond to cyanide exposures.

The Facility has signed a medical service guarantee agreement with Weifang Binhai Economic and Technological Development Zone Traditional Chinese Medicine Hospital. The Hospital is the designated cooperative unit for medical services of the Site. It will undertake the emergency medical treatment of the venue, provide green medical channels for the Site, and provide 24-hour medical services. Before signing the agreement, the Facility has checked that Weifang Binhai Economic and Technological Development Zone Traditional Chinese Medicine Hospital is satisfied that the facilities have suitable staff and equipment to respond to cyanide exposures.

The Report about Occupational Hazards and Emergency Response Plan for Production Safety Accident are in place to investigate and evaluate cyanide exposure incidents to determine if the operations programmes and procedures, to protect worker health and safety and to respond to cyanide exposures, are adequate or need to be revised.

It outlines an accident classification system which specifies the type of investigation required, and the accident reporting and communication process. The most serious accident and exposures require investigation by the government or an external party. For accidents without lost working day, the investigation is to be undertaken by the cyanide production units along with the safety engineer to determine the root cause of the incident.

The accident and treatment report details the accident, the accident analysis, the prevention measures, the person/s responsible and their financial punishment decision. It then moves to a corrective measures section which lists the hazard, corrective actions, date for implementation and the person responsible.

No cyanide exposure or cyanide release incidents have been reported during the audit period.

The non-cyanide-related incidents response process has also been specified in the Emergency Response Plan for Production Safety Accident. And some first aid incidents have been investigated as required in the past three years.

PRINCIPLE 3 | MONITORING

Ensure that process controls are protective of the environment.

STANDARD OF PRACTICE 3.1

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

☒ in full compliance with

The operation is

☐ in substantial compliance with Standard of Practice 3.1

☐ not in compliance with

Summarize the basis for this Finding/Deficiencies Identified:

The Facility is in FULL COMPLIANCE with Production Practice 3.1 requiring environmental monitoring to be conducted to confirm that planned or unplanned releases of cyanide do not result in adverse impacts.

The Facility does not have any direct discharge of wastewater to surface water.

All cyanide contained wastewater is collected within cyanide production units and returned to the liquid cyanide production processes after pre-treatment, hence no wastewater containing cyanide is sent to the onsite wastewater treatment plant (WWTP) for treatment.

The main cyanide contained wastewater streams collected within cyanide production units include:

- Stream #1: Wastewater from scrubber systems in liquid and Solid Cyanide Production Units
- Stream #2: Production area floor flushing wastewater, collected in the underground wastewater collected tanks in liquid and Solid Cyanide Production Units
- Stream #3: Wastewater from employee shower and working cloth laundry
- Stream #4: Initial storm water runoff of liquid and Solid Cyanide Production Units, collected in the same underground wastewater collected tanks

Streams #1 are returned and stored in the intermediate tanks for production; other streams will be pre-treated to remove the particulates using frame filters before adding into the neutralization and adsorption process.

After the initial 15-minute first flush, stormwater from the Liquid Cyanide Production Unit will be switched to the storm water drainage system and discharge into the nearest storm water receiving creek through 2 storm water discharge outfalls, i.e. DW005, DW007.

As a key polluter, the facility is subject to supervision and management on potential soil and groundwater contamination by the local environmental authority. The facility has conducted soil and groundwater monitoring twice every year, i.e. during high flow period and low flow period. In total, 18 soil sampling locations and 7 groundwater monitoring wells were installed upgradient and downgradient of the facility.

All the parameters of the groundwater samples, except for total hardness, sulfate, total dissolved solids, chloride, sodium, etc., which exceeded the requirements of the "Groundwater Quality Standard" (GBT14848-2017) Class IV Water Quality Standard, all other parameters met the requirements of the "Groundwater Quality Standard" (GB/T14848-2017) Class IV Water Quality Standard.

The Facility does not have any direct discharge of wastewater to surface water, but the facility has two storm water discharge outfalls that discharge the storm water after the initial 15-minute runoff to the nearest creeks that finally flow to Cuijia River.

