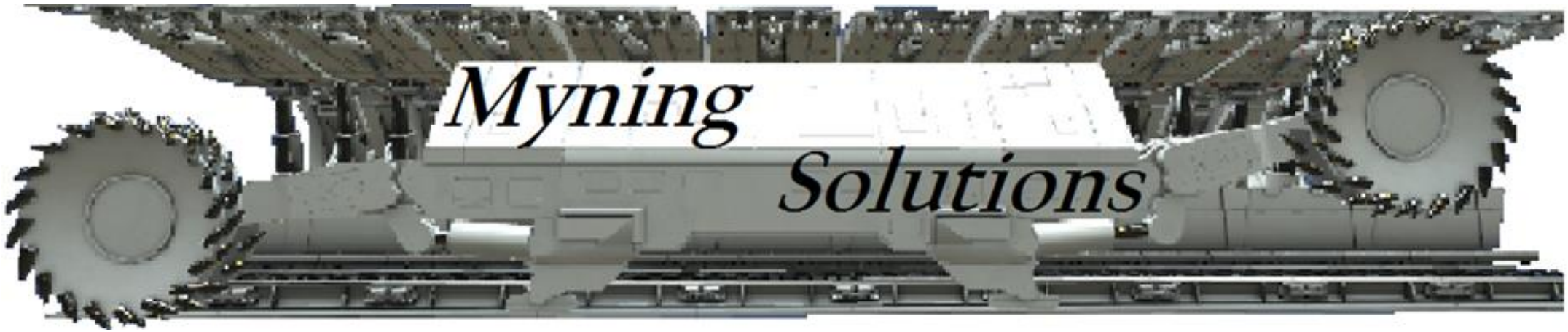

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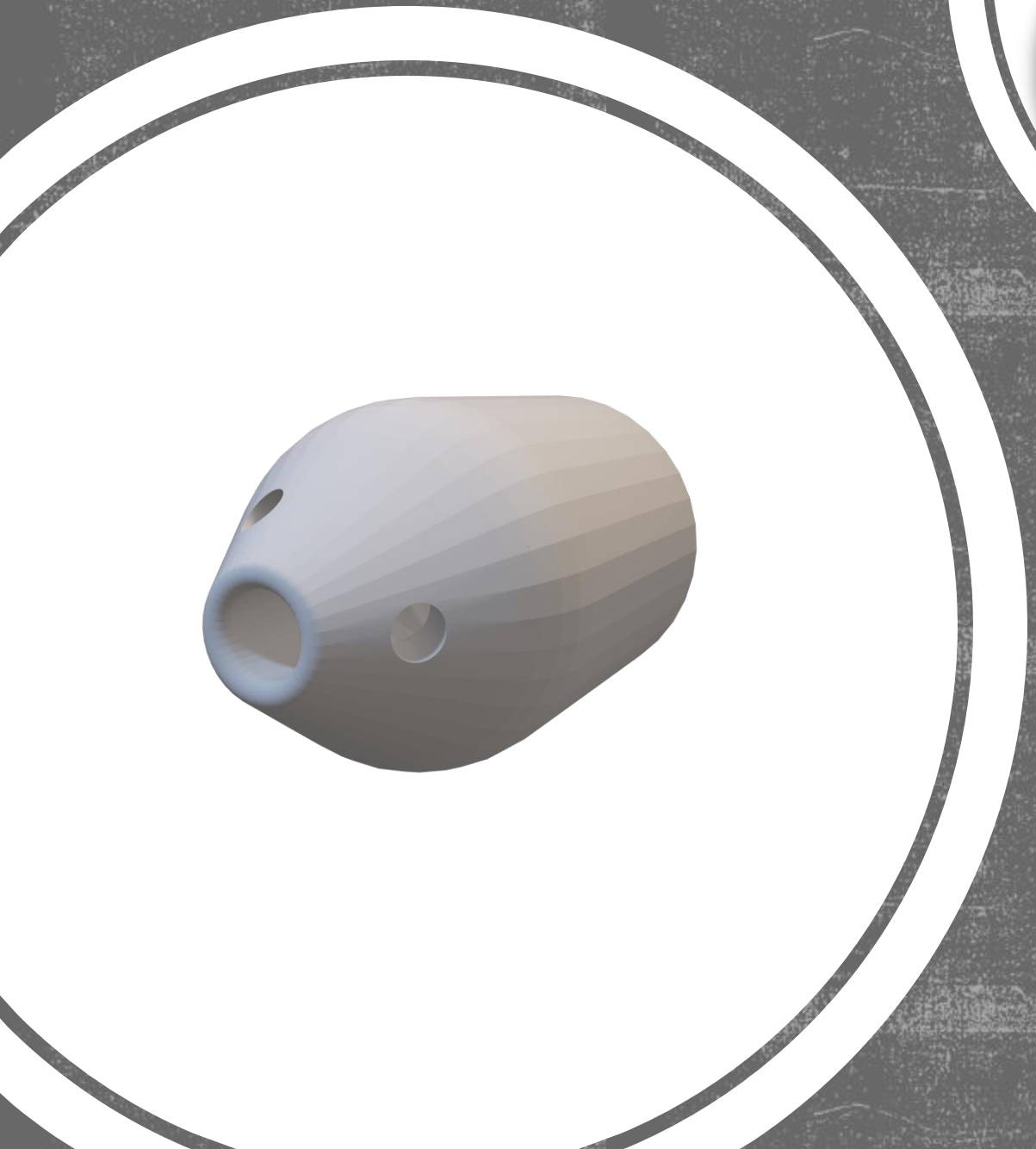
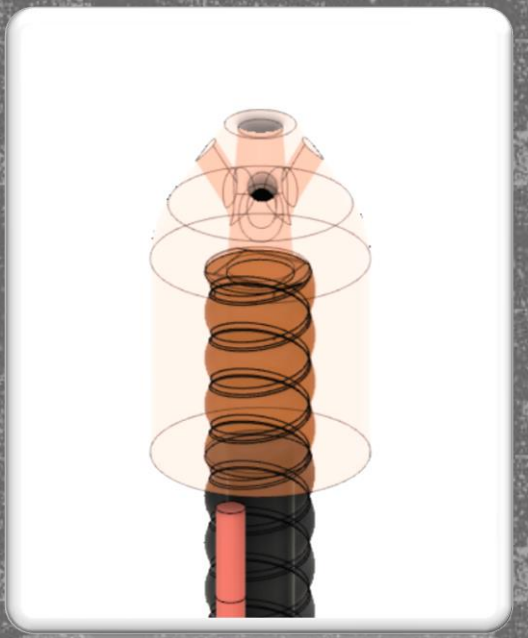
FEATURES

- Remove the guesswork - Know what temperature the PUR is at the top of the hole, and 2 and 4m back from that point.
- Eliminate the risk of commencing Mining Operations before the product has cooled, potentially putting heated material into the goaf.
- Eliminate production delays while unnecessarily waiting for Product to cool. Once the temperature is below an acceptable level of risk, production can be re-commenced.
- Simple to install - The sensor cable is taped in place behind the nose cone and at each joiner along the dowel string as it is fed into the hole.
- Simple device – no power supply required.
- Easy to read temperatures using existing underground multi-meters.





NOSE CONE

- Provides protection for the start of the sensor cable as well as a leading edge for the dowel string.
- Distributes product evenly, even if the lead hole is obstructed.
- Printed from PETG plastic which has good mechanical strength, flexibility and heat resistance.

SENSORS – PT1000 CLASS B +/-0.3°C

- The PT1000's give a resistance reading that can quickly be converted to temperature using the conversion table on the back of the MK1.2 control box.
- Sensors are extremely small, durable and accurate. Will read up to 600 degrees Celsius.
- Sensors are accurate to within 0.3°C and are tested using NATA calibrated equipment to ensure all sensor cables delivered have less than a maximum drift of +/- 1.0°C. NATA Traceable Test Certificates are issued with each FireWatch Sensor Kit.

