SEP 1 1966

CRA, INC.

WOODWARD NO. 13, 15, 16, 18, 19, & 27-I

DIPMETER REPORT

BRONSON Field

SCHLUMBERGER WELL SERVICES
A DIVISION OF SCHLUMBERGER TECHNOLOGY CORPORATION
5000 GULF FREEWAY P. O. BOX 2175 HOUSTON, TEXAS 77001

August 25, 1966

PLEASE REPLY TO
SUITE 1120 WICHITA PLAZA BLDG.
WICHITA, KANSAS 67202

CRA, Inc.
Box 445
Wellington, Kansas

Gentlemen:

This report is intended to summarize our interpretation of the Continuous Dipmeter Surveys ran on your Woodward Wells Nos. 13, 15, 16, 18, 19, and 27-I, Bourbon County, Kansas. Included in this report is the graphic presentation of dip calculations, the tabular presentation of dip calculations and a series of dip frequency polar diagrams the interpretation of which is discussed below.

Originally we had called the Bartlesville Sand in wells No. 2, 4, 8, and 9 a bar sand because the geometry derived from the dipmeters on them described a curved upper surface. It now appears the Bartlesville Sand in all of the Woodward wells has both a curved upper and lower surface. The dipmeter data on Wells 13, 15, 16, 18, 19, and 27-I all describe the sand as a channel cut and fill system with a curved upper surface. The strike information derived is valid whether the sand system is a bar type or channel cut and fill system. The direction toward thickening sand will vary 180 degrees if the wrong assumption is made. Subsequent drilling has proved that this is a channel cut and fill system.

The following strike and direction of sand thickening were derived assuming the system is a channel cut and fill:

Woodward No. 13 strikes N20W-S20E and thickens S70W.

Woodward No. 15 strikes N10W-S10E and thickens S80W.

Woodward No. 16 strikes N20E-S20W and thickens N70W.

Woodward No. 18 strikes N20E-S20W and thickens N70W.

Woodward No. 19 strikes N20E-S20W and thickens S70E.

Woodward No. 27-I strikes N20E-S20W and thickens S70E.

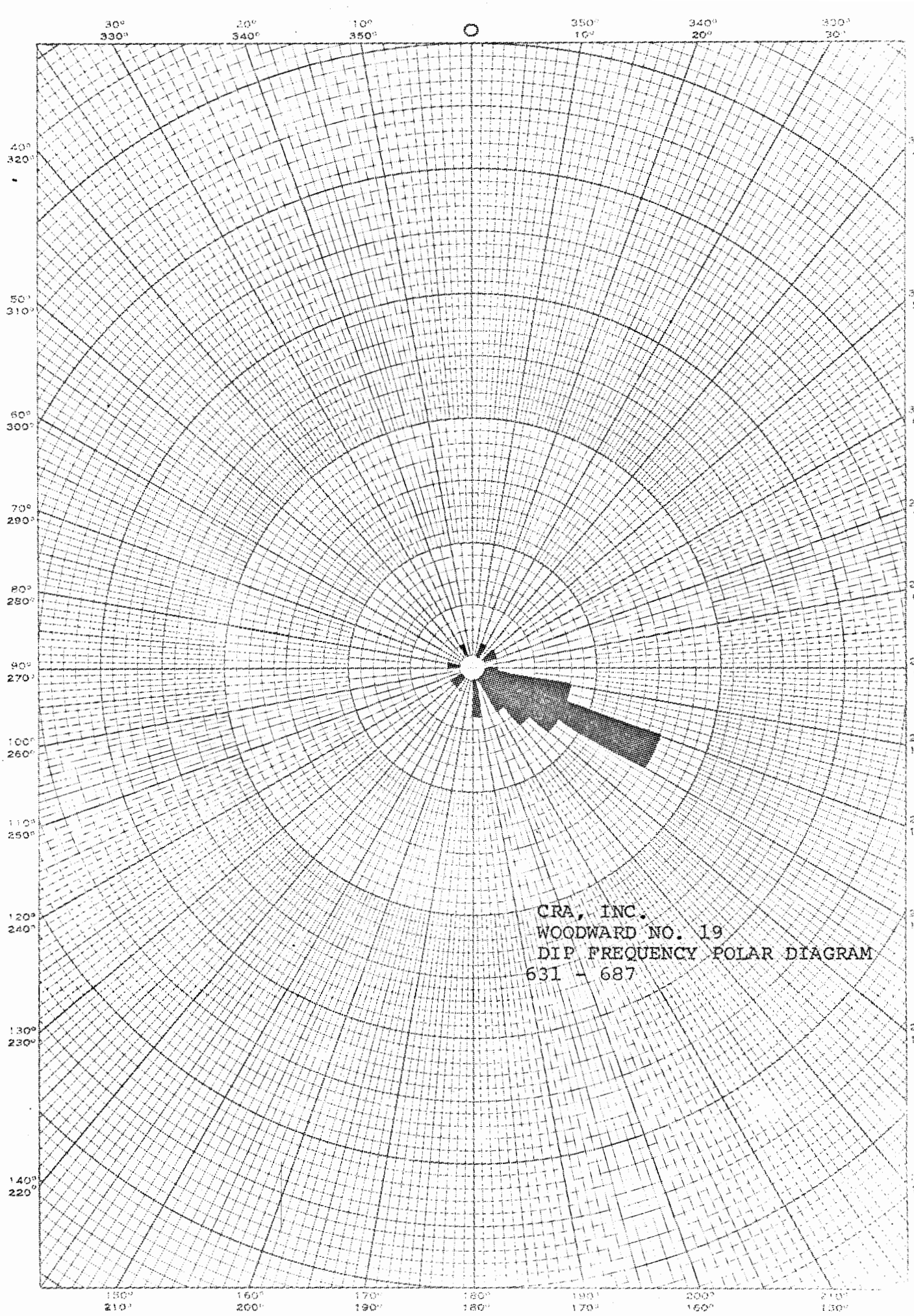
Further development should be along a strike direction of N20E.

