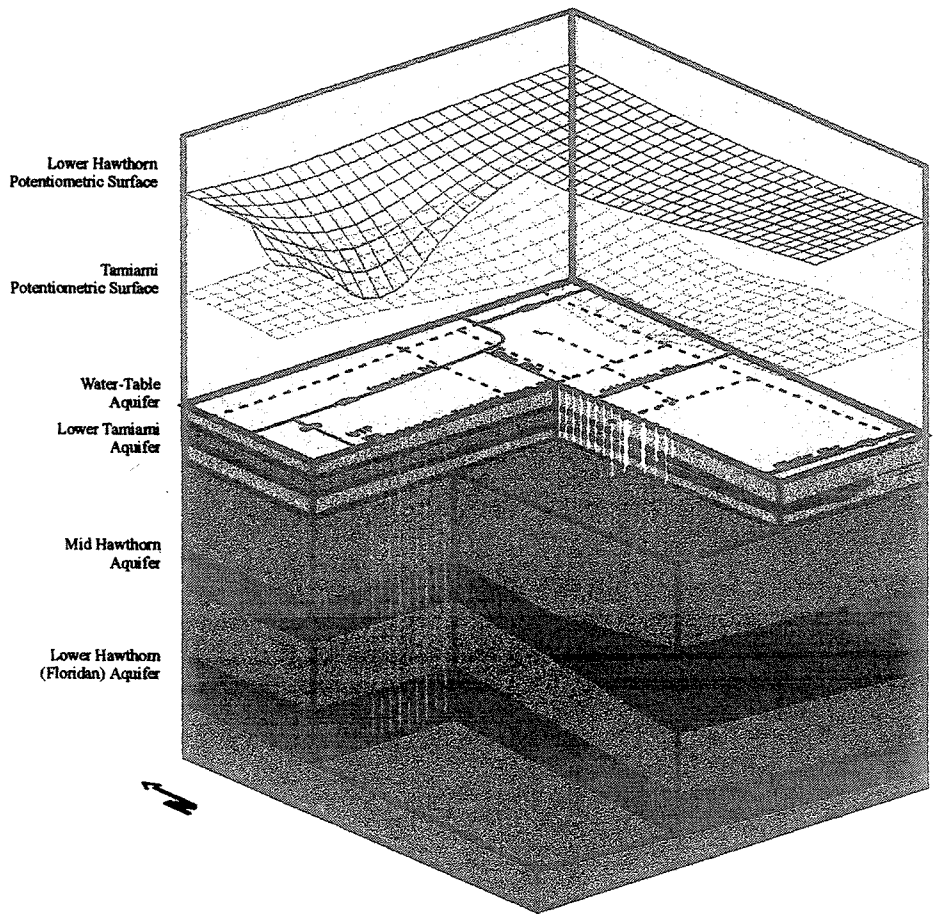
COLLIER COUNTY UTILITIES
BRACKISH WATER WELLFIELD STUDY

Volume 2: Appendix

MC - 5000
5001
5002
5004



Prepared for:

Board of County Commissioners
Collier County Government

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APPENDICES

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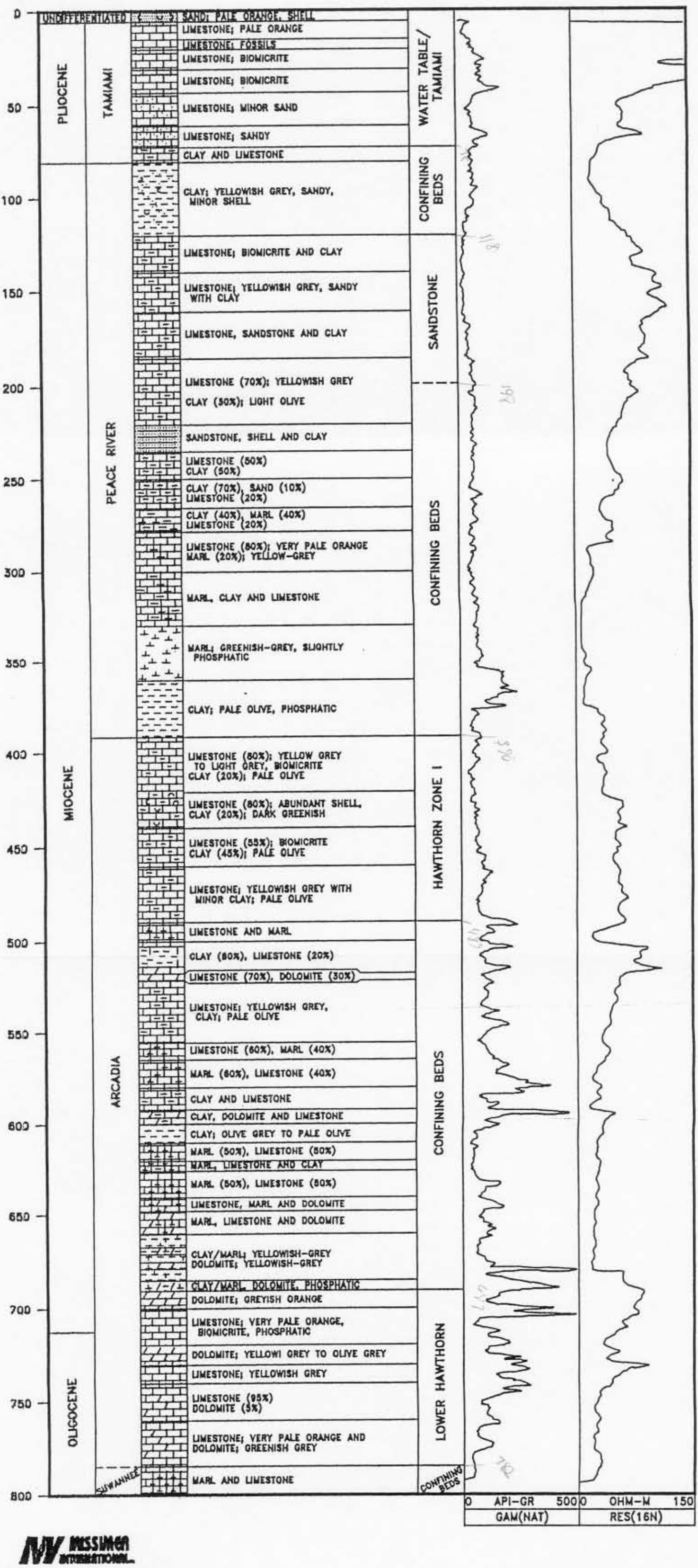
1. STRATIGRAPHIC COLUMNS

WELL MC-5004



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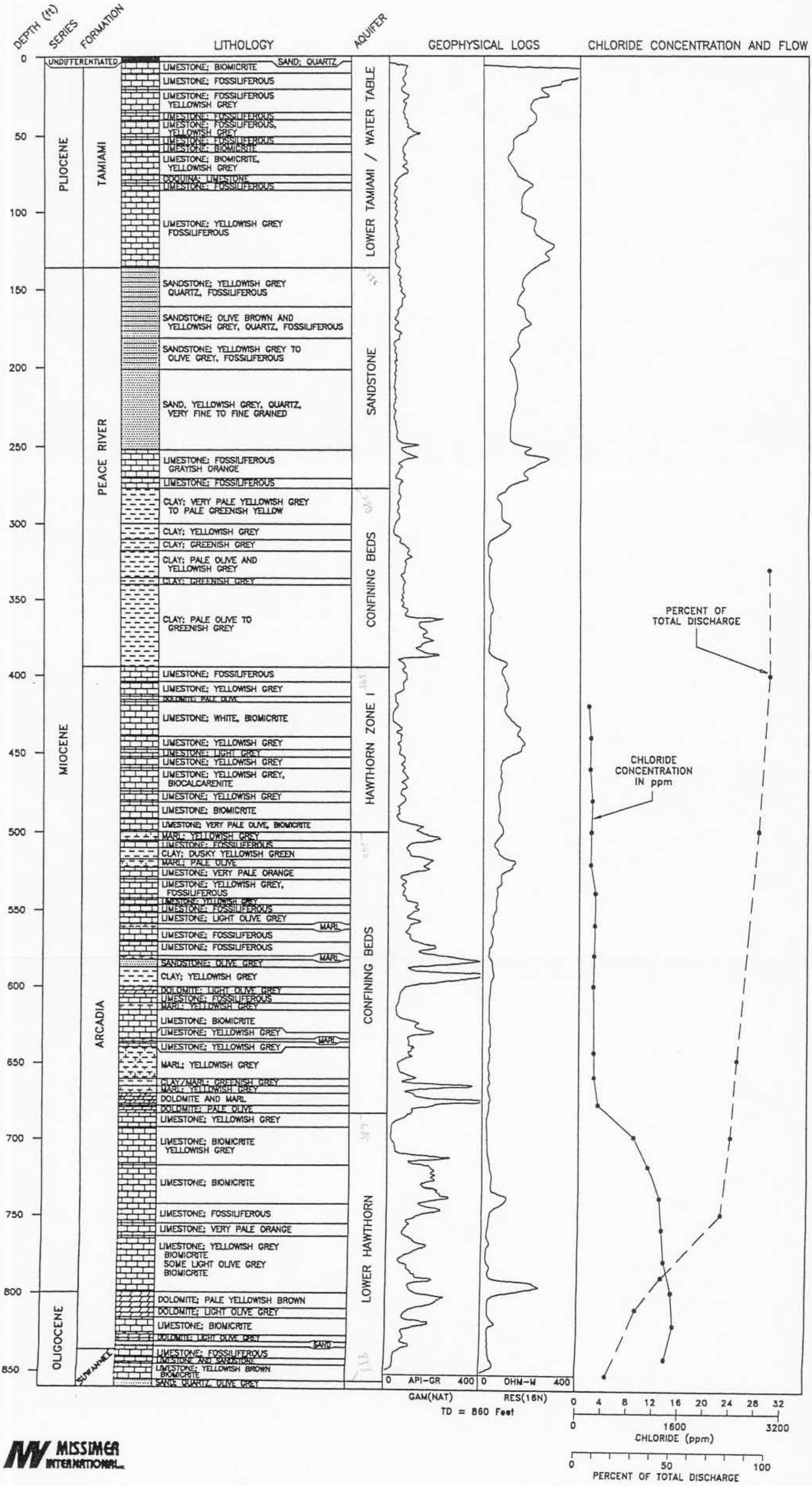

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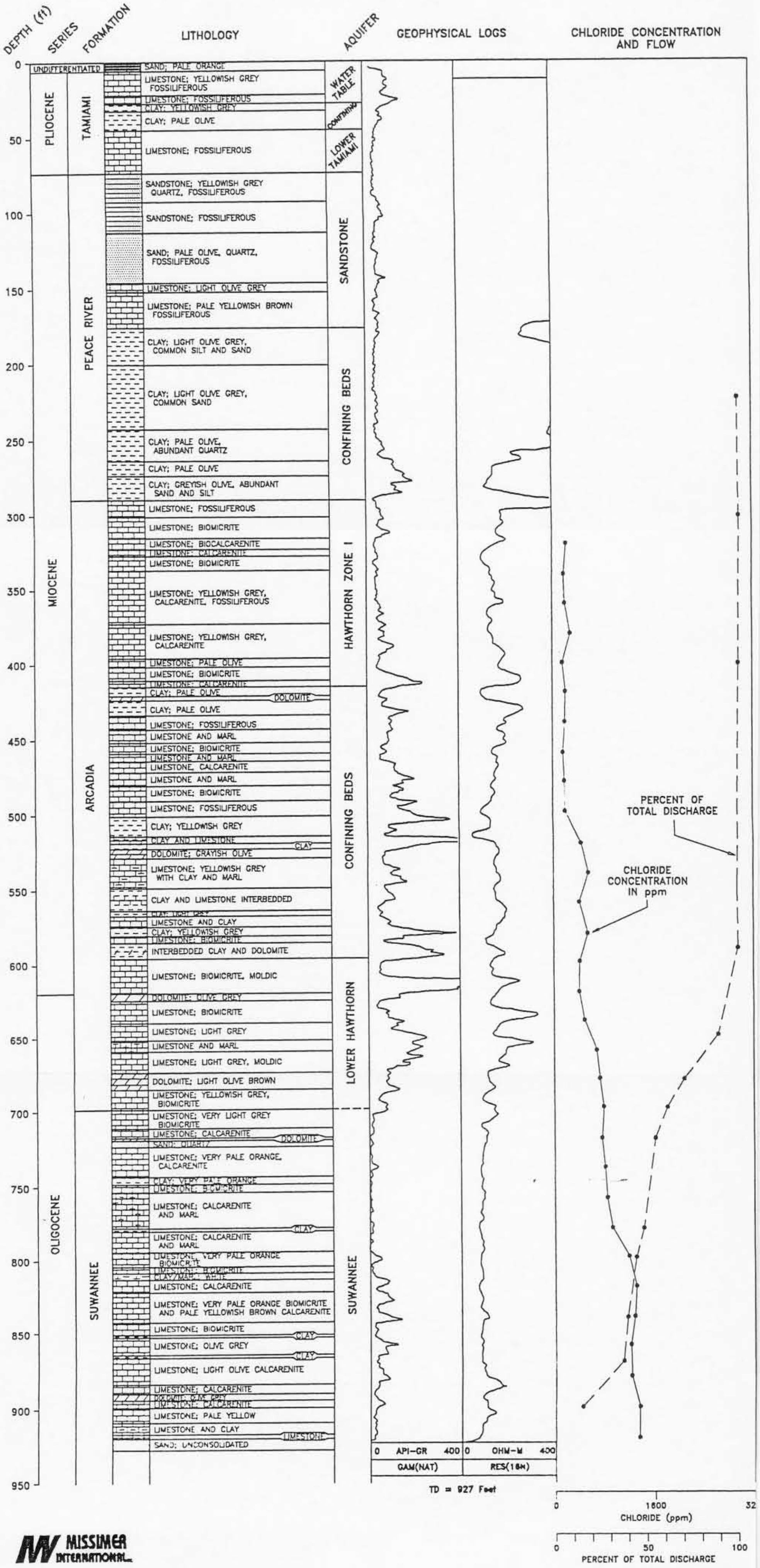

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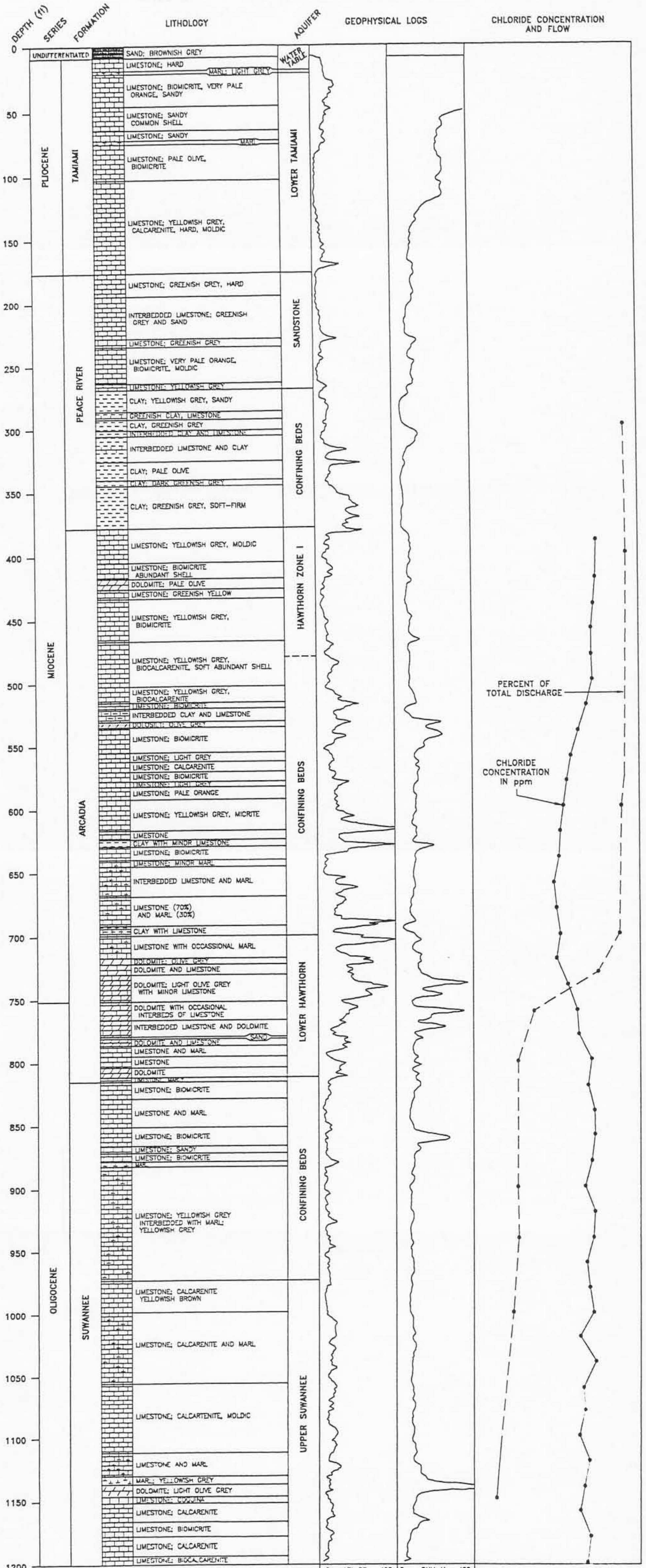

MISSIMER INTERNATIONAL

2. GEOLOGISTS LOGS

GEOLOGIST'S LOG OF MC-5000

Depth (ft)	Lithology
0-2	Sand, light brownish-gray (5 YR 6/1), fine grained, subangular to subrounded.
2-3.5	Sand, pale yellowish-brown (10 YR 6/2), fine grained, subangular to subrounded, 30% shell fragments.
3.5-6	Limestone, very pale orange (10 YR 8/2) to pale yellowish-brown (10 YR 6/2), micrite, hard, moderate to high apparent porosity, high apparent permeability.
6-10	Limestone, light olive-gray (5 Y 6/1) to very pale orange (10 YR 8/2), micrite, hard, very high apparent porosity, high apparent permeability.
10-16	Limestone, yellowish-gray (5 Y 8/1), biomicrite, moderately hard, very high apparent porosity, high apparent permeability.
16-18	Marl, very light gray (N8), soft, sticky, very slightly cohesive with limestone (20%) as above.
18-44	Limestone, very pale orange (10 YR 8/2) to light olive-gray (5 Y 6/1), biomicrite, hard, sandy, high to very high apparent porosity, high permeability. Limestone contains ~ 30% slightly phosphatic sand. Accessory constituents: shell (10-15%). Limestone predominately very pale orange (10 YR 8/2) from 25 to 44 feet.
44-62	Limestone, very pale orange (10 YR 8/2), calcarenite (biosparite), sandy (quartz), slightly phosphatic, moldic, high to very high apparent permeability. Accessory constituents: 50% shell interbedded with limestone, medium light gray (N6), calcarenite, sandy (quartz), phosphatic, moldic porosity, high to very high apparent permeability. Accessory constituents, 50% shell, phosphate grains (2mm size) noted at 50 feet.
62-72	Limestone, very pale orange (10 YR 8/2), calcarenite (biosparite), sandy (quartz), slightly phosphatic, high to very high moldic porosity, high apparent permeability. Accessory constituents: Shell 50%, 2mm phosphate particles 1-2%.

Continued: GEOLOGIST'S LOG OF MC-5000

Depth (feet)	Lithology
72-74	Marl, yellowish-gray (5 Y 7/2), slightly silty, soft, sticky, very low permeability. Accessory constituents: Shell 30%, limestone 30% (as above).
74-102	Limestone, pale greenish-yellow (10 Y 8/2) to pale olive (10 Y 6/2), biomicrite (biosparite), moderately hard, slightly phosphatic, very high moldic porosity, very high apparent permeability. Accessory constituents: Phosphate (2 mm particles) (2-5%), shell fragments (40%).
102-175	Limestone, yellowish-gray (5 Y 7/2), calcarenite, hard, abundant molds and casts, very high moldic porosity, high apparent permeability.
175-194	Limestone, greenish-gray (5 GY 6/1), calcarenite (biosparite), hard, slightly phosphatic, with high moldic porosity and high apparent permeability. Limestone is softer from 194 feet down and contains more abundant shell and fossil fragments.
194-227	Limestone, greenish-gray (5 GY 6/1), calcarenite, hard, phosphatic, with high moldic porosity and high apparent permeability, interbedded with sand, yellowish-gray (5 Y 7/2), fine grained, soft, phosphatic, subangular to subrounded particles. Accessory constituents: Shell (50%) from 215 to 227 feet, trace amounts of sandy phosphatic clay at 220 feet.
227-234	Limestone, greenish-gray (5 GY 6/1), sandy (quartz), hard, phosphatic, very high moldic porosity, high apparent permeability. Accessory constituents: 2mm phosphate grains 15%, shell 5-10%.
234-262	Limestone, very pale orange (10 YR 8/2), biomicrite, moderately hard, phosphatic, abundant molds and casts, abundant shell (40%), very high moldic porosity, high apparent permeability. The limestone contains occasional 2-5 mm phosphate particles between 245 to 262 feet. Lens of sandy clay, very pale orange (10 YR 8/2) at 248 feet.

Continued: GEOLOGIST'S LOG OF MC-5000

Depth (feet)	Lithology
262-268	Limestone, yellowish-gray (5 Y 8/1) to greenish-gray (5 GY 6/1), biosparite to biomicrite, phosphatic, abundant shell 40%, very high apparent moldic porosity, high apparent permeability.
268-285	Clay, yellowish-gray (5 Y 8/1), sandy, soft, phosphatic, sticky, low apparent porosity, very low permeability. Accessory constituents: Limestone as above 5%, shell fragments 5%.
285-292	Clay, greenish-gray (5 GY 6/1), stiff, phosphatic, cohesive, low apparent porosity, very low permeability. Accessory constituents: Phosphatic limestone (10%) from above. Band of clay, olive-gray (5 Y 4/1) to brownish-gray (5 YR 4/1) at 289 feet containing 10% shell and ~25% limestone. The clay contains 35% limestone from 290 to 292 feet. The limestone at this depth is greenish-gray (5 GY 6/1), biomicrite, hard, with fair to high porosity and high permeability.
292-300	Clay (50%), greenish-gray (5 GY 6/1), stiff, cohesive, phosphatic, low apparent porosity, very low permeability, and Limestone (50%), very pale orange (10 YR 8/2), phosphatic biomicrite interbedded with clay, pale orange (10 YR 8/2) to light greenish-gray (5 GY 8/1), soft, sticky, phosphatic, with low to moderate porosity.
300-305	Clay, yellowish-gray (5 Y 7/2) to pale olive (10 Y 6/2), stiff, sandy, phosphatic, with very low apparent permeability. Accessory constituents: Limestone (45%), pale olive (10 Y 6/2) micrite, hard, phosphatic, very high apparent porosity, high apparent permeability.
305-325	Limestone (70%), light greenish-gray (5 GY 8/1) to greenish-gray (5 GY 6/1), micrite, moderately hard, phosphatic and clay (30%), light greenish-gray (5 GY 8/1), soft, sticky, phosphatic with low apparent permeability. Accessory constituents: phosphate grains 2mm (5%).
325-340	Clay, pale olive (10 Y 6/2) to light olive-gray (5 Y 5/2), sticky, cohesive, phosphatic with low apparent porosity and limestone

Continued: GEOLOGIST'S LOG OF MC-5000

Depth (feet)	Lithology
	(10%), pale greenish-yellow (10 Y 8/2), biomicrite, phosphatic, with high to very high apparent porosity and high apparent permeability.
340-345	Clay, dark greenish-gray (5 GY 6/1), soft to firm, phosphatic, low apparent porosity and permeability. Accessory constituents: Phosphate grains 1-2 mm (5%).
345-379	Clay, greenish-gray (5 G 6/1), firm to soft, cohesive, phosphatic, low apparent porosity, very low permeability. Accessory constituents: Limestone, very pale orange (10 YR 8/2), biomicrite, phosphatic, very high apparent porosity, and high apparent permeability.
379-405	Limestone, yellowish-gray (5 Y 8/1) to light gray (N7), biomicrite, phosphatic, (10-15% 1-2 mm grains), very high moldic porosity, very high apparent permeability.
405-417	Limestone (30%), very pale orange (10 YR 8/2), slightly phosphatic, hard, micrite, high to very high apparent permeability, high porosity and (40%) limestone, very light gray (N8) to light greenish-gray (5 GY 8/1), biomicrite, phosphatic, hard, high moldic porosity, very high permeability, contain molds and casts, 25% shell, 5% very coarse sand to granule-sized phosphate grains.
417-423	Dolomite (100%), pale olive (10 Y 6/2), sucrosic, slightly phosphatic, excellent porosity, very high permeability.
423-425	Dolomite (80%), pale olive (10 Y 6/2), sucrosic, moderately hard, as above, and limestone (20%), very light gray (N8), biomicrite, phosphatic, moderately hard, very high apparent permeability, excellent porosity.
425-427	Sand, pale greenish-yellow, very fine grained, unconsolidated?, phosphatic, subangular to subrounded particles.

Continued: GEOLOGIST'S LOG OF MC-5000

Depth (feet)	Lithology
427-429	Limestone, pale greenish-yellow, calcarenite (poorly cemented biosparite), sandy (quartz), abundant (30%) fine shell fragments, phosphatic, fairly soft, high porosity, high apparent permeability, contains occasional (10%) very light gray phosphatic limestone.
429-460	Limestone, yellowish-gray (5 Y 8/1), to very light gray (N8), biomicrite, moderately hard, slightly phosphatic, high apparent porosity, excellent permeability, abundant shell (40%), occasional (2%), 1-2mm phosphatic grains.
460-502	Limestone, yellowish-gray (5 Y 8/1), calcarenite (poorly cemented biosparite), soft, phosphatic, abundant shell (30%), occasional grains of phosphate 2%, excellent moldic porosity, very high apparent permeability, abundant echinoderm fragments.
502-515	Limestone, yellowish-gray (5 Y 8/1), calcarenite (poorly cemented biosparite), moderately soft, abundant (15%) shell fragments, slightly phosphatic, abundant fossils - fossiliferous, very high to excellent porosity, very high apparent permeability.
151-516	Limestone, light olive-gray (5 Y 6/1), biomicrite, phosphatic, moderately soft, very high apparent porosity, high to very high apparent permeability, accessory constituents, shell fragments (40%), phosphatic grains (2%), 1-2 mm. Abundant (50%) shell fragments at 516-517, traces (5%) of yellowish-gray (5 Y 8/1), biomicritic limestone, as above.
516-519	Limestone, yellowish-gray (5 Y 8/1), biomicrite, slightly phosphatic (2% sand-sized grains), moderately hard, abundant shell fragments, very high apparent porosity, very high to excellent permeability. Limestone has a higher moldic porosity (10%) at 519 feet.
519-521	Limestone, pale olive (10 Y 6/2), biomicrite, moderately hard, phosphatic, very high porosity, very high permeability, 20% shell fragments, 5% phosphate.

