Appendix E.2

REPORT OF GEOPHYSICAL INVESTIGATION
PROPOSED 950,000 SQUARE FOOT DISTRIBUTION CENTER
SYCAMORE V PROJECT
RIVERSIDE, CALIFORNIA
PREPARED FOR
HILLWOOD INVESTMENT PROPERTIES
JOB NO. 14285-8

CHJ Consultants
1355 E. Cooley Drive, Suite C, Colton, CA 92324 ◆ Phone (909) 824-7311 ◆ Fax (909) 503-1136
15345 Anacapa Road, Suite D, Victorville, CA 92392 ◆ Phone (760) 243-0506 ◆ Fax (760) 243-1225
77-564A Country Club Drive, Suite 122, Palm Desert, CA 92211 ◆ Phone (760) 772-8234 ◆ Fax (909) 503-1136

May 14, 2014

Hillwood Investment Properties
901 Via Piemonte, Suite 175
Ontario, California 91764
Attention: Mr. John Schaefer

Job No. 14285-8

Dear Mr. Schaefer:

Atttached herewith is the Report of Geophysical Investigation addressing the rippability of bedrock at the site. This report supplements the data from a previous geophysical survey conducted on the site, and the data from that survey are also included in this report.

This report was based upon a scope of services generally outlined in our proposal dated April 21, 2014, and other written and verbal communications.

We appreciate this opportunity to provide geotechnical consulting services for this project. If you have questions or comments concerning this report, please contact this firm at your convenience.

Respectfully submitted,
CHJ CONSULTANTS

Jay J. Martin, E.G.
Vice President

JJM:lb

TABLE OF CONTENTS

TABLE OF APPENDICES

REPORT OF GEOPHYSICAL INVESTIGATION
PROPOSED 950,000 SQUARE FOOT DISTRIBUTION CENTER
SYCAMORE V PROJECT
RIVERSIDE, CALIFORNIA
PREPARED FOR
HILLWOOD INVESTMENT PROPERTIES
JOB NO. 14285-8

INTRODUCTION

During May of 2014, a geophysical investigation was conducted at the proposed distribution center site. The purposes of the geophysical investigation were to evaluate the seismic velocity profile of the bedrock and relate that velocity to anticipated rippability with heavy equipment.

To orient our investigation at the site, a CAD copy of a Cut/Fill Plan showing topography, the building footprint and the depths of proposed cuts and fills was provided to us by Boberg Engineering. Aerial photographic imagery published by Google Earth was utilized. The site location is shown on the attached Index Map (Enclosure "A-1").

The results of our investigation, together with our conclusions, are presented in this report.

SCOPE OF SERVICES

The scope of services provided during this geophysical investigation includes the following:

- Geologic field reconnaissance of the site and surrounding area
- Geologic logging of 16 trenches at locations specified by Boberg Engineering
- Deployment of 14 additional seismic refraction lines by Terra Geosciences at locations selected by Boberg Engineering
- Review and analysis of the seismic refraction data with respect to the excavation potential of the bedrock with heavy equipment
- Preparation of this report

PROJECT CONSIDERATIONS

The site is proposed to be developed with an approximately 950,000-square-foot distribution center of concrete tilt-up or similar construction. Two water quality basins are proposed in the southern portion of the site. Review of the cut/fill map indicates that cuts of up to approximately 28 feet below existing grade may be required for site development. Since most of the proposed cuts are within bedrock, excavation potential is a significant concern.

A geotechnical investigation was conducted by C.H.J., Incorporated for this general site area (July 20, 2007). That investigation included deployment of 12 seismic refraction lines (Line Nos. 1 through 12). The seismic refraction data from that report are included with this report. Line Nos. 1 and 2 are omitted because they are not within the boundaries of this project.

SITE DESCRIPTION

The site is located in Riverside, California, at the western terminus of Sierra Ridge Drive. The southern portion of the site was graded and relatively level. This portion of the site was several feet lower in elevation than the rest of the site. The northern portion of the site was separated from the southern portion via a soil berm approximately 4 to 5 feet in height. North of this, the site was undeveloped and the topography consisted of rolling hills and valleys. A south-draining arroyo traverses the central portion of the site. Areas of dense vegetation were present within the areas of low elevation. Numerous bedrock outcrops were observed on the hilltops. The area surrounding the site to the north and east generally consists of single- and multi-family residential developments. Commercial warehouse buildings were located south and west of the site.

FIELD INVESTIGATION

Geologic conditions were first explored by means of 16 exploratory trenches excavated with a Cat 349E excavator with a 36-inch-wide bucket on April 29. The trench locations were chosen by Boberg Engineering. The approximate locations of the exploratory trenches are indicated on the attached Plat (Enclosure "A-2").

Continuous logs of the subsurface conditions, as encountered within the exploratory trenches, were recorded at the time of excavation by a geologist from this firm. Bedrock, native soil and fill were identified. The degree of weathering of the bedrock and the degree of excavation difficulty, if any, were noted on the logs.

Our exploratory trench logs are presented in Appendix "B". The stratification lines presented on the exploratory boring logs represent approximate boundaries between soil/rock types, which may include gradual transitions.

Following logging of the test trenches, a seismic refraction survey was conducted by Terra Geosciences on May 3 and 4. The refraction survey included 14 24-channel seismic lines, each approximately 140 feet in length. A geophone spacing of 5 feet was used. The seismic lines were placed so as to provide the critical information in areas of both deep and shallow cuts. Some of the refraction lines as originally requested were longer than 140 feet. The 140-foot-long lines were selected for use in the field based on the superior resolution provided by the 5-feet geophone spacing as opposed to a greater spacing. In addition, the depth of proposed cut is less than the depth of information typically provided by the 140-foot-long lines, so that only 140-foot-long lines were necessary.

The approximate locations of the refraction lines in relation to the proposed cuts are shown on the Cut/Fill Plan included as Enclosure "A-2". Some line locations were adjusted in the field to avoid

abrupt topographic changes, boulders/outcrops, surface debris and engineered improvements. We have included the locations of the previous lines from 2007 on Enclosure "A-2".

SITE GEOLOGY

The site is located on the Perris Block, a portion of the Peninsular Ranges Geomorphic Province. The Perris Block is a fault-bounded region of relative tectonic stability, a mass of relatively high land composed of crystalline bedrock of the southern California batholith that is thinly and discontinuously mantled by sedimentary material (Woodford and others, 1971). Several geomorphic surfaces that represent former, local, erosional/depositional base levels are well developed on the Perris Block. The site is located on the youngest of the Perris Block surfaces, known as the Paloma surface (Woodford and others, 1971). The Paloma surface is characterized by crystalline bedrock overlain by fine-grained alluvial deposits.

Regional geologic mapping conducted by Morton and Cox (2001) shows the site as underlain by Val Verde tonalite (granitic bedrock). The Val Verde tonalite is characterized as medium crystalline gray bedrock with black accessory minerals. In some areas, including the site, it includes dark, elliptical, fine-grained inclusions of more mafic-appearing rock, known as schlieren. Tonalite exhibiting various degrees of weathering, including some hard, rounded boulder outcrops (corestones), was exposed in scattered areas throughout the site. Review of the seismic refraction data and our experience grading nearby sites suggest that in general the corestones at the surface are "rooted" at depth with hard bedrock. Hard bedrock corestones can be anticipated to be encountered within the rock during grading, even where no surface manifestation of corestones exists.

The presence of fractures and joints (systems of regular fractures) can aid bulldozer tooth penetration during ripping. Exposures of the tonalite on and near the site were examined for evidence of significant joints or fractures. None was observed.

All of the exploratory trenches encountered the tonalite at varying depths (Appendix "B"). The tonalite is mantled by soil materials consisting of deeply weathered bedrock, alluvium/colluvium and fill. The soil mantle consists of silty sand (SM) and sand (SP-SM).

Hard digging was encountered in Trench Nos. 1, 6, 8, 9, 11, 13, 14, 15 and 16 at depths of 2 to 11 feet below the ground surface. Refusal was encountered in Trench Nos. 5, 6, 8, 9, 10, 11, 14, 15 and 16 at varying depths. The excavation capability of the excavator utilized for the trenches is far below that of typical heavy equipment utilized for grading rock sites.

Groundwater was not encountered within any of the exploratory trenches.

SEISMIC REFRACTION

The velocity of a seismic wave is proportional to the density of the medium in which it is traveling. The denser the medium, the faster seismic waves will travel through it. As seismic waves cross a boundary between materials of differing densities, the velocity difference will cause the wave front to bend or "refract" at the interface, as the portion of the wave front traveling in the faster medium outruns the portion in the slower medium. As the seismic wave travels through the faster medium, it is also re-refracted back across the interface into the slow medium.

In the case of a seismically "slow" soil underlain by seismically "fast" bedrock, a downward directed portion of a seismic wave front propagating from a source at the ground surface will travel down through the soil, be refracted into the bedrock, be refracted again back up into the soil and travel back to the surface. The laterally directed portion of the wave front will travel only through the "slow" soil. During the time it traveled in the rock, the initially downward directed, but refracted, portion of the seismic wave front has gained on the unrefracted portion that traveled only through soil. At a distance from the seismic source dependent on the velocity differential and the depth of the interface, the

refracted portion of the wave front will have gained enough to arrive back at the surface before the unrefracted portion of the wave front, travelling laterally through the soil, has reached that point.

In seismic refraction surveying, a linear array of seismic motion detectors (geophones) are set at known, fixed distances from each other and seismic waves are generated at known points along this line. The first arrival of seismic energy at each geophone for each seismic source location is selected and plotted on a time vs. distance plot of the refraction line. The slope of the line formed by the plotted points corresponds to the velocity of the material, and major inflections in this plotted line correspond to first arrival points (crossover) of energy refracted from faster, deeper material. Utilizing the time of this crossover, a correction for topographic changes, and the distance along the seismic line to where it is detected, the depth of the corresponding velocity interface can be calculated (Dobrin, 1976). It is generally possible to detect multiple crossovers from velocity interfaces, if they are present, to a depth equal to approximately 1/3 the length of the refraction line, provided the subjacent material is always of higher velocity. The exact depth of interrogation is dependent upon the subsurface velocity profile.

The seismic refraction data collected by the field investigation were reduced by Terra Geosciences using three separate computer programs: SIPwin (Seismic Refraction Interpretation Program for Windows) developed by Rimrock Geophysics, Inc. (2004); Refractor (Geogiga, 2001-2013); and Rayfract™ (Intelligent Resources, Inc., 1996-2014).

SIPwin and Refractor were utilized to generate the layer models for Line Nos. 13 through 26 included in Appendix "C". These models present the subsurface data as discrete layers with a uniform seismic velocity.

Rayfract was utilized to generate the tomographic models for Line Nos. 13 through 26 included in Appendix "D". The tomographic models present the data as a velocity gradient, with velocity contours provided on the plots.

The layer models (Appendix "C") generally depict a surficial (thin) layer of alluvium/colluvium with a low velocity, less than 3,000 feet per second (fps). This surficial layer may also include some very highly weathered bedrock. The surface layer is underlain typically by one or two layers of bedrock. Most of the bedrock ranges from 4,000 to 6,000 fps (in the rippable range with a Cat D10T), with some harder exceptions at depth.

The tomographic models in Appendix "D" show some significant differences with the layer models. The tomographic models depict greater detail in the subsurface than the layer models. For example, the hard surface projection in the tomographic model of S-8 (Enclosure "D-6") is masked in the layer model of S-8 (Enclosure "C-6").

The layer models tend to mask subsurface variations in rock composition and seismic velocity, as they utilize an average velocity for a given subsurface interval. We consider the tomographic models to be superior for subsurface imaging due to their better data presentation. We have observed grading and blasting of numerous rock sites where both layer models and tomographic models were available and have found the tomographic models to more accurately image the subsurface conditions. However, both models as well as the results of the test pits are used in our interpretation of rippability.

RIPPABILITY

The seismic velocity can be utilized to estimate the rippability of subsurface materials. Charts included in the Caterpillar Performance Handbook (2013), included as Appendix "E", correlate seismic velocity of different rock types to rippability by Cat D9R/D9T and D10T bulldozers utilizing a single or multi-shank ripper. The Caterpillar charts do not include tonalite as a rock type, but granite is included. For the purposes of this report, granite is considered to be the approximate equivalent of tonalite. The chart for the D10T indicates granite rock with a seismic velocity up to 7,200 fps as rippable. Granite with a seismic velocity of between 7,200 to 8,500 fps is considered to be marginally rippable, and velocities of greater than 8,500 fps are considered to be non-rippable. Based on our

experience with massive Peninsular ranges granitic bedrock similar to that present on site, the velocities indicated on the Caterpillar chart are approximately 1,200 fps too fast for rock that can normally be ripped with a single shank at reasonable production rates. It is our opinion that the on-site bedrock with p-wave velocities of up to approximately 6,000 fps will be rippable, and the bedrock with a seismic velocity of between 6,000 to 7,300 fps will be marginally rippable with a single shank at reasonable production rates. Rock with a seismic velocity greater than approximately 7,300 fps is expected to be generally non-rippable.

The velocity at which rock can be ripped and the production rate also depends upon the skill of the operator, the condition of the equipment and the number of ripper teeth used.

The following table is a line-by-line summary of anticipated rippability conditions using a D10T ripper. It is based on the anticipated grades shown on the Cut/Fill Plan. We have not incorporated possible overexcavation depths for the proposed structure in our rippability analysis. Such overexcavation could be 5 feet or more in cut areas for the footings and could be deeper (at least 10 feet) for some deep footing elements such as "K" braces. These depths should be recommended during a future geotechnical investigation.

Table of Anticipated Rippability			
Line No.	**Location**	**Proposed Cut/Fill Depth (ft)**	**Rippable?**
3	NE footprint of bldg.	17-19 feet cut	yes; T-8 dug to 8 feet
4	NE footprint of bldg.	3 feet cut to 1 foot fill	yes; shallow cut; T-9 dug to 5 feet
5	E pad and cut slope	17 feet cut east end/1-2 feet cut and fill west and center	yes; T-2 dug to 10 feet
6	SE pad	2-9 feet fill	yes
7	SE footprint	12-15 feet fill	yes
8[1]	basin slope	15 feet cut to 3 feet fill	marginal to non-ripp in center knob
9	SW footprint	6-14 feet fill	yes
10[1]	NW footprint	5-16 feet cut	marginal at north two-thirds; T-14 refusal at 8 feet
11	central footprint	13 feet fill SE end/0 feet at NW end	yes
12	NE footprint	3 feet cut at ends/6 feet fill at center	yes
13	SE pad-street	7-16 feet cut	yes
14	basin	1-14 feet cut	yes
15	basin	1-17 feet cut	yes
16	basin	10 feet cut to 2 feet fill	yes
17[1]	basin and cut slope	8-17 feet cut	marginal at bottom of cut in center portion
18[1]	NW pad	15-18 feet cut	marginal at west portion; T-13 dug to 15 feet
19[1]	NW pad and cut slope	2-20 feet cut	marginal to non-ripp at east half of line at cut bottom
20[1]	NW pad and cut slope	25-28 feet cut	marginal across entire line at cut bottom
21	NW pad	18-23 feet cut	yes; T-11 refusal at 7 feet
22	NW footprint	7-14 feet cut	yes
23	NE footprint	11-18 feet cut	yes; T-8 refusal at 8 feet
24	NE pad	12-21 feet cut	yes
25	NE pad and slope	14-20 feet cut	yes
26	NE pad-street	13-24 feet cut	yes; T-6 refusal at 11 feet

1. Lines that are discussed individually in the text.

The following is a discussion of individual lines where marginally rippable to non-rippable conditions are expected based on the proposed grades shown on the Cut/Fill Plan.

Line No. 8 traversed a hard bedrock knob where previous borrowing has apparently removed some of the surrounding soil and highly weathered rock. The top of the knob is expected to be cut down approximately 15 feet. The center of this knob includes a hard corestone with a maximum velocity of approximately 7,200 fps (Enclosure "D-6"). This material is expected to be marginal to non-rippable.

Line No. 10 detected a relatively wide zone of hard bedrock in an area where proposed cut is 5 to 16 feet. At the south end of the line, rippable rock is expected due to the shallow depth of cut (5 feet). At the north end and center of this line, marginally rippable rock (7,000 fps) is expected at the proposed cut depth of up to 16 feet.

Line No. 17 was placed across the northwest corner of the western-most water quality basin. Some removal of weathered bedrock and soil mantle has occurred at this location. The area of deepest cut along this line is 17 feet near the center of the line. Marginally rippable (7,000 fps) conditions are expected at the center of the line.

Line No. 18 was placed across a bedrock ridge in the northwest portion of the site in an area of 15 to 18 feet of proposed cut. Marginally rippable conditions (7,000 fps) are expected in the proposed 17-foot-deep cut on the west portion of this line.

Line No. 19 was placed across a bedrock slope in the northwest portion of the site, where maximum cut depth is proposed at 20 to 24 feet. Marginally rippable to non-rippable conditions (7,000 to 9,000 fps) are expected in the central and eastern portions of this line.

Line No. 20 was placed across a bedrock slope in the northwest corner of the site, where proposed cut depths are 24 to 28 feet. Marginally rippable bedrock (7,000 fps) is expected at the proposed cut depth along most of this line.

Review of the bedrock imaging conducted for this investigation (Lines 13 to 26) and the previous investigation (Lines 1 to 12) indicates that higher velocity bedrock occurs at a shallower depth in Line Nos. 8, 9, 10, 16, 17, 18 and 19, all located in the western portion of the site. The approximate boundary of the higher-velocity rock area is shown on Enclosure "A-2". No lithologic difference in the tonalite was observed in the field. However, only subtle chemical or structural differences are necessary to account for the observed difference in the condition of the bedrock. We anticipate that the highest potential for non-rippable rock to be encountered during the proposed grading is within deeper cuts in the zone of higher velocity rock (Enclosure "A-2").

CONCLUSIONS

The site is underlain by Val Verde Tonalite, characterized as medium crystalline gray bedrock with black accessory minerals. Hard, rounded boulder outcrops (corestones) are exposed in scattered areas throughout the site. Review of the seismic refraction data and our experience grading nearby sites suggest that in general the corestones at the surface are "rooted" at depth with hard bedrock. Hard bedrock corestones can be anticipated to be encountered within the rock during grading, even where no surface manifestation of corestones exists.

The presence of fractures and joints (systems of regular fractures) can aid bulldozer tooth penetration during ripping. Exposures of the tonalite on and near the site were examined for evidence of significant joints or fractures. None was observed.

We have evaluated the (p-wave) seismic velocity profile and the proposed cut depths with respect to single-shank D10T bulldozer performance as indicated by the Caterpillar Performance Handbook and

based on our experience with similar grading projects. It is our opinion that the on-site bedrock with p-wave velocities of up to approximately 6,000 fps will be rippable, and the bedrock with a seismic velocity of between 6,000 to 7,300 fps will be marginally rippable with a single shank at reasonable production rates. Rock with a seismic velocity greater than approximately 7,300 fps is expected to be generally non-rippable. The velocity at which rock can be ripped and the production rate also depends upon the skill of the operator, the condition of the equipment and the number of ripper teeth used.

Refraction Line Nos. 8, 10, 17, 18, 19 and 20 revealed bedrock that is expected to be marginal to non-rippable with a D10T or equivalent, based on the proposed grades. The remaining refraction lines encountered what we expect to be rippable with a D10T or equivalent to the proposed cut depths.

A high potential for encountering corestones and hard areas outside the seismic refraction lines exists, particularly in the zone of higher velocity shown on Enclosure "A-2". Bedrock that is non-excavatable with conventional heavy equipment may require alternate means of excavation, such as jack hammering, chain trenching or blasting.

Excavations to the proposed depths are expected to generate significant quantities of oversize materials (rocks greater than 12 inches in maximum dimension). Recommendations for dealing with oversize materials can be provided in a future geotechnical investigation.

RECOMMENDATIONS

BLASTING:

Blasting may be selected as an efficient method of excavation of the hard bedrock on the site. If blasting is conducted it should be carefully controlled so that finished slope and pad surfaces are not overshot. Consideration should be given to the need for trenching footing excavations in hard

bedrock. Blasting and/or splitting operations should be conducted so as to accommodate the need for trenching footing excavations in the building pad and in utility corridors.

CUT SLOPE CONSTRUCTION:

Cut slopes are proposed around the periphery of the site to approximately 20 feet in maximum height. Significant cut slopes are also proposed associated with the water quality basins in the southern portion of the site. Heavy ripping and/or blasting could produce unstable rock masses in finished slope faces. The presence of hard corestones in the subsurface may exacerbate this potential. Any blasting utilized should be controlled so as not to produce overshot slope faces. The engineering geologist should observe cut slope faces during grading and provide recommendations for removal or stabilization of any unstable rock masses in slope faces.

GEOLOGIC IN-GRADING OBSERVATION:

Due to considerations that require geologic input, including the stability of cut slope faces, in-grading observations should be performed by the engineering geologist.

LIMITATIONS

CHJ Consultants has striven to perform our services within the limits prescribed by our client and in a manner consistent with the usual thoroughness and competence of reputable geotechnical engineers and engineering geologists practicing under similar circumstances. No other representation, express or implied, and no warranty or guarantee is included or intended by virtue of the services performed or reports, opinion, documents, or otherwise supplied.

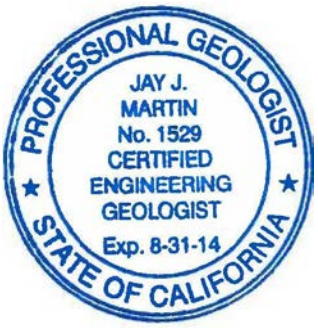
This report reflects the testing conducted on the site as the site existed during the investigation, which is the subject of this report. However, changes in the conditions of a property can occur with the passage of time, due to natural processes or the works of man on this or adjacent properties. Changes in applicable or appropriate standards may also occur whether as a result of legislation, application or the broadening of knowledge. Therefore, this report is indicative of only those conditions tested at the time of the subject investigation, and the findings of this report may be invalidated fully or partially by changes outside of the control of CHJ Consultants. This report is therefore subject to review and should not be relied upon after a period of one year.

The conclusions and recommendations in this report are based upon observations performed and data collected at separate locations, and interpolation between these locations, carried out for the project and the scope of services described. It is assumed and expected that the conditions between locations observed and/or sampled are similar to those encountered at the individual locations where observation and sampling was performed. However, conditions between these locations may vary significantly. Should conditions that appear different from those described herein be encountered in the field by the client or any firm performing services for the client or the client's assign, this firm should be contacted immediately in order that we might evaluate their effect.

If this report or portions thereof are provided to contractors or included in specifications, it should be understood by all parties that they are provided for information only and should be used as such. The report and its contents resulting from this investigation are not intended or represented to be suitable for reuse on extensions or modifications of the project or for use on any other project.

CLOSURE

We appreciate this opportunity to be of service and trust this report provides the information desired at this time. Should questions arise, please do not hesitate to contact this firm at your convenience.



Respectfully submitted,

CHJ CONSULTANTS

Jay J. Martin, E.G. 1529
Vice President

Robert J. Johnson, G.E. 443
President

JJM/RJJ:jm/lb

REFERENCES

Caterpillar Inc., 2013, Caterpillar Performance Handbook, 43nd Edition: Peoria, Illinois, U.S.A., 2046 p.

C.H.J., Incorporated, July 20, 2007, Geotechnical Investigation, Proposed Industrial Development, Lance and Sierra Ridge Drives, Riverside, California, Job No. 07489-3.

Dobrin, M.B., 1976, Introduction to Geophysical Prospecting, Third Edition.

Geogiga Technology Corp., 2001-2013, Geogiga Seismic Pro Refractor Software Program, Version 7.31, http://www.geogiga.com/.

Intelligent Resources, Inc., 1991-2014, Rayfract™ Seismic Refraction Tomography Software, Version 3.31, http://rayfract.com/.

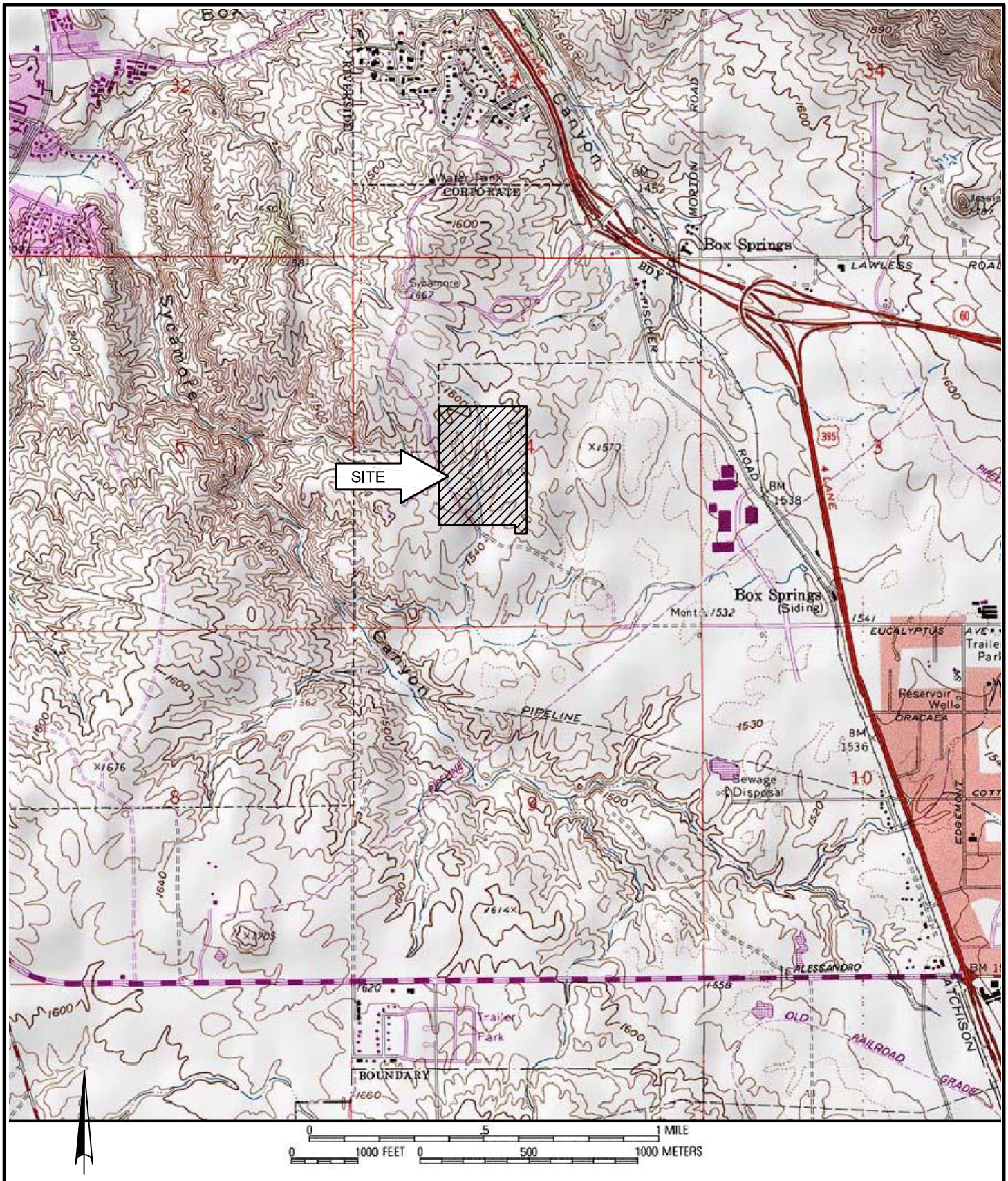
Morton, D.M.,and Cox, B.F., 2001, Geologic Map of the Riverside East Quadrangle, Riverside County, California: U.S. Geological Survey Open-File Report 01-452. Scale 1:24,000.

Rimrock Geophysics, Inc., 2004, SIPwin, Seismic Refraction Interpretation Program for Windows, Version 2.78.

Woodford, A.O., Shelton, F.S., Doehring, D.O., and Morton, R.K., 1971, Pliocene - Pleistocene history of the Perris block, southern California: Geological Society of America Bulletin, v. 82, p. 3421-3448.

