ENVIRONMENTAL IMPACT ASSESSMENT

for the proposed Aluminium Pechiney smelter within the Coega Industrial Development Zone, Port Elizabeth, South Africa

FINAL ENVIRONMENTAL IMPACT REPORT

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CSIR Report No: ENV-S-C 2002-109
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For Authority Review

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Proponent’s Commitment Statement

Aluminium Pechiney is proposing to construct and operate a 455,000 tonne per year primary aluminium smelter, known as PAS 2005, in the Coega IDZ. In accordance with South African legislation, Aluminium Pechiney has commissioned CSIR Environmentek as an independent consultant to undertake an Environmental Impact Assessment for the PAS 2005 Project. In parallel with conducting this EIA, Aluminium Pechiney is establishing a range of financial partners to take up shares in the Project.

Aluminium Pechiney is a part of Pechiney, the world’s fourth largest aluminium production and conversion group and the world’s second largest producer of silicon. Pechiney is also the world’s third largest manufacturer of high value-added specialty packaging. The Group’s other activities include an efficient global sales network and leading positions in distribution and trading. As a group, Pechiney operates 334 manufacturing and sales facilities in 51 countries. Aluminium Pechiney operates 8 aluminium smelters in 5 countries and has provided its technology to more than 80% of the smelter developments built over the last 20 years.

Environmental protection, health and safety are key priorities in Pechiney’s corporate strategy and in our Continuous Improvement System. Pechiney is committed to applying the following guidelines throughout the Group:

1. To ensure transparency in issues concerning environmental protection, health and safety, in particular by evaluating and publishing achievements and performances measured by selected indicators applicable to the Group’s activities.
2. To ensure regulatory compliance of operations and facilities, as well as compliance with the internal standards the Group is developing to align its practices.
3. To ensure continuous improvement of employees’ health and safety conditions and those of Group subcontractors.
4. To continue to reduce the environmental impact of the Group’s past, current or future activities as well as of its products, by limiting emissions and waste, optimising processes, managing the risk of accidents, remediating any damage done, and developing partnerships with customers and suppliers.
5. To develop products that are more considerate of the environment by analysing their life cycles, from design to recycling.
6. To implement the best available and most economically viable technology in new investments and the best environmental practices throughout the Group.
7. To manage industrial risks through efficient identification and ranking procedures, as well as by the implementation of appropriate prevention and protection measures and their ongoing adaptation.
8. To organise a scientific health watch activity to detect and control new risks.

This corporate policy will equally apply to the construction and operation of the PAS 2005 project in South Africa.
Aluminium Pechiney will respect and comply with all statutory and legislative requirements of South African law, including environmental aspects and across the conduct of all of our general business.

In order to ensure application of best practice environmental management, and in line with the Company’s continuous improvement strategies, the Project will establish and implement an accredited environmental management system based on the ISO 14001 standard.

Throughout the EIA process Aluminium Pechiney has worked with Stakeholders and the CSIR to ensure mutual understanding and practicality of recommendations and proposed impact mitigation measures. Aluminium Pechiney thus largely approves findings of the technical studies and supports the recommendations filed by CSIR in the Final Environmental Impact Report.

In some cases, additional studies are suggested to further optimise the Project. Whilst these necessarily remain options today, Aluminium Pechiney accepts to expediently investigate these in conjunction with the stakeholders concerned in order to finalise the most appropriate solutions.

Of all the recommendations in the Final Environmental Impact Report, only the proposal to study and allocate provisions for a future rail link between the smelter and Port remains a strong concern for Aluminium Pechiney. The Company believes such an option to be unviable and an unnecessary restriction given the very short distance, the existence of an appropriate IDZ road infrastructure and the negative effect on land management within the IDZ and Port areas.

Aluminium Pechiney has extensive experience with environmental monitoring of its operations worldwide. Recommendations for monitoring provided in this Final Environmental Impact Report are fully supported by the PAS 2005 Project. It is recognised that finer details of the various programs will need to be established with the authorities and other stakeholders concerned. In connection with this monitoring, Aluminium Pechiney supports establishing a public reporting process. Again, details and modes of such reporting will need to be established in consultation with relevant stakeholders.

During the EIA process, Aluminium Pechiney has recognised the importance to local communities and authorities of being able to report against the triple performance criteria of financial, social and ecological aspects associated with future operations. The Company commits to establishing auditable processes to evaluate and publicly report in terms of these features.

In parallel with the final stages of the EIA process, Aluminium Pechiney has commenced applications for a series of environmental permits. These permits demonstrate strong interactions with the EIA and we believe these should be issued in reasonable time following the Record of Decision. Aluminium Pechiney will work with the relevant authorities to finalise the necessary detail to expedite these permits.
Finally, with an expectation that all requirements will be concluded timeously (both internal and external to Pechiney) for a decision to proceed with the PAS 2005 Project, including the issue of a favourable Record of Decision and subsequent Permits, Aluminium Pechiney commits to establishing an ongoing communications program to ensure stakeholders are kept informed of progress and performance of the Project.

Jean-Paul Aussel
Business Unit Director
PAS 2005
The Final Environmental Impact Report (this report, dated November 2002) incorporates comments provided by a wide range of stakeholders on the Draft Environmental Impact Report (EIR). Comments were provided by communities, NGOs, businesses, environmental groups, as well as the authorities and parastatal bodies. These have been compiled as a Comments and Response Trail and included as Chapter 17 in the Final EIR. The full comments received are attached as appendices to this report.

Based on the comments received the following significant changes were made to the Draft Environmental Impact Report. These do not include minor editing and layout changes.

- **Chapter 1**: No significant changes.

- **Chapter 2**: Figure 2.1 (location map) has been updated. The project summary has been updated to reflect project outputs as well as inputs (Box 2.2). Additional information is provided on the provision of an electromagnetic buffer zone (Box 2.3); and on energy conservation measures employed by Aluminium Pechiney (Box 2.4).

- **Chapter 3**: The status of the Eskom powerline EIAs (section 3.3.2) has been updated based on information provided by Bohlweki Environmental (the consultants undertaking the current EIAs on transmission lines to the IDZ on behalf of Eskom). The table of roles and responsibilities of roleplayers has been updated (Table 3.1).

- **Chapter 4**: Groundwater information has been corrected (Section 4.2.5). Extra information is included in Table 4.3 on the economic contribution of different sectors in the Nelson Mandela Metropole (NMMM) and the Sundays River Valley.

- **Chapter 5** has been updated to include the public participation process for the Draft EIR.

- **Chapter 6**: A table has been added which provides a breakdown of the recyclable component of the waste stream (Table 6.3)

- **Chapter 7**: Information on Aluminium Pechiney’s commitment to direct greenhouse gas emission reductions has been included as Box 7.1

- **Chapter 8**: Recommendations for monitoring have been extended to include monitoring of impacts of fluoride emissions on key indicator species, including wildlife.

