

**ICMI CYANIDE CODE
SUMMARY AUDIT REPORT
RE-CERTIFICATION AUDIT
CYANIDE PRODUCTION**

**CYPLUS GMBH
SITE WESSELING
BRÜHLER STRASSE 2
50389 WESSELING
GERMANY**

**Submitted to:
International Cyanide Management Institute
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Name of Cyanide Production Facility: CyPlus GmbH (Röhm Group), Wesseling Plant
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Location detail and Description of operation:

The CyPlus facility is located on the industrial park premises of Evonik Industries AG in Wesseling, close to Cologne, Germany. The facility is specialized in the manufacturing of sodium cyanide (NaCN). The production of alkali cyanides is completed in several steps. The subject facility depends on several tasks and services provided by Evonik industrial park site services in Wesseling. The services retained are regulated under an appropriate service level agreement. CyPlus is completely involved into Evonik's site specific Emergency Response Plan and into the corresponding mock drills.

The present report describes the results of the fifth ICMC production protocol re-assessment.



Auditor's Finding

This operation is

- ☒ in full compliance
- ☐ in substantial compliance *(see below)
- ☐ not in compliance

with the International Cyanide Management Code.

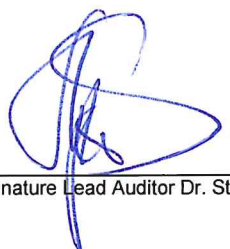
This operation has maintained full compliance with the International Cyanide Management Code throughout the previous three – year audit cycle.

* For cyanide production operations seeking Code certification, the Corrective Action Plan to bring an operation in substantial compliance into full compliance must be enclosed with this Summary Audit Report. The plan must be fully implemented within one year of the date of this audit.

Audit Company	LULU Intelligent Organization
Audit Team Leader	Dr. Benno Steinweg
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Names / Signatures of other auditors ...	n/a
Date of audit	Sep 20 - 21, 2021 (on site)

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

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



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.

This operation is ☒ in full compliance with
☐ in substantial compliance with Production Practice 1.1
☐ not in compliance with

Summarize the basis for this Finding:

The CyPlus facility was built using sound, accepted engineering practices and quality control processes. Extensive QC & QA records regarding the construction of the production, packaging and warehouse facilities were reviewed and were found to be acceptable. Appropriate quality assurance and quality control, management of change documentation, drawing control, equipment sign-offs and usage of a data control computerized system (DCS) were available to demonstrate compliance to Code requirements. Acceptable materials for construction are formally defined in Evonik (resp. CyPlus's former holding companies) / CyPlus's Engineering Standards and a review of records confirmed that materials used conform to internal requirements. All operations and process equipment are in a closed building or under a roof of an open-air building within lined concrete secondary containment areas with concrete sumps. The production / packaging area has appropriate containment systems that ensure full containment with sufficient capacity in case of a storm event bringing rain water or snow. Alarms and interlock systems keep the production process under control in the event that there is an upset condition or a container that is being loaded becomes full. CyPlus uses management system procedures and standard forms to inspect their interlocks, dust collection systems, process equipment, and containment systems regularly to ensure functionality and integrity. Spill prevention and containment measures are provided for all cyanide solution containing equipment, e.g. tanks and pipelines. All equipment is installed within containments with concrete surface and sufficient capacity. Cyanide detectors are installed at selected high-risk positions. All the facilities (production, storage, pipelines etc.) for the handling of cyanide solution are located in secure areas.

