West
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TECHNIQUES AND TESTS FOR MEASURING JOINT INTENSITY

by Jeanette M. Dixon
Research Associate
Devonian Shale Program

DOE # 260

Dept. of Geology & Geography
College of Arts & Sciences
Morgantown, W. V. 26506

U.S. Department of Energy
Contract number DE-AC21-76MC05194
formerly EY-76-C-05-5194

December 1979

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ACKNOWLEDGEMENTS

Support for this study was funded by the Morgantown Energy Technology Center and the Department of Energy (Contract number EY -76-C-05-5194). The author would like to thank Dr. R.L. Wheeler and Dr. R.C. Shumaker who served as advisors for this study and whose guidance and encouragement were greatly appreciated. G.R. Hobbs advised in the statistical analyses. The final manuscript was greatly improved by suggestions from Drs. G.R. Hobbs, M.T. Heald, and J.J. Renton. The data was prepared by WYLBUR, a text-editing system developed at the Stanford University Computation Center. The author would like to give special thanks to Tom Wilson, Brian Long, Don Neal, Rus Wheeler, and Richard Winston for their assistance in the operator variance test and in field work. Phil Haring and John Wright assisted in the completion of the drafting of figures. Laura Wray, Paul Queen, Mary Dowse, and Dave Elliott provided encouragement and discussions throughout much of the study. Finally, the author wishes to acknowledge good friends Art, Abby, Elmo, and Nelly for always being around for support.

ABSTRACT

Anomalous intense jointing has been cited as a reason for gas production from fractured shales, coal mine roof falls, some construction problems, and increased water-well yields. Accordingly, a method for measuring joint intensity and locating areas of intense fracturing would be generally useful. The Parsons and Petersburg structural lineaments, in the Plateau province of north-central West Virginia, were chosen to develop and test a method for measuring joint intensity because previous studies indicated that these lineaments were broad zones of intense jointing. The project developed in four related test areas. First, the Parsons lineament in the eastern Plateau province, Tucker County, West Virginia, was chosen to develop and test field and analytical methods for measuring joint intensity. Second, rocks of the Middle and Upper Devonian Chemung Group and Catskill Formation, and the Mississippian Pocono Formation along the Allegheny Front, were studied to determine how the fracturing effects of the Petersburg lineament varies with depth and with different lithologies. Third, in the Plateau province, rocks of the Lower and Middle Pennsylvanian Pottsville Group and Allegheny Formation were measured to determine the westward extent of the lineaments. Finally, a large roadcut in northern West Virginia, which exposes

two coal seams and an overlying stream channel, was chosen to study the effects of a stream channel on coal cleat intensities. Joint spacing was found to be the only necessary measurement, other than strike and dip. to determine joint intensity. Rocks inside the Parsons and Petersburg lineaments were found to be more intensely jointed than rocks adjacent to the lineaments. Along the Allegheny Front, results suggest that the Petersburg lineament affects rock at least one half mile below ground level. Farther west in the Plateau province, joint intensities measured indicate that the high-intensity joint systems of the Parsons and Petersburg lineaments are disrupted or terminated. Air photograph and LANDSAT lineaments may be an aid in locating structural lineaments or areas of intense jointing, but do not necessarily define or bound such areas. Intensity of cleats in coal is greater under the stream channel than outside.

INTRODUCTION

The Middle and Upper Devonian clastic rocks referred to as the Devonian shales in the Appalachian Basin have been known and used as a source for gas since the early 1900's. Decreases in national energy resources have increased the economic attractiveness of the Devonian shales and in unconventional methods needed to explore for and recover their gas.

Anomalous intense fracturing has been cited as a reason for hydrocarbon production from reservoirs in the Devonian shales of the Appalachian Basin as well as in other areas. (Hereafter, fracture will be used to mean natural fractures that are not faults; most such fractures are systematic or nonsystematic joints.) Increased water-well yields, coal mine roof falls, and some construction problems also are associated with an increase in fracture intensity; a causal relationship is commonly assumed or demonstrated. Accordingly, a method to measure fracture intensity and locate or predict locations of areas in intense fracturing or jointing would be generally useful. In particular, it would be useful in exploration areas where little or no subsurface data are available. As part of the Eastern Gas Shales Project, funded by the U.S. Department of Energy, such a method was developed (Wheeler, 1978a; 1979a; Dixon, 1979a; 1979b; Wheeler and others, 1979; Wheeler and Dixon, in preparation). This

paper reports the development and some field tests and applications of this method. The purpose is to characterize exposed systems of natural fractures considered to be analogues of buried fractured gas reservoirs (Wheeler, 1978a; 1978b) in order to assist in exploration for gas in the Devonian shales.

Four test areas were chosen for this study. Three of the test areas straddle one or more large structural lineaments of the type that Wheeler and others (1979) described and named cross-strike structural discontinuities, or CSD's. Hereafter, lineament is defined as one of those CSD's unless otherwise stated. Note that CSD's are not always associated with photolineaments seen on satellite or aircraft images, and usually are larger, more diffused, and more complex structurally than are photolineaments (Table 1 of Wheeler and others, 1979). First, the Parsons structural lineament in the eastern Plateau province, Tucker County, West Virginia (Figures 1 and 2), was chosen to develop and test field and analytical methods for measuring joint intensity. Second, the Petersburg structural lineament and adjacent terranes, along the Allegheny Front in Grant and Pendleton Counties, West Virginia (Figures 1 and 2), were studied to determine how the fracturing effects of a lineament varies with depth below ground level and with different lithologies. The

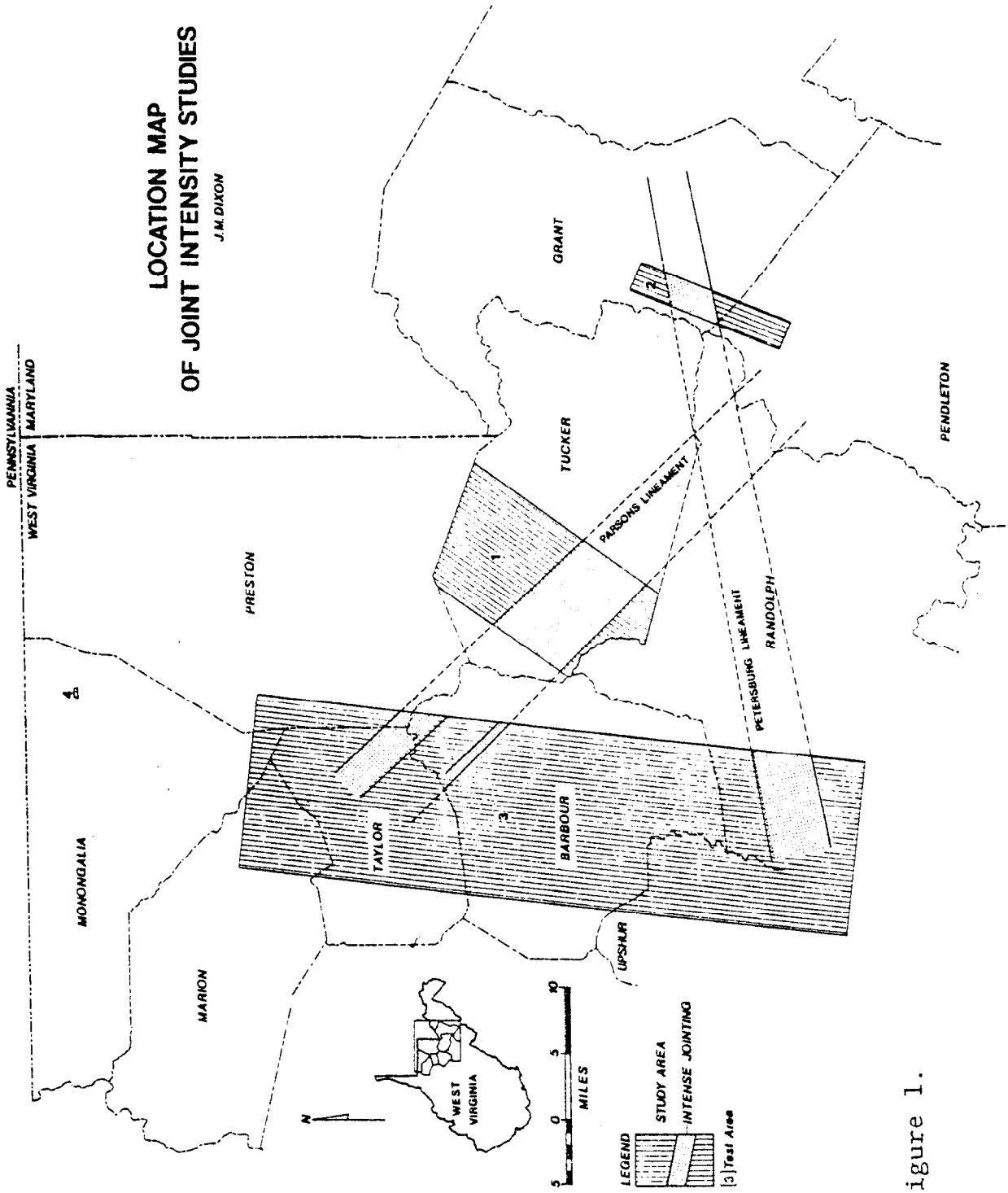

LOCATION MAP
OF JOINT INTENSITY STUDIES
J.M.DIXON
PENNSYLVANIA
MARYLAND
WEST VIRGINIA
PRESTON
MONONGALIA
MARION
TAYLOR
BARBOUR
UPSHUR
TUCKER
GRANT
PENDLETON
RANDOLPH
PARSONS LINEAMENT
PETERSBURG LINEAMENT
1
2
3
4
WEST VIRGINIA
N
5 0 5 10
MILES
LEGEND
STUDY AREA
INTENSE JOINTING
Test Area

Figure 1.

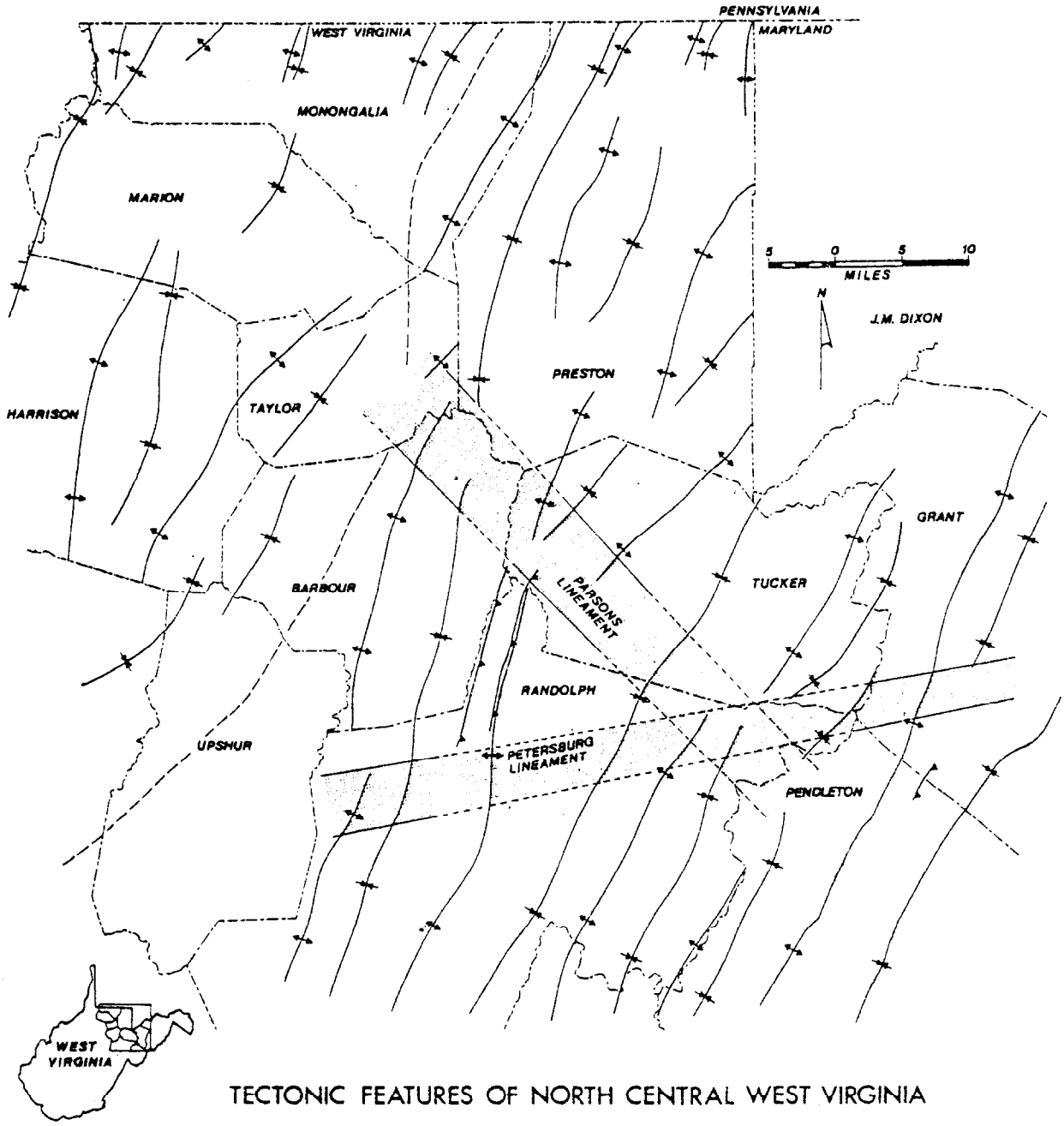


Figure 2. Structural axes west of the dashed line are for the most part based on subsurface information (modified from Cardwell and others, 1968).

third study, in the Plateau province in Taylor, Barbour, and bordering counties (Figures 1 and 2), was to determine the westward extent of the Parsons and Petersburg lineaments. Finally, the purpose of the fourth study, in northeastern Monongalia County, West Virginia (Figure 1), was to measure the effect of an overlying stream channel on coal cleat intensity.

TEST AREA 1: DEVELOPMENT OF METHODS AND PARSONS LINEAMENT, TUCKER COUNTY

SETTING

The Parsons structural lineament in the Plateau province in eastern West Virginia (Figure 1) was chosen to develop and test a method of measuring joint intensity, because previous studies (Wheeler and others, 1979; Wheeler and Holland, 1978a; 1978b) indicate that rocks exposed in the lineament are more intensely jointed than are rocks of the same unit and in the same structural positions exposed outside the lineament. The lineament is a northwest-trending alignment of disruptions in the regular northeast-trending folds and reverse faults characteristic of the eastern Plateau and Valley and Ridge provinces (Figure 2; Gwinn, 1964; Cardwell and others, 1968). The lineament is at least 30 miles long and six to seven miles wide, according to interpretations of terrain-corrected gravity, structural, topographic and LANDSAT data (Wheeler and others, 1979). This study deals with systematic joints in interbedded siltstones, mudstones, and shales of the Middle and Upper Devonian Chemung Group in Tucker County. Only the Chemung (mainly siltstones) was studied in order to reduce the effects of different lithologies. Bed thicknesses range from 0.2 to 200 cm (0.08 to 79 in), and typically are 10 to 30 cm (4.0 to 12.0 in). In western Tucker County, the Parsons

lineament crosses the outcrop belt of the Chemung rocks exposed in the cores of the northeast-trending Deer Park, Etam, and Elkins Valley anticlines (Figure 3; Cardwell and others, 1968; Gwinn, 1964).

METHODS

A total of 1594 systematic joints were measured at 143 stations (Figure 3). Wherever feasible strike, dip, and the following four other variables were measured on each joint: (1) exposed depth, the total exposed extent of a joint in the direction perpendicular to bedding; (2) exposed length, the total exposed length in a direction parallel to bedding (a joint's true depth and true length are rarely exposed in a measurable fashion); (3) spacing, the perpendicular distance to the adjacent joint in the same set (Stubbs and Wheeler, 1975; Wheeler and Stubbs, 1979); (4) bed thickness, the thickest bed through which the joint penetrates. Exposure size, regularity or irregularity of spacing, and the number of joint sets exposed determined the number of measurements taken per station. Every attempt was made to measure a representative sample of joints. Fifty-four percent of the joints were measured in roadcuts; the rest in streamcuts and stream pavements.

Joint intensity is defined as joint surface area per unit volume of rock. It is estimated or measured by cal-

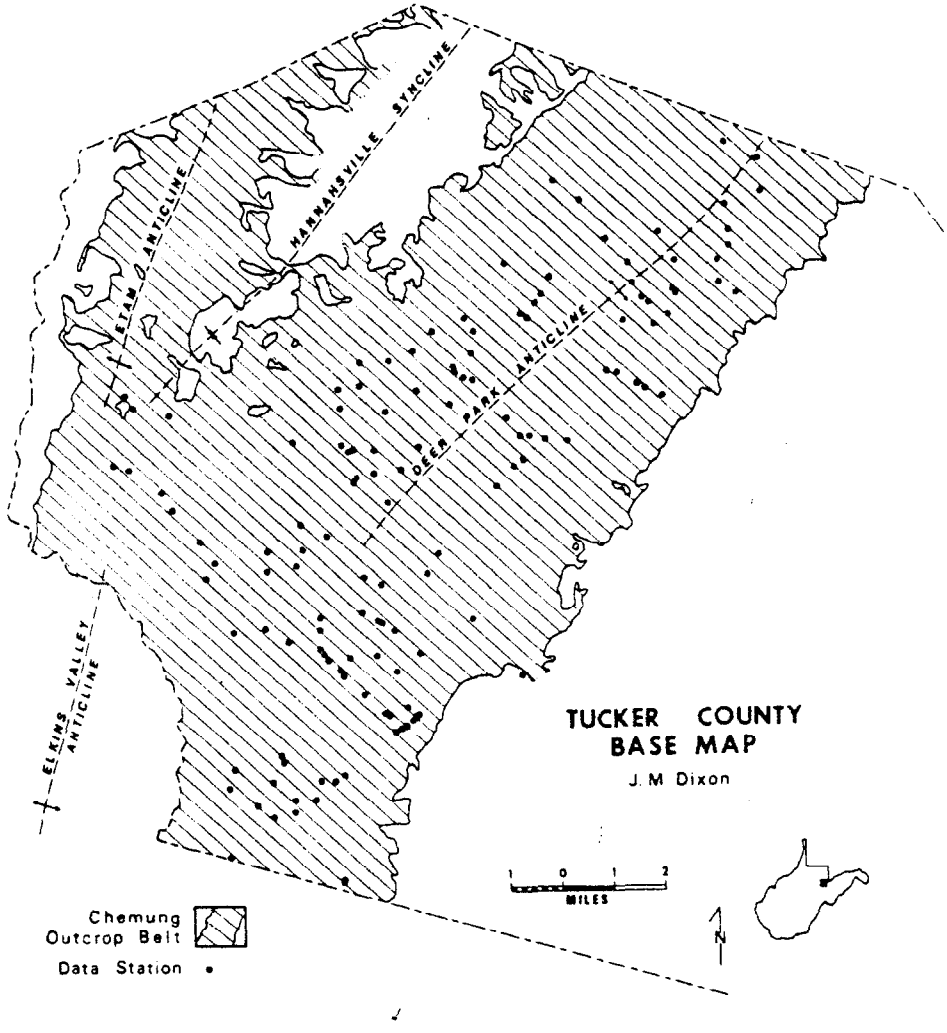


Figure 3. Index map showing the extent of the Chemung outcrop belt and station locations in Test Area 1.

culating inverses of average spacings of individual joint sets, summed over all sets in an exposure (Vialon and others, 1976; Dixon, 1979a; 1979b; Wheeler, 1979a; Wheeler and Dixon, in preparation). The measure of intensity incorporates the effects of true joint size, exposed joint size, and joint abundance (Wheeler and Dixon, in preparation). If, for example, four joint sets were exposed in an outcrop, then the following formula would be used to estimate intensity (I) from average spacings ($\bar{S}$):

$$I = 1/\bar{S}_1 + 1/\bar{S}_2 + 1/\bar{S}_3 + 1/\bar{S}_4.$$

Regardless of the number of joints measured or the number of sets in an exposure, only one intensity (I) measurement is calculated for that exposure. Statistical analyses and contour maps of joint intensity, joint spacing, and bed thickness were produced with local modifications of the Statistical Analysis System, an orientation plotting program (E. Werner, written and oral communications, 1978 and 1979), and the SYMAP contouring and mapping program.

Reproducibility of data (operator variance) is important in measuring joint intensity. To test this, four operators, with experience in measuring joint orientation but with extensive to no experience in measuring joint intensity, measured strike, dip, and spacing at three stations in the Chemung Group. No instructions or assis-

tance beyond those included in this paper were given. The operators worked independently, often taking measurements at different places on the exposure and at different times. The exposures varied in size, type, and structural complexity. Although the number of joints measured varied greatly among operators (Table 1), the intensities did not differ significantly (alpha level of 0.05, by the Least-Squares Means and the Kruskal-Wallis tests (Davis, 1973; Gibbons, 1976)). Thus intensity measurements obtained in this and other studies can be considered reproducible, probably objective, and therefore valid. One should note that even if significant variations were to occur between two operators, real differences in relative intensities between exposures can be detected by a single operator as long as he or she is consistent from exposure to exposure. Operator consistency ensures valid relative intensities. Consistency between operators is necessary if comparisons of data are made between operators.

RESULTS

A circular histogram of all measured joints shows three sets: N 35-55°W (transverse to folds), N 25-45°E (longitudinal to folds), and N 80°E - N 80°W (diagonal to folds), with the northwest set dominating (Figure 4d). All three sets appear north, within, and south of the lineament, but in different relative abundances (Figures

TABLE 1. OPERATOR VARIANCE

Operator	Station 33		Station 87		Station 35	
	I	n	I	N	I	n
1	0.24	12	0.21	12	0.09	19
2	0.08	32	0.19	31	0.20	40
3	0.22	25	0.04	17	0.19	42
4	0.10	11	0.15	16	0.14	16

Table 1. Intensities (I) and number of observations (n) measured at data stations in Tucker County.

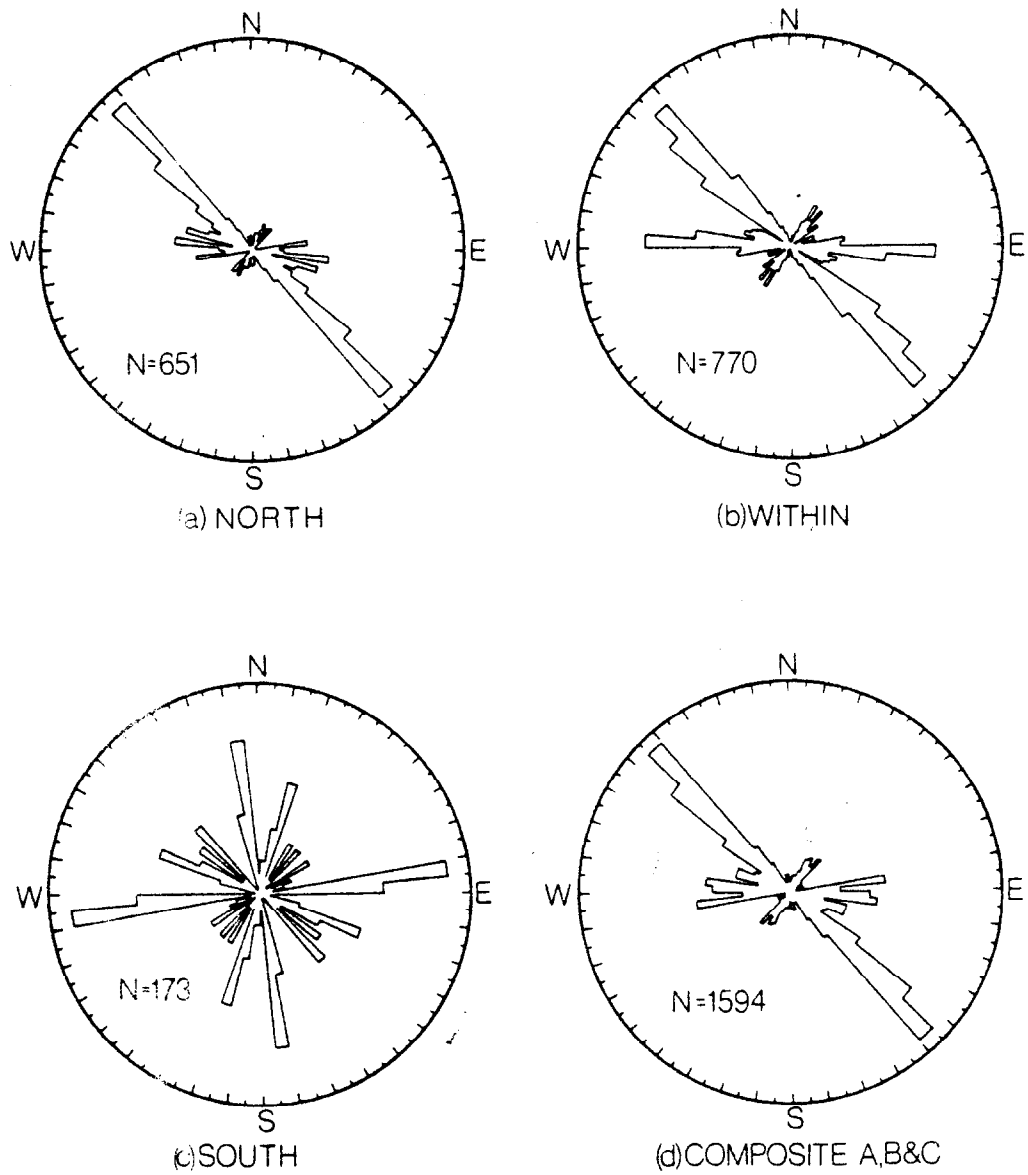


Figure 4. Circular histograms of joints taken (a) north, (b) within, (c) south of the Parsons lineament and (d) a composite of all measured joints.

4a, b, and c). In addition, a N 05-10°W set appears south of the lineament (Figure 4c). A comparison of the orientations of joints taken at roadcuts and in streams shows that the three main sets are exposed with the same relative abundances in both exposure types (Figures 5a and b). The scatter in orientations is reduced slightly in the stream joints, perhaps because many stream joints were measured on pavements where the greater map exposures of the joints would allow better estimations of orientations.

A SYMAP map (computer-generated contour map) of joint intensity shows more intense jointing within the Parsons lineament than outside (Figure 6). SYMAP maps of mean spacings of the three main joint sets were made to determine what, if any, relationship exists between the Parsons lineament and the spacings of the joint sets. The northeast-striking set appears to be most directly related to the lineament by having small spacings (high intensities) most closely associated with the lineament (Figure 7). The northwest-striking set appears to be only slightly related to the lineament (Figure 8), and the east-striking set appears little, if at all, related (Figure 9). The mean spacings of each set support that statement (Table 2). A comparison of mean spacings of all joints indicates a slight increase in joint spacing (a decrease in intensity) south of the lineament as op-

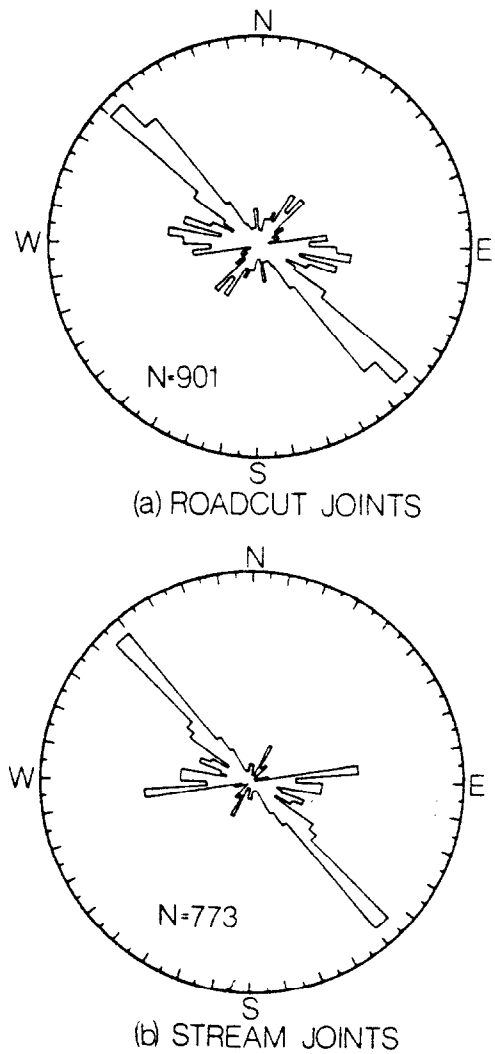


Figure 5. Circular histograms of joints measured (a) along roadcuts, and (b) along streamcuts and stream pavements.

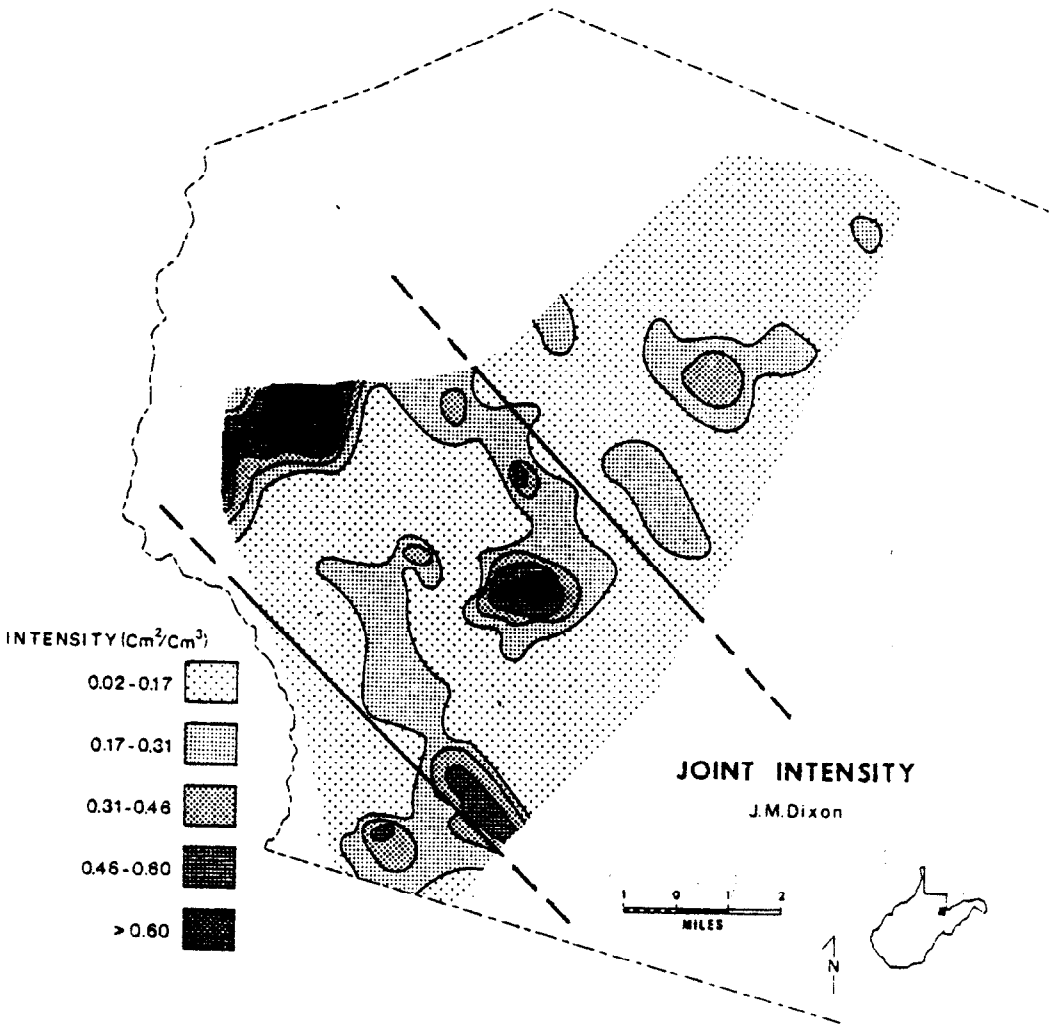


Figure 6. Contour map showing joint intensity, plotted at each station. Northwest-trending lines indicate the boundary of the Parsons lineament, drawn on this map by 5 geologists independently. The 5 choices of the boundaries differed by less than one mile.

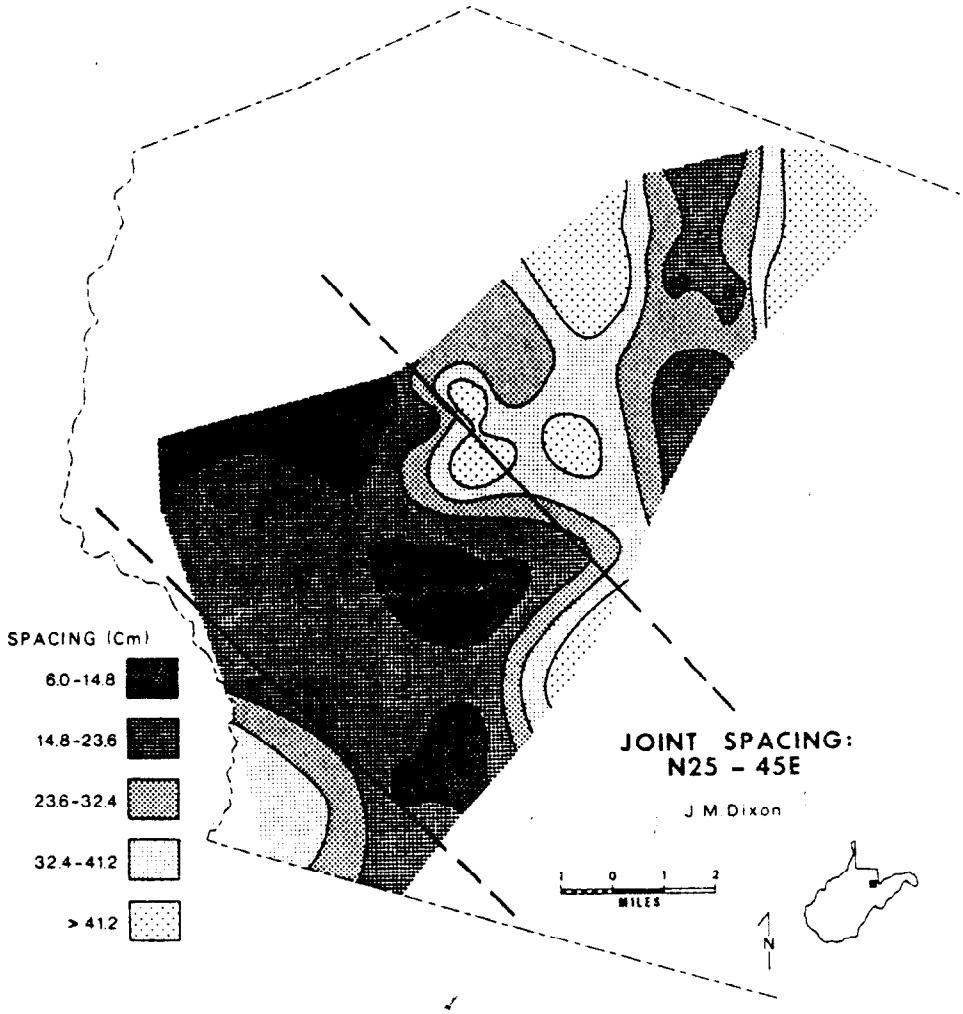


Figure 7. Contour map of the mean spacing, plotted at each station, of the northeast-striking joint set. Parsons lineament is bounded by the solid lines taken from Figure 6.

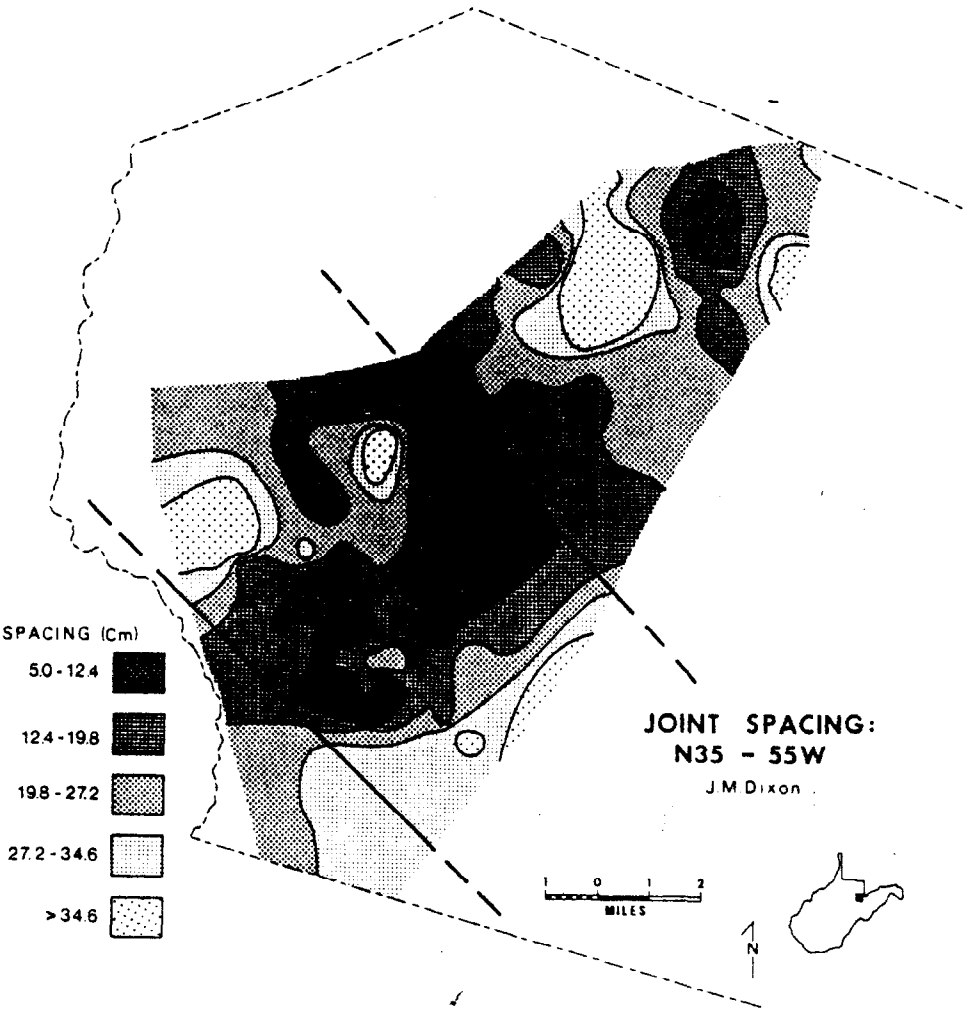


Figure 8. Contour map of the mean spacing, plotted at each station, of the northwest-striking joint set. Parsons lineament is bounded by the solid lines taken from Figure 6.

