



SAFETY AUDIT REPORT-2019



FOREWORD



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Coromandel International Limited – Kakinada (CIL), a Murugappa group company located at Kakinada, East Godavari district of Andhra Pradesh, engaged in the manufacture of complex fertilizers of various grades. Fertilizer manufacturing involves in the import, storage and handling of toxic chemicals such as Ammonia, Sulfuric acid and phosphoric acid and bulk materials such as Muriate of Potash (MOP), Mono ammonium Phosphate (MAP) etc., in large quantities.

Coromandel International Limited, India's second largest Phosphatic fertilizer player, is in the business segments of Fertilizers, Specialty Nutrients, Crop Protection and Retail. The Company manufactures a wide range of fertilizers and markets around 4.5 million tons making it a leader in its addressable markets.

In its endeavor to be a complete plant nutrition solutions Company, Coromandel has also introduced a range of Specialty Nutrient products including Organic Fertilizers. The Crop Protection business produces insecticides, fungicides and herbicides and markets these products in India and across the globe. Coromandel is the second largest manufacturer of Malathion and only the second manufacturer of Phenthoate. Coromandel has also ventured into the retail business setting up around 800 rural retail centers in the States of Andhra Pradesh, Telangana, Karnataka and Maharashtra.

The Company clocked a turnover of Rs. 11,049 Crore during FY 2017-18. It was ranked among the top 20 best companies to work for by Business Today and was also voted as one of the ten greenest companies in India by TERI, reflecting its commitment to the environment and society. Coromandel is a part of the INR 329 Billion (32,893 Crores) Murugappa Group.



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Over the years, Coromandel has received a number of awards and recognitions including the British Council 'Five Star' rating for Safety Management Systems and being adjudged one of the 'Ten Greenest Companies in India' by a joint survey of TERI and Business Today magazine.

As the organization is importing, storing and processing large quantities of Ammonia, Sulfuric acid and Phosphoric acid, it is the requirement of the organization, to arrange and to conduct safety audit of its safety systems by an external agency and report to be submitted to concerned authorities, as per the requirement under rule 10 (4 & 5) of Manufacture, Storage, Import of hazardous chemicals 1989 and amendments there on.

Good safety practices of the organization are a very visible way of showing that the organization does value the people working with them; so also, it will be rewarded by a workplace that's not only safer but more productive as well. Apart from implementing good safety practices, periodical checking of the performance of the practices or the systems is also required. Conducting safety audit is one such requirement.

Safety audits are intended to promote, improve and then maintain good safety performance.

Audits review safety programs, policies, and procedures to check that they cover employee job tasks and hazards. They are a structured and effective way of preventing incidents and controlling safety hazards.

Though several audits are being conducted by the organization, including internal audits of the systems being implemented, one of the requirements is conducting of the safety audit as per the statutory requirement.

So as to comply with the requirement, **CIL** management is engaging outside agency, for evaluating its occupational health and safety management system performance, followed by compliance of the observations and as part



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of it, engaged **Lumen Engineering Associates** for conducting the safety audit for the year 2019.

Lumen Engineering Associates feels it as an honor for getting the above assignment. Lumen Engineering Associates took this opportunity and carried out the audit, with an objective to review the various work practices and activities of the organization, such that the Occupational Health and Safety functioning of the organization is in line with the regulatory and other OHS system requirements.

Audit not only looks into the deviations or lacunae but also focuses on the best practices implemented by the organization. The recommendations given in the report are to be viewed as an aid to Management, for continual improvement and not as any faultfinding exercise.

Lumen Engineering Associates offers it's sincere thanks to the top management for providing the opportunity to Lumen in conducting the audit. Lumen extends its sincere thanks to all the HODs & other Plant Personnel for their co operation to the audit team in carrying the audit successfully.

30th January 2020,
Kakinada.

for **Lumen Engineering Associates**

D.A.Narasimha Raju
Chartered Engineer
Competent Engineer - Safety



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EXECUTIVE SUMMARY



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- CIL, Kakinada is the First Phosphatic Fertilizer plant in the country to receive 5S sustenance award in the year 2018 and 5S Model award in the year 2019.
- Over all plant housekeeping is good.
- Lightening arrestor survey been conducted by Cholamandalam and recommendations are being implemented to protect total plant area from lightening.
- Occupational Health Hazards are identified and Manual prepared for reference.
- The organization has implemented and maintaining various systems such as OHSMS, EMS, PSMS & 5S. Frequent audits of these systems are being carried out which gives the organization an opportunity in identifying the lapses there by correcting them and continually improving them and the work environment.
- Periodical review, compliance of legal requirements, ensuring continual improvement; imparting education and training on OHS issues are found satisfactory.
- HRD is keen on evaluating the competence levels and there by identifying the training needs of the employees. Basing on the training needs, HRD & Safety dept are preparing the training calendar covering specific training programs as required.
- Employee participation in the functioning of OH&S system seems to be good. Participation of workmen representatives and officers in periodical safety meetings, suggestion schemes, hazards identification, incident investigations, preparation of SOPs, prestart up safety reviews are some of the areas of participation.



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- Motivational and promotion measures for improving OH & S taken by Coromandel are laudable. Activities like publication of safety bulletins, conducting safety competitions during safety day celebrations are noteworthy.
- Incident (incl. of near misses and emergency situations) reporting, investigation and analysis is being carried out thoroughly meeting the requirements of PSMS and ISO-45001 standards.
- First Aid facilities provided at all sections of the plant were found adequate. Provision of PPE both general and respiratory is in place.
- Identification and compliance of OHS nonconformities, through regular plant safety inspections is in practice.
- Organization seems to be implementing various programs under its Corporate Social Responsibility, It has established a hospital outside the plant area and treating the out patients taking a nominal fee.
- Greenery in and around the plant is good however at some areas this may cause some problems which need focus.
- Site specific observations and recommendations are given in detail in this report for implementations as per the priority of Coromandel International Limited-Kakinada.



