



28 February 2008

MINISTRY OF ENERGY AND ENERGY INDUSTRIES TEMPLATE FOR THE ENVIRONMENTAL MANAGEMENT PLAN (EMP)

ENVIRONMENTAL MANAGEMENT PLAN TEMPLATE

The completion of ALL sections is mandatory!

SECTION ONE (1): CONTACT DETAILS OF THE APPLICANT

Full Name of Applicant:

Mailing or Postal Address:

Physical or Residential Address:

Phone Number:

Fax Number:

Mobile Number:

Email Address:

Full Name of Alternative Contact Person:

Phone Number:

Fax Number:

Mobile Number:

Email Address:

Signature:

Date:

SECTION TWO (2): PROPERTY DESCRIPTION DETAILS

Project/Company/Operator's Name:

Quarry Location:

Area of the Land (in acres):

Land Status (Private or State):

Relevant Minerals:

Relevant Stakeholders:

Mining Activities (development and rehabilitation):

Proposed Hours of Working and Planned Project Life (in years):

Financial Insurance Data:

Equipment used:

Workforce:

SECTION THREE (3): ENVIRONMENTAL ASPECTS RELATING TO THE DEVELOPMENT

Please check (✓) the appropriate boxes where necessary.

N.B: EACH OF THE FOLLOWING QUESTIONS WILL RELATE SPECIFICALLY TO YOUR OPERATION!

1. AIR QUALITY: IMPACTS, MONITORING AND CONTROLS

Air Emission Types:

1.1 What are the various types of air emissions being generated?

- Dust/ Particulates (e.g. Sulphur, Mineral Particles etc.)
- Smoke
- Gases (e.g. Sulphur Dioxide (SO₂), Nitrogen Oxides (NO_x) or Ozone (O₃) forming smog
- Other

If 'other' please specify- _____

Air Emission Sources:

1.2 What are the main sources of air pollutants within the mining development?

- Mineral Particulate Matter/ Dust
- Products of Combustion
- Emissions from the vehicles on-site and off-site
- Odours/ Fumes
- Other

If 'other' please specify- _____

1.3 What are the major sources of dust from the quarrying operation?

- Drilling and blasting
- Loading and unloading of soil, overburden and mineral/s
- Plant movements
- Processing
- Dust blown from the excavation, mounds and stockpiles
- Other

If 'other' please specify- _____

Air Emission Quantities:

1.4 Based on a percentage (%), how much of the previously selected emission/s is/are produced per day? (Please tick (√) the appropriate space provided.)

Emission	Percentages (%)									
	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
Dust/ Particulates										
Smoke										
Gases										
Other										

1.5 Based on a range, how far is/are the previously selected emission/s allowed to travel? (Please tick (√) the appropriate space provided.)

Emission	Ranges			
	On-site only	As far as the boundary	Up to 1000 feet from the Boundary (Off-site)	>1000 feet (Off-site)
Dust/ Particulates				
Smoke				
Gases				
Other				

1.6 Based on a frequency, how often is/are the previously selected emission/s produced? (Please tick (√) the appropriate space provided.)

Emission	Frequencies					
	<1 hour per day	1-3 hours per day	4-6 hours per day	7-9 hours per day	10-12 hours per day	>12 hours per day
Dust/ Particulates						
Smoke						
Gases						
Other						

Controlling and Mitigation:

1.7 What planning conditions/ techniques are used?

- Water-Spraying of materials
- Spraying of haul roads
- Use of Dust Extractors
- Use of Conveyors/ Housing
- Enclosing of fixed plant
- Use of tree screens
- Installation of wheel washing
- Road Sweeping
- Cyclones
- Wet Collectors
- Fabric filters
- Electrostatic precipitators
- Materials handling and storage
- Site design
- Site Management
- Fixed plant vs. Mobile plant
- Other

If 'other' please specify- _____

1.8 How often are these selected planning conditions/ techniques carried out? (Please tick (✓) the appropriate space provided.)

Condition/ Techniques	Frequency						
	Every 1-6 hours	Every 7-12 hours	Every 13-18 hours	Every 19 hours to a day	Every week	Every month	Every Year
Water-Spraying of materials							
Spraying of haul roads							
Installation of wheel washing							
Road Sweeping							

2. WATER MANAGEMENT

Water Pollutants/Contaminants Types:

2.1 What are the various potential types of water contaminants being generated?

- **Non-dissolved contaminants:**

- Suspended solids/Turbidity (e.g. Silts and Clays etc.)
- Petroleum Products (e.g. Diesel, Lubricants and Waste Oils etc.)

