



**CUYAMA VALLEY
GROUNDWATER
BASIN**

**ADDENDUM –
GROUNDWATER
INVESTIGATION
REPORT FOR THE
SANTA BARBARA
CANYON FAULT
AND RUSSELL
FAULT**

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**Cuyama Basin
Groundwater
Sustainability Agency**
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**Cuyama Valley Groundwater Basin
Addendum - Groundwater Investigation Report
for the Santa Barbara Canyon Fault and Russell
Fault**

Prepared for

**Cuyama Basin
Groundwater Sustainability Agency**

Project No. 0011078.04



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1. INTRODUCTION

At the request of the Cuyama Basin Groundwater Sustainability Agency (GSA), Woodard & Curran performed a groundwater investigation of the Santa Barbara Canyon (SBC) Fault and the Russell Fault in the Cuyama Valley Groundwater Basin (Basin) in Santa Barbara County, California (**Figure 1-1**) in 2024. Woodard & Curran submitted the *Groundwater Investigation Report for the Santa Barbara Canyon Fault and Russell Fault* (Report) to the Cuyama Basin GSA in May 2025 (Woodard & Curran, 2025). As part of the investigation, Woodard & Curran retained Spectrum Geophysics (Spectrum) of Huntington Beach, California to assist in the design and implementation of surface geophysical surveys of the concealed (i.e., buried) SBC and Russell Faults. The Report concluded the SBC Fault was identified at a survey transect in the Cuyama River floodplain where its location had been inferred by the United States Geological Survey (USGS) in 1970 (Singer and Swarzenski, 1970). However, the inferred easterly extension of the SBC Fault by the USGS was not observed at a second transect east of the Cuyama River adjacent to State Highway 33.

The Report recommended two additional surface geophysical surveys adjacent to Highway 33 to confirm the eastward trend of the concealed SBC Fault across the southeastern portion of the Basin and its effect on groundwater levels. The Cuyama Basin GSA agreed with the recommendation and authorized Woodard & Curran to conduct an additional surface geophysical investigation in 2025. This Addendum to the *Groundwater Investigation Report for the Santa Barbara Canyon Fault and Russell Fault* (Addendum) summarizes the approach, methods, and results of the additional surface geophysical investigation.

2. PREVIOUS GEOPHYSICAL SURVEY OF THE SANTA BARBARA CANYON FAULT

Woodard & Curran and Spectrum conducted the previous surface geophysical survey of the SBC Fault in February 2024. The objectives of the survey were to confirm the presence, orientation (i.e., normal/extension or thrust/compression movement), trend across the southeastern portion of the Basin, burial depth beneath younger alluvium, and the hydrogeologic influence of the concealed fault on water levels. Two linear transects were established across the inferred location of the fault (**Figure 2-1**). The transects could not be oriented perpendicularly to the inferred location of the fault due to land access constraints. Transect 1 was established within the right-of-way on the eastern side of Highway 33 south of the Ballinger Canyon Wash. Transect 1 extended approximately 3,600 feet in a south-southeast to north-northwest orientation. Transect 2 was located on U.S. Bureau of Land Management (BLM) property within the Cuyama River floodplain. The orientation maximized its length across the inferred location of the fault with limited topographic relief on BLM property. Transect 2 measured approximately 3,000 feet in length. Both transects were designed to achieve a depth of investigation of 600 to 800 feet below ground surface to detect the buried fault. Spectrum conducted the survey using two-dimensional direct-current (DC) electrical resistivity and induced polarization (IP) methods.

The geophysical survey results for Transect 1 indicated laterally continuous subsurface resistivity readings and patterns with no significant vertical offsets (**Appendix A**). These data indicate the SBC Fault is not present beneath this section of Highway 33 as inferred by the USGS. In contrast, subsurface resistivity readings and patterns on Transect 2 clearly delineated a steeply north-dipping vertical to subvertical anomaly interpreted as the SBC Fault, as well as an unnamed younger thrust/reverse fault or splay of the SBC Fault (**Appendix A**). These features offset the Upper and Lower Morales Formation and deeper alluvium and cause a substantial difference in the depth of groundwater-bearing zones across an SBC Fault Zone (Spectrum, 2024). South of the SBC Fault Zone, water-bearing alluvium was detected at approximately 50 to 100 feet below ground surface whereas no comparable saturated zones were identified north of the SBC Fault Zone to a depth of 600 feet at Transect 2. Without a second confirmed location of the SBC Fault Zone, the trend across the southeastern portion of the Basin could not be confirmed. This Addendum reports on the additional surface geophysical investigation conducted in 2025 to identify the location of the SBC Fault under Highway 33 and its trend east of the Cuyama River where it was detected in 2024.

3. ADDITIONAL GEOPHYSICAL SURVEY OF THE SANTA BARBARA CANYON FAULT

3.1 Approach

Woodard & Curran retained Spectrum to assist in the planning and implementation of the additional surface geophysical survey of the SBC Fault. Based on the consistent objectives of the previous investigation, Spectrum recommended the same methods for data collection, two-dimensional DC electrical resistivity and IP. The two additional survey transects were designed to be 3,600 to 4,100 feet long with electrodes spaced at 10-meter intervals (about 33 feet) to achieve the desired depth of investigation of 800 feet. Additional Transects 3 and 4 were established to overlap the northern and southern ends of Transect 1, respectively, to avoid data gaps between the transects.

As noted in the Report (Woodard & Curran, 2025), resistivity and IP data collection methods were employed to provide two-dimensional (lateral and vertical) profiles of the resistivity and chargeability variation in the subsurface geologic units along each transect. The resistivity of a material is a measure of the ease with which an electrical current can flow through that material. The IP chargeability of a material is a measure of its ability to polarize, or hold charge, after current has been applied. DC resistivity and IP were chosen for the surveys because these methods are effective for the delineation of changes in the lithology of sediments and rocks in the subsurface. These methods are sensitive to changes in grain size, chemistry or mineralogy, saturation (particularly of permeable materials), and changes in the competency/density of sediments and rocks. DC resistivity and IP methods provide high quality, high resolution two-dimensional images of subsurface stratigraphy and structure in areas where there is a contrast in resistivity and/or IP across an interface or geologic contact, such as the contrasts between dry, coarse alluvium and saturated alluvium, or the contrast between coarse sand/gravel and clay.

3.2 Methods and Equipment

The resistivity and IP field equipment consisted of the Advanced Geosciences SuperSting R8/IP system, passive electrodes, and associated electrical cables. This equipment is designed to collect data in units of meters and then convert to feet during data processing. The Schlumberger and dipole-dipole geometrical arrays were used to collect resistivity and IP data. Utility locators and a Fisher M-Scope shallow focus metal detector were used to confirm the absence of utilities and other shallow metallic features along the additional transects that would interfere with the ability of the methods to image deeper geologic structure. A Garmin 66S Handheld GPS unit was used to map the endpoints and key features along each transect. Advanced Geosciences, Inc. (AGI) EarthImager[®] software package (AGI, 2015) was used to process the resistivity and IP data. Additional information on these methods and the equipment used for the survey is available in the *Report of Supplemental Geophysical Investigation, Santa Barbara Canyon Fault, Cuyama Valley Groundwater Basin, Santa Barbara County, California* (Spectrum, 2026; **Appendix B**).

3.3 Permitting

In contrast to the previous geophysical investigation, regulatory permits were not required for Transects 3 and 4 (**Figure 3-1**). Landowners adjacent to Highway 33 provided full cooperation for Woodard & Curran and Spectrum to conduct the survey. Woodard & Curran communicated with these landowners prior to confirming the end points of the new transects and maintained coordination throughout the field work.

Avoiding a state permit to work in the right-of-way of Highway 33 saved considerable time and expense for the additional investigation.

3.4 Santa Barbara Canyon Fault Transect 3

Transect 3 was located north of Transect 1 on the west side of and parallel to Highway 33 on property owned by Kern Ridge Growers LLC. The location of this transect was selected to evaluate whether the SBC Fault Zone continues along the northeastward trend inferred by the USGS on the west side of Transect 1 rather than an abrupt change beneath the Cuyama River to an east-to-southeast trend (Woodard & Curran, 2025). Transect 3 measured approximately 3,600 feet in length and crossed the Ballinger Canyon Wash. To ensure adequate continuity in subsurface data collection, Transect 3 overlapped with the northern 1,300 feet of Transect 1. This overlap extended beyond nested monitoring wells 915 and 916, enabling correlation of resistivity features with known lithologic and borehole geophysical logs. The depth of investigation for Transect 3 was approximately 820 feet. The Schlumberger and dipole-dipole geometrical arrays were used to collect resistivity and IP data from September 29 to October 1, 2025.

3.5 Santa Barbara Canyon Fault Survey Transect 4

Transect 4 was located south of Transect 1 on the east side of and parallel to Highway 33 on property owned by the Mitzel's, Wegis', and Harrington's from south to north. The location of this transect was selected to evaluate whether the SBC Fault Zone has a more southeasterly trend than that inferred by the USGS and, if so, would cross Highway 33 south of Transect 1 (Woodard & Curran, 2025). Transect 4 measured approximately 4,100 feet in length which included a slight bend in the highway causing a gentle curvature in the southern portion of the transect (**Figure 3-1**). The north end of Transect 4 was extended to create adequate overlap with the southern end of Transect 1. The depth of investigation for Transect 4 was approximately 850 feet. The Schlumberger and dipole-dipole geometrical arrays were used to collect resistivity and IP data from October 1 to October 3, 2025.

3.6 Data Processing

As reported by Spectrum (2024), the Schlumberger and dipole-dipole data files for each transect were entered into the industry standard software program EarthImager® (AGI, 2015). The data files were reviewed separately and edited appropriately to remove noisy or erroneous data points (e.g., near buried utilities on Transect 4). Afterwards, the Schlumberger and dipole-dipole data sets were merged together, and an appropriate model solution was generated. For each transect, the final products of the processing are two color-contoured model cross-sections, one for resistivity and one for IP. The resolution of the resistivity/IP method decreases with increasing depth. Because two different arrays of resistivity data were collected along each transect and then merged during processing, the loss in resolution of the resistivity data was minimized. The data with the highest resolution and most accurate depths are in the upper two-thirds of the model cross-sections, where the lateral resolution is approximately one-half of the electrode spacing. Therefore, one-half of the 10-meter electrode spacing corresponds to five meters (about 16 feet) of lateral resolution.

The resistivity profiles developed by Spectrum contain the inverted resistivity distribution which best represents the actual lateral and vertical variation of earth resistivity beneath the ground surface along the transects. Colored contours on the profiles are associated with variations in resistivity values with low resistivity values in blue grading to high resistivity values in purple. Spectrum also correlated resistivity

values with lithological interpretations and presence of groundwater based on information from nearby wells. Further information on data processing and correlation of resistivity values with lithology are provided in **Appendix B**.

4. GEOPHYSICAL SURVEY RESULTS

4.1 Interpretation of Resistivity Data for Transect 3

Spectrum's interpretations of the resistivity and IP data for Transect 3 are shown in **Figure 4-1** and **Figure 4-2**, respectively. The profiles depict a cross-sectional view from south-southeast on the left-hand side of the image to north-northwest on the right-hand side. The depth of data interpretation (i.e., investigation) is shown in feet relative to an elevation of zero feet at the south end of the transects. The horizontal length of the transects are shown in feet beginning at zero at the south end. Horizontal distances that are referenced below use the station numbers as labeled at the top of the transect figures. The overlap of the southern end of Transect 3 with the northern end of Transect 1 is also shown. The same display format was used for the resistivity and IP data for Transect 4.

The interpretation of the resistivity data in **Figure 4-1** shows a steeply north-dipping, approximately 600-foot wide SBC Fault Zone bounded approximately between Stations 1250 and 1890. Two principal normal faults are expressed in the Lower Morales near Stations 1200 and 2000 that branch upward into "flower structure" splays and locally produce anticlinal "squeeze-up" features that are within 50 to 100 feet of the ground surface beneath Ballinger Canyon Wash. A wedge of very high resistivity material at 200 to 250 feet depth between Stations 1350 and 1664 further indicates sharp lithologic discontinuity consistent with fault splays. The mapped geometry of these faults tie to features shown on Transect 2 (**Appendix A**). Together, these features support a complex SBC Fault Zone trending west-to-southwest to east-to-northeast. The additional geophysical data confirms the SBC Fault continues on a northeastward trend instead of an abrupt change beneath the Cuyama River to the east-to-southeast trend inferred by the USGS (1970). The complex SBC Fault Zone exhibits normal/transensional (i.e., spreading) motion at depth and probable transpressional (i.e., compression) reactivation near the ground surface.

Interpretation of the presence of groundwater on Transect 3 is tied to Opti well 915 located on the southern end of the transect. Well 915, the shallower of dual nested monitoring wells 915 and 916, has a screen interval of 660 to 680 feet below ground surface. In October 2025, the measured depth to water was 586 feet. No water level data were available near the central and northern portions of Transect 3. Based on the resistivity at approximately 600 feet at well 915, the depth to water north of the Ballinger Canyon Wash is interpreted to correlate with similar resistivity at a depth of approximately 750 to 800 feet. These data indicate the depth to water is greater than 100 feet lower north of the interpreted fault zone.

4.2 Interpretation of Resistivity Data for Transect 4

Spectrum's interpretations of the resistivity and IP data for Transect 4 are shown in **Figure 4-3** and **Figure 4-4**, respectively. The interpretation of the resistivity data shows two fault systems: (i) a steeply north-dipping "Unnamed Fault Zone" with splays from approximately Station 1600 to 2490, including a vertical/subvertical strand that approaches within 50 to 100 feet of ground surface near Station 1910 and a down-dropped channel between Stations 2000 to 2482; and (ii) a steeply south-dipping thrust/reverse fault near Station 3458 that places Lower Morales over Upper Morales. This fault correlates with the unnamed thrust/reverse fault on Transect 2 and produces over 250 feet of vertical offset in the Lower Morales.

Interpretation of the presence of groundwater on Transect 4 is tied to well 276 near the southern end of the transect and several wells further north at variable distances west of the transect (wells 277 to 287). Water levels in these wells were measured from May 2024 to October 2025 or provided by the owners

during the survey. As shown on **Figure 4-3**, the interpreted depth to water ranges from approximately 100 feet at the south end of the transect to approximately 600 feet at the north end.

4.3 Fault Trends and Implications on Groundwater Levels

Based on the results of the surface geophysical surveys in 2024 and 2025, the spatial trends of the detected faults/fault zones are shown in **Figure 4-5**. The approximately 600-foot wide SBC Fault Zone trends west-to-southwest to east-to-northeast from the northern end of Transect 2 to the central portion of Transect 3 beneath the Ballinger Canyon Wash. The unnamed younger thrust/reverse fault beneath the central portion of Transect 2 trends west-to-northwest to east-to-southeast beneath the northern end of Transect 4. The trend of the Unnamed Fault Zone beneath the central portion of Transect 4 cannot be determined without a second location but is inferred to have a similar trend as the SBC Fault Zone.

Groundwater levels in wells noted above and levels measured or reported by well owners in wells located further east and west of Transects 1, 3, and 4 are shown in **Figure 4-6**. These well locations and water levels indicate the depth to water is approximately 100 to 120 feet on the southern side of the Unnamed Fault Zone detected beneath the central portion of Transect 4. Further north, the measured water level of 226 feet in well 287 indicates a drop of 100 to 125 feet between the Unnamed Fault Zone and the unnamed thrust/reverse fault. North of this fault to approximately the Ballinger Canyon Wash, water levels drop further to approximately 600 feet (i.e., a decrease of roughly 375 feet). North of the Ballinger Canyon Wash, water levels drop to more than 700 feet.

The apparent association of successively lower water levels from south to north across faults/fault zones indicates these features are impeding groundwater flow within at least 700 feet of the ground surface. The 2024 and 2025 geophysical surveys provide new information on the complex geology and subsurface structures in the southeastern portion of the Basin and their affect on groundwater levels.

4.4 Limitations

As reported by Spectrum (2025), there are inherent limitations in the interpretation of resistivity and IP data. Interpretations and data accuracy are limited by subsurface units, particularly the Lower Morales, extending deeper than the 850-foot investigation depth, preventing full resolution of their thickness and structure. Uncertainty in groundwater conditions persists where water levels were unavailable, especially within fault zones and in northern portions of the transects, requiring projection to distant wells. Along Transect 4, utilities and buried objects introduced noise that reduced resistivity data resolution in several locations. The SBC Fault is a complex, multi-splay fault zone, and overlapping structural features combined with evidence of reactivated motion contribute to inherent uncertainty in the structural interpretations.

The lateral resolution, and accuracy, for resistivity/IP surveys is determined by data quality and electrode spacing. The 10-meter (33-foot) electrode spacing used for data collection provided a 5-meter (16-foot) lateral and vertical resolution of features in the upper two-thirds of the resistivity/IP profiles. The vertical resolution of features decreased with further depth, ranging from about six meters (about 20 feet) at 200 feet to about 15 to 20 meters (about 50 to 65 feet) at 600 to 800 feet.

5. REFERENCES

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Spectrum, 2026. Report of Supplemental Geophysical Investigation, Santa Barbara Canyon Fault, Cuyama Valley Groundwater Basin, Santa Barbara County, California. February 19.

Woodard & Curran, 2025. Cuyama Valley Groundwater Basin, Groundwater Investigation Report for the Santa Barbara Canyon Fault and Russell Fault, Santa Barbara County, California. May.