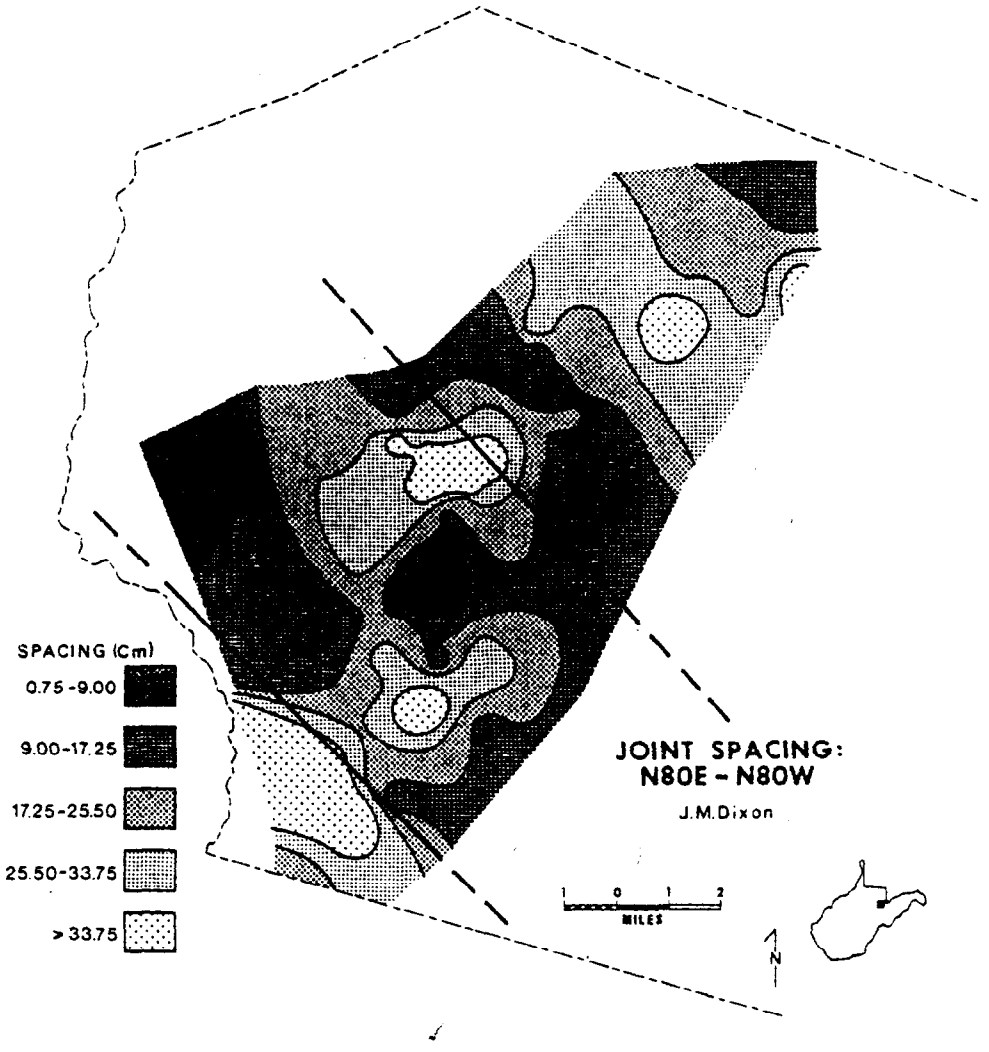


Figure 9. Contour map of the mean spacing, plotted at each station, of the east-striking joint set. Parsons lineament is bounded by the solid lines taken from Figure 6.

TABLE 2. MEAN SPACINGS OF JOINT SETS IN TUCKER COUNTY

Location	Joint Set											
	Northeast			Northwest			East-West			All		
	n	$\bar{s}$	σ_s	n	$\bar{s}$	σ_s	n	$\bar{s}$	σ_s	n	$\bar{s}$	σ_s
North	50	31	30	232	22	20	136	22	14	587	25	22
Within	79	17	16	270	19	19	172	25	24	711	21	20
South	15	28	13	18	30	27	36	42	40	164	28	22

Table 2. Mean spacing in cm ($\bar{s}$), number of observations (n), and Standard deviations in cm (σ_s) of each joint set north, within, and south of the Parsons lineament.

posed to north of the lineament.

A SYMAP map of average bed thickness shows a northeast trending band of thin beds, reflecting the thinner beds of the lower Chemung rocks exposed along the crests of the Deer Park and Elkins Valley anticlines (Figure 10). Many of the higher-intensity exposures occur in thinner beds (Figures 6 and 10). However, the strongest trends found in the spacing and intensity maps are generally elongated to the northwest and north, whereas that of the bed thickness map is northeast. Thus, I conclude that a factor other than bed thickness also controls joint intensity. (Statistical analysis shows only a minor correlation between bed thickness and joint spacing). That factor apparently is the Parsons lineament.

Large, northeast-trending anticlines plunge into the Parsons lineament (Figures 2 and 3; Cardwell and others, 1968), which may have increased the intensity of the transverse (northwest-striking) joint set on the anticlinal noses. Smaller, northeast-trending anticlines with wavelengths on the order of half a kilometer are more numerous in the lineament than outside it (Trumbo, 1976), and may increase the intensity of the longitudinal (northeast-striking) set there. The diagonal (east-striking) joint set bears no clear relationship to folds or faults associated with the lineament, but it also shows no clear increase in intensity inside the lineament (Fig-

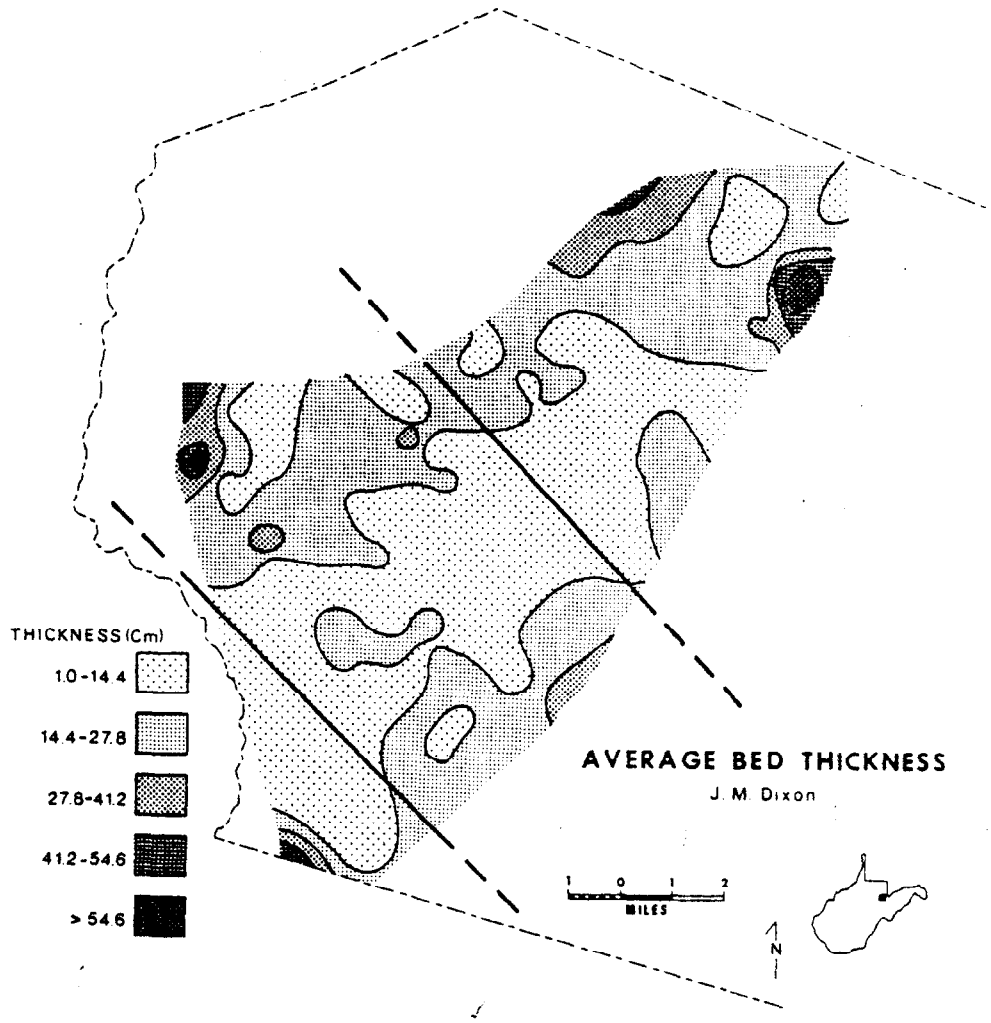


Figure 10. Contour map of the mean bed thickness, plotted at each station. Parsons lineament is bounded by the solid lines taken from Figure 6.

ure 8 and Table 2). However, the southward increase in relative abundance of the east-striking set (Figure 4) may be caused by the more northerly strike of the Elkins Valley and Etam anticlines (Figure 3). The east-striking set would then be transverse to those folds.

Statistical analysis of exposed lengths and exposed depths of measured joints shows no relationship to the Parsons lineament (Table 3 and 4). These measurements are greatly affected by exposure type and size. Stream pavements yield longer joint measurements while road and stream cuts yield deeper measurements. Further, as Wheeler and Dixon (in preparation) demonstrate, the effect of joint size is incorporated in the measurement of intensity. Therefore, depth and length need not be measured in a joint intensity study and will not be further discussed in this paper.

Individual sets may show close spacings at stations outside the lineament as seen in Figures 7, 8, and 9. This may be caused by exposure type, exposure orientation, position relative to a structure, or other factors. However, it is only the intensity measurement which quantifies the total effect of all joints in an exposure and gives the best measurement of how fractured the rock is in the exposure. In intensity investigations generally, the mean spacings of individual joint sets should be used only as an aid to identifying possible causes of intense

TABLE 3. MEAN EXPOSED LENGTH OF JOINT SETS IN TUCKER COUNTY

Location	Joint Set								
	Northeast			Northwest			East-West		
	n	$\bar{l}$	σ_s	n	$\bar{l}$	σ_s	n	$\bar{l}$	σ_s
North	46	84	106	246	52	47	139	62	75
Within	73	36	55	293	61	76	170	67	130
South	16	88	115	21	75	65	38	151	112

Table 3. Mean exposed length in cm ($\bar{l}$), number of observations (n), and standard deviations in cm (σ_s) of each joint set north, within, and south of the Parsons lineament.

TABLE 4. MEAN EXPOSED DEPTH OF JOINT SETS IN TUCKER COUNTY

Location	Joint Set								
	Northeast			Northwest			East-West		
	n	$\bar{d}$	σ_s	n	$\bar{d}$	σ_s	n	$\bar{d}$	σ_s
North	46	24	25	245	24	29	139	34	47
Within	74	16	26	292	26	30	172	24	32
South	16	8	3	21	14	15	24	26	28

Table 4. Mean exposed depth in cm ($\bar{d}$), number of observations (n), and standard deviations in cm (σ_s) of each joint set north, within, and south of the Parsons lineament.

jointing and not as an overall intensity indicator.

Analyses of high-altitude aircraft and LANDSAT infrared images (Trumbo, 1976) show lineaments with prefered orientations similar to those of the three main joint sets and to the trend of the Parsons lineament (Trumbo, 1976, Figure 17-22). Map densities of these lineaments visable on LANDSAT images appear to be an aid in identifying or locating the Parsons lineament, but do not specifically define the boundaries or zones of highest joint intensity. Three large LANDSAT lineaments are subparallel to the structural lineament (Figure 11).

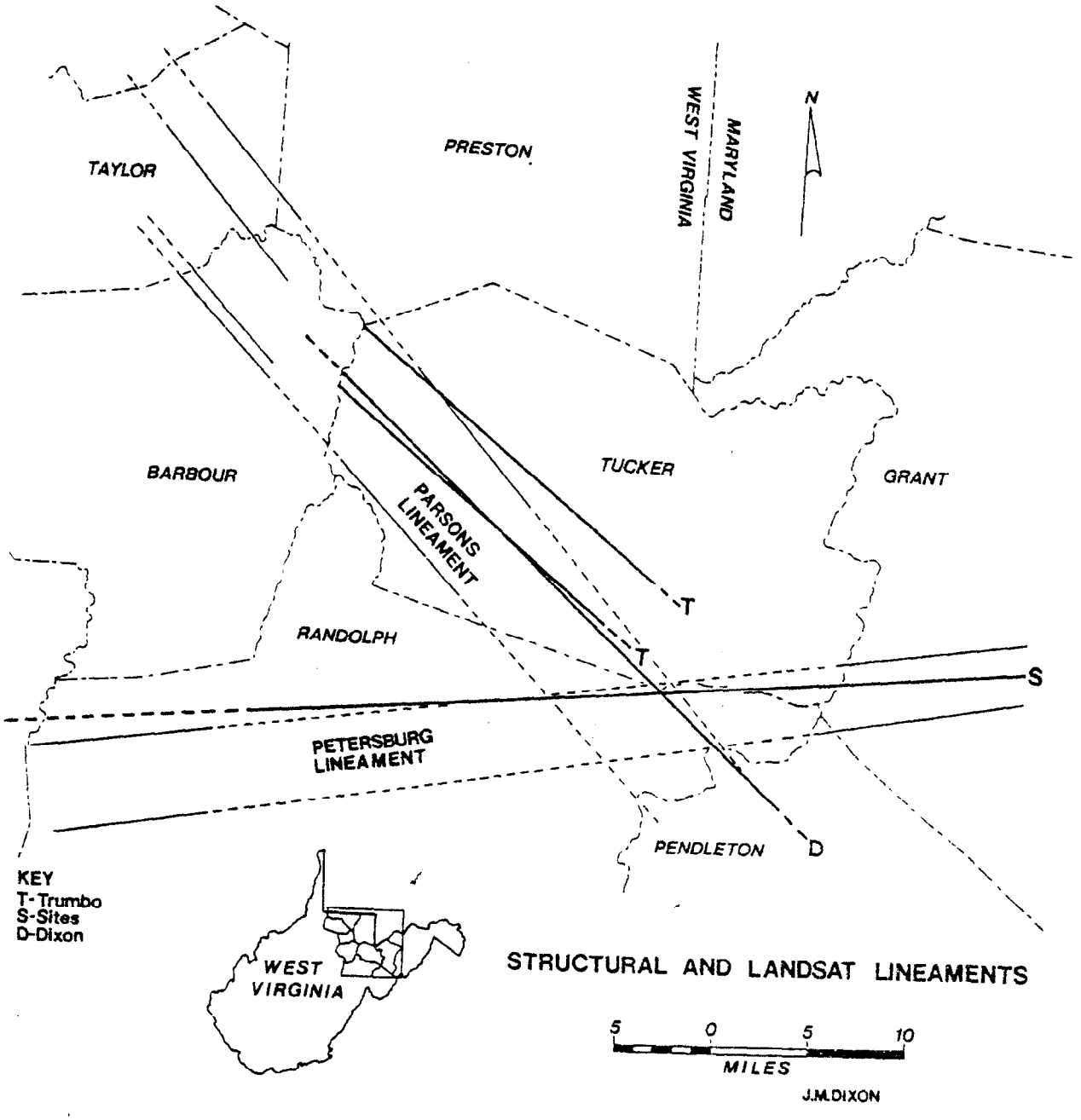


Figure 11. Parsons and Petersburg lineaments and related LANDSAT lineaments as identified by Dixon, Trumbo (1976), and Sites (1978).

TEST AREA 2: ALLEGHENY FRONT AND PETERSBURG LINEAMENT SETTING

The intersection of the Petersburg lineament with the Allegheny Front in Grant and Pendleton Counties, West Virginia (Figure 1), was studied to determine how the fracturing effects of a lineament vary with depth below ground level and with different lithologies. The Front is the western limb of the Wills Mountain anticline and there Pennsylvanian through Devonian rocks are exposed. The average strike and dip of measured beds are N 25-30°E, 20-30°NW. Sites (1978) found that east of the Front in the Valley and Ridge province, the lineament is an almost east-west band from 3 to 5 miles wide, characterized by plunging folds and disrupted bed orientations. Sites did not measure intensity or joint spacing. LaCaze (1978) examined the Pennsylvanian Homewood Sandstone rocks on top of the Allegheny Front and found the Petersburg lineament there to be characterized by plunging folds and disrupted bed orientations and by a decrease in joint spacing (i.e. an increase in joint intensity). The great vertical exposure of rock down the Front affords an excellent opportunity to measure any change in the lineament's effect with depth and on different lithologies. Any variation found down the Front could be partly caused by elevation change, partly by stratigraphic change and/or partly by structural level, but I assume at least some com-

ponent of the latter.

METHODS

A total of 498 joints were measured at 29 stations (Figure 12) in the Middle Devonian black shales, the Middle and Upper Devonian Chemung and Catskill interbedded sandstones, siltstones, and shales, and the Lower Mississippian Pocono sandstone and conglomerate. Joint strike, dip, and spacing were measured. At least one station was measured in each unit north, within, and south of the Petersburg lineament. Statistical analyses and circular histograms were produced as described above for Test Area 1.

RESULTS

A circular histogram of all measured joints shows one dominant set centered at N 80-85°W, and lesser sets (in decreasing order of prominence) centered at N 45-50°W, N 10-20°E, and N 35°E; a minor set is centered at N 50°E (Figure 13d). The N 50°E set is not found south of the lineament (Figures 13a, b, and c). Otherwise, joint orientations north, within, and south of the Petersburg lineament are similar.

Joint intensities were calculated and plotted by unit (Figure 14). In order to eliminate the effects of the different units and lithologies so that all intensity measurements could be compared, the aligned ranks were

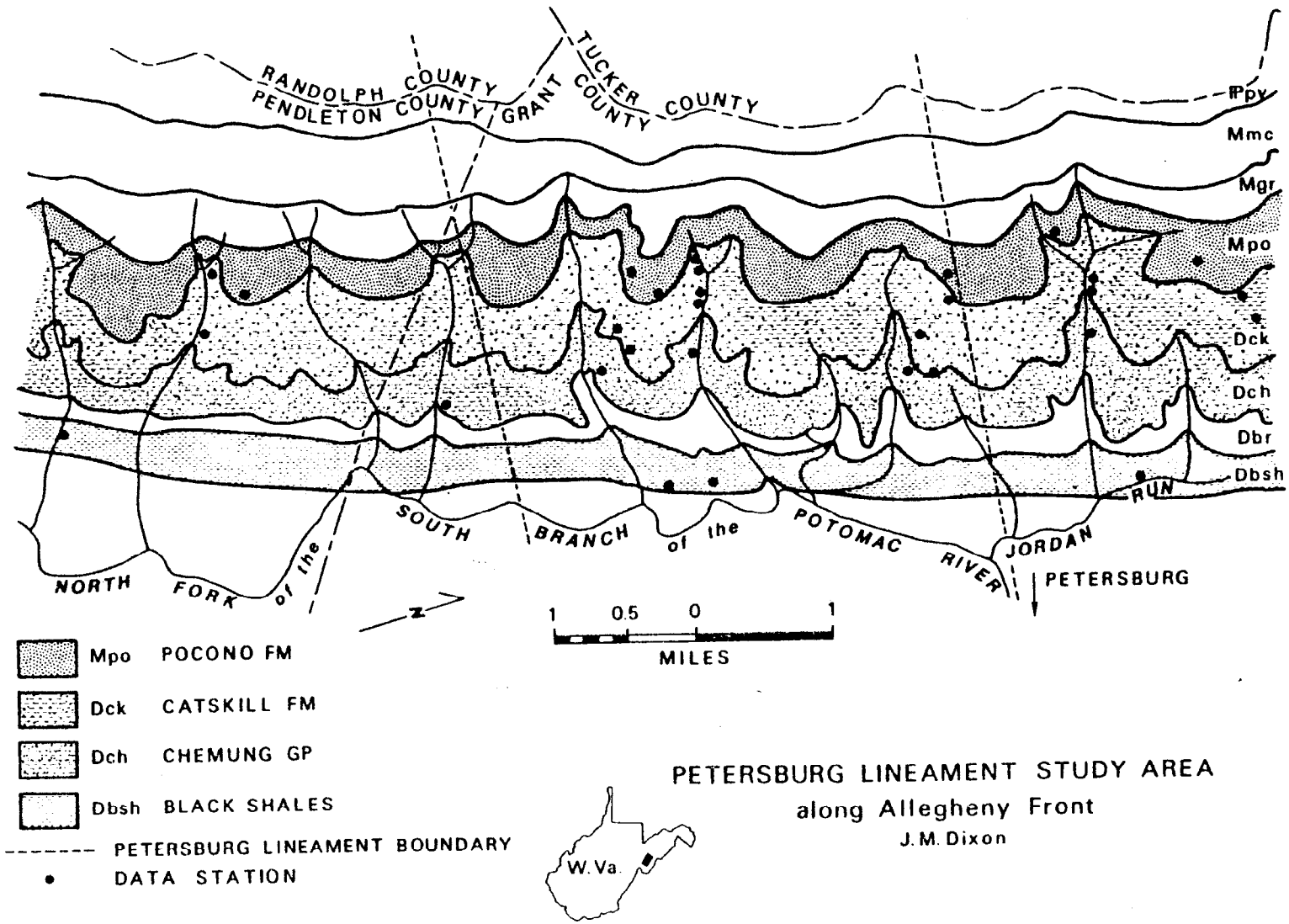


Figure 12. Index map of station locations along the Allegheny Front (modified from Reger and Tucker, 1924; Tilton and others, 1927). Mgr - Mississippian Greenbrier, Mmc - Mauch Chunk; Ppv - Pennsylvanian Pottsville.

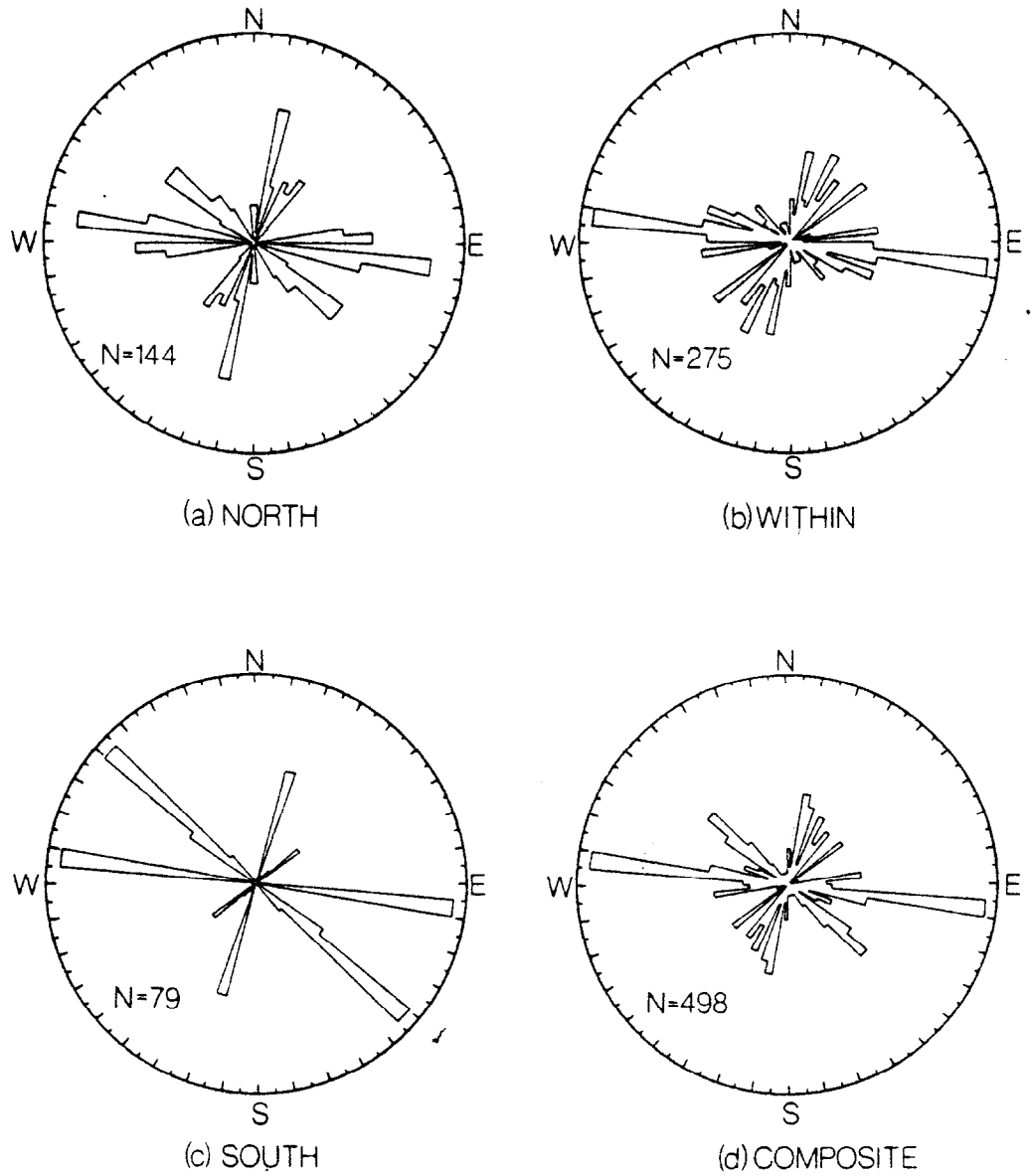


Figure 13. Circular histograms of joints taken (a) north, (b) within, (c) south of Petersburg lineament and (d) a composite of all joints measured.

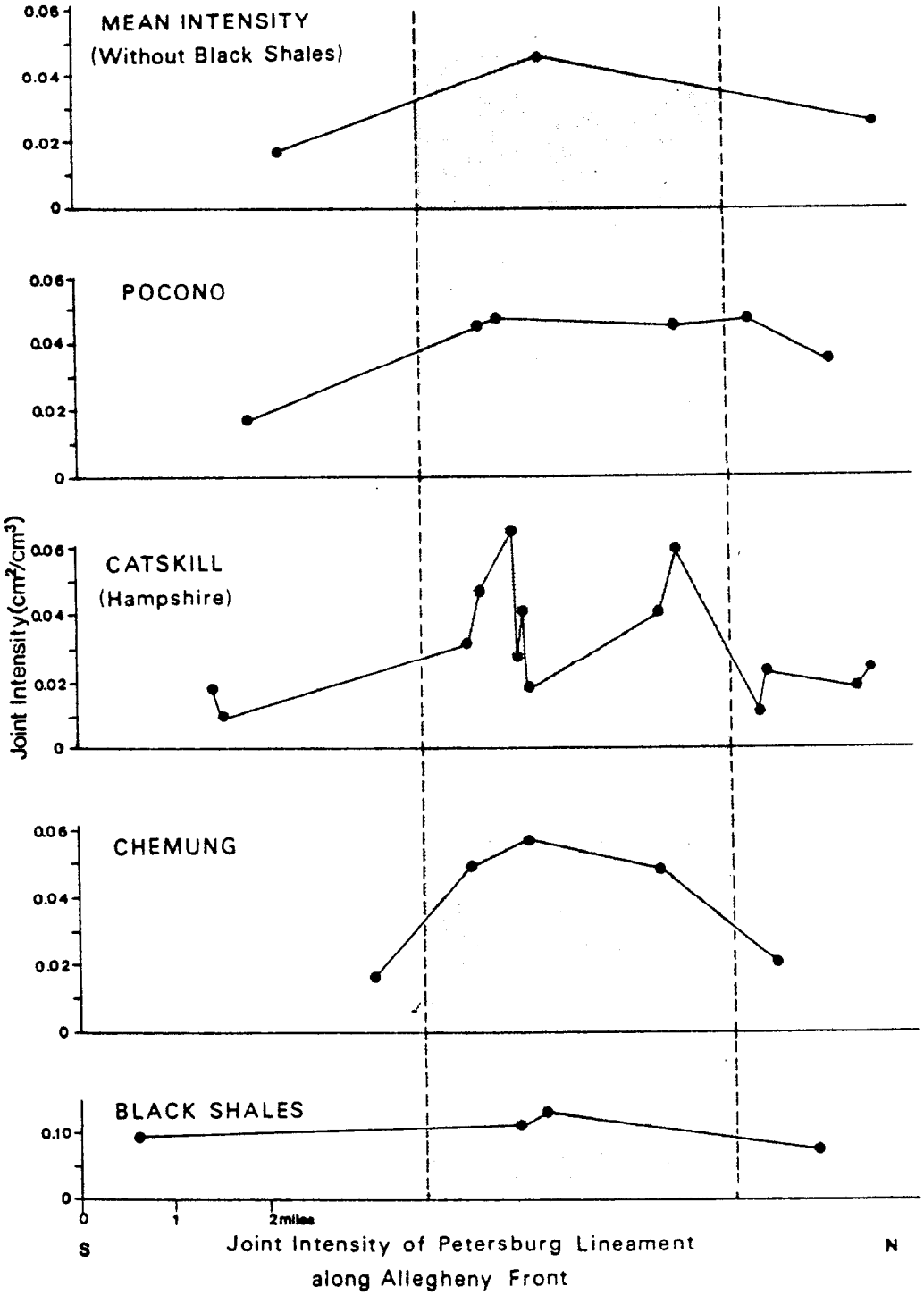


Figure 14. Joint intensities measured along the Allegheny Front. Dashed lines indicate the boundary of the Petersburg lineament.

used (Lehmann, 1975). Aligned rank intensities were calculated by subtracting the intensity value of a station from the mean intensity of that rock unit. This centers all intensity values around zero. Joint intensities inside the lineament were found to be significantly higher (alpha level of 0.05) than outside as calculated by the Kruskal-Wallis test (Gibbons, 1976). The mean intensity is slightly less south of the lineament than it is north of it. A comparison of mean spacings of the four main sets shows that all four sets are closer spaced inside the lineament (Table 5). Thus all sets are contributing to the increase in intensity.

At the Allegheny Front in Grant and Pendleton Counties, the section from the Devonian Oriskany Sandstone to the top of the Mississippian Pocono Formation is approximately 7400 feet thick (Reger and Tucker, 1924; Dennison, 1963). From the top of the Pocono to the top of the Pennsylvanian Homewood Sandstone, the section is another 850 to 1800 feet thick, yielding a total of 8250 to 9400 feet of section (Reger and Tucker, 1924). The total elevation difference is about one half mile. Because all sampled rocks from the top of the Oriskany to the top of the Pocono, and the Homewood, are more intensely fractured inside the lineament, it is reasonable to assume that the rocks between the Pocono and the Homewood are also more intensely fractured inside the lineament. Even though

TABLE 5. MEAN SPACINGS OF JOINT SETS ALONG ALLEGHENY FRONT

Location	Joint Set											
	East-West			Northwest			N 15°E			N 35°E		
	n	$\bar{s}$	σ_s	n	$\bar{s}$	σ_s	n	$\bar{s}$	σ_s	n	$\bar{s}$	σ_s
North	49	121	102	37	116	80	21	157	103	15	108	59
Within	68	59	52	15	81	28	38	49	26	45	56	23
South	12	81	36	23	134	80	13	117	44	2	238	88

Table 5. Mean spacing in cm ($\bar{s}$), number of observations (n), and standard deviations in cm (σ_s) of each joint set north, within, and south of the Petersburg lineament.

only exposed rocks have been measured for joint intensity, it is unlikely that, in a structural lineament which affects folding, faulting, bed disruptions, and jointing of strata, fracturing in the Petersburg lineament is only a superficial phenomenon. It seems reasonable to assume that the increased fracturing of rock within the lineament extends at least one half mile deep from the top of the Front down to the Oriskany Sandstone. Whether or not the lineament affects the entire 8250 to 9400 vertical section to the west is not known at this time.

The boundaries of the Petersburg lineament were determined from joint intensity measurements taken in this study and are in general agreement with the boundaries assigned by Sites (1978) and LaCaze (1978) as discussed earlier. LaCaze also found a general decrease in joint intensity to the south. The most intensely fractured exposures found in each unit both in this study and in that by LaCaze form a crude east-west alignment and may represent an axis of fracture deformation in the lineament.

A LANDSAT lineament can be easily seen extending sub-parallel to the Petersburg lineament from Petersburg westward through Elkins (Figure 11; Sites, 1978). This lineament appears to aid in locating the Petersburg structural lineament, but it does not specifically locate the area of intense fracturing.

TEST AREA 3: WESTWARD EXTENSIONS OF THE PARSONS AND PETERSBURG LINEAMENTS

SETTING

The westward extensions of the Parsons and Petersburg lineaments would be useful in locating areas of intense jointing in the central Plateau province where the gas producing Devonian rocks are buried. The low-dipping, massive sandstones and conglomerates of the Lower and Middle Pennsylvanian Pottsville Group and Allegheny Formation were chosen for this study (Figure 1) because their outcrop belt extends across both lineaments and provides good exposures. The overlying Upper Pennsylvanian Conemaugh Group is poorly exposed. No previous related studies in this area have been found.

METHODS

Three hundred and eighty-two joints in 69 exposures, in a band appromimately 47 miles long and 14 miles wide, were measured for strike, dip, and spacing (Figure 15). Unlike test areas 1 and 2, for which a representative sample of joints was measured at each exposure, nearly all of the few joints found in this test area were measured.