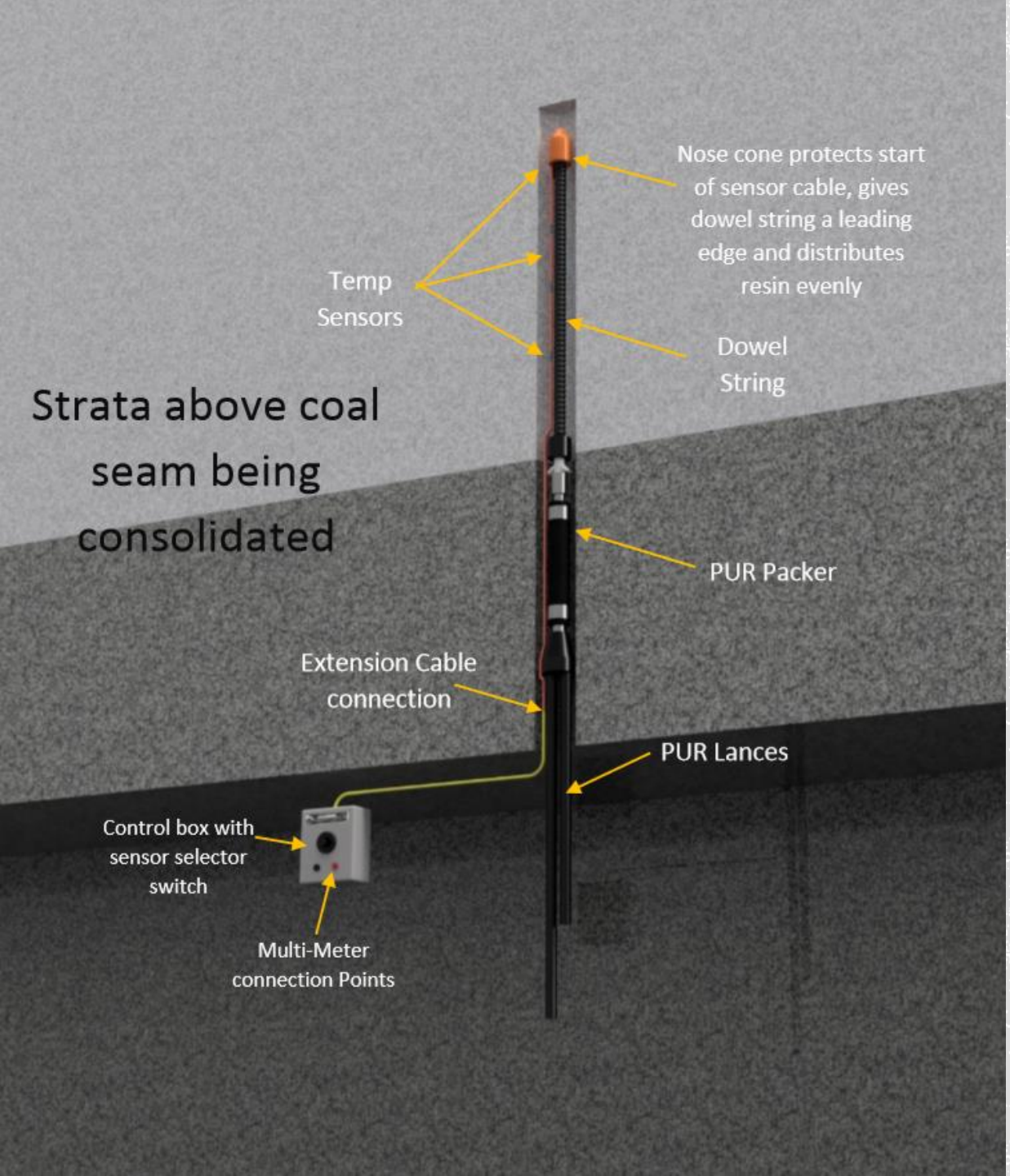
CABLES – SILICONE SHEATHED 200 °C RATED

- The sensor cables are 11m of 24 AWG (0.22mm2), 6 core Silicone Sheathed Ribbon for within the hole, joined (soldered and sealed) to 4m of 9 core round cable that remains out of the hole. Sensor cables will withstand up to 200 °C, have good mechanical strength and flexibility, as well as being flat to allow passing the packer. Sensor cables will also withstand the pressure of the packer expanding.

CONTROL BOX

- IP67 Rated Simple device (Not Powered).
- 9 Pin IP67 Socket for connecting to the sensor Cable.
- Rotary Selector switch to select which sensor to read.
- Test Point connection Sockets for connecting Underground I.S. Multimeter to take PT1000 readings and convert to Degrees Celsius.
- Resistance Conversion Chart on the back of the Control Box.

Temperature	Resistance	Temperature	Resistance
10	1039	160	1610.5
20	1077.9	170	1647.7
30	1116.7	180	1684.8
40	1155.4	190	1721.7
50	1194	200	1758.6
60	1232.4	210	1795.3
70	1270.8	220	1831.9
80	1309	230	1868.4
90	1347.1	240	1904.7
100	1385.1	250	1941
110	1422.9	260	1977.1
120	1460.7	270	2013.1
130	1498.3	280	2049
140	1535.8	290	2084.8



