Core Analysis of the Sulphur Point Formation, Cameron Hills, North West Territories

Introduction

This Core study is being conducted to determine the nature of the reservoir in the lower dolomitized portion of the Sulphur Point formation (the upper limestone portion is non reservoir and therefore will only be discussed briefly). Cores from five wells in the Cameron Hills area were studied in detail to help answer the following questions.

1) What are the depositional facies; what is the depositional system?
2) What types of dolomite are present? What controls the occurrence of dolomite? What is the timing of dolomitization?
3) What is controlling the development of reservoir? What is the relationship between porosity and permeability (why does some high porosity rock have low permeability?) Is fracturing a component?
4) Is there a basement control on facies / dolomitization /reservoir development?
5) Can the geometry of the reservoir be predicted?

This study successfully determined the depositional and diagenetic controls on reservoir development. This study began by understanding the depositional processes then moved into the numerous diagenetic processes that have effected this formation. Basement tectonics and its role in deposition and diagenesis were also determined.

Summary table of depositional and diagenetic systems:

Depositional System	Facies Name	Description	Processes	Effect on reservoir
Supratidal	A: Evaporite pan	Nodular to chicken wire anhydrite with thin dolo mudstone beds and variable dolo mudstone matrix	Repeated storm recharge and evaporation in depressions or pans landward of the shoreline	Non-reservoir
	B: Cryptalgal Grainstone	Cryptalgal laminated mud-allochem grainstone composed of a mix of pellets, peloids, intraclasts, and micritized non-skeletal grains; contains rare skeletal fragments	Repeated storm deposition of mud-allochems from the intertidal and subtidal zones onto the supratidal flat seaward of the evaporite pans	Reservoir if secondarily dolomitized, non reservoir if early dolomitized.
	C: Sabkha Mudstone	Typically mottled but, occasionally, wavey laminated mudstone. Often has subaerial and/or soil diagenesis	Repeated storm deposition of carbonate mud from the intertidal and subtidal zones onto the supratidal flat seaward of the	Reservoir if secondarily dolomitized

			evaporite pans	
Intertidal	D: Upper Intertidal	Cryptalgal laminated mud-allochem grainstone composed of a mix of pellets, peloids, intraclasts, and micritized non-skeletal grains; contains rare skeletal fragments. Minor current evidence, possible vertical burrows.	Common subaerial exposure, minor bioturbation	Reservoir if secondarily dolomitized, meteoric leaching enhances porosity and permeability
	E: Middle Intertidal	Current dominated sedimentary structures with minor cryptalgal laminations. Vertical burrows with some horizontal burrows possible.	Moderate subaerial exposure.	Reservoir if secondarily dolomitized, meteoric leaching enhances porosity and permeability
	F: Lower Intertidal	Well bioturbated sediments with little current structures or cryptalgal laminations preserved; both vertical and horizontal burrows.	Uncommon subaerial exposure, common bioturbation	Reservoir if secondarily dolomitized, meteoric leaching enhances porosity and permeability
Subtidal	G: Shallow Subtidal	Muddy texture with little evidence of bedding due to bioturbation, no current evidence, occasional skeletal grains, Stromatoporoid fossils may present.	Low current energy deposition of sediments; the high amount of bioturbation destroys sedimentary structures.	Non reservoir in muddy rocks, reservoir in grainy rocks if secondarily dolomitized. Typically low porosity.
Regolith	Regolith F: Fluvial/ alluvium	Carbonate clasts floating in clay or shale matrix. A wide range of sediments that usually include both a laminated, black, argillaceous matrix with carbonate rock clasts. The carbonate clasts may be hard and corroded or soft and semi-conformed. Soil overprinting may be present on carbonate clasts.	Deposition of carbonate clasts and fluvial sourced shale and clastics on top of soils.	Non-reservoir
Regolith	Regolith C: Cave Floor Deposition	Typically a mixture of carbonate clasts floating in clay or shale matrix. Some soft sediment deformation features may be present.	Sediments transported from the surface into a karst cavern system	Non-reservoir
Regolith	Regolith M: Marine	Carbonate and argillaceous clasts floating in a peloidal grainstone. Light gray in colour. No bedding is visible.	A mixture of detrital clasts and marine derived sediments; probably deposited in a	Limited reservoir potential if there is secondary porosity development by meteoric leaching or dolomitization.

			shallow subtidal setting.	
Diagenetic system	Subfacies Name	Description	Processes	Effect on reservoir
Karst; Dissolution of carbonate sediments	Subfacies L: Meteoric leaching	Marine carbonates have fabric selective leached porosity.	Carbonate sediments are dissolved by meteoric leaching	Creation of secondary matrix porosity
	Subfacies R: Cavern development and Roof Collapse	Carbonate clast breccia. Fracture network may be open, or infilled with sediment or cement.	Cave roof collapses due to overburden pressure.	Typically non reservoir because fractures are infilled, reservoir if there is no matrix infill and is secondarily dolomitized
Soil development	Subfacies P: Paleosol/Soil	Bedding is mottled, fabric is no longer recognizable, limestone or dolostone is either bleached or has a gray reduction alteration colour, karst features are common and rooting is rare.	The alteration of sediments via subaerial exposure, plant activity and ground water.	Either reservoir of non-reservoir
Dolomitization	Subfacies S: Sabkha	Sabkha: Supratidal deposits, typically cryptalgal laminated mudstone, with earthy dololmite crystals. Fabric is well preserved. Light brown in colour, locally oil stained.	The evaporation of seawater in tidal flat pools increases the magnesium concentration; this fluid percolates through the sediments and subsequently dolomitizes the sediments.	Low permeability reservoir
	Subfacies B: Burial compaction/ Fluid Expulsion dolomites	Micro crystalline to very fine crystalline dolomite; partial destruction of fabric.	Expulsion of magnesium rich waters from the underlying Muskeg evaporates percolates in the phreatic zone dolomitizing all carbonate facies	Produces reservoir in grainy rocks
	Subfacies H: Hydrothermal	Coarser dolomite crystals, up to 2 mm, white to light gray in colour, hydrofractured sediments, associated galena;	Basement fault sourced fluids travel up through a fault	Does not produce reservoir

		vugs up to 1 cm with dolomite crystals.	and into the sedimentary rocks through existing permeability pathways	
Syndepositional Tectonics	Subfacies T: Syndepositional fracturing, liquefaction and brecciation	Fracturing, faulting, brecciation and liquefaction of sedimentary layers prior to complete lithification resulting in a mottled or chaotic appearance. Healed fractures or faults with millimeter to centimeter scale offset of beds. These features are attributed to tectonic events and are not related to karst diagenesis.	Tectonic activity generates seismic events which results in brecciation or liquefaction of sediments	No effect

Discussion of Depositional Facies

Marine Carbonates
The carbonate sediments found in the Sulphur Point formation in this area are typically peritidal, hard pellet grainstones and packstones. Supratidal, Sabkha, deposits are common at the base of the formation and may occur throughout the formation. Often the supratidal deposits have a subaerial diagenetic overprint. In the limestone section the depositional facies are more visible because of a lack of diagenetic overprinting. The intertidal deposits are mainly composed of peloids but there is a minor skeletal component and the sediments are variably muddy. There is one subtidal bed that is about 30cm thick and is present in each core. This bed has characteristic Stromatoporoid fossils in it. Being subtidal, this is the only bed in the study area that may be laterally continuous over large areas.

