# SUMMARY AUDIT REPORT

Name of Cyanide Production Facility: CyPlus GmbH, Wesseling Plant
Name of Facility Owner: CyPlus GmbH
Name of Facility Operator: CyPlus GmbH
Name of Responsible Manager: Frank Harenburg
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State/Province: NRW Country: Germany
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Location detail and description of operation:

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**Description of operation:**

The CyPlus facility is located on the premises of Evonik-Degussa in Wesseling. The facility is specialized in the manufacturing of sodium cyanide (NaCN) and potassium cyanide (KCN) used in the international gold mining industry. The products are available as powder, granules, bricks or solution. Main raw materials related to CyPlus operations include sodium hydroxide solution, caustic potash solution, and hydrogen cyanide. The production of alkali cyanides is completed in several steps. CyPlus employs 40 staff incl. management. The subject facility depends on several tasks and services provided by Evonik site services in Wesseling, in particular related to energy and pressurized air supply, steam, water and cooling water supply, general environmental management services, wastewater treatment, waste management, security, medical services, emergency preparedness including fire brigade and fire water retention. The services retained are governed by an appropriate service contract. CyPlus is completely involved into the Emergency Response Plan and into the corresponding mock drills.
The present report describes the results of the first re-assessment of the ICMC.

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## *Auditor's Finding*

This operation is

**x** in full compliance
□ in substantial compliance *****(see below)
□ not in compliance

with the International Cyanide Management Code.

***** 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: DQS GmbH; August-Schanz-Str. 21; D-60433 Frankfurt/Main
Audit Team Leader: Dr. Klinken, Heinz Theo E-mail: okt.klinken@t-online.de
Names and Signatures of Other Auditors: n.a.

Date(s) of Audit: Nov 21st, 2008, and Mar 23rd, 2009

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.

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***1. OPERATIONS: Design, construct and operate cyanide production facilities to prevent release of cyanide.***

*Production Practice1.1:* *Design and construct cyanide production facilities consistent with sound, accepted engineering practices and quality control/quality assurance procedures.*

The operation is
**x** in full compliance with
☐ in substantial compliance with Production Practice 1.1
☐ not in compliance with

*Summarize the basis for this Finding/Deficiencies Identified:*
*The complete production plant at Wesseling site including all equipment and buildings have been built according to German law. The construction and the corresponding programs for Quality Assurance and Quality Control are on an high level and meet the Code´s criteria. The used materials and the installed equipment as well as the constructing activities were controlled by QA/QC procedures and were carried out by qualified personnel. Corresponding records are available and retained in specific files. Approvals and statements of the authorities are in place. A management of change regulates the maintaining activities. The CyPlus safety report describes the production process and all installed equipment on the production facility. It defines automatic systems and interlocks to shut down production and prevent releases. Extensive technical equipment to control the production process is installed and under control. The whole cyanide production process is controlled, supervised and checked by an automatic Digital Control System (DCS). Secondary containment with sufficient capacity is available, spill prevention and containment measures for all pipelines are provided.*

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

The operation is
**x** in full compliance with
☐ in substantial compliance with Production Practice 1.2
☐ not in compliance with

*Summarize the basis for this Finding/Deficiencies Identified:*
*The CyPlus safety report describes the production process and all installed equipment of the facility. The corresponding hazard analysis defines automatic systems and interlocks to shut down production systems and prevent releases. As well, technical safety equipment is installed and under control. The whole cyanide production process is controlled, supervised and checked by an automatic DCS (Digital Control System). An integrated management system for quality and environment acc. to ISO 9001 and ISO 14001 had been certified. All relevant procedures are described such as:*

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- *standard operating procedures (in addition to DCS)*
- *procedures and working instructions in case of contingency*
- *a change management procedure*
- *a procedure for preventive maintenance*
- *regulations to prevent unauthorized discharges from secondary containments*
- *procedures for waste separation and disposal*
- *regulations for secure storage (including ventilation and preventing from water contact)*
- *detailed instructions for packaging taking into account the individual legislations of the relevant countries.*

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

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|---|---|---|
| The operation is | **x** in full compliance with<br>☐ in substantial compliance with<br>☐ not in compliance with | Production Practice 1.3 |

*Summarize the basis for this Finding/Deficiencies Identified: CyPlus provides a list representing the installation register in accordance to legislation. It covers annual routine inspections of tanks, pipelines, containments and other equipment by authorized experts and independent certified bodies. The corresponding inspection protocols state compliance with the Code´s requirements. Additional routine inspections by shift leaders (permanently) and preventive controls (by the operating personnel, several times per shift according to a schedule) are considered and are part of the maintenance program. The results of those routine inspections are documented in the shift manual.*

