

SUMMARY AUDIT REPORT

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Cyanide Production Operation
Summary Audit Report

for

Proguigel Candeias Unit/

Prepared by: Ferreira & Cerqueira Ltda.

Name of Company
Proguigel Candeias



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Instructions

1. The basis for the finding and/or statement of deficiencies for each Standard of Practice should be summarized in this Summary Audit Report. This should be done in a few sentences or a paragraph.
2. The name of the mine operation, lead auditor signature and date of the audit must be inserted on the bottom of each page of this Summary Audit Report. The lead auditor's signature at the bottom of the attestation on page 3 must be certified by notarization or equivalent.
3. An operation that is in substantial compliance must submit a Corrective Action Plan with the Summary Audit Report.
4. The Summary Audit Report and Corrective Action Plan, if appropriate, with all required signatures must be submitted in hard copy to:

ICMI
1400 I Street, NW, Suite 550.
Washington, DC, 20005, USA.
Tel: +1-202-495-4020.

5. The submittal must be accompanied with 1) a letter from the owner or authorized representative which grants the ICMI permission to post the Summary Audit Report on the Code Website, and 2) a completed Auditor Credentials Form. The letter and lead auditor's signature on the Auditor Credentials Form must be certified by notarization or equivalent.
6. Action will not be taken on certification based on the Summary Audit Report until the application form for a Code signatory and the required fees are received by ICMI from the applicable gold mining company.
7. The description of the operations should include sufficient information to describe the scope and complexity of the gold mining operation and gold recovery process.

Name of Producer: PROQUIGEL QUÍMICA S.A. – CANDEIAS UNIT
Name of Producer Owner: PROQUIGEL QUIMICA S/A
Name of Producer Operator: PROQUIGEL QUIMICA S/A
Name of Responsible Manager: Deiviti Caetano
Address: Fazenda Caroba s/n, Candeias, Bahia State.....Country: Brasil
Telephone: (55) 71-38786532
Fax: (55) 71-38786532
E-mail: deiviti.caetano@unigel.com.br

Location detail and description of operation:


Proquigel Candeias Unit has its plant within the petrochemical complex in Candeias, an city located in Bahia, in northeastern Brazil. It is 50 kilometers far from Salvador the capital of the state of Bahia and 30 kilometers far from Camaçari Industrial Complex which was the first planned petrochemical plant in Brazil. The access is by a very good asphalted road.

1) Company/ process description:

U 233 – CYANIDE REACTION

- The sodium cyanide manufacturing process is divided into the following phases:
 - a) Dilution of sodium hydroxide
 - This phase has the objective of diluting NaOH at a concentration of 50% with demineralized water, so it can reach a concentration between 33% and 45% for NaOH. After dilution, the soda

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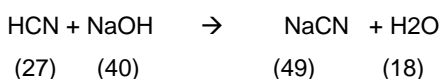
concentration will see to the needs demanded by the process for the NaCN concentration required.

- For a sodium cyanide concentration around 42%, we have to operate with caustic soda at a concentration of approximately 45%.
- The water coming from tanks TQ 610.02/05 and the soda coming from tank TQ-920-15 is supplied by means of a pipeline and they are mixed in line. Considering the heat release caused by the dilution NaOH + H₂O (exothermic reaction), the mixture temperature rises about 10°C and because of that it goes through a static mixer and is then fed to the diluted soda tank. (TQ-233-01).
- The diluted soda is stored and then sent to the phase where the reaction with hydrocyanic acid will take place.

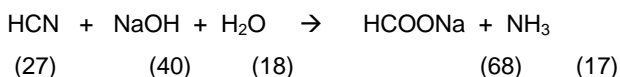
b) Reaction of hydrocyanic acid with soda

• Chemical Reaction

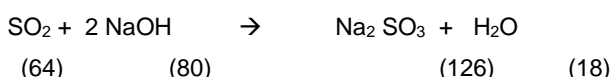
The manufacturing of sodium cyanide is carried out through the direct reaction between liquid hydrocyanic acid and sodium hydroxide in aqueous solution. The reaction is as follows:



- This is an exothermic reaction and it releases: 7.45 Kcal/mol HCN or 152 Kcal/kg NaCN. The temperature increase accelerates a secondary reaction for the formation of sodium formate and ammonia. The temperature during the synthesis should not exceed 55°C, so that the formation of these impurities is not accelerated.



- Due to the presence of SO₂ as a stabilizer of the hydrocyanic acid we will also have the following reaction:
- SO₂ + 2NaOH = Na₂SO₃ + H₂O



c) Process description

- Hydrocyanic acid (HCN) is fed to a mixer (venture type) within the reactor circulation circuit where the sodium cyanide solution goes to, containing an excess of soda in the order of 0,5 to 1,5% p/p. Inside the reactor circulation is maintained and it is responsible for the perfect homogenization of the solution.
- Given the heat that is released during the reaction, the circulation in the reactor goes through a heat exchanger (P-233-01) which is in charge of controlling the temperature so it will not surpass 45°C in the solution.
- The soda solution is introduced through the top of the reactor. It goes through an absorption column where the possible hydrocyanic acid vapors released in the solution are retained. Inert gases that go through the column are sent to the chimney by means of the nitrogen purge.

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- Nitrogen is continuously introduced with the objective of dragging on possible vapors of hydrocyanic acid to the absorption column and also of maintaining the environment in an inert condition. The sodium cyanide solution extraction is continuously carried out to storage or control tanks and then transferred to the crystallization unit.

Gas washing column at the outlet

- There is a packed gas washing column T-233-01 at the reactor vent space. The soda is fed to the reactor through the upper part. Gases coming out of the reactor reach the T-233-01 base, when they are back washed in the soda in the first packing layer. After this, they pass through the second layer (demister) and are sent to the exhaustion system/chimney.

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U 230/U235 - SOLID CYANIDE

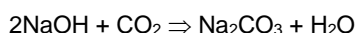
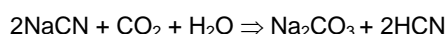
The saturated solution is continuously fed to an evaporator from which, in a supersaturation condition, it goes on to a crystallizer. The evaporated water containing cyanide is condensed and then sent to the internal treatment of effluents.

The evaporator levels, as well as the crystallizer levels, are interdependent due to the column formed because of the vacuum in the system. The density factor (larger amount of fines or not) also affects those levels. The crystallizer is equipped with a low rotation 2 rotations per minute (rpm) scraper agitator that maintains crystals in suspension, therefore avoiding decantation in its bottom. This is necessary because the suction of the crystal withdrawal pumps in crystallizer B 230.06 A/B and B 235.61 A/B are not in the bottom of the equipment, but in the middle of the liquid.

After the evaporation of the water the solution will become super saturated and it will then "discharge" the crystals that were formed. Crystals formed in the evaporator are then enough to complete the level in the crystallizer and they are then sent to decantation tanks TQ 230.10 and TQ 235.64 by means of pumps B 230.06 A/B and B 235.61 A/B, respectively.