- **Dissolved Contaminants:**

- Heavy metals
- Sulphate
- Chloride- salinity
- Alkalis
- Flocculants
- Eutrophicants (e.g. Nitrates, and Phosphates etc.)
- Acids (e.g. Sulphuric Acid)
- Ammonia-based reagents
- Process chemicals
- Soaps and detergents
- Treatment chemicals

- **Other Contaminants:**

- Heat
- Sewage
- Other

If 'other' please specify- _____

Water Pollutants/ Contaminants Sources:

2.2 What are the main sources of water contaminants within the mining development?

- Soil Erosion and water run-off
- Washing Procedures
- Water treatment plant activities
- Construction activities
- Waste and Product Handling and storage activities
- Recycling facilities
- On-site toilet facilities and other sewage facilities
- Minerals present within the site boundaries
- Processing plant chemicals
- Dissolution of explosives
- Dissolution of excess fertilizers
- Leaching activities
- Mobile plant cleaning areas
- Non- contact cooling water and other coolant waters
- Other

If 'other' please specify- _____

Water Pollutants/ Contaminants Quantities:

2.3 Based on a percentage (%), how much of the previously selected contaminant/s is/are produced per day? (Please tick (√) the appropriate space provided.)

Pollutant/ Contaminants	Percentages (%)									
	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
Suspended solids										
Petroleum Products										
Heavy metals										
Sulphate										
Chloride-salinity										
Alkalis										
Flocculants										
Eutrophicants										
Acids										
Ammonia-based reagents										
Process chemicals										
Soaps and detergents										
Treatment chemicals										
Heat										
Sewage										
Other										

2.4 Based on a range, how far is/are the previously selected pollutant/s allowed to travel? (Please tick (✓) the appropriate space provided.)

Pollutant/Contaminants	Ranges			
	On-site only	As far as the boundary	Up to 1000 feet from the Boundary (Off-site)	>1000 feet (Off-site)
Suspended solids				
Petroleum Products				
Heavy metals				
Sulphate				
Chloride-salinity				
Alkalis				
Flocculants				
Eutrophicants				
Acids				
Ammonia-based reagents				
Process chemicals				
Soaps and detergents				
Treatment chemicals				
Heat				
Sewage				
Other				

2.5 Based on a frequency, how often is/are the previously selected pollutant/s produced? (Please tick (√) the appropriate space provided.)

Pollutant/Contaminants	Frequencies					
	<1 hour per day	1-3 hours per day	4-6 hours per day	7-9 hours per day	10-12 hours per day	>12 hours per day
Suspended solids						
Petroleum Products						
Heavy metals						
Sulphate						
Chloride-salinity						
Alkalis						
Flocculants						
Eutrophicants						
Acids						
Ammonia-based reagents						
Process chemicals						
Soaps and detergents						
Treatment chemicals						
Heat						
Sewage						
Other						

Water Monitoring:

2.6 What parameters are used to determine the water quality?

- pH
- Dissolved Metals
- Total Dissolved Solids
- Total Suspended Solids
- Dissolved Oxygen
- Organic Materials
- Nitrate
- Salinity/Chlorides
- Sulphates
- Process Chemicals
- Other

If 'other' please specify- _____

2.7 How often are these parameters tested? (Please tick (√) the appropriate space provided.)

Condition/ Techniques	Frequency						
	Every 1-6 hours	Every 7-12 hours	Every 13-18 hours	Every 19 hours to a day	Every week	Every month	Every Year
pH							
Dissolved Metals							
Total Dissolved Solids							
Total Suspended Solids							
Dissolved Oxygen							
Organic Materials							
Nitrate							
Salinity/Chlorides							
Sulphates							
Process Chemicals							
Other							

2.8 What water areas are being impacted and therefore monitored?

- Surface Waters
- Groundwaters
- Adjacent Streams and Rivers
- Other

If 'other' please specify- _____

Preventive and Control Measures:

2.9 What equipment/ procedures are used to mitigate the impacts?

Ground Investigation:

- Boreholes grouted or lockable covers installed
- Pumped water monitored
- Compensation ponds

Operations and rehabilitation:

- Removal and recycling of wastes
- Maintenance and monitoring of on-site sewage treatment facilities
- Proper storage of chemicals
- Bunds
- Minimization of Total Disturbed Area
- Proper drainage management
- Re-vegetation
- Contouring
- Settling ponds
- Construction and lining of ditches and water-transfer systems
- Lining and covering of storage systems
- Proper control and timing between different existing procedures (e.g. Drilling and Priming of blastholes and Re-vegetation and

Application of fertilizers.