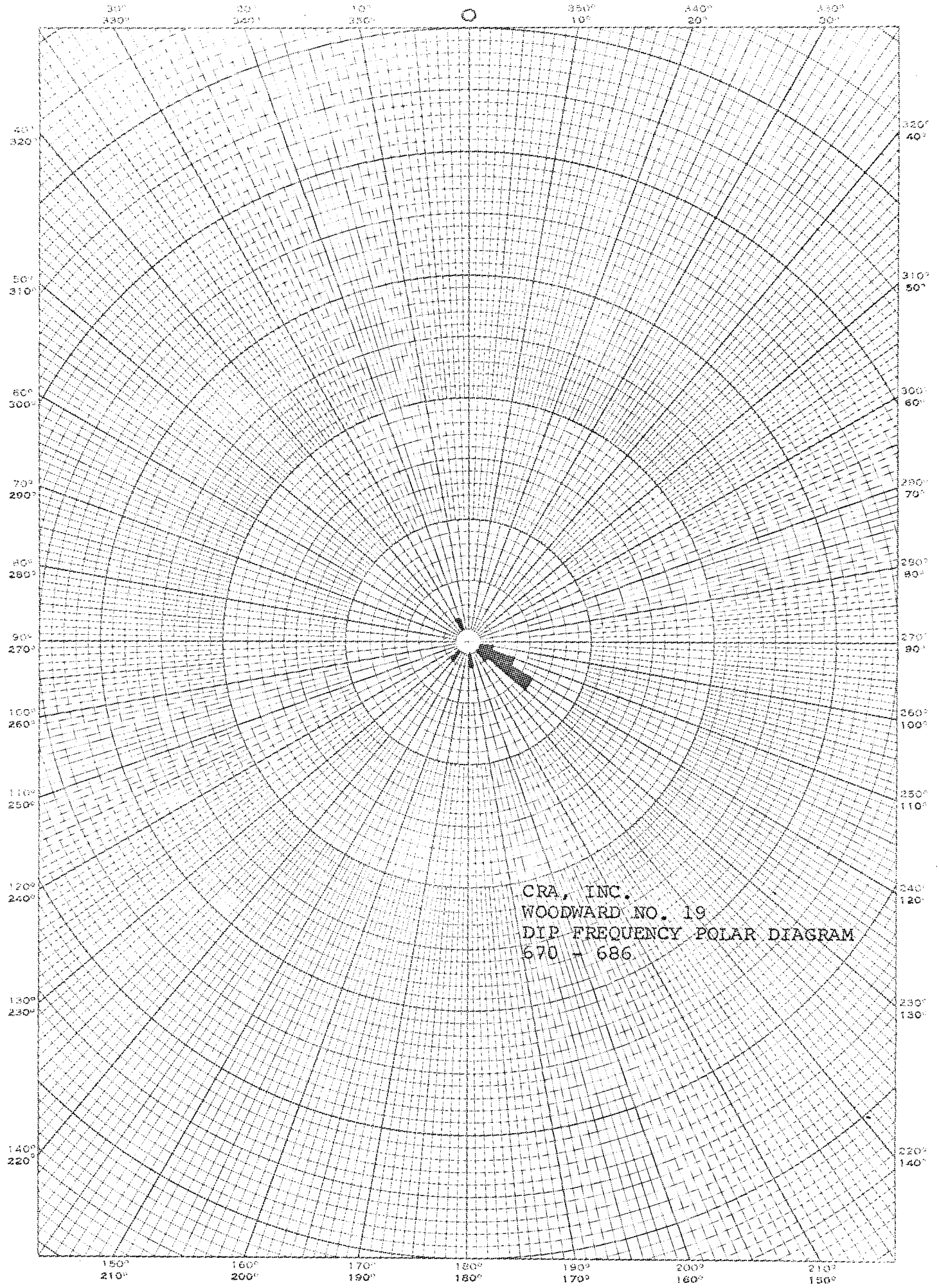
The interpretation of dipmeter logs and the geological conclusions which are discussed in this report represent our best judgment. Nevertheless, since all interpretations and the conclusions reached are based on inferences from electrical and other measurements, as well as geological data which necessarily includes the consideration of some unproven factors, we must advise you that we cannot and do not guarantee their accuracy or correctness and shall not be liable or responsible, except in the case of willful negligence on our part, for any loss, costs, damages or expenses that may be incurred or sustained from such interpretations or the geological conclusions set out in this report.