The crystal concentration control in the crystallizer is carried out by means of sampling done in this transfer current to TQ 230.10/TQ 235.64 and it is maintained within a range of 25 to 35%. The crystallizer level superficial solution, in which the thin crystals are supposed to be in suspension, continuously overflows to TQ 230.07/TQ 235.63 which at its turn transfers the solution to TQ 230.05/TQ 235.61.

- Reaction of the atmospheric air CO₂ with NaCN and NaOH



These reactions are undesirable, since they can jeopardize the purity of the final product.

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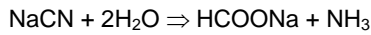


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- Sodium formate formation

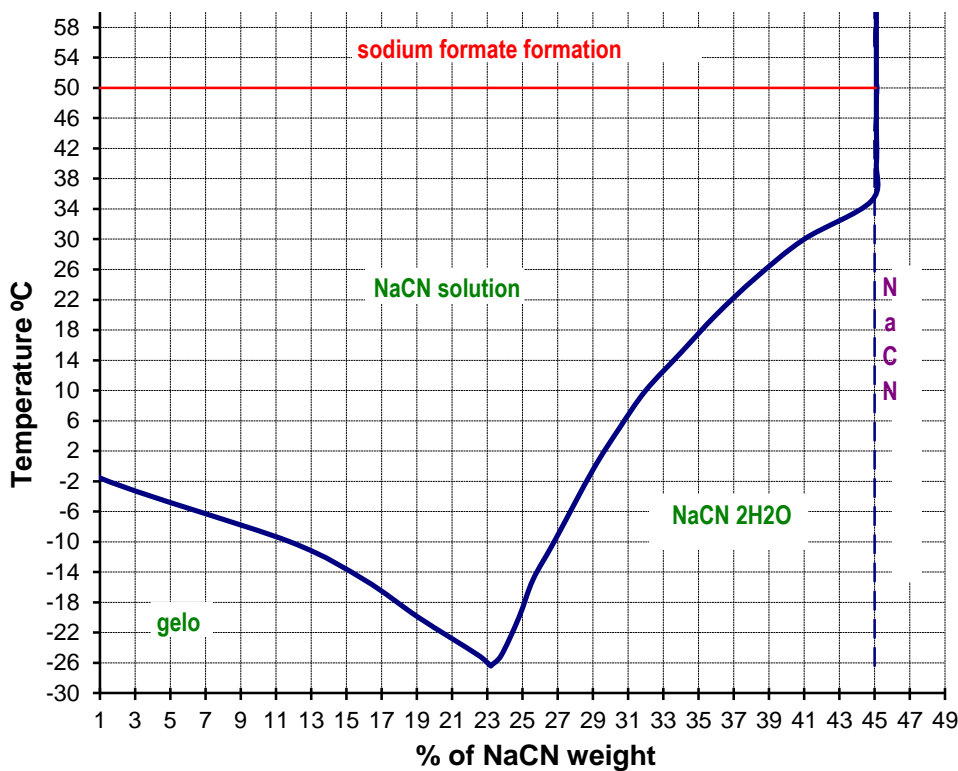


This reaction takes place at temperatures above 50°C, but it occurs in a very slow way. This reaction is undesirable as well, since it also jeopardizes the purity of the final product.

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In order to avoid the presence of NaCN crystals: In accordance with the NaCN solubility curve, the 43,54% concentration is very close to its own solubility curve at the operation temperature. In order to avoid the compound's precipitation during this phase, the recommendation is to work with NaCN solution at a concentration of approximately 42%, since this will ensure the solubilized form of the NaCN.

NaCN Solubility Curve in H₂O



Circuit Description:

This section in U-230 is basically formed by:

- One evaporator (VP 230.01)
- One crystallizer (CR 230.01)
- Ejectors (J 230.02/03)
- Condensers (P 230.02/10/03 and TQ 230.08)
- Pumps

And this section in U-235 is basically formed by:

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- One evaporator (VP 235.61)
- One crystallizer (CR 235.61)
- Ejectors (J 235.61/62)
- Condensers (P 235.61/62/63 and TQ 235.62)
- Pumps

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The evaporator is maintained under vacuum (30 mmHg absolute (Abs) in order to guarantee the low vaporization temperature (approximately 44⁰C) so that formation of the formate can be avoided. The evaporator is equipped with a tubular bundle where water vapor at 0.2 Kg/cm² is injected, thus promoting evaporation of the water contained in the solution. It is physically installed above the crystallizer and is interconnected by means of a tube (which forms the barometric leg) containing the NaCN saturate solution. It holds the saturated NaCN solution and the crystals formed in the evaporator by density differential are then sent to the crystallizer.


The main undesirable condition during this phase is the crystal thinning and this condition is basically caused by:

- a) High differential between the feed stream temperature and the internal temperature in the evaporator (max 2⁰C): when the temperature in the feed stream is too high in relation to the internal temperature in the evaporator, there will be excessive “flashing” of the solution inside the evaporator. This will lead to the production of many cores besides the excessive agitation of the solution, which will cause thinning of crystals due to breaking or abrasion.
- b) Excessive vapor in the tubular bundle: excessive vapor will cause the concentration in the saturated liquid to reach the supersaturation zone, thus leading to excessive spontaneous nucleation.
- c) High crystal concentration in the crystallizer: the starting cause of the elevation of crystal concentration in the crystallizer is essentially the lack of balance caused by the difference between the amount of crystals produced and the withdrawal of the product in the centrifuge. As seen before, the production of crystals is a direct function of the vapor supplied to the evaporator bundle. This leads us to the conclusion then that the control of two parameters is vital so the system does not become unbalanced.

When it undergoes evaporation, the solution is super concentrated and when it “discharges” the crystals it goes back to the point on the solubility curve. The concentration differential will be the amount of crystals produced. In this phase it is important to keep the point below the zone of supersaturation, since in this condition there will be excessive spontaneous nucleation and, as a consequence, the crystals formed will be too thin. This is due to the fact that that all of the energy in the system will be used in the formation of nuclei, and growth energy will be consumed.

Separation: During this phase, the crystals produced are transferred from the crystallizer to a decantation tanks (TQ 230.10/TQ 235.64) thus undergoing a first separation phase. The bottom product in tanks TQ 230.10/TQ 235.64, which has got a high concentration of crystals is continuously fed to one of

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the centrifuges (CT 230.03/CT 235.61), in a way that the solid product resulting from the separation contains 6 to 8% of humidity. The liquid product is the mother liquor which contains the thin crystals from separation. It is sent to the lung tanks in the unit (TQ 230.05/TQ 235.61) for dissolution of thin crystals and subsequent recycling. Transfer of the crystallizer to decantation tanks TQ 230.10/ TQ 235.64 should not agitate it, since that will cause crystals to return to the crystallizer by means of the tanks overflow. This might cause break and thinning of crystals that have already been formed and separation in the centrifuge will be more difficult.