Storm water monitoring will be conducted whenever there is rain. Storm water samples were taken and sent to the onsite lab to test the cyanide. Site management reported that no mandatory limits were defined by the local environmental authority, which recommended applying *Integrated Wastewater Discharge Standard for Basin Part 5: Shandong Peninsula basin* (DB37/3416.5-2018). Monitoring results of cyanide conducted in onsite laboratory in 2024 and 2025 are under detection limit (0.078mg/L).

Initial 15-minute runoff was collected in two initial storm water collection tanks, from where pumped to onsite WWTP for further treatment.

Although wastewater and initial 15-minute runoff from cyanide production units are collected and recycled within the production process, Weifang Binhai has operated an onsite wastewater treatment plant (WWTP) to treat process wastewater and domestic wastewater from other production units than cyanide production units. The treated wastewater is discharged into the WWTP run by Weifang Bofa wastewater treatment plant (Bofa) that is managed by the industrial park where the facility is located, i.e. Advanced manufacturing industrial park of Weifang Binhai economic and technology development zone (AMIP). The service contract was signed and renewed every year, which defines the wastewater receiving quality from the facility, and the annual testing result for total cyanide is under the detection limit (0.001mg/L).

From the perspective of wastewater volume, the wastewater from the facility, after being treated by Bofa has little impact on the water quality of Cuijia River.

The closest sensitive water receptors are all located more than 5km of the site, including Second Plain Reservoir (-5km), Bailang Cave and Yuwang National Wetland Park (-5km), and Weibei Plain Reservoir (>5km), which have no hydraulic connection with the facility and Cuijia River. Under normal circumstances, the wastewater discharge from the facility will not have an environmental impact on these sensitive receptors.

As a key polluter identified by the local Ecological Management Bureau, the Facility is subject to supervision and management on potential soil and groundwater contamination by the local environmental authority. The Facility has conducted soil and groundwater monitoring twice every year, i.e. during high flow period and low flow period. In total 18 soil sampling locations and 7 groundwater monitoring wells were installed and tested as planned every year.

According to the monitoring results, the average cyanide concentration in the soil samples was below the method detection limit (0.01mg/kg), which met the requirement in the "Soil Environmental Quality - Risk Control Standards for Soil Pollution in Construction Land" (GB36600-2018). The average cyanide concentration in the groundwater samples is below

method detection limit (0.002mg/L), which met the requirements of the "Groundwater Quality Standard" (GB/T14848-2017) Class IV water quality standard.

All the parameters of the groundwater samples, except for total hardness, sulfate, total dissolved solids, chloride, sodium, etc., which exceeded the requirements of the "Groundwater Quality Standard" (GB/T14848-2017) Class IV water quality standard, all other parameters met the requirements of the "Groundwater Quality Standard" (GB/T14848-2017) Class IV water quality standard.

The Facility management confirmed that no groundwater was used within the boundary of the facility but reported that some chemical companies within the industrial park utilize the brine groundwater to produce bromide.

No seepage from the facility has caused the cyanide concentration of soil and groundwater to exceed the applicable limits.

The Facility has several underground structures that hold cyanide containing wastewater in both liquid and Solid Cyanide Production Units. Based on site observation, the underground wastewater collected tanks were concrete structured and applied with anti-corrosion and impermeable coating (glass fiber + epoxy resin), except for the underground wastewater holding tank in Liquid Cyanide Production Unit, which was installed since 2014 and reportedly has never been inspected for integrity. According to the construction document of underground wastewater holding tank, 25cm C30 reinforced concrete was applied for walls, 30cm reinforced concrete was applied for ground. No anticorrosion and impermeable coating was applied on the surface of concrete. The Facility realized the risk of potential leakage due to long term service and planned to establish a regular integrity testing program in the near future.