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1.0

INTRODUCTION



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1.1 LOCATION:

Coromandel International is located about 8 KM North-East of New Kakinada Port Railway Station. The plant is located at 17 degrees N Latitude and 82 degrees E longitude. The management has acquired 696 acres of land, out of which one hundred acres have been utilized for construction of the plant, utilities and offices. The site faces the sea on Eastern side 1000 meters away from the high tide line and is 5 Kms North East of Kakinada Port. The site faces the sea on the Eastern side, 500 meters away from the high tide line and is 5 Kms North East of Kakinada port. It is bound by Beach Road on East side, NFCL boundary and railway track on South side, bypass road on North side leading to Valasapakala village and on West side Coromandel greenbelt.

1.2 ABOUT THE PLANT:

Coromandel International Limited, formerly known as Godavari Fertilizers and chemicals Limited, was initially promoted by Government of Andhra Pradesh and Asia's largest co-operative M/s. Indian Farmers and Fertilizers Co-operative Limited (IFFCO) and was incorporated as a joint venture company on 17th December 1981. On 12th July 2003 M/s Coromandel entered into sale purchase agreement with Government of A.P. and subsequently the company has become an associate of Coromandel of the renowned Murugapa Group. With effect from 01.02.2008, the Company merged with Coromandel. The company has annual installed capacity to produce 15 Lakhs MT per annum wide range of fertilizer products. The group took a decision to change the organization's name from Coromandel fertilizers to Coromandel International.



1.3 MANAGEMENT SYSTEMS IMPLEMENTED AT COROMANDEL- CIL Kakinada has implemented Quality Management System (QMS), Environment Management System (EMS) and Occupational Health and Safety Management System (OHSMS) and got their systems certified by M/s. DNV in accordance with ISO 9001:2015, ISO 14001-2015, & ISO 45001:2018. Coromandel has also voluntarily implemented Process Safety Management System (PSMS), which is a mandatory requirement in the USA under OSHA, for the hazardous chemicals processing and handling units. Coromandel is also implementing “5S” in all its departments.

1.3 BRIEF PROCESS DESCRIPTION OF THE PLANT:

MANUFACTURING PROCESS OF DAP & NPK FERTILISER (A, B & C TRAINS)

- The main raw materials used for manufacturing DAP & NPK fertilizers are Phosphoric Acid (54% P₂O₅), Ammonia, Urea, Sulphuric Acid, River sand (Filler). In addition to the above, Muriate of Potash is used as an additional raw material for manufacturing NPK Complex fertilizer.

PRE-NEUTRALISER PROCESS:

- Manufacturing DAP with mixed PN&PR Process: About 55-65% of the total Ammonium Phosphate slurry is prepared in the Pre-neutraliser under normal conditions. Necessary Slurry can also be prepared in the Pipe-Reactor if needed, in case of pre-neutralizer shut down at lower Production capacity.
- Making NPK fertilizers with mixed PN&PR Process: All necessary slurry of Ammonium Sulphate and part of Ammonium Phosphate Slurry is being made in PN , and rest of Ammonium Phosphate Slurry is made in Pipe



Reactor. About 80-85% of the total slurry of Ammonium Sulphate and Ammonium Phosphate Slurry is made in PN.

- The PN is fed with Phosphoric acid, Sulphuric acid, acid liquor from Scrubbing systems, Water, Liquid Ammonia and Gas Ammonia from Ammonia separator to prepare Slurry. Liquid or Gas Ammonia is fed from the bottom of the pre-neutralizer through a series of Nozzles (4 for liquid and 4 for gas) located all along the circumference, to obtain the best reaction efficiency. The pre-neutralizer is provided with an agitator to improve the reaction process and to obtain homogenous slurry. The Phos. Acid feed to the process is as follows:
- 25% of total required Phos. acid along with Water is fed to SET to obtain 23 % P₂O₅ and Sp.Gr. 1.30 in Scrubber Liquor. The Scrubber Liquor goes to Pre-Scrubber where 70% of the total Phos. acid required is fed to the system. Pre-scrubber specific gravity, mole ratio and P₂O₅ % is maintained at 1.46, 0.45 and 42% respectively for DAP manufacturing. From Pre-Scrubber, some part of acid goes to PN and some part to PR feed tank in addition to scrubber liquor. 5% of total required Phos acid is fed in pipe reactor feed tank.
- The Temperature of PN is usually 110-120 Degree C in case of making Ammonium Phosphate Slurry and 106-110 Degree C in case of making Ammonium Phosphate Sulphate Slurry. The Slurry from PN is then pumped to the granulator. There are two independent slurry transfer lines, each one connected to one of the Pumps. Each line is provided with its respective set of flow meters of the magnetic type with control valve (ball type) and a controller.



PIPE REACTOR PROCESS:

- Reaction in the pipe reactors:
- Ammonia, phosphoric acid having 54% P₂O₅ along with recycled scrubber liquor and sulfuric acid is reacted in the Pipe reactors in definite proportions depending upon the grade. The ammonium phosphate slurry produced is pumped to the granulator for further granulation. The fumes generated are passed through the scrubbing system for recovery of ammonia.

