

# MRVE

## The Minnesota River Valley 1990 Wide-angle Experiment

Prepared by  
W. Clement and S. Smithson  
University of Wyoming

### PASSCAL Data Report 94-006



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## Minnesota River Valley 1990 Wide-angle experiment

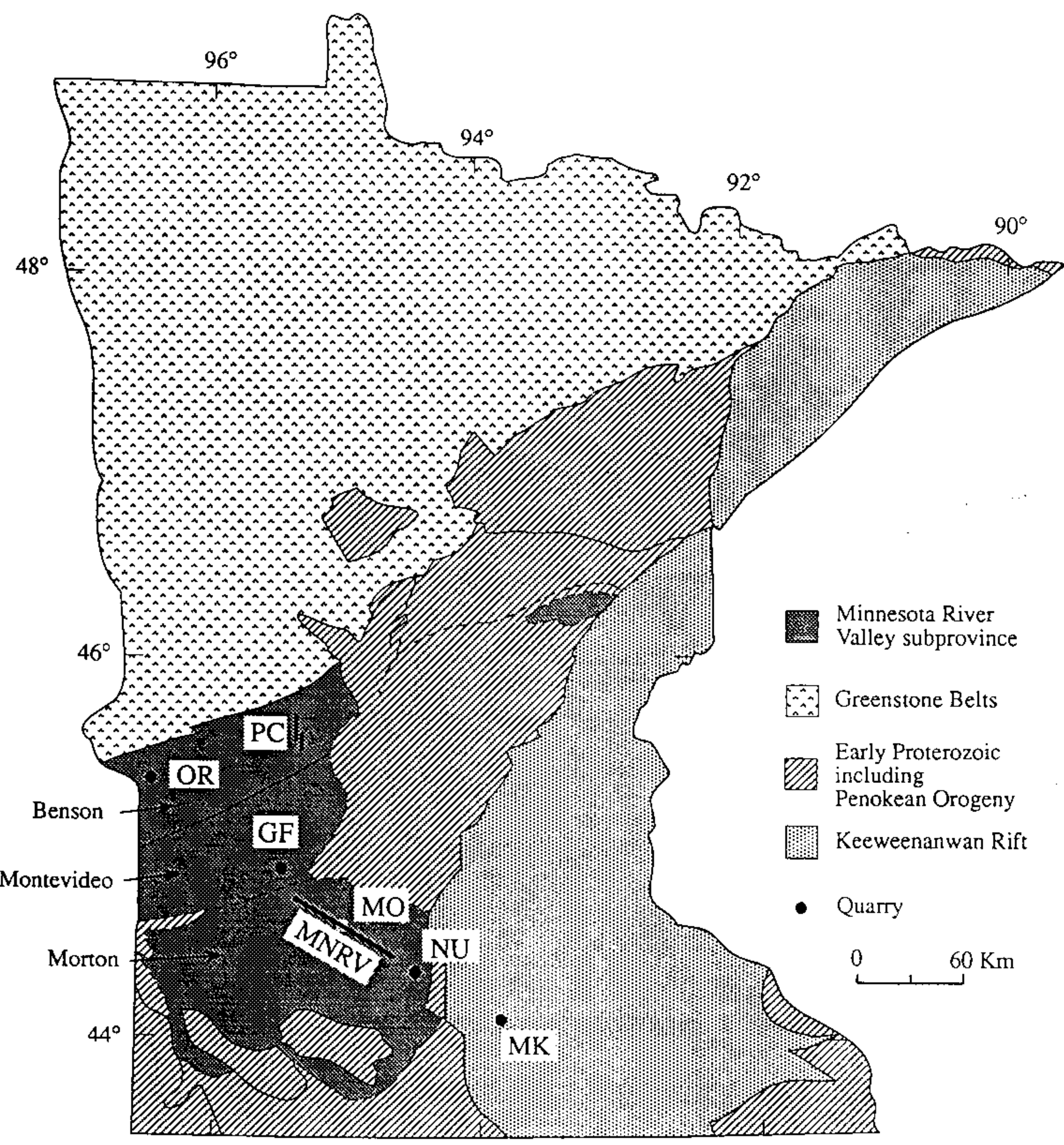
Principle Investigator:  
Scott B. Smithson  
Department of Geology and Geophysics  
University of Wyoming  
Laramie, WY 82071