The Facility has several air emission sources from cyanide production as below:

- Liquid Cyanide Production Unit: Off gas from the neutralization absorption tower, treated by incinerator with heat recovery, the test results for cyanide are 0.16-0.17mg/m³ which is below 0.3 mg/ m³ specified in *Emission standards of pollutants from inorganic chemical industry (GB31573-2015)*.
- Liquid Cyanide Production Unit: Off gas from ammonia removal tower, treated by 3-stage scrubbers (alkali scrubber + acid scrubber + alkali scrubber), the test results for cyanide are 1.22-1.56mg /m³ which is below 14 mg/ m³ specified in Emission standard for odor pollutants (GB14554-93)
- Solid Cyanide Production Unit: Off gas from Evaporation, Dryer and Cyclone, Palletizer and Packaging, treated by 3-stage scrubbers (alkali scrubber + acid scrubber + alkali scrubber), the test results for cyanide are 0.20-0.23mg /m³ which is below 0.3 mg/ m³ specified in *Emission standards of pollutants from inorganic chemical industry (GB31573-2015)*.
- Tank farm, ventilation from liquid cyanide refinement: Fugitive emission testing results for cyanide are below method detection limit 0.0024mg/m³

The air emissions are monitored quarterly. According to the monitoring data, the cyanide concentration from all point sources and at boundary were all below the applicable standard limits.

SOPs are developed that include the operation control requirements for air emission treatment facilities in liquid and Solid Cyanide Production Units. In SOP "Cyanide process safe operation procedure for 101 Workshop" (BH-TP-101), it defines the key control parameters for off gas incinerator, e.g. furnace temperature is controlled between 800°C-1300°C.

Environmental monitoring plan is developed per legal requirements that define the parameters and frequency to be monitored. Monitoring is conducted at frequencies adequate to characterize the medium being monitored and to identify changes in a timely manner.

The frequency of monitoring undertaken for cyanide are summarized as below:

- Wastewater discharges – quarterly monitoring and continuously
- Air emissions – quarterly monitoring and continuously
- Stormwater discharges – Whenever there is rain, by internal laboratory
- Soil and groundwater quality – Twice every year (high flow period and low flow period)

These frequencies are considered adequate in the operating circumstances to meet Code requirements.

PRINCIPLE 4| TRAINING

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

STANDARD OF PRACTICE 4.1

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

☒ in full compliance with

The operation is ☐ in substantial compliance with Standard of Practice 4.1

☐ not in compliance with

Summarize the basis for this Finding/Deficiencies Identified:

The Facility is in FULL COMPLIANCE with Production Practice 4.1 requiring employees to be trained to operate the plant in a manner that minimises the potential for cyanide exposures and releases.

The Facility does train workers to understand the hazards of cyanide and refresher training is periodically conducted. New employees have three levels of training comprising company, departmental and operational level training.

Company level training consists of three days of classroom training. One main booklet called 'Safety Training material' is given to all employees during the training. The books are available after the course in the cyanide department control rooms.

Departmental level training consists of three days training. The training is held both in the meeting room and on Site to show the chemical hazards, emergency response and PPE. The new employee is shown the operation of the whole cyanide production plant. For the staff who may encounter cyanide the training will cover the topics of the health effects of cyanide, the symptoms of cyanide exposure, and the procedures to follow in the event of exposure.

Operational level training consists of three days training on Site in the area of the cyanide department that the new employee will be working, each employee is designated an experienced worker who teaches them how to operate the machinery in that area. During the three days they do not operate the machinery by themselves, at the end of the three days they have an exam. In addition, they go through the operating procedures.

Refresher training is provided in the form of monthly training sessions. Each month the safety adviser for the cyanide department gives training that lasts approximately two hours.

72 hours are required for the new employee training and 24 hours are required for the refresher training at least.

Interviews with personnel and training records confirmed that workers are trained in cyanide hazards prior to undertaking work and refresher training is provided.

The training plan includes training dates and training time, training topic, trainer, training location.

The Facility trains workers in the use of personal protective equipment (PPE) and when and where this equipment is required.

PPE training covers all three levels of training (company, departmental and operational) and there are specific management and departmental procedures regarding PPE storage, maintenance and which type of PPE is required in the different operations within the cyanide department.

Interviews with employees confirmed that training on how and when to use PPE is provided.

The Facility trains workers to perform their normal production tasks with minimum risk to worker health and safety and in a manner that prevents unplanned cyanide releases.

The Operations Regulations outline the necessary requirements for the safe execution of specific tasks, which include the mandatory use of personal protective equipment (PPE) before commencing certain activities. New employees are paired with experienced colleagues to facilitate their learning process, with oversight provided by the area supervisor.

The employees are trained prior to allowing them to work with cyanide.

