United Collieries

xstrata coal

18th Electrical Engineering Safety Seminar

Longwall 3.3kV Individual Drive Isolation System

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Location





3.3kV Longwall Isolation

- The majority of underground longwall equipment operates at 3.3kV.
- Work on 3.3kV equipment requires high voltage practices and procedures.





3.3kV Longwall Isolation

The previous isolation practices involved.

- Isolation of equipment via control circuit
- Withdrawing equipment plugs from a restrained outlet.
- Inserting restrained plug into an earth outlet and lock into position.





3.3kV Longwall Isolation

The issues in isolating this way are:

- Isolation relied on the control circuit.
- Removing 3.3kV plug placed operator in close proximity to electrical conductors
- Removal of plug/cable which involved manual handling





3.3kV Longwall Isolation

Design Requirements

- Remove the reliance on control circuit isolation
- Remove the need for the operator to remove 3,300V plugs that could potentially
  - be energised or
  - cause injury
- Guarantee zero energy with a visual break of the High Voltage conductors





3.3kV Longwall Isolation

The Answer

- Introduce visual whole current isolation for all 3.3kV equipment.
- This included
  - A flameproof isolator enclosure for the face equipment
  - Isolators for outbye pump drives.



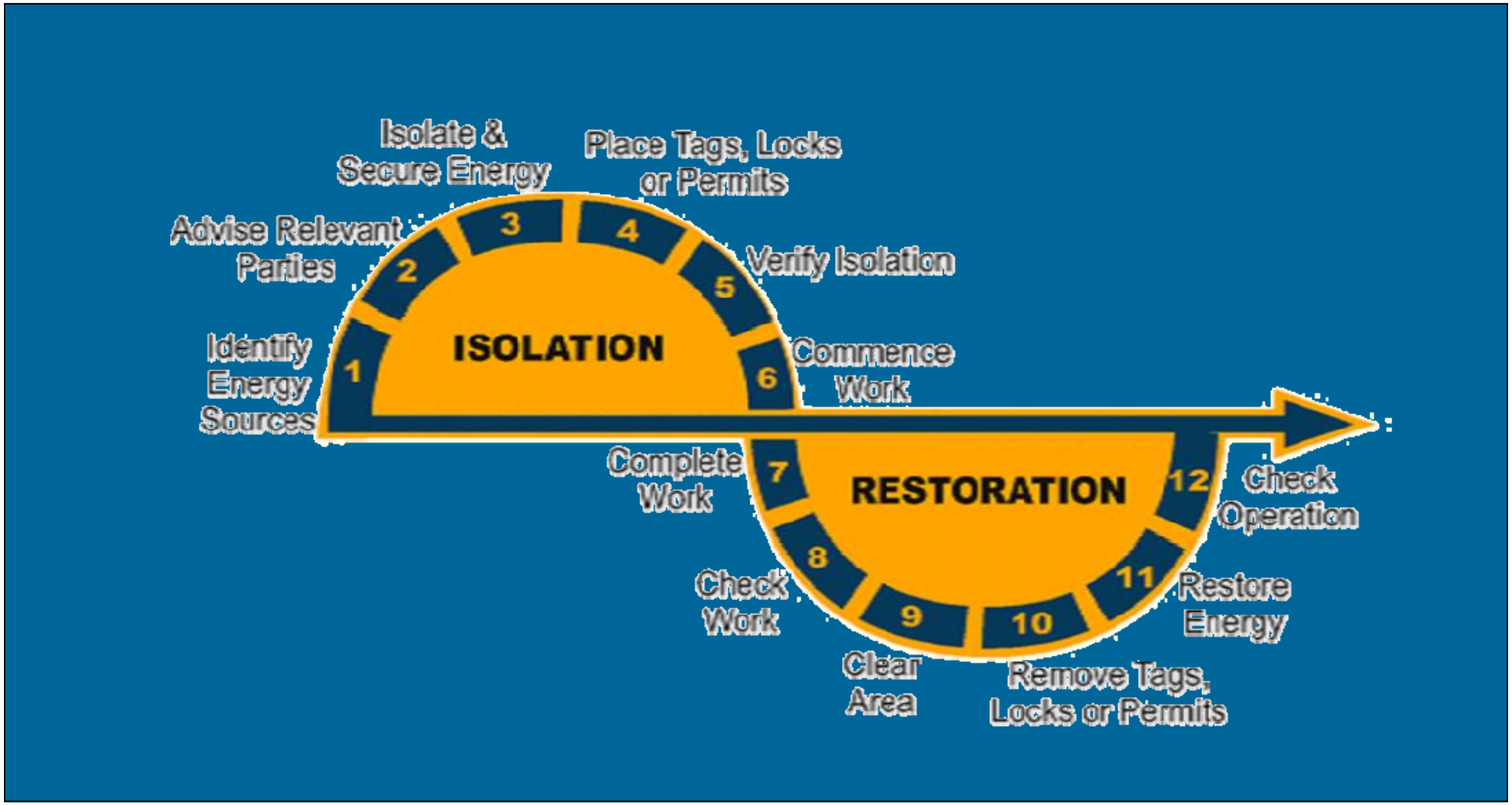


3.3kV Longwall Isolation

Each Isolator includes

- A suitably rated combination isolator and earth switch which is mechanically and electrically interlocked.