- **Chapter 9**: The information on geology and groundwater has been updated and expanded upon, with clear monitoring recommendations provided. Following discussions on the draft EIR with Dept of Water Affairs and Forestry (DWAF), a new
scenario whereby process water is potentially discharged to the metro’s sewage treatment system was included. Other additions include a water balance (Figure 9.1), international guidelines and permits affecting Aluminium Pechiney’s current international operations (Table 9.6) and a breakdown of the potential sources of fluoride in stormwater and process wastewater (Table 9.7).

- **Chapter 10:** Information has been added on how the South African marine water quality guideline for fluoride in discharge effluent (of 5 mg/litre) was determined (Box 10.1), and on the potential effects of fluoride on marine biota (Box 10.2). Additional information on the National Port Authority’s (NPA) current situation with regard to dredging permits for the construction of the Port of Ngqura is provided, as well as the future requirements during operation of the port.

- **Chapters 11 to 15:** No significant changes have been made to these chapters.

- **Chapter 16:** The section with information on power generation has been updated, based largely on new information provided by Eskom. For example, new information is provided on South Africa’s energy reserves, on the National Energy Regulator (NER), and on future reductions in coal-based power generation. The recommendation that the externality costs associated with power supply to the smelter be assessed, has been removed, with reasons provided in the Comments-Response Trail. An explanation of the national approach to determining electricity tariffs is provided in the Comments-Response Trail (section 17.1.9).

- **Chapter 17:** This chapter is entirely new and contains the Comments-Response Trail.

- **Chapter 18:** This was Chapter 17 in the draft EIR, and has undergone several edits based on the changes in the above chapters. In particular, changes were incorporated into Table 18.1 and Figure 18.1.

- **Chapter 19:** The references list has been updated where required.

- **Appendices:** Full records are provided of communications (eg. Media advertisements, letters etc), inputs and comments received from the public participation process for the comments period of the draft Environmental Impact Report.
SUMMARY

Introduction

Aluminium Pechiney, a French company listed on the French Commercial Register, is planning to construct a new aluminium smelter to meet the rising global demand for aluminium. The project, known as PAS 2005, would increase Aluminium Pechiney’s aluminium production by approximately 485 000 tonnes per year.

Selection of the Coega site for the smelter

In an international site selection study, Aluminium Pechiney identified 11 potential sites for locating this smelter. More detailed investigations were undertaken for three of the preferred sites, these being within the Coega Industrial Development Zone (IDZ) in South Africa, and sites in Australia and Argentina. Engineering, planning and environmental studies are currently underway at the South African and Australian sites. Based on the results of these feasibility studies, Aluminium Pechiney will decide on the site for the smelter.

Rationale for the project

Aluminium Pechiney conducted a market analysis, which indicated an anticipated rise in the global demand for aluminium of 2.5% per year, up to the year 2010. In order to meet this demand Aluminium Pechiney is investigating the feasibility of establishing a new aluminium smelter.

Context of the smelter within the Coega IDZ

The Coega IDZ lies at the mouth of the Coega River, approximately 15 km north-east of Port Elizabeth in the Eastern Cape province. The IDZ is situated within the Nelson Mandela Metropolitan Municipality (NMMM), which includes the former Port Elizabeth, Uitenhage and Despatch municipalities. The Coega IDZ consists of 12 000 hectares of land, and will be serviced by the Port of Ngqura, which is currently being constructed. This is the first IDZ to be established in South Africa, and forms part of the South African government’s Growth, Employment and Redistribution (GEAR) strategy.

The establishment of the Coega IDZ follows extensive environmental assessment studies. A Strategic Environmental Assessment was undertaken in 1996 to assess the opportunities and constraints to developing the IDZ and the deepwater port at Coega. Subsequently, EIAs have been completed for the rezoning of land for the IDZ and the
establishment of the Port of Ngqura. These EIAs were authorized by the national Department of Environmental Affairs and Tourism (DEAT) in May 2002.

**Proposed aluminium smelter project**

The proposed site for the smelter lies within an area in the IDZ identified as a metallurgical cluster. The smelter would be operated on a continuous basis (24 hours, 365 days per year) using the new generation AP50 smelting technology developed by Aluminium Pechiney.

<table>
<thead>
<tr>
<th>Infrastructure requirements:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total site area for single potline (including buffer zone)</td>
<td>~ 120ha</td>
</tr>
<tr>
<td>Total cleared area for single potline (including construction laydown area)</td>
<td>~ 135ha</td>
</tr>
<tr>
<td>Hardened surfaces for single potline</td>
<td>~ 50 hectares</td>
</tr>
<tr>
<td>Number of potlines</td>
<td>1</td>
</tr>
<tr>
<td>Number of potrooms</td>
<td>2 (in parallel)</td>
</tr>
<tr>
<td>Length of potline</td>
<td>1 200m</td>
</tr>
<tr>
<td>Number of electrolysis cells (&quot;pots&quot;)</td>
<td>336</td>
</tr>
<tr>
<td>Electricity supply</td>
<td>3 x 275 kV transmission towers (operated as 132kV distribution lines)</td>
</tr>
<tr>
<td>Port infrastructure</td>
<td>Use of 2 berths at the Port of Ngqura</td>
</tr>
<tr>
<td>Interim product storage area</td>
<td>Conveyor belt</td>
</tr>
</tbody>
</table>

**Inputs**

<table>
<thead>
<tr>
<th>Consumption/Usage</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alumina consumption</td>
<td>~ 931 000 t/year</td>
</tr>
<tr>
<td>Petroleum coke consumption</td>
<td>~ 180 000 t/year</td>
</tr>
<tr>
<td>Liquid pitch consumption</td>
<td>~ 38 000 t/year</td>
</tr>
<tr>
<td>Aluminium fluoride consumption</td>
<td>~ 8 800 t/year</td>
</tr>
<tr>
<td>Heavy fuel oil usage</td>
<td>~ 31 800 t/year</td>
</tr>
<tr>
<td>Electricity demand</td>
<td>~ 860 MW</td>
</tr>
<tr>
<td>Water usage</td>
<td>~ 600 000 m³/year</td>
</tr>
<tr>
<td>Total investment</td>
<td>~ $ 2 094 million</td>
</tr>
</tbody>
</table>

**Outputs**

<table>
<thead>
<tr>
<th>Output</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminium production capacity</td>
<td>~ 485 000 t/year</td>
</tr>
<tr>
<td>Direct jobs created</td>
<td>Construction: 4 000 average; 6 000 peak Operation: 750 employees; 200-300 subcontractors</td>
</tr>
<tr>
<td>Solid waste for landfill</td>
<td>~ 10 410 t/year (industrial and hazardous)</td>
</tr>
<tr>
<td>Solid waste for external recycling/reuse</td>
<td>~ 17 220 t/year</td>
</tr>
<tr>
<td>Domestic wastewater</td>
<td>~ 80 000 m³/year</td>
</tr>
<tr>
<td>Process wastewater</td>
<td>~ 300 000 m³/year</td>
</tr>
<tr>
<td>Stormwater</td>
<td>Varies according to rainfall</td>
</tr>
<tr>
<td>Air emissions</td>
<td>Sulphur dioxide (SO₂), hydrogen fluoride (HF), total suspended particulates (TSPs), polycyclic aromatic hydrocarbons (PAH), perfluorocarbons (PFCs), carbon dioxide (CO₂), nitrogen oxides (NOₓ)</td>
</tr>
</tbody>
</table>
Raw materials

The main raw materials required for the Aluminium Pechiney smelting process are alumina, petroleum coke, liquid pitch, aluminium fluoride, electrical power and heavy fuel oil (HFO). The alumina and petroleum coke will be imported via the Port of Ngqura in dedicated vessels, offloaded, and transported by conveyor to the storage facilities at the smelter site. The liquid pitch will be carried by heated road tanker from the Port of Ngqura to the smelter site. The aluminium fluoride will be brought in either through the Port of Ngqura or the Port Elizabeth harbour; and the HFO will be transported via Port Elizabeth harbour.