FIGURES

- FIGURE 1-1: LOCATION OF THE SANTA BARBARA CANYON FAULT**
- FIGURE 2-1: SANTA BARBARA CANYON FAULT TRANSECTS 1 AND 2**
- FIGURE 3-1: SANTA BARBARA CANYON FAULT TRANSECTS 3 AND 4**
- FIGURE 4-1: SANTA BARBARA CANYON FAULT TRANSECT 3: RESISTIVITY PROFILE**
- FIGURE 4-2: SANTA BARBARA CANYON FAULT TRANSECT 3: IP PROFILE**
- FIGURE 4-3: SANTA BARBARA CANYON FAULT TRANSECT 4: RESISTIVITY PROFILE**
- FIGURE 4-4: SANTA BARBARA CANYON FAULT TRANSECT 4: IP PROFILE**
- FIGURE 4-5: PROJECTION OF FAULTS BASED ON 2024 AND 2025 INVESTIGATIONS**
- FIGURE 4-6: PROJECTION OF FAULTS WITH WATER LEVEL DATA**

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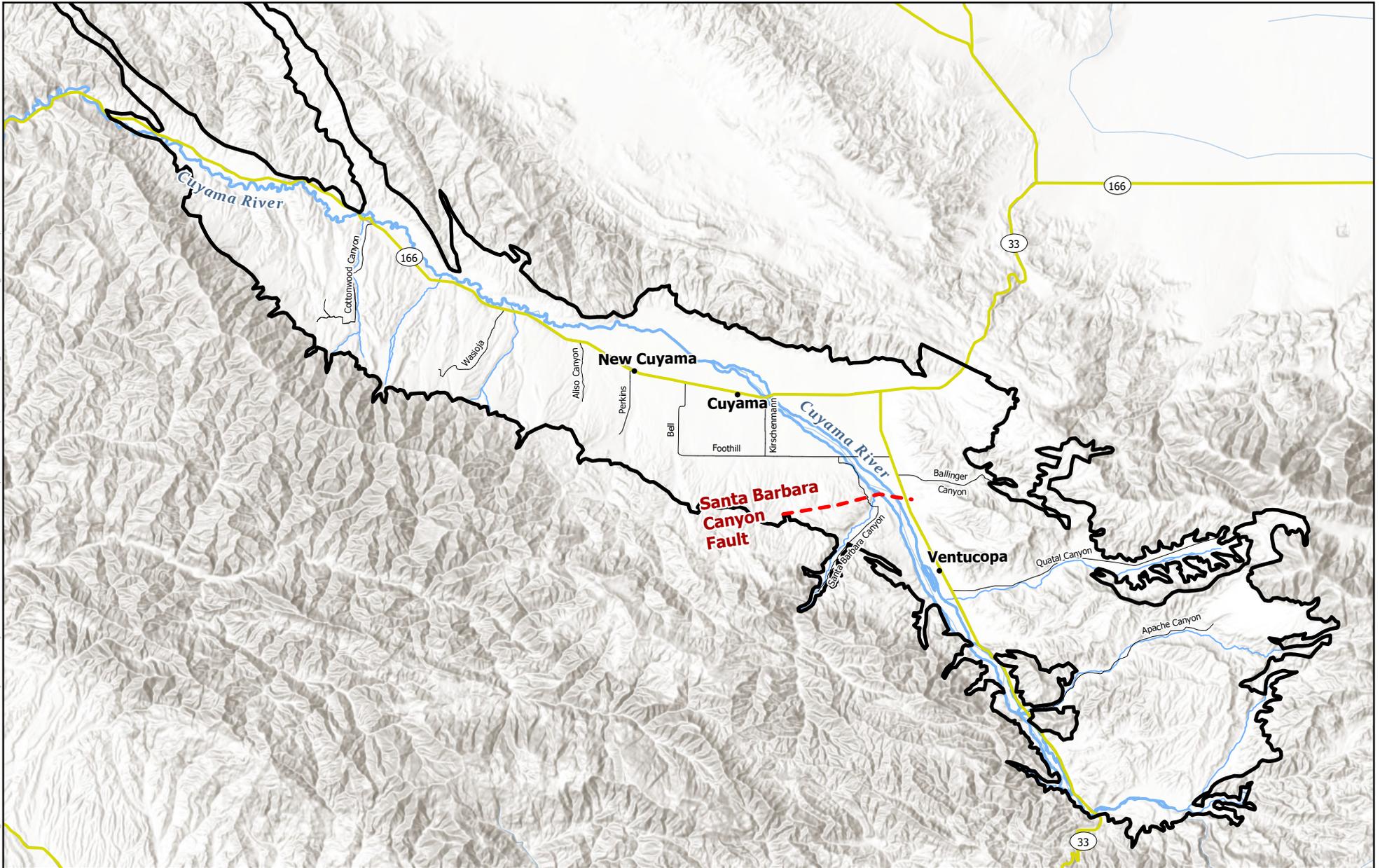


Figure 1-1
Location of the
Santa Barbara Canyon Fault
 Cuyama Basin Groundwater
 Fault Investigation Report
 Addendum

Legend	 Fault (Dashed where Inferred by USGS)	 Town	 Cuyama River
	 Cuyama Basin	 Highway	 Creek
	 Local Road		

N









0 2 4 8 Miles

Map Created: February 2026

Third Party GIS Disclaimer: This map is for reference and graphical purposes only and should not be relied upon by third parties for any legal decisions. Any reliance upon the map or data contained herein shall be at the users' sole risk. **Data sources: CA DWR, Esri, USGS**

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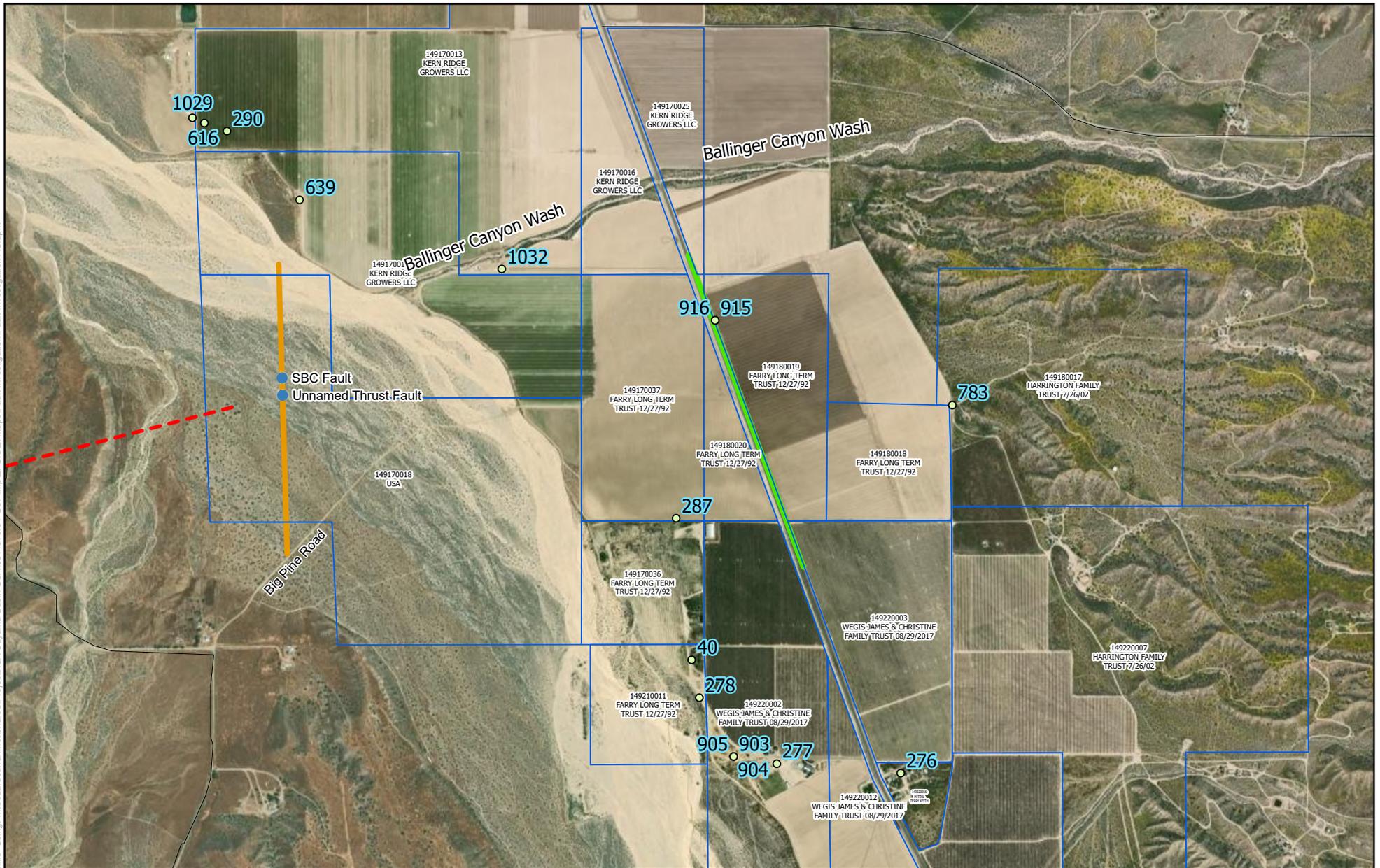


Figure 2-1
Santa Barbara Canyon Fault
Transects 1 and 2
 Cuyama Basin Groundwater
 Fault Investigation Report
 Addendum

Legend	Fault (Dashed where Inferred by USGS)	Transect 2 with Faults Identified
	Transect 1	Parcel Boundaries
	Selected DMS Wells	

N

0 550 1,100 2,200 Feet

Map Created: February 2026

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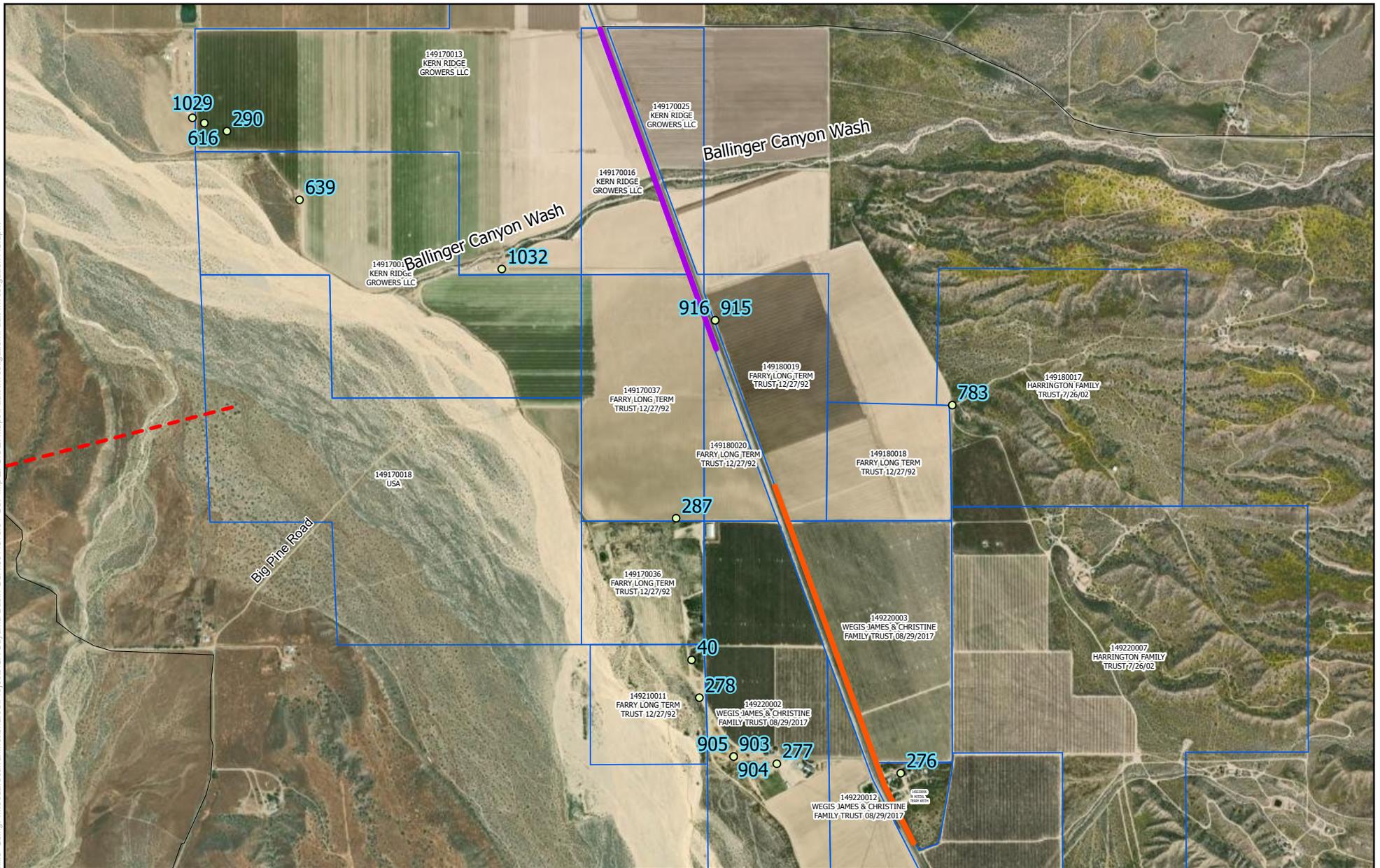


Figure 3-1
Santa Barbara Canyon Fault
Transects 3 and 4
 Cuyama Basin Groundwater
 Fault Investigation Report
 Addendum

Legend	Fault (Dashed where Inferred by USGS)	Transect 4 (4,100 ft)
	Transect 3 (3,600 ft)	Parcel Boundaries
	Selected DMS Wells	



Woodard & Curran

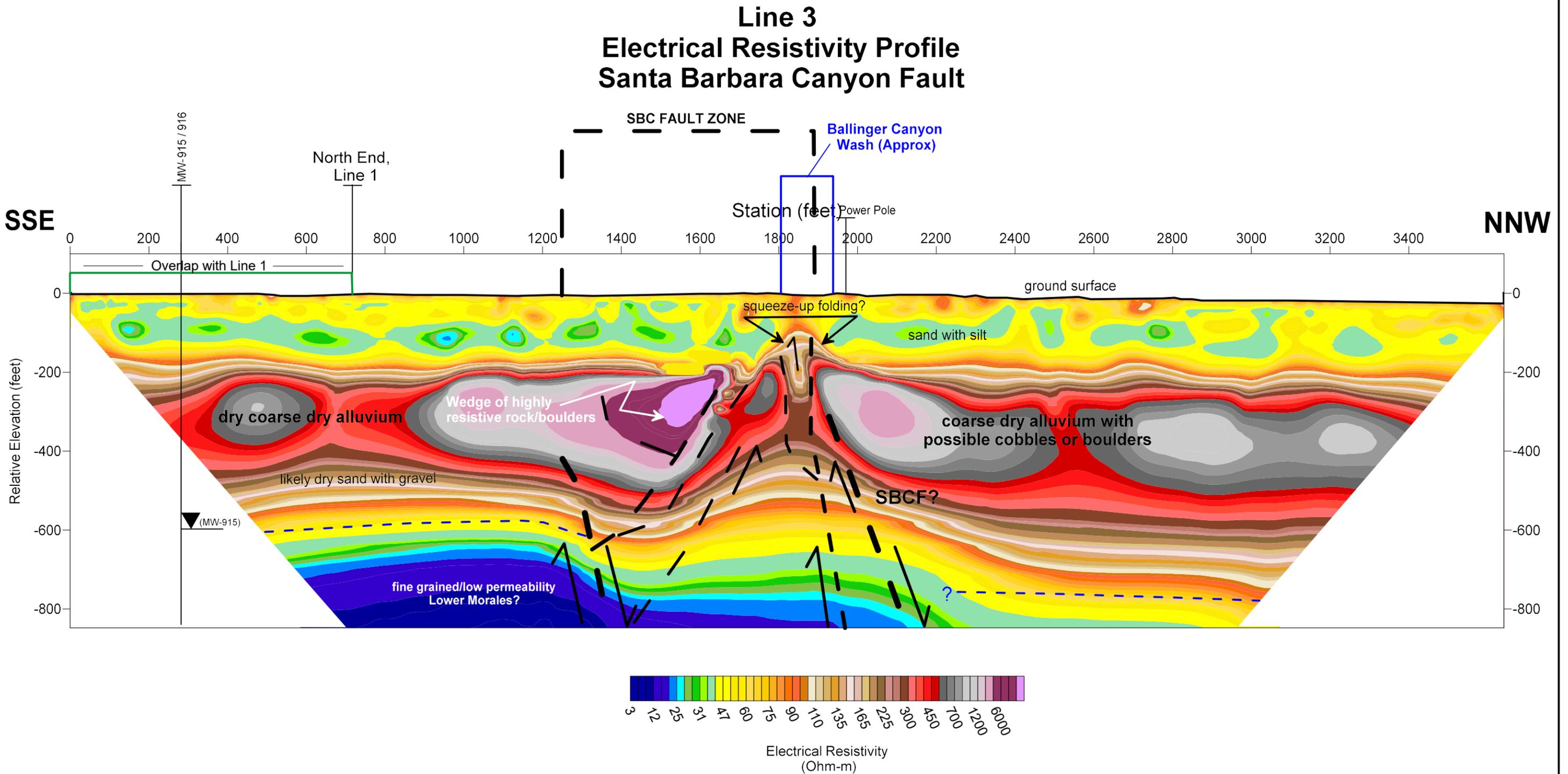
CUYAMA BASIN
GROUNDWATER SUSTAINABILITY AGENCY

0 550 1,100 2,200 Feet

Map Created: February 2026

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Figure 4-1: Santa Barbara Canyon Fault Transect 3: Resistivity Profile