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Auditor's Finding

This operation is:

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

With the International Cyanide Management Code.

Furthermore, the auditor verified that there have been no significant changes to processes, policies and procedures for the management of cyanide, no significant releases or exposures and no compliance issues over the past three years associated with this operation. * 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: Ferreira & Cerqueira Ltda.
Acting Audit Team Leader: Luiz Eduardo Ferreira
E-mail: luizeferreira2015@gmail.com (ICMI qualified lead auditor and TEA)
Names and Signatures of Other Auditors: NA

Date(s) of Audit: 11/11/2019 ~14/11/2019 and 13/01/2020 ~14/01/2020 (on site) 24/01/2020 ~ 25/01/2010 (off 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 Producer 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 Practice 1.1: *Design and construct cyanide production facilities consistent with sound, accepted engineering practices and quality control/quality assurance procedures.*

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

Summarize the basis for this Finding/Deficiencies Identified:

Evidenced that quality control and quality assurance programs were implemented during construction of cyanide, production and storage facilities. Observed that Proquigel Candeias established, implemented and maintains quality control and quality assurance programs for new and existing cyanide facilities and modifications / changes. Standards drawings reviewed and found duly implemented. Noted that records of quality control and quality assurance maintained as required. It is clearly defined and documented that material requirements for each piping system used on the project and specified all applicable standards,

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codes and technical specifications. Sampled examples were: Regulatory Standard (NR) 13 / API 510 – Pressure Vessel Inspection Code; API 570 – Piping Inspection Code; American Society of Mechanical Engineers (ASME) B31.1 – Power and Process Piping; ASME B31.3 – Process Piping; ASME B31.8 – Training Resources; API 620 – Design and Construction of Large Welded Low Pressure Storage tanks; American Petroleum Institute (API) 650 – Welded Steel Tanks for Oil Storage; API 653 – Tank Inspection, Repair, Alteration and Reconstruction. Competence records such as training, education, experience and ability records of personnel involved with QC and QA matters were reviewed and found to be adequate. Proquigel presented all required documentation related to QC/QA documentation and records.

Evidenced that all materials used for construction of cyanide production facilities are compatible with reagents used and processes employed. Evidenced that ET-000-21-10.1 clearly defines the materials that shall be used and that is duly established, implemented and maintained. Sampled examples were: Sodium cyanide briquettes – Specification BHM A 312 TP 304 I; Sodium Cyanide solution specification BHM – A312 – TP -304 L; Sulfuric acid – carbon steel; Hydrochloric acid – carbon steel; Sodium hydroxide – carbon steel; Sodium cyanide – 304 L stainless steel.

On the place where HCN and NaOH solution are treated it is used SUS27 JIS – 304 in order to protect from contamination with rust. For NaCN solution, though this is slightly corrosive, carbon steel may be used. But in place where NaOH solution are treated it is used SUS27 JIS 504 stainless steel in order to prevent contamination with rust. NaCN solution is strong alkaline and generates slight HCN and NH3 with decomposition. Copper (Cu), copper-alloy, aluminum (Al), or aluminum alloy reacts with cyanic ion (CN) when contacting with air (or oxygen) and heating, then forms “cyano-complex”. Thus, it is not used copper, copper-alloy, aluminum or aluminum-alloy in the parts contacting with gases or solutions including NaCN or HCN. For NaCN powder, this is a stable substance. In the plant operation, there is the occasion to wash away NaCN from pipes, equipment, machinery and others. Thus, as above-mentioned, it is used SUS JIS- 304 stainless steel (AISI) in order to protect from contamination with rust and it is not used copper, copper-alloy, aluminum or aluminum-alloy in the parts contacting with cyanide powder.

Proquigel Candeias has an automatic system / interlock to shut down production systems and prevent releases due to outages and equipment failures. Evidenced documented operational instructions CNT.I.21 –“Interlock system in Unities 230 and 235” and CNS.I.08 – “Interlock system in Unity 233 duly established, implemented and maintained. During audit field evidenced that interlocks are adequately established. Observed during the field audit that all cyanide tanks have containment dikes and are located on a concreted area. All facilities constructed with using concrete. Evidenced “Technical Report” which states that all cyanide areas were constructed in concrete area and is adequate to prevent and minimize seepage to the subsurface. The Technical report includes inspections of structures, dikes, floors, basins and pump bases. It states that all inspected areas are in accordance Brazilian regulation laws such as: NBR 13752, NBR 1996, NBR 8800, Lei 5907, Decreto 13251, NBR 9575, NBR 279 and NBR 9689. Proquigel Candeias monitors 24 hours/day its processes through a digital system - DCS (distributed control system) that controls and alarms levels, temperature, concentration and pressure. Evidenced that Proquigel has an internal documented procedure PCS.Q.04 10 that defines the alarm levels in DCS. Evidenced that all of the control systems at their DCS room were operating adequately.

The secondary containments for process and storage tanks and containers constructed of materials that provide a competent barrier to leakage and sized to hold a volume greater than that of the largest tank or container within the containment and any piping draining back to the tank. As already mentioned all cyanide tanks have containment dikes and are located on a concreted area. During the field audit evidenced that all containments are in accordance with ICMI requirements as well as the Brazilian regulation laws. Evidenced that spill prevention and containment measures are provided for all cyanide solution pipelines. Preventive measures: Plan for preventive inspection of pipelines of units U 230 / U 235 and U 233. All flanges are covered with vinyl canvas (flange cover). The isotank loading line has a protection (shirt) with vinyl canvas

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 in full compliance with **Production Practice 1.2**
 in substantial compliance with
 not in compliance with

Summarize the basis for this Finding/Deficiencies Identified:

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Evidenced that Proquigel Candeias has an extensive system of plans, procedures, instructions and checklists that support management of the integrity of *exposures* process equipment and its operation in a manner intended to avoid cyanide releases and. Noted that shutdowns operations are covered by pertinent documented procedures which clearly define power failure, steam failure shortage of air for the instruments, shortage of natural gas and water, unblocking and cleaning of equipment. Evidenced that SEG.NO.04 – clearly define the PPE that shall be used in each area. During the field audit evidenced all personnel using PPE as stated. Management Evidenced that Proquigel operated and operates in conformance with its operation instructions, were written and proper to safety and environment according to its basic design. Evidenced that internal documented procedure SGI.NO.09 and checklist SGI.Q.12 clearly define that all kinds of leakage and spills (large or small) shall be identified, classified and controlled. Field audit provided evidences that the above-mentioned is implemented as stated.

