Environmental Product Declaration

Uranium Oxide (U_3O_8)

December 2011
Prepared for Rössing Uranium Limited

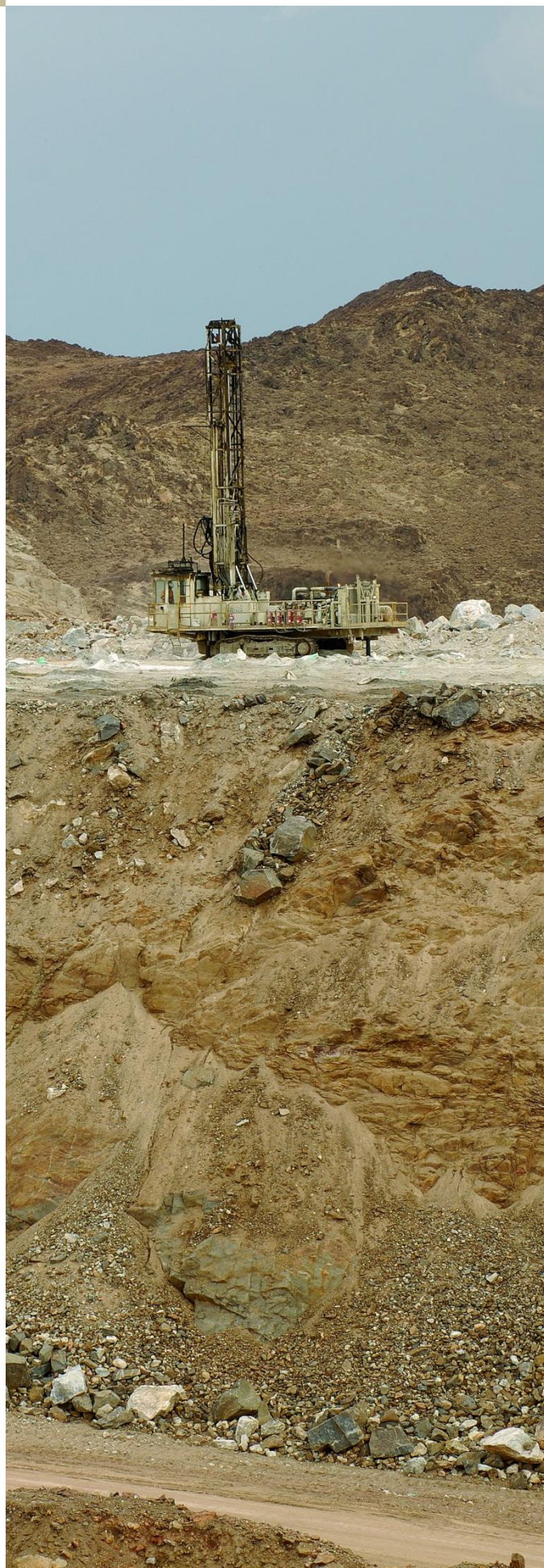
Rössing Uranium Limited

RioTinto

This document is valid for Uranium oxide (U_3O_8). The site-specific LCA data was collected at Rössing Uranium Ltd.

This document was compiled following the ISO 14025 standard as a guideline

Voluntary Product Declaration	**Program holder**
PE INTERNATIONAL South Africa PE INTERNATIONAL EXPERTS IN SUSTAINABILITY	**LCA Practitioner**
Rössing Uranium Limited	**Declaration holder**
Concentrated uranium oxide, U_3O_8. Results are declared for 1 kilogram of concentrated uranium oxide delivered to the enrichment facility gate.	**Declared product**



Product Information

Uranium oxide (U_3O_8) is a mineral used in the conversion step within the nuclear process chain for electricity generation. It is used under strict international safeguards monitored by the International Atomic Energy Agency. Rössing Uranium Limited

Product Specification

Characterization

Concentrated uranium oxide with 97.5% - 99.5% U_3O_8 content

Application

Uranium oxide (U_3O_8) concentrate of a low radiation level is produced at the mine and transported via rail and sea for further processing to conversion and enrichment facilities in other parts of the world, where it is used as nuclear fuel in the power plants of Rössing Uranium's global customers. Namibia is signatory to the Nuclear Non-Proliferation Treaty (NPT) whose objectives is to prevent the spread of nuclear weapons and to promote co-operation in the peaceful uses of nuclear energy. The sale of uranium oxide (U_3O_8) at Rössing Uranium is subjected to the International Atomic Energy Agency (IAEA) of the United Nations and Namibian laws and regulations.

