

**KANSAS GEOLOGICAL SURVEY  
OPEN-FILE REPORT 83-36**

**FINAL REPORT TO  
KANSAS CITY DISTRICT, U.S. ARMY CORPS OF ENGINEERS  
ON**

**MICROEARTHQUAKE RECORDING IN KANSAS  
FROM 1978 THROUGH 1982**

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FROM 1978 THROUGH 1982

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## INTRODUCTION

### Historical Seismicity and Tectonic Setting

At least 25 felt earthquakes with epicenters in Kansas have been documented since 1867 (DuBois and Wilson, 1978). For comparison, historical earthquakes are shown in Figure 1 and microearthquakes from 5 years' recording are shown in Figure 2. The most serious of the historical earthquakes were Modified Mercalli Intensity VII events that occurred in 1867 and 1906 in the vicinity of Manhattan. Although the geologic structure or structures responsible for these two earthquakes have not been positively identified, the following paragraphs outline the tectonic setting and provide some insight to the probable geologic structure or structures involved.

The proximity of several MM Intensity VII/VIII earthquake epicenters in Kansas, Nebraska, and Oklahoma to the Nemaha Ridge (a buried Precambrian granitic uplift) or the Humboldt Fault (the eastern boundary of the Nemaha Ridge, Figure 3) led early investigators (Lugn, 1935; Lee, 1954) to ascribe the source of seismic activity to movement on these structures. This view is also reflected in the Seismic Risk Map of the United States (Algermissen, 1969) which shows a zone two (moderate damage expected) designation in the vicinity of the Nemaha Ridge.

Docekal (1970) analyzed the isoseismal patterns of Intensity VII/VIII historical earthquakes in the midcontinent and related them to basement configuration, structure, and lithology. From this, he delineated the Midcontinent Seismic Trend, with earthquake occurrence in central Texas; central Oklahoma; northeast Kansas; southeast Nebraska; southeast Minnesota; and the Keweenaw Peninsula, Michigan. He concluded that the stronger earthquakes of the region were genetically related to

the Arbuckle, Nemaha/Humboldt, and Keweenawan Mafic Belt (MGA) structures or combinations of them.

More recently, the Midcontinent Geophysical Anomaly (MGA) has been recognized as representing an important structural feature in the Central Stable Region. The MGA (Figure 4) extends from the Lake Superior region southwestward at least to central Kansas and into Oklahoma (King and Zeitz, 1971; Chase and Gilmer, 1973).

Yarger (1981) has shown without doubt that the MGA extends southward beyond the Kansas-Oklahoma border. Data presented on page 8532 of Guinness et al. (1982) suggest that the MGA extends as far south as near 32.5°N, 99.6°W, near Abilene, Texas. The MGA is the largest positive gravity anomaly in North America with a length of more than 1000 km, a width of 50 to 100 km, and a maximum peak-to-peak amplitude of 160 mgal. It marks a thick sequence of mafic igneous rocks emplaced along a zone of major late Precambrian rifting (Ocola and Meyer, 1973). The structure is bounded by faults at the surface in the Lake Superior region, and similar bounding faults are inferred from geophysical data in the area to the south where the structure is deeply buried below younger sediments (King and Zeitz, 1971). An offset of 50 to 60 km laterally in the Nebraska section of the MGA (near the Kansas-Nebraska border) is interpreted by Chase and Gilmer (1973) as a transform fault of the Precambrian rifting. F. W. Wilson (oral communication) has noted that epicenters of all Intensity VII earthquakes in Kansas, Nebraska, Iowa, and Minnesota lie very close to the transform faults hypothesized by Chase and Gilmer (1973).

There are surface structures associated with the MGA in the Manhattan, Kansas area. The Abilene anticline (Jewett, 1941) parallels its

southeast flank and the Riley County kimberlite intrusives (Brookins, 1970) lie along the same structural trend. Emplacement of the kimberlites has been associated with right lateral strike-slip movement on a buried fault at the east flank of the Abilene anticline (Chelikowsky, 1972). The direction of movement is inferred from rotation of rock joints in the area of the possible fault. The relation of the kimberlites to this strike slip hypothesis is in doubt because the long axis of the intrusions is oriented northwest-southeast, perpendicular to the axis of the Abilene anticline (Cook, 1955). This indicates that the direction of least horizontal compressive stress was perpendicular to the Abilene anticline at the time the kimberlites were emplaced, a condition incompatible with strike slip parallel to the Abilene anticline. The Elk Creek, Nebraska, carbonatite (Brookins et al., 1975) also lies along the southeast flank of the MGA not far from the Kansas-Nebraska border. It appears from aeromagnetic evidence (Yarger, 1981) all of these ultramafic intrusions are controlled or at least influenced by the faults bounding the MGA.

Recently, deep seismic reflection data have been gathered by the Consortium for Continental Reflection Profiling (COCORP) across the MGA in Kansas. These data ultimately will go far in assisting in regional interpretation of the relationship of the MGA to the Nemaha Ridge and in constructing a geologic cross-section of the MGA itself. Data from the eastern section of the COCORP line show the relatively flat-lying sediments in the Forest City basin and complex structures within the Precambrian basement at depths of 10 to 20 km (Brown et al., 1983). The deep Precambrian structures become more shallow in the vicinity of the

MGA and the Nemaha Ridge, suggesting 2 to 3 km of uplift since the mid-Precambrian. The age of the uplift may well be Keweenawan, associated with the rifting.

The COCORP data from the MGA vicinity (Serpa et al., in preparation) indicate that the Rice Formation reaches a thickness of as much as 3 to 4 km along the flanks of the MGA. The basalt flows within the MGA itself reach a thickness of about 8 km, also. Preliminary interpretation of these latest COCORP data suggest that the Humboldt fault zone dips about 20°-30° to the east and that the Humboldt may be a reactivation of Precambrian aged faults associated with the formation of the MGA. Faults with similar dips are present on both sides of the central portion of the MGA.

#### THE KANSAS MICROEARTHQUAKE NETWORK

The proposed siting of nuclear power plants in eastern Kansas, southeastern Nebraska, and northeastern Oklahoma, as well as the proposed location of flood control reservoirs over the trace of the Humboldt fault zone in Pottawatomie and Chase counties, Kansas, have emphasized the need for a better understanding of seismic activity in Kansas. The Kansas Geological Survey (KGS), a research division of the University of Kansas, receives several calls per year from architects and engineers seeking earthquake design criteria for structures in Kansas. We can now provide better guidance to these individuals as a result of the research reported here.

In addition to the Corps of Engineers contract for which this report is written, the KGS has a contract with the U.S. Nuclear Regulatory Commission (NRC) to study earthquakes and seismic risk in Kansas.

Our contract with NRC is part of a multi-state study that also involves state geological surveys in Minnesota, Oklahoma, Nebraska, and Iowa. The KGS has established a nine-station microearthquake network (Figure 5) as part of the total program. Six telemetered stations were added to the network in eastern Nebraska in late 1982. In addition, the U.S. Geological Survey has contracted with Dr. George Rothe of the Geology Department at the University of Kansas to establish a network of eight stations near McCook, Nebraska, to investigate the possibility of induced seismicity in the Sleepy Hollow oil field.

The purpose of the total KGS seismic program is to attempt to relate earthquakes to specific fault zones or tectonic features and to estimate the relative seismicity of various regions by understanding the tectonic features which interact to cause the earthquakes. The station configuration in Figure 5 is designed to provide detection and location capability for microearthquakes down to about local magnitude 1.5 along the previously discussed geologic features in eastern Kansas as established by Sheehan and Steeples (1983 in press) and shown in Figures 6 and 7. Locations for earthquakes in eastern Nebraska will be attainable down to about local magnitude 1.7 with the new network. The Sleepy Hollow network in Nebraska is designed specifically to examine earthquakes in that vicinity down to about local magnitude -1.

#### Instrumentation

The seismic network data are telemetered to the KGS offices at the University of Kansas in Lawrence, Kansas, on long distance voice-grade telephone lines. Data lines are multiplexed where possible to decrease costs of telemetry. Recording is done with translating ink pen on rotating paper-covered drums.

## BOREHOLE SEISMOMETER EXPERIMENTS

Each station has been equipped with a borehole seismometer in a steel-cased borehole 50 to 58 meters deep. Boreholes are useful in eliminating local cultural noise and, to some degree, in improving the signal to noise ratio, particularly at frequencies in the 10 Hz range or higher as described in the discussion below.

The depth of 50 to 58 meters was chosen partially for economic reasons and partially for seismological reasons. Drilling is relatively expensive, so the depth chosen is near the average that can normally be attained by the KGS drilling rig in a day, including cementing the steel casing in place. Casing inside diameter is 6.25 cm to accommodate the smallest available commercial borehole seismometer. Casing costs go up almost exponentially with increasing casing diameter, and drilling costs rapidly accelerate with depth. Total site preparation costs for our stations including drilling, casing, cement and telephone line installation averaged slightly less than \$800 per station.

From a seismological point of view it is desirable to place the seismometer below the surface to avoid cultural noise such as vehicular traffic and trains. However, if the seismometer is a large fraction of a seismic wavelength beneath the surface, some waveforms can be distorted by energy reflected downward from the earth's surface. Since the highest frequencies we are interested in are of the order of 10 to 15 Hz and average P-wave velocity in the upper 50 meters at our station sites is roughly 3 km/sec, the minimum wavelength of seismic data of interest is about 200 meters. Hence, the boreholes are about one-fourth wavelength deep for the highest frequency of interest.

It has been our experience that the boreholes are of little use in eliminating train noise which is mostly surface waves peaked in the 2 to 3 Hz part of the spectrum. These wavelengths are in the range of 600 to 1000 meters, several times our borehole depth. The elimination of most of the noise from trains would require boreholes perhaps several hundred meters deep.

Local vehicular traffic and noise caused by such things as domestic livestock, however, is effectively reduced by our shallow boreholes. We have performed some experiments to examine the advantages of the use of our shallow boreholes. Figure 8 shows two similar blasts from a quarry in southeast Kansas about 180 km distant from the edge of our network that were recorded at Belvue (BEK) and Emporia (EMK). Both events at Emporia were recorded with a 10 Hz exploration-type digital-grade geophone at the surface. The first (August) blast was recorded at Belvue at the surface with an identical geophone, the second (September) was recorded with an identical geophone at the bottom of a 51 meter borehole. Using the Emporia records to normalize the Belvue records to the same size event, a 10 dB gain was experienced by moving the geophone to the bottom of the borehole. Six dB was attributed to higher instrumentation gain and 4 dB was attributed to decreased attenuation in the weathered surface layers or to slightly different wave propagation characteristics for the two blasts.

Figure 9 and Figure 10 show the advantages of using boreholes with respect to such cultural noise sources as large animals in the vicinity of the seismograph station. There also appears to be some advantage in the use of a very long vertically buried pipe with the geophone rigidly connected to the top of the pipe, as the amplitudes generated by the man

running are smaller for the geophone connected to the top of the pipe than for the two geophones at the surface. These traces were all recorded simultaneously with a digital exploration seismograph. Note the bottom (borehole) trace on Figure 9 where the amplitude of the waves generated by a man running appears to be zero. Note also that in Figure 10 the bottom (borehole) trace has a visible amplitude when Automatic Gain Control (AGC) is used to blow up amplitudes on that trace only. The fact that only the three-foot impacts of closest approach appear on the trace with AGC suggests that the energy recorded at the bottom of the borehole represents some mode that propagated down the pipe rather than directly through the rocks.

More recently, experiments with borehole seismometers at the Sleepy Hollow network have shown that cultural noise from traffic about 100 meters from the seismometer can be decreased as much as 24 dB by placing the seismometer in boreholes as shallow as 20 meters deep.

#### RESULTS FROM FIVE YEARS RECORDING

Historical earthquakes can often be linked to specific geologic features by inference from the recording of present-day microearthquakes. The microearthquake pattern shown in Figure 2 bears a very striking resemblance to that shown by historical earthquakes in Figure 1. Both data sets from Figures 1 and 2 are combined in Figure 2a for comparison. This result in conjunction with other geological and geophysical studies of the past few years at the KGS allows us to make useful observations about earthquake activity in Kansas. While Cole (1976) showed a single long Humboldt fault in the basement, more recent geophysical evidence (Steeple, 1982) indicates that a zone of faulting

perhaps tens of kilometers wide exists along both sides of the Nemaha Ridge. This conclusion is drawn in part from the scatter in both the historical and microearthquake seismicity and in part from other geological and geophysical evidence. Seismic reflection surveys, including unpublished proprietary data, indicate a myriad of faulting along both sides of the Nemaha Ridge. Gravity and aeromagnetic data are consistent with a multitude of unmapped faults. Drawing on these data and LANDSAT lineaments, Berendsen (in press) has examined cuttings from hundreds of wells on both sides of the Nemaha and has hypothesized faulting between basement crustal blocks. That interpretation enjoys much favor among KGS staff who are interested in the problem.

At first, this might seem to indicate increased earthquake risk in the Nemaha Ridge vicinity. The good news is that this interpretation, based on large amounts of new data, does not increase the likely maximum length of known faults. Hence, the maximum expected earthquake is not increased by the new data. It should not be a surprise, however, if earthquakes up to body wave magnitude 5 to 5 1/2 occur in the future on faults auxiliary to the Humboldt fault, or on faults associated with the boundaries of the MGA. With this idea in mind, discussion of seismicity in Kansas follows.

The occurrence of microearthquakes along the approximate trace of the Humboldt fault zone implies the possible occurrence in the past and future of larger earthquakes. Previously unknown felt reports from the 1867 so-called "Manhattan earthquake" (Modified Mercalli Intensity VII) suggest that the epicenter may have been east of Manhattan near the known Humboldt fault trace (DuBois and Wilson, 1978) rather than "22 miles northwest of Manhattan" (Merriam, 1956). Several more years of

microearthquake data will be required in conjunction with historical earthquake data to estimate the average return period for the 1867-type earthquake.

The series of felt earthquakes in the Manhattan vicinity in 1929 are no longer such an enigma in regard to their structural source. Isoseismal patterns clearly indicate that the epicenters were 20 to 40 km west of the main trace of the Humboldt fault. As detailed earlier, however, there are other structures in the Manhattan area that may be responsible for some of the historical earthquakes. The pattern of microearthquakes along the Nemaha Ridge is diverse, suggesting that several faults are capable of producing small to moderate earthquakes. At least one microearthquake has occurred in the area south of Junction City, at least 20 km west of the Humboldt fault.

Several epicenters of both historic earthquakes and microearthquakes in northwest Kansas have not yet been discussed in this report. The microearthquakes plotted in Figure 2 in northwest Kansas and southwest Nebraska occurred between December 1, 1977 and April 1, 1983. They all clearly lie on a structural trend known as the Central Kansas Uplift in Kansas and as the Chadron and Cambridge Arch in Nebraska. In 1978 a magnitude 4.0 event (not shown in Figure 2) occurred on the Chadron Arch in western Nebraska. The seismicity pattern of the past five years coupled with several historical epicenters (Woolard, 1958) suggests that some low to moderate level of tectonic activity is occurring along this whole structure in central and northwest Kansas and in western Nebraska. A long-term trend of such tectonic movement is explicitly suggested by Stanley and Wayne (1972) on the basis of drainage and sedimentation patterns in the area during the Pleistocene Epoch and by present-day

stream gradients and knickpoints on several rivers that cross the structural trend.

A trend of earthquakes has developed unexpectedly in a southwest-northeast direction across Nebraska. There is no named geologic feature with which to associate these earthquakes. They are coincident with a pair of faults shown on the USGS/AAPG Tectonic Map of the U.S. The KGS contract with the NRC will allow us to further examine the Nebraska trend with the installation of six telemetered stations in the eastern half of Nebraska.

Perhaps one of the most critical and important observations with respect to seismic activity in western Kansas and central Nebraska is that the two trends intersect at the Sleepy Hollow oil field. Because of that intersection, I believe that the Sleepy Hollow earthquakes (at least some of them) are tectonic in nature rather than induced by water-flood operations in the oil field. It is worth noting that other water-flood operations within oil fields along the Central Kansas Uplift do not cause earthquake activity, further suggesting that the earthquakes at Sleepy Hollow are tectonic.

#### CONCLUSIONS

1. The microearthquake pattern established over a five-year period in the Kansas vicinity bears striking resemblance to the historical pattern established over the past 125 years of recorded history.
2. The vast majority of the microearthquakes in Kansas can be related directly to the Nemaha Ridge/Humboldt fault zone, the Midcontinent Geophysical Anomaly and its southward extension into Oklahoma, and the Central Kansas Uplift.

3. A large number of faults exist in the vicinity of these major structures. These faults are likely capable of generating earthquakes in the body wave magnitude range of 5 to 5 1/2.
4. At least some of the earthquakes in the Sleepy Hollow oil field in southwestern Nebraska are likely tectonic because that seismic activity lies at the intersection of the Central Kansas Uplift and an unnamed northeastward trend that extends some 350 km across Nebraska.