Continued: GEOLOGIST'S LOG OF MC-5000

Depth (feet)	Lithology
521-529	Clay (25%), pale olive (10 Y 6/2) to grayish-olive (10 Y 6/2), soft to stiff, phosphatic, cohesive, high apparent porosity, low apparent permeability, approximately 2% of clay is in places partially lithified. Limestone (70%), pale olive (10 Y 6/2), biomicrite, as above, 5% shell fragments.
529-533	Dolosilt, light olive-gray (5 Y 5/2), fine-grained texture, sucrosic, moderately soft, slightly phosphatic, very high apparent porosity, high apparent permeability.
533-540	Limestone, yellowish-gray (5 Y 8/1), to very light gray (N8), biomicrite, moderately hard, phosphatic, abundant shell (35%), very high moldic porosity, very high apparent permeability. Limestone becomes predominantly yellowish-gray at 539 feet with more abundant molds and casts.
540-544	Limestone (80%), yellowish-gray (5 Y 7/2), biomicrite, moderately hard, slightly phosphatic, very high apparent porosity and permeability. Limestone (20%), yellowish-gray (5 Y 7/2), micrite, moderately hard, very high apparent porosity and permeability.
544-549	Limestone, very light gray (N8), biomicrite, moderately hard to hard, phosphatic, abundant molds and casts, very high moldic porosity, very high apparent permeability.
549-554	Limestone, yellowish-gray (5 Y 7/2), to light olive-gray (5 Y 5/2), biomicrite, slightly phosphatic, moderately hard, very high moldic porosity, high apparent permeability.
554-561	Limestone, very light gray (N8), biomicrite, moderately hard, slightly phosphatic, very high moldic porosity, very high apparent permeability.
561-570	Limestone, very light gray (N8) to pale greenish-yellow (10 Y 8/2), calcarenite (poorly cemented biosparite), moderately soft, very high apparent porosity, slightly phosphatic, high apparent permeability.

Continued: GEOLOGIST'S LOG OF MC-5000

Depth (feet)	Lithology
570-576	Limestone, yellowish-gray (5 Y 7/2), biomicrite, moderately hard, slightly phosphatic, very high apparent porosity, high apparent permeability.
576-581	Limestone, very light gray (N8), biomicrite, slightly phosphatic, moderately hard, very high moldic porosity, high apparent permeability, abundant molds and casts.
581-591	Limestone, very pale orange (10 YR 8/2) to yellowish-gray (5 Y 7/2), biomicrite, moderately hard, slightly phosphatic, abundant (15%) coarse shell fragments, high apparent porosity and permeability.
591-615	Limestone (95%), yellowish-gray (5 Y 7/2), micrite, hard, phosphatic (5%), and, at 610 feet, marl, yellowish-gray (5 Y 7/2), soft, phosphatic (1-2% very coarse sand-sized grains).
615-618	Limestone (50%), pale olive (10 Y 6/2), soft, biomicrite, phosphatic, high apparent porosity, high permeability, 25% shell, 25% phosphate (very coarse sand-sized grains), 1% trace clay, pale olive (10 Y 6/2), soft, phosphatic.
618-621	Limestone (40%), light gray (N7), biomicrite, moderately hard, phosphatic (flecks of phosphate), high apparent porosity, high apparent permeability, 35% phosphate (very coarse sand-sized grains), 25% shell fragments.
621-623	Limestone, very pale orange (10 YR 8/2), biomicrite, hard, phosphatic (10% granule-sized grains), fossiliferous, high apparent porosity and permeability.
623-629	Clay (80%), olive-gray (5 Y 4/1), soft, phosphatic, and limestone (10%), as above, abundant (10-15%) very coarse sand-sized phosphate grains.
629-632	Limestone, pale olive (10 Y 6/2) to light olive-gray (5 Y 5/2), biomicrite, moderately hard, phosphatic, very high porosity and permeability, abundant 15% phosphate granules,

Continued: GEOLOGIST'S LOG OF MC-5000

Depth (feet)	Lithology
	abundant molds and casts of aragonitic fossils, limestone appears to be partially dolomitized (50%).
632-638	Limestone, pale orange (10 YR 8/2) to yellowish-gray (5 Y 7/2), biomicrite, moderately hard, phosphatic, very high apparent porosity and permeability, common (2-5%) very coarse sand-sized phosphate grains.
638-640	Limestone, yellowish-gray (5 Y 8/1), biomicrite, moderately hard, phosphatic, abundant (15%) very coarse sand to granule-sized phosphate grains (15%), very high apparent porosity and permeability.
640-645	Marl (10%), yellowish-gray (5 Y 8/1), soft, very low apparent permeability, moderate porosity, phosphatic, and limestone (90%), as above, yellowish-gray (5 Y 8/1), common (20%) bryozoans.
645-669	Limestone (45%), yellowish-gray (5 Y 8/1), biomicrite, moderately hard, fossiliferous, abundant (40%) bryozoan fragments, very high apparent porosity and permeability. Marl (50%), yellowish-gray (5 Y 8/1), very soft, common (5%) phosphate, very coarse sand-sized grains.
669-678	Limestone (70%), yellowish-gray (5 Y 7/2), biomicrite, moderately hard, abundant molds and casts, phosphatic (very coarse sand-sized grains), very high apparent porosity and permeability. Marl (30%), yellowish-gray, very soft, as above.
678-693	Marl (30%), yellowish-gray (5 Y 7/2), soft to firm, low to moderate apparent porosity, very low permeability, and limestone (70%), yellowish-gray (5 Y 7/2), biomicrite, moderately hard, high apparent porosity and permeability.
693-700	Clay (80%), dark greenish-gray (5 G 4/1), soft to firm, phosphatic, moderate porosity, low apparent permeability, very low permeability. Limestone (15%), yellowish-gray (5 Y 7/2), as above. Marl (5%), yellowish-gray (5 Y 7/2), as above,

Continued: GEOLOGIST'S LOG OF MC-5000

Depth (feet)	Lithology
	with very coarse sand-sized phosphate grains. Trace amounts (1-2%) of pale olive limestone at 698 feet.
700-706	Limestone (70%), pale olive (10 Y 6/2), moderately soft, pelmicrite, slightly phosphatic, very high apparent porosity and permeability, limestone (10%), yellowish-gray (5 Y 7/2), pelmicrite, moderately hard, very high apparent porosity and permeability, common (5%) very coarse sand-sized phosphate grains. Marl (15%), yellowish-gray (5 Y 7/2), very soft, moderate apparent porosity, very low apparent permeability.
706-718	Limestone (85%), very pale orange (10 YR 8/2), to yellowish-gray (5 Y 7/2), biomicrite, moderately hard, slightly phosphatic, very high apparent porosity, very high apparent permeability. Marl (15%), yellowish-gray (5 Y 7/2), very soft.
718-721	Dolomite, light olive-gray (5 Y 6/1) to olive-gray (5 Y 4/1), sucrosic texture, sparry, calcitic, moderately hard, slightly phosphatic, moderate porosity, high apparent permeability.
721-728	Dolomite (80%), light olive-gray (5 Y 5/2) to moderate olive-brown (5 Y 4/4), phosphatic, moderately hard, sucrosic texture, crystalline, high porosity, high apparent permeability, limestone (15%), yellowish-gray (5 Y 7/2), calcarenite (biosparite), moderately hard, phosphatic, high apparent porosity and permeability. Common (5%) phosphate granules.
728-729	Limestone, yellowish-gray (5 Y 7/2), micrite, moderately hard, phosphatic, very high apparent porosity, high apparent permeability.
729-730	Dolomitic limestone (80%), light olive-gray (5 Y 5/2), sucrosic texture, moderately hard, phosphatic, limestone (20%), very light gray (N8), biomicrite, phosphatic, abundant molds and casts, high moldic porosity, very high permeability.
730-738	Dolomite (90-96%), light olive-gray (5 Y 5/2) to moderate olive-brown (5 Y 4/4), hard, sucrosic texture, slightly

Continued: GEOLOGIST'S LOG OF MC-5000

Depth (feet)	Lithology
	phosphatic, excellent porosity (vuggy), very high to excellent permeability, limestone (5-10%), very light gray (N8), as above.
738-745	Dolomite (100%), light olive-gray (5 Y 5/1), hard, sucrosic, phosphatic, excellent apparent porosity, very high apparent permeability, color change at 745 feet.
745-753	Dolomite (50%), light olive-gray (5 Y 5/2), cryptocrystalline, very hard, porous, high secondary porosity, very high apparent permeability and dolomitic limestone (50%), yellowish-gray (5 Y 7/2), as above, molds and casts, very hard crystalline texture, high secondary porosity, very high apparent permeability.
753-754	Limestone, yellowish-gray (5 Y 7/2), calcarenite sparite (peloids/bioclasts), moderately soft, very high apparent porosity and permeability.
754-755	Dolomite (50%), light olive-gray (5 Y 5/2), microsucrosic, very hard, very high apparent porosity, high to very high permeability, dolomitic limestone (50%), yellowish-gray (5 Y 7/2), very hard crystalline, very high secondary porosity, very high apparent permeability.
755-756	Limestone (50%), yellowish-gray (5 Y 7/2), phosphatic, calcarenite (very poorly cement bio/pelsparite), very soft, very high apparent porosity (intergranular) and permeability (50%). Limestone is a very poorly cemented carbonate sand.
756-759	Dolomite (75%), yellowish-gray (5 Y 7/2), microsucrosic, moderately hard, phosphate, abundant molds and casts, very high porosity (moldic) and very high apparent permeability, dolomite (25%), light olive-gray (5 Y 5/2), as above, harder from 757-759 feet, ~ 5% moderate yellowish-brown (10 YR 5/4) intermixed with above at 759 feet.

Continued: GEOLOGIST'S LOG OF MC-5000

Depth (feet)	Lithology
759-760	Dolomite, light olive-gray (5 Y 5/2), pale yellowish-brown (10 YR 6/2), microsucrosic, very hard, phosphatic, very high secondary porosity, moderate to high apparent permeability.
760-761	Limestone, yellowish-gray (5 Y 8/1), biomicrite, very hard, phosphatic, very high moldic porosity, moderate to high apparent permeability.
761-767	Dolomitic limestone, light olive-gray (5 Y 5/2), crystalline, very hard, phosphatic, low apparent porosity, moderate apparent permeability.
767-770	Limestone, yellowish-gray (5 Y 7/2), biomicrite, phosphatic, hard, abundant molds and casts, high moldic porosity, moderate to high apparent permeability.
770-780	Limestone (50%), yellowish-gray (5 Y 7/2), calcarenite (poorly cemented bio/pelsparite), moderately soft, slightly phosphatic, high apparent porosity, very high apparent permeability, ~40% of this limestone partially dolomitized and dolomite (50%), light olive-gray (5 Y 6/1), sucrosic texture, moderately hard to hard, very high apparent porosity, moderate to high apparent permeability.
780-781	Carbonate sand, yellowish-gray (5 Y 7/2), unconsolidated or very poorly cemented, very fine grained, subangular to subrounded.
781-786	Dolomite, light olive-gray (5 Y 6/1), sucrosic texture, hard, slightly phosphatic, vuggy, abundant casts and molds, very high moldic porosity, moderate to high apparent permeability, dolomite (50%), yellowish-gray (5 Y 7/2), sucrosic texture, hard, vuggy, slightly phosphatic, very high apparent porosity, moderate to high apparent permeability.
786-788	Dolomite (50%), dusky yellow (5 Y 6/4) to light olive gray (5 Y 4/1) sucrosic texture, moderately hard to hard, phosphatic, very high apparent porosity, moderate to high apparent permeability. Limestone (50%), yellowish-gray (5 Y 7/2)

Continued: GEOLOGIST'S LOG OF MC-5000

Depth (feet)	Lithology
	calcarenite, (poorly cemented carbonate sand), sandy, moderately soft, very high apparent porosity, high apparent permeability.
788-790	Dolomite (30%), dusky yellow (5 Y 6/4) to light olive-gray, phosphatic, sucrosic texture, as above. Limestone (70%), very pale orange (10 YR 8/2), biomicrite, slightly phosphatic, moderately hard, very high apparent porosity and permeability.
790-797	Limestone (50%), yellowish-gray (5 Y 7/2), biomicrite, soft, marly, high apparent porosity. Marl (50%), yellowish-gray (5 Y 7/2), moderately soft, sticky, low apparent porosity.
797-804	Limestone, very light gray (N8), biomicrite, moderately hard, abundant molds and casts, high moldic porosity, very high apparent permeability, becoming light olive-gray (5 Y 6/1) at 799 feet.
804-812	Dolomite, greenish-gray (5 G 6/1), moderately hard, sucrosic texture, slightly phosphatic, high apparent porosity, moderate to high apparent permeability. From 809-812 feet, dolomite, pale yellowish-brown (10 YR 6/2), crystalline texture, vuggy, hard, high apparent porosity, moderate to high apparent permeability.
812-813	Marl (80%), yellowish-gray (5 Y 7/2), soft, low porosity, very low permeability. Limestone (20%), yellowish-gray (5 Y 7/2), biomicrite, high apparent porosity.
813-814	Limestone, yellowish-gray (5 Y 7/2) to grayish-orange (10 YR 7/4), micrite, slightly phosphatic, moderately hard, high apparent porosity, high apparent permeability.
814-814.5	Clay, pale yellowish-brown (10 YR 6/2) to yellowish-gray (5 Y 7/2), soft, low porosity, very low permeability.
814.5-816	Limestone (90%), yellowish-gray (5 Y 7/2) to very light gray (N8), calcarenite (bio/pelsparite), moderately hard, high

Continued: GEOLOGIST'S LOG OF MC-5000

Depth (feet)	Lithology
874-880	Limestone, yellowish-gray (5 Y 8/1), biomicrite, moderately hard, very high apparent moldic porosity, high apparent permeability.
880-881	Limestone, yellowish-gray (5 Y 8/1), calcarenite (bio/pelsparite), moderately hard, high apparent porosity (moldic and intergranular).
881-885	Marl, light gray (N8), soft to firm, cohesive, low apparent porosity, very low permeability.
885-916	Limestone (70%), yellowish-gray (5 Y 8/1), calcarenite (bio/pelsparite), moderately hard, high apparent moldic porosity. Marl (30%), yellowish-gray (5 Y 8/1), soft, low apparent porosity, very low permeability.
916-925	Limestone, light olive-gray (5 Y 6/1), calcarenite (biosparite), moderately hard to moderately soft, high apparent porosity, high to moderate apparent permeability. Marl (25%), yellowish-gray (5 Y 8/1), soft, low apparent porosity, very low permeability.
925-953	Limestone (75%), yellowish-gray (5 Y 8/1), calcarenite (poorly cemented biosparite), moderately soft, high apparent porosity, moderate permeability. Marl (20%), light olive-gray (5 Y 6/1), soft, low porosity, very low permeability. Clay (5%), pale olive (10 Y 6/2), soft to firm, partially lithified, low apparent porosity, very low permeability.
953-959	Limestone (60%), yellowish-gray (5 Y 8/1), calcarenite (poorly cemented biosparite), moderately soft, high apparent porosity. Marl (25%), light olive-gray (5 Y 6/1), soft, low porosity, very low permeability. Clay (15%), light olive-gray (5 Y 6/1) to yellowish-gray (5 Y 8/1), soft, cohesive, low porosity.
959-963	Limestone (70%), yellowish-gray (5 Y 8/1), biomicrite, moderately soft to moderately hard, high apparent moldic porosity. Limestone (20%), yellowish-gray (5 Y 8/1), calcarenite, as above. Marl (10%), yellowish-gray (5 Y 8/1)

Continued: GEOLOGIST'S LOG OF MC-5000

Depth (feet)	Lithology
	to light olive-gray (5 Y 6/1), soft, low apparent porosity, very low permeability.
963-968	Limestone (90%), yellowish-gray (5 Y 8/1), calcarenite (poorly cemented biosparite), moderately soft, fossiliferous, high apparent porosity, moderate permeability. Marl (10%), yellowish-gray (5 Y 8/1), soft, low porosity, very low permeability.
968-972	Limestone (10%), yellowish-gray (5 Y 7/2) to pale yellowish-brown, biomicrite, moderately hard, high apparent moldic porosity. Marl (30%), yellowish-gray (5 Y 7/2), soft to firm, cohesive, low apparent porosity, very low permeability. Limestone (60%), yellowish-gray (5 Y 7/2), calcarenite (biosparite), moderately hard to moderately soft, high apparent porosity.
972-975	Limestone (20%), yellowish-gray (5 Y 7/2), calcarenite (bio/pel sparite), moderately soft, high apparent porosity. Marl (10%), yellowish-gray (5 Y 8/2), soft, low porosity, very low permeability. Limestone (70%), pale yellowish-brown (10 YR 6/2), biomicrite, moderately hard, high moldic porosity.
975-1001	Limestone (90%), pale yellowish-brown (10 YR 6/2), calcarenite (biosparite), soft, high apparent porosity, common molds and casts of aragonitic fossils, minor echinoderm fragments. Marl (10%), yellowish-gray (5 Y 7/2), soft, very low permeability.
1001-1012	Limestone (80%), very pale orange (10 YR 8/2), calcarenite (poorly cemented bio/pelsparite), moderately soft to moderately hard, high intergranular porosity. Marl (20%), pale olive (10 Y 6/2), soft, very low permeability.
1012-1014	Limestone (70%), grayish-orange (10 YR 7/4) to pale yellowish-brown (10 YR 6/2), calcarenite (poorly cemented bio/pelsparite), moderately hard to moderately soft, high intergranular porosity. Marl (30%), grayish-orange (10 YR 7/4), soft, low apparent porosity, very low permeability.

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Depth (feet)	Lithology
1014-1018	Limestone (80%), very pale orange (10 YR 8/2), calcarenite (poorly cemented bio/pelsparite), moderately soft to moderately hard, high intergranular porosity. Marl (20%), pale olive (10 Y 6/2), soft, low apparent porosity, very low permeability.
1018-1020	Limestone (70%), grayish-orange (10 YR 7/4), calcarenite (poorly cemented bio/pelsparite), moderately soft to moderately hard, high intergranular porosity. Marl (30%), grayish-orange (10 YR 7/4), soft, low apparent porosity, very low permeability.
1020-1029	Limestone (90%), light olive-gray (5 Y 5/2), calcarenite (bio/pelsparite), moderately hard, very high moldic porosity, abundant small bivalve shells. Marl (10%), light olive-gray (5 Y 5/2), soft, very low permeability.
1029-1036	Limestone, yellowish-gray (5 Y 7/2), calcarenite (poorly cemented biosparite), moderately hard, very high moldic porosity, abundant small bivalve shells. Marl, yellowish-gray (5 Y 7/2), soft, low apparent porosity, very low permeability.
1036-1041	Limestone (60%), yellowish-gray (5 Y 7/2), calcarenite (poorly cemented biosparite), moderately hard, fossiliferous, abundant small bivalve shells, high porosity (moldic and intergranular). Limestone (30%), pale olive-gray (10 Y 6/2), biomicrite, moderately hard, high moldic porosity. Marl (10%), pale olive (10 Y 6/2), soft, low apparent porosity, very low permeability.
1041-1055	Limestone (90%), very pale orange (10 YR 8/2), calcarenite (poorly cemented bio/pelsparite), moderately soft to moderately hard, high intergranular porosity. Marl (10%), pale olive (10 Y 6/2), soft, moderate to low apparent porosity, very low permeability.
1055-1058	Limestone (70%), yellowish-gray (5 Y 7/2), calcarenite (poorly cemented bio/pelsparite), moderately hard, high intergranular porosity, 1% small bivalve shells. Limestone (20%), very pale orange (10 YR 8/2), calcarenite, (poorly cemented

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Depth (feet)	Lithology
	bio/pelsparite), moderately soft to moderately hard, high porosity (moldic and intergranular). Marl (10%), pale olive (10 Y 6/2), soft, low to moderate porosity, very low permeability.
1058-1061	Limestone, yellowish-gray (5 Y 7/2), calcarenite (poorly cemented bio/pelsparite), moderately hard, very high intergranular porosity.
1061-1073	Limestone, yellowish-gray (5 Y 7/2) to pale olive (10 Y 6/2), calcarenite (poorly cemented bio/pelsparite), moderately hard, high moldic and intergranular porosity, numerous small bivalve shells.
1073-1075	Limestone (70%), very light gray (N8), biomicrite, moderately hard, high apparent moldic porosity. Limestone (30%), yellowish-gray (5 Y 7/2), calcarenite (poorly cemented biosparite), moderately hard, high intergranular porosity, numerous small bivalve shells.
1075-1079	Limestone, yellowish-gray (5 Y 7/2), calcarenite (poorly cemented biosparite), moderately hard, high intergranular porosity, abundant (15%) small bivalve shells.
1079-1089	Limestone, yellowish-gray (5 Y 7/2), calcarenite (poorly cemented biosparite), moderately hard, high moldic and intergranular porosity, minor (5%) small bivalve shells.
1089-1098	Limestone, very pale orange (10 YR 8/2), calcarenite (poorly cemented biosparite), moderately soft to moderately hard, high intergranular porosity, abundant (15-20%) small bivalve shells.
1098-1104	Limestone (60%), very pale orange (10 YR 8/2) to yellowish-gray (5 Y 8/1), micrite, moderately hard, high moldic porosity. Limestone (40%), yellowish-gray (5 Y 2/2), calcarenite (poorly cemented biosparite), moderately soft to moderately hard, high intergranular porosity.

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Depth (feet)	Lithology
1104-1109	Limestone, very pale orange (10 YR 8/2), calcarenite (poorly cemented biosparite), moderately soft to moderately hard, minor molds and casts of aragonitic fossils, minor (1-2%) small bivalve shells, high intergranular porosity.
1109-1114	Limestone (80%), very pale orange (10 YR 8/2), calcarenite, moderately soft to moderately hard, high intergranular porosity, molds and casts (30%), marl (20%), white (N9), soft, moderate to low apparent porosity.
1114-1117	Limestone (40%), very pale orange (10 YR 8/2), biomicrite, moderately hard, high moldic porosity. Limestone (40%), very pale orange (10 YR 8/2), calcarenite (poorly cemented biosparite), moderately soft, high intergranular porosity. Marl (20%), white (N9), soft, moderate to low apparent porosity, very low permeability.
1117-1120	Limestone (50%), medium gray (N5), biomicrite, moderately hard, slightly phosphatic (sand-sized grains), high moldic porosity. Limestone (40%), very pale orange (10 YR 8/2), moderately hard, very high moldic porosity. Marl (10%), light gray (N7), moderate to low apparent porosity, very low permeability.
1120-1133	Limestone (70%), very pale orange (10 YR 8/2), calcarenite (biosparite), moderately hard, high moldic porosity. Marl (30%), very light gray (N8), soft, cohesive fine phosphate, low apparent porosity, very low permeability.
1133-1138	Marl (75-80%), yellowish-gray (5 Y 8/1), soft to firm, cohesive, low apparent porosity, very low permeability. Limestone (20-25%), yellowish-gray (5 Y 8/1), micrite, sandy (quartz), moderately soft, slightly phosphatic, moderate to low porosity.
1138-1148	Dolomite (100%), light olive-gray (5 Y 5/2), sucrosic texture, hard, phosphatic, moderate porosity, low apparent permeability.

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Depth (feet)	Lithology
	apparent porosity. Marl (10%), yellowish-gray (5 Y 7/2), soft, low apparent porosity.
816-831	Limestone (80%), very pale orange (10 YR 8/2) to yellowish-gray (5 Y 7/2), biomicrite, moderately hard, phosphatic, high apparent moldic porosity, moderate to high apparent permeability. Fossils include bivalves, gastropods, and foraminifera. Limestone (20%), pale gray (N7), biomicrite from 821 to 831 feet.
831-841	Limestone (70%), yellowish-gray (5 Y 8/1), calcarenite (poorly cemented biosparite, moderately soft, high apparent porosity, marly. Marl (30%), yellowish-gray (5 Y 8/1), soft, slightly sticky, low apparent porosity, very low permeability.
841-853	Limestone (80%), yellowish-gray (5 Y 8/1), biomicrite, moderately soft to soft, high apparent porosity (moldic) and permeability. Fossils include bivalves (molds and casts) and foraminifera. Marl (20%), yellowish-gray (5 Y 8/1), soft, low to moderately apparent porosity, very low permeability.
853-855	Limestone, yellowish-gray (5 Y 8/1) to light gray (N8), biomicrite, moderately hard, abundant molds and casts of aragonitic fossils, phosphatic, high moldic porosity and (apparent) permeability.
855-859	Limestone, yellowish-gray (5 Y 8/1), calcarenite (biosparite), moderately hard, abundant molds and casts of mollusks, very high apparent permeability.
859-869	Limestone, pale yellowish-brown (10 YR 6/2), biomicrite, moderately hard, abundant molds and casts of mollusks, high apparent porosity (moldic) and permeability. Limestone (~25%), pale gray (N7), biomicrite.
869-874	Limestone (90%), yellowish-gray (5 YR 8/1), calcarenite (bio/pelsparite), moderately soft to moderately hard, high apparent porosity. Marl (10%), yellowish-gray (5 Y 8/1), soft, low porosity, very low permeability.

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Depth (feet)	Lithology
1148-1154	Shell/coquina, very pale orange (10 YR 8/2), moderately soft to soft, very high porosity and permeability.
1154-1169	Limestone, yellowish-gray (5 Y 8/1), calcarenite (poorly cemented biosparite), moderately hard, phosphatic, very high apparent porosity (intergranular).
1169-1175	Limestone, light gray (N7) to yellowish-gray (5 Y 8/1), biomicrite, fossiliferous, moderately hard, very high moldic porosity, phosphatic.
1175-1181	Limestone, light gray (N7) to light olive-gray (5 Y 6/1), biomicrite, moderately hard, sandy, high moldic porosity.
1181-1195	Limestone, very pale orange (10 YR 8/2), calcarenite (poorly cemented biosparite), moderately soft to moderately hard, marly, high intergranular porosity.
1195-1201	Limestone (100%), yellowish-gray (5 Y 8/1), calcarenite and biomicrite, moderately hard, slightly phosphatic, high to very high moldic porosity.

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Depth (ft)	Lithology
0-5	Sand, very pale orange (10 YR 8/2), quartz, fine-grained.
5-15	Limestone, yellowish-gray (5 Y 8/1) with some olive-gray (5 Y 4/1) staining, texturally variable, cuttings range from biosparite to biomicrite, hard, not friable, abundant large fossil fragments (bivalves and gastropods).
15-20	Limestone, yellowish-gray (5 Y 8/1), calcarenite, fossiliferous, medium-grained, soft, friable, high visible porosity (intergranular to less abundantly moldic after aragonitic fossils), some large fossil (bivalves, minor bryozoans) fragments.
20-25	Marl, yellowish-gray (5 Y 7/2), highly fossiliferous (bivalves), soft, very low permeability, abundant large fossil (bivalve) fragments.
25-42	Marl, pale olive (10 Y 6/2) to pale yellowish-brown (10 YR 6/2), highly fossiliferous (bivalves), soft, very low permeability.
42-60	Limestone, yellowish-gray (5 Y 7/2), packed biomicrite, abundant sand-sized and larger (centimeter-sized) fossil, diverse fauna, soft, poorly friable, high porosity with common moldic pores after aragonitic fossils. Common sand-sized black/dark gray fossil fragments.
60-70	Limestone, yellowish-gray (5 Y 8/1), calcarenite (biosparite), hard, high visible intergranular porosity, common moldic pores after aragonitic fossils.
70-90	Sandstone, yellowish-gray (5 Y 8/1), quartz, fine to medium-grained, very fossiliferous, calcite-cemented, hard, not friable, moderate porosity. Common (1-2%) sand-sized black phosphate grains. Common large fossils, including bivalves and gastropods.
90-100	Sandstone, two lithologies present: A) Yellowish-gray (5 Y 8/1), quartz, fine-grained, calcite-cemented, common fossil fragments, common (1-2%) sand-sized phosphate grains.

