PETROGRAPHIC AND PETROPHYSICAL STUDY OF CORES

FROM THREE WELLS

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

HENDRY AND COLLIER COUNTIES,

FLORIDA

COLLIER CONSULTING, INC.

JUNE 10, 1998

PROCEDURE

This study consists of a petrographic and petrophysical analysis of seventeen cores from three wells in Hendry and Collier Counties, South Florida. The cores were provided by the South Florida Water Management District (SFWMD) and are as follows:

1. I-75-PW, Collier County
2. I WSD-PW, Collier County
3. L 2-PW, Hendry County

These cores were slabbed, photographed, and analyzed for porosity and permeability by Core Laboratories in Midland, Texas. The cores were examined, described, and core plugs for thin sections were selected by Ron Shaw and Dr. Hughbert Collier. Seventy-eight thin sections were made. The thin sections and slabbed cores were described for lithofacies, porosity types, visual porosity, rock type, cement type, lithology, mineralogy, facies, dominate allochems, fossil type, grain size, sorting, and sand content. All thin sections were stained with Alizarin Red S for dolomite content. The slabbed cores and thin sections were examined under a binocular Nikon SMZ-2T and a Nikon petrographic microscope.

The cores from the three wells contain four formations as noted from the lithologic well log printout provided by SFWMD. The formations are as follows:

1.	I-75-PW	3 cores	Hawthorn Formation
	910 - 913		
	945 - 956		
	1020 - 1023.5		
2.	IWSD-PW		
	882 - 889.4	2 cores	Suwannee Limestone
	955 - 962.1		
	1040 - 1049.7	4 cores	Ocala Group
	1060 - 1062.2		
	1080 - 1089.1		
	1090 - 1098		
3.	L2-PW		
	830 - 839.5	3 cores	Ocala Group
	1020 - 1029.8		
	1190 - 1199.1		

4. 1330 - 1339 5 cores Avon Park Formation
1480 - 1485
1580 - 1583.3
1630 - 1633.3
1710 -1711.3

The lithology of the cores is predominately limestone, with traces of dolomite, glauconite, thin beds of sandstone, and very sandy limestone. The I-75-PW and L2-PW cores contain only traces of sand while the IWSD-PW contains significant amounts of sand and some thin sandstone laminations.

Dolomitization was rare in two cores and scattered in one, occurring mainly as patches and secondary porosity rim occlusion. The I-75-PW and the IWSD-PW contain only traces of dolomite in some pore spaces. Most of the dolomite in the cores from these two wells occurs as very fine crystalline dolomite rim cement. The L2-PW core contains up to 60 % dolomite in two thin sections and 5 to 20 % in eight other thin sections. Most of these dolomite occurrences are in porosity molds and microcrystalline matrix (see the core description spreadsheets).

The study confirms that permeability is controlled by lithofacies. Analysis of additional wells should allow regional mapping of lithofacies, which can then be used to select the best locations for future wells.

I-75-PW

The I-75-PW is composed of three cores which are entirely in the Miocene Hawthorn Group. These rocks are mainly composed of peloidal packstone limestone with some interbedded grainstones, wackestones, and coquina. The lithofacies indicate moderate energy in an open lagoon shoal of the lower middle shelf. Evidence for three depositional cycles are observed from 910-956' - two regressive and one transgressive. Part of one cycle is present from 1020-1023.5'.

The dominant lithofacies of these cores is a foram-peloidal packstone with good interparticle and vuggy-moldic porosity. The best porosities and permeabilities are in the interbedded coquina, intraclastic-algal-foram-peloidal packstone-grainstone, and the bryozoan pelecypod wackestone to grainstone.

The best porosity occurs in a bryozoan-pelecypod wackestone to grainstone in a bryozoan mound complex at 951.6-956'. The permeabilities range from 1,026 to 2,339 MD and the porosity from 47.1 to 48.4 %.

The highest permeability values in these three cores occurs at 949.4-949.8' (core 2) in an intraclastic-algal-form-peloidal packstone-grainstone. This interval has a permeability of 17,294 MD and 42.9 % porosity. The lowest permeabilities are found in the skeletal peloidal to peloidal skeletal packstone lithofacies in core 3 from 1020 to 1022'.

