CONTACT INFORMATION
Mining Records Curator
Arizona Geological Survey
3550 N. Central Ave, 2nd floor
Phoenix, AZ, 85012
602-771-1601
http://www.azgs.az.gov
inquiries@azgs.az.gov

TERRAMETRICS ASSOCIATES

GEOLOGY • HYDROLOGY • GEOPHYSICS

TELEX: 364412 INTR ID894

1472 NORTH FIFTH • P.O. BOX 1292 • LARAMIE, WYOMING 82070 • (307) 742-8366
810 WEST GRANT ROAD • P.O. BOX 5964 • TUCSON, ARIZONA 85703-0964 • (602) 623-0578

March 24, 1988

Phelps Dodge Corporation
Copper Queen Branch
Highway 92
Bisbee, AZ 85603

Attn: Mr. C. Steve Eady
Project Manager - Sr. Geologist

Re: Preliminary Proposal
Cochise Project
Terrametrics #AZ 1837-88

Dear Steve & Tony:

Background

Since our visit to the site on 10 February 1988, we have received from Steve's office, one drill hole plan map of the area and three geological sections - two oriented north-south and one east-west. We dubbed the easternmost north-south section as A-A', the next one to the west as B-B' and the east-west section as C-C'.

Upon receipt of these data Section A-A' and C-C' were partly digitized with velocities derived from the density data also provided and the latter assigned to the particular formation on each section. Then, we used the drill holes as assumed access for sonic energy point sources at 50' spacing in the holes and with geophone receivers spaced 50' apart along the profile at the surface - along a line joining the holes. These data were then used to derive computer velocity contour plots as shown on the attached illustrations. A few different assumptions and changes were made to see how the plots were affected.

Results:

With the 50 foot cell density given above, it appears that features with velocity contrasts of the order of 10% - 15% will be resolved if their major dimension is no less than approximately 200 feet. Conceivably, some features as small as 100 feet may be resolved in some instances if conditions are otherwise sufficiently favorable.

The interpreted faults shown on the sections, fit the modeled data quite well. This may tend to reinforce confidence in the interpretations already made. Obviously, however, picking unknown faults out of real seismic field data will still require careful interpretation of the plots and full correlation with all known surface and drill hole information available including the new VLF data. This will be particularly necessary because of the highly variable nature of fault thicknesses both up and down dip as well as along strike and with thicknesses ranging from knife blade or less to up to ten feet or more.

Conclusions:

Forward modeling results are encouraging in that indications show that this approach could give factual information of value to the project not as economically available or otherwise not available at all. Never the less, the program still must be considered experimental because of various logistical uncertainties typical of many first time mining engineering geophysical applications. In this case, the additional power of second dimension access and resultant tomographic resolvability, is only as feasible as will be allowed and provided by the existing drill holes.

Ideally for maximum coverage and raypath development, it is most desirable to use the holes for both source and sink access. However, suitable geophones for holes nominally three inches in diameter are not immediately available to us. Nor are some of the energy generation devices such as air guns, sparkers, etc. This means that right now, we must rely on small explosive or specially designed fire arm type devices such as the patented Betsy Seisgun Sources modified shot gun shell assemblies. Even these will not be absolutely fool proof and totally immune from any logistical problems. But, we are reasonably confident that these, or alternatively a very small charge (¼ stick or less) of standard dynamite, with zero delay electric blasting caps, will supply all of the energy necessary. If the Betsy system proves logistically feasible to use in the dry holes as is, then that will be the proferable way to go. If we find that water is necessary to improve energy transfer then we would request your assistance with a water truck. If the holes do not hold water long enough to adequately aid the shooting process, a mud mixture could be invoked if necessary.

We realize that it would be most desirable not to destroy the holes. At this point however, we cannot guarantee no drill hole attrition but, we feel that there is a reasonable chance that Betsy damage would be minimal. Of course, it remains manditory to have enough energy to transmit an adequate minimum signal from each source point to each geophone. In any event, it is intended to shoot each hole, first on the bottom and then to retreat upward at the interval selected, most likely 50 feet per shot. Hopefully, we can devise a weighted cable system to lower a string of shots into the hole first and then to shoot successively one shot at a time from the bottom to the top of each hole. This system has been used successfully elsewhere and saves much time required to otherwise enter the hole to plant each shot separately. This same procedure could also be used with dynamite if necessary.

Geophones would be equally spaced on the surface along a line between holes using 24 geophones per spread. Initially, we visualize using a 60 foot geophone interval which would provide a spread length of 1,320 ft. between end geophones.

The recording equipment would be portable or semi portable, battery powered, with various filter options and both analog and digital recording.

Digitized data is completely stored on floppy disks for ultimate computer processing into formats somewhat similar to the illustrations which accompany this proposal and from which the final interpretations would be made.

Both refraction and reflection data would be collected including vertical velocity at the holes and transverse velocity between the holes. All in all, these data should prove most beneficial toward providing insitu elastic property information relative to slope stability analysis, mine planning and design.

Recommendations:

1. One initial 1,320 ft. test spread involving four holes, four hundred feet apart, i.e. 1,200 feet, along a line connecting each hole. The north-south spread across holes BC-33, BC-6, BC-23, and BC-35 would be satisfactory unless Phelps Dodge has another initial choice.

2. If the data, interpretation and costs from and of this initial line, are deemed sufficiently favorable to Phelps Dodge, then continue with additional coverage as desired.

Estimated Costs and Production:

The first spread would probably consume two or three days to lay out, completely shoot four holes and pick up. Computer data processing would consume an additional two days at least but, this could be partly concurrent with the field work. Interpretation would take one or two full days and written report another day or two. Thus, such a preliminary test would require about ten days elapsed time from start to finish - turnkey.

Mobilization and demobilization -	$3,500.00 x 1 =	$3,500.00
Daily per field operating day -	$1,975.00 x 2 =	$3,950.00
One time office compilation and report charge -	$1,000.00 x 1 =	$1,000.00
Per field operating day, compilation and report charge -	$ 900.00 x 2 =	$1,800.00
Per field operating day, Betsy system -	$ 275.00 x 2 =	$ 550.00
		$10,800.00

If the one line test results are sufficiently favorable that additional coverage is immediately desired, we estimate that similar additional spreads can be completed on the average in approximately one field operating day each at an additional cost of about $3,150.00 each, provided there is no mobilization or demobilization involved.

In addition to a water truck, if needed, it would be helpful and most efficient if your personnel could flag the lines for us in order to expedite laying out the spread cables and geophones. The cable geophone takeouts are already measured a set distance apart for distance control along each line.

The above costs include all the normal and usual equipment and supplies necessary, a four man crew and one vehicle. If additional special supplies such as mud or dynamite and caps or more personnel, or special equipment, or standby, are desired and agreed to or requested by you, these items would be furnished at 115% of our invoiced or payroll costs.

Additional Comment:

As mentioned before, the seismic tomographic approach considered in this proposal can also be applied in the electrical resistance domain instead of sonic velocity. Potential advantage might be inductive energy coupling as opposed to direct physical coupling. However, resistance correlation with structural integrity of the rocks is somewhat more tenuous than is seismic velocity and related parameters.

To better assure hole preservation, effort was made to locate suitable electrical equipment worthy of immediate application, with the idea that this might be tried first. No such equipment was immediately identified, but it was determined that P.D. has equipment which might be modified for this purpose later on.

Availability:

Right now, we are available on about one week to ten days notice. Usual availability rarely exceeds three to four weeks.

Additional Reference Data Appended:

Attached separately is an itemized list of appended data and a selected reference on the acoustic tomographic method.

If you have any questions please do not hesitate to let us know right away.

Respectfully submitted,
Terrametrics Associates

Walter E. Heinrichs, Jr., Principal
Geol. Engr. - Geophysicist
P.E. & C.P.G.S.

WEH:jh

cc: A. C. Hauck III
Phelps Dodge Corporation
P. O. Box 50427
Tucson, AZ 85703

Enclosures: as listed.

Appended Reference Data:

1. Notes on Model Study: Fax transmittal 3/4/83
2. Figure 1: Cross Section A-A' 2/28/88
   Fax transmittal 3/14/88
3. Figure 2: Fax transmittal 3/14/88
4. Figure 3: " " 3/14/88
5. Figure 4: " " 3/14/88
6. Figure 5: " " 3/21/88
7. Figure 6: " " 3/5/83
8. Figure 7: " " 3/4/83

First Break Vol. 4 No. 7, July 1986, Page 25.
Curved ray seismic tomography: application to the Grand Etag Dam (Reunion Island: by J. F. Cottin, P. Deletie, J. Jacquet-Francillon, J. Lakshmanan, Y. Lemoine & M. Sanchez

GEOPHYSICS, Vol. 51, No. 4 (April 1986) : 914-929, 23.Figs.
Application of cross-hole seismic measurements in site investigation surveys. by D. M. McCann, R. Baria, P. D. Jackson and A. S. P. Green.

Notes on Model Study

Velocities

Velocities determined on basis of:

a. Primarily using velocity/density relationships in Figure 9.3 of Clarke (GSA Memoir 97).

b. Pinal schist velocities determined as in a, above, and then reduced by 2000'/sec to account for larger atomic number of mafics.

c. Arbitrary assignment based on experience:
   - Dump material - 1000'/sec
   - Leached zone (Lz) - 7000'/sec
   - Wide fault zones (>50') - 1500'/sec

Modifications of Cross Sections

1. Cross section B-B' was not used as no velocity contrast was apparent.
2. Added leached zone above ore to test capability of program to define it. This is not an important problem as refraction data will be gathered in conjunction with the tomographic data.
3. Arbitrarily assigned a fracture zone at least 50' wide to certain faults. These faults are noted with a cross bar on the cross sections.

Model Parameters

1. Velocity cells were 50' squares.
2. Used 50' separation of sources and receivers.
3. All receivers on surface -- all sources in drill holes.
4. Used straight ray paths to reduce computer time. No significant error believed to result on section A-A'. The complexity of C-C' would have been bettered handled using curved ray paths.
5. Model resolution is a function of the number of ray paths which traverse the cells. This means that in areas of sparse ray paths, the tomographic solution is not optimum. This can be seen by comparing the tomographic sections with the original section in the deeper zones where ray paths are lacking.

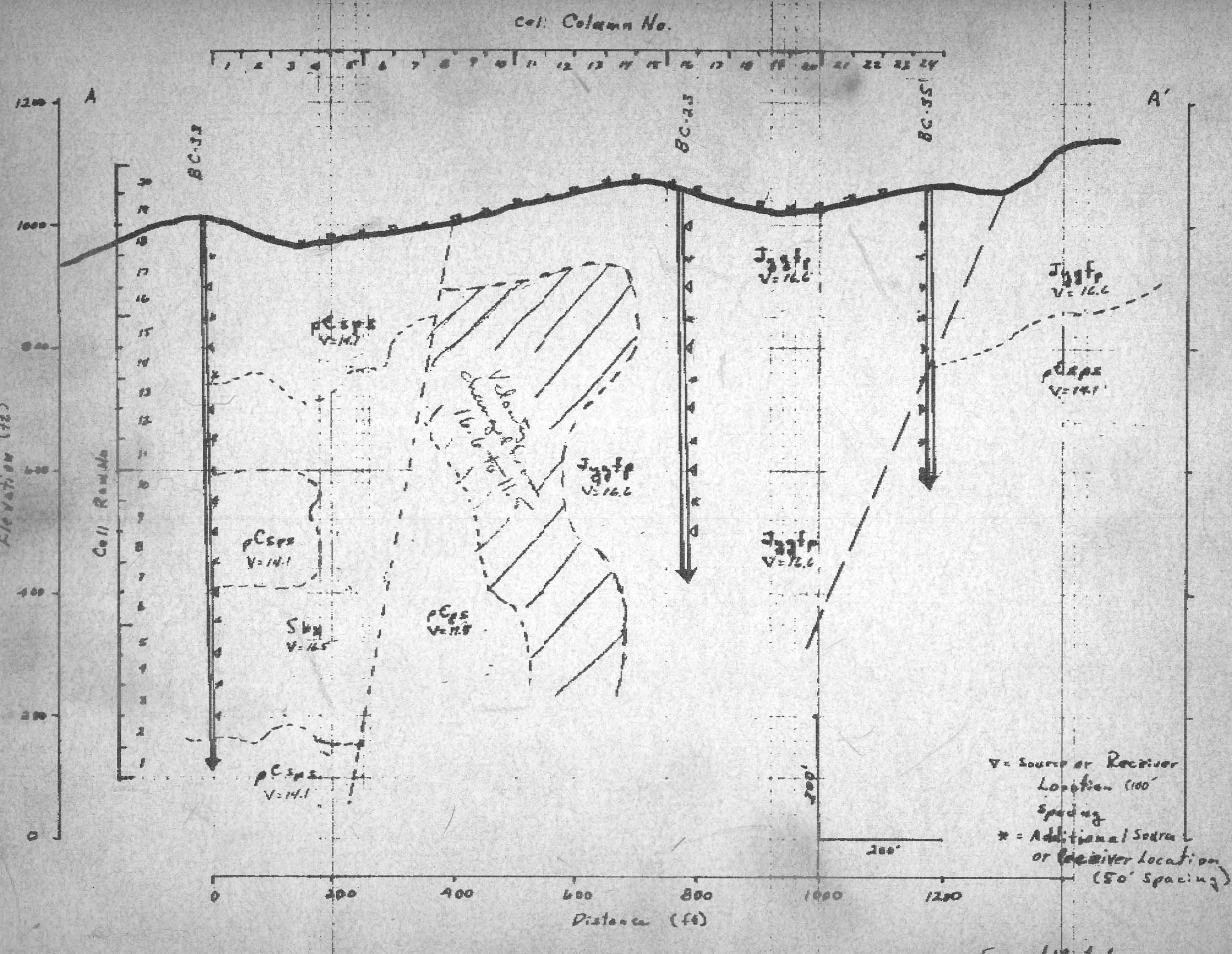
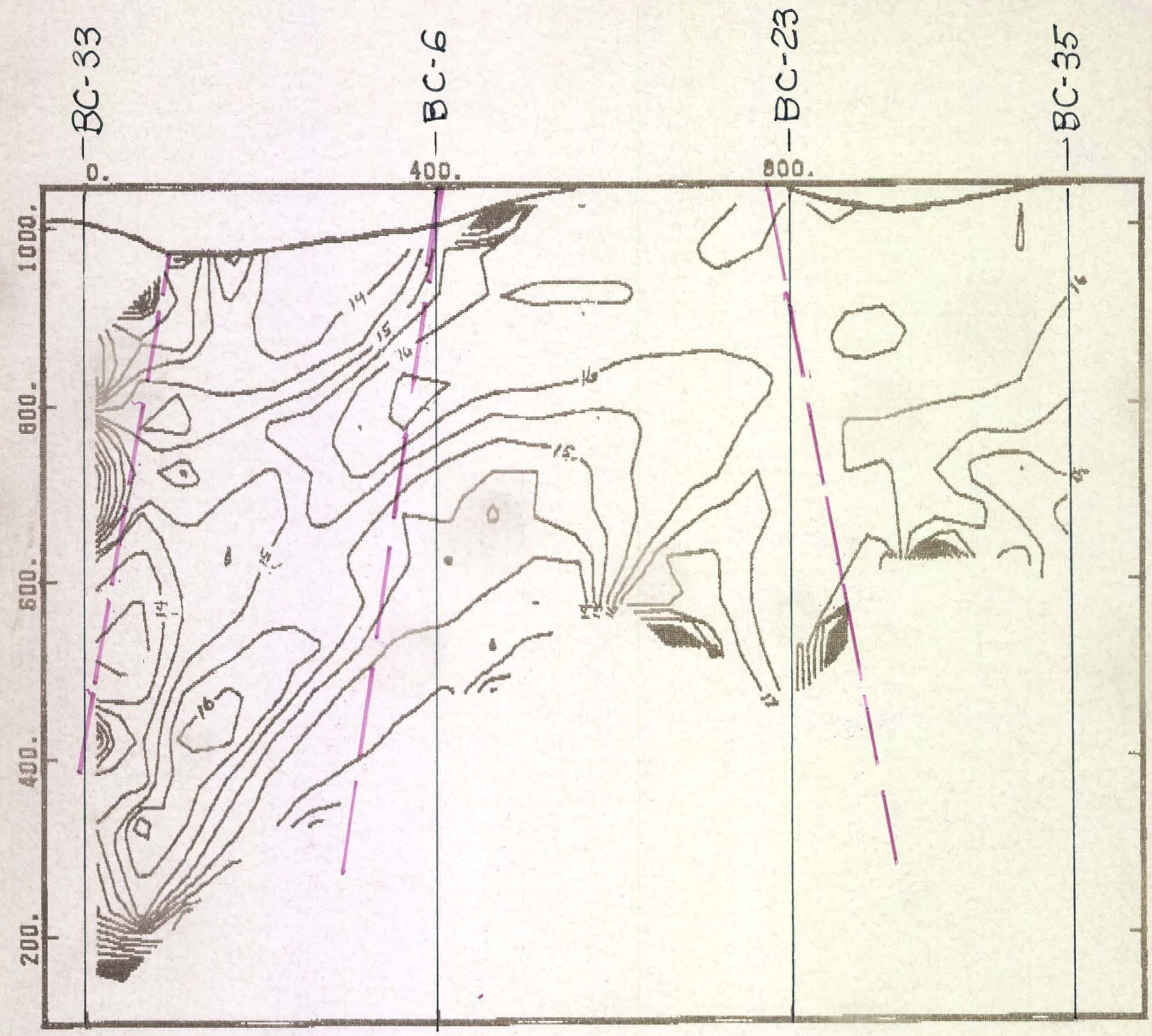


FIGURE 1: Cross Section A-A'.