This sedimentary package indicates that this area was a warm water, shallow marine setting similar the modern Bahamas. Changes in sedimentation are a function of relative sea level changes due to active basement tectonics.

Regoliths
Regoliths are an accumulation of carbonate clasts sourced by the erosion of carbonate sediments and from fluvial sourced argillaceous material. The carbonate clasts may be semiconformed implying that the carbonate sediments (marine deposition) were eroded prior to complete lithification. Some carbonate clasts were completely lithified and are corroded. Some of the clasts have paleosol diagenesis evidence. All of this implies that carbonate sediments were deposited in a marine setting (supratidal to intertidal), were rapidly uplifted and were eroded. The argillaceous matrix within the regolith sediments was sourced from a fluvial source. Regoliths develop is several setting in this formation. First, regoliths are found on top of soil horizons. Second, regoliths can be found within caverns; this implies that there is a connection between the cavern and the surface. Third, regoliths can be found in sinkholes. Fourth, some parts of the regolith sediments can be found within marine carbonate beds. This implies that regolith sediments were transported into the marine environment, sorted, and deposited.

There is a thick regolith bed, often referred to as the main regolith that is found within each core at approximately the same position. This bed is a terrestrial accumulation that often occurs on a paleosol. The formation of this bed occurred by the erosion of tectonically uplifted Sulphur Point carbonates which were transported to the study area by a fluvial source. This indicates that there was a large regional uplift with a long duration. Marine carbonates overly this regolith bed which indicates that the basement dropped and a marine incursion followed.

Discussion of Diagenesis

Karst
Karst features are common throughout the Sulphur Point formation. Cave development and roof collapse features occur throughout the Sulphur Point. Roof collapse fractures can add permeability to a reservoir unit if the fractures are not filled with sediment or cement. Solution enhanced fractures occurs are found occasionally in the Sulphur Point. Meteoric leaching, which creates secondary matrix porosity, also occurred at this time. The topography of the Sulphur point varied during periods of exposure. The K-74 well has advanced karst features such as cavern creation and collapse and was high relative to the M-73 well which has very little cavern development and appears to have been within the water table. The northern area (A-52 and G-21) has evidence of meteoric leaching in the lower reservoir and common karst features including roof collapse above the lower reservoir.

Paleosols
Soil development is common throughout the Sulphur Point. Some paleosols have great porosity while others have poor porosity. Paleosols in both muddy and grainy rocks were found in the cores. Rocks that are microcrystalline paleosols may have either poor porosity or good intercrystalline porosity; this is probably a function of cementing, position of the water table and the amount of time the sediment was exposed to meteoric fluids. Some of the pay zones are in fact paleosols. The rocks were initially grainy carbonates in some cases or are unidentifiable in others.

Dolomitization
Three types of dolomitization were found in the study area:
1: Sabkha dolomitization. This is limited to Sabkha beds near the base of the Sulphur Point formation. This process occurs very early in the diagenetic history; burial depth is probably less than 3m. There is excellent preservation of the original cryptalgal fabric of the rock. This process is responsible for only a small portion of the dolomitization of the Sulphur Point carbonates and in some areas these lower Sabkha beds were destroyed or altered by karst diagenesis or soil development.

2: Burial dolomitization. This process is the dominant dolomitization mechanism in the Sulphur Point. Dolomitizing fluids rose from the Muskeg equivalent anhydrites when a critical pressure/temperature was reached, possibly during Slave Point? The upward motion of this fluid stopped when the vadose/phreatic boundary was reached. Burial dolomitization appears to be confined to the phreatic zone. In the limestone beds above there is extensive karst dissolution and subsequent roof collapse breccias that are not dolomitized; this type of meteoric dissolution occurs in the vadose zone. This interface occurs in either the main regolith bed or in the roof collapse breccias above it. It is transitional over about a one meter interval. This dolomitization process creates intercrystalline porosity within grainy intertidal beds.

3: Hydrothermal dolomitization. This diagenetic component does not create reservoir. The presence of saddle dolomite within crystalline dolostone was found in thin section indicating a hydrothermal overprint; it slightly reduces porosity. The peloidal rocks have a secondary dolomite crystal growth within pores. Fault sourced hydrothermal dolomite occurs as detritus within the main regolith and rarely in argillaceous beds within the marine carbonate sediments. The hydrothermal dolomite detritus was probably eroded from a fault sourced hydrothermal dolostone. This fault sourced HDT was emplaced during the Sulphur Pt, in the Sulphur Pt, uplifted and eroded, and deposited in Sulphur Pt.

Synsedimentary tectonics
Tectonic features are present throughout the Sulphur Point. Faults and fractures, liquefaction brecciation, and soft sediment deformation features are common. These features occur sporadically throughout the deposition of this formation. The soft sediment deformation features occur before complete lithification.

Fractured beds with millimeter to centimeter offset have no displacement in beds the overlying beds. All of these features indicate that the basement was continuously tectonically active throughout the deposition of the Sulphur Point formation. All of the features have an early or healed appearance which implies that they occurred prior to complete lithification. These tectonic events occurred concurrently with all of the other diagenetic events in the Sulphur Point. These features appear to predate karst features but some of the roof collapse features may have been generated by tectonic events.

The effect of the large scale tectonic uplifting is first that the depositional environment is changed and secondly, areas that are raised above the tidal zone, sub aerially exposed, begin the diagenetic process. The longer a carbonate sediment is exposed to the karst process the more secondary porosity will be created.

Reservoir Discussion

The K-74 well has a great reservoir because of the secondary porosity generation created by meteoric leaching and karst dissolution. The karst dissolution probably occurred over a long period of time, caverns were created which subsequently collapsed. This reservoir is fractured from due to roof collapse; thus it has good porosity and permeability. This well has a higher than expected cumulative oil production. This well has abundant open fractures throughout the dolomitized section, above and below the perforated interval, and is probably receiving production from a very thick zone. Obviously it has a large lateral drainage as well. Although the beds may not be laterally continuous on a kilometer scale, porous and/or fractured beds are probably in communication with each other at this scale. Pressure depletion data from neighboring wells will support or disprove this theory.