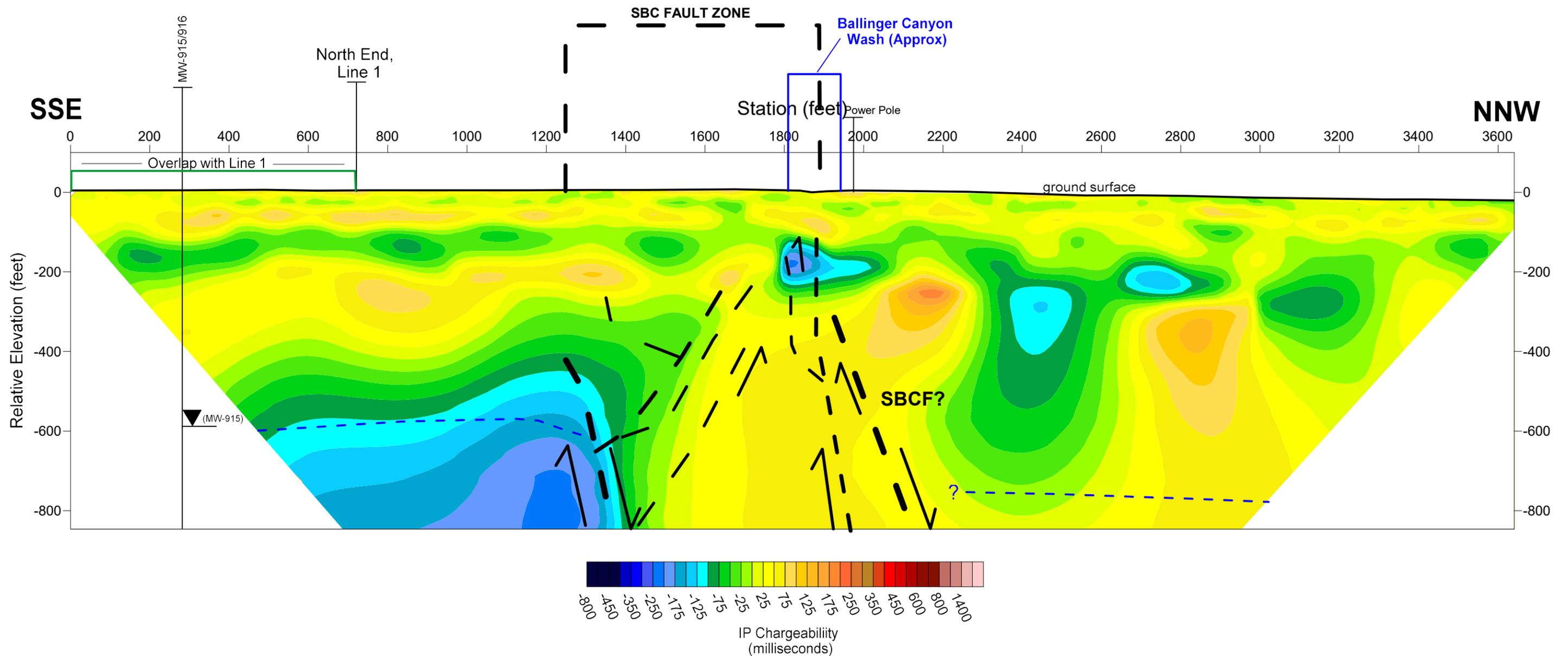
LEGEND

- ▼ Projected Water Level (Measured September/October 2025)
- - - - - Interpreted Top of Water Bearing Zone

 16691 GOTHARD, SUITE L HUNTINGTON BEACH, CA 92646 (818) 886-4500 www.spectrum-geophysics.com	Electrical Resistivity Profile - Line 3 Santa Barbara Canyon Fault		FIGURE NO.
	PROJECT Supplemental Geophysical Investigation Cuyama Valley Groundwater Basin San Luis Obispo County, California		
	PREPARED FOR Woodard & Curran Walnut Creek, California		PROJECT NO. 10315
	SCALE 1 inch = 250 feet	FIGURE BY VNS	REVIEWED BY LCD
			DATE 2/17/26

Figure 4-2: Santa Barbara Canyon Fault Transect 3: IP Profile

**Line 3
Induced Polarization Profile
with Resistivity Interpretations
Santa Barbara Canyon Fault**



LEGEND

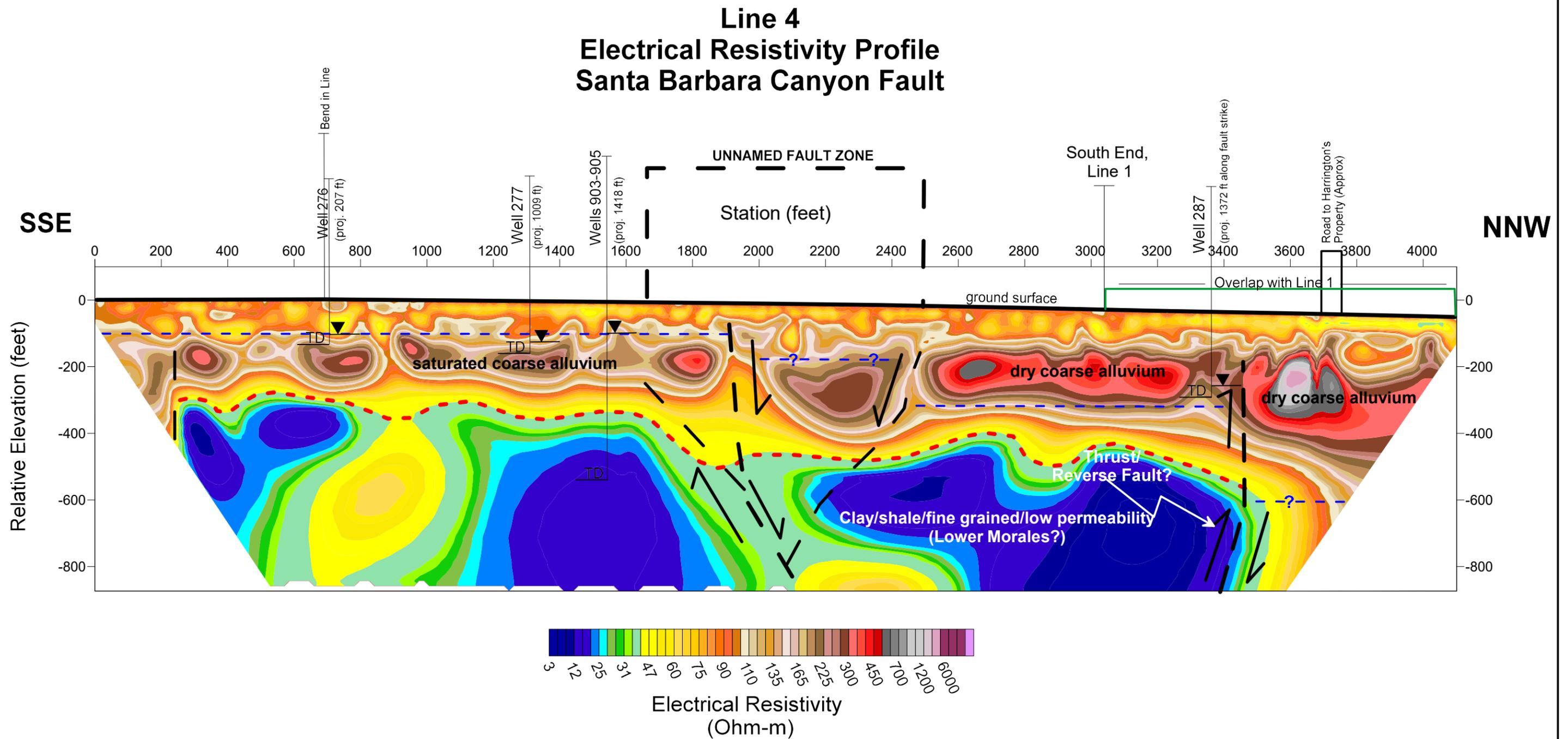
- ▼ Projected Water Level (Measured September/October 2025)
- - - - - Interpreted Top of Water Bearing Zone



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MAP	Induced Polarization Profile - Line 3 Santa Barbara Canyon Fault			FIGURE NO.
PROJECT	Supplemental Geophysical Investigation Cuyama Valley Groundwater Basin San Luis Obispo County, California			
PREPARED FOR	Woodard & Curran Walnut Creek, California		PROJECT NO.	10315
SCALE	1 inch = 250 feet	FIGURE BY	REVIEWED BY	DATE
		AR	LCD	2/17/26

Figure 4-3: Santa Barbara Canyon Fault Transect 4: Resistivity Profile



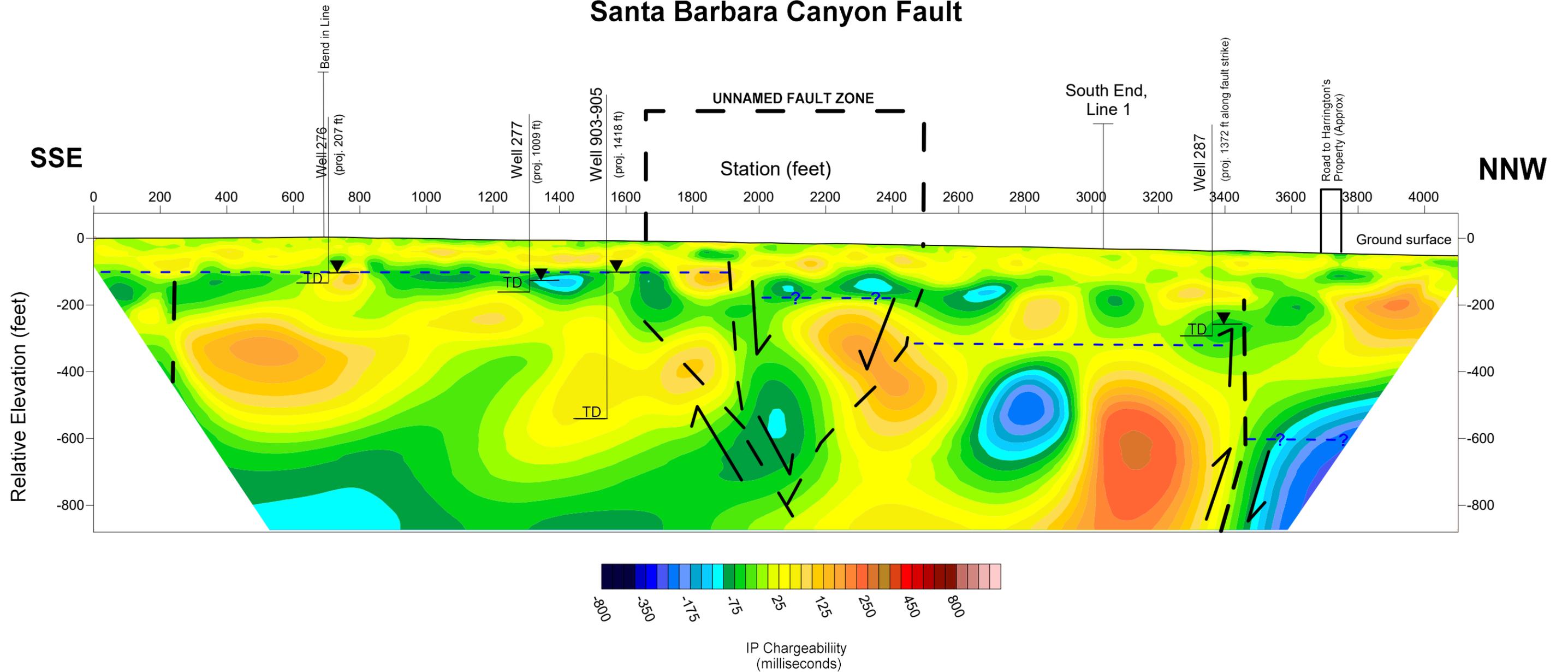
LEGEND

- - - Interpreted Upper Morales/Lower Morales interface
- - - Interpreted Top of Water Bearing Zone
- ▼ Projected Water Level (Measured September/October 2025)
- _TD Total Depth

<p style="font-size: small; margin-top: 5px;">REVEALING THE SUBSURFACE</p>	Electrical Resistivity Profile - Line 4 Santa Barbara Canyon Fault		FIGURE NO.	
	PROJECT Supplemental Geophysical Investigation Cuyama Valley Groundwater Basin San Luis Obispo County, California			
16691 GOTHARD, SUITE L HUNTINGTON BEACH, CA 92646 (818) 886-4500 www.spectrum-geophysics.com		PREPARED FOR Woodard & Curran Walnut Creek, California		PROJECT NO. 10315
SCALE 1 inch = 300 feet		FIGURE BY AR	REVIEWED BY LCD	DATE 02/17/26

Figure 4-4: Santa Barbara Canyon Fault Transect 4: IP Profile

**Line 4
Induced Polarization Profile
with Resistivity Interpretations
Santa Barbara Canyon Fault**



LEGEND

- - - Interpreted Top of Water Bearing Zone
- ▼ Projected Water Level (Measured in September/October 2025)
- |_ TD Total Depth

 REVEALING THE SUBSURFACE	MAP Induced Polarization Profile - Line 4 Santa Barbara Canyon Fault		FIGURE NO. _____
	PROJECT Supplemental Geophysical Investigation Cuyama Valley Groundwater Basin San Luis Obispo County, California		
16691 GOTHARD, SUITE L HUNTINGTON BEACH, CA 92646 (818) 886-4500 www.spectrum-geophysics.com	PREPARED FOR Woodard & Curran Walnut Creek, California		DATE 02/18/26
SCALE 1 inch = 300 feet	FIGURE BY AR	REVIEWED BY LCD	DATE 02/18/26

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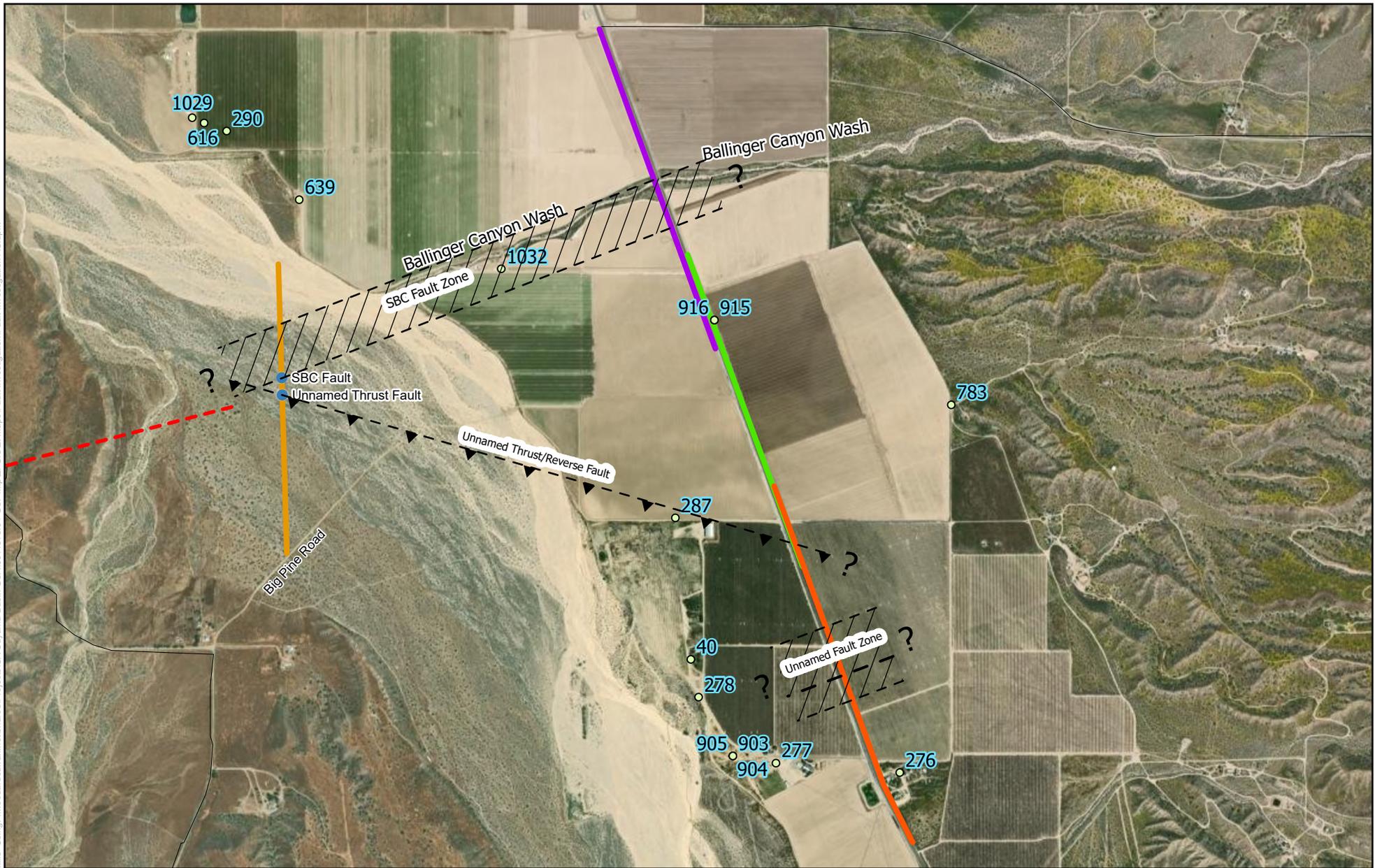


Figure 4-5
Projection of Faults Based on
2024 and 2025 Investigations
 Cuyama Basin Groundwater
 Fault Investigation Report
 Addendum

Legend	
	Fault (Dashed where Inferred by USGS)
	Transect 1
	Transect 2 with Faults Identified
	Transect 3 (3,600 ft)
	Approximate Fault Zone
	Transect 4 (4,100 ft)
	Selected DMS Wells



0 550 1,100 2,200 Feet

Map Created: February 2026

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Figure Exported: 2/20/2026, By: Acanillie, Using: \\woodardcurran.net\share\Projects\CA\Cuyama Basin\GSA0011078.01_GSP\MapZ_GISZ_Maps\Fault Investigation\Fault Investigation AC.aprx

