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GeothermEx, Inc. 901 MENDOCINO AVE. BERKELEY, CA. 94707

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TECHNICAL REPORT

DEEP WELL TEST AND EXPLORATION PROGRAM

for

ORE-IDA NO. 1,

ONTARIO, OREGON

VOLUME 2 - APPENDICES A, B, C, D, E

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APPENDIX A

BINOCULAR MICROSCOPE DESCRIPTION OF CUTTINGS AND CORE

Notes:

1. Sample depths are determined by mud loggers from a lagging estimation based on depth and mud pump strokes, confirmed by carbide test slugs. The formation changes on this log do not always conform with the geophysical logs.

2. The cuttings were washed and dried before examination. These samples do not account for soft and fine formation materials which were washed out in their preparation. The Mud Log may provide a better estimate of the total sample composition.

3. The term Basalt/Diabase has been used to signify a basic compositon igneous rock which is holocrystalline and phaneritic, with non-oriented plagioclase laths surrounding brown pyroxene or plagioclase laths interbedded in pyroxene. The texture is very frequently diabasic. In the absence of larger textural data or information concerning the relationships of these units to the surrounding rocks, it is uncertain if they are all flows or whether some are intrusives.

DEPTH	DESCRIPTION
0 - 30	No sample
30 - 60	No sample 30-54. 100% Claystone, slightly silty, light to medium gray, slightly greenish; poor to medium induration.
60 - 90	100% Claystone, as above. Trace of very fine mica.
90-120	90% Claystone, as above. Trace of pelecypod shells. 10% Sand, angular to subrounded, very fine to fine grains; quartz, dark grains, possible trace of glass shards.
120-150	60% Sandstone, light gray, silty, argillaceous, very fine grained, weakly indurated trace mica; fish vertebrae. 40% Claystone, silty, light gray, trace mica. Trace of calcite veinlets.
150-180	80% Sand and Sandstone, light gray, very fine grained, very silty and argillacous, angular to subrounded, weakly indurated; quartz, mica, dark rock fragments, glass shards. 20% Claystone, light gray, silty, as above. Trace of fish bone material.
180-210	90% Sand and Sandstone, light gray, very fine grained, very silty and argillaceous, weakly indurated, as above. 10% Claystone, silty, as above.
210-240	100% Siltstone, light gray, argillaceous, with very fine sand; weakly indurated tuffaceous, with fresh microscopic glass shard fragments.
240-270	95% Siltstone, as above, argillaceous, with very fine sand, tuffaceous. 5% Limestone, light brown, silty argillaceous, probably as thin beds or concretionary streaks.
270-300	100% Siltstone, light gray, argillaceous, with very fine sand, tuffaceous, with microscopic glass shards; slightly calcareous. Trace of brown mica. Weakly indurated.
300-330	97% Siltstone, as above, 3% Limestone, medium brown, silty, argillaceous, hard, probably present as thin beds or concretions.
330-360	100% Siltstone, as above.

360-390	97% Siltstone, as above. 3% Limestone, medium brown, silty, argillaceous, hard.
390-420	100% Siltstone, as above.
420-450	97% Siltstone, as above. 3% Limestone, medium brown, silty, argillaceous, hard.
450-480	90% Siltstone, as above. 10% Limestone, as above, grading into calcareous claystone, brown, silty.
480-510	100% Siltstone, as above.
510-540	100% Siltstone, as above.
540-570	100% Siltstone, light gray, argillaceous, tuffaceous, with microscopic glass shards and trace of brown mica, weakly indurated.
570-600	100% Siltstone, as above, slightly sandy.
600-630	97% Siltstone, as above. 3% Limestone, light brown, argillaceous, silty, hard.
630-660	100% Siltstone, as above, slightly sandy.
660-690	100% Siltstone, as above. Trace of limestone, brown, argillaceous, silty.
690-720	100% Siltstone, light gray, argillaceous, tuffaceous, with microscopic glass shards, trace of brown mica and very fine-grained sand; weakly indurated, slightly calcareous.
720-750	97% Siltstone, as above. 3% Limestone, light brown, argillaceous, silty.
750-780	100% Siltstone, as above.
780-810	100% Siltstone, as above.
810-840	100% Siltstone, as above, or claystone, silty, tuffaceous.
840-870	100% Claystone, light gray, silty, tuffaceous, slightly calcareous. Differs from 690-720 only by increase of clay relative to silt and decrease of sand; weakly indurated.
870-900	100% Claystone, as above.
900-930	100% Claystone, as above.

930 - 960	100% Siltstone, light gray, argillaceous, tuffaceous(?), weakly indurated.
960 - 990	100% Siltstone, as above.
990-1,020	100% Siltstone, as above, with trace of sand, very fine grained.
1,020-1,050	100% Siltstone, as above, slightly calcareous.
1,050-1,080	100% Siltstone, as above.
1,080-1,110	70% Sandstone, light gray, fine to very fine grained, silty, argillaceous, tuffaceous, slightly calcareous. Many clasts are glass shards; trace of brown mica, weakly indurated. 30% Siltstone, light gray, as above.
1,110-1,140	70% Siltstone, light gray, argillaceous, tuffaceous, trace of brown mica. 30% Sand or Sandstone, as above.
1,140-1,170	90% Siltstone, as above. 10% Sand or Sandstone, as above.
1,170-1,200	50% Siltstone, as above. 50% Sand or Sandstone, as above.
1,200-1,230	70% Siltstone, light gray, argillaceous, tuffaceous, weakly indurated, as above; trace biotite mica. 30% Sandstone and Sand, light gray, very fine to fine grained, silty, slightly calcareous, weakly indurated, tuffaceous; clasts of quartz, glass shards, dark chert or siliceous volcanic fragments, angular to subrounded.
1,230-1,260	90% Siltstone, as above. 5% Claystone, light gray, waxy, firm. 5% Sandstone, as above. Trace of Limestone, light tan-gray.
1,260-1,290	50% Claystone, as above, silty. 40% Siltstone, as above. 10% Sand, as above.
1,290-1,320	100% Siltstone, as above.
1,320-1,340	100% Siltstone, as above. Trace of Sand, as above.

1,350-1,380	100% Siltstone, as above; trace biotite mica.
1,380-1,410	100% Siltstone, as above.
1,410-1,440	100% Siltstone, light gray, micaceous, argillaceous, tuffaceous, slightly calcareous; weakly indurated.
1,440-1,470	80% Siltstone, as above. 20% Sandstone, very fine to medium grained, poorly sorted, angular to well-rounded grains, multicolored (red, yellow, green, dark and light), silty or argillaceous, very poorly lithified, slightly calcareous, with micro-gastropods in sandstone.
1,470-1,500	80% Sandstone, as above, with aligned glass shards in matrix; moderately calcareous. Sandstone has greenish-gray color when wet. 20% Siltstone, as above.
1,500-1,530	95% Claystone, light gray, silty, tuffaceous, micaceous, slightly to moderately indurated. 5% Sandstone, as above.
1,530-1,560	90% Claystone, as above, very light gray, slightly calcareous. 10% Sandstone, as above.
1,560-1,590	100% Claystone, as above, light gray to very light gray. Chips are well-formed, indicating better induration.
1,590-1,620	100% Claystone, as above, slightly calcareous. Trace Sandstone, as above.
1,620-1,650	100% Claystone, as above. Trace of calcite fracture-filling.
1,650-1,680	100% Claystone, light gray, tuffaceous, silty, micaceous, slightly to moderately indurated, slightly calcareous.
1,680-1,710	100% Claystone, light gray to very light gray, as above.
1,710-1,740	100% Claystone, as above.
1,740-1,770	80% Claystone, as above. 20% Sand and Sandstone, poorly sorted, with varicolored fragments angular to rounded, slightly calcareous, non-lithified to slightly indurated, argillaceous, fine to medium grained.

1,770-1,800	50% Claystone, as above. 50% Sandstone, as above. Trace of siliceous Shale, greenish-gray.
1,800-1,830	70% Sandstone, as above. Abundant glass shards, mica. 30% Claystone, as above.
1,830-1,860	90% Claystone, as above. 10% Sandstone, as above.
1,860-1,890	90% Claystone, as above. 10% Sandstone, as above. Calcite vugs and veins.
1,890-1,920	95% Claystone, as above, slightly fissile. 5% Sandstone, as above.
1,920-1,950	100% Claystone, as above, no fissility. Trace of Sandstone, as above.
1,950-1,980	100% Claystone, light gray to very light gray, tuffaceous, micaceous, silty, slightly calcareous, slightly indurated. Trace of Sand, as above.
1,980-2,010	100% Claystone, as above. Slight to moderate induration. Trace of Sand, as above.
2,010-2,040	100% Claystone, as above. Trace of Sand.
2,040-2,070	100% Claystone, as above, some with abundant mica and carbonaceous material. Trace of Sand.
2,070-2,100	100% Claystone, as above. Trace of very fine grained Sandstone and Sand.
2,100-2,130	100% Claystone, as above. Trace of Sand, as above.
2,130-2,160	60% Claystone, as above. 40% Sandstone, very fine grained to fine grained, argillaceous, tuffaceous, poorly sorted; slightly indurated, slightly calcareous.
2,160-2,190	80% Claystone, as above. 10% Sand and Sandstone, as above.
2,190-2,220	95% Claystone, as above, abundant biotite. 5% Sand and Sandstone, as above.
2,220-2,250	100% Claystone, as above. Trace of Sand, as above.

2,250-2,280	100% Claystone, as above, with some sandy and micaceous streaks. Trace Sandstone.
2,280-2,310	100% Claystone, as above.
2,310-2,340	100% Claystone, as above. Trace Sand, as above.
2,340-2,370	80% Sandstone, light gray, very fine grained, very tuffaceous, moderately indurated. 20% Claystone, as above.
2,370-2,400	50% Sandstone, as above. 50% Claystone, as above, silty.
2,400-2,430	70% Sandstone, as above. 30% Claystone, as above.
2,430-2,460	60% Claystone, light gray, slightly silty. 40% Sandstone, light gray, very fine to fine grained, tuffaceous, silty.
2,460-2,490	90% Claystone, as above. 10% Sandstone and Sand, as above. Trace Limestone, hard, gray.
2,490-2,520	100% Claystone, as above. Trace of Siltstone, tuffaceous, and Sandstone, as above.
2,520-2,550	90% Claystone, light gray, tuffaceous, weakly indurated, more or less silty, slightly micaceous. 10% Sand and Sandstone, light gray, tuffaceous, silty, slightly calcareous, slightly indurated.
2,550-2,580	90% Claystone, as above. 10% Sand and Sandstone, as above.
2,580-2,610	90% Claystone, as above. 10% Sand and Sandstone, as above. Trace of white clay (altered very fine grained tuff).
2,610-2,640	80% Claystone, light gray, silty, tuffaceous, slightly micaceous, weakly to moderately indurated. 20% Sandstone, very fine grained, argillaceous, tuffaceous, weakly indurated.
2,640-2,670	95% Claystone, as above. 5% Sandstone, as above.
2,670-2,700	95% Claystone, silty, as above. 5% Sandstone, as above.

2,700-2,730	100% Claystone, as above.
2,730-2,760	100% Claystone, as above. Trace of Sand and white Claystone or altered tuff.
2,760-2,790	100% Claystone, as above.
2,790-2,820	100% Claystone, as above.
2,820-2,850	100% Claystone, as above; trace of slickensides.
2,850-2,880	100% Claystone, light gray, slightly silty, tuffaceous, slightly micaceous, weakly to moderately indurated.
2,880-2,910	100% Claystone, as above. Trace of Tuff, white, fine-grained, altered to clay.
2,910-2,940	100% Claystone, as above, with a trace of carbonaceous(?) film. Trace of Tuff, white, as above.
2,940-2,970	100% Claystone, as above. Trace of Tuff, white, as above.
2,970-3,000	100% Claystone, as above Trace of Tuff, white, as above.
3,000-3,030	100% Claystone, as above. Trace of Tuff, white and dark gray, altered to clay, as above.
3,030-3,090	100% Claystone, as above.
3,090-3,120	100% Claystone, as above. Trace of Tuff, white, as above.
3,120-3,150	100% Claystone, as above. Trace of Tuff, white, as above.
3,150-3,180	100% Claystone, as above.
3,180-3,210	100% Claystone, as above.
3,210-3,240	100% Claystone, as above. Trace of Sandstone, light gray, very fine grained, argillaceous, weakly indurated.
3,240-3,270	100% Claystone, light gray, silty, tuffaceous, slightly calcareous, weakly indurated.
3,270-3,300	100% Claystone, as above.

3,300-3,330	100% Claystone, as above.
3,330-3,360	100% Claystone, as above. Trace of Tuff, white, very fine grained, altered to clay.
3,350±	Desilter sample: Sand, very fine to medium, volcanic quartz, glass shards, marcasite(?) concretions, siliceous rock fragments, obsidian spheres, glassy feldspar, fish bone(?), chips of Sandstone and Claystone.
3,360-3,390	100% Claystone, as above.
3,390-3,420	100% Claystone, as above.
3,420-3,450	100% Claystone, as above.
3,450-3,480	100% Claystone, as above, slightly micaceous.
3,480-3,510	80% Siltstone or Claystone, silty, very tuffaceous, light gray; moderately indurated. 20% Sandstone, very fine grained, tuffaceous. Trace of Tuff, light to dark gray, waxy, altered to clay. Trace of marcasite(?) crystals.
3,510-3,540	100% Siltstone, light gray, argillaceous, very tuffaceous, as above.
3,540-3,570	60% Siltstone, as above, very tuffaceous. 40% Claystone, light to medium gray, silty, tuffaceous.
3,570-3,600	80% Siltstone, very light gray, argillaceous, very tuffaceous. 20% Claystone, light to medium gray, silty, tuffaceous.
3,600-3,630	100% Siltstone, light gray to very light gray, very tuffaceous. Trace of Tuff, white, very fine grained, altered to clay.
3,630-3,660	90% Claystone, light to medium gray, silty, tuffaceous. 10% Siltstone, light gray, very tuffaceous, micaceous. Trace of Sandstone, light gray, very fine grained, tuffaceous. Trace of Tuff, white, altered to clay.
3,660-3,690	100% Siltstone, light to medium gray, very tuffaceous, slightly micaceous (biotite).
3,690-3,720	60% Siltstone, as above. 40% Claystone, medium gray, tuffaceous, sticky.
3,720-3,750	100% Siltstone, light and medium gray, as above.

3,750-3,780	100% Siltstone, light and medium gray, as above.
3,780	Desilter sample: quartz, siliceous rock grains, biotite mica, glassy feldspar cleavages, Pumice and tuffaceous Siltstone, glass shards.
3,780-3,810	100% Siltstone, light gray, very tuffaceous, moderate induration.
3,810-3,840	100% Siltstone, very light to medium gray, as above.
3,840-3,870	100% Siltstone, as above.
3,870-3,900	100% Siltstone, as above, trace of pyrite or marcasite in granular film.
3,900-3,930	100% Siltstone, as above, trace of biotite mica.
3,930-3,960	95% Siltstone, light to very light gray, very tuffaceous, as above. 5% Tuff, white, clay alteration, very fine grained glass shards.
3,960-3,990	100% Siltstone, as above, trace of biotite.
3,990-4,020	90% Siltstone, as above. 10% Tuff, white, altered glass shards, very fine grained. Trace of Sandstone, very fine grained, tuffaceous.
4,020-4,050	80% Siltstone, as above. 20% Claystone, medium gray, waxy. Trace of Tuff, white, fine grained, clay alteration. Trace of Sandstone, very fine grained, tuffaceous, soft.
4,050-4,080	100% Siltstone, as above.
4,080-4,110	100% Siltstone, as above. Trace of pyrite or marcasite. Trace of Tuff, white, altered to clay. Trace of Sandstone, very fine grained, tuffaceous.
4,110-4,140	100% Siltstone, as above, micaceous, trace of calcite vein material.
4,140-4,170	80% Siltstone, as above. 20% Siltstone, sandy, very fine grained, light gray, tuffaceous, trace of quartz, biotite granite clasts.
4,170-4,200	95% Siltstone, light gray, very tuffaceous, trace of mica; slightly calcareous. 5% Sandstone, light gray, fine grained, poor sorting, angular to rounded, tuffaceous, slightly calcareous, grains of quartz, feldspar (glassy) red and black siliceous rock fragments.

4,200-4,230	100% Siltstone, as above.
4,230-4,260	100% Siltstone, as above, trace of vein calcite.
4,260-4,290	100% Siltstone, as above, micaceous (biotite).
4,290-4,320	100% Siltstone, as above Trace of Sandstone, as above.
4,320-4,350	100% Siltstone, as above.
4,350-4,380	100% Siltstone, as above. Trace of vein calcite.
4,380-4,410	100% Siltstone, as above, slightly micaceous (biotite). Trace of Sandstone, very fine grained, tuffaceous. Trace of vein calcite.
4,410-4,440	100% Siltstone, as above, slightly micaceous.
4,440-4,470	95% Siltstone, as above. 5% Sandstone, light gray, fine-grained, with quartz, mica, glassy feldspar(?), tuffaceous.
4,470-4,500	100% Siltstone, light gray, slightly micaceous, as above.
4,500-4,530	100% Siltstone, light gray, micaceous, tuffaceous, moderate induration. Trace of Sandstone, very fine grained, with quartz, mica, feldspar (glassy), tuffaceous and silicious rock fragments.
4,530-4,560	100% Siltstone, as above, trace of coarse muscovite flakes. Trace of Sandstone, as above. Trace of vein calcite.
4,560-4,590	80% Siltstone, as above (possibly caving). 15% Sandstone, fine to medium grained, hard; clasts are quartz, biotite, glass shards(?), silicious rock fragments. 5% Tuff, white, fine-grained altered to clay, soft.
4,590-4,600	60% Siltstone, as above (caving). 20% Basalt/Diabase, dark green-gray, partly altered, hard and soft, holocrystalline, tabular glassy plagioclase, brownish pyroxene; anhedral to subhedral magnetite is abundant. Includes some green and white chloritic-clay material, perhaps an altered contact zone. 15% Sandstone, as above. 5% Tuff, white, as above. Trace of granular pyrite lumps.

4,600-4,610	60% Siltstone, as above (caving). 30% Basalt/Diabase, as above. 10% Sandstone, as above.
4,610-4,620	50% Siltstone, as above (caving). 50% Basalt/Diabase, as above.
4,620-4,630	60% Basalt/Diabase, as above. 40% Siltstone, as above (caving).
4,630-4,640	80% Basalt/Diabase, as above. 20% Siltstone, as above (caving).
4,640-4,650	50% Siltstone, as above (caving). 50% Basalt/Diabase, as above.
4,650-4,660	50% Siltstone, as above (caving). 50% Basalt/Diabase, as above.
4,660-4,670	50% Basalt/Diabase, as above (caving). 40% Siltstone, as above (caving). 10% Sandstone, light gray, medium to coarse grained, angular to subrounded, fair to poor sorting; quartz (some crystal overgrowths?), trace of biotite, dark rock fragments and milky white feldspar(?).
4,670-4,680	50% Basalt/Diabase, as above (caving?). 30% Siltstone, as above (caving). 20% Sandstone, as above.
4,680-4,710	50% Basalt/Diabase, as above (caving?). 30% Sandstone, as above. 20% Siltstone, as above.
4,710-4,740	100% Siltstone, light gray, tuffaceous; some pieces micaceous (biotite), moderately indurated. Trace of Basalt/Diabase, as above. Trace of vein calcite.
4,740-4,770	100% Siltstone, as above.
4,770-4,800	70% Siltstone, as above. 30% Tuff, white, fine-grained, granular, altered, moderately hard.
4,800-4,830	50% Siltstone, as above. 50% Tuff, as above, fine glass shards visible. Trace of Basalt/Diabase.
4,830-4,860	60% Tuff, as above. 40% Siltstone, as above. Trace of Basalt/Diabase. Trace of Sandstone, medium-grained.

4,860-4,890	80% Siltstone, as above. 20% Tuff, as above.
4,890-4,920	85% Siltstone, as above. 10% Tuff, as above. 5% Sandstone, white tuffaceous, fine-grained, quartz, muscovite, rock fragments, tuffaceous matrix.
4,920-4,050	90% Siltstone, as above. 10% Tuff, as above but finer grained.
4,950-4,980	95% Siltstone, as above. 5% Tuff, as above. Trace of calcite.
4,980-5,010	80% Siltstone, light gray, tuffaceous, argillaceous, moderate induration, slightly calcareous. 20% Tuff, white, fine to very fine grained, altered glass shards, moderate induration.
5,010-5,040	95% Siltstone, as above, trace of pyrite. 5% Tuff, as above. Trace of Sandstone, as above.
5,040-5,060	50% Siltstone, as above. 50% Siltstone or very fine tuff, light gray, trace of mica. Trace of Sandstone, as above.
5,060-5,070	70% Siltstone, light gray, as above. 30% Sandstone, light gray, fine grained, tuffaceous matrix, as above.
5,070-5,080	80% Siltstone, as above. 20% Sandstone, as above.
5,080-5,100	80% Siltstone, as above. 10% Sandstone, as above. Trace of calcite veinlets.
5,100-5,110	100% Siltstone.
5,110-5,120	95% Siltstone, as above. 5% Sandstone, as above.
5,120-5,130	60% Siltstone, as above. 40% Sandstone, light gray, fine grained, quartz, muscovite, biotite, feldspar(?); moderately indurated, tuffaceous matrix(?).
5,130-5,140	60% Siltstone, light gray, tuffaceous, trace of mica. 40% Sandstone, light gray, fine-grained quartz, mica, feldspar(?), black rock fragments, tuffaceous matrix; trace of intergranular pyrite.

5,140-5,150	50% Siltstone, as above, moderately well indurated. 30% Sandstone, as above, abundant mica. 20% Tuff, white, soft, fine grained.
5,150-5,160	60% Siltstone, as above, moderately well indurated. 20% Sandstone, as above. 20% Tuff, as above. Trace of Basalt/Diabase.
5,160-5,180	80% Siltstone, as above (caving). 10% Basalt/Diabase, as above. 5% Tuff, white, as above; some with glass shards. 5% light-colored igneous rock, granitic texture, feldspar (white, partly altered; trace of biotite(?) and trace of quartz. Possibly coarse clasts from sandstone.
5,180-5,190	80% Siltstone, as above (caving). 15% Basalt/Diabase, as above. 5% Tuff, as above. Trace of pyrite. Trace of Sandstone, coarse, poorly sorted, pebbly.
5,190-5,200	60% Siltstone, light gray, tuffaceous, moderate induration (all caving). 30% Basalt/Diabase, dark gray, slight green stain (plagioclase, brown amphibole, magnetite). 5% Tuff, fine grained, clay alteration. 5% Sandstone, medium grained, pebbly; clasts of granite(?) and gray siliceous rock.
5,200-5,210	50% Basalt/Diabase, as above. 45% Siltstone, as above (caving). 5% Tuff, white, as above.
5,210-5,220	80% Siltstone, as above (caving). 20% Basalt/Diabase, as above. Trace of Tuff, white, micaceous.
5,220-5,230	70% Siltstone, as above (caving). 20% Basalt/Diabase, as above. 10% Tuff, white, fine grained (caving).
5,230-5,240	80% Siltstone, as above (caving). 20% Basalt/Diabase, as above. Trace of Tuff (caving).
5,240-5,250	80% Siltstone, as above (caving), occasional scattered pebbles. 15% Basalt/Diabase, as above. 5% Tuff, white, as above (caving).

5,250-5,260	60% Siltstone, as above (caving). 40% Basalt/Diabase, as above. Trace of Tuff, white, as above (caving).
5,260-5,270	80% Siltstone, light gray, tuffaceous, moderate induration (caving). 20% Basalt/Diabase, as above; with increasing hydrothermal veinlets(?) of white soft mineral containing trace of residual magnetite.
5,270-5,290	90% Siltstone, as above (caving?). 5% Basalt/Diabase, as above. 5% Sandstone, light gray, fine grained, very tuffaceous.
5,290-5,300	70% Basalt/Diabase, as above. 30% Siltstone, as above (caving).
5,300-5,310	60% Basalt/Diabase, as above; some diabase is light gray, fine crystalline, perhaps a segregation or xenolith; some is white, altered magnetite-containing material (zeolite?). 40% Siltstone, as above.
5,310-5,320	50% Tuff, white, very fine grained, altered to clay. 40% Siltstone, as above (caving?). 20% Basalt/Diabase, as above (caving?).
5,320-5,330	60% Siltstone, as above (caving?). 20% Tuff, as above. 20% Basalt/Diabase (caving?).
5,330-5,340	50% Siltstone, light to medium gray, tuffaceous, argillaceous, moderate induration. 30% Siltstone, light gray (caving). 10% Basalt/Diabase, as above (caving). 10% Tuff, white, as above.
5,340-5,350	60% Siltstone, light gray, as above (caving). 20% Tuff, as above (caving?). 10% Basalt/Diabase (caving). 10% Siltstone, medium gray, as above.
5,350-5,360	70% Siltstone, light gray, as above (caving). 20% Basalt/Diabase, as above (caving?). 10% Siltstone, medium gray, as above. Trace of Tuff, white, as above.
5,360-5,370	50% Siltstone, medium gray, as above. 40% Basalt/Diabase, as above (caving?). 10% Siltstone, light gray, as above (caving?). Trace of Tuff, white (caving).

5,370-5,380	Sample appears to be entirely caving. Basalt/Diabase, white Tuff, light gray Siltstone. Trace of Sandstone, light gray, fine grained, tuffaceous.
5,380-5,390	Mostly caving (Siltstone, light gray; Tuff, white; Basalt/Diabase) Siltstone, medium gray; and Sandstone, as above.
5,390-5,400	Mostly caving (Basalt/Diabase, Siltstone, light gray) Siltstone, medium gray, as above (in situ).
5,400-5,410	Mostly caving (Siltstone, light gray; Basalt/Diabase Siltstone, light to medium gray, as above (in situ?). Trace of Sandstone, as above.
5,410-5,440	Mostly caving, as above. Siltstone, light to medium gray, as above (in situ?).
5,440-5,450	60% Siltstone, light gray, tuffaceous, moderately indurated (caving?). 40% Sandstone, light gray, fine grained, poor sorting, angular to subrounded; tuffaceous and calcareous matrix. Clasts are quartz, glass shards(?), trace of biotite, black aphanitic fragments; possibly glassy feldspar; weakly indurated.
5,450-5,460	70% Sandstone, as above, trace of medium-grained clasts in fine-grained matrix. 20% Siltstone, as above (caving). 10% Tuff, white, as above. Trace of Basalt/Diabase.
5,460-5,470	70% Siltstone, as above (caving?). 30% Sandstone, as above. Trace of diabase. Trace of Tuff, white, as above.
5,470-5,480	80% Siltstone, very light gray, tuffaceous (% caving?). 20% Sandstone, as above; locally abundant biotite.
5,480-5,490	70% Siltstone, as above (% caving?), trace of pyrite. 30% Sandstone, as above. Trace of Basalt/Diabase.
5,490-5,500	60% Sandstone, as above. 40% Siltstone, as above (% caving?). Trace of Basalt/Diabase.
5,500-5,510	60% Siltstone, as above (% caving?). 40% Sandstone, as above.

5,510-5,520	80% Siltstone, light gray, tuffaceous, as above (% caving?). 10% Sandstone, fine grained, slightly calcareous, tuffaceous, weakly indurated. 10% Tuff, white, fine grained, altered. Trace of Basalt/Diabase. Trace of thin calcite veinlet with disseminated pyrite.
5,520-5,530	50% Siltstone, very light gray, as above (% caving?). 45% Sandstone, as above. 5% Sandstone, light gray, medium grained angular to subrounded; quartz, glassy plagioclase, minor biotite, trace of pyrite in interstices, very little aphanite groundmass, probably opaline silica cement.
5,530-5,540	60% Sandstone, fine grained, tuffaceous, as above. 35% Siltstone, as above. 5% Sandstone, medium grained, as above, siliceous.
5,540-5,550	60% Siltstone, as above. 50% Sandstone, fine grained, as above. Trace of Sandstone, medium grained, as above.
5,550-5,560	60% Sandstone, fine grained, tuffaceous, as above. 40% Siltstone, as above (much caving).
5,560-5,570	90% Siltstone, as above (% caving?). 10% Sandstone, fine grained, tuffaceous, poorly indurated, as above.
5,570-5,580	100% Siltstone, as above, with some dark gray siltstone (% caving?). Trace of Basalt/Diabase.
5,580-5,590	30% Siltstone, light gray, tuffaceous, moderately indurated, as above (% caving?). 30% Siltstone, medium to dark gray, tuffaceous, moderately indurated (caving?). 35% Basalt/Diabase, dark gray (plagioclase-pyroxene-magnetite). 5% Sandstone, fine grained, tuffaceous (caving?). Trace of Tuff, white, fine grained (caving?). Trace of Sandstone, light gray, medium grained, siliceous, as above (caving?).
5,590-5,600	85% Basalt/Diabase, as above, finer grained than 5,160-5,300 or 4,580-4,660. Magnetite-rich. 5% Siltstone, light gray, as above; trace of marcasite or pyrite. 5% Sandstone, fine grained, as above. 5% Siltstone, dark gray, as above.

5,600-5,610	90% Basalt/Diabase, as above. 10% Siltstone, as above (caving).
5,610-5,620	95% Basalt/Diabase, as above, continued finer grained than previous bodies. 5% Tuff, as above (caving).
5,620-5,630	100% Basalt/Diabase, as above. Trace of Siltstone (caving).
5,630-5,640	95% Basalt/Diabase, as above. Trace with microcrystalline groundmass. 5% Siltstone, as above (caving).
5,640-5,650	100% Basalt/Diabase, dark gray (plagioclase, brown pyroxene and abundant magnetite); slightly coarser grained than above.
5,650-5,660	80% Basalt/Diabase, as above. 20% Siltstone, light gray, tuffaceous, poorly to moderately indurated (caving?).
5,660-5,670	90% Basalt/Diabase, as above. 10% Siltstone, as above (caving).
5,670-5,680	60% Siltstone, as above (% caving?). 35% Basalt/Diabase, as above. 5% Sandstone, light gray, fine-grained tuffaceous matrix, weakly indurated.
5,680-5,690	70% Basalt/Diabase, as above. 30% Siltstone, as above (caving?).
5,690-5,700	80% Siltstone, as above, very light gray to tan. 20% Basalt/Diabase, as above.
5,700-5,720	80% Siltstone, as above, very light gray. 20% Basalt/Diabase, as above (caving). Trace of pyrite. Trace of Sandstone, medium grained, siliceous. Trace of Tuff, white, very fine grained, altered to clay.
5,720-5,730	80% Siltstone, as above. 20% Basalt/Diabase, as above (caving). Trace of pyrite.
5,730-5,740	70% Siltstone, light tan-gray, very tuffaceous, weakly to moderately indurated. 30% Basalt/Diabase, dark gray (plagioclase, pyroxene, abundant magnetite), (caving).

5,740-5,750	50% Claystone, light to medium gray, silty, tuffaceous. 40% Siltstone, light tan-gray, as above (% caving?). 10% Basalt/Diabase, as above (caving).
5,750-5,760	70% Claystone, silty, as above. 30% Siltstone, as above.
5,760-5,770	80% Claystone, as above. 20% Siltstone, as above.
5,770-5,780	90% Claystone, as above. 10% Siltstone, as above. Trace of Tuff, white, very fine grained, altered to clay.
5,780-5,790	90% Claystone, as above. 10% Siltstone, as above.
5,790-5,800	95% Claystone, as above, trace of disseminated pyrite. 5% Sandstone, light gray, fine grained, tuffaceous, weakly indurated.
5,800-5,810	60% Claystone, light to medium gray, as above. 40% Siltstone, as above. Trace of Sandstone, fine grained, tuffaceous. Trace of Sandstone, fine to medium grained (quartz, biotite), siliceous.
5,810-5,820	Poor sample--mostly caving. 100% Claystone(?), medium gray, micaceous.
5,820-5,830	90% Claystone, light to medium gray, silty, tuffaceous, disseminated pyrite. 10% Sandstone, fine to medium grained. Trace of coarse grained, light gray, tuffaceous Sandstone, angular to subrounded. Trace of Basalt/Diabase (caving). Trace of pyrite.
5,830-5,840	90% Claystone, as above. 5% Sandstone, light gray, coarse grained, angular to subrounded (quartz, feldspar, rock fragments). 5% Sandstone, fine grained, as above.
5,840-5,850	60% Claystone, as above (% caving?), trace of pyrite. 30% Sandstone, mostly coarse, as above. 10% Basalt/Diabase (caving).
5,850-5,880	60% Claystone, as above. 30% Sandstone, mostly coarse, as above. 10% Basalt/Diabase, as above (caving). Trace of pyrite.

