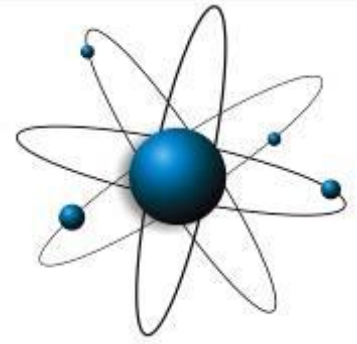


APPENDIX 5: ENVIRONMENTAL MANAGEMENT PROGRAMME



ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT (EMPr):

**ESCIENCE
ASSOCIATES
(PTY) LTD**

**PROPOSED CHROME TANNING SALTS
PRODUCTION FACILITY**

**POSTAL
ADDRESS:**
PO Box 2950
Saxonwold
2132

FOR

**BROTHER CISA, NEWCASTLE, KWAZULU-
NATAL**

**PHYSICAL
ADDRESS:**
9 Victoria Street
Oaklands
Johannesburg
2192

TEL:
+27 11 718 6380

KZN EDTEA REF:
DC25/0004/2020

FAX:
+27 86 516 6627

NEAS reference number (EIA):
KZN/EIA/0001344/2020

WEBSITE:
www.escience.co.za

September 2020

E-MAIL:
info@escience.co.za

R No 2009/014472/07

PROJECT INFORMATION SHEET

PROJECT:

**PROPOSED CHROME TANNING SALTS PRODUCTION FACILITY
BROTHER CISA, NEWCASTLE, KWAZULU-NATAL.**

APPLICANT:

BROTHER CISA (PTY) LTD

Postal Address: Private Bag X6600, Newcastle, 2940

Tel: +27 34 370 1641

Fax: +27 866 144 538

E-mail: jacque.hunlun@Brothercisa.com

ENVIRONMENTAL ASSESSMENT PRACTITIONER:

ESCIENCE ASSOCIATES (PTY) LTD.

Postal Address: PO Box 2950, Saxonwold, 2132

Contact: Tel: (011) 718 6380

Fax: 086 610 6703

E-mail: info@escience.co.za

Project Leader: Abdul Ebrahim

COMPETENT AUTHORITY:

**KZN DEPARTMENT OF ECONOMIC DEVELOPMENT, TOURISM AND ENVIRONMENTAL
AFFAIRS (KZNEDTEA).**

Physical Address: Newcastle Regional Office, 43 Hardening St, Newcastle

E-mail: poovie.moodley@kznedtea.gov.za

REPORT HISTORY AND DETAILS:

Draft Environmental Management Programme Report for Public Participation

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1 INTRODUCTION

Brother CISA (Pty) Ltd (hereinafter referred to as Brother CISA) has commissioned the services of EScience Associates (Pty) Ltd. (hereinafter referred to as 'EScience Associates' or 'EScience'), as an independent Environmental Assessment Practitioner (EAP), to conduct a Basic Assessment (BA), in accordance with the environmental regulatory process for environmental permitting applications, for the proposed expansion of their existing product range at their Newcastle plant in KwaZulu Natal.

The Brother CISA chrome chemicals facility is situated within the Newcastle Chemicals Park. The plant is authorised to produce various chrome chemicals products which include sodium dichromate (SDC), chromic acid, and chrome oxide. The plant was founded in 1996 and went into operation in 1998. It currently has an authorised production capacity of 140 000 tonnes per annum (t/a) of SDC equivalents (this includes 15 000 t/a of chromic acid, and 20 000 t/a of chrome oxide) and 20 000 t/a of sodium sulphate, as per environmental authorisation reference number DC25/0006/08/ AMND/2010.

Brother CISA proposes to establish an inorganic production process, and an organic process, producing 50 000 t/a and 30 000 t/a of CTS respectively. CISA will also establish production capacity for synthetic vitamin K compounds of 2 000 t/a.

1.1 PROJECT DESCRIPTION

Brother CISA produces sodium dichromate (SDC) and various related chrome chemicals and by-products. Brother CISA proposes to expand its existing product range to include chrome tanning salts (CTS) and synthetic vitamin K compounds. It is intended to establish an inorganic and an organic process producing 50 000 t/a and 30 000 t/a of CTS respectively, as well as synthetic vitamin K of 2 000 t/a.

One of the primary raw materials for producing these will be sodium dichromate (SDC) coming from the existing operations. The manner in which the proposed CTS Plant will fit into the existing operation is shown in Figure 1-1.

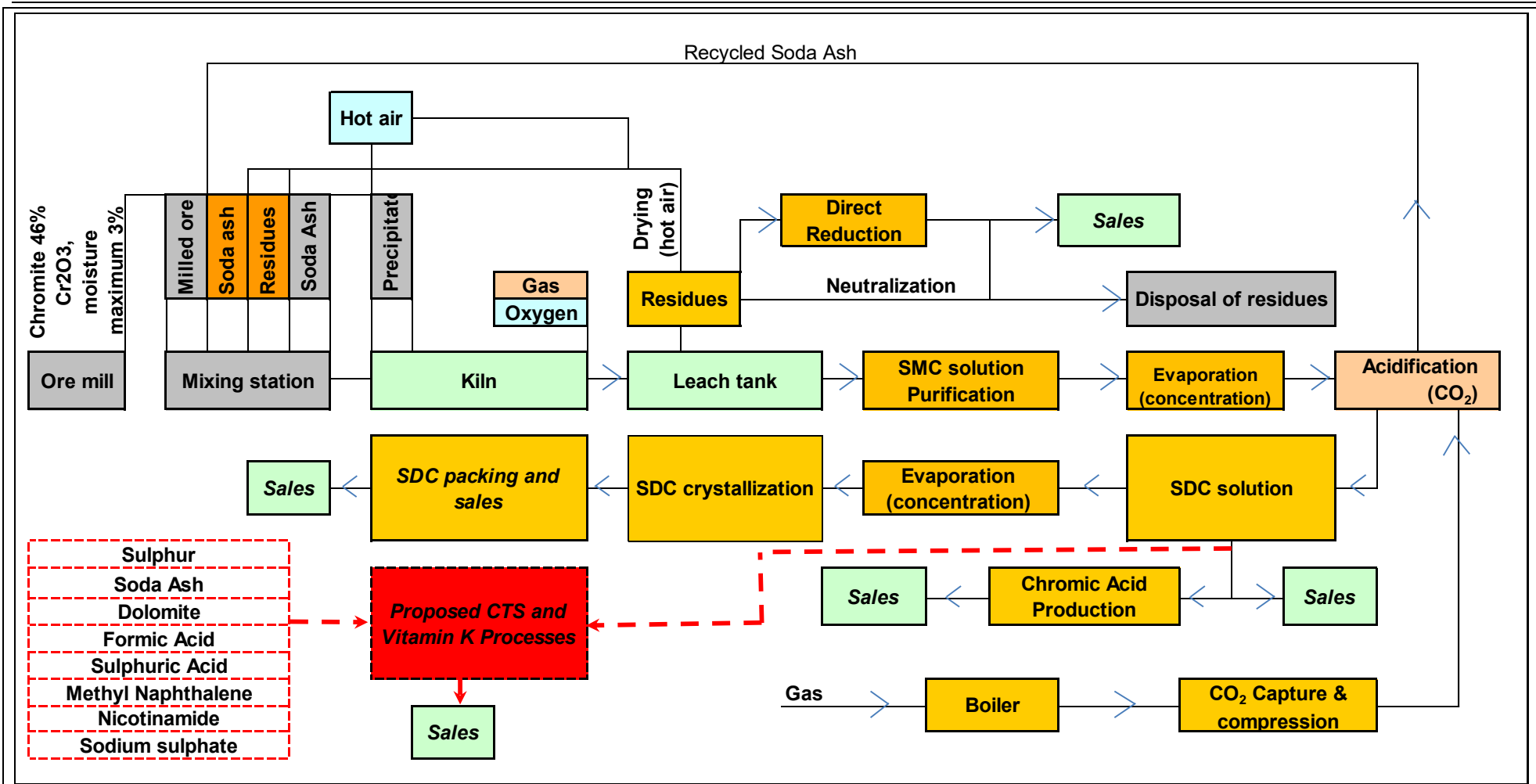


Figure 1-1: Overall Process Flow Diagram

There are two proposed processes:

1. Inorganic Chrome Tanning Salts Production Process
2. Organic Chrome Tanning Salts and Synthetic Vitamin K Production Process

these are discussed in detail in the ensuing sections.

1.1.1 INORGANIC CHROME TANNING SALTS PRODUCTION PROCESS

The manufacture of inorganic CTS involves the reaction of Sodium Dichromate (SDC) and Sulphur Dioxide gas (SO_2). The SO_2 gas is generated by burning sulphur in a furnace. The SO_2 gas from the burner is fed into a set of absorption columns where it reacts with, and reduces the SDC, to form CTS. This produces a CTS liquor which is then dried to form a powder. The powder along, with various additives, is then stored as a product and may be bagged or supplied to clients in bulk.

The proposed inorganic process is illustrated in Figure 1-2.

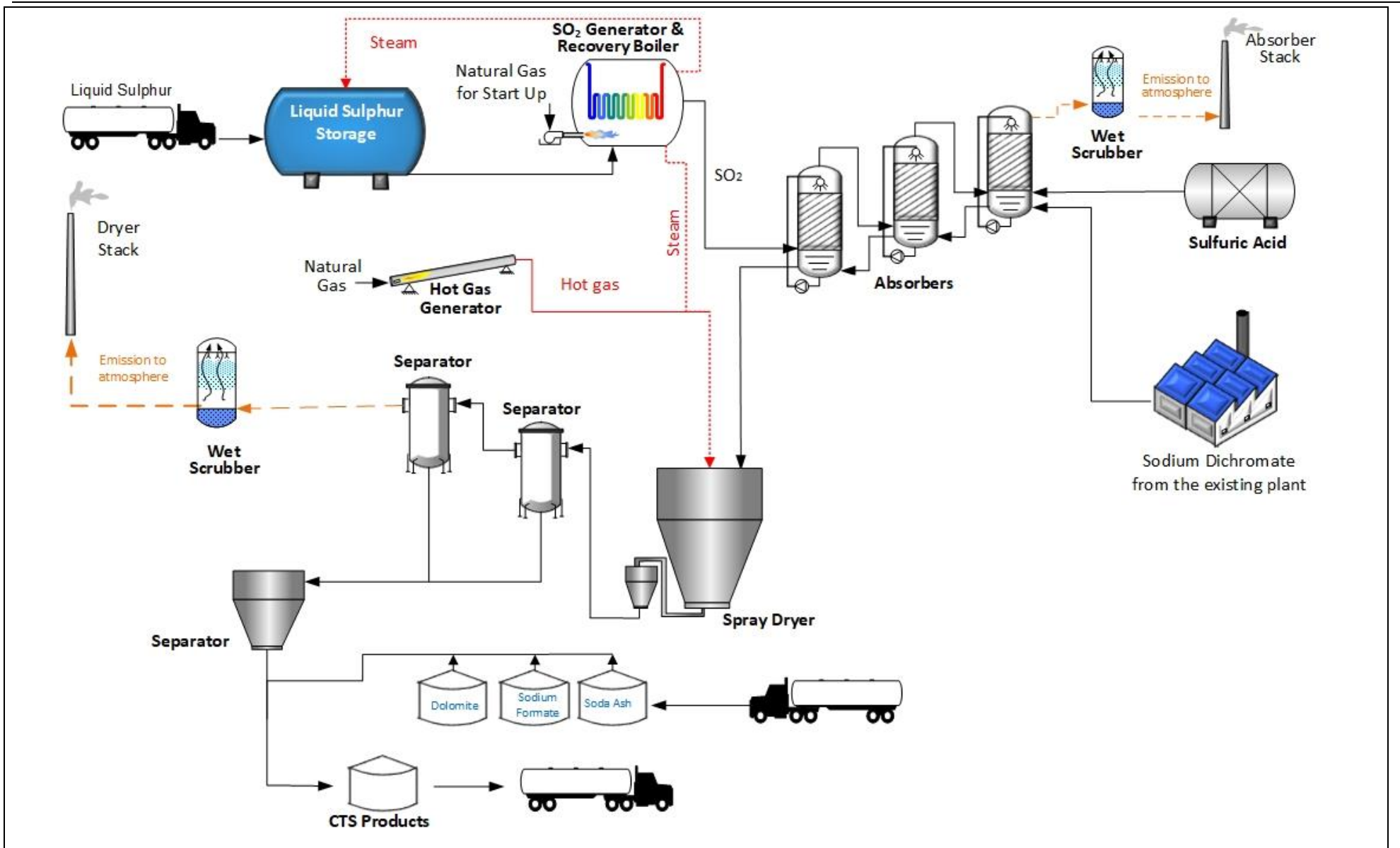


Figure 1-2: Inorganic CTS Process Flow Diagram

1.1.2 ORGANIC CHROME TANNING SALTS AND SYNTHETIC VITAMIN K PRODUCTION PROCESS

To manufacture organic CTS and synthetic vitamin K compounds, methyl naphthalene and sulphuric acid are mixed with SDC to produce crystalline menadione. This is subsequently dissolved with heptane and sulphurated to produce menadione sodium bisulphite (MSB). Menadione sodium bisulphite is a water-soluble form of menadione, which belongs to the Vitamin K class of compounds. A portion of the MSB is then purified, dried and packaged, and the remainder is converted to menadione nicotinamide bisulphite (MNB). MNB is subsequently purified, dried and packaged. MNB is a bioactive source of vitamin K.

The bulk of sodium sulphate recovered as a by-product of the above is then used to produce organic CTS. The sodium sulphate is mixed with SDC, glycol, and sulphuric acid to produce CTS solution. The solution is concentrated by evaporation, mixed with further sodium sulphate and then dried. The dried powder along, with various additives, is then stored as product and may be bagged or supplied to clients in bulk.

The proposed organic process is illustrated in Figure 1-3 to Figure 1-6.