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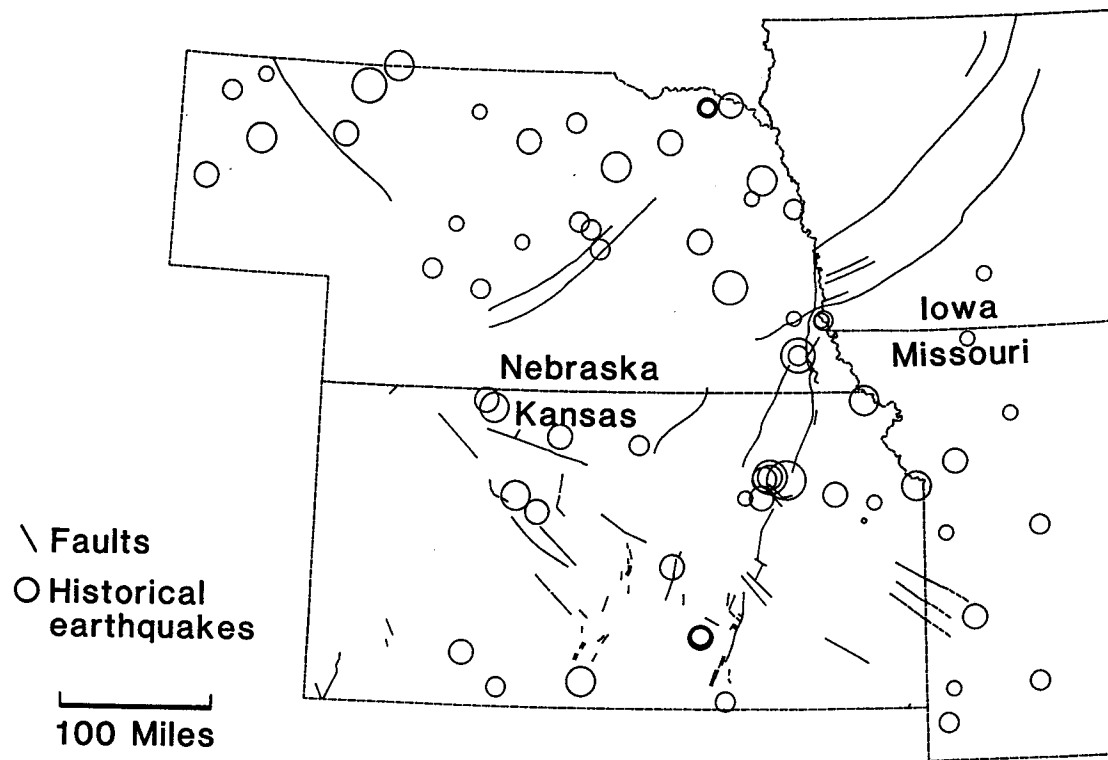


Figure 1. Historical earthquakes are shown by size-coded circles of Modified Mercalli Intensity. Largest events are in the MM VII range. Faults are depicted by lines and are taken from many sources in the literature.

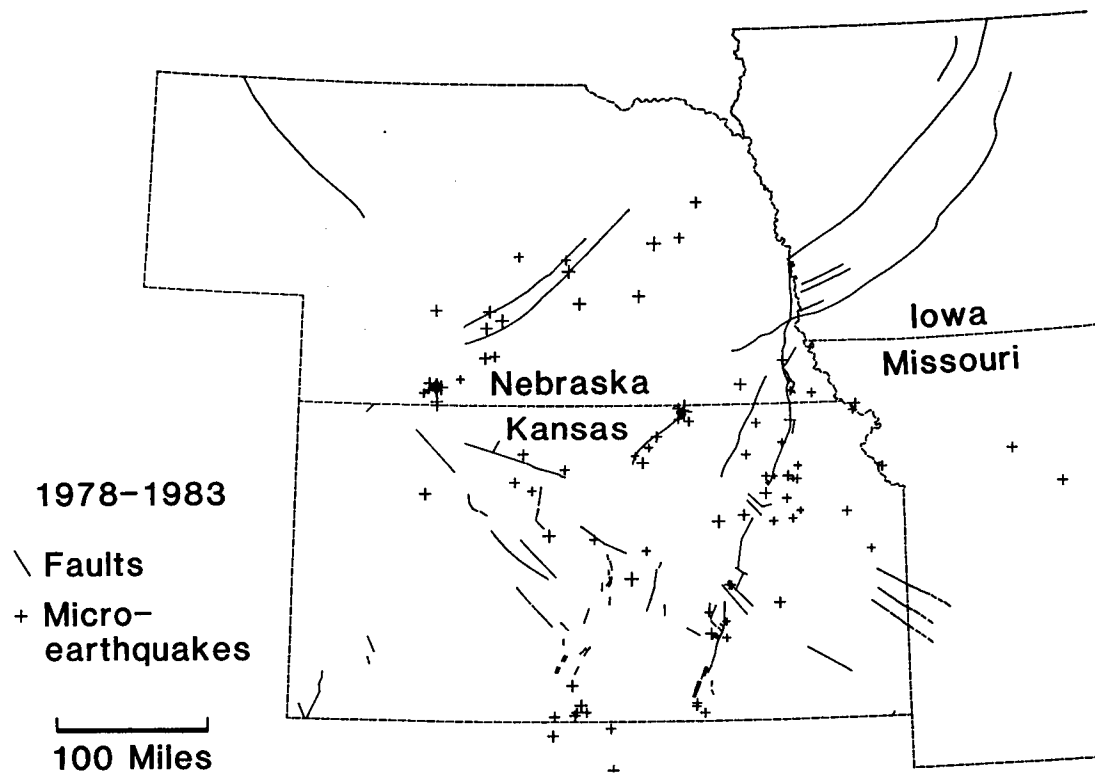


Figure 2. Microearthquakes, recorded by the Kansas Geological Survey between August, 1977, and April, 1983, are size-coded by local magnitude. The largest event has magnitude 3.3 and the smallest is local magnitude 1.0. Faults plotted are identical to Figure 1.

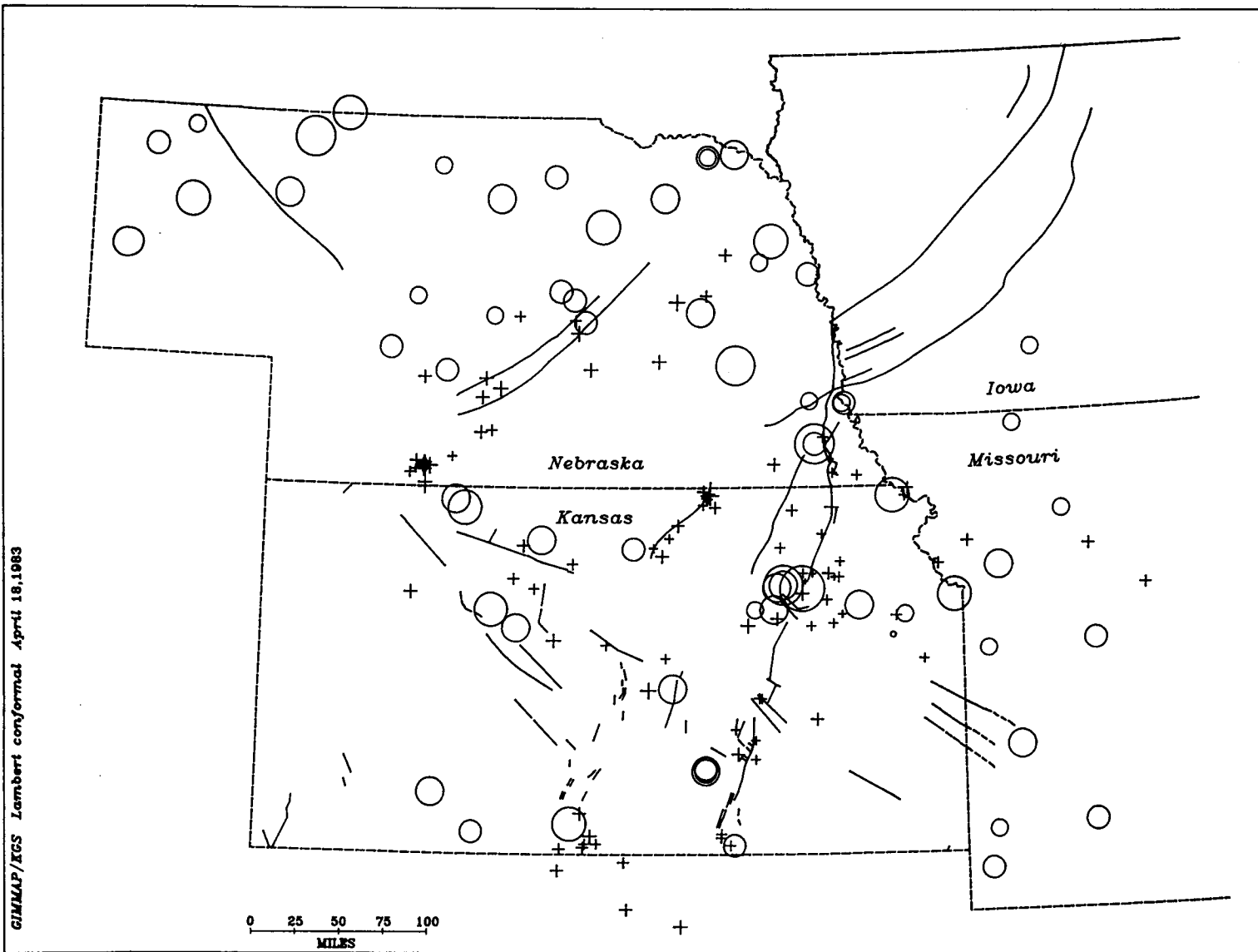


Figure 2a. Historical earthquakes from Figure 1 and microearthquakes from Figure 2 plotted along with known faults. Note the similarity of the two data sets.

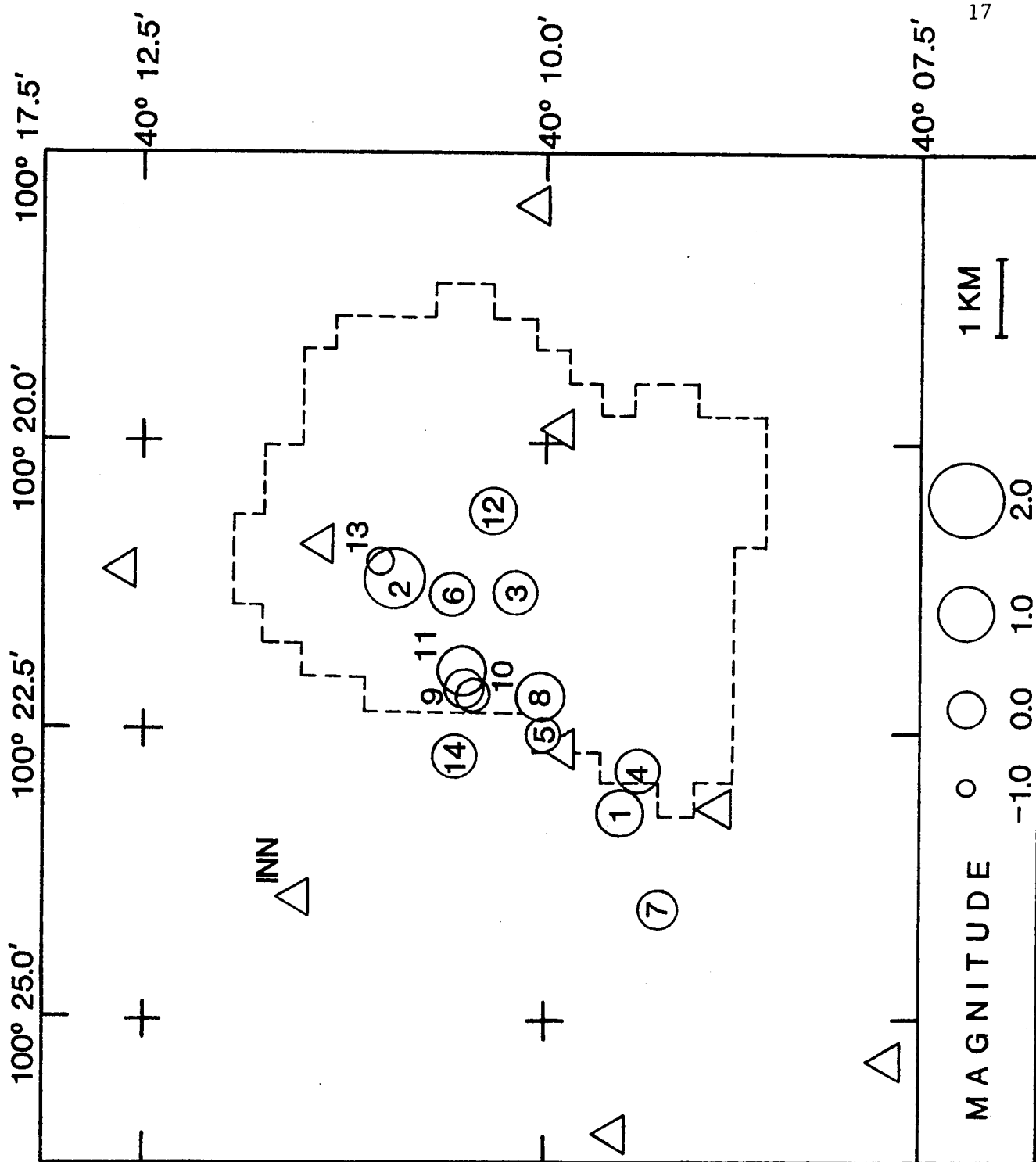


Figure 2b. Epicenter locations from Table 2 from Sleepy Hollow network between April 1, 1982 and December 31, 1982, are plotted by circles. Event numbers are near or within corresponding circles. Station locations are shown by open triangles. Lease limits of Sleepy Hollow oil field are shown by dashed line.

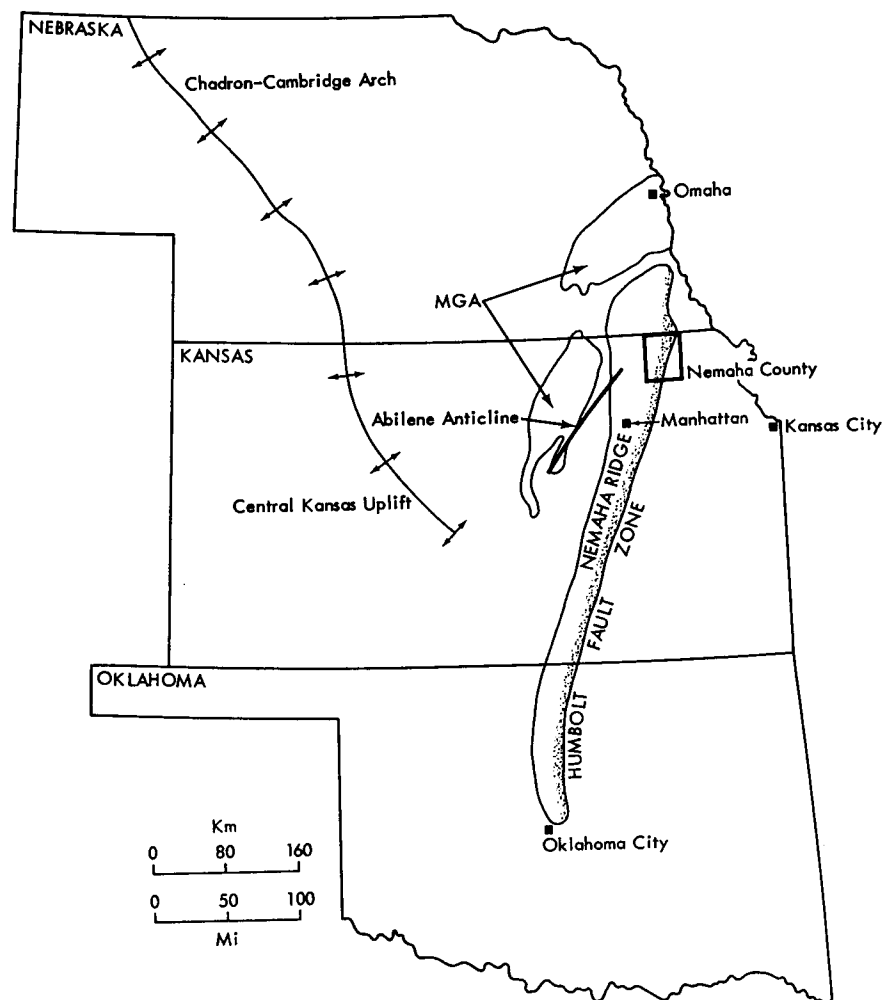


Figure 3. Major regional tectonic features that are apparently related to earthquake activity. Nemaha County is the locality where the Nemaha Ridge was discovered by drilling in the early 1900's.