IWSD-PW

The IWSD-PW well consists of six discontinuous cores from 882 to 1098'. This cored section contains rocks from the Oligocene Suwannee Formation and the Eocene Ocala Group. Overall, the cored section was sandy peloidal packstone, but it also contains interbedded coquinas, algal boundstones, significant intraclastic dominated packstones, and sandy to very sandy packstones. The lithofacies were formed in an open and a restrictive lagoon environment with a strong clastic influx during Suwannee times and minor sand influx in Ocala times. The sand content of the IWSD-PW is the greatest of the three wells examined in this study.

The upper two cores, cores 1 and 2, are in the Suwannee Formation. Two depositional cycles are represented by these cores, but the interval from 889.4-955' was not cored. The Suwannee is dominated by intraclastic and sandy packstones. This in contrast to the Ocala Group cores, which are less intraclastic and sandy. The two Suwannee cores represent deposition in a more restrictive part of the lagoon of the middle shelf than the cores from the Ocala Group, which were deposited in a more open part of the lagoon.

The porosities and permeabilities of the Suwannee section are much lower in core 1 that in core 2. Most porosities are in the low 20's % and the permeabilities are less that 200 MD. The best porosities and permeabilities are in the skeletal-rich intraclastic-peloidal lithofacies. The porosities range from 18.4 to 32.9 % and the permeabilities range from 42.2 MD to 3,161 MD. Core two (955.0-962.1') has much higher porosities and permeabilities. The permeabilities range from 241 to 1,350 MD and the porosities range from 23.7-39.1 %. The higher porosities and permeabilities in core two (955 to 962.1') are in a skeletal-coated grain-

peloidal packstone of a back bank to shoal flank environment. Also, core 2 is better sorted than core 1.

The Ocala Group is represented by four discontinuous cores from 1040 to 1098'. The Ocala Group is dominated by pelecypod wackestones to packstone and coquinas. The coquinas represent deposition in a shoal environment of the open lagoon. Three depositional cycles are represented by the cores, but are discontinuous because the cores are discontinuous.

The highest permeabilities are in core 4 (1060-1062.2') and the highest porosities are in core 6 (1090-1098'). These values are in the coquina and the grainstone lithofacies (a peloidal pelecypod wackestone-packstone-coquina has 10,018 to 14,720 MD and a peloidal-pelecypod coquina has 484 to 10,936 MD). The highest overall porosities are in core 3 and core 4 coquina lithofacies, but the highest porosity (41.2 %) is in a bryozoan-foram-peloidal grainstone of a shoal environment. Core 4 has more interparticle porosity and therefore more permeability than core 3.

L2-PW

The L2-PW well is composed of 8 discontinuous cores from 830 to 1711.3'. The 8 cores are from the Eocene Ocala Group, 830 to 1199.1', and the Avon Park Formation, 1330 to 1711.3'. These cores are dominated by foram-peloidal packstone lithofacies, but contain wackestones, intraclastic wackestones to packstones, and large foram Lepidocyclina and Nummulities bafflestones to wackestones. The Ocala Group and Avon Park of this well are more laminated and contain more wackestones than the other two wells. The porosities of the L2-PW are similar to the other wells, but the permeabilities are significantly lower, ranging from 21.3 to 643 MD.

Core 1 is composed of Lepidocyclina and wackestone to bafflestone from 830-839.5'. Core 2 is dominated by Nummulites-foram-peloidal wackestone to packstone from 1020 to 1026.9'. Both of the cores have porosities similar to the other two wells, which have more vuggy moldic. The base of the Ocala cores is dominated by foram-peloidal packstones with permeabilities from 24.7 to 185 MD and porosities of 32 to 43.5 %. Some interbedded algal lamination occurred from 1194.1 to 1199.1'. The best porosities are found in the peloidal packstones of these laminated lithofacies.

The Eocene Avon Park Formation is composed of five discontinuous cores (cores 4-8) from 1330 to 1711.3'. These five cores are dominated by foram-peloidal packstones and peloidal-intraclastic packstones. The lower two cores are wackestone dominated. The lower permeabilities of these five cores are higher than those of the overlying Ocala Group, but the porosities are similar. In the Avon Park cores the highest permeabilities are in the slightly intraclastic-foram-sponge-peloidal packstones at 1580 to 1583.2' (643 MD) and the slightly laminated foram-peloidal packstone to foram-intraclastic peloidal packstone at 1334.7 to 1339.9' (639 MD). Porosities in the Avon Park are, overall, slightly lower than in the overlying Ocala Group. The best porosity is 39.6 % in the laminated foram-peloidal packstone at 1480 to 1481'.