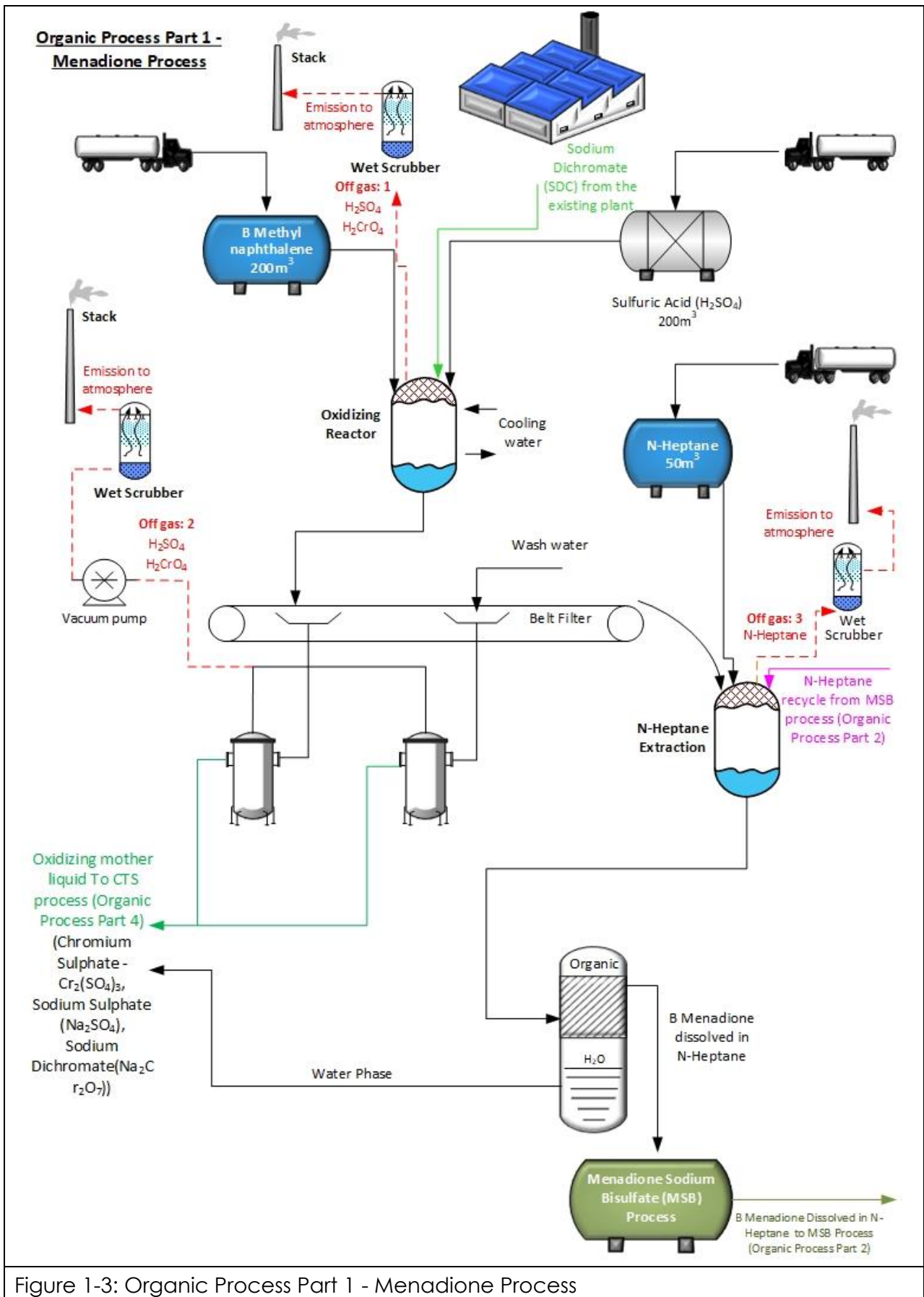


Figure 1-3: Organic Process Part 1 - Menadione Process

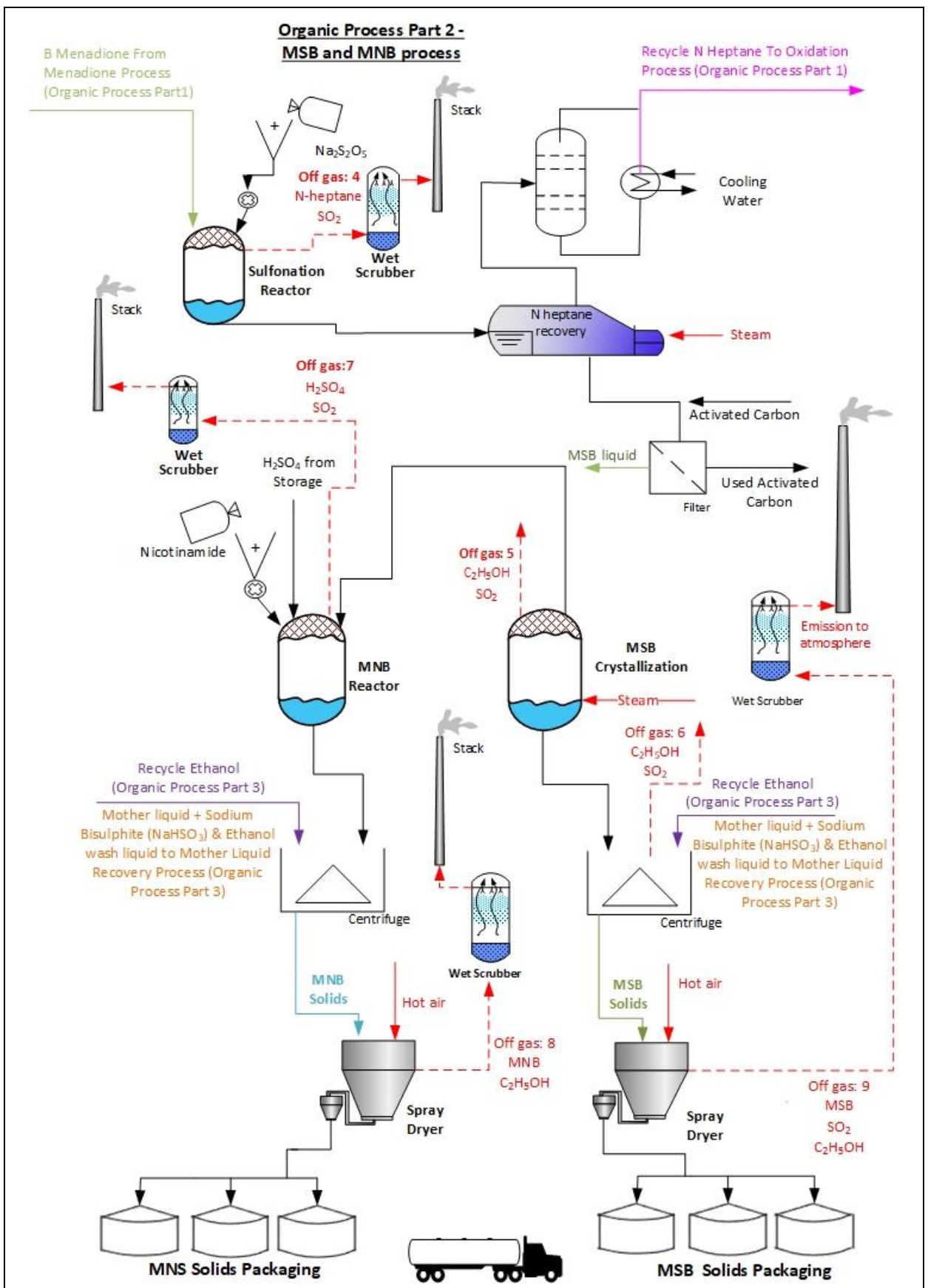


Figure 1-4: Organic Process Part 2 - Menadione sodium bisulphite (MSB) and menadione nicotinamide bisulphite (MNB) process

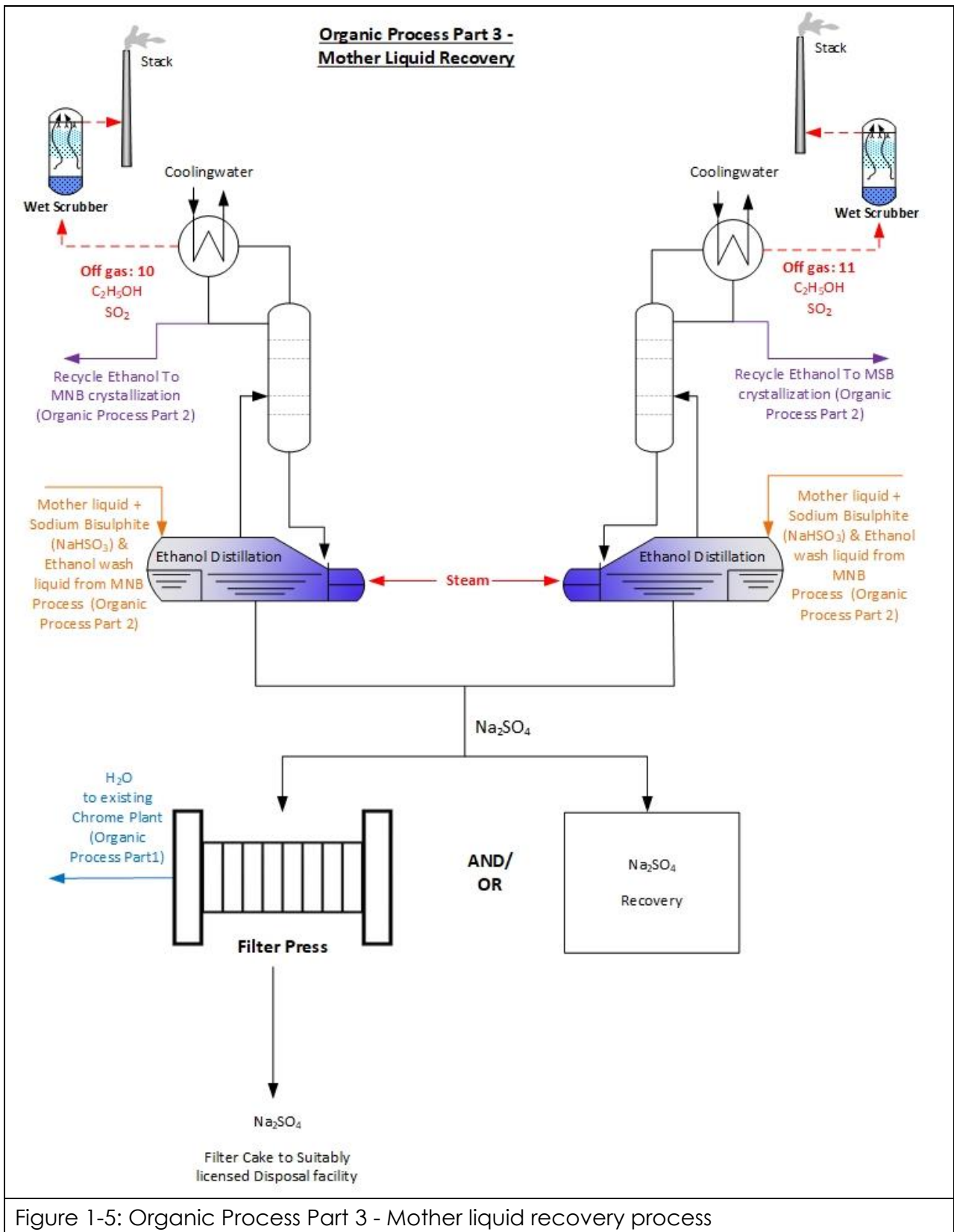


Figure 1-5: Organic Process Part 3 - Mother liquid recovery process

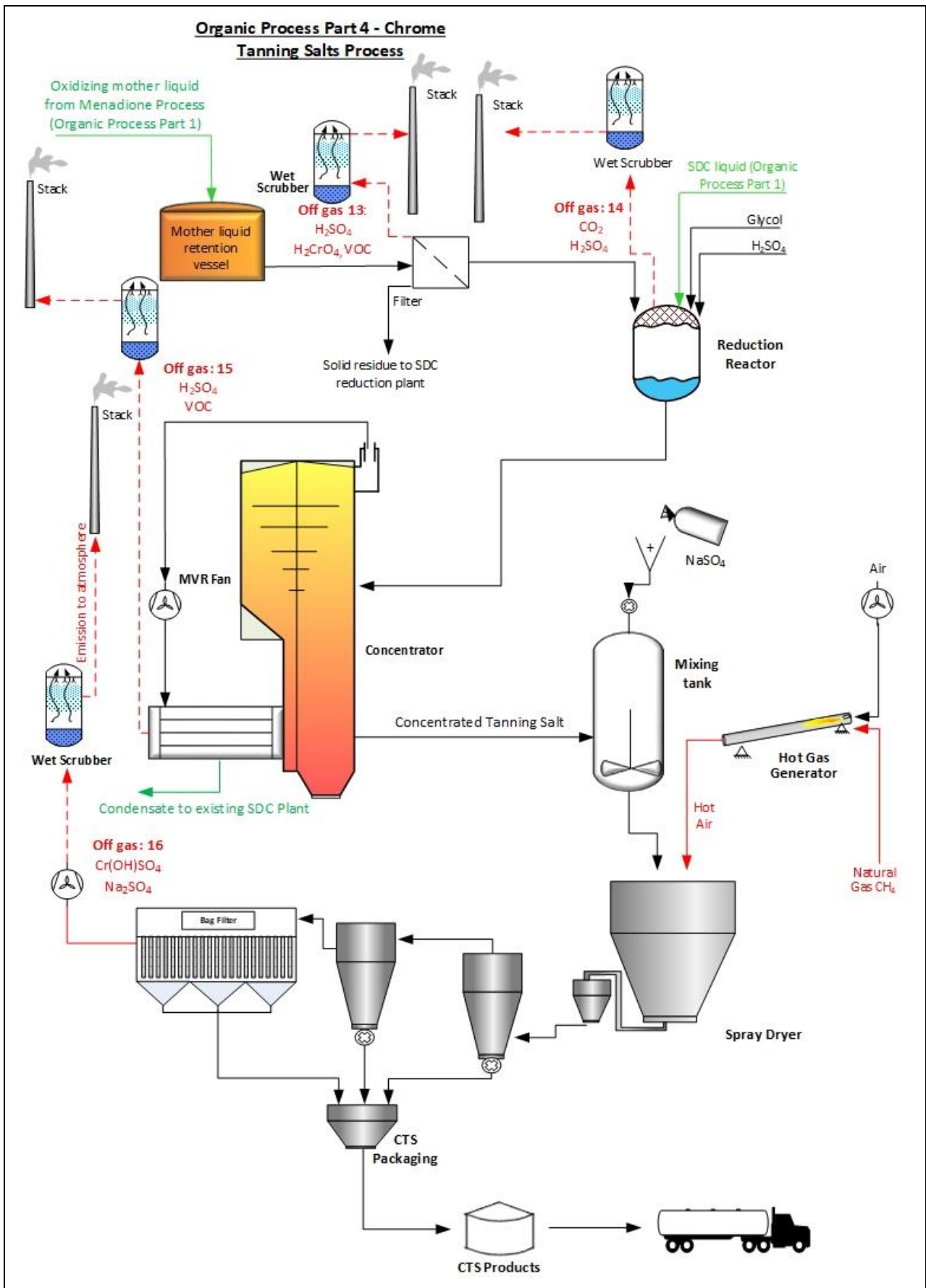


Figure 1-6: Organic Process Part 4 – Chrome Tanning Salts process

1.1.3 STORAGE OF DANGEROUS GOODS

The storage quantities for raw materials and products are shown in Table 1-1 and Table 1-2 respectively. It is notable that "dangerous goods" is defined as "goods containing any of the substances as contemplated in South African National Standard No. 10234, supplement 2008 1.00: designated "List of classification and labelling of chemicals in accordance with the Globally Harmonized Systems (GHS)" published by Standards South Africa, and where the presence of such goods, regardless of quantity, in a blend or mixture, causes such blend or mixture to have one or more of the characteristics listed in the Hazard Statements in section 4.2.3, namely physical hazards, health hazards or environmental hazards;"

Although some of the materials are not listed in the SANS 10234 supplement of 2008 they may be assessed as being hazardous in terms of SANS 10234 classification procedures. All the materials have been included here in keeping with the precautionary principle.