INSTALLATION

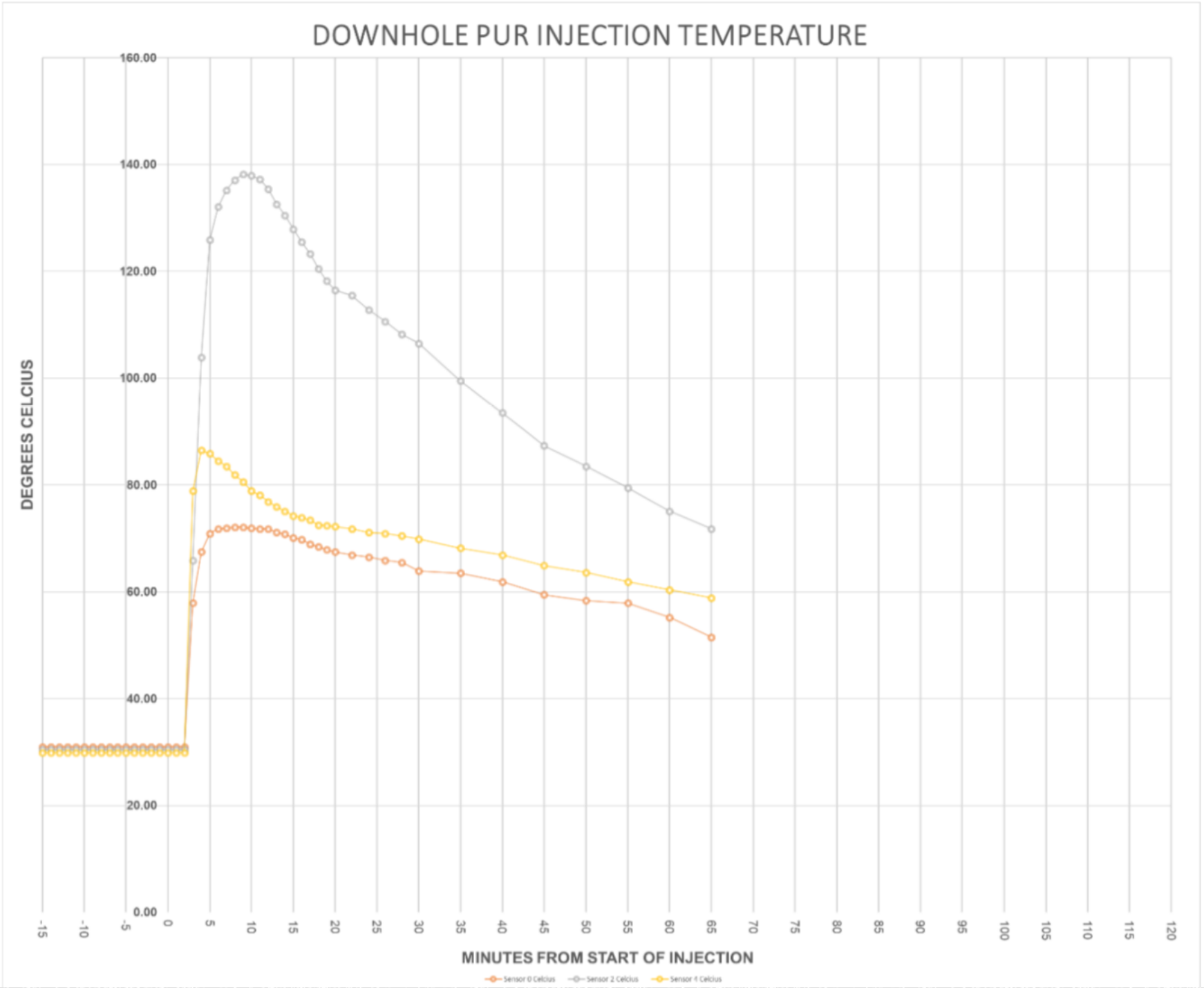
- Each kit contains 10 sensor cables, 1 extension cable, 10 joiners, 10 nose cones,1 control box, 1 pair of patch leads and 2 rolls of tape.
- Screw the nose cone onto the lead dowel and tape the start of the sensor cable (containing the 0M Sensor) to the dowel just behind the nose cone. Feed up the hole as normal, taping the cable to the dowel string at each dowel joiner. Depending on hole depth there will be 3-6m tail left on the cable outside the hole.
- Run the cable out a safe distance and secure to the rib away from potential danger or damage. Use 10m extension cable if required.
- To measure the temperature, plug the cable into the control box, insert multi meter test leads into control box test points and measure the resistance. Convert the resistance to temperature using the conversion table on the back of the control box – for PT1000 Model.
- With the rotary switch in the "0" position, the sensor at the nose cone is being read, then 2m & 4m, from that point when 2 & 4 selected by the rotary switch.

TRIAL RESULTS

- A successful trial was conducted by the Geotechnical Department at Broadmeadow mine in December 2021. See Extracts from their report below. Full report available on request.

Summary

