

**Data Report**

**for**

**1988 PASSCAL Brooks Range Seismic Survey**

*A. R. Levander, E. S. Wissinger, C. F. Lafond*

*Department of Geology and Geophysics  
Rice University  
PO Box 1982  
Houston, TX 77251*

*713-527-4880  
713-285-5214 (FAX)*

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## INTRODUCTION

In June and July 1988, Rice University, in conjunction with the U.S. Geological Survey at Menlo Park, conducted a pilot seismic reflection/refraction experiment in the Brooks Range, Arctic Alaska. The experiment was funded primarily by the Program for Array Seismic Studies of the Continental Lithosphere (PASSCAL) of the Incorporated Research Institutions for Seismology (IRIS) with additional support provided by the USGS. Considerable manpower for the experiment was provided by the U.S. Geological Survey, and the University of Alaska at Fairbanks. The 1988 survey was the first of two Brooks Range-Arctic Slope experiments designed to investigate the crustal structure of the Brooks Range fold and thrust belt and foreland basin as part of the Trans-Alaska Crustal Transect (TACT) program of the Trans-Alaska Lithospheric Investigation (TALI), a consortium consisting of the U.S. Geological Survey and several universities (the University of Alaska at Fairbanks and Rice University).

The 1988 survey was a pilot program undertaken to aid in the design of the much larger experiment subsequently conducted in 1990. The goals of the 1988 survey were to gather a reversed wide-angle reflection/refraction profile across the Endicott Mountains Allochthon in the northern Brooks Range, to gather wave test data to examine wave propagation effects in the perma-frost layer, to test the broadcast range of the FM radio controlled SGR seismic system employed for recording, and to assess the logistical difficulties involved in conducting a large scale seismic experiment in the Arctic along the Dalton Highway (the Trans-Alaska Pipeline Road). This report describes the wide-angle reflection/refraction data collected across the Endicott Mountains Allochthon, a large-scale thrust sheet consisting of unmetamorphosed Paleozoic clastic and carbonate units (see Oldow et al., 1987; Mull, 1989).

## SURVEY DESCRIPTION

The wide-angle reflection/refraction profile extended roughly north-south along the Dalton highway, from near the Doonerak Window area at Chandalar Shelf across Atigun Pass to near the northern front of the Brooks Range (see figure 1). The data were recorded with 80 Seismic Group Recorders (SGR III) borrowed from AMOCO Corporation, Houston, TX. (The 80 SGRs are a part of the SGR system donated to Stanford by AMOCO.) Due to the limited number of instruments available, and the relatively short turn-on range (~10-15 km) of the radio triggered instruments, the profile was shot in four

deployments. A total of 10 shots at 3 shotpoints (see figures 1 and 2) were fired into the four deployments, producing a reversed profile 38 km in length, and an unreversed profile extending 14 km south of SP1. The seismic recorders were spaced at 150-m, 300-m, or 450-m. Deployments 1, 2, and 3 extended from south to north between shotpoints 1 and 3. Deployment 4 partially overlapped deployment 1, and extended south of shotpoint 1 (see figures 1 and 2). Shots were fired in drillholes at depths of 10 to 70 feet. Shot size varied from 150 lb to 550 lb of high explosive (see Appendix 1).

Each SGR recorded the output of a single 8-Hz vertical component industry geophone. The SGRs were turned on by an FM signal broadcast from a radio controller unit which was triggered by a USGS master clock, thus all instruments are on a common time base. Synchronized master clocks were used to trigger the shooting systems. The SGRs recorded 32-s of data at 2-msec sampling on 1/4" cassette tapes (20 seconds of reduced data have been written to tape). All instruments were run at the same gain setting, with no filters except the built in anti-alias filter. The SGR amplifier response is flat from DC up to 200 Hz, at which the anti-alias filter rolloff begins. The system response is therefore that of the 8-Hz geophone up to 200 Hz.

Seismograph station locations were surveyed every 150-m using a surveyor's wheel. Every tenth to twentieth station was located on a topographic map and aerial photographs. The station locations were later digitized from the topographic maps into local Cartesian coordinates (UTM), and the locations written to the data trace headers. We believe the stations are located with an accuracy of  $\pm 20$ -m. A table of the station locations is given.

#### DATA REDUCTION AND TAPE FORMAT

The SGR field records are identified by the number of the SGR box (SGRID), and FIELD FILE ID (FFID). Each time the controller box turned on the SGRs, a unique FFID number was written to the SGR field tapes. The shotpoints are identified in the data trace headers as shotpoint (SP = 1, 2, 3), and shot number (SHOT) which corresponds to the receiver station number (REC-STAT) at the shotpoint (SHOT=1000, 1114, 1275). A table showing the correspondence of SP, SHOT, and FFID is given in Appendix 1.

The data were corrected for timing errors between the master clocks used for shooting and the master clock used for triggering the SGR systems, and for time delays built into the SGR system. Times are believed to be accurate to  $\pm 2$  msec.