Table 1-1: Raw Material Storage Quantities		
Name of Raw Material	Storage Quantity (tons)	SANS 10234 Classification*
Vitamin K3 Raw Materials		
B-methyl naphthalene	340	Not listed
Sulfuric acid	900	Eye irritant, Skin irritant
Sodium dichromate	2000	Oxidising solid Carcinogen Mutagen Reproductive toxicity Skin corrosion Respiratory sensitivity Acute aquatic toxicity Chronic aquatic toxicity
N-heptane	60	Flammable liquid Aspiration hazard Acute aquatic toxicity Chronic aquatic toxicity
Sodium pyrosulphite	200	Not listed
Nicotinamide	100	Not listed
Activated carbon	10	Not listed
Ethanol	60	Flammable liquid
Liquid alkali (Sodium Hydroxide)	200	Eye irritant, Skin irritant
Liquid ammonia	4	Acute toxicity (inhalation) Skin corrosive Acute aquatic toxicity

Table 1-1: Raw Material Storage Quantities		
Name of Raw Material	Storage Quantity (tons)	SANS 10234 Classification*
Organic Chrome Tanning Salts Raw Materials		
Sodium dichromate	200	As above
Glucose	100	Not listed
Oxidized mother liquor	500	Not listed
Sodium sulphate	100	Not listed
Inorganic Chrome Tanning Salts Raw Materials		
Sodium dichromate	500	As above
Molten sulphur	300	Not listed
Sulfuric acid	90	As above
Dolomite	10	Not listed
Sodium formate	4	Not listed
Soda ash	10	Not listed
* as listed in the supplement to SANS 10234:2008		

Table 1-2: Product storage quantities		
Name of Product	Storage quantity (tons)	SANS 10234 Classification*
Vitamin K3 MSB (bisulphite Sodium menthoquinone)	10	Not listed
Vitamin K3 MNB (bisulphite Nicotinamide menthoquinone)	100	Not listed
Organic Chrome Tanning Salts	3000	Not listed
Inorganic Chrome Tanning Salts	5000	Not listed
* as listed in the supplement to SANS 10234:2008		

1.1.4 SITE LAYOUT

The proposed site layout is shown in Figure 1-7.

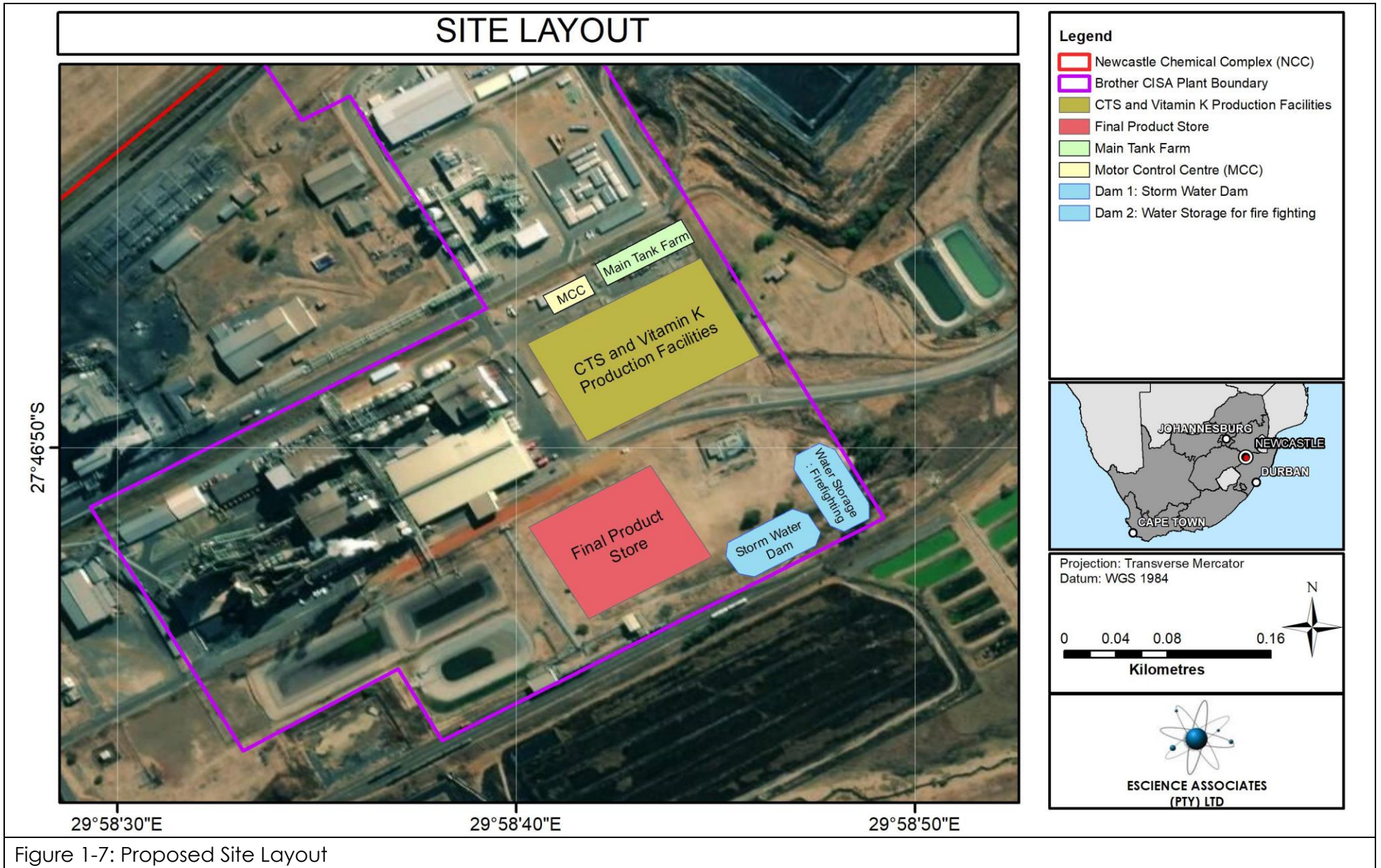


Figure 1-7: Proposed Site Layout

1.2 LOCATION AND SITE DESCRIPTION

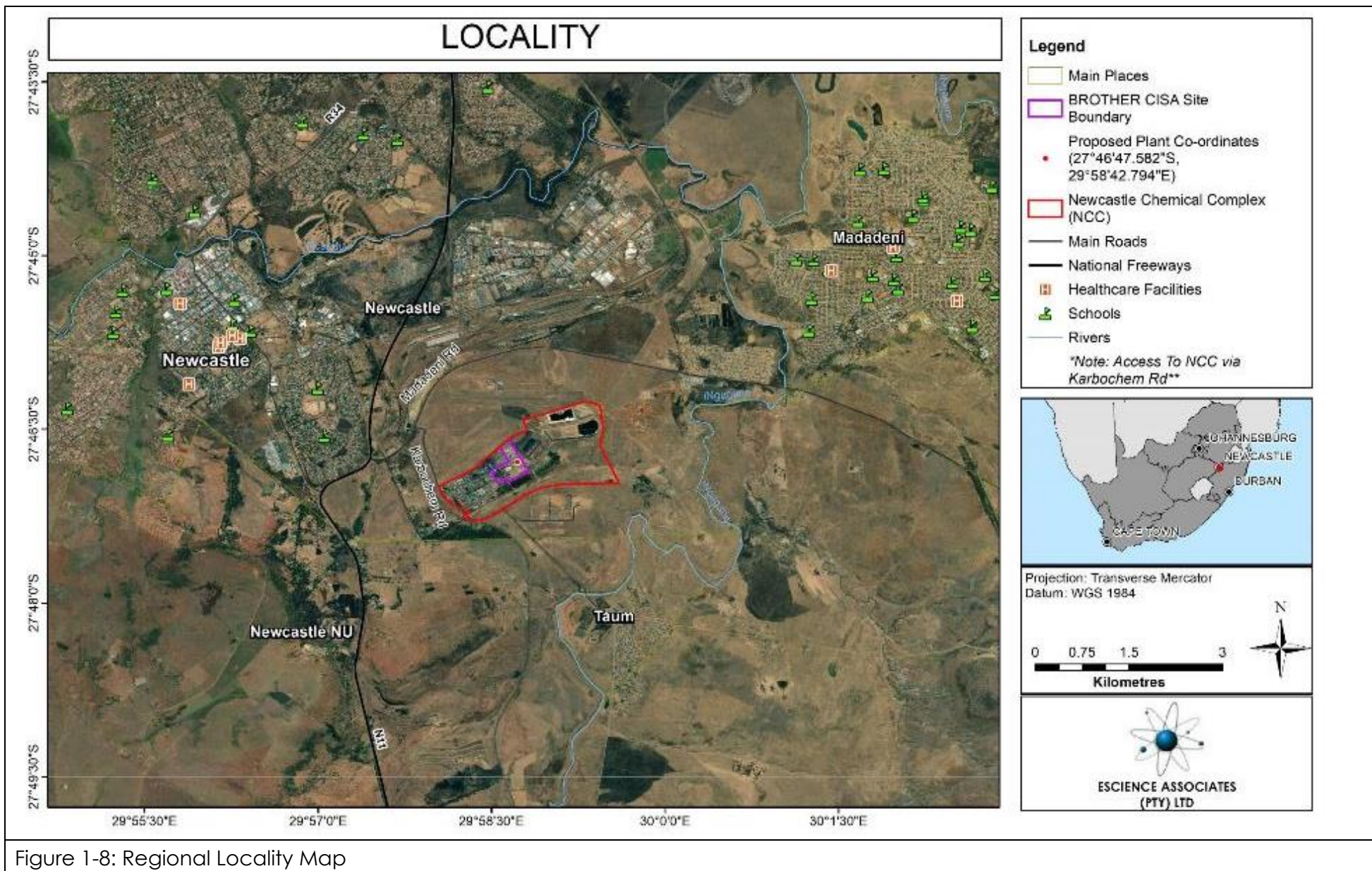
The Brother CISA chrome chemicals facility is situated within the Newcastle Chemical Park, Karbochem Road, Newcastle, in northern KwaZulu Natal.

Refer to Figure 1-8 for the location of the facility, and Table 1-3 for further details of the site.

Physical Address of the Plant	1 Karbochem Road, Newcastle, 2940
Description of Site (Where No Street Address)	N/A
Coordinates of Approximate Centre of Operations	Latitude: 27.780936°S; Longitude: 29.976462°E
Extent (km ²)	0.327
Elevation Above Mean Sea Level	1240
Province	Kwazulu-Natal
Metropolitan/District Municipality	Amajuba District Municipality
Local Municipality	Newcastle Local Municipality
Designated Priority Area (if applicable)	N/A

Brother CISA's operations are undertaken on the properties listed in Table 1-4 below. The properties belong to the applicant.

Property Registration Number (Surveyor-General Code)	(K252)NOHS 0221 0001 5432 000000
	(K252)NOHS 0221 0001 3661 000020
	(K252)NOHS 0221 0001 3661 000030
	(K252)NOHS 0221 0001 3661 000060
	(K252)NOHS 0221 0001 3661 000050
	(K252)NOHS 0221 0001 3744 000030



1.3 PLANNED LIFE OF THE FACILITY

The facility is planned to operate permanently. If decommissioning is ever planned a decommissioning plan must be developed. Given that de-commissioning is not reasonably anticipated to occur in the foreseeable future, this EMP covers only a limited set of impacts related to de-commissioning which are foreseeable.

1.4 DETAILS OF ENVIRONMENTAL ASSESSMENT PRACTITIONER

The Environmental Management Programme (EMPr) for this application was undertaken by EScience Associates (Pty) Ltd, as independent Environmental Assessment Practitioners (EAP). The team was led by Mr. A Ebrahim (Table 1-5). Detailed curricula vitae are attached as Appendix 1.

Table 1-5: Details of EAP (Author of the EMP)	
Name of Company	EScience Associates (Pty) Ltd.
Contact Person	Abdul Ebrahim
Postal Address	PO Box 2950, Saxonwold, Johannesburg, 2132
Physical Address	9 Victoria Street, Oaklands, Johannesburg, 2192
Telephone	(011) 718 6380
Fax	086 610 6703
Email	abdul@escience.co.za
Qualifications/ Registrations	BEng (Hons) Environmental Engineering Certified EAP Member of the Engineering Council of South Africa

1.5 ADMINISTRATIVE INFORMATION

The following section and associated set of tables provide pertinent administrative information pertaining to the development/lease area (Table 1-6 and Table 1-7).

Table 1-6: Name and Address of the Proponent.	
Company Name	Brother CISA (Pty) Ltd
Company Registration	1996/014329/07
Physical Address	Newcastle Chemical Park, Karbochem Road, Newcastle, KZN
Postal Address	Private Bag X6600, Newcastle, 2940
Telephone	034 370 7000

Table 1-7: Details of responsible person(s) at facility	
Contact person:	Jacque Hunlun
Position	EH & S Manager
Telephone:	034 370 7005
E-mail:	jacque.hunlun@brothercisa.com

1.6 EMP STRUCTURE

In order to realise the objectives of the EMP, the document:

- Specifies the general roles and responsibilities for the implementation and monitoring of the EMP;
- Identifies the specific aspects (i.e. activities related to the development) that may result in environmental impacts and therefore require management/mitigation;
- Identifies the specific impacts or risks that may eventuate during the construction or operational phases of the project;
- Determines and specifies the specific mitigation measures that must be implemented;
- Identifies the related monitoring procedures;
- Specifies the responsible party for implementation of specific measures and monitoring procedures; and
- Determines the frequency of implementing measures and monitoring procedures.