In accordance with the Safety Operation Regulations, all employees are required to complete 72 hours of new employee training before engaging in work involving cyanide. Training records have been made available for review as evidence of compliance.

Refresher training on standard production tasks has been implemented to ensure that employees maintain safe and environmentally responsible work practices.

This training is conducted through monthly sessions, with a minimum requirement of 24 hours of training for each employee. Additionally, assessments will be conducted following each training session to evaluate understanding and retention of the material.

The training elements necessary for each job are identified in training materials.

The training program encompasses a comprehensive understanding of the physical and chemical properties of cyanide, fire prevention strategies, the use of personal protective equipment, emergency response protocols to cyanide exposure and release, and the prevention of critical hazards. Additionally, it includes tailored training materials relevant to each specific role.

As interviewed with Site employees, it is evident that they possess a clear understanding of how to perform cyanide-related tasks and respond effectively in emergencies.

The Facility employs 38 personnel who hold safety management certifications. Internal training is conducted by these qualified individuals or managers for staff members. Additionally, external training sessions are facilitated by accredited agencies, including the local safety department, environmental protection department, fire department, and special equipment management department.

The Facility evaluates the effectiveness of cyanide training by testing. There are questionnaires that are used for the tiered induction training, and these are retained. Tests are also arranged after the annual refresher training and monthly training.

New employees are teamed with an experienced person who demonstrates and observes the workers performing their tasks.

STANDARD OF PRACTICE 4.2

Train employees to respond to cyanide exposures and releases.

☒ in full compliance with

The operation is ☐ in substantial compliance with Standard of Practice 4.2

☐ not in compliance with

Summarize the basis for this Finding/Deficiencies Identified:

The Facility is in FULL COMPLIANCE with Production Practice 4.2 requiring employees to be trained to respond to cyanide exposures and releases.

The Facility does train workers in the procedures to be followed if a cyanide exposure or release occurs.

Workers are trained in procedures to be followed if a cyanide release is discovered during company, departmental and operational training and well as monthly and weekly training. The Facility has 38 designated safety management personnel with qualifications.

Also, workers are required to attend the mock drills to evaluate emergency response efficiency. Workers interviewed could describe the response processes including evacuation to an upwind location, use of safety showers, reporting the incident and use of antidote. In addition to the processing workers the operation also has dedicated emergency responders that are trained in higher level response actions.

The Facility does train workers to respond to worker exposure to cyanide and to cyanide releases.

Routine mock drills are used to test and improve their response skills.

Mock drills are conducted with workers to train them and test their response skills. The facility has conducted worker exposure and release scenarios for the Solid Cyanide Production Unit area and the Liquid Cyanide Production Unit area. The drills are recorded, and reports assess the performance of the exercise and improvements needed.

Training records are retained throughout an individual's employment, documenting the training they have received and including the names of the employee and the trainer, the date of training, the topics covered, and how the employee demonstrated an understanding of the training materials.

Training files for members of Cyanide Production Units were reviewed and contained evidence of training including course content, assessments and certificates.

All workers received training on personal protective equipment and emergency response procedures during a spill or exposure at daily, weekly, monthly and annual training sessions.

PRINCIPLE 5| EMERGENCY RESPONSE

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

STANDARD OF PRACTICE 5.1

Prepare detailed emergency response plans for potential cyanide releases.

☒ in full compliance with

The operation is

☐ in substantial compliance with Standard of Practice 5.1

☐ not in compliance with

Summarize the basis for this Finding/Deficiencies Identified:

The Facility is in FULL COMPLIANCE with Production Practice 5.1 requiring a detailed emergency response plan for potential cyanide releases.

The Facility developed a general Emergency Response Plan (ERP) for Production Safety Accident (ERP) and ERP for Environmental Accidents to address potential releases of chemicals (including cyanide) that may occur on Site or may otherwise require response.