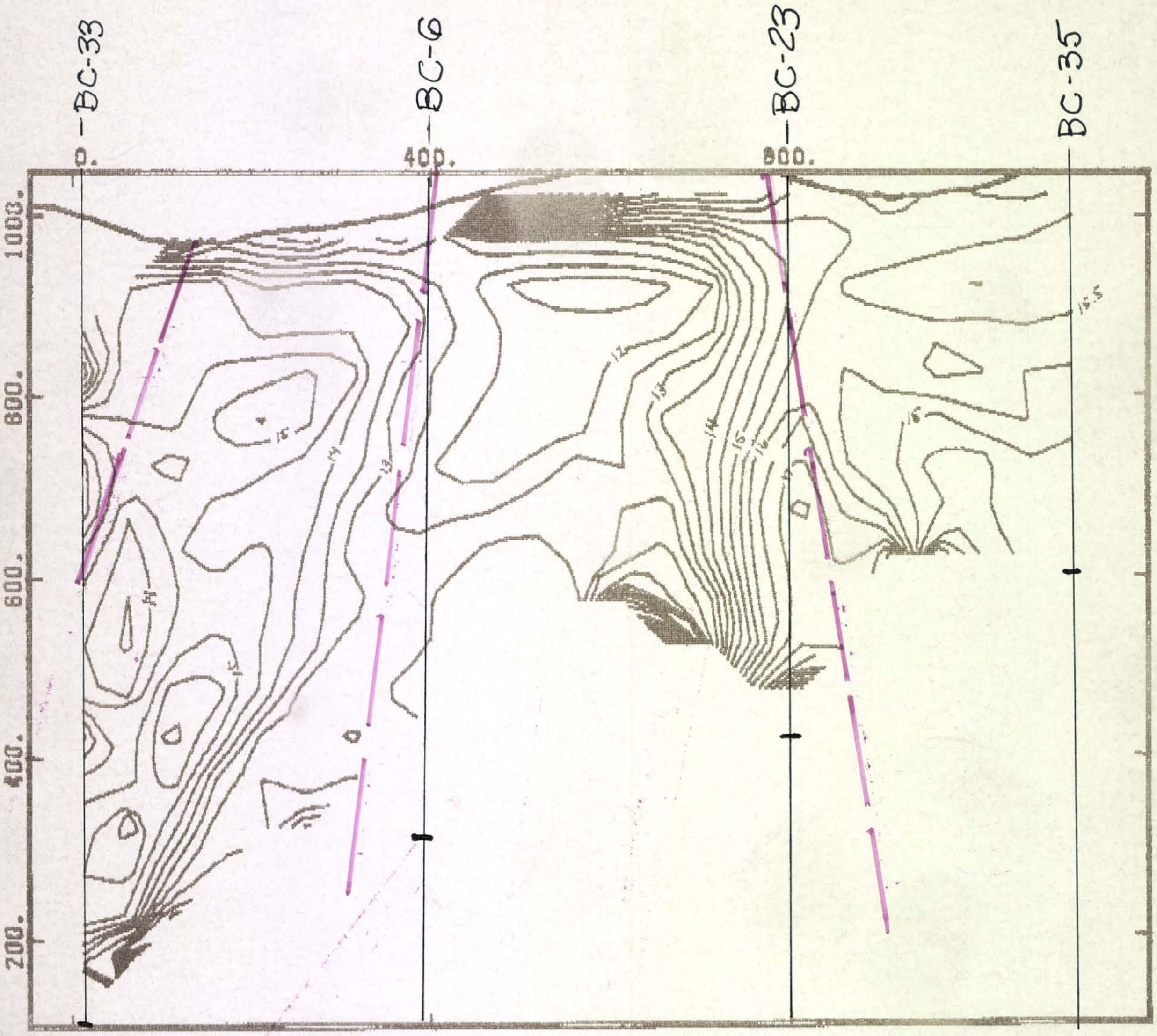


TYPE OF SPLINE: SMTHD. ORIG.

CROSS SECTION A-A' -- ORIGINAL

PREPARED BY:
TERRAMETRICS ASSOCIATES
Geology, Hydrology, Geophysics
Tucson, AZ & Laramie, WY
14-MAR-88

FIGURE 2: Original data provided.



TYPE OF SPLINE: SMTHD. ORIG.

CROSS SECTION A-A' - REVISED

PREPARED BY:
TERRAMETRICS ASSOCIATES
Geology, Hydrology, Geophysics
Tucson, AZ & Laramie, WY
14-MAR-88

FIGURE 3: Original cross-section revised to fit figure 1.

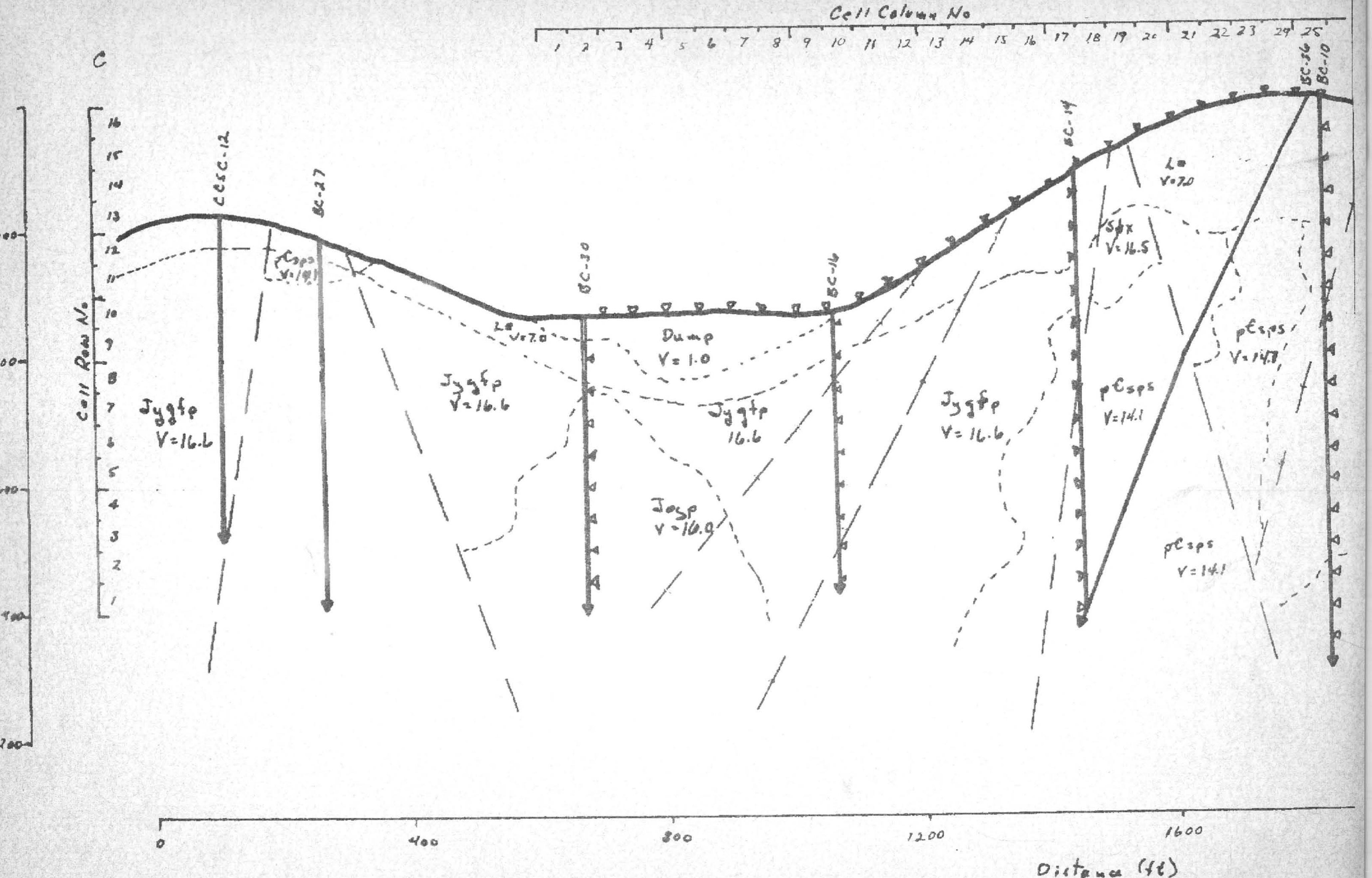
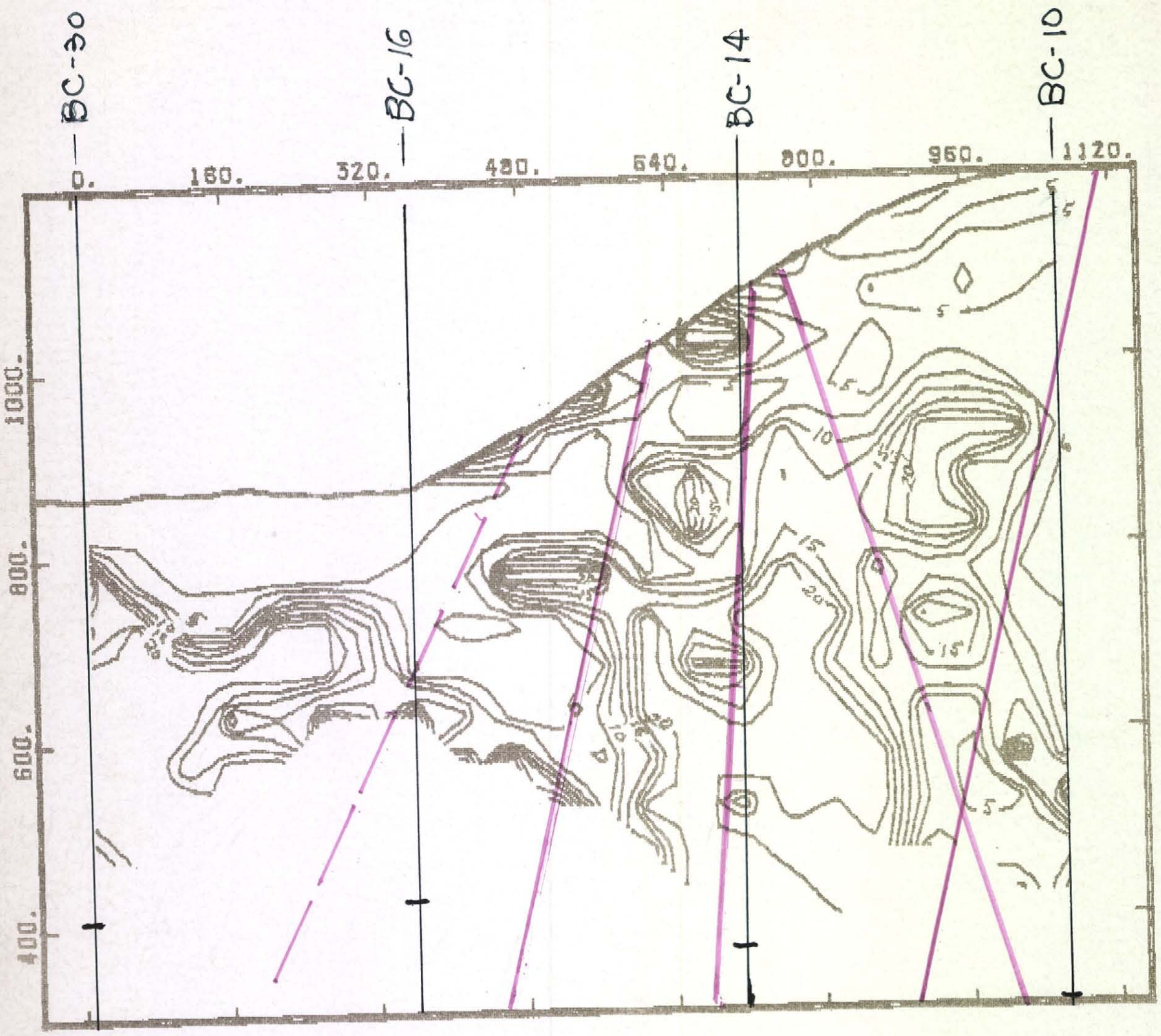


Figure 4: Cross Section C–C' with a leached zone (Lz) and Dump. Sources are at 50' intervals in borings and receivers at 50' intervals along surface.



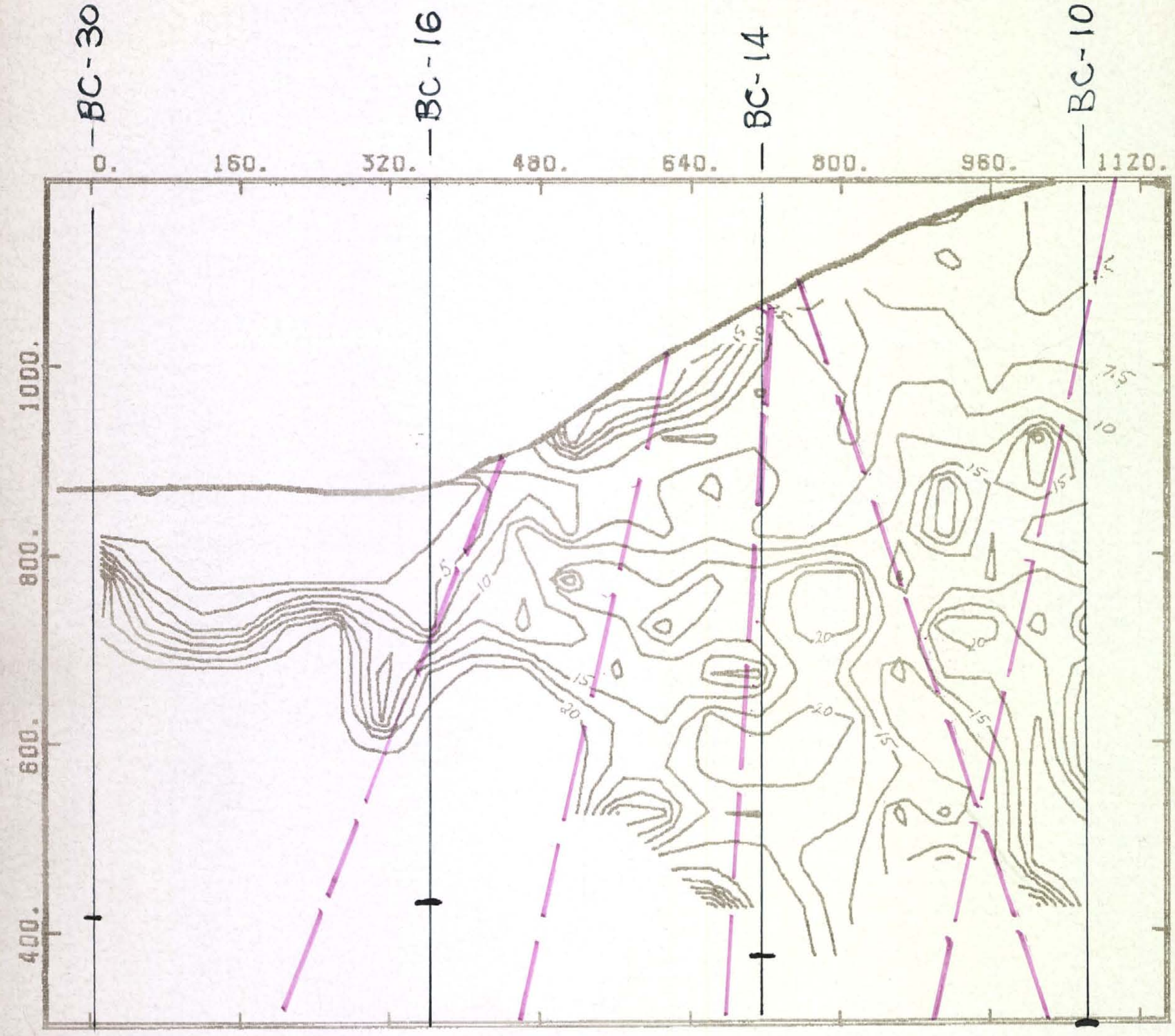
TYPE OF SPLINE: SMTHD. ORIG.

