

# Decision on proposed waste by-product disposal at Douglas Mine Pit 23



Environment  
Protection  
Authority Victoria

Publication 1626  
Published May 2016

## Summary report

Environment Protection Authority Victoria (EPA) has assessed a works approval application from mining company Iluka Resources to continue disposing of radioactive materials in Pit 23 at its Douglas Mine in western Victoria. EPA has found that neither pollution nor environmental hazard has occurred or is likely to occur in the future as a result of current or proposed disposal activities.

As a result, EPA has determined the company does not require a works approval or licence for these activities but will still require a planning permit and the radiation management licence currently in place at the site.

This publication summarises the key aspects of EPA's assessment and decision-making process around the proposal.

## Mineral sands mining and current waste by-product disposal

Iluka Resources Pty Ltd (Iluka) has been mining mineral sands in Australia for over 60 years, producing zircon and titanium oxide products. Iluka has mineral sands mines in New South Wales, South Australia and Victoria. Once mined, the mineral sands are transported to the Hamilton Mineral Separation Plant in Hamilton, Victoria, where the final zircon and titanium oxide products are extracted for sale and export.

In processing the mineral sands, the Hamilton plant produces waste by-products of sands, clay and gypsum, which contain naturally-occurring radioactive materials – namely radioactive uranium, thorium, and radium.

Waste by-products from the plant are currently being transported 93 kilometres to Iluka's Douglas Mine site in western Victoria, and placed in a former mine void known as Pit 23. As the waste is disposed in the pit, it is progressively covered with non-radioactive gravel and rocks.

Mining ceased at the Douglas Mine in 2012, and it is now being progressively rehabilitated. It has a number of other waste storage pits that have already been rehabilitated for use as agricultural land. Because Iluka has now completed mining in Victoria, and will soon finish processing stockpiled mineral sands that originated from Victorian mines, its mining licence will be revoked and no longer cover the continued disposal into Pit 23.

Iluka propose to continue disposal into Pit 23. To do this, Iluka applied for a planning permit from Horsham Rural City Council (HRCC), and a works approval from Environment Protection Authority Victoria (EPA).



Waste by-products from the Hamilton Mineral Separation plant being deposited by truck into Pit 23 at the Douglas Mine Site.

## EPA's decision on the proposed works approval

The *Environment Protection Act 1970* (EP Act) is the legislation that gives EPA its regulatory powers. While the EPA has power under the Act to regulate waste, regarding radioactive materials the EP Act says:

'This Act **does not apply** to a radiation source within the meaning of the *Radiation Act 2005* **unless** a condition of pollution or an environmental hazard has arisen or is likely to arise.'

EPA has investigated whether the current and proposed radioactive material disposals into Pit 23 has or is causing or is likely to cause pollution or environmental hazard. If there is no pollution or hazard, the EP Act does not apply.

EPA has considered all possible pathways that pollution or hazards could arise from Pit 23, and also commissioned an independent desktop reviewer to conduct a technical review of potential groundwater and surface water impacts. To assess the potential human health and environmental impacts of radioactive materials, EPA consulted with the Department of Health and Human Services (DHHS), which is responsible for regulating radioactive materials and associated risks to human health and the environment.

EPA has not found any evidence to show that a condition of pollution or environmental hazard has arisen or is likely to arise from Iluka's proposal. Accordingly, the EP Act does not apply to the proposed disposal activities and **Iluka does not require a works approval or a licence from EPA** for it to continue its disposal activities into Pit 23.

Iluka will still require a planning permit from HRCC in addition to the Radiation Management Licence it currently holds from the DHHS. EPA will continue to work with these and other regulators in an advisory role.

EPA has put forward a series of recommendations for consideration by the regulators of the site to help ensure that the disposal activities have appropriate environmental protection measures, in particular groundwater monitoring to be able to anticipate and identify any future impacts.

Pollution\* is an alteration of chemical state of the environment, which is detrimental to the beneficial uses of that environment.

An **environmental hazard** means a state of danger to human beings or the environment, whether imminent or otherwise resulting from the location, storage or handling of any substance having toxic, corrosive, flammable, explosive, infectious or otherwise dangerous characteristics.