In the summer of 1990, the University of Wyoming conducted a wide-angle reflection/refraction experiment along the Minnesota River Valley (figure 1). The goal of the seismic experiment is to image crustal structure and determine the velocity of the crust beneath this Archean terrane. We deployed the instruments along the Minnesota River, since it has eroded the glacial till, exposing Archean rocks. Blasts from four quarries provided approximately in-line sources for the survey. The data are of typical quarry blast quality; the first arrival is the only easily correlatable phase.

SGRs and REFTEKs on loan from IRIS PASSCAL were deployed along the Minnesota River northwest of North Redwood Falls, MN. The array consisted of about 180 SGRs and thirty-three 6-channel REFTEKs spaced at about 100 meter intervals. The REFTEKs were deployed at stations 19 to 84 and the SGRs were deployed from station 85 to 262. The SGRs had vertical component geophones and the REFTEK instruments had three-component geophones. A REFTEK was deployed at every other station, recording three components at two stations.

Seven blasts from four quarries provided the seismic energy. Quarries located at Ortonville, MN and Granite Falls, MN were to the northwest of the receiver array and quarries from Mankato, MN and New Ulm, MN were to the southeast of the receiver spread. Shot 2 was from Granite Falls, MN, shot 3 from Ortonville, MN, shots 4 and 5 from New Ulm, MN and shots 6 and 7 were from Mankato, MN. Shot 4 was supposedly a single, large blast. The other shots were all ripple fired quarry blasts. Not all the shots were recorded by the SGRs and the REFTEKs. The SGRs recorded shots 2, 3, 4, 5, and 7, whereas the REFTEKs recorded shots 2, 3, 4, and 6. The quarries provided offsets ranging between 25 km to 140 km.

The data are stored in SEG-Y format on two exabyte tapes. The spatial data on the tapes are in meters. Locations are in UTM coordinates. One tape, MINN9001, contains the seismic data from the SGRs and the other tape, MINN9002, contains the three-component data from the REFTEK instruments. There are two non-defined headers. Bytes 189-190 contain the shot number in integer format and bytes 191-192 contain information about the receiver orientation. The information in bytes 191-192 is a two digit integer header named INDEX; the tens digit refers to the shot number and the ones digit refers to the receiver orientation. For the SGR data, INDEX is a multiple of ten since only vertical component geophones were deployed. The REFTEK data INDEX header has the ones digit ranging from 1 to 6; 1 and 4 refer to the vertical component data, 2 and 5 refer to the north-south oriented geophones; and 3 and 6 refer to the east-west oriented geophones. 1 to 3 are for the odd numbered stations and 4 to 6 are for the even numbered stations since the REFTEKs were deployed over two stations.



adapted from Chandler and Southwick (1990)

## Appendix A

List of receiver locations from the DISCO LINE module. Note that the locations are in UTM format and the elevations are in meters.

(LOCN station number LXY Easting Northing Elevation)