Pipe reactor:

- Two pipe reactors, installed behind the granulator to feed ammonia, phosphoric acid and sulfuric acid. All the above mixed and reacted in the mixing tee unit of the pipe reactor. The slurry so formed in the pipe reactor is pumped through a venturi to the granulator. The heat of reaction generated in the process is used to evaporate a part of dilution water contained in the phosphoric acid and that in recycled scrubber liquor. The phosphoric acid dilution is adjusted by controlling the scrubber liquor to get the required phosphate content at the outlet of the pipe reactor. The ammonium phosphate slurry that has formed in the pipe reactors goes into the granulator for further granulation. The fumes generated are passed thorough scrubbing system for recovery of ammonia.

Reaction in the granulator:

- Ammonium phosphate slurry produced from pipe reactor is prayed on to the recycle material bed in the granulator. The recycle material bed is formed in the Granulator out of the granulator / fine material that recycled from the dry section equipments as recycle material to ensure designed moisture for effective granulation. Supplementary liquid Ammonia is sparged into the Granulator, beneath the rolling bed of solid materials in



order to adjust mole ratio to the value required by the formulation i.e. between 1.6-1.8.

- The efficiency of the reaction, taking place in this unit is very high because of the Pipe Reactor process adopted in the Granulator. The unfixed Ammonia in the Granulator is recovered in the gas scrubbing system.

Drying of the Product:

- The product formed in the Granulator is routed to the Drying unit, where the drying is accomplished in a rotary co-current hot gas dryer. This unit is so designed to enable it to run in auto-thermal condition i.e. without fuel oil combustion. The dryer is fitted with chains and knockers to reduce scaling.

Screening and Pulverization of the Product:

- The dried product is sent for screening. This screening is established by using two sets of screens viz scalping screens and product screens to efficiently segregate the material into oversize, fines and product size. The oversize is pulverized in the oversize pulverizer, and then recycled to the Recycle system. The fines join the recycle system directly. The product that is drawn out is measured by product weigh scale fitted on the product conveyor and it is controlled by means of controlling the material feeding to product screens through variable speed conveyors.

Product Cooling:

- The product is air-cooled in a counter current cooler by means of ambient air to the degree as required for the stability of the hygroscopic fertiliser material. The cooled Product then goes to storage area through Product Conveyor.



SCRUBBING SYSTEM IN NPK PLANT:

- During Manufacturing Process of DAP/NPK fertilizers the Main Pollutants that are releasing to the atmosphere are Ammonia, Dust, Fluoride and Sulphur Dioxide. The main nutrients that are escaping during manufacturing process are un reacted Ammonia & Dust and is required to be recovered for plant economy as well as for protecting the environment. To recover these materials scrubbing systems are provided in the plant that consists of Cyclones, venturi, cyclonic wet scrubbers, Dust scrubber and final Tail Gas Scrubber.

PRE -SCRUBBER:

- The first Scrubbing Unit is the Pre-Scrubber, where the Ammonia Gases & Dust coming from granulator are scrubbed. It is a vertical cyclonic type scrubber. The washing liquid is normally diluted Phosphoric Acid containing 40% P2O5 and some Sulfuric acid. A considerable part of the Phosphoric Acid is fed to the Pre-Scrubber, where it mixes with liquid coming from the scrubber effluent tank containing more diluted Phos.Acid.
- The escaped Ammonia from Granulator react with acid Producing MAP and Ammonium Sulphate, so that the mole ratio N/P in this liquid is maintained at about 0.4 to 0.6. The addition of variable quantity of Sulfuric Acid can help to control N/P ratio and solubility.
- The Pre-Scrubber consists of two Sections. The first section is a throat type venturi. The Pressure drop across the venturi shall be of 100-150mm water column, at which the medium and larger size dust particles can be effectively captured. The venturi bottom plates maintain a turbulent pool of scrubbing liquid for erosion protection and gravity drain to the sumps ahead of the gas inlet of the cyclonic scrubber.



- The second section is composed of two sprays in the horizontal arm followed by cyclonic section, which serve to retain the liquid droplets carried from the venturi arm washing units.

FUMES SCRUBBER:

- Escaped gases from Pre-Scrubber are then sucked to the fumes scrubber where diluted Phosphoric Acid is sprayed through nozzles as a scrubbing medium to absorb unreacted Ammonia.

DRYER SCRUBBER:

- The gas released from dryer consists of dust and few quantities of Ammonia. The gas is passed through dryer cyclones where the fine dust is captured and returned to the granulator process through the fines conveyor and secondary elevator. The escaped dust from the cyclones is then passed through Dryer Wet Scrubber where Scrubber Liquor (20 to 23 % P₂O₅) is used as scrubbing medium to further catch the escaped dust particles

COOLER SCRUBBER:

- The generated gases from Cooler Scrubber consists of fine dust is passed through cooler cyclones where the fine dust particles are separated. Then the escaped gas from cooler cyclones consisting of fine dust is passed through Cooler wet Scrubber where scrubber liquor is used a scrubbing medium to capture fine dust particles.

DUST SCRUBBER:

- The purpose of Dust Scrubber is similar to Cooler Scrubber, where all dust particle from recycle equipments are scrubbed in a separator via dust cyclones. The medium of scrubber is Scrubber liquor containing 20 to 23 % P₂O₅.



DUCT SCRUBBER:

- All the off-gases from fumes Scrubber, Dryer Scrubber, Cooler Scrubber and Dust Scrubber then goes to a horizontal Duct Scrubber for second stage scrubbing. The duct scrubber consists of six spray nozzles and the scrubbing medium is acidic water having pH around 5 to absorb escaped Ammonia & Dust.