The data stations were grouped into sub-areas according to their positions relative to the lineaments. In Figure 15, "O" sub-areas are outside the lineaments and "I" sub-areas are inside the lineaments. Circular histo-

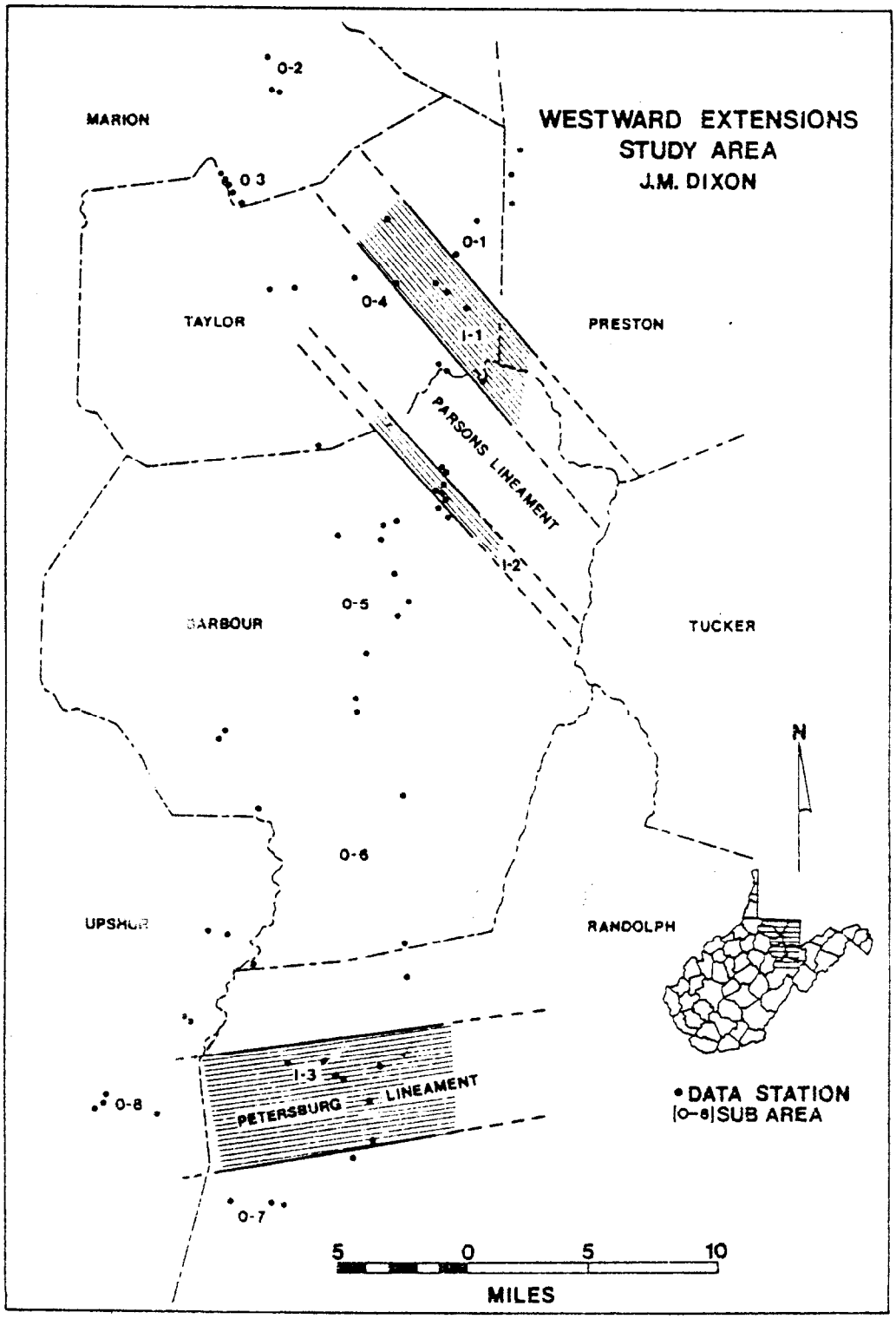


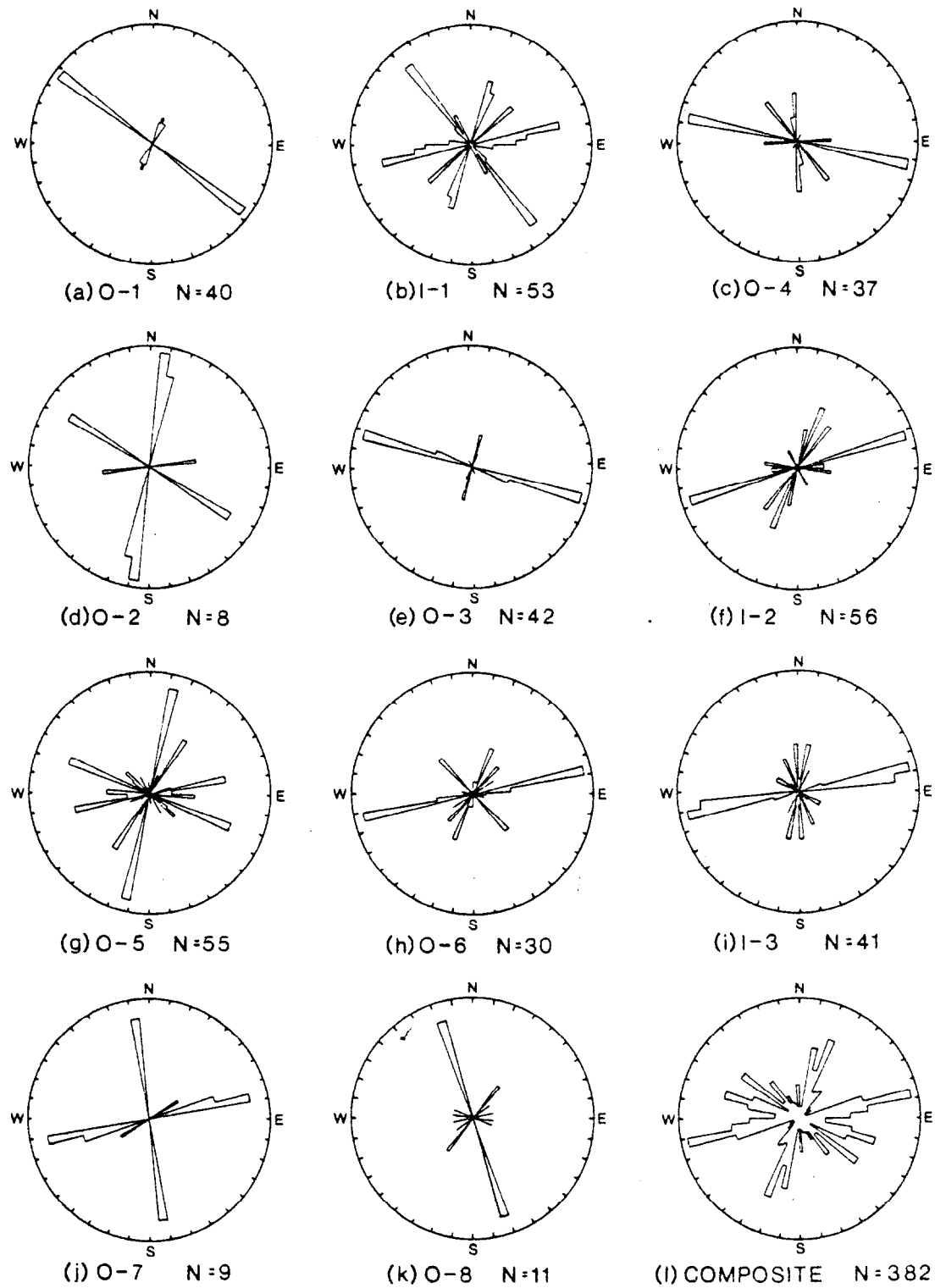
Figure 15. Index map of data stations taken in the Westward Extensions area.

grams of joints in each sub-area were plotted (Figure 16). Joint intensities were analyzed statistically. Boundaries of the lineaments were determined initially by extending the boundaries from test areas 1 and 2 westward, and refined finally by results of the joint intensity measurements.

RESULTS

A comparison of joint intensities measured across a north-south traverse in the study area shows a marked increase in intensity within both the Parsons and Petersburg lineaments (Figure 17). Intensities of sub-areas west of the lineaments(0-2, 0-3, and 0-8 in Figure 15) are low, and suggest that the high intensity joint systems of the lineaments are either disrupted or terminated in eastern Upshur and Marion Counties.

Intensity measurements of the 69 exposures fall into two distinct groups. Data stations with intensities greater than 0.005 cm^{-1} are located within the lineaments and those with intensities equal to or less than 0.005 cm^{-1} are located outside the lineaments. Only two intensity measurements greater than 0.005 cm^{-1} are found outside the lineaments (both are 0.006 cm^{-1}), and only two intensity measurements less than 0.005 cm^{-1} are found inside the lineaments (they are 0.004 cm^{-1} and 0.003 cm^{-1}). A statistical comparison by Least-Squares Means (alpha level



J.M. Dixon

Figure 16. Circular histograms of joints taken outside (O) and inside (I) the Parsons and Petersburg lineaments, Test Area 3.

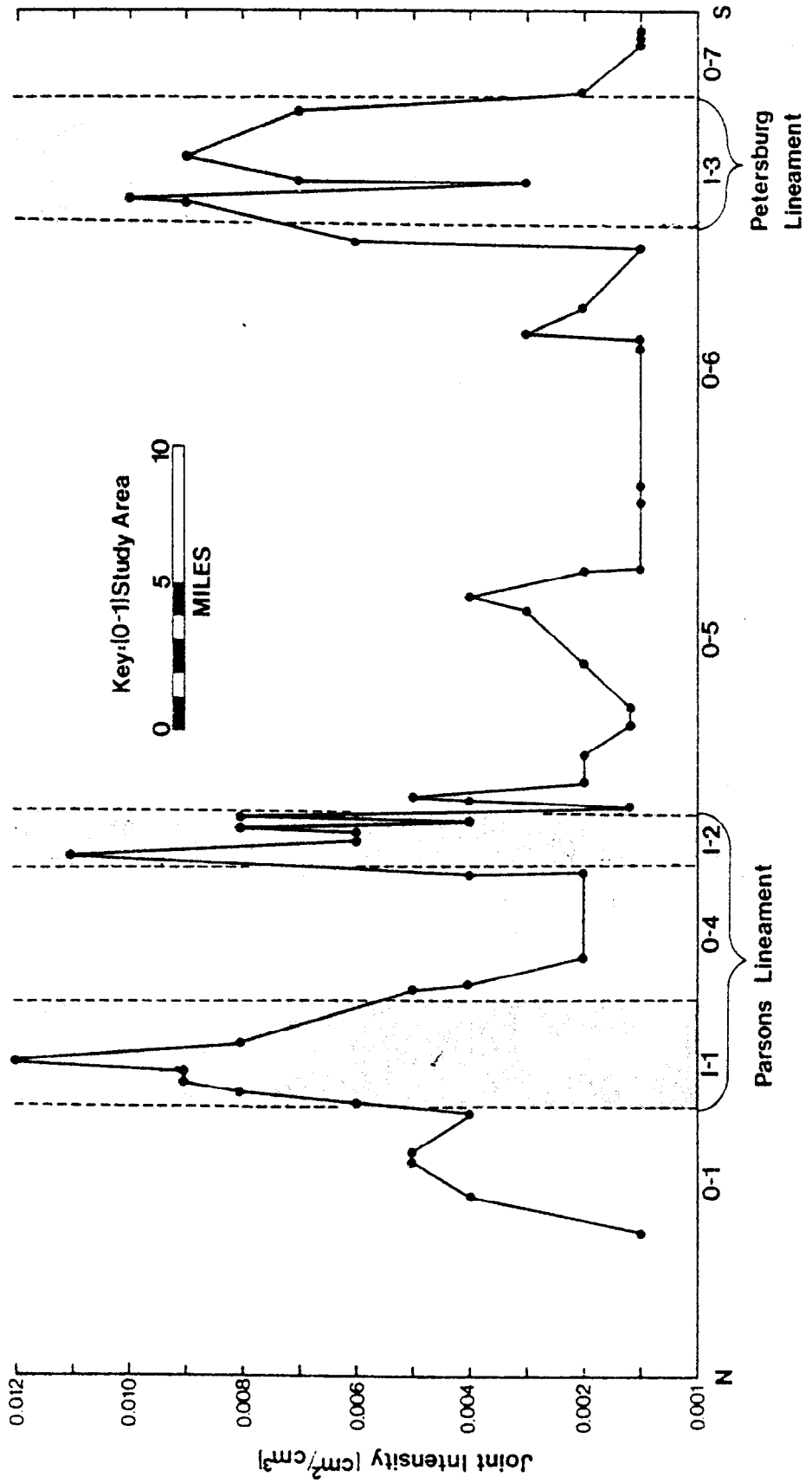


Figure 17. Dots represent intensity values for 52 of the 69 data stations of Figure 15 that fall roughly on a north-south traverse.

of 0.05) shows that the intensities inside both parts of the Parsons lineament, which appears to be split into two narrow bands (also suggested in Test Area 1, Figure 6), are similar to the intensities inside the Petersburg lineament, even though the lineaments are separated by over 20 miles (Figures 15 and 17). The comparison shows the sub-areas outside the lineaments to be similar to each other. However, an over-all southward increase in spacing (and decrease in intensity) can be easily seen when comparing mean spacings in each sub-area (Table 6). The small sample sizes in sub-areas O-7 and O-8 occur because with such wide spacings, only a small number of joints are exposed. This southward decrease in intensity and increase in spacing is consistent with the southward changes recorded by this investigator in the Parsons lineament in Tucker County (Table 2), in the Petersburg lineament along the Allegheny Front (Figure 14), and by LaCaze (1978) in the Petersburg lineament on top of the Front.

A comparison of circular histograms of measured joints does not show a particularly simple pattern across all of test areas 1, 2, and 3, but rather a changing pattern more consistent with the orientations of the lineaments (Figure 18). North of the Parsons lineament in both Tucker and Taylor Counties (Figure 18), the dominant northwest-striking joint set parallels the trend of the lineament. Both histograms are fairly simple. Inside

TABLE 6. MEAN SPACING OF MEASURED JOINTS IN THE WESTWARD EXTENSIONS AREA

Location	n	$\bar{s}$	σ_s	Location	n	$\bar{s}$	σ_s
O-1	40	503	243	I-1	52	278	180
O-2	8	404	182	I-2	56	286	197
O-3	42	455	262	I-3	40	372	294
O-4	36	535	377				
O-5	43	657	433				
O-6	27	840	573				
O-7	8	946	427				
O-8	9	709	134				

Table 6. Mean spacing in cm ($\bar{s}$), number of observations (n), and standard deviations in cm (σ_s) of joints measured in the Westward Extensions area. For sub-area locations, see Figure 14.

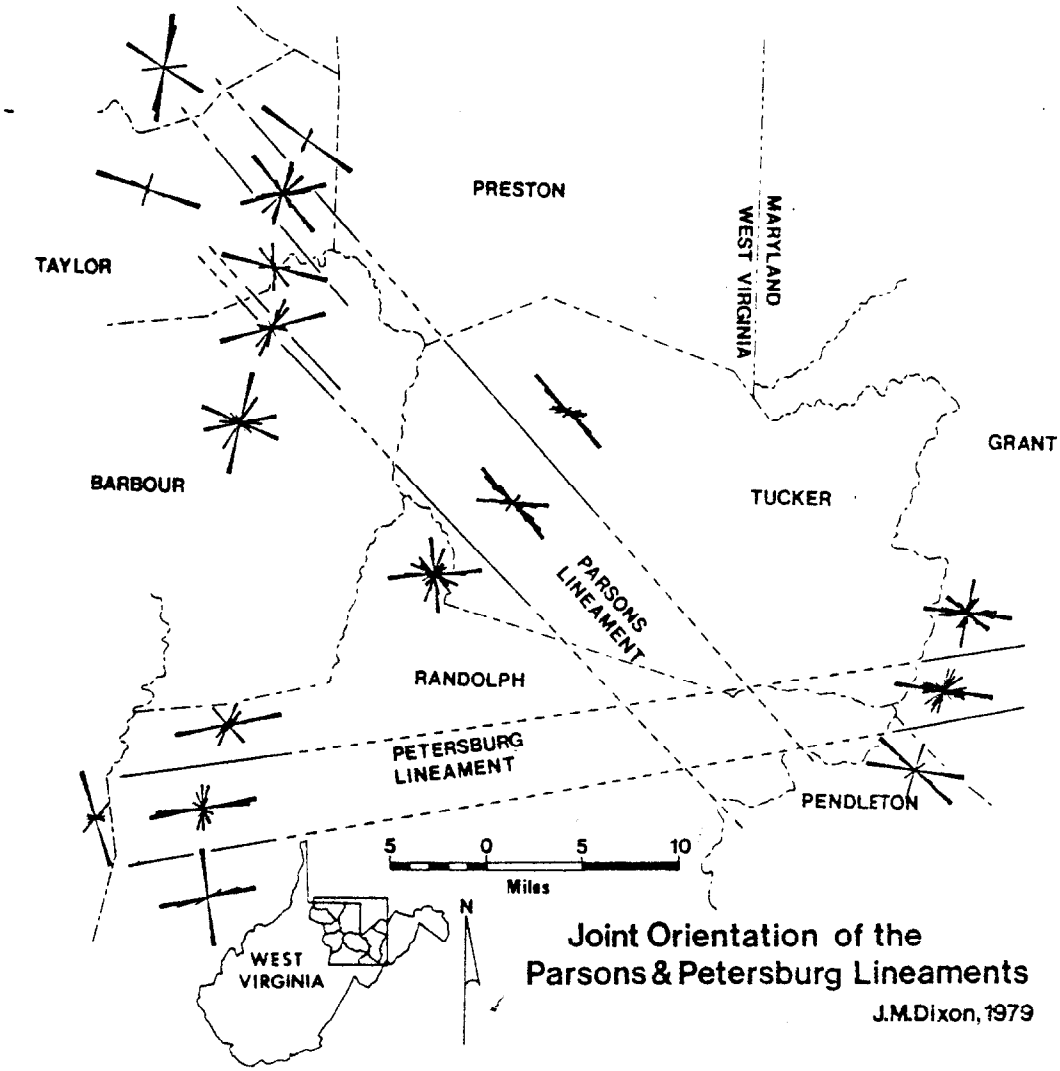

PRESTON
MARYLAND
WEST VIRGINIA
TAYLOR
GRANT
BARBOUR
TUCKER
PARSONS LINEAMENT
RANDOLPH
PETERSBURG LINEAMENT
PENDLETON
5 0 5 10
Miles
N
WEST VIRGINIA
Joint Orientation of the
Parsons & Petersburg Lineaments
J.M.Dixon, 1979

Figure 18.

the lineament, the northwest set in prominent and the east-west set is enhanced. In the wedge between the Parsons and Petersburg lineaments, the joint pattern becomes more complex and the northwest-striking joint set loses its dominance. The southern edge of the Parsons lineament exhibits a transitional pattern. Inside the Petersburg lineament, the east-west joint set dominates the pattern. Finally, south of the Petersburg lineament, the joint pattern becomes less complicated. The joint patterns in the sub-areas west of the lineaments also are relatively simple (Figure 18). Thus the two lineaments constitute and divide domains of different joint fabrics.

Sharp correlations between the joint patterns in the lineaments and the trends of the lineaments may be masked by the joint strikes associated with folds. The dominance of the northwest-striking joint set in Tucker County may occur because the northwest (fold transverse) joints are enhanced by joints associated with the similarly trending Parsons lineament. The enhancement of the east-west set in the Parsons lineament may be caused by the more northerly-trending Elkins Valley and Etam anticlines influencing joint trends in that area, or by whatever mechanism or mechanisms forming the lineament. The enhancement of the east-west set in the Petersburg lineament may be caused by the lineament's development.

The complexity of the joint pattern in the wedge

between the Parsons and Petersburg lineaments (Figure 18), the presence of two thrust faults contained within the wedge (Figure 2), and the terminations or bending of folds associated with the lineaments (Figure 2) suggest a possible interaction between the two lineaments. It may be that the lineaments were formed by differential ramping of detached strata, as suggested by Gwinn (1964), Sites (1978), LaCaze (1978), and Wheeler (1978a; 1978b), or that the lineaments were formed as a result of basement structures propagating upward or reactivating during detachment deformation, as suggested by Wheeler (1979b), or by a combination of both. Because many such lineaments do involve basement structures (Wheeler, 1979b), basement involvement in the formation of the Parsons and Petersburg lineaments is a reasonable hypothesis. The northwest trend of the Parsons lineament is compatible with Central Appalachian deformation trends and may be more detachment related, whereas the east-west trend of the Petersburg lineament may suggest a different origin such as basement structure.

Two preliminary studies of gas fields in and around the Parsons and Petersburg lineaments indicate that gas production decreases inside the lineaments (R. Wheeler and D. Skoff, written and oral communication, 1979). However, much of the production information comes from areas where the Devonian shales are on or near the surface. The in-

crease in fracturing may have broken the reservoir's seal and allowed the gas to escape. In areas further west where the shales are deeper, the increased fracturing inside the lineaments may enhance gas recovery where the seal is more likely unbroken. Detailed studies would be needed to determine more precisely the effects of the lineaments on gas production.

TEST AREA 4: COAL CLEAT INTENSITY

SETTING

Measuring differences in coal cleat intensities and features associated with those changes could be of use in coal mining in predicting roof falls, pillar strength, increasing mineral matter, or other such problems. The purpose of this study is to determine if variances in cleat intensities could be detected and to observe the effects of an overlying stream channel on two coal seams.

The north wall of a large east-trending roadcut (the first cut east of Exit 10, U.S. Route 48) in eastern Monongalia County, West Virginia (Figure 1), was chosen for the study because of the exposure of the entire stream channel and because of the great lateral extent of the roadcut. At the base of the outcrop are layers of interbedded siltstones and shales with two layers of Upper Freeport coal (T. Jake, oral communication, 1978) which vary in thickness from 35 to 70 cm (14 to 28 in). Overlying this is a channel sequence with a thin, argillaceous coal at the base and channel and pointbar sands on top (Figure 19).

METHODS

Face and butt cleats were measured for orientation and spacing in the two coal seams. Stations are located in the seams directly above the values plotted on the

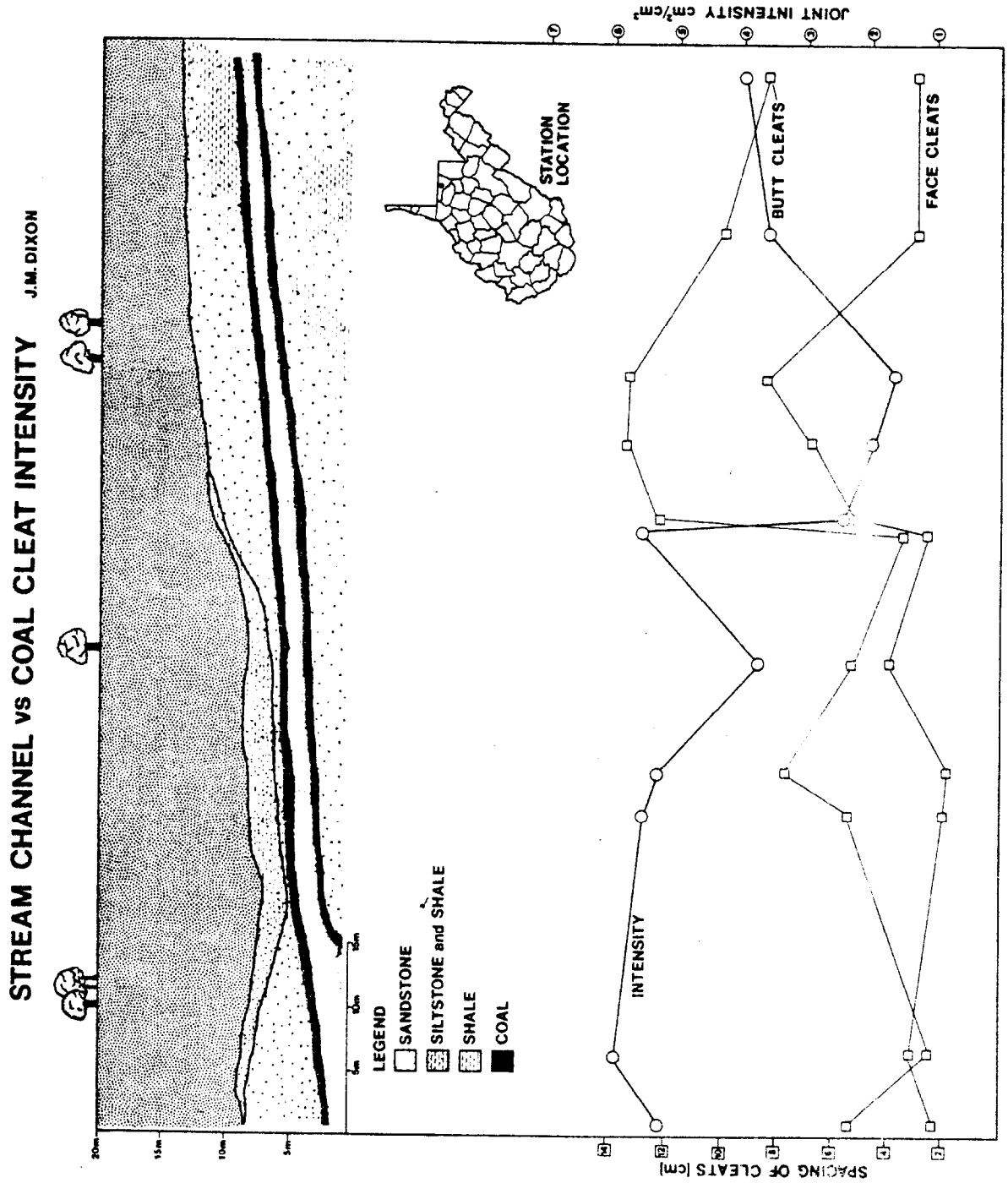


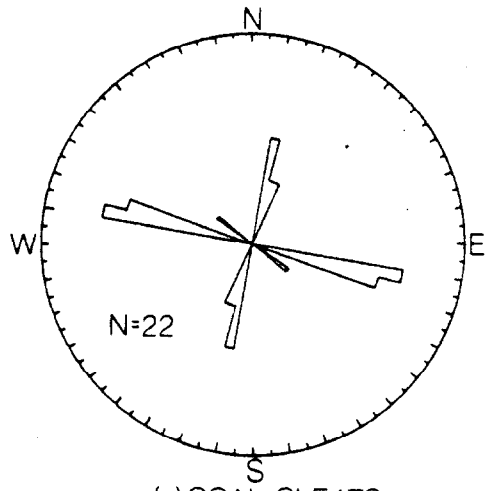
Figure 19. Cross-section of roadcut in Test Area 4 and graph of mean spacings and coal cleat intensities.

graph (Figure 19). Both primary cleats (wide but equally spaced cleats which penetrate much or all of the seam) and secondary cleats (closely but often irregularly spaced cleats which penetrate only a few layers of the seam) (Ting, 1977) were measured. At each station, ten spacings of primary face and butt cleats were measured and the number of secondary cleats per 10 centimeters were recorded. Although some differences in cleat intensities were detected in the secondary cleats, their great variability within a short distance reduces their reliability. Orientations of joints in clastic rocks and of cleats were plotted on circular histograms (Figure 20).

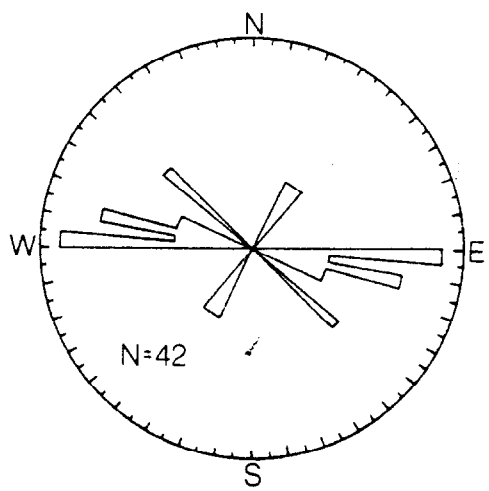
RESULTS

Three sets of cleats were found: N 70-80°W (face), N 05-25°E (butt), and N 50-55°W (diagonal) (Figure 20a). These sets resemble the three bedrock joint sets found: N 65-90°W, N 25-40°E, and N 45-50°W Figure 20b). The face cleats, which formed transverse to the Chestnut Ridge anticline, and the diagonal cleats are straight, regularly spaced, and smooth suggesting a tectonic origin. The butt cleats are crenulated, irregularly spaced, and rough suggesting a non-tectonic origin such as dehydration or devolatilization (Ting, 1977).

A graph of mean spacings of primary face and butt cleats and of primary cleat intensity (Figure 19) shows



(a) COAL CLEATS



(b) ROCK JOINTS

Figure 20. Circular histograms of (a) coal cleats and (b) bedrock joints in Test Area 4.

that the coals tend to be 1.5 to 3.0 times more intensely fractured under the channel than outside. Whether or not this difference in cleat intensity holds true in all stream channels is secondary to the fact that variations in cleat intensity can be quantitatively measured. This could be of value in the mining industry.

SUMMARY AND CONCLUSIONS

1. Joint spacing was found to be the only necessary measurement, other than strike and dip, to determine joint intensity.
2. No significant difference in operator variance was detected when measuring joint intensity. This not only adds credence to the validity of measurements, but it indicates that comparisons between different studies and different investigators can be made.
3. The Middle and Upper Devonian Chemung rocks in the Parsons lineament are more intensely jointed than the same rocks outside. The northeast-striking joint set contributes most, the dominant northwest set slightly, and the east-west set least, to that increased intensity.
4. Rocks in the Petersburg lineament are more intensely jointed than rocks outside. The four main joint sets, centered at N 80-85°W, N 45-50°W, N 10-20°E, and N 35°E all contribute to the increase in intensity.
5. On the Allegheny Front, the four units studied, the Middle Devonian black shales, the Middle and Upper Devonian Chemung Group and the Catskill Formation, and the Mississippian Pocono Formation, all reflect the increase in joint intensity inside the Petersburg lineament. These increases, along with the increase in intensity in the Pennsylvanian Homewood Sandstone,

suggest that the Petersburg lineament affects rock at least one half mile below ground level.

6. Joint intensities measured in the Pennsylvanian Pottsville Group and Allegheny Formation indicate that the high-intensity joint system of the Parsons lineament extends into and is disrupted or terminated in Taylor County, West Virginia. The high-intensity joint system of the Petersburg lineament extends to the Upshur-Randolph County line where it is disrupted or terminated.
7. Circular histograms of measured joints suggest that joint orientations reflect the orientations of the Parsons and Petersburg lineaments.
8. Air photograph and LANDSAT lineaments may be an aid in locating structural lineaments or areas of intense jointing, but do not necessarily define or bound such areas.
9. The joint patterns, associated thrust faults and fold terminations and bends, and other lineaments' associations with basement structures, suggest that the Parsons and Petersburg lineaments may be associated with basement structure.
10. Variations in coal cleat intensities can be detected. This study reveals greater intensities under a stream channel than outside. The detection and quantification of these changes could be useful in the mining

industry as an aid in predicting roof falls, pillar strength, and other such problems.

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APPENDIX A

STATION LOCATIONS IN TUCKER COUNTY
(in UTM Grid Coordinates)

Key to Abbreviations:

STA - station number

STA	LATITUDE	LONGITUDE	STA	LATITUDE	LONGITUDE
001	4328.280	615.120	050	4333.900	617.470
002	4329.710	613.710	051	4333.790	618.170
003	4330.340	614.080	052	4334.940	614.420
004	4330.800	610.530	054	4333.600	613.450
005	4329.340	612.220	055	4338.430	623.520
006	4325.480	613.100	056	4338.780	622.980
007	4325.200	612.500	057	4338.280	620.510
008	4325.870	611.720	058	4339.400	620.080
009	4327.030	611.250	059	4340.170	619.370
010	4326.430	611.070	060	4341.340	618.560
011	4326.920	610.600	061	4341.940	617.730
012	4323.350	611.100	062	4339.500	622.920
013	4323.170	610.800	063	4339.920	623.300
014	4322.600	610.180	064	4340.420	623.310
015	4329.560	611.700	065	4343.180	623.170
016	4330.600	606.530	066	4342.680	624.210
017	4328.020	603.700	067	4341.220	623.180
018	4325.610	602.990	068	4341.650	624.310
019	4324.870	602.920	069	4337.770	621.360
020	4323.480	602.570	070	4337.480	620.910
021	4319.750	602.580	071	4335.990	619.440
022	4319.980	611.050	072	4337.620	614.910
023	4320.060	611.070	073	4339.380	616.180
024	4322.170	609.520	074	4336.200	611.610
025	4322.020	608.870	075	4336.270	612.530
026	4327.130	610.470	076	4336.540	613.300
027	4327.270	610.340	077	4337.210	613.890
028	4327.500	609.300	078	4333.230	616.750
029	4327.920	608.600	079	4333.020	616.460
030	4327.800	607.570	080	4332.420	615.920
031	4333.670	611.010	082	4326.500	616.700
032	4333.480	611.250	083	4332.900	612.910
033	4332.480	611.380	084	4334.700	612.430
035	4331.160	609.720	085	4335.520	611.590
036	4326.640	610.970	086	4335.390	610.920
037	4325.270	612.380	087	4334.810	610.980
038	4325.210	612.490	088	4333.730	609.500
040	4324.700	612.700	089	4330.370	609.760
041	4324.800	612.880	090	4329.880	609.590
042	4324.880	613.080	091	4330.320	608.650
043	4325.060	613.230	092	4329.730	608.640
044	4325.120	613.300	093	4329.950	606.990
045	4325.180	613.350	094	4329.450	606.720
046	4325.250	613.420	095	4331.600	605.670
047	4334.540	616.240	096	4332.160	605.300
048	4334.000	616.680	097	4332.870	604.300
049	4333.980	616.960	098	4332.960	603.770

STA	LATITUDE	LONGITUDE	STA	LATITUDE	LONGITUDE
099	4335.130	604.140	125	4335.620	620.390
100	4334.770	604.430	126	4335.480	620.620
101	4334.580	605.560	127	4335.230	621.170
102	4327.190	613.480	128	4335.380	613.380
103	4327.880	612.700	129	4335.680	615.170
104	4328.090	612.320	130	4335.770	614.900
105	4328.470	611.660	131	4335.920	614.580
106	4328.170	612.150	132	4336.110	614.550
107	4327.110	612.150	133	4336.510	615.130
108	4326.600	612.760	134	4337.230	615.220
109	4327.870	610.340	135	4323.160	610.330
110	4328.220	610.350	136	4323.690	609.170
111	4332.660	611.480	137	4323.900	609.100
112	4332.780	612.030	138	4320.770	607.490
113	4333.500	612.080	139	4323.120	608.840
114	4333.540	611.400	140	4322.550	609.540
115	4331.860	612.480	141	4322.370	608.360
116	4338.610	621.520	142	4323.480	607.630
117	4339.480	621.580	143	4322.870	607.460
118	4340.370	621.090	144	4323.010	604.680
119	4338.450	621.620	145	4338.960	617.630
120	4338.150	620.740	146	4338.430	617.360
121	4338.780	620.220	147	4338.110	617.150
123	4337.580	619.920	148	4337.660	616.910
124	4335.950	619.720	149	4337.800	616.690

APPENDIX B

TUCKER COUNTY DATA

Key to Abbreviations:

STA - station number

STRI- joint strike

DIP - joint dip

LNG - joint length (in cm)

DTH - joint depth (in cm)

SPA - joint spacing (in cm)

BED - bed thickness (in cm)

EX - type of exposure: R = roadcut, S = stream pavement, SC = streamcut

ST - indicates into which of three main joint sets the joint falls: NW = northwest, NE = northeast, EW = east-west

LO - location with respect to the Parsons lineament: IN = within, NO = north, SO = south

GR - group with respect to the Parsons lineament: IN = within, OT = outside

STA	STRI	DIP	LNG	DTH	SPA	BED	EX	ST	LO	GR
001	N45W	88SW	106	048	060	020	R	NW	IN	IN
001	N46E	90NW	004	022	013	015	R		IN	IN
001	N45W	88SW	148	020	002	015	R	NW	IN	IN
001	N46E	90NW	007	017	044	017	R		IN	IN
001	N46E	90NW	027	029	060	020	R		IN	IN
001	N45W	88SW	084	021	007	021	R	NW	IN	IN
001	N45W	88SW	074	022	002	022	R	NW	IN	IN
001	N45W	88SW	075	039	005	020	R	NW	IN	IN
001	N46E	90NW	007	015	014	015	R		IN	IN
001	N46E	90NW	009	008	014	008	R		IN	IN
001	N46E	90NW	012	008	022	008	R		IN	IN
002	N84W	81SW	013	002	007	002	R	EW	IN	IN
002	N30E	90NW	026	003	003	003	R	NE	IN	IN
002	N84W	81SW	005	002	005	002	R	EW	IN	IN
002	N45W	90SW	010	125		003	R	NW	IN	IN
002	N20E	90NW	110	070	010	004	R		IN	IN
002	N20E	90NW	087	065	003	004	R		IN	IN
002	N78W	90SW	007	005		005	R		IN	IN
002	N60W	90SW	023	010	007	010	R		IN	IN
002	N60W	90SW	063	011	015	011	R		IN	IN
002	N45W	90SW	027	007		007	R	NW	IN	IN
002	N45W	90SW	035	007	002	007	R	NW	IN	IN
002	N80E	80SE	040	012	045	012	R	EW	IN	IN
002	N30E	90NW	024	001	008	001	R	NE	IN	IN
002	N30E	90NW	020	001	005	001	R	NE	IN	IN
002	N30E	90NW	021	001	008	001	R	NE	IN	IN
002	N30E	90NW	018	001	004	001	R	NE	IN	IN
002	N45W	90SW	100	010	016	010	R	NW	IN	IN
002	N70W	90SW	027	005	016	005	R		IN	IN
002	N30E	90NW	016	001	008	001	R	NE	IN	IN
002	N30E	90NW	005	001	006	001	R	NE	IN	IN
002	N84W	81SW	022	003	016	003	R	EW	IN	IN
002	N84W	81SW	036	002	015	002	R	EW	IN	IN
002	N84W	81SW	020	004	010	004	R	EW	IN	IN
002	N84W	81SW	010	004	004	004	R	EW	IN	IN
002	N84W	81SW	023	004	010	004	R	EW	IN	IN
003	N34E	90NW	028	015	033	015	R	NE	IN	IN
003	N34E	90NW	035	015	017	015	R	NE	IN	IN
003	N34E	90NW	055	015	020	015	R	NE	IN	IN
003	N34E	90NW	045	015	008	015	R	NE	IN	IN
003	N34E	90NW	054	015	024	015	R	NE	IN	IN
003	N87E	80NW	153	015	030	015	R	EW	IN	IN
003	N87E	80NW	055	015	020	015	R	EW	IN	IN
003	N87E	80NW	036	015	022	015	R	EW	IN	IN
003	N87E	80NW	070	015	020	015	R	EW	IN	IN
003	N87E	80NW	033	015	016	015	R	EW	IN	IN
003	N87E	80NW	078	015	016	015	R	EW	IN	IN

STA	STRI	DIP	LNG	DTH	SPA	BED	EX	ST	LO	GR
003	N34E	90NW	012	003	007	003	R	NE	IN	IN
003	N34E	90NW	010	003	004	003	R	NE	IN	IN
003	N34E	90NW	007	006	008	006	R	NE	IN	IN
003	N87E	80NW	013	006	011	006	R	EW	IN	IN
003	N60W	85SW	105	044	030	006	R		IN	IN
004	N45W	88NE	135	048	050	010	R	NW	IN	IN
004	N45W	88NE	107	020	020	010	R	NW	IN	IN
004	N45W	88NE	175	015	005	010	R	NW	IN	IN
004	N50E	90NW	001	008	036	008	R		IN	IN
004	N50E	90NW	003	026	035	010	R		IN	IN
004	N50E	90NW	020	010	007	010	R		IN	IN
004	N50E	90NW	025	010	012	010	R		IN	IN
005	N55W	73NE	007	005	011	005	R	NW	IN	IN
005	N40E	15SE	007	007	007	007	R	NE	IN	IN
005	N55W	73NE	015	007	008	007	R	NW	IN	IN
005	N40E	15SE	005	007	003	007	R	NE	IN	IN
005	N40E	15SE	005	005	004	005	R	NE	IN	IN
005	N40E	15SE	001	005	002	005	R	NE	IN	IN
005	N55W	73NE	011	005	005	005	R	NW	IN	IN
005	N55W	73NE	020	006	007	006	R	NW	IN	IN
005	N84E	77SE	022	014	005	014	R	EW	IN	IN
005	N84E	77SE	042	003	005	003	R	EW	IN	IN
005	N84E	77SE	019	008	010	008	R	EW	IN	IN
005	N84E	77SE	024	010	002	010	R	EW	IN	IN
005	N50W	70NE	021	008	011	008	R	NW	IN	IN
005	N50W	70NE	026	015	007	019	R	NW	IN	IN
005	N50W	70NE	045	024	012	024	R	NW	IN	IN
005	N40E	15SE	025	024	033	024	R	NE	IN	IN
005	N40E	15SE	027	030	039	024	R	NE	IN	IN
005	N60W	70NE	032	016	003	010	R		IN	IN
005	N55W	73NE	022	010	008	010	R	NW	IN	IN
005	N40E	15SE	018	020	005	005	R	NE	IN	IN
006	N45W	82NE	007	012	015	012	R	NW	IN	IN
006	N45W	82NE	018	014	020	012	R	NW	IN	IN
006	N45W	82NE	009	020	015	010	R	NW	IN	IN
006	N45W	82NE	009	020	022	010	R	NW	IN	IN
006	N45W	82NE	007	017	012	010	R	NW	IN	IN
006	N45W	82NE	006	021	023	010	R	NW	IN	IN
006	N45W	82NE	035	021	016	011	R	NW	IN	IN
006	N45W	82NE	012	050	009	011	R	NW	IN	IN
006	N45W	82NE	005	020	007	011	R	NW	IN	IN
006	N45W	82NE	050	033	023	033	R	NW	IN	IN
006	N45W	82NE	022	006	010	006	R	NW	IN	IN
006	N45W	82NE	030	006	013	006	R	NW	IN	IN
006	N45W	82NE	031	006	012	006	R	NW	IN	IN
006	N45W	82NE	012	006	011	006	R	NW	IN	IN
006	N40E	56SE	010	006	010	006	R	NE	IN	IN