*CALL	LINE	STATIONS		
LOCN	1	LXY	420543.4895176	273.
LOCN	2	LXY	387831.4903970.	262.
LOCN	3	LXY	343103.4934485.	273.
LOCN	4	LXY	339087.4936109.	274.
LOCN	5	LXY	338898.4936102.	271.
LOCN	6	LXY	338700.4936132.	268.
LOCN	7	LXY	338522.4936215.	259.
LOCN	8	LXY	338320.4936227.	258.
LOCN	9	LXY	338117.4936239.	257.
LOCN	10	LXY	337914.4936251.	256.
LOCN	11	LXY	337711.4936262.	255.
LOCN	12	LXY	337505.4936246.	255.
LOCN	13	LXY	337419.4936282.	255.
LOCN	14	LXY	337335.4936346.	255.
LOCN	15	LXY	337271.4936444.	259.
LOCN	16	LXY	337195.4936499.	261.
LOCN	17	LXY	337133.4936563.	262.
LOCN	18	LXY	337038.4936622.	264.
LOCN	19	LXY	336957.4936672.	264.
LOCN	20	LXY	336875.4936722.	264.
LOCN	21	LXY	336794.4936772.	264.
LOCN	22	LXY	336697.4936824.	264.
LOCN	23	LXY	336611.4936858.	264.
LOCN	24	LXY	336526.4936892.	264.
LOCN	25	LXY	336433.4936941.	264.
LOCN	26	LXY	336339.4936989.	264.
LOCN	27	LXY	336238.4937047.	264.
LOCN	28	LXY	336170.4937085.	264.
LOCN	29	LXY	336097.4937156.	264.
LOCN	30	LXY	336023.4937227.	264.
LOCN	31	LXY	335939.4937282.	265.
LOCN	32	LXY	335855.4937337.	265.
LOCN	33	LXY	335772.4937385.	265.
LOCN	34	LXY	335687.4937447.	264.
LOCN	35	LXY	335601.4937508.	264.
LOCN	36	LXY	335502.4937541.	264.
LOCN	37	LXY	335412.4937586.	265.
LOCN	38	LXY	335323.4937631.	267.
LOCN	39	LXY	335233.4937675.	268.

LOCN	40	LXY	335142.4937715.	268.
LOCN	41	LXY	335050.4937755.	268.
LOCN	42	LXY	334959.4937795.	268.
LOCN	43	LXY	334879.4937831.	267.
LOCN	44	LXY	334810.4937907.	265.
LOCN	45	LXY	334745.4937982.	263.
LOCN	46	LXY	334679.4938056.	261.
LOCN	47	LXY	334623.4938142.	264.
LOCN	48	LXY	334568.4938228.	268.
LOCN	49	LXY	334512.4938313.	271.
LOCN	50	LXY	334428.4938433.	277.
LOCN	51	LXY	334383.4938495.	276.
LOCN	52	LXY	334303.4938562.	276.
LOCN	53	LXY	334280.4938636.	276.
LOCN	54	LXY	334227.4938736.	276.
LOCN	55	LXY	334124.4938740.	270.
LOCN	56	LXY	334058.4938827.	264.
LOCN	57	LXY	333983.4938898.	264.
LOCN	58	LXY	333907.4938968.	264.
LOCN	59	LXY	333837.4939018.	264.
LOCN	60	LXY	333775.4939103.	267.
LOCN	61	LXY	333713.4939187.	270.
LOCN	62	LXY	333655.4939263.	270.
LOCN	63	LXY	333597.4939338.	270.
LOCN	64	LXY	333539.4939413.	270.
LOCN	65	LXY	333480.4939503.	270.
LOCN	66	LXY	333420.4939593.	270.
LOCN	67	LXY	333357.4939668.	269.
LOCN	68	LXY	333293.4939743.	268.
LOCN	69	LXY	333230.4939817.	268.
LOCN	70	LXY	333138.4939907.	268.
LOCN	71	LXY	333090.4939971.	271.
LOCN	72	LXY	333028.4940036.	271.
LOCN	73	LXY	332965.4940100.	271.
LOCN	74	LXY	332903.4940184.	271.
LOCN	75	LXY	332840.4940268.	271.
LOCN	76	LXY	332779.4940348.	272.
LOCN	77	LXY	332718.4940427.	273.
LOCN	78	LXY	332657.4940506.	274.
LOCN	79	LXY	332596.4940585.	274.
LOCN	80	LXY	332527.4940658.	275.
LOCN	81	LXY	332457.4940730.	276.
LOCN	82	LXY	332388.4940802.	277.
LOCN	83	LXY	332301.4940857.	277.
LOCN	84	LXY	332214.4940911.	277.
LOCN	85	LXY	332134.4940968.	274.