TAIL GAS SCRUBBER:

- Tail Gas Scrubber is a cylindrical vertical tower, equipped with separator, packed bed washed with several sprays and a demister in its final part, before the final stack.
- The Off-gases from Duct Scrubber consisting of little quantity of Dust, Ammonia Gas, and little quantity of Fluoride gas generated during phosphoric acid neutralization. The off gas from duct scrubber finally enters into Tail Gas Scrubber for final scrubbing of Pollutants.
- All Process Water is added to the Tail Gas Scrubber and the water level is regulated in its reaction tank by means of level controller. After washing in the Packing Section, water overflows to the bottom section of cyclonic tower, where it is slightly acidulated with Sulphuric Acid to maintain the pH around 4-5.
- The off-gas from Tail Gas Scrubber is then directly released to the atmosphere.
- The flow diagram of scrubbing system is enclosed in the annexure.



1.4 OBJECTIVE AND SCOPE OF SAFETY AUDIT.

The objective of the safety audit is to evaluate the effectiveness of the company's safety effort and make recommendations which lead to a reduction in accidents and minimization of loss potential.

Safety audits are an important part of a company's control system and these checks ensure that deteriorating standards are detected. Examination of the defects exposed in this review results in hazardous conditions and potential accidents being avoided.

Regular audits should be based on the premise that resources should be made available to identify and eliminate hazards before accidents occur, rather than use the resource of manpower and materials only after injuries and damage to equipment have resulted in human suffering, significant monetary loss which, in certain circumstances, affect the profitability severely.

In order to meet the statutory requirement under sub rules 4,5,& 6 of rule 10 of MSIHC rules 1989, CIL entrusted an external agency for conducting Safety Audit covering all the Departments of CIL-Kakinada including Jetty area.

The following are the members of audit team involved in conducting the Audit and preparation of report during 30th January - 31st January, 2020.

1. Mr. D.A. Narasimha Raju – Chartered Engineer
2. Mr. V.V. Seshagiri Rao - Chemical Engineer
3. Mr. Robin – Chemical Engineer



2.0

METHODOLOGY



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Auditing is a process of evaluating the functioning of Occupational Health and Safety system.

Auditing examines each stage in the OH&S management system by measuring compliance with the controls the organization has developed, with the ultimate aim of assessing their effectiveness and their validity, for the future.

This site safety audit was conducted referencing to BIS: 14489: 1998 and discussions with plant officials, perusal of documents and records submitted by the company. Walk thro' field inspection, information data, clarifications & inputs provided by the company officials, etc.

Auditors walk through the workplace focusing on given job tasks and observe employee behaviors, observations of employee working habits doing a variety of job tasks, regarding safe work practices, such as follow up of safety regulations, usage of PPE and following good ergonomics.

Audit also focuses on safe work behaviors and good work practices

An illustrative list of documents perused during the safety audit is given below:

- ◆ EQHS Policy
- ◆ Safety Organization Chart
- ◆ Training records on safety, fire and first aid
- ◆ Record of plant safety inspections
- ◆ Record of tests and examinations of equipment and structures as per statutes
- ◆ Standard Operating Procedures for various operations
- ◆ Record of Work Permits
- ◆ Maintenance and testing records of fire detection and firefighting equipment
- ◆ Approval of layouts and other approval from Statutory authorities
- ◆ Maintenance inspection records
- ◆ Calibration and testing records
- ◆ Shut down maintenance procedures
- ◆ Records of previous audits
- ◆ Safety checklist for transportation of hazardous substances

The following elements of safety management system are elaborated in this report.

- ◆ Occupational Safety & Health Policy



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- ◆ EHS Organizational setup
- ◆ Education & training
- ◆ Employees participation in OS & H Management
- ◆ Motivational and promotional measures
- ◆ Safety manual and rules
- ◆ Compliance with statutory requirements
- ◆ Hazardous area classification
- ◆ Accident reporting, analysis, investigation & implementation of recommendations
- ◆ Risk Assessment including hazard identification
- ◆ Safety Inspections
- ◆ Health and Safety improvement plans / targets
- ◆ First aid facilities – Occupational health Center
- ◆ Personal Protective equipment
- ◆ Housekeeping
- ◆ Material handling equipment
- ◆ Electrical and Personal safeguarding
- ◆ Ventilation, Illumination and Noise
- ◆ Work environment monitoring system
- ◆ Fire prevention, protection and fighting systems
- ◆ Emergency Preparedness Plans
- ◆ Process / Plant modification procedure
- ◆ Transportation of Hazardous Substances
- ◆ Contractor Safety System
- ◆ Budget provision for safety



3.0

REVIEW OF OHS MANAGEMENT SYSTEMS



The following are the observations and suggestions during the review of OHS management system. Management can prioritize the observations for implementation.

3.1 OCCUPATIONAL SAFETY & HEALTH POLICY:

Observations:

The organization is going to implement another 5 elements in the Process Safety Management System (PSMS) one of which is “TOP MANAGER’S COMMITMENT” in process safety.

- I. Top Management has published occupational health & Safety Policy. The policy clearly indicates the Management’s commitment towards creating a safe work environment. Following are the core objectives of the policy:
 - Periodical review of all the documents and implementation of safety management systems by addressing the safety concerns on priority.
 - Compliance with various legislation, regulations and other legal requirements.
 - Ensuring continual improvement in occupational health & safety performance.
 - Maintaining an encouraging environment for taking all the workers into active involvement.
 - Imparting continuous education & training on occupational health & safety to the employees and contract workers as a whole.



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- Defining clear responsibilities of the contractors for strict compliance with all the relevant legislation's regulations and other requirements as per the safety code prepared by CIL.
- II. This policy is displayed at relevant areas and is communicated to all the employees and contract workers with the intent of making them aware of their individual occupational health and safety obligations and is also made available to interested parties.