STA	STRI	DIP	LNG	DTH	SPA	BED	EX	ST	LO	GR
006	N40E	56SE	011	006	023	006	R	NE	IN	IN
006	N40E	56SE	010	010	011	010	R	NE	IN	IN
006	N40E	56SE	033	014	003	014	R	NE	IN	IN
007	N23W	90SW	104	019	023	019	R		IN	IN
007	N23W	90SW	033	019	022	019	R		IN	IN
007	N23W	90SW	016	019	017	019	R		IN	IN
007	N23W	90SW	001	019	010	019	R		IN	IN
007	N23W	90SW	018	019	011	019	R		IN	IN
007	N23W	90SW	012	019	022	019	R		IN	IN
007	N23W	90SW	022	019	017	019	R		IN	IN
007	N69E	90NW	260	090	048	025	R		IN	IN
007	N69E	90NW	250	048	017	017	R		IN	IN
007	N23W	90SW	010	005	012	005	R		IN	IN
007	N23W	90SW	008	005	014	003	R		IN	IN
007	N23W	90SW	001	008	002	003	R		IN	IN
007	N23W	90SW	001	020	005	005	R		IN	IN
007	N69E	90NW	043	021	011	021	R		IN	IN
007	N69E	90SE	001	034	015	034	R		IN	IN
007	N69E	90NW	015	007	040	007	R		IN	IN
007	N69E	90NW	007	007	041	007	R		IN	IN
007	N69E	90NW	002	007	060	007	R		IN	IN
007	N69E	90NW	002	007	065	007	R		IN	IN
007	N69E	90NW	032	010	010	010	R		IN	IN
007	N69E	90NW	010	010	009	010	R		IN	IN
008	N35E	90NW	010	011	010	011	R	NE	IN	IN
008	N75W	90SW	600	070	055	038	R		IN	IN
008	N35E	90NW	011	011	028	011	R	NE	IN	IN
008	N35E	90NW	011	011	015	011	R	NE	IN	IN
008	N35E	90NW	012	011	035	011	R	NE	IN	IN
008	N35E	90NW	009	011	021	011	R	NE	IN	IN
008	N85W	56NE	038	020	048	020	R	EW	IN	IN
008	N85W	56NE	165	011	050	011	R	EW	IN	IN
008	N35E	90NW	015	004	013	004	R	NE	IN	IN
008	N35E	90NW	001	004	013	004	R	NE	IN	IN
008	N35E	90NW	001	004	010	004	R	NE	IN	IN
008	N35E	90NW	017	007	014	007	R	NE	IN	IN
008	N35E	90NW	016	007	007	007	R	NE	IN	IN
008	N35E	90NW	014	015	020	015	R	NE	IN	IN
008	N53W	90SW	500	115		060	R	NW	IN	IN
008	N53W	90SW	500	233		085	R	NW	IN	IN
009	N74E	90NW	060	013	008	013	S		IN	IN
009	N74E	90NW	080	013	034	013	S		IN	IN
009	N74E	90NW	080	013	017	013	S		IN	IN
009	N74E	90NW	065	013	020	013	S		IN	IN
009	N74E	90NW	070	013	010	013	S		IN	IN
009	N74E	90NW	051	013	007	013	S		IN	IN
009	N74E	90NW	040	013	020	013	S		IN	IN

STA	STRI	DIP	LNG	DTH	SPA	BED	EX	ST	LO	GR
009	N74E	90NW	041	013	030	013	S		IN	IN
009	N74E	90NW	007	008	020	008	S		IN	IN
009	N35W	90SW	040	008	030	008	S	NW	IN	IN
009	N35W	90SW	063	013	037	013	S	NW	IN	IN
009	N35W	90SW	042	013	013	013	S	NW	IN	IN
009	N35W	90SW	043	013	021	013	S	NW	IN	IN
009	N35W	90SW	070	013	021	013	S	NW	IN	IN
010	N52W	90SW	105	007	010	007	R	NW	IN	IN
010	N52W	90SW	125	007	002	007	R	NW	IN	IN
010	N52W	90SW	029	007	009	007	R	NW	IN	IN
010	N52W	90SW	040	011	006	011	R	NW	IN	IN
010	N52W	90SW	022	011	010	011	R	NW	IN	IN
010	N52W	90SW	228	070	003	011	R	NW	IN	IN
010	N52E	90NW	001	007	043	007	R		IN	IN
010	N52E	90NW	001	007	011	007	R		IN	IN
010	N52E	90NW	001	007	023	007	R		IN	IN
010	N52E	90NW	010	007	026	007	R		IN	IN
010	N52E	90NW	001	007	043	007	R		IN	IN
010	N52E	90NW	005	007	024	007	R		IN	IN
010	N52E	90NW	009	007	046	007	R		IN	IN
010	N52E	90NW	001	007	038	007	R		IN	IN
010	N52E	90NW	001	007	031	007	R		IN	IN
010	N52E	90NW	001	007	030	007	R		IN	IN
010	N52E	90NW	001	010	021	010	R		IN	IN
010	N52E	90NW	001	010	020	010	R		IN	IN
010	N52E	90NW	001	010	024	010	R		IN	IN
011	N46W	87SW	057	018	030	018	R	NW	IN	IN
011	N46W	87SW	161	030	028	030	R	NW	IN	IN
011	N46W	87SW	022	009	028	009	R	NW	IN	IN
011	N46W	87SW	022	009	018	009	R	NW	IN	IN
011	N46W	87SW	105	030	025	030	R	NW	IN	IN
011	N46W	87SW	098	023	054	023	R	NW	IN	IN
011	N46W	87SW	050	023	020	023	R	NW	IN	IN
012	N48W	90SW	025	105	012	012	R	NW	IN	IN
012	N48W	90SW	020	057	012	012	R	NW	IN	IN
012	N48W	90SW	020	012	030	012	R	NW	IN	IN
012	N48W	90SW	120	130	080	012	R	NW	IN	IN
012	N65E	90NW	075	012	035	012	R		IN	IN
012	N65E	90NW	016	013	014	013	R		IN	IN
012	N21E	86SE	045	037		012	R		IN	IN
012	N46E	73NW	047	024	009	017	R		IN	IN
012	N46E	73NW	088	017	011	017	R		IN	IN
012	N48W	90SW	160	060	018	030	R	NW	IN	IN
012	N48W	90SW	015	028	022	011	R	NW	IN	IN
012	N48W	90SW	002	030		010	R	NW	IN	IN
012	N30E	90NW	057	020	004	008	R	NE	IN	IN
012	N28E	84NW	023	027	030	012	R	NE	IN	IN

STA	STRI	DIP	LNG	DTH	SPA	BED	EX	ST	LO	GR
012	N88W	90SW	030	002	005	002	R	EW	IN	IN
012	N88W	90SW	013	007	010	007	R	EW	IN	IN
012	N88W	90SW	014	007	025	007	R	EW	IN	IN
012	N55E	90NW	180	040		040	R		IN	IN
012	N55W	90SW	079	112		040	R	NW	IN	IN
012	N55W	90SW	150	040		040	R	NW	IN	IN
012	N55W	90SW	200	080	060	040	R	NW	IN	IN
013	N68W	90SW	039	058	023	047	R		IN	IN
013	N86W	90SW	038	038	043	038	R	EW	IN	IN
013	N68W	90SW	001	027	003	027	R		IN	IN
013	N68W	90SW	001	047	046	047	R		IN	IN
013	N68W	90SW	003	055	012	055	R		IN	IN
013	N68W	90SW	001	055	023	055	R		IN	IN
013	N68W	90SW	042	018	043	018	R		IN	IN
013	N68W	90SW	027	018	040	018	R		IN	IN
013	N68W	90SW	010	027	037	018	R		IN	IN
013	N68W	90SW	030	018	020	018	R		IN	IN
013	N68W	90SW	005	018	022	018	R		IN	IN
013	N78W	90SW	023	026	028	007	R		IN	IN
013	N78W	90SW	014	005	020	005	R		IN	IN
013	N78W	90SW	010	005	016	005	R		IN	IN
013	N20W	81SW	052	010		010	R		IN	IN
014	N75W	85NE					R		IN	IN
015	N73W	55NE	096	015	029	003	R		IN	IN
015	N73W	55NE	040	006		003	R		IN	IN
015	N73W	55NE	020	007	012	003	R		IN	IN
015	N73W	55NE	012	007	013	003	R		IN	IN
015	N73W	55NE	020	007	022	003	R		IN	IN
015	N73W	55NE	045	007	011	003	R		IN	IN
015	N73W	55NE	045	010	028	003	R		IN	IN
015	N73W	55NE	045	010	038	003	R		IN	IN
015	N73W	55NE	037	010	040	003	R		IN	IN
015	N73W	55NE	035	010	033	003	R		IN	IN
015	N73W	55NE	029	010	025	003	R		IN	IN
016	N49W	76SW	060	050	074	050	R	NW	IN	IN
016	N46W	75SW	138	120	052	065	R	NW	IN	IN
016	N46W	75SW	092	055	049	055	R	NW	IN	IN
016	N46W	75SW	061	040	037	040	R	NW	IN	IN
016	N46W	74SW	064	065	024	060	R	NW	IN	IN
016	N46W	75SW	034	051	026	051	R	NW	IN	IN
016	N46W	75SW	071	035	033	035	R	NW	IN	IN
016	N46W	75SW	045	022	035	022	R	NW	IN	IN
016	N46W	75SW	070	054	078	054	R	NW	IN	IN
016	N46W	75SW	101	075	116	045	R	NW	IN	IN
016	N46W	75SW	083	052	077	052	R	NW	IN	IN
016	N46W	75SW	105	038	045	038	R	NW	IN	IN
016	N46W	75SW	095	038	029	038	R	NW	IN	IN

STA	STRI	DIP	LNG	DTH	SPA	BED	EX	ST	LO	GR
016	N46W	75SW	010	038	045	045	R	NW	IN	IN
016	N60E	78SE	014	008	021	008	R		IN	IN
016	N60E	72SE	003	008	028	008	R		IN	IN
017	N62E	78SE	006	008	041	008	R		BR	OT
017	N62E	78SE	018	008	057	008	R		BR	OT
017	N62E	78SE	018	012	039	010	R		BR	OT
017	N62E	78SE	001	012	026	010	R		BR	OT
017	N62E	78SE	014	010	046	010	R		BR	OT
017	N62E	78SE	008	010	030	010	R		BR	OT
017	N62E	78SE	014	006	038	003	R		BR	OT
017	N62E	78SE	014	006	035	006	R		BR	OT
017	N62E	78SE	002	006	040	006	R		BR	OT
017	N62E	78SE	001	006	035	006	R		BR	OT
018	N42W	75SW	061	004	055	004	R	NW	BR	OT
018	N42W	75SW	024	004	028	004	R	NW	BR	OT
018	N42W	75SW	034	012	045	012	R	NW	BR	OT
018	N42W	75SW	012	010	030	010	R	NW	BR	OT
018	N13E	90NW	043	004	018	004	R		BR	OT
018	N42W	75SW	020	014	014	004	R	NW	BR	OT
018	N42W	75SW	075	004	024	004	R	NW	BR	OT
018	N42W	75SW	028	008	028	008	R	NW	BR	OT
018	N42W	75SW	102	016	044	016	R	NW	BR	OT
018	N13E	90NW	058	016		016	R		BR	OT
018	N87E	90NW	015	001	007	001	R	EW	BR	OT
018	N87E	90NW	012	001		001	R	EW	BR	OT
018	N25E	90NW	087	005	052	005	R	NE	BR	OT
018	N45W	74SW	065	010	060	010	R	NW	BR	OT
018	N45W	75SW	059	049	040	005	R	NW	BR	OT
018	N45W	74SW	030	005	067	005	R	NW	BR	OT
018	N45W	74SW	050	005	059	005	R	NW	BR	OT
019	N33E	73NW	026	005	012	005	R	NE	BR	OT
019	N33E	73NW	013	005	010	005	R	NE	BR	OT
019	N33E	73NW	014	005	010	005	R	NE	BR	OT
019	N33E	73NW	026	005	013	005	R	NE	BR	OT
019	N33E	73NW	019	005	010	005	R	NE	BR	OT
019	N33E	73NW	015	004	005	004	R	NE	BR	OT
019	N33E	73NW	016	004	007	004	R	NE	BR	OT
019	N33E	73NW	016	004	010	004	R	NE	BR	OT
019	N33E	73NW	012	004	007	004	R	NE	BR	OT
019	N33E	73NW	012	003	008	003	R	NE	BR	OT
019	N33E	73NW	001	003	005	003	R	NE	BR	OT
019	N33E	73NW	015	005	012	005	R	NE	BR	OT
019	N33E	73NW	018	005	005	005	R	NE	BR	OT
019	N50W	88SW	005	004	023	004	R	NW	BR	OT
019	N50W	88SW	007	005	015	005	R	NW	BR	OT
019	N50W	88SW	001	005	015	005	R	NW	BR	OT
019	N50W	88SW	001	006	016	006	R	NW	BR	OT

STA	STRI	DIP	LNG	DTH	SPA	BED	EX	ST	LO	GR
019	N50W	88SW	001	006	014	006	R	NW	BR	OT
019	N50W	88SW	006	002	015	002	R	NW	BR	OT
019	N50W	88SW	007	002	011	002	R	NW	BR	OT
019	N50W	88SW	009	003	010	003	R	NW	BR	OT
019	N50W	88SW	006	003	007	003	R	NW	BR	OT
020	N24E	68SE	048	004	007	004	R		BR	OT
020	N35E	67SE	075	009		009	R	NE	BR	OT
020	N35E	66SE	010	007	003	007	R	NE	BR	OT
020	N49W	75SW	007	023	030	004	R	NW	BR	OT
020	N49W	75SW	017	011	065	004	R	NW	BR	OT
020	N49W	75SW	001	013	048	008	R	NW	BR	OT
020	N49W	75SW	001	013	050	008	R	NW	BR	OT
020	N24E	68SE	183	013	003	008	R		BR	OT
020	N24E	68SE	103	008		008	R		BR	OT
020	N05E	58NW	089	026		015	R		BR	OT
020	N05E	58NW	089	014	008	005	R		BR	OT
020	N05E	58NW	035	019	007	008	R		BR	OT
020	N05E	58NW	053	054	019	008	R		BR	OT
020	N05E	58NW	057	041		005	R		BR	OT
020	N05E	58NW	024	007	005	007	R		BR	OT
021	N37W	85SW	048	024	025	024	R	NW	BR	OT
021	N12E	67NW	066	026	023	026	R		BR	OT
021	N12E	67NW	064	023	004	023	R		BR	OT
021	N12E	67NW	119	023		023	R		BR	OT
021	N12E	67NW	078	023	030	023	R		BR	OT
021	N12E	67NW	045	023	004	023	R		BR	OT
021	N12E	67NW	078	023		023	R		BR	OT
021	N37W	85SW	035	010	024	010	R	NW	BR	OT
021	N37W	85SW	032	012	032	012	R	NW	BR	OT
021	N37W	85SW	006	011	016	001	R	NW	BR	OT
021	N37W	85SW	032	019	031	019	R	NW	BR	OT
021	N37W	85SW	070	023	030	023	R	NW	BR	OT
021	N37W	85SW	037	011	029	011	R	NW	BR	OT
021	N37W	85SW	037	022	026	022	R	NW	BR	OT
021	N37W	85SW	034	022	019	022	R	NW	BR	OT
021	N70W	90SW	007	021	006	021	R		BR	OT
021	N70W	90SW	001	024	004	024	R		BR	OT
021	N70W	90SW	001	024	003	024	R		BR	OT
021	N70W	90SW	001	024	007	024	R		BR	OT
021	N70W	90SW	001	024	008	024	R		BR	OT
021	N70W	90SW	001	024	009	024	R		BR	OT
021	N70W	90SW	001	024	008	024	R		BR	OT
021	N70W	90SW	001	024	026	024	R		BR	OT
022	N57E	78NW	062	039	029	039	R		SO	OT
022	N16E	77SE	040	039	084	039	R		SO	OT
022	N57E	78NW	050	039		039	R		SO	OT
022	N57E	78NW	125	028	025	028	R		SO	OT

STA	STRI	DIP	LNG	DTH	SPA	BED	EX	ST	LO	GR
022	N57E	78NW	012	037	044	037	R		SO	OT
022	N57E	78NW	027	037	057	037	R		SO	OT
022	N57E	78NW	038	037	018	037	R		SO	OT
022	N16E	77SE	003	007	029	007	R		SO	OT
022	N16E	77SE	030	007	018	007	R		SO	OT
022	N57E	78NW	055	025		025	R		SO	OT
022	N16E	77SE	045	025	075	025	R		SO	OT
022	N16E	77SE	080	025	052	025	R		SO	OT
023	N10E	90NW	025	005	018	005	R		SO	OT
023	N10E	90NW	014	005	028	005	R		SO	OT
023	N10E	90NW	012	005	028	005	R		SO	OT
023	N10E	90NW	009	005	014	005	R		SO	OT
023	N40E	90NW	017	005	023	005	R	NE	SO	OT
023	N40E	90NW	019	005	024	005	R	NE	SO	OT
023	N40E	90NW	014	005	030	005	R	NE	SO	OT
023	N45W	73SW	071	012		012	R	NW	SO	OT
023	N45W	73SW	087	009		009	R	NW	SO	OT
023	N13W	75SW	030	006	013	006	R		SO	OT
023	N13W	75SW	005	006	015	006	R		SO	OT
023	N40E	90NW	017	007	023	007	R	NE	SO	OT
023	N40E	90NW	007	007	005	007	R	NE	SO	OT
023	N40E	90NW	017	007	015	007	R	NE	SO	OT
023	N40E	90NW	010	007	015	007	R	NE	SO	OT
023	N45W	73SW	200	050	025	007	R	NW	SO	OT
024	N08W	70SW	020	007	022	007	R		SO	OT
024	N08W	70SW	021	007	022	007	R		SO	OT
024	N08W	70SW	020	010	022	010	R		SO	OT
024	N08W	70SW	020	002	020	002	R		SO	OT
024	N08W	72SW	044	009	043	009	R		SO	OT
024	N28E	90NW	015	003	025	003	R	NE	SO	OT
024	N28E	90NW	007	005	027	005	R	NE	SO	OT
024	N08W	72SW	010	006	014	006	R		SO	OT
024	N08W	72SW	017	008		008	R		SO	OT
024	N08W	72SW	049	014	022	014	R		SO	OT
024	N08W	72SW	026	014	018	004	R		SO	OT
024	N10E	65NW	014	005	023	005	R		SO	OT
024	N20E	77NW	007	007	002	007	R		SO	OT
024	N20E	77NW	010	008	008	008	R		SO	OT
025	N10W	69SW	012	017	008	017	R		SO	OT
025	N02E	69SE	006	017	005	017	R		SO	OT
025	N07W	69SW	002	017	008	017	R		SO	OT
025	N07W	69SW	010	017	013	017	R		SO	OT
025	N07W	69SW	010	010	023	010	R		SO	OT
025	N07W	69SW	017	010	014	010	R		SO	OT
025	N07W	69SW	040	025	052	025	R		SO	OT
025	N07W	69SW	057	025	018	025	R		SO	OT
025	N07W	69SW	047	110	026	025	R		SO	OT

STA	STRI	DIP_	LNG	DTH	SPA	BED	EX	ST	LO	GR
025	N07W	69SW	023	004	008	004	R		SO	OT
025	N07W	69SW	009	004	018	004	R		SO	OT
025	N18E	61NW	027	006	006	006	R		SO	OT
025	N18E	61NW	010	006	004	006	R		SO	OT
025	N18E	61NW	017	006	007	006	R		SO	OT
025	N18E	61NW	010	006	004	006	R		SO	OT
025	N18E	61NW	020	008	004	008	R		SO	OT
025	N18E	61NW	007	008	005	008	R		SO	OT
025	N18E	61NW	001	008	008	008	R		SO	OT
025	N18E	61NW	001	008	009	008	R		SO	OT
025	N18E	61NW	001	008	009	008	R		SO	OT
026	N38W	90SW	413	018	010	018	R	NW	IN	IN
026	N80E	60SE	001	018	042	018	R	EW	IN	IN
026	N80E	60SE	001	018	057	018	R	EW	IN	IN
026	N80E	60SE	001	018	029	018	R	EW	IN	IN
026	N80E	60SE	001	018	059	018	R	EW	IN	IN
026	N35W	90SW	057	019	023	029	R	NW	IN	IN
026	N35W	90SW	048	019	013	019	R	NW	IN	IN
026	N35W	90SW	099	019	013	019	R	NW	IN	IN
026	N35W	90SW	099	019	012	019	R	NW	IN	IN
026	N35W	90SW	090	019	014	019	R	NW	IN	IN
026	N35W	90SW	057	019	010	019	R	NW	IN	IN
026	N35W	90SW	056	019	018	019	R	NW	IN	IN
026	N35W	90SW	120	019	024	019	R	NW	IN	IN
026	N80E	60SE	009	009	028	009	R	EW	IN	IN
026	N80E	60SE	003	009	026	009	R	EW	IN	IN
026	N80E	60SE	003	009	015	009	R	EW	IN	IN
026	N80E	60SE	001	009	012	009	R	EW	IN	IN
026	N80E	60SE	003	009	035	009	R	EW	IN	IN
026	N80E	60SE	016	009	013	009	R	EW	IN	IN
026	N80E	60SE	003	009	032	009	R	EW	IN	IN
026	N80E	60SE	003	009	035	009	R	EW	IN	IN
026	N38W	90SW	014	006	019	006	R	NW	IN	IN
026	N38W	90SW	008	103	015	006	R	NW	IN	IN
026	N38W	90SW	005	006	015	006	R	NW	IN	IN
027	N71W	90SW	114	012		012	R		IN	IN
027	N06W	90SW	127	010		010	R		IN	IN
027	N71W	90SW	022	007		007	R		IN	IN
027	N71W	90SW	032	011		011	R		IN	IN
027	N45E	90NW	038	013		013	R	NE	IN	IN
028	N50W	90SW	075	015	009	015	R	NW	IN	IN
028	N50W	90SW	078	017	014	017	R	NW	IN	IN
028	N50W	90SW	075	013		013	R	NW	IN	IN
028	N50W	90SW	091	008		008	R	NW	IN	IN
028	N50W	90SW	020	010	015	010	R	NW	IN	IN
028	N50W	90SW	025	008		008	R	NW	IN	IN
028	N50W	90SW	129	006		006	R	NW	IN	IN

STA	STRI	DIP	LNG	DTH	SPA	BED	EX	ST	LO	GR
028	N77W	74NE	050	013	027	013	R		IN	IN
028	N75W	75NE	072	014	011	014	R		IN	IN
028	N77W	78NE	025	009	011	009	R		IN	IN
028	N77W	78NE	001	009	005	009	R		IN	IN
028	N77W	78NE	030	009	003	009	R		IN	IN
028	N77W	78NE	022	004	011	004	R		IN	IN
028	N77W	78NE	048	004	016	004	R		IN	IN
028	N77W	78NE	020	004	008	004	R		IN	IN
028	N77W	78NE	015	004	006	004	R		IN	IN
028	N77W	78NE	015	003	009	003	R		IN	IN
028	N77W	78NE	028	015	022	004	R		IN	IN
029	N85E	85NW	139	021		021	R	EW	IN	IN
029	N45W	78SW	094	011		011	R	NW	IN	IN
029	N40W	80SW	083	032	008	032	R	NW	IN	IN
029	N40W	80SW	036	032	010	032	R	NW	IN	IN
029	N40W	80SW	042	032	031	032	R	NW	IN	IN
029	N40W	80SW	037	025	005	025	R	NW	IN	IN
029	N40W	80SW	154	025		025	R	NW	IN	IN
029	N40W	80SW	041	012	009	012	R	NW	IN	IN
029	N40W	80SW	047	012	013	012	R	NW	IN	IN
029	N40W	80SW	070	018	020	018	R	NW	IN	IN
029	N40W	80SW	015	012	008	012	R	NW	IN	IN
029	N40W	80SW	074	012		012	R	NW	IN	IN
029	N85E	85NW	052	019	011	007	R	EW	IN	IN
029	N85E	85NW	100	018	004	018	R	EW	IN	IN
029	N85E	85NW	195	030		030	R	EW	IN	IN
030	N59W	90SW	017	003	020	003	R		IN	IN
030	N59W	90SW	019	002	012	002	R		IN	IN
030	N59W	90SW	021	002	027	002	R		IN	IN
030	N59W	90SW	020	003	020	003	R		IN	IN
031	N42W	83SW	058	046	103	046	R	NW	IN	IN
031	N87W	85SW	045	069		033	R	EW	IN	IN
031	N65W	89NE	054	028	016	028	R		IN	IN
031	N65W	89NE	012	028		028	R		IN	IN
031	N87W	85SW	030	036	057	036	R	EW	IN	IN
031	N87W	85SW	010	050		050	R	EW	IN	IN
031	N87W	85SW	010	022	045	022	R	EW	IN	IN
031	N87W	85SW	017	024	022	024	R	EW	IN	IN
031	N87W	85SW	005	050		050	R	EW	IN	IN
031	N87W	85SW	017	101	044	050	R	EW	IN	IN
031	N38W	88SW	102	078	058	078	R	NW	IN	IN
031	N42W	83NE	120	078	076	078	R	NW	IN	IN
031	N42W	83NE	078	043	037	043	R	NW	IN	IN
031	N42W	83NE	045	042	044	042	R	NW	IN	IN
031	N42W	83NE	047	026	050	026	R	NW	IN	IN
032	N89E	83NW	024	020	028	020	R	EW	IN	IN
032	N89E	83NW	011	019		019	R	EW	IN	IN

STA	STRI	DIP	LNG	DTH	SPA	BED	EX	ST	LO	GR
032	N89E	83NW	011	008	017	008	R	EW	IN	IN
032	N89E	83NW	010	002	017	002	R	EW	IN	IN
032	N89E	83NW	005	005	013	005	R	EW	IN	IN
032	N89E	83NW	012	003	007	003	R	EW	IN	IN
032	N89E	83NW	022	013	034	013	R	EW	IN	IN
032	N89E	83NW	010	022	075	022	R	EW	IN	IN
032	N89E	83NW	015	022	048	022	R	EW	IN	IN
033	N83W	90SW	037	018	025	018	R	EW	IN	IN
033	N83W	90SW	012	018	020	018	R	EW	IN	IN
033	N83W	90SW	021	014	014	014	R	EW	IN	IN
033	N83W	90SW	007	006	011	006	R	EW	IN	IN
033	N83W	90SW	021	006	012	006	R	EW	IN	IN
033	N83W	90SW	006	010	008	010	R	EW	IN	IN
033	N83W	90SW	027	016	018	016	R	EW	IN	IN
033	N83W	90SW	087	019	024	019	R	EW	IN	IN
033	N83W	90SW	053	018	024	018	R	EW	IN	IN
033	N83W	90SW	056	025	032	025	R	EW	IN	IN
035	N47W	90SW	300				SC	NW	IN	IN
035	N24E	45SE	200		090		SC		IN	IN
035	N24E	45SE	200		059		SC		IN	IN
035	N24E	45SE	040		029		SC		IN	IN
035	N02E	45SE	040		021		SC		IN	IN
035	N02E	45SE	016		031		SC		IN	IN
035	N02E	45SE	023		011		SC		IN	IN
035	N55W	90SW	048	017	047	010	SC	NW	IN	IN
035	N55W	90SW	017	010	009	010	SC	NW	IN	IN
035	N55W	90SW	030	010	025	010	SC	NW	IN	IN
035	N55W	90SW	039	010	035	010	SC	NW	IN	IN
035	N85W	90SW	020	010	036	010	SC	EW	IN	IN
035	N85W	90SW	047	010	029	010	SC	EW	IN	IN
035	N85W	90SW	036	010	016	010	SC	EW	IN	IN
035	N85W	90SW	036	010	037	010	SC	EW	IN	IN
035	N68W		077				SC		IN	IN
036	N48W	84SW	029	018	010	007	R	NW	IN	IN
036	N81E	82SE	002	007	011	007	R	EW	IN	IN
036	N43E	57NW	012	007	017	007	R	NE	IN	IN
036	N48W	84SW	001	018	020	007	R	NW	IN	IN
036	N48W	84SW	029	018	016	007	R	NW	IN	IN
036	N48W	84SW	021	007		007	R	NW	IN	IN
036	N81E	82SE	012	007	010	007	R	EW	IN	IN
036	N81E	82SE	017	007	055	007	R	EW	IN	IN
036	N48W	84SW	086	019	022	007	R	NW	IN	IN
036	N48W	84SW	035	007	008	007	R	NW	IN	IN
036	N48W	84SW	001	007	008	007	R	NW	IN	IN
036	N48W	84SW	001	007	008	007	R	NW	IN	IN
036	N81E	82SE	010	007		007	R	EW	IN	IN
036	N43E	57NW	001	007	037	007	R	NE	IN	IN

STA	STRI	DIP	LNG	DTH	SPA	BED	EX	ST	LO	GR
036	N43E	57NW	001	007	005	007	R	NE	IN	IN
036	N43E	57NW	001	007	018	007	R	NE	IN	IN
036	N48W	84SW	015	003	009	003	R	NW	IN	IN
036	N48W	84SW	003	003	005	003	R	NW	IN	IN
036	N48W	84SW	001	003	010	003	R	NW	IN	IN
036	N48W	84SW	001	003	003	003	R	NW	IN	IN
036	N43E	57NW	019	005	013	005	R	NE	IN	IN
036	N43W	57NW	015	005	014	005	R	NW	IN	IN
036	N81E	82SE	014	005	021	005	R	EW	IN	IN
036	N81E	82SE	018	016	009	005	R	EW	IN	IN
037	N65W	90SW					R		IN	IN
037	N18E	90NW					R		IN	IN
038	N57W	90SW	500	019		019	R		IN	IN
038	N57W	90SW	043	006	012	006	R		IN	IN
038	N57W	90SW	014	006	015	006	R		IN	IN
038	N57W	90SW	007	006	012	006	R		IN	IN
038	N57W	90SW	019	006	010	006	R		IN	IN
038	N57W	90SW	052	006	006	006	R		IN	IN
038	N57W	90SW	250	008	023	008	R		IN	IN
038	N57W	90SW	117	016	020	016	R		IN	IN
039							R		IN	IN
040	N53W	90SW					R	NW	IN	IN
040	N46W	90SW					R	NW	IN	IN
040	N45W	90SW					R	NW	IN	IN
040	N72W	88NE		150			R		IN	IN
040	N51W	90SW					R	NW	IN	IN
040	N80W	90SW					R	EW	IN	IN
040	N73W	90SW					R		IN	IN
040	N74W	90SW					R		IN	IN
040	N80W	90SW		150	015		R	EW	IN	IN
041	N80W	88NE		150			R	EW	IN	IN
041	N25E	90NW					R	NE	IN	IN
041	N25E	90NW	180	090		090	R	NE	IN	IN
041	N25E	90NW		200			R	NE	IN	IN
042	N53W	90SW	035	006	020	006	R	NW	IN	IN
042	N55W	90SW	010	025	028	012	R	NW	IN	IN
042	N53W	90SW	020	150		012	R	NW	IN	IN
042	N53W	90SW	029	048		012	R	NW	IN	IN
042	N53W	90SW	015	012	020	012	R	NW	IN	IN
042	N53W	90SW	050	120	057	020	R	NW	IN	IN
042	N53W	90SW	020	110	040	020	R	NW	IN	IN
042	N53W	90SW	015	050	040	020	R	NW	IN	IN
043	N46W	90SW	005	064	020	020	R	NW	IN	IN
043	N46W	90SW	005	065	050	020	R	NW	IN	IN
043	N46W	90SW	012	063	027	020	R	NW	IN	IN
043	N46W	90SW	063	051		051	R	NW	IN	IN
043	N46W	90SW	012	006	016	006	R	NW	IN	IN

STA	STRI	DIP	LNG	DTH	SPA	BED	EX	ST	LO	GR
043	N46W	90SW	009	006	018	006	R	NW	IN	IN
043	N46W	90SW	004	058	029	058	R	NW	IN	IN
043	N46W	90SW	029	019	023	019	R	NW	IN	IN
044	N48W	90SW	210	185		025	R	NW	IN	IN
044	N48W	90SW	104	100		025	R	NW	IN	IN
044	N48W	90SW	200	101		050	R	NW	IN	IN
044	N48W	90SW	500	050		030	R	NW	IN	IN
044	N48W	90SW	001	062	005	026	R	NW	IN	IN
044	N48W	90SW	001	062	075	026	R	NW	IN	IN
045	N65W	90SW	125	092	030	015	R		IN	IN
045	N65W	90SW	025	149		015	R		IN	IN
045	N65W	90SW	003	010	006	003	R		IN	IN
045	N65W	90SW	003	010	005	003	R		IN	IN
045	N65W	90SW	001	010	007	003	R		IN	IN
045	N65W	90SW	001	010	010	003	R		IN	IN
045	N65W	90SW	001	010	006	003	R		IN	IN
046	N85W	90SW	012	182	052	020	R	EW	IN	IN
046	N85W	90SW	007	190	028	020	R	EW	IN	IN
046	N85W	90SW	015	146	007	020	R	EW	IN	IN
046	N85W	90SW	001	097	007	020	R	EW	IN	IN
046	N85W	90SW	002	097	002	020	R	EW	IN	IN
046	N85W	90SW	003	096	002	020	R	EW	IN	IN
046	N85W	90SW	002	092	003	020	R	EW	IN	IN
046	N85W	90SW	002	093	005	020	R	EW	IN	IN
047	N26E	83SE	083	057	065	001	R	NE	NO	OT
047	N26E	83SE	041	059	020	001	R	NE	NO	OT
047	N85W	86SW	014	007	020	007	R	EW	NO	OT
047	N85W	86SW	006	010	013	007	R	EW	NO	OT
047	N85W	86SW	007	006	006	006	R	EW	NO	OT
047	N85W	86SW	010	011	029	011	R	EW	NO	OT
047	N85W	86SW	014	015	017	009	R	EW	NO	OT
047	N85E	86SW	023	009	026	009	R	EW	NO	OT
047	N85E	86SE	009	010	014	010	R	EW	NO	OT
048	N33W	55SW	146	070		003	R		NO	OT
048	N83E	90NW	006	004	007	004	R	EW	NO	OT
048	N83E	90NW	006	004	005	004	R	EW	NO	OT
048	N83E	90NW	001	004	011	004	R	EW	NO	OT
048	N30W	62SW	012	004		004	R		NO	OT
048	N30W	62SW	009	004		004	R		NO	OT
048	N45W	62SW	010	004	005	004	R	NW	NO	OT
049	N46W	71SW	165	027		027	R	NW	NO	OT
049	N88W	76NE	121	028		028	R	EW	NO	OT
049	N88W	76NE	034	004	008	004	R	EW	NO	OT
049	N46W	71SW	066	016	028	016	R	NW	NO	OT
049	N46W	71SW	050	016	011	016	R	NW	NO	OT
049	N46W	71SW	035	010	011	010	R	NW	NO	OT
049	N88W	76NE	028	018	030	018	R	EW	NO	OT

