

Supervising Scientist

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notes

TRIAL LANDFORM RESEARCH AT RANGER MINE

The **Environmental Research Institute of the Supervising Scientist** is conducting research on a *trial rehabilitation landform* at the Ranger mine. The research is being conducted in collaboration with Environmental Strategy – Energy Resources of Australia Ltd (ERA).

What is the trial landform?

A trial landform of approximately 200m x 400m (8ha) was constructed during late 2008 and early 2009. The trial landform is being used to conduct research that will help with the design of the rehabilitated final landform once work at Ranger mine has finished.

Two different types of material have been placed on the surface of the trial landform to see if there are any

differences in erosion rates, and to assess how vegetation grows in these different materials.

The two different types of surface materials are *waste rock* (waste rock is the rock obtained during the mining process that doesn't have any uranium ore in it) and a waste rock mixed with finer material called *laterite*. The laterite makes up approximately 30% of the second type of surface cover.



Aerial view of the trial landform at the Ranger mine



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Vegetation research

Vegetation research is being undertaken by ERA to determine if there is any difference between using seeds or small plants (tube stock) to try and establish vegetation on the trial landform. The two surface cover types have had *seeds* or *small plants* planted to see if they grow differently.



Map of erosion plots on the trial landform

Erosion plots

Four erosion plots (30m x 30m) were constructed by **eriss** on the landform surface during the dry season of 2009 to measure rates of erosion. The following measurements are made:

- water runoff – height and flow
- suspended sediment amounts in the runoff water (called turbidity)
- salt content of the water (called electrical conductivity)

Water research

Water height is measured at the outlet of each erosion plot using an engineered weir or flume.

The height of the water is recorded as it passes over the top of the flume and converted to the amount of flow (discharge) using mathematical equations.

Water samples are collected from near to the flume by automatic water samplers triggered by increases in water level. The water samples are analysed to measure the amount of fine sediments and salts that are being washed off the surface.

Larger particles (bedload) are washed off the erosion plots and deposited above the flume during runoff events. The bedload is collected each week.

Rainfall that falls on the trial landform is also recorded. Data is stored by a data logger and downloaded once a day.

Mapping

The surface of the trial landform has also been mapped using a *total station* (survey instrument) and a much more sophisticated *laser scanner* and *differential GPS*. It is planned that surveys will be completed each year to see if the surface of the trial landform is being significantly eroded.

The maps generated by these measurements will be used to help predict how much erosion might occur from the final rehabilitated mine site.

Use for collected data

Data will continue to be collected for the next few wet seasons to measure the rate of erosion from the surface of the trial landform. This information will be fed into computer *landform evolution models* to assist with developing the best design for the construction of the final landform, to be done once mining operations at Ranger have finished. The ERA research on how the plants grow will be used to determine the most appropriate type of plants to be used for the final rehabilitation.



Water flow being measured by a flume