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Depth (feet)	Lithology
	B) Medium gray (N5) to dark medium gray (N4), quartz, fine-grained, less fossiliferous than lighter colored sandstone.
100-110	Sandstone, yellowish-gray (5 Y 8/1) to medium gray (N4), quartz, mostly fine-grained, fossiliferous (common large bivalves), mostly moderately hard, moderate porosity, common (5%) granule-sized phosphate fragments.
110-144	Sand, pale olive (10 YR 6/2) to (10 YR 5/2), quartz, clay-rich matrix, fine-grained, very fossiliferous (abundant large bivalves), common (2-5%) granule-sized phosphate fragments. Bivalve fragments are white (N9) to very pale orange (10 YR 8/2).
144-174	Limestone, light olive-gray (5 Y 6/1) and pale yellowish-brown (10 YR 6/2) to light yellowish-brown (10 YR 6/4), sparse biomicrite to biosparite, hard, very high visible porosity, both intergranular and moldic. Fossils include casts and molds of bivalves, gastropods, and (rare) corals.
174-198	Clay, light olive-gray (5 Y 6/1), common silt and fine sand-sized quartz grains, soft, very low permeability. Minor sand-sized phosphate grains and fossils (gastropods).
198-242	Clay, very light olive-gray (5 Y 7/1) to light olive-gray (5 Y 6/1), common medium sand to granule-sized quartz grains, soft, very low permeability. Minor coarse sand to granule-sized phosphate grains.
242-262	Clay, pale olive (10 YR 6/2), soft, abundant very fine to very coarse sand-sized quartz grains, common rounded sand-sized phosphate grains, very low permeability. Minor sandstone (very fine-grained) and siltstone.
262-270	Clay, pale olive (10 Y 6/2), abundant silt and very fine sand-sized quartz grains, soft, very low permeability, common (5%) sand-sized phosphate grains, minor fossils (gastropods). A lot of sand production during drilling.
270-289	Clay, medium grayish-olive (10 Y 5/2) to medium greenish-gray (5 GY 5/1) and less commonly (10%) pale greenish-

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Depth (feet)	Lithology
	yellow (10 Y 8/2), abundant silt and very fine sand-sized quartz grains, soft. Common (5%) sand-sized phosphate grains, fossils are rare. A lot of sand production during drilling.
289-297	Limestone, very light gray (N8) to yellowish-gray (5 Y 8/1), calcarenite (biosparite), moderate hardness, moderate to high porosity. Limestone consists of large bivalve fragments in a carbonate sand matrix. Common very fine sand-sized phosphate grains.
297-305	Limestone (90%), yellowish-gray (5 Y 8/1), biomicrite, moderately hard, phosphatic, very good moldic porosity, marl (10%), yellowish-gray (5 Y 8/1), soft, phosphatic, moderate to low porosity.
305-314	Limestone, yellowish-gray (5 Y 8/1), biomicrite, moderately hard, phosphatic, abundant shell fragments (40%), coral fragments common (20%), fossiliferous, excellent apparent porosity. Limestone becoming pale olive (10 YR 6/2) with calcarenitic texture from 314'.
314-320	Limestone, pale olive (10 Y 6/2) to yellowish-gray (5 Y 8/1), calcarenite (biosparite), fossiliferous, moderately hard, phosphatic, high porosity (moldic), harder from 318' to 320'.
320-324	Limestone, light gray (N7), biomicrite, moderately hard to moderately soft, fossiliferous, high porosity (moldic).
324-335	Limestone (70%), yellowish-gray (5 Y 8/1), calcarenite (biosparite), moderately hard, phosphatic, good intergranular porosity, Limestone (30%), light gray (N7), biomicrite, moderately hard, fossiliferous, high porosity (moldic).
335-369	Limestone, very pale orange (10 YR 8/2), biomicrite, moderately hard, phosphatic, abundant molds and casts of aragonitic fossils, high to very high porosity, (good H_2O producer). Limestone is yellowish-gray (5 Y 8/1) from 340' to 369'.

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Depth (feet)	Lithology
369-392	Limestone, yellowish-gray (5 Y 8/1), calcarenite (biosparite), moderately hard, fossiliferous, phosphatic, abundant molds and casts, high porosity.
392-397	Limestone, pale olive (10 Y 6/2) to yellowish-gray (5 Y 8/1), calcarenitic texture, moderately hard, fossiliferous, high porosity, including abundant moldic pores.
397-400	Limestone (70%), pale olive (10 Y 6/2) to yellowish-gray (5 Y 8/1), as above. Marl (30%), yellowish-gray (5 Y 8/1), soft to firm, apparently very low porosity and permeability.
400-408	Limestone (75%), yellowish-gray (5 Y 7/2), biomicrite, slightly (quartz) sandy, moderately hard, fossiliferous, abundant, (50%) coral and shell fragments.
408-412	Limestone, pale olive (10 Y 6/2), calcarenite (biosparite), fossiliferous, moderately hard, high apparent porosity.
412-415	Clay, pale olive (10 Y 6/2), soft to firm, low apparent porosity and very low permeability, abundant quartz sand, phosphatic, abundant shell fragments (20%).
415-418.5	Clay, yellowish-gray (5 Y 7/2), soft to firm, phosphatic, low apparent porosity, large percentage (20%) 1-2mm phosphate at 418', abundant shell fragments (20%).
418.5-420	Dolomite, pale olive (10 Y 6/2), microsucrosic texture, hard, slightly phosphatic, moderate to high porosity, low apparent permeability.
420-429	Clay, pale olive (10 Y 6/2), soft to firm, sticky to cohesive, slightly phosphatic, low apparent porosity and very low permeability. Clay is greenish-gray (5 Y 4/1), from 402' and is interbedded with Limestone, very pale orange (10 YR 8/2), biomicrite, moderately hard, phosphatic, abundant shell fragments, apparent high porosity.
429-431	Clay (40%), pale olive, soft to stiff, phosphatic, very low permeability and Limestone (60%), very pale orange (10 YR

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Depth (feet)	Lithology
	8/2), biomicrite, moderately hard, phosphatic, fossiliferous, abundant shell, moderate to high apparent porosity.
431-438	Limestone, very pale orange (10 YR 8/2), biomicrite, moderately hard, phosphatic, fossiliferous, high porosity (moldic). Fossils include coral and echinoderm fragments.
438-440	Limestone, yellowish-gray (5 Y 7/2) to dusky yellow (5 Y 6/4), biomicrite, moderately hard, fossiliferous (abundant echinoderm and coral fragments), high to very high porosity.
440-449	Limestone, yellowish-gray (5 Y 8/1), biomicrite, moderately hard, phosphatic, fossiliferous, coral fragments predominant, high porosity (moldic).
449-451	Limestone (70%), yellowish-gray (5 Y 8/1), biomicrite as above. Marl (30%), yellowish-gray (5 Y 8/1), phosphatic, soft to firm, low apparent porosity and very low permeability.
451-454	Limestone, yellowish-gray (5 Y 8/1), biomicrite, moderately hard, phosphatic, abundant molds and casts, high porosity (moldic).
454-459	Limestone (70%), very pale orange (10 YR 8/2) to white (N9), biomicrite, phosphatic, fossiliferous, moderately hard, high porosity (moldic). Marl (30%), yellowish-gray (5 Y 8/1) to white (N9), soft, phosphatic, low porosity and very low permeability.
459-468	Limestone, yellowish-gray (5 Y 8/1), calcarenite (poorly cemented biosparite), moderately soft to moderately hard, phosphatic, fossiliferous, high intergranular porosity, and Marl (20%) as above.
468-469	Limestone, white (N9), calcarenite (poorly cemented biosparite), moderately hard, fossiliferous, phosphatic, high porosity.
469-471	Limestone, pale olive (10 Y 6/2), biomicrite, moderately hard, phosphatic, fossiliferous, high porosity.

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Depth (feet)	Lithology
471-474	Marl (50%), very pale orange (10 YR 8/2), soft, phosphatic, low apparent porosity and very low permeability. Limestone (50%), very pale orange (10 YR 8/2), biomicrite, moderately hard, fossiliferous, phosphatic, high porosity.
474-478	Limestone (70%), yellowish-gray (5 Y 8/1), calcarenite (poorly cemented biosparite), phosphatic, moderately soft, fossiliferous, high porosity. Marl (30%), very pale orange (10 YR 8/2) to yellowish-gray (5 Y 8/1), soft, phosphatic, low apparent porosity and very low permeability.
478-479	Marl, yellowish-gray (5 Y 8/1), soft to firm, phosphatic, low apparent porosity and very low permeability.
479-487	Limestone, pale olive (10 Y 6/2), biomicrite, moderately hard, phosphatic, high porosity.
487-497	Limestone (50%), yellowish-gray (5 Y 8/1), biomicrite, moderately hard, fossiliferous, phosphatic, high porosity. Marl (50%), yellowish-gray (5 Y 8/1) to white (N9), soft to stiff phosphatic, low apparent porosity and very low permeability.
497-508	Clay, yellowish-gray (5 Y 8/1) to pale olive (10 Y 6/2), firm, phosphatic, 1 mm particles of phosphate and shell, low apparent porosity and very low permeability. Clay is grayish-olive (10 Y 4/2) from 499' to 508', abundant (30%) phosphate grains, 1-2mm from 505 to 508'.
508-515	Clay (60%), yellowish-gray (5 Y 8/1), firm, phosphatic, low apparent porosity. Limestone (20%), yellowish-gray (5 Y 8/1), biosparite, phosphatic, moderate to hard, good apparent porosity. Marl (10%), yellowish-gray (5 Y 8/1), soft, low apparent porosity and very low permeability. Phosphate (10%).
515-516	Dolomite, grayish-olive (10 Y 4/2), crystalline, hard, moderately apparent porosity.
516-518.5	Clay, grayish-olive (10 Y 4/2), firm, cohesive, phosphatic with low apparent porosity and very low permeability.

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Depth (feet)	Lithology
518.5-525	Dolomite (60%), grayish-olive (10 Y 4/2), microsucrosic texture, hard, phosphatic, moderate to high porosity (moldic), low apparent permeability, occasional large 2-5 mm phosphate particles common. Dolomite (40%), very light gray (N8), sucrosic, vuggy, hard, phosphatic, high porosity.
525-545	Limestone (60%), yellowish-gray (5 Y 7/2), calcarenite (poorly cemented biosparite), moderately soft with moderate porosity. Marl (10%), yellowish-gray (5 Y 7/2), soft, low apparent porosity and very low permeability. Clay (30%), yellowish-gray (5 Y 7/2), olive-gray (5 Y 4/1), firm, cohesive, phosphatic, low apparent porosity and very low permeability.
545-549	Clay, yellowish-gray (5 Y 7/2), soft to firm, phosphate and shell (10%), low apparent porosity and very low permeability.
549-552	Limestone (50%), yellowish-gray (5 Y 8/1), biomicrite, moderately hard, fossiliferous (abundant coral and bryozoan fragments), high porosity and Clay, yellowish-gray (5 Y 8/1), soft to firm, low apparent porosity and very low permeability, (2%) occasional phosphate granules.
552-560	Clay, yellowish-gray (5 Y 7/2), to pale olive (10 Y 6/2), firm, cohesive, low apparent porosity and very low permeability, accessory constituents, phosphate granules 1-2mm (5%), coral fragments (25%).
560-560.5	Limestone, pale olive (10 Y 6/2), biomicrite, moderately hard, abundant molds and casts, abundant shell fragments (bivalves), high porosity.
560.5-562	Clay, light gray (N8), soft to firm, low apparent porosity, very low permeability.
562-570	Limestone (50%), yellowish-gray (5 Y 7/2) to light gray (N8), biomicrite, very soft, fossiliferous, abundant (20%) shell fragments (including bryozoans and bivalves), high apparent porosity. Clay (50%), yellowish-gray (5 Y 7/2), soft to firm, low apparent porosity, very low permeability.

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Depth (feet)	Lithology
570-574	Clay (70%), yellowish-gray (5 Y 7/2), soft to firm, phosphatic (flecks of phosphate), low apparent porosity and very low permeability. Limestone (30%), yellowish-gray, as above.
574-576	Clay, light greenish-gray (5 GY 8/1), soft to firm, cohesive, low apparent porosity and very low permeability. Common (30%) shell fragments (calcitic bivalves).
576-577	Limestone, yellowish-gray (5 Y 7/2), biomicrite, moderately hard, fossiliferous, phosphatic, high porosity.
577-579.5	Limestone, yellowish-gray (5 Y 8/2), to light olive-gray (5 Y 6/1), biomicrite, moderately hard, phosphatic, (flecks of phosphate throughout rock), occasional (1-2%) phosphate grains, high porosity (moldic).
579.5-581	Clay, yellowish-gray (5 y 8/1) to light olive-gray (5 Y 6/1), soft to firm, cohesive, phosphatic, flecks of phosphate, abundant (20%) phosphate granules, low apparent porosity and very low permeability.
581-585	Dolomite (90%), greenish-gray/(5 GY 6/1) microsucrosic texture, hard to moderately hard, moderate to low porosity. Clay (10%), greenish-gray (5 Y 6/1), soft to firm, low porosity.
585-589	Clay, greenish-gray (5 GY 6/1), soft to firm, cohesive, low apparent porosity and very low permeability, common (15%) phosphate granules.
589-589.5	Dolomite (90%), greenish-gray (5 GY 6/1), microsucrosic texture, hard to moderately hard, moderate to low porosity. Clay (10%), greenish-gray (5 GY 6/1), soft to firm, low porosity and very low permeability.
589.5-592	Clay, greenish-gray (5 GY 6/1), soft to firm, phosphatic, low apparent porosity and very low permeability, phosphatic.
592-597	Limestone (80%), yellowish-gray (5 Y 8/1), micrite, marly, moderately soft to moderately hard, phosphatic, fossiliferous, high apparent porosity, phosphate granules (10%), 2-5 mm

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Depth (feet)	Lithology
	size. Dolomite (10%), greenish-gray (5 GY 6/1), microsucrosic texture, hard to moderately hard, moderate porosity.
597-609	Limestone (100%), yellowish-gray (5 Y 8/1), phosphatic, biomicrite, moderately soft, phosphatic, marly, high porosity.
609-611	Limestone, light gray (N7), biomicrite, moderately hard, phosphatic, abundant shell fragments, high moldic porosity.
611-614	Limestone, very pale orange (10 YR 8/2), biomicrite, moderately hard, high moldic porosity, 1-2% phosphate granules.
614-620	Dolomite, yellowish-gray (5 Y 8/1) to light olive-gray (5 Y 6/1), crystalline texture, phosphatic, very hard, high porosity (moldic), additional constituents: phosphate (1-2%).
620-629	Limestone, yellowish-gray (5 Y 8/1), biomicrite, moderately hard, abundant molds and casts, high porosity (moldic).
629-630	Dolomite (30%), pale greenish-yellow (10 Y 8/2), microsucrosic texture, hard, moderate apparent porosity. Limestone (70%), as above.
630-635	Limestone, yellowish-gray (5 Y 8/1), biomicrite, phosphatic, moderately hard, high porosity (moldic).
635-646	Limestone (95%), light gray (N7) to greenish-gray (5 GY 6/1), biomicrite, hard, phosphatic, abundant molds and casts, high to very high moldic porosity. Calcite cement in some molds. Dolomite (~5%), olive-gray (5 Y 4/1), crystalline texture, hard, low apparent porosity.
646-654	Marl 20%,light gray (N7), soft, low apparent porosity, and very low permeability. Limestone (10%), very pale orange (10 YR 8/2), calcarenite (biosparite), moderately soft to moderately hard, phosphatic, high porosity (intergranular). Limestone (65%), light gray (N7) to greenish-gray (5 GY 6/1), moderately soft to moderately hard, calcarenite (biosparite), phosphatic, high porosity (intergranular). Dolomite (5%), olive-gray (5 Y 4/1), sucrosic, hard, moderate apparent porosity.

Continued: GEOLOGIST'S LOG OF MC-5001

Depth (feet)	Lithology
654-669	Limestone, light gray (N7) to greenish-gray (5 GY 6/1), biomicrite, moderately hard, abundant molds and casts, phosphatic, very high porosity (moldic). Limestone is partially dolomitized (flecks of brownish-gray (5 YR 4/1)).
669-670	Dolomite (10%), light olive-brown (5 Y 5/6), microsucrosic texture, very hard, phosphatic, low apparent porosity. Dolomite (90%), very pale orange (10 YR 8/2), microsucrosic texture, molds and casts, fossiliferous, phosphatic, hard, high porosity (moldic).
670-680	Dolomite (70%), very pale orange (10 YR 8/2), sucrosic, hard, with 1 mm flecks of olive-brown dolomite, as above, phosphate, good moldic porosity. Dolomite (30%), light gray (N7) to greenish-gray (5 GY 6/1), hard, microsucrosic texture, phosphatic, abundant molds and casts, high apparent porosity, softer zone from 677-680'.
680-694	Limestone, yellowish-gray (5 Y 8/1) to white (N9), biomicrite, abundant molds and casts, moderately hard, high porosity (moldic).
694-705	Limestone, very light gray (N8), biomicrite, moderately hard, slightly phosphatic, abundant molds and casts, high to very high porosity.
705-707	Limestone, very light gray (N8), calcarenite (biosparite), moderately hard, slightly phosphatic, high porosity (intergranular).
707-711	Limestone, yellowish-gray (5 Y 7/2) to grayish-orange (10 YR 7/4), calcarenite (biosparite), moderately hard, abundant molds and casts, high porosity (moldic and intergranular).
711-712	Dolomite (50%), yellowish-gray (5 Y 7/2) to pale greenish-yellow (10 Y 8/2), microsucrosic texture, very hard, low apparent porosity. Dolomite (50%), grayish-orange (10 YR 7/2), microsucrosic texture, very hard, low apparent porosity.
712-719	Sand, light greenish-gray (5 GY 8/1) to very light gray (N8), very fine grained, subangular to subrounded particles.

Continued: GEOLOGIST'S LOG OF MC-5001

Depth (feet)	Lithology
719-721	Dolomite (40%), very pale orange (10 YR 8/2) to pale yellowish-brown (10 YR 6/2), microsucrosic texture, moderately hard, moderate to high apparent porosity (moldic and intercrystalline). Dolomite (40%), yellow (10 Y 8/6), microsucrosic texture, moderately hard to hard, moderate to low apparent porosity. Clay (20%), yellowish-gray (5 Y 7/2), soft, slightly cohesive, low apparent porosity and very low permeability.
721-740	Limestone (70%), very pale orange (10 YR 8/2) calcarenite, moderately hard, high porosity (moldic). Marl (30%), very light gray (N8), soft low apparent porosity and very low permeability.
740-744	Clay (70%), very pale orange (10 YR 8/2) to yellowish-gray (5 Y 8/1), soft to firm, cohesive, low apparent porosity and very low permeability. Marl (20%), yellowish-gray (5 Y 8/2), soft, low apparent porosity. Limestone (10%), yellowish-gray (5 Y 8/1), biomicrite, soft, marly, high porosity.
744-750	Limestone, yellowish-gray (5 Y 8/1), calcarenite (very poorly cemented biosparite), sandy, moderately soft, high porosity (intergranular).
750-760	Limestone (80%), very pale orange (10 YR 8/2) to grayish-orange (10 YR 7/4), calcarenite (very poorly cemented biosparite), sandy texture, moderately soft and firm, high porosity (mostly intergranular, minor moldic). Calcite infilling molds at 755'. Abundant molds and casts from 755-760', marl (20%), light gray (N8), soft, moderate to low apparent porosity.
760-773	Limestone (80%), very pale orange (10 YR 8/2), calcarenite (poorly cemented biosparite), moderately soft, high porosity (intergranular), common (20%) shell (bivalve) fragments. Marl (20%), light gray (N8), soft, low apparent porosity permeability.
773-774	Clay, light greenish-gray (5 G 8/1), soft to firm, low apparent porosity and very low permeability.

Continued: GEOLOGIST'S LOG OF MC-5001

Depth (feet)	Lithology
774-780	Limestone (80%), very pale orange (10 YR 8/2), calcarenite, (poorly cemented biosparite) moderately soft, fossiliferous, abundant to occasional molds and casts, high porosity. Marl (20%), light gray (N8), soft, low to moderate porosity.
780-791	Limestone, very pale orange (10 YR 8/2), calcarenite (poorly cemented biosparite), moderately soft, marly, microfossils present, moderate to high porosity (intergranular).
791-793	Limestone (60%), very pale orange (10 YR 8/2), biomicrite, moderately hard, occasional molds and casts, high apparent porosity. Limestone (40%), light greenish-gray (5 G 8/1), biomicrite, moderately hard, high porosity.
793-794	Limestone, grayish-orange (10 YR 7/4), biomicrite, moderately hard, occasional molds and casts, high moldic porosity.
794-799	Limestone, very pale orange (10 YR 8/2), biomicrite, moderately hard, molds and casts common, high apparent porosity.
799-804	Limestone, very pale orange (10 YR 8/2), biomicrite, slightly more sandy than above, moderately hard, good high porosity (intergranular and moldic).
804-808	Clay (70%), marl, white (N9), soft to firm, cohesive, low apparent porosity and very low permeability. Limestone (30%) as above.
808-818	Limestone, very pale orange (10 YR 8/2), calcarenite (biosparite) texture, moderately soft to moderately hard, high porosity (intergranular and moldic).
818-819	Limestone, very pale orange (10 YR 8/2), biomicrite, moderately hard, very high apparent porosity.
819-819.5	Clay, very pale orange (10 YR 8/2) to pale yellowish-brown (10 YR 6/2), soft to firm, cohesive, low apparent porosity and very low permeability.

Continued: GEOLOGIST'S LOG OF MC-5001

Depth (feet)	Lithology
819.5-820	Limestone, pale yellowish-brown (10 YR 6/2), calcarenite, (biosparite), moderately soft, high apparent intergranular porosity.
820-835	Limestone (70%), pale yellowish-brown (10 YR 6/2), biomicrite, calcarenitic texture, moderately hard to moderately soft, high porosity (intergranular). Limestone (30%), very pale orange (10 YR 8/2), biomicrite, marly, moderately soft, high intergranular porosity.
835-835.5	Clay (50%), grayish-brown, soft, low apparent porosity and very low permeability, phosphate (50%).
835.5-838	Limestone (70%), pale yellowish-brown (10 YR 6/2), biomicrite (calcarenitic texture), moderately hard, high intergranular porosity. Limestone (30%), very pale orange (10 YR 8/2), biomicrite, marly, moderately soft, high apparent porosity.
838-847	Limestone, yellowish-gray (5 Y 8/1) to light gray (N7), calcarenite, moderately soft, high porosity (intergranular).
847-848	Clay (50%), olive-gray (5 Y 4/1), soft, low apparent porosity and very low permeability. Limestone (50%), yellowish-gray (as above).
848-852	Limestone, yellowish-gray (5 Y 8/1) to olive-gray (5 Y 4/1), biomicrite, abundant foraminifera, moderately hard, high apparent porosity.
852-860	Limestone, light greenish-gray (5 GY 8/1), to light olive-gray (5 Y 6/1), calcarenite (biosparite), moderately soft to moderately hard, very high intergranular porosity.
860-861	Limestone, yellowish-gray (5 Y 8/1), micrite, sandy, moderately soft to moderately hard, high porosity (intergranular).
861-862	Clay (60%), very pale orange (10 YR 8/2), soft to firm, low apparent porosity and very low permeability. Clay (40%), dark yellowish-brown (10 YR 4/2), soft, low apparent porosity.

Continued: GEOLOGIST'S LOG OF MC-5001

Depth (feet)	Lithology
862-866	Limestone, olive-gray (5 Y 6/1), biomicrite, sandy, moderately hard, high porosity.
866-874	Limestone, yellowish-gray (5 Y 8/1), biomicrite, sandy (quartz), marly, moderately hard to moderately soft, high porosity.
874-875	Limestone, pale yellowish-brown (10 YR 6/2), biomicrite, slightly sandy (quartz), moderately soft to moderately hard, high apparent porosity.
875-880	Limestone, yellowish-gray (5 Y 8/1), calcarenite (biosparite), moderately hard, microfossils present, very high intergranular porosity.
880-885	Limestone, yellowish-gray (5 Y 8/1) to light gray (N7), calcarenite (biosparite/packed biomicrite), marly, moderately soft, high apparent intergranular porosity.
885-890	Dolomite, light olive-gray (5 Y 6/1), microsucrosic texture, very hard, moderate porosity. Clay (2%) at 890'. Clay is dark greenish-gray (5 GY 4/1), firm, low apparent porosity and very low permeability.
890-893	Dolomite, pale yellowish-brown (10 YR 6/2), microsucrosic texture, very hard, moderate to low apparent porosity.
893-894	Clay, very light gray (N8), soft to firm, low apparent porosity and very low permeability.
894-900	Limestone, yellowish-gray (5 Y 8/1), calcarenite (poorly cemented biosparite), moderately soft to moderately hard, high porosity (intergranular).
900-908	Limestone, pale yellowish-brown (10 YR 6/2), calcarenite (poorly cemented biosparite), moderately soft, phosphatic, occasional molds and casts, very high intergranular porosity. Molds and casts are abundant from 906' to 908'.

Continued: GEOLOGIST'S LOG OF MC-5001

Depth (feet)	Lithology
908-910	Limestone, pale yellowish-brown (10 YR 6/2) to light gray (N7), biomicrite, slightly sandy, moderately hard, abundant molds and casts, phosphatic, high porosity (moldic)..
910-917	Limestone (95%), pale yellowish-brown (10 YR 6/2), calcarenite (poorly cemented biosparite), moderately soft, slightly phosphatic, occasional molds and casts (10%), high porosity (intergranular). Clay (5%), dark greenish-gray (5 GY 4/1), partially lithified, moderately soft, low apparent porosity and very low permeability.
917-917.5	Sand, pale yellowish brown (10 YR 6/2), quartz, very fine grained, subangular to subrounded particles.
917.5-920	Limestone, pale yellowish-brown (10 YR 6/2), calcarenite (poorly cemented biosparite), moderately soft, phosphatic, high porosity (intergranular).
920-927	Sand (80%), pale yellowish-brown (10 YR 6/2), predominantly quartz, very fine grained, subangular to subrounded particles, unconsolidated, phosphatic. Limestone (20%), pale yellowish-brown (10 YR 6/2), calcarenite (poorly cemented biosparite), moderately soft, phosphatic, high intergranular porosity.

