

10. ENVIRONMENTAL MANAGEMENT PLAN

10.1 Introduction

The Environmental Management System (EMS) is designed to provide a process to ensure the Project's compliance with the applicable national and international laws and regulations.

This framework Environmental Management Plan ("EMP") will require further development to produce the final EMS for the construction and operation of the Plant.

The primary objectives of this EMS are as follows:

To establish minimum standards for an Environmental Management System for the Project
Provide a framework that can be customized into a site specific EMS following the conclusion of the Project development but prior to commencement of construction

Provide an EMS framework that will facilitate ISO 14000 certification at the Project site, if necessary

ISO 14001 provide guidelines that provides organizations with guidelines to develop appropriate environmental management practices, and where appropriate seek registration with a relevant certification establishment.

The following outline is based on the general requirements of an environmental management plan for this Project consistent with the requirements under the ISO 14001 standard.

1. Environmental policy
2. Planning
 - Environmental aspects
 - Legal and other requirements
 - Objectives and targets
 - Environmental management program(s)
3. Implementation and operation
 - Structure and responsibility
 - Training, awareness and competence
 - Communication
 - Environment management system documentation
 - Document control
 - Operational control
 - Emergency preparedness and response
4. Checking and corrective action
 - Monitoring and measurement
 - Non-conformance and corrective and preventative action
 - Records
 - Environmental management system audit
5. Management review

Specific monitoring requirements are outlined in Chapter 11.

10.2 Key Elements of the EMS

The key elements of the EMS areas follows:

- Assessing environmental effects (environmental aspects)
- Compliance with laws / regulations (legal and other requirements)
- Setting environmental objectives and targets
- Environmental management program(s)
- Structure and responsibility
- Training, awareness and competence
- Document control
- Emergency preparedness
- Reporting
- Audit and management review.

The EPC Contractor will be primarily responsible for maintaining the EMS during construction whilst the Chief Operating Officer of the Project Company will have primary responsibility for maintaining the EMS during the operations phase.

10.2.1 Assessing Environmental Effects (Environmental Aspects)

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This Environmental Impact Assessment comprises the environmental assessments that have been carried out in relation to construction and operation (and future decommissioning) activities at the Project site. The assessment covers:

- Air emissions;
 - Water intake and discharge;
 - Waste characterization and inventory;
 - Aesthetics;
 - Noise;
 - Consumption of chemicals, energy and other raw materials; and
 - Labour and social issues.

Please refer to Chapter 7 of this ESIA Report for detailed review of the specific construction and operational impacts.

10.2.2 Compliance with Laws/Regulations

Approvals / permits / consents / licenses relating to the environment will be in place prior to construction and operational phases. The "permits-to-construct" and the "permits-to-operate" will be displayed at locations easily accessible to personnel operating at the Plant. The approvals / permits / licenses will include the following:

- Land use permits;

- Planning permission;
 - Environmental approvals (discharge to air, discharges to water, transport of waste, etc.)
 - Water intake permits; and
 - Contract with special and approved for transport of hazardous material.

Securing the requisite approvals and permits will be the responsibility of the Project Company. Should any other approvals or permits be required for new activities, these will be obtained prior to the commencement of any such activities.

10.2.3 Environmental Compliance Targets and Objectives

There are a number of specific environmental objectives that relate to the construction and operation of the plant. The primary environmental objectives are as follows:

- Design, construct and operate its facilities in a manner that protects human health and minimizes the impact of its operations on the environment
 - Strive for an injury-free work force and minimize environmental impact through implementation of programs in its facilities and the surrounding communities that reduce risks to employees, neighbors, the public at large and the environment
 - The Project Company and EPC Construction Contractor will encourage and promote waste minimization, the sustainable use of natural resources, recycling, energy efficiency, resource conservation and resource recovery
 - The Project Company will actively participate with the state and national governmental agencies to ensure that the development and implementation of environmental policies, laws, regulations and practices serve the public interest and are based on sound scientific judgment
 - All employees are expected to work in a safe manner and comply with the company's Environmental policies and procedures. The Project Company should promote a culture that encourages each employee to be environmentally responsible.