The best reservoir beds occur in grainy, intertidal deposits that are either crystalline dolostones or are meteoric leached peloidal rocks; the later type has the highest porosity and permeability. Porosity generation in the crystalline dolostone is simply from the dolomitization process. In the leached rocks porosity in generated by the removal of sediment or cements, not by dolomitization.

Sabkha beds usually have good porosity but because of the microcrystalline matrix the permeability is generally too low for oil production (<10mD). These beds are thin, usually 10-20cm thick, and often have diagenetic overprints which harm the reservoir; these beds are not economic targets.

Fractures
Several different types of fractures were recognized in core;
1: Syndepositional Tectonics; early fractures that are healed. No benefit to reservoir.
2: Roof collapse; often have cements such as dolomite or anhydrite but may be open and have solution enhancement. Beneficial to reservoir.
3: Tectonic. Last stage of fracturing; ranges from partially to completely cemented. Beneficial to reservoir.

Reservoir Summary for cored wells:
The K-74 well has the roof collapse fractures which are a solution enhanced.
The M-73 well has poor, patchy pp vug porosity, and glade soils that are poor reservoir. (There is a definite sub aerial diagenesis overprint, sed structures are gone, fractures are solution enhanced, but the porosity is lacking)
The C-75 well had patchy porosity that looks better in core analysis than core.
The G-21 well has good reservoir
The A-52 well has better reservoir than G-21

Reservoir Paragenesis for each well

The paragenesis of the K-74 reservoir zone is; marine deposition of hard pellet grainstone and packstone, syndepositional tectonic liquefaction, lithification, soil development, vadose dissolution, roof collapse, burial dolomitization. The roof collapse feature in this well has added significant permeability through the fracture network. Soil development has also occurred in this zone and has a negative effect on parts of the reservoir.

The paragenesis of the C-75 reservoir zone is; marine deposition of hard pellet grainstone and packstone, syndepositional tectonic liquefaction, lithification, burial dolomitization. The C-75 well is wet but still has some good reservoir, although it is less than the K-74 well in thickness and porosity and permeability. This well lacks the extensive meteoric leaching and the karst collapse found in the K-74 well.

The paragenesis of the M-73 reservoir zone is; marine deposition of hard pellet grainstone and packstone, syndepositional tectonic liquefaction, lithification, karst, soil development, marine deposition, ect, burial dolomitization. The M-73 appears to have very little reservoir compared to the K-74 and A-52 wells. Meteoric leaching is a minor component of the total porosity; most of the porosity is related to burial dolomitization. The beds with sub aerial exposure related diagenesis have less than expected porosity and permeability. Paleosols in this well have low porosity and permeability. Some of these beds appear to be glade soil (waterlogged).

The paragenesis of the A-52 reservoir zone is; marine deposition, syndepositional tectonic liquefaction, lithification, vadose dissolution, burial dolomitization. Although this well lacks the fractures from a roof collapse, the porosity and permeability are excellent.

The paragenesis of the G-21 reservoir zone is; marine deposition of hard pellet grainstone and packstone, lithification, meteoric leaching (vadose), burial dolomitization. No evidence of tectonics in the lower reservoir unit, but is present in the upper unit. Good porosity and permeability but not as good as A-52.

Paragenesis for the study area

Generalized Sulphur Point paragenesis within the study area:
1) Deposition of the Muskeg equivalent anhydrite
2) Exposure and erosion of the Muskeg equivalent anhydrite
3) Deposition of Sulphur Point supratidal (sabkha) carbonates early dolomitization
4) Uplift and exposure; karst and paleosol development
5) Marine incursion, deposition of intertidal and subtidal grainy carbonates
6) Uplift and exposure; karst and paleosol development; meteoric dissolution and the creation of reservoir
7) Alternating deposition of peritidal carbonates and subaerial exposure; karst and paleosol development Emplacement of fault sourced hydrothermal dolomite.
8) Broad tectonic uplift (with a region higher than the study area), erosion and deposition of the thick regolith deposit that occurs throughout the study area.
9) Tectonic drop, marine incursion, deposition of intertidal and subtidal grainy carbonates (this is the mostly LS bed).
10) Uplift, exposure and karst development
11) Deposition of the Watt Mountain shales (marine?), then uplift, subaerial exposure and paleosol development
12) Burial dolomitization

Well Summaries

K-74
Extensive karst development within the limestone section; most of this section is a roof collapse breccia. Most of the limestone section is a roof collapse breccia. The limestone/dolostone contact is within the main regolith bed. The beds immediately above the reservoir have abundant karst features and the reservoir unit also has karst cavern and roof collapse as well as meteoric leaching. This reservoir unit lies above the subtidal bed with the Stromatoporoid fossils. The base of the Sulphur point is a karst cavern with fill and

the roof intact. No Muskeg Equivalent anhydrite was recovered in the core. This core has the most karst cavern features than the others suggesting that it was structurally high and was exposed to dissolution for a long period of time.

C-75
Extensive karst development within the limestone section; most of this section is a roof collapse breccia. The limestone/dolostone contact is in the bedded grainy carbonates immediately above the main regolith bed. The upper dolomite section (between the reservoir and the main regolith bed) is a series of grainy carbonates with some karst diagenesis. The reservoir is a grainy carbonate that is probably an upper intertidal to supratidal deposit with karst and soil diagenesis. The porosity is patchy compared to wells such as K-74 and the northern area. Less subaerial diagenesis than M-73.

M-73
The limestone section of this well is mostly intact, not a big roof collapse breccia like most of the other cores. Perhaps it was structurally lower than the K-74 well and was therefore not as affected by karst diagenesis. There are syndepositional tectonic features through out the limestone unit. There is porosity development and oil staining in the limestone where soils did not develop. This porosity is the result of meteoric leaching.

The limestone/dolostone contact is into the roof collapse breccia above the main regolith. There are detrital clasts and crystals of hydrothermal dolomite near the top of the main regolith that appear to be a fault sourced hydrothermal dolomite that was probably emplaced during the Sulphur point time, uplifted and eroded.

This well is in the more tectonically active South East area. When compared to the A-52 and G-21 wells in the North West, it is apparent that there is a marine deposition and subsequent sub aerial exposure cyclicity throughout these sediments. The rocks in this core are often bleached but the porosity development is not as good as expected; this may be due to soil development and the position of the water table. If the rocks are in the vadose zone then the necessary leaching for good reservoir occurs. Secondly, there are multiple soil horizons in this core but not great porosity. The porosity within the intertidal beds is patchy unlike the North West area.

