INTERNATIONAL CYANIDE MANAGEMENT INSTITUTE

Cyanide Production Summary Audit Report

For the
International Cyanide Management Code

Asahi Kasei Corporation
Mizushima Works

27 August 2018

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Mizushima Works

Name of Production Facility

Lead Auditor Signature

Date

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Name of Cyanide Production Facility: Asahi Kasei Corporation
Name of Facility Owner: Mizushima Works
Name of Facility Operator: Asahi Kasei Corporation
Name of Responsible Manager: Mr. Yoshihito Itani / Senior GM of Acrylonitrile Division
Name of Coordinator: Mr. Akihiko Sakamoto / Plant General Manager
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Location detail and description of operation:

The Asahi Kasei Corporation Mizushima Works (hereinafter called as Asahi Kasei Corporation) is located at the Mizushima Chemical Complex, Kurashiki City, Okayama Province, Japan. The whole area covered by the plant is 1,400,000 m².

The sodium cyanide plant of Asahi Kasei Corporation was established and started operation during 1969 year. The current production capacity of solid sodium cyanide is about 25,000 ton per year.

The cyanide plant includes all facilities related to production, storage and consignment. The cyanide produced by the Asahi Kasei Corporation is sodium cyanide used for gold mining. The sodium cyanide is produced using the hydrogen cyanide generated from the acrylonitrile process and sodium hydroxide as raw material. The hydrogen cyanide is produced as by-product from acrylonitrile plant operated within same plant area. The solid sodium cyanide is packaged into box or drum and exported to gold mining located in overseas areas.

The plant employs total 1,200 staff in its production facility. The Asahi Kasei Corporation have developed, implemented and maintained safety and environmental policy and procedures with the reflection of Japanese laws related to environment, safety and health and the requirements of ICMC production protocol.
Auditor's Findings

This operation is

X in full compliance
in substantial compliance *(see below) with the International Cyanide Management Code.
not in compliance

with the International Cyanide Management Code.
This operation has maintained full compliance with the International Cyanide Management Code.

Audit Company : 3Points C., Ltd.
Audit Team Leader : Mr. Sang Ho Ahn
E-mail : sangho.ahn@naver.com
Dates of Certification Audit : 11–13 July 2018

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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27 August 2018
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.

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 sodium cyanide plant was constructed and started operation during 1969 year. The construction company Nisso Engineering Co., Ltd. conducted the quality control and quality assurance for cyanide production and storage facilities. Reactor and piping material were tested by suppliers. During and after the construction of sodium cyanide plant, the construction company implemented test and inspection according to quality plan and submit the results to RC and engineering team and supervising agency. RC and engineering team and supervising agency reviewed the result reports and concluded that facilities were established according to drawing and specification. According to the test and inspection reports, the sodium cyanide process facilities were established to prevent spillage of sodium cyanide, hydrogen cyanide and raw material chemicals. They have conducted annual shut-down and overhaul works for sodium cyanide plant according to maintenance program. During and after the overhaul works, they have inspected facilities as pipelines, reactor and storage tanks. The inspection was conducted by internally qualified personnel and external non-destructive test service agency. The RC and engineering team have maintained inspection reports including the conclusion that the continued operation of sodium cyanide plant according to manual and operational criteria will protect cyanide exposure and release.

According to cyanide process drawing, P & ID and material specification, the material of piping and vessel facilities were mainly stainless such as SUS304 and SUS316L or higher grade those are compatible with hydrogen cyanide, liquid sodium cyanide and other chemicals. Since the start of operation of sodium cyanide plant during 1969 year, there were several cases of facility changes. The materials such as pipe, valve and flange were used during facility changes. Those materials were inspected by maintenance team with drawing and only conforming materials were used during the facility changes. And also automatic interlocks systems were established to shut down production and prevention of release due to power outages or equipment failures.

All main process facilities such as condensation, reaction, drier, packaging and storage were established and managed on a concrete to prevent cyanide seepage to subsurface.