1.7 EMP IMPLEMENTATION

The EMP should not be seen as an additional requirement separate from the day-to-day activities of the site and associated responsibilities. If it becomes merely another layer of control, it could be perceived as an obstruction to normal duties and operations. The EMP must be integrated with routine operations and responsibilities, which requires commitment from management and the workforce alike (DEAT, 2004).

2 ROLES & RESPONSIBILITIES

2.1 THE PROJECT PROPONENT/DEVELOPER (BROTHER CISA)

Brother CISA will be responsible for the overall implementation, monitoring and enforcement of the activities as outlined in the EMP. The project manager or other senior designate from Brother CISA will be responsible for overseeing that environmental compliance and monitoring is performed and will undertake all correspondence with the relevant authorities.

Brother CISA remains ultimately responsible for ensuring that the activity is implemented according to the provisions of the EMP and conditions of a potential Environmental Authorisation (EA) throughout all phases of the project. Although specific role-players will be appointed by Brother CISA to perform certain functions on its behalf, the ultimate responsibility is not delegated. Brother CISA has to ensure that sufficient resources (time, financial, human, equipment, etc.) are available to these other parties to efficiently perform their tasks in terms of the EMP. Because Brother CISA is liable for restoring negligent damage caused to the environment¹, each member of staff has to be responsible and accountable for compliance as per the EMP.

2.2 PROJECT/SITE MANAGER (PSM)

Brother CISA must appoint/designate a senior representative as Project/Site Manager (PSM) to act on its behalf. The duties of this representative, as relevant, would include:

- Ensure that the EMP is part of relevant contractual documentation so that any contractors are bound to the conditions of the EMP and relevant licences, permits/approvals/authorisations;
- Monitor the undertaking of environmental awareness training for all new personnel coming onto site, or undertake environmental awareness courses themselves;
- Appoint an Environmental Control Officer (IEO) to assist with day-to-day EMP implementation and monitoring duties;
- Ensure that the necessary waste licenses and permits have been obtained and are maintained;
- Comply with the contents of the EMP to ensure that the requirements of the EMP are met;
- Monitor and verify that the EMP is adhered to at all times and take action if the specifications are not followed;
- Monitor and verify that environmental impacts are kept to a minimum;
- Review operational procedures in conjunction with the IEO;
- Assist the IEO in finding environmentally responsible and effective solutions to any problems encountered during implementation;
- Inspect the site and surrounding areas from time to time; and
- Monitor, review and verify compliance with the EMP as reported by the IEO.

¹ In this respect see section 34 (Criminal Proceedings) of the National Environmental Management Act, 1998 (Act No. 107 of 1998)

It must be noted that the PSM at different phases of the project may be different people, for example during the operational phase the PSM would be the relevant management in control of the authorised activities, whereas during construction the PSM may be the relevant management in control of the construction phase of the project.

2.3 INTERNAL ENVIRONMENTAL OFFICER (IEO)

Brother CISA's IEO will be responsible for monitoring, reviewing and verifying compliance with the EMP on a day-to-day basis. This role may be fulfilled by any suitably qualified and responsible representative involved with daily on-site operations. In particular, the IEO shall:

- Regularly inspect and continuously monitor the site to ascertain the level of compliance with the EMPr;
- The IEO must oversee all the environmental aspects relating to the development and provide auditing of compliance with the EMPr;
- Maintain inspection reports on file;
- Monitor and verify through bi-annual audits that the EMP is adhered to at all times and take action if the specifications are not followed;
- Monitor and verify that environmental impacts are kept to a minimum;
- Assist Brother CISA in finding environmentally responsible solutions to problems;
- Keep records of all activities/incidents concerning environment performance;
- Keep a register of complaints from IAPs;
- Provide material/manuals and support for raising environmental awareness of staff;
- Ensure that activities on site comply with legislation of relevance to the environment;
- Liaise with relevant authorities;
- Liaise with contractors regarding environmental management;
- Complete checklists as necessary; and
- Continually, internally review the EMP and submit monthly reports to the PSM.

2.4 EXTERNAL ENVIRONMENTAL AUDITOR (EEA)

An External Environmental Auditor (EEA) may be appointed by Brother CISA to independently review relevant environmental aspects relating to this development. The EEA would need to conduct independent periodic external audits to assess compliance with the EMP and be responsible for providing feedback on potential environmental problems associated with the activities on site. The minimum periodicity of these external audits shall be determined by the site's Environmental Authorisation.

2.5 ATMOSPHERIC EMISSION CONTROL OFFICER (AECO)

An Atmospheric Emission Control Officer² (AECO) must be appointed in terms of the site's Atmospheric Emissions Licence (AEL).

The AECO is required to:

²Referred to as "Emission Control Officer" in the Atmospheric Emissions Licence and in NEMAQA but noted in this EMPr as AECO to denote that responsibilities are specific to "atmospheric" emissions. This is to avoid confusion with the widely used term Environmental Control Officer (ECO).

- a) work towards the development and introduction of cleaner production technologies and practices;
- b) take all reasonable steps to ensure compliance by the holder of the licence with the licence conditions and requirements; and
- c) promptly report any non-compliance with any AEL conditions or requirements to the atmospheric emissions licensing authority.

3 RECORD KEEPING

Record keeping must be done in such a way that all information generated is secure can be accessed easily. The IEO will be responsible for maintenance of environmental records and reports. The IEO will ensure that these are readily accessible for reporting to site management as well relevant authorities within the timeframes stipulated in the Environmental Authorisation.

4 EMP REPORTING

Adequate monitoring, auditing and record keeping make reporting a simple task. Information and existing reports can be assembled and presented to whoever may need them. Knowing what reporting is necessary can help inform the type of monitoring and the system of record keeping. Typical reporting requirements include:

- Company performance/management system reports (e.g. performance targets);
- Company environmental/sustainability reports (part of annual reports);
- Audit reports, including review of the EMP; and
- Incident/event reports.

5 EMP UPDATE

This EMP must be updated upon substantive amendment of the Environmental Authorisation. Brother CISA may periodically review the EMP and update it to suit changing circumstances. Updates/amendments must be undertaken in compliance with the conditions of the Environmental Authorisation and the applicable EIA regulations. Where the Environmental Authorisation is not prescriptive in respect of such updates or amendments, the competent authority must be informed of such intended updates/amendments to the EMP.

6 ASPECTS AND IMPACTS COVERED BY EMPR

A summary of the impact assessment is presented in Table 6-1. It is clear that the impacts of the proposed upgrades, with mitigation are all anticipated to be low, negligible or positive.

Table 6-1: Summary of Environmental Impacts		
Construction phase:	Impact	Impact significance with mitigation
Potential general waste generation during construction phase	-	Negligible
Potential impacts on groundwater resources through accidental leaks and spillages of hazardous materials (particularly hydrocarbons, e.g. diesel, oil) during construction activities	-	Negligible
Potential impacts on surface water resources through accidental leaks and spillages of hazardous materials (particularly hydrocarbons, e.g. diesel, oil) during construction activities	-	Negligible
Potential impacts on soil through accidental leaks and spillages of hazardous materials (particularly hydrocarbons, e.g. diesel, oil) during construction activities	-	Negligible
Potential Air Quality Impacts through dust generation	-	Negligible
Potential noise generation during construction phase	-	Negligible
Socio-economic Impact through creation of temporary / short-term employment opportunities during the construction phase	+	Moderate (Positive)
Archaeological		Negligible
Palaeontological		Negligible
Operational phase:	Impact	Impact significance with mitigation
Air quality	-	Acceptably Low
Traffic	-	Low
Emergency Incident	-	Societal Risk Acceptably Low
Potential impacts on groundwater resources through accidental leaks and spillages of	-	Negligible

Table 6-1: Summary of Environmental Impacts		
hazardous materials during operations		
Potential impacts on surface water resources through accidental leaks and spillages of hazardous materials during operations	-	Negligible
Potential impacts on soil through accidental leaks and spillages of hazardous materials during operations	-	Negligible
Socio-economic Impact through creation of employment opportunities during operations	+	Moderate (Positive)
Aviation	-	Negligible
Decommissioning phase:	Impact	Impact significance with mitigation
Potential general waste generation during decommissioning phase	-	Negligible
Potential impacts on groundwater resources through accidental leaks and spillages of hazardous materials (particularly hydrocarbons, e.g. diesel, oil) during decommissioning activities	-	Negligible
Potential impacts on surface water resources through accidental leaks and spillages of hazardous materials (particularly hydrocarbons, e.g. diesel, oil) during decommissioning activities	-	Negligible
Potential impacts on soil through accidental leaks and spillages of hazardous materials (particularly hydrocarbons, e.g. diesel, oil) during decommissioning activities	-	Negligible
Potential Air Quality Impacts through dust generation	-	Negligible
Potential noise generation during decommissioning phase	-	Negligible
Socio-economic Impact through creation of temporary / short-term employment opportunities during the decommissioning phase	+	Moderate (Positive)

7 IMPACT MANAGEMENT OUTCOMES

The impact management outcomes, as described in the sub-sections below, were identified and taken into consideration during the development of this EMPr.

7.1 PROJECT PLANNING AND DESIGN PHASE

- Ensure that competent staff are appointed to develop procedures and implement the requirements of the EMPr;
- Update the EMPr to reflect the requirements of the Environmental Authorisation;
- Contractors and Staff must be trained in all environmental aspects related to their duties.

7.2 CONSTRUCTION PHASE

- Maintain soil integrity and minimise erosion;
- Maintain a hygienic environment in construction site and construction camp;
- Minimise the risk of fires;
- Avoid excessive atmospheric pollution;
- Avoid excessive noise generation from construction activities;
- Prevent land and water pollution;
- Minimise the generation of waste.

7.3 OPERATIONAL PHASE

- Ensure environmental legal requirements are identified and are met;
- Contractors and staff must be made aware of the provisions and requirements of the EMPr and Environmental Authorisation relevant to their activities;
- Ensure ongoing inspections and maintenance of the facility;
- Emergency situations to be dealt with efficiently and all staff to be trained to do so;
- Avoid excessive atmospheric pollution;
- Prevent land and water pollution.

7.4 CLOSURE

Given that de-commissioning is not reasonably anticipated to occur in the foreseeable future, this EMP covers only a limited set of impacts related to de-commissioning which are foreseeable.

- A decommissioning plan must be formulated prior to commencement of decommissioning to manage or avoid environmental impacts
- Maintain soil integrity and minimise erosion;
- Minimise the risk of fires;
- Avoid excessive atmospheric pollution;
- Avoid excessive noise generation from decommissioning activities;
- Prevent land and water pollution;
- Minimise the generation of waste.

8 ENVIRONMENTAL MANAGEMENT PROGRAMME

The mitigation tables that follow have been compiled consist of five (5) criteria, as follows:

- Aspect – The broad area of application with respect to the waste management activity (E.g. Waste storage, air emissions);
- Activity - This row will identify the issue being addressed, e.g. Activities potentially impacting on air quality;
- Management Actions and Monitoring - This column will include all the necessary mitigation measures for each activity and /or area under scrutiny;
- Frequency of action – This column provides time guidelines for the ‘Responsible party’ by which he/she is to action or manage the required mitigation;
- Responsible Party – Indicates that party who is ultimately responsible for ensuring that the prescribed mitigation measures are appropriately implemented within the specified time-frames;

8.1 PROJECT PLANNING & DESIGN PHASE

Table 8-1: Environmental Management Plan - Planning and Design Phase				
ASPECT	ACTIVITY	MANAGEMENT ACTIONS & MONITORING	RESPONSIBILITY	FREQUENCY
1. Project Planning & Design Phase				
1.1 Management (Set-up structures and procedures for implementation of EMP)	Appointment of and duties of IEO	Appoint an Internal Environmental Control Officer (IEO) who will be required to monitor the activities with a direct hands-on approach and ensure compliance and co-operation of all personnel.	PSM	Before commencement
	Update the EMP after detailed design has been completed	This EMP must be updated to ensure that it is relevant to the detailed design of the facility.	PSM, IEO	Before commencement
	Update the EMP to reflect the requirements of the EA	This EMP must be updated to ensure that all conditions of the EA and other environmental approvals (e.g. permits, licenses etc) issued for this project have been incorporated into the EMP, as necessary.	IEO	Before commencement

Table 8-1: Environmental Management Plan - Planning and Design Phase				
ASPECT	ACTIVITY	MANAGEMENT ACTIONS & MONITORING	RESPONSIBILITY	FREQUENCY
	Appointment and duties of IEO	The project proponent must appoint an independent Environmental Officer (IEO) who must monitor compliance with the EMP.	PSM, IEO	When required
	Management of staff and contractors	The EMP must be made binding to the any contractors and should be included in tender documentation for any applicable contracts.	PSM, IEO	Once-off before contractor appointments
		The EMP must be made available to the contractors, staff, as well as other relevant role-players associated with the project.	PSM, IEO	Continuous
1.2 Layout Design	Clear demarcation of activities	Internal routes, Drop-off, pick-up, refuelling zones, and storage areas must be clearly demarcated.	PSM	Before commencement
	Roads	A clear space should be provided along the site Internal Road for pedestrian walking.	PSM	Continuous
	Noise	Sources of potentially significant noise must ideally be positioned away from sensitive receptors as far as is practical.	PSM	Before commencement
1.3 Signage	Information for the public	A general notice board must be erected at the construction site entrance in appropriate official languages. The notice must have details of emergency contact persons and procedures and operational hours, unless the EA indicates otherwise.	IEO	Before conducting the authorised activities
1.4 Training	Training of staff and contractors	Staff must be trained in all environmental aspects of their duties and responsibilities relating to the EA and the EMP. Records of training and verification of competence must be kept by Brother CISA.	IEO	Prior to commencement of work