300/F-73
The dark brown crystalline dolostones are characteristic of intertidal, peloidal grainstones and packstones that have not undergone meteoric leaching. The porosity in these rocks is related to dolomitization and in core is often patchy with poor permeability matrix separating the patches. The light brown microcrystalline rocks have undergone diagenesis related to subaerial exposure; some meteoric leaching is evident in these rocks. The permeability of these microcrystalline beds is probably less than 5mD which results is low oil production.

302/F-73
The drill cuttings from this well are a lighter colour of brown than most of the cuttings from the original 300/F-73 well. From core analysis this lighter colour is a result of diagenesis related to sub aerial exposure. The good porosity spike at 1526-1527m MD is probably an intertidal, peloidal packstone that was subjected to meteoric leaching and dolomitization. The interval from 1527-1530m is probably a mixture of Sabkha beds and intertidal beds with low porosity. There are low porosity micro crystalline, crystalline and crypto crystalline rocks in the samples. The bottom porosity spike from 1530-1531m is probably a Sabkha bed that has meteoric leaching and dolomitization generated secondary porosity. The permeability of this reservoir is limited by the microcrystalline dolomite crystals that are commonly found in the packstones and the Sabkha mudstones.

A-52
This core has part of the Watt Mountain shale which is green and has paleosol features. Green clay from the Watt Mountain can be found within the roof collapse breccias of the Sulphur Point limestone in this and other cores. Extensive karst development within the limestone section; most of this section is a roof collapse breccia. The limestone/dolostone contact is in the roof collapse breccia above the main regolith

bed. Karst features are found throughout the dolostone section above the reservoir; immediately above the reservoir there was a karst cavern and subsequent roof collapse. The reservoir has evidence of meteoric leaching. The reservoir lies above and below the subtidal Stromatoporoid bed. This reservoir has excellent matrix porosity and permeability, but no fractures.

G-21
Extensive karst development within the limestone section; most of this section is a roof collapse breccia. The limestone/dolostone contact is within the main regolith bed. There are detrital clasts and crystals of hydrothermal dolomite near the top of the main regolith that appear to be a fault sourced hydrothermal dolomite that was probably emplaced during the Sulphur point time, uplifted and eroded.

The G-21 well has good consistent reservoir beds that have both meteoric leaching and dolomitization created secondary porosity. The dark brown coloured intertidal beds lack meteoric leaching and have pin point vuggy and intercrystalline porosity. Karst evidence is present above the lower porous unit. The upper porous unit is one meter thick and is a Sabkha bed that has some evidence for sub aerial diagenesis. This rock is microcrystalline and has good porosity and permeability.

Exploration Models

North West
A-52 has higher porosity and permeability than G-21 but is wet. Use the 3D seismic to target current structural highs; I believe some of these highs already produce gas.

South East
Paleosols can be either poor or very good reservoir. Advanced karst development, caverns, creates more secondary porosity through meteoric leaching. Is there a relationship between isopachs or something else that could indicate whether the well is like K-74 (cavern) or M-73 (soils)?

Template for logging other cores

Evaluate the degree of karst diagenesis in the limestone section. Determine the top and bottom of the main regolith bed and note where the limestone/dolostone contact is. For the dolostone section the karst features and secondary porosity creation are important. The relationship of the reservoir bed to the subtidal Strom bed may be helpful in determining the timing of the meteoric leaching. The amount of time that the sediments are exposed to meteoric fluids and the position of the paleo water table are important to reservoir development.

Conclusions

1) Deposition of the Sulphur Point Carbonates occurred in a warm, shallow marine environment.
2) The basin was tectonically active throughout Sulphur Point time. Numerous cycles of deposition, uplift and erosion or evident.
3) Karst diagenesis is common throughout the study area, is an indicator of uplift and subaerial exposure and creates reservoir.
4) Although Sabkha, Burial, and Hydrothermal dolostone is present, only burial dolomitization is significant. Intercrystalline porosity is created by burial dolomite.

Recommendations

Any other cores in the study area should be logged and compared to these findings to see if the relationships hold or change.