Level indicators were installed to storage tanks and reactor and alarm system for high level were applied to storage tanks and reactor. The levels of storage tanks and reactor were controlled automatically and actual levels were checked in control room monitors. If the levels of chemical solution in tanks and reactor were reach the high level, alarm signals appeared in monitor. Dikes were installed around cyanide process facility and storage tank areas. The volumes of dike were enough to hold spilled chemicals and solution from the largest tank. And also secondary containment were installed around the hydrogen cyanide solution tank and sodium hydroxide tank. The piping materials including valve and flange are SUS 304 or SUS 316L which can endure the hydrogen cyanide and sodium cyanide solution. And also the solution pipelines were on the concrete and marked by red color.
Production Practice 1.2: Develop and implement plans and procedures to operate cyanide production facilities in a manner that prevents accidental releases.

X in full compliance with
The operation is
in substantial compliance with
not in compliance with
Production Practice 1.2

Summarize the basis for this Finding/Deficiencies Identified:

The production team have developed and maintained safe operation procedure and standard operation program in which standard practices such as operational criteria for pressure, temperature and flow rate, start-up & shut down process and packaging process, prevention of unauthorized and unregulated discharge of cyanide solution and cyanide-contaminated water and detail control of waste water were defined. The cyanide waste water from process areas shall be treated in waste water treatment facility. And the waste cyanide water shall not be discharged to environment in any case. For some emergency situation, the waste water shall be treated with the direction of top management plant manager.

And also the production team have maintained disaster prevention plan to assure safe and sound process operation.

They have established and maintained emergency disaster prevention procedure, cyanide leakage response procedure and emergency shut-down procedure. In those procedures, detail preparedness plans to control the possible emergency situations such as sodium cyanide spillage, hydrogen cyanide leakage, fire, explosion and employee exposure to hydrogen cyanide and sodium cyanide were reflected and updated periodically. They also have developed and maintained construction and equipment design control procedure and change control procedure in which identification and control of the changes such as process facility and piping changes, process operation changes and material changes from initial design and operation were defined.

The maintenance team have prepared long term maintenance program, high pressure gas and hazardous material facility inspection program every year for the facilities of cyanide production and handling according to preventive maintenance operation procedure. The preventive maintenance period, facility and equipment, inspection item and detail method were defined in those programs prepared by annual base. Those programs were implemented and results were recorded and maintained by maintenance team.

Main process parameters such as flow rate of hydrogen cyanide and sodium hydroxide, temperature, pressure and level of tank and reactor were monitored by DCS in control room. And also main instrument as thermometer, pressure gauge, flow meter was calibrated during overhaul works as defined in preventive maintenance programs and calibration procedure.

They have developed and maintained waste treatment and transport procedure. The control and disposal of waste cyanide and cyanide contaminated solid were clearly defined in the procedure. According to cyanide product storage and transport management procedure, cyanide products stored in warehouse in which ventilation fans were installed and operated, the cyanide was filled in steel drum or wooden box and those steel drum and wooden box were maintained in warehouse to prevent exposure of moisture and the cyanide product storage warehouse is secured from public access as public can’t enter the warehouse without special acceptance from environment and safety team. The cyanide products were packaged according to cyanide product storage and transport management procedure with the reflection of IMDG requirements. The tag warning the toxic chemical storage and MSDS were attached outside the packaging steel drum and wooden box.
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Production Practice 1.3: Inspect cyanide production facilities to ensure their integrity and prevent accidental releases.

The operation is X in full compliance with Production Practice 1.3
in substantial compliance with Production Practice 1.3
not in compliance with Production Practice 1.3

Summarize the basis for this Finding/Deficiencies Identified:

The maintenance team have conducted routine inspections of tanks, valves, pipelines, containments and other cyanide production and storage facilities according to preventive maintenance operation procedure. The hydrogen cyanide and sodium hydroxide tanks were inspected every year during over-haul works. The secondary containments were checked by production team every day and environment and safety team by weekly base to find out spillage and leakage from facilities. According to preventive maintenance operation procedure, the detail inspection frequency and item, last date and next planned date of preventive maintenance and inspection for tanks, valves, pipelines, containments and other cyanide production and storage facilities were reflected to long term maintenance program, high pressure gas and hazardous material facility inspection program. Recently there was no severe incident and accident related to equipment failure. So the current frequency of preventive maintenance and inspection were properly established and sufficient to prevent failure, incident and accident.