The geometry of the experiment was defined for the DISCO seismic processing system database using the locations digitized from topographic maps. The data were resampled to 4-msec, debiased (removal of DC) and low pass filtered at 50 Hz. The data were then sorted from deployments (keyed by FFID) into shot records (keyed by SHOT) with geometry written to headers. Lastly, a time reduction of  $T_R = (\text{offset}/6 \text{ km/sec})$  was applied, and traces were truncated to 20 sec (5000 samples).

We calculated amplitude corrections to equalize trace amplitudes in each composite shot record. Recall that each shot record is constructed from data from several different deployments. The amplitude correction factors were computed by comparing amplitudes at the same station occupied during different deployments or, where identical stations were unavailable, by comparing groups of adjacent traces. [Although each deployment had a few overlapping stations with the previous one, the overlap stations sometimes failed to turn on as they were at the ends of our recording spreads and consequently were at the limit of radio range]. We feel that the amplitude corrections are reasonable, but since we did not have identical stations recorded for each deployment, we wrote the uncorrected data to tape, and have provided a list of amplitude correction factors keyed by FFID in Appendix 2.

The data from the experiment are written in SEG Y format on 6250 bpi 9-track tape. The tape has standard SEG Y headers with the exceptions noted in Appendix 3. Shot and station locations in local Cartesian coordinates (UTM) are given in Appendices 4 and 5.

## DATA

The composite refraction profile shot records are plotted as reduced time record sections with trace normalized amplitude in figures 3-5 (reducing velocity = 6 km/s). Three seconds of data are shown. Negative offsets are to the south of the shotpoint, positive offsets to the north. The data have had a 50 Hz low-pass filter and debias applied only. No trace editing has been done. The plots show exactly what is on the SEG Y tape with the traces normalized and truncated to 3 seconds.

## ACKNOWLEDGEMENTS

We would like to thank Ed Criley, Gary Fuis, Ron Kaderabek, and Bob Page from the US Geological Survey in Menlo Park, David Stone, Doug Christensen, and Lorraine Wolf from the University of Alaska at Fairbanks, and Bruce Beaudoin from Stanford University for substantial assistance in the field. The Geophysical Institute at the University of Alaska at Fairbanks provided us use of a crucial staging area and electronics lab in Fairbanks. We would like to thank the AMOCO Production Company for use of the SGR system, and Danny Robinson at AMOCO for training us in use of the SGRs. George Thompson at Stanford University kindly lent us the 80 SGR's as they were "enroute" from the AMOCO Houston office to their new home at Stanford. The Alyeska Pipeline Company graciously provided permission to conduct the experiment along the pipeline corridor.

## REFERENCES

- Mull, C.G., 1989, Summary of structural style and history of Brooks Range deformation, in Mull, C.G., and K.E. Adams, editors, Dalton Highway, Yukon River to Prudhoe Bay, Alaska, Bedrock Geology of the eastern Koyukuk Basin, central Brooks Range, and eastcentral Arctic Slope, Guidebook 7, VI, Alaska Division of Geological and Geophysical Surveys, 31-46.
- Oldow, J.S., C.M. Seidensticker, J.C. Phelps, F.E. Julian, R.R. Gottschalk, K.W. Boler, J.W. Handschy, and H.G. Ave' Lallemand, 1987, Balanced Cross Sections Through the Central Brooks Range and North Slope, Arctic Alaska, *Am. Assoc. Petrol. Geol. Special Publication*, 19, pages, 8 plates.

## FIGURE CAPTIONS

Figure 1 : Location map of survey with latitude and longitude noted. Inset map of Alaska shows location of geologic map (stippled). Dashed line is Dalton Highway. Dark solid line shows receiver coverage with shotpoints noted. Maps are from Oldow et al., (1988).

Figure 2 : Schematic deployment diagram (top) and elevation profile (bottom) for BR88 survey. TOP : Stars show shotpoints, solid lines show the four deployments. L is approximate spread length,  $\Delta g$  is instrument spacing in each deployment.

Figure 3 : Trace normalized, reduced time record section from SP 1 (SHOT = 1000). Reducing velocity is 6 km/sec. Negative offsets are to the south of the shotpoint, positive offsets are to the north of the shotpoint. Instrument spacing is nominally 450 m south of the shotpoint, 150 m from 0 to 20 km offset and 36 to 38 km offset, and 300 m from 20 to 36 km offset. (See Figure 2). This is a plot of the first ensemble on the tape, with the record truncated to 3 seconds and the amplitudes normalized to the maximum value on each trace.

Figure 4 : Trace normalized, reduced time record section from SP 2 (SHOT 1114). Reducing velocity is 6 km/sec. Negative offsets are to the south of the shotpoint, positive offsets are to the north of the shotpoint. Instrument spacing is nominally 150 m from -15 to 6 km offset and 22 to 24 km offset, and 300 m from 6 to 22 km offset. (See Figure 2). This is a plot of the second ensemble on the tape, with the record truncated to 3 seconds and the amplitudes normalized to the maximum value on each trace.