Evidenced that Proquigel Candeias has procedures for contingencies during upsets in its activities that may result in cyanide exposures or releases such as NO.SGI.100.0123 - Activities in facilities that operate with dangerous products; NO.SGI.100.0125 – Occupational and safety in activities with flammable and combustible materials; NO.SGI.100.0152 – Safety general rules; NO.SGI.100.0120 – Internal environmental, occupational health and safety audit; NO.SGI.100.0112 – Process and designs risk management; NO.SGI.100.0110 - Management of Personnel Protective equipment; NO.SGI.100.0108 – environmental, occupational health and safety planned inspections; NO.SGI.100.0106 – Emergency during dangerous products transportation; no.sgi.100.0103 - Environmental, occupational health and safety committee; NO.SGI.0102 - Environmental, occupational health and safety Meetings; NO.SGI.100.0011 – Access control in cyanide units; PP.SGI.391.0100 - Emergency General Plan, PP.SGI.391.0101 – Emergency Response Equipment; MN.SGI.100.0001 – Occupational health and safety Manual; MN.SGI.100.0002 – Sodium Cyanide manual. Evidenced that activities related to Safety Work Permit (PTS), Pipelines Opening; I6 – Isolation of Hazards Energy Sources; Preliminary Risk Analysis (APR); Analysis and Classification of Critical Activities and Return to Operation (RTO) are covered by internal documented procedures. Procedures NO.SGI.013 defines methodology for management on change duty implemented; It defines that review and sign-off by environmental and safety personnel prior to implementation of proposed process and operational changes and modifications

Proquigel Candeias established several internal documented procedures for maintenance activities. It is defined that all maintenance activities shall be preceded by performing pertinent Work Permits. Responsibilities of maintenance technical planning, maintenance supervisor, instrumentalist and process operator clearly defined. It is documented how to remove instrument and how to decontaminate them in order to avoid workers exposure to cyanide. The maintenance activities in Proquigel Candeias include corrective, preventive and predictive maintenance. Evidenced that the documentation identify specific items to be observed and include the date of the inspection, the name of the inspector, and any observed deficiencies as well as the nature and date of corrective actions documented, and records retained.


Process parameters are monitored with necessary instrumentation and is the instrumentation calibrated according to manufacturer's recommendations. All instrumentation used for controlling critical process parameters are calibrated and verified, at specified intervals, or prior to use, against measurement standards traceable to international or national measurement standards as well as when no such standards exist, the basis used for calibration or verification is retained as documented information. procedures are in place and being implemented to prevent unauthorized/unregulated discharge to the environment of any cyanide solution or cyanide-contaminated water that is collected in a secondary containment area. During the field audit evidenced that Proquigel established, implemented and maintained internal documented procedure NO.SGI.100.603 that defines methodology for management of liquid effluents. Evidenced that Proquigel manages its wastewater in accordance Brazilian regulations laws such as: Lei Estadual Bahia10431, Decreto Estadual Bahia 11235, Portaria CRA 5210, Portaria CRA 12064 and Portaria CRA 8164. The effluent generated in a solid cyanide plant, after treatment with sodium hypochloride, is sent to tank TQ-220-12, where it is monitored through analysis of cyanide content and sent via truck, for disposal at CBE (Acrinor)

Proquigel established, implemented and maintained internal documented procedure defining how to manage cyanide-contaminated solids which is in accordance Brazilian federal Law 12305 dated on August 02, 2010 as well as ICMI principles. During the field audit evidenced that all cyanide-contaminated solids are identified, handled, storage and disposal in accordance Brazilian environmental laws. All cyanide residues are incinerated at Cetrel that is duly authorized by INEMA (local EPA) for this activity.

During the field audit evidenced that all cyanide solution is adequately stored in tanks, which are hermetically closed with adequate ventilation. Evidenced that are adopted all measures to avoid and minimize potential exposure of cyanide to moisture. Besides, it is stored in a closed and secure area where public access is prohibited. All cyanide areas have controlled access.

Evidenced that Proquigel has an internal documented procedure, MAN,I,500 that defines methodology for inspection cyanide tanks. Pertinent records were assessed and provided evidences that are duly implemented. Final products kept in a proper and secure storage area. Proquigel Candeias established, implemented and maintains procedures to ensure that cyanide is packaged as required by the political jurisdictions through which the load will pass. During field audit noted at the final product warehouse, that

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the solid sodium cyanide wooden boxes are correctly labeled. Proquigel Candeias has Packaging Approval Certification issued by Marinha do Brasil in accordance IMDG (International Marine Transportation Dangerous Goods). Pertinent drawings reviewed and found in accordance political jurisdictions,

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

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

Summarize the basis for this Finding/Deficiencies Identified:

Inspections of the integrity of pressure vessels, tanks, pumps, valves, pipelines, secondary containments (addressing structural and corrosion concerns) are undertaken as part of preventive maintenance. Besides, inspections for leaks and housekeeping are performed too. Inspection records were reviewed and found to be in place. Evidenced that inspection frequencies are sufficient to assure that equipment is functioning within design parameters. Evidenced that documentation identify specific items to be observed and include the date of inspection, the name of inspector, and any observed deficiencies. Evidenced that inspection frequencies are sufficient to assure that equipment is functioning within design parameters. The nature and date of corrective actions are documented and pertinent records retained.

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.*


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

Summarize the basis for this Finding/Deficiencies Identified:

Proquigel Candeias developed, documented, implemented and maintains a Safety Health Environment and Quality (SHEQ) (occupational health, safety, environmental and quality) management system, in order to adequately manage the identified hazards and evaluated risks. There is a formal hazard identification and risk evaluation procedure, which triggers the necessity to develop, document and implement (through operational training) the standard or safe operational procedures (SOP) for normal or routine activities or tasks, including planned maintenance ones. Noted during the interviews with operators that they actively participate in the development of such SOPs. The same approach is used and evidenced for the development, document and implementation of emergency response procedures. For non-routine tasks or activities (including maintenance ones), it is mandatory the realization of a pre-task hazard identification and risk evaluation (APR), which must be reviewed and approved by an assigned safety officer before the non-routine task is allowed/released (PTS/safe work permit). During the field audit evidenced several SOPs and APR.

The operation implemented procedure to review proposed and operational changes and modifications for their potential impacts on worker health and safety, and incorporate the necessary worker protection measures. Evidenced internal documented procedure NO.SGI.013 that defines methodology for MOC – management on change. Evidenced that above-mentioned procedure is duly established, implemented and maintained.