For each facilities and equipment, checklists for preventive maintenance and inspection item were prepared. And also inspection date, inspector, deficiency and follow-up result were recorded. Corrective actions for identified deficiency were implemented and results were recorded as required by corrective action procedure.

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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.

X in full compliance with
The operation is in substantial compliance with Production Practice 2.1
not in compliance with

Summarize the basis for this Finding/Deficiencies Identified:

The Asahi Kasei Corporation have developed and implemented safe operation procedure, emergency disaster prevention procedure, cyanide leak response procedure and emergency shut-down procedure. Detail PPEs, wearing areas and activities were reflected to safe operation procedure. The procedure was informed and trained to employees, visitors and contractors. Employees, visitors and contractors should wear PPE and need to be prevented from the exposure of cyanide during normal, abnormal and emergency operation, maintenance and overhaul activities. Since initial operation of sodium cyanide plant during 1969 year, there are several cases of facility changes in sodium cyanide process and relevant process areas. According to change control procedure and construction and equipment design control procedure, committee was opened for each change case and potential impacts on worker health and safety were reviewed for facility and operational changes and modifications. During the review of changes, necessary measure and prerequisite requirement to control the risk from changes were identified. And production team and maintenance team have implemented the relevant requirements before the change started.
According to the rule of health and safety committee opened every two months, workers were required to contribute in developing and evaluating health and safety work instructions and procedures.

The Asahi Kasei Corporation have installed hydrogen cyanide detectors in process and storage tank areas where the leakage and emission of hydrogen cyanide can be estimated. The monitoring result of hydrogen cyanide concentration in process area is far below national legal requirement and ICMC criteria. They have conducted inspection of working environment for drier, packaging and storage processes to check the concentration of dust including sodium, calcium and potassium cyanide by monthly base. The inspection results for those areas were comply with national legal requirements and ICMC criteria.

The maintenance team have implemented the calibration for hydrogen cyanide detector installed in process and portable detectors periodically.
Such areas as hydrogen cyanide condensation process, hydrogen cyanide storage tank, reactor, drier, sodium cyanide packaging and storage areas and activities such as site patrol, maintenance and overhaul works were identified as where worker may be exposed to hydrogen cyanide, sodium and potassium cyanide dust. Around those areas, they maintained warning panels informing toxic chemical presence and requiring PPEs. And according to safe operation procedure, employee, visitor and sub-contractor are required to use PPEs such as mask, goggle, company clothing and shoes.
According to safe operation procedure and work permit procedure, they applied paging system and buddy system for such irregular works and dangerous works as repair works by sub-contractor, patrol of dangerous area and basement and maintenance works.
They have conducted health check for employee twice per year including special health check.
According to the health check results, fitness of employee to perform their tasks were determined and follow-up actions were implemented.

All employees, contractors and visitors shall wear clothing provided by environment and safety team to go and work in cyanide process areas. And when the employees, contractors and visitors leave the

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process areas, they shall exchange the clothing.  
The warning signs of cyanide presence and wearing of PPEs maintained to storage tank, process, 
packaging and cyanide product storage areas. Red color mark was applied to piping for hydrogen 
cyanide. Personnel including employees, contractors and visitors were prohibited from smoking, eating, 
drinking in potential cyanide contamination areas such as process, packaging and storage areas. The 
MSDS or warning signs advising above issues were maintained in control room, process, packaging 
and storage areas. 