8.2 CONSTRUCTION PHASE

Table 8-2: Environmental Management Plan – Construction Phase				
ASPECT	POTENTIAL IMPACT/RISK/ISSUE	MANAGEMENT ACTIONS & MONITORING	RESPONSIBILITY	FREQUENCY
2. Construction Phase				
2.1 Monitoring and Reporting	Compliance with the EMP & EA	Monitor site activities and compliance with EMP.	IEO	Continuous
		Identify, propose, monitor and sign off on the implementation of any required rectification measures.	IEO, PSM	Continuous
		Audit compliance with EMP and report to authorities.	IEO IEO	As determined by the EA
2.2 Environmental incidents	Environmental incidents during the construction phase	Serious incidents must be report as per S30 of NEMA. A record of these incidents must be kept. NEMA S30(1a) stipulates: "incident" means an unexpected, sudden and uncontrolled release of a hazardous substance, including from a major emission, fire or explosion, that causes, has caused or may cause significant harm to the environment, human life or property;	PSM	As required
		Brother CISA will be responsible for rehabilitating any damages caused to the environment due to any incident occurring on site that is as a direct result of the construction activities.	PSM	As required
2.3 Construction site management	Atmospheric pollution and odours	Ensure that no wastes are burnt on the premises or on surrounding premises.	Contractor,	Daily
		The Contractor is to take appropriate measures to minimise the generation of dust as a result of construction works, to the satisfaction of the IEO.	Contractor, IEO,	As necessary
	Soil integrity and erosion	The Contractor shall take appropriate and active measures to prevent erosion resulting from his works.	Contractor	As required

Table 8-2: Environmental Management Plan – Construction Phase				
ASPECT	POTENTIAL IMPACT/RISK/ISSUE	MANAGEMENT ACTIONS & MONITORING	RESPONSIBILITY	FREQUENCY
		The Contractor shall protect areas susceptible to erosion by installing all the necessary temporary and permanent drainage works as soon as possible to prevent the surface water from being concentrated in streams and from scouring any significant slopes, or other areas. These drainage facilities must have silt traps to prevent silt from entering storm water systems.	Contractor	As required
	Construction hazards	Construction/activities must be planned and undertaken in compliance with the Occupational Health and Safety Amendment Act, Act No. 181 of 1993, and the regulations thereunder, including but not necessarily limited to: General Safety Regulations, 1986, Construction Regulations, 2003; and, the National Building Regulations and Building Standards Act, 1977 (Act No.103 of 1977) and regulations thereunder.	PSM, Contractors	Continuous
	Noise	Vehicles to comply with the standards as provided in the International Finance Corporation's Environmental Health & Safety Regulations.	PSM, Contractors	Continuous
		Acoustic screening measures to be installed in and around noise sources which generate a noise exceeding 85.0dBA at the source	PSM, Contractors	Once-off (if necessary)
	Risk of fires	No open fires are to be allowed on site to prevent any fire damage to surrounding buildings.	Contractor	Continuous
		Welding, gas cutting or cutting of metal will only be permitted inside the working areas.	IEO, Contractors	Continuous
		Suitable and sufficient fire-extinguishing equipment must be placed at strategic locations and must be adequately maintained.	IEO, Contractors	Continuous
		The Contractor shall pay the costs incurred to organisations called to put out any fires started by him. The Contractor shall also pay any costs incurred to reinstate burnt areas as deemed necessary by the IEO.	IEO, Contractors	Continuous

Table 8-2: Environmental Management Plan – Construction Phase				
ASPECT	POTENTIAL IMPACT/RISK/ISSUE	MANAGEMENT ACTIONS & MONITORING	RESPONSIBILITY	FREQUENCY
	Hazardous Substances	Hazardous substances such as fuel and oil must be stored within appropriately sized, impermeable, bund walls, with the appropriate warning signage.	IEO, Contractors	Continuous
		The IEO must ensure that the storage and utilization of potentially hazardous material such as diesel, petrol, oils and lubricants, etc does not result in any form of soil and water contamination.	IEO, Contractors	Continuous
		Spill kits to be readily available at all points where hazardous substances will be stored and/or transferred (e.g. refuelling points)	IEO, Contractors	Continuous
2.4 Preparation of Building Material & Cement works	Surface water and ground water pollution prevention.	Where possible building materials are to be prepared at a batching plant, to enable the effects of cement and other substances, and the resulting effluent to be more easily managed.	Contractor, IEO	Once-off & inspect daily
		Cement contaminated water may not enter a natural or man-made water system. Preventative measures include establishing sumps from where contaminated water can be either treated in situ or removed to an appropriate waste site. If possible/appropriate ready mix concrete should be used.	Contractor, IEO	Once-off & inspect daily
		Excess or spilled concrete should be confined within the works area and then removed to a suitable waste site.	Contractor, IEO	Once-off & inspect daily
2.5 Waste Management	Land and water pollution, littering.	Adequate Bins and/or skips must be provided on the site to provide for general waste. Waste sorting must be done at source or within a dedicated area. Undesired or non-recyclable waste must be collected by an appropriate waste management service provider.	IEO	Once off;
		Ensure that no refuse or builders rubble generated on the premises be placed, dumped or deposited on adjacent/surrounding properties including road verges, roads or public places and open spaces during or after the construction period. All discard materials produced during construction that will not be recovered or recycled must be taken offsite and deposited in an appropriate, licenced landfill site.	Contractor, IEO	Continuous, inspect daily

Table 8-2: Environmental Management Plan – Construction Phase				
ASPECT	POTENTIAL IMPACT/RISK/ISSUE	MANAGEMENT ACTIONS & MONITORING	RESPONSIBILITY	FREQUENCY
		The Contractor shall ensure that waste and surplus food, food packaging and organic waste are not deposited by his employees anywhere on the site except in dedicated refuse bins for removal on a daily basis by the Contractor. Refuse bins shall be weather-proof.	Contractor	Continuous, inspect daily
2.6 Vehicles and Fuel Storage	Land and water pollution	If vehicle and/or construction machinery maintenance is to occur onsite, a suitable leak proof container for the storage of oiled equipment (filters, drip tray contents and oil changes etc.) must be established.	Contractor, IEO	Continuous, inspect daily
		Drip trays to be appropriately placed under vehicles and plant that stay over-night on bare soil surfaces.	Contractor, IEO	Continuous, inspect daily
		All servicing of onsite mechanical machinery must have a drip tray present to prevent accidental spillage of oils and fuels.	Contractor, IEO	Continuous, inspect daily
		All vehicles, equipment, fuel and petroleum services and tanks must be maintained in a condition that prevents leakage and possible contamination of soil or water supplies. Refuelling areas must be bunded and secured to prevent soil and water contamination.	Contractor, IEO	Continuous, inspect daily
		Fuels and flammable materials are to be stored in suitably equipped storage areas complying with general fire safety requirements.	Contractor, IEO	Continuous, inspect daily
		Where hydrocarbon spills occur on soils, the soil is to be removed for treatment or disposal as soon as practical.	Contractor, IEO	Continuous
2.7 Heritage and Culture	Destruction of cultural resources	Should any cultural heritage be observed once development commences, a specialist must be consulted to perform an examination of the finds.	Contractor, IEO	Continuous

Table 8-2: Environmental Management Plan – Construction Phase				
ASPECT	POTENTIAL IMPACT/RISK/ISSUE	MANAGEMENT ACTIONS & MONITORING	RESPONSIBILITY	FREQUENCY
	Destruction of fossils	If construction activities on this property should involve excavation of the property (i.e. earth movement) that expose any fossil deposits, SAHRA should be contacted immediately and a professional palaeontologist should be brought in to assess their significance and provide recommendations (e.g. recording, sampling, collection and mitigation).	Contractor, IEO	Continuous
2.8 Aviation	Impact on Aviation	The activities are to be subject to a height restriction of 54m above natural ground level within the development site.	PSM, COnttractor	Continuous

8.3 OPERATIONAL PHASE

Table 8-3: Environmental Management Plan – Operational Phase				
ASPECT	POTENTIAL IMPACT/RISK/ISSUE	MANAGEMENT ACTIONS & MONITORING	RESPONSIBILITY	FREQUENCY
3. Operational Phase				
3.1 Legal Compliance	Identification of environmental legal requirements	Procedures must be drawn up to ensure that all relevant environmental legal requirements and amendments are identified, and that this EMPr can be updated to ensure that those legal requirements are met.	PSM	Before commencement of operation.
	Atmospheric Emission Licence	The site's Atmospheric Emission Licence must be updated to include the relevant activities listed in terms of S21 of NEMAQA prior to operating these activities. Notably S22(a) of NEMAQA states "No person may without a provisional atmospheric emission licence or an atmospheric emission licence conduct an activity listed on the national list anywhere in the Republic."		
	Updating the EMPr	The EMPr must be reviewed, and if necessary updated, on a periodic basis to ensure that environmental legal requirements for the operations are adhered to.	PSM	At least once per calendar year
3.2 Awareness and Training	Training of Staff and Contractors	Contractors and staff must be adequately trained in all environmental aspects relating to their role in the operation. Contractors and staff must be made aware of the provisions and requirements of the EMPr and the EA relevant to their activities. Records of training and verification of competence must be kept by Brother CISA.	PSM, Contractors, IEO.	Before commencement of operations.
		Any persons having duties that are or may be affected by the EA must have convenient access to a copy thereof, which copy must be kept at or near the place where those duties are carried out.	IEO	Continuous

Table 8-3: Environmental Management Plan – Operational Phase				
ASPECT	POTENTIAL IMPACT/RISK/ISSUE	MANAGEMENT ACTIONS & MONITORING	RESPONSIBILITY	FREQUENCY
		Brother CISA must ensure that all personnel who work with hazardous substances are trained to deal with these potential hazardous situations so as to minimise the risk involved. Records of training and verification of competence must be kept by Brother CISA.	IEO	Before commencement of operations.
3.3 Monitoring and Reporting	Compliance with the EMP, EA and AEL	Monitor site activities and compliance with EMP, EA and AEL	IEO	Continuous
		Internal audits must be conducted biannually by the IEO and on each audit occasion an official report must be compiled to report the findings of the audits, which must be made available to the PSM.	IEO, AECO	Bi-Annual
		Where non-compliance occurs - Identify, propose, monitor and sign off on the implementation of rectification measures.	IEO, PSM	Continuous
		Stack monitoring must be undertaken in accordance with the requirements of the Atmospheric Emissions Licence	IEO, PSM	As required by AEL
	If required by the EA, Brother CISA must appoint an independent external auditor to audit the site annually and the auditor must compile an audit report documenting the findings of the audit, which must be undertaken, and if required must be submitted to the competent authority, according to conditions of the EA.	IEO	Annual	
	Complaints	A complaints register shall be maintained and kept at reception in order to record complaints.	IEO	Continuous

Table 8-3: Environmental Management Plan – Operational Phase				
ASPECT	POTENTIAL IMPACT/RISK/ISSUE	MANAGEMENT ACTIONS & MONITORING	RESPONSIBILITY	FREQUENCY
3.4 Emergency Preparedness	Emergency Response	<p>Brother CISA must develop, implement and maintain an emergency preparedness plan and review it annually when conducting an audit, and after each emergency incident and major accident.</p> <p>The plan must, amongst others, include measures to address:</p> <ul style="list-style-type: none"> a) Equipment malfunction; b) Site fires; c) Spillage (on Site); d) Natural disasters such as floods; and e) The plan must include contact details of the nearest police station, ambulance services and the emergency centre. 	IEO	Once-off & updated as required
		<p>Ensure that the contact details of the emergency response services (ambulance service, fire brigade) are available on site.</p>	IEO	Once-off & updated as required
	Fire prevention and response	<p>Suitable (type) and sufficient (volume) fire-extinguishing equipment must be placed at strategic locations to respond immediately to fires. These must be well maintained, and the case of fire extinguishers these must inspected annually.</p>	IEO	After construction, Before commencement of operations. Annual inspections.
		<p>Prohibit smoking and open flames on site.</p>	PSM	Prior to commencement , ongoing
	Environmental Incidents	<p>All staff will be made aware of emergency procedures.</p>	IEO	Continuous
		<p>Key staff to be trained in emergency techniques e.g. first aid and firefighting.</p>	IEO	Continuous

Table 8-3: Environmental Management Plan – Operational Phase				
ASPECT	POTENTIAL IMPACT/RISK/ISSUE	MANAGEMENT ACTIONS & MONITORING	RESPONSIBILITY	FREQUENCY
		<p>The competent authority and other relevant authorities must immediately be informed should any serious incident occur which is likely to have detrimental effects on the environment. A record of these incidents must be kept. All incidents must be reported as per the requirements of S30 of the National Environmental Management Act, No. 107 OF 1998.</p> <p>“Incident” means an unexpected, sudden and uncontrolled release of a hazardous substance, including from a major emission, fire or explosion, that causes, has caused or may cause significant harm to the environment, human life or property;</p>	As soon as reasonably practicable after obtaining knowledge of the incident, Preferably within 24 hours.	Environmental incidents
		Brother CISA will be responsible for rehabilitating any damage caused to the environment due to any event occurring on site.	IEO	If required
3.5 General Maintenance	Land and water pollution	All mechanical equipment, forklifts and trucks used must be clean and free from leaks of oil, petrol, diesel, hydraulic fluid, etc.	PSM	Daily inspections
		Where maintenance is undertaken, adequate measures must be implemented to prevent contamination of soil and/or water. All maintenance undertaken outside buildings (i.e. on roads, paving or any exposed area exposed) must be undertaken with drip trays to capture any spills or leaks.	PSM	Continuous
	Storage tanks	Maintenance of the tanks should take place regularly to avoid pollution or the degradation of the Environment.	PSM, IEO	Continuous
		A maintenance schedule is to be kept and maintained on site.	PSM	Continuous
	Air pollution	All machinery and equipment capable of emitting atmospheric pollutants (e.g. forklifts) must be adequately maintained to prevent noxious and avoidable emissions.	PSM, AECO	Daily inspections
3.6 Containment of run-off and spills/leaks	Land and water pollution	All potentially contaminated runoff and spills within the plant must be channelled to existing lined dirty water dams/containment facilities.	PSM	Continuous