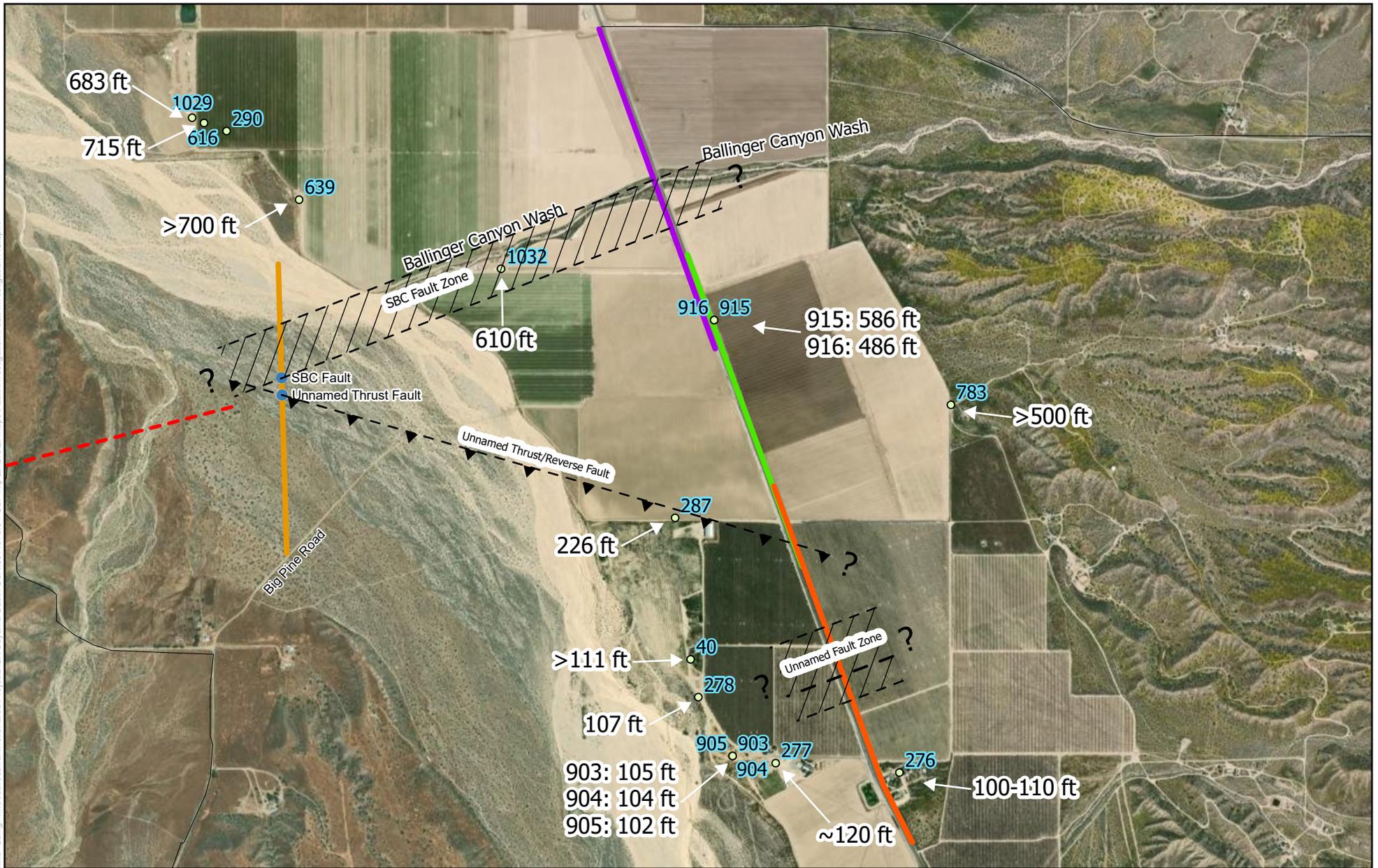


Figure 4-6
Projection of Faults
with Water Level Data
 Cuyama Basin Groundwater
 Fault Investigation Report
 Addendum

Legend	Fault (Dashed where Inferred by USGS)	Transect 2 with Faults Identified	Transect 4 (4,100 ft)
	Transect 1	Transect 3 (3,600 ft)	Selected DMS Wells
		Approximate Fault Zone	

">500 ft" = Depth below ground surface

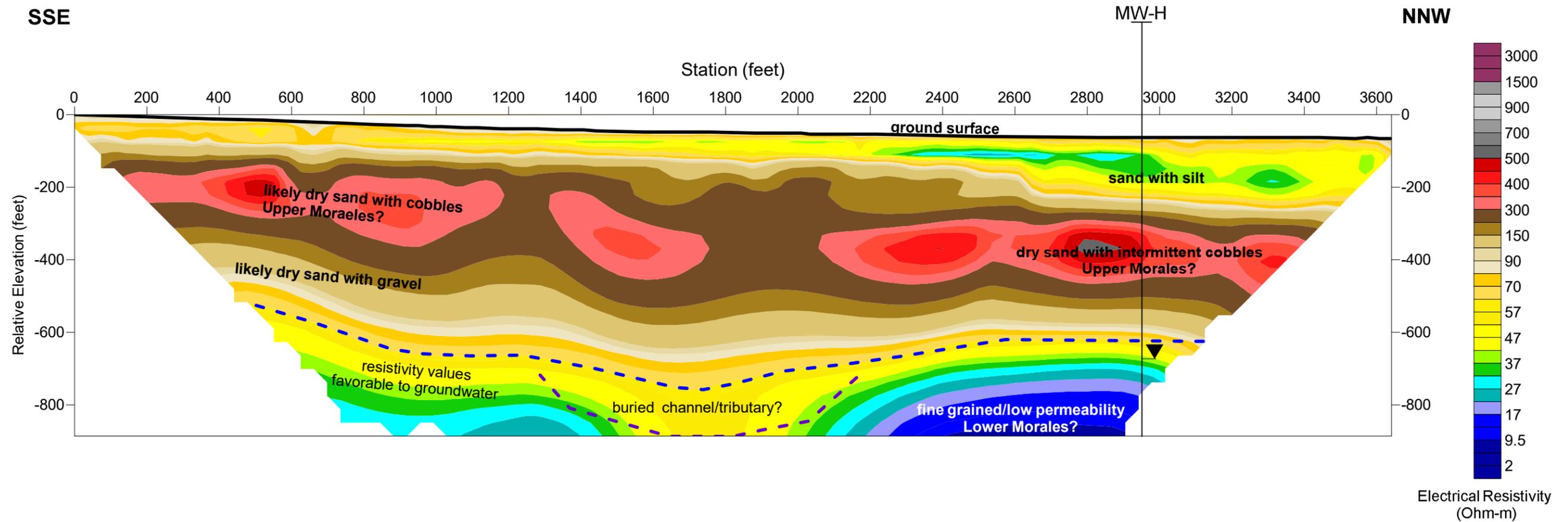
0 550 1,100 2,200 Feet

Map Created: February 2026

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**APPENDIX A: ELECTRICAL RESISTIVITY AND INDUCED POLARIZATION
PROFILES FOR TRANSECT 1 AND TRANSECT 2**

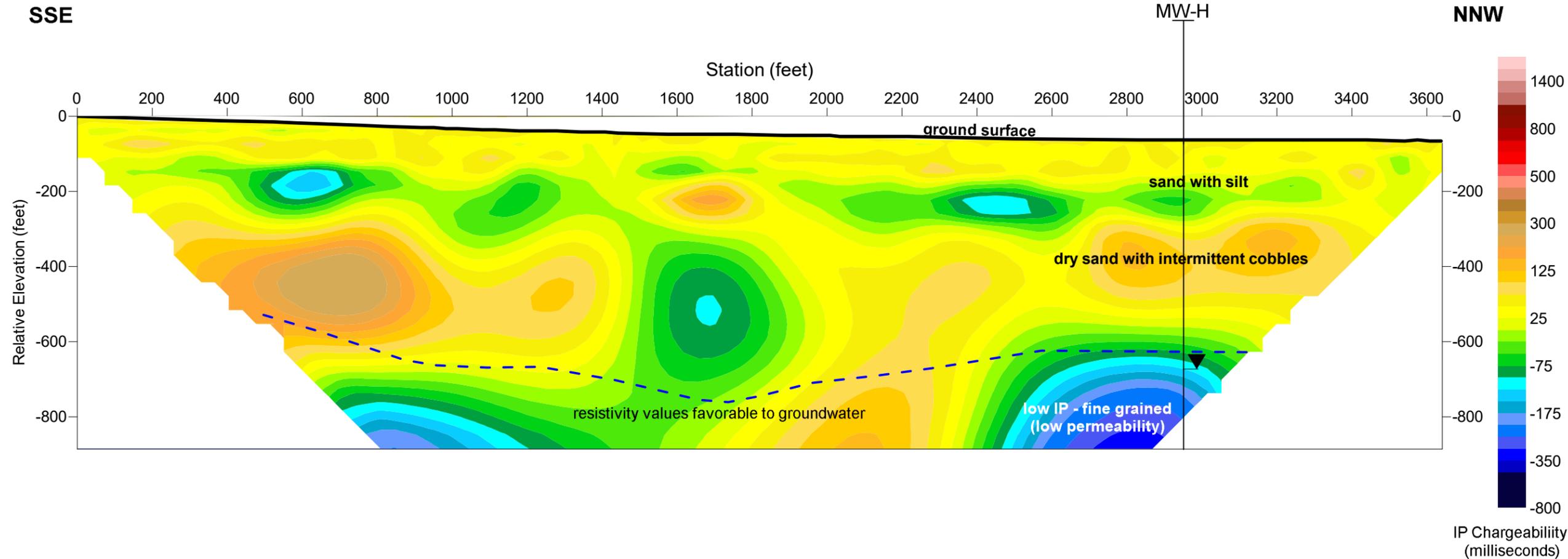
Line 1 Electrical Resistivity Profile Santa Barbara Canyon Fault



--- Water table (interpreted)

 REVEALING THE SUBSURFACE	MAP Electrical Resistivity Profile - Line 1 Santa Barbara Canyon Fault		FIGURE NO. 2
	PROJECT Cuyama Valley Groundwater Basin San Luis Obispo County, California		PROJECT NO. 8443
16691 GOTHARD, SUITE L HUNTINGTON BEACH, CA 92646 (818) 886-4500 www.spectrum-geophysics.com	PREPARED FOR Woodard & Curran Sacramento, California		DATE 8/02/24
SCALE 1 inch = 300 feet	FIGURE BY BU	REVIEWED BY LCD	

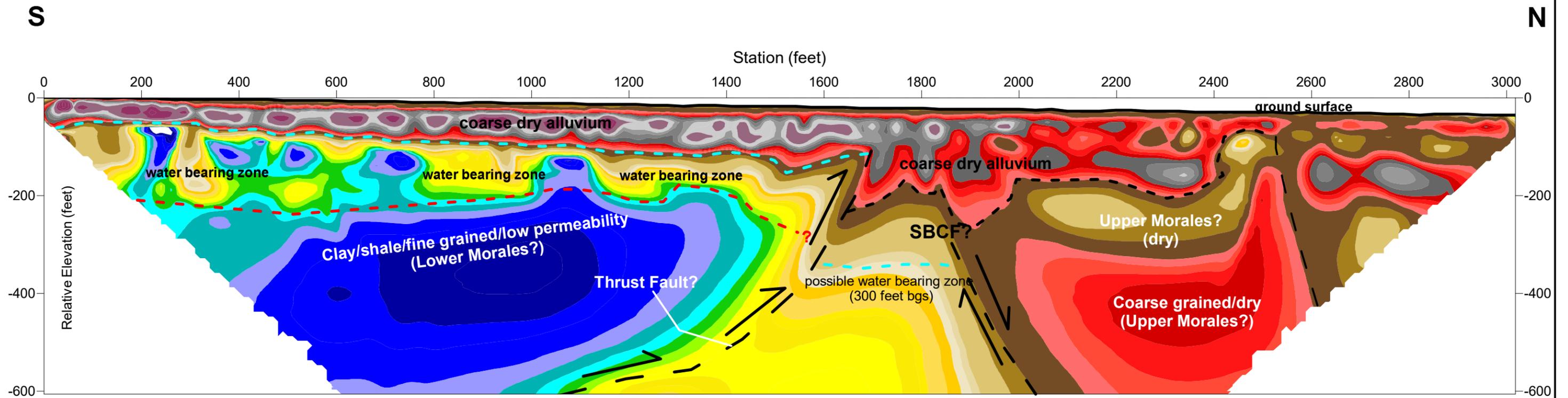
Line 1 Induced Polarization Profile with Resistivity Interpretations Santa Barbara Canyon Fault



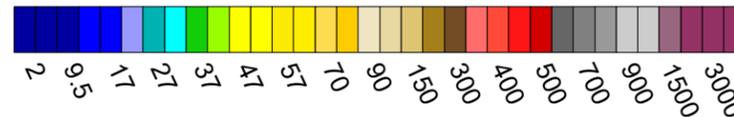
Water table (interpreted)

 <small>REVEALING THE SUBSURFACE</small>	Induced Polarization Profile - Line 1 Santa Barbara Canyon Fault		<small>FIGURE NO.</small> 2A
	<small>PROJECT</small> Cuyama Valley Groundwater Basin San Luis Obispo County, California		
16691 GOTHARD, SUITE L HUNTINGTON BEACH, CA 92646 (818) 886-4500 www.spectrum-geophysics.com	<small>PREPARED FOR</small> Woodard & Curran Sacramento, California		<small>DATE</small> 8/02/24
<small>SCALE</small> 1 inch = 300 feet	<small>FIGURE BY</small> BU	<small>REVIEWED BY</small> LCD	

Line 2 Electrical Resistivity Profile Santa Barbara Canyon Fault



Electrical Resistivity
(Ohm-m)

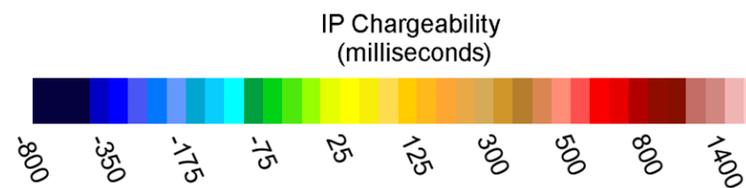
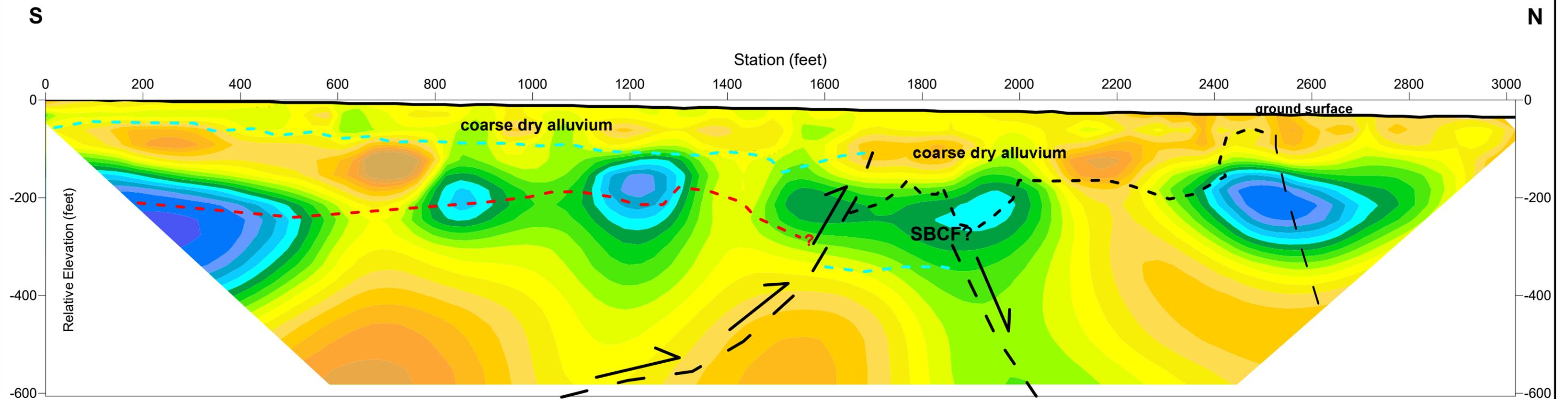


LEGEND

- - - Interpreted top of water bearing zone
- - - Interpreted dry alluvium/Upper Morales interface (dry)
- - - Interpreted water bearing alluvium/Lower Morales interface

<p style="font-size: small; text-align: center;">REVEALING THE SUBSURFACE</p>	Electrical Resistivity Profile - Line 2 Santa Barbara Canyon Fault		FIGURE NO. 3
	Cuyama Valley Groundwater Basin San Luis Obispo County, California		PROJECT NO. 8443
16691 GOTHARD, SUITE L HUNTINGTON BEACH, CA 92646 (818) 886-4500 www.spectrum-geophysics.com		PREPARED FOR Woodard & Curran Sacramento, California	PROJECT NO. 8443
SCALE 1 inch = 200 feet		FIGURE BY BU	REVIEWED BY LCD
		DATE 8/02/24	

Line 2 Induced Polarization Profile with Resistivity Interpretations Santa Barbara Canyon Fault



LEGEND

- - - - Interpreted dry alluvium/Upper Morales interface (dry)
- - - - Interpreted top of water bearing zone
- - - - Interpreted water bearing alluvium/Lower Morales interface

 16691 GOTHARD, SUITE L HUNTINGTON BEACH, CA 92646 (818) 886-4500 www.spectrum-geophysics.com	Induced Polarization Profile - Line 2 Santa Barbara Canyon Fault		FIGURE NO. <h1 style="font-size: 2em;">3A</h1>
	PROJECT Cuyama Valley Groundwater Basin San Luis Obispo County, California		PROJECT NO. 8443
PREPARED FOR Woodard & Curran Sacramento, California		SCALE 1 inch = 200 feet	FIGURE BY BU
		REVIEWED BY LCD	DATE 8/02/24

**APPENDIX B: SPECTRUM GEOPHYSICS REPORT OF SUPPLEMENTAL
GEOPHYSICAL INVESTIGATION SANTA BARBARA
CANYON FAULT, CUYAMA VALLEY GROUNDWATER
BASIN, SANTA BARBARA COUNTY, CALIFORNIA**



February 19, 2026

Mr. Jim Strandberg
Woodard & Curran, Inc.
2175 North California Blvd.
Suite # 810
Walnut Creek, California 94596

**RE: Report of Supplemental Geophysical Investigation
Santa Barbara Canyon Fault
Cuyama Valley Groundwater Basin
Santa Barbara County, California**

Dear Mr. Strandberg:

A geophysical investigation was conducted by Spectrum Geophysics (Spectrum) for Woodard & Curran in the Cuyama Valley Groundwater Basin of Santa Barbara County, California (hereinafter referred to as the Basin) from September 29th- October 3rd, 2025. This investigation was conducted in the vicinity of the Santa Barbara Canyon Fault (SBCF) – a mapped feature at the southeast end of the Basin. This investigation was supplemental to a previous geophysical investigation conducted by Spectrum during the week of February 13th, 2024, in which two geophysical transects (Line 1 on the east shoulder of Highway 33 and Line 2 in the Cuyama Riverbed) were established to provide an image of and confirm the inferred location/trend of the SBCF. Since the SBCF was identified on Line 2 but could not be identified on Line 1 during the 2024 survey, its trend could not be determined. Therefore, two additional transects were established in 2025 to locate and determine the trend of the SBCF – Line 3 north of Line 1 on the west side of Highway 33, and Line 4 south of Line 1 on the east side of Highway 33; these transects are shown in yellow-green in Figure 1. Secondary goals for the supplemental investigation were to locate the trend of an unknown thrust fault identified on Line 2 during the 2024 survey, and to determine if the SBCF and the unknown thrust fault provided a barrier to groundwater flow– particularly in the area of groundwater Wells #903-905, where groundwater was known to be significantly shallower than it was in the area of Ballinger Canyon Wash. As in the 2024 geophysical investigation, the methods used were DC resistivity and induced polarization (IP).

