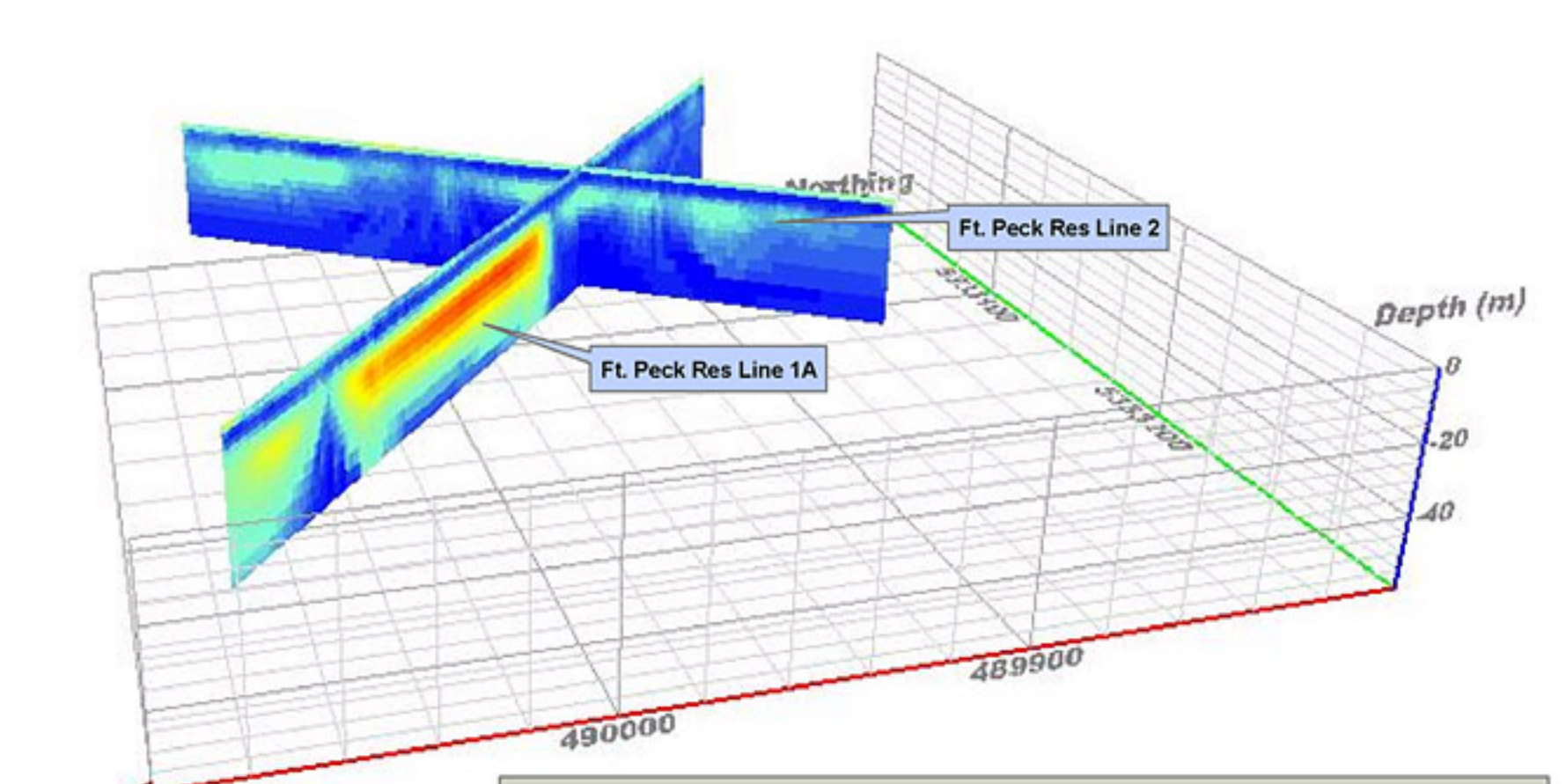
