APPENDIX D - Surface Geophysical Test Data – No Change for Rev. 4

D.1 – Seismic Refraction Survey Report
D.2 – Seismic Reflection Survey Report

APPENDIX D.1 – Seismic Refraction Survey Report

No Change for Rev. 4

amec

DOCUMENTATION OF TECHNICAL REVIEW
SUBCONTRACTOR WORK PRODUCT

Project Name: Clinch River SMR Project

Project Number: 6468-13-1072

Project Manager: Steve Criscenzo

Project Technical Leads: Al Tice, Carl Tockstein

The report described below has been prepared by the named subcontractor retained in accordance with the AMEC QAPD. The report is a revision to address comments received from Bechtel reviewers. The revised report has been reviewed by an AMEC technically qualified person. Comments from the Bechtel review were discussed with Bechtel and most were addressed without need for report revision. Editorial revisions based on Bechtel comments have been made appropriately incorporated by the subcontractor. The revised report is accepted for use on the Clinch River SMR Project.

MATERIAL : Report, Seismic Refraction Investigation, Clinch River SMR Project, Oak Ridge, Tennessee, report 13162-01, Rev. 2 dated February 28, 2014

SUBCONTRACTOR: GEOVision Geophysical Services

DATE OF REVIEW AND ACCEPTANCE : March 4, 2014

TECHNICAL REVIEWER: J. Allan Tice

PROJECT TECHNICAL LEAD: J. Allan Tice

REPORT

SEISMIC REFRACTION INVESTIGATION

Clinch River SMR Project
Oak Ridge, Tennessee

Report 13162-01 Rev 2

February 28, 2014

REPORT

SEISMIC REFRACTION INVESTIGATION

Clinch River SMR Project
Oak Ridge, Tennessee

GEO*Vision* Project No. 13162

Prepared for

AMEC Environment & Infrastructure, Inc
4021 Stirrup Creek Drive, Suite 100
Durham, NC 27703
(919) 381-9900

Prepared by

GEO*Vision* Geophysical Services, Inc.
1124 Olympic Drive
Corona, CA 92881
(951) 549-1234

Report 13162-01 Rev 2

February 28, 2014

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1 INTRODUCTION

A seismic refraction survey was conducted at the Clinch River SMR Project site near Oak Ridge, Tennessee from June 3rd through the 6th, 2013. The purpose of the seismic refraction survey was to map the depth to bedrock beneath six (6) seismic refraction profiles. The P-wave seismic refraction technique was the primary technique used during this investigation.

Data acquisition was performed by a **GEO***Vision* field team led by William Dalrymple. Data analysis was performed by Antony Martin and William Dalrymple and reviewed by John Diehl of **GEO***Vision*. Report preparation was performed by William Dalrymple, verified and reviewed by John Diehl and Antony Martin, of **GEO***Vision*. The work was performed under subcontract with AMEC Environment & Infrastructure, Inc. (AMEC E&I) with Steve Criscenzo serving as the point of contact and Al Tice as the technical lead for AMEC E&I. Data acquisition was completed under Work Instruction 017 issued June 3rd, 2013. Processing and reporting was completed under Work Instruction 076 issued November 25th, 2013.

Subsurface geologic conditions at the site consist of a layer of soil or compacted fill comprised of gravel, sand and soils overlying weathered siltstone, weathered limestone and limestone bedrock. Seismic refraction data were acquired along six (6) lines (SRS-1 through SRS-6). The locations of the seismic lines were established and surveyed by AMEC E&I at 100 ft intervals. The ends of the seismic lines that were not coincident with the surveyed locations were interpolated from the known survey points. The locations of the seismic lines and boreholes in the site vicinity are shown in Figure 1. The coordinates of the interpolated and surveyed line endpoints are presented in Table 1. The AMEC E&I asbuilt surveyed location coordinates of boreholes within 50 feet of each seismic line are presented as Table 2. All final coordinates were provided to **GEO***Vision* by AMEC E&I through a submittal issued December 19th, 2013. Geologic borehole logs were provided to **GEO***Vision* by AMEC E&I through a submittal issued December 20th, 2013.

The following sections include a discussion of methodology, equipment and field procedures, data processing, interpretation and conclusions relating to the geophysical investigation.

2 METHODOLOGY

Detailed discussions of the seismic refraction method can be found in Telford et al. (1990), Dobrin and Savit (1988) and Redpath (1973).