Aluminium reduction process

The smelting process uses electrical energy to break the bonds between aluminium and oxygen in the alumina, in order to produce liquid aluminium. This process takes place in large steel containers (reduction pots), which are arranged in long buildings known as potrooms. Two potrooms constitute a potline. The potline proposed for the Coega IDZ will consist of two elongated potrooms measuring 1200m x 30m.

Product

The final product of the aluminium smelting process is in the form of aluminium ingots. The ingots will be stacked and trucked to the Port of Ngqura prior to shipping to international markets.

Employment

The construction workforce is expected to peak at approximately 6 000 people for a period of 12 months. The average workforce during construction is estimated to be 4 000 workers. Operation of the smelter will require approximately 750 full-time, permanent employees. These will consist of 550 semi-skilled and skilled waged employees and 200 highly skilled technical and management positions. An additional 200 to 300 direct subcontractors will also be employed permanently.

Project Schedule

Construction is anticipated to commence in early 2003 leading to first metal production in early 2005 and full metal production 8 months later. The life of the project is expected to be 30 to 40 years.
Biophysical and socio-economic environment

Climate

The Coega IDZ is situated at the transition between the temperate and subtropical bioclimatic zones with rain occurring throughout the year. Port Elizabeth receives an average of 624 mm of rainfall annually. The area has a warm temperate climate with the average daily temperature ranging from 21°C (summer) to 14°C (winter). The predominant winds in the Port Elizabeth area follow the coastline and are consequently from the West-South-west and East-North-East.

Air quality

Air quality monitoring of Sulphur Dioxide (SO$_2$) total suspended particulates (TSP) and dust is being undertaken for the Coega area. The results show that the existing air quality of the area is good.

Geology

The Eastern Cape coastline has a complex geology, mostly consisting of sedimentary formations such as sandstone, mudstone, limestone, conglomerate and tillite. A section of the Table Mountain Sandstone complex underlies Algoa Bay and its islands (the Bird Island group and St Croix Island group). The Coega IDZ is underlain by limestone and calcareous sand blown onshore by the wind.

Biophysical environment

The catchment of the seasonal Coega River covers approximately 550 km$^2$ and is 45 km long and 15 km wide. The lower 3.3 km section of the river, between the N2 Highway and the coast, is highly modified. In this section the river has been diverted into an earth channel and a commercial saltworks is located within the floodplain.

The smelter site is located approximately 4 km inland on a flat coastal plain with an elevation of 47 to 57 metres above sea level. The vegetation cover in this part of the IDZ consists mainly of Dune thicket near the coast, Succulent thicket inland, and open Bontveld on the crests.

Socio-economic context

The population of the NMMM area was estimated to be more than 1.1 million in 1999, which is 2.5% of the South Africa’s population. The unemployment rate in the NMMM is estimated to be around 40%. This is exacerbated in the urban areas where 50% to 60% of adults are unemployed.
The search for employment is a major factor driving migratory movements in South Africa. This is largely based on the perception that better employment opportunities exist in the urban centres. The Nelson Mandela Metropole is the recipient of many of these migrants from rural areas.

The NM MMM has a well developed road network and is relatively well served by rail transport, though this does not always provide adequate accessibility to and from low-income areas. As part of the development of the Coega IDZ the road network within the Coega area will be extended and upgraded. Key challenges for improving infrastructure and services are to improve the quality of education and to overcome the severe housing backlog.

**Environmental Impact Assessment process**

An Environmental Impact Assessment (EIA) of the proposed smelter is required in terms of Regulations published under the Environment Conservation Act (Act 73 of 1989). In a South African legal context, the term “environment” refers not only to the “green” environment (the biophysical components such as land, water, air, soil, plants and animals) but also to the social, economic, cultural, political and historical components of the environment.

The purpose of this EIA is to provide information to stakeholders and decision-makers on the predicted positive and negative impacts of the proposed Aluminium Pechiney smelter. This assists in understanding the extent to which the proposed project meets the goals for sustainable development. The goals for sustainable development in the southern African region have been described by the United Nations Department of Economic and Social Affairs (1997) as:

- Acceleration of economic growth with greater equity and self-reliance;
- Improving the health, income and living conditions of the poor majority;
- Ensuring equitable and sustainable use of the environment and natural resources for the benefit of present and future generations.

The EIA process has four broad stages:

- Scoping, to identify the issues to be addressed in the EIA
- Specialist studies to investigate the issues raised, and to predict the scale of the impact
- Integration and preparation of the Environmental Impact Report
- Decision making by the authorities on whether the project should proceed, and if so, under what conditions.

Aluminium Pechiney appointed the CSIR as the independent consultant to conduct the EIA. The CSIR team includes Sandy & Mazizi Consulting (who are carrying out the public participation process) and a team of specialists. Public consultation is taking place throughout the EIA process, to ensure that interested and affected parties are meaningfully engaged.
The following specialist studies have been undertaken as part of this EIA:

1) Materials handling and solid waste
2) Air quality
3) Air emission impacts on vegetation and agriculture
4) Water use and liquid waste
5) Water discharges to the marine environment
6) Traffic and transportation
7) Noise
8) Social impacts
9) Visual impacts
10) Macro-economics

**Impact assessment and mitigation**

The environmental impact assessment has been conducted according to the requirements of the South African EIA Regulations (DEAT, 1998). The process has also been designed to meet the World Bank requirements, as documented in the International Finance Corporation’s *Procedure for the Environmental and Social Review of Projects* (IFC, 1998). The EIA process is based on accepted international best practice for impact assessment. This included:

- appropriate and timely access to the process for all interested and affected parties (I&APs);
- process and timing of the assessment is agreed upon in advance with I&APs;
- process is aligned with the legal requirements and has clear purpose and well-defined responsibilities;
- opportunities for I&APs to contribute to the process are tailored according to their circumstances;
- scoping focuses on identifying and reaching closure on the key issues to be addressed;
- detailed terms of reference are developed for specialist studies and verified with I&APs;
- specialist studies are peer reviewed to ensure objectivity and professionalism;
- the EIA informs the design and implementation phase of the project;
- the project is assessed in a holistic context, taking into consideration the goals of sustainable development;
- information and outputs are presented in a readily understandable and usable format in order to assist decision-making.