The depositional environment of the Avon Park cores is an open to a restrictive lagoon with cores 7 and 8 in a more restrictive part (based on the presence of lower energy laminated wackestones).

The Avon Park Formation shows an overall higher energy, deepening upward sequence going from restrictive part-laminated foram-peloidal wackestones upward to peloidal-foram-packstones. Six individual depositional cycles are recognized in the five cores, but there may be many more since there is 100+ feet of section between some cores.

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

CORE DESCRIPTIONS

I-75-PW

COLLIER COUNTY, FLORIDA

HAWTHORN GROUP

Open lagoon shoal
910 - 911.8
Limestone, cream-white, very fine-fine grained, foram-peloid packstone-wackestone. Trace coarse grained, good porosity, interparticle with scattered moldic and vugs, common foram intraparticle, slightly glauconitic, increasing porosity at 911.8'; increasing foram pellet packstone.

Shoal
911.8 - 913
Limestone, molluscan, coquina-rudstone, yellow gray, fine-pebble grained, poor sorted, very porous, good interparticle and moldic porosity.

Open lagoon shoal
945 - 946.8
Limestone, yellow gray, ostracod-foram-peloidal packstone-grainstone, fine-medium grained, well sorted, slightly laminated, with fine to medium size fair to good intraparticle porosity, a trace of rare large vugs.

Open lagoon shoal
946.8 - 947
Limestone, yellow gray, foram-peloidal packstone, medium grained, well sorted, with good interparticle moldic porosity, fair to good intraparticle porosity, increasing vuggy porosity with increasing grain size.

Restrictive lagoon shoal
947 - 947.25
Limestone, yellow gray, slightly laminated, foram-peloidal packstone, fine to medium grained, moderate well sorted, very porous with abundant good interparticle and vuggy moldic porosity, traces of coarse to very coarse vugs.

Open lagoon shoal
947.25 - 950.75
Intraclast-algal-foram-peloidal packstone, very fine 5% coarse to granular grained, moderately sorted, very porous, interparticle-vuggy moldic.
Abundant 2-3 mm algae at 950', scattered 1-5 mm vugs.

Open lagoon shoal
950.75 - 951.6
Limestone, very pale orange, slightly laminated, foram-peloidal packstone, fine very fine grained, with very fine-fine size vugs and molds scattered intraparticle porosity.

Bryozoan mound
951.6 - 955
Limestone, very light brown to pale orange, gastropod-bryozoan-pelecypod wackestone-grainstone-rudstone, fine to very coarse grained, some pebble, very poor sorted, with good vuggy moldic porosity, scattered 40 mm bryozoan molds, abundant bryozoan molds at 952-953', pelecypod shells dominate below 953', bivalve packstone-wackestone.

955 - 956
Limestone, yellow gray, gastropod-molluscan-packstone, abundant 5-15 mm mollusca, scattered bryozoan, trace gastropod.

Restrictive lagoon
1020 - 1020.3
Limestone yellow gray, coarse-granular some pebble grained, gastropod-molluscan coquina, with abundant very good moldic and interparticle porosity and scattered large vugs 5-10 mm size.

Mound flank
1020.3 - 1023.5
Limestone, white, very fine-medium grained, skeletal packstone with abundant very fine size vuggy moldic porosity, trace medium size vugs and scattered intraparticle porosity, discontinuous slightly laminated at 1020.5-1020.6'.

1021
Limestone, yellow gray, ostracod-foram-peloidal packstone, medium-coarse grained, well sorted, with good foram moldic-intraparticle porosity and good interparticle porosity.

SOUTH FLORIDA WELL MANAGEMENT DISTRICT

CORE DESCRIPTIONS

IWSD-PW

COLLIER COUNTY, FLORIDA

SUWANNEE LIMESTONE

Core #1

Open lagoon shoal-backbank
882 - 882.7
Limestone, light gray-yellow gray, peloidal-coated quartz sand-intraclastic packstone, sandy, very intraclastic, granular size, traces interparticle-large molds, rudstone 882.2-882.4'.