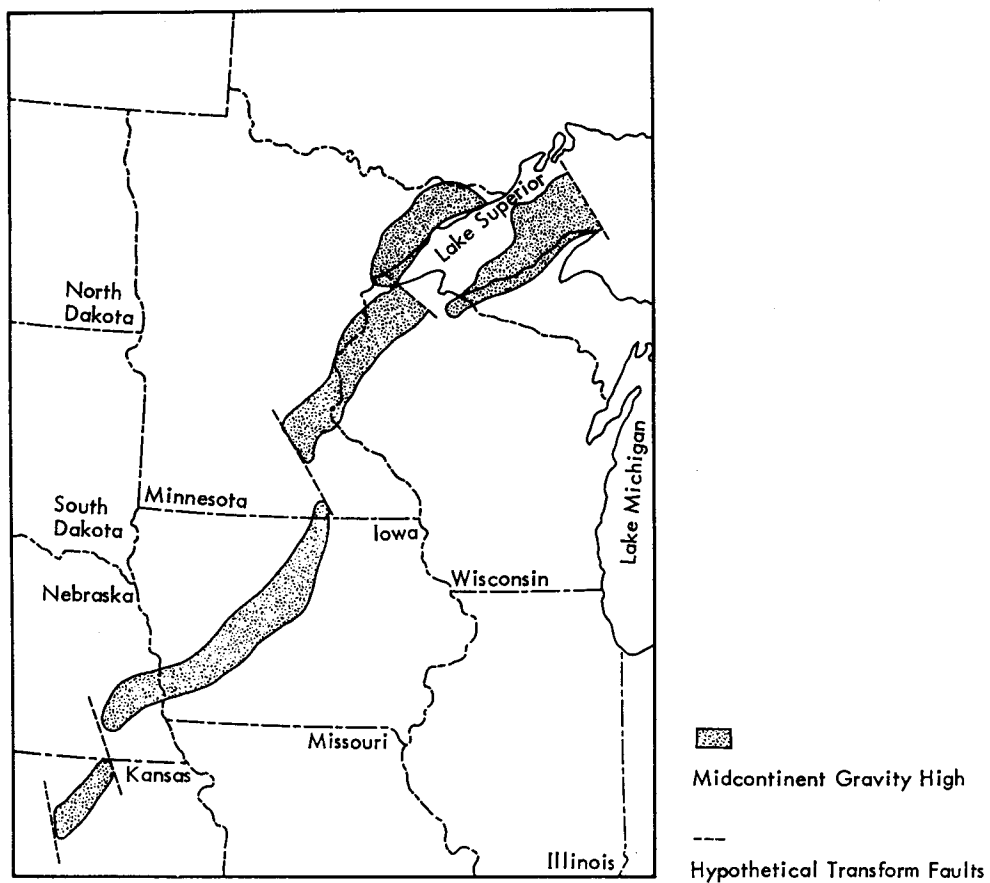


Figure 4. Regional extent of the MGA, modified from Chase and Gilmer (1973).

# Microearthquakes and Bouguer Gravity

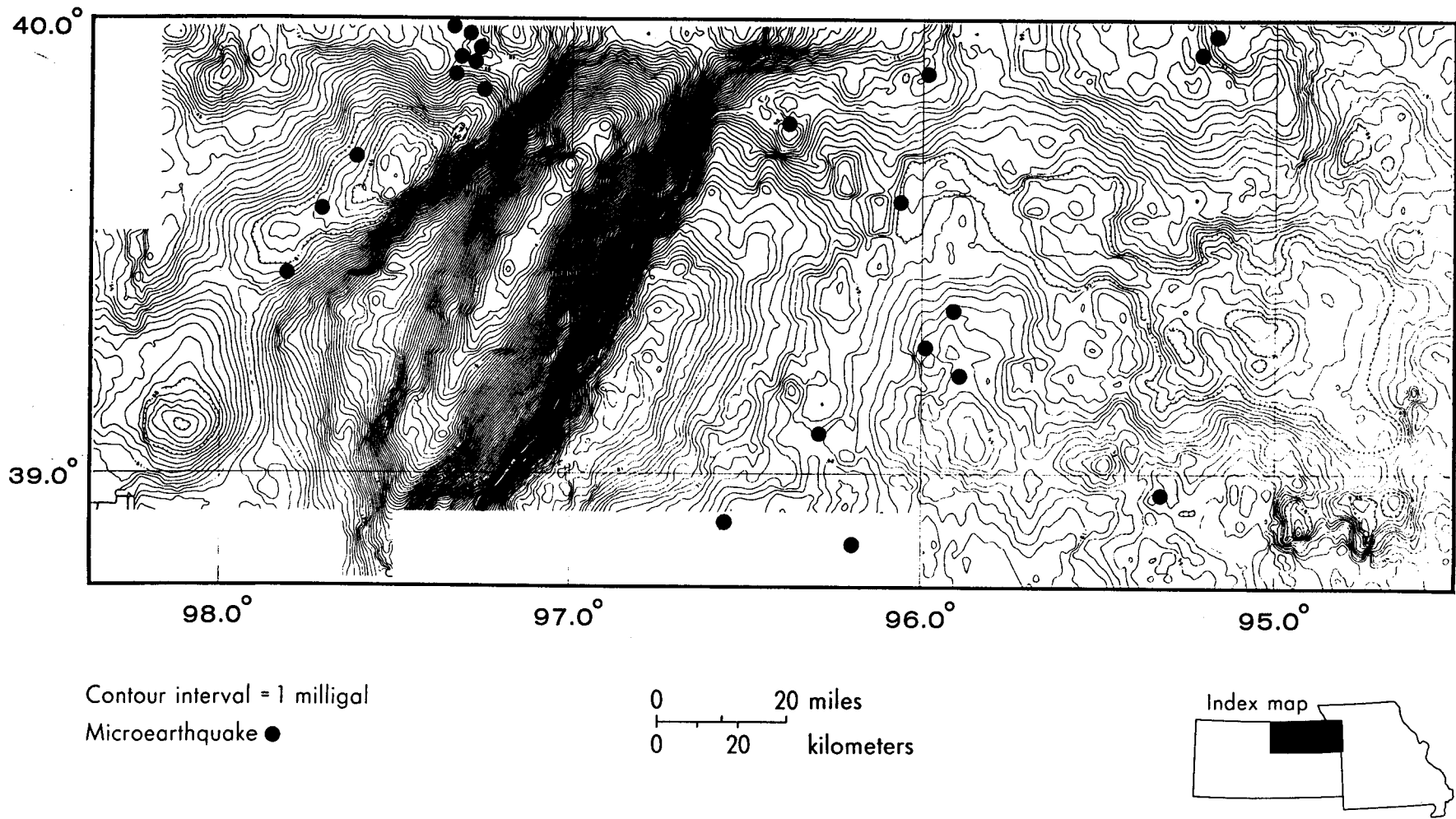


Figure 4a. Locations of microearthquakes from 1978 to 1981.

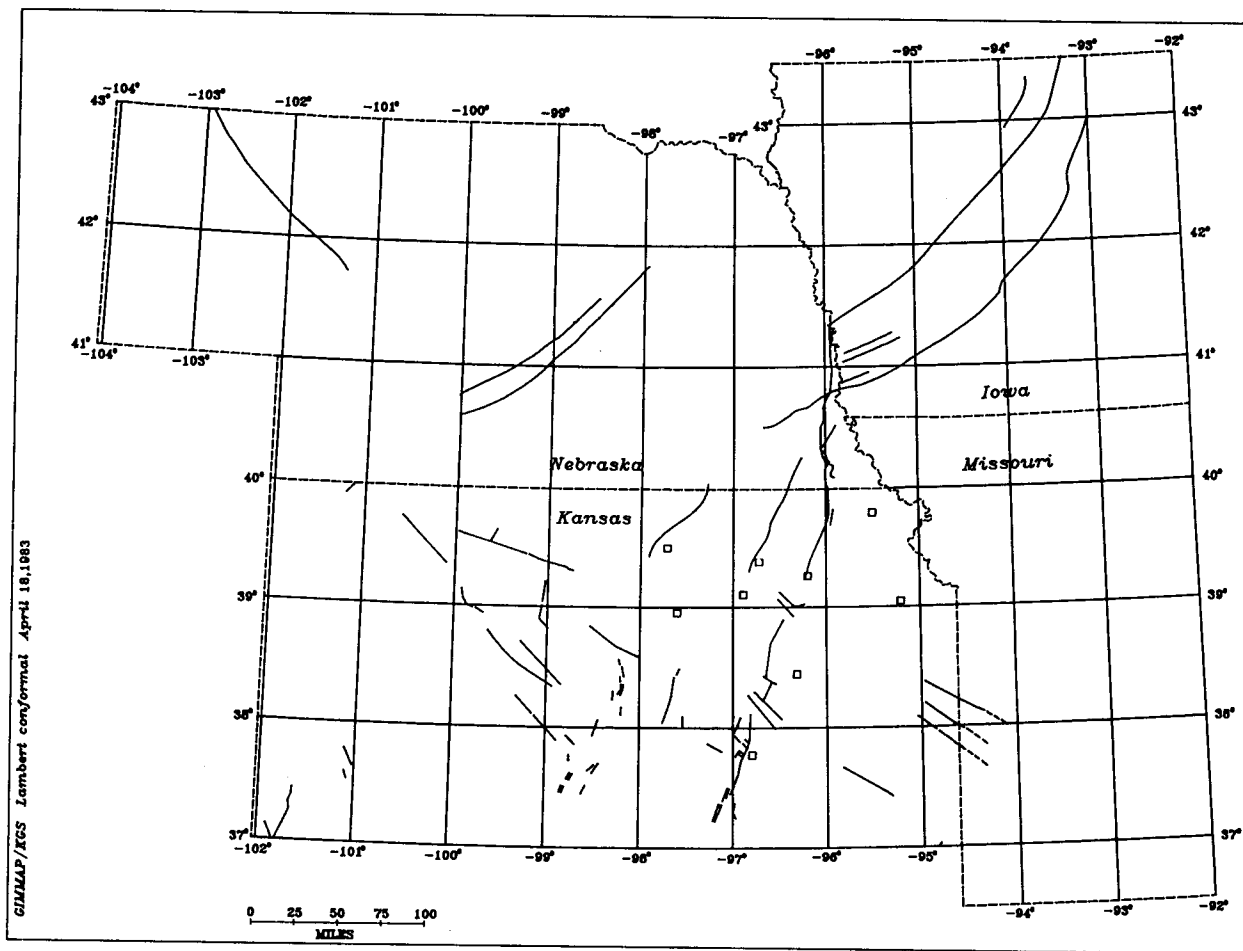


Figure 5. Stations of the Kansas seismograph network are shown by open squares. These stations operated continuously from August, 1977, and will be in operation beyond 1983.

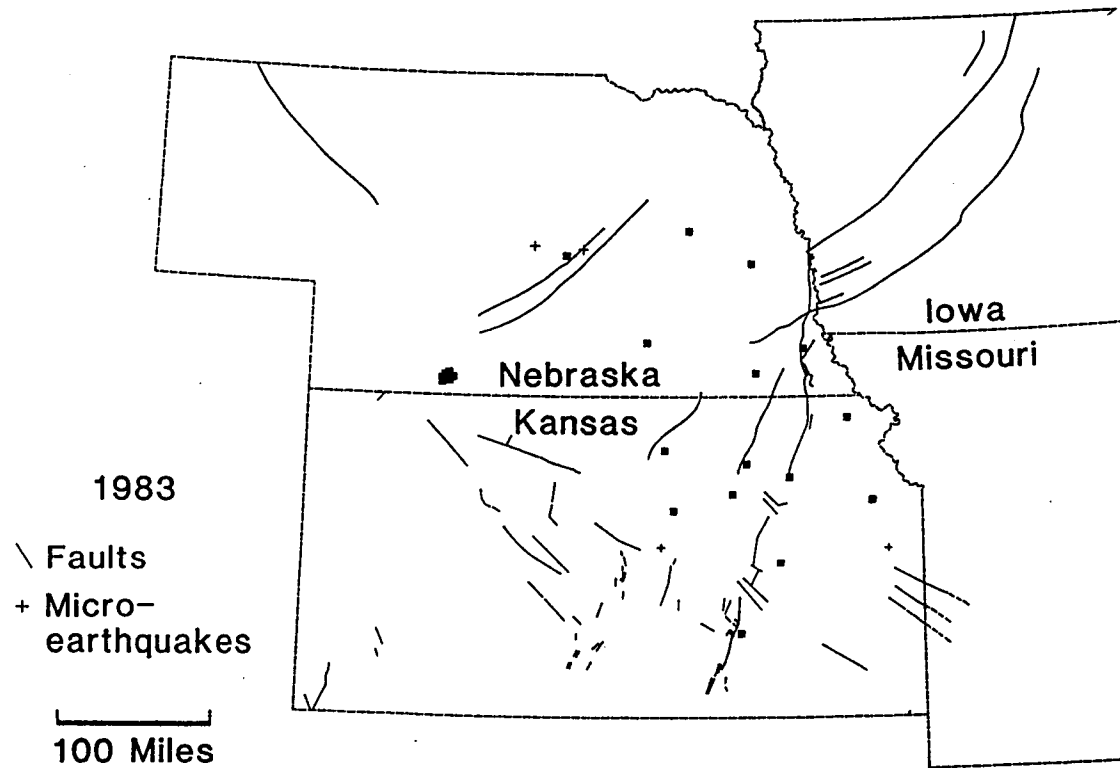


Figure 5a. Stations of the Kansas-Nebraska seismograph network after December 1, 1982, are shown by solid squares. The Sleepy Hollow seismograph network is a dense network of eight stations in southwestern Nebraska. The Indianola, Nebraska, station was operated for two years using local on-site recording near the center of that present network.

### Sensitivity At Magnitude 1.5

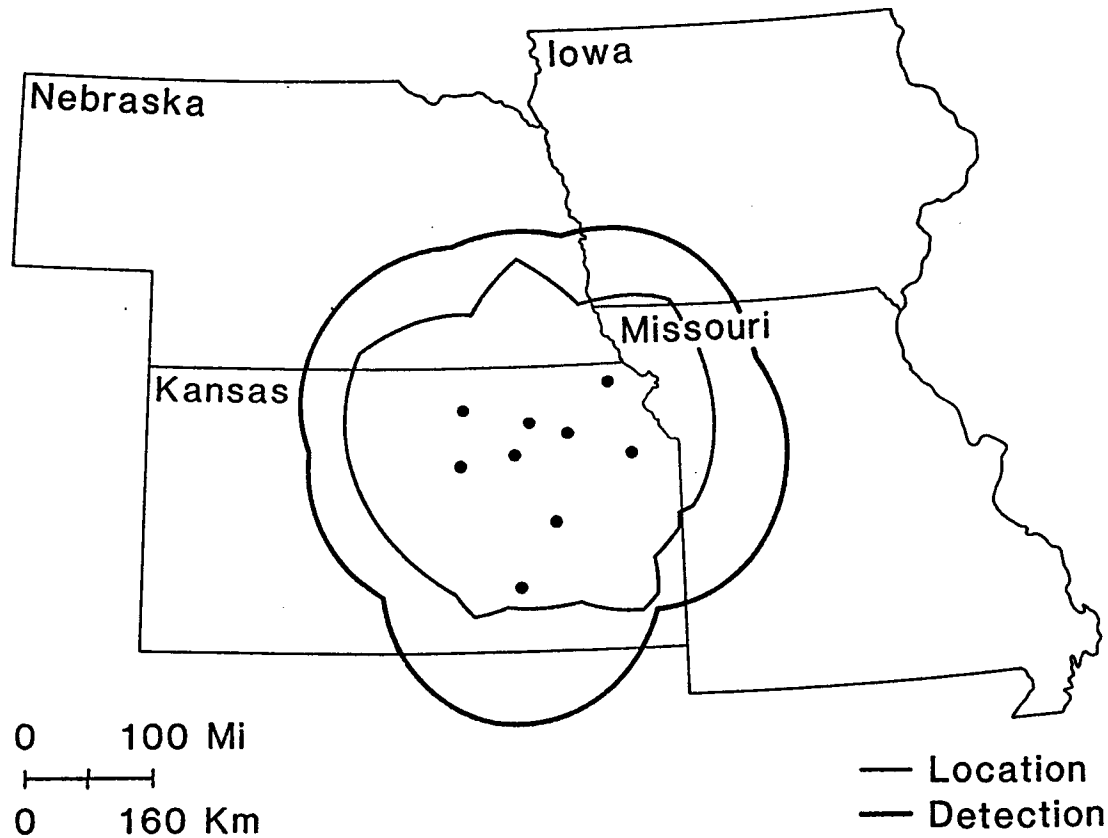


Figure 6. The sensitivity of the network at local magnitude 1.5 is shown. The outer closed curve is detection sensitivity. The inner closed curve is location sensitivity, based upon detection by at least three stations.