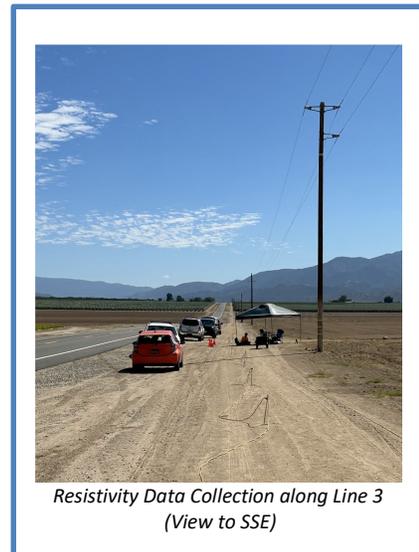
Since a complete discussion of resistivity and IP methods and their limitations was provided in the report of the 2024 investigation, this information is not reiterated here; rather, the reader is referred to the geophysical investigation report dated August 2nd, 2024 (Spectrum Geophysics, 2024).

Electrical resistivity and IP field equipment consisted of the Advanced Geosciences SuperSting R8/IP system (SuperSting), passive electrodes and associated cabling. This equipment is designed such that the data are collected in units of meters and then converted to feet during the data processing stage. Utility locators and a Fisher M-Scope shallow focus metal detector (M-Scope) were used to locate utilities and shallow metallic features along the designated transects. A Juniper Geode GNS3m GPS antenna coupled with a Mesa3 tablet utilizing UINTA software (Mesa) was used to map the endpoints and key features along each resistivity/IP transect. The Advanced Geosciences EarthImager[®] software package (AGI, 2015) was used to process the resistivity and IP data.

FIELD PROCEDURES

As was done for the 2024 investigation, electrical resistivity and IP data for the supplemental investigation were collected with an AGI SuperSting R8/IP automated resistivity system (SuperSting) with associated resistivity cabling. These data were collected along Lines 3 and 4 using a linear array of 112 or more electrodes spaced 10 meters apart and array geometries of both Schlumberger and dipole-dipole in order to obtain a 2D image of the subsurface materials along each line. Since the area of concern along Line 4 was greater than the length provided with an array of 112 electrodes, the length of Line 4 was extended using the “leap frog” method.

Line 3 ran south-southeast to north-northwest on the west side of Highway 33; this line was 1,110 ground meters (3,641.7 ground feet) in length. Because of the taper effect that occurs in the data at either end of a resistivity/IP transect, there was a gap in the resistivity/IP data at the north end of Line 1 from the 2024 investigation. To fill in this data gap during the 2025 survey, care was taken to provide enough overlap distance between the south end of Line 3 and the north end of Line 1 as to provide the full depth of investigation (840 feet) at the Line 3 tie point with the north end of Line 1. Once the south end of Line 3 was established, the line was then extended 1,110 ground meters (3,641.7 ground feet) to the north, where it terminated at Ballinger Canyon Road. This survey design also ensured the maximum depth of investigation in the area of Ballinger Canyon Wash.



Line 4 ran south-southeast to north-northwest on the east side of Highway 33; this line was 1,250 ground meters (4101 ground feet) in length. Line 4 was designed to fill in the gap in the

resistivity/IP data at the south end of Line 1, as well as to extend the resistivity/IP data to the south to provide imaging in the area of wells #903-905, #277 and #276, where the saturated zone was quite a bit shallower than that at the north end of Line 1 (wells #915-916). The design of Line 4 allowed enough overlap distance between the north end of Line 4 and the south end of Line 1 to provide the full depth of investigation (840 feet bgs) at the Line 4 tie point with the south end of Line 1. During data collection for Line 4 (data were acquired from south to north) the beginning a fault-type anomaly was observed at depth at the north end of the 112-electrode array. Because this feature was evident, Line 4 was extended about 350 feet past (north of) the entrance to the Harrington property to ensure full characterization of this fault anomaly; this extent provided an overlap of about 1100 feet between the south end of Line 1 and the north end of Line 4 (Figure 1).

Because utilities were present along Lines 3 and 4, utilities were located and marked in the vicinity of the transects (particularly at entrance roads and in front of a residence on Line 4), and care was taken to offset electrode locations from utilities and utility vaults as much as possible to minimize the electromagnetic interference effects from these utilities. In addition, where unexpected interference effects were observed in the raw field data, utility locating equipment and shallow metal detectors were used to investigate anomalies and document their source to allow removal of these effects during office data processing.

Once the data were collected, data files were downloaded to a laptop and saved for subsequent office processing. In addition, elevations of each station along each line were surveyed by the Spectrum crew, so that surface topography could be included in office resistivity/IP data processing.



During office processing a resistivity/IP geophysical inversion routine was utilized along each profile in order to obtain 2D models of the electrical resistivity and IP distribution beneath the ground surface along Lines 3 and 4. Electrical resistivity and IP methods, including data processing, were discussed in the 2024 Spectrum report, and so are not reiterated here.

INTERPRETATION

Once the final model sections of resistivity and IP data were generated from the software program EarthImager[®], resistivity and IP profiles for Lines 3 and 4 were color contoured using similar color tables (color paired with resistivity or IP value) to those used for Lines 1 and 2 from the 2024 investigation, to allow comparison of lithology and structural/hydrogeologic features between the profiles. This resulted in a resistivity color spectrum ranging from dark blue (lowest resistivity) to yellow/orange to tan colors to bright/deep orange to grey to dark purple to light purple (highest resistivity), and an IP

chargeability color spectrum ranging from dark blue (lowest IP) to green to yellow to orange to red to dark purple to pale pink (highest IP). The primary difference between the 2025 and 2024 resistivity color schemes was greater detail in the color spectrum in the range of 100 to 200 Ohm-meters (to allow more effective delineation of apparent geologic attitude and offsets from fault splays in the Upper Morales and Older/Younger Alluvium) and a slight change in the colors used for very high resistivity values (1500 Ohm-meters and above) to better display a section of particularly high resistivity values obtained on Line 3. This change allowed for short/narrow contour intervals and a somewhat linear color distribution for resistivity values ranging from 3 to about 200 Ohm-meters (the value range known to be associated with Lower and Upper Morales as well as saturated alluvium – where detail was most important), and a gradual change to larger/wider color-contour intervals for higher resistivity values (typically associated with dry alluvium or dry cobbles/boulders/wedges of rock).

The primary difference between the 2025 and 2024 IP profiles was minor: a sharper color contrast (to dark orange and orange-brown) was utilized for IP values of 200 milliseconds or above, to better illustrate areas of positive charge buildup and to better exhibit dipoles (positives juxtaposed with negatives) where they might exist.

Once the color contoured profiles of resistivity and IP for Lines 3 and 4 were generated, layers with similar resistivity value ranges were reviewed for lateral and vertical continuity, and these profiles were compared with those for Lines 1 and 2 from the 2024 investigation, where the assumption made was layers with the same resistivity value range (same color) corresponded to layers with the same lithology. For potential identification of faulting, layers and features evident in the resistivity profiles for Lines 3 and 4 were compared with those from Line 2, where resistivity features such as sharp lateral or vertical offsets in resistivity or abrupt changes in apparent attitude of resistivity layers were compared to resistivity features and offsets in areas where a fault was identified on Line 2, to determine if similarity in character or orientation could be identified. Once this was done, a fault or fault splays were interpreted in areas where sharp discontinuities existed.

Resistivity and IP profiles for Lines 3 and 4 were correlated with those of Line 1, for indications of similar resistivity values at similar depths and general lithological and hydrogeological continuity in the areas of overlap between the 2024 and the 2025 transects. These profiles were also reviewed for indications of groundwater offsets and significant differences in the depth to the Lower Morales unit, when compared to Line 1.

Lithologic and hydrogeologic interpretation of the resistivity and IP profiles generated from this supplemental investigation was done based on review of available geologic maps, comparisons/correlation with the data from the 2024 investigation and available maps of wells in the vicinity of Lines 3 and 4, with current groundwater level information for these wells, where available. In particular, the following maps, data and wells were reviewed for interpretation of the profiles for Lines 3 and 4:

- Woodard & Curran map entitled “Water Levels in Wells Near Transects 1-4” (Woodard & Curran, 2025a)

- Dibblee Foundation Geologic maps for the Ballinger Canyon, Cuyama, Cuyama Peak and Fox Mountain quadrangles (Dibblee and Minch, 2005a and 2005b; Dibblee and Minch, 2006; Dibblee and Minch, 2007)
- September/October 2025 water level data, geophysical logs, and lithologic logs for nested wells #903-905 and #915-916
- September/October 2025 water level data and available information for Wells #276, 277 and 287

Based on information provided by Woodard & Curran, water level data for October 2025 indicated a depth to water ranging from 102 to 105 feet bgs for nested wells #903-905 and a depth to water of 586 feet bgs for well #915 (Woodard & Curran, 2025a).

PROJECT RESULTS

The geophysical survey interpretation map for the supplemental SBCF investigation is presented in Figure 1. Lines 3 and 4 are shown in green on this map and Lines 1 and 2 from the 2024 investigation are shown in red. The electrical resistivity and IP profiles for Line 3 are presented in Figures 2 and 2A, respectively. The electrical resistivity and IP profiles for Line 4 are presented in Figures 3 and 3A, respectively. A summary of resistivity interpretation for lithology for the supplemental investigation is presented in Table I. In each of the profiles for Lines 3 and 4, key surface features and wells that tie to the line are shown in the appropriate location. A brief discussion of the site-specific resistivity color table used in the profiles for Lines 3 and 4 may be found below.

As mentioned previously, both the color table and the interpretation of resistivity for lithology for the supplemental investigation were similar to that used for the 2024 investigation. The lowest resistivity values measured range from 3 to 20 Ohm-meters and are shaded dark blue in the profiles. These low resistivity areas were assumed to correspond to finer grained materials such as clays and silts where they occurred in the known depth range of alluvium, and shales and claystones (likely of the Lower Morales) where they occurred at greater depths. As the resistivity values increase above 20 ohm-meters the colors change to turquoise (25 Ohm-meters) to dark green (29 Ohm-meters) to pale green (33 Ohm-meters) to yellow (40 Ohm-meters) as the grain size of the material gradually increases from silt to silty sand to coarse sand. However, whether the material associated with a particular resistivity value or value range (pale green to yellow layers – corresponding to a range of 33 to 45 Ohm-meters, for example) is interpreted as unconsolidated alluvium or more consolidated/lithified material (such as siltstone or lithified sands of the Upper Morales) depends on what depth layers of a particular resistivity are found in the profile and the character and thickness of these layers. In general, dry alluvial materials from sand to coarse sand range in resistivity from 40 (yellow) to 60 Ohm-meters (yellow-orange), and as the grain size increases from gravels to cobbles to boulders the resistivity increases from 75 Ohm-meters (orange – likely gravels) to 100-150 Ohm-meters (tan colors – likely gravels and cobbles) to 200 to 450 Ohm-meters (brown to salmon colors – more likely to have thick deposits of cobbles with some boulders). As the resistivity value increases above 500 Ohm-meters the corresponding material is more

likely to be cemented/lithified with larger sized deposits, where resistivity layers corresponding to 800 to 1500 to 2000 (dark grey to light grey to light pink) likely correspond to layers with large amounts of dry cobbles or boulders in alluvium. Resistivity values above 3,000 Ohm-meters (up to 10,000 Ohm-meters -dark purple colors) are likely to be associated with either large deposits of dry boulders or dry, impermeable rock. Very high resistivity values (10,000 Ohm-meters and greater – light purple) are likely to be associated with dense, unfractured, impermeable rock.

As mentioned previously, the IP color table used for the 2025 investigation was similar to that used for the 2024 investigation, where the primary difference was a sharper color contrast (to dark orange) for IP values of 200 or above, to better illustrate areas of positive charge buildup and to better exhibit dipoles (positives juxtaposed with negatives) where they might exist. In a very general sense, the color table in Figures 2A and 3A represents a range from high amplitude negatively charged materials (-800 milliseconds - darkest blue) to “non-charged” materials (0 milliseconds - crossover between yellow-green to yellow-gold) to high amplitude positively charged materials (800 milliseconds and greater – rose-grey to pink). During this investigation the lowest IP values measured were about -300 milliseconds (blue colors) and the highest IP values measured were about 300 milliseconds (orange-brown colors). For the purposes of discussion, IP values ranging from -300 to about -150 milliseconds are referred to as “low IP” and are shaded blue. IP values ranging from about -150 to about -50 milliseconds are referred to as “moderately low IP” and are shaded from dark green to green colors. IP values ranging from about + 50 to + 150 milliseconds are referred to as “moderately high IP” and are shaded from pale orange to yellow-orange. IP values from +150 to +300 milliseconds are referred to as “high IP” and are shaded yellow-orange to dark orange to orange-brown. It should be mentioned that IP response is a complex phenomenon involving the buildup of electrical charge at a boundary, where current flow direction can determine the polarity of the response (particularly in time domain IP). As such, IP values alone cannot be used to interpret geology or lithology. Because there is no direct correlation between IP response and material type, no lithologic interpretation was made from the IP response alone; although, fine grained materials such as clays and certain minerals (such as sulfide minerals) are known to polarize (hold charge). The interpretation of lithology, structure and geologic features for this investigation was made primarily from the resistivity data collected. The IP was used for comparison with the resistivity data, primarily for the identification of faulting, saturated zones, and indications of barriers and offsets to groundwater flow. The results of the investigation are discussed on a line by line basis below.

1. Line 3

The profile in Figure 2 contains the inverted resistivity distribution which best represents the actual lateral and vertical variation of earth resistivity beneath the ground surface along Line 3. In this figure, the colors represent values of resistivity, which key to the color bar below the image and to the lithological interpretations presented in Table I. The numbers across the top of the profile represent ground distance along Line 3 in units of feet as measured from Station 0 (south end of profile). The tie to nested wells #915-916 is shown, as well as the area of overlap between the south end of Line 3 and the north end of Line 1. The boundaries of Ballinger Canyon Wash (roughly at the center of the profile) are shown in blue for reference.

The numbers along the vertical axis of the profile represent elevations in feet relative to Station 0, which was arbitrarily assigned an elevation of zero. Dashed blue lines at depth in Figure 2 indicate the interpreted top of the water saturated zone, where it appeared reasonably clear in the data. The interpretation of saturated zones was made primarily by correlation with the known water level in well #915 and also by a laterally traceable vertical decrease in resistivity across the profile.

The IP profile in Figure 2A contains the inverted IP chargeability distribution which best represents the actual lateral and vertical variation of IP chargeability beneath the ground surface along Line 3. In this figure, the colors represent values of chargeability, which key to the color bar below the image. The numbers across the top of the profile represent ground distance along Line 3 in units of feet as measured from Station 0 (south end of profile). The tie to nested wells #915-916 is shown, as well as the area of overlap between the south end of Line 3 and the north end of Line 1. The boundaries of Ballinger Canyon Wash (roughly at the center of the profile) are shown in blue for reference. The numbers along the vertical axis of the profile represent elevations in feet relative to Station 0, which was arbitrarily assigned an elevation of zero. Dashed blue lines at depth in Figure 2 indicate the interpreted top of the water saturated zone, where it appeared reasonably clear in the data. The interpretation of saturated zones was made primarily by correlation with the known water level in well #915 and also by a laterally traceable vertical decrease in resistivity across the profile. There is, however, some correspondence between a vertical decrease in resistivity and a vertical change in IP chargeability in the areas where saturated zones are interpreted along Line 3.

The resistivity and IP data collected along Line 3 were very high quality and provided reliable measurements to about 850 feet bgs. Because the resistivity data were used as the primary tool to discriminate lithology and geologic structure, these data will be dominant in the discussion of results. The IP data were used to corroborate the interpretation of structural features that could be giving rise to barriers to groundwater flow, and to assist with identifying saturated zones in the subsurface.

In a general sense the resistivity profile along Line 3 indicates four (somewhat) laterally continuous geologic/lithologic layers that are stratified vertically. In addition, these layers correlate well with resistivity layers observed in the Line 1 resistivity profile, and the depths and thicknesses of the upper 3 layers agree well in the area where Line 3 overlaps Line 1. The first layer (Layer 1) extends from the surface to about 200 feet bgs, is marked by moderate resistivity values (35 to 55 Ohm-meters- pale green to yellow-orange) and is (mostly) horizontal and laterally continuous across the length of the profile. This layer is interpreted to be a 200-foot layer of dry sand with silt.