Figure 5 : Trace normalized, reduced time record section from SP 3 (SHOT=1275). Reducing velocity is 6 km/sec. Negative offsets are to the south of the shotpoint, positive offsets are to the north of the shotpoint. Instrument spacing is nominally 450 m from -51 to -42, 300 m from -42 to -29 km offset, and -18 to -2 km offset, and 150 m elsewhere. (See Figure 2). This is a plot of the third ensemble on the tape, with the record truncated to 3 seconds and the amplitudes normalized to the maximum value on each trace.

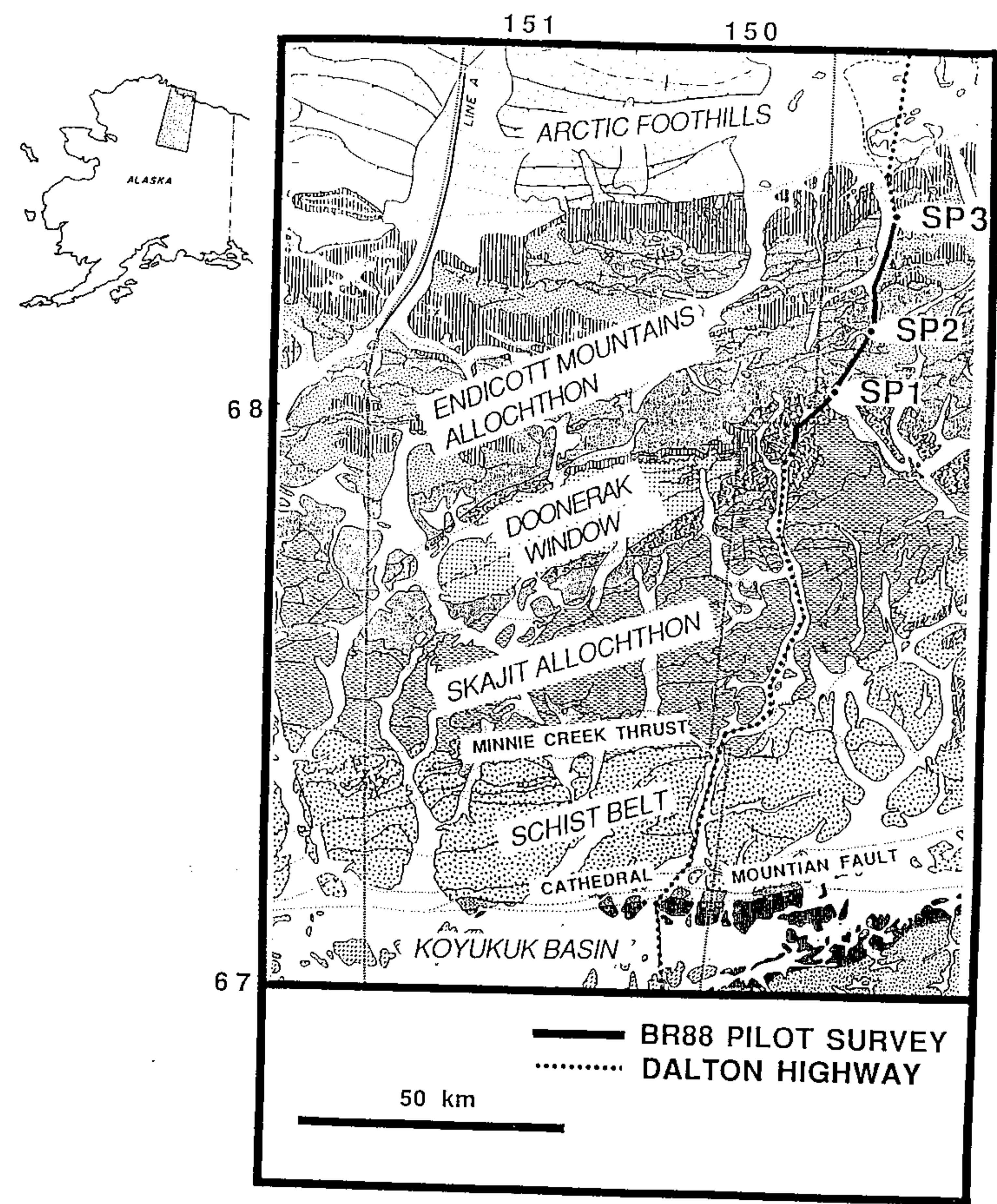


Figure 1.