### Sensitivity At Magnitude 2.0

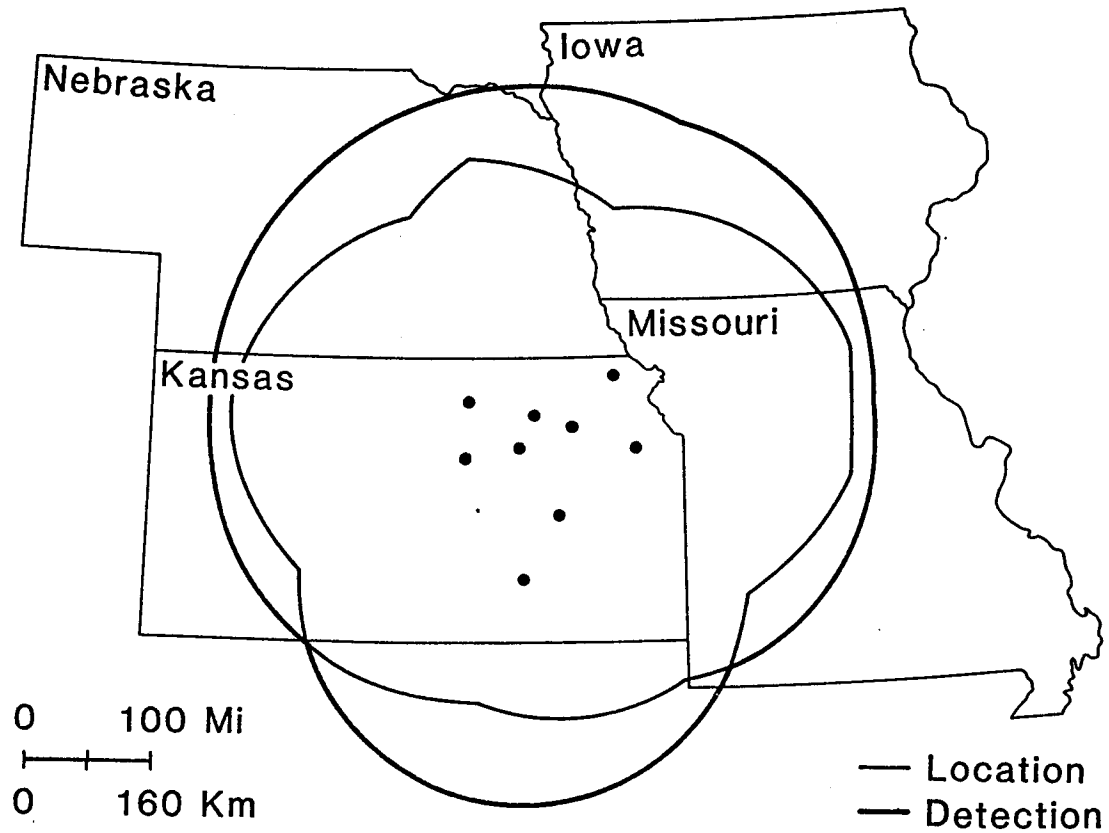


Figure 6a. Sensitivity of the network to earthquakes of local magnitude 2.0. The inner closed curve is for location by detection at three or more stations. The outer closed curve is for detection at only one station.

### Magnitude Vs. Distance Curves For All Stations

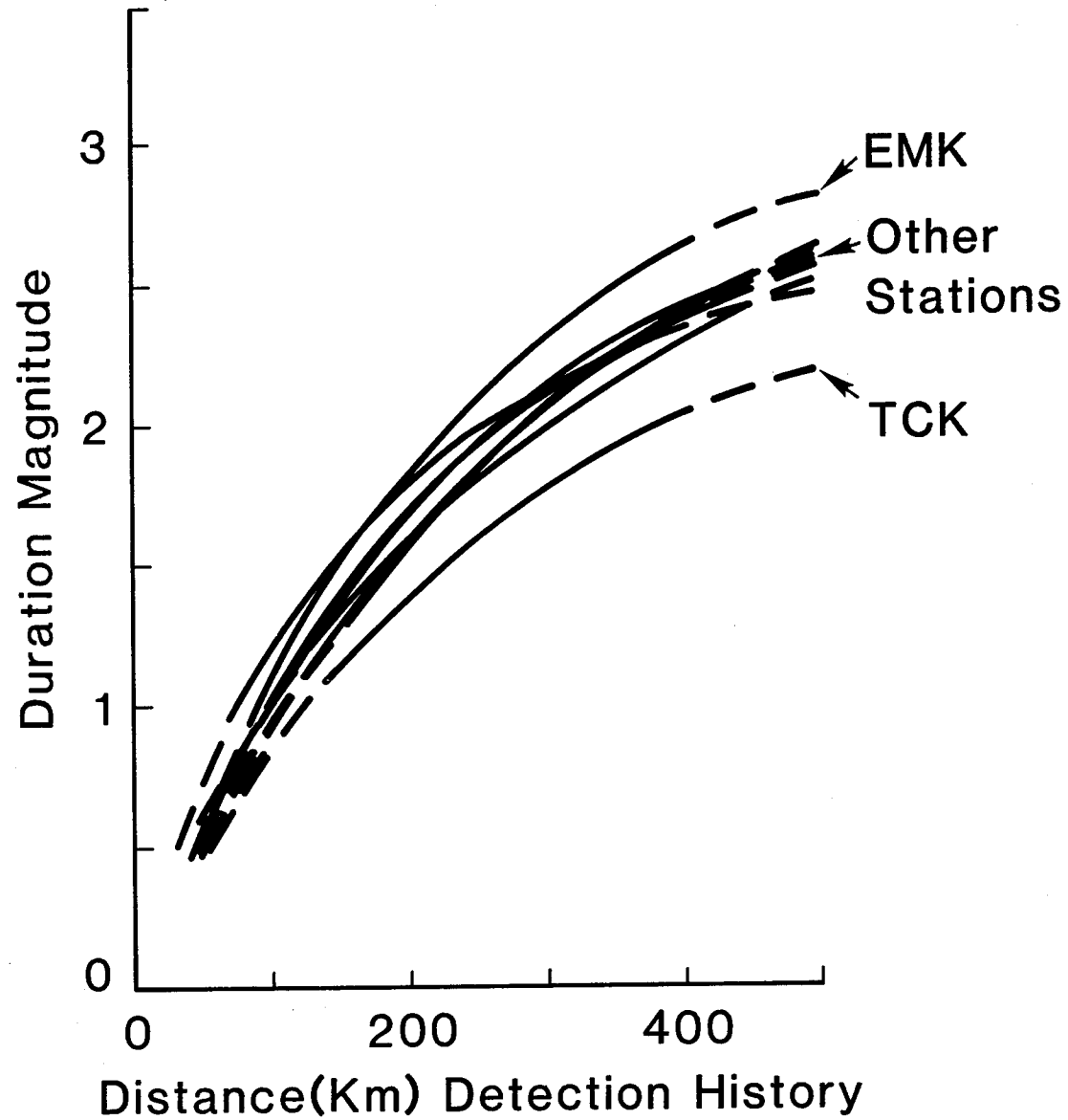
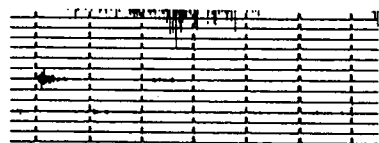


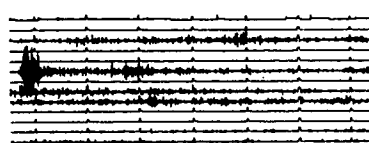
Figure 7. Magnitude versus detection history curves used in preparation of Figure 6.

## DISTANT QUARRY BLASTS RECORDED IN KANSAS

August 13, 1977

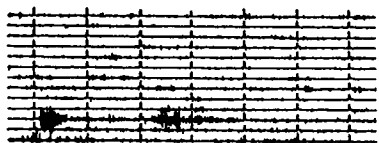


BEK (Surface Seismometer)

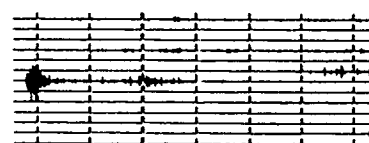


EMK (Surface Seismometer)

September 15, 1977



BEK (Borehole Seismometer)



EMK (Surface Seismometer)

10 sec  
10 mm

Figure 8. Blasts from 180 km distant quarry recorded on August 13 and September 15, 1977, at BEK and EMK. Note that signal recorded by borehole seismometer is considerably enhanced.

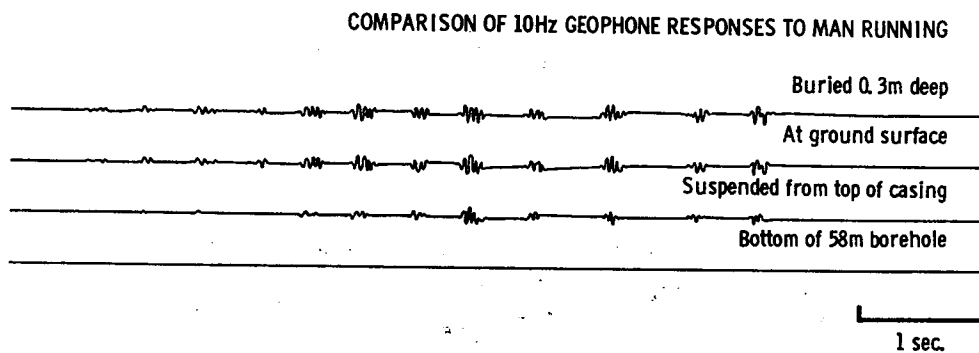


Figure 9. Response of four identical geophones (three at or very near top of borehole) to 100 kg man running from 15 meters from borehole to within two meters of borehole and to 15 meters beyond borehole. Note that using identical plotting and recording parameters, signal at bottom of borehole appears to be missing.

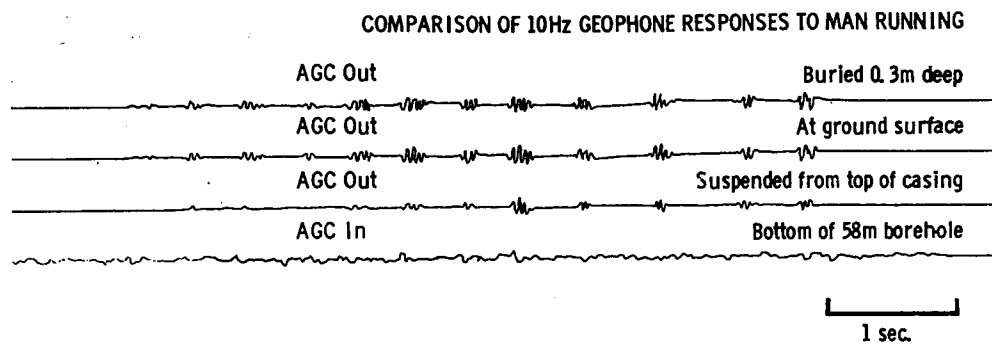


Figure 10. Identical to data in Figure 9, except Automatic Gain Control (AGC) was used to expand amplitudes on trace from borehole geophone. Note that on the three foot impacts nearest the borehole (near the center of the record) some signal propagated to the bottom of the borehole.

TABLE 1.

date	origin	lat n	long w	depth	mag	no	gap	dmin	rms	erh	erz	qm
770818	1034	25.21	41-24.90	98-28.07	5.00	2.5	9	249289.3	1.14	26.2	21.2	d1
771201	13 4	34.20	40-18.53	100-22.00	5.00	2.3	7	197326.6	0.72	25.5	16.2	d1
771201	1322	38.57	40-12.52	100-17.87	5.00	2.4	4	194316.7	0.07			c1
771216	612	27.28	37- 9.50	97- 0.21	12.24	2.0	8	185 51.9	0.20	2.9	1.8	d1
771220	756	39.36	37- 7.60	97- 1.82	5.00	2.3	11	189 48.6	0.23	4.1	3.6	d1
780108	416	34.39	37- 4.59	97- 4.00	5.00	1.8	4	194 43.5	0.05			c1
780111	2132	3.88	38-52.05	96-12.08	0.41	1.6	7	162 43.9	0.75	5.2	3.7	d1
780113	2015	33.39	40- 5.58	95-42.00	5.00	1.7	8	173 35.5	5.46	41.4	123.0	d1
780127	1125	37.65	39-50.13	95-58.42	9.03	2.4	10	118 41.0	0.18	1.4	13.9	c1
780203	025	47.62	40- 1.92	100-20.00	5.00	2.4	4	198312.9	0.07			c1
780414	2327	38.29	39-48.86	96-23.68	1.18	1.9	5	240 55.4	0.07	2.0	58.3	d1
780520	153	43.36	39-59.85	100-20.00	5.00	2.3	6	197230.9	0.30	29.9	9510.3	d1
780522	428	35.06	39- 8.12	96-17.51	8.86	2.3	8	86 16.3	0.22	1.4	5.4	c1
780914	8 6	18.59	40-53.76	100-22.00	5.00	2.2	6	226273.5	1.19	29.9	*****	d1
781101	844	59.88	39-51.59	97-20.94	5.00	1.6	5	257 50.0	0.05	2.0	1.4	c1
781204	23 6	23.20	39- 8.26	100-27.30	5.00	2.3	8	184240.1	0.66	17.0	10.6	d1
781204	23 6	14.64	37-20.39	98-38.41	0.52	2.2	8	166 84.2	1.50	5.7	2.1	d1
781210	1341	2.12	39-28.61	93-15.56	5.00	2.0	11	194174.5	1.06	8.0	7.5	d1
790124	342	0.85	39-37.12	96- 4.94	5.00	1.5	10	183 40.7	0.34	1.9	26.3	d1
790210	1956	3.61	39-15.89	95-54.32	4.02	1.7	11	146 25.4	0.89	4.0	29.8	d1
790225	1929	44.18	39- 8.02	92-40.28	5.00	1.9	11	184195.2	0.93	4.9	2.9	d1
790309	1147	43.48	37- 8.42	97-10.03	1.21	1.7	15	95 52.6	0.83	2.9	3.8	d1
790309	1243	18.77	37-10.16	97- 9.61	2.04	1.8	20	96 55.5	1.23	3.7	4.6	d1
790408	2246	10.41	40-58.12	98-33.83	0.67	2.4	12	175114.3	0.87	8.9	4.0	d1
790603	5 6	22.10	39-26.64	97-47.30	12.93	2.2	16	120 9.6	0.42	2.2	1.5	c1
790606	1616	21.91	40- 8.61	100-20.88	1.00*	2.5	8	119 25.1	0.60	1.9	6.1	d1
790612	1113	11.88	40-24.33	96- 3.26	2.07	1.8	10	159 5.6	0.34	2.3	9.5	c1
790615	5 8	23.60	39-50.40	97-13.21	5.00	1.9	10	253 66.2	0.66	5.3	7.6	d1
790625	730	22.45	38- 0.97	97- 0.32	2.09	1.6	12	178 32.6	0.60	2.4	3.6	d1
790626	13 4	10.23	39-17.77	96- 0.98	8.98	2.0	12	84 16.2	0.43	1.6	4.1	c1
790630	2046	41.34	39-56.20	97-16.45	5.00	3.1	10	139 60.7	0.16	1.3	1.8	c1
790630	2110	7.27	39-54.49	97-17.54	5.00	1.4	8	235 57.2	0.39	3.6	8.3	d1
790701	1959	34.14	39-57.11	97-17.15	5.00	2.0	6	240 61.4	0.24	4.4	8.5	d1
790714	1832	26.81	39-31.55	99-15.35	12.61	2.1	13	180 81.4	0.48	4.5	3.3	d1
790716	0 3	48.18	40-10.07	100-17.22	5.00	2.7	8	167 23.5	0.43	4.3	3.6	c1
790716	134	20.32	40-11.59	100-20.70	5.00	2.5	8	192 22.5	0.16	1.7	1.3	c1
790716	527	1.42	40-11.45	100-20.00	9.08	1.3	5	187 22.3	0.04	0.7	3.6	c1
790716	6 8	9.89	40-11.32	100-20.73	11.09	1.5	6	191 23.0	0.04	0.4	1.4	c1
790716	7 5	56.02	40-12.00	100-19.90	7.08	1.1	4	188 21.3	0.06			c1
790724	416	46.09	40-12.47	100-26.00	0.88	2.2	8	223 25.6	0.79	15.4	11.7	d1
790724	8 4	46.26	40-27.94	99-37.38	0.87	1.9	7	224 52.1	0.73	8.7	6.9	d1
790802	1046	32.55	38-55.78	96-33.76	18.21	2.2	12	115 34.6	0.35	1.2	3.8	c1
790802	416	21.66	40-10.34	100-21.44	0.84	2.5	10	261 27.9	0.32	21.9	12.7	d1
790813	11 9	47.65	40- 6.80	100-30.10	1.50	1.7	5	234 21.2	0.87	18.5	*****	d1
790814	2359	31.37	40-10.39	100-20.58	1.76	1.5	6	187 24.5	0.22	1.7	346.9	d1
790815	645	53.87	40- 8.68	100-20.34	1.51	1.5	6	181 25.4	0.15	1.2	254.9	d1
790815	16 7	7.14	40- 8.49	100-26.43	1.23	1.3	5	216 23.6	0.15	3.0	2.1	d1
790831	8 0	11.70	40- 8.31	100-20.22	1.53	2.2	5	180 24.8	0.32	4.9	682.8	d1
790909	0 0	22.19	39-23.46	95-53.52	5.00	1.5	9	122 30.1	0.38	1.7	5.6	c1
791019	1617	25.83	37- 3.64	98-36.43	5.11	2.0	7	146 62.6	0.45	5.7	9.2	d1
791019	2112	28.05	37- 5.38	98-35.29	5.00	1.8	11	154 66.0	0.91	5.1	7.8	d1
791119	458	43.40	40-14.86	100- 2.77	13.57	1.5	4	271 20.7	0.44			d1
791129	22 2	31.21	40- 9.80	100-21.64	3.15	1.9	6	168 4.7	0.15	4.0	9.9	c1
791207	1417	8.19	39-41.65	97-37.11	0.15	2.1	6	245 22.2	0.42	3.8	1.9	d1
791215	730	15.53	37- 5.41	98-28.26	0.46	1.7	6	157 74.3	0.45	2.0	14.3	d1

TABLE 1 (contd.)