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

This operation is ☒ in full compliance with
☐ in substantial compliance with Production Practice 1.2
☐ not in compliance with

Summarize the basis for this Finding:

The facility has a full set of standard operating procedures which describe the standard practices necessary for its safe and environmentally sound operation, but also for contingencies during upsets in its activities that may result in cyanide exposures or releases. Further detailed work instructions are maintained, updated and valid. Preventive maintenance programs are in place. The facility runs a management of change procedure with a corresponding form sheet. In case of planned changes or planned engineering work / projects the site management needs to sign it to release the change suggestion. To assure safe and continuous production, in-line measurement instrumentation such as HCN detectors, transducers, level transmitters etc. are installed. Cyanides are recycled within the process and thus do not generate waste. Contaminated solids and other materials are shredded, washed and collected in waste drums which are labeled according to German legislation and are transported and disposed by authorized waste-companies. The storage locations are constructed at all sides with full protection against rainfall. Fire fighting with water when cyanide is present is prohibited. Fire fighting and fire protection is outsourced to the industrial park owner and operator company "Evonik Industries", who is running a continuous and rigid testing and training system, where the CyPlus plant is completely involved. Inside the building HCN detectors / indicators are in place. The storage of the final goods is continuously ventilated by an appropriate HVAC system. The production and storage areas are located within an industrial park property that is –in general- protected by a very restricted access control system. The produced cyanide is packed in packages which are in full compliance with the international regulations for transportation of dangerous goods (e.g. ADR and UN regulations). There is no physical outlet from the collecting tank system or from the secondary containment system into the outside environment. Unauthorized or unregulated discharge of contaminated cyanide solution into the sewer system is prevented by monitoring, interlocking and control via digital control system.

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

This operation is ☒ in full compliance with
☐ in substantial compliance with Production Practice 1.3
☐ not in compliance with

Summarize the basis for this Finding:

The facility runs routine inspection and maintenance programs to assure the functionality of all equipment. Besides these inspections additional routine inspections for tanks, pipelines, containments, valves are performed regularly by shift leaders and operating personnel throughout the facility. Preventive controls incl. checks triggered by mandatory requirements such as metering the thickness of tank walls and container surfaces are considered and are part of the defined maintenance program; inspection plans and schedules are maintained. The performed inspections are sufficient and are in compliance with the local German / European law. Frequencies are defined by law and / or by risk assessments. The facility conducts routine inspection programs for tanks, valves, pipelines, containments and other cyanide production and storage facilities. The German / European requirements are often equivalent or higher than expected by the Code. In cases where no local requirements or just requirements on a lower level exist, the respective ICM Code requirements are defined as valid. All verified inspections were without any complaint. A Technical Measure system is in place to handle deficiencies coming out of inspections or technical checks.

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.

This operation is ☒ in full compliance with
☐ in substantial compliance with Production Practice 2.1
☐ not in compliance with

Summarize the basis for this Finding:

In accordance to German / European legislation the CyPlus organization is enforced to perform a danger and risk analysis (HAZOP) in which all relevant aspects regarding safety on work are considered. All working places and effects on all employees such as operational manager, shift leaders or shift-workers have been analyzed. As a result of this analysis, different measures and actions concerning personal protective equipment (PPE), monitoring devices, technical equipment, inspection routines, procedures, instructions, emergency plans, warning signs, medical check-ups were developed and implemented in cooperation with medical experts, doctors and a safety technician. The danger and risk analysis docs are reviewed routinely by an expert team (medical department, safety technician and plant manager), periodically by internal audits or inspections, partially together with the employees. In addition to this analysis job safety analysis is implemented. All workers in the production and partially in the storage area have to wear a personnel portable HCN detector. Within these procedures all items of verification protocol chapter 2.1 are taken into account.

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

This operation is ☒ in full compliance with
☐ in substantial compliance with Production Practice 2.2
☐ not in compliance with

Summarize the basis for this Finding:

The cyanide plant has developed and implemented an operational alarm and emergency response plan in accordance to German / European legislation. This includes the specific conditions and measures in the production plant, e.g. summary of the most important responsibilities for emergency cases, behaviour in case of emergency and cooperation with cyanide squad of the CEFIC organization and the "Mutual Aid Scheme". Antidote management system and handling standard operation procedures are in place. Safety Data Sheets (SDS) are available in German language for all products. According to German law additional advices in writing are available on that place where cyanide handling is performed. These advices are basis of routine trainings. Dangerous goods labelling (not just cyanide, but also other dangerous goods related) of storage and process tanks, pipelines, containers, transportation facilities and so on are in place; in case of piping also with arrows indicating the direction of cyanide flow. First-aid equipment is in place at the plant. The emergency facilities are inspected periodically, records are available and in place. Medical support with all required instruments