GEOLOGIST'S LOG OF MC-5002

Depth (ft)	Lithology
0-3.5	Sand, pale yellowish brown (10 YR 6/2), quartz, fine-grained, unfossiliferous.
3.5-11	Limestone, mostly yellowish gray (5 Y 7/2 to 5 Y 8/2) with some dark yellowish brown (10 YR 6/6) iron oxide surface staining, texturally variable (biomicrite and biosparite). Fossils include mollusks and corals (including Montastrea annularis), which commonly have a chalk appearance and are very soft.
11-15	Limestone, yellowish gray (5 Y 7/2) with moderate olive brown (5 Y 4/4) to olive gray (5 Y 3/2) iron oxide surface staining, biosparite, hard, high porosity. Minor (several percent) fine-grained, quartz Sand. Fossils include chalky appearing mollusk fragments, corals are less abundant than above.
15-20	Limestone, yellowish gray (5 Y 7/2), with moderate olive brown (5 Y 4/4) to olive gray (5 Y 3/2) iron oxide surface staining from 15-17, biosparite, hard, high porosity, very high permeability, major loss of mud circulation at about 17'. Minor (several percent) fine-grained quartz Sand. Minor large, diagenetically altered aragonitic mollusk fragments, common molds after small bivalves.
20-34	Limestone, yellowish gray (5 Y 7/2) to very pale orange (10 YR 8/2), biosparite, hard, moderate to high porosity including common molds after aragonitic mollusk shells. Minor (several percent) fine-grained quartz Sand.
34-40	Limestone, medium light gray (N6) to light olive gray (5 Y 6/1), biosparite, moderate hardness, moderate to high porosity, including common molds after aragonitic mollusk shells. Minor (several percent) very fine to fine-grained quartz sand.
40-50	Limestone, yellowish gray (5 Y 7/2), biosparite, moderate hardness, moderate to high porosity including common molds after aragonitic mollusk shells. Minor (several percent) very fine to fine-grained quartz sand. Limestone consists of abundant large fossils (mollusks) in a carbonate sand matrix.

GEOLOGISTS LOG OF MC-5002

Depth (feet)	Lithology
50-55	Limestone, yellowish gray (5 Y 7/2), biosparite, moderate hardness (somewhat softer than above), moderate to high porosity including common molds after aragonitic mollusk shells. Minor (several percent) very fine to fine-grained quartz sand. Limestone consists of abundant large fossils (mollusks) in a carbonate sand matrix.
55-60	Limestone, yellowish gray (5 Y 7/2), biopelsparite, soft (generally semifriable), moderate to high porosity, finer grained (fine to medium-grained) than overlying limestone. Minor (several percent) very fine to fine-grained quartz sand. Common calcitic mollusk shells.
60-75	Limestone, yellowish gray (5 Y 7/2 to 5 Y 6/2), biopelsparite, soft (generally semifriable), moderate to high porosity. Minor (several percent) very fine to fine-grained quartz sand. Minor (1%) calcitic mollusk shells.
75-80	Limestone (Coquina?), interval with extremely abundant fossils, thin-shelled calcite mollusk and minor bryozoans. Swift, rapid drilling rate. Matrix, if any, is carbonate Sand, no clay fragments were recovered. Minor phosphate.
80-85	Limestone, yellowish gray (5 Y 8/1 to 5 Y 7/2), biosparite, hard, moderate to high visible porosity (intergranular and moldic after aragonitic mollusks), minor (2-5%) quartz and (1-2%) very fine to fine sand-sized phosphate grains. Some large calcitic bivalves and internal casts of gastropods.
85-110	Limestone, biosparite, hard, yellowish gray (5 Y 8/1 to 5 Y 7/2), minor (2-5%) quartz (several and (1-2%) very fine to fine Sand-sized quartz phosphate grains. Some large calcitic bivalves and internal casts of gastropods, moderate to high visible porosity, intergranular and moldic after aragonitic mollusks. Minor (1-2%) glauconite from 100-110'.
110-125	Limestone, yellowish gray (5 Y 8/1), slightly lighter colored than overlying limestone, biosparite, hard, moderate to high visible intergranular porosity, common quartz (3-10%), trace (< 1%) phosphate. Some large calcitic bivalves and internal casts of gastropods.

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Depth (feet)	Lithology
125-135	Limestone, yellowish gray (5 Y 8/1), quartz biosparite, hard, moderate to high visible porosity, 10-20+% very fine to fine-grained quartz, Minor medium gray (N5) to medium olive gray (5 Y 7/1) biomicrite.
135-160	Sandstone, yellowish gray (5 Y 8/1), quartz and less abundant carbonate grains, fine-grained, fossiliferous, hard (not friable), moderate porosity, common calcitic bivalves. Trace phosphate grains, mostly silt and very fine sand-sized.
160-180	Sandstone, moderate olive brown (5 Y 4/4) and yellowish gray (5 Y 7/2), quartz, fine-grained, muddy, fossiliferous, calcite-cemented, moderate hardness and porosity. Fossils consist mostly of large bivalves.
180-200	Sandstone, yellowish gray (5 Y 7/2) and/to light olive gray (5 Y 5/2), quartz, fine-grained, muddy, fossiliferous, calcite-cemented, moderate hardness and porosity. Fossils consist mostly of large bivalves.
200-252	Sand, yellowish gray (5 Y 7/2 to 5 Y 6/2), quartz and less abundant carbonate grains, very fine to fine-grained, trace very-fine grained phosphate grains. Sand predominantly produced during drilling, few large cuttings.
252-270	Limestone, grayish orange (10 YR 7/4 to 10 YR 7/6), biosparite, hard, high visible intergranular and moldic porosity, minor sand-sized phosphate grains. Limestone consists of large fossils (bivalves, gastropods and minor bryozoans) in a carbonate sand matrix.
255-270	Limestone, biosparite, hard, High visible intergranular and moldic porosity, grayish orange (10 YR 7/4 to 10 YR 7/6). Large fossils (bivalves, gastropods and minor bryozoans) in a carbonate Sand matrix. Minor sand-sized phosphate grains. At 264' some white (N9) to yellowish gray (5 Y 8/1) biomicrite cuttings.
270-278	Limestone, grayish orange (10 YR 7/4 to 10 YR 7/6) to yellowish gray (5 Y 7/2), predominantly biosparite, hard, moderate to high visible intergranular and moldic porosity.

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Depth (feet)	Lithology
	Limestone consists of large fossils (bivalves and minor bryozoans) in a carbonate sand matrix. Some coarse shelly fragments have a very high moldic porosity.
278-300	Clay, very pale yellowish gray (5 Y 8/2) to pale greenish yellow (10 Y 8/2) and greenish gray (5 GY 6/1), subsidiary amounts of silt and very fine sand-sized quartz grains, soft, very low permeability, minor phosphate. Minor (5-10%) sandstone, yellowish gray (5 Y 7/2), quartz, fine-grained, and limestone, yellowish gray (5 Y 7/2), quartz biomicrite.
300-310	Clay, yellowish gray (5 Y 7/2) to pale greenish yellow (10 Y 7/2) and pale yellowish gray (5 Y 8/2) and pale greenish yellow (10 Y 8/2), abundant silt and fine sand-sized quartz, soft, very low permeability. Minor (1-3%) sand-sized phosphate grains.
310-318	Clay, greenish gray (5 GY 6/1 to 5 GY 5/1), abundant silt and fine sand-sized quartz and common medium sand-sized and coarser quartz grains, soft, very low permeability. Minor (1-3%) sand-sized phosphate grains.
318-335	Clay, pale olive (10 Y 6/2) and yellowish gray (5 Y 8/1 to 5 Y 7/2), subsidiary amounts of silt and fine sand-sized quartz, soft, very low permeability, minor (1-3%) sand-sized phosphate grains. Common medium sand-sized and coarser quartz grains from about 333' to 335'
335-340	Clay, greenish gray (5 GY 6/1 to 5 GY 5/1), relatively little quartz silt and sand, soft, very low permeability. Minor (1-3%) very fine and fine sand-sized phosphate grains. Very minor limestone, yellowish gray (5 Y 7/2), packed biomicrite, high moldic porosity after aragonitic mollusks,.
340-365	Clay, pale olive (10 YR 6/2) and less commonly greenish gray (5 Y 5/1 to 5 Y 6/1), subsidiary amounts of silt and very fine-grained quartz sand, soft, very low permeability. Minor (1-3%) very fine and fine sand-sized phosphate grains.
365-394	Clay, pale olive (10 YR 6/2) to greenish gray (5 Y 6/1 to 5 Y 5/1), subsidiary amounts of silt and very fine-grained quartz

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Depth (feet)	Lithology
	sand, soft, very low permeability. Common (3-5%) very fine sand to granule-sized phosphate grains. Phosphate concentration is significantly higher than in overlying clay.
394-403	Limestone, very light gray (N8), biosparite to packed biomicrite, hard, non-friable, moderate visible intergranular porosity, minor (1-2%) silt and very fine sand-sized phosphate grains. Minor (0-5%) very fine-grained quartz. Abundant mollusk fragments, mostly calcitic bivalves.
403-414	Limestone, yellowish-gray (5 Y 7/2) to pale greenish-yellow (10 Y 8/2), biomicrite, slightly sandy, moderately soft to moderately hard, phosphatic, abundant (50%) shell fragments (bivalves), common (5-10%) phosphate grains, high porosity (moldic).
414-415	Limestone, light gray (N7), biomicrite, moderately soft to moderately hard, phosphatic, high moldic porosity, trace 1 mm phosphate grains.
415-417	Dolomite, pale olive (10 Y 6/2), microsucrosic, hard, phosphatic, trace sand-sized phosphate grains, high apparent porosity, moderate to low permeability, ~30% shell mixed with dolomite at 417'.
417-427	Limestone, very light gray (N8) to white (N9), biomicrite, moderately soft to moderately hard, phosphatic, abundant shell (bivalve) and coral fragments, high porosity (moldic).
427-430	Limestone, yellowish-gray (5 Y 7/2), biocalcarenite (biosparite), moderately soft, phosphatic, abundant fossils (including echinoderm and coral fragments), high porosity (moldic).
430-432	Limestone, white (N9), biomicrite, sandy, moderately soft, phosphatic, abundant shell (30%), high porosity (moldic).
432-435	Limestone, white (N9), biomicrite, moderately soft, phosphatic, abundant (30%) shell fragments, high porosity (moldic).

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Depth (feet)	Lithology
435-440	Limestone, white (N9), biomicrite, slightly sandy (quartz), moderately hard, phosphatic, abundant shell fragments (bivalves and foraminifera), very high moldic porosity.
440-447	Limestone, yellowish-gray (5 Y 7/2), biomicrite, moderately hard, phosphatic, very high moldic porosity.
447-453	Limestone, very light gray (N8), biomicrite, moderately hard to hard, phosphatic, high to very high moldic porosity. Sand (quartz) concentration increases below 452'.
453-459	Limestone, yellowish-gray (5 Y 7/2), biomicrite, sandy, hard, phosphatic, high moldic porosity.
459-461	Limestone, yellowish-gray (5 Y 7/2), calcarenite (poorly cemented biosparite), hard, phosphatic, abundant (30%) shell fragments, high porosity (intergranular moldic).
461-474	Limestone, yellowish-gray (5 Y 7/2) to dusky yellow (5 Y 6/4), calcarenite (poorly cemented biosparite), moderate soft, phosphatic, high porosity (intergranular). Fossil abundance decreased from 471 to 474 feet.
474-475	Limestone, yellowish-gray (5 Y 7/2) to pale olive (10 Y 6/2), calcarenite (poorly cemented biosparite), moderately soft, phosphatic, , abundant coral fragments, high apparent intergranular and moldic porosity.
475-478	Limestone (90%), yellowish-gray to pale olive, as above. Clay (10%), pale olive (10 Y 6/2), partially lithified, stiff, low apparent porosity, very low permeability.
478-481	Limestone, yellowish-gray (5 Y 7/2) to pale olive (10 Y 6/2), calcarenite (poorly cemented biopelsparite, moderately soft, high good intergranular and moldic porosity.
481-492	Limestone, yellowish gray (5 Y 7/2 - 5 Y 8/1), biopelsparite, moderate hardness, moderate to high porosity, mostly intergranular, much less abundantly moldic after aragonitic bivalves. Minor (1-2%) very fine sand-sized phosphate grains. Limestone consists predominantly of fine-grained

GEOLOGISTS LOG OF MC-5002

Depth (feet)	Lithology
	carbonate sands with sparse larger (millimeter-sized) fossil fragments, including bivalves and gastropods.
492-500	Limestone, very pale olive (10 Y 7/2 to 10 Y 7/4) and yellowish gray (5 Y 7/2), biosparite, moderate hardness, high porosity, mostly intergranular, much less abundantly moldic after aragonitic bivalves. Minor (1-2%) very fine sand-sized phosphate grains. Calcitic fossil fragments (bivalves and bryozoans) are much more abundant than in overlying limestone (10%). Minor very pale orange (10 YR 8/2) packed biomicrite was encountered at about 492 feet.
500-505	Marl, yellowish gray (5 Y 7/2) to very pale olive (10 Y 6/2), abundant very fine to fine-grained sand (carbonate), soft, very low permeability, common (10%) large fossil fragments (calcitic bivalves and bryozoans), 2-4% sand-sized phosphate grains, trace granule-sized phosphate grains.
505-509	Limestone, yellowish gray (5 Y 8/1), packed biomicrite and less abundantly biosparite (calcarenite), moderate hardness, moderate porosity, larger fossils include calcitic bivalves and casts of gastropods, 1-3% very fine to fine-grained phosphate grains.
509-511	Marl, pale olive (10 Y 6/2), fossiliferous (calcitic bivalves), soft, abundant carbonate sand, very low permeability.
511-513	Limestone, dolomite, and marl (subequal abundances). Limestone: yellowish gray (5 Y 8/1), packed biomicrite and less abundantly biosparite, moderate hardness, moderate porosity. Dolomite: yellowish gray (5 Y 7/2), microsucrosic. Marl, dusky yellowish green (5 GY 5/2), silty, fossiliferous (calcitic bivalves), soft, very low permeability.
513-517	Clay, dusky yellowish green (5 GY 5/2), silty, fossiliferous (calcitic bivalves), soft, very low permeability, 1-2% very coarse sand to granule-sized phosphate grains.
517-523	Marl, pale olive (10 YR 6/2) to yellowish gray (5 Y 7/2), abundant very fine-grained quartz and carbonate sand (may

GEOLOGISTS LOG OF MC-5002

Depth (feet)	Lithology
	be more of a muddy sand), fossiliferous (calcitic bivalves), 2-4% very fine sand-sized and trace very coarse sand to granule-sized phosphate grains. Minor (<10%) limestone, yellowish gray (5 Y 8/1) biosparite.
523-525	Limestone, very pale orange (10 YR 8/2) to yellowish gray (5 Y 8/1), biosparite (calcarenite) and packed biomicrite, hard, low to moderate porosity (moldic after aragonitic fossils), 2-3% very fine to fine-grained phosphate. Large (millimeter-sized) fossil fragments include echinoderms and calcitic bivalves.
525-530	Limestone, very pale orange (10 YR 8/2) to yellowish gray (5 Y 8/1), packed biomicrite, hard, moderate porosity (moldic after aragonitc fossils), 2-3% very fine to fine-grained phosphate. Large (millimeter-sized) fossil fragments include echinoderms and calcitic bivalves. Matrix has a silty appearance.
530-535	Limestone, yellowish gray (5 Y 8/1), packed biomicrite (abundant mollusks) and minor (5-10%) biosparite, hard, low porosity. Minor dolomite, light olive gray (5 Y 6/1) at about 530 feet and 532-535 feet, which occurs as a microcrystalline replacement of the micrite matrix. Aragonite mollusk shells are consist of neomorphic and/or cement calcite.
535-542	Limestone, yellowish gray (5 Y 8/1), packed biomicrite and minor (5-10%) biosparite, hard, moderate porosity, fossil include: calcitic bivalves, and molds and casts or aragonitic bivalves and gastropods. Minor (1-2%) sand-sized phosphate grains.
542-546.5	Limestone, yellowish gray (5 Y 8/1) to very pale orange (10 YR 8/2), poorly cemented biosparite (calcarenite), soft, friable, moderate porosity and permeability, 1-3% sand-sized phosphate. Large fossils include bivalves, echinoid spines, and bryozoan fragments. The limestone from 545-546.5 feet is very poorly lithified or unlithified.
546.5-549.5	Dolomite, yellowish gray (5 Y 7/2), microsucrosic, fossiliferous, hard, moderate to high porosity (moldic after

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Depth (feet)	Lithology
	aragonitic fossils) and intercrystalline. Dolomite contains some unreplaced calcite.
549.5-552	Limestone, yellowish gray (5 Y 8/1), packed biomicrite, hard, moderate porosity (mostly moldic after aragonitic bivalves, minor large calcitic bivalve fragments, 1-2% sand-sized phosphate.
552-559	Limestone, very light olive gray (5 Y 7/1) to very pale orange (10 YR 8/2), poorly cemented biosparite (calcarenite), soft, friable, moderate porosity, 5-8% very fine sand-sized phosphate.
559-560	Dolomite, yellowish gray (5 Y 7/2), microsucrosic, fossiliferous, hard, moderate to high porosity (moldic after aragonitic fossils) and intercrystalline. Dolomite contains some unreplaced calcite.
560-562	Marl, yellowish gray (5 Y 8/1), sandy (carbonate), very soft.
562-565	Limestone, yellowish gray (5 Y 7/2), poorly cemented biopelsparite (calcarenite), fine-grained, soft, friable, high porosity, trace phosphate, large fossil fragments are sparse.
565-569	Limestone, very pale orange (10 YR 8/2) to yellowish gray (5 Y 8/1), packed biomicrite, hard, moderate porosity (moldic after aragonitic mollusks), 1-2% sand-sized phosphate. Fossils include formerly aragonitic mollusks, calcitic bivalves, and bryozoans.
569-579	Limestone, yellowish gray (5 Y 7/2), biosparite (calcarenite), soft to moderately hard, semi-friable, moderate to high porosity, 5-10% sand-sized phosphate. Limestone consists of large (millimeter and greater-sized) bivalves and bryozoans in a fine-grained carbonate sand matrix.
579-582.5	Marl, yellowish gray (5 Y 7/2) to very pale olive (10 Y 7/2), sandy (calcareous), fossiliferous (bivalves and bryozoans), soft, 5-10% very fine to fine sand-sized phosphate.

GEOLOGISTS LOG OF MC-5002

Depth (feet)	Lithology
582.5-588	Sandstone, light to medium olive gray (5 Y 5/2 to 5 Y 4/2), very fine to fine-grained, soft, semifriable, moderate porosity, minor fossils (calcitic bivalves and bryozoans), very mild reaction to hydrochloric acid.
588-590	Clay, dark olive gray (10 Y 3/2) and some light to medium olive gray (5 Y 6/1 to 5 Y 5/1), abundant quartz silt, soft, fossiliferous (calcitic bivalves), 5-10% silt to granule-sized phosphate grains.
590-595	Clay, yellowish gray (5 Y 7/2), abundant quartz silt, soft, fossiliferous (calcitic bivalves and echnoids), 5-10% silt to granule-sized phosphate grains. Approximately 10% limestone from 592-595 feet, yellowish gray (5 Y 8/1 to 5 Y 7/2), biopelmicrite to biopelsparite.
595-600	Clay, yellowish gray (5 Y 8/1, abundant quartz silt, fossiliferous (calcitic bivalves and echnoids), 5% silt to granule-sized phosphate grains.
600-605	Dolomite, light olive gray (5 Y 5/2) to yellowish gray (5 Y 7/2), microsucrosic, very hard, dense, low to moderate porosity (some vuggy pores), phosphate is abundant (10-20%) from 600-601, where it occurs as same sized grains and millimeter-sized concretions. Common (5%) unreplaced calcitic bivalves.
605-609.5	Limestone, yellowish gray (5 Y 8/1), poorly cemented biopelsparite (calcarenite), fine-grained, soft to moderately hard, semifriable, moderate porosity (intergranular), common granular sized phosphate grains and fragments of larger nodules/layers, 2-5% large fossil fragments including calcitic bivalves, bryozoans and echinoderms.
609.5-614.5	Marl, yellowish gray (5 Y 8/1), abundant silt and very fine sand-sized quartz, soft, 1-2% very fine to fine sand and trace granule-sized phosphate, minor large fossils (bryozoans and bivalves).
614.5-630	Limestone, yellowish gray (5 Y 7/2 to 5 Y 8/2), poorly cemented biopelsparite (calcarenite), soft, friable, high

GEOLOGISTS LOG OF MC-5002

Depth (feet)	Lithology
	porosity, minor large fossils (bryozoans), trace sand-sized phosphate.
633-636	Marl, yellowish gray (5 Y 8/1), fossiliferous (bivalves), unlithified, plastically deformable, 1-2% sand-sized phosphate. Appears to contain abundant silt to very fine sand-sized peloids.
636-639	Limestone, yellowish gray (5 Y 8/1, packed biomicrite to biosparite, hard, low to moderate porosity, common large fossils (calcitic bivalves), 1-3% sand-sized phosphate. Some (trace) cuttings contain more than 50% phosphate.
639-651	Marl, yellowish gray (5 Y 7/2) to pale olive (10 Y 6/2), fossiliferous (bryozoans and bivalves), soft, trace phosphate. Contains abundant silt to very fine sand-sized quartz.
651-655	Marl, light yellowish gray (5 Y 9/1) and yellowish gray (5 Y 8/1 to N8), fossiliferous (bryozoans and bivalves), soft, trace phosphate. Contains abundant silt to very fine sand-sized quartz.
655-660	Marl, yellowish gray (5 Y 7/2) to very pale olive (10 Y 7/2), fossiliferous (bryozoans and bivalves), soft, trace phosphate. Contains abundant silt to very fine sand-sized quartz.
660-662	Clay/marl, greenish gray (5 GY 6/1), fossiliferous (bryozoans and bivalves), soft, trace very coarse sand to granule-sized phosphate. Contains abundant silt to very fine sand-sized quartz.
662-665	Clay/marl, yellowish gray (5 Y 7/2) to very pale olive (10 Y 7/2) to very pale greenish gray (5 GY 7/1), fossiliferous (bryozoans and minor bivalves), soft, trace very coarse sand to granule-sized phosphate. Contains abundant silt to very fine sand-sized peloids. Mild hydrochloric acid reaction.
665-667	Clay, very pale greenish gray (5 GY 7/1), minor fossils (bryozoans), soft, trace phosphate. More cohesive (clayey) than marl at 662-665 feet. Contains abundant silt to very fine sand-sized peloids.

GEOLOGISTS LOG OF MC-5002

Depth (feet)	Lithology
667-669	Marl, pale olive (10 Y 6/2), minor fossils (bryozoans), soft. Minor siltstone-very fine-grained sandstone, pale olive (10 Y 6/2), poorly cemented, friable.
669-670	Marl, very pale yellowish gray (5 Y 8/1), fossiliferous (bryozoans), very low volume of coarse cuttings.
670-671.5	Limestone, yellowish gray (5 Y 8/1) to very pale orange (10 YR 8/2), biosparite (calcarenite), moderate hardness, high porosity, abundant large fossil fragments (calcitic bivalves and bryozoans), 2-3% phosphate fragments and granules.
671.5-676.5	Dolomite and marl Dolomite: medium olive gray (5 Y 5/1 and 5 Y 4/1), microsucrosic, very hard, low porosity, replacement of micrite. Marl: yellowish gray (5 Y 8/1), silty, soft, 5% phosphate.
676.5-678.5	Dolomite, pale to medium olive (10 Y 6/2 to 10 Y 5/2), microsucrosic, hard, high porosity, trace phosphate.
678.5-679.5	Marl, pale olive (10 Y 6/2), silty, soft, minor bivalve fragments, 1-3% very coarse sand to granule-sized phosphate grains.
679.5-683.5	Dolomite, pale olive (10 Y 6/2), microsucrosic, very hard, moderate to high porosity (mostly intercrystalline), 1-2% sand to granule-sized phosphate, 2-3% white calcitic shell fragments.
683.5-684.5	Marl, fossiliferous, very little recovery.
684.5-693.5	Limestone, yellowish gray (5 Y 8/1), poorly cemented biosparite, variable hardness, moderate to high porosity, minor bivalves, 1-5% sand-sized phosphate (abundance is variable).
693.5-694.5	Limestone, dolomite, and marl (minor). Limestone: yellowish gray (5 Y 8/1) packed biomicrite to biosparite (calcarenite). Dolomite, very pale olive to pale olive (10 Y 7/2 to 10 Y 6/2), microsucrosic. Marl, yellowish gray (5 Y 8/1), soft.

GEOLOGISTS LOG OF MC-5002

Depth (feet)	Lithology
694.5-717	Limestone, yellowish gray (5 Y 8/1), poorly cemented biopelsparite, fine to medium-grained, soft (friable) to moderately hard (variable), high porosity, very minor large fossils (bivalves and bryozoans), only trace phosphate.
717-722	Limestone, yellowish gray (5 Y 7/2), biopelmicrite/sparite, hard to moderately hard, low to moderate porosity, 1-2% sand-sized phosphate. Darker and more phosphatic than overlying limestone.
722-725	Limestone, yellowish gray (5 Y 8/1), biopelsparite (calcarenite), fine-grained, moderate hardness, moderate porosity, trace (< 1%) sand-sized phosphate. Trace (1%) large fossils (bivalves).
725-728	Limestone, yellowish gray (5 Y 8/1), biopelmicrite, moderate hardness, moderate porosity (moldic after aragonitic mollusks).
728-734	Limestone, light gray (N8) to yellowish gray (5 Y 8/1), biosparite, fine to medium-grained, 5% quartz, hard, moderate porosity, trace phosphate. Some moldic pores after aragonitic mollusks from 730-734 feet.
734-742	Limestone, yellowish gray (5 Y 8/1), biopelsparite, hard, moderate porosity, trace phosphate and minor large (millimeter-sized) fossils (bivalves). Minor (10%) dolomite, pale olive (10 Y 6/2), microsucrosic, most common 738-740 feet.
742-755	Limestone, yellowish gray (5 Y 8/1), packed biomicrite, hard, low porosity (moldic after aragonitic fossils), 2-5% skeletal phosphate grains. Large fossils include: calcitic bivalves, casts and molds of aragonitic bivalves and gastropods, neomorphosed and/or cement-filled molds of aragonitic mollusks, and corals from 754-755.
755-758	Limestone, very pale orange (10 YR 8/2), coral, neomorphosed, hard, very low porosity in cuttings. There could still be a high "intercoral" porosity in this interval.