APPENDIX "A"

GEOTECHNICAL MAPS

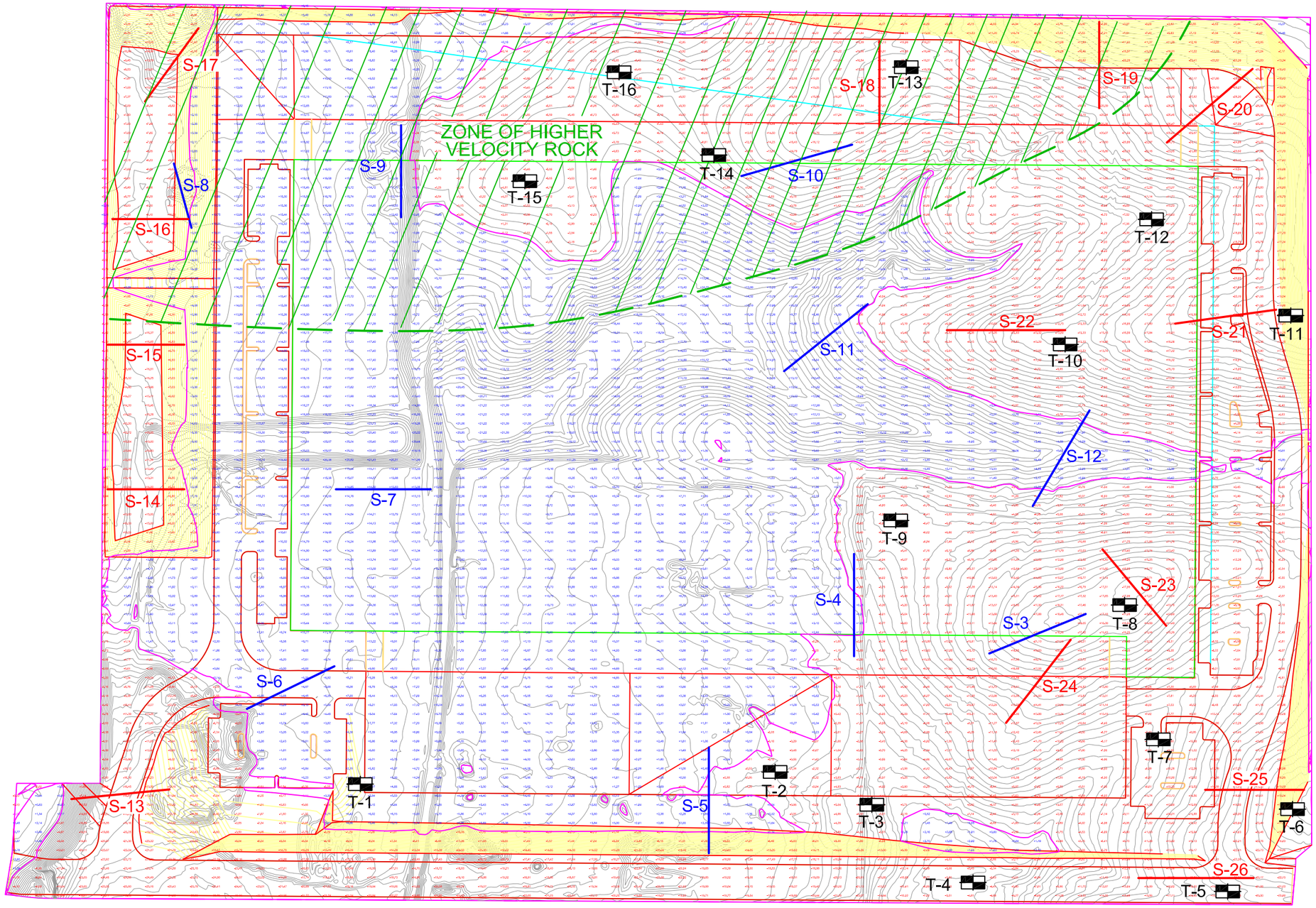


SCALE: 1" = 2000'

INDEX MAP

FOR: HILLWOOD INVESTMENT PROPERTIES	PROPOSED 950,000 SF DISTRIBUTION CENTER SYCAMORE V PROJECT RIVERSIDE, CALIFORNIA	ENCLOSURE "A-1"
DATE: MAY 2014		JOB NUMBER 14285-8

CHJ Consultants



SCALE: 1" = 160'

LEGEND:

T-16 Exploratory Trench

Seismic Refraction Line - this investigation

Seismic Refraction Line - previous investigation (C.H.J., Inc., July 20, 2007)

PLAT

FOR: HILLWOOD INVESTMENT PROPERTIES

DATE: MAY 2014

PROPOSED 950,000 SF DISTRIBUTION CENTER
SYCAMORE V PROJECT
RIVERSIDE, CALIFORNIA

ENCLOSURE "A-2"

JOB NUMBER 14285-8

CHJ Consultants

APPENDIX "B"

EXPLORATORY LOGS

Enclosure "B"
Job No. 14285-8

UNIFIED SOIL CLASSIFICATION SYSTEM

UNIFIED SOIL CLASSIFICATION AND SYMBOL CHART

COARSE-GRAINED SOILS (more than 50% of material is larger than No. 200 sieve size)			
GRAVELS More than 50% of coarse fraction larger than No.4 sieve size	Clean Gravels (Less than 5% fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines
		GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines
	Gravels with fines (More than 12% fines)	GM	Silty gravels, gravel-sand-silt mixtures
		GC	Clayey gravels, gravel-sand-clay mixtures
SANDS 50% or more of coarse fraction smaller than No.4 sieve size	Clean Sands (Less than 5% fines)	SW	Well-graded sands, gravelly sands, little or no fines
		SP	Poorly graded sands, gravelly sands, little or no fines
	Sands with fines (More than 12% fines)	SM	Silty sands, sand-silt mixtures
		SC	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS (50% or more of material is smaller than No. 200 sieve size)			
SILTS AND CLAYS Liquid limit less than 50%		ML	Inorganic silts and very fine sands, rock flour, silty of clayey fine sands or clayey silts with slight plasticity
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
		OL	Organic silts and organic silty clays of low plasticity
SILTS AND CLAYS Liquid limit 50% or greater		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
		CH	Inorganic clays of high plasticity, fat clays
		OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS		PT	Peat and other highly organic soils

LABORATORY CLASSIFICATION CRITERIA

GW $C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{D_{30}^2}{D_{10} \times D_{60}}$ between 1 and 3

GP Not meeting all gradation requirements for GW

GM Atterberg limits below "A" line or P.I. less than 4

GC Atterberg limits above "A" line with P.I. greater than 7

Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols.

SW $C_u = \frac{D_{60}}{D_{10}}$ greater than 6; $C_c = \frac{D_{30}^2}{D_{10} \times D_{60}}$ between 1 and 3

SP Not meeting all gradation requirements for SW

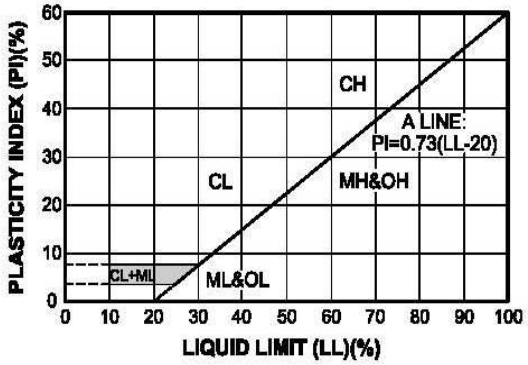
SM Atterberg limits below "A" line or P.I. less than 4

SC Atterberg limits above "A" line with P.I. greater than 7

Limits plotting in shaded zone with P.I. between 4 and 7 are borderline cases requiring use of dual symbols.

Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size).
Coarse-grained soils are classified as follows:
Less than 5 percent.....GW, GP, SW, SP
More than 12 percent.....GM, GC, SM, SC
5 to 12 percent.....Borderline cases requiring dual symbols

PLASTICITY CHART



EXPLORATORY TRENCH NO. 1

Date Excavated: 4/29/14 Client: Hillwood

Equipment: CAT 349E Track Excavator Bucket Size: 36" Bucket

Surface Elevation(ft): 1548.0 Logged by: VJR Station No.: N/A

DEPTH (ft)	GRAPHIC LOG	VISUAL CLASSIFICATION	REMARKS	SAMPLES: DENSITY	SAMPLES: BULK	RELATIVE COMP. (%)	FIELD MOISTURE (%)	DRY UNIT WT. (pcf)	LAB/FIELD TESTS
1		(SM) Silty Sand, fine to medium, brown	Native						
2		Granitic bedrock, weathered, gray	Very hard digging						
3									
4		END OF TRENCH NO GROUNDWATER, NO FILL NO CAVING, NO REFUSAL GRANITIC BEDROCK AT 1.5'							
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									

TRENCH_LOG_15_FT. 14285-8.GPJ CHJ.GDT 5/12/14

CHJ

SYCAMORE V
RIVERSIDE, CALIFORNIA

Job No. 14285-8 Enclosure B-1

EXPLORATORY TRENCH NO. 2

Date Excavated: 4/29/14 Client: Hillwood

Equipment: CAT 349E Track Excavator Bucket Size: 36" Bucket

Surface Elevation(ft): 1559.0 Logged by: VJR Station No.: N/A

DEPTH (ft)	GRAPHIC LOG	VISUAL CLASSIFICATION	REMARKS	SAMPLES: DENSITY	SAMPLES: BULK	RELATIVE COMP. (%)	FIELD MOISTURE (%)	DRY UNIT WT. (pcf)	LAB/FIELD TESTS
0		(SP-SM) Sand, fine to medium, with coarse, with silt, dark brown	Fill						
5		(SM) Silty Sand, fine with medium, brown	Native						
9		Granitic bedrock, very weathered, gray							
10		END OF TRENCH NO GROUNDWATER, NO CAVING NO REFUSAL, FILL TO 4.5' GRANITIC BEDROCK AT 9'							

TRENCH_LOG_15_FT. 14285-8.GPJ CHJ.GDT 5/12/14

CHJ

SYCAMORE V
RIVERSIDE, CALIFORNIA

Job No. 14285-8 Enclosure B-2

EXPLORATORY TRENCH NO. 3

Date Excavated: 4/29/14 Client: Hillwood

Equipment: CAT 349E Track Excavator Bucket Size: 36" Bucket

Surface Elevation(ft): 1662.0 Logged by: VJR Station No.: N/A

DEPTH (ft)	GRAPHIC LOG	VISUAL CLASSIFICATION	REMARKS	SAMPLES: DENSITY	SAMPLES: BULK	RELATIVE COMP. (%)	FIELD MOISTURE (%)	DRY UNIT WT. (pcf)	LAB/FIELD TESTS
1		(SM) Silty Sand, fine with medium, brown	Native						
2									
3									
4									
5									
6		Granitic bedrock, very weathered, gray							
7									
8			Less Weathered						
9		END OF TRENCH NO GROUNDWATER, NO FILL NO CAVING, NO REFUSAL GRANITIC BEDROCK AT 5.5'							
10									
11									
12									
13									
14									

TRENCH_LOG_15_FT. 14285-8.GPJ CHJ.GDT 5/12/14

CHJ

SYCAMORE V
RIVERSIDE, CALIFORNIA

Job No. 14285-8 Enclosure B-3

EXPLORATORY TRENCH NO. 4

Date Excavated: 4/29/14 Client: Hillwood

Equipment: CAT 349E Track Excavator Bucket Size: 36" Bucket

Surface Elevation(ft): 1553.0 Logged by: VJR Station No.: N/A

DEPTH (ft)	GRAPHIC LOG	VISUAL CLASSIFICATION	REMARKS	SAMPLES: DENSITY	SAMPLES: BULK	RELATIVE COMP. (%)	FIELD MOISTURE (%)	DRY UNIT WT. (pcf)	LAB/FIELD TESTS
0		(SM) Silty Sand, fine to medium, brown	Native						
6		(SP-SM) Sand, fine to coarse, with silt, grayish brown, very heavily weathered bedrock inclusions							
9		Granitic bedrock, very weathered, gray							
14		END OF TRENCH NO GROUNDWATER, NO FILL							

TRENCH_LOG_15_FT. 14285-8.GPJ CHJ.GDT 5/12/14

CHJ

SYCAMORE V
RIVERSIDE, CALIFORNIA

Job No. 14285-8 Enclosure B-4a

EXPLORATORY TRENCH NO. 4

Date Excavated: 4/29/14 Client: Hillwood

Equipment: CAT 349E Track Excavator Bucket Size: 36" Bucket

Surface Elevation(ft): 1553.0 Logged by: VJR Station No.: N/A

DEPTH (ft)	GRAPHIC LOG	VISUAL CLASSIFICATION	REMARKS	SAMPLES		RELATIVE COMP. (%)	FIELD MOISTURE (%)	DRY UNIT WT. (pcf)	LAB/FIELD TESTS
				DENSITY	BULK				
		NO CAVING, NO REFUSAL GRANITIC BEDROCK AT 9'							
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									

TRENCH_LOG_15_FT. 14285-8.GPJ CHJ.GDT 5/12/14

CHJ

SYCAMORE V
RIVERSIDE, CALIFORNIA

Job No. 14285-8 Enclosure B-4b

EXPLORATORY TRENCH NO. 5

Date Excavated: 4/29/14 Client: Hillwood

Equipment: CAT 349E Track Excavator Bucket Size: 36" Bucket

Surface Elevation(ft): 1579.0 Logged by: VJR Station No.: N/A

DEPTH (ft)	GRAPHIC LOG	VISUAL CLASSIFICATION	REMARKS	SAMPLES: DENSITY	SAMPLES: BULK	RELATIVE COMP. (%)	FIELD MOISTURE (%)	DRY UNIT WT. (pcf)	LAB/FIELD TESTS
0		(SM) Silty Sand, fine to medium, brown	Native						
3		Granitic bedrock, very weathered, gray	Less weathered						
8		END OF TRENCH NO GROUNDWATER, NO FILL NO CAVING, REFUSAL AT 8' GRANITIC BEDROCK AT 5.5'							

TRENCH_LOG_15_FT. 14285-8.GPJ CHJ.GDT 5/12/14

EXPLORATORY TRENCH NO. 6

Date Excavated: 4/29/14 Client: Hillwood

Equipment: CAT 349E Track Excavator Bucket Size: 36" Bucket

Surface Elevation(ft): 1588.0 Logged by: VJR Station No.: N/A

DEPTH (ft)	GRAPHIC LOG	VISUAL CLASSIFICATION	REMARKS	SAMPLES: DENSITY	SAMPLES: BULK	RELATIVE COMP. (%)	FIELD MOISTURE (%)	DRY UNIT WT. (pcf)	LAB/FIELD TESTS
1		(SM) Silty Sand, fine with medium, brown	Native						
2		Granitic bedrock, very weathered, gray							
6			Less weathered						
9			Very hard digging						
11		END OF TRENCH NO GROUNDWATER, NO FILL NO CAVING, REFUSAL AT 11' GRANITIC BEDROCK AT 2'							

TRENCH_LOG_15_FT. 14285-8.GPJ CHJ.GDT 5/12/14

CHJ

SYCAMORE V
RIVERSIDE, CALIFORNIA

Job No. 14285-8 Enclosure B-6

EXPLORATORY TRENCH NO. 7

Date Excavated: 4/29/14 Client: Hillwood

Equipment: CAT 349E Track Excavator Bucket Size: 36" Bucket

Surface Elevation(ft): 1570.0 Logged by: VJR Station No.: N/A

DEPTH (ft)	GRAPHIC LOG	VISUAL CLASSIFICATION	REMARKS	SAMPLES: DENSITY	SAMPLES: BULK	RELATIVE COMP. (%)	FIELD MOISTURE (%)	DRY UNIT WT. (pcf)	LAB/FIELD TESTS
1		(SM) Silty Sand, fine to medium, brown	Native						
2									
3									
4									
5		Granitic bedrock, very weathered, gray							
6									
7									
8									
9			Less weathered						
10									
11		END OF TRENCH							
12		NO GROUNDWATER, NO FILL NO CAVING, NO REFUSAl GRANITIC BEDROCK AT 5'							
13									
14									

TRENCH_LOG_15_FT. 14285-8.GPJ CHJ.GDT 5/12/14

EXPLORATORY TRENCH NO. 8

Date Excavated: 4/29/14 Client: Hillwood

Equipment: CAT 349E Track Excavator Bucket Size: 36" Bucket

Surface Elevation(ft): 1586.0 Logged by: VJR Station No.: N/A

DEPTH (ft)	GRAPHIC LOG	VISUAL CLASSIFICATION	REMARKS	SAMPLES: DENSITY	SAMPLES: BULK	RELATIVE COMP. (%)	FIELD MOISTURE (%)	DRY UNIT WT. (pcf)	LAB/FIELD TESTS
0		(SM) Silty Sand, fine to medium, brown	Native						
2		Granitic bedrock, very weathered, gray	Very hard digging						
8		END OF TRENCH NO GROUNDWATER, NO FILL NO CAVING, REFUSAL AT 8' GRANITIC BEDROCK AT 2'							

TRENCH_LOG_15_FT. 14285-8.GPJ CHJ.GDT 5/12/14

CHJ

SYCAMORE V
RIVERSIDE, CALIFORNIA

Job No. 14285-8 Enclosure B-8

EXPLORATORY TRENCH NO. 9

Date Excavated: 4/29/14 Client: Hillwood

Equipment: CAT 349E Track Excavator Bucket Size: 36" Bucket

Surface Elevation(ft): 1573.0 Logged by: VJR Station No.: N/A

DEPTH (ft)	GRAPHIC LOG	VISUAL CLASSIFICATION	REMARKS	SAMPLES: DENSITY	SAMPLES: BULK	RELATIVE COMP. (%)	FIELD MOISTURE (%)	DRY UNIT WT. (pcf)	LAB/FIELD TESTS
0		(SM) Silty Sand, fine to medium, brown	Native						
1		Granitic bedrock, moderately weathered, gray							
2			Very hard digging						
3									
4									
5		END OF TRENCH NO GROUNDWATER, NO FILL NO CAVING, REFUSAL AT 5' GRANITIC BEDROCK AT 0.5'							
6									
7									
8									
9									
10									
11									
12									
13									
14									

TRENCH_LOG_15_FT. 14285-8.GPJ CHJ.GDT 5/12/14

CHJ

SYCAMORE V
RIVERSIDE, CALIFORNIA

Job No. 14285-8 Enclosure B-9

EXPLORATORY TRENCH NO. 10

Date Excavated: 4/29/14 Client: Hillwood

Equipment: CAT 349E Track Excavator Bucket Size: 36" Bucket

Surface Elevation(ft): 1581.0 Logged by: VJR Station No.: N/A

DEPTH (ft)	GRAPHIC LOG	VISUAL CLASSIFICATION	REMARKS	SAMPLES: DENSITY	SAMPLES: BULK	RELATIVE COMP. (%)	FIELD MOISTURE (%)	DRY UNIT WT. (pcf)	LAB/FIELD TESTS
1		(SM) Silty Sand, fine to medium, brown	Native						
2		Granitic bedrock, weathered, gray							
3									
4									
5									
6			Less weathered						
7									
8									
9									
10		END OF TRENCH NO GROUNDWATER, NO FILL NO CAVING, REFUSAL AT 10' GRANITIC BEDROCK AT 2'							
11									
12									
13									
14									

TRENCH_LOG_15_FT. 14285-8.GPJ CHJ.GDT 5/12/14

CHJ

SYCAMORE V
RIVERSIDE, CALIFORNIA

Job No. 14285-8 Enclosure B-10

EXPLORATORY TRENCH NO. 11

Date Excavated: 4/29/14 Client: Hillwood

Equipment: CAT 349E Track Excavator Bucket Size: 36" Bucket

Surface Elevation(ft): 1591.0 Logged by: VJR Station No.: N/A

DEPTH (ft)	GRAPHIC LOG	VISUAL CLASSIFICATION	REMARKS	SAMPLES: DENSITY	SAMPLES: BULK	RELATIVE COMP. (%)	FIELD MOISTURE (%)	DRY UNIT WT. (pcf)	LAB/FIELD TESTS
1		(SM) Silty Sand, fine to medium, brown	Native						
2		Granitic bedrock, moderately weathered, gray							
3									
4									
5			Very hard digging						
6									
7		END OF TRENCH							
8		NO GROUNDWATER, NO FILL NO CAVING, REFUSAL AT 7' GRANITIC BEDROCK AT 2'							
9									
10									
11									
12									
13									
14									

TRENCH_LOG_15_FT. 14285-8.GPJ CHJ.GDT 5/12/14

CHJ

SYCAMORE V
RIVERSIDE, CALIFORNIA

Job No. 14285-8 Enclosure B-11

EXPLORATORY TRENCH NO. 12

Date Excavated: 4/29/14 Client: Hillwood

Equipment: CAT 349E Track Excavator Bucket Size: 36" Bucket

Surface Elevation(ft): 1575.0 Logged by: VJR Station No.: N/A

DEPTH (ft)	GRAPHIC LOG	VISUAL CLASSIFICATION	REMARKS	SAMPLES: DENSITY	SAMPLES: BULK	RELATIVE COMP. (%)	FIELD MOISTURE (%)	DRY UNIT WT. (pcf)	LAB/FIELD TESTS
1		(SM) Silty Sand, fine to medium, brown	Native						
2									
3									
4									
5									
6									
7									
8		Granitic bedrock, very weathered, gray							
9									
10		END OF TRENCH							
11		NO GROUNDWATER, NO FILL NO CAVING, NO REFUSAL GRANITIC BEDROCK AT 8'							
12									
13									
14									

TRENCH_LOG_15_FT. 14285-8.GPJ CHJ.GDT 5/12/14

CHJ

SYCAMORE V
RIVERSIDE, CALIFORNIA

Job No. 14285-8 Enclosure B-12

EXPLORATORY TRENCH NO. 13

Date Excavated: 4/29/14 Client: Hillwood

Equipment: CAT 349E Track Excavator Bucket Size: 36" Bucket

Surface Elevation(ft): 1576.0 Logged by: VJR Station No.: N/A

DEPTH (ft)	GRAPHIC LOG	VISUAL CLASSIFICATION	REMARKS	SAMPLES: DENSITY	SAMPLES: BULK	RELATIVE COMP. (%)	FIELD MOISTURE (%)	DRY UNIT WT. (pcf)	LAB/FIELD TESTS
1		(SM) Silty Sand, fine to medium, brown	Native						
2									
3									
4									
5									
6									
7									
8		Granitic bedrock, very weathered, gray							
9									
10									
11			Very hard digging						
12									
13									
14									

TRENCH_LOG_15_FT. 14285-8.GPJ CHJ.GDT 5/12/14

CHJ

SYCAMORE V
RIVERSIDE, CALIFORNIA

Job No. 14285-8 Enclosure B-13a

EXPLORATORY TRENCH NO. 13

Date Excavated: 4/29/14 Client: Hillwood

Equipment: CAT 349E Track Excavator Bucket Size: 36" Bucket

Surface Elevation(ft): 1576.0 Logged by: VJR Station No.: N/A

DEPTH (ft)	GRAPHIC LOG	VISUAL CLASSIFICATION	REMARKS	SAMPLES: DENSITY	SAMPLES: BULK	RELATIVE COMP. (%)	FIELD MOISTURE (%)	DRY UNIT WT. (pcf)	LAB/FIELD TESTS
		END OF TRENCH							
16		NO GROUNDWATER, NO FILL NO CAVING, NO REFUSAL GRANITIC BEDROCK AT 8'							
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									

TRENCH_LOG_15_FT. 14285-8.GPJ CHJ.GDT 5/12/14

CHJ

SYCAMORE V
RIVERSIDE, CALIFORNIA

Job No. 14285-8 Enclosure B-13b

EXPLORATORY TRENCH NO. 14

Date Excavated: 4/29/14 Client: Hillwood

Equipment: CAT 349E Track Excavator Bucket Size: 36" Bucket

Surface Elevation(ft): 1569.0 Logged by: VJR Station No.: N/A

DEPTH (ft)	GRAPHIC LOG	VISUAL CLASSIFICATION	REMARKS	SAMPLES: DENSITY	SAMPLES: BULK	RELATIVE COMP. (%)	FIELD MOISTURE (%)	DRY UNIT WT. (pcf)	LAB/FIELD TESTS
0		(SM) Silty Sand, fine with medium, brown	Native						
1		Granitic bedrock, moderately weathered, gray							
2									
3			Very hard digging						
4									
5									
6									
7									
8		END OF TRENCH							
9		NO GROUNDWATER, NO FILL NO CAVING, REFUSAL AT 8' GRANITIC BEDROCK AT 1'							
10									
11									
12									
13									
14									

TRENCH_LOG_15_FT. 14285-8.GPJ CHJ.GDT 5/12/14

CHJ

SYCAMORE V
RIVERSIDE, CALIFORNIA

Job No. 14285-8 Enclosure B-14

EXPLORATORY TRENCH NO. 15

Date Excavated: 4/29/14 Client: Hillwood

Equipment: CAT 349E Track Excavator Bucket Size: 36" Bucket

Surface Elevation(ft): 1569.0 Logged by: VJR Station No.: N/A

DEPTH (ft)	GRAPHIC LOG	VISUAL CLASSIFICATION	REMARKS	SAMPLES: DENSITY	SAMPLES: BULK	RELATIVE COMP. (%)	FIELD MOISTURE (%)	DRY UNIT WT. (pcf)	LAB/FIELD TESTS
0		(SM) Silty Sand, fine to medium, brown	Native						
1		Granitic bedrock, moderately weathered, gray							
2			Very hard digging						
3									
4									
5									
6									
7		END OF TRENCH NO GROUNDWATER, NO FILL NO CAVING, REFUSAL AT 6.5' GRANITIC BEDROCK AT 0.5'							
8									
9									
10									
11									
12									
13									
14									

TRENCH_LOG_15_FT. 14285-8.GPJ CHJ.GDT 5/12/14

CHJ

SYCAMORE V
RIVERSIDE, CALIFORNIA

Job No. 14285-8 Enclosure B-15

EXPLORATORY TRENCH NO. 16

Date Excavated: 4/29/14 Client: Hillwood

Equipment: CAT 349E Track Excavator Bucket Size: 36" Bucket

Surface Elevation(ft): 1568.0 Logged by: VJR Station No.: N/A

DEPTH (ft)	GRAPHIC LOG	VISUAL CLASSIFICATION	REMARKS	SAMPLES: DENSITY	SAMPLES: BULK	RELATIVE COMP. (%)	FIELD MOISTURE (%)	DRY UNIT WT. (pcf)	LAB/FIELD TESTS
1		(SM) Silty Sand, fine to medium, brown	Native						
2		Granitic bedrock, moderately weathered, gray							
5			Hard Digging						
10		END OF TRENCH NO GROUNDWATER, NO FILL NO CAVING, REFUSAL AT 10' GRANITIC BEDROCK AT 2'	Very hard, less weathered						

TRENCH_LOG_15_FT. 14285-8.GPJ CHJ.GDT 5/12/14

CHJ

SYCAMORE V
RIVERSIDE, CALIFORNIA

Job No. 14285-8 Enclosure B-16

APPENDIX "C"