When conducting a seismic survey, acoustic energy is input to the subsurface by an energy source such as a sledgehammer impacting a metallic plate, weight drop, vibratory source or explosive charge. The acoustic waves propagate into the subsurface at a velocity dependent upon the elastic properties of the material through which they travel. When the waves reach an interface where the density or velocity changes significantly, a portion of the energy is reflected back to the surface and the remainder is transmitted into the lower layer. Where the velocity of the lower layer is higher than that of the upper layer, a portion of the energy is also critically refracted along the interface. Critically refracted waves travel along the interface at the velocity of the lower layer and continually refract energy back to the surface. Receivers (geophones) laid out in linear array on the surface, record the incoming refracted and reflected waves. The seismic refraction method involves analysis of the travel times of the first energy to arrive at the geophones. These first arrivals are from either the direct wave (at geophones close to the source), or critically refracted waves (at geophones further from the source).

Analysis of seismic refraction data depends upon the complexity of the subsurface velocity structure. If the subsurface target is planar in nature then the slope intercept method (Telford et al., 1990) can be used to model multiple horizontal or dipping planar layers. A minimum of one end shot is required to model horizontal layers and reverse end shots are required to model dipping planar layers. If the subsurface target is undulating (i.e. bedrock valley) then layer-based analysis routines such as the generalized reciprocal method (Palmer, 1980 and 1981; Lankston and Lankston, 1986 and Lankston, 1990), reciprocal method (Hawkins, 1961) also referred to as the ABC method, Hales' method (Hales, 1958), delay time method (Wyrobek, 1956 and Gardner, 1967), time-term inversion (Scheidegger and Willmore, 1957), plus-minus method (Hagedoorn, 1959) and wavefront method (Rockwell, 1967) are required to model subsurface velocity structure. These methods generally require a minimum of 5 shot points per spread (end shots, off end shots and a center shot). If subsurface velocity structure is complex and cannot be adequately modeled using layer-based modeling techniques (i.e. complex weathering profile in bedrock, numerous lateral velocity variations), then Monte Carlo or tomographic inversion techniques (Zhang and Toksoz, 1998; Schuster and Quintus-Bosz, 1993) are required to model the seismic refraction data. These techniques require a high shot density; typically every 2 to 6 stations/geophones. Generally, these techniques cannot effectively take advantage of off-end shots to extend depth of investigation, so longer profiles are required. For applications involving sites with unknown velocity structure, it is prudent to collect sufficient data to permit layer-based and tomographic processing methods.

Errors in seismic refraction models can be caused by velocity inversions, hidden layers or lateral velocity variations. At sites with steeply dipping or highly irregular bedrock surfaces, out of plane refractions (refractions from structures to the side of the line rather than from beneath the line) may severely complicate modeling. A velocity inversion is a geologic layer with a lower seismic velocity than an overlying layer. Critical refraction does not occur along such a layer because velocity has to increase with depth for critical refraction to occur. This type of layer, therefore, cannot be recognized or modeled and depths to underlying layers would be overestimated. A hidden layer is a layer with a velocity increase, but of sufficiently small thickness relative to the velocities of overlying and underlying layers, that refracted arrivals do not arrive at the geophones before those from the deeper, higher velocity layer. Because the seismic refraction method generally only involves the interpretation of first arrivals, a hidden layer cannot be recognized or modeled and depths to underlying layers would be underestimated. Saturated soils, overlying high velocity bedrock can be a hidden layer under many field conditions. However, saturated soils generally have a much higher velocity than unsaturated soils, typically in the 5,000 to 7,000 ft/s range, and can occasionally be interpreted as a second arrival when the layer does not give rise to a first arrival. A subsurface velocity structure that increases as a function of depth rather than as discrete layers will also cause depths to subsurface refractors to be underestimated, in a manner very similar to that of the hidden layer problem. Lateral velocity variations that are not adequately addressed in the seismic models will also lead to depth errors. Tomographic imaging techniques can often resolve the complex velocity structures associated with hidden layers, velocity gradients and lateral velocity variations. However, in the event of an abrupt increase in velocity at a geologic horizon, the velocity model generated using tomographic inversion routines will smooth the horizon with velocity being underestimated at the interface and possibly overestimated at depth.

3 EQUIPMENT AND FIELD PROCEDURES

The seismic data acquisition system consisted of two 24-channel Geometrics Geode signal enhancement seismographs combined to form a 48-channel system and a laptop computer running Geometrics Seismodule Controller Software (Geometrics Multiple Geode OS, Controller Version 9.14.0.0©). The seismograph calibration procedure and calibration records are included in a separate submittal.