STA	STRI	DIP	LNG	DTH	SPA	BED	EX	ST	LO	GR
049	N88W	76NE	036	013	015	013	R	EW	NO	OT
049	N46W	71SW	015	016	014	016	R	NW	NO	OT
049	N12W	28SW	010	022	019	022	R		NO	OT
049	N12W	28SW	012	017		017	R		NO	OT
049	N12W	28SW	005	007	005	007	R		NO	OT
049	N12W	28SW	001	006	006	006	R		NO	OT
049	N12W	28SW	012	027	040	027	R		NO	OT
049	N46W	71SW	028	027	021	027	R	NW	NO	OT
049	N46W	71SW	025	027	013	027	R	NW	NO	OT
049	N46W	71SW	065	027	014	027	R	NW	NO	OT
049	N12W	28SW	010	015	013	015	R		NO	OT
049	N12W	28SW	003	015	020	015	R		NO	OT
049	N88W	76NE	033	017	021	017	R	EW	NO	OT
049	N88W	76NE	023	025	012	025	R	EW	NO	OT
050	N21W	90SW	500		096	001	S		NO	OT
050	N21W	90SW	500				S		NO	OT
050	N05W	90SW	386		122	001	S		NO	OT
050	N05W	90SW	238			001	S		NO	OT
050	N05W	90SW	120		025	001	S		NO	OT
050	N05W	90SW	293		036	001	S		NO	OT
050	N05W	90SW	251		037	001	S		NO	OT
050	N03W	90SW	450		150		SC		NO	OT
050	N03W	90SW	223				SC		NO	OT
050	N45W	90SW	048	007	015	007	SC	NW	NO	OT
050	N45W	90SW	061	007	018	007	SC	NW	NO	OT
050	N45W	90SW	081	007	025	007	SC	NW	NO	OT
050	N45W	90SW	105	007	018	007	SC	NW	NO	OT
050	N45W	90SW	014	007	017	007	SC	NW	NO	OT
050	N45W	90SW	015	007	015	007	SC	NW	NO	OT
050	N45W	90SW	028	007	036	007	SC	NW	NO	OT
051	N48W	88SW	081	029	027	029	SC	NW	NO	OT
051	N48W	88SW	081	029	025	029	SC	NW	NO	OT
051	N48W	88SW	078	029	021	029	SC	NW	NO	OT
051	N48W	88SW	066	029	005	029	SC	NW	NO	OT
051	N48W	88SW	048	029	032	029	SC	NW	NO	OT
051	N48W	88SW	049	029	015	029	SC	NW	NO	OT
051	N83W	90SW	130	025	038	025	SC	EW	NO	OT
051	N43W	90SW	072	025	030	025	SC	NW	NO	OT
051	N43W	90SW	086	025	062	025	SC	NW	NO	OT
051	N43W	90SW	090	025	034	025	SC	NW	NO	OT
051	N48W	88SW	035	025		025	SC	NW	NO	OT
051	N48W	88SW	056	005	015	005	SC	NW	NO	OT
051	N48W	88SW	085	005	006	005	SC	NW	NO	OT
051	N48W	88SW	056	005	006	005	SC	NW	NO	OT
051	N48W	88SW	061	005	015	005	SC	NW	NO	OT
051	N48W	88SW	046	005	010	005	SC	NW	NO	OT
051	N48W	88SW	067	005	055	005	SC	NW	NO	OT

STA	STRI	DIP	LNG	DTH	SPA	BED	EX	ST	LO	GR
052	N58W	75SW	150	080			R		NO	OT
053							R		NO	OT
054	N66W	90SW			032	013	R		IN	IN
054	N66W	90SW			027	013	R		IN	IN
054	N66W	90SW			021	013	R		IN	IN
054	N66W	90SW			028	013	R		IN	IN
054	N66W	90SW			016	013	R		IN	IN
054	N66W	90SW			015	013	R		IN	IN
054	N66W	90SW			028	013	R		IN	IN
054	N66W	90SW			022	013	R		IN	IN
054	N42E	45NW			059		R	NE	IN	IN
054	N42E	45NW			053		R	NE	IN	IN
054	N42E	45NW			081		R	NE	IN	IN
054	N42E	45NW			068		R	NE	IN	IN
054	N42E	45NW			016		R	NE	IN	IN
054	N42E	45NW			027		R	NE	IN	IN
054	N42E	45NW			038		R	NE	IN	IN
054	N42E	45NW			021		R	NE	IN	IN
054	N88W	90SW			067		R	EW	IN	IN
054	N88W	90SW			030		R	EW	IN	IN
054	N88W	90SW			020		R	EW	IN	IN
054	N88W	90SW			071		R	EW	IN	IN
054	N88W	90SW			027		R	EW	IN	IN
054	N88W	90SW			026		R	EW	IN	IN
054	N88W	90SW			030		R	EW	IN	IN
054	N88W	90SW			009		R	EW	IN	IN
055	N46W	89SW	109	047	019	047	R	NW	NO	OT
055	N87W	89NE	075	034	038	047	R	EW	NO	OT
055	N87W	89NE	138	028	069	028	R	EW	NO	OT
055	N42E	85NW	010	056		001	R	NE	NO	OT
055	N36E	90NW	050	028	130	028	R	NE	NO	OT
055	N46W	89SW	013	019		028	R	NW	NO	OT
055	N25E	90NW	012	006	009	001	R	NE	NO	OT
055	N25E	90NW	001	006	019	001	R	NE	NO	OT
055	N25E	90NW	001	006	020	001	R	NE	NO	OT
055	N36E	90NW	050	027	092	027	R	NE	NO	OT
055	N46W	89SW	048	027		027	R	NW	NO	OT
055	N87W	89NE	030	008	015	008	R	EW	NO	OT
055	N87W	89NE	010	008		008	R	EW	NO	OT
056	N45W	90SW	034	043	036	043	R	NW	NO	OT
056	N45W	90SW	010	043	062	043	R	NW	NO	OT
056	N45W	90SW	120	134		100	R	NW	NO	OT
056	N45W	90SW	038	123	015	100	R	NW	NO	OT
056	N45W	90SW	146	200		200	R	NW	NO	OT
056	N45W	90SW	180	220		200	R	NW	NO	OT
057	N83W	83NE	073	026	018	026	R	EW	NO	OT
057	N83W	84NE	001	026	018	026	R	EW	NO	OT

STA	STRI	DIP	LNG	DTH	SPA	BED	EX	ST	LO	GR
057	N83W	83NE	020	026	054	026	R	EW	NO	OT
057	N36W	83SW	041	021	016	021	R	NW	NO	OT
057	N36W	83SW	028	021	025	021	R	NW	NO	OT
057	N36W	83SW	033	021	024	021	R	NW	NO	OT
057	N38E	33NW	016	021	046	021	R	NE	NO	OT
057	N38E	33NW	025	021	029	021	R	NE	NO	OT
057	N38E	33NW	024	021	029	021	R	NE	NO	OT
058	N83E	49SE	057	067	006	001	R	EW	NO	OT
058	N73W	75SW	173	049		058	R		NO	OT
058	N83E	49SE	007	075	006	010	R	EW	NO	OT
058	N83E	49SE	008	069	019	010	R	EW	NO	OT
058	N83E	49SE	020	180	063	010	R	EW	NO	OT
058	N83E	49SE	015	250		010	R	EW	NO	OT
058	N83E	49SE	012	053	009	010	R	EW	NO	OT
058	N83E	49SE	006	041	010	010	R	EW	NO	OT
059	N20E	90NW					R		NO	OT
059	N80W	90SW					R	EW	NO	OT
060	N49W	90SW	042	030	025	030	R	NW	NO	OT
060	N49W	90SW	031	030	036	030	R	NW	NO	OT
060	N49W	90SW	029	030	006	030	R	NW	NO	OT
061	N41W	77SW	019	061	051	061	R	NW	NO	OT
061	N41W	77SW	038	061	041	061	R	NW	NO	OT
061	N41W	77SW	049	061	058	061	R	NW	NO	OT
061	N41W	77SW	033	038	024	038	R	NW	NO	OT
061	N41W	77SW	028	038	023	038	R	NW	NO	OT
061	N41W	77SW	021	038	037	038	R	NW	NO	OT
062	N75W	90SW	300	104		083	R		NO	OT
062	N45E	48NW					R	NE	NO	OT
063	N47W	84NE	091	058	068	058	S	NW	NO	OT
063	N75W	72NE	027	058		058	S		NO	OT
063	N47W	84NE	050	058	064	058	S	NW	NO	OT
063	N47W	84NE	080	047	021	044	S	NW	NO	OT
063	N47W	84NE	087	047	060	044	S	NW	NO	OT
063	N47W	84NE	020	058	037	058	S	NW	NO	OT
063	N47W	84NE	008	058	035	058	S	NW	NO	OT
063	N75W	72NE	001	078	088	058	S		NO	OT
063	N75W	72NE	003	163	100	058	S		NO	OT
063	N75W	72NE	008	080	025	020	S		NO	OT
063	N47W	84NE	031	018	023	018	S	NW	NO	OT
063	N47W	84NE	037	018	019	018	S	NW	NO	OT
063	N75W	72NE	045	018	085	018	S		NO	OT
063	N75W	72NE	060	018	031	018	S		NO	OT
063	N75W	72NE	027	018	051	018	S		NO	OT
064	N75W	80NE	029	005	014	005	R		NO	OT
064	N45W	78SW	025	019	015	012	R	NW	NO	OT
064	N45W	78SW	052	010	012	010	R	NW	NO	OT
064	N75W	80NE	026	005	011	005	R		NO	OT

STA	STRI	DIP	LNG	DTH	SPA	BED	EX	ST	LO	GR
064	N45W	78SW	022	012	020	012	R	NW	NO	OT
064	N75W	80NE	046	010	007	010	R		NO	OT
064	N45W	78SW	035	019	028	019	R	NW	NO	OT
064	N45W	78SW	007	019	013	019	R	NW	NO	OT
064	N45W	78SW	018	019	014	019	R	NW	NO	OT
064	N45W	78SW	057	012	020	012	R	NW	NO	OT
064	N87E	76NW	021	017	014	017	R	EW	NO	OT
064	N87E	76NW	007	017	015	017	R	EW	NO	OT
064	N87E	76NW	015	017	014	017	R	EW	NO	OT
065	N44W	89SW	058	025	042	025	S	NW	NO	OT
065	N44W	89SW	043	025	010	025	S	NW	NO	OT
065	N44W	89SW	039	025	025	025	S	NW	NO	OT
065	N44W	89SW	037	025	036	025	S	NW	NO	OT
065	N44W	89SW	054	025	027	025	S	NW	NO	OT
065	N44W	89SW	032	012	010	025	S	NW	NO	OT
065	N44W	89SW	028	012	008	025	S	NW	NO	OT
065	N44W	89SW	027	012	013	025	S	NW	NO	OT
065	N44W	89SW	025	012	012	025	S	NW	NO	OT
065	N89W	90SW	053	025	018	025	S	EW	NO	OT
065	N89W	90SW	029	025	009	025	S	EW	NO	OT
066	N72W	66SW	031	007	032	007	R		NO	OT
066	N72W	66SW	011	012	026	012	R		NO	OT
066	N58W	63SW	010	009	011	009	R		NO	OT
066	N58W	63SW	025	009	014	009	R		NO	OT
066	N58W	63SW	029	009	015	009	R		NO	OT
066	N58W	63SW	020	009	012	009	R		NO	OT
066	N49W	76SW	014	010	066	024	R	NW	NO	OT
066	N49W	76SW	031	012	013	012	R	NW	NO	OT
066	N49W	76SW	026	012	017	012	R	NW	NO	OT
067	N78W	69SW	026	019			R		NO	OT
067	N78W	69SW	035	019			R		NO	OT
068	N40W	90NW	016		065		S	NW	NO	OT
068	N45W	90SW	067	017	020	007	S	NW	NO	OT
068	N45W	90SW	040	027	024	007	S	NW	NO	OT
068	N45W	90SW	058	009	011	009	S	NW	NO	OT
068	N45W	90SW	060	009	026	009	S	NW	NO	OT
068	N45W	90SW	055	009	022	009	S	NW	NO	OT
068	N45W	90SW	072	009	042	009	S	NW	NO	OT
068	N78W	69SW	250				S		NO	OT
068	N78W	69SW	005	006	023	006	S		NO	OT
068	N78W	69SW	008	007	009	006	S		NO	OT
068	N78W	69SW	003	007	020	006	S		NO	OT
068	N78W	69SW	002	009	010	006	S		NO	OT
069	N46W	90SW	121	050	035	050	R	NW	NO	OT
069	N46W	90SW	093	042		042	R	NW	NO	OT
069	N46W	90SW	105	017		020	R	NW	NO	OT
069	N46W	90SW	135	060	021	042	R	NW	NO	OT

STA	STRI	DIP	LNG	DTH	SPA	BED	EX	ST	LO	GR
069	N46W	90SW	098	043		043	R	NW	NO	OT
069	N46W	90SW	080	035		035	R	NW	NO	OT
069	N34E	90NW	080	035		035	R	NE	NO	OT
069	N64W	90SW	094	046		039	R		NO	OT
069	N46W	90SW	109	053		053	R	NW	NO	OT
069	N46W	90SW	068	025	034	025	R	NW	NO	OT
069	N46W	90SW	055	025		025	R	NW	NO	OT
069	N46W	90SW	025	012	005	012	R	NW	NO	OT
069	N46W	90SW	012	012	007	012	R	NW	NO	OT
069	N46W	90SW	013	012	009	012	R	NW	NO	OT
070	N32E	81NW	461	020	000	032	R	NE	NO	OT
070	N36E	82NW	479	012	000	032	R	NE	NO	OT
070	N41W	90SW	015	006	000	006	R	NW	NO	OT
070	N48E	65NW	025	006	000	006	R		NO	OT
070	N46W	90SW	016	008	009	008	R	NW	NO	OT
070	N41W	90SW	004	008	013	008	R	NW	NO	OT
070	N41W	90SW	022	010	018	010	R	NW	NO	OT
070	N41W	90SW	023	010	000	010	R	NW	NO	OT
070	N43W	90SW	006	013	006	013	R	NW	NO	OT
070	N41W	90SW	005	013	006	013	R	NW	NO	OT
070	N41W	90SW	015	013	009	013	R	NW	NO	OT
070	N41W	90SW	006	010	010	010	R	NW	NO	OT
070	N41W	90SW	007	010	011	010	R	NW	NO	OT
070	N41W	90SW	019	010	007	010	R	NW	NO	OT
070	N41W	90SW	011	017	060	017	R	NW	NO	OT
070	N41W	90SW	011	017	015	017	R	NW	NO	OT
071	N71W	84SW	005	008	011	008	R		NO	OT
071	N71W	84SW	008	008	016	008	R		NO	OT
071	N71W	84SW	001	008	010	008	R		NO	OT
071	N71W	84SW	019	008	013	008	R		NO	OT
071	N71W	84SW	022	008	010	008	R		NO	OT
071	N71W	84SW	004	009	001	009	R		NO	OT
071	N71W	84SW	001	009	012	009	R		NO	OT
071	N71W	84SW	008	009	015	009	R		NO	OT
071	N71W	84SW	003	009	014	009	R		NO	OT
071	N71W	84SW	003	009	002	009	R		NO	OT
071	N11E	59NW	033	010	006	010	R		NO	OT
071	N11E	59NW	028	010	000	010	R		NO	OT
071	N42W	77SW	033	023	017	017	R	NW	NO	OT
071	N42W	77SW	027	027	009	018	R	NW	NO	OT
071	N42W	77SW	010	017	000	022	R	NW	NO	OT
071	N78W	81SW	007	013	008	013	R		NO	OT
071	N78W	81SW	008	013	010	013	R		NO	OT
071	N78W	81SW	027	013	011	013	R		NO	OT
071	N42W	77SW	025	030	032	030	R	NW	NO	OT
071	N42W	77SW	039	055	032	030	R	NW	NO	OT
072	N60W	90SW	055	018	000	023	R		NO	OT

STA	STRI	DIP	LNG	DTH	SPA	BED	EX	ST	LO	GR
072	N25E	90NW	039	010	000	010	R	NE	NO	OT
072	N55W	90SW	020	028	000	021	R	NW	NO	OT
072	N60W	90SW	032	032	000	030	R		NO	OT
072	N60W	90SW	027	020	026	020	R		NO	OT
072	N85E	90NW	020	042	000	003	R	EW	NO	OT
072	N70W	83SW	020	083	000	007	R		NO	OT
072	N55W	90SW	038	080	000	015	R	NW	NO	OT
073	N85W	84SW	093	041	000	041	R	EW	NO	OT
073	N31W	79SW	045	036	099	036	R		NO	OT
073	N31W	79SW	039	036	099	036	R		NO	OT
073	N31W	79SW	010	036	000	036	R		NO	OT
073	N85W	84SW	044	020	000	020	R	EW	NO	OT
073	N41W	69SW	036	053	023	029	R	NW	NO	OT
073	N41W	69SW	043	060	000	020	R	NW	NO	OT
074	N87W	76SW	122	134	000	134	R	EW	NO	OT
074	N87W	76SW	070	027	000	023	R	EW	NO	OT
074	N87W	76SW	037	007	018	007	R	EW	NO	OT
074	N87W	76SW	031	007	010	007	R	EW	NO	OT
074	N87W	76SW	053	033	000	007	R	EW	NO	OT
074	N05E	79NW	046	007	000	007	R		NO	OT
075	N70E	60NW	165	010	000	005	R		NO	OT
075	N82E	90NW	135	015	035	015	R	EW	NO	OT
075	N82E	90NW	058	015	000	015	R	EW	NO	OT
076	N15E	90NW	076	012	076	012	S		NO	OT
076	N15E	90NW	050	012	037	012	S		NO	OT
076	N15E	90NW	086	012	047	012	S		NO	OT
076	N15E	90NW	094	012	049	012	S		NO	OT
076	N15E	90NW	080	012	000	012	S		NO	OT
076	N85E	90NW	157	012	000	012	S	EW	NO	OT
077	N22E	90NW	048	019	016	019	S		NO	OT
077	N45E	85NW	071	018	064	018	S	NE	NO	OT
077	N46W	90SW	051	025	019	019	S	NW	NO	OT
077	N87W	90SW	082	000	010	009	S	EW	NO	OT
077	N22E	90NW	037	019	016	019	S		NO	OT
077	N46W	90SW	053	019	014	019	S	NW	NO	OT
077	N45E	85NW	109	034	000	019	S	NE	NO	OT
077	N87W	90SW	110	009	011	009	S	EW	NO	OT
077	N87W	90SW	049	009	011	009	S	EW	NO	OT
078	N63W	90SW	206	034	065	034	R		NO	OT
078	N63W	90SW	101	015	080	015	R		NO	OT
078	N63W	90SW	080	015	000	015	R		NO	OT
078	N63W	90SW	278	034	000	034	R		NO	OT
078	N48W	90SW	050	008	017	008	R	NW	NO	OT
078	N55W	90SW	045	001	008	008	R	NW	NO	OT
078	N55W	90SW	086	001	008	008	R	NW	NO	OT
078	N55W	90SW	088	003	006	008	R	NW	NO	OT
078	N55W	90SW	098	002	005	008	R	NW	NO	OT

STA	STRI	DIP	LNG	DTH	SPA	BED	EX	ST	LO	GR
078	N55W	90SW	068	001	011	008	R	NW	NO	OT
078	N55W	90SW	062	004	013	008	R	NW	NO	OT
079	N47W	82SW	013	016	014	016	R	NW	NO	OT
079	N47W	82SW	039	019	000	019	R	NW	NO	OT
079	N47W	82SW	008	006	015	006	R	NW	NO	OT
079	N82W	87SW	020	016	038	016	R	EW	NO	OT
079	N82W	87SW	010	014	011	014	R	EW	NO	OT
079	N82W	87SW	015	014	003	014	R	EW	NO	OT
079	N82W	87SW	018	014	012	014	R	EW	NO	OT
079	N82W	87SW	017	014	024	014	R	EW	NO	OT
079	N47W	82SW	003	017	018	017	R	NW	NO	OT
079	N47W	82SW	018	018	013	018	R	NW	NO	OT
079	N47W	82SW	018	014	015	014	R	NW	NO	OT
079	N82W	87SW	009	014	017	014	R	EW	NO	OT
079	N82W	87SW	032	014	019	014	R	EW	NO	OT
079	N47W	82SW	017	018	012	018	R	NW	NO	OT
079	N47W	82SW	027	020	018	017	R	NW	NO	OT
079	N12W	70SW	043	013	000	013	R		NO	OT
079	N07E	59NW	018	018	001	018	R		NO	OT
079	N12E	48NW	033	013	014	013	R		NO	OT
080	N72W	84SW	033	008	008	008	R		NO	OT
080	N21E	84NW	017	008	018	008	R		NO	OT
080	N72W	84SW	007	008	013	008	R		NO	OT
080	N72W	84SW	024	008	018	008	R		NO	OT
080	N72W	84SW	044	009	015	009	R		NO	OT
080	N72W	84SW	018	009	009	009	R		NO	OT
080	N72W	84SW	018	009	018	009	R		NO	OT
080	N72W	84SW	018	009	011	009	R		NO	OT
080	N21E	84NW	017	008	029	008	R		NO	OT
080	N21E	84NW	001	009	013	009	R		NO	OT
080	N21E	84NW	015	009	012	009	R		NO	OT
080	N21E	84NW	024	009	025	009	R		NO	OT
080	N21E	84NW	010	009	018	009	R		NO	OT
080	N21E	84NW	019	010	017	010	R		NO	OT
082	N23E	74NW	049	026	080	026	R		IN	IN
082	N48W	88SW	064	027	065	027	R	NW	IN	IN
082	N48W	88SW	100	026	000	026	R	NW	IN	IN
082	N48W	88SW	020	036	039	036	R	NW	IN	IN
082	N48W	88SW	060	040	050	040	R	NW	IN	IN
082	N48W	88SW	062	046	067	046	R	NW	IN	IN
082	N84W	87SW	053	040	025	033	R	EW	IN	IN
082	N84W	87SW	005	040	020	033	R	EW	IN	IN
082	N84W	87SW	027	026	000	026	R	EW	IN	IN
082	N23E	74NW	058	030	063	030	R		IN	IN
082	N23E	74NW	072	033	000	033	R		IN	IN
083	N70W	87SW	020	015	000	013	R		IN	IN
083	N46W	88SW	012	004	010	008	R	NW	IN	IN

STA	STRI	DIP	LNG	DTH	SPA	BED	EX	ST	LO	GR
083	N46W	88SW	003	003	013	008	R	NW	IN	IN
083	N46W	88SW	005	004	010	008	R	NW	IN	IN
083	N70W	87SW	014	009	007	009	R		IN	IN
083	N21E	73NW	129	022	011	007	R		IN	IN
083	N21E	73NW	063	018	012	009	R		IN	IN
084	N85W	88SW	075	142	030	020	R	EW	IN	IN
084	N89W	90SW	034	034	044	034	R	EW	IN	IN
084	N89W	88SW	028	029	021	022	R	EW	IN	IN
084	N89W	88SW	035	056	041	022	R	EW	IN	IN
084	N89W	88SW	015	018	013	006	R	EW	IN	IN
084	N89W	88SW	012	026	014	006	R	EW	IN	IN
084	N89W	88SW	005	005	008	005	R	EW	IN	IN
084	N35E	84NW	015	019	006	019	R	NE	IN	IN
084	N35E	84NW	024	019	023	019	R	NE	IN	IN
084	N42W	71SW	024	014	000	014	R	NW	IN	IN
084	N89W	88SW	010	014	021	014	R	EW	IN	IN
084	N89W	88SW	010	014	022	014	R	EW	IN	IN
084	N89W	88SW	019	017	016	017	R	EW	IN	IN
084	N45W	84SW	146	018	015	018	R	NW	IN	IN
084	N42W	71SW	105	020	000	020	R	NW	IN	IN
084	N89W	88SW	216	020	015	012	R	EW	IN	IN
085	N54W	90SW	205	013	000	013	R	NW	IN	IN
085	N30E	51NW	005	036	030	036	R	NE	IN	IN
085	N30E	51NW	047	036	042	036	R	NE	IN	IN
085	N30E	51NW	012	036	023	036	R	NE	IN	IN
085	N30E	51NW	107	048	000	036	R	NE	IN	IN
085	N54W	90SW	102	013	000	013	R	NW	IN	IN
085	N54W	90SW	056	013	000	013	R	NW	IN	IN
086	N33E	90NW	046	005	000	005	S	NE	IN	IN
086	N47E	67NW	034	010	000	010	S		IN	IN
086	N47E	67NW	029	008	000	008	S		IN	IN
086	N33E	90NW	026	006	015	006	S	NE	IN	IN
086	N40W	90SW	030	007	000	007	S	NW	IN	IN
086	N40W	90SW	019	007	016	007	S	NW	IN	IN
086	N40W	90SW	013	007	000	007	S	NW	IN	IN
087	N87W	90SW	008	020	018	010	SC	EW	IN	IN
087	N51W	90SW	034	033	000	013	SC	NW	IN	IN
087	N87W	90SW	022	005	008	005	SC	EW	IN	IN
087	N87W	90SW	015	007	012	007	SC	EW	IN	IN
087	N87W	90SW	015	009	024	009	SC	EW	IN	IN
087	N87W	90SW	005	010	038	011	SC	EW	IN	IN
087	N87W	90SW	014	010	009	010	SC	EW	IN	IN
087	N87W	90SW	007	005	017	007	SC	EW	IN	IN
087	N87W	90SW	010	007	017	007	SC	EW	IN	IN
087	N87W	90SW	015	013	034	007	SC	EW	IN	IN
087	N87W	90SW	018	003	000	007	SC	EW	IN	IN
087	N51W	90SW	010	070	000	010	SC	NW	IN	IN

STA	STRI	DIP	LNG	DTH	SPA	BED	EX	ST	LO	GR
087	N51W	90SW	010	056	000	010	SC	NW	IN	IN
087	N43W	90SW	070	061	000	010	SC	NW	IN	IN
087	N51W	90SW	197	050	007	015	SC	NW	IN	IN
087	N51W	90SW	040	012	026	012	SC	NW	IN	IN
087	N84E	90NW	182	057	011	007	SC	EW	IN	IN
087	N84E	90NW	085	043	011	007	SC	EW	IN	IN
087	N84E	90NW	063	038	000	007	SC	EW	IN	IN
087	N87W	90SW	047	067	006	007	SC	EW	IN	IN
087	N73W	90SW	124	073	032	006	SC		IN	IN
087	N73W	90SW	117	060	031	006	SC		IN	IN
088	N45W	90SW	050	019	030	019	S	NW	IN	IN
088	N45W	90SW	043	019	033	019	S	NW	IN	IN
088	N45W	90SW	047	019	000	019	S	NW	IN	IN
088	N86W	75SW	142	022	039	022	S	EW	IN	IN
088	N86W	75SW	062	022	031	022	S	EW	IN	IN
088	N86W	75SW	032	020	000	022	S	EW	IN	IN
089	N62W	72SW	060	039	038	039	SC		IN	IN
089	N62W	72SW	077	039	009	039	SC		IN	IN
089	N62W	72SW	045	039	005	039	SC		IN	IN
089	N62W	72SW	035	039	011	039	SC		IN	IN
089	N62W	72SW	064	039	007	039	SC		IN	IN
089	N03E	52NW	060	019	008	019	SC		IN	IN
089	N03E	52NW	043	014	004	007	SC		IN	IN
089	N28E	44NW	025	010	000	007	SC	NE	IN	IN
089	N62W	72SW	040	039	007	039	SC		IN	IN
089	N62W	72SW	038	039	006	039	SC		IN	IN
089	N28E	44NW	015	014	011	014	SC	NE	IN	IN
089	N28E	44NW	010	008	008	008	SC	NE	IN	IN
089	N28E	44NW	020	005	001	005	SC	NE	IN	IN
090	N43W	90SW	020	009	003	009	SC	NW	IN	IN
090	N43W	90SW	016	009	009	009	SC	NW	IN	IN
090	N43W	90SW	011	009	003	009	SC	NW	IN	IN
090	N43W	90SW	012	009	010	009	SC	NW	IN	IN
090	N43W	90SW	018	017	005	009	SC	NW	IN	IN
090	N43W	90SW	018	013	006	009	SC	NW	IN	IN
090	N43W	90SW	018	017	010	009	SC	NW	IN	IN
090	N43W	90SW	018	013	014	009	SC	NW	IN	IN
090	N43W	90SW	010	017	007	009	SC	NW	IN	IN
090	N43W	90SW	012	017	015	009	SC	NW	IN	IN
090	N43W	90SW	010	017	013	009	SC	NW	IN	IN
090	N43W	90SW	010	017	010	009	SC	NW	IN	IN
091	N36W	87SW	180	025	068	025	S	NW	IN	IN
091	N36W	87SW	130	025	025	025	S	NW	IN	IN
091	N36W	87SW	103	025	012	025	S	NW	IN	IN
091	N36W	87SW	090	025	039	025	S	NW	IN	IN
091	N36W	87SW	087	025	014	025	S	NW	IN	IN
091	N36W	87SW	085	025	040	025	S	NW	IN	IN

STA	STRI	DIP	LNG	DTH	SPA	BED	EX	ST	LO	GP
091	N36W	87SW	080	025	055	025	S	NW	IN	IN
092	N55W	74SW	017	007	016	007	SC	NW	IN	IN
092	N55W	74SW	020	007	000	007	SC	NW	IN	IN
092	N55W	74SW	005	002	022	002	SC	NW	IN	IN
092	N55W	74SW	005	002	000	002	SC	NW	IN	IN
092	N87E	90NW	051	030	004	004	SC	EW	IN	IN
093	N25E	90NW	206	005	029	005	SC	NE	IN	IN
093	N25E	90NW	174	005	043	005	SC	NE	IN	IN
093	N25E	90NW	355	012	000	005	SC	NE	IN	IN
093	N25E	90NW	089	015	020	010	SC	NE	IN	IN
093	N49W	88SW	039	013	000	013	SC	NW	IN	IN
093	N40W	72SW	043	012	000	012	SC	NW	IN	IN
093	N40W	72SW	031	012	005	012	SC	NW	IN	IN
093	N40W	72SW	011	012	013	012	SC	NW	IN	IN
093	N85W	84SW	021	006	000	006	SC	EW	IN	IN
093	N85W	84SW	043	015	023	015	SC	EW	IN	IN
093	N40W	72SW	010	005	017	005	SC	NW	IN	IN
093	N40W	72SW	014	007	015	008	SC	NW	IN	IN
093	N40W	72SW	011	007	010	008	SC	NW	IN	IN
093	N40W	72SW	008	007	008	009	SC	NW	IN	IN
093	N40W	72SW	004	007	016	010	SC	NW	IN	IN
094	N76W	80SW	020	010	043	010	S		IN	IN
094	N76W	80SW	015	010	050	010	S		IN	IN
094	N76W	80SW	020	010	055	010	S		IN	IN
094	N76W	80SW	022	009	017	009	S		IN	IN
094	N35E	78NW	050	010	015	010	S	NE	IN	IN
095	N36W	84SW	320	014	006	014	R	NW	IN	IN
095	N36W	84SW	340	015	000	015	R	NW	IN	IN
095	N36W	84SW	310	008	000	008	R	NW	IN	IN
095	N36W	84SW	010	010	040	010	R	NW	IN	IN
096	N43W	88SW	073	005	000	005	R	NW	IN	IN
096	N25E	90NW	015	008	026	008	R	NE	IN	IN
096	N25E	90NW	024	008	021	008	R	NE	IN	IN
096	N43W	88SW	050	007	000	007	R	NW	IN	IN
097	N76E	74NW	242	102	008	102	R		IN	IN
097	N76E	74NW	171	102	000	102	R		IN	IN
097	N76E	74NW	190	039	004	039	R		IN	IN
097	N76E	74NW	187	015	000	015	R		IN	IN
098	N84E	75NW	078	026	003	016	R	EW	IN	IN
098	N84E	75NW	196	021	000	011	R	EW	IN	IN
098	N84E	75NW	132	007	000	007	R	EW	IN	IN
098	N84E	75NW	106	007	000	007	R	EW	IN	IN
098	N40E	68NW	053	013	008	013	R	NE	IN	IN
098	N40E	68NW	045	013	007	013	R	NE	IN	IN
099	N10W	69SW	110	046	014	046	R		IN	IN
099	N10W	69SW	040	046	000	046	R		IN	IN
099	N45W	90SW	055	072	000	072	R	NW	IN	IN

STA	STRI	DIP	LNG	DTH	SPA	BED	EX	ST	LO	GR
099	N45W	90SW	016	046	048	046	R	NW	IN	IN
100	N72W	76SW	224	011	000	011	R		IN	IN
100	N72W	76SW	133	017	000	017	R		IN	IN
101	N33W	70SW	019	006	012	006	R		IN	IN
101	N33W	70SW	021	006	000	006	R		IN	IN
101	N42E	86NW	031	006	023	006	R	NE	IN	IN
101	N42E	86NW	041	010	000	010	R	NE	IN	IN
101	N77E	90NW	051	008	000	008	R		IN	IN
101	N65W	87SW	094	023	004	023	R		IN	IN
101	N65W	87SW	096	043	000	023	R		IN	IN
102	N41W	85SW	084	014	032	005	S	NW	IN	IN
102	N41W	85SW	109	013	052	005	S	NW	IN	IN
102	N41W	85SW	045	005	008	005	S	NW	IN	IN
102	N41W	85SW	109	005	013	007	S	NW	IN	IN
102	N41W	85SW	034	012	036	007	S	NW	IN	IN
102	N41W	85SW	108	015	000	015	S	NW	IN	IN
102	N87W	84SW	142	023	042	023	S	EW	IN	IN
102	N87W	84SW	035	012	012	012	S	EW	IN	IN
102	N87W	84SW	024	012	019	012	S	EW	IN	IN
102	N87W	84SW	048	014	054	014	S	EW	IN	IN
102	N87W	84SW	092	021	000	021	S	EW	IN	IN
102	N41W	85SW	174	011	025	006	S	NW	IN	IN
102	N41W	85SW	153	013	012	006	S	NW	IN	IN
102	N41W	85SW	085	009	032	006	S	NW	IN	IN
102	N41W	85SW	174	013	038	006	S	NW	IN	IN
102	N87W	84SW	092	010	051	010	S	EW	IN	IN
102	N87W	84SW	095	009	040	009	S	EW	IN	IN
102	N87W	84SW	057	005	034	009	S	EW	IN	IN
103	N38W	84SW	014	008	007	008	S	NW	IN	IN
103	N38W	84SW	013	008	012	008	S	NW	IN	IN
103	N38W	84SW	023	007	009	007	S	NW	IN	IN
103	N38W	84SW	017	007	011	007	S	NW	IN	IN
103	N38W	84SW	013	008	000	008	S	NW	IN	IN
103	N38W	84SW	010	010	009	010	S	NW	IN	IN
103	N38W	84SW	012	010	008	010	S	NW	IN	IN
103	N38W	84SW	016	010	010	010	S	NW	IN	IN
103	N85E	58NW	022	006	008	006	S	EW	IN	IN
103	N85E	58NW	015	014	006	006	S	EW	IN	IN
103	N85E	58NW	011	007	003	003	S	EW	IN	IN
103	N85E	58NW	005	004	009	006	S	EW	IN	IN
104	N42W	86SW	057	012	012	012	S	NW	IN	IN
104	N42W	86SW	030	012	014	012	S	NW	IN	IN
104	N42W	86SW	039	009	007	009	S	NW	IN	IN
104	N42W	86SW	053	009	010	009	S	NW	IN	IN
104	N42W	86SW	058	009	007	009	S	NW	IN	IN
104	N42W	86SW	115	007	032	007	S	NW	IN	IN
104	N42W	86SW	042	008	004	008	S	NW	IN	IN

STA	STRI	DIP	LNG	DTH	SPA	BED	EX	ST	LO	GR
104	N42W	86SW	021	008	006	008	S	NW	IN	IN
105	N77W	75SW	045	023	015	023	S		IN	IN
105	N77W	75SW	016	023	000	023	S		IN	IN
105	N44W	85SW	023	022	040	022	S	NW	IN	IN
105	N44W	85SW	020	022	040	022	S	NW	IN	IN
105	N44W	85SW	010	014	025	014	S	NW	IN	IN
105	N44W	85SW	023	012	016	012	S	NW	IN	IN
105	N44W	85SW	012	012	012	012	S	NW	IN	IN
105	N44W	85SW	015	022	029	022	S	NW	IN	IN
105	N44W	85SW	016	018	023	018	S	NW	IN	IN
105	N44W	85SW	030	016	009	016	S	NW	IN	IN
105	N44W	85SW	038	023	019	012	S	NW	IN	IN
105	N44W	85SW	035	023	016	012	S	NW	IN	IN
105	N44W	85SW	015	020	000	012	S	NW	IN	IN
106	N51W	82SW	050	025	011	025	S	NW	IN	IN
106	N51W	82SW	101	025	010	025	S	NW	IN	IN
106	N51W	82SW	240	025	019	025	S	NW	IN	IN
106	N51W	82SW	111	015	014	015	S	NW	IN	IN
106	N51W	82SW	099	007	005	007	S	NW	IN	IN
106	N51W	82SW	097	007	004	007	S	NW	IN	IN
106	N51W	82SW	089	007	015	007	S	NW	IN	IN
106	N51W	82SW	078	007	011	007	S	NW	IN	IN
106	N32E	58NW	130	025	000	025	S	NE	IN	IN
106	N32E	58NW	050	015	000	015	S	NE	IN	IN
106	N01E	58NW	026	007	000	007	S		IN	IN
106	N01E	58NW	019	015	000	015	S		IN	IN
107	N82E	70NW	053	004	006	004	S	EW	IN	IN
107	N82E	70NW	058	015	012	015	S	EW	IN	IN
107	N82E	70NW	030	015	020	015	S	EW	IN	IN
107	N46W	90SW	100	019	034	025	S	NW	IN	IN
107	N46W	90SW	101	007	000	025	S	NW	IN	IN
108	N88W	77SW	055	005	035	005	SC	EW	IN	IN
108	N88W	77SW	047	005	027	005	SC	EW	IN	IN
108	N88W	77SW	055	005	036	005	SC	EW	IN	IN
108	N18W	80SW	033	045	006	045	SC		IN	IN
108	N18W	80SW	073	045	030	045	SC		IN	IN
108	N18W	80SW	065	045	000	045	SC		IN	IN
108	N18W	80SW	075	007	006	007	SC		IN	IN
108	N18W	80SW	052	008	000	008	SC		IN	IN
108	N18W	80SW	062	045	037	045	SC		IN	IN
108	N35E	90NW	044	045	038	045	SC	NE	IN	IN
108	N35E	90NW	010	045	000	045	SC	NE	IN	IN
109	N43W	83SW	044	012	012	012	SC	NW	IN	IN
109	N43W	83SW	058	014	021	014	SC	NW	IN	IN
109	N43W	83SW	055	021	014	021	SC	NW	IN	IN
109	N43W	83SW	042	020	012	020	SC	NW	IN	IN
109	N43W	83SW	020	020	012	020	SC	NW	IN	IN