Aside from the general safety and environmental ERPs, the Facility also developed the specific emergency response plans and onsite handling process for the specific emergency scenarios:

- Specific ERP for cyanide tank farm
- Specific ERP for cyanide refinement workshop
- Onsite emergency handling process for cyanide poison and asphyxia cases in cyanide production unit and cyanide off gas incinerator
- Specific ERP for solid cyanide production workshop
- Specific ERP for solid cyanide warehouse

The facility conducted risk assessments to identify potential emergency scenarios and assess the risk. The major potential failure scenarios appropriate for Binhai specific environmental and operating circumstances related to cyanide production include:

- a) Catastrophic release of hydrogen cyanide
- b) Releases of solid or liquid cyanide during packaging, storage, loading and unloading operations
- c) Releases during fires and explosions
- d) Pipe, valve and tank ruptures
- e) Power outages and equipment failures
- f) Overflow of ponds, tanks and waste treatment facilities

Corresponding responses were developed in the ERPs to address these potential failure scenarios.

The general ERPs describe overall emergency response organization, responsibility and general processes as appropriate for the typical emergency situations onsite, while the specific ERPs and onsite handling processes provide the detail description on response actions for specific area and situations. The general response actions on cyanide release, employee exposure and poison and mitigation measures are summarized as below:

- Control of the release sources, remotely or manually with appropriate PPE
- Apply classified area control to isolate the areas, which includes evacuation measures for clearing site personnel and potentially affected communities from the area of exposure.
- Perform emergency rescue and detoxification treatment for patients with mild symptoms who have breathing difficulties, 1-2 vials of isopentyl nitrite should be inhaled immediately or intramuscularly injected 2ml anti-cyanide emergency injection and drive the poisoned person to the contracted hospital for further treatment.
- Collect spilled cyanide and contaminated materials and decontaminate using sodium hypochlorite or hydrogen peroxide, washing and clean up the area and waste disposal, containment, assessment, mitigation and future prevention of releases are covered in the Emergency Response Plan for Environmental Emergencies.

STANDARD OF PRACTICE 5.2

Involve site personnel and stakeholders in the planning process.

☒ in full compliance with

The operation is ☐ in substantial compliance with Standard of Practice 5.2

☐ not in compliance with

Summarize the basis for this Finding/Deficiencies Identified:

The Facility is in FULL COMPLIANCE with Production Practice 5.2 requiring the Facility to involving site personnel and stakeholders in the planning process.

The Facility has actively engaged functional departments and operational teams throughout the preparation and review phases of the Environmental and Safety Management Plans (ERPs). The finalized ERPs were submitted to local authorities for assessment and underwent a thorough review by an expert panel prior to registration. This expert panel comprises representatives from local authorities as well as neighboring companies that may be impacted by potential incidents at the facility.

Whenever the safety ERP is updated, a notification letter is sent to the neighborhood that are potentially affected and made them aware of the nature of the risks and response actions associated with the emergency scenarios, along with a copy of the latest ERP.

The notification letters provide the major emergency scenarios and potential impact to the community, detail the general response actions and mitigation measures for scenarios with high impact risk, e.g. fire accident, explosion, poisoning and asphyxia from release of chemicals.

Aside from ERP notification letters, the facility also shared the key information of their major hazard installations with these neighboring companies via a formal notification. The notification provides the key hazardous chemicals used in major hazard installations, potential accident scenarios and consequences, as well as emergency response actions, which include cyanide and its related processes/facilities.

The Facility has conducted surveys to evaluate the availability of response resources both internally and externally. According to the survey, several local response agencies are engaged to act as external responders and medical facilities in the emergency response process, including:

- Shandong Guobang Pharmaceutical Co., Ltd (Guobang), 2km west of the site
- Firefight brigade of Weifang Binhai Economic and technology development zone, 2km northeast to the site
- Binhai hazardous chemical emergency response center, 21km north to the site
- Weifang Binhai Economic Development Traditional Chinese Medical Hospital, 4.5km northeast to the site

The Facility has entered into a service agreement with Guobang and the Traditional Chinese Medical Hospital to deliver firefighting and medical treatment services, respectively. Additional external resources include governmental subordinate organizations, which will be dispatched by the local government as needed. In the event that the impact of an emergency situation exceeds the Site's control, the Facility will coordinate with the local government to mobilize available response resources in the area.

The Facility has engaged the local regulatory agencies and their neighborhood to involve in the process of ERP development whenever there is update on ERP.