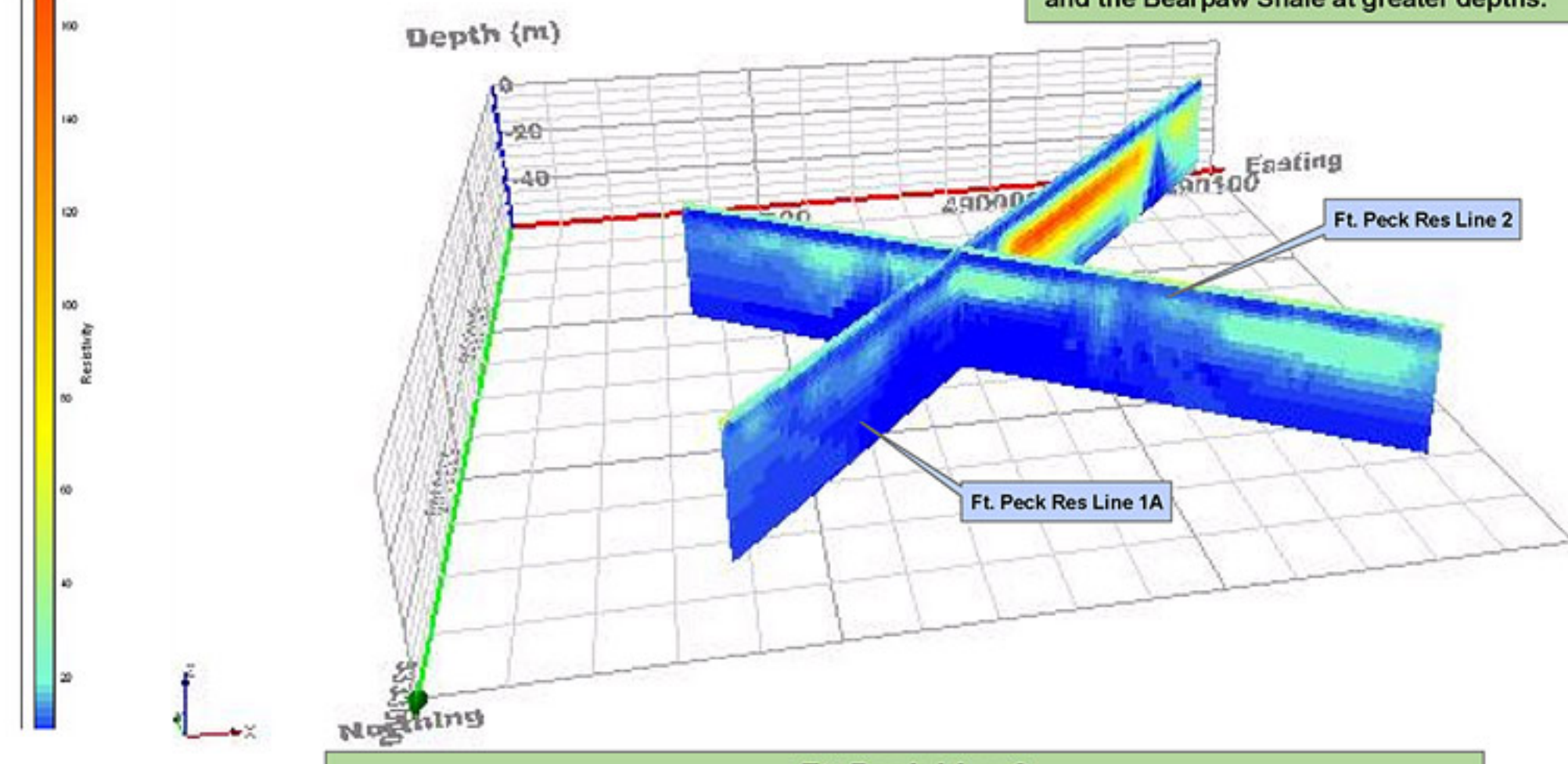