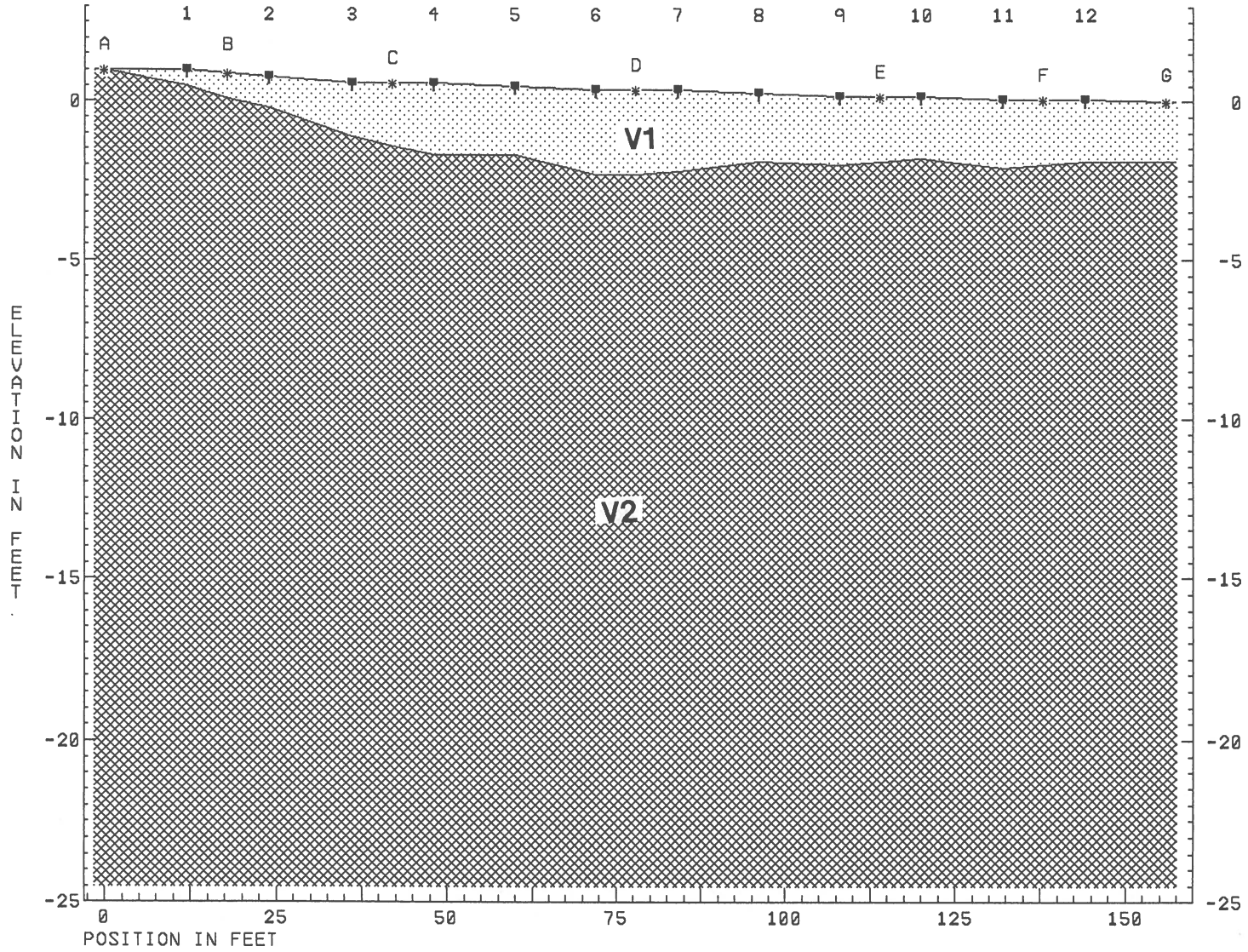
REFRACTION LAYER MODELS

LAYER VELOCITY PROFILE S-3

North 25° West →

FILE 2224-3.SIP
SEISMIC LINE S-3

SPREAD A



LEGEND

LAYER	VEL	SPREAD
	2566	A
	5229	A

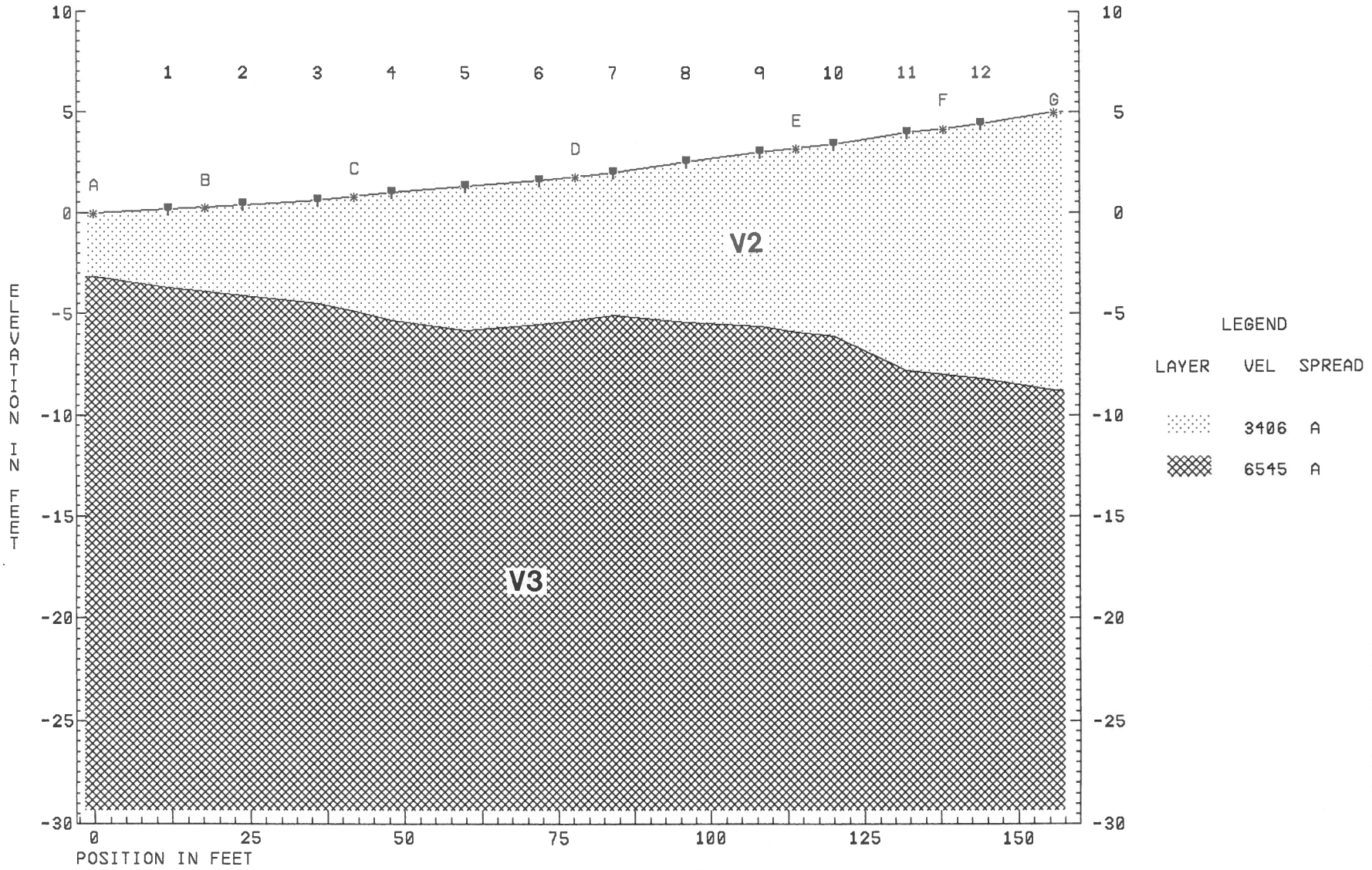
Enclosure "C-1"
Job No. 14285-8

LAYER VELOCITY PROFILE S-4

← East - West →

FILE 2224-4A.SIP
SEISMIC LINE S-4

SPREAD A



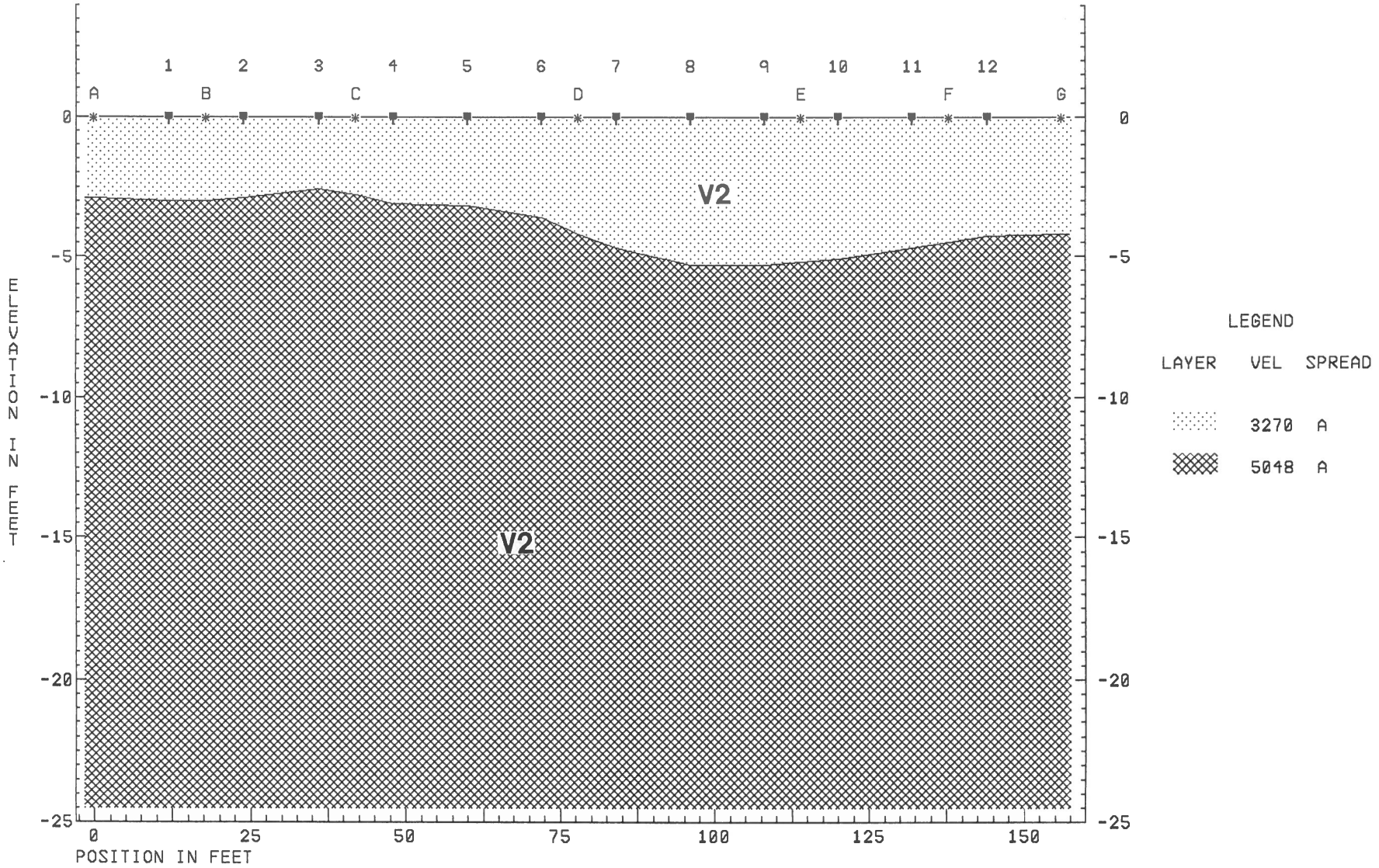
Enclosure "C-2"
Job No. 14285-8

LAYER VELOCITY PROFILE S-5

← West - East →

FILE 2224-5.SIP
SEISMIC LINE S-5

SPREAD A



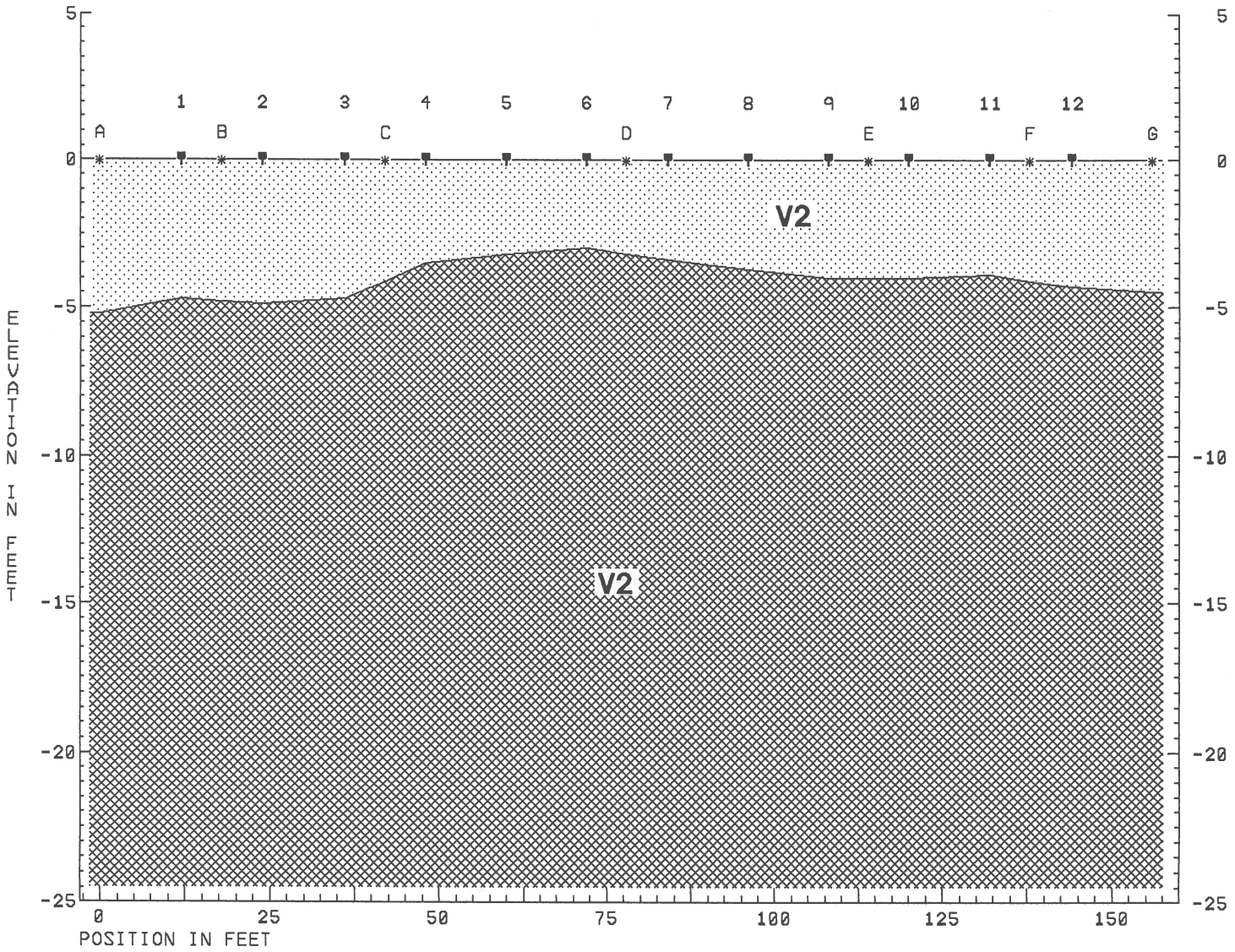
Enclosure "C-3"
Job No. 14285-8

LAYER VELOCITY PROFILE S-6

North 70° West →

FILE 2224-6.SIP
SEISMIC LINE S-6

SPREAD A



LEGEND

LAYER	VEL	SPREAD
	3102	A
	5852	A

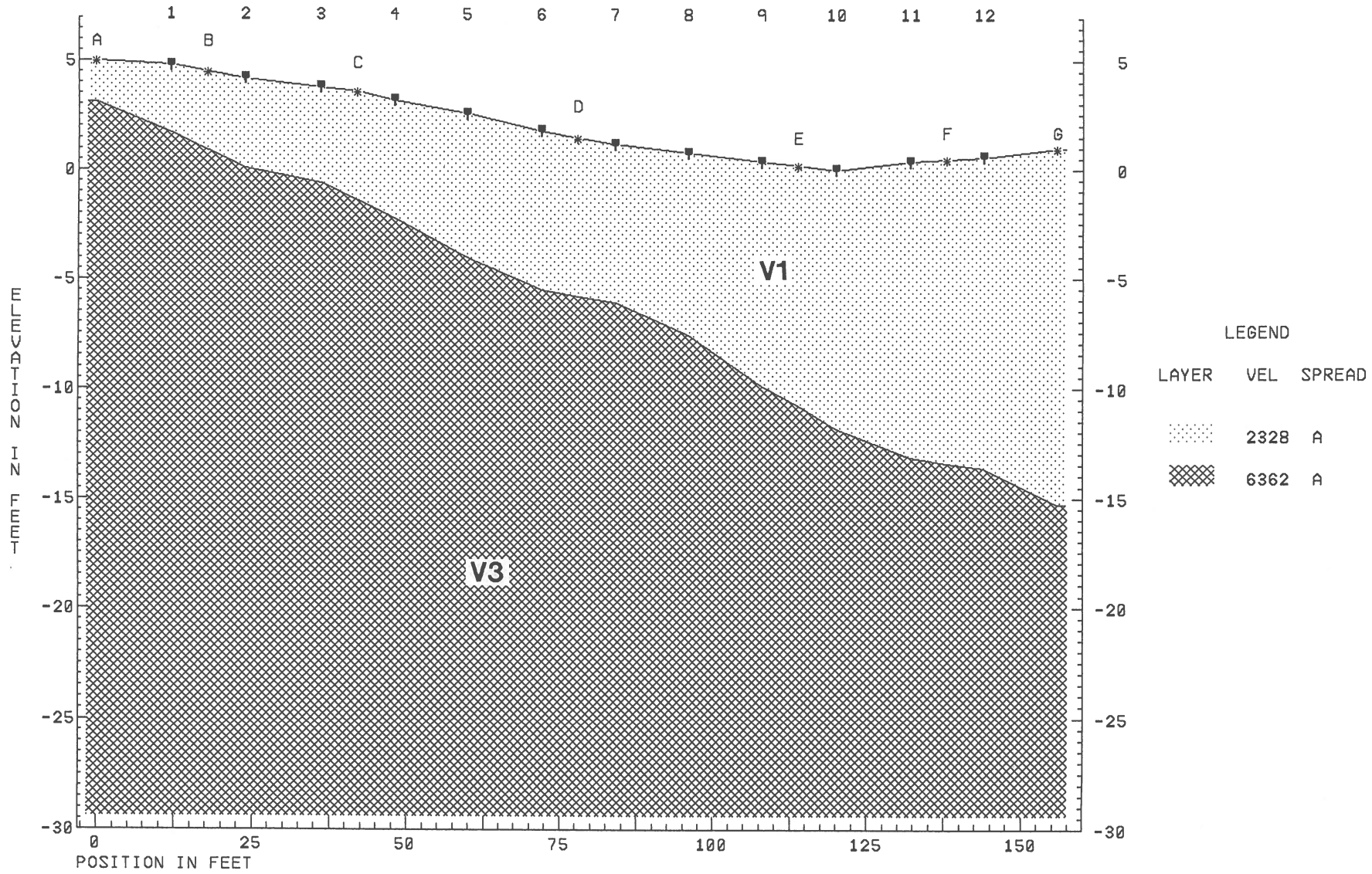
Enclosure "C-4"
Job No. 14285-8

LAYER VELOCITY PROFILE S-7

← North - South →

FILE 2224-7.SIP
SEISMIC LINE S-7

SPREAD A



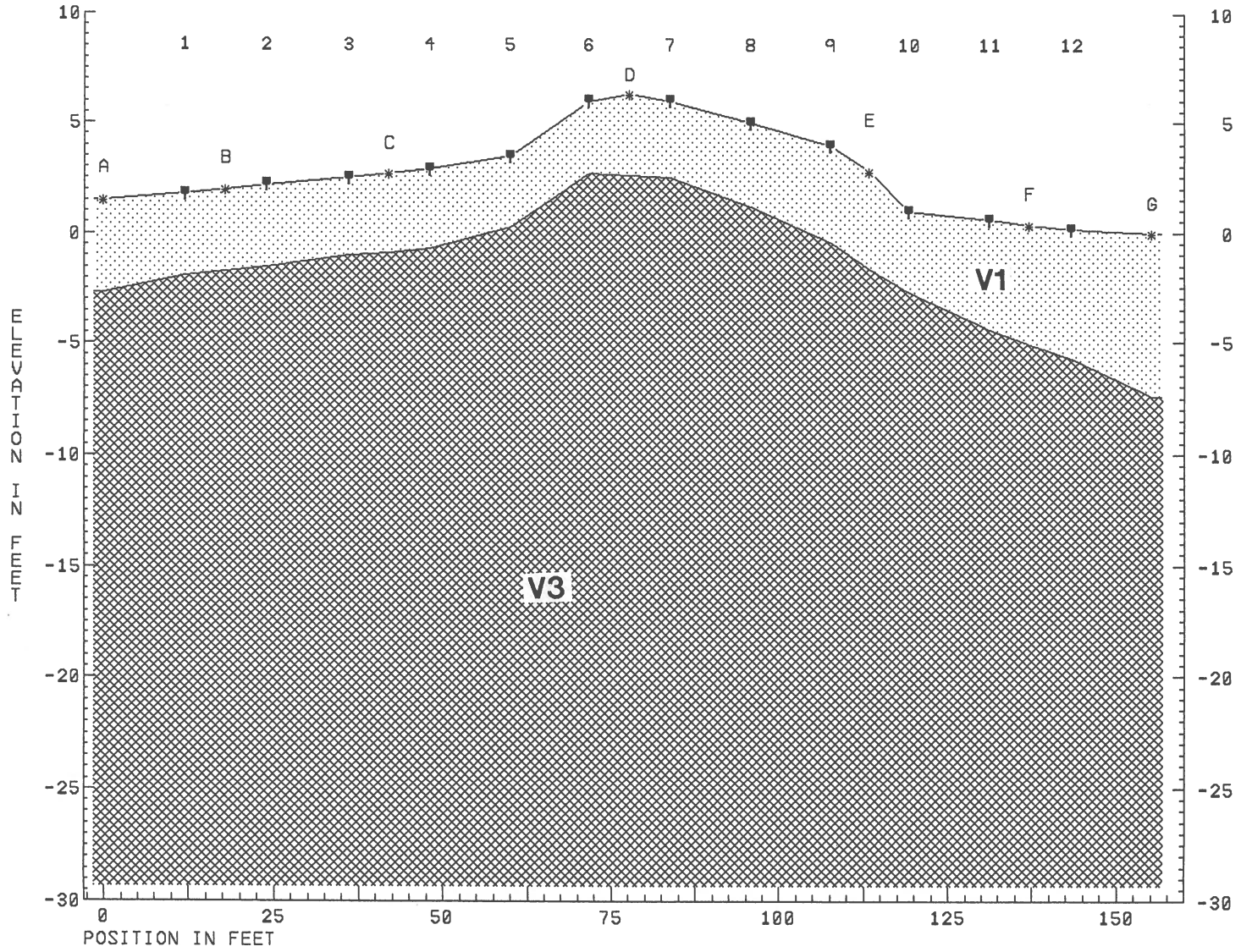
Enclosure "C-5"
Job No. 14285-8

LAYER VELOCITY PROFILE S-8