The following sections provide an overview of the main positive and negative impacts of the project, and the key mitigation and management actions required.
**Materials handling and solid waste**

**Application of best practice**

**Impacts of spillages, fugitive emissions and dust**
The potential for spillages, fugitive atmospheric emissions and dust generation from materials handling is low and the volumes are expected to be small. If spillages are cleaned up promptly according to stringent housekeeping procedures, then the negative impacts arising from materials handling is predicted to be of low significance.

**Reduction in spare landfill capacity**
Waste produced during construction includes rubble, refractory material, used packaging, scrap iron, electrical waste, timber and motor oil. These will be recycled (where possible) or sent to waste disposal sites in the N MMM. The resulting negative impact on the capacity of these sites is of low significance. During operation, the volume of waste from the smelter is relatively small. Opportunities exist to further reduce this waste through recycling and re-use. The impact of disposal of waste is therefore of low negative significance.

**Re-use of spent potlinings**
Spent potlinings (SPLs) are classified as hazardous waste. It is highly likely that SPLs will be re-used in South Africa, rather than being sent to a landfill site, thus reducing the volume of hazardous waste for disposal.

**Air quality**

**Application of best practice**
The smelter will employ best available technology to minimise atmospheric emissions. The following assessment of impacts is based on the assumption that all equipment is properly maintained and that best operating practices are employed. Practical mitigation measures have been proposed.

**Dust generation during construction**
Under windy conditions, dust generated during construction (particularly the early excavations) may have a nuisance impact beyond the immediate construction area. The negative impact is assessed to be of medium significance.
Compliance with air quality guidelines
The predicted atmospheric emissions from the smelter are within the limits set by both South African and international guideline values. Potential health risks associated with the smelter were assessed at Motherwell, Bluewater Bay, Sundays River Mouth, Port Elizabeth, the smelter site, the Port of Ngqura and at Addo Heights. Constituents considered in the human health risk assessment included sulphur dioxide, hydrogen fluoride, fluoride particulates, total suspended particulates, carbon monoxide, nitrogen oxides and poly-aromatic hydrocarbons. No acute or chronic health effects are expected in any healthy or sensitive individual. The potential negative impacts on human health are, therefore, assessed to be negligible or of low significance. A significant reduction in sulphur dioxide emissions may be achieved in future if natural gas becomes commercially available to replace the use of heavy fuel oil in the anode baking furnace and casthouse.

Air emission impacts on vegetation and animals

Impacts on vegetation
It is anticipated that emissions of sulphur dioxide (SO$_2$) and hydrogen fluoride (HF) from the smelter will not exceed the tolerance thresholds of vegetation beyond the boundary of the IDZ. Based on international standards, the impact of SO$_2$ and HF emissions on the vegetable and citrus growing areas is assessed to be negligible. Within the IDZ, the impact on indigenous vegetation is expected to be of medium significance, implying that some visible effects of the pollutants will manifest with time.

Impacts of fluoride emissions on livestock and wildlife outside the IDZ
In general, there is very little information on impacts of fluoride on fauna, besides livestock. Based on available international guidelines for land-use, the predicted emissions are below levels of concern. The impact of fluoride emissions on livestock boundary is assessed to be of low significance. It is inferred that the impact on goats, an issue raised in scoping, is of low significance. There is a possibility that wild animals are more sensitive to fluoride and other emissions than domestic animals. However, this could not be confirmed due to an absence of relevant studies and literature. It is expected that the distance between the proposed smelter site and the nearest boundary of the Greater Addo Elephant National Park reduces the risk of negative impacts being realised. The uncertainty in this prediction would be reduced through monitoring and research on the sensitivity of key indicator species to fluoride emissions.

Impacts of fluoride emissions on butterflies
Another particular concern is the potential effect of the smelter on two rare butterfly species that occur within the boundaries of the IDZ, Aloeides clarki and
**Lepidochrysops bacchus.** No information on the direct effect of fluoride on the butterflies was available. Impacts on the plant species on which the larval stages of the butterflies feed may affect the health of these butterflies.

**Water use and liquid waste**

**Availability of water**
The NMMM has confirmed that there is sufficient spare water capacity to meet the water requirements for the smelter during both construction and operation. The potential **negative impact** on water supplies is of **low significance**.

**Discharge of stormwater and process water**
Atmospheric deposition of fluoride emissions on the smelter site and possible spillages of materials containing fluoride will result in fluoride-enriched stormwater. Process wastewater from the cooling systems also contains some fluoride. The levels of fluoride in process wastewater and stormwater runoff will exceed the Department of Water Affairs and Forestry’s (DWAF) stringent General Limit Value of 1 mg/litre for a surface water environment (eg. Coega River). The option of discharge of process wastewater and stormwater from the smelter to a fresh water reserve is therefore assessed to be a **negative impact of high significance**. In order overcome this problem, the option of discharge to the marine environment was recommended.

**Water discharges to the marine environment**

Impacts of combined process wastewater and stormwater discharge were assessed for two possible discharge locations: into the harbour basin of the Port of Ngqura and into the surfzone north-east of the breakwater.

**Impact of wastewater discharge on water column**
An assessment of process water and stormwater on marine water quality shows that, with the exception of aluminium (Al), copper (Cu) and zinc (Zn), compliance with marine water quality guidelines is achieved within a 200 m mixing zone beyond either point of discharge. The expected biogeochemical behaviour of these three constituents (Al, Cu and Zn) in seawater would suggest that the **negative impact** of discharging contaminated wastewater into the marine environment is of **low significance** in terms of impacts on marine water quality for either possible discharge location.

**Impact of wastewater on marine sediments**
The time taken for sediment quality to reach unacceptable threshold levels in terms of the London Convention, is generally very long (10 to 1000 years). However, sediment quality thresholds are estimated to be exceeded in the short-term for cyanide (CN), cadmium (Cd) and Zinc (Zn). While these three constituents are assessed to have a **negative impact of medium significance** (without mitigation) in the case of the port
discharge, the only constituent to have a medium significance impact for the surfzone discharge is cyanide. **Negative impacts** can be reduced to **low significance** by means of monitoring and periodic dredging of marine sediments within the harbour basin to ensure compliance with the sediment quality guidelines.

**Impact of spillages at the port**
Spillage of liquid pitch will have a **negative impact** of **medium significance** (without mitigation). This can be reduced to **low significance** with proper management (eg. through spill contingency planning).

**Traffic and transportation**

During construction traffic impacts are predicted for some existing intersections near the smelter site. Minor improvements to key intersections and construction of critical sections of the proposed Coega IDZ road network should be completed before the peak construction period. This will reduce the impact to **low significance**.