Contamination\* means an alteration to the environment that can be harmful, beneficial or neutral. Contamination does not always mean 'pollution' has occurred.

(\*These explanations are for information only, and are not definitions from the EP Act.)

# Iluka Douglas Mine Pit 23 Works Approval Decision

## Assessment of pollution and hazard

The key issues EPA considered in assessing pollution and environmental hazard regarding Pit 23 were:

- the potential for **leaching** of radionuclides and other contaminants into groundwater;
- potential contamination of surface waters; and
- radiation risks to human health and the environment, which was assessed by the DHHS and provided to EPA.

EPA also considered potential impacts related to air, noise and greenhouse gas emissions.

EPA's assessment relied on data and information provided by Iluka and its consultants, as well as the conclusions drawn by the independent desktop reviewer and the DHHS.

## Groundwater

### Key features of groundwater

Groundwater monitoring shows that the groundwater beneath Pit 23 flows in a north-west direction, eventually discharging to McGlashin Swamp or potentially emerging in springs along the way. Groundwater does not flow from Pit 23 to the Glenelg River, and is unlikely to flow there in the future.

The most likely pollutants from Pit 23 that could impact groundwater are salts, heavy metals and radionuclides, which can be picked up in leachate water and then carried in the groundwater along its flow path towards McGlashin Swamp. Iluka and its consultants completed a number of computer models to understand groundwater flow paths and discharges

### What is leaching?

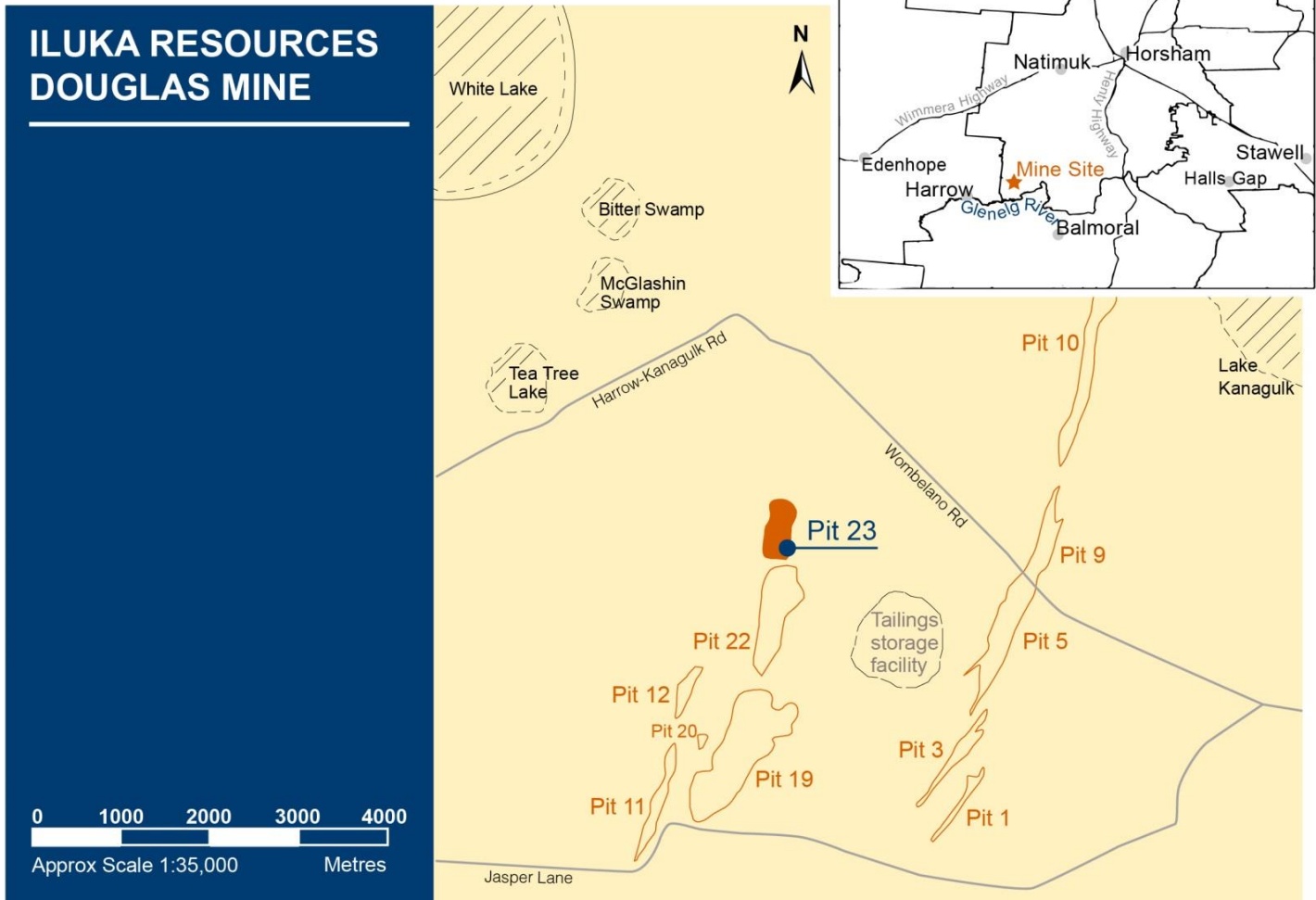
When rainwater or groundwater comes into contact with waste material, it can pick up or dissolve pollutants in the waste – This is called leaching.