***2. WORKER SAFETY: Protect workers' health and safety from exposure to cyanide.***

*Production Practice 2.1: Develop and implement procedures to protect plant personnel from exposure to cyanide.*

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|---|---|---|
| The operation is | **x** in full compliance with<br>☐ in substantial compliance with<br>☐ not in compliance with | Production Practice 2.1 |

*Summarize the basis for this Finding/Deficiencies Identified:*
*In accordance to German law the CyPlus organization is enforced to perform a danger and risk analysis in which all relevant aspects are considered. All working places have been analyzed in cooperation with medical experts, doctors and safety engineers (including the assessment of worker´s health and fitness).*

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*The analysis is reviewed annually; additional Job Safety Analysis had been implemented. The workforce is involved in these activities. By these means, areas and tasks with potential high cyanide exposure and the required PPE had been identified.*
*Preventive measures are arranged, if necessary. Within the integrated management system for quality, environment and safety CyPlus has implemented many documents to operate the facility in a sound and safe manner. Specific instructions to minimize worker exposure are developed such as general safety instructions, instructions concerning the handling of hazardous material or emergency operations (e.g. use of a buddy system or worker clothing change procedure). Change management is mentioned in different procedures such as "protection concepts". Hydrogen cyanide monitoring equipment is maintained, tested and calibrated. Warning signs are installed throughout the facility; smoking, eating and drinking is prohibited. The employees demonstrated high awareness to the auditor.*

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

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|---|---|---|
| The operation is | **x** in full compliance with<br>□ in substantial compliance with<br>□ not in compliance with | Production Practice 2.2 |

*Summarize the basis for this Finding/Deficiencies Identified:*
*The cyanide plant has developed and implemented an operational alarm and emergency response plan in accordance to German law. This includes the specific conditions and measures in the production plant. All relevant aspects such as behaviour in case of emergency are taken into account. First aid and emergency response equipment (showers, eye-wash stations, non-acidic fire-extinguishers, antidotes, MSDS and so on ) are available and under control. Water, oxygen, resuscitator, antidote and means of communication or emergency communication are in place. A very intensive medical support with all required instruments and equipment has been implemented. The medical doctor on site cooperates with local hospitals. A fire brigade is on site. First-aid and emergency response equipment is available and regularly inspected or replaced in accordance to existing schedules. The labeling of tanks, pipelines, flow-direction, reactors and other items is in place. Regulations for employees, contractors and visitors to control potential skin exposures are implemented. Mock emergency drills are conducted weekly. In case of incidents investigations and evaluations are conducted to identify corrective and preventive actions.*

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***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.*

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|---|---|---|
| The operation is | **x** in full compliance with<br>□ in substantial compliance with<br>□ not in compliance with | Production Practice 3.1 |

*Summarize the basis for this Finding/Deficiencies Identified:*
*The CyPlus operations are regulated by a number of permits according to German law. To fulfill the requirements, environmental monitoring concerning emissions, wastewater handling, waste disposal or hazardous materials are realized. The results show that environmental impacts are under control. For example, the CyPlus facility discharges waste water into Evonik´s internal sewer system. The waste water is analyzed permanently before biological treatment. The cyanide leaving the biological treatment is lower than 0.1 mg/l and meets the requirements. The facility has implemented a map detailing all emission sources relevant to its operations. The periodical emission measurements by analytical laboratories (internal and every three years authorized measurements by an external certified laboratory) show that the emissions meet the required limits. Groundwater is used only for technical purposes; quality is controlled in an appropriate manner. The groundwater conditions are clarified by analysis of groundwater wells. Contaminations were not identified in the course of the periodical assessments.*

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

*Production Practice 4.1: Train employees to operate the plant in a manner that minimizes the potential for cyanide exposures and releases.*

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|---|---|---|
| The operation is | **x** in full compliance with<br>□ in substantial compliance with<br>□ not in compliance with | Production Practice 4.1 |

*Summarize the basis for this Finding/Deficiencies Identified:*
*Based on their professional education, the operating employees are qualified as skilled chemical workers which went through professional training and finished their education with a certified degree. In addition to the education a training program is elaborated for each employee; refresher trainings are also part of the program.*

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*This program provides several lessons concerning the general operation of the facility or the use of personal protective equipment as well as specific training concerning individual tasks and hazard recognition training. The training is provided by qualified experts and shift-leaders. Training program and activities are fully documented. The training effectiveness is evaluated by testing and observation. The training elements are documented and the records are retained according to internal requirements for several years.*

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

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|---|---|---|
| The operation is | **x** in full compliance with<br>□ in substantial compliance with<br>□ not in compliance with<br>□ not subject to | Production Practice 4.2 |