LOCN	86	LXY	332053.4941025.	271.
LOCN	87	LXY	331973.4941081.	268.
LOCN	88	LXY	331878.4941123.	267.
LOCN	89	LXY	331783.4941165.	266.
LOCN	90	LXY	331693.4941227.	267.
LOCN	91	LXY	331614.4941266.	267.
LOCN	92	LXY	331527.4941312.	268.
LOCN	93	LXY	331439.4941357.	270.
LOCN	94	LXY	331375.4941439.	268.
LOCN	95	LXY	331334.4941536.	274.
LOCN	96	LXY	331293.4941633.	280.
LOCN	97	LXY	331237.4941714.	283.
LOCN	98	LXY	331206.4941797.	283.
LOCN	99	LXY	331151.4941890.	280.
LOCN	100	LXY	331095.4941982.	277.
LOCN	101	LXY	331034.4942060.	280.
LOCN	102	LXY	330972.4942137.	282.
LOCN	103	LXY	330900.4942195.	282.
LOCN	104	LXY	330828.4942253.	282.
LOCN	105	LXY	330730.4942309.	282.
LOCN	106	LXY	330673.4942380.	282.
LOCN	107	LXY	330628.4942462.	279.
LOCN	108	LXY	330551.4942531.	279.
LOCN	109	LXY	330389.4942639.	280.
LOCN	110	LXY	330313.4942688.	282.
LOCN	111	LXY	330236.4942736.	283.
LOCN	112	LXY	330141.4942813.	283.
LOCN	113	LXY	330039.4942837.	279.
LOCN	114	LXY	329937.4942861.	274.
LOCN	115	LXY	329841.4942854.	270.
LOCN	116	LXY	329763.4942900.	270.
LOCN	117	LXY	329698.4943006.	274.
LOCN	118	LXY	329618.4943076.	276.
LOCN	119	LXY	329523.4943071.	276.
LOCN	120	LXY	329427.4943095.	274.
LOCN	121	LXY	329317.4943091.	273.
LOCN	122	LXY	329224.4943093.	273.
LOCN	123	LXY	329130.4943094.	273.
LOCN	124	LXY	329020.4943115.	274.
LOCN	125	LXY	328930.4943137.	274.
LOCN	126	LXY	328840.4943159.	274.
LOCN	127	LXY	328739.4943185.	275.
LOCN	128	LXY	328637.4943210.	276.
LOCN	129	LXY	328554.4943251.	262.
LOCN	130	LXY	328483.4943316.	265.
LOCN	131	LXY	328412.4943381.	268.