Table 8-3: Environmental Management Plan – Operational Phase				
ASPECT	POTENTIAL IMPACT/RISK/ISSUE	MANAGEMENT ACTIONS & MONITORING	RESPONSIBILITY	FREQUENCY
		Contaminated water from the lined catchment dams must be recycled into the process plant.	PSM	Continuous
		Existing leak detection measures and groundwater monitoring network must be maintained.	PSM	Continuous
3.7 Waste management	Land and water pollution	Waste management practices must adhere to the regulations set out in GN.R634 National Environmental Management: Waste Act (59 / 2008): Waste Classification and Management Regulations.	PSM, IEO	Continuous
		All waste and storage areas must be clearly demarcated and maintained.	IEO	Once off, weekly inspection
		Storage of waste is to take place under roof on an impermeable surface and within a bunded area.	PSM, IEO	Continuous
		Storage areas for recyclable material generated by Brother CISA must be allocated and effectively maintained.	PSM, IEO	Continuous
		Procedures to deal with litter must be put in place and staff should be trained in these procedures. Daily housekeeping within the site must be undertaken.	IEO	Daily
	Disposal of hazardous waste	All records of these must be kept and made available to relevant parties on request.	PSM	Continuous
	Non-Recyclable / Non-Reusable General Waste	Non-Recyclable General Waste must be disposed of at a permitted disposal site.	IEO	Continuous
Record Keeping	<p>The site must keep accurate and up to date records of the management of waste, which must reflect—</p> <ul style="list-style-type: none"> • the specific types of waste generated; • the quantity of each type of waste generated, expressed in tons per month; and • the quantities of each type of waste that has either been re-used, recycled, recovered, treated or disposed of. 	IEO	Continuous: Monthly records	

Table 8-3: Environmental Management Plan – Operational Phase				
ASPECT	POTENTIAL IMPACT/RISK/ISSUE	MANAGEMENT ACTIONS & MONITORING	RESPONSIBILITY	FREQUENCY
		Such records must be made available to the competent authority upon request and kept on record for a period of at least five (5) years.	IEO	Continuous
3.8 Air emissions	Prevention and mitigation strategies and Abatement equipment	Prevention and mitigation strategies and Abatement equipment must be instituted as per the project design to meet the requirements of the Atmospheric Emissions Licence and the Environmental Authorisation.	IEO, AECO	Before commencement of operation
	Emission source monitoring	Emissions from all point sources must be monitored in accordance with the stipulations of GN 893 of 2015 as amended, and in compliance with the requirements of the Atmospheric Emissions Licence.	PSM, IEO, AECO	As per AEL requirements
	Emission management procedures	Emissions management procedures must be formulated to ensure that the above requirements for waste management are implemented.	PSM, IEO, AECO	before commencement of operation
		Emissions management procedures must be reviewed and upgraded periodically to ensure that any amendments to relevant environmental law, permits, licences, or other relevant authorisations are identified and implemented appropriately.	IEO, AECO	At least once per annum

Table 8-3: Environmental Management Plan – Operational Phase																		
ASPECT	POTENTIAL IMPACT/RISK/ISSUE	MANAGEMENT ACTIONS & MONITORING	RESPONSIBILITY	FREQUENCY														
	Hexavalent Chromium Emissions	<p>No maximum allowable emission concentration is provided for Cr(VI) in GN 893 of 2015 as amended, It is recommended that Cr(VI) emissions limits as shown in Table 8-4 be applied to stacks where Cr(VI) emissions are anticipated.</p> <table border="1"> <thead> <tr> <th colspan="2">Table 8-4: Recommended Cr(VI) emissions limits</th> </tr> <tr> <th>Point Source</th> <th>Proposed Cr(VI) emissions limit (mg/Nm³)</th> </tr> </thead> <tbody> <tr> <td>CTS1 - CTS Organic Stack 1</td> <td>0.035</td> </tr> <tr> <td>CTS2 - CTS Organic Stack 2</td> <td>0.035</td> </tr> <tr> <td>CTS13 - CTS Organic Stack 13</td> <td>0.035</td> </tr> <tr> <td>CTS14 - CTS Organic Stack 14</td> <td>0.035</td> </tr> <tr> <td>CTS17 – CTS Inorganic Stack 1</td> <td>0.01</td> </tr> </tbody> </table>	Table 8-4: Recommended Cr(VI) emissions limits		Point Source	Proposed Cr(VI) emissions limit (mg/Nm ³)	CTS1 - CTS Organic Stack 1	0.035	CTS2 - CTS Organic Stack 2	0.035	CTS13 - CTS Organic Stack 13	0.035	CTS14 - CTS Organic Stack 14	0.035	CTS17 – CTS Inorganic Stack 1	0.01	PSM, IEO, AECO	Continuous, monitoring as per AEL
Table 8-4: Recommended Cr(VI) emissions limits																		
Point Source	Proposed Cr(VI) emissions limit (mg/Nm ³)																	
CTS1 - CTS Organic Stack 1	0.035																	
CTS2 - CTS Organic Stack 2	0.035																	
CTS13 - CTS Organic Stack 13	0.035																	
CTS14 - CTS Organic Stack 14	0.035																	
CTS17 – CTS Inorganic Stack 1	0.01																	
3.9 Storm Water Management	Surface water runoff from the operations	The existing Storm Water Management Plan must be updated, implemented and adhered to.	PSM, IEO	Continuous														
		Interceptors should be installed to prevent solid waste from entering the storm water drainage systems. These interceptors must be cleared regularly.	PSM	Once off and weekly monitoring														
		No contaminated runoff water may be discharged to a water course unless it complies with the quality requirements specified in the General Standards, as published by the Department of Water Affairs in Government Notice 991 of 18 May 1984 or its successor.	IEO	Continuous														
		Prevent storm water contamination through regular inspection and maintenance of the storm water management system.	PSM	Monthly and continuous monitoring of these areas														

Table 8-3: Environmental Management Plan – Operational Phase				
ASPECT	POTENTIAL IMPACT/RISK/ISSUE	MANAGEMENT ACTIONS & MONITORING	RESPONSIBILITY	FREQUENCY
		All drainage structures must be cleared of organic and inorganic debris, and accumulated silt.	PSM	Continuous monitoring of these areas
3.10 Dangerous Goods Storage and Handling	Storage, handling and transportation of hazardous goods	Dangerous goods are to be stored and handled as per the requirements of SANS 10231, 10232, and 10131, as well the hazardous chemicals regulations under the Occupational Health and Safety Amendment Act, Act No. 181 of 1993.	IEO, PSM	Before commencement of operation
		Hazardous substances such as fuel and oil must be stored within appropriately sized, impermeable, bund walls, with the appropriate warning signage.	IEO, PSM	Continuous
		Dangerous goods storage bunds should be able to contain 110% of the volume of fuel stored.	IEO, PSM	Before commencement of operation
		Spill kits to be readily available at all points where hazardous substances will be stored and/or transferred.	PSM	Continuous
		The liquid sulphur dioxide storage tank must be equipped with a deluge system inside a bund, in case of a leak, which is linked to an alarm at the central security office.	PSM	Before commencement of operation
		The ammonia engine room must be equipped with a detector, linked to an alarm at the central security office.	PSM	Before commencement of operation
		The molten sulphur storage tank must be mounted inside a bund and equipped with a deluge system in case of a leak, linked to an alarm at the central security office.	PSM	Before commencement of operation

8.4 CLOSURE

The facility is planned to operate permanently. If decommissioning is to take place a decommissioning plan must be developed. Given that de-commissioning is not reasonably anticipated to occur in the foreseeable future, this EMP covers only a limited set of impacts related to de-commissioning which are foreseeable. Notably the site is an industrial operation within an urban setting with assets, buildings, and infrastructure of value. It is not anticipated that closure of the site would include the demolition and removal of infrastructure, and it is anticipated that physical assets would be saleable if not according to their asset value then as scrap material.

Table 8-5: Environmental Management Plan – Decommissioning Phase				
ASPECT	POTENTIAL IMPACT/RISK/ISSUE	MANAGEMENT ACTIONS & MONITORING	RESPONSIBILITY	FREQUENCY
4. Closure				
4.1 Permanent closure and decommissioning	Legal Compliance & Planning	A decommissioning plan must be formulated prior to commencement of decommissioning. Relevant environmental legislation in force at the time must be consulted to ensure that decommissioning is undertaken in accordance. Saleable assets, facilities, and infrastructure must be identified for sale as such, this includes for example scrap steel, cabling, et cetera.	IEO, PSM	Once off at the time of decommission.
	Recyclable/Recoverable Waste	All recyclable waste must be recovered and passed on to appropriate recycling operators. This includes steel, plastics, glass etc.	IEO, PSM	Once off at the time of decommission.
	Non-Recyclable Waste	Non-recyclable waste must be disposed of to an appropriate disposal facility in accordance with legislation in force.	IEO, PSM	Once off at the time of decommission.
	Noise	De-commissioning activities which may result in significant noise must be undertaken during general business hours where they occur during the week.	PSM	Once off at the time of decommission.
4.1 Monitoring and Reporting	Compliance with the EMP & EA	Monitor site activities and compliance with EMP.	IEO	Continuous
		Identify, propose, monitor and sign off on the implementation of any required rectification measures.	IEO, PSM	Continuous

Table 8-5: Environmental Management Plan – Decommissioning Phase				
ASPECT	POTENTIAL IMPACT/RISK/ISSUE	MANAGEMENT ACTIONS & MONITORING	RESPONSIBILITY	FREQUENCY
4.2 Environmental incidents	Environmental incidents during the decommissioning and closure phase	Serious incidents must be report as per S30 of NEMA. A record of these incidents must be kept.	PSM	As required
		NEMA S30(1a) stipulates: "incident" means an unexpected, sudden and uncontrolled release of a hazardous substance, including from a major emission, fire or explosion, that causes, has caused or may cause significant harm to the environment, human life or property;		
		Brother CISA will be responsible for rehabilitating any damages caused to the environment due to any incident occurring on site that is as a direct result of the activities.	PSM	As required
4.3 Demolition/closure site management	Atmospheric pollution and odours	Ensure that no wastes are burnt on the premises or on surrounding premises.	Contractor,	Daily
		The Contractor is to take appropriate measures to minimise the generation of dust as a result of construction works, to the satisfaction of the IEO.	Contractor, IEO,	As necessary
	Soil integrity and erosion	The Contractor shall take appropriate and active measures to prevent erosion resulting from his works.	Contractor	As required
		The Contractor shall protect areas susceptible to erosion by installing all the necessary temporary and permanent drainage works as soon as possible to prevent the surface water from being concentrated in streams and from scouring any significant slopes, or other areas. These drainage facilities must have silt traps to prevent silt from entering storm water systems.	Contractor	As required
	Demolition hazards	Demolition/closure activities must be planned and undertaken in compliance, where applicable, with the Occupational Health and Safety Amendment Act, Act No. 181 of 1993, and the regulations thereunder, including but not necessarily limited to: General Safety Regulations, 1986, Construction Regulations, 2003; and, the National Building Regulations and Building Standards Act, 1977 (Act No.103 of 1977) and regulations thereunder.	PSM, Contractors	Continuous

Table 8-5: Environmental Management Plan – Decommissioning Phase					
ASPECT	POTENTIAL IMPACT/RISK/ISSUE	MANAGEMENT ACTIONS & MONITORING	RESPONSIBILITY	FREQUENCY	
	Noise	Vehicles to comply with the standards as provided in the International Finance Corporation's Environmental Health & Safety Regulations.	PSM, Contractors	Continuous	
		Acoustic screening measures to be installed in and around noise sources which generate a noise exceeding 85.0dBA at the source	PSM, Contractors	Once-off (if necessary)	
	Risk of fires	No open fires are to be allowed on site to prevent any fire damage to surrounding buildings.	Contractor	Continuous	
		Welding, gas cutting or cutting of metal will only be permitted inside the working areas.	IEO, Contractors	Continuous	
		Suitable and sufficient fire-extinguishing equipment must be placed at strategic locations and must be adequately maintained.	IEO, Contractors	Continuous	
		The Contractor shall pay the costs incurred to organisations called to put out any fires started by him. The Contractor shall also pay any costs incurred to reinstate burnt areas as deemed necessary by the IEO.	IEO, Contractors	Continuous	
	Hazardous Substances	Hazardous substances such as fuel and oil must be stored within appropriately sized, impermeable, bund walls, with the appropriate warning signage.	IEO, Contractors	Continuous	
		The IEO must ensure that the storage and utilization of potentially hazardous material such as diesel, petrol, oils and lubricants, etc does not result in any form of soil and water contamination.	IEO, Contractors	Continuous	
		Spill kits to be readily available at all points where hazardous substances will be stored and/or transferred (e.g. refuelling points)	IEO, Contractors	Continuous	
	4.4 Waste Management	Land and water pollution, littering.	Adequate Bins and/or skips must be provided on the site to provide for general waste. Waste sorting must be done at source or within a dedicated area. Undesired or non-recyclable waste must be collected by an appropriate waste management service provider.	IEO	Once off;

Table 8-5: Environmental Management Plan – Decommissioning Phase				
ASPECT	POTENTIAL IMPACT/RISK/ISSUE	MANAGEMENT ACTIONS & MONITORING	RESPONSIBILITY	FREQUENCY
		Ensure that no refuse or rubble generated on the premises be placed, dumped or deposited on adjacent/surrounding properties including road verges, roads or public places and open spaces during or after the construction period. All discard materials produced during construction that will not be recovered or recycled must be taken offsite and deposited in an appropriate, licenced landfill site.	Contractor, IEO	Continuous, inspect daily
		The Contractor shall ensure that waste and surplus food, food packaging and organic waste are not deposited by his employees anywhere on the site except in dedicated refuse bins for removal on a daily basis by the Contractor. Refuse bins shall be weather-proof.	Contractor	Continuous, inspect daily
4.5 Vehicles and Fuel Storage	Land and water pollution	If vehicle and/or construction machinery maintenance is to occur onsite, a suitable leak proof container for the storage of oiled equipment (filters, drip tray contents and oil changes etc.) must be established.	Contractor, IEO	Continuous, inspect daily
		Drip trays to be appropriately placed under vehicles and plant that stay over-night on bare soil surfaces.	Contractor, IEO	Continuous, inspect daily
		All servicing of onsite mechanical machinery must have a drip tray present to prevent accidental spillage of oils and fuels.	Contractor, IEO	Continuous, inspect daily
		All vehicles, equipment, fuel and petroleum services and tanks must be maintained in a condition that prevents leakage and possible contamination of soil or water supplies. Refuelling areas must be bunded and secured to prevent soil and water contamination.	Contractor, IEO	Continuous, inspect daily
		Fuels and flammable materials are to be stored in suitably equipped storage areas complying with general fire safety requirements.	Contractor, IEO	Continuous, inspect daily
		Where hydrocarbon spills occur on soils, the soil is to be removed for treatment or disposal as soon as practical.	Contractor, IEO	Continuous

Table 8-5: Environmental Management Plan – Decommissioning Phase				
ASPECT	POTENTIAL IMPACT/RISK/ISSUE	MANAGEMENT ACTIONS & MONITORING	RESPONSIBILITY	FREQUENCY
4.8 Contaminated Land	Assessment	An assessment in terms of the national norms and standards for the remediation of contaminated land and soil quality (GN 331 of 2014) or it's successor must be undertaken where dangerous goods were stored, manufactured, or handled in a manner that may have caused such contamination.	Contractor, IEO	Continuous
	Remediation	If significant contamination is identified, then remediation of contaminated land and/or groundwater must be undertaken accordingly.	PSM, IEO	Post removal of assets and infrastructure.