and equipment is implemented. First aid and emergency response equipment is stored and in maintenance as recommended by the experts (medical doctor, manufacturer). The decontamination policy is established and transferred to different work instructions of the plant documentation. All the cyanide plant's programs and procedures maintained are defined in controlled documents. In general there are two ways / rationales to review and update those plant's emergency response programs and procedure: driven by time and driven by event. Evonik's site located medical center resp. doctors cooperate with local hospitals and neighbored industry. Besides these activities, in cooperation with site operating organization Evonik and local fire-brigades mock-drills are conducted routinely at the premises of Wesseling industrial park.

Showers, suitable eye-wash stations, fire extinguishers and other first-aid-equipment are available throughout the operation area at strategic positions where cyanide contact may occur to the employees. They are checked and tested according to the maintenance list (max. in a 2-years sequence). Each fire extinguisher and every fire detection and alarm system is obligatorily monitored and checked by the local site fire brigade.

An antidote management system as well as handling standard operation procedures are in place. Medical oxygen, resuscitating aids (e.g. defibrillation equipment) are readily accessible on the plant. In case of emergency, the antidote drugs (e.g. Cyanokit; hydroxocobalamin for injection) are available very fast (both: firebrigade's and ambulance's vehicles are equipped with respective injection kits). The drugs are administered, handled and applied by qualified healthcare professionals only, i.e. medical doctors and medical nurses.

The Wesseling plant has direct access to Evonik's highly qualified site medical center, which is specialized in chemical accidents resp. issues and which is the first address for any accidents. In case of any specific needs the transfer of the employee to a more specialized or capable clinic or hospital is arranged by the site med center, based on a medical doctor's recommendation.

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.

This operation is ☒ in full compliance with
☐ in substantial compliance with Production Practice 3.1
☐ not in compliance with

Summarize the basis for this Finding:

The CyPlus production plant at Wesseling has no direct discharge to surface water. Production plants (including CyPlus's cyanide plant) operating on the Evonik site in Wesseling discharge their wastewater into Evonik's infrastructure sewer system. Process wastewater is treated at the on-site wastewater treatment plant. Monitoring and control systems are in place to prevent unplanned spill into the river Rhine. The groundwater regime is well and continuously investigated due to the submission of an application for groundwater abstraction. From the auditor's perspective the monitoring frequencies of the groundwater situation, of the process water situation (including the surface water) and of the gas

phase processes are adequate to characterize the respective medium monitored and to identify changes in a timely manner.

CyPlus is following the requirements of an EHS management system according to ISO 14001 and is member of the Responsible Care initiative of the chemical industry. The CyPlus operations are regulated by a number of permits according to the German Federal Air Emission Act as well as according to Waste Water Act (and further requirements), as outlined in the current list of permissions. Generally all filling processes are controlled by suction units in the immediate surrounding of the scales. The emissions are finally treated in a gas scrubber. Based on a report, it was concluded that current allowable workplace concentrations are met. The site operates in compliance with the permit requirements stipulated for air emissions.

The cyanide plant's waste water passes subsequently the steps: (1) detoxification, (2) detoxified sewage transferred to industrial park's WWTP, (3) mechanical WW-treatment, (4) biological WW-treatment, (5) downstream mixing / blending and finally (6) discharge to surface water when qualified according to WW-specs. The continuous measurements after final mixing and before discharging to surface water show in each and every case values (far) below 1 ppb free cyanide.

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.

This operation is ☒ in full compliance with
☐ in substantial compliance with Production Practice 4.1
☐ not in compliance with

Summarize the basis for this Finding:

Based on their professional education, the operating employees are qualified as skilled chemical workers. They went through professional training, especially training-on-the-job mostly for a 3-yrs-period and finished their education with an examination that leads to a certified degree by German industry and commerce chamber. This education is the basis for the further training concept which is specified to the requirements of the certain function of each and every employee. Thus all employees are instructed prior to work regarding the risks of cyanide handling and working at the plant. New employees are integrated into their job by a defined procedure.