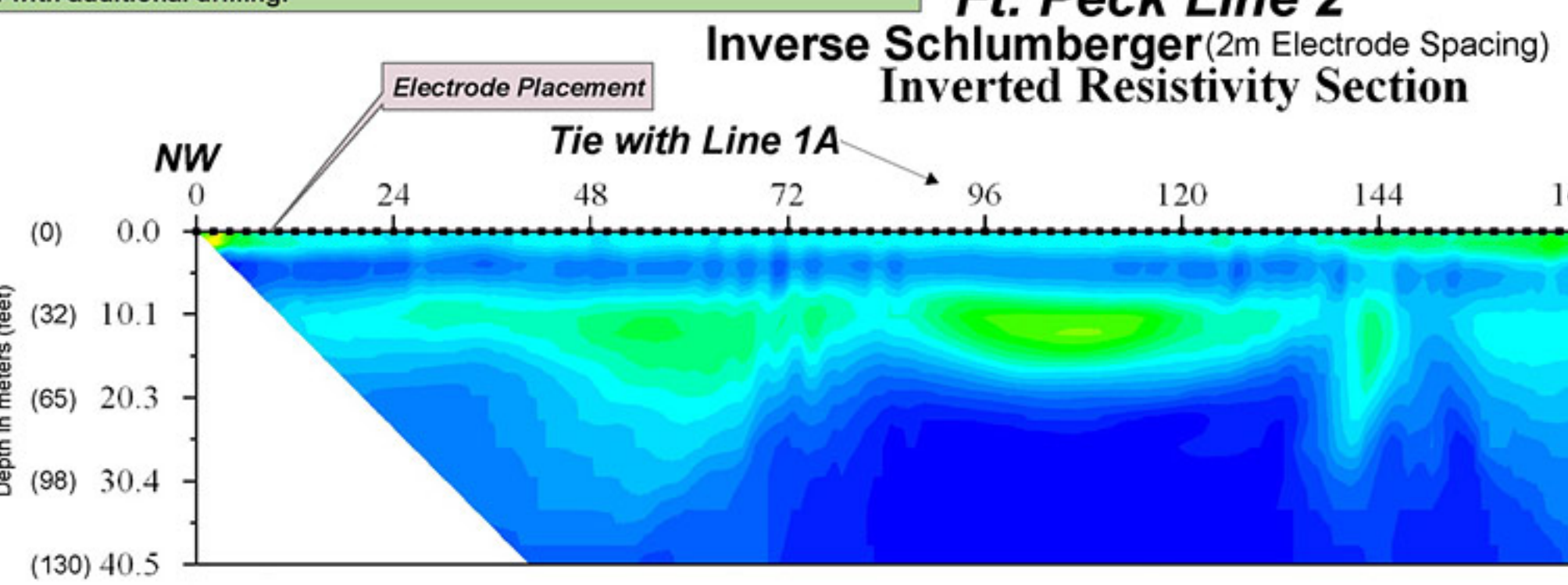
Geophysical Fence Diagram for Resistivity Line 1A & 2