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Proquigel Candeias uses fixed and portable HCN detectors, all set to alarm at 4,5 ppm hydrocyanic acid or sodium cyanide dust. The fixed ones installed at specifically assigned points were the potential to expose workers above 4.7 ppm exists. They are installed in line and interconnected with the interlock system. Once alarmed, the entire operation shuts-down. Besides, others actions are taken such as evacuation or investigation by emergency responders, in the event that HCN gas or cyanide dust triggers the 4.5 ppm alarm level on the personal and/or fixed HCN monitors. The fixed detectors are calibrated every six months, by an authorized dealer / qualified representative in Bahia/ Brazil). Observed that the portable detectors are systematically calibrated (every six months) and the associated records are kept on file. During the field audit and interviewing the plant personnel noted that they are involved in the development, evaluation and updating of health and safety. The work force is also involved in the change management process. Proquigel's Candeias monitoring equipment are maintained, tested and calibrated as directed by the manufacturer as well as the pertinent records are maintained for at least one year.

the operation identified all points where workers could be exposed to HCN or NaCN dust above 4,7 ppm. Internal documented procedure SEG.NO.04 – clearly define the PPE that are mandatory in such areas such as full mask breather, Tyvec overall, chemical resistant gloves and boots.

All operational activities in the process plant are monitored through CCTV system from the main control room and all the operators are equipped with radios. HCN detectors also placed in critical points at the plant, connected to alarms and the interlock system. During the field audit noted that such controls are effective. Beyond that, the process plant is equipped with emergency response resources such as antidotes, fire extinguishers, autonomous breathing apparatus, low-pressure showers and eye washers, water, absorbent materials.

Evidenced that the operation has a comprehensive health monitoring system for all workers of the operation to determine their fitness to perform their specified tasks. Proquigel Candeias established, designed, implemented and maintains internal documented procedures SOC.PR.03 PCMSO and SOC.PR.04 PCMSO that defines all occupational health system in accordance with Brazilian legal requirements NR 7. Proquigel maintains and retains all documented information on its legal requirements and other requirements and ensures that it is updated to reflect any changes. Specific monitoring of urine (thiocyanate control) is performed for process plant workers every six months. According to the Brazilian law (NR7), the operation must issue an occupational health certificate (ASO), retaining one copy and delivering another copy to the worker. These certificates state if the worker is able to work in its function or not. In the last three years there were not any cases of worker not able to work in the production process. Reviewed (for the last three years), the occupational health certificate (ASO - Atestado de Saúde Ocupacional) for production workers and emergency team members.

Evidenced that the operation defined, implemented and maintains internal documented procedure NO.SGI.100.0020 that clearly defines a clothing change policy for all workers, contractors, visitors (like auditors). Evidenced during the field audit that in the exit of the production area there are specific drums for potentially or really contaminated clothing (Tyvec overall, gloves, jackets) must be disposed in this drum and sent to final disposal (incineration) at Cetrel. It is mandatory before you leave the production area to wash your boots in a place specifically designed for this purpose. Non-contaminated normal production clothing (cotton) is not allowed to leave the operation with workers and is sent to a specific qualified laundry.

The production plant site and surroundings are richly identified with safety and warning signals about the presence of cyanide and showing the necessary PPE to be used. Clearly evidenced during the field audit.

Evidenced during the field audit that there are in place comprehensive safety and warning signals and placards, including the ones that is forbidden to eat, drink smoke or have open flames in areas where there is the potential for cyanide contamination.


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

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

Summarize the basis for this Finding/Deficiencies Identified:

Evidenced that the operation established, implemented and maintains internal documented procedures to respond cyanide exposure in order to address potential releases of cyanide that may occur on site or may otherwise require response such as: PP.SGI.391.0100 – Emergency General Plan; PP.SGI.391.0101 – Emergency response Equipment; DS.SGI.391.0102 – Emergency response Team; DS.SGI.391.0103 –

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Emergency response coordinators; SEG.P.05.R.02 – Emergency check list; SEG.P.05.R.04 – Alarm and emergency phones tests and control, Camaçari Petrochemical Pole Contingency Plan (Candeias unit is under the radar of Camaçari Pole Emergency response plan).

Evidenced during the field audit that the operation maintains (as part of preventive maintenance program) low pressure showers and eye washers in the plant , with specific water line for these installations, which were tested during the audit and worked accordingly. It Evidenced in the process plant several non-acid fire extinguishers, adequately maintained and up to date inspected (monthly inspections) by the occupational safety process. Evidenced that monthly is performed maintenance and inspection of emergency shower and eyewash stations as required.

Evidenced during the field audit that the operation made available all necessary and mandatory resources for use in the plant like water, oxygen, resuscitator (life pack 500 AED), breathing apparatus, antidote (e.g: amyl nitrate, cyanokit 5 gr), radio, CCTV.

Candeias inspects its first aid equipment regularly to assure its available when needed as well as first-aid emergency response equipment are stored and/or tested in such manner that assures they will be effective when used. Several internal documented procedures are established, implemented and maintained related to above-mentioned requirements. Sampled examples were: SOC.I.02.R.01 – Occupational health equipment preventive inspection; SOC.I.02.R.02 – Emergency kits for chemical intoxication inspection; SOC.I.02.R.05 – Ambulance inspection; SOC.I.01.R.02 – Medicine Control; SOC.I.06.R.01 – Sterilized materials preventive inspection; SOC.I.02 – Occupational health preventive maintenance. Evidenced five points where these first aid equipment at Proquigel such as medical center, hydrocyanic acid unit, sulfuric acid unit, sodium cyanide solution loading area and solid sodium cyanide warehouse. The above-mentioned procedures clearly defines who, when, where, what, why and how to do the inspections, tests and preventive maintenances first-aid emergency response equipment. Reviewing pertinent records evidenced duly implemented as stated.

Evidenced expiration date of chemicals related to cyano kit as well as the preservation conditions has been dully inspected, controlled and managed.

Evidenced, during the field audit that environmental, safety and health related information (MSDS, internal documented procedures signage, first aid posters) available are written in Portuguese.

Evidenced during the field audit that cyanide containing installations and equipment are clearly identified and as well as the flow in the piping. Evidenced that process tanks, storage tanks, reactor, containers and piping containing cyanide are duly identified in accordance Brazilian Standards NBR 7197 and NBR 6493, as well as the direction of cyanide flow in piping.

Evidenced in the system and field audit that the operation has a decontamination operational procedure consisting of strategically placed low-pressure showers, eye washers and water hoses. In the event of any suspicious of skin contamination the person must unvested and abundantly washed with water. The access to the production plant is performed through a personal magnetic card. Visitors, suppliers and workers are not allowed to stay alone in these areas. Mandatory PPEs are defined and during field audit observed adequately used in such areas. It is also mandatory, when leaving the process plant area to wash your boots in a specifically designated area. During the field audit, all these procedures were checked and found in conformance. Evidenced that the medical center of the operation has its own facility to decontaminate any suspicious case and, if necessary. The operation has a well-equipped medical center, with all the necessary resources (including an expert doctor in chemical intoxication and a team of qualified work nurses), such as all sort of antidotes, oxygen installations, decontamination area, among others. It is clearly defined that only medical staff administers cyanide antidote injections If necessary, the operation may use the Candeias Municipality Hospital, the Camaçari Complex Medical Center or the São Rafael Hospital downtown Salvador city. Depending on the grade of intoxication, the exposed worker may be transported by ambulance or helicopter.