STA	STRI	DIP	LNG	DTH	SPA	BED	EX	ST	LO	GR
109	N43W	83SW	023	009	003	009	SC	NW	IN	IN
109	N43W	83SW	023	009	009	009	SC	NW	IN	IN
109	N43W	83SW	023	009	003	009	SC	NW	IN	IN
109	N43W	83SW	025	009	007	009	SC	NW	IN	IN
109	N43W	83SW	054	039	008	067	SC	NW	IN	IN
110	N48W	90SW	020	053	020	007	S	NW	IN	IN
110	N48W	90SW	021	054	029	007	S	NW	IN	IN
110	N48W	90SW	005	008	009	008	S	NW	IN	IN
110	N48W	90SW	006	008	004	008	S	NW	IN	IN
110	N48W	90SW	005	008	004	008	S	NW	IN	IN
110	N48W	90SW	005	008	010	008	S	NW	IN	IN
110	N48W	90SW	002	008	008	008	S	NW	IN	IN
110	N48W	90SW	002	008	007	008	S	NW	IN	IN
111	N87W	85SW	144	012	025	012	SC	EW	IN	IN
111	N87W	85SW	152	012	019	012	SC	EW	IN	IN
111	N87W	85SW	178	014	024	014	SC	EW	IN	IN
111	N87W	85SW	195	014	016	014	SC	EW	IN	IN
111	N87W	85SW	117	014	013	014	SC	EW	IN	IN
111	N87W	85SW	025	010	019	010	SC	EW	IN	IN
111	N87W	85SW	057	010	020	010	SC	EW	IN	IN
111	N87W	85SW	049	010	020	01	SC	EW	IN	IN
111	N87W	85SW	070	010	010	010	SC	EW	IN	IN
111	N08E	72NW	020	010	030	010	SC		IN	IN
111	N08E	72NW	020	010	047	010	SC		IN	IN
111	N08E	72NW	010	010	027	010	SC		IN	IN
111	N08E	72NW	022	015	047	015	SC		IN	IN
111	N08E	72NW	013	015	025	015	SC		IN	IN
112	N84W	87SW	728	020	085	020	S	EW	IN	IN
112	N84W	87SW	720	020	123	020	S	EW	IN	IN
112	N84W	87SW	320	022	076	022	S	EW	IN	IN
112	N34W	57SW	085	020	046	020	S		IN	IN
112	N34W	57SW	085	020	053	020	S		IN	IN
112	N34W	57SW	085	020	085	020	S		IN	IN
112	N34W	57SW	123	020	088	020	S		IN	IN
112	N34W	57SW	123	020	164	020	S		IN	IN
112	N84W	87SW	007	022	062	022	S	EW	IN	IN
112	N84W	87SW	340	022	106	022	S	EW	IN	IN
112	N84W	87SW	320	022	052	022	S	EW	IN	IN
112	N84W	87SW	750	022	069	022	S	EW	IN	IN
112	N84W	87SW	720	042	083	042	S	EW	IN	IN
112	N84W	87SW	715	020	177	020	S	EW	IN	IN
113	N50W	90SW	082	010	000	003	S	NW	IN	IN
113	N45W	87SW	180	010	000	010	S	NW	IN	IN
113	N50W	90SW	017	008	007	008	S	NW	IN	IN
113	N50W	90SW	019	008	004	008	S	NW	IN	IN
113	N50W	90SW	034	008	007	008	S	NW	IN	IN
113	N50W	90SW	040	008	003	008	S	NW	IN	IN

STA	STRI	DIP	LNG	DTH	SPA	BED	EX	ST	LO	GR
113	N50W	90SW	009	005	008	003	S	NW	IN	IN
113	N50W	90SW	020	005	006	003	S	NW	IN	IN
114	N87W	85SW	130	010	035	010	S	EW	IN	IN
114	N87W	85SW	063	010	016	010	S	EW	IN	IN
114	N87W	85SW	174	010	021	010	S	EW	IN	IN
114	N87W	85SW	040	010	012	010	S	EW	IN	IN
114	N87W	85SW	102	010	031	010	S	EW	IN	IN
115	N83W	89SW	032	012	025	012	S	EW	IN	IN
115	N83W	89SW	015	012	019	012	S	EW	IN	IN
115	N83W	89SW	015	012	020	012	S	EW	IN	IN
115	N83W	89SW	023	012	010	012	S	EW	IN	IN
115	N83W	89SW	019	012	006	012	S	EW	IN	IN
115	N83W	89SW	017	012	013	012	S	EW	IN	IN
116	N44W	88SW	158	061	029	061	SC	NW	NO	OT
116	N44W	88SW	132	030	058	030	SC	NW	NO	OT
116	N44W	88SW	061	030	000	030	SC	NW	NO	OT
116	N38W	85SW	049	031	018	031	SC	NW	NO	OT
116	N38W	85SW	058	005	000	005	SC	NW	NO	OT
116	N38W	85SW	057	026	044	026	SC	NW	NO	OT
116	N38W	85SW	045	026	000	026	SC	NW	NO	OT
117	N55W	87SW	025	040	010	040	R	NW	NO	OT
117	N55W	87SW	024	040	009	040	R	NW	NO	OT
117	N01W	86SW	020	009	000	009	R		NO	OT
117	N01W	86SW	021	016	000	016	R		NO	OT
117	N55W	87SW	015	012	010	012	R	NW	NO	OT
117	N55W	87SW	019	012	009	012	R	NW	NO	OT
117	N55W	87SW	017	012	008	012	R	NW	NO	OT
117	N55W	87SW	023	012	007	012	R	NW	NO	OT
117	N55W	87SW	015	012	010	012	R	NW	NO	OT
117	N55W	87SW	007	014	017	012	R	NW	NO	OT
117	N55W	87SW	015	042	015	025	R	NW	NO	OT
117	N55W	87SW	012	025	019	025	R	NW	NO	OT
118	N41W	77SW	020	006	016	006	SC	NW	NO	OT
118	N41W	77SW	010	006	011	006	SC	NW	NO	OT
118	N41W	77SW	021	006	008	006	SC	NW	NO	OT
118	N41W	77SW	022	006	004	006	SC	NW	NO	OT
118	N41W	77SW	023	006	003	006	SC	NW	NO	OT
118	N41W	77SW	026	006	004	006	SC	NW	NO	OT
118	N41W	77SW	013	006	009	006	SC	NW	NO	OT
118	N41W	77SW	022	006	007	006	SC	NW	NO	OT
118	N41W	77SW	015	006	008	006	SC	NW	NO	OT
118	N41W	77SW	027	006	004	006	SC	NW	NO	OT
119	N80E	76NW	040	014	006	014	SC	EW	NO	OT
119	N80E	76NW	084	014	018	014	SC	EW	NO	OT
119	N80E	76NW	095	014	018	014	SC	EW	NO	OT
119	N80E	76NW	067	014	024	014	SC	EW	NO	OT
119	N80E	76NW	079	014	017	014	SC	EW	NO	OT

STA	STRI	DIP	LNG	DTH	SPA	BED	EX	ST	LO	GR
119	N80E	76NW	069	014	030	014	SC	EW	NO	OT
119	N80E	76NW	077	014	011	014	SC	EW	NO	OT
119	N80E	76NW	075	014	021	014	SC	EW	NO	OT
119	N44E	44NW	079	014	016	014	SC	NE	NO	OT
119	N44E	44NW	091	014	009	014	SC	NE	NO	OT
119	N44E	44NW	138	014	014	014	SC	NE	NO	OT
119	N44E	44NW	179	014	008	014	SC	NE	NO	OT
119	N44E	44NW	202	014	005	014	SC	NE	NO	OT
119	N44E	44NW	203	014	030	014	SC	NE	NO	OT
120	N83E	90NW	083	016	026	016	S	EW	NO	OT
120	N83E	90NW	058	016	028	016	S	EW	NO	OT
120	N83E	90NW	053	016	048	016	S	EW	NO	OT
120	N83E	90NW	046	016	015	016	S	EW	NO	OT
120	N83E	90NW	046	025	028	025	S	EW	NO	OT
120	N83E	90NW	062	025	039	025	S	EW	NO	OT
120	N83E	90NW	032	025	003	025	S	EW	NO	OT
120	N83E	90NW	019	025	022	025	S	EW	NO	OT
120	N83E	90NW	044	025	036	025	S	EW	NO	OT
120	N32W	87SW	054	012	030	012	S		NO	OT
120	N32W	87SW	058	012	013	012	S		NO	OT
120	N32W	87SW	065	012	026	012	S		NO	OT
120	N32W	87SW	057	012	018	012	S		NO	OT
120	N32W	87SW	025	012	027	012	S		NO	OT
120	N32W	87SW	030	012	015	012	S		NO	OT
121	N85W	80SW	005	012	036	012	R	EW	NO	OT
121	N85W	80SW	047	012	025	012	R	EW	NO	OT
121	N85W	80SW	003	014	010	014	R	EW	NO	OT
121	N85W	80SW	010	014	024	014	R	EW	NO	OT
121	N85W	80SW	019	014	035	014	R	EW	NO	OT
121	N35E	80NW	015	019	020	019	R	NE	NO	OT
121	N35E	80NW	013	019	008	019	R	NE	NO	OT
121	N35E	80NW	012	015	012	015	R	NE	NO	OT
123	N80E	90NW	035	022	033	022	S	EW	NO	OT
123	N80E	90NW	050	022	038	022	S	EW	NO	OT
123	N80E	90NW	028	022	058	022	S	EW	NO	OT
123	N03E	90NW	033	022	035	022	S		NO	OT
123	N03E	90NW	038	022	050	022	S		NO	OT
123	N03E	90NW	058	022	028	022	S		NO	OT
123	N47W	90SW	070	012	038	012	S	NW	NO	OT
123	N47W	90SW	034	012	041	012	S	NW	NO	OT
123	N47W	90SW	057	012	008	012	S	NW	NO	OT
123	N27E	90NW	021	012	038	012	S	NE	NO	OT
123	N27E	90NW	016	012	017	012	S	NE	NO	OT
123	N27E	90NW	018	012	027	012	S	NE	NO	OT
124	N42W	87SW	115	014	025	014	S	NW	NO	OT
124	N42W	87SW	106	014	036	014	S	NW	NO	OT
124	N4E	90NW	190	020	025	007	S		NO	OT

STA	STRI	DIP	LNG	DTH	SPA	BED	EX	ST	LO	GR
124	N42W	87SW	075	007	000	007	S	NW	NO	OT
124	N42W	87SW	078	010	015	010	S	NW	NO	OT
124	N42W	87SW	055	010	047	010	S	NW	NO	OT
124	N42W	87SW	038	019	035	019	S	NW	NO	OT
124	N42W	87SW	042	019	031	019	S	NW	NO	OT
124	N42W	87SW	065	019	042	019	S	NW	NO	OT
124	N42W	87SW	069	019	028	019	S	NW	NO	OT
124	N42W	87SW	070	019	025	019	S	NW	NO	OT
124	N42W	87SW	350	035	018	020	S	NW	NO	OT
125	N87E	90NW	196	007	036	007	S	EW	NO	OT
125	N87E	90NW	134	007	024	007	S	EW	NO	OT
125	N87E	90NW	158	007	020	007	S	EW	NO	OT
125	N87E	90NW	152	007	022	007	S	EW	NO	OT
125	N87E	90NW	152	007	021	007	S	EW	NO	OT
125	N87E	90NW	127	073	047	025	S	EW	NO	OT
125	N87E	90NW	097	077	042	025	S	EW	NO	OT
125	N87E	90NW	180	074	032	025	S	EW	NO	OT
126	N87W	85SW	546	270	030	020	SC	EW	NO	OT
126	N87W	85SW	584	240	029	020	SC	EW	NO	OT
126	N87W	85SW	042	020	023	020	SC	EW	NO	OT
126	N35E	85NW	020	035	025	007	SC	NE	NO	OT
126	N35E	85NW	005	007	027	007	SC	NE	NO	OT
126	N35E	85NW	004	007	009	007	SC	NE	NO	OT
126	N35E	85NW	003	007	016	007	SC	NE	NO	OT
126	N35E	85NW	005	007	010	007	SC	NE	NO	OT
127	N85W	90SW	063	007	033	007	S	EW	NO	OT
127	N85W	90SW	030	007	040	007	S	EW	NO	OT
127	N85W	90SW	033	007	020	007	S	EW	NO	OT
127	N85W	90SW	028	007	026	007	S	EW	NO	OT
128	N05E	90NW	074	024	012	024	SC		NO	OT
128	N05E	90NW	055	024	010	024	SC		NO	OT
128	N05E	90NW	012	024	038	024	SC		NO	OT
128	N63W	90SW	035	024	001	024	SC		NO	OT
128	N63W	90SW	014	024	075	024	SC		NO	OT
128	N63W	90SW	023	024	018	024	SC		NO	OT
128	N63W	90SW	022	024	072	024	SC		NO	OT
128	N63W	90SW	015	011	023	007	SC		NO	OT
128	N63W	90SW	013	011	030	007	SC		NO	OT
128	N63W	90SW	021	011	027	007	SC		NO	OT
128	N69W	90SW	106	033	059	033	SC		NO	OT
128	N69W	90SW	074	033	071	033	SC		NO	OT
128	N69W	90SW	150	036	058	033	SC		NO	OT
128	N69W	90SW	135	036	081	033	SC		NO	OT
128	N69W	90SW	150	033	069	033	SC		NO	OT
128	N69W	90SW	083	033	043	033	SC		NO	OT
128	N37W	85SW	030	035	009	019	SC	NW	NO	OT
128	N37W	85SW	027	035	005	019	SC	NW	NO	OT

STA	STRI	DIP	LNG	DTH	SPA	BED	EX	ST	LO	GR
128	N37W	85SW	007	016	026	016	SC	NW	NO	OT
128	N37W	85SW	018	016	019	016	SC	NW	NO	OT
128	N37W	85SW	027	020	030	020	SC	NW	NO	OT
128	N37E	79NW	147	093	120	004	SC	NE	NO	OT
128	N37E	79NW	180	112	072	004	SC	NE	NO	OT
128	N37E	79NW	130	110	000	004	SC	NE	NO	OT
128	N37E	79NW					SC	NE	NO	OT
129	N73W	60SW	020	017	016	017	S		NO	OT
129	N73W	60SW	010	017	016	017	S		NO	OT
129	N73W	60SW	010	017	000	017	S		NO	OT
129	N73W	60SW	010	029	005	029	S		NO	OT
129	N73W	60SW	001	029	013	029	S		NO	OT
129	N73W	60SW	006	029	018	029	S		NO	OT
130	N35W	90SW	075	008	020	008	S	NW	NO	OT
130	N35W	90SW	089	008	007	008	S	NW	NO	OT
130	N35W	90SW	120	008	023	008	S	NW	NO	OT
130	N35W	90SW	099	008	012	008	S	NW	NO	OT
130	N35W	90SW	039	008	016	008	S	NW	NO	OT
130	N35W	90SW	104	008	018	008	S	NW	NO	OT
130	N35W	90SW	109	008	008	008	S	NW	NO	OT
130	N35W	90SW	121	008	023	008	S	NW	NO	OT
130	N35W	90SW	083	008	028	008	S	NW	NO	OT
130	N40E	88NW	182	008	033	008	S	NE	NO	OT
130	N40E	88NW	197	008	034	008	S	NE	NO	OT
130	N40E	88NW	184	008	031	008	S	NE	NO	OT
130	N40E	88NW	098	008	000	008	S	NE	NO	OT
131	N53W	90SW	118	055	032	001	SC	NW	NO	OT
131	N53W	90SW	079	055	000	001	SC	NW	NO	OT
131	N53W	90SW	101	012	024	012	SC	NW	NO	OT
131	N53W	90SW	027	012	032	012	SC	NW	NO	OT
131	N53W	90SW	043	012	016	012	SC	NW	NO	OT
131	N53W	90SW	041	012	044	012	SC	NW	NO	OT
131	N53W	90SW	050	012	029	012	SC	NW	NO	OT
131	N53W	90SW	041	012	025	012	SC	NW	NO	OT
131	N53W	90SW	037	012	036	012	SC	NW	NO	OT
131	N53W	90SW	064	012	034	012	SC	NW	NO	OT
131	N53W	90SW	081	012	032	012	SC	NW	NO	OT
131	N53W	90SW	090	012	028	012	SC	NW	NO	OT
131	N53W	90SW	210	156	021	012	SC	NW	NO	OT
131	N53W	90SW	075	075	054	012	SC	NW	NO	OT
131	N53W	90SW	052	063	019	012	SC	NW	NO	OT
131	N53W	90SW	116	056	090	012	SC	NW	NO	OT
131	N53W	90SW	210	124	019	012	SC	NW	NO	OT
131	N53W	90SW	055	052	018	012	SC	NW	NO	OT
131	N53W	90SW	035	061	008	012	SC	NW	NO	OT
131	N53W	90SW	426	170	000	012	SC	NW	NO	OT
132	N58W	83SW	035	027	073	027	SC		NO	OT

STA	STRI	DIP	LNG	DTH	SPA	BED	EX	ST	LO	GR
132	N58W	83SW	023	027	070	027	SC		NO	OT
132	N58W	83SW	036	027	060	027	SC		NO	OT
132	N58W	83SW	056	027	014	027	SC		NO	OT
132	N58W	83SW	020	027	065	027	SC		NO	OT
132	N58W	83SW	029	027	020	027	SC		NO	OT
132	N58W	83SW	036	027	062	027	SC		NO	OT
132	N58W	83SW	009	040	033	027	SC		NO	OT
132	N58W	83SW	001	027	024	027	SC		NO	OT
132	N58W	83SW	007	027	026	027	SC		NO	OT
132	N58W	83SW	001	027	021	027	SC		NO	OT
132	N58W	83SW	001	027	032	027	SC		NO	OT
132	N40E	79NW	027	016	017	016	SC	NE	NO	OT
132	N40E	79NW	039	016	037	016	SC	NE	NO	OT
132	N40E	79NW	018	016	016	016	SC	NE	NO	OT
132	N40E	79NW	016	017	025	017	SC	NE	NO	OT
132	N40E	79NW	054	017	027	017	SC	NE	NO	OT
133	N84W	82SW	064	012	004	004	S	EW	NO	OT
133	N84W	82SW	030	004	019	004	S	EW	NO	OT
133	N61W	90SW	194	016	040	016	S		NO	OT
133	N61W	90SW	182	016	007	016	S		NO	OT
133	N61W	90SW	085	020	027	016	S		NO	OT
133	N61W	90SW	084	020	029	016	S		NO	OT
133	N61W	90SW	050	016	033	016	S		NO	OT
133	N61W	90SW	174	016	053	016	S		NO	OT
134	N48W	88SW	065	007	014	007	S	NW	NO	OT
134	N48W	88SW	063	007	055	007	S	NW	NO	OT
134	N48W	88SW	031	007	026	007	S	NW	NO	OT
134	N48W	88SW	053	007	026	007	S	NW	NO	OT
134	N48W	88SW	032	007	029	007	S	NW	NO	OT
134	N48W	88SW	043	007	041	007	S	NW	NO	OT
135	N80E	86NW	054	109	019	005	SC	EW	NO	OT
135	N80E	86NW	025	095	002	009	SC	EW	NO	OT
135	N80E	86NW	077	234	013	009	SC	EW	NO	OT
135	N80E	86NW	033	126	012	009	SC	EW	NO	OT
135	N80E	86NW	035	049	011	006	SC	EW	NO	OT
135	N80E	86NW	022	073	010	006	SC	EW	NO	OT
135	N80E	86NW	042	104	021	008	SC	EW	NO	OT
135	N80E	86NW	012	041	015	005	SC	EW	NO	OT
135	N04W	79SW	067	010	005	001	SC		NO	OT
135	N45W	88SW	059	016	036	016	SC	NW	NO	OT
135	N45W	88SW	049	016	005	016	SC	NW	NO	OT
135	N45W	88SW	040	015	031	015	SC	NW	NO	OT
135	N45W	88SW	032	014	076	014	SC	NW	NO	OT
135	N45W	88SW	050	011	006	011	SC	NW	NO	OT
135	N45W	88SW	084	013	048	013	SC	NW	NO	OT
135	N25W	87SW	068	006		001	SC		NO	OT
135	N06E	75NW	155	012	020	012	SC		NO	OT

STA	STRI	DIP	LNG	DTH	SPA	BED	EX	ST	LO	GP
135	N06E	75NW	071	015	023	015	SC		NO	OT
135	N06E	75NW	065	017		017	SC		NO	OT
135	N80E	86NW	110	030	038	001	SC	EW	NO	OT
135	N80E	86NW	104	027	013	001	SC	EW	NO	OT
135	N80E	86NW	057	018	023	001	SC	EW	NO	OT
135	N80E	86NW	074	084	011	001	SC	EW	NO	OT
135	N80E	86NW	213	096	015	001	SC	EW	NO	OT
135	N80E	86NW	179	075	025	001	SC	EW	NO	OT
136	N70W	75NE	146	020	022	009	S		NO	OT
136	N70W	75NE	023	003	017	003	S		NO	OT
136	N70W	75NE	176	013	035	003	S		NO	OT
136	N70W	75NE	123	023	036	007	S		NO	OT
136	N70W	75NE	079	006	029	006	S		NO	OT
136	N70W	75NE	065	009	028	006	S		NO	OT
137	N78W	90SW	103	014	007	014	S		NO	OT
137	N78W	90SW	126	024	021	024	S		NO	OT
137	N78W	90SW	043	032	014	012	S		NO	OT
137	N78W	90SW	103	023	016	013	S		NO	OT
137	N78W	90SW	001	015	016	016	S		NO	OT
137	N78W	90SW	031	043	013	020	S		NO	OT
138	N80E	82NW	087	111	057	111	S	EW	SO	OT
138	N80E	82NW	079	062	012	062	S	EW	SO	OT
138	N80E	82NW	030	025	021	062	S	EW	SO	OT
138	N80E	82NW	128	083		083	S	EW	SO	OT
138	N46W	86NE	052	060		060	S	NW	SO	OT
138	N04W	67SW	056	064	038	112	S		SO	OT
138	N15W	78SW	029	063	020	063	S		SO	OT
138	N15W	78SW	072	053	032	053	S		SO	OT
138	N80E	82NW	020	033	010	001	S	EW	SO	OT
138	N80E	82NW	008	030	003	001	S	EW	SO	OT
138	N80E	82NW	010	025	010	001	S	EW	SO	OT
139	N55W	80SW	294	011	064	001	S	NW	SO	OT
139	N55W	80SW	183	005	032	001	S	NW	SO	OT
139	N55W	80SW	031	002	032	001	S	NW	SO	OT
139	N55W	80SW	037	003	022	001	S	NW	SO	OT
139	N55W	80SW	030	018	029	018	S	NW	SO	OT
139	N55W	80SW	045	008	008	008	S	NW	SO	OT
139	N55W	80SW	063	018	008	018	S	NW	SO	OT
139	N55W	80SW	104	008	043	008	S	NW	SO	OT
139	N55W	80SW	091	015	034	015	S	NW	SO	OT
139	N72E	85SE	062	024	030	024	S		SO	OT
139	N72E	85SE	062	021	019	018	S		SO	OT
139	N72E	85SE	082	023	010	005	S		SO	OT
140	N87E	85NW	540	010	068	001	S	EW	SO	OT
140	N87E	85NW	429	010	012	001	S	EW	SO	OT
140	N87E	85NW	092	012	127	001	S	EW	SO	OT
140	N87E	85NW	364	016	087	001	S	EW	SO	OT

STA	STRI	DIP	LNG	DTH	SPA	BED	EX	ST	LO	GR
140	N87E	85NW	134	001	007	001	S	EW	SO	OT
140	N87E	85NW	182	003	024	001	S	EW	SO	OT
140	N87E	85NW	163	005		001	S	EW	SO	OT
140	N03E	84SE	084	012	028	001	S		SO	OT
140	N03E	84SE	070	007	050	001	S		SO	OT
140	N03E	84SE	136	006	014	001	S		SO	OT
140	N87E	85NW	268	025	003	001	S	EW	SO	OT
140	N87E	85NW	182	019	008	001	S	EW	SO	OT
140	N87E	85NW	204	022	027	001	S	EW	SO	OT
140	N87E	85NW	255	027	095	001	S	EW	SO	OT
140	N87E	85NW	246	025	083	001	S	EW	SO	OT
140	N87E	85NW	217	024	008	001	S	EW	SO	OT
140	N87E	85NW	229	025	010	001	S	EW	SO	OT
140	N87E	85NW	242	025	114	001	S	EW	SO	OT
141	N67W	90SW	180	009	027	009	S		SO	OT
141	N67W	90SW	214	009	030	009	S		SO	OT
141	N67W	90SW	131	009	043	009	S		SO	OT
141	N67W	90SW	108	009	026	009	S		SO	OT
141	N67W	90SW	224	009	015	009	S		SO	OT
141	N67W	90SW	224	009	027	009	S		SO	OT
141	N67W	90SW	182	009	017	009	S		SO	OT
141	N67W	90SW	156	009	016	009	S		SO	OT
141	N67W	90SW	130	009	014	009	S		SO	OT
141	N67W	90SW	100	009	019	009	S		SO	OT
141	N67W	90SW	077	009	009	009	S		SO	OT
141	N67W	90SW	069	009	011	009	S		SO	OT
141	N67W	90SW	065	009	013	009	S		SO	OT
141	N30E	90NW	071	005	048	005	S	NE	SO	OT
141	N30E	90NW	073	005	044	005	S	NE	SO	OT
141	N30E	90NW	302	012	052	012	S	NE	SO	OT
141	N30E	90NW	352	012	030	012	S	NE	SO	OT
141	N30E	90NW	260	012	021	012	S	NE	SO	OT
141	N30E	90NW	134	012	042	012	S	NE	SO	OT
141	N30E	90NW	093	012		012	S	NE	SO	OT
142	N83E	83SE	073	005	012	005	S	EW	SO	OT
142	N83E	83SE	067	005	062	005	S	EW	SO	OT
142	N83E	83SE	107		072		S	EW	SO	OT
142	N83E	83SE	093		015		S	EW	SO	OT
142	N83E	83SE	134		043		S	EW	SO	OT
142	N83E	83SE	087		049		S	EW	SO	OT
142	N83E	83SE	088		084		S	EW	SO	OT
142	N83E	83SE	102		042		S	EW	SO	OT
142	N83E	83SE	080		051		S	EW	SO	OT
142	N83E	83SE	131		031		S	EW	SO	OT
142	N83E	83SE	112		039		S	EW	SO	OT
142	N83E	83SE	111		039		S	EW	SO	OT
142	N83E	83SE	103		058		S	EW	SO	OT

STA	STRI	DIP	LNG	DTH	SPA	BED	EX	ST	LO	GR
142	N83E	83SE	094		060		S	EW	SO	OT
142	N83E	83SE	110		045		S	EW	SO	OT
142	N83E	83SE	125		039		S	EW	SO	OT
142	N13W	73SW	063		010		S		SO	OT
142	N13W	73SW	029		013		S		SO	OT
142	N13W	73SW	109		013		S		SO	OT
142	N13W	73SW	141	012	026	012	S		SO	OT
142	N13W	73SW	095		013		S		SO	OT
142	N13W	73SW	064	007	003	007	S		SO	OT
142	N12E	70NW	072	014	019	014	S		SO	OT
142	N12E	70NW	284	011	014	011	S		SO	OT
142	N12E	70NW	141	012	031	012	S		SO	OT
142	N75W	84NE	013	007	031	007	S		SO	OT
142	N75W	84NE	010	010	072	010	S		SO	OT
142	N75W	84NE	030	009	036	009	S		SO	OT
142	N75W	84NE	017	009	029	009	S		SO	OT
142	N75W	84NE	011	009	036	009	S		SO	OT
143	N45W	64SW	030	007	012	007	S	NW	SO	OT
143	N45W	64SW	027	007	011	007	S	NW	SO	OT
143	N45W	64SW	041	007	016	007	S	NW	SO	OT
143	N45W	64SW	029	007	006	007	S	NW	SO	OT
143	N45W	64SW	057	011	037	011	S	NW	SO	OT
143	N45W	64SW	023	011	013	011	S	NW	SO	OT
143	N45W	64SW	025	011	027	011	S	NW	SO	OT
143	N45W	64SW	056	020	042	020	S	NW	SO	OT
143	N68E	75NW	042	007	028	007	S		SO	OT
143	N68E	75NW	018	007	029	007	S		SO	OT
143	N68E	75NW	052	007	023	007	S		SO	OT
143	N68E	75NW	032	020	011	020	S		SO	OT
143	N65W	84SW	034	011	026	011	S		SO	OT
143	N65W	84SW	016	011	012	011	S		SO	OT
143	N65W	84SW	042	007	017	007	S		SO	OT
143	N65W	84SW	031	005	034	005	S		SO	OT
143	N65W	84SW	057	007	025	007	S		SO	OT
143	N65W	84SW	025	017	023	017	S		SO	OT
143	N65W	84SW	038	017	010	017	S		SO	OT
143	N65W	84SW	036	015	012	015	S		SO	OT
144	N28E	90NW	120		018		S	NE	BR	OT
144	N28E	90NW	134		019		S	NE	BR	OT
144	N28E	90NW	172		024		S	NE	BR	OT
144	N28E	90NW	234		023		S	NE	BR	OT
144	N28E	90NW	186		023		S	NE	BR	OT
144	N28E	90NW	100		016		S	NE	BR	OT
144	N28E	90NW	089		014		S	NE	BR	OT
144	N28E	90NW	115		012		S	NE	BR	OT
144	N28E	90NW	140		013		S	NE	BR	OT
144	N46W	90SW	045		082		S	NW	BR	OT

STA	STRI	DIP	LNG	DTH	SPA	BED	EX	ST	LO	GP
144	N46W	90SW	130		017		S	NW	BR	OT
144	N46W	90SW	090		017		S	NW	BR	OT
144	N46W	90SW	090		024		S	NW	BR	OT
145	N25E	65SE					S	NE	NO	OT
145	N72W	87NE					S		NO	OT
145	N10E	70SE					S		NO	OT
145	N80E	90NW					S	EW	NO	OT
145	N25E	65SE			070		S	NE	NO	OT
145	N25E	65SE			092		S	NE	NO	OT
145	N25E	65SE			060		S	NE	NO	OT
145	N25E	65SE			035		S	NE	NO	OT
145	N25E	65SE			024		S	NE	NO	OT
145	N25E	65SE			031		S	NE	NO	OT
145	N45W	88SW	058	022	128	022	S	NW	NO	OT
145	N45W	88SW	088	022	103	022	S	NW	NO	OT
145	N45W	88SW	020	020	032	020	S	NW	NO	OT
145	N45W	88SW	030	020	090	020	S	NW	NO	OT
145	N45W	88SW	012	020	071	020	S	NW	NO	OT
146	N70W	86SW	070	048	027	012	S		NO	OT
146	N70W	86SW	016	010	042	010	S		NO	OT
146	N70W	86SW	089	010	010	010	S		NO	OT
146	N70W	86SW	083	010		010	S		NO	OT
146	N70W	86SW	045	020	015	005	S		NO	OT
146	N70W	86SW	040	016	067	003	S		NO	OT
146	N70W	86SW	059	014	036	003	S		NO	OT
146	N70W	86SW	065	012	038	003	S		NO	OT
146	N84W	80NE	052	020	068	020	S	EW	NO	OT
146	N84W	80NE	076	041	049	020	S	EW	NO	OT
146	N84W	80NE	063	015	019	015	S	EW	NO	OT
146	N70W	86SW	068	014	035	014	S		NO	OT
146	N70W	86SW	057	014	074	014	S		NO	OT
146	N84W	80NE	080	022	028	022	S	EW	NO	OT
146	N84W	86NE	070	012	014	012	S	EW	NO	OT
146	N84W	80NE	061	012	019	012	S	EW	NO	OT
146	N84W	86NE	073	006	021	006	S	EW	NO	OT
146	N84W	86NE	062	012	048	012	S	EW	NO	OT
146	N70W	86SW	098	022	089	022	S		NO	OT
147	N85W	78NE	070	030	037	030	S	EW	NO	OT
147	N85W	78NE	061	030	043	030	S	EW	NO	OT
147	N85W	78NE	052	030	038	030	S	EW	NO	OT
147	N85W	78NE	032	030	033	030	S	EW	NO	OT
147	N85W	78NE	028	030	031	030	S	EW	NO	OT
147	N85W	78NE	044	030	028	030	S	EW	NO	OT
147	N85W	78NE	056	030	032	030	S	EW	NO	OT
147	N85W	78NE	083	030	043	030	S	EW	NO	OT
147	N85W	78NE	079	030	055	030	S	EW	NO	OT
147	N85W	78NE	075	030	027	030	S	EW	NO	OT

STA	STRI	DIP_	LNG	DTH	SPA	BED	EX	ST	LO	GR
147	N85W	78NE	082	030	027	030	S	EW	NO	OT
147	N65W	90SW	013	022	013	022	S		NO	OT
147	N65W	90SW	032	022	013	022	S		NO	OT
148	N80E	90NW	039	025	027	007	S	EW	NO	OT
148	N80E	90NW	079	045	021	009	S	EW	NO	OT
148	N80E	90NW	029	028	016	009	S	EW	NO	OT
148	N80E	90NW	025	015	007	009	S	EW	NO	OT
148	N80E	90NW	039	012	020	009	S	EW	NO	OT
148	N80E	90NW	007	007	020	007	S	EW	NO	OT
148	N80E	90NW	031	007	019	007	S	EW	NO	OT
148	N43W	87SW	024	006	006	006	S	NW	NO	OT
148	N43W	87SW	021	006	009	006	S	NW	NO	OT
148	N43W	87SW	030	006	015	006	S	NW	NO	OT
148	N43W	87SW	069	022	012	022	S	NW	NO	OT
148	N43W	87SW	061	012	013	012	S	NW	NO	OT
148	N43W	87SW	050	012	012	012	S	NW	NO	OT
149	N44W	85NE	025	012	009	012	S	NW	NO	OT
149	N44W	85NE	022	012	018	012	S	NW	NO	OT
149	N44W	85NE	016	012	014	012	S	NW	NO	OT
149	N44W	85NE	032	012	013	012	S	NW	NO	OT
149	N44W	85NE	033	012	011	012	S	NW	NO	OT
149	N44W	85NE	023	012	015	012	S	NW	NO	OT
149	N44W	85NE	029	012	016	012	S	NW	NO	OT
149	N44W	85NE	035	012	007	012	S	NW	NO	OT
149	N44W	85NE	028	012	013	012	S	NW	NO	OT
149	N44W	85NE	025	012		012	S	NW	NO	OT
149	N60W	41SW	027	020	016	007	S		NO	OT
149	N60W	41SW	024	020	010	020	S		NO	OT
149	N60W	41SW	018	007	017	007	S		NO	OT
149	N60W	41SW	035	027	036	007	S		NO	OT
149	N60W	41SW	016	037	017	012	S		NO	OT
149	N60W	41SW	021	040	032	012	S		NO	OT

APPENDIX C

STATION LOCATIONS AT THE ALLEGHENY FRONT
(in UTM Grid Coordinates)

Key to Abbreviations:

STA - station number

STA	LATITUDE	LONGITUDE
001	4317.020	646.880
002	4317.090	647.220
003	4316.590	647.850
004	4316.560	648.050
005	4324.310	648.460
006	4324.360	648.690
007	4324.870	649.130
008	4318.570	646.500
009	4318.720	647.550
010	4318.660	647.870
011	4318.510	648.280
012	4313.750	645.430
013	4313.470	646.070
014	4313.320	646.300
015	4313.120	646.420
016	4314.670	645.500
017	4314.740	645.640
018	4314.610	646.050
019	4314.460	646.420
020	4314.280	646.640
021	4309.770	644.080
022	4309.550	643.560
023	4309.130	644.310
024	4310.800	646.980
025	4307.000	642.710
026	4313.210	647.910
027	4313.760	648.230
028	4318.500	650.010
029	4314.090	645.800

APPENDIX D

ALLEGHENY FRONT DATA

Key to Abbreviations:

STA - station number

STRI- joint strike

DIP - joint dip

SPA - joint spacing (in cm)

LTH - unit: MPO = Pocono, DCK = Catskill, DCH = Chemung, DBS = black shales

LO - location with respect to the Petersburg lineament: IN = within, NO = north, SO = south

GR - group with respect to the Petersburg lineament: IN = within, OT = outside

STA	STRI	DIP	SPA	LTH	LO	GR
001	N70W	86SW	170	MPO	IN	IN
001	N65W	90SW	165	MPO	IN	IN
001	N71W	82SW	044	MPO	IN	IN
001	N70W	86SW	105	MPO	IN	IN
001	N69E	90SE	112	MPO	IN	IN
001	N75E	87SE	023	MPO	IN	IN
001	N75E	83SE	053	MPO	IN	IN
001	N69E	90SE	350	MPO	IN	IN
001	N12E	67SE		MPO	IN	IN
001	N30E	72SE	019	MPO	IN	IN
001	N25E	71SE	049	MPO	IN	IN
002	N78E	57SE	103	DCK	IN	IN
002	N68E	67SE	093	DCK	IN	IN
002	N78E	57SE	105	DCK	IN	IN
002	N68E	67SE	320	DCK	IN	IN
003	N63W	88NE	050	DCK	IN	IN
003	N69W	90SW	085	DCK	IN	IN
003	N73W	85SW	130	DCK	IN	IN
003	N63W	88NE	038	DCK	IN	IN
003	N69W	90SW	058	DCK	IN	IN
003	N73W	85SW	056	DCK	IN	IN
003	N88W	78SW	200	DCK	IN	IN
003	N86W	64SW	075	DCK	IN	IN
003	N88W	78SW	090	DCK	IN	IN
003	N27E	37SE	092	DCK	IN	IN
003	N37E	30SE	097	DCK	IN	IN
003	N28E	33SE	060	DCK	IN	IN
003	N27E	37SE	057	DCK	IN	IN
003	N37E	30SE	029	DCK	IN	IN
003	N28E	33SE	021	DCK	IN	IN
003	N27E	37SE	034	DCK	IN	IN
003	N37E	30SE	046	DCK	IN	IN
003	N28E	33SE	031	DCK	IN	IN
003	N27E	37SE	061	DCK	IN	IN
003	N37E	30SE	030	DCK	IN	IN
003	N28E	33SE	070	DCK	IN	IN
003	N27E	37SE	085	DCK	IN	IN
003	N37E	30SE	065	DCK	IN	IN
003	N28E	33SE	031	DCK	IN	IN
003	N27E	37SE	026	DCK	IN	IN
003	N28E	33SE	032	DCK	IN	IN
003	N27E	37SE	095	DCK	IN	IN
003	N37E	30SE	094	DCK	IN	IN
004	N86W	43SW	240	DCH	IN	IN
004	N86W	43SW	190	DCH	IN	IN
004	N86W	43SW	130	DCH	IN	IN
004	N86W	43SW	055	DCH	IN	IN