South 75° West →

FILE 2224-8.SIP
SEISMIC LINE S-8

SPREAD A



LEGEND

LAYER	VEL	SPREAD
	1769	A
	6377	A

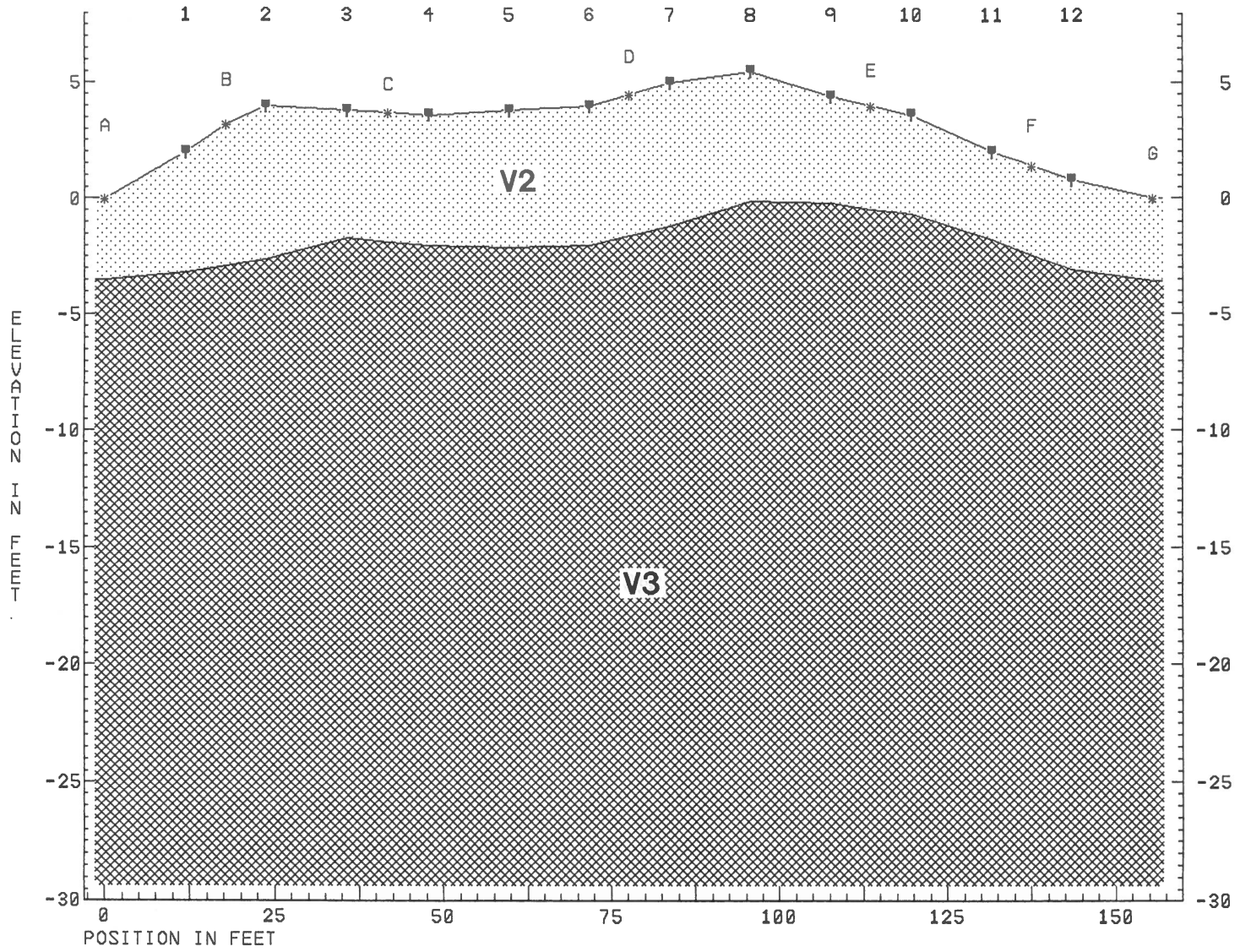
Enclosure "C-6"
Job No. 14285-8

LAYER VELOCITY PROFILE S-9

← East - West →

FILE 2224-9.SIP
SEISMIC LINE S-9

SPREAD A



LEGEND

LAYER	VEL	SPREAD
	3111	A
	7698	A

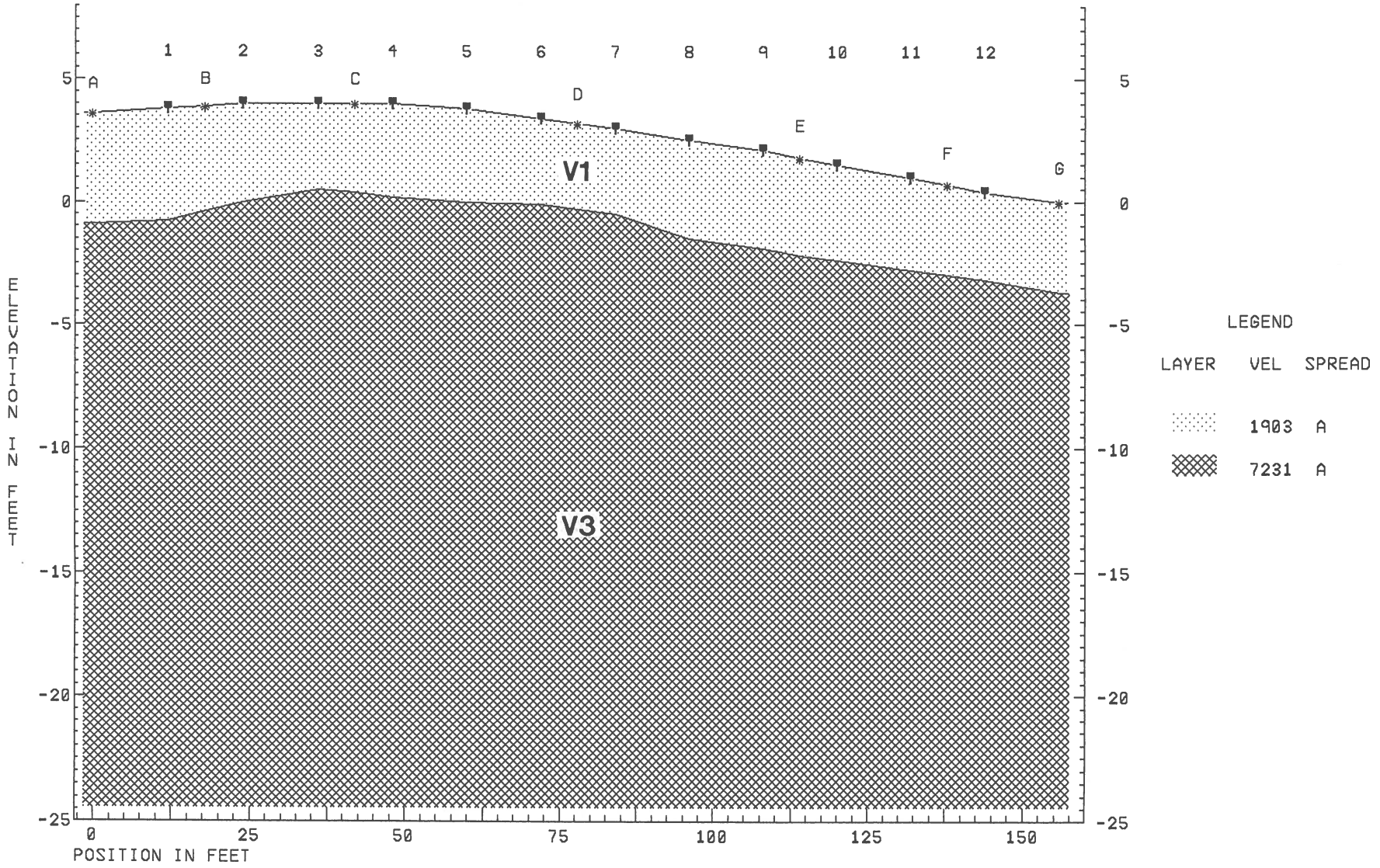
Enclosure "C-7"
Job No. 14285-8

LAYER VELOCITY PROFILE S-10

South 15° East →

FILE 2224-10.SIP
SEISMIC LINE S-10

SPREAD A

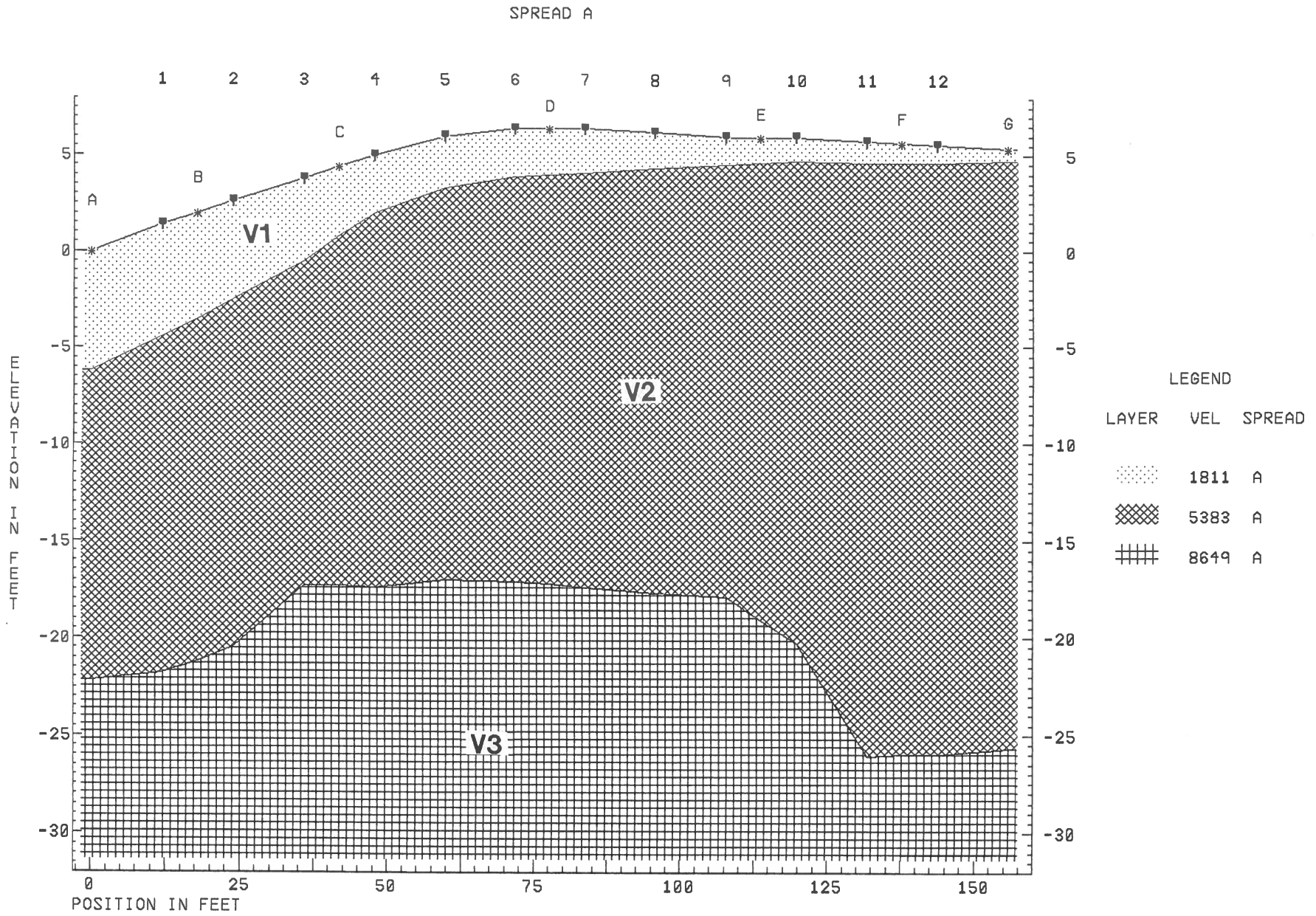


Enclosure "C-8"
Job No. 14285-8

LAYER VELOCITY PROFILE S-11

North 40° West →

FILE 2224-11.SIP
SEISMIC LINE S-11



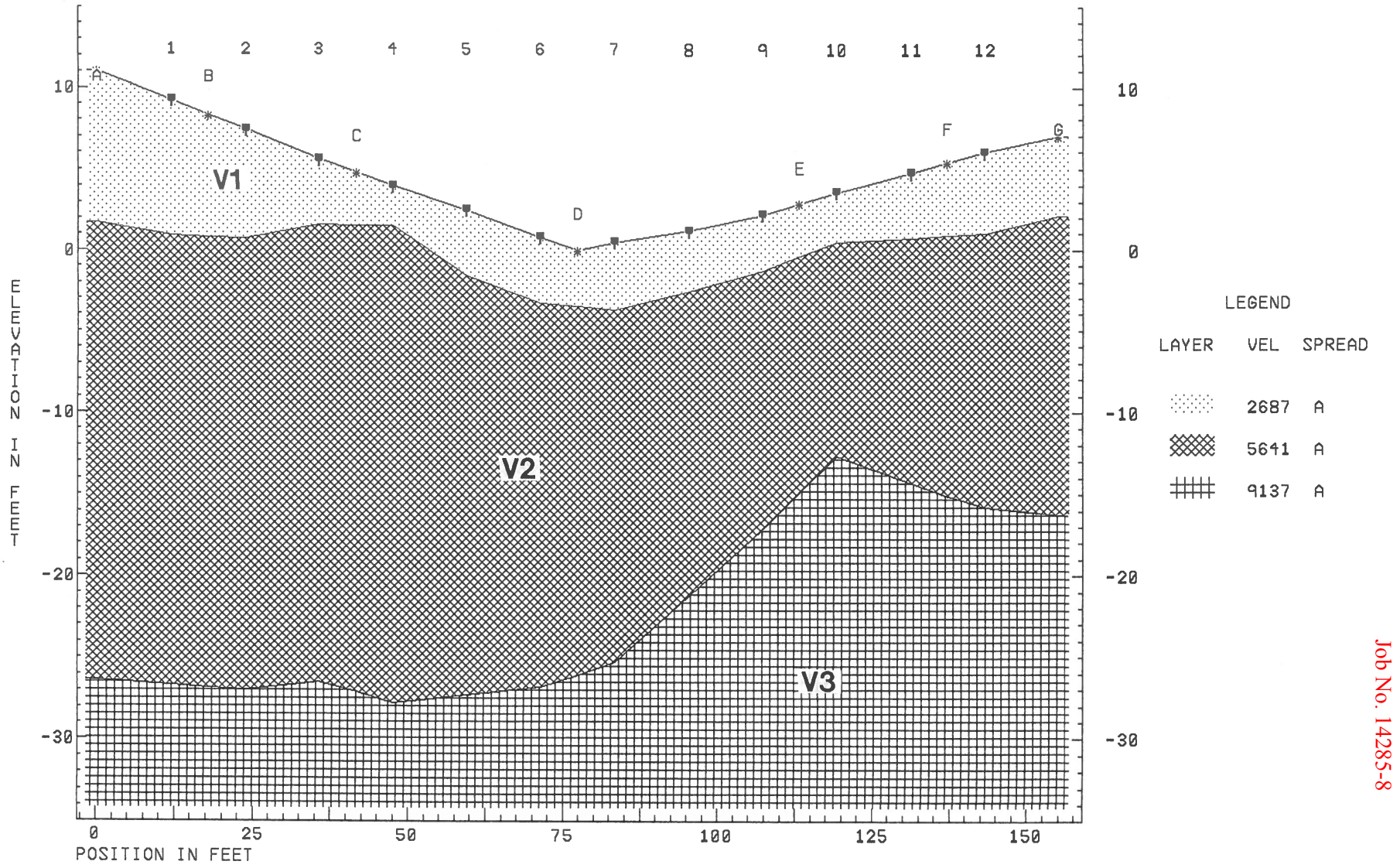
Enclosure "C-9"
Job No. 14285-8

LAYER VELOCITY PROFILE S-12

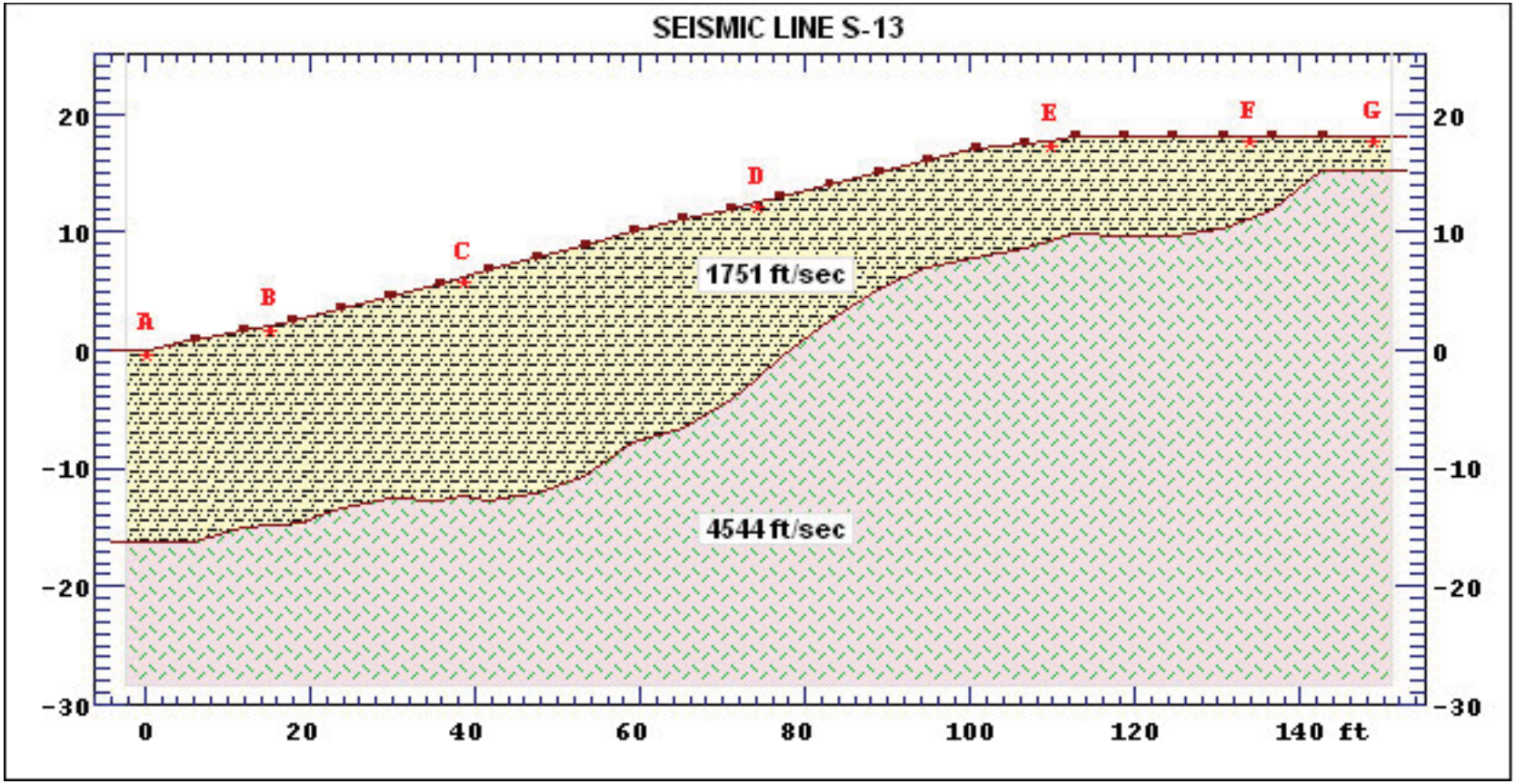
South 60° East →

FILE 2224-12.SIP
SEISMIC LINE S-12

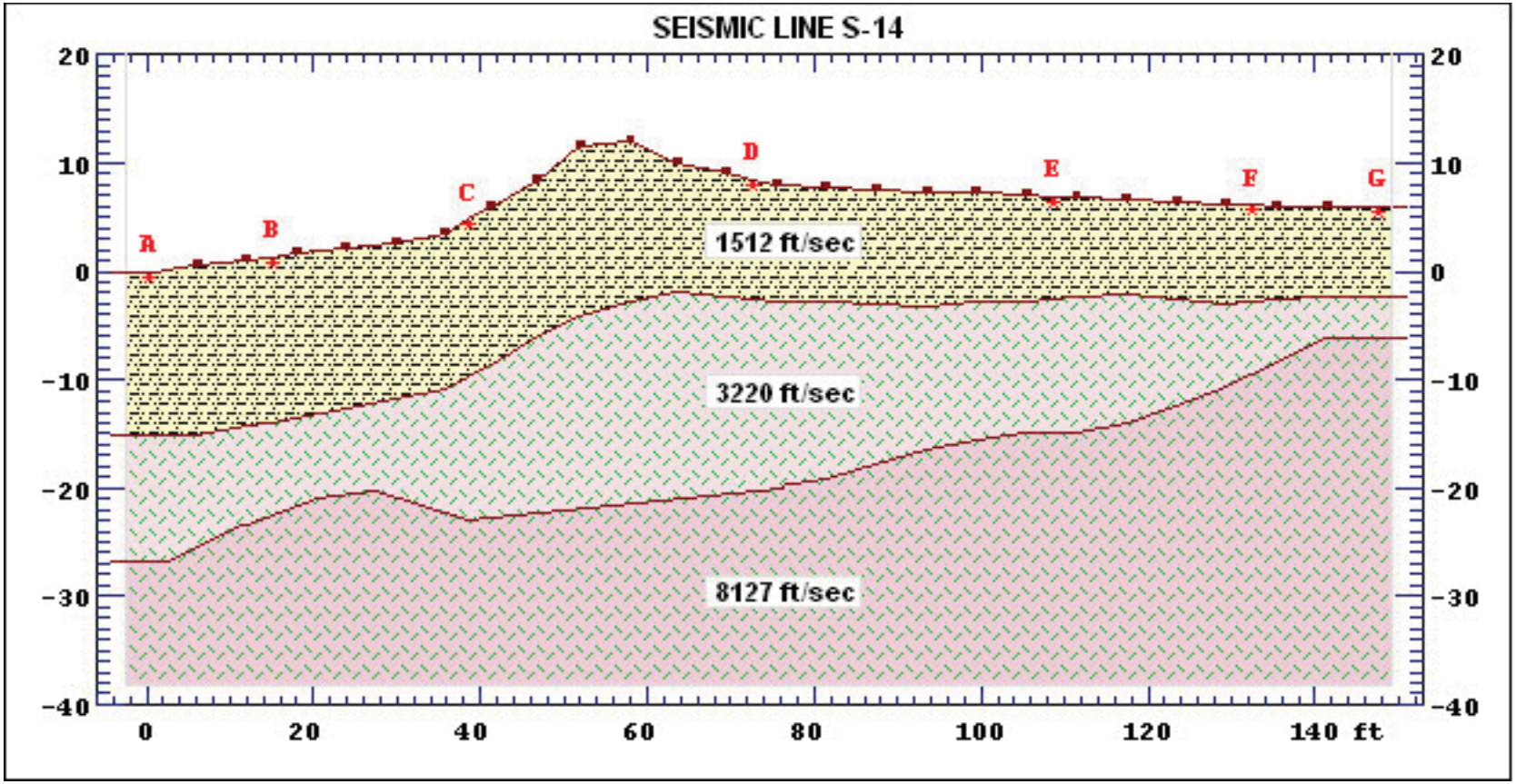
SPREAD A



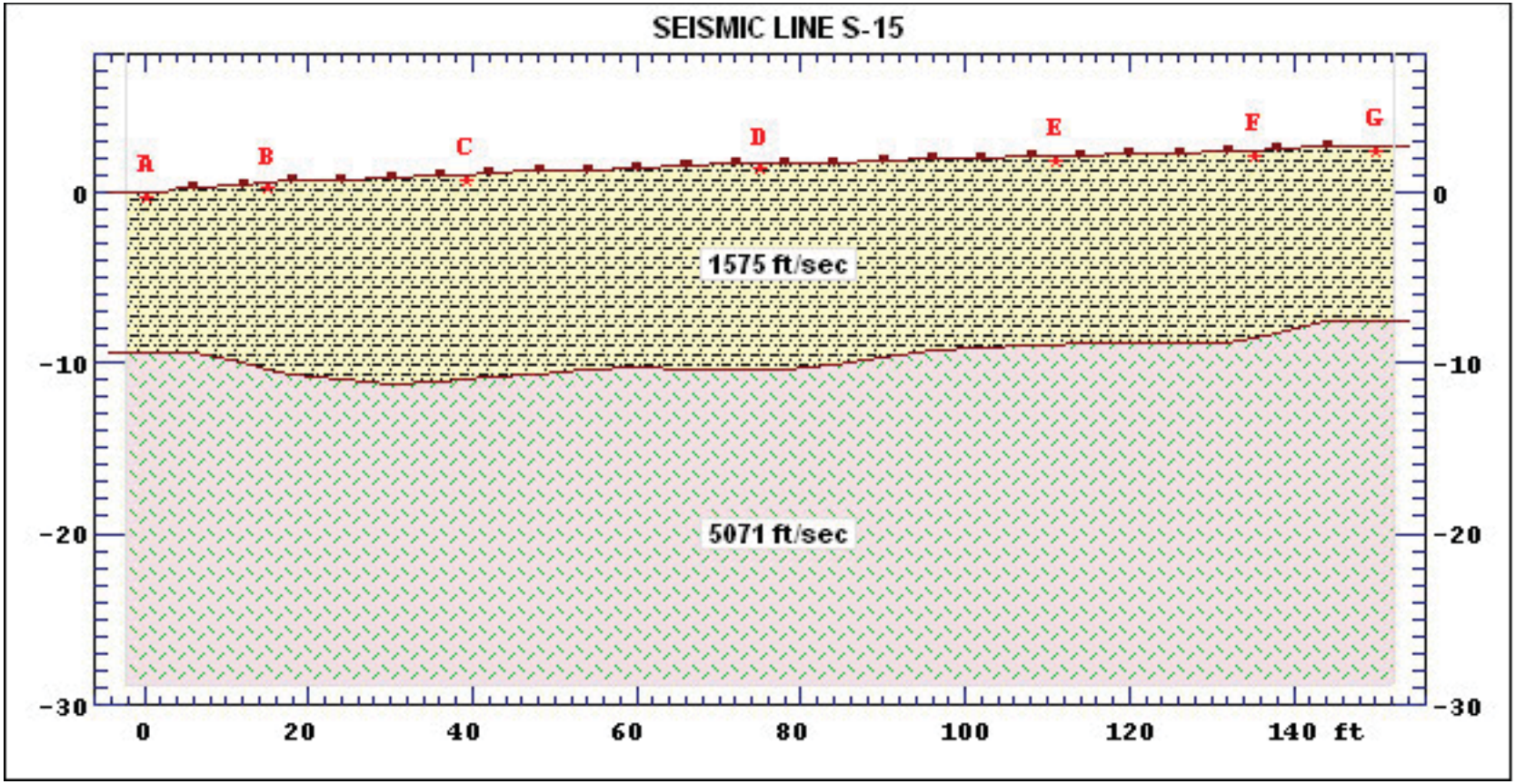
Enclosure "C-10"
Job No. 14285-8