GEOLOGISTS LOG OF MC-5002

Depth (feet)	Lithology
758-762	Limestone, very light olive gray (5 Y 7/1), biopelsparite (calcarenite), fine-grained carbonate sand with minor larger fossil fragments, moderate hardness, high porosity, 1-5% phosphate (skeletal fragments and black grains). Larger fossil include: molds of aragonitic bivalves and gastropods, calcitic bivalves, and echnoids.
762-799.5	Limestone, yellowish gray (5 Y 8/1), biopelsparite and possible minor (<5%) biomicrite, fine to medium-grained carbonate sand with some (< 10%) larger fossils, moderately hard to hard (variable), moderate porosity (moldic and intergranular), trace very fine-grained phosphate sand. Fossils include calcitic bivalves, echinoderms, foraminifera, mollusk casts and molds, and neomorphosed and/or cement-filled molds of aragonitic mollusks.
799.5-800	Limestone, very light olive gray (5 Y 7/1) to light gray (N7). quartz biopelmicrite/sparite, abundant very fine to fine-grained quartz sand.
800-808.5	Dolomite, pale yellowish brown (10 YR 6/2) to very light olive gray (5 Y 6/2) to yellowish gray (5 Y 7/2), dense, microsucrosic, extremely hard, no visible porosity, structureless, no ghosts of precursor.
808.5-814.5	Dolomite, light olive gray (5 Y 5/2) to (5 Y 6/2), microsucrosic, replacement of fossiliferous limestone, very hard, low to moderate porosity (moldic and ?vuggy).
814.5-817	Limestone, light olive gray (5 Y 5/2), biomicrite/sparite, very fine to fine-grained, soft to moderately hard, low to moderate porosity. Limestone appears to consist of sand grains in a marly/clayey matrix.
817-818.5	Limestone, yellowish gray (5 Y 7/2), poorly cemented biopelsparite (calcarenite), very fine to fine-grained, soft to moderately hard, moderate to high porosity, minor calcitic fossil fragments.
818.5-822	Limestone, yellowish gray (5 Y 8/1), poorly cemented biopelsparite, very fine to fine-grained, soft to moderately hard

GEOLOGISTS LOG OF MC-5002

Depth (feet)	Lithology
	(semi-friable), high porosity (intergranular and minor moldic after aragonitic fossils), large fossil fragments were not observed. Marl encountered in the 818.5 to 819.5 interval.
822-825	Limestone, yellowish gray (5 Y 8/1), biopelsparite/micrite (calcarenite), hard (not friable), moderate porosity (intergranular and minor moldic after aragonitic fossils). Large (millimeter-sized fossil fragments are common and include calcitic bivalves and molds and casts of aragonitic bivalves and gastropods.
825-829.5	Dolomite, light olive gray (5 Y 5/2), microsucrosic, very hard, low porosity, sandy appearance. This dolomite formed by replacement of carbonate sand.
829.5-832.5	Sand, yellowish gray (5 Y 7/2 to 5 Y 8/1), very fine to fine-grained quartz, minor marl at 829.5.
832.5-840	Limestone, very pale yellowish brown (10 YR 7/2), quartz biomicrite, 30+% quartz sand, approaches a sandstone composition, hard, low to moderate porosity.
840-843	Limestone (70%) and sandstone (30%) Limestone: very pale yellowish brown (10 YR 7/2), quartz biomicrite/biosparite, 30+% quartz sand, hard, moderate porosity, identifiable fossils includes mollusks. Sandstone: light olive gray (10 YR 6/2) to medium light gray (N6) and very pale yellowish brown (10 YR 7/2), calcareous, fine-grained, fossiliferous, hard, low to moderate porosity (moldic after aragonitic fossils).
843-854	Limestone, very pale yellowish brown (10 YR 7/2), poorly cemented biopelsparite (calcarenite), soft (semifriable), high porosity (intergranular and moldic), fossils include bivalves and 1-2 millimeter-sized foraminifera. Minor (<5%) micritic lithologies are present that are hard and lower porosities.
854-860	Sand, light olive gray (5 Y 6/1), very fine to fine-grained quartz, 2-3% black phosphate sand grains.

GEOLOGIST'S LOG OF MC-5004

Depth (ft)	Lithology
0-3	Sand, grayish-orange (10 YR 7/4), quartz, very fine grained, subangular to subrounded, phosphatic, abundant (30%) shell fragments.
3-5	Shell (60%), numerous gastropods and bivalves. Sand (40%), very pale orange (10 YR 8/2), quartz, very fine to fine grained, subangular to subrounded particles.
5-10	Limestone, grayish-orange (10 YR 7/4) to very pale orange, (10 YR 8/2), biosparite (poorly cemented), abundant quartz, moderately hard, very fossiliferous, abundant shell (50%), high intergranular and moldic porosity. Fossils include mollusks and corals.
10-15	Limestone, grayish-orange (10 YR 7/4) to very pale orange (10 YR 8/2), biocalcarenite (biosparite), sandy (quartz), moderately hard, abundant fossils (50%), very high moldic porosity after aragonitic fossils. Fossils include gastropod, bivalves, and corals.
15-19	Limestone, grayish-orange (10 YR 7/4), biocalcarenite (biosparite), moderately hard, fossiliferous, very high moldic porosity.
19-20	Limestone, yellowish-gray (5 Y 8/1), calcarenite (biosparite), phosphatic, moderately hard, very fossiliferous, very high apparent moldic porosity. Fossils include bivalves, gastropods, and corals.
20-27	Limestone, yellowish-gray (5 Y 8/1), biomicrite, hard, fossiliferous, sandy, hard, phosphatic, very high to excellent moldic porosity. Fossils include bivalves, gastropods and corals.
27-32	Limestone, yellowish-gray (5 Y 8/1) to light gray (N7), biomicrite, sandy, phosphatic, moderately hard, fossiliferous, very high moldic porosity.
32-37	Limestone, light gray (N7), biomicrite, sandy (quartz), very hard, fossiliferous, phosphatic, very high apparent porosity.
37-42	Limestone, yellowish-gray (5 Y 8/1) to medium light gray (N6), biomicrite, moderately hard, fossiliferous, phosphatic, high moldic porosity. Common small bivalves and coral fragments.
42-44	Limestone, medium light gray (N6), biomicrite, fossiliferous, moderately soft to moderately hard, phosphatic, occasional quartz grains, very high moldic porosity.

Continued: GEOLOGIST'S LOG OF MC-5004

Depth (feet)	Lithology
44-60	Limestone, yellowish-gray (5 Y 8/1), to medium light gray, (N6), biomicrite, moderately hard, fossiliferous, phosphatic, very high moldic porosity. Fossils include coral fragments, echinoid spines, and mollusk fragments. Minor quartz sand.
60-72	Limestone, pale yellowish-brown (10 YR 6/2), biomicrite, sandy (quartz), moderately hard, abundant medium light gray (N6) molds and casts, very high apparent moldic porosity.
72-80	Clay (50%), yellowish-gray (5 Y 8/1), to light greenish-gray (5 GY 8/1), sandy, cohesive, soft to stiff, low apparent porosity, very low permeability. Limestone (50%), yellowish-gray, (5 Y 8/1), biomicrite, phosphatic, moderately hard to moderately soft, very high porosity.
80-120	Clay, yellowish-gray (5 Y 8/1) to light greenish-gray (5 GY 8/1), sandy, soft to firm, cohesive, low apparent porosity and very low permeability, ~10% shell also present.
120-140	Limestone (70%), yellowish-gray (5 Y 8/1), biomicrite, phosphatic, moderately hard to hard, abundant molds and casts (fossiliferous), very high moldic porosity. Clay (30%), yellowish-gray (5 Y 8/1) to light olive-gray (5 Y 6/1), soft to firm, cohesive, phosphatic, low apparent porosity and very low permeability.
140-160	Limestone (85%), yellowish-gray (5 Y 8/1), to light gray (N7), slightly sandy (quartz) biomicrite, phosphatic, fossiliferous, (abundant molds and casts), moderately hard, high moldic porosity. Interbeds of sandstone, (15%), light olive-gray (5 Y 6/1), fine grained, phosphatic, subangular to subrounded particles, moderately hard, high intergranular porosity.
160-185	Limestone (80%), yellowish-gray (5 Y 8/1), to white (N9), biomicrite, abundant molds and casts of aragonitic fossils, phosphatic, very high moldic porosity. Minor medium gray (N5) micritic limestone. Occasional traces (5-10%) of light olive-gray Sandstone, and light olive-gray (5 Y 6/1) Clay (5-10%).
185-220	Limestone (70%), yellowish-gray (5 Y 8/1) to white (N9), biomicrite, sandy (quartz), phosphatic, abundant molds and casts of aragonitic mollusks, very high moldic porosity. Clay (30%), light olive-gray (5 Y 6/1), soft to firm, cohesive, phosphatic, low apparent porosity, very low permeability.

Continued: GEOLOGIST'S LOG OF MC-5004

Depth (feet)	Lithology
220-235	Sandstone, yellowish-gray (5 Y 7/2) to pale olive (10 Y 6/2), quartz, fine grained, subangular to subrounded particles, phosphatic, moderately soft, calcite-cement, phosphatic, very high intergranular porosity. Common (20%) shell fragments. Clay (30%), yellowish-gray (5 Y 7/2), sandy, phosphatic, soft to firm, low apparent porosity, very low permeability.
235-240	Limestone (50%), light gray (N7), sandy (quartz), biomicrite, medium hard, phosphatic, high apparent intergranular porosity with 30% shell. Clay (50%), yellowish-gray (5 Y 7/2), sandy (quartz), phosphatic, soft to firm, low apparent porosity, very low permeability.
240-250	Limestone (50%), yellowish-gray (5 Y 7/2), phosphatic, biomicrite, common molds and casts, high apparent moldic porosity. Clay/Marl (50%), yellowish-gray (5 Y 7/2), sandy, phosphatic, soft, low apparent porosity, very low permeability. Trace - common large 2 mm phosphate granules.
250-265	Clay/Marl (70%), yellowish-gray (5 Y 7/2), sandy (quartz), phosphatic, soft, low apparent porosity, very low permeability. Sandstone (10%), quartz, yellowish-gray (5 Y 7/2), to pale yellowish-brown (10 YR 6/2), moderately hard, phosphatic, high intergranular porosity. Limestone (20%), yellowish-gray (5 Y 7/2), as above.
265-278	Clay (40%), grayish-olive (10 Y 4/2), soft, phosphatic, low apparent porosity, very low permeability. Clay/Marl (40%), yellowish-gray (5 Y 7/2), soft, sandy (quartz), phosphatic, low apparent porosity, very low permeability. Limestone (20%), yellowish-gray (5 Y 7/), sandy (quartz), biomicrite, phosphatic, fossiliferous, moderately hard, high moldic porosity.
278-300	Limestone (80%), very pale orange (10 YR 8/2), biomicrite, moderately hard, common shell, high apparent porosity, with common large phosphate (2 mm). Marl (20%), yellowish-gray (5 Y 7/2), soft, sandy (quartz), low apparent porosity, very low permeability.
300-330	Clay/Marl (55%), light greenish-gray (5 GY 8/1) to yellowish-gray (5 Y 7/2), soft, slightly phosphatic, low apparent porosity, very low permeability. Clay (25%), medium light gray (N6), soft to firm, slightly phosphatic, very low apparent porosity. Limestone (20%), very pale orange (10 YR 8/2); biomicrite, moderately hard, common shell, high apparent porosity.

Continued: GEOLOGIST'S LOG OF MC-5004

Depth (feet)	Lithology
330-360	Marl (100%), greenish-gray (5 GY 6/1), soft, very low permeability, with traces of sandy limestone. Marl is slightly phosphatic with a low apparent porosity. Bands of sandy limestone evident from 354-360'.
360-392	Clay, pale olive (10 Y 6/2), soft to firm, phosphatic (1-2 mm granules of phosphate), with low apparent porosity. Traces of very pale orange (10 Yr 8/2) limestone.
392-420	Limestone (80%), yellowish-gray (5 Y 8/1), to very light gray (N8), biomicrite, moderately hard, phosphatic (silt to granule-sized grains of phosphate common to abundant). Limestone exhibits high apparent porosity. Clay (20%), pale olive (10 Y 6/2), soft, phosphatic, low apparent porosity, very low permeability.
420-440	Limestone (80%), yellowish-gray (5 Y 8/1), biomicrite, moderately hard, phosphatic, abundant shell and coral fragments, very high apparent porosity, and clay (20%), dark greenish-gray (5 G 4/1), soft to very low apparent porosity, very low permeability.
	Zone of lost circulation between 420' and 430'.
440-460	Limestone (55%), very pale orange (10 YR 8/2) to yellowish-gray (5 Y 7/2), biomicrite, moderately hard, phosphatic, fossiliferous (common shell and molds), very high apparent porosity. Clay (25%), pale olive (10 Y 6/2), soft to firm, phosphatic, low apparent porosity. Clay (20%), greenish-gray (5 GY 6/1) to dark greenish-gray (5 GY 4/1), partially lithified, moderately soft to firm, low apparent porosity, very low permeability.
460-490	Limestone (80%), yellowish-gray (5 Y 7/2), biomicrite, moderately hard, phosphatic (silt to granule-sized phosphate grains common throughout), fossiliferous, marly, very high apparent porosity. Clay (20%), pale olive (10 Y 6/2), soft, firm, phosphatic, low apparent porosity and very low permeability.
490-493	Limestone (55%), yellowish-gray (5 Y 7/2), biomicrite, very hard, phosphatic, high moldic porosity. Marl/Clay (45%), yellowish-gray (5 Y 7/2), soft, phosphatic, low apparent porosity and very low permeability.
493-495	Limestone (70%), yellowish-gray (5 Y 7/2), biomicrite, hard, phosphatic, (common silt to granule-sized grains), fossiliferous, high apparent

Depth (feet)	Lithology
	porosity. Dolomite (10%), pale olive (10 Y 6/2), microsucrosic texture, very hard, with moderate apparent permeability. Clay (5%), yellowish-gray (5 Y 7/2), very soft, phosphatic, (flecks of phosphate), low apparent porosity. Dolomite (10%), white (N9), Microsucrosic texture, extremely hard, slightly phosphatic, moderate porosity. Clay (5%), pale olive (10 Y 6/2), soft to firm, phosphatic, low apparent porosity.
495-498	Limestone (60%), yellowish-gray (5 Y 7/2), biomicrite, moderately hard, phosphatic, common shell fragments, high apparent porosity. Marl (40%), yellowish-gray (5 Y 7/2), soft, phosphatic, low apparent porosity, very low permeability.
498-517	Clay (80%), pale olive (10 Y 6/2), soft to firm, phosphatic, low apparent porosity, very low permeability. Limestone (20%), yellowish-gray, as above.
517-520	Limestone (60%), white (N9), biomicrite, hard, phosphatic, very high apparent porosity. Dolomite (30%), light olive-gray (5 Y 5/2), microsucrosic texture, hard, moderate porosity. Lime mud (10%), white (N9), soft, phosphatic, low apparent porosity, very low permeability.
520-555	Limestone (60%), yellowish-gray (5 Y 7/2) to white, biomicrite, fossiliferous, phosphatic, moderately hard, very high apparent porosity. Marl (30%), yellowish-gray (5 Y 7/2), soft, low apparent porosity, very low permeability. Clay (10%), pale olive (10 Y 6/2), soft to firm, phosphatic, low apparent porosity, very low permeability.
555-565	Marl (40%), yellowish-gray (5 Y 7/2), soft, phosphatic, low apparent porosity, very low permeability. Limestone (60%), yellowish-gray (5 Y 7/2), biomicrite, moderately hard, numerous fragments of coral (bryozoan) and shell, very high apparent porosity.
565-580	Limestone (40%), yellowish-gray, as above. Marl (60%), yellowish-gray, as above.
580-593	Clay (50%), light-olive gray (5 Y 6/1), soft, phosphatic, low apparent porosity, very low permeability. Limestone (30%), yellowish-gray (5 Y 7/2), biomicrite, moderately hard, high apparent porosity. Marl (20%), yellowish-gray (5 Y 7/2), soft, low apparent porosity, very low permeability.

Continued: GEOLOGIST'S LOG OF MC-5004

Depth (feet)	Lithology
593-600	Clay (50%), olive-gray (5 Y 6/1), soft, low porosity, very low permeability. Dolomite (25%), light olive-gray (5 Y 6/1), very hard, microsucrosic texture, moderate porosity. Limestone (25%), yellowish-gray (5 Y 7/2), as above.
600-608	Clay, olive-gray (5 Y 6/1) (20%) and yellowish-gray (5 Y 7/2) (40%), soft to firm, phosphatic, low apparent porosity, very low permeability. Limestone (40%), yellowish-gray (5 Y 7/2), biomicrite, moderately hard, very high apparent porosity. Limestone is phosphatic (flecks of phosphate throughout matrix). Abundant 1-2 mm phosphate granules.
608-610	Clay (70%), pale olive (10 Y 6/2), soft, phosphatic, low apparent porosity, very low permeability. Limestone (30%), yellowish-gray, as above.
610-620	Marl (50%), yellowish-gray (5 Y 7/2), soft to firm, low apparent porosity, very low permeability. Limestone (50%), yellowish-gray, as above.
620-625	Clay (20%), pale olive (10 Y 6/2), soft phosphatic, low porosity, very low permeability. Marl (50%), yellowish-gray (5 Y 7/2), soft, phosphatic, low porosity, very low permeability. Limestone (30%), yellowish-gray, as above.
625-640	Marl (50%), yellowish-gray; Limestone (50%), yellowish-gray, as above.
640-647	Limestone (50%), yellowish-gray, as above. Dolomite (~5%), light olive-gray (5 Y 6/1), hard, phosphatic, moderate porosity. Marl (45%), yellowish-gray.
647-660	Clay/Marl (70%), yellowish-gray, soft, low apparent porosity, very low permeability. Limestone (25%), yellowish-gray and Dolomite (5%), as above.
660-685	Dolomite, (40%), yellowish-gray (5 Y 7/2), microsucrosic texture, very hard, moderate porosity. Clay/Marl (60%), yellowish-gray (5 Y 7/2), soft, low porosity, very low permeability. **Loss of drilling mud to formation here.**
685-690	Marl (20%), light gray (N7), soft to firm, cohesive, low apparent porosity, very low permeability. Dolomite (30%), light olive-gray (5 Y 6/1), microsucrosic texture, phosphatic, very hard, moderate apparent

Depth (feet)	Lithology
	porosity. Clay (50%), light olive-gray (5 Y 6/1), soft to firm, low apparent porosity, very low permeability. Phosphate granules (10%), 1-2 mm size.
690-700	Dolomite (70%), grayish-orange (10 YR 7/4) to pale yellowish-brown (10 YR 6/2), sucrosic texture, hard to moderately hard, phosphatic, moderate apparent porosity. Dolomite (20%), light olive-gray (5 Y 6/1), as above. Phosphate granules (10%), 1-2 mm size.
700-720	Limestone, very pale orange (10 YR 8/2), biomicrite, moderately hard, phosphatic (common, 10%, silt to granule-sized grains), high apparent porosity.
720-731	Dolomite, yellowish-gray (5 Y 8/1), to light olive-gray (5 Y 6/1), sucrosic texture, moderately hard, phosphatic, moderate apparent porosity.
731-740	Limestone, yellowish-gray (5 Y 8/1), biomicrite, moderately hard, phosphatic, high apparent moldic porosity. Trace lime mud (2%), white (N9). Lime mud is soft with a low apparent porosity.
740-760	Limestone (95%), very pale orange (10 YR 8/2), biomicrite, moderately soft, phosphatic, high apparent porosity. Dolomite (5%), grayish-orange (10 YR 7/4), sucrosic, moderately hard to hard, phosphatic, moderate porosity.
760-785	Limestone, very pale orange (10 YR 8/2) to yellowish-gray (5 Y 7/2), micrite, moderately hard to hard, slightly phosphatic, moderate apparent porosity. Limestone is partially dolomitized. Dolomite, grayish-orange (10 YR 7/4) (5%), greenish-gray (5 GY 6/1) (10%), sucrosic texture, hard, slightly phosphatic, moderate porosity.
785-800	Marl (70%), yellowish-gray (5 Y 7/2), firm, low apparent porosity, very low permeability. Limestone (20%), pale orange to yellowish-gray, as above. Dolomite (10%), grayish orange as above. (Note: Low volume of cuttings produced from last 15').

3. WATER QUALITY

ANALYSIS OF CHLORIDE CONCENTRATION AND CONDUCTIVITY FOR MC-5000

SAMPLE #	DEPTH (FT BLS)	CHLORIDE CONCENTRATION (MG/L)	CONDUCTIVITY (uMHOS/cm)
H134	390	2420	8440
P-2	420	2400	8680
H-111	440	2360	8520
551	460	2300	8500
P-3	480	2280	8500
P-1	500	2260	8380
42	500	2300	8480
61	520	2200	8100
73	540	2040	7760
62	560	1920	6580
66	580	1860	6810
69	600	1800	6860
64	620	1760	6820
75	640	1700	6680
72	660	1640	6290
63	680	1660	6400
49	700	1740	6750
44	720	1660	6550
59	740	1860	7070
53	760	2040	7840
60	780	2080	7850
51	800	2340	8350
74	820	2260	8460
56	840	2380	8530
H-1040	860	2360	8570
M-51	880	2320	8570
H-1024	900	2200	8370
H-118	920	2360	8380
H-1054	940	2340	8510
508	960	2220	8300
D-2	980	2240	8270
3006	1000	2340	8210
71	1020	2360	7910
68	1040	2140	7890
54	1060	2140	8020
58	1080	2040	7830
65	1100	2120	7830
47	1120	2160	7590
A-46	1140	2120	7750
37	1160	2060	7280
45	1180	2260	7840
70	1200	2200	7900

ANALYSIS OF CHLORIDE CONCENTRATION AND CONDUCTIVITY FOR MC-5001

SAMPLE #	DEPTH (FT BLS)	CHLORIDE CONCENTRATION (MG/L)	CONDUCTIVITY (uMHOS/cm)
18	320	220	1350
39	340	180	1300
57	360	200	1420
55	380	280	1390
62	400	160	1480
60	420	200	1410
66	440	200	1680
33	460	180	1720
71	480	200	1760
45	500	200	1810
54	520	440	3360
31	540	576	3610
57	560	440	3480
39	580	540	3570
66	600	400	3260
31	620	420	3070
74	640	520	3330
70	660	720	3760
71	680	760	3830
33	700	800	4070
18	720	800	4130
73	740	820	4070
31	760	880	4340
70	780	980	4640
33	800	1240	4920
39	820	1300	5340
33	840	1300	5240
39	860	1240	5230
66	880	1260	5350
70	900	1380	5580
73	920	1380	5580

ANALYSIS OF CHLORIDE CONCENTRATION AND CONDUCTIVITY FOR MC-5002

SAMPLE #	DEPTH (FT BLS)	CHLORIDE CONCENTRATION (MG/L)	CONDUCTIVITY (uMHOS)
73	420	140	2030
57	440	180	1980
55	460	180	1950
31	480	200	1980
21	502	180	1980
36	517	180	1980
32	542	240	2170
48	562	280	2210
30	582	280	2200
43	602	280	2230
67	622	280	2230
74	642	280	2200
39	662	290	2240
25	682	340	2440
50	702	910	4180
58	722	1140	4970
37	742	1300	5390
66	762	1350	5550
1	782	1410	5780
19	802	1480	6040
8	822	1520	6240
63	842	1410	6200

4. STEP DRAWDOWN TEST DATA

STEP DRAWDOWN TEST
FOR WELL MC-5000

static water level measured with pressure gauge

static water level: 9 PSI = 20.79' above center of gauge

pressure gauge is located at top of casing which is 2.5' a.l.s.

STEP 1

FLOW RATE: 33 gpm

SPECIFIC CAPACITY: 9.58 gpm/ft

TIME (min)	WATER LEVEL (ft)	DRAWDOWN (ft)
5	18.48	2.31
10	17.32	3.47
15	17.32	3.47
20	17.32	3.47
25	17.32	3.47
30	17.32	3.47

STEP 2

FLOW RATE: 62 gpm

SPECIFIC CAPACITY: 8.96 gpm/ft

TIME (min)	WATER LEVEL (ft)	DRAWDOWN (ft)
5	13.86	6.93
10	13.86	6.93
15	13.86	6.93
20	13.86	6.93

STEP 3

FLOW RATE: 90 gpm

SPECIFIC CAPACITY: 7.77 gpm

TIME (min)	WATER LEVEL (ft)	DRAWDOWN (ft)
5	9.24	11.55
10	9.24	11.55
15	9.24	11.55

STEP DRAWDOWN TEST
FOR WELL MC-5001

static water level: 1psi = 2.31'

static measured from center of gauge
which is located at top of casing

top of casing: 1.8' above land surface

STEP 1

FLOW RATE: 100 gpm

SPECIFIC CAPACITY: 18.21gpm/ft

TIME (min)	WATER LEVEL (ft)	DRAWDOWN (ft)
5	3.46	5.46
10	3.47	5.47
15	3.49	5.49
20	3.49	5.49
25	3.49	5.49

STEP 2

FLOW RATE: 150 gpm

SPECIFIC CAPACITY: 9.76 gpm/ft

TIME (min)	WATER LEVEL (ft)	DRAWDOWN (ft)
5	7.2	9.2
10	-	-
15	12.68	14.68
20	12.8	14.80
25	12.92	14.92
30	12.95	14.95
35	13.07	15.07
40	13.14	15.14
45	13.17	15.17
50	13.20	15.20
55	13.34	15.34
60	13.37	15.37

STEP 3

FLOW RATE : 187 gpm

SPECIFIC CAPACITY : 8.68 gpm/ft

TIME (min)	WATER LEVEL (ft)	DRAWDOWN (ft)
5	18.50	20.50
10	19.42	21.42
15	19.08	21.08
20	19.35	21.35
25	19.49	21.49
30	19.64	21.64
35	19.55	21.55
40	19.60	21.60
45	19.55	21.55
50	19.55	21.55

STEP DRAWDOWN TEST
FOR WELL MC-5002

static water level : 2.5 psi
2.5 psi = 5.77' above measuring point at center of gauge

STEP 1

FLOW RATE : 88 gpm

SPECIFIC CAPACITY : 9.28 gpm/ft

TIME (min)	WATER LEVEL (ft)	DRAWDOWN (ft)
2	4.78	10.55
5	4.39	10.16
6.5	4.24	10.01
7	-	-
10	4.22	9.99
13	3.96	9.73
15	3.92	9.69
17	3.85	9.62
19	3.85	9.62
21	3.79	9.56
23	3.74	9.51
25	3.70	9.47
27	3.71	9.48
30	3.71	9.48

STEP 2

FLOW RATE: 98 gpm

SPECIFIC CAPACITY: 6.55 gpm/ft

TIME (min)	WATER LEVEL (ft)	DRAWDOWN (ft)
1.5	7.47	13.24
3	7.70	13.47
7	8.07	13.84
8	-	-
10.5	8.21	13.98
13	8.39	14.16
14.5	-	-
16	8.49	14.26
18	8.54	14.31
22	8.63	14.40
25	8.64	14.41
30	9.01	14.78
34	9.11	14.88
36	9.12	14.89
39	-	-
40	9.20	14.97
44	-	-

STEP 3

FLOW RATE: 120 gpm

SPECIFIC CAPACITY: 5.23 gpm/ft

TIME (min)	WATER LEVEL (ft)	DRAWDOWN (ft)
7	16.32	22.09
12.5	16.59	22.36
19	16.93	22.70
24	16.97	22.74
28	17.02	22.79
34	17.12	22.89
37.5	17.17	22.94

STEP DRAWDOWN TEST
WELL MC-5003

static water level : 3.5' above top of casing

top of casing is 2.85' above land surface

STEP 1

FLOW RATE : 250 gpm

SPECIFIC CAPACITY : 14.38 gpm/ft

TIME (min)	WATER LEVEL (ft)	DRAWDOWN (ft)
5	12.11	15.61
10	12.35	15.85
15	12.78	16.28
20	12.92	16.42
25	13.18	16.68
30	13.30	16.80
35	13.40	16.90
40	13.51	17.01
45	13.63	17.13
50	13.70	17.30
55	13.75	17.35
60	13.78	17.38

STEP 2

FLOW RATE : 363 gpm

SPECIFIC CAPACITY : 10.92 gpm/ft

TIME (min)	WATER LEVEL (ft)	DRAWDOWN (ft)
5	26.32	29.82
10	27.40	30.90
15	27.82	31.32
20	28.18	31.68
25	28.50	32.00
30	28.68	32.18
35	28.88	32.38
40	28.95	32.45
45	29.13	32.63
50	29.32	32.82
55	29.45	32.93
60	29.73	33.23

STEP 3

FLOW RATE : 540 gpm

SPECIFIC CAPACITY : 9.48 gpm/ft

TIME (min)	WATER LEVEL (ft)	DRAWDOWN (ft)
5	13.63	49.44
10	11.09	51.98
15	10.39	52.68
20	9.24	53.83
25	8.09	54.99
30	7.62	55.45
35	7.16	55.85
40	6.93	56.14
45	6.47	56.60
50	6.24	56.83
55	5.78	57.30
60	5.78	57.30

Note: drawdown was measured using an airline for step 3. The length of the airline was 60'. Static water level was measured as 27.8 PSI = 64.22' at the center of the gauge. The pressure gauge had a calibration error of .5 PSI =1.15'. Static is therefore 64.22'-1.15'-60.0' = 3.07'.