# Wide-Angle Deployments

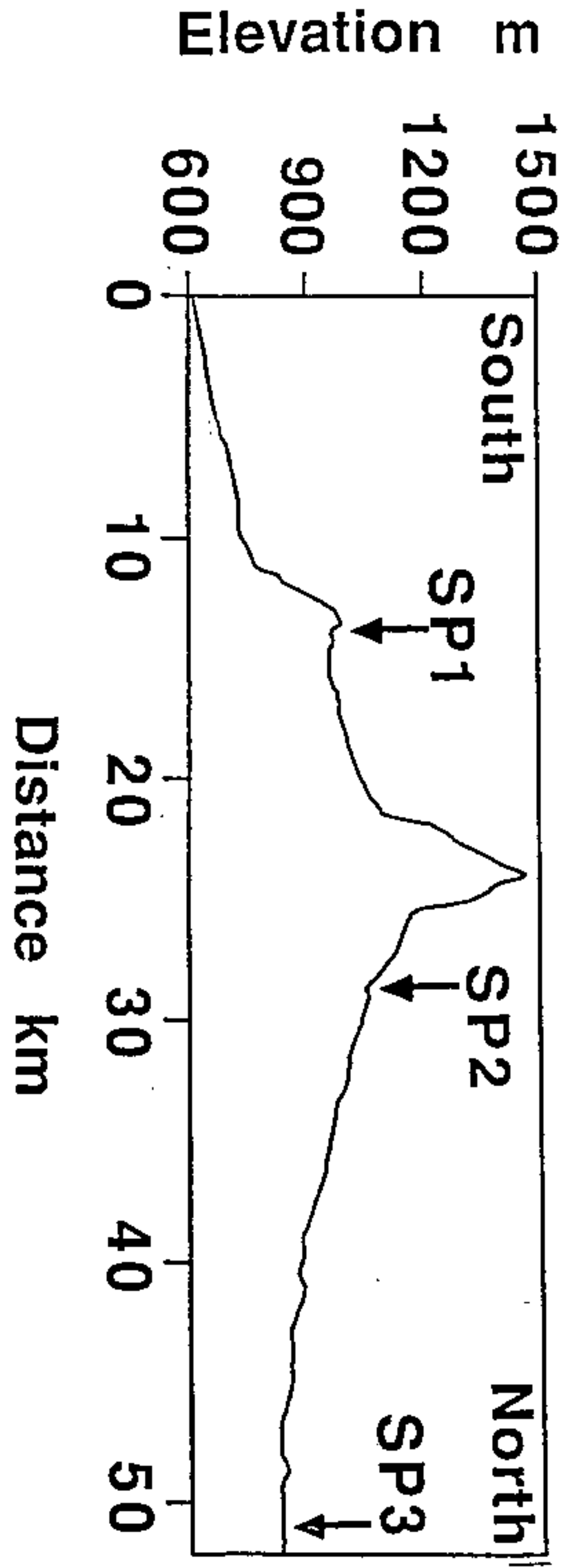
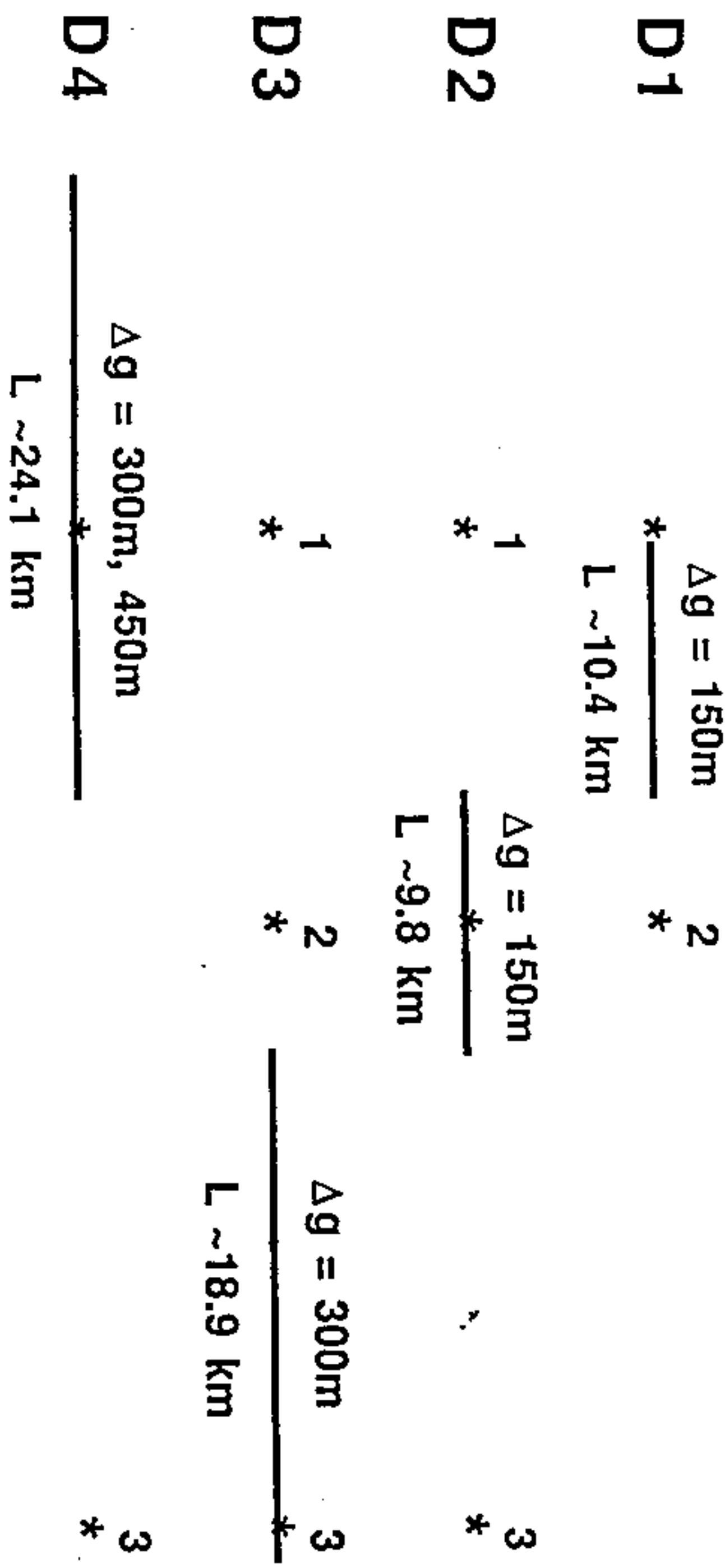
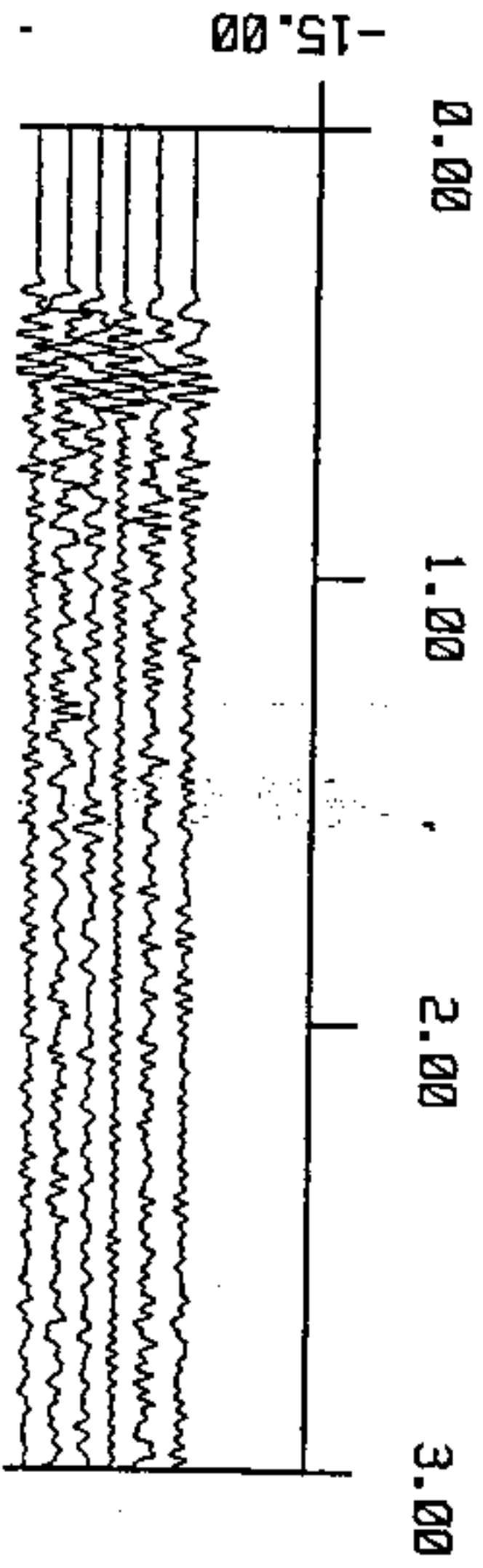