- Provision for locking isolator in the OFF and EARTHED position
- A viewing window to confirm isolation
- An Emergency stop
- Appropriate labeling

The 12 steps of Isolation







Benefits

- ✓Clear visual break
- ✓Simplifies isolation
- ✓Removes the need for access permits for mechanical isolation
- ✓Less manual handling
- ✓Reduction in time to isolate

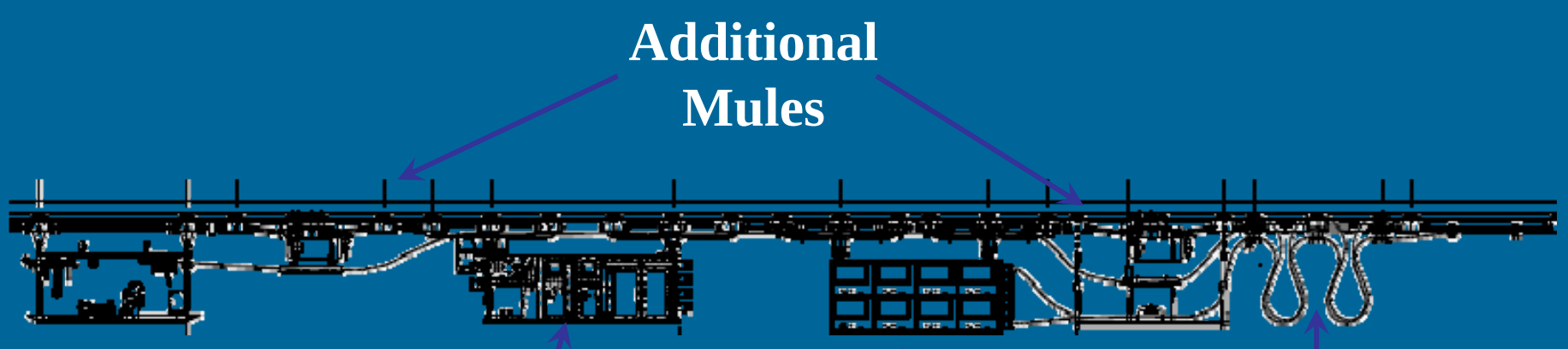
Implementation

- ✓ Project started late 2005
- ✓ Major modification to Longwall monorail
- ✓ Pumpstation brought out of mine and modified
- ✓ Developed new isolation procedures
- ✓ Commissioned Nov 2007
- ✓ Trained all Longwall crews





Monorail Layout







3.3kV Electrical Locks

All of the LW plugs have been locked out and can only be unplugged under Access Permit conditions





Costs

- Design and certification - $53k
- Manufacture of Flameproof enclosure - $210k
- Modification to monorail and extra mules- $280K
- Manufacture of Non Flameproof isolators - $72K
- Pump station modification and installation- $12k





Conclusion

- ✓ Significantly reduces the risk of working with High Voltage
- ✓ It is a simple design that should be considered when manufacturing new Longwalls and can be retrofitted to existing Longwalls





Conclusion

Thanks to all who have been involved in the project

United Longwall Department

MI Power and Electronics – Design and certification of enclosure

SES services – Pump Station modification

Rutherford Cables – Supply of new cables

Jang Engineering – Project Management

DBT – Monorail Engineering