CROSS SECTION C-C'

PREPARED BY:
TERRAMETRICS ASSOCIATES

Geology, Hydrology, Geophysics
Tucson, AZ & Laramie, WY
08-MAR-88

FIGURE 4: Solution using only BC-30, BC- 14, and BC-10.



TYPE OF SPLINE: SMTHD. ORIG.

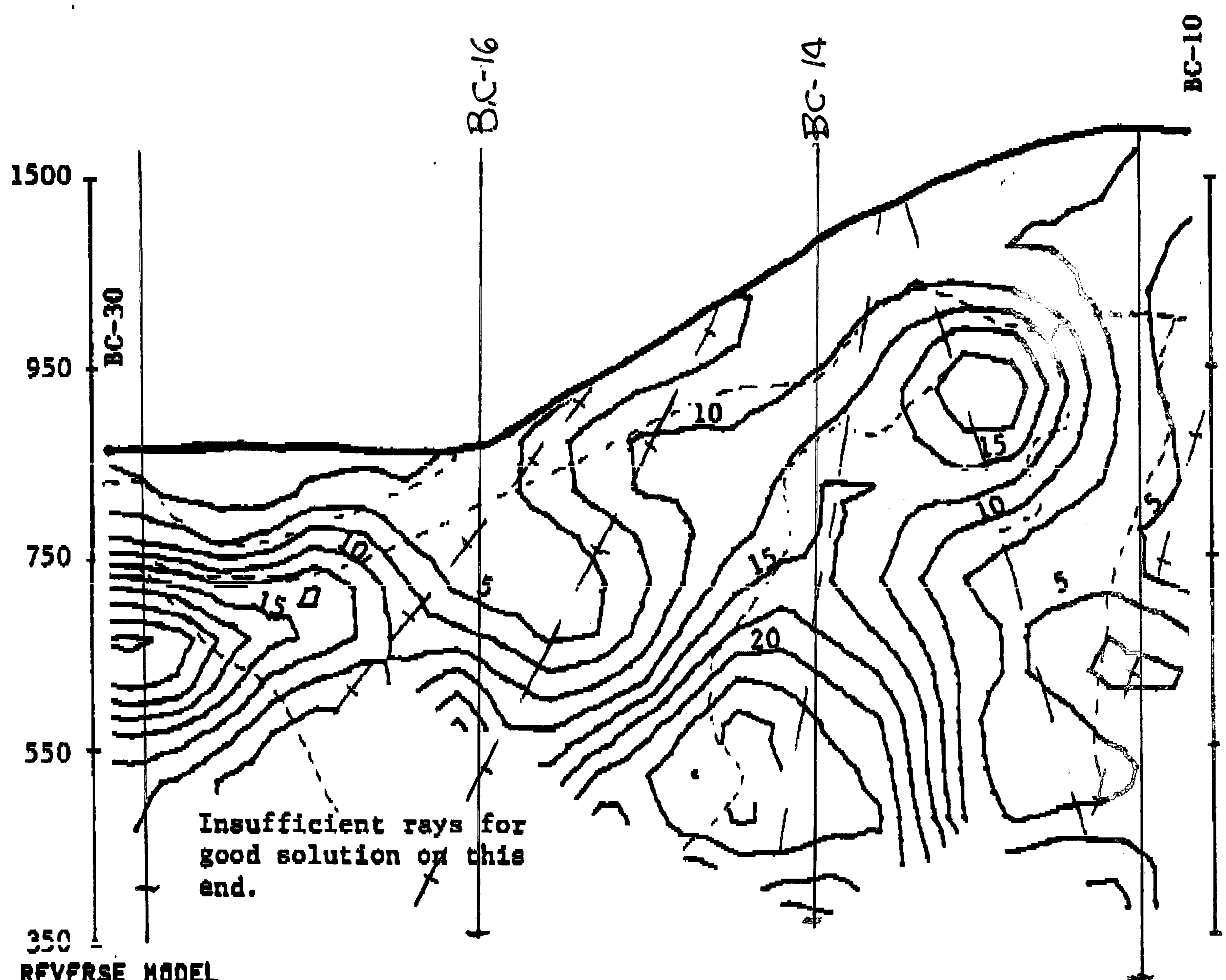
CROSS SECTION C-C'

PREPARED BY:
TERRAMETRICS ASSOCIATES
Geology, Hydrology, Geophysics
Tucson, AZ & Laramie, WY
22-MAR-88

Figure 5: Cross Section C-C' without 50' wide fault zones and with leached zone and dump. Contour interval is 2.5 1000'/sec.

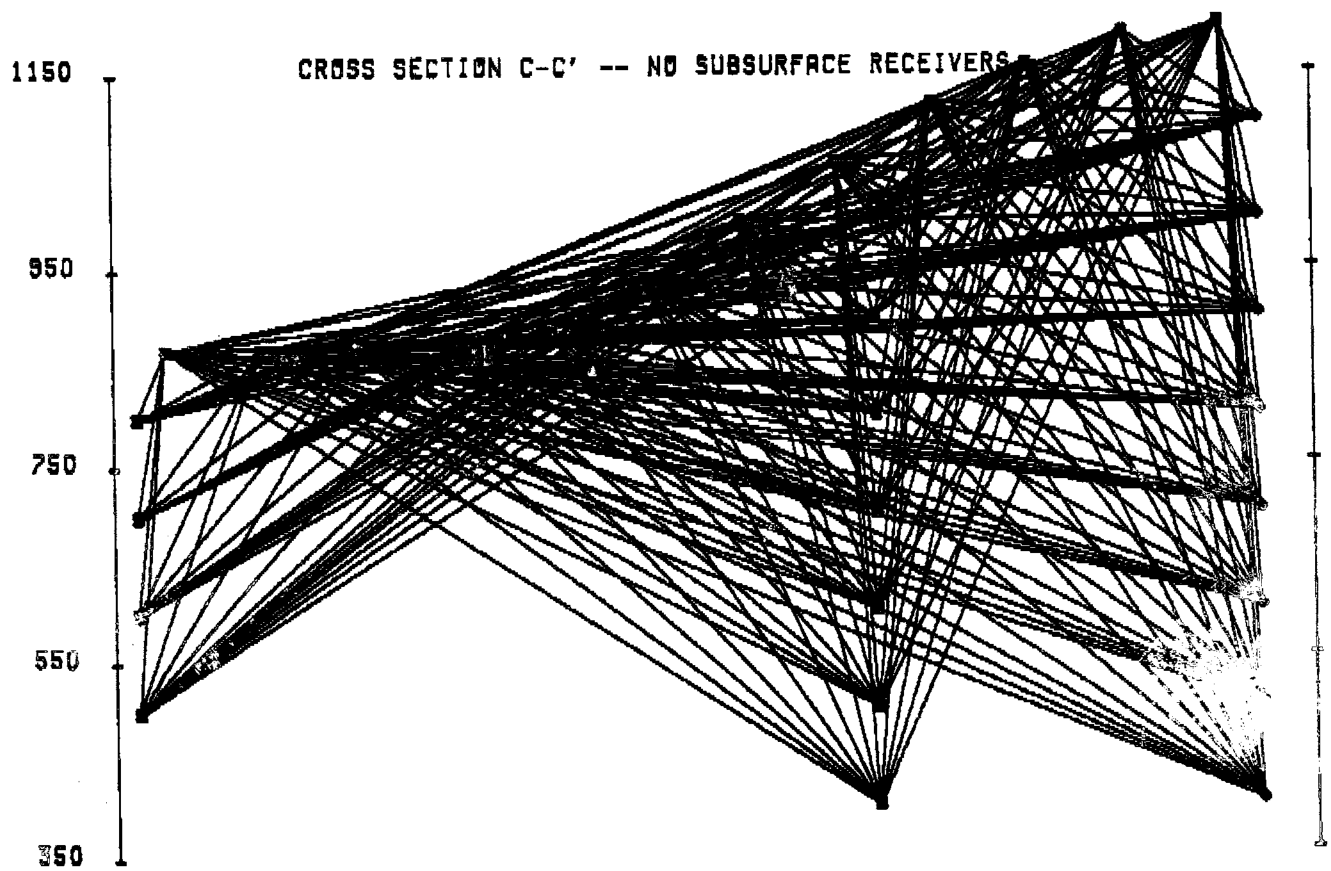
Figure 6

CROSS SECTION C-C' WITH ALL RECEIVERS ON SURFACE



REVERSE MODEL
RMS ERROR: 7.6
NO. OF ITER: 35

PREPARED BY:
TERRAMETRICS ASSOCIATES
Geology, Hydrology, Geophysics
Tucson, AZ & Laramie, WY
03-MAR-88



FORWARD MODEL

PREPARED BY:
TERRAMETRICS ASSOCIATES
Geology, Hydrology, Geophysics
Tucson, AZ & Laramie, WY
25-FEB-88

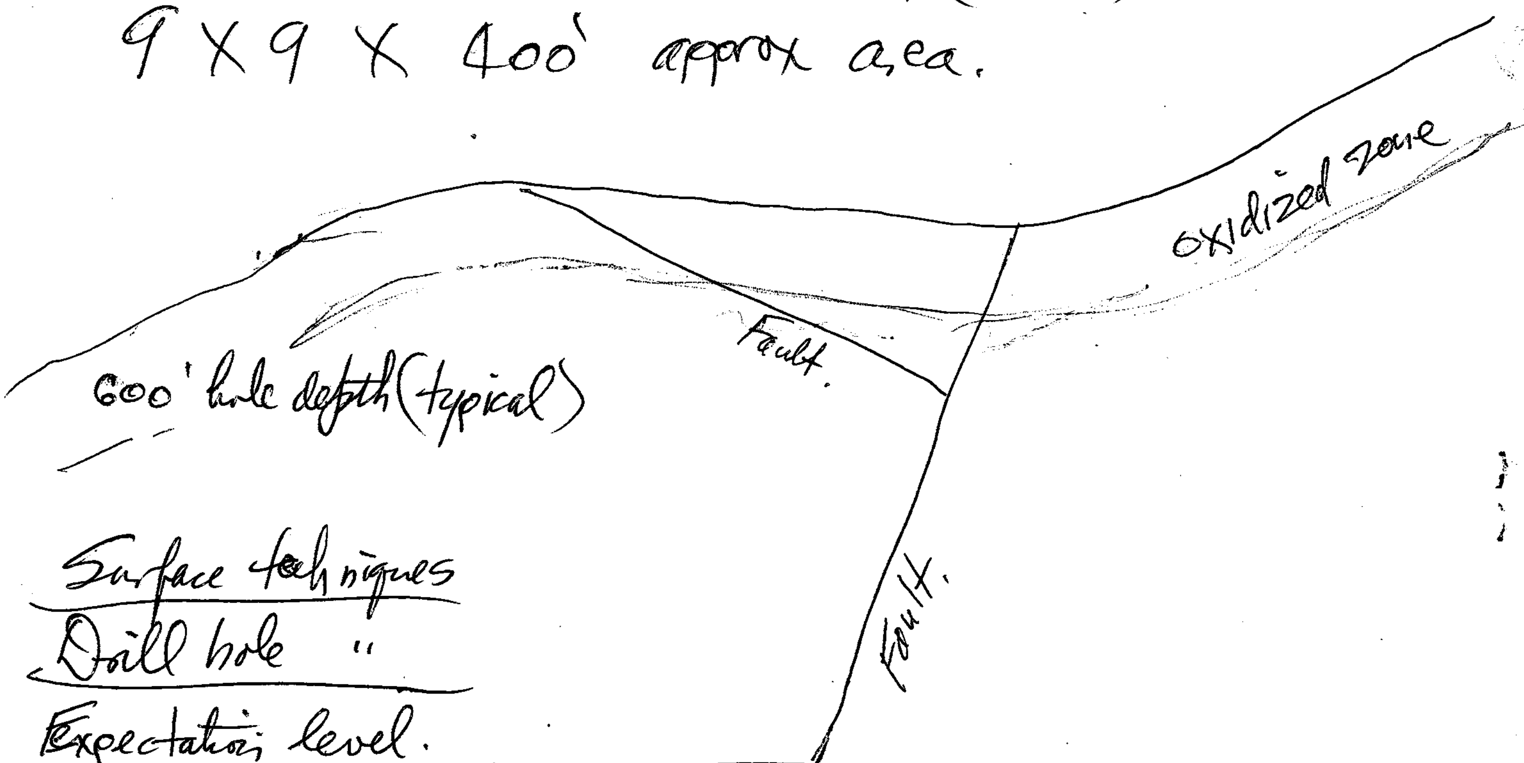
Figure 7: Ray path diagram for C-C' with sources and receivers 100 feet apart. All sources in drill holes and all receivers on surface.

Specific Gravity

Rock Type		Average S. G.
Quartz-feldspar porphyry	Fewest (except gouge)	2.71
Quartz porphyry		2.67
Pinal Schist		2.57
Silica breccia - schist		2.65
Silica breccia - porphyry		2.57
Silica breccia - mixed		2.70
Fault material	(Least No.)	2.49
Leached porphyry		2.30
Leached silica breccia		2.46
Leached schist		2.45
		2.56

Above does not include Km. (Morita)

9 X 9 X 400' approx area.



Surface techniques

Drill hole "

Expectation level.

Test program

Pre May '88 — 44 μsec — 1" ≅ 400'

Cochise & — 52

" [illegible] area (Km)

TO R.W. Davis
Box 1292
Laramie Wyo 82070

FROM M.B.G.
Box 5964
Tucson, AZ 85703-0964

SUBJECT P. D.'s "Cochise" Project, our # AZ 1837-88 DATE 2/19/88

MESSAGE Dear Dick: Here are one plan @ 1" = 500' and 3 sections at ≈ 1" = 200' (H. & Vert.) With the geol plotted by symbol. Oxidized zone &/or "leached capping" is not plotted per se but usually represents top 50' or so below surface. Obvious offset at Hole BC-6 on Sec. A-A' must be sort of thing they hope we might help with. From Sec A-A' to Sec. B-B', things don't correlate real dandy do they? Will look for YR. Comments – M.