Fence Diagram
The spatial relationship between resistivity lines 1a and 2 is shown in this fence diagram. Of particular interest is the discontinuity of the resistive zone (the red colored zone). Although the electrical conductivity of the groundwater decreases the resistivity of the sediment alone, this red zone is considered to be an area of greatest gravel content found in these two lines. Regardless of the effects imposed by the groundwater, this gravel layer is not relatively continuous and the deposit continues laterally as a relatively more fine-grained deposit.

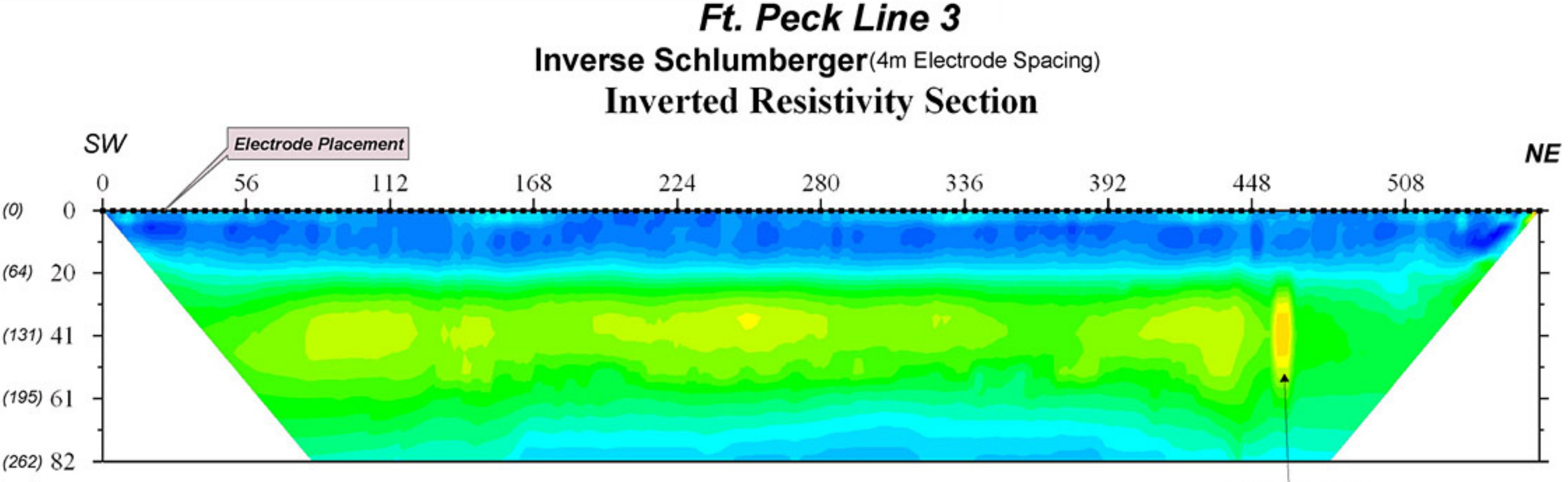


Ft. Peck Line 2
An additional objective of this line was to assess lateral changes of the resistive zone noted in lines 1 and -1A. To have a better chance of intersecting this resistive zone, placement of line 2 was located slightly downgradient in the perceived direction of stratigraphic deposition.
Although this targeted resistive zone is not found on this line, a thin zone of lower apparent resistivity (17 to 28 ohm-m) is found to cross the profile. The same conductive zone found in line 1A, however, is found in this profile. The actual basis for this conductive zone should be verified with additional drilling.