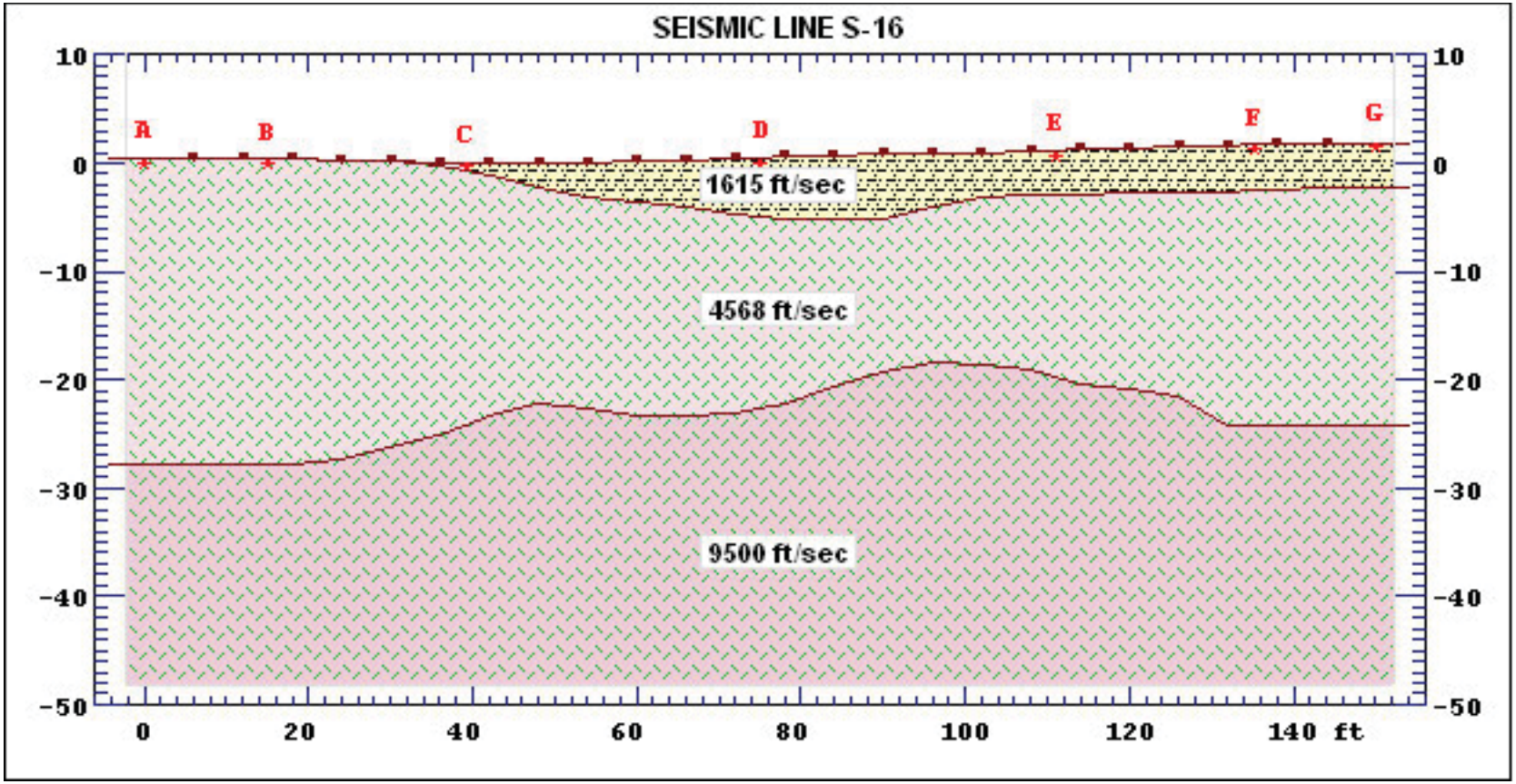
Enclosure "C-11"
Job No. 14285-8



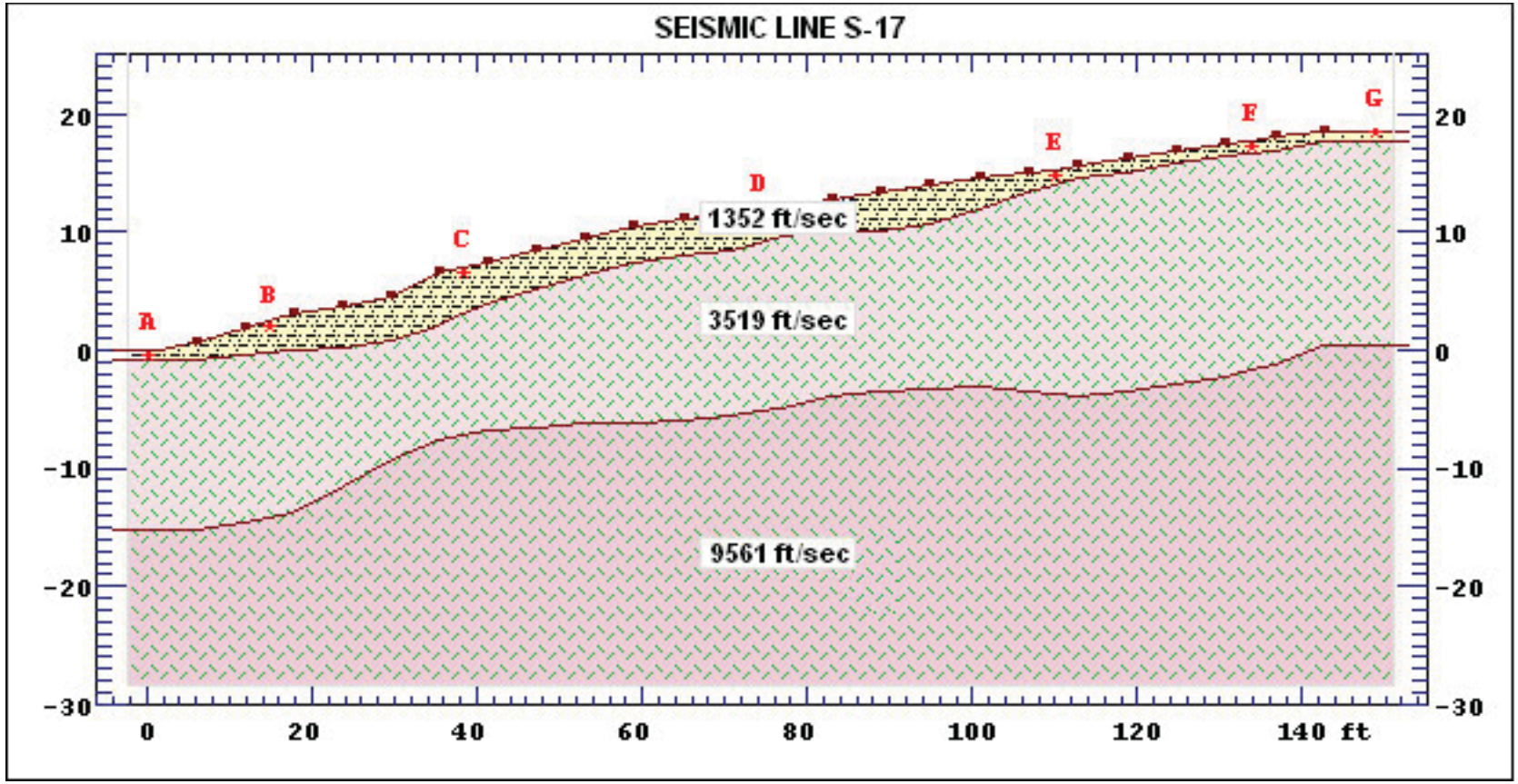
Enclosure "C-12"
Job No. 14285-8



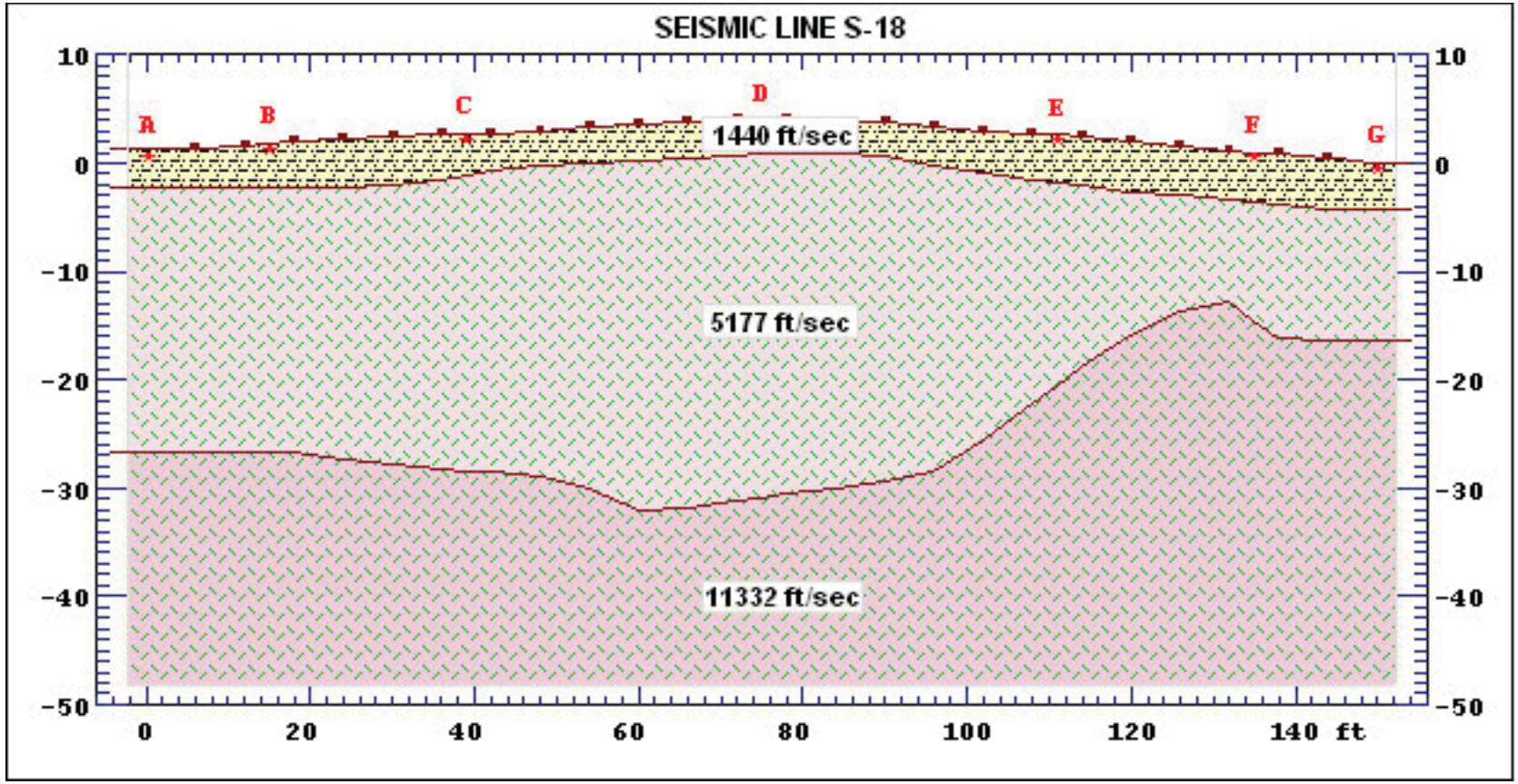
Enclosure "C-13"
Job No. 14285-8



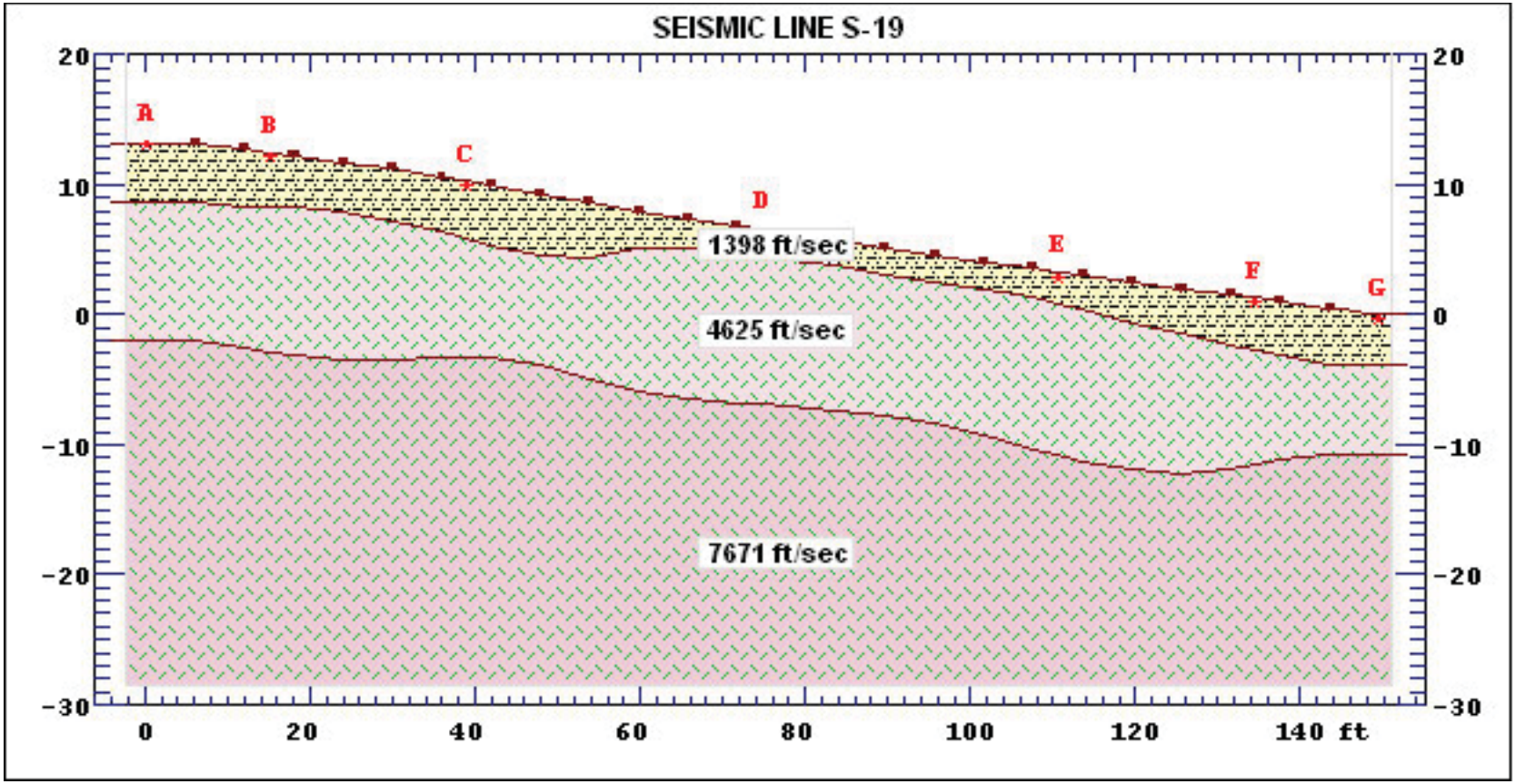
Enclosure "C-14"
Job No. 14285-8



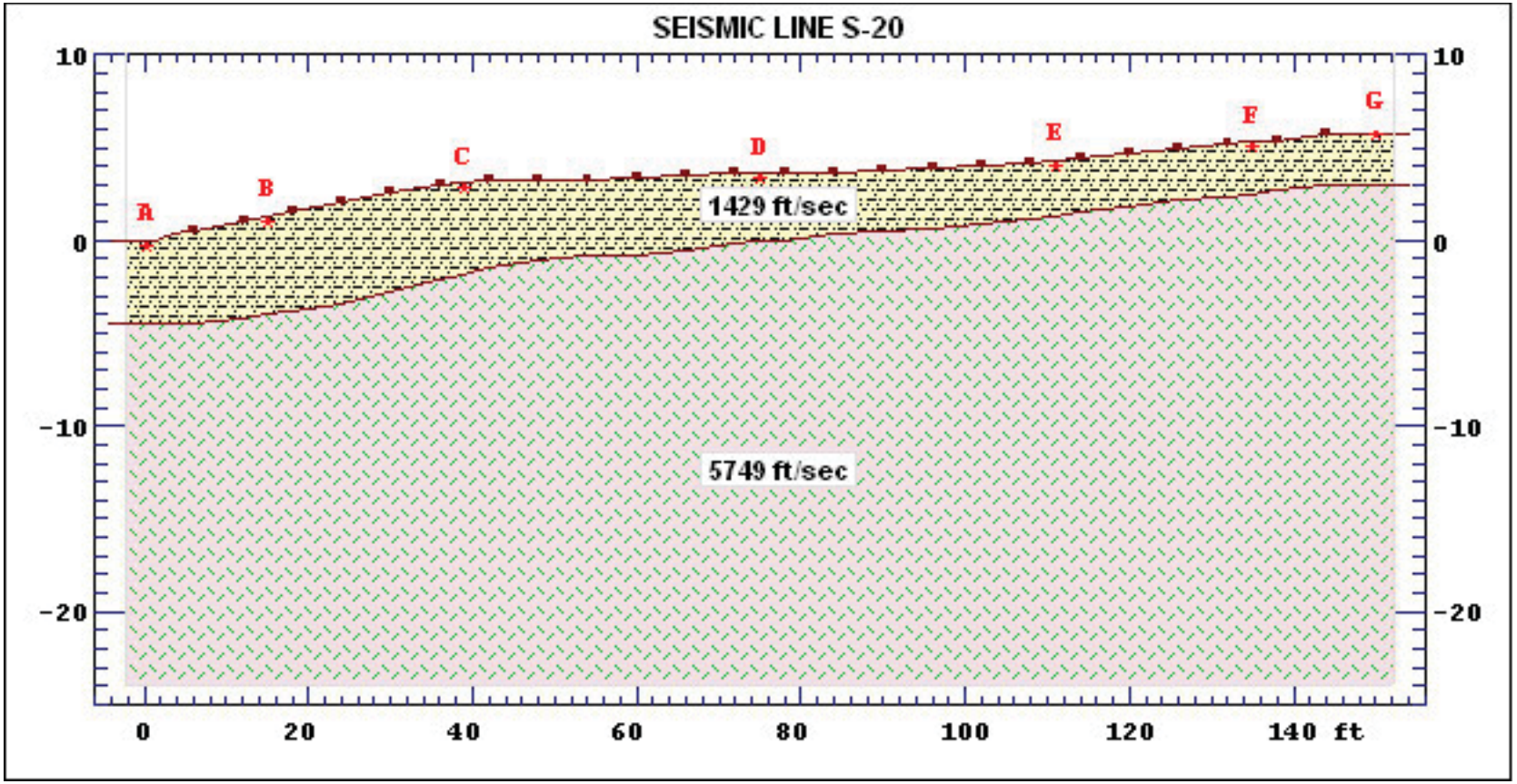
Enclosure "C-15"
Job No. 14285-8



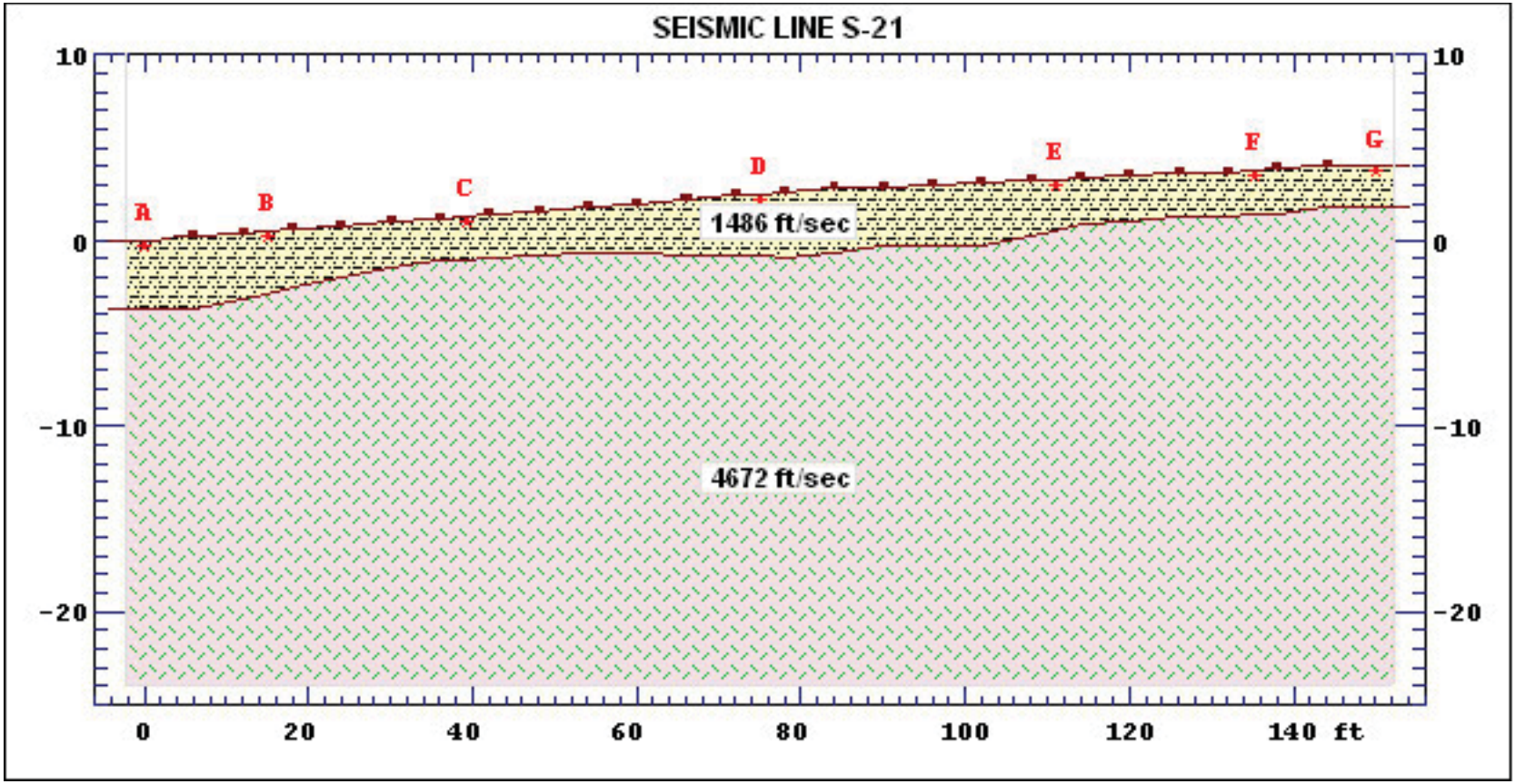
Enclosure "C-16"
Job No. 14285-8



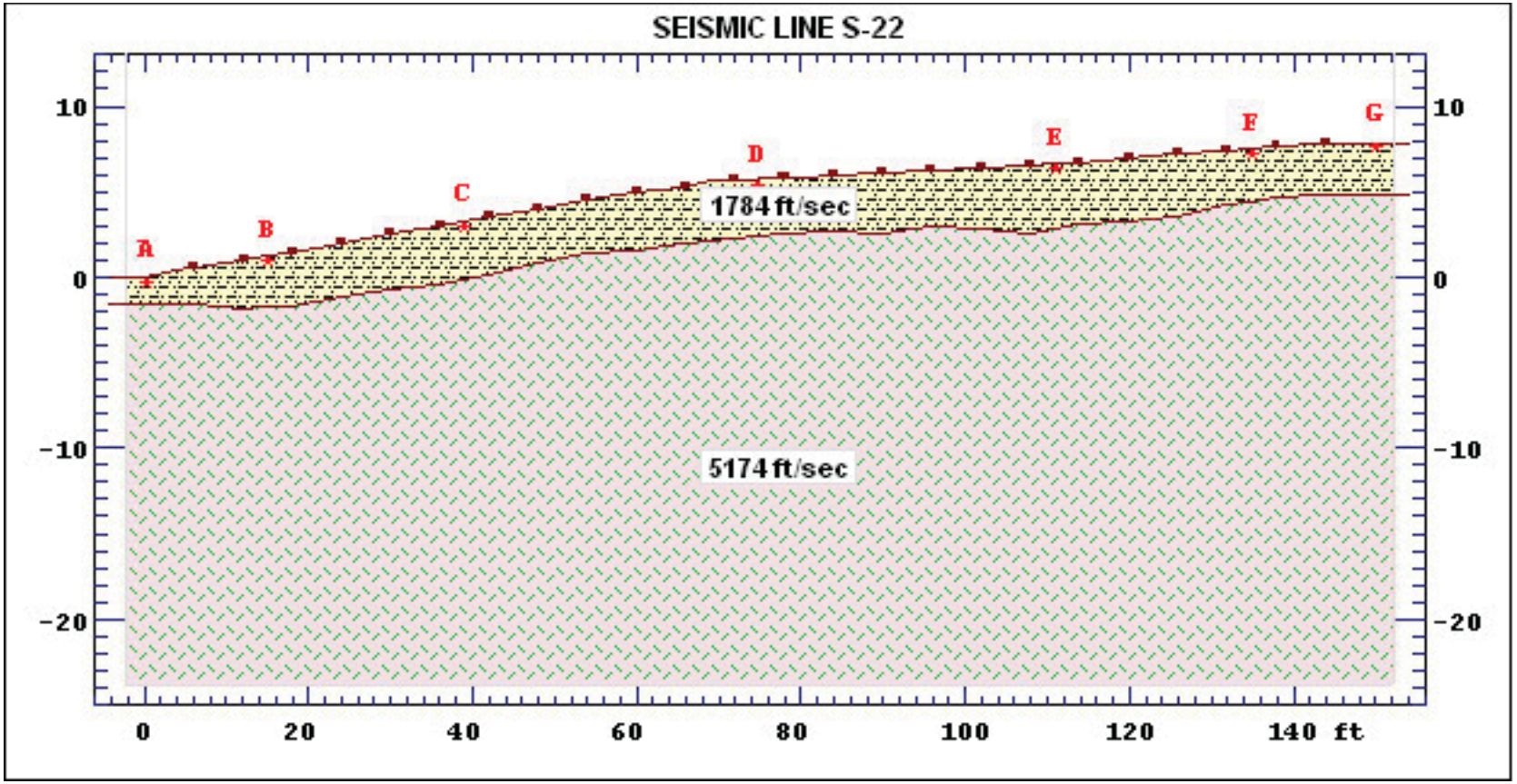
Enclosure "C-17"
Job No. 14285-8



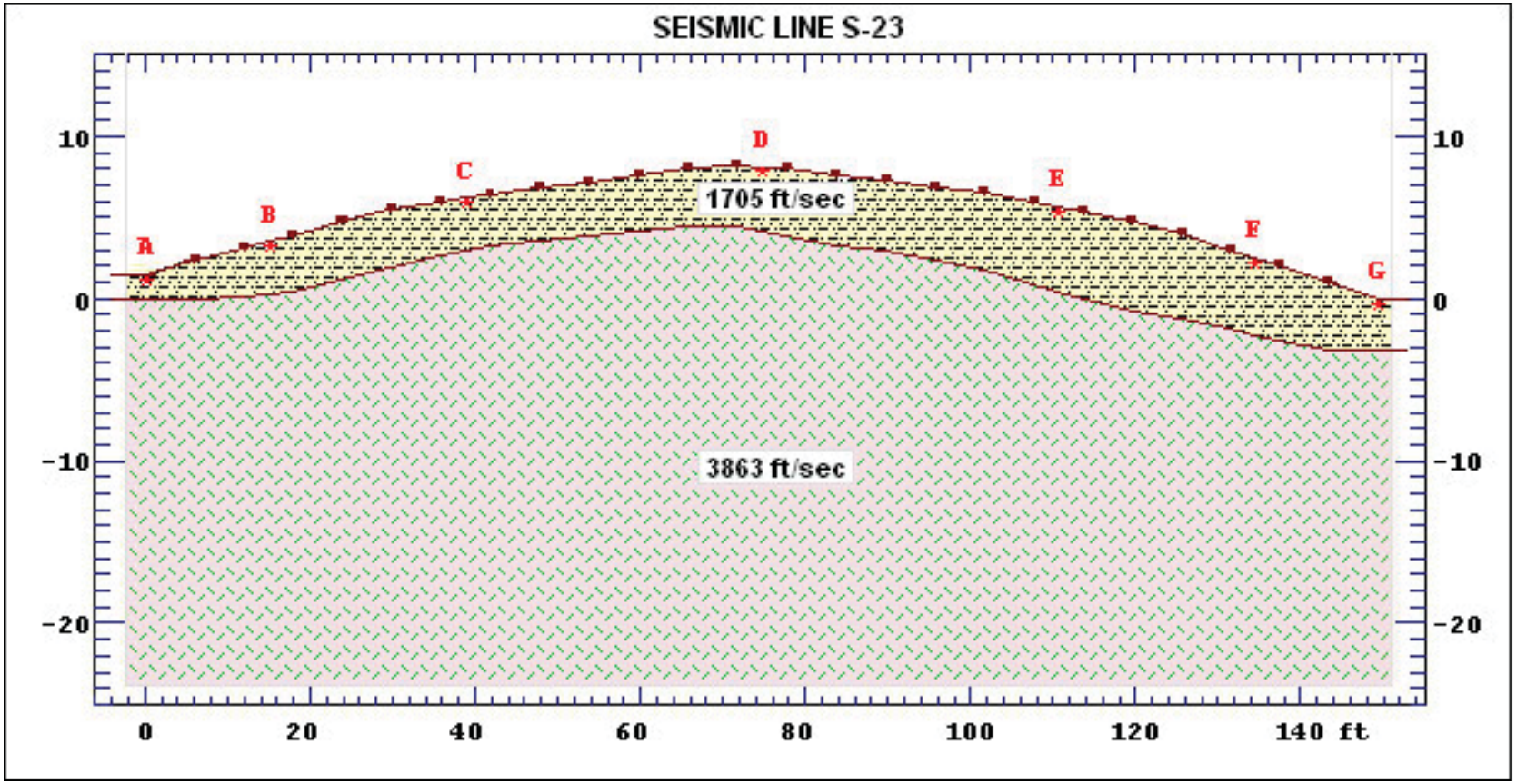
Enclosure "C-18"
Job No. 14285-8



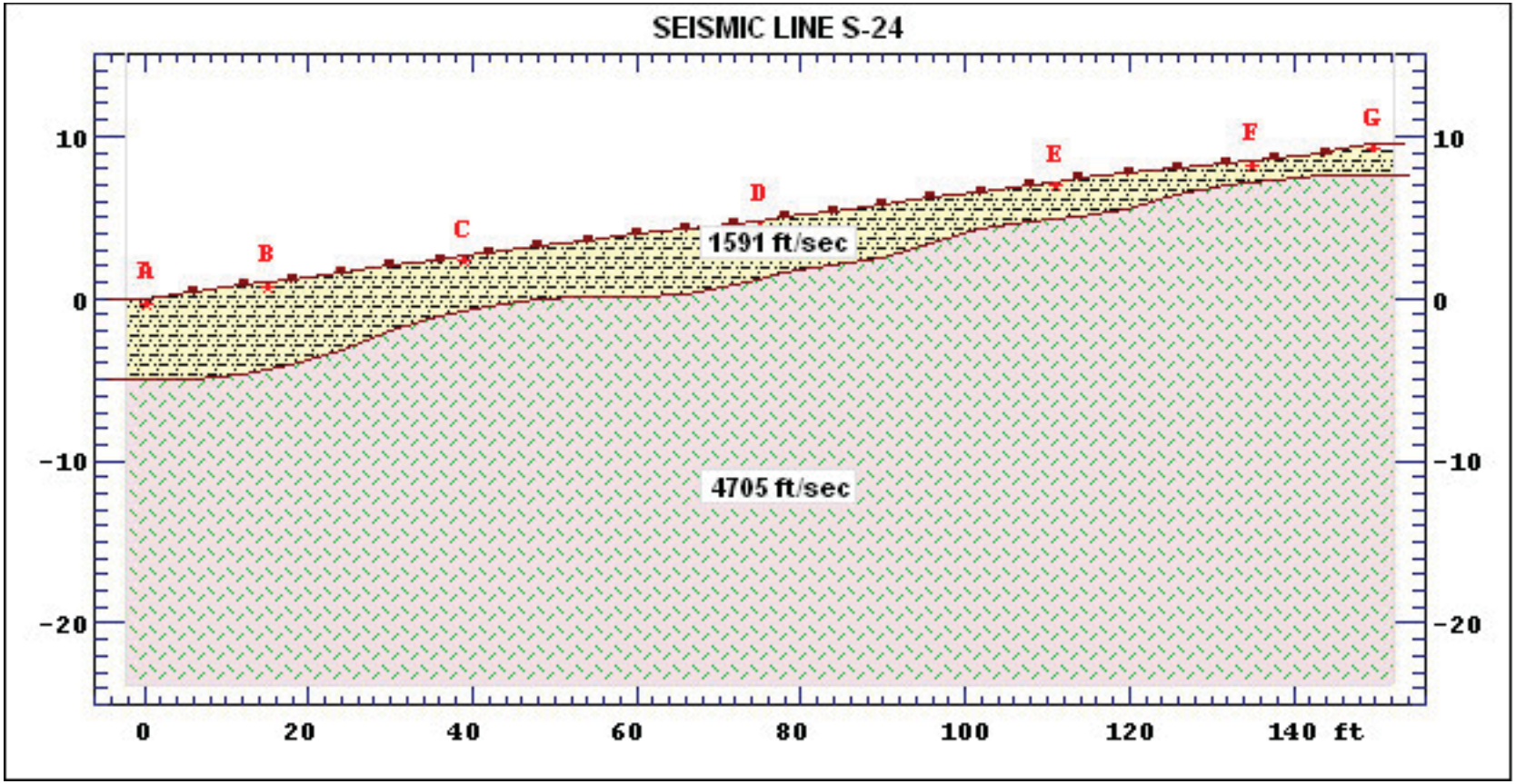
Enclosure "C-19"
Job No. 14285-8



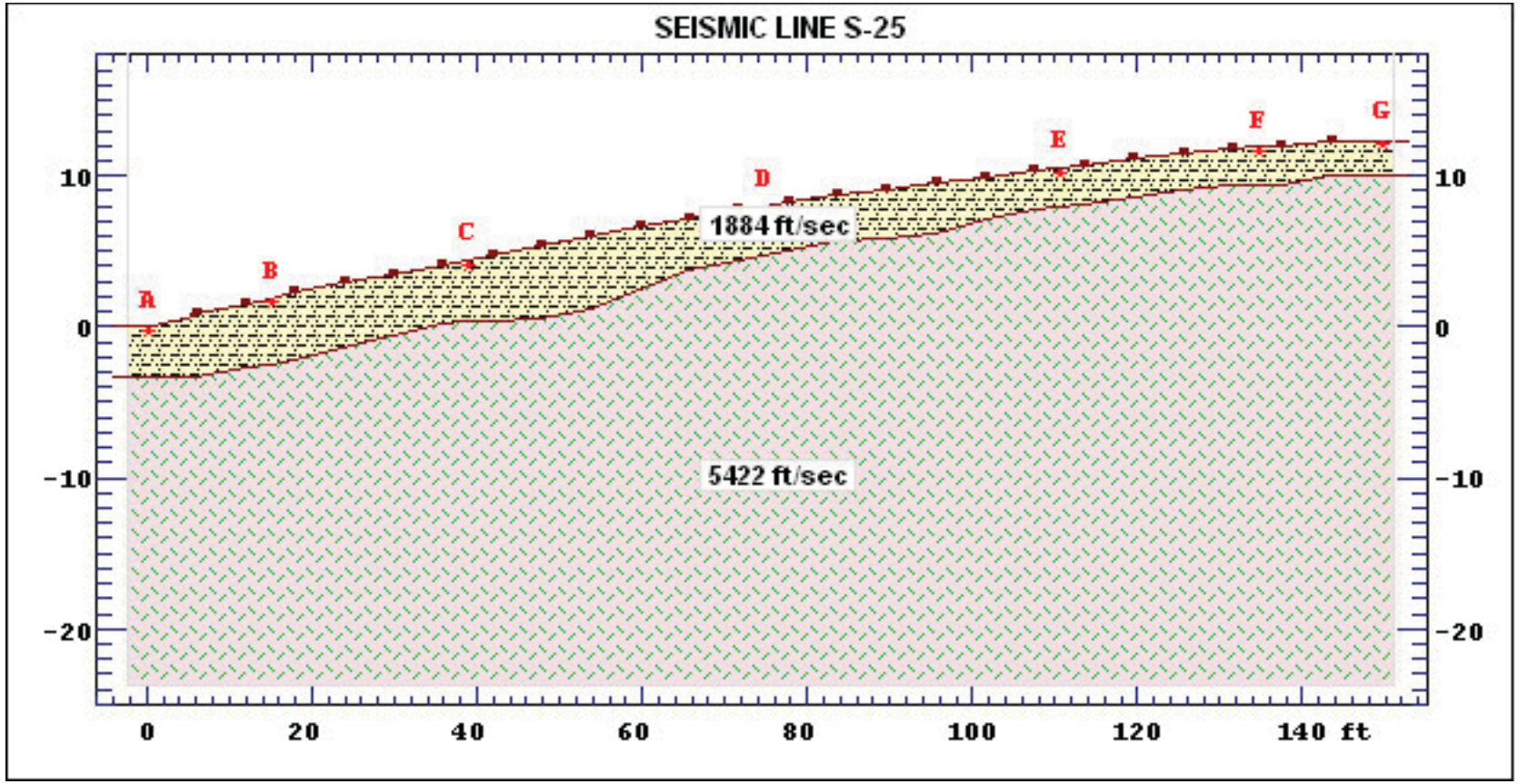
Enclosure "C-20"
Job No. 14285-8



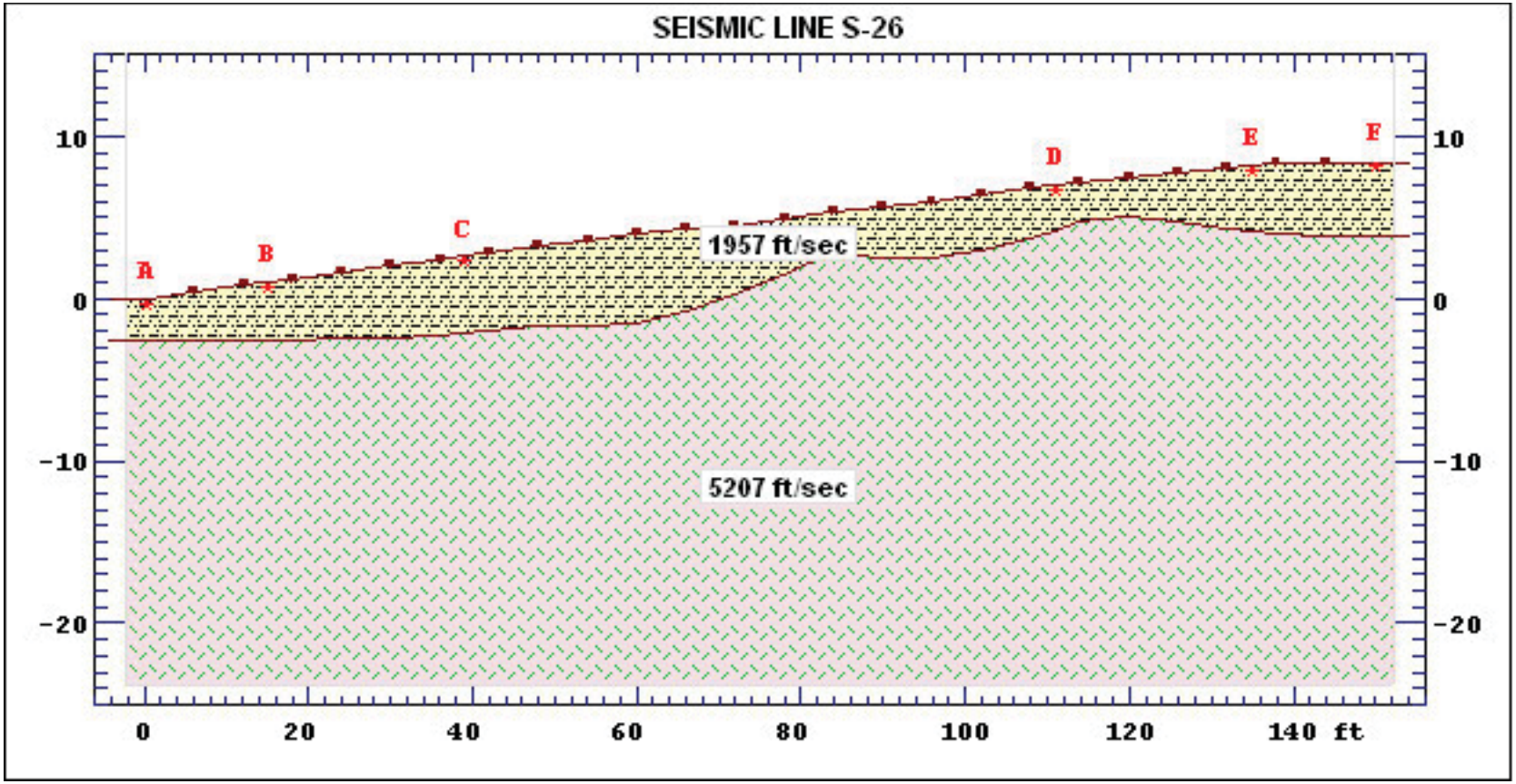
Enclosure "C-21"
Job No. 14285-8



Enclosure "C-22"
Job No. 14285-8



Enclosure "C-23"
Job No. 14285-8



Enclosure "C-24"
Job No. 14285-8

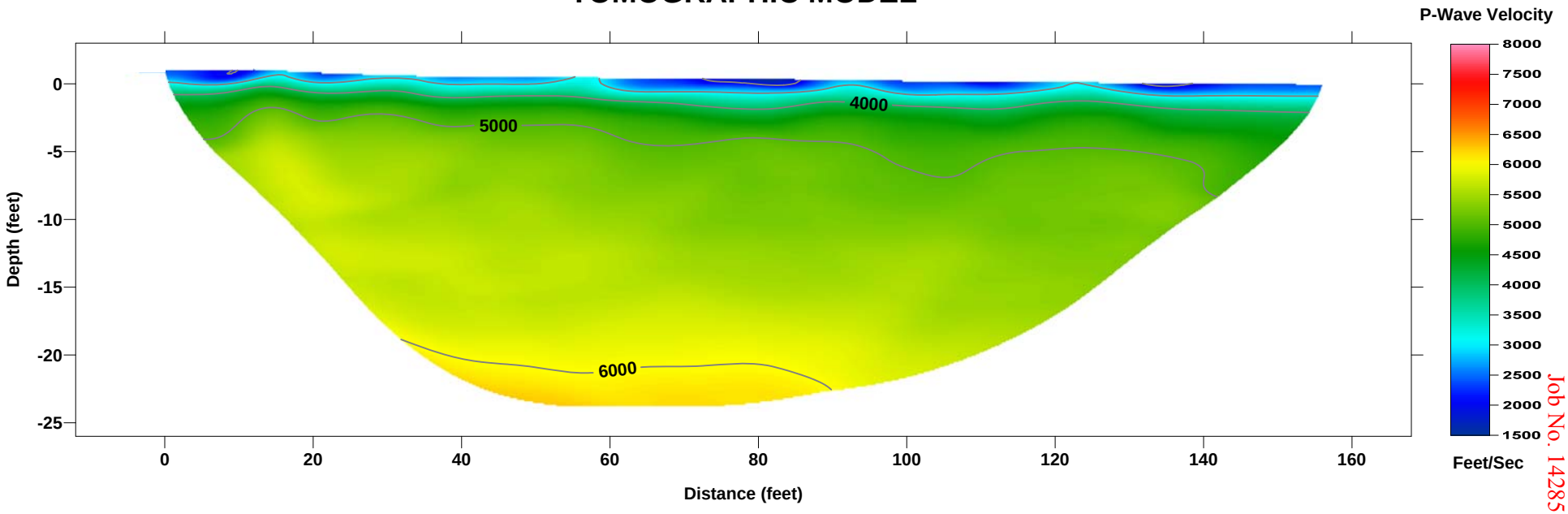
APPENDIX "D"

