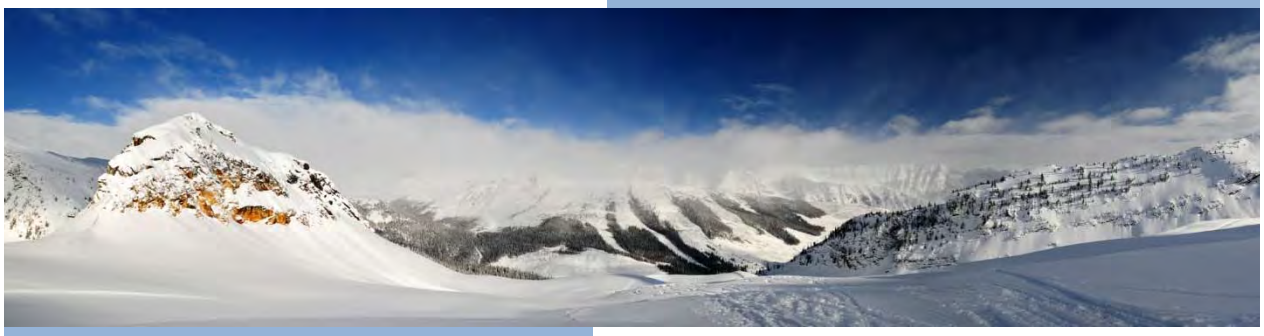
Whitewater
Hydrogeology Ltd.



# 2018 ADAPTIVE MANAGEMENT PLAN COMPLIANCE MONITORING REPORT

## KEPPEL QUARRY

Prepared for:

Harold Sutherland CONSTRUCTION

Whitewater Hydrogeology Ltd
Phone: 705.888.7064
Email: tecia@white-water.ca

Date: June 2019

Whitewater
Hydrogeology Ltd.

80 Chamberlain Cres
Collingwood, ON L9Y 0C8
Phone: 705-888-7064
Email: tecia@white-water.ca

June 26, 2019

Harold Sutherland Construction
323545 East Linton Road, R.R #2
Kemble, Ontario, Canada N0H 1S0

Attention: Mr. Dave Munro

**Re: Keppel Quarry: 2018 Adaptive Management Plan Compliance Monitoring Report**

Dear Sir:

Whitewater Hydrogeology Ltd. (Whitewater) is pleased to present the 2018 Adaptive Management Plan Compliance Monitoring Report. Based on the monitoring data, Whitewater concludes that extraction did not cause any negative impacts on groundwater resources in 2018.

Subject to approval from the Ministry of Natural Resources and Forestry, the Adaptive Management Plan shall be updated to include any recommended changes to the groundwater and surface water monitoring program, including trigger values. It is suggested that a pre-submission meeting with the Ministry of Natural Resources and Forestry be held to discuss the current issues with the program, including trigger values, prior to submitting the proposed revisions to the Water Resources Monitoring Program

If you have any questions, please do not hesitate to call anytime.

7/3/2019

X Tecia White

Tecia White, M.Sc., P.Geo (License #0701)
Senior Hydrogeologist/President
Signed by: Tecia

## Table of Contents

## List of Figures



## List of Tables



## List of Appendices

# 1.0 INTRODUCTION

Harold Sutherland Construction Ltd. (HSCL) owns and operates the Keppel Quarry located on Part Lot 28, Concession 10, in the Township of Georgian Bluffs, Grey County (Figure 1). The Keppel Quarry operates under two Aggregate Resources Act (ARA) licenses:

1. License Number 4881 (Original License: East Quarry)
2. License Number 609501 (New License: West Quarry)

Through the ARA licensing process and Ontario Municipal Board proceedings for the New West Quarry, there were extensive technical studies completed to establish baseline data and to assess the potential for adverse impacts to the natural environment because of the quarry operations. This information was used to develop an Adaptive Management Plan (AMP), which includes monitoring, mitigation, and contingency measures that will be used to prevent, minimize, or, if necessary, mitigate environmental impacts. The AMP is a condition of the East Quarry license and approved ARA Site Plans.

## 1.1 Keppel Quarry: Extraction/Operations Plan

A detailed description of the extraction plan is provided on page 3 of the Site Plans (Bradshaw, May 2012). The sequence of operations describes the extraction from the four areas of the quarry (Area 1A, Area 1B, Area 2, and Area 3). Area 1A was a small expansion of the East Quarry and has been fully extracted to a depth of approximately 234 masl. In 2018, operations (blasting) occurred in Area 1B of the West Quarry. Aggregate was extracted to an elevation of approximately 238 masl (lift one of two). Material is currently hauled to the East Quarry for processing.

## 1.2 Keppel Quarry: Water Management Plan

To maintain dry operating conditions, the East Quarry relies on a water management plan. An Ontario Water Resources Act Section 34 Permit to Take Water (PTTW, No.: 4028-8RCKTY) and Section 54 Environmental Compliance Approval (ECA, Number 3515-8M4PWM) have been issued to allow for the management of groundwater and surface water entering the East Quarry. The PTTW permits the pumping of 2,160,000 L/day at an instantaneous rate of 3,000 L/min for 12 hours a day.

On August 29, 2017, the Ministry of the Environment, Conservation, and Parks (MECP) issued ECA No.:1624-ANJQ4P, which permitted the modifications to the existing sewage works for the collection, transmission, treatment, and disposal of the groundwater and surface water collected in the West Quarry footprint. On June 14, 2018, the MECP issued PTTW No.: 5843-AZ4QLJ, which permits the pumping of the West Quarry at a maximum rate of 6,000 L/min to the sewage works regulated under ECA No.:1624-ANJQ4P.


**FIGURE 1: SITE LOCATION MAP**

## 2.0 GROUNDWATER AND SURFACE WATER MONITORING RESULTS

The monitoring program outlined in the AMP is intended to minimize potential impacts on water resources and monitor the effects of blasting to ensure that proposed mitigation measures are sufficient. There are three components to the monitoring program:

- Water Resources Monitoring (including Private Well Monitoring) (Main Report and Appendix A); and
- Blast Monitoring (Appendix B).

The Water Resources Monitoring Program is designed to track the performance of the West Quarry and the potential impacts on water resources. The Water Resources Monitoring Program tracks changes in each of the following environmental receptors:

- The bedrock groundwater flow system;
- The Shouldice Wetland; and
- The Glen Management Area.

The annual reporting for the West Quarry involves the data compilation, presentation, and evaluation of the performance monitoring data, including the trend analysis. The annual AMP monitoring reports are to be stand-alone documents that provide the reviewers/agencies with interpretations of the data collected and make recommendations to modify the monitoring programs and/or the ARA Site Plan.

The comprehensive monitoring program required under the AMP has resulted in an extensive database of water level and water quality data. Therefore, to ensure that the report provides a clear and concise interpretation of the 2018 monitoring activities relative to the historical and background data, the data is provided in graphical format only. Data in raw format (in the form of extensive tables) have not been included in the report but will be made available upon request.

The AMP for the Keppel Quarry currently relies on seasonal site-specific trigger water level elevations at selected sentry monitoring wells and surface water monitoring stations. These seasonal triggers are set for four quarterly periods (highlighted in Figure 2):

- Winter: December 21$^{st}$ to March 21$^{st}$
- Spring: March 21$^{st}$ to June 21$^{st}$
- Summer: June 21$^{st}$ to September 21$^{st}$
- Fall: Sept 21$^{st}$ to Dec 21$^{st}$

Ontario experiences significant seasonal climatic variability and season creep, which needs to be taken into consideration during the hydrogeological impact assessment for the Keppel Quarry. An approach to assessing how changes in climate (both temperature and precipitation) affect the hydrogeological response in groundwater and surface water regimes coupled with potential impacts from the aggregate operation is required. As a result, an assessment of the local climatic conditions has been included. Additional information on the trigger conditions is provided in Section 2.3.3.

## 2.1 Climatic Conditions

A key component of the groundwater and surface water assessment is understanding the climatic conditions over the monitoring period. Variability outside of the normal conditions will have a strong influence on the seasonal groundwater and surface water levels, and trends, which will impact the hydrogeological assessment. Therefore, to ensure that the database is complete, the local precipitation data that has been relied upon was collected from the Wiarton Airport Environment Canada (EC) Weather Station (located approximately 15.5 km from the site).

As shown in Figure 2, seasonal variability is evident when comparing the climatic normal to actual precipitation data collected between 2010 and 2018. This will have an influence on the seasonal variability in both groundwater levels and surface water flows.

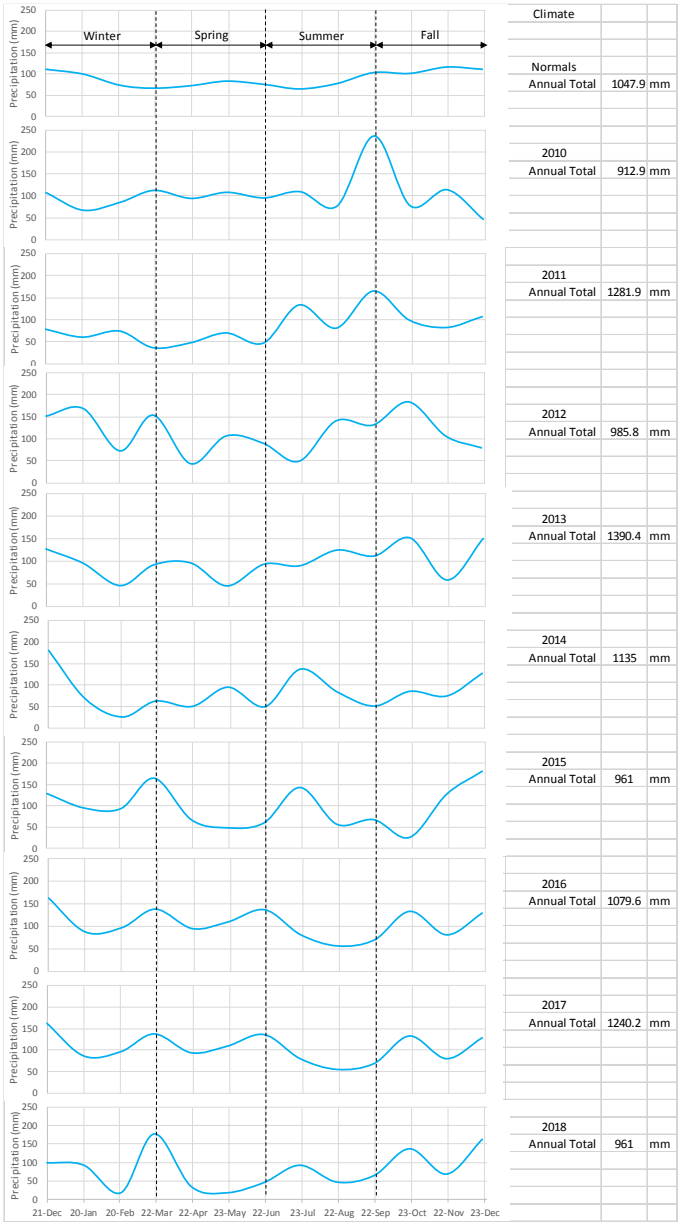



**FIGURE 2: SEASONAL PRECIPITATION TRENDS**

## 2.2 New Keppel Quarry Activities

### *2.2.1 Pumping Records*

Quarry dewatering in 2018 continued from the East Quarry under PTTW No.: 4028-8RCKTY. The pump that is used for dewatering the East Quarry is rated at 3,000 L/min and enables the quarry to be dewatered at the maximum permitted rate. In 2018, 276,710 m3 of water were pumped over 130 days (Figure 3). The maximum daily taking was reported to be 2,149,000 L. HSCL remains in compliance with PTTW No.: 4028-8RCKTY. No dewatering was conducted in the West Quarry under PTTW No.: 5843-AZ4QLJ in 2018.

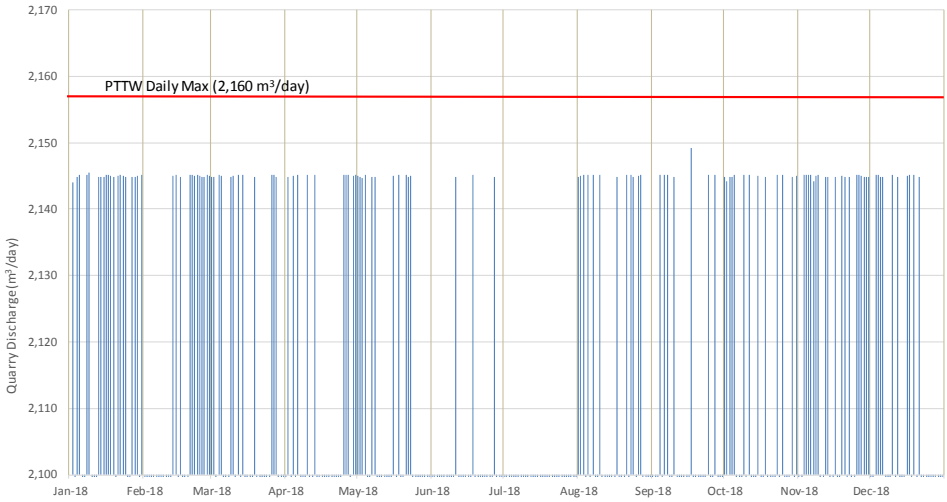



**FIGURE 3: 2018 DAILY PUMPING VOLUMES**

### *2.2.2 Water Bearing Fractures*

The AMP requires visual inspections along the active quarry face after each blast for water-bearing fractures. The intent is to ensure that the quarry does not interfere with potential epi-karst pathways that might otherwise deliver water to surface water features such as springs found in the Shouldice Wetland. Visual inspections were made by HSCL staff after each blast in 2018.

There were 13 blasts in total, which took place on:

- April 3 at 4:30 pm
- April 4 at 4:02 pm
- May 15 at 2:06 pm
- June 28 at 4:05 pm
- July 19 at 3:48 pm
- August 15 at 4:42 pm
- September 17 at 2:55 pm
- October 10 at 2:02 pm
- October 29 at 2:08 pm
- November 5 at 4:56 pm
- November 13 at 2:02 pm
- November 30 at 1:53 pm
- December 13 at 2:42 pm

No concerns related to water (i.e., high flows observed in new and/or existing fractures) were reported after any of the blasts.

## 2.3 Groundwater Monitoring

The bedrock groundwater system includes three distinct components:

1. Epi-karst.
2. Shallow bedrock.
3. Deeper bedrock.

The groundwater elevation monitoring program, which has been designed to characterize all three groundwater flow zones over time, has been divided into two areas: the groundwater monitoring locations within the predicted area of influence (Groundwater Monitoring Wells); and the groundwater monitoring of locations outside the predicted area of influence (Sentry Groundwater Monitoring Wells). The water monitoring network is shown in Figure 4.

### *2.3.1 Changes to the Groundwater Monitoring Program*

Several changes to the groundwater monitoring program have occurred over the years. Specifically, several wells have been destroyed because of the on-going extraction of aggregate. These wells include:

- OW11s and OW11d
- OW16s and OW16d
- OW34
- OW35
- OW36
- OW40

The AMP had proposed additional observation wells which have not yet been constructed. For example:

- OW61 - HSCL has committed to installing this observation well after logging and grading is completed in Area 1B (MTE, 2015).
- OW66, OW67, OW68 – These observation wells are in a part of the ANSI that is too sensitive for the installation of monitoring points without causing significant disturbance to the Natural Environment (Hearts-tongue Fern habitat6). MTE recommended that these locations be removed from the AMP (MTE, 2015).
- OW69 and OW70 - Given the presence of existing observation wells in proximity to their proposed locations, MTE recommended that their installation is deferred until such time that the AMP indicates the extra water level data is required (MTE, 2015).

### *2.3.2 Groundwater Elevations*

Monthly groundwater levels are collected at 46 monitoring well locations (Figure 4). Nested groundwater wells (multi-level) are found at 30 of the 46 monitoring locations. Water level data collected from multi-level groundwater wells allow for the assessment of the horizontal flow direction within the bedrock aquifer systems as well as the vertical movement of groundwater over time.

The epi-karst (designated by the letter ‘k’) is discontinuous across the site but where present is contained within the upper 5 m. Shallow wells (designated by the letter ‘s’) extend five to 10 metres below ground surface (mbgs), while deep wells (designated by the letter ‘d’) are between 10 and 22 mbgs. Deep wells are screened at an elevation close to the current quarry floor elevation (234 masl), while shallow screens are placed about halfway between the natural grade and the finished quarry floor elevation.

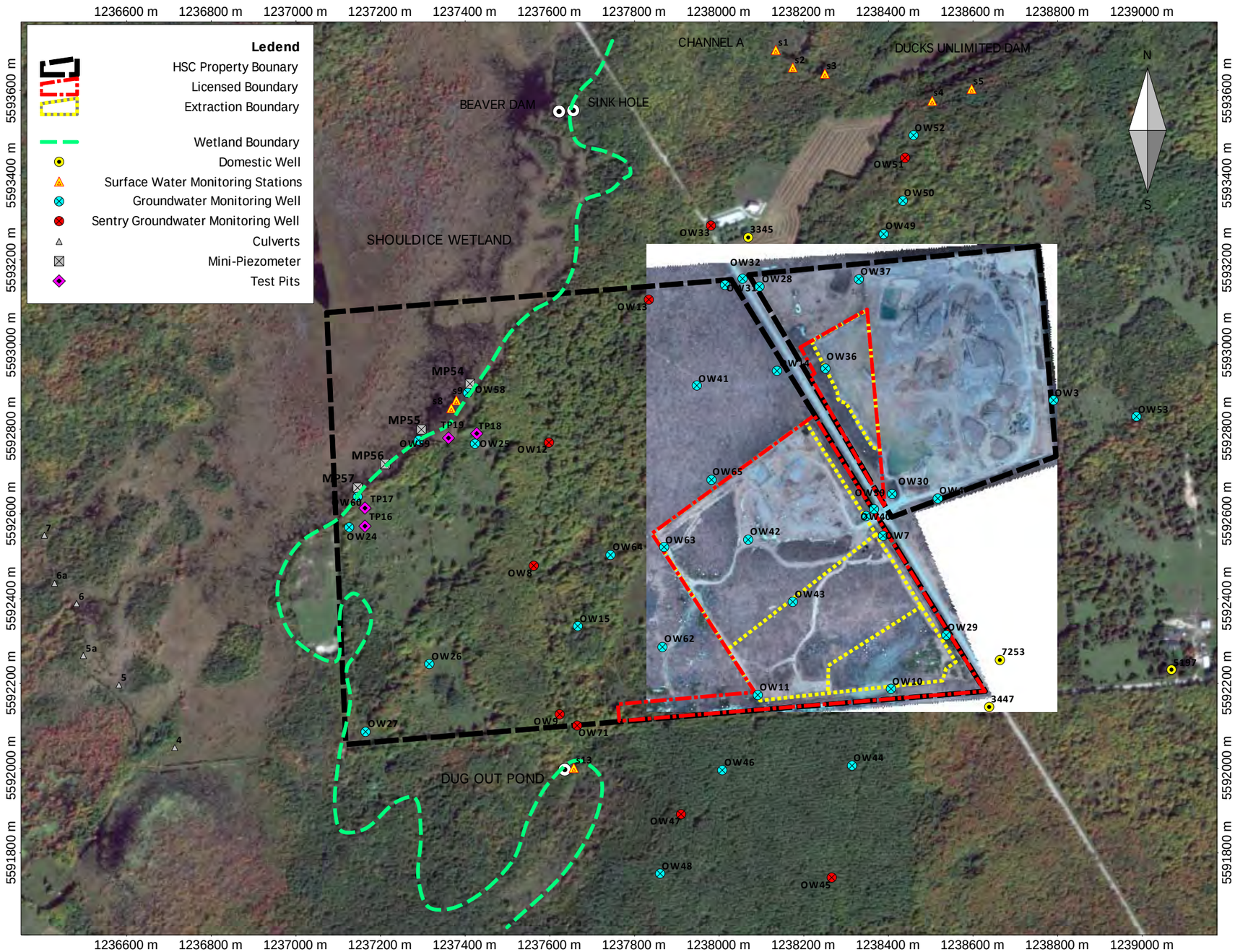



**FIGURE 4: MONITORING LOCATION MAP**

Monthly water levels are measured at the following groundwater monitoring wells:

- OW3d
- OW4d[1]
- OW7s and OW7d[1]
- OW10s and OW10d
- OW14s and OW14d
- OW15s and OW15d
- OW24d[2]
- OW25s[2] and OW25d[2]
- OW26d[2]
- OW27s[2] and OW27d[2]
- OW28s and OW28d
- OW29s and OW29d
- OW30s and OW30d[1]
- OW31s and OW31d
- OW32s and OW32d
- OW36d
- OW37d[1]
- OW38d
- OW39d[1]
- OW41s and OW41d
- OW42s and OW42d
- OW43s and OW43d
- OW44s and OW44d
- OW46k, OW46s, and OW46d
- OW48d
- OW49d[3]
- OW50d[3]
- OW52d[3]
- OW53d[1]
- OW58s[2] and OW58d[2]
- OW59s[2] and OW59d[2]
- OW60s[2] and OW60d[2]
- OW62k, OW62s, and OW62d
- OW63s and OW63d
- OW64s and OW64d
- OW65s and OW65d
- OW72s (OW11 replacement)

**Note:**

1. Monitoring wells that have reported a drawdown / decreasing water level trend since 2009.
2. Monitoring wells that were installed to monitor groundwater levels under the Shouldice Wetland.
3. Monitoring wells that were installed to monitor groundwater levels under the Glen Management Area.

Groundwater levels have been monitored in the shallow and deep bedrock since 2003. Historical baseline groundwater levels are presented in Appendix A-1a. Trend analysis has been completed on groundwater elevation data. While linear trend (least squares regression) analysis can be a useful tool, it can also provide misleading results and must be used with caution. For example, water levels were not measured routinely in the winter and spring between 2005 and 2008, where water levels tend to be the highest. Data collected prior to 2009 would be biased toward seasonally low water levels during the summer and fall (resulting in increasing water levels with time) and would not reflect average climate conditions or potential impacts from quarry dewatering.

It wasn't until 2009 that routine monthly water level monitoring was completed and captured the true seasonal fluctuations. Water level hydrographs (with trend lines) have been generated for the period between 2009 and 2018 (Appendix A-1a). The hydrographs have a constant vertical scale which spans between 234 masl (base of the quarry floor) and 250 masl, which allows for a comparison between the water level elevations, seasonal fluctuations, and trends.

Water levels across the site remain within the historical seasonal ranges, except for the observed drawdown trends measured at monitoring wells located near the recently extracted areas in the East Quarry (final phase under the original licensed area and Area 1A). These wells include:

- OW4d
- OW7d
- OW30d
- OW37d
- OW39d
- OW53d

The water level decline at these locations (except for OW4d) is minor with less than a 1 m over the 9-year evaluation period. A 2 m drop is observed at OW4d, which is located immediately adjacent to the East Quarry face. It is anticipated that the water levels within the area of influence of the East Quarry are approaching a new equilibrium as extraction in this area is complete. On-going monitoring will identify the influence of the extraction of the West Quarry has on the existing area of influence.

Bedrock groundwater levels between the Keppel Quarry and the Glen Management Area are measured at OW49, OW50, OW51, and OW52. Monitoring results indicate that water levels remain within background conditions.

Water level monitoring that is completed to assess the potential impacts to the Shouldice Wetland is completed for the overburden sediments (test pits and mini-piezometers) as well as within the groundwater beneath the wetland. In 2018, water levels in the overburden remained within the historical ranges with the exception of MP 55 where water levels dropped by approximately 0.4 m in 2018. The groundwater elevations within the deep bedrock aquifer show a slight downward trend at OW26 and OW27. A more significant decline in water levels are observed at OW24 where water levels dropped approximately 1 m in 2018. Hydrographs for the water levels in the vicinity of the are presented in Appendix A-1b.

In order to determine if this drawdown trend is a result of the 2018 quarry operations, a more detailed assessment was completed. This assessment incorporated the findings of the vertical gradient and area of influenced evaluations and are presented in Section 2.3.5 and 2.3.6.

### *2.3.3 Sentry Groundwater Monitoring Wells*

Nine (9) of the 46 monitoring locations have been equipped with automatic dataloggers to supplement the manual groundwater monitoring. These wells are located outside the predicted zone of influence from the quarry operations and are therefore referred to as sentry well locations. As a contingency measure, the AMP identifies trigger values for the sentry wells that, if exceeded, will trigger action by HSCL so that mitigation can occur before any negative effects to the natural environment can occur.

For each of the sentry wells, there are three standard categories of trigger values (green, yellow, and red). Each trigger value is accompanied by a set of actions that are implemented if these values are exceeded. Data loggers were not installed until the spring of 2017. The assessment has been completed on based on spot measurements, and extrapolation between these data points on the hydrograph is interpretative (as a result of the erroneous barometric data in 2018).

Green trigger values were set at 15 cm above observed seasonal lows (spring, summer, autumn, and winter) reported from the monthly water level data collected between 2009 and 2014 for each of the Sentry Wells. Exceedance of a green trigger value indicates no significant negative impacts have been observed and water levels are still within the normal historical range. This will trigger a Green Action as an early response action (i.e., increase monitoring frequency and investigate). Yellow trigger values are equal to observed seasonal lows for each location. Exceedance of a yellow trigger value indicates water levels are slightly below seasonal lows, but no significant negative impacts have been observed. This is used to trigger a Yellow Action or a precautionary mitigation measure. Red trigger values were set at 15 cm below observed seasonal lows. Exceedance of a red trigger value is used to trigger Red Actions or immediate responses if the yellow actions fail to correct or reverse the impact.

Monthly and continuous water levels (collected via datalogger) are measured at the following sentry groundwater monitoring well locations:

- OW8s and OW8d
- OW9s and OW9d
- OW12s and OW12d
- OW13s and OW13d
- OW33s and OW33d
- OW45d
- OW47s and OW47d
- OW51d
- OW71k, OW71s, and OW71d[1]

**Note:**

1. Monitoring wells were installed to monitor groundwater levels under the Shouldice Wetland.

Water level hydrographs (in comparison to the associated trigger values) have been generated for the period between 2015 and 2019 (Appendix A-1c). A review of the data indicates that generally water levels remain within historical levels. In fact, water level trends are either constant or increasing, which is not unexpected

given the monitoring period (trend line ending at a time of relatively high water levels relative to those measured at the start of the monitoring period).

Although the water levels at the Sentry Wells show no drawdown because of the quarry operations, a comparison to the seasonal trigger levels has been completed with the understanding that there is climatic variability (Appendix A-1c). A summary of this assessment is provided in Table 1. Overall, 20 yellow and 28 red triggers were exceeded since 2015. Green triggers (water levels above season low) were not included in the summaries.

**TABLE 1: SUMMARY OF TRIGGER EXCEEDANCES**

| Trigger Type | Winter | Spring | Summer | Fall | Total |
|---|---|---|---|---|---|
| Yellow | 1 | 6 | 3 | 10 | 20 |
| Red | 6 | 0 | 4 | 18 | 28 |

Seasonal trigger levels were set at 15 cm above, 0 cm, and 15 cm below low water levels. Although there were no drawdown trends attributed to the operation of the Keppel Quarry, triggers were frequently exceeded. It is apparent from the assessment of the water level data collected since the AMP and Site Plans took effect that the application of the seasonal trigger response system as a means in providing an early warning system for potential groundwater impacts from quarry operations is ineffective. A detailed discussion of the application of triggers is provided in Section 3.0.

### *2.3.4 Overburden Water Levels and Groundwater Recharge*

Four test pits with standpipes have been installed in the overburden within 100 m of the Shouldice Wetland boundary. These test pits (TP16, TP17, TP18, and TP19) are monitored to assess water level conditions in the overburden aquifer, which are believed to be a potential source of groundwater recharge for the wetland springs. Water levels in the overburden remain within historical ranges (Appendix A-1d).

### *2.3.5 Groundwater Flow*

*Vertical Hydraulic Gradients*

The vertical movement of groundwater in the overburden sediments and the bedrock aquifer can be determined by measuring the hydraulic head difference between the units by installing a mini-piezometer (MP). A mini-piezometer is a portable drive probe that provides a comparison between the stage of a surface water body and the hydraulic head beneath the surface water body at the depth to which the screen at the end of the probe is driven. Because the MP is driven manually into the sediments, obtaining a good seal between the MP and the sediments is difficult, and data should be interpreted with caution.

At the Keppel Quarry, groundwater levels in the overburden are monitored at four mini-piezometers (MP) which are constructed in the ponded water of the Shouldice Wetland (MP54, MP55, MP56, MP57) and are monitored monthly during unfrozen conditions (Appendix A1-e). These overburden water levels were used to estimate the vertical direction of groundwater flow beneath the wetland, when wet. In 2018, the wetland was dry the majority of the time. As a result, the vertical hydraulic gradients could not be calculated during these periods. The 2018 hydraulic gradients are like the historical averages.

**TABLE 2: VERTICAL HYDRAULIC GRADIENTS BENEATH THE SHOULDICE WETLAND**

| Date | Overburden | | | | Bedrock | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | MP54 | MP55 | MP56 | MP57 | OW58 | OW59 | OW60 | OW71 S&K | OW71 S&D |
| 27-Apr | -0.01 | -0.07 | 0 | -0.01 | 0.03 | 0.02 | 0.00 | 0.05 | 0.02 |
| 30-May | Dry | Dry | 0.05 | Dry | 0.03 | 0.05 | -0.01 | 0.05 | 0.00 |
| 30-Jun | Dry | Dry | Dry | Dry | 0.04 | 0.05 | 0.01 | 0.05 | 0.00 |
| 25-Jul | Dry | Dry | Dry | Dry | 0.04 | 0.06 | 0.01 | 0.01 | 0.01 |
| 30-Aug | Dry | Dry | Dry | Dry | 0.04 | 0.05 | 0.01 | 0.05 | 0.00 |
| 7-Sep | Dry | Dry | Dry | Dry | 0.03 | 0.05 | 0.01 | 0.04 | 0.00 |
| 26-Oct | Dry | Dry | 0.16 | Dry | 0.03 | 0.02 | 0.00 | 0.07 | 0.00 |
| 16-Nov | 0.04 | Dry | -0.06 | -0.03 | 0.03 | 0.04 | 0.00 | 0.03 | 0.01 |
| *Average* | NA | NA | NA | NA | 0.03 | 0.04 | 0.00 | 0.04 | 0.01 |

Groundwater vertical hydraulic gradients were also calculated using observation wells installed in the bedrock underlying the Shouldice Wetland, including observation well nests OW58, OW59, OW60, and OW71. The calculated values for OW58, OW59, and OW60 showed neutral to slightly upward gradients on average (0.01 to 0.03 m/m) in 2018. The average vertical gradient for the karst bedrock to the shallow bedrock at OW71 was slightly upward (0.04 m/m), while the average vertical gradient for the shallow bedrock to deep bedrock at OW71 was neutral (0 to 0.01 m/m). These gradients were consistent with historical data at these locations. This information, coupled with the gradients calculated from the mini-piezometers indicates that the groundwater vertical hydraulic gradients in the Shouldice Wetland or the bedrock underneath the wetland, were not affected by extraction in 2018.

*Horizontal Groundwater Flow.*

The shallow and deep groundwater flow maps have been prepared based water levels collected on July 25, 2018, to assess the dry conditions. The potentiometric surface for the shallow bedrock aquifer is presented in Figure 5. The shallow groundwater flows from a high of approximately 246 masl in the east to a low of approximately 240 masl in the west. The extraction of Area 1A and 1B appears to have had no influence on the shallow groundwater flow pattern. This is supported by the lack of drawdown trends observed in the water level data from the shallow groundwater regime (Section 2.3.2).

The potentiometric surface for the deep bedrock aquifer is presented in Figure 6. The deep groundwater flows from a high of approximately 245 masl in the central portion of the new quarry. Groundwater flows radially from this groundwater mound towards the Shouldice Wetland in the west and toward the East Quarry. The extraction of Area 1B appears to have had no influence on the deep groundwater flow pattern. The extraction in the East Quarry has resulted in an area of influence that extends between 300-500 m from the quarry face.

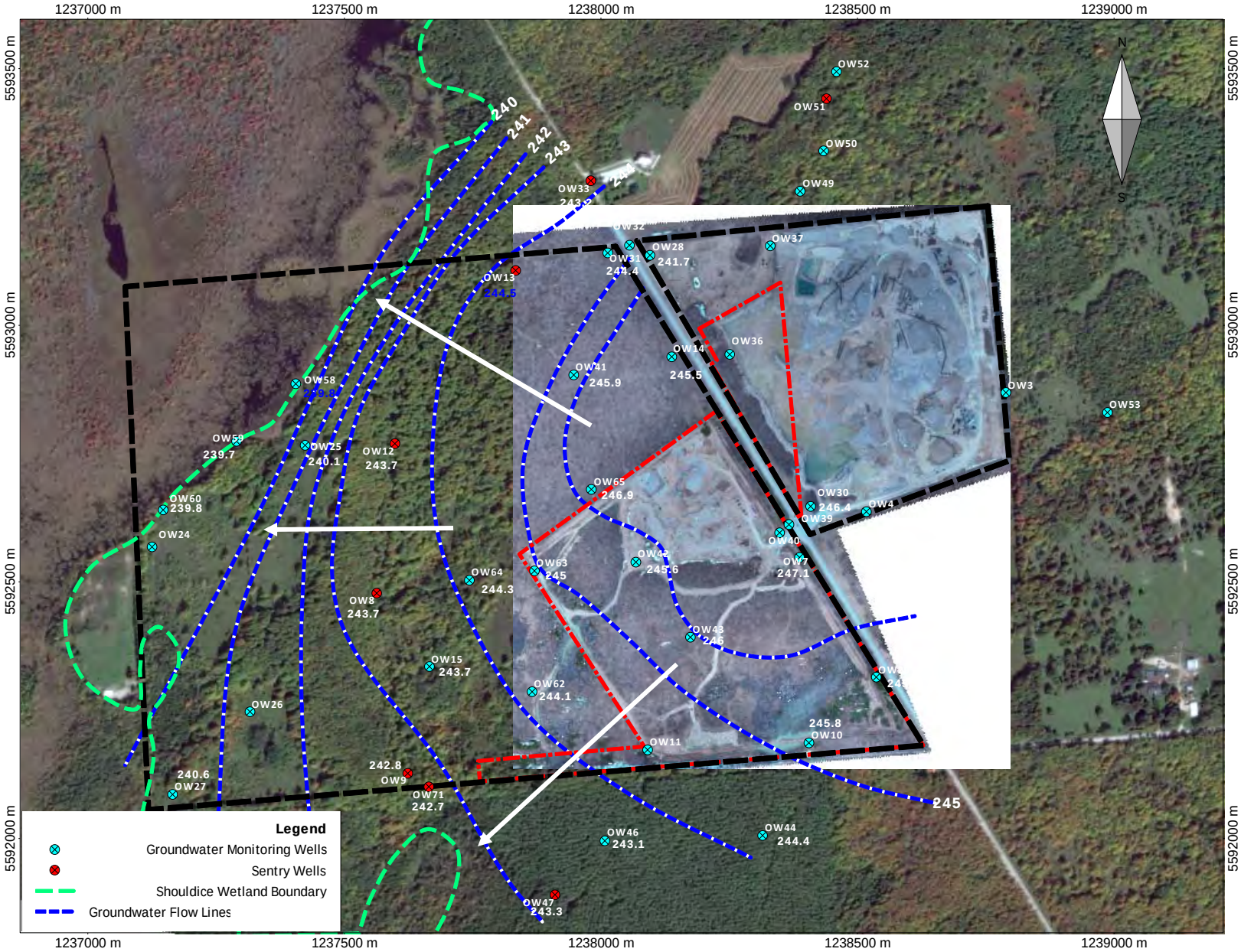



**FIGURE 5: GROUNDWATER FLOW PATTERN – SHALLOW AQUIFER**

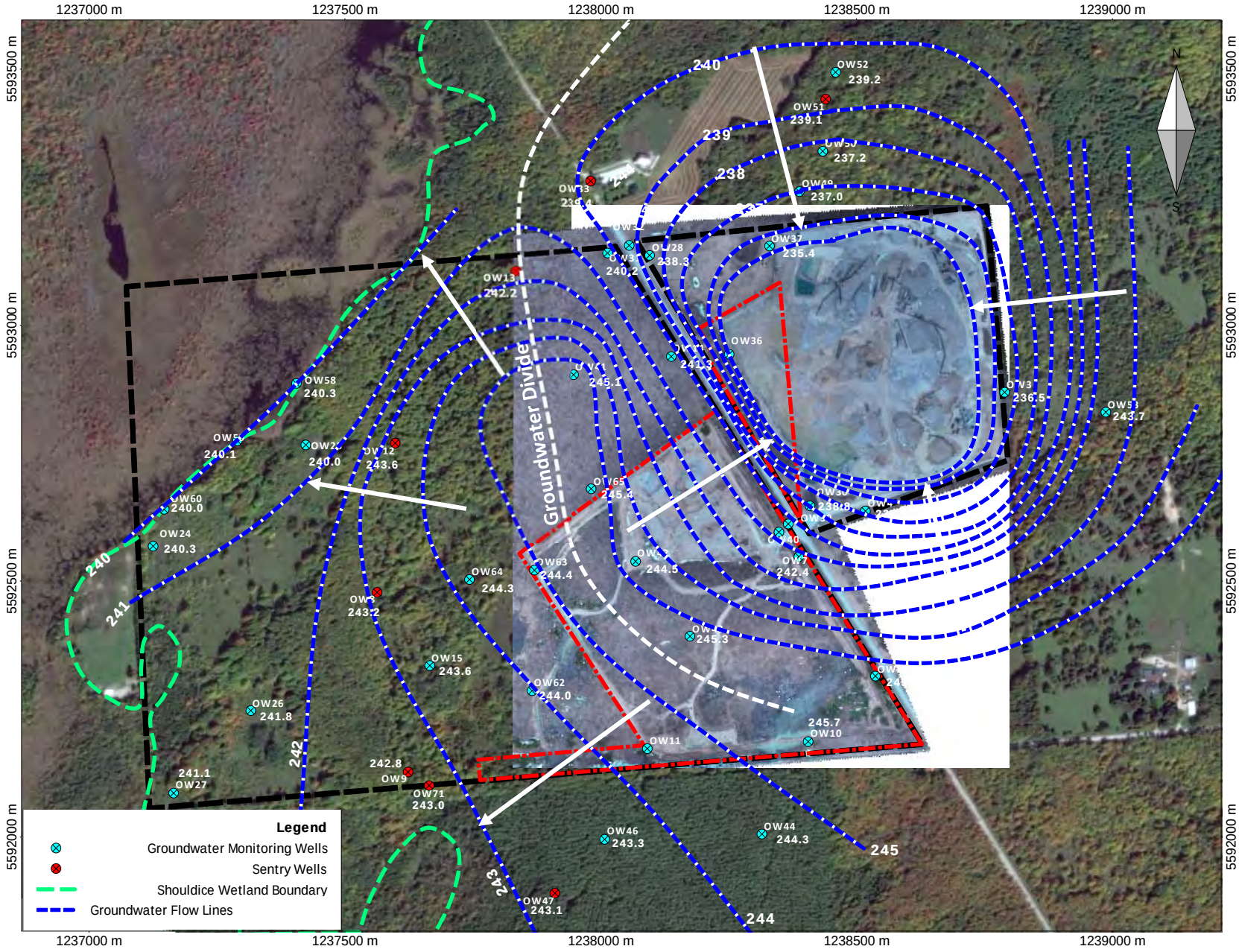



**FIGURE 6: GROUNDWATER FLOW PATTERN - DEEP AQUIFER**

### *2.3.6 Groundwater Area of Influence Assessment*

The zone of influence within the bedrock aquifer has been defined by mapping the water table contours based on the seasonal low water levels (Section 2.3.5). To supplement this plan view delineation of the zone of influence and to track the changes within this area over time, distance-water level plots have been generated (Appendix A2). These distance-water elevation plots are to be generated along 9 monitoring lines outlined in the AMP and subsequently modified by MTE (2016).

Figure A2-1 shows the transect lines used to generate the distance – water level plots. Transect Line 1 shows an inflection point at OW50 for most of the year. Between September and December, this inflection point moves to OW52. Therefore, the area of influence that has resulted from the extraction of aggregate at the Keppel Quarry extends between 200 and 350 m in a northerly direction.

Transect Lines 2, 3, and 4 all run from the east towards the Shouldice Wetland in the west. Transect Line 2 is within the area of influence, and no inflection point is noted. Transect Line 3 and 4 extend to the Shouldice Wetland and shows inflection points 300 m at OW41 (Line 3) and 380 m (at OW42). Transect Lines 5 and 6 runs from the quarry face south. Inflection points are noted at distances of 380 m (OW43) and 495 m (at OW10).

## 2.4 Domestic Water Well Monitoring

A Private Domestic Water Well Monitoring Program has been developed to monitor water supplies of residents within one kilometer of the Keppel Quarry (Figure 4). Private wells have been separated into two categories:

1. Category A wells – includes those wells within or just outside the predicted zone of influence for the deep bedrock aquifer when the Keppel Quarry is at its full extent. These wells include:
    - well no. 3345 (the Ritchie well);
    - well no. 3447 (owned by HSCL);
    - well no. 5197 (the Ruthven well); and
    - well no. 7253 (the Cramp well)
2. Category B wells - includes those wells within 1 km of the Keppel Quarry license boundaries but outside the predicted zone of influence. Category B Private Wells include:
    - well no. PW1 (the Jenks well);
    - well no. PW2 (the Thompson well); and
    - well no. PW3 (the Porter well).

### *2.4.1 Category "A" Domestic Water Wells*

*1. Private well no. 3345 (the Ritchie well)*

As stated in the 2015 and 2016 AMP Compliance Assessment Report (MTE, 2016 and 2017), the resident declined to be a part of the monitoring program. This remains unchanged, and therefore no water level data was collected at this location in 2018.

*2. Private well no. 3447 (owned by HSCL)*

Access to the well is limited as it is in a locked shed occupied by the tenant's scrap material and garbage. HSCL has requested the shed be cleaned up for safer access. Water levels cannot be collected until access to the well has been re-established.

*3. Private well no. 5197 (the Ruthven well)*

Water levels in Private Well No. 5197 were measured using a data logger. Water levels were like historical values fluctuating around 248 masl on average. At least 4.75 m of water column remained in this well while extraction occurred in 2018, which is like previous years. This information indicates that the water supply has not been affected by extraction.

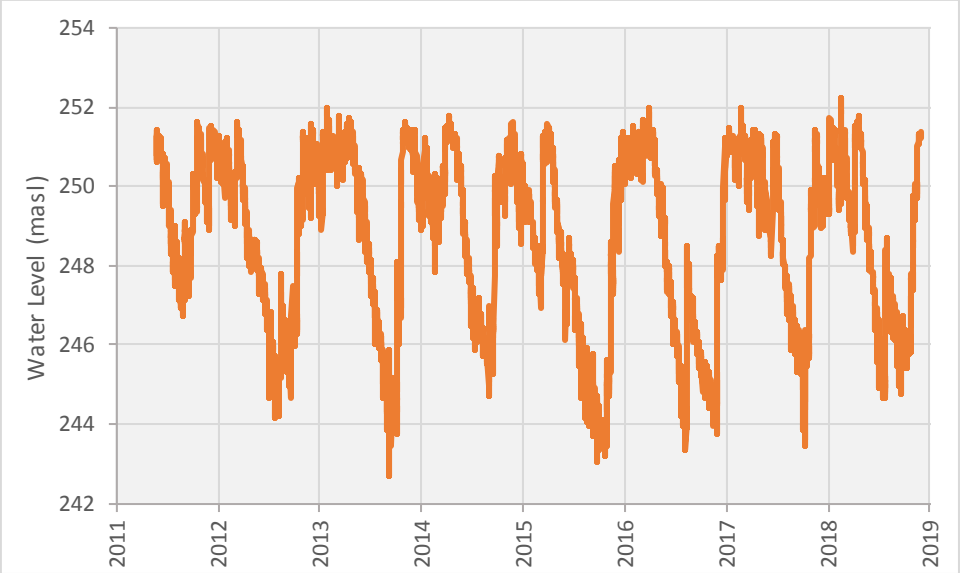



**FIGURE 7: WATER LEVEL HYDROGRAPH - WELL NO.: 5197**

*4. Private well no. 7253 (the Cramp well)*

Water levels in Private Well No. 7253 were measured using a data logger. Water levels measured in 2018 were like historical values fluctuating around 248 masl (Figure 8). At least 14 m of water column remained in this well while extraction occurred in 2018. This information indicates that the water has not been affected by extraction.

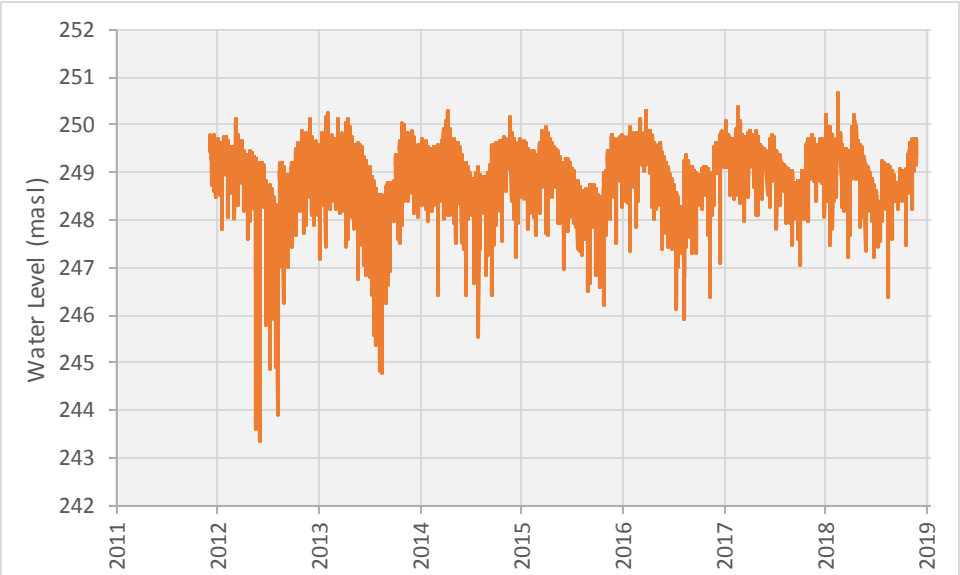



**FIGURE 8: WATER LEVEL HYDROGRAPH – WELL NO.: 7253**

### *2.4.2 Category "B" Domestic Water Wells*

Water levels are to be measured manually from each of the participating Category B private wells on a seasonal basis (3 times per year). PW1, PW2, and PW3 fluctuated seasonally in 2018 with the highest water levels being measured in the spring, the lowest water level in the summer and then a small amount of recharge in the fall. Water levels measured at the Category B wells in 2018 were comparable to previous years.

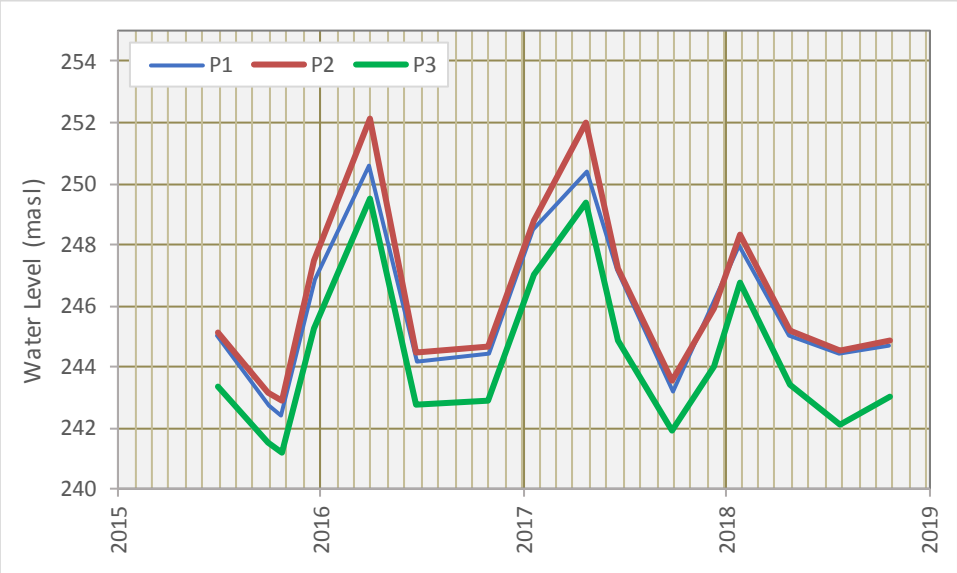



**FIGURE 9: CATEGORY B - DOMESTIC WELL WATER LEVELS**

### *2.4.3 Domestic Water Well Interference Complaints*

There were no well interference complaints received by HSCL from any of the private wells in 2018.

## 2.5 Surface Water Monitoring

### *2.5.1 Shouldice Wetland*

The Shouldice Wetland is a Provincially Significant Wetland (PSW). The wetland has been identified as an environmental receptor due to its ecological importance and its unique hydraulic and hydrogeologic characteristics (MTE, 2009). Key indicators used to monitor the Shouldice Wetland include:

- Bedrock Groundwater levels (refer to Section 2.3.2);
- Groundwater recharge (refer to Section 2.3.4);
- Groundwater vertical hydraulic gradients using mini-piezometers (refer to Section 2.3.4);
- Springs (s8, s9, and s13) and the dugout pond;
- Shouldice Wetland culverts; and
- Beaver dam and sinkhole.

As discussed in Sections 2.3, the groundwater conditions indicate that the vertical hydraulic gradients between the Shouldice Wetland and both the overburden and bedrock aquifers were not affected by extraction in 2018. To supplement this information and provide multi lines of evidence to effectively assess the impacts of aggregate extraction from the Keppel Quarry on the wetland, the following surface water program was conducted in 2018 to comply with the requirements of the AMP:

A. Continuous and monthly surface water levels, conductivity and temperature measurements (datalogger) at Spring s8, s13 and dugout pond (SG1 and outflow) to characterize the hydroperiod, trends, and to determine the water source (groundwater or surface water);
B. Monthly surface water levels and flows at Spring s9;
C. Flow conditions at the Shouldice Wetland culverts to confirm the length of hydroperiod and trends; and
D. Monthly surface water flows measurements at the beaver dam sinkhole to characterize the hydroperiod and trends. Continuous water level, temperature, and conductivity monitoring to determine the water source (groundwater or surface water).

*A: Surface Water Stations s8 and s13 and the Dugout Pond*

Spring s8 is located along the edge of the Shouldice Wetland approximately 850m west of Area 1a. Spring s13 is located approximately one kilometer southwest of Area 1A and adjacent to the dugout pond (SG1). The spring locations are identified in Figure 4. The monthly monitoring data are provided in Table 3. Continuous water level and temperature data are presented in Figure 10.

**TABLE 3: SURFACE WATER FIELD MEASUREMENTS**

| Date | Surface Water Springs | | | | | | Dug Pond | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | s8 | | | s13 | | | SG1 | | Pond Outflow | | |
| | Conductivity | Temperature | Flow | Conductivity | Temperature | Flow | Conductivity | Temperature | Conductivity | Temperature | Flow |
| | µS | °C | L/s | µS | °C | L/s | µS | °C | µS | °C | L/s |
| 26-Jan-18 | NA | NA | NA | 26 | 0.17 | F | NA | NA | NA | NA | NA |
| 27-Jan-18 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 26-Mar-18 | 600 | 10.2 | F | NF | NF | NF | NA | NA | NF | NF | NF |
| 26-Apr-18 | 528 | 7.1 | F | NF | NF | NF | NA | NA | NF | NF | NF |
| 30-May-18 | 574 | 8.2 | NF | 607 | 8.1 | NF | 662 | 12.6 | NF | NF | NF |
| 29-Jun-18 | D | D | D | D | D | D | D | D | D | D | D |
| 28-Jul-18 | D | D | D | D | D | D | D | D | D | D | D |
| 31-Aug-18 | D | D | D | 998 | 22.2 | NF | 1128 | 23.1 | NF | NF | NF |
| 6-Sep-18 | 602 | 15.9 | NF | NF | NF | NF | D | D | D | D | D |
| 26-Oct-18 | D | D | D | 1098 | 8 | NF | 1106 | 8.5 | NF | NF | NF |
| 16-Sep-18 | 498 | 8.6 | NF | 698 | 7.6 | NF | 1027 | 7.7 | NF | NF | NF |
| 16-Nov-18 | 498 | 8.6 | NF | 698 | 7.6 | NF | 1027 | 7.7 | NF | NF | NF |
| 4-Dec-18 | 447 | 4.7 | NF | 778 | 4.5 | NF | 826 | 5.1 | NF | NF | NF |
| Notes: | F = Flowing | | | | | | | | | | |
| | NF = No Apparent Flow | | | | | | | | | | |
| | D = Dry | | | | | | | | | | |
| | NA = Frozen | | | | | | | | | | |

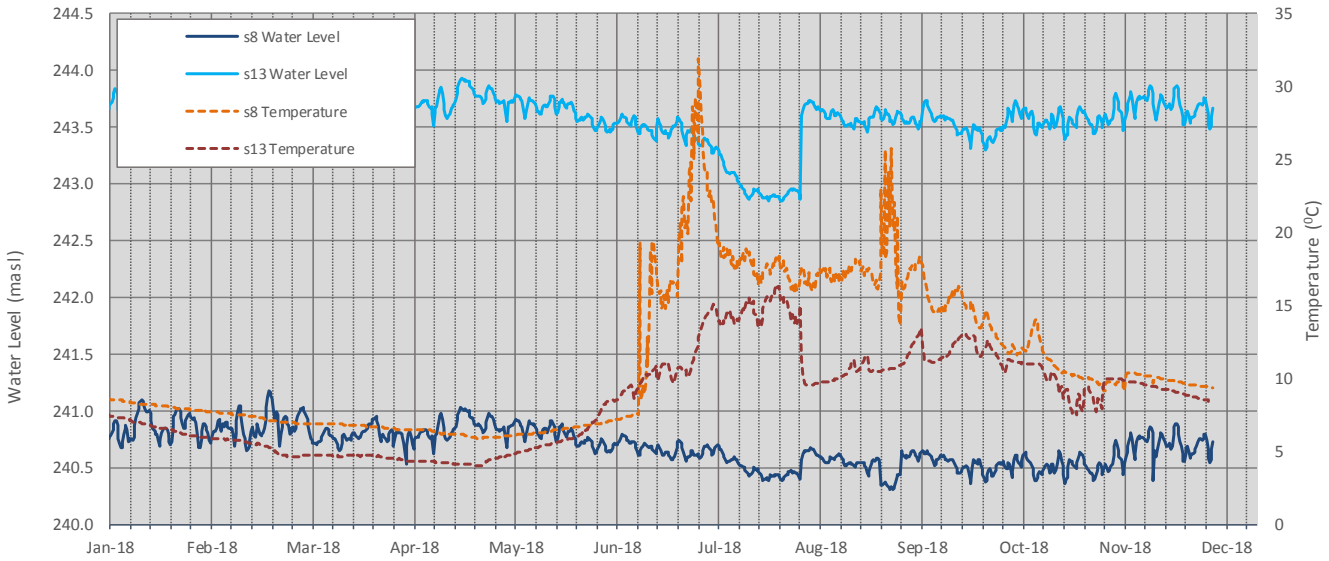



**FIGURE 10: S8 AND S13 WATER LEVELS AND TEMPERATURE**

Flows collected in 2018 suggest that the hydroperiod for s8 and s13 was year-round, except the monitoring stations reported dry conditions in June and July, and again in September and October. Water levels measured in 2018 at s8 were comparable to historical values fluctuating around 240.5 masl. Water levels at spring s13 fluctuated between 242.85 and 243.59 masl (average of 244 masl) 241.7 - 242 masl, which was also consistent with historical values. Water levels at these locations were not affected by extraction in 2018.

Historical conductivity values ranged from 447 µS to 602 µS at spring s8, 26 µS to 1,098 µS at spring s13 and 662 µS to 1228 µS at the dugout pond. The 2018 values are comparable to historical data collected at these locations.

*B: Surface Water Station s9*

Spring s9 is either dry, ponded, or frozen, and no flow was observed in 2018.

*C: Shouldice Wetland culverts*

There are several culverts (Culverts 4 through 7) that allow water to cross under a snowmobile trail constructed at the end of Gun Club Road, which through the Shouldice Wetland (Figure 2). Monthly monitoring of surface water flows (observed as 'flowing,' 'no apparent flow,' 'dry' 'frozen or blocked), conductivity; and water temperature is collected to assist in evaluating the hydro-period of the Shouldice Wetland. The monitoring results from 2018 are summarized in Table 4. The monitoring locations were frozen in December, January, February, and March 2018.

Baseline data suggests that the hydroperiod for these culverts typically ended in July, but there were some years when these culverts flowed all year (2010, 2011, and 2012). In 2018, the culverts were generally dry between July and September (except Culver 5 and 6a). This information combined with the flows observed at the springs (s8 and s13) and the dugout pond indicated that the hydro-period for the Shouldice Wetland was short ending in July, which is not unexpected with the dry conditions reported in 2018.

The conductivity values collected in 2018 at the culverts ranged from 412 to 785 at the culverts. These values are comparable to historical data collected at these locations. Water temperature values collected in 2018 at the culverts ranged from 4 to 21°C. Historically, temperatures have risen as high as 30°C.

**TABLE 4: CULVERT FIELD MEASUREMENTS**

| Location | Parameter | Unit | Monitoring Results | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 26-Apr-18 | 30-May-18 | 29-Jun-18 | 28-Jul-19 | 31-Aug-18 | 6-Sep-18 | 25-Oct-18 | 16-Nov-18 | 4-Dec-18 |
| Culvert 4 | Conductivity | mS | 611 | 785 | D | D | D | D | D | 502 | 428 |
| | Temperature | °C | 7.1 | 12.5 | D | D | D | D | D | 6.7 | 4.5 |
| | Flow | L/s | NF | NF | D | D | D | D | D | NF | NF |
| Culvert 5 | Conductivity | mS | 549 | 521 | 602 | D | 421 | 461 | 563 | 563 | 445 |
| | Temperature | °C | 6.6 | 11.6 | 21.6 | D | 20.6 | 17.9 | 9.9 | 7.1 | 4.3 |
| | Flow | L/s | F | F | NF | D | F | F | F | F | F |
| Culvert 5a | Conductivity | mS | 620 | 432 | D | D | D | D | NA | 412 | 462 |
| | Temperature | °C | 6.5 | 11 | D | D | D | D | NA | 7.1 | 4.9 |
| | Flow | L/s | NF | NF | D | D | D | D | NA | NF | NF |
| Culvert 6 | Conductivity | mS | 429 | 485 | D | D | D | D | 625 | 422 | 439 |
| | Temperature | °C | 6.8 | 11.6 | D | D | D | D | 9.5 | 6.8 | 4.7 |
| | Flow | L/s | F | F | D | D | D | D | F | F | F |
| Culvert 6a | Conductivity | mS | 416 | D | D | D | 489 | 485 | D | 436 | 477 |
| | Temperature | °C | 7 | D | D | D | 21.1 | 18 | D | 6.9 | 5.1 |
| | Flow | L/s | F | D | D | D | NF | NF | D | NF | NF |
| Culvert 7 | Conductivity | mS | 587 | 528 | D | D | D | D | NA | NA | NA |
| | Temperature | °C | 6.9 | 13 | D | D | D | D | NA | NA | NA |
| | Flow | L/s | NF | NF | D | D | D | D | NA | NA | NA |
| Notes: | F = Flowing | | | | | | | | | | |
| | NF = No Apparent Flow | | | | | | | | | | |
| | D = Dry | | | | | | | | | | |
| | NA = Frozen or Blocked | | | | | | | | | | |

*D: Beaver Dam and Sinkhole*

The beaver dam and sinkhole are located approximately 850 m north of the Keppel Quarry (Figure 4) in the Shouldice Wetland. The beaver dam maintains surface water levels in the north portion of the Shouldice Wetland which would otherwise recharge the shallow groundwater regime by the sinkhole located at the edge of the wetland. During high water levels, surface water drains over the dam and recharges the bedrock along a prominent joint in the limestone bedrock. This sinkhole is a discrete karst feature that is connected to springs s1-s3 in the Glen Management Area.

Monthly monitoring of surface water flows (observed as 'flowing,' 'no apparent flow,' 'dry,' 'frozen'), conductivity; and water temperature is collected to assist in evaluating the hydro-period of the Shouldice Wetland. The monitoring results from 2018 are summarized in Table 5.

**TABLE 5: BEAVER DAM AND SINK HOLE FIELD MEASUREMENTS**

| Date | Beaver Dam | | | | | |
|---|---|---|---|---|---|---|
| | Sinkhole | | | Dam | | |
| | Conductivity | Temperature | Flow | Conductivity | Temperature | Flow |
| | µS | °C | L/s | µS | °C | L/s |
| 30-Jan-18 | NA | NA | NA | NA | NA | NA |
| 28-Feb-18 | 457 | 1.8 | NF | 430 | 1.5 | F |
| 26-Mar-18 | 473 | 7 | NF | 517 | 5.9 | F |
| 26-Apr-18 | 648 | 7.3 | NF | 789 | 7.2 | F |
| 31-May-18 | 630 | 13.3 | NF | 647 | 13.5 | F |
| 29-Jun-18 | D | D | D | 497 | 22 | F |
| 28-Jul-18 | D | D | D | D | D | D |
| 31-Aug-18 | D | D | D | 572 | 21 | F |
| 6-Sep-18 | D | D | D | 596 | 17.2 | F |
| 26-Oct-18 | 598 | 8.9 | NF | 699 | 8.8 | F |
| 16-Nov-18 | NF | NF | NF | 558 | 7.7 | F |
| 4-Dec-18 | NF | NF | NF | 647 | 5.2 | F |
| Notes: | F = Flowing | | | | | |
| | NF = No Apparent Flow | | | | | |
| | D = Dry | | | | | |
| | NA = Frozen | | | | | |

Based on the flow data collected at the beaver dam, water was observed flowing through and into the cove all year except for dry periods in July. Flow observations at the sinkhole are made at the eastern extent of the cove and flow ended in July with minor flow occurring again during the month of October. Even though flows at the sinkhole ended in July, the hydroperiod for the sinkhole is tied to the flow through the beaver dam because the bedrock joint extends through the entire cove and water sinks along its entire length (Cowell, 2008).

Conductivity values collected in 2018 at the dam and sink hole ranged from 430 µs/cm to 789 µs/cm and 457 and 648 us/cm, respectively. The conductivity ranges fall within the historical conductivity values for these locations. Water temperature values collected in 2018 at the beaver dam and sinkhole range from 1 to 13 °C and 1 and 22°C, respectively. These values are comparable to historical data collected at these locations.

*Summary*

The monitoring results indicate that there has been no measurable impact on the Shouldice Wetland. This monitoring shall continue as extraction in Phase 1B and 2 proceed. The continued monitoring will provide the information required to assess the potential impact of extraction on the wetland's form and function. This assessment is needed to allow for the holding provision on Area 3 to be lifted by the MNRF and MECP to allow for the extraction of this area.

If the monitoring results indicate a potential impact, an infiltration pond is to be constructed to augment flow to spring s13 and the Dugout Pond. If required, then the infiltration pond shall be constructed in the headwater recharge area for spring s13. As presented, the monitoring data collected in 2018 did not trigger the construction of the infiltration pond.

### *2.5.2 Glen Management Area*

The north portion of the Glen Management Area located approximately 500 m north of the Area 1a is monitored as part of the AMP. The key indicators that are used to monitor this feature include:

- Bedrock Groundwater Levels at OW49-OW52 (refer to Section 2.3.2);
- Beaver Dam and Sink Hole (refer to Section 2.5.1);
- Glen Management Area Springs (s1, s2, and s3);
- Mud Creek (Channel A and Channel B);
- Glen Management Area Springs (s4 (a-c), s5);
- Ducks Unlimited Dam; and
- Ephemeral Pond.

As discussed in Sections 2.3.2, the groundwater conditions near the Glen Management Area have continued to fluctuate within the historical ranges. To support this conclusion and to provide multiple lines of evidence to effectively assess the impacts of aggregate extraction from the Keppel Quarry on the Glen Management Area, monthly surface water flows, conductivity and temperature are measured at the groundwater spring (s1, s2, and s3), Mud Creek (Channel A and B), and the Ducks Unlimited Dam (outflow weir).

*A: Glen Management Area Springs (s1, s2, and s3)*

The field measurements collected at the Glen Management Area springs (s1-s3) are provided in Table 6. The surface water flow data continues to show that the hydro-period for these springs extended from January through to December in 2018. This information is consistent with the historical data.

**TABLE 6: GLEN MANAGEMENT SPRINGS FIELD MEASUREMENTS (S1, S2, AND S3)**

| Date | Surface Water Springs | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | s1 | | | s2 | | | s3 | | |
| | Conductivity µS | Temperature °C | Flow | Conductivity µS | Temperature °C | Flow | Conductivity µS | Temperature °C | Flow |
| 30-Jan-18 | 492 | 1.5 | F | 447 | 1.3 | F | 492 | 1.3 | F |
| 27-Jan-18 | 474 | 3.3 | F | 464 | 3.4 | F | 480 | 3 | F |
| 26-Mar-18 | 587 | 4.4 | F | 554 | 3.7 | F | 546 | 3.6 | F |
| 26-Apr-18 | 469 | 6.3 | F | 501 | 6.2 | F | 522 | 6.9 | F |
| 31-May-18 | 559 | 12.9 | F | 592 | 13.2 | F | 499 | 13.3 | F |
| 29-Jun-18 | 577 | 18.4 | F | 516 | 17.1 | F | 513 | 16.9 | F |
| 27-Jul-18 | 621 | 22.3 | F | D | D | D | 549 | 22 | F |
| 31-Aug-18 | 551 | 18.3 | F | 523 | 18.6 | F | 548 | 19.6 | F |
| 7-Sep-18 | 585 | 16.2 | F | 589 | 16.7 | F | 601 | 16.9 | F |
| 26-Oct-18 | 685 | 9.9 | F | 697 | 9.5 | F | 649 | 9.6 | F |
| 16-Nov-18 | 623 | 6.8 | F | 646 | 6.7 | F | 658 | 6.9 | F |
| 3-Dec-18 | 554 | 4.9 | F | 502 | 5.1 | F | 569 | 5.1 | F |
| Notes: | F = Flow | | | | | | | | |
| | NF = No Apparent Flow | | | | | | | | |
| | D = Dry | | | | | | | | |
| | NA = Frozen | | | | | | | | |

Conductivity values collected in 2018 range between 447 µs/cm and 658 µs/c, which is comparable to historical data. Conductivity values in this range indicate that there is a mix of groundwater and surface water flowing from these features (Cowell, 2009). Water temperature values collected in 2018 at the springs range between 1°C and 22°C. Due to inputs from groundwater at these springs, their temperatures do not raise much beyond 22°C. The water temperatures recorded at these springs in 2018 were comparable to historical data collected at these locations.

*B: Mud Creek Channel A and Channel B*

The headwaters for Mud Creek include springs s1-s3. There are two channels that flow from these springs into Mud Creek. These are referred to as:

- Channel A, the main channel; and
- Channel B, a secondary channel that flows intermittently.

Field measurements collected in 2018 at Mud Creek (Channel A and B) are found in Table 7.

**TABLE 7: MUD CREEK FIELD MEASUREMENTS**

| Date | Mud Creek | | | | | |
|---|---|---|---|---|---|---|
| | Channel A | | | Channel B | | |
| | Conductivity µS | Temperature °C | Flow | Conductivity µS | Temperature °C | Flow |
| 30-Jan-18 | 423 | 1.9 | F | NA | NA | NA |
| 28-Feb-18 | 493 | 3.2 | F | 490 | 3.3 | NF |
| 26-Mar-18 | 579 | 6.8 | F | NF | NF | NF |
| 26-Apr-18 | 473 | 6.7 | F | NF | NF | NF |
| 31-May-19 | 519 | 11.2 | F | NF | NF | NF |
| 29-Jun-18 | 485 | 15.4 | F | NF | NF | NF |
| 27-Jul-18 | D | D | D | D | D | D |
| 31-Aug-18 | 498 | 18.5 | F | D | D | D |
| 7-Sep-18 | 507 | 15 | F | D | D | D |
| 26-Oct-18 | 612 | 9.5 | F | D | D | D |
| 16-Nov-18 | 488 | 7.2 | F | NF | NF | NF |
| 3-Dec-18 | 432 | 5.6 | F | D | D | D |
| Notes: | F = Flow | | | | | |
| | NF = No Apparent Flow | | | | | |
| | D = Dry | | | | | |
| | NA = Frozen | | | | | |

Based on the 2018 flow data collected, the hydroperiod for Channel A extended from December through to January. The existence (and therefore, significance) of Channel B remains unclear. Generally, there is only

ponded water in the area of the channel. This information is consistent with historical data, which has Channel B as either ponded or dry throughout the year, whereas Channel A flows almost all year.

Conductivity values ranged from 455 µs/cm to 645 µs/cm for Channel A in 2018 is comparable to historical data. Water temperature in Channel A ranged from 2°C to about 18°C. The water temperatures recorded in Mud Creek (Channel A and B) in 2018 were comparable to historical data collected at these locations.

*C: Glen Management Area Springs (s4a, s4b, s4c, and s5)*

The field measurements collected at the Glen Management Area springs (s4a, s4b, s4c, and s5) are provided in Table 8. The surface water flow data continues to show that the hydro-period for these springs extended from January through to June in 2018. This information is consistent with the historical data.

**TABLE 8: GLEN MANAGEMENT SPRINGS FIELD MEASUREMENTS (S4 AND S5)**

| Date | Surface Water Springs | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | s4a | | | s4b | | | s4c | | | s5 | | |
| | Conductivity µS | Temperature °C | Flow | Conductivity µS | Temperature °C | Flow | Conductivity µS | Temperature °C | Flow | Conductivity µS | Temperature °C | Flow |
| 30-Jan-18 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 28-Feb-18 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 26-Mar-18 | 668 | 7.3 | F | 595 | 5.5 | F | D | D | D | D | D | D |
| 26-Apr-18 | 623 | 6.8 | F | 699 | 6.9 | F | D | D | D | D | D | D |
| 31-May-18 | 756 | 10.5 | F | 629 | 11.7 | F | D | D | D | D | D | D |
| 29-Jun-18 | D | D | D | D | D | D | D | D | D | D | D | D |
| 27-Jul-18 | D | D | D | D | D | D | D | D | D | D | D | D |
| 31-Aug-18 | D | D | D | D | D | D | D | D | D | D | D | D |
| 7-Sep-18 | D | D | D | D | D | D | D | D | D | D | D | D |
| 26-Oct-18 | D | D | D | D | D | D | 520 | 12.1 | F | D | D | D |
| 16-Nov-18 | D | D | D | D | D | D | D | D | D | D | D | D |
| 3-Dec-18 | 699 | 4.8 | F | 658 | 4.8 | F | 682 | 4.6 | F | D | D | D |
| Notes: | F = Flow | | | | | | | | | | | |
| | NF = No Apparent Flow | | | | | | | | | | | |
| | D = Dry | | | | | | | | | | | |
| | NA = Frozen | | | | | | | | | | | |

*D: Ducks Unlimited Dam*

The field measurements collected at the Ducks Unlimited Dam outflow weir are provided in Table 9. The surface water flow data continues to show that the hydro-period for these springs extended year-round. This information is consistent with the historical data.

**TABLE 9: DUCKS UNLIMITED DAM FIELD MEASUREMENTS**

| Date | Ducks Unlimited Dam | | |
|---|---|---|---|
| | Conductivity µS | Temperature °C | Flow |
| 30-Jan-18 | No data | No data | F |
| 28-Feb-18 | No data | No data | F |
| 26-Mar-18 | 579 | 6.8 | F |
| 26-Apr-18 | 409 | 7.6 | F |
| 31-May-18 | 457 | 14 | F |
| 29-Jun-18 | 522 | 20.7 | F |
| 27-Jul-18 | 498 | 23.2 | F |
| 31-Aug-18 | 665 | 23.5 | F |
| 7-Sep-18 | 587 | 16.3 | F |
| 26-Oct-18 | 487 | 10 | F |
| 16-Nov-18 | 499 | 6.9 | F |
| 3-Dec-18 | No data | No data | F |
| Notes: | F = Flow | | |
| | NF = No Apparent Flow | | |
| | D = Dry | | |
| | NA = Frozen | | |

*E: Ephemeral Pond*

There was an ephemeral pond on Lot 26 Concession 10. The AMP requires that three years of baseline water levels be measured using a staff gauge in this feature prior to extraction occurring within Area 1B. Water levels shall be measured during the amphibian breeding season which extends from April 1 to June 30. The results from 2018 are provided in Table 10.

**TABLE 10: EPHEMERAL POND**

| Date | Ephermeral Pond water depth | Date | Ephermeral Pond water depth | Date | Ephermeral Pond water depth |
|---|---|---|---|---|---|
| 5-Apr-18 | 0.65 | 3-May-18 | 0.54 | 6-Jun-18 | 0.33 |
| 13-Apr-18 | 0.59 | 9-May-18 | 0.56 | 13-Jun-18 | 0.3 |
| 18-Apr-18 | 0.58 | 18-May-19 | 0.52 | 21-Jun-18 | 0.25 |
| 27-Apr-18 | 0.59 | 31-May-19 | 0.5 | 26-Jun-18 | 0.25 |

## 3.0 ASSESSMENT OF TRIGGER VALUES

The AMP for the Keppel Quarry currently relies on seasonal site-specific trigger water level elevations at selected sentry monitoring wells and surface water monitoring locations. Trigger values were determined based on the evaluation of baseline water level data and based these levels on the predicted the maximum extent of the cone of influence once the New Keppel Quarry is fully extracted. By defining the maximum extent of the cone of influence, suitable trigger values were set that will activate mitigation measures if the observed values collected through the Water Resources Monitoring Program are lower than predicted.

The approved trigger values were set for four quarterly seasonal periods (spring, summer, fall, and winter). For selected monitoring locations, there are three standard categories of trigger values; green, yellow, and red. Green trigger values were set at 15 cm above observed seasonal lows. Yellow trigger values are equal to observed seasonal lows for each location. Red trigger values were set at 15 cm below observed seasonal lows.

Since the AMP has been implemented, there have been numerous false positive trigger exceedances. The reasons for these exceedances include:

1. Seasonal conditions were assessed based on monthly spot measurements, which may not have captured actual seasonal low water level conditions;
2. The oversimplification of the approach to setting the triggers (broadly apply a 15 cm drawdown to all sentry monitoring locations); and
3. The neglect to account for the full impact of climate change during the development of the AMP.

Limiting drawdown to 15 cm during a set period which defines a season at a selected sentry location is a strict criterion to ensure minimal impact from quarry dewatering (as this is a relatively small change in the water level). However, the approach has one significant drawback, which is the lack of consideration in the variability in the seasonal variation in water levels. For example, for OW51, the water level fluctuates 5 m. If the water level drops an additional 15 cm, that change only represents 3% of the variability. At OW12s the water level fluctuates only 1.38 m seasonally. If the water level drops an additional 15 cm, that change increase to 11% of the variability. Therefore, the use of seasonal trends should be considered. Furthermore, the development of a single site-specific trigger value for each sentry monitoring location would result in more appropriate drawdown trigger value.

In addition, the full impact of climate change must be incorporated into the development of revised trigger values. Climate change has resulted in an increase in the frequency and intensity of some types of extreme weather events. For example, warming is causing more rain to fall in heavy isolated downpours. There are also

longer dry periods between rainfalls. This, coupled with more evaporation due to higher temperatures, intensifies drought conditions. In addition, season creep, which refers to observed changes in the timing of the seasons, has been widely observed in Ontario (refer to Section 2.1).

Since 2015, the yellow and red triggers set for the Keppel Quarry have been exceeded numerous times. Therefore, it is recommended that the trigger mechanism for both the surface water and groundwater be re-evaluated. As per Condition 10.3 of the AMP, a Site Plan Amendment application must be submitted to the MNRF so that any revisions to the trigger values can be considered.

## 4.0 CONCLUSION

Based on the monitoring data, Whitewater concludes that extraction did not cause any negative impacts on groundwater resources in 2018.

## 5.0 RECOMMENDATIONS

Subject to approval from MNRF, the AMP shall be updated to include any recommended changes to the groundwater and surface water monitoring program, including trigger values. It is suggested that a pre-submission meeting with the MNRF be held to discuss the current issues with the program, including trigger values, prior to submitting the proposed amended Water Resources Monitoring Program.