1:120

m	Dist from top core	Adjusted Depth	Fmtn	Unit	Basal Cont	Color: Weath / Fresh: (dk, lt, me, pal, mot; bn,gy,bk,yl, gn,ppl,red, bl,ong,olv, wt)	Long Facies Desc. & Comments (lith, alloch, mineralogy, porosity, defining features, etc)	Res. Pot. good, poor, questble	Resvr Type: m,ss,sl,ts,tl,fa,fd,f	Core Analysis Porosity	Core Analysis Perm (md)	Pore Types Dm	Pore Types Mn	Pore Types Tr	HC Show Dm	HC Show Mn	HC Show Tr	Analysis c=core, p=plug	Samples	DolXll & SilicicGn Size, Sort, Rnd	sum	Foss-Allochem	Biot-Burrow-Ped Deg	I.Fac	Traces, hz,vt	Sedimentary Structures	Depositional Environment & Processes	Interpreted Structure / Structural Processes
1420.4																												
			Sulphur pt	LS	karst	dk brn, dk gy	Roof collapse, peloidal lime grainstone, chaotic	P		0.0	0.0										0	pld						roof collapse breccia
				LS			Lime Gs, pld, int tidal.	P		0.0	0.0										0	pld				lam bedding	intertidal	
				LS	karst		Roof collapse, peloidal lime grainstone, chaotic	P		0.0	0.0										0	pld						roof collapse breccia
1421.4	1			LS	stylolitic	lt brn	Lime GS, pld, cryptalgal, supratidal.	P		1.0	37.0	FR						FD1			0	pld			tr rootlet in fracture	cryptalgal lam	supratidal	
				LS		brn	lime GS, peloidal, mottled, trace algal, sub tidal	P		0.0	0.0										0	pld				massive	subtidal	
				LS	karst			P		0.0	0.0										0	pld						
				LS			Roof collapse breccia	P		0.0	0.0										0	pld					intertidal	roof collapse breccia
1422.4	2			LS	karst	gy-brn	Peloidal and gastropod WS, anhy fill in molds. Tight	P		0.0	0.0										0	gas, pld				mnr faint bedding		
				LS	karst			P		0.0	0.0										0	gas, pld						
				LS		gy-brn	Roof collapse, chaotic breccia, clasts are GS, WS and MS. Clasts can be internally fractured. Mnr Infill of small LS clasts/grains and clays. Mnr pyrite.	P		2.0	0.8	MX						FD2			0	gas, pld						roof collapse breccia
				LS				P		0.0	0.0										0							
1423.4	3			LS				P		0.0	0.0										0							
				LS				P		2.0	1.0	MX						FD3			0							
		1423.9	Sulphur pt	LS	diagenetic		The LS/DS contact is within a brecciated bed. It is	P		0.0	0.0										0							
			Sulphur pt	DS		gy-brn	Cave fill sediment, chaotic breccia wi clasts of GS, WS and MS. Clasts can be internally fractured. Mnr	P		6.0	7.0	MX		FR				FD4		d (20-40u)	0					mnr faint bedding in		roof collapse breccia
1424.4	4			DS	karst			P		6.0	3.7	MX		FR				FD5		d (20-40u)	0							
				DS		blk-brn	Matrix supported breccia, clasts are probably GS, WS and MS. Clasts can be internally fractured. Argillaceous matrix with dolostone grains and clasts	P		0.0	0.0									d (20-40u)	0						regolith	
				DS				P		8.0	0.2	MX						FD6		d (20-40u)	0							
				DS	karst			P		8.0	0.8	MX						FD7		d (20-40u)	0							
1425.4	5			DS	karst	lt brn	clast supported breccia. Clasts appear to be pld GS	P		8.0	3.3	P	MX					FD8		d (60-125u)	0	pld				mnr algal lam		roof collapse breccia
				DS		blk-brn	Matrix supported breccia, clasts are probably GS, WS and MS. Clasts can be internally fractured. Argillaceous matrix with dolostone grains and clasts. Mnr dism pyrite.	P		8.0	1.0	P	MX					FD9		d (60-125u)	0						cave fill sediment	
				DS				P		8.0	2.8	MX						FD10		d (20-40u)	0						cave fill sediment	
				DS				P		7.0	0.5	MX						FD11		d (20-40u)	0						cave fill sediment	
1426.4	6			DS				P		7.0	0.7	MX						FD12		d (20-40u)	0						cave fill sediment	
				DS				P		9.0	0.9	MX						FD13		d (20-40u)	0						cave fill sediment	
				DS	karst			P		12.0	0.8	MX						FD14		d (20-40u)	0						cave fill sediment	
				DS				P		7.7	3.2	VI	P	FR				FD15		d (60-125u)	0					laminations	cave fill sediment	
1427.4	7			DS		brn-dk brn	Laminated dolo wackestone. No bioturbation. One teepee structure.Sediment appears to be MS to peloidal GS. Some open fractures	P		4.6	0.1	X	P					FD16		d (60-125u)	0	pld				teepee structure	supratidal, up intertidal	
				DS				P		5.0	1.0	X	P					FD17		d (60-125u)	0	pld				laminations	supratidal, up intertidal	
				DS	karst			P		4.0	0.1	P		FS				SP18		d (60-125u)	0	pld				laminations	supratidal, up intertidal	
				DS		brn-dk brn	chaoitc breccia, a mixture of lt brn algal, brn lam and dk brn not laminated clasts. Blk arg clay infill at the base of the cave	P		0.0	0.0									d (60-125u)	0					mnr algal lam	cave fill sediment	mix of roof collapse and cave sediments
1428.4	8			DS				P		0.0	0.0									d (60-125u)	0						cave fill sediment	
				DS	karst			G		6.0	17.0	MX	V	FS				FD19		d (20-40u)	0						cave fill sediment	
				DS		brn-dk brn	Laminated dolostone with partial karst brecciation throughout the interval. Mnr mottled beds and lt brn beds without bedding that have common vugs, some open fractures wi mineralization (dol). Upper intertidal with some supratidal.	G		5.0	195.0	x		FS	f		o	FD20		d (60-125u)	0	pld	s		hz and vt	laminated bedding	intertidal, early brecciation and	syn depositonal tectonic brecciation and