SIGNED

REPLY

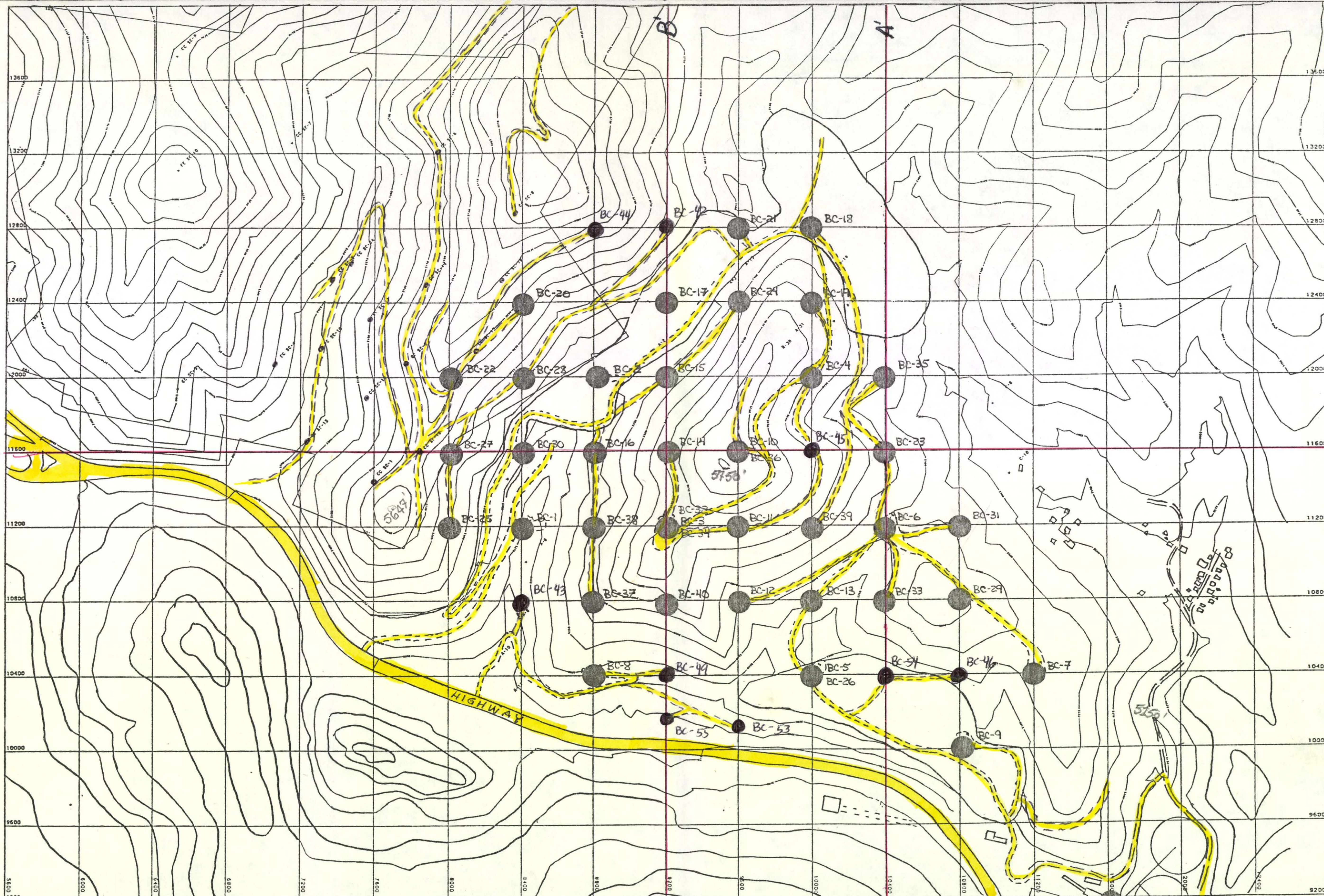
SIGNED DATE / /

REDIFORM® 4S 472

SEND PARTS 1 AND 3 WITH CARBON INTACT - PART 3 WILL BE RETURNED WITH REPLY.

POLY PAK (50 SETS) 4P472

DETACH AND FILE FOR FOLLOW-UP



contour interval -: 50' GEOEX#AZ-1837-88

MAP SCALE
1" = 500'
0 200 400 600

NO.	DATE	MADE BY	DESCRIPTION
1			
2			
3			
4			
5			

REVISIONS

DATE | DRAWN BY | CHECKED | APPROVED

Diamond Drill Hole Location
Map
Holes Completed During 1987

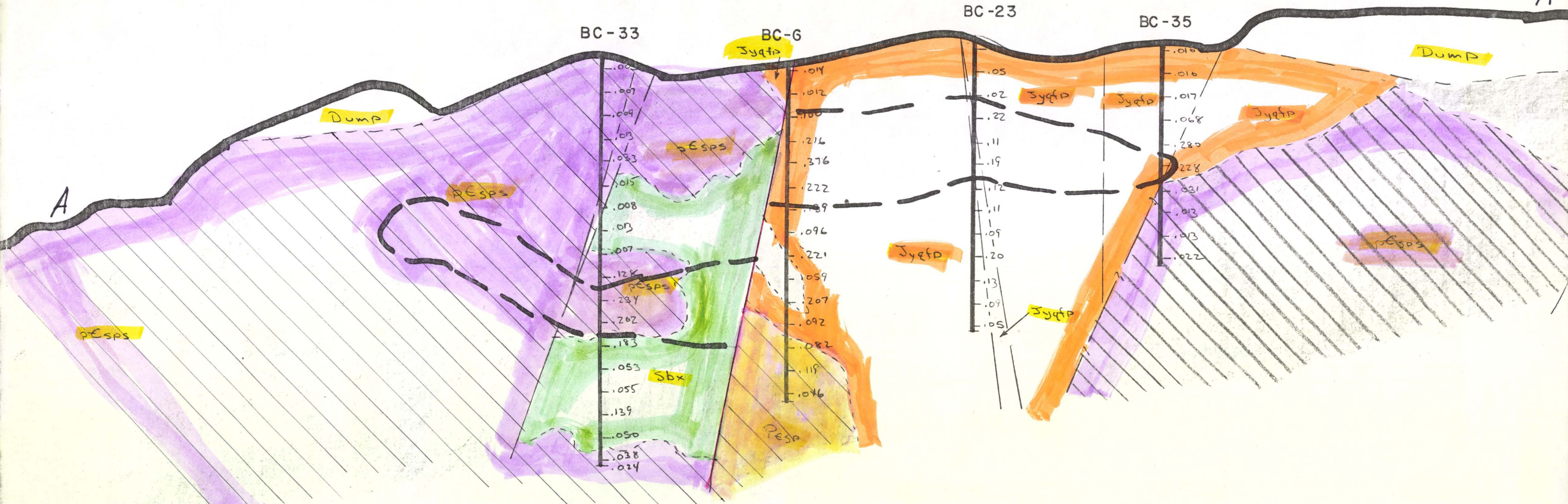
OFFICE | DEPARTMENT

PREPARED BY MINTEC, INC.

COCHISE PROJECT
PLAN MAP OF DH'S
AND TOPO

MAP INDEX NUMBER | SCALE | DRAWING NUMBER

Terrametrics-~~AZ~~-1837-88



2.57 – PЄps – Precambrian Pinal schist

2.65 – pЄsps – Precambrian Silicified Pinal Schist

2.71 – Jyqfp – Jurraisic younger quartz feldspar porphyry

2.67 – Joqp – " older quartz porphyry

2.70 – Sbx – Silica breccia

≅200'

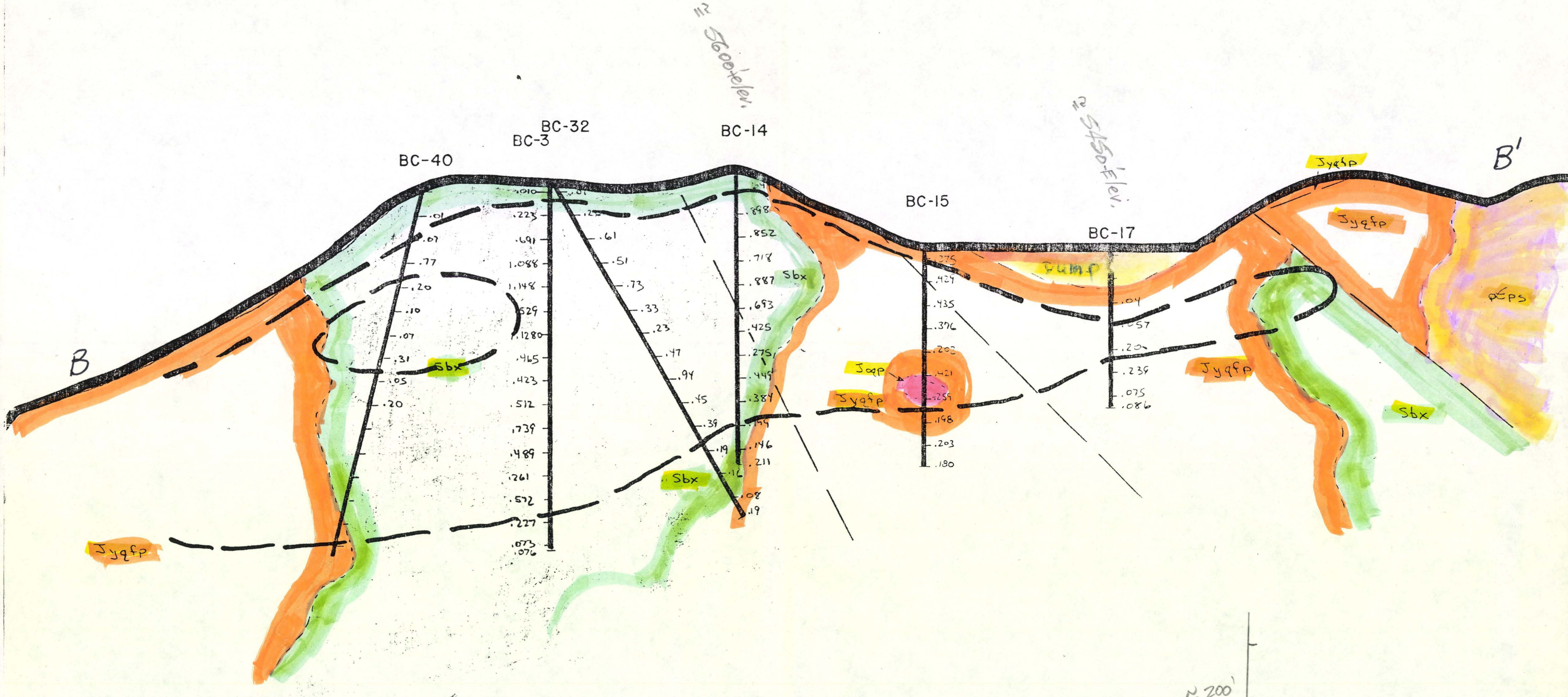
≅200'

1" = 200' (Horiz & vert.)

Section along 10,400 E.

Looking West

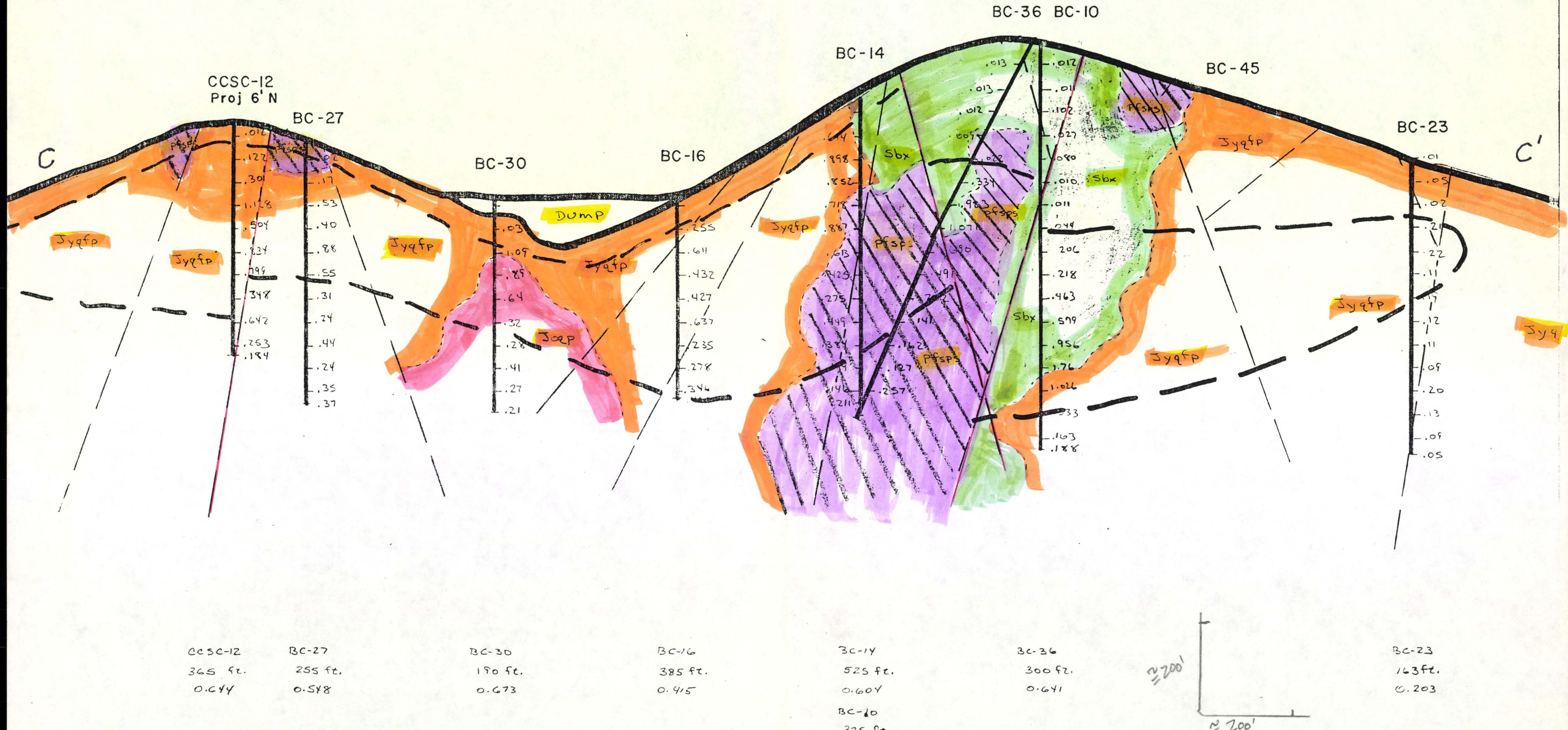
Terrametrics # Az-1837-88



Thickness Weighted Grade (%Cu)	BC-40	BC-3	BC-32	BC-15	BC-17
	Not Complete	665 ft.	500 ft.	370 ft.	90 ft.
		0.647	0.505	0.337	0.230
			BC-14		
			525 ft.		
			0.604		

Section along 9,200 E
Looking West

Terrametrics Az-1837-86



CCSC-12	BC-27	BC-30	BC-16	BC-14	BC-36	BC-23
365 ft.	255 ft.	190 ft.	385 ft.	525 ft.	300 ft.	163 ft.
0.644	0.548	0.673	0.415	0.604	0.641	0.203
				BC-10		
				375 ft.		
				0.762		

Section along 11,600 N.

Looking North

COOKSLEY GEOPHYSICS, INC.
Geology • Geophysics • Engineering

March 7, 1988

Mr. Steve Eady
Phelps Dodge Corporation
Western Exploration Office
Copper Queen Branch
Bisbee, AZ 85603

Dear Steve,

It was a real pleasure visiting you last week. Thank-you for the hospitality and the very informative field inspection of the proposed exploration sites. The following day, Tony Hauck, Phil Mathews and I had a constructive meeting concerning the applications of seismic methods.

For the last week, we at CGI have been directing considerable attention to coming up with a substantive program which will meet your company's requirements. As we presently understand, these requirements are as follows:

1. A geophysical investigation program must ultimately result in your being able to accurately delineate and map fault structures, vertically as well as horizontally, on the site of the Cochise mine project.

2. This program must be accomplished in an efficient and economic manner.

3. Some assurance of success, commensurate with expenditures on the program, must be offered the company.

In order to meet these requirements, we feel that a small first phase, consisting of an intense effort directed along a single line on the east hill is warranted. Along this line, the following data would be derived:

1. 24-fold reflection seismic data,
2. refraction seismic data, and
3. one or two down-hole velocity measurement surveys in existing drill hole(s).

REPLY TO: P. O. Box 1602/Redding, California 96099/(916) 241-3167

Although 24-fold data would be acquired in the field, the data would be processed not only as 24-fold, but also as 12-fold and 6-fold in order to assess utilization of less expensive routines. If 12-fold or 6-fold field data yielded acceptable final sections, a very significant reduction in costs of future work would be realized. To provide better parameters for the processing phase of the work, we would supply velocity measurements from both refraction data and downhole work.

Such a program will supply base-line data concerning the capabilities and costs of CGI's seismic effort. From this foundation, PHELPS DODGE can assess the utilization of the method and hence a program which will meet the needs of the project can be designed.