Technical properties

See converter agreements in terms of acceptable product quality specifications.

Product Quality Standards

Regular compliance audits for the following international standards are conducted:

- ISO 14001: 2004 Environmental management systems – specification with guidance for use
- ISO 18001: 2001 Occupational health and safety management systems – specification with guidance for use

Regular compliance audits for the following internal standards are conducted:

- The Rio Tinto HSEQ Management System Standard, including Element 2 Legal and Other Requirements
- Rio Tinto Compliance Standards
- Rio Tinto Corporate Governance Standards
- Rio Tinto Data Privacy Standards and Guidance Notes
- Rio Tinto HSE Performance Standards
- Rio Tinto Insider Trading Rules
- RUL HSE Standards
- Rio Tinto The Way We Work
- Rio Tinto The Way We Buy
- Rio Tinto Community Standards

Product Characteristics at Delivery

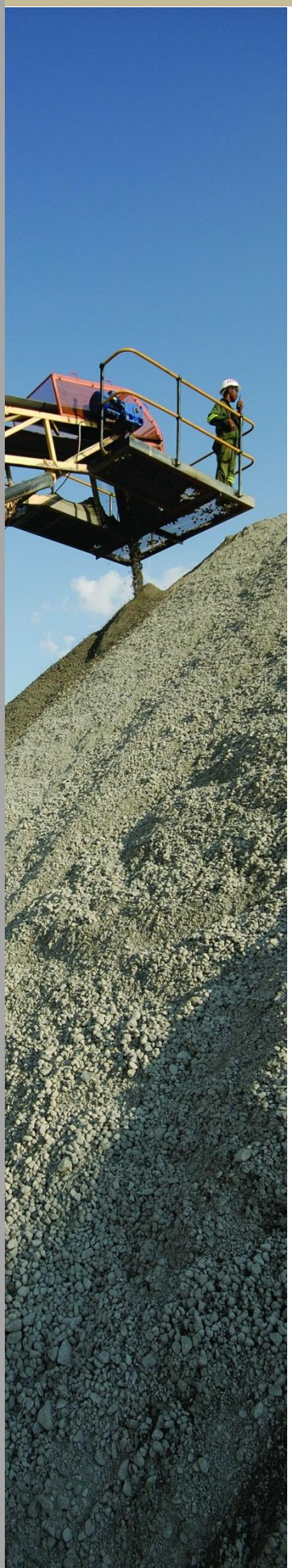
97.5% - 99.5% U_3O_8 content:

Quality certificate from converters

Production Process

Manufacturing

Uranium Oxide is produced out of uranium ore. Through drilling, blasting and hauling the uranium ore is mined. The ore is delivered to the primary crusher by haul truck and then by conveyor to the coarse ore stockpile. Wet grinding of the crushed ore by means of steel rods reduces to further to slurry. A combined leaching and oxidation process takes place in large mechanically agitated tanks. The product of leaching is a pulp containing suspended sand and slime. Cyclones separate these components and, after washing in Rotoscoops to remove traces of uranium-bearing solution, the sand is transported via a sand conveyor to a tailings disposal area. Counter-current decantation thickeners wash the slimes from previous stages. A clear uranium-bearing solution ('pregnant' solution) overflows from the thickeners. Uranium ions are adsorbed onto a resin and are preferentially extracted from the solution. Beads are removed periodically to elution



columns where an acid wash removes the uranium from the beads. The acidic eluate from the ion exchange plant is mixed with an organic solvent which takes up the uranium-bearing component. In a second stage, the organic solution is mixed with a neutral aqueous ammonium sulphate solution which takes up the uranium-rich 'OK liquor'. The addition of gaseous ammonia to the 'OK liquor' raises the solution pH, resulting in precipitation of ammonium diuranate, which is then thickened to a yellow slurry. The ammonium diuranate is recovered on rotating drum filters as yellow paste - known as 'yellow cake'. Final roasting drives off the ammonia, leaving uranium oxide. The product is then packed into metal drums.