5,880-5,910	50% Claystone, as above (caving?). 50% Sandstone, light gray, fine, medium, and coarse, as above; weakly indurated quartz, feldspar, mica, rock fragments, tuffaceous matrix, and siliceous cement.
5,910-5,940	60% Sandstone, as above. 40% Claystone, as above (caving?).
5,910-5,940	80% Sandstone, light gray, fine to medium grained, tuffaceous matrix, poor sorting, subangular to subrounded (quartz with overgrowths, mica, feldspar, rock fragments) trace pyrite; slightly calcareous, weakly indurated. 20% Claystone, light to medium gray, silty, tuffaceous, moderately indurated.
5,940-5,950	60% Sandstone, as above. 40% Claystone, as above (% caving?).
5,950-5,960	80% Sandstone, as above, very tuffaceous. 20% Claystone, as above (% caving?).
5,960-5,990	80% Sandstone, as above, very tuffaceous. 20% Claystone, as above (% caving?).
5,990-6,020	80% Sandstone, as above. 20% Claystone, as above (% caving?).
6,020-6,050	90% Sandstone, as above, harder, less tuffaceous. 10% Siltstone, dark gray, slightly micaceous.
6,050-6,080	80% basic intrusive or lava, dark green-gray, very fine grained, holocrystalline (mainly plagioclase, minor euhedral magnetite), partly to entirely sausseritized. Appears mineralogically related to diabase or diabasic textured basalt. 10% Sandstone, as above. 10% Claystone, as above.
6,080-6,090	40% Basalt, as above. 40% Basalt(?) or altered Basalt Tuff, medium green-gray, microgranular with traces of brown pyroxene, plagioclase, and magnetite phenocrysts; matrix altered to green and white "clay," appears almost to have pyroclastic texture. 20% Sandstone, white, tuffaceous, as above.
6,090-6,100	95% Basalt(?), dark green-gray, very fine to fine crystalline, holocrystalline, variable amounts of pyroxene, plagioclase, and magnetite phenocrysts in granular groundmass. More or less sausseritized. Minor diabasic texture. Trace of pyrite. 5% Sandstone, light gray, coarse grained, arkosic.

6,100-6,110	95% Basalt, dark green-gray, as above. Some textures appear pyroclastic; some range to fine-grained diabasic. 5% Tuff, white, fine grained, altered.
6,110-6,120	95% Basalt, as above. Increasing diabasic texture. 5% Tuff, white, as above.
6,120-6,130	100% Basalt, as above, uncertain whether flow or intrusion. Matrix is very fine grained with a few phenocrysts of plagioclase and pyroxene. May contain clots of coarse crystals with more or less diabasic texture (glomeroporphyritic).
6,130-6,140	100% Basalt, as above.
6,140-6,150	100% Basalt, as above.
6,150-6,160	100% Basalt, as above.
6,160-6,170	100% Basalt, dark green-gray, fine-grained matrix, pyroxene and plagioclase phenocrysts, and abundant magnetite; pervasively altered, with feldspars saussuritized; patches of white clay-like alteration; texture is partly porphyritic, partly diabasic, and partly aphanitic.
6,170-6,180	100% Basalt, as above.
6,180-6,190	100% Basalt, as above.
6,190-6,200	100% Basalt, as above, trace of pyrite.
6,200-6,210	100% Basalt, as above, trace of pyrite.
6,210-6,220	100% Basalt, as above.
6,220-6,230	100% Basalt, as above, trace of pyrite.
6,230-6,240	100% Basalt, as above.
6,240-6,250	95% Basalt, as above, trace of coarse diabasic texture. 5% Sandstone, white, fine grained, tuffaceous. Trace of Sandstone, hard, medium grained, siliceous.
6,250-6,260	100% Basalt, as above.
6,260-6,270	100% Basalt, as above, some plagioclase-pyroxene undergrowths, subdiabasic(?).
6,270-6,280	100% Basalt, as above.

6,280-6,290	100% Basalt, as above.
6,290-6,300	70% Basalt, as above. 20% Tuff, white, very fine grained. 10% Sandstone, tuffaceous and quartzitic, fine to medium grained.
6,300-6,310	50% Siltstone, light to medium gray, tuffaceous, argillaceous. 30% Basalt, as above. 20% Sandstone, fine to medium grained, some siliceous.
6,310-6,320	50% Claystone, light tan-gray, silty. 30% Basalt, as above (caving?). 20% Sandstone, medium grained (quartz, minor feldspar, trace of mica, silica cement).
6,320-6,330	60% Claystone, as above. 20% Basalt, as above (caving). 20% Sandstone, as above, but poorly indurated. A few percent of rounded basalt clasts are present.
6,330-6,340	50% Claystone, as above. 30% Sandstone, as above, poorly indurated. 20% Basalt, as above (caving).
6,340-6,350	40% Claystone, as above. 30% Siltstone, light tan-gray, hard, siliceous. 20% Basalt, as above (caving). 10% Sandstone, as above.
6,350-6,360	70% Sandstone, as above, moderately indurated. 25% Siltstone, siliceous, as above. 5% Basalt, as above (caving).
6,360-6,370	60% Sandstone, as above, moderately indurated. 20% Siltstone, as above. 20% Basalt, as above (caving).
6,370-6,380	40% Sandstone, as above. 30% Siltstone, siliceous, as above. 20% Claystone, as above. 10% Basalt, as above (caving).
6,380-6,390	60% Sandstone, white, fine to medium grained, tuffaceous matrix, clasts of quartz, feldspar(?), gray and black rock fragments; weakly indurated. 40% Siltstone, light tan-gray, siliceous, trace of disseminated pyrite; well indurated. Trace of Basalt, as above (caving).

6,390-6,400	60% Siltstone, siliceous, as above, pyritic. 40% Sandstone, as above. Trace of Basalt, as above (caving?).
6,400-6,410	90% Siltstone, as above. 10% Sandstone, as above.
6,410-6,420	95% Siltstone, light to medium tan-gray, as above, siliceous, well indurated. 5% Sandstone, as above.
6,420-6,430	60% Siltstone, siliceous, as above. 40% Sandstone, as above. Trace of Basalt, as above (caving).
6,430-6,440	40% Siltstone, as above. 30% Sandstone, as above. 30% Basalt, dark green-gray, fine to coarse crystalline (plagioclase, pyroxene, and abundant magnetite).
6,440-6,450	Poor sample. 80% Siltstone, as above. 10% Sandstone, as above. 10% diabase and fine-grained basic igneous rock.
6,450-6,460	50% Claystone, light to medium tan-gray. 20% Siltstone, light to medium tan-gray, siliceous, hard, pyritic. 30% Sandstone, light gray, fine grained, subangular to subrounded tuffaceous matrix. Weakly indurated. Trace of Tuff, white, fine grained, altered to clay. Trace of Basalt/Diabase.
6,460-6,470	50% Claystone, as above, micaceous. 40% Siltstone, as above, siliceous. 10% Sandstone, as above.
6,470-6,480	80% Claystone, as above, micaceous. 10% Sandstone, as above. 10% Siltstone, siliceous, as above.
6,480-6,490	80% Claystone, as above. 10% Sandstone, as above. 10% Siltstone, siliceous, as above.
6,490-6,500	50% basic igneous rock--possibly basalt, dark gray, very fine crystalline groundmass, phenocrysts of plagioclase and pyroxene; matrix mostly altered to gray clay. 30% Claystone, as above. 20% Sandstone, as above.

6,500-6,510	40% Basalt, as above. 20% Claystone, as above. 20% Siltstone, as above. 20% Sandstone, as above.
6,510-6,520	Poor sample 40% Claystone, light to medium tan-gray. 40% Siltstone, light to medium tan-gray, siliceous, tuffaceous. 20% Basalt, as above.
6,520-6,530	90% Claystone, medium gray, as above. 10% Siltstone, light to medium gray, tuffaceous as above.
6,530-6,540	80% Claystone, as above. 20% Siltstone, as above.
6,540-6,550	40% Claystone, as above. 40% Siltstone, as above. 10% Sandstone, as above. 10% Basalt, as above.
6,550-6,560	60% Claystone, as above. 40% Siltstone, as above.
6,560-6,570	80% Claystone, as above. 20% Siltstone, as above. Trace of Sandstone, medium grained, arkosic, pyritic.
6,570-6,580	40% Claystone, as above. 40% Sandstone, white, fine grained, tuffaceous matrix, poorly indurated. 10% Siltstone, as above. 10% Basalt/Diabase (basic igneous rock, as above), (caving).
6,580-6,590	50% Sandstone, as above. 30% Siltstone, as above. 20% Claystone, as above.
6,590-6,600	70% Sandstone, white to light gray, fine grained, tuffaceous matrix, clasts of quartz, feldspar, biotite, rare dark rock grains (basalt?), poorly indurated, pyritic. 10% Claystone, medium tan-gray. 10% Siltstone, light gray, tuffaceous. 10% Basalt/Diabase, dark gray (plagioclase, pyroxene, and magnetite).
6,600-6,610	50% Sandstone, very tuffaceous, as above. 40% Siltstone, as above. 10% Claystone, as above. Trace of Basalt/Diabase, as above.

6,610-6,640	80% Sandstone, as above. 10% Siltstone, as above. 10% Basalt/Diabase, as above. Trace of Claystone, as above.
6,640-6,650	80% Sandstone, as above. 10% Siltstone, as above. 10% Claystone, as above.
6,650-6,660	90% Sandstone, as above. 5% Claystone, as above. 5% Siltstone, as above. Trace of Basalt/Diabase, as above.
6,660-6,670	90% Sandstone, as above, but much of sample is very fine grained. 5% Siltstone, as above. 5% Sandstone, medium grained, as above, pyritic.
6,670-6,680	90% Sandstone, white to light gray, very fine to fine grained with trace of medium grained; very tuffaceous matrix with quartz, feldspar, a trace of biotite, and minor dark rock fragments; pyritic; weak to moderate induration. 10% Siltstone, light gray, tuffaceous. Trace of Basalt/Diabase, caving.
6,680-6,690	95% Sandstone, as above. 5% Siltstone, as above.
6,690-6,700	100% Sandstone, as above.
6,700-6,730	90% Sandstone, as above. 10% Claystone, light to medium tan-gray.
6,730-6,760	90% Sandstone, as above. 10% Siltstone, medium gray, as above. Trace of Basalt/Diabase, caving.
6,760-6,770	90% Sandstone, as above, trace of carbonaceous material, pyritic. 10% Claystone, medium to dark gray, as above.
6,770-6,780	60% Sandstone, as above, carbonaceous. 30% Claystone, as above. 10% Siltstone, light tan-gray, tuffaceous, siliceous, moderately hard.
6,780-6,790	80% Sandstone, as above. 10% Siltstone, siliceous, as above. 10% Claystone, as above.

6,790-6,800	80% Sandstone, light gray, fine grained, tuffaceous matrix, quartz, feldspar, trace of black siliceous rock fragments; trace of black interstitial carbonaceous(?) material. Rare coarse grains of siliceous gray rock. 10% Sandstone, white, medium grained, quartz, feldspar, biotite(?), siliceous cement, hard. 10% Siltstone, light to medium tan-gray.
6,800-6,810	80% Sandstone, fine grained, as above. 20% Siltstone, medium tan-gray, as above.
6,810-6,820	80% Sandstone, fine grained, as above. 20% Siltstone, as above.
6,820-6,830	40% Sandstone, fine grained, as above. 40% Siltstone, as above, micromicaceous. 20% Sandstone, medium grained, as above.
6,830-6,840	40% Sandstone, fine grained, as above. 40% Siltstone, light to medium gray, as above. 20% Sandstone, medium grained, as above, with scattered coarse grains of well-rounded quartz.
6,840-6,850	50% Sandstone, fine grained, as above. 50% Siltstone, as above.
6,850-6,860	70% Siltstone, as above. 30% Sandstone, fine grained, as above.
6,860-6,870	90% Sandstone, light gray, fine grained, tuffaceous matrix, quartz, feldspar, mica grains; weakly to moderately indurated. 10% Siltstone, light to medium grained, tuffaceous, moderately indurated.
6,870-6,880	60% Siltstone, medium gray, as above. 40% Sandstone, as above.
6,880-6,890	70% Siltstone, light and medium gray, as above. 30% Sandstone, as above.
6,890-6,900	70% Siltstone, light and medium gray, as above. 30% Sandstone, as above.
6,900-6,910	80% Siltstone, light gray, as above. 20% Sandstone, as above.
6,910-6,920	70% Siltstone, light and medium gray, as above. 30% Sandstone, as above
6,920-6,930	80% Sandstone, as above. 20% Siltstone, as above.

6,930-6,940	Poor sample, much caving. 50% Sandstone, as above. 50% Siltstone, as above.
6,940-6,950	80% Sandstone, as above. 20% Siltstone, as above.
6,950-6,980	90% Sandstone, as above. 10% Siltstone, light to medium gray, as above.
6,980-7,010	60% Sandstone, light gray, tuffaceous matrix, quartz, feldspar, trace of mica and dark rock grains. 40% Siltstone, light to medium gray, tuffaceous, more or less micaceous, trace of black carbonaceous matter on parting surfaces. Trace of Sandstone, medium grained, quartz, feldspar, biotite, dark rock fragments, siliceous cement.
7,010-7,020	50% Sandstone, fine grained, as above. 50% Siltstone, as above. Trace of Siltstone, black, argillaceous, carbonaceous(?), scattered quartz grains.
7,020-7,030	70% Sandstone, fine grained, as above. 30% Siltstone, light to medium gray, as above. Trace of Siltstone, black, as above.
7,030-7,040	50% Basalt, dark gray, microcrystalline groundmass, porphyritic (plagioclase and pyroxene pnenocrysts) ranging to diabasic; zeolite crystal aggregates (caving?). 25% Sandstone, fine grained, as above. 25% Siltstone, as above. Trace of pyrite.
7,040-7,050	40% Sandstone, fine grained, as above. 40% Basalt/Diabase, as above (caving?). 20% Siltstone, as above.
7,050-7,060	40% Basalt/Diabase, dark gray, medium grained. 40% Sandstone, as above. 20% Siltstone, as above.
7,060-7,070	80% Basalt/Diabase, dark gray, fine grained (glassy plagioclase, brown pyroxene, magnetite), trace of green alteration, soft prismatic, light green alteration mineral (serpentine or talc?). 10% Siltstone, light to medium tan, tuffaceous, moderately indurated. 5% Sandstone, white, very tuffaceous, fine grained to very fine grained. 5% Sandstone, white, medium grained; quartz, feldspar, trace of mica and rock fragments; siliceous.

7,070-7,080	60% Basalt/Diabase, as above. 20% Siltstone, as above. 20% Sandstone, fine grained, as above.
7,080-7,090	80% Basalt/Diabase, dark gray, as above. 20% Siltstone, as above, some hard, siliceous fragments.
7,090-7,100	40% Sandstone, as above. 30% Siltstone, as above. 30% Basalt/Diabase, as above.
7,100-7,110	80% Basalt/Diabase, as above. 10% Sandstone, fine grained, as above. 10% Siltstone, as above. Trace of Scoria, red, porous, rounded grain, clast in sandstone?
7,110-7,120	80% Basalt/Diabase, as above. 10% Sandstone, as above. 10% Siltstone, as above. Trace of talc or serpentine.
7,120-7,130	80% Basalt/Diabase, dark greenish-gray, fine to medium crystalline (plagioclase, brown pyroxene, and abundant magnetite). Minor green alteration in feldspar. 15% Sandstone, light gray, tuffaceous, fine grained. 5% Siltstone, light tan-gray, tuffaceous.
7,130-7,140	90% Basalt/Diabase, dark gray, as above [diabase and fine, holocrystalline, microdiabase(?)]. 5% Sandstone, as above. 5% Siltstone, as above.
7,140-7,154	90% Basalt/Diabase, as above, partly fine, equigrained. 10% Siltstone, as above.
7,154-7,160	80% Basalt/Diabase, dark gray, fine to medium grained (some crystals to 4 mm), plagioclase, brown pyroxene, magnetite. Trace of green soft mineral (talc or serpentine) in thin veinlets. 10% Sandstone, as above, caving. 10% Siltstone, as above, caving.
7,160-7,170	70% Basalt/Diabase, as above. 15% Sandstone, as above, caving. 15% Siltstone, as above, caving.
7,170-7,180	80% Basalt/Diabase, as above. 10% Sandstone, as above, caving. 10% Siltstone, as above, caving.

7,180-7,190	80% Basalt/Diabase, as above, with minor ophitic texture and patches of fine-grained groundmass. 10% Siltstone, as above, caving. 10% Sandstone, as above, caving.
7,190-7,200	70% Basalt/Diabase, dark gray, fine to medium grained (plagioclase, brown pyroxene, magnetite), minor talc or serpentine, green, in veinlets. Trace of dense black "Basalt" may be chill-zone material. 20% Siltstone, light tan-gray, soft and hard. 10% Sandstone, light gray, fine grained, quartz, feldspar, black rounded rock fragments, slightly tuffaceous clay matrix; soft to moderately indurated.
7,200-7,210	60% Basalt/Diabase, as above. Trace of soft, green prismatic alteration mineral (talc or serpentine?). 20% Siltstone, light to medium brown-gray, moderately indurated to hard, slightly sandy; trace of pyrite in irregular masses. 20% Sandstone, as above, soft to moderately indurated.
7,210-7,220	50% Basalt/Diabase, as above. 40% Sandstone, as above, some hard, with siliceous cement. 10% Siltstone, hard, as above, with biotite mica.
7,220-7,230	40% Sandstone, as above, with some fine-grained and siliceous cemented sandstone. 30% Siltstone, light gray to medium tan-gray, soft to moderately indurated. 30% Basalt/Diabase, as above (caving?).
7,230-7,240	60% Sandstone, light gray, fine to very fine grained, arkosic (quartz, feldspar, trace of mica and black rock fragments), subangular to subrounded, varying amounts of tuffaceous clay matrix, minor siliceous cement; weak to strong induration. 30% Siltstone, light to medium tan-gray, tuffaceous(?), argillaceous, trace of mica; weak to moderate induration. 10% Basalt/Diabase, dark gray, fine crystalline, as above.
7,240-7,250	40% Sandstone, as above. 40% Siltstone, as above. 20% Basalt/Diabase, as above.
7,250-7,260	50% Sandstone, as above. 40% Siltstone, as above. 10% Basalt/Diabase, as above.
7,260-7,270	50% Sandstone, as above. 50% Siltstone, as above.

7,270-7,280	40% Sandstone, as above. 40% Siltstone, as above. 20% Basalt/Diabase, as above.
7,280-7,290	50% Sandstone, as above. 30% Siltstone, as above. 20% Basalt/Diabase, as above.
7,290-7,300	50% Sandstone, as above. 40% Siltstone and silty claystone, as above. 10% Basalt/Diabase, as above.
7,300-7,310	40% Basalt/Diabase, dark gray (plagioclase, brown pyroxene, magnetite), with a trace of green alteration. 40% Sandstone, white to light gray, fine to medium grained, arkosic (quartz, feldspar, trace of mica and black rock fragments; variable tuffaceous(?) clay matrix, minor siliceous cement). 20% Siltstone, light to medium gray, argillaceous, tuffaceous(?).
7,310-7,320	60% Basalt/Diabase, as above. 20% Siltstone, as above. 20% Sandstone, as above.
7,320-7,330	40% Basalt/Diabase, as above. 40% Sandstone, as above. 20% Siltstone, as above.
7,330-7,340	40% Sandstone, as above. 30% Siltstone, as above. 30% Basalt/Diabase, as above (caving?).
7,340-7,350	60% Siltstone, as above. 30% Sandstone, as above. 10% Basalt/Diabase, as above (caving).
7,350-7,360	60% Sandstone, as above, white, very tuffaceous. 30% Siltstone, as above. 10% Basalt/Diabase, as above (caving).
7,360-7,370	70% Sandstone. light gray to white, very fine to fine with scattered medium grains, fair to poor sorting, quartz, feldspar, trace of mica, minor dark rock fragments, variable amount of tuffaceous clay matrix and calcite cement. Trace of carbonaceous material. 25% Siltstone, light to medium tan-gray, argillaceous, variable tuffaceous content. 5% Basalt/Diabase, dark gray, as above (caving).

7,370-7,380	80% Sandstone, as above. 20% Siltstone, as above. Trace of Basalt/Diabase, as above (caving).
7,380-7,390	60% Siltstone, as above. 40% Sandstone, as above. Trace of Basalt/Diabase, as above (caving).
7,390-7,400	60% Sandstone, as above, trace of medium-grained angular sandstone; trace of carbonaceous laminae. 20% Siltstone, as above. 20% Basalt/Diabase, as above (caving).
7,400-7,410	50% Basalt/Diabase, as above (caving?). 25% Sandstone, as above, trace of pyritized cement. 25% Siltstone, as above.
7,410-7,420	40% Basalt/Diabase, as above (caving?). 40% Sandstone, as above, fine to very fine grained. 20% Siltstone, as above.
7,420-7,430	40% Basalt/Diabase, as above (caving?). 30% Sandstone, fine grained, as above. 30% Siltstone, as above.
7,430-7,440	50% Basalt/Diabase, dark gray, finely crystalline, holocrystalline (plagioclase, brown pyroxene, magnetite), trace of green talc or serpentine(?) in veinlets. Possible caving? 30% Siltstone, light to medium tan-gray; argillaceous tuffaceous. 20% Sandstone, light gray to white, fine to very fine grained; quartz, feldspar, trace of dark rock or chert fragments, more or less tuffaceous clay matrix and calcite cement; moderately indurated.
7,440-7,450	70% Siltstone, as above. 20% Basalt/Diabase, as above (caving?). 10% Sandstone, as above.
7,450-7,460	70% Siltstone, as above. 20% Basalt/Diabase, as above (caving?). 10% Sandstone, as above.
7,460-7,470	40% Siltstone, as above. 40% Sandstone, as above. 20% Basalt/Diabase, as above (caving?).
7,470-7,480	80% Siltstone, as above. 20% Sandstone, as above, very fine grained, tuffaceous. Trace of Basalt/Diabase, as above (caving).

7,480-7,490	60% Sandstone, as above. 30% Siltstone, as above. 10% Basalt/Diabase, as above (caving).
7,490-7,500	40% Sandstone, light gray, fine to very fine grained, subangular to subrounded, quartz, feldspar, trace of dark rock fragments or chert in tuffaceous(?) clay matrix; slightly calcareous. 40% Siltstone, light to medium gray, tuffaceous, argillaceous. 20% Basalt/Diabase, dark gray, as above (caving?).
7,500-7,510	70% Siltstone, as above, slightly carbonaceous. 30% Sandstone, very fine grained, as above.
7,510-7,530	60% Siltstone, as above, slightly carbonaceous and micaceous; some white tuff or very tuffaceous fragments. 25% Sandstone. 10% Tuff or very tuffaceous siltstone, white, partly altered to clay. 5% Basalt/Diabase.
7,530-7,540	50% Siltstone, as above. 20% Tuff or Siltstone, white to light gray, as above. 20% Sandstone, as above. 10% Basalt/Diabase, as above (caving).
7,540-7,550	60% Tuff or Siltstone, light gray, as above. 20% Siltstone, light to medium gray, as above. 20% Sandstone, as above. Trace of Basalt/Diabase, as above (caving).
7,550-7,560	60% Siltstone, medium to dark gray, slightly micaceous, tuffaceous(?), moderately indurated. 20% Siltstone or tuff, light gray, very fine grained. 10% Sandstone, light gray, fine to very fine grained, with quartz, feldspar, and dark rock fragments in argillaceous and tuffaceous(?) matrix. 10% Basalt/Diabase, dark gray, as above (caving).
7,560-7,570	50% Siltstone, medium gray, as above. 30% Siltstone or tuff, light gray, as above. 20% Sandstone, as above Trace of Basalt/Diabase, as above.
7,570-7,580	50% Sandstone, as above. 30% Siltstone or tuff, as above. 20% Siltstone, dark gray, as above.
7,580-7,590	70% Siltstone or tuff, light gray, as above. 20% Claystone, dark gray, as above. 10% Basalt/Diabase, as above (caving).

7,590-7,600	70% Claystone, dark and medium gray, as above. 30% Siltstone, light gray, tuffaceous, argillaceous, as above.
7,600-7,610	70% Claystone, dark and medium gray, as above. 30% Siltstone, light gray, tuffaceous, argillaceous, as above.
7,610-7,620	70% Siltstone, light to medium gray, argillaceous, tuffaceous, moderately indurated. 30% Claystone, medium to dark gray.
7,620-7,630	50% Siltstone, light to medium gray, as above. 50% Claystone, medium to dark gray, as above.
7,630-7,640	80% Claystone, medium to dark gray. 20% Siltstone, light to medium gray.
7,640-7,650	40% Claystone, as above. 40% Siltstone, as above. 10% Basalt/Diabase, dark gray, as above (caving). 10% Sandstone, light gray, very fine grained, tuffaceous matrix (caving).
7,650-7,660	40% Basalt/Diabase, dark gray, fine grained; plagioclase, brown pyroxene, and magnetite (caving?). 20% Siltstone, light gray, tuffaceous, as above. 20% Claystone, dark gray, as above. 20% Sandstone, as above.
7,660-7,670	50% Siltstone, very light gray to medium gray, argillaceous, tuffaceous. 20% Basalt/Diabase, dark gray, fine grained (caving). 20% Claystone, dark gray, as above. 10% Sandstone, light gray, very fine grained, with quartz, feldspar, and gray lithic fragments, micaceous, argillaceous matrix.
7,670-7,680	40% Siltstone, as above. 40% Claystone, as above. 10% Basalt/Diabase, as above (caving?). 10% Sandstone, as above.
7,680-7,690	50% Siltstone, as above, some white, tuffaceous. 30% Basalt/Diabase, as above (caving?). 10% Claystone, as above. 10% Sandstone, as above, trace pyritized. Sample has slight to moderate amount of clay-sized $CaCO_3$.

7,690-7,700	60% Clay and Claystone, light to dark gray, silty, tuffaceous, slightly calcareous, with dark lithic clasts. 40% Siltstone, very light gray to medium gray, tuffaceous, argillaceous, soft to moderately hard, some hygroscopic. Minor Basalt/Diabase cavings(?).
7,700-7,710	80% Clay and Claystone, as above. 20% Siltstone, very light gray to dark gray, as above.
7,710-7,720	90% Clay and Claystone, as above. 10% Siltstone, as above, with trace of disseminated pyrite. Minor Basalt/Diabase cavings(?).
7,720-7,730	90% Clay and Claystone, as above. 10% Siltstone, very light gray to medium gray, as above.
7,730-7,740	100% Clay and Claystone, as above. Minor Siltstone, as above.
7,740-7,750	90% Clay and Claystone, as above. 10% Siltstone, as above. Trace of Sandstone, medium grained, poorly sorted, argillaceous, with quartz and feldspar clasts.
7,750-7,760	100% Clay and Claystone, as above. Minor Siltstone, as above. Trace of disseminated pyrite.
7,760-7,770	90% Clay and Claystone, as above. 10% Siltstone, as above. Trace of disseminated pyrite.
7,770-7,780	80% Clay and Claystone, light gray to dark gray, tuffaceous, silty, slightly calcareous, hygroscopic. 20% Siltstone, very light gray to dark gray, argillaceous, tuffaceous(?), soft, hygroscopic. Minor altered Sandstone, greenish, argillaceous, quartz-rich (caving?).
7,780-7,790	50% Sandstone, white to light gray, very fine to fine grained, argillaceous, micaceous, tuffaceous(?), with subrounded to angular clasts of quartz, feldspar, and mafic rock or mineral, friable. 30% Clay and Claystone, as above. 20% Siltstone, as above.

7,790-7,800	60% Sandstone, as above (granitic appearance, as in sandstones in upper part of hole, at tops of basic igneous units), very argillaceous with microalignments of mica, very friable. 20% Siltstone, as above. 20% Clay and Claystone, as above.
7,800-7,810	80% Sandstone, as above, white to medium gray, very fine grained. 10% Siltstone, as above, cavings? 10% Clay and Claystone, as above.
7,810-7,820	70% Sandstone, as above, even more friable. 20% Siltstone, light to medium gray with some purplish gray, tuffaceous. 10% other: Clay, Claystone, very dark gray, possibly carbonaceous.
7,820-7,830	60% Sandstone, as above. 30% Siltstone, as above. 10% Clay and Claystone, as above.
7,830-7,840	40% Sandstone, as above. 40% Siltstone, as above, tuffaceous. 10% Claystone, tuffaceous, silty, as above. 10% other: Sandstone with greenish alteration, carbonaceous siltstone, diabase cavings.
7,840-7,850	40% Sandstone, as above. 30% Siltstone, as above. 20% Basalt/Diabase, cavings(?). 10% Sand, rounded spherical grains of white to greenish-white quartz(?) with average size of 1 millimeter.
7,850-7,860	40% Sandstone, as above. 30% Siltstone, as above. 20% Sand, spherical rounded quartz(?) grains, as above with 50% greenish-gray tuff(?) with white zeolitic(?) clasts. 10% Basalt/Diabase cavings(?). Minor carbonaceous(?) material. Trace of disseminated pyrite.
7,860-7,870	50% Tuff(?), greenish gray, completely altered to clay, sandy, with white argillaceous and/or zeolitic altered phenocrysts or amygdules, well-rounded, spherical. Some color variation with purplish-gray and light- to medium-gray fragments. 30% Sandstone, as above, very fine grained. 20% Crystalline Rock, dark yellowish brown with interlocking grains, possibly igneous rock cavings from above. Disseminated pyrite.

7,870-7,880	80% Tuff, greenish gray, as above, soft, slight to moderate calcareous. 10% Siltstone, light to medium gray to purplish gray, tuffaceous, as above. 10% other: Sandstone as above, Basalt/Diabase cavings(?), and spherical rounded quartz grains.
7,880-7,890	80% Tuff(?), as above. 10% Siltstone, tuffaceous, as above, cavings(?). 10% other: Sand, Basalt/Diabase.
7,890-7,900	80% Tuff, as above. 10% Siltstone, as above. 10% other: quartz Sand, Diabase cavings, gypsum(?).
7,900-7,910	90% Tuff, as above, more altered. 10% other: Siltstone, as above, spherical quartz Sand and Sandstone.
7,910-7,920	80% Sand or Sandstone (in tuffaceous green clay-silt matrix), white, green, and gray, ¼ to 1 millimeter angular to rounded grains of quartz and dark-gray lithic clasts. 20% Clay and Silt, greenish gray, tuffaceous.
7,920-7,930	80% Clay-Silt and Siltstone, greenish gray to gray, disintegrates in water. 20% Sand or Sandstone, as above.
7,930-7,940	30% Sandstone, greenish white, very fine to fine grained with clay-silt matrix, quartz grains, as above. 30% Sand, spherical rounded quartz grains and lithic fragments, ½ to 1 millimeter in size. 30% Siltstone, light to medium to pinkish gray, as above, tuffaceous. 10% Siltstone, greenish gray to pinkish gray, as above. Minor gypsum(?) or zeolite crystals.
7,940-7,950	50% Siltstone, dark gray to brown, tuffaceous(?), fractures readily into prismatic fragments. 30% Tuff(?), white to greenish white, argillaceous, disintegrates in water, very fine grained to silty, micaceous, contains coarse clasts of black rock with calcite fillings. 20% Sand, as above. Minor Siltstone, tan, hard, possibly silicifed; Claystone.
7,950-7,960	Very mixed sample, probably abundant cavings. 30% Tuff(?), white to greenish, as above. 30% Basalt/Diabase, dark gray, diabasic to fine grained, caving(?). 30% Siltstone, as above. 10% Clay and Claystone, as above.

7,960-7,970	Cuttings considerably larger in size--cavings? 70% Tuff(?) or Tuffaceous Siltstone, light brownish gray, argillaceous, well-indurated, with dark lithic(?) fragments. 10% Sandstone, as above. 10% Siltstone, medium gray, sandy, tuffaceous, argillaceous. 10% Basalt/Diabase, cavings(?).
7,970-7,980	70% Siltstone, very light to medium gray, occasionally sandy, tuffaceous. 10% Tuff(?) or Tuffaceous Siltstone, light brownish gray, as above. 10% Sandstone, as above, caving(?). 10% Basalt/Diabase, as above, caving(?). Trace of pyrite crystals, in white Tuff.
7,980-7,990	80% Siltstone, very light to medium gray, as above. 20% Tuff or Tuffaceous Siltstone, light brownish gray, as above. Minor Basalt/Diabase cavings. Trace of pyrite, disseminated in tuff.
7,990-8,000	80% Siltstone, as above. 10% Tuff(?) or Tuffaceous Siltstone, as above. 10% other: Diabase and Sandstone, as above, probably cavings.
8,000-8,010	90% Siltstone, as above. 10% other: Diabase, Sandstone.
8,010-8,020	90% Clay and Claystone, light gray, tuffaceous, silty. 10% Tuff(?), very light brownish-gray, as above. Minor Sand in clay matrix, dark-gray igneous rock, cavings(?).
8,020-8,030	Very small sample. 80% Clay, Claystone, and Siltstone, light gray, tuffaceous, as above. 20% Tuff(?), white to beige, with white calcite, very friable.
8,030-8,040	80% Siltstone, light to medium gray, tuffaceous, argillaceous, as above. 10% Tuff(?), very light gray, very fine grained, argillaceous. 10% other: Diabase, dark-gray aphanitic rock with quartz or zeolite lining fractures, disseminated pyrite in Tuffs and Siltstones. Pyrite in this sample is more prevalent than previously.