Aluminium ingots will be transported from the smelter to the harbour by means of 56 trucks trips per day each carrying 24-tonne payloads. This will have a **negative impact** of **low significance** on the structural capacity of the road and road safety along Neptune Road and Ranger Road extension. Alternatives for mitigating this impact include using trucks with larger volumes and the possible longer-term option of changing to rail transport.

**Noise**

During construction the main sources of noise are the general construction activities and infrequent higher-level activities such as blasting and use of impacting equipment. These impacts can be mitigated by providing a vegetated buffer along most, if not all, of the inner perimeter of the property of at least 100m width. With mitigation, all noise impacts during construction are expected to be of **low to medium significance**.

During operations, good design principles, which are standard practice in a modern smelter, will reduce noise impacts to **medium-low significance**. Noise emission levels at the boundary of the smelter site are predicted to be within the 70 dB(A) noise guideline for industrial areas set by the World Bank (World Bank, 1998).

The noise emitted by trucks transporting ingots downhill to the port was identified as a significant noise source during operations. Considering that this trucking will take place within the IDZ and Port area, and will use a road constructed specifically for use of heavy-duty vehicles, the noise impact from this activity is predicted to be of **medium significance** (with mitigation).
Visual impacts

**Impact of smelter structures and lighting on scenic quality**
The proposed Aluminium Pechiney smelter would be visually prominent in the immediate area, and probably larger in scale than other buildings envisaged in the Coega IDZ. Based on available information, no floodlighting of buildings or high-mast lighting are required for the proposed plant. Depending on the effectiveness of the mitigating measures, and on the final architectural design, the significance of the visual impacts of the smelter on the scenic quality of the area will be **medium to high**, and for lighting, **medium**. The significance of the lighting would probably be further moderated to **low/medium**, once the Coega IDZ is developed further in the next 10 to 20 years.

**Impacts on the Greater Addo Elephant National Park**
Given the distance of some 16 km to the edge of the proposed Greater Addo Elephant National Park, it is expected that the smelter will have **negligible visual impact** on the Park.

Social impacts

**Positive social impacts**
The project is predicted to lead to several positive social benefits, such as: employment creation; opportunities for using local labour; opportunities for supporting small, medium and micro-enterprise (SMME) development; training and skills development; and increased investor confidence. These are assessed to be of **high significance**.

**Negative social impacts**
During construction, the smelter project could contribute to in-migration to the NMMM and an increase in the spread of HIV/AIDS. While Aluminium Pechiney is not solely or directly responsible for these impacts, the potential for these impacts to occur should be acknowledged. Implementation of successful mitigation measures will reduce these impacts to **medium significance**. During operations these impacts would be of **low significance**, because of the smaller number of staff employed than during construction.

**Other social issues**
During operations the **significance** of the **positive aspects** of employment creation, the use of local labour, and training and skills development opportunities are **reduced** because a relatively small number of highly skilled permanent employees will be employed. However, opportunities for SMME development throughout the operations phase remains of **high significance**. This **positive impact** can be further enhanced by Aluminium Pechiney through facilitation of SMME development, a Corporate Social Responsibility programme, and linking with existing institutions assisting SMMEs.
Macro-economics

The construction of the smelter will require a total expenditure of $2,094 million. This consists of $1,042 million of direct investment (e.g., equipment, construction and salary costs), of which approximately 53% will consist of imported goods. The remaining budget consists of indirect investment, financial reserves and financing costs. All amounts quoted are indicative and not to be taken as absolute values as finances and budgets are still being finalised.

Impact on South Africa’s balance of payments

The sale of ingots is estimated to generate in the order of $510 million/year (at 2002 prices) and will contribute positively to South Africa’s balance of payments. This will be reduced by imports and capital outflow in the form of repayment of international debt and remittances. The contribution to South Africa’s balance of payments can affect the exchange rate of the Rand and interest rates. Based on the information provided, the project will make a positive contribution to South Africa’s balance of payments during construction (2003 to 2005) and during the operations period from 2013 to 2046. The most critical time is the period from 2006 to 2013 when capital outflows include depreciation as well as debt repayments. For this period, the contribution to balance of payments is marginally negative.

Impact on employment and income

During construction, an additional 30,000 to 51,000 jobs will be created or sustained in the South African economy; and during operation an additional 9,000 to 15,000 jobs. Of these operational jobs, some 36% will be created in the Nelson Mandela Metro and the remainder elsewhere in South Africa, mostly in the electricity sector. The increase in income for the Port Elizabeth area is predicted to be $29 million/year (R302 million/year), which is 0.6% of the province’s remuneration.

Impact on Gross Domestic Product (GDP)

The project is expected to contribute approximately 0.25% to GDP over the construction period. During operations, the contribution to GDP is 0.3%.

Impact on government revenue

During construction, increased domestic demand caused by downstream businesses will contribute $49 million/year (R513 million/year) in indirect taxes, mostly Value Added Tax (VAT). During operation, the smelter will contribute corporate tax (less depreciation allowances), local government taxes and secondary tax on companies. Down-stream activity resulting from the smelter will generate additional indirect taxes. It is estimated that this project will generate an approximate annual total of $50 million (R527 million/year) in taxes, or 0.2% of the total government revenue per annum at 2002 prices, once depreciation has been written off (i.e. from 2013).
Role of Aluminium Pechiney as an anchor tenant and catalyst for investment

The Aluminium Pechiney investment may be seen as a ‘vote of confidence’ in the country and will stimulate further inflows of capital and economic growth. The smelter will also be an important long-term anchor tenant for the Coega IDZ.

Monitoring

The monitoring recommendations will be included in the comprehensive Environmental Management Plan for the smelter. The key monitoring requirements identified through the EIA are summarised below:

<table>
<thead>
<tr>
<th>Impact Category</th>
<th>Monitoring</th>
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</table>
| Materials handling and waste generation | ➢ Verify input data used in specialist study and waste classification.  
➢ Develop and implement a waste management system (including audits of spillages and monitoring of materials handling equipment). |
| Air quality | ➢ Monitor ambient air quality and meteorology.  
➢ Monitor process emissions at the smelter.  
➢ Test, monitor and service air pollution abatement equipment to ensure high levels of operational efficiency. |
| Air emission impacts on vegetation and animals | ➢ Monitor fluoride in vegetation (indigenous species and citrus) to establish the baseline condition of vegetation both within the IDZ and more distantly.  
➢ Monitor fluoride in water resources outside the boundary of the IDZ that may be used by livestock and wild animals.  
➢ Focussed monitoring programme to improve the understanding of effects of fluoride on indicator species. |
| Water use and liquid waste | ➢ Process wastewater and stormwater monitoring to verify modelling predictions  
➢ Plant-wide spillage audits  
➢ Monitor groundwater at the smelter site (this should include a pre-construction baseline geohydrological study). |
| Water discharges to the marine environment | ➢ Chemical monitoring of the water column and sediments for constituents assessed in the specialist studies.  
➢ Toxicological monitoring of the stormwater and process wastewater prior to discharge to the marine environment.  
➢ Bio-accumulation monitoring of constituents in the marine water column and sediments. |
| Traffic and transportation | ➢ Monitor construction progress and traffic volumes to determine whether upgrades at critical intersections are required. |
| Noise | ➢ Undertake sound level monitoring at key locations during the construction and operation of the smelter. |
| Visual | ➢ Design review by the CDC and their visual consultants of the final layout and architectural design of the Aluminium Pechiney smelter to ensure that: (i) visual mitigation measures have been incorporated; and (ii) the design satisfies the visual guidelines prepared by CDC for the IDZ.  
➢ Monitor the implementation of visual screening and dust control measures. |
Environmental permits and licences