*Summarize the basis for this Finding/Deficiencies Identified:*
*The above mentioned education is the basis for the training concept which is specified to the requirements of the certain function of each employee. Trainings for special tasks such as safety representative, first aid responder or firemen are conducted. These training lessons are performed by internal or external experts. They are provided to qualify specific functions of the operation personnel and to improve their behaviour in cases of emergency such as cyanide exposure. Periodical drills are performed to optimize the response in cases of emergency; the response training is reported and evaluated, training records are retained.*

## *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.*

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|---|---|---|
| The operation is | **x** in full compliance with<br>□ in substantial compliance with<br>□ not in compliance with | Production Practice 5.1 |

*Summarize the basis for this Finding/Deficiencies Identified:*
*All relevant and potential failure scenarios are regulated through both emergency response plans: a) the operational alarm and emergency response plan for the cyanide facility and b) the site alarm and emergency response plan for the whole Wesseling site and its neighbourhood. In all emergency situations the central fire-brigade and the medical stations are alarmed.*

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*The plans describe specific response actions such as evacuation, information of the neighbourhood or affected persons and communication with all relevant institutions, use of antidotes and first aid measures, handling of hazardous material or control of releases. Containment, assessment, mitigation and actions to prevent future releases are considered.*

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

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| The operation is | **x** in full compliance with<br>□ in substantial compliance with<br>□ not in compliance with | Production Practice 5.2 |

*Summarize the basis for this Finding/Deficiencies Identified:*
*Tasks and responsibilities in cases of emergency are regulated by the different response plans. The certain functions such as security personnel, medical department, fire-brigade, site crisis team or the involvement of the top management are taken into account. 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 the cyanide production facility. The ways of communication in general and in cases of emergency are regulated. The acting persons know each other. Documents concerning the behaviour in cases of emergency are in place at the different communities. A mandatory information broshure according to Seveso II guideline is distributed to inform the neighbourhood on potential hazards, emissions and other safety risks. Different means of communication are initiated to ensure that the relevant information and updates concerning the actuality of the emergency response plans are addressed.*

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

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| The operation is | **x** in full compliance with<br>□ in substantial compliance with<br>□ not in compliance with | Production Practice 5.3 |

*Summarize the basis for this Finding/Deficiencies Identified:*
*The Emergency Response Plans determinate the different functions and roles with specified duties in cases of emergency such as the responsibilities of the chief emergency response coordinator, the head of the fire-brigade, the top management or the communication manager. The Emergency Response Teams are defined, too. As mentioned above, the Wesseling site provides professional medical doctors and fire-brigades within a permanent 24 hours standby service. General alarming procedures, site maps with focal points of risks, lists of response equipment and inspection procedures are integrated into the plans.*

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*The technical equipment for emergency response is in very good condition. Mock drills of the fire-brigade and the medical station are performed at a minimum once per week together with production staff. Outside responders are involved in extensive mock drills periodically. All these drills and exercises are reported and documented.*

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

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| The operation is | **x** in full compliance with<br>☐ in substantial compliance with<br>☐ not in compliance with | Production Practice 5.4 |

*Summarize the basis for this Finding/Deficiencies Identified:*
*The relevant procedures are described in the above mentioned alarm and emergency response plans. In addition, an "Alkali cyanide Mutual Aid Scheme (MAS)" is in place to respond to transport accidents with cyanides. They contain relevant procedures for internal and external emergency notification and reporting. The relevant contacts such as to authorities, police, neighboured companies, public institutions, hospitals or public media are involved. According to legal guidelines the companies on Evonik Wesseling site are obliged to inform the neighbourhood on potential hazards, emissions or other risks. Interested parties are allowed to read the official safety report of the cyanide plant.*

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

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| The operation is | **x** in full compliance with<br>☐ in substantial compliance with<br>☐ not in compliance with | Production Practice 5.5 |

*Summarize the basis for this Finding/Deficiencies Identified:*
*The above mentioned Mutual Aids Scheme describes general procedures for dealing with a spillage of alkaline cyanides. Remediation measures are integrated in this concept. Systematic activities to identify sufficient monitoring and remedial actions are included in these plans. Detoxification by chemical treatment is prohibited. At the Wesseling plant a mobile environmental laboratory (vehicle) is in place and will be alarmed in cases of emergency.*

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

The operation is
**x** in full compliance with
☐ in substantial compliance with
☐ not in compliance with
Production Practice 5.6

*Summarize the basis for this Finding/Deficiencies Identified:*
*As stated before, the response procedures are trained periodically. Mock drills (at least once per week) are performed. The results and reports of these drills are the basis for reviewing the procedures. In addition, the different alarm and emergency response plans are revised once per year by the competent responsible. According to the basic principles of an EHS management system ("continuous improvement") revision and evaluation of the ERP are defined. In addition to regular annual reviews it is stated that in case of upcoming needs or suitable occasions revisions are mandatory.*

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