8,040-8,050	100% Clay and Siltstone, argillaceous, light to medium gray, as above.
8,050-8,060	80% Siltstone, argillaceous, as above. 10% Tuff, light brownish-gray, as above. 10% other: Diabase, green, altered, dark-gray aphanitic rock with white cyrstals (zeolites?).
8,060-8,070	70% Clay and Siltstone, argillaceous, tuffaceous, as above. 30% Tuff(?), light gray to white, as above. Trace of pyrite.
8,070-8,080	50% Sandstone, white, argillaceous, tuffaceous, with rounded quartz grains 1 millimeter or less in size, calcite cement, dark lithic clasts, very friable. 30% Tuff(?), white, as above. 20% Clay and Siltstone, argillaceous, gray, as above. Trace of Basalt/Diabase, cavings(?).
8,080-8,090	70% Clay and Siltstone, argillaceous, as above. 30% Sandstone, as above. Trace of pyrite.
8,090-8,100	50% Clay and Siltstone, argillaceous, as above. 40% Tuff(?) or tuffaceous Siltstone, as above, some greenish. 10% white mineral--zeolite(?), gypsum(?).
8,100-8,110	40% Clay and Siltstone, argillaceous, gray, as above. 30% Sandstone, white, tuffaceous, as above. 30% Tuff, white to greenish.
8,110-8,120	80% Clay and Siltstone, argillaceous, as above. 20% Tuff(?), as above.
8,120-8,130	50% Clay and Siltstone, argillaceous, as above. 50% Tuff(?) or tuffaceous Sandstone, as above.
8,130-8,140	50% Sandstone, white, poorly sorted, tuffaceous, argillaceous, with dark lithic clasts, friable. 40% Clay and Siltstone, argillaceous, as above. 10% Basalt, with dark slender trachytic(?) plagioclase(?); green alteration.
8,140-8,150	50% Sandstone, or Tuff, as above, white. 50% Basalt/Diabase, altered, green, some with pyrite coatings, some appears serpentinized, some diabasic texture.

8,150-8,160	70% Basalt/Diabase, green, as above, with occasional pyrite, some large patches of dark minerals. 30% Sandstone or Tuff, as above. Minor Siltstone, reddish-brownish gray, micaceous, fissile.
8,160-8,170	80% Basalt/Diabase, green, altered, as above, diabasic to fine grained, some fibrous green mineral, soft, talc? 20% Sandstone, as above. Minor Siltstone, reddish-brownish gray, as above.
8,170-8,180	80% Basalt/Diabase, altered, but less altered than above, textures vary from aphanitic to diabasic and ophitic magnetite, plagioclase, pyroxenes, and amphiboles with trace of pyrite, silica(?)-filled fractures or veinlets. 10% Sandstone, white, as above. 10% Siltstone, tuffaceous, as above.
8,180-8,190	80% Basalt/Diabase, altered, as above. 10% Sandstone, as above. 10% Siltstone, as above.
8,188-8,215, recovered 27 feet of core	Core #1--Basalt or Diabase, dark gray to green-gray, holocrystalline, fine grained to diabasic texture (plagioclase laths with minor dark-brown pyroxene and abundant fine-grained plagioclase groundmass). The groundmass is sausseritized while the larger plagioclase crystals appear less altered. Patches of pyrite occur in the groundmass. The core appears to be homogeneous throughout. It is cut by numerous high-angle fractures, with minor offsets occurring at a few fracture intersections. The fractures are mostly filled with alteration products consisting of chloritic material, serpentine or talc, calcite, and thin white sheets of radial crystals, possibly zeolites. Pyrite occurs in a few fractures and a few open quartz and calcite crystal-lined vugs occur in the fractures. A trace of solid black bituminous material occurs in these vugs, giving a good cut. The fracture fillings are up to approximately ¼-inch thick. Alteration of the rock appears to be more intense near fractures than elsewhere. No vesicles nor amygdules were seen. The rock, based on its texture, could be either an intrusive or extrusive body. It is similar to igneous intervals seen elsewhere in the hole.

8,210-8,220 Sample appears to be made up almost entirely of cavings.
30% Basalt/Diabase, altered, as above.
30% Tuff or Tuffaceous Siltstone, pinkish white to brownish gray.
20% Sandstone, white, fine grained, poorly sorted, angular to subrounded clasts of quartz and lithic fragments in white argillaceous matrix.
20% Siltstone, purplish gray to gray, well-indurated, tuffaceous, argillaceous.
Trace of pyrite coatings.

9-5/8" casing run to 8,183 feet, cemented. Drilling resumed with water and a "milling" bit. Samples very finely ground, and sparse. Considerable metal shavings from casing, and iron-oxide staining.

8,220-8,265 90% Basalt, dark gray to black, porphyritic aphanitic, holocrystalline(?) with phenocrysts of pyroxene and plagioclase in aphanitic groundmass, with some glassy grains, possibly olivine(?); some zeolite(?)-filled fractures. Grades to altered igneous rock, as above, some very serpentinized, either caving or altered zone. Altered portion is up to 20% of sample.
10% other: white Tuff or Siltstone, greenish-white Sandstone with quartz and lithic fragments in argillaceous matrix, light-brown tuffaceous Siltstone.

8,265-8,280 50% Basalt, as above, some with diabasic texture.
40% Tuff or Siltstone, tuffaceous, argillaceous, brownish white to white, with lamination of fine sand-sized lithic and quartz grains.
10% Sandstone, light greenish to white, fine grained, poorly sorted, rounded to subangular clasts of quartz and dark lithic fragments, argillaceous, tuffaceous, as above.

8,280-8,310 Sample is very fine grained cuttings, approximately ½ millimeter in size, of principally igneous rocks.
90% Basalt, as above, more coarse, with numerous grains of plagioclase and smoky brown pyroxene grains. Matrix may be altered chloritic material which has been washed by water, leaving sand-like cuttings.
10% Tuff or Tuffaceous Siltstone, as above.
Minor Sandstone, as above.

8,310-8,320 90% Basalt, as above.
10% Tuff or Siltstone, tuffaceous, argillaceous, as above.
Minor Sandstone.

8,320-8,330	100% Basalt, as above, but more altered. Much has greenish color with considerable clay alteration and sugary texture. Pyrite coatings on some grains. Minor Tuff or Clay-Siltstone, orange-white.
8,330-8,340	100% Basalt, as above, slightly less altered, some pyrite coatings. Trace of pinkish-orange Tuff or Siltstone.
8,340-8,355	100% Basalt, as above, more or less altered. Minor Tuff or Siltstone, as above.
8,355-8,365	100% Basalt, as above, more serpentinized with green fibrous mineral, possibly talc.
8,365-8,380	100% Basalt, as above, altered.
8,380-8,390	90% Basalt, as above, altered. 10% Siltstone, tuffaceous, white to orangish white, as above (caving?).
8,390-8,400	100% Basalt, dark gray to greenish gray, aphanitic to phaneritic, fine grained with diabasic and ophitic texture, some of aphanitic portion seems ropy--possibly flow bottom (?), some fragments show white alteration, scattered pyrite patches and quartz crystals (fracture filling?).
8,400-8,410	100% Basalt, altered, as above. Trace of Tuff, white, very fine grained.
8,410-8,420	100% Basalt, altered, as above, with some unaltered aphanitic chunks with ropy appearance. Trace of white Tuff(?) and light-brown tuffaceous Clay-Siltstone.
8,420-8,430	50% Basalt, as above. 30% Tuff(?), rhyolitic(?), white to light purplish gray, aphanitic, altered to clay in part and partly silicified; some relict texture suggests compressed glass shards. 20% Claystone or Siltstone, light gray to light-greenish gray, tuffaceous, silicified clear glass shards (?).
8,340-8,440	60% Tuff(?), rhyolitic, white to light purplish gray as above, some zeolitic(?) material attached. 20% Siltstone and Sandstone, white to gray, silicified(?), tuffaceous. 20% Basalt, as above (caving?).

8,440-8,450	80% Tuff, as above, more dark colored, purplish gray to dark gray, some with mafic (basalt) fragments (microbreccia?). 10% Siliceous sediments, as above. Some appear almost like a dacite. 10% Basalt, as above, altered, trace of aphanitic olivine Basalt; drusy quartz from fractures.
8,450-8,460	50% Tuff, as above, white, purplish gray to gray, as above; traces of pyrite. 30% Siltstone, siliceous, as above, greenish white to gray. 20% Basalt, some unaltered, trace of scioriaceous(?).
8,460-8,470	50% Tuff or tuffaceous sediments, white to light green with very fine feldspar(?) weathering to clay. 40% Basalt, altered, mostly diabasic texture, some aphanitic. 20% Tuff, purple to gray, as above.
8,470-8,480	70% Basalt, as above, both diabasic and aphanitic, some veins or amgydules filled with quartz(?), pyrite. 20% Tuff or tuffaceous Siltstone, as above, white. 10% Altered igneous rock, tuff, or basalt; clasts of basalt microbreccia(?), green and white and black.
8,480-8,490	80% Basalt, altered, as above. 20% Tuff or tuffaceous sediments, white to greenish white, as above. Minor white, green, and brown altered igneous rock.
8,490-8,500	80% Basalt, altered, as above--mostly holocrystalline, fine grained, some diabasic and ophitic textures. 10% Tuff or tuffaceous sediments, white, as above. 10% Altered igneous rock--white, green, brown, as above. Minor purplish tuff(?), as above.
8,500-8,510	90% Basalt, altered, as above, aphanitic portion (?) (10%) seems to be vesicular(?) and fractured, but vesicles and fractures are filled with quartz or zeolite. Phaneritic portion, as above. 10% Tuff(?), white, purplish, and altered igneous rock, as above.
8,510-8,520	90% Basalt, altered, as above. 10% Tuff(?), white, purplish, and altered igneous rock, as above.
8,520-8,530	90% Basalt, altered, as above. 10% Tuff, white, and altered igneous rock, as above.

8,530-8,540	95% Basalt, as above, higher percentage of aphanitic material. 5% Igneous rock, altered, white tuff or tuffaceous sediments. Trace of pyrite.
8,540-8,550	80-85% Basalt, as above, higher percentage of aphanitic material. 15-20% Claystone, beige; altered igneous rock, white Tuff(?), and Siltstone, as above.
8,550-8,560	90-95% Basalt, as above, some pyrite patches. 5-10% Igneous rock, altered, white Tuff, and tuffaceous sediments, as above.
8,560-8,570	90% Basalt, dark gray to green-gray, fine grained, holocrystalline, ophitic and minor diabasic textures; minor sausseritization of fine-grained groundmass. 5% Basalt(?), completely altered to streaked white, green, and gray secondary minerals; probably fracture filling. 5% Tuff, light gray to white, very fine grained, altered, siliceous and clayey, trace of unaltered glassy phenocrysts of feldspar.
8,570-8,580	50% Basalt/Diabase, ophitic and diabasic, as above. 45% Basalt, dark gray, porphyritic, with plagioclase and pyroxene phenocrysts in a fine granular groundmass, trace of green alteration and pyrite. 5% Basalt, altered, green, white, and gray streaked, as above.
8,580-8,590	100% Basalt/Diabase, dark gray, phaneritic, ophitic, and diabasic, as above, trace of pyrite; calcite and zeolites in veinlets or amygdules.
8,590-8,600	90% Basalt/Diabase, dark gray, phaneritic, as above. Feldspars are cloudy and brown stained. 10% Tuff, light gray to white, very fine grained, altered, siliceous, as above.
8,600-8,610	80% Basalt/Diabase, dark gray, phaneritic, as above. 15% Basalt, dark gray, aphanitic to porphyritic, as above. Trace of pyrite. 5% Tuff, white to light gray, as above.
8,610-8,620	90% Basalt/Diabase, dark gray, phaneritic, as above; feldspars show brown stain. 10% Basalt, dark gray, aphanitic to prophyritic, as above.

8,620-8,630	85% Basalt/Diabase, dark gray with brown stain, phaneritic, as above. 15% Basalt, dark gray, aphanitic to porphyritic, as above.
8,630-8,640	95% Basalt/Diabase, dark gray, phaneritic, as above; trace of pyrite. 5% Basalt, dark gray, aphanitic to porphyritic, as above.
8,640-8,650	80% Basalt/Diabase, dark gray, phaneritic, as above. 20% Basalt, dark gray, aphanitic to prophyritic, as above.
8,650-8,660	95% Basalt/Diabase, dark gray, phaneritic, as above. 5% Basalt, dark gray, aphanitic to porphyritic, as above.
8,660-8,670	70% Basalt/Diabase, dark gray to greenish gray, phaneritic, diabasic, ophitic and subophitic(?) textures, as above. 30% Basalt, dark gray, aphanitic to porphyritic, as above.
8,670-8,680	80% Basalt/Diabase, dark gray, phaneritic, as above. 20% Basalt, dark gray, aphanitic to porphyritic, as above.
8,680-8,690	80% Basalt/Diabase, dark gray, phaneritic, as above. 20% Basalt, dark gray, aphanitic to porphyritic, as above.
8,690-8,700	95% Basalt/Diabase, dark gray, phaneritic, as above. 5% Basalt(?), altered to zeolite/talc(?), mottled white, green, gray, probably fracture filling.
8,700-8,710	95% Basalt/Diabase, dark gray, phaneritic, as above. 5% Basalt(?), altered to zeolite/talc(?), as above. Trace of zeolite vein or amygdule filling.
8,710-8,720	80% Basalt/Diabase, dark gray, phaneritic, as above. 15% Basalt, dark gray, aphanitic, as above. 5% Basalt, altered, gray-white and green streaked, probably fracture filling.
8,720-8,730	90% Basalt/Diabase, dark gray, phaneritic, as above. 10% Basalt, dark gray, aphanitic to porphyritic, as above. Trace of altered Basalt (fracture filling), as above. Trace of Tuff, light gray, fine grained, altered, siliceous.

8,730-8,740	95% Basalt/Diabase, dark gray to green-gray, phaneritic, diabasic, and ophitic (plagioclase, brown pyroxene, ilmenite, or magnetite). Trace of green alteration. 5% Basalt, dark gray, aphanitic to porphyritic, with plagioclase and pyroxene phenocrysts. Trace of green alteration. Trace of altered Basalt(?), gray-white and green, soft, probably fracture filling.
8,740-8,750	70% Basalt/Diabase, dark gray, phaneritic, as above. 30% Basalt, dark gray, aphanitic to porphyritic, as above.
8,750-8,760	90% Basalt/Diabase, as above. 10% Basalt, aphanitic to porphyritic, as above.
8,760-8,770	95% Basalt/Diabase, as above. 5% Basalt, aphanitic to porphyritic, as above. Trace of light gray altered Basalt(?) from fracture fillings.
8,770-8,780	80% Basalt/Diabase, as above. 15% Basalt, aphanitic to porphyritic, as above. 5% Altered Basalt, white, gray, green streaked, zeolite-talc(?) mixture, possibly fracture filling.
8,780-8,790	80% Basalt/Diabase, as above. 20% Basalt, aphanitic to porphyritic, as above. Trace of altered Basalt, as above.
8,790-8,800	90% Basalt/Diabase, as above. 10% Basalt, aphanitic to porphyritic, as above.
8,800-8,810	85% Basalt/Diabase, dark gray to green-gray, phaneritic, fine grained, ophitic and diabasic. 10% Basalt, dark gray, aphanitic to porphyritic with pyroxene and plagioclase phenocrysts. 5% Altered Basalt, white and green-gray, streaked, soft, mixture of zeolite and talc(?), from fracture fillings (?).
8,810-8,820	95% Basalt/Diabase, as above. 5% Altered Basalt, soft, fracture filling, as above. Trace of igneous rock, fine grained, phaneritic, equigrained, light gray, mostly feldspar with 10% unidentified ferromagnesian (diorite dike or dioritic segregation clot?). Trace of Tuff, white, very fine grained, altered siliceous.

8,820-8,830	100% Basalt/Diabase, as above. Trace of light-colored igneous rock, as above.
8,830-8,840	100% Basalt/Diabase, as above, trace of pyrite. Trace of light-colored igneous rock, as above.
8,840-8,850	70% Basalt/Diabase, as above. 30% Sandstone, light gray, fine to very fine grained, quartz and feldspar, tuffaceous matrix.
8,850-8,860	80% Sandstone, as above. 20% Basalt/Diabase, as above.
8,860-8,870	50% Basalt/Diabase, as above, increasing green alteration. 40% Basalt, medium to dark gray, aphanitic; glomeroporphyritic clusters of plagioclase and pyroxene. 5% Sandstone, as above. 5% Chalcedony, white to light green, veinlets or amygdules.
8,870-8,880	50% Basalt, medium to dark green-gray, aphanitic groundmass, porphyritic and glomeroporphyritic. 40% Basalt/Diabase, as above. 10% Sandstone, tuffaceous, as above.
8,880-8,890	90% Basalt/Diabase, dark gray to green-gray, phaneritic, ophitic and diabasic, fine grained; some sausseritization. 10% Basalt, dark green-gray, aphanitic to porphyritic and glomeroporphyritic, groundmass shows sausseritization.
8,890-8,900	50% Basalt/Diabase, phaneritic, as above. 50% Basalt, aphanitic, as above.
8,900-8,910	80% Basalt/Diabase, phaneritic, as above. 20% Basalt, aphanitic, as above. Trace of zeolite in veins or amygdules.
8,910-8,920	90% Basalt/Diabase, phaneritic, as above. 10% Basalt, aphanitic, as above.
8,920-8,930	80% Basalt/Diabase, phaneritic, as above. 20% Basalt, aphanitic, as above. Trace of zeolite and quartz from veinlets.
8,930-8,940	70% Basalt/Diabase, phaneritic, as above. 30% Basalt, aphanitic, as above. Trace of Sandstone, white, tuffaceous, as above (caving?).

8,940-8,950	60% Basalt/Diabase, as above. 40% Basalt, aphanitic, as above.
8,950-8,960	60% Basalt/Diabase, phaneritic, as above. 40% Basalt, aphanitic, as above. Trace of talc(?), light green.
8,960-8,970	70% Basalt/Diabase, phaneritic, as above, with traces of pyrite. 30% Basalt, aphanitic, as above. Trace of Sandstone, tuffaceous, as above.
8,970-8,980	60% Basalt/Diabase, phaneritic, as above. 40% Basalt, aphanitic, as above. Trace of chalcedony and zeolite in veinlets or amygdules.
8,980-8,990	70% Basalt/Diabase, as above, trace of pyrite. 30% Basalt, aphanitic, as above.
8,990-9,000	60% Basalt/Diabase, phaneritic, as above, trace of pyrite. 40% Basalt, aphanitic, as above.
9,000-9,010	60% Basalt/Diabase, phaneritic, as above, with overall finer grain size, trace of pyrite. 40% Basalt, aphanitic groundmass, porphyritic and glomeroporphyritic; green alteration in groundmass. Trace of white altered phaneritic Basalt(?). Trace of chert, light gray, or silicified tuff.
9,010-9,020	60% Basalt/Diabase, as above. 40% Basalt, aphanitic and porphyritic to glomeroporphyritic, as above.
9,020-9,030	70% Basalt, medium to dark gray, aphanitic, trace of pyrite, trace of green alteration. 30% Basalt/Diabase, phaneritic, diabasic to ophitic, fine grained, trace of pyrite and green alteration. Trace of chert, light gray. Trace of Sandstone, light gray, tuffaceous matrix.
9,030-9,040	50% Basalt, aphanitic, as above, trace of pyrite, green alteration and quartz veinlets. Some appears silicified. 50% Basalt/Diabase, phaneritic, ophitic and diabasic, as above.
9,040-9,050	60% Basalt, aphanitic, as above. 40% Basalt/Diabase, phaneritic, as above. Trace of gray chert.

9,050-9,060	50% Siltstone, white to light tan-gray, tuffaceous(?), silicified in part, trace of pyrite. 30% Basalt/Diabase, phaneritic, as above. 20% Basalt, aphanitic, as above, trace of green alteration. Trace of quartz vein material.
9,060-9,070	50% Basalt, dark gray, microcrystalline to aphanitic; trace of green alteration and pyrite. 30% Siltstone or Tuff, as above, siliceous, disseminated pyrite. 20% Basalt/Diabase, phaneritic, as above. Trace of quartz veinlets.
9,070-9,080	60% Basalt/Diabase, phaneritic, as above. 40% Basalt, aphanitic to microcrystalline, as above. Trace of pyrite.
9,080-9,090	60% Basalt/Diabase, phaneritic, as above, trace of pyrite. 40% Basalt, aphanitic, as above, trace of green alteration. Trace of talc-serpentine veinlets and quartz veinlets.
9,090-9,100	80% Basalt/Diabase, phaneritic, as above, trace of pyrite. 20% Basalt, aphanitic, as above.
9,100-9,110	60% Basalt/Diabase, dark gray, phaneritic, fine grained, ophitic and diabasic, trace of pyrite. 40% Basalt, medium to dark gray, aphanitic to microcrystalline, slightly porphyritic, green alteration. Trace of talc or serpentine from veinlets, fibrous, gray-green.
9,110-9,120	80% Basalt/Diabase, phaneritic, as above. 20% Basalt, aphanitic to microcrystalline, as above.
9,120-9,130	80% Basalt/Diabase, phaneritic, as above. 20% Basalt, aphanitic, as above.
9,130-9,140	70% Basalt/Diabase, phaneritic, as above. 30% Basalt, aphanitic, as above. Trace of quartz, zeolite(?), and calcite, from veinlets.
9,140-9,150	80% Basalt/Diabase, phaneritic, as above, trace of pyrite. 20% Basalt, aphanitic, as above. Trace of quartz, gray chert(?), serpentine-talc; from veinlets.
9,150-9,160	80% Basalt/Diabase, phaneritic, as above, trace of pyrite. 20% Basalt, aphanitic, as above. Trace of serpentine-talc(?) veinlets.

9,160-9,170	50% Basalt/Diabase, phaneritic, as above, 50% Basalt, aphanitic, as above. Trace of chlorite, zeolite(?), and serpentine-talc(?), from veinlets.
9,170-9,180	70% Basalt/Diabase, phaneritic, as above. 30% Basalt, aphanitic, as above. Trace of Sandstone, tuffaceous, or Tuff, sandy, white, soft.
9,180-9,190	80% Basalt/Diabase, dark gray, phaneritic, fine grained, ophitic and diabasic, trace of green alteration and pyrite. 20% Basalt, medium to dark gray, aphanitic to micro-crystalline, minor green alteration. Trace of altered Basalt, chlorite(?), talc-serpentine(?), in veinlets.
9,190-9,200	90% Basalt/Diabase, phaneritic, as above. 10% Basalt, aphanitic, as above. Trace of serpentine-talc(?), quartz.
9,200-9,210	90% Basalt/Diabase, phaneritic, as above. 10% Basalt, aphanitic, as above. Trace of zeolite and serpentine-talc(?) veinlet filling.
9,210-9,220	90% Basalt/Diabase, phaneritic, as above. 10% Basalt, aphanitic, as above. Trace of zeolite(?) veinlet filling.
9,220-9,230	90% Basalt/Diabase, phaneritic, as above. 10% Basalt, aphanitic, as above. Trace of felsic veinlet (?), light gray, microcrystalline feldspar(?). Trace of serpentine-talc(?) fracture lining.
9,230-9,240	80% Basalt/Diabase, phaneritic, as above, trace of pyrite. 20% Basalt, aphanitic, as above. Trace of quartz veinlet. Trace of Tuff and tuffaceous Sandstone, white, altered to clay (caving?).
9,240-9,250	60% Basalt/Diabase, phaneritic, as above. 40% Basalt, aphanitic, as above.
9,250-9,260	50% Basalt/Diabase, dark gray, phaneritic, fine to very fine grained, ophitic and diabasic, trace of pyrite. 40% Siltstone or silty Claystone, medium gray to brown-gray, moderately hard, micromicaceous(?). 10% Basalt, medium to dark gray, aphanitic to micro-crystalline, minor green alteration. Trace of quartz crystals from open cavities.

9,260-9,270	50% Basalt/Diabase, phaneritic, as above. 40% Siltstone, as above. 10% Basalt, aphanitic, as above; minor green alteration. Trace of Tuff(?), white, fine grained, altered glass shards (?), disseminated pyrite. Trace of calcite in veinlets with pyrite. Trace of fibrous serpentine-talc(?), light green-gray, and zeolite(?) from fractures.
9,270-9,280	60% Siltstone, as above. 30% Basalt/Diabase, phaneritic, as above, trace of pyrite. 10% Serpentine-talc(?), prismatic masses, light to dark green, moderately soft; with chlorite(?), from fractures.
9,280-9,290	60% Basalt/Diabase, phaneritic, as above. 40% Siltstone, as above.
9,290-9,300	45% Basalt/Diabase, phaneritic, as above. 45% Siltstone, as above, trace of disseminated pyrite. 10% Basalt, aphanitic, minor green alteration, as above.
9,300-9,310	Poor quality sample; much caving. 40% Basalt/Diabase, dark gray, phaneritic, fine to very fine grained, ophitic and diabasic, trace of green alteration (caving?). 40% Siltstone, light to medium gray, hard, calcareous and siliceous(?), trace of pyrite. 10% Siltstone, medium to dark brown-gray, moderately hard, trace of pyrite. 10% Basalt, dark green-gray, aphanitic to microcrystalline (caving?). Trace of serpentine-talc(?), light to dark green, prismatic, soft, fracture filling (caving?).
9,310-9,320	50% Basalt/Diabase, phaneritic, as above (caving). 30% Siltstone, light gray, as above. 10% Siltstone, dark gray, as above. 5% Sandstone, light gray, very fine grained, calcereous, siliceous(?), hard. Trace of dissseminated pyrite. 5% Basalt, aphanitic, as above (caving). Trace of serpentine-talc vein filling (caving).
9,320-9,330	60% Basalt/Diabase, phaneritic, as above (caving?). 30% Siltstone, medium to dark gray, as above. 10% Basalt, aphanitic, as above (caving?). Trace of talc-serpentine(?). Trace of aphanitic to slightly microporphyritic igenous rock, light to medium gray, felsite or altered basalt.

9,330-9,340	Poor sample, much caving. 60% Basalt/Diabase, phaneritic, as above (caving?). 30% Siltstone, medium to dark gray, as above. 10% Sandstone, light gray, very fine grained, hard, as above.
9,340-9,350	60% Basalt/Diabase, dark gray, phaneritic, very fine to fine grained, some diabasic and ophitic (caving?). 30% Siltstone, dark gray, hard, argillaceous, siliceous(?), micromicaceous(?). 10% Basalt, dark gray, aphanitic to slightly porphyritic (caving?). Trace of green talc-serpentine(?) and chlorite(?) vein material. Trace of pyrite.
9,350-9,360	40% Basalt/Diabase, phaneritic, as above (caving?). 40% Siltstone, as above. 20% Basalt, aphanitic, as above (caving?).
9,360-9,370	40% Basalt/Diabase, phaneritic, as above (caving?). 40% Siltstone, as above, with calcite veinlets. 20% Basalt, aphanitic, as above (caving).
9,370-9,380	40% Basalt/Diabase, phaneritic, as above, trace of pyrite (caving?). 40% Siltstone, as above, pyritic, micromicaceous. 20% Basalt, aphanitic to microcrystalline, as above, pyritic (caving?).
9,380-9,390	50% Siltstone, as above, with minor white Claystone, soft, tuffaceous. 40% Basalt/Diabase, phaneritic, as above (caving?). 10% Basalt, aphanitic, as above (caving?).
9,390-9,400	50% Basalt/Diabase, phaneritic, as above (caving?). 40% Siltstone, as above. 10% Basalt, aphanitic to microcrystalline, as above (caving?).
9,400-9,410	60% Basalt/Diabase, phaneritic, as above (caving?). 30% Siltstone, as above. 10% Basalt, aphanitic, as above (caving?).
9,410-9,420	50% Siltstone, dark brown-gray and gray, argillaceous, siliceous(?), slightly micromicaceous and pyritic, moderately hard, subfissile. Trace of calcite veinlet. 40% Basalt/Diabase, dark gray, phaneritic, very fine to fine grained, some ophitic and diabasic, trace of pyrite (caving?). 10% Basalt, dark green-gray, aphanitic to microcrystalline (caving?). Trace of Sandstone (or Siltstone), light gray, very fine grained, tuffaceous(?), silicified, hard.

9,420-9,430	60% Siltstone, as above. 40% Basalt/Diabase, as above (caving). Trace of Sandstone or Siltstone, tuffaceous, as above.
9,430-9,440	50% Siltstone, as above. 30% Basalt/Diabase, phaneritic, as above (caving?). 20% Basalt, aphanitic, as above (caving?). Trace of chert (silicified siltstone).
9,440-9,450	60% Siltstone, as above. 30% Basalt/Diabase, phaneritic, as above (caving?). 10% Basalt, aphanitic, as above (caving?). Trace of serpentine-talc, light green, soft, veinlets, (caving?). Trace of Sandstone or Siltstone, tuffaceous, as above. Trace of chert (or silicified siltstone?).
9,450-9,460	60% Siltstone, dark gray and brown-gray, argillaceous, micromicaceous, siliceous(?), moderately hard, subfissile. Trace of calcite veinlets. 30% Basalt/Diabase, dark gray, phaneritic, some ophitic and diabasic (caving?). 10% Basalt, dark gray to green-gray, aphanitic to microcrystalline (caving?).
9,460-9,470	50% Siltstone, as above. 40% Basalt/Diabase, phaneritic, as above (caving?). 10% Basalt, aphanitic, as above (caving?). Trace of talc-serpentine vein filling (caving?). Trace of chert or silicified Siltstone, light gray, hard.
9,470-9,480	60% Siltstone, as above. 20% Basalt/Diabase, phaneritic, as above (caving?). 20% Basalt, aphanitic and microcrystalline, as above (caving?).
9,480-9,490	60% Basalt/Diabase, phaneritic, as above (caving?). 30% Siltstone, as above, with calcite veinlets. 10% Basalt, aphanitic, as above, some altered light-greenish gray (caving?). Trace of tuffaceous Siltstone, white, soft. Trace of serpentine-talc(?), light green, soft (caving?).
9,490-9,500	80% Basalt/Diabase, phaneritic, as above. 10% Siltstone, as above. 10% Basalt, aphanitic, as above. Trace of tuffaceous Siltstone and serpentine(?), as above.
9,500-9,510	60% Siltstone, medium and dark gray, argillaceous, subfissile, micromicaceous. 20% Basalt/Diabase, phaneritic, as above. 20% Basalt, aphanitic, as above. Trace of light gray chert or silicified Siltstone.

9,510-9,520	80% Basalt/Diabase, greenish, phaneritic, altered, as above; some with diabasic texture. 10% Basalt, aphanitic, as above. 10% Siltstone, as above.
9,520-9,530	70% Basalt/Diabase, phaneritic, as above. 20% Basalt, aphanitic, as above. 10% Siltstone, as above. Trace of vein quartz and calcite and gray chert or silicified siltstone.
9,530-9,540	85% Basalt/Diabase, phaneritic, as above. 10% Basalt, aphanitic, as above. 5% Siltstone, as above.
9,540-9,550	75% Basalt/Diabase, phaneritic, as above. 10% Basalt, aphanitic, as above. 10% Siltstone, as above. 5% Tuff, white (caving?). Trace of quartz, pyrite, zeolite veinlet, talc-serpentine veinlet, and light-gray chert, as above.
9,550-9,560	70% Basalt/Diabase, phaneritic, as above. 5% Basalt, aphanitic, as above. 25% Siltstone, as above. Trace of serpentine-talc veinlet.
9,560-9,570	50% Siltstone, medium hard, medium to dark gray. 45% Basalt/Diabase, phaneritic, as above. 5% Basalt, aphanitic, as above.
9,570-9,580	80% Siltstone, dark gray, argillaceous, subfissile, hard, as above. 10% Basalt/Diabase, phaneritic, as above. 10% Tuff, white to gray, partly silicified.
9,580-9,590	50% Tuff, light gray, very fine grained, partly silicified. 45% Siltstone, as above. 5% Basalt/Diabase, phaneritic, as above.
9,590-9,600	60% Basalt, phaneritic, as above. 30% Siltstone, as above. 10% Tuff, gray, siliceous, as above.
9,600-9,610	55% Siltstone, as above. 45% Basalt/Diabase, phaneritic, as above.
9,610-9,620	60% Basalt/Diabase, phaneritic, as above. 20% Basalt, aphanitic, as above. 20% Siltstone, as above. Trace of quartz vein and pyrite.

9,620-9,630	70% Basalt/Diabase, phaneritic, as above. 20% Siltstone, as above (caving?). 10% Basalt, aphanitic, as above.
9,630-9,640	70% Basalt/Diabase, phaneritic, as above. 20% Siltstone, as above (caving?). 10% Basalt, aphanitic, as above. Trace of Tuff, buff to white. Trace of pyrite and quartz.
9,640-9,650	50% Basalt/Diabase, phaneritic, as above. 40% Siltstone, as above (caving?). 10% Basalt, aphanitic, as above. Trace of Tuff, as above. Trace of pyrite.
9,650-9,660	60% Basalt/Diabase, dark gray, phaneritic, very fine grained, minor diabasic and ophitic textures. 20% Basalt, dark gray, aphanitic, trace of green alteration. 20% Siltstone, medium to dark gray, argillaceous, as above.
9,660-9,670	50% Basalt/Diabase, phaneritic, as above. 40% Siltstone, dark gray, as above (caving?). 10% Basalt, aphanitic, as above. Trace of Tuff, light gray, as above. Trace of vein quartz and serpentine-talc(?).
9,670-9,680	50% Basalt/Diabase, phaneritic, as above, trace of pyrite. 40% Siltstone, as above (caving?). 10% Basalt, aphanitic, as above. Trace of Tuff, as above.
9,680-9,690	80% Basalt/Diabase, phaneritic, as above. 10% Basalt, aphanitic, as above. 10% Siltstone, as above (caving?).
9,690-9,700	45% Basalt/Diabase, phaneritic. 45% Siltstone, medium gray and pink-gray (caving?). 5% Tuff, white, silicified in part. 5% Basalt, aphanitic, as above.
9,700-9,710	65% Basalt/Diabase, phaneritic, as above. 30% Siltstone, medium gray (caving?). 5% Basalt, aphanitic, as above. Trace of quartz and white siliceous Tuff.
9,710-9,720	85% Basalt/Diabase, phaneritic, as above. 10% Siltstone, medium gray, as above. 5% Basalt, aphanitic, as above. Trace of quartz and Tuff, as above.