30

date	origin	lat n	long w	depth	mag	no	gap	dmin	rms	erh	erz	qm	
800211	545	44.15	39-58.13	97-20.63	5.00	2.1	5	199	55.9	0.34	2.2	6.7 d1	
800309	545	49.97	38-16.50	96-45.40	11.91	1.7	16	132	42.9	0.51	1.7	3.5 d1	
800309	922	43.97	38-16.23	96-43.77	5.00	1.6	14	129	41.0	0.43	1.4	2.9 c1	
800321	9	9	56.41	39-55.07	95-11.96	5.00	1.6	10	282	28.5	0.21	1.9	2.0 c1
800326	1011	57.32	39-10.52	99- 8.32	17.83	1.7	14	206	114.7	0.98	6.8	3.0 d1	
800326	2256	58.31	39-58.85	95- 9.89	7.06	1.9	7	215	34.6	0.05	0.6	0.9 c1	
800416	713	21.47	39-54.85	97-18.89	5.00	1.6	7	188	56.6	0.15	2.1	4.5 c1	
800426	1421	48.50	40-43.99	99-43.91	5.00	2.3	12	243	82.5	0.99	12.1	15.2 d1	
800629	1614	31.32	38-56.56	95-18.49	5.00	1.8	15	185	84.9	0.95	4.1	5.0 d1	
800630	1	0	22.83	38-52.46	96-52.26	15.37	2.5	8	101	25.8	0.20	1.3	4.5 b1
800810	1010	1.37	36-52.00	98-52.00	5.00	2.1	9	146	31.2	0.97	28.1	52.8 d1	
800813	550	11.83	41-53.59	97-06.01	9.99	2.1	11	271	117.7	0.63	4.0	3.9 d	
800907	022	33.40	39-35.35	97-42.88	8.30	1.5	8	286	9.0	0.37	4.5	3.6 d1	
801109	1453	5.86	39-15.89	95-57.20	12.89	1.0	8	189	21.2	0.31	7.8	4.4 d1	
801122	334	9.68	36-32.36	98- 9.41	2.84	2.1	22	100	90.3	1.26	3.8	5.0 d1	
810217	553	2.87	39-22.74	98-44.20	8.67	1.8	9	325	89.3	0.43	5.8	8.3 d1	
810313	1242	16.68	40-53.44	99-41.67	5.00	2.4	10	214	228.1	1.20	20.3	24.4 d1	
810320	5	9	48.17	40-10.31	100-19.60	1.75	1.9	5	177	4.5	0.09	0.2	1.5 c1
810420	1818	13.48	41- 2.14	97-49.68	5.00	2.4	9	175	118.2	0.37	3.6	4.5 d1	
810530	9	7	10.35	39-21.66	94-51.61	0.46	1.9	17	230	73.4	0.43	2.5	1.0 d1
810620	516	51.44	38-42.73	98-22.76	11.89	1.8	13	186	72.6	0.68	3.9	4.1 d1	
810626	1855	2.20	41-31.02	97-37.95	4.21	2.7	15	255	74.3	0.60	3.8	6.4 d1	
810708	641	15.11	39- 4.83	96- 2.03	5.00	1.7	5	169	24.8	0.07	1.3	9.8 d1	
810717	1241	57.77	41-34.06	97-18.80	5.00	1.9	5	197	125.5	0.31	3.0	6.1 d1	
810801	158	44.50	38-20.55	97-55.84	10.00	2.7	14	158	73.5	0.54	3.1	3.8 d1	
811009	2154	25.58	41-15.83	98-41.88	5.00	2.5	21	205	142.2	0.60	4.6	5.3 d1	
811127	1	8	26.13	37- 2.85	98-50.92	5.00	2.0	14	127	47.0	0.78	4.7	7.2 d1
811208	620	42.00	40-26.84	99-44.61	5.00	2.2	11	230	62.6	0.74	7.0	6.5 d1	
811217	544	54.21	36-23.80	97-35.67	10.64	2.4	15	236	136.6	0.39	2.9	2.1 d1	
820130	10	8	59.00	37-55.75	96-47.80	5.00	1.4	10	149	17.2	.31	3.4	11.6 c1
820224	2035	25.48	37-46.53	97- 8.73	6.92	2.2	20	184	30.9	.46	2.7	2.5 d1	
820311	1819	57.05	39-15.41	99-21.39	8.84	1.9	9	218	91.0	.70	10.9	4.1 d1	
820315	658	25.44	36-55.18	98-10.33	5.00	1.9	9	118	90.3	1.06	8.4	12.7 d1	
820327	1957	23.61	38-53.32	95-58.64	5.00	1.6	8	136	45.8	.33	1.9	34.3 c1	
820328	8	9	37.07	38-57.67	95-52.44	5.00	1.2	8	254	43.8	.46	4.9	46.0 d1
820406	012	58.55	39-19.26	97-42.88	5.00	1.4	5	194	20.8	1.20	23.9	133.5 d1	
820413	7	6	4.49	39-32.31	94-32.62	5.00	2.0	9	297	79.0	.23	2.4	1.8 c1
820424	1635	37.41	39-18.72	96-10.62	7.59	1.0	6	127	5.8	.05	.6	.7 b1	
820505	1607	12.88	39-49.69	92-25.79	5.00	2.0		269	262.6	1.13	7.1	34.5 d1	
820603	1420	50.20	40-10.91	96-35.12	4.68	2.2	20	118	24.2	.82	3.1	6.2 d1	
820607	1726	26.10	37-55.74	96-58.43	5.00	1.5	6	226	23.3	.77	12.9	37.4 d1	
820721	2141	35.77	38- 5.93	96- 9.00	2.28	2.1	23	117	41.3	.33	1.0	1.5 c1	
820722	330	56.27	37- 9.29	98-32.04	5.65	2.3	9	155	74.5	.80	6.0	9.7 d1	
820827	1419	25.39	40- 5.67	95-57.96	5.00	1.6	10	269	51.6	.19	1.6	3.3 c1	
820903	1055	20.54	38-47.43	98-53.55	10.86	2.5	12	197	113.3	.21	2.0	1.9 c1	
820906	1445	59.10	39-20.77	96-18.04	4.27	1.6	6	140	12.7	.22	2.8	15.3 c1	
821026	044	7.77	39-31.79	96-32.23	9.10	1.8	6	163	41.5	.18	.1	.5 c1	
821223	222	.79	40-49.06	99-32.98	5.00	2.5	12	178	74.9	.33	6.0	5.7 d1	
830209	1610	23.93	38-36.34	97-43.48	10.18	1.7	20	216	40.0	.20	.9	.9 c1	
830212	1624	3.22	41-23.84	99-17.52	8.88	1.8	9	297	31.1	.31	3.3	2.4 d1	
830226	624	58.34	41-22.45	98-43.12	5.00	1.8	6	295	109.4	.31	4.5	2.7 d1	
830303	821	35.72	38-36.52	95- 3.08	5.00	1.5	8	276	50.4	.58	11.2	31.5 d1	

## (Explanation of Table 1)

The microearthquakes are listed in chronological order under the following headings:

- DATE: year, month, day
- ORIGIN: hour, minute, seconds, hundredths of seconds
- LAT N: degrees, minutes, hundredths of minutes north
- LONG W: degrees, minutes, hundredths of minutes west
- DEPTH: calculated in kilometers or fixed at 5.00 km
- MAG: duration magnitude calculated according to equation derived at Oklahoma Geological Observatory
- NO: number of P- and S-arrivals used in hypocenter solution
- GAP: largest azimuthal separation between stations measured from the epicenter
- DMIN: epicentral distance in kilometers to nearest station
- RMS: root-mean-square error of the time residuals
- [ $RMS = (\sum_i R_i^2 / NO)^{1/2}$ ] where  $R_i$  is the observed seismic-wave travel time less the computed time at the  $i^{th}$  station
- ERH: standard error of the epicenter in kilometers
- [ $ERH = (SDX^2 + SDY^2)^{1/2}$ ] where SDX and SDY are the standard errors in latitude and longitude, respectively, of the epicenter
- ERZ: standard error of depth in kilometers (asterisks are used if greater than 999 km). This is not a good estimate of depth uncertainty in a sparse network.
- Q: quality of the event. In a dense network, values are A, B, C, D. Only C and D quality solutions are obtained because of the sparseness of the network. Q is based upon GAP, ERH, ERZ, DMIN, RMS, and NO.
- M: Crustal model number. All of our locations use the same crustal model derived by Steeples and shown in Brown et al. (1983).

This table contains locations for all microearthquakes located with data from the Kansas network between 1 August 1977 and 1 May 1983.

TABLE 2. EARTHQUAKES LOCATED BY THE SLEEPY HOLLOW SEISMIC NETWORK, April 1, 1982 to December 31, 1982

EVENT NO.	DATE	HRMN	LAT N	LONG W	DEPTH	MAG	RMS	ERH	ERZ
1	820401	2234	40-09.45	100-23.16	2.6	1.7	0.08	0.5	0.8
2	820403	1931	40-10.97	100-21.20	2.0	1.3	0.07	0.3	0.7
3	820408	1500	40-10.20	100-21.31	3.2	0.4	0.05	0.6	1.7
4	820411	2105	40-09.37	100-22.84	3.8	0.4	0.06	0.3	0.4
5	820414	0211	40-10.01	100-22.51	2.5	-0.2	0.10	0.5	0.6
6	820415	1104	40-11.23	100-21.34	2.2	0.3	0.04	0.4	0.7
7	820421	1845	40-09.29	100-24.05	0.5	0.1	0.06	0.3	0.3
8	820509	1026	40-10.01	100-22.21	3.2	0.7	0.13	0.7	1.2
9	820915	0943	40-10.55	100-22.15	1.8	0.2	0.10	0.4	0.2
10	820915	1220	40-10.48	100-22.23	2.5	-0.1	0.08	0.1	0.2
11	820915	1452	40-10.56	100-22.00	3.8	0.7	0.11	0.1	0.5
12	820927	0651	40-10.34	100-20.62	2.2	0.5	0.10	0.0	0.3
13	821016	1119	40-11.06	100-21.07	2.0	-0.5	0.05	0.2	1.6
14	821105	1344	40-10.57	100-22.75	2.2	0.3	0.10	0.3	0.7

Table headings are defined in explanation of Table 1.

L	STN	LAT	LONG	ELV
1	BEK	3915.79N	9611.98W	349
2	EMK	3826.79N	9619.03W	307
3	HWK	3948.13N	9529.79W	320
4	LAK	39 2.78N	9512.27W	326
5	MLK	39 6.36N	9653.54W	386
6	TCK	3923.09N	9643.35W	377
7	EDK	3746.43N	9647.70W	418
8	SNK	3857.18N	9736.18W	407
9	CNK	3930.48N	9742.78W	465
10	OBK	3955.73N	10026.33W	805
11	NNK	3956.18N	100 2.50W	730
12	INN	4011.55N	10024.01W	762
13	JHN	4026.82N	96 1.05W	329
14	CUN	4128.73N	9722.80W	466
15	MKN	4022.44N	10013.50W	730
16	DTN	41 1.30N	97 2.15W	465
17	SGN	41 3.95N	9613.12W	348
18	HMN	4017.18N	9650.13W	368
19	TUL	3554.00N	9547.55W	256
20	WLO	34 3.80N	9722.18W	284
21	SIO	3544.78N	9618.42W	323
22	CRO	34 9.00N	9433.33W	302
23	ACO	3641.90N	99 8.77W	521
24	PCO	3641.47N	9658.68W	331
25	RLO	3610.02N	95 1.52W	363
26	QMO	3453.57N	9918.42W	479
27	MRO	3550.13N	9713.59W	964
28	MZO	36 7.90N	9518.00W	182
29	RRO	3527.42N	9821.51W	482
30	GBO	3551.15N	9511.06W	302
31	JRTX	3256.04N	10057.18W	804
32	FVM	3759.04N	9025.56W	0
33	TYS	3830.90N	9034.08W	195
34	GOL	3942.02N	10522.27W	2359
35	RFI	4041.35N	9533.97W	308
36	TPI	4114.07N	9532.10W	350
37	PHI	4149.62N	9550.75W	384
38	ESI	4134.77N	95 9.02W	376
39	CAI	41 2.05N	9449.90W	357
40	MRN	40 7.19N	10025.90W	793
41	NNKA	3953.13N	100 2.22W	756
42	NRTK	3953.13N	100 2.22W	756
43	SCN	40 7.99N	10020.60W	783
44	SHN	4010.47N	10019.89W	766
45	QZO	3454.31N	9918.32W	488
46	EHO	3418.48N	9452.04W	143
47	OCO	3531.44N	9728.44W	0
48	SHAN	4012.66N	10021.10W	0
49	SHBN	4011.45N	10020.91W	0
50	SHCN	40 9.60N	10026.00W	0
51	SHDN	40 9.91N	10022.64W	0
52	SHEN	40 9.65N	10020.86W	0
53	SHFN	4010.08N	10017.79W	0
54	SHGN	40 9.81N	10023.15W	0
55	SHHN	40 7.81N	10025.35W	0
56	BENE	4013.00N	9636.15W	1300
57	PCNE	4132.35N	9725.65W	1580
58	LCNE	4118.50N	9856.32W	2200
59	CCNE	4030.22N	9756.20W	1735
60	WHNE	4114.17N	9639.15W	1250
61	JHN	4026.80N	96 1.12W	1100
62	RSSD	44 7.22N	104 2.17W	0
63	ATO	3547.53N	98 7.17W	0

## CRUSTAL MODEL 1

VELOCITY	DEPTH
2.400	.000
4.500	.526
6.000	1.300
6.100	8.113
8.250	42.000

TABLE 3. This table contains station locations for all stations used during the life of the network. Most of the stations are not operated by us. Crustal model is listed at the end of station locations.

MLK	P 0	770818103510.20	41.10	IS 3
BEK	P 3	770818103511.50	45.00	S 3
EMK	P 1	770818103518.30	51.40	S 3
ACO	P 0	770818103539.30		

1	RLO	P 3	770818103550.80		
2	CRO	P 4	770818103515.20		
3	GOL	P 0	770818103548.00		
4	**		10		
5			0		
6	TCK	EPN3	771201130524.90	59.40	S 3
7	MLK	IPN0	771201130522.80	58.00	S 3
8	HWK	EPN0	771201130533.30	30.00	S 3
9	GOL	P 0	771201130535.00		
10	**		10	40 00.00	100 00.00
11			0	40 00.00	100 00.00
12	TCK	P 3	771201132326.50	62.20	S 5
13	MLK	P 0	771201132325.90	62.00	S 3
14	HWK	P 2	771201132337.50		
15	GOL	P 0	771201132340.50		
16	**		10	40 00.00	100 00.00
17			0	40 00.00	100 00.00
18	PCO	IP 0	771216061235.50	43.00	IS 2
19	TUL	EPG2	771216061256.50	78.50	S 3
20	MZO	PN3	771216061258.50	32.60	S 3
21	RLO	PN3	771216061301.70	27.80	S 3
22	CRO	P 4	771216061312.50		
23	HWK	P 4	771216061312.60	46.60	S 4
24	BEK	EP 3	771216061305.10	35.00	ESG3
25	MLK	IP 0	771216061301.40	27.10	IS 3
26	TCK	IP00	771216061305.70	36.00	IS 2
27	EMK	IPU0	771216061253.40	72.45	IS 2
28	**		10		
29			0		
30	PCO	IPG0	771220075648.00	54.00	IS 1
31	MLK	PN0	771220075715.00	41.00	IS 2
32	BEK	PN0	771220075718.10		
33	TCK	PN0	771220075719.10	48.00	S 2
34	HWK	PN1	771220075728.00	64.00	S 2
35	RLO	PN4	771220075717.30	38.90	IS 1
36	TUL	PN4	771220075702.00	28.80	S 2
37	**		10		
38			0		
39	PCO	IPG0	780108041642.00	49.40	ESG0
40	EMK	EP 0	780108041702.20	23.40	ESG1
41	MLK	EPN1	780108041710.70	42.90	ESN4
42	TCK	EPN3	780108041715.20	52.10	ESN4
43	**		10	37 05.00	97 04.00
44			0	37 05.00	97 04.00
45	BEK	EP 0	780111213211.70	16.50	S 1
46	EMK	IP 0	780111213212.50		
47	MLK	IP 0	780111213214.90		
48	TCK	IP 0	780111213215.90	27.00	S 1
49	HWK	P 4	780111213266.00	41.00	S 1
50	**		10		
51			0		
52	MLK	P 1	780113201556.50	78.70	S 2
53	BEK	P 0	780113201547.00	61.80	S 0
54	TCK	P 4	780113201554.50	72.30	S 1
55	HWK	P 1	780113201553.50	41.10	S 2
56	ABN	P 4	780113201524.50	34.50	S 3
57	**		00	40 24.00	95 42.00
			10	40 24.00	95 42.00
	HWK	IP 0	780127112545.10	50.10	S 0

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Phase arrival information using format of Lee and Lahr (1972) for the earthquake location program HYPO71.

TABLE 4.