The next (mostly) laterally continuous layer in the profile for Line 3 (Layer 2) lies directly beneath the first layer, and exhibits a significant increase in resistivity from the first layer – with resistivity values varying widely but typically ranging from 300 to 1200 Ohm-meters (salmon to grey colors). This layer begins about 200 feet bgs and is between 200 and 250 feet thick between Stations 200 and 1200; north of Station 1200 this layer thickens and becomes more complex in character up to about Station 2000. North of Station 2000 Layer 2 thickens to between 300 and 350 feet thick – where it extends to depths of 500 to 550 feet bgs. Layer 2 is interpreted as a layer of coarse, dry alluvium consisting of gravels, cobbles and boulders.

Layer 3 lies directly beneath Layer 2, and can be described as a unit of partially horizontal, partially undulating layers with moderate resistivity (ranging from 300 Ohm-meters at the top to about 40 Ohm-meters at the bottom, with colors ranging from brown to beige to orange to yellow, respectively), where the resistivity value continuously decreases with depth. Layer 3 ranges in thickness from 150 to 200 feet between (at least) Stations 400 and about 1600; north of this, Layer 3 thickens to about 200 to 250 feet thick or greater (at least to Station 3000). Based on correlations with Line 1 and lithology/water levels for well #915, Layer 3 is interpreted as a fining downward unit that transitions from the gravel, cobbles and boulders of Layer 2 to continuously smaller grained material with depth (e.g. coarse sand or sand with gravel), where there is a transition from dry to wet (saturated) material near the base of Layer 3. Based on its position directly above Layer 4, Layer 3 is interpreted as corresponding to the Upper Morales unit.

Layer 4 lies directly beneath Layer 3, and can be described as a massive layer of moderate to low resistivity, with values ranging from about 35 Ohm-meters (green) to typically 20 Ohm-meters down to 4 Ohm-meters (royal blue to dark blue). The top of Layer 4 steps down as the profile is traversed from south to north: Between Stations 600 and 1200 the top of this layer is about 600 feet bgs, between Stations 1400 and about 2000, the top of Layer 4 is about 750 feet bgs, and north of about Station 2200 Layer 4 is barely evident (although there is some indication of the transition to this layer at about 800 feet bgs). Based on correlations with Line 1 and the boring log for well # 915, Layer 4 is interpreted as the Lower Morales unit. While the top of the Lower Morales is evident in the data, its thickness is unknown since its extent lies to depths greater than those reached by the data.

1.1 Indications of Faulting

Traversing the profile in Figure 3 from the south, the first evidence of a sharp lateral change in resistivity is observed at Station 239, where an (apparently) sharp vertical boundary separates higher resistivity (150 to 200 Ohm-meters – brown to beige colors) material to the south from lower resistivity material (10 to 15 Ohm-meters (dark blue) -interpreted as Lower Morales) to the north at a depth of about 300 feet bgs. This feature is marked with a dashed vertical black line in Figure 3 and 3A. Although this vertical feature appears to extend to within about 200 feet of the surface and could be associated with a fault splay, this feature is not well defined and could be associated with some other geologic feature, such as a channel. Therefore, it is not shown in Figure 1.

Based on abrupt, steeply north dipping step-downs in the Lower Morales at Station 1200 and 2000, two normal faults in the Morales are interpreted at depth at these locations. Each of these normal faults exhibits a steep, north-dipping fault plane that extends to shallower depths and, based on sharp offsets and abrupt lateral contrasts in resistivity, branches into a complex “flower structure” type pattern of fault splays as it approaches the surface. These faults are indicated with dashed black lines in Figure 2 (heavier line where the fault is considered to be a primary fault). These faults and fault splays, as interpreted from the resistivity data, are shown superimposed on the IP profile in Figure 2A. The southern fault first evident in the top of the Morales at Station 1200 appears to be centered at Station 1370 at depth, and extends towards the surface (at least to a point about 400 feet bgs) to about Station 1250. The

interpretation of this southern fault is corroborated in the IP profile in Figure 2A, where a low IP (blue) anomaly, first evident at about 500 feet bgs, is evident directly south of the fault and extends fully to depth and fully to the south (at least to Station 400). This low IP anomaly is interpreted as being associated with the “step-up” of the fine grained Lower Morales unit directly south of the fault, where there is charge buildup against the fault.

In the resistivity profile this southern fault branches and splays north towards the surface, where Layer 2 is no longer horizontal but appears to dip steeply to the south (salmon-colored layer at Station 1800) as it is “squeezed” against additional fault splays. Additionally, a wedge of highly resistive (resistivity values ranging from 3,000 to 20,000 Ohm-meters - dark purple to light purple) material is evident within Layer 2 between Stations 1350 and 1664 in the depth range of 200 to 250 feet bgs. This wedge of material suggests a sharp discontinuity in lithology – where highly resistive rock or boulders have been shoved against less resistive material, suggesting a fault splay branching to the south. The IP profile also exhibits a traceable pattern through these branching faults: a section of moderately low IP (green) material directly north of the main fault appears to arch upwards and to the north, corresponding to the fault branches interpreted from the resistivity- at least to a depth of about 300 feet at Station 1600. This section of moderately polarized material is likely also related to charge buildup, predominantly south of the north-branching fault splays.

The northern fault first evident in the top of the Morales at Station 2000 appears to be centered at Station 2110 at depth, and extends steeply south towards the surface, so that the fault is within about 100 feet of the surface at Station 1890. This northern fault is considered a bounding fault, where immediately north of it Layer 2 is squeezed up against it, based on a steeply north dipping section of high resistivity. Another, nearly vertical fault splay is identified at Station 1960 at depth and extends upward through an apparently anticlinal feature in Layer 3, above which (depth of about 375 feet bgs) a vertical high resistivity (280-Ohm-meters-brown) anomaly rises toward the surface, where another apparently small anticlinal feature is evident in the data to within about 50 feet of the surface. This small anticlinal feature with “squeeze-up” folding is surprising, given that it falls almost directly beneath Ballinger Canyon Wash (Figure 3)– where a channel type feature might be typically expected in the subsurface. The IP profile also exhibits an anomaly in the area south of this northern bounding fault. A wide, nearly vertically-oriented section of non-chargeable, homogeneous (gold colored) material that extends from depth to about 350 feet bgs is evident in Figure 2A between Stations 1700 and 2050. This vertically oriented IP anomaly appears to be associated with the near vertical faulting beneath the area of Ballinger Canyon Wash. In addition, the IP profile exhibits a change of character in the anomalies north of the northern bounding fault, where a number of dipolar (paired highs and lows) are evident north of about Station 2000 beginning at a depth of about 200 feet.

The resistivity anomalies and features discussed are labeled in Figure 3 and, together, identify a steeply north dipping complex fault zone that is bounded by faults between Stations 1250 and 1890 on Line 3. This fault zone exhibits normal/transensional offset at depth within the Lower Morales unit, and appears to have been reactivated through time with various types of motion, depending on the stress/strain regime. Based on the shallow, vertical resistivity anomaly and “squeeze-up” folding evident within 50 to 100 feet of the surface, it appears this fault zone is currently being activated as a transpressional fault, possibly with significant

strike-slip motion. These types of features are commonly observed in geologic structure where both strike-slip and compressive motion are observed in geologic offsets. The southern bounding fault at Station 1250 connects well to the normal fault identified at Station 1840 on Line 2, and the northern bounding fault at 1890 on Line 3 connects well to an unknown fault splay at Station 2520 on Line 2. Based on these connections this fault zone trends WSW-ENE and is shown with black hatching in Figure 1. Based on normal offset in the Morales at depth and its steeply north-dipping fault plane, this complex fault zone is interpreted as the Santa Barbara Canyon Fault Zone (SBC Fault Zone), and is labeled as such in Figures 2 and 2A.

1.2 Groundwater

As stated previously, the tie to nested wells #915-916 is shown at the south end of Line 3. Based on the most recent water level data provided by Woodard & Curran (October 2025) the water level in well # 915 was 586 feet bgs; whereas it was 486 feet in well # 916. This discrepancy is likely because well #916 was screened in a deeper interval than well # 915 and reflects a deeper confined water bearing zone that is not representative of the water table. The water level of well # 915 was compared to resistivity values measured at a similar depth in the area of the south end of the Line 3 profile. Based on this, a horizontal layer of moderate (50 to 60 Ohm-meters – yellow to gold colors) resistivity at a depth of about 580 to 600 feet bgs could be traced between (at least) Stations 500 and 1200. Similarly, a low IP (blue) anomaly appears at a depth of about 590 feet bgs at about Station 500 and can be traced laterally to just south of the fault and Station 1200; vertically, this low IP anomaly appears to extend to depth (at least 850 feet bgs). This extensive low IP anomaly appears to be associated with the Lower Morales unit (known to be fine grained), as fine grained material is known to polarize; and corroborates the interpretation of the saturated zone situated just above the Lower Morales in this area. The sharp drop in IP amplitude (colors changing from green to yellow) that can be traced laterally north of the fault supports the interpretation of fault properties providing some sort of barrier or restriction to groundwater flow across the fault.

This moderate resistivity layer agreed well in resistivity value range with that interpreted on Line 1 for the 2024 survey; therefore, the saturated zone is interpreted based on this layer and is shown with a dashed blue line in Figure 2. Because of the presence of the SBCF Zone between Stations 1300 and about 2000 in this depth range, it is assumed that groundwater levels drop through the fault zone. While the “yellow/gold” moderate resistivity layer is evident in the data through this faulted area, it was unclear whether a saturated zone was present without additional water level data. Therefore, no water levels are interpreted between Stations 1300 and 2000 on Line 3; although, the water levels would be assumed to drop 50 to 100 feet in this area based on the down-drop in the Lower Morales unit. Based on the down-drop of the Lower Morales north of the SBCF Zone at depth, and the roughly horizontal, yellow/gold moderate resistivity layer (although there appears to be a very shallow dip to the north of this layer), the saturated zone appears to be present at about 750 feet bgs north of Station 2200 along Line 3- at least to about Station 3000. This interpretation is corroborated in the IP profile, where a laterally variable, somewhat dipolar pattern in the IP data is evident above 750 feet bgs and the IP values change to “non-polarizeable” (yellow-green to yellow/gold) below this depth.

Based on a vertical offset in groundwater of roughly 160 feet either side of the SBCF Zone, it appears that the SBCF Zone provides a barrier to the flow of groundwater across it. In addition, anticlinal, “squeeze up” features in individual resistivity layers in Layer 3 at depths of 500 to 600 feet within the fault zone may give rise to some sort of divide in groundwater flow direction in this depth range.

2. Line 4

The resistivity profile for Line 4 is presented in Figure 3 and the IP profile for Line 4 is presented in Figure 3A. Because the resistivity data were used as the primary tool to discriminate lithology and geologic structure along Line 4, these data will be dominant in the discussion of results. It should be noted that the same resistivity color table that was used for Line 3 was used for Line 4, to allow comparison between interpreted lithology and features of interest; therefore, the colors in the profile key to the color bar below the image key to the lithological descriptions in Table I. The numbers across the top of the profile represent ground distance along Line 4 in units of feet as measured from Station 0 (south end of Line 4). The ties to nested wells #903-905 and several other wells are shown (along with projected distance), as well as the area of overlap between the north end of Line 4 and the south end of Line 1. A slight bend in Line 4 is indicated at about Station 691 (southern area of profile); this was a bend to the southeast of about 7 degrees that followed the bend in Highway 33 and kept the line of electrodes along the berm on the east side of Highway 33. This bend had a minimal effect on the data but is shown for documentation purposes. The numbers along the vertical axis of the profile represent elevations in feet relative to Station 0 of Line 4, which was arbitrarily assigned an elevation of zero. Dashed blue lines in Figure 3 indicate the interpreted top of the saturated zone, where it could be interpreted from the data. The interpretation of saturated zones along Line 4 was made primarily by projections of the known water levels for the wells that tied to the line, and also by identification of zones where a laterally traceable vertical drop in resistivity could be correlated with a roughly horizontal moderately low IP layer.

The IP profile in Figure 3A contains the inverted IP chargeability distribution which best represents the actual lateral and vertical variation of IP chargeability beneath the ground surface along Line 4. In this figure, the colors represent values of chargeability, which key to the color bar below the image. It should be noted that the same IP color table that was used for Line 3 was used for Line 4, to allow comparison between features of interest. The numbers across the top of the profile represent ground distance along Line 4 in units of feet as measured from Station 0 (south end of Line 4). The ties to nested wells #903-905 and several other wells are shown (along with projected distance), as well as the area of overlap between the north end of Line 4 and the south end of Line 1. The numbers along the vertical axis of the profile represent elevations in feet relative to Station 0 of Line 4, which was arbitrarily assigned an elevation of zero. Dashed blue lines in Figure 3 indicate the interpreted top of the saturated zone, where it could be interpreted from the data. As stated above, the interpretation of saturated zones along Line 4 was made primarily by projections of the known water levels for the wells that tied to the line. However, the IP data provided corroboration of the resistivity data for indications of saturation, particularly in the areas where groundwater is

known to be shallow, where a laterally traceable horizontal, moderately low (light blue to green) IP layer was interpreted as a drop in IP at the water table.

The resistivity and IP data collected along Line 4 were of generally high quality (although there were some noisy locations due to utilities or buried objects) and provided reliable measurements to at least 850 feet bgs. In a broad sense the resistivity profile along Line 4 indicates three somewhat horizontal geologic/lithologic layers/units that are stratified vertically, underlain by an undulating but laterally traceable fourth layer. The upper three layers correlate well with resistivity layers observed in the Line 1 resistivity profile, and the depths and thicknesses of the upper 3 layers agree reasonably well in the area where Line 4 overlaps Line 1.

The first layer on Line 4 (Layer 1) begins at the surface and is about 80 to 100 feet thick. This layer is marked by moderate resistivity values (predominantly 40 to 100 Ohm-meters- yellow to orange to tan) and is laterally continuous across the length of the profile. This layer is interpreted to be an 80 to 100-foot thick layer of predominantly dry sand to sand with gravel; although there is some indication of increasing silt content north of about Station 3600, based on indications of lower resistivity (35 Ohm-meters-green) material at the north end of Line 4.

The next layer evident in the profile for Line 4 (Layer 2) is horizontally traceable, lies directly beneath Layer 1 and exhibits an increase in resistivity when compared with Layer 1. However, the thickness and resistivity range of Layer 2 are significantly different north and south of about Station 1910. South of Station 1910, Layer 2 is 130 to 140 feet thick and ranges in resistivity primarily between 100 and 250 Ohm-meters (beige, tan and brown colors) with a few spots of higher resistivity (300 to 350 Ohm-meters-salmon colors). North of Station 1910, Layer 2 is thicker, more variable in character and higher in resistivity. Between about Station 2000 and 2482, Layer 2 exhibits a channel-type shape, is about 250 feet thick at its center, and ranges in resistivity between 100 and 290 Ohm-meters (beige to tan to dark brown (290 Ohm-meters). North of Station 2482, Layer 2 is somewhat horizontal and appears to be split into two segments: a thinner segment between Station 2482 and about 3458 and a thicker segment that extends from just north of Station 3458 to the north end of Line 4 (at least to Station 4000). Between Stations 2482 and 3458 Layer 2 is about 180 feet thick and has a resistivity range varying from 100 to about 450 Ohm-meters, but typically between 300 and 400 Ohm-meters (salmon colors). North of Station 3458 Layer 2 is significantly thicker, where it is typically at least 300 feet thick (at least to Station 3900) ranges in resistivity from 100 to 2,000 Ohm-meters. It is also worth noting that north of Station 3458 Layer 2 extends to depths of up to 380 feet bgs. Based on correlations with Lines 1 and 3, Layer 2 on Line 4 is interpreted as a layer of coarse alluvium. South of Station 1910 this alluvial layer likely consists of sands and gravels, with perhaps some cobbles; Layer 2 appears to be saturated for the majority of its thickness between Stations 0 and 1910 - based on both water level ties to nearby wells and its moderate range in resistivity. North of Station 1910 Layer 2 appears to become more coarse grained based on its higher resistivity values; this layer may be associated with gravels and cobbles, and north of Station 2482 Layer 2 likely consists of dry sand with cobbles, gravels, and possibly groups of cobbles or boulders (particularly where resistivity values rise above 1000 Ohm-meters, such as north of Station 3458).

Layer 3 lies directly beneath Layer 2 on Line 4, and can be described as a relatively thin, somewhat undulating layer of moderate resistivity (ranging from 300 Ohm-meters to about 40 Ohm-meters, with colors ranging from brown to beige to orange to yellow), where the resistivity value continuously decreases with depth. Layer 3 is 50 to 100 feet thick south of Station 1600; north of this, Layer 3 thickens to about 200 to 250 feet thick or greater to about Station 2000. North of Station 2000 Layer 3 ranges in thickness between 100 and 200 feet, to at least Station 3458. Based on correlations with Line 1 and lithology/water levels for the wells that tied to Line 4, Layer 3 is interpreted as a fining downward unit that transitions from the sands, gravels and cobbles/boulders of Layer 2 to continuously smaller grained material with depth (e.g. coarse sand or sand with gravel). Based on known water levels (which typically fall above Layer 3 or at the top of Layer 3 - at least to Station 3458) and the resistivity values present within Layer 3, it appears that Layer 3 is saturated. Based on its position directly above Layer 4, Layer 3 is interpreted as being associated with the Upper Morales unit.