3.2 OH&S ORGANISATIONAL SETUP:

OBSERVATIONS:

- I. The Safety department of CIL Kakinada is headed by AGM – EHS, who directly reports to the Unit Head. He is assisted by Dy. Manager-EHS. The safety team also consisting of Assistant Managers, senior officers, Officers and technicians for carrying out activities in other three shifts.
- II. The main function of the Safety department is offline management and co-ordination with the Operations and other service departments. The safety staff has been empowered to stop the work or withdraw a worker from the work spot in case of any safety violations found during their vigilance.
- III. As a proactive measure, periodical inspections are being carried out by the safety department as one of its key functions.



- IV. The audit team observed that a healthy co-ordination is prevailing between the safety department and individual production / service departments. The on-going occupational health & safety in the plant is facilitating well for further strengthening the co-ordination and mutual exchanging of various safety development schemes / proposals.
- V. The safety department conducts safety training programs to regular and contract staff, safety inspections & vigilance regarding safety practices, mock drills, safety committee meetings. Safety department appraises these particulars on monthly basis to the top management.

3.3 SAFETY EDUCATION AND TRAINING:

Observations:

- Coromandel has a corporate policy on training and the organization has developed the training need basing on the policy. Training calendar is being prepared basing on the training needs evaluation and programs are being fixed and arranged accordingly. Apart from these training programs, HR department with the co ordination of safety and other departments, is conducting induction and refresher training programs on Safety, health and environment, and relevant topics of other departments. Some of the safety training programs include:
 - I. Fire control and prevention
 - II. Operational safety
 - III. First aid



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IV. Emergency preparedness

V. Usage and maintenance of respiratory personal protective equipment

VI. Environment related topics

- The aspects like training feedback system, identification of further training needs, are yet to be started. The relevant records regarding training are being maintained by HRD and Safety departments.
- Trainings are being conducted by Doctor at regular intervals, recently an awareness session regarding Malaria and Dengue conducted and witnessed with photos.
- Recommending Behavioral Based Safety trainings to all the workers to bring change and acceptance towards Individual Safety.

3.4 EMPLOYEES CONSULTATION, PARTICIPATION AND COMMUNICATION IN OH&S MANAGEMENT:

Observations:

- Employee participation in OHS & environment issues is found to be satisfactory.
- PSM System being maintained in the organization has a requirement of employee participation and as per the requirement, employees of the relevant departments participate in:
 - I. incident investigations



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- II. preparation of standard operating procedures / operational control procedures
 - III. prestart up safety reviews
 - IV. Hazard identification and risk assessment / HAZOP
 - V. Internal auditing of the systems etc.,
- General Safety Committee is found to be functioning as per the statutory requirement, with equal participation from workmen and management staff. Meetings are being convened as per schedule and agenda once every quarter and suggestions / observations are being complied.
 - Communication regarding EHS related matters to employees is carried out through Department safety committee meetings / circulars etc.,
 - Suggestion schemes are in place to encourage participation and consultation from employees.

3.5 MOTIVATIONAL AND PROMOTIONAL MEASURES FOR OH&S:

Observations:

The following motivational and promotional measures are in practice at Coromandel.

- Successfully conducted Off-Site Emergency Mock drill in presence of Director of Factories evacuating large number of Schools and colleges.
- Publication of Safety Bulletins, Paintings & hoardings.



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- Screening of Safety Films on every month.
- Safety suggestion scheme in place.
- Competitions on Safety Debate, Safety Essay, Safety Posters, Safety Slogans, Safety Songs / Poem and Safety Quiz for all the employees.
- Celebrating of National Safety Day on 4th March every year.
- Safety performance competitions and distribution of prizes once in a year.

3.6 SAFETY MANUAL AND RULES:

Observations:

- Conducting Visitor Induction with clear understanding of how to act during emergency situations.
- Issuing Photo identity pass with plant layout denoting way to Assembly point for all Visitors.

3.7 COMPLIANCE WITH STATUTORY REQUIREMENTS:

Observations:

- Coromandel is complying with all the required statutory requirements.
- Safety report is being prepared as per schedule – 8, RULE – 10 (1) OF MANUFACTURE, STORAGE AND IMPORT OF HAZARDOUS CHEMICALS (MSIHC) RULES -1989.



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- All the lifting tools and tackles are being tested and certified by competent person as per rule 55-A of AP factories rules for the year 2019. Department / section wise list is prepared.
- The Unit has obtained Fire NOC on 7th November, 2019 from A.P. State Disaster Response and Fire Service Department.

3.8. HAZARDOUS AREA CLASSIFICATION:

Observations:

- Coromandel has carried out hazardous area classification according to the storage and handling of hazardous chemicals and plotted the same. The organization has carried out Hazard identification and risk assessment and also QRA for all the activities and storage facilities basing on Job Safety Analysis.

3.9. INCIDENT REPORTING, ANALYSIS, INVESTIGATION AND IMPLEMENTATION OF RECOMMENDATIONS:

Observations:

- Incident Reports in Form No. 16 of ESI Act and Form 18 of AP factories rules are being maintained and perused. It is noted that even near misses or no injury incidences are documented for proactive prevention of serious potential incidents.
- All the required formats for accident reporting are being maintained.