Other geophysical equipment for the P-wave refraction survey consisted of 10 Hz vertical geophones, refraction cables with 20-foot takeouts, a 2,200 lb United Services Alliance, Inc. XLR8 track mounted accelerated weight drop (AWD), a 220 lb truck mounted AWD, an aluminum plate, 3D Geophysics hammer switches, a trigger extension and a Seismic Source Co. radio trigger module (RTM). Photographs of geophysical equipment used during this investigation are presented in Figure 2.

The seismic refraction survey was conducted in accordance with the seismic refraction procedure included in a separate submittal. Each seismic line consisted of one spread of 48 geophones, spaced 10 or 12.5 feet apart, aligned in a linear array. Horizontal and vertical control at 200 ft intervals for the seismic lines was established at the site by AMEC E&I. The locations of the seismic refraction lines are shown in Figure 1. The seismic line geometry is presented as Table 1. All geophone locations were measured using a 300-foot tape measure and 100 foot station marks were placed by AMEC Environment and Infrastructure. Relative elevations along each seismic line were surveyed using a Sokkia C300 automatic level. Relative elevations were converted to true elevation using survey data provided by AMEC E&I. If leveled elevations did not match the surveyed station markers within 0.3 feet, then the section was to be leveled again with a closed loop. For this project, all surveyed locations matched the relative elevation data and additional leveling was unnecessary.

Up to 20 shot point locations were occupied on each spread: off-end shots where possible, end shots and multiple interior shot points nominally located between every fourth geophone. Topography limited the placement of some of the shot points.

The truck mounted AWD was used for the majority of the shots on each line and the XLR8 AWD was used for the off-end shots on two of the lines. The final seismic record at each shot point was the result of stacking 7 to 15 shots to increase the signal to noise ratio. The data were saved to an internal hard drive. Data files were named with the sequential line, spread and shot number and a ".dat" extension (i.e. data file 1115.dat is the seismic record from SRS-1, spread 1, shot 15). Seismic refraction field logs are included in a separate submittal.

4 DATA PROCESSING

Seismic refraction data were modeled using the generalized reciprocal method (GRM), as outlined in Palmer (1980 and 1981), Lankston and Lankston (1986), and Lankston (1990). Layer-based modeling routines, such as GRM, are most applicable to modeling seismic refraction data acquired at sites exhibiting layered geologic structure with abrupt increases in seismic velocity at the top of geologic units of interest. GRM is a seismic refraction interpretation method designed to accurately map undulating refractor surfaces from in-line refraction data using both forward and reverse shots. The method is related to the Hales (1958) method and the reciprocal method (Hawkins, 1961) and can accurately model refractor surfaces with dips of less than 20 degrees.

Seismic refraction data were also modeled using the tomographic analysis technique available in the SeisImager™ Plotrefa software package, developed by OYO Corporation. Refraction tomography techniques are often able to resolve complex velocity structure that cannot be imaged using layer-based modeling techniques. As an example, layer-based modeling techniques, such as the GRM, are not able to accurately model the velocity gradients that can be observed in weathered bedrock.

Tomographic inversion techniques will model a smooth velocity gradient even if a sharp velocity boundary exists. At this site, abrupt velocity contacts were expected at the top of the bedrock; however, velocity gradients are better imaged by the tomographic modeling. The use of layer-based starting models for tomographic inversion can often sharpen the contact between geologic units with large velocity variation. The layer base tomographic inversions were used to obtain the expected, abrupt velocity contacts present in the geologic section while also modeling the slight velocity gradients that may be present in the sections.

The first step in data processing consisted of picking the arrival time of the first energy received at each geophone (first arrival) for each shot point. The first arrivals on each seismic record are either a direct arrival from a compressional (P) wave traveling in the uppermost layer or a refracted arrival from a subsurface interface where there is a velocity increase. First-arrival times were selected using the automatic and manual picking routines in the software package SeisImager™ Plotrefa (OYO Corporation). These first arrival times were saved in an ASCII file containing shot location, geophone locations and associated first arrival time. Variations in the first arrival times generally increased with distance from the shot point. First arrival picking variations probably averaged about 1 ms with variations probably less than 0.5 ms at geophone locations near the shot point and up to 2 ms at distal geophone locations.