Figure 2.



T - X/VRED



T - X/VRED

T - X/VRED

0.00

1.00

2.00

3.00

## APPENDIX 1 : Shot Information

Deployment	FFID	SHOT	SP	Charge Size (lb)	Depth (ft)
1	9404	1000	1	250 lb	55
1	9406	1114	2	250	25
2	9205	1114	2	150	11
2	9206	1000	1	300	55
2	9208	1275	3	540	65
3	9303	1000	1	500	70
3	9304	1275	3	300	50
3	9307	1114	2	240	40
4	9607	1275	3	550	65
4	9611	1000	1	200	60

## APPENDIX 2 : Scaling Factors for Amplitudes in Composite Records

SP	SHOT	
1	1000	
FFID	REC-STAT	Multiplicative Scale
9206	1074-1148	1.00
9303	1149-1280	0.65
9404	1000-1072	1.32
9611	909-996	1.00

SP	SHOT	
2	1114	
FFID	REC-STAT	Multiplicative Scale
9205	1074-1150	1.00
9307	1152-1280	0.41
9406	1000-1072	0.64

SP	SHOT	
3	1275	
FFID	REC-STAT	Multiplicative Scale
9208	1074-1150	1.00
9304	1152-1280	1.32
9607	909-1072	0.87

## APPENDIX 3 : Special Headers on SEG Y Tape

Header Name	Byte Numbers	Meaning
FFID	9 - 12	Field File ID : unique record identifier
SHOT	17-20	Shot number corresponds to nearest receiver station to shotpoint
SHT-STAT	185-188	Shot station number : equivalent to SHOT
REC-STAT	189-192	Receiver station number
SGRID	197-200	SGR instrument number
VRED	201-204	Reducing velocity : 6000 meters/sec
AZIMUTH	209-212	0 if receiver is north of shotpoint, 180 if receiver is south of shotpoint
SP	213-216	Shotpoint number : either 1, 2, or 3

## APPENDIX 4 : Shot Locations in XY-UTM Coordinates

SP	SHOT*	SHT-X (East, meters)	SHT-Y (North, meters)	Elevation** (meters)
1	1000	516206	7548591	971
2	1114	523219	7561905	1055
3	1275	528140	7584683	824

\* SHOT is assigned as the closest REC-STAT to the shotpoint.