The operation developed and implements operational procedures to transport potentially or really intoxicated workers to external medical facilities, such as Candeias Municipality Hospital, the Camaçari Complex Medical Center or the São Rafael Hospital downtown Salvador city.

Dr. Alexandre Rodrigues (operation expert MD in chemical intoxication) developed partnership with the Candeias Municipality Hospital, Camaçari Complex Medical Center and the São Rafael Hospital, which are fully equipped and with expert medical team to respond to cyanide intoxication. Dr. Alexandre MD also developed response procedures to cyanide intoxication and trained the partners medical team (doctors and nurses) in such procedures.

Evidenced that the operation plans, perform, review and implement improvements related to emergency drills. Was reviewed a drill related to an intoxicated worker with cyanide in the Cyanide plant and directed to the Proquigel's Medical Center. Reviewed the above-mentioned drill dated on July 30, 2019. All planned objectives were achieved, and it was not necessary to change the emergency response procedure for this scenario.

The operation developed, documented, implemented and maintains a management procedures (SGI-NO-03 and SEG-NO-03) in order to investigate and evaluate cyanide exposures, define and implement improvement pertinent actions (corrective and / or preventive for the case of real or potential incidents respectively) and verify the effectiveness of the corrective or preventive actions taken. Reviewing pertinent

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records well as interviewing with coordinators, supervisors and operational personnel we conclude that in the last three years did not occur Proquigel's workers or contractor submitted to cyanide exposure

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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.*

The operation is in full compliance with
 in substantial compliance with Production Practice 3.1
 not in compliance with

Summarize the basis for this Finding/Deficiencies Identified:

Proquigel Candeias manages its direct discharged effluents in accordance with internal documented procedures NO.SGI.100.0603– Liquid Effluent Management. Evidenced that above-mentioned procedures is in accordance with Brazilian legislation IMA # 14409/11 (local EPA) which define that CNt (total cyanide) must be below 1,0 ppm and CNf (free cyanide) must be below 0,02 ppm, at the equalization pond (effluent treatment with hypochlorite), before release at São Paulo river. According to the environmental permit, sampling frequency must be performed three times a week. The three types of cyanide Total (CNt), Free (CNf) and Weak Acid Dissociable (CNw) are evaluated. Observed that Proquigel Candeias uses analytical procedures methods based on American Water Works Association (AWWA) Standards

Evidenced that internal documented procedure LAB-MA-015 is used for total and free cyanide determination in water and wastewater by spectrophotometry as well as internal documented procedure LAB-MA-167 is used for Weak Acid Dissociable (WAD) cyanide determination in water and wastewater. Both of them based on Standards Methods For The Examination Of Waters and Wastewater, APHA-AWWA-WEF-20th Edition, Washington DC, 1988. During the audit reviewed monitoring reports since 2017, after effluent treatment (equalization pond) and downstream of mixing zone at São Paulo river. The sampling collecting and frequency showed to be adequate to characterize the mean being monitored. Noted that pertinent records provide evidence that all cyanide contents are in accordance Brazilian legislation as well as Cyanide Code - ICMI requirements. Reviewing the monitoring results we may conclude that the effluent treatment process is effective and ensures that cyanide concentrations in groundwater were below the adopted acceptance criteria of <0.005 mg/L total cyanide


The operation does not have any indirect discharge to surface water. The water quality of São Paulo river is monitored upstream and downstream of the mixing point and the results do not show indirect discharges to the river.

The management of groundwater quality is made in accordance with internal documented procedure NO.SGI.100.0607 – Management of ground water. There are no acceptance criteria for CNw (WAD cyanide), CNt (total) and CNf (free), in the applicable Brazilian legislation, but the operation adopted, as reference, the acceptance criteria defined at EPA 335.2 standard (CNt < 0,005 mg/l). The operation installed twenty-one monitoring weels up and down gradient of the plant (covering the extension of phreatic line) in order to monitor the underground water quality. CETREL take samples every six months and performs the analytical tests. Reviewing CETREL monitoring reports evidenced that all monitoring results demonstrated that cyanide concentrations in groundwater were below the adopted acceptance criteria of <0.005 mg/L total cyanide

During the last three years there was not any reported seepage that could negatively impact the beneficial use of underground water. CN impact in underground water is not a major concern. Sulphates are the main ones.

Evidenced that Proquigel Candeias limit atmospheric process emissions of hydrogen cyanide gas such that the health of workers and the community are protected. During the field audit observed that all the HCN pipeline circuit is monitored through HCN sensors and alarm at 4.5 ppm HCN. This system is

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connected with the interlock system that shuts down the whole operation. This is basically a standard operational control .Beyond that and in order to satisfy the Camaçari Complex escape emissions monitoring program, which defines maximum of 1112 g/ year of volatile organic compounds leaks, the operation performs annually its emissions to the atmosphere in accordance with internal documented procedure NO.SGI.100.0609 – Atmospheric Emission Management. The above-mentioned procedure defines parameters to be analyzed (cyanide acid), particulate material, sulfur oxides, nitrogen oxides, volatile organic materials), analytical procedures, sampling plan (frequency and points).

The operation has a solid and implemented monitoring program for surface and underground waters.

The monitoring frequencies are in accordance with the criteria defined in the environmental permit issued by INEMA, the local EPA. Several monitoring reports and results were reviewed, and found in conformance, and based on that, the established frequencies seems to be adequate to characterize the medium being monitored. Any changes on the monitoring frequencies (air and water), must be reviewed and approved by the local EPA. No cases were evidenced.

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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.*

The operation is in full compliance with
 in substantial compliance with Production Practice 4.1
 not in compliance with

Summarize the basis for this Finding/Deficiencies Identified:

Evidenced that the Human Resources process developed, documented, implemented and maintains a management system focused on the integration and training of all workers to understand the hazards of cyanide and to conduct refresher training periodically. Observed that internal documented procedures NO.SGI.0002 and DS.SGI.391.0104 define the refresh training frequency (yearly), for subjects such as: Safety Basic Training, Cyanide Basic Training, Personnel Protective Basic training - PPE. The training is through "e-learning" approach, or at class room and the attendees submitted to tests after the training. Training records (initial and refresh) were reviewed and found in conformance.

The Human Resources process developed, documented, implemented and maintains in conjunction with the SHE process developed specific training program focused on the use and maintenance of PPE. This training is part of the integration of new workers and is refreshed for the work force on a yearly basis through the e-learning platform or at classroom. Tests performed in the end of the training session in order to ensure that the worker learned and maintain the knowledge about the subject trained. Records, specifically related to PPE training were reviewed and found as required.