STA	STRI	DIP	SPA	LTH	LO	GR
004	N86W	43SW	030	DCH	IN	IN
004	N86W	43SW	238	DCH	IN	IN
004	N86W	43SW	157	DCH	IN	IN
004	N86W	43SW	100	DCH	IN	IN
004	N86W	43SW	050	DCH	IN	IN
004	N11W	39NE	028	DCH	IN	IN
004	N11W	39NE	033	DCH	IN	IN
004	N11W	39NE	035	DCH	IN	IN
004	N11W	39NE	056	DCH	IN	IN
004	N70W	69SW	024	DCH	IN	IN
004	N70W	71SW	026	DCH	IN	IN
004	N70W	69SW	015	DCH	IN	IN
004	N70W	71SW	083	DCH	IN	IN
004	N70W	69SW	055	DCH	IN	IN
004	N70W	71SW	067	DCH	IN	IN
004	N70W	69SW	044	DCH	IN	IN
004	N70W	71SW	036	DCH	IN	IN
004	N70W	69SW	045	DCH	IN	IN
004	N70W	71SW	047	DCH	IN	IN
004	N70W	69SW	075	DCH	IN	IN
004	N70W	71SW	066	DCH	IN	IN
005	N15E	87SW	132	MPO	NO	OT
005	N14E	83SE	370	MPO	NO	OT
005	N19E	76SE	022	MPO	NO	OT
005	N15E	87SE	230	MPO	NO	OT
005	N14E	83SE	050	MPO	NO	OT
005	N52W	89SW	066	MPO	NO	OT
005	N58W	89NE	045	MPO	NO	OT
005	N51W	90SW	042	MPO	NO	OT
005	N52W	89SW	113	MPO	NO	OT
005	N58W	89NE	310	MPO	NO	OT
005	N51W	90SW	195	MPO	NO	OT
005	N52W	89SW	110	MPO	NO	OT
005	N58W	89NE	054	MPO	NO	OT
005	N51W	90SW	020	MPO	NO	OT
005	N52W	89SW	092	MPO	NO	OT
005	N58W	89NE	078	MPO	NO	OT
005	N51W	90SW	030	MPO	NO	OT
005	N52W	89SW	115	MPO	NO	OT
005	N85W	84SW	048	MPO	NO	OT
005	N85W	84SW	035	MPO	NO	OT
005	N85W	84SW	030	MPO	NO	OT
005	N85W	84SW	070	MPO	NO	OT
005	N85W	84SW	050	MPO	NO	OT
005	N85W	84SW	085	MPO	NO	OT
006	N12E	58SE	086	DCK	NO	OT
006	N12E	61SE	300	DCK	NO	OT

STA	STRI	DIP	SPA	LTH	LO	GR
006	N19E	54SE	065	DCK	NO	OT
006	N12E	58AQ	380	DCK	NO	OT
006	N44W	90NE	250	DCK	NO	OT
006	N43W	90NE	084	DCK	NO	OT
006	N48W	88NE	068	DCK	NO	OT
006	N40W	90NE	089	DCK	NO	OT
006	N44W	90NE	086	DCK	NO	OT
006	N43W	90NE	178	DCK	NO	OT
006	N48W	88NE	361	DCK	NO	OT
006	N85E	75NW	030	DCK	NO	OT
006	N85W	80NE	028	DCK	NO	OT
006	N85E	75NW	250	DCK	NO	OT
006	N85W	80NE	125	DCK	NO	OT
006	N85E	75NW	222	DCK	NO	OT
006	N85W	80NE	180	DCK	NO	OT
006	N85E	75NW	030	DCK	NO	OT
006	N85W	80NE	221	DCK	NO	OT
007	N84E	87SE	120	DCK	NO	OT
007	N85E	82SE	043	DCK	NO	OT
007	N84E	87SE	148	DCK	NO	OT
007	N85E	82SE	050	DCK	NO	OT
007	N84E	87SE	100	DCK	NO	OT
007	N85E	82SE	150	DCK	NO	OT
007	N84E	82SE	110	DCK	NO	OT
007	N35W	80NE	134	DCK	NO	OT
007	N40W	85NE	110	DCK	NO	OT
007	N35W	80NE	115	DCK	NO	OT
007	N40W	85NE	180	DCK	NO	OT
007	N35W	80NE	114	DCK	NO	OT
007	N40W	85NE	128	DCK	NO	OT
007	N12E	50SE	092	DCK	NO	OT
007	N13E	50SE	150	DCK	NO	OT
007	N09E	60SE	180	DCK	NO	OT
007	N12E	50SE	212	DCK	NO	OT
007	N13E	50SE	250	DCK	NO	OT
008	N52W	90NE	053	MPO	NO	OT
008	N50W	90NE	080	MPO	NO	OT
008	N52W	90NE	075	MPO	NO	OT
008	N50W	90NE	200	MPO	NO	OT
008	N10E	70SE	105	MPO	NO	OT
008	N10E	70SE	180	MPO	NO	OT
008	N10E	70SE	085	MPO	NO	OT
008	N10E	70SE	075	MPO	NO	OT
008	N10E	70SE	040	MPO	NO	OT
008	N83E	90NW	150	MPO	NO	OT
008	N84E	90NW	055	MPO	NO	OT
008	N83E	90NW	064	MPO	NO	OT

STA	STRI	DIP	SPA	LTH	LO	GR
008	N84E	90NW	175	MPO	NO	OT
008	N83E	89NW	150	MPO	NO	OT
008	N35W	90NE	060	MPO	NO	OT
008	N41W	90NE	045	MPO	NO	OT
008	N36W	90NE	070	MPO	NO	OT
008	N41W	90NE	035	MPO	NO	OT
008	N36W	90NE	060	MPO	NO	OT
009	N82W	88NE		DCK	NO	OT
009	N88E	88NW	050	DCK	NO	OT
009	N88E	88NW	600	DCK	NO	OT
009	N88E	88NW	350	DCK	NO	OT
009	N88E	88NW	160	DCK	NO	OT
009	N88E	88NW	150	DCK	NO	OT
009	N05W	88SW	180	DCK	NO	OT
009	N00W	88SW	250	DCK	NO	OT
009	N05W	88SW	180	DCK	NO	OT
009	N00W	88SW	065	DCK	NO	OT
009	N05W	88SW	200	DCK	NO	OT
009	N00W	88SW	025	DCK	NO	OT
009	N05W	88SW	072	DCK	NO	OT
009	N00W	88SW	098	DCK	NO	OT
010	N40E	79SE	073	DCK	NO	OT
010	N32E	80SE	200	DCK	NO	OT
010	N40E	79SE	150	DCK	NO	OT
010	N28E	72NW	180	DCK	NO	OT
010	N25E	56SE	073	DCK	NO	OT
010	N25E	67SE	030	DCK	NO	OT
010	N28E	72NW	078	DCK	NO	OT
010	N25E	56SE	055	DCK	NO	OT
010	N25E	67SE	054	DCK	NO	OT
010	N28E	72NW	044	DCK	NO	OT
010	N78W	80NE	027	DCK	NO	OT
010	N83W	88SW	100	DCK	NO	OT
010	N78W	77NE	079	DCK	NO	OT
010	N80W	88NE	200	DCK	NO	OT
010	N78W	80NE	230	DCK	NO	OT
010	N83W	88SW	100	DCK	NO	OT
010	N78W	77NE	054	DCK	NO	OT
010	N80W	88NE	288	DCK	NO	OT
010	N78W	80NE	070	DCK	NO	OT
010	N50W	72NE	200	DCK	NO	OT
010	N50W	72NE	260	DCK	NO	OT
011	N32E	53SE	100	DCH	NO	OT
011	N32E	53SE	200	DCH	NO	OT
011	N32E	53SE	180	DCH	NO	OT
011	N32E	53SE	060	DCH	NO	OT
011	N32E	53SE	150	DCH	NO	OT

STA	STRI	DIP	SPA	LTH	LO	GR
011	N83W	90SW	050	DCH	NO	OT
011	N77W	90SW	070	DCH	NO	OT
011	N83W	90SW	050	DCH	NO	OT
011	N77W	90SW	095	DCH	NO	OT
011	N83W	90SW	040	DCH	NO	OT
011	N77W	90SW	110	DCH	NO	OT
011	N83W	90SW	150	DCH	NO	OT
011	N77W	90SW	110	DCH	NO	OT
011	N83W	90SW	080	DCH	NO	OT
011	N16E	70SE	170	DCH	NO	OT
011	N16E	70SE	120	DCH	NO	OT
012	N42W	89SW	062	MPO	IN	IN
012	N45W	88SW	055	MPO	IN	IN
012	N39W	90SW	088	MPO	IN	IN
012	N50W	85SW	043	MPO	IN	IN
012	N42W	89SW	110	MPO	IN	IN
012	N45W	88SW	085	MPO	IN	IN
012	N39W	90SW	120	MPO	IN	IN
012	N50W	85SW	075	MPO	IN	IN
012	N42W	89SW	130	MPO	IN	IN
012	N45W	88SW	068	MPO	IN	IN
012	N39W	90SW	049	MPO	IN	IN
012	N28E	90SE	080	MPO	IN	IN
012	N28E	80SE	060	MPO	IN	IN
012	N24E	85SE	110	MPO	IN	IN
012	N28E	90SE	074	MPO	IN	IN
012	N28E	80SE	096	MPO	IN	IN
012	N24E	85SE	060	MPO	IN	IN
012	N10E	75SE	042	MPO	IN	IN
012	N15E	90SE	055	MPO	IN	IN
012	N10E	75SE	040	MPO	IN	IN
012	N15E	90SE	027	MPO	IN	IN
012	N10E	75SE	080	MPO	IN	IN
012	N15E	90SE	060	MPO	IN	IN
013	N75W	86NE	058	DCK	IN	IN
013	N75W	86NE	095	DCK	IN	IN
013	N75W	86NE	105	DCK	IN	IN
013	N74W	86NE	047	DCK	IN	IN
013	N30E	53SE	057	DCK	IN	IN
013	N30E	53SE	052	DCK	IN	IN
013	N30E	53SE	045	DCK	IN	IN
013	N30E	53SE	049	DCK	IN	IN
013	N30E	53SE	059	DCK	IN	IN
013	N30E	53SE	083	DCK	IN	IN
013	N30E	53SE	048	DCK	IN	IN
013	N30E	53SE	045	DCK	IN	IN
014	N65W	86SW	150	DCK	IN	IN

STA	STRI	DIP	SPA	LTH	LO	GR
014	N65W	90SW	240	DCK	IN	IN
014	N65W	86SW	090	DCK	IN	IN
014	N64W	90SW	100	DCK	IN	IN
014	N65W	86SW	030	DCK	IN	IN
014	N65W	86SW	030	DCK	IN	IN
014	N65W	90SW	080	DCK	IN	IN
014	N65W	86SW	120	DCK	IN	IN
014	N08E	78NW	040	DCK	IN	IN
014	N08E	78NW	040	DCK	IN	IN
014	N08E	78NW	100	DCK	IN	IN
014	N08E	78NW	100	DCK	IN	IN
014	N08E	78NW	090	DCK	IN	IN
014	N35E	55SE	039	DCK	IN	IN
014	N35E	55SW	045	DCK	IN	IN
014	N35E	55SW	030	DCK	IN	IN
014	N35E	55SW	050	DCK	IN	IN
014	N35E	55SW	040	DCK	IN	IN
014	N35E	55SW	050	DCK	IN	IN
014	N35E	55SW	063	DCK	IN	IN
014	N35E	55SW	049	DCK	IN	IN
014	N88W	60SW	039	DCK	IN	IN
014	N88W	60SW	022	DCK	IN	IN
014	N88W	60SW	030	DCK	IN	IN
015	N85W	88SW	026	DCH	IN	IN
015	N85W	88SW	034	DCH	IN	IN
015	N85W	88SW	026	DCH	IN	IN
015	N85W	88SW	033	DCH	IN	IN
015	N85W	88SW	080	DCH	IN	IN
015	N02E	27SE	020	DCH	IN	IN
015	N02E	27SE	030	DCH	IN	IN
015	N02E	27SE	038	DCH	IN	IN
015	N02E	27SE	055	DCH	IN	IN
015	N02E	27SE	038	DCH	IN	IN
015	N02E	27SE	024	DCH	IN	IN
015	N02E	27SE	025	DCH	IN	IN
015	N02E	27SE	050	DCH	IN	IN
016	N18E	78SE	081	DCK	IN	IN
016	N20E	70SE	008	DCK	IN	IN
016	N18E	78SE	016	DCK	IN	IN
016	N20E	70SE	040	DCK	IN	IN
016	N18E	78SE	045	DCK	IN	IN
016	N20E	70SE	040	DCK	IN	IN
016	N18E	78SE	035	DCK	IN	IN
016	N20E	70SE	080	DCK	IN	IN
016	N18E	70SE	045	DCK	IN	IN
016	N20E	70SE	110	DCK	IN	IN
016	N26W	74NE	068	DCK	IN	IN

STA	STRI	DIP	SPA	LTH	LO	GR
016	N26W	74NE	074	DCK	IN	IN
016	N26W	74NE	050	DCK	IN	IN
016	N26W	74NE	022	DCK	IN	IN
016	N85W	90SW	025	DCK	IN	IN
016	N85W	90SW	015	DCK	IN	IN
016	N85W	90SW	043	DCK	IN	IN
016	N85E	75SE	030	DCK	IN	IN
016	N85W	90SW	027	DCK	IN	IN
016	N85W	90SW	016	DCK	IN	IN
016	N85W	90SW	012	DCK	IN	IN
016	N85W	90SW	023	DCK	IN	IN
016	N85W	90SW	026	DCK	IN	IN
016	N85W	90SW	038	DCK	IN	IN
016	N85W	90SW	032	DCK	IN	IN
016	N85W	90SW	052	DCK	IN	IN
016	N85W	90SW	033	DCK	IN	IN
016	N85W	90SW	041	DCK	IN	IN
016	N85W	90SW	075	DCK	IN	IN
016	N85W	90SW	053	DCK	IN	IN
016	N85W	90SW	035	DCK	IN	IN
016	N85W	90SW	025	DCK	IN	IN
016	N85W	90SW	030	DCK	IN	IN
016	N85W	90SW	120	DCK	IN	IN
017	N82E	90SE		DCK	IN	IN
017	N10E	75SE	070	DCK	IN	IN
017	N10E	75SE	036	DCK	IN	IN
017	N10E	75SE	073	DCK	IN	IN
017	N10E	75SE	045	DCK	IN	IN
017	N10E	75SE	073	DCK	IN	IN
017	N45W	90SW	090	DCK	IN	IN
017	N45W	90SW	110	DCK	IN	IN
017	N45W	90SW	080	DCK	IN	IN
018	N80W	86NE	020	DCK	IN	IN
018	N80W	86NE	053	DCK	IN	IN
018	N80W	86NE	040	DCK	IN	IN
018	N80W	86NE	045	DCK	IN	IN
018	N80W	86NE	042	DCK	IN	IN
018	N80W	86NE	023	DCK	IN	IN
018	N80W	86NE	080	DCK	IN	IN
018	N50E	62SE	076	DCK	IN	IN
018	N50E	62SE	023	DCK	IN	IN
018	N50E	62SE	029	DCK	IN	IN
018	N50E	62SE	040	DCK	IN	IN
018	N50E	62SE	078	DCK	IN	IN
018	N50E	62SE	058	DCK	IN	IN
018	N50E	62SE	060	DCK	IN	IN
018	N50E	62SE	100	DCK	IN	IN

STA	STRI	DIP	SPA	LTH	LO	GR
019	N85W	83SW	060	DCK	IN	IN
019	N85W	83SW	082	DCK	IN	IN
019	N85W	83SW	060	DCK	IN	IN
019	N85W	83SW	040	DCK	IN	IN
019	N85W	83SW	023	DCK	IN	IN
019	N85W	83SW	040	DCK	IN	IN
019	N85W	83SW	150	DCK	IN	IN
019	N85W	83SW	150	DCK	IN	IN
019	N85W	83SW	040	DCK	IN	IN
019	N85W	83SW	018	DCK	IN	IN
019	N85W	83SW	028	DCK	IN	IN
019	N85W	83SW	032	DCK	IN	IN
020	N80W	90SW	070	DCH	IN	IN
020	N80W	90SW	050	DCH	IN	IN
020	N80W	90SW	040	DCH	IN	IN
020	N80W	90SW	020	DCH	IN	IN
020	N80W	90SW	050	DCH	IN	IN
020	N80W	90SW	040	DCH	IN	IN
020	N80W	90SW	080	DCH	IN	IN
020	N80W	90SW	020	DCH	IN	IN
020	N80W	90SW	040	DCH	IN	IN
020	N10E	50SE	020	DCH	IN	IN
020	N10E	50SE	020	DCH	IN	IN
020	N10E	50SE	020	DCH	IN	IN
020	N10E	50SE	040	DCH	IN	IN
021	N15E	66SE	110	MPO	SO	OT
021	N15E	66SE	175	MPO	SO	OT
021	N15E	66SE	080	MPO	SO	OT
021	N50W	80NE	150	MPO	SO	OT
021	N50W	80NE	120	MPO	SO	OT
021	N50W	80NE	120	MPO	SO	OT
021	N50W	80NE	070	MPO	SO	OT
021	N50W	80NE	050	MPO	SO	OT
021	N50W	80NE	070	MPO	SO	OT
021	N50W	80NE	200	MPO	SO	OT
021	N50W	80NE	175	MPO	SO	OT
021	N50W	80NE	075	MPO	SO	OT
021	N50W	80NE	250	MPO	SO	OT
022	N40E	70SE	300	DCK	SO	OT
022	N40E	70SE	175	DCK	SO	OT
022	N45W	88NE	070	DCK	SO	OT
022	N45W	88NE	300	DCK	SO	OT
022	N45W	88NE	250	DCK	SO	OT
022	N45W	88NE	150	DCK	SO	OT
023	N50E	21NW	070	DCK	SO	OT
023	N50E	21NW	075	DCK	SO	OT
023	N50E	21NW	090	DCK	SO	OT

STA	STRI	DIP	SPA	LTH	LO	GR
023	N50E	21NW	200	DCK	SO	OT
023	N50E	21NW	040	DCK	SO	OT
023	N50E	21NW	060	DCK	SO	OT
023	N51W	90SW	160	DCK	SO	OT
023	N51W	90SW	060	DCK	SO	OT
023	N51W	90SW	075	DCK	SO	OT
023	N51W	90SW	100	DCK	SO	OT
023	N51W	90SW	070	DCK	SO	OT
023	N51W	90SW	080	DCK	SO	OT
023	N51W	90SW	030	DCK	SO	OT
023	N51W	90SW	150	DCK	SO	OT
023	N51W	90SW	300	DCK	SO	OT
023	N34E	53NW		DCK	SO	OT
024	N81W	89NE	057	DCH	SO	OT
024	N81W	89NE	060	DCH	SO	OT
024	N81W	89NE	054	DCH	SO	OT
024	N81W	89NE	035	DCH	SO	OT
024	N81W	89NE	067	DCH	SO	OT
024	N81W	89NE	115	DCH	SO	OT
024	N81W	89NE	100	DCH	SO	OT
024	N81W	89NE	037	DCH	SO	OT
024	N81W	89NE	150	DCH	SO	OT
024	N81W	89NE	115	DCH	SO	OT
024	N81W	89NE	075	DCH	SO	OT
024	N81W	89NE	105	DCH	SO	OT
024	N16E	76NW	160	DCH	SO	OT
024	N16E	76NW	075	DCH	SO	OT
024	N16E	76NW	169	DCH	SO	OT
024	N16E	76NW	065	DCH	SO	OT
024	N16E	76NW	175	DCH	SO	OT
024	N16E	76NW	160	DCH	SO	OT
024	N16E	76NW	120	DCH	SO	OT
024	N16E	76NW	070	DCH	SO	OT
024	N16E	76NW	070	DCH	SO	OT
024	N16E	76NW	100	DCH	SO	OT
025	N50W	54SW	018	DBS	SO	OT
025	N50W	54SW	018	DBS	SO	OT
025	N50W	54SW	016	DBS	SO	OT
025	N50W	54SW	019	DBS	SO	OT
025	N50W	54SW	017	DBS	SO	OT
025	N50W	54SW	017	DBS	SO	OT
025	N50W	54SW	022	DBS	SO	OT
025	N50W	54SW	017	DBS	SO	OT
025	N50W	54SW	015	DBS	SO	OT
025	N50W	54SW	014	DBS	SO	OT
025	N50W	54SW	013	DBS	SO	OT
025	N50W	54SW	009	DBS	SO	OT

STA	STRI	DIP	SPA	LTH	LO	GR
025	N85W	30NE	030	DBS	SO	OT
025	N85W	30NE	017	DBS	SO	OT
025	N85W	30NE	025	DBS	SO	OT
025	N85W	30NE	040	DBS	SO	OT
025	N85W	30NE	030	DBS	SO	OT
025	N85W	30NE	040	DBS	SO	OT
025	N85W	30NE	020	DBS	SO	OT
025	N85W	30NE	052	DBS	SO	OT
025	N85W	30NE	016	DBS	SO	OT
025	N85W	30NE	050	DBS	SO	OT
026	N83E	71NW	045	DBS	IN	IN
026	N83E	71NW	007	DBS	IN	IN
026	N83E	71NW	007	DBS	IN	IN
026	N83E	71NW	013	DBS	IN	IN
026	N83E	71NW	015	DBS	IN	IN
026	N83E	71NW	008	DBS	IN	IN
026	N83E	71NW	009	DBS	IN	IN
026	N83E	71NW	015	DBS	IN	IN
026	N83E	71NW	010	DBS	IN	IN
026	N83E	71NW	028	DBS	IN	IN
026	N83E	71NW	013	DBS	IN	IN
026	N83E	71NW	015	DBS	IN	IN
026	N83E	71NW	018	DBS	IN	IN
026	N83E	71NW	025	DBS	IN	IN
026	N83E	71NW	007	DBS	IN	IN
026	N14E	34SE	028	DBS	IN	IN
026	N14E	34SE	028	DBS	IN	IN
026	N14E	34SE	019	DBS	IN	IN
026	N14E	34SE	011	DBS	IN	IN
027	N50E	45SE	016	DBS	IN	IN
027	N50E	45SE	010	DBS	IN	IN
027	N50E	45SE	020	DBS	IN	IN
027	N50E	45SE	020	DBS	IN	IN
027	N50E	45SE	020	DBS	IN	IN
027	N50E	45SE	009	DBS	IN	IN
027	N50E	45SE	010	DBS	IN	IN
027	N50E	45SE	030	DBS	IN	IN
027	N50E	45SE	019	DBS	IN	IN
027	N55W	86NE	013	DBS	IN	IN
027	N55W	86NE	012	DBS	IN	IN
027	N55W	86NE	007	DBS	IN	IN
027	N55W	86NE	007	DBS	IN	IN
027	N55W	86NE	012	DBS	IN	IN
027	N55W	86NE	030	DBS	IN	IN
028	N35E	55NW	020	DBS	NO	OT
028	N35E	55NW	016	DBS	NO	OT
028	N35E	55NW	009	DBS	NO	OT

STA	STRI	DIP	SPA	LTH	LO	GR
028	N35E	55NW	023	DBS	NO	OT
028	N35E	55NW	017	DBS	NO	OT
028	N35E	55NW	023	DBS	NO	OT
028	N35E	55NW	034	DBS	NO	OT
028	N35E	55NW	025	DBS	NO	OT
028	N50W	60SW	040	DBS	NO	OT
028	N50W	60SW	026	DBS	NO	OT
028	N50W	60SW	038	DBS	NO	OT
028	N50W	60SW	041	DBS	NO	OT
028	N50W	60SW	033	DBS	NO	OT
029			058	MPO	IN	IN
029			059	MPO	IN	IN
029			090	MPO	IN	IN
029			052	MPO	IN	IN
029			049	MPO	IN	IN
029			042	MPO	IN	IN
029			033	MPO	IN	IN
029			034	MPO	IN	IN
029			076	MPO	IN	IN
029			075	MPO	IN	IN
029			057	MPO	IN	IN
029			082	MPO	IN	IN

APPENDIX E

STATION LOCATIONS OF THE WESTWARD EXTENSIONS PARSONS AND PETERSBURG LINEAMENTS (in UTM Grid Coordinates)

Key to Abbreviations:

STA - station number

STA	LATITUDE	LONGITUDE	STA	LATITUDE	LONGITUDE
038	4340.470	592.200	81A	4311.470	580.210
042	4330.820	586.670	082	4313.780	578.540
043	4338.920	585.530	083	4314.000	578.020
044	4340.010	589.220	084	4308.180	576.310
045	4341.180	591.640	085	4307.770	576.620
046	4341.700	591.610	087	4304.660	586.050
047	4341.900	591.450	088	4304.510	586.690
048	4341.960	591.270	089	4305.600	588.780
049	4342.500	591.740	090	4313.450	589.900
050	4353.810	592.840	091	4311.540	589.900
051	4355.000	591.780	092	4306.030	585.600
052	4355.360	591.260	093	4305.130	583.910
053	4354.980	588.700	094	4321.510	581.100
054	4359.300	593.310	095	4303.280	588.650
055	4362.350	595.450	096	4300.280	588.170
056	4363.770	596.120	097	4299.210	587.180
057	4360.580	595.570	098	4296.560	582.920
058	4356.220	592.020	099	4296.800	582.100
059	4349.870	591.830	100	4294.590	578.900
060	4342.910	592.070	101	4302.330	575.710
061	4343.110	592.010	102	4344.770	584.380
062	4367.310	580.420	103	4322.850	589.800
063	4367.070	581.080	104	4331.470	586.340
064	4359.870	578.640	105	4326.170	578.380
065	4349.260	594.170	106	4326.480	578.480
066	4350.070	591.320	107	4302.250	570.990
068	4361.550	577.800	108	4302.720	571.330
069	4361.340	577.910	109	4303.100	571.520
070	4360.840	578.170	110	4332.110	587.660
071	4360.630	578.380	111	4334.280	589.070
072	4370.410	579.710	112	4334.550	590.570
078	4359.160	587.580	113	4337.390	588.710
079	4355.410	586.060	114	4339.020	588.090
080	4354.770	582.400	115	4339.940	587.960
081	4354.320	580.710			

APPENDIX F

WESTWARD EXTENSIONS DATA

Key to Abbreviations:

STA - station number

STRI- joint strike

DIP - joint dip

SPA - joint spacing (in cm)

LTH - unit: PAL = Allegheny, PPV = Pottsville

LOC - location with respect to lineaments. See Figure 14 for sub-area locations

GR - group with respect to lineaments: IN = within, OT = outside

STA	STRI	DIP	SPA	LTH	LOC	GR
038	N22E		0367	PPV	I-2	IN
038	N22E		0202	PPV	I-2	IN
038	N22E		0220	PPV	I-2	IN
038	N22E		0200	PPV	I-2	IN
038	N22E		0900	PPV	I-2	IN
038	N22E		0760	PPV	I-2	IN
038	N22E		0280	PPV	I-2	IN
038	N22E		0400	PPV	I-2	IN
038	N22E		0260	PPV	I-2	IN
038	N22E		0297	PPV	I-2	IN
038	N80E		0220	PPV	I-2	IN
038	N80E		0360	PPV	I-2	IN
038	N80E		0227	PPV	I-2	IN
042	N85E	77NE	0900	PAL	O-5	OT
042	N85E	77NE	1500	PAL	O-5	OT
042	N14E	82SE	0300	PAL	O-5	OT
042	N14E	82SE	0560	PAL	O-5	OT
042	N14E	82SE	0750	PAL	O-5	OT
042	N14E	82SE	0280	PAL	O-5	OT
042	N49W	86NE	0550	PAL	O-5	OT
042	N49W	86NE	1500	PAL	O-5	OT
042	N49W	86NE	1450	PAL	O-5	OT
043	N34E	85SE	0450	PAL	O-5	OT
043	N34E	85SE	0800	PAL	O-5	OT
043	N34E	85SE	0520	PAL	O-5	OT
043	N34E	85SE	1080	PAL	O-5	OT
043	N34E	85SE	0630	PAL	O-5	OT
043	N76E	88SE	0490	PAL	O-5	OT
043	N76E	88SE	0104	PAL	O-5	OT
043	N76E	88SE	0295	PAL	O-5	OT
043	N76E	88SE	0310	PAL	O-5	OT
043	N76E	88SE	0276	PAL	O-5	OT
043	N76E	88SE	0130	PPV	O-5	OT
043	N75E	88SE	0100	PPV	O-5	OT
044	N70W	90SW	0340	PPV	O-5	OT
044	N70W	90SW	0190	PPV	O-5	OT
044	N70W	90SW	0210	PPV	O-5	OT
044	N70W	90SW	0710	PPV	O-5	OT
044	N70W	90SW	0580	PPV	O-5	OT
044	N70W	90SW	0238	PPV	O-5	OT
044	N70W	90SW	0320	PPV	O-5	OT
044	N10E	90NW	1390	PPV	O-5	OT
044	N10E	90NW	0400	PPV	O-5	OT
044	N10E	90NW	1120	PPV	O-5	OT
044	N10E	90NW	0205	PPV	O-5	OT
044	N10E	90NW	0605	PPV	O-5	OT
044	N10E	90NW	0505	PPV	O-5	OT

STA	STRI	DIP	SPA	LTH	LOC	GR
045	N13E	81NW	0170	PPV	I-2	IN
045	N13E	81NW	0150	PPV	I-2	IN
045	N13E	81NW	0230	PPV	I-2	IN
045	N13E	81NW	0095	PPV	I-2	IN
045	N13E	81NW	0180	PPV	I-2	IN
045	N13E	81NW	0370	PPV	I-2	IN
045	N87E	75SE	0940	PPV	I-2	IN
045	N87E	75SE	0190	PPV	I-2	IN
045	N87E	75SE	0380	PPV	I-2	IN
045	N87E	75SE	0370	PPV	I-2	IN
046	N30W	77SW	0230	PPV	I-2	IN
046	N30W	77SW	0220	PPV	I-2	IN
046	N30W	77SW	0250	PPV	I-2	IN
047	N72E	87SE	0150	PAL	I-2	IN
047	N72E	87SE	0150	PAL	I-2	IN
047	N72E	87SE	0100	PAL	I-2	IN
047	N72E	87SE	0200	PAL	I-2	IN
047	N72E	87SE	0115	PAL	I-2	IN
047	N72E	87SE	0100	PAL	I-2	IN
047	N72E	87SE	0130	PAL	I-2	IN
047	N72E	87SE	0110	PAL	I-2	IN
047	N72E	87SE	0120	PAL	I-2	IN
047	N72E	87SE	0200	PAL	I-2	IN
047	N72E	87SE	0300	PAL	I-2	IN
047	N72E	87SE	0170	PAL	I-2	IN
048	N70E	90NW	0380	PAL	I-2	IN
048	N70E	90NW	0440	PAL	I-2	IN
048	N70E	90SW	0730	PAL	I-2	IN
048	N70E	90NW	0570	PAL	I-2	IN
048	N70E	90NW	0770	PAL	I-2	IN
048	N35E	90NW	0300	PAL	I-2	IN
048	N35E	90NW	0280	PAL	I-2	IN
048	N35E	90NW	0410	PAL	I-2	IN
048	N35E	90NW	0240	PAL	I-2	IN
048	N35E	90NW	0150	PAL	I-2	IN
048	N35E	90NW	0200	PAL	I-2	IN
049	N85W	70NE	0150	PAL	I-2	IN
049	N85W	70NE	0125	PAL	I-2	IN
049	N85W	70NE	0200	PAL	I-2	IN
049	N85W	70NE	0150	PAL	I-2	IN
049	N85W	70NE	0180	PAL	I-2	IN
049	N35E	90NW	0200	PAL	I-2	IN
049	N35E	90NW	0250	PAL	I-2	IN
050	N88E	88NW	0020	PST	I-1	IN
050	N88E	88NW	0055	PST	I-1	IN
050	N88E	88NW	0280	PST	I-1	IN
050	N88E	88NW	0200	PST	I-1	IN

STA	STRI	DIP	SPA	LTH	LOC	GR
050	N22E	90NW	0200	PST	I-1	IN
050	N22E	90NW	0220	PST	I-1	IN
051	N19E	72SE	0300	PAL	I-1	IN
051	N19E	72SE	0180	PAL	I-1	IN
051	N19E	72SE	0150	PAL	I-1	IN
051	N19E	72SE	0150	PAL	I-1	IN
051	N19E	72SE	0180	PAL	I-1	IN
051	N19E	72SE	0275	PAL	I-1	IN
051	N75E	90NW	0300	PAL	I-1	IN
051	N75E	90NW	0300	PAL	I-1	IN
051	N75E	90NW	0180	PAL	I-1	IN
051	N75E	90NW	0250	PAL	I-1	IN
051	N75E	90NW	0270	PAL	I-1	IN
051	N75E	90NW	0200	PAL	I-1	IN
051	N75E	90NW	0200	PAL	I-1	IN
051	N75E	90NW	0350	PAL	I-1	IN
052	N24E	90NW	0270	PAL	I-1	IN
052	N24E	90NW	0690	PAL	I-1	IN
052	N24E	90NW	1020	PAL	I-1	IN
052	N83E	75NW	0140	PAL	I-1	IN
052	N83E	75NW	0040	PAL	I-1	IN
052	N83E	75NW	0940	PAL	I-1	IN
052	N83E	75NW	0100	PAL	I-1	IN
052	N83E	75NW	0400	PAL	I-1	IN
052	N36W	75NW	0350	PAL	I-1	IN
052	N35W	75NW	0150	PAL	I-1	IN
053	N85W	90NE	0200	PAL	I-1	IN
053	N86W	90NE	0300	PAL	I-1	IN
053	N86W	90NE	0220	PAL	I-1	IN
053	N30W	89NE	0220	PAL	I-1	IN
053	N30W	89NE	0350	PAL	I-1	IN
053	N30W	89NE	0180	PAL	I-1	IN
054	N50W		0300	PAL	O-1	OT
054	N50W		0500	PAL	O-1	OT
054	N24E		0210	PAL	O-1	OT
054	N24E		0310	PAL	O-1	OT
054	N24E		0380	PAL	O-1	OT
054	N24E		0300	PAL	O-1	OT
054	N24E		0530	PAL	O-1	OT
055	N25E		0620	PAL	O-1	OT
055	N25E		0530	PAL	O-1	OT
055	N25E		0400	PAL	O-1	OT
055	N25E		0850	PAL	O-1	OT
055	N55W		0425	PAL	O-1	OT
055	N55W		0280	PAL	O-1	OT
055	N55W		0240	PAL	O-1	OT
055	N55W		0590	PAL	O-1	OT

STA	STRI	DIP	SPA	LTH	LOC	GR
055	N55W		0370	PAL	O-1	OT
055	N55W		0340	PAL	O-1	OT
056	N52W		0330	PAL	O-1	OT
056	N52W		1150	PAL	O-1	OT
056	N52W		0800	PAL	O-1	OT
056	N52W		0940	PAL	O-1	OT
057	N15E	88SE	1060	PAL	O-1	OT
057	N15E	88SE	0580	PAL	O-1	OT
057	N15E	88SE	0330	PAL	O-1	OT
057	N54W	80SW	0290	PAL	O-1	OT
057	N54W	80SW	0300	PAL	O-1	OT
057	N54W	80SW	0340	PAL	O-1	OT
057	N15E	88SE	0270	PAL	O-1	OT
058	N54W	90SW	0870	PAL	O-1	OT
058	N54W	90SW	0900	PAL	O-1	OT
058	N54W	90SW	0840	PAL	O-1	OT
058	N54W	90SW	0590	PAL	O-1	OT
058	N54W	90SW	0500	PAL	O-1	OT
058	N54W	90SW	0450	PAL	O-1	OT
058	N54W	90SW	0470	PAL	O-1	OT
058	N54W	90SW	0560	PAL	O-1	OT
058	N33E	75NW	0340	PAL	O-1	OT
058	N33E	75NW	0340	PAL	O-1	OT
058	N33E	75NW	0350	PAL	O-1	OT
058	N33E	75NW	0360	PAL	O-1	OT
059	N02W	75SW	0510	PAL	O-4	OT
059	N02W	75SW	2000	PAL	O-4	OT
059	N02W	75SW	0510	PAL	O-4	OT
059	N02W	75SW	1070	PAL	O-4	OT
059	N20E	75SW	0330	PAL	O-4	OT
060	N80W	80NE	0570	PPV	O-4	OT
060	N80W	80NE	0720	PPV	O-4	OT
060	N80W	80NE	1110	PPV	O-4	OT
060	N80W	80NE	0840	PPV	O-4	OT
060	N80W	80NE	0245	PPV	O-4	OT
060	N80W	80NE	0955	PPV	O-4	OT
060	N80W	80NE	0815	PPV	O-4	OT
060	N80W	80NE	0160	PPV	O-4	OT
060	N80W	80NE	0420	PPV	O-4	OT
060	N80W	80NE	0295	PPV	O-4	OT
060	N80W	80NE	0170	PPV	O-4	OT
060	N80W	80NE	0460	PPV	O-4	OT
060	N80W	80NE	0210	PPV	O-4	OT
060	N80W	80NE	0170	PPV	O-4	OT
060	N80W	80NE	0270	PPV	O-4	OT
061	N25E			PPV	O-4	OT
061	N04W	80SW	0480	PPV	O-4	OT