9,720-9,730	75% Basalt/Diabase, phaneritic, as above. 20% Siltstone, medium gray, as above (caving?). 5% Tuff, white, as above. Trace of quartz.
9,730-9,740	50% Siltstone, tuffaceous, gray-white, siliceous, hard. 40% Siltstone, dark gray, micromicaceous, hard, as above. 10% Basalt/Diabase, phaneritic, as above.
9,740-9,750	65% Siltstone, dark gray, as above. 25% Basalt/Diabase, phaneritic, as above. 10% Tuff, white siliceous, as above. Trace of pyrite and quartz.
9,750-9,760	45% Tuff, white, siliceous, as above. 40% Siltstone, dark gray, as above. 15% Basalt/Diabase, phaneritic, as above.
9,760-0,770	40% Tuff, white, as above. 30% Basalt/Diabase, phaneritic, very fine grained, green alteration. 30% Siltstone, medium gray, as above.
9,770-9,780	60% Basalt/Diabase, phaneritic, green alteration, as above. 40% Siltstone, gray, platy in part, calcite cement. Trace of quartz and pyrite.
9,780-9,790	75% Basalt, phaneritic, dark gray with green alteration, very fine grained, minor diabasic texture. 25% Siltstone, dark gray, subfissile, hard, as above. Trace of clear quartz, and pyrite.
9,790-9,800	80% Basalt/Diabase, phaneritic, as above, green alteration. 10% Basalt, aphanitic, dark gray with green alteration, as above. 10% Siltstone, dark gray, as above. Trace of Tuff, light gray, very fine grained, siliceous.
9,800-9,810	70% Tuff, white, brittle, hard, very fine grained, silicified. 15% Basalt/Diabase, phaneritic, pale green-gray. 15% Siltstone, dark brown-gray, subfissile, hard.
9,810-9,820	85% Tuff, white, silicified, hard, brittle, very fine grained with occasional crystal-rich fragments (quartz and glassy feldspar). May also be aphanitic rhyolite. 10% Siltstone, gray-brown, as above. 5% Basalt/Diabase, phaneritic, as above (caving).

9,820-9,830	80% Basalt/Diabase, phaneritic, as above, trace of green alteration. 15% Tuff, as above. 5% Siltstone, as above.
9,830-9,840	70% Basalt/Diabase, as above. 20% Tuff, as above. 10% Siltstone, as above.
9,840-9,850	55% Basalt, very fine grained, phaneritic, some ophitic texture. 35% Siltstone, as above, dark gray to brown. 10% Tuff, as above, silicified.
9,850-9,860	70% Basalt, phaneritic, ophitic and diabasic, as above, considerable green alteration. 25% Siltstone, as above. 5% Tuff, as above.
9,860-9,870	60% Basalt, as above. 35% Siltstone, as above. 5% Tuff, as above.
9,870-9,780	70% Basalt, as above. 20% Siltstone, as above. 10% Tuff, as above. Trace of quartz.
9,880-9,890	65% Basalt, as above. 20% Siltstone, as above. 10% Tuff, as above. 5% Vein quartz.
9,890-9,900	70% Basalt, as above. 25% Siltstone, dark gray (caving?). 5% Tuff, as above.
9,900-9,910	80% Basalt, as above, green alteration. 15% Siltstone, as above. 5% Tuff, as above.
9,910-9,920	65% Basalt, dark gray, fine grained, phaneritic, some ophitic and diabasic (?), some green alteration. 25% Tuff, white, very fine, as above, some medium soft. 15% Siltstone, as above.
9,920-9,930	60% Basalt, phaneritic, as above. 30% Siltstone, gray and brown, hard, subfissile, as above. 10% Tuff, as above.

9,930 - 9,940	45% Basalt, phaneritic, as above. 45% Siltstone, as above. 5% Basalt, aphanitic, dark gray. 5% Tuff, as above.
9,940 - 9,950	60% Basalt, phaneritic, as above. 30% Siltstone, as above. 5% Basalt, aphanitic, as above. 5% Tuff, as above. Trace of quartz and zeolite(?) vein material.
9,950 - 9,960	70% Basalt, phaneritic, as above. 25% Siltstone, as above (caving). 5% Basalt, aphanitic, as above. Trace of quartz, pyrite, and serpentine-talc.
9,960 - 9,970	80% Basalt, phaneritic, as above. 15% Siltstone, as above. 5% Basalt, aphanitic, as above. Trace of quartz.
9,970 - 9,980	85% Basalt, phaneritic, ophitic and diabasic, as above, trace of pyrite. 10% Siltstone, as above (caving). 5% Basalt, aphanitic, as above. Trace of quartz, pyrite, Tuff, and serpentine-talc in veinlets.
9,980 - 9,990	60% Basalt, phaneritic, as above. 40% Siltstone, as above, some fissile. Trace of quartz, Tuff.
9,990-10,000	70% Basalt, phaneritic, as above. 25% Siltstone, as above (caving?). 5% Tuff, white, soft, very fine grained. Trace of quartz, pyrite, and serpentine-talc veinlets.
10,000-10,010	85% Basalt, phaneritic, as above. 10% Siltstone, as above (caving). 5% Basalt, aphanitic, as above. Trace of quartz, Tuff, calcite.
10,010-10,020	40% Tuff, white, hard, fine grained, crystal-rich, welded(?) (quartz, glassy feldspar), maybe rhyolite. 40% Basalt, phaneritic, as above (caving?). 20% Siltstone, dark brown-gray, as above (caving?).
10,020-10,030	60% Basalt, phaneritic, as above. 20% Siltstone, as above. 20% Tuff, as above.
10,030-10,040	85% Basalt, phaneritic, as above. 10% Siltstone, as above (caving?). 5% Tuff, hard to soft, white to buff (caving?).

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APPENDIX B

THIN-SECTION PETROGRAPHY

Note: All sample numbers refer to intervals of feet below surface.

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Introduction

This appendix describes 22 petrographic thin sections prepared from cuttings and core No. 1 from Ore-Ida No. 1, plus 2 sections of basalt from the Quartz Mountain Basalt of the Deer Butte Formation. The cuttings were mostly preselected and sorted from the samples represented using a binocular microscope. The emphasis was on mafic igneous materials, in a search for evidence of extrusive or intrusive origin.

Principal findings of the examination are summarized immediately below and in table B-1. Detailed commentaries for all samples follow the summary statements. The slides were initially prepared and examined in two batches, 4,630-4,640 feet to core #1 (8,188 to 8,215 feet), and 8,210-8,220 feet to 10,010-10,020 feet. Point counts were performed on most samples in the first batch; percentages given for the second batch are estimates, made without point counts.

Summary

The term basalt/diabase is used herein to signifiy a basic composition igneous rock which is holocrystalline and phaneritic, with non-oriented plagioclase laths surrounding brown pyroxene or plagioclase laths interbedded in pyroxene, described frequently as a diabasic texture. In the absence of other information concerning these rocks it was uncertain whether they are all flows or whether some are intrusives. These rocks are mildly altered olivine basalts or diabases, and are the principal kind of rocks represented in the thin sections. The basalts/diabases have a relatively coarse subophitic to intergranular texture, which grades commonly to intersertal, where interstices between feldspar laths are filled with a deuteric assemblage dominated by chlorite. Flow textures, oriented laths, glass and scoria often characteristic of basalt lava flows are absent. Very rare, fine, amygdule-like structures appear only in core #1, which is notably devoid of olivine.

The possibility that the basalts/diabases are extrusive is emphasized by their similarity to samples of the Quartz Mountain Basalt of the Deer Butte Formation. For example, one of the Quartz Mountain rocks bears abundant very fine interstitial amygdules and amygdules are said to be abundant in some outcrops. However, the question of their origin should be considered unresolved. Some could be intrusive.

Olivine-free basalts with typical extrusive textures, which appear as 30% of samples 8,210-8,220 and 9,100-9,110, and in minor

APPENDIX B

Table B-1: THIN-SECTION PETROGRAPHY, ORE-IDA #1

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Sample-Depth Interval	Principal Lithologies	Percent Each Lithologic Type[1]	POINT COUNTS Mineralogy[2] Clino-pyroxene	Feldspar	Olivine-Iddingsite	Opaque	Chlorite-Deuteric Assems.	Notes
U1 4,630-4,640	Olivine basalt or diabase	xxxxxxxxxx 100%	29%	51%	5%	9%	6%	
U2 5,230-5,240	do.	xxxxxxxxxx 100%	21%	64%	1%	7%	7%	
U3 5,630-5,640	do.	xxxxxxxxxx 100%	27%	45%	4%	10%	14%	
U4 6,130-6,140	Cataclastite or tuff; olivine basalt or diabase	-----xxxxx 56% -42%	-	-	-	-	-	
U4 6,160-6,170	Olivine basalt or diabase; cataclastite or tuff	xxxxxxx--- 65% -35%	31%	53%	3%	6%	8%	3
U4 6,220-6,230	Olivine(?) basalt or diabase	xxxxxxxxxx 100%	15%	36%	c.1%(?)	7%	41%	4
U5 7,040-7,050	Olivine basalt or diabase	xxxxxxxxxx 100%	25%	48%	5%	9%	12%	
U5 7,100-7,110	do.	xxxxxxxxxx 100%	18%	54%	10%	9%	10%	
U5 7,166-7,168	do.	xxxxxxxxxx 100%	23%	49%	7%	10%	11%	
U6 8,200	Basalt (diabase?)	xxxxxxxxxx 100%	24%	50%	0%	9%	18%	
U6 8,214	Basalt (diabase?)	xxxxxxxxxx 100%	16%	54%	0%	2%	27%	
8,210-8,220	Olivine basalt or diabase; Basalt	xxxxxxxvvv 70% -30%						
8,540-8,550	Olivine basalt or diabase; cataclastite	xxxxxxxxx+ 90% -10%						
8,720-8,730	Olivine basalt or diabase; Basalt	xxxxxxxxxv 85% -15%						
8,920-8,930	Olivine basalt or diabase	xxxxxxxxxv 90% -10%						
9,100-9,110	Olivine basalt or diabase; Basalt	xxxxxxxvvv 70% -30%						
9,200-9,210	Olivine basalt or diabase	xxxxxxxxxv 90% -10%						
9,530-9,540	do.	xxxxxxxxxv 90% -10%						
9,660-9,670	do.	xxxxxxxxxx 100%						
9,780-9,790	do.	xxxxxxxxxx 100%						
9,810-9,820	Sandstone; Siltstone	∘∘∘∘∘●●●●● 50% -50%						
9,550-9,560	Olivine basalt or diabase	xxxxxxxxxx 100%						
10,010-10,020	Sandstone	∘∘∘∘∘∘∘∘∘∘ 100%						

Key to Lithologic Type

A. xxx = Ophitic-subophitic-intersertal-intergranular olivine basalt or diabase mildly altered, no flow textures. Subophitic-intersertal predominates, lesser intergranular. Olivine absent from core #1.

B. vvv = Intergranular-intersertal basalt, mildly altered, sometimes porphyritic, occasional flow texture, finer grained and distinct from basalt or diabase A and B.

C. --- = Cataclastite or tuff(?). Broken crystals from basalt or diabase in flow-textured, altered matrix rich in chlorite and micas.

D. +++ = Cataclastite. Broken olivine basalt or diabase in flow-textured matrix, less altered than in C.

E. ∘∘∘ = Sandstone, quartzo-feldspathic.

F. ●●● = Siltstone, quartzo-feldspathic.

NOTES: 1. Cuttings mounted were selected to represent certain rock types only and when more than one type is present the percentages recorded may only approximate the relative percentages in total sample recovered from the well.

2. See text for mineral descriptions.

3. Point count represents the basalt.

4. Presence of traces of iddingsite after olivine uncertain, no fresh olivine seen. Material counted may be part of chloritic deuteric assemblage.

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amounts, possibly as slough, in other samples from 8,720-8,730 to 9,530-9,540 are in contrast to the basalts/diabases. These are finer grained than the basalts/diabases. Intergranular and intersertal textures predominate, and some are microporphyritic. Flow textures and fine chloritic amygdules also occur, as well as occasional chips of fine chlorite + silica ± calcite, which appear to be fragments of larger veins or amygdules. These basalts are typically quite distinct from the basalts/diabases, though very occasional cuttings chips are hard to classify, and are described as "Basalt/Diabase. Olivine-free".

Weakly to strongly foliated cataclastic rocks, composed of crushed and sheared materials of basalt/diabase, appear in samples from the intervals 6,130-6,170 and 8,540-8,550. In the upper interval the rocks are moderately recrystallized; a cataclastic origin is not entirely certain and they could result from alteration of pyroclastic material. In 6,160-6,170 the associated olivine basalts/diabases appear somewhat crushed and broken.

Samples 9,810-9,820 and 10,010-10,020 were selected to represent materials identified as tuff under binocular examination. These are instead altered quartzo-feldspathic sand and siltstone.

Mineralogy of Basalt/Diabase

All of the basalt/diabase examined has a similar mineralogy. Point counts were made on samples from the interval 4,630-4,640 to core #1 (8,188-8,215); variations in composition were minor (table B-1). Samples from greater depths appeared equivalent in mineral composition.

Clinopyroxene is a colorless to very pale brown augite, in subophitic, intergranular, rarely ophitic relation to feldspar. Maximum grain dimensions are about 1.5 mm, rarely as much as 2 mm. Orthopyroxene and pigeonite are absent.

Feldspar is plagioclase, composition undetermined, generally fresh, unzoned. Locally, it bears dusty inclusions and chlorite where altered, particularly near grain boundaries. It is often invaded by brown to green alteration assemblages (chlorite, micas, sphene, dust and so forth) along cleavages. It occurs as laths to 1.5 mm long, rarely to 2 or 3 mm, with random orientation.

Olivine is usually replaced, largely to totally, by brown iddingsite, occasionally by green bowlingite(?) and/or other alteration assemblages. Replacements are often pseudomorphous after the

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olivine; where form is less clear, the material is not always clearly distinguishable from chlorite-deuteric assemblage. Olivine occurs as rounded crystals within pyroxene, feldspar, and intergranular to feldspar.

Opaque mineral matter is anhedral, angular to rounded. It is included in pyroxene and feldspar as well as being intergranular.

The chlorite-deuteric assemblage occurs intersertal to feldspar and along cracks in feldspar laths. Boundaries against pyroxene, feldspar, and iddingsite-bowlingite vary from sharp to diffuse. Exact character and composition varies from sample to sample. Colors are green to brown. Transparency quality is highly translucent to nearly opaque, due to inclusions. Phases present include chlorite(s), lesser white and brown micas, opaque dust, sphene, apatite, fine feldspar laths, possible zoisite-epidote-clinozoisite, and possible actinolite. Micas and chlorite(s) are often intimately associated and probably interlayered, for example as felted mats of very fine-grained phyllosilicate with pleochroic green color and high birefringence.

Sample Descriptions*

4,630-4,640

Cuttings: 80% Basalt/Diabase. Dark green-gray, partly altered, hard and soft, holocrystalline, tabular glassy plagioclase, brownish pyroxene; anhedral to subhedral magnetite abundant.
20% Siltstone (caving).

Thin section: Basalt/Diabase. Subophitic to locally ophitic, locally intersertal where interstices are filled by chlorite-deuteric assemblage (henceforth referred to as altered). Table B-1 contains the point-count, and the text above presents a generalized description of mineralogy.

5,230-5,240

Cuttings: 80% Siltstone (caving).
20% Basalt/Diabase (plagioclase, brown amphibole, magnetite).

*Cuttings descriptions are from Appendix A. Only selected lithologies were prepared for thin-sections.

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Thin section: Basalt/Diabase. Subophitic, locally intersertal where altered. Generally same as 4,630-4,640.

5,630-5,640

Cuttings: 95% Basalt/Diabase (plagioclase, pyroxene, magnetite). Trace with microcrystalline groundmass.
5% Siltstone (caving).

Thin section: Basalt/Diabase. Subophitic to intergranular, to intersertal where altered. Rarely ophitic. (Intergranular refers to gradation from subophitic, which results when feldspar laths exceed pyroxene sufficiently to enclose it.) Pyroxene usually fills the interstices and is bounded by the feldspar, i.e., it does not occur as euhedral or subhedral grains. Generally the same as 4,630-4,640.

6,130-6,140

Cuttings: 100% Basalt. Uncertain whether flow or intrusion: Matrix is very fine grained with a few phenocrysts of plagioclase and pyroxene. May contain clots of coarse crystals with more or less diabasic texture (glomerporphyritic).

Thin section: 56% clastic-textured rock of the basalt/diabase material. Clasts of basalt and basalt minerals, rounded and broken to very fine sizes (rarely >0.5 mm); euhedral forms rare, in a matrix recrystallized to fine chlorite-micas and much fine dust. In many cuttings clasts the matrix displays a flow-oriented, laminar-type texture; this may be present in all, but visible only in grains mounted in an appropriate orientation. This rock may be a lithic tuff or may be a cataclastite, generated in a fault zone or during eruptive processes, as suggested by apparent crushing, granulation and stringing-out of some feldspar and pyroxene grains.
42% ophitic to intersertal olivine basalt/diabase.

6,160-6,170

Cuttings: 100% Basalt. Dark green-gray, fine grained matrix, pyroxene and plagioclase phenocrysts and abundant magnetite; pervasively altered, with feldspar saussuritized; patches of white clay-like alteration. Texture is partly porphyritic, partly diabasic and partly aphanitic.

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Thin section: 53% Ophitic and subohpitic Basalt/Diabase. Relatively fresh. Generally the same as 4,630-4,640, and same comments apply.
35% Clastic-textured rock of the Basalt/Diabase. Generally the same as in 6,130-6,140, but laminar texture appears only rarely.
12% Cuttings with textures intermediate between the ophitic basalt/diabase and the clastic rock. Most often appears as intersertal basalt, grading to other types.

6,220-6,230

Cuttings: 100% Basalt, as in 6,160-6,170.

Thin section: Basalt/Diabase. Generally the same as 4,630-4,640.

7,040-7,050

Cuttings: 40% Sandstone. Fine grained.
40% Basalt/Diabase. Dark-grey, microcrystalline groundmass, porphyritic (plagioclase and pyroxene phenocrysts), ranging to diabasic; zeolite crystal aggregates (caving?).
20% Siltstone.

Thin section: Basalt/Diabase. Intersertal-intergranular and subophitic textures. Generally the same as 4,630-4,640 and 5,630-5,640.

7,100-7,110

Cuttings: 80% Basalt/Diabase. Dark grey, fine-grained (glassy plagioclase, brown pyroxene, magnetite), trace of green alteration and soft prismatic, bright green alteration mineral (serpentine or talc?).
10% Sandstone.
10% Siltstone.
Trace scoria, red, porous, rounded grain, clast in sandstone?

Thin section: Basalt/Diabase. Subophitic and intersertal (where altered)-intergranular textures. Generally the same as 4,630-4,640 and 5,630-5,640.

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7,166-7,168

Cuttings (7,160-7,170):

70% Basalt/Diabase. Dark grey, fine- to medium-grained (some crystals to 4 mm), plagioclase, brown pyroxene, magnetite, trace of green soft mineral (talc or serpentine) in veinlets.
15% Sandstone.
15% Siltstone.

Thin section: See comment for 7,100-7,110.

8,200 (Core #1)

Megascopic examination:

Basalt/Diabase. Dark grey to green-grey, holocrystalline, fine-grained to diabasic texture (plagioclase laths with minor dark-brown pyroxene and abundant fine-grained plagioclase groundmass). The groundmass is saussuritized, while the larger plagioclase crystals appear less altered. Patches of pyrite occur in the groundmass. The core appears to be homogenous throughout, and is cut by numerous high-angle fractures, with minor offsets occurring at a few fracture intersections. The fractures are mostly filled with alteration products, consisting of chloritic materials, serpentine or talc, calcite, and thin white sheets of radial crystals, possibly zeolites. Pyrite occurs in a few fractures, and a few open quartz and calcite crystal-lined vugs occur in the fractures. A trace of solid black bituminous materials occurs in these vugs, and gives a good cut. The fracture fillings are up to approximately 1/4 inch thick. Alteration of the rock appears to be more intense near fractures than elsewhere. No vesicles nor amygdules were seen. The rock, based on its texture, could be either an intrusive or extrusive body. It is similar to igneous intervals seen elsewhere in the hole.

Thin section: Basalt/Diabase. Olivine-free. Subophitic or locally intersertal where altered. Bears a single 2 mm roundish body of fine, matted chlorite, developed alongside a cluster of opaque and feldspar, with an associated patch of calcite; this may be an amygdule. Otherwise texturally similar to all the basalt/diabase above.

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8,214 (Core #1)

Megascopic examination: See 8,200.

Thin section: Basalt/Diabase. Olivine-free. Ophitic to subophitic texture, locally intersertal where altered. Bears a single 2 mm amygdule of fine chlorite, calcite and silica, plus chlorite in numerous interstices, which has grown in fibrous habit perpendicular to the surfaces of bounding feldspar and pyroxene.

8,210-8,220

Cuttings: Sample appears to be made up almost entirely of cavings.
30% Basalt/Diabase. Altered.
20% Tuff or Tuffaceous Siltstone. Pinkish white to brownish gray.
20% Sandstone. White, fine-grained, poorly sorted, angular to subrounded clasts of quartz and lithic fragments in white argillaceous matrix.
20% Siltstone. Purplish-gray to gray, well-indurated, tuffaceous, argillaceous.

Thin section: About 70% Basalt/Diabase. Subophitic to locally intersertal where altered, as in samples 4,630-4,640 to 7,166 -7,168.
About 25% Basalts. A variety of fine intersertal and intergranular textures, quite distinct from the coarser subophitic varieties above. Maximum grain dimensions rarely exceed 1 mm (compare to 3 mm in the subophitic). Typically comprise feldspar laths to 0.5 mm long in random orientation, partly saussuritized and with common "invasions" or replacements of chlorite along cracks and at core, with interstitial assemblages of green to occasionally brown chlorite, opaque, sphene, apatite, micas, granular to lath-shaped pyroxene. Some cuttings display porphyritic texture: feldspar microlites, chlorite, much fine dust (opaque = sphene?) with feldspar microphenocrysts to about 1 mm long. Occasional flow-oriented textures resulting from parallel feldspars, and fine amygdules of chlorite.
About 5% Amygdule or vein fillings. Fine green chlorite, silica, uncommon calcite.
Trace Sandstone. Poorly sorted angular to subangular quartz, with trace feldspar in matrix of calcite, minor white phyllosilicate.

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8,540-8,550

Cuttings: 80-85% Basalt. Altered, diabasic and ophitic to aphantic.
15-20% Claystone, altered igneous rock, white tuff(?) and Siltstone.

Thin section: 85-90% Basalt/Diabase. Subophitic to intergranular to locally intersertal where altered, as in 8,210-8,220.
10-15% Cataclastite. Basalt/Diabase materials, strained, fractures and sheared to lenticular shapes, in a matrix of the same material, finer grained and partially recrystallined to brown chlorite and alteration materials, opaques, fine dust. This may be from a fault zone.
Trace Basalt. Intersertal-intergranular as in 8,210-8,220 (probably cave).

8,720-8,730

Cuttings: 90% Basalt/Diabase. Dark grey, phaneritic.
10% Basalt. Dark grey, aphanitic-porphyritic.
Trace of altered Basalt (fracture filling). Trace of tuff, light grey, fine grained, altered, siliceous.

Thin section: 85% Basalt/Diabase. Subophitic to locally intersertal, as above.
10% Basalt. Intersertal to intergranular as in 8,210-8,220, microporphyritic.
<5% Vein and amygdule fillings (calcite, chlorite plus silica), cataclastite as in 8,540-8,550.

8,920-8,930

Cuttings: 80% Basalt/Diabase. Phaneritic, ophitic and diabasic, fine grained.
20% Basalt. Aphanitic.

Thin section: 90% Basalt/Diabase. Textures vary from subophitic and fairly unaltered to more altered intergranular and intersertal, as in 4,630-4,640 and 5,630-5,640. Feldspar in intergranular to intersertal varieties is moderately saussuritized throughout. Rare chlorite veinlets.
10% Basalt. Fine intergranular-intersertal, altered, variable, as in 8,210-8,220, including microporphyritic textures. Rare cataclastite as in 8,540-8,550.

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9,100-9,110

Cuttings: 60% Basalt/Diabase. Dark grey, phaneritic, fine-grained, ophitic and diabasic, with trace of pyrite.
40% Basalt. Medium-dark grey, aphanitic to microcrystalline, slightly porphyritic, green alteration.
Trace of talc or serpentine from veinlets, fibrous, gray-green.

Thin section: 70% Basalt/Diabase as in 8,920-8,930. Commonly altered, some crushed-looking, with chlorite invading along cracks. Total olivine and alteration pseudomorphs after olivine rarely exceeds 5% in the slide and all others below core #1. Low abundance means most cuttings lack olivine or pseudomorphs.
25% Basalt. Very fine, as in 8,920-8,930, microcrystalline, with fine feldspar phenocrysts, much altered.
5% varieties appearing gradational. Coarser than most Basalt but finer than Basalt/Diabase. Pyroxene usually less abundant and finer grained than in Basalt/Diabase, feldspar laths more elongate.

9,200-9,210

Cuttings: 90% Basalt/Diabase. Phaneritic, as above.
10% Basalt. Aphanitic, as above.

Thin section: 90% Basalt/Diabase, as above.
10% Basalt. Very fine, microporphyritic, as above.

9,530-9,540

Cuttings: 85% Basalt/Diabase. Phaneritic, as above.
10% Basalt. Aphanitic, as above.
5% Siltstone.

Thin section: 90% Basalt/Diabase, as above. Intergranular-intersertal, some subophitic. Feldspars are generally fresh but usually chlorite accompanies (and locally replaces) pyroxene, and opaque, in interstices. Some micas also present.
10% Cataclastite and Basalt. Aphanitic, as above.

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9,660-9,670

Cuttings:
50% Basalt/Diabase. Phaneritic, as above.
40% Siltstone. Dark Gray (caving?).
10% Basalt. Aphanitic, as above.

Thin section:
95% Basalt/Diabase, as above; slightly higher abundance subophitic and less altered.
5% Basalt. Aphanitic and cataclastite.

9,780-9,790

Cuttings:
75% Basalt. Phaneritic, dark gray with green alteration, very fine grained, minor diabasic texture.
25% Siltstone.

Thin section:
100% Basalt/Diabase, as above. Subophitic texture uncommon, mostly intergranular-intersertal. Trace Cataclastite and Basalt, aphanitic, as above.

9,810-9,820

Cuttings:
85% Tuff. White silicified, hard, brittle, very fine grained, with occasional crystal-rich fragments of quartz and glassy feldspar. May also be aphanitic rhyolite.
10% Siltstone.
5% Basalt/Diabase. Phaneritic, as above (caving).

Thin section:
50% Sandstone. Altered, subangular clasts feldspar, with dusty saussuritic inclusions and approximately equal amount clear quartz. Grain dimensions generally about 0.1 to 1 mm. Tightly packed with only a small amount, local interstitial "cement" of very fine dusty silica/feldspar and occasional grains and patches epidote as much as 0.5 mm across. Rare interstitial sphene also present.
50% Siltstone. Appears of identical composition to the sandstone, but much finer grained with primary texture widely destroyed by recrystallization to nearly cryptocrystalline assemblage of felsics and dusty greenish epidote and/or chlorite. Only outlines of larger clasts (0.05 mm) remain. Sharply contacts sandstone in one cutting, gradational in 1 or 2 others. Cut by occasional silica veinlets.

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9,950-9,960

Cuttings: 70% Basalt. Phaneritic, as above.
25% Siltstone.
5% Basalt. Aphanitic as above.
Trace of quartz, pyrite and serpentine-talc.

Thin section: 100% Basalt/Diabase. Intergranular to intersertal, occasionally subophitic, as above. Trace of basalt. Fine intergranular-intersertal and microporphyritic, as above.

10,010-10,020

Cuttings: 40% Tuff. White, hard, fine grained, crystal-rich welded(?), quartz, glassy feldspar. May be rhyolite.
40% Basalt. Phaneritic, as above (caving?).
20% Siltstone. Dark brown-gray, as above (caving?).

Thin section: 100% Sandstone. Altered, subangular clear quartz and about equal amount of dusty feldspar, plus occasional plates of brown biotite. Tightly packed with no interstitial cement in much of rock. Clast boundaries are ofter irregular, with a slightly intergrown appearance, as in a granite. Elsewhere with small amount of interstitial calcite and/or chlorite and fine silica-feldspar. Numerous biotite clasts bent by compression between the feldspathic-silicic clasts. Occasional larger patches calcite to several mm across.

Deer Butte Formation, Quartz Mountain Basalt

Slide 1:

Thin section: Subophitic and intersertal. Feldspar laths, twinned, 0.2 to 3.5 mm long, usually fairly elongate. Shorter laths in subophitic, rarely ophitic relationship to fresh colorless clinopyroxene. Interstitial to longer laths are clinopyroxene and opaque, matted green chlorite, and pseudomorphs after olivine. The chloritic and clinopyroxene-opaque domains are generally exclusive,with chlorite occupying some interstices and clinopyroxene plus opaque in others. The chlorite often

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invades feldspar along cleavages. The pseudomorphs are roundish laths about 0.2 to 2 mm long, which tend to cluster, composed of relatively coarse golden-brown biotite plus traces of chlorite, particularly rimming the biotite. Most pseudo-olivine is interstitial to feldspar, occasionally it occurs as inclusions in clinopyroxene.

Olivine may have formed 10 to 15% of the rock prior to alteration. Feldspar is about 30 to 40%. Clinopyroxene 30 to 40%, chlorite 10 to 20%, opaque 5%.

Slide 2:

Thin section: Altered intergranular and amygdaloidal. Feldspar laths, elongate, 0.3 to 3 mm long, in random orientation, with common to abundant deposits of chlorite and lesser calcite along cleavage cracks. Interstitial clinopyroxene, pseudomorphs after olivine(?), opaque and amygdules of chlorite. Clinopyroxene is colorless, usually fills interstices along with lesser opaque, crystallized after and bounded by the feldspar. Pseudomorphs roundish to lath-shaped, about 0.2 to 1 mm long, tend to cluster. Larger pseudomorphs are composed of a green mafic of moderate birefringence, with extinction and cleavage planes parallel to lath elongation, and which contain patches of fine matted green chlorite, sometimes a patch of calcite at the core, and opaque along the rim and in curvilinear cracks, which are relics of olivine cleavages. The opaque is often altered to translucent iron hydroxide. The green mafic may be an orthopyroxene crystal structure altered in part to amphibole or chlorite. Smaller pseudomorphs are principally matted chlorite plus the opaque and sometimes calcite, with the pyroxene-like mafic often absent. Amygdules are fine matter green to brown chlorite and mostly occupy lobate, irregularly shaped interstices between feldspar laths. The largest are about 2 mm across.

Approximate percentages: feldspar-40%; clinopyroxene-20 to 25%; pseudomorphs-10 to 15%; amygdules-20%; opaque-5 to 10%.

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APPENDIX C

DIPMETER SURVEY

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APPENDIX C

Dipmeter Survey

The dipmeter survey was carried out by Welex. It covers the interval from the base of the 13-3/8" casing, at 925 feet,* to 7,956 feet, and from 8,180 feet to 9,930 feet. The dipmeter was not run from the surface to 925 feet, from 7,958 to 8,180 feet or from 9,930 to 10,054 feet. Included in this appendix are polar plots showing the distribution of dipmeter points relative to azimuth and amount of dip, constructed by GeothermEx for selected intervals. These are included as a part of the interpretation of the significance of the dipmeter data. Actual data sheets and "pollywog diagrams" are being sent directly from Welex to report recipients.

The dipmeter may record the attitude of various types of surfaces, including normal bedding places, cross-bedding or cut-and-fill surfaces, fault planes and joint surfaces. Thus the significance of the dipmeter readings must be determined in relation to other geological information available. The following is a summary of observations concerning the significance of the data.

1. Very few data points were measured in the fine basalt/diabase intervals. The points measured are highly variable and probably represent fracture surfaces. As a result, they do not provide conclusive evidence relative to the concordance of the igneous bodies with the surrounding sedimentary rocks.

2. The data available at the contacts between igneous units and the surrounding sediments show sharp changes in dip degree or azimuth which might correlate with a discordant intrusive contact. The bodies might still be sills, as far as can be determined from this information.

