

EPIDEMIOLOGICAL STUDY OF RÖSSING MINE WORKERS ('HEALTH STUDY')

FREQUENTLY ASKED QUESTIONS

1. Why has the study been performed?

- a. Nothing is more important to Rio Tinto than the health and safety of our people. The University of Manchester was appointed in 2015 by Rio Tinto to conduct an independent epidemiological study to investigate if working at the Rössing mine is linked with a higher risk of developing cancer.

2. The study did not find 'a strong link' – but is there a link?

- a. This study does not provide strong evidence that radiation or other exposures at the Rössing mine caused an increased risk of cancers in the workforce. However, the quality of the cancer registry data, and considerable uncertainties in some of the dose estimates due to the quality of the available data, mean that there are consequent uncertainties in the study findings and interpretation – resulting in the conclusion.

The study found that, based on available data, radiation exposures for workers at the Rössing mine appear to be low. At these radiation levels and from what is known about radiation risks an increase in cancer incidence in the Rössing workforce is not expected. Moreover, for many workers the assessed radiation levels at work are similar to the exposure from naturally occurring background radiation in their everyday lives, such as exposure to radon in their homes.

3. What was the aim of the health study?

- a. To determine retrospectively whether uranium mineworkers employed by Rössing Uranium since the operation began have an excess risk for developing cancers identified as most likely to be related to occupational exposure at RUL (radiation, acid mist, diesel engine exhaust and silica).

4. What type of study was performed?

- a. An epidemiological study was carried out. Epidemiology is the study of patterns, causes, and effects of health and disease conditions in defined populations. The researchers try to determine if specific conditions are associated with particular health outcomes by measuring those conditions within a group or various groups of population. For example, in a city or country we can presume that tobacco could relate to cancer if we observe that people with cancer smoke more. Similarly, we could compare cities or countries, one that smokes more than the other and observe the occurrence of cancer.

5. How was the study performed?

- a. An epidemiological model called 'case-cohort' was chosen. Firstly, in this model initial information for the entire population of Rössing employees (within the predetermined timeframe) was collected. Secondly, using scientific methods that avoid selection bias, the researchers chose a subgroup of 14.5% so as to maintain representativeness of the whole population of employees. In parallel, all cancer cases (within the predetermined timeframe) were gathered. Thirdly, detailed information was collected and complex exposure calculations done for each individual of both the subgroup ('sub-cohort') and the cases, and then scientific analysis comparing the two groups was performed.

6. What Rössing Uranium employees were included?

- a. The study considered all employees who worked at Rössing Uranium between 1 January 1976 and 31 December 2010 with at least one year of continuous employment.

- 7. How did Rössing Uranium trace former employees?**
 - a. Tracing former employees was not required as no new medical examinations were carried out; the relevant data from existing medical records of employees was studied.
- 8. Why were not all employees included in the analysis with detailed data and exposure calculations?**
 - a. The design and execution of the study was carried out independently by the University of Manchester study team as experts in the field. The rationale for the design is detailed in the study materials.
- 9. Why was the comparison not done against the general (non-working) population?**
 - a. The design and execution of the study was carried out independently by the University of Manchester study team as experts in the field. The rationale for the design is detailed in the study materials.
- 10. Did Rössing Uranium have consent of the 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 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 was made available to third parties.
- 11. How did the study comply with the highest ethical standards for research?**
 - a. The project has been submitted to the Ethics Committee of the University of Manchester, which granted ethical approval for both for the original protocol and for subsequent amendments (notably the extension of cancer case ascertainment to the South African National Cancer Registry –SANCR– and to Medixx). In addition, permission (including review of the ethical case) was obtained from the Ministry of Health and Social Services of the Republic of Namibia to whom regular progress reports have been submitted. Similarly, Ethical permission was obtained from the Medical Ethics Committee of the University of the Witwatersrand (as required by the SANCR)
- 12. In Namibia, ethical oversight was provided by the External Advisory Committee (formerly External Oversight Committee), consisting of:**
 - a. A community leader – Asser Kapere;
 - b. The chairperson of the Atomic Energy Board of Namibia –Dr Wotan Swiegers (deceased over the course of the study)
 - c. An Inspector of Mines, Ministry of Mines and Energy –Samson Nghiteeka;
 - d. A former Rössing Uranium employee –Willem van Rooyen;
 - e. The President of the Mine Workers Union of Namibia –Ismael Kasuto; and
 - f. A representative of the Ministry of Health and Social Services.
- 13. Who did the study?**
 - a. The University of Manchester was appointed to lead the study. The University of Manchester’s Centre for Occupational and Environmental Health was 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.
- 14. Are the methods and outcomes of the study reliable?**
 - a. The methods have been chosen and executed within strict scientific frameworks. Even data limitations that appeared along the way were managed under scientific principles such that to ensure as reliable an outcome as possible.

