

Rössing Uranium Health Study

Frequently Asked Questions - June 2018



The Rössing Uranium Mine

Uranium was discovered in the Namib Desert in 1928, but it was not until intensive exploration in the late 1950s that much interest was shown in the area. After discovering numerous uranium occurrences, Rio Tinto secured the rights to the low-grade Rössing deposit in 1966. Ten years later, in 1976, Rössing Uranium, Namibia's first commercial uranium mine, began operating, celebrating its 40th year of production in 2016.

Today, Namibia has two significant uranium mines, which together provide for roughly 5 per cent of the world's uranium oxide mining output; Rössing Uranium produces about 2 per cent of the world's output. The mine has a nameplate capacity of 4,500 tonnes of uranium per year and, by the end of 2015, had supplied a total of 128,650 tonnes of uranium oxide to the world.

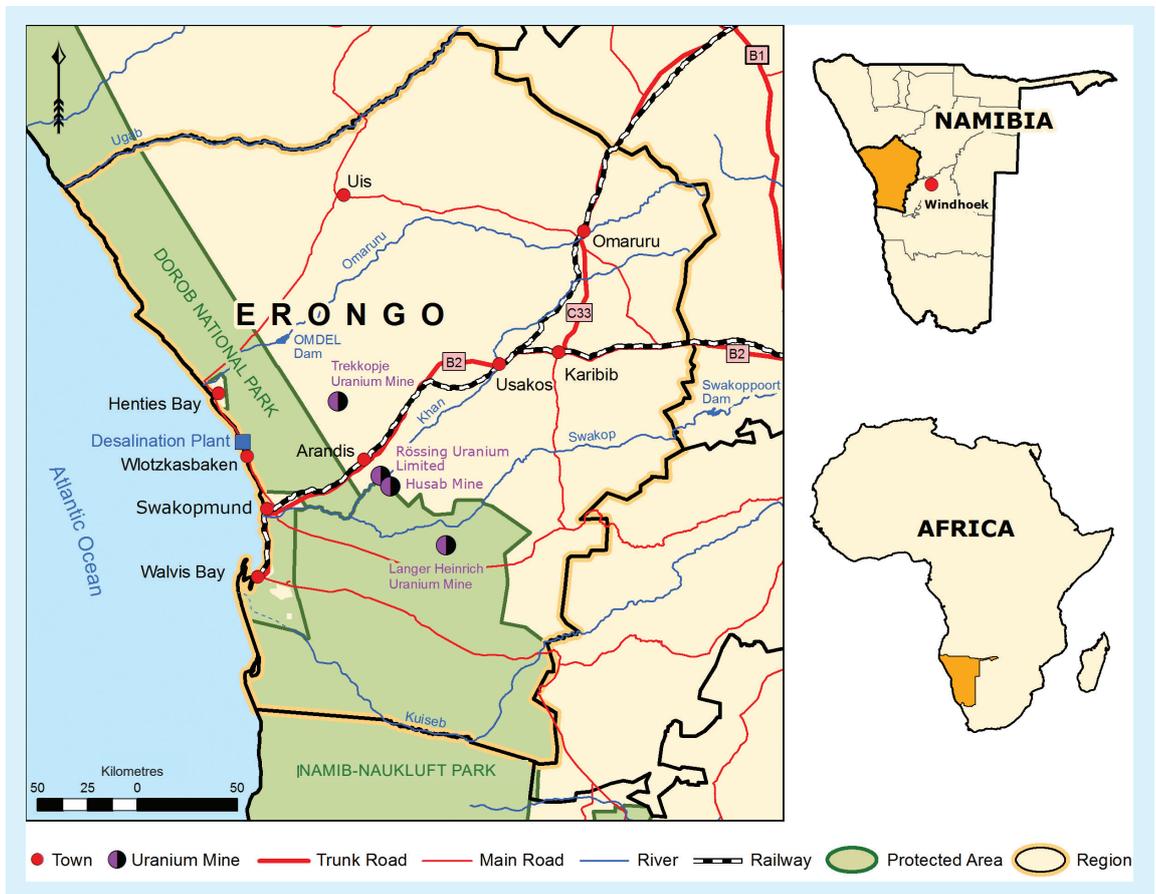
The mine is located 12 km from the town of Arandis, which lies 70 km inland from the coastal town of Swakopmund in Namibia's Erongo Region. Walvis Bay,

Namibia's only deep-water harbour, is located 30 km south of Swakopmund.

The mining operation is located in an arid environment. Insolation at Rössing Uranium is high, and as a result, daytime ranges of temperatures are wide, especially during May and September, when the difference between minimum and maximum temperatures exceeds 20°C daily. The lowest temperatures are normally recorded during August, but frost is rare. The highest temperatures are recorded in the late summer, particularly March.

The mine site encompasses a mining licence and accessory works areas of about 180 km², of which 25 km² is used for mining, waste disposal and processing.