				DS				G		3.8	67.0	x		FS	f		o	FD21		d (60-125u)	0	pld	s		hz and vt	laminated bedding		
1429.4	9			DS				G		0.0	0.0	x		FS	f		o			d (60-125u)	0	pld	s		hz and vt	laminated bedding		
				DS				G		6.6	503.0	v	x	FS	f		o	FD22		d (60-125u)	0	pld	s		hz and vt	laminated bedding		
				DS				P		7.5	5.3	P	x	FS	f		o	FD23		d (60-125u)	0	pld	s		hz and vt	laminated bedding		
				DS						0.0	0.0	x		fr	f		o			d (60-125u)	0	pld	s		hz and vt	laminated bedding		
1430.4	10			DS				G		4.3	249.0	P	x	FS	f		o	FD24		d (60-125u)	0	pld	s		hz and vt	laminated bedding		
				DS				P		5.5	6.3	P	V	FS	f		o	SP25		d (60-125u)	0	pld	s		hz and vt	laminated bedding		
				DS	karst					0.0	0.0	x		fr	f		o			d (60-125u)	0	pld	s		hz and vt	laminated bedding		
				DS		lt brn-blk	Chaotic breccia and cave fill sediments, dark arg	G		8.0	68.0	P	MX	fr				FD26		d (60-125u)	0						cave fill sediment	
1431.4	11			DS			Core analysis looks wrong, mnr open fracs wi mnr			0.0	0.0									d (60-125u)	0						cave fill sediment	
				DS		brn-dk brn	Laminated dolostone with partial karst brecciation throughout the interval. Mnr mottled beds that appear to be bioturbated. Dolomite crystal size is 100-	G		4.3	95.0	X		FR	f		o	FD27		d (60-125u), d (125-250u)	0		s		hz and vt	laminated bedding	intertidal	early healed breccia and karst, mix of
				DS						4.5	0.1	X			f		o	FD28		d (60-125u), d (125-250u)	0		s		hz and vt	laminated bedding		
				DS				P		4.5	7.2	X		FR	f		o	FD30		d (60-125u), d (125-250u)	0		s		hz and vt	laminated bedding		
1432.4	12			DS	Karst	lt brn-blk	Chaotic breccia and cave fill sediments.Dark arg sed	P		9.4	5.5	e	MX	sty				FD31		m (5-10u), m (10-20u), m (20-40u), m (40-60u), m (60-125u)	0					soft sed def	cave fill sediment	semi conformed carbonates and shales
				DS		dk brn	Grainstone, peloidal wi mnr skeletal grs, mnr to chaotic breccia, intercrystalline, moldic and fracture porosity. Abundant oil stain. This is the main reservoir interval. Repeated exposure and soil development, later roof collapse breccia. Intertidal.		frd, m	14.7	336.0	V	P	FS	f		o	01P		t (20-40u), m (40-60u), d (60-125u)	0	pld, shl				remnant cryptalgal lam	intertidal?	cave roof collapse breccia
				DS					frd, m	12.5	602.0	V	P	FS	f		o	002P	Thin section	t (20-40u), m (40-60u), d (60-125u)	0							
				DS					frd, m	11.8	94.0	V	P	FS	f		o	FD32		t (20-40u), m (40-60u), d (60-125u)	0							
1433.4	13			DS					frd, m	10.8	337.0	V	P	FS	f		o	FD33		t (20-40u), m (40-60u), d (60-125u)	0							
				DS					frd, m		0.0	V	P	FS	f		o			t (20-40u), m (40-60u), d (60-125u)	0							
				DS					frd, m	13.6	1000.0	V	P	FS	f		o	03P		t (20-40u), m (40-60u), d (60-125u)	0							
				DS					frd, m	13.3	594.0	V	P	FS	f		o	004P	Thin section	m (20-40u), d (40-60u), m (60-125u)	0							
1434.4	14			DS					frd, m	12.2	887.0	V	P	FS	f		o	05P		t (20-40u), m (40-60u), d (60-125u)	0							
				DS	karst				frd, m	0.0	0.0	V	P	FS	f		o			t (20-40u), m (40-60u), d (60-125u)	0							
				DS		dk brn	Dolo WS, stromatoporoid fossils, no visible bedding, subtidal.	Q		5.4	137.0	V	FS					FD34		m (10-20u), m (20-40u), m (40-60u), m (60-125u)	0	strA, strS	ch			mottled	lagoonal	
				DS						0.0	0.0									m (10-20u), m (20-40u), m (40-60u), m (60-125u)	0	pld						
1435.4	15			DS	karst			G		10.5	404.0	FS	V					FD35		m (10-20u), m (20-40u), m (40-60u), m (60-125u)	0	pld						roof collapse
				DS		brn	dolo GS, peloidal and cryptalgal, upper intertidal and supratidal	P		1.0	0.0	FS	P					SP36		d (60-125u)	0	pld				cryptalgal laminations	supratidal and upper intertida	fractures from cave stress
				DS				Q		4.8	161.0	FS	P					FD37		d (60-125u)	0	pld				cryptalgal laminations		
				DS						0.0	0.0									d (60-125u)	0	pld				cryptalgal laminations		
1436.4	16			DS						0.0	0.0									d (60-125u)	0	pld				cryptalgal laminations		
				DS						0.0	0.0									d (60-125u)	0	pld				cryptalgal laminations		
				DS				Q		6.8	10.6	P	MX	FS				SP38		d (60-125u)	0	pld				cryptalgal laminations		
				DS						0.0	0.0									d (60-125u)	0	pld				cryptalgal laminations		
1437.4	17			DS				P		9.0	1.8	P	MX					FD39		d (60-125u)	0	pld				cryptalgal laminations		
				DS				P		8.2	3.7							FD40		d (60-125u)	0	pld				cryptalgal laminations		
				DS				Q		5.0	485.0	V	P	FS				FD41		d (60-125u)	0	pld				cryptalgal laminations		
				DS						0.0	0.0									d (60-125u)	0	pld				cryptalgal laminations		
1438.4	18	1437.0		DS	karst					0.0	0.0									d (60-125u)	0	pld				cryptalgal laminations	cave roof	
				DS		lt gy-blk	Cave sediments, blk arg matrix, lt gy dolostone clasts.			0.0	0.0										0						cave sediments	
				DS						0.0	0.0										0							
				DS	end of core					0.0	0.0										0							
1439.4	19									0.0	0.0										0							