3.10. MECHANICAL MAINTENANCE PRACTICES:

Observations:

- Cross Country pipe line carrying Anhydrous Ammonia, tested and certified by TUV in 2015.
- A good practice of Bitumen painting around the Hydrant lines to avoid rusting is brought into existence
- Emergency Siren is being tested on 10th of every month at 5: 30 PM and on every Saturday as shift end siren.
- The company has well developed procedure for maintenance planning and breakdown responding system as a part of the maintenance management systems. Comprehensive checks from part of the capital repairs, works undertaken on a plant basis.
- Condition monitoring is carried out so as to analyze the healthiness of the equipment and for taking proactive actions in case of any deviations.
- Coromandel under its PSM system identified the critical equipment, developed procedures for mechanical integrity checks and implementing the procedures as per the drawn schedules.
- During audit rounds Sprinkler system for Storage Tank-D and Pumps was verified and witnessed Safe working condition.



3.11 SAFE WORK PRACTICES:

- Coromandel is having a good permit-to-work system in place, such as hot work, electrical isolation including lock out and tag out, mechanical isolation, equipment / pipeline opening, height work, excavation work, work in confined space, Electrical works and cold work. And for works besides work at height involving high risk, a detailed Job Safety Analysis is prepared and attached to the permit
- Coromandel is following a good practice of Pre-Startup Safety Review before start up of after modifications, new equipment by preparing a checklist and ensuring the completion of required works.

3.12. HEALTH AND SAFETY IMPROVEMENT PLAN / TARGETS AND SAFETY BUDGET:

Observations:

- Coromandel has systematized management of its Occupational Health & Safety. As part of system implementation, the organization is setting up objectives organization wise and functional wise for its OHS improvements. For achieving the set objectives Management plans are drawn up with fixed targets and are being complied as per the plan. The objectives are being discussed in the Management Review Meetings (MRM). The budgetary requirements for OHS improvements are also discussed in the MRM.
- It is learnt that apart from meeting the basic OHS requirements such as PPE and other legal requirements, there are no budgetary constraints for other OHS improvement plans.



3.13. FIRST AID FACILITIES – OCCUPATIONAL HEALTH CENTRE:

Observations:

- Trainings are being conducted monthly by AFIH trained Doctor.
- Doctor is included in Monthly Safety Committee meeting and discussing health relating issues.
- The company has a well-equipped Occupational Health Centre. First-Aider (Nurse) has been appointed and attends in the general shift and also for any emergency situations during shifts and holidays.
- It is important that injured personnel are given proper medical attention as soon as possible. For this, the plant has provided first aid boxes within the plant premises in various locations.

3.14. MATERIAL HANDLING EQUIPMENT:

Observations:

Material handling contributes to a major portion of the injuries, arising from operation of Hazardous material transportation etc.,

- Conveyor system
- Lifting and handling of Tools & Tackles, etc.,
- Gas cylinders transportation etc.,
- Bags stacking / de stacking loading in wagons and trucks



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- Tools and tackles are being maintained in condition and to be tested and certified by competent person.

3.15. ELECTRICAL & INSTRUMENTATION MAINTENANCE PRACTICES:

Observations:

- CIL has provided separate Three phase and Single phase junction boxes, only for contractor usage with strict vigilance of 30mA ELCB and also RCCB.
- Values along with Due dates are displayed at earth pits, register is being maintained for recording of earth pit values.
- All emergency shutdown devices and safety control are connected to UPS for fail-safe operations in case of any power failure.
- A good system of maintenance and calibration is available for the instruments. The instrumentation section is responsible for maintaining the field instruments like pressure gauges, level indicators, and temperature gauges etc.,
- All field lighting is being replaced with LED lighting system so as to reduce power consumption.
- Lightning arrestor system survey has been under taken and is under approval for installation (Rolling sphere method)



3.16. VENTILATION, ILLUMINATION AND NOISE :

Observations :

- By physical observation, it was found that ventilation and illumination at all process areas, warehouse areas are adequate.
- Noise level survey is being conducted periodically at all the potential areas in the plant. Wherever, the noise levels are higher than the prescribed limits, earmuffs / earplugs to be supplied to the operators as a part of compliance of PPEs.

3.17. ENVIRONMENTAL MONITORING SYSTEM:

Observations:

- The environmental monitoring system is in place as per the standard environmental policy.

3.18. STANDARD OPERATING PROCEDURES:

Observations:

- Required OCPs / Work instructions are made available at point of use.
- SOPs are prepared as part of PSMS requirement for relevant operations and where required (for Ammonia ship unloading and handling activities) mandatory checklists are being maintained.



3.19. FIRE PREVENTION, PROTECTION AND FIGHTING SYSTEMS & SECURITY:

Observations:

- Fire Department is under safety, which is under the control of EHS Department.
- Fire fighting dept. is equipped with fire tender, fire trailer pump and portable fire extinguishers Emergency equipment like breathing apparatus, fire suits are also available
- Fire tender is in good working condition and periodic maintenance is being undertaken.
- Fire personnel are aware of the Emergency preparedness procedures, and Mutual aid with the neighboring industries
- Mock drills and review meetings are being conducted, to evaluate the emergency preparedness.
- Fire department and security department are thoroughly trained to fight fire or to mitigate any emergency that may arise. In addition to this the plant operating and maintenance staff is also trained in fire fighting. All the required personnel protective equipment are available for routine use as well as for emergency requirement.
- All the work areas are equipped with fire fighting system and fire hydrant system. Fire water pressure is maintained in auto. List of fire extinguishers existing in the plant is enclosed.
- All Fire Hydrant lines are as per the drawing and a dedicated pathway was laid to reach to every hydrant points.



3.20. EMERGENCY PREPAREDNESS PLANS (ON-SITE):

Observations:

- Coromandel has a well prepared On-site Emergency Plan and is being reviewed for its effectiveness by practicing mock drills and basing on the reviews, facility changes, such as, installation of new equipment, implementation of new or change processes and change of personnel is being revised periodically, to keep it update.
- Mock drills are being conducted once in 6 months.
- It is learnt that Coromandel is having mutual aid agreement with NFCL, Spectrum power generation Ltd, so as to have cooperation during emergencies.