\*\* Shot elevations are not written to trace headers

## APPENDIX 5 : Receiver Locations in XY-UTM Coordinates

The following table contains the locations of the receiver stations occupied in the BR88 pilot experiment. Station number corresponds to the header REC-STAT. X and Y correspond to the UTM East and North coordinates in meters, respectively. All of the stations were occupied during the experiment, however not all boxes turned on at each station for each shot due to equipment failure and radio transmission problems.

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\*\*\*STATION NUMBERS, XY-UTM COORDINATES, AND ELEVATIONS

\*\* ST# X. Y. ELEV (m)

STATION	888	LXY	507339.7534707.	604.
STATION	894	LXY	507803.7535625.	608.
STATION	900	LXY	508539.7536086.	610.
STATION	906	LXY	509057.7536886.	610.
STATION	909	LXY	509316.7537324.	616..
STATION	912	LXY	509506.7537810.	622.
STATION	915	LXY	509632.7538272.	628.
STATION	918	LXY	509674.7538720.	634.
STATION	921	LXY	509730.7539201.	640.
STATION	924	LXY	509805.7539674.	643.
STATION	927	LXY	509859.7540082.	648.
STATION	930	LXY	510009.7540553.	654.
STATION	933	LXY	509991.7541061.	660.
STATION	936	LXY	510033.7541540.	666.
STATION	939	LXY	510184.7542011.	680.
STATION	942	LXY	510423.7542430.	683.
STATION	945	LXY	510591.7542870.	701.
STATION	948	LXY	510848.7543287.	707.
STATION	951	LXY	511092.7543674.	713.
STATION	954	LXY	511342.7544064.	718.
STATION	957	LXY	511598.7544481.	724.
STATION	960	LXY	511850.7544894.	730.
STATION	963	LXY	512111.7545297.	730.
STATION	966	LXY	512387.7545689.	730.
STATION	969	LXY	512757.7546014.	735.
STATION	972	LXY	513252.7546125.	745.
STATION	974	LXY	513553.7546180.	753.
STATION	976	LXY	513822.7546311.	759.
STATION	978	LXY	514060.7546503.	767.
STATION	980	LXY	514306.7546683.	773.
STATION	982	LXY	514597.7546738.	788.
STATION	984	LXY	514894.7546801.	832.
STATION	986	LXY	515074.7547049.	844.
STATION	988	LXY	515295.7547237.	878.
STATION	990	LXY	515381.7547521.	917.
STATION	992	LXY	515389.7547810.	948.
STATION	994	LXY	515435.7548096.	977.
STATION	996	LXY	515642.7548303.	986.
STATION	998	LXY	515897.7548469.	995.
STATION	1000	LXY	516202.7548599.	971.
STATION	1001	LXY	516264.7548733.	968.
STATION	1002	LXY	516296.7548861.	972.
STATION	1003	LXY	516359.7549009.	972.
STATION	1004	LXY	516424.7549147.	972.
STATION	1005	LXY	516481.7549283.	966.
STATION	1006	LXY	516540.7549426.	963.
STATION	1007	LXY	516587.7549556.	963.
STATION	1008	LXY	516637.7549692.	963.
STATION	1009	LXY	516686.7549828.	963.
STATION	1010	LXY	516735.7549980.	963.
STATION	1011	LXY	516781.7550121.	963.
STATION	1012	LXY	516822.7550253.	963.
STATION	1013	LXY	516880.7550405.	963.
STATION	1014	LXY	516924.7550541.	966.
STATION	1015	LXY	516984.7550675.	969.
STATION	1016	LXY	517055.7550816.	972.
STATION	1017	LXY	517145.7550950.	978.
STATION	1018	LXY	517270.7551067.	985.
STATION	1019	LXY	517383.7551167.	983.
STATION	1020	LXY	517488.7551266.	988.