Packaging

Uranium oxide is packed into steel drums containing a mean net weight of 400 kg of concentrated uranium. Packaging is included in the product system.

EHS

Rössing maintains a comprehensive integrate HSE Management System, which has remained certified to Det Norske Veritas ISO 14001 from 2000. It includes:
The requirements for the mining of uranium, waste disposal and pollution prevention, transporting of radioactive and radioactively contaminated material, water use and abstraction, occupational and public exposure (includes hygiene and radiation), occupational hazards, worker health and safety (includes, wellness, hygiene and radiation).
Rössing has the following policy documents relating to health, safety and environmental management:

- The Rio Tinto Health, Safety and Environment policy;
- The Rössing Health, Safety and Environmental Policy Statement (http://hse.riotinto.org/HSEQMS/RossingUranium/RossingMine/Menu_Home.aspx);
- The Rössing Policy Strategies on Health, Safety and Environmental Management (http://hse.riotinto.org/HSEQMS/RossingUranium/RossingMine/Menu_Home.aspx).

Transport of the Product

Transport procedure

The drummed U_3O_8 is transported via rail to Walvis Bay and then by ship, train/or road to the enrichment plants in Europe, Asia and North America

Packaging

Uranium oxide is packed in steel drums containing a mean net weight of 400 kg of concentrated uranium. Packaging is included in the product system.

Standards for transport EHS

Rössing Uranium Health, Safety and Environment Management System and ISO 14001 includes health, safety and environmental aspects associated with transport of uranium oxide. Rössing Uranium complies with IAEA Safety Standards Regulation for the Safe Transport of Radioactive Material 2005 Edition No. TS-R-1.