STEP DRAWDOWN TEST

FOR WELL MC-5004

static water level measured with pressure gauge

static water level: 14 PSI = 32.34' above center of gauge

pressure gauge is located at top of casing which is 1.1' b.l.s.

STEP 1

FLOW RATE: 40 gpm

SPECIFIC CAPACITY: 0.85 gpm/ft

TIME (min)	WATER LEVEL (ft)	DRAWDOWN (ft)
5	13.40	45.74
10	14.60	46.60
15	14.53	46.87
20	14.37	46.71
25	13.95	46.29
30	14.57	46.91
35	14.96	47.30
40	14.94	47.28
45	14.96	47.30
50	14.95	47.29

STEP 2

FLOW RATE: 47 gpm

SPECIFIC CAPACITY: 0.82 gpm/ft

TIME (min)	WATER LEVEL (ft)	DRAWDOWN (ft)
10	24.78	57.12
15	24.71	57.05
20	24.72	57.06
25	24.72	57.06
30	24.72	57.06

STEP 3

FLOW RATE: 37 gpm

SPECIFIC CAPACITY: 0.91 gpm/ft

TIME (min)	WATER LEVEL (ft)	DRAWDOWN (ft)
5	8.1	40.44
10	8.1	40.44
15	8.1	40.44

STEP 4

FLOW RATE: 33 gpm

SPECIFIC CAPACITY: 1.02 gpm/ft

TIME (min)	WATER LEVEL (ft)	DRAWDOWN (ft)
5	0.48	32.82
10	0.25	32.59
15	0.14	32.48
20	0.13	32.47
25	0.13	32.47

STEP DRAWDOWN TEST
WELL MC-5005

static water level measured with pressure gauge

static water level : 12.5 PSI = 28.87' above center of gauge

center of gauge is 2.80' a.l.s.

STEP 1

FLOW RATE : 320 gpm

SPECIFIC CAPACITY : 55.46 gpm/ft

TIME (min)	WATER LEVEL (ft)	DRAWDOWN (ft)
5	23.33	5.54
10	23.10	5.77
15	23.10	5.77
20	23.10	5.77
25	23.10	5.77

STEP 2

FLOW RATE : 420 gpm

SPECIFIC CAPACITY : 41.34 gpm/ft

TIME (min)	WATER LEVEL (ft)	DRAWDOWN (ft)
5	18.71	10.16
10	18.71	10.16
15	18.71	10.16
20	18.71	10.16
25	18.71	10.16

STEP 3

FLOW RATE : 520 gpm

SPECIFIC CAPACITY : 36.31 gpm/ft

TIME (min)	WATER LEVEL (ft)	DRAWDOWN (ft)
5	14.55	14.32
10	14.55	14.32
15	14.55	14.32
20	14.55	14.32

STEP 4

FLOW RATE : 604 gpm

SPECIFIC CAPACITY : 33.11 gpm/ft

TIME (ft)	WATER LEVEL (ft)	DRAWDOWN (ft)
5	10.62	18.24
10	10.62	18.24
15	10.85	18.02
20	10.62	18.24
25	10.62	18.24

STEP 5

FLOW RATE : 685 gpm

SPECIFIC CAPACITY : 30.26 gpm/ft

TIME (min)	WATER LEVEL (ft)	DRAWDOWN (ft)
5	6.23	22.64
10	6.23	22.64
15	6.23	22.64
20	6.23	22.64

5. TIME AND DRAWDOWN DATA

TIME AND DRAWDOWN DATA
FOR MONITOR WELL MC 5000
DURING APT TEST OF
LOWER HAWTHORN AQUIFER

TIME (MINUTES)	DRAWDOWN (FEET)	TIME (MINUTES)	DRAWDOWN (FEET)	TIME (MINUTES)	DRAWDOWN (FEET)
.0001	0.009	2.6	0.152	160	0.266
0.0166	0.019	3.0	0.152	180	0.256
0.0333	0.028	3.4	0.152	200	0.256
0.0500	0.038	3.8	0.152	220	0.247
0.0666	0.038	4.2	0.161	240	0.237
0.0833	0.038	4.6	0.18	260	0.209
0.1	0.047	5.0	0.18	280	0.237
0.1166	0.047	5.4	0.19	300	0.18
0.1333	0.047	5.8	0.171	320	0.18
0.1500	0.047	6.2	0.171	340	0.161
0.1666	0.057	6.60	0.18	360	0.218
0.1833	0.057	7.0	0.19	380	0.18
0.2	0.066	7.4	0.19	400	0.171
0.2166	0.066	7.8	0.19	420	0.171
0.2333	0.066	8.2	0.19	440	0.152
0.2500	0.076	8.6	0.18	460	0.161
0.2666	0.076	9	0.171	480	0.161
0.2833	0.076	9.4	0.171	500	0.152
0.3	0.076	9.8	0.171	520	0.152
0.3166	0.085	12	0.19	540	0.161
0.3333	0.085	16	0.19	560	0.161
0.3666	0.085	20	0.19	580	0.171
0.4	0.085	24	0.209	600	0.18
0.4333	0.095	28	0.209	620	0.19
0.4666	0.095	32	0.218	640	0.19
0.5	0.104	36	0.209	660	0.218
0.5333	0.104	40	0.209	680	0.228
0.5666	0.104	44	0.199	700	0.237
0.6	0.104	48	0.228	720	0.256
0.6333	0.104	52	0.209	740	0.275
0.6666	0.104	56	0.218	760	0.304
0.7	0.114	60	0.218	780	0.313
0.7333	0.114	64	0.228	800	0.332
0.7666	0.114	68	0.218	820	0.361
0.8	0.123	72	0.228	840	0.38
0.8333	0.123	76	0.228	860	0.399
0.8666	0.123	80	0.247	880	0.399
0.9	0.123	84	0.237	900	0.418
0.9333	0.123	88	0.237	920	0.437
0.9666	0.123	92	0.237	940	0.437
1.0	0.133	96	0.256	960	0.437
1.4	0.142	100	0.247	980	0.446
1.8	0.152	120	0.256	1000	0.437
2.2	0.152	140	0.256	1020	0.418

TIME AND DRAWDOWN DATA
FOR MONITOR WELL MC 5000
DURING APT TEST OF
LOWER HAWTHORN AQUIFER

TIME (MINUTES)	DRAWDOWN (FEET)	TIME (MINUTES)	DRAWDOWN (FEET)	TIME (MINUTES)	DRAWDOWN (FEET)
1040	0.418	1920	0.266	2800	0.456
1060	0.408	1940	0.256	2820	0.456
1080	0.399	1960	0.256	2840	0.437
1100	0.389	1980	0.247	2860	0.437
1120	0.38	2000	0.247	2880	0.437
1140	0.38	2020	0.256	2900	0.427
1160	0.37	2040	0.256	2920	0.456
1180	0.361	2060	0.247	2940	0.427
1200	0.351	2080	0.256	2960	0.456
1220	0.332	2100	0.266	2980	0.446
1240	0.323	2120	0.275	3000	0.446
1260	0.323	2140	0.285	3020	0.456
1280	0.323	2160	0.294	3040	0.437
1300	0.313	2180	0.304	3060	0.465
1320	0.304	2200	0.313	3080	0.456
1340	0.294	2220	0.323	3100	0.446
1360	0.304	2240	0.351	3120	0.456
1380	0.304	2260	0.361	3140	0.456
1400	0.304	2280	0.38	3160	0.513
1420	0.294	2300	0.399	3180	0.475
1440	0.294	2320	0.418	3200	0.465
1460	0.285	2340	0.446	3220	0.475
1480	0.285	2360	0.456	3240	0.475
1500	0.285	2380	0.475	3260	0.475
1520	0.323	2400	0.484	3280	0.456
1540	0.323	2420	0.503	3300	0.456
1560	0.332	2440	0.522	3320	0.456
1580	0.313	2460	0.532	3340	0.456
1600	0.313	2480	0.532	3360	0.446
1620	0.361	2500	0.522	3380	0.446
1640	0.313	2520	0.522	3400	0.446
1660	0.351	2540	0.522	3420	0.437
1680	0.275	2560	0.522	3440	0.446
1700	0.351	2580	0.513	3460	0.456
1720	0.266	2600	0.513	3480	0.446
1740	0.351	2620	0.513	3500	0.446
1760	0.323	2640	0.513	3520	0.446
1780	0.323	2660	0.503	3540	0.456
1800	0.313	2680	0.494	3560	0.446
1820	0.304	2700	0.484	3580	0.446
1840	0.285	2720	0.475	3600	0.456
1860	0.313	2740	0.475	3620	0.456
1880	0.285	2760	0.465	3640	0.465
1900	0.275	2780	0.465	3660	0.475

TIME AND DRAWDOWN DATA
FOR MONITOR WELL MC 5000
DURING APT TEST OF
LOWER HAWTHORN AQUIFER

TIME (MINUTES)	DRAWDOWN (FEET)	TIME (MINUTES)	DRAWDOWN (FEET)	TIME (MINUTES)	DRAWDOWN (FEET)
3680	0.475	3900	0.636	4120	0.712
3700	0.484	3920	0.646	4140	0.712
3720	0.494	3940	0.655	4160	0.712
3740	0.522	3960	0.674	4180	0.703
3760	0.522	3980	0.693	4200	0.703
3780	0.541	4000	0.693	4220	0.684
3800	0.541	4020	0.703	4240	0.674
3820	0.56	4040	0.703	4260	0.665
3840	0.589	4060	0.722	4280	0.655
3860	0.598	4080	0.722	4300	0.636
3880	0.617	4100	0.722		

TIME AND DRAWDOWN DATA
FOR MONITOR WELL MC 5007
DURING APT TEST OF
LOWER HAWTHORN AQUIFER

TIME (MINUTES)	DRAWDOWN (FEET)	TIME (MINUTES)	DRAWDOWN (FEET)	TIME (MINUTES)	DRAWDOWN (FEET)
.00001	0.247	2.2	0.465	120	0.546
0.0166	0.275	2.6	0.47	140	0.546
0.0333	0.289	3	0.465	160	0.555
0.05	0.299	3.4	0.475	180	0.541
0.0666	0.304	3.8	0.479	200	0.536
0.0833	0.318	4.2	0.484	220	0.527
0.1	0.323	4.6	0.475	240	0.522
0.1166	0.337	5	0.479	260	0.494
0.1333	0.342	5.4	0.47	280	0.508
0.15	0.356	5.8	0.475	300	0.503
0.1666	0.351	6.2	0.475	320	0.47
0.1833	0.361	6.6	0.475	340	0.46
0.2	0.37	7	0.479	360	0.479
0.2166	0.365	7.4	0.489	380	0.465
0.2333	0.375	7.8	0.475	400	0.456
0.25	0.384	8.2	0.479	420	0.46
0.2666	0.38	8.6	0.475	440	0.451
0.2833	0.389	9	0.465	460	0.456
0.3	0.394	9.4	0.479	480	0.46
0.3166	0.399	9.8	0.475	500	0.465
0.3333	0.399	12	0.479	520	0.451
0.3666	0.399	16	0.479	540	0.489
0.4	0.408	20	0.494	560	0.498
0.4333	0.408	24	0.498	580	0.503
0.4666	0.408	28	0.494	600	0.517
0.5	0.399	32	0.503	620	0.532
0.5333	0.399	36	0.503	640	0.536
0.5666	0.399	40	0.498	660	0.57
0.6	0.399	44	0.503	680	0.574
0.6333	0.394	48	0.508	700	0.593
0.6666	0.394	52	0.503	720	0.612
0.7	0.403	56	0.513	740	0.627
0.7333	0.403	60	0.513	760	0.65
0.7666	0.408	64	0.527	780	0.66
0.8	0.418	68	0.503	800	0.693
0.8333	0.413	72	0.513	820	0.707
0.8666	0.413	76	0.527	840	0.736
0.9	0.418	80	0.522	860	0.75
0.9333	0.427	84	0.532	880	0.764
0.9666	0.432	88	0.532	900	0.783
1	0.427	92	0.517	920	0.793
1.4	0.441	96	0.541	940	0.798
1.8	0.465	100	0.536	960	0.798

TIME AND DRAWDOWN DATA
FOR MONITOR WELL MC 5007
DURING APT TEST OF
LOWER HAWTHORN AQUIFER

TIME (MINUTES)	DRAWDOWN (FEET)	TIME (MINUTES)	DRAWDOWN (FEET)	TIME (MINUTES)	DRAWDOWN (FEET)
980	0.798	1840	0.655	2700	0.902
1000	0.798	1860	0.655	2720	0.888
1020	0.793	1880	0.655	2740	0.878
1040	0.783	1900	0.641	2760	0.874
1060	0.774	1920	0.627	2780	0.874
1080	0.769	1940	0.631	2800	0.869
1100	0.76	1960	0.617	2820	0.859
1120	0.755	1980	0.622	2840	0.84
1140	0.745	2000	0.627	2860	0.84
1160	0.731	2020	0.631	2880	0.84
1180	0.726	2040	0.631	2900	0.831
1200	0.722	2060	0.636	2920	0.84
1220	0.703	2080	0.636	2940	0.826
1240	0.698	2100	0.655	2960	0.84
1260	0.703	2120	0.665	2980	0.836
1280	0.688	2140	0.688	3000	0.826
1300	0.688	2160	0.684	3020	0.831
1320	0.674	2180	0.698	3040	0.831
1340	0.684	2200	0.717	3060	0.826
1360	0.684	2220	0.726	3080	0.845
1380	0.674	2240	0.745	3100	0.84
1400	0.669	2260	0.774	3120	0.836
1420	0.66	2280	0.774	3140	0.836
1440	0.66	2300	0.807	3160	0.85
1460	0.655	2320	0.817	3180	0.84
1480	0.65	2340	0.85	3200	0.845
1500	0.66	2360	0.859	3220	0.859
1520	0.703	2380	0.888	3240	0.85
1540	0.679	2400	0.897	3260	0.864
1560	0.684	2420	0.907	3280	0.84
1580	0.679	2440	0.926	3300	0.85
1600	0.674	2460	0.931	3320	0.84
1620	0.707	2480	0.926	3340	0.84
1640	0.684	2500	0.931	3360	0.84
1660	0.693	2520	0.935	3380	0.84
1680	0.679	2540	0.935	3400	0.84
1700	0.698	2560	0.931	3420	0.831
1720	0.684	2580	0.921	3440	0.85
1740	0.703	2600	0.912	3460	0.859
1760	0.665	2620	0.912	3480	0.855
1780	0.674	2640	0.916	3500	0.855
1800	0.669	2660	0.912	3520	0.845
1820	0.669	2680	0.907	3540	0.859

TIME AND DRAWDOWN DATA
FOR MONITOR WELL MC 5007
DURING APT TEST OF
LOWER HAWTHORN AQUIFER

TIME (MINUTES)	DRAWDOWN (FEET)	TIME (MINUTES)	DRAWDOWN (FEET)	TIME (MINUTES)	DRAWDOWN (FEET)
3560	0.855	3820	0.983	4080	1.159
3580	0.855	3840	1.011	4100	1.144
3600	0.864	3860	1.026	4120	1.13
3620	0.864	3880	1.035	4140	1.125
3640	0.864	3900	1.064	4160	1.14
3660	0.893	3920	1.068	4180	1.13
3680	0.893	3940	1.083	4200	1.13
3700	0.888	3960	1.106	4220	1.111
3720	0.916	3980	1.121	4240	1.106
3740	0.931	4000	1.116	4260	1.092
3760	0.94	4020	1.121	4280	1.068
3780	0.959	4040	1.116	4300	1.054
3800	0.959	4060	1.144		

6. ANALYTICAL DATA

BFGoodrich REVERSE OSMOSIS PROJECTION

Arrowhead Industrial Water, Inc.
A BFGoodrich Company
10320 Brecksville Road
Brecksville, Ohio 44141
Phone: 216-447-6580
Fax: 216-838-1868

CUSTOMER Miselmer International
SAMPLE ID: MC 5005 8 in. Production Well
DATE: 02/15/95

CATIONS:	ppm
ALUMINUM	<DL
BARIUM	0.03
BORON***	0.82
CALCIUM	174.00
CHROMIUM	<DL
COPPER	0.01
IRON	0.01
LEAD	<DL
MAGNESIUM	167.40
MANGANESE	<DL
PHOSPHORUS***	<DL
POTASSIUM	50.51
SILICON***	8.13
SODIUM	1427.20
ZINC	<DL

ANIONS:	ppm
ALKALINITY*	194.00
CHLORIDE	2286.72
FLUORIDE	1.50
NITRATE	<DL
PHOSPHATE	<DL
SULFATE	794.97
TOTAL CATIONS	1819.16
TOTAL ANIONS	3319.27
BALANCE (%)	99%
pH	7.30
TEMPERATURE (C)	25.0

ADDITIONAL COMPONENTS:

ALKALINITY, TOTAL (ppmCaCO3)	194.0
ALKALINITY, BICARBONATE (ppmCaCO3)	194.0
ALKALINITY, CARBONATE (ppmCaCO3)	--
CARBON, TOTAL ORGANIC (ppm)	2.6
CARBON DIOXIDE (ppm AS ION, CALCULATED)	18.3
CONDUCTIVITY**	7820.0
CHLORINE, TOTAL (ppm Cl2)	<DL
HARDNESS, TOTAL (ppm CaCO3)	1124.7
SILICA ,TOTAL (ppm SiO2, CALCULATED/Si)	17.4
SILICA , REACTIVE (ppm SiO2, HACH)	16.8
TDS (ppm AS NaCl BY CONDUCTIVITY)	4268.4
TURBIDITY (NTU) (as received)	0.3

FOULANTS:

CALCIUM CARBONATE SCALING INDEX	1.2
CALCIUM SULFATE (%)	78.9
CALCIUM FLUORIDE (%)	8354.6
BARIUM SULFATE (%)	1121.1
SILICA (%)	86.7
FERRIC HYDROXIDE (%)	****

IF THE '% OF SATURATION' EXCEEDS 100 THEN ANTISCALANT IS REQUIRED.
PROJECTION OF BRINE % OF SATURATION @ 50% RECOVERY***

*ALKALINITY IN PPM CaCO3
**CONDUCTIVITY IN umhos/cm
***BORON,SILICON & PHOSPHORUS are not included in the cation total
****POTENTIAL FOR FOULING

Lee County Environmental Laboratory
60 Danley Drive # 2
Fort Myers, Florida 33907
(813) 278-7288
HRS ID 45031/E45049

April 13, 1995

Mr. Richard Holzinger
Missimer International, Inc.
P.O. Box 61528
Fort Myers, Fl 33906
813/277-3999

Dear: Mr. Holzinger:

Below are the results of analysis of 1 sample received for examination on April 4, 1995:

Sample I.D. AA54900 Location code: MISSINT
Location Description: Missimer Int'l
Sample collector: PAM TATE Sample collection date: 04/04/95
Lab submittal date: 04/04/95 Time: 15:19

TEST PARAMETER	UNITS	TEST RESULT	DETECTION LIMIT
THM Maximum Formation Potential	ug/L	170	0.4

Please advise should you have questions concerning these data.

Respectfully submitted,

Keith A. Kibbey
Laboratory Director
Division of Natural Resources Management

AT&T Analytical Services

IC Group

555 Union Boulevard
Allentown, PA 18103
610 712-6016
FAX: 610 712-6869

CERTIFICATE OF ANALYSIS

CLIENT: MISSIMER INTERNATIONAL
REPORT DATE: 5/5/95
SUBMITTED BY: PAM TATE
DATE SUBMITTED: 4/26/95
LIMS NUMBER: 56241
REPORT FILE: MISSIMER.101
SAMPLE DESCRIPTION: PRESERVED WITH NITRIC ACID

MAILING ADDRESS:
8140 COLLEGE PRKWY
SUITE 202
FR MEYERS FLA 33919

LIMS	DESCRIPTION	STRONIUM (ppm)
56241	WELL MC 5005	13.4

C. A. Eckert
AT&T ANALYTICAL SERVICES

BF Goodrich

Arrowhead Industrial Water, Inc.
A BFGoodrich Company
10320 Brecksville Road
Brecksville, Ohio 44141
Phone: 216-447-5580
Fax: 216-838-1868

RECEIVED 4/24/95

April 19, 1995

Mr. John Buonassisi
Systems Solutions, Inc.
203 South Jackson Road
Venice, FL 34292

Dear John:

Following are the results of the samples received for analysis from Missimer International. The analysis request was for Hydrogen Sulfide (H_2S), ammonia and strontium. Two samples were received: one was acidified and the other was not. The results are as follows:

	Sample #1 (Acidified)	Sample #2 (non-acidified)
Sulfide	2.4 mg/l	1.9 mg/l
Ammonia	0.61 mg/l	1.3 mg/l
Sr	12.4 ppm	12.5 ppm

With spiking, the recovery on the strontium was 91%. Please reference purchase order number 13784 for the above analyses.

If you have any questions, please call.

Sincerely,

Deborah L. Miller

Deborah L. Miller
Development Chemist

DLM:plj

(3192)

cc: R. W. Zuhl

Tri-Tech Analytical Laboratories, Inc.

P.O. Box 140966 • Orlando, FL 32814-0966 • (407) 275-8463

REPORT OF ANALYSIS

Missimer International
8140 Colledge Parkway Suite 202
Ft. Myers, Florida 33919
Attention: Ms. Pamela Tate

Work Order # : 95-07-805
Date Received: 07/28/95
Date Reported: 08/03/95
TTA Contact : L. Trytek

Work ID : Collier County Brackish Water Wellfield Study
Total Samples: 1

Sampling information is based on data supplied by Client.

SAMPLE ID	DATE SAMPLED	TEST CODE
#1. MC 5005	07/27/95 11:00am	Total Coliform Fecal Coliform Plate Count & ID Algae Count/ID

A discussion and test results can be found on the following pages. Testing was performed on July 28, 1995, with results recorded on July 29, 31, and August 3, 1995.

Respectfully Submitted,
Tri-Tech Laboratories, Inc.

Linda Trytek
Laboratory Director

REPORT OF ANALYSIS
RESULTS BY SAMPLE

Tri-Tech Laboratories, Inc. Work Order# : 95-07-805
Date Received: 07/28/95 9:15am

Date Collected: 07/27/95 11:00am Sample Matrix: Water

Test Parameter: Total Coliform Test Code : TC-COL

SAMPLE ID	RESULTS	UNITS
#1. MC 5005	Absent	cfu's/100mls.

Test Parameter: Fecal Coliform Test Code : FC-COL

SAMPLE ID	RESULTS	UNITS
#1. MC 5005	Absent	cfu's/100mls.

Date and Time Of Setup: 07/28/95 9:30am
Date and Time Read....: 07/29/95 9:30am
Analyst.....:

FINAL REPORT

STANDARD PLATE COUNT & IDENTIFICATION (SPC-ID)

A. DISCUSSION:

The Standard Plate Count procedure provides a standardized means of determining the density of aerobic and facultative anaerobic heterotrophic bacteria in a sample. This is a empirical measurement because bacteria occur singly, in pairs, Chains, clusters or packets. No single growth medium or set of physical and chemical conditions can satisfy the physiological requirements of all bacteria in a sample. Consequently, the number of viable colonies may be lower substantially than the actual number of bacteria present.

For identification of bacteria from the Standard Plate Count every colony is removed and streaked onto blood agar plates to check for hemolysis reaction. Then gram stained for proper placement into the Genus (sometimes as far down as the species).

B. SPC RESULTS:

	SAMPLE ID	TOTAL COLONIES	ORGANISM #	BREAKDOWN AND TYPE IDENTIFICATION
#1	MC 5005	163	1-56 (56)	Gram (-) small rods KOH (+) clear spreading colonies with no hemolysis.
				ID: Pseudomonas species

SAMPLE ID	TOTAL COLONIES	ORGANISM #	BREAKDOWN AND TYPE IDENTIFICATION
		57-89 (33)	Fungus with tan spores set into the agar.
			ID: Aspergillus species
		90-104 (15)	Gram (-) single rods KOH (+) colonies are clear brown with no hemolysis.
			ID:Acinetobacter species
		105-122 (18)	Gram (+) rod in chains KOH (-) no spores flattened gray white colonies with no hemolysis.
			ID: Cactobacillus species
		123-141 (19)	Gram (+) rods with spores KOH (-) large gray colonies with Beta hemolysis.
			ID: Bacillus species

SAMPLE ID	TOTAL COLONIES	ORGANISM #	BREAKDOWN AND TYPE IDENTIFICATION
		142-156 (15)	Gram (+) large cocci in packets of two's KOH (-) clear pin point colonies with no hemolysis.
			ID: Micrococcus species
		157-163 (7)	Fungus filamentous thread like dark white puffs.
			ID: Crenothrix bacteria

OVERALL CONCLUSION

1. Most bacteria isolated from this sample is indicative of bacteria found in water,(Pseudomonas, Cactobacillus, and Bacillus). These bacteria are not harmful when consumed.

2. The colonies of Aspergillus and Acinetobacter species that was isolated are normally found in the air, and will not exist for long due to the lack of nutrients. After denaturing (dying) of these bacteria, they will become a nutrient source for other water bacteria and can increase in the bacterial contamination of this water supply.

3. Crenothrix bacteria isolated, also known as iron bacteria and proves the presence of iron from the water supply.

NOTE:

The important factors discovered from this ID are:

1. **All results prove MEDIUM QUALITY water supply analyzed.**
2. **There was no harmful bacteria isolated from this water supply analyzed.**
3. **It is suggested to treat this water supply to achieve a higher quality drinking water supply.**

FINAL REPORT

MICROSCOPIC STUDY :

A. DISCUSSION:

A standard microscope, with a mechanical stage capable of moving all parts of the counting cell past the objective lens, was used for identification. Lens objectives 10X, 20X or 40X magnification were used to give an accurate and adequate distance for the viewing chamber.

The sample was prepared by the following procedure for the microscopic study:

1. Transfer 0.1 mL. of sample to a glass slide.
2. Place a cover slip over the sample.
3. Seal the cover slip with a proper adhesive, to prevent evaporation.

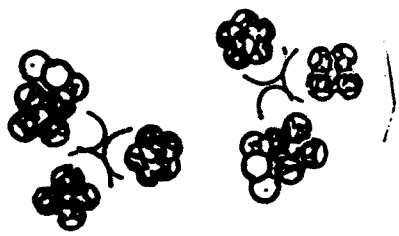
B. MICROSCOPIC STUDY RESULTS:

SAMPLE ID	RESULTS
#1. MC 5005 (Water)	Viewed: a. No Odor b. Slight Turbidity c. 650 Algae Cells viewed. d. Algae Appears in Segments.