1	TCK	IP	0	780127112551.70	61.70	S	0
2	MLK	IP	0	780127112556.80	70.80	S	0
3	EMK	P	1	780127112564.00	33.10	S	0
4	BEK	NP	4	780127112547.60	57.80	S	1
5	GRN	EP	9	780127112555.30	72.70	IS	2
6	**			10			
7				0			
8	TCK	P	0	780203002635.10	70.00	S	3
9	MLK	P	1	780203002634.45			
10	BEK	P	1	780203002641.00	77.50	S	3
11	GOL	P	0	780203002649.00			
12	**			10	40	10.00	100 20.00
13				0	40	10.00	100 20.00
14	TCK	IP	0	780414232747.80	55.50	ES	3
15	MLK	IP	0	780414232753.60	65.45	IS	2
16	HWK	IP	0	780414232751.45	59.45	IS	2
17	EMK	EP	3	780414232764.10	82.85	ES	3
18	LAK	EPW	3	780414232761.05	76.95	ES	3
19	**			00			
20				10			
21	CNK	PN0		780520015420.95	49.30	S	2
22	SNK	EPN	3	780520015424.00	54.70	ES	3
23	MLK	IPN	0	780520015429.50	59.90	ES	3
24	HWK	EPN	4	780520015447.00	88.60	ES	3
25	TCK	EPN	1	780520015430.50			
26	BEK	IPN	0	780520015436.40	58.30	ESN	3
27	GOL	PN0		780520015444.80			
28	**			10	40	20.00	100 20.00
29				0	40	20.00	100 20.00
30	MLK	IPU	0	780522042844.30	50.45	S	1
31	TCK	IPU	0	780522042843.30	48.90	SU	1
32	HWK	IPU	0	780522042852.05	63.85	S	1
33	EMK	IPD	0	780522042848.35	58.15	SD	1
34	LAK	IPD	0	780522042851.10			
35	CNK	IP	8	780522042856.65	72.05	ISD	1
36	EDK	IP	8	780522042860.75	79.45	ISD	1
37	BEK	IPD	0	780522042838.50	40.95	S	1
38	RLO	EP	4	780522042935.30	69.40	S	4
39	TUL	P	4	7805220429	84.50	S	4
40	**			10			
41				0			
42	HWK	P	4	780914080806.20	25.15		4
43	MLK	EPN	3	780914080712.50	44.40	ESN	3
44	TCK	EPN	3	780914080712.20	43.80	ESN	3
45	SNK	EP	3	780914080705.00	35.20	SN	1
46	CNK	IPG	0	780914080659.15	86.10	ISG	0
47	EDK	EPN	4	780914080736.50	74.50	ESN	4
48	GOL	PN0		780914080721.95			
49	RLO	EPN	4	780914080846.90	112.30	ESN	4
50	TUL	EPN	4	780914080845.50			
51	ACO	IPN	0	780914080726.30			
52	**			10	40	10.00	100 22.00
53				0	40	10.00	100 22.00
54	MLK	PG0		781101084515.70	27.10	SG	3
55	SNK	PG0		781101084517.40	30.30	SG	3
56	CNK	PG0		781101084508.55	14.90	SG	1
57	TCK	P	0	781101084512.70	22.20	SG	2
58	LAK	P	1	781101084533.80	57.40	IS	2
59	HWK	P	4	781101084500.00	44.50	S	3
60	EDK	P	4	7811010846 .00	06.90	S	4
61	**			10			
62				0			
63	TCK	P	3	781204230708.00			

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1	SNK	IPN0	781204230702.20	31.00	S	0
2	CNK	EPG0	781204230702.20	29.00	ESN0	
3	MLK	EPN3	781204230706.60	44.40	S	3
4	EMK	P 4	781204230700.00	59.35	ESG4	
5	HWK	EPN4	781204230728.00	70.70	ESN4	
6	LAK	P 4	781204230719.40	55.40	ES	4
7	GOL	PG0	781204230724.00			
8	**		10			
9			0			
10	ACO	IP 0	781204230627.60	41.00	IS	2
11	RPO	PN0	781204230650.00	79.20	S	3
12	MLK	PN2	781204230655.95			
13	TCK	PN3	781204230657.05			
14	CNK	PG3	781204230654.50	39.05	SG3	
15	**		10			
16			0			
17	LAK	IPG0	781210134131.35	52.75	ISG0	
18	HWK	PG0	781210134134.05	58.50	SG1	
19	TCK	EPN0	781210134149.00	87.70	SN3	
20	EMK	EPG4	781210134154.60	82.90	ESG3	
21	RLO	EPN2	781210134158.60			
22	RLO	4	781210134200.00	42.50	ESN3	
23	FVM	EP 4	781210134157.00	31.50	ESN3	
24	TYS	EPN0	781210134141.60	70.20	ESN3	
25	**		10			
26			0			
27	BEK	IP 0	790124034208.60	13.45	IS	3
28	LAK	PG0	790124034217.65	29.00	SG3	
29	MLK	EO 3	790124034216.00	27.00	ES	3
30	TCK	IPD0	790124034211.15	18.80	ES	3
31	HWK	P 0	790124034210.30	16.90	S	3
32	**		10			
33			0			
34	BEK	IP 0	790210195608.00	11.00	IS	0
35	BEK	IP 0	790210195608.00	11.00	IS	0
36	TCK	P 0	790210195618.00	25.10	S	3
37	MLK	P 4	7902101956	29.00	S	3
38	HWK	EP 3	790210195616.30	23.7	ES	3
39	LAK	NP 3	790210195616.10	22.10	S	3
40	**		10			
41			0			
42	MLK	PN0	790225193037.49			
43	CNK	P 2	790225193045.49	74.2		4
44	SNK	P 2	790225193045.11	92.50	S	3
45	TCK	PN3	790225193034.59	73.90	SN4	
46	HWK	PN0	790225193023.30	54.43	SN3	
47	BEK	IPN0	790225193030.00	72.60	IS	4
48	ABN	P 4	790225193010.00			
49	JHN	P 4	790225193028.00			
50	TYS	P 0	790225193015.80	51.70		4
51	FVM	P 0	790225193022.90	53.30		3
52	**		10			
53			0			
54	EDK	IP 0	790309114756.80	66.50	S	3
55	TCK	EP 3	790309114826.00	53.50	ES	3
56	LAK	P 4	7903091148	59.20	ESG3	
57	MLK	EPN4	790309114813.30	40.50	ES	3
58	SNK	PN1	790309114817.05	42.50	IS	2
59	RLO	EPN3	790309114819.30	46.10	ESN3	
60	PCO	P 4	7903091148	00.00	SG3	
61	MRO	P 4	7903091148	25.50	SG3	
62	SIO	P 4	7903091148	33.80	SG3	
63	TUL	EP*4	790309114814.00	36.50	ESG3	

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ACO P 4 7903091148 37.70 SG3

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0

7	TCK	EP 4	7903091244	33.70	28.50	ES 3
8	MLK	EPN3	7903091243	54.50	30.90	ESN3
9	EMK	P 4	7903091244		04.45	ES 3
10	EDK	IPG0	7903091243	31.90	41.00	ISG0
11	BEK	EPN3	7903091243	59.70	39.00	ESN3
12	CNK	P 4	7903091244		28.00	ESN3
13	LAK	P 4	7903091244		35.00	ISN4
14	MRO	PG3	7903091243	42.50	50.40	S 3
15	TUL	EP+3	7903091243	49.20	71.60	ISG2
16	ACO	PN3	7903091243	50.00	72.70	ESG3
17	RLO	IPN1	7903091243	57.80	80.90	ESN3
18	SIO	P 4	7903091244		08.90	ESG3
19	PCO	PG1	7903091243	29.10	35.50	SG2

\*\* 10  
0

20	HWK	IPN0	7904082246	56.25	88.50	S 3
21	MLK	EPN3	7904082246	50.50	80.40	S 4
22	CNK	EPN0	7904082246	39.40	62.30	SN3
23	EDK	EPN3	7904082247	06.20	48.60	S 3
24	EMK	EP 3	7904082247	10.30	40.10	ES 3
25	BEK	PN3	7904082246	51.90		
26	CUN	IPG9	7904082246	25.90	39.40	ISG1
27	OBK	IPN9	7904082246	39.36	63.17	ISN2
28	MKN	IPN9	7904082246	35.05	54.75	ISN2

\*\* 10  
0

29	HWK	IPD0	7906030506	54.60	79.25	IS 3
30	MLK	IP 0	7906030506	36.90	48.10	IS 1
31	SNK	IPD0	7906030506	32.20	39.50	IS 1
32	TCK	IP 0	7906030506	37.60	49.10	S 3
33	CNK	IPD0	7906030506	24.90		S
34	EMK	IPD0	7906030506	50.50	70.00	IS 2
35	EDK	IP 0	7906030506	54.50	79.70	IS 3
36	OBK	IPN9	7906030506	57.30	82.00	S 3
37	NNK	IPG9	7906030506	53.50	78.50	ISG3
38	MKN	IP 9	7906030506	58.80	83.70	SG3

\*\* 10  
0

39	EDK	PG4	7906061617	22.70		
40	SNK	PE3	7906061617	07.25		
41	CNK	IP 0	7906061616	59.55		
42	MLK	IPN0	7906061617	09.30		
43	GOL	PN0	7906061617	23.30		
44	NNK	IP 0	7906061616	29.10		
45	BEK	IPN0	7906061617	15.85	55.70	S 3
46	OBK	IPU0	7906061616	26.60		
47	MKN	IP 0	7906061616	27.60		

\*\* 11 1.0 40 00.00 100 00.00  
01 1.0 40 00.00 100 00.00

48	MLK	IPG0	7906121113	39.00	59.20	IS 1
49	HWK	IPG0	7906121113	26.45	35.7	IS 2
50	CNK	EPG3	7906121113	41.80	61.5	S 3
51	SNK	EPG4	7906121113	49.20	66.5	S 4
52	TCK	EPG1	7906121113	33.35	49.0	IS 2
53	JHN	IP 0	7906121113	13.00	14.0	IS 2

\*\* 10  
0

54	TCK	PG1	7906150508	36.10		
55	EMK	IPD0	7906150508	52.55	74.40	IS 2
56	HWK	EP 2	7906150508	48.55	65.60	ES 3

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1	MLK	IP00	790615050838.65	48.20IS	2	
2	SNK	IP00	790615050840.75	52.20IS	2	
3	EDK	EP 4	790615050800.00	90.00ES	3	
4	**		10	40 00.00	37 12.00	
5			0	40 00.00	37 12.00	
6	EDK	IP 0	790625073023.00	31.7	S 3	
7	SNK	EP 2	790625073042.20	57.50IS	2	
8	BEK	P 4	7906250731	03.70ES	4	
9	EMK	EP 1	790625073035.50	45.45ES	1	
10	MLK	EP 3	790625073041.30	57.80	S 2	
11	HWK	EPN4	790625073055.40	84.50ES	4	
12	RLO	PN3	790625073105.10	36.7	S 3	
13	TUL	P 3	790625073103.50	32.3	SN3	
14	**		10			
15			0			
16	TCK	IPG1	790626130421.00	28.50	S 2	
17	EMK	IPG0	790626130426.90	38.70	S 1	
18	HWK	IPG3	790626130421.70	31.30	S 4	
19	MLK	EPG3	790626130424.20	33.30	S 4	
20	SNK	P 4	790626130400.00	53.80	S 4	
21	LAK	IPG0	790626130423.55	32.55IS	60	
22	BEK	IPG0	790626130414.00	16.10	S 1	
23	JHN	IP 2	790626130430.50	45.90	S 3	
24	**		10			
25			0			
26	CNK	IP 0	790630204651.8			
27	TCK	IP 0	790630204654.80	64.00	S 3	
28	MLK	IP 0	790630204658.15	69.40	S 3	
29	SNK	IP 0	790630204700.30	14.30	S 2	
30	HWK	IP 0	790630204706.75			
31	EMK	IP 0	790630204712.15	34.00	S 3	
32	EDK	IP 0	790630204719.85	42.20	S 3	
33	BEK	IP 0	790630204701.50	15.70	S 2	
34	CUN	IP 9	790630204709.90	30.90	S 3	
35	OBK	IP 3	790630204721.25	25.50	S 3	
36	JHN	IPU0	790630204702.00	17.20IS	3	
37	**		10			
38			0			
39	CNK	IP 0	790630211016.80	24.20ES	2	40
40	MLK	P 0	790630211024.05	35.25	S 2	35
41	SNK	P 0	790630211025.05	40.10	S 3	30
42	EMK	P 4	7906302110	59.90	S 3	
43	BEK	P 4	7906302110	46.10	S 3	
44	HWK	P 4	7906302110	52.00ES	3	
45	**		10			
46			0			
47	CNK	IP 1	790701195944.60	51.20	S 2	
48	TCK	EP 3	790701195948.90			
49	MLK	IP 0	790701195951.40	62.20	S 1	
50	SNK	IP 0	790701195953.50	67.90	S 3	
51	HWK	P 1	790701195960.10	80.10	S 3	
52	EMK	IP 1	790701195965.00	86.70	S 3	
53	**		10			
54			0			
55	MLK	PN3	790714183300.10	21.85	S 3	
56	HWK	P 4	7907141833	32.60	S 4	
57	TCK	P 0	790714183301.70	26.50	S 3	
58	EDK	P 4	7907141833	40.85	S 4	
59	SNK	IP 0	790714183252.90	71.90IS	0	
60	CNK	IP 0	790714183249.50	65.90IS	3	
61	OBK	IP 0	790714183246.50	58.70IS	0	
62	MKN	IP 0	790714183247.95	63.80IS	2	
63	NNK	IP 0	790714183240.70	49.90	S 3	

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	**	10		
		0		
	SNK	EPN2	790716000427.75	59.90ES3
	SNK	IPG4	790716000432.50	
1	HWK	EPN3	790716000448.50	93.00 S 3
2	HWK	PG4	790716000455.15	
3	MLK	IPN0	790716000435.20	73.30 S 3
4	TCK	PNC	790716000435.50	59.60 S 3
5	TCK	PG4	790716000439.75	
6	CNK	IPNC	790716000425.45	53.85 S 3
7	CNK	IPG4	790716000425.30	
8	OBK	IP 0	790716000353.20	
9	NNK	IP 0	790716000354.50	
10	MKN	P 2	790716000352.50	
11	**	10		
12		0		
13	SNK	EPN3	790716013501.70	32.70 S 3
14	SNK	PG4	790716013505.00	
15	HWK	EPN3	790716013521.00	62.60 S 3
16	HWK	PG4	790716013527.70	
17	MLK	EPN3	790716013508.20	43.50 S 3
18	MLK	PG4	790716013514.75	
19	TCK	EPN3	790716013508.70	42.75 S 3
20	TCK	PG4	790716013513.00	
21	CNK	EPN0	790716013458.05	88.30 S 3
22	OBK	IP 0	790716013425.70	
23	NNK	IP 0	790716013427.10	
24	MKN	IP 0	790716013424.55	
25	**	10		
26		0		
27	OBK	IP 0	790716052706.95	12.00 S 3
28	NNK	IP 0	790716052708.20	13.10 S 2
29	MKN	IP 0	790716052705.65	08.90 S 2
30	**	10		
31		0		
32	OBK	IP 0	790716060815.40	19.60 S 3
33	NNK	IP 0	790716060816.80	21.80 S 2
34	MKN	IP 0	790716060814.35	17.70 S 2
35		10		
36	NNK	IP 0	790716070602.80	
37	MKN	IP 0	790716070600.10	02.90 S 3
38	OBK	EP 3	790716070601.60	
39	**	10		
40		0		
41	CNK	IP 0	790724041725.50	52.10ES 3
42	SNK	EPN3	790724041731.00	63.90 S 3
43	SNK	EPG4	790724041732.90	
44	MKN	IP 0	790724041651.10	54.10IS 2
45	OBK	IP 0	790724041651.10	54.60 S 3
46	**	10		40 10.00 100 20.00
47		0		40 10.00 100 20.00
48	MKN	IP 0	790724080455.70	62.25IS 1
49	SNK	P 4	7907240805	55.20ES 2
50	OBK	IP 0	790724080502.15	13.20IS 1
51	CNK	P 1	790724080517.70	42.10 S 3
52	**	10		40 10.00 100 20.00
53		0		40 10.00 100 20.00
54	MLK	IPU0	790802104639.15	44.30 S 2
55	SNK	IPU4	790802104639.45	
56	BEK	IPD0	790802104641.65	48.10 S 3
57	EMK	IPU0	790802104643.25	50.50 S 2
	CNK	IPU0	790802104652.80	66.75IS 1
	EDK	EP 3	790802104654.10	69.90 S 3