STATION 1021	LXY	517583.7551370.	988.
STATION 1022	LXY	517718.7551487.	986.
STATION 1023	LXY	517815.7551595.	986.
STATION 1024	LXY	517921.7551700.	988.
STATION 1025	LXY	518014.7551801.	991.
STATION 1026	LXY	518119.7551916.	994.
STATION 1027	LXY	518231.7552026.	997.
STATION 1028	LXY	518337.7552131.	1000.
STATION 1029	LXY	518440.7552252.	1003.
STATION 1030	LXY	518543.7552384.	1006.
STATION 1031	LXY	518645.7552523.	1006.
STATION 1032	LXY	518721.7552667.	1009.
STATION 1033	LXY	518778.7552795.	1012.
STATION 1034	LXY	518833.7552943.	1015.
STATION 1035	LXY	518877.7553077.	1018.
STATION 1036	LXY	518912.7553230.	1021.
STATION 1037	LXY	518992.7553357.	1024.
STATION 1038	LXY	519108.7553438.	1027.
STATION 1039	LXY	519233.7553533.	1030.
STATION 1040	LXY	519315.7553650.	1033.
STATION 1041	LXY	519382.7553778.	1036.
STATION 1042	LXY	519436.7553916.	1041.
STATION 1043	LXY	519506.7554044.	1045.
STATION 1044	LXY	519583.7554170.	1050.
STATION 1045	LXY	519679.7554323.	1055.
STATION 1046	LXY	519706.7554501.	1059.
STATION 1047	LXY	519690.7554662.	1064.
STATION 1048	LXY	519621.7554801.	1067.
STATION 1049	LXY	519566.7554908.	1071.
STATION 1050	LXY	519525.7555058.	1076.
STATION 1051	LXY	519466.7555202.	1081.
STATION 1052	LXY	519397.7555344.	1085.
STATION 1053	LXY	519403.7555485.	1090.
STATION 1054	LXY	519442.7555627.	1094.
STATION 1055	LXY	519492.7555771.	1117.
STATION 1056	LXY	519540.7555892.	1158.
STATION 1057	LXY	519582.7556050.	1213.
STATION 1058	LXY	519704.7556133.	1225.
STATION 1059	LXY	519804.7556230.	1244.
STATION 1060	LXY	519900.7556349.	1259.
STATION 1061	LXY	520026.7556439.	1268.
STATION 1062	LXY	520166.7556516.	1274.
STATION 1063	LXY	520286.7556635.	1292.
STATION 1064	LXY	520404.7556740.	1311.
STATION 1065	LXY	520536.7556804.	1326.
STATION 1066	LXY	520700.7556859.	1347.
STATION 1067	LXY	520838.7556911.	1359.
STATION 1068	LXY	520974.7556977.	1372.
STATION 1069	LXY	521129.7557039.	1387.
STATION 1070	LXY	521265.7557088.	1402.
STATION 1071	LXY	521402.7557142.	1273.
STATION 1072	LXY	521541.7557209.	1448.
STATION 1073	LXY	521682.7557282.	1463.
STATION 1074	LXY	521715.7557430.	1448.
STATION 1075	LXY	521784.7557553.	1402.
STATION 1076	LXY	521874.7557676.	1381.
STATION 1077	LXY	522005.7557752.	1366.
STATION 1079	LXY	522123.7557802.	1362.
STATION 1080	LXY	522255.7557861.	1347.
STATION 1081	LXY	522415.7557884.	1335.
STATION 1082	LXY	522548.7557938.	1320.
STATION 1083	LXY	522710.7557961.	1295.
STATION 1084	LXY	522865.7557993.	1259.
STATION 1085	LXY	523007.7558022.	1204.

STATION 1086	LXY	523143.7558054.	1180.
STATION 1088	LXY	523224.7558232.	1164.
STATION 1089	LXY	523243.7558388.	1161.
STATION 1090	LXY	523271.7558538.	1155.
STATION 1091	LXY	523287.7558687.	1152.
STATION 1092	LXY	523313.7558836.	1149.
STATION 1093	LXY	523334.7558979.	1146.
STATION 1094	LXY	523355.7559129.	1143.
STATION 1095	LXY	523362.7559270.	1140.
STATION 1096	LXY	523372.7559421.	1137.
STATION 1097	LXY	523371.7559567.	1134.
STATION 1098	LXY	523386.7559720.	1131.
STATION 1099	LXY	523433.7559854.	1128.
STATION 1100	LXY	523487.7560009.	1122.
STATION 1101	LXY	523534.7560137.	1116.
STATION 1102	LXY	523576.7560270.	1109.
STATION 1103	LXY	523615.7560412.	1103.
STATION 1104	LXY	523651.7560550.	1097.
STATION 1105	LXY	523659.7560699.	1091.
STATION 1106	LXY	523651.7560848.	1085.
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STATION 1108	LXY	523608.7561136.	1071.
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STATION 1114	LXY	523222.7561919.	1055.
STATION 1115	LXY	523373.7562056.	1058.
STATION 1116	LXY	523475.7562170.	1055.
STATION 1117	LXY	523579.7562272.	1052.
STATION 1118	LXY	523683.7562387.	1049.
STATION 1119	LXY	523759.7562525.	1045.
STATION 1120	LXY	523825.7562656.	1042.
STATION 1121	LXY	523900.7562786.	1039.
STATION 1122	LXY	523967.7562919.	1039.
STATION 1123	LXY	524041.7563063.	1033.
STATION 1124	LXY	524075.7563208.	1030.
STATION 1125	LXY	524084.7563343.	1027.
STATION 1126	LXY	524074.7563478.	1024.
STATION 1127	LXY	524054.7563624.	1021.
STATION 1128	LXY	524038.7563781.	1018.
STATION 1129	LXY	524022.7563928.	1015.
STATION 1130	LXY	524035.7564089.	1012.
STATION 1131	LXY	524078.7564222.	1009.
STATION 1132	LXY	524138.7564367.	1006.
STATION 1133	LXY	524197.7564487.	1006.
STATION 1134	LXY	524282.7564625.	1009.
STATION 1135	LXY	524367.7564729.	1006.
STATION 1136	LXY	524444.7564865.	1003.
STATION 1137	LXY	524535.7564987.	1003.
STATION 1138	LXY	524624.7565114.	1003.
STATION 1139	LXY	524702.7565230.	1000.
STATION 1140	LXY	524786.7565356.	997.
STATION 1141	LXY	524805.7565525.	994.
STATION 1142	LXY	524784.7565680.	991.
STATION 1143	LXY	524741.7565834.	988.
STATION 1144	LXY	524695.7565966.	985.
STATION 1145	LXY	524637.7566102.	981.
STATION 1146	LXY	524584.7566236.	978.
STATION 1147	LXY	524513.7566376.	977.
STATION 1148	LXY	524460.7566528.	974.
STATION 1149	LXY	524492.7566660.	972.
STATION 1150	LXY	524572.7566795.	971.