Open lagoon shoal-algal mound
882.7 - 887.5
Limestone, yellow gray-pale orange, very sandy-skeletal slightly intraclastic-peloidal packstone fine-very coarse grained .2-1 mm, moderately well sorted, sandy (angular-subangular), fair scattered interparticle porosity, some scattered vugs.

Restrictive lagoon
887.5 - 888.7
Limestone, pale yellow brown-yellow gray slightly laminated, slightly sandy-intraclastic-peloidal packstone with some algal laminations and scattered algal balls, fair to poor interparticle and scattered vug porosity, 887.6' interlaminated algae with scattered vugs and microporosity, small patches microcrystalline to very fine crystalline dolomite in interconnected vugs, trace rudstone at 887.4-887.6'.

Restrictive lagoon
888.7 - 889.4
Skeletal-peloidal-intraclastic packstone, very intraclastic, 5-30 mm rounded pebble size, fair bivalve moldic, (3-10 mm molds) scattered .5 mm molds. 888.9' coated sand.

Open lagoon shoal flank-backbank
995 - 962.1
Limestone, yellow gray skeletal phylloid algal-coated grain-peloidal packstone, slightly laminated, abundant echinoid, moderately sorted. Good moldic interparticle porosity, scattered algal molds and secondary vugs, fair secondary

molds with "free floating" coatings at 956' sandy echinoid packstone-grainstone, moderately sorted, bimodal, abundant secondary floating porosity.

957.8
Slightly cemented echinoid overgrowth, slightly sandy-peloidal-echinoid grainstone, very porous interparticle, trace foram intraparticle porosity.

Core #2

960.7
Sandy echinoid-bryozoan grainstone, lots of secondary vugs and floating grains very good very porous vuggy interparticle porosity.

961
Very porous diagonal vugs and secondary vugs .3 mm-granular size, trace large gastropods (3.5 cm) molds.

961.4
Slightly dolomitized, slightly sandy peloidal-echinoid grainstone, poorly sorted, part recrystallized .2-1 mm, very good vugs, traces rim cement dolomite.

OCALA GROUP

Open lagoon shoal flank-shoal
1040 - 1041
Limestone, yellow gray, coquina, very sandy, friable, very fine-fine grain, pelecypod wackestone, poor vuggy porosity.

Core #3

Open lagoon
1041 - 1044
Limestone yellow gray, sandy, intraclastic-ostracod-pelecypod-peloidal wackestone, scattered moldic porosity, poor vuggy interparticle.

Open lagoon-shoal
1044 - 1049.7
Limestone, gray orange-yellow gray brown, peloidal, coquina, sandy, with trace gastropod, fine-granular grained, pebble, 3-25 mm most 10-15 mm, moderately well sorted, very good vuggy pelecypod moldic porosity, scattered oversized vugs, part occluded by very fine secondary calcite cement.

Open lagoon-shoal
1060 - 1062.2
Limestone, slightly sandy, gastropod-peloidal-pelecypod wackestone-packstone, very fine granular grained, very poor sorting, fair scattered moldic porosity, some interparticle porosity, trace intraparticle, good interconnected molds.

Backbank
1080 - 1089.1
Limestone, yellow gray with very light gray intraclasts, sparsely intraclastic-gastropod-echinoid-pelecypod-foram peloidal packstone very fine-coarse grained-pebble very slightly sandy, very fine to fine grained, good interparticle, fair intraparticle-moldic porosity, scattered large molds (molds .5-2.5 mm), trace intraclast (2.5-8 cm).

1083.5 - 1083.6
Trace of very fine microcrystalline dolomite rim cement in molds at 108.6', 30% dolomitic recrystallized poor porosity at 1080-1082', fair moldic porosity at 1082-1088'.

Open lagoon-shoal
1090 - 1096
Limestone, yellow gray, foram-peloidal packstone, fine-medium grained, well sorted 30% echinoid at 1093.8', fair very fine-fine size interparticle porosity, poor interparticle at 1093', scattered intraparticle and a trace moldic porosity, trace molluscan and scattered bryozoan.

Open lagoon shoal-backbank
1096 - 1098
Limestone, yellow gray bryozoan-foram-peloidal grainstone highly burrowed fine-medium grained, well sorted, very good interparticle porosity with a trace of moldic porosity, 5% slightly cemented, patchy interparticle and intraparticle porosity at 1097.7', trace dolomite, very fine crystalline rim cement.