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

X in full compliance with 
The operation is in substantial compliance with Production Practice 2.2 
not in compliance with 

Summarize the basis for this Finding/Deficiencies Identified:

The Asahi Kasei Corporation have developed and maintained emergency disaster prevention 
procedure and cyanide leakage response procedure in which detail emergency cases including cyanide 
exposure and response methods were defined. The showers, eye wash stations and fire extinguishers 
were located at relevant areas and checked periodically to assure availability.  
The production team, environment and safety team have maintained the first aid equipment as water, 
oxygen, amyl nitrite as smelling salt and resuscitator in cabinets installed in process areas and office.  
The environment and safety team have inspected first aid equipment by periodically according to safe 
operation procedure. According to site check during this audit, it was found that the first aid 
equipment maintained properly in cabinets installed in process areas and office. 
The MSDS, cyanide leakage response procedure, action procedure for cyanide exposure and 
ersgency response channel were described in Japanese language and maintained in process areas, 
control room, cyanide product packaging and storage areas and office. 
The material names were attached to the storage tanks, process tanks and containers. Red color mark 
was used to pipeline containing hydrogen cyanide. And also cyanide flow directions were identified by 
arow mark in pipeline. 
The decontamination details during entrance and leaving from process areas was defined in safe 
operation procedure and PPE wearing procedure. The employees, contractors and visitors shall 
echange clothing and wash their hands before leaving the process. 
They have maintained the first aid equipment as water, oxygen, antidote amyl nitrate and resuscitator 
in cabinets installed in process areas and office. They have nominated rescue team member for 
employees in environment and safety team and production team received training related to rescue 
employee, use of antidote amyl nitrate and resuscitator etc. And transportation of cyanide exposed 
workers to Mizushima Chuo Hospital was defined in action procedure for cyanide exposure. 
The environment and safety team identified local hospital Mizushima Chuo Hospital located near 
their plant to treat employee exposed to cyanide. They inform to the Mizushima Chou Hospital about 
the potential need to treat patients exposed to cyanide. 
The mock emergency drill for cyanide exposure case was conducted every year by production team, 
environment and safety team. The mock emergency drill process and result were evaluated and 
lessons were recorded and reflected to emergency response plans. 
Detail investigation and evaluation for incident including cyanide exposure case were defined in 
hazard extraction and evaluation procedure and corrective action procedure. After the investigation, 
they shall evaluate the root cause and reflect to relevant procedures and work instruction and 
 improvement for process areas as needed.

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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.

X in full compliance with

The operation is in substantial compliance with

Production Practice 3.1

not in compliance with

Summarize the basis for this Finding/Deficiencies Identified:

The waste water from process was treated at in-house waste water treatment facility and then discharged directly to Mizushima nada Sea. The environment and safety team have monitored the cyanide concentration of final discharged water weekly based. The monitoring result of total cyanide was comply with requirement based on agreement with Kurashiki City and ICMC requirement. The total cyanide concentration of final discharged water from Asahi Kasei Corporation’s plant is monitored below the ICMC requirement. So the free cyanide concentration in mixing zone is far below 0.022mg/L.

All cyanide process areas were covered by concrete and dike. Any spilled cyanide, chemical and initial rain water were collected and sent to waste water treatment facility in plant. No surface water was discharged to outside of plant.

The plant of Asahi Kasei Corporation is in Mizushima Chemical Complex in which there is no designated beneficial use of ground water, no regulatory point of compliance and no actual beneficial use of the ground water. So Asahi Kasei Corporation did not monitor the cyanide concentration of ground water. All cyanide process areas were covered by concrete and dike. Any spilled cyanide, chemical and initial rain water were collected and sent to waste water treatment facility in plant. The seepage from the process causing cyanide concentration of ground water to exceed can’t be occurred. They have limited the hydrogen cyanide gas emission to protect the health of employee and local community. The monitoring result of hydrogen cyanide concentration was 0.85 ppm at 25 June 2018 year. The monitoring and trend analysis results of hydrogen cyanide air emission concentration were around 0.8 to 0.9 ppm comply with the Japanese national legal requirements.

They have analyzed weekly base the cyanide concentration at outlet of rainwater discharged. Recently the cyanide was not detected in discharged rainwater.

The environment and safety team have monitored at frequencies defined in the procedure for the air emission of hydrogen cyanide concentration and water discharge of cyanide concentration. The monitoring frequency for air emission of hydrogen cyanide and water discharge of cyanide were defined with the reflection Japanese environment legal requirements.
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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Summarize the basis for this Finding/Deficiencies Identified:

The Asahi Kasei Corporation have developed and implemented safety training procedure. According to the safety training procedure, routine refresh training by production team, safety training by environment and safety team and new employee training were implemented and results were maintained in each team.