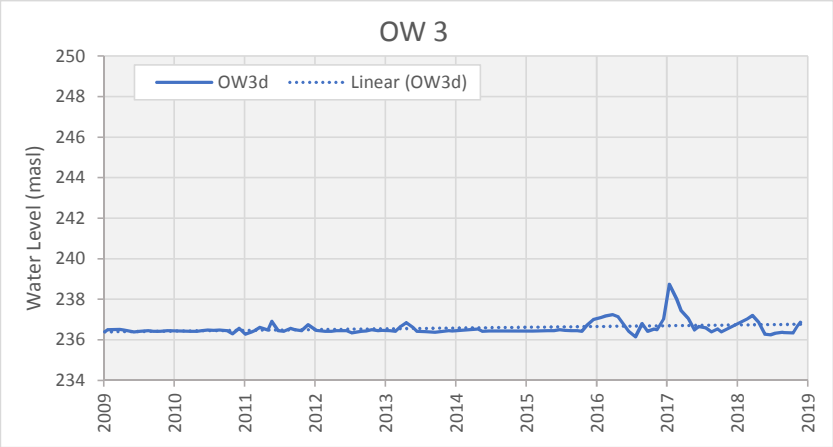
# APPENDIX A1

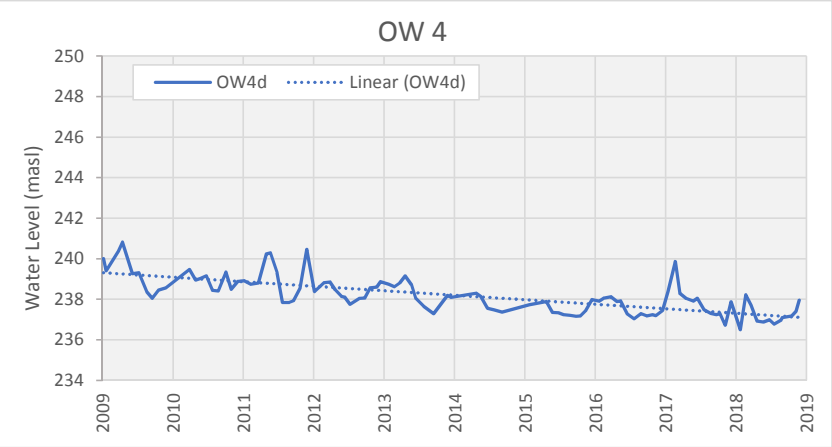
# GROUNDWATER HYDROGRAPHS

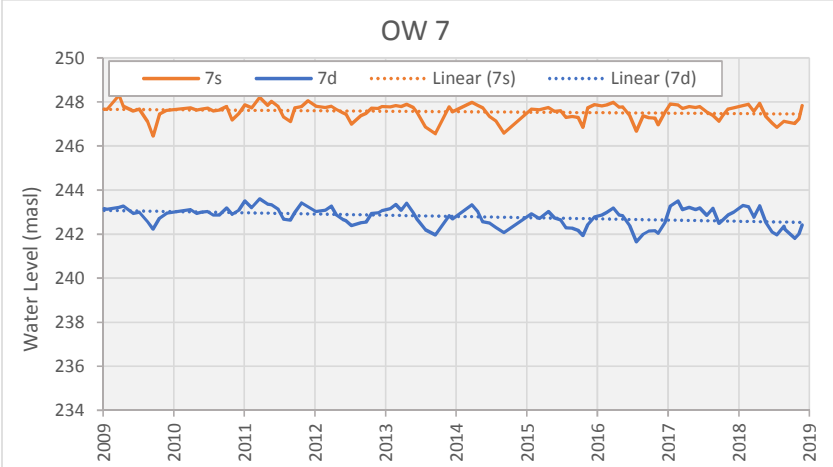
# APPENDIX A1-a

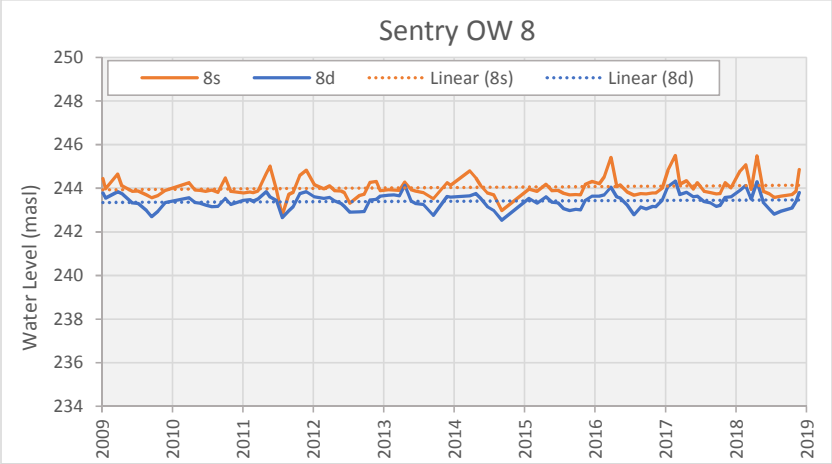
# GROUNDWATER MONITORING WELLS

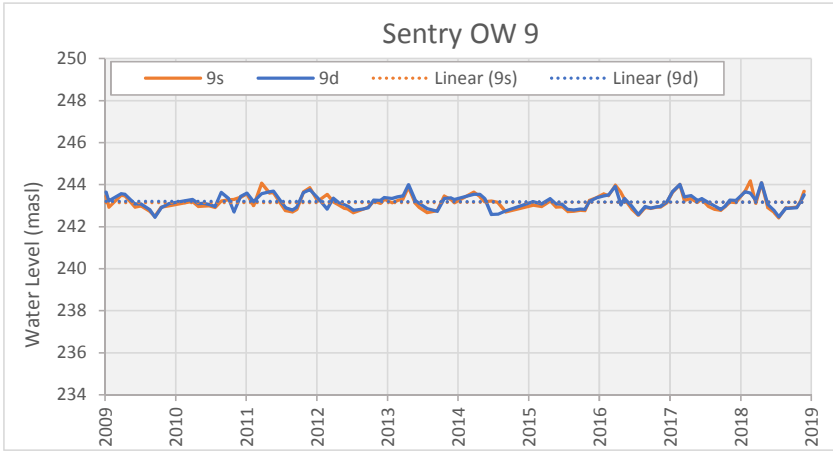
**Keppel Quarry: Appendix A-1a**
**Groundwater Hydrographs**

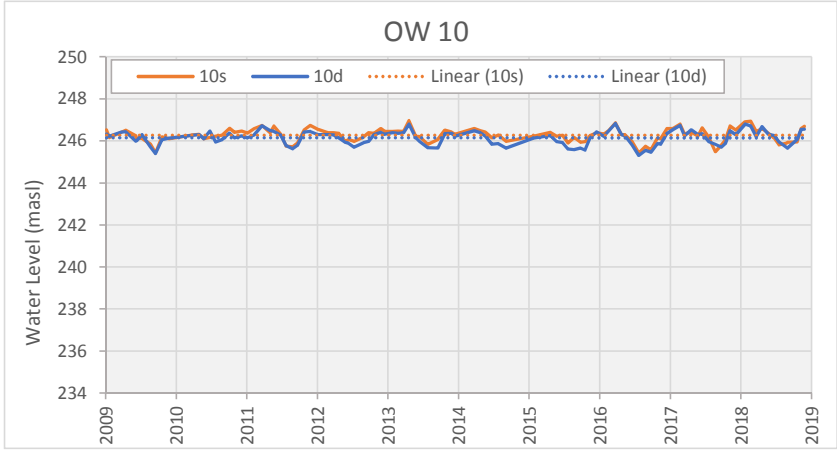


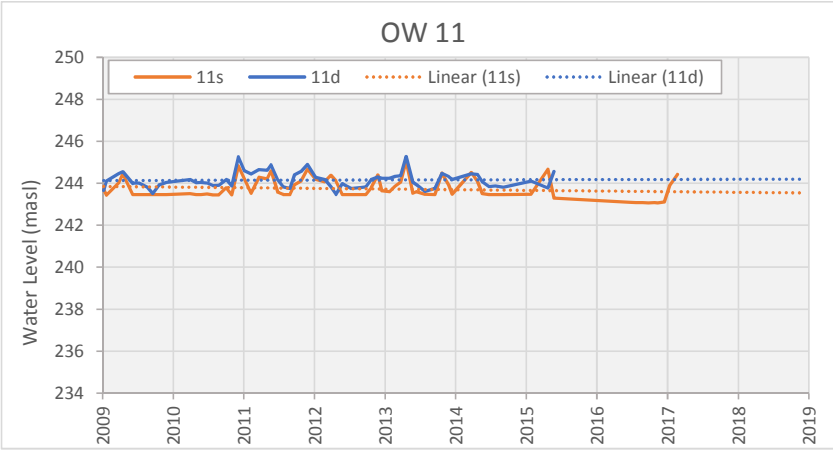



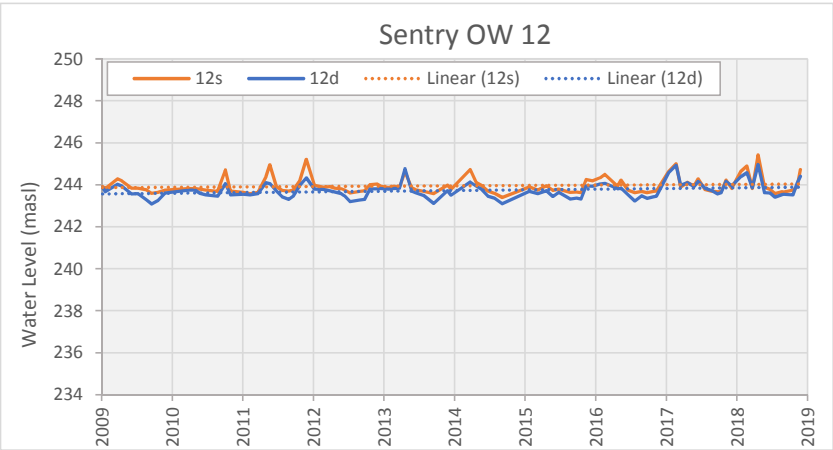



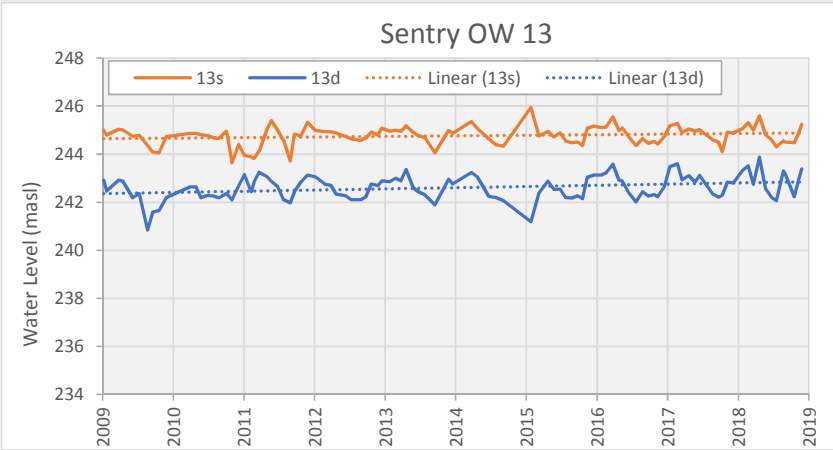



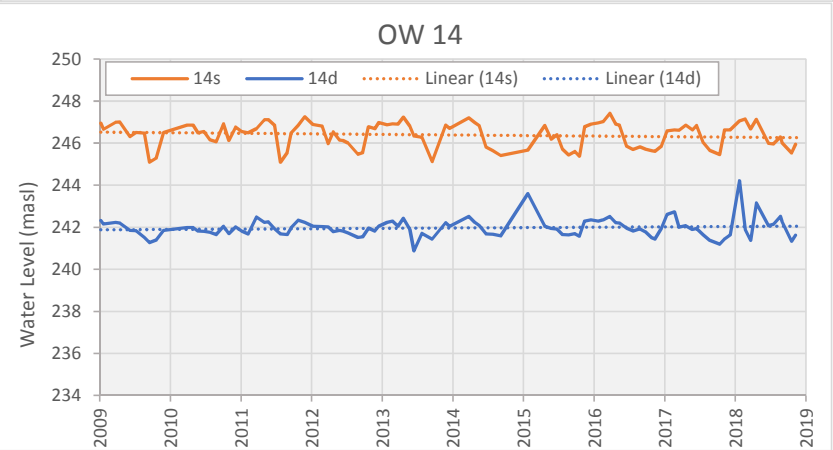



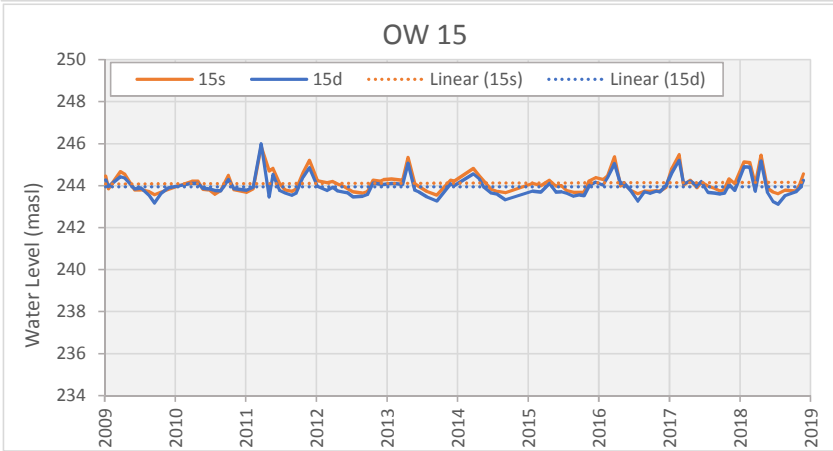
**Keppel Quarry: Appendix A-1a**
**Groundwater Hydrographs**

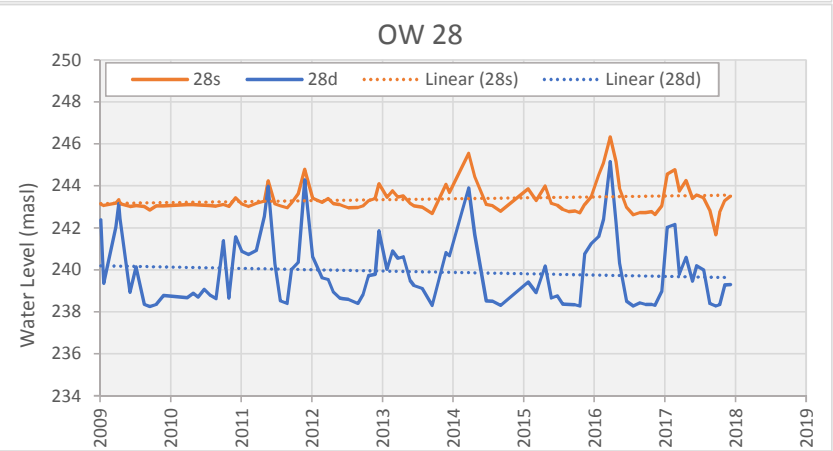


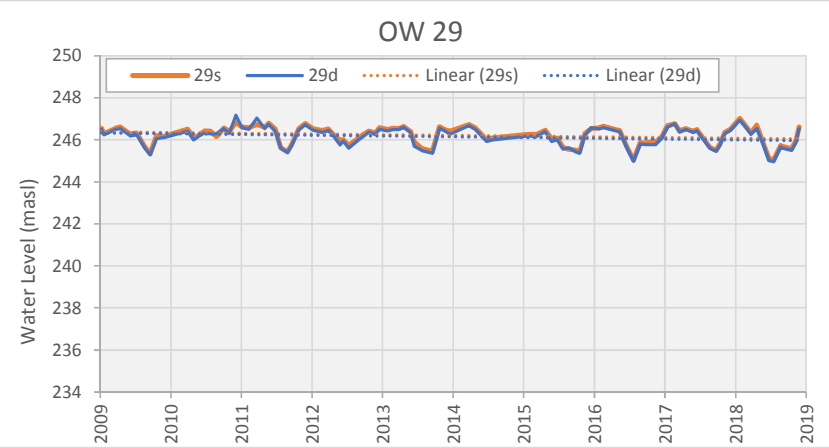



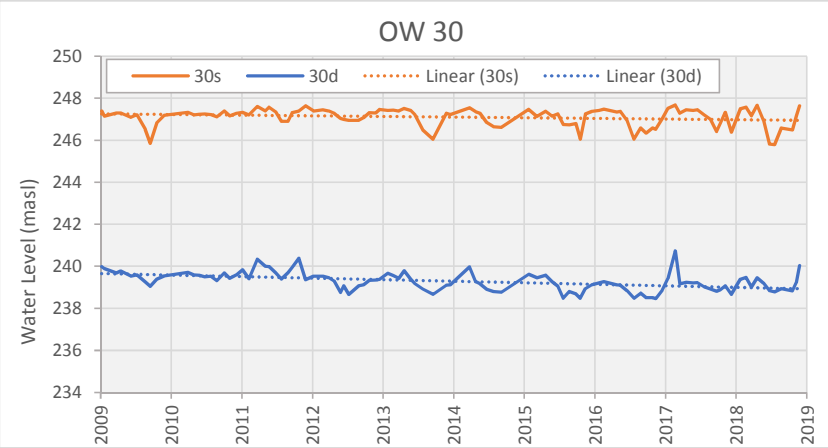



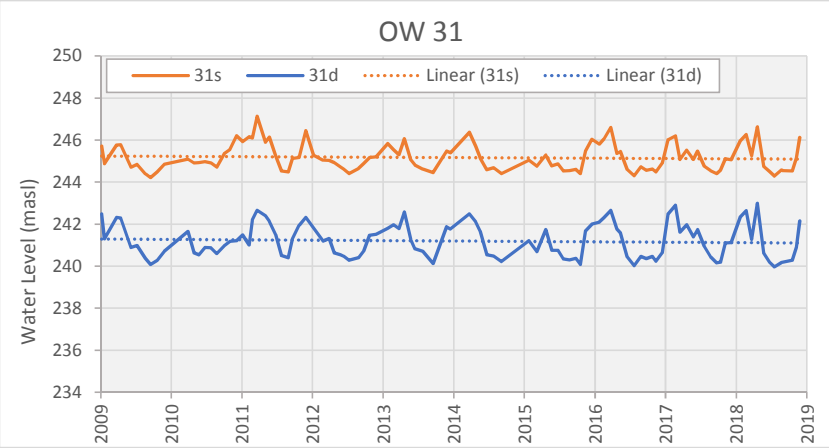



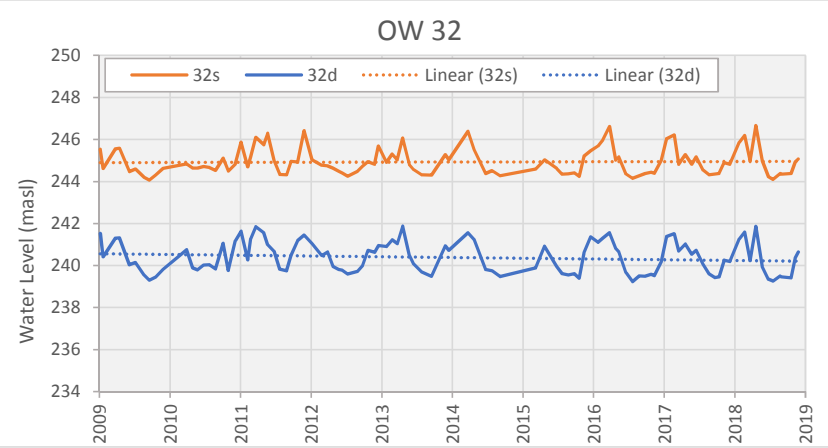



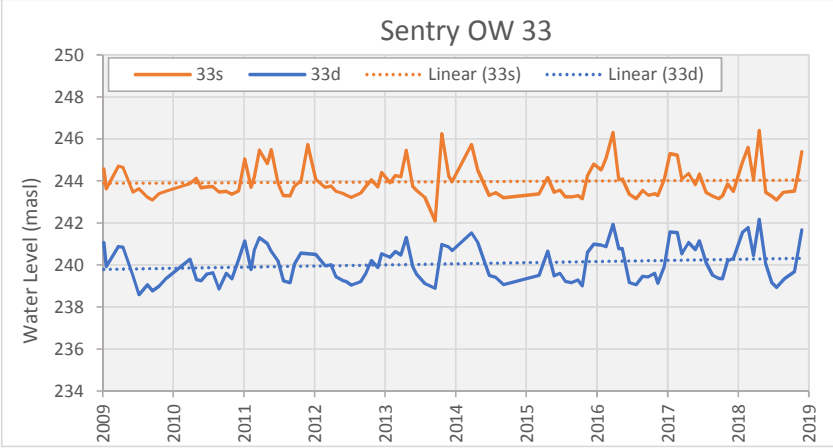
**Keppel Quarry: Appendix A-1a**
**Groundwater Hydrographs**

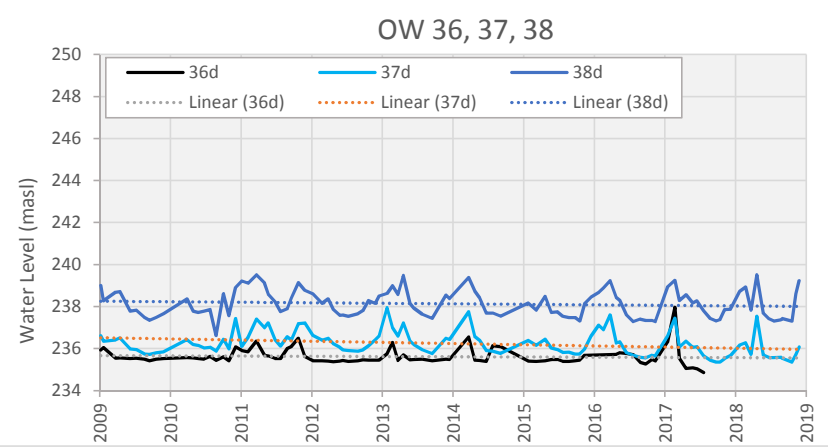


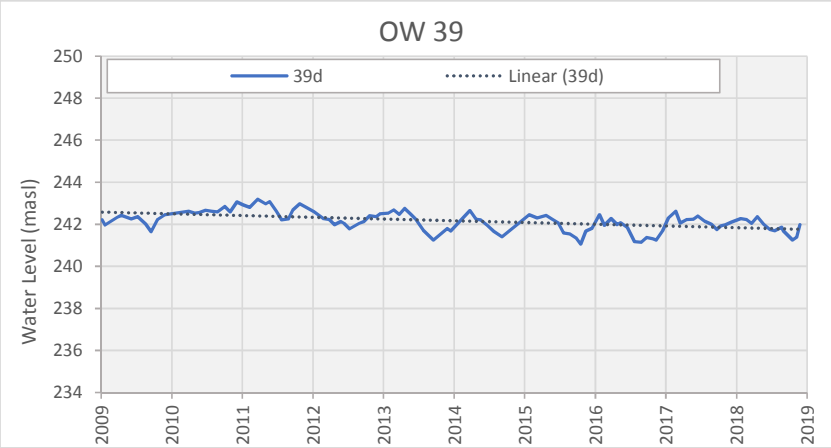



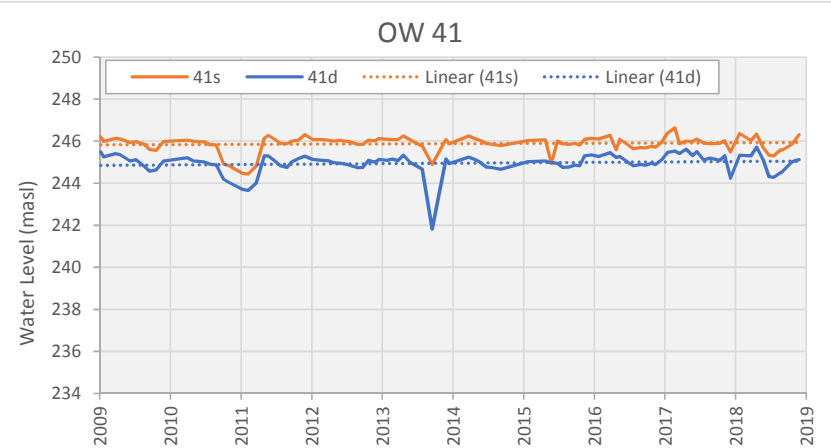



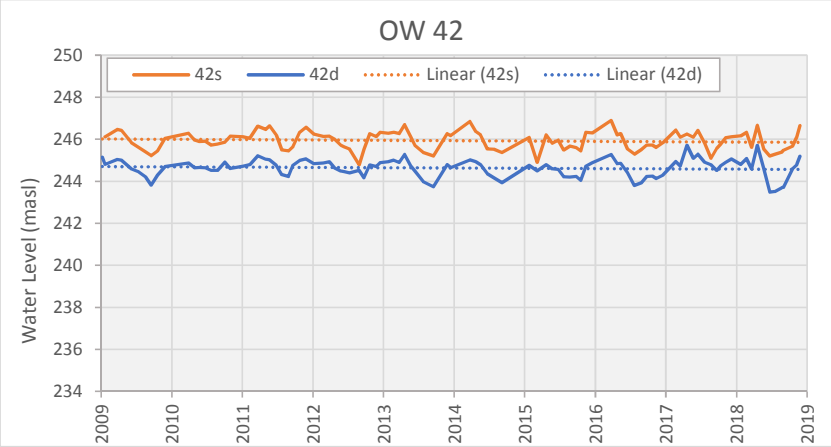



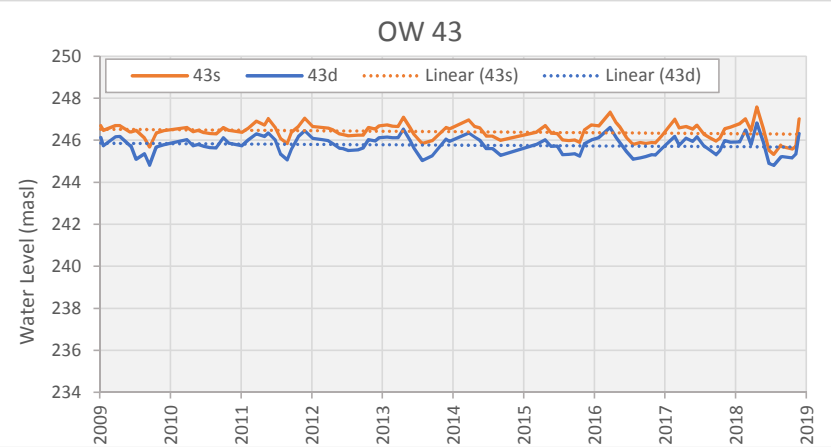



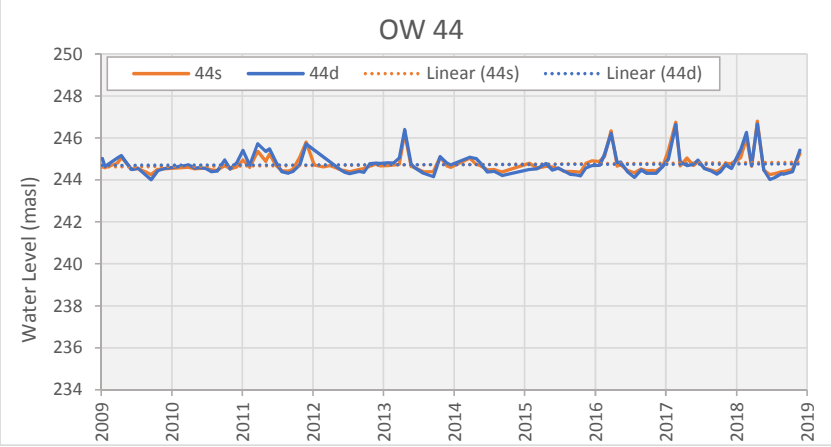
**Keppel Quarry: Appendix A-1a**
**Groundwater Hydrographs**

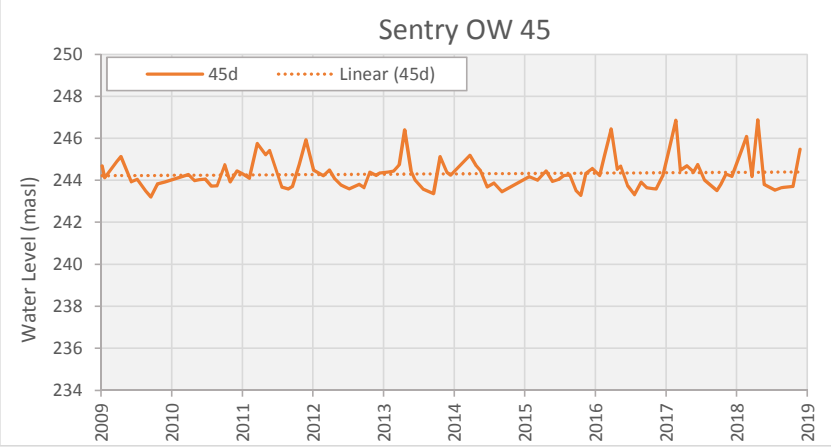


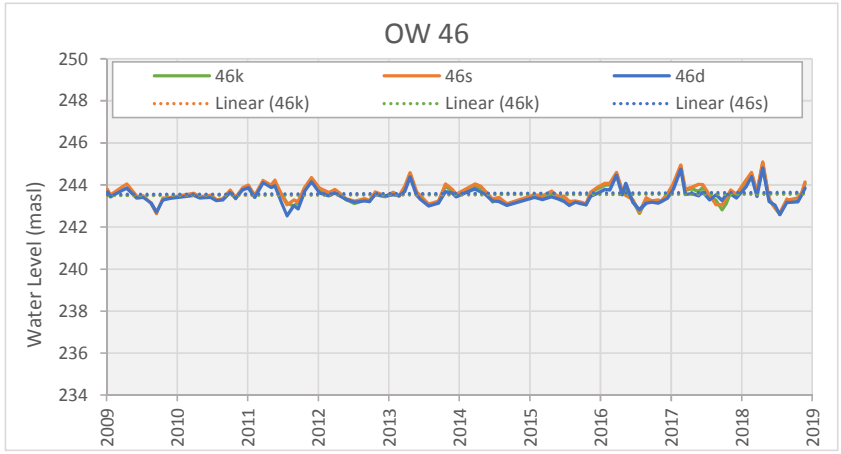



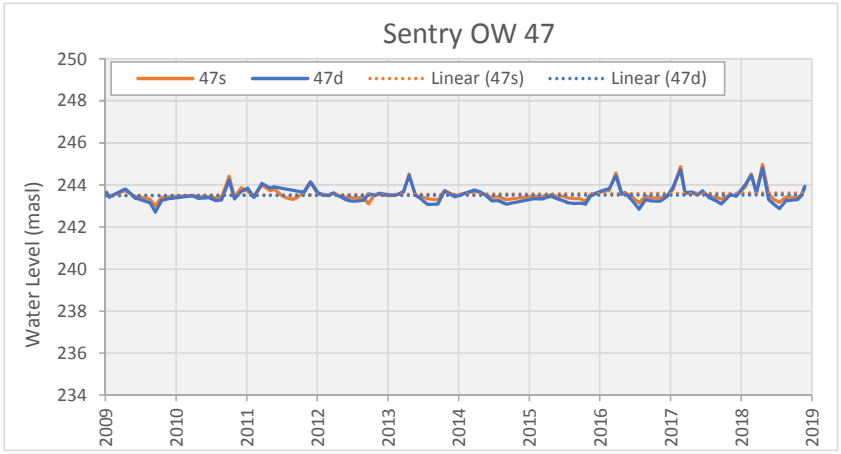



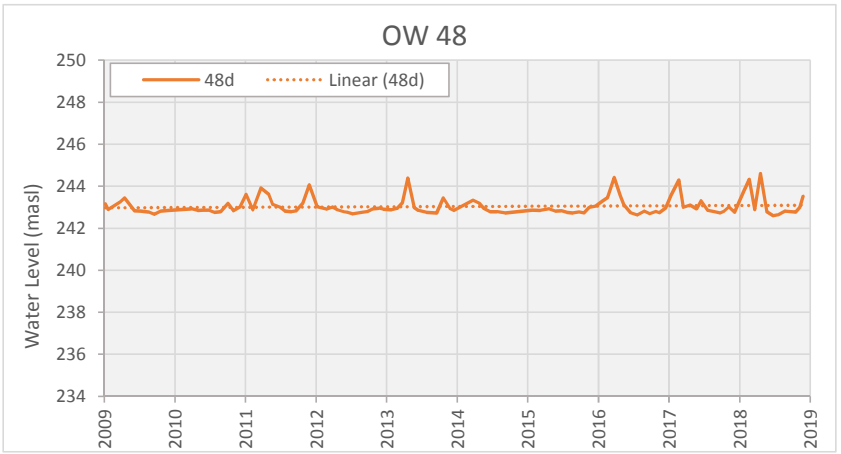



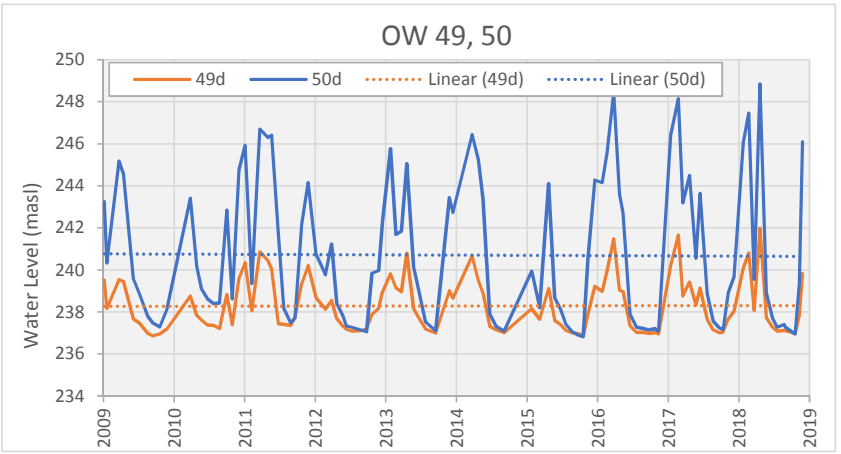



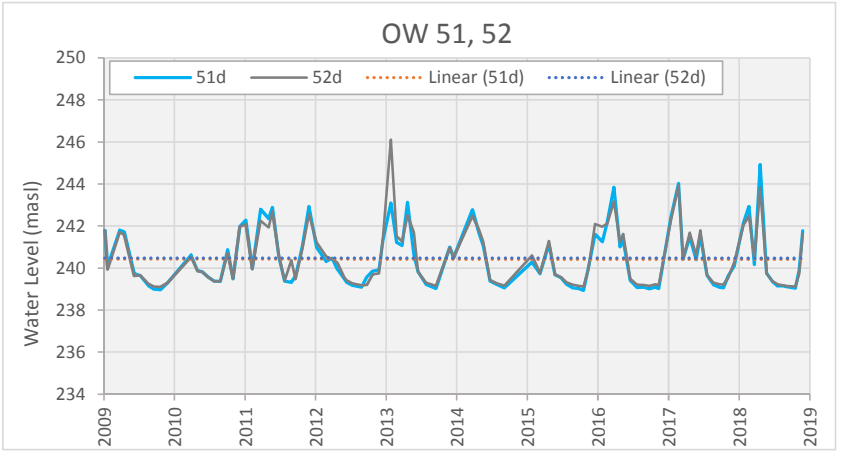
**Keppel Quarry: Appendix A-1a**
**Groundwater Hydrographs**

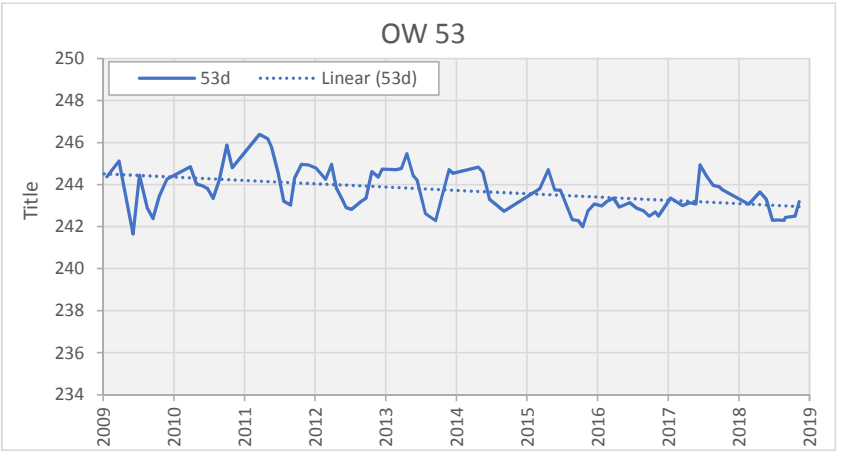


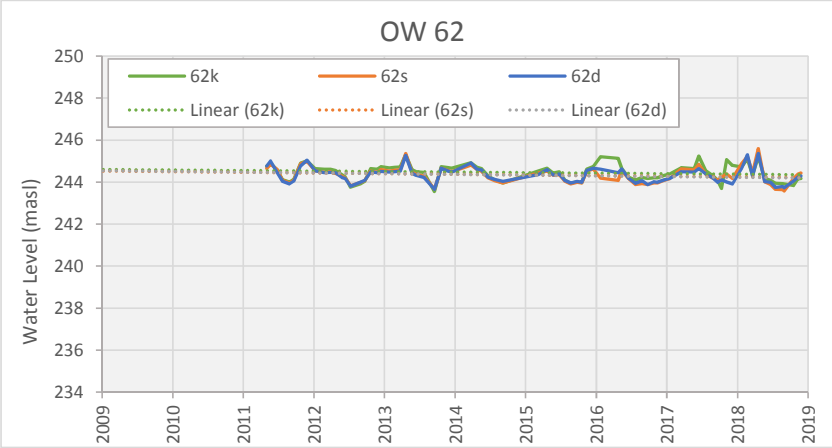



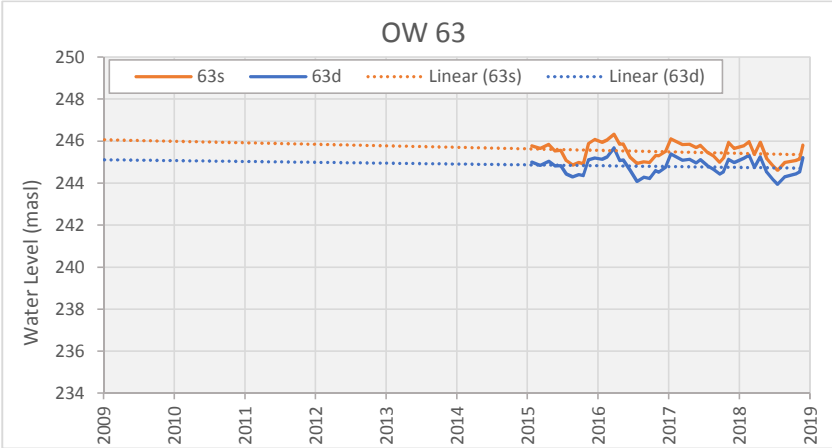



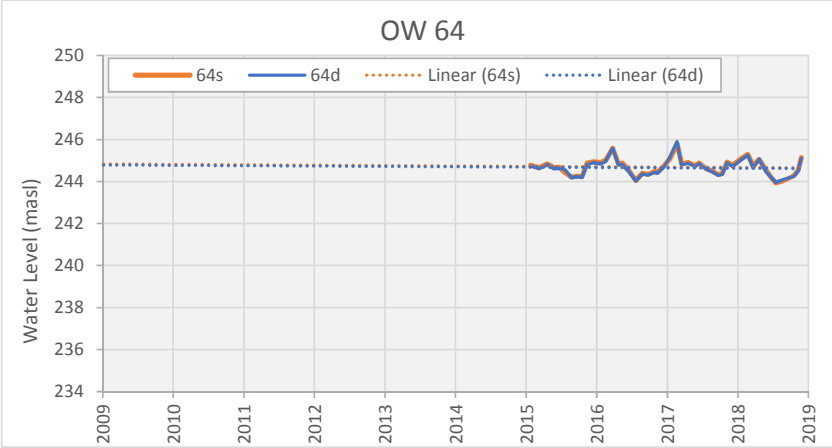



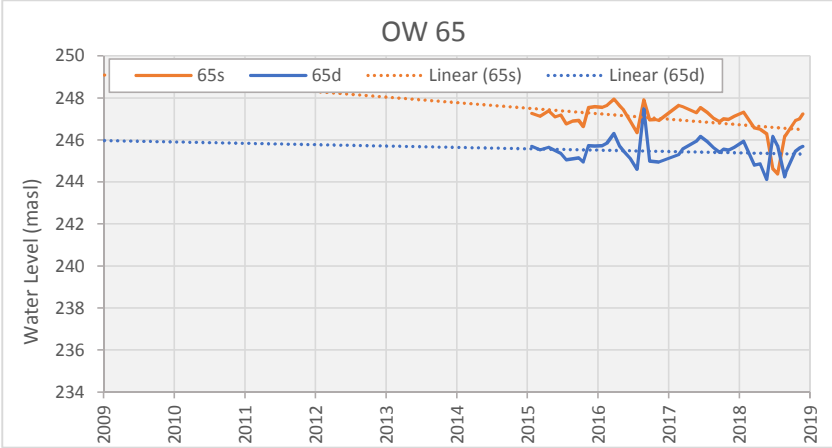



**Keppel Quarry: Appendix A-1a**
**Groundwater Hydrographs**



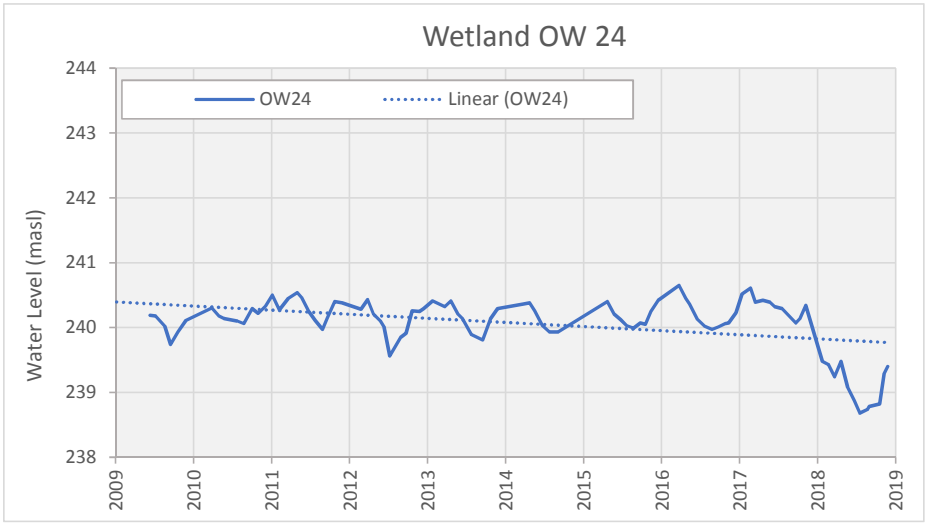



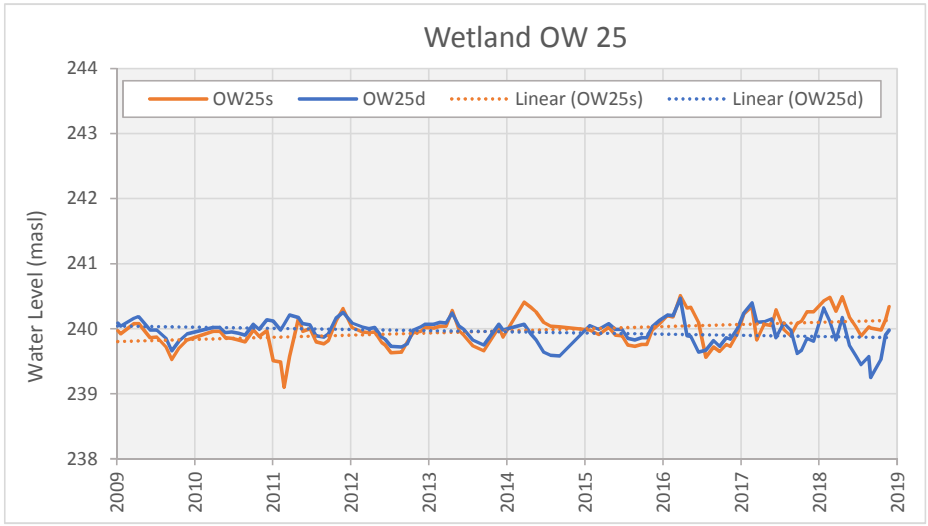



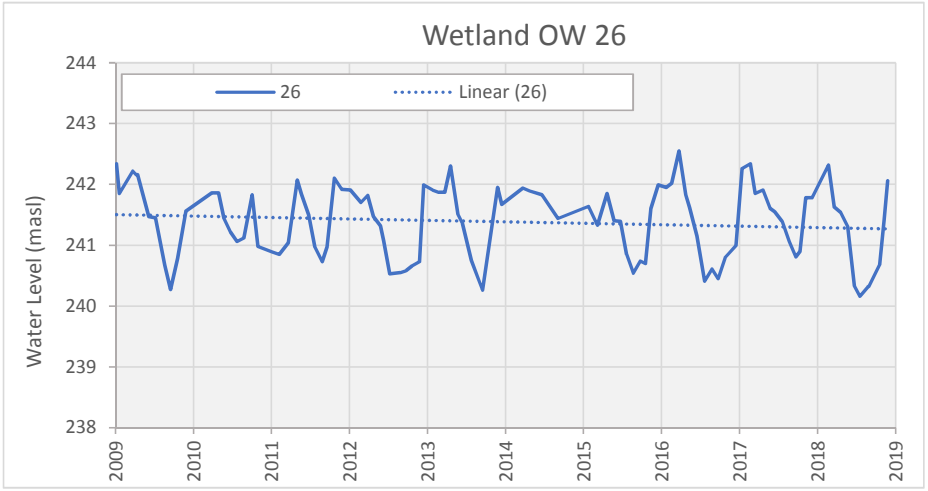
# APPENDIX A1-b

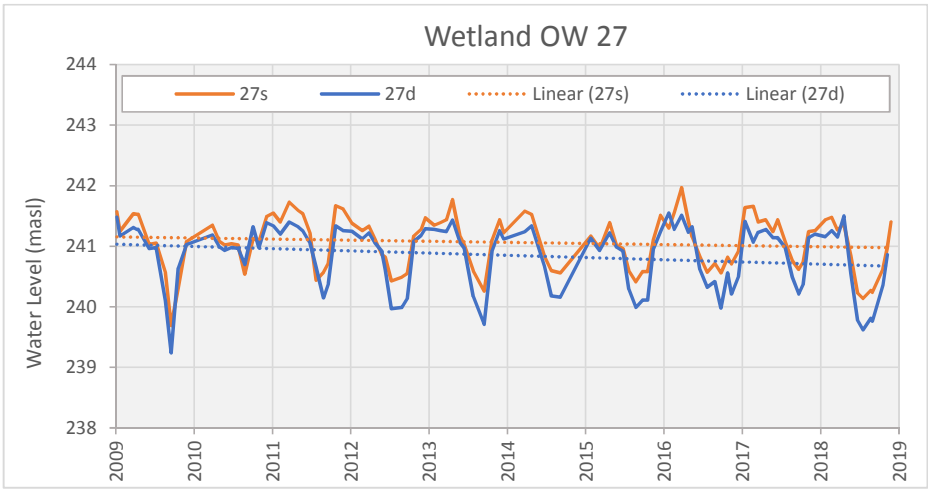
# GROUNDWATER MONITORING WELLS: WETLAND AREAS

**Keppel Quarry: Appendix A-1b**
**Groundwater Hydrographs (Wetland Area)**

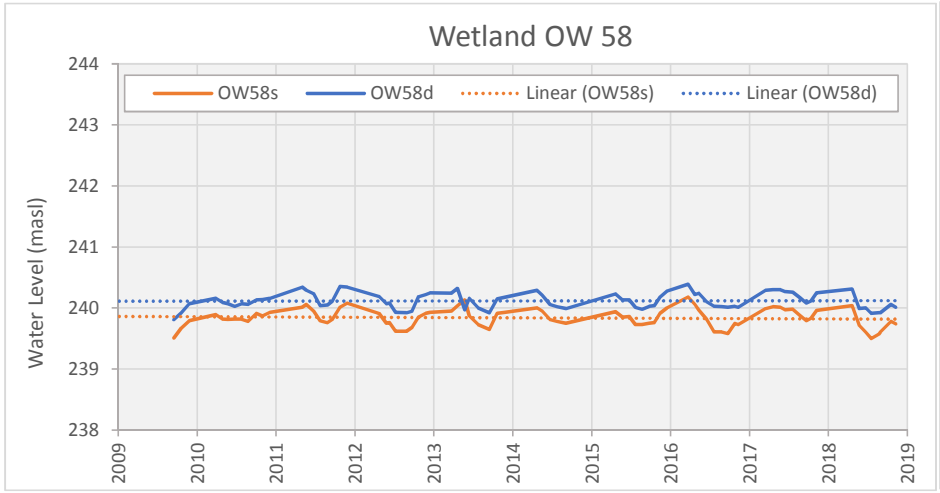


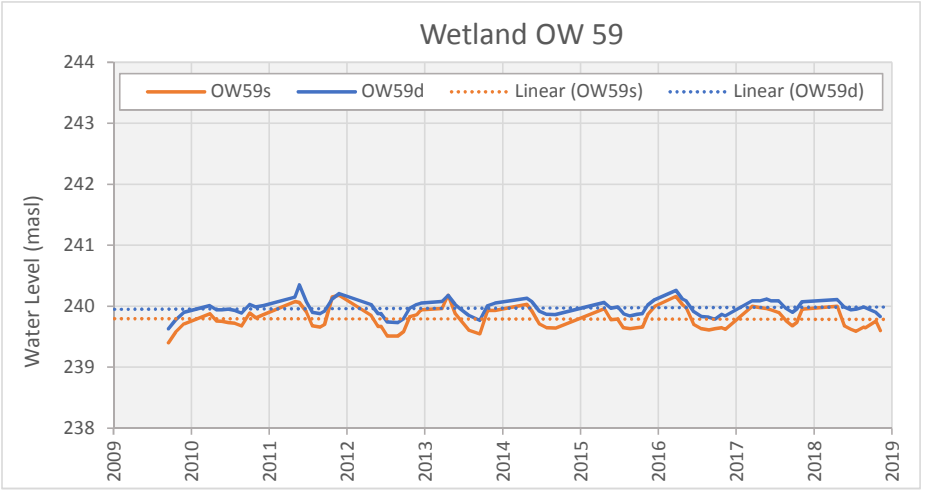



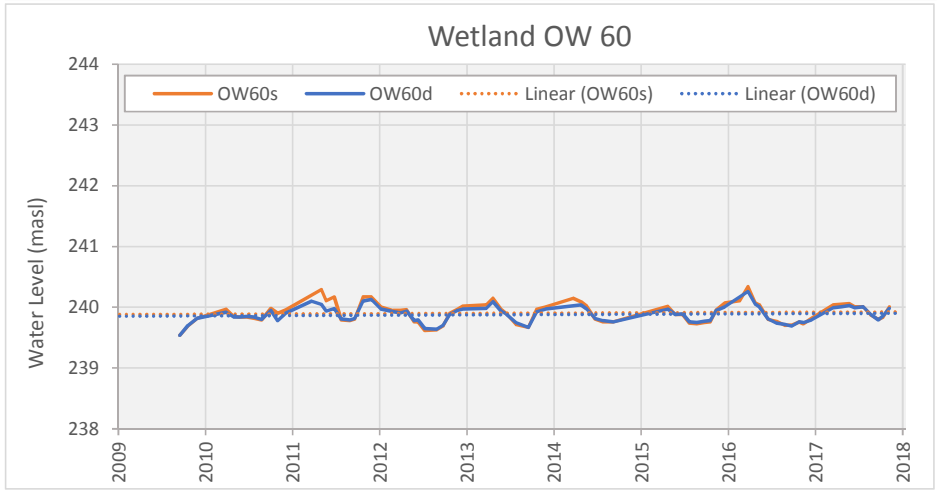



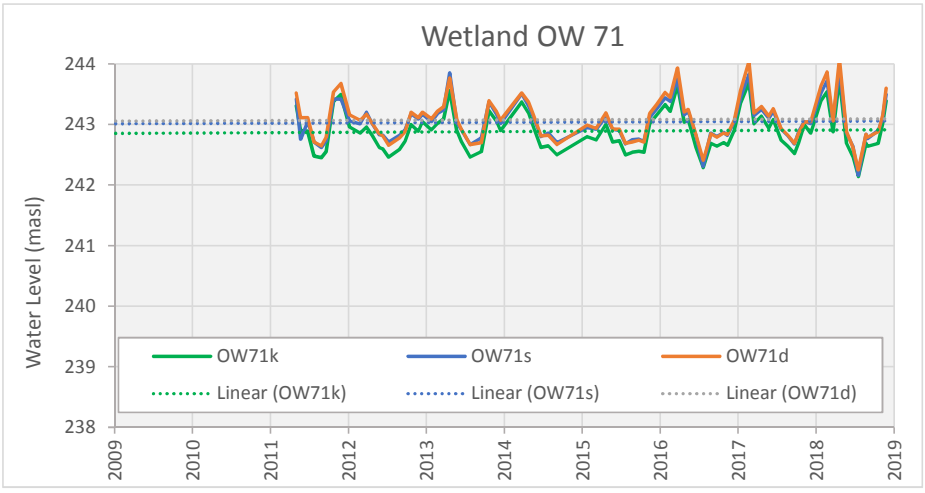



**Keppel Quarry: Appendix A-1b**
**Groundwater Hydrographs (Wetland Area)**



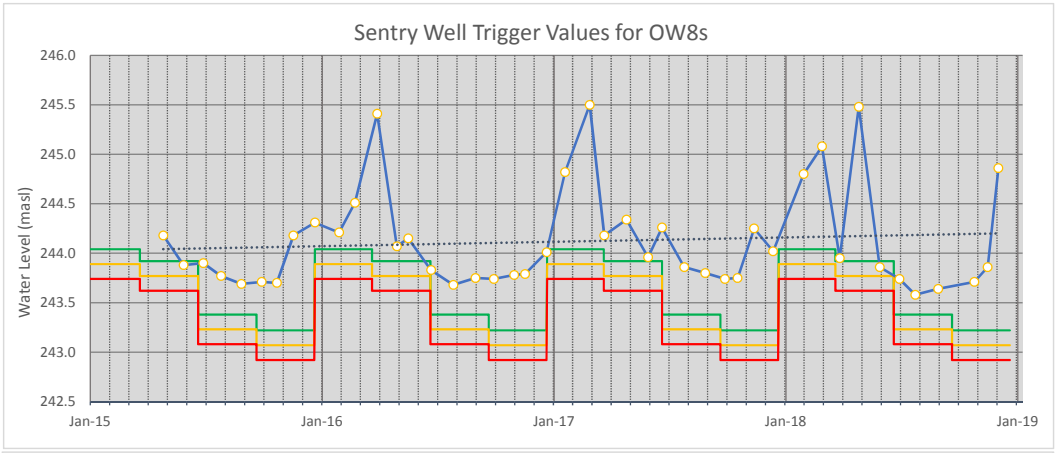



# APPENDIX A1-c

# SENTRY MONITORING WELLS

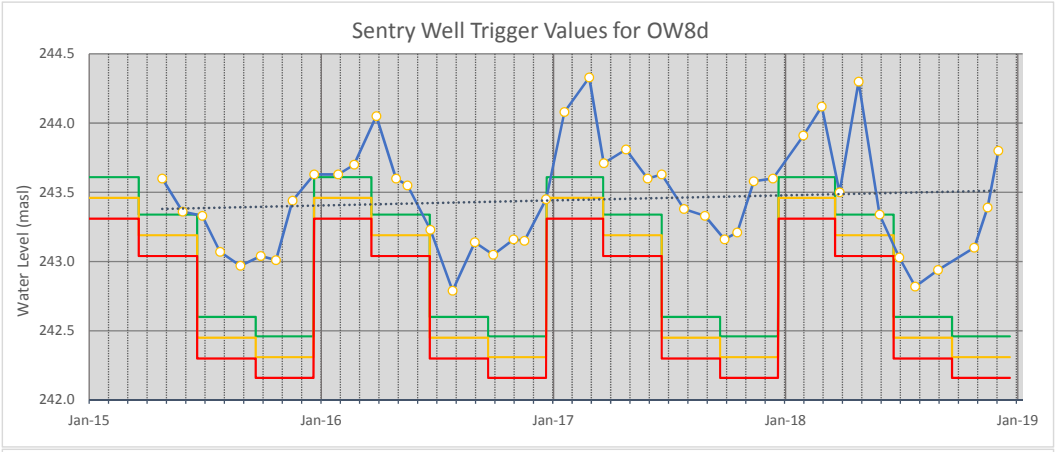
**Keppel Quarry: Appendix A-1c**
**Sentry Well Hydrographs and Trigger Values**




**Trigger Exceedences (OW8s)**

| Date | Season | Trigger Type |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

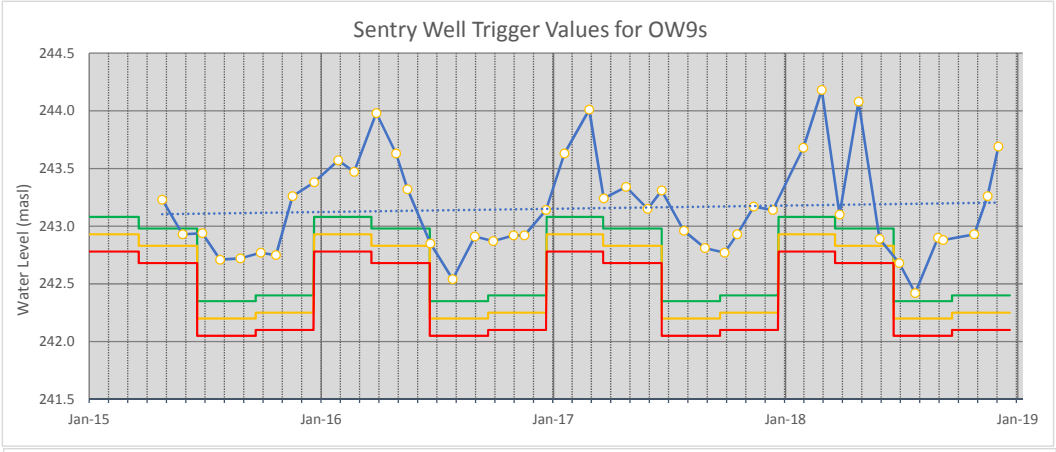
green triggers not included




**Trigger Exceedences (OW8d)**

| Date | Season | Trigger Type |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

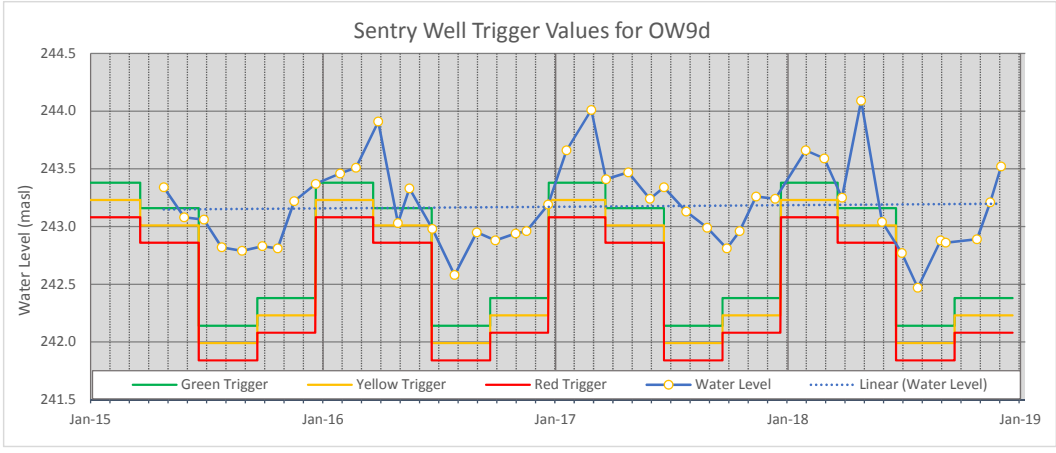
green triggers not included




**Trigger Exceedences (OW9s)**

| Date | Season | Trigger Type |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

green triggers not included

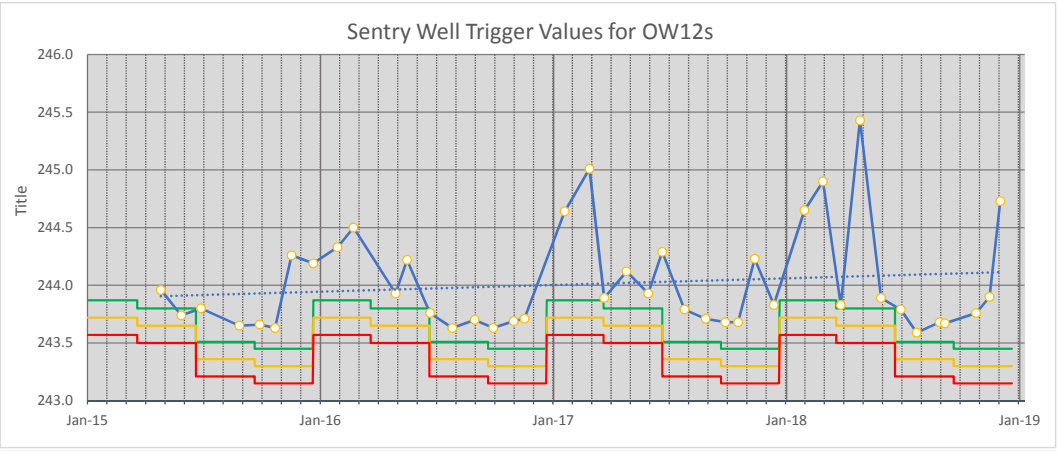



**Trigger Exceedences (OW9d)**

| Date | Season | Trigger Type |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

green triggers not included

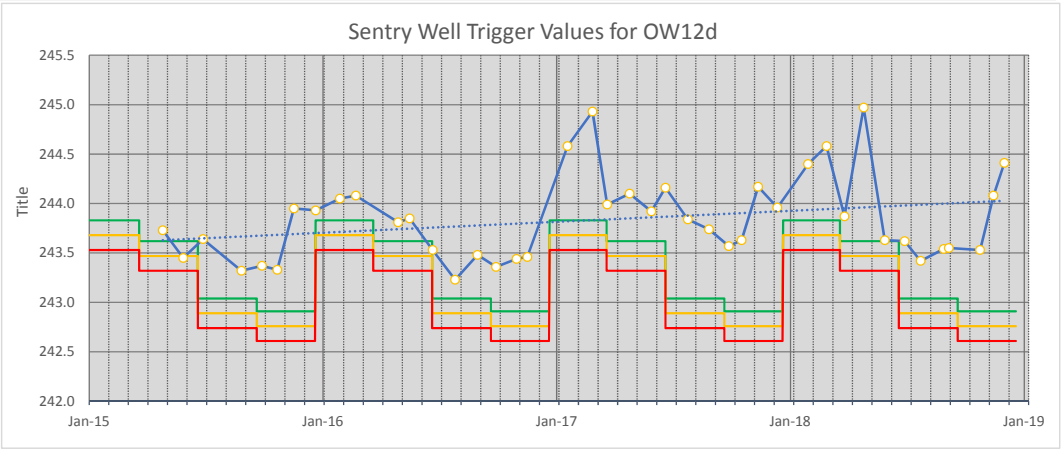
**Keppel Quarry: Appendix A-1c**
**Sentry Well Hydrographs and Trigger Values**




**Trigger Exceedences (OW12s)**

| Date | Season | Trigger Type |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

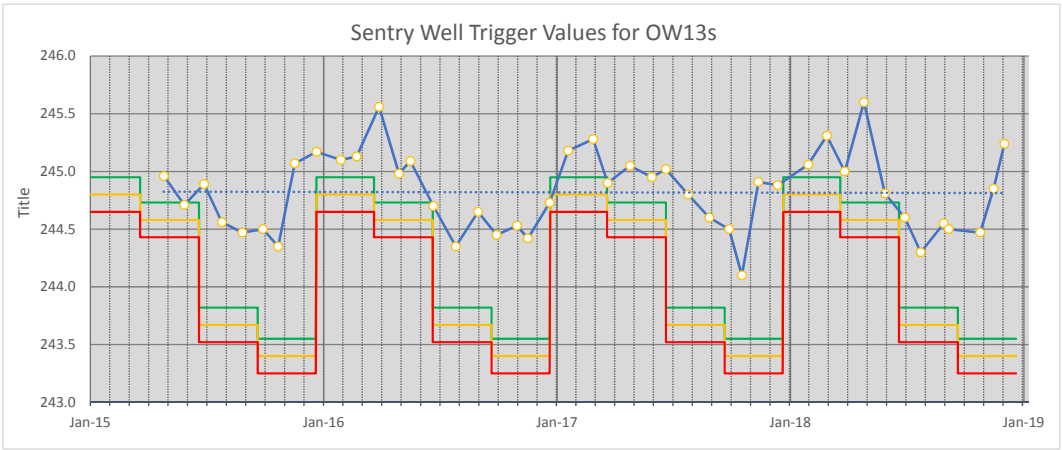
green triggers not included




**Trigger Exceedences (OW12d)**

| Date | Season | Trigger Type |
|---|---|---|
| 29-May-15 | Spring | Yellow |
| | | |
| | | |
| | | |
| | | |
| | | |

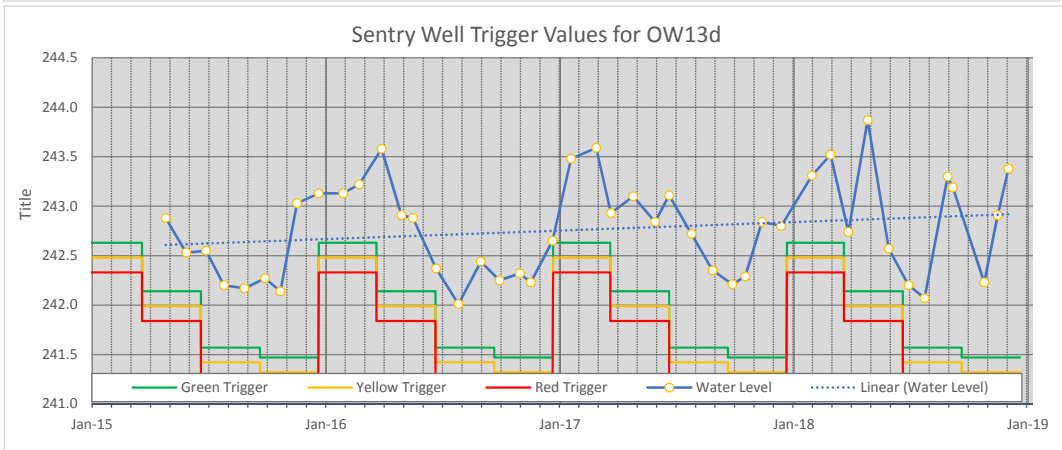
green triggers not included




**Trigger Exceedences (OW13s)**

| Date | Season | Trigger Type |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

green triggers not included

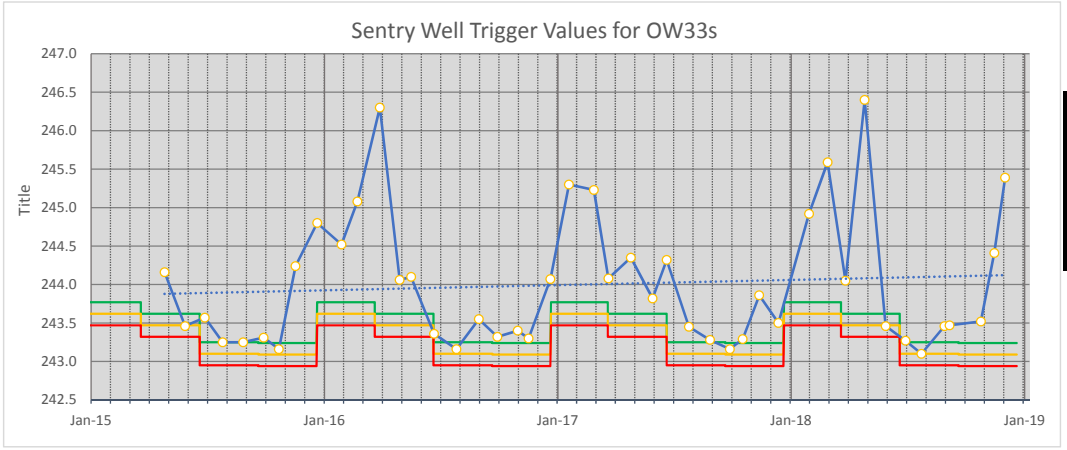



**Trigger Exceedences (OW13d)**

| Date | Season | Trigger Type |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

green triggers not included

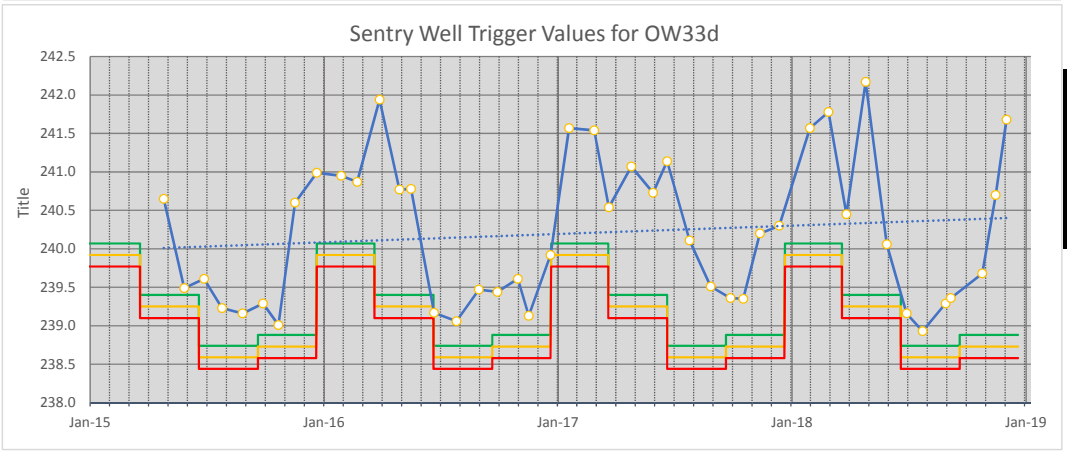
**Keppel Quarry: Appendix A-1c**
**Sentry Well Hydrographs and Trigger Values**




**Trigger Exceedences (OW33s)**

| Date | Season | Trigger Type |
|---|---|---|
| 30-May-18 | Spring | Yellow |
| | | |
| | | |
| | | |
| | | |
| | | |

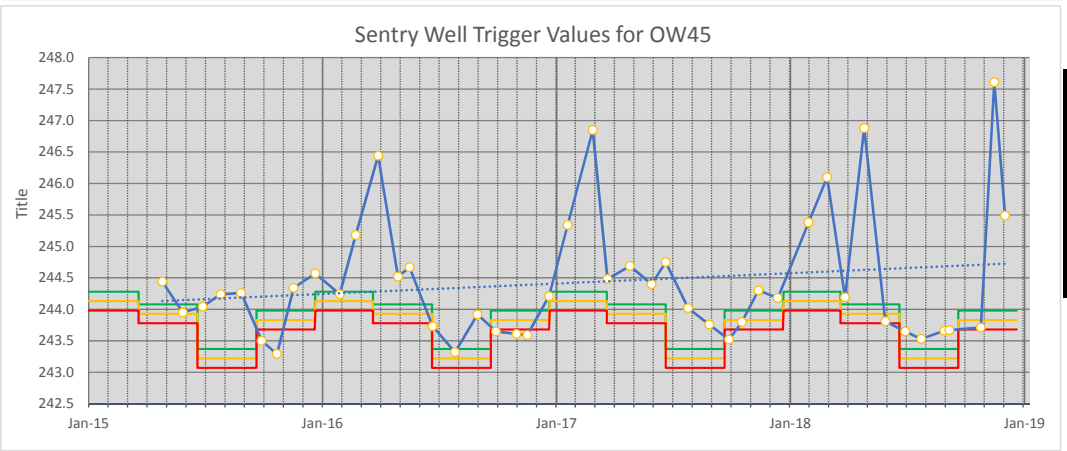
green triggers not included




**Trigger Exceedences (OW33d)**

| Date | Season | Trigger Type |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

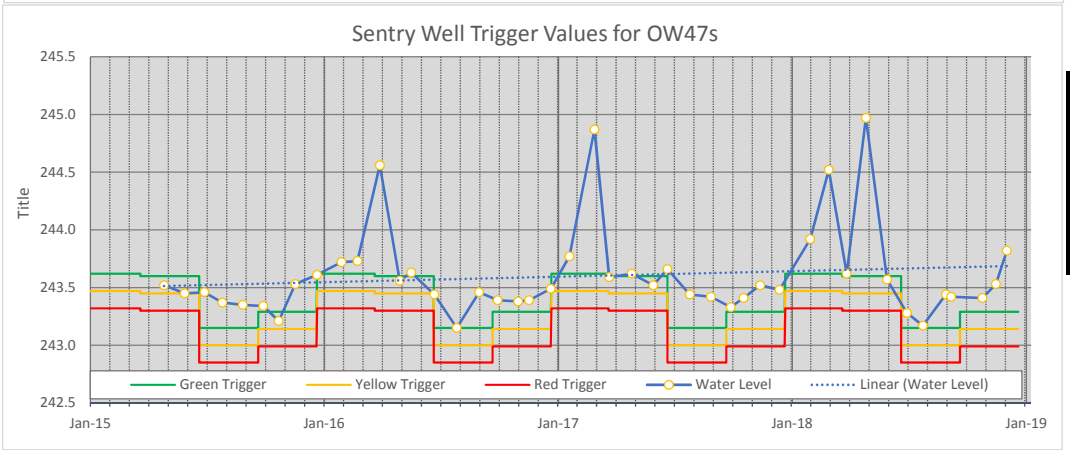
green triggers not included




**Trigger Exceedences (OW45)**

| Date | Season | Trigger Type |
|---|---|---|
| 29-Sep-15 | Fall | Red |
| 23-Oct-15 | Fall | Red |
| 29-Sep-16 | Fall | Red |
| 31-Oct-16 | Fall | Red |
| 17-Nov-16 | Fall | Red |
| 28-Sep-17 | Fall | Red |
| 30-May-18 | Spring | Yellow |
| 25-Oct-18 | Spring | Yellow |

green triggers not included

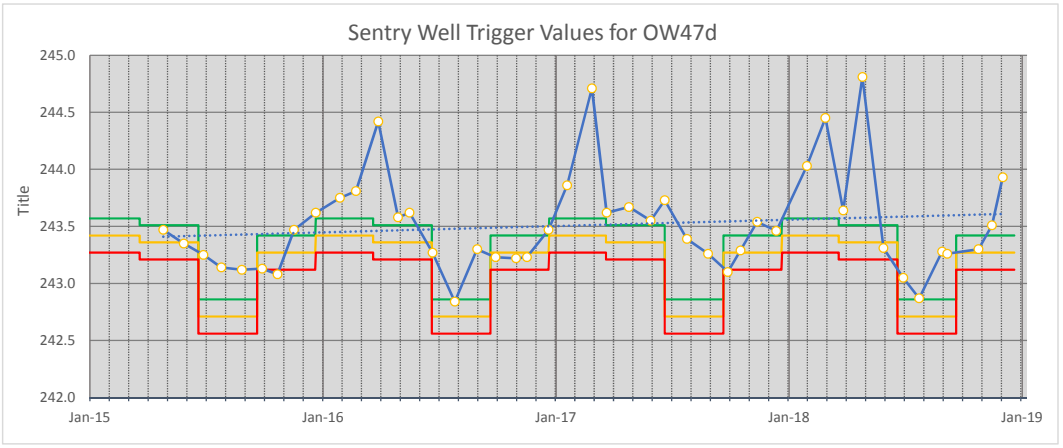



**Trigger Exceedences (OW47s)**

| Date | Season | Trigger Type |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

green triggers not included

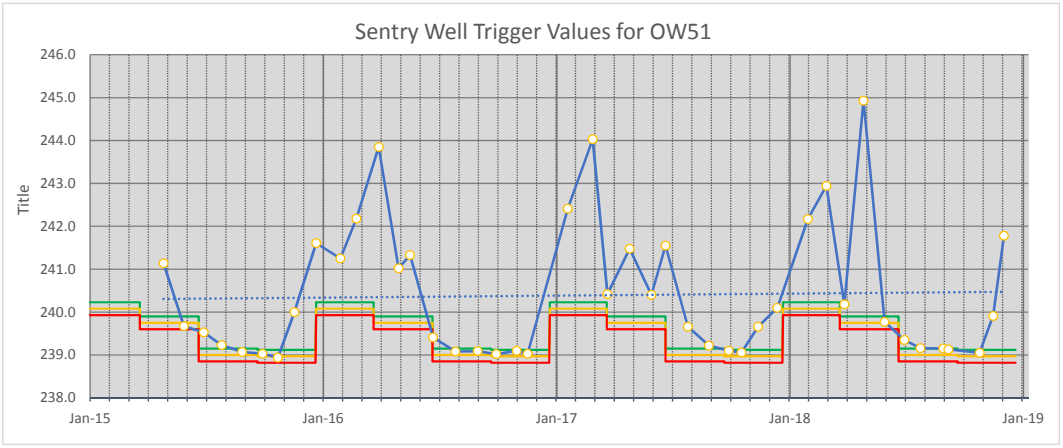
**Keppel Quarry: Appendix A-1c**
**Sentry Well Hydrographs and Trigger Values**




**Trigger Exceedences (OW47d)**

| Date | Season | Trigger Type |
|---|---|---|
| 29-May-15 | Spring | Yellow |
| 29-Sep-15 | Fall | Yellow |
| 23-Oct-15 | Fall | Red |
| 29-Sep-16 | Fall | Yellow |
| 31-Oct-16 | Fall | Yellow |
| 17-Nov-16 | Fall | Yellow |
| 28-Sep-17 | Fall | Red |
| 30-May-18 | Spring | Yellow |

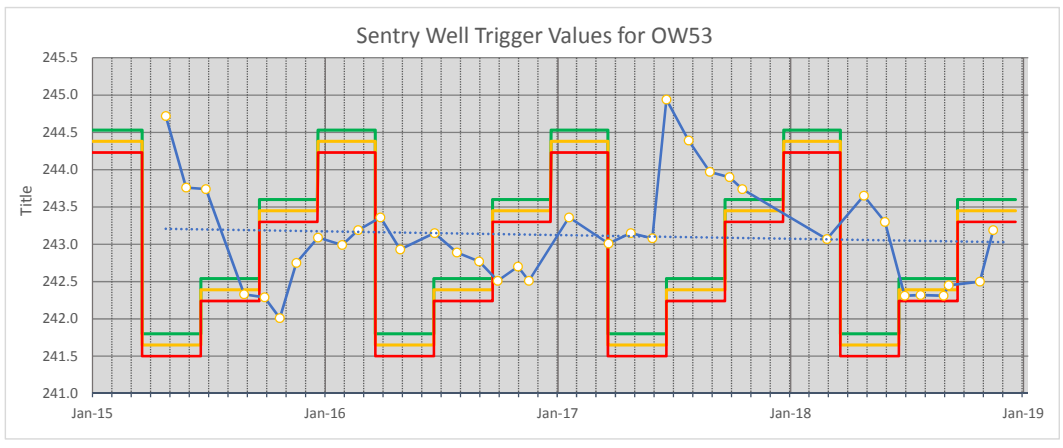
green triggers not included




**Trigger Exceedences (OW51d)**

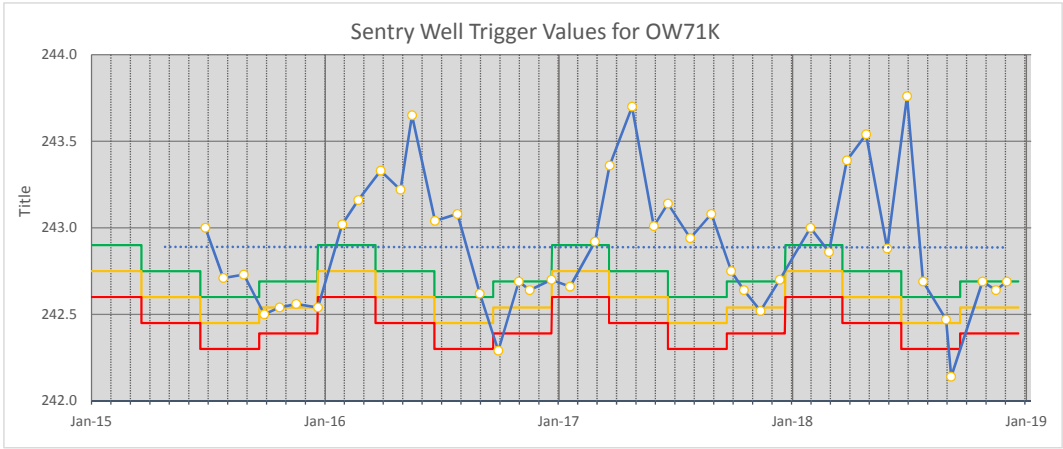
| Date | Season | Trigger Type |
|---|---|---|
| 23-Oct-15 | Fall | Yellow |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

green triggers not included




**Trigger Exceedences (OW53d)**

| Date | Season | Trigger Type |
|---|---|---|
| 28-Aug-18 | Summer | Yellow |
| 29-Sep-15 | Fall | Red |
| 23-Oct-15 | Fall | Red |
| 18-Nov-15 | Fall | Red |
| 22-Dec-15 | Winter | Red |
| 29-Jan-16 | Winter | Red |
| 23-Feb-16 | Winter | Red |
| 29-Sep-16 | Fall | Red |
| 31-Oct-16 | Fall | Red |
| 17-Nov-16 | Fall | Red |
| 19-Jan-17 | Winter | Red |
| 28-Feb-18 | Winter | Red |
| 25-Jul-18 | Summer | Yellow |
| 30-Aug-18 | Summer | Yellow |
| 26-Oct-18 | Fall | Red |
| 16-Nov-18 | Fall | Red |

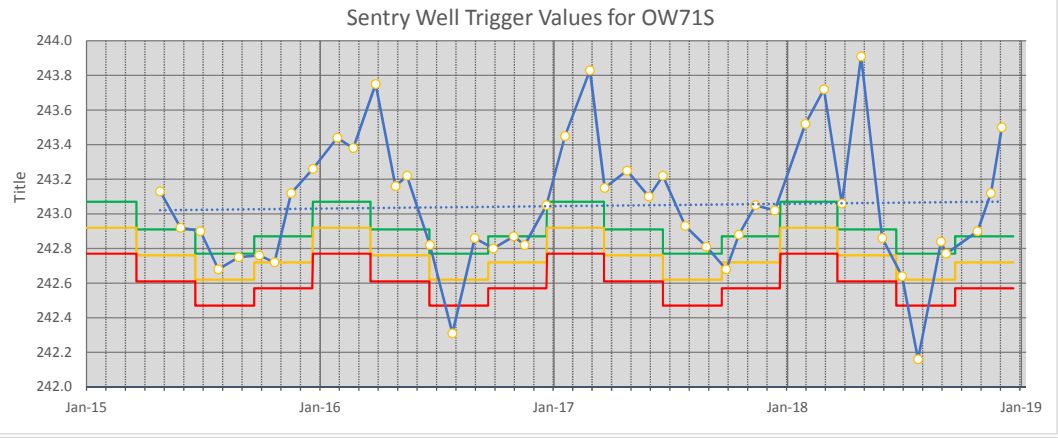



**Trigger Exceedences (OW71K)**

| Date | Season | Trigger Type |
|---|---|---|
| 29-Sep-15 | Fall | Yellow |
| 23-Oct-15 | Fall | Yellow |
| 22-Dec-16 | Winter | Red |
| 29-Sep-16 | Fall | Red |
| 19-Jan-17 | Winter | Yellow |
| 13-Nov-17 | Fall | Yellow |
| 26-Oct-18 | Fall | Red |

green triggers not included

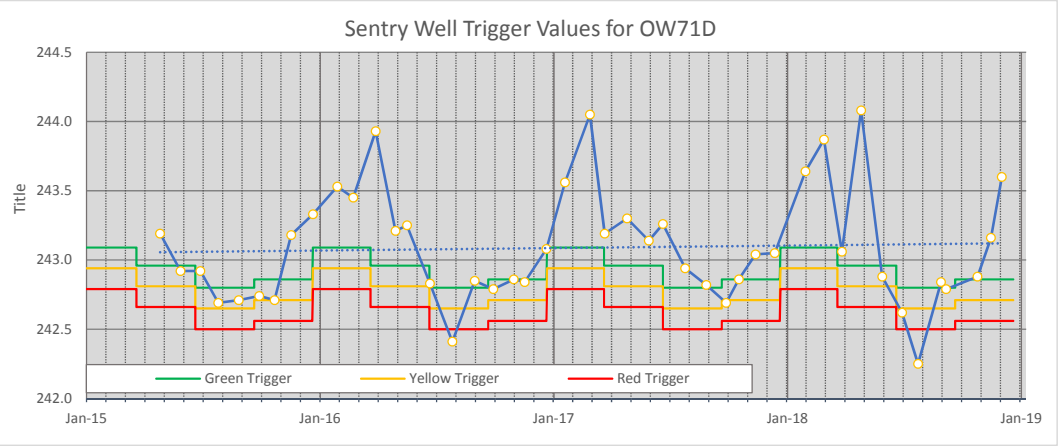
**Keppel Quarry: Appendix A-1c**
**Sentry Well Hydrographs and Trigger Values**