Mining is done by blasting, loading and hauling from the main open pit, referred to as the SJ Pit, before the uranium-bearing rock is processed to produce uranium oxide. The open pit currently measures 3 km by 1.5 km, and is 390 m deep.



1. Introduction

We place great importance on safety issues in all areas of our operations and we continuously focus on making the workplace accident-free. We believe all incidents are preventable and thus, our goal is Zero Harm.

Radiation safety is and continues to be a discipline that employees and the public are deeply concerned about. With the multitude of allegations and stories abounding, it is often difficult for people to differentiate between rumours and facts.

It is therefore important to continuously inform both employees and the public about the perceived and actual risks posed by radiation exposures resulting from the mine,

and empower them with sufficient information to assess the risks independently of any anecdotal contributions to the topic.

For public information we have launched a link on our website www.rossing.com - Reports & Research, accessing the Questions and Answers on the health study when you click on the folder - Rössing health study.

The website also features information on our health, safety, environmental and community best practices and includes a link 'Reports & Research' to our past reports on various topics, and fact sheets about radiation, providing introductory explanations about the terminology and issues relevant to radiation safety.

2. Questions and Answers

Q: Why are we doing the study?

A: Rössing Uranium is committed to an incident and injury free workplace, and we are passionate about the health and wellbeing of our workers. Our goal is zero harm to our workforce.

Q: What is the aim of the health study?

A: The health study focuses on the effect of exposure to dust, radiation and other substances on workers at the Rössing Uranium mine. It aims to determine whether there have been work-related cancer risks at the Rössing Uranium mine from 1976 onwards.

Q: When will the study be conducted?

A: The scoping study was undertaken in 2014. The research study started in October 2015, and will take about three years to complete.

Q: How will the study be undertaken?

A: All data used for the study will be anonymised. This means that personal information is not disclosed to third parties.

The project is designed as a case-cohort study. This means:

- *cohort* is the Rössing Uranium workforce, past and present who worked continuously for at least one year and started work between 1976 and 2010 (more than 12,000 employees);
- *cases* are identified cancers among the cohort; and
- *controls* are randomly selected persons within the cohort without specified cancer (at least five controls per case identified).

The occupational exposure (radiation, silica, fumes, vapours, diesel exhaust, and other exposures, plus confounding factors, such as smoking) of cases will be compared with that of controls to establish a connection (if any) between occupational exposure (eg radiation) and health outcome (ie cancer).

Q: Which type of cancers will be considered in the study?

A: Research has shown that a number of cancer types are likely to occur from radiation/uranium exposure, namely those of the lung, kidney and blood-forming organs.

Q: Will Rössing Uranium employees be examined by doctors?

A: The study is retrospective, and hence no new medical examinations will be undertaken. The reason for this is that the health outcomes to be studied are cancers which have already been diagnosed. Comparisons are of statistical nature and will be made based on exposure data which is available.

Q: What happens if the researchers do not identify all cancer cases among the historical Rössing Uranium workforce?

A: We will identify as many cases as possible to increase the statistical power of the study. But the study is designed to compare cases with controls to see if there is a link between the occupational exposure and the outcome (cancer). Missing cancer cases will not influence the statistical findings of the study.

Q: Will workers get feedback after the completion of the study?

A: A summary report will be presented to Rössing Uranium and made available upon completion. It will be discussed with the workforce. The outcome will also be published in the international peer-reviewed scientific literature. All the relevant stakeholders that are involved in the process will be updated on progress.

Q: How will Rössing Uranium trace former employees?

A: It is not required to trace former employees as no new medical examinations will be carried out; the relevant data from existing medical records of employees will be studied.

Q: What about health impacts that might not be the result of radiation exposure?

A: In the study, cases with specific cancer types that have been linked in scientific studies to radiation/uranium exposure will be identified. Some of those cancers might be linked to other occupational exposures (eg silica dust), and any association of this nature will be considered in the study.

Q: Why are we not considering all cancer types?

A: The study will focus on those cancer types for which a potential association between the cancer type and exposure to radiation/uranium has been found in the scientific literature.

Q: Can we trust the medical data from our occupational medical service provider?

A: For the purpose of the study, the medical data that is available is of adequate standard for statistical analysis.

Q: Who will conduct the study?

A: The University of Manchester was appointed to lead the study. The Centre for Occupational and Environmental Health has been selected because of their very detailed knowledge of statistics and the study of health of working populations, and their experience in conducting studies on occupational health internationally.

Q: Who pays for the study?

A: The study is funded by Rössing Uranium (50 per cent) and Rio Tinto (50 per cent).

Q: What is epidemiology?

A: Epidemiology is the study of patterns, causes, and effects of health and disease conditions in defined populations. It is a study that compares groups of people who may be exposed to different factors, such as chemicals, at work and who may display different health effects as a result of their exposures. The researchers try to determine if specific factors are associated with particular health outcomes. A well-known example is the study of the effects of smoking on lung cancer.

Q: Who has been chosen to participate in the study?