According to PPE wearing procedure and safety training procedure, they have trained employees related to PPE usage such as types of PPE what should they wear, areas where should they wear and time when should they wear.

Through annual safety training by environment and safety team and routine training by each team, employees were trained for safe working method and standard operation programs to perform their normal tasks with minimum risk and to prevent unplanned cyanide release. The responsibility, authority, work instruction and detail control method including the hazard and risk of cyanide for such works as production, maintenance, packing, storage, logistics, transportation and other administration activities are described in the training material and standard operation programs.

The trainings have been provided by each team managers and environment and safety team members qualified according to training procedure. According to the safety training procedure, all new employees shall receive on the job training by each team and special health and safety training by environment and safety team related to cyanide hazard, cyanide handling, emergency disaster prevention procedure and cyanide leakage response procedure.

After the safety training, they have conducted the evaluation of effectiveness and result records were maintained in each team and environment and safety team.

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

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Summarize the basis for this Finding/Deficiencies Identified:

According to the safety training procedure and safety training plan, production team, environment and safety team have provided safety training for their employee the emergency response plans for cyanide release and exposure. All plant employees including shift workers, engineers and administrators have participated in the mock emergency drill conducted every year. The
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Improvement follow-up items identified in the mock emergency drill have been taken, reflected to emergency response plans and next mock emergency drill. Every year, the mock emergency drill for cyanide release and exposure was implemented and after the emergency mock drills, evaluation for each step and personnel has been implemented by using emergency response checklist. And emergency response plans as the emergency disaster prevention procedure and cyanide leakage response procedure were updated timely and re-trainings were provided to relevant employees.

All training records including in-house training and external agency training were maintained effectively by each team and environment and safety team. Attendants, trainer, training topics, training hours and evaluation results were maintained as records.
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.

........... X in full compliance with
The operation is. in substantial compliance with Production Practice 5.1
not in compliance with

Summarize the basis for this Finding/Deficiencies Identified:

The Asahi Kasei Corporation have developed and maintained the emergency response plans as emergency disaster prevention procedures, cyanide leakage response procedure and emergency shut-down procedure to response for potential cyanide release. Potential failures as catastrophic release of hydrogen cyanide, releases during loading, dissolution operations, fires and explosions, pipe, valve and tank ruptures, power outages and equipment failures, overtopping of ponds, tanks and waste treatment facilities were considered and reflected to the emergency response plans.
The specific response actions as anticipation of emergency cases, evacuation and estimation of personnel and community affected were reflected to emergency disaster prevention procedure. The detail emergency response scenario to control the release of explosion source, containment, mitigation and future prevention including cyanide supply line shut down, prevention of cyanide spread, collection of spilled cyanide and use of antidote and first aid kit were defined in cyanide leakage response procedure and emergency shut-down procedure.

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

........... X in full compliance with
The operation is. in substantial compliance with Production Practice 5.2
not in compliance with

Summarize the basis for this Finding/Deficiencies Identified:

The Asahi Kasei Corporation have developed and maintained crisis management manual and emergency contact network of Mizushima Plant. In the manual and emergency contact network, the fire agency, municipal office, environment control agency, hospitals other plants and companies located nearby the Asahi Kasei Corporation were involved. They have informed to nearby companies, plants, fire agency, municipal office, environment control agency, hospitals about the risks related to accidental cyanide release.
Since plant operation, the Asahi Kasei Corporation have engaged in regular consultation and communication with other plants and companies located in Mizushima Chemical Complex by the environment and safety committee meeting. And also they have contacted irregularly with city municipal office, fire agency, local newspaper company, broad casting station and hospitals.

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

........... X in full compliance with
The operation is. in substantial compliance with Production Practice 5.3
not in compliance with

Summarize the basis for this Finding/Deficiencies Identified:

The Asahi Kasei Corporation nominated the environment and safety team leader as primary emergency response coordinator and the RC and engineering team manager as alternative response coordinator. Those primary coordinator and alternative coordinator were supervised by plant manager. Detail job description, responsibility and authority for plant manager, environment and safety team leader, RC and engineering team leader and emergency response teams were defined in their emergency response plans.