Life Cycle Assessment

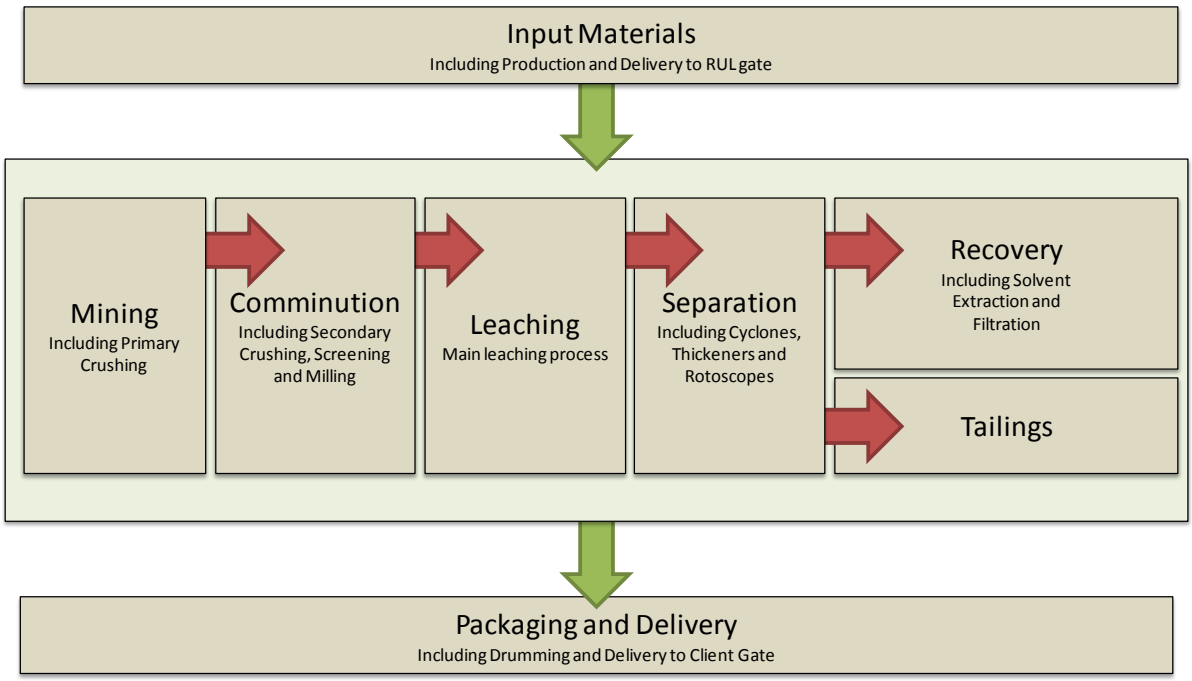
About Life Cycle Assessments

The life cycle assessment is used to quantify and monitor the environmental impact at Rossing Uranium. The following impact categories are considered according to the CML2001(Centre for Environmental Science, University of Leiden) definitions and ISO 14040 series LCA standards:

- Global Warming Potential (100 years) measured in kg CO_2 equivalent
- Acidification Potential measured in kg SO_2 equivalent
- Abiotic Depletion Potential measured in kg Sb equivalent
- Eutrophication Potential measured in kg Phosphate equivalent
- Primary Energy Demand measured in MJ

System boundaries

The assessment is based on a "Cradle to Clients Gate" LCA of one kg of Uranium Oxide including from the mine to the final product recovery and the transport to the clients of Rössing Uranium Limited in 2009. Beside the transport of the final product to the clients gate the transport of all major auxiliary materials to the site have been taken into consideration.



System boundaries check box

All processes from upstream production of input materials until delivery to client gate is included, as described in the table below.

Production			U_3O_8 enrichment plant		Use stage /operation	Use stage/maintenance				End-of-Life			
Mining	Transport	U_3O_8 production	Transport	Enrichment Process	Use	Maintenance incl. Transport	Repair, incl. Transport	Replacement, incl. Transport	Refurbishment incl. Transport	Deconstruction/ Demolition	Transport	Re-use/Recycling	Disposal
X	X	X	X										

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Rössing Uranium Limited

System boundaries & scenarios

The assessment is based on a "Cradle to Gate" LCA of one kg of 97.5 % to 99.5% U_3O_8 including the transport to the clients (enrichment plants in Europe, North America and Asia) of Rössing Uranium.

Radioactive emissions were considered in terms of U_3O_8 emissions to air from the roaster in Final Product Recovery (FPR).

Radiation in terms of Becquerel was not considered.

Data quality

The background LCA data is less than 8 years old. Data for the production of U_3O_8 is primary data from the Rössing Uranium site, represents the year of 2009. The predominant part of the data for the upstream supply chain comes from industrial sources which were collected under consistent time and methodological framework conditions according to ISO 14025 requirements. The delivered data (processes) were checked for plausibility. There are no known data gaps in the model.

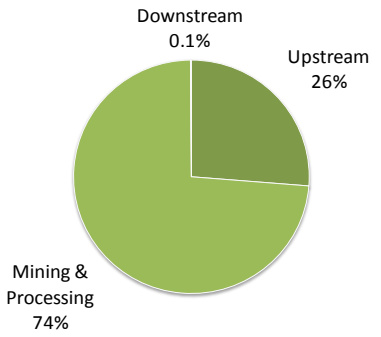
Methodological principles

Allocation procedures in the background data follow the ISO 14040-44 requirements. Namely, economic allocations are used when necessary. No allocation was used in the foreground model.