Thank you for calling Schlumberger on these wells. If we can be of further assistance, please feel free to call on us at any time.

Sam Fain

SF:ep




CRA, INC.
WOODWARD NO. 19
DIP FREQUENCY POLAR DIAGRAM
670 - 686

JOB NO. 65

SCHLUMBERGER WELL SURVEYING CORPORATION
CONTINUOUS DIPMETER CALCULATIONS

CRA. INC.
WOODWARD NO. 19
BOURBON COUNTY. KANSAS

DEPT	DIP	DIP AZM	DIP BRG	DEV	DEV AZM
400	6.5	325	N 35 W	0.6	328
401	9.3	324	N 36 W	0.6	323
403	5.9	325	N 35 W	0.6	308
405	11.4	306	N 54 W	0.6	318
407	4.9	297	N 63 W	0.6	308
408	3.3	318	N 42 W	0.6	313
409	2.8	11	N 11 E	0.6	323
411	4.8	58	N 58 E	0.7	323
415	9.3	92	S 88 E	0.7	326
416	6.8	82	N 82 E	0.7	326
417	4.4	98	S 82 E	0.7	326
418	4.0	130	S 50 E	0.7	318
419	5.7	144	S 36 E	0.7	323
421	5.7	139	S 41 E	0.7	318
422	4.3	198	S 18 W	0.7	323
425	1.6	174	S 6 E	0.7	323
426	2.6	155	S 25 E	0.7	328
427	1.8	129	S 51 E	0.7	318
428	2.5	147	S 33 E	0.6	323
429	0.6	143	S 37 E	0.6	323
431	2.5	138	S 42 E	0.6	318
432	2.5	135	S 45 E	0.6	323
433	4.3	96	S 84 E	0.6	323
434	1.1	70	N 70 E	0.6	323
435	1.7	153	S 27 E	0.6	323
437	1.7	149	S 31 E	0.6	323
438	0.6	133	S 47 E	0.6	313
439	1.6	140	S 40 E	0.5	313
440	3.3	121	S 59 E	0.4	313
441	3.2	101	S 79 E	0.4	308
442	1.1	78	N 78 E	0.0	138
443	1.1	78	N 78 E	0.0	138
444	3.9	92	S 88 E	0.0	138
445	2.2	138	S 42 E	0.0	138
447	2.2	138	S 42 E	0.0	138
449	1.9	48	N 48 E	0.0	138
450	2.9	174	S 6 E	0.0	133
451	2.9	114	S 66 E	0.0	133
453	2.8	119	S 61 E	0.0	138
455	2.2	198	S 18 W	0.0	138
459	7.0	64	N 64 E	0.0	138
460	3.8	74	N 74 E	0.0	148
461	3.2	158	S 22 E	0.0	158

