

Ramu

Waste Disposal Approach



This project uses the Deep Sea Tailings Placement (DSTP) system for waste disposal.

The key points to note about the system are:

1. Uses the world's best practice for the design and operation of such systems, including following the guidelines issued by SAMS (Scottish Association of Marine Scientists) in 2010, concerning the design and operation of DSTP systems
2. Will operate within the guidelines and permits issued by the PNG Government
3. Selected on the basis that it will have the least impact on the environment
4. Adhere to the Company's Environmental Policy Statement

The attached brochure provides details of the Ramu DSTP



RAMU NICO & DEEP SEA TAILINGS PLACEMENT FACT SHEET

www.ramunico.com

FREQUENTLY ASKED QUESTIONS AND ANSWERS

1. What is Ramu NiCo?

Ramu NiCo is a nickel & cobalt mining operation under construction in the Madang Province. The project is scheduled to commence operations in early 2011 and the planned life of mine is 20 years or more.

The project comprises three main parts:

Kurumbukari mine site (KBK):

Here the lateritic ore (soil) is mined and prepared for transfer via the pipeline.

Pipeline:

This 135 km long pipeline transfers the rock slurry (ore plus water) to Basamuk. No chemicals are added at this stage.

Basamuk:

The process plant is located on the coast at Basamuk. Here the rock slurry from KBK is treated with acid to remove the nickel and cobalt. No cyanide is used in the process. After the metals are removed the remaining rock slurry becomes a waste product, called "tailings". It is this material that will be disposed to the ocean at depth following treatment with limestone to remove the acidity.



Basamuk refinery

2. Will the project help the country?

The project will bring money to the country by means of salaries, tax on salaries, company tax, royalty payments and equity distributions (payments to shareholders). The estimated value of this over 20 years is 3 billion kina (3,000,000,000 kina).

Additionally, the project will train many PNG nationals to operate a complex mining project. These skills will be in demand even after mine closure.



Direct employment as part of project development



KBK mine site



Pipeline

3. Has the project received the necessary approvals from Government?

Yes. As required by law, a detailed Environmental Plan was approved by the Government in 2000. This plan was produced by consultants after three years of environmental studies, at the cost of \$5 million. An environmental permit was issued under the Environment Act in 2000.

4. What are DSTP?

DSTP (Deep Sea Tailings Placement) is a method of disposing of the tailings. Instead of putting the tailings into a dam like many mining operations, the tailings will be piped out to sea, 150 m below the surface of the water. From there the tailings will fall quickly to greater than 400 m below the surface.

5. Why DSTP?

Extensive studies have shown that DSTP is a safer way to dispose of the tailings at Ramu NiCo. Putting the tailings into a dam is more risky. Some of the problems related to tailings dams in this country include:

- Loss of productive land.
- Earthquakes leading to damage to the dam wall or even collapse.
- High rainfall leading to overflow of water.
- Problems with maintaining the dam in the long-term.

Although it is true that there are some environmental impacts from DSTP, these are confined to deep water, which is isolated from surface layers and not greatly used by man.

6. Are there other mines that practise DSTP?

DSTP has been used at mines around the world. In PNG, the Lihir mine has practised DSTP for many years, as did the Misima mine (Misima has now closed down).

For comparison, the discharge depth of the tailings at Ramu NiCo will be 150 m, deeper than at Misima (112 m) and Lihir (128 m).

7. Will there be environmental damage caused by DSTP?

Detailed environmental studies tell us that the tailings are of low toxicity and after mixing with seawater will be non-toxic.

It is true that the tailings will gradually cover some of the deep sea bed. This will mean a very small percentage of fish habitat will be covered by the mud. However, following mine closure this will gradually be covered by normal sediments and plant and fish life will return.

These effects and risks are considered to be preferable to the potential environmental effects of a large tailings dam on the land.



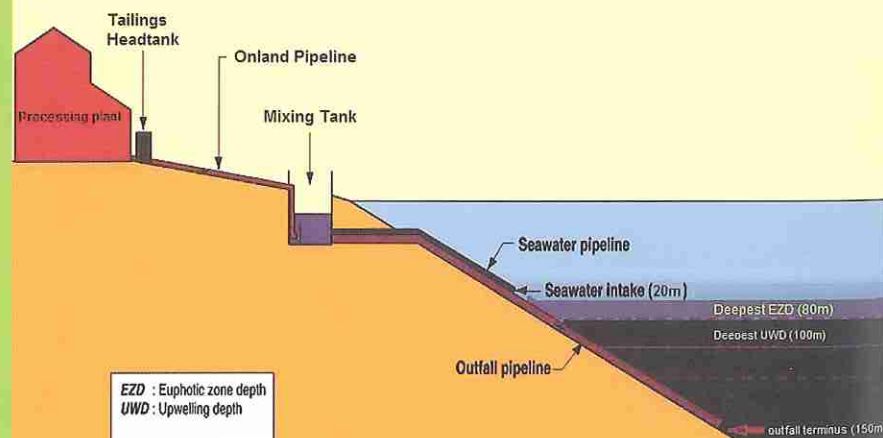
Ramu Project puts more emphasis into detailed environmental studies

8. What is tailings?

Before being sent to the processing plant the rock is crushed and mixed with water to form a mud. After processing, most of the nickel and cobalt is removed. What is left is called "tailings". This looks like mud, and is very similar to the material that flows down the river after a heavy storm.