STANDARD OF PRACTICE 5.3

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

☒ in full compliance with

The operation is

☐ in substantial compliance with Standard of Practice 5.3

☐ not in compliance with

Summarize the basis for this Finding/Deficiencies Identified:

The Facility is in FULL COMPLIANCE with Production Practice 5.3 requiring designated appropriate personnel and committed equipment and resources for emergency response.

The ERPs have specified:

a) A safety engineer of HSE department is designated as coordinators to commit the resources necessary to prepare and implement the ERP.

b): Both environmental and safety ERPs define the organization chart for emergency response team (ERT): headed by general manager, supported by the functional teams, i.e. rescue team,

engineering rescue team, logistics assurance team, expert coordination Team, resource supply and medical team, environmental monitoring team.

c) General ERP training is provided to the management team by HSE team annually, and each department will provide specific ERP and onsite handling process training to their personnel within their areas.

d) Both environmental and safety ERPs detail 24-hour contact information for company leaders and all team members (with cell phone numbers). All members of the emergency response team are required to keep the phones on 24 hours a day. An emergency response communication group consisting of all ERT members is set up on Walkie-talkie channel. The ERP coordinator is responsible for updating the emergency contact list and communication methods whenever there is personnel or contact change. Also, the call-out process for initiating a response to a cyanide-related emergency has been specified in the Emergency Response Plans.

e) Both environmental and safety ERPs define the responsibilities for all ERT members.

f) & g) Both environmental and safety list the required emergency equipment in the Appendixes, which specifies location, required materials/equipment, model, quantity, function, responsible person and contact number. The assigned responsible person conducts inspection of all emergency supplies within their area monthly to ensure adequate availability of material/equipment and in good condition.

h) The roles of external responders and medical facilities are also specified in ERPs. The Facility has confirmed that external responders or entities included in the Emergency Response Plans are aware of their involvement through signing service agreements.

The Facility also engages the local regulatory agencies, firefighting brigade and hazardous chemical emergency response center to involve in the mock drills. Sometime local firefighting brigade would request the facility to participate in their mock drills in the industrial zone.

STANDARD OF PRACTICE 5.4

Develop procedures for internal and external emergency notification and reporting.

☒ in full compliance with

The operation is ☐ in substantial compliance with Standard of Practice 5.4

☐ not in compliance with

Summarize the basis for this Finding/Deficiencies Identified:

The Facility is in FULL COMPLIANCE with Production Practice 5.4 requiring development of procedures for internal and external emergency notification and reporting.

Both environmental and safety ERPs include procedures and contact information of external stakeholders, including Development Zone committee, local environmental and safety authorities, other regulatory agencies, external response service providers, medical facilities, as well as neighboring companies that may be affected by emergency cases.

According to the EPRs, once receiving the alarm from areas, the emergency office (HSE department) will promptly inform the ERT members and report to the emergency commander. The emergency response commander or its deputy will organize the ERT and decide whether to involve external response providers or report to the government department as well as surrounding neighbors.

Safety ERP defines that the response commander will act as press spokesperson and is responsible for communicating with the public media. ERP also provides a template to prepare press speech.

Safety ERP specifies that if any significant cyanide related accident occurs, Binhai will notify ICMI as required in ICMI's Definitions and Acronyms document.

As interviewed, no such significant cyanide incidents have occurred to date.

STANDARD OF PRACTICE 5.5

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

☒ in full compliance with

The operation is

☐ in substantial compliance with Standard of Practice 5.5

☐ not in compliance with

Summarize the basis for this Finding/Deficiencies Identified:

The Facility is in FULL COMPLIANCE with Production Practice 5.5 requiring the Facility to incorporate monitoring elements that account for the additional hazards of using cyanide treatment chemicals into response plans and remediation measures.

Both environmental and safety ERPs describe specific, appropriate remediation measures, such as collection or neutralization of cyanide solutions or solids, decontamination of soils or other contaminated media and disposal of spill clean-up debris etc.