462	3.9	154	S	26	E	0.0	168
463	2.8	132	S	48	E	0.0	173
465	1.9	148	S	32	E	0.0	178
467	4.3	152	S	28	E	0.5	328
469	1.5	185	S	5	W	0.5	341
472	2.6	140	S	40	E	0.4	328
475	2.2	120	S	60	E	0.4	333
477	13.6	114	S	66	E	0.4	328
479	4.7	194	S	14	W	0.4	328
481	2.0	222	S	42	W	0.4	333
483	1.4	190	S	10	W	0.4	333
484	2.5	196	S	16	W	0.4	333
485	1.4	190	S	10	W	0.4	333
486	3.1	181	S	1	W	0.3	333
487	2.2	143	S	37	E	0.0	203
488	1.1	206	S	26	W	0.0	206
489	1.1	266	S	86	W	0.0	206
490	1.9	233	S	53	W	0.0	203
491	3.8	233	S	53	W	0.0	203
494	6.5	138	S	42	E	0.0	198
497	6.1	194	S	14	W	0.0	203
498	6.7	178	S	2	E	0.0	203
499	2.9	222	S	42	W	0.0	203
501	3.3	263	S	83	W	0.0	203
502	2.2	86	N	86	E	0.0	206
503	1.9	356	N	4	W	0.0	206
505	2.2	23	N	23	E	0.0	203
507	8.2	325	N	35	W	0.0	198
509	2.2	16	N	16	E	0.0	196
511	1.9	343	N	17	W	0.0	193
512	2.9	292	N	68	W	0.0	191
514	3.8	93	S	87	E	0.0	183
515	0.0					0.0	178
517	2.2	238	S	58	W	0.0	178
519	1.9	201	S	21	W	0.0	171
521	2.2	48	N	48	E	0.0	168
523	1.1	48	N	48	E	0.0	168
525	1.1	171	S	9	E	0.0	171
529	0.0					0.0	171
530	1.1	171	S	9	E	0.0	171
532	1.1	168	S	12	E	0.0	168
533	1.1	168	S	12	E	0.0	168
535	1.1	168	S	12	E	0.0	168
536	1.1	166	S	14	E	0.0	166
538	1.9	193	S	13	W	0.0	163
539	1.1	103	S	77	E	0.0	163
541	1.9	133	S	47	E	0.0	163
542	2.9	122	S	58	E	0.0	163
543	2.9	117	S	63	E	0.0	158
545	2.9	139	S	41	E	0.0	158
546	1.9	128	S	52	E	0.0	158
547	1.1	98	S	82	E	0.0	158
549	1.1	98	S	82	E	0.0	158
551	2.2	158	S	22	E	0.0	158
552	1.9	128	S	52	E	0.0	158
553	0.0					0.0	158
555	0.0					0.0	153