Included in the baseline data, PHELPS DODGE will have a reflection seismic profile and a geologic section interpreted therefrom. The primary objective of obtaining this data is to delineate faults, and every technology within the seismic geophysical realm known to this office will be considered. I feel confident that the first phase will yield usable structural information on the vertical extent of the faults. Please see Appendix with examples of seismic lines. But also, the survey will yield seismic velocity data on which engineers can assess excavation costs and slope stability.

There is an operational advantage to the first phase. By accomplishing the field data acquisition this spring, we could have the summer to process and evaluate the data. Thus the data acquisition in the field could be resumed in the more favorable cooler weather of late fall or winter.

Seismic exploration has not received routine use in the copper mining industry. The main reason for this is that geophysical work has been limited mainly to the exploration phase, and has been directed largely to the detection of metallic sulfides. Induced polarization is the main method used by the industry.

Geophysical methods based on potential theory such as induced polarization tend to lose reliability and resolution at depths in excess of several hundred feet. The induced polarization method was perfected mainly to detect metallic sulfides. The method was not developed for the purpose of defining geologic structure.

The task of defining geologic structure falls on the more expensive seismic methods. These methods have been undergoing development since the 1920's with their main purpose being to define and map the geologic structures and rock units. With seismics, one observes the physical nature of the rock as a function of elastic moduli and density. Metal cannot normally be detected as a direct response with seismic methods.

Because seismic methods allow the assessment of the physical condition of rock, e.g., fracturing and shearing, they have been used in many surface and underground mines in studying geologic and engineering problems associated with mine development and operations. Enclosed is an annotated appendix which includes a sampling of mining applications of the seismic method. Also, enclosed are two papers concerning the use of seismics in mineral exploration.

To keep costs down, CGI will need some help from PHELPS DODGE in the form of supplying about 60 shot holes, 5 to 10 feet in depth, spaced in 33-foot intervals along the line.

Target cost estimates of first phase - seismic geophysical program are as follows:

TARGET COST ESTIMATE for 470 M (1551 ft) Line, 24-fold Coverage.

Field Costs	
Lay cable, plant geophones - Party Manager, Observer, 1-Field Tech	$ 840.00
Record data and pickup cables, etc. - Geophysicist, Party Manager, Observer, 1-Field Tech	2304.00
Equipment and Instruments	500.00
Explosives	360.00
Surveying - Party Manager, 1-Field Tech	126.00
Subsistance	480.00
	$ 4610.00
Analysis and Interpretation	
Geophysicist, Jr. Geophysicist	840.00
Report	
Geophysicist, Draftsman, Typist	630.00
Contract Data Processing	1500.00
	$ 7580.00

Computing Refraction Data	
Geophysicist, Jr. Geophysicist	1260.00
Downhole Seismic Recording	
Crew & Equipment 2 holes	1440.00
Mobilization & Demobilization	4896.00
	========
	$15176.00

The "target cost" is our estimate of what the total cost of this project will be. This work will be done on a time and materials basis.

Respectfully,

James W. Cooksley
President/Geophysicist

COOKSLEY GEOPHYSICS, INC.

JWC/sas

enclosures
copy: Tony Hauck

Notes on Model Study

Velocities

Velocities determined on basis of:

a. Primarily using velocity/density relationships in Figure 9.3 of Clarke (GSA Memoir 97).
b. Pinal schist velocities determined as in a, above, and then reduced by 2000'/sec to account for larger atomic number of mafics.
c. Arbitrary assignment based on experience:
   - Dump material - 1000'/sec
   - Leached zone (Lz) - 7000'/sec
   - Wide fault zones (>50') - 1500'/sec

Modifications of Cross Sections

1. Cross section B-B' was not used as no velocity contrast was apparent.
2. Added leached zone above ore to test capability of program to define it. This is not an important problem as refraction data will be gathered in conjunction with the tomographic data.
3. Arbitrarily assigned a fracture zone at least 50' wide to certain faults. These faults are noted with a cross bar on the cross sections.

Model Parameters

1. Velocity cells were 50' squares.
2. Used 50' separation of sources and receivers.
3. All receivers on surface -- all sources in drill holes.
4. Used straight ray paths to reduce computer time. No significant error believed to result on section A-A'. The complexity of C-C' would have been bettered handled using curved ray paths.
5. Model resolution is a function of the number of ray paths which traverse the cells. This means that in areas of sparse ray paths, the tomographic solution is not optimum. This can be seen by comparing the tomographic sections with the original section in the deeper zones where ray paths are lacking.

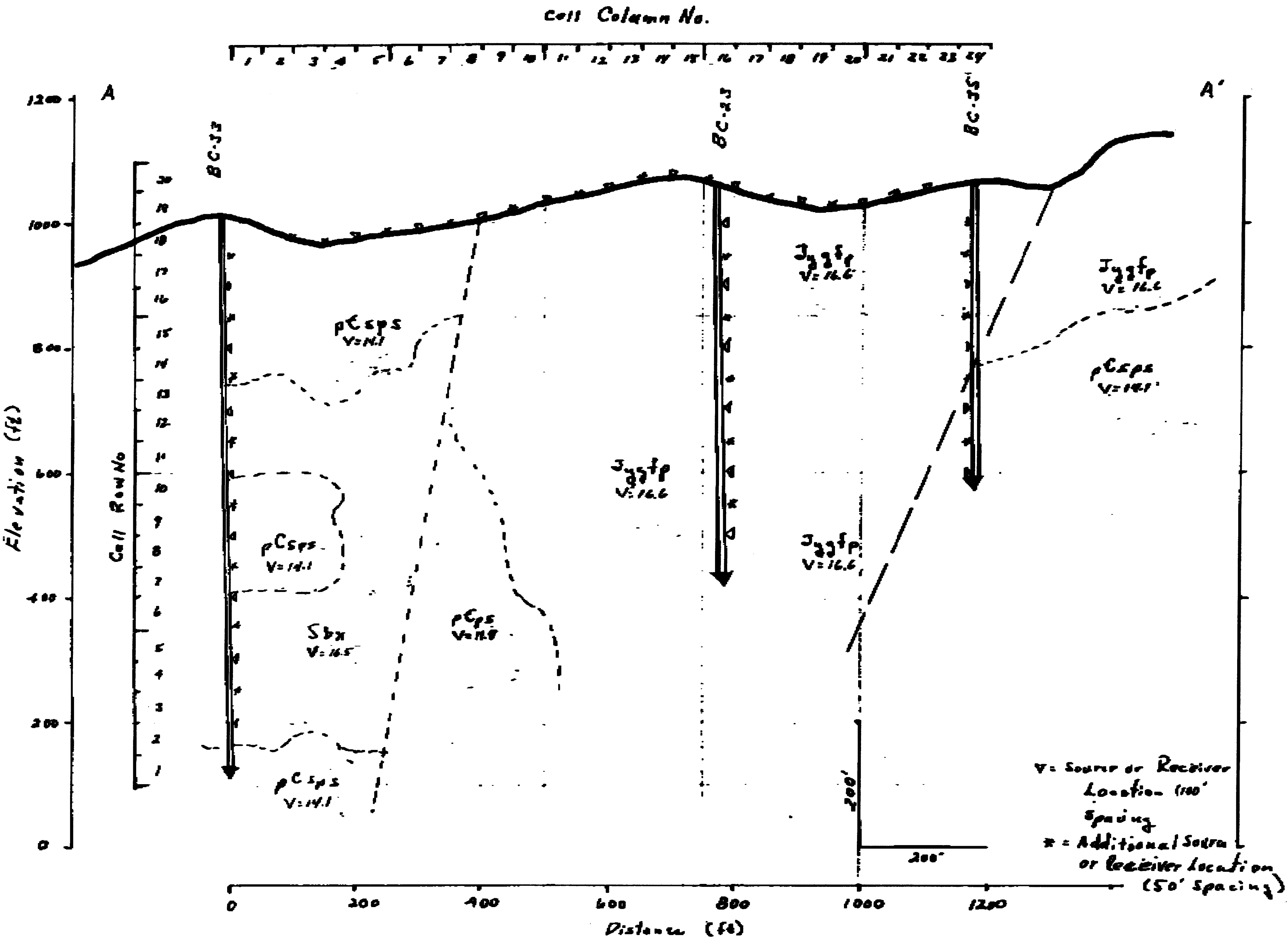
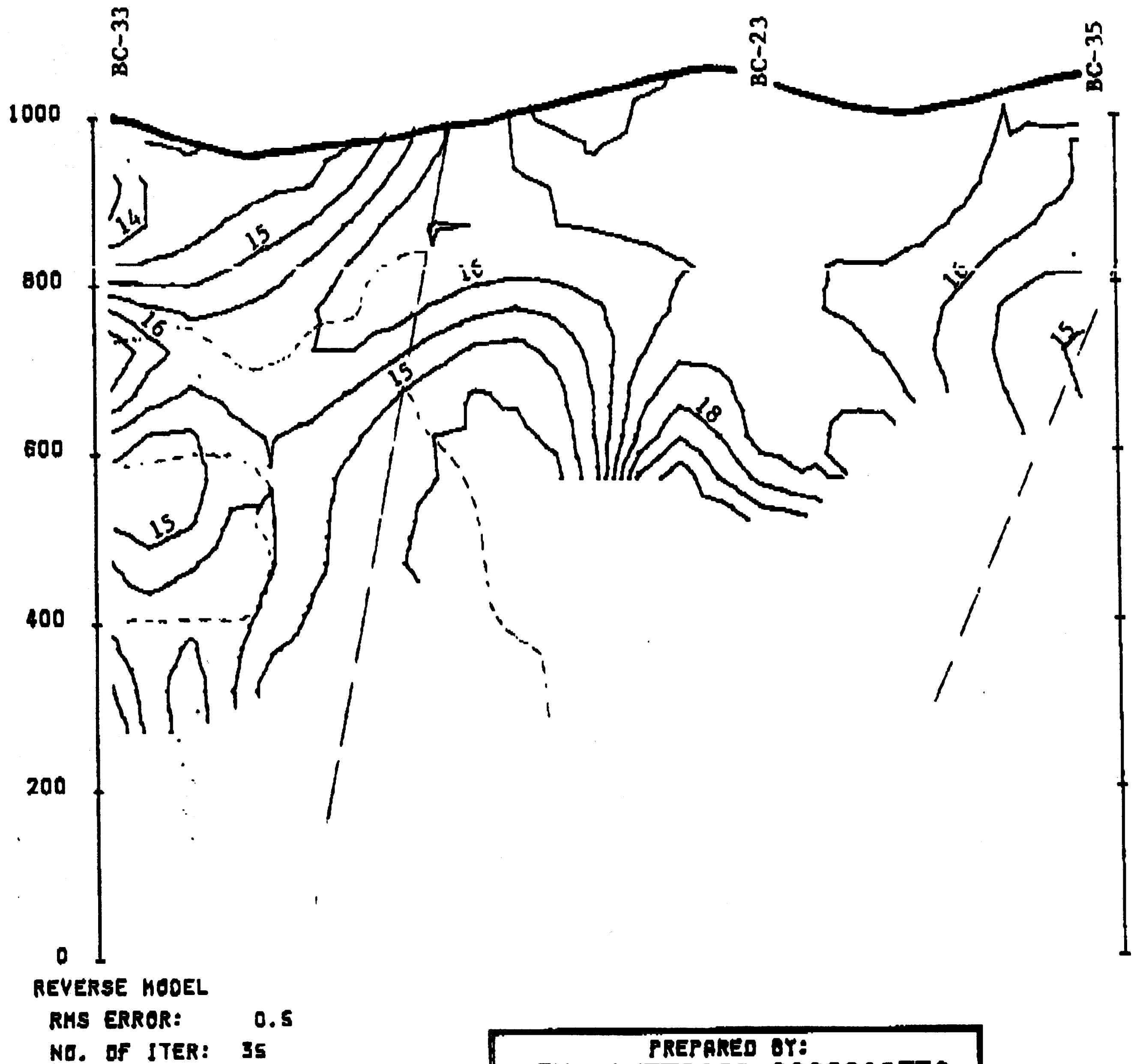


Figure 1: Cross Section A-A'.

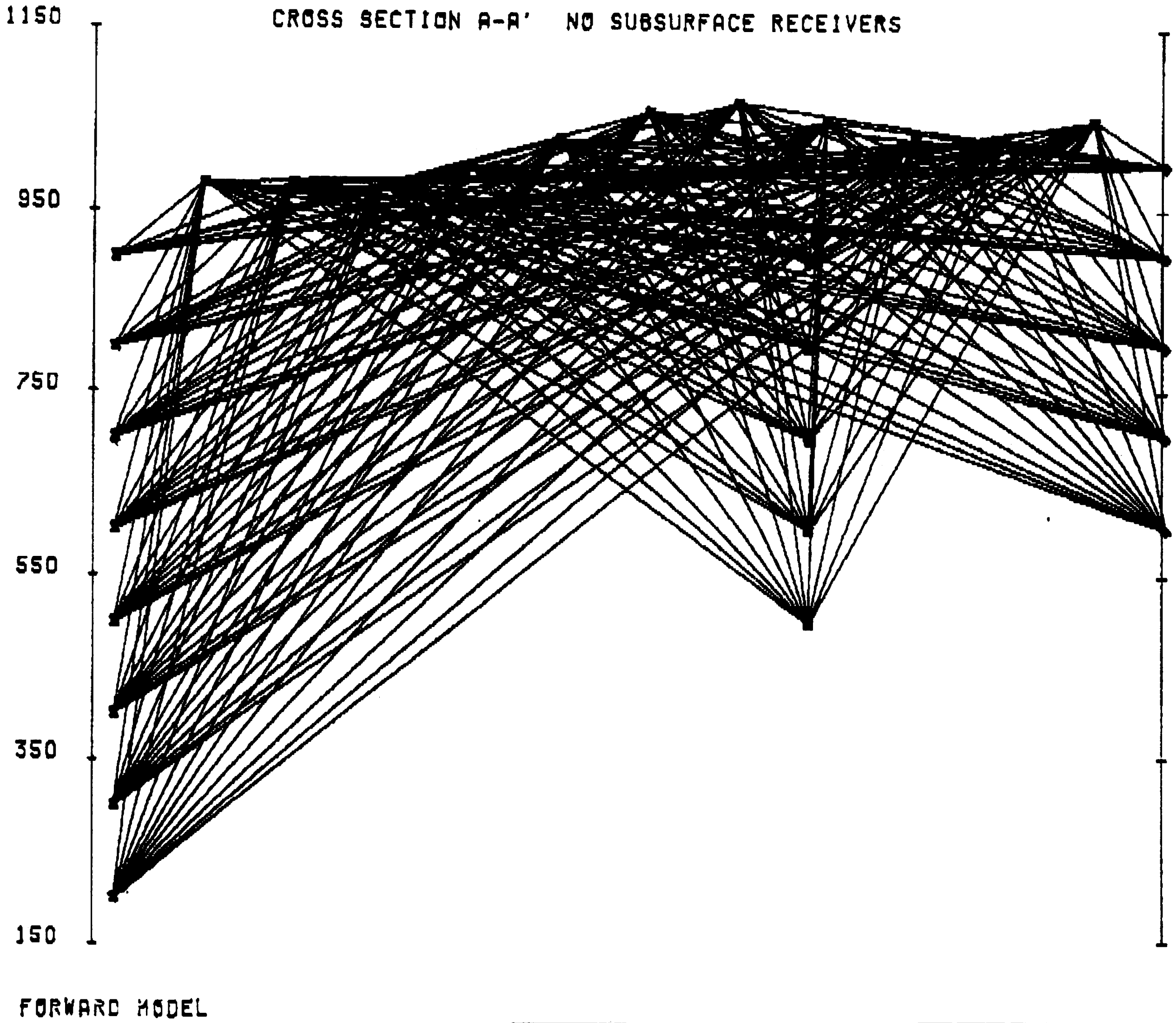
Forward Model Job (#3)

Figure 2

CROSS SECTION A-A' WITH ALL RECEIVERS ON SURFACE



PREPARED BY:
TERRAMETRICS ASSOCIATES
Geology, Hydrology, Geophysics
Tucson, AZ & Laramie, WY
03-MAR-88



PREPARED BY:
TERRAMETRICS ASSOCIATES
Geology, Hydrology, Geophysics
Tucson, AZ & Laramie, WY
29-FEB-88

Figure 3: Ray path diagram for A-A' with no receivers in holes and sources and receivers 100' apart. Using 50 foot spacing on Figure 2 quadruples the number of ray paths and improves resolution.