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

CORE DESCRIPTIONS

L2-PW

HENDRY COUNTY, FLORIDA

OCALA GROUP

Open lagoon foram bank
830 - 839.5
Limestone, very light gray-very pale orange, Lepidocyclina (sp) wackestone-packstone, very fine to very coarse grained, very poor sorted; fair scattered vuggy moldic porosity, medium to coarse size, trace intraparticle scattered shelter porosity at 832.4'. Grades downward into skeletal pellet wackestone, very fine to very coarse grained, large sponge 837.3-837.6'.

Open lagoon foram bank
1020 - 1026.9
Limestone, very light yellow gray, slightly laminated (1020-1021') slightly dolomitic (10-20% in matrix) porosity Nummulites (sp) (some sponge?), Foram-pellet wackestone-packstone, scattered dolomite occlusions in Nummulites molds, scattered Nummulites moldic porosity, 3-15 mm abundant vuggy interparticle porosity at 1020', fine to very fine size, some abundant porosity.

Restrictive lagoon
1026.9 - 1029.8
Limestone, very light yellow gray to very pale orange, foram-peloidal packstone, very thinly laminated, moderate well sorted, bimodal. Scattered isolated vugs and intercrystalline porosity, slightly dolomitic, partly cemented molds with increased cementation 1027.7'. Abundant moldic microporosity at 1029 to 1026.9', slightly dolomitic (20% very fine) intercrystalline porosity.

Restrictive lagoon
1190 - 1190.5
Limestone, grayish orange, peloidal-intraclastic packstone, fine grained-granular trace pebble, poor sorted.

1190.5 - 1190.9
Fine to coarse crystalline, thinly laminated, wavy.

Restrictive lagoon
1190.9 - 1191.75
Limestone, very light orange-very light brown, foram-peloidal packstone, thinly-very thinly laminated, microcrystalline to very fine crystalline, interlaminated, very fine to fine grained, and very fine grained, slightly porous to very porous, some abundant microporosity, possible very thin stylolites.

Restrictive lagoon
1191.75 - 1194.1
Limestone yellow gray-very pale orange, foram-peloidal wackestone-packstone, very fine to fine grained, with scattered vuggy porosity (2-5 mm) some foram intraparticle, very fine to fine size vuggy molds, some vertical vugs at top, increasing microporosity at 1193', some partly recrystallized laminae, some microfaults offset laminae.

Restrictive lagoon-intertidal
1194 - 1199.1
Limestone, very light orange-yellow gray, slightly laminated, wavy to slightly inclined, foram-peloidal packstone-pellet packstone interlaminated with intraclastic algal peloidal boundstone laminae, very fine grained packstone, some laminae with good vuggy and microporosity. Some medium grained laminae at 1198.5'.

AVON PARK FORMATION

Restrictive shoal bank
1330 - 1331.6
Limestone, yellow gray peloidal-foram-intraclast packstone, (3-4 mm intraclast) very fine-pebble grained, very poor sorted, fair vuggy moldic porosity with a trace intraparticle porosity.

Restrictive lagoon shoal
1331.6 - 1332
Very light brown-very light orange, foram-peloidal packstone, interlaminated, thin-very thin inclined, 1331.5' slightly dolomitic matrix.

Restrictive lagoon shoal
1332 - 1334.3
Yellow gray, peloidal-foram packstone, very fine-fine grained, moderately sorted, good interparticle foram porosity, some large vertical vugs at 1332'.

peloidal packstone, good interparticle, traces very fine crystalline dolomite rim cement in pore. 1631' grayish orange-yellow brown, discontinuous slightly wavy laminate, good vuggy moldic increasing downward.

Restrictive lagoon
1631.6 - 1633.3
Limestone, foram-peloidal wackestone, orange gray, nonlaminated, part recrystallized, very fine crystalline, very fine-fine grained, with abundant microporosity, fair scattered vuggy moldic porosity. Traces very fine crystalline rim cement in pores.

Restrictive lagoon
1710 - 1711
Limestone, very light brown-yellow gray, foram-peloidal wackestone with patches of very porous vuggy interparticle porosity abundant very porous moldic vuggy porosity at 1710.5-174', abundant microporosity at 1710.5-1711', slightly laminated, trace vertical vugs, trace very fine crystalline rim dolomite cement in molds.