The Human Resources process developed, documented, implemented and maintains in conjunction with the Production process an "on-the-job training program" to train workers to perform their normal production tasks with a minimum risk to worker health and safety and in a manner that prevents unplanned cyanide releases. This program takes approximately three months and is consisted of technical operational training. Before the on-the-job training, all new workers must pass through the introductory training as previously mentioned. 2018 and 2019 on-the-job training programs reviewed and noted that both of them have the following program content: Production structure, Process description. Operational procedures; Environmental, Occupational Health and Safety instructions, Emergency procedures; Emergency Response Brigade; Preventive Maintenance procedures; Dangerous Products Work, Confined Space Work, Work at height. Reviewed records evidenced duly implemented.


Evidenced that the training elements necessary for each job is identified in the training materials. The technical-operational training is based on the developed and implemented operational procedures.

Occupational health, safety and environmental training materials are developed by the Safety Health and Environmentt (SHE) process.

All the assigned training instructors are at minimum master supervisor which are working in the operation since its start-up, in most of the cases.

All personnel that will work on the production plant must be approved in the introductory training and in the "on the job" training, before be allowed to work on the plant. Reviewing training records evidenced duly implemented.

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- I Introductory training effectiveness evaluated in accordance with internal methodology FO.SGI.0002.1 All cyanide-related training including the on-the-job training have their effectiveness evaluated by testing and on the job observation. After that, the master supervisor evaluates the operator performance and he decides if the trainee operator is approved or not. Evidenced duly implemented.

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

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The operation is in full compliance with in substantial compliance with not in compliance with Production Practice 4.2

Summarize the basis for this Finding/Deficiencies Identified:

All plant / process operators are trained and qualified to be emergency responders. The emergency responders training takes around 33 hours of training which scope includes: first aid, firefighting, chemical emergencies, emergency hardware use, drills. This process performed every year. The performance of the participants is determined through testing (theoretical and practical).

All operators are trained and qualified to be emergency responders. Annually they participate in a refreshing training session and participate in emergency drills. The routines drills used to test and improve their response drills in accordance with SEG.P.05.R.01. All the emergency drills reviewed in terms of performance to confirm if the personnel did act adequately and the emergency response plan is correct. Reviewed intoxication drill report, carried out during 2018 and 2019 where the results were adequately reviewed.

Proquigel Candeias retain training records, which address the trainee name, instructor name, scope of training, date of training, duration of training, and the performance of the trainee.

5. EMERGENCY RESPONSE: *Protect communities and the environment through the development of emergency response strategies and capabilities.*

Production Practice 5.1: *Prepare detailed emergency response plans for potential cyanide releases.*

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

Summarize the basis for this Finding/Deficiencies Identified:

Evidenced that Proquigel Candeias established, implemented and maintains internal documented procedures in order to address potential releases of cyanide that may occur on site or may otherwise require response such as: PP.SGI.391.0100 – Emergency General Plan; PP.SGI.391.0101 – Emergency response Equipment; DS.SGI.391.0102 – Emergency response Team; DS.SGI.391.0103 – Emergency response coordinators; SEG.P.05.R.02 – Emergency check list; SEG.P.05.R.04 – Alarm and emergency phones tests and control. NS.04 – COFIC Emergency Plan, SEG.R.05.03 – Emergency Brigade
The Plan consider Catastrophic release of hydrogen cyanide; Releases during loading and dissolution operations; Releases during fires and explosions; Pipe, valve and tank ruptures; Power and equipment failures/outages as well as overtopping of ponds, tanks and waste treatment facilities (all of them at PP.SGI.391.0100)

The Plan describe specific response actions, as appropriate for the anticipated emergencies, such as evacuating site personnel and potentially affected communities from the area of exposure, the use of cyanide antidotes and first aid measures for cyanide exposure, the control of releases at their source as well as the containment, assessment, mitigation and future prevention of releases (all of them at PP.SGI.391.0100)

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

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

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Summarize the basis for this Finding/Deficiencies Identified:

Evidenced that Proquigel involved its workforce and stakeholders, including potentially affected communities, in the emergency response planning process. Internal documented procedure PP.SGI.391.0100 defines methodology that Proquigel uses in order to involve its workforce and stakeholders. Evidenced duly implemented. Noted that training is provided to stakeholders addressed emergency response planning and pertinent records are duly maintained.

Proquigel made potentially affected communities aware of the nature of their risks associated with accidental cyanide releases, and consulted with them directly or through community representatives regarding what communications and response actions are appropriate. Evidenced records providing evidences that the Health, Safety and Environmental Manager Mr. Deiviti Caetano Safety Security and Environment Area (SSMA) manager) as well as Alexandre Rodrigues (Medicine Doctor) performed a presentation about "Sodium Cyanide Manual" for all Companies of Charlie Area Camaçari Petrochemical Complex.

Proquigel has involved local response agencies such as outside responders and medical facilities in the emergency planning and response process. Evidenced contract signed between Suatrans and Proquigel Candeias. Suatrans is a company of Ambipar group with extensive experience in the segment of environmental emergency response.

Suatrans operates in accordance with its clients' Emergency Action Plans that guide the global performance of its highly trained teams, counting with the support of specially designed equipment. During the audit, evidenced Emergency Action Plan for Proquigel issued by Suatrans related with road transportation of sodium cyanide. Noted that the above-mentioned plan is in full compliance with Brazilian regulations specifically with dangerous products road transportation.

Examples of involved local response agencies, outside responders were: Aratú Naval Base (is a military base of Brazilian Navy. It is located on the Paripe Península, in Aratú Bay, Cetrel (company responsible for water supply, treatment and final disposition of industrial effluents and waste, water distribution and re-use, besides the total environmental monitoring of Camaçari Petrochemical Complex), Chesf (company responsible by the generation, transmission and commercialization of electrical energy, Codeba (a Public Port Company), INEMA (the local EPA). Detran (State Traffic Department), DNER(Brazilian Department of highway), Road federal Police, Military Police, Limpec (Municipal Public Cleaning Company). Evidenced that Proquigel has involved medical facilities in the emergency planning and response process. Sampled examples were: Hospital São Rafael Caxias D'Or, SAMU, Hospital Municipal de Camaçari, Hospital Santa Isabel, Hospital Santa Helena, Pano de Auxílio Mútuo de Emergência (PAME) Hospital and Hospital Centro de Medicina Humana as well as Minutes of meetings between Proquigel and the doctors of chemical and petrochemical plants of Camaçari Industrial Complex during the Cofic Occupational Health Meeting. Besides, evidenced that interested parties have been involved such as: COFIC – "Comitê de Fomento Industrial de Camaçari", COSIMA – "Comissão de Segurança e Higiene Industrial", PAM – Mutual Aid Plan, PAME, COSIC – " Comissão de Segurança Patrimonial". It is used Awareness Preparedness for Emergencies at Local Level (APELL) the guideline prepared by NATO / UNEP. Proquigel engage in regular consultation or communication with stakeholders to assure that the Plan addresses current conditions and risks. Evidenced Protocol Presentation with stakeholders and other interested parties; Programa Ver de Dentro; Niquini Meeting ((cyanide transporter), Concordia meeting (cyanide transporter). Presentation letters containing cyanide information from The Health, Safety and Environmental Manager of Proquigel Candeias Mr. Deiviti Caetano as well as Alexandre Rodrigues (Medicine Doctor) for interested parties.