Data quality was affected by factors such as: site activity (machinery and vehicle traffic), weather and geologic conditions. For certain lines, data acquisition was delayed for noise due to machinery traffic and weather and continued when the noise ceased or lessened to acceptable limits. Poor source coupling in fill soils in some areas may have increased noise at some shot locations.

Layer-based data analysis was conducted with the GRM computer program VIEWSEIS (Kassenaar, 1989-1992). First arrival and elevation data were entered into the software package and time-distance plots for the forward and reverse shots were generated. Forward shots are shot points where energy travels from geophone 1 to 48. Energy travels in the opposite direction for reverse shots and interior shots have both forward and reverse components. The first arrival data for all the shot points were then assigned to the layer from which they were refracted. Typically, two layers were assigned to the travel time data. The first layers corresponded to soils/gravel/fill and the second layer corresponded to bedrock. The travel time data refracted from the bedrock layer were then phantomed (shifted in time) to line up with the travel-time data associated with the zero-offset end shot, therefore forming a single travel-time curve for each refractor along the line. This method was employed for both forward and reverse shots according to the procedures outlined in Lankston and Lankston (1986) and Redpath (1973). After phantoming was completed GRM processing was conducted to generate depth and velocity models.

In an attempt to image velocity gradients present on portions of each line, compensate for the limited offset of off-end shots on some of the seismic lines and also to retain some of the layer resolution benefits of layer-based modeling techniques, tomographic inversion of the seismic travel time data was conducted using both a layer-based starting model and a smooth velocity gradient starting model. After loading the seismic refraction first arrival and elevation data into SeisImager, tomographic analysis was conducted as outlined in the following steps. An initial model was generated using parameters outlined by the processor. The initial model had 20 layers with velocity structure either based on the GRM starting model or allowed to very smoothly model the structure with depth as determined by the processor. The base of the velocity model was set at a nominal depth of 100 ft, to account for the required depth of investigation. The velocity models were extended to permit the use of off-end shot points during the inversion. A minimum of 20 iterations of non-linear raypath inversion were then implemented to improve the fits of the travel time curves to near-surface soils/bedrock. Additional iterations were not found to improve the model. Final tomographic velocity models for each seismic line were exported as ASCII files and imported into the Geosoft Oasis montaj® v8 mapping system where the velocity models were gridded, contoured and annotated for presentation.

Both SeisImager Plotrefa and VIEWSEIS analysis software were approved for use on the project by AMEC E&I.

5 INTERPRETATION

5.1 Overview

Seismic tomography models for lines SRS-1 through SRS-5 are presented as Figures 3 through 8. The color scheme used on the seismic tomography images consist of blue-green, yellow-orange and red-pink representing low, intermediate and high velocities, respectively. The transition from blue to green occurs at a velocity of 3,000 ft/s and the transition from green to yellow occurs at a velocity of 6,500 ft/s. The transition from orange to red occurs at 10,000 ft/s. GRM models are not presented as the non-uniform subsurface weathering and the possible presence of water in the thicker weathering sequences were not adequately represented. The GRM method is best used in situations with abrupt layer contacts rather than uneven weathering zones as encountered at this site. Also, included on each seismic model, where applicable, are the locations of boreholes within 50 ft of each line. These boreholes were projected to the closest point along each line and are presented with the range of interpreted weathered and competent rock (also referred to in this report as bedrock) depths from the geotechnical field logs, as applicable. In the interpretations below, "seismic bedrock" is the term used for the single velocity contour that best matches the competent rock reported in the borehole logs throughout the project; 7,000 ft/s. Because velocity structure is complex at this site, this interpreted "seismic bedrock" contact is not expected to accurately depict the top of rock, but rather demonstrate the relative trends of the bedrock surface, outlining areas where bedrock is shallow compared to where bedrock is deeper. In short, the contact is in a transition and the velocity is selected to represent that transition. It should be noted that all the models are presented with the low side of each line on the left side of each page. By convention, seismic models are typically collected south to north and west to east, as done for this site.

Tomographic inversion techniques will typically model a gradual increase in velocity with depth even if an abrupt velocity contact is present. Therefore, if velocity gradients are not present, tomographic inversion routines will overestimate and underestimate velocity above and below a layer contact, respectively with the actual layer contact tracing a velocity contour between that of the two layers. Velocity gradients are very common in geologic environments with weathered rock, such as the project site.