The environmental permits and licences which may be required by Aluminium Pechiney for the operation of the smelter are listed below:

<table>
<thead>
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<th>Details</th>
<th>Government Department</th>
<th>Applicable Legislation</th>
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<td>For storage for SPLs on site for more than 90 days</td>
<td>DWAF</td>
<td>Environment Conservation Act (Act 73 of 1989), Section 20</td>
</tr>
<tr>
<td>Major Hazard Installation (MHI) permit</td>
<td>A risk assessment must be completed to determine whether the proposed smelter is a MHI</td>
<td>Department of Labour</td>
<td>Occupational Health and Safety Act (Act 85 of 1993), Section 43</td>
</tr>
<tr>
<td>Registration certificate for air emissions</td>
<td>Registration certificate required for scheduled processes such as the operation of an aluminium smelter</td>
<td>DEAT</td>
<td>Air Pollution Prevention (APPA)(Act 45 of 1965), Section 9</td>
</tr>
<tr>
<td>Water licence</td>
<td>For construction, operation and maintenance of the on-site stormwater interceptor pond and attenuation dam</td>
<td>DWAF</td>
<td>National Water Act (Act 36 of 1998).</td>
</tr>
</tbody>
</table>

Summary assessment

The significance of the predicted positive and negative impacts associated with the proposed smelter has been investigated and assessed in this Environmental Impact Assessment (EIA). No negative impacts of high significance are predicted, provided the recommended best practicable environmental options (BPEO) and mitigation measures are implemented effectively. Whether or not the Aluminium Pechiney proposal is authorised will require that the authorities weigh up the costs and benefits of the proposal. Figure 1 provides a summary of all predicted positive (+) and negative (-) impacts of the project, that are of either medium or high significance (with mitigation). Where these costs or benefits apply only to the construction phase, this is stated. Figure 1 also places the costs and benefits within the context of the three goals of sustainable development, i.e. biophysical integrity, social equity and economic growth.
Figure 1: Summary of the most significant environmental costs and benefits of the proposed smelter
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## DEFINITIONS

| **Alternatives** | A possible course of action, in place of another, that would meet the same purpose and need (of proposal). Alternatives can refer to any of the following but are not limited here: alternative sites for development, alternative site layouts, alternative designs, alternative processes and materials. In Integrated Environmental Management the so-called “no go” alternative refers to the option of not allowing the development and may also require investigation in certain circumstances. |
| **Alumina** | Alumina is the name given to the raw material, aluminium oxide (Al₂O₃), which is used in the melting process to produce aluminium. It is a white powdery oxide produced through refining of bauxite. |
| **Aluminium** | Aluminium (in metallic form) is a relatively lightweight metal which is highly corrosion resistant, an excellent thermal conductor, non-magnetic, non-toxic and highly workable. End uses of aluminium include building and construction materials, electrical products, packaging and containers, cooking utensils, the aeronautical, automotive industries and leisure goods industries. Aluminium is produced by a melting process which separates the aluminium from alumina (aluminium oxide) through electrolytic reduction. |
| **Anchor tenant** | Anchor tenants acts as catalysts for further investment (including improvements in local infrastructure and services) and as a magnet for other economic activities. They usually involve large-scale projects and in the construction and operational phases, present major employment and other economic opportunities for local enterprises. |
| **Anode** | An anode is the name given to a positive electrode in a reduction cell. The anode used in the aluminium industry provides the positive electrical contact. The anode block is consumed during the melting process. |
| **Assessment** | The process of collecting, organising, analysing, interpreting and communicating data that is relevant to some decision. |
| **Baking furnace** | The anodes produced at the paste plant are baked at about 1100°C in an oil-fired furnace for several weeks in order to give them mechanical and conductivity properties. |
| **Balance of payments** | The Balance of Payments (BoP) is an accounting record of a country’s involvement in international trade (indicated on the current account of the BoP) and international capital flows (indicated on the capital account). |
| **Bath** | This is the name given to the electrolytic medium within the pot through which the electric current is passed in the aluminium melting process. Bath is made up of cryolite, alumina and aluminium fluoride. |
| **Bauxite** | Aluminium ore which is refined to produce alumina. |
| **Best practicable environmental option** | The option that provides the most benefit or causes the least damage to the environment as a whole, at a cost acceptable to society, in the long term as well as in the short-term. In terms of the Aluminium Pechiney proposal, the identification of the BPEO is differentiated from impact mitigation and benefit enhancement measures in that the identified option involves a decision regarding fundamental design alternatives for the project. |
| **Butt crushing plant** | At the butt crushing plant the spent anodes which are recovered from the potline are crushed in order for them to be used for the production of new anodes. |
| **Casthouse** | Liquid aluminium which is extracted from the potline is transported to the casthouse where it is cast into aluminium ingots. |
| **Cathode** | A cathode is the name given to the negative electrode in a reduction cell. The cathode used in the aluminium industry provides the negative electrical contact as well as serving as the lining of the pot in which the smelting process takes place. |
| **Cementation** | Cementation is the process in which chemical precipitates (in the form of new crystals) form in the pores of a sediment or rock, binding the grains together. |
| **Climate change** | A change in climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climatic variability observed over comparable time periods. |
| **Cryolite** | A mineral (sodium aluminium fluoride) which the main component of bath in the aluminium smelting process. |
| **Current account of the balance of payments** | External account of the country with the rest of the world with respect to the imports and exports of goods and services. |
| **Dross** | The skimmings on the surface of the molten aluminium which are removed because they contain impurities which could affect the quality of the aluminium metal produced in the smelter. |
| **Dry scrubbing** | The process whereby potential gaseous pollutants such as fluoride are attracted onto a solid substance and thereby removed from the air. An alternative approach is “wet scrubbing” but this has the disadvantage of producing additional liquid waste and may lead to corrosion. |
| **Electrolysis** | When electricity is passed through a liquid solution of an ion or an electrolyte, a chemical reaction called electrolysis occurs. The energy from the electric current breaks chemical bonds. In the aluminium smelting process this enables the separation of aluminium from alumina (aluminium oxide). |
| **Environment** | The biophysical, social, economic, cultural, political and historical context within which people live and within which development takes place. |
| **Environmental impact** | A change resulting from the effect of an activity on the environment, whether desirable or undesirable. Impacts may be the direct consequence of an organisation’s activities or may be indirectly caused by them. |
| **Environmental impact assessment** | An Environmental Impact Assessment (EIA) refers to the process of identifying, predicting and assessing the potential positive and negative social, economic and biophysical impacts of any proposed project, plan, programme or policy which requires authorisation of permission by law and which may significantly affect the environment. The EIA includes an evaluation of alternatives, as well as recommendations for appropriate mitigation measures for minimising or avoiding negative impacts, measures for enhancing the positive aspects of the proposal, and environmental management and monitoring measures. |
| **Environmental issue** | A concern felt by one or more parties about some existing, potential or perceived environmental impact. |
| **Externalities** | Those costs and benefits, which could be incurred by third parties – expressed in biophysical, social, political and economic terms – as a result of an existing or planned activity. |
### Fatal flaw

A fatal flaw is an environmental constraint that is considered so important that development should not proceed at all, or requires significant changes to be environmentally feasible.