**Trigger Exceedences (OW71s)**

| Date | Season | Trigger Type |
|---|---|---|
| 27-Jul-16 | Summer | Red |
| 28-Sep-17 | Fall | Yellow |
| 25-Jul-18 | Summer | Red |

green triggers not included




**Trigger Exceedences (OW71d)**

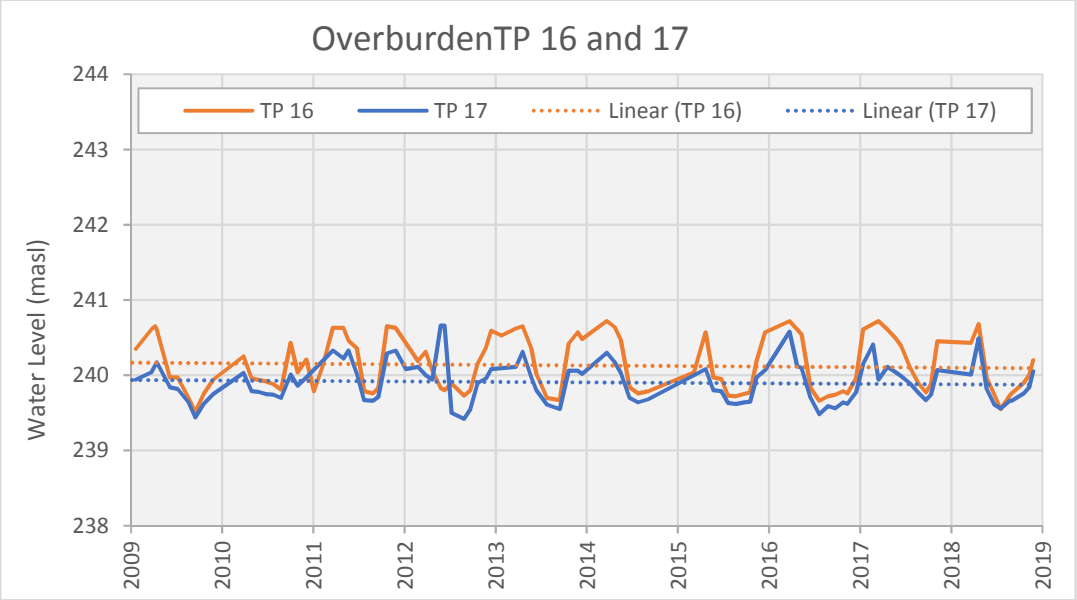
| Date | Season | Trigger Type |
|---|---|---|
| 27-Jul-16 | Summer | Red |
| 28-Sep-17 | Fall | Yellow |
| 25-Jul-18 | Summer | Red |

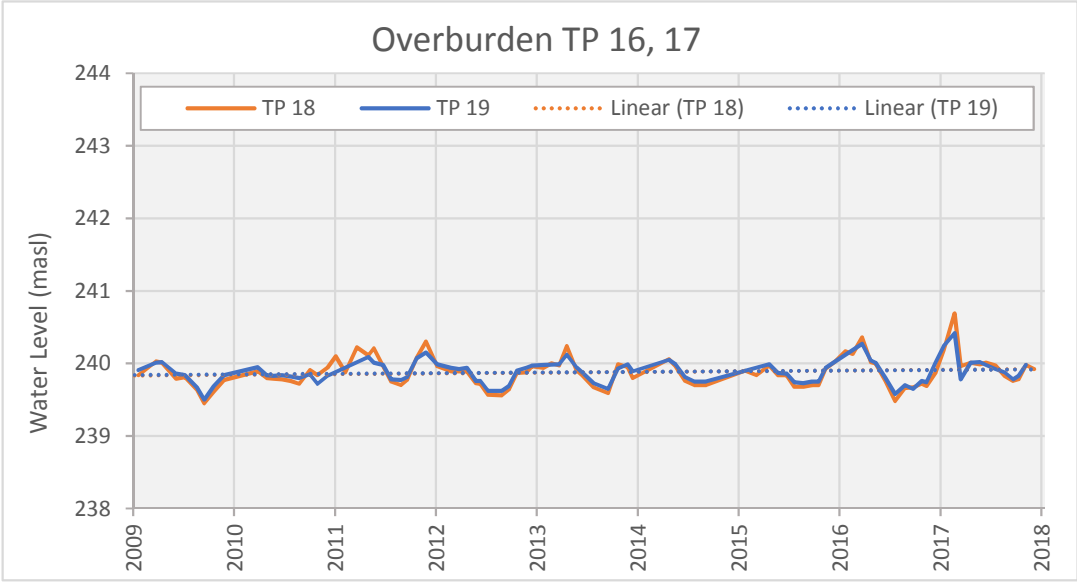
green triggers not included

# APPENDIX A1-d

# OVERBURDEN TEST PITS

**Keppel Quarry: Appendix A-1d**
**Overburden Test Pits**

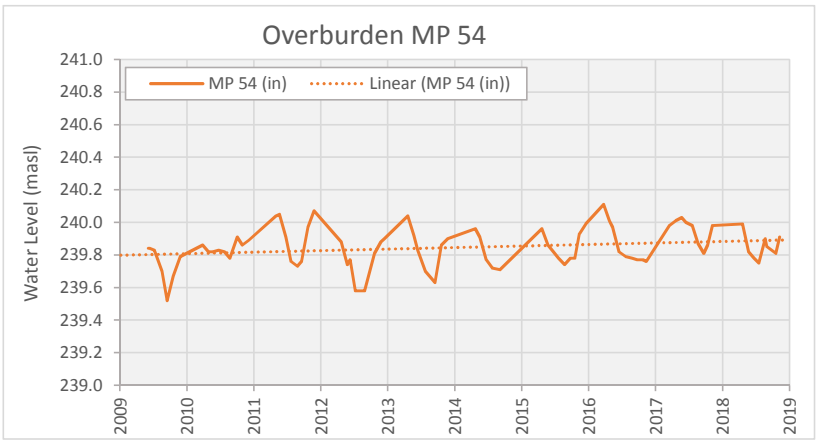


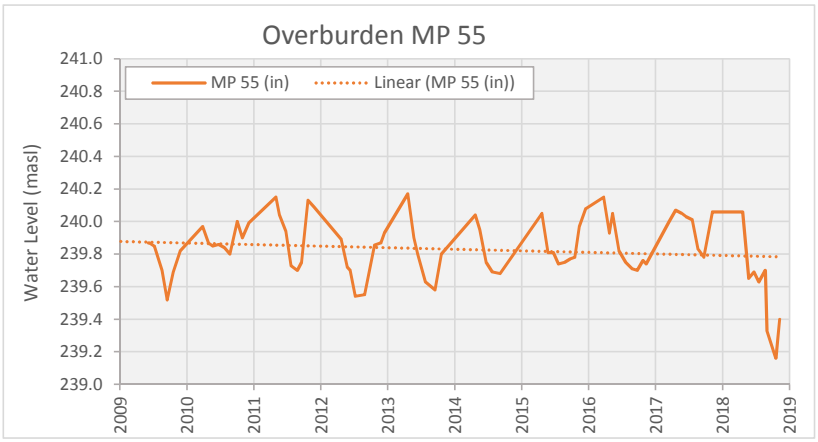



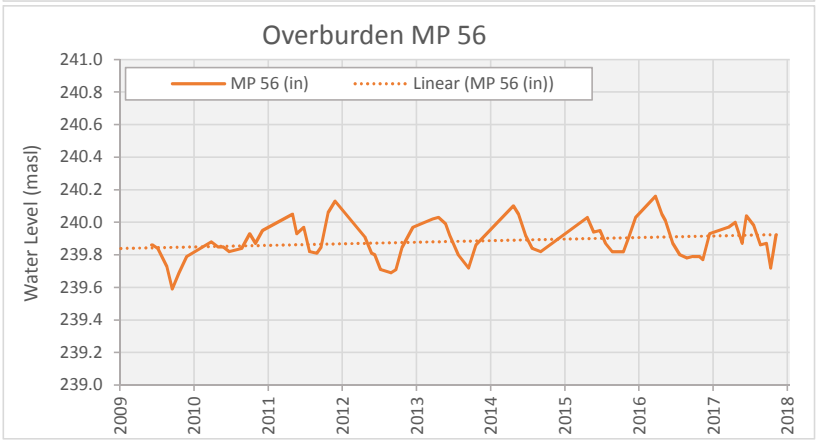
# APPENDIX A1-e

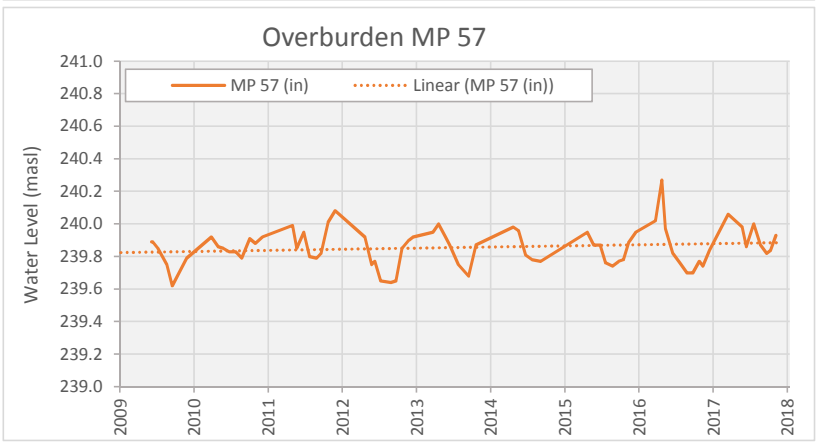
# OVERBURDEN MINI-PIEZOMETERS

**Keppel Quarry: Appendix A1-e**
**Groundwater Hydrographs**



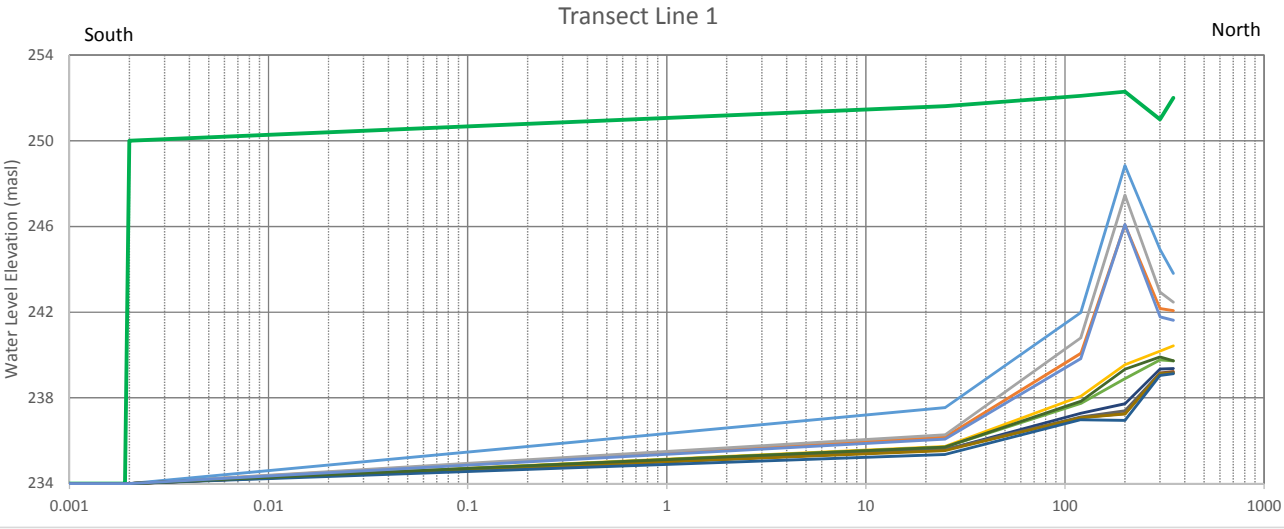



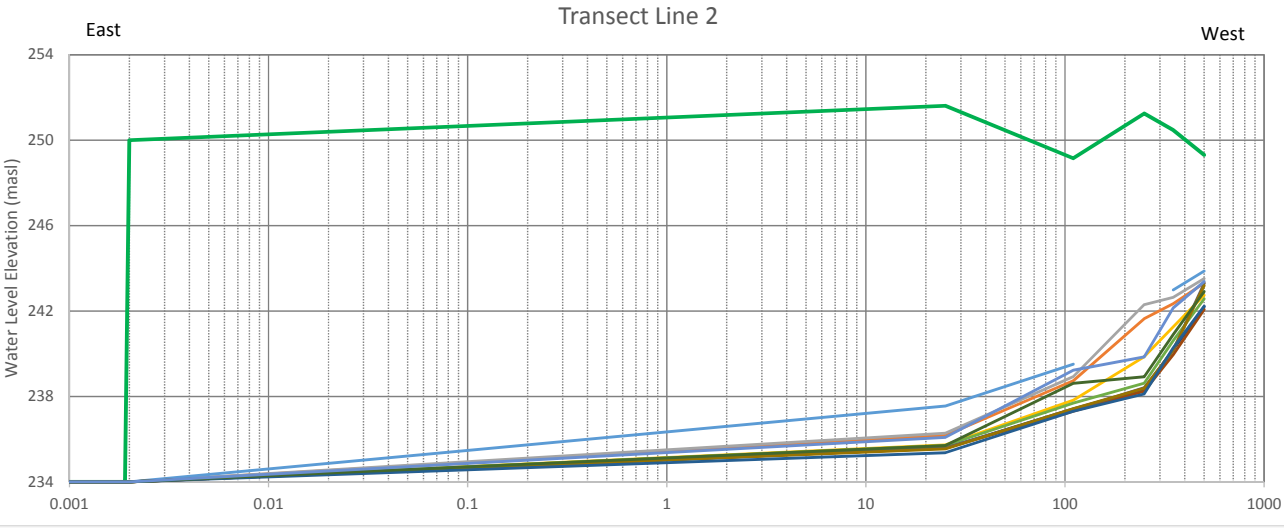



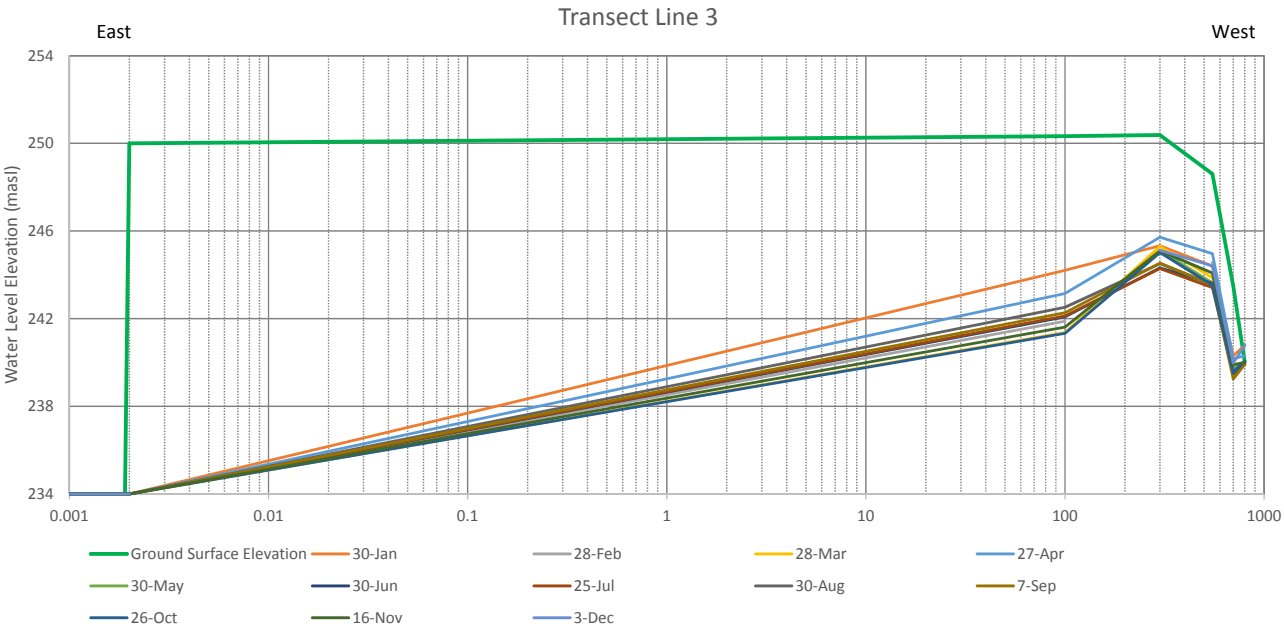
# APPENDIX A2

# DISTANCE – DRAWDOWN PLOTS

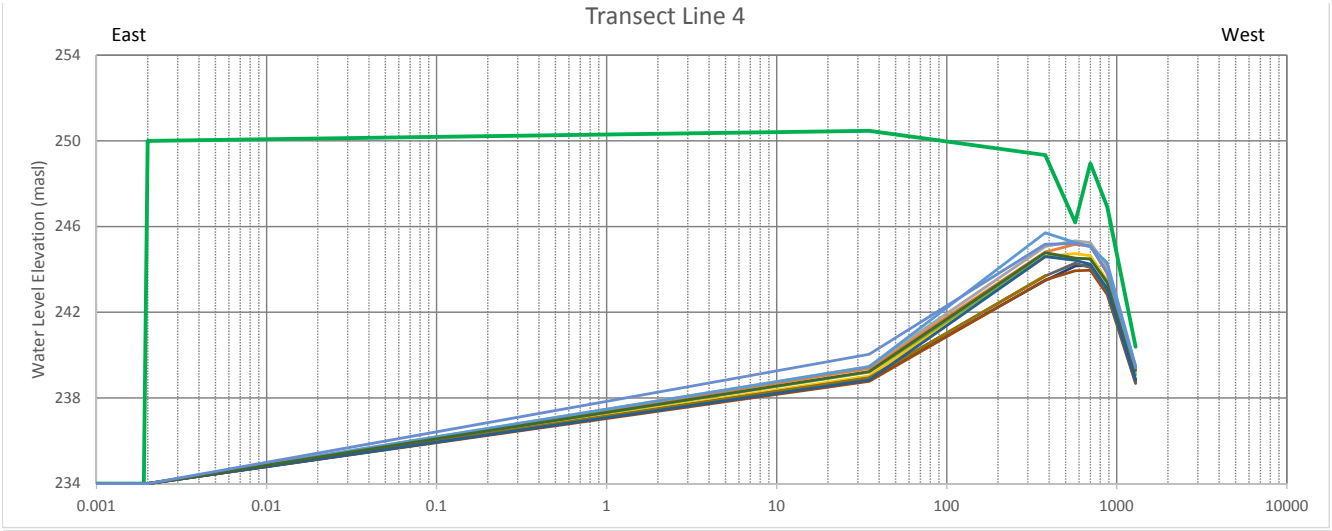
**Keppel Quarry: Appendix A2**
**Distance-Water Level Graphs**

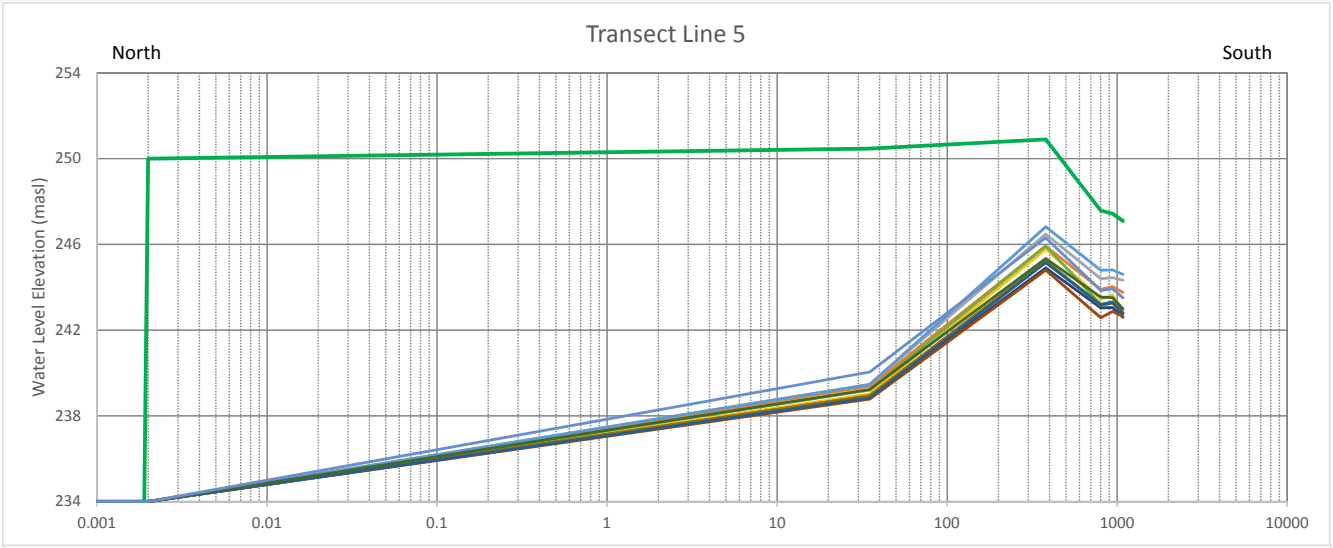


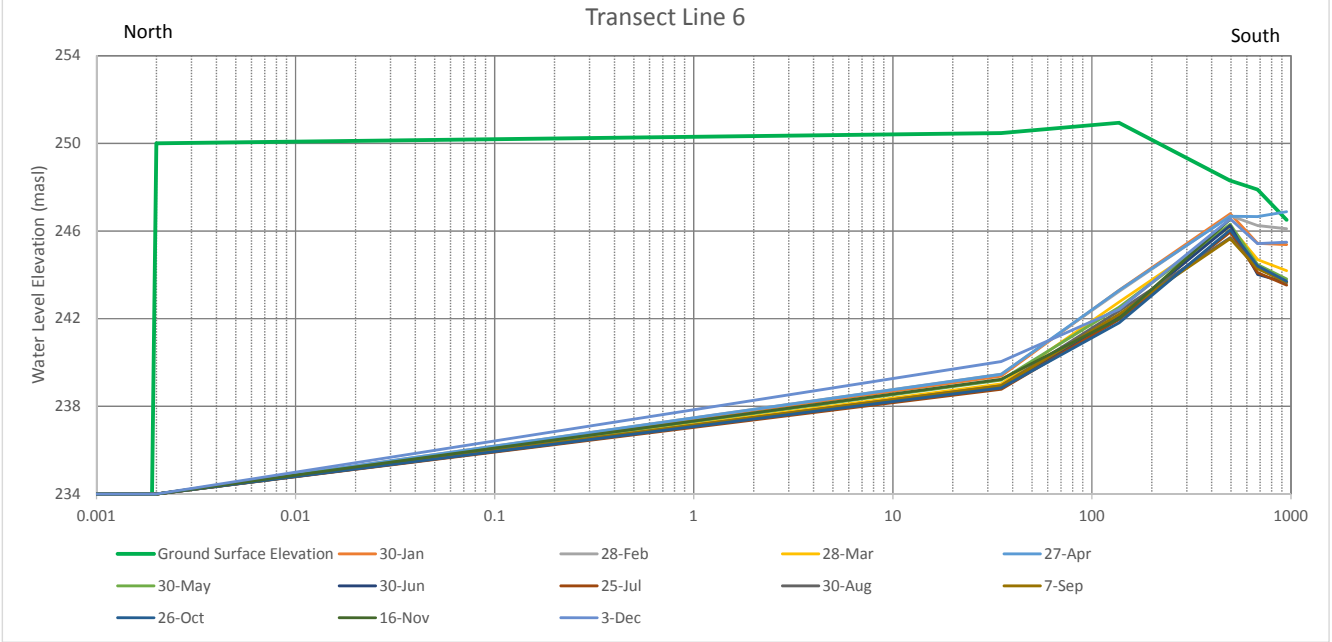



**Keppel Quarry: Appendix A2**
**Distance-Water Level Graphs**



# APPENDIX B

# BLAST REPORTING

June 26, 2019

Harold Sutherland Construction
323545 East Linton Road, R.R #2
Kemble, Ontario, Canada N0H 1S0

Attention: Mr. Dave Munro

**Re: Keppel Quarry: 2018 Blast Reporting**

Dear Sir:

Whitewater Hydrogeology Ltd. (Whitewater) is pleased to present a summary of the 2018 Blasting Monitoring Program, which is a condition of the Aggregate Resource Act license for the Keppel Quarry. The Blasting Monitoring Program was developed to ensure that blasting operations are carried out in a safe and productive manner and to ensure no damage to any buildings, structures or residences surrounding the Keppel Quarry.

Blasts were designed by Austin Powder Ltd. so that the seismic activity (vibrations) and noise induced by blasting operations remain within the guidelines set by the Ministry of the Environment, Conservation and Parks (MECP). Austin Powder Ltd. set up the primary monitors and HSCL we set up any additional monitors as required.

The Adaptive Management Plan (AMP) stipulates that all blasts be monitored for vibration and overpressure using digital seismographs. In 2018, there were 13 blasts in total, which took place on:

- April 3 at 4:30 pm
- April 4 at 4:02 pm
- May 15 at 2:06 pm
- June 28 at 4:05 pm
- July 19 at 3:48 pm
- August 15 at 4:42 pm
- September 17 at 2:55 pm
- October 10 at 2:02 pm
- October 29 at 2:08 pm
- November 5 at 4:56 pm
- November 13 at 2:02 pm
- November 30 at 1:53 pm
- December 13 at 2:42 pm

The recommended limit set by the MECP for vibration and overpressure (noise) are as follows:

- • Vibration - 12.5 mm/sec; and
- • Overpressure (Noise) - 128 dB.

Event Reports showing noise and vibration readings measured in 2018 during each blast are appended and the results are summarized in Table 1.

Seismograph readings showed that vibrations levels ranged from not registered 8.814 mm/sec. Overpressure readings ranged from to not registered to 167 dB average. All measured vibration levels were below the recommended MOECC limit in 2018.

No fly rock was generated beyond the blast area in any of the blasts in 2018.

TABLE 1: BLAST SUMMARY RESULTS

| Receptor | Date | Blast Distance (m) | Overpressure (dB) | Vibration (mm/s) | Weather |
|---|---|---|---|---|---|
| ***178841 Grey Rd 17*** | April 3, 2018 | 642 | NR | NR | Cloudy/High Clouds |
| | April 4, 2018 | 553 | 117 | 1.951 | Heavy Snow |
| | May 15, 2018 | 585 | | | |
| | June 28, 2019 | 609 | 118 | 2.715 | Clear |
| | July 19, 2018 | 569 | 118 | 3.827 | Clear |
| | August 15, 2018 | 616 | 120 | 2.024 | Cloudy/High Clouds |
| | September 17, 2018 | 655 | 120 | 0.311 | Clear |
| | October 10, 2018 | 584 | 118 | 2.218 | Clear |
| | October 29, 2018 | 635 | 119 | 0.22 | Light Snow |
| | November 5, 2018 | 664 | 119 | NR | Light Rain |
| | November 13, 2018 | 642 | 116 | NR | Heavy Snow |
| | November 30, 2018 | 563 | 119 | NR | Cloudy/High Clouds |
| | December 13, 2018 | 576 | 123 | 0.22 | Overcast/Low Clouds |
| ***283197 Conc Rd 10*** | April 3, 2018 | 966 | NR | NR | Cloudy/High Clouds |
| | April 4, 2018 | 1097 | 116 | NR | Heavy Snow |
| | May 15, 2018 | 1056 | | | |
| | June 28, 2019 | 1048 | 123 | 0.622 | Clear |
| | July 19, 2018 | 1059 | NR | NR | Clear |
| | August 15, 2018 | 1004 | 114 | 3.471 | Cloudy/High Clouds |
| | September 17, 2018 | 1014 | 113 | 2.222 | Clear |
| | October 10, 2018 | 1028 | 116 | 2.318 | Clear |
| | October 29, 2018 | 1072 | 116 | 0.254 | Light Snow |
| | November 5, 2018 | 926 | 110 | NR | Light Rain |
| | November 13, 2018 | 1082 | 115 | NR | Heavy Snow |
| | November 30, 2018 | 1042 | 117 | NR | Cloudy/High Clouds |
| | December 13, 2018 | 1021 | 123 | 0.311 | Overcast/Low Clouds |
| ***178717 Grey Rd 17*** | April 3, 2018 | 552 | 108 | 3.195 | Cloudy/High Clouds |
| | April 4, 2018 | 678 | 108 | 3.05 | Heavy Snow |
| | May 15, 2018 | 657 | | | |
| | June 28, 2019 | 624 | 124 | 2.036 | Clear |
| | July 19, 2018 | 644 | NR | NR | Clear |
| | August 15, 2018 | 589 | 120 | 2.024 | Cloudy/High Clouds |
| | September 17, 2018 | 583 | 120 | 2.163 | Clear |
| | October 10, 2018 | 616 | 122 | 1.746 | Clear |
| | October 29, 2018 | 636 | 124 | 2.214 | Light Snow |
| | November 5, 2018 | 518 | NR | NR | Light Rain |
| | November 13, 2018 | 643 | 115 | NR | Heavy Snow |
| | November 30, 2018 | 635 | 119 | NR | Cloudy/High Clouds |
| | December 13, 2018 | 615 | 119 | 0.311 | Overcast/Low Clouds |

Notes: NR = Not Registered

If you have any questions, please do not hesitate to call anytime.

7/12/2019

X Tecia White

Tecia White, M.Sc., P.Geo (License #0701)
Senior Hydrogeologist/President
Signed by: Tecia

# AUSTIN POWDER LTD.
# BLAST REPORT

327-Orillia
RR #4 ON, Orillia, Canada L3V 1- 84

Blast No.: 2018-04 | Blast Type: Stone Quarry/Stone Mine - Production | Customer: HAROLD SUTHERLAND CONST.-KEPPEL (HAR1525-001)

Date/Time: 06/28/2018 16:05 | Pit/Permit: KEPPEL QUARRY / SHOT SERVICE | Location: West and East side

## ENVIRONMENT

Method Used: U.T.M. | Weather: Clear | Wind From: WSW

Temperature: 29 °C | Terrain: Flat | Wind Velocity: 8-0 km/h

Blast U.T.M.: 17N 500199 mE 4942412 mN

## NEAREST PROTECTED STRUCTURE

Compass Point: NNW

Structure Name: 178841 Grey Rd #17 | Direction/Bearing: 351 °

Structure Type: Dwelling | Distance: 607 m

Structure U.T.M.: 17N 500101 mE 4943011 mN

## LAYOUT

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | Hole Depth: | 10.06-16... m | Material Blasted: | Limestone | Total Meters Drilled: | 2,141.5 m |
| No. of Holes: | 155 | Subdrilling: | 0.61 m | Burden: | [See Below] | Water Depth: | 4.57 m |
| No. of V.P.† Holes: | 154 | Face Height: | 9.45-15.85 m | Spacing: | [See Below] | Stem Length: | min 1.83 m |
| No. of Rows: | [See Below] | Drilling Angle: | [See Below] | Back Fill Depth: | 0.00 m | Area Type: | [See Below] |
| Diameter: | [See Below] | Mats Used: | No | Stem Type: | Clear Stone | Method: | [See Below] |

† V.P. = Volume Producing

## WEIGHTS

| | | | | | |
|---|---|---|---|---|---|
| | | Max. Wt. of Expl. in Overlapped Decks: | 511.8 kg | Volume Produced: | 22,954.3 m³ |
| Initiation: | Electronic | Max. Wt. of Expl. Per 8 ms Interval: | 511.8 kg | Weight Produced: | 60,819.1 t |
| Firing Device: | E*Star Blasting Machine (WRFD) | Max. No. of Holes Per 8 ms Interval: | 3 | Powder Factor 1: | 2.800 t/kg |
| Other Method: | | Max. Wt. of Explosive Per Hole: | 170.6 kg | Powder Factor 2: | 0.946 kg/m³ |
| Mfg and Model: | DBM1600-2-RC | Scaled Distance Factor (max charge): | 46.46 | Rock Density: | 2.650 t/m³ |
| Initiation Settings: | | Scaled Distance Factor (per delay): | 26.82 | | |
| Series Resistance (ohms): | | | | | |

## SEISMOGRAPHS

See seismographs on separate page

## CREW

Blast occurred other than scheduled time: No | Misfire Occurred: No | Protective Cover: Loader Bucket

| Last Name | First Name | License / Cert | 2nd License / Cert | In Charge | Tied In | Chk. Tie-In | Driller | Layout |
|---|---|---|---|---|---|---|---|---|
| SMART | EVAN, C | * ON - N/A | | Yes | Yes | Yes | No | Yes |
| BELTRAME | ALEXANDER, A | | | No | Yes | No | No | No |
| FRALICK | CRAIG, A | | | No | Yes | No | No | No |
| KOUYOUMJIAN | MACKENZIE, H | | | No | Yes | No | No | No |
| NEWTON | JOHN, D | | | No | Yes | Yes | No | No |
| O'DONOHOE | LIAM, J | | | No | Yes | No | No | No |

# AUSTIN POWDER LTD.
# BLAST REPORT

327-Orillia
RR #4 ON, Orillia, Canada L3V 1- 84

Blast No.: 2018-04
Blast Type: Stone Quarry/Stone Mine - Production
Customer: HAROLD SUTHERLAND CONST.-KEPPEL (HAR1525-001)
Date/Time: 06/28/2018 16:05
Pit/Permit: KEPPEL QUARRY / SHOT SERVICE
Location: West and East side

***PRODUCTS AND SERVICES***

| Number | Product Description | Quantity | Weight ( kg ) |
|---|---|---|---|
| 11782 | E*Star Booster - 454g (1 lb) | 94.00 ea | 43.49 |
| 15107 | Eagle 450 E*Star Booster (1lb) | 216.00 ea | 216.00 |
| 15001 | 24' E*STAR Detonator - QM | 151.00 ea | 0.00 |
| 15003 | 40' E*STAR Detonator - QM | 64.00 ea | 0.00 |
| 15030 | 60' E*STAR Detonator - QM/HD | 95.00 ea | 0.00 |
| 12276 | E*Star Bus Wire - 1250' spool | 2.00 sp | 0.00 |
| 15128 | Hydromite 4100 Bulk NB | 21,460.00 kg | 21,460.00 |
| 12981 | Mini Stem Plug - 6015 | 134.00 ea | 0.00 |
| | | Total Weight of Explosives (Include Primers) ( kg ): | 21,719.48 |

***COMMENTS / EXPLANATIONS***

Signature of Blaster in Charge

# AUSTIN POWDER LTD.
# BLAST REPORT

327-Orillia
RR #4 ON, Orillia, Canada L3V 1- 84

Blast No.: 2018-04 | Blast Type: Stone Quarry/Stone Mine - Production | Customer: HAROLD SUTHERLAND CONST.-KEPPEL (HAR1525-001)

Date/Time: 06/28/2018 16:05 | Pit/Permit: KEPPEL QUARRY / SHOT SERVICE | Location: West and East side

*Pattern: 1*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| No. of Holes: | 91 | Hole Depth: | 16.46 m | Burden: | 3.35 m | Area Type: | Conventional |
| No. of V.P.† Holes: | 91 | Diameter: | 114.3 mm | Spacing: | 3.66 m | Method: | Specified |
| No. of Rows: | 2 | Subdrilling: | 0.61 m | | | | (H = 15.85 m) |
| Drilling Angle: | 0 ° | Face Height: | 15.85 m | | | Total volume for pattern: | 17,687.4 m³ |
| † V.P. = Volume Producing | | | | | | Total weight for pattern: | 46,864.0 t |

*Pattern: 2*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| No. of Holes: | 63 | Hole Depth: | 10.06 m | Burden: | 3.05 m | Area Type: | Center Start/Breakout |
| No. of V.P.† Holes: | 63 | Diameter: | 114.3 mm | Spacing: | 3.05 m | Method: | Specified |
| No. of Rows: | 3 | Subdrilling: | 0.61 m | | | | (H = 9.45 m) |
| Drilling Angle: | 0 ° | Face Height: | 9.45 m | | | Total volume for pattern: | 5,266.9 m³ |
| † V.P. = Volume Producing | | | | | | Total weight for pattern: | 13,955.1 t |

Total blast volume: 22,954.3 m³

Total weight produced: 60,819.1 t

# AUSTIN POWDER LTD.
# BLAST REPORT

327-Orillia
RR #4 ON, Orillia, Canada L3V 1- 84

Blast No.: 2018-04 | Blast Type: Stone Quarry/Stone Mine - Production | Customer: HAROLD SUTHERLAND CONST.-KEPPEL (HAR1525-001)

Date/Time: 06/28/2018 16:05 | Pit/Permit: KEPPEL QUARRY / SHOT SERVICE | Location: West and East side

## *SEISMOGRAPH 1 - 178841 GREY ROAD #17*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Data Type: | Seismic Record | Seismograph Type: | Instantel - Minimate Blaster | | | | |
| Date: | 06/28/18 | Trigger Level: | 1.50 mm/s | 115.00 dB | Transverse: | 1.524 mm/s | 43.0 Hz |
| Time: | 16:05 | Calibration Date: | 01/17/18 | | Vertical: | 1.524 mm/s | 16.0 Hz |
| Distance From Blast: | 606.86 m | Calibration Signal: | OK | | Longitudinal: | 2.667 mm/s | 34.0 Hz |
| Direction From Blast: | NNW | Geophone Min. Freq.: | --- Hz | | PPV: | --- mm/s | --- Hz |
| Readout: | Printed Copy | Mic. Min. Freq.: | --- Hz | | Acoustic: | 118 dB | |
| Location: | Bolted to Bedrock. | | | | Vector Sum: | 2.715 mm/s | |
| U.T.M.: | 17N 500101 mE 4943011 mN | | | | | | |
| Reader and Firm: | Evan Smart, AUSTIN POWDER | | | | | | |
| Analyst and Firm: | | | | | | | |
| Installer and Firm: | Evan Smart, Austin Powder Ltd. | | | | | | |

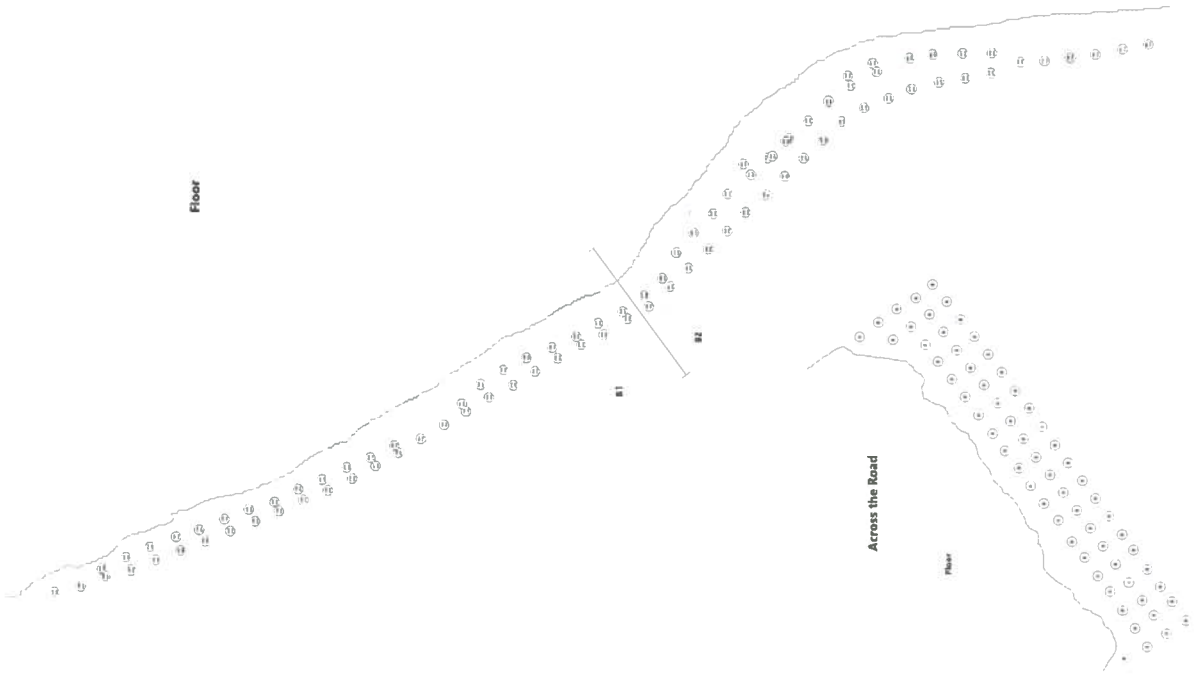
## *SEISMOGRAPH 2 - 178717 GREY RD #17*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Data Type: | Seismic Record | Seismograph Type: | Instantel - Minimate Blaster | | | | |
| Date: | 06/28/18 | Trigger Level: | 1.50 mm/s | 115.00 dB | Transverse: | 0.889 mm/s | 27.0 Hz |
| Time: | 16:05 | Calibration Date: | 01/15/18 | | Vertical: | 1.651 mm/s | 17.0 Hz |
| Distance From Blast: | 624.23 m | Calibration Signal: | OK | | Longitudinal: | 1.778 mm/s | 37.0 Hz |
| Direction From Blast: | SE | Geophone Min. Freq.: | --- Hz | | PPV: | --- mm/s | --- Hz |
| Readout: | Printed Copy | Mic. Min. Freq.: | --- Hz | | Acoustic: | 124 dB | |
| Location: | Spiked and buried. | | | | Vector Sum: | 2.036 mm/s | |
| U.T.M.: | 17N 500660 mE 4941991 mN | | | | | | |
| Reader and Firm: | Evan Smart, AUSTIN POWDER | | | | | | |
| Analyst and Firm: | | | | | | | |
| Installer and Firm: | Evan Smart, Austin Powder Ltd. | | | | | | |

## *SEISMOGRAPH 3 - 283197 CONC. RD. #10*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Data Type: | Seismic Record | Seismograph Type: | Instantel - Minimate Blaster | | | | |
| Date: | 06/28/18 | Trigger Level: | 1.50 mm/s | 115.00 dB | Transverse: | 0.381 mm/s | 57.0 Hz |
| Time: | 16:05 | Calibration Date: | 01/15/18 | | Vertical: | 0.508 mm/s | 43.0 Hz |
| Distance From Blast: | 1,048.82 m | Calibration Signal: | OK | | Longitudinal: | 0.508 mm/s | 51.0 Hz |
| Direction From Blast: | ESE | Geophone Min. Freq.: | --- Hz | | PPV: | --- mm/s | --- Hz |
| Readout: | Printed Copy | Mic. Min. Freq.: | --- Hz | | Acoustic: | 123 dB | |
| Location: | Spiked and buried. | | | | Vector Sum: | 0.622 mm/s | |
| U.T.M.: | 17N 501117 mE 4941905 mN | | | | | | |
| Reader and Firm: | Evan Smart, AUSTIN POWDER | | | | | | |
| Analyst and Firm: | | | | | | | |
| Installer and Firm: | Evan Smart, Austin Powder Ltd. | | | | | | |

Hole Label Mode: Cumulative In-Hole Delays

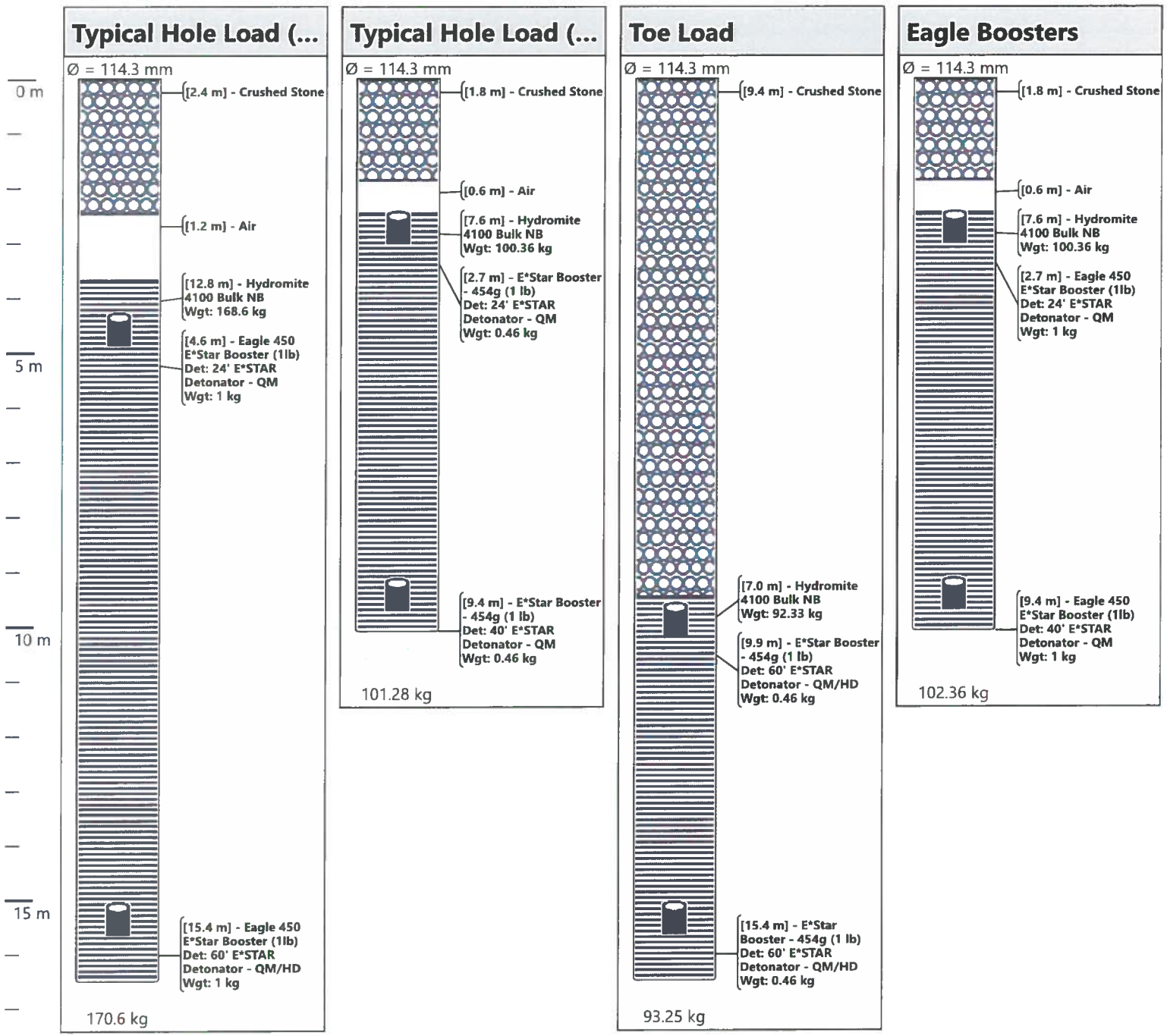


| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ41 | Typical Hole Load (OS) | 0 | 377/382 |
| ZZ44 | Typical Hole Load (OS) | 0 | 268/273 |
| ZZ70 | Typical Hole Load (OS) | 0 | 260/265 |
| ZZ81 | Typical Hole Load (OS) | 0 | 399/404 |
| ZZ35 | Typical Hole Load (OS) | 0 | 440/445 |
| ZZ36 | Typical Hole Load (OS) | 0 | 352/357 |
| ZZ78 | Typical Hole Load (OS) | 0 | 344/349 |
| ZZ13 | Typical Hole Load (OS) | 0 | 580/585 |
| ZZ89 | Typical Hole Load (OS) | 0 | 483/488 |
| ZZ47 | Typical Hole Load (OS) | 0 | 314/319 |
| ZZ6 | Typical Hole Load (OS) | 0 | 692/697 |
| ZZ51 | Typical Hole Load (OS) | 0 | 272/277 |
| ZZ74 | Typical Hole Load (OS) | 0 | 302/307 |
| ZZ91 | Typical Hole Load (OS) | 0 | 525/530 |
| ZZ87 | Typical Hole Load (OS) | 0 | 462/467 |
| ZZ86 | Typical Hole Load (OS) | 0 | 428/433 |
| ZZ34 | Typical Hole Load (OS) | 0 | 373/378 |
| ZZ31 | Typical Hole Load (OS) | 0 | 394/399 |
| ZZ59 | Typical Hole Load (OS) | 0 | 188/193 |
| ZZ30 | Typical Hole Load (OS) | 0 | 482/487 |
| ZZ72 | Typical Hole Load (OS) | 0 | 281/286 |
| ZZ67 | Typical Hole Load (OS) | 0 | 252/257 |
| ZZ10 | Typical Hole Load (OS) | 0 | 650/655 |
| ZZ32 | Typical Hole Load (OS) | 0 | 407/412 |
| ZZ63 | Typical Hole Load (OS) | 0 | 176/181 |
| ZZ21 | Typical Hole Load (OS) | 0 | 491/496 |
| ZZ7 | Typical Hole Load (OS) | 0 | 643/648 |
| ZZ53 | Typical Hole Load (OS) | 0 | 251/256 |
| ZZ65 | Typical Hole Load (OS) | 0 | 231/236 |
| ZZ79 | Typical Hole Load (OS) | 0 | 378/383 |
| ZZ75 | Typical Hole Load (OS) | 0 | 336/341 |
| ZZ9 | Typical Hole Load (OS) | 0 | 622/627 |
| ZZ57 | Typical Hole Load (OS) | 0 | 209/214 |
| ZZ50 | Typical Hole Load (OS) | 0 | 205/210 |
| ZZ29 | Typical Hole Load (OS) | 0 | 428/433 |
| ZZ71 | Typical Hole Load (OS) | 0 | 294/299 |
| ZZ2 | Typical Hole Load (OS) | 0 | 776/781 |
| ZZ27 | Typical Hole Load (OS) | 0 | 503/508 |
| ZZ8 | Typical Hole Load (OS) | 0 | 671/676 |
| ZZ73 | Typical Hole Load (OS) | 0 | 315/320 |
| ZZ77 | Typical Hole Load (OS) | 0 | 357/362 |
| ZZ90 | Typical Hole Load (OS) | 0 | 504/509 |
| ZZ54 | Typical Hole Load (OS) | 0 | 163/168 |
| ZZ64 | Typical Hole Load (OS) | 0 | 197/202 |
| ZZ60 | Typical Hole Load (OS) | 0 | 100/105 |
| ZZ15 | Toe Load | 0 | 546/551 |

| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ1 | Typical Hole Load (OS) | 0 | 797/802 |
| ZZ40 | Typical Hole Load (OS) | 0 | 310/315 |
| ZZ22 | Typical Hole Load (OS) | 0 | 545/550 |
| ZZ4 | Typical Hole Load (OS) | 0 | 734/739 |
| ZZ68 | Typical Hole Load (OS) | 0 | 239/244 |
| ZZ85 | Typical Hole Load (OS) | 0 | 441/446 |
| ZZ18 | Typical Hole Load (OS) | 0 | 512/517 |
| ZZ25 | Toe Load | 0 | 458/463 |
| ZZ55 | Typical Hole Load (OS) | 0 | 230/235 |
| ZZ28 | Toe Load | 0 | 437/442 |
| ZZ33 | Typical Hole Load (OS) | 0 | 461/466 |
| ZZ46 | Toe Load | 0 | 247/252 |
| ZZ3 | Typical Hole Load (OS) | 0 | 755/760 |
| ZZ5 | Typical Hole Load (OS) | 0 | 713/718 |
| ZZ82 | Typical Hole Load (OS) | 0 | 386/391 |
| ZZ48 | Typical Hole Load (OS) | 0 | 226/231 |
| ZZ49 | Typical Hole Load (OS) | 0 | 293/298 |
| ZZ62 | Typical Hole Load (OS) | 0 | 155/160 |
| ZZ24 | Typical Hole Load (OS) | 0 | 524/529 |
| ZZ58 | Typical Hole Load (OS) | 0 | 121/126 |
| ZZ42 | Typical Hole Load (OS) | 0 | 289/294 |
| ZZ45 | Typical Hole Load (OS) | 0 | 335/340 |
| ZZ76 | Typical Hole Load (OS) | 0 | 323/328 |
| ZZ19 | Typical Hole Load (OS) | 0 | 525/530 |
| ZZ88 | Typical Hole Load (OS) | 0 | 449/454 |
| ZZ38 | Typical Hole Load (OS) | 0 | 331/336 |
| ZZ39 | Typical Hole Load (OS) | 0 | 398/403 |
| ZZ52 | Typical Hole Load (OS) | 0 | 184/189 |
| ZZ61 | Typical Hole Load (OS) | 0 | 134/139 |
| ZZ17 | Typical Hole Load (OS) | 0 | 587/592 |
| ZZ56 | Typical Hole Load (OS) | 0 | 142/147 |
| ZZ83 | Typical Hole Load (OS) | 0 | 420/425 |
| ZZ26 | Typical Hole Load (OS) | 0 | 449/454 |
| ZZ80 | Typical Hole Load (OS) | 0 | 365/370 |
| ZZ16 | Typical Hole Load (OS) | 0 | 559/564 |
| ZZ11 | Typical Hole Load (OS) | 0 | 601/606 |
| ZZ66 | Typical Hole Load (OS) | 0 | 218/223 |
| ZZ23 | Typical Hole Load (OS) | 0 | 470/475 |
| ZZ43 | Typical Hole Load (OS) | 0 | 356/361 |
| ZZ69 | Typical Hole Load (OS) | 0 | 273/278 |
| ZZ20 | Typical Hole Load (OS) | 0 | 566/571 |
| ZZ12 | Typical Hole Load (OS) | 0 | 629/634 |
| ZZ84 | Typical Hole Load (OS) | 0 | 407/412 |
| ZZ14 | Typical Hole Load (OS) | 0 | 608/613 |
| ZZ37 | Typical Hole Load (OS) | 0 | 419/424 |
| ZZ145 | Typical Hole Load (NS) | 0 | |

| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ136 | Typical Hole Load (NS) | 0 | |
| ZZ135 | Typical Hole Load (NS) | 0 | |
| ZZ122 | Typical Hole Load (NS) | 0 | |
| ZZ126 | Typical Hole Load (NS) | 0 | |
| ZZ148 | Eagle Boosters | 0 | |
| ZZ110 | Typical Hole Load (NS) | 0 | |
| ZZ116 | Typical Hole Load (NS) | 0 | |
| ZZ133 | Typical Hole Load (NS) | 0 | |
| ZZ143 | Typical Hole Load (NS) | 0 | |
| ZZ140 | Typical Hole Load (NS) | 0 | |
| ZZ108 | Typical Hole Load (NS) | 0 | |
| ZZ107 | Typical Hole Load (NS) | 0 | |
| ZZ128 | Typical Hole Load (NS) | 0 | |
| ZZ141 | Typical Hole Load (NS) | 0 | |
| ZZ142 | Typical Hole Load (NS) | 0 | |
| ZZ106 | Typical Hole Load (NS) | 0 | |
| ZZ111 | Typical Hole Load (NS) | 0 | |
| ZZ129 | Typical Hole Load (NS) | 0 | |
| ZZ96 | Eagle Boosters | 0 | |
| ZZ114 | Typical Hole Load (NS) | 0 | |
| ZZ132 | Typical Hole Load (NS) | 0 | |
| ZZ144 | Typical Hole Load (NS) | 0 | |
| ZZ93 | Eagle Boosters | 0 | |
| ZZ149 | Eagle Boosters | 0 | |
| ZZ120 | Typical Hole Load (NS) | 0 | |
| ZZ97 | Eagle Boosters | 0 | |
| ZZ119 | Typical Hole Load (NS) | 0 | |
| ZZ109 | Typical Hole Load (NS) | 0 | |
| ZZ105 | Typical Hole Load (NS) | 0 | |
| ZZ127 | Typical Hole Load (NS) | 0 | |
| ZZ131 | Typical Hole Load (NS) | 0 | |
| ZZ92 | Eagle Boosters | 0 | |
| ZZ118 | Typical Hole Load (NS) | 0 | |
| ZZ99 | Eagle Boosters | 0 | |
| ZZ94 | Eagle Boosters | 0 | |
| ZZ153 | Eagle Boosters | 0 | |
| ZZ101 | Eagle Boosters | 0 | |
| ZZ139 | Typical Hole Load (NS) | 0 | |
| ZZ115 | Typical Hole Load (NS) | 0 | |
| ZZ117 | Typical Hole Load (NS) | 0 | |
| ZZ125 | Typical Hole Load (NS) | 0 | |
| ZZ130 | Typical Hole Load (NS) | 0 | |
| ZZ98 | Eagle Boosters | 0 | |
| ZZ150 | Eagle Boosters | 0 | |
| ZZ104 | Eagle Boosters | 0 | |
| ZZ121 | Typical Hole Load (NS) | 0 | |

| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ138 | Typical Hole Load (NS) | 0 | |
| ZZ134 | Typical Hole Load (NS) | 0 | |
| ZZ102 | Eagle Boosters | 0 | |
| ZZ124 | Typical Hole Load (NS) | 0 | |
| ZZ123 | Typical Hole Load (NS) | 0 | |
| ZZ113 | Typical Hole Load (NS) | 0 | |
| ZZ137 | Typical Hole Load (NS) | 0 | |
| ZZ152 | Eagle Boosters | 0 | |
| ZZ112 | Typical Hole Load (NS) | 0 | |
| ZZ146 | Typical Hole Load (NS) | 0 | |
| ZZ95 | Eagle Boosters | 0 | |
| ZZ151 | Eagle Boosters | 0 | |
| ZZ100 | Eagle Boosters | 0 | |
| ZZ147 | Typical Hole Load (NS) | 0 | |
| ZZ103 | Eagle Boosters | 0 | |
| ZZ154 | Eagle Boosters | 0 | |
| ZZ155 | Eagle Boosters | 0 | 0 |


Typical Hole Load (...
Ø = 114.3 mm
[2.4 m] - Crushed Stone
[1.2 m] - Air
[12.8 m] - Hydromite 4100 Bulk NB Wgt: 168.6 kg
[4.6 m] - Eagle 450 E*Star Booster (1lb) Det: 24' E*STAR Detonator - QM Wgt: 1 kg
[15.4 m] - Eagle 450 E*Star Booster (1lb) Det: 60' E*STAR Detonator - QM/HD Wgt: 1 kg
170.6 kg
Typical Hole Load (...
Ø = 114.3 mm
[1.8 m] - Crushed Stone
[0.6 m] - Air
[7.6 m] - Hydromite 4100 Bulk NB Wgt: 100.36 kg
[2.7 m] - E*Star Booster - 454g (1 lb) Det: 24' E*STAR Detonator - QM Wgt: 0.46 kg
[9.4 m] - E*Star Booster - 454g (1 lb) Det: 40' E*STAR Detonator - QM Wgt: 0.46 kg
101.28 kg
Toe Load
Ø = 114.3 mm
[9.4 m] - Crushed Stone
[7.0 m] - Hydromite 4100 Bulk NB Wgt: 92.33 kg
[9.9 m] - E*Star Booster - 454g (1 lb) Det: 60' E*STAR Detonator - QM/HD Wgt: 0.46 kg
[15.4 m] - E*Star Booster - 454g (1 lb) Det: 60' E*STAR Detonator - QM/HD Wgt: 0.46 kg
93.25 kg
Eagle Boosters
Ø = 114.3 mm
[1.8 m] - Crushed Stone
[0.6 m] - Air
[7.6 m] - Hydromite 4100 Bulk NB Wgt: 100.36 kg
[2.7 m] - Eagle 450 E*Star Booster (1lb) Det: 24' E*STAR Detonator - QM Wgt: 1 kg
[9.4 m] - Eagle 450 E*Star Booster (1lb) Det: 40' E*STAR Detonator - QM Wgt: 1 kg
102.36 kg
0 m
5 m
10 m
15 m

# AUSTIN POWDER LTD.
# BLAST REPORT

327-Orillia
RR #4 ON, Orillia, Canada L3V 1- 84

Blast No.: 2018-12 | Blast Type: Stone Quarry/Stone Mine - Production | Customer: HAROLD SUTHERLAND CONST.-KEPPEL (HAR1525-001)

Date/Time: 11/30/2018 13:53 | Pit/Permit: KEPPEL QUARRY / SHOT SERVICE | Location: East Bench

## *ENVIRONMENT*

Method Used: U.T.M. | Weather: Cloudy / High Clouds | Wind From: SW

Temperature: 0 °C | Terrain: Flat | Wind Velocity: 1-5 km/h

Blast U.T.M.: 17N 500238 mE 4942465 mN

## *NEAREST PROTECTED STRUCTURE*

Compass Point: NNW

Structure Name: 178841 Grey Road #17 | Direction/Bearing: 346 °

Structure Type: Dwelling | Distance: 563 m

Structure U.T.M.: 17N 500101 mE 4943011 mN

## *LAYOUT*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | Hole Depth: | 9.45 m | Material Blasted: | Limestone | Total Meters Drilled: | 1,011.0 m |
| No. of Holes: | 107 | Subdrilling: | 0.30 m | Burden: | m | Water Depth: | 4.57 m |
| No. of V.P.† Holes: | 108 | Face Height: | 9.14 m | Spacing: | m | Stem Length: | 1.83 m |
| No. of Rows: | 0 | Drilling Angle: | ° | Back Fill Depth: | 0.00 m | Area Type: | Center Start/ Breakout |
| Diameter: | 114.3 mm | Mats Used: | No | Stem Type: | Clear Stone | Method: | Specified (H = 0.00 m) |

† V.P. = Volume Producing

## *WEIGHTS*

| | | | | | |
|---|---|---|---|---|---|
| | | Max. Wt. of Expl. in Overlapped Decks: | 384.1 kg | Volume Produced: | 9,088.3 m³ |
| Initiation: | Electronic | Max. Wt. of Expl. Per 8 ms Interval: | 384.1 kg | Weight Produced: | 21,815.4 t |
| Firing Device: | E*Star Blasting Machine (WRFD) | Max. No. of Holes Per 8 ms Interval: | 4 | Powder Factor 1: | 0.000 t/kg |
| Other Method: | | Max. Wt. of Explosive Per Hole: | 96.3 kg | Powder Factor 2: | 1.130 kg/m³ |
| Mfg and Model: | DBM1600-2-RC | Scaled Distance Factor (max charge): | 57.37 | Rock Density: | 2.400 t/m³ |
| Initiation Settings: | | Scaled Distance Factor (per delay): | 28.72 | | |
| Series Resistance (ohms): | | | | | |

## *SEISMOGRAPHS*

See seismographs on separate page

## *CREW*

Blast occurred other than scheduled time: No | Misfire Occurred: No | Protective Cover: Shot Remotely

| Last Name | First Name | License / Cert | 2nd License / Cert | In Charge | Tied In | Chk. Tie-In | Driller | Layout |
|---|---|---|---|---|---|---|---|---|
| NEWTON | JOHN, D | * ON - N/A | * MB - 4-4579R [12/8/2018] | Yes | Yes | Yes | No | No |
| FRALICK | CRAIG, A | | | No | No | No | No | No |
| KOUYOUMJIAN | MACKENZIE, H | | | No | No | No | No | No |
| MACPHADEN | AARON, K | | | No | Yes | Yes | No | No |

| Other Crew Members | Company | In Charge | Tied In | Chk. Tie-In | Driller | Layout |
|---|---|---|---|---|---|---|
| Mike | Harold Sutherland | No | No | No | Yes | Yes |

# AUSTIN POWDER LTD.
# BLAST REPORT

327-Orillia
RR #4 ON, Orillia, Canada L3V 1- 84

Blast No.: 2018-12 Blast Type: Stone Quarry/Stone Mine - Production Customer: HAROLD SUTHERLAND CONST.-KEPPEL (HAR1525-001)

Date/Time: 11/30/2018 13:53 Pit/Permit: KEPPEL QUARRY / SHOT SERVICE Location: East Bench

***PRODUCTS AND SERVICES***

| Number | Product Description | Quantity | Weight ( kg ) |
|---|---|---|---|
| 11782 | E*Star Booster - 454g (1 lb) | 69.00 ea | 31.92 |
| 15103 | Eagle 450 Booster (1lb) | 4.00 ea | 4.00 |
| 15107 | Eagle 450 E*Star Booster (1lb) | 141.00 ea | 141.00 |
| 15001 | 24' E*STAR Detonator - QM | 107.00 ea | 0.00 |
| 15003 | 40' E*STAR Detonator - QM | 107.00 ea | 0.00 |
| 12276 | E*Star Bus Wire - 1250' spool | 1.00 sp | 0.00 |
| 15128 | Hydromite 4100 Bulk NB | 10,090.00 kg | 10,090.00 |
| 12981 | Mini Stem Plug - 6015 | 107.00 ea | 0.00 |
| | | Total Weight of Explosives (Include Primers) ( kg ): | 10,266.92 |

***COMMENTS / EXPLANATIONS***

Signature of Blaster in Charge



Blast ID: ru00342105-10311 Version: 7.5.4.1

Print Date: 11/30/2018

# AUSTIN POWDER LTD.
# BLAST REPORT

327-Orillia
RR #4 ON, Orillia, Canada L3V 1- 84

Blast No.: 2018-12 Blast Type: Stone Quarry/Stone Mine - Production Customer: HAROLD SUTHERLAND CONST.-KEPPEL (HAR1525-001)

Date/Time: 11/30/2018 13:53 Pit/Permit: KEPPEL QUARRY / SHOT SERVICE Location: East Bench

## *SEISMOGRAPH 1 - 178841 GREY ROAD #17*

Data Type: Seismic Record Seismograph Type: Instantel Mini-Mate II
Date: 11/30/18 Trigger Level: 1.50 mm/s 115.00 dB
Time: 13:53 Calibration Date: 01/17/18
Distance From Blast: 562.97 m Calibration Signal:
Direction From Blast: NNW Geophone Min. Freq.: --- Hz
Readout: Printed Copy Mic. Min. Freq.: --- Hz
Location: Bolted to bedrock at the front of the property. Unit #233.
U.T.M.: 17N 500101 mE 4943011 mN
Reader and Firm: John Newton, AUSTIN POWDER
Analyst and Firm:
Installer and Firm: John Newton, Austin Powder Ltd.

| | | |
|---|---|---|
| Transverse: | 1.397 mm/s | 37.0 Hz |
| Vertical: | 1.016 mm/s | 47.0 Hz |
| Longitudinal: | 2.159 mm/s | 28.0 Hz |
| Acoustic: | 119 dB | --- Hz |
| Vector Sum: | --- mm/s | |

## *SEISMOGRAPH 2 - 178717 GREY RD. 17*

Data Type: Seismic Record Seismograph Type: Instantel Mini-Mate II
Date: 11/30/18 Trigger Level: 1.50 mm/s 115.00 dB
Time: 13:53 Calibration Date: 01/15/18
Distance From Blast: 634.59 m Calibration Signal:
Direction From Blast: SE Geophone Min. Freq.: --- Hz
Readout: Printed Copy Mic. Min. Freq.: --- Hz
Location: Buried at the front of the property.
U.T.M.: 17N 500660 mE 4941991 mN
Reader and Firm: John Newton, AUSTIN POWDER
Analyst and Firm:
Installer and Firm: John Newton, Austin Powder Ltd.

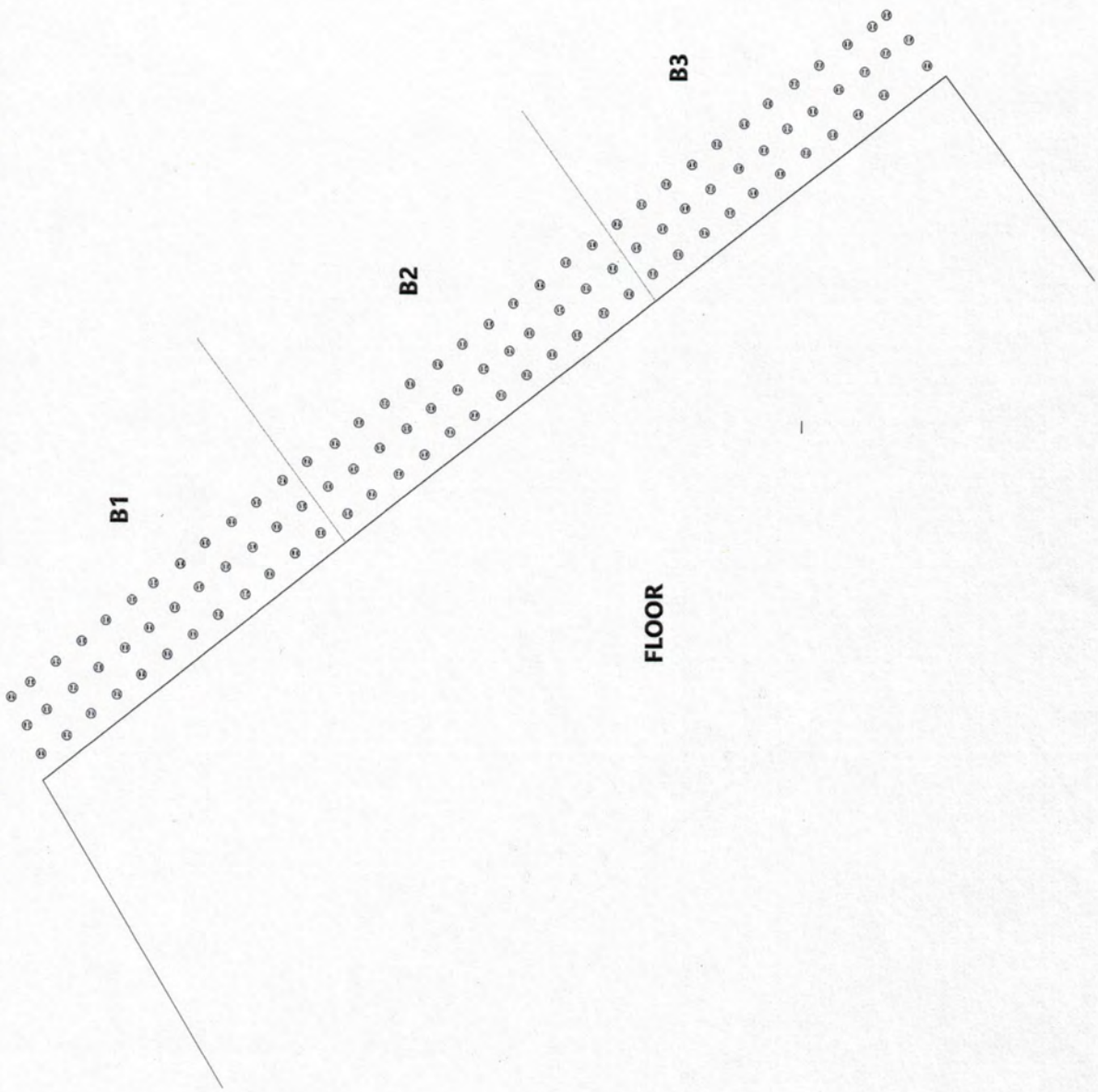
| | | |
|---|---|---|
| Transverse: | 0.254 mm/s | --- Hz |
| Vertical: | 0.254 mm/s | --- Hz |
| Longitudinal: | 0.254 mm/s | --- Hz |
| Acoustic: | 119 dB | --- Hz |
| Vector Sum: | --- mm/s | |

## *SEISMOGRAPH 3 - 283197 CONC. RD. 10*

Data Type: Seismic Record Seismograph Type: Instantel Mini-Mate II
Date: 11/30/18 Trigger Level: 1.50 mm/s 115.00 dB
Time: 13:53 Calibration Date: 01/15/18
Distance From Blast: 1,042.42 m Calibration Signal:
Direction From Blast: ESE Geophone Min. Freq.: --- Hz
Readout: Printed Copy Mic. Min. Freq.: --- Hz
Location: Buried at the road.
U.T.M.: 17N 501117 mE 4941905 mN
Reader and Firm: John Newton, AUSTIN POWDER
Analyst and Firm:
Installer and Firm: John Newton, Austin Powder Ltd.

| | | |
|---|---|---|
| Transverse: | 2.54 mm/s | 32.0 Hz |
| Vertical: | 1.016 mm/s | 32.0 Hz |
| Longitudinal: | 2.54 mm/s | 27.0 Hz |
| Acoustic: | 117 dB | --- Hz |
| Vector Sum: | --- mm/s | |

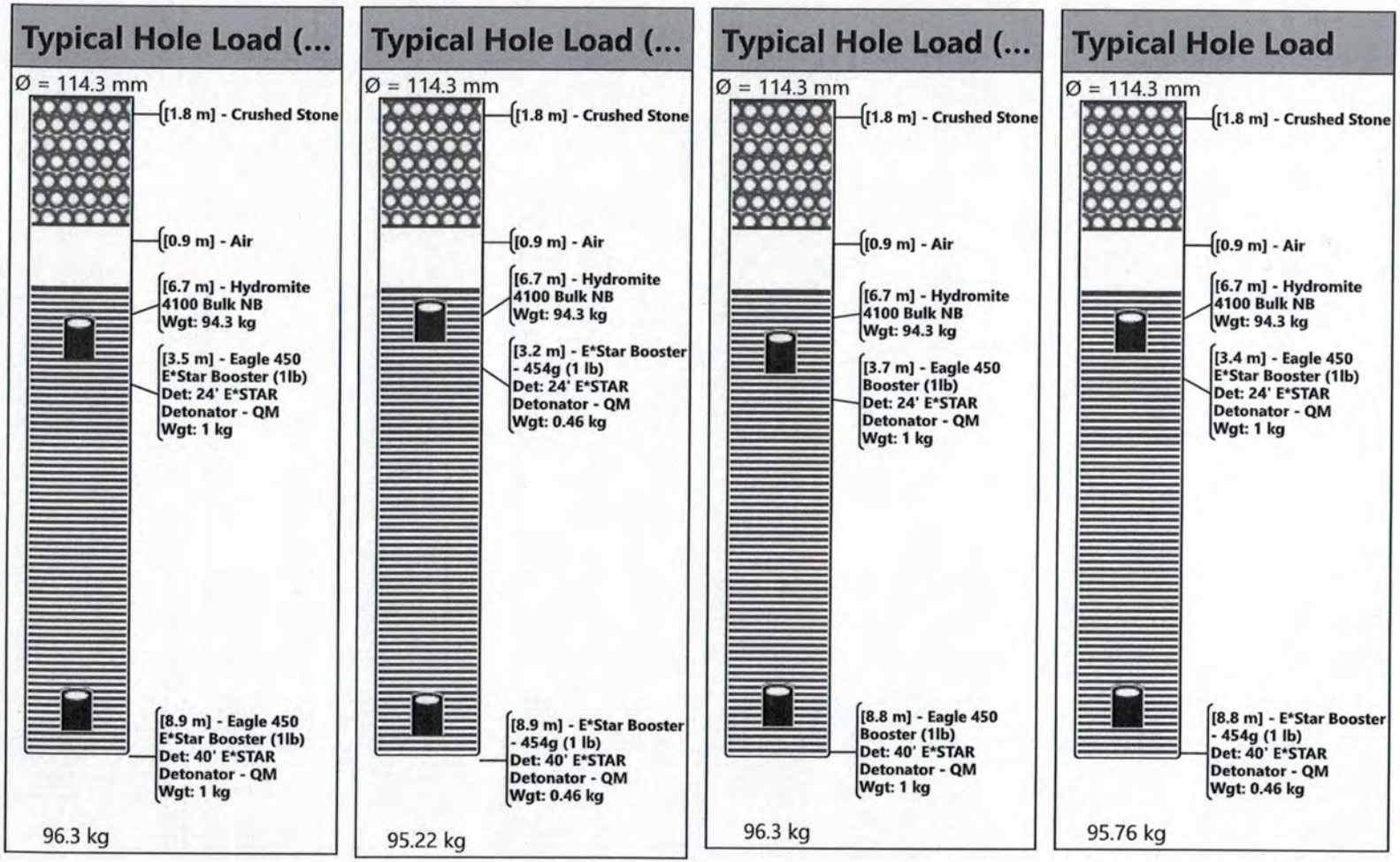
Hole Label Mode: Cumulative In-Hole Delays




| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ1 | Typical Hole Load (E*Star) | 0 | 657/662 |
| ZZ92 | Typical Hole Load (Eagle E*Star) | 0 | 612/617 |
| ZZ11 | Typical Hole Load (E*Star) | 0 | 509/514 |
| ZZ27 | Typical Hole Load (E*Star) | 0 | 310/315 |
| ZZ17 | Typical Hole Load (E*Star) | 0 | 463/468 |
| ZZ85 | Typical Hole Load (Eagle E*Star) | 0 | 631/636 |
| ZZ10 | Typical Hole Load (E*Star) | 0 | 427/432 |
| ZZ104 | Typical Hole Load (Eagle E*Star) | 0 | 739/744 |
| ZZ89 | Typical Hole Load (Eagle E*Star) | 0 | 580/585 |
| ZZ66 | Typical Hole Load (Eagle E*Star) | 0 | 401/406 |
| ZZ42 | Typical Hole Load (Eagle E*Star) | 0 | 361/366 |
| ZZ84 | Typical Hole Load (Eagle E*Star) | 0 | 599/604 |
| ZZ8 | Typical Hole Load (E*Star) | 0 | 533/538 |
| ZZ95 | Typical Hole Load (Eagle E*Star) | 0 | 644/649 |
| ZZ45 | Typical Hole Load (Eagle E*Star) | 0 | 169/174 |
| ZZ90 | Typical Hole Load (Eagle E*Star) | 0 | 666/671 |
| ZZ73 | Typical Hole Load (Eagle E*Star) | 0 | 501/506 |
| ZZ48 | Typical Hole Load (Eagle E*Star) | 0 | 314/319 |
| ZZ77 | Typical Hole Load (Eagle E*Star) | 0 | 449/454 |
| ZZ63 | Typical Hole Load (Eagle E*Star) | 0 | 204/209 |
| ZZ13 | Typical Hole Load (E*Star) | 0 | 569/574 |
| ZZ6 | Typical Hole Load (E*Star) | 0 | 640/645 |
| ZZ14 | Typical Hole Load (E*Star) | 0 | 485/490 |
| ZZ102 | Typical Hole Load (Eagle E*Star) | 0 | 799/804 |
| ZZ41 | Typical Hole Load (Eagle E*Star) | 0 | 276/281 |
| ZZ7 | Typical Hole Load (E*Star) | 0 | 616/621 |
| ZZ19 | Typical Hole Load (E*Star) | 0 | 526/531 |
| ZZ5 | Typical Hole Load (E*Star) | 0 | 557/562 |
| ZZ94 | Typical Hole Load (Eagle E*Star) | 0 | 566/571 |
| ZZ12 | Typical Hole Load (E*Star) | 0 | 592/597 |
| ZZ30 | Typical Hole Load (E*Star) | 0 | 454/459 |
| ZZ79 | Typical Hole Load (Eagle E*Star) | 0 | 565/570 |
| ZZ20 | Typical Hole Load (E*Star) | 0 | 439/444 |
| ZZ56 | Typical Hole Load (Eagle E*Star) | 0 | 219/224 |
| ZZ96 | Typical Hole Load (Eagle E*Star) | 0 | 731/736 |
| ZZ31 | Typical Hole Load (E*Star) | 0 | 432/437 |
| ZZ34 | Typical Hole Load (Eagle 450) | 0 | 240/245 |
| ZZ57 | Typical Hole Load (Eagle E*Star) | 0 | 137/142 |
| ZZ82 | Typical Hole Load (Eagle E*Star) | 0 | 434/439 |
| ZZ3 | Typical Hole Load (E*Star) | 0 | 497/502 |
| ZZ80 | Typical Hole Load (Eagle E*Star) | 0 | 480/485 |
| ZZ25 | Typical Hole Load (E*Star) | 0 | 479/484 |
| ZZ53 | Typical Hole Load (Eagle E*Star) | 0 | 181/186 |
| ZZ72 | Typical Hole Load (Eagle E*Star) | 0 | 468/473 |
| ZZ70 | Typical Hole Load (Eagle E*Star) | 0 | 303/308 |
| ZZ51 | Typical Hole Load (Eagle E*Star) | 0 | 121/126 |

| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ88 | Typical Hole Load (Eagle E*Star) | 0 | 499/504 |
| ZZ75 | Typical Hole Load (Eagle E*Star) | 0 | 334/339 |
| ZZ100 | Typical Hole Load (Eagle E*Star) | 0 | 632/637 |
| ZZ18 | Typical Hole Load (E*Star) | 0 | 545/550 |
| ZZ29 | Typical Hole Load (E*Star) | 0 | 368/373 |
| ZZ106 | Typical Hole Load (Eagle E*Star) | 0 | 685/690 |
| ZZ98 | Typical Hole Load (Eagle E*Star) | 0 | 678/683 |
| ZZ65 | Typical Hole Load (Eagle E*Star) | 0 | 316/321 |
| ZZ93 | Typical Hole Load (Eagle E*Star) | 0 | 533/538 |
| ZZ47 | Typical Hole Load (Eagle E*Star) | 0 | 228/233 |
| ZZ68 | Typical Hole Load (Eagle E*Star) | 0 | 351/356 |
| ZZ43 | Typical Hole Load (Eagle E*Star) | 0 | 338/343 |
| ZZ69 | Typical Hole Load (Eagle E*Star) | 0 | 271/276 |
| ZZ83 | Typical Hole Load (Eagle E*Star) | 0 | 513/518 |
| ZZ24 | Typical Hole Load (E*Star) | 0 | 502/507 |
| ZZ64 | Typical Hole Load (Eagle E*Star) | 0 | 236/241 |
| ZZ54 | Typical Hole Load (Eagle E*Star) | 0 | 267/272 |
| ZZ55 | Typical Hole Load (Eagle E*Star) | 0 | 302/307 |
| ZZ74 | Typical Hole Load (Eagle E*Star) | 0 | 416/421 |
| ZZ61 | Typical Hole Load (Eagle E*Star) | 0 | 368/373 |
| ZZ44 | Typical Hole Load (Eagle E*Star) | 0 | 252/257 |
| ZZ97 | Typical Hole Load (Eagle E*Star) | 0 | 763/768 |
| ZZ107 | Typical Hole Load (Eagle E*Star) | 0 | 766/771 |
| ZZ26 | Typical Hole Load (E*Star) | 0 | 392/397 |
| ZZ101 | Typical Hole Load (Eagle E*Star) | 0 | 710/715 |
| ZZ35 | Typical Hole Load (Eagle 450) | 0 | 322/327 |
| ZZ2 | Typical Hole Load (E*Star) | 0 | 575/580 |
| ZZ50 | Typical Hole Load (Eagle E*Star) | 0 | 205/210 |
| ZZ103 | Typical Hole Load (Eagle E*Star) | 0 | 830/835 |
| ZZ76 | Typical Hole Load (Eagle E*Star) | 0 | 367/372 |
| ZZ87 | Typical Hole Load (Eagle E*Star) | 0 | 466/471 |
| ZZ108 | Typical Hole Load | 0 | 848/853 |
| ZZ16 | Typical Hole Load (E*Star) | 0 | 381/386 |
| ZZ36 | Typical Hole Load (E*Star) | 0 | 407/412 |
| ZZ58 | Typical Hole Load (Eagle E*Star) | 0 | 171/176 |
| ZZ99 | Typical Hole Load (Eagle E*Star) | 0 | 599/604 |
| ZZ38 | Typical Hole Load (Eagle E*Star) | 0 | 298/303 |
| ZZ52 | Typical Hole Load (Eagle E*Star) | 0 | 100/105 |
| ZZ28 | Typical Hole Load (E*Star) | 0 | 287/292 |
| ZZ9 | Typical Hole Load (E*Star) | 0 | 451/456 |
| ZZ4 | Typical Hole Load (E*Star) | 0 | 474/479 |
| ZZ62 | Typical Hole Load (Eagle E*Star) | 0 | 277/282 |
| ZZ67 | Typical Hole Load (Eagle E*Star) | 0 | 436/441 |
| ZZ91 | Typical Hole Load (Eagle E*Star) | 0 | 698/703 |
| ZZ37 | Typical Hole Load (Eagle E*Star) | 0 | 385/390 |
| ZZ23 | Typical Hole Load (E*Star) | 0 | 416/421 |

| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ22 | Typical Hole Load (E*Star) | 0 | 334/339 |
| ZZ78 | Typical Hole Load (Eagle E*Star) | 0 | 533/538 |
| ZZ81 | Typical Hole Load (Eagle E*Star) | 0 | 401/406 |
| ZZ86 | Typical Hole Load (Eagle E*Star) | 0 | 548/553 |
| ZZ15 | Typical Hole Load (E*Star) | 0 | 404/409 |
| ZZ49 | Typical Hole Load (Eagle E*Star) | 0 | 291/296 |
| ZZ40 | Typical Hole Load (Eagle E*Star) | 0 | 194/199 |
| ZZ60 | Typical Hole Load (Eagle E*Star) | 0 | 336/341 |
| ZZ33 | Typical Hole Load (E*Star) | 0 | 263/268 |
| ZZ46 | Typical Hole Load (Eagle E*Star) | 0 | 146/151 |
| ZZ39 | Typical Hole Load (Eagle E*Star) | 0 | 216/221 |
| ZZ59 | Typical Hole Load (Eagle E*Star) | 0 | 251/256 |
| ZZ71 | Typical Hole Load (Eagle E*Star) | 0 | 384/389 |
| ZZ32 | Typical Hole Load (E*Star) | 0 | 345/350 |
| ZZ21 | Typical Hole Load (E*Star) | 0 | 357/362 |


Typical Hole Load (...
Ø = 114.3 mm
0 m
5 m
10 m
[1.8 m] - Crushed Stone
[0.9 m] - Air
[6.7 m] - Hydromite 4100 Bulk NB Wgt: 94.3 kg
[3.5 m] - Eagle 450 E*Star Booster (1lb) Det: 24' E*STAR Detonator - QM Wgt: 1 kg
[8.9 m] - Eagle 450 E*Star Booster (1lb) Det: 40' E*STAR Detonator - QM Wgt: 1 kg
96.3 kg
Typical Hole Load (...
Ø = 114.3 mm
[1.8 m] - Crushed Stone
[0.9 m] - Air
[6.7 m] - Hydromite 4100 Bulk NB Wgt: 94.3 kg
[3.2 m] - E*Star Booster - 454g (1 lb) Det: 24' E*STAR Detonator - QM Wgt: 0.46 kg
[8.9 m] - E*Star Booster - 454g (1 lb) Det: 40' E*STAR Detonator - QM Wgt: 0.46 kg
95.22 kg
Typical Hole Load (...
Ø = 114.3 mm
[1.8 m] - Crushed Stone
[0.9 m] - Air
[6.7 m] - Hydromite 4100 Bulk NB Wgt: 94.3 kg
[3.7 m] - Eagle 450 Booster (1lb) Det: 24' E*STAR Detonator - QM Wgt: 1 kg
[8.8 m] - Eagle 450 Booster (1lb) Det: 40' E*STAR Detonator - QM Wgt: 1 kg
96.3 kg
Typical Hole Load
Ø = 114.3 mm
[1.8 m] - Crushed Stone
[0.9 m] - Air
[6.7 m] - Hydromite 4100 Bulk NB Wgt: 94.3 kg
[3.4 m] - Eagle 450 E*Star Booster (1lb) Det: 24' E*STAR Detonator - QM Wgt: 1 kg
[8.8 m] - E*Star Booster - 454g (1 lb) Det: 40' E*STAR Detonator - QM Wgt: 0.46 kg
95.76 kg

# AUSTIN POWDER LTD.
# BLAST REPORT

327-Orillia
RR #4 ON, Orillia, Canada L3V 1- 84

Blast No.: 2018-01
Blast Type: Stone Quarry/Stone Mine - Production
Customer: HAROLD SUTHERLAND CONST.-KEPPEL (HAR1525-001)
Date/Time: 04/03/2018 16:30
Pit/Permit: KEPPEL QUARRY / SHOT SERVICE
Location: Top Bench (Across the Road)

## *ENVIRONMENT*

Method Used: U.T.M.
Weather: Cloudy / High Clouds
Wind From: ESE
Temperature: 2 °C
Terrain: Flat
Wind Velocity: 0-10 km/h
Blast U.T.M.: 17N 500285 mE 4942396 mN

## *NEAREST PROTECTED STRUCTURE*

Compass Point: NNW
Structure Name: 178841 Grey Rd #17
Direction/Bearing: 343 °
Structure Type: Dwelling
Distance: 642 m
Structure U.T.M.: 17N 500101 mE 4943011 mN

## *LAYOUT*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | Hole Depth: | 1.52-4.57 m | Material Blasted: | Limestone | Total Meters Drilled: | 1,713.0 m |
| No. of Holes: | 538 | Subdrilling: | 0.00 m | Burden: | [See Below] | Water Depth: | 0.00 m |
| No. of V.P.† Holes: | 293 | Face Height: | 1.52-4.57 m | Spacing: | [See Below] | Stem Length: | min 1.37 m |
| No. of Rows: | [See Below] | Drilling Angle: | [See Below] | Back Fill Depth: | 0.00 m | Area Type: | [See Below] |
| Diameter: | [See Below] | Mats Used: | No | Stem Type: | Clear Stone | Method: | [See Below] |

† V.P. = Volume Producing

## *WEIGHTS*

| | | | | | |
|---|---|---|---|---|---|
| | | Max. Wt. of Expl. in Overlapped Decks: | 73.0 kg | Volume Produced: | 12,445.3 m³ |
| Initiation: | Non-Electric | Max. Wt. of Expl. Per 8 ms Interval: | 73.0 kg | Weight Produced: | 32,974.6 t |
| Firing Device: | Other | Max. No. of Holes Per 8 ms Interval: | 4 | Powder Factor 1: | 3.260 t/kg |
| Other Method: | Wireless | Max. Wt. of Explosive Per Hole: | 35.3 kg | Powder Factor 2: | 0.813 kg/m³ |
| Mfg and Model: | DBM1600-2-RC | Scaled Distance Factor (max charge): | 108.12 | Rock Density: | 2.650 t/m³ |
| Initiation Settings: | | Scaled Distance Factor (per delay): | 75.14 | | |
| Series Resistance (ohms): | | | | | |

## *SEISMOGRAPHS*

See seismographs on separate page

## *CREW*

Blast occurred other than scheduled time: No
Misfire Occurred: No
Protective Cover: Loader Bucket

| Last Name | First Name | License / Cert | 2nd License / Cert | In Charge | Tied In | Chk. Tie-In | Driller | Layout |
|---|---|---|---|---|---|---|---|---|
| SMART | EVAN, C | * ON - N/A | | Yes | Yes | Yes | No | Yes |
| BELTRAME | ALEXANDER, A | | | No | No | No | No | No |
| FRALICK | CRAIG, A | | | No | No | No | No | No |
| KICKSEE | WAYNE, R | | | No | No | No | No | No |
| KOUYOUMJIAN | MACKENZIE, H | | | No | Yes | No | No | No |
| NEWTON | JOHN, D | | | No | Yes | No | No | No |
| O'DONOHOE | LIAM, J | | | No | No | No | No | No |
| REED | ADAM, G | | | No | Yes | No | No | No |

# AUSTIN POWDER LTD.
# BLAST REPORT

327-Orillia
RR #4 ON, Orillia, Canada L3V 1- 84

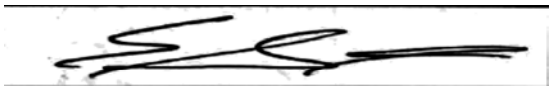
Blast No.: 2018-01
Blast Type: Stone Quarry/Stone Mine - Production
Customer: HAROLD SUTHERLAND CONST.-KEPPEL (HAR1525-001)
Date/Time: 04/03/2018 16:30
Pit/Permit: KEPPEL QUARRY / SHOT SERVICE
Location: Top Bench (Across the Road)

***PRODUCTS AND SERVICES***

| Number | Product Description | Quantity | Weight ( kg ) |
|---|---|---|---|
| 11743 | Black Cap DC Booster - 340g (.75 lb) | 542.00 ea | 184.34 |
| 10751 | SHOCK*STAR DualDelay 9.2m/30' 25/500 | 542.00 ea | 0.00 |
| 15001 | 24' E*STAR Detonator - QM | 1.00 ea | 0.00 |
| 01494 | 30' SHOCK*STAR Quick Relay 42 ms | 25.00 ea | 0.00 |
| 07602 | Hydromite 4100 Bulk | 9,930.00 kg | 9,930.00 |
| 12981 | Mini Stem Plug - 6015 | 538.00 ea | 0.00 |
| | | Total Weight of Explosives (Include Primers) ( kg ): | 10,114.34 |

***COMMENTS / EXPLANATIONS***

General Comments: .