LOCN	132	LXY	328308.4943401.	271.
LOCN	133	LXY	328204.4943420.	274.
LOCN	134	LXY	328103.4943432.	275.
LOCN	135	LXY	328012.4943430.	274.
LOCN	136	LXY	327920.4943428.	273.
LOCN	137	LXY	327814.4943452.	277.
LOCN	138	LXY	327720.4943460.	282.
LOCN	139	LXY	327655.4943562.	287.
LOCN	140	LXY	327579.4943625.	287.
LOCN	141	LXY	327496.4943686.	285.
LOCN	142	LXY	327414.4943747.	284.
LOCN	143	LXY	327331.4943807.	283.
LOCN	144	LXY	327254.4943881.	283.
LOCN	145	LXY	327191.4943946.	289.
LOCN	146	LXY	327122.4944027.	285.
LOCN	147	LXY	327062.4944106.	283.
LOCN	148	LXY	326993.4944176.	281.
LOCN	149	LXY	326924.4944245.	279.
LOCN	150	LXY	326855.4944314.	277.
LOCN	151	LXY	326779.4944377.	275.
LOCN	152	LXY	326704.4944439.	273.
LOCN	153	LXY	326628.4944501.	270.
LOCN	154	LXY	326586.4944624.	268.
LOCN	155	LXY	326595.4944714.	271.
LOCN	156	LXY	326595.4944794.	277.
LOCN	157	LXY	326541.4944878.	283.
LOCN	158	LXY	326487.4944962.	289.
LOCN	159	LXY	326421.4945037.	294.
LOCN	160	LXY	326379.4945142.	296.
LOCN	161	LXY	326345.4945233.	298.
LOCN	162	LXY	326310.4945323.	299.
LOCN	163	LXY	326271.4945421.	300.
LOCN	164	LXY	326232.4945518.	301.
LOCN	165	LXY	326140.4945605.	300.
LOCN	166	LXY	326092.4945684.	296.
LOCN	167	LXY	326029.4945744.	295.
LOCN	168	LXY	325965.4945818.	295.
LOCN	169	LXY	325909.4945885.	295.
LOCN	170	LXY	325816.4945950.	295.
LOCN	171	LXY	325748.4946017.	294.
LOCN	172	LXY	325697.4946104.	294.
LOCN	173	LXY	325613.4946176.	295.
LOCN	174	LXY	325548.4946261.	292.
LOCN	175	LXY	325490.4946330.	292.
LOCN	176	LXY	325451.4946443.	283.
LOCN	177	LXY	325465.4946496.	283.

LOCN	178	LXY	325463.4946599.	283.
LOCN	179	LXY	325460.4946702.	283.
LOCN	180	LXY	325457.4946836.	283.
LOCN	181	LXY	325435.4946922.	283.
LOCN	182	LXY	325381.4947023.	283.
LOCN	183	LXY	325336.4947096.	283.
LOCN	184	LXY	325272.4947155.	283.
LOCN	185	LXY	325175.4947212.	282.
LOCN	186	LXY	325078.4947269.	282.
LOCN	187	LXY	324976.4947335.	281.
LOCN	188	LXY	324886.4947338.	281.
LOCN	189	LXY	324788.4947357.	281.
LOCN	190	LXY	324688.4947364.	281.
LOCN	191	LXY	324587.4947370.	281.
LOCN	192	LXY	324505.4947371.	279.
LOCN	193	LXY	324393.4947393.	280.
LOCN	194	LXY	324281.4947414.	281.
LOCN	195	LXY	324188.4947411.	279.
LOCN	196	LXY	324095.4947409.	276.
LOCN	197	LXY	323993.4947413.	276.
LOCN	198	LXY	323890.4947417.	277.
LOCN	199	LXY	323788.4947447.	277.
LOCN	200	LXY	323689.4947516.	276.
LOCN	201	LXY	323595.4947509.	279.
LOCN	202	LXY	323507.4947549.	287.
LOCN	203	LXY	323411.4947668.	291.
LOCN	204	LXY	323340.4947718.	294.
LOCN	205	LXY	323268.4947768.	297.
LOCN	206	LXY	323190.4947778.	299.
LOCN	207	LXY	323093.4947799.	299.
LOCN	208	LXY	323018.4947860.	299.
LOCN	209	LXY	322984.4947948.	291.
LOCN	210	LXY	322962.4948057.	291.
LOCN	211	LXY	322935.4948153.	291.
LOCN	212	LXY	322892.4948252.	294.
LOCN	213	LXY	322831.4948319.	294.
LOCN	214	LXY	322755.4948389.	294.
LOCN	215	LXY	322679.4948458.	295.
LOCN	216	LXY	322591.4948493.	294.
LOCN	217	LXY	322490.4948459.	293.
LOCN	218	LXY	322404.4948445.	283.
LOCN	219	LXY	322303.4948498.	277.
LOCN	220	LXY	322225.4948545.	273.
LOCN	221	LXY	322119.4948543.	270.
LOCN	222	LXY	322012.4948560.	265.
LOCN	223	LXY	321924.4948614.	270.