### Financial account of the balance of payments

External account of the country with the rest of the world with respect to financial assets.

### Fume treatment

The fume treatment centre (FTC) extracts and recycles fluoride, polyaromatic hydrocarbon containing tar and dust from emissions created by the anode baking process.

### Fugitive emissions

Emissions not caught by a capture system which are often due to equipment leaks, evaporative processes, and windblown disturbances.

### Gas treatment

The gas treatment centres have the primary role of recycling the fluoride and dust captured from the pots.

### Greenhouse gases

Greenhouse gases are those gases, both natural and resulting from human activities, which absorb and re-emit infrared radiation from the earth’s surface. They contribute to a warming of the earth’s atmosphere by acting as a blanket over the earth’s surface. Greenhouse gases included under the Kyoto Protocol are carbon dioxide (CO₂), methane (CH₄), hydrofluorocarbons (HFCs), Nitrous oxide (N₂O), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆). These gases have different global warming potentials, which is a measure of the relative effect of a gas in warming the atmosphere over a given time period (100 years in terms of the Kyoto protocol), compared against a value of one for CO₂. For purposes of comparability greenhouse gas emissions are therefore often expressed in terms of equivalent volumes of CO₂.

### Gross Domestic Product

Value of all final goods and services produced within the borders of the country within a given time period.

### Gross Geographic Product

Value of all final goods and services produced in a specific local geographic area of the country within a given time period.

### Gross National Disposable Income

Value of all final goods and services produced by citizens of the country within a given time period.

### Industrial D

An Industrial Development Zone is an area identified for industrial development. The aim is to attract domestic and foreign investment into industrial and commercial parks by providing serviced industrial sites with purpose-built infrastructure.

### Ingot

Bars of aluminium metal which are produced as the final product of the primary aluminium smelting process.

### Integrated environmental management

An integrated approach for environmental assessment, management, and decision-making and to promote sustainable development and the equitable use of resources. Principles underlying IEM provide for a democratic, participatory, holistic, sustainable, equitable and accountable approach.

### Interested and affected parties

Individuals or groups concerned with or affected by an activity and its consequences. These include the authorities, local communities, investors, work force, consumers, environmental interest groups and the general public.
### Key issue
An issue raised during the Scoping process that has not received an adequate response and which requires further investigation before it can be resolved.

### Liquid pitch
Pitch is a heavy, sticky, tar-like by-product derived from the coking of coal. It is used as a binding agent for the petroleum coke in the anode blocks, prior to baking.

### Listed activities
Development actions that are likely to result in significant environmental impacts as identified by the Minister of Environmental Affairs and Tourism in terms of Section 21 of the Environment Conservation Act.

### Megawatt
A measure of power, equal to 1 000 kilowatts or 1 million Watts. This is the unit used to quantify the electricity required by a given system.

### Necrosis
Death of tissue

### Negative impact
A change that reduces the quality of the environment (for example, by reducing species diversity and the reproductive capacity of the ecosystem, by damaging health, or by causing nuisance).

### Paste plant
At the paste plant crushed petroleum coke and spent anode butts (the remainder of the anode which was not consumed in the potline) are mixed with liquid pitch to form an anode paste which is compacted into anode blocks prior to baking.

### Petroleum coke
Petroleum coke is the main carbon source for the anode blocks. It is imported from overseas and is made from oil derivatives, which are regarded as a by-product by oil refineries.

### Phytotoxic
Harmful to plants

### Pitch fume
The pitch fume treatment centre (PFTC) treats PAH containing tar and dust emissions from the paste plant.

### Positive impact
A change which improves the quality of life of affected people or the quality of the environment.

### Pot
The pot is the steel shell within which the aluminium smelting process takes place. Otherwise referred to as electrolytic reduction cells.

### Potline
Pots are electrically connected and arranged in long buildings called potrooms. Two potrooms constitute a potline.

### Potlinings
Potlinings consist of the refractory bricks that are used to insulate the steel shell of the pot (to contain the heat and prevent damage to the steel shell) and the carbon blocks that form the cathode.

### Reduction
Reduction is an electrochemical process that involves the transfer of electrons from one atom to another. Reduction forms part of the electrolysis process.

### Rel
The environmental authority on national, provincial or local level entrusted in terms of the Constitution and in terms of the designation of powers in Notice No. R. 1184 of 5 September 1997 with the responsibility for granting approval to a proposal or allocating resources.

### Rodding shop
Newly manufactured anodes are attached to an electrical conducting stem in the rodding shop before being transported to the potline.

### Scoping
This refers to the process of determining the spatial and temporal boundaries (the extent) for the EIA and key issues to be addressed in an environmental assessment.
**Smelting**

Aluminium smelting refers to the separation of aluminium from aluminium oxide.

**Spent Potlinings**

The potlinings which have reached the end of their useful life and which need to be replaced and disposed of.

