

# HME emissions monitoring

## Business challenge

We're seeking a technology-based solution to measure real-time emissions and fuel usage on our surface heavy mobile equipment (HME). The solution should be safe, environmentally sound, reliable, and cost effective, and take the remote location of many of our operations into consideration.

Although our current fleet of surface mining equipment meets or exceeds government and regulatory requirements and local communities' expectations, we know we can do more to reduce our fuel usage, gaseous and particulates emissions.



Any solutions need to be able to operate in both extreme heat and extreme cold; and provide fuel usage/return and monitoring for contaminants such as NO, NO<sub>2</sub>, CO, CO<sub>2</sub>, HC, PN, PM, as well as opacity, ionization, and scattering.

The appendix includes example data which could form part of answering the challenge.

## Solutions we seek

We are reaching out to the global research, technology, and innovation industry. Our ideal solution will monitor our equipment exhaust for contaminants, at an asset level, to enable real-time remote data collection and monitoring, including:

- Near real-time emission and fuel usage monitoring per asset (mins)
- Identify fuel savings and target CO<sub>2</sub> reduction, through:
  - Early maintenance issue identification
  - Identifying under-performing assets at an emissions level
  - Enabling operators to understand their impact and to optimise their behaviours influencing emission reductions.
  - Optimising haul road performance by identifying areas and roads where changing the road's design could reduce emissions

We are looking for technologies and partners to help us explore new solutions. Depending upon the feasibility, costs, and the solution's potential, we have financing available and can provide access to existing datasets and our technical specialists.

Solutions do not need to meet every requirement, but they must demonstrate capability and the value they would add when integrated with proven mine monitoring and control technology. However, all solutions must meet the requirements to withstand the operating conditions.

We'll evaluate solutions partly on technological maturity, deployability, level of maintenance, cost effectiveness for fleet-wide adoption (1000+ assets) as well as their ability to monitor fuel usage live, and how many contaminants they can monitor.

We intend to establish a trial at our Kennecott operation in Salt Lake City, Utah.

## Timeline

The crowdsourcing campaign is a two-stage process. This initial phase will close for submissions on 31 January, 2023. We'll then contact an initial shortlist of selected submissions during the first week of March 2023 for further discussions. Submissions must be lodged through Pioneer Portal by the deadline or they may be deemed ineligible.

## About your submission

We encourage you to include proof points or evidence that assure us that your solution or concept is feasible and effective.

We may elect to proceed with any, all, or none of the submissions. Alternatively, if aspects of your solution could work with other solutions, we may consider whether you would be willing to work with third parties. We'll discuss this Individually if it becomes relevant.

Submit via the form on the [Rio Tinto Pioneer Portal](#) and agree to the Terms and Conditions.

For further clarification, email [pioneerportal@riotinto.com](mailto:pioneerportal@riotinto.com).

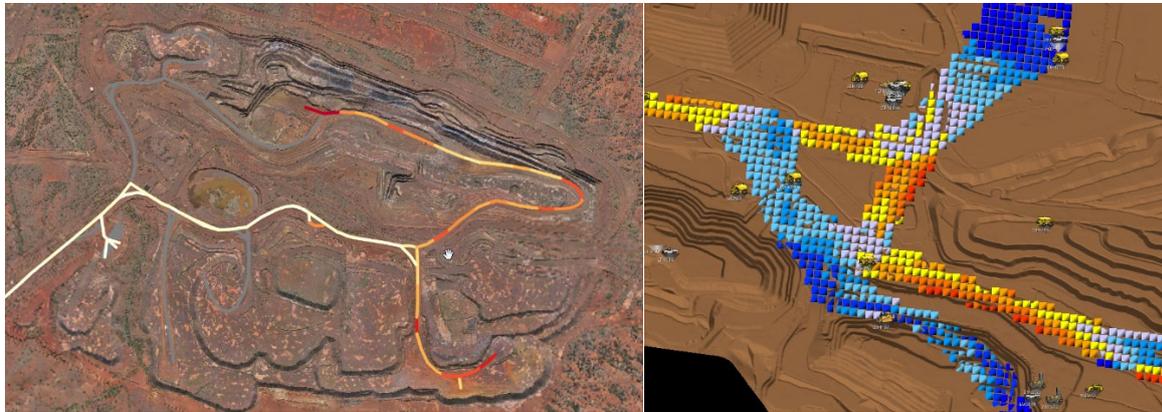
## Appendix

Example of data which can be provided via Rio Tinto.

Asset ID	Position X	Position Y	Position Z	Asset Model	Engine Model	SMU Clock Hours	Operation ID	Payload (t)
Truck1	51.505	-0.120	11.0	Komatsu 930	MTU	5000	12345	300
Truck2				Caterpillar 793	Caterpillar	10000	12345	250
Truck1	51.508	-0.091	11.2	Komatsu 930	MTU	5000	12345	300
Truck3				Komatsu 930	Cummins	7000	12345	0
Truck1	51.480	-0.16	11.5	Komatsu 930	MTU	5001	12345	300

### Example tools

If required, we have internal tools and capability to present spatial based data through our RTVis platform as per below example.



### Additional device quality questions

- Please provide typical ranges for measurement of contaminants.
- Please provide frequency, automated/manual download of data measurements.
- What environmental factors does your device perform in (eg. -40c -> +50c)?
- Do you have a cellular/LTE options for offloading the data?

**Questions and answers**

- 1) *Q) Is there a recent rule change that prompted the action on emissions?*  
**A) No.**
  
- 2) *Q) How many assets are proposed in the trial?*  
**A) Ideally, we'll select enough to be able to solve the use cases. Cost and complexity will need to be a consideration, however our initial thinking is 20+ assets.**
  
- 3) *Q) Where will it be trialled?*  
**A) At the moment, we intend to trial any selected solutions at our Kennecott operation in Salt Lake City, Utah.**
  
- 4) *Q) Will this be a trial in surface or underground, or both?*  
**A) Surface mine.**
  
- 5) *Q) What commodity is being mined?*  
**A) Copper.**
  
- 6) *Q) Do the assets have onboard computers/electronic control units (ECUs)?*  
**A) Yes, although ideally the solution will focus on measuring the exhaust itself rather than inferring from ECU of the equipment.**
  
- 7) *Q) Does Rio Tinto have resources to support the program?*  
**A) Yes; we're looking for a solution that can provide the emissions measurements and partner with the analysis.**
  
- 8) *Q) What type of funding is in place?*  
**A) All options are on the table at this stage – grants, consulting, lease, purchase or subscription.**