STA	STRI	DIP	SPA	LTH	LOC	GR
061	N04W	80SW	0400	PPV	O-4	OT
061	N85E		0500	PPV	O-4	OT
061	N85E		0500	PPV	O-4	OT
061	N85E		0800	PPV	O-4	OT
061	N85E		0740	PPV	O-4	OT
062	N11E		0350	PPV	O-2	OT
062	N11E		0200	PPV	O-2	OT
063	N56W	90SW	0380	PAL	O-2	OT
063	N56W	90SW	0360	PAL	O-2	OT
064	N75W	90SW	0184	PAL	O-3	OT
064	N75W	90SW	0227	PAL	O-3	OT
064	N75W	90SW	0250	PAL	O-3	OT
064	N75W	90SW	0530	PAL	O-3	OT
064	N75W	90SW	0445	PAL	O-3	OT
064	N75W	90SW	0320	PAL	O-3	OT
064	N75W	90SW	0100	PAL	O-3	OT
064	N75W	90SW	0180	PAL	O-3	OT
064	N75W	90SW	0100	PAL	O-3	OT
064	N75W	90SW	0200	PAL	O-3	OT
064	N75W	90SW	0210	PAL	O-3	OT
064	N75W	90SW	0240	PAL	O-3	OT
064	N75W	90SW	0310	PAL	O-3	OT
064	N75W		0440	PAL	O-3	OT
064	N75W		0610	PAL	O-3	OT
065	N45E		0250	PAL	I-1	IN
065	N45E		0325	PAL	I-1	IN
065	N45E		0200	PAL	I-1	IN
065	N45E		0225	PAL	I-1	IN
065	N45E		0325	PAL	I-1	IN
065	N38W		0280	PAL	I-1	IN
065	N38W		0350	PAL	I-1	IN
065	N38W		0350	PAL	I-1	IN
065	N38W		0300	PAL	I-1	IN
065	N38W		0150	PAL	I-1	IN
065	N38W		0175	PAL	I-1	IN
065	N38W		0275	PAL	I-1	IN
065	N38W		0275	PAL	I-1	IN
066	N15W		1117	PAL	O-4	OT
066	N15W		0420	PAL	O-4	OT
066	N15W		0640	PAL	O-4	OT
066	N37W		0260	PAL	O-4	OT
066	N37W		0330	PAL	O-4	OT
066	N37W		0220	PAL	O-4	OT
066	N37W		0240	PAL	O-4	OT
066	N37W		0140	PAL	O-4	OT
066	N37W		0310	PAL	O-4	OT

STA	STRI	DIP	SPA	LTH	LOC	GR
068	N75W		0200	PAL	O-3	OT
068	N75W		0190	PAL	O-3	OT
068	N75W		0460	PAL	O-3	OT
068	N75W		0350	PAL	O-3	OT
068	N75W		0260	PAL	O-3	OT
069	N70W		0560	PAL	O-3	OT
069	N70W		0560	PAL	O-3	OT
069	N70W		0700	PAL	O-3	OT
070	N18E	88NW	0675	PAL	O-3	OT
070	N18E	88NW	0475	PAL	O-3	OT
070	N75W	86NE	0775	PAL	O-3	OT
070	N75W	86NE	0690	PAL	O-3	OT
070	N75W	86NE	1090	PAL	O-3	OT
070	N75W	86NE	1030	PAL	O-3	OT
070	N75W	86NE	0530	PAL	O-3	OT
071	N69W	89NE	0330	PAL	O-3	OT
071	N69W	89NE	0520	PAL	O-3	OT
071	N69W	89NE	0230	PAL	O-3	OT
071	N69W	89NE	0450	PAL	O-3	OT
072	N07E		0530	PAL	O-2	OT
072	N07E		0340	PAL	O-2	OT
072	N07E		0280	PAL	O-2	OT
072	N80E		0790	PAL	O-2	OT
078	N01E	89NW		PAL	I-1	IN
078	N45W	79SW	0490	PAL	I-1	IN
078	N45W	79SW	0410	PAL	I-1	IN
078	N80W	85SW	0220	PAL	I-1	IN
079	N87W	90SW	0350	PAL	O-4	OT
080	N25E	90NW	0540	PAL	O-3	OT
080	N25E	90NW	0190	PAL	O-3	OT
080	N25W	90SW	0430	PAL	O-3	OT
081	N15E	90NW	0570	PAL	O-3	OT
081	N15E	90NW	0480	PAL	O-3	OT
081	N15E	90NW	0840	PAL	O-3	OT
081	N15E	90NW	0430	PAL	O-3	OT
081	N85W	74SW	1200	PAL	O-3	OT
81A	N20E	90NW	1810	PPV	O-6	OT
81A	N20E	90NW	1270	PPV	O-6	OT
81A	N20E	90NW	1950	PPV	O-6	OT
81A	N20E	90NW	1410	PPV	O-6	OT
81A	N45W	80NE	0230	PPV	O-6	OT
81A	N45W	80NE	0760	PPV	O-6	OT
81A	N45W	80NE	1730	PPV	O-6	OT
81A	N45W	80NE	1200	PPV	O-6	OT
082	N40E	90NW	1030	PAL	O-6	OT
082	N40E	90NW	0830	PAL	O-6	OT
082	N40E	90NW	0670	PAL	O-6	OT

STA	STRI	DIP	SPA	LTH	LOC	GR
082	N80E	75SE	0070	PAL	O-6	OT
082	N80E	75SE	0220	PAL	O-6	OT
082	N80E	75SE	0400	PAL	O-6	OT
083				PAL	O-6	OT
084	N80W	88SW	1220	PAL	O-6	OT
084	N03E	87SE			O-6	OT
086	N75E	89SE	0130	PPV	O-6	OT
086	N75E	89SE	0110	PPV	O-6	OT
086	N75E	89SE	0230	PPV	O-6	OT
087	N73E	87SE	1000	PAL	I-3	IN
087	N73E	87SE	0460	PAL	I-3	IN
087	N01E	77NW	0740	PAL	I-3	IN
088	N81E	90NW	0330	PPV	I-3	IN
088	N81E	90NW	0330	PPV	I-3	IN
088	N81E	90NW	0340	PPV	I-3	IN
088	N81E	90NW	0380	PPV	I-3	IN
088	N81E	90NW	0440	PPV	I-3	IN
088	N81E	90NW	0490	PPV	I-3	IN
088	N81E	90NW	0240	PPV	I-3	IN
088	N81E	90NW	0190	PPV	I-3	IN
088	N60W	90SW	0270	PPV	I-3	IN
088	N60W	90SW	0260	PPV	I-3	IN
089	N25E	83SE	0450	PPV	I-3	IN
089	N65W	90SW	0275	PPV	I-3	IN
090	N55E	78NW	0620	PAL	O-6	OT
090	N55E	78NW	0710	PAL	O-6	OT
090	N85E	85NW	0800	PAL	O-6	OT
091	N75E	78SE	0810	PAL	O-6	OT
091	N75E	78SE	1900	PAL	O-6	OT
091	N75E	78SE	0650	PAL	O-6	OT
091	N75E	78SE	0260	PAL	O-6	OT
091	N75E	78SE	1130	PAL	O-6	OT
091	N75E	78SE	0520	PAL	O-6	OT
092	N10E	90NW	0160	PAL	I-3	IN
092	N10E	90NW	0110	PAL	I-3	IN
092	N10E	90NW	1320	PAL	I-3	IN
092	N10E	90NW	0840	PAL	I-3	IN
092	N85E	90NW	1140	PAL	I-3	IN
092	N27E	75NW	0160	PAL	I-3	IN
093	N22W	82SW	0120	PPV	I-3	IN
093	N22W	82SW	0100	PPV	I-3	IN
093	N22W	82SW	0080	PPV	I-3	IN
093	N45W	90SW		PPV	I-3	IN
094	N35E	90NW		PAL	O-6	OT
095	N65W	90SW	0150	PPV	I-3	IN
095	N89W	90SW	0480	PPV	I-3	IN
096	N75E	78NW	0180	PPV	I-3	IN

STA	STRI	DIP	SPA	LTH	LOC	GR
096	N75E	78NW	0300	PPV	I-3	IN
096	N75E	78NW	0190	PPV	I-3	IN
096	N75E	78NW	0080	PPV	I-3	IN
096	N75E	78NW	0210	PPV	I-3	IN
096	N75E	78NW	0210	PPV	I-3	IN
096	N75E	78NW	0140	PPV	I-3	IN
096	N75E	78NW	0140	PPV	I-3	IN
096	N75E	78NW	0510	PPV	I-3	IN
096	N75E	78NW	0490	PPV	I-3	IN
096	N05W	77NE	0190	PPV	I-3	IN
096	N05W	77NE	0780	PPV	I-3	IN
096	N05W	77NE	0250	PPV	I-3	IN
096	N05W	77NE	0340	PPV	I-3	IN
097	N72E	83SE	0440	PAL	O-7	OT
097	N72E	83SE	1070	PAL	O-7	OT
097	N10W	90SW	1500	PAL	O-7	OT
097	N10W	90SW	0580	PAL	O-7	OT
097	N10W	90SW	0450	PAL	O-7	OT
098	N75E	78NW	0870	PPV	O-7	OT
098	N75E	78NW	1230	PPV	O-7	OT
098	N75E	78NW	1430	PPV	O-7	OT
099	N55E	90NW		PPV	O-7	OT
100				PPV	O-7	OT
101	N52E	80SE		PAL	O-8	OT
102	N53W	65SW	0950	PAL	O-5	OT
102	N55W	65SW	1910	PAL	O-5	OT
102	N34E	80SE	0510	PAL	O-5	OT
103	N12E	80SE		PAL	O-6	OT
104	N30W	85SW	0640	PAL	O-5	OT
104	N30W	85SW	0700	PAL	O-5	OT
104	N70W	90SW	0850	PAL	O-5	OT
105				PAL	O-5	OT
106	N05W	78NE	1000	PAL	O-5	OT
106	N67E	90NW	1060	PAL	O-5	OT
106	N67E	90NW	0850	PAL	O-5	OT
107	N37E	85SE	0850	PAL	O-8	OT
107	N37E	85SE	0480	PAL	O-8	OT
107	N85W	90SW	0750	PAL	O-8	OT
108	N20W	80SW	0700	PAL	O-8	OT
108	N20W	80SW	0600	PAL	O-8	OT
108	N20W	80SW	0800	PAL	O-8	OT
108	N20W	80SW	0600	PAL	O-8	OT
108	N20W	80SW	0900	PAL	O-8	OT
108	N75E	90NW	0700	PAL	O-8	OT
109	N70W	90SW		PAL	O-8	OT
110	N56E	87NW		PAL	O-5	OT
110	N25W	77NE	0410	PAL	O-5	OT
111	N81E	89NW	0670	PAL	O-5	OT
111	N81E	89NW	2100	PAL	O-5	OT
112	N22E	80SE		PAL	O-5	OT
113	N10W	79NE	0970	PPV	O-5	OT

STA	STRI	DIP	SPA	LTH	LOC	GR
113	N62E	90NW	1700	PPV	0-5	OT
114	N21E	88SE	0400	PPV	0-5	OT
115	N87W	90SW	0800	PPV	0-5	OT
115	N87W	90SW	0600	PPV	0-5	OT
115	N87W	90SW	1000	PPV	0-5	OT
115	N87W	90SW	1000	PPV	0-5	OT

APPENDIX G

OPERATOR VARIANCE DATA

Key to Abbreviations:

OPR - operator

STRI- joint strike

SP - joint spacing (in cm)

ST - joint set: EW = east-west, 7W = N 70-79°W, 6W = N 60-69°W, NE = northeast, NN = N 05°W to N 05°E, NW = northwest

STA - station number. See Appendix A, Station Locations in Tucker County

OPR	STRI	SP	ST	STA
BRI	N74W	06	EW	33
BRI	N83W	08	EW	33
BRI	N87W	13	EW	33
BRI	N53W	07	NW	33
BRI	N18E	03	NE	33
BRI	N25E	10	NE	33
BRI	N83W	22	EW	33
BRI	N82W	26	EW	33
BRI	N86W	11	EW	33
BRI	N86E	28	EW	33
BRI	N10E	28	NN	33
BRI	N14E	29	NN	33
BRI	N75W	31	7W	87
BRI	N77W	32	7W	87
BRI	N73W	12	7W	87
BRI	N23E	27	NE	87
BRI	N83E	31	EW	87
BRI	N80E	20	EW	87
BRI	N15E	21	NN	87
BRI	N45W		NW	87
BRI	N85E	45	EW	87
BRI	N87W	15	EW	87
BRI	N82W	13	EW	87
BRI	N80E	05	EW	87
BRI	N18E	55	NN	87
BRI	N53W		NW	87
BRI	N58W	32	NW	35
BRI	N64W	13	6W	35
BRI	N60W	07	6W	35
BRI	N61W	06	6W	35
BRI	N57W	08	6W	35
BRI	N71W	10	6W	35
BRI	N26E	04	NE	35
BRI	N25E	03	NE	35
BRI	N12E	19	NE	35
BRI	N62W	12	6W	35
BRI	N63W	09	6W	35
BRI	N58W	39	6W	35
BRI	N60E	23	6E	35
BRI	N62E	28	6E	35
BRI	N89W	16	EW	35
BRI	N28E	45	NE	35
BRI	N32E	99	NE	35
TOM	N86W	29	EW	33
TOM	N87W	24	EW	33
TOM	N84W	35	EW	33
TOM	N86W	34	EW	33

OPR	STRI	SP	ST	STA
TOM	N87W	55	EW	33
TOM	N84W	66	EW	33
TOM	N86W	68	EW	33
TOM	N87W	12	EW	33
TOM	N84W	34	EW	33
TOM	N86W	40	EW	33
TOM	N19E	19	NE	33
TOM	N21E	02	NE	33
TOM	N42E	19	NE	33
TOM	N19E	23	NE	33
TOM	N21E	08	NE	33
TOM	N42E	16	NE	33
TOM	N19E	23	NE	33
TOM	N21E	10	NE	33
TOM	N42E	16	NE	33
TOM	N19E	17	NE	33
TOM	N21E	22	NE	33
TOM	N42E	32	NE	33
TOM	N19E	30	NE	33
TOM	N21E	03	NE	33
TOM	N42E	27	NE	33
TOM	N19E	34	NE	33
TOM	N21E	17	NE	33
TOM	N42E	08	NE	33
TOM	N19E	13	NE	33
TOM	N21E	21	NE	33
TOM	N42E	23	NE	33
TOM	N19E	39	NE	33
TOM	N83E	30	EW	87
TOM	N85E	32	EW	87
TOM	N79W	37	EW	87
TOM	N83E	14	EW	87
TOM	N85E	11	EW	87
TOM	N79W	18	EW	87
TOM	N83E	25	EW	87
TOM	N85E	46	EW	87
TOM	N79W	13	EW	87
TOM	N83E	62	EW	87
TOM	N85E	18	EW	87
TOM	N79W	06	EW	87
TOM	N83E	15	EW	87
TOM	N85E	16	EW	87
TOM	N79W	03	EW	87
TOM	N83E	17	EW	87
TOM	N85E	10	EW	87
TOM	N79W	12	EW	87
TOM	N83E	09	EW	87

OPR	STRI	SP	ST	STA
TOM	N85E	06	EW	87
TOM	N79W	30	EW	87
TOM	N83E	10	EW	87
TOM	N85E	10	EW	87
TOM	N79W	16	EW	87
TOM	N83E	07	EW	87
TOM	N85E	17	EW	87
TOM	N40W		NW	87
TOM	N20E	15	NE	87
TOM	N26E	28	NE	87
TOM	N24E	13	NE	87
TOM	N20E	08	NE	87
TOM	N26E	06	NE	87
TOM	N44E	42	NE	35
TOM	N25E	35	NE	35
TOM	N29E	07	NE	35
TOM	N25E	46	NE	35
TOM	N61W	13	NW	35
TOM	N51W	23	NW	35
TOM	N51W	34	NW	35
TOM	N53W	35	NW	35
TOM	N53W	11	NW	35
TOM	N51W	32	NW	35
TOM	N53W	28	NW	35
TOM	N51W	15	NW	35
TOM	N53W	08	NW	35
TOM	N51W	39	NW	35
TOM	N53W	79	NW	35
TOM	N51W	39	NW	35
TOM	N73E	27	7E	35
TOM	N73E	23	7E	35
TOM	N52W	14	NW	35
TOM	N53W	15	NW	35
TOM	N51W	26	NW	35
TOM	N02E	12	NN	35
TOM	N02E	11	NN	35
TOM	N51W	32	NW	35
TOM	N53W	08	NW	35
TOM	N51W	07	NW	35
TOM	N53W	17	NW	35
TOM	N51W	24	NW	35
TOM	N25E	99	NE	35
TOM	N29E	37	NE	35
TOM	N25E	35	NE	35
TOM	N29E	14	NE	35
RUS	N87W	19	EW	33
RUS	N84W	12	EW	33

OPR	STRI	SP	ST	STA
RUS	N82W	10	EW	33
RUS	N84W	18	EW	33
RUS	N87W	31	EW	33
RUS	N84W	07	EW	33
RUS	N83W	12	EW	33
RUS	N39W	16	NW	33
RUS	N46W	18	NW	33
RUS	N47W	24	NW	33
RUS	N47W	27	NW	33
RUS	N39W	13	NW	33
RUS	N46W	18	NW	33
RUS	N47W	70	NW	33
RUS	N47W	36	NW	33
RUS	N39W	29	NW	33
RUS	N67W	17	6W	33
RUS	N63W	04	6W	33
RUS	N67W	08	6W	33
RUS	N21E	43	NE	33
RUS	N14E	26	NE	33
RUS	N14E	29	NE	33
RUS	N17E	53	NE	33
RUS	N21E	34	NE	33
RUS	N14E	33	NE	33
RUS	N14E	23	NE	33
RUS	N21E	59	NE	33
RUS	N14E	71	NE	33
RUS	N87E	70	EW	87
RUS	N85E	05	EW	87
RUS	N89E	99	EW	87
RUS	N85E	38	EW	87
RUS	N87E	06	EW	87
RUS	N85E	07	EW	87
RUS	N89E	03	EW	87
RUS	N85E	72	EW	87
RUS	N87E	70	EW	87
RUS	N85E	28	EW	87
RUS	N70W	30	7W	87
RUS	N72W	99	7W	87
RUS	N71W	32	7W	87
RUS	N72W	48	7W	87
RUS	N70W	43	7W	87
RUS	N72W	48	7W	87
RUS	N71W	47	7W	87
RUS	N58W	12	NW	35
RUS	N57W	11	NW	35
RUS	N57W	13	NW	35
RUS	N62W	09	NW	35

OPR	STRI	SP	ST	STA
RUS	N58W	24	NW	35
RUS	N57W	36	NW	35
RUS	N62W	38	NW	35
RUS	N74W	22	7W	35
RUS	N70W	12	7W	35
RUS	N70W	05	7W	35
RUS	N74W	08	7W	35
RUS	N70W	21	7W	35
RUS	N70W	16	7W	35
RUS	N70W	11	7W	35
RUS	N74W	02	7W	35
RUS	N70W	05	7W	35
RUS	N70W	24	7W	35
RUS	N70W	13	7W	35
RUS	N70W	13	7W	35
RUS	N70W	39	7W	35
RUS	N70W	32	7W	35
RUS	N70W	12	7W	35
RUS	N70W	16	7W	35
RUS	N70W	28	7W	35
RUS	N70W	30	7W	35
RUS	N57W	06	NW	35
RUS	N55W	09	NW	35
RUS	N57W	09	NW	35
RUS	N55W	08	NW	35
RUS	N57W	19	NW	35
RUS	N27E	28	NE	35
RUS	N17E	25	NE	35
RUS	N27E	32	NE	35
RUS	N17E	45	NE	35
RUS	N27E	03	NE	35
JAN	N80W	25	EW	33
JAN	N83W	20	EW	33
JAN	N80W	14	EW	33
JAN	N80W	11	EW	33
JAN	N83W	12	EW	33
JAN	N83W	08	EW	33
JAN	N80W	18	EW	33
JAN	N83W	24	EW	33
JAN	N80W	24	EW	33
JAN	N83W	32	EW	33
JAN	N50W	16	NW	33
JAN	N45W	20	NW	33
JAN	N48W	19	NW	33
JAN	N50W	12	NW	33
JAN	N87W	18	EW	87
JAN	N87W	08	EW	87

OPR	STRI	SP	ST	STA
JAN	N87W	12	EW	87
JAN	N87W	24	EW	87
JAN	N87W	38	EW	87
JAN	N87W	09	EW	87
JAN	N87W	17	EW	87
JAN	N87W	17	EW	87
JAN	N87W	34	EW	87
JAN	N51W	07	NW	87
JAN	N51W	26	NW	87
JAN	N84E	11	EW	87
JAN	N84E	11	EW	87
JAN	N73W	32	7W	87
JAN	N73W	31	7W	87
JAN	N24E	90	NE	35
JAN	N24E	59	NE	35
JAN	N24E	29	NE	35
JAN	N02E	21	NN	35
JAN	N02E	31	NN	35
JAN	N02E	11	NN	35
JAN	N55W	47	NW	35
JAN	N55W	09	NW	35
JAN	N55W	25	NW	35
JAN	N54W	35	NW	35
JAN	N85W	36	EW	35
JAN	N85W	29	EW	35
JAN	N85W	12	EW	35
JAN	N85W	16	EW	35
JAN	N85W	37	EW	35

APPENDIX H

COAL CLEAT INTENSITY DATA

Key to Abbreviations:

STA - station number

STRI - joint strike

DIP - joint dip

CLEAT- type of cleat: FACE, BUTT

SPA - cleat spacing (in cm)

BT - bed thickness (in cm)

STA	STRI	DIP	CLEAT	SPA	BT
001	N75W	90SW	FACE	02.5	40
001	N75W	90SW	FACE	02.0	40
001	N75W	90SW	FACE	04.5	40
001	N75W	90SW	FACE	03.0	40
001	N75W	90SW	FACE	01.0	40
001	N75W	90SW	FACE	02.5	40
001	N75W	90SW	FACE	03.0	40
001	N75W	90SW	FACE	01.0	40
001	N75W	90SW	FACE	02.5	40
001	N75W	90SW	FACE	02.0	40
001	N11E	75SE	BUTT	03.5	40
001	N11E	75SE	BUTT	05.0	40
001	N11E	75SE	BUTT	03.0	40
001	N11E	75SE	BUTT	07.0	40
001	N11E	75SE	BUTT	04.0	40
001	N11E	75SE	BUTT	08.0	40
001	N11E	75SE	BUTT	04.0	40
001	N11E	75SE	BUTT	10.0	40
001	N11E	75SE	BUTT	04.0	40
001	N11E	75SE	BUTT	05.5	40
002	N70W	90SW	FACE	03.0	38
002	N70W	90SW	FACE	04.0	38
002	N70W	90SW	FACE	06.0	38
002	N70W	90SW	FACE	02.5	38
002	N70W	90SW	FACE	02.5	38
002	N70W	90SW	FACE	03.0	38
002	N70W	90SW	FACE	03.0	38
002	N70W	90SW	FACE	03.0	38
002	N70W	90SW	FACE	03.0	38
002	N70W	90SW	FACE	02.5	38
002	N05E	70SE	BUTT	02.5	38
002	N05E	70SE	BUTT	02.0	38
002	N05E	70SE	BUTT	03.0	38
002	N05E	70SE	BUTT	02.0	38
002	N05E	70SE	BUTT	04.0	38
002	N05E	70SE	BUTT	01.5	38
002	N05E	70SE	BUTT	02.0	38
002	N05E	70SE	BUTT	03.5	38
002	N05E	70SE	BUTT	04.0	38
002	N05E	70SE	BUTT	01.5	38
004	N74W	90SW	FACE	02.0	35
004	N74W	90SW	FACE	02.0	35
004	N74W	90SW	FACE	02.5	35
004	N74W	90SW	FACE	01.0	35
004	N74W	90SW	FACE	02.5	35
004	N74W	90SW	FACE	02.5	35
004	N74W	90SW	FACE	02.0	35

STA	STRI	DIP	CLEAT	SPA	BT
004	N74W	90SW	FACE	01.5	35
004	N74W	90SW	FACE	02.5	35
004	N74W	90SW	FACE	03.0	35
004	N15E	83SE	BUTT	09.0	35
004	N15E	83SE	BUTT	05.0	35
004	N15E	83SE	BUTT	04.0	35
004	N15E	83SE	BUTT	05.0	35
004	N15E	83SE	BUTT	05.0	35
004	N15E	83SE	BUTT	04.0	35
004	N15E	83SE	BUTT	04.0	35
004	N15E	83SE	BUTT	06.0	35
004	N15E	83SE	BUTT	05.0	35
004	N15E	83SE	BUTT	08.5	35
006	N78W	90SW	FACE	03.5	20
006	N78W	90SW	FACE	03.0	20
006	N78W	90SW	FACE	03.0	20
006	N78W	90SW	FACE	02.0	20
006	N78W	90SW	FACE	02.0	20
006	N78W	90SW	FACE	01.5	20
006	N78W	90SW	FACE	02.0	20
006	N78W	90SW	FACE	04.0	20
006	N78W	90SW	FACE	04.0	20
006	N78W	90SW	FACE	02.5	20
006	N22E	87NW	BUTT	03.0	20
006	N22E	87NW	BUTT	02.0	20
006	N22E	87NW	BUTT	03.5	20
006	N22E	87NW	BUTT	02.5	20
006	N22E	87NW	BUTT	04.0	20
006	N22E	87NW	BUTT	04.0	20
006	N22E	87NW	BUTT	07.0	20
006	N22E	87NW	BUTT	03.0	20
006	N22E	87NW	BUTT	03.0	20
006	N22E	87NW	BUTT	03.5	20
007	N75W	90SW	FACE	07.0	35
007	N75W	90SW	FACE	08.5	35
007	N75W	90SW	FACE	07.0	35
007	N75W	90SW	FACE	08.0	35
007	N75W	90SW	FACE	09.5	35
007	N75W	90SW	FACE	06.5	35
007	N75W	90SW	FACE	07.5	35
007	N75W	90SW	FACE	06.5	35
007	N75W	90SW	FACE	09.0	35
007	N75W	90SW	FACE	07.5	35
007	N15E	80NW	BUTT	08.5	35
007	N15E	80NW	BUTT	09.0	35
007	N15E	80NW	BUTT	10.5	35
007	N15E	80NW	BUTT	12.0	35

STA	STRI	DIP	CLEAT	SPA	BT
007	N15E	80NW	BUTT	10.5	35
007	N15E	80NW	BUTT	08.0	35
007	N15E	80NW	BUTT	08.0	35
007	N15E	80NW	BUTT	09.5	35
007	N15E	80NW	BUTT	08.0	35
007	N15E	80NW	BUTT	10.0	35
008	N75W	89SW	FACE	02.0	40
008	N75W	89SW	FACE	03.0	40
008	N75W	89SW	FACE	03.5	40
008	N75W	89SW	FACE	03.0	40
008	N75W	89SW	FACE	05.5	40
008	N75W	89SW	FACE	03.5	40
008	N75W	89SW	FACE	02.5	40
008	N75W	89SW	FACE	02.5	40
008	N75W	89SW	FACE	02.5	40
008	N75W	89SW	FACE	02.0	40
008	N11E	73SE	BUTT	08.0	40
008	N113	73SE	BUTT	10.0	40
008	N11E	73SE	BUTT	06.0	40
008	N11E	73SE	BUTT	05.0	40
008	N11E	73SE	BUTT	11.0	40
008	N11E	73SE	BUTT	13.0	40
008	N11E	73SE	BUTT	06.0	40
008	N113	73SE	BUTT	06.5	40
008	N11E	73SE	BUTT	13.0	40
008	N11E	73SE	BUTT	05.0	40
011	N77W	89NE	FACE	02.0	40
011	N77W	89NE	FACE	02.0	40
011	N77W	89NE	FACE	02.0	40
011	N77W	89NE	FACE	03.0	40
011	N77W	89NE	FACE	02.0	40
011	N77W	89NE	FACE	02.0	40
011	N77W	89NE	FACE	02.0	40
011	N77W	89NE	FACE	01.0	40
011	N77W	89NE	FACE	03.0	40
011	N77W	89NE	FACE	01.0	40
011	N15E	77SE	BUTT	06.0	40
011	N15E	77SE	BUTT	09.0	40
011	N15E	77SE	BUTT	07.0	40
011	N15E	77SE	BUTT	05.0	40
011	N15E	77SE	BUTT	07.0	40
011	N15E	77SE	BUTT	05.0	40
011	N15E	77SE	BUTT	07.0	40
011	N15E	77SE	BUTT	12.0	40
011	N15E	77SE	BUTT	10.0	40
011	N15E	77SE	BUTT	10.0	40
012	N73W	86SW	FACE	04.0	40

STA	STRI	DIP	CLEAT	SPA	BT
012	N73W	86SW	FACE	02.5	40
012	N73W	86SW	FACE	06.0	40
012	N73W	86SW	FACE	04.0	40
012	N73W	86SW	FACE	05.0	40
012	N73W	86SW	FACE	03.0	40
012	N73W	86SW	FACE	06.0	40
012	N73W	86SW	FACE	05.0	40
012	N73W	86SW	FACE	03.0	40
012	N73W	86SW	FACE	02.0	40
012	N18E	90NW	BUTT	08.0	40
012	N18E	90NW	BUTT	04.0	40
012	N18E	90NW	BUTT	04.5	40
012	N18E	90NW	BUTT	03.0	40
012	N18E	90NW	BUTT	04.0	40
012	N18E	90NW	BUTT	05.0	40
012	N18E	90NW	BUTT	06.0	40
012	N18E	90NW	BUTT	06.0	40
012	N18E	90NW	BUTT	07.0	40
012	N18E	90NW	BUTT	06.0	40
013	N76W	90SW	FACE	03.0	40
013	N76W	90SW	FACE	03.0	40
013	N76W	90SW	FACE	03.0	40
013	N76W	90SW	FACE	03.5	40
013	N76W	90SW	FACE	02.5	40
013	N76W	90SW	FACE	03.0	40
013	N76W	90SW	FACE	03.0	40
013	N76W	90SW	FACE	04.0	40
013	N76W	90SW	FACE	03.0	40
013	N76W	90SW	FACE	02.5	40
013	N25E	75SE	BUTT	11.0	40
013	N25E	75SE	BUTT	09.0	40
013	N25E	75SE	BUTT	04.0	40
013	N25E	75SE	BUTT	14.0	40
013	N25E	75SE	BUTT	09.0	40
013	N25E	75SE	BUTT	10.0	40
013	N25E	75SE	BUTT	11.0	40
013	N25E	75SE	BUTT	12.0	40
013	N25E	75SE	BUTT	08.0	40
013	N25E	75SE	BUTT	11.0	40
014	N74W	85SW	FACE	05.0	35
014	N74W	85SW	FACE	03.5	35
014	N74W	85SW	FACE	06.0	35
014	N74W	85SW	FACE	05.0	35
014	N74W	85SW	FACE	05.5	35
014	N74W	85SW	FACE	06.5	35
014	N74W	85SW	FACE	06.0	35
014	N74W	85SW	FACE	05.0	35

STA	STRI	DIP	CLEAT	SPA	BT
014	N74W	85SW	FACE	04.0	35
014	N74W	85SW	FACE	06.0	35
014	N10E	83SE	BUTT	07.5	35
014	N10E	83SE	BUTT	12.0	35
014	N10E	83SE	BUTT	12.5	35
014	N10E	83SE	BUTT	13.0	35
014	N10E	83SE	BUTT	13.0	35
014	N10E	83SE	BUTT	13.0	35
014	N10E	83SE	BUTT	17.0	35
014	N10E	83SE	BUTT	16.0	35
014	N10E	83SE	BUTT	10.0	35
014	N10E	83SE	BUTT	09.0	35
015	N72W	90SW	FACE	08.0	35
015	N72W	90SW	FACE	07.0	35
015	N72W	90SW	FACE	04.0	35
015	N72W	90SW	FACE	05.0	35
015	N72W	90SW	FACE	10.0	35
015	N72W	90SW	FACE	07.0	35
015	N72W	90SW	FACE	10.0	35
015	N72W	90SW	FACE	11.0	35
015	N72W	90SW	FACE	11.0	35
015	N72W	90SW	FACE	11.0	35
015	N12E	80NW	BUTT	14.0	35
015	N12E	80NW	BUTT	18.0	35
015	N12E	80NW	BUTT	16.0	35
015	N12E	80NW	BUTT	05.0	35
015	N12E	80NW	BUTT	07.0	35
015	N12E	80NW	BUTT	18.0	35
015	N12E	80NW	BUTT	11.0	35
015	N12E	80NW	BUTT	17.0	35
015	N12E	80NW	BUTT	14.0	35
015	N12E	80NW	BUTT	13.0	35

APPENDIX I

FIELD METHODS FOR MEASURING JOINT INTENSITY

FIELD METHODS FOR MEASURING JOINT INTENSITY

This handbook is meant to assist people who are about to engage in a joint intensity study, perhaps for the first time. Certain procedures need to be strictly adhered to, regardless of the study; others will vary. Within a study, consistency is most important.

Ideally, the area to be studied should be previewed. Some rocks lend themselves to this type of study better than others. A preliminary investigation of rock type, number of exposures, and a few sample measurements could save time, trouble, and retracing of steps.

Joint strike, dip, and spacing are the only necessary measurements. However, bed thickness is a useful measurement. If the joints are very regular and consistent, only one strike and dip measurement per set per exposure may be necessary; two or three measurements may be useful where joints are less consistent.

Spacing is the perpendicular distance to the next adjacent joint in the same set. In an exposure, one should measure spacing consistently in one direction so as not to repeat a spacing measurement. If part of the exposure has been washed out, covered by vegetation, covered by talus, or in any way covered, spacing should not be measured across the area; a joint may be hidden and the spacing measurement would be erroneous. Wherever possible, at least three spacings per set should be meas-

ured. The number of joint spacings one should measure at each exposure will vary according to the number of joint sets and the regularity or irregularity of the spacing. If joint spacing in a set is fairly consistent across the exposure, only three to five measurements are necessary; if spacing is variable, 10 to 20 measurements may be necessary. The key to measuring spacings is to chose a representative sample. The exception to the rule is massive sandstone where joint spacing may be many meters. If the exposure is large, and yet has only one or two joints or one or two spacings, then the intensity value may be considered equal to or less than the calculated value. For example, if an outcrop is 25 meters long and two joints at a high angle to the face of the outcrop are found at one end ten meters apart and the next joint spacing is greater than 15 meters, then no other joint from that set will be found in the remaining 15 meters of the outcrop. The average spacing of that set can be considered equal to or greater than 12.5 meters. It is important to note when an outcrop has no joints, particularly if the outcrop is of fair size.

Field equipment is often a personal choice. However, two measuring instruments are found to be useful: a six-foot folding, metric/English carpenter's ruler and a 30 meter fiberglass tape. The carpenter's ruler is good when spacings are less than a few meters. It is invaluable

when measuring steep cuts where joints are a few feet above your reach. The ruler can be unfolded into an upside down L shape, using the long end for extension and the short end for measuring spacings. The 30 meter fiberglass tape, used when spacings are large, is flexible and will not rust when used in streams or other wet areas.

One should beware of blasting fractures, weathering cracks, or other breaks which are not joints. As a general rule, when in doubt, don't! If you are unsure whether or not a fracture is a systematic joint, do not measure it for spacing. When you have completed the study, any differences in joint intensities will be detected from spacings you are sure are real.

Processing of the data will vary from study to study. In areas where a great number of intensity measurements were taken a simple contour map may best illustrate intensity variances. Mean spacings of individual sets can assist in interpreting causes of joint intensity. However, it is only the joint intensity measurement that estimates the total surface area of fractured rock per unit volume. An individual set may show close spacing in a area, which would suggest increased intensity, but that may be counteracted by wide spacings of other sets.

APPENDIX J

SUGGESTIONS FOR FUTURE WORK

SUGGESTIONS FOR FUTURE WORK

1. Two preliminary studies suggest that gas production decreases inside the Parsons and Petersburg lineaments. Because intense fracturing is being considered as one criterion for locating drilling sites, additional detailed studies should be done to compare gas production with the Parsons and Petersburg lineaments.
2. Joint orientations seem to be affected by the Parsons and Petersburg lineaments. A study of the area where these lineaments appear to intersect may better define the area of intersection, and determine time and structural relationships between them.
3. A study of surface joint orientations and intensities around gas fields known to be producing from fractured reservoirs may determine if any relationship exists between surface and subsurface fractures.
4. Joint intensity studies along lineaments associated with known basement structures may characterize those lineaments and give an indication as to the origins of the Parsons and Petersburg lineaments.
5. Rocks between the test areas in this study could be examined to determine if the Parsons and Petersburg lineaments are more intensely fractured all along their lengths. Permian rocks of the Dunkard Group could be studied to determine whether the lineaments are disrupted or terminated in northwestern West Virginia.

6. Surface rocks above coal mine roof falls should be examined to determine if any relationship exists between roof falls and surface joint intensities. If a correlation exists, surface joint intensity studies may be used to assist in predicting roof falls.
7. Studies on coal cleat intensities could be used to determine relationships between cleating and pillar strengths. Stream channels, faults, folds, and other stratigraphic and tectonic structures located around coal seams could be examined to determine their effects on cleat intensities.