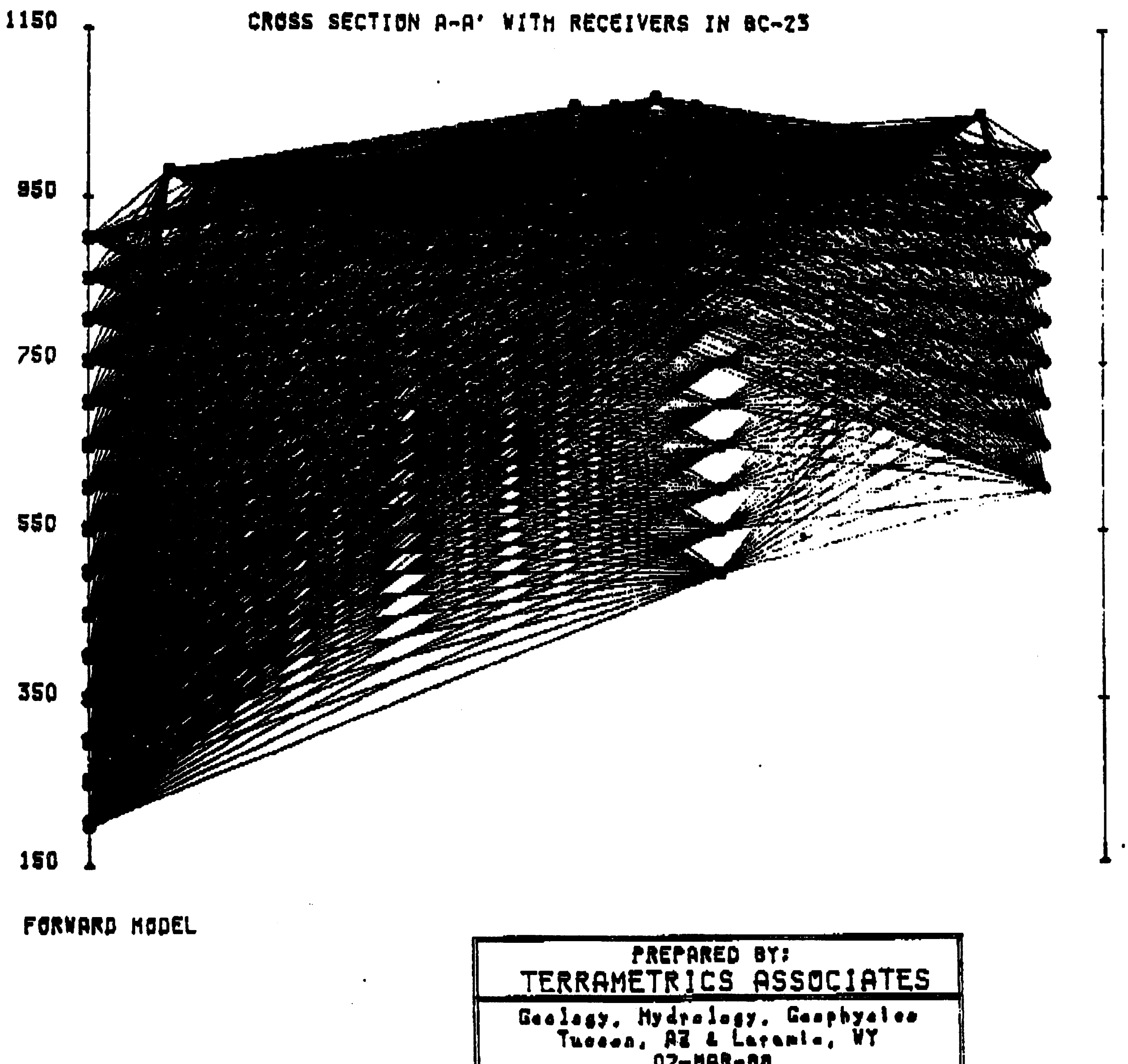


Figure 4: Ray path diagram for A-A' with added receivers at 50 foot intervals in hole BC-23. A very dense network results and the depth of resolution is significantly enhanced over that in Figure 3.

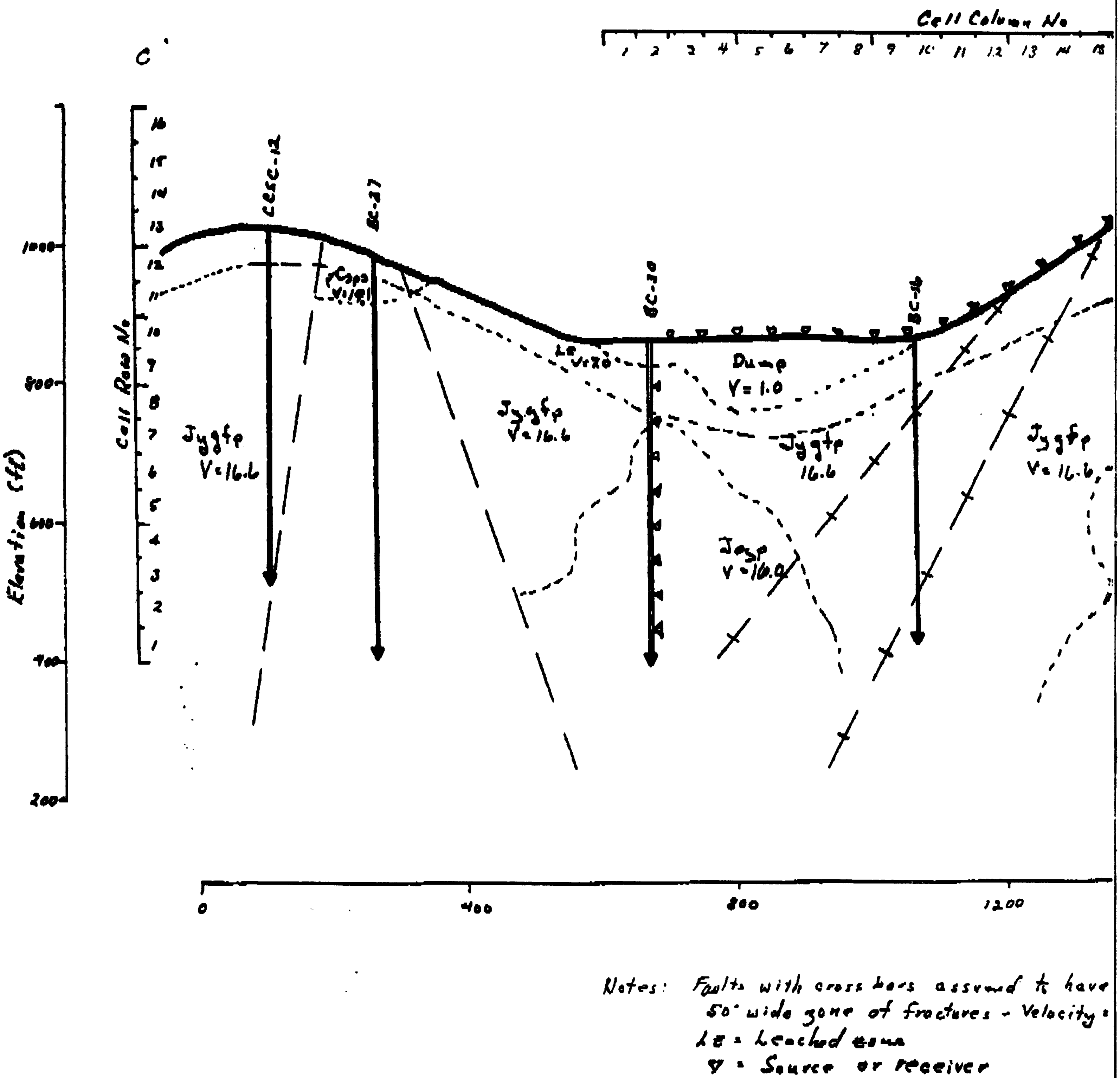
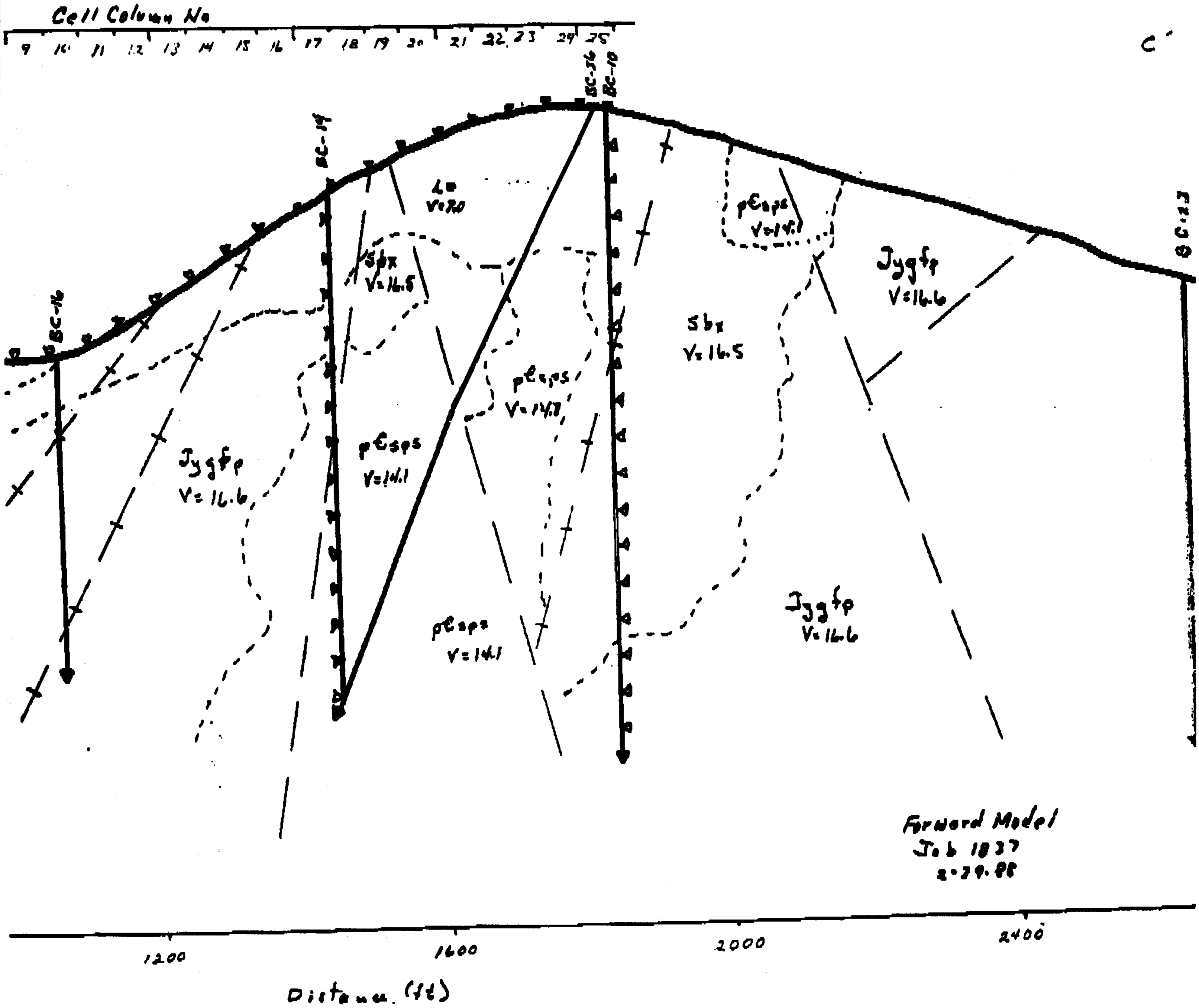


Figure 5: Cross Section C-C'.



bers assumed to have a
of fractures - Velocity = 1500'/sec
zone
or receiver

TERRAMETRICS ASSOCIATES

GEOLOGY · HYDROLOGY · GEOPHYSICS

TELEX: 364412 INTR ID694

1472 NORTH FIFTH • P.O. BOX 1292 • LARAMIE, WYOMING 82070 • (307) 742-8366
810 WEST GRANT ROAD • P.O. BOX 5964 • TUCSON, ARIZONA 85703-0964 • (602) 623-0578

TELECOPY TRANSMITTAL COVER SHEET

FROM: Terrametrics Associates

Richard W. Davis

TO: Firm Name: Heinrichs Geoexploration Company 602/623-0578

Attention: Walt Heinrichs

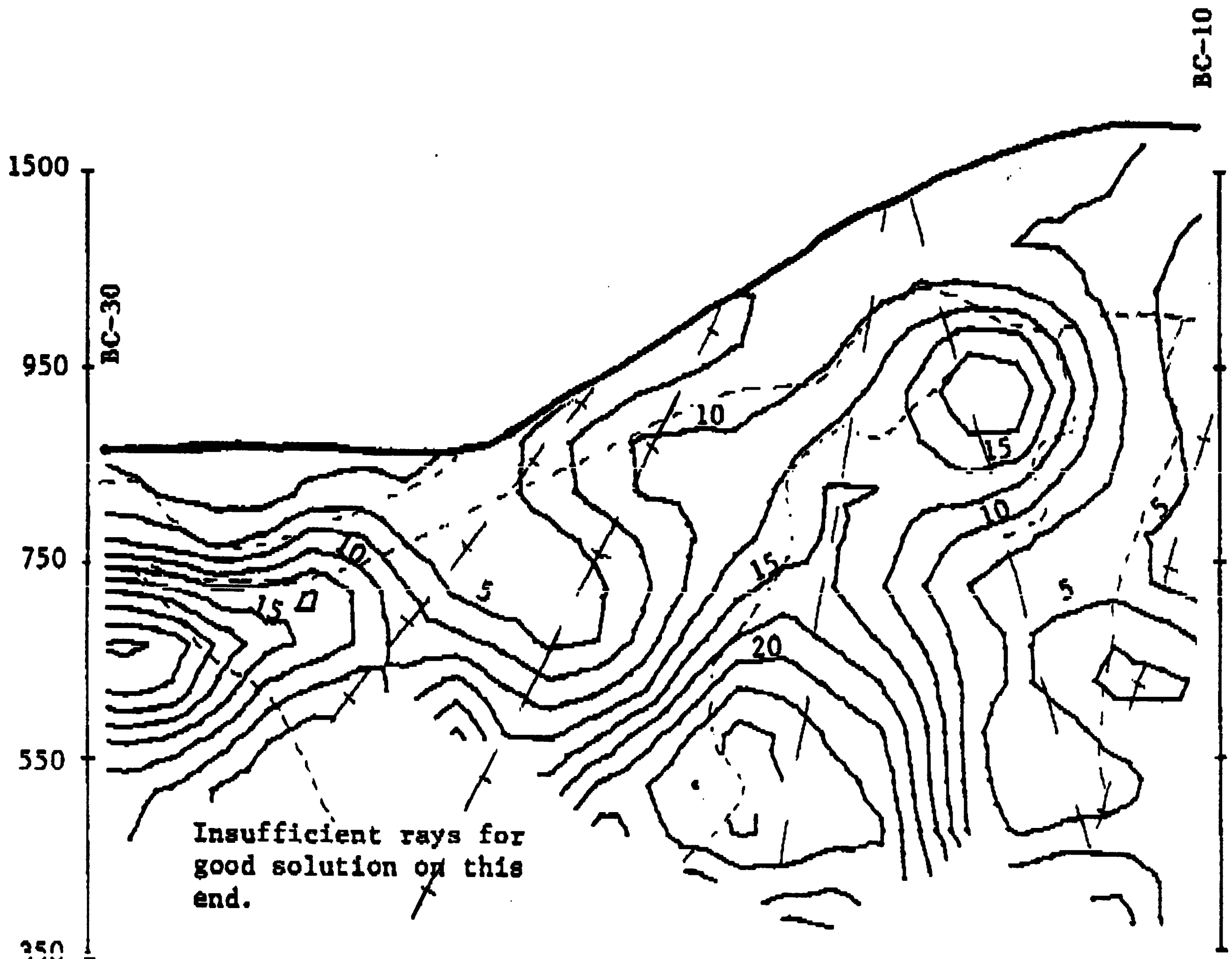
Telecopy Number: (602)325-1588

SENDING: Cover Sheet and 8 Pages -- TOTAL PAGES 9

Date Sent 3/03/88

Figure 6

CROSS SECTION C-C' WITH ALL RECEIVERS ON SURFACE



REVERSE MODEL
RMS ERROR: 7.6
NO. OF ITER: 35

PREPARED BY:
TERRAMETRICS ASSOCIATES
Geology, Hydrology, Geophysics
Tucson, AZ & Laramie, WY
03-MAR-88