One of the many further trainings are basic safety trainings which are enforced by German / European legislation or which are in accordance to the risk analysis, such as: handling of hazardous materials, usage of PPE, alarm and emergency responding, emergency drills, cyanide exposures and how to act / react, or operating procedures/instructions. These trainings are partially mandatory required and have to be repeated annually, held by specially qualified trainers. The trainings are focussing on the specifics of the dangerous materials, e.g. cyanides and HCN. A training schedule is maintained, based on requirements of the jobs (taking HAZOP study into account) and also based on the skills of each individual. Modern methods are used, e.g. eLearning tools or video presentations at an intranet portal.

The evaluation of training effectiveness takes place according to ISO 9001 ch. 7.2.c requirements: by supervisor's observation, evaluation incl. dialogue between worker and supervisor, practical tests, classroom discussions and also written exams.

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

This operation is ☒ in full compliance with
☐ in substantial compliance with Production Practice 4.2
☐ not in compliance with

Summarize the basis for this Finding:

All employees at the CyPlus plant undergo periodical training lessons regarding safety issues when cyanide handling occurs. This includes potential exposures and releases. The training contents are mostly an outcome of the Emergency Response Plan. The risk scenarios (HAZOP assessments) are practised by routine drills. Corrective actions are derived, defined and realized. The acting people of the CyPlus plant are involved throughout the complete mock drill activities to improve their skills and to refresh / optimise their awareness. Following the specific requirements of ISO 9001 / 14001 ch. 7.5 the trainings are documented as required: to be traced back personally to each individual, covering the subjects trainer, topic, date, duration and kind of verification of understanding resp. effectiveness.

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.

This operation is ☒ in full compliance with
☐ in substantial compliance with Production Practice 5.1
☐ not in compliance with

Summarize the basis for this Finding:

All relevant and potential failure scenarios are regulated through both emergency response plans: the plan from CyPlus and the plan from Evonik Industries, the operator of the industrial park at the Wesseling site, where CyPlus's NaCN plant is located. Both work together in a handshake system. Crisis and emergency response management is regulated in detail. The local emergency responders such as TUIS-qualified fire brigade and medical doctors are involved in the process of developing these Emergency Response Plans. Objectives and contents of the ERP are defined and described. In all emergency situations the site-located professional fire-brigade and the medical center are alarmed; they are present on site within a few minutes in order to control releases, to extinguish fires, to support with first aid measures and cyanide antidotes.

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

This operation is ☒ in full compliance with
☐ in substantial compliance with Production Practice 5.2
☐ not in compliance with

Summarize the basis for this Finding:

In addition to the ERP-based process a documentation and emergency response system is in place to respond to transport accidents with cyanides within Europe. This system, the Alkali Cyanide Mutual Aid Scheme (MAS), was initiated by CEFIC. The cyanide production site of CyPlus is participating. In accordance to the European Seveso III directive all companies at the Evonik Wesseling site are obliged to inform the neighborhood on potential hazards, emissions and other safety risks. The companies involved meet periodically for a so called "Domino" meeting. Especially the risks resulting from cyanide releases are obligate part of these evaluations. Beside this, potentially affected communities such as local government and environmental authorities, the mayor, fire-brigades, police or hospitals are involved and well informed about the nature of the risks of CyPlus's plant. The ERP contains a list of the industrial neighbors which may be affected in case of cyanide release. Their activities, addresses, contact dates and contact names are listed. Some communication activities with interested parties and stakeholders are initiated to assure that the relevant information and updates concerning the actuality of emergency response plans are addressed. Among others the regular "Domino" meeting is a main driver for spreading the current / correct information to the relevant parties.