- Improved plant operations
- Other

If 'other' please specify- _____

Treatment options:

2.10 What treatment options are available?

- Desilting lagoons and ponds (settling ponds)
- Wetlands (natural ecosystems capable of removing dissolved metals)
- Clarifiers
- Filter presses
- Chemical treatment options
- Oil-water separators
- Precipitation (using lime, soda and other chemicals) followed by solid-liquid separation
- Desalination
- Reverse Osmosis
- Neutralisation with acid/alkalis
- Ion exchange
- Cooling ponds
- Other

If 'other' please specify- _____

3. ENVIRONMENTAL NOISE/ VIBRATION

Noise/Vibration Types:

3.1 What are the various types of noise/vibrations within the quarry?

- Heavy Equipment Operations
- Rock Crushers
- Screening Systems
- Trucking and Transportation
- Material Processing Systems
- Gas Compressors
- Gas Treatment Facilities
- Power Generation Facilities
- Other

If 'other' please specify- _____

Noise/Vibration Sources:

3.2 Where is noise/vibration generated from within your operation (i.e. the source of noise/vibration)?

- Soils and Overburden stripping and replacement
- Mineral extraction and movement within the site
- Mineral Processing and loading
- Transport off-site in road-going trucks
- Other

If 'other' please specify- _____

Noise Intensity:

3.3 Based on a decibel (dB) level how much noise is produced?

- <20
- 21-40
- 41-60
- 61-80
- 81-100
- 101-120
- 121-140
- >140

3.4 Based on a range, how far does the noise from the operation travel up to?

- Maintained on-site
- Only up to the boundary
- Up to 1000ft. from the boundary
- >1000ft. from the boundary

3.5 Based on a frequency, how often is the noise produced?

- Once per day
- 2-3 times per day
- 4-5 times per day
- > 5 times per day

Noise/Vibration Mitigation:

3.6 What noise/vibration mitigation procedures are implemented?

- Plant-replacement programmes (replacement of noisier plant with quieter one)
- Replacing steel decks on vibrating screens with plastic or rubber decks
- Lining hoppers and chutes internally with rubber or similar resilient material
- Applying silencers to exhaust stacks and blower or fan inlets and outlets
- Reducing vibration area (e.g. from areas that are loose or touching or attached to vibrating sources such as screens)
- Introducing stiffening or dampening material, or by adding mass to vibrating structures
- Cross-bracing
- Use of silencers
- Heavy and complete enclosure of the source of noise (using noise insulation and/or absorption materials)
- Screen barrier between source and receiver
- Other

If 'other' please specify- _____

4. IDENTIFICATION, ASSESSMENT AND MITIGATION OF LAND/VISUAL IMPACTS

Land/Visual Type:

4.1 What type of visual impact is experienced?

- Visual Intrusion (pre-existing view encroached upon by new element of poorer visual quality)
- Visual Obstruction (element block and prevents visibility to the pre-existing view)
- Other

If 'other' please specify- _____

Land/ Visual Sources:**4.2 What are the main sources of potential land/visual impact due to quarrying?**

- Quarry landforms (e.g. Storage Mounds, Bunds, Stockpiles, Waste Heaps, Quarry Faces, Haul Roads, Embankments etc.)
- Mobile plant (e.g. Processing plant, Vehicles, Drill Rigs etc.)
- Built structures (e.g. Storage Hoppers, Crushing and Screening plant, Washing and Dewatering plant, Walkways and Conveyors, Concrete plant, Exhaust Stacks etc.)
- Long range indicators of the quarrying industry (e.g. Air Pollution, Dust Deposits, Mud on roads, Lighting etc.)
- Other

If 'other' please specify- _____

Land/ Visual Quantities:**4.3 Based on a percentage (%) how much of the land operated on is currently changed from its original state (i.e. before any operation procedures begun)?**

- 1-10
- 11-20
- 21-30
- 31-40
- 41-50
- 51-60
- 61-70
- 71-80
- 81-90
- 91-100

4.4 Based on a range, how far are the visual impacts from quarry operations seen?

- On-site only
- As far as the boundary
- 1000 feet from the boundary
- >1000 feet from the boundary

4.5 What is the magnitude of the visual impact?**- Spatial impact:**

- Local
- Regional

- Duration:

- Short-term
- Medium-term
- Long-term

- Permanence:

- Reversible
- Irreversible

- Likelihood of its recurrence:

- Cumulative
- Isolated

Mitigation of Land/Visual Impact:

4.6 What mitigation measures are implemented to deal with land/visual impacts?

Concentration of visual impact:

- Mineral planning zoning strategy (new quarry units sited within a limited geographic area)
- Spatial concentration of particular elements such as processing plant, haul roads, waste dumps etc.