3.21. TRANSPORTATION OF HAZARDOUS SUBSTANCES:

Observations:

- I. A standard checklist for tank/truck transportation is available for hazardous material transported through such tanks/trucks. The following elements form part of the checklist. Vehicle entering the premises classified as hazardous area are equipped with PESO.
 - TREM cards availability
 - First Aid box availability
 - PPE availability
 - Is vehicle having required approvals and road worthy.
 - Fire Extinguishers available
 - Leak points verified.



3.22. CONTRACTOR SAFETY SYSTEMS:

Observations:

- Coromandel has well laid out procedure for contractor' evaluation and contractor work men controls as per the PSM system. Emphasis is being made during safety orientation, training and work site inspection and in the general safety rules on safety aspects.
 - Material handling
 - Electrical work
 - Welding and gas cutting safety
 - Safety at elevated work
 - Material transportation safety
 - Mobile equipment operation safety
 - Safety in the use of hand and power operated tools
 - Safety while working with or near crane / hoist / lifting tackles
 - Personal Protective Equipment
 - Company's emergency plan
- It is suggested that contractors and their workmen are to be briefed about work permit system.
- Contract work men are also provided with induction training, tool box talks on relevant topics before taking up operational / maintenance jobs by EHS department. Accordingly, the contractor work men are provided with identification cards after the induction training.
- Material / tools brought by contract workmen are being checked and certified before put into use.



4.0.

SUMMARY OF SITE SPECIFIC **OBSERVATIONS &** **RECOMMENDATIONS**



4.1. GOOD PRACTICES:

- Good to note that induction to visitors regarding safety to be followed while visiting the plant and briefing about how to act during emergency situations and also evaluating the understanding of the induction program by the visitor by conducting a simple test.
- And also issuing photo identity pass with plant layout and denoting way to Assembly point.
- CIL- KKD is maintaining ISO certifications of ISO-9001, ISO-14001 and ISO - 45001.
- Implementation of 5S is very visible in the entire plant and CIL- KKD is the First Phosphatic Fertilizer plant to receive model award-2019 for its implementation of “5S”
- OHC is found to be equipped with lab for carrying some analysis.
- It is good to note that dining facility is being provided to contract workmen.
- Even un-safe conditions are being reported and recorded as near misses.
- CIL introduced a new system of verifying Portable electrical tools for every six months by internal electrical team.
- Arc Flash analysis study for all HT panels has been conducted by an external party and Marking the Threat Zone boundary is in progress.



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- Electrical Team is practicing good safety systems by displaying Test Certificate of Breaker Lifting Trolley inspected by Competent person.
- It is good to note that portable electrical equipment are being checked and tag is being provided certifying it for use.
- All Earth Pits are found to be marked with clear identification numbers, mentioning Resistivity value of Pit, Test Date and Due Date at the pit.
- All lighting is being replaced in phased manner with LED lamps so as to reduce power consumption.
- Hazards associated with H₂SO₄ are clearly displayed as signages both pictographically and in local language.
- Structural Stability of all Mechanical Equipment has been conducted and requirements have been fulfilled by replacing major Gratings and Structures with a cost of rupees 4.65 Crores.
- So also, TCL acting as a Third party certifying all replaced structures yearly.
- It's noteworthy that overall Personal Protective Equipment usage is satisfactory.
- A good practice of raising a permit has been initiated for entering into the conveyor area at Go-down.
- It's noteworthy that Health awareness training programs are being conducted monthly by Doctor.
- OHC doctor is Post graduate certified in Industrial Health and also Associate Fellow of Industrial Health.
- Canteen workers are undergoing all important Medical Tests regularly without fail.



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- Pipelines being inspected internally every two years. Sulfuric acid piping checked and observations are complied as per report of 18.07.2017.
- Occupational Health Hazards are identified and Manual prepared for reference.
- CIL has provided separate Three phase and Single-phase junction boxes, only for contractor usage with strict vigilance of 30mA ELCB and also RCCB.
- Lightening arrestor survey has been conducted by Cholamandalam and recommendations are being implemented to protect total plant area from lightening.
- Trainings are being conducted by Doctor at regular intervals, recently a training regarding Malaria and Dengue conducted and witnessed with photos.
- Doctor has been included in Monthly Safety Committee meeting and discussing health relating issues.
- A good practice of Bitumen painting around the Hydrant lines to avoid rusting is brought into existence.
- During audit rounds Sprinkler system for Storage Tank-D and Pumps was verified and witnessed Safe working condition.
- It's Note worthy that Emergency Siren is being tested on 10th of every month at 5: 30 PM along with Saturday shift end siren.



4.2. RECOMMENDATIONS:

4.2.1. GENERAL:

- For the Transformer at Bagging Plant-3: Consider replacing the Silica gel as it turned into pale pink.
- Ensure availability of HAZOP study total report to all the employees working at Ammonia handling system.

4.2.2. A&B TRAIN:

- It was observed that Product accumulation on Electrical Cable and cable trays is high, consider clearing the dust avoiding potential hazards.
- Consider providing Flange bonding for all the flanges at A&B –Train Hot Chambers Natural Gas piping.
- Consider replacing the corroded Valves, Valve Handles at A-Train Natural Gas piping.
- HAG-1, BMS panel-Combustion Chamber Panel-A : Some of the Panel Alarm Indications are found to be not working and Alarm audibility is very feeble and could not be heard due the other noises and also incase the operator is away. Consider rectifying the Visual indication and increasing the audibility of the alarm for identifying the fault immediately.

