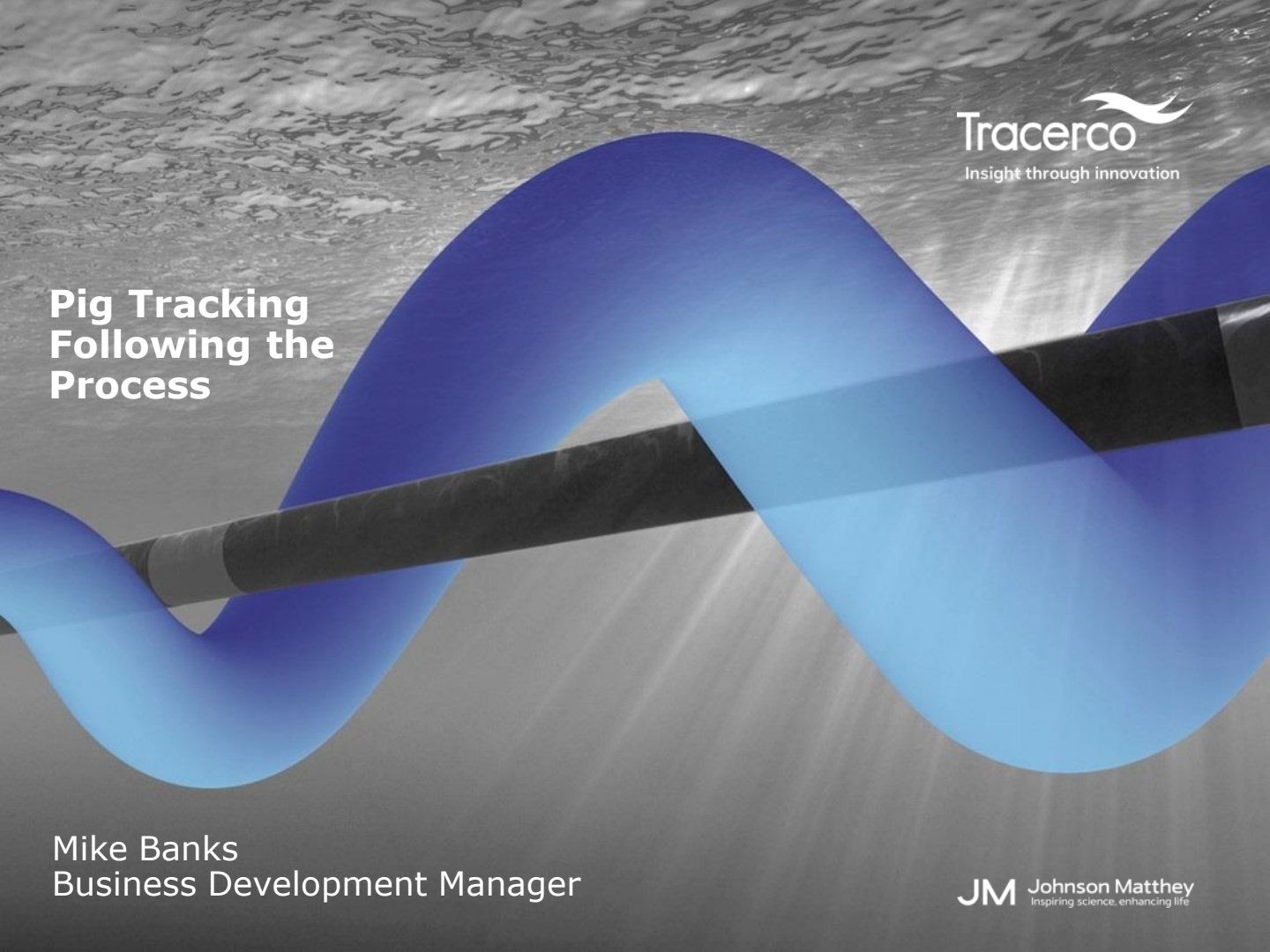
Tracerco
Insight through innovation
Pig Tracking
Following the
Process
Mike Banks
Business Development Manager
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Introduction

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Pipelines for the main transport system for gases and liquids.

Some fluids contain solids that can be deposited within the pipeline causing flow restrictions or blockages which can be expensive to remediate.

Regular pigging can help to keep the pipeline clean.

Pigging can also be used in pipeline commissioning, in-line inspection, batch separation of products and isolation

Introduction

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However:

- **A stalled pig will restrict or block the flow.**
- **It is therefore important to be able to quickly locate a pig should it become lost or stuck.**
- **This can be achieved by using pig tracking technologies.**

Case Study – Gulf of Mexico

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- A GoM Operator was commissioning a newly-installed pipeline of over 200 miles in length.