	HWK	IPU0	790802104654.85	70.90	S	3	40
	**		10				
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	CNK	EPN3	790802041700.20	28.20	SN	3	
	CNK	EPG4	790802041703.15	31.30	SG	4	
2	OBK	IP 0	790802041626.80	30.40	IS	0	
3	OBK	IP 0	790802041526.30	30.40	IS	0	
4	EMK	P 4	7908020418	02.70	SN	3	
5	BEK	EPN3	790802041714.80	56.65	SN	3	
6	BEK	EPG4	790802041723.75				
7	HWK	P 4	7908020417	57.40	ES	SN3	
8	HWK	P 4	7908020417	66.30	SN	3	
9	**		10	40	10.00	100	20.00
10			0	40	10.00	100	20.00
11	OBK	IPU0	790813110955.60	57.10	IS	0	
12	NNK	IPD0	790813110955.60	61.40	IS	1	
13	MKN	IPU0	790813110954.70	57.90	IS	0	
14	**		10	40	00.00	100	00.00
15			0	40	00.00	100	00.00
16	NNK	P 1	790814235938.20	42.20	S	1	
17	OBK	IPU0	790814235936.50	40.00	IS	0	
18	MKN	P 1	790814235935.80	39.10	S	1	
19	**		10	40	00.00	100	00.00
20			0	40	00.00	100	00.00
21	NNK	P 1	790815064559.90	64.50	S	1	
22	OBK	IPU0	790815064558.70	61.60	S	0	
23	MKN	IPU0	790815064558.70	62.30	S	1	
24			10	40	00.00	100	00.00
25	MKN	IPU0	790815160712.50	16.70	S	1	
26	OBK	IPU0	790815160711.30	14.60	S	0	
27	NNK	EP 1	790815160714.50				
28	**		10	40	00.00	100	00.00
29			0	40	00.00	100	00.00
30	MKN	IPU0	790831080016.40				
31	OBK	IPU0	790831080016.60	19.20	IS	0	
32	NNK	IPU0	790831080017.80	18.80	IS	3	
33	**		10	40	00.00	100	00.00
34			0	40	00.00	100	00.00
35	SNK	P 4	790909000000.00	57.00	ES	3	
36	CNK	P 4	790909000000.00	68.60	ES	3	
37	BEK	IPD0	790909000027.60	31.15	IS	2	
38	LAK	PN3	790909000035.30	43.60	ES	SN3	
39	EMK	P 0	790909000041.30	53.85	S	3	
40	HWK	P 4	790909000000.00	39.15	S	0	
41	MLK	EP 4	790909000035.30				
42	**		10				
43			0				
44	EDK	EP 0	791019161755.80	75.80	IS	2	
45	SNK	EP 3	791019161802.40	28.40	ES	2	
46	BEK	EPM3	791019161814.40	47.60	ES	SN2	
47	CNK	PN3	791019161803.40				
48	ACO	IPG0	791019161736.70	45.00	ES	SG3	
49	PCO	EPG3	791019161750.75				
50	MRO	EPN3	791019161756.50				
51	PCO	P 4	791019161800.00	12.20	ES	SG3	
52	MRO	P 4	791019161800.00	19.60	ES	SN4	
53	SIO	P 4	791019161800.00	38.87	ES	SN4	
54	TUL	P 4	791019161800.00	45.90	ES	SN4	
55	RLO	P 4	791019161900.00	00.80	ES	SN4	
56	GB0	P 4	791019161900.00	00.80	ES	SN4	
57	**		10				
			0				
	EDK	EP 3	791019211257.80	78.20	IS	2	

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1	SNK	EP 0	791019211305.20	29.20ES 3	
2	MLK	EPN3	791019211311.10	36.70ESN3	
3	MLK	IPG4	791019211312.25	40.65ISG2	
4	ACO	IPG0	791019211239.20	47.50ESG3	
5	PCO	P 4	791019211300.00	11.40 SG3	
6	MRO	P 4	7910192113 0.00	22.10ESG3	
7	**		10		
8			0		
9	MKN	IP 9	791119045344.20	47.10 S 1	
10	OBK	IP 0	791119045851.50		
11	INN	IP 0	791119045849.80	53.50 S 1	
12	**		10		
13			0		
14	INN	IP 0	791129220232.50	33.00IS 1	
15	MKN	IP 0	791129220236.10	39.20IS 1	
16	OBK	IP 0	791129220236.00	39.60IS 1	
17	**		10		
18			0		
19	HWK	P 0	791207141738.80	61.50 S 2	
20	BEK	P 0	791207141731.30	49.50 S 4	
21	CNK	P 0	791207141712.10	17.50 S 4	
22	EMK	P 0	791207141738.80	60.80 S 2	
23	**		10		
24			0		
25	EDK	EPN1	791215073043.10	62.20IS 2	40
26	EDK	PG4	791215073044.00	S	
27	EMK	P 4	7912150731	21.90ESG3	
28	TCK	EPN3	791215073101.85	32.50ES 3	70
29	MLK	EPN1	791215073057.40	37.50 SG2	45
30	ACO	EPG0	791215073028.25	37.60ESG2	
31	PCO	EPG3	791215073039.35	56.70ESG3	
32	RLO	PN3	791215073105.13	S	
33	MRO	P 4	7912150731	07.20 SG3	
34	**		10		
35			0		
36	CNK	IP 0	800211054554.60	61.85IS 2	80
37	TCK	IPD0	800211054557.75	65.2 ES 4	110
38	EMK	P 4	800211054605.50	18.2 ES 4	65
39	HWK	EP 0	800211054611.00	29.10ES 3	60
40	BEK	IP 0	800211054605.60	18.10ES 4	55
41	HMN	EP 1	800211054554.00	60.20ES 3	
42	**		10		
43			0		
44	EMK	IP 0	800309054557.65	62.75IS 0	
45	EDK	IP 0	800309054559.95	66.55IS 1	
46	SNK	P 1	800309054606.90	20.70 S 3	
47	BEK	IP 0	800309054610.70	24.70 S 3	
48	TCK	IP 0	800309054610.95	25.95 S 3	
49	LAK	EP 3	800309054616.00	34.70ES 3	
50	HWK	EPN3	800309054623.30	46.30ES 3	
51	HWK	EPG4	800309054624.90		
52	MLK	IP 0	800309054606.60	17.30IS 2	
53	**		10		
54			0		
55	EMK	IP 0	800309092251.30	56.40IS 0	
56	EDK	IP 0	800309092253.45	60.10IS 1	
57	SNK	P 4	800309092257.10	75.60 S 3	
58	BEK	IP 0	800309092304.60	18.95 S 3	
59	TCK	IP 0	800309092304.95	18.80 S 2	
60	LAK	P 4	8003090923	28.40ES 3	
61	HWK	EPN3	800309092317.20	41.20ES 3	
62	HWK	EPG4	800309092318.20		
63	MLK	IP 0	800309092300.50	11.70IS 2	

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	**		10		
			0		
1	LAK	EP 3	800321091013.00	25.20ES	3
2	BEK	IP 0	800321091015.40	29.50IS	0
3	HWK	IP 0	800321091001.55	35.30IS	3
4	MLK	EPG3	800321091025.00	47.10ES	3
5	CNK	EP 3	800321091031.70	59.40ES	3
6	**		10		
7			0		
8	CNK	IP 0	800326101217.45	37.50 S	3
9	BEK	P 4	8003261013	34.50ES	3
10	SNK	IP 1	800326101217.15	37.80IS	3
11	TCK	EPN1	800326101229.50	55.70ESN3	
12	TCK	PG4	800326101232.40		
13	MLK	EPN3	800326101227.50	52.00ESN3	
14	MLK	P 4	8003261012	54.20ISG4	
15	MKN	PG2	800326101223.70	45.50 S	3
16	OBK	P 3	800326101223.80		
17	NNK	EP 3	800326101215.50	31.20ES	3
18	**		10		
19			0		
20	MLK	IP 0	800326225727.90	50.20IS	2
21	HWK	IP 0	800326225704.50	39.80IS	3
22	BEK	IP 0	800326225718.50	32.90ES	3
23	TCK	IP 0	800326225723.30	41.30ES	3
24	SNK	P 4	8003262258	06.90ES	3
25	CNK	EP 3	800326225734.30	62.20ES	3
26	EDK	P 4	8003262258	21.50 S	3
27	EMK	P 4	8003262257	54.90 S	3
28	JHN	P 9	800326225709.50	20.80IS	1
29	CAI	EP 1	800326225718.60	32.30 S	3
30	**		10		
31			0		
32	CNK	IP 0	800416071331.20	38.40IS	3
33	TCK	P 0	800416071334.80	42.25ES	3
34	MLK	IP 0	800416071337.90	46.20IS	4
35	SNK	P 0	800416071340.15	53.20ES	3
36	BEK	IP 0	800416071342.00	57.00ES	3
37	HWK	EP 4	800416071345.80	65.05ES	3
38	EMK	P 0	800416071352.05	73.80IS	2
39	LAK	EP 4	800416071356.25	80.65ES	3
40	EDK	EP 4	800416071403.20	27.80ES	3
41	HMN	EP 3	800416071331.30	37.30ES	2
42	**		10		
43			0		
44	BEK	PN3	800426142239.75		
45	CNK	PG0	800426142223.70	51.95ISG3	
46	SNK	EP 1	800426142232.10	57.85 S	4
47	TCK	PN0	800426142231.90	72.25ES	3
48	TCK	PG4	800426142238.40		
49	HWK	PN3	800426142243.50	84.00 S	3
50	MLK	P 4	800426142232.85	66.50 S	3
51	LAK	P 4	8004261424	01.70 S	4
52	NNK	P 0	800426142204.30	16.00 S	0
53	INN	P 0	800426142202.50	12.40 S	2
54	ACO	PN4	800426142305.10	57.20 SN4	
55	**		10	40 50.00 100 00.00	
56			0	40 50.00 100 00.00	
57	BEK	IP 1	800629161446.15	58.70 S	3
58	HWK	IP 0	800629161447.20	60.30 S	1
59	EMK	EP 3	800629161448.20	61.40 S	3
60	MLK	P 4	800629161453.35		
61	TCK	IP 0	800629161453.60	70.80 S	3

CNK	P 4	8006291515	33.20	S 3
SNK	P 3	800629151501.50		
EDK	P 3	800629151502.25	22.30	S 3
RLO	PN3	800629151513.30	50.80	SN3
GB0	PN4	800629151525.30	61.70	SN3

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4	BEK	IP 3	800630010034.20	
5	MLK	IP 0	800630010023.05	
6	TCK	IP 0	800630010033.15	39.50 S 3
7	SNK	P 0	800630010034.00	41.10 S 3
8	EMK	P 1	800630010034.70	41.35 S 3
9	CNK	P 1	800630010040.20	52.20 S 3
10	EDK	P 1	800630010043.20	58.10 S 3
11	HWK	P 2	800630010048.70	67.50 S 4
12	RLO	EPN4	800630010111.67	49.20 S 4
13	TUL	EPN4	800630010118.70	
14	STO	PN4	800630010119.67	
15	GB0	PN4	800630010119.60	55.00 S 4

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18	HMN	PN1	800727001817.70	52.60 S
19	EMK	P 3	800727001826.70	
20	MLK	P 3	800727001818.80	
21	EDK	P 3	800727001848.30	
22	CNK	P 3	800727001826.70	
23	BEK	P 3	800727001825.10	

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26	ACO	IP00	800810101007.40	11.05IS 1
27	STO	EPN2	800810101041.00	
28	RLO	EPN3	800810101053.07	
29	TUL	PN3	800810101045.60	79.10 SN3
30	MLK	EP 1	800810101048.20	83.40ES 3
31	EMK	EP 2	800810101047.20	74.30 S 4
32	HWK	P 4	8008101011	51.30ES 3
33	SNK	EPN0	800810101041.10	71.90ES 3
34	CNK	IP 0	800810101048.20	
35	BEK	EP 4	800810101101.10	34.70ES 3
36	EDK	P 0	800810101034.30	67.10 S 4

\*\* 10 36 52.00 98 52.00  
0 36 52.00 98 52.00

39	MLK	EPN4	800813055104.55	34.75ES 4
40	CNK	EPN0	800813055053.20	83.20ESN3
41	EMK	P 4	8008130552	01.80ES 4
42	BEK	EPG4	800813055102.00	33.10ESN4
43	SNK	P 4	8008130551	45.50ESN4
44	HMN	P 0	800813055041.80	62.50 S 3
45	JHN	P 9	800813055037.50	61.00 S 0
46	SGN	P 0	800813055028.00	41.80 S 0
47	ESI	EP 3	800813055039.80	59.70ES 3
48	CAI	EP 3	800813055046.50	71.00ES 3

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51	CNK	PN0	800905102203.30	30.30 SN3
52	TCK	EPN1	800905102211.60	43.50ESN3
53	SNK	P 4	8009051022	32.20ESN3
54	MLK	PN1	800905102213.85	44.15 SN3
55	EMK	P 4	8009051022	74.80 SG4
56	LAK	EPN4	800905102234.80	71.00ESN4

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CNK IP 0 800907002235.40 37.30 S 0

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TCK P 0 800907002248.55 50.40 S 3  
 MLK P 3 800907002247.90 59.90 S 3  
 SNK P 3 800907002246.20 55.10 S 3  
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0  
 MLK P 2 801109145320.00 28.70 S 3  
 LAK P 2 801109145318.00 25.75 S 3  
 TCK P 0 801109145317.75 25.75 S 1  
 BEK IP 0 801109145310.12 13.70 S 0  
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0  
 ACO IPG0 801122033425.15 36.00 ESN3  
 PCO IPG0 801122033427.80 40.70 ESN3  
 RRO EPG0 901122033429.75 45.00 ESN3  
 MRO EPG3 801122033430.40 45.00 ESN3  
 SIO EPN2 901122033439.07 61.57 ESN3  
 TUL EPN2 801122033447.47 59.57 ESN3  
 GBO EPN2 801122033455.13 35.93 ESN3  
 RLO EPN2 801122033456.50 34.00 ESN3  
 EDK PGO 801122033440.30 61.00 SG3  
 TCK PNO 801122033500.40 41.17 SG4  
 EMK PN3 801122033449.40 32.00 SG3  
 HWK PG4 801122033516.67 56.80 SG4  
 MLK PNO 801122033455.87 93.70 SG4  
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0  
 TCK IP 0 810217055331.70 53.00 S 2  
 BEK EP 3 810217055337.90 66.50 S 4  
 SNK EP 2 810217055320.30 35.80 S 3  
 MLK EP 0 810217055329.65 50.25 IS 0  
 CNK P 0 810217055313.60 29.70 S 4

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 CNK PNO 810313124252.2 80.7 ESN3 115  
 SNK EPN3 810313124259.5 89.5 ESN3 090  
 HWK EPN3 810313124311.2 135  
 MLK EPNO 810313124304.80 40.8 ESN3 130  
 GOL PGO 810313124325.0  
 ACO PN3 810313124320.7 71.6 SN3  
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0  
 INN IP 0 810320050949.67 50.50 S 2  
 SCN IP 0 810320050949.30 49.90 S 2  
 MKN IP 9 810320050951.30 54.45 S 1  
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0  
 CNK IPNO 810420181842.1 63.7 ES 3 98  
 BEK EP 3 810420181852.5 81.7 ES 4  
 SNK EP 3 810420181853.6 78.7 ES 3  
 TCK P 1 810420181847.0 68.6 ES 3 143  
 EMK P 4 810420181904.5 37.5 ES 4 110  
 HWK PNO 810420181852.1 76.5 ES 3 110  
 MLK P 1 810420181849.5 71.7 ES 3 135  
 PHT P 3 810420181843.7 66.2 S 3  
 RFI P 1 810420181846.2 71.8 S 3  
 HMN IPG3 810420181833.7 52.2 SG3  
 INN PNO 810420181851.3 78.3 SG3  
 SCN PN1 810420181850.7 76.4 SG3  
 MKN PN9 810420181841.0 76.0 SN3

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 HWK IP 0 810530090722.6 33.0 IS 2  
 CNK P 3 810530090748.9 82.1 SG4

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1	SNK	PN4	810530090742.7	51.1	SN4	45
2	TCK	P 2	810530090737.6	57.8	S 3	
3	BEK	IP 0	810530090730.45	45.55	S 3	
4	EMK	P 0	810530090737.6	57.3	IS 1	
5	RFI	P 2	810530090737.4	56.3	S 3	
6	ESI	P 2	810530090730.5	79.8	S 3	
7	TPI	P 2	810530090745.9	72.2	S 3	
8	CAI	P 3	810530090742.5	64.4	S 3	
9	**		10			
10			0			
11	TCK	P 0	810620051717.6	36.8	S 3	75
12	MLK	P 0	810620051714.3	31.0	S 2	70
13	EMK	P 3	810620051721.1	43.6	S 2	50
14	SNK	P 1	810620051704.5	14.0	S 1	
15	CNK	IP 0	810620051709.6	22.3	S 2	45
16	EDK	P 4	8106200517	42.1	IS 3	
17	SCN	P 4	810620051731.0	55.75	S 2	
18	INN	P 4	8106200517	55.20	S 3	
19	**		10			
20			0			
21	CNK	P 0	810626185538.3	66.5	S 3	
22	TCK	P 0	810626185541.0			
23	MLK	P 0	810626185544.2			
24	PHI	P 0	810626185527.7	46.1	S 3	
25	TPI	P 0	810626185532.2	54.7	S 3	
26	ESI	P 3	810626185535.0	59.0	S 3	
27	RFI	P 0	810626185536.1	60.5	S 3	
28	CAI	P 1	810626185540.5	71.8	S 3	
29	HMN	P 9	810626185528.55	47.7	S 2	
30	SGN	P 9	810626185521.3	36.7	S 2	
31	DTN	P 9	810626185515.45	23.6	S 2	
32	**		10			
33			0			
34	TCK	P 0	810708064126.80	35.4	S 1	45
35	CNK	P 3	810708064141.9	61.5	S 4	
36	EMK	P 0	810708064127.9	36.8	S 3	
37	HWK	P 3	810708064130.8	39.8	S 4	
38	MLK	P 4	8107080641	35.7	S 3	45
39	BEK	P 0	810708064119.65	23.2	S 1	
40	**		10			
41			0			
42	TCK	IPNO	810711211031.45	80.50	SN3	
43	EMK	IPNO	810711211020.30	60.95	SN3	2.66170
44	MLK	IPNO	810711211027.10	77.75	SN3	2.62163
45	BEK	PNO	810711211030.55			
46	LAK	NPN3	810711211033.20	83.85	ESN3	
47	CNK	EPN3	810711211032.75	79.00	ESN3	2.58154
48	SNK	EPN3	810711211022.25	70.50	ESN3	2.59156
49	EDK	PNO	810711211011.15	46.30	ESN3	2.57153
50	TUL	P 1	810711210954.0	80.0	S 2	
51	SIO	P 1	810711210929.0			
52	GBO	P 1	810711211000.0			
53	RLO	P 1	810711211003.0			
54	**		10			
55			0			
56	TCK	EPN3	810711200808.80	58.85	SN3	2.35116
57	EMK	EPN3	810711200752.40			
58	BEK	P 4	8107112008	59.00	SN3	
59	EMK	P 4	8107112008	40.60	SN3	
60	**		10			
61			0			
62	TCK	IPU4	810717124239.50	67.50	ISU1	
63	CNK	EPU1	810717124234.50	58.25	ESU3	