Restrictive lagoon shoal flank
1711 - 1711.3
Limestone, light gray brown, foram-peloidal intraclastic wackestone very fine-fine grained some granular-pebble size, poorly sorted, with fair scattered vuggy moldic porosity, some foram moldic, some large diagonal vugs 5-45 mm.

SOUTH FLORIDA PROJECT

WELL	LOGS WE HAVE	OTHER SERVICES	CURVES on LOG	CURVES WE HAVE	DIGITIZED INTERVAL	SCALE (IN)	FILENAME	REMARKS	BLI (1)	TLI (1)	BLI (2)	TLI (2)	BIT SIZE	RM @ TEMP	RW @	CORE INT.	CORE FILE	SGR INT.	SGR FILE	WELL
LAB-TW	Differential Temperature Log Spinner/X-Y Caliper	DIFL/GR, DAL/GR, X-Y CALIPER, TEMP/FLOWMETER	GR, CAL 1-3, CAL 2-4, SPEED, DIFF TENSION, TEMP, DIFF TEMP	SP	690-2460	5	LABGEO2.PRN	NO CENTRALIZER	1084	204	2407	678	9.875	3.02ohmm @ 75 DEGF						LAB-TW
	Multiple array Acoustilog, monopole compressional quality control plot	DIFL-ZDL-CN, SPINNER, 4-ARM	GR, CAL, RCVR DT, TTQC COMPRESSION, DDBHC COMPRESSIONAL DTC, Xmtr DTC, Rcvr DTC, R-Qu, X-Qu	GR		5	LABGEO2.PRN	Run 1: DAL, No full waveforms; Run 2: MAC, made several passes over zone between 1800 and 1700	1084	204	2454	678	9.875	3.02ohmm @ 75 DEGF						
	Multiple array Acoustilog,Dipole shear	DIFL-ZDL-CN, SPINNER, 4-ARM	GR, CAL, FLEXURAL DT, TT QC SHEAR, COMPRESSIONAL DT, FLEXURAL DT, Vp/Vs	RILM, RILD		5	LABGEO2.PRN	Run 1: DAL, No full waveforms; Run 2: MAC, made several passes over zone between 1800 and 1701	1084	204	2454	678	9.875	3.02ohmm @ 75 DEGF						
	Multiple array Acoustilog, compressional and shear slowness, CNL GR	DIFL-ZDL-CN, SPINNER, 4-ARM	GR, VP/VS, CAL, DTC, FLEXURAL SHEAR, NEUTRON POROSITY	DCAL		5	LABGEO2.PRN	Run 1: DAL, No full waveforms; Run 2: MAC, made several passes over zone between 1800 and 1702	1084	204	2454	678	9.875	3.02ohmm @ 75 DEGF						
	Compensated Neutron Log, Gamma Ray Log	DIFL/GR, DAL/GR, X-Y CALIPER, TEMP/FLOWMETER	GR, Z-DENSITY POROSITY (PORZ), NEUTRON POROSITY (CNCF)	RFOC		1	LABGEO2.PRN	Porz Recorded on limestone matrix (2.71 G/CC), CNCF recorded on limestone matrix with caliper correction	1084	204	2454	678	9.875	3.02ohmm @ 75 DEGF						
	Multiple Array Acoustilog, Gamma Ray Log	N/A	GR, 2FT DELTA-T [DT24]	PE		1	LABGEO2.PRN	NONE	1084	204	2407	678	9.875	3.02ohmm @ 75 DEGF						
	Dual Induction Focused Log, Gamma Ray Log	DIFL/GR	GR, SP, DIFF TENSION, RILD, RILM, RFOC (Shallow)	ZDEN		1	LABGEO2.PRN	Porz Recorded on limestone matrix (2.71 G/CC), CNCF recorded on limestone matrix with caliper correction	1084	204	2407	678	9.875	3.02ohmm @ 75 DEGF						