- Phase 1 – Dewatering
- Phase 2 – Conditioning

- Calculated pigging operation 14 days.
- Operator selected radioisotope pig tracking as it is not reliant on battery life - as opposed to some pig tracking transponders.

Radioisotope Pig Tracking

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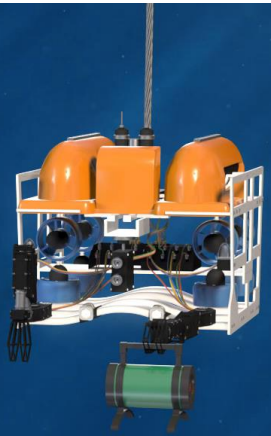
The GammaTrac™ is a multi-functional pig detection unit that allows for non-intrusive detection of multiple pigs and time stamping of pig passage.



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Providing Insight Onsite

Tracerco GammaTrac™ Operating Modes

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Flagger - On detecting a labelled pig, a red light is illuminated and remains illuminated until the unit is reset

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Tracerco GammaTrac™ Operating Modes

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Totaliser - Counts the total number of labelled pigs that have passed down the line. This is displayed in numerical form up to a total of 99

Tracerco GammaTrac™ Operating Modes

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Interrogator - Determines the detection of the pig or pigs to "real time". Displays the number of pigs that have passed and the time at which the last pig passed the unit.

Pig No.2 passed
At 09:49:59

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Tracerco GammaTrac™ Operating Modes

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Ranger - Gives an analogue display according to the proximity of a labelled pig. It enables the position of a stationary pig to be determined accurately; usually to within + or - 5 cm

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Pre-Project Planning

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Radiation Safety

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Source sizes (activity) are kept to a minimum by optimising the activity of the source to the particular pipeline.

The radiation intensity is dependent on several factors:

- The radionuclide
- The activity of the radioisotope
- The distance from the radioisotope
- The thickness of the material between the radioisotope and detector
- The density of the material between the radioisotope and detector.

The optimum radioisotope size is calculated using the pipeline diameter (the distance from the radioisotope), the wall thickness and density of the pipeline fluid.

Radiation Safety

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- Once the source sizes are calculated, comprehensive project documentation is generated detailing the extent of any controlled areas and an assessment of like radiation dose to workers.
- All source handling is performed by Tracerco engineers who are trained and qualified as Radiation Protection Supervisors under the Ionising Radiations Regulations 2017

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Dewatering Project Phase One
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Dewatering Project Phase One

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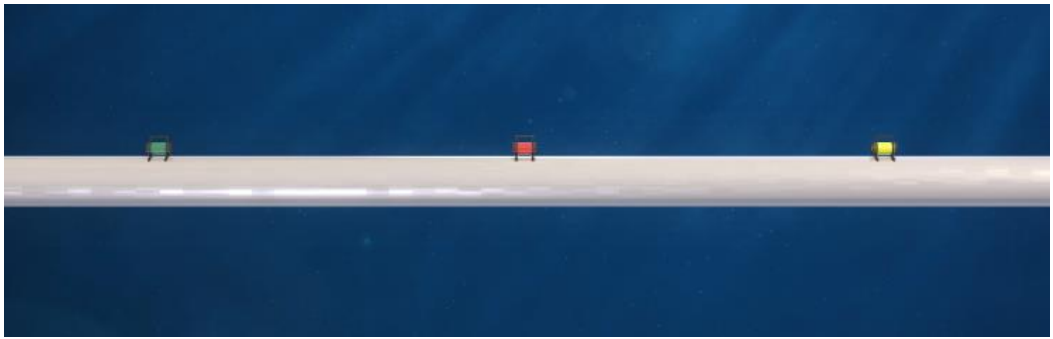
- Prior to starting this phase, the number of GammaTrac™ units was cut from 7 as originally planned to 4. These were positioned on the pipeline at strategic points subsea.



- Sources were fitted to each of the 3 pigs in the train and loaded into the launcher and subsequently launched.