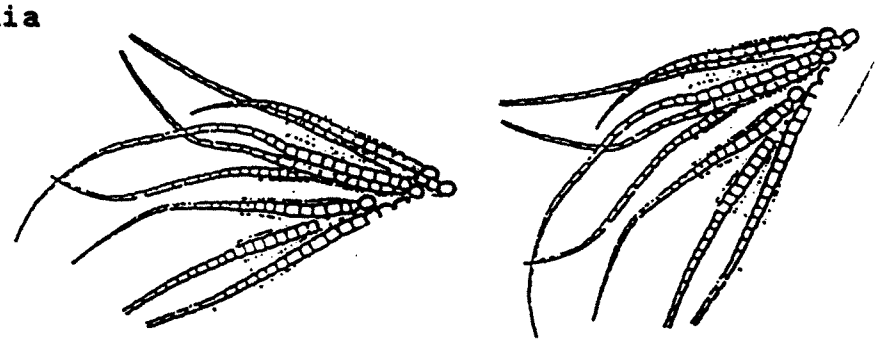
Major Algae Viewed:

Anacystis

Westella



Gleotrichia



C. Conclusion:

There was several types of Algae viewed in this water sample. The Gleotrichia Algae is a clean water type of algae. The Westella and Anacystis Algae are all fast reproducers and make any water sample appear to have a greenish color tint. There was no Algae viewed of any health concern to man when consumed.

Reviewed By: Tamara Haynes
Title : Quality Control Director

ARCC

Alford
Rogers
Cullimore
Concepts, Inc.

Ground Water
Scientist and Microbiologist
Research and Development
Water Well Rehabilitation

1954 Old Daytona Road • Daytona Beach, Florida 32124 • (904) 258-5695 • FAX (904) 258-6989

August 14, 1995

Ms. Pam Tate P.G.
Missimer International Inc.
8140 College Parkway, Suite 202
Fort Meyers, Fl 33919

Dear Pam:

INTRODUCTION: Until recently, it was assumed by many that microorganisms could not survive in a confined aquifer. This assumption has been dispelled by the US Department of Energy's (DOE) study of the **"Deep Subsurface Microbiology."** Using aseptic drilling procedures, this work has recovered viable microorganisms from depths greater than 500 meters.

These intrinsic microorganisms are capable of living under the most stressful situation, utilizing the slightest trace of nutrient, gases and metals to survive. Many times when the environment will not support them they revert to the ultra-microcell and wait out the situation.

With mans increasing requirement for water, which forces him to further exploit the groundwater systems of the world, he must learn to live and deal with the potential for biofouling.

This biofouling can manifest itself in a number of ways. The most common are corrosion, increased or fluctuations of bacteria, and plugging of the well and/or treatment system.

This report will briefly discuss the potential for problems in the Collier County well in question.

LOWER HAWTHORN AQUIFER: This aquifer being of limestone and dolomite should be a most prolific water producer. There are however factors that will influence the possible short term and probably long term quality and/or production.

As the different layers of rock were forming, metals, various forms of sea life (diatoms etc.) and organic material were being accumulated. Even though they may only be in trace amounts, there is enough to allow microorganisms to survive.

When a well drilled into such an area is placed into operation, it will progressively begin to accumulate both nutrients and organisms around the well. This accumulation becomes heavier as it gets closer to the bore. ARCC has demonstrated this for the Army Corps' Waterways Experiment Station. Contact person is Mr. Roy Leach @ 601-634-2727.

This biofilm development may or may not effect the ability of the well to produce. Production will be determined by aggressiveness of the organisms, nutrient, capacity of the aquifer and pumping to name a few. Other deleterious effects could be corrosion due to sulfur/sulfate bacteria and abnormal bacteria counts.

BIOLOGICAL ASSAY: The findings by Tri-Tech Analytical (TTA) are not at all unusual. In fact these particular bacteria would be anticipated. The first two organisms (pseudomonas and acinetobacter) were the same bacteria isolated by the DOE from some 500 meters in the ground at their (DOE) study in Aiken,SC.

The other bacteria were simply members of the biological community.

Pseudomonas sp. are probably the most ubiquitous bacteria found in nature. These organisms are aerobic normally but can utilize nitrate in some cases to sustain life. They often use metals in their metabolism.

Operating in a consortial biofilm they have been known to survive 2000 PPM of chlorine.

It is suspected that pseudomonads lay down the substrate so that other organisms can establish.

As for the segments of algae, there are many ways that their presents can be explained. One is that most likely they are archives, and the least likely is that they are carry-overs from the drilling process.

CONCLUSION: This writers primary concern would be the biofouling of the well, pump, and treatment facility. As prolific as this aquifer is though, this could take quite some time. It is however suggested that the client consider developing some type of routine maintenance to control the biofilm and its potential for plugging and fouling.

Another consideration, is the strong probability of microbial corrosion (MIC). Given the amount of sulfate present, there is no doubt that there is going to be growth of sulfate reducing bacteria (SRB).

To be sure, the design should call for the use of as much plastic, fiber-glass and stainless steel as possible. The connection of dissimilar metals must be avoided.

It has been said that everything is everywhere that nature intends it to be. The presents of microorganisms in groundwater is not something new and unique to Florida. Without these bacteria in the environment, this world would cease to function. The only problem is that we must learn to work within or control their environment.

I trust that this report is what you require for your project. If I have not fully explained or covered anything to your satisfaction, please do not hesitate to contact me. I will be out of pocket for the next few weeks at Shaw AFB, SC, but I am in contact with the office several times a day.

If you should wish a truly in-depth report, Anita Highsmith of the CDC is associated with ARCC and is well acquainted with membrane biofouling and Dr. Brenda Little of the Navy also works with us on corrosion.

Thank you all for the opportunity to be of service and I look forward to working with MI again in the future.

Respectfully submitted,

George Alford
President

7. FLOW AND SOLUTE TRANSPORT MODEL INPUT FILES

FLOW MODEL (MODFLOW) INPUT FILES

BASIC PACKAGE:

```
MISSIMER INTERNATIONAL, INC.: COLLER COUNTY WELLFIELD, FH4-26
MODFLOW MODEL FOR FLOW CALIBRATION/BOUNDARY CONDITION GENERATION
         3          73          76          27          4
 11 12   0   0   0   0 00   0   0   0   0 22 23
          0           1                                    Save initial heads
         32           1           (76i2)            -2 Layer 1, all cells active
         32           1           (76i2)            -2 Layer 2, all cells active
         32           1           (76i2)            -2 Layer 3, ghb
     999.99
         30          1.           (76F10.0)         -2 Start heads, layer 1
         30          1.           (76F10.0)         -2 Start heads, layer 2
         30          1.           (76F10.0)         -2 Start heads, layer 3
 0.0000139           5       1.20
 0.0000069           5       1.20
 0.0000139           5       1.20
 0.0000139           5       1.20
 0.0000208           5       1.20
 0.0000694           5       1.20
 0.0000694           5       1.20
 0.0001389           5       1.20
 0.0001389           5       1.20
 0.0002083           5       1.20
 0.0006944           5       1.20
 0.0006944           5       1.20
 0.0013889           5       1.20
 0.0013889           5       1.20
 0.0020833           5       1.20
 0.0069444           5       1.20
 0.0069444           5       1.20
 0.0138889           5       1.20
 0.0138889           5       1.20
 0.0208333           5       1.20
 0.0694444           5       1.20
 0.0694444           5       1.20
 0.1388889           5       1.20
 0.2388889           5       1.20
 0.4083333           5       1.20
 0.9944444           5       1.20
 1.0944444           5       1.20
```

BCF PACKAGE

```
        0         0      -888         0        1.         1         0           ;Steady state
 0 0 0
        0        1.
       11        1.          (10F6.0)         0     DelR Control Record 70 Columns
 14000 12000 10000  8000  6000  4000  4000  4000  4000  4000
  2000  2000  2000  2000  2000  2000  2000  2000  2000  2000
   500   300   200   100   200   300   400  2000  2000  2000
  2000  2000  2000  2000  2000  2000  2000  2000  2000  2000
  2000  2000  2000  2000  2000  2000  2000  2000  2000  2000
  2000  2000  2000  2000  2000  2000  2000  2000  2000  2000
  2000  2000  2000  2000  2000  2000  4000  4000  4000  4000
  4000  6000  8000 10000 12000 14000
       11        1.          (10F6.0)         0     DelC Control Record 62 Rows
 14000 12000 10000  8000  6000  4000  4000  4000  4000  4000
  2000  2000  2000  2000  2000  2000  2000  2000  2000  2000
  2000  2000  2000  2000  2000  2000  2000  2000  2000  2000
  2000  2000  2000  2000  2000   400   200   150   100  99.5
   1.0 149.5   100 149.5   1.0 249.5   400  2000  2000  2000
  2000  2000  2000  2000  2000  2000  2000  2000  2000  2000
  2000  2000  2000  4000  4000  4000  4000  4000  6000  8000
 10000 12000 14000
       76   0.00020  (76f3.0)               -7     43    65      87                  ;S1 L1
       75    22.000  (20F10.0)              -7   10.404 12.485 16.646 18.727  20.808  ;k  L1
        0 0.0000003                         -7     .5    .6      .8    .9      1.     ;VCont, Layer 1&2
       76   .000155  (76f3.0)               -7     1     1.5     2      2.5     5     ;S L2
       75  1200.000  (20F10.0)              -7  668.45 1002.675 1336.9 1671.125 3342.25  ;k L2
        0  .001336  .0001336                       -7   0.00067    0.0067    0.067         ;VCont, Layer 2&3
        0  0.00015                                                                   ;S L3
        0    63838   127675                      -7                                        ;T L3
```

WELL PACKAGE (ZONE 1 AND ZONE 2 TEST)

2	0			2	0		
2	0			2	0		
1	39	24	-103950.3 Lower zone test We540 gpm	1	39	24	- 0.00 Lower zone test We540 gpm
2	39	24	- 0.00 Lower zone test We850 gpm	2	39	24	-163625.4 Lower zone test We850 gpm
-2				-2			
-3				-3			
-4				-4			
-5				-5			
-6				-6			
-7				-7			
-8				-8			
-9				-9			
-10				-10			
-11				-11			
-12				-12			
-13				-13			
-14				-14			
-15				-15			
-16				-16			
-17				-17			
-18				-18			
-19				-19			
-20				-20			
-21				-21			
-22				-22			
-23				-23			
-24				-24			
-25				-25			
-26				-26			
-27				-27			

GENERAL HEAD BOUNDARY PACKAGE

520	0			3	
520	0				
2	1	1	39	693e+15	1
2	1	2	40.094211	594e+15	2
2	1	3	41.387368	495e+15	3
2	1	4	42.967895	396e+15	4
2	1	5	45	297e+15	5
2	1	6	47.166667	198e+15	6
2	1	7	49.875	198e+15	7
2	1	8	52.583333	198e+15	8
2	1	9	55.291667	198e+15	9
2	1	10	58	198e+15	10
2	1	11	58.142857	99e+15	11
2	1	12	58.357143	99e+15	12
2	1	13	58.571429	99e+15	13
2	1	14	58.785714	99e+15	14
2	1	15	59	99e+15	15
2	1	16	59.2	99e+15	16
2	1	17	59.4	99e+15	17
2	1	18	59.6	99e+15	18
2	1	19	59.8	99e+15	19
2	1	20	60	99e+15	20
2	1	21	60.1	99e+15	21
2	1	22	60.2	99e+15	22
2	1	23	60.3	99e+15	23
2	1	24	60.4	99e+15	24
2	1	25	60.5	99e+15	25
2	1	26	60.56	99e+15	26
2	1	27	60.62	99e+15	27
2	1	28	60.68	99e+15	28
2	1	29	60.74	99e+15	29
2	1	30	60.8	99e+15	30
2	1	31	60.88	99e+15	31
2	1	32	60.96	99e+15	32
2	1	33	61.04	99e+15	33
2	1	34	61.12	99e+15	34
2	1	35	61.2	99e+15	35
2	1	36	61.26	99e+15	36
2	1	37	61.32	99e+15	37
2	1	38	61.38	99e+15	38
2	1	39	61.44	99e+15	39
2	1	40	61.5	99e+15	40
2	1	41	61.6	99e+15	41
2	1	42	61.7	99e+15	42
2	1	43	61.8	99e+15	43
2	1	44	61.9	99e+15	44
2	1	45	62	99e+15	45
2	1	46	62.1	99e+15	46
2	1	47	62.2	99e+15	47
2	1	48	62.3	99e+15	48
2	1	49	62.4	99e+15	49
2	1	50	62.5	99e+15	50
2	1	51	62.6	99e+15	51
2	1	52	62.7	99e+15	52
2	1	53	62.8	99e+15	53
2	1	54	62.9	99e+15	54
2	1	55	63	99e+15	55
2	1	56	63.1	99e+15	56
2	1	57	63.2	99e+15	57
2	1	58	63.3	99e+15	58
2	1	59	63.4	99e+15	59
2	1	60	63.5	99e+15	60
2	1	61	63.625	198e+15	61
2	1	62	63.71875	198e+15	62
2	1	63	63.8125	198e+15	63
2	1	64	63.90625	198e+15	64
2	1	65	64	198e+15	65
2	1	66	64	297e+15	66
2	2	67	64	396e+15	67
2	3	68	64	495e+15	68
2	4	69	64	594e+15	69
2	5	70	64	693e+15	70
2	57	1	20	693e+15	71
2	59	2	20	594e+15	72
2	61	3	20	495e+15	73
2	62	4	20	396e+15	74
2	62	5	20	297e+15	75
2	62	6	20.166667	198e+15	76
2	62	7	20.375	198e+15	77
2	62	8	20.583333	198e+15	78
2	62	9	20.791667	198e+15	79
2	62	10	21	198e+15	80
2	62	11	21.571429	99e+15	81
2	62	12	22.428571	99e+15	82
2	62	13	23.285714	99e+15	83
2	62	14	24.142857	99e+15	84
2	62	15	25	99e+15	85
2	62	16	25.8	99e+15	86
2	62	17	26.6	99e+15	87
2	62	18	27.4	99e+15	88
2	62	19	28.2	99e+15	89
2	62	20	29	99e+15	90
2	62	21	29.4	99e+15	91
2	62	22	29.8	99e+15	92
2	62	23	30.2	99e+15	93
2	62	24	30.6	99e+15	94

2	62	25	31	99e+15	95
2	62	26	31.4	99e+15	96
2	62	27	31.8	99e+15	97
2	62	28	32.2	99e+15	98
2	62	29	32.6	99e+15	99
2	62	30	33	99e+15	100
2	62	31	33.4	99e+15	101
2	62	32	33.8	99e+15	102
2	62	33	34.2	99e+15	103
2	62	34	34.6	99e+15	104
2	62	35	35	99e+15	105
2	62	36	35.2	99e+15	106
2	62	37	35.4	99e+15	107
2	62	38	35.6	99e+15	108
2	62	39	35.8	99e+15	109
2	62	40	36	99e+15	110
2	62	41	36.25	99e+15	111
2	62	42	36.5	99e+15	112
2	62	43	36.75	99e+15	113
2	62	44	37	99e+15	114
2	62	45	37.125	99e+15	115
2	62	46	37.25	99e+15	116
2	62	47	37.375	99e+15	117
2	62	48	37.5	99e+15	118
2	62	49	37.6	99e+15	119
2	62	50	37.7	99e+15	120
2	62	51	37.8	99e+15	121
2	62	52	37.9	99e+15	122
2	62	53	38	99e+15	123
2	62	54	38.4	99e+15	124
2	62	55	38.8	99e+15	125
2	62	56	39.2	99e+15	126
2	62	57	39.6	99e+15	127
2	62	58	40	99e+15	128
2	62	59	40.545455	99e+15	129
2	62	60	41.090909	99e+15	130
2	62	61	41.454545	198e+15	131
2	62	62	41.727273	198e+15	132
2	62	63	42	198e+15	133
2	62	64	43.310316	198e+15	134
2	62	65	44.620632	198e+15	135
2	62	66	45.668885	297e+15	136
2	62	67	46.417637	396e+15	137
2	62	68	47	495e+15	138
2	62	69	52.416667	594e+15	139
2	62	70	57	693e+15	140
2	2	1	38	693e+15	141
2	3	1	37.803279	594e+15	142
2	4	1	37.570791	495e+15	143
2	5	1	37.286639	396e+15	144
2	6	1	36.9213	297e+15	145
2	7	1	36.409826	198e+15	146
2	8	1	35.770484	198e+15	147
2	9	1	35.131141	198e+15	148
2	10	1	34.491799	198e+15	149
2	11	1	33.852457	198e+15	150
2	12	1	33	99e+15	151
2	13	1	32.692308	99e+15	152
2	14	1	32.384615	99e+15	153
2	15	1	32.076923	99e+15	154
2	16	1	31.769231	99e+15	155
2	17	1	31.461538	99e+15	156
2	18	1	31.153846	99e+15	157
2	19	1	30.846154	99e+15	158
2	20	1	30.538462	99e+15	159
2	21	1	30.230769	99e+15	160
2	22	1	29.923077	99e+15	161
2	23	1	29.615385	99e+15	162
2	24	1	29.307692	99e+15	163
2	25	1	29	99e+15	164
2	26	1	28.692308	99e+15	165
2	27	1	28.384615	99e+15	166
2	28	1	28.076923	99e+15	167
2	29	1	27.769231	99e+15	168
2	30	1	27.461538	99e+15	169
2	31	1	27.153846	99e+15	170
2	32	1	26.846154	99e+15	171
2	33	1	26.538462	99e+15	172
2	34	1	26.230769	99e+15	173
2	35	1	25.923077	99e+15	174
2	36	1	25.615385	99e+15	175
2	37	1	25.307692	99e+15	176
2	38	1	25	99e+15	177
2	39	1	24.692308	99e+15	178
2	40	1	24.384615	99e+15	179
2	41	1	24.076923	99e+15	180
2	42	1	23.769231	99e+15	181
2	43	1	23.461538	99e+15	182
2	44	1	23.153846	99e+15	183
2	45	1	22.846154	99e+15	184
2	46	1	22.538462	99e+15	185
2	47	1	22.230769	99e+15	186
2	48	1	21.923077	99e+15	187
2	49	1	21.615385	99e+15	188
2	50	1	21.307692	99e+15	189
2	51	1	21	99e+15	190
2	52	1	20.829509	198e+15	191
2	53	1	20.70164	198e+15	192

2	54	1	20.573772	198e+15	193
2	55	1	20.445903	198e+15	194
2	56	1	20.318035	198e+15	195
2	57	1	20.21574	297e+15	196
2	58	1	20.142672	396e+15	197
2	59	1	20.085842	495e+15	198
2	60	1	20.039344	594e+15	199
2	61	1	20	693e+15	200
2	2	70	65	693e+15	201
2	3	70	64.905139	594e+15	202
2	4	70	64.79303	495e+15	203
2	5	70	64.656008	396e+15	204
2	6	70	64.479837	297e+15	205
2	7	70	64.233197	198e+15	206
2	8	70	63.924898	198e+15	207
2	9	70	63.616599	198e+15	208
2	10	70	63.308299	198e+15	209
2	11	70	63	198e+15	210
2	12	70	62.94958	99e+15	211
2	13	70	62.87395	99e+15	212
2	14	70	62.798319	99e+15	213
2	15	70	62.722689	99e+15	214
2	16	70	62.647059	99e+15	215
2	17	70	62.571429	99e+15	216
2	18	70	62.495798	99e+15	217
2	19	70	62.420168	99e+15	218
2	20	70	62.344538	99e+15	219
2	21	70	62.268908	99e+15	220
2	22	70	62.193277	99e+15	221
2	23	70	62.117647	99e+15	222
2	24	70	62.042017	99e+15	223
2	25	70	61.966387	99e+15	224
2	26	70	61.890756	99e+15	225
2	27	70	61.815126	99e+15	226
2	28	70	61.739496	99e+15	227
2	29	70	61.663866	99e+15	228
2	30	70	61.588235	99e+15	229
2	31	70	61.512605	99e+15	230
2	32	70	61.436975	99e+15	231
2	33	70	61.361345	99e+15	232
2	34	70	61.285714	99e+15	233
2	35	70	61.210084	99e+15	234
2	36	70	61.134454	99e+15	235
2	37	70	61.058824	99e+15	236
2	38	70	60.983193	99e+15	237
2	39	70	60.907563	99e+15	238
2	40	70	60.831933	99e+15	239
2	41	70	60.756303	99e+15	240
2	42	70	60.680672	99e+15	241
2	43	70	60.605042	99e+15	242
2	44	70	60.529412	99e+15	243
2	45	70	60.453782	99e+15	244
2	46	70	60.378151	99e+15	245
2	47	70	60.302521	99e+15	246
2	48	70	60.226891	99e+15	247
2	49	70	60.151261	99e+15	248
2	50	70	60.07563	99e+15	249
2	51	70	60	99e+15	250
2	52	70	59.829509	198e+15	251
2	53	70	59.70164	198e+15	252
2	54	70	59.573772	198e+15	253
2	55	70	59.445903	198e+15	254
2	56	70	59.318035	198e+15	255
2	57	70	59.21574	297e+15	256
2	58	70	59.142672	396e+15	257
2	59	70	59.085842	495e+15	258
2	60	70	59.039344	594e+15	259
2	61	70	59	693e+15	260
1	20	1	55	693e+15	261
1	7	2	55	594e+15	262
1	4	3	55	495e+15	263
1	2	4	55	396e+15	264
1	1	5	53	297e+15	265
1	1	6	52.833333	198e+15	266
1	1	7	52.625	198e+15	267
1	1	8	52.416667	198e+15	268
1	1	9	52.208333	198e+15	269
1	1	10	52	198e+15	270
1	1	11	51.857143	99e+15	271
1	1	12	51.642857	99e+15	272
1	1	13	51.428571	99e+15	273
1	1	14	51.214286	99e+15	274
1	1	15	51	99e+15	275
1	1	16	50.8	99e+15	276
1	1	17	50.6	99e+15	277
1	1	18	50.4	99e+15	278
1	1	19	50.2	99e+15	279
1	1	20	50	99e+15	280
1	1	21	49.75	99e+15	281
1	1	22	49.5	99e+15	282
1	1	23	49.25	99e+15	283
1	1	24	49	99e+15	284
1	1	25	48.875	99e+15	285
1	1	26	48.75	99e+15	286
1	1	27	48.625	99e+15	287
1	1	28	48.5	99e+15	288
1	1	29	48.375	99e+15	289
1	1	30	48.25	99e+15	290

1	1	31	48.125	99e+15	291
1	1	32	48	99e+15	292
1	1	33	47.75	99e+15	293
1	1	34	47.5	99e+15	294
1	1	35	47.25	99e+15	295
1	1	36	47	99e+15	296
1	1	37	46.875	99e+15	297
1	1	38	46.75	99e+15	298
1	1	39	46.625	99e+15	299
1	1	40	46.5	99e+15	300
1	1	41	46.3	99e+15	301
1	1	42	46.1	99e+15	302
1	1	43	45.9	99e+15	303
1	1	44	45.7	99e+15	304
1	1	45	45.5	99e+15	305
1	1	46	45.4	99e+15	306
1	1	47	45.3	99e+15	307
1	1	48	45.2	99e+15	308
1	1	49	45.1	99e+15	309
1	1	50	45.0	99e+15	310
1	1	51	44.9	99e+15	311
1	1	52	44.5	99e+15	312
1	1	53	43.5	99e+15	313
1	1	54	12	99e+15	314
1	1	55	9.8	99e+15	315
1	1	56	9.2	99e+15	316
1	1	57	8.8	99e+15	317
1	1	58	8.6	99e+15	318
1	1	59	8.3	99e+15	319
1	1	60	8	99e+15	320
1	1	61	6.75	198e+15	321
1	1	62	5.8125	198e+15	322
1	1	63	4.875	198e+15	323
1	1	64	3.9375	198e+15	324
1	1	65	3	198e+15	325
1	1	66	2.0	297e+15	326
1	1	67	1.6	396e+15	327
1	1	68	1.1	495e+15	328
1	1	69	0.5	594e+15	329
1	1	70	0	693e+15	330
1	62	1	50	693e+15	331
1	62	2	50	594e+15	332
1	62	3	50	495e+15	333
1	62	4	50	396e+15	334
1	62	5	50	297e+15	335
1	62	6	49.5	198e+15	336
1	62	7	48.875	198e+15	337
1	62	8	48.25	198e+15	338
1	62	9	47.625	198e+15	339
1	62	10	47	198e+15	340
1	62	11	46.714286	99e+15	341
1	62	12	46.285714	99e+15	342
1	62	13	45.857143	99e+15	343
1	62	14	45.628571	99e+15	344
1	62	15	45.45	99e+15	345
1	62	16	45.2	99e+15	346
1	62	17	45.	99e+15	347
1	62	18	42.	99e+15	348
1	62	19	12.	99e+15	349
1	62	20	11.8	99e+15	350
1	62	21	11.6	99e+15	351
1	62	22	11.4	99e+15	352
1	62	23	11.2	99e+15	353
1	62	24	11.1	99e+15	354
1	62	25	11	99e+15	355
1	62	26	10.8	99e+15	356
1	62	27	10.6	99e+15	357
1	62	28	10.4	99e+15	358
1	62	29	10.2	99e+15	359
1	62	30	10	99e+15	360
1	62	31	9.8	99e+15	361
1	62	32	9.6	99e+15	362
1	62	33	9.4	99e+15	363
1	62	34	9.2	99e+15	364
1	62	35	9	99e+15	365
1	62	36	8.8	99e+15	366
1	62	37	8.6	99e+15	367
1	62	38	8.4	99e+15	368
1	62	39	8.2	99e+15	369
1	62	40	8.	99e+15	370
1	62	41	7.42	99e+15	371
1	62	42	5.66	99e+15	372
1	62	43	4.24	99e+15	373
1	62	44	3.52	99e+15	374
1	62	45	3.	99e+15	375
1	62	46	1.8	99e+15	376
1	62	47	0.6	99e+15	377
1	62	48	0.0	99e+15	378
1	62	49	0.0	99e+15	379
1	62	50	0	99e+15	380
1	62	51	0	99e+15	381
1	62	52	0	99e+15	382
1	62	53	0	99e+15	383
1	62	54	0	99e+15	384
1	62	55	0	99e+15	385
1	62	56	0	99e+15	386
1	62	57	0	99e+15	387
1	62	58	0	99e+15	388