	4-Arm Caliper Log, Gamma Ray Log	N/A	GR, KTH, CAL, URAN, POTA, THOR, CALIPER 1-3, CALIPER 2-4	ZCOR		1	LABGEO2.PRN	Porz Recorded on limestone matrix (2.71 G/CC), CNCF recorded on limestone matrix with caliper correction	1084	204	2407	678	9.875	3.02ohmm @ 75 DEGF						
	Epilog Complex Reservoir Analysis	N/A	GR, GR. DENS., PERM, SW, TOTAL POR, H20 POR, SH, SND, LIME, DOLO, ANYDRITE, TOTAL POROSITY	CNCF		5	LABGEO2.PRN	Density and Neutron curves are affected due to large bore-hole size. Were environmentally corrected & edited where	2470	670			9.875	3.02ohmm @ 75 DEGF						
	Epilog Flow Profile Analysis	N/A	SPD, TEMP, CAL13, SPNR, CUM. FLOW	DT, PORZ		1	LABGEO2.PRN	NONE	1084	600			9.875	3.02ohmm @ 75 DEGF						
L2-TW RUN3	Compensated Neutron Formation Density	XY CAL/GR, TEMP, DIL/LL3/SP, FLOWMETER	GR, CALI, DPHI, NPHI, DRHO, RHOB	GR, DENS, SGR	740-2230	5	L2GEO.PRN	Density Matrix=2.71 G/CC, Neutron Matrix= Lime, Logging Speed 20 fpm	2098	726			11.5"-742, 17"-742, 11"-2230	?		830-839 1020-1029	COREAL2.PRN COREBL2.PRN	830-839.5 1020-1029.8	16ALOG.PRN 16BLOG.PRN	L2-TW RUN3
	BHC Sonic, VDL Gamma Ray	CNL/FDC, TEMP, DIL/LL3/SP, FLOWMETER	GR, DT, VDL1	RILM, RILD,CGR		5	L2GEO.PRN	Delta-T Presentation	2098	727			11.5"-742, 17"-742, 11"-2231			1190-1198 1330-1338	CORECL2.PRN COREDL2.PRN	1190-1199.1 1330-1339	16CLOG.PRN 16DLOG.PRN	
	Dual Induction, LL3, Gamma Ray, SP	CNL/FDC, TEMP, XY CAL/GR, FLOWMETER	GR, SP, LL3, ILM, ILD	CALI, POR		5	L2GEO.PRN	NONE	2098	700			11.5"-742, 17"-742, 11"-2232			1480-1484 1580-1583	COREEL2.PRN COREFL2.PRN	1480-1485 1580-1583.3	16ELOG.PRN 16FLOG.PRN	
	XY Caliper, Gamma Ray	CNL/FDC, TEMP, DIL/LL3/SP, FLOWMETER	GR, Y-CALIPER, X-CALIPER	POTA, URAN		5	L2GEO.PRN	NONE	2236	700			11.5"-742, 17"-742, 11"-2233			1630-1631 1710-1711	COREHL2.PRN COREGL2.PRN	1630-1632.07 1710-1711.3	16GLOG.PRN 16FLOG.PRN	
	High Resolution Temperature	CNL/FDC, XYCAL/GR, DIL/LL3/SP, FLOWMETER	MC: TEMPERATURE, DELTA TEMPERATURE, TEMPERATURE	THOR, DT, RLL3		5	L2GEO.PRN	Data gathered logging down	2236	700			11.5"-742, 17"-742, 11"-2234							
	Flowmeter	CNL/FDC, TEMP, DIL/LL3/SP, XYCAL/GR	LINE SPEED, RAW DATA CCW, RAW DATA CW	DPHI,DPHI, DEGF, FLOWD, FLOWU		5	L2GEO.PRN	Data gathered logging up, all flowmeter blips associated with line speed, blips due to impeller stoppage from debris. 1 Revolution=10 CPS = 6" travel	2096	700			11.5"-742, 17"-742, 11"-2235							
I75-TW	Dual Induction, LL3/SP, Gamma Ray Log	CAMERA/XYCAL, HRT/FDC/CNL, BHC/VIL,	GR BACKUP, SP, GR, LL3, ILM, ILD	SP, GR, DENS	900-2380	5	I75-GEO.PRN	Repeat section logged at the top of the hole due to hole conditions	2369	875			7 7/8"		.34 @ 73 DEGF	910-912	175ACORE.PRN	910-913	18ALOG.PRN	I75-TW