4.2.3. RAW MATERIAL STORAGE:1

- It was observed that the godown structural supporting RCC columns are being hit by pay loaders, while during operation. Consider protecting them by providing additional brick wall or other barricaders around them.
- At RMS – 1, for the beams and slab peeling / spalling of concrete has been observed and the reinforcement rods are visible and are getting



corroded, needs concreting / gunniting to prevent decay and eventual failure of structure.

4.2.4. AMMONIA PIPING AREA FOR A&B STREAMS:

- Recommending Hot insulation for steam lines at all accessible areas so as to avoid hot burns while touching the bare steam lines due to human error or unwanted incident.

4.2.5. APFC MCC ROOM:

- Concreting to be carried out to the areas where spalling is observed in the beams after treating the exposed reinforcement with anti-corrosive paint inside MCC room.
- Illumination levels inside the MCC room need to be improved.
- According to IS-15652 Earth leak Rubber mats integrity to be verified yearly.

4.2.6. DAP-MCC-AB TRAIN:

- Concreting to be carried out to the areas where spalling is observed in the beams after treating the exposed reinforcement with anti-corrosive paint at RMS-1.

4.2.7. SCREENS AREA:

- At screens outlet to recycle ducting (outlet hose going from screens floor) the area is covered with a chequered plate and is being used as a working platform for inspecting and unplugging of the duct, ensure the integrity of the plate periodically as it is liable to collapse in case of corrosion and the level of corrosion cannot be assessed by just seeing it. Or replace it with grating whose condition is visible.



4.2.8. C-TRAIN-SCREENS AREA:

- At Dust Cyclone-A; the Cat ladder provided is almost touching the cyclone insulating sheet and the gap between cyclone and the cat ladder is very little causing it difficult for anybody going up the ladder in holding the cat ladder sides or even the rungs. Consider rectification of the same.

4.2.9. C-TRAIN-GROUND FLOOR:

- Pre-Scrubber area the supporting structure was found to be badly corroded, consider in replacing the same.

4.2.10. BAGGING PLANT:

- At Bin Top floor-North, the railing provided towards opening (for the material lift operating area) found to be not good, it needs to be fixed firmly to prevent possible fall of railing along with the personnel holding or leaning to it. In case of failure of railing it is of extreme risk level.
- It was observed that Spill material dumping chute bin top cover was badly corroded, needs replacement at the earliest.
- Consider closing the de-dusting hopper openings on the Conveyor-3, to avoid spilling of material / dust emission.
- At the other end of the floor, the Mono Rail which is not being used, found to be corroded, consider in removing the monorail, lest it may get further corroded and can fall below causing an incident of high-risk level.
- At Bin-3: (also at other bins) Consider covering the man hole with hard sheets as at present it was covered with rubber sheet which is prone to collapse and fall into bin in case persons are standing on it unknowingly.



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- Provide anchoring point, full body harness with life line and instruct personnel to wear the harness while covering the loaded truck with tarpaulin sheet, so as to avoid fall from truck top while doing the job.

4.2.11. SCREEN HOUSE -3:

- Conveyor-6 tail-end, gravity take-up and other rotating parts need to be guarded, restricting hand and finger injuries.
- It was observed that the bucket elevator casing is leaking causing material spill and forming heaps of spilled material around the elevator, consider in replacing the bucket elevator casing to avoid the leaks.



5.0

CONCLUSION



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Coromandel International Limited-Kakinada has implemented and maintaining good safety health, environment and other management systems and also the implementation of 5S is very visible. This focusses the efforts and participation of all employees and the management.

In order to sustain these efforts and to continually improve, further more efforts are needed by the employees and to motivate them, area managers should lead their people, working under them, to be vigilant all the time and to encourage their staff from time and again to achieve the desired goals. They need to monitor their performance from time to time.

As this statutory safety audit is conducted based on random sampling, the inhouse performance monitoring to evaluate the effectiveness of the systems being implemented is to be carried periodically by conducting internal inspections / audits and to take remedial actions accordingly. Deviations observed at some areas are given in this report. Similar deviations / lacunae may arise in other work area..

The area managers have the technical capability and experience in tackling the deviations / lacunae that are coming in their work area and in maintaining a safe working atmosphere. Their talents should be utilized to achieve the desired goals in Occupational Safety, Health and Environment.

The recommendations given in this report are to be viewed as an aid to Management, for continual improvement and not as any deficiency detect or fault-finding exercise.



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6.0.

DISCLAIMER



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As mentioned earlier, this audit is based on random sampling only and few of the areas, where hazard potential existed are given in this report.

Also, the suggestions given in the report are based on the observations made and on the prevailing situations at the time of audit and on the interaction with the plant personnel and basing on the professional experience of the auditors.

Users of this report are informed that this report is neither a substitute for qualified engineering analysis, nor to be construed as any rule or regulation of relevant governmental agency. Any changes or modifications carried out basing on the suggestions are to be further reviewed under Management of change, before initiating actual change and expert guidelines are to be sought wherever required.

Lumen Engineering Associates does not hold any legal obligation in case of occurrence of any incident / accident / emergency in the plant, while implementing the recommendations of this report, as, all the views are based on technical expertise and past experience of the auditors.

The validity of this report is one year from concluding date of the audit or next external safety audit, due as per statutory requirements.

30th January 2020,
Kakinada.

for **Lumen Engineering Associates**

D.A.Narasimha Raju
Chartered Engineer
Competent Engineer - Safety



7.0.

ANNEXURES