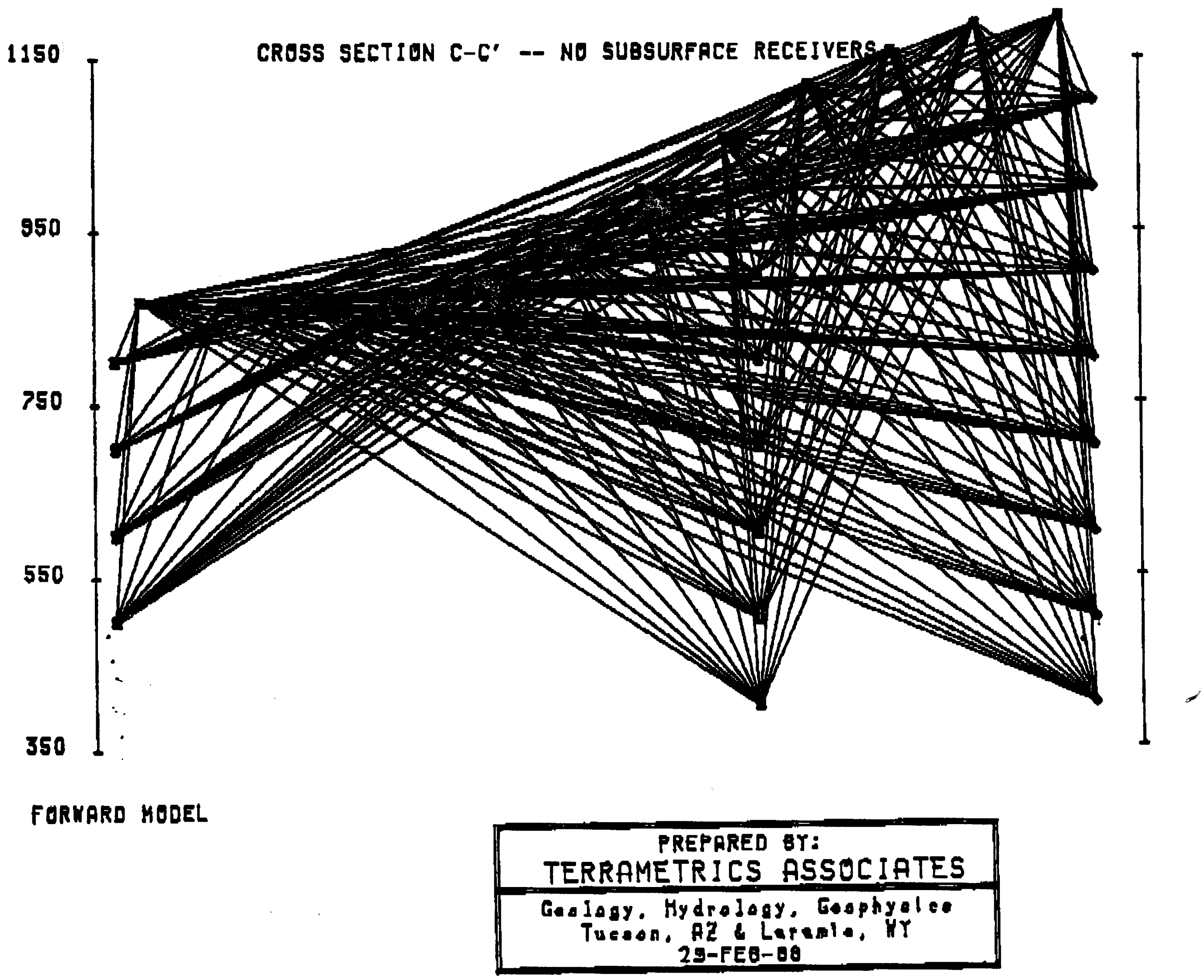


Figure 7: Ray path diagram for C-C' with sources and receivers 100 feet apart. All sources in drill holes and all receivers on surface.

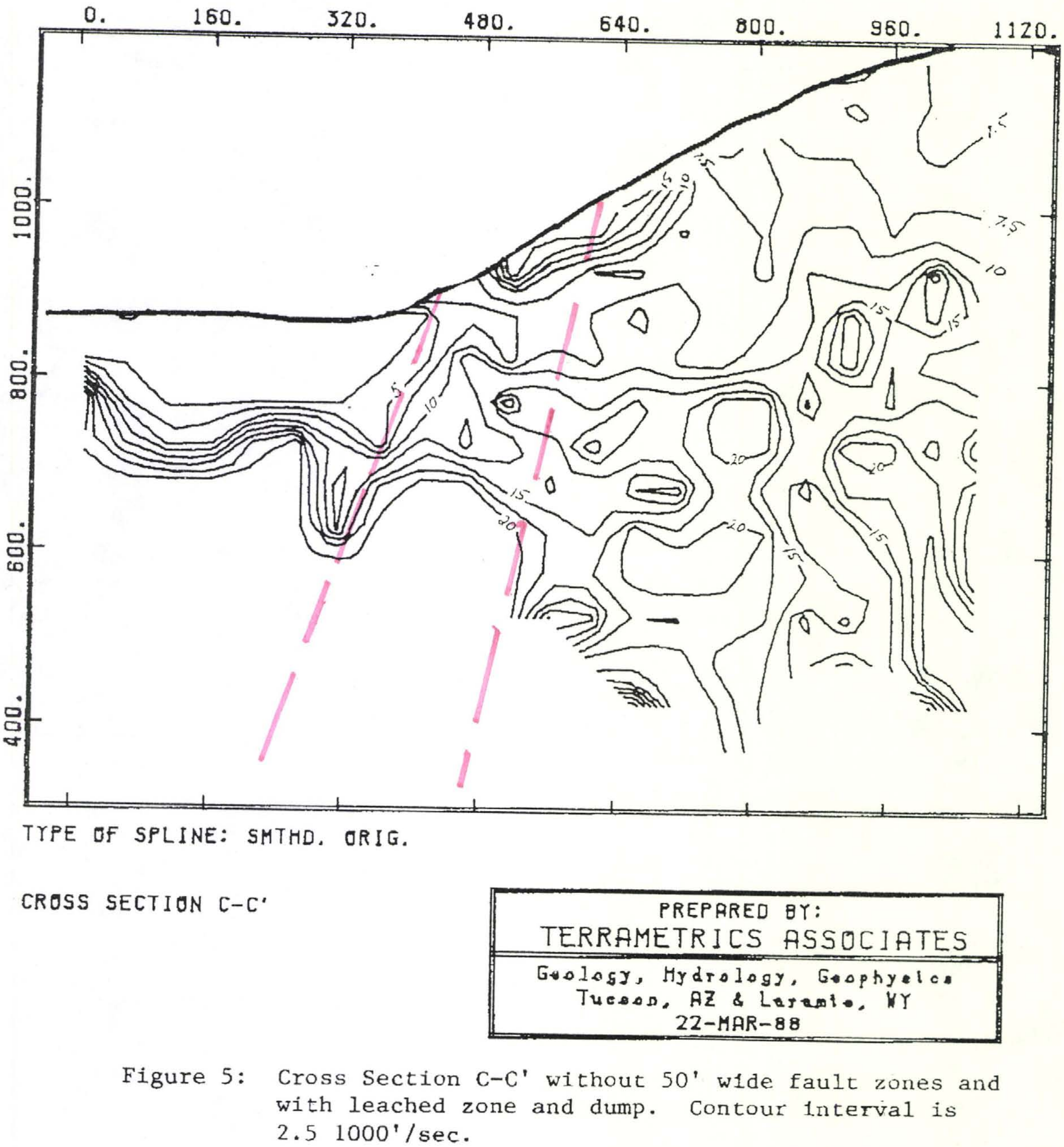


Figure 5: Cross Section C-C' without 50' wide fault zones and with leached zone and dump. Contour interval is 2.5 1000'/sec.

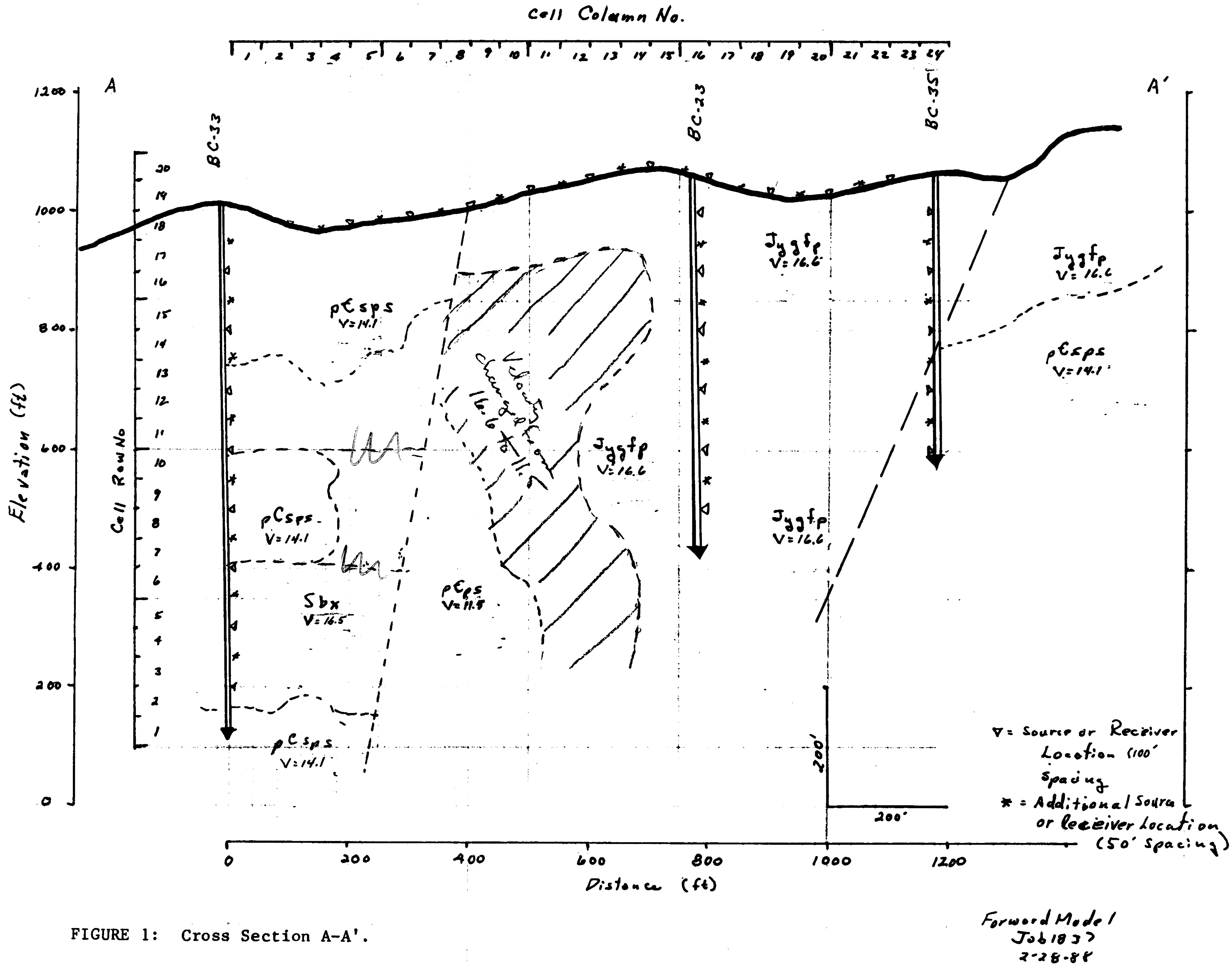
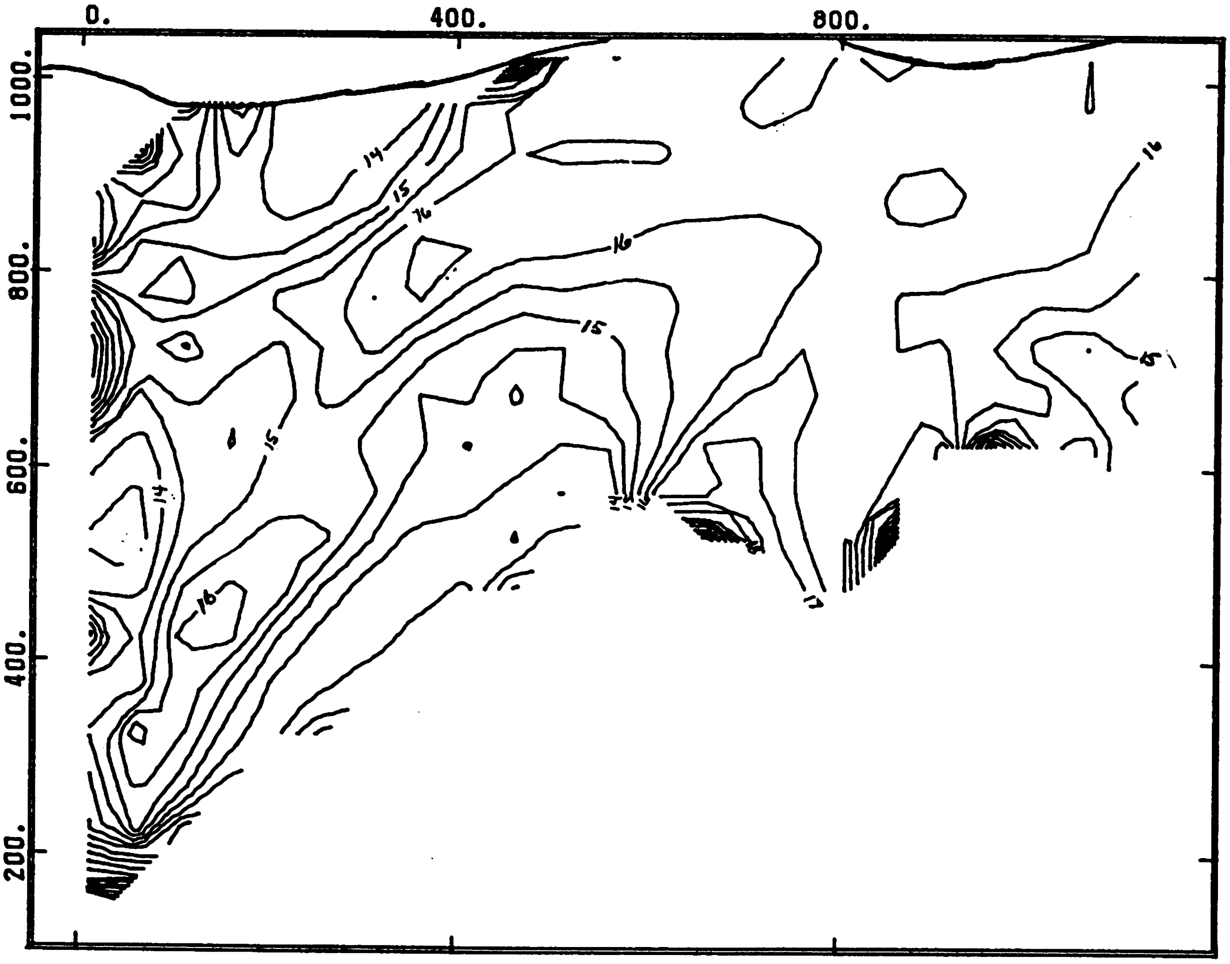


FIGURE 1: Cross Section A-A'.