Layer 4 lies directly beneath Layer 3, and can be described as (primarily) a massive, thick layer of moderate to low resistivity that is evident in the data between about Station 263 and Station 3460, with values ranging primarily from about 35 Ohm-meters (green) to typically 20 Ohm-meters down to 4 Ohm-meters (royal blue to dark blue). The top of Layer 4 (indicated in Figure 3 by a dashed red line) undulates somewhat, but primarily exhibits a roughly flat surface with a step-down pattern to the north as the profile is traversed from south to north. Between Stations 263 and about 1600, the top of Layer 4 ranges between 300 and 350 feet bgs. Just north of Station 1600 the top of Layer 4 slopes down to the north, to a low point at Station 1850, where it is about 500 feet deep. North of Station 1850 the top of Layer 4 is generally observed about 450 feet bgs to Station 3300: although, it is evident as shallow as 390 feet bgs and as deep as 470 feet bgs in some locations. The top of Layer 4 exhibits another low point at Station 3458, where it is 500 feet bgs; north of this location Layer 4 is absent in the data, suggesting a drop of at least 250 feet in its surface. Based on correlations with Lines 1 and 3, the boring logs for nested wells # 903-905 and # 915-916, Layer 4 is interpreted as the Lower Morales unit. While the top of the Lower Morales is evident in the data, its thickness is unknown since its extent lies to depths greater than those reached by the data. It is worth noting that, perhaps because the Lower Morales is shallower on Line 4 than on Line 3 (and therefore more of this layer can actually be observed in the data), the Lower Morales exhibits some variability in resistivity across the Line 4 profile – where a steeply south dipping, roughly 420-foot wide section of higher resistivity (40 to 60 Ohm-meters – yellow to gold colors) material is evident in the data between Stations 640 and about 1060. Another section of higher resistivity material in the Lower Morales is evident in the data at the base of the section (depth range of 770 to 850 feet) between Stations 2108 and 2541. These higher resistivity sections may contain a greater sand or gravel content.

2.1 Indications of Faulting

Based on abrupt step-downs in the Lower Morales at Station 1600 and 3458 on Line 4, two faults in the Morales are interpreted at depth at these locations. The southernmost fault appears to have a steeply north-dipping fault plane that extends to Station 2105 at depth) and splays both vertically and in “flower structure” type branches to the south and the north of it. Based on increased thickness in Layer 3, the southern splay appears to extend to Station 1660 at a point about 250 feet bgs; based on an apparently down-dropped channel-type feature in Layer 2 between about Station 2000 and 2482, the northern splay appears to extend to about Station 2490, where it terminates within about 130 feet of the surface. The vertical/subvertical splay of this fault extends to the surface to about Station 1910, where it terminates within about 60 feet of the surface. The splay is vertical at this depth, and is evident based on the down-dropped channel feature north of it (with a thicker Layer 2) and the thinner and apparently vertically offset Layer 2 south of it. These faults are indicated with dashed black lines in Figure 3, where the apparent sense of motion of these faults is indicated where it can be resolved in the data. Together, these faults and splays identify a fault zone that is steeply north dipping at depth. This fault zone appears to exhibit normal/transensional offset at depth within the Lower Morales unit, and displays a more complex, branching pattern that runs between Stations 1660 and 2490 as the fault reaches the surface. This fault zone is identified as an “Unnamed Fault Zone” and is labeled as such in Figures 3 and 3A. Based on the data, this Unnamed Fault Zone appears to be transtensional (if somewhat complex) to within at least 100 feet of the surface. The IP profile exhibits a somewhat complex dipolar signature through this fault zone and cannot be used to interpret the location or attitude of faulting directly; although, there is a somewhat vertically aligned moderately low IP (light blue to green) anomaly directly north of the vertical/subvertical splay at Station 1910.

Although this fault zone was not detected in any of the other resistivity profiles generated during either the 2024 or the 2025 investigation, its normal/transensional expression in the Lower Morales suggests a similar trend to that of the SBCF Zone; therefore, it is shown in Figure 1 with an apparent trend of WSW-ENE. It should be understood that this trend may be incorrect and could warrant further investigation.

The northernmost fault on Line 4 at Station 3458 in the Lower Morales appears to have a steeply south-dipping fault plane that extends south to at least Station 3390 at depth. Based on a sharp lateral increase in resistivity (to between 40 and 75 Ohm-meters) and a steeply south dipping linear anomaly in higher resistivity immediately north of this boundary (with virtual absence of the low resistivity values in the Lower Morales north of the boundary), a thrust/reverse fault is interpreted at this location. This thrust/reverse fault appears to thrust Lower Morales over Upper Morales at depth, and appears to extend vertically through Layer 3 and Layer 2 based on increased thickness in Layer 2 alluvium north of the fault. Based on this vertical projection, this thrust/reverse fault appears to terminate at a depth of about 150 feet bgs at Station 3462 on Line 4.

The interpretation of this thrust/reverse fault is corroborated in the IP profile in Figure 3A, where a steeply south-dipping, sharp dipolar anomaly is evident across the fault beginning at a

depth of about 450 feet bgs: south of the fault the IP anomaly is high IP (orange to orange-brown) and north of the fault the IP anomaly is low IP (blue). This sharp dipolar character across the fault is interpreted as oppositely polarized charge buildup either side of the fault.

This northernmost thrust/reverse fault correlates well with the “Unnamed Thrust Fault” identified on Line 2 at Station 1700 of that line, which exhibits the same sense of motion and a fault plane dipping to the south. These thrust/reverse faults on Lines 2 and 4 are therefore assumed to be the same fault, and a northwest-southeast oriented thrust/reverse fault has therefore been added to the map in Figure 1. Based on at least 250 feet of apparent vertical offset in the Lower Morales across this fault, along with the sharp dipolar IP anomaly across it, this thrust/reverse fault is likely to give rise to some sort of barrier or restriction to the flow of groundwater across it.

2.2 Groundwater

As stated previously, the tie to nested well #903-905 is shown on Line 4. In addition, ties to wells #276, #277 and #287 are shown (note the tie to Well # 287 was projected along the strike of the Unnamed Thrust/Reverse Fault, since this fault was assumed to affect groundwater levels). Once the tie points to these wells were determined for Line 4, the most current water levels were projected to the line as well. These water levels were provided by Woodard & Curran for September/October 2025, and are as follows, along with their projected distance:

- Well # 903-905..... 102 – 105 feet (projected 1418 feet)
- Well # 276..... 100-110 feet (projected 207 feet)
- Well # 277..... 120 feet (projected 1009 feet)
- Well # 287..... 226 feet (projected 1372 feet along fault strike)

While these water levels were projected to Line 4, it should be understood water levels from wells located more than about 100 feet off-line from the resistivity profile may not correspond to actual water levels along the profile. This is because both the geology and structure vary *off-line* (i.e not all layers are horizontal and continuous in the subsurface in all directions away from the line) and it is well known that the *greater the distance* lithologic or groundwater information from a well is projected, the *less likely* that information is to perfectly tie to the line; although this depends on site-specific geology, hydrogeology and geologic structure.

Nevertheless, known water levels were compared to resistivity values at similar depths along Line 4, and some correlations could be made. A horizontally traceable line could be drawn between the water levels for Wells # 276 and #903-905, and it was found that this line corresponded to resistivity values ranging between 60 and about 150 Ohm-meters (yellow-gold to tan/beige colors), which is a resistivity range commonly seen in saturated very coarse alluvium such as saturated gravels and cobbles. As a result, a horizontal dark blue dashed line is shown between Stations 0 and 1910 at a depth of about 100 feet on Line 4 and is assumed to be the top of the saturated zone on Line 4. This interpretation is corroborated by the presence of a horizontally traceable moderately low IP (light blue to green) layer directly

below the saturated zone in this area (Figure 3A). Although there were no water level ties between Stations 2000 and about 3370, resistivity values, interpreted fault zones and horizontal moderately low IP signatures were used to interpret a down-stepping pattern in the saturated zone along Line 4, to Stations 3462; this interpreted saturated zone is indicated with a dashed blue line in Figures 3 and 3A. A horizontally traceable layer with resistivity of about 150 Ohm-meters was used to delineate the saturated zone at about 170 feet bgs above the apparently down-dropped channel feature between Stations 2000 and about 2470 (within the down-dropped block in the Unnamed Fault Zone).

North of this location, the water level projected from Well # 287 was used to identify a horizontally traceable drop in resistivity beneath the coarse dry alluvium of Layer 2 between Stations 2480 and 3440 at a depth of about 300 feet (corresponding to a range of 150 to 200 Ohm-meters). Additionally, a laterally traceable vertical change in IP response (to “non-chargeable” materials or “no IP” – yellow-green to yellow) is evident at about 300 feet bgs in this station range. Based on this, the saturated zone is interpreted at a depth of about 300 feet in this area and is shown with a dashed blue line in Figure 3A. Although no water level ties were available (within a 500-foot radius) north of the unknown thrust/reverse fault at Station 3460, the expected water level interpreted from the resistivity profile at the south end of Line 1 (2024 investigation) and the known water level at well #915 for this investigation were used to interpret a possible saturated zone at depth north of the fault. Because there is no indication of a horizontally traceable vertical drop in resistivity in the depth range of 500 to 600 feet bgs, and because the IP response is unclear in this depth range as a result of data loss with depth at the north end of Line 4, the interpretation of the saturated zone at about 600 feet bgs appears reasonable, given the (at least) 250 feet of vertical offset in the Lower Morales across the fault. It should be understood that this interpretation may be incorrect.

Based on vertical offsets in groundwater of 70 to 130 feet across the splays of the Unnamed Fault Zone between Stations 1910 and 2490, it appears that these splays may cause a restriction in groundwater flow across their traces – where perhaps the most significant restriction or partial barrier may be caused by the splay at Station 2490.

Based on an apparent vertical offset in groundwater of 300 feet across the Unnamed Thrust/Reverse Fault at Station 3458, it appears that this fault provides a significant barrier to the flow of groundwater across it. In addition, a strong/sharp dipolar anomaly (+/- 250 milliseconds) in the IP profile beginning about 500 feet bgs and extending to depth indicates there is charge buildup either side of the fault, which would support restricted groundwater flow across it.

CONCLUSIONS

The supplemental investigation has successfully identified the trend of the SBCF and has identified the trend of the Unknown Thrust Fault identified on Line 2 during the 2024 investigation. In addition, the supplemental investigation has shown the SBCF is more complex than originally thought, where it actually consists of a complex, roughly 600-foot wide transtensional zone of faults and fault splays.

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The supplemental investigation has also shown that the roughly 500-foot vertical difference in groundwater levels between the area of nested wells #903-905 and the Ballinger Canyon Wash area wells, including nested wells # 915-916, is likely associated with the Lower Morales being about 300 feet shallower in the area of nested wells #903-905 (causing a shallower saturated zone in this area) -where the steeply south-dipping Unnamed Thrust/Reverse Fault at Station 3458 along Line 4 appears to be giving rise to at least 250 feet of vertical offset in the Lower Morales and an associated offset in groundwater of about 300 feet. This investigation has also shown that several faults/fault splays that appear to be parallel to the SBCF Zone extend to within 100 to 200 feet of the surface in the area south of Station 3458 along Line 4, and appear to be giving rise to offsets in groundwater of 70 to 130 feet.

We appreciate the opportunity to provide these results to Woodard & Curran. Please let us know if there are any questions regarding this report.

Sincerely,

SPECTRUM GEOPHYSICS

Attached Figures and Tables:

- Figure 1.....Geophysical Interp. Map
- Figure 2.....Resistivity Profile – Line 3
- Figure 2A.....IP Profile – Line 3
- Figure 3.....Resistivity Profile- Line 4
- Figure 3A.....IP Profile – Line 4
- Table I...Resistivity Interpretation of Lithology



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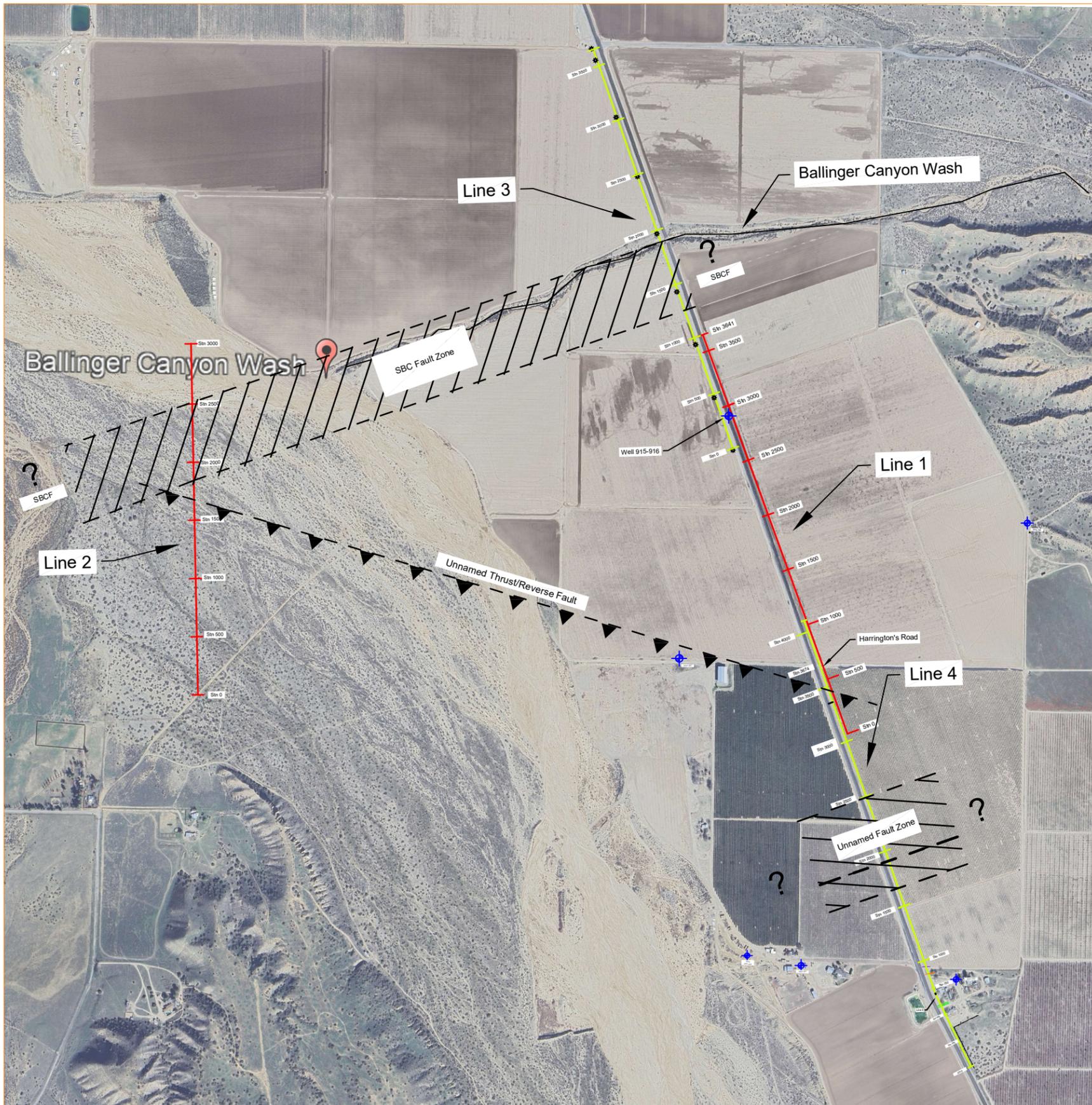
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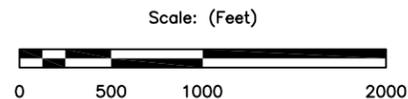
REPORT

Woodard & Curran. 2025a. Map of Water Levels Near Transects 1-4, Cuyama Basin Groundwater Fault Investigation.