Signature of Blaster in Charge

# AUSTIN POWDER LTD.
# BLAST REPORT

327-Orillia
RR #4 ON, Orillia, Canada L3V 1- 84

Blast No.: 2018-01
Blast Type: Stone Quarry/Stone Mine - Production
Customer: HAROLD SUTHERLAND CONST.-KEPPEL (HAR1525-001)
Date/Time: 04/03/2018 16:30
Pit/Permit: KEPPEL QUARRY / SHOT SERVICE
Location: Top Bench (Across the Road)

***Pattern: 1***

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| No. of Holes: | 293 | Hole Depth: | 4.57 m | Burden: | 3.05 m | Area Type: | Conventional |
| No. of V.P.† Holes: | 293 | Diameter: | 114.3 mm | Spacing: | 3.05 m | Method: | Deepest Hole Load |
| No. of Rows: | 14 | Subdrilling: | 0.00 m | | | | |
| Drilling Angle: | 0 ° | Face Height: | 4.57 m | | | Total volume for pattern: | 12,445.3 m³ |
| † V.P. = Volume Producing | | | | | | Total weight for pattern: | 32,974.6 t |

***Pattern: 2***

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| No. of Holes: | 245 | Hole Depth: | 1.52 m | Burden: | 3.05 m | Area Type: | Non Volume Producing |
| No. of V.P.† Holes: | 0 | Diameter: | 88.9 mm | Spacing: | 3.05 m | Method: | |
| No. of Rows: | 12 | Subdrilling: | 0.00 m | | | | |
| Drilling Angle: | 0 ° | Face Height: | 1.52 m | | | Total volume for pattern: | 0.0 m³ |
| † V.P. = Volume Producing | | | | | | Total weight for pattern: | 0.0 t |

**Total blast volume: 12,445.3 m³**
**Total weight produced: 32,974.6 t**

# AUSTIN POWDER LTD.
# BLAST REPORT

327-Orillia
RR #4 ON, Orillia, Canada L3V 1- 84

Blast No.: 2018-01
Blast Type: Stone Quarry/Stone Mine - Production
Customer: HAROLD SUTHERLAND CONST.-KEPPEL (HAR1525-001)
Date/Time: 04/03/2018 16:30
Pit/Permit: KEPPEL QUARRY / SHOT SERVICE
Location: Top Bench (Across the Road)

***SEISMOGRAPH 1 - 178717 GREY RD #17***

Data Type: Seismic Record
Seismograph Type: Instantel - Minimate Blaster
Date: 04/03/18
Trigger Level: 1.50 mm/s 115.00 dB
Time: 16:30
Calibration Date: 01/15/18
Distance From Blast: 551.99 m
Calibration Signal: OK
Direction From Blast: SE
Geophone Min. Freq.: --- Hz
Readout: Printed Copy
Mic. Min. Freq.: --- Hz
Location: Spiked and buried.
U.T.M.: 17N 500660 mE 4941991 mN
Reader and Firm: Evan Smart, AUSTIN POWDER
Analyst and Firm:
Installer and Firm: John Newton, Austin Powder Ltd.

| | | |
|---|---|---|
| Transverse: | 2.032 mm/s | 37.0 Hz |
| Vertical: | 1.778 mm/s | 37.0 Hz |
| Longitudinal: | 2.921 mm/s | 37.0 Hz |
| PPV: | --- mm/s | --- Hz |
| Acoustic: | 108 dB | |
| Vector Sum: | 3.195 mm/s | |

***SEISMOGRAPH 2 - 178706 GREY RD #17***

Data Type: No Trigger
Seismograph Type: Instantel - Minimate Blaster
Date: 04/03/18
Trigger Level: 1.50 mm/s 115.00 dB
Time: 16:30
Calibration Date: 01/15/18
Distance From Blast: 612.95 m
Calibration Signal: OK
Direction From Blast: SE
Geophone Min. Freq.: --- Hz
Readout:
Mic. Min. Freq.: --- Hz
Location: Spiked and weight bagged in front yard
U.T.M.: 17N 500660 mE 4941911 mN
Reader and Firm: Evan Smart, AUSTIN POWDER
Analyst and Firm:
Installer and Firm: John Newton, Austin Powder Ltd.

| | | |
|---|---|---|
| Transverse: | --- mm/s | --- Hz |
| Vertical: | --- mm/s | --- Hz |
| Longitudinal: | --- mm/s | --- Hz |
| PPV: | --- mm/s | --- Hz |
| Acoustic: | --- dB | |
| Vector Sum: | --- mm/s | |

***SEISMOGRAPH 3 - 178841 GREY ROAD #17***

Data Type: No Trigger
Seismograph Type: Instantel - Minimate Blaster
Date: 04/03/18
Trigger Level: 1.50 mm/s 115.00 dB
Time: 16:30
Calibration Date: 01/15/18
Distance From Blast: 641.91 m
Calibration Signal: OK
Direction From Blast: NNW
Geophone Min. Freq.: --- Hz
Readout:
Mic. Min. Freq.: --- Hz
Location: Bolted to Bedrock.
U.T.M.: 17N 500101 mE 4943011 mN
Reader and Firm: Evan Smart, AUSTIN POWDER
Analyst and Firm:
Installer and Firm: John Newton, Austin Powder Ltd.

| | | |
|---|---|---|
| Transverse: | --- mm/s | --- Hz |
| Vertical: | --- mm/s | --- Hz |
| Longitudinal: | --- mm/s | --- Hz |
| PPV: | --- mm/s | --- Hz |
| Acoustic: | --- dB | |
| Vector Sum: | --- mm/s | |

# AUSTIN POWDER LTD.
# BLAST REPORT

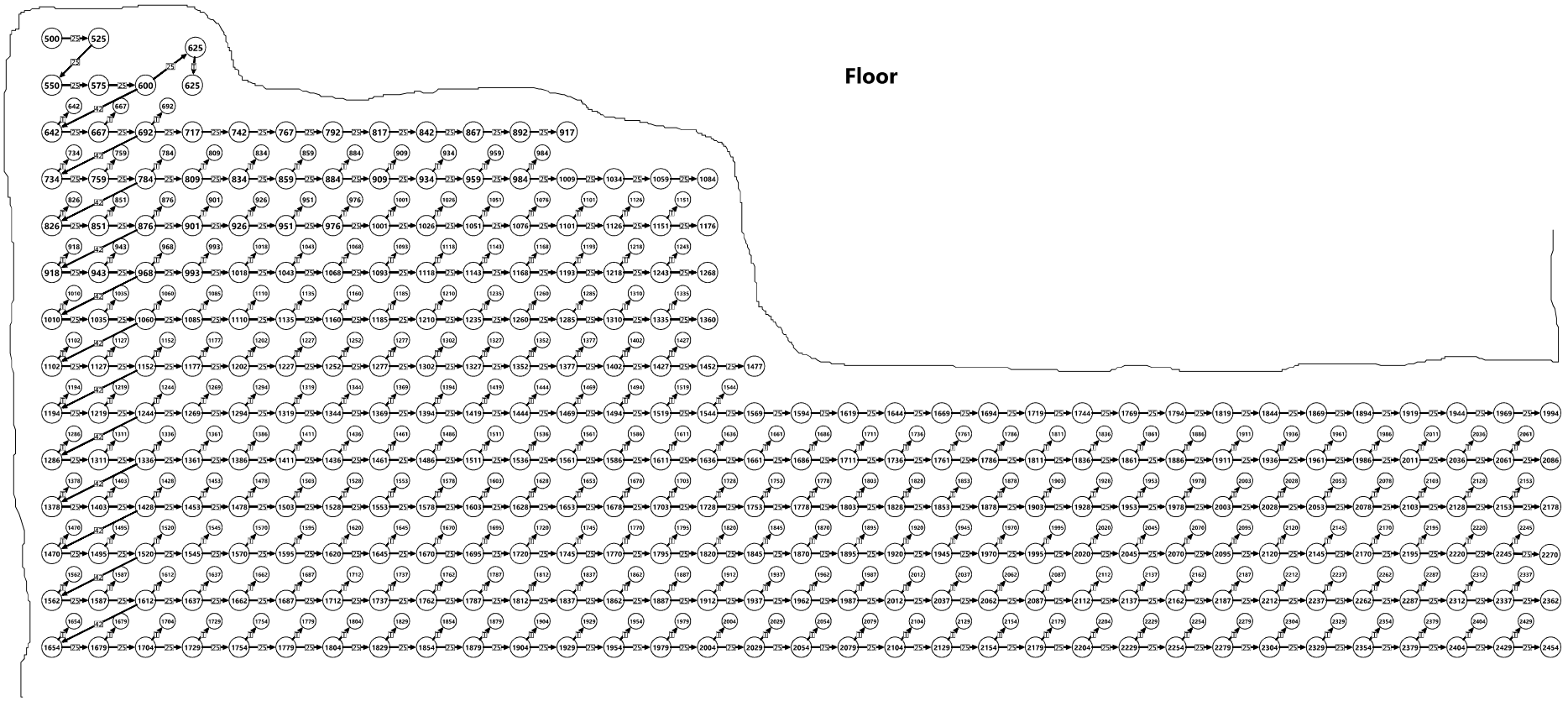
327-Orillia
RR #4 ON, Orillia, Canada L3V 1- 84

| | | | | | |
|---|---|---|---|---|---|
| Blast No.: | 2018-01 | Blast Type: | Stone Quarry/Stone Mine - Production | Customer: | HAROLD SUTHERLAND CONST.-KEPPEL (HAR1525-001) |
| Date/Time: | 04/03/2018 16:30 | Pit/Permit: | KEPPEL QUARRY / SHOT SERVICE | Location: | Top Bench (Across the Road) |

***SEISMOGRAPH 4 - 283197 CONC. RD. #10***

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Data Type: | No Trigger | Seismograph Type: | Instanel - Minimate Blaster | | | | |
| Date: | 04/03/18 | Trigger Level: | 1.50 mm/s | 115.00 dB | Transverse: | --- mm/s | --- Hz |
| Time: | 16:30 | Calibration Date: | 01/15/18 | | Vertical: | --- mm/s | --- Hz |
| Distance From Blast: | 966.22 m | Calibration Signal: | OK | | Longitudinal: | --- mm/s | --- Hz |
| Direction From Blast: | ESE | Geophone Min. Freq.: | --- Hz | | PPV: | --- mm/s | --- Hz |
| Readout: | | Mic. Min. Freq.: | --- Hz | | Acoustic: | --- dB | |
| Location: | Spiked and buried. | | | | Vector Sum: | --- mm/s | |
| U.T.M.: | 17N 501117 mE 4941905 mN | | | | | | |
| Reader and Firm: | Evan Smart, AUSTIN POWDER | | | | | | |
| Analyst and Firm: | | | | | | | |
| Installer and Firm: | John Newton, Austin Powder Ltd. | | | | | | |

Hole Label Mode: Cumulative In-Hole Delays



| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| A1 | Typical Hole Load | 0 | 500 |
| A2 | Typical Hole Load | 25 | 525 |
| A4 | Typical Hole Load | 125 | 625 |
| B1 | Typical Hole Load | 50 | 550 |
| B2 | Typical Hole Load | 75 | 575 |
| B3 | Typical Hole Load | 100 | 600 |
| B4 | Typical Hole Load | 125 | 625 |
| C1 | Typical Hole Load | 142 | 642 |
| C2 | Typical Hole Load | 167 | 667 |
| C3 | Typical Hole Load | 192 | 692 |
| C4 | Typical Hole Load | 217 | 717 |
| C5 | Typical Hole Load | 242 | 742 |
| C6 | Typical Hole Load | 267 | 767 |
| C7 | Typical Hole Load | 292 | 792 |
| C8 | Typical Hole Load | 317 | 817 |
| C9 | Typical Hole Load | 342 | 842 |
| C10 | Typical Hole Load | 367 | 867 |
| C11 | Typical Hole Load | 392 | 892 |
| C12 | Typical Hole Load | 417 | 917 |
| D1 | Typical Hole Load | 234 | 734 |
| D2 | Typical Hole Load | 259 | 759 |
| D3 | Typical Hole Load | 284 | 784 |
| D4 | Typical Hole Load | 309 | 809 |
| D5 | Typical Hole Load | 334 | 834 |
| D6 | Double Cap | 359 | 859 |
| D7 | Typical Hole Load | 384 | 884 |
| D8 | Typical Hole Load | 409 | 909 |
| D9 | Typical Hole Load | 434 | 934 |
| D10 | Typical Hole Load | 459 | 959 |
| D11 | Typical Hole Load | 484 | 984 |
| D12 | Typical Hole Load | 509 | 1009 |
| D13 | Typical Hole Load | 534 | 1034 |
| D14 | Typical Hole Load | 559 | 1059 |
| D15 | Typical Hole Load | 584 | 1084 |
| E1 | Typical Hole Load | 326 | 826 |
| E2 | Typical Hole Load | 351 | 851 |
| E3 | Typical Hole Load | 376 | 876 |
| E4 | Typical Hole Load | 401 | 901 |
| E5 | Typical Hole Load | 426 | 926 |
| E6 | Typical Hole Load | 451 | 951 |
| E7 | Double Cap | 476 | 976 |
| E8 | Typical Hole Load | 501 | 1001 |
| E9 | Typical Hole Load | 526 | 1026 |
| E10 | Typical Hole Load | 551 | 1051 |
| E11 | Typical Hole Load | 576 | 1076 |
| E12 | Typical Hole Load | 601 | 1101 |
| E13 | Typical Hole Load | 626 | 1126 |
| E14 | Typical Hole Load | 651 | 1151 |
| E15 | Typical Hole Load | 676 | 1176 |
| F1 | Typical Hole Load | 418 | 918 |
| F2 | Typical Hole Load | 443 | 943 |
| F3 | Typical Hole Load | 468 | 968 |
| F4 | Typical Hole Load | 493 | 993 |
| F5 | Typical Hole Load | 518 | 1018 |
| F6 | Double Cap | 543 | 1043 |
| F7 | Typical Hole Load | 568 | 1068 |
| F8 | Typical Hole Load | 593 | 1093 |
| F9 | Typical Hole Load | 618 | 1118 |
| F10 | Typical Hole Load | 643 | 1143 |
| F11 | Typical Hole Load | 668 | 1168 |
| F12 | Typical Hole Load | 693 | 1193 |
| F13 | Typical Hole Load | 718 | 1218 |
| F14 | Typical Hole Load | 743 | 1243 |
| F15 | Typical Hole Load | 768 | 1268 |
| G1 | Typical Hole Load | 510 | 1010 |
| G2 | Typical Hole Load | 535 | 1035 |
| G3 | Typical Hole Load | 560 | 1060 |
| G4 | Typical Hole Load | 585 | 1085 |
| G5 | Typical Hole Load | 610 | 1110 |
| G6 | Typical Hole Load | 635 | 1135 |
| G7 | Double Cap | 660 | 1160 |
| G8 | Typical Hole Load | 685 | 1185 |
| G9 | Typical Hole Load | 710 | 1210 |
| G10 | Typical Hole Load | 735 | 1235 |
| G11 | Typical Hole Load | 760 | 1260 |
| G12 | Typical Hole Load | 785 | 1285 |
| G13 | Typical Hole Load | 810 | 1310 |
| G14 | Typical Hole Load | 835 | 1335 |
| G15 | Typical Hole Load | 860 | 1360 |
| H1 | Typical Hole Load | 602 | 1102 |
| H2 | Typical Hole Load | 627 | 1127 |
| H3 | Typical Hole Load | 652 | 1152 |
| H4 | Typical Hole Load | 677 | 1177 |
| H5 | Typical Hole Load | 702 | 1202 |
| H6 | Typical Hole Load | 727 | 1227 |
| H7 | Typical Hole Load | 752 | 1252 |
| H8 | Typical Hole Load | 777 | 1277 |
| H9 | Typical Hole Load | 802 | 1302 |
| H10 | Typical Hole Load | 827 | 1327 |
| H11 | Typical Hole Load | 852 | 1352 |
| H12 | Typical Hole Load | 877 | 1377 |
| H13 | Typical Hole Load | 902 | 1402 |

| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| H14 | Typical Hole Load | 927 | 1427 |
| H15 | Typical Hole Load | 952 | 1452 |
| H16 | Typical Hole Load | 977 | 1477 |
| I1 | Typical Hole Load | 694 | 1194 |
| I2 | Typical Hole Load | 719 | 1219 |
| I3 | Typical Hole Load | 744 | 1244 |
| I4 | Typical Hole Load | 769 | 1269 |
| I5 | Typical Hole Load | 794 | 1294 |
| I6 | Typical Hole Load | 819 | 1319 |
| I7 | Typical Hole Load | 844 | 1344 |
| I8 | Typical Hole Load | 869 | 1369 |
| I9 | Typical Hole Load | 894 | 1394 |
| I10 | Typical Hole Load | 919 | 1419 |
| I11 | Typical Hole Load | 944 | 1444 |
| I12 | Typical Hole Load | 969 | 1469 |
| I13 | Typical Hole Load | 994 | 1494 |
| I14 | Typical Hole Load | 1019 | 1519 |
| I15 | Typical Hole Load | 1044 | 1544 |
| I16 | Typical Hole Load | 1069 | 1569 |
| I17 | Berm Side of Shot | 1094 | 1594 |
| I18 | Berm Side of Shot | 1119 | 1619 |
| I19 | Berm Side of Shot | 1144 | 1644 |
| I20 | Berm Side of Shot | 1169 | 1669 |
| I21 | Berm Side of Shot | 1194 | 1694 |
| I22 | Berm Side of Shot | 1219 | 1719 |
| I23 | Berm Side of Shot | 1244 | 1744 |
| I24 | Berm Side of Shot | 1269 | 1769 |
| I25 | Berm Side of Shot | 1294 | 1794 |
| I26 | Berm Side of Shot | 1319 | 1819 |
| I27 | Berm Side of Shot | 1344 | 1844 |
| I28 | Berm Side of Shot | 1369 | 1869 |
| I29 | Berm Side of Shot | 1394 | 1894 |
| I30 | Berm Side of Shot | 1419 | 1919 |
| I31 | Berm Side of Shot | 1444 | 1944 |
| I32 | Berm Side of Shot | 1469 | 1969 |
| I33 | Berm Side of Shot | 1494 | 1994 |
| J1 | Typical Hole Load | 786 | 1286 |
| J2 | Typical Hole Load | 811 | 1311 |
| J3 | Typical Hole Load | 836 | 1336 |
| J4 | Typical Hole Load | 861 | 1361 |
| J5 | Typical Hole Load | 886 | 1386 |
| J6 | Typical Hole Load | 911 | 1411 |
| J7 | Typical Hole Load | 936 | 1436 |
| J8 | Typical Hole Load | 961 | 1461 |
| J9 | Typical Hole Load | 986 | 1486 |
| J10 | Typical Hole Load | 1011 | 1511 |
| J11 | Typical Hole Load | 1036 | 1536 |
| J12 | Typical Hole Load | 1061 | 1561 |
| J13 | Typical Hole Load | 1086 | 1586 |
| J14 | Typical Hole Load | 1111 | 1611 |
| J15 | Typical Hole Load | 1136 | 1636 |
| J16 | Typical Hole Load | 1161 | 1661 |
| J17 | Berm Side of Shot | 1186 | 1686 |
| J18 | Berm Side of Shot | 1211 | 1711 |
| J19 | Berm Side of Shot | 1236 | 1736 |
| J20 | Berm Side of Shot | 1261 | 1761 |
| J21 | Berm Side of Shot | 1286 | 1786 |
| J22 | Berm Side of Shot | 1311 | 1811 |
| J23 | Berm Side of Shot | 1336 | 1836 |
| J24 | Berm Side of Shot | 1361 | 1861 |
| J25 | Berm Side of Shot | 1386 | 1886 |
| J26 | Berm Side of Shot | 1411 | 1911 |
| J27 | Berm Side of Shot | 1436 | 1936 |
| J28 | Berm Side of Shot | 1461 | 1961 |
| J29 | Berm Side of Shot | 1486 | 1986 |
| J30 | Berm Side of Shot | 1511 | 2011 |
| J31 | Berm Side of Shot | 1536 | 2036 |
| J32 | Berm Side of Shot | 1561 | 2061 |
| J33 | Berm Side of Shot | 1586 | 2086 |
| K1 | Typical Hole Load | 878 | 1378 |
| K2 | Typical Hole Load | 903 | 1403 |
| K3 | Typical Hole Load | 928 | 1428 |
| K4 | Typical Hole Load | 953 | 1453 |
| K5 | Typical Hole Load | 978 | 1478 |
| K6 | Typical Hole Load | 1003 | 1503 |
| K7 | Typical Hole Load | 1028 | 1528 |
| K8 | Typical Hole Load | 1053 | 1553 |
| K9 | Typical Hole Load | 1078 | 1578 |
| K10 | Typical Hole Load | 1103 | 1603 |
| K11 | Typical Hole Load | 1128 | 1628 |
| K12 | Typical Hole Load | 1153 | 1653 |
| K13 | Typical Hole Load | 1178 | 1678 |
| K14 | Typical Hole Load | 1203 | 1703 |
| K15 | Typical Hole Load | 1228 | 1728 |
| K16 | Typical Hole Load | 1253 | 1753 |
| K17 | Berm Side of Shot | 1278 | 1778 |
| K18 | Berm Side of Shot | 1303 | 1803 |
| K19 | Berm Side of Shot | 1328 | 1828 |
| K20 | Berm Side of Shot | 1353 | 1853 |
| K21 | Berm Side of Shot | 1378 | 1878 |
| K22 | Berm Side of Shot | 1403 | 1903 |
| K23 | Berm Side of Shot | 1428 | 1928 |

| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| K24 | Berm Side of Shot | 1453 | 1953 |
| K25 | Berm Side of Shot | 1478 | 1978 |
| K26 | Berm Side of Shot | 1503 | 2003 |
| K27 | Berm Side of Shot | 1528 | 2028 |
| K28 | Berm Side of Shot | 1553 | 2053 |
| K29 | Berm Side of Shot | 1578 | 2078 |
| K30 | Berm Side of Shot | 1603 | 2103 |
| K31 | Berm Side of Shot | 1628 | 2128 |
| K32 | Berm Side of Shot | 1653 | 2153 |
| K33 | Berm Side of Shot | 1678 | 2178 |
| L1 | Typical Hole Load | 970 | 1470 |
| L2 | Typical Hole Load | 995 | 1495 |
| L3 | Typical Hole Load | 1020 | 1520 |
| L4 | Typical Hole Load | 1045 | 1545 |
| L5 | Typical Hole Load | 1070 | 1570 |
| L6 | Typical Hole Load | 1095 | 1595 |
| L7 | Typical Hole Load | 1120 | 1620 |
| L8 | Typical Hole Load | 1145 | 1645 |
| L9 | Typical Hole Load | 1170 | 1670 |
| L10 | Typical Hole Load | 1195 | 1695 |
| L11 | Typical Hole Load | 1220 | 1720 |
| L12 | Typical Hole Load | 1245 | 1745 |
| L13 | Typical Hole Load | 1270 | 1770 |
| L14 | Typical Hole Load | 1295 | 1795 |
| L15 | Typical Hole Load | 1320 | 1820 |
| L16 | Typical Hole Load | 1345 | 1845 |
| L17 | Berm Side of Shot | 1370 | 1870 |
| L18 | Berm Side of Shot | 1395 | 1895 |
| L19 | Berm Side of Shot | 1420 | 1920 |
| L20 | Berm Side of Shot | 1445 | 1945 |
| L21 | Berm Side of Shot | 1470 | 1970 |
| L22 | Berm Side of Shot | 1495 | 1995 |
| L23 | Berm Side of Shot | 1520 | 2020 |
| L24 | Berm Side of Shot | 1545 | 2045 |
| L25 | Berm Side of Shot | 1570 | 2070 |
| L26 | Berm Side of Shot | 1595 | 2095 |
| L27 | Berm Side of Shot | 1620 | 2120 |
| L28 | Berm Side of Shot | 1645 | 2145 |
| L29 | Berm Side of Shot | 1670 | 2170 |
| L30 | Berm Side of Shot | 1695 | 2195 |
| L31 | Berm Side of Shot | 1720 | 2220 |
| L32 | Berm Side of Shot | 1745 | 2245 |
| L33 | Berm Side of Shot | 1770 | 2270 |
| M1 | Typical Hole Load | 1062 | 1562 |
| M2 | Typical Hole Load | 1087 | 1587 |
| M3 | Typical Hole Load | 1112 | 1612 |
| M4 | Typical Hole Load | 1137 | 1637 |
| M5 | Typical Hole Load | 1162 | 1662 |
| M6 | Typical Hole Load | 1187 | 1687 |
| M7 | Typical Hole Load | 1212 | 1712 |
| M8 | Typical Hole Load | 1237 | 1737 |
| M9 | Typical Hole Load | 1262 | 1762 |
| M10 | Typical Hole Load | 1287 | 1787 |
| M11 | Typical Hole Load | 1312 | 1812 |
| M12 | Typical Hole Load | 1337 | 1837 |
| M13 | Typical Hole Load | 1362 | 1862 |
| M14 | Typical Hole Load | 1387 | 1887 |
| M15 | Typical Hole Load | 1412 | 1912 |
| M16 | Typical Hole Load | 1437 | 1937 |
| M17 | Berm Side of Shot | 1462 | 1962 |
| M18 | Berm Side of Shot | 1487 | 1987 |
| M19 | Berm Side of Shot | 1512 | 2012 |
| M20 | Berm Side of Shot | 1537 | 2037 |
| M21 | Berm Side of Shot | 1562 | 2062 |
| M22 | Berm Side of Shot | 1587 | 2087 |
| M23 | Berm Side of Shot | 1612 | 2112 |
| M24 | Berm Side of Shot | 1637 | 2137 |
| M25 | Berm Side of Shot | 1662 | 2162 |
| M26 | Berm Side of Shot | 1687 | 2187 |
| M27 | Berm Side of Shot | 1712 | 2212 |
| M28 | Berm Side of Shot | 1737 | 2237 |
| M29 | Berm Side of Shot | 1762 | 2262 |
| M30 | Berm Side of Shot | 1787 | 2287 |
| M31 | Berm Side of Shot | 1812 | 2312 |
| M32 | Berm Side of Shot | 1837 | 2337 |
| M33 | Berm Side of Shot | 1862 | 2362 |
| N1 | Typical Hole Load | 1154 | 1654 |
| N2 | Typical Hole Load | 1179 | 1679 |
| N3 | Typical Hole Load | 1204 | 1704 |
| N4 | Typical Hole Load | 1229 | 1729 |
| N5 | Typical Hole Load | 1254 | 1754 |
| N6 | Typical Hole Load | 1279 | 1779 |
| N7 | Typical Hole Load | 1304 | 1804 |
| N8 | Typical Hole Load | 1329 | 1829 |
| N9 | Typical Hole Load | 1354 | 1854 |
| N10 | Typical Hole Load | 1379 | 1879 |
| N11 | Typical Hole Load | 1404 | 1904 |
| N12 | Typical Hole Load | 1429 | 1929 |
| N13 | Typical Hole Load | 1454 | 1954 |
| N14 | Typical Hole Load | 1479 | 1979 |
| N15 | Typical Hole Load | 1504 | 2004 |
| N16 | Typical Hole Load | 1529 | 2029 |

| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| N17 | Berm Side of Shot | 1554 | 2054 |
| N18 | Berm Side of Shot | 1579 | 2079 |
| N19 | Berm Side of Shot | 1604 | 2104 |
| N20 | Berm Side of Shot | 1629 | 2129 |
| N21 | Berm Side of Shot | 1654 | 2154 |
| N22 | Berm Side of Shot | 1679 | 2179 |
| N23 | Berm Side of Shot | 1704 | 2204 |
| N24 | Berm Side of Shot | 1729 | 2229 |
| N25 | Berm Side of Shot | 1754 | 2254 |
| N26 | Berm Side of Shot | 1779 | 2279 |
| N27 | Berm Side of Shot | 1804 | 2304 |
| N28 | Berm Side of Shot | 1829 | 2329 |
| N29 | Berm Side of Shot | 1854 | 2354 |
| N30 | Berm Side of Shot | 1879 | 2379 |
| N31 | Berm Side of Shot | 1904 | 2404 |
| N32 | Berm Side of Shot | 1929 | 2429 |
| N33 | Berm Side of Shot | 1954 | 2454 |
| ZZ478 | Stab Holes | 142 | 642 |
| ZZ479 | Stab Holes | 167 | 667 |
| ZZ480 | Stab Holes | 192 | 692 |
| ZZ511 | Stab Holes | 234 | 734 |
| ZZ512 | Stab Holes | 259 | 759 |
| ZZ513 | Stab Holes | 284 | 784 |
| ZZ514 | Stab Holes | 309 | 809 |
| ZZ515 | Stab Holes | 334 | 834 |
| ZZ516 | Stab Holes | 359 | 859 |
| ZZ517 | Stab Holes | 384 | 884 |
| ZZ518 | Stab Holes | 409 | 909 |
| ZZ519 | Stab Holes | 434 | 934 |
| ZZ520 | Stab Holes | 459 | 959 |
| ZZ521 | Stab Holes | 484 | 984 |
| ZZ544 | Stab Holes | 326 | 826 |
| ZZ545 | Stab Holes | 351 | 851 |
| ZZ546 | Stab Holes | 376 | 876 |
| ZZ547 | Stab Holes | 401 | 901 |
| ZZ548 | Stab Holes | 426 | 926 |
| ZZ549 | Stab Holes | 451 | 951 |
| ZZ550 | Stab Holes | 476 | 976 |
| ZZ551 | Stab Holes | 501 | 1001 |
| ZZ552 | Stab Holes | 526 | 1026 |
| ZZ553 | Stab Holes | 551 | 1051 |
| ZZ554 | Stab Holes | 576 | 1076 |
| ZZ555 | Stab Holes | 601 | 1101 |
| ZZ556 | Stab Holes | 626 | 1126 |
| ZZ557 | Stab Holes | 651 | 1151 |
| ZZ577 | Stab Holes | 418 | 918 |

| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ578 | Stab Holes | 443 | 943 |
| ZZ579 | Stab Holes | 468 | 968 |
| ZZ580 | Stab Holes | 493 | 993 |
| ZZ581 | Stab Holes | 518 | 1018 |
| ZZ582 | Stab Holes | 543 | 1043 |
| ZZ583 | Stab Holes | 568 | 1068 |
| ZZ584 | Stab Holes | 593 | 1093 |
| ZZ585 | Stab Holes | 618 | 1118 |
| ZZ586 | Stab Holes | 643 | 1143 |
| ZZ587 | Stab Holes | 668 | 1168 |
| ZZ588 | Stab Holes | 693 | 1193 |
| ZZ589 | Stab Holes | 718 | 1218 |
| ZZ590 | Stab Holes | 743 | 1243 |
| ZZ610 | Stab Holes | 510 | 1010 |
| ZZ611 | Stab Holes | 535 | 1035 |
| ZZ612 | Stab Holes | 560 | 1060 |
| ZZ613 | Stab Holes | 585 | 1085 |
| ZZ614 | Stab Holes | 610 | 1110 |
| ZZ615 | Stab Holes | 635 | 1135 |
| ZZ616 | Stab Holes | 660 | 1160 |
| ZZ617 | Stab Holes | 685 | 1185 |
| ZZ618 | Stab Holes | 710 | 1210 |
| ZZ619 | Stab Holes | 735 | 1235 |
| ZZ620 | Stab Holes | 760 | 1260 |
| ZZ621 | Stab Holes | 785 | 1285 |
| ZZ622 | Stab Holes | 810 | 1310 |
| ZZ623 | Stab Holes | 835 | 1335 |
| ZZ643 | Stab Holes | 602 | 1102 |
| ZZ644 | Stab Holes | 627 | 1127 |
| ZZ645 | Stab Holes | 652 | 1152 |
| ZZ646 | Stab Holes | 677 | 1177 |
| ZZ647 | Stab Holes | 702 | 1202 |
| ZZ648 | Stab Holes | 727 | 1227 |
| ZZ649 | Stab Holes | 752 | 1252 |
| ZZ650 | Stab Holes | 777 | 1277 |
| ZZ651 | Stab Holes | 802 | 1302 |
| ZZ652 | Stab Holes | 827 | 1327 |
| ZZ653 | Stab Holes | 852 | 1352 |
| ZZ654 | Stab Holes | 877 | 1377 |
| ZZ655 | Stab Holes | 902 | 1402 |
| ZZ656 | Stab Holes | 927 | 1427 |
| ZZ676 | Stab Holes | 694 | 1194 |
| ZZ677 | Stab Holes | 719 | 1219 |
| ZZ678 | Stab Holes | 744 | 1244 |
| ZZ679 | Stab Holes | 769 | 1269 |
| ZZ680 | Stab Holes | 794 | 1294 |

| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ681 | Stab Holes | 819 | 1319 |
| ZZ682 | Stab Holes | 844 | 1344 |
| ZZ683 | Stab Holes | 869 | 1369 |
| ZZ684 | Stab Holes | 894 | 1394 |
| ZZ685 | Stab Holes | 919 | 1419 |
| ZZ686 | Stab Holes | 944 | 1444 |
| ZZ687 | Stab Holes | 969 | 1469 |
| ZZ688 | Stab Holes | 994 | 1494 |
| ZZ689 | Stab Holes | 1019 | 1519 |
| ZZ690 | Stab Holes | 1044 | 1544 |
| ZZ709 | Stab Holes | 786 | 1286 |
| ZZ710 | Stab Holes | 811 | 1311 |
| ZZ711 | Stab Holes | 836 | 1336 |
| ZZ712 | Stab Holes | 861 | 1361 |
| ZZ713 | Stab Holes | 886 | 1386 |
| ZZ714 | Stab Holes | 911 | 1411 |
| ZZ715 | Stab Holes | 936 | 1436 |
| ZZ716 | Stab Holes | 961 | 1461 |
| ZZ717 | Stab Holes | 986 | 1486 |
| ZZ718 | Stab Holes | 1011 | 1511 |
| ZZ719 | Stab Holes | 1036 | 1536 |
| ZZ720 | Stab Holes | 1061 | 1561 |
| ZZ721 | Stab Holes | 1086 | 1586 |
| ZZ722 | Stab Holes | 1111 | 1611 |
| ZZ723 | Stab Holes | 1136 | 1636 |
| ZZ724 | Stab Holes | 1161 | 1661 |
| ZZ725 | Stab Holes | 1186 | 1686 |
| ZZ726 | Stab Holes | 1211 | 1711 |
| ZZ727 | Stab Holes | 1236 | 1736 |
| ZZ728 | Stab Holes | 1261 | 1761 |
| ZZ729 | Stab Holes | 1286 | 1786 |
| ZZ730 | Stab Holes | 1311 | 1811 |
| ZZ731 | Stab Holes | 1336 | 1836 |
| ZZ732 | Stab Holes | 1361 | 1861 |
| ZZ733 | Stab Holes | 1386 | 1886 |
| ZZ734 | Stab Holes | 1411 | 1911 |
| ZZ735 | Stab Holes | 1436 | 1936 |
| ZZ736 | Stab Holes | 1461 | 1961 |
| ZZ737 | Stab Holes | 1486 | 1986 |
| ZZ738 | Stab Holes | 1511 | 2011 |
| ZZ739 | Stab Holes | 1536 | 2036 |
| ZZ740 | Stab Holes | 1561 | 2061 |
| ZZ742 | Stab Holes | 878 | 1378 |
| ZZ743 | Stab Holes | 903 | 1403 |
| ZZ744 | Stab Holes | 928 | 1428 |
| ZZ745 | Stab Holes | 953 | 1453 |
| ZZ746 | Stab Holes | 978 | 1478 |
| ZZ747 | Stab Holes | 1003 | 1503 |
| ZZ748 | Stab Holes | 1028 | 1528 |
| ZZ749 | Stab Holes | 1053 | 1553 |
| ZZ750 | Stab Holes | 1078 | 1578 |
| ZZ751 | Stab Holes | 1103 | 1603 |
| ZZ752 | Stab Holes | 1128 | 1628 |
| ZZ753 | Stab Holes | 1153 | 1653 |
| ZZ754 | Stab Holes | 1178 | 1678 |
| ZZ755 | Stab Holes | 1203 | 1703 |
| ZZ756 | Stab Holes | 1228 | 1728 |
| ZZ757 | Stab Holes | 1253 | 1753 |
| ZZ758 | Stab Holes | 1278 | 1778 |
| ZZ759 | Stab Holes | 1303 | 1803 |
| ZZ760 | Stab Holes | 1328 | 1828 |
| ZZ761 | Stab Holes | 1353 | 1853 |
| ZZ762 | Stab Holes | 1378 | 1878 |
| ZZ763 | Stab Holes | 1403 | 1903 |
| ZZ764 | Stab Holes | 1428 | 1928 |
| ZZ765 | Stab Holes | 1453 | 1953 |
| ZZ766 | Stab Holes | 1478 | 1978 |
| ZZ767 | Stab Holes | 1503 | 2003 |
| ZZ768 | Stab Holes | 1528 | 2028 |
| ZZ769 | Stab Holes | 1553 | 2053 |
| ZZ770 | Stab Holes | 1578 | 2078 |
| ZZ771 | Stab Holes | 1603 | 2103 |
| ZZ772 | Stab Holes | 1628 | 2128 |
| ZZ773 | Stab Holes | 1653 | 2153 |
| ZZ775 | Stab Holes | 970 | 1470 |
| ZZ776 | Stab Holes | 995 | 1495 |
| ZZ777 | Stab Holes | 1020 | 1520 |
| ZZ778 | Stab Holes | 1045 | 1545 |
| ZZ779 | Stab Holes | 1070 | 1570 |
| ZZ780 | Stab Holes | 1095 | 1595 |
| ZZ781 | Stab Holes | 1120 | 1620 |
| ZZ782 | Stab Holes | 1145 | 1645 |
| ZZ783 | Stab Holes | 1170 | 1670 |
| ZZ784 | Stab Holes | 1195 | 1695 |
| ZZ785 | Stab Holes | 1220 | 1720 |
| ZZ786 | Stab Holes | 1245 | 1745 |
| ZZ787 | Stab Holes | 1270 | 1770 |
| ZZ788 | Stab Holes | 1295 | 1795 |
| ZZ789 | Stab Holes | 1320 | 1820 |
| ZZ790 | Stab Holes | 1345 | 1845 |
| ZZ791 | Stab Holes | 1370 | 1870 |
| ZZ792 | Stab Holes | 1395 | 1895 |

| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ793 | Stab Holes | 1420 | 1920 |
| ZZ794 | Stab Holes | 1445 | 1945 |
| ZZ795 | Stab Holes | 1470 | 1970 |
| ZZ796 | Stab Holes | 1495 | 1995 |
| ZZ797 | Stab Holes | 1520 | 2020 |
| ZZ798 | Stab Holes | 1545 | 2045 |
| ZZ799 | Stab Holes | 1570 | 2070 |
| ZZ800 | Stab Holes | 1595 | 2095 |
| ZZ801 | Stab Holes | 1620 | 2120 |
| ZZ802 | Stab Holes | 1645 | 2145 |
| ZZ803 | Stab Holes | 1670 | 2170 |
| ZZ804 | Stab Holes | 1695 | 2195 |
| ZZ805 | Stab Holes | 1720 | 2220 |
| ZZ806 | Stab Holes | 1745 | 2245 |
| ZZ808 | Stab Holes | 1062 | 1562 |
| ZZ809 | Stab Holes | 1087 | 1587 |
| ZZ810 | Stab Holes | 1112 | 1612 |
| ZZ811 | Stab Holes | 1137 | 1637 |
| ZZ812 | Stab Holes | 1162 | 1662 |
| ZZ813 | Stab Holes | 1187 | 1687 |
| ZZ814 | Stab Holes | 1212 | 1712 |
| ZZ815 | Stab Holes | 1237 | 1737 |
| ZZ816 | Stab Holes | 1262 | 1762 |
| ZZ817 | Stab Holes | 1287 | 1787 |
| ZZ818 | Stab Holes | 1312 | 1812 |
| ZZ819 | Stab Holes | 1337 | 1837 |
| ZZ820 | Stab Holes | 1362 | 1862 |
| ZZ821 | Stab Holes | 1387 | 1887 |
| ZZ822 | Stab Holes | 1412 | 1912 |
| ZZ823 | Stab Holes | 1437 | 1937 |
| ZZ824 | Stab Holes | 1462 | 1962 |
| ZZ825 | Stab Holes | 1487 | 1987 |
| ZZ826 | Stab Holes | 1512 | 2012 |
| ZZ827 | Stab Holes | 1537 | 2037 |
| ZZ828 | Stab Holes | 1562 | 2062 |
| ZZ829 | Stab Holes | 1587 | 2087 |
| ZZ830 | Stab Holes | 1612 | 2112 |
| ZZ831 | Stab Holes | 1637 | 2137 |
| ZZ832 | Stab Holes | 1662 | 2162 |
| ZZ833 | Stab Holes | 1687 | 2187 |
| ZZ834 | Stab Holes | 1712 | 2212 |
| ZZ835 | Stab Holes | 1737 | 2237 |
| ZZ836 | Stab Holes | 1762 | 2262 |
| ZZ837 | Stab Holes | 1787 | 2287 |
| ZZ838 | Stab Holes | 1812 | 2312 |
| ZZ839 | Stab Holes | 1837 | 2337 |

| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ841 | Stab Holes | 1154 | 1654 |
| ZZ842 | Stab Holes | 1179 | 1679 |
| ZZ843 | Stab Holes | 1204 | 1704 |
| ZZ844 | Stab Holes | 1229 | 1729 |
| ZZ845 | Stab Holes | 1254 | 1754 |
| ZZ846 | Stab Holes | 1279 | 1779 |
| ZZ847 | Stab Holes | 1304 | 1804 |
| ZZ848 | Stab Holes | 1329 | 1829 |
| ZZ849 | Stab Holes | 1354 | 1854 |
| ZZ850 | Stab Holes | 1379 | 1879 |
| ZZ851 | Stab Holes | 1404 | 1904 |
| ZZ852 | Stab Holes | 1429 | 1929 |
| ZZ853 | Stab Holes | 1454 | 1954 |
| ZZ854 | Stab Holes | 1479 | 1979 |
| ZZ855 | Stab Holes | 1504 | 2004 |
| ZZ856 | Stab Holes | 1529 | 2029 |
| ZZ857 | Stab Holes | 1554 | 2054 |
| ZZ858 | Stab Holes | 1579 | 2079 |
| ZZ859 | Stab Holes | 1604 | 2104 |
| ZZ860 | Stab Holes | 1629 | 2129 |
| ZZ861 | Stab Holes | 1654 | 2154 |
| ZZ862 | Stab Holes | 1679 | 2179 |
| ZZ863 | Stab Holes | 1704 | 2204 |
| ZZ864 | Stab Holes | 1729 | 2229 |
| ZZ865 | Stab Holes | 1754 | 2254 |
| ZZ866 | Stab Holes | 1779 | 2279 |
| ZZ867 | Stab Holes | 1804 | 2304 |
| ZZ868 | Stab Holes | 1829 | 2329 |
| ZZ869 | Stab Holes | 1854 | 2354 |
| ZZ870 | Stab Holes | 1879 | 2379 |
| ZZ871 | Stab Holes | 1904 | 2404 |
| ZZ872 | Stab Holes | 1929 | 2429 |

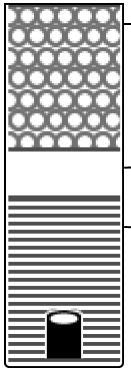
0 m

5 m

10 m

## Typical Hole Load

Ø = 114.3 mm



[1.8 m] - Crushed Stone

[0.6 m] - Air

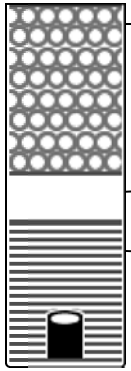
[2.1 m] - Hydromite 4100 Bulk
Wgt: 34.91 kg

[4.2 m] - Black Cap DC Booster - 340g (.75 lb)
Det: SHOCK*STAR DualDelay 9.2m/30' 25/500
Del: 500.00 (ms)
Con: Other Hole
Wgt: 0.34 kg

35.25 kg

## Berm Side of Shot

Ø = 114.3 mm



[2.1 m] - Crushed Stone

[0.6 m] - Air

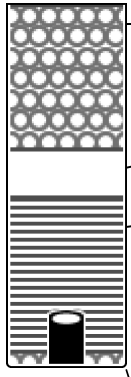
[1.8 m] - Hydromite 4100 Bulk
Wgt: 29.92 kg

[4.2 m] - Black Cap DC Booster - 340g (.75 lb)
Det: SHOCK*STAR DualDelay 9.2m/30' 25/500
Del: 500.00 (ms)
Con: Other Hole
Wgt: 0.34 kg

30.26 kg

## Double Cap

Ø = 114.3 mm



[1.8 m] - Crushed Stone

[0.6 m] - Air

[2.0 m] - Hydromite 4100 Bulk
Wgt: 31.92 kg

[4.2 m] - Black Cap DC Booster - 340g (.75 lb)
Det: SHOCK*STAR DualDelay 9.2m/30' 25/500
Del: 500.00 (ms)
Con: Other Hole
Wgt: 0.34 kg

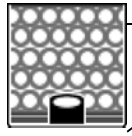
[0.2 m] - Crushed Stone

[4.5 m] - Black Cap DC Booster - 340g (.75 lb)
Det: SHOCK*STAR DualDelay 9.2m/30' 25/500
Del: 500.00 (ms)
Con:
Wgt: 0.34 kg

32.6 kg

## Stab Holes

Ø = 88.9 mm



[1.4 m] - Crushed Stone

[0.1 m] - Air

[0.1 m] - Hydromite 4100 Bulk
Wgt: 0.91 kg

[1.5 m] - Black Cap DC Booster - 340g (.75 lb)
Det: SHOCK*STAR DualDelay 9.2m/30' 25/500
Del: 500.00 (ms)
Con: Other Hole
Wgt: 0.34 kg

1.25 kg

# AUSTIN POWDER LTD.
# BLAST REPORT

327-Orillia
RR #4 ON, Orillia, Canada L3V 1- 84

Blast No.: 2018-02
Blast Type: Stone Quarry/Stone Mine - Production
Customer: HAROLD SUTHERLAND CONST.-KEPPEL (HAR1525-001)
Date/Time: 04/04/2018 16:02
Pit/Permit: KEPPEL QUARRY / SHOT SERVICE
Location: SE Corner of Sump

## *ENVIRONMENT*

Method Used: U.T.M.
Weather: Heavy Snow
Wind From: W
Temperature: 0 °C
Terrain: Flat
Wind Velocity: 30-50 km/h
Blast U.T.M.: 17N 500173 mE 4942463 mN

## *NEAREST PROTECTED STRUCTURE*

Compass Point: NNW
Structure Name: 178841 Grey Rd #17
Direction/Bearing: 353 °
Structure Type: Dwelling
Distance: 553 m
Structure U.T.M.: 17N 500101 mE 4943011 mN

## *LAYOUT*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | Hole Depth: | 10.06-18... m | Material Blasted: | Limestone | Total Meters Drilled: | 983.9 m |
| No. of Holes: | 97 | Subdrilling: | 0.00 m | Burden: | 3.05 m | Water Depth: | max 12.19 m |
| No. of V.P.† Holes: | 96 | Face Height: | 10.06-18.29 m | Spacing: | 3.05 m | Stem Length: | min 1.83 m |
| No. of Rows: | 4 | Drilling Angle: | ° | Back Fill Depth: | 0.00 m | Area Type: | Center Start/ Breakout |
| Diameter: | 114.3 mm | Mats Used: | No | Stem Type: | Clear Stone | Method: | Specified (H = 9.14 m) |

† V.P. = Volume Producing

## *WEIGHTS*

| | | | | | |
|---|---|---|---|---|---|
| | | Max. Wt. of Expl. in Overlapped Decks: | 501.2 kg | Volume Produced: | 7,825.8 m³ |
| Initiation: | Electronic | Max. Wt. of Expl. Per 8 ms Interval: | 501.2 kg | Weight Produced: | 20,734.9 t |
| Firing Device: | E*Star Blasting Machine (WRFD) | Max. No. of Holes Per 8 ms Interval: | 5 | Powder Factor 1: | 2.124 t/kg |
| Other Method: | | Max. Wt. of Explosive Per Hole: | 137.5 kg | Powder Factor 2: | 1.247 kg/m³ |
| Mfg and Model: | DBM1600-2-RC | Scaled Distance Factor (max charge): | 47.13 | Rock Density: | 2.650 t/m³ |
| Initiation Settings: | | Scaled Distance Factor (per delay): | 24.68 | | |
| Series Resistance (ohms): | | | | | |

## *SEISMOGRAPHS*

See seismographs on separate page

## *CREW*

Blast occurred other than scheduled time: No
Misfire Occurred: No
Protective Cover: Loader Bucket

| Last Name | First Name | License / Cert | 2nd License / Cert | In Charge | Tied In | Chk. Tie-In | Driller | Layout |
|---|---|---|---|---|---|---|---|---|
| SMART | EVAN, C | * ON - N/A | | Yes | Yes | Yes | No | Yes |
| BELTRAME | ALEXANDER, A | | | No | No | No | No | No |
| FRALICK | CRAIG, A | | | No | Yes | No | No | No |
| NEWTON | JOHN, D | * ON - N/A | | No | Yes | Yes | No | No |
| O'DONOHOE | LIAM, J | | | No | Yes | No | No | No |

| Other Crew Members | Company | In Charge | Tied In | Chk. Tie-In | Driller | Layout |
|---|---|---|---|---|---|---|
| Mike | Harold Sutherland | No | No | No | Yes | Yes |

# AUSTIN POWDER LTD.
# BLAST REPORT

327-Orillia
RR #4 ON, Orillia, Canada L3V 1- 84

Blast No.: 2018-02
Blast Type: Stone Quarry/Stone Mine - Production
Customer: HAROLD SUTHERLAND CONST.-KEPPEL (HAR1525-001)
Date/Time: 04/04/2018 16:02
Pit/Permit: KEPPEL QUARRY / SHOT SERVICE
Location: SE Corner of Sump

***PRODUCTS AND SERVICES***

| Number | Product Description | Quantity | | Weight ( kg ) |
|---|---|---|---|---|
| 11782 | E*Star Booster - 454g (1 lb) | 194.00 | ea | 89.75 |
| 15001 | 24' E*STAR Detonator - QM | 96.00 | ea | 0.00 |
| 15003 | 40' E*STAR Detonator - QM | 98.00 | ea | 0.00 |
| 12276 | E*Star Bus Wire - 1250' spool | 1.00 | sp | 0.00 |
| 07602 | Hydromite 4100 Bulk | 9,670.00 | kg | 9,670.00 |
| 12981 | Mini Stem Plug - 6015 | 98.00 | ea | 0.00 |
| | | Total Weight of Explosives (Include Primers) ( kg ): | | 9,759.75 |

***COMMENTS / EXPLANATIONS***

General Comments: Imported on 4/4/2018 5:24:54 PM

Signature of Blaster in Charge

# AUSTIN POWDER LTD.
# BLAST REPORT

327-Orillia
RR #4 ON, Orillia, Canada L3V 1- 84

Blast No.: 2018-02
Blast Type: Stone Quarry/Stone Mine - Production
Customer: HAROLD SUTHERLAND CONST.-KEPPEL (HAR1525-001)
Date/Time: 04/04/2018 16:02
Pit/Permit: KEPPEL QUARRY / SHOT SERVICE
Location: SE Corner of Sump

## *SEISMOGRAPH 1 - 178841 GREY ROAD #17*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Data Type: | Seismic Record | Seismograph Type: | Instantel - Minimate Blaster | | | | |
| Date: | 04/04/18 | Trigger Level: | 1.50 mm/s | 115.00 dB | Transverse: | 1.397 mm/s | 34.0 Hz |
| Time: | 16:02 | Calibration Date: | 01/17/18 | | Vertical: | 1.651 mm/s | 37.0 Hz |
| Distance From Blast: | 552.60 m | Calibration Signal: | OK | | Longitudinal: | 1.778 mm/s | 37.0 Hz |
| Direction From Blast: | NNW | Geophone Min. Freq.: | --- Hz | | PPV: | --- mm/s | --- Hz |
| Readout: | Printed Copy | Mic. Min. Freq.: | --- Hz | | Acoustic: | 117 dB | |
| Location: | Bolted to Bedrock. | | | | Vector Sum: | 1.951 mm/s | |
| U.T.M.: | 17N 500101 mE 4943011 mN | | | | | | |
| Reader and Firm: | Evan Smart, AUSTIN POWDER | | | | | | |
| Analyst and Firm: | | | | | | | |
| Installer and Firm: | John Newton, Austin Powder Ltd. | | | | | | |

## *SEISMOGRAPH 2 - 178717 GREY RD #17*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Data Type: | Seismic Record | Seismograph Type: | Geosonic Inc. | | | | |
| Date: | 04/04/18 | Trigger Level: | 1.02 mm/s | 115.00 dB | Transverse: | 2.54 mm/s | 27.8 Hz |
| Time: | 16:02 | Calibration Date: | 07/10/17 | | Vertical: | 2.73 mm/s | 35.7 Hz |
| Distance From Blast: | 678.18 m | Calibration Signal: | OK | | Longitudinal: | 2.67 mm/s | 41.7 Hz |
| Direction From Blast: | SE | Geophone Min. Freq.: | --- Hz | | PPV: | --- mm/s | --- Hz |
| Readout: | Printed Copy | Mic. Min. Freq.: | --- Hz | | Acoustic: | 108 dB | |
| Location: | Spiked and buried. | | | | Vector Sum: | 3.05 mm/s | |
| U.T.M.: | 17N 500660 mE 4941991 mN | | | | | | |
| Reader and Firm: | Evan Smart, AUSTIN POWDER | | | | | | |
| Analyst and Firm: | | | | | | | |
| Installer and Firm: | John Newton, Austin Powder Ltd. | | | | | | |

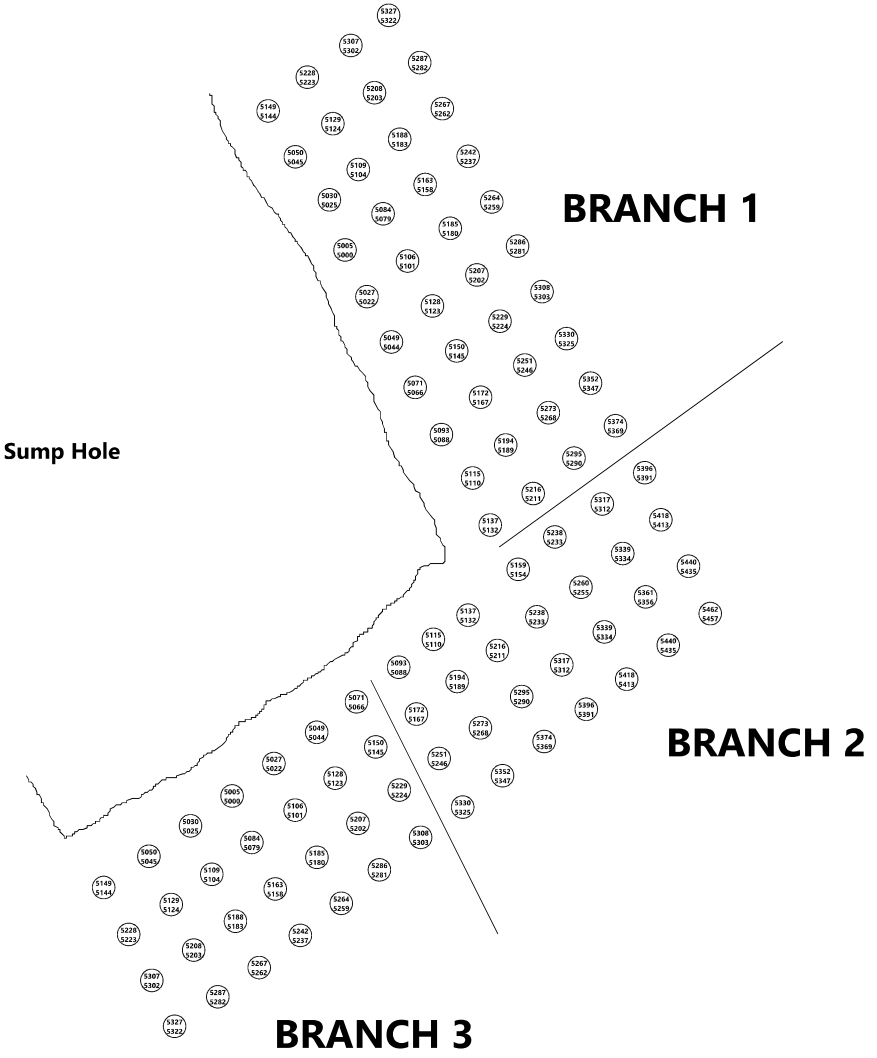
## *SEISMOGRAPH 3 - 283197 CONC. RD. #10*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Data Type: | Seismic Record | Seismograph Type: | White | | | | |
| Date: | 04/04/18 | Trigger Level: | 1.50 mm/s | 115.00 dB | Transverse: | 1.52 mm/s | 34.1 Hz |
| Time: | 16:02 | Calibration Date: | 01/15/18 | | Vertical: | 3.55 mm/s | 42.6 Hz |
| Distance From Blast: | 1,096.67 m | Calibration Signal: | OK | | Longitudinal: | 2.28 mm/s | 34.1 Hz |
| Direction From Blast: | ESE | Geophone Min. Freq.: | --- Hz | | PPV: | --- mm/s | --- Hz |
| Readout: | Display Only | Mic. Min. Freq.: | --- Hz | | Acoustic: | 116 dB | |
| Location: | Spiked and buried. | | | | Vector Sum: | --- mm/s | |
| U.T.M.: | 17N 501117 mE 4941905 mN | | | | | | |
| Reader and Firm: | Evan Smart, AUSTIN POWDER | | | | | | |
| Analyst and Firm: | | | | | | | |
| Installer and Firm: | John Newton, Austin Powder Ltd. | | | | | | |

Hole Label Mode: Cumulative In-Hole Delays

105
100

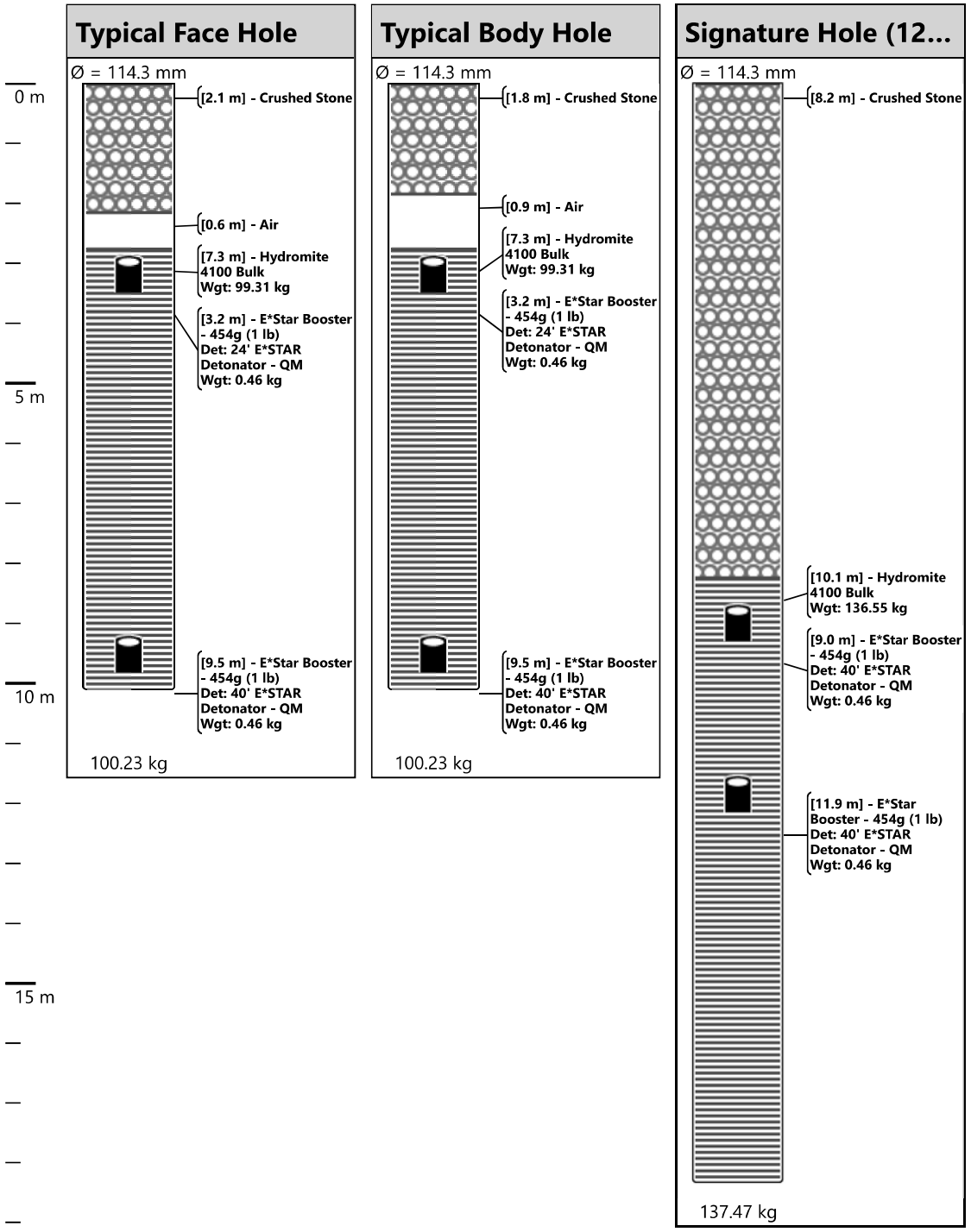
# SIG HOLE



| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ45 | Typical Face Hole | 0 | 5132/5137 |
| ZZ87 | Typical Body Hole | 0 | 5302/5307 |
| ZZ62 | Typical Body Hole | 0 | 5233/5238 |
| ZZ14 | Typical Body Hole | 0 | 5158/5163 |
| ZZ95 | Typical Body Hole | 0 | 5282/5287 |
| ZZ94 | Typical Body Hole | 0 | 5262/5267 |
| ZZ33 | Typical Face Hole | 0 | 5110/5115 |
| ZZ58 | Typical Body Hole | 0 | 5145/5150 |
| ZZ71 | Typical Body Hole | 0 | 5268/5273 |
| ZZ73 | Typical Body Hole | 0 | 5224/5229 |
| ZZ29 | Typical Body Hole | 0 | 5325/5330 |
| ZZ93 | Typical Body Hole | 0 | 5237/5242 |
| ZZ79 | Typical Body Hole | 0 | 5391/5396 |
| ZZ81 | Typical Body Hole | 0 | 5413/5418 |
| ZZ21 | Typical Body Hole | 0 | 5281/5286 |
| ZZ42 | Typical Body Hole | 0 | 5312/5317 |
| ZZ35 | Typical Body Hole | 0 | 5268/5273 |
| ZZ16 | Typical Face Hole | 0 | 5000/5005 |
| ZZ24 | Typical Face Hole | 0 | 5044/5049 |
| ZZ2 | Typical Body Hole | 0 | 5223/5228 |
| ZZ10 | Typical Body Hole | 0 | 5104/5109 |
| ZZ47 | Typical Face Hole | 0 | 5088/5093 |
| ZZ5 | Typical Body Hole | 0 | 5282/5287 |
| ZZ41 | Typical Body Hole | 0 | 5391/5396 |
| ZZ48 | Typical Face Hole | 0 | 5066/5071 |
| ZZ19 | Typical Body Hole | 0 | 5180/5185 |
| ZZ15 | Typical Body Hole | 0 | 5079/5084 |
| ZZ39 | Typical Body Hole | 0 | 5211/5216 |
| ZZ68 | Typical Body Hole | 0 | 5334/5339 |
| ZZ64 | Typical Body Hole | 0 | 5334/5339 |
| ZZ28 | Typical Body Hole | 0 | 5303/5308 |
| ZZ59 | Typical Body Hole | 0 | 5167/5172 |
| ZZ43 | Typical Body Hole | 0 | 5233/5238 |
| ZZ6 | Typical Body Hole | 0 | 5203/5208 |
| ZZ80 | Typical Body Hole | 0 | 5369/5374 |
| ZZ60 | Typical Body Hole | 0 | 5189/5194 |
| ZZ18 | Typical Body Hole | 0 | 5101/5106 |
| ZZ8 | Typical Face Hole | 0 | 5045/5050 |
| ZZ86 | Typical Face Hole | 0 | 5144/5149 |
| ZZ26 | Typical Body Hole | 0 | 5145/5150 |
| ZZ38 | Typical Body Hole | 0 | 5290/5295 |
| ZZ57 | Typical Body Hole | 0 | 5123/5128 |
| ZZ37 | Typical Body Hole | 0 | 5369/5374 |
| ZZ3 | Typical Body Hole | 0 | 5302/5307 |
| ZZ83 | Typical Body Hole | 0 | 5457/5462 |
| ZZ55 | Typical Body Hole | 0 | 5079/5084 |

| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ70 | Typical Body Hole | 0 | 5290/5295 |
| ZZ1 | Typical Face Hole | 0 | 5144/5149 |
| ZZ23 | Typical Body Hole | 0 | 5123/5128 |
| ZZ75 | Typical Body Hole | 0 | 5281/5286 |
| ZZ27 | Typical Body Hole | 0 | 5224/5229 |
| ZZ34 | Typical Body Hole | 0 | 5189/5194 |
| ZZ61 | Typical Body Hole | 0 | 5211/5216 |
| ZZ65 | Typical Body Hole | 0 | 5413/5418 |
| ZZ25 | Typical Face Hole | 0 | 5066/5071 |
| ZZ72 | Typical Body Hole | 0 | 5246/5251 |
| ZZ12 | Typical Body Hole | 0 | 5262/5267 |
| ZZ84 | Typical Body Hole | 0 | 5124/5129 |
| ZZ17 | Typical Face Hole | 0 | 5022/5027 |
| ZZ31 | Typical Body Hole | 0 | 5167/5172 |
| ZZ91 | Typical Body Hole | 0 | 5180/5185 |
| ZZ7 | Typical Body Hole | 0 | 5124/5129 |
| ZZ85 | Typical Body Hole | 0 | 5223/5228 |
| ZZ13 | Typical Body Hole | 0 | 5237/5242 |
| ZZ11 | Typical Body Hole | 0 | 5183/5188 |
| ZZ56 | Typical Body Hole | 0 | 5101/5106 |
| ZZ30 | Typical Body Hole | 0 | 5246/5251 |
| ZZ4 | Typical Body Hole | 0 | 5322/5327 |
| ZZ50 | Typical Face Hole | 0 | 5022/5027 |
| ZZ88 | Typical Body Hole | 0 | 5203/5208 |
| ZZ32 | Typical Face Hole | 0 | 5088/5093 |
| ZZ66 | Typical Body Hole | 0 | 5435/5440 |
| ZZ22 | Typical Body Hole | 0 | 5202/5207 |
| ZZ77 | Typical Body Hole | 0 | 5325/5330 |
| ZZ92 | Typical Body Hole | 0 | 5259/5264 |
| ZZ9 | Typical Face Hole | 0 | 5025/5030 |
| ZZ44 | Typical Face Hole | 0 | 5154/5159 |
| ZZ78 | Typical Body Hole | 0 | 5347/5352 |
| ZZ51 | Typical Face Hole | 0 | 5000/5005 |
| ZZ82 | Typical Body Hole | 0 | 5435/5440 |
| ZZ52 | Typical Face Hole | 0 | 5025/5030 |
| ZZ69 | Typical Body Hole | 0 | 5312/5317 |
| ZZ49 | Typical Face Hole | 0 | 5044/5049 |
| ZZ63 | Typical Body Hole | 0 | 5255/5260 |
| ZZ36 | Typical Body Hole | 0 | 5347/5352 |
| ZZ96 | Typical Body Hole | 0 | 5322/5327 |
| ZZ76 | Typical Body Hole | 0 | 5303/5308 |
| ZZ54 | Typical Body Hole | 0 | 5104/5109 |
| ZZ46 | Typical Face Hole | 0 | 5110/5115 |
| ZZ89 | Typical Body Hole | 0 | 5183/5188 |
| ZZ53 | Typical Face Hole | 0 | 5045/5050 |
| ZZ67 | Typical Body Hole | 0 | 5356/5361 |

| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ90 | Typical Body Hole | 0 | 5158/5163 |
| ZZ20 | Typical Body Hole | 0 | 5259/5264 |
| ZZ40 | Typical Face Hole | 0 | 5132/5137 |
| ZZ74 | Typical Body Hole | 0 | 5202/5207 |
| ZZ97 | Signature Hole (125kg) | 0 | 100/105 |


Typical Face Hole
Ø = 114.3 mm
0 m
5 m
10 m
15 m
20 m
[2.1 m] - Crushed Stone
[0.6 m] - Air
[7.3 m] - Hydromite 4100 Bulk Wgt: 99.31 kg
[3.2 m] - E*Star Booster - 454g (1 lb) Det: 24' E*STAR Detonator - QM Wgt: 0.46 kg
[9.5 m] - E*Star Booster - 454g (1 lb) Det: 40' E*STAR Detonator - QM Wgt: 0.46 kg
100.23 kg
Typical Body Hole
Ø = 114.3 mm
[1.8 m] - Crushed Stone
[0.9 m] - Air
[7.3 m] - Hydromite 4100 Bulk Wgt: 99.31 kg
[3.2 m] - E*Star Booster - 454g (1 lb) Det: 24' E*STAR Detonator - QM Wgt: 0.46 kg
[9.5 m] - E*Star Booster - 454g (1 lb) Det: 40' E*STAR Detonator - QM Wgt: 0.46 kg
100.23 kg
Signature Hole (12...
Ø = 114.3 mm
[8.2 m] - Crushed Stone
[10.1 m] - Hydromite 4100 Bulk Wgt: 136.55 kg
[9.0 m] - E*Star Booster - 454g (1 lb) Det: 40' E*STAR Detonator - QM Wgt: 0.46 kg
[11.9 m] - E*Star Booster - 454g (1 lb) Det: 40' E*STAR Detonator - QM Wgt: 0.46 kg
137.47 kg

Blast No.: 2018-03

Date/Time: 05/15/2018 14:06

## *ENVIRONMENT*

Method Used: U.T.M.