	Compensated Bulk Density Log	DIL, HRT, CNL, BHC, FLOW, XYCALGR	CALI, RHOB, DRHO	ILM, ILD, POR		1,2,5	I75-GEO.PRN	NONE	2380	865			7 7/8"		.34 @ 73 DEGF	945-955	175BCORE.PRN	945-956	18BLOG.PRN	
	XY Caliper, Gamma Ray Log	CAMERA/DIL, HRT/FDC/CNL, BHC/VIL, FLOWMETER	GR BACKUP, GR, Y-CALIPER, X-CALIPER	POTA, URAN		5	I75-GEO.PRN	Repeat section logged at the top of the hole due to hole conditions, cement in bottom of casing drilled with 7 7/8"	2371	875			7 7/8"		.34 @ 73 DEGF	1021-1022	175CCORE.PRN	1020-1023.5	18CLOG.PRN	
	Borehole Compensated Sonic VIL Gamma Ray	CAMERA/DIL, HRT/FDC/CNL, XYCAL, FLOWMETER	GR BACKUP, BR, SPHI, DT, VDL4	THOR,DT,DRHO		5	I75-GEO.PRN	Repeat section logged at the top of the hole due to hole conditions	2366	875			7 7/8"		.34 @ 73 DEGF					
	High Resolution Temperature Log	DIL, CDL, CNL, BHC, FLOW, XYCALTR	MC: TEMPERATURE, DELTA TEMPERATURE, TEMPERATURE	DPHI, LL3,TEMP		5	I75-GEO.PRN	NONE	2380	865			7 7/8"		.34 @ 73 DEGF					
	Compensated Density Compensated Neutron	DIL, HRT, BHC, FLOW, XYCALGR	CALI, NPHI, DPHI	XCAL,YCAL,NPHI		1,2,5	I75-GEO.PRN	NONE	2380	865			7 7/8"		.34 @ 73 DEGF					
	Dynamic Flowmeter Log	DIL, CDL, CNL, BHC, HRT, XYCALGR	LINE SPEED, SPINNER CCW	CGR, SGR		5	I75-GEO.PRN	FLOWRATE=230 GPM, Tool was stopped momentarily at 1645 feet	2380	780			7 7/8"		.34 @ 73 DEGF					
IWSD-TW	Dual Induction, Laterlog-3, Gamma Ray W/SP	XYCALGR, BHC, FLOWMETER, CDL, CNL	GR BACKUP, SP, GR, LL3, ILM, ILD	GR, RILM, RILD	1058-2350	1,2,5	IWSDGEO.PRN	NONE	2354	1053			7 7/8"			882-889	CORAIWSD.PRN	882-889.4	17ALOG.PRN	IWSD-TW
	Compensated Neutron Gamma Ray	XYCALGR, BHC, FLOWMETER, DIL	GR BACKUP, GR, NPHI	POR, POTA,URAN		1,2,5	IWSDGEO.PRN	NONE	2354	1050			7 7/8"			955-961	CORBIWSD.PRN	955-962.1	17BLOG.PRN	
	Borehole Compensated Sonic W/VDL	XYCALGR, DIL, FLOWMETER, CDL, CNL	GR BACKUP, GR, SPHI, DT, VDL4	THOR, DT, RLL3		1,2,5	IWSDGEO.PRN	NONE	2354	1040			7 7/8"			1040-1049	CORCIWSD.PRN	1040-1049.7	17CLOG.PRN	
	XY-Caliper, Gamma Ray Log	CNL, BHC, FLOWMETER, DIL	GR BACKUP, GR, Y-CALIPER, X-CALIPER	FLOWD, FLOWU		5	IWSDGEO.PRN	NONE	2354	1020			7 7/8"			1061-1062	CORDIWSD.PRN	1060-1062.2	17DLOG.PRN	
	Dynamic Flowmeter Log	XYCALGR, BHC, CNL, DIL	LINE SPEED UP, LINE SPEED DOWN, SPINNER UP CCW, SPINNER UP, CW, SPINNER DOWN CW	XCAL, YCAL, SPHI, NNEU, FCNL, NRATIO, NPHI, SGR, CGR		5	IWSDGEO.PRN	Surface Flowrate approximately 800 GPM	2336	1040			7 7/8"			1080-1098	CORFIWSD.PRN	1080-1089.1 1090-1098	17ELOG.PRN 17FLOG.PRN	