The Project Company should develop and maintain written safety policies and programs to address known hazards at the plant. The KNO has very well documented safety operating procedures and manuals which the Project Company should replicate. Policy and program effectiveness and compliance should be regularly assessed

One of the most important components of these management systems is the *Environmental Performance Review*,

- The frequency of audits should be similar to the regime practiced at the KNO Plant
 - Audit teams constituted by a multi disciplinary team including environmental professional Engineers to promote a critical approach to the audit process
 - When an audit is completed, the auditors report the findings to the site environmental management team and work with them to develop action plans to correct any deficiencies identified
 - It is anticipated that Department of Petroleum Resources (Nigeria) will carry out

regular inspections of the Plant to ensure compliance with environmental regulations and permits.

10.2.4 Environmental Management Program

Specific environmental management programs and procedures will be in place prior to the commencement of construction and operation of the Plant. Procedures will include:

- Effluent Monitoring Procedures
- Stack Emission Monitoring Procedures
- Solid Waste Management Program (disposal and reuse procedures)
- Emergency Response Procedures
- Environmental and Security Management.

Detailed provisions will be issued with the EPC Contractor (for the construction phase) prior to the start of construction. Detailed provisions for the operation phase will be issued by the Project Company prior to the completion of commissioning/operation start.

The programs should be reviewed according to the frequency specified in the document control system, or on an as-required basis following any incident, or non-compliance.

The solid waste management program is a key component of the environmental management program and it is presented in the following section as an example of an environmental management program.

Solid Waste Management Program

During both construction and operation phases, waste should be handled according to a waste management plan to be completed by the EPC contractor (for the construction phase) and the Project Company (for the operation phase) prior to the start of these phases.

The ESIA outlines waste management system requirements for construction and operation as follows:

- Individuals and the company must accept responsibility for waste generated
- Waste reduction at source, followed by recycling, reuse, or recovery are the preferred options
- Where options other than disposal are not feasible, destruction or treatment to render the waste non-hazardous should be the practice
- If the hazard cannot be eliminated, the waste should be contained in a secure manner and monitored to ensure it is not and will not be damaging the environment
- Wastes should be segregated and quantified so they can be effectively managed.
- The amount of waste disposed offsite will be kept to a minimum.

Hazardous Waste Management

Hazardous waste materials, such as catalysts, will be handed back to the suppliers for specialist disposal. All hazardous waste shipped from site will be subject to a waste manifest to track generation, transportation through licensed and approved contractors.

Non-Hazardous Waste Management

Non-hazardous industrial solid waste shall be stored in collection containers located within the plant site and will be appropriately identified with markings. These waste materials will be frequently removed in accordance with an agreed schedule by an approved and licensed contractor. A waste handling program should exist for all non-hazardous waste streams in order to avoid waste accumulation.

The monitoring program will ensure proper implementation of the management plan. Solid non-hazardous waste quantities and the location of (government approved) final disposal sites will be documented and the documentation kept for a minimum of 10 years.

10.2.5 Structure and responsibility

- All personnel working at the plant must be aware of their environmental responsibilities under the relevant national and international legislation, and all EPC contractors and operational staff members and contractors must undergo the Induction/Orientation Program, which should include a section on Environmental Awareness.
- Each Supervisor is responsible for the management of environmental issues in their respective sections
- The EPC contractor (during the construction phase) and the Plant Management (during the operation phase) will oversee the waste management system and find efficient ways to minimize the waste produced.
- The EPC contractor (during the construction phase) and the Plant Management (during the operation phase) are responsible for the co-ordination of the Environmental Management System.
- The EPC contractor (during the construction phase) and the Plant Management (during the operation phase) should have the overall responsibility for environmental performance at the site and should be required to assign dedicated resources to coordinate all aspects of the Environmental Management System.

10.2.6 Training, awareness and competence

Training of personnel to ensure awareness and knowledge of the relevant EHS provisions should be mandatory. The training program should cover:

- Fundamental understanding of the process plant operations
- Security of operations
- Incident Reporting
- Emergency Response and Notification
- Environmental Protection
- Site Hazards

- Personal Protective Equipment
- General Safety Rules & Safety Program
- Work Permit System/ Hazard Identification.

10.2.7 Document Control

Documentation and records system is central to the implementation of the EMS. The KNO has developed and operated a very effective and sophisticated documentation system which should be replicated by the Project following relocation of the process plant. The documentation system will include:

- Plant Operations manuals (KNO Plants 4,5 and 6 operations manuals updated to reflect conditions at the relocated plant)
- Compliance and monitoring records and reporting based on KNO format
- Incident reporting based on KNO format
- Training manuals (KNO Plants 4,5 and 6 training manuals updated to reflect conditions at the relocated plant)
- Training records
- Project records – building on KNO Plants 4,5 and 6 project records
- Materials Management System.