During previous construction activities at the site, some areas in the survey area were excavated and later backfilled resulting in fill overlying weathered and/or competent rock. The fill soils likely have variable seismic velocity depending upon the amount of compaction. Further complicating subsurface velocity structure, borehole geologic logs indicate that weathered siltstone of variable thickness, overlies competent limestone in some portions of the site. Additionally, bedrock is steeply dipping at the site and, therefore, lateral velocity variation is expected within the bedrock unit. It is also possible that saturated fill may be present in areas with deeper bedrock. These features combine to limit the effectiveness of layer-based seismic refraction modeling routines or tomographic inversion utilizing layered starting velocity models. Therefore, seismic refraction models resulting from tomographic inversion with smooth velocity gradient starting models are selected for the purpose of site characterization. In the following sections, fill and weathered siltstones are combined as the weathered section for the purpose of discussion.

5.2 Seismic Refraction SRS-1

The seismic tomography model for line SRS-1 is presented as Figure 3.

Seismic line SRS-1 intersects line SRS-5 at a position of 140.0 ft along line SRS-1. Seven boreholes (MP-202, MP-204, MP-206, MP-208, MP-210, MP-214 and MP-409) were all located within 44 ft of the seismic line at positions of 482.4, 463.7, 530.5, 454.3, 571.4, 421.0 and 128.8 ft, respectively, as shown on Figure 1 and the seismic model (Figure 3). Where applicable, the interpreted weathered rock and competent rock interfaces are presented on the seismic models with a WR or CR, respectively.

The interpreted seismic bedrock interface is denoted with a black, dotted line along the 7,000 ft/s contour. This interface shows bedrock deepening at the southern and northern ends of the line. The interpreted bedrock beneath the southern portion of the line is about 36 to 38 ft deep. The rock is interpreted to be shallower beneath the central and northern portion of the line with depths of about 9 to 22 ft. The weathered section throughout the profile tends to slightly overestimate depth of the interpreted seismic bedrock when compared to the geologic logs, except for MP-409. MP-409 has borehole rock depths greater than the interpreted seismic bedrock, which may be attributed to the thicker weathering section in the area and the possible presence of saturated soils. P-wave refraction is unable to adequately resolve the saturated soils zones beneath the line and may, therefore, underestimate depth to rock in areas with saturated soils. However, the velocity of the imaged rock layer is not affected in this case. There is also good agreement between the velocity contours of SRS-1 and SRS-5, where the two lines intersect.

5.3 Seismic Refraction SRS-2

The seismic tomography model for line SRS-2 is presented as Figure 4.

Seismic line SRS-2 intersects line SRS-5 at a position of 15.0 ft along line SRS-2. Three boreholes (MP-215, MP-216 and MP 410) were all located within 47 ft of the seismic line at positions of 229.4, 328.0 and 29.0 ft, respectively, as shown on Figure 1 and the seismic model (Figure 4). Where applicable, the interpreted weathered rock and competent rock interfaces are presented on the seismic models with a WR or CR, respectively.

The interpreted seismic bedrock interface is denoted with a black, dotted line along the 7,000 ft/s contour. This interface shows bedrock deepening at the southern and northern portion of the line. The interpreted bedrock beneath the northern portion of the line is about 36 ft deep. The rock is interpreted to be shallower beneath the central and southern portion of the line with depths of about 10 to 19 ft. The weathering section appears to be slightly thicker in the northern portion on the line where bedrock is interpreted to be deepest. Generally, there is good agreement between the borehole rock depths in the area and the interpreted seismic bedrock interface. Differences in depths may be attributed to the weathered sections which contribute to different interpretations of rock between borehole logs and seismic refraction data. There is also good agreement between the velocity contours of SRS-2 and SRS-5, where the two lines intersect.

5.4 Seismic Refraction SRS-3

The seismic tomography model for line SRS-3 is presented as Figure 5.

No seismic lines intersect line SRS-3. Thirteen boreholes (MP-101, MP-102, MP-103, MP-104, MP-105, MP-106, MP-107, MP-108, MP-110, MP-111, MP-111PS, MP-111UD and MP-114) were all located within 46 ft of the seismic line at positions of 435.0, 276.0, 464.5, 254.7, 403.1, 322.0, 501.1, 244.4, 361.8, 511.6, 531.5, 544.0 and 210.5 ft, respectively, as shown on Figure 1 and the seismic model (Figure 5). Where applicable, the interpreted weathered rock and competent rock interfaces are presented on the seismic models with a WR or CR, respectively.