9 MONITORING AND REPORTING

Brother CISA must monitor compliance with EMPr and conditions of the Environmental Authorisation through:

- Internal audits must be conducted bi-annually, unless otherwise specified by the Environmental Authorisation (EA);
- On each audit occasion an official report must be compiled to report the findings of the audits, which must be made available to the PSM or relevant management in control of the authorised facilities at that time.
- Where non-compliance occurs - Identify, propose, monitor and sign off on the implementation of rectification measures.
- If required by the EA, Brother CISA must appoint an independent external auditor to audit the site annually and the auditor must compile an audit report documenting the findings of the audit, which must be undertaken, and if required must be submitted to the competent authority, according to conditions of the EA.

9.1 STACK EMISSIONS

Emissions from all point sources must be monitored in accordance with the stipulations of GN 893 of 2015 as amended, and in compliance with the requirements of the Atmospheric Emissions Licence.

9.2 AMBIENT ATMOSPHERIC CONCENTRATIONS

The existing ambient monitoring programme for monitoring of Hexavalent Chromium should continue as shown in Table 9-1

Parameter	Position	Monitoring Frequency	Sampling and testing method	Reporting frequency	Responsibility
Hexavalent Chromium	Arbor Park, NWC Airport, Keyway Motors and KBC Effluent Plant	Continuous	California Environmental Protection Agency SOP MLD039	Annual	AECO

9.3 GROUNDWATER AND SURFACE WATER

Groundwater and surface water monitoring is to be undertaken on the site at the locations depicted in Figure 9-1.

It is recommended that two additional boreholes be monitored – one upstream and one downstream of the proposed CTS plant.

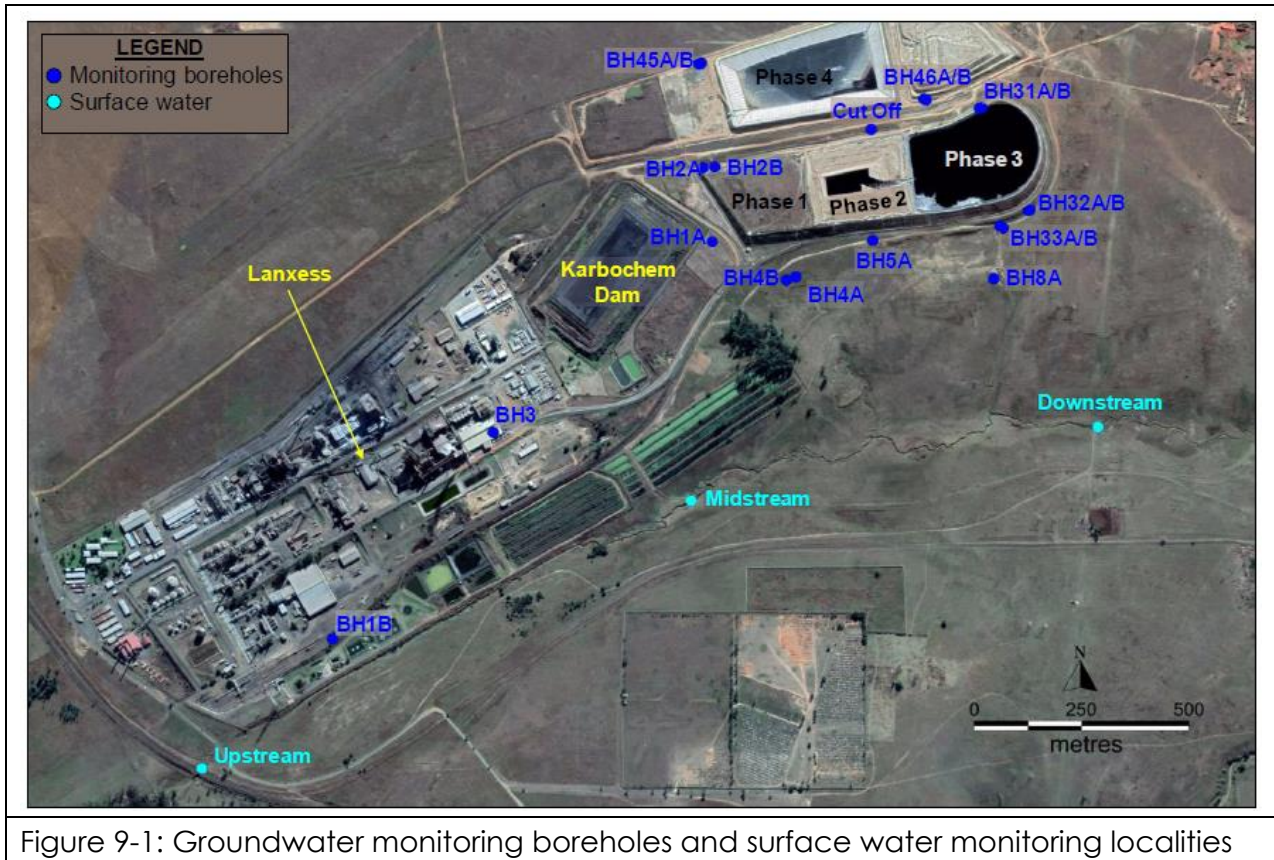


Figure 9-1: Groundwater monitoring boreholes and surface water monitoring localities

9.3.1 SURFACE WATER

Surface water monitoring is to be undertaken at the three surface water monitoring points given in Table 9-2.

Table 9-2: Surface Water Monitoring Points

Sampling points	Latitude	Longitude
Upstream	27°47' 15,98" S	29° 58'15,55" E
Midstream	27°46' 55,46" S	29°,58' 56,89" E
Downstream	27°46' 49,65" S	29°59'31,37" E

Surface water is monitored in the Karbochem Spruit on monthly basis for the variables specified in Annexure V of the existing Waste Management Licence, namely:

- Alkalinity (P .Alk)
- Alluminium (Al)
- Free & saline Ammonia as N(NH4-N)

- Calcium (Ca)
- Chemical Oxygen Demand (COD)
- Chloride (Cl)
- Chromium hexavalent (Cr6+)
- Total Chromium (Cr)
- Electrical Conductivity (EC)
- Fluoride (F)
- Iron (FE)
- Magnesium (Mg)
- Manganese (Mn)
- Nitrate as N (NO₃-N)
- pH
- Soluble Ortho-phosphate (PO₄-P)
- Potassium (K)
- Sodium (Na)
- Sulphate (SO₄)
- Titanium

Surface water is to be monitored in the Karbochem Spruit on an annual basis for the variables specified in Annexure IV of the existing Waste Management Licence, namely:

- Alkalinity (p.Alk)
- Boron (B)
- Cadmium (Cd)
- Calcium (Ca)
- Fluoride (F)
- Chemical Oxygen Demand (COD)
- Biological Oxygen Demand (BOD)
- Chromium (hexavalent) (Cr6+)
- Chromium (Total) (Cr)
- Chloride (Cl)
- Cyanide (CN)
- Electrical conductivity (EC)
- Free & saline ammonia as N (NH₄-N)
- Lead (Pb)
- Magnesium (Mg)
- Mercury (Hg)
- Manganese (Mn)
- Nitrate (as N) (NO₃-N)
- pH
- Phenolic compounds (Phen)
- Potassium
- Sodium (Na)
- Sulphate (SO₄)
- Thiocyanide (SCN)
- Total dissolved solid (TDS)
- Total organic carbon (TOC)
- Total organic halogen (TOX)

- Volatile organic compound

9.3.2 GROUNDWATER

Quarterly groundwater monitoring is conducted on all boreholes as listed in Table 9-3.

The variables listed in Annexure V of the Waste Management Licence (see list below) are monitored quarterly aside from Hexavalent Chromium (Cr6+), pH, Sodium and electrical conductivity which are monitored monthly:

- Alkalinity (P .Alk)
- Alluminium (Al)
- Free & saline Ammonia as N(NH4-N)
- Calcium (Ca)
- Chemical Oxygen Demand (COD)
- Chloride (Cl)
- Chromium hexavalent (Cr6+)
- Total Chromium (Cr)
- Electrical Conductivity (EC)
- Fluoride (F)
- Iron (FE)
- Magnesium (Mg)
- Manganese (Mn)
- Nitrate as N (N03-N)
- pH
- Soluble Ortho-phosphate (P04-P)
- Potassium (K)
- Sodium (Na)
- Sulphate (S04)
- Titanium

Parameter	Borehole
Groundwater Levels and Groundwater Quality	BH1A/B; BH2-A/B; BH3A; BH4A/B; BH5A; BH8A; BH31A/B; BH32A/B; BH33A/B; BH45A/B; BH46A/B; It is recommended that two additional boreholes be monitored – one upstream and one downstream of the proposed CTS plant.

10 ENVIRONMENTAL INCIDENTS

An environmental incident is defined as any unplanned event that results in actual or potential damage to the environment, whether of a serious or non-serious nature. An incident may involve non-conformance with any of the following:

- Legal requirements;
- Requirements of the EMP;
- Conditions/Requirements of the EA; and
- Any verbal or written order given by the IEO/PSM on-site.

Corrective actions to mitigate an incident must be appropriate to the nature and scale of the incident. Any residual environmental damage caused by the incident or by the mitigation measures themselves must also be rehabilitated. The contractor must also change his/her operating procedures, where applicable, to prevent a recurrence of an incident.

The IEO must inform the PSM of serious incidents immediately upon occurrence of the incident. The IEO must complete an Incident Report for all environmental incidents. The IEO shall investigate incidents with a view to determine the cause of the incident and to prevent a recurrence of similar incidents (not to apportion blame).

The IEO must maintain Incident Reports for inspection by the environmental authority if required, and for reporting as part of audit reports. In the case of serious incidents or emergencies, the incident report must be sent to the authority as soon as possible after the incident has been recorded.

11 CONCLUSION

This EMPr and associated Basic Assessment have been compiled in terms of the provisions to meet regulatory requirements under the National Environmental Management Act (Act No. 107 of 1998)[NEMA] and its associated 2014 EIA Regulations.

This EMPr addresses potential environmental impacts on all relevant aspects related to activities on the site and allows for continuous improvement through regular monitoring and reporting to IAPs and relevant spheres of Local, Provincial and National Government.

12 UNDERTAKING

(Note, undertaking to be signed by appointed the PSM and/or IEO prior to construction)

I, _____

the undersigned, and duly authorised thereto by Brother CISA (Pty) Ltd have studied and understand the contents of this document in its entirety and hereby duly undertake to adhere to the conditions as set out therein.

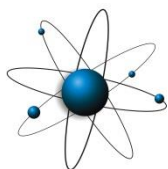
Signed at _____

this _____ day of _____

Applicant's name:

Designation:

APPENDIX 1: EAP CURRICULUM VITAE



EScience Associates
9 Victoria Road, Oaklands
Johannesburg, 2192
Tel: +27 (0)11 718 6380

Curriculum Vitae:

Abdul
Ebrahim

Surname: Abdul Ebrahim

Date of birth: 07 December 1977

Country of Residency: Republic of South Africa

Position: Director

Key Qualifications: BEng (Hons) Environmental, BEng (Hons) Mechanical

Registrations: ECSA, EAPASA

Contact details

☎: 011 7186380

☎: 072 268 1119

✉: abdul@escience.co.za

Abstract

Abdul Ebrahim is a director of EScience Associates, an environmental consultancy specialising in waste and waste recovery, effluent, atmospheric emissions and air quality, as well as cleaner and renewable energy. EScience Associates caters for a diversity of industries and economic sectors and has forged strong relationships with other specialists, and specialist agencies, allowing the company to deal with complex and contentious environmental problems.

Abdul Ebrahim holds a BEng (Hons) in both Mechanical and Environmental Engineering disciplines. He specialises in air quality management, hazardous waste management and cleaner production, as well as their related environmental authorisation and licensing processes. His work experience includes numerous environmental impact assessments, cleaner production, waste recover-recuse-recycling, hazardous waste management assessments, and air quality impact management projects in power generation, manufacturing, minerals processing, and mining industries. His interests range from atmospheric modelling and wind energy, to the beneficial use of industrial wastes and effluents.

He is a certified Environmental Assessment Practitioner (EAP) and member of amongst other professional organisations: Engineering Council of South Africa (ECSA), and the National Association of Clean Air (NACA).

Abdul has provided Honours level lecturing at the University of Pretoria, UNISA, Cape Town University of Technology and various private training institutions in the fields of Environmental Compliance Enforcement, Environmental Impact Assessment, Cleaner Production and Air Quality Management since 2005.

His work experience includes:

- Environmental strategic, legal, and technical compliance advisory services
- Environmental Permitting - Environmental Authorisation, Waste Management Licensing, Atmospheric Emissions Licensing, Mine Environmental Management Programme development, and their relating environmental impact assessment and stakeholder engagement processes.
- Air quality management and Air Quality Management Plan development – Emissions quantification; meteorological and air quality modelling and impact assessment; development of emissions abatement and management strategies;
- Waste management consulting - classification, landfill assessment, mine residue liner risk assessments, development of waste minimisation treatment & recycling strategies;
- Development of specialist training courses (including EIA Administration and Review, Environmental Enforcement, Environmental Compliance Achievement for Industry).
- Environmental Due Diligence – due diligence assessment to inform purchase or ownership transfer of existing going concerns or proposed new establishments.

Abdul has 20 years post graduate experience of which four years are in industry, and the remainder in consulting.

Education

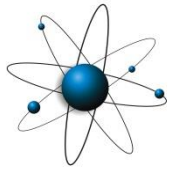
BEng (Hons) Mechanical Engineering

BEng (Hons) Environmental Engineering

Languages

English (excellent speaking and writing)

Limited French and Portuguese



Experience

Personal work experience includes:

- Cleaner and renewable energy strategy development, plan and project development;
- Technical and environmental due diligence – industrial and energy projects
- Waste management (classification, handling, storage, and disposal requirements;
- Development of waste minimisation treatment & recycling strategies);
- Air quality management and emissions inventorying, development of abatement and management strategies;
- Environmental Impact Assessment and Permitting
- Development and dissemination of specialist training for government and the private sector at NQF level 7 (honours degree).