3. The dipmeter data have been graded A, B, C and D by Welex, to indicate reliability. No consistent relationship was seen between A-grade correlations and probable bedding-plane dips and many may be readings on fracture planes. Therefore, no attempt has been made to distinguish between data points on the basis of their letter grade.

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*All figures refer to depth below surface.

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4. The scatter of azimuth and dip values is great in the intervals plotted on polar diagrams. Care was taken during plotting to note any systematic changes with depth. Those detected are noted below. The lack of concentrations of values in many intervals makes it difficult to clearly define the prevailing attitudes and the locations of possible angular unconformities.

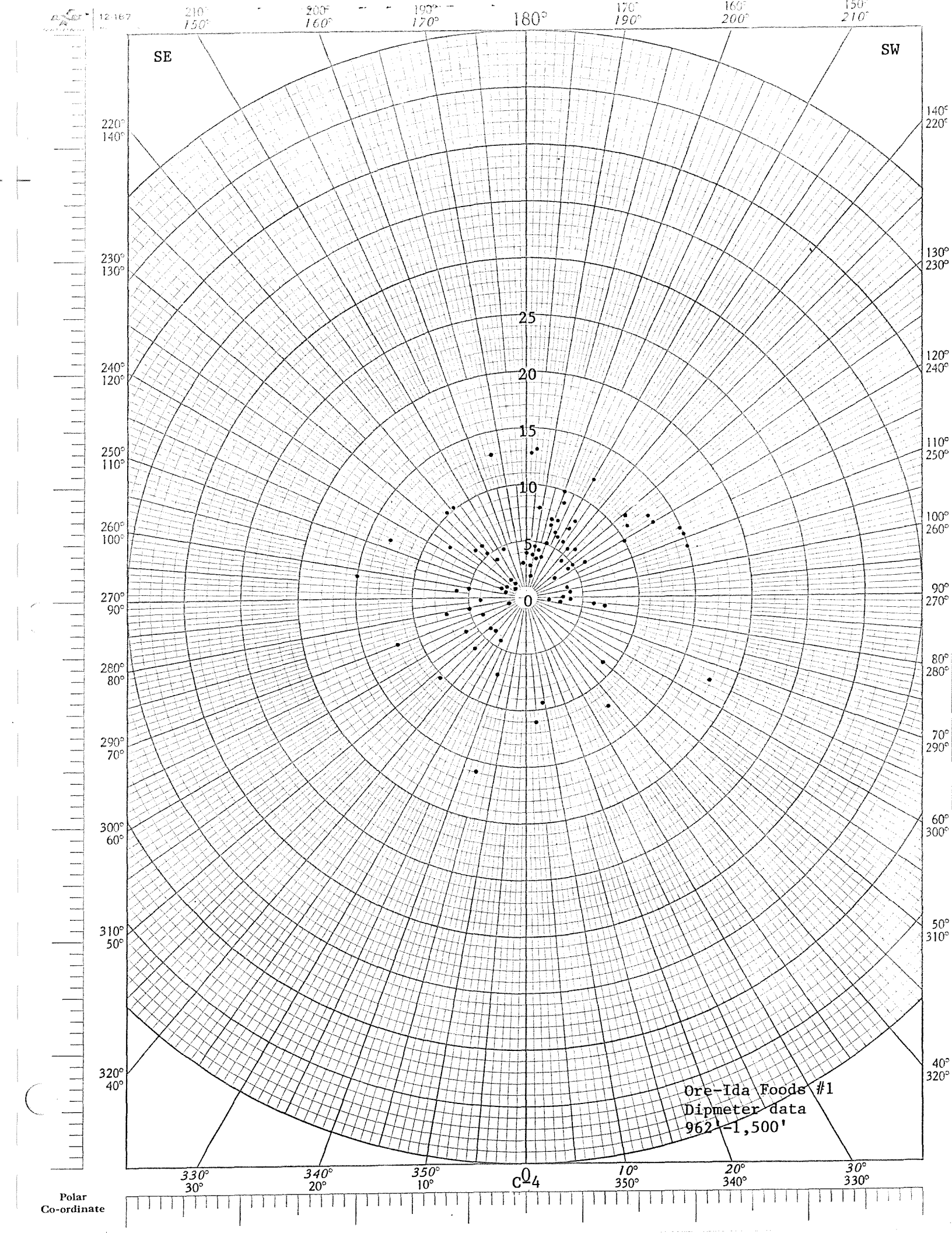
5. The main structural units suggested by the dipmeter are located in table C-1. The most prominant structural break recorded by these data appears to be the change from a predominantly southwest azimuth above the basalt/diabase at 5,150 to 5,300 feet to a southeast to east-southeast azimuth below. Of the other changes in azimuth, all appear to be local changes of uncertain significance. In particular, the northeast azimuth in the 5,600 to 6,030 foot interval is actually confined to a section of tuffaceous and silty sandstone between 5,830 feet to 6,030 feet. The average dip angle also appears to be higher than that in adjacent intervals. The unusual character of the attitudes in this interval may include other factors than true bedding.

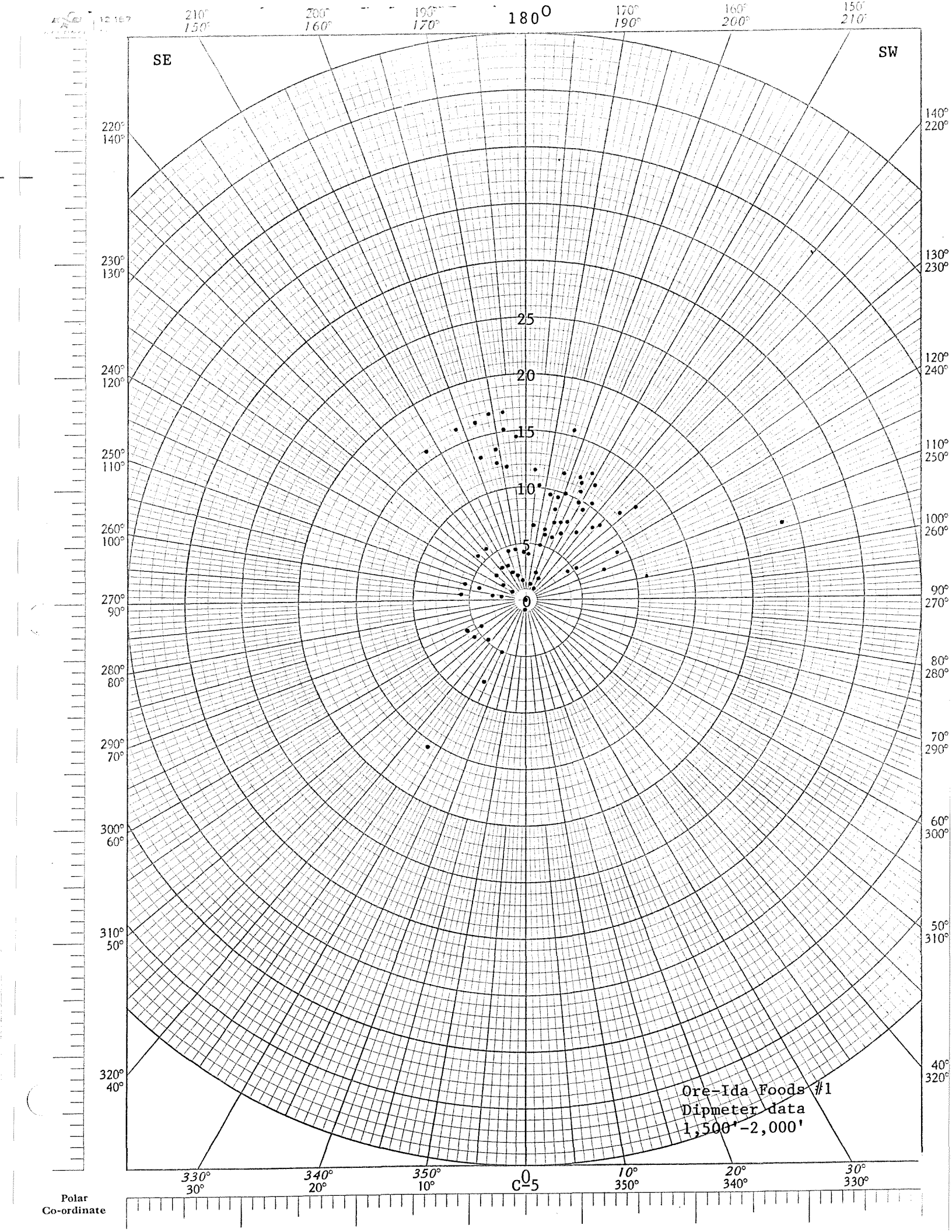
   Below 8,135 feet, the section is mainly basalt/diabase, with a few thin tuffs or sedimentary units interbedded. The dipmeter data are sparse and inconsistent in this interval, except for the tuff and sediment unit from 9,240 to 9,510 feet. The data concentration is poor but a southeasterly dip averaging about 20 degrees may occur.

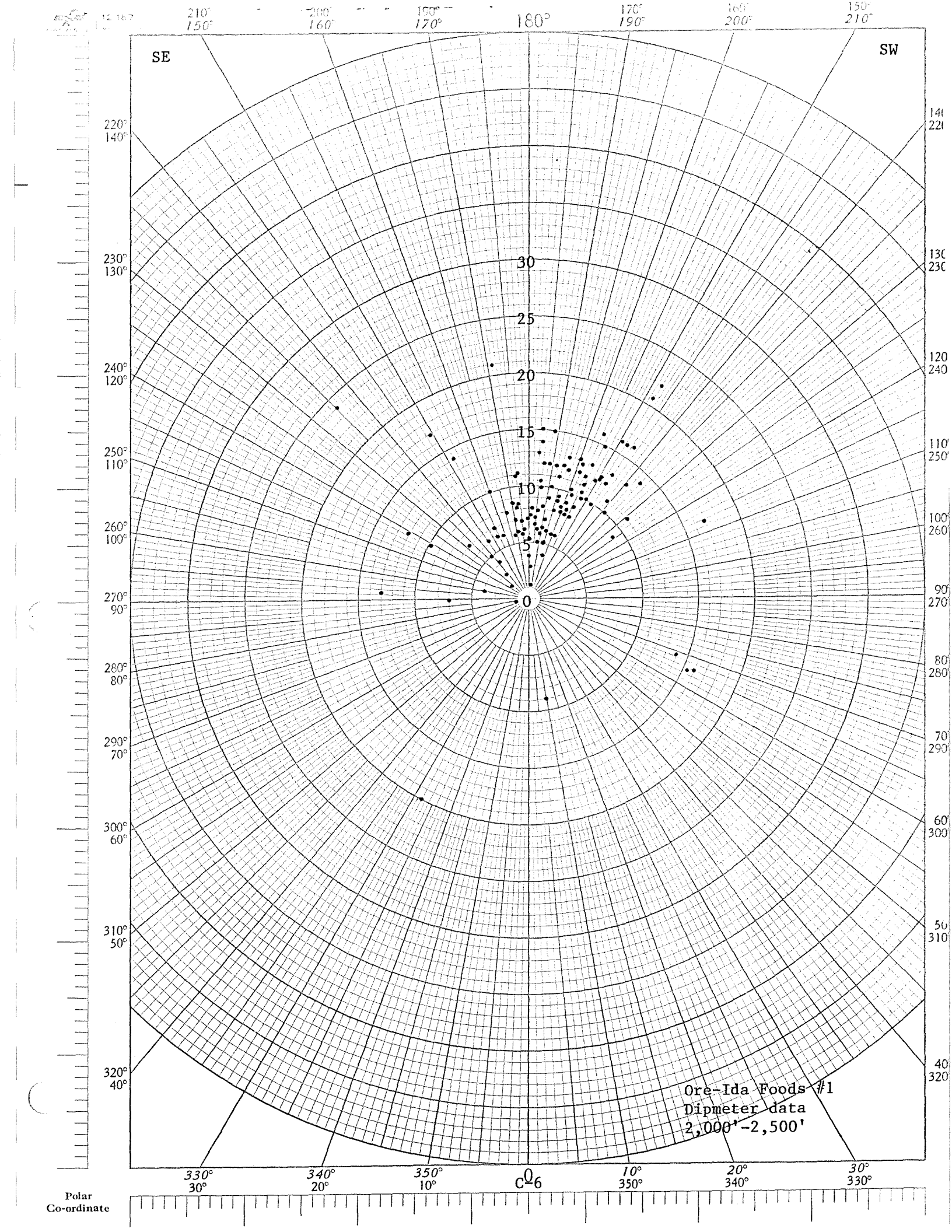
TABLE C-1

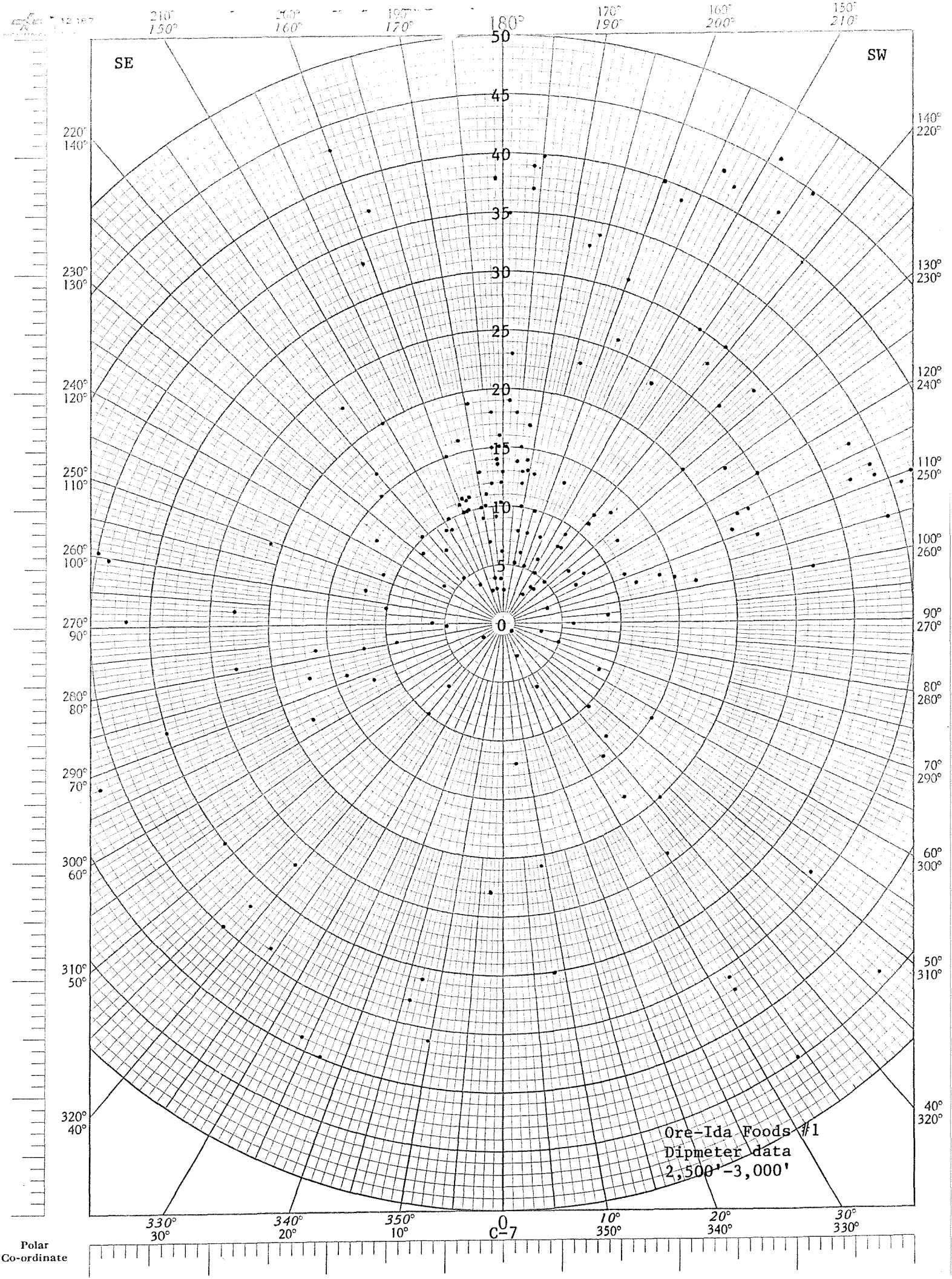
Summary of Dipmeter Data

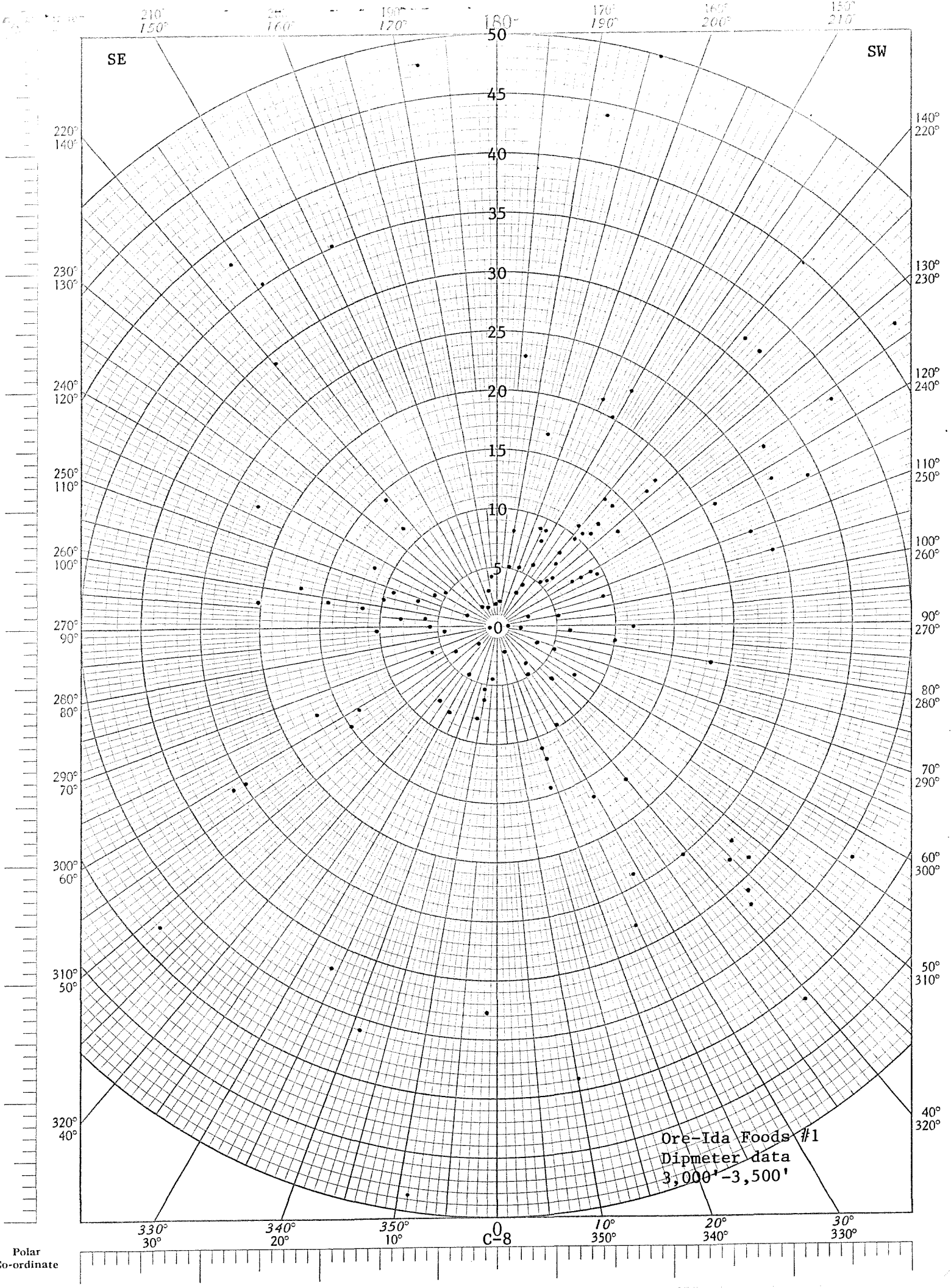
Interval (feet)	Estimated Average Dip	Azimuth	Comments
962-2,500	3°-15°±	Southwest	Fair data concentration
2,500-3,000	3°-15°±	South	Poor data concentration
3,000-4,000	Uncertain	Southwest?	Very poor data concentration
4,000-4,570	15°±	South	Poor data concentration
4,570-4,660	---	---	Basalt/diabase--excluded
4,660-5,150	8°±	Southwest	Poor data concentration
5,150-5,300	---	---	Basalt/diabase--excluded
5,300-5,580	15°±	Southeast	Good data concentration
5,580-5,660	---	---	Basalt/diabase--excluded
5,660-5,800	?	?	Poor data concentration
5,800-6,030	20°-25°	Northeast	Good data concentration
6,030-6,300	---	---	Basalt/diabase--excluded
6,300-7,015	5°-15°	East southeast	Fair data concentration
7,015-7,150	---	---	Basalt/diabase--excluded
7,150-7,956	10°	Southeast	Good data concentration above 7,600; poor below
7,955-8,180	---	---	Not logged
8,180-9,240	---	---	Basalt/diabase with minor tuffs and sediments--excluded
9,240-9,510	20°±	Southeast	Poor data concentration
9,510-9,931	---	---	Basalt/diabase with minor tuff--excluded

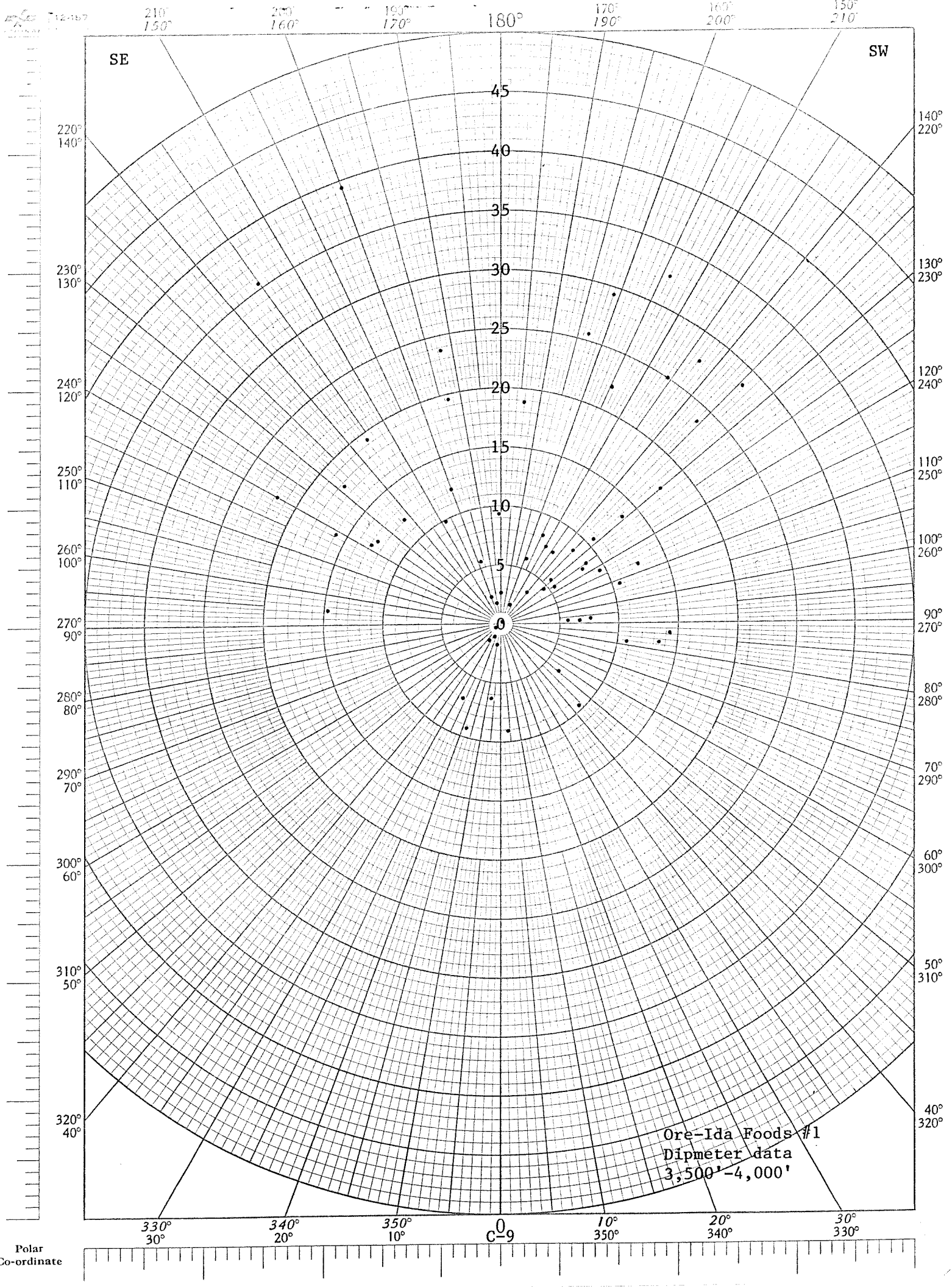

SE
SW
180°
25
20
15
10
5
0
Ore-Ida Foods #1
Dipmeter data
962'-1,500'
Polar
Co-ordinate

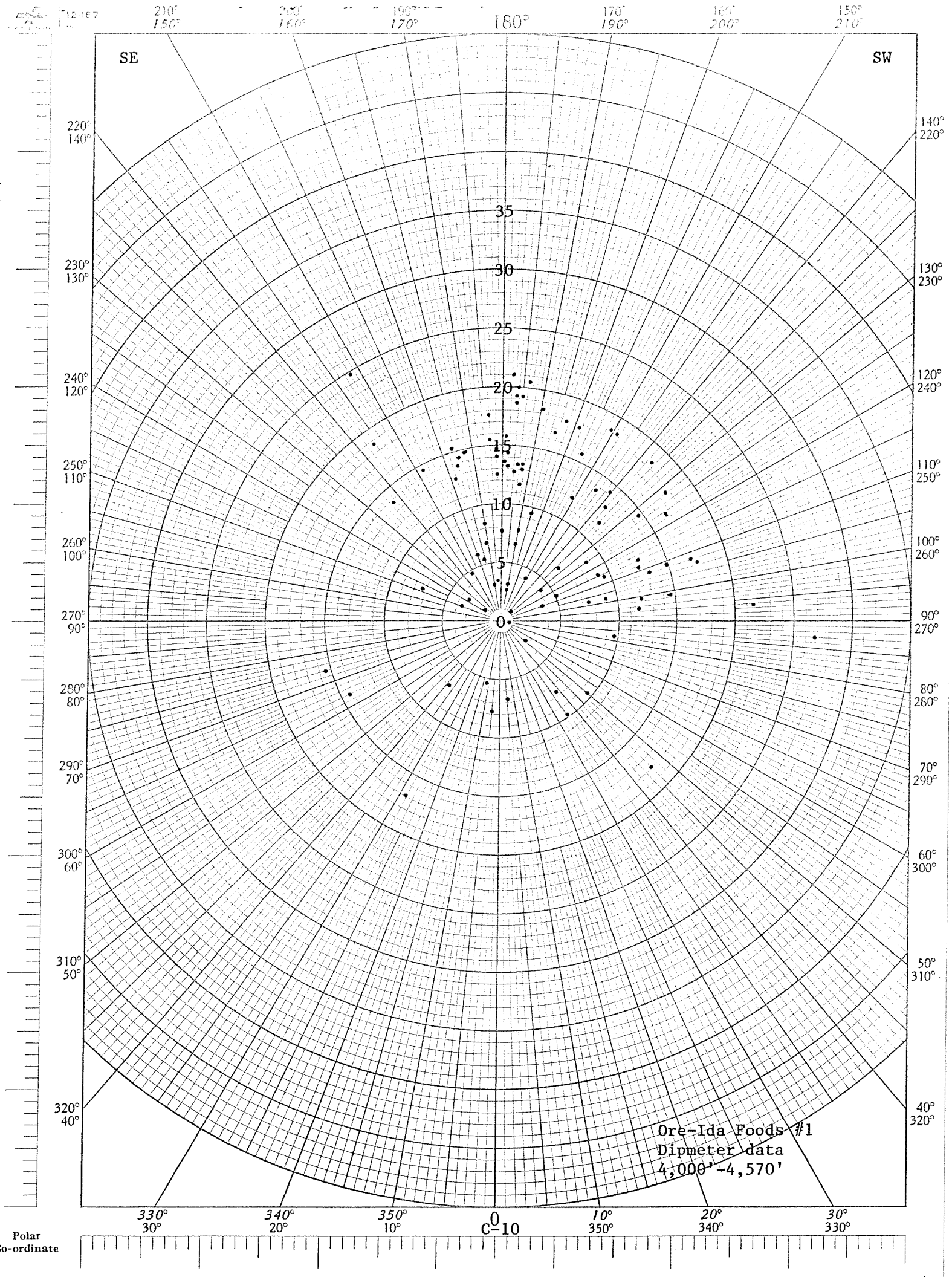

180°
SE
SW
25
20
15
10
5
0
Ore-Ida Foods #1
Dipmeter data
1,500'-2,000'
C-5
Polar
Co-ordinate

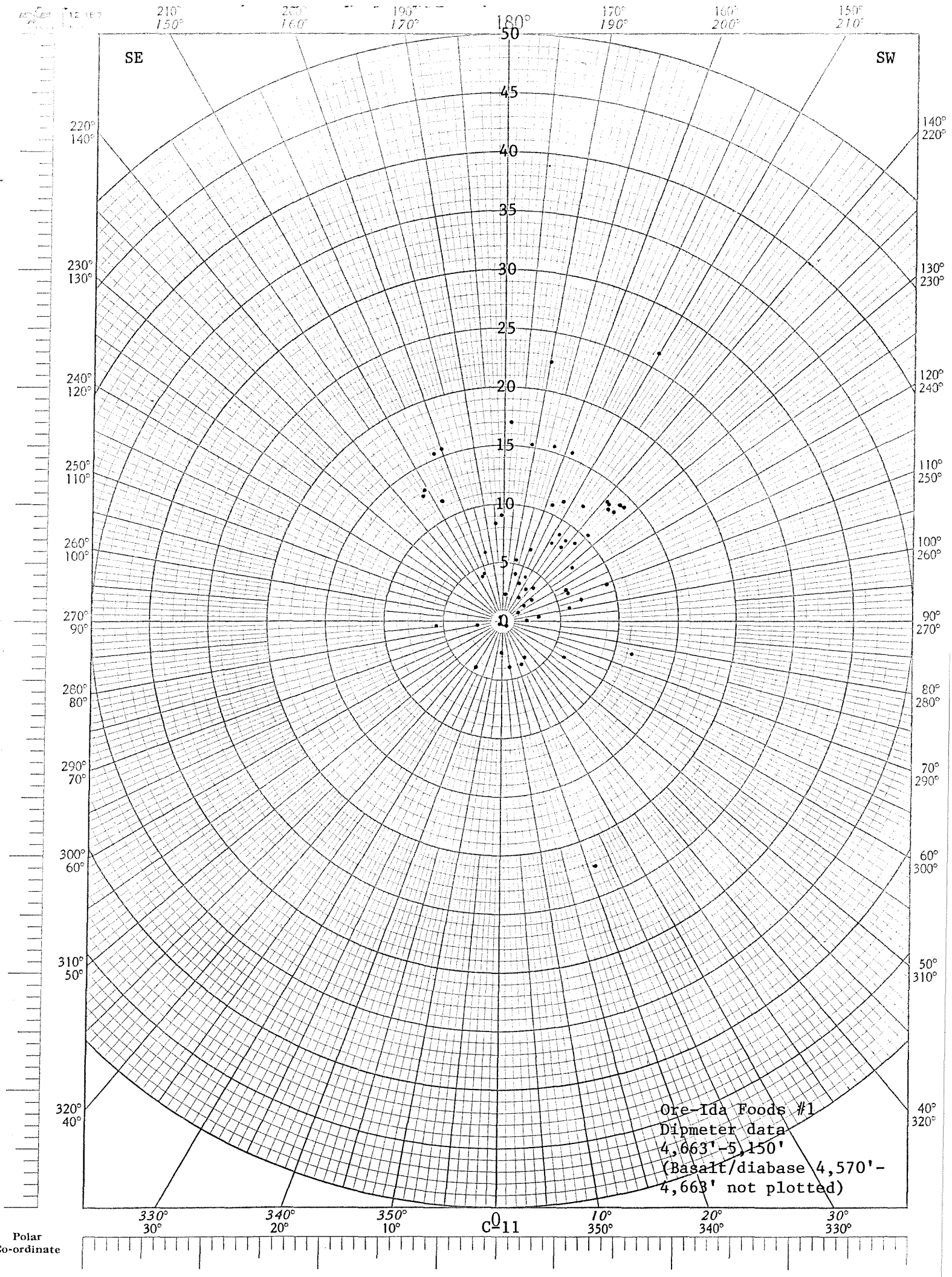

SE
SW
180°
30
25
20
15
10
5
0
Ore-Ida Foods #1
Dipmeter data
2,000'-2,500'
C06
Polar
Co-ordinate