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$A_2O_3$</td>
<td>Alumina (Aluminium Oxide)</td>
</tr>
<tr>
<td>AP</td>
<td>Aluminium Pechiney</td>
</tr>
<tr>
<td>APCO</td>
<td>Air Pollution Control Officer</td>
</tr>
<tr>
<td>BAT</td>
<td>Best available techniques</td>
</tr>
<tr>
<td>BEE</td>
<td>Black economic empowerment</td>
</tr>
<tr>
<td>BEEF</td>
<td>Black Economic Empowerment Forum</td>
</tr>
<tr>
<td>BEP</td>
<td>Best environmental practice</td>
</tr>
<tr>
<td>BOP</td>
<td>Balance of payments</td>
</tr>
<tr>
<td>BPEO</td>
<td>Best practicable environmental option</td>
</tr>
<tr>
<td>$CO_2$</td>
<td>Carbon dioxide</td>
</tr>
<tr>
<td>CDC</td>
<td>Coega Development Corporation</td>
</tr>
<tr>
<td>COMSEC</td>
<td>Community Self Employment Centre</td>
</tr>
<tr>
<td>CSI</td>
<td>Corporate Social Investment</td>
</tr>
<tr>
<td>CSIR</td>
<td>Council for Scientific and Industrial Research</td>
</tr>
<tr>
<td>DBSA</td>
<td>Development Bank of Southern Africa</td>
</tr>
<tr>
<td>DEAT</td>
<td>Department of Environmental Affairs and Tourism (National)</td>
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<tr>
<td>DEAE&amp;T</td>
<td>Department of Economic Affairs Environment &amp; Tourism (Eastern Cape)</td>
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<tr>
<td>DSR</td>
<td>Draft Scoping Report</td>
</tr>
<tr>
<td>DTI</td>
<td>Department of Trade and Industry</td>
</tr>
<tr>
<td>DWAF</td>
<td>Department of Water Affairs and Forestry</td>
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<tr>
<td>EIA</td>
<td>Environmental Impact Assessment</td>
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<tr>
<td>EIR</td>
<td>Environmental Impact Report</td>
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<tr>
<td>EMP</td>
<td>Environmental Management Plan</td>
</tr>
<tr>
<td>EMS</td>
<td>Environmental Management System</td>
</tr>
<tr>
<td>FTC</td>
<td>Fume Treatment Centre</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
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<tr>
<td>--------------</td>
<td>-------------</td>
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<tr>
<td>GCM</td>
<td>General Construction Manager</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>GEAR</td>
<td>Growth, employment and redistribution</td>
</tr>
<tr>
<td>GGP</td>
<td>Gross Geographic Product</td>
</tr>
<tr>
<td>GNDI</td>
<td>Gross National Disposable Income</td>
</tr>
<tr>
<td>GTC</td>
<td>Gas Treatment Centre</td>
</tr>
<tr>
<td>HFO</td>
<td>Heavy fuel oil</td>
</tr>
<tr>
<td>I&amp;AP</td>
<td>Interested and Affected Party</td>
</tr>
<tr>
<td>IEM</td>
<td>Integrated Environmental Management</td>
</tr>
<tr>
<td>IDC</td>
<td>Industrial Development Corporation</td>
</tr>
<tr>
<td>IDP</td>
<td>Integrated Development Planning</td>
</tr>
<tr>
<td>IDZ</td>
<td>Industrial Development Zone</td>
</tr>
<tr>
<td>IPCC</td>
<td>Intergovernmental Panel on Climate Change</td>
</tr>
<tr>
<td>ISO 14001</td>
<td>International Standards Organisation’s Environmental Management System</td>
</tr>
<tr>
<td>IWMP</td>
<td>Integrated Waste Management Plan</td>
</tr>
<tr>
<td>LBMS</td>
<td>Labour and Business Management Service</td>
</tr>
<tr>
<td>LMS</td>
<td>Labour Management Services</td>
</tr>
<tr>
<td>M&amp;E</td>
<td>Monitoring and Evaluation</td>
</tr>
<tr>
<td>MHI</td>
<td>Major hazardous installation</td>
</tr>
<tr>
<td>NEPAD</td>
<td>New Partnership for Africa’s Development</td>
</tr>
<tr>
<td>NMMM</td>
<td>Nelson Mandela Metropolitan Municipality</td>
</tr>
<tr>
<td>NPA</td>
<td>National Ports Authority</td>
</tr>
<tr>
<td>OHSA</td>
<td>Occupational Health and Safety Act (No 85 of 1993)</td>
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<tr>
<td>PAH</td>
<td>Poly-aromatic hydrocarbon</td>
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<tr>
<td>PAS 2005</td>
<td>Project title for the proposed Aluminium Pechiney smelter</td>
</tr>
<tr>
<td>PERCCI</td>
<td>Port Elizabeth Regional Chamber of Commerce and Industry</td>
</tr>
<tr>
<td>P</td>
<td>Port Elizabeth Regional Manufacturing Advisory Centre</td>
</tr>
<tr>
<td>PFC</td>
<td>Perfluorinated carbons</td>
</tr>
<tr>
<td>PFTC</td>
<td>Pitch Fume Treatment Centre</td>
</tr>
<tr>
<td>PLA</td>
<td>Project Labour Agreement</td>
</tr>
<tr>
<td>PM10</td>
<td>Particulate matter &lt; 10 microns</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
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<tr>
<td>--------------</td>
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<tr>
<td><strong>PPP</strong></td>
<td>Public Participation Programme</td>
</tr>
<tr>
<td><strong>POP</strong></td>
<td>Persistent Organic Pollutants</td>
</tr>
<tr>
<td><strong>ROD</strong></td>
<td>Record of Decision</td>
</tr>
<tr>
<td><strong>SA</strong></td>
<td>South Africa</td>
</tr>
<tr>
<td><strong>SABS</strong></td>
<td>South African Bureau of Standards</td>
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<tr>
<td><strong>SA S</strong></td>
<td>South African National Parks</td>
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<tr>
<td><strong>SANRAL</strong></td>
<td>South African National Roads Agency Limited</td>
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<tr>
<td><strong>SAPP</strong></td>
<td>South African Power Pool</td>
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<tr>
<td><strong>SDI</strong></td>
<td>Spatial Development Initiative</td>
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<tr>
<td><strong>SEA</strong></td>
<td>Strategic Environmental Assessment</td>
</tr>
<tr>
<td><strong>S</strong></td>
<td>Small, Medium and Micro Enterprises</td>
</tr>
<tr>
<td><strong>SO₂</strong></td>
<td>Sulphur dioxide</td>
</tr>
<tr>
<td><strong>SPL</strong></td>
<td>Spent potlining</td>
</tr>
<tr>
<td><strong>TSP</strong></td>
<td>Total suspended particulates</td>
</tr>
<tr>
<td><strong>US EPA</strong></td>
<td>United States Environment Protection Agency</td>
</tr>
<tr>
<td><strong>WESSA</strong></td>
<td>Wildlife and Environment Society of Southern Africa</td>
</tr>
<tr>
<td><strong>WHO</strong></td>
<td>World Health Organisation</td>
</tr>
<tr>
<td><strong>ZLA</strong></td>
<td>Zone Labour Agreement</td>
</tr>
</tbody>
</table>

## UNITS USED

<table>
<thead>
<tr>
<th>Unit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>kg/tAl</td>
<td>Kilogram per tonne of aluminium produced</td>
</tr>
<tr>
<td>kV</td>
<td>Kilovolt</td>
</tr>
<tr>
<td>m³/month</td>
<td>Cubic metres per month</td>
</tr>
<tr>
<td>m³/year</td>
<td>Cubic metres per year</td>
</tr>
<tr>
<td>MW</td>
<td>Megawatt</td>
</tr>
<tr>
<td>MWh/tAl</td>
<td>Megawatt hours per tonne of aluminium produced</td>
</tr>
<tr>
<td>t/year</td>
<td>Tonnes per year</td>
</tr>
<tr>
<td>µg/m³</td>
<td>Microgram per cubic meter</td>
</tr>
</tbody>
</table>