REFRACTION TOMOGRAPHIC MODELS

SEISMIC LINE S-3

North 25 West →

TOMOGRAPHIC MODEL

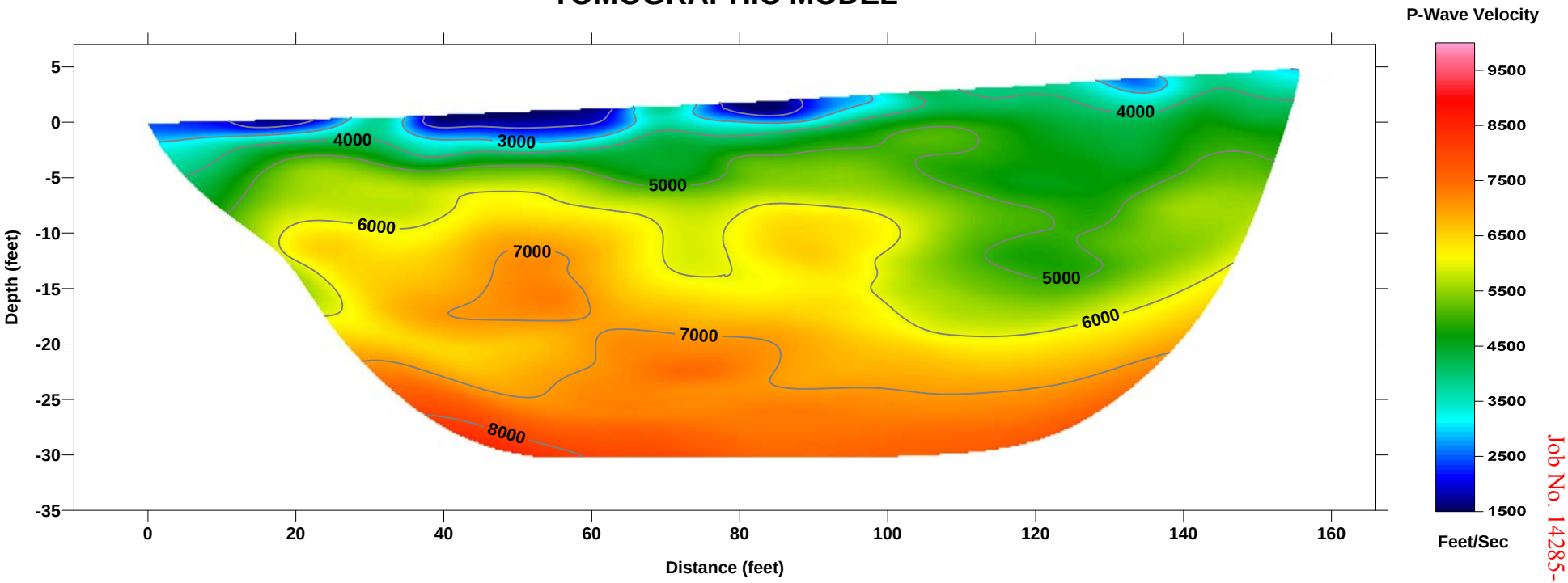


Enclosure "D-1"
Job No. 14285-8

SEISMIC LINE S-4

← East - West →

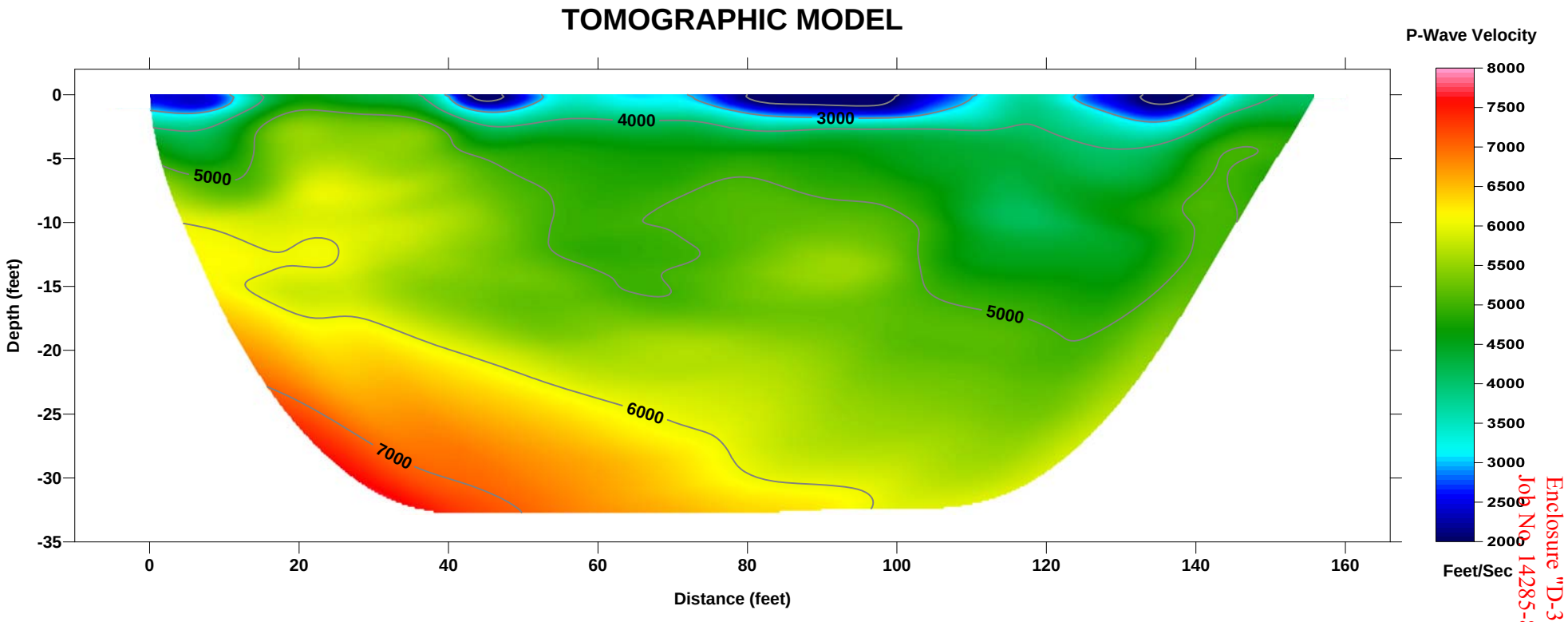
TOMOGRAPHIC MODEL



Enclosure "D-2"
Job No. 14285-8

SEISMIC LINE S-5

← West - East →

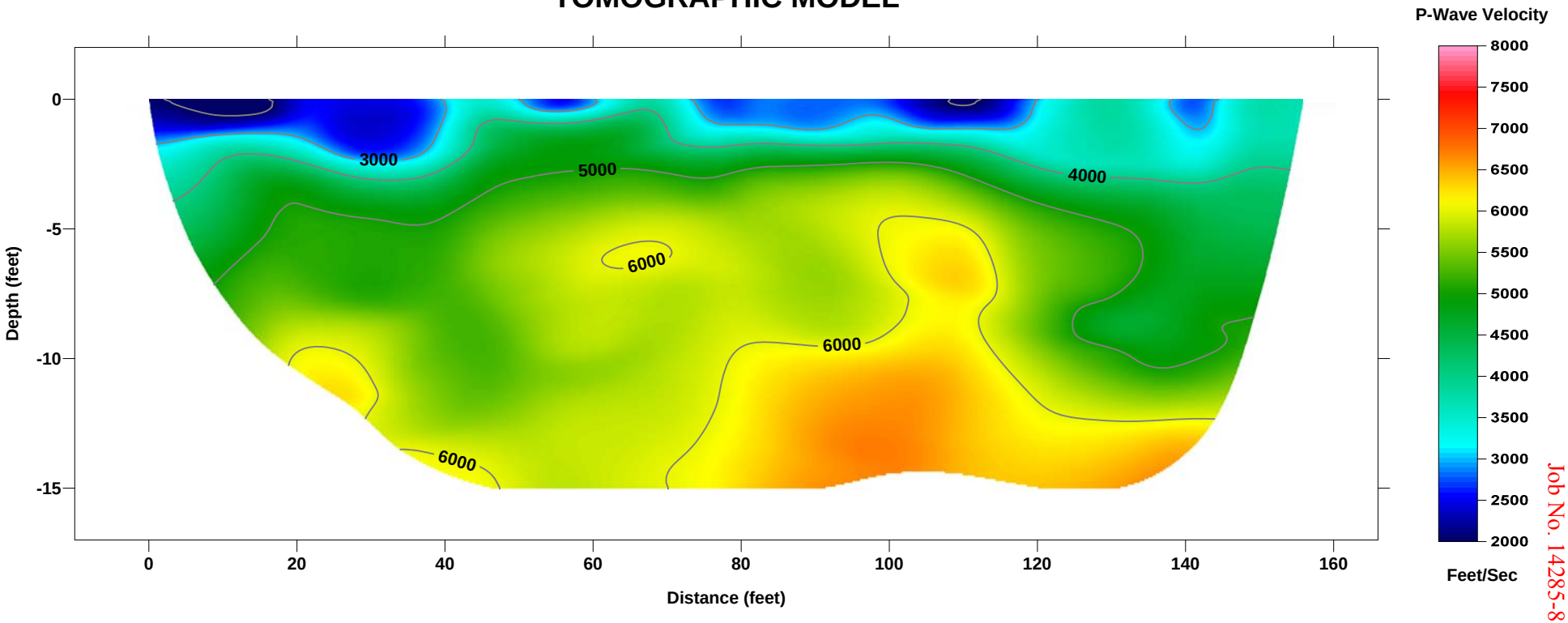


Enclosure "D-3"
Job No. 14285-8

SEISMIC LINE S-6

North 70 West →

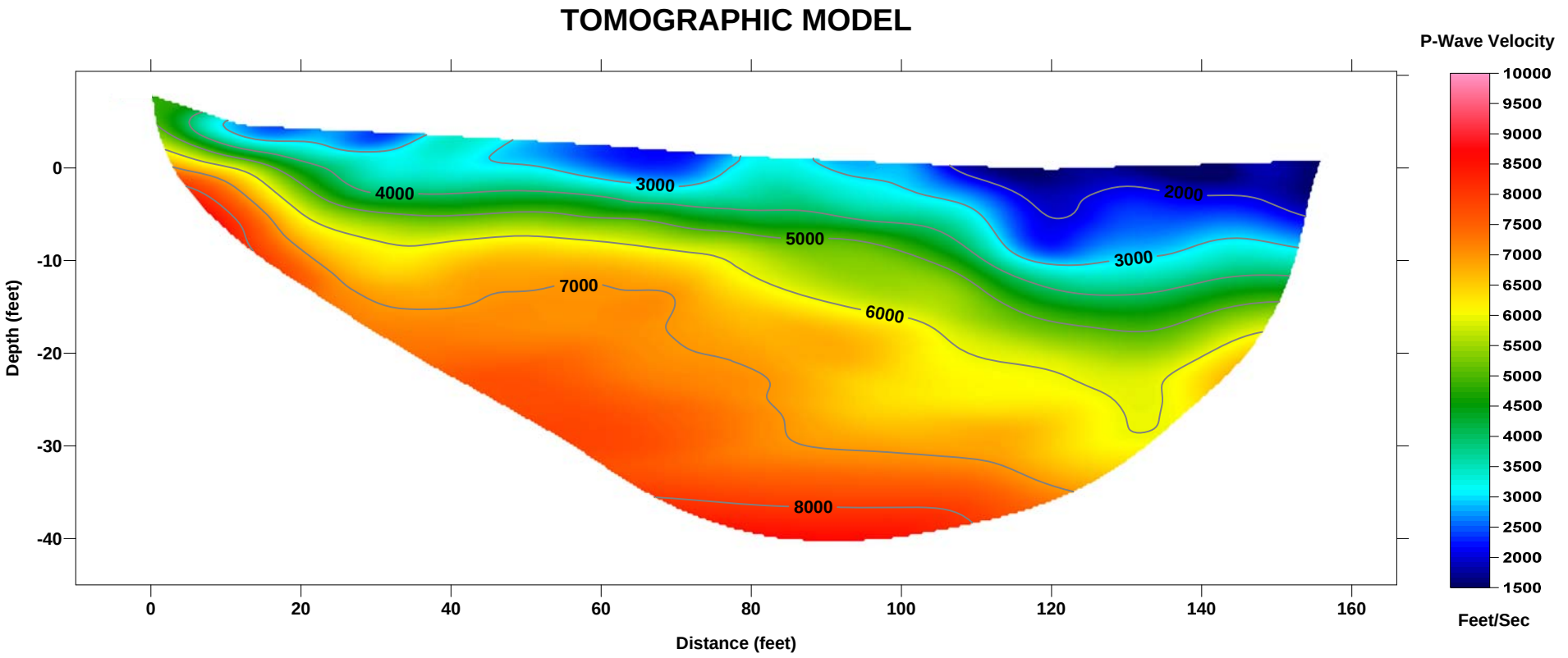
TOMOGRAPHIC MODEL



Enclosure "D-4"
Job No. 14285-8

SEISMIC LINE S-7

← North - South →

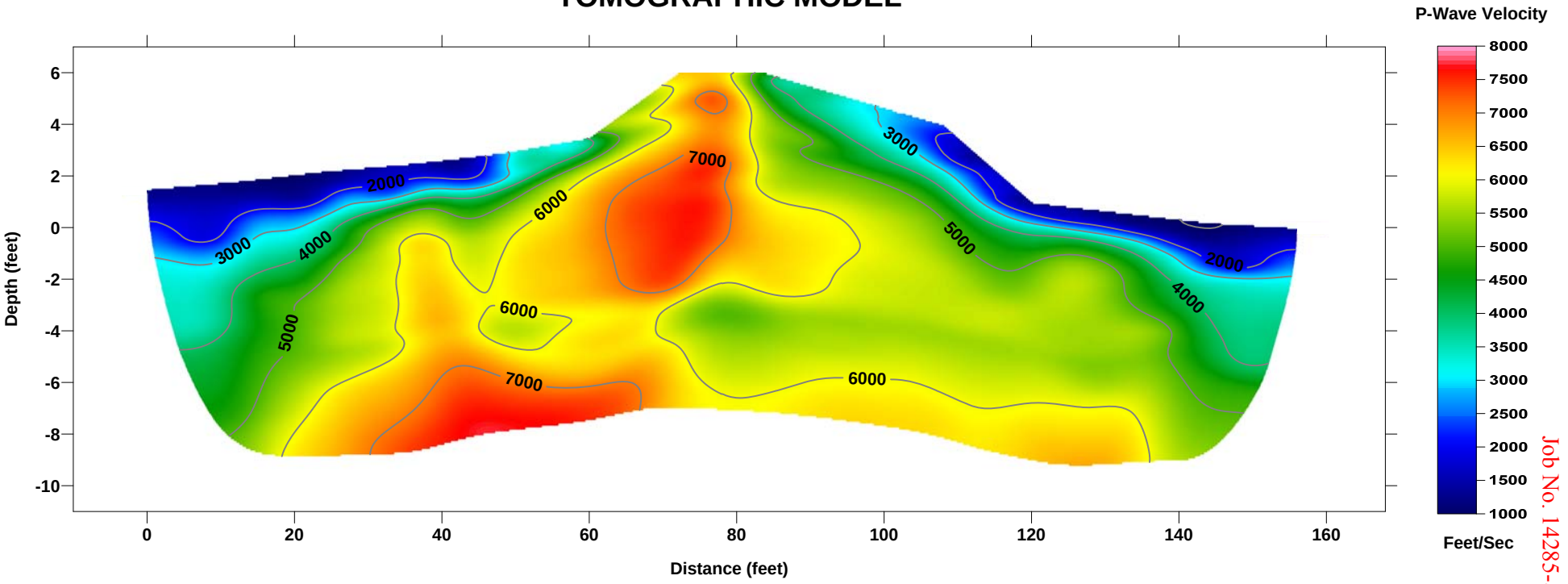


Enclosure "D-5"
Job No. 14285-8

SEISMIC LINE S-8

South 75 West →

TOMOGRAPHIC MODEL

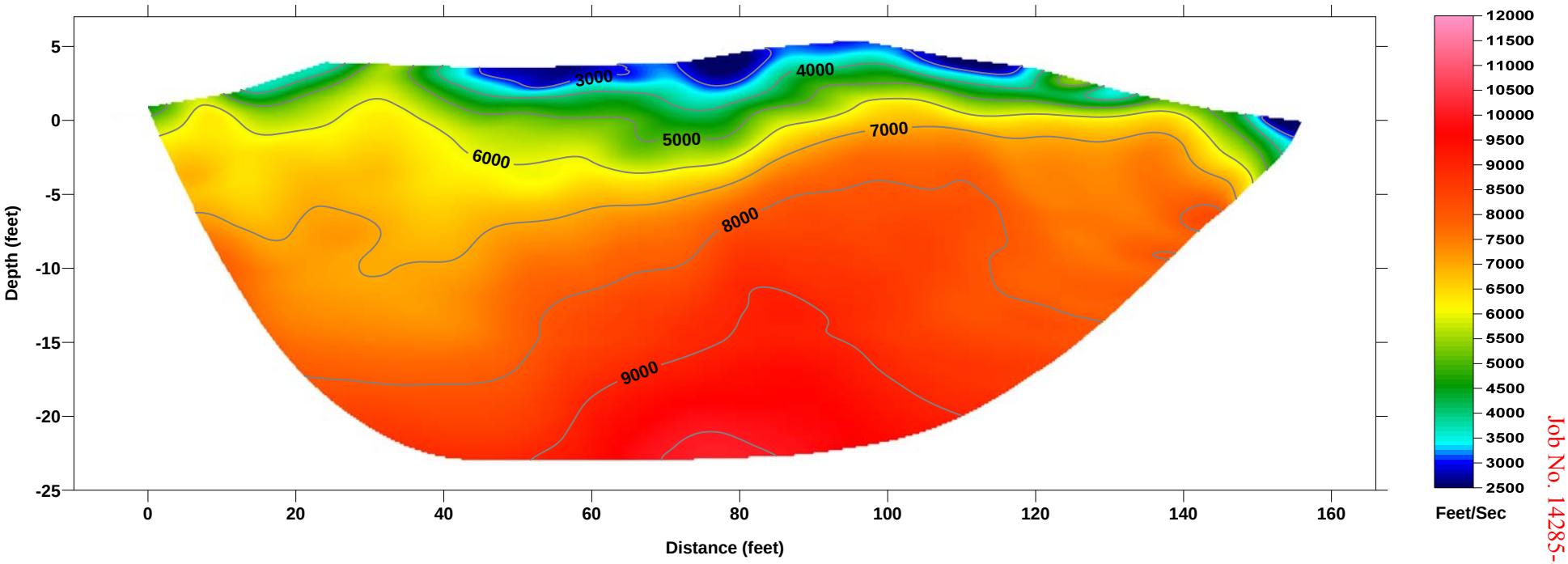


Enclosure "D-6"
Job No. 14285-8

SEISMIC LINE S-9

← East - West →

TOMOGRAPHIC MODEL

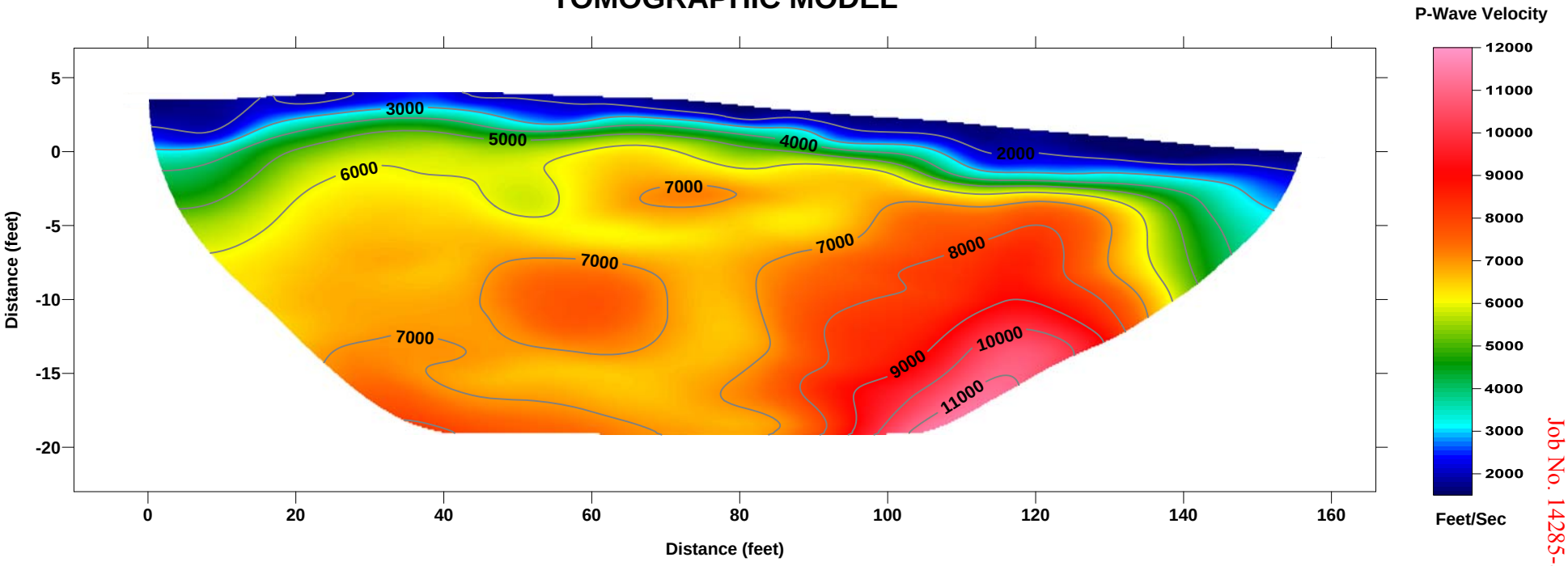


Enclosure "D-7"
Job No. 14285-8

SEISMIC LINE S-10

South 15 East →

TOMOGRAPHIC MODEL

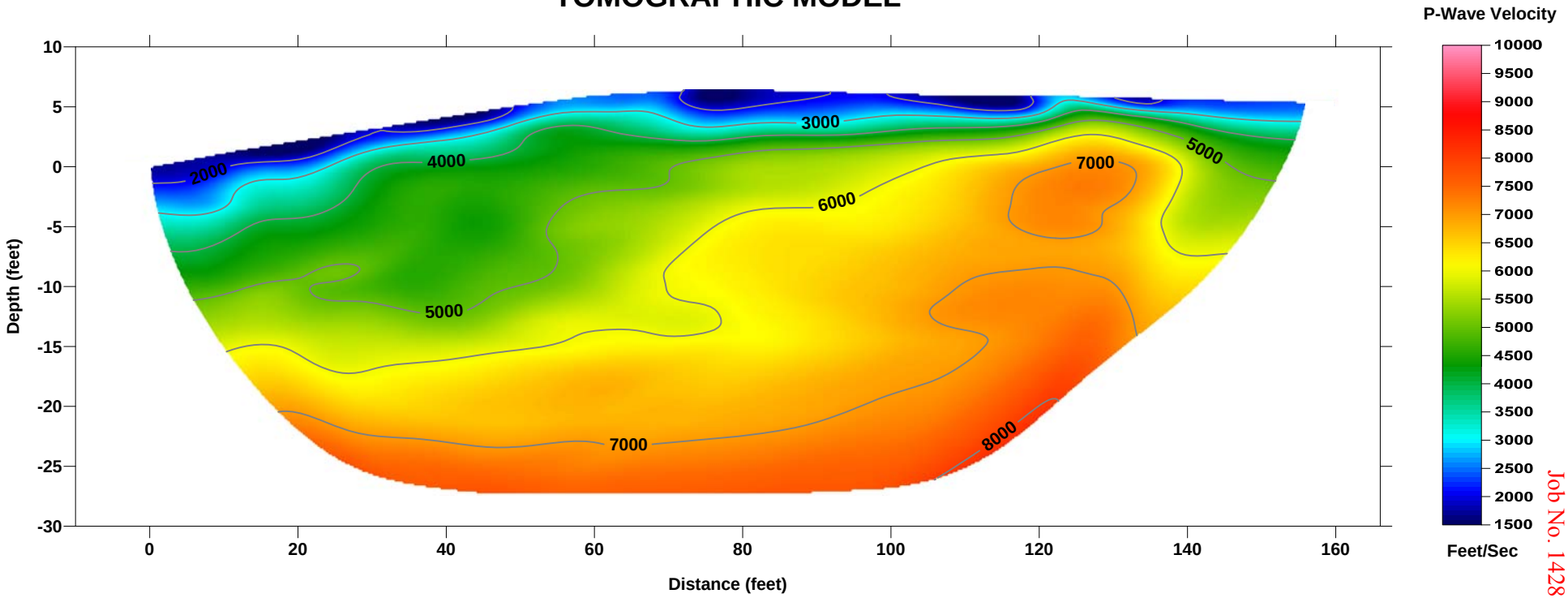


Enclosure "D-8"
Job No. 14285-8

SEISMIC LINE S-11

North 40 West →

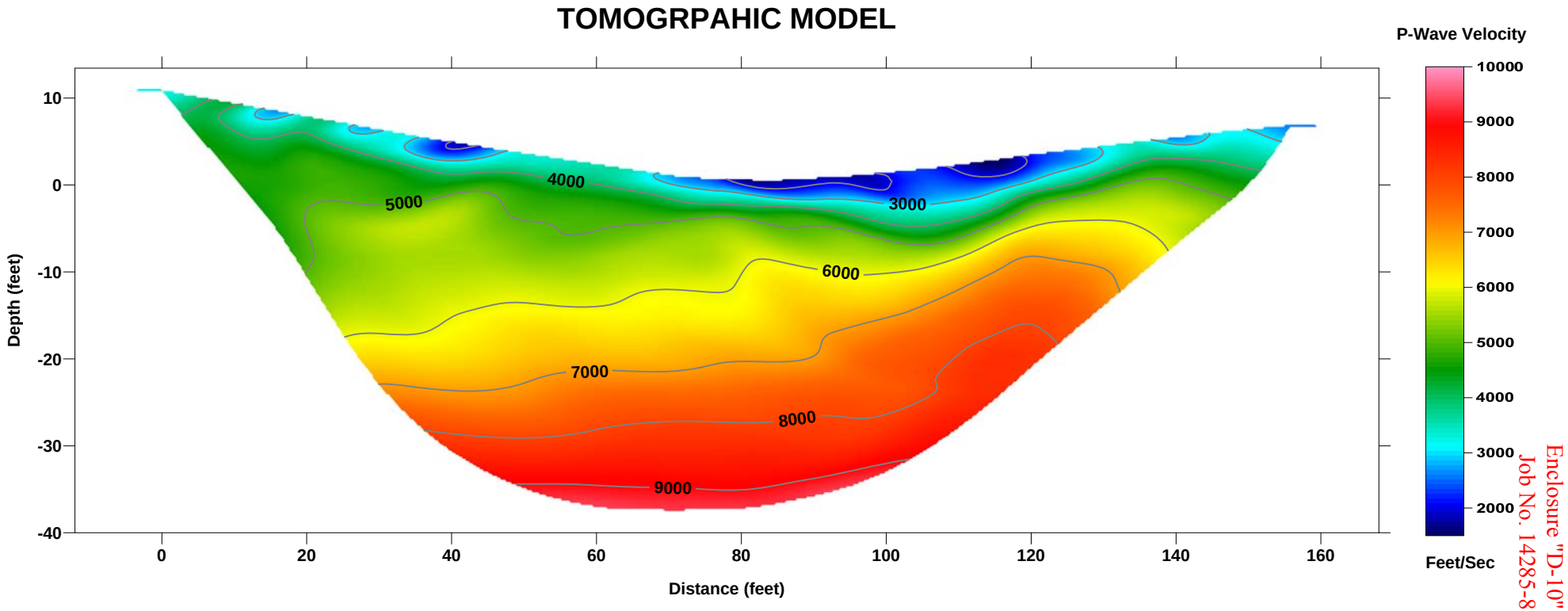
TOMOGRAPHIC MODEL



Enclosure "D-9"
Job No. 14285-8

SEISMIC LINE S-12

South 60 East →

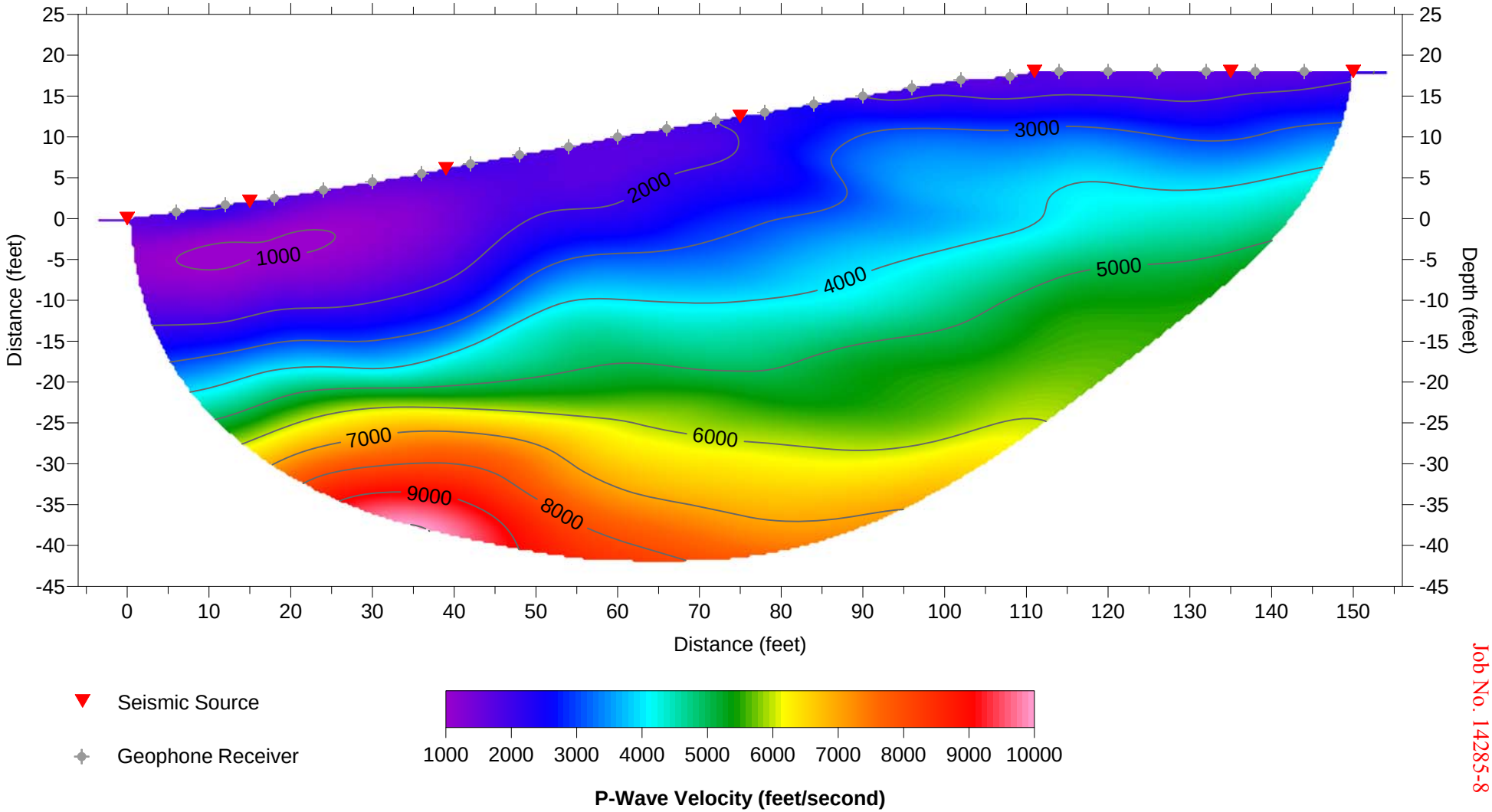


Enclosure "D-10"
Job No. 14285-8

SEISMIC LINE S-13

North 5° West →

REFRACTION TOMOGRAPHIC MODEL



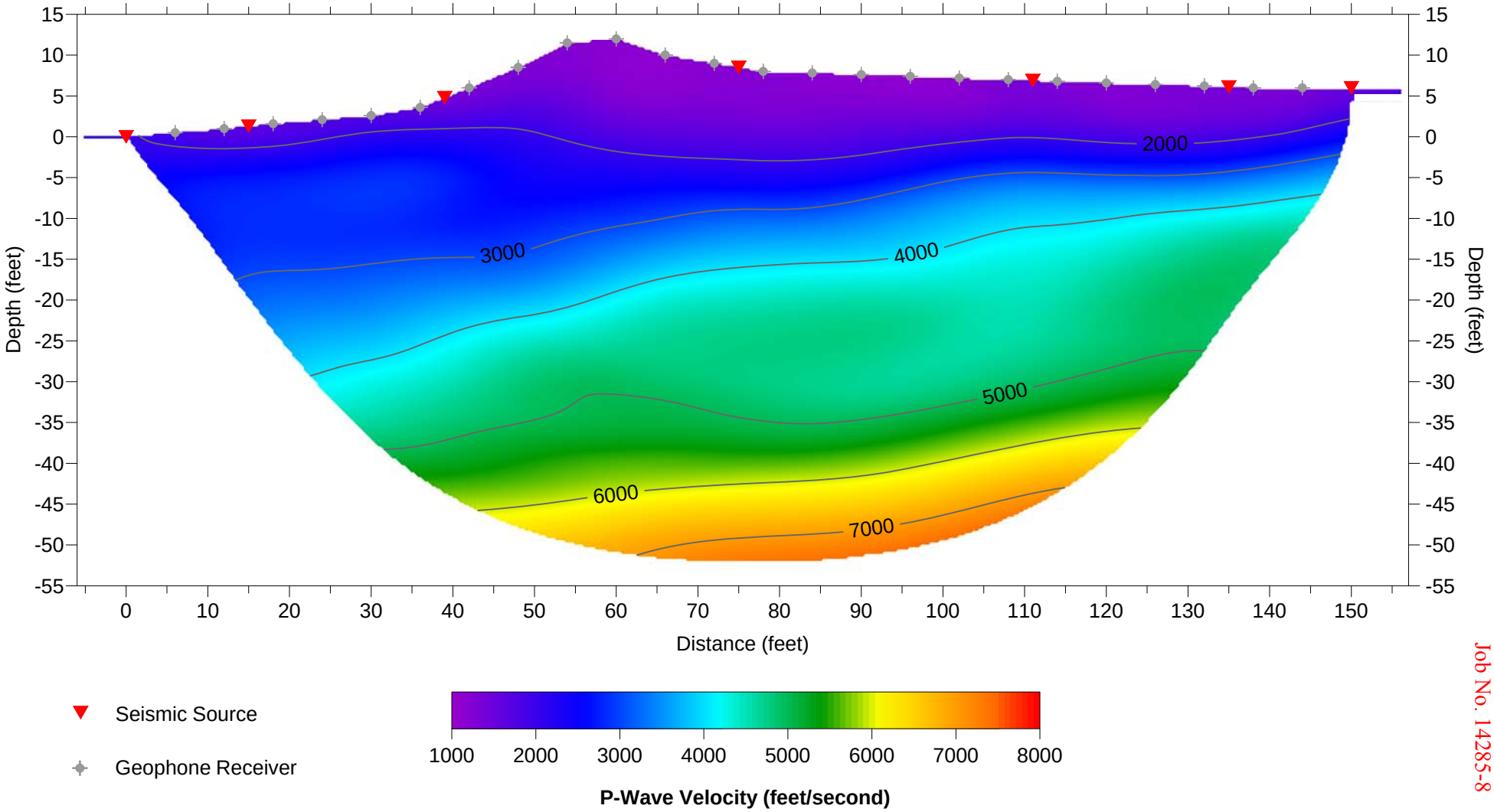
Enclosure "D-11"
Job No. 14285-8

RMS error 1.4 %, Rayfract Version 3.31

SEISMIC LINE S-14

← South - North →

REFRACTION TOMOGRAPHIC MODEL



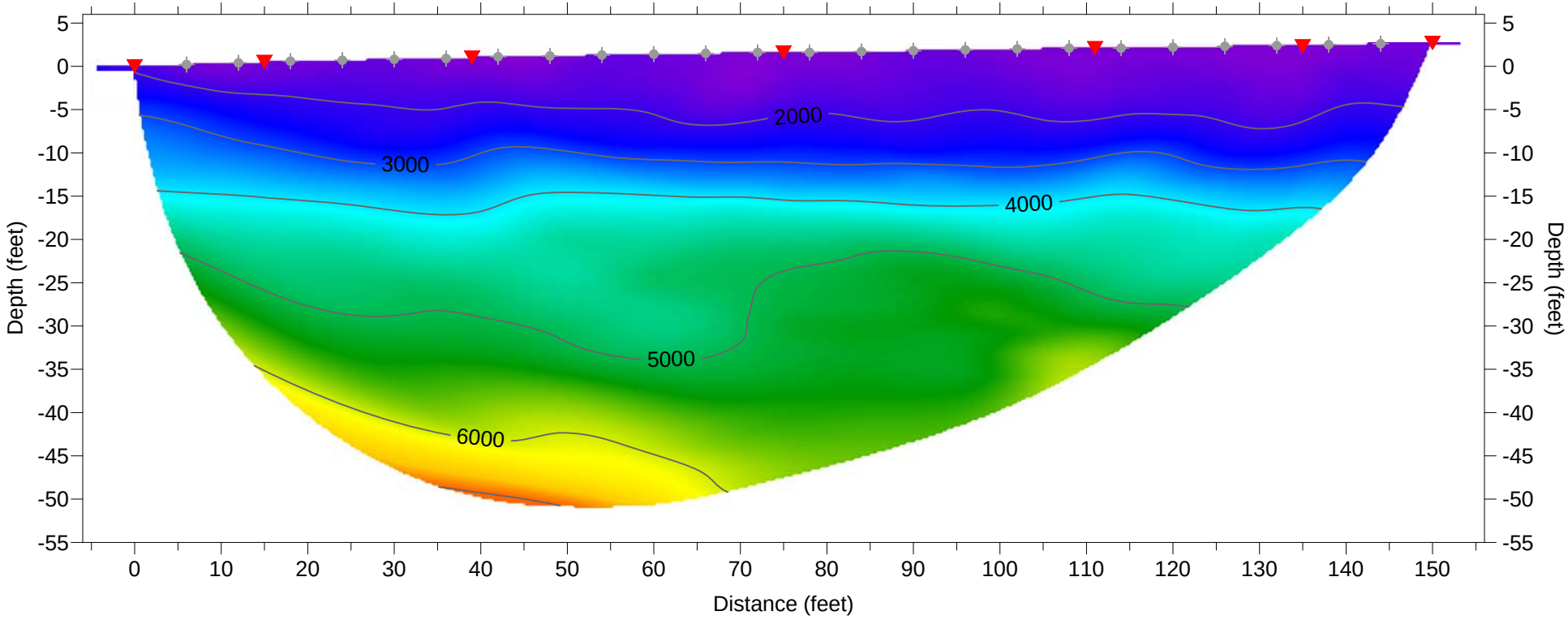
Enclosure "D-12"
Job No. 14285-8

RMS error 1.5 %, Rayfract Version 3.31

SEISMIC LINE S-15

← South - North →

REFRACTION TOMOGRAPHIC MODEL



Seismic Source

Geophone Receiver

1000 2000 3000 4000 5000 6000 7000

P-Wave Velocity (feet/second)