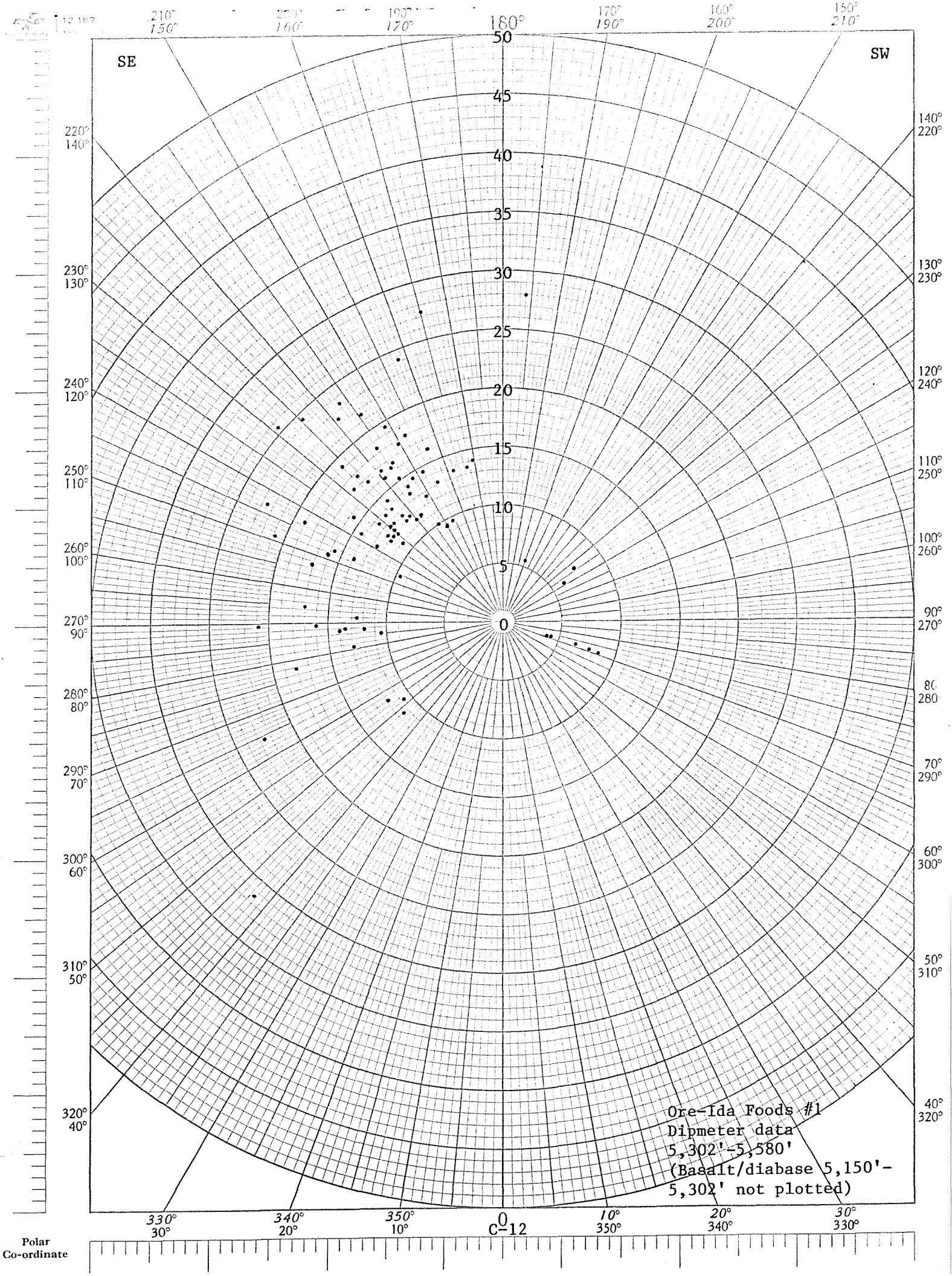

SE
SW
50
45
40
35
30
25
20
15
10
5
0
Ore-Ida Foods #1
Dipmeter data
2,500'-3,000'
Polar
Co-ordinate
C-7


SE
SW
50
45
40
35
30
25
20
15
10
5
0
Ore-Ida Foods #1
Dipmeter data
3,000'-3,500'
C-8
Polar
Co-ordinate


SE
SW
180°
45
40
35
30
25
20
15
10
5
0
Ore-Ida Foods #1
Dipmeter data
3,500'-4,000'
C-9
Polar
Co-ordinate


SE
SW
180°
35
30
25
20
15
10
5
0
Ore-Ida Foods #1
Dipmeter data
4,000'-4,570'
C-10
Polar
Co-ordinate


SE
SW
50
45
40
35
30
25
20
15
10
5
0
210° 150°
200° 160°
190° 170°
180°
170° 190°
160° 200°
150° 210°
220° 140°
230° 130°
240° 120°
250° 110°
260° 100°
270° 90°
280° 80°
290° 70°
300° 60°
310° 50°
320° 40°
140° 220°
130° 230°
120° 240°
110° 250°
100° 260°
90° 270°
80° 280°
70° 290°
60° 300°
50° 310°
40° 320°
330° 30°
340° 20°
350° 10°
C 11
10° 350°
20° 340°
30° 330°
Ore-Ida Foods #1
Dipmeter data
4,663'-5,150'
(Basalt/diabase 4,570'-
4,663' not plotted)
Polar
Co-ordinate


SE
SW
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10
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180°
210° 150°
200° 160°
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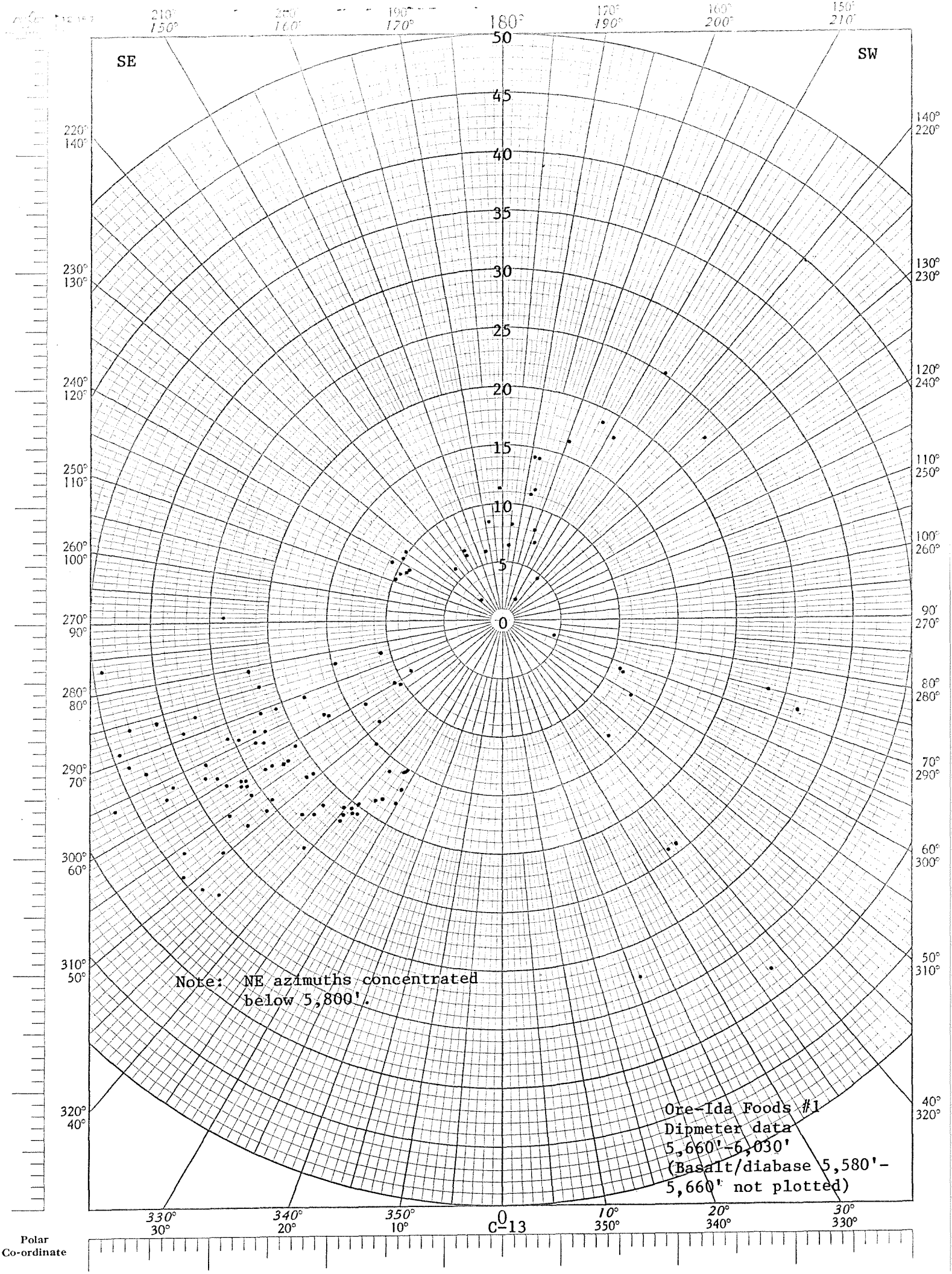
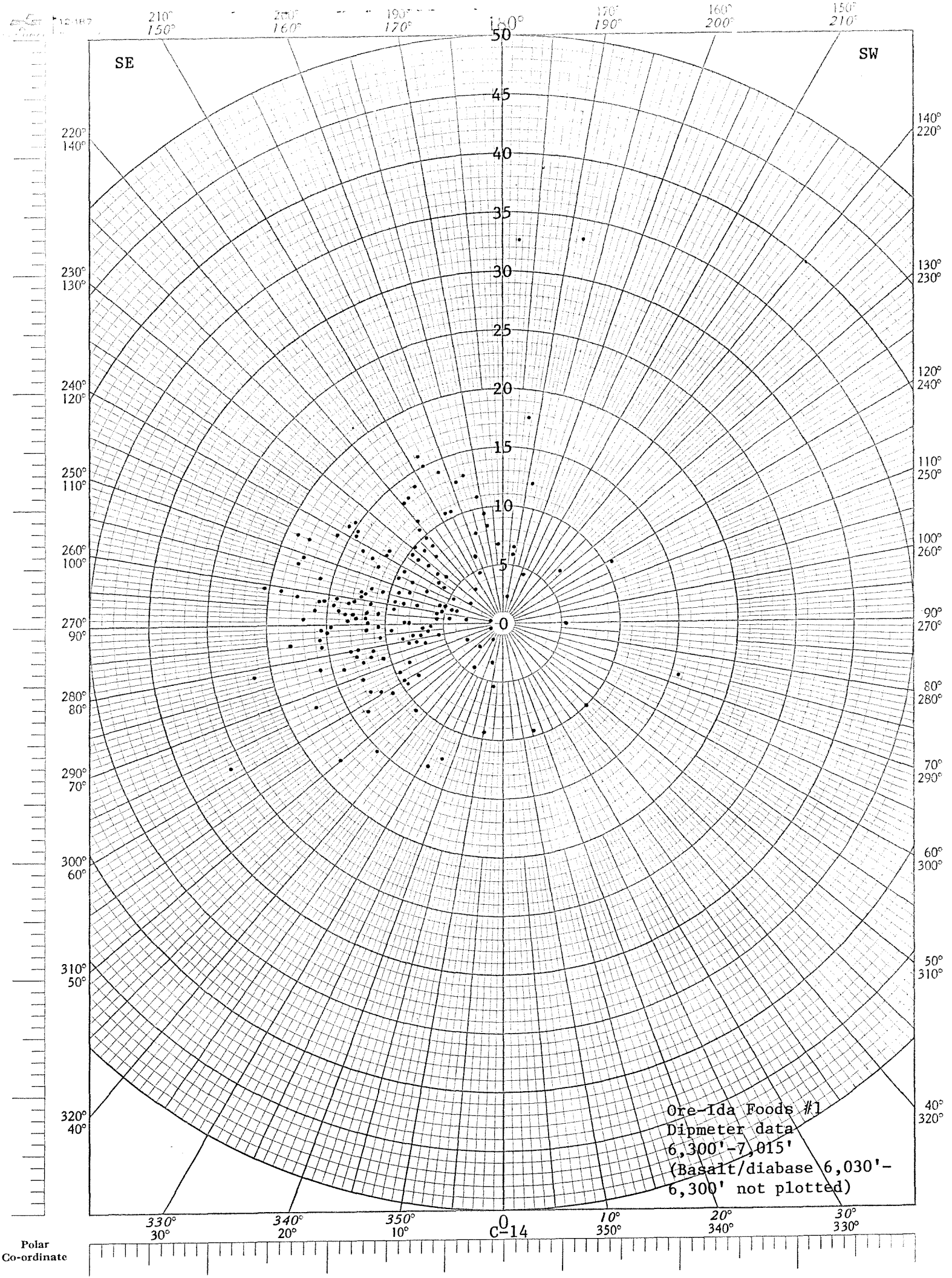
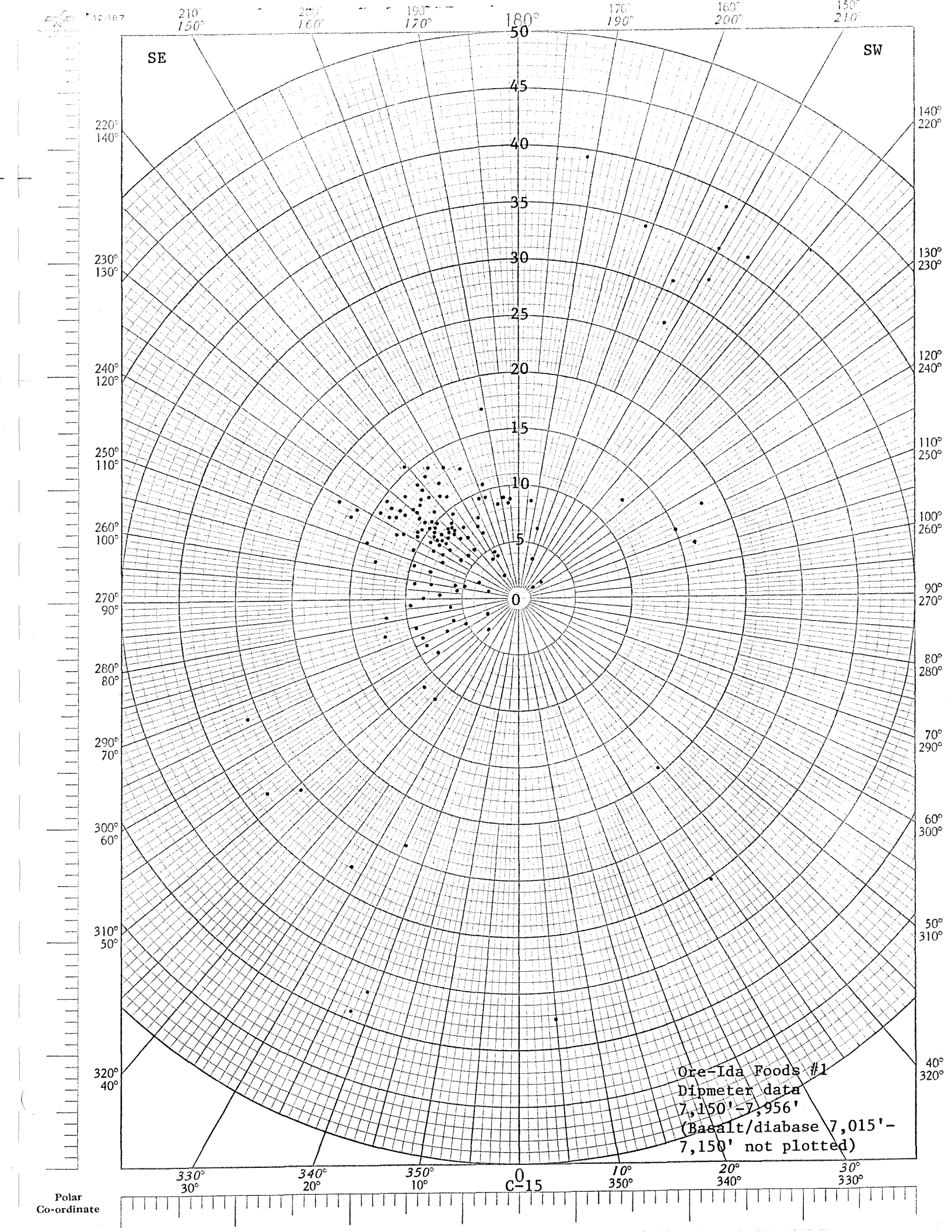
160° 200°
150° 210°
140° 220°
130° 230°
120° 240°
110° 250°
100° 260°
90° 270°
80° 280°
70° 290°
60° 300°
50° 310°
40° 320°
330° 30°
340° 20°
350° 10°
10° 350°
20° 340°
30° 330°
Ore-Ida Foods #1
Dipmeter data
5,302'-5,580'
(Basalt/diabase 5,150'-
5,302' not plotted)
C-12
Polar
Co-ordinate


SE
SW
50
45
40
35
30
25
20
15
10
5
0
Note: NE azimuths concentrated below 5,800'.
Ore-Ida Foods #1
Dipmeter data
5,660'-6,030'
(Basalt/diabase 5,580'-5,660' not plotted)
C-13
Polar Co-ordinate


SE
SW
50
45
40
35
30
25
20
15
10
5
0
Ore-Ida Foods #1
Dipmeter data
6,300'-7,015'
(Basalt/diabase 6,030'-
6,300' not plotted)
C-14
Polar
Co-ordinate



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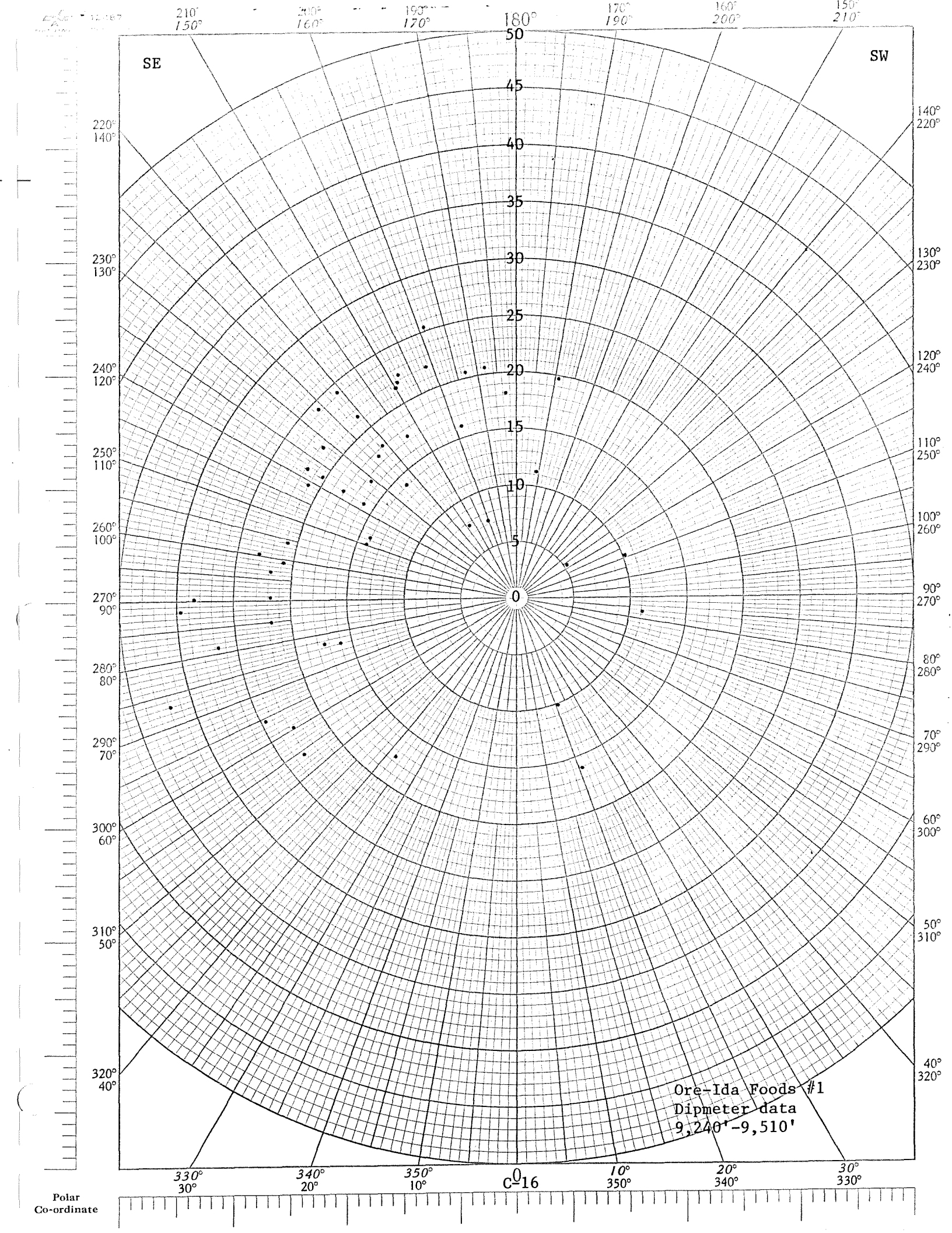
SE
SW
50
45
40
35
30
25
20
15
10
5
0
180°
210° 150°
200° 160°
190° 170°
170° 190°
160° 200°
150° 210°
220° 140°
230° 130°
240° 120°
250° 110°
260° 100°
270° 90°
280° 80°
290° 70°
300° 60°
310° 50°
320° 40°
140° 220°
130° 230°
120° 240°
110° 250°
100° 260°
90° 270°
80° 280°
70° 290°
60° 300°
50° 310°
40° 320°
330° 30°
340° 20°
350° 10°
0
10° 350°
20° 340°
30° 330°
Ore-Ida Foods #1
Dipmeter data
9,240'-9,510'
C-16
Polar
Co-ordinate

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APPENDIX D

MUD LOG

This appendix is a copy of the mud log prepared by EnergyLog well logging service, Sacramento, California. This log covers the interval from 54 feet to the total depth of 10,054 feet. Copies of the log are being sent directly from Energylog to recipients of the report.

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APPENDIX E

DRILLING AND TESTING HISTORY

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August 21, 1979

New hole was drilled from 356 to 925 feet depths. Weight on the bit ranged from 15,000 to 28,000 pounds, and the bit turned at 90 rpm. Pump pressure was 400 psi with mud weight of 67 pcf and viscosity of 38. The total life of bit No. 1 was 21-1/2 hours and 871 feet. There was a total of 569 feet drilled in 7-1/2 hours, averaging 76 feet per hour. Cuttings consisted of sand, sandy siltstone, limestone and clay of the upper Idaho Group, possibly the Chalk Butte Formation. Mud return temperatures averaged 85°F. GeothermEx personnel present: as above. A deviation survey run at 480 feet showed an angle of 1/4°; a survey run at 925 feet showed an angle of 3/4°.

Casing was run, to 925 feet depth, consisting of 19 joints of 13-3/8 inch buttress U. S. steel, with flexiflow fill at 880 feet, and 3 centralizers, cemented with 395 sacks of class G cement, premixed with perlite, silica flour and gel. The welds were tested at 1,500 psig for 15 minutes. The hole diameter was reduced to 12-1/4 inches.

August 22, 1979

No new hole was made. The Blow-out preventers were installed and tested. These consisted of a 12-inch series 900 Shaffer dual hydraulic control gate and a Hydril G.K. The rams, casing, blowdown manifold, wing valves, standpipe valves, and Kelly cock were tested to 1,500 psig. The G.K. was pressure tested to 1,200 psig. Except for the kelly cock that would not close, and the standpipe valve which leaked, both of which were to be replaced, the tests were successful as witnessed and approved by W. N. Hathaway, Drilling Engineer.

The hole was redrilled to 895 feet, in firm cement, with a mud weight of 67 pcf and a mud viscosity of 38. GeothermEx personnel: as above.

August 23, 1979

New hole was made from 925 feet to 2,049 feet. The weight on the bit ranged from 35,000 to 40,000 pounds, and the bit turned at 80 to 100 rpm. The pump pressure was 1,500 psi. A deviation survey was run at 1,807 feet; no deviation was reported. The mud weights was 71 pcf; the mud viscosity was 45.

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There were a total of 1,124 feet drilled in 16-3/4 hours, averaging 67 feet per hour. The rocks encountered consisted of clay, clay-siltstone, sandy siltstone, sand and sandstone of the upper Idaho Group. Mud return temperatures reached 119°F. GeothermEx personnel present: as above.

August 24, 1979

New hole was made from 2,049 feet to 2,866 feet. A bit change was made at 2,049 feet depth. The life of bit No. 2 was 1,124 feet and 22 hours. A deviation survey was run at 2,049 feet; deviation reported was 1°15'. Drilling resumed with 25,000 to 30,000 pounds on the bit, turning at 100 rpm. Mud pressure was 1,800 psi and mud weight was 71 pcf with viscosity of 50. A second deviation survey was run at 2,584 feet; deviation of 1°45' was observed.

There were a total of 817 feet drilled in a period of 15-3/4 hours, averaging 52 feet per hour. Cuttings consisted of claystone, sandstone, sand and a trace of tuff, which probably belong to the Upper Idaho Group. Mud return temperatures reached 119°F. GeothermEx personnel: as above.

August 25, 1979

New hole was drilled from 2,866 feet to 3,333 feet, with 20,000 to 30,000 pounds on the bit, turning at 100 rpm. The mud pressure was 1,800 psi with a mud weight of 65 pcf and a viscosity of 45. Four hours were spent on rig repairs. A deviation survey showed 1°45' at 3,131 feet. The drillers circulated for 2 hours in preparation for a temperature survey, which was run at 3,243 feet depth.

There were a total of 467 feet drilled in 10-1/4 hours, averaging 45 feet per hour. The lithology consisted of claystone, siltstone and a trace of white tuff, from the Upper Idaho Group. The maximum reading thermometer gave a reading of 126°F, after remaining at 3,243 feet depth for 45 minutes. GeothermEx personnel: as above.

August 26, 1979

New hole was made from 3,333 feet to 3,802 feet depths. The weight on the bit varied from 20,000 to 30,000 pounds, turning at 100 rpm. The mud pressure was 1,800 psi with a mud weight of 74 pcf and a viscosity of 50. Drillers hit a bridge at 3,424 feet, circulated

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heavy mud and reamed the hole. Drillers tripped for a bit change at 3,652 feet. The total life on bit #3 was 33 hours, and 1,603 feet. A deviation survey run at 3,652 feet showed 0°15'.

There were a total of 469 feet drilled in approximately 13-1/2 hours, averaging 35 feet per hour. Drilling returns consisted of siltstones and claystones with interbedded tuffs, from the Upper Idaho Group. Mud return temperatures reached 131°F. GeothermEx personnel: as above.

August 27, 1979

New hole was made from 3,802 feet to 4,088 feet depths. The weight on the bit varied from 20,000 to 30,000 pounds, turning at 100 rpm. The mud pressure was 1,800 psi, with a mud weight of 74 pcf and a viscosity of 43. The main driveshaft on the drawworks broke. The drillers welded the shaft and pulled the drill string carefully to 1,539 feet, at which point the weld broke. Drillers circulated while waiting for new parts.

There were a total of 286 feet drilled in 9-3/4 hours, averaging 29 feet per hour. Cuttings consisted of claystone, siltstone and tuff of the Upper Idaho Group. Mud return temperatures reached 135°F. GeothermEx personnel: as above.

August 28 to August 31, 1979

Drillers waited on parts, while circulating mud at 1,539 feet depth. GeothermEx personnel were as above through August 29. Murray Gardner was present from August 30 and August 31.

September 1, 1979

No new hole was made. Drillers repaired the drawworks at 9:00 a.m. and pulled the bit. Total life on bit No. 4 was 15-3/4 drilling hours and 466 feet. Re-entering the hole, caving was encountered to 1,900 feet. The hole was reamed to 4,088 feet. Circulation breaks occurred at 1,780 feet and 2,340 feet, and a bridge was encountered at 2,522 feet. GeothermEx personnel: as above, except Cox away on August 31.

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September 2, 1979

New hole was made from 4,088 feet to 4,160 feet. The weight on the bit was 15,000 to 25,000 pounds, turning at 100 rpm. The mud pressure was 1,900 psi with a weight of 77 pcf and a viscosity of 55.

There were a total of 72 feet drilled in approximately 2 hours, averaging 36 feet per hour. Lithology consisted of Upper Idaho Group siltstones. Mud return temperatures reached 147°F. A chromatograph was installed to analyze the components of the ditch gas, at 4,115 feet. GeothermEx personnel: Jim McIntyre, Murray Gardner.

September 3, 1979

New hole was made from 4,160 feet to 4,706 feet depths. The weight on the bit varied from 15,000 to 25,000 pounds, turning at 100 rpm. The mud weight was 76 pcf, with a mud viscosity of 50 and pump pressure of 1,800 psi. A temperature survey was run at 4,535 feet.

There were a total of 546 feet drilled in 20 hours, averaging 27 feet per hour. The lithology consisted of siltstones, sandstones and a white tuff to 4,570 feet, belonging probably to the Upper Idaho Group, possibly still the Chalk Butte Formation. At 4,570 feet depth a basalt/diabase was encountered, belonging possibly to the Grassy-Mountain-Deer Butte Formation of the Lower Idaho Group. Mud return temperatures reached 149°F. The maximum reading thermometer survey showed 165°F after 40 minutes at 4,565 feet. GeothermEx personnel: as above.

September 4, 1979

New hole was made from 4,706 feet to 4,981 feet depths. The bit was changed at 4,722 feet. The life of bit No. 5 was 604 feet and 23-1/4 hours. A deviation survey was run at 4,722 feet and showed 1°30'. There was a break in circulation at 3,245 feet, and the tight hole was reamed, while mud weight was built to 80 pcf with a viscosity of 50. Mud pressure was 1,800 psi, with 15,000 to 25,000 pounds on the bit, which turned at 100 rpm.

There were a total of 275 feet drilled in 11 hours, averaging 25 feet per hour. The cuttings consisted of tuffs, siltstones and sandstones of the Lower Idaho Group. Mud return temperatures reached 151°F. GeothermEx personnel: as above

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September 5, 1979

New hole was made from 4,981 feet to 5,201 feet depths. The mud weight was 79 pcf with a viscosity of 47, and a pressure of 1,800 psi. The weight on the bit was 15,000 to 25,000 pounds, turning at 100 rpm. The bit was changed at 5,151 feet. The total life on bit No. 6 was 19-1/2 hours, and 429 feet. A deviation survey run at this depth showed an angle of 1°30'. Drillers noticed a possible washout at 5,194 feet.

There were a total of 220 feet drilled in 16 hours, averaging 14 feet per hour. The cuttings consisted of sandstone, siltstone, clay, and tuff to 5,160 feet, at which depth a second basalt/diabase unit was encountered. Both the sedimentary sequence and the basalt are thought to belong to the Lower Idaho Group. Mud return temperatures reached 158°F. GeothermEx personnel: Murray Gardner, Jim McIntyre, Billie Cox.

September 6, 1979

New hole was made from 5,201 feet to 5,264 feet. Mud pressure was 1,800 psi, with a weight of 79 pcf and a viscosity of 42. The drill-string was pulled to check for a washout, and the bit was changed before any new hole was made. The life on bit #7 was 50 feet and 6-1/2 hours.

There were a total of 63 feet drilled in 12 hours, averaging 5-1/4 feet per hour. Cuttings consisted basalt/diabase, probably from the Lower Idaho Group. The mud return temperatures reached 160°F. GeothermEx personnel: as above.

September 7, 1979

New hole was made from 5,264 feet to 5,362 feet. The weight on the bit was 15,000 to 35,000 pounds, turning at 45 to 100 rpm. The mud weight was 79 pcf with viscosity of 40 and pressure of 1,800 psi. At 5,284 feet the drillers checked for a wash-out, and changed the bit. The total life of bit No. 8 was 16 hours and 83 feet. A maximum reading thermometer survey was run after the bit change.

There were a total of 98 feet drilled in 12 hours, averaging 8 feet per hour. The diabase continued to 5,302 feet, at which depth the cuttings showed a white tuff, also of the Lower Idaho Group. The

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mud return temperatures reached 158°F. The maximum reading thermometer showed 192°F after sitting for 40 minutes at 5,220 feet depth. GeothermEx personnel: as above.

September 8, 1979

New hole was made from 5,363 feet to 5,608 feet, with 25,000 to 35,000 pounds of weight on the bit, turning at 45 rpm. The mud weight was 81 pcf, with a viscosity of 40, and a pressure of 1,800 psi.

There were a total of 246 feet drilled in 23-1/2 hours, averaging 10 feet per hour. The cuttings consisted of sandstone, siltstone and tuff to 5,580 feet, where a third basalt/diabase unit was penetrated. Both lithologies are believed to belong to the Lower Idaho Group. Mud return temperatures reached 167°F. The chromatograph recorded a maximum of 1,700 ppm of C_1 at 5,425 to 5,430 feet. GeothermEx personnel: as above.

September 9, 1979

New hole was made from 5,608 feet to 5,777 feet, with 25,000 to 35,000 pounds of weight on the bit turning at 45 rpm. The mud weight was 81 pcf with a viscosity of 40, and a pressure of 1,800 psi.