Temperature: 18 °C

Blast U.T.M.: 17N 500204 mE 4942435 mN

## *NEAREST PROTECTED STRUCTURE*

Structure Name: 178841 Grey Rd #17

Structure Type: Dwelling

Structure U.T.M.: 17N 500101 mE 4943011 mN

## *LAYOUT*

| | | | |
|---|---|---|---|
| No. of Holes: | | 632 | Hole D |
| No. of V.P.† Holes: | | 394 | Subdri |
| No. of Rows: | [See Below] | | Face He |
| Diameter: | [See Below] | | Drilling A |
| | | | Mats |

† V.P. = Volume Producing

## *WEIGHTS*

| | | | | | |
|---|---|---|---|---|---|
| Initiation: | Electronic | Max. Wt. of Expl. in Overlapped Decks: | 448.5 kg | Volume Produced: | 20,136.1 m³ |
| Firing Device: | E*Star Blasting Machine (WRFD) | Max. Wt. of Expl. Per 8 ms Interval: | 448.5 kg | Weight Produced: | 53,352.0 t |
| Other Method: | | Max. No. of Holes Per 8 ms Interval: | 6 | Powder Factor 1: | 2.806 t/kg |
| Mfg and Model: | DBM1600-2-RC | Max. Wt. of Explosive Per Hole: | 90.2 kg | Powder Factor 2: | 0.944 kg/m³ |
| Initiation Settings: | | Scaled Distance Factor (max charge): | 61.57 | Rock Density: | 2.650 t/m³ |
| Series Resistance (ohms): | | Scaled Distance Factor (per delay): | 27.61 | | |

## *SEISMOGRAPHS*

See seismographs on separate page

## *CREW*

Blast occurred other than scheduled time: No  Misfire Occurred: No  Protective Cover: Bulldozer

| Last Name | First Name | License / Cert | 2nd License / Cert | In Charge | Tied In | Chk. Tie-In | Driller | Layout |
|---|---|---|---|---|---|---|---|---|
| SMART | EVAN, C | * ON - N/A | | Yes | Yes | Yes | No | Yes |
| BELTRAME | ALEXANDER, A | | | No | No | No | No | No |
| FRALICK | CRAIG, A | | | No | No | No | No | No |
| KOUYOUMJIAN | MACKENZIE, H | | | No | No | No | No | No |
| NEWTON | JOHN, D | | | No | No | No | No | No |
| O'DONOHOE | LIAM, J | | | No | No | No | No | No |
| ROMPHF | ALAN, S | | | No | No | No | No | No |

Blast No.: 2018-03

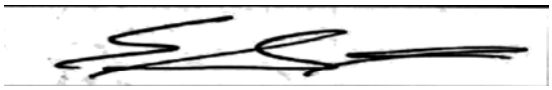
Date/Time: 05/15/2018 14:06

***PRODUCTS AND SERVICES***

| Number | Product Description | Quantity | Weight ( kg ) |
|---|---|---|---|
| 11743 | Black Cap DC Booster - 340g (.75 lb) | 525.00 ea | 178.55 |
| 11782 | E*Star Booster - 454g (1 lb) | 235.00 ea | 108.72 |
| 10751 | SHOCK*STAR DualDelay 9.2m/30' 25/500 | 526.00 ea | 0.00 |
| 15001 | 24' E*STAR Detonator - QM | 117.00 ea | 0.00 |
| 01492 | 30' SHOCK*STAR Quick Relay 17 ms | 2.00 ea | 0.00 |
| 01494 | 30' SHOCK*STAR Quick Relay 42 ms | 25.00 ea | 0.00 |
| 15003 | 40' E*STAR Detonator - QM | 119.00 ea | 0.00 |
| 12276 | E*Star Bus Wire - 1250' spool | 2.00 sp | 0.00 |
| 07602 | Hydromite 4100 Bulk | 18,730.00 kg | 18,730.00 |
| 12981 | Mini Stem Plug - 6015 | 700.00 ea | 0.00 |
| | | Total Weight of Explosives (Include Primers) ( kg ): | 19,017.27 |

***COMMENTS / EXPLANATIONS***

General Comments: Imported on 5/16/2018 6:26:32 AM



Signature of Blaster in Charge

Blast No.: 2018-03

Date/Time: 05/15/2018 14:06

***Pattern: 1***

| | | |
|---|---|---|
| No. of Holes: | 117 | H |
| No. of V.P.† Holes: | 117 | |
| No. of Rows: | 4 | |
| Drilling Angle: | 0 ° | F |

† V.P. = Volume Producing

***Pattern: 2***

| | | |
|---|---|---|
| No. of Holes: | 277 | H |
| No. of V.P.† Holes: | 277 | |
| No. of Rows: | 13 | |
| Drilling Angle: | 0 ° | F |

† V.P. = Volume Producing

***Pattern: 4***

| | | |
|---|---|---|
| No. of Holes: | 228 | H |
| No. of V.P.† Holes: | 0 | |
| No. of Rows: | 12 | |
| Drilling Angle: | 0 ° | F |

† V.P. = Volume Producing

Blast No.: 2018-03

Date/Time: 05/15/2018 14:06

***SEISMOGRAPH 1 - 178841 GREY ROAD #17***

| | | | |
|---|---|---|---|
| Data Type: | Seismic Record | Seismograph Type: | Instantel - Minimate Blas |
| Date: | 05/15/18 | Trigger Level: | |
| Time: | 14:06 | Calibration Date: | 01/17/18 |
| Distance From Blast: | 584.61 m | Calibration Signal: | |
| Direction From Blast: | NNW | Geophone Min. Freq.: | |
| Readout: | Printed Copy | Mic. Min. Freq.: | |
| Location: | Bolted to Bedrock. | | |
| U.T.M.: | 17N 500101 mE 4943011 mN | | |
| Reader and Firm: | Evan Smart, AUSTIN POWDER | | |
| Analyst and Firm: | | | |
| Installer and Firm: | John Newton, Austin Powder Ltd. | | |

***SEISMOGRAPH 2 - 178717 GREY RD #17***

| | | | |
|---|---|---|---|
| Data Type: | Seismic Record | Seismograph Type: | Geosonic Inc. |
| Date: | 05/15/18 | Trigger Level: | |
| Time: | 14:06 | Calibration Date: | 07/10/17 |
| Distance From Blast: | 637.03 m | Calibration Signal: | |
| Direction From Blast: | SE | Geophone Min. Freq.: | |
| Readout: | Printed Copy | Mic. Min. Freq.: | |
| Location: | Spiked and buried. | | |
| U.T.M.: | 17N 500660 mE 4941991 mN | | |
| Reader and Firm: | Evan Smart, AUSTIN POWDER | | |
| Analyst and Firm: | | | |
| Installer and Firm: | John Newton, Austin Powder Ltd. | | |

***SEISMOGRAPH 3 - 178706 GREY RD #17***

| | | | |
|---|---|---|---|
| Data Type: | Seismic Record | Seismograph Type: | Instantel - Minimate Blas |
| Date: | 05/15/18 | Trigger Level: | |
| Time: | 14:06 | Calibration Date: | 01/15/18 |
| Distance From Blast: | 695.25 m | Calibration Signal: | |
| Direction From Blast: | SE | Geophone Min. Freq.: | |
| Readout: | Printed Copy | Mic. Min. Freq.: | |
| Location: | Spiked and weight bagged in front yard | | |
| U.T.M.: | 17N 500660 mE 4941911 mN | | |
| Reader and Firm: | Evan Smart, AUSTIN POWDER | | |
| Analyst and Firm: | | | |
| Installer and Firm: | John Newton, Austin Powder Ltd. | | |

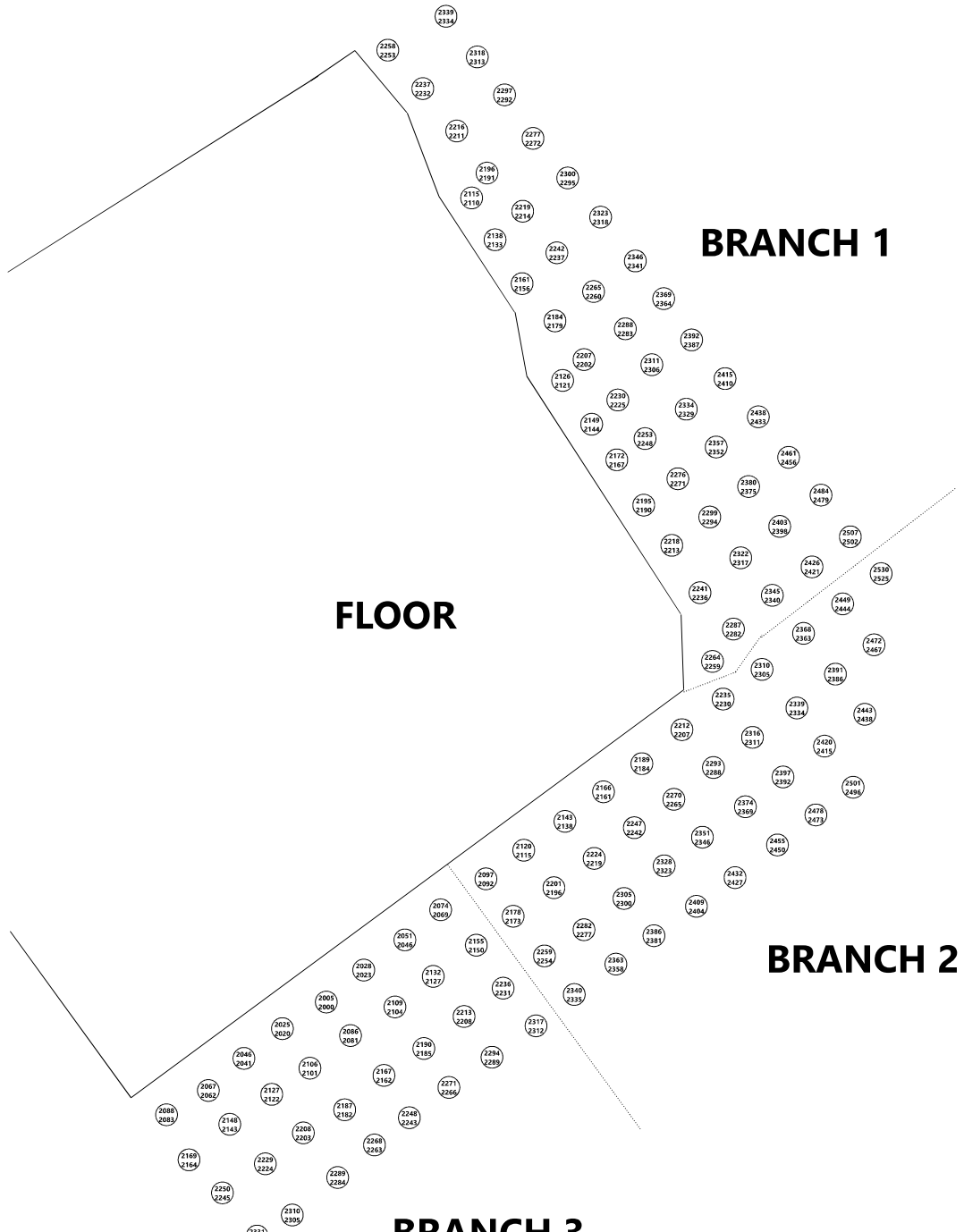
Blast No.: 2018-03

Date/Time: 05/15/2018 14:06

***SEISMOGRAPH 4 - 283197 CONC. RD. #10***

| | | | |
|---|---|---|---|
| Data Type: | No Trigger | Seismograph Type: | Instantel - Minimate Blas |
| Date: | 05/15/18 | Trigger Level: | |
| Time: | 14:06 | Calibration Date: | 01/15/18 |
| Distance From Blast: | 1,056.44 m | Calibration Signal: | |
| Direction From Blast: | ESE | Geophone Min. Freq.: | |
| Readout: | | Mic. Min. Freq.: | |
| Location: | Spiked and buried. | | |
| U.T.M.: | 17N 501117 mE 4941905 mN | | |
| Reader and Firm: | Evan Smart, AUSTIN POWDER | | |
| Analyst and Firm: | | | |
| Installer and Firm: | John Newton, Austin Powder Ltd. | | |

Hole Label Mode: Cumulative In-Hole Delays



| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ103 | Typical Face Hole | 0 | 2156/2161 |
| ZZ48 | Typical Face Hole | 0 | 2161/2166 |
| ZZ67 | Typical Body Hole | 0 | 2340/2345 |
| ZZ14 | Typical Body Hole | 0 | 2182/2187 |
| ZZ68 | Typical Body Hole | 0 | 2421/2426 |
| ZZ61 | Typical Body Hole | 0 | 2496/2501 |
| ZZ63 | Typical Body Hole | 0 | 2334/2339 |
| ZZ27 | Typical Body Hole | 0 | 2208/2213 |
| ZZ36 | Typical Body Hole | 0 | 2335/2340 |
| ZZ35 | Typical Body Hole | 0 | 2254/2259 |
| ZZ33 | Typical Face Hole | 0 | 2092/2097 |
| ZZ111 | Typical Body Hole | 0 | 2272/2277 |
| ZZ112 | Typical Body Hole | 0 | 2292/2297 |
| ZZ34 | Typical Body Hole | 0 | 2173/2178 |
| ZZ28 | Typical Body Hole | 0 | 2289/2294 |
| ZZ55 | Typical Body Hole | 0 | 2288/2293 |
| ZZ101 | Typical Body Hole | 0 | 2260/2265 |
| ZZ50 | Typical Body Hole | 0 | 2265/2270 |
| ZZ62 | Typical Body Hole | 0 | 2415/2420 |
| ZZ107 | Typical Body Hole | 0 | 2214/2219 |
| ZZ21 | Typical Body Hole | 0 | 2266/2271 |
| ZZ13 | Typical Body Hole | 0 | 2263/2268 |
| ZZ11 | Typical Body Hole | 0 | 2203/2208 |
| ZZ97 | Typical Body Hole | 0 | 2202/2207 |
| ZZ85 | Typical Body Hole | 0 | 2352/2357 |
| ZZ110 | Typical Body Hole | 0 | 2191/2196 |
| ZZ66 | Typical Face Hole | 0 | 2259/2264 |
| ZZ39 | Typical Body Hole | 0 | 2196/2201 |
| ZZ22 | Typical Body Hole | 0 | 2185/2190 |
| ZZ30 | Typical Body Hole | 0 | 2231/2236 |
| ZZ108 | Typical Face Hole | 0 | 2133/2138 |
| ZZ92 | Typical Body Hole | 0 | 2387/2392 |
| ZZ31 | Typical Body Hole | 0 | 2150/2155 |
| ZZ49 | Typical Face Hole | 0 | 2184/2189 |
| ZZ116 | Typical Body Hole | 0 | 2334/2339 |
| ZZ105 | Typical Body Hole | 0 | 2318/2323 |
| ZZ2 | Typical Body Hole | 0 | 2164/2169 |
| ZZ117 | Typical Face Hole | 0 | 2253/2258 |
| ZZ23 | Typical Body Hole | 0 | 2104/2109 |
| ZZ7 | Typical Body Hole | 0 | 2143/2148 |
| ZZ8 | Typical Face Hole | 0 | 2062/2067 |
| ZZ69 | Typical Body Hole | 0 | 2502/2507 |
| ZZ37 | Typical Body Hole | 0 | 2358/2363 |
| ZZ106 | Typical Body Hole | 0 | 2295/2300 |
| ZZ72 | Typical Body Hole | 0 | 2363/2368 |
| ZZ6 | Typical Body Hole | 0 | 2224/2229 |

| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ41 | Typical Face Hole | 0 | 2138/2143 |
| ZZ9 | Typical Face Hole | 0 | 2041/2046 |
| ZZ12 | Typical Body Hole | 0 | 2284/2289 |
| ZZ91 | Typical Body Hole | 0 | 2410/2415 |
| ZZ18 | Typical Body Hole | 0 | 2081/2086 |
| ZZ73 | Typical Body Hole | 0 | 2386/2391 |
| ZZ86 | Typical Body Hole | 0 | 2271/2276 |
| ZZ100 | Typical Body Hole | 0 | 2341/2346 |
| ZZ19 | Typical Body Hole | 0 | 2162/2167 |
| ZZ88 | Typical Face Hole | 0 | 2167/2172 |
| ZZ113 | Typical Face Hole | 0 | 2211/2216 |
| ZZ114 | Typical Face Hole | 0 | 2232/2237 |
| ZZ82 | Typical Body Hole | 0 | 2375/2380 |
| ZZ71 | Typical Body Hole | 0 | 2444/2449 |
| ZZ43 | Typical Body Hole | 0 | 2300/2305 |
| ZZ10 | Typical Body Hole | 0 | 2122/2127 |
| ZZ4 | Typical Body Hole | 0 | 2326/2331 |
| ZZ15 | Typical Body Hole | 0 | 2101/2106 |
| ZZ44 | Typical Body Hole | 0 | 2381/2386 |
| ZZ16 | Typical Face Hole | 0 | 2020/2025 |
| ZZ25 | Typical Face Hole | 0 | 2046/2051 |
| ZZ51 | Typical Body Hole | 0 | 2346/2351 |
| ZZ64 | Typical Body Hole | 0 | 2305/2310 |
| ZZ94 | Typical Body Hole | 0 | 2225/2230 |
| ZZ56 | Typical Face Hole | 0 | 2207/2212 |
| ZZ87 | Typical Face Hole | 0 | 2190/2195 |
| ZZ40 | Typical Face Hole | 0 | 2115/2120 |
| ZZ20 | Typical Body Hole | 0 | 2243/2248 |
| ZZ57 | Typical Body Hole | 0 | 2230/2235 |
| ZZ78 | Typical Body Hole | 0 | 2317/2322 |
| ZZ32 | Typical Face Hole | 0 | 2069/2074 |
| ZZ99 | Typical Body Hole | 0 | 2364/2369 |
| ZZ90 | Typical Body Hole | 0 | 2329/2334 |
| ZZ59 | Extra 40' | 0 | 2392/2397 |
| ZZ115 | Typical Body Hole | 0 | 2313/2318 |
| ZZ81 | Typical Body Hole | 0 | 2294/2299 |
| ZZ80 | Typical Face Hole | 0 | 2213/2218 |
| ZZ26 | Typical Body Hole | 0 | 2127/2132 |
| ZZ42 | Typical Body Hole | 0 | 2219/2224 |
| ZZ74 | Typical Body Hole | 0 | 2467/2472 |
| ZZ70 | Typical Body Hole | 0 | 2525/2530 |
| ZZ3 | Typical Body Hole | 0 | 2245/2250 |
| ZZ47 | Typical Body Hole | 0 | 2242/2247 |
| ZZ75 | Typical Body Hole | 0 | 2438/2443 |
| ZZ79 | Typical Face Hole | 0 | 2236/2241 |
| ZZ45 | Typical Body Hole | 0 | 2404/2409 |

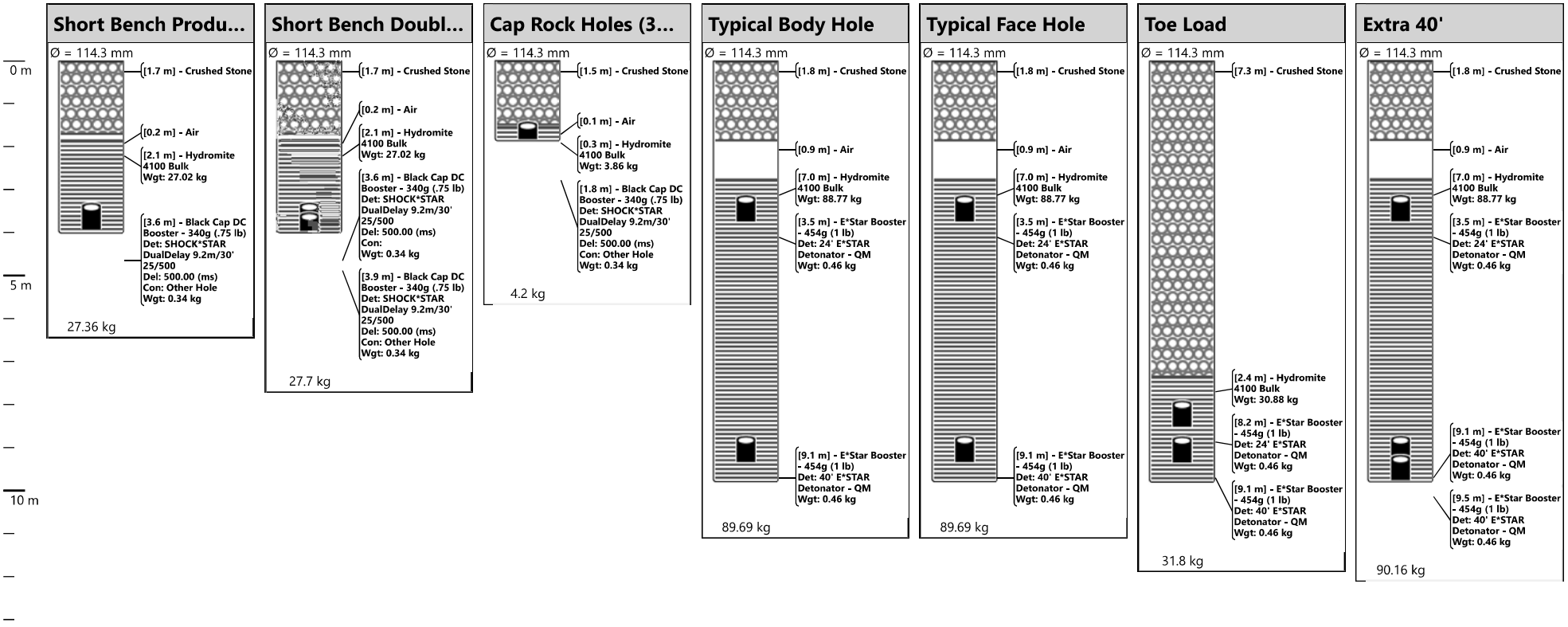
| Hole | Load |
|---|---|
| ZZ24 | Typical Face Hole |
| ZZ65 | Typical Body Hole |
| ZZ58 | Typical Body Hole |
| ZZ17 | Typical Face Hole |
| ZZ53 | Typical Body Hole |
| ZZ83 | Typical Body Hole |
| ZZ54 | Typical Body Hole |
| ZZ76 | Typical Body Hole |
| ZZ5 | Typical Body Hole |
| ZZ38 | Typical Body Hole |
| ZZ95 | Typical Face Hole |
| ZZ52 | Typical Body Hole |
| ZZ104 | Typical Body Hole |
| ZZ109 | Toe Load |
| ZZ102 | Typical Face Hole |
| ZZ93 | Typical Body Hole |
| ZZ77 | Typical Body Hole |
| ZZ60 | Typical Body Hole |
| ZZ89 | Typical Body Hole |
| ZZ1 | Typical Face Hole |
| ZZ46 | Typical Body Hole |
| ZZ96 | Typical Face Hole |
| ZZ84 | Typical Body Hole |
| ZZ98 | Typical Body Hole |
| ZZ29 | Typical Body Hole |
| B8 | Short Bench Production |
| B9 | Short Bench Production |
| B10 | Short Bench Production |
| B11 | Short Bench Production |
| B12 | Short Bench Production |
| B13 | Short Bench Production |
| B14 | Short Bench Production |
| B15 | Short Bench Production |
| B16 | Short Bench Production |
| B17 | Short Bench Production |
| B18 | Short Bench Production |
| B19 | Short Bench Production |
| B20 | Short Bench Production |
| B21 | Short Bench Production |
| B22 | Short Bench Production |
| B23 | Short Bench Production |
| B24 | Short Bench Production |
| B25 | Short Bench Production |
| B26 | Short Bench Production |
| B27 | Short Bench Production |
| B28 | Short Bench Production |

| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| C8 | Short Bench Production | 92 | 592 |
| C9 | Short Bench Production | 117 | 617 |
| C10 | Short Bench Production | 142 | 642 |
| C11 | Short Bench Production | 167 | 667 |
| C12 | Short Bench Production | 192 | 692 |
| C13 | Short Bench Production | 217 | 717 |
| C14 | Short Bench Production | 242 | 742 |
| C15 | Short Bench Production | 267 | 767 |
| C16 | Short Bench Production | 292 | 792 |
| C17 | Short Bench Production | 317 | 817 |
| C18 | Short Bench Production | 342 | 842 |
| C19 | Short Bench Production | 367 | 867 |
| C20 | Short Bench Production | 392 | 892 |
| C21 | Short Bench Production | 417 | 917 |
| C22 | Short Bench Production | 442 | 942 |
| C23 | Short Bench Production | 467 | 967 |
| C24 | Short Bench Production | 492 | 992 |
| C25 | Short Bench Production | 517 | 1017 |
| C26 | Short Bench Production | 542 | 1042 |
| C27 | Short Bench Production | 567 | 1067 |
| C28 | Short Bench Production | 592 | 1092 |
| D7 | Short Bench Production | 159 | 659 |
| D8 | Short Bench Production | 184 | 684 |
| D9 | Short Bench Production | 209 | 709 |
| D10 | Short Bench Production | 234 | 734 |
| D11 | Short Bench Production | 259 | 759 |
| D12 | Short Bench Production | 284 | 784 |
| D13 | Short Bench Production | 309 | 809 |
| D14 | Short Bench Production | 334 | 834 |
| D15 | Short Bench Production | 359 | 859 |
| D16 | Short Bench Production | 384 | 884 |
| D17 | Short Bench Production | 409 | 909 |
| D18 | Short Bench Production | 434 | 934 |
| D19 | Short Bench Production | 459 | 959 |
| D20 | Short Bench Production | 484 | 984 |
| D21 | Short Bench Production | 509 | 1009 |
| D22 | Short Bench Production | 534 | 1034 |
| D23 | Short Bench Production | 559 | 1059 |
| D24 | Short Bench Production | 584 | 1084 |
| D25 | Short Bench Production | 609 | 1109 |
| D26 | Short Bench Production | 634 | 1134 |
| D27 | Short Bench Production | 659 | 1159 |
| D28 | Short Bench Production | 684 | 1184 |
| E7 | Short Bench Production | 251 | 751 |
| E8 | Short Bench Production | 276 | 776 |
| E9 | Short Bench Production | 301 | 801 |
| E10 | Short Bench Production | 326 | 826 |
| E11 | Short Bench Production | 351 | 851 |
| E12 | Short Bench Production | 376 | 876 |
| E13 | Short Bench Production | 401 | 901 |
| E14 | Short Bench Production | 426 | 926 |
| E15 | Short Bench Production | 451 | 951 |
| E16 | Short Bench Production | 476 | 976 |
| E17 | Short Bench Production | 501 | 1001 |
| E18 | Short Bench Production | 526 | 1026 |
| E19 | Short Bench Production | 551 | 1051 |
| E20 | Short Bench Production | 576 | 1076 |
| E21 | Short Bench Production | 601 | 1101 |
| E22 | Short Bench Production | 626 | 1126 |
| E23 | Short Bench Production | 651 | 1151 |
| E24 | Short Bench Production | 676 | 1176 |
| E25 | Short Bench Production | 701 | 1201 |
| E26 | Short Bench Production | 726 | 1226 |
| E27 | Short Bench Production | 751 | 1251 |
| E28 | Short Bench Production | 776 | 1276 |
| F3 | Short Bench Production | 268 | 768 |
| F4 | Short Bench Production | 293 | 793 |
| F5 | Short Bench Production | 318 | 818 |
| F6 | Short Bench Production | 343 | 843 |
| F7 | Short Bench Production | 368 | 868 |
| F8 | Short Bench Production | 393 | 893 |
| F9 | Short Bench Production | 418 | 918 |
| F10 | Short Bench Production | 443 | 943 |
| F11 | Short Bench Production | 468 | 968 |
| F12 | Short Bench Production | 493 | 993 |
| F13 | Short Bench Production | 518 | 1018 |
| F14 | Short Bench Production | 543 | 1043 |
| F15 | Short Bench Production | 568 | 1068 |
| F16 | Short Bench Production | 593 | 1093 |
| F17 | Short Bench Production | 618 | 1118 |
| F18 | Short Bench Production | 643 | 1143 |
| F19 | Short Bench Double Cap | 668 | 1168 |
| F20 | Short Bench Production | 693 | 1193 |
| F21 | Short Bench Production | 718 | 1218 |
| F22 | Short Bench Production | 743 | 1243 |
| F23 | Short Bench Production | 768 | 1268 |
| F24 | Short Bench Production | 793 | 1293 |
| F25 | Short Bench Production | 818 | 1318 |
| F26 | Short Bench Production | 843 | 1343 |
| F27 | Short Bench Production | 868 | 1368 |
| F28 | Short Bench Production | 893 | 1393 |
| G3 | Short Bench Production | 360 | 860 |
| G4 | Short Bench Production | 385 | |
| G5 | Short Bench Production | 410 | |
| G6 | Short Bench Production | 435 | |
| G7 | Short Bench Production | 460 | |
| G8 | Short Bench Production | 485 | |
| G9 | Short Bench Production | 510 | |
| G10 | Short Bench Production | 535 | |
| G11 | Short Bench Double Cap | 560 | |
| G12 | Short Bench Production | 585 | |
| G13 | Short Bench Production | 610 | |
| G14 | Short Bench Production | 635 | |
| G15 | Short Bench Production | 660 | |
| G16 | Short Bench Production | 685 | |
| G17 | Short Bench Double Cap | 710 | |
| G18 | Short Bench Production | 735 | |
| G19 | Short Bench Production | 760 | |
| G20 | Short Bench Production | 785 | |
| G21 | Short Bench Production | 810 | |
| G22 | Short Bench Production | 835 | |
| G23 | Short Bench Production | 860 | |
| G24 | Short Bench Production | 885 | |
| G25 | Short Bench Production | 910 | |
| G26 | Short Bench Production | 935 | |
| G27 | Short Bench Production | 960 | |
| G28 | Short Bench Production | 985 | |
| H3 | Short Bench Production | 452 | |
| H4 | Short Bench Production | 477 | |
| H5 | Short Bench Production | 502 | |
| H6 | Short Bench Production | 527 | |
| H7 | Short Bench Production | 552 | |
| H8 | Short Bench Production | 577 | |
| H9 | Short Bench Production | 602 | |
| H10 | Short Bench Production | 627 | |
| H11 | Short Bench Production | 652 | |
| H12 | Short Bench Production | 677 | |
| H13 | Short Bench Production | 702 | |
| H14 | Short Bench Production | 727 | |
| H15 | Short Bench Production | 752 | |
| H16 | Short Bench Double Cap | 777 | |
| H17 | Short Bench Production | 802 | |
| H18 | Short Bench Production | 827 | |
| H19 | Short Bench Double Cap | 852 | |
| H20 | Short Bench Production | 877 | |
| H21 | Short Bench Double Cap | 902 | |
| H22 | Short Bench Double Cap | 927 | |
| H23 | Short Bench Production | 952 | |

| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| H24 | Short Bench Production | 977 | 1477 |
| H25 | Short Bench Production | 1002 | 1502 |
| H26 | Short Bench Production | 1027 | 1527 |
| H27 | Short Bench Production | 1052 | 1552 |
| H28 | Short Bench Production | 1077 | 1577 |
| I2 | Short Bench Production | 519 | 1019 |
| I3 | Short Bench Production | 544 | 1044 |
| I4 | Short Bench Production | 569 | 1069 |
| I5 | Short Bench Production | 594 | 1094 |
| I6 | Short Bench Production | 619 | 1119 |
| I7 | Short Bench Production | 644 | 1144 |
| I8 | Short Bench Production | 669 | 1169 |
| I9 | Short Bench Production | 694 | 1194 |
| I10 | Short Bench Production | 719 | 1219 |
| I11 | Short Bench Double Cap | 744 | 1244 |
| I12 | Short Bench Production | 769 | 1269 |
| I13 | Short Bench Production | 794 | 1294 |
| I14 | Short Bench Production | 819 | 1319 |
| I15 | Short Bench Production | 844 | 1344 |
| I16 | Short Bench Production | 869 | 1369 |
| I17 | Short Bench Double Cap | 894 | 1394 |
| I18 | Short Bench Production | 919 | 1419 |
| I19 | Short Bench Production | 944 | 1444 |
| I20 | Short Bench Production | 969 | 1469 |
| I21 | Short Bench Production | 994 | 1494 |
| I22 | Short Bench Production | 1019 | 1519 |
| I23 | Short Bench Production | 1044 | 1544 |
| I24 | Short Bench Production | 1069 | 1569 |
| I25 | Short Bench Production | 1094 | 1594 |
| I26 | Short Bench Production | 1119 | 1619 |
| I27 | Short Bench Production | 1144 | 1644 |
| I28 | Short Bench Production | 1169 | 1669 |
| J2 | Short Bench Production | 611 | 1111 |
| J3 | Short Bench Production | 636 | 1136 |
| J4 | Short Bench Production | 661 | 1161 |
| J5 | Short Bench Production | 686 | 1186 |
| J6 | Short Bench Production | 711 | 1211 |
| J7 | Short Bench Production | 736 | 1236 |
| J8 | Short Bench Production | 761 | 1261 |
| J9 | Short Bench Production | 786 | 1286 |
| J10 | Short Bench Production | 811 | 1311 |
| J11 | Short Bench Production | 836 | 1336 |
| J12 | Short Bench Production | 861 | 1361 |
| J13 | Short Bench Production | 886 | 1386 |
| J14 | Short Bench Production | 911 | 1411 |
| J15 | Short Bench Production | 936 | 1436 |
| J16 | Short Bench Production | 961 | 1461 |
| J17 | Short Bench Production | 986 | 1486 |
| J18 | Short Bench Production | 1011 | 1511 |
| J19 | Short Bench Production | 1036 | 1536 |
| J20 | Short Bench Production | 1061 | 1561 |
| J21 | Short Bench Production | 1086 | 1586 |
| J22 | Short Bench Double Cap | 1111 | 1611 |
| J23 | Short Bench Production | 1136 | 1636 |
| J24 | Short Bench Production | 1161 | 1661 |
| J25 | Short Bench Production | 1186 | 1686 |
| J26 | Short Bench Production | 1211 | 1711 |
| J27 | Short Bench Production | 1236 | 1736 |
| J28 | Short Bench Production | 1261 | 1761 |
| K3 | Short Bench Production | 728 | 1228 |
| K4 | Short Bench Production | 753 | 1253 |
| K5 | Short Bench Production | 778 | 1278 |
| K6 | Short Bench Production | 803 | 1303 |
| K7 | Short Bench Production | 828 | 1328 |
| K8 | Short Bench Production | 853 | 1353 |
| K9 | Short Bench Production | 878 | 1378 |
| K10 | Short Bench Production | 903 | 1403 |
| K11 | Short Bench Production | 928 | 1428 |
| K12 | Short Bench Production | 953 | 1453 |
| K13 | Short Bench Production | 978 | 1478 |
| K14 | Short Bench Production | 1003 | 1503 |
| K15 | Short Bench Production | 1028 | 1528 |
| K16 | Short Bench Production | 1053 | 1553 |
| K17 | Short Bench Production | 1078 | 1578 |
| K18 | Short Bench Production | 1103 | 1603 |
| K19 | Short Bench Production | 1128 | 1628 |
| K20 | Short Bench Production | 1153 | 1653 |
| K21 | Short Bench Production | 1178 | 1678 |
| K22 | Short Bench Production | 1203 | 1703 |
| K23 | Short Bench Production | 1228 | 1728 |
| K24 | Short Bench Production | 1253 | 1753 |
| K25 | Short Bench Production | 1278 | 1778 |
| K26 | Short Bench Production | 1303 | 1803 |
| K27 | Short Bench Production | 1328 | 1828 |
| K28 | Short Bench Production | 1353 | 1853 |
| L3 | Short Bench Production | 820 | 1320 |
| L4 | Short Bench Production | 845 | 1345 |
| L5 | Short Bench Production | 870 | 1370 |
| L6 | Short Bench Production | 895 | 1395 |
| L7 | Short Bench Production | 920 | 1420 |
| L8 | Short Bench Production | 945 | 1445 |
| L9 | Short Bench Production | 970 | 1470 |
| L10 | Short Bench Production | 995 | |
| L11 | Short Bench Production | 1020 | |
| L12 | Short Bench Production | 1045 | |
| L13 | Short Bench Production | 1070 | |
| L14 | Short Bench Production | 1095 | |
| L15 | Short Bench Production | 1120 | |
| L16 | Short Bench Production | 1145 | |
| L17 | Short Bench Production | 1170 | |
| L18 | Short Bench Production | 1195 | |
| L19 | Short Bench Production | 1220 | |
| L20 | Short Bench Production | 1245 | |
| L21 | Short Bench Production | 1270 | |
| L22 | Short Bench Production | 1295 | |
| L23 | Short Bench Production | 1320 | |
| L24 | Short Bench Production | 1345 | |
| L25 | Short Bench Production | 1370 | |
| L26 | Short Bench Production | 1395 | |
| L27 | Short Bench Production | 1420 | |
| L28 | Short Bench Production | 1445 | |
| M6 | Short Bench Production | 987 | |
| M7 | Short Bench Production | 1012 | |
| M8 | Short Bench Production | 1037 | |
| M9 | Short Bench Production | 1062 | |
| N7 | Short Bench Production | 1104 | |
| N8 | Short Bench Production | 1129 | |
| N9 | Short Bench Production | 1154 | |
| ZZ700 | Cap Rock Holes (3kg) | 92 | |
| ZZ701 | Cap Rock Holes (3kg) | 117 | |
| ZZ702 | Cap Rock Holes (3kg) | 142 | |
| ZZ703 | Cap Rock Holes (3kg) | 167 | |
| ZZ704 | Cap Rock Holes (3kg) | 192 | |
| ZZ705 | Cap Rock Holes (3kg) | 217 | |
| ZZ706 | Cap Rock Holes (3kg) | 242 | |
| ZZ707 | Cap Rock Holes (3kg) | 267 | |
| ZZ708 | Cap Rock Holes (3kg) | 292 | |
| ZZ709 | Cap Rock Holes (3kg) | 317 | |
| ZZ710 | Cap Rock Holes (3kg) | 342 | |
| ZZ711 | Cap Rock Holes (3kg) | 367 | |
| ZZ712 | Cap Rock Holes (3kg) | 392 | |
| ZZ713 | Cap Rock Holes (3kg) | 417 | |
| ZZ714 | Cap Rock Holes (3kg) | 442 | |
| ZZ715 | Cap Rock Holes (3kg) | 467 | |
| ZZ716 | Cap Rock Holes (3kg) | 492 | |
| ZZ717 | Cap Rock Holes (3kg) | 517 | |
| ZZ718 | Cap Rock Holes (3kg) | 542 | |
| ZZ726 | Cap Rock Holes (3kg) | 184 | |

| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ727 | Cap Rock Holes (3kg) | 209 | 709 |
| ZZ728 | Cap Rock Holes (3kg) | 234 | 734 |
| ZZ729 | Cap Rock Holes (3kg) | 259 | 759 |
| ZZ730 | Cap Rock Holes (3kg) | 284 | 784 |
| ZZ731 | Cap Rock Holes (3kg) | 309 | 809 |
| ZZ732 | Cap Rock Holes (3kg) | 334 | 834 |
| ZZ733 | Cap Rock Holes (3kg) | 359 | 859 |
| ZZ734 | Cap Rock Holes (3kg) | 384 | 884 |
| ZZ735 | Cap Rock Holes (3kg) | 409 | 909 |
| ZZ736 | Cap Rock Holes (3kg) | 434 | 934 |
| ZZ737 | Cap Rock Holes (3kg) | 459 | 959 |
| ZZ738 | Cap Rock Holes (3kg) | 484 | 984 |
| ZZ739 | Cap Rock Holes (3kg) | 509 | 1009 |
| ZZ740 | Cap Rock Holes (3kg) | 534 | 1034 |
| ZZ741 | Cap Rock Holes (3kg) | 559 | 1059 |
| ZZ742 | Cap Rock Holes (3kg) | 584 | 1084 |
| ZZ743 | Cap Rock Holes (3kg) | 609 | 1109 |
| ZZ744 | Cap Rock Holes (3kg) | 634 | 1134 |
| ZZ751 | Cap Rock Holes (3kg) | 251 | 751 |
| ZZ752 | Cap Rock Holes (3kg) | 276 | 776 |
| ZZ753 | Cap Rock Holes (3kg) | 301 | 801 |
| ZZ754 | Cap Rock Holes (3kg) | 326 | 826 |
| ZZ755 | Cap Rock Holes (3kg) | 351 | 851 |
| ZZ756 | Cap Rock Holes (3kg) | 376 | 876 |
| ZZ757 | Cap Rock Holes (3kg) | 401 | 901 |
| ZZ758 | Cap Rock Holes (3kg) | 426 | 926 |
| ZZ759 | Cap Rock Holes (3kg) | 451 | 951 |
| ZZ760 | Cap Rock Holes (3kg) | 476 | 976 |
| ZZ761 | Cap Rock Holes (3kg) | 501 | 1001 |
| ZZ762 | Cap Rock Holes (3kg) | 526 | 1026 |
| ZZ763 | Cap Rock Holes (3kg) | 551 | 1051 |
| ZZ764 | Cap Rock Holes (3kg) | 576 | 1076 |
| ZZ765 | Cap Rock Holes (3kg) | 601 | 1101 |
| ZZ766 | Cap Rock Holes (3kg) | 626 | 1126 |
| ZZ767 | Cap Rock Holes (3kg) | 651 | 1151 |
| ZZ768 | Cap Rock Holes (3kg) | 676 | 1176 |
| ZZ769 | Cap Rock Holes (3kg) | 701 | 1201 |
| ZZ770 | Cap Rock Holes (3kg) | 726 | 1226 |
| ZZ777 | Cap Rock Holes (3kg) | 368 | 868 |
| ZZ778 | Cap Rock Holes (3kg) | 393 | 893 |
| ZZ779 | Cap Rock Holes (3kg) | 418 | 918 |
| ZZ780 | Cap Rock Holes (3kg) | 443 | 943 |
| ZZ781 | Cap Rock Holes (3kg) | 468 | 968 |
| ZZ782 | Cap Rock Holes (3kg) | 493 | 993 |
| ZZ783 | Cap Rock Holes (3kg) | 518 | 1018 |
| ZZ784 | Cap Rock Holes (3kg) | 543 | 1043 |
| ZZ785 | Cap Rock Holes (3kg) | 568 | 1068 |
| ZZ786 | Cap Rock Holes (3kg) | 593 | 1093 |
| ZZ787 | Cap Rock Holes (3kg) | 618 | 1118 |
| ZZ788 | Cap Rock Holes (3kg) | 643 | 1143 |
| ZZ789 | Cap Rock Holes (3kg) | 668 | 1168 |
| ZZ790 | Cap Rock Holes (3kg) | 693 | 1193 |
| ZZ791 | Cap Rock Holes (3kg) | 718 | 1218 |
| ZZ792 | Cap Rock Holes (3kg) | 743 | 1243 |
| ZZ793 | Cap Rock Holes (3kg) | 768 | 1268 |
| ZZ794 | Cap Rock Holes (3kg) | 793 | 1293 |
| ZZ795 | Cap Rock Holes (3kg) | 818 | 1318 |
| ZZ796 | Cap Rock Holes (3kg) | 843 | 1343 |
| ZZ799 | Cap Rock Holes (3kg) | 360 | 860 |
| ZZ800 | Cap Rock Holes (3kg) | 385 | 885 |
| ZZ801 | Cap Rock Holes (3kg) | 410 | 910 |
| ZZ802 | Cap Rock Holes (3kg) | 435 | 935 |
| ZZ803 | Cap Rock Holes (3kg) | 460 | 960 |
| ZZ804 | Cap Rock Holes (3kg) | 485 | 985 |
| ZZ805 | Cap Rock Holes (3kg) | 510 | 1010 |
| ZZ806 | Cap Rock Holes (3kg) | 535 | 1035 |
| ZZ807 | Cap Rock Holes (3kg) | 560 | 1060 |
| ZZ808 | Cap Rock Holes (3kg) | 585 | 1085 |
| ZZ809 | Cap Rock Holes (3kg) | 610 | 1110 |
| ZZ810 | Cap Rock Holes (3kg) | 635 | 1135 |
| ZZ811 | Cap Rock Holes (3kg) | 660 | 1160 |
| ZZ812 | Cap Rock Holes (3kg) | 685 | 1185 |
| ZZ813 | Cap Rock Holes (3kg) | 710 | 1210 |
| ZZ814 | Cap Rock Holes (3kg) | 735 | 1235 |
| ZZ815 | Cap Rock Holes (3kg) | 760 | 1260 |
| ZZ816 | Cap Rock Holes (3kg) | 785 | 1285 |
| ZZ817 | Cap Rock Holes (3kg) | 810 | 1310 |
| ZZ818 | Cap Rock Holes (3kg) | 835 | 1335 |
| ZZ819 | Cap Rock Holes (3kg) | 860 | 1360 |
| ZZ820 | Cap Rock Holes (3kg) | 885 | 1385 |
| ZZ821 | Cap Rock Holes (3kg) | 910 | 1410 |
| ZZ822 | Cap Rock Holes (3kg) | 935 | 1435 |
| ZZ825 | Cap Rock Holes (3kg) | 452 | 952 |
| ZZ826 | Cap Rock Holes (3kg) | 477 | 977 |
| ZZ827 | Cap Rock Holes (3kg) | 502 | 1002 |
| ZZ828 | Cap Rock Holes (3kg) | 527 | 1027 |
| ZZ829 | Cap Rock Holes (3kg) | 552 | 1052 |
| ZZ830 | Cap Rock Holes (3kg) | 577 | 1077 |
| ZZ831 | Cap Rock Holes (3kg) | 602 | 1102 |
| ZZ832 | Cap Rock Holes (3kg) | 627 | 1127 |
| ZZ833 | Cap Rock Holes (3kg) | 652 | 1152 |
| ZZ834 | Cap Rock Holes (3kg) | 677 | 1177 |
| ZZ835 | Cap Rock Holes (3kg) | 702 | |
| ZZ836 | Cap Rock Holes (3kg) | 727 | |
| ZZ837 | Cap Rock Holes (3kg) | 752 | |
| ZZ838 | Cap Rock Holes (3kg) | 777 | |
| ZZ839 | Cap Rock Holes (3kg) | 802 | |
| ZZ840 | Cap Rock Holes (3kg) | 827 | |
| ZZ841 | Cap Rock Holes (3kg) | 852 | |
| ZZ842 | Cap Rock Holes (3kg) | 877 | |
| ZZ843 | Cap Rock Holes (3kg) | 902 | |
| ZZ844 | Cap Rock Holes (3kg) | 927 | |
| ZZ845 | Cap Rock Holes (3kg) | 952 | |
| ZZ846 | Cap Rock Holes (3kg) | 977 | |
| ZZ847 | Cap Rock Holes (3kg) | 1002 | |
| ZZ848 | Cap Rock Holes (3kg) | 1027 | |
| ZZ851 | Cap Rock Holes (3kg) | 544 | |
| ZZ852 | Cap Rock Holes (3kg) | 569 | |
| ZZ853 | Cap Rock Holes (3kg) | 594 | |
| ZZ854 | Cap Rock Holes (3kg) | 619 | |
| ZZ855 | Cap Rock Holes (3kg) | 644 | |
| ZZ856 | Cap Rock Holes (3kg) | 669 | |
| ZZ857 | Cap Rock Holes (3kg) | 694 | |
| ZZ858 | Cap Rock Holes (3kg) | 719 | |
| ZZ859 | Cap Rock Holes (3kg) | 744 | |
| ZZ860 | Cap Rock Holes (3kg) | 769 | |
| ZZ861 | Cap Rock Holes (3kg) | 794 | |
| ZZ862 | Cap Rock Holes (3kg) | 819 | |
| ZZ863 | Cap Rock Holes (3kg) | 844 | |
| ZZ864 | Cap Rock Holes (3kg) | 869 | |
| ZZ865 | Cap Rock Holes (3kg) | 894 | |
| ZZ866 | Cap Rock Holes (3kg) | 919 | |
| ZZ867 | Cap Rock Holes (3kg) | 944 | |
| ZZ868 | Cap Rock Holes (3kg) | 969 | |
| ZZ869 | Cap Rock Holes (3kg) | 994 | |
| ZZ870 | Cap Rock Holes (3kg) | 1019 | |
| ZZ871 | Cap Rock Holes (3kg) | 1044 | |
| ZZ872 | Cap Rock Holes (3kg) | 1069 | |
| ZZ873 | Cap Rock Holes (3kg) | 1094 | |
| ZZ874 | Cap Rock Holes (3kg) | 1119 | |
| ZZ876 | Cap Rock Holes (3kg) | 611 | |
| ZZ877 | Cap Rock Holes (3kg) | 636 | |
| ZZ878 | Cap Rock Holes (3kg) | 661 | |
| ZZ879 | Cap Rock Holes (3kg) | 686 | |
| ZZ880 | Cap Rock Holes (3kg) | 711 | |
| ZZ881 | Cap Rock Holes (3kg) | 736 | |
| ZZ882 | Cap Rock Holes (3kg) | 761 | |
| ZZ883 | Cap Rock Holes (3kg) | 786 | |

| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ884 | Cap Rock Holes (3kg) | 811 | 1311 |
| ZZ885 | Cap Rock Holes (3kg) | 836 | 1336 |
| ZZ886 | Cap Rock Holes (3kg) | 861 | 1361 |
| ZZ887 | Cap Rock Holes (3kg) | 886 | 1386 |
| ZZ888 | Cap Rock Holes (3kg) | 911 | 1411 |
| ZZ889 | Cap Rock Holes (3kg) | 936 | 1436 |
| ZZ890 | Cap Rock Holes (3kg) | 961 | 1461 |
| ZZ891 | Cap Rock Holes (3kg) | 986 | 1486 |
| ZZ892 | Cap Rock Holes (3kg) | 1011 | 1511 |
| ZZ893 | Cap Rock Holes (3kg) | 1036 | 1536 |
| ZZ894 | Cap Rock Holes (3kg) | 1061 | 1561 |
| ZZ895 | Cap Rock Holes (3kg) | 1086 | 1586 |
| ZZ896 | Cap Rock Holes (3kg) | 1111 | 1611 |
| ZZ897 | Cap Rock Holes (3kg) | 1136 | 1636 |
| ZZ898 | Cap Rock Holes (3kg) | 1161 | 1661 |
| ZZ899 | Cap Rock Holes (3kg) | 1186 | 1686 |
| ZZ900 | Cap Rock Holes (3kg) | 1211 | 1711 |
| ZZ903 | Cap Rock Holes (3kg) | 728 | 1228 |
| ZZ904 | Cap Rock Holes (3kg) | 753 | 1253 |
| ZZ905 | Cap Rock Holes (3kg) | 778 | 1278 |
| ZZ906 | Cap Rock Holes (3kg) | 803 | 1303 |
| ZZ907 | Cap Rock Holes (3kg) | 828 | 1328 |
| ZZ908 | Cap Rock Holes (3kg) | 853 | 1353 |
| ZZ909 | Cap Rock Holes (3kg) | 878 | 1378 |
| ZZ910 | Cap Rock Holes (3kg) | 903 | 1403 |
| ZZ911 | Cap Rock Holes (3kg) | 928 | 1428 |
| ZZ912 | Cap Rock Holes (3kg) | 953 | 1453 |
| ZZ913 | Cap Rock Holes (3kg) | 978 | 1478 |
| ZZ914 | Cap Rock Holes (3kg) | 1003 | 1503 |
| ZZ915 | Cap Rock Holes (3kg) | 1028 | 1528 |
| ZZ916 | Cap Rock Holes (3kg) | 1053 | 1553 |
| ZZ917 | Cap Rock Holes (3kg) | 1078 | 1578 |
| ZZ918 | Cap Rock Holes (3kg) | 1103 | 1603 |
| ZZ919 | Cap Rock Holes (3kg) | 1128 | 1628 |
| ZZ920 | Cap Rock Holes (3kg) | 1153 | 1653 |
| ZZ921 | Cap Rock Holes (3kg) | 1178 | 1678 |
| ZZ922 | Cap Rock Holes (3kg) | 1203 | 1703 |
| ZZ923 | Cap Rock Holes (3kg) | 1228 | 1728 |
| ZZ924 | Cap Rock Holes (3kg) | 1253 | 1753 |
| ZZ925 | Cap Rock Holes (3kg) | 1278 | 1778 |
| ZZ926 | Cap Rock Holes (3kg) | 1303 | 1803 |
| ZZ929 | Cap Rock Holes (3kg) | 820 | 1320 |
| ZZ930 | Cap Rock Holes (3kg) | 845 | 1345 |
| ZZ931 | Cap Rock Holes (3kg) | 870 | 1370 |
| ZZ932 | Cap Rock Holes (3kg) | 895 | 1395 |
| ZZ933 | Cap Rock Holes (3kg) | 920 | 1420 |
| ZZ934 | Cap Rock Holes (3kg) | 945 | 1445 |
| ZZ935 | Cap Rock Holes (3kg) | 970 | 1470 |
| ZZ936 | Cap Rock Holes (3kg) | 995 | 1495 |
| ZZ937 | Cap Rock Holes (3kg) | 1020 | 1520 |
| ZZ938 | Cap Rock Holes (3kg) | 1045 | 1545 |
| ZZ939 | Cap Rock Holes (3kg) | 1070 | 1570 |
| ZZ940 | Cap Rock Holes (3kg) | 1095 | 1595 |
| ZZ941 | Cap Rock Holes (3kg) | 1120 | 1620 |
| ZZ942 | Cap Rock Holes (3kg) | 1145 | 1645 |
| ZZ943 | Cap Rock Holes (3kg) | 1170 | 1670 |
| ZZ944 | Cap Rock Holes (3kg) | 1195 | 1695 |
| ZZ945 | Cap Rock Holes (3kg) | 1220 | 1720 |
| ZZ946 | Cap Rock Holes (3kg) | 1245 | 1745 |
| ZZ947 | Cap Rock Holes (3kg) | 1270 | 1770 |
| ZZ948 | Cap Rock Holes (3kg) | 1295 | 1795 |
| ZZ949 | Cap Rock Holes (3kg) | 1320 | 1820 |
| ZZ950 | Cap Rock Holes (3kg) | 1345 | 1845 |
| ZZ951 | Cap Rock Holes (3kg) | 1370 | 1870 |
| ZZ952 | Cap Rock Holes (3kg) | 1395 | 1895 |
| ZZ958 | Cap Rock Holes (3kg) | 987 | 1487 |
| ZZ959 | Cap Rock Holes (3kg) | 1012 | 1512 |
| ZZ960 | Cap Rock Holes (3kg) | 1037 | 1537 |
| ZZ985 | Cap Rock Holes (3kg) | 1104 | 1604 |
| ZZ986 | Cap Rock Holes (3kg) | 1129 | 1629 |
| ZZ1001 | Cap Rock Holes (3kg) | 1144 | 1644 |
| ZZ1006 | Cap Rock Holes (3kg) | 659 | 1159 |
| ZZ1002 | Cap Rock Holes (3kg) | 1052 | 1552 |
| ZZ1007 | Cap Rock Holes (3kg) | 567 | 1067 |
| ZZ1000 | Cap Rock Holes (3kg) | 1236 | 1736 |
| ZZ999 | Cap Rock Holes (3kg) | 1328 | 1828 |
| ZZ1003 | Cap Rock Holes (3kg) | 960 | 1460 |
| ZZ998 | Cap Rock Holes (3kg) | 1420 | 1920 |
| ZZ1004 | Cap Rock Holes (3kg) | 868 | 1368 |
| ZZ1005 | Cap Rock Holes (3kg) | 751 | 1251 |


0 m
5 m
10 m
Short Bench Produ...
Ø = 114.3 mm
[1.7 m] - Crushed Stone
[0.2 m] - Air
[2.1 m] - Hydromite 4100 Bulk Wgt: 27.02 kg
[3.6 m] - Black Cap DC Booster - 340g (.75 lb) Det: SHOCK*STAR DualDelay 9.2m/30' 25/500 Del: 500.00 (ms) Con: Other Hole Wgt: 0.34 kg
27.36 kg
Short Bench Doubl...
Ø = 114.3 mm
[1.7 m] - Crushed Stone
[0.2 m] - Air
[2.1 m] - Hydromite 4100 Bulk Wgt: 27.02 kg
[3.6 m] - Black Cap DC Booster - 340g (.75 lb) Det: SHOCK*STAR DualDelay 9.2m/30' 25/500 Del: 500.00 (ms) Con: Wgt: 0.34 kg
[3.9 m] - Black Cap DC Booster - 340g (.75 lb) Det: SHOCK*STAR DualDelay 9.2m/30' 25/500 Del: 500.00 (ms) Con: Other Hole Wgt: 0.34 kg
27.7 kg
Cap Rock Holes (3...
Ø = 114.3 mm
[1.5 m] - Crushed Stone
[0.1 m] - Air
[0.3 m] - Hydromite 4100 Bulk Wgt: 3.86 kg
[1.8 m] - Black Cap DC Booster - 340g (.75 lb) Det: SHOCK*STAR DualDelay 9.2m/30' 25/500 Del: 500.00 (ms) Con: Other Hole Wgt: 0.34 kg
4.2 kg
Typical Body Hole
Ø = 114.3 mm
[1.8 m] - Crushed Stone
[0.9 m] - Air
[7.0 m] - Hydromite 4100 Bulk Wgt: 88.77 kg
[3.5 m] - E*Star Booster - 454g (1 lb) Det: 24' E*STAR Detonator - QM Wgt: 0.46 kg
[9.1 m] - E*Star Booster - 454g (1 lb) Det: 40' E*STAR Detonator - QM Wgt: 0.46 kg
89.69 kg
Typical Face Hole
Ø = 114.3 mm
[1.8 m] - Crushed Stone
[0.9 m] - Air
[7.0 m] - Hydromite 4100 Bulk Wgt: 88.77 kg
[3.5 m] - E*Star Booster - 454g (1 lb) Det: 24' E*STAR Detonator - QM Wgt: 0.46 kg
[9.1 m] - E*Star Booster - 454g (1 lb) Det: 40' E*STAR Detonator - QM Wgt: 0.46 kg
89.69 kg
Toe Load
Ø = 114.3 mm
[7.3 m] - Crushed Stone
[2.4 m] - Hydromite 4100 Bulk Wgt: 30.88 kg
[8.2 m] - E*Star Booster - 454g (1 lb) Det: 24' E*STAR Detonator - QM Wgt: 0.46 kg
[9.1 m] - E*Star Booster - 454g (1 lb) Det: 40' E*STAR Detonator - QM Wgt: 0.46 kg
31.8 kg
Extra 40'
Ø = 114.3 mm
[1.8 m] - Crushed Stone
[0.9 m] - Air
[7.0 m] - Hydromite 4100 Bulk Wgt: 88.77 kg
[3.5 m] - E*Star Booster - 454g (1 lb) Det: 24' E*STAR Detonator - QM Wgt: 0.46 kg
[9.1 m] - E*Star Booster - 454g (1 lb) Det: 40' E*STAR Detonator - QM Wgt: 0.46 kg
[9.5 m] - E*Star Booster - 454g (1 lb) Det: 40' E*STAR Detonator - QM Wgt: 0.46 kg
90.16 kg

# AUSTIN POWDER LTD.
# BLAST REPORT

327-Orillia
RR #4 ON, Orillia, Canada L3V 1- 84

Blast No.: 2018-04

Blast Type: Stone Quarry/Stone Mine - Production

Date/Time: 06/28/2018 16:05

Pit/Permit: KEPPEL QUARRY / SHOT SERVICE

## *ENVIRONMENT*

Method Used: U.T.M.

Weather: Clear

Temperature: 29 °C

Terrain: Flat

Blast U.T.M.: 17N 500199 mE 4942412 mN

## *NEAREST PROTECTED STRUCTURE*

Structure Name: 178841 Grey Rd #17

Structure Type: Dwelling

Structure U.T.M.: 17N 500101 mE 4943011 mN

## *LAYOUT*

| | | | | | |
|---|---|---|---|---|---|
| No. of Holes: | 155 | Hole Depth: | 10.06-16.46 m | Material Blasted: | Limestone |
| No. of V.P.† Holes: | 154 | Subdrilling: | 0.61 m | Burden: | [See Below] |
| No. of Rows: | [See Below] | Face Height: | 9.45-15.85 m | Spacing: | [See Below] |
| Diameter: | [See Below] | Drilling Angle: | [See Below] | Back Fill Depth: | 0.00 m |
| | | Mats Used: | No | Stem Type: | Clear Stone |

† V.P. = Volume Producing

## *WEIGHTS*

| | | | | | |
|---|---|---|---|---|---|
| Initiation: | Electronic | Max. Wt. of Expl. in Overlapped Decks: | 511.8 kg | Volume Produced: | 22,954.3 $m^3$ |
| Firing Device: | E*Star Blasting Machine (WRFD) | Max. Wt. of Expl. Per 8 ms Interval: | 511.8 kg | Weight Produced: | 60,819.1 t |
| Other Method: | | Max. No. of Holes Per 8 ms Interval: | 3 | Powder Factor 1: | 2.800 t/kg |
| Mfg and Model: | DBM1600-2-RC | Max. Wt. of Explosive Per Hole: | 170.6 kg | Powder Factor 2: | 0.946 $kg/m^3$ |
| Initiation Settings: | | Scaled Distance Factor (max charge): | 46.46 | Rock Density: | 2.650 $t/m^3$ |
| Series Resistance (ohms): | | Scaled Distance Factor (per delay): | 26.82 | | |

## *SEISMOGRAPHS*

See seismographs on separate page

## *CREW*

Blast occurred other than scheduled time: No

Misfire Occurred: No

Protective Cover: Loader Bucket

| Last Name | First Name | License / Cert | 2nd License / Cert | In Charge | Tied In | Chk. Tie-In | Driller | Layout |
|---|---|---|---|---|---|---|---|---|
| SMART | EVAN, C | * ON - N/A | | Yes | Yes | Yes | No | Yes |
| BELTRAME | ALEXANDER, A | | | No | Yes | No | No | No |
| FRALICK | CRAIG, A | | | No | Yes | No | No | No |
| KOUYOUMJIAN | MACKENZIE, H | | | No | Yes | No | No | No |
| NEWTON | JOHN, D | | | No | Yes | Yes | No | No |
| O'DONOHOE | LIAM, J | | | No | Yes | No | No | No |

# AUSTIN POWDER LTD.
# BLAST REPORT

327-Orillia
RR #4 ON, Orillia, Canada L3V 1- 84

Blast No.: 2018-04

Blast Type: Stone Quarry/Stone Mine - Production

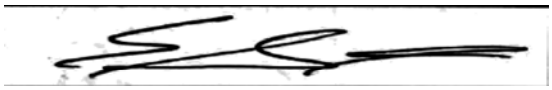
Date/Time: 06/28/2018 16:05

Pit/Permit: KEPPEL QUARRY / SHOT SERVICE

***PRODUCTS AND SERVICES***

| Number | Product Description | Quantity | Weight ( kg ) |
|---|---|---|---|
| 11782 | E*Star Booster - 454g (1 lb) | 94.00 ea | 43.49 |
| 15107 | Eagle 450 E*Star Booster (1lb) | 216.00 ea | 216.00 |
| 15001 | 24' E*STAR Detonator - QM | 151.00 ea | 0.00 |
| 15003 | 40' E*STAR Detonator - QM | 64.00 ea | 0.00 |
| 15030 | 60' E*STAR Detonator - QM/HD | 95.00 ea | 0.00 |
| 12276 | E*Star Bus Wire - 1250' spool | 2.00 sp | 0.00 |
| 15128 | Hydromite 4100 Bulk NB | 21,460.00 kg | 21,460.00 |
| 12981 | Mini Stem Plug - 6015 | 134.00 ea | 0.00 |
| | | Total Weight of Explosives (Include Primers) ( kg ): | 21,719.48 |

***COMMENTS / EXPLANATIONS***



Signature of Blaster in Charge

# AUSTIN POWDER LTD.
# BLAST REPORT

327-Orillia
RR #4 ON, Orillia, Canada L3V 1- 84

Blast No.: 2018-04

Blast Type: Stone Quarry/Stone Mine - Production

Date/Time: 06/28/2018 16:05

Pit/Permit: KEPPEL QUARRY / SHOT SERVICE

***Pattern: 1***

| | | | | | |
|---|---|---|---|---|---|
| No. of Holes: | 91 | Hole Depth: | 16.46 m | Burden: | 3.35 m |
| No. of V.P.† Holes: | 91 | Diameter: | 114.3 mm | Spacing: | 3.66 m |
| No. of Rows: | 2 | Subdrilling: | 0.61 m | | |
| Drilling Angle: | 0 ° | Face Height: | 15.85 m | | Tot |

† V.P. = Volume Producing

To

***Pattern: 2***

| | | | | | |
|---|---|---|---|---|---|
| No. of Holes: | 63 | Hole Depth: | 10.06 m | Burden: | 3.05 m |
| No. of V.P.† Holes: | 63 | Diameter: | 114.3 mm | Spacing: | 3.05 m |
| No. of Rows: | 3 | Subdrilling: | 0.61 m | | |
| Drilling Angle: | 0 ° | Face Height: | 9.45 m | | Tot |

† V.P. = Volume Producing

To

# AUSTIN POWDER LTD.
# BLAST REPORT

327-Orillia
RR #4 ON, Orillia, Canada L3V 1- 84

Blast No.: 2018-04
Blast Type: Stone Quarry/Stone Mine - Production

Date/Time: 06/28/2018 16:05
Pit/Permit: KEPPEL QUARRY / SHOT SERVICE

***SEISMOGRAPH 1 - 178841 GREY ROAD #17***

| | | | | | | |
|---|---|---|---|---|---|---|
| Data Type: | Seismic Record | Seismograph Type: | Instantel - Minimate Blaster | | | |
| Date: | 06/28/18 | Trigger Level: | 1.50 mm/s | 115.00 dB | | Transverse: |
| Time: | 16:05 | Calibration Date: | 01/17/18 | | | Vertical: |
| Distance From Blast: | 606.86 m | Calibration Signal: | OK | | | Longitudinal: |
| Direction From Blast: | NNW | Geophone Min. Freq.: | --- Hz | | | PPV: |
| Readout: | Printed Copy | Mic. Min. Freq.: | --- Hz | | | Acoustic: |
| Location: | Bolted to Bedrock. | | | | | Vector Sum: |
| U.T.M.: | 17N 500101 mE 4943011 mN | | | | | |
| Reader and Firm: | Evan Smart, AUSTIN POWDER | | | | | |
| Analyst and Firm: | | | | | | |
| Installer and Firm: | Evan Smart, Austin Powder Ltd. | | | | | |

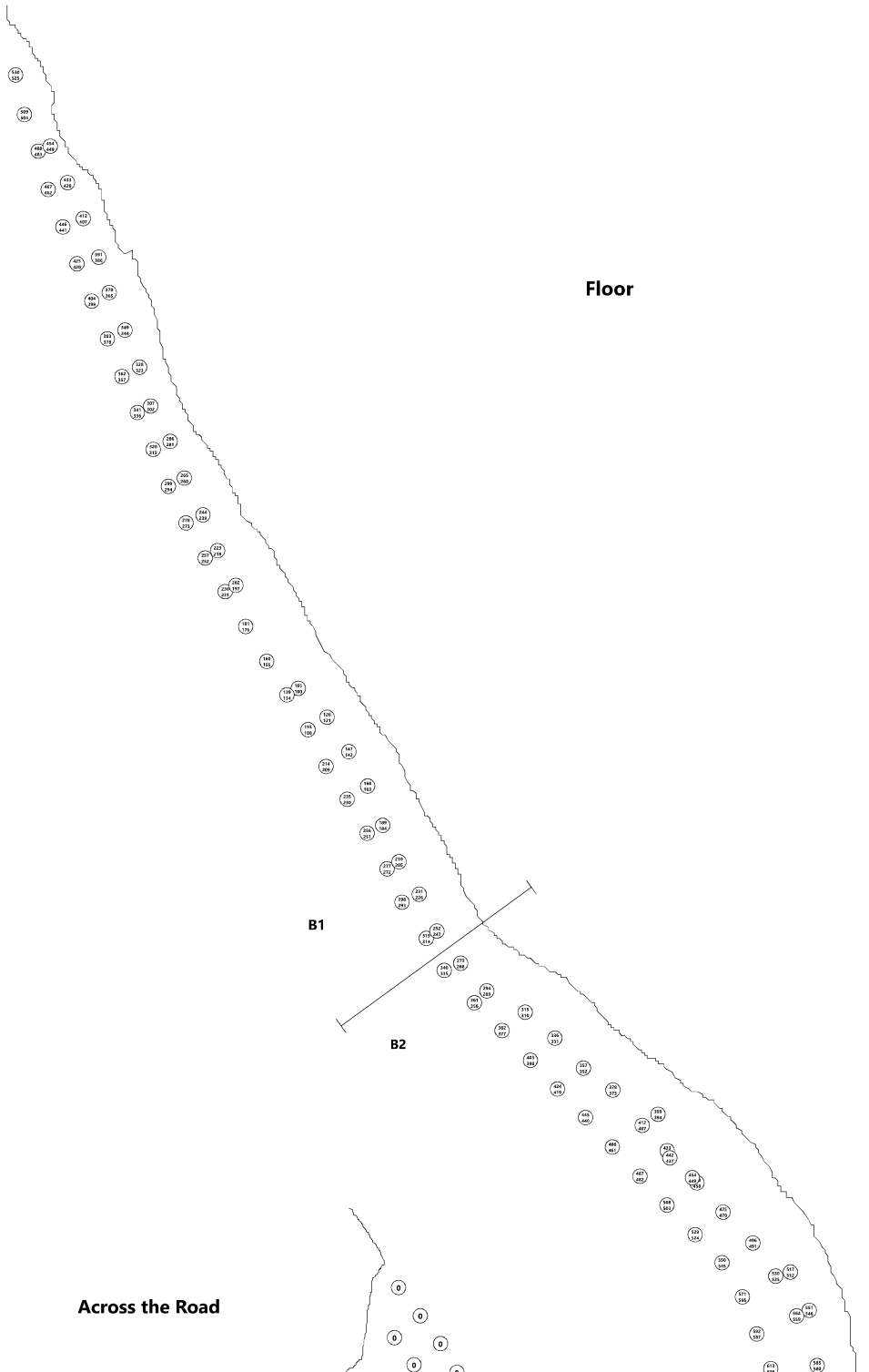
***SEISMOGRAPH 2 - 178717 GREY RD #17***

| | | | | | | |
|---|---|---|---|---|---|---|
| Data Type: | Seismic Record | Seismograph Type: | Instantel - Minimate Blaster | | | |
| Date: | 06/28/18 | Trigger Level: | 1.50 mm/s | 115.00 dB | | Transverse: |
| Time: | 16:05 | Calibration Date: | 01/15/18 | | | Vertical: |
| Distance From Blast: | 624.23 m | Calibration Signal: | OK | | | Longitudinal: |
| Direction From Blast: | SE | Geophone Min. Freq.: | --- Hz | | | PPV: |
| Readout: | Printed Copy | Mic. Min. Freq.: | --- Hz | | | Acoustic: |
| Location: | Spiked and buried. | | | | | Vector Sum: |
| U.T.M.: | 17N 500660 mE 4941991 mN | | | | | |
| Reader and Firm: | Evan Smart, AUSTIN POWDER | | | | | |
| Analyst and Firm: | | | | | | |
| Installer and Firm: | Evan Smart, Austin Powder Ltd. | | | | | |

***SEISMOGRAPH 3 - 283197 CONC. RD. #10***

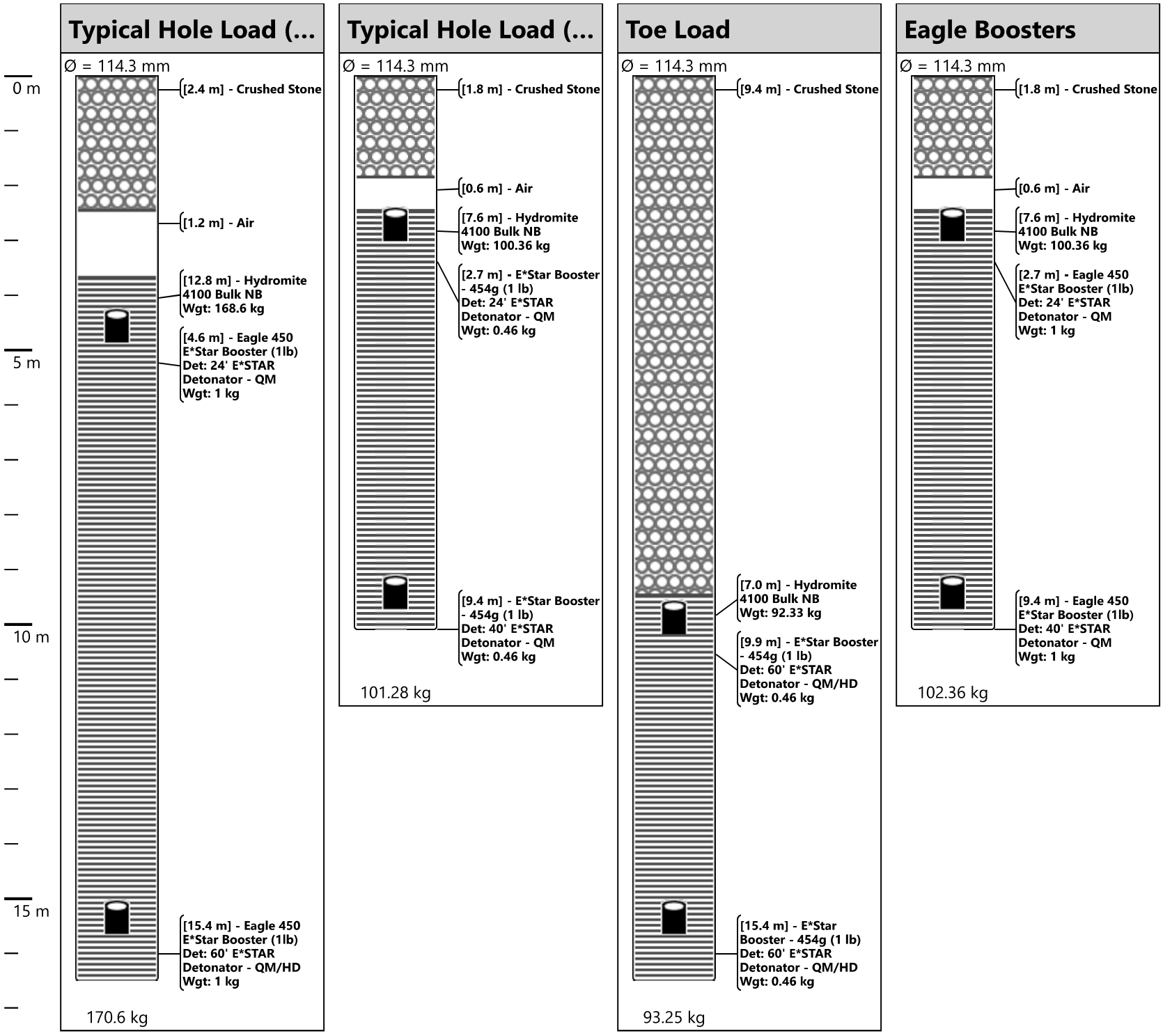
| | | | | | | |
|---|---|---|---|---|---|---|
| Data Type: | Seismic Record | Seismograph Type: | Instantel - Minimate Blaster | | | |
| Date: | 06/28/18 | Trigger Level: | 1.50 mm/s | 115.00 dB | | Transverse: |
| Time: | 16:05 | Calibration Date: | 01/15/18 | | | Vertical: |
| Distance From Blast: | 1,048.82 m | Calibration Signal: | OK | | | Longitudinal: |
| Direction From Blast: | ESE | Geophone Min. Freq.: | --- Hz | | | PPV: |
| Readout: | Printed Copy | Mic. Min. Freq.: | --- Hz | | | Acoustic: |
| Location: | Spiked and buried. | | | | | Vector Sum: |
| U.T.M.: | 17N 501117 mE 4941905 mN | | | | | |
| Reader and Firm: | Evan Smart, AUSTIN POWDER | | | | | |
| Analyst and Firm: | | | | | | |
| Installer and Firm: | Evan Smart, Austin Powder Ltd. | | | | | |