EPA considered whether leachate from Pit 23 had the potential to carry pollutants – primarily salts and radionuclides – to surface waters or groundwaters.

EPA's assessment found that dissolved salts are likely to be carried in groundwater for approximately 1 kilometre from Pit 23, but this would not affect the **beneficial uses** of the groundwater. Radionuclides are not likely to travel beyond 15 metres from the Pit 23 boundary, which is still in the rehabilitation area.

to surface water receptors. Their models showed that groundwater will move slowly, taking around 165 years to travel from Pit 23 to McGlashin Swamp. This was confirmed by the independent desktop reviewer.

Groundwater in the region is naturally saline. The salinity of the groundwater beneath Pit 23 places it in a category called 'Segment C', which means it should be protected for certain **beneficial uses** under the *State Environment Protection Policy (Groundwaters of Victoria)* (SEPP GoV). The beneficial uses of Segment C include: maintenance of ecosystems, stock watering, industrial water use, primary contact recreation, buildings and structures. EPA assessed whether contamination from Pit 23 would affect these uses to an extent that would cause pollution.



# Iluka Douglas Mine Pit 23 Works Approval Decision

## Potential for groundwater pollution

Computer modelling of groundwater has shown that leachate from Pit 23 is predicted to make the groundwater slightly more saline for up to one kilometre along its flow path from Pit 23. However, this increase in salinity is unlikely to affect the beneficial uses of groundwater as the salinity would still remain within the limits of Segment C. As such, this is not considered pollution.

Radionuclides from the waste are also likely to be picked up in leachate and enter the groundwater, however, computer modelling shows that the groundwater is unlikely to carry radionuclides more than 10-15 metres from the edge of Pit 23. This is because the surrounding rocks naturally hold on to or 'sorb' the radionuclides from the water. This 15 metre zone of contamination will still be within the rehabilitation area of the pit, and so will be controlled and managed into the future along with the waste material in the pit itself.

The independent desktop reviewer concluded that there is low-to-no likelihood of an environmental hazard occurring in groundwater due to the waste by-product in Pit 23.

## Surface water

### Key features surface water drainage and potential pollution

When rain falls on or around Pit 23, it generally seeps down through soils and any materials in the pit to become groundwater, or flows overland to lower-lying areas as runoff. If the water comes into contact with materials in Pit 23, it can pick up contaminants in the waste and potentially transport them elsewhere. That water is called leachate.

The land surface surrounding Pit 23 is generally flat, with a slight slope down towards the north and east. Because of this, surface water runoff from Pit 23 will generally flow north-east towards Lake Kanagulk or via drainage lines towards the salty lakes in the north west (McGlashin Swamp, Tea Tree Lake, White Lake). These surface water receptors have a limited flow for much of the year due to low rainfall. However, runoff is generally captured in dams on the mine site. There is no current flow path from Pit 23 towards the Glenelg River in the south.