9. Where will the tailings go?

The tailings will be discharged from a large pipe at 150 m below the surface. This is below the level that sunlight can reach. From this level it will fall rapidly to beyond 400 m. The scientific studies indicate that it is unlikely that any tailings will move towards the sea surface.



10. Are the tailings poisonous?

The tailings have a similar composition to mud. Like mud, tailings are not suitable to support fish or similar marine life. However, the scientific studies tell us that within a short distance from the end of the pipe the tailings will be mixed with sea water and the water will remain suitable for marine life.

There is no evidence that the tailings will lead to poisoning or other ill-effects on fish.

The discharge of mud from the rivers to the sea is a natural feature of this country. The tailings from the operation will form only a small proportion of the total solids passing from rivers to the area of the ocean known as the Vitiaz Basin (less than 6%). Once the mining operations cease, the tailings will be rapidly covered by these natural deposits.



World environment lab ALS , Cantest na CSIRO

11. Why not make the tailings discharge deeper?

Making the tailings discharge deeper is technically possible, but is not necessary. There is already a large safety margin in the design (about 50 m).

Making the pipe longer would require re-engineering the entire system, including the pumps and holding tank at the plant site. The pipe would be substantially more difficult to install.

12. Will it still be safe to eat fish and other seafood from the bay?

The nature of the tailings (very low levels of soluble metals) means that metals will not be accumulated by fish or other animals and they will remain good to eat. The tailings will fall to great depth, well below the level at which most fishing takes place.

13. What about Upwelling?

Upwelling is the process whereby material at depth in the sea can be brought to the surface by water movement. It only occurs in certain locations and conditions. The Ramu NiCo tailings outlet will be at 150 m below the sea surface. This is about 50 m below the deepest level at which upwelling is thought to be likely. There is no evidence of upwelling in the Vitiaz Basin, and the SAMS report does not suggest that upwelling will occur.

The chance of upwelling for the Ramu NiCo project is therefore very small, however it is important to understand that the tailings has low toxicity in any case. If unusual conditions resulted in upwelling, there would be a great amount of dilution.

14. Will the colour of the sea change?

The tailings will be discharged at 150 m and will descend rapidly to much greater depths. The chance of any of this material moving up to the surface is extremely small (the tailings particles are heavier than water and will tend to sink).

15. What about heavy metals?

The ore at the Ramu NiCo project is highly weathered lateritic "soil" with very low amounts of "heavy metals".

It is not like the ore at many gold mines which unweathered (from depth) and typically carries elevated levels of potentially dangerous metals like arsenic (known as "heavy" metals).

There are no metals in the tailings that are not already found in the seawater, and scientific opinion is that there will be no build up of metals in the local marine life.

16. How will we know if there is a problem?

The environmental permit for the operations requires a very comprehensive environmental monitoring programme. This will include regular measurement of:

- seawater quality,
- fish abundance,
- condition of coral, and
- trace metal levels within the flesh of fish caught locally.

These results will be interpreted by third-party experts and provided to Government.

Also, the tailings leaving the pipeline will be monitored continually and a remotely operated vehicle will be used to visually inspect the line each year.

17. Can we trust the engineering?

Great effort has been made to ensure that the DSTP system will function correctly. The design is by Rescan, a Canadian company that invented the DSTP technology. All pipeline materials are the highest quality from North America and Europe. Construction is by specialists from Canada and Australia. The pipeline itself is much thicker (80mm) than it needs to be.

In the unlikely event that the DSTP pipe becomes blocked or damaged, there is an automatic system that will divert slurry from the process plant to two large holding ponds. In this case the plant will simply be shut down until the problem is fixed.

18. What about the SAMS report?

The Scottish Association for Marine Science (SAMS) has produced a review of DSTP for the PNG Government. This report includes proposed guidelines for new DSTP projects (known as the "SAMS Guidelines").

Although this work was done after the Ramu NiCo project was designed, it has been confirmed that the Ramu NiCo project meets **all** the SAMS Guidelines.

19. Has the Company conducted awareness programmes?

There have been three phases of awareness programmes for the project. The first, in 1999, was attended by 13,400 people across the Madang province. In 2010, over 6,000 people attended the latest awareness programme.

20. Need more information?

More information can be obtained from the General Manager HSE:

Matthew Orr,

Ramu NiCo Management (MCC) Limited,
Madang Office,

P. O. Box 1229,

MADANG,

Papua New Guinea.

Email: mattheworr@mccgrd.com

Fax: 422 1710



Strongest and best HDPE pipes made in Canada