Hole Label Mode: Cumulative In-Hole Delays



| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ41 | Typical Hole Load (OS) | 0 | 377/382 |
| ZZ44 | Typical Hole Load (OS) | 0 | 268/273 |
| ZZ70 | Typical Hole Load (OS) | 0 | 260/265 |
| ZZ81 | Typical Hole Load (OS) | 0 | 399/404 |
| ZZ35 | Typical Hole Load (OS) | 0 | 440/445 |
| ZZ36 | Typical Hole Load (OS) | 0 | 352/357 |
| ZZ78 | Typical Hole Load (OS) | 0 | 344/349 |
| ZZ13 | Typical Hole Load (OS) | 0 | 580/585 |
| ZZ89 | Typical Hole Load (OS) | 0 | 483/488 |
| ZZ47 | Typical Hole Load (OS) | 0 | 314/319 |
| ZZ6 | Typical Hole Load (OS) | 0 | 692/697 |
| ZZ51 | Typical Hole Load (OS) | 0 | 272/277 |
| ZZ74 | Typical Hole Load (OS) | 0 | 302/307 |
| ZZ91 | Typical Hole Load (OS) | 0 | 525/530 |
| ZZ87 | Typical Hole Load (OS) | 0 | 462/467 |
| ZZ86 | Typical Hole Load (OS) | 0 | 428/433 |
| ZZ34 | Typical Hole Load (OS) | 0 | 373/378 |
| ZZ31 | Typical Hole Load (OS) | 0 | 394/399 |
| ZZ59 | Typical Hole Load (OS) | 0 | 188/193 |
| ZZ30 | Typical Hole Load (OS) | 0 | 482/487 |
| ZZ72 | Typical Hole Load (OS) | 0 | 281/286 |
| ZZ67 | Typical Hole Load (OS) | 0 | 252/257 |
| ZZ10 | Typical Hole Load (OS) | 0 | 650/655 |
| ZZ32 | Typical Hole Load (OS) | 0 | 407/412 |
| ZZ63 | Typical Hole Load (OS) | 0 | 176/181 |
| ZZ21 | Typical Hole Load (OS) | 0 | 491/496 |
| ZZ7 | Typical Hole Load (OS) | 0 | 643/648 |
| ZZ53 | Typical Hole Load (OS) | 0 | 251/256 |
| ZZ65 | Typical Hole Load (OS) | 0 | 231/236 |
| ZZ79 | Typical Hole Load (OS) | 0 | 378/383 |
| ZZ75 | Typical Hole Load (OS) | 0 | 336/341 |
| ZZ9 | Typical Hole Load (OS) | 0 | 622/627 |
| ZZ57 | Typical Hole Load (OS) | 0 | 209/214 |
| ZZ50 | Typical Hole Load (OS) | 0 | 205/210 |
| ZZ29 | Typical Hole Load (OS) | 0 | 428/433 |
| ZZ71 | Typical Hole Load (OS) | 0 | 294/299 |
| ZZ2 | Typical Hole Load (OS) | 0 | 776/781 |
| ZZ27 | Typical Hole Load (OS) | 0 | 503/508 |
| ZZ8 | Typical Hole Load (OS) | 0 | 671/676 |
| ZZ73 | Typical Hole Load (OS) | 0 | 315/320 |
| ZZ77 | Typical Hole Load (OS) | 0 | 357/362 |
| ZZ90 | Typical Hole Load (OS) | 0 | 504/509 |
| ZZ54 | Typical Hole Load (OS) | 0 | 163/168 |
| ZZ64 | Typical Hole Load (OS) | 0 | 197/202 |
| ZZ60 | Typical Hole Load (OS) | 0 | 100/105 |
| ZZ15 | Toe Load | 0 | 546/551 |
| ZZ1 | Typical Hole Load (OS) | 0 | 797/802 |
| ZZ40 | Typical Hole Load (OS) | 0 | 310/315 |
| ZZ22 | Typical Hole Load (OS) | 0 | 545/550 |
| ZZ4 | Typical Hole Load (OS) | 0 | 734/739 |
| ZZ68 | Typical Hole Load (OS) | 0 | 239/244 |
| ZZ85 | Typical Hole Load (OS) | 0 | 441/446 |
| ZZ18 | Typical Hole Load (OS) | 0 | 512/517 |
| ZZ25 | Toe Load | 0 | 458/463 |
| ZZ55 | Typical Hole Load (OS) | 0 | 230/235 |
| ZZ28 | Toe Load | 0 | 437/442 |
| ZZ33 | Typical Hole Load (OS) | 0 | 461/466 |
| ZZ46 | Toe Load | 0 | 247/252 |
| ZZ3 | Typical Hole Load (OS) | 0 | 755/760 |
| ZZ5 | Typical Hole Load (OS) | 0 | 713/718 |
| ZZ82 | Typical Hole Load (OS) | 0 | 386/391 |
| ZZ48 | Typical Hole Load (OS) | 0 | 226/231 |
| ZZ49 | Typical Hole Load (OS) | 0 | 293/298 |
| ZZ62 | Typical Hole Load (OS) | 0 | 155/160 |
| ZZ24 | Typical Hole Load (OS) | 0 | 524/529 |
| ZZ58 | Typical Hole Load (OS) | 0 | 121/126 |
| ZZ42 | Typical Hole Load (OS) | 0 | 289/294 |
| ZZ45 | Typical Hole Load (OS) | 0 | 335/340 |
| ZZ76 | Typical Hole Load (OS) | 0 | 323/328 |
| ZZ19 | Typical Hole Load (OS) | 0 | 525/530 |
| ZZ88 | Typical Hole Load (OS) | 0 | 449/454 |
| ZZ38 | Typical Hole Load (OS) | 0 | 331/336 |
| ZZ39 | Typical Hole Load (OS) | 0 | 398/403 |
| ZZ52 | Typical Hole Load (OS) | 0 | 184/189 |
| ZZ61 | Typical Hole Load (OS) | 0 | 134/139 |
| ZZ17 | Typical Hole Load (OS) | 0 | 587/592 |
| ZZ56 | Typical Hole Load (OS) | 0 | 142/147 |
| ZZ83 | Typical Hole Load (OS) | 0 | 420/425 |
| ZZ26 | Typical Hole Load (OS) | 0 | 449/454 |
| ZZ80 | Typical Hole Load (OS) | 0 | 365/370 |
| ZZ16 | Typical Hole Load (OS) | 0 | 559/564 |
| ZZ11 | Typical Hole Load (OS) | 0 | 601/606 |
| ZZ66 | Typical Hole Load (OS) | 0 | 218/223 |
| ZZ23 | Typical Hole Load (OS) | 0 | 470/475 |
| ZZ43 | Typical Hole Load (OS) | 0 | 356/361 |
| ZZ69 | Typical Hole Load (OS) | 0 | 273/278 |
| ZZ20 | Typical Hole Load (OS) | 0 | 566/571 |
| ZZ12 | Typical Hole Load (OS) | 0 | 629/634 |
| ZZ84 | Typical Hole Load (OS) | 0 | 407/412 |
| ZZ14 | Typical Hole Load (OS) | 0 | 608/613 |
| ZZ37 | Typical Hole Load (OS) | 0 | 419/424 |
| ZZ145 | Typical Hole Load (NS) | 0 | |
| ZZ136 | Typical Hole Load (NS) | 0 | |
| ZZ135 | Typical Hole Load (NS) | 0 | |
| ZZ122 | Typical Hole Load (NS) | 0 | |
| ZZ126 | Typical Hole Load (NS) | 0 | |
| ZZ148 | Eagle Boosters | 0 | |
| ZZ110 | Typical Hole Load (NS) | 0 | |
| ZZ116 | Typical Hole Load (NS) | 0 | |
| ZZ133 | Typical Hole Load (NS) | 0 | |
| ZZ143 | Typical Hole Load (NS) | 0 | |
| ZZ140 | Typical Hole Load (NS) | 0 | |
| ZZ108 | Typical Hole Load (NS) | 0 | |
| ZZ107 | Typical Hole Load (NS) | 0 | |
| ZZ128 | Typical Hole Load (NS) | 0 | |
| ZZ141 | Typical Hole Load (NS) | 0 | |
| ZZ142 | Typical Hole Load (NS) | 0 | |
| ZZ106 | Typical Hole Load (NS) | 0 | |
| ZZ111 | Typical Hole Load (NS) | 0 | |
| ZZ129 | Typical Hole Load (NS) | 0 | |
| ZZ96 | Eagle Boosters | 0 | |
| ZZ114 | Typical Hole Load (NS) | 0 | |
| ZZ132 | Typical Hole Load (NS) | 0 | |
| ZZ144 | Typical Hole Load (NS) | 0 | |
| ZZ93 | Eagle Boosters | 0 | |
| ZZ149 | Eagle Boosters | 0 | |
| ZZ120 | Typical Hole Load (NS) | 0 | |
| ZZ97 | Eagle Boosters | 0 | |
| ZZ119 | Typical Hole Load (NS) | 0 | |
| ZZ109 | Typical Hole Load (NS) | 0 | |
| ZZ105 | Typical Hole Load (NS) | 0 | |
| ZZ127 | Typical Hole Load (NS) | 0 | |
| ZZ131 | Typical Hole Load (NS) | 0 | |
| ZZ92 | Eagle Boosters | 0 | |
| ZZ118 | Typical Hole Load (NS) | 0 | |
| ZZ99 | Eagle Boosters | 0 | |
| ZZ94 | Eagle Boosters | 0 | |
| ZZ153 | Eagle Boosters | 0 | |
| ZZ101 | Eagle Boosters | 0 | |
| ZZ139 | Typical Hole Load (NS) | 0 | |
| ZZ115 | Typical Hole Load (NS) | 0 | |
| ZZ117 | Typical Hole Load (NS) | 0 | |
| ZZ125 | Typical Hole Load (NS) | 0 | |
| ZZ130 | Typical Hole Load (NS) | 0 | |
| ZZ98 | Eagle Boosters | 0 | |
| ZZ150 | Eagle Boosters | 0 | |
| ZZ104 | Eagle Boosters | 0 | |
| ZZ121 | Typical Hole Load (NS) | 0 | |

| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ138 | Typical Hole Load (NS) | 0 | |
| ZZ134 | Typical Hole Load (NS) | 0 | |
| ZZ102 | Eagle Boosters | 0 | |
| ZZ124 | Typical Hole Load (NS) | 0 | |
| ZZ123 | Typical Hole Load (NS) | 0 | |
| ZZ113 | Typical Hole Load (NS) | 0 | |
| ZZ137 | Typical Hole Load (NS) | 0 | |
| ZZ152 | Eagle Boosters | 0 | |
| ZZ112 | Typical Hole Load (NS) | 0 | |
| ZZ146 | Typical Hole Load (NS) | 0 | |
| ZZ95 | Eagle Boosters | 0 | |
| ZZ151 | Eagle Boosters | 0 | |
| ZZ100 | Eagle Boosters | 0 | |
| ZZ147 | Typical Hole Load (NS) | 0 | |
| ZZ103 | Eagle Boosters | 0 | |
| ZZ154 | Eagle Boosters | 0 | |
| ZZ155 | Eagle Boosters | 0 | 0 |


Typical Hole Load (...
Ø = 114.3 mm
0 m
5 m
10 m
15 m
[2.4 m] - Crushed Stone
[1.2 m] - Air
[12.8 m] - Hydromite 4100 Bulk NB Wgt: 168.6 kg
[4.6 m] - Eagle 450 E*Star Booster (1lb) Det: 24' E*STAR Detonator - QM Wgt: 1 kg
[15.4 m] - Eagle 450 E*Star Booster (1lb) Det: 60' E*STAR Detonator - QM/HD Wgt: 1 kg
170.6 kg
Typical Hole Load (...
Ø = 114.3 mm
[1.8 m] - Crushed Stone
[0.6 m] - Air
[7.6 m] - Hydromite 4100 Bulk NB Wgt: 100.36 kg
[2.7 m] - E*Star Booster - 454g (1 lb) Det: 24' E*STAR Detonator - QM Wgt: 0.46 kg
[9.4 m] - E*Star Booster - 454g (1 lb) Det: 40' E*STAR Detonator - QM Wgt: 0.46 kg
101.28 kg
Toe Load
Ø = 114.3 mm
[9.4 m] - Crushed Stone
[7.0 m] - Hydromite 4100 Bulk NB Wgt: 92.33 kg
[9.9 m] - E*Star Booster - 454g (1 lb) Det: 60' E*STAR Detonator - QM/HD Wgt: 0.46 kg
[15.4 m] - E*Star Booster - 454g (1 lb) Det: 60' E*STAR Detonator - QM/HD Wgt: 0.46 kg
93.25 kg
Eagle Boosters
Ø = 114.3 mm
[1.8 m] - Crushed Stone
[0.6 m] - Air
[7.6 m] - Hydromite 4100 Bulk NB Wgt: 100.36 kg
[2.7 m] - Eagle 450 E*Star Booster (1lb) Det: 24' E*STAR Detonator - QM Wgt: 1 kg
[9.4 m] - Eagle 450 E*Star Booster (1lb) Det: 40' E*STAR Detonator - QM Wgt: 1 kg
102.36 kg

# AUSTIN POWDER LTD.
# BLAST REPORT

327-Orillia
RR #4 ON, Orillia, Canada L3V 1- 84

Blast No.: 2018-05
Blast Type: Stone Quarry/Stone Mine - Production
Customer: HAROLD SUTHERLAND CONST.-KEPPEL (HAR1525-001)
Date/Time: 07/19/2018 15:48
Pit/Permit: KEPPEL QUARRY / SHOT SERVICE
Location: South and East Walls

## *ENVIRONMENT*

Method Used: U.T.M.
Weather: Clear
Wind From: SE
Temperature: 28 °C
Terrain: Flat
Wind Velocity: 5-2 km/h
Blast U.T.M.: 17N 500211 mE 4942453 mN

## *NEAREST PROTECTED STRUCTURE*

Compass Point: NNW
Structure Name: 178841 Grey Rd #17
Direction/Bearing: 349 °
Structure Type: Dwelling
Distance: 569 m
Structure U.T.M.: 17N 500101 mE 4943011 mN

## *LAYOUT*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | Hole Depth: | 10.06 m | Material Blasted: | Limestone | Total Meters Drilled: | 2,051.9 m |
| No. of Holes: | 204 | Subdrilling: | 0.76 m | Burden: | 3.05 m | Water Depth: | 3.05 m |
| No. of V.P.† Holes: | 203 | Face Height: | 9.30 m | Spacing: | 3.05 m | Stem Length: | min 1.68 m |
| No. of Rows: | 4 | Drilling Angle: | ° | Back Fill Depth: | 0.00 m | Area Type: | Center Start/ Breakout |
| Diameter: | 114.3 mm | Mats Used: | No | Stem Type: | Clear Stone | Method: | Specified (H = 9.30 m) |

† V.P. = Volume Producing

## *WEIGHTS*

| | | | | | |
|---|---|---|---|---|---|
| | | Max. Wt. of Expl. in Overlapped Decks: | 501.1 kg | Volume Produced: | 17,186.9 m³ |
| Initiation: | Electronic | Max. Wt. of Expl. Per 8 ms Interval: | 501.1 kg | Weight Produced: | 45,537.9 t |
| Firing Device: | E*Star Blasting Machine (WRFD) | Max. No. of Holes Per 8 ms Interval: | 5 | Powder Factor 1: | 2.234 t/kg |
| Other Method: | | Max. Wt. of Explosive Per Hole: | 101.2 kg | Powder Factor 2: | 1.187 kg/m³ |
| Mfg and Model: | DBM1600-2-RC | Scaled Distance Factor (max charge): | 56.53 | Rock Density: | 2.650 t/m³ |
| Initiation Settings: | | Scaled Distance Factor (per delay): | 25.41 | | |
| Series Resistance (ohms): | | | | | |

## *SEISMOGRAPHS*

See seismographs on separate page

## *CREW*

Blast occurred other than scheduled time: No
Misfire Occurred: No
Protective Cover: Loader Bucket

| Last Name | First Name | License / Cert | 2nd License / Cert | In Charge | Tied In | Chk. Tie-In | Driller | Layout |
|---|---|---|---|---|---|---|---|---|
| SMART | EVAN, C | * ON - N/A | | Yes | Yes | Yes | No | Yes |
| BELTRAME | ALEXANDER, A | | | No | Yes | No | No | No |
| FRALICK | CRAIG, A | | | No | Yes | No | No | No |
| KOUYOUMJIAN | MACKENZIE, H | | | No | Yes | No | No | No |
| NEWTON | JOHN, D | | | No | Yes | Yes | No | No |
| O'DONOHOE | LIAM, J | | | No | Yes | No | No | No |
| REED | ADAM, G | | | No | Yes | No | No | No |

# AUSTIN POWDER LTD.
# BLAST REPORT

327-Orillia
RR #4 ON, Orillia, Canada L3V 1- 84

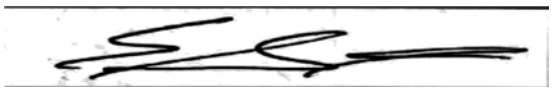
Blast No.: 2018-05
Blast Type: Stone Quarry/Stone Mine - Production
Customer: HAROLD SUTHERLAND CONST.-KEPPEL (HAR1525-001)
Date/Time: 07/19/2018 15:48
Pit/Permit: KEPPEL QUARRY / SHOT SERVICE
Location: South and East Walls

***PRODUCTS AND SERVICES***

| Number | Product Description | Quantity | | Weight ( kg ) |
|---|---|---|---|---|
| 15107 | Eagle 450 E*Star Booster (1lb) | 408.00 | ea | 408.00 |
| 15001 | 24' E*STAR Detonator - QM | 202.00 | ea | 0.00 |
| 15003 | 40' E*STAR Detonator - QM | 206.00 | ea | 0.00 |
| 12276 | E*Star Bus Wire - 1250' spool | 3.00 | sp | 0.00 |
| 15128 | Hydromite 4100 Bulk NB | 19,940.00 | kg | 19,940.00 |
| 20334 | Hydromite 880 76x400 (3x16) | 9.00 | st | 45.00 |
| 12981 | Mini Stem Plug - 6015 | 204.00 | ea | 0.00 |
| | | Total Weight of Explosives (Include Primers) ( kg ): | | 20,393.00 |

***COMMENTS / EXPLANATIONS***

General Comments: Imported on 7/20/2018 5:01:07 AM



Signature of Blaster in Charge

# AUSTIN POWDER LTD.
# BLAST REPORT

327-Orillia
RR #4 ON, Orillia, Canada L3V 1- 84

Blast No.: 2018-05
Blast Type: Stone Quarry/Stone Mine - Production
Customer: HAROLD SUTHERLAND CONST.-KEPPEL (HAR1525-001)
Date/Time: 07/19/2018 15:48
Pit/Permit: KEPPEL QUARRY / SHOT SERVICE
Location: South and East Walls

## *SEISMOGRAPH 1 - 178841 GREY ROAD #17*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Data Type: | Seismic Record | Seismograph Type: | Instantel - Minimate Blaster | | | | |
| Date: | 07/19/18 | Trigger Level: | 1.50 mm/s | 115.00 dB | Transverse: | 3.81 mm/s | 47.0 Hz |
| Time: | 15:48 | Calibration Date: | 01/17/18 | | Vertical: | 2.032 mm/s | 34.0 Hz |
| Distance From Blast: | 568.76 m | Calibration Signal: | OK | | Longitudinal: | 2.667 mm/s | 18.0 Hz |
| Direction From Blast: | NNW | Geophone Min. Freq.: | --- Hz | | PPV: | --- mm/s | --- Hz |
| Readout: | Printed Copy | Mic. Min. Freq.: | --- Hz | | Acoustic: | 118 dB | |
| Location: | Bolted to Bedrock. | | | | Vector Sum: | 3.827 mm/s | |
| U.T.M.: | 17N 500101 mE 4943011 mN | | | | | | |
| Reader and Firm: | Evan Smart, AUSTIN POWDER | | | | | | |
| Analyst and Firm: | | | | | | | |
| Installer and Firm: | Evan Smart, Austin Powder Ltd. | | | | | | |

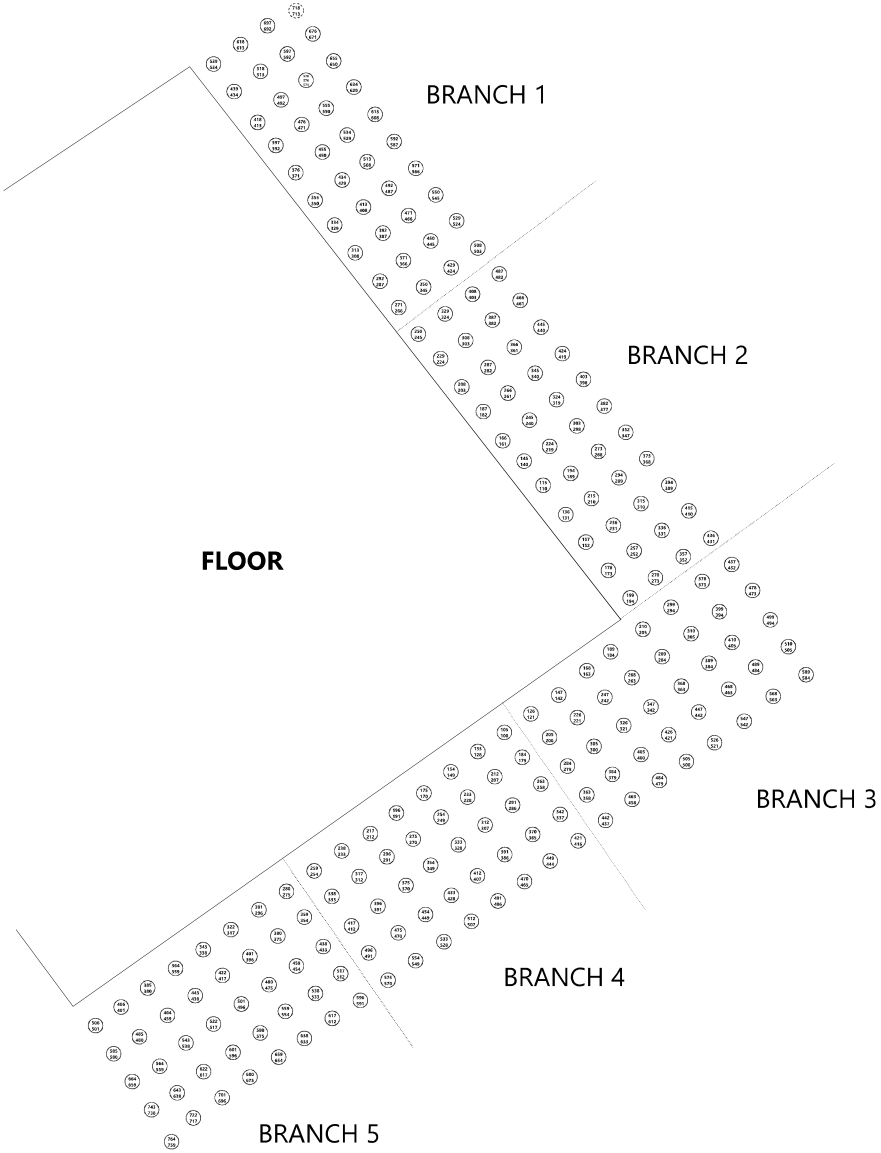
## *SEISMOGRAPH 2 - 283197 CONC. RD. #10*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Data Type: | No Trigger | Seismograph Type: | Instantel - Minimate Blaster | | | | |
| Date: | 07/19/18 | Trigger Level: | 1.50 mm/s | 115.00 dB | Transverse: | --- mm/s | --- Hz |
| Time: | 03:48 | Calibration Date: | 01/15/18 | | Vertical: | --- mm/s | --- Hz |
| Distance From Blast: | 1,058.88 m | Calibration Signal: | OK | | Longitudinal: | --- mm/s | --- Hz |
| Direction From Blast: | ESE | Geophone Min. Freq.: | --- Hz | | PPV: | --- mm/s | --- Hz |
| Readout: | | Mic. Min. Freq.: | --- Hz | | Acoustic: | --- dB | |
| Location: | Spiked and weight bagged beside the mail box. | | | | Vector Sum: | --- mm/s | |
| U.T.M.: | 17N 501117 mE 4941905 mN | | | | | | |
| Reader and Firm: | Evan Smart, AUSTIN POWDER | | | | | | |
| Analyst and Firm: | | | | | | | |
| Installer and Firm: | Evan Smart, Austin Powder Ltd. | | | | | | |

## *SEISMOGRAPH 3 - 178717 GREY RD #17*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Data Type: | No Trigger | Seismograph Type: | Instantel - Minimate Blaster | | | | |
| Date: | 07/19/18 | Trigger Level: | 1.50 mm/s | 115.00 dB | Transverse: | --- mm/s | --- Hz |
| Time: | 03:48 | Calibration Date: | 01/15/18 | | Vertical: | --- mm/s | --- Hz |
| Distance From Blast: | 644.35 m | Calibration Signal: | OK | | Longitudinal: | --- mm/s | --- Hz |
| Direction From Blast: | SE | Geophone Min. Freq.: | --- Hz | | PPV: | --- mm/s | --- Hz |
| Readout: | | Mic. Min. Freq.: | --- Hz | | Acoustic: | --- dB | |
| Location: | Spiked and buried. | | | | Vector Sum: | --- mm/s | |
| U.T.M.: | 17N 500660 mE 4941991 mN | | | | | | |
| Reader and Firm: | Evan Smart, AUSTIN POWDER | | | | | | |
| Analyst and Firm: | | | | | | | |
| Installer and Firm: | Evan Smart, Austin Powder Ltd. | | | | | | |

Hole Label Mode: Cumulative In-Hole Delays




| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ124 | Typical Face Hole | 0 | 194/199 |
| ZZ186 | Typical Hole Load | 0 | 529/534 |
| ZZ108 | Typical Hole Load | 0 | 484/489 |
| ZZ192 | Typical Hole Load | 0 | 629/634 |
| ZZ51 | Typical Face Hole | 0 | 212/217 |
| ZZ82 | Typical Hole Load | 0 | 200/205 |
| ZZ7 | Typical Hole Load | 0 | 638/643 |
| ZZ98 | Typical Hole Load | 0 | 342/347 |
| ZZ187 | Typical Hole Load | 0 | 450/455 |
| ZZ179 | Typical Hole Load | 0 | 408/413 |
| ZZ76 | Typical Hole Load | 0 | 416/421 |
| ZZ200 | Typical Hole Load | 0 | 671/676 |
| ZZ95 | Typical Hole Load | 0 | 479/484 |
| ZZ141 | Typical Face Hole | 0 | 140/145 |
| ZZ62 | Typical Hole Load | 0 | 249/254 |
| ZZ37 | Typical Hole Load | 0 | 512/517 |
| ZZ63 | Typical Hole Load | 0 | 328/333 |
| ZZ73 | Typical Hole Load | 0 | 286/291 |
| ZZ162 | Typical Hole Load | 0 | 403/408 |
| ZZ80 | Typical Face Hole | 0 | 100/105 |
| ZZ56 | Typical Hole Load | 0 | 507/512 |
| ZZ167 | Typical Hole Load | 0 | 424/429 |
| ZZ71 | Typical Face Hole | 0 | 128/133 |
| ZZ48 | Typical Hole Load | 0 | 391/396 |
| ZZ3 | Typical Hole Load | 0 | 659/664 |
| ZZ54 | Typical Hole Load | 0 | 449/454 |
| ZZ189 | Typical Face Hole | 0 | 392/397 |
| ZZ146 | Typical Hole Load | 0 | 319/324 |
| ZZ171 | Typical Hole Load | 0 | 366/371 |
| ZZ78 | Typical Hole Load | 0 | 258/263 |
| ZZ89 | Typical Hole Load | 0 | 221/226 |
| ZZ94 | Typical Hole Load | 0 | 400/405 |
| ZZ77 | Typical Hole Load | 0 | 337/342 |
| ZZ173 | Typical Face Hole | 0 | 308/313 |
| ZZ159 | Typical Hole Load | 0 | 382/387 |
| ZZ23 | Typical Hole Load | 0 | 496/501 |
| ZZ164 | Typical Face Hole | 0 | 245/250 |
| ZZ138 | Typical Hole Load | 0 | 268/273 |
| ZZ24 | Typical Hole Load | 0 | 575/580 |
| ZZ86 | Typical Hole Load | 0 | 458/463 |
| ZZ36 | Typical Hole Load | 0 | 591/596 |
| ZZ191 | Triple Cap | 0 | 550/555 |
| ZZ45 | Typical Hole Load | 0 | 570/575 |
| ZZ17 | Typical Hole Load | 0 | 596/601 |
| ZZ39 | Typical Hole Load | 0 | 354/359 |
| ZZ33 | Typical Hole Load | 0 | 454/459 |

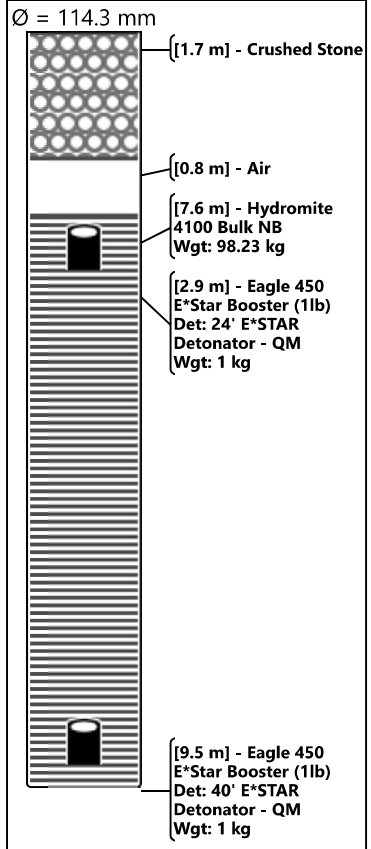
| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ35 | Typical Hole Load | 0 | 612/617 |
| ZZ117 | Typical Hole Load | 0 | 505/510 |
| ZZ19 | Typical Hole Load | 0 | 438/443 |
| ZZ182 | Typical Hole Load | 0 | 429/434 |
| ZZ43 | Typical Hole Load | 0 | 412/417 |
| ZZ132 | Typical Face Hole | 0 | 152/157 |
| ZZ105 | Typical Hole Load | 0 | 521/526 |
| ZZ1 | Typical Face Hole | 0 | 501/506 |
| ZZ14 | Typical Hole Load | 0 | 617/622 |
| ZZ157 | Typical Face Hole | 0 | 224/229 |
| ZZ201 | Typical Hole Load | 0 | 692/697 |
| ZZ4 | Typical Hole Load | 0 | 738/743 |
| ZZ65 | Typical Hole Load | 0 | 486/491 |
| ZZ143 | Typical Hole Load | 0 | 298/303 |
| ZZ144 | Typical Hole Load | 0 | 377/382 |
| ZZ155 | Typical Hole Load | 0 | 282/287 |
| ZZ134 | Typical Hole Load | 0 | 210/215 |
| ZZ195 | Single Cap | 0 | 492/497 |
| ZZ44 | Typical Hole Load | 0 | 491/496 |
| ZZ25 | Typical Hole Load | 0 | 654/659 |
| ZZ148 | Typical Face Hole | 0 | 161/166 |
| ZZ163 | Typical Hole Load | 0 | 324/329 |
| ZZ2 | Typical Hole Load | 0 | 580/585 |
| ZZ90 | Typical Face Hole | 0 | 142/147 |
| ZZ100 | Typical Face Hole | 0 | 184/189 |
| ZZ158 | Typical Hole Load | 0 | 303/308 |
| ZZ168 | Typical Hole Load | 0 | 503/508 |
| ZZ20 | Typical Face Hole | 0 | 359/364 |
| ZZ149 | Typical Face Hole | 0 | 182/187 |
| ZZ185 | Typical Hole Load | 0 | 608/613 |
| ZZ202 | Typical Hole Load | 0 | 613/618 |
| ZZ67 | Typical Hole Load | 0 | 386/391 |
| ZZ68 | Typical Hole Load | 0 | 307/312 |
| ZZ170 | Typical Hole Load | 0 | 445/450 |
| ZZ177 | Typical Hole Load | 0 | 566/571 |
| ZZ10 | Typical Face Hole | 0 | 401/406 |
| ZZ28 | Typical Hole Load | 0 | 475/480 |
| ZZ26 | Typical Hole Load | 0 | 633/638 |
| ZZ109 | Typical Hole Load | 0 | 463/468 |
| ZZ101 | Typical Hole Load | 0 | 205/210 |
| ZZ121 | Typical Hole Load | 0 | 431/436 |
| ZZ199 | Typical Hole Load | 0 | 592/597 |
| ZZ70 | Typical Face Hole | 0 | 149/154 |
| ZZ120 | Typical Hole Load | 0 | 452/457 |
| ZZ16 | Typical Hole Load | 0 | 675/680 |
| ZZ106 | Typical Hole Load | 0 | 542/547 |

| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ9 | Typical Hole Load | 0 | 480/485 |
| ZZ55 | Typical Hole Load | 0 | 528/533 |
| ZZ22 | Typical Hole Load | 0 | 417/422 |
| ZZ176 | Typical Hole Load | 0 | 545/550 |
| ZZ41 | Typical Face Hole | 0 | 254/259 |
| ZZ15 | Typical Hole Load | 0 | 696/701 |
| ZZ140 | Typical Face Hole | 0 | 110/115 |
| ZZ47 | Typical Hole Load | 0 | 470/475 |
| ZZ169 | Typical Hole Load | 0 | 524/529 |
| ZZ42 | Typical Hole Load | 0 | 333/338 |
| ZZ118 | Typical Hole Load | 0 | 494/499 |
| ZZ190 | Typical Hole Load | 0 | 471/476 |
| ZZ194 | Typical Hole Load | 0 | 571/576/576 |
| ZZ29 | Typical Hole Load | 0 | 396/401 |
| ZZ172 | Typical Face Hole | 0 | 287/292 |
| ZZ103 | Typical Hole Load | 0 | 363/368 |
| ZZ18 | Typical Hole Load | 0 | 517/522 |
| ZZ99 | Typical Hole Load | 0 | 263/268 |
| ZZ87 | Typical Hole Load | 0 | 379/384 |
| ZZ93 | Typical Hole Load | 0 | 321/326 |
| ZZ85 | Typical Hole Load | 0 | 437/442 |
| ZZ150 | Typical Hole Load | 0 | 261/266 |
| ZZ74 | Typical Hole Load | 0 | 365/370 |
| ZZ64 | Typical Hole Load | 0 | 407/412 |
| ZZ122 | Typical Hole Load | 0 | 352/357 |
| ZZ84 | Typical Hole Load | 0 | 358/363 |
| ZZ174 | Typical Hole Load | 0 | 387/392 |
| ZZ161 | Typical Hole Load | 0 | 482/487 |
| ZZ126 | Typical Hole Load | 0 | 252/257 |
| ZZ116 | Typical Hole Load | 0 | 584/589 |
| ZZ27 | Typical Hole Load | 0 | 554/559 |
| ZZ60 | Typical Face Hole | 0 | 191/196 |
| ZZ112 | Typical Hole Load | 0 | 394/399 |
| ZZ139 | Typical Hole Load | 0 | 189/194 |
| ZZ166 | Typical Hole Load | 0 | 345/350 |
| ZZ96 | Typical Hole Load | 0 | 500/505 |
| ZZ46 | Typical Hole Load | 0 | 549/554 |
| ZZ127 | Typical Hole Load | 0 | 331/336 |
| ZZ58 | Typical Hole Load | 0 | 349/354 |
| ZZ81 | Typical Face Hole | 0 | 121/126 |
| ZZ91 | Typical Face Hole | 0 | 163/168 |
| ZZ49 | Typical Hole Load | 0 | 312/317 |
| ZZ102 | Typical Hole Load | 0 | 284/289 |
| ZZ107 | Typical Hole Load | 0 | 563/568 |
| ZZ145 | Typical Hole Load | 0 | 398/403 |
| ZZ92 | Typical Hole Load | 0 | 242/247 |

| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ133 | Typical Face Hole | 0 | 131/136 |
| ZZ53 | Typical Hole Load | 0 | 370/375 |
| ZZ79 | Typical Hole Load | 0 | 179/184 |
| ZZ12 | Typical Hole Load | 0 | 459/464 |
| ZZ69 | Typical Hole Load | 0 | 228/233 |
| ZZ38 | Typical Hole Load | 0 | 433/438 |
| ZZ178 | Typical Hole Load | 0 | 487/492 |
| ZZ152 | Typical Hole Load | 0 | 419/424 |
| ZZ136 | Typical Hole Load | 0 | 368/373 |
| ZZ180 | Typical Face Hole | 0 | 329/334 |
| ZZ50 | Typical Face Hole | 0 | 233/238 |
| ZZ5 | Typical Hole Load | 0 | 759/764 |
| ZZ61 | Typical Face Hole | 0 | 170/175 |
| ZZ104 | Typical Hole Load | 0 | 442/447 |
| ZZ193 | Typical Hole Load | 0 | 650/655 |
| ZZ137 | Typical Hole Load | 0 | 347/352 |
| ZZ151 | Typical Hole Load | 0 | 340/345 |
| ZZ154 | Typical Hole Load | 0 | 361/366 |
| ZZ165 | Typical Face Hole | 0 | 266/271 |
| ZZ142 | Typical Hole Load | 0 | 219/224 |
| ZZ115 | Typical Hole Load | 0 | 373/378 |
| ZZ156 | Stick | 0 | 203/208 |
| ZZ114 | Typical Hole Load | 0 | 294/299 |
| ZZ88 | Typical Hole Load | 0 | 300/305 |
| ZZ196 | Typical Face Hole | 0 | 413/418 |
| ZZ57 | Typical Hole Load | 0 | 428/433 |
| ZZ188 | Typical Face Hole | 0 | 371/376 |
| ZZ153 | Typical Hole Load | 0 | 440/445 |
| ZZ113 | Typical Hole Load | 0 | 305/310 |
| ZZ110 | Typical Hole Load | 0 | 384/389 |
| ZZ6 | Typical Hole Load | 0 | 717/722 |
| ZZ129 | Typical Hole Load | 0 | 389/394 |
| ZZ135 | Typical Hole Load | 0 | 289/294 |
| ZZ59 | Typical Hole Load | 0 | 270/275 |
| ZZ147 | Typical Hole Load | 0 | 240/245 |
| ZZ175 | Typical Hole Load | 0 | 466/471 |
| ZZ181 | Typical Face Hole | 0 | 350/355 |
| ZZ131 | Typical Hole Load | 0 | 231/236 |
| ZZ111 | Typical Hole Load | 0 | 405/410 |
| ZZ203 | Typical Face Hole | 0 | 534/539 |
| ZZ83 | Typical Hole Load | 0 | 279/284 |
| ZZ183 | Typical Hole Load | 0 | 508/513 |
| ZZ8 | Typical Hole Load | 0 | 559/564 |
| ZZ30 | Typical Face Hole | 0 | 317/322 |
| ZZ119 | Typical Hole Load | 0 | 473/478 |
| ZZ160 | Typical Hole Load | 0 | 461/466 |

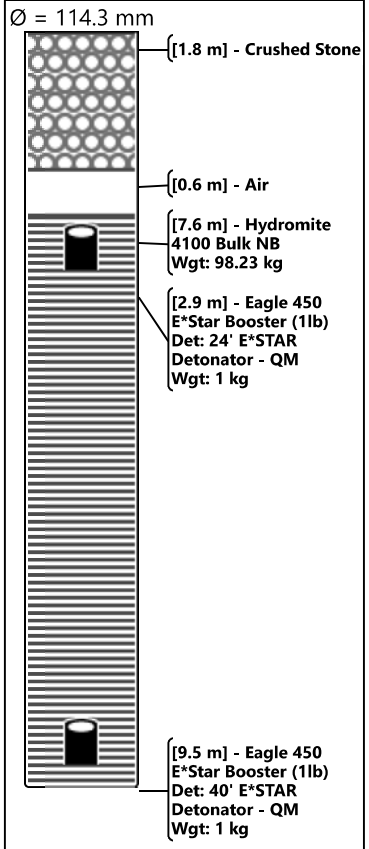
| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ13 | Typical Hole Load | 0 | 538/543 |
| ZZ198 | Typical Hole Load | 0 | 513/518 |
| ZZ66 | Typical Hole Load | 0 | 465/470 |
| ZZ130 | Typical Hole Load | 0 | 310/315 |
| ZZ34 | Typical Hole Load | 0 | 533/538 |
| ZZ197 | Typical Face Hole | 0 | 434/439 |
| ZZ97 | Typical Hole Load | 0 | 421/426 |
| ZZ21 | Typical Face Hole | 0 | 338/343 |
| ZZ11 | Typical Face Hole | 0 | 380/385 |
| ZZ40 | Typical Face Hole | 0 | 275/280 |
| ZZ32 | Typical Hole Load | 0 | 375/380 |
| ZZ31 | Typical Face Hole | 0 | 296/301 |
| ZZ184 | Typical Hole Load | 0 | 587/592 |
| ZZ72 | Typical Hole Load | 0 | 207/212 |
| ZZ128 | Typical Hole Load | 0 | 410/415 |
| ZZ123 | Typical Hole Load | 0 | 273/278 |
| ZZ75 | Typical Hole Load | 0 | 444/449 |
| ZZ52 | Typical Hole Load | 0 | 291/296 |
| ZZ125 | Typical Face Hole | 0 | 173/178 |
| ZZ204 | Typical Hole Load | 0 | 713/718 |

## Typical Hole Load



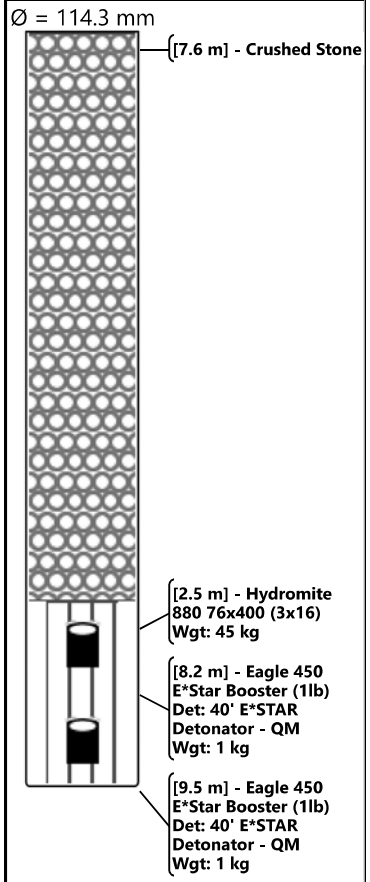

100.23 kg

## Typical Face Hole



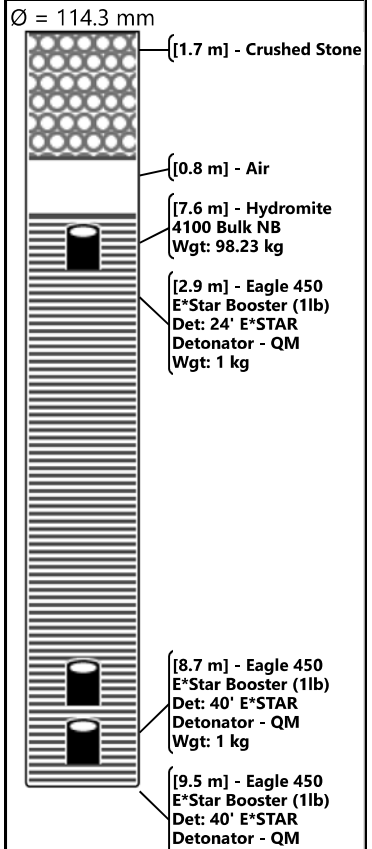

100.23 kg

## Stick



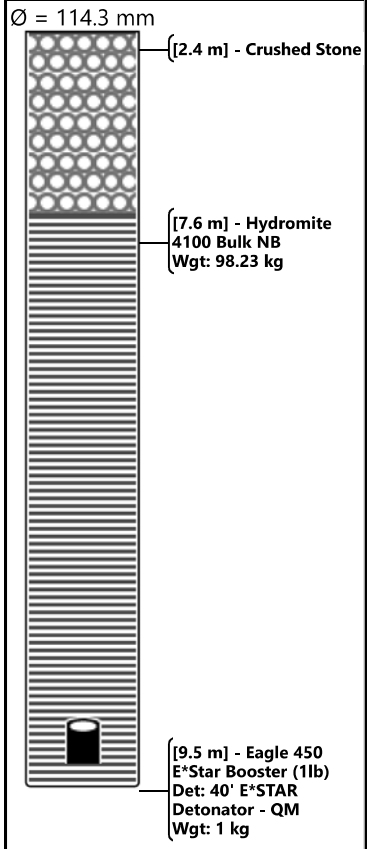

47 kg

## Triple Cap




101.23 kg

## Single Cap




99.23 kg

# AUSTIN POWDER LTD.
# BLAST REPORT

327-Orillia
RR #4 ON, Orillia, Canada L3V 1- 84

Blast No.: 2018-06 | Blast Type: Stone Quarry/Stone Mine - Production | Customer: HAROLD SUTHERLAND CONST.-KEPPEL (HAR1525-001)

Date/Time: 08/15/2018 16:42 | Pit/Permit: KEPPEL QUARRY / SHOT SERVICE | Location: 34' Bench

## *ENVIRONMENT*

Method Used: U.T.M. | Weather: Cloudy / High Clouds | Wind From: S

Temperature: 28 °C | Terrain: Flat | Wind Velocity: 3-0 km/h

Blast U.T.M.: 17N 500252 mE 4942414 mN

## *NEAREST PROTECTED STRUCTURE*

Compass Point: NNW

Structure Name: 178841 Grey Rd #17 | Direction/Bearing: 346 °

Structure Type: Dwelling | Distance: 616 m

Structure U.T.M.: 17N 500101 mE 4943011 mN

## *LAYOUT*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | Hole Depth: | 10.36 m | Material Blasted: | Limestone | Total Meters Drilled: | 2,300.6 m |
| No. of Holes: | 222 | Subdrilling: | 0.61 m | Burden: | 3.05 m | Water Depth: | 4.57 m |
| No. of V.P.† Holes: | 220 | Face Height: | 9.75 m | Spacing: | 3.05 m | Stem Length: | 1.83 m |
| No. of Rows: | 4 | Drilling Angle: | ° | Back Fill Depth: | 0.00 m | Area Type: | Center Start/ Breakout |
| Diameter: | 114.3 mm | Mats Used: | No | Stem Type: | Clear Stone | Method: | Specified (H = 9.75 m) |

† V.P. = Volume Producing

## *WEIGHTS*

| | | | | | |
|---|---|---|---|---|---|
| | | Max. Wt. of Expl. in Overlapped Decks: | 476.2 kg | Volume Produced: | 19,750.7 m³ |
| Initiation: | Electronic | Max. Wt. of Expl. Per 8 ms Interval: | 476.2 kg | Weight Produced: | 52,330.5 t |
| Firing Device: | E*Star Blasting Machine (WRFD) | Max. No. of Holes Per 8 ms Interval: | 5 | Powder Factor 1: | 2.474 t/kg |
| Other Method: | | Max. Wt. of Explosive Per Hole: | 95.7 kg | Powder Factor 2: | 1.071 kg/m³ |
| Mfg and Model: | DBM1600-2-RC | Scaled Distance Factor (max charge): | 62.93 | Rock Density: | 2.650 t/m³ |
| Initiation Settings: | | Scaled Distance Factor (per delay): | 28.21 | | |
| Series Resistance (ohms): | | | | | |

## *SEISMOGRAPHS*

See seismographs on separate page

## *CREW*

Blast occurred other than scheduled time: No | Misfire Occurred: No | Protective Cover: Loader Bucket

| Last Name | First Name | License / Cert | 2nd License / Cert | In Charge | Tied In | Chk. Tie-In | Driller | Layout |
|---|---|---|---|---|---|---|---|---|
| SMART | EVAN, C | * ON - N/A | | Yes | Yes | Yes | No | Yes |
| BELTRAME | ALEXANDER, A | | | No | Yes | No | No | No |
| FRALICK | CRAIG, A | | | No | Yes | No | No | No |
| KOUYOUMJIAN | MACKENZIE, H | | | No | Yes | No | No | No |
| LI | JACKSON, A | | | No | No | No | No | No |
| O'DONOHOE | LIAM, J | | | No | Yes | No | No | No |

# AUSTIN POWDER LTD.
# BLAST REPORT

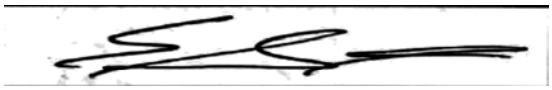
327-Orillia
RR #4 ON, Orillia, Canada L3V 1- 84

Blast No.: 2018-06
Blast Type: Stone Quarry/Stone Mine - Production
Customer: HAROLD SUTHERLAND CONST.-KEPPEL (HAR1525-001)
Date/Time: 08/15/2018 16:42
Pit/Permit: KEPPEL QUARRY / SHOT SERVICE
Location: 34' Bench

***PRODUCTS AND SERVICES***

| Number | Product Description | Quantity | Weight ( kg ) |
|---|---|---|---|
| 11782 | E*Star Booster - 454g (1 lb) | 445.00 ea | 205.87 |
| 15001 | 24' E*STAR Detonator - QM | 223.00 ea | 0.00 |
| 15030 | 60' E*STAR Detonator - QM/HD | 222.00 ea | 0.00 |
| 12276 | E*Star Bus Wire - 1250' spool | 2.00 sp | 0.00 |
| 15128 | Hydromite 4100 Bulk NB | 20,940.00 kg | 20,940.00 |
| 12981 | Mini Stem Plug - 6015 | 222.00 ea | 0.00 |
| | | Total Weight of Explosives (Include Primers) ( kg ): | 21,145.87 |

***COMMENTS / EXPLANATIONS***



Signature of Blaster in Charge

# AUSTIN POWDER LTD.
# BLAST REPORT

327-Orillia
RR #4 ON, Orillia, Canada L3V 1- 84

Blast No.: 2018-06
Blast Type: Stone Quarry/Stone Mine - Production
Customer: HAROLD SUTHERLAND CONST.-KEPPEL (HAR1525-001)
Date/Time: 08/15/2018 16:42
Pit/Permit: KEPPEL QUARRY / SHOT SERVICE
Location: 34' Bench

***SEISMOGRAPH 1 - 178717 GREY RD #17***

Data Type: Seismic Record
Seismograph Type: Instantel - Minimate Blaster
Date: 08/15/18
Trigger Level: 1.50 mm/s 115.00 dB
Time: 16:42
Calibration Date: 01/15/18
Distance From Blast: 587.96 m
Calibration Signal: OK
Direction From Blast: SE
Geophone Min. Freq.: --- Hz
Readout: Printed Copy
Mic. Min. Freq.: --- Hz
Location: Spiked and buried.
U.T.M.: 17N 500660 mE 4941991 mN
Reader and Firm: Evan Smart, AUSTIN POWDER
Analyst and Firm:
Installer and Firm: Evan Smart, Austin Powder Ltd.

| | | |
|---|---|---|
| Transverse: | 1.905 mm/s | 51.0 Hz |
| Vertical: | 1.27 mm/s | 16.0 Hz |
| Longitudinal: | 1.524 mm/s | 32.0 Hz |
| PPV: | --- mm/s | --- Hz |
| Acoustic: | 120 dB | |
| Vector Sum: | 2.024 mm/s | |

***SEISMOGRAPH 2 - 178841 GREY ROAD #17***

Data Type: Seismic Record
Seismograph Type: Instantel - Minimate Blaster
Date: 08/15/18
Trigger Level: 1.50 mm/s 115.00 dB
Time: 16:42
Calibration Date: 01/17/18
Distance From Blast: 615.70 m
Calibration Signal: OK
Direction From Blast: NNW
Geophone Min. Freq.: --- Hz
Readout: Printed Copy
Mic. Min. Freq.: --- Hz
Location: Bolted to Bedrock.
U.T.M.: 17N 500101 mE 4943011 mN
Reader and Firm: Evan Smart, AUSTIN POWDER
Analyst and Firm:
Installer and Firm: Evan Smart, Austin Powder Ltd.

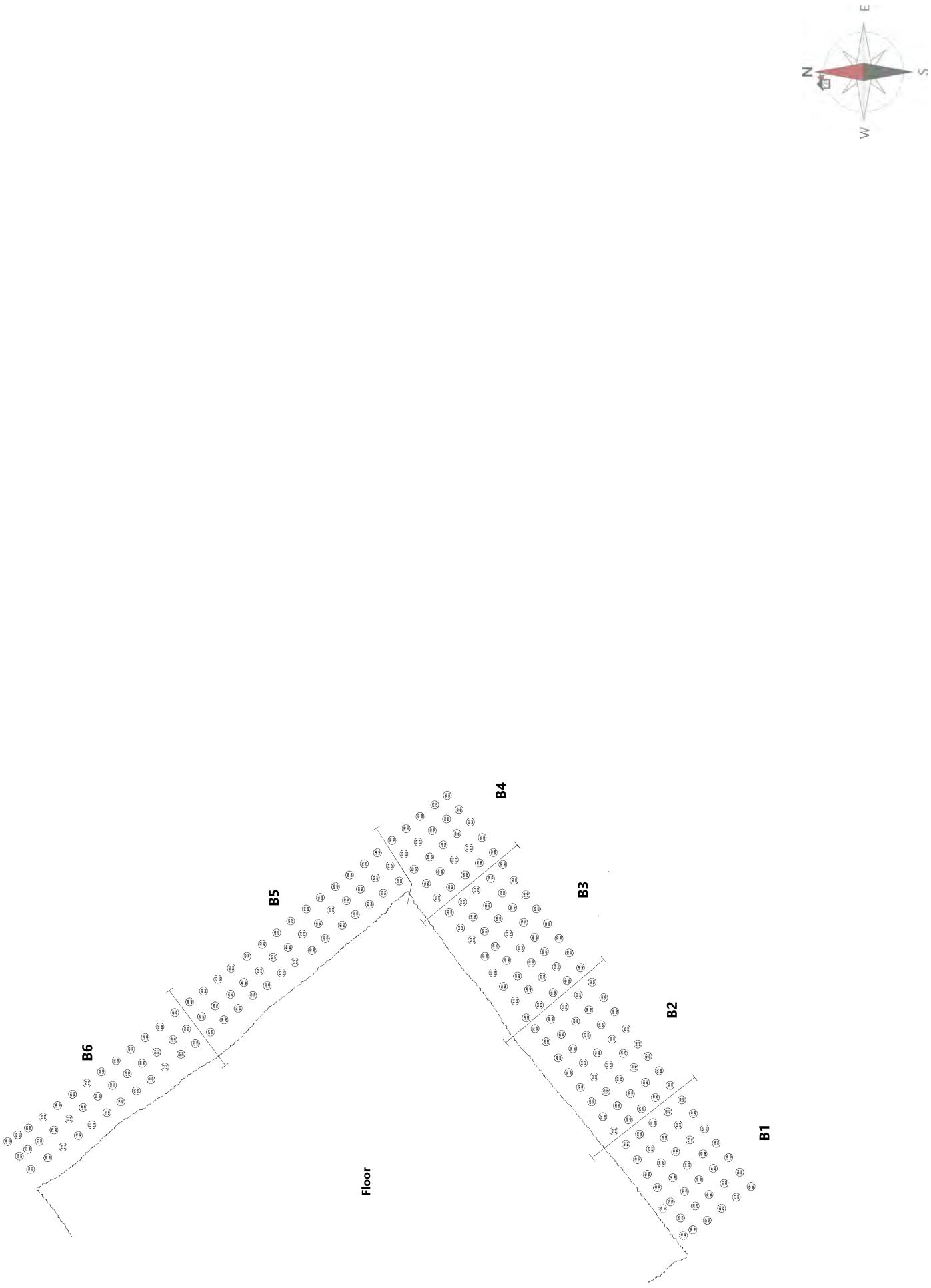
| | | |
|---|---|---|
| Transverse: | 1.397 mm/s | 47.0 Hz |
| Vertical: | 1.651 mm/s | 51.0 Hz |
| Longitudinal: | 1.905 mm/s | 37.0 Hz |
| PPV: | --- mm/s | --- Hz |
| Acoustic: | 123 dB | |
| Vector Sum: | 2.502 mm/s | |

***SEISMOGRAPH 3 - 283197 CONC. RD. #10***

Data Type: Seismic Record
Seismograph Type: Instantel - Minimate Blaster
Date: 08/15/18
Trigger Level: 1.50 mm/s 115.00 dB
Time: 16:42
Calibration Date: 01/15/18
Distance From Blast: 1,004.01 m
Calibration Signal: OK
Direction From Blast: ESE
Geophone Min. Freq.: --- Hz
Readout: Printed Copy
Mic. Min. Freq.: --- Hz
Location: Spiked and weight bagged beside the mail box.
U.T.M.: 17N 501117 mE 4941905 mN
Reader and Firm: Evan Smart, AUSTIN POWDER
Analyst and Firm:
Installer and Firm: Evan Smart, Austin Powder Ltd.

| | | |
|---|---|---|
| Transverse: | 1.651 mm/s | 43.0 Hz |
| Vertical: | 1.27 mm/s | 47.0 Hz |
| Longitudinal: | 2.921 mm/s | 39.0 Hz |
| PPV: | --- mm/s | --- Hz |
| Acoustic: | 114 dB | |
| Vector Sum: | 3.471 mm/s | |

Hole Label Mode: Cumulative In-Hole Delays



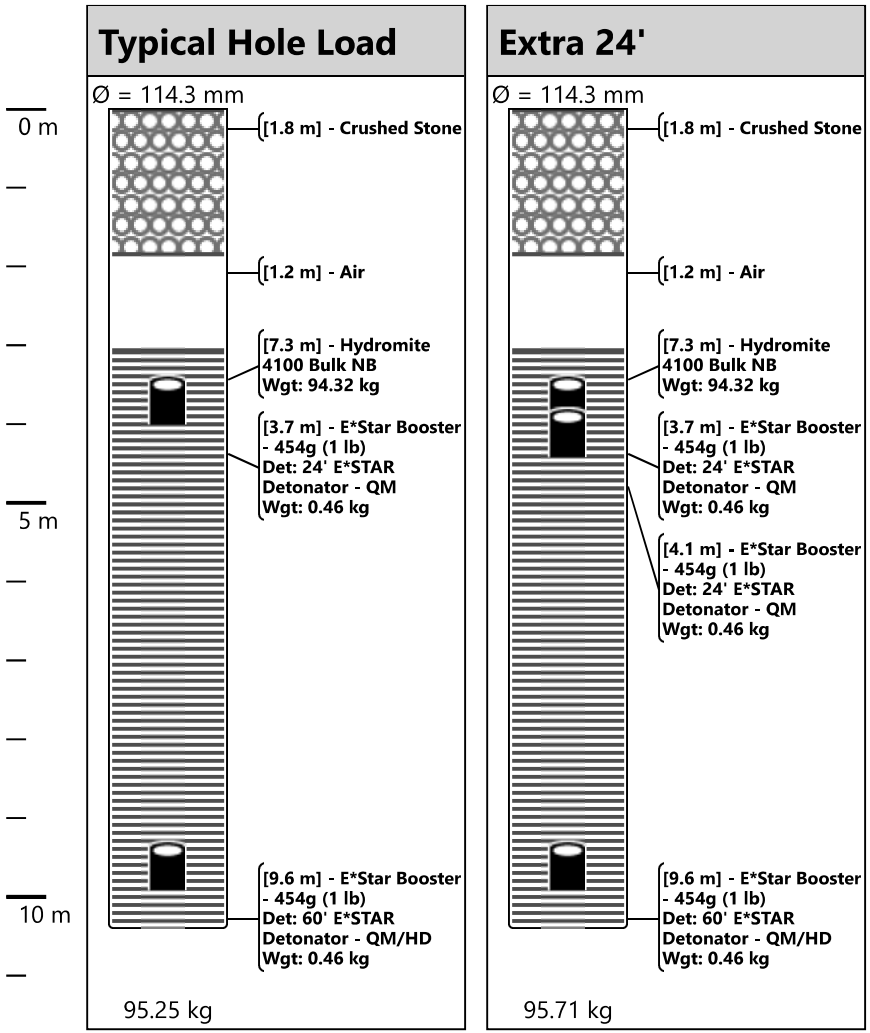
| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ148 | Typical Hole Load | 0 | 300/303 |
| ZZ174 | Typical Hole Load | 0 | 390/393 |
| ZZ46 | Typical Hole Load | 0 | 415/418 |
| ZZ225 | Typical Hole Load | 0 | 820/823 |
| ZZ58 | Typical Hole Load | 0 | 495/498 |
| ZZ106 | Typical Hole Load | 0 | 880/883 |
| ZZ215 | Typical Hole Load | 0 | 298/301 |
| ZZ173 | Typical Hole Load | 0 | 495/498 |
| ZZ35 | Typical Hole Load | 0 | 440/443 |
| ZZ118 | Typical Hole Load | 0 | 630/633 |
| ZZ30 | Typical Hole Load | 0 | 420/423 |
| ZZ79 | Typical Hole Load | 0 | 635/638 |
| ZZ212 | Typical Hole Load | 0 | 613/616 |
| ZZ7 | Typical Hole Load | 0 | 413/416 |
| ZZ49 | Typical Hole Load | 0 | 435/438 |
| ZZ71 | Typical Hole Load | 0 | 680/683 |
| ZZ77 | Typical Hole Load | 0 | 720/723 |
| ZZ28 | Typical Hole Load | 0 | 295/298 |
| ZZ86 | Typical Hole Load | 0 | 960/963 |
| ZZ57 | Typical Hole Load | 0 | 390/393 |
| ZZ127 | Typical Hole Load | 0 | 485/488 |
| ZZ168 | Typical Hole Load | 0 | 305/308 |
| ZZ22 | Typical Hole Load | 0 | 255/258 |
| ZZ76 | Typical Hole Load | 0 | 615/618 |
| ZZ136 | Typical Hole Load | 0 | 550/553 |
| ZZ134 | Typical Hole Load | 0 | 760/763 |
| ZZ9 | Typical Hole Load | 0 | 163/166 |
| ZZ180 | Typical Hole Load | 0 | 475/478 |
| ZZ67 | Typical Hole Load | 0 | 555/558 |
| ZZ199 | Typical Hole Load | 0 | 343/346 |
| ZZ45 | Typical Hole Load | 0 | 310/313 |
| ZZ115 | Typical Hole Load | 0 | 860/863 |
| ZZ94 | Typical Hole Load | 0 | 835/838 |
| ZZ195 | Typical Hole Load | 0 | 205/208 |
| ZZ65 | Typical Hole Load | 0 | 640/643 |
| ZZ203 | Typical Hole Load | 0 | 468/471 |
| ZZ197 | Typical Hole Load | 0 | 133/136 |
| ZZ82 | Typical Hole Load | 0 | 780/783 |
| ZZ15 | Typical Hole Load | 0 | 110/113 |
| ZZ17 | Typical Hole Load | 0 | 320/323 |
| ZZ139 | Typical Hole Load | 0 | 320/323 |
| ZZ213 | Typical Hole Load | 0 | 508/511 |
| ZZ141 | Typical Hole Load | 0 | 530/533 |
| ZZ211 | Typical Hole Load | 0 | 593/596 |
| ZZ224 | Typical Hole Load | 0 | 800/803 |
| ZZ26 | Typical Hole Load | 0 | 170/173 |

| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ91 | Typical Hole Load | 0 | 520/523 |
| ZZ105 | Typical Hole Load | 0 | 900/903 |
| ZZ176 | Typical Hole Load | 0 | 180/183 |
| ZZ183 | Typical Hole Load | 0 | 455/458 |
| ZZ192 | Typical Hole Load | 0 | 520/523 |
| ZZ135 | Typical Hole Load | 0 | 655/658 |
| ZZ33 | Typical Hole Load | 0 | 230/233 |
| ZZ209 | Typical Hole Load | 0 | 383/386 |
| ZZ8 | Typical Hole Load | 0 | 308/311 |
| ZZ39 | Typical Hole Load | 0 | 270/273 |
| ZZ210 | Typical Hole Load | 0 | 488/491 |
| ZZ144 | Typical Hole Load | 0 | 720/723 |
| ZZ40 | Typical Hole Load | 0 | 375/378 |
| ZZ56 | Typical Hole Load | 0 | 370/373 |
| ZZ157 | Typical Hole Load | 0 | 240/243 |
| ZZ14 | Typical Hole Load | 0 | 143/146 |
| ZZ84 | Typical Hole Load | 0 | 875/878 |
| ZZ19 | Typical Hole Load | 0 | 235/238 |
| ZZ187 | Typical Hole Load | 0 | 120/123 |
| ZZ25 | Typical Hole Load | 0 | 275/278 |
| ZZ13 | Typical Hole Load | 0 | 248/251 |
| ZZ170 | Typical Hole Load | 0 | 515/518 |
| ZZ2 | Typical Hole Load | 0 | 328/331 |
| ZZ181 | Typical Hole Load | 0 | 580/583 |
| ZZ128 | Typical Hole Load | 0 | 380/383 |
| ZZ126 | Typical Hole Load | 0 | 590/593 |
| ZZ87 | Typical Hole Load | 0 | 855/858 |
| ZZ21 | Typical Hole Load | 0 | 150/153 |
| ZZ66 | Typical Hole Load | 0 | 660/663 |
| ZZ81 | Typical Hole Load | 0 | 760/763 |
| ZZ83 | Typical Hole Load | 0 | 800/803 |
| ZZ107 | Typical Hole Load | 0 | 775/778 |
| ZZ3 | Typical Hole Load | 0 | 203/206 |
| ZZ133 | Typical Hole Load | 0 | 780/783 |
| ZZ64 | Typical Hole Load | 0 | 535/538 |
| ZZ164 | Typical Hole Load | 0 | 430/433 |
| ZZ166 | Typical Hole Load | 0 | 220/223 |
| ZZ4 | Typical Hole Load | 0 | 183/186 |
| ZZ189 | Typical Hole Load | 0 | 330/333 |
| ZZ121 | Typical Hole Load | 0 | 400/403 |
| ZZ16 | Typical Hole Load | 0 | 215/218 |
| ZZ44 | Typical Hole Load | 0 | 290/293 |
| ZZ130 | Typical Hole Load | 0 | 465/468 |
| ZZ151 | Typical Hole Load | 0 | 490/493 |
| ZZ140 | Typical Hole Load | 0 | 425/428 |
| ZZ152 | Typical Hole Load | 0 | 595/598 |

| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ54 | Typical Hole Load | 0 | 580/583 |
| ZZ31 | Typical Hole Load | 0 | 315/318 |
| ZZ207 | Typical Hole Load | 0 | 173/176 |
| ZZ146 | Typical Hole Load | 0 | 510/513 |
| ZZ208 | Typical Hole Load | 0 | 278/281 |
| ZZ53 | Typical Hole Load | 0 | 560/563 |
| ZZ184 | Typical Hole Load | 0 | 350/353 |
| ZZ89 | Typical Hole Load | 0 | 675/678 |
| ZZ93 | Typical Hole Load | 0 | 730/733 |
| ZZ37 | Typical Hole Load | 0 | 355/358 |
| ZZ206 | Typical Hole Load | 0 | 153/156 |
| ZZ27 | Typical Hole Load | 0 | 190/193 |
| ZZ119 | Typical Hole Load | 0 | 525/528 |
| ZZ223 | Typical Hole Load | 0 | 700/703 |
| ZZ196 | Typical Hole Load | 0 | 100/103 |
| ZZ190 | Typical Hole Load | 0 | 435/438 |
| ZZ185 | Typical Hole Load | 0 | 245/248 |
| ZZ137 | Typical Hole Load | 0 | 445/448 |
| ZZ69 | Typical Hole Load | 0 | 470/473 |
| ZZ47 | Typical Hole Load | 0 | 520/523 |
| ZZ194 | Typical Hole Load | 0 | 310/313 |
| ZZ165 | Typical Hole Load | 0 | 325/328 |
| ZZ205 | Typical Hole Load | 0 | 258/261 |
| ZZ138 | Typical Hole Load | 0 | 340/343 |
| ZZ131 | Typical Hole Load | 0 | 570/573 |
| ZZ147 | Typical Hole Load | 0 | 405/408 |
| ZZ74 | Typical Hole Load | 0 | 490/493 |
| ZZ59 | Typical Hole Load | 0 | 600/603 |
| ZZ216 | Typical Hole Load | 0 | 193/196 |
| ZZ177 | Typical Hole Load | 0 | 160/163 |
| ZZ1 | Typical Hole Load | 0 | 433/436 |
| ZZ109 | Typical Hole Load | 0 | 565/568 |
| ZZ156 | Typical Hole Load | 0 | 260/263 |
| ZZ70 | Typical Hole Load | 0 | 575/578 |
| ZZ102 | Typical Hole Load | 0 | 585/588 |
| ZZ50 | Typical Hole Load | 0 | 330/333 |
| ZZ111 | Typical Hole Load | 0 | 440/443 |
| ZZ169 | Typical Hole Load | 0 | 410/413 |
| ZZ123 | Typical Hole Load | 0 | 610/613 |
| ZZ204 | Typical Hole Load | 0 | 363/366 |
| ZZ149 | Typical Hole Load | 0 | 280/283 |
| ZZ42 | Typical Hole Load | 0 | 500/503 |
| ZZ38 | Typical Hole Load | 0 | 250/253 |
| ZZ158 | Typical Hole Load | 0 | 345/348 |
| ZZ145 | Typical Hole Load | 0 | 615/618 |
| ZZ153 | Typical Hole Load | 0 | 575/578 |

| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ5 | Extra 24' | 0 | 288/291 |
| ZZ63 | Typical Hole Load | 0 | 430/433 |
| ZZ125 | Typical Hole Load | 0 | 695/698 |
| ZZ51 | Typical Hole Load | 0 | 350/353 |
| ZZ132 | Typical Hole Load | 0 | 675/678 |
| ZZ155 | Typical Hole Load | 0 | 365/368 |
| ZZ154 | Typical Hole Load | 0 | 470/473 |
| ZZ175 | Typical Hole Load | 0 | 285/288 |
| ZZ99 | Typical Hole Load | 0 | 605/608 |
| ZZ143 | Typical Hole Load | 0 | 740/743 |
| ZZ68 | Typical Hole Load | 0 | 450/453 |
| ZZ114 | Typical Hole Load | 0 | 755/758 |
| ZZ124 | Typical Hole Load | 0 | 715/718 |
| ZZ171 | Typical Hole Load | 0 | 620/623 |
| ZZ73 | Typical Hole Load | 0 | 595/598 |
| ZZ214 | Typical Hole Load | 0 | 403/406 |
| ZZ193 | Typical Hole Load | 0 | 415/418 |
| ZZ10 | Typical Hole Load | 0 | 268/271 |
| ZZ18 | Typical Hole Load | 0 | 340/343 |
| ZZ29 | Typical Hole Load | 0 | 400/403 |
| ZZ222 | Typical Hole Load | 0 | 680/683 |
| ZZ188 | Typical Hole Load | 0 | 225/228 |
| ZZ96 | Typical Hole Load | 0 | 920/923 |
| ZZ60 | Typical Hole Load | 0 | 620/623 |
| ZZ75 | Typical Hole Load | 0 | 510/513 |
| ZZ103 | Typical Hole Load | 0 | 690/693 |
| ZZ200 | Typical Hole Load | 0 | 448/451 |
| ZZ20 | Typical Hole Load | 0 | 130/133 |
| ZZ108 | Typical Hole Load | 0 | 670/673 |
| ZZ117 | Typical Hole Load | 0 | 735/738 |
| ZZ129 | Typical Hole Load | 0 | 360/363 |
| ZZ61 | Typical Hole Load | 0 | 515/518 |
| ZZ80 | Typical Hole Load | 0 | 530/533 |
| ZZ160 | Typical Hole Load | 0 | 555/558 |
| ZZ43 | Typical Hole Load | 0 | 395/398 |
| ZZ162 | Typical Hole Load | 0 | 640/643 |
| ZZ12 | Typical Hole Load | 0 | 353/356 |
| ZZ122 | Typical Hole Load | 0 | 505/508 |
| ZZ100 | Typical Hole Load | 0 | 500/503 |
| ZZ55 | Typical Hole Load | 0 | 475/478 |
| ZZ88 | Typical Hole Load | 0 | 750/753 |
| ZZ23 | Typical Hole Load | 0 | 360/363 |
| ZZ36 | Typical Hole Load | 0 | 460/463 |
| ZZ182 | Typical Hole Load | 0 | 560/563 |
| ZZ202 | Typical Hole Load | 0 | 573/576 |
| ZZ191 | Typical Hole Load | 0 | 540/543 |

| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ6 | Typical Hole Load | 0 | 393/396 |
| ZZ92 | Typical Hole Load | 0 | 625/628 |
| ZZ150 | Typical Hole Load | 0 | 385/388 |
| ZZ179 | Typical Hole Load | 0 | 370/373 |
| ZZ172 | Typical Hole Load | 0 | 600/603 |
| ZZ90 | Typical Hole Load | 0 | 655/658 |
| ZZ167 | Typical Hole Load | 0 | 200/203 |
| ZZ62 | Typical Hole Load | 0 | 410/413 |
| ZZ116 | Typical Hole Load | 0 | 840/843 |
| ZZ52 | Typical Hole Load | 0 | 455/458 |
| ZZ163 | Typical Hole Load | 0 | 535/538 |
| ZZ78 | Typical Hole Load | 0 | 740/743 |
| ZZ101 | Typical Hole Load | 0 | 480/483 |
| ZZ120 | Typical Hole Load | 0 | 420/423 |
| ZZ161 | Typical Hole Load | 0 | 660/663 |
| ZZ198 | Typical Hole Load | 0 | 238/241 |
| ZZ178 | Typical Hole Load | 0 | 265/268 |
| ZZ98 | Typical Hole Load | 0 | 710/713 |
| ZZ11 | Typical Hole Load | 0 | 373/376 |
| ZZ41 | Typical Hole Load | 0 | 480/483 |
| ZZ72 | Typical Hole Load | 0 | 700/703 |
| ZZ201 | Typical Hole Load | 0 | 553/556 |
| ZZ142 | Typical Hole Load | 0 | 635/638 |
| ZZ104 | Typical Hole Load | 0 | 795/798 |
| ZZ97 | Typical Hole Load | 0 | 815/818 |
| ZZ159 | Typical Hole Load | 0 | 450/453 |
| ZZ85 | Typical Hole Load | 0 | 980/983 |
| ZZ113 | Typical Hole Load | 0 | 650/653 |
| ZZ48 | Typical Hole Load | 0 | 540/543 |
| ZZ112 | Typical Hole Load | 0 | 545/548 |
| ZZ95 | Typical Hole Load | 0 | 940/943 |
| ZZ186 | Typical Hole Load | 0 | 140/143 |
| ZZ110 | Typical Hole Load | 0 | 460/463 |
| ZZ32 | Typical Hole Load | 0 | 210/213 |
| ZZ24 | Typical Hole Load | 0 | 380/383 |
| ZZ34 | Typical Hole Load | 0 | 335/338 |
| ZZ226 | Typical Hole Load | 0 | 143/146 |
| ZZ227 | Typical Hole Load | 0 | 103/106 |


Typical Hole Load
Ø = 114.3 mm
0 m
5 m
10 m
[1.8 m] - Crushed Stone
[1.2 m] - Air
[7.3 m] - Hydromite 4100 Bulk NB Wgt: 94.32 kg
[3.7 m] - E*Star Booster - 454g (1 lb) Det: 24' E*STAR Detonator - QM Wgt: 0.46 kg
[9.6 m] - E*Star Booster - 454g (1 lb) Det: 60' E*STAR Detonator - QM/HD Wgt: 0.46 kg
95.25 kg
Extra 24'
Ø = 114.3 mm
[1.8 m] - Crushed Stone
[1.2 m] - Air
[7.3 m] - Hydromite 4100 Bulk NB Wgt: 94.32 kg
[3.7 m] - E*Star Booster - 454g (1 lb) Det: 24' E*STAR Detonator - QM Wgt: 0.46 kg
[4.1 m] - E*Star Booster - 454g (1 lb) Det: 24' E*STAR Detonator - QM Wgt: 0.46 kg
[9.6 m] - E*Star Booster - 454g (1 lb) Det: 60' E*STAR Detonator - QM/HD Wgt: 0.46 kg
95.71 kg

# AUSTIN POWDER LTD.
# BLAST REPORT

327-Orillia
RR #4 ON, Orillia, Canada L3V 1- 84

Blast No.: 2018-08
Blast Type: Stone Quarry/Stone Mine - Production
Customer: HAROLD SUTHERLAND CONST.-KEPPEL (HAR1525-001)
Date/Time: 10/10/2018 14:02
Pit/Permit: KEPPEL QUARRY / SHOT SERVICE
Location: Bottom Bench

## *ENVIRONMENT*

Method Used: U.T.M.
Weather: Clear
Wind From: S
Temperature: 28 °C
Terrain: Flat
Wind Velocity: 0-8 km/h
Blast U.T.M.: 17N 500242 mE 4942444 mN

## *NEAREST PROTECTED STRUCTURE*

Compass Point: NNW
Structure Name: 178841 Grey Rd #17
Direction/Bearing: 346 °
Structure Type: Dwelling
Distance: 584 m
Structure U.T.M.: 17N 500101 mE 4943011 mN

## *LAYOUT*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | Hole Depth: | 9.60 m | Material Blasted: | Limestone | Total Meters Drilled: | 1,930.0 m |
| No. of Holes: | 201 | Subdrilling: | 0.61 m | Burden: | 3.05 m | Water Depth: | max 3.05 m |
| No. of V.P.† Holes: | 201 | Face Height: | 8.99 m | Spacing: | 3.05 m | Stem Length: | min 1.68 m |
| No. of Rows: | 3 | Drilling Angle: | ° | Back Fill Depth: | 0.00 m | Area Type: | Center Start/ Breakout |
| Diameter: | 114.3 mm | Mats Used: | No | Stem Type: | Clear Stone | Method: | Specified (H = 8.99 m) |

† V.P. = Volume Producing

## *WEIGHTS*

| | | | | | |
|---|---|---|---|---|---|
| | | Max. Wt. of Expl. in Overlapped Decks: | 573.2 kg | Volume Produced: | 16,539.8 m³ |
| Initiation: | Electronic | Max. Wt. of Expl. Per 8 ms Interval: | 573.2 kg | Weight Produced: | 43,823.6 t |
| Firing Device: | E*Star Blasting Machine (WRFD) | Max. No. of Holes Per 8 ms Interval: | 6 | Powder Factor 1: | 2.288 t/kg |
| Other Method: | | Max. Wt. of Explosive Per Hole: | 96.9 kg | Powder Factor 2: | 1.158 kg/m³ |
| Mfg and Model: | DBM1600-2-RC | Scaled Distance Factor (max charge): | 59.34 | Rock Density: | 2.650 t/m³ |
| Initiation Settings: | | Scaled Distance Factor (per delay): | 24.41 | | |
| Series Resistance (ohms): | | | | | |

## *SEISMOGRAPHS*

See seismographs on separate page

## *CREW*

Blast occurred other than scheduled time: No
Misfire Occurred: No
Protective Cover: Loader Bucket

| Last Name | First Name | License / Cert | 2nd License / Cert | In Charge | Tied In | Chk. Tie-In | Driller | Layout |
|---|---|---|---|---|---|---|---|---|
| SMART | EVAN, C | * ON - N/A | | Yes | Yes | Yes | No | Yes |
| BELTRAME | ALEXANDER, A | | | No | Yes | No | No | No |
| KOUYOUMJIAN | MACKENZIE, H | | | No | Yes | No | No | No |
| NEWTON | JOHN, D | | | No | Yes | Yes | No | No |
| O'DONOHOE | LIAM, J | | | No | Yes | No | No | No |

# AUSTIN POWDER LTD.
# BLAST REPORT

327-Orillia
RR #4 ON, Orillia, Canada L3V 1- 84

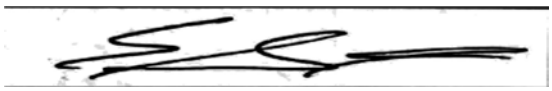
Blast No.: 2018-08
Blast Type: Stone Quarry/Stone Mine - Production
Customer: HAROLD SUTHERLAND CONST.-KEPPEL (HAR1525-001)
Date/Time: 10/10/2018 14:02
Pit/Permit: KEPPEL QUARRY / SHOT SERVICE
Location: Bottom Bench

***PRODUCTS AND SERVICES***

| Number | Product Description | Quantity | | Weight ( kg ) |
|---|---|---|---|---|
| 15107 | Eagle 450 E*Star Booster (1lb) | 404.00 | ea | 404.00 |
| 15001 | 24' E*STAR Detonator - QM | 203.00 | ea | 0.00 |
| 15003 | 40' E*STAR Detonator - QM | 201.00 | ea | 0.00 |
| 12276 | E*Star Bus Wire - 1250' spool | 2.00 | sp | 0.00 |
| 15128 | Hydromite 4100 Bulk NB | 18,750.00 | kg | 18,750.00 |
| 20334 | Hydromite 880 76x400 (3x16) | 1.00 | st | 5.00 |
| 12981 | Mini Stem Plug - 6015 | 201.00 | ea | 0.00 |
| | | Total Weight of Explosives (Include Primers) ( kg ): | | 19,158.99 |

***COMMENTS / EXPLANATIONS***

General Comments: Imported on 10/10/2018 3:24:44 PM



Signature of Blaster in Charge

# AUSTIN POWDER LTD.
# BLAST REPORT

327-Orillia
RR #4 ON, Orillia, Canada L3V 1- 84

Blast No.: 2018-08
Blast Type: Stone Quarry/Stone Mine - Production
Customer: HAROLD SUTHERLAND CONST.-KEPPEL (HAR1525-001)
Date/Time: 10/10/2018 14:02
Pit/Permit: KEPPEL QUARRY / SHOT SERVICE
Location: Bottom Bench

## *SEISMOGRAPH 1 - 178841 GREY ROAD #17*

Data Type: Seismic Record
Seismograph Type: Instantel - Minimate Blaster
Date: 10/10/18
Trigger Level: 1.50 mm/s 115.00 dB
Time: 14:02
Calibration Date: 01/17/18
Distance From Blast: 584.30 m
Calibration Signal: OK
Direction From Blast: NNW
Geophone Min. Freq.: --- Hz
Readout: Printed Copy
Mic. Min. Freq.: --- Hz
Location: Bolted to Bedrock.
U.T.M.: 17N 500101 mE 4943011 mN
Reader and Firm: Evan Smart, AUSTIN POWDER
Analyst and Firm:
Installer and Firm: Evan Smart, Austin Powder Ltd.

| | | |
|---|---|---|
| Transverse: | 1.397 mm/s | 43.0 Hz |
| Vertical: | 1.651 mm/s | 43.0 Hz |
| Longitudinal: | 1.524 mm/s | 34.0 Hz |
| Acoustic: | 118 dB | --- Hz |
| Vector Sum: | 2.218 mm/s | |

## *SEISMOGRAPH 2 - 178717 GREY RD #17*

Data Type: Seismic Record
Seismograph Type: Instantel - Minimate Blaster
Date: 10/10/18
Trigger Level: 1.50 mm/s 115.00 dB
Time: 14:02
Calibration Date: 01/15/18
Distance From Blast: 616.31 m
Calibration Signal: OK
Direction From Blast: SE
Geophone Min. Freq.: --- Hz
Readout: Printed Copy
Mic. Min. Freq.: --- Hz
Location: Spiked and buried.
U.T.M.: 17N 500660 mE 4941991 mN
Reader and Firm: Evan Smart, AUSTIN POWDER
Analyst and Firm:
Installer and Firm: John Newton, Austin Powder Ltd.