There were a total of 169 feet drilled in 23-1/2 hours, averaging 7 feet per hour. The lithology consisted of basalt/diabase to 5,660 feet, below which the cuttings were siltstone, claystone, sandy siltstone, tuffs and tuffaceous sediments. Both the diabase and the sediments probably belong to the Lower Idaho Group. Mud return temperatures reached 168°F. GeothermEx personnel: as above.

September 10, 1979

New hole was made from 5,777 feet to 5,953 feet, with 25,000 to 35,000 pounds on the bit, turning at 45 to 70 rpm. The mud weight was 80 pcf, the viscosity 43, and the pressure was 1,800 psi. The bit was changed at 5,846 feet. Bit No. 9 had a life of 562 feet and 63 hours. A deviation survey was run which showed 1°30'. The drillers ran a shock sub.

There were a total of 179 feet drilled in 15 hours, averaging 12 feet per hour. The cuttings consisted of tuffaceous sandstone and

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sand, probably from the Lower Idaho Group. The mud return temperatures reached 171°F. The chromatograph showed a maximum of 1,200 ppm of C_1 at 5,630 to 5,655 feet. A maximum thermometer reading of 200°F was recorded after the instrument sat at 5,805 feet for 1 hour. GeothermEx personnel: as above.

September 11, 1979

New hole was made from 5,953 feet to 6,125 feet, with weight on the bit of 25,000 to 35,000 pounds, turning at 50 to 80 rpm. The mud weight was 80 pcf, the viscosity was 42, and the pump pressure 1,800 psi.

There were a total of 262 feet drilled in 23-1/2 hours, averaging 11 feet per hour. Cuttings consisted of sandstone and claystone to 6,030 feet, at which depth a fourth diabase unit was penetrated. Both of these lithologies are thought to belong to the Grassy Mountain/ Deer Butte Formations of the Lower Idaho Group. The mud return temperature read 179°F, but the recorder was later determined to be malfunctioning. The chromatograph showed a maximum of 1,500 ppm C_1 at 6,160 to 6,165 feet. GeothermEx personnel: as above.

September 12, 1979

New hole was made from 6,215 feet to 6,288 feet, with 35,000 to 45,000 pounds on the bit, turning at 60 to 75 rpm. The mud weight was 82 pcf, the viscosity was 45, and the pump pressure was 1,800 psi. There was a partial mud loss at 6,275 feet to 6,285 feet. The bit was changed at 6,266 feet, with the total life on bit No. 10 of 420 feet and 38-1/4 hours. A temperature and deviation survey was run at 6,261 feet, with a reported deviation of 1°.

There were a total of 73 feet drilled in 13-1/2 hours, averaging 5-1/2 feet per hour. Cuttings consisted of altered basalt diabase, probably from the Grassy Mountain-Deer Butte Formation. The mud return temperatures reached 172°F, but were later found that the equipment was not functioning. The maximum reading thermometer read 230°F after sitting at 6,260 feet depth for 30 minutes. The chromatography showed a maximum of 1,500 ppm C_1, with highs occurring at 6,250 to 6,255 and 6,295 to 6,300 feet. GeothermEx personnel: as above.

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September 13, 1979

New hole was made from 6,288 feet to 6,449 feet depths, with 35,000-45,000 pounds on the bit, turning at 60 to 75 rpm. The mud weight was 83 pcf, the viscosity 44, and the pump pressure 1,800 psi.

There were a total of 161 feet drilled in 23-1/2 hours, averaging 7 feet per hour. The lithology consisted of altered basalt diabase to 6,292 feet below which depth the cuttings consisted of tuffaceous siltstone and sandstone. Both the basalt and sedimentary rocks are believed to belong to the Lower Idaho Group. The mud return temperatures reached 172°F, but the instrument was later found to be malfunctioning between 6,000 feet and 6,450 feet. The chromatograph showed maxima of 1,500 ppm of C_1, with 6,360 to 6,365 and 6,370 to 6,380 feet. GeothermEx personnel: as above.

September 14, 1979

New hole was made from 6,449 feet to 6,548 feet, with a weight on the bit of 35,000 to 45,000 feet, turning at 60 to 75 rpm. The mud weight was 81 pcf, the viscosity was 42, and the pump pressure showed 1,800 psi.

There were a total of 99 feet drilled in 23-1/2 hours, averaging 4 feet per hour. Cuttings consisted of siltstone, tuffaceous siltstone, and tuffaceious sandstone, probably of the Lower Idaho Group. Mud return temperatures reached 163°F. GeothermEx personnel: as above.

September 15, 1979

New hole was made from 6,548 feet to 6,681 feet, with a bit weight of 35,000 to 45,000 pounds, turning at 50 to 75 rpm. The mud weight was 82 pcf, the viscosity was 43 and the pump pressure was 1,800 psi. A deviation survey run at 6,616 feet recorded an angle of 0°45'. The bit was changed at 6,631 feet, with a total life on bit No. 11 of 365 feet and 60-1/2 hours.

There were a total of 133 feet drilled in 14-3/4 hours, averaging 9 feet per hour. Cuttings consisted of sandstones, probably of the Lower Idaho Group. Mud return temperatures reached 166°F. The chromatgraph showed a maximum of 2,200 ppm C_1 at 6,630 feet with over 1,000 ppm C_1 throughout the interval 6,535 to 6,681 feet. GeothermEx personnel: as above.

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September 16, 1979

New hole was made from 6,681 feet to 6,906 feet, with 35,000 to 45,000 pounds on the bit, turning at 45 to 55 rpm. Mud weight was 82 pcf, viscosity was 43, and pump pressure was 1,800 psi.

There were a total of 225 feet drilled in 23-1/2 hours, averaging 9-1/2 feet per hour. The lithology consisted of sandstones, sand and siltstone, probably from the Lower Idaho Group. Mud return temperatures reached 169°F. The chromatograph showed a maxima of 1,500 ppm C_1 with highs at 6,775 to 6,780 and 6,810 to 6,860 feet. GeothermEx personnel: as above.

September 17, 1979

New hole was made from 6,906 feet to 7,156 feet, with 35,000 to 45,000 pounds on the bit, turning at 45 to 55 rpm. The mud weight was 82 pcf, the viscosity was 42 and the pump pressure was 1,800 psi.

There were a total of 250 feet drilled in 22-3/4 hours, averaging 11 feet per hour. The cuttings consisted of sand, siltstone and sandstone of the Lower Idaho Group to 7,015 feet, at which depth a fifth unit of diabase was penetrated. This is also thought to belong to the Lower Idaho Group. The mud return temperatures reached 175°F. The chromatograph showed a maximum C_1 of 2,000 ppm, with a high gas zone from 6,980 to 7,015 feet. GeothermEx personnel: as above.

September 18, 1979 - September 19, 1979

No new hole was made. Welex ran Dual Induction, Sonic, Density, Neutron, Fracture-finder and temperature logs. GeothermEx personnel: as above.

September 20, 1979

No new hole was made. The logging was completed at 6:00 a.m. The bit was changed. Total life on bit No. 12 was 525 feet and 52 hours. The hole was reamed from 7,068 feet with difficulty. GeothermEx personnel: Murray Gardner, Jim McIntyre.

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September 21, 1979

New hole was made from 7,156 feet to 7,230 feet. The mud weight was increased to 88 pcf, in order to hold the hole open and remove the accumulated cuttings while reaming. The increased weight caused the drillers to lose circulation at 7,169 feet. Mud weight was reduced from 88 pcf to 82 pcf, lost circulation materials were added, circulation regained, and drilling resumed.

There were a total of 74 feet drilled in 16 hours, averaging 7 feet per hour. Cuttings consisted of sandstone and siltstone, probably from the Lower Idaho Group. Mud return temperatures reached 162°F. GeothermEx personnel: as above.

September 22, 1979

New hole was made from 7,230 feet to 7,320 feet, with a weight on the bit of 25,000 to 35,000 pounds, turning at 45 to 60 rpm. The mud weight was 83 pcf, the viscosity was 44, and the pump pressure was 1,800 psi. A deviation survey was run at 7,320 feet, with a reported angle of 0°30'.

There were a total of 90 feet drilled in 23 hours, averaging 4 feet per hour. The cuttings consisted of a siliceous sandstone and siltstone, probably of the Lower Idaho Group. Mud return temperatures reached 174°F. The chromatograph showed a maximum C_1 of 1,400 ppm at 7,310 feet. GeothermEx personnel: as above.

September 23, 1979

New hole was made from 7,320 feet to 7,445 feet, with a weight on the bit of 25,000 to 35,000 pounds, turning at 50 to 60 rpm. The mud weight was 83 pcf, the viscosity was 44, and the pump pressure was 1,800 psi. There was a bit change at 7,326 feet, with a total life on bit No. 13 of 170 feet and 39 hours.

There were a total of 125 feet drilled in 18 hours, averaging 7 feet per hour. Cuttings consisted of sandstones and siltstones of the Lower Idaho Group. Mud return temperatures reached 171°F. GeothermEx personnel: as above.

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September 24, 1979

New hole was made from 7,445 to 7,565 feet, with a weight on the bit of 25,000 to 35,000 pounds, turning at 50 to 60 rpm. The mud weight was 83 pcf, the viscosity was 44, and the pressure was 1,800 psi.

There were a total of 120 feet drilled in 20-1/4 hours, averaging 6 feet per hour. The cuttings consisted of clay, claystone, siltstone, and sandstone of the Lower Idaho Group. Mud return temperatures reached 173°F. GeothermEx personnel: Jim McIntyre.

September 25, 1979

New hole was made from 7,565 feet to 7,660 feet, with a weight on the bit of 25,000 to 35,000 pounds, turning at 45 to 65 rpm. The mud weight was 82 pcf, the viscosity was 44, and the pump pressure was 1,800 psi. A deviation survey was run at 7,660 feet and showed an angle of 0°45'.

There were a total of 95 feet drilled in 20 hours, averaging 5 feet per hour. The cuttings consisted of clay and siltstone which were probably from the Lower Idaho Group. The mud return temperatures reached 176°F. GeothermEx personnel: as above.

September 26, 1979

New hole was made from 7,660 feet to 7,722 feet, with a weight on the bit of 25,000 to 35,000 pounds, turning at 45 rpm. The mud weight was 83 pcf, the viscosity was 44 and the pump pressure was 1,800 psi. There was a bit change at 7,660 feet, with the total life on bit No. 14 of 334 feet and 58-1/4 hours.

There were a total of 62 feet drilled in 20 hours, averaging 3 feet per hour. The cuttings consisted of clay, claystone, and siltstone of the Lower Idaho Group. Mud return temperatures were lowered to 160°F after mud cooling equipment was installed. GeothermEx personnel: Murray Gardner, Billie Cox, Jim McIntyre.

September 27, 1979

New hole was made from 7,722 feet to 7,873 feet, with a weight on the bit of 25,000 to 35,000 pounds, turning at 45 to 65 rpm. The

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mud weight was 82 pcf, the viscosity was 42, and the pump pressure was 1,800 psi.

There were a total of 151 feet drilled in 24 hours, averaging 6 feet per hour. Cuttings consisted of sandstone, clay, claystone, and siltstone, probably of the Lower Idaho Group. Mud return temperatures reached 150°F. The chromatograph showed a maximum C_1 of 1,500 ppm. Gas highs over 1,000 ppm were at 7,790 to 7,805, 7,820 to 7,830, 7,845 and 7,855 to 7,870 feet. GeothermEx personnel: Murray Gardner, Billie Cox.

September 28, 1979

New hole was made from 7,873 feet to 7,960 feet, with a weight on the bit of 25,000 to 35,000 pounds, turning at 45 to 65 rpm. The mud weight was 82 pcf, the viscosity was 42 and the mud pressure was 1,800 psi. The drill pipe twisted off at 7,506 feet depth at the first joint above the drill collars.

There were a total of 87 feet drilled in 20 hours, averaging 4 feet per hour. The cuttings consisted of clay and sandy siltstone, of the Lower Idaho Group. Mud return temperatures reached 150°F. GeothermEx personnel: as above.

September 29, 1979

No new hole was made. The drillers waited for fishing tools to arrive, ran the fishing tools, and jarred the fish loose. GeothermEx personnel: as above.

September 30, 1979

No new hole was made. The fish was recovered, drillers conditioned the hole for logging, and Wellex began the temperature log. GeothermEx personnel: as above.

October 1 and October 2, 1979

No new hole was made. The Wellex Dual Induction, Sonic, Density, Neutron, Fracture-finder and temperature logs were run. Maximum reading thermometers read 282°F and 315°F at 7,960 feet depth. GeothermEx personnel: Murray Gardner, Jim McIntyre, Billie Cox.

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October 3, 1979

New hole was made from 7,960 feet to 7,998 feet, with a weight on the bit of 25,000 to 35,000 pounds, turning at 60 to 70 rpm. The mud weight was 82 pcf, the viscosity was 43, and the pump pressure 1,800 psi. Logging continued to 8:00 a.m. The drill stem and subs were then magnafluxed. Drilling commenced at 6:00 p.m. with a new bit. Total life on bit No. 15 was 64-1/2 hours, 300 feet.

There were a total of 38 feet drilled in 6-1/2 hours, averaging 6 feet per hour. Cuttings consisted of sandy siltstone and clay of the Lower Idaho Group. Mud return temperatures reached 153°F. GeothermEx personnel: as above.

October 4, 1979

New hole was made from 7,998 feet to 8,062 feet, with a weight on the bit of 25,000 to 35,000 pounds, turning at 45 to 70 rpm. The mud weight was 83 pcf, the viscosity was 43, and the mud pressure was 1,800 psi. There was a bit change at 8,035 feet, with a total life on bit No. 16 of 75 feet and 16-3/4 hours. Repairs were made on the main mud pump clutch, after which drilling resumed.

There were a total of 64 feet drilled in 15 hours, averaging 4 feet per hour. Cuttings consisted of sandstone, tuff, and siltstone of the Lower Idaho Group. Mud return temperatures reached 151°F. GeothermEx personnel: Murray Gardner, Jim McIntyre, Billie Cox, Dave Blackwell.

October 5, 1979

New hole was made from 8,062 feet to 8,188 feet, with a weight on the bit of 25,000 to 35,000 feet, turning at 45 to 55 rpm. Mud weight was 84 pcf, viscosity was 46, and mud pump pressure 1,800 psi. Drilling penetrated a sixth igneous unit at 8,134 feet depth, and a decision was made to obtain a core from this unit. Drillers conditioned the hole, pulled out, and changed the bit. Total life on bit No. 17 was 153 feet and 18-3/4 hours. Drillers ran back in the hole and waited for the core-logging tools to arrive.

There was a total of 126 feet drilled in 14 hours, averaging 9 feet per hour. Cuttings consisted of sandstone, probably of the Lower Idaho Group, to 8,134 feet. The sixth igneous unit was a serpentinized massive basalt, thought to be equivalent to the Owyhee Columbia River Basalts. Mud return temperatures reached 152°F. GeothermEx personnel: as above.

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October 6, 1979

No new hole was made. Drillers waited 15 hours for coring tools, made up the tools and ran the core barrel. The bit on the core barrel was a 9-7/8 inch drag bit, and would not cut. Mud return temperatures with the cooling unit shut off reached 168°F. GeothermEx personnel: Jim McIntyre, Billie Cox.

October 7, 1979

No new hole was made. Drillers pulled out of the hole, waited 9-3/4 hours for a new diamond core bit, changed the bit on the coring tool, and ran back into the hole. Mud return temperatures reached 164°F. GeothermEx personnel: Murray Gardner, Jim McIntyre, Billie Cox.

October 8, 1979

New hole was made from 8,188 feet to 8,216 feet. Drillers cut a 28 foot length of core, with 22,000 pounds on the bit, turning at 50 rpm, with a pump pressure of 1,700 psi. Drillers pulled out of the hole, retrieved the core, and changed the bit. The total life on the core bit, No. 18, was 28 feet and 18-3/4 hours. Drillers ran back in the hole and reamed the cored interval with bit No. 19, a 12-1/4 inch bit, which was used for 2.5 hours.

There were a total of 28 feet drilled in 18-3/4 hours, averaging 1-1/2 feet per hour. This cored interval was a massive serpentinized basalt, possibly equivalent to the Columbia River-Owyhee Basalts. GeothermEx personnel: as above.

October 9, 1979

No new hole was made. Drillers drilled a rat hole in preparation for installation of the 9-5/8 inch casing, circulated, and waited for the casing. GeothermEx personnel: as above.

October 10, 1979

No new hole was made. Drillers waited 6 hours for casing, pulled out and rigged up to run the casing, and spent 10 hours running 9-5/8 inch casing. GeothermEx personnel: Murray Gardner, Billie Cox.

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October 11, 1979

No new hole was made. Drillers ran 9-5/8 inch casing to 8,153 feet, which included a D.V. collar at 4,045 feet, float collar and float shoe on the shoe joint. Centralizers were placed at 4,005 feet and 4,085 feet, and 8 centralizers were placed between 7,850 feet and 8,163 feet. The shoe was cemented by Halliburton at 8,183 feet with 2,000 cubic feet of slurry volume Class G cement premixed with perlite, gel, R-11 and silica flour. The casing was tested at 2,500 psig, the D.V. collar was opened at 4,045 feet, and water was circulated ahead of the cement. Halliburton then cemented through the D.V. collar with 3,000 cubic feet of slurry volume Class G cement, closed the D.V. with 2,200 psig and obtained surface returned of 25 cubic feet of the 100 cubic feet of water pumped ahead of the cement. There were full returns of the flow line, both cement jobs. GeothermEx personnel: none present.

October 12, 1979

No new hole was made. Drillers installed a W.K.M. geothermal expansion spool, tested it to 2,000 psig, and reinstalled the blowout preventers. The preventers, casing, kelly cock, kill and blow-down lines were then tested at 2,000 psig, witnessed and approved by W. N. Hathaway. GeothermEx personnel: Murray Gardner, Billie Cox.

October 13, 1979

New hole was made from 8,216 feet to 8,320 feet, with a weight on the bit of 20,000 to 25,000 pounds, turning at 40 to 45 rpm. The hole was drilled with water, as per instructions by D.O.E., with a pump pressure of 1,800 psi. Drillers cleaned the mud pits and filled them with fresh water, ran into the hole with an 8-1/2 inch bit and drilled to 8,320 feet.

There were a total of 104 feet drilled in 9-3/4 hours, averaging 10-1/2 feet per hour. Cuttings consisted of a massive altered basalt, a Columbia River-Owyhee equivalent, with a possible interbed of tuffaceous siltstone at 8,245 to 8,260 feet. Water return temperatures reached 137°F. The chromatograph showed a maximum of 2,000 ppm of C_1 at 8,216 feet depth. GeothermEx personnel: Murray Gardner, Jim McIntyre, Billie Cox.

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October 14, 1979

New hole was made from 8,320 feet to 8,400 feet, with 25,000 to 35,000 pounds on the bit, turning at 40 to 45 rpm. The hole was drilled with water, with 1,800 psi pump pressure. Drillers tripped out of the hole at 8,400 feet for a bit change, with a total life on bit No. 20 of 184 feet and 16-3/4 hours. Due to squeezing and caving, drillers had to ream from 8,321 feet and could not get below 8,345 feet. The drill pipe was stuck and freed twice. Drillers pulled the strong to 8,100 feet and waited for instructions from D.O.E.

There were a total of 80 feet drilled in 7 hours, averaging 11-1/2 feet per hour. The rocks were altered massive basalt, believed to be Columbia River-Owyhee equivalents. Water returns reached 122°F. GeothermEx personnel: as above.

October 15, 1979

No new hole was made. Drillers waited 9 hours for a D.O.E. decision. They built the mud to 70 pcf, as per D.O.E. instructions, which took 15 hours. GeothermEx personnel: as above.

October 16, 1979

No new hole was made. Drillers spent 6 hours building the mud weight to 70 pcf. They reamed from 8,273 feet and stuck the pipe for 3-1/2 hours at 8,304 feet, after which authorization was given to build the mud weight to 81 pcf. Drillers were able to get the pipe unstuck at the end of the evening shift. The mud returns reached 139°F. GeothermEx personnel: as above.

October 17, 1979

No new hole was made. Drillers pulled out for a bit change; the bearings on bit No. 21 were badly worn after 72 hours of circulation. The mud was built to 82 pcf, with a viscosity of 58. Mud return temperatures reached 138°F. GeothermEx personnel: as above.

October 18, 1979

No new hole was made. Drillers reamed to 8,400 feet, with great difficulty. The rotary clutch broke at noon, and the rest of

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the day was spent waiting on a new rotary clutch and repairing the clutch. GeothermEx personnel: as above.

October 19, 1979

New hole was made from 8,400 feet to 8,470 feet, with a weight on the bit of 20,000 to 25,000 pounds, turning at 40 to 45 rpm. The mud weight was 83 pcf, the viscosity was 45, and the pump pressure 2,000 psi. Drillers reamed and drilled, after spending 3 hours on the rotary clutch repair.

There were a total of 70 feet drilled in 15-1/2 hours, averaging 4-1/2 feet per hour. The lithology consisted of altered massive basalt, probably Columbia River-Owyhee Basalt equivalent, with interbeds of tuffaceous sediments. Mud return temperatures reached 150°F. GeothermEx personnel: as above.

October 20, 1979

New hole was made from 8,470 feet to 8,541 feet, with 20,000 to 30,000 pounds on the bit, turning at 40 to 50 rpm. The mud weight was 83 pcf, the viscosity was 43, and the pump pressure was 2,000 psi. The drillers pulled out to check for a washout at 8,527 feet, and changed the bit. The total life on bit No. 22 was 127 feet and 21-1/4 hours. The drillers had to ream from 8,498 feet to 8,527 feet, then drilled to 8,541 feet.

There were a total of 71 feet drilled in 11-1/4 hours, averaging 6 feet per hour. Cuttings consisted of an altered massive basalt, probably equivalent to Columbia River/Owyhee Basalts. Mud return temperatures reached 144°F. GeothermEx personnel: as above.

October 21, 1979

New hole was made from 8,541 feet to 8,627 feet, with 20,000 to 25,000 pounds on the bit, turning at 40 to 50 rpm. The mud weight was 85 pcf, and the viscosity was increased from 44 to 55, with a pump pressure of 2,000 psi. The drillers wiped the hole twice in a tight zone from 8,575 feet to 8,595 feet.

There were a total of 86 feet drilled in 22-1/2 hours, averaging 4 feet per hour. The lithology was the same altered massive basalt, probably equivalent to the Owyhee-Columbia River Basalts. The mud

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return temperatures reached 147°F. GeothermEx personnel: Jim McIntyre, Billie Cox.

October 22, 1979

New hole was made from 8,627 feet to 8,757 feet, with 20,000 to 30,000 pounds on the bit, turning at 40 to 45 rpm. The mud weight was 85 pcf, the viscosity 47 and the pump pressure 2,000 psi. Drillers wiped the hole for 30 minutes in the tight zone, and started to pull out of the hole at the end of the shift for a bit change.

There were a total of 130 feet drilled in 22 hours, averaging 6 feet per hour. The cuttings consisted of altered massive basalt, probably equivalent to the Columbia River-Owyhee Basalts. Mud return temperatures reached 142°F. GeothermEx personnel: Jim McIntyre, Murray Gardner.

October 23, 1979

New hole was made from 8,757 feet to 8,858 feet, with 20,000 to 30,000 pounds on the bit, turning at 40 to 45 rpm. The mud weight was 84 pcf, the viscosity was 46, and the pump pressure 2,000 psi. The bit was changed at 8,757 feet, with 230 feet and 50 hours on bit No. 23.

There were a total of 101 feet drilled in 17-1/2 hours, averaging 6 feet per hour. The cuttings consisted of altered basalt, probably equivalent to Columbia River-Owyhee Basalts. Mud return temperatures reached 140°F. GeothermEx personnel: as above.

October 24, 1979

New hole was made from 8,858 feet to 8,956 feet, with 20,000 to 30,000 pounds on the bit, turning at 40 to 45 rpm. The mud weight was 85 pcf, the viscosity was 45, and the pump pressure 2,000 psi.

There were a total of 98 feet drilled in 23 hours, averaging 4 feet per hour. The cuttings consisted of altered basalt, the probable equivalent of Columbia River-Owyhee Basalts. Mud return temperatures reached 158°F. GeothermEx personnel: as above.

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October 25, 1979

New hole was made from 8,956 feet to 9,028 feet, with 20,000 to 35,000 pounds on the bit, turning at 45 rpm. The mud weight was 85 pcf, the viscosity was 46, and the pump pressure varied from 2,000 to 1,800 psi. Drillers pulled out of the hole for a bit change at 9,023 feet, with a total life on bit No. 24 of 266 feet and 50-3/4 hours. A deviation survey run at this depth showed an angle of 0°45'. Drillers ran back into the hole, lost and regained circulation at 5,000 feet, washed and reamed the hole, and reached 9,028 feet.

There were a total of 72 feet drilled in 11-1/4 hours, averaging 6 feet per hour. Cuttings consisted of altered basalt, probably Columbia River-Owyhee Basalt equivalents. Mud return temperatures reached 161°F. GeothermEx personnel: as above.

October 26, 1979

New hole was made from 9,028 feet to 9,176 feet, with a weight on the bit of 20,000 to 25,000 pounds, turning at 45 rpm. The mud weight was 84 pcf, the viscosity was 46, and the pump pressure was 2,000 psi.

There were a total of 148 feet drilled in 23-1/2 hours, averaging 6 feet per hour. The cuttings were altered massive basalt, probably equivalent to the Columbia River-Owyhee Basalts. Mud return temperatures decreased from 163°F to 142°F as the mud cooler functioned properly after repairs. GeothermEx personnel: as above.

October 27, 1979

New hole was made from 9,176 feet to 9,280 feet, with a weight on the bit of 20,000 to 30,000 pounds, turning at 45 rpm. The mud weight was 84 pcf, the viscosity was 46, and the pump pressure 2,000 psi.

There were a total of 104 feet drilled in 23-1/2 hours, averaging 4-1/2 feet per hour. Cuttings consisted of altered basalt to 9,242 feet, below which cuttings showed a hard brown-gray siltstone. Both rock types are probably equivalent to Columbia River-Owyhee Basalts with the siltstone being an interbed. Mud return temperatures reached 140°F. GeothermEx personnel: as above:

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MURRAY C. GARDNER

October 28, 1979

New hole was made from 9,280 feet to 9,322 feet, with a weight on the bit of 25,000 to 30,000 pounds, turning at 45 rpm. The mud weight was 84 pcf, the viscosity was 58, and the pump pressure was 2,000 psi. The bit was changed at 9,302 feet, with 279 feet and 54-3/4 hours on bit No. 25. Drillers ran back into the hole, with a break in circulation at 5,124 feet.

There were a total of 42 feet drilled in 9-1/2 hours, averaging 4-1/2 feet per hour. Cuttings consisted of siltstone and silty shale, probably an interbed in the Columbia River-Owyhee Basalt equivalent. Mud return temperatures reached 142°F. GeothermEx personnel: as above.

October 29, 1979

New hole was made from 9,322 feet to 9,367 feet, with 20,000 to 35,000 pounds on the bit, turning at 45 rpm. The mud weight was 84 pcf, the viscosity was 45, and the pump pressure was 2,000 psi.

There were a total of 45 feet drilled in 24 hours, averaging 2 feet per hour. The cuttings consisted of gray siltstone and shale, probably an interbed in the Owyhee-Columbia River Basalt equivalent. Mud return temperatures reached 140°F. GeothermEx personnel: Murray Gardner.

October 30, 1979

New hole was made from 9,367 feet to 9,398 feet, with 20,000 to 30,000 pounds on the bit, turning at 45 to 70 rpm. The mud weight was 84 pcf, the viscosity was 44, and the pump pressure 2,000 psi. The bit was changed at 9,382 feet, with 80 feet and 42-1/4 hours on bit No. 26.

There were a total of 31 feet drilled in 17 hours, averaging 2 feet per hour. The cuttings consisted of gray siltstone and shale, probably an interbed in the Columbia River-Owyhee Basalt equivalent. Mud return temperatures reached 139°F. GeothermEx personnel: as above.

October 31, 1979

New hole was made from 9,398 feet to 9,442 feet, with 20,000 to 30,000 pounds on the bit, turning at 65 to 75 rpm. The mud weight

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was 84 pcf, the viscosity was 43, and the pump pressure 2,000 psi. There was a 30-minute repair made on the kelly cock.

There were a total of 44 feet drilled in 23-1/2 hours, averaging 2 feet per hour. Drilling returns consisted of tuffaceous siltstone, probably an interbed in the Columbia-River Owyhee Basalt equivalent. Mud return temperatures reached 139°F. GeothermEx personnel: as above.

November 1, 1979

New hole was made from 9,442 feet to 9,511 feet, with 25,000 to 30,000 pounds on the bit, turning at 45 to 70 rpm. The mud weight was 83 pcf, the viscosity was 44, and the pump pressure was 2,000 psi.

There were a total of 69 feet drilled in 23 hours, averaging 3 feet per hour. The cuttings consisted of siltstone and white tuff, probably an interbed in the Columbia River-Owyhee Basalt equivalent. Mud return temperatures reached 140°F. GeothermEx personnel: Murray Gardner and Jim McIntyre.

November 2, 1979

New hole was made from 9,511 feet to 9,604 feet, with 25,000 to 30,000 pounds on the bit, turning at 45 to 60 rpm. The mud weight was 83 pcf, the viscosity was 45 and the pump pressure varied from 2,000 to 1,800 psi. There was a bit change at 9,577 feet, with 195 feet and 64 hours on bit No. 27.

There were a total of 93 feet drilled in 19 hours, averaging 5 feet per hour. Cuttings consisted of white tuff to 9,514 feet, altered basalt from 9,514 feet to 9,564 feet, siltstone from 9,564 feet to 9,580 feet, white tuff from 9,580 feet to 9,585 feet, and altered basalt from 9,585 feet to 9,604 feet. These are probably equivalent to Columbia River-Owyhee Basalts and interbeds. Mud return temperatures reached 140°F. GeothermEx personnel: as above.

November 3, 1979

New hole was made from 9,604 feet to 9,692 feet, with 25,000 to 30,000 pounds on the bit, turning at 45 to 55 rpm. The mud weight was 83 pcf, the viscosity 44, and the pump pressure 2,000 psi. Drillers pulled out of the hole to check for a possible washout, then returned to drilling.

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There were a total of 80 feet drilled in 20 hours, averaging 4 feet per hour. Cuttings consisted of altered basalt, probably Columbia River-Owyhee Basalt equivalent. Mud return temperatures reached 137°F. GeothermEx personnel: as above

November 4, 1979

New hole was made from 9,692 feet to 9,755 feet, with 25,000 to 30,000 pounds on the bit, turning at 45 to 55 rpm. The mud weight was 83 pcf, the viscosity was 43, and the pump pressure 2,000 psi.

There were a total of 67 feet drilled in 24 hours, averaging 2-1/2 feet per hour. Cuttings consisted of alternating basalt, siltstone and tuff, probably equivalent to Columbia River Owyhee Basalt and interbeds. Mud temperature to 142°F. GeothermEx personnel: as above.

November 5, 1979

New hole was made from 9,755 feet to 9,868 feet, with 25,000 to 30,000 pounds on the bit, turning at 45-55 rpm. The mud weight was 84 pcf, the viscosity was 44, and the pump pressure 2,000 psi. Drillers started pulling out of the hole for a bit change at the end of the shift.

There were a total of 113 feet drilled in 19-1/2 hours, averaging 6 feet per hour. Cuttings consisted of altered basalt with interbedded tuffs, probably equivalent to Columbia River-Owyhee Basalts. Mud return temperatures reached 147°F. GeothermEx personnel: Murray Gardner.

November 6, 1979

New hole was made from 9,868 feet to 9,959 feet, with 25,000 to 30,000 pounds on the bit, turning at 45 to 55 rpm. The mud weight was 84 pcf, the viscosity was 42, and the pump pressure 2,000 psi. The bit was changed at 9,868 feet, with 301 feet and 70.5 hours on bit No. 28.

There were a total of 91 feet drilled in 18 hours, averaging 5 feet per hour. Cuttings consisted of altered basalt, probably equivalent to Columbia River-Owyhee Basalts. Mud return temperatures reached 148°F. GeothermEx personnel: Murray Gardner, Dave Wendland.

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November 7, 1979

New hole was made from 9,959 feet to total depth at 10,054 feet, with 25,000 to 30,000 pounds on the bit, turning at 45 to 55 rpm. The mud weight was 84 pcf, the viscosity 43, and the pump pressure 2,000 psi. Total depth was reached at 10:00 p.m., at which time drillers proceeded to circulate and condition the hole for logging.

There were a total of 95 feet drilled in 21-1/2 hours, averaging 4-1/2 feet per hour. Cuttings consisted of altered basalt and tuffaceous siltstone, probably equivalent to Columbia River-Owyhee Basalts. Mud return temperatures reached 148°F. GeothermEx personnel: as above.

November 8 and 9, 1979

Welex ran Dual Induction, Sonic, Density, Neutron, Fracture-finder and Temperature logs. Then a cement bond/neutron was run in the 9-5/8 inch casing. Welex then ran a dip log. GeothermEx personnel: Murray Gardner, Jim Koenig, Subir Sanyal.