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Interpreted Lithology & Facies (Karst Feature, Dolomitization Mechanism, Tectonic Structural feature, VC ss / Xll dol, ls, C ss / Gnst dol, ls, M ss / Pkst dol, ls, F ss / Pkd Wackst dol, ls, VF ss / Sprs Wackst, Sltst: silicic, dol, ls, Mudst: silicic, dol, ls, Shale, bk, gy, gn; EVAP; 0 Gamma Ray Trace 150) | Facies & Resvr Summary | DolXll & SilicicGn Size, Sort, Rnd | Sedimentology, Bioturbation, Fossils etc | Dep Systems & Environment

m (1417.6)	Dist from top core	Adjusted Depth	Fmtn	Unit	Basal Cont	Karst Feature	Dolomitization Mechanism	Tectonic Structural feature	Lithology	Color: Weath / Fresh: (dk, lt, me, pal, mot; bn,gy,bk,yl, gn,ppl,red, bl,ong,olv, wt)	Long Facies Desc. & Comments (lith, alloch, mineralogy, porosity, defining features, etc)	Res. Pot. good, poor, questble	Resvr Type: m,ss,sl,ts,tl,fa,fd,f	Core Analysis Porosity	Core analysis Perm (md)	Pore Types; e, mx, x, xi, g, gi, fe, m, vi, vt, sh, sc, p, fr, art: Dm	Pore Mn	Pore Tr	HC Show; P=pyrobit, D= dissem, F=film, O=odor: Dm	Analysis	Samples	< 5 um (clay & cryptoXll)	10-20u, f slt (earthy)	20-40u, m slt (mic xll)	40-60u, c slt (mic xll)	60-125u, v fine	125-250u, fine	sum	Foss-Allochem	Biot-Burrow-Ped: Deg	I.Fac	Traces, hz,vt	Sedimentary Structures	Restr. Marine / Lagoon / U Shoreface	Peritidal / Foreshore	Supratidal / Back Beach	Soil / Karst / Eolian	Depositional Environment & Processes	Interpreted Structure / Structural Processes
			Sulphur Pt.	LS		r				dk brn	LS, GS/PS, pld, low compaction/early cmt, karst breccia with sediment infill (grn shale), roof collapse.			0.0	0.0													0	pld										
				LS		r				dk brn				0.0	0.0					SP1P								0	pld										
				LS		r				dk brn				0.0	0.0													0	pld										
1418.6	1			LS		r				dk brn				0.0	0.0													0	pld										
				LS		r				dk brn				0.0	0.0													0	pld										
				LS					G	dk brn	LS, GS/PS, pld, crytpo xl, low compaction/early cmt, some karst breccia with sediment infill (grn shale).			0.0	0.0							d						0	pld				tr bedding					up intertidal-supratidal	
				LS						dk brn				0.0	0.0					SP2P		d						0	pld										
1419.6	2			LS						dk brn				0.0	0.0							d						0	pld										
				LS						dk brn				0.0	0.0							d						0	pld										
				LS						dk brn				0.0	0.0							d						0	pld										
				LS		r	h			dk brn	Alluvium/regolith. Clast breccia with arg and rego			0.0	0.0													0	pld										
1420.6	3	1419.5		LS			h			dk brn				0.0	0.0													0											
			Sulphur Pt.	DS			h			gy-blk				0.0	0.0													0											
				DS			h							0.0	0.0					FD002	Thin section							0											
				DS			b							0.0	0.0													0	pld										
1421.6	4			DS			b							0.0	0.0													0	pld										
				DS			b				Alluvium/regolith. Clast breccia with arg and carbonate matrix, clasts are lt -dk brn, soft to hard.			0.0	0.0													0	pld										
				DS			b							0.0	0.0													0	pld										
				DS			b							0.0	0.0													0	pld										
1422.6	5			DS			b							0.0	0.0													0	pld										
				DS			b							0.0	0.0													0	pld										
				DS			b							0.0	0.0													0	pld										
				DS		s	b	b	P	lt brn/dk brn	Top 10cm is lt brn earthy to mxl dolo MS; sub aerial diagenesis on sabkha? Oil stn. Dolo PS wi			5.0	0.1					FD007					m	d		0	pld	m			mottled laminations		c			intertidal	tectonic breccia
1423.6	6			DS			b			dk brn				3.0	0.0					SP9P					m	d		0	pld	m			mottled laminations		c				tectonic mottled
				DS		s	b				Karst, cm scale shale beds, soil diagenesis and			0.0	0.0								d					0					mottled laminations		c		c	soil/karst	
				DS		s	b	b	Xll	lt brn	Dolostone, mxl and earthy, mod lam and bed, com pp vug and inter xl por, oil stn, tectonic SSD and fractures (healed). The base has mm-cm scale carbonate clasts (soft) in a carb matrix; possible		m	16.5	55.0	e	p	g	f	FD009	Thin section		m	d				0					mottled laminations					up inter or supratidal?	tectonic breccia
				DS			b	b					m	19.4	63.0	e	p	g	f	FD010			m	d				0					mottled laminations						tectonic breccia
1424.6	7			DS			b	b					m	22.6	37.0	e	p	g	f	FD011			m	d				0					mottled laminations						tectonic breccia
				DS	erosional		b	f					m	27.0	30.0	e	p	g	f	FD012	Thin section		m	d				0					mottled laminations						tectonic fractures
				DS			b		P	dk brn	Dolo PS wi some GS, abdnt lam, some			4.0	0.2	p				SP13P						d		0	pld	w			mnr wavey lam		c			intertidal	
				DS		c	b		M	brn	Dolo MS, m xl, 3 cm thick shale at base, probably			6.6	0.0	e				FD13					d			0											
1425.6	8			DS			b		P	dk brn	Dolo PS wi some GS, abdnt lam, some			0.0	0.0	p										d	d	0	pld	m			mnr wavey lam		c			intertidal	
				DS			b			dk brn				2.0	0.0	p				SP14P						d		0	pld	m			mnr wavey lam		c				
				DS		s	b		M	gy	Dolo MS, m xl, gy from dism pyr, soil diagenesis.			0.0	0.0										d			0											
				DS			b		P	dk brn	Dolo PS wi some GS, abdnt lam, some			4.0	0.0	e	x			FD14			m				d	0	pld	m			mnr wavey lam		c			intertidal	
1426.6	9			DS			b			dk brn				8.0	2.8	e	x			SP015	Thin section		m				d	0	pld	m			mnr wavey lam		c				
				DS			b			dk brn				6.4	0.1	e	x			SP016			m				d	0	pld	m			mnr wavey lam		c				
				DS			b			dk brn				4.0	0.0	e	x			SP16P			m				d	0	pld	w			mnr wavey lam		c				
				DS		s	b		M	brn	Dolostone, soil diagenesis, gray reduction mottling			11.6	1.0	mx				FD17				d	d			0										soil diagenesis	
1427.6	10			DS		s	h							6.8	0.1	e				SP018				d				0											
				DS		r	b			dk brn	dolostone, pld GS/PS, vf crystalline, top 10 cm of this bed are lam, the remainder is breccia clasts that lack sed structures, bioturbated, early breccia with sediment infill. subtidal?			6.0	0.0	x				SP18P						d		0	pld				wavey lam		c		c	intertidal	brecciated, roof collapse
				DS		r	b			dk brn				6.0	2.0	x				FD19						d		0	pld					c			c	subtidal	
				DS		r	b			dk brn				8.0	4.0	x				FD20						d		0	pld					c			c		
1428.6	11			DS		r	b			dk brn				6.0	1.4	x				FD21						d		0	pld					c			c		
				DS		r	b			dk brn				7.0	0.3	x				SP19P						d		0	pld					c			c		
				DS		r	b			dk brn				4.0	0.0	x				FD22						d		0	pld					c			c		
				DS		c	b			lt brn	Dolostone, dk brn-lt brn clasts in a lt brn matrix, clasts up to 12cm in length, coarsening upwards.			4.0	0.0	p	x			SP20P			d				m	0									c	cave deposit, subtidal?	
1429.6	12			DS		c	b			lt brn				15.0	4.0	e				FD23			d				m	0									c		
				DS			b		G	lt brn-brn	Dolo GS-WS, mostly PS, pld, mnr wavey lam, biot, mostly PP vug wi mxl and earthy porosity, oil stn. Lower intertidal		m	18.0	15.0	p	g		f	FD24				d	m			0	pld	w	cr	hz	mnrwavey lam		c			low intertidal	
				DS			b						m	20.0	34.0	p	g		f	SP22P				d	m			0	pld	w	cr	hz	mnrwavey lam		c				
				DS		s	b						m	18.5	54.0	p	g		f	SP23P	Thin section			d	m			0	pld	w	cr	hz	mnrwavey lam		c				
1430.6	13			DS			b		Wp	dk brn	Dolo WS, VF xl, strom and amphi fossils, subtidal.	p		5.0	0.0	gi	p			FD26						d		0	strA, strl	ch				c				subtidal	
				DS		s	b		G	lt brn	Dolo GS-WS, pld, mnr wavey lam, biot, mostly PP vug wi mxl and earthy porosity, mnr meteoric		m	20.0	48.0	p		g	f	SP027	Thin section			d				0	pld	w	cr	hz	mnrwavey lam		c			low intertidal	
			End C#1	DS			b						m	15.7	14.0	p		g	f	FD29				d				0	pld	w	cr	hz	mnrwavey lam		c				
				DS			b		P	dk brn	Dolo PS, pld, com lam, mnr bioturbation, crypto to low f xl, pp vug por. Upper intertidal	f		9.0	9.0	p				FD31						d		0	pld	m	cr	hz	wavey lam		c			Up intertidal	
1431.6	14			DS			b					f		7.6	3.4	p				FD32						d		0	pld	m	cr	hz	wavey lam		c				
				DS			b					f		13.7	77.0	p	x	f		SP26P	Thin section					d		0	pld	m	cr	hz	wavey lam		c				
				DS			b					f		8.5	6.7	p				FD33						d		0	pld	m	cr	hz	wavey lam		c				early sed filled v frac
				DS			b					p		7.8	1.4	p	x			FD35	Thin section					d		0	pld	m	cr	hz	wavey lam		c				
1432.6	15			DS			b					p		6.0	0.8	p				FD36						d		0	pld	tr	cr	hz	wavey lam		c				
				DS			b					p		4.5	0.0	p				SP037						d		0	pld	tr	cr	hz	mottled, ssd		c				
				DS			s		Xll	lt brn	Dolo MS, wavey lam, supratidal sabkha, early sabkha dol, oil stn. Earthy wi some micro crystalline dol.	p		12.2	2.5	e	m			FD 38			d	m				0		tr	cr	hz	wavey lam			c		Sabkha	
				DS		s	s					p		19.6	8.8	e				FD39			d	m				0					root traces?			c			
1433.6	16			DS			s					p		16.0	6.6	e				SP040			d	m				0					SSD,			c			
				DS		c				blk/grn	Karst cave fill shale	p		0.0	0.0													0										Karst cave fill	
				DS		s	b		M	brn/dk brn	Dolostone, extensive karst and soil diagenesis, 50-100um.	p		0.0	0.0									d				0					karst breccia			c	c	probably sabkha	
		1433.25	Sulphur Pt.	DS		s	b					p		0.0	0.0									d				0								c	c		
1434.6	17		Muskeg	An					An					0.0	0.0													0								e		evap pan	
			Anhydrite											0.0	0.0													0								e			
														0.0	0.0													0								e			
														0.0	0.0													0								e			
1435.6	18													0.0	0.0													0											