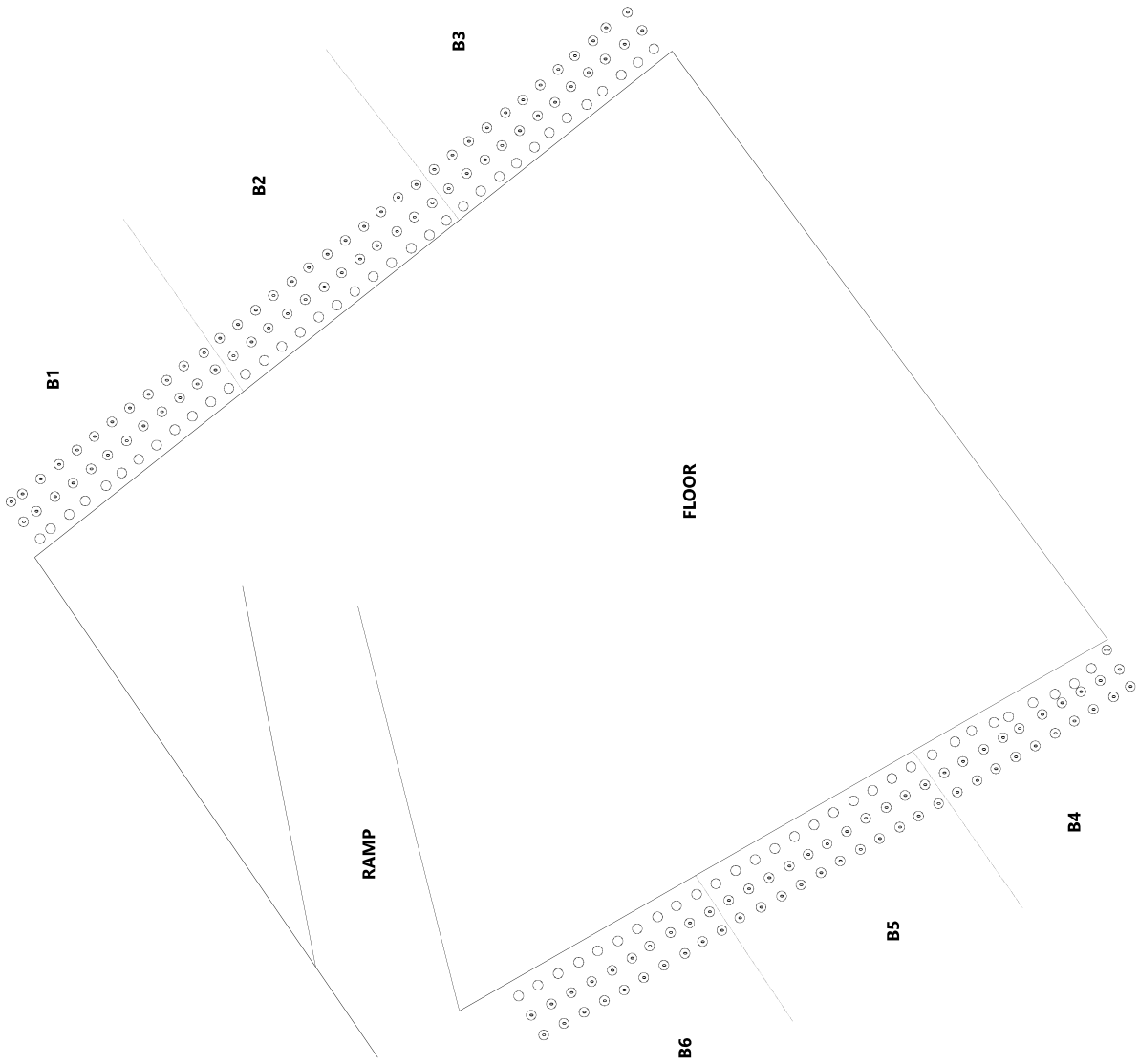
| | | |
|---|---|---|
| Transverse: | 1.27 mm/s | 26.0 Hz |
| Vertical: | 1.27 mm/s | 20.0 Hz |
| Longitudinal: | 1.524 mm/s | 34.0 Hz |
| Acoustic: | 122 dB | --- Hz |
| Vector Sum: | 1.746 mm/s | |

## *SEISMOGRAPH 3 - 283197 CONC. RD. #10*

Data Type: Seismic Record
Seismograph Type: Instantel - Minimate Blaster
Date: 10/10/18
Trigger Level: 1.50 mm/s 115.00 dB
Time: 14:02
Calibration Date: 01/15/18
Distance From Blast: 1,027.79 m
Calibration Signal: OK
Direction From Blast: ESE
Geophone Min. Freq.: --- Hz
Readout: Printed Copy
Mic. Min. Freq.: --- Hz
Location: Spiked and weight bagged beside the mail box.
U.T.M.: 17N 501117 mE 4941905 mN
Reader and Firm: Evan Smart, AUSTIN POWDER
Analyst and Firm:
Installer and Firm: Evan Smart, Austin Powder Ltd.

| | | |
|---|---|---|
| Transverse: | 2.286 mm/s | 43.0 Hz |
| Vertical: | 0.889 mm/s | 43.0 Hz |
| Longitudinal: | 1.524 mm/s | 43.0 Hz |
| Acoustic: | 116 dB | --- Hz |
| Vector Sum: | 2.318 mm/s | |

Hole Label Mode: Cumulative In-Hole Delays

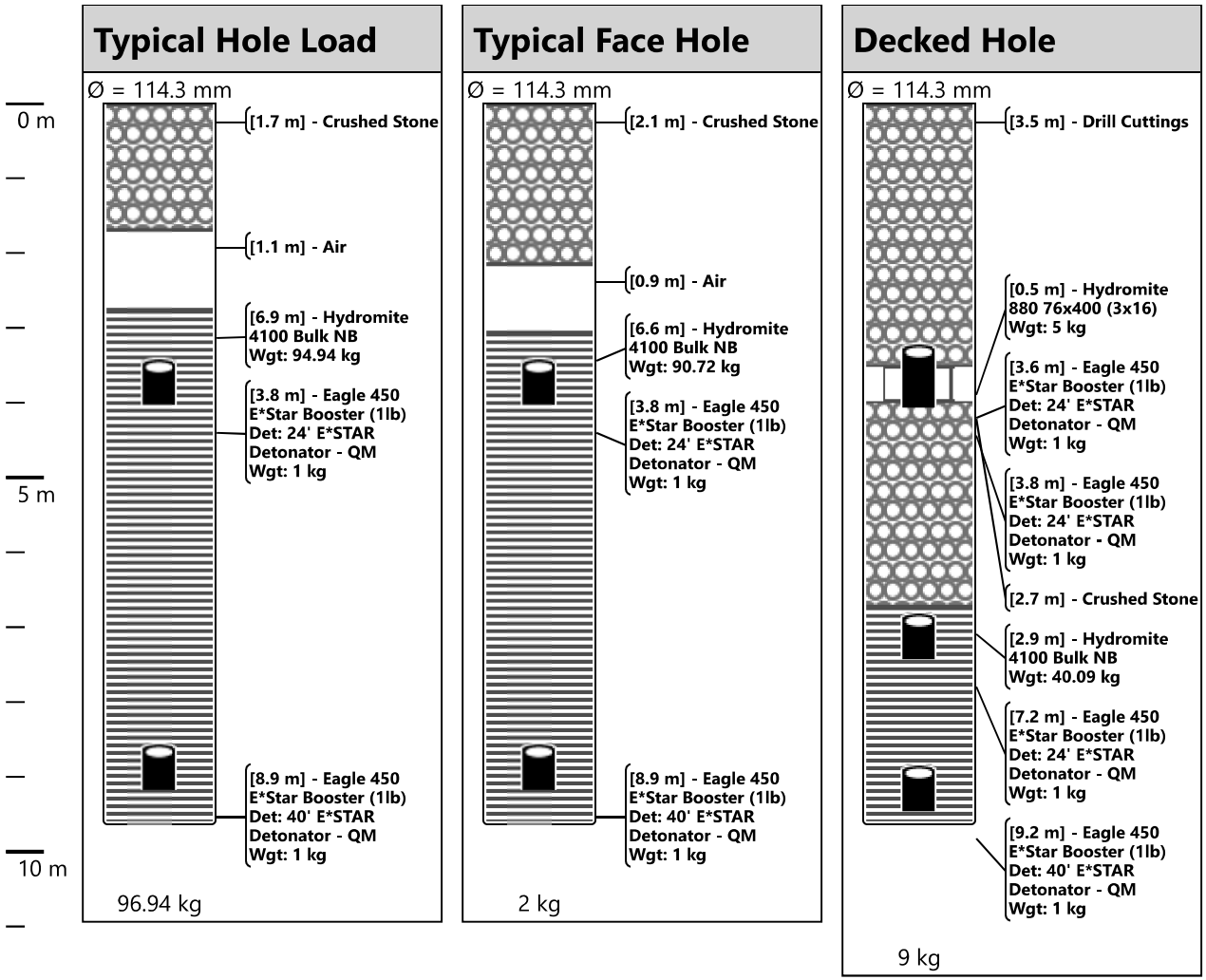


| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ1 | Typical Hole Load | 0 | 0 |
| ZZ2 | Typical Hole Load | 0 | 0 |
| ZZ3 | Typical Face Hole | 0 | |
| ZZ4 | Typical Face Hole | 0 | |
| ZZ5 | Typical Hole Load | 0 | 0 |
| ZZ6 | Typical Hole Load | 0 | 0 |
| ZZ7 | Typical Hole Load | 0 | 0 |
| ZZ8 | Typical Hole Load | 0 | 0 |
| ZZ9 | Typical Face Hole | 0 | |
| ZZ10 | Typical Face Hole | 0 | |
| ZZ11 | Typical Hole Load | 0 | 0 |
| ZZ12 | Typical Hole Load | 0 | 0 |
| ZZ13 | Typical Hole Load | 0 | 0 |
| ZZ14 | Typical Hole Load | 0 | 0 |
| ZZ15 | Typical Face Hole | 0 | |
| ZZ16 | Typical Face Hole | 0 | |
| ZZ17 | Typical Hole Load | 0 | 0 |
| ZZ18 | Typical Hole Load | 0 | 0 |
| ZZ19 | Typical Hole Load | 0 | 0 |
| ZZ20 | Typical Hole Load | 0 | 0 |
| ZZ21 | Typical Face Hole | 0 | |
| ZZ22 | Typical Face Hole | 0 | |
| ZZ23 | Typical Hole Load | 0 | 0 |
| ZZ24 | Typical Hole Load | 0 | 0 |
| ZZ25 | Typical Hole Load | 0 | 0 |
| ZZ26 | Typical Hole Load | 0 | 0 |
| ZZ27 | Typical Face Hole | 0 | |
| ZZ28 | Typical Face Hole | 0 | |
| ZZ29 | Typical Hole Load | 0 | 0 |
| ZZ30 | Typical Hole Load | 0 | 0 |
| ZZ31 | Typical Hole Load | 0 | 0 |
| ZZ32 | Typical Hole Load | 0 | 0 |
| ZZ33 | Typical Face Hole | 0 | |
| ZZ34 | Typical Face Hole | 0 | |
| ZZ35 | Typical Hole Load | 0 | 0 |
| ZZ36 | Typical Hole Load | 0 | 0 |
| ZZ37 | Typical Hole Load | 0 | 0 |
| ZZ38 | Typical Hole Load | 0 | 0 |
| ZZ39 | Typical Face Hole | 0 | |
| ZZ40 | Typical Face Hole | 0 | |
| ZZ41 | Typical Hole Load | 0 | 0 |
| ZZ42 | Typical Hole Load | 0 | 0 |
| ZZ43 | Typical Hole Load | 0 | 0 |
| ZZ44 | Typical Hole Load | 0 | 0 |
| ZZ45 | Typical Face Hole | 0 | |
| ZZ46 | Typical Face Hole | 0 | |
| ZZ47 | Typical Hole Load | 0 | 0 |
| ZZ48 | Typical Hole Load | 0 | 0 |
| ZZ49 | Typical Hole Load | 0 | 0 |
| ZZ50 | Typical Hole Load | 0 | 0 |
| ZZ51 | Typical Face Hole | 0 | |
| ZZ52 | Typical Face Hole | 0 | |
| ZZ53 | Typical Hole Load | 0 | 0 |
| ZZ54 | Typical Hole Load | 0 | 0 |
| ZZ55 | Typical Hole Load | 0 | 0 |
| ZZ56 | Typical Hole Load | 0 | 0 |
| ZZ57 | Typical Face Hole | 0 | |
| ZZ58 | Typical Face Hole | 0 | |
| ZZ59 | Typical Hole Load | 0 | 0 |
| ZZ60 | Typical Hole Load | 0 | 0 |
| ZZ61 | Typical Hole Load | 0 | 0 |
| ZZ62 | Typical Hole Load | 0 | 0 |
| ZZ63 | Typical Face Hole | 0 | |
| ZZ64 | Typical Face Hole | 0 | |
| ZZ65 | Typical Hole Load | 0 | 0 |
| ZZ66 | Typical Hole Load | 0 | 0 |
| ZZ67 | Typical Hole Load | 0 | 0 |
| ZZ68 | Typical Hole Load | 0 | 0 |
| ZZ69 | Typical Face Hole | 0 | |
| ZZ70 | Typical Face Hole | 0 | |
| ZZ71 | Typical Hole Load | 0 | 0 |
| ZZ72 | Typical Hole Load | 0 | 0 |
| ZZ73 | Typical Hole Load | 0 | 0 |
| ZZ74 | Typical Hole Load | 0 | 0 |
| ZZ75 | Typical Face Hole | 0 | |
| ZZ76 | Typical Face Hole | 0 | |
| ZZ77 | Typical Hole Load | 0 | 0 |
| ZZ78 | Typical Hole Load | 0 | 0 |
| ZZ79 | Typical Hole Load | 0 | 0 |
| ZZ80 | Typical Hole Load | 0 | 0 |
| ZZ81 | Typical Face Hole | 0 | |
| ZZ82 | Typical Face Hole | 0 | |
| ZZ83 | Typical Hole Load | 0 | 0 |
| ZZ84 | Typical Hole Load | 0 | 0 |
| ZZ85 | Typical Hole Load | 0 | 0 |
| ZZ86 | Typical Hole Load | 0 | 0 |
| ZZ87 | Typical Face Hole | 0 | |
| ZZ88 | Typical Face Hole | 0 | |
| ZZ89 | Typical Hole Load | 0 | 0 |
| ZZ90 | Typical Hole Load | 0 | 0 |
| ZZ91 | Typical Hole Load | 0 | 0 |
| ZZ92 | Typical Hole Load | 0 | 0 |

| Hole | Load | Surface Delay | Deck 1 Delay | Deck 2 Delay |
|---|---|---|---|---|
| ZZ93 | Typical Face Hole | 0 | | |
| ZZ94 | Typical Face Hole | 0 | | |
| ZZ95 | Typical Hole Load | 0 | 0 | |
| ZZ96 | Typical Hole Load | 0 | 0 | |
| ZZ97 | Typical Hole Load | 0 | 0 | |
| ZZ98 | Typical Hole Load | 0 | 0 | |
| ZZ99 | Typical Face Hole | 0 | | |
| ZZ100 | Typical Face Hole | 0 | | |
| ZZ101 | Typical Hole Load | 0 | 0 | |
| ZZ102 | Typical Hole Load | 0 | 0 | |
| ZZ103 | Typical Hole Load | 0 | 0 | |
| ZZ104 | Typical Hole Load | 0 | 0 | |
| ZZ105 | Typical Face Hole | 0 | | |
| ZZ106 | Typical Face Hole | 0 | | |
| ZZ107 | Typical Hole Load | 0 | 0 | |
| ZZ108 | Typical Hole Load | 0 | 0 | |
| ZZ109 | Typical Hole Load | 0 | 0 | |
| ZZ110 | Typical Hole Load | 0 | 0 | |
| ZZ111 | Decked Hole | 0 | 0 | 0 |
| ZZ112 | Typical Face Hole | 0 | | |
| ZZ113 | Typical Hole Load | 0 | 0 | |
| ZZ114 | Typical Hole Load | 0 | 0 | |
| ZZ115 | Typical Hole Load | 0 | 0 | |
| ZZ116 | Typical Hole Load | 0 | 0 | |
| ZZ117 | Typical Face Hole | 0 | | |
| ZZ118 | Typical Face Hole | 0 | | |
| ZZ119 | Typical Hole Load | 0 | 0 | |
| ZZ120 | Typical Hole Load | 0 | 0 | |
| ZZ121 | Typical Hole Load | 0 | 0 | |
| ZZ122 | Typical Hole Load | 0 | 0 | |
| ZZ123 | Typical Face Hole | 0 | | |
| ZZ124 | Typical Face Hole | 0 | | |
| ZZ125 | Typical Hole Load | 0 | 0 | |
| ZZ126 | Typical Hole Load | 0 | 0 | |
| ZZ127 | Typical Hole Load | 0 | 0 | |
| ZZ128 | Typical Hole Load | 0 | 0 | |
| ZZ129 | Typical Face Hole | 0 | | |
| ZZ130 | Typical Face Hole | 0 | | |
| ZZ131 | Typical Hole Load | 0 | 0 | |
| ZZ132 | Typical Hole Load | 0 | 0 | |
| ZZ133 | Typical Hole Load | 0 | 0 | |
| ZZ134 | Typical Hole Load | 0 | 0 | |
| ZZ135 | Typical Face Hole | 0 | | |
| ZZ136 | Typical Face Hole | 0 | | |
| ZZ137 | Typical Hole Load | 0 | 0 | |
| ZZ138 | Typical Hole Load | 0 | 0 | |

| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ139 | Typical Hole Load | 0 | 0 |
| ZZ140 | Typical Hole Load | 0 | 0 |
| ZZ141 | Typical Face Hole | 0 | |
| ZZ142 | Typical Face Hole | 0 | |
| ZZ143 | Typical Hole Load | 0 | 0 |
| ZZ144 | Typical Hole Load | 0 | 0 |
| ZZ145 | Typical Hole Load | 0 | 0 |
| ZZ146 | Typical Hole Load | 0 | 0 |
| ZZ147 | Typical Face Hole | 0 | |
| ZZ148 | Typical Face Hole | 0 | |
| ZZ149 | Typical Hole Load | 0 | 0 |
| ZZ150 | Typical Hole Load | 0 | 0 |
| ZZ151 | Typical Hole Load | 0 | 0 |
| ZZ152 | Typical Hole Load | 0 | 0 |
| ZZ153 | Typical Face Hole | 0 | |
| ZZ154 | Typical Face Hole | 0 | |
| ZZ155 | Typical Hole Load | 0 | 0 |
| ZZ156 | Typical Hole Load | 0 | 0 |
| ZZ157 | Typical Hole Load | 0 | 0 |
| ZZ158 | Typical Hole Load | 0 | 0 |
| ZZ159 | Typical Face Hole | 0 | |
| ZZ160 | Typical Face Hole | 0 | |
| ZZ161 | Typical Hole Load | 0 | 0 |
| ZZ162 | Typical Hole Load | 0 | 0 |
| ZZ163 | Typical Hole Load | 0 | 0 |
| ZZ164 | Typical Hole Load | 0 | 0 |
| ZZ165 | Typical Face Hole | 0 | |
| ZZ166 | Typical Face Hole | 0 | |
| ZZ167 | Typical Hole Load | 0 | 0 |
| ZZ168 | Typical Hole Load | 0 | 0 |
| ZZ169 | Typical Hole Load | 0 | 0 |
| ZZ170 | Typical Hole Load | 0 | 0 |
| ZZ171 | Typical Face Hole | 0 | |
| ZZ172 | Typical Face Hole | 0 | |
| ZZ173 | Typical Hole Load | 0 | 0 |
| ZZ174 | Typical Hole Load | 0 | 0 |
| ZZ175 | Typical Hole Load | 0 | 0 |
| ZZ176 | Typical Hole Load | 0 | 0 |
| ZZ177 | Typical Face Hole | 0 | |
| ZZ178 | Typical Face Hole | 0 | |
| ZZ179 | Typical Hole Load | 0 | 0 |
| ZZ180 | Typical Hole Load | 0 | 0 |
| ZZ181 | Typical Hole Load | 0 | 0 |
| ZZ182 | Typical Hole Load | 0 | 0 |
| ZZ183 | Typical Face Hole | 0 | |
| ZZ184 | Typical Face Hole | 0 | |

| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ185 | Typical Face Hole | 0 | |
| ZZ186 | Typical Hole Load | 0 | 0 |
| ZZ187 | Typical Hole Load | 0 | 0 |
| ZZ188 | Typical Face Hole | 0 | |
| ZZ189 | Typical Face Hole | 0 | |
| ZZ190 | Typical Hole Load | 0 | 0 |
| ZZ191 | Typical Hole Load | 0 | 0 |
| ZZ192 | Typical Hole Load | 0 | 0 |
| ZZ193 | Typical Hole Load | 0 | 0 |
| ZZ194 | Typical Hole Load | 0 | 0 |
| ZZ195 | Typical Hole Load | 0 | 0 |
| ZZ196 | Typical Hole Load | 0 | 0 |
| ZZ197 | Typical Hole Load | 0 | 0 |
| ZZ198 | Typical Face Hole | 0 | |
| ZZ199 | Typical Face Hole | 0 | |
| ZZ200 | Typical Hole Load | 0 | 0 |
| ZZ201 | Typical Hole Load | 0 | 0 |


Typical Hole Load
Ø = 114.3 mm
0 m
5 m
10 m
[1.7 m] - Crushed Stone
[1.1 m] - Air
[6.9 m] - Hydromite 4100 Bulk NB Wgt: 94.94 kg
[3.8 m] - Eagle 450 E*Star Booster (1lb) Det: 24' E*STAR Detonator - QM Wgt: 1 kg
[8.9 m] - Eagle 450 E*Star Booster (1lb) Det: 40' E*STAR Detonator - QM Wgt: 1 kg
96.94 kg
Typical Face Hole
Ø = 114.3 mm
[2.1 m] - Crushed Stone
[0.9 m] - Air
[6.6 m] - Hydromite 4100 Bulk NB Wgt: 90.72 kg
[3.8 m] - Eagle 450 E*Star Booster (1lb) Det: 24' E*STAR Detonator - QM Wgt: 1 kg
[8.9 m] - Eagle 450 E*Star Booster (1lb) Det: 40' E*STAR Detonator - QM Wgt: 1 kg
2 kg
Decked Hole
Ø = 114.3 mm
[3.5 m] - Drill Cuttings
[0.5 m] - Hydromite 880 76x400 (3x16) Wgt: 5 kg
[3.6 m] - Eagle 450 E*Star Booster (1lb) Det: 24' E*STAR Detonator - QM Wgt: 1 kg
[3.8 m] - Eagle 450 E*Star Booster (1lb) Det: 24' E*STAR Detonator - QM Wgt: 1 kg
[2.7 m] - Crushed Stone
[2.9 m] - Hydromite 4100 Bulk NB Wgt: 40.09 kg
[7.2 m] - Eagle 450 E*Star Booster (1lb) Det: 24' E*STAR Detonator - QM Wgt: 1 kg
[9.2 m] - Eagle 450 E*Star Booster (1lb) Det: 40' E*STAR Detonator - QM Wgt: 1 kg
9 kg

# AUSTIN POWDER LTD.
# BLAST REPORT

327-Orillia
RR #4 ON, Orillia, Canada L3V 1- 84

Blast No.: 2018-09
Blast Type: Stone Quarry/Stone Mine - Production
Customer: HAROLD SUTHERLAND CONST.-KEPPEL (HAR1525-001)
Date/Time: 10/29/2018 14:08
Pit/Permit: KEPPEL QUARRY / SHOT SERVICE
Location: 30' Holes

## *ENVIRONMENT*

Method Used: U.T.M.
Weather: Light Snow
Wind From: NW
Temperature: 3 °C
Terrain: Flat
Wind Velocity: 6-10 km/h
Blast U.T.M.: 17N 500155 mE 4942378 mN

## *NEAREST PROTECTED STRUCTURE*

Compass Point: N
Structure Name: 178841 Grey Rd #17
Direction/Bearing: 355 °
Structure Type: Dwelling
Distance: 635 m
Structure U.T.M.: 17N 500101 mE 4943011 mN

## *LAYOUT*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | Hole Depth: | 9.14 m | Material Blasted: | Limestone | Total Meters Drilled: | 1,133.9 m |
| No. of Holes: | 124 | Subdrilling: | 0.91 m | Burden: | 3.05 m | Water Depth: | 3.05 m |
| No. of V.P.† Holes: | 124 | Face Height: | 8.23 m | Spacing: | 3.05 m | Stem Length: | min 1.68 m |
| No. of Rows: | 4 | Drilling Angle: | ° | Back Fill Depth: | 0.00 m | Area Type: | Center Start/ Breakout |
| Diameter: | 114.3 mm | Mats Used: | No | Stem Type: | Clear Stone | Method: | Specified (H = 8.23 m) |

† V.P. = Volume Producing

## *WEIGHTS*

| | | | | | |
|---|---|---|---|---|---|
| | | Max. Wt. of Expl. in Overlapped Decks: | 555.3 kg | Volume Produced: | 9,174.7 m³ |
| Initiation: | Electronic | Max. Wt. of Expl. Per 8 ms Interval: | 555.3 kg | Weight Produced: | 24,308.9 t |
| Firing Device: | E*Star Blasting Machine (WRFD) | Max. No. of Holes Per 8 ms Interval: | 6 | Powder Factor 1: | 98.020 t/kg |
| Other Method: | | Max. Wt. of Explosive Per Hole: | 92.5 kg | Powder Factor 2: | 0.027 kg/m³ |
| Mfg and Model: | DBM1600-2-RC | Scaled Distance Factor (max charge): | 66.03 | Rock Density: | 2.650 t/m³ |
| Initiation Settings: | | Scaled Distance Factor (per delay): | 26.95 | | |
| Series Resistance (ohms): | | | | | |

## *SEISMOGRAPHS*

See seismographs on separate page

## *CREW*

Blast occurred other than scheduled time: No
Misfire Occurred: No
Protective Cover: Loader Bucket

| Last Name | First Name | License / Cert | 2nd License / Cert | In Charge | Tied In | Chk. Tie-In | Driller | Layout |
|---|---|---|---|---|---|---|---|---|
| SMART | EVAN, C | * ON - N/A | | Yes | Yes | Yes | No | Yes |
| BELTRAME | ALEXANDER, A | | | No | Yes | No | No | No |
| FRALICK | CRAIG, A | | | No | Yes | No | No | No |
| KOUYOUMJIAN | MACKENZIE, H | | | No | Yes | No | No | No |

# AUSTIN POWDER LTD.
# BLAST REPORT

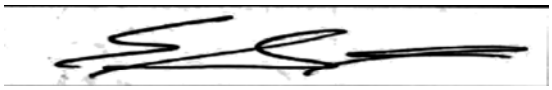
327-Orillia
RR #4 ON, Orillia, Canada L3V 1- 84

Blast No.: 2018-09
Blast Type: Stone Quarry/Stone Mine - Production
Customer: HAROLD SUTHERLAND CONST.-KEPPEL (HAR1525-001)
Date/Time: 10/29/2018 14:08
Pit/Permit: KEPPEL QUARRY / SHOT SERVICE
Location: 30' Holes

***PRODUCTS AND SERVICES***

| Number | Product Description | Quantity | Weight ( kg ) |
|---|---|---|---|
| 15107 | Eagle 450 E*Star Booster (1lb) | 248.00 ea | 248.00 |
| 15001 | 24' E*STAR Detonator - QM | 122.00 ea | 0.00 |
| 15003 | 40' E*STAR Detonator - QM | 126.00 ea | 0.00 |
| 15128 | Hydromite 4100 Bulk NB | 11,100.00 kg | 11,100.00 |
| 12981 | Mini Stem Plug - 6015 | 124.00 ea | 0.00 |
| | | Total Weight of Explosives (Include Primers) ( kg ): | 11,348.00 |

***COMMENTS / EXPLANATIONS***



Signature of Blaster in Charge

# AUSTIN POWDER LTD.
# BLAST REPORT

327-Orillia
RR #4 ON, Orillia, Canada L3V 1- 84

Blast No.: 2018-09 | Blast Type: Stone Quarry/Stone Mine - Production | Customer: HAROLD SUTHERLAND CONST.-KEPPEL (HAR1525-001)

Date/Time: 10/29/2018 14:08 | Pit/Permit: KEPPEL QUARRY / SHOT SERVICE | Location: 30' Holes

## *SEISMOGRAPH 1 - 178841 GREY ROAD #17*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Data Type: | Seismic Record | Seismograph Type: | Instantel - Minimate Blaster | | | | |
| Date: | 10/29/18 | Trigger Level: | 1.50 mm/s | 115.00 dB | Transverse: | 0.127 mm/s | 0.0 Hz |
| Time: | 14:08 | Calibration Date: | 01/17/18 | | Vertical: | 0.127 mm/s | 0.0 Hz |
| Distance From Blast: | 635.20 m | Calibration Signal: | OK | | Longitudinal: | 0.127 mm/s | 0.0 Hz |
| Direction From Blast: | N | Geophone Min. Freq.: | --- Hz | | | | |
| Readout: | Printed Copy | Mic. Min. Freq.: | --- Hz | | Acoustic: | 119 dB | --- Hz |
| Location: | Bolted to Bedrock. | | | | Vector Sum: | 0.22 mm/s | |
| U.T.M.: | 17N 500101 mE 4943011 mN | | | | | | |
| Reader and Firm: | Evan Smart, AUSTIN POWDER | | | | | | |
| Analyst and Firm: | | | | | | | |
| Installer and Firm: | Evan Smart, Austin Powder Ltd. | | | | | | |

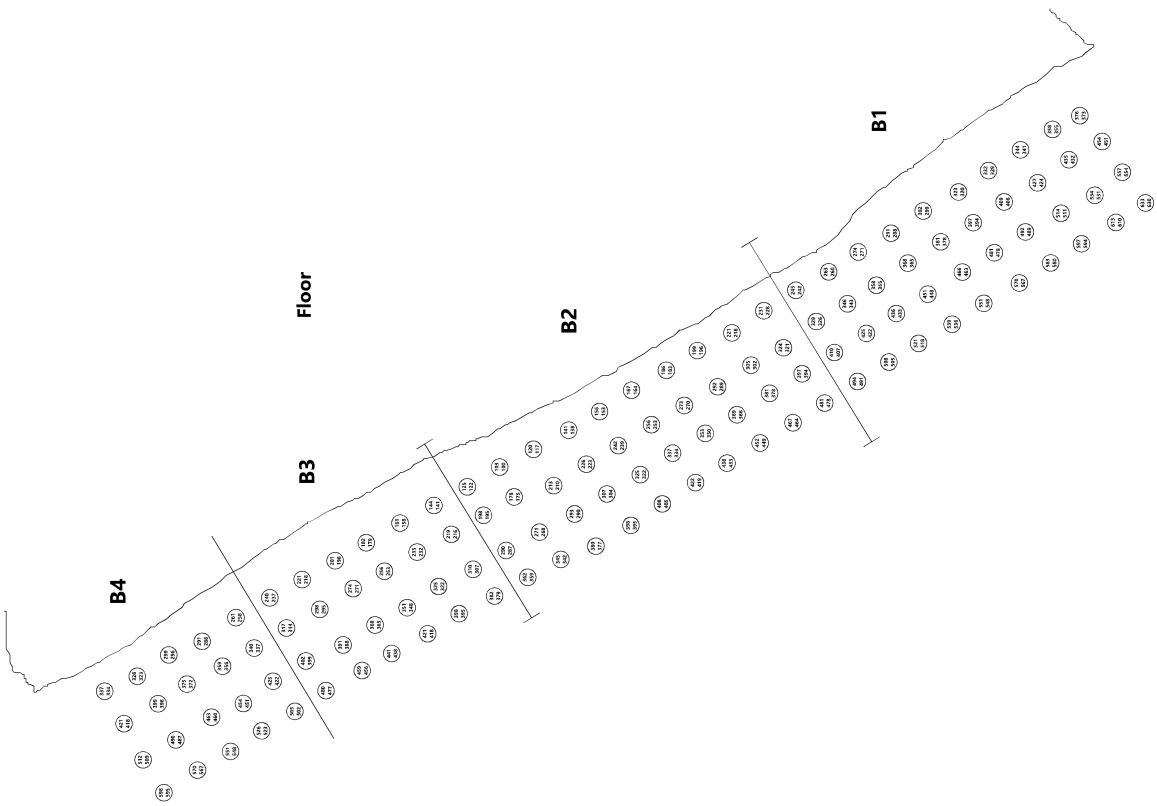
## *SEISMOGRAPH 2 - 178717 GREY RD #17*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Data Type: | Seismic Record | Seismograph Type: | Instantel - Minimate Blaster | | | | |
| Date: | 10/29/18 | Trigger Level: | 1.50 mm/s | 115.00 dB | Transverse: | 1.651 mm/s | 43.0 Hz |
| Time: | 14:08 | Calibration Date: | 01/15/18 | | Vertical: | 1.016 mm/s | 26.0 Hz |
| Distance From Blast: | 636.12 m | Calibration Signal: | OK | | Longitudinal: | 1.778 mm/s | 39.0 Hz |
| Direction From Blast: | ESE | Geophone Min. Freq.: | --- Hz | | | | |
| Readout: | Printed Copy | Mic. Min. Freq.: | --- Hz | | Acoustic: | 124 dB | --- Hz |
| Location: | Spiked and buried. | | | | Vector Sum: | 2.214 mm/s | |
| U.T.M.: | 17N 500660 mE 4941991 mN | | | | | | |
| Reader and Firm: | Evan Smart, AUSTIN POWDER | | | | | | |
| Analyst and Firm: | | | | | | | |
| Installer and Firm: | Evan Smart, Austin Powder Ltd. | | | | | | |

## *SEISMOGRAPH 3 - 283197 CONC. RD. #10*

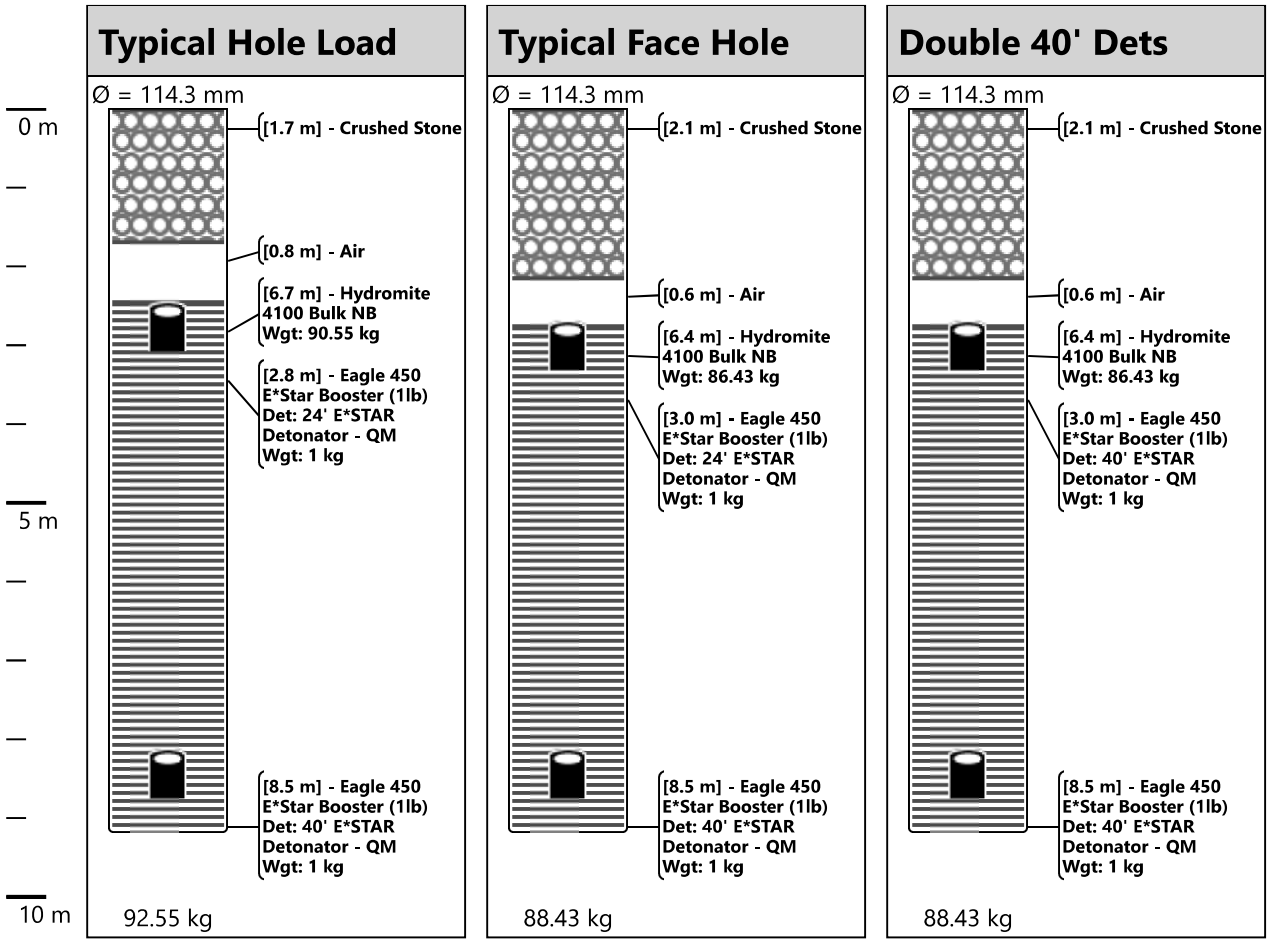
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Data Type: | Seismic Record | Seismograph Type: | Instantel - Minimate Blaster | | | | |
| Date: | 10/29/18 | Trigger Level: | 1.50 mm/s | 115.00 dB | Transverse: | 0.254 mm/s | 0.0 Hz |
| Time: | 14:08 | Calibration Date: | 01/15/18 | | Vertical: | 0.127 mm/s | 0.0 Hz |
| Distance From Blast: | 1,071.98 m | Calibration Signal: | OK | | Longitudinal: | 0.127 mm/s | 0.0 Hz |
| Direction From Blast: | ESE | Geophone Min. Freq.: | --- Hz | | | | |
| Readout: | Printed Copy | Mic. Min. Freq.: | --- Hz | | Acoustic: | 116 dB | --- Hz |
| Location: | Spiked and weight bagged beside the mail box. | | | | Vector Sum: | 0.254 mm/s | |
| U.T.M.: | 17N 501117 mE 4941905 mN | | | | | | |
| Reader and Firm: | Evan Smart, AUSTIN POWDER | | | | | | |
| Analyst and Firm: | | | | | | | |
| Installer and Firm: | Evan Smart, Austin Powder Ltd. | | | | | | |

Hole Label Mode: Cumulative In-Hole Delays



| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ1 | Typical Hole Load | 0 | 630/633 |
| ZZ2 | Typical Hole Load | 0 | 554/557 |
| ZZ3 | Typical Hole Load | 0 | 451/454 |
| ZZ4 | Typical Face Hole | 0 | 373/376 |
| ZZ5 | Typical Face Hole | 0 | 355/358 |
| ZZ6 | Typical Hole Load | 0 | 432/435 |
| ZZ7 | Typical Hole Load | 0 | 531/534 |
| ZZ8 | Typical Hole Load | 0 | 610/613 |
| ZZ9 | Typical Hole Load | 0 | 594/597 |
| ZZ10 | Typical Hole Load | 0 | 511/514 |
| ZZ11 | Typical Hole Load | 0 | 424/427 |
| ZZ12 | Typical Face Hole | 0 | 341/344 |
| ZZ13 | Typical Face Hole | 0 | 329/332 |
| ZZ14 | Typical Hole Load | 0 | 406/409 |
| ZZ15 | Typical Hole Load | 0 | 489/492 |
| ZZ16 | Typical Hole Load | 0 | 580/583 |
| ZZ17 | Typical Hole Load | 0 | 567/570 |
| ZZ18 | Typical Hole Load | 0 | 478/481 |
| ZZ19 | Typical Hole Load | 0 | 394/397 |
| ZZ20 | Typical Face Hole | 0 | 320/323 |
| ZZ21 | Typical Face Hole | 0 | 299/302 |
| ZZ22 | Typical Hole Load | 0 | 378/381 |
| ZZ23 | Typical Hole Load | 0 | 463/466 |
| ZZ24 | Typical Hole Load | 0 | 548/551 |
| ZZ25 | Typical Hole Load | 0 | 536/539 |
| ZZ26 | Typical Hole Load | 0 | 448/451 |
| ZZ27 | Typical Hole Load | 0 | 365/368 |
| ZZ28 | Typical Face Hole | 0 | 288/291 |
| ZZ29 | Typical Face Hole | 0 | 271/274 |
| ZZ30 | Typical Hole Load | 0 | 355/358 |
| ZZ31 | Typical Hole Load | 0 | 433/436 |
| ZZ32 | Typical Hole Load | 0 | 518/521 |
| ZZ33 | Typical Hole Load | 0 | 505/508 |
| ZZ34 | Typical Hole Load | 0 | 422/425 |
| ZZ35 | Typical Hole Load | 0 | 343/346 |
| ZZ36 | Typical Face Hole | 0 | 260/263 |
| ZZ37 | Typical Face Hole | 0 | 242/245 |
| ZZ38 | Typical Hole Load | 0 | 326/329 |
| ZZ39 | Typical Hole Load | 0 | 407/410 |
| ZZ40 | Typical Hole Load | 0 | 491/494 |
| ZZ41 | Typical Hole Load | 0 | 478/481 |
| ZZ42 | Typical Hole Load | 0 | 394/397 |
| ZZ43 | Typical Hole Load | 0 | 321/324 |
| ZZ44 | Typical Face Hole | 0 | 228/231 |
| ZZ45 | Typical Face Hole | 0 | 218/221 |
| ZZ46 | Typical Hole Load | 0 | 302/305 |
| ZZ47 | Typical Hole Load | 0 | 378/381 |
| ZZ48 | Typical Hole Load | 0 | 464/467 |
| ZZ49 | Typical Hole Load | 0 | 449/452 |
| ZZ50 | Typical Hole Load | 0 | 366/369 |
| ZZ51 | Typical Hole Load | 0 | 289/292 |
| ZZ52 | Typical Face Hole | 0 | 196/199 |
| ZZ53 | Typical Face Hole | 0 | 183/186 |
| ZZ54 | Typical Hole Load | 0 | 270/273 |
| ZZ55 | Typical Hole Load | 0 | 350/353 |
| ZZ56 | Typical Hole Load | 0 | 433/436 |
| ZZ57 | Typical Hole Load | 0 | 419/422 |
| ZZ58 | Typical Hole Load | 0 | 334/337 |
| ZZ59 | Typical Hole Load | 0 | 253/256 |
| ZZ60 | Typical Face Hole | 0 | 164/167 |
| ZZ61 | Typical Face Hole | 0 | 153/156 |
| ZZ62 | Typical Hole Load | 0 | 239/242 |
| ZZ63 | Typical Hole Load | 0 | 322/325 |
| ZZ64 | Typical Hole Load | 0 | 405/408 |
| ZZ65 | Typical Hole Load | 0 | 395/398 |
| ZZ66 | Typical Hole Load | 0 | 304/307 |
| ZZ67 | Typical Hole Load | 0 | 223/226 |
| ZZ68 | Typical Face Hole | 0 | 138/141 |
| ZZ69 | Typical Face Hole | 0 | 117/120 |
| ZZ70 | Typical Hole Load | 0 | 210/213 |
| ZZ71 | Typical Hole Load | 0 | 290/293 |
| ZZ72 | Typical Hole Load | 0 | 377/380 |
| ZZ73 | Typical Hole Load | 0 | 342/345 |
| ZZ74 | Typical Hole Load | 0 | 268/271 |
| ZZ75 | Typical Hole Load | 0 | 175/178 |
| ZZ76 | Typical Face Hole | 0 | 100/103 |
| ZZ77 | Typical Face Hole | 0 | 122/125 |
| ZZ78 | Typical Hole Load | 0 | 195/198 |
| ZZ79 | Typical Hole Load | 0 | 287/290 |
| ZZ80 | Typical Hole Load | 0 | 359/362 |
| ZZ81 | Typical Hole Load | 0 | 379/382 |
| ZZ82 | Typical Hole Load | 0 | 307/310 |
| ZZ83 | Typical Hole Load | 0 | 216/219 |
| ZZ84 | Typical Face Hole | 0 | 141/144 |
| ZZ85 | Typical Face Hole | 0 | 158/161 |
| ZZ86 | Typical Hole Load | 0 | 232/235 |
| ZZ87 | Typical Hole Load | 0 | 322/325 |
| ZZ88 | Typical Hole Load | 0 | 395/398 |
| ZZ89 | Typical Hole Load | 0 | 418/421 |
| ZZ90 | Typical Hole Load | 0 | 348/351 |
| ZZ91 | Typical Hole Load | 0 | 253/256 |
| ZZ92 | Typical Face Hole | 0 | 179/182 |

| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ93 | Typical Face Hole | 0 | 198/201 |
| ZZ94 | Typical Hole Load | 0 | 271/274 |
| ZZ95 | Typical Hole Load | 0 | 365/368 |
| ZZ96 | Typical Hole Load | 0 | 438/441 |
| ZZ97 | Typical Hole Load | 0 | 456/459 |
| ZZ98 | Typical Hole Load | 0 | 388/391 |
| ZZ99 | Typical Hole Load | 0 | 295/298 |
| ZZ100 | Typical Face Hole | 0 | 218/221 |
| ZZ101 | Typical Face Hole | 0 | 237/240 |
| ZZ102 | Typical Hole Load | 0 | 314/317 |
| ZZ103 | Typical Hole Load | 0 | 399/402 |
| ZZ104 | Typical Hole Load | 0 | 477/480 |
| ZZ105 | Typical Hole Load | 0 | 502/505 |
| ZZ106 | Typical Hole Load | 0 | 523/526 |
| ZZ107 | Typical Hole Load | 0 | 422/425 |
| ZZ108 | Typical Hole Load | 0 | 451/454 |
| ZZ109 | Typical Hole Load | 0 | 337/340 |
| ZZ110 | Typical Hole Load | 0 | 356/359 |
| ZZ111 | Typical Face Hole | 0 | 258/261 |
| ZZ112 | Typical Face Hole | 0 | 288/291 |
| ZZ113 | Typical Face Hole | 0 | 296/299 |
| ZZ114 | Typical Hole Load | 0 | 372/375 |
| ZZ115 | Typical Hole Load | 0 | 460/463 |
| ZZ116 | Typical Hole Load | 0 | 548/551 |
| ZZ117 | Typical Hole Load | 0 | 567/570 |
| ZZ118 | Typical Hole Load | 0 | 487/490 |
| ZZ119 | Typical Hole Load | 0 | 396/399 |
| ZZ120 | Double 40' Dets | 0 | 323/326 |
| ZZ121 | Double 40' Dets | 0 | 334/337 |
| ZZ122 | Typical Hole Load | 0 | 418/421 |
| ZZ123 | Typical Hole Load | 0 | 509/512 |
| ZZ124 | Typical Hole Load | 0 | 595/598 |


Typical Hole Load
Ø = 114.3 mm
0 m
5 m
10 m
[1.7 m] - Crushed Stone
[0.8 m] - Air
[6.7 m] - Hydromite 4100 Bulk NB Wgt: 90.55 kg
[2.8 m] - Eagle 450 E*Star Booster (1lb) Det: 24' E*STAR Detonator - QM Wgt: 1 kg
[8.5 m] - Eagle 450 E*Star Booster (1lb) Det: 40' E*STAR Detonator - QM Wgt: 1 kg
92.55 kg
Typical Face Hole
Ø = 114.3 mm
[2.1 m] - Crushed Stone
[0.6 m] - Air
[6.4 m] - Hydromite 4100 Bulk NB Wgt: 86.43 kg
[3.0 m] - Eagle 450 E*Star Booster (1lb) Det: 24' E*STAR Detonator - QM Wgt: 1 kg
[8.5 m] - Eagle 450 E*Star Booster (1lb) Det: 40' E*STAR Detonator - QM Wgt: 1 kg
88.43 kg
Double 40' Dets
Ø = 114.3 mm
[2.1 m] - Crushed Stone
[0.6 m] - Air
[6.4 m] - Hydromite 4100 Bulk NB Wgt: 86.43 kg
[3.0 m] - Eagle 450 E*Star Booster (1lb) Det: 40' E*STAR Detonator - QM Wgt: 1 kg
[8.5 m] - Eagle 450 E*Star Booster (1lb) Det: 40' E*STAR Detonator - QM Wgt: 1 kg
88.43 kg

# AUSTIN POWDER LTD.
# BLAST REPORT

327-Orillia
RR #4 ON, Orillia, Canada L3V 1- 84

Blast No.: 2018-10 | Blast Type: Stone Quarry/Stone Mine - Production | Customer: HAROLD SUTHERLAND CONST.-KEPPEL (HAR1525-001)

Date/Time: 11/05/2018 16:58 | Pit/Permit: KEPPEL QUARRY / SHOT SERVICE | Location: 20' Bench

## *ENVIRONMENT*

Method Used: Lat./Long. | Weather: Light Rain | Wind From: WSW

Temperature: 7 °C | Terrain: Hilly | Wind Velocity: 4-8 km/h

Blast Lat./Long.: 44° 38' 5.400" N 80° 59' 45.200" W

## *NEAREST PROTECTED STRUCTURE*

Compass Point: NNW

Structure Name: 178841 Grey Rd. 17 | Direction/Bearing: 340 °

Structure Type: Dwelling | Distance: 661 m

Structure Lat./Long.: 44° 38' 25.580" N 80° 59' 55.233" W

## *LAYOUT*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | Hole Depth: | 5.18 m | Material Blasted: | Limestone | Total Meters Drilled: | 2,051.9 m |
| No. of Holes: | 396 | Subdrilling: | 0.00 m | Burden: | 3.05 m | Water Depth: | 3.05 m |
| No. of V.P.† Holes: | 396 | Face Height: | 5.18 m | Spacing: | 3.05 m | Stem Length: | 2.13 m |
| No. of Rows: | 14 | Drilling Angle: | ° | Back Fill Depth: | 0.00 m | Area Type: | Center Start/ Breakout |
| Diameter: | 114.3 mm | Mats Used: | No | Stem Type: | Clear stone | Method: | Deepest Hole Load |

† V.P. = Volume Producing

## *WEIGHTS*

| | | | | | |
|---|---|---|---|---|---|
| | | Max. Wt. of Expl. in Overlapped Decks: | 124.4 kg | Volume Produced: | 18,389.0 m³ |
| Initiation: | Electronic | Max. Wt. of Expl. Per 8 ms Interval: | 124.4 kg | Weight Produced: | 44,140.9 t |
| Firing Device: | E*Star Blasting Machine (WRFD) | Max. No. of Holes Per 8 ms Interval: | 3 | Powder Factor 1: | 2.688 t/kg |
| Other Method: | | Max. Wt. of Explosive Per Hole: | 41.8 kg | Powder Factor 2: | 0.893 kg/m³ |
| Mfg and Model: | DBM1600-2-RC | Scaled Distance Factor (max charge): | 102.25 | Rock Density: | 2.400 t/m³ |
| Initiation Settings: | | Scaled Distance Factor (per delay): | 59.28 | | |
| Series Resistance (ohms): | | | | | |

## *SEISMOGRAPHS*

See seismographs on separate page

## *CREW*

Blast occurred other than scheduled time: No | Misfire Occurred: No | Protective Cover: loader bucket

| Last Name | First Name | License / Cert | 2nd License / Cert | In Charge | Tied In | Chk. Tie-In | Driller | Layout |
|---|---|---|---|---|---|---|---|---|
| REED | ADAM, G | * ON - N/A | | Yes | Yes | Yes | No | Yes |
| BELTRAME | ALEXANDER, A | | | No | Yes | Yes | No | No |
| GRENIER | JOHNATHON, R | | | No | No | No | No | No |
| KICKSEE | WAYNE, R | | | No | No | No | No | No |
| KOUYOUMJIAN | MACKENZIE, H | | | No | Yes | Yes | No | No |
| NEWTON | JOHN, D | | | No | No | Yes | No | No |

# AUSTIN POWDER LTD.
# BLAST REPORT

327-Orillia
RR #4 ON, Orillia, Canada L3V 1- 84

Blast No.: 2018-10
Blast Type: Stone Quarry/Stone Mine - Production
Customer: HAROLD SUTHERLAND CONST.-KEPPEL (HAR1525-001)
Date/Time: 11/05/2018 16:58
Pit/Permit: KEPPEL QUARRY / SHOT SERVICE
Location: 20' Bench

***PRODUCTS AND SERVICES***

| Number | Product Description | Quantity | Weight ( kg ) |
|---|---|---|---|
| 11743 | Black Cap DC Booster - 340g (.75 lb) | 794.00 ea | 270.04 |
| 10751 | SHOCK*STAR DualDelay 9.2m/30' 25/500 | 794.00 ea | 0.00 |
| 01494 | 30' SHOCK*STAR Quick Relay 42 ms | 39.00 ea | 0.00 |
| 01849 | 30' SHOCK*STAR Quick Relay 67 ms | 20.00 ea | 0.00 |
| 15003 | 40' E*STAR Detonator - QM | 1.00 ea | 0.00 |
| 15128 | Hydromite 4100 Bulk NB | 16,150.00 kg | 16,150.00 |
| 12981 | Mini Stem Plug - 6015 | 397.00 ea | 0.00 |
| | | Total Weight of Explosives (Include Primers) ( kg ): | 16,420.04 |

***COMMENTS / EXPLANATIONS***

General Comments: .

Adam Reed

Signature of Blaster in Charge

# AUSTIN POWDER LTD.
# BLAST REPORT

327-Orillia
RR #4 ON, Orillia, Canada L3V 1- 84

Blast No.: 2018-10 | Blast Type: Stone Quarry/Stone Mine - Production | Customer: HAROLD SUTHERLAND CONST.-KEPPEL (HAR1525-001)

Date/Time: 11/05/2018 16:58 | Pit/Permit: KEPPEL QUARRY / SHOT SERVICE | Location: 20' Bench

***SEISMOGRAPH 1 - 178717 GREY RD 17***

| | | | |
|---|---|---|---|
| Data Type: | No Trigger | Seismograph Type: | instantel |
| Date: | 11/05/18 | Trigger Level: | 2.00 mm/s 120.00 dB |
| Time: | 16:58 | Calibration Date: | 01/15/18 |
| Distance From Blast: | 517.55 m | Calibration Signal: | ok |
| Direction From Blast: | SE | Geophone Min. Freq.: | --- Hz |
| Readout: | | Mic. Min. Freq.: | --- Hz |
| Location: | | | |
| Lat./Long.: | 44° 37' 52.587" N | | 80° 59' 30.045" W |
| Reader and Firm: | Adam Reed, AUSTIN POWDER | | |
| Analyst and Firm: | | | |
| Installer and Firm: | Adam Reed Austin Powder | | |

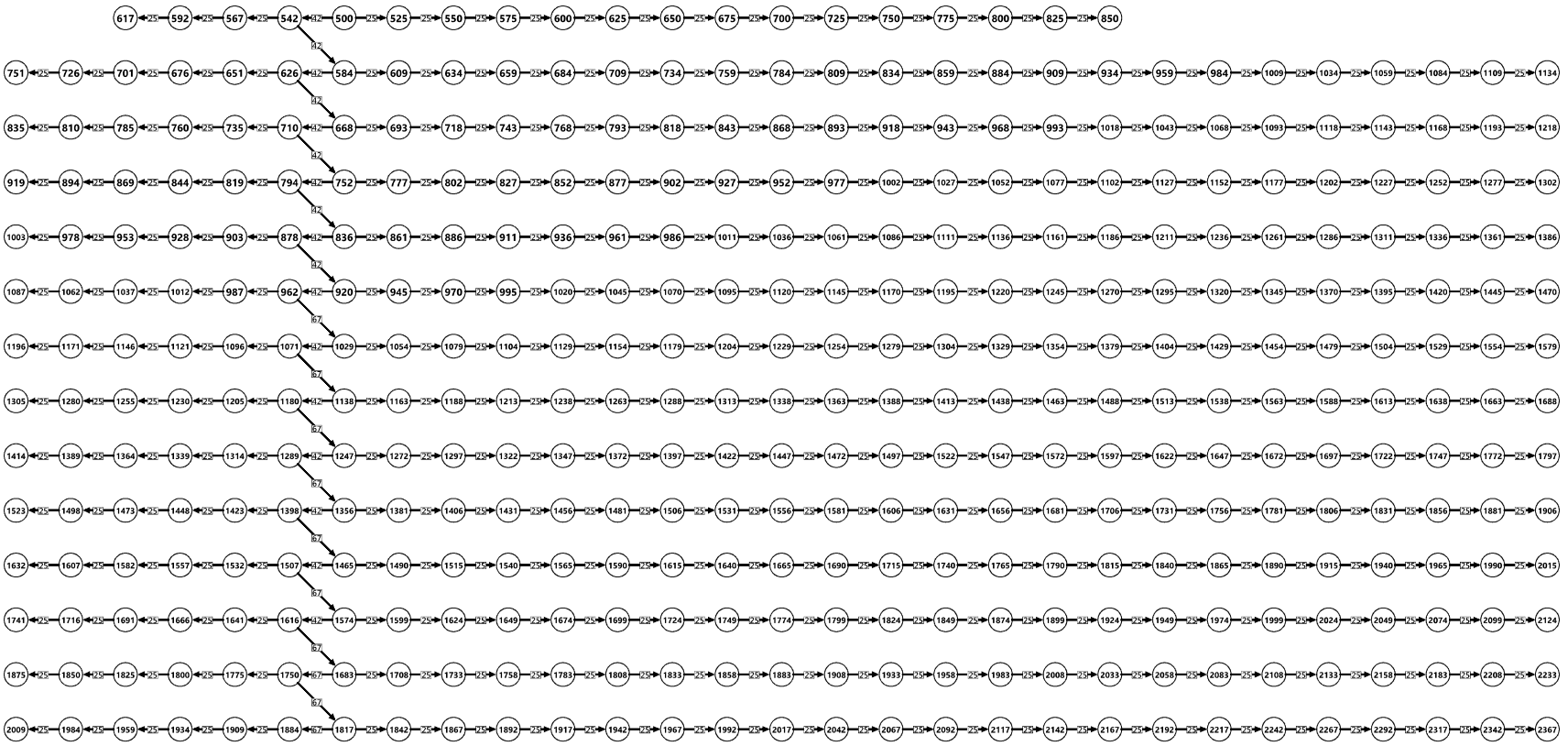
***SEISMOGRAPH 2 - 178841 GREY ROAD #17***

| | | | | | | |
|---|---|---|---|---|---|---|
| Data Type: | Seismic Record | Seismograph Type: | Instantel Mini-Mate II | | | |
| Date: | 11/05/18 | Trigger Level: | 2.00 mm/s 120.00 dB | Transverse: | 0.254 mm/s | --- Hz |
| Time: | 16:58 | Calibration Date: | 01/15/18 | Vertical: | 0.254 mm/s | --- Hz |
| Distance From Blast: | 664.16 m | Calibration Signal: | | Longitudinal: | 0.508 mm/s | --- Hz |
| Direction From Blast: | NNW | Geophone Min. Freq.: | --- Hz | | | |
| Readout: | | Mic. Min. Freq.: | --- Hz | Acoustic: | 119 dB | --- Hz |
| Location: | Bolted to bedrock at the front of the property. | | | Vector Sum: | --- mm/s | |
| Lat./Long.: | 44° 38' 25.645" N | | 80° 59' 55.415" W | | | |
| Reader and Firm: | Adam Reed, AUSTIN POWDER | | | | | |
| Analyst and Firm: | | | | | | |
| Installer and Firm: | Adam Reed Austin Powder | | | | | |

***SEISMOGRAPH 3 - 283197 10TH CONC.***

| | | | | | | |
|---|---|---|---|---|---|---|
| Data Type: | Seismic Record | Seismograph Type: | Instantel Mini-Mate II | | | |
| Date: | 11/05/18 | Trigger Level: | 1.00 mm/s --- dB | Transverse: | 1.397 mm/s | 47.0 Hz |
| Time: | 16:58 | Calibration Date: | 01/15/18 | Vertical: | 2.413 mm/s | 51.0 Hz |
| Distance From Blast: | 926.29 m | Calibration Signal: | | Longitudinal: | 1.397 mm/s | 39.0 Hz |
| Direction From Blast: | ESE | Geophone Min. Freq.: | --- Hz | | | |
| Readout: | | Mic. Min. Freq.: | --- Hz | Acoustic: | 110 dB | --- Hz |
| Location: | Behind the mail box. | | | Vector Sum: | --- mm/s | |
| Lat./Long.: | 44° 37' 49.797" N | | 80° 59' 9.304" W | | | |
| Reader and Firm: | Adam Reed, AUSTIN POWDER | | | | | |
| Analyst and Firm: | | | | | | |
| Installer and Firm: | Adam Reed Austin Powder | | | | | |

# Hole Label Mode: Cumulative In-Hole Delays



| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| A3 | Typical hole | 117 | 617 |
| A4 | Typical hole | 92 | 592 |
| A5 | Typical hole | 67 | 567 |
| A6 | Typical hole | 42 | 542 |
| A7 | Typical hole | 0 | 500 |
| A8 | Typical hole | 25 | 525 |
| A9 | Typical hole | 50 | 550 |
| A10 | Typical hole | 75 | 575 |
| A11 | Typical hole | 100 | 600 |
| A12 | Typical hole | 125 | 625 |
| A13 | Typical hole | 150 | 650 |
| A14 | Typical hole | 175 | 675 |
| A15 | Typical hole | 200 | 700 |
| A16 | Typical hole | 225 | 725 |
| A17 | Typical hole | 250 | 750 |
| A18 | Typical hole | 275 | 775 |
| A19 | Typical hole | 300 | 800 |
| A20 | Typical hole | 325 | 825 |
| A21 | Typical hole | 350 | 850 |
| B1 | Typical hole | 251 | 751 |
| B2 | Typical hole | 226 | 726 |
| B3 | Typical hole | 201 | 701 |
| B4 | Typical hole | 176 | 676 |
| B5 | Extra | 151 | 651 |
| B6 | Typical hole | 126 | 626 |
| B7 | Typical hole | 84 | 584 |
| B8 | Typical hole | 109 | 609 |
| B9 | Typical hole | 134 | 634 |
| B10 | Typical hole | 159 | 659 |
| B11 | Typical hole | 184 | 684 |
| B12 | Typical hole | 209 | 709 |
| B13 | Typical hole | 234 | 734 |
| B14 | Typical hole | 259 | 759 |
| B15 | Typical hole | 284 | 784 |
| B16 | Typical hole | 309 | 809 |
| B17 | Typical hole | 334 | 834 |
| B18 | Typical hole | 359 | 859 |
| B19 | Typical hole | 384 | 884 |
| B20 | Typical hole | 409 | 909 |
| B21 | Typical hole | 434 | 934 |
| B22 | Typical hole | 459 | 959 |
| B23 | Typical hole | 484 | 984 |
| B24 | Typical hole | 509 | 1009 |
| B25 | Typical hole | 534 | 1034 |
| B26 | Typical hole | 559 | 1059 |
| B27 | Typical hole | 584 | 1084 |
| B28 | Typical hole | 609 | 1109 |
| B29 | Typical hole | 634 | 1134 |
| C1 | Typical hole | 335 | 835 |
| C2 | Typical hole | 310 | 810 |
| C3 | Typical hole | 285 | 785 |
| C4 | Typical hole | 260 | 760 |
| C5 | Typical hole | 235 | 735 |
| C6 | Typical hole | 210 | 710 |
| C7 | Typical hole | 168 | 668 |
| C8 | Typical hole | 193 | 693 |
| C9 | Typical hole | 218 | 718 |
| C10 | Typical hole | 243 | 743 |
| C11 | Typical hole | 268 | 768 |
| C12 | Typical hole | 293 | 793 |
| C13 | Typical hole | 318 | 818 |
| C14 | Typical hole | 343 | 843 |
| C15 | Typical hole | 368 | 868 |
| C16 | Typical hole | 393 | 893 |
| C17 | Typical hole | 418 | 918 |
| C18 | Typical hole | 443 | 943 |
| C19 | Typical hole | 468 | 968 |
| C20 | Typical hole | 493 | 993 |
| C21 | Typical hole | 518 | 1018 |
| C22 | Typical hole | 543 | 1043 |
| C23 | Typical hole | 568 | 1068 |
| C24 | Typical hole | 593 | 1093 |
| C25 | Typical hole | 618 | 1118 |
| C26 | Typical hole | 643 | 1143 |
| C27 | Typical hole | 668 | 1168 |
| C28 | Typical hole | 693 | 1193 |
| C29 | Typical hole | 718 | 1218 |
| D1 | Typical hole | 419 | 919 |
| D2 | Typical hole | 394 | 894 |
| D3 | Typical hole | 369 | 869 |
| D4 | Typical hole | 344 | 844 |
| D5 | Typical hole | 319 | 819 |
| D6 | Typical hole | 294 | 794 |
| D7 | Typical hole | 252 | 752 |
| D8 | Typical hole | 277 | 777 |
| D9 | Typical hole | 302 | 802 |
| D10 | Typical hole | 327 | 827 |
| D11 | Typical hole | 352 | 852 |
| D12 | Typical hole | 377 | 877 |
| D13 | Typical hole | 402 | 902 |
| D14 | Typical hole | 427 | 927 |
| D15 | Typical hole | 452 | 952 |

| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| D16 | Typical hole | 477 | 977 |
| D17 | Typical hole | 502 | 1002 |
| D18 | Typical hole | 527 | 1027 |
| D19 | Typical hole | 552 | 1052 |
| D20 | Typical hole | 577 | 1077 |
| D21 | Typical hole | 602 | 1102 |
| D22 | Typical hole | 627 | 1127 |
| D23 | Typical hole | 652 | 1152 |
| D24 | Typical hole | 677 | 1177 |
| D25 | Typical hole | 702 | 1202 |
| D26 | Typical hole | 727 | 1227 |
| D27 | Typical hole | 752 | 1252 |
| D28 | Typical hole | 777 | 1277 |
| D29 | Typical hole | 802 | 1302 |
| E1 | Typical hole | 503 | 1003 |
| E2 | Typical hole | 478 | 978 |
| E3 | Typical hole | 453 | 953 |
| E4 | Typical hole | 428 | 928 |
| E5 | Typical hole | 403 | 903 |
| E6 | Typical hole | 378 | 878 |
| E7 | Typical hole | 336 | 836 |
| E8 | Typical hole | 361 | 861 |
| E9 | Typical hole | 386 | 886 |
| E10 | Typical hole | 411 | 911 |
| E11 | Typical hole | 436 | 936 |
| E12 | Typical hole | 461 | 961 |
| E13 | Typical hole | 486 | 986 |
| E14 | Typical hole | 511 | 1011 |
| E15 | Typical hole | 536 | 1036 |
| E16 | Typical hole | 561 | 1061 |
| E17 | Typical hole | 586 | 1086 |
| E18 | Typical hole | 611 | 1111 |
| E19 | Typical hole | 636 | 1136 |
| E20 | Typical hole | 661 | 1161 |
| E21 | Typical hole | 686 | 1186 |
| E22 | Typical hole | 711 | 1211 |
| E23 | Typical hole | 736 | 1236 |
| E24 | Typical hole | 761 | 1261 |
| E25 | Typical hole | 786 | 1286 |
| E26 | Typical hole | 811 | 1311 |
| E27 | Typical hole | 836 | 1336 |
| E28 | Typical hole | 861 | 1361 |
| E29 | Typical hole | 886 | 1386 |
| F1 | Typical hole | 587 | 1087 |
| F2 | Typical hole | 562 | 1062 |
| F3 | Typical hole | 537 | 1037 |

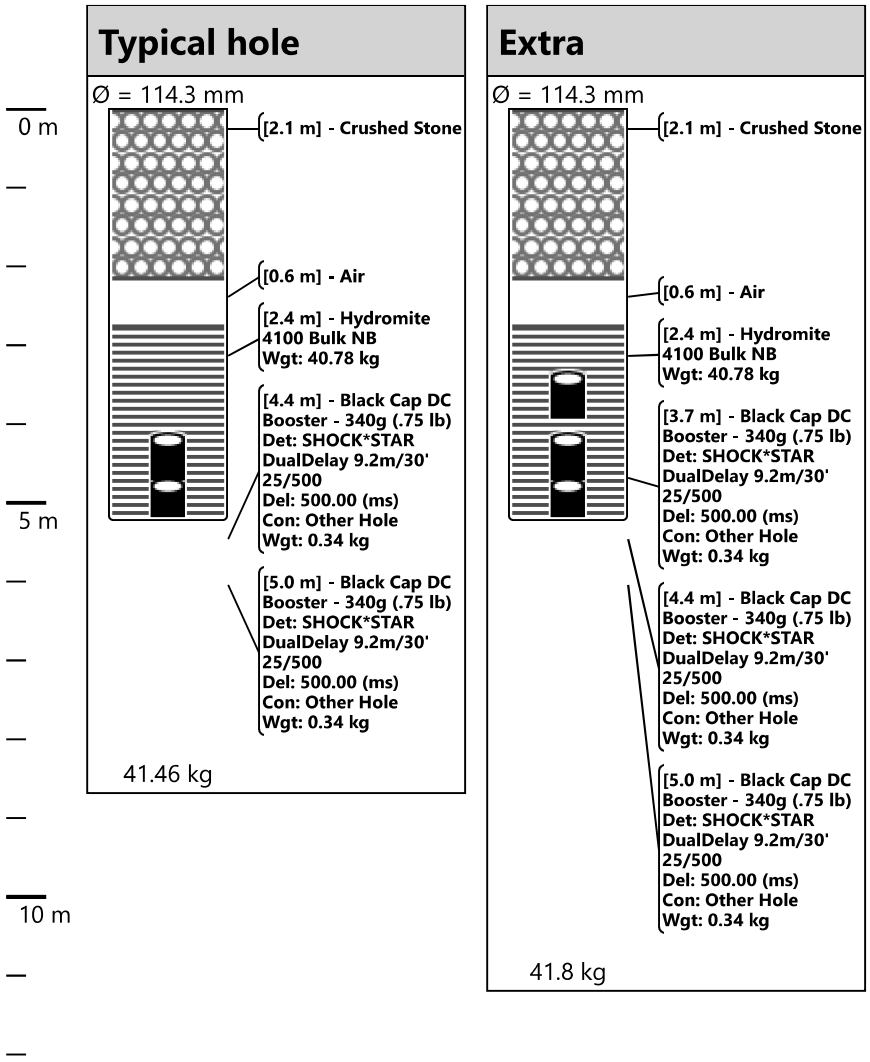
| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| F4 | Typical hole | 512 | 1012 |
| F5 | Typical hole | 487 | 987 |
| F6 | Typical hole | 462 | 962 |
| F7 | Typical hole | 420 | 920 |
| F8 | Typical hole | 445 | 945 |
| F9 | Typical hole | 470 | 970 |
| F10 | Typical hole | 495 | 995 |
| F11 | Typical hole | 520 | 1020 |
| F12 | Typical hole | 545 | 1045 |
| F13 | Typical hole | 570 | 1070 |
| F14 | Typical hole | 595 | 1095 |
| F15 | Typical hole | 620 | 1120 |
| F16 | Typical hole | 645 | 1145 |
| F17 | Typical hole | 670 | 1170 |
| F18 | Typical hole | 695 | 1195 |
| F19 | Typical hole | 720 | 1220 |
| F20 | Typical hole | 745 | 1245 |
| F21 | Typical hole | 770 | 1270 |
| F22 | Typical hole | 795 | 1295 |
| F23 | Typical hole | 820 | 1320 |
| F24 | Typical hole | 845 | 1345 |
| F25 | Typical hole | 870 | 1370 |
| F26 | Typical hole | 895 | 1395 |
| F27 | Typical hole | 920 | 1420 |
| F28 | Typical hole | 945 | 1445 |
| F29 | Typical hole | 970 | 1470 |
| G1 | Typical hole | 696 | 1196 |
| G2 | Typical hole | 671 | 1171 |
| G3 | Typical hole | 646 | 1146 |
| G4 | Typical hole | 621 | 1121 |
| G5 | Typical hole | 596 | 1096 |
| G6 | Typical hole | 571 | 1071 |
| G7 | Typical hole | 529 | 1029 |
| G8 | Typical hole | 554 | 1054 |
| G9 | Typical hole | 579 | 1079 |
| G10 | Typical hole | 604 | 1104 |
| G11 | Typical hole | 629 | 1129 |
| G12 | Typical hole | 654 | 1154 |
| G13 | Typical hole | 679 | 1179 |
| G14 | Typical hole | 704 | 1204 |
| G15 | Typical hole | 729 | 1229 |
| G16 | Typical hole | 754 | 1254 |
| G17 | Typical hole | 779 | 1279 |
| G18 | Typical hole | 804 | 1304 |
| G19 | Typical hole | 829 | 1329 |
| G20 | Typical hole | 854 | 1354 |

| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| G21 | Typical hole | 879 | 1379 |
| G22 | Typical hole | 904 | 1404 |
| G23 | Typical hole | 929 | 1429 |
| G24 | Typical hole | 954 | 1454 |
| G25 | Typical hole | 979 | 1479 |
| G26 | Typical hole | 1004 | 1504 |
| G27 | Typical hole | 1029 | 1529 |
| G28 | Typical hole | 1054 | 1554 |
| G29 | Typical hole | 1079 | 1579 |
| H1 | Typical hole | 805 | 1305 |
| H2 | Typical hole | 780 | 1280 |
| H3 | Typical hole | 755 | 1255 |
| H4 | Typical hole | 730 | 1230 |
| H5 | Typical hole | 705 | 1205 |
| H6 | Typical hole | 680 | 1180 |
| H7 | Typical hole | 638 | 1138 |
| H8 | Typical hole | 663 | 1163 |
| H9 | Typical hole | 688 | 1188 |
| H10 | Typical hole | 713 | 1213 |
| H11 | Typical hole | 738 | 1238 |
| H12 | Typical hole | 763 | 1263 |
| H13 | Typical hole | 788 | 1288 |
| H14 | Typical hole | 813 | 1313 |
| H15 | Typical hole | 838 | 1338 |
| H16 | Typical hole | 863 | 1363 |
| H17 | Typical hole | 888 | 1388 |
| H18 | Typical hole | 913 | 1413 |
| H19 | Typical hole | 938 | 1438 |
| H20 | Typical hole | 963 | 1463 |
| H21 | Typical hole | 988 | 1488 |
| H22 | Typical hole | 1013 | 1513 |
| H23 | Typical hole | 1038 | 1538 |
| H24 | Typical hole | 1063 | 1563 |
| H25 | Typical hole | 1088 | 1588 |
| H26 | Typical hole | 1113 | 1613 |
| H27 | Typical hole | 1138 | 1638 |
| H28 | Typical hole | 1163 | 1663 |
| H29 | Typical hole | 1188 | 1688 |
| I1 | Typical hole | 914 | 1414 |
| I2 | Typical hole | 889 | 1389 |
| I3 | Typical hole | 864 | 1364 |
| I4 | Typical hole | 839 | 1339 |
| I5 | Typical hole | 814 | 1314 |
| I6 | Typical hole | 789 | 1289 |
| I7 | Typical hole | 747 | 1247 |
| I8 | Typical hole | 772 | 1272 |

| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| I9 | Typical hole | 797 | 1297 |
| I10 | Typical hole | 822 | 1322 |
| I11 | Typical hole | 847 | 1347 |
| I12 | Typical hole | 872 | 1372 |
| I13 | Typical hole | 897 | 1397 |
| I14 | Typical hole | 922 | 1422 |
| I15 | Typical hole | 947 | 1447 |
| I16 | Typical hole | 972 | 1472 |
| I17 | Typical hole | 997 | 1497 |
| I18 | Typical hole | 1022 | 1522 |
| I19 | Typical hole | 1047 | 1547 |
| I20 | Typical hole | 1072 | 1572 |
| I21 | Typical hole | 1097 | 1597 |
| I22 | Typical hole | 1122 | 1622 |
| I23 | Typical hole | 1147 | 1647 |
| I24 | Typical hole | 1172 | 1672 |
| I25 | Typical hole | 1197 | 1697 |
| I26 | Typical hole | 1222 | 1722 |
| I27 | Typical hole | 1247 | 1747 |
| I28 | Typical hole | 1272 | 1772 |
| I29 | Typical hole | 1297 | 1797 |
| J1 | Typical hole | 1023 | 1523 |
| J2 | Typical hole | 998 | 1498 |
| J3 | Typical hole | 973 | 1473 |
| J4 | Typical hole | 948 | 1448 |
| J5 | Typical hole | 923 | 1423 |
| J6 | Typical hole | 898 | 1398 |
| J7 | Typical hole | 856 | 1356 |
| J8 | Typical hole | 881 | 1381 |
| J9 | Typical hole | 906 | 1406 |
| J10 | Typical hole | 931 | 1431 |
| J11 | Typical hole | 956 | 1456 |
| J12 | Typical hole | 981 | 1481 |
| J13 | Typical hole | 1006 | 1506 |
| J14 | Typical hole | 1031 | 1531 |
| J15 | Typical hole | 1056 | 1556 |
| J16 | Typical hole | 1081 | 1581 |
| J17 | Typical hole | 1106 | 1606 |
| J18 | Typical hole | 1131 | 1631 |
| J19 | Typical hole | 1156 | 1656 |
| J20 | Typical hole | 1181 | 1681 |
| J21 | Typical hole | 1206 | 1706 |
| J22 | Typical hole | 1231 | 1731 |
| J23 | Typical hole | 1256 | 1756 |
| J24 | Typical hole | 1281 | 1781 |
| J25 | Typical hole | 1306 | 1806 |

| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| J26 | Typical hole | 1331 | 1831 |
| J27 | Typical hole | 1356 | 1856 |
| J28 | Typical hole | 1381 | 1881 |
| J29 | Typical hole | 1406 | 1906 |
| K1 | Typical hole | 1132 | 1632 |
| K2 | Typical hole | 1107 | 1607 |
| K3 | Typical hole | 1082 | 1582 |
| K4 | Typical hole | 1057 | 1557 |
| K5 | Typical hole | 1032 | 1532 |
| K6 | Typical hole | 1007 | 1507 |
| K7 | Typical hole | 965 | 1465 |
| K8 | Typical hole | 990 | 1490 |
| K9 | Typical hole | 1015 | 1515 |
| K10 | Typical hole | 1040 | 1540 |
| K11 | Typical hole | 1065 | 1565 |
| K12 | Typical hole | 1090 | 1590 |
| K13 | Typical hole | 1115 | 1615 |
| K14 | Typical hole | 1140 | 1640 |
| K15 | Typical hole | 1165 | 1665 |
| K16 | Typical hole | 1190 | 1690 |
| K17 | Typical hole | 1215 | 1715 |
| K18 | Typical hole | 1240 | 1740 |
| K19 | Typical hole | 1265 | 1765 |
| K20 | Typical hole | 1290 | 1790 |
| K21 | Typical hole | 1315 | 1815 |
| K22 | Typical hole | 1340 | 1840 |
| K23 | Typical hole | 1365 | 1865 |
| K24 | Typical hole | 1390 | 1890 |
| K25 | Typical hole | 1415 | 1915 |
| K26 | Typical hole | 1440 | 1940 |
| K27 | Typical hole | 1465 | 1965 |
| K28 | Typical hole | 1490 | 1990 |
| K29 | Typical hole | 1515 | 2015 |
| L1 | Typical hole | 1241 | 1741 |
| L2 | Typical hole | 1216 | 1716 |
| L3 | Typical hole | 1191 | 1691 |
| L4 | Typical hole | 1166 | 1666 |
| L5 | Typical hole | 1141 | 1641 |
| L6 | Typical hole | 1116 | 1616 |
| L7 | Typical hole | 1074 | 1574 |
| L8 | Typical hole | 1099 | 1599 |
| L9 | Typical hole | 1124 | 1624 |
| L10 | Typical hole | 1149 | 1649 |
| L11 | Typical hole | 1174 | 1674 |
| L12 | Typical hole | 1199 | 1699 |
| L13 | Typical hole | 1224 | 1724 |
| L14 | Typical hole | 1249 | 1749 |
| L15 | Typical hole | 1274 | 1774 |
| L16 | Typical hole | 1299 | 1799 |
| L17 | Typical hole | 1324 | 1824 |
| L18 | Typical hole | 1349 | 1849 |
| L19 | Typical hole | 1374 | 1874 |
| L20 | Typical hole | 1399 | 1899 |
| L21 | Typical hole | 1424 | 1924 |
| L22 | Typical hole | 1449 | 1949 |
| L23 | Typical hole | 1474 | 1974 |
| L24 | Typical hole | 1499 | 1999 |
| L25 | Typical hole | 1524 | 2024 |
| L26 | Typical hole | 1549 | 2049 |
| L27 | Typical hole | 1574 | 2074 |
| L28 | Typical hole | 1599 | 2099 |
| L29 | Typical hole | 1624 | 2124 |
| M1 | Typical hole | 1375 | 1875 |
| M2 | Typical hole | 1350 | 1850 |
| M3 | Typical hole | 1325 | 1825 |
| M4 | Typical hole | 1300 | 1800 |
| M5 | Typical hole | 1275 | 1775 |
| M6 | Typical hole | 1250 | 1750 |
| M7 | Typical hole | 1183 | 1683 |
| M8 | Typical hole | 1208 | 1708 |
| M9 | Typical hole | 1233 | 1733 |
| M10 | Typical hole | 1258 | 1758 |
| M11 | Typical hole | 1283 | 1783 |
| M12 | Typical hole | 1308 | 1808 |
| M13 | Typical hole | 1333 | 1833 |
| M14 | Typical hole | 1358 | 1858 |
| M15 | Typical hole | 1383 | 1883 |
| M16 | Typical hole | 1408 | 1908 |
| M17 | Typical hole | 1433 | 1933 |
| M18 | Typical hole | 1458 | 1958 |
| M19 | Typical hole | 1483 | 1983 |
| M20 | Typical hole | 1508 | 2008 |
| M21 | Typical hole | 1533 | 2033 |
| M22 | Typical hole | 1558 | 2058 |
| M23 | Typical hole | 1583 | 2083 |
| M24 | Typical hole | 1608 | 2108 |
| M25 | Typical hole | 1633 | 2133 |
| M26 | Typical hole | 1658 | 2158 |
| M27 | Typical hole | 1683 | 2183 |
| M28 | Typical hole | 1708 | 2208 |
| M29 | Typical hole | 1733 | 2233 |
| N1 | Typical hole | 1509 | 2009 |

| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| N2 | Typical hole | 1484 | 1984 |
| N3 | Typical hole | 1459 | 1959 |
| N4 | Typical hole | 1434 | 1934 |
| N5 | Typical hole | 1409 | 1909 |
| N6 | Typical hole | 1384 | 1884 |
| N7 | Typical hole | 1317 | 1817 |
| N8 | Typical hole | 1342 | 1842 |
| N9 | Typical hole | 1367 | 1867 |
| N10 | Typical hole | 1392 | 1892 |
| N11 | Typical hole | 1417 | 1917 |
| N12 | Typical hole | 1442 | 1942 |
| N13 | Typical hole | 1467 | 1967 |
| N14 | Typical hole | 1492 | 1992 |
| N15 | Typical hole | 1517 | 2017 |
| N16 | Typical hole | 1542 | 2042 |
| N17 | Typical hole | 1567 | 2067 |
| N18 | Typical hole | 1592 | 2092 |
| N19 | Typical hole | 1617 | 2117 |
| N20 | Typical hole | 1642 | 2142 |
| N21 | Typical hole | 1667 | 2167 |
| N22 | Typical hole | 1692 | 2192 |
| N23 | Typical hole | 1717 | 2217 |
| N24 | Typical hole | 1742 | 2242 |
| N25 | Typical hole | 1767 | 2267 |
| N26 | Typical hole | 1792 | 2292 |
| N27 | Typical hole | 1817 | 2317 |
| N28 | Typical hole | 1842 | 2342 |
| N29 | Typical hole | 1867 | 2367 |