Dewatering Project Phase One

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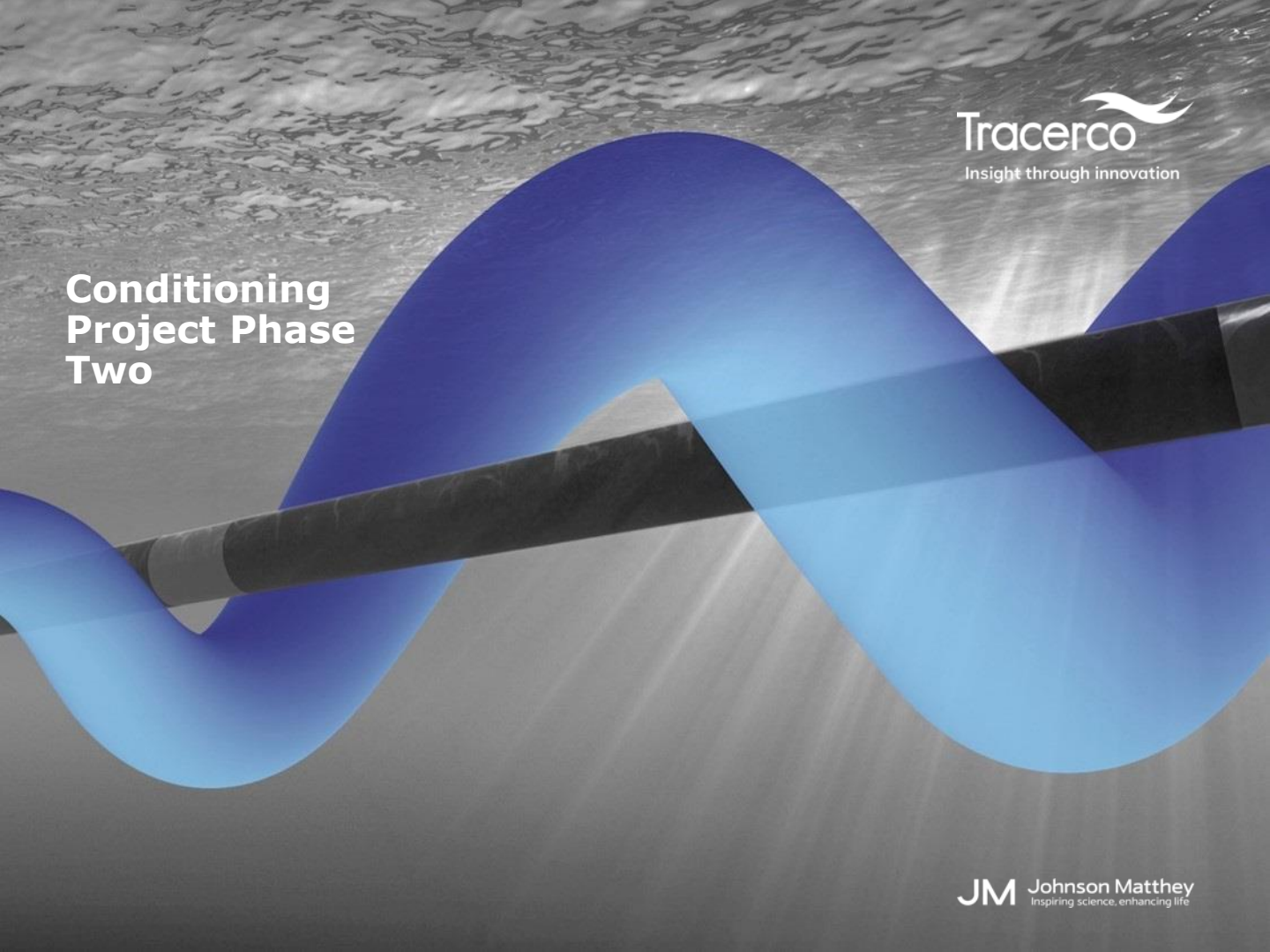
- After some time, it became apparent that things were not going to plan.
- ROV confirmed that only 2 pigs had passed the first location.

- A search for the 3rd pig was performed using Tracerco's ROV Alarm detector.
- The pig was located approximately 75 miles from where the pigging contractor expected it to be.
- The pig was eventually freed following pressure pulsing.

- All pigs then tracked through to the final parking location completing the dewatering phase.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Conditioning
Project Phase
Two
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Conditioning Project Phase Two

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- Conditioning chemicals were added to the pipeline separated by a 7 pig train, each tagged with a radioisotope.
- 12 additional GammaTrac™ units were deployed at key locations immediately following a pipeline feature such as a valve of in-line skid.
- The progress of the pig train was monitored by ROV using the GammaTrac™ Interrogator mode to log the time each pig passed each monitoring location and to calculate the velocity of the pigs.
- Pumping rates were increased once it was known that the velocities were slower than expected.