Proquigel engage in regular consultation or communication with stakeholders to assure that the Plan addresses current conditions and risks. Evidenced that the Health, Safety and Environmental Manager Mr. Deiviti Caetano (SSMA manager) as well as Alexandre Rodrigues (Medicine Doctor) performed a presentation about "Sodium Cyanide Manual" for all Companies of Camaçari Charlie Area.

Evidenced records of training provided by Proquigel for all direct or indirectly persons involved with cyanide like PAM - Mutual Aid Plan, PAME – Medical Emergency Plan, COFIC and COSIMA.

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

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

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Summarize the basis for this Finding/Deficiencies Identified:

Evidenced that Emergency Plan:

- a) Designate primary and alternate emergency response coordinators with explicit authority to commit the resources necessary to implement the Plan - DS.SGI.391.0103 – Emergency response coordinators
- b) Identify Emergency Response Teams - Internal Emergency Brigade - DS.SGI.391.0102 – Emergency response Team and SEG.R.05.03 – Emergency Brigade
- c) Require appropriate training for emergency responder -.PP.SGI.391.0100 – Emergency General Plan;
- d) Include call-out procedures and 24-hour contact information for the coordinators and response team members - PP.SGI.391.0100 – Emergency General Plan;
- e) Specify the duties and responsibilities of the coordinators and team members - DS.SGI.391.0102 - Emergency response Team and SEG.R.05.03 – Emergency Brigade
- f) List all emergency response equipment that should be available - PP.SGI.391.0101 – Emergency response Equipment
- g) Include procedures to inspect emergency response equipment and assure its availability when required - PP.SGI.391.0101 – Emergency response Equipment
- h) Describe the role of outside responders, medical facilities or communities in emergency response procedures? Yes. PP.SGI.391.0100 – Emergency General Plan


Evidenced that above-mentioned Emergency Plans designate primary and alternate emergency response coordinator. It is clearly identified the Emergency Response Team and individual responsibilities and authorities. Training requirements defined. Evidenced that Proquigel Emergency Brigade trains continually in accordance Brazilian legislation laws such as NR 23 item 23.8.5 and NBR 14.726.

During the field audit, evidenced all emergency response equipment were available on-site as stated. Pertinent checklists provided evidence that emergency response equipment inspected as stated. Observed a list containing 24-hour contact information for the coordinators and response team members. Role of outside responders, medical facilities and communities in emergency response procedures are clearly describe such as PAM, PAME, COFIC, COSIMA, INEMA, Militar Fire Brigade, Area Charlie Camaçari Brigade, e, Bahia Militar Police, Bahia Civil Police, Simões Filho Civil Police, SOS COTEC (name of a emergency Company) , Concordia Transportes, Niquini Transportes, Hospital São Rafael, Organized Civil Society.

Evidenced that Proquigel confirmed that outside entities included in the Plan are aware of their involvement and are included as necessary in mock drills or implementation exercises. Records assessed reviewed and provided evidences of adequate aware of outside entities.

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

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

Summarize the basis for this Finding/Deficiencies Identified:

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Internal documented procedure PP.SGI.391.0100 – Emergency General Plan clearly identifies procedures and contact information for notifying management, regulatory agencies, outside response providers and medical facilities of the emergency, as appropriate. Evidenced that the above-mentioned procedure is duly established, implemented and maintained. Internal documented procedure PP.SGI.391.0100 – Emergency General Plan clearly identifies procedures and contact information for notifying potentially affected communities of the incident and/or response measures and for communication with the media. Evidenced that the above-mentioned procedure is duly established, implemented and maintained.

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

The operation is in full compliance with in substantial compliance with not in compliance with Production Practice 5.5


Summarize the basis for this Finding/Deficiencies Identified:

Evidenced that internal documented procedure PP.SGI.391.0100 – Emergency General Plan clearly describe appropriate remediation measures, such as recovery or neutralization of solutions or solids, decontamination of soils or other contaminated media and management and/or disposal of spill clean-up debris, and provision of an alternate drinking water supply, as appropriate. Any internal leaks inside the solids plant (U230 and U235 are conducted via internal channel to a tank, TQ 230-20, and sent to sodium hypochlorite treatment section. At the U-233 Cyanide Plant any spills are conducted via a channel to a closed tank, V-215-09, and sent to incineration. Decontamination of equipment and lines for maintenance is performed by the following documented Evidenced that the above-mentioned documented procedure is duly established, implemented and maintained.

Evidenced that internal documented procedure PP.SGI.391.0100 – Emergency General Plan clearly prohibit the use of chemicals such as sodium hypochlorite, ferrous sulfate and hydrogen peroxide to treat cyanide that has been released into surface water

Evidenced that that internal documented procedure PP.SGI.391.0100 – Emergency General Plan clearly address the potential need for environmental monitoring to identify the extent and effects of a release, and include sampling methodologies, parameters and, where practical, possible locations. It addresses the need for monitoring releases into both water and soil, as well as identifies the species of cyanide to be monitored. Evidenced that the above-mentioned documented procedure is duly established, implemented and maintained.

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

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 in substantial compliance with Production Practice 5.6
 not in compliance with

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Summarize the basis for this Finding/Deficiencies Identified:

Evidenced that internal documented procedure PP.SGI.391.0100 – Emergency General Plan include provisions for reviewing and evaluating yearly its adequacy on an established frequency. Evidenced that the above-mentioned documented procedure have been revised over this three-year ICMI audit period as stated and that it is duly established, implemented and maintained.

Evidenced that mock emergency drills conducted periodically as part of the Plan evaluation process. Records of mock emergency drills clearly demonstrate – Objectives of simulations such – Review of Emergency Plans, Review of check emergency Procedures Training of Emergency Response Brigade, Review of stakeholders involvement, Review of Communities Involvement, , Measuring of Communication effectiveness , Review of Internal resources, Review of PAME and PAM.

Evidenced that planning and evaluation of emergency drills have been duly performed as stated in internal documented procedure SEG.P.05.R.05.

There are provisions to evaluate the Plan after any emergency that required its implementation, and for revising it as necessary. Reviewing pertinent records, performing field audit and interviewing all Proquigel levels was not evidenced the occurrence of any cyanide incident in the last three years. Evidenced that planning and evaluation of emergency drills have been duly performed as stated in internal documented procedure SEG.P.05.R.05

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