This document describes the different types of records systems for environmental management at the site.

10.2.8 Emergency Procedures

Specific emergency procedures must be developed by the EPC Contractor (for the construction phase) and the Project Company (for the operation phase) prior to the commencement of these phases. These procedures govern any emergency incidents at the Project site such as spills, fires, gas leaks etc. Emergency Response procedures should cover all anticipated emergency incidents.

10.2.9 Reporting

Full and detailed logs of the following incidents must be recorded:

- environmental limits breaches
- all major incidents.

In addition, all regulatory reporting and a full comprehensive annual EHS report should be included in the financial statements of the Project Company.

10.2.10 Auditing and Management Review

Auditing is an important component of the Environmental Management Systems consistent with ISO 14001. The audit of the EMS should be undertaken annually and should cover:

Verification of ongoing conformance with to all applicable laws and regulations
Confirmation of the continued efficacy of management systems to ensure compliance with

the applicable environmental standards
Identification of actual and/or potential environmental risks

The audit process will also assist management in identifying and prioritizing activities to enhance environmental compliance.

10.3 Occupational Health and Safety & Community Health and Safety

The Project Company will implement all reasonable precautions to protect the health and safety of its workers. Although this will primarily apply during the operations phase, the Project Company will also ensure that all contractors and sub-contractors employed at the Project site during the construction phase will put in place occupational health and safety policies to protect their workers.

The Project has been designed and located to be isolated from the community so the provisions usually required for plants located close to communities would be limited for this Project.

The emphasis should be placed on instituting preventive and protective measures in the following order of priority:

1. Eliminating the hazard such as using less hazardous chemicals wherever possible
2. Controlling the hazard primarily through the use of engineering control measures
3. Minimizing the hazard through the design and use of safe work systems such as training safe work procedures, lock-out and tag-out
4. Providing appropriate personal protective equipment ("PPE").

Facility Design and Operation

1. *Integrity of Workplace Structures* – the plant buildings will be built and designed to be structurally sound, fire-resistant and noise-absorbing materials will be used for cladding on ceilings and walls, wherever possible, the large rotating equipment will be relocated from KNO in their dedicated modular buildings
2. *Standard Operating Procedures ("SOPs")* - will be designed for emergency evacuations and practice drills will undertaken, at least, annually
3. *Workspace and Emergency Exits* – adequate space will be provided for each worker, the number and capacity of emergency exits will be sufficient for the orderly evacuation of the maximum number of people and exits must be clearly marked to be visible in total darkness
4. *Fire precautions* – the plant will be designed to minimize fire incidents through the application of the relevant fire codes, fire detectors, alarm systems and fire-fighting equipment will be installed, as standard
5. *Lavatories and showers* – adequate facilities will be installed consistent with the number of workers expected to work at the plant
6. *Lighting* – the plant will be designed to maximize natural lighting and emergency lighting will be installed with automatic activation in the event of failure of the principal artificial light source
7. *Safe Access* – passageways for pedestrians and vehicles within the plant boundary limits will be segregated for safe and easy access, equipment requiring servicing will be unobstructed and unrestricted for ready access.
8. *First Aid and medical facilities* – eye wash stations and well equipped first-aid stations will be provided throughout the Plant. A medical facility capable of treating trauma

and serious illnesses up to the point of transfer to hospital will be provided within the plant battery limits

9. *Air Supply* – sufficient fresh air should be supplied for indoor and confined work spaces
10. *Work environment temperature* – the temperature in work, rest room and other facilities will be maintained at levels appropriate for the facility during service hours.

Communication and Training

1. *OHS Training* – will be provided to all new employees to cover basic site rules, basic hazard awareness, safe work practices, personal protection and preventing injuries to other employees
2. *Visitor Orientation* – a visitor orientation and control program will be established to ensure visitors do not enter hazard areas unescorted
3. *New employee and contractor training* – all new employees and contractors will receive detailed training and information prior to working at the plant
4. *Area signage* – hazardous areas (electrical rooms, compressor rooms etc), emergency exits etc should be marked appropriately
5. *Hazard code communication* – copies of hazard coding system should be posted outside the facility, at emergency entrance doors and fire emergency connection systems. Information regarding the types of hazardous materials stored, handled or used at the facility should be shared proactively with emergency personnel and security personnel.