- 15. The study was funded by Rio Tinto (50%) and Rössing (50%). How did it influence the study results?**
- The study was funded by Rio Tinto and by RUL with one (conjoint) income stream to the University of Manchester. The terms of the contract were such that no body external to the University of Manchester could 'veto' or 'censor' any content of the University's report.
- 16. Why not all types of cancer were included?**
- The study focused 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.
- 17. Were all cancer cases of the selected types analysed?**
- Considerable efforts were made to ascertain all the cases of cancers of interest within the RUL workforce. There were significant complications to overcome with cancer registry that required to combine different sources of information (such as the Namibian National Cancer Registry, Medixx and South African National Cancer Registry) and multiple searches to ensure the best possible case capture.
- 18. Did the researchers take precautions to ensure accuracy of the received data?**
- In compliance with best scientific practice, this study adopted double data entry as the basic procedure for data quality assurance. As part of the process, the researchers performed data audits to ensure the quality of the final dataset. Details of the entire study process will be outlined in the peer reviewed report published in a scientific journal.
- 19. How employee's confidentiality and privacy was maintained?**
- Information retained by Rössing Uranium about employees is confidential and was only disclosed to the research team on the basis that such confidentiality is protected, and personal data was anonymized. The same applies to any data that may be disclosed by the Namibian or South African Cancer Registry to the University research team.
- 20. Radiation is not the only exposure that could cause cancer. Were others considered?**
- Yes, other exposures potentially related to the cancers of interest were included such as acid mist, diesel engine exhaust and respirable crystalline silica.
- 21. What were the study results / outcomes?**
- The final conclusion was that the study didn't provide convincing evidence of an increased risk for any of the cancer sites of interest in relation to occupational radiation dose or other occupational exposures.
- 22. Will the results of the study be published? When?**
- Yes, the contract with the University of Manchester establishes that, following peer review, the study will be published in a scientific journal. Scientific publication is a process that lasts months.
 - A summary of the study in plain language is available to all parties before the peer-reviewed publication, including the authorities from the Namibian government, and Rössing Uranium employees, communities and union. This is also available on the RUL website.
- 23. How individual employees are affected by the study results?**
- The study results does not affect individual employees. All workers will continue to have access to their health records whenever individual reviews are required.

- 24. Will employees exposed to gamma radiation or radioactive dust able to be compensated if they develop cancer?**
- a. All individual cases would continue to follow the normal evaluation process under the corresponding legal and technical frameworks, with consideration of individual exposure profiles, individual diagnosis and the pertinent scientific literature beyond the solely consideration of the present study.
- 25. Shouldn't employees with exposure to radiation and toxicity be compensated if they develop cancer?**
- a. Workers with occupational diseases are compensated based on an individual case evaluation under the relevant legal and technical frameworks.
- 26. 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 realized 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 determine a different exposure profile, with very low exposures indeed.
- 27. 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.
- 28. Does the study results imply that any Rössing Uranium employee's compensation claim about cancer will now be dismissed or rejected?**
- a. No. Individual cases would continue to follow the normal evaluation process under the corresponding legal and technical frameworks, with consideration of individual exposure profiles, individual diagnosis and the pertinent scientific literature beyond the solely consideration of the present study.
- 29. Isn't the study deliberately delayed till after the sale of Rössing Uranium?**
- a. No – additional time was requested by the University of Manchester in course of the study as the sources of information and the analysis were more challenging than initially planned, subsequently final approval to publish from the Government of Namibia's Ministry of Health were also delayed due to impacts of COVID-19.
- 30. Did this study generate any benefit to the workforce or their families?**
- a. The study has increased the knowledge with regard to a topic that is of the interest of the workforce and their families, as well as the field of health and the mining industry.