Three sensors were installed along an injection hole at 7m, 5m and 3m depth. The middle sensor measured a peak temperature at **138.2 degrees 9 minutes after the start of injection.** The remaining two sensors recorded lower peak reaction temperatures between 85 and 70 degrees. The temperature began decreasing on all sensors prior to the end of pumping 14 minutes after the pump was turned on. After the initial fall, the sensors measured a steady rate of temperature reduction. Monitoring continued for 65 minutes after pumping initiated.



TRIAL RESULTS

FIREWATCH

TRIAL RESULTS

Results

The temperature increased rapidly between 3 and 5 minutes from the pump starting. Sensor 4 was the first to reach its peak temperature at 86.5 degrees at 4 minutes after pumping. This was followed by Sensor 0, which reached its peak temperature of 72.1 degrees 8 minutes after pumping commenced. The highest peak temperature of 132.8 degrees was measured on the middle sensor 2, 9 minutes after pumping. Monitoring continued for close to an hour after the peak in temperatures and recorded the rate of temperature decline in the hole.

Discussion

The variation of temperatures within the hole was unexpected, and may reflect the complexity of the mixing and reaction process within the hole with the central sensor showing a significantly higher peak reaction temperature. Overall the monitoring successfully monitored the reaction temperatures in the hole.

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