Physical Hazards

1. *Rotating and moving equipment* – the KNO rotating equipment have been designed to eliminate trap hazards and ensure that operators are kept out of harm's way during normal operating conditions. Guards should be designed and installed to conform with appropriate machine safety standards. The requisite turning off, disconnecting, isolating and de-energizing (Locked Out and Tagged Out) procedures will be adopted
2. *Noise* – no employee will be exposed to noise levels greater than 85 dB(A) for a duration of more than 8 hours per day without hearing protection and no unprotected ear will be exposed to a peak sound pressure level of 140 dB(C). The use of hearing protection will be actively enforced. The buildings design will incorporate the use of acoustic insulating materials where feasible
3. *Vibration* – workers exposure to vibration from hand and power tools and large equipment will be controlled through equipment selection, installation of vibration dampening pads and limiting the duration of exposure
4. *Electrical* – the plant will adopt the appropriate electrical safety measures for a facility of this nature to include marking all energized electrical devices with warning lights, locking-out and tagging-out all devices during service or

maintenance etc

5. *Eye Hazards* – the use of machine guards or splash shields and/or safety glasses or face shields (as appropriate) will be mandatory
6. *Welding/Hot Work* – the use of proper eye protection such as welder goggles and barrier screens will be mandatory. Hot work procedures will form an integral part of the Standard Operating Procedures for the plant.
7. *Industrial Vehicle Driving and Site Traffic* – right-of-way, site speed limits etc will be clearly established to control site traffic. Drivers will undergo training and licensing as well as frequent basic medical surveillance

Chemical Hazards

1. *Air Quality* – air quality will be regularly monitored consistent with the IFC guidelines outlined in Section 2
2. *Fire and Explosions* – prevention and control strategies for fires and explosions are outlined in Section 4.4
3. *Asbestos* – Agrium have confirmed that there is no residual asbestos containing materials in KNO plants 4, 5 and 6. The Functional Design Specification for the EPC Contractor prohibits the use of asbestos for the relocated plant construction.

Biological Hazards

1. Work processes, engineering and administrative controls will be designed

1. Work processes, engineering and administrative controls will be designed, maintained and operated to avoid or minimize the release of biological agents into the work environment
2. Measures to eliminate and control hazards from known and suspected biological agents at work places will be maintained in close cooperation with local health authorities.

Radiological Hazards

1. Work places with occupational and natural exposure to ionizing radiation will be established and operated in accordance with the appropriate international standards and guidelines
2. Exposure to non-ionizing radiation (such as static magnetic fields, static electric fields, radio frequency, microwave radiation, light and near-infrared radiation and ultraviolet radiation) will be controlled to internally recommended limits.

Communication Systems

1. Alarm bells, visual alarms will be used to alert workers and emergency services to an emergency
2. Alarm and warning systems will be tested at least annually
3. Plans and measures will be implemented to communicate a potential emergency to the community if the community is at risk from such potential emergency
4. Emergency information will be communicated to the media through trained local spokesperson and via formal press releases with accurate information and

appropriate level of detail for the emergency.

Hazardous Material Release Mitigation, Implementation Strategies and Emergency Response Plan

Strategy 1: Promote public awareness of potential hazards associated with handling of toxic and hazardous substances.

Implementation Actions

- Cooperate with the local community, Ikpoba-Okha local government, Edo State and federal agencies to develop and disseminate information about the location, types and amounts of hazardous substances to be handled by the plant.
- Communicate Emergency Response Plan to the local community, Ikpoba-Okha local government, Edo State and federal agencies with particular emphasis on hazardous material spill, fire and explosion.

Strategy 2. Promote public knowledge of how to react to accidental hazardous material release, plant fire and explosions

Implementation Actions

- Develop public education program to teach plant staff and the community about sheltering in place and developed emergency preparedness plans and kits.
- Develop evacuation plans for all areas within the plant and the potentially impacted community areas and provide public education about where to find evacuation information.

Strategy 3. Develop emergency response capabilities in the event of an accidental discharge of toxic or hazardous substances.

Implementation Actions

- Support training programs for first responders particularly process plant first aiders and the plant fire departments.
- The emergency response team should be capable of responding at the technician level, with support from additional responders trained to operations level.
- Conduct a hazardous materials risk analysis specific to the materials used and transported within and outside the plant.
- The construction phase emergency response plan will form an integral part of the

Construction Phase Site Rules to be completed prior to Construction Start – this document will be issued to and adhered to by all the contractors operating at the site.

- The operations phase emergency response plan will form integral part of the Plant Operations and Maintenance Manual to be completed prior to Plant Commissioning – this document will be issued to and adhered to by all the staff working at the plant.