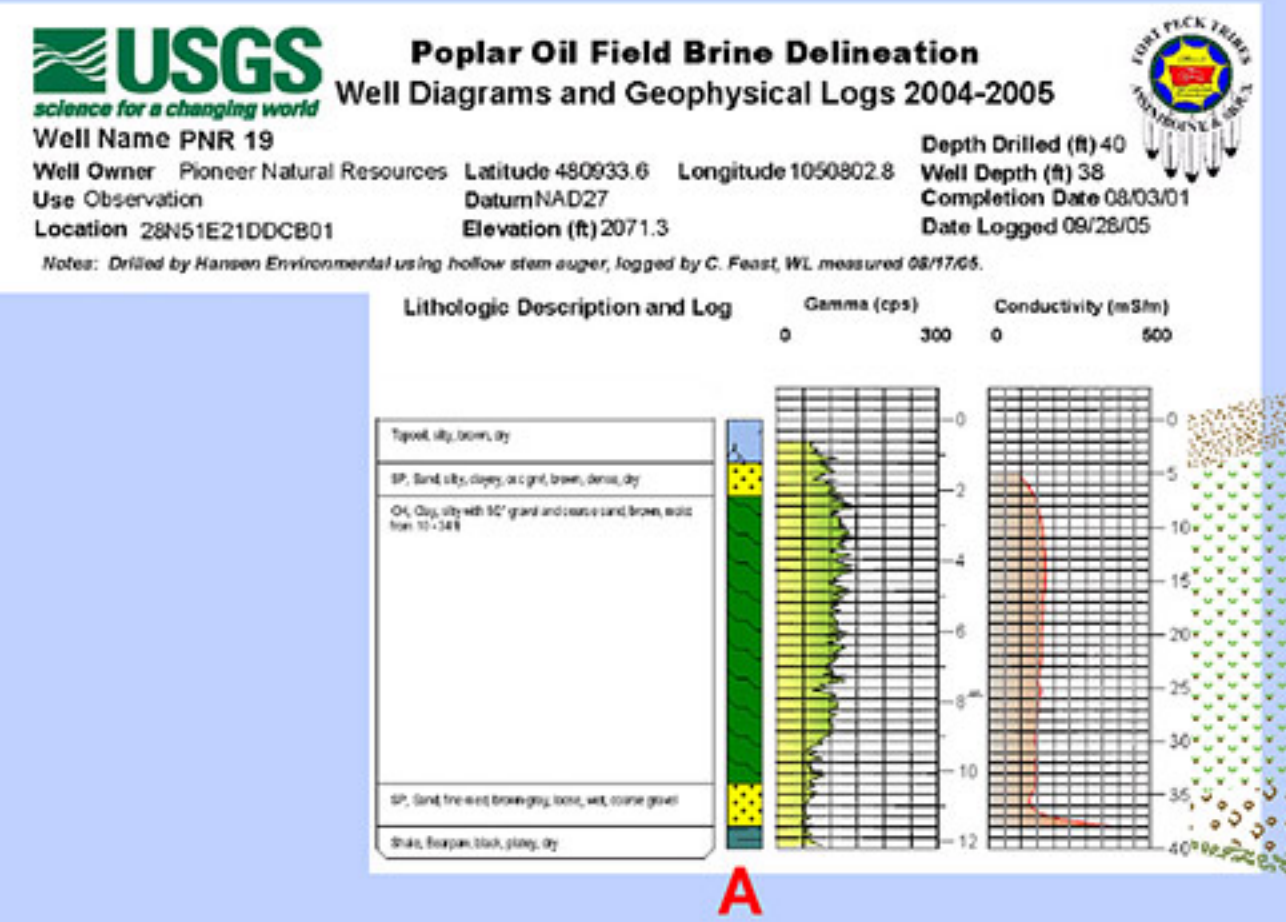
Ft. Peck Line 2
Inverse Schlumberger (2m Electrode Spacing)
Inverted Resistivity Section

Ft. Peck Line 3
(Non-saline groundwater conditions)
This line was acquired in an area considered to be unaffected by saline groundwater conditions. Because the depth to the Bearpaw Shale was known to be greater in this area an electrode spacing of 4m was used.
A continuous layer of relatively moderate apparent resistivity (31 to 40 ohm-m) crosses this profile (green-yellow hues in the profile). Correlation to the nearest well (LAW-M06), located approximately 600 ft off the southwestern end of this line, indicates this resistive zone could correlate to a gravel layer. Better resolution of the underlying Bearpaw Shale, considered to be a conductive zone, should be obtainable with the use of a 5m electrode spacing in this portion of the study area.



Ft. Peck Line 3
Inverse Schlumberger (4m Electrode Spacing)
Inverted Resistivity Section