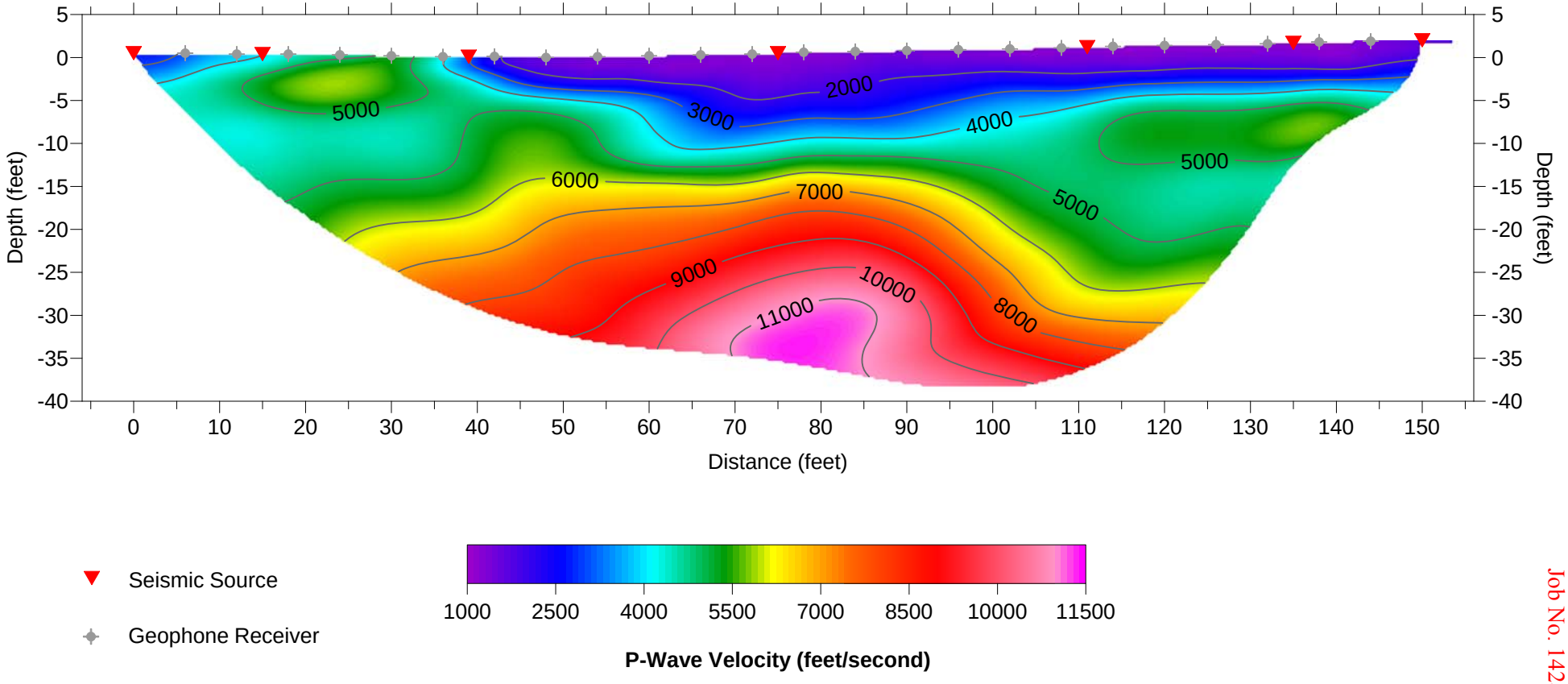
Enclosure "D-13"
Job No. 14285-8

RMS error 1.3 %, Rayfract Version 3.31

SEISMIC LINE S-16

← South - North →

REFRACTION TOMOGRAPHIC MODEL



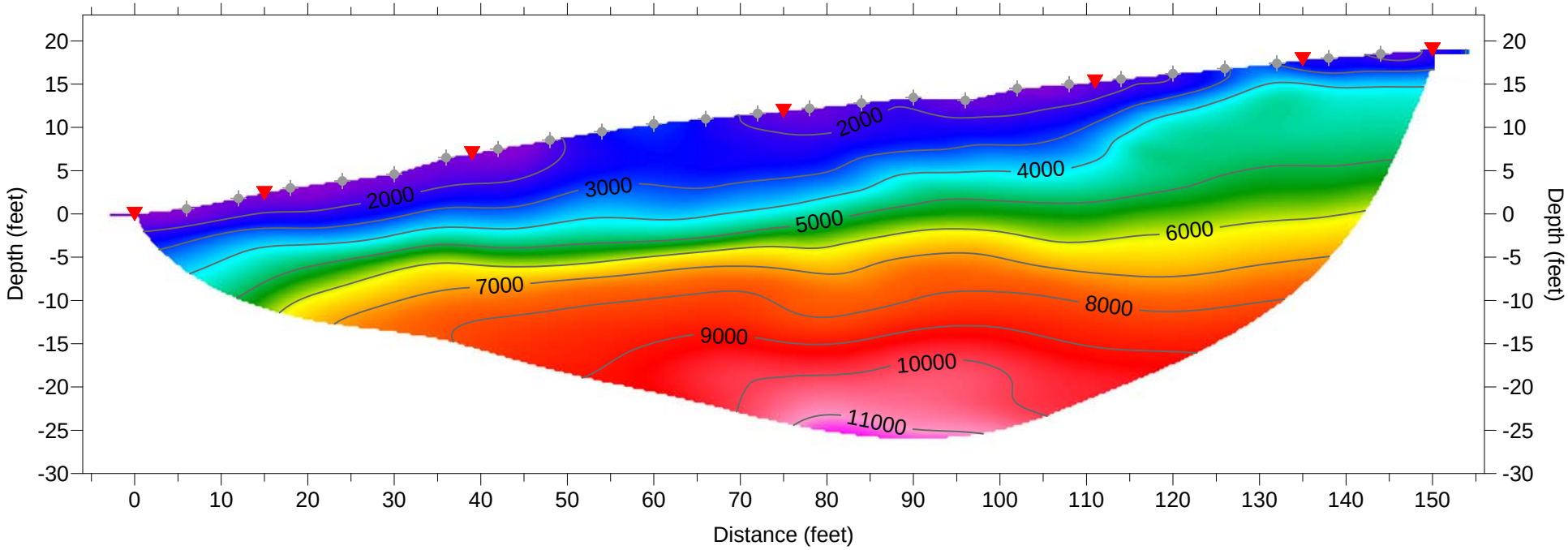
Enclosure "D-14"
Job No. 14285-8

RMS error 2.0 %, Rayfract Version 3.31

SEISMIC LINE S-17

North 54° West →

REFRACTION TOMOGRAPHIC MODEL



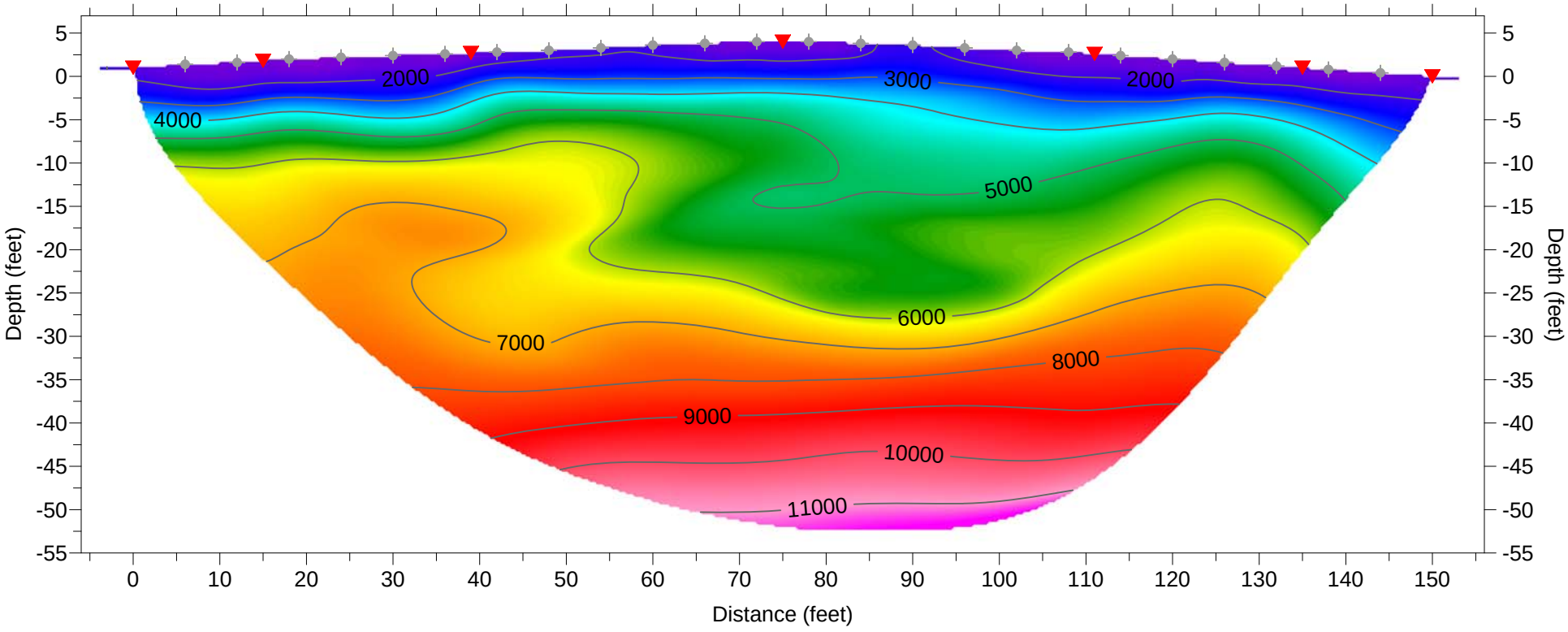
Enclosure "D-15"
Job No. 14285-8

RMS error 2.0 %, Rayfract Version 3.31

SEISMIC LINE S-18

← West - East →

REFRACTION TOMOGRAPHIC MODEL



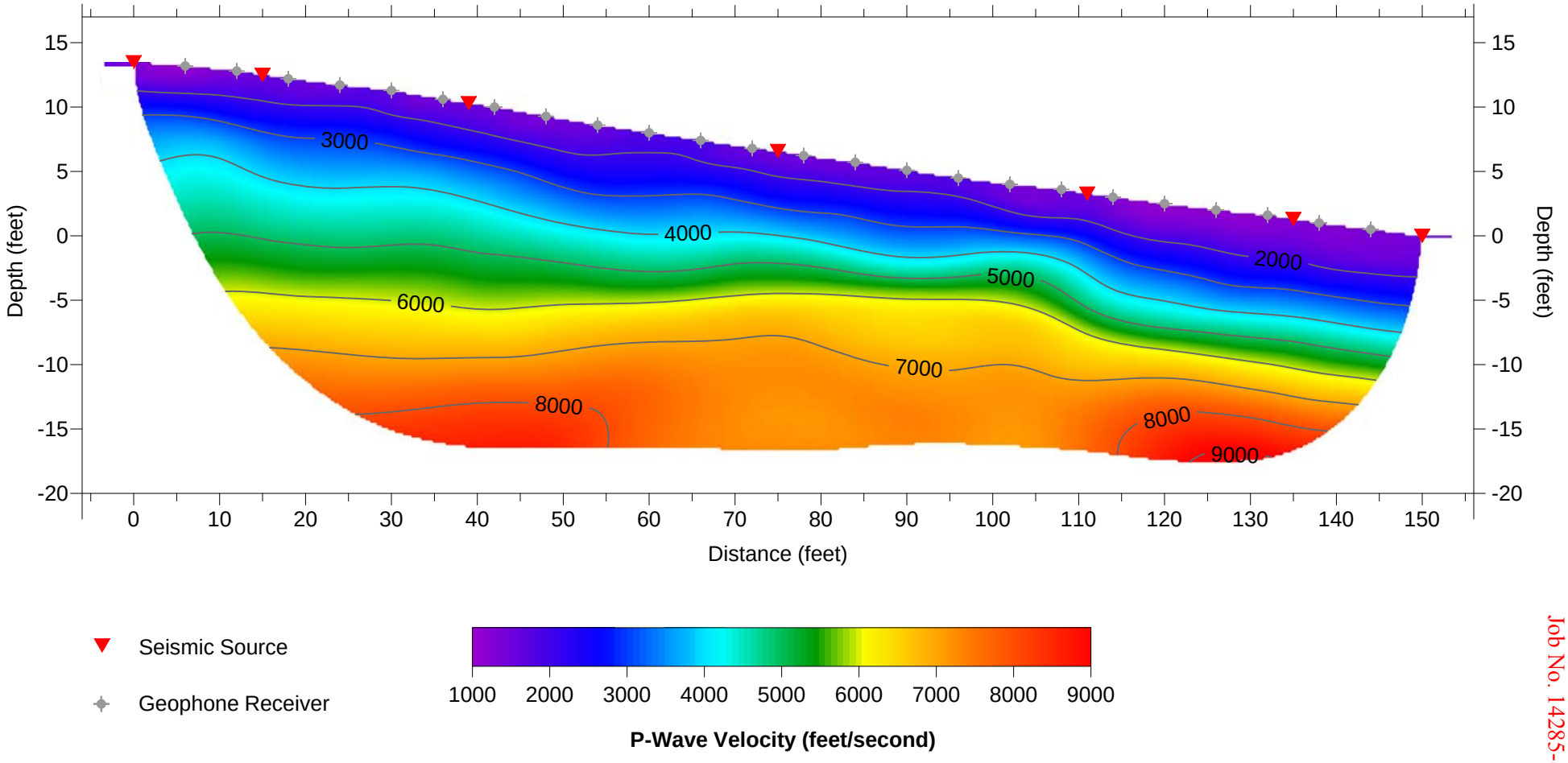
Enclosure "D-16"
Job No. 14285-8

RMS error 1.2 %, Rayfract Version 3.31

SEISMIC LINE S-19

← West - East →

REFRACTION TOMOGRAPHIC MODEL



Enclosure "D-17"
Job No. 14285-8

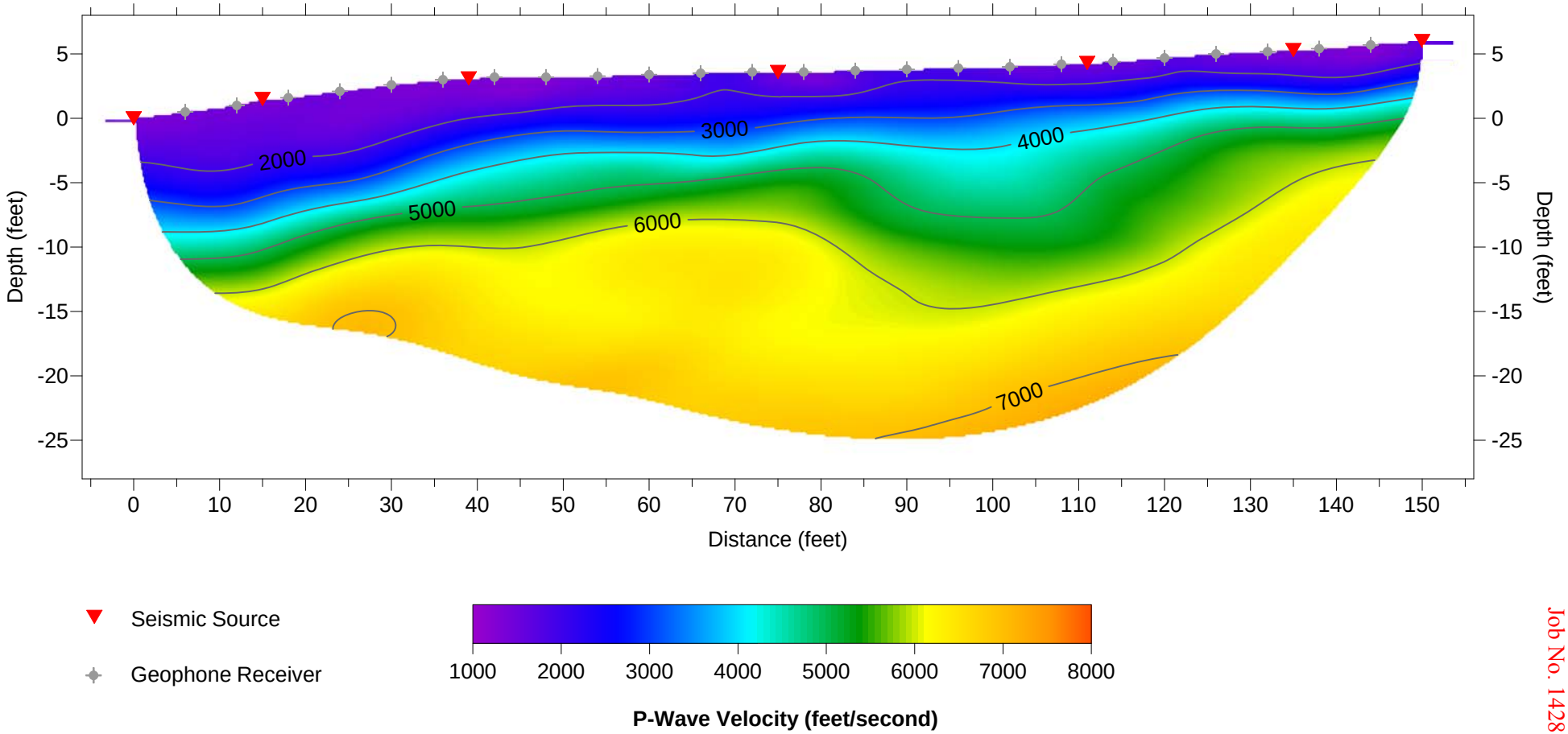
NOTE: Vertcal Exaggeration 1.5X

RMS error 1.0 %, Rayfract Version 3.31

SEISMIC LINE S-20

North 45° West →

REFRACTION TOMOGRAPHIC MODEL



Enclosure "D-18"
Job No. 14285-8

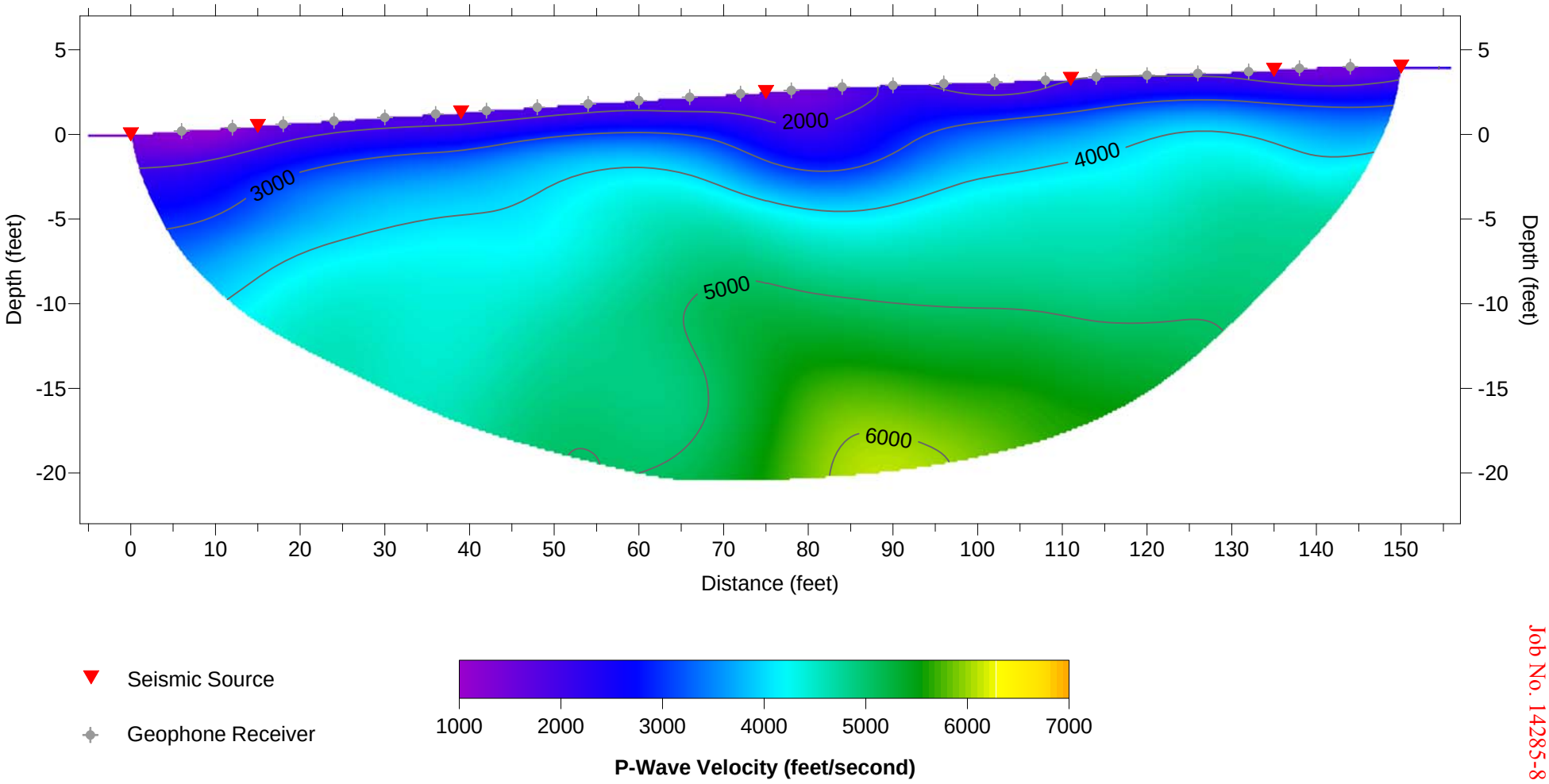
NOTE: Vertcal Exaggeration 1.5X

RMS error 0.8 %, Rayfract Version 3.31

SEISMIC LINE S-21

North 5° West →

REFRACTION TOMOGRAPHIC MODEL



Enclosure "D-19"
Job No. 14285-8

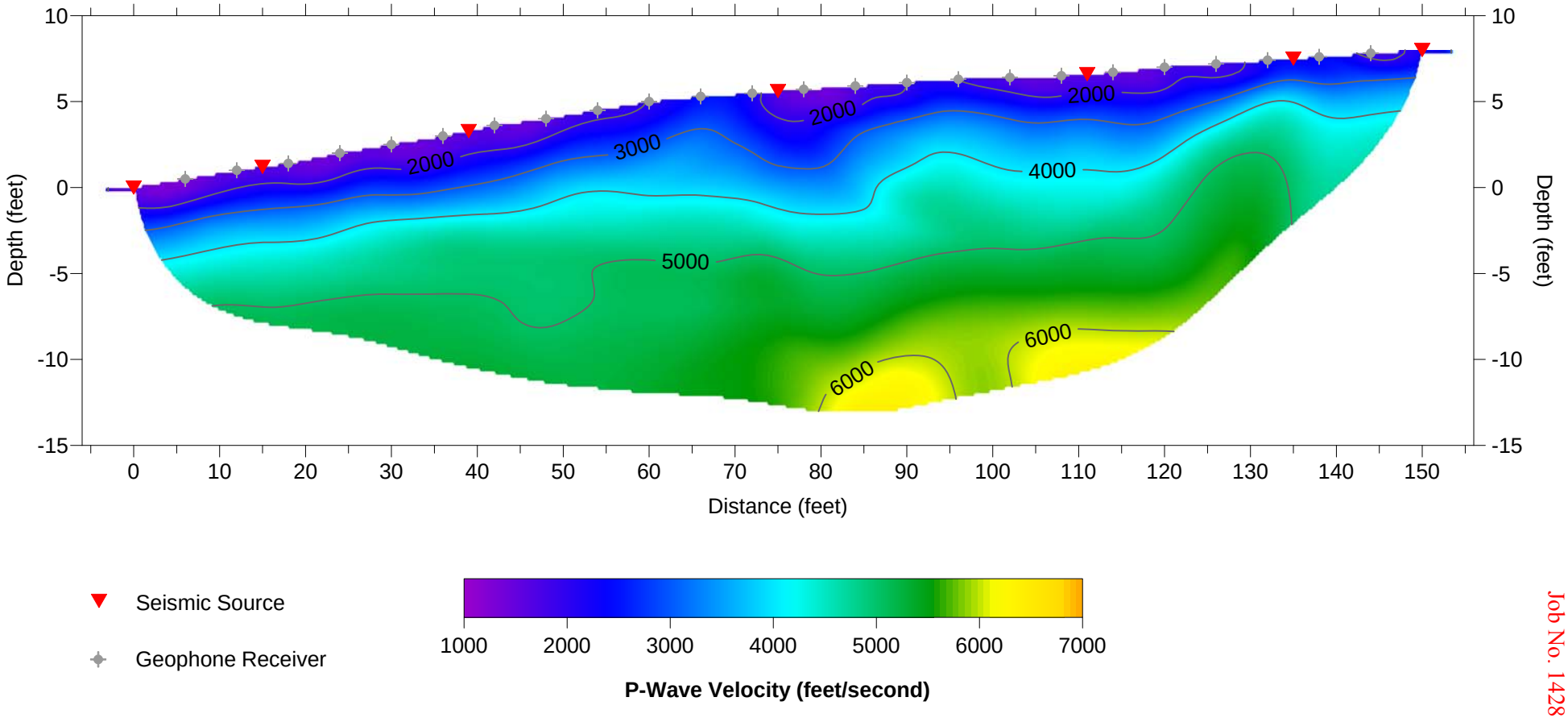
NOTE: Vertcal Exaggeration 2X

RMS error 1.6 %, Rayfract Version 3.31

SEISMIC LINE S-22

← South - North →