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- Electrical Resistivity Transect, 2024 Investigation
- Electrical Resistivity Transect, 2025 Investigation
- Thrust/Reverse Fault, teeth on upthrown side
- Complex North Dipping Transensional Fault Zone

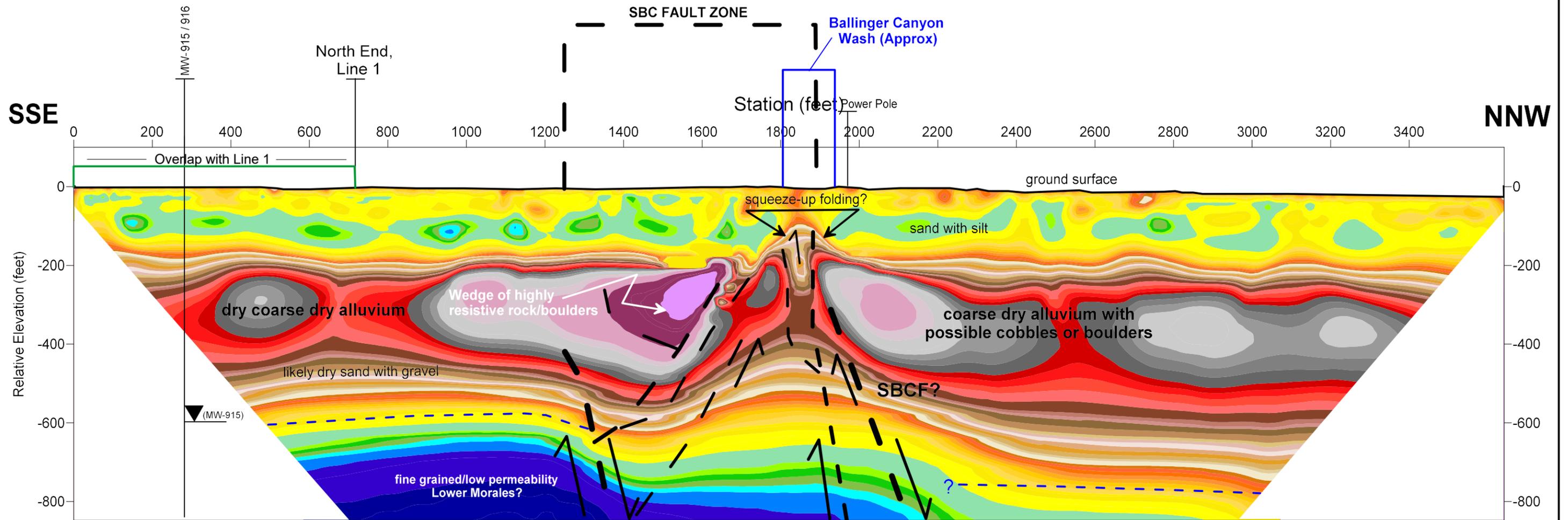


***Note: Not all below ground utilities or features may be represented on this map

<p style="font-size: small; margin-top: 5px;">REVEALING THE SUBSURFACE</p>	Geophysical Interpretation Map		FIGURE NO. 1
	PROJECT Cuyama Valley Groundwater Basin Supplemental Geophysical Investigation Santa Barbara Canyon Fault		
16691 GOTHARD STREET, SUITE L HUNTINGTON BEACH, CA 92647 Phone: (818) 886-4500 www.spectrum-geophysics.com	PREPARED FOR Woodard & Curran Walnut Creek, California		PROJECT NO. 10315
SCALE 1 inch = 1000 ft	FIGURE BY AR	REVIEWED BY LCD	DATE 02/17/26



Line 3 Electrical Resistivity Profile Santa Barbara Canyon Fault

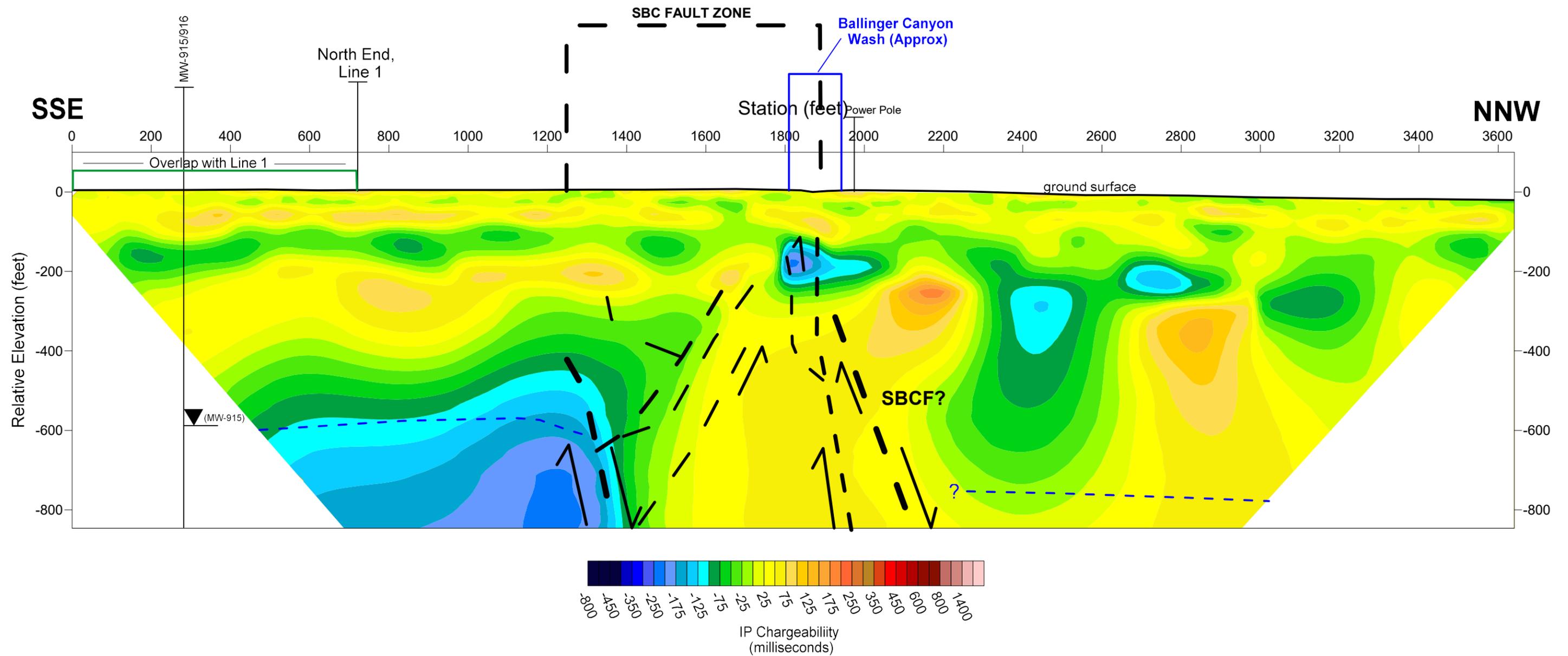


LEGEND

- ▼ Projected Water Level (Measured September/October 2025)
- - - Interpreted Top of Water Bearing Zone

<p style="font-size: 8px; margin-top: 5px;">REVEALING THE SUBSURFACE</p>	MAP Electrical Resistivity Profile - Line 3 Santa Barbara Canyon Fault		FIGURE NO. 2
	PROJECT Supplemental Geophysical Investigation Cuyama Valley Groundwater Basin San Luis Obispo County, California		
16691 GOTHARD, SUITE L HUNTINGTON BEACH, CA 92646 (818) 886-4500 www.spectrum-geophysics.com	PREPARED FOR Woodard & Curran Walnut Creek, California		PROJECT NO. 10315
	SCALE 1 inch = 250 feet	FIGURE BY VNS	REVIEWED BY LCD

Line 3 Induced Polarization Profile with Resistivity Interpretations Santa Barbara Canyon Fault

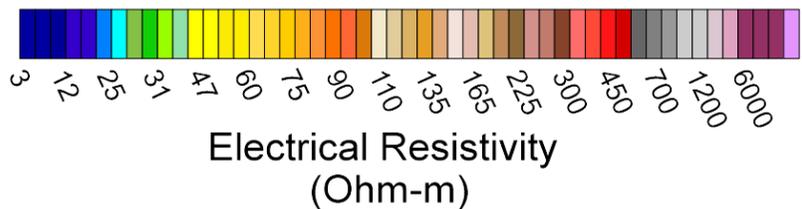
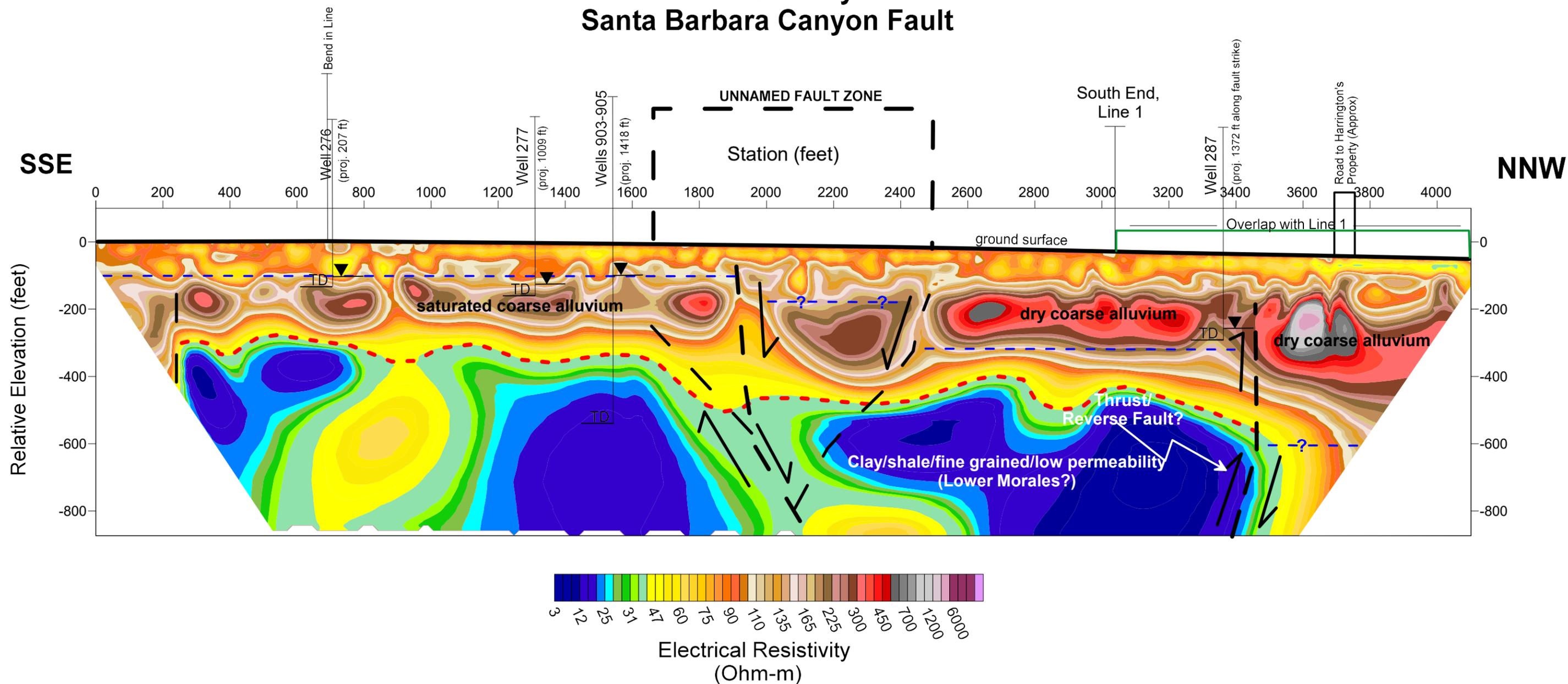


LEGEND

- Projected Water Level (Measured September/October 2025)
- Interpreted Top of Water Bearing Zone

<p style="font-size: small;">REVEALING THE SUBSURFACE</p>	Induced Polarization Profile - Line 3 Santa Barbara Canyon Fault		FIGURE NO. <h1 style="font-size: 2em; margin: 0;">2A</h1>	
	PROJECT Supplemental Geophysical Investigation Cuyama Valley Groundwater Basin San Luis Obispo County, California			PROJECT NO. 10315
16691 GOTHARD, SUITE L HUNTINGTON BEACH, CA 92646 (818) 886-4500 www.spectrum-geophysics.com		PREPARED FOR Woodard & Curran Walnut Creek, California		PROJECT NO. 10315
SCALE 1 inch = 250 feet		FIGURE BY AR	REVIEWED BY LCD	DATE 2/17/26

Line 4 Electrical Resistivity Profile Santa Barbara Canyon Fault

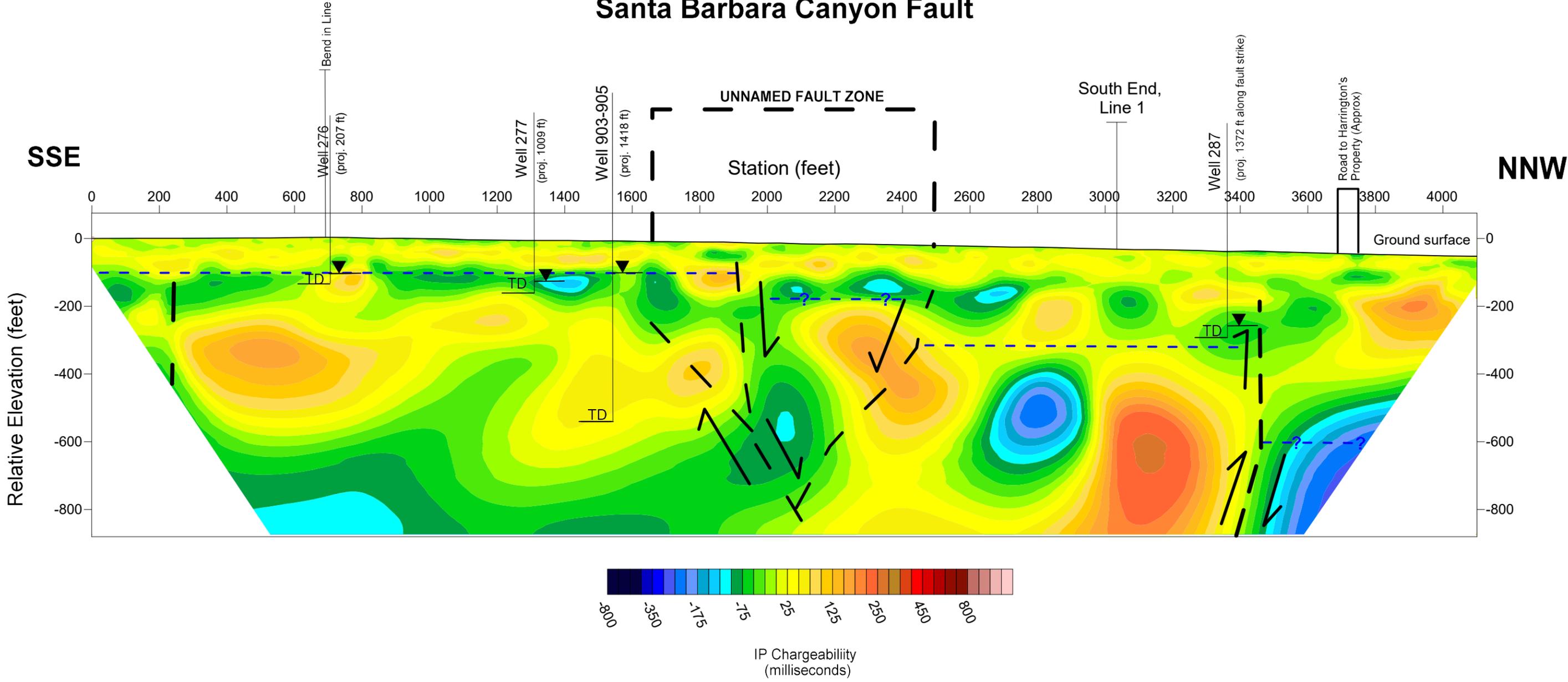


LEGEND

- - - Interpreted Upper Morales/Lower Morales interface
- - - Interpreted Top of Water Bearing Zone
- ▼ Projected Water Level (Measured September/October 2025)
- _TD Total Depth

	Electrical Resistivity Profile - Line 4 Santa Barbara Canyon Fault		FIGURE NO. 3
	PROJECT Supplemental Geophysical Investigation Cuyama Valley Groundwater Basin San Luis Obispo County, California		
16691 GOTHARD, SUITE L HUNTINGTON BEACH, CA 92646 (818) 886-4500 www.spectrum-geophysics.com		PREPARED FOR Woodard & Curran Walnut Creek, California	
SCALE 1 inch = 300 feet		FIGURE BY AR	REVIEWED BY LCD
			PROJECT NO. 10315 DATE 02/17/26

Line 4 Induced Polarization Profile with Resistivity Interpretations Santa Barbara Canyon Fault



- LEGEND**
- - - Interpreted Top of Water Bearing Zone
 - ▼ Projected Water Level (Measured in September/October 2025)
 - | TD Total Depth

<p style="font-size: small; margin-top: 5px;">REVEALING THE SUBSURFACE</p>	Induced Polarization Profile - Line 4 Santa Barbara Canyon Fault		FIGURE NO. <h1 style="font-size: 2em; margin: 0;">3A</h1>	
	PROJECT Supplemental Geophysical Investigation Cuyama Valley Groundwater Basin San Luis Obispo County, California			PROJECT NO. 10315
16691 GOTHARD, SUITE L HUNTINGTON BEACH, CA 92646 (818) 886-4500 www.spectrum-geophysics.com		PREPARED FOR Woodard & Curran Walnut Creek, California		DATE 02/18/26
SCALE 1 inch = 300 feet		FIGURE BY AR	REVIEWED BY LCD	

**TABLE I: Interpretation of Resistivity for Lithology - Supplemental Geophysical Investigation,
Santa Barbara Canyon Fault, Cuyama Basin, California**

Resistivity			Interpretation
Range	Color	Category	
3 to 20 Ohm-meters	dark blue to royal blue	low resistivity	clay (3 to 10 Ohm-m) to silty clay to clayey silt (12 to 20 Ohm-m), where values approaching 20 Ohm-meters have greater amounts of silt in the matrix. Alternatively, low resistivity values ranging from 3 to 12 Ohm-m could be associated with the claystone of the Lower Morales unit, and values ranging from 14 to 20 Ohm-meters could be associated with siltstone of the Lower Morales
21 to 35 Ohm-meters	teal to turquoise to green	low to moderate resistivity	clayey silt (21 Ohm-m) to silty sand to sand (35 Ohm-m), where the grain size of material increases with increasing resistivity values. Alternatively, these values could be associated with siltstone or sandstone of the Lower Morales
35 to 70 Ohm-meters	yellow-green to yellow to yellow-orange	moderate resistivity	sand or sandy (35 Ohm-m) to gravelly alluvium (50 Ohm-m), where values approaching 70 Ohm-m have greater amounts of gravels. Alternatively, these values could be associated with siltstone or sandstone of the Morales unit. Where these values are horizontally continuous at a favorable depth for groundwater, (40 to 70 Ohm-m) they may be associated with water bearing zones in alluvium, or saturated Upper Morales sand or sandstone
75 to 200 Ohm-meters	yellow-orange to beige to tan to brown	moderate to high resistivity	partly saturated or dry alluvium with gravels (75 Ohm-m) to cobbles (100 to 200 Ohm-m), where values approaching 200 Ohm-m have greater amounts of (or larger diameter) cobbles. Alternatively, these values could be associated with partially consolidated gravelly arkosic sand and siltstone of the Upper Morales, where the higher the resistivity value the more likely the material is to be dry
225 to 10,000 and greater Ohm-meters	rose-grey to salmon colored to grey to dark purple to light purple	high to very high resistivity	transitional range from moderate (225 Ohm-m) to high resistivity (500 Ohm-m and above), where material is likely dry. These values in alluvium are likely associated with dry gravels, cobbles and boulders (1,000 to 1500 Ohm-meters). Where laterally continuous and and over 200 feet thick, moderate to high resistivity values are likely associated with sandstone or siltstone of the Upper Morales. Values over 3,000 Ohm-meters are likely associated with large deposits of dry boulders or dry, unfractured rock (10,000 Ohm-meters and greater)

* NOTE: It should be understood that interpretation of resistivity for lithology is highly site specific. This table should not be used for other geologic environments



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