557	1.1	88	N	88	E	0.0	148
559	2.2	148	S	32	E	0.0	148
560	2.2	148	S	32	E	0.0	148
562	1.9	113	S	67	E	0.0	143
564	1.1	138	S	42	E	0.0	138
565	1.1	138	S	42	E	0.0	138
567	0.0					0.0	138
569	2.2	78	N	78	E	0.0	138
570	1.9	48	N	48	E	0.0	138
572	2.9	59	N	59	E	0.0	138
573	2.2	78	N	78	E	0.0	138
574	2.2	13	N	13	E	0.0	133
575	3.9	27	N	27	E	0.0	133
576	1.1	18	N	18	E	0.0	138
579	1.9	113	S	67	E	0.0	143
581	2.2	23	N	23	E	0.0	143
585	1.1	318	N	42	W	0.0	138
586	1.9	108	S	72	E	0.0	138
587	1.9	108	S	72	E	0.0	138
588	1.1	138	S	42	E	0.0	138
589	1.1	138	S	42	E	0.0	138
591	1.1	198	S	18	W	0.0	138
593	1.1	138	S	42	E	0.0	138
594	2.2	138	S	42	E	0.0	138
595	2.2	138	S	42	E	0.0	138
596	2.2	138	S	42	E	0.0	138
597	2.2	78	N	78	E	0.0	138
598	1.9	108	S	72	E	0.0	138
599	1.1	78	N	78	E	0.0	138
600	2.2	78	N	78	E	0.0	138
601	4.7	221	S	41	W	0.0	138
603	5.7	108	S	72	E	0.0	138
605	7.3	71	N	71	E	0.0	131
607	3.3	11	N	11	E	0.0	131
608	3.9	357	N	3	W	0.0	131
609	2.9	352	N	8	W	0.0	131
613	5.0	357	N	3	W	0.0	128
615	4.7	331	N	29	W	0.0	128
616	3.8	341	N	19	W	0.0	131
618	3.9	145	S	35	E	0.0	131
619	4.7	154	S	26	E	0.0	131
625	6.1	317	N	43	W	0.0	128
626	8.7	308	N	52	W	0.0	128
627	12.4	291	N	69	W	0.0	128
629	11.4	267	S	87	W	0.0	128
631	7.6	291	N	69	W	0.0	133
633	6.5	28	N	28	E	0.0	148
641	15.5	101	S	79	E	0.0	158
643	5.7	118	S	62	E	0.0	148
645	8.7	112	S	68	E	0.0	153
646	8.6	114	S	66	E	0.0	148
647	12.6	105	S	75	E	0.0	143
649	8.8	90			E	0.0	131
651	6.7	113	S	67	E	0.0	138
652	5.7	118	S	62	E	0.0	148
653	6.1	102	S	78	E	0.0	153
657	4.0	144	S	36	E	0.0	158

658	3.8	133	S	47	E	0.0	163
659	5.7	133	S	47	E	0.0	163
661	4.8	143	S	37	E	0.0	166
663	4.0	62	N	62	E	0.0	168
665	6.1	57	N	57	E	0.0	168
667	1.1	231	S	51	W	0.0	171
668	1.1	173	S	7	E	0.0	173
669	5.1	124	S	56	E	0.0	173
670	5.1	124	S	56	E	0.0	173
671	7.7	108	S	72	E	0.0	168
673	1.1	223	S	43	W	0.0	163
676	10.0	332	N	28	W	0.0	163
677	4.0	177	S	3	E	0.0	163
679	7.6	128	S	52	E	0.0	158
681	6.7	138	S	42	E	0.0	163
683	5.1	114	S	66	E	0.0	163
685	5.1	117	S	63	E	0.0	166
686	6.9	124	S	56	E	0.0	168
687	5.1	119	S	61	E	0.0	168
689	3.8	138	S	42	E	0.0	168
691	3.8	138	S	42	E	0.0	168
693	4.8	129	S	51	E	0.0	166
694	1.9	138	S	42	E	0.0	168
695	2.9	130	S	50	E	0.0	171
697	7.9	182	S	2	W	0.0	168
698	4.0	122	S	58	E	0.0	168
699	3.3	108	S	72	E	0.0	168
701	2.9	159	S	21	E	0.0	178
703	3.3	178	S	2	E	0.0	178
705	2.9	137	S	43	E	0.0	178
706	4.0	159	S	21	E	0.0	173
707	4.8	150	S	30	E	0.0	173
709	10.0	124	S	56	E	0.0	173
711	10.5	157	S	23	E	0.0	178
713	12.7	218	S	38	W	0.0	171
715	9.0	123	S	57	E	0.0	171
717	5.7	141	S	39	E	0.0	171
719	2.9	269	S	89	W	0.0	168
721	7.7	133	S	47	E	0.0	171
725	6.7	133	S	47	E	0.0	168
727	9.0	120	S	60	E	0.0	168
728	6.7	131	S	49	E	0.0	166
729	5.7	133	S	47	E	0.0	163