## Assessment of radiation impacts

The DHHS conducted a radiation risk assessment in relation to the radioactive material in Pit 23. DHHS considered the various radiation exposure pathways including during the period when the pit is proposed to be filled and also after it has been capped and rehabilitated. DHHS considered potential exposures such as inhalation and ingestion of dust, impacts on groundwater and surface water and also the impact of direct exposure to radiation.

Based on their assessment, DHHS consider that the radiation practices proposed for Pit 23 would ensure that the risk of radionuclides migrating off-site is sufficiently low as not to cause a hazard to human health or the environment.

As part of its assessment, DHHS also commissioned an independent assessment of a radiation impact assessment report that had been prepared by specialist consultants on behalf of Iluka. The assessor concluded that Iluka's consultant had assessed the impacts appropriately.

DHHS have also advised that the existing operations at Pit 23 comply with the radiation dose limits to people (workers and nearby communities). There is no evidence to suggest that the existing operations at Pit 23 have resulted in a radiation dose to a member of the public or a worker that would exceed the prescribed radiation dose limits.

DHHS have concluded that continued disposal of waste by-product from the Hamilton Mineral Separation Plant into Pit 23 would not significantly increase the off-site radiation risks to human health or the environment, to a level that would cause a hazard or environmental pollution.

DHHS continues to regulate Iluka's operations through a radiation management licence.

## Recommendations for environmental protection

EPA recommends that HRCC consider the following actions as potential planning conditions if it grants planning permission, and DHHS consider in its continued licensing of the disposal activities:

- The waste disposed of into Pit 23 should be restricted to waste that has originated from Iluka's mining, processing and transporting operations, and is contaminated with naturally-occurring radioactive materials. Records of waste transport and deposition into Pit 23 should also be required.
- Additional groundwater monitoring bores should be installed around Pit 23 and a rigorous groundwater monitoring and management plan should be developed. The monitoring should continue for the duration of disposal activities and beyond, and should be supervised by a hydrogeologist (groundwater expert).
- Regular checks should be done to ensure all existing groundwater bores are fit for purpose and maintained in working order.
- The groundwater monitoring data should be used to ground-truth and refine the groundwater computer models, providing an early warning system of any leachate fronts.
- Additional surface water monitoring should be undertaken along the drainage lines and lakes to the west of the site (when they are flowing) to pick up any potential future surface water impacts.
- Further surveying should be done along the drainage lines and lakes to the west to detect springs where groundwater may emerge.
- Appropriate dust and noise controls should be in place to ensure that amenity impacts do not occur.
- A decommissioning and rehabilitation plan should be developed and implemented.
- The final cap on Pit 23 should be at least 5 metres thick to create an effective barrier above the waste.
- A rehabilitation bond should be required from Iluka.
- Long-term land-use restrictions should be placed on Pit 23.
- Iluka should establish effective Community Engagement strategies.

# Iluka Douglas Mine Pit 23 Works Approval Decision

---

## Does Pit 23 represent best practice?

In addition to potential pollution impacts, EPA has also assessed how well the proposed disposal practices at Pit 23 demonstrate environmental best practice. EPA concluded that:

- Pit 23 is the most appropriate disposal site - taking into account environmental sensitivity and void space availability in the pit;
- the proposal represents best practice within the mineral sands industry; and
- the proposed containment measures in Pit 23 are appropriate, and the installation of a pit lining material would only achieve short term reductions in leaching to groundwater and would not provide any further protection to the beneficial uses of groundwater, as these are not expected to be affected by the proposal.

We noted that additionally, both DHHS and Earth Resources Regulation (ERR) consider the proposals to be [best practice](#).

## Limitations of this assessment

EPA's assessment of the works approval application has focused on potential pollution and hazards from Pit 23 only and not on other parts of the Douglas Mine, which are regulated by ERR.

EPA has reached a decision on the proposed disposal works based on the information available at the time, which is considered satisfactory. EPA has, however, recommended additional ongoing monitoring and assessment to detect any environmental changes that could cause or signal pollution.

## Further information

For [further detail](#) on EPA's decision and assessment of the works approval application for Pit 23, please see the full Works Approval and Assessment Report (for application number 1001971) available on EPA's website.

Please feel free to contact EPA on 1300 372 842 (1300 EPA VIC) or via email [contact@epa.vic.gov.au](mailto:contact@epa.vic.gov.au)