1	62	59	0	99e+15	389
1	62	60	0	99e+15	390
1	62	61	0	198e+15	391
1	62	62	0	198e+15	392
1	62	63	0	198e+15	393
1	62	64	0	198e+15	394
1	62	65	0	198e+15	395
1	62	66	0	297e+15	396
1	62	67	0	396e+15	397
1	61	68	0	495e+15	398
1	58	69	0	594e+15	399
1	55	70	0	693e+15	400
1	2	4	55	693e+15	401
1	3	3	54.905139	594e+15	402
1	4	3	54.79303	495e+15	403
1	5	2	54.656008	396e+15	404
1	6	2	54.479837	297e+15	405
1	7	2	54.233197	198e+15	406
1	8	2	53.924898	198e+15	407
1	9	2	53.616599	198e+15	408
1	10	2	53.308299	198e+15	409
1	11	1	53	198e+15	410
1	12	1	52.846154	99e+15	411
1	13	1	52.615385	99e+15	412
1	14	1	52.384615	99e+15	413
1	15	1	52.153846	99e+15	414
1	16	1	51.923077	99e+15	415
1	17	1	51.692308	99e+15	416
1	18	1	51.461538	99e+15	417
1	19	1	51.230769	99e+15	418
1	20	1	51	99e+15	419
1	21	1	50.94271	99e+15	420
1	22	1	50.885421	99e+15	421
1	23	1	50.828131	99e+15	422
1	24	1	50.770841	99e+15	423
1	25	1	50.713551	99e+15	424
1	26	1	50.656262	99e+15	425
1	27	1	50.598972	99e+15	426
1	28	1	50.541682	99e+15	427
1	29	1	50.484392	99e+15	428
1	30	1	50.427103	99e+15	429
1	31	1	50.369813	99e+15	430
1	32	1	50.312523	99e+15	431
1	33	1	50.255233	99e+15	432
1	34	1	50.197944	99e+15	433
1	35	1	50.140654	99e+15	434
1	36	1	50.083364	99e+15	435
1	37	1	50.026074	99e+15	436
1	38	1	49.968785	99e+15	437
1	39	1	49.911495	99e+15	438
1	40	1	49.854205	99e+15	439
1	41	1	49.796916	99e+15	440
1	42	1	49.739626	99e+15	441
1	43	1	49.682336	99e+15	442
1	44	1	49.625046	99e+15	443
1	45	1	49.567757	99e+15	444
1	46	1	49.510467	99e+15	445
1	47	1	49.453177	99e+15	446
1	48	1	49.395887	99e+15	447
1	49	1	49.338598	99e+15	448
1	50	1	49.281308	99e+15	449
1	51	1	49.224018	99e+15	450
1	52	1	49.185825	198e+15	451
1	53	1	49.15718	198e+15	452
1	54	1	49.128535	198e+15	453
1	55	1	49.09989	198e+15	454
1	56	1	49.071246	198e+15	455
1	57	1	49.04833	297e+15	456
1	58	1	49.031961	396e+15	457
1	59	1	49.01923	495e+15	458
1	60	1	49.008814	594e+15	459
1	61	1	49	693e+15	460
1	2	70	0	693e+15	461
1	3	70	0	594e+15	462
1	4	70	0	495e+15	463
1	5	70	0	396e+15	464
1	6	70	0	297e+15	465
1	7	70	0	198e+15	466
1	8	70	0	198e+15	467
1	9	70	0	198e+15	468
1	10	70	0	198e+15	469
1	11	70	0	198e+15	470
1	12	70	0	99e+15	471
1	13	70	0	99e+15	472
1	14	70	0	99e+15	473
1	15	70	0	99e+15	474
1	16	70	0	99e+15	475
1	17	70	0	99e+15	476
1	18	70	0	99e+15	477
1	19	70	0	99e+15	478
1	20	70	0	99e+15	479
1	21	70	0	99e+15	480
1	22	70	0	99e+15	481
1	23	70	0	99e+15	482
1	24	70	0	99e+15	483
1	25	70	0	99e+15	484
1	26	70	0	99e+15	485
1	27	70	0	99e+15	486

1	28	70	0	99e+15	487	-17
1	29	70	0	99e+15	488	-18
1	30	70	0	99e+15	489	-19
1	31	70	0	99e+15	490	-20
1	32	70	0	99e+15	491	-21
1	33	70	0	99e+15	492	-22
1	34	70	0	99e+15	493	-23
1	35	70	0	99e+15	494	-24
1	36	70	0	99e+15	495	-25
1	37	70	0	99e+15	496	-26
1	38	70	0	99e+15	497	-27
1	39	70	0	99e+15	498	
1	40	70	0	99e+15	499	
1	41	70	0	99e+15	500	
1	42	70	0	99e+15	501	
1	43	70	0	99e+15	502	
1	44	70	0	99e+15	503	
1	45	70	0	99e+15	504	
1	46	70	0	99e+15	505	
1	47	70	0	99e+15	506	
1	48	70	0	99e+15	507	
1	49	70	0	99e+15	508	
1	50	70	0	99e+15	509	
1	51	70	0	99e+15	510	
1	52	69	0	198e+15	511	
1	53	69	0	198e+15	512	
1	54	69	0	198e+15	513	
1	55	68	0	198e+15	514	
1	56	68	0	198e+15	515	
1	57	68	0	297e+15	516	
1	58	68	0	396e+15	517	
1	59	67	0	495e+15	518	
1	60	67	0	594e+15	519	
1	61	67	0	693e+15	520	
-2						
-3						
-4						
-5						
-6						
-7						
-8						
-9						
-10						
-11						
-12						
-13						
-14						
-15						
-16						

SOLUTE TRANSPORT (SWIFT) MODEL INPUT FILES

12MGD

```
SOLUTE TRANSPORT MODEL OF COLLIER COUNTY UTILITIES WELLFIELD                          M1:TITLE 1   12
(SWIFT-486 SIMULATION OF CHLORIDE CONCENTRATION CHANGES)                              M1:TITLE 2
    4     0     0     0     0     0     0     0     0    01     1     0     0         M2:
   70    62     5     2     0     1     3     1     0  1300     0     2     0     0   M3:-1
    0     0     0     0                 -  5120  1040  1300    -2                     M3:-2
  3.20E-6    3.0E-6      0.0       1.0       1.0                                      R1_1:
      0.0       0.0      0.0       0.0      75.0       10.0       0.0E-0              R1_2:
    170.0   0.00000     68.0     62.40     64.01                                      R1_3:
    0     1     1     3                                                               R1_6:
      68.       1.0      68.       1.0                                                R1_7:
      78.       1.0                                                                   R1_9:
      78.       1.0                                                                   R1_10:
    3000.      68.0                                                                   R1_11:
       0.      68.0                                                                   R1_11:
   -3000.      68.0                                                                   R1_11:
    0     0                                                                           R1_12:
      68.  0.000000       0.0        0.0                                              R1_16:
14000 12000 10000  8000  6000  4000  4000  4000  4000  4000
 2000  2000  2000  2000  2000  2000  2000  2000  2000  2000
 2000  2000  2000  2000  2000  2000  2000  2000  2000  2000
 2000  2000  2000  2000  2000  2000  2000  2000  2000  2000
 2000  2000  2000  2000  2000  2000  2000  2000  2000  2000
 2000  2000  2000  2000  2000  2000  2000  2000  2000  2000
 4000  4000  4000  4000  4000  6000  8000 10000 12000 14000
14000 12000 10000  8000  6000  4000  4000  4000  4000  4000
 2000  2000  2000  2000  2000  2000  2000  2000  2000  2000
 2000  2000  2000  2000  2000  2000  2000  2000  2000  2000
 2000  2000  2000  2000  2000  2000  2000  2000  2000  2000
 2000  2000  2000  2000  2000  2000  2000  2000  2000  2000
 2000  2000  4000  4000  4000  4000  4000  6000  8000 10000
12000 14000
  100   350   150   200   600                                                         R1-19 thickness
      1.0       1.0       1.0        0.3       0.0       0.0  404.0345                R1_20:
   -1    -1    -1    -1    -1    -1           to read from file R_21.dat             R1_21-1:
                                                                                      R1_26-Blank:
    4     0                                                                           R1_27:
  -88    98   'r1_28.dat'                                                             R1_28-file and
BLANK

    1     0     0                                                                     R1_33-Blank
  -88    99   'i_2.dat'                                                               I_1: or I_1-Blank
     0.0                                                                              I_2: or I_1-Blank
    2     1     1     0     0     0     0     1     0     0     0                     R1A_2:
    2        0.5                          indt                                        R2_1:
   10                                                                                 R2_2:CIT/CIS
    1        0.0  320855.6                          production                        R2_4:
    2        0.0  320855.6                              "                             R2_6:
    3        0.0  320855.6                              "                             R2_6:
    4        0.0  320855.6                              "                             R2_6:
    5        0.0  320855.6                              "                             R2_6:
    6        0.0       0.0                          production                        R2_6:
    7        0.0       0.0                              "                             R2_6:
    8        0.0       0.0                              "                             R2_6:
    9        0.0       0.0                              "                             R2_6:
   10        0.0       0.0                              "                             R2_6:
                                                                                      R2_6:
                                                                                      R2_6:Blank
    1    21    36     3     3     1                     1                             R2_7-1:
0.480E+06 0.000E+00       68.0 0.000E+00                                              R2_7-2:
    2    22    36     3     3     1                     2                             R2_7-1:
0.480E+06 0.000E+00       68.0 0.000E+00                                              R2_7-2:
    3    23    36     3     3     1                     3                             R2_7-1:
```

```
0.480E+06 0.000E+00      68.0 0.000E+00                                             R2_7-2:
   4   24    36     3     3    1                        4                           R2_7-1:
0.480E+06 0.000E+00      68.0 0.000E+00                                             R2_7-2:
   5   25    36     3     3    1                        5                           R2_7-1:
0.480E+06 0.000E+00      68.0 0.000E+00                                             R2_7-2:
   6   26    36     3     3    1                        6                           R2_7-1:
0.480E+06 0.000E+00      68.0 0.000E+00                                             R2_7-2:
   7   27    36     3     3    1                        7                           R2_7-1:
0.480E+06 0.000E+00      68.0 0.000E+00                                             R2_7-2:
   8   28    36     3     3    1                        8                           R2_7-1:
0.480E+06 0.000E+00      68.0 0.000E+00                                             R2_7-2:
   9   24    36     4     4    1                        9                           R2_7-1:
0.480E+06 0.000E+00      68.0 0.000E+00                                             R2_7-2:
  10   25    36     5     5    1                       10                           R2_7-1:
0.480E+06 0.000E+00      68.0 0.000E+00                                             R2_7-2:
                                                                                    R2_7-Blank
   1   15    10                              :====>may want to use 1 1 10           R2_11:
     0.0          0.0                                                               R2_12:
   1    0     1     1    -1     1   010     0 0101     1    11    -1    -1    00    R2_13:
   1    1     1    -1    -1     0                                                   R2_14:
     6.0          6.0        0.0        0.0        0.0        0.0                   R2_14.5:
   1   70     1    62     1     4    -100.0        0.0                              R2_15:1
   1   70     1    62     1     4    -100.0        0.0                              R2_15:1
   0    0     1     0     0     0     0     0     1     0     0                     R2_1:
   2        0.5                                                                     R2_2:
   2                                                                                R2_11.5
     3.0          1.0        0.95       0.25       50.0        9.0        30.0   1.0R2_12:
   1    0     1     1    -1     1   010     0 0101     0    11    -1    -1    00    R2_13:
   2    1     1     0     0     0     0     2     0     0     0                     R2_1:
   2        0.5                        indt                                         R2_2:
  10                                                                                R2_4:
   1  320855.6  385026.7                          production                        R2_6:
   2  320855.6  385026.7                              "                             R2_6:
   3  320855.6  385026.7                              "                             R2_6:
   4  320855.6  385026.7                              "                             R2_6:
   5  320855.6  385026.7                              "                             R2_6:
   6       0.0  385026.7                          production                        R2_6:
   7       0.0  385026.7                              "                             R2_6:
   8       0.0  192513.4                              "                             R2_6:
   9       0.0       0.0                              "                             R2_6:
  10       0.0       0.0                              "                             R2_6:
                                                                                    R2_6:Blank
   1   21    36     3     3    1                        1                           R2_7-1:
0.480E+06 0.000E+00      68.0 0.000E+00                                             R2_7-2:
   2   22    36     3     3    1                        2                           R2_7-1:
0.480E+06 0.000E+00      68.0 0.000E+00                                             R2_7-2:
   3   23    36     3     3    1                        3                           R2_7-1:
0.480E+06 0.000E+00      68.0 0.000E+00                                             R2_7-2:
   4   24    36     3     3    1                        4                           R2_7-1:
0.480E+06 0.000E+00      68.0 0.000E+00                                             R2_7-2:
   5   25    36     3     3    1                        5                           R2_7-1:
0.480E+06 0.000E+00      68.0 0.000E+00                                             R2_7-2:
   6   26    36     3     3    1                        6                           R2_7-1:
0.480E+06 0.000E+00      68.0 0.000E+00                                             R2_7-2:
   7   27    36     3     3    1                        7                           R2_7-1:
0.480E+06 0.000E+00      68.0 0.000E+00                                             R2_7-2:
   8   28    36     3     3    1                        8                           R2_7-1:
0.480E+06 0.000E+00      68.0 0.000E+00                                             R2_7-2:
   9   24    36     4     4    1                        9                           R2_7-1:
0.480E+06 0.000E+00      68.0 0.000E+00                                             R2_7-2:
  10   25    36     5     5    1                       10                           R2_7-1:
0.480E+06 0.000E+00      68.0 0.000E+00                                             R2_7-2:
                                                                                    R2_7-Blank
   1   15    10                              :====>may want to use 1 1 10           R2_11:
   0  250    1.0E-05       1.0               :====>may want to use E-05        4,1.8R2_11.1:
   0  250    5.0E-15       1.0               :====>may want to use E-06             R2_11.1:
    60.0          3.0        0.95       0.25       50.0        9.0        30.0   1.0R2_12:
   1    0     1     1    -1     1   010     0 0101     0    11    -1    -1    00    R2_13:
```

```
 0    0    0    0    0    0    0    0    0    0    0
  120.0        6.0        0.95       0.25       50.0        9.0        30.0
 1    0    1    1   -1    1  010    0 0101    0   11   -1   -1   00
 0    0    0    0    0    0    0    0    0    0    0
  360.0       24.0        0.95       0.25       50.0        9.0        30.0
 1    0    1    1   -1    1  010    0 0101    0   11   -1   -1   00
 0    0    0    0    0    0    0    0    0    0    0
  720.0       30.0         0.0        0.0        0.0        0.0
 1    0    1    1   -1    1  010    0 0101    0   11   -1   -1   00
 0    0    0    0    0    0    0    0    0    0    0
1080.0       30.0
 1    0    1    1   -1    1  010    0 0101    0   11   -1   -1   00
 0    0    0    0    0    0    0    0    0    0    0
1800.0       30.0
 1    0    1    1   -1    1  010    0 0101    0   11   -1   -1   00
 0    0    0    0    0    0    0    0    0    0    0
2520.0       60.0
 1    0    1    1   -1    1  010    0 0101    0   11   -1   -1   00
 0    0    0    0    0    0    0    0    0    0    0
3600.0       60.0        0.95       0.25       50.0        9.0        30.0
 1    0    1    1   -1    1  010    0 0101    0   11   -1   -1   00
 0    0    0    0    0    0    0    0    0    0    0
4320.0       60.0        0.95       0.25       50.0        9.0        30.0
 1    0    1    1   -1    1  010    0 0101    0   11   -1   -1   00
 0    0    0    0    0    0    0    0    0    0    0
5400.0       90.0        0.95       0.25       50.0        9.0        30.0
 1    0    1    1   -1    1  010    0 0101    0   11   -1   -1   00
 0    0    0    0    0    0    0    0    0    0    0
7200.0      120.0        0.95       0.25       50.0        9.0        30.0
 1    0    1    1   -1    1  010    0 0101    0   11   -1   -1   00
 0    0    0    0    0    0    0    0    0    0    0
10800.0      360.0        0.95       0.25       50.0        9.0        30.0
 1    0    1    1   -1    1  010    0 0101    0   11   -1   -1   00
 0    0    0    0    0    0    0    0    0    0    0
14610.0      381.0        0.95       0.25       50.0        9.0        30.0
 1    0    1    1   -1    1  010    0 0101    0   11   -1   -1   00
 0    0    0    1    0    0    0    0    0    0    0
**********  END OF DATA FILE  **********
```

```
R2_1:
1.0R2_12:
R2_13:
R2_1:
1.0R2_12:
R2_13:
R2_1:
R2_14.5:
R2_13:
R2_1:
R2_12:
R2_13:
R2_1:
R2_12:
R2_13:
R2_1:
R2_12:
R2_13:
R2_1:
1.0R2_12:
R2_13:
R2_1:
1.0R2_12:
R2_13:
R2_1:
1.0R2_12:
R2_13:
R2_1:
1.0R2_12:
R2_13:
R2_1:
1.0R2_12:
R2_13:
R2_1:
```

```
20 MGD

SOLUTE TRANSPORT MODEL OF COLLIER COUNTY UTILITIES WELLFIELD                  M1:TITLE 1 20
(SWIFT-486 SIMULATION OF CHLORIDE CONCENTRATION CHANGES)                      M1:TITLE 2
    4     0     0     0     0     0     0     0     0   01     1     0     0  M2:
   70    62     5     2     0     1     3     1     0 1300     0     2     0     0  M3:-1
    0     0     0     0                 -     5120  1040 1300    -2          M3:-2
  3.20E-6     3.0E-6        0.0         1.0         1.0                       R1_1:
      0.0         0.0         0.0         0.0        75.0        10.0     0.0E-0  R1_2:
    170.0    0.00000        68.0       62.40       64.01                      R1_3:
    0    1    1    3                                                         R1_6:
       68.         1.0        68.         1.0                               R1_7:
       78.         1.0                                                       R1_9:
       78.         1.0                                                       R1_10:
     3000.        68.0                                                       R1_11:
        0.        68.0                                                       R1_11:
    -3000.        68.0                                                       R1_11:
    0    0                                                                   R1_12:
       68.  0.000000         0.0         0.0                                 R1_16:
 14000 12000 10000  8000  6000  4000  4000  4000  4000  4000
  2000  2000  2000  2000  2000  2000  2000  2000  2000  2000
  2000  2000  2000  2000  2000  2000  2000  2000  2000  2000
  2000  2000  2000  2000  2000  2000  2000  2000  2000  2000
  2000  2000  2000  2000  2000  2000  2000  2000  2000  2000
  2000  2000  2000  2000  2000  2000  2000  2000  2000  2000
  4000  4000  4000  4000  4000  6000  8000 10000 12000 14000
 14000 12000 10000  8000  6000  4000  4000  4000  4000  4000
  2000  2000  2000  2000  2000  2000  2000  2000  2000  2000
  2000  2000  2000  2000  2000  2000  2000  2000  2000  2000
  2000  2000  2000  2000  2000  2000  2000  2000  2000  2000
  2000  2000  2000  2000  2000  2000  2000  2000  2000  2000
  2000  2000  4000  4000  4000  4000  4000  6000  8000 10000
 12000 14000
   100   350   150   200   600
       1.0         1.0         1.0         0.3         0.0         0.0  404.0345  R1_20:
   -1    -1    -1    -1    -1    -1              to read from file R_21.dat    R1_21-1:

    4     0                                                                   R1_26-Blank
  -88    98  'r1_28.dat'                                                      R1_27:
BLANK                                                                         R1_28-file and

    1     0     0                                                           R1_33-Blank
  -88    99  'i_2.dat'                                                       I_1:
       0.0                                                                  I_2:
    2     1     1     0     0     0     0     1     0     0     0            R1A_2:
    2         0.5                           indt                            R2_1:
   10                                                                       R2_2:
    1         0.0  320855.6                          production             R2_4:
    2         0.0  320855.6                              "                  R2_6:
    3         0.0  320855.6                              "                  R2_6:
    4         0.0  320855.6                              "                  R2_6:
    5         0.0  320855.6                              "                  R2_6:
    6         0.0        0.0                    production                  R2_6:
    7         0.0        0.0                        "                       R2_6:
    8         0.0        0.0                        "                       R2_6:
    9         0.0        0.0                        "                       R2_6:
   10         0.0        0.0                        "                       R2_6:
                                                                            R2_6:
    1    21    36     3     3     1                          1              R2_6:Blank
0.480E+06 0.000E+00        68.0 0.000E+00                                   R2_7-1:
    2    22    36     3     3     1                          2              R2_7-2:
0.480E+06 0.000E+00        68.0 0.000E+00                                   R2_7-1:
    3    23    36     3     3     1                          3              R2_7-2:
0.480E+06 0.000E+00        68.0 0.000E+00                                   R2_7-1:
    4    24    36     3     3     1                          4              R2_7-2:
0.480E+06 0.000E+00        68.0 0.000E+00                                   R2_7-1:
    5    25    36     3     3     1                          5              R2_7-2:
0.480E+06 0.000E+00        68.0 0.000E+00                                   R2_7-1:
                                                                            R2_7-2:
```

```
   6   26   36    3     3    1                         6                    R2_7-1:
 0.480E+06 0.000E+00      68.0 0.000E+00                                     R2_7-2:
   7   27   36    3     3    1                         7                    R2_7-1:
 0.480E+06 0.000E+00      68.0 0.000E+00                                     R2_7-2:
   8   28   36    3     3    1                         8                    R2_7-1:
 0.480E+06 0.000E+00      68.0 0.000E+00                                     R2_7-2:
   9   24   36    4     4    1                         9                    R2_7-1:
 0.480E+06 0.000E+00      68.0 0.000E+00                                     R2_7-2:
  10   25   36    5     5    1                        10                    R2_7-1:
 0.480E+06 0.000E+00      68.0 0.000E+00                                     R2_7-2:
                                                                             R2_7-Blank
   1   15   10                                :====>may want to use 1 1 10   R2_11:
     0.0        0.0                                                          R2_12:
   1    0    1    1   -1    1  010     0 0101    1    11   -1   -1    00     R2_13:
   1    1    1   -1   -1    0                                                R2_14:
     6.0        6.0       0.0        0.0        0.0        0.0               R2_14.5:
   1   70    1   62    1    4    -100.0        0.0                           R2_15:1
   1   70    1   62    1    4    -100.0        0.0                           R2_15:1
   0    0    1    0    0    0    0    0    1    0    0                       R2_1:
   2        0.5                                                              R2_2:
   2                                                                         R2_11.5
     3.0        1.0       0.95       0.25       50.0        9.0       30.0  1.0R2_12:
   1    0    1    1   -1    1  010     0 0101    0    11   -1   -1    00     R2_13:
   2    1    1    0    0    0    0    2    0    0    0                       R2_1:
   2        0.5                        indt                                  R2_2:
  10                                                                         R2_4:
   1  356506.2                                                               R2_6:
   2  356506.2                                                               R2_6:
   3  356506.2                                                               R2_6:
   4  356506.2                                                               R2_6:
   5  356506.2                                                               R2_6:
   6  356506.2                                                               R2_6:
   7  356506.2                                                               R2_6:
   8  178253.1                                                               R2_6:
   9       0.0                                                               R2_6:
  10       0.0                                                               R2_6:
                                                                             R2_6:Blank
   1   21   36    3     3    1                         1                    R2_7-1:
 0.480E+06 0.000E+00      68.0 0.000E+00                                     R2_7-2:
   2   22   36    3     3    1                         2                    R2_7-1:
 0.480E+06 0.000E+00      68.0 0.000E+00                                     R2_7-2:
   3   23   36    3     3    1                         3                    R2_7-1:
 0.480E+06 0.000E+00      68.0 0.000E+00                                     R2_7-2:
   4   24   36    3     3    1                         4                    R2_7-1:
 0.480E+06 0.000E+00      68.0 0.000E+00                                     R2_7-2:
   5   25   36    3     3    1                         5                    R2_7-1:
 0.480E+06 0.000E+00      68.0 0.000E+00                                     R2_7-2:
   6   26   36    3     3    1                         6                    R2_7-1:
 0.480E+06 0.000E+00      68.0 0.000E+00                                     R2_7-2:
   7   27   36    3     3    1                         7                    R2_7-1:
 0.480E+06 0.000E+00      68.0 0.000E+00                                     R2_7-2:
   8   28   36    3     3    1                         8                    R2_7-1:
 0.480E+06 0.000E+00      68.0 0.000E+00                                     R2_7-2:
   9   24   36    4     4    1                         9                    R2_7-1:
 0.480E+06 0.000E+00      68.0 0.000E+00                                     R2_7-2:
  10   25   36    5     5    1                        10                    R2_7-1:
 0.480E+06 0.000E+00      68.0 0.000E+00                                     R2_7-2:
                                                                             R2_7-Blank
   1   15   10                                :====>may want to use 1 1 10   R2_11:
   0  250   1.0E-05       1.0                 :====>may want to use E-05  4,1.8R2_11.1:
   0  250   5.0E-15       1.0                 :====>may want to use E-06     R2_11.1:
    60.0        3.0       0.95       0.25       50.0        9.0       30.0  1.0R2_12:
   1    0    1    1   -1    1  010     0 0101    0    11   -1   -1    00     R2_13:
   0    0    0    0    0    0    0    0    0    0    0                       R2_1:
   120.0        6.0       0.95       0.25       50.0        9.0       30.0  1.0R2_12:
   1    0    1    1   -1    1  010     0 0101    0    11   -1   -1    00     R2_13:
   0    0    0    0    0    0    0    0    0    0    0                       R2_1:
   360.0       24.0       0.95       0.25       50.0        9.0       30.0  1.0R2_12:
```

```
 1     0     1     1    -1     1   010     0 0101     0    11    -1    -1    00          R2_13:
 0     0     0     0     0     0     0     0     0     0     0                          R2_1:
  720.0       30.0        0.0         0.0         0.0         0.0                      R2_14.5:
 1     0     1     1    -1     1   010     0 0101     0    11    -1    -1    00          R2_13:
 0     0     0     0     0     0     0     0     0     0     0                          R2_1:
1080.0       30.0                                                                     R2_12:
 1     0     1     1    -1     1   010     0 0101     0    11    -1    -1    00          R2_13:
 0     0     0     0     0     0     0     0     0     0     0                          R2_1:
1800.0       30.0                                                                     R2_12:
 1     0     1     1    -1     1   010     0 0101     0    11    -1    -1    00          R2_13:
 0     0     0     0     0     0     0     0     0     0     0                          R2_1:
2520.0       60.0                                                                     R2_12:
 1     0     1     1    -1     1   010     0 0101     0    11    -1    -1    00          R2_13:
 0     0     0     0     0     0     0     0     0     0     0                          R2_1:
3600.0       60.0        0.95        0.25        50.0         9.0        30.0       1.0R2_12:
 1     0     1     1    -1     1   010     0 0101     0    11    -1    -1    00          R2_13:
 0     0     0     0     0     0     0     0     0     0     0                          R2_1:
4320.0       60.0        0.95        0.25        50.0         9.0        30.0       1.0R2_12:
 1     0     1     1    -1     1   010     0 0101     0    11    -1    -1    00          R2_13:
 0     0     0     0     0     0     0     0     0     0     0                          R2_1:
5400.0       90.0        0.95        0.25        50.0         9.0        30.0       1.0R2_12:
 1     0     1     1    -1     1   010     0 0101     0    11    -1    -1    00          R2_13:
 0     0     0     0     0     0     0     0     0     0     0                          R2_1:
7200.0      120.0        0.95        0.25        50.0         9.0        30.0       1.0R2_12:
 1     0     1     1    -1     1   010     0 0101     0    11    -1    -1    00          R2_13:
 0     0     0     0     0     0     0     0     0     0     0                          R2_1:
10800.0      360.0        0.95        0.25        50.0         9.0        30.0       1.0R2_12:
 1     0     1     1    -1     1   010     0 0101     0    11    -1    -1    00          R2_13:
 0     0     0     0     0     0     0     0     0     0     0                          R2_1:
14610.0      381.0        0.95        0.25        50.0         9.0        30.0       1.0R2_12:
 1     0     1     1    -1     1   010     0 0101     0    11    -1    -1    00          R2_13:
 0     0     0     1     0     0     0     0     0     0     0                          R2_1:
**************** END OF DATA FILE ************************************
```

Binary files and model input files for sensitivity analysis are available in electronic format on request.