Concealment of source of visual impact:

- Belt of trees used to obscure offending view
- Grass-covered earth bund used to obscure offending view
- Perimeter screening
- Improvement in design and operational modifications (e.g. placing processing plant in deepest part of the quarry)
- Minimize the number of viewers as well as the duration of visibility
- Improved extraction techniques

Innovative techniques:

- Understanding and cooperation developed with local community
- Improve familiarity by construction of perimeter viewing platforms with interpretation boards
- Compensatory local landscape improvements

Practical measure for mitigation:

- Site selection
- Method of working
- Screening
- Camouflage
- Haulage
- Housekeeping
- Other

If 'other' please specify- _____

Restoration of the Landscape:

4.7 What restoration procedures/options are implemented?

- Recreation
- Aquaculture
- Built environment
- Commercial forestry
- Nature Conservation
- Other

If 'other' please specify- _____

5. WASTE MANAGEMENT

Waste Types/ Sources:

5.1 What are the main types/ sources of waste?

Mineral waste:

- Overburden and interburden (rocks and soils)
- Process wastes (discards from screening, crushing and other primary mineral-processing plants)
- Sub-standard or unmarketable materials

Operational waste:

- General office waste
- Waste oils
- Used filters
- Tyres
- Scrap
- Other

If 'other' please specify- _____

Waste Quantities:

5.2 Based on a percentage (%), how much of the previously selected waste/s is/are produced per day? (Please tick (✓) the appropriate space provided.)

Waste Type/ Source	Percentage (%)									
	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
Overburden and interburden										
Process wastes										
Sub-standard or unmarketable materials										
General office waste										
Waste oils										
Used filters										
Tyres										
Scrap										
Other										

5.3 Based on a range, how far is/are the previously selected waste/s seen? (Please tick (✓) the appropriate space provided.)

Waste Type/ Source	Ranges			
	On-site only	As far as the boundary	Up to 1000 feet from the Boundary (Off-site)	>1000 feet (Off-site)
Overburden and interburden				
Process wastes				
Sub-standard or unmarketable materials				
General office waste				
Waste oils				
Used filters				
Tyres				
Scrap				
Other				

5.4 Based on a frequency, how often is/are the previously selected waste/s produced? (Please tick (✓) the appropriate space provided.)

Waste Type/ Source	Frequencies					
	<1 hour per day	1-3 hours per day	4-6 hours per day	7-9 hours per day	10-12 hours per day	>12 hours per day
Overburden and interburden						
Process wastes						
Sub-standard or unmarketable materials						
General office waste						
Waste oils						
Used filters						
Tyres						
Scrap						
Other						

Waste Disposal:

5.5 How is the waste disposed of?

- Landfill
- Incineration (combustion/burning)
- Decomposition/Composting (anaerobic digestion)
- Recycling
- Other

If 'other' please specify- _____

Waste Mitigation:

5.6 What waste-retention structures are used?

- Spoil heaps
- Backfills
- Lagoons (liquid tips or settling ponds)
- Stockpiles
- Amenity banks
- Other

If 'other' please specify- _____

6. BIODIVERSITY

Biodiversity Types:

6.1 What are the various types of biodiversity (animals and plant species) present in the area?

6.2 What endangered/ threatened/ vulnerable animal species of Trinidad and Tobago are located within the area?

- Ocelot
- Pawi
- Porcupine
- Yellow Headed Parrot
- Blue and Yellow Macaw
- Matte
- Tayra
- Red Howler Monkey
- Wild Hog (Quenk)
- Golden Tree Frog
- Crab-eating Racoon
- Agouti
- Armadillo
- Red Brocket Deer
- Tatoo
- Lappe
- Manicou
- Iguana
- Scarlet Ibis
- Red-Billed Whistling Duck
- Green Anaconda
- Other

If 'other' please specify-

Biodiversity Quantities:

6.3 Based on a population size how much of each of the previously selected endangered/ threatened/ vulnerable species are present in the area?