LOCN	224	LXY	321829.4948622.	272.
LOCN	225	LXY	321733.4948629.	274.
LOCN	226	LXY	321625.4948635.	282.
LOCN	227	LXY	321529.4948622.	280.
LOCN	228	LXY	321434.4948609.	278.
LOCN	229	LXY	321338.4948595.	277.
LOCN	230	LXY	321235.4948584.	276.
LOCN	231	LXY	321131.4948573.	274.
LOCN	232	LXY	321028.4948562.	274.
LOCN	233	LXY	320929.4948548.	276.
LOCN	234	LXY	320829.4948534.	278.
LOCN	235	LXY	320730.4948520.	279.
LOCN	236	LXY	320630.4948510.	280.
LOCN	237	LXY	320530.4948500.	280.
LOCN	238	LXY	320432.4948508.	282.
LOCN	239	LXY	320327.4948496.	283.
LOCN	240	LXY	320234.4948476.	284.
LOCN	241	LXY	320145.4948459.	283.
LOCN	242	LXY	320030.4948448.	280.
LOCN	243	LXY	319949.4948447.	284.
LOCN	244	LXY	319842.4948435.	286.
LOCN	245	LXY	319734.4948422.	288.
LOCN	246	LXY	319639.4948441.	288.
LOCN	247	LXY	319544.4948459.	288.
LOCN	248	LXY	319438.4948439.	288.
LOCN	249	LXY	319343.4948419.	288.
LOCN	250	LXY	319248.4948398.	288.
LOCN	251	LXY	319153.4948377.	288.
LOCN	252	LXY	319051.4948389.	288.
LOCN	253	LXY	318948.4948401.	288.
LOCN	254	LXY	318845.4948413.	288.
LOCN	255	LXY	318742.4948424.	288.
LOCN	256	LXY	318650.4948448.	288.
LOCN	257	LXY	318551.4948462.	286.
LOCN	258	LXY	318451.4948476.	284.
LOCN	259	LXY	318352.4948490.	281.
LOCN	260	LXY	318284.4948580.	279.
LOCN	261	LXY	318268.4948668.	279.
LOCN	262	LXY	318252.4948755.	279.
LOCN	263	LXY	318203.4948867.	276.
LOCN	264	LXY	318194.4948964.	278.
LOCN	265	LXY	318185.4949061.	280.
LOCN	266	LXY	318175.4949158.	282.
LOCN	267	LXY	318166.4949254.	283.
LOCN	268	LXY	318157.4949351.	284.
LOCN	269	LXY	318134.4949458.	285.

LOCN	270	LXY	318123.4949549.	287.
LOCN	271	LXY	318095.4949662.	287.
LOCN	272	LXY	318057.4949756.	288.
LOCN	273	LXY	318014.4949842.	288.
LOCN	274	LXY	297501.4965482.	311.
LOCN	275	LXY	229799.5014993.	297.

**Appendix B**

List of shot locations from the DISCO SOURCE module. Note that the shots correspond to LOCNs in the LINE file (Appendix A).

(SHOT shot number location number Easting Northing Year Pattern number)

*CALL	SOURCE	1	275	ABSOLUTE
SHOT 1001	274	297501.4965482.1990		30
SHOT 1002	274	297501.4965482.1990		30
SHOT 1003	275	229799.5014993.1990		30
SHOT 1004	2	387831.4903970.1990		30
SHOT 1005	2	387831.4903970.1990		30
SHOT 1006	1	420543.4895176.1990		30
SHOT 1007	1	420543.4895176.1990		30

\*END

All the data were written to exabyte tape using 1600 bpi density. The SGR data are 32 seconds long with a sample rate of 2 milliseconds. The REFTEK data are 60 seconds long with a sample rate of 8 milliseconds.

For more information, contact:  
Scott B. Smithson or William P. Clement  
Department of Geology and Geophysics  
University of Wyoming  
Laramie, WY 82071  
Phone: (307) 766-5280  
Fax: (307) 766-6679