The interpreted seismic bedrock interface is denoted with a black, dotted line along the 7,000 ft/s contour. This interface shows the interpreted bedrock beneath the southern and northern portion of the line to be the deepest, at about 33 and 42 ft, respectively. The rock is interpreted to be shallower beneath the central portion of the line with an average depth of about 16 ft. The weathered section appears to be slightly thicker beneath the ends of the line where bedrock is interpreted to be deepest. Generally, there is good agreement between the borehole rock depths in the area and the interpreted seismic bedrock interface. Differences in depths may be attributed to the variable weathering of the rock which contribute to different interpretations of rock between borehole logs and seismic refraction. However, there is a larger difference between the borehole rock depths and the interpreted seismic rock interface in the central portion of the line. The uppermost zone of rock may be more weathered in this portion of the line and the 5,000 to 6,000 ft/s velocity contour may more accurately track the top of the competent rock.

5.5 Seismic Refraction SRS-4

The seismic tomography model for line SRS-4 is presented as Figure 6.

No seismic lines intersect line SRS-4. Seven boreholes (MP-112, MP-113, MP-115, MP-116, MP-117, MP-118 and MP-429) were all located within 41 ft of the seismic line at positions of 400.7, 324.2, 211.8, 311.6, 413.3, 511.5, and 90.5 ft, respectively, as shown on Figure 1 and the seismic model (Figure 6). Where applicable, the interpreted weathered rock and competent rock interfaces are presented on the seismic models with a WR or CR, respectively.

The interpreted seismic bedrock interface is denoted with a black, dotted line along the 7,000 ft/s contour. This interface shows the interpreted bedrock beneath the southern and northern portion to be the deepest, at about 39 and 43 ft, respectively. The rock is interpreted to be shallower beneath the central portion of the line with an average depth of about 23 ft. The weathered section appears to be much thicker beneath the ends of the line where bedrock is interpreted to be deepest. Generally, there is good agreement between the borehole rock depths in the area and the interpreted seismic bedrock interface. Differences in depths may be attributed to the weathered sections which contribute to different interpretations of rock between borehole logs and seismic refraction data.

5.6 Seismic Refraction SRS-5

The seismic tomography model for line SRS-5 is presented as Figure 7.

Seismic line SRS-5 intersects line SRS-1 at a position of 245.0 ft along line SRS-5 and SRS-2 at a position of 445.0 ft along line SRS-5. Two boreholes (MP-409 and MP-410) were both located within 1 ft of the seismic line at positions of 215.3 and 498.3 ft, respectively, as shown on Figure 1 and the seismic model (Figure 7). Where applicable, the interpreted weathered rock and competent rock interfaces are presented on the seismic models with a WR or CR, respectively.

The interpreted seismic bedrock interface is denoted with a black, dotted line along the 7,000 ft/s contour which shows bedrock to be deeper beneath the western half of the line. This interface shows the interpreted bedrock beneath the western portion of the line to be about 42 ft deep. The rock is interpreted to be shallower beneath the central and eastern portion of the line with average depths of about 14 to 19 ft. There is good agreement between the velocity contours of SRS-5, SRS-1 and SRS-2, where the three lines intersect, which indicates that the model is consistent with the other seismic models in the area. The seismic model appears to overestimate depth to competent rock near MP-410 (eastern portion of the line) and underestimate depth to rock near MP-409 (western portion of the line). It is possible that the uppermost portion of rock is more weathered in the vicinity of MP-410, whereby the rock surface would track the slower velocity contours. In the vicinity of MP-409 there is a possible 30 ft section of saturated soils that may result in bedrock depth to be underestimated.

5.7 Seismic Refraction SRS-6

The seismic tomography model for line SRS-6 is presented as Figure 8.

No other seismic lines intersect line SRS-6 and no boreholes are located within 50 feet of the line.

The interpreted seismic bedrock interface is denoted with a black, dotted line along the 7,000 ft/s contour. This interface shows the interpreted bedrock beneath the majority of the line to be at depths of about 54 ft. However, the ends of the line show rock to be much shallower, about 3 ft at the western end and 30 ft at the eastern end. The change in rock topography is likely the result of cut and fill operations for the former construction structure and probably not natural, unaltered subsurface topography. There were no boreholes or nearby lines to compare results and the 7,000 ft/s contour was chosen for the interpreted seismic bedrock interface as bedrock is expected to similar to that beneath the other seismic lines.