Abdul's work experience in a wide diversity of economic sectors and industries and provides him with a good understanding of both small scale and large scale impacts of waste and pollution, as well as keeping up to date with various management alternatives available and their individual advantages and disadvantages, both locally and internationally implemented and pilot scale. Various waste streams have been dealt with to determine the most applicable disposal methods and impacts on the environment, from various industries:

- Metallurgical processes
- Power generation
- Food processing
- Waste recovery, reuse, and recycling and waste to energy
- Mining
- Cement manufacturing
- General Commercial – General waste management from various industries

Professional Registration

Environmental Assessment Practitioner (EAP)
Engineering Council of South Africa (ECSA)

Hourly Rate

Nature of expertise offered

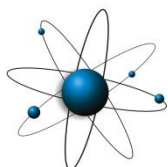
- Ability to interpret and analyse technical material on wide range of subjects
- Engineering expertise in energy, waste, air quality and multi-disciplinary subjects
- Ability to undertake technology feasibility studies, technical and financial due diligence
- Understanding of the green economy and technologies, ICT and agricultural and agro-processing sectors
- Ability to undertake a market research and investigation into the industry
- Proposal evaluation expertise

Experience and relevant projects

1. AIR QUALITY MANAGEMENT:

1.1 Government & Regulatory

- Vaal Triangle Air-shed Priority Area - Air Quality Management Plan review, development of emissions inventory and Ambient Air Quality Impact Assessment.
- Highveld Priority Area Air Quality Management Plan – development of emissions inventory, and mitigation strategies.
 - Reference: Dr Thulile Mdluli



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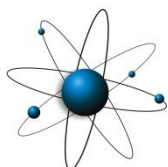
Curriculum Vitae:

Abdul
Ebrahim

- Tel: 012 310 3436
- Email : tmdluli@environment.gov.za
- Ekurhuleni Metropolitan Municipality - Development of an Air Quality Management Plan (AQMP)
 - Reference: Mr Edmund van Wyk
 - Tel: 011 999 2470
 - Email: Edmund.vWyk@ekurhuleni.gov.za
- Nkangala District Municipality - Development of an Air Quality Management Plan (AQMP)
 - Reference: Mr Vusi Mahlangu
 - Tel: 013 249 2164
 - Email: Mahlangumv@nkangaladm.gov.za
- North West Province - development of provincial emissions inventory (PM, NO_x, SO₂ etc)
- Development of National Air Quality Officers Companion Guide for the Republic of South Africa
- Development of the atmospheric emissions licensing department for Nkangala District Municipality
- EThekweni Municipality (Durban) - Greenhouse gas emissions quantification
- Newcastle Local Municipality - Development of an Air Quality Management Plan (AQMP)
 - Reference: Mr Phelelani Ntshingila
 - Tel: 034 328 3300
 - Phelelani.Ntshingila@newcastle.gov.za

1.2 Industrial and Mining

- A large variety of major industrial and mining operation across the Highveld and Vaal Triangle as part of Highveld Priority Area and Vaal Triangle Air-shed Priority Area AQMP projects.
- Lanxess CISA Chrome Chemicals Plant Expansion, CO₂ generation, Power Generation and hazardous waste treatment and recovery
- Samancor Chrome Proposed Chrome Chemicals plant
- Karbochem (Synthetic Rubber Manufacture) proposed Power Generation Plant
- PPC Cement Slurry Cement Plant Expansion
- PPC Cement Jupiter Cement Plant Expansion
- PPC Cement PE Cement Plant Expansion
- PPC Cement Dwaalboom waste heat recovery
- PPC Cement De Hoek, PE, Slurry, and Dwaalboom postponement applications
- Afrisam Cement - Dudfield Environmental Management Programme update.
- ClinX Medical Waste Incineration plant expansion
- Goedemoed organic waste incineration
- AWPP pyrolysis of organic waste
- Interwaste Waste Recovery, Waste to Energy and Waste Incineration plant
- Eskom power generation emissions off-setting
- Hayes Lemmerz SA Aluminium Wheel Manufacturing
- Evraz Highveld Steel and Vanadium proposed Powered Generation - Furnace Off-Gases
- Assmang Ferrochrome and Ferromanganese plants Powered Generation - Furnace Off-Gases
- Resource Generation Proposed Boikarabelo Power Station – coal fired
- Weir Minerals Africa (Isando, Alrode and Heavy Bay Foundries)
- Goedemoed Prison proposed Waste incineration and Landfill
- Consolidated Wire Industries Expansion
- Sylvania Proposed Open Cast PGE Mine and Processing Plant
- Assmang Black Rock proposed manganese mine expansion and sinter plant
- Assmang machadodorp proposed smelter plant expansion and cross-over to manganese



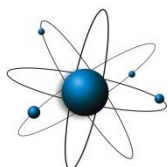
- Dwarsrivier Chrome Mine
- Nkwe proposed Platinum Mine
- Agricultural Research Commission hazardous and infectious waste incineration
- Sephaku Aganang proposed use of AFR's in cement manufacture
- Idwala Phalaborwa atmospheric emission licence for magnetite drying
- Mandini Wealth (Pty) Ltd tyre pyrolysis air quality health risk assessment
- Johnson Tiles a Division of Norcross Sa (Pty) Ltd Air quality health risk assessment
- Lanxess CISA (Pty) Ltd Air quality health risk assessment
- Namakwa Sands, South Africa – Tronox
- Devon Valley Landfill expansion
- Groblersdal limestone mine

2. WASTE CLASSIFICATION, HAZARD RISK ASSESSMENT AND MANAGEMENT

- Weir Minerals Africa
- Heavy Bay foundry Port Elizabeth
- Lafarge Gypsum
- Consolidated Wire Industries
- BPB Gypsum
- PG Bison melamine plant
- ABBW Electrical manufacturing plant
- CBI copper and fibre optical cable manufacture
- Holcim Cement
- Lanxess Chrome Chemicals
- Assmang Chrome
- Assmang Manganese
- Hayes Lemmerz SA Aluminium Wheel Manufacturing
- Auto industrial group (Pty) Ltd
- CBI Electrical
- Various mining residues

3. ENVIRONMENTAL IMPACT ASSESSMENT:

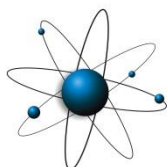
- Assmang Black Rock Mine expansions, tailings facilities, water treatment facilities
- Highveld Steel furnace off-gas power generation
- Lanxess CISA chrome chemicals plant expansion and hazardous waste landfilling
- Samancor chrome chemicals plant development
- Herculon Ferrochrome power generation from furnace off-gases
- Kanhym Biogas project
- Alumicor secondary aluminium recovery rotary salt furnaces
- Hays Lemmerz Aluminium smelters, furnace and alloy die casting
- Agricultural Research Commission hazardous waste incineration plant
- Darkling Metal Industries
- Idwala Lime Danielskuil asbestos waste disposal
- Plettenburg Polo Estates
- PG Bison Decorative Panels
- British Aerospace Land Based OMC Systems
- BPB Gypsum phosphogypsum plant
- Extrupet HPDE and PET recycling plants
- Assmang BRMO



- Assmang Machadodorp
- Interwaste waste recovery and waste to energy plants
- PPC Cement expansions, electricity generation, use of alternative fuels and resources
- Sephaku cement use of alternative fuels and resources
- ClinX Healthcare Risk Waste Management
- Turfontein Race Course night racing

4. ENVIRONMENTAL LEGAL COMPLIANCE ASSESSMENT & RECTIFICATION PLANNING:

- SASOL Synfuels
- NATCOS Petrochem
- Dwarsrivier Chrome Mine
- Angloplatinum Base Metals Recovery
- Samancor Hotazel Manganese Mines
- PG Bison (Pty) Ltd MDF manufacturing
- Samancor Manganese Division Samancor Metalloys Meyerton
- Holcim SA (Pty) Ltd Cement Plants:
 - DUDFIELD
 - ULCO
 - ROODEPOORT
- Natal Portland Cement Plants:
 - NEWCASTLE
- Consolidated Wire Industries
- South African Airways (Pty) Ltd Technical Division
- TWK forestry strategic environmental legal compliance assessment
- Inergy Automotive Systems(Pty) Ltd
- Consolidated Wire Industries
- Mittal Steel Vereeninging and Dunswart plants – specialist assistance to DEAT environmental management inspectors
- Assmang Black Rock Mining Operations
- ClinX Medical Waste Management
- Extrupet PET and HDEP recycling plants
- Scaw Metals High Chromium Ball Plant
- Unilever waste recovery, recycling, and zero waste-to-landfill
- Numerous waste recycling facilities
- Oilflow
- The Smart Company
- Darkling Industrial Metals CC
- Unilever waste recovery, recycling, and zero waste-to-landfill
- Central Waste
- AT Packaging
- EWaste Africa
- Mpact Recycling
- Wasteplan
- Fine Metals
- Living Earth
- Industrial Plastic Recyclers
- SA Paper Mills
- Interwaste
- Matchem
- TGS
- Verigreen



- SB Boxes
- Drumpal
- Oscars Meat
- FOSECO South Africa (Pty) Ltd
-

5. GREENHOUSE GAS QUANTIFICATIONS AND ASSESSMENTS

- PPC Riebeeck
- Lafarge Lichtenburg
- Ilangabi Investments coal mining
- Lanxess CISA (Pty) Ltd
- Consolidated Wire Industries
- ClinX Waste Management
- ArcelorMittal Newcastle
- Development of emission factors for ferrochrome smelting

6. CLEANER PRODUCTION AUDITS, WASTE TO ENERGY, ENERGY RECOVERY, WASTE RECOVERY AND RELATED PROJECTS:

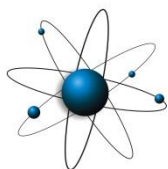
- Tuffy Plastics
- Proplas plastics
- WHS Distribution
- Premier Foods Pretoria Wheat Mill
- Alfred Nzou municipality
- Lanxess chrome chemicals residue recovery
- Karbochem power generation ash to bricks project
- Cement kilns alternative fuels and raw materials assessment for South Africa
- Kanhym Estates Biogas Generation from piggery effluent
- British American Tobacco:
- Tobacco Processors Zimbabwe
- Souza Cruz Brazil

7. ENVIRONMENTAL MANAGEMENT SYSTEM DEVELOPMENT & IMPLEMENTATION:

- British American Tobacco (full system development from scratch – ISO 14001 and ISO 9001)
 - Weir Minerals Aspects Identification, Rating, Assessment and Development of EMPs
 - Lafarge Gypsum Aspects Identification, Rating, Assessment and Development of EMPs
 - Environmental Aspects Identification, rating and formulation of EMPs for Samancor Metalloys Meyerton
 - Environmental Aspects Identification, rating and formulation of EMPs for DMS Powders.
 - Holcim Slagment development & implementation of EMS components including waste and air quality management
 - Holcim Roodepoort development & implementation of EMS components including waste and air quality management
 - Consolidated Wire Industries Environmental Aspects Identification, rating and formulation of EMPs and operational control procedures.
 - Samancor Metalloys Ferro Silicon Manganese and FerroSilicon production
 - DMS FeSi dense media production

8. ISO14001 AUDITING:

- Debswana Orapa and Letlhakane Mines
- Ingwe Colliery



- Arnot Colliery
- FOSECO South Africa (Pty) Ltd
- Lafarge Gypsum
- CWI

9. SPECIALIST TRAINING COURSE DEVELOPMENT & PRESENTATION

- 2011 Training of Atmospheric Emissions Licensing Authorities – air quality management, emissions quantification, regulation and enforcement.

- 2007-2015 Training of Authorities for EIA review and permitting

Responsible for development of NEMA EIA Review Course and Administrators EIA Review Manual, theoretical and practical training material, and training of Government Officials responsible for EIA Review - responsible for the whole manual other than Law applicable to EIA Review. As at May 2013 approximately 1000 officials from National, Provincial and Local Government.

- 2005&6 Bridging Training for Environmental Management Inspectors and Enforcement

ESA was part of a consortium selected to develop and conduct the EMI Training. More than 2000 officials and university students have completed the training.

- University Of Pretoria Specialist Lecturer

- Environmental Legal Compliance inspections and investigations (RSA)
- Environmental Legal Compliance achievement (RSA)
- Environmental Legal Compliance inspections and investigations (Africa)

- University Of South Africa Specialist Lecturer

- Environmental Legal Compliance inspections and investigations (RSA)

- Training for industry and mining

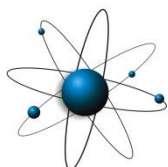
Development and presentation of training material for environmental impact identification and management in terms of South African environmental law for the SABS and other training institutions.

10. SOIL AND GROUNDWATER CONTAMINATION ASSESSMENT:

- Weir Heavy Bay Foundry
- Lafarge Gypsum
- Kanhym Estates
- SABAT (Pty) Ltd Johannesburg – investigation of heavy metal contamination of soils and groundwater
- Chemiphos SA (Pty) Ltd – investigation of phosphate and heavy metal contamination of soils and groundwater
- Castrol Lubricants Zimbabwe

11. ENVIRONMENTAL DUE DILIGENCE AUDITS, INCLUDING ASSESSMENT OF ENVIRONMENTAL AND CLOSURE LIABILITY:

- Determination and quantification of financial provision for the environmental rehabilitation and closure requirements of smelting operations for Highveld Steel & Vanadium operations:



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9 Victoria Road, Oaklands
Johannesburg, 2192
Tel: +27 (0)11 718 6380

Curriculum Vitae:

Abdul
Ebrahim

- HIGHVELD IRON AND STEEL WORKS
 - VANCHEM
 - TRANSALLOYS
 - RAND CARBIDE
 - MAPOCHS MINE
-
- Determination and quantification of financial provision for the environmental rehabilitation and closure requirements of smelting operations for TransAlloys
 - Determination and quantification of financial provision for the environmental rehabilitation and closure requirements of mining operations for Samancor Chrome:
 - MIDDELBURG FERROCHROME
 - FERROMETALS
 - TUBATSE FERROCHROME
 - WESTERN CHROME MINES
 - EASTERN CHROME MINES
 - Determination of critical environmental liability associated with the purchase of Xmeco Foundry by Weir Minerals Africa, and subsequent legal compliance achievement programme

12.

Possible timelines to commit to the assignment

- Available for assignments over the next two years
- Not available during the December holiday period - from 15 December until 3 January – due to company's closure for the festive season