Conditioning Project Phase Two

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- The positioning of the GammaTrac™ units not only confirmed the safe passage of the pigs but also gave important information to the pigging contractor to make adjustments to the pigging regime in order to deliver a successful project and allow the operator to meet his production start-up date.
- The GammaTrac™ and ROV Alarm equipment utilised on the project ensured a timely completion of the project. In turn, the operator saved significant capital on vessel rental

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Summary

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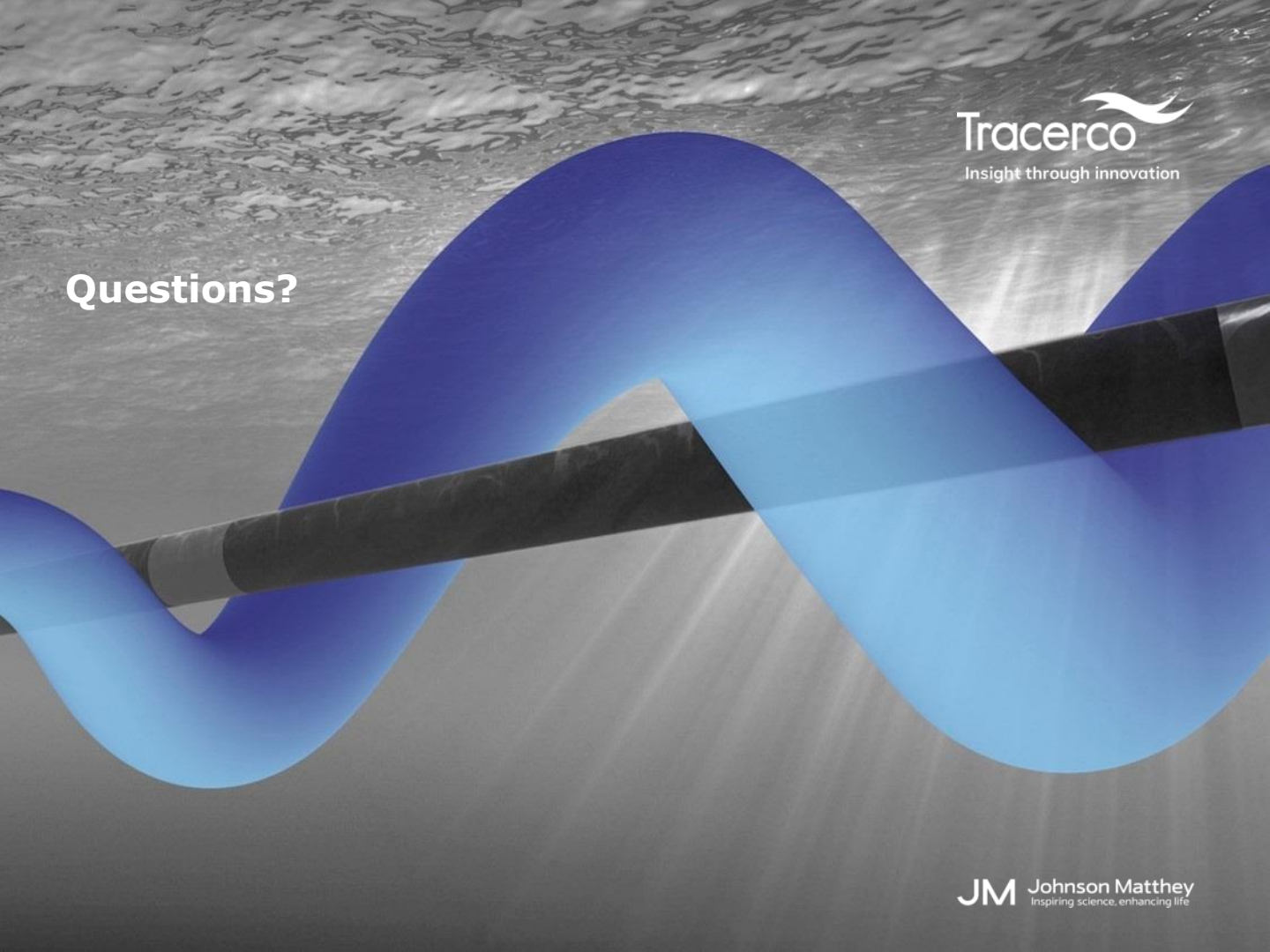
- **Tracerco's pig tracking system is not limited to battery life and is 100% reliable and safe**
- **Stalled or lost pigs can be located accurately and quickly**
- **With the enhanced functions of the GammaTrac™ unit, useful information such as the pig velocities can be measured which allows the operator to adjust the pumping regime to better control the pigging process**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Questions?
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