November 10, 11 and 12, 1979

Welex finished running the temperature logs. Drillers ran the 8-1/2 inch bit to the bottom with no reaming required. Drillers circulated and waited on the liner which arrived at 7:00 p.m. on November 12. GeothermEx personnel: Jim Koenig, Subir Sanyal, Jim McIntyre.

November 13, 1979

Drillers ran a 7-inch liner from 8,142 feet to 10,038 feet. This liner consisted of 47 joints of 7-inch outer diameter, 32 pound new casing including bullplugged collar on the bottom, and a Burns lead seal liner hanger on the top. The liner had shop cut slots from 8,186 feet to 10,036 feet of 125 mesh, 8-row, 2-inch long slots with 6 inch centers. GeothermEx personnel: Jim McIntyre, Jim Koenig.

November 14, 1979

Drillers changed from mud to fresh water, which was completed at 4:00 p.m. Drillers waited on the NOWSCO nitrogen truck to be repaired. GeothermEx personnel: Jim McIntyre.

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November 15, 1979

Drillers waited on NOWSCO until 2:00 p.m. then ran 3 wire-line temperature surveys. GeothermEx personnel: Jim Koenig, Jim McIntyre.

November 16, 1979

The temperature survey was completed, drillers waited on NOWSCO then rigged up for NOWSCO. With drill pipe to 6,012 feet depth, 1 barrel of foamer was pumped in and nitrogen was blown in down the drill pipe. Temperature and pressure surveys were run. The pressure tester was on bottom for 4 hours with a 28 feet fluid rise. The hole was again unloaded with nitrogen to the bottom of the liner. The recovered water, nitrogen and steam flow were too small to measure. The hole was again pressure tested. GeothermEx personnel: as above.

November 17, 1979

The well was bled with 100 barrels of water. The drill pipe was pulled and Cogco shot 4-4-inch SSB jets per foot at the following intervals: 8,730-8,750', 8,760-8,780', 8,790-8,810', 8,820-8,840', 9,020-9,040', 9,050-9,070', 9,080-9,100', 9,110-9,130', 9,150-9,170', 9,190-9,210', 9,220-9,240', 9,790-9,810', 9,875-9,895' as per D.O.E. instructions. D.O.E. wanted to break down any mudcake which might be impeding the flow. GeothermEx personnel: as above.

November 18, 1979

Cogco finished gun-perforating selected intervals in the slotted liner, then ran the wireline pressure tester and temperature surveys. The tester malfunctioned, then was run to 9,820 feet and showed 668 psig declining to 666 psig in 30 minutes with the fluid top at 8,300 feet. There was apparently no fluid entry. Drillers ran back in the hole at 4:00 p.m. to lift fluid from the bottom with nitrogen for the flow test, and unloaded the hole from 10,018 feet. There was very small amount of steam flow estimated to be less than 5 psig. The pressure tester was run to the bottom. GeothermEx personnel: as above.

November 19, 1979

The pressure tester stayed on bottom for 4 hours. After recovering the tester, drillers pumped 300 barrels of fresh water in the well. While pulling out of the hole, with the pipe rams closed, the drill pipe

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MURRAY C. GARDNER

parted, the crown block was damaged, and drillers had to shut down to wait on parts and repairs. GeothermEx personnel: Jim McIntyre.

November 20, 1979

Drillers waited on parts, and repaired the crown block. GeothermEx personnel: as above.

November 21, 1979

Drillers finished repairs on the crown block, pulled out of the hole, and shut down for Thanksgiving. GeothermEx personnel: none present.

November 22 and 23, 1979

Drilling rig shut down for Thanksgiving vacation. Two drillers remained to watch the rig. GeothermEx personnel: Murray Gardner, on November 23.

November 24, 1979

Operations were resumed at 12:01 a.m. A temperature survey was run which showed the top of the fluid level to be 5,650 feet. Cogco shot 4-4 inch SSB jets per foot at the following intervals: 5,980-6,000', 6,580-6,640', 6,955-7,015', 7,060-7,140', 7,770-7,790', 7,905-7,925', and 8,320-8,340'. Then another temperature survey was run. GeothermEx personnel: Murray Gardner.

November 25, 1979

Drillers finished running the temperature survey. The drill pipe was run to 8,350 feet, then the well was blown with nitrogen down the drill pipe. Another temperature survey was run. The survey tool pulled out of the rope socket leaving the temperature and pressure recorder in the hole. A presusre survey was then run. GeothermEx personnel: as above.

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MURRAY C. GARDNER

November 26, 1979

The pressure survey was completed. Cogco shot 4-4-inch SSB jets for foot at the following intervals: 6,975-7,015', 7,060-7,140', 7,770-7,790', and 7,905-7,925'. GeothermEx personnel: Murray Gardner, Jim Koenig.

November 27, 1979

Drillers ran drill pipe to 7,950 feet, then blew the well with nitrogen down the drill pipe. A pressure survey was run to 7,900 feet. Fluid rose from 6,855 feet to 6,091 feet in 3 hours with a rate of influx of 13 gallons per minute. The drill pipe was run to 9,919 feet. The rig was released to Montgomery(?) at 12:00 noon for rig-down and move-out. GeothermEx personnel: as above.

November 28 and 29, 1979

Drillers rigged down and prepared to move. GeothermEx personnel: Murray Gardner.

Form 4 1/54

STATE OF OREGON
DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
1069 State Office Building, Portland 1, Oregon

WELL SUMMARY REPORT
(Submit in duplicate)

Operator ORE-IDA FOODS, INC. Field Malheur County

Well No. Ore-Ida No. 1 Sec. 3, T 18S, R 47E, _____ W. B. & M.

Location SW/4SW/4NE/4 Elevation above sea level +2157 feet

All depth measurements taken from top of kelly bushing, which is 20 feet above ground

In compliance with the rules and regulations pursuant to ORS 520 (Chapter 667 OL 1953) the information given herewith is a complete and correct record of the present condition of the well and all work done thereon, so far as can be determined from all available records.

Date January 10, 1980 Signed W. N. Hathaway

Hathaway Engineering Engineer GeothermEx Superintendent Title Petroleum Engineer (President, Secretary or Agent)

Commenced drilling August 19, 1979 Completed drilling November 7, 1979 Drilling tools ~~XXXX~~ Rotary

Total depth 10,054' Plugged depth 10,054'

Junk

Wireline pressure and temperature recorders and sinker bars below 9919' in 7" liner.

GEOLOGICAL MARKERS — DEPTH

Commenced producing _____ Date Flowing/gas lift/pumping (cross out unnecessary words)

	Clean oil bbl. per day	Gravity Clean oil	Percent water including emulsion	Gas Mcf. per day	Tubing Pressure	Casing Pressure
Initial production						
Production after 30 days						

CASING RECORD (Present Hole)

Size of casing (A.P.I.)	Depth of shoe	Top of casing	Weight of casing	New or second hand	Seamless or Lapweld	Grade of casing	Size of hole drilled	No. of sacks of cement	Depth of cementing if through perforations
13-3/8"	925	Surf.	54½#	N	S	K-55	17½	395	Shoe
9-5/8"	8183'	Surf.	40-47#	N	S, ERW	K&N	12¼"	2000cf	Shoe
								3000cf	4045'
7"	10038	8142'	32#	N	S	N&C	8½"	Hung	

PERFORATIONS

Size of casing	From	To	Size of perforations	Number of rows	Distance between centers	Method of perforating
7"	8186 ft.	10036 ft.	2" x 0.125"	8	6"	Shop cut slots
7"	8730 ft.	9895 ft.				Selected jet holes
9-5/8"	5980 ft.	7925 ft.				Selected jet holes
	ft.	ft.				
	ft.	ft.				

Form 6-54

STATE OF OREGON
DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
1069 State Office Building Portland 1, Oregon

HISTORY OF OIL OR GAS WELL

(Submit in duplicate)

In compliance with rules and regulations adopted pursuant to ORS 520.095 (Chapter 667 OL 1953)

Operator ORE-IDA FOODS, INC. Field Malheur County

Well No. Ore-Ida No. 1 , Sec. 3 , T. 18S R. 47E W.B. & M.

Signed W. N. Hathaway

Date January 10, 1980 Title Petroleum Engineer
(President, Secretary or Agent)

It is of the greatest importance to have a complete history of the well. Use this form in reporting the history of all important operations at the well, together with the dates thereof, prior to the first production. Include in your report such information as size of hole drilled to cementing or landing depth of casings, number of sacks of cement used in the plugging, number of sacks or number of feet of cement drilled out of casing, depth at which cement plugs started, and depth at which hard cement encountered. If the well was dynamited, give date, size, position and number of shots. If plugs or bridges were put in to test for water, state kind of material used, position and results of pumping or bailing.

Date	
1979	
8-15	Moved in R. B. Montgomery Drilling Company, Rig No. 7. Rigged up.
8-19	Spudded in at 9:00 AM with 17½" bit. Installed EnergyLog mud logging service @ 54'.
	Depth 230'. Survey: BE @ 220'.
	Cracked swivel sub.
8-20	Repaired swivel.
	Depth 356'.
8-21	Depth 925'. Survey: ¼° @ 480'. 3/4° @ 925'.
	13-3/8" casing @ 925'. Ran 19 joints of 13-3/8" OD, 54½#, K-55, buttress R3, new, smls. USS casing including guide shoe, insert flexiflow fill at 880', 3 centralizers. Cemented shoe @ 925' with 395 sacks Class G cement premixed with 395 cf. expanded perlite, 130 sacks silica flour, 8% gel. Had good cement returns.
	Landed 13-3/8" casing. Tested weld with 1500 psig.
8-23	Installed 12" Series 900 Shaffer dual hydraulic control gate and Hydril GK. Tested each preventer, casing, kelly cock, kill and blow down lines with 1200 psig. Test witnessed and approved by W. N. Hathaway.
	Drilled out firm cement 860'-925'. Ran 2 welded wing drilltrols.
8-23	Drilled 12¼" hole to 2049'. Mud 71 pcf. Survey: BE @ 1807'.
8-24	Depth 2866'. Mud 71 pcf. Survey: 1:15 @ 2049'. 1:45 @ 2584'.
8-25	Depth 3333'. Mud 68 pcf. 1:45 @ 3131'.
8-26	Depth 3802'. Mud 74 pcf. Survey: 0:15 @ 3652'.
8-27	Depth 4088'. Mud 74 pcf. Broke drawworks main drive shaft. Welded shaft and pulled carefully to 1539' where weld broke. Circulated.
9-01	Repaired drawworks @ 9:00 AM. Pulled bit. Reamed from 1780' to 4088'.
9-02	Reamed. Drilled 12¼" hole to 4160'. Mud 76 pcf. Ran drilling jars.
9-03	Depth 4706'. Mud 76 pcf.
9-04	Depth 4981'. Mud 80 pcf. Survey: 1:30 @ 4722'.
9-05	Depth 5201'. Mud 79 pcf. Survey: 1:30 @ 5151'.
9-06	Depth 5264'. Mud 79 pcf.
9-07	Depth 5362'. Mud 79 pcf.
9-08	Depth 5608'. Mud 81 pcf.
9-09	Depth 5777'. Mud 81 pcf.
9-10	Depth 5953'. Mud 80 pcf. Survey: 1:30 @ 5834'. Ran shock sub.
9-11	Depth 6215'. Mud 80 pcf.
9-12	Depth 6288'. Mud 82 pcf. Survey: 1:00 @ 6261'.
9-13	Depth 6449'. Mud 83 pcf.

Form 6-54

STATE OF OREGON
DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
1069 State Office Building Portland 1, Oregon

HISTORY OF OIL OR GAS WELL

(Submit in duplicate)

In compliance with rules and regulations adopted pursuant to ORS 520.095 (Chapter 667 OL 1953)

Operator ORE-IDA FOODS, INC. Field Malheur County

Well No. Ore-Ida No. 1 , Sec. 3 , T. 18S R. 47E W.B. & M.

Signed W. N. Hathaway

Date January 10, 1980 Title Petroleum Engineer
(President, Secretary or Agent)

It is of the greatest importance to have a complete history of the well. Use this form in reporting the history of all important operations at the well, together with the dates thereof, prior to the first production. Include in your report such information as size of hole drilled to cementing or landing depth of casings, number of sacks of cement used in the plugging, number of sacks or number of feet of cement drilled out of casing, depth at which cement plugs started, and depth at which hard cement encountered. If the well was dynamited, give date, size, position and number of shots. If plugs or bridges were put in to test for water, state kind of material used, position and results of pumping or bailing.

Date	
1979	
9-14	Depth 6548'. Mud 81 pcf.
9-15	Depth 6681'. Mud 82 pcf.
9-16	Depth 6906'. Mud 82 pcf.
9-17	Depth 7156'. Mud 82 pcf.
9-18	Ran Welex DIG, Sonic, Density, Neutron, FracFinder and temperature logs.
9-20	Ran 12¼" bit. Reamed from 7068'.
9-21	Depth 7230'. Mud 82 pcf. While drilling @ 7169' with 88 pcf. mud, lost circulation. Reduced mud weight and resumed drilling.
9-22	Depth 7320'. Mud 83 pcf. Survey: 0:30 @ 7320'.
9-23	Depth 7445'. Mud 83 pcf.
9-24	Depth 7565'. Mud 83 pcf.
9-25	Depth 7660'. Mud 82 pcf. Survey: 0:45 @ 7660'.
9-26	Depth 7722'. Mud 83 pcf.
9-27	Depth 7873'. Mud 82 pcf.
9-28	Depth 7960'. Mud 82 pcf. Drill pipe twisted off @ 7506', in first single above drill collars.
9-29	Ran fishing tools, Jarred fish loose.
9-30	Recovered fish. Conditioned hole for logs.
10-01	Ran Welex DIG, Sonic, Density, Neutron, FracFinder and temperature logs.
10-02	Ran bit. Circulated to cool hole for logs.
10-03	Depth 7998'. Mud 82 pcf.
10-04	Depth 8062'. Mud 83 pcf.
10-05	Depth 8188'. Mud 84 pcf.
10-06	Waited on and ran core barrel. Rock cutter head would not cut.
10-07	Ran diamond core head.
10-08	Cut 6½" core 8188'-8216'. Cut 28' and recovered 26' basalt.
10-11	9-5/8" casing @ 8183'. Ran 9-5/8" OD casing with DV collar @ 4045' and float collar and float shoe on shoe joint. Placed centralizers @ 4005', 4085' and 8 centralizers 7850'-8163'. Cemented shoe @ 8183' with 2000 cf. slurry volume Class G cement premixed with 1:1 expanded perlite, 2% gel, 1.2% R-11, 30% silica flour (Bottom 1000 cf. was 40% silica flour). Tested casing 2500 psig. Opened DV collar @ 4045'. Circulated out water ahead of cement. Cemented through DV collar with 3000 cf. slurry volume Class G cement premixed with 1:1 expanded perlite, 2% gel, 30% silica flour, 0.8% R-11. Closed DV with 2200 psig Surface returns of 25 cf. of 100 cf. water pumped ahead of cement. Had full returns of flow line, both cement jobs.

Form 6-54

STATE OF OREGON
DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
1069 State Office Building Portland 1, Oregon

HISTORY OF OIL OR GAS WELL

(Submit in duplicate)

In compliance with rules and regulations adopted pursuant to ORS 520.095 (Chapter 667 OL 1953)

Operator ORE-IDA FOODS, INC. Field Malheur County

Well No. Ore-Ida No. 1 , Sec. 3 , T. 18S R. 47E W.B. & M.

Signed W. N. Hathaway

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(President, Secretary or Agent)

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Date

1979

9-5/8" OD casing detail

1 jt. 43½#, ERW, buttress, N-80	45.58'
74 jt. 40 #, smls buttress, K-55	2967.68
24 jt. 40 #, smls buttress, N-80	1036.59
Halliburton DV collar	3.67
21 jt. 40 #, smls buttress, N-80	900.27
18 jt. 43½#, ERW buttress (bottom jt. LT&C)	770.82
58 jt. 47 #, smls, LT&C, 8RT, N-80	2419.91
Halliburton float collar	1.95
1 jt. 47 #, smls, LT&C, 8RT, N-80	39.75
Halliburton float shoe	1.62
On hook	8187.84'
Above KB	5.00
Landed at	8182.84'

10-12 Installed WKM geothermal expansion spool. Tested to 2000 psig. Re-installed blowout preventers. Tested each preventer, casing, kelly cock, kill and blow down lines with 2000 psig. Witnessed and approved by W. N. Hathaway.

10-13 Cleaned pits and filled with fresh water!!! Ran bit. Drilled 8½" hole to 8320'. Mud: water!!!

10-14 Depth 8400'. On trip @ 8400' had to ream from 8321'. Could not get below 8345'. Stuck and freed drill pipe twice. Pulled to 8100'.

10-15 "Mudded up" to 70 pcf. Reamed from 8273'. Stuck drill pipe for 3½ hours @ 8304'. Weighted mud to 83 pcf. and pipe came free.

10-17 Reamed to 8400'.

10-18 Repair rotary clutch.

10-19 Drilled 8½" hole to 8470'. Mud 83 pcf.

10-20 Depth 8541'. Mud 83 pcf.

10-21 Depth 8627'. Mud 85 pcf.

10-22 Depth 8757'. Mud 85 pcf.

10-23 Depth 8858'. Mud 84 pcf.

10-24 Depth 8956'. Mud 85 pcf.

10-25 Depth 9068'. Mud 85 pcf. Survey: 0:45 @ 9023'.

10-26 Depth 9176'. Mud 84 pcf.

10-27 Depth 9280'. Mud 84 pcf.

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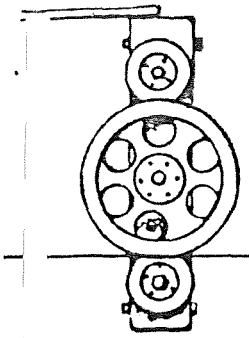
Date	
1979	
11-24 (Cont)	Cogco shot 4 - 4" SSB jets per foot 5980'-6000', 6580'-6640', 6955'-7015' 7060'-7140', 7770'-7790', 7905'-7925' & 8320'-8340'. Ran temperature survey.
11-25	Ran drill pipe to 8350'. Blew well with nitrogen down drill pipe. Ran temperature survey. Pulled out of rope socket leaving temperature and pressure recorder in hole. Ran pressure survey.
11-26	Cogco shot 4 - 4" SSB jets per foot 6975'-7015', 7060'-7140', 7770'-7790' & 7905'-7925'.
11-27	Ran drill pipe to 7950'. Blew well with nitrogen down drill pipe. Ran pressure survey to 7900'. Fluid rose from 6855' to 6091' in 3 hours, rate of influx = 13 gallons per minute. Ran drill pipe to 9919'. Released rig to Contractor @ 12:00 Noon for rig out and tear out.

All piano wire temperature and pressure runs attached.



PRESSURE SERVICE

P.O. BOX 624
ELK GROVE, CALIFORNIA, 95624

A Line of Service

SUB-SURFACE SURVEY

OWNER ORE-IDA FOODS INC. FIELD WELL NAME ORE-IDA #1

CASING 9-5/8" with shoe 8183' ELEV. DATE: 11-16-79

LINER DESCRIPTION 7" Liner 32# N-80 & C-95 hung @ 8142 to 10,038' ZERO POINT 22.5'

Liner Perforated with shop cut slots 2" X 1.8" 16 slots per foot Depth 10,054

TUBING DETAIL @ ZONE

PUMP SHOE GAS ANCHOR INTAKE

PURPOSE Determine temperature and pressure build up over 4 hour period.

REMARKS Instrument #36394 and 20561

ELEMENT SERIAL No. CLOCK TURN

ENGAGE STYLUS DISENGAGE STYLUS

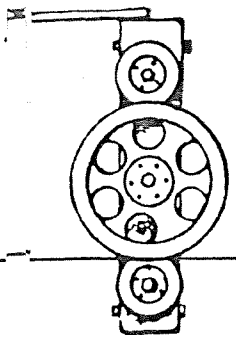
OBS. TBG. PRESS. OBS. CSG. PRESS

COR. TBG. PRESS. COR. CSG. PRESS

PICKUP @ 9970' TIME ON BOTTOM 1:AM TIME OFF BOTTOM 5:AM

TIME	PRESSURE	TEMPERATURE
0	1667	325.8
2 hr	1674	327.2
4 hr	1681	328.5

R. K. McAnally



PRESSURE SERVICE

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ELK GROVE, CALIFORNIA, 95624

A Line of Service

SUB-SURFACE SURVEY

OWNER ORE-IDA FOODS INC. FIELD WELL NAME ORE-IDA #1

CASING 9-5/8" with shoe 8183' ELEV. DATE: 11-16-79 11-17-79

LINER DESCRIPTION 7" Liner 32# N-80 and C-95 hung 8142-10,038' ZERO POINT 22.5'

Liner perforsted with shop cut slots 2" X 1/8" 16 slots per foot Depth 10,054 TD

TUBING DETAIL @ ZONE

PUMP SHOE GAS ANCHOR INTAKE

PURPOSE Tandem instruments hung on bottom to determine fluid and temperature build up 4 hours.

REMARKS Instrument Serial #42317 and 36394

ELEMENT SERIAL No. CLOCK TURN

ENGAGE STYLUS DISENGAGE STYLUS

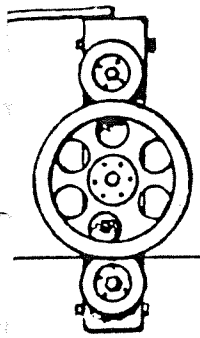
OBS TBG. PRESS. OBS. CSG. PRESS

COR. TBG. PRESS. COR. CSG. PRESS

PICKUP @ TIME ON BOTTOM 12:26AM TIME OFF BOTTOM 4:30AM 11-17-79

TIME	PRESSURE	TEMPERATURE
0 hr	153	327.1
1 hr	164	328.0
2 hr	175	329.5
3 hr	182	330.2
4 hr	197	331.0

R. K. McAnally



PRESSURE SERVICE

P.O. BOX 624

ELK GROVE, CALIFORNIA; 95624

A Line of Service

SUB-SURFACE SURVEY

OWNER ORE-IDA FOODS INC. FIELD WELL NAME ORE-IDA # 1

CASING 9-5/8" with shoe @ 8183' ELEV. DATE: 11-18-79

LINER DESCRIPTION 7" 32# N-80 & C-95 hung 8142 to 10,038' ZERO POINT 22.5'

Liner Perforated with shop cut slots 2" X 1/8" 16 per foot Depth 10,054' TD

TUBING DETAIL @ ZONE

PUMP SHOE GAS ANCHOR INTAKE

PURPOSE Determine pressure and temperature build up and rate.

REMARKS Instrumant # 42317 and 36394.

ELEMENT SERIAL No. CLOCK 24 hr 15 TURN

ENGAGE STYLUS DISENGAGE STYLUS

OBS. TBG. PRESS. OBS. CSG. PRESS

COR. TBG. PRESS. COR. CSG. PRESS

PICKUP @ 9900' TIME ON BOTTOM 10:30PM TIME OFF BOTTOM 2:30AM 11-19-79

TIME	PRESSURE	TEMPERATURE
0 hr	60	300.3
1 hr	81	299.3
2 hr	101	302.7
3 hr	115	306.6
4 hr	118	309.5

R. K. McAnally

PRESSURE SERVICE

P.O. BOX 624

ELK GROVE, CALIFORNIA, 95624

A Line of Service

SUB-SURFACE SURVEY

OWNER ORE-IDA FOODS INC. FIELD WELL NAME ORE-IDA # 1

CASING 9-5/8" with shoe @ 8183' ELEV. DATE: 11-24-79

LINER DESCRIPTION 7" 32# N-80 & C-95 hung @ 8142 to 10,038' ZERO POINT 22.5'

Depth 10,054'

TUBING DETAIL @ ZONE

PUMP SHOE GAS ANCHOR INTAKE

PURPOSE Constant rate of travel 20' per minute survey from fluid level near 6000' to bottom

REMARKS Instruments in tandem #36394 & 20561

ELEMENT 125 to 350° F SERIAL No. 36394 CLOCK 24 15 TURN

ENGAGE STYLUS 2:30AM DISENGAGE STYLUS 6:50AM

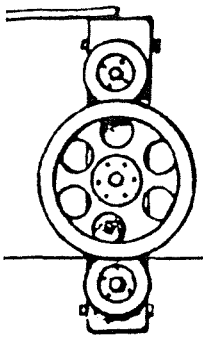
OBS. TBG. PRESS. OBS. CSG. PRESS

COR. TBG. PRESS. COR. CSG. PRESS

PICKUP @ 9960' TIME ON BOTTOM 6:17AM TIME OFF BOTTOM 6:23AM

DEPTH	TEMPERATURE	DEPTH	TEMPERATURE	
6000	246.2	8183	284.2	
6150	246.6	8310	286.6	
6260	246.9	8420	287.4	
6336	246.9	8560	290.0	
6410	246.9	8700	297.0	
6475	247.6	8740	297.0	
6577	250.7	8830	292.6	
6660	253.4	8850	275.9	
6750	256.6	8885	306.3	
6840	258.5	9040	306.8	
6960	261.6	9150	315.4	
7080	262.8	9240	315.3	
7200	263.4	9355	316.0	
7310	264.5	9471	321.2	
7400	265.9	9615	330.2	
7500	267.9	9700	332.0	
7610	270.9	9775	338.9	
7722	273.0	9850	346.6	
7844	275.3	9960	355.6	) Instrument hung 6 minutes.
7940	278.3	9960	355.6	)
8045	281.6			

R. K. McAnally



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SUB-SURFACE SURVEY

OWNER ORE-IDA FOODS INC FIELD WELL NAME ORE-IDA #1

CASING 9-5/8" with shoe 8183' ELEV. DATE: 11-25-79 11-26-79

LINER DESCRIPTION 7" 32# N-80 & C-95 hung 8142 to 10,038' ZERO POINT 22.5

Liner Perforated with shop cut slots 2" X 1/8" 16 slots to foot Depth 10,054

TUBING DETAIL Drill Pipe in hole prior to@unloading with nitrogen ZONE

PUMP SHOE GAS ANCHOR INTAKE

PURPOSE To determine pressure and temperature prior to unloading well after perforating casing

REMARKS Tandem instruments #20561 and 36394

ELEMENT SERIAL No. CLOCK 24 hr 15 TURN screw

ENGAGE STYLUS DISENGAGE STYLUS

OBS. TBG. PRESS. OBS. CSG. PRESS

COR. TBG. PRESS. COR. CSG. PRESS

PICKUP @ 9960' TIME ON BOTTOM 8:50PM TIME OFF BOTTOM 12:50

TIME	PRESSURE	TEMPERATURE
8:50	1956	356.6
9:50	2258	357.3
10:50	2308	357.0
11:50	2344	356.8
12:50	2389	356.7

R. K. McAnally

PRESSURE SERVICE

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ELK GROVE, CALIFORNIA, 95624

A Line of Service

SUBSURFACE PRESSURE SURVEY

OWNER ORE-IDA FOODS INC. FIELD Wildcat - Onterio WELL NAME ORE IDA #1

CASING 9-5/8" with shoe 8183 ELEV. DATE: 11-26-79

LINER DESCRIPTION 7" Liner 32# N-80 & C-95 hung @ 8142 to 10038 ZERO POINT 22.5'

Liner perforated with shop cut slots 2" X 1/8" 16 slots per foot Depth 10054' TD

TUBING DETAIL None @ ZONE

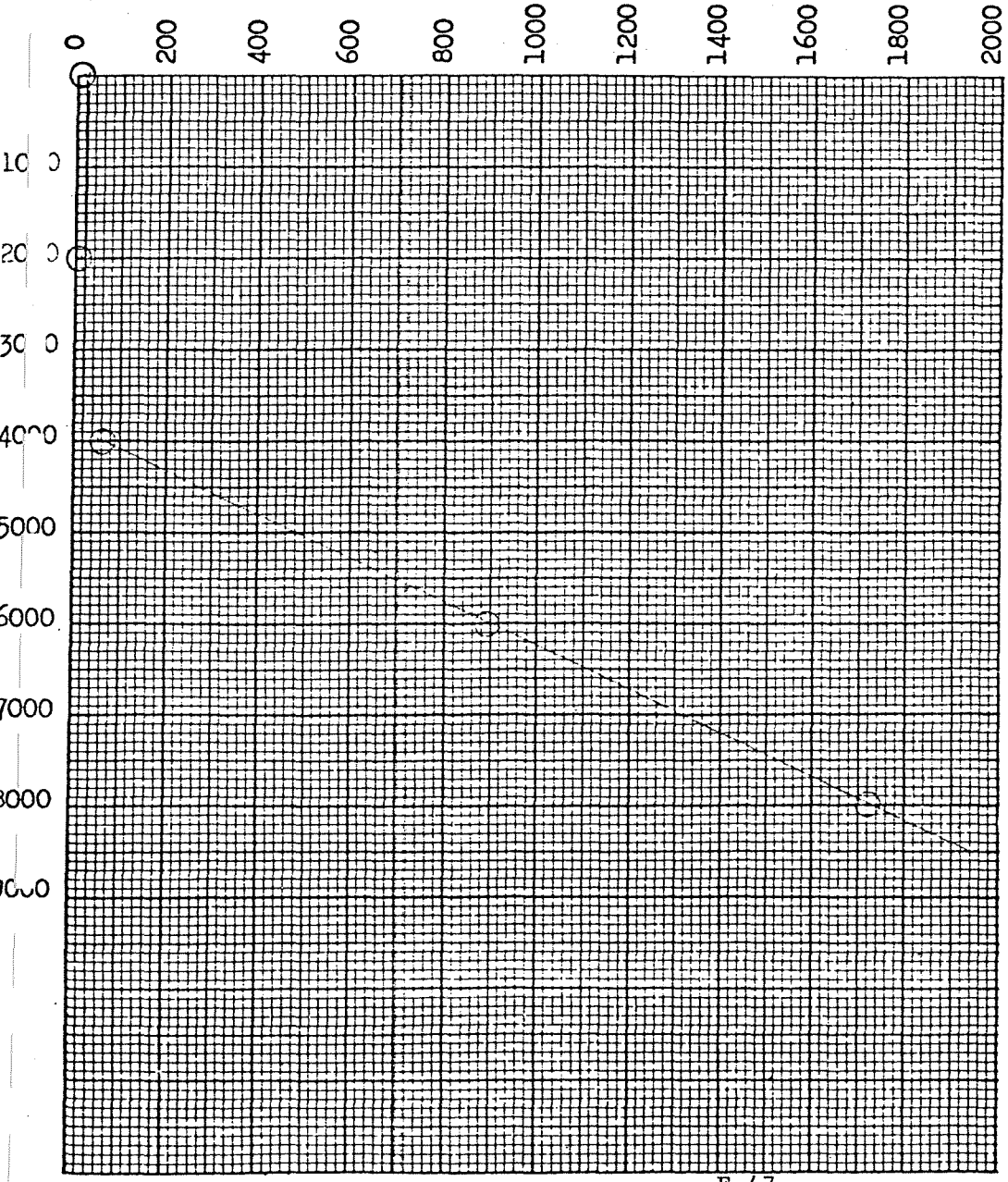
PUMP SHOE GAS ANCHOR INTAKE

PURPOSE Locate fluid level after blowing well from 8300' thru drill pipe with nitrogen.

REMARKS Pressure Instrument #42317 @ 3000 psi with 3 hour clock.

PICKUP @ MAXIMUM TEMPZRATURE °F @

This run made after loosing tandem instruments by pulling wire from rope socket.



STABILIZATION PERIOD

GROSS OIL RATE B/D

NET OIL RATE B/D

FORMATION GAS MCF/D

GOR CFT/BBL.

CIRCULATED GAS MCF/D

OIL DRY GRAVITY °API

BEAN SIZE

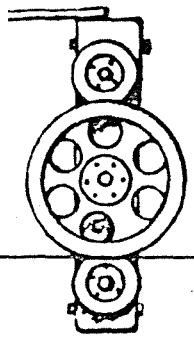
CASING PRESSURE

TUBING PRESSURE

DEPTH	PRESSURE	GRADIENT
0	14	.---
2000	16	.001
4000	65	.024
6000	895	.415
8000	1725	.415

Fluid level 3860'

BY: R. K., McAnally



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SUB-SURFACE SURVEY

OWNER ORE-IDA FOODS INC. FIELD WELL NAME ORE-IDA # 1

CASING 9-5/8" with shoe @ 8183' ELEV. DATE: 11-27-79

LINER DESCRIPTION 7" 32# N-80 & C-95 hung8142 to 10038 ZERO POINT 22.5'

Depth 10,054'

TUBING DETAIL Drill Pipe to 7950 @ ZONE

PUMP SHOE GAS ANCHOR INTAKE

PURPOSE Survey to determine fluid entry and rate.

REMARKS

ELEMENT 3000 psi SERIAL No. 42317 CLOCK 48 hr 15 TURN

ENGAGE STYLUS DISENGAGE STYLUS

OBS TBG. PRESS. OBS. CSG. PRESS

COR. TBG. PRESS. COR. CSG. PRESS

PICKUP @ TIME ON BOTTOM 4AM TIME OFF BOTTOM 7AM

Instrument hung in drill pipe @ 7900'

TIME	PRESSURE
0	460
1 hr	586
2 hr	696
3 hr	796

R. K. McAnally