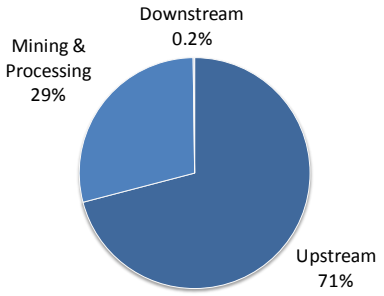
LCA Results

Environmental Profile for 1 kg of Uranium Oxide

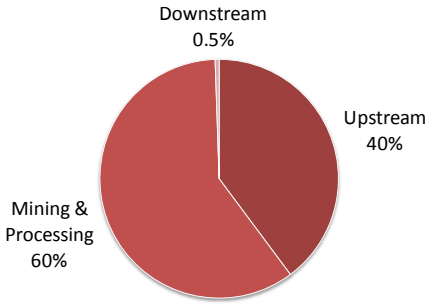
Global Warming Potential
196 kg CO_2 equivalent



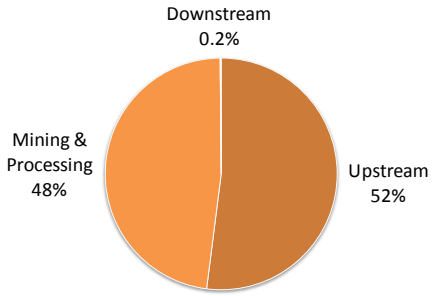
Primary Energy Demand
1515 MJ



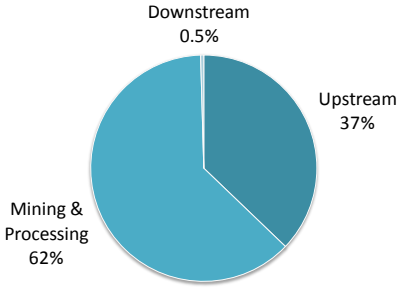
Acidification Potential
1.4 kg SO_2 equivalent



Abiotic Depletion Potential
0.96 kg Sb equivalent



Eutrophication Potential
0.15 PO_4^{4-} equivalent



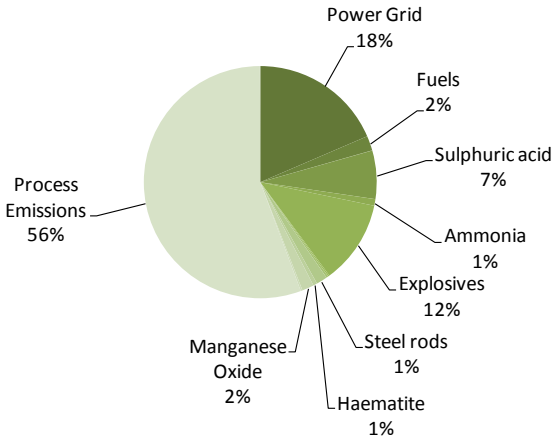
For all of the impact categories the production process of uranium oxide is the most substantial contributor. This includes energy consumed from the Namibian power grid, diesel and other fuel consumption onsite, as well as direct process emissions. Emissions from upstream activities cannot be ignored either. For Acidification Potential upstream production and transport activities contributes 40%. This is primarily due to Sulphuric acid production and emissions heavy fuel oil in shipping. For this reason RUL has put a strong focus on green procurement initiatives as part of the Product Stewardship program.

In order to look more specifically at the contribution of input materials, the following graphs shows the Global Warming Potential, Primary Energy Demand and Acidification Potential for input sources.

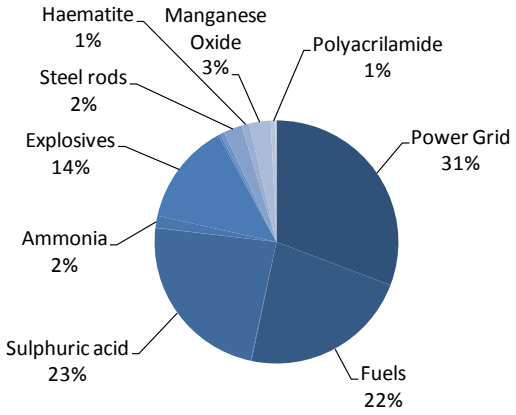
Input products included in this analysis are listed below. These products were modelled using the GaBi software. While every effort was made to select emissions profiles applicable to the geography, in some instances generic, European models were used.