Typical hole
Ø = 114.3 mm
0 m
5 m
10 m
[2.1 m] - Crushed Stone
[0.6 m] - Air
[2.4 m] - Hydromite 4100 Bulk NB Wgt: 40.78 kg
[4.4 m] - Black Cap DC Booster - 340g (.75 lb) Det: SHOCK*STAR DualDelay 9.2m/30' 25/500 Del: 500.00 (ms) Con: Other Hole Wgt: 0.34 kg
[5.0 m] - Black Cap DC Booster - 340g (.75 lb) Det: SHOCK*STAR DualDelay 9.2m/30' 25/500 Del: 500.00 (ms) Con: Other Hole Wgt: 0.34 kg
41.46 kg
Extra
Ø = 114.3 mm
[2.1 m] - Crushed Stone
[0.6 m] - Air
[2.4 m] - Hydromite 4100 Bulk NB Wgt: 40.78 kg
[3.7 m] - Black Cap DC Booster - 340g (.75 lb) Det: SHOCK*STAR DualDelay 9.2m/30' 25/500 Del: 500.00 (ms) Con: Other Hole Wgt: 0.34 kg
[4.4 m] - Black Cap DC Booster - 340g (.75 lb) Det: SHOCK*STAR DualDelay 9.2m/30' 25/500 Del: 500.00 (ms) Con: Other Hole Wgt: 0.34 kg
[5.0 m] - Black Cap DC Booster - 340g (.75 lb) Det: SHOCK*STAR DualDelay 9.2m/30' 25/500 Del: 500.00 (ms) Con: Other Hole Wgt: 0.34 kg
41.8 kg

# AUSTIN POWDER LTD.
# BLAST REPORT

327-Orillia
RR #4 ON, Orillia, Canada L3V 1- 84

Blast No.: 2018-11
Blast Type: Stone Quarry/Stone Mine - Production
Customer: HAROLD SUTHERLAND CONST.-KEPPEL (HAR1525-001)
Date/Time: 11/13/2018 14:02
Pit/Permit: KEPPEL QUARRY / SHOT SERVICE
Location: Bottom bench

## *ENVIRONMENT*

Method Used: Lat./Long.
Weather: Heavy Snow
Wind From: WSW
Temperature: -3 °C
Terrain: Flat
Wind Velocity: 10-20 km/h
Blast Lat./Long.: 44° 38' 4.900" N 80° 59' 53.600" W

## *NEAREST PROTECTED STRUCTURE*

Compass Point: N
Structure Name: 178841 Grey Rd. 17
Direction/Bearing: 356 °
Structure Type: Dwelling
Distance: 639 m
Structure Lat./Long.: 44° 38' 25.580" N 80° 59' 55.233" W

## *LAYOUT*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | Hole Depth: | 9.45 m | Material Blasted: | Limestone | Total Meters Drilled: | 1,115.0 m |
| No. of Holes: | 118 | Subdrilling: | 0.61 m | Burden: | 3.05 m | Water Depth: | max 3.05 m |
| No. of V.P.† Holes: | 114 | Face Height: | 8.84 m | Spacing: | 3.05 m | Stem Length: | min 1.68 m |
| No. of Rows: | 4 | Drilling Angle: | ° | Back Fill Depth: | 0.00 m | Area Type: | Center Start/ Breakout |
| Diameter: | 114.3 mm | Mats Used: | No | Stem Type: | Clear stone | Method: | Specified (H = 8.84 m) |

† V.P. = Volume Producing

## *WEIGHTS*

| | | | | | |
|---|---|---|---|---|---|
| | | Max. Wt. of Expl. in Overlapped Decks: | 10,046.0 kg | Volume Produced: | 9,033.1 m³ |
| Initiation: | Electronic | Max. Wt. of Expl. Per 8 ms Interval: | 10,046.0 kg | Weight Produced: | 21,682.9 t |
| Firing Device: | E*Star Blasting Machine (WRFD) | Max. No. of Holes Per 8 ms Interval: | 118 | Powder Factor 1: | 2.158 t/kg |
| Other Method: | | Max. Wt. of Explosive Per Hole: | 92.9 kg | Powder Factor 2: | 1.112 kg/m³ |
| Mfg and Model: | DBM1600-2-RC | Scaled Distance Factor (max charge): | 66.34 | Rock Density: | 2.400 t/m³ |
| Initiation Settings: | | Scaled Distance Factor (per delay): | 6.38 | | |
| Series Resistance (ohms): | | | | | |

## *SEISMOGRAPHS*

See seismographs on separate page

## *CREW*

Blast occurred other than scheduled time: No
Misfire Occurred: No
Protective Cover: loader bucket

| Last Name | First Name | License / Cert | 2nd License / Cert | In Charge | Tied In | Chk. Tie-In | Driller | Layout |
|---|---|---|---|---|---|---|---|---|
| REED | ADAM, G | * ON - N/A | | Yes | Yes | Yes | No | Yes |
| FRALICK | CRAIG, A | | | No | No | No | No | No |
| KOUYOUMJIAN | MACKENZIE, H | | | No | No | No | No | No |
| PETERSON | JORDIN, M | | | No | Yes | Yes | No | No |
| ROMPHF | ALAN, S | | | No | Yes | Yes | No | No |

# AUSTIN POWDER LTD.
# BLAST REPORT

327-Orillia
RR #4 ON, Orillia, Canada L3V 1- 84

Blast No.: 2018-11
Blast Type: Stone Quarry/Stone Mine - Production
Customer: HAROLD SUTHERLAND CONST.-KEPPEL (HAR1525-001)
Date/Time: 11/13/2018 14:02
Pit/Permit: KEPPEL QUARRY / SHOT SERVICE
Location: Bottom bench

***PRODUCTS AND SERVICES***

| Number | Product Description | Quantity | Weight ( kg ) |
|---|---|---|---|
| 11782 | E*Star Booster - 454g (1 lb) | 37.00 ea | 17.12 |
| 15107 | Eagle 450 E*Star Booster (1lb) | 200.00 ea | 200.00 |
| 15001 | 24' E*STAR Detonator - QM | 118.00 ea | 0.00 |
| 15003 | 40' E*STAR Detonator - QM | 118.00 ea | 0.00 |
| 15128 | Hydromite 4100 Bulk NB | 9,830.00 kg | 9,830.00 |
| 12981 | Mini Stem Plug - 6015 | 118.00 ea | 0.00 |
| | | Total Weight of Explosives (Include Primers) ( kg ): | 10,047.11 |

***COMMENTS / EXPLANATIONS***

General Comments: Imported on 11/13/2018 5:22:47 PM

Adam Reed

Signature of Blaster in Charge

# AUSTIN POWDER LTD.
# BLAST REPORT

327-Orillia
RR #4 ON, Orillia, Canada L3V 1- 84

Blast No.: 2018-11 | Blast Type: Stone Quarry/Stone Mine - Production | Customer: HAROLD SUTHERLAND CONST.-KEPPEL (HAR1525-001)

Date/Time: 11/13/2018 14:02 | Pit/Permit: KEPPEL QUARRY / SHOT SERVICE | Location: Bottom bench

***SEISMOGRAPH 1 - 178841 GREY ROAD #17***

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Data Type: | Seismic Record | Seismograph Type: | Instantel Mini-Mate II | | | | |
| Date: | 11/13/18 | Trigger Level: | 1.50 mm/s | 115.00 dB | Transverse: | 0.127 mm/s | --- Hz |
| Time: | 14:02 | Calibration Date: | 01/15/18 | | Vertical: | 0.127 mm/s | --- Hz |
| Distance From Blast: | 641.60 m | Calibration Signal: | | | Longitudinal: | 0.127 mm/s | --- Hz |
| Direction From Blast: | N | Geophone Min. Freq.: | --- Hz | | | | |
| Readout: | | Mic. Min. Freq.: | --- Hz | | Acoustic: | 116 dB | --- Hz |
| Location: | Bolted to bedrock at the front of the property. | | | | Vector Sum: | --- mm/s | |
| Lat./Long.: | 44° 38' 25.645" N | | 80° 59' 55.415" W | | | | |
| Reader and Firm: | Adam Reed, AUSTIN POWDER | | | | | | |
| Analyst and Firm: | | | | | | | |
| Installer and Firm: | Adam Reed Austin Powder | | | | | | |

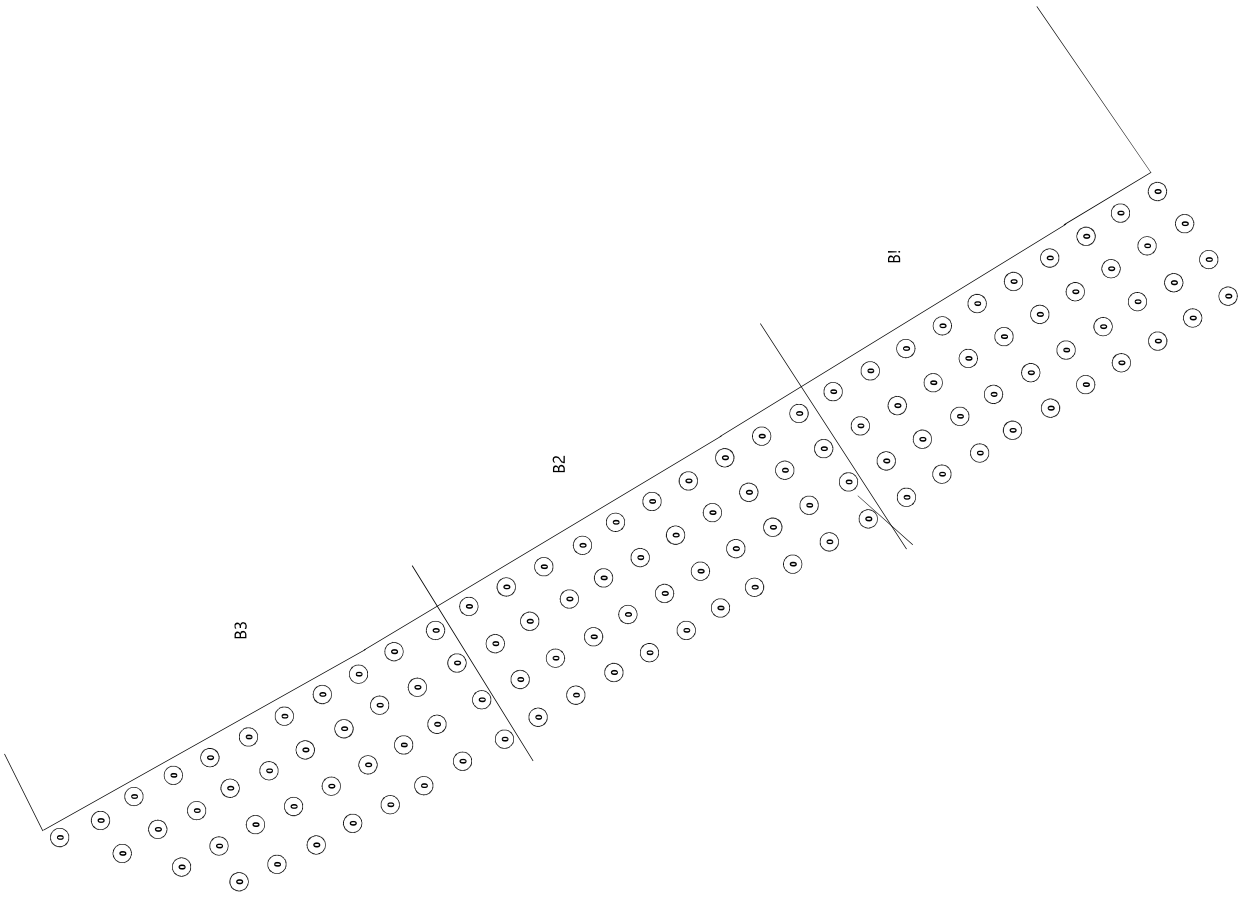
***SEISMOGRAPH 2 - 178717 GREY RD 17***

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Data Type: | Seismic Record | Seismograph Type: | instantel | | | | |
| Date: | 11/13/18 | Trigger Level: | 1.50 mm/s | 115.00 dB | Transverse: | 0.254 mm/s | --- Hz |
| Time: | 14:02 | Calibration Date: | 01/15/18 | | Vertical: | 0.254 mm/s | --- Hz |
| Distance From Blast: | 643.43 m | Calibration Signal: | ok | | Longitudinal: | 0.254 mm/s | --- Hz |
| Direction From Blast: | ESE | Geophone Min. Freq.: | --- Hz | | | | |
| Readout: | | Mic. Min. Freq.: | --- Hz | | Acoustic: | 118 dB | --- Hz |
| Location: | | | | | Vector Sum: | --- mm/s | |
| Lat./Long.: | 44° 37' 52.587" N | | 80° 59' 30.045" W | | | | |
| Reader and Firm: | Adam Reed, AUSTIN POWDER | | | | | | |
| Analyst and Firm: | | | | | | | |
| Installer and Firm: | Adam Reed Austin Powder | | | | | | |

***SEISMOGRAPH 3 - 283197 10TH CONC.***

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Data Type: | Seismic Record | Seismograph Type: | Instantel Mini-Mate II | | | | |
| Date: | 11/13/18 | Trigger Level: | 1.50 mm/s | 115.00 dB | Transverse: | 0.381 mm/s | --- Hz |
| Time: | 14:02 | Calibration Date: | 01/15/18 | | Vertical: | 0.381 mm/s | --- Hz |
| Distance From Blast: | 1,082.04 m | Calibration Signal: | | | Longitudinal: | 0.381 mm/s | --- Hz |
| Direction From Blast: | ESE | Geophone Min. Freq.: | --- Hz | | | | |
| Readout: | | Mic. Min. Freq.: | --- Hz | | Acoustic: | 115 dB | --- Hz |
| Location: | Behind the mail box. | | | | Vector Sum: | --- mm/s | |
| Lat./Long.: | 44° 37' 49.797" N | | 80° 59' 9.304" W | | | | |
| Reader and Firm: | Adam Reed, AUSTIN POWDER | | | | | | |
| Analyst and Firm: | | | | | | | |
| Installer and Firm: | Adam Reed Austin Powder | | | | | | |

Hole Label Mode: Cumulative In-Hole Delays



| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ129 | Old Estar boosters | 0 | 0 |
| ZZ130 | Old Estar boosters | 0 | 0 |
| ZZ126 | Old Estar boosters | 0 | 0 |
| ZZ29 | Typical Hole | 0 | 0 |
| ZZ86 | Face Hole | 0 | 0 |
| ZZ33 | Typical Hole | 0 | 0 |
| ZZ58 | Typical Hole | 0 | 0 |
| ZZ92 | Typical Hole | 0 | 0 |
| ZZ53 | Typical Hole | 0 | 0 |
| ZZ127 | Old Estar boosters | 0 | 0 |
| ZZ102 | Typical Hole | 0 | 0 |
| ZZ103 | Typical Hole | 0 | 0 |
| ZZ93 | Typical Hole | 0 | 0 |
| ZZ36 | Typical Hole | 0 | 0 |
| ZZ134 | Old Estar boosters | 0 | 0 |
| ZZ78 | Face Hole | 0 | 0 |
| ZZ2 | Face Hole | 0 | 0 |
| ZZ57 | Typical Hole | 0 | 0 |
| ZZ106 | Face Hole | 0 | 0 |
| ZZ24 | Typical Hole | 0 | 0 |
| ZZ118 | Old Estar boosters | 0 | 0 |
| ZZ66 | Typical Hole | 0 | 0 |
| ZZ64 | Typical Hole | 0 | 0 |
| ZZ32 | Typical Hole | 0 | 0 |
| ZZ14 | Typical Hole | 0 | 0 |
| ZZ62 | Typical Hole | 0 | 0 |
| ZZ51 | Face Hole | 0 | 0 |
| ZZ121 | Face Hole | 0 | 0 |
| ZZ49 | Typical Hole | 0 | 0 |
| ZZ18 | Typical Hole | 0 | 0 |
| ZZ117 | Old Estar boosters | 0 | 0 |
| ZZ138 | Old Estar boosters | 0 | 0 |
| ZZ21 | Face Hole | 0 | 0 |
| ZZ96 | Face Hole | 0 | 0 |
| ZZ47 | Typical Hole | 0 | 0 |
| ZZ113 | Extra | 0 | 0 |
| ZZ65 | Typical Hole | 0 | 0 |
| ZZ70 | Typical Hole | 0 | 0 |
| ZZ132 | Old Estar boosters | 0 | 0 |
| ZZ99 | Typical Hole | 0 | 0 |
| ZZ72 | Typical Hole | 0 | 0 |
| ZZ8 | Typical Hole | 0 | 0 |
| ZZ13 | Typical Hole | 0 | 0 |
| ZZ120 | Face Hole | 0 | 0 |
| ZZ98 | Typical Hole | 0 | 0 |
| ZZ69 | Face Hole | 0 | 0 |

| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ10 | Face Hole | 0 | 0 |
| ZZ112 | Typical Hole | 0 | 0 |
| ZZ124 | Face Hole | 0 | 0 |
| ZZ115 | Face Hole | 0 | 0 |
| ZZ109 | Typical Hole | 0 | 0 |
| ZZ63 | Typical Hole | 0 | 0 |
| ZZ41 | Typical Hole | 0 | 0 |
| ZZ17 | Typical Hole | 0 | 0 |
| ZZ114 | Face Hole | 0 | 0 |
| ZZ12 | Typical Hole | 0 | 0 |
| ZZ76 | Typical Hole | 0 | 0 |
| ZZ6 | Typical Hole | 0 | 0 |
| ZZ19 | Typical Hole | 0 | 0 |
| ZZ3 | Typical Hole | 0 | 0 |
| ZZ128 | Face Hole | 0 | 0 |
| ZZ104 | Typical Hole | 0 | 0 |
| ZZ77 | Typical Hole | 0 | 0 |
| ZZ87 | Typical Hole | 0 | 0 |
| ZZ116 | Old Estar boosters | 0 | 0 |
| ZZ34 | Typical Hole | 0 | 0 |
| ZZ97 | Typical Hole | 0 | 0 |
| ZZ52 | Typical Hole | 0 | 0 |
| ZZ105 | Face Hole | 0 | 0 |
| ZZ22 | Typical Hole | 0 | 0 |
| ZZ28 | Typical Hole | 0 | 0 |
| ZZ23 | Typical Hole | 0 | 0 |
| ZZ122 | Old Estar boosters | 0 | 0 |
| ZZ68 | Face Hole | 0 | 0 |
| ZZ107 | Typical Hole | 0 | 0 |
| ZZ82 | Typical Hole | 0 | 0 |
| ZZ5 | Typical Hole | 0 | 0 |
| ZZ20 | Face Hole | 0 | 0 |
| ZZ83 | Typical Hole | 0 | 0 |
| ZZ108 | Typical Hole | 0 | 0 |
| ZZ39 | Face Hole | 0 | 0 |
| ZZ1 | Face Hole | 0 | 0 |
| ZZ125 | Face Hole | 0 | 0 |
| ZZ31 | Face Hole | 0 | 0 |
| ZZ85 | Face Hole | 0 | 0 |
| ZZ136 | Old Estar boosters | 0 | 0 |
| ZZ67 | Typical Hole | 0 | 0 |
| ZZ135 | Old Estar boosters | 0 | 0 |
| ZZ30 | Face Hole | 0 | 0 |
| ZZ37 | Typical Hole | 0 | 0 |
| ZZ60 | Face Hole | 0 | 0 |
| ZZ38 | Face Hole | 0 | 0 |

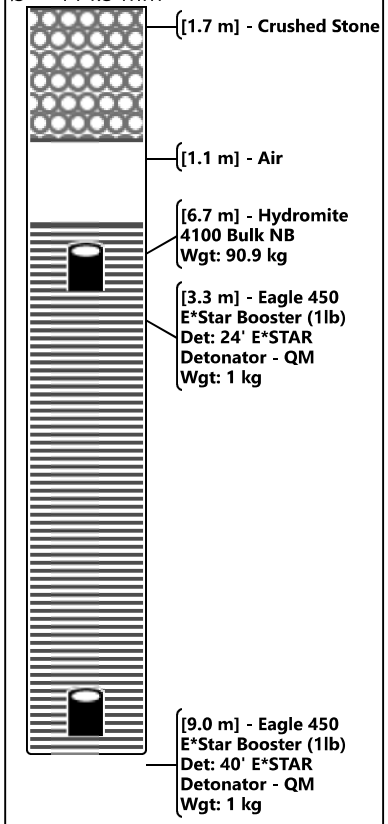
| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ88 | Typical Hole | 0 | 0 |
| ZZ75 | Typical Hole | 0 | 0 |
| ZZ4 | Face Hole | 0 | 0 |
| ZZ27 | Typical Hole | 0 | 0 |
| ZZ40 | Typical Hole | 0 | 0 |
| ZZ42 | Typical Hole | 0 | 0 |
| ZZ54 | Typical Hole | 0 | 0 |
| ZZ133 | Old Estar boosters | 0 | 0 |
| ZZ111 | Typical Hole | 0 | 0 |
| ZZ35 | Typical Hole | 0 | 0 |
| ZZ131 | Old Estar boosters | 0 | 0 |
| ZZ94 | Typical Hole | 0 | 0 |
| ZZ11 | Face Hole | 0 | 0 |
| ZZ119 | Old Estar boosters | 0 | 0 |
| ZZ137 | Old Estar boosters | 0 | 0 |
| ZZ59 | Typical Hole | 0 | 0 |
| ZZ50 | Face Hole | 0 | 0 |
| ZZ7 | Typical Hole | 0 | 0 |
| ZZ9 | Typical Hole | 0 | 0 |
| ZZ123 | Old Estar boosters | 0 | 0 |
| ZZ84 | Typical Hole | 0 | 0 |
| ZZ89 | Typical Hole | 0 | 0 |
| ZZ71 | Typical Hole | 0 | 0 |
| ZZ61 | Face Hole | 0 | 0 |
| ZZ48 | Typical Hole | 0 | 0 |
| ZZ95 | Face Hole | 0 | 0 |

0 m

5 m

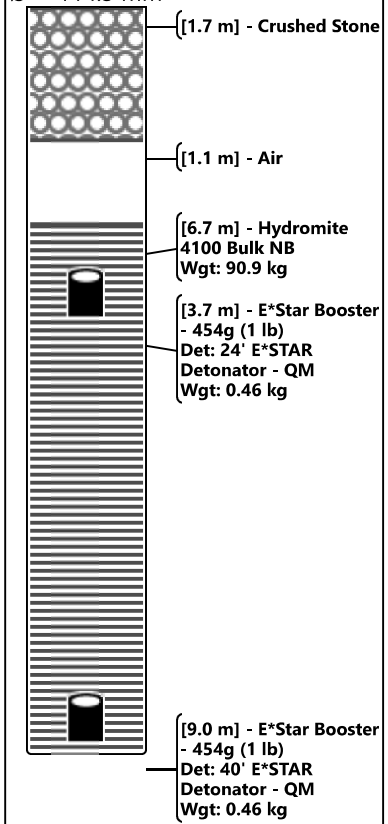
10 m

## Typical Hole



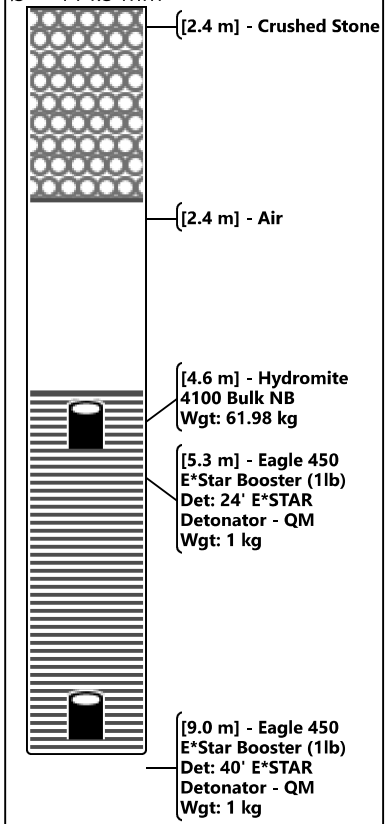

92.9 kg

## Old Estar boosters



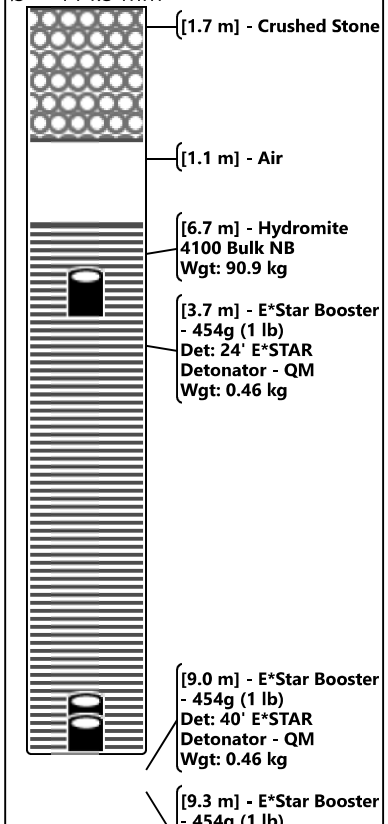

91.83 kg

## Face Hole




63.98 kg

## Extra




92.29 kg

# AUSTIN POWDER LTD.
# BLAST REPORT

327-Orillia
RR #4 ON, Orillia, Canada L3V 1- 84

Blast No.: 2018-13
Blast Type: Stone Quarry/Stone Mine - Production
Customer: HAROLD SUTHERLAND CONST.-KEPPEL (HAR1525-001)
Date/Time: 12/13/2018 14:22
Pit/Permit: KEPPEL QUARRY / SHOT SERVICE
Location: Bottom Bench + Sump

## *ENVIRONMENT*

Method Used: U.T.M.
Weather: Overcast / Low Clouds
Wind From: W
Temperature: 0 °C
Terrain: Flat
Wind Velocity: 0-2 km/h
Blast U.T.M.: 17N 500258 mE 4942457 mN

## *NEAREST PROTECTED STRUCTURE*

Compass Point: NNW
Structure Name: 178841 Grey Rd #17
Direction/Bearing: 344 °
Structure Type: Dwelling
Distance: 576 m
Structure U.T.M.: 17N 500101 mE 4943011 mN

## *LAYOUT*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | Hole Depth: | 3.66-9.75 m | Material Blasted: | Limestone | Total Meters Drilled: | 1,010.4 m |
| No. of Holes: | 110 | Subdrilling: | 0.00-0.61 m | Burden: | 3.05 m | Water Depth: | max 4.57 m |
| No. of V.P.† Holes: | 99 | Face Height: | 3.66-9.14 m | Spacing: | 3.35 m | Stem Length: | min 1.68 m |
| No. of Rows: | 3 | Drilling Angle: | ° | Back Fill Depth: | 0.00 m | Area Type: | Center Start/ Breakout |
| Diameter: | 114.3 mm | Mats Used: | No | Stem Type: | Clear Stone | Method: | Specified (H = 9.14 m) |

† V.P. = Volume Producing

## *WEIGHTS*

| | | | | | |
|---|---|---|---|---|---|
| | | Max. Wt. of Expl. in Overlapped Decks: | 461.2 kg | Volume Produced: | 9,209.1 m³ |
| Initiation: | Electronic | Max. Wt. of Expl. Per 8 ms Interval: | 461.2 kg | Weight Produced: | 22,105.4 t |
| Firing Device: | E*Star Blasting Machine (WRFD) | Max. No. of Holes Per 8 ms Interval: | 5 | Powder Factor 1: | 2.304 t/kg |
| Other Method: | | Max. Wt. of Explosive Per Hole: | 92.2 kg | Powder Factor 2: | 1.042 kg/m³ |
| Mfg and Model: | DBM1600-2-RC | Scaled Distance Factor (max charge): | 59.95 | Rock Density: | 2.400 t/m³ |
| Initiation Settings: | | Scaled Distance Factor (per delay): | 26.81 | | |
| Series Resistance (ohms): | | | | | |

## *SEISMOGRAPHS*

See seismographs on separate page

## *CREW*

Blast occurred other than scheduled time: No
Misfire Occurred: No
Protective Cover: Loader Bucket

| Last Name | First Name | License / Cert | 2nd License / Cert | In Charge | Tied In | Chk. Tie-In | Driller | Layout |
|---|---|---|---|---|---|---|---|---|
| SMART | EVAN, C | * ON - N/A | | Yes | Yes | Yes | No | Yes |
| FRALICK | CRAIG, A | | | No | No | No | No | No |
| KOUYOUMJIAN | MACKENZIE, H | | | No | Yes | No | No | No |
| MACPHADEN | AARON, K | | | No | Yes | No | No | No |
| NEWTON | JOHN, D | | | No | Yes | Yes | No | No |
| O'DONOHOE | LIAM, J | | | No | Yes | Yes | No | No |

# AUSTIN POWDER LTD.
# BLAST REPORT

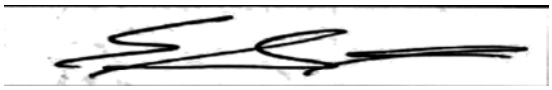
327-Orillia
RR #4 ON, Orillia, Canada L3V 1- 84

Blast No.: 2018-13
Blast Type: Stone Quarry/Stone Mine - Production
Customer: HAROLD SUTHERLAND CONST.-KEPPEL (HAR1525-001)
Date/Time: 12/13/2018 14:22
Pit/Permit: KEPPEL QUARRY / SHOT SERVICE
Location: Bottom Bench + Sump

***PRODUCTS AND SERVICES***

| Number | Product Description | Quantity | | Weight ( kg ) |
|---|---|---|---|---|
| 15107 | Eagle 450 E*Star Booster (1lb) | 218.00 | ea | 218.00 |
| 15001 | 24' E*STAR Detonator - QM | 119.00 | ea | 0.00 |
| 15003 | 40' E*STAR Detonator - QM | 99.00 | ea | 0.00 |
| 12276 | E*Star Bus Wire - 1250' spool | 1.00 | sp | 0.00 |
| 15128 | Hydromite 4100 Bulk NB | 9,130.00 | kg | 9,130.00 |
| 12981 | Mini Stem Plug - 6015 | 109.00 | ea | 0.00 |
| | Total Weight of Explosives (Include Primers) ( kg ): | | | 9,348.00 |

***COMMENTS / EXPLANATIONS***



Signature of Blaster in Charge

# AUSTIN POWDER LTD.
# BLAST REPORT

327-Orillia
RR #4 ON, Orillia, Canada L3V 1- 84

Blast No.: 2018-13 | Blast Type: Stone Quarry/Stone Mine - Production | Customer: HAROLD SUTHERLAND CONST.-KEPPEL (HAR1525-001)

Date/Time: 12/13/2018 14:22 | Pit/Permit: KEPPEL QUARRY / SHOT SERVICE | Location: Bottom Bench + Sump

***SEISMOGRAPH 1 - 178841 GREY ROAD #17***

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Data Type: | Seismic Record | Seismograph Type: | Instantel - Minimate Blaster | | | | |
| Date: | 12/13/18 | Trigger Level: | 1.50 mm/s | 115.00 dB | Transverse: | 0.127 mm/s | 0.0 Hz |
| Time: | 14:22 | Calibration Date: | 01/17/18 | | Vertical: | 0.127 mm/s | 0.0 Hz |
| Distance From Blast: | 575.77 m | Calibration Signal: | OK | | Longitudinal: | 0.127 mm/s | 0.0 Hz |
| Direction From Blast: | NNW | Geophone Min. Freq.: | --- Hz | | | | |
| Readout: | Printed Copy | Mic. Min. Freq.: | --- Hz | | Acoustic: | 123 dB | --- Hz |
| Location: | Bolted to Bedrock. | | | | Vector Sum: | 0.22 mm/s | |
| U.T.M.: | 17N 500101 mE 4943011 mN | | | | | | |
| Reader and Firm: | Evan Smart, AUSTIN POWDER | | | | | | |
| Analyst and Firm: | | | | | | | |
| Installer and Firm: | John Newton, Austin Powder Ltd. | | | | | | |

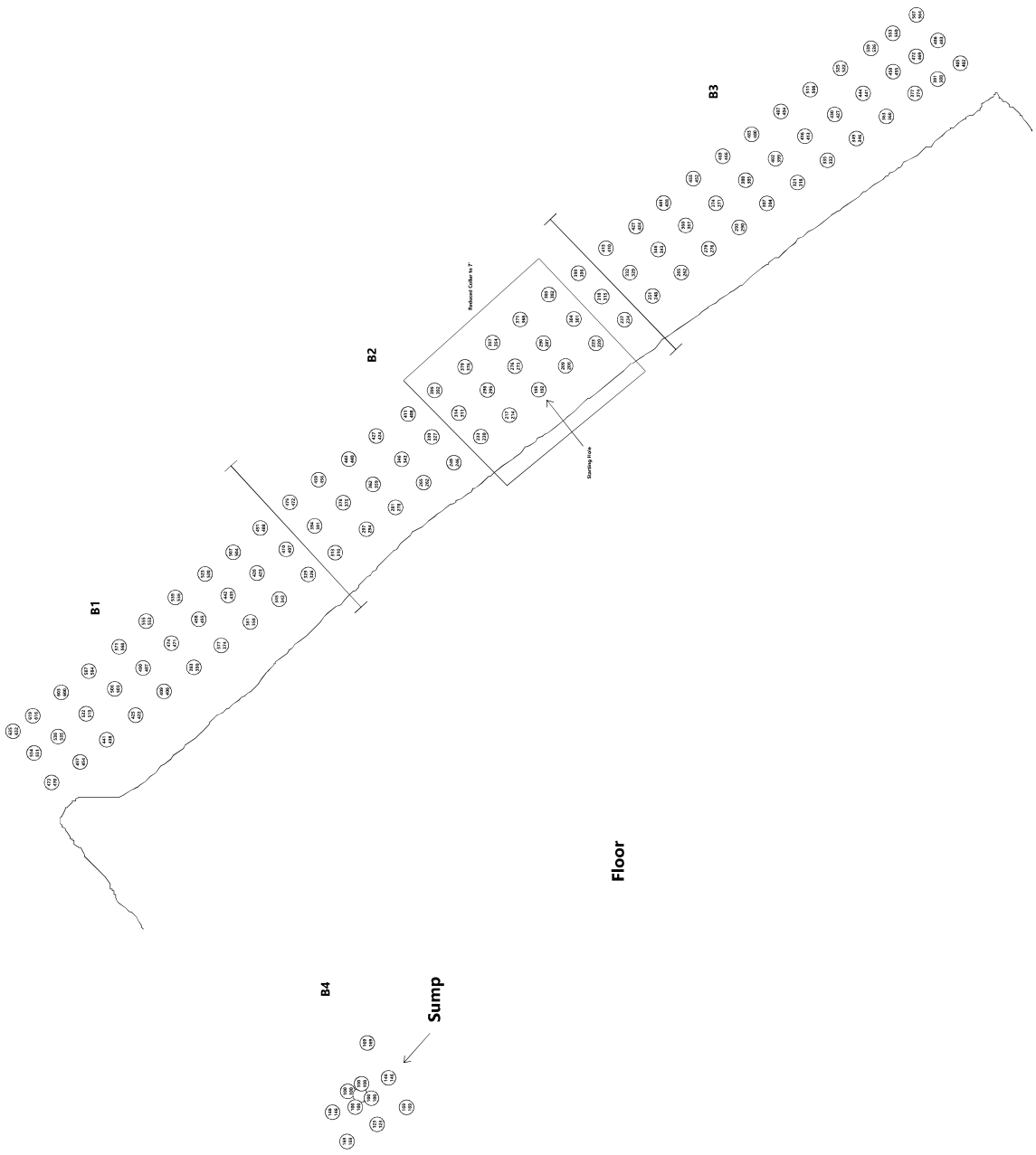
***SEISMOGRAPH 2 - 178717 GREY RD #17***

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Data Type: | Seismic Record | Seismograph Type: | Instantel - Minimate Blaster | | | | |
| Date: | 12/13/18 | Trigger Level: | 1.50 mm/s | 115.00 dB | Transverse: | 0.254 mm/s | 0.0 Hz |
| Time: | 14:22 | Calibration Date: | 01/15/18 | | Vertical: | 0.127 mm/s | 0.0 Hz |
| Distance From Blast: | 615.39 m | Calibration Signal: | OK | | Longitudinal: | 0.254 mm/s | 0.0 Hz |
| Direction From Blast: | SE | Geophone Min. Freq.: | --- Hz | | | | |
| Readout: | Printed Copy | Mic. Min. Freq.: | --- Hz | | Acoustic: | 119 dB | --- Hz |
| Location: | Spiked and buried. | | | | Vector Sum: | 0.311 mm/s | |
| U.T.M.: | 17N 500660 mE 4941991 mN | | | | | | |
| Reader and Firm: | Evan Smart, AUSTIN POWDER | | | | | | |
| Analyst and Firm: | | | | | | | |
| Installer and Firm: | John Newton, Austin Powder Ltd. | | | | | | |

***SEISMOGRAPH 3 - 283197 CONC. RD. #10***

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Data Type: | Seismic Record | Seismograph Type: | Instantel - Minimate Blaster | | | | |
| Date: | 12/13/18 | Trigger Level: | 1.50 mm/s | 115.00 dB | Transverse: | 0.254 mm/s | 0.0 Hz |
| Time: | 14:22 | Calibration Date: | 01/15/18 | | Vertical: | 0.127 mm/s | 0.0 Hz |
| Distance From Blast: | 1,021.08 m | Calibration Signal: | OK | | Longitudinal: | 0.127 mm/s | 0.0 Hz |
| Direction From Blast: | ESE | Geophone Min. Freq.: | --- Hz | | | | |
| Readout: | Printed Copy | Mic. Min. Freq.: | --- Hz | | Acoustic: | 123 dB | --- Hz |
| Location: | Spiked and weight bagged beside the mail box. | | | | Vector Sum: | 0.311 mm/s | |
| U.T.M.: | 17N 501117 mE 4941905 mN | | | | | | |
| Reader and Firm: | Evan Smart, AUSTIN POWDER | | | | | | |
| Analyst and Firm: | | | | | | | |
| Installer and Firm: | John Newton, Austin Powder Ltd. | | | | | | |

Hole Label Mode: Cumulative In-Hole Delays

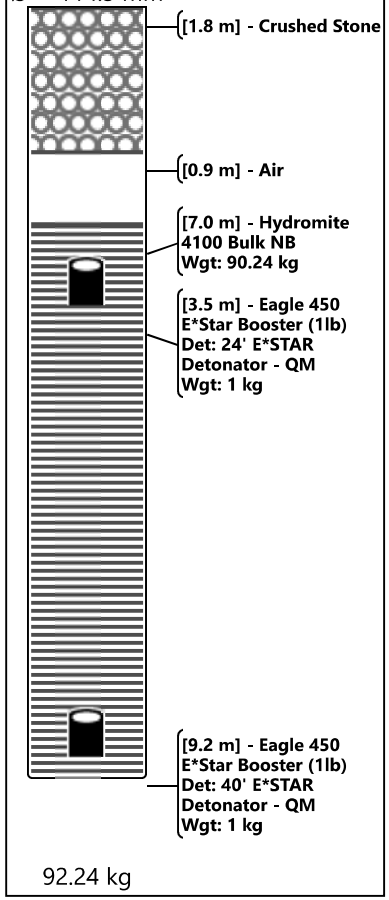


| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ33 | Typical Hole Load | 0 | 472/475 |
| ZZ80 | Typical Hole Load | 0 | 399/402 |
| ZZ99 | Typical Hole Load | 0 | 564/567 |
| ZZ17 | Typical Hole Load | 0 | 471/474 |
| ZZ9 | Typical Hole Load | 0 | 600/603 |
| ZZ73 | Typical Hole Load | 0 | 290/293 |
| ZZ44 | Typical Hole Load | 0 | 327/330 |
| ZZ61 | Typical Hole Load | 0 | 234/237 |
| ZZ110 | Sinking Cut Burn Holes | 0 | 100/100 |
| ZZ108 | Sinking Cut | 0 | 169/169 |
| ZZ90 | Typical Hole Load | 0 | 360/363 |
| ZZ51 | Typical Hole Load | 0 | 376/379 |
| ZZ74 | Typical Hole Load | 0 | 371/374 |
| ZZ103 | Sinking Cut | 0 | 146/146 |
| ZZ94 | Typical Hole Load | 0 | 550/553 |
| ZZ105 | Sinking Cut | 0 | 146/146 |
| ZZ24 | Typical Hole Load | 0 | 342/345 |
| ZZ67 | Typical Hole Load | 0 | 262/265 |
| ZZ18 | Typical Hole Load | 0 | 390/393 |
| ZZ37 | Typical Hole Load | 0 | 278/281 |
| ZZ55 | Typical Hole Load | 0 | 206/209 |
| ZZ1 | Typical Hole Load | 0 | 470/473 |
| ZZ89 | Typical Hole Load | 0 | 441/444 |
| ZZ104 | Empty Hole | 0 | |
| ZZ81 | Typical Hole Load | 0 | 480/483 |
| ZZ56 | Typical Hole Load | 0 | 287/290 |
| ZZ30 | Typical Hole Load | 0 | 326/329 |
| ZZ63 | Typical Hole Load | 0 | 396/399 |
| ZZ60 | Typical Hole Load | 0 | 220/223 |
| ZZ82 | Typical Hole Load | 0 | 494/497 |
| ZZ3 | Typical Hole Load | 0 | 632/635 |
| ZZ23 | Typical Hole Load | 0 | 358/361 |
| ZZ91 | Typical Hole Load | 0 | 374/377 |
| ZZ29 | Typical Hole Load | 0 | 407/410 |
| ZZ5 | Typical Hole Load | 0 | 535/538 |
| ZZ87 | Typical Hole Load | 0 | 508/511 |
| ZZ96 | Typical Hole Load | 0 | 388/391 |
| ZZ85 | Typical Hole Load | 0 | 346/349 |
| ZZ34 | Typical Hole Load | 0 | 456/459 |
| ZZ109 | Sinking Cut Burn Holes | 0 | 100/100 |
| ZZ25 | Typical Hole Load | 0 | 423/426 |
| ZZ12 | Typical Hole Load | 0 | 422/425 |
| ZZ19 | Typical Hole Load | 0 | 374/377 |
| ZZ43 | Typical Hole Load | 0 | 246/249 |
| ZZ77 | Typical Hole Load | 0 | 385/388 |
| ZZ45 | Typical Hole Load | 0 | 408/411 |

| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ72 | Typical Hole Load | 0 | 276/279 |
| ZZ84 | Typical Hole Load | 0 | 332/335 |
| ZZ39 | Typical Hole Load | 0 | 440/443 |
| ZZ21 | Typical Hole Load | 0 | 536/539 |
| ZZ76 | Typical Hole Load | 0 | 466/469 |
| ZZ92 | Typical Hole Load | 0 | 455/458 |
| ZZ107 | Sinking Cut | 0 | 123/123 |
| ZZ64 | Typical Hole Load | 0 | 410/413 |
| ZZ20 | Typical Hole Load | 0 | 455/458 |
| ZZ53 | Typical Hole Load | 0 | 273/276 |
| ZZ35 | Typical Hole Load | 0 | 375/378 |
| ZZ112 | Sinking Cut Burn Holes | 0 | 100/100 |
| ZZ2 | Typical Hole Load | 0 | 551/554 |
| ZZ98 | Typical Hole Load | 0 | 483/486 |
| ZZ7 | Typical Hole Load | 0 | 438/441 |
| ZZ79 | Typical Hole Load | 0 | 318/321 |
| ZZ70 | Typical Hole Load | 0 | 438/441 |
| ZZ27 | Typical Hole Load | 0 | 520/523 |
| ZZ36 | Typical Hole Load | 0 | 294/297 |
| ZZ97 | Typical Hole Load | 0 | 402/405 |
| ZZ11 | Typical Hole Load | 0 | 503/506 |
| ZZ28 | Typical Hole Load | 0 | 488/491 |
| ZZ86 | Typical Hole Load | 0 | 427/430 |
| ZZ50 | Typical Hole Load | 0 | 295/298 |
| ZZ52 | Typical Hole Load | 0 | 354/357 |
| ZZ38 | Typical Hole Load | 0 | 359/362 |
| ZZ88 | Typical Hole Load | 0 | 522/525 |
| ZZ59 | Typical Hole Load | 0 | 301/304 |
| ZZ8 | Typical Hole Load | 0 | 519/522 |
| ZZ13 | Typical Hole Load | 0 | 406/409 |
| ZZ31 | Typical Hole Load | 0 | 310/313 |
| ZZ46 | Typical Hole Load | 0 | 392/395 |
| ZZ41 | Typical Hole Load | 0 | 343/346 |
| ZZ71 | Typical Hole Load | 0 | 357/360 |
| ZZ16 | Typical Hole Load | 0 | 552/555 |
| ZZ65 | Typical Hole Load | 0 | 329/332 |
| ZZ106 | Sinking Cut | 0 | 169/169 |
| ZZ47 | Typical Hole Load | 0 | 311/314 |
| ZZ6 | Typical Hole Load | 0 | 454/457 |
| ZZ40 | Typical Hole Load | 0 | 424/427 |
| ZZ14 | Typical Hole Load | 0 | 487/490 |
| ZZ68 | Typical Hole Load | 0 | 343/346 |
| ZZ78 | Typical Hole Load | 0 | 304/307 |
| ZZ93 | Typical Hole Load | 0 | 536/539 |
| ZZ75 | Typical Hole Load | 0 | 452/455 |
| ZZ42 | Typical Hole Load | 0 | 262/265 |

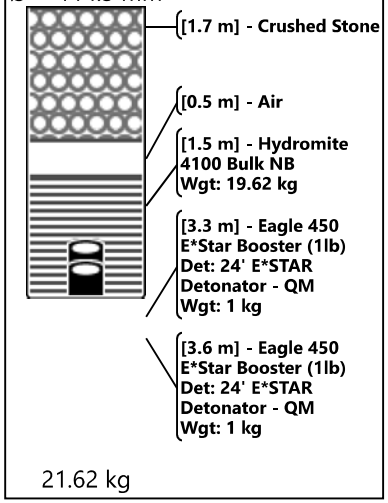
| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ54 | Typical Hole Load | 0 | 192/195 |
| ZZ48 | Typical Hole Load | 0 | 230/233 |
| ZZ66 | Typical Hole Load | 0 | 248/251 |
| ZZ83 | Typical Hole Load | 0 | 413/416 |
| ZZ49 | Typical Hole Load | 0 | 214/217 |
| ZZ10 | Typical Hole Load | 0 | 584/587 |
| ZZ4 | Typical Hole Load | 0 | 616/619 |
| ZZ32 | Typical Hole Load | 0 | 391/394 |
| ZZ26 | Typical Hole Load | 0 | 504/507 |
| ZZ69 | Typical Hole Load | 0 | 424/427 |
| ZZ15 | Typical Hole Load | 0 | 568/571 |
| ZZ100 | Sinking Cut | 0 | 169/169 |
| ZZ57 | Typical Hole Load | 0 | 368/371 |
| ZZ22 | Typical Hole Load | 0 | 439/442 |
| ZZ111 | Sinking Cut Burn Holes | 0 | 100/100 |
| ZZ62 | Typical Hole Load | 0 | 315/318 |
| ZZ95 | Typical Hole Load | 0 | 469/472 |
| ZZ58 | Typical Hole Load | 0 | 382/385 |

## Typical Hole Load



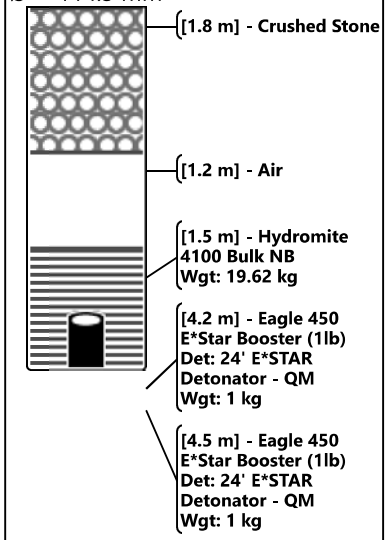

92.24 kg

## Sinking Cut



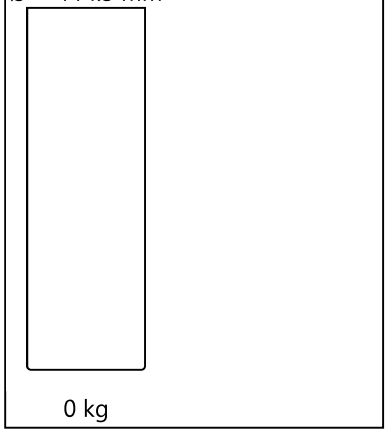

21.62 kg

## Sinking Cut Burn...




21.62 kg

## Empty Hole




0 kg

# AUSTIN POWDER LTD.
# BLAST REPORT

327-Orillia
RR #4 ON, Orillia, Canada L3V 1- 84

Blast No.: 2018-07
Blast Type: Stone Quarry/Stone Mine - Production
Customer: HAROLD SUTHERLAND CONST.-KEPPEL (HAR1525-001)
Date/Time: 09/17/2018 14:55
Pit/Permit: KEPPEL QUARRY / SHOT SERVICE
Location: Bottom Bench

## *ENVIRONMENT*

Method Used: U.T.M.
Weather: Clear
Wind From: W
Temperature: 33 °C
Terrain: Flat
Wind Velocity: 11-11 km/h
Blast U.T.M.: 17N 500213 mE 4942365 mN

## *NEAREST PROTECTED STRUCTURE*

Compass Point: NNW
Structure Name: 178841 Grey Rd #17
Direction/Bearing: 350 °
Structure Type: Dwelling
Distance: 656 m
Structure U.T.M.: 17N 500101 mE 4943011 mN

## *LAYOUT*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | Hole Depth: | 10.36 m | Material Blasted: | Limestone | Total Meters Drilled: | 2,352.4 m |
| No. of Holes: | 227 | Subdrilling: | 0.01 m | Burden: | 3.05 m | Water Depth: | 4.57 m |
| No. of V.P.† Holes: | 227 | Face Height: | 10.36 m | Spacing: | 3.05 m | Stem Length: | min 1.68 m |
| No. of Rows: | 4 | Drilling Angle: | ° | Back Fill Depth: | 0.00 m | Area Type: | Center Start/ Breakout |
| Diameter: | 114.3 mm | Mats Used: | No | Stem Type: | Clear Stone | Method: | Specified (H = 9.75 m) |

† V.P. = Volume Producing

## *WEIGHTS*

| | | | | | |
|---|---|---|---|---|---|
| | | Max. Wt. of Expl. in Overlapped Decks: | 646.0 kg | Volume Produced: | 20,206.9 m³ |
| Initiation: | Electronic | Max. Wt. of Expl. Per 8 ms Interval: | 646.0 kg | Weight Produced: | 53,539.6 t |
| Firing Device: | E*Star Blasting Machine (WRFD) | Max. No. of Holes Per 8 ms Interval: | 7 | Powder Factor 1: | 2.588 t/kg |
| Other Method: | | Max. Wt. of Explosive Per Hole: | 92.3 kg | Powder Factor 2: | 1.023 kg/m³ |
| Mfg and Model: | DBM1600-2-RC | Scaled Distance Factor (max charge): | 68.95 | Rock Density: | 2.650 t/m³ |
| Initiation Settings: | | Scaled Distance Factor (per delay): | 26.06 | | |
| Series Resistance (ohms): | | | | | |

## *SEISMOGRAPHS*

See seismographs on separate page

## *CREW*

Blast occurred other than scheduled time: No
Misfire Occurred: No
Protective Cover: Loader Bucket

| Last Name | First Name | License / Cert | 2nd License / Cert | In Charge | Tied In | Chk. Tie-In | Driller | Layout |
|---|---|---|---|---|---|---|---|---|
| SMART | EVAN, C | * ON - N/A | | Yes | Yes | Yes | No | Yes |
| BELTRAME | ALEXANDER, A | | | No | Yes | No | No | No |
| GRENIER | JOHNATHON, R | | | No | No | No | No | No |
| KOUYOUMJIAN | MACKENZIE, H | | | No | Yes | No | No | No |
| NEWTON | JOHN, D | | | No | Yes | Yes | No | No |
| PASSMORE | EDGAR, M | | | No | No | No | No | No |
| REED | ADAM, G | | | No | Yes | No | No | No |

# AUSTIN POWDER LTD.
# BLAST REPORT

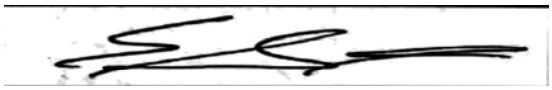
327-Orillia
RR #4 ON, Orillia, Canada L3V 1- 84

Blast No.: 2018-07
Blast Type: Stone Quarry/Stone Mine - Production
Customer: HAROLD SUTHERLAND CONST.-KEPPEL (HAR1525-001)
Date/Time: 09/17/2018 14:55
Pit/Permit: KEPPEL QUARRY / SHOT SERVICE
Location: Bottom Bench

***PRODUCTS AND SERVICES***

| Number | Product Description | Quantity | | Weight ( kg ) |
|---|---|---|---|---|
| 15107 | Eagle 450 E*Star Booster (1lb) | 454.00 | ea | 454.00 |
| 15001 | 24' E*STAR Detonator - QM | 222.00 | ea | 0.00 |
| 15003 | 40' E*STAR Detonator - QM | 232.00 | ea | 0.00 |
| 12276 | E*Star Bus Wire - 1250' spool | 3.00 | sp | 0.00 |
| 15128 | Hydromite 4100 Bulk NB | 20,230.00 | kg | 20,230.00 |
| 12981 | Mini Stem Plug - 6015 | 227.00 | ea | 0.00 |
| | | Total Weight of Explosives (Include Primers) ( kg ): | | 20,684.00 |

***COMMENTS / EXPLANATIONS***



Signature of Blaster in Charge

# AUSTIN POWDER LTD.
# BLAST REPORT

327-Orillia
RR #4 ON, Orillia, Canada L3V 1- 84

Blast No.: 2018-07
Blast Type: Stone Quarry/Stone Mine - Production
Customer: HAROLD SUTHERLAND CONST.-KEPPEL (HAR1525-001)
Date/Time: 09/17/2018 14:55
Pit/Permit: KEPPEL QUARRY / SHOT SERVICE
Location: Bottom Bench

## *SEISMOGRAPH 1 - 178717 GREY RD #17*

Data Type: Seismic Record
Seismograph Type: Instantel - Minimate Blaster
Date: 09/17/18
Trigger Level: 1.50 mm/s 115.00 dB
Time: 14:55
Calibration Date: 01/15/18
Distance From Blast: 582.78 m
Calibration Signal: OK
Direction From Blast: SE
Geophone Min. Freq.: --- Hz
Readout: Printed Copy
Mic. Min. Freq.: --- Hz
Location: Spiked and buried.
U.T.M.: 17N 500660 mE 4941991 mN
Reader and Firm: Evan Smart, AUSTIN POWDER
Analyst and Firm:
Installer and Firm: Evan Smart, Austin Powder Ltd.

| | | |
|---|---|---|
| Transverse: | 1.778 mm/s | 39.0 Hz |
| Vertical: | 1.905 mm/s | 43.0 Hz |
| Longitudinal: | 2.032 mm/s | 43.0 Hz |
| PPV: | --- mm/s | --- Hz |
| Acoustic: | 120 dB | |
| Vector Sum: | 2.163 mm/s | |

## *SEISMOGRAPH 2 - 283197 CONC. RD. #10*

Data Type: Seismic Record
Seismograph Type: Instantel - Minimate Blaster
Date: 09/17/18
Trigger Level: 1.50 mm/s 115.00 dB
Time: 14:55
Calibration Date: 01/15/18
Distance From Blast: 1,014.37 m
Calibration Signal: OK
Direction From Blast: ESE
Geophone Min. Freq.: --- Hz
Readout: Printed Copy
Mic. Min. Freq.: --- Hz
Location: Spiked and weight bagged beside the mail box.
U.T.M.: 17N 501117 mE 4941905 mN
Reader and Firm: Evan Smart, AUSTIN POWDER
Analyst and Firm:
Installer and Firm: Evan Smart, Austin Powder Ltd.

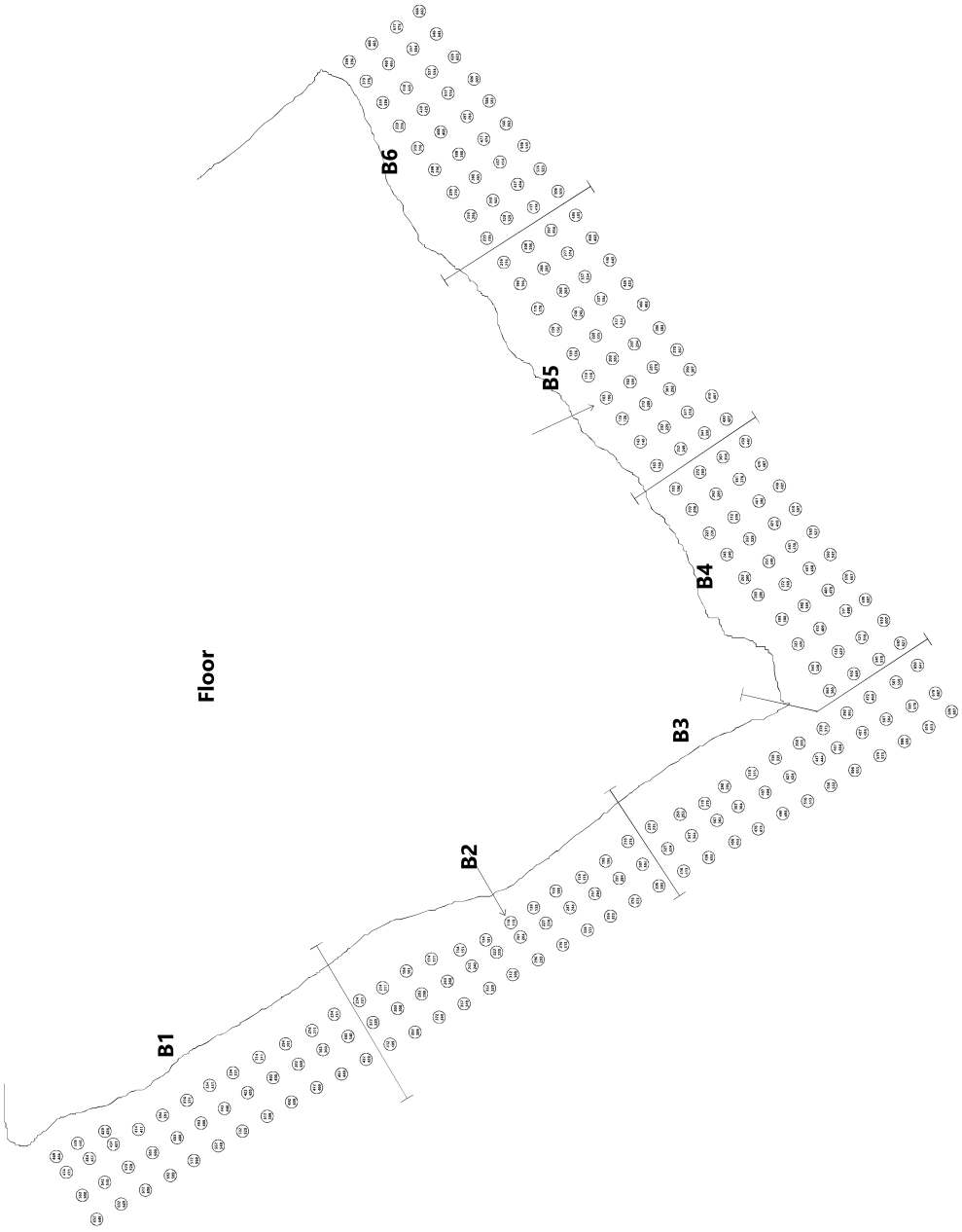
| | | |
|---|---|---|
| Transverse: | 1.143 mm/s | 43.0 Hz |
| Vertical: | 2.032 mm/s | 43.0 Hz |
| Longitudinal: | 1.905 mm/s | 43.0 Hz |
| PPV: | --- mm/s | --- Hz |
| Acoustic: | 113 dB | |
| Vector Sum: | 2.222 mm/s | |

## *SEISMOGRAPH 3 - 178841 GREY ROAD #17*

Data Type: Seismic Record
Seismograph Type: Instantel - Minimate Blaster
Date: 09/17/18
Trigger Level: 1.50 mm/s 115.00 dB
Time: 14:55
Calibration Date: 01/17/18
Distance From Blast: 655.62 m
Calibration Signal: OK
Direction From Blast: NNW
Geophone Min. Freq.: --- Hz
Readout: Printed Copy
Mic. Min. Freq.: --- Hz
Location: Bolted to Bedrock.
U.T.M.: 17N 500101 mE 4943011 mN
Reader and Firm: Evan Smart, AUSTIN POWDER
Analyst and Firm:
Installer and Firm: Evan Smart, Austin Powder Ltd.

| | | |
|---|---|---|
| Transverse: | 0.127 mm/s | 0.0 Hz |
| Vertical: | 0.254 mm/s | 0.0 Hz |
| Longitudinal: | 0.127 mm/s | 0.0 Hz |
| PPV: | --- mm/s | --- Hz |
| Acoustic: | 120 dB | |
| Vector Sum: | 0.311 mm/s | |

Hole Label Mode: Cumulative In-Hole Delays



| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ172 | Typical Hole Load | 0 | 220/223 |
| ZZ145 | Typical Hole Load | 0 | 364/367 |
| ZZ92 | Typical Hole Load | 0 | 507/510 |
| ZZ65 | Typical Hole Load | 0 | 120/123 |
| ZZ120 | Typical Hole Load | 0 | 395/398 |
| ZZ37 | Typical Hole Load | 0 | 483/486 |
| ZZ59 | Typical Hole Load | 0 | 294/297 |
| ZZ150 | Typical Hole Load | 0 | 235/238 |
| ZZ205 | Typical Hole Load | 0 | 440/443 |
| ZZ195 | Typical Hole Load | 0 | 469/472 |
| ZZ212 | Typical Hole Load | 0 | 569/572 |
| ZZ41 | Typical Hole Load | 0 | 196/199 |
| ZZ17 | Typical Hole Load | 0 | 316/319 |
| ZZ103 | Typical Hole Load | 0 | 389/392 |
| ZZ5 | Typical Hole Load | 0 | 643/646 |
| ZZ60 | Typical Hole Load | 0 | 383/386 |
| ZZ4 | Typical Hole Load | 0 | 663/666 |
| ZZ122 | Typical Hole Load | 0 | 504/507 |
| ZZ29 | Typical Hole Load | 0 | 523/526 |
| ZZ168 | Typical Hole Load | 0 | 115/118 |
| ZZ152 | Typical Hole Load | 0 | 413/416 |
| ZZ52 | Typical Hole Load | 0 | 423/426 |
| ZZ194 | Typical Hole Load | 0 | 449/452 |
| ZZ164 | Typical Hole Load | 0 | 333/336 |
| ZZ116 | Typical Hole Load | 0 | 627/630 |
| ZZ97 | Typical Hole Load | 0 | 280/283 |
| ZZ27 | Typical Hole Load | 0 | 454/457 |
| ZZ101 | Typical Hole Load | 0 | 567/570 |
| ZZ185 | Typical Hole Load | 0 | 211/214 |
| ZZ34 | Typical Hole Load | 0 | 325/328 |
| ZZ202 | Typical Hole Load | 0 | 420/423 |
| ZZ221 | Typical Hole Load | 0 | 540/543 |
| ZZ55 | Typical Hole Load | 0 | 225/228 |
| ZZ137 | Typical Hole Load | 0 | 335/338 |
| ZZ166 | Typical Hole Load | 0 | 224/227 |
| ZZ83 | Typical Hole Load | 0 | 378/381 |
| ZZ225 | Typical Hole Load | 0 | 471/474 |
| ZZ30 | Typical Hole Load | 0 | 434/437 |
| ZZ183 | Typical Hole Load | 0 | 389/392 |
| ZZ158 | Typical Hole Load | 0 | 373/376 |
| ZZ204 | Typical Hole Load | 0 | 351/354 |
| ZZ118 | Typical Hole Load | 0 | 558/561 |
| ZZ125 | Typical Hole Load | 0 | 687/690 |
| ZZ136 | Typical Hole Load | 0 | 424/427 |
| ZZ200 | Typical Hole Load | 0 | 489/492 |
| ZZ160 | Typical Hole Load | 0 | 264/267 |

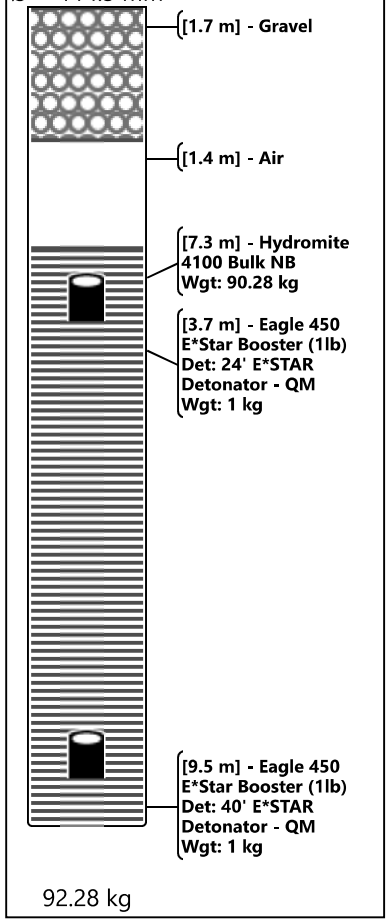
| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ138 | Typical Hole Load | 0 | 315/318 |
| ZZ179 | Typical Hole Load | 0 | 171/174 |
| ZZ167 | Typical Hole Load | 0 | 135/138 |
| ZZ102 | Typical Hole Load | 0 | 478/481 |
| ZZ128 | Typical Hole Load | 0 | 573/576 |
| ZZ189 | Typical Hole Load | 0 | 429/432 |
| ZZ224 | Typical Hole Load | 0 | 466/469 |
| ZZ218 | Typical Hole Load | 0 | 520/523 |
| ZZ144 | Typical Hole Load | 0 | 275/278 |
| ZZ214 | Typical Hole Load | 0 | 500/503 |
| ZZ206 | Typical Hole Load | 0 | 529/532 |
| ZZ105 | Typical Hole Load | 0 | 320/323 |
| ZZ177 | Typical Hole Load | 0 | 349/352 |
| ZZ9 | Typical Hole Load | 0 | 356/359 |
| ZZ71 | Typical Hole Load | 0 | 229/232 |
| ZZ62 | Typical Hole Load | 0 | 278/281 |
| ZZ112 | Typical Hole Load | 0 | 340/343 |
| ZZ8 | Typical Hole Load | 0 | 376/379 |
| ZZ143 | Typical Hole Load | 0 | 295/298 |
| ZZ82 | Typical Hole Load | 0 | 289/292 |
| ZZ77 | Typical Hole Load | 0 | 447/450 |
| ZZ25 | Typical Hole Load | 0 | 276/279 |
| ZZ191 | Typical Hole Load | 0 | 251/254 |
| ZZ78 | Typical Hole Load | 0 | 358/361 |
| ZZ28 | Typical Hole Load | 0 | 543/546 |
| ZZ54 | Typical Hole Load | 0 | 314/317 |
| ZZ180 | Typical Hole Load | 0 | 191/194 |
| ZZ43 | Typical Hole Load | 0 | 374/377 |
| ZZ94 | Typical Hole Load | 0 | 438/441 |
| ZZ39 | Typical Hole Load | 0 | 305/308 |
| ZZ134 | Typical Hole Load | 0 | 533/536 |
| ZZ220 | Typical Hole Load | 0 | 629/632 |
| ZZ151 | Typical Hole Load | 0 | 324/327 |
| ZZ32 | Typical Hole Load | 0 | 256/259 |
| ZZ87 | Typical Hole Load | 0 | 309/312 |
| ZZ13 | Typical Hole Load | 0 | 603/606 |
| ZZ119 | Typical Hole Load | 0 | 469/472 |
| ZZ121 | Typical Hole Load | 0 | 484/487 |
| ZZ58 | Typical Hole Load | 0 | 205/208 |
| ZZ182 | Typical Hole Load | 0 | 369/372 |
| ZZ88 | Typical Hole Load | 0 | 220/223 |
| ZZ169 | Typical Hole Load | 0 | 204/207 |
| ZZ187 | Typical Hole Load | 0 | 320/323 |
| ZZ2 | Typical Hole Load | 0 | 485/488 |
| ZZ148 | Typical Hole Load | 0 | 344/347 |
| ZZ223 | Typical Hole Load | 0 | 446/449 |

| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ14 | Typical Hole Load | 0 | 514/517 |
| ZZ36 | Typical Hole Load | 0 | 503/506 |
| ZZ219 | Typical Hole Load | 0 | 609/612 |
| ZZ19 | Typical Hole Load | 0 | 494/497 |
| ZZ108 | Typical Hole Load | 0 | 587/590 |
| ZZ106 | Typical Hole Load | 0 | 409/412 |
| ZZ47 | Typical Hole Load | 0 | 265/268 |
| ZZ132 | Typical Hole Load | 0 | 355/358 |
| ZZ161 | Toe Load | 0 | 175/178 |
| ZZ86 | Typical Hole Load | 0 | 398/401 |
| ZZ18 | Typical Hole Load | 0 | 405/408 |
| ZZ16 | Typical Hole Load | 0 | 336/339 |
| ZZ11 | Typical Hole Load | 0 | 534/537 |
| ZZ174 | Toe Load | 0 | 151/154 |
| ZZ95 | Typical Hole Load | 0 | 349/352 |
| ZZ178 | Typical Hole Load | 0 | 260/263 |
| ZZ114 | Typical Hole Load | 0 | 449/452 |
| ZZ123 | Typical Hole Load | 0 | 578/581 |
| ZZ3 | Typical Hole Load | 0 | 574/577 |
| ZZ53 | Typical Hole Load | 0 | 403/406 |
| ZZ155 | Toe Load | 0 | 215/218 |
| ZZ61 | Typical Hole Load | 0 | 367/370 |
| ZZ93 | Typical Hole Load | 0 | 527/530 |
| ZZ139 | Typical Hole Load | 0 | 404/407 |
| ZZ196 | Typical Hole Load | 0 | 380/383 |
| ZZ186 | Typical Hole Load | 0 | 231/234 |
| ZZ227 | Typical Hole Load | 0 | 649/652 |
| ZZ89 | Typical Hole Load | 0 | 240/243 |
| ZZ192 | Typical Hole Load | 0 | 271/274 |
| ZZ22 | Typical Hole Load | 0 | 474/477 |
| ZZ130 | Typical Hole Load | 0 | 464/467 |
| ZZ38 | Typical Hole Load | 0 | 394/397 |
| ZZ6 | Typical Hole Load | 0 | 554/557 |
| ZZ12 | Typical Hole Load | 0 | 623/626 |
| ZZ208 | Typical Hole Load | 0 | 460/463 |
| ZZ188 | Typical Hole Load | 0 | 409/412 |
| ZZ175 | Typical Hole Load | 0 | 240/243 |
| ZZ57 | Typical Hole Load | 0 | 116/119 |
| ZZ171 | Typical Hole Load | 0 | 309/312 |
| ZZ67 | Typical Hole Load | 0 | 298/301 |
| ZZ216 | Typical Hole Load | 0 | 426/429 |
| ZZ217 | Typical Hole Load | 0 | 431/434 |
| ZZ115 | Typical Hole Load | 0 | 538/541 |
| ZZ64 | Typical Hole Load | 0 | 100/103 |
| ZZ222 | Typical Hole Load | 0 | 451/454 |
| ZZ153 | Typical Hole Load | 0 | 393/396 |

| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ154 | Typical Hole Load | 0 | 304/307 |
| ZZ193 | Typical Hole Load | 0 | 360/363 |
| ZZ113 | Typical Hole Load | 0 | 360/363 |
| ZZ76 | Typical Hole Load | 0 | 427/430 |
| ZZ146 | Typical Hole Load | 0 | 453/456 |
| ZZ203 | Typical Hole Load | 0 | 331/334 |
| ZZ211 | Typical Hole Load | 0 | 480/483 |
| ZZ23 | Typical Hole Load | 0 | 385/388 |
| ZZ99 | Typical Hole Load | 0 | 458/461 |
| ZZ198 | Typical Hole Load | 0 | 311/314 |
| ZZ46 | Typical Hole Load | 0 | 354/357 |
| ZZ98 | Typical Hole Load | 0 | 369/372 |
| ZZ74 | Typical Hole Load | 0 | 249/252 |
| ZZ199 | Typical Hole Load | 0 | 400/403 |
| ZZ31 | Typical Hole Load | 0 | 345/348 |
| ZZ26 | Typical Hole Load | 0 | 365/368 |
| ZZ163 | Typical Hole Load | 0 | 244/247 |
| ZZ140 | Typical Hole Load | 0 | 493/496 |
| ZZ44 | Typical Hole Load | 0 | 463/466 |
| ZZ173 | Typical Hole Load | 0 | 131/134 |
| ZZ81 | Typical Hole Load | 0 | 200/203 |
| ZZ33 | Typical Hole Load | 0 | 236/239 |
| ZZ73 | Typical Hole Load | 0 | 160/163 |
| ZZ213 | Typical Hole Load | 0 | 589/592 |
| ZZ156 | Toe Load | 0 | 195/198 |
| ZZ149 | Typical Hole Load | 0 | 255/258 |
| ZZ66 | Typical Hole Load | 0 | 209/212 |
| ZZ7 | Typical Hole Load | 0 | 465/468 |
| ZZ181 | Typical Hole Load | 0 | 280/283 |
| ZZ48 | Typical Hole Load | 0 | 176/179 |
| ZZ207 | Typical Hole Load | 0 | 549/552 |
| ZZ131 | Typical Hole Load | 0 | 375/378 |
| ZZ110 | Typical Hole Load | 0 | 518/521 |
| ZZ190 | Typical Hole Load | 0 | 340/343 |
| ZZ176 | Typical Hole Load | 0 | 329/332 |
| ZZ170 | Typical Hole Load | 0 | 293/296 |
| ZZ10 | Typical Hole Load | 0 | 445/448 |
| ZZ210 | Typical Hole Load | 0 | 391/394 |
| ZZ15 | Typical Hole Load | 0 | 425/428 |
| ZZ70 | Typical Hole Load | 0 | 318/321 |
| ZZ215 | Typical Hole Load | 0 | 411/414 |
| ZZ111 | Typical Hole Load | 0 | 429/432 |
| ZZ68 | Typical Hole Load | 0 | 387/390 |
| ZZ79 | Typical Hole Load | 0 | 269/272 |
| ZZ165 | Typical Hole Load | 0 | 313/316 |
| ZZ126 | Typical Hole Load | 0 | 613/616 |

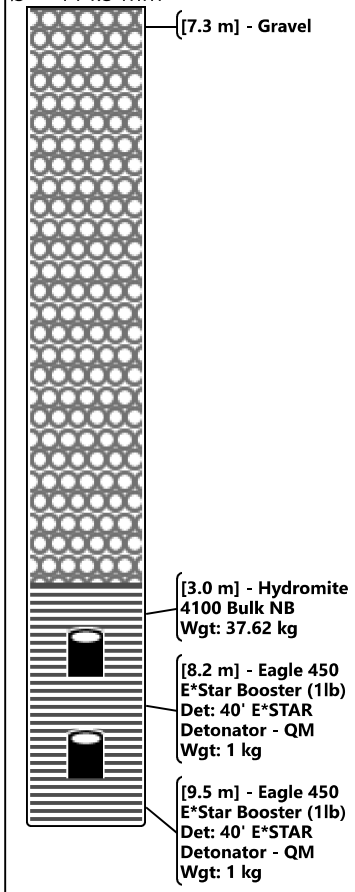
| Hole | Load | Surface Delay | Deck 1 Delay |
|---|---|---|---|
| ZZ124 | Typical Hole Load | 0 | 667/670 |
| ZZ49 | Typical Hole Load | 0 | 156/159 |
| ZZ85 | Typical Hole Load | 0 | 487/490 |
| ZZ45 | Typical Hole Load | 0 | 443/446 |
| ZZ35 | Typical Hole Load | 0 | 414/417 |
| ZZ142 | Typical Hole Load | 0 | 384/387 |
| ZZ96 | Typical Hole Load | 0 | 260/263 |
| ZZ117 | Typical Hole Load | 0 | 647/650 |
| ZZ63 | Typical Hole Load | 0 | 189/192 |
| ZZ147 | Typical Hole Load | 0 | 433/436 |
| ZZ109 | Typical Hole Load | 0 | 607/610 |
| ZZ84 | Typical Hole Load | 0 | 467/470 |
| ZZ1 | Typical Hole Load | 0 | 396/399 |
| ZZ42 | Typical Hole Load | 0 | 285/288 |
| ZZ157 | Typical Hole Load | 0 | 284/287 |
| ZZ127 | Typical Hole Load | 0 | 593/596 |
| ZZ91 | Typical Hole Load | 0 | 418/421 |
| ZZ162 | Typical Hole Load | 0 | 155/158 |
| ZZ201 | Typical Hole Load | 0 | 509/512 |
| ZZ24 | Typical Hole Load | 0 | 296/299 |
| ZZ90 | Typical Hole Load | 0 | 329/332 |
| ZZ50 | Typical Hole Load | 0 | 245/248 |
| ZZ159 | Typical Hole Load | 0 | 353/356 |
| ZZ209 | Typical Hole Load | 0 | 371/374 |
| ZZ21 | Typical Hole Load | 0 | 563/566 |
| ZZ40 | Typical Hole Load | 0 | 216/219 |
| ZZ129 | Typical Hole Load | 0 | 553/556 |
| ZZ226 | Typical Hole Load | 0 | 560/563 |
| ZZ56 | Typical Hole Load | 0 | 136/139 |
| ZZ184 | Typical Hole Load | 0 | 300/303 |
| ZZ75 | Typical Hole Load | 0 | 338/341 |
| ZZ69 | Typical Hole Load | 0 | 407/410 |
| ZZ20 | Typical Hole Load | 0 | 583/586 |
| ZZ100 | Typical Hole Load | 0 | 547/550 |
| ZZ141 | Typical Hole Load | 0 | 473/476 |
| ZZ197 | Typical Hole Load | 0 | 291/294 |
| ZZ133 | Typical Hole Load | 0 | 444/447 |
| ZZ72 | Typical Hole Load | 0 | 140/143 |
| ZZ80 | Typical Hole Load | 0 | 180/183 |
| ZZ107 | Typical Hole Load | 0 | 498/501 |
| ZZ135 | Typical Hole Load | 0 | 513/516 |
| ZZ51 | Typical Hole Load | 0 | 334/337 |
| ZZ104 | Toe Load | 0 | 300/303 |

## Typical Hole Load




92.28 kg

## Toe Load




39.62 kg