A: The health study includes all workers employed by Rössing Uranium at the mine between 1976 and 2010, with at least one year's continual employment at the mine during this period.

Q: Does Rössing Uranium have the consent of workers to use their information for the study?

A: Rössing Uranium informed all its present workers about the study, and all its former workers that could be reached by mail. All local newspapers have published information about the study. All present and former workers were given the option to withdraw their consent for the use of their data, although no personal information will be made available to third parties.

Q: How many workers have worked at Rössing Uranium over the years?

A: The Rössing Uranium cohort (past and present workers) consists of about 12,500 workers.

Q: How is confidentiality and privacy maintained?

A: Information retained by Rössing Uranium about employees is confidential and will only be disclosed to the research team on the basis that such confidentiality is protected, and personal data is anonymised. The same applies to any data that may be disclosed by the Namibian or South African Cancer Registry to the University research team.

Q: How does Rössing Uranium ensure that the research complies with the highest ethical standards?

A: The project has been submitted to the Ethics Committee of the University of Manchester, who has granted ethical approval for this research.

In Namibia, ethical oversight is provided by the External Oversight Committee, consisting of

- Asser Kapere, Community leader;
- Dr Wotan Swiegers, Chairperson of the Atomic Energy Board of Namibia; (deceased 2018 - representative to be appointed)
- Samson Nghiteeka, Inspector of Mines, Ministry of Mines and Energy;
- Willem van Rooyen, former Rössing Uranium employee;
- Ismael Kasuto, President of the Mine Workers Union of Namibia; and
- Hilma Nangombe, Ministry of Health and Social Services.

Q: When will the project be completed?

A: If there is sufficient data for the health study, it is proposed to be undertaken in the period up to December 2018.

Q: Will the outcomes of the research be published?

A: The outcomes of the research will be published in peer-reviewed academic journals. A summary of the results will also be discussed with the Union representatives of the Rössing Uranium mine before the study results are published and made public, and this summary will be made available for current and former workers.

Q: Why are workers who started work after 2010 not being included in the study?

A: Cancers of interest (ie those that could potentially be the result of radiation exposure) have a very long time lag before they occur. These types of cancer will therefore not be found

among workers who have only recently started work at Rössing Uranium .

Q: Why are workers who worked for less than one consecutive year at Rössing Uranium not being included in the study?

A: Occupational radiation exposures at Rössing Uranium are very low. The exposure of workers who worked for less than one year is negligible and will therefore not be able to yield any statistical information.

Q: What is the value of the study if individuals are not informed about their health status?

A: All workers have access to their health records. The study will not find new information about the health of workers, but make use of (anonymised) information that exists already.

Q: Should individual workers who are affected by exposure to radiation and toxicity be compensated?

A: Workers with occupational diseases are compensated. However, the study searches to establish a statistical connection (if present) between a cause (radiation) and a potential effect (cancer). It is not possible to conclude anything about individuals from an epidemiological study.

Q: Don't the workers have a right to be informed about their own health status and likewise to know whether there is a link between occupational exposure and early deaths of family members, friends and or colleagues, as they believe there is?

A: Workers have access to their health status via their medical service providers. The study is aimed at establishing any links between occupational exposures and health effects, but it will do so in a statistical sense, not on a one-by-one personal basis. This is the nature of epidemiology.

Q: It is known that uranium miners worldwide, particularly in the past, have suffered from ill health effects due to their occupational exposures. Why does Rössing Uranium maintain it is not causing any such health effects?

A: Previous epidemiological studies about uranium miners were primarily about underground mines with very high uranium ore grades. Exposures to workers occurred mostly as a result of radon and dust inhalation, before it was realised that these exposures must be controlled. Rössing Uranium is an open cast uranium mine with very low ore grade and hence low radiation exposures from radon and from dust. This fact and the occupational controls in place ensure that worker exposures are very low indeed.

Q: How can a study solely based on historical records be valid?

A: The nature of epidemiological studies by definition is that they are statistical in nature. This means data are pooled from a large group of workers. Such large groups are only possible to collect if all past and present workers are pooled.

Q: Will the study consider the allegation that low doses of radiation increases cancer risk?

A: The Rössing Uranium study is about extremely low radiation exposures. It aims to establish if there is any link between excess cancers and very low radiation exposure doses. The mine-wide weighted average exposure dose to radiation is close to 1 mSv per annum, with the highest recorded doses to individuals being not more than 8 mSv in any single year. The legal occupational dose limit is 20 mSv per year (when averaged over any 5 consecutive years).

Q: Will health effects other than radiation-linked cancers be considered in the study?

A: Kidney cancers will be included in the study. If they occur, they might be linked to uranium toxicity rather than radioactivity. Brain cancers will also be included in the study, although no link to toxicity or radioactivity is suspected in these.

Q: What are the risks to individuals if they are included in the study?

A: Because the study is retrospective and no new information will be collected, there are no health risks to workers. The information used is anonymised, so there is no risk to workers of information about their health becoming known to anyone.