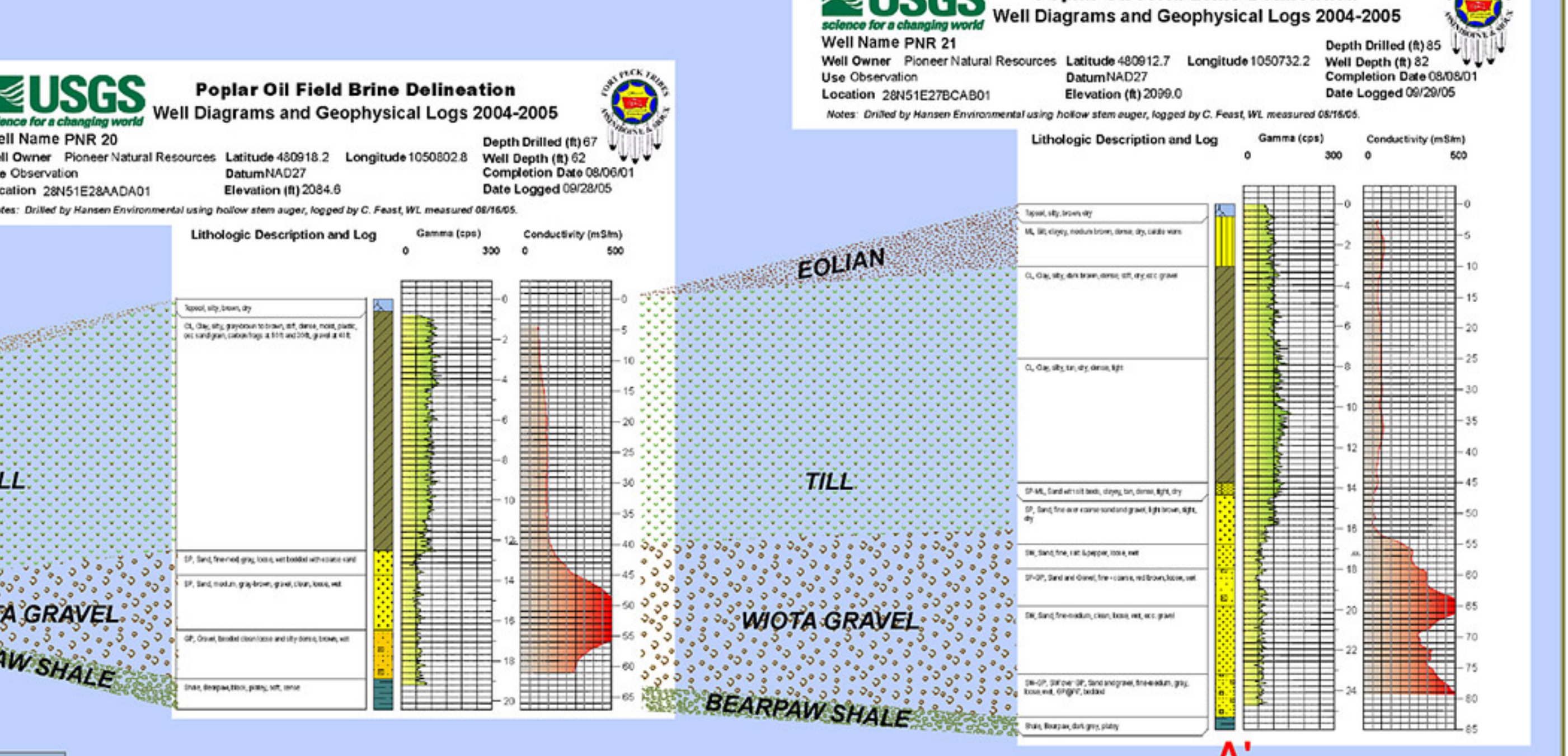
Cross Section A - A'
This cross section shows the stratigraphic correlation of wells near resistivity lines 1, 1a and 2. Of particular interest is the conductive zones noted in the conductivity logs (red log) of wells PNR-20 and PNR-21. This significant increase in conductivity is not matched by an increase in the gamma logs (yellow log) for the same intervals. This occurrence is evidence that the saline groundwater plume is present in these wells and likely in the immediate area of the resistivity survey.