Animal	Population Size
Ocelot	
Pawi	
Porcupine	
Yellow Headed Parrot	
Blue and Yellow Macaw	
Matte	
Tayra	
Red Howler Monkey	
Wild Hog (Quenk)	
Golden Tree Frog	
Crab-eating Racoon	
Agouti	
Armadillo	
Red Brocket Deer	
Tatoo	
Lappe	
Manicou	
Iguana	
Scarlet Ibis	
Red-Billed Whistling Duck	
Green Anaconda	

Conservation/Protection:

6.4 How is the biodiversity conserved/protected in the area?

- Through different agencies (e.g. EMA, Forestry Division, National Parks Division)
- Proper management and monitoring on-site
- Public awareness/education/information/advice
- Research/ Data collection
- Other

If 'other' please specify- _____

Restoration:

6.5 How is land managed to ensure restoration/rehabilitation and therefore benefits for biodiversity?

- Reafforestation/ Revegetation
- Agriculture
- Nature Reserves
- Aquaculture
- Other

If 'other' please specify- _____

7. HUMANS/COMMUNITY

Community Type:

7.1 What communities are situated nearby and are therefore affected by the operation? (Give the name of the settlement and the its type (i.e. town, village etc.).

7.2 What type of settlement pattern exists in the nearby community?

- Dispersed
- Ribbon/Linear
- Nucleated/Clustered

Community Quantities:

7.3 How many homes are affected by the operation?

- 0
- 1-10
- 11-20
- 21-30
- 31-40
- 41-50
- 51-60
- 61-70
- 71-80
- 81-90
- 91-100
- >100

7.4 Based on a range, how far away are the communities affected by the operation?

- <1000m
- 1000-2000m
- 2001-3000m
- 3001-4000m
- 4001-5000m
- >5000m

Impacts:

7.5 What operations cause impacts onto the nearby communities (source of the impacts)?

- Mining techniques (e.g. Blasting, Application of toxic chemicals, and Heating chemicals)
- Dangers from chemicals (e.g. Lead, Asbestos, etc.)
- Human error (e.g. Truck accidents, Ruptured containment liners, Poorly engineered storages of waste etc.)
- Air and water transport of pollution
- Other

If 'other' please specify- _____

Monitoring:

7.6 Are surveys/questionnaires used to record the human/community complaints?

Mitigation:

7.7 What procedures are used to mitigate impacts caused onto the communities?

- Aid from regulatory agencies (establish risks and monitor pollutants etc.)
- Provide information on health risks
- Engage local communities
- Health and safety management
- Other

If 'other' please specify- _____

7.8 What health and safety issues are in place to minimize the effect caused onto humans (e.g. protective gear,)?

8. TRAFFIC

Traffic Type:

8.1 What type of traffic is experienced?

- On-site
- Off-site

8.2 What is being transported?

- Overburden
- Minerals
- Discarded Materials
- Mineral Products (e.g. Coated roadstone, bricks, blocks, cement, etc.)
- Supplies and Services (e.g. Fuel, bitumen, etc.)
- Other

If 'other' please specify- _____

Traffic Source:

8.3 What type of vehicle is used?

- Trucks
- Trains
- Ships
- Barges
- Conveyors
- Load-and-carry plant
- Cableways
- Other

If 'other' please specify- _____

8.4 What traffic mode/transport network is used?

- Road
- Sea
- Inland waterway
- Rail systems
- Conveyor
- Pipelines
- Other

If 'other' please specify-

Traffic Quantities:

8.5 How many modes of transport are involved in the operation?

- 1-5
- 6-10
- 11-15
- 16-20
- >20

8.6 Based on a range, how far away must the vehicles travel from the quarry site in order to reach their final destination?

8.7 Based on a frequency, how often do these vehicles travel from the quarry site?

- Once a day
- Twice a day
- Three times a day
- > Three times a day

Mitigation:

8.8 What are the best-practice measures that are put in place to minimize the environmental effects of traffic?

- Identification of who/what affected
- Increasing the distance between operations and potential receptors
- Moving traffic routes away from the site boundary
- Using other modes of transport that is more environmentally friendly (e.g. Railways)
- Avoiding the problem (e.g. Using suitable/preferred routes, areas where no inconvenience is caused to people or resources etc.)
- Taming the vehicle (e.g. Ensuring the condition of the vehicle is up to standard, including maintenance, freedom from mud and dirt and the containment of its mineral product load and transport operations improved by better driver training etc.)
- Other

If 'other' please specify-

