#### RioTinto

#### A Community Based Environmental Radiation Study

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### **QIT Madagascar Mineral and the Fort Dauphin Site**

- A large mineral sands operation employing approximately 2000 people
- A joint venture between Rio Tinto (80%) and the Government of Madagascar (20%) producing
- Located on the south eastern end of Madagascar
- The site is in a rural area with a number of small villages, isolated farms and river and lake systems
  with the major regional centre being Fort Dauphin to the south
- The topography is a relatively flat costal plain rising in the west to mountains and a near costal mountain located near Fort Dauphin
- Winds totally dominated by ENE winds with October to January having the highest wind speeds
- The entire costal region is characterised by mineralised sands of varying activity
- Mining has two separate phases: a floating wet processing place separating based on density and a land based dry processing plant separating on the basis of magnetic and electrostatic properties



# The Region





### **Comprehensive sampling**



### **Environmental gamma**

• Regional and local variability very high



### Mine related gamma

- Post rehabilitation dose rates are lower than regional averages
- Transport and storage of products have negligible impact on public dose



### **Dust inhalation**

- Dust inhalation is a very low source of exposure (<0.07 mSv/y)
- Significant (1-2 orders of magnitude) disequilibrium in long lived radon decay products (Pb210 & Po210)



# Water ingestion

• Drinking water across the region has only a very small radiation dose (0.02 mSv/y)



## Soils and sediments

- U and Th series in equilibrium
- Sediments from the release and decantation ponds have radionuclides within the baseline range



### Aquatic food ingestion

- All fish caught in the region have radionuclide concentrations within the international range
- Fish caught in the minesite paddocks recorded radionuclide concentrations within the range of regional fish



# **Crop ingestion**

• All plants/crops in the region have highly variable radionuclide concentrations



#### Inhalation and ingestion dose

- Dose heavily dependent on the consumption rate and age group
- Dose for an adult is 3.4mSv/y (food survey average) vs 1.7mSv/y (WHO Malagasy diet)
- The maximum dose is 12mSv/y for a 15 year old in Andrakaraka



#### **Total dose**

• Gamma is the major contributor to total dose and is associated with the highest variability



#### Mine contribution to annual dose

- Mine contribution not directly measurable in comparison with natural background
- Pathway analysis performed to determine maximum potential for each pathway



#### Conclusions

- Natural background radiation doses in the study region are highly variable and at level similar to other mineral sand rich area
- No need to alter local diets or lifestyles or any health concerns for radiological levels
- Unable to quantify dose contribution from mining activities from receptor samples due to natural background variation. However, pathway analysis indicates a negligible contribution
- Communicate findings to a wide range of stakeholders (regulators, NGOs, scientific community, and the local community)
- The entire report including scientific analysis is available for public download on the QMM Rio Tinto website <u>https://www.riotinto.com/en/operations/madagascar/qit-madagascar-minerals</u> under QMM Downloads







# Any Questions?