Emissions Sources for 1 kg of Uranium Oxide

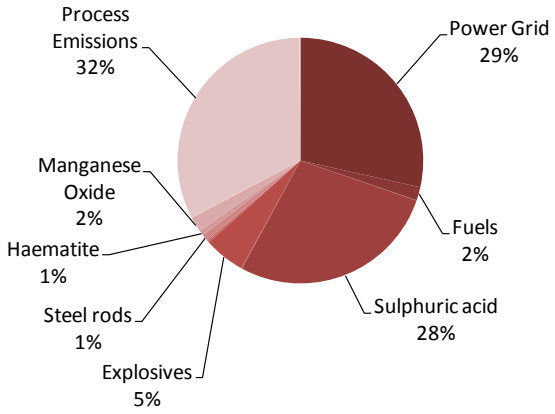
Global Warming Potential



Primary Energy Demand



Acidification Potential



Emissions from the National power grid, production of explosives and sulphuric acid, and use of fuels are the main contributors to all categories. A large quality of hard coal is used in the power grid and shipping of sulphuric acid and other materials is significant contributor. With Rossing Uranium's green procurement initiatives these upstream emissions will be a core focus for mitigation efforts in addition to its core processing activities.

Other products with significantly smaller contributions were excluded from these graphs. These include: Isodecanol, Alamine, Resin, Soda and Sodium Hydroxide.

Tracking the use of water

Water as a resource requires careful management in the Namibian region as access to water becomes scarce. Rossing Uranium is now actively working towards reporting and disclosing it water consumption patterns from where improvements can be made. The data below represents the company's first detailed water footprint reporting effort.

In the period of this analysis, it is estimated that fresh water consumption reached 725 kg water per kg U_3O_8 produced, a 3% reduction from the previous year.

The figures on the following page show a summarised water balance, and the breakdown of water losses based on a percentage of total water lost. Water loss from the dams account for 68% of the total water lost.

Summarise Water Balance

INPUTS	
Fresh water to mine	4,800
Fresh water to processing	3,300
Water contained in Acid	10
Moisture in ore	800
Ground water	250

RUL
Summarised water balance

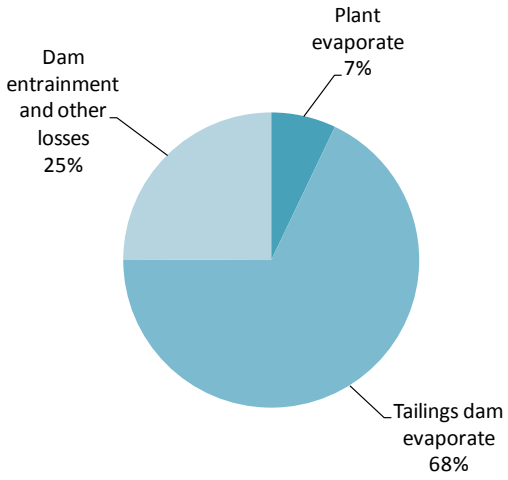
OUTPUTS	
Evaporate from processing	500
Evaporate from dams	4,800
Other dam losses	1,760
Water used for services	2,100

***all figures are approximate m^3/day**

Fresh Water Consumption as a Performance Indicator

725
kg fresh water per kg U_3O_8

Breakdown of Losses



Conclusion

Rossing Uranium is actively engaging with its Life Cycle Assessment (LCA) to determine its impact on the environment, begin to look at ways in which to improve on the result, and bring all supply chain parties together in this effort. A strong energy efficiency improvement team looks at day-to-day changes to reduce dependence of fossil fuels, while the procurement team actively plans to take forward a green procurement initiative.

This EPD summarises the results of the current activities at Rossing Uranium contributing to the production of Uranium Oxide. With this baseline information future efforts will be benchmarked to show LCA improvements.