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MLK	IPU1	81071712+239.90	50.00ESD4
EMK	P 4	8107171242	96.00ESU3
SNK	EPU4	810717124237.60	55.00ESD4
INN	EP 1	810717124243.70	74.30ES 2
PHI	P 1	810717124218.75	37.15 S 3
RFI	P 1	810717124227.65	50.50 S 3
**		10	

SNK	IP 0	810801015857.90	67.10 S 1	
CNK	IP 0	810801015906.15	21.7 S 2	210
MLK	IP 0	810801015905.95	19.0 S 3	192
HWK	EP 2	810801015925.10		
EMK	IP 0	810801015907.90	25.8 S 1	183
TCK	P 1	810801015910.0	30.0 S 1	235
ACO	P 3	810801015918.0		
STO	P 4	810801015931.2		
GBO	P 4	810801015935.5		
JHN	P 9	810801015928.00	68.00 S 4	
GOL	P 4	810801015976.1		
HMN	IP 3	810801015921.00	49.00IS 3	
**		10		

JHN	IP 9	810807115520.00	99.00ES 9
MLK	EP 2	810807115520.00	92.50ES 2
TCK	EP 1	810807115523.00	94.50ES 2
NNKA	IP 4	810807115536.25	
CNK	IP 1	810807115536.25	
BEK	EP 1	810807115517.50	34.50ES 2
HWK	IP 2	810807115517.50	87.50ES 4
EMK	EP 2	810807115513.75	76.25ES 3
NNKA	IP 4	8108071156	52.00ES 2
CNK	IP 4	8108071156	58.50ES 2

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SNK	EPU4	810907003920.50	63.50ISD2
CNK	EPD3	810907003920.03	58.00ISU4
EMK	P 4	8109070040	35.25ESD4
MLK	IPD1	810907003924.65	68.50ESU1
BEK	IPU0	810907003927.50	71.00ISD2
HMN	P 9	810907003917.00	48.50 S 1
JHN	P 4	810907003924.50	
INN	P 0	810907003858.00	92.30 S 0
**		10	

TCK	EPD1	810913221751.10	
EMK	IPD3	810913221803.50	71.00ISU2
SNK	EPU2	810913221751.12	
BEK	IPD2	810913221757.50	
TCK	P 4	8109132218	56.70ESD2
SNK	P 4	8109132218	45.01ISD1
BEK	P 4	8109132218	60.75ISU1
JHN	P 2	810913221759.45	
INN	EP 1	810913221721.38	43.13 S 2
**		10	

EMK	IPU2	811009215519.00	53.25ESU3
MLK	IPU0	811009215509.10	40.05ESD3
TCK	EPU1	811009215506.50	36.01ESU3
BEK	EPU0	811009215512.00	48.50ESU3
CNK	EPU0	811009215500.15	26.04ISU0
SNK	IPD4	811009215510.75	43.00ISD4
INN	IP 9	811009215459.08	82.40 S 1
GOL	EPN4	811009215543.70	
ACO	EPN2	811009215536.60	

6	SIO	EPN3	911009215552.60		
7	CAI	P 4	811009215518.20	55.50	S 4
8	PFI	P 3	811009215538.50	38.60	S 0
9	TPI	P 1	811009215507.50	35.20	S 1
10	PHI	P 0	811009215534.50	33.10	S 1
11	DTN	P 9	811009215548.90	66.35	S 0
12	HMN	P 9	811009215557.25	82.60	S 3
13	JHN	P 9	811009215510.05	39.40	S 0
14	**		10		
15			0		
16	EDK	P 3	811016224257.70		
17	TCK	IP 1	811016224245.80	30.50	ES 2
18	MLK	EP 1	811016224242.55	75.90	S 2
19	LAK	P 2	811016224238.05	56.70	S 1
20	BEK	EP 2	811016224244.10	71.50	S 3
21	NNKAEP	2	811016224313.50	65.95	S 2
22	**		10		
23			0		
24	SNK	EP 4	811127010908.15	35.93	S 4
25	NNKAEP	4	811127010918.77	51.88	S 0
26	CNK	EP 4	811127010916.87	45.85	S 4
27	LAK	IP 0	811127010922.10	62.73	S 2
28	MLK	P 4	811127010914.80	42.68	S 1
29	TCK	IP 0	811127010914.38	47.70	S 3
30	EDK	P 3	811127010900.00	21.63	S 3
31	ACO	PG0	811127010834.4	39.75	ISG0
32	QZO	P 3	811127010902.2	27.55	ESN4
33	STO	PN2	811127010908.7	40.0	ESN3
34	GB0	PN3	811127010920.13	61.5	ESN4
35	**		10		
36			0		
37	BEK	P 4	8112080622	06.85	ESN2
38	BEK	P 4	8112080622	17.10	ESG4
39	SNK	P 4	8112080621	53.30	ESG4
40	MLK	EPN2	811208062126.50	56.10	ESN4
41	MLK	PG4	811208062132.30		
42	EDK	P 4	8112080622	19.30	ISN3
43	TCK	EPN0	811208062125.10	58.45	ESN2
44	TCK	EPG4	811208062130.80	64.40	ESG4
45	NNKAIPP0		811208062054.40		
46	EMK	EPN4	811208062142.40	73.90	ESN3
47	EMK	EPG4	811208062146.20		
48	CNK	EPN0	811208062115.55	40.40	ESN1
49	CNK	IPG4	811208062116.65	42.70	ESG4
50	HWK	PG4	811208062144.40	91.20	ESN4
51	ACO	PN4	811208062150.2	93.8	SN4
52	INN	PN0	811208062053.1	59.35	S 0
53	**		10		
54			0		
55	SIO	IPG0	811217054517.03		
56	TUL	IPN0	811217054522.43	43.60	S 2
57	TUL	IPG4	811217054523.80		
58	GB0	IPN0	811217054530.13	56.87	ESN3
59	RLO	IPN0	811217054531.13	59.60	ESN4
60	TCK	IPN0	811217054544.10	80.01	ESN2
61	EMK	EPN4	811217054534.80		
62	MLK	EPN2	811217054540.20	73.05	ESN3
63	BEK	EPN4	811217054542.10	71.35	ESN4
64	CNK	IPN0	811217054543.90	80.85	ESN3
65	SNK	IPN0	811217054536.70	64.51	ESN4
66	EDK	IPN0	811217054522.90	43.25	ISN1
67	JHN	EPN9	811217054608.40	61.80	ISN3
68	**		10		

1	EDK	IP	0	820130100902.55	04.3019	0
2	EMK	IP	0	820130100911.35	20.2519	1
3	SNK	IP	0	820130100921.30	38.00	0
4	MLK	IP	0	820130100921.55	37.20	1
5	TCK	IP	4	820130100927.40	46.55	1
6	BEK	IP	4	8201301009	44.30	2

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7	EDK	IP	0	820224203530.85	34.95	3
8	EMK	IP	0	820224203543.43	57.25	3
9	MLK	EP	0	820224203551.10	69.10	3
10	BEK	EP	0	820224203555.60	78.6013	2
11	CNK	EP	3	820224203558.50	82.25	2
12	TCK	EP	0	820224203556.10	78.50	3

13	RLO	EPN1	820224203605.33	35.4	3
14	SIO	P	1 820224203603.3	30.2	3
15	GB0	P	1 820224203607.2	40.3	3
16	TUL	P	1 820224203603.8	31.2	3
17	JHN	P	9 820224203607.60	39.35	4

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18	SNK	P	1 820311182022.90	40.80	3
19	CNK	IPG0	820311182021.80	40.42	3
20	MLK	IPN0	820311182031.30	56.60ES	0
21	BEK	PN4	820311182041.30	72.65	4
22	LAK	P	4 8203111820	31.35ES	4
23	TCK	P	0 820311182033.55	57.95	3
24	NRTK	P	9 820311182000.00	10.05	2

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25	SNK	P	1 820315065861.6	38.95	3
26	EDK	P	0 820315065850.9	69.9	2
27	TCK	P	2 820315065913.1	48.2	4
28	MLK	P	4 8203150658	99.99	3
29	LAK	P	4 820315065872.6		
30	ACO	P	9 820315065800.00	10.6	0
31	MRO	P	0 820315065851.00	66.8	3

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32	LAK	EP	4 820327195737.00	43.95	3
33	CNK	P	4 8203271957	42.65ES	3
34	BEK	IP	0 820327195731.55	37.70IS	2
35	MLK	P	4 8203271957	47.10	3
36	TCK	P	0 820327195738.30	48.55	3
37	EMK	IP	0 820327195733.70	40.45	3

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38	TCK	P	0 820328080951.30	63.15	0
39	MLK	P	3 820328080953.35	55.80	3
40	BEK	P	0 820328080945.10	49.90	2
41	EMK	P	1 820328080948.60	57.80	1

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42	TCK	P	2 820406001315.2	42.1	3
43	SNK	P	0 820406001306.0	25.5	3
44	CNK	P	1 820406001302.2	16.4	3
45	EMK	P	4 820406001314.9	44.0	4
46	BEK	P	3 820406001316.7	44.3	4
47	MLK	P	2 820406001310.4	35.9	4

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1	SNK	P	3	820413070649.25	82.00	S	4
2	MLK	P	0	820413070638.75	64.85	S	3
3	HWK	P	0	820413070619.15	30.50	S	2
4	BEK	P	1	820413070629.10	51.30	S	4
5	LAK	P	0	820413070518.00	27.95	S	1
6	**			10			
7				0			
8	HWK	P	3	820423194837.75	48.15	S	3
9	BEK	P	4	8204231948	44.60	S	3
10	MLK	P	3	820423194831.80	41.70	S	3
11	TCK	IP	0	820423194827.90	29.70	S	0
12	**			10			
13				0			
14	EMK	P	3	820424163553.75	55.15	S	3
15	MLK	P	3	820424163548.80	56.10	S	3
16	TCK	P	0	820424163545.75	51.70	S	3
17	BEK	IP	0	820424163539.20	39.80	S	0
18	HWK	P	0	820424163551.00	61.90	S	3
19	LAK	P	3	820424163552.70	63.70	S	3
20	**			10			
21				0			
22	TCK	P	2	820505160805.05	46.00	S	2
23	HWK	P	0	820505160753.20	93.10	S	2
24	BEK	P	4	820505160802.90	38.90	S	3
25	EMK	P	3	820505160807.80	47.15	S	3
26	MLK	P	2	820505160807.50	48.00	S	3
27	TPI	P	9	820505160759.60	92.35	S	3
28	**			10			
29				0			
30	LAK	P	0	820603142119.75	39.80	S	1
31	EMK	EP	0	820603142122.35	46.95	S	3
32	CNK	P	0	820603142111.10	24.95	S	3
33	MLK	IP	0	820603142111.05	26.25	S	2
34	BEK	IP	0	820603142108.80	21.60	S	3
35	SNK	P	2	820603142117.90	36.20	S	3
36	TCK	IP	0	820603142105.80	15.35	S	3
37	HMN	IP	0	820603142054.60	57.10	S	1
38	RFI	P	9	820603142070.00	32.50	S	3
39	SHCN	P	0	820603142143.70	71.85	S	3
40	JHN	P	9	820603142100.00	06.70	S	1
41	**			10			
42				0			
43	BEK	P	4	820607172661.50	78.35	S	2
44	MLK	P	4	820607172653.60	67.05	S	4
45	SNK	P	4	8206071726	62.00	S	4
46	EMK	P	0	820607172640.25	52.65	S	0
47	EDK	P	0	820607172627.50	33.20	S	0
48	TCK	P	3	820607172654.15	78.20	S	3
49	**			10			
50				0			
51	EDK	IP	0	820721214147.25	55.25	S	1
52	EMK	IP	0	820721214143.35	48.50	S	1
53	HWK	P	0	820721214168.90	87.50	S	4
54	TCK	IP	0	820721214161.25	79.75	S	2
55	CNK	P	1	820721214170.35	95.45	S	3
56	BEK	IP	0	820721214157.80	73.70	S	1
57	SNK	P	0	820721214162.45	82.00	S	3
58	LAK	IP	0	820721214158.45	74.40	S	2
59	MLK	P	4	820721214160.75	74.65	S	3
60	TUL	PN3		820721214215.9	43.15	S	3
61	GB0	P	3	820721214215.7	48.2	S	3
62	RLO	EPN2		820721214213.3	41.7	S	3
63	SIO	PN3		820721214218.0	49.5	S	4

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1	SNK	P	0	820722033131.55	57.50	S	1	60
2	EDK	P	0	820722033124.85	43.20	S	1	65
3	TCK	P	3	820722033142.30	55.75	S	4	80
4	ACO	P	0	820722033109.50	17.20	S	1	
5	PCO	P	0	820722033121.40	39.40	S	1	

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6	HWK	IP	0	820827141934.20	41.05	S	1	73
7	BEK	P	4	820827141949.80	53.75	S	3	30
8	LAK	IP	0	820827141947.80	54.35	S	3	45
9	EMK	P	4	820827141960.60	79.25	S	3	25
10	MLK	P	0	820827141943.45	56.05	S	3	45
11	TCK	IP	0	820827141942.75	54.95	S	3	57

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12	TCK	P	0	820903105552.80	73.80	S	4	210
13	CNK	P	0	820903105542.45	58.20	S	3	180
14	MLK	P	1	820903105549.90	59.30	S	4	160
15	SNK	P	0	820903105539.90	53.75	S	2	140
16	LAK	P	4	820903105573.30	103.05	S	3	108
17	HWK	P	4	820903105570.60	103.30	S	4	105
18	EMK	P	0	820903105556.55	78.50	S	4	122
19	EDK	P	2	820903105554.75	75.60	S	4	125
20	SHCN	P	2	820903105553.50	78.00	S	3	
21	SHGN	P	2	820903105552.50	76.50	S	3	

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22	TCK	P	0	820906144605.70	10.15	S	3	55
23	BEK	IP	0	820906144601.50	03.30	S	2	45
24	HWK	P	1	820906144614.00	24.10	S	2	35
25	CNK	P	4	8209061446	24.20	S	4	
26	SNK	P	4	820906144620.75	32.00	S	4	
27	LAK	P	4	820906144615.20	26.60	S	4	
28	EMK	P	4	820906144604.00	12.20	S	4	

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29	MLK	IP	0	821026004417.50	24.30	IS	2	58
30	BEK	IP	0	821026004415.25	20.70	S	3	57
31	HWK	IP	0	821026004423.80	35.05	S	3	60
32	LAK	P	2	821026004428.85	43.90	S	3	51
33	CNK	P	1	821026004425.05	37.85	S	3	62
34	EMK	P	1	821026004427.90	42.50	S	3	60

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35	BEK	P	4	821223022252.50	83.30	S	4	
36	JHN	P	1	821223022247.00				
37	WHNE	P	0	821223022239.50	71.00	S	4	
38	TCK	P	0	821223022244.70	85.00	S	4	
39	SNK	P	0	821223022241.80	73.50	S	3	
40	LCNE	P	0	821223022213.60	23.20	S	1	

41	CCNE	P	4	821223022221.00				
42	PCNE	P	3	821223022232.50	55.00	S	4	
43	MLK	P	4	821223022249.00	83.30	S	4	

44	SHCN	P	0	821223022218.41				
45	SHAN	P	0	821223022217.19	28.83	S	3	
46	SHGN	P	0	821223022218.37				

47	RSSD	P	3	821223022276.30				
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48	SNK	P	0	830209161030.94	36.68	S	3	
49	MLK	P	1	830209161039.60	51.10	S	3	

OFFICE ELECTRONICS INC. #114

1	CNK	P	0	830209161040.92	53.55	S	3
2	EDK	P	0	830209161044.60	60.00	S	3
3	tck	p	0	830209161044.70	52.40	S	3
4	emk	p	0	830209161044.65	50.25	S	3
5	hek	p	0	830209161049.30	67.75	S	2
6	bene	p	3	830209161055.40	81.25	S	3
7	ccne	p	0	830209161057.80	31.50	S	3
8	lak	p	3	830209161059.20	36.00	S	3
9	hwk	p	4	830209161063.50	85.00	S	4
10	jhn	p	3	830209161064.50	91.30	S	4
11	whne	p	4	830209161067.00	00.00	S	4
12	lcne	p	4	830209161069.20	36.00	S	4
13	pcne	p	4	830209161069.00	36.00	S	4
14		**		10			
15				3			
16	lcne	n	0	830212162407.00	13.00	S	3
17	ccne	p	0	830212162423.40	47.30	S	2
18	pcne	p	3	830212162429.80	48.40	S	2
19	whne	p	4	830212162400.00	63.50	S	4
20	cnk	p	3	830212162443.10	74.60	S	4
21	bene	p	4	830212162441.50	77.25	S	4
22	jhn	p	4	830212162452.00	85.00	S	4
23	tck	p	1	830212162449.30	84.05	S	3
24		**		10			
25				0.			
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