Current EPRs states the following action:

- Emergency rescue teams should wear light protective clothing and positive pressure air respirators when entering the accident site.
- Special Emergency Response Plan for Major Hazard Installations outlines to use an appropriate amount of 5% sodium hydroxide solution or 10% sodium hypochlorite solution for disinfection. After sampling and testing the cyanide content, if it meets the standard, rinse with a large amount of water. The rinsing wastewater should be transferred to the emergency pool through a closed valve in the contaminated area by the emergency rescue team.
- If cyanide is found in the soil on-site, it should be collected by emergency personnel and placed in a temporary hazardous waste storage area. Disinfect again with 5% sodium hydroxide or 10% sodium hypochlorite, and after confirming cyanide content meets standards, seal in double-layer plastic bags for hazardous waste incineration.

- Place contaminated PPE at one end of a container filled with 1% sodium hypochlorite solution, soak for 30 minutes. After soaking, rinse with clean water, then either reuse or repeat cleaning before disposal. If no visible white stains remain after drying, items are considered treated. Qualified items can be packed in double-layer plastic bags for hazardous waste incineration. Sodium hydroxide and sodium hypochlorite are stored adjacent to the solid cyanide absorption tower.

The drinking water on the Site is purchased bottled water, so there is no concern about the contamination of drinking water.

Cyanide production units were designed and constructed to contain the potential spill within its unit boundary. The gate valves are installed at the storm water discharge outfalls to prevent any spill from leaving the facility. Considering that no sensitive water protection zones are located within 5km radius of the facility, the possibility of cyanide released into surface water body is considered low.

The environmental ERP specifies the principles for emergency monitoring method, parameters and frequency, it also defines the monitoring schemes related to air, water and soil & groundwater, with specified locations, monitoring parameters, method and frequency. Post-accident follow-up monitoring is also required till the confirmation of elimination of pollutants.

The sampling methodologies and parameters have been specified in the Annual Soil and Groundwater Monitoring Plan, which shall comply with national standards.

STANDARD OF PRACTICE 5.6

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

☒ in full compliance with

The operation is ☐ in substantial compliance with Standard of Practice 5.6

☐ not in compliance with

Summarize the basis for this Finding/Deficiencies Identified:

The Facility is in FULL COMPLIANCE with Production Practice 5.6 requiring the Facility to periodically evaluate response procedures and capabilities and revise them as needed.

The Facility developed an ERP management procedure that stipulates ERP must be reviewed every two years if no significant change occurs on the site. Review of ERP will determine the necessity of revision.

Mock emergency drills are conducted twice every year for each specific ERP or emergency handling process, i.e. cyanide release in Liquid Cyanide Production Unit, Solid Cyanide Production Unit and off gas incinerator, as well as cyanide poisoning and asphyxia, to test response procedures for various emergency scenarios. The drills simulated the entire emergency response process from the initial emergency callout notification through to the close-out of the response process. For each drill the following is recorded in the mock drill report:

- Description of emergency scenario

- Record of training attendance and test results
- Photographs of the event.
- Conclusion

The Facility developed an ERP management procedure that requires an ERP evaluation team to be set up for each mock drill to review and evaluate the effectiveness of ERPs.

A mock drill evaluation report must be prepared after the drill based on the observation, to identify the weakness of ERP and propose the needs for ERP revision. The Emergency Response Management Procedure stipulates that in the event of a cyanide-related emergency, the Site will assess and update its emergency response procedures as needed.

If no significant changes occur, ERP will be reviewed every two years to determine if revision is necessary.

7.0 IMPORTANT INFORMATION

Your attention is drawn to the document titled – “Important Information Relating to this Report”, which is included in **Appendix A** of this report. The statements presented in that document are intended to inform a reader of the report about its proper use. There are important limitations as to who can use the report and how it can be used. It is important that a reader of the report understands and has realistic expectations about those matters. The Important Information document does not alter the obligations ERM (Shanghai) Limited has under the contract between it and its client.



APPENDIX A IMPORTANT INFORMATION RELATING TO THIS REPORT

The document ("Report") to which this page is attached and which this page forms a part of, has been issued by ERM (Shanghai) Limited ("ERM") subject to the important limitations and other qualifications set out below.

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Having regard to the matters referred to in the previous paragraphs on this page in particular, carrying out the Services has allowed ERM to form no more than an opinion as to the actual conditions at any relevant location. That opinion is necessarily constrained by the extent of the



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