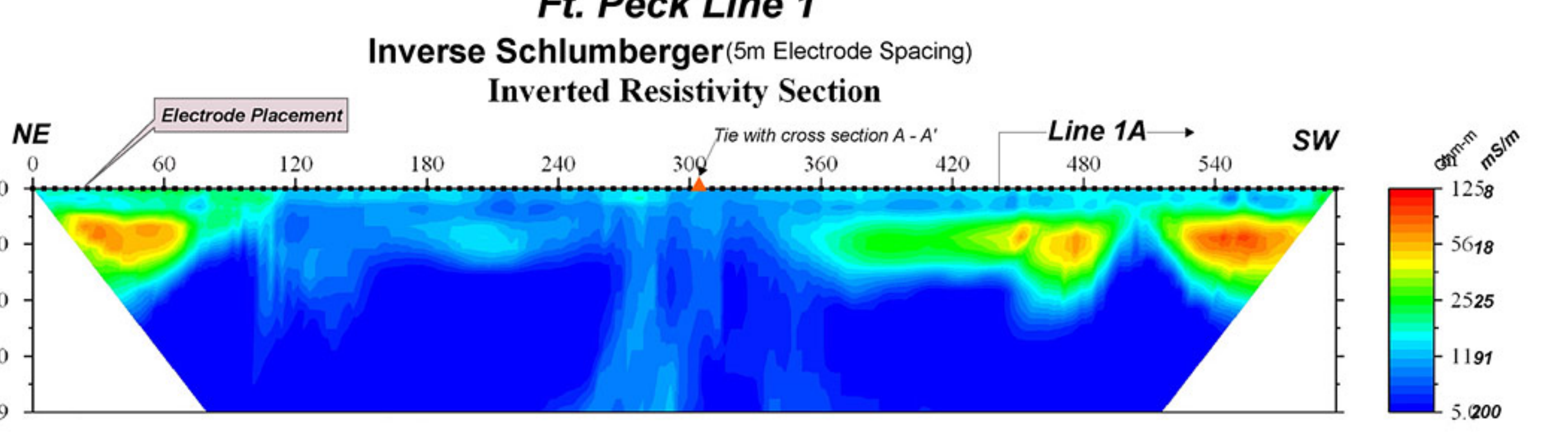
Soil Classification Chart
GP Poorly-graded gravels, gravel-sand mixtures, little or no fines
SW Well-graded sands, gravelly sand, little or no fines
SP Poorly-graded sands, gravelly sand, little or no fines
ML Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
CL Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
CH Inorganic clays of high plasticity

Ft. Peck Line 1
This was the first line acquired as part of this study, and was used to evaluate the ability of a 5 meter electrode spacing in achieving study objectives, e.g., resolving the stratigraphic boundaries of interest.
At either end of this profile are resistive zones (red colored zones in the profile) that range from 60 to 103 ohm-m. These resistive zones likely correlate to sand and gravel intervals noted in nearby wells (PNR-20, -21, -28 and -29). A significant portion of this profile is very low in resistivity, (represented by the purple hues in the profile). The conductive zone could correlate to one or more subsurface conditions such as clayey till in the shallow depths of approximately 0 to 10m; and saline ground water and/or the Bearpaw Shale at greater depths.