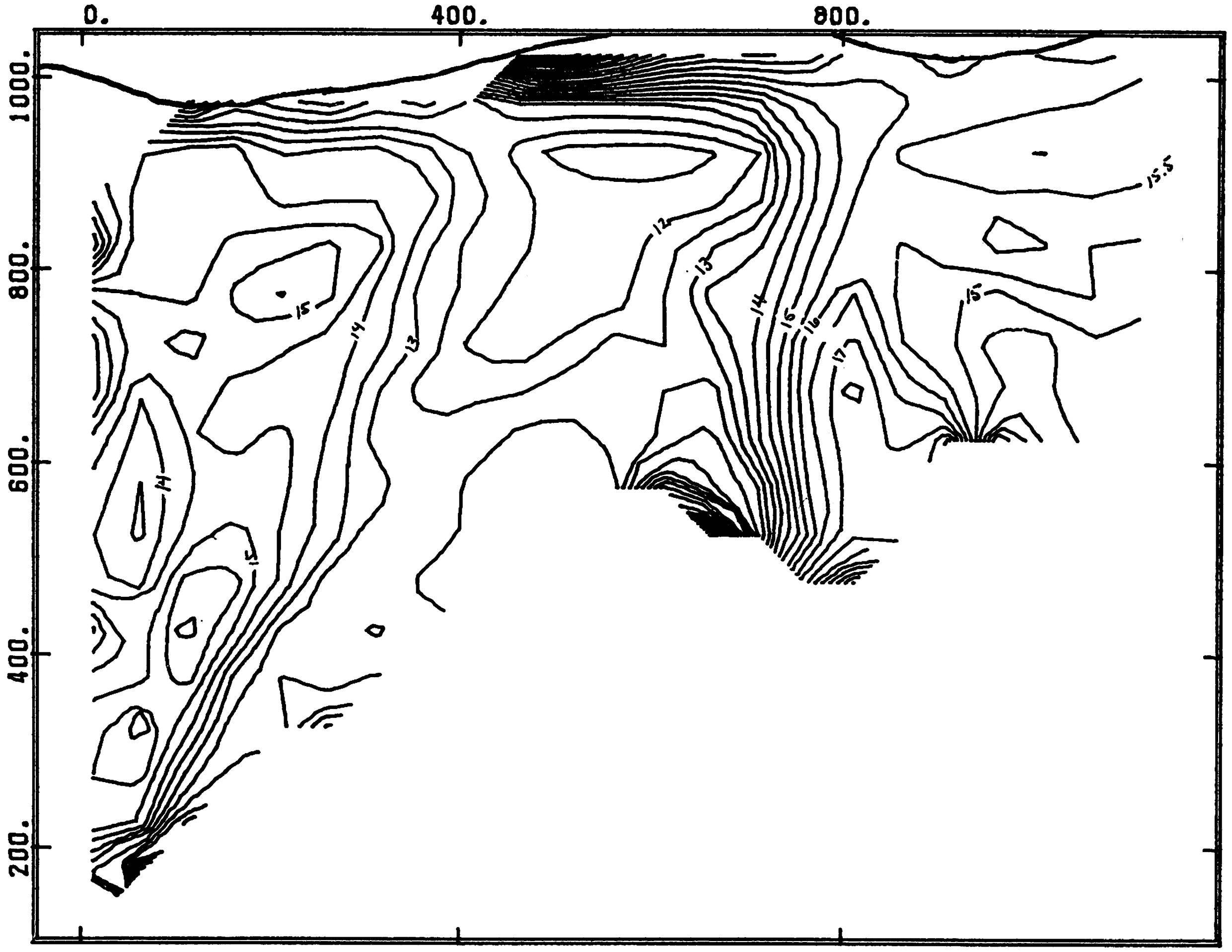


TYPE OF SPLINE: SMTHD. ORIG.

CROSS SECTION A-A' -- ORIGINAL

PREPARED BY: TERRAMETRICS ASSOCIATES
Geology, Hydrology, Geophysics Tucson, AZ & Laramie, WY 14-MAR-88

FIGURE 2: Original data provided.



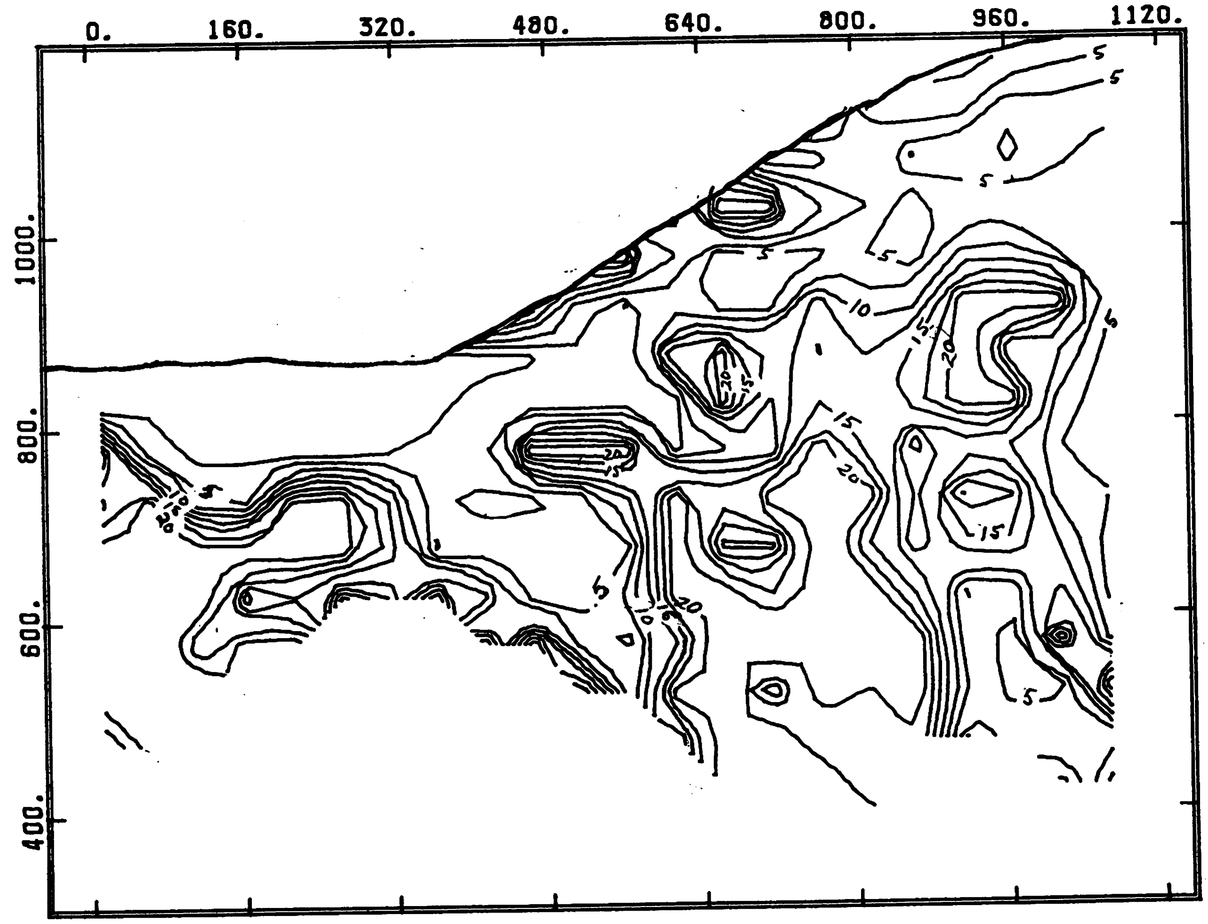
TYPE OF SPLINE: SMTHD. ORIG.

CROSS SECTION A-A' - REVISED

PREPARED BY:
TERRAMETRICS ASSOCIATES

Geology, Hydrology, Geophysics
Tucson, AZ & Laramie, WY
14-MAR-88

FIGURE 3: Original cross-section revised to fit figure 1.



TYPE OF SPLINE: SMTHD. ORIG.

CROSS SECTION C-C'

PREPARED BY:
TERRAMETRICS ASSOCIATES

Geology, Hydrology, Geophysics
Tucson, AZ & Laramie, WY
08-MAR-88

FIGURE 4: Solution using only BC-30, BC- 14, and BC-10.

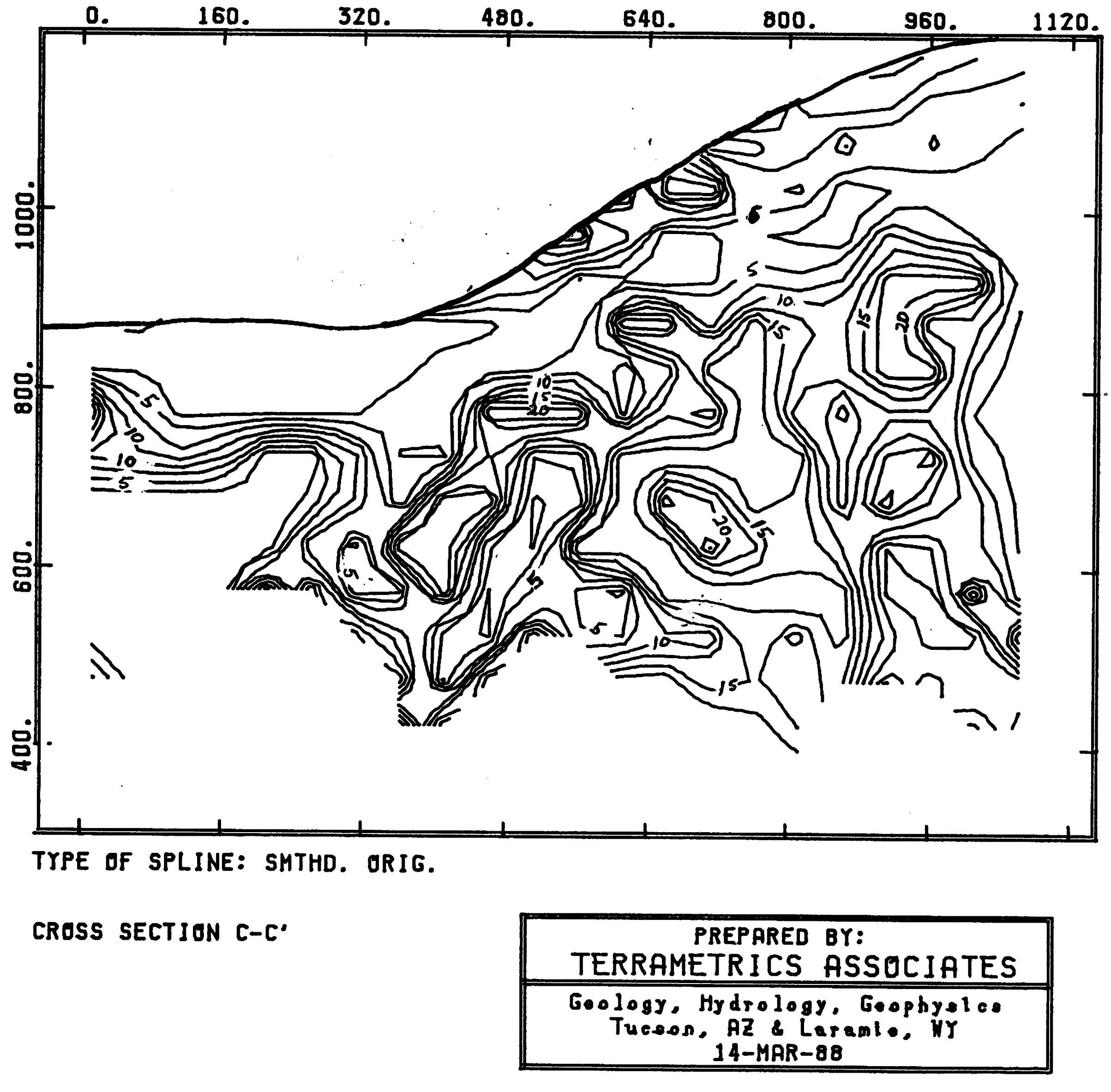
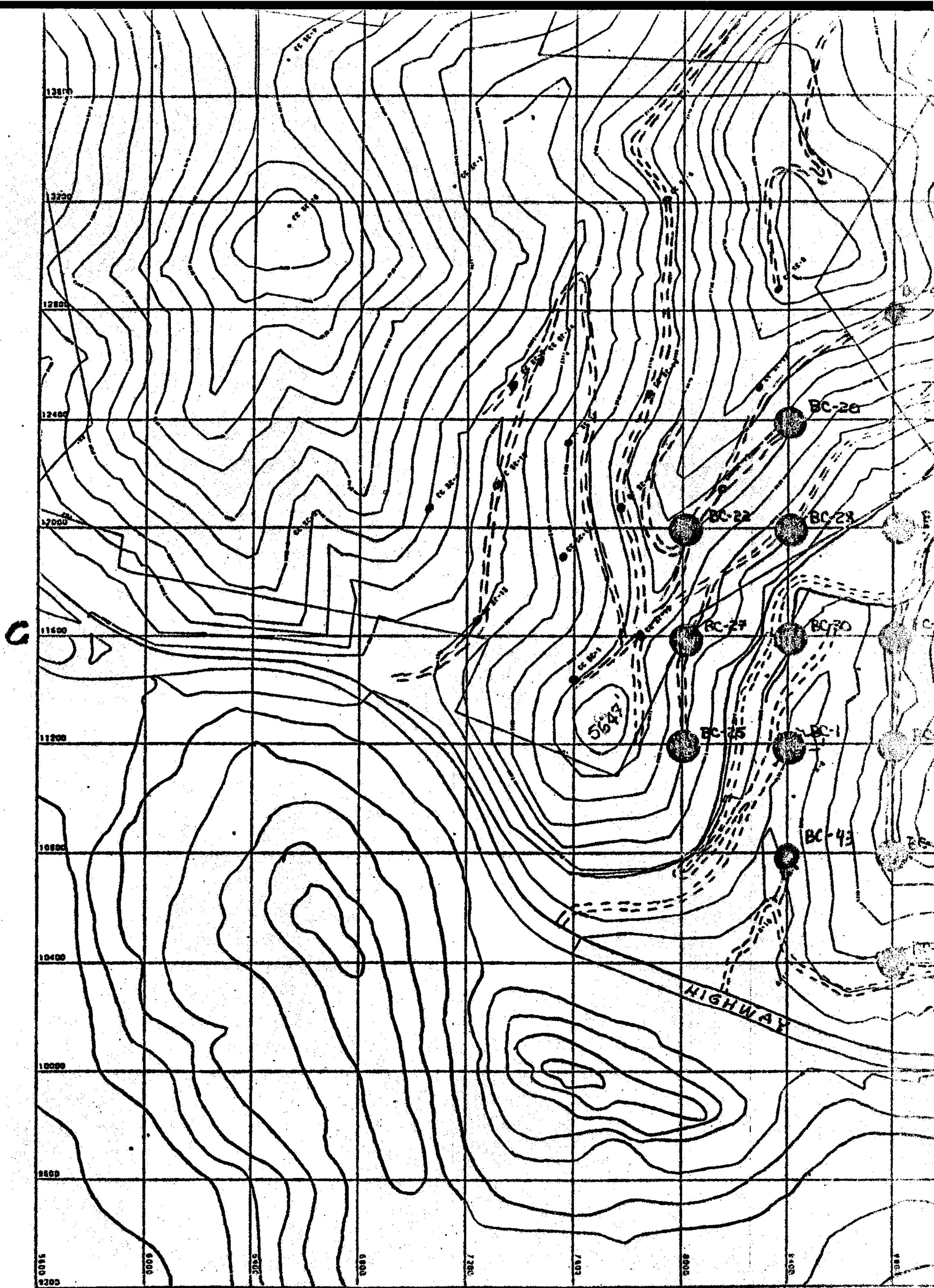


FIGURE 5: Solution using BC-30, BC-16, BC-14, and BC-10. There is an improvement in detail over Figure 4.



contour interval -: 50' GEOEX #AZ-1837

phelps dodge Corporation Western Exploration Office, P.O. Box 50427
1810 West Grant Road, Suite 103, Tucson, AZ 85703-1427 • (602) 792-4981

RECEIVED
MAY 10 1988

May 6, 1988

Walter Heinrichs
Terrametrics Associates
P.O. Box 5964
Tucson, Arizona 85703-0964

Dear Walt:

As we discussed this week, it appears that with the emphasis to move into preliminary feasibility as quickly as possible, we will not be able to do any geophysical test work at this time. I want to thank you for your efforts to get us a good proposal and an education as to what you could do for us. If events change, I will certainly be in touch with you again. Thanks again.

Very truly yours,

Steve Eady

C.S. Eady
Senior Geologist

CSE/el

cc: D.E. Ranta
A.M. Hauck

5/10/88
Mach Copy to RWD