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INTERNATIONAL URANIUM PRODUCTION

- NAMIBIAN PERSPECTIVE

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Namibia

In the 1970's Namibia was seen as a country rich in minerals and particularly as a promising source for uranium. Potential deposits for uranium were identified at Rossing, Langer Heinrich, Tubas and Trekkopje, but of these Rossing is the only one which has been brought into production and is today one of the largest uranium mines in the world. Any paper dealing with uranium production in Namibia must therefore concentrate on the Rossing Uranium mine.

ROSSING URANIUM LIMITED

History

Rossing is located in the Namib desert about 40' North East of Swakopmund, a seaside town situated halfway up the west coast of Namibia. Whilst the presence of radioactive minerals was known as early as 1928, it was not until the Rio Tinto-Zinc Corporation Plc, with its considerable experience in developing large scale low grade mining projects that the rights to explore in the area in 1966 were acquired and the viability of the project was determined. Investigation of the project continued up to 1974 when mine preparation and plant construction commenced, leading to full production in 1979. Full production is still being maintained at a level close to 4800 s.t. U3O8 per annum.

The original development work was carried out from Johannesburg and RTZ in London but now Rossing Uranium Limited is an autonomous operation in which RTZ has a beneficial interest of 46.5%. The Company's management and head office are now situated at Windhoek, the Capital of Namibia, with marketing based in London.

Location

Namibia is a country equal to the size of France and the Federal Republic of Germany put together, but with a population of just over 1 million people of various tribal backgrounds. About 10% are white and the Ovambos, mainly located in the north, account for about 50%.

A fifth of the area of country is the Namib desert and conditions can only be described as dry or very dry. From the point of view of the operation, the physical conditions are difficult and the lack of an industrial base in Namibia has necessitated the provision on the mine of virtually all engineering and non-technical services.

Rossing is linked by rail to Walvis Bay, a deepwater port from which the final product is exported worldwide to all the major user countries of U3O8.

The Operation - Open Pit

As the deposit is low grade, the removal of very large quantities of material from the pit takes place continuously. Some 30 170 T Wabco and Euclid trucks remove about 160,000 mt of ore and waste per day from the pit. The trucks are loaded from eight electric shovels fed from a 25 KV ring main system and with an ore to waste ratio of 1:3 about 40 000 mt of ore is fed daily to the Primary Crusher.

The material is blasted in the pit and approximately 360 mt of explosive (ammonium nitrate and fuel oil) is used each week. Continuous drilling, together with radiometric results of blast holes helps to maintain a satisfactory level of grade in what is a widely disseminated ore body. Long, medium and short term computerised mine plans ensure a twenty two year planned life for the mine which, with the known reserves that exist, could be adapted and extended if necessary. Eventually the pit will extend to 3 km in length by 1 km wide, down to a depth of 300 m. Bench height is 15 metres.

The Operation - Crushing

The grade is controlled by radiometric scanning of each truck. Trucks then either discharge the ore into the Primary Crusher, or alternatively the ore is diverted into low grade stockpiles. The Primary Crushers reduce the rock to minus 175 mm coarse ore, which is conveyed to a stockpile with a total capacity of 400,000 mt. The live part of the stockpile can supply the process plant for approximately two days. From the coarse ore stockpile, the material is further reduced in a closed loop crushing system to minus 19 mm size, from which it passes to the fine ore stockpile and finally to four rod mills where heated water is added to enhance the later leaching process. The material is milled to minus 1.7mm and leaves the rod mills in the form of a pulp.

The Operation - Metallurgical Plant

The pulp from the rodmills feeds into a dilute sulphuric acid leaching plant where the uranium content of the ore passes into solution. The waste solid material is separated from the uranium solution by cyclones, rotoscones and thickeners and pumped into a nearby tailings

dam. The uranium content of the solution is upgraded in an ion exchange plant and a solvent extraction plant. The upgraded solution is precipitated with ammonia to produce yellowcake which is then roasted to give the final U308 product. There is also a small ion exchange plant which recovers uranium from the tailings solution which is a useful addition to the overall production. The whole metallurgical plant is built on a modular basis so that major expansions are possible without disrupting the existing operation.

The major consumable item in the process is sulphuric acid and 60/70% of the acid required is produced in Rossing's own acid plant. The mine is virtually self-sufficient with respect to repairs, maintenance and engineering services.

A recent innovation has been the installation of a computerised Central Process Control system for the whole plant to give improved control of the operations and increase efficiencies. Even without this new facility, metallurgical recovery and other technical parameters have improved year by year since full production was achieved in 1979, which has resulted in the unit cost for uranium produced each year remaining well below the rate of inflation.

Employment

A total of just under 3,000 are employed at Rossing with salaries for all personnel being based on the Paterson system which grades each individual according to the decision-making involved in the job. The policy is entirely non-racial and determines salary, housing and holiday benefits. There is no contract labour at Rossing.

70% of the workforce and their families live in the nearby town of Arandis where Rossing has built over 800 three-bedroom houses, other smaller houses and single quarters. The town has shopping facilities, schooling, a 50 bed hospital, sporting and recreational facilities, social clubs, central community services, churches and various cottage industries.

The remaining staff are housed at Swakopmund. During 1983 over 1,300 of the staff were involved in occupational training at Rossing in one form or another. Whilst the standard of education is low in Namibia, it is the aim of Rossing to train and develop employees to their full potential and in particular, there has been a marked success in training local people to become skilled artisans.

Employee Health and Environmental Control

In a desert environment the main hazard to employee health derives from the possibility of dust inhalation. Dust suppression by spraying water is carried out in all areas and the wearing of respiratory protection in areas of high dust level is mandatory. All employees undergo an annual medical (biannual in areas where low level radio-activity is present) and included in these medicals is a detailed lung-function test, analysed by computer-based techniques and interpreted by both in-house medical staff and by external specialists. This is of course only one of the medical tests undertaken each year on every employee. To date no occupationally related diseases have been reported.

With regard to the tailings pond where liquids have failed to evaporate, the liquids move into a pond where the metals present, and particularly radium, are precipitated. Boreholes arranged in the area monitor seepage and to date there is no significant movement of radium from the tailing pond and no impact on the quality of the underground water in the area.

The Political Position

As the major shareholder and manager of Rossing, The Rio Tinto-Zinc Corporation Plc is sometimes criticised for being involved in one country which is governed by another. From a moral standpoint the criticism deserves proper examination. Anyone who visits Rossing would know that those people of Namibia who are associated with the project gain much from it in terms of housing, education and health and indirectly this also extends to those who provide services and supplies to the operation. On a wider scale Rossing also contributes one third of the GNP of Namibia and looks forward to the establishment of a fairly elected government for the territory. At present there are distinct signs that this may be coming about and whatever the outcome, Rossing looks forward to continuing as a major supplier to electrical utilities worldwide whilst at the same time contributing to the economy of a newly emerging nation.