AMC RESI DRILL™ achieves 100% core recovery and reduces costs

CASE STUDY

AMC RESI DRILL™ combined with AMC's technical expertise, persistence and experience delivered improved core recovery and integrity, maintained hole stability, increased productivity and reduced costs while drilling through challenging formations in two locations in North Western Australia.

The project included two exploration programs in the Kimberley region, North Western Australia for one of the world's largest renewable energy companies. AMC was confident that the core recovery, which had been fluctuating from 50 – 100%, could be improved significantly, and AMC worked closely with the drilling contractor to improve results for the client.

With the aid of AMC RESI DRILL™, AMC was able to deliver improved core recovery, maintained hole stability and improved hole stability. The project delivered core recovery rates of 94 – 100%, increasing from 83% and exceeding the expectation of the client.

Background

The shallow holes varied from 100 – 500m and both sites consisted of difficult formations, including clay and shale, hard rock and fine to coarse sands. Lost circulation issues were also encountered, making drilling operations and core recovery challenging. Attempts by previous contractors to drill formations in this area had been unsuccessful.

Results

- Core recovery improvement from 50 to 100%
- Improved core integrity
- Reduced costs through improved productivity
- Successful project completion.

AMC RESI DRILL™ CASE STUDY

Improved core recovery from 50 to 100%

Challenging Conditions at First Drill Site

Drilling was very difficult for the first 100m of the third hole on this site. The formation was extremely unstable and included washed sand sections to clay/shale bands and back into hard rock. Where formations changed severely, only short runs of 0.4m were achieved, rather than the target 1.5m runs.

The experienced drill crew at the site employed the "dry plugging" drilling technique, which raised core recovery rates up to 83%, dropping to 50% in sandy conditions. Given the nature of the sandy formation, viscosity was kept high, at 70 seconds, to aid recovery, which was producing significant wear and tear on the mud pumps.

Location	80 km south east of Derby, Western Australia
Formation details	Washed sand sections to clay/shale bands then back into hard rock
Hole depth	100 – 250m
Fluid mix	Hole 3: 25 – 30kg AMC AUS GEL XTRA™ 3kg AMC PAC L™ Hole 4: 25 – 30kg AMC AUS GEL XTRA™ 3kg AMC PAC L™ 5kg AMC RESI DRILL™

TRIAL RESULTS

Core recovery	Before AMC RESI DRILL™	After AMC RESI DRILL™	↑88%
	83%, dropping to 50% through sandy sections	94%	
Viscosity	Before AMC RESI DRILL™	After AMC RESI DRILL™	↓36%
	70 seconds	45 – 60 seconds	

Experience and Persistence Delivers Results

A combination of extensive product knowledge and previous local experience from AMC's on-site mud engineers lead to the recommendation to use AMC RESI DRILL™. The conditions at this site in particular were ideally suited for the product, which reduces dynamic filtration loss, stabilises the bore hole and protects the drill hole wall from damage.

On commencement of the fourth hole, the new mud system, including AMC's RESI DRILL™ was prepared in the earth pits. Some improvements were observed immediately, including a reduction in viscosity from 70 seconds to 45 seconds, without any compromise in core recovery.

AMC's technician adjusted the mud system to achieve the optimal coating of the core. Other modifications included adjusting the solids in the system to counter the fresh mud system and increasing the AMC AUS GEL XTRA™ content.

These changes delivered the coating on the core to ensure improved core recovery. The system was now delivering optimal results, including:

- 94% core recovery
- Filtrate control under 10cc's
- Viscosity reduction from 70 seconds to 60 seconds
- Rate of penetration (ROP) increased.

Before

Core recovery before AMC RESI DRILL™.

After

Core recovery after AMC RESI DRILL™.

AMC RESI DRILL™ CASE STUDY

Improved core recovery from 50 to 100%

AMC RESI DRILL™ Delivers the Solution for New Contract

Similar conditions were experienced at the second site, with the formation ranging from very fine to coarse sands, with lost circulation issues. AMC planned to replicate the success achieved on the previous site by implementing the AMC RESI DRILL™ fluid system.

Location	140km north east of Pardoo Roadhouse, Western Australia
Formation details	**0 – 60m** – Ferruginised sandstone with occasional metric bands of shale and conglomerate **60 – 150m** – Plastic silty clay with carbonaceous material and bands of medium to coarse grained sand **150 – 350m** – Fine to very coarse grained poorly sorted sand
Hole depth	100 – 350m
Fluid mix	**To 87m:** 25 – 30kg AMC AUS GEL XTRA™ 3kg AMC PAC L™ **From 87m to TD:** 25 – 30kg AMC AUS GEL XTRA™ 3kg AMC PAC L™ 5kg AMC RESI DRILL™

TRIAL RESULTS

Core recovery	Before AMC RESI DRILL™ 83%	After AMC RESI DRILL™ 95% – 100%	↑20%
Viscosity	Before AMC RESI DRILL™ 40 seconds	After AMC RESI DRILL™ 45	↑12%

Ensuring Success in the Target Zone

AMC took time to prepare and condition the fluid system as drilling approached the target zone. Quality mixing equipment on site created an ideal system, ensuring fluids were incorporated properly for successful hole completion. AMC RESI DRILL™ was pre-hydrated in the mixing tank, and AMC PAC R™ was also added to assist raise viscosity.

Taking time to closely manage the fluid system delivered another successful outcome, including:

- Core recovery ranging from 95 – 100%
- Hole stability achieved through increasing viscosity to 45 seconds limiting problems caused by the unstable formation
- 1.5m runs
- High Rate of Penetration (ROP) achieving 20m per shift.

The thick coating created by AMC RESI DRILL™ maintains integrity of core samples in fine to coarse sand formations.

AMC RESI DRILL™ CASE STUDY

Improved core recovery from 50 to 100%

The thick coating created by AMC RESI DRILL™ maintains integrity of core samples in fine to coarse sand formations.

Project Outcome

This project delivered core recovery rates of 94 – 100%, increasing from 50% in sandy conditions and exceeding the expectation of the client. The enhanced integrity of the samples provided the client with the best possible opportunity to evaluate the potential of the site.

This was achieved in extremely challenging conditions, where previous attempts by alternative contractors had been unsuccessful.

A key factor in the success of this project was AMC's technical expertise. A combination of formation experience and persistance achieved the best results for the client. While core recovery and integrity improvement was the key objective, this project also successfully delivered:

- Increased average metres drilled per shift
- Improved productivity through maintaining hole stability and eliminating time lost to fix drilling problems
- Reduced costs through management of filtrate and lost circulation issues.

Further Information

For more information about this case study, please contact amc@imdexlimited.com or your local AMC representative.

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