REFRACTION TOMOGRAPHIC MODEL



Enclosure "D-20"
Job No. 14285-8

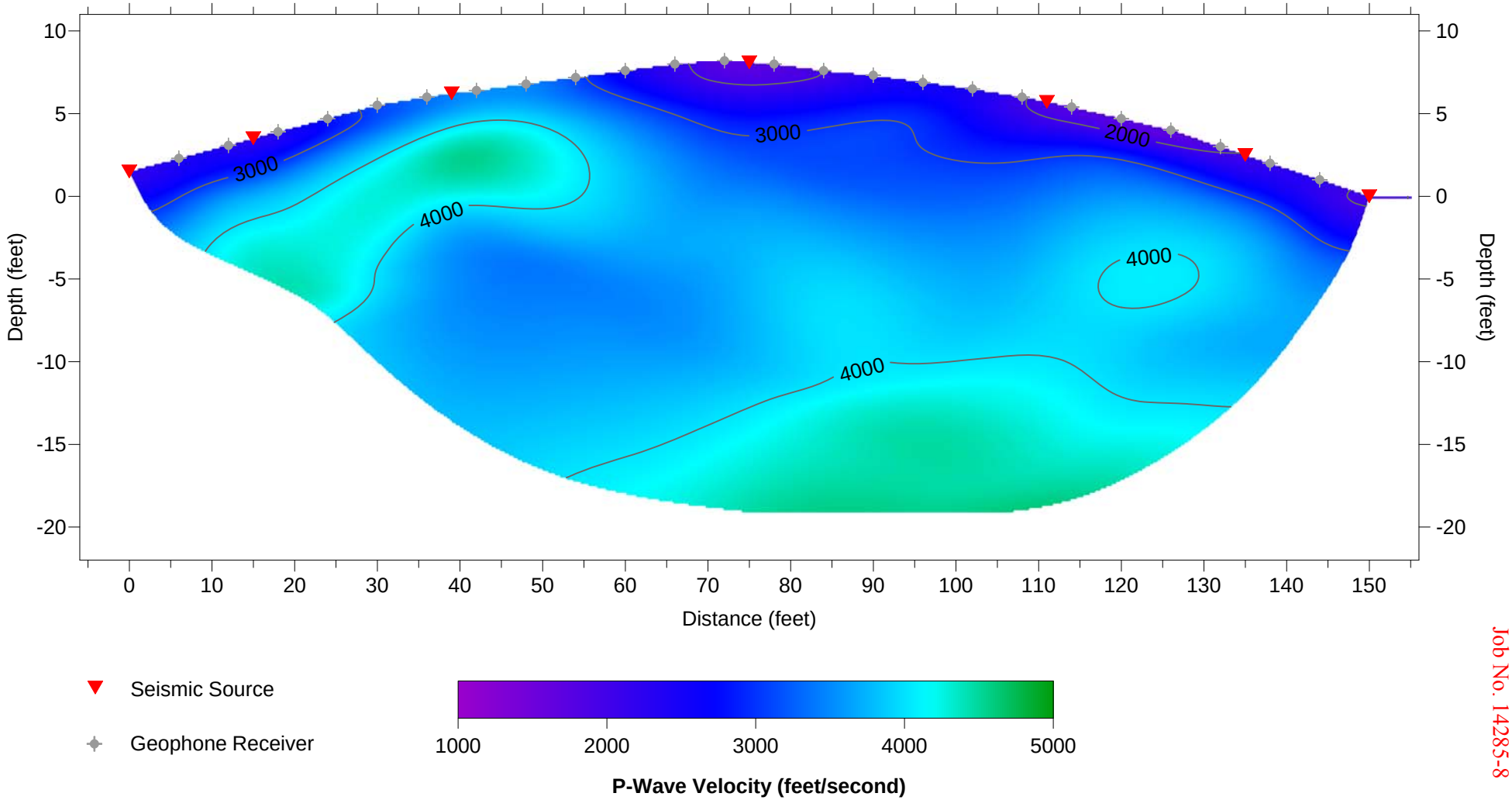
NOTE: Vertcal Exaggeration 2X

RMS error 2.2 %, Rayfract Version 3.31

SEISMIC LINE S-23

North 54° West →

REFRACTION TOMOGRAPHIC MODEL



Enclosure "D-21"
Job No. 14285-8

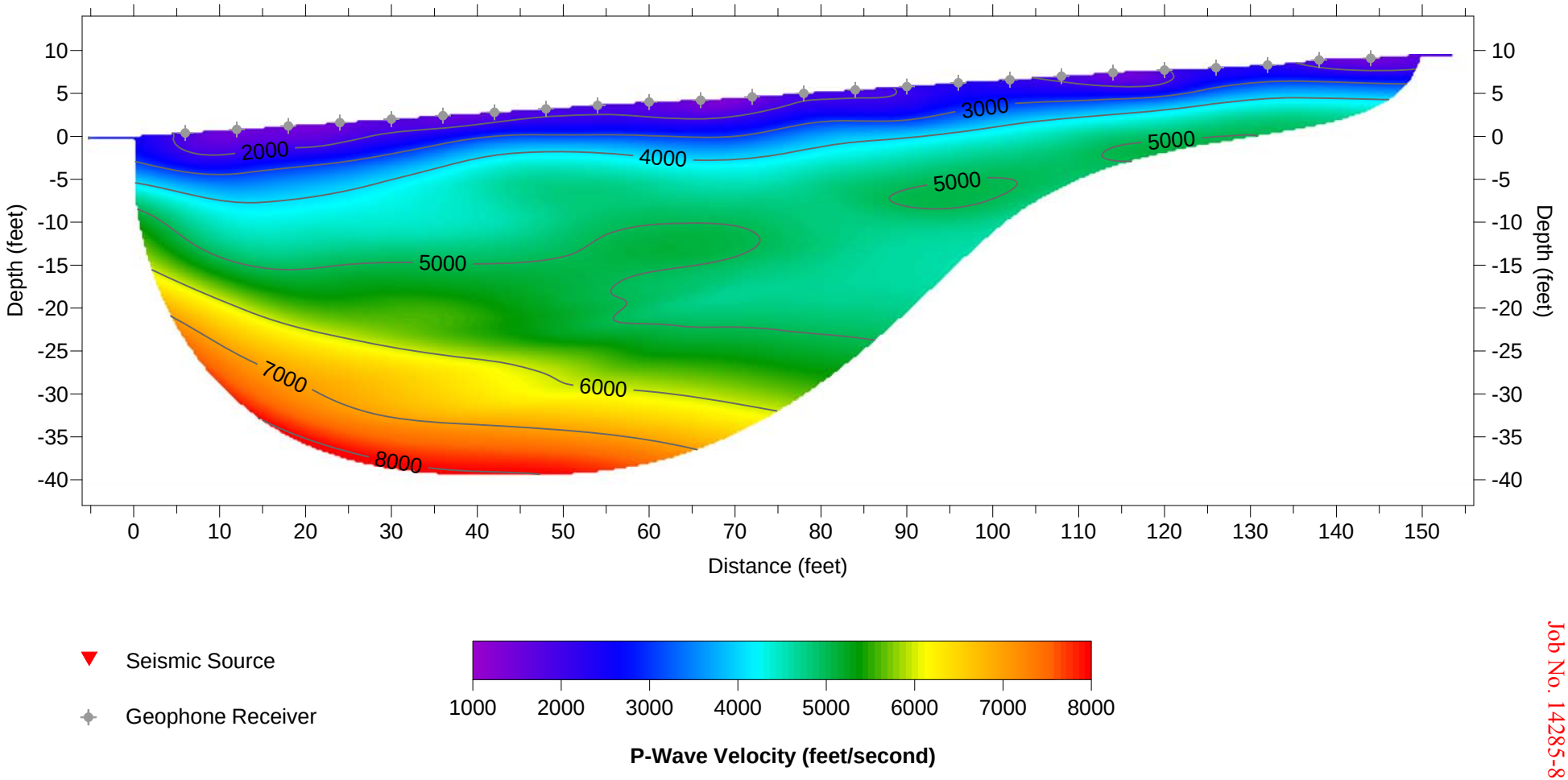
NOTE: Vertcal Exaggeration 2X

RMS error 1.7 %, Rayfract Version 3.31

SEISMIC LINE S-24

North 45° West →

REFRACTION TOMOGRAPHIC MODEL



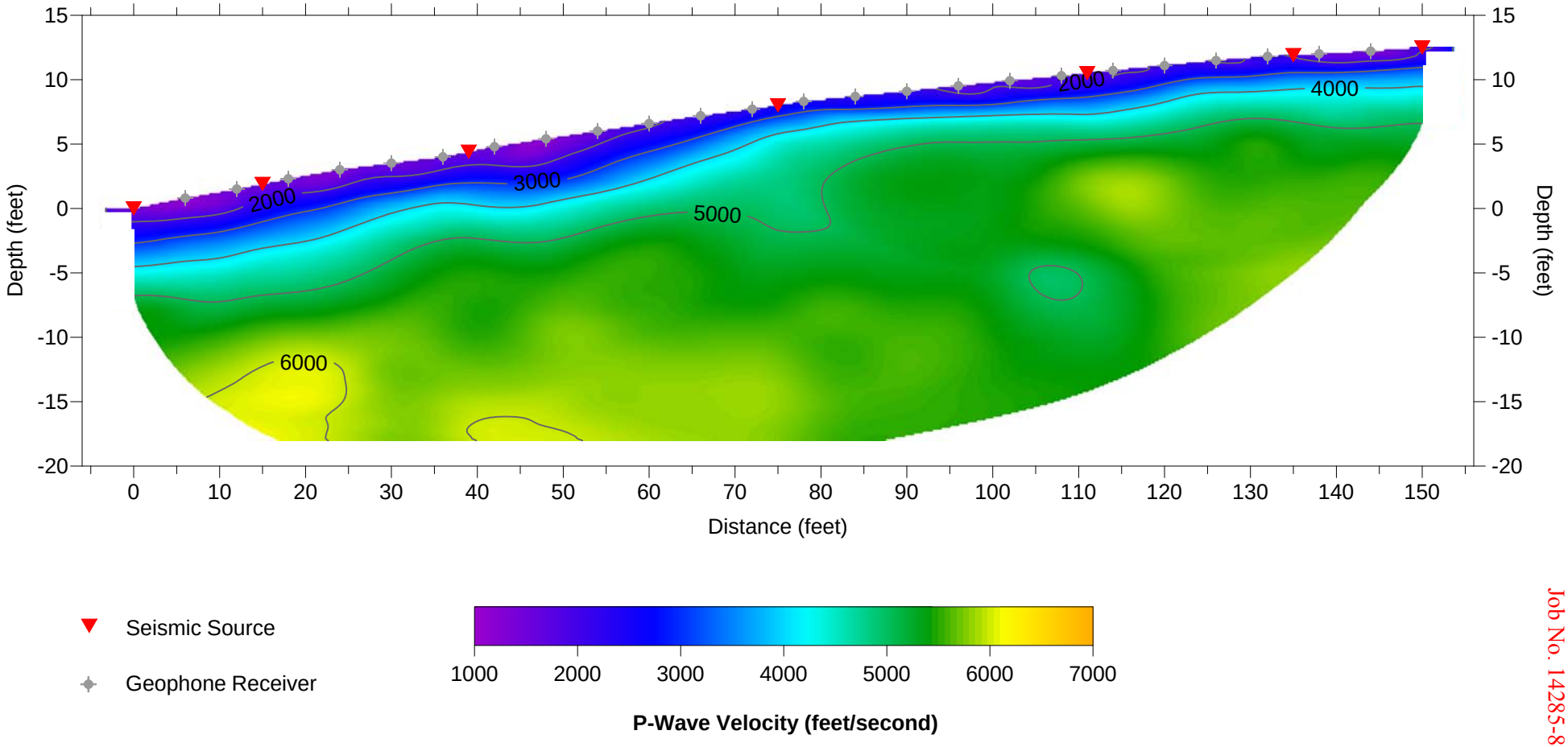
Enclosure "D-22"
Job No. 14285-8

RMS error 0.9 %, Rayfract Version 3.31

SEISMIC LINE S-25

← South - North →

REFRACTION TOMOGRAPHIC MODEL



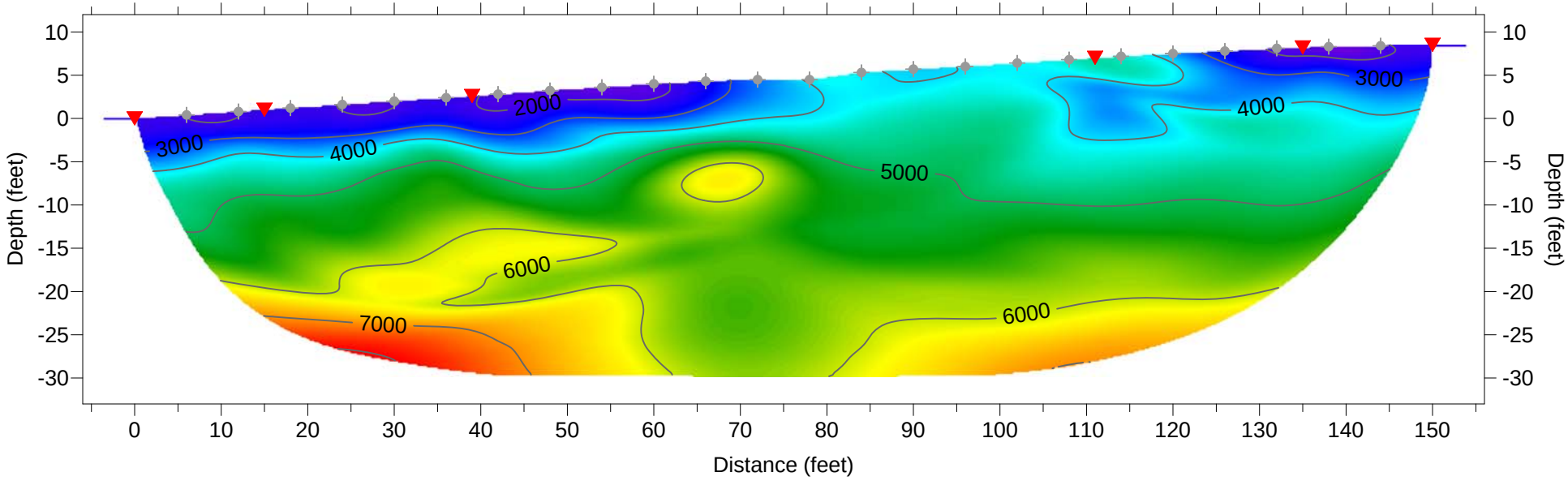
Enclosure "D-23"
Job No. 14285-8

RMS error 1.5 %, Rayfract Version 3.31

SEISMIC LINE S-26

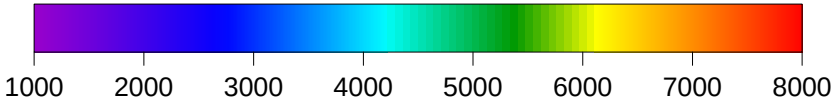
← South - North →

REFRACTION TOMOGRAPHIC MODEL



Seismic Source

Geophone Receiver



P-Wave Velocity (feet/second)

Enclosure "D-24"
Job No. 14285-8

RMS error 1.8 %, Rayfract Version 3.31

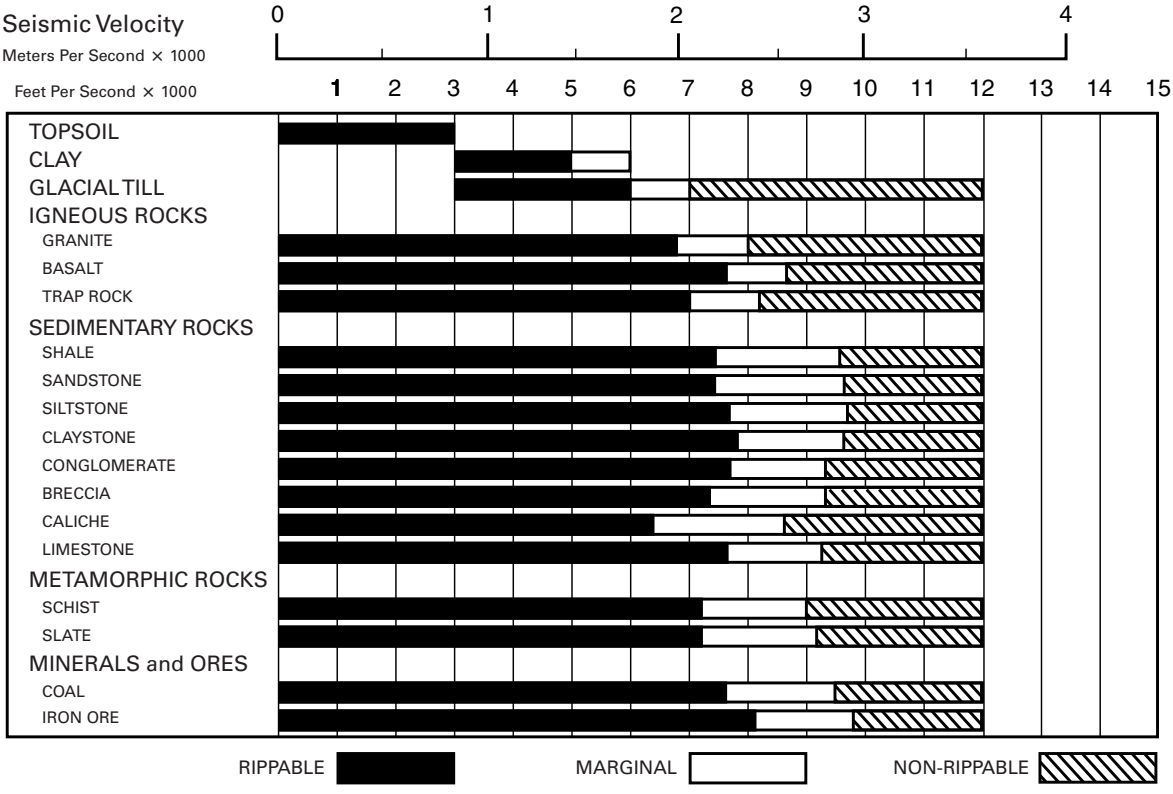
APPENDIX "E"

RIPPER CHARTS

Enclosure "E-1"
Job No. 14285-8

D9R/D9T

- **Multi- or Single Shank No. 9 Ripper**
- **Estimated by Seismic Wave Velocities**



Enclosure "E-2"
Job No. 14285-8

D10T
- **Multi- or Single Shank No. 10 Ripper**
- **Estimated by Seismic Wave Velocities**