STATION 1152	LXY	524721.7567023.	968.
STATION 1154	LXY	524756.7567323.	965.
STATION 1156	LXY	524693.7567614.	962.
STATION 1158	LXY	524632.7567904.	959.
STATION 1160	LXY	524574.7568200.	956.
STATION 1162	LXY	524506.7568494.	953.
STATION 1164	LXY	524430.7568798.	949.
STATION 1166	LXY	524290.7569115.	946.
STATION 1168	LXY	524154.7569369.	943.
STATION 1170	LXY	524038.7569643.	943.
STATION 1172	LXY	523997.7569920.	942.
STATION 1174	LXY	524019.7570214.	936.
STATION 1176	LXY	524036.7570510.	930.
STATION 1178	LXY	524057.7570825.	924.
STATION 1180	LXY	524100.7571140.	917.
STATION 1182	LXY	524243.7571405.	911.
STATION 1184	LXY	524384.7571678.	905.
STATION 1186	LXY	524528.7571945.	899.
STATION 1188	LXY	524666.7572208.	893.
STATION 1190	LXY	524649.7572485.	884.
STATION 1192	LXY	524787.7572761.	884.
STATION 1194	LXY	524934.7573038.	884.
STATION 1196	LXY	525079.7573317.	884.
STATION 1198	LXY	525227.7573583.	878.
STATION 1200	LXY	525370.7573849.	872.
STATION 1202	LXY	525515.7574112.	878.
STATION 1204	LXY	525739.7574329.	887.
STATION 1206	LXY	525967.7574527.	884.
STATION 1208	LXY	526123.7574766.	881.
STATION 1210	LXY	526172.7575062.	872.
STATION 1212	LXY	526223.7575356.	866.
STATION 1214	LXY	526260.7575674.	860.
STATION 1216	LXY	526289.7575955.	852.
STATION 1218	LXY	526326.7576252.	850.
STATION 1220	LXY	526360.7576556.	852.
STATION 1222	LXY	526401.7576845.	853.
STATION 1224	LXY	526461.7577148.	853.
STATION 1226	LXY	526521.7577488.	850.
STATION 1228	LXY	526605.7577779.	850.
STATION 1230	LXY	526689.7578068.	852.
STATION 1232	LXY	526769.7578361.	849.
STATION 1234	LXY	526855.7578629.	844.
STATION 1236	LXY	526815.7578942.	840.
STATION 1238	LXY	526768.7579234.	835.
STATION 1240	LXY	526718.7579559.	831.
STATION 1242	LXY	526707.7579864.	824.
STATION 1244	LXY	526772.7580169.	821.
STATION 1246	LXY	526868.7580465.	821.
STATION 1248	LXY	526966.7580757.	821.
STATION 1250	LXY	527078.7581049.	821.
STATION 1252	LXY	527212.7581297.	820.
STATION 1254	LXY	527354.7581572.	832.
STATION 1256	LXY	527499.7581861.	838.
STATION 1258	LXY	527636.7582125.	826.
STATION 1260	LXY	527753.7582413.	820.
STATION 1262	LXY	527771.7582698.	820.
STATION 1263	LXY	527785.7582842.	820.
STATION 1264	LXY	527823.7582999.	820.
STATION 1265	LXY	527873.7583145.	820.
STATION 1266	LXY	527915.7583281.	820.
STATION 1267	LXY	527967.7583419.	820.
STATION 1268	LXY	528014.7583576.	820.
STATION 1269	LXY	528056.7583709.	820.
STATION 1270	LXY	528103.7583851.	820.

STATION 1271	LXY	528148.7583991.	820.
STATION 1272	LXY	528195.7584140.	820.
STATION 1273	LXY	528213.7584294.	821.
STATION 1274	LXY	528192.7584485.	821.
STATION 1275	LXY	528172.7584685.	824.
STATION 1276	LXY	528151.7584824.	823.
STATION 1277	LXY	528128.7584972.	820.
STATION 1278	LXY	528112.7585124.	820.
STATION 1279	LXY	528093.7585265.	820.
STATION 1280	LXY	528071.7585413.	820.