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

This operation is ☒ in full compliance with
☐ in substantial compliance with Production Practice 5.3
☐ not in compliance with

Summarize the basis for this Finding:

Crisis and emergency response management is clearly defined and trained. The ERPs are the core documents to describe the relevant activities in case of incidents. Parts of these documents are the determination of tasks and responsibilities and the description of certain functions such as security personnel, fire-brigade, medical department, 24-hour-standby duty service team or site crisis team. The specific members of these teams are named, listed and kept up to date. The responsible coordinators and functional leaders are defined as well, Call-out procedures are included and 24-hour contact information for the response team members is ensured. Alert chains and internal / external reporting lines are implemented. According to the ERP and to detailed procedures appropriate trainings for the staff of the fire-brigade are exercised routinely; the crisis team meets for training reasons at least once per year. All emergency respond equipment including its inspection is listed in corresponding work instructions as a part of the EHS management system. The cooperation with outside responders is also part of the ERP; telephone numbers, addresses and contact persons (includes internal contacts and external contacts such as authorities, police, neighboured companies, public institutions, transport companies, hospitals and medical support, public media) are listed and kept up to date. In addition to the ERP regulation a documentation and an emergency response system is in place to respond to transport accidents with cyanides within Europe.

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

This operation is ☒ in full compliance with
☐ in substantial compliance with Production Practice 5.4
☐ not in compliance with

Summarize the basis for this Finding:

The ERP describes in detail the anticipated emergency situations using a risk assessment method. As an outcome of this risk assessment the following organizational steps are defined:

- General alarming procedures (warning of the employees; internal reporting; communication processes depending on the severity of the incident; involvement of the neighbourhood; cooperation with public media in cooperation with Evonik Industrial Park Organization).
- Fast definition of: Who is responsible? What is to be organized? (general roles and rules of behaviour; description of certain functions such as security personnel, fire-brigade, medical department, production plant staff, technical and environmental department, 24 hours standby service team, site crisis team, district fire-brigade).
- Telephone numbers, addresses and contact persons (including internal and external contacts such as authorities, police, city government, adjacent companies, public institutions, transport companies, hospitals and medical support, public media such as local radio stations)

According to the European Seveso III directive all companies at Evonik Wesseling industrial park site are obliged to inform the neighbourhood on potential hazards, emissions and other safety risks by a defined brochure that contains assignments and directions for behaviour in case of emergency in detail. The companies involved meet periodically for the "Domino" meeting. The Seveso III directive also regulates the involvement of neighbouring communities in permitting issues and potential risk information. That means that all interested parties are allowed to read the official safety report of the cyanide plant. In all cases the public relations department of the site services in Wesseling is involved in the external communication processes.

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

This operation is ☒ in full compliance with
☐ in substantial compliance with Production Practice 5.5
☐ not in compliance with

Summarize the basis for this Finding:

Both emergency response plans -the CyPlus's BAGAP and Evonik's WAGAP- include remediation measures as integrated processes; at Wesseling site these activities are accompanied by the analytical lab and, in case of spillage, by the mobile environmental lab. Evonik Industries is qualified and certified according to technical standards (external validation). If necessary, specific activities will be realized in relation to the environmental impacts. The use of chemicals is regulated in the procedures, sodium

hypochlorite, ferrous sulphate or hydrogen peroxide treatment of cyanide that has been released into surface water is prohibited. Furthermore, if negative environmental impact may occur from cyanide accidents, monitoring instruments, methods, parameters and locations have to be identified to check the current situation and to figure out an appropriate action plan for remediation activities.

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

This operation is ☒ in full compliance with
☐ in substantial compliance with Production Practice 5.6
☐ not in compliance with

Summarize the basis for this Finding:

The routine and the non-routine processes for plan reviewing procedure are described in CyPlus's emergency response plan BAGAP. Intensive and routinely performed mock emergency drills have been conducted with all necessary resp. interested parties (partially also including other CEFIC member companies) as described in the previous chapters of this report. Resulting findings and room for improvement analysis are part of systematic evaluation process of the emergency response plans. This is the basis for the continuous improvement of the safety and security situation at the CyPlus site within the industrial park in Wesseling.