Emergency response teams were organized as the plant manager was nominated as emergency team leader, the environment and safety team leader and RC and engineering team leader were nominated as primary coordinator and alternative coordinator. And also communication team, personnel rescue team, excavation leading team and facility control team etc. were organized and defined in emergency response plans. Detail trainings such as internal and external communication method, use of PPE and antidote, personnel rescue, lead evacuation, control of facility etc. were required and provided to emergency responders.

The call-out procedure and 24-hour contact information were included in emergency disaster prevention procedure and emergency contact network of Mizushima Plant.

The list of emergency response equipment was defined in emergency response plans. And emergency response equipment such as PPE including toxic gas mask, glove, antidote and first aid kit were maintained in each team. The environment and safety team has inspected and tested monthly base the emergency response equipment maintained in each team to assure availability.

The role, responsibility and detail communication channel of outside responders and communities such as fire agency, municipal office, environment control agency, hospitals, nearby companies and plants were defined in their emergency response plans and emergency contact network of Mizushima Plant. They have informed and communicated regularly the cyanide related emergency response plans, risks and hazards related to cyanide to those outside entities.

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

........... X in full compliance with
The operation is. in substantial compliance with Production Practice 5.4
not in compliance with

Summarize the basis for this Finding/Deficiencies Identified:

The emergency communication channel, communication method and contact information were defined in emergency response plans and emergency contact network of Mizushima Plant. In internal communication channel, the contact information as telephone number and mobile phone numbers of top management, plant manager, each team leader and environment and safety team members were identified. In external communication channel, regulatory agencies such as fire

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agency, municipal office and environment control agency and hospitals, nearby companies and plants were identified. The communication methods and contact information such as telephone number and mobile phone number of relevant personnel of outside responders were identified in emergency contact network of Mizushima Plant. They have identified potentially affected communities as nearby companies and plants through the simulation of emergency cases as hydrogen cyanide gas leakage and sodium cyanide spillage. The contact information such as telephone number and mobile phone number of relevant personnel of nearby companies and plants were identified and reflected to emergency response plans and emergency contact network of Mizushima 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.

........... X in full compliance with
The operation is. in substantial compliance with Production Practice 5.5

not in compliance with

Summary the basis for this Finding/Deficiencies Identified:

The Asahi Kasei Corporation have developed emergency response plans as emergency disaster prevention procedure and cyanide leakage response procedure in which the remediation methods such as neutralization of spilled cyanide solid and solution, decontamination of soil, disposal of cyanide contaminated soil, water and debris and provision of alternate drinking water were defined. According to the cyanide leakage response procedure, chemicals as sodium hypochlorite, ferrous sulfate and hydrogen peroxide shall not be used to treat and neutralize the cyanide released into surface water.
The potential need for environment monitoring to identify the extent and effect of hydrogen cyanide gas release and sodium cyanide spillage, sampling method, parameter and possible location were defined in cyanide leakage response procedure and crisis management manual. To minimize the hazard from air emission of hydrogen cyanide gas and sodium cyanide dust, they have maintained air emission control system including emergency shut-down and scrubber operation and to minimize the soil contamination from spillage of sodium cyanide, the sodium cyanide packaging, transportation and storage areas were paved by concrete.

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

........... X in full compliance with
The operation is. in substantial compliance with Production Practice 5.6

not in compliance with

Summary the basis for this Finding/Deficiencies Identified:

The emergency response plans as crisis management manual, emergency disaster prevention procedure and cyanide leakage response procedure were reviewed, evaluated and updated by environment and safety team, team leaders and plant manager periodically annual base and also

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after the mock emergency drill.
The environment and safety team have organized and conducted the overall plant mock emergency
drill once per year. And each relevant team such as production team, logistic team and maintenance
team shall conduct the mock emergency drill for potential emergency cases in each team.
The mock emergency drill was implemented during May 2018 year by environment and safety team.
They evaluated their emergency response plans as emergency disaster prevention procedure and
cyanide leakage response procedure and confirmed appropriateness of existing emergency response
plans.