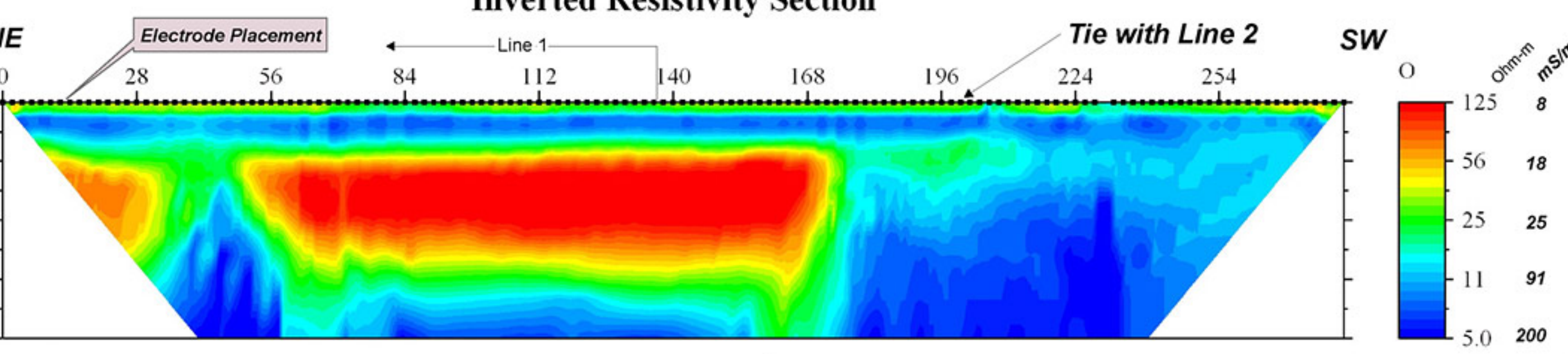
Geologic Cross Section A - A'
(horizontal distance not to scale)



Soil Classification Chart
GP Poorly-graded gravels, gravel-sand mixtures, little or no fines
SW Well-graded sands, gravelly sand, little or no fines
SP Poorly-graded sands, gravelly sand, little or no fines
ML Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
CL Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
CH Inorganic clays of high plasticity



Ft. Peck Line 1
Inverse Schlumberger (5m Electrode Spacing)
Inverted Resistivity Section



Ft. Peck Line 1A
Inverse Schlumberger (2m Electrode Spacing)
Inverted Resistivity Section

Ft. Peck Line 1A
An additional objective of this line was to assess if using a shorter electrode spacing (2m) would improve the resolution of the primary stratigraphic targets. This line was superimposed over line 1 in order to provide greater resolution of the resistive zone that starts at the 450 meter mark on line 1. Remaining in-line with line 1, line 1A extends southwest 135m beyond the end of line 1.
This same resistive zone is found again on line 1A (red colored zone) with apparent resistivity values ranging between 57 to 125 ohm-m. This resistive zone likely correlates to sand and gravel intervals noted in nearby drill logs. This resistive zone terminates; however, at the 172 meter mark on line 1A. Due to the relatively more continuous information obtained by the dc resistivity method, its results may show more lateral discontinuity of the stratigraphy than what has been noted in drill logs to date. This potential spatial variability should be confirmed with additional drilling. To the southwest of this resistive zone shown on line 1A, and at greater depth, is a conductive area which could correlate to the Bearpaw Shale and/or an increase in groundwater salinity. The actual basis for this conductive zone should be verified with additional drilling.

Introduction
In October 2006, the Bureau of Land Management, assisted the Fort Peck Assiniboine and Sioux Tribes and the United States Geological Survey (USGS) in evaluating the use of direct current (dc) electrical resistivity for their groundwater investigation near Poplar, MT. The overall objective was to evaluate the application of this methodology and its ability to image subsurface conditions in the study area; specifically its ability to image the Woota Gravel, the top of the Bearpaw Shale and potentially the presence of saline groundwater. This Plate presents the results of this initial dc electrical resistivity survey.
The survey used Super Sting R8 instrumentation manufactured by Advanced Geosciences Incorporated (AGI). The instrumentation consisted of 100 electrodes, two booster boxes, and a programmable Super Sting R8 meter. Each line consisted of 100 electrodes placed in a straight line for a 2-dimensional inverse schlumberger array. Each electrode was coupled to the ground via connection to a stainless steel stake. Each line was inverted using AGI's EarthImager 2D software in order to produce the apparent resistivity depth sections provided on this Plate. The raw dc resistivity data files were edited to remove data spikes (mistake data) which are typically caused by various noise sources and cause a single apparent resistivity value to stand out on a pseudo-layer. In addition, a fence diagram is presented to segment visualizing the spatial variability of two profiles (line 1A and line 2). This diagram was prepared in Encom's Profile Analyst software.