1:240 | Bulk Lithology: % of Sample; 5% increments (20 40 60 80 100) | 0 PE trace 5 | Gamma Ray Trace 0 150

m	Sample Quality; good,fair,poor,terrible	Fmtn	Unit	Interpreted Lithology & Facies	Color: Weath / Fresh: (dk, lt, me, pal, mot; bn,gy,bk,yl, gn,ppl,red, bl,ong,olv, wt)	Long Facies Desc. & Comments (lith, alloch, mineralogy, porosity, defining features, etc)	Res. Pot. good, poor, questble	Resvr Type: m,ss,sl,ts,tl,fa,fd,f	Est. Total Effective Por	Est. Total Perm (md)	Pore Types; e, mx, x, xi, g, gi, fe, m, vi, sh, sc, p, fr, art: Dm	Mn	Tr	HC Show; P=pyrobit, D= dissem, F=film, O=odor: Dm	Mn	Tr
1410		Sulphur	LS						0.0	0.0						
		Point	LS						0.0	0.0						
		limestone	LS						0.0	0.0						
		dolosotne	DS						0.0	0.0						
1415			DS						0.0	0.0						
			DS						0.0	0.0						
			DS						0.0	0.0						
			DS			Porous interval from logs is 1422-1427m			0.0	0.0						
			DS						0.0	0.0						
1420		Sulphur	DS						0.0	0.0						
		Point	DS			Dolo GS/PS, crypto xl, pel wi tr ooid, tr pp vug and inter granualr porosity.			0.0	0.0						
		Dolostone	DS						0.0	0.0						
	fair		DS	Xll	brn-dk brn	XL dol, 50-150um, peloidal PS/GS, patchy xl and tr pp vug por, est 1-12% por, 1-		m	4.1	13.1	x	p				
			DS	Xll	lt gy/lt brn	Micro XL dolostone, mostly earthy porosity, tr intergran por, low perm due to		m	3.9	0.4	e		g			
1425			DS	G	dk brn	XL dol, 50-150um, peloidal PS/GS, patchy xl and tr pp vug por, est 1-12% por, 0.1-		ss	5.9	3.8	p					
			DS						0.0	0.0						
			DS	Xll	lt brn	Micro XL dolostone, sabkha, mostly earthy porosity, tr intergran por, low perm		m	5.6	2.6	e		g			
	fair	Muskeg	An	An		Anhydrite			0.0	0.0						
		Anhydrite							0.0	0.0						
1430									0.0	0.0						
									0.0	0.0						
	fair								0.0	0.0						
									0.0	0.0						
1431									0.0	0.0						
									0.0	0.0						
									0.0	0.0						
									0.0	0.0						
1432									0.0	0.0						

Interpreted Lithology & Facies columns: Grn Sup Cngl / Rudst, Mtx Sup Cngl / Floatst, Cngl ss / Foss dol, ls, VC ss / Xll dol, ls, C ss / Gnst dol, ls, M ss / Pkst dol, ls, F ss / Pkd Wackst dol, ls, VF ss / Sprs Wackst, Sltst: silicic, dol, ls, Mudst: silicic, dol, ls, Shale, bk, gy, gn; EVAP

DolXll & SilicicGn Size, Sort, Rnd

Columns: < 5 um (clay & cryptoXll), 5-10u, vf slt (earthy), 10-20u, f slt (earthy), 20-40u, m slt (mic xll), 40-60u, c slt (mic xll), 60-125u, v fine, 125-250u, fine, 250-500u, med, 500u-1mm, crs, 1-2 mm, v crs, 2-4 mm, gran, 4-64 mm, pbl, 64-256, cob, >256 mm, bldr, SORTING (5=vp,4=p,3=m,2=w,1=vw), ROUNDING (a,sa,sr,r)

Row	< 5 um	5-10u	10-20u	20-40u	40-60u	60-125u	125-250u
(XL dol, brn-dk brn)			m			d	d
(Micro XL dolostone, lt gy/lt brn)	m	m	d	m			
1425 (XL dol, dk brn)			m			d	d
(Micro XL dolostone, sabkha, lt brn)			d	m			

Structure / Fractures

Columns: %Open Fractures, Fracture Aperture (um, largest), Approx. Ave. Block Size (cm), %Fract. Shards, %Loose Euhedral Quartz, %Loose Massive Quartz, %Loose Euhedral Spar, %Loose Massive Spar, %Druse (>10 um thick), %Micro-Druse<10 um thick, %Pressure Shadow Fibrous Minera, %Slickensides, %Tectonic Microbreccia, %Breccia, %Parting Flakes- weak or no strain, %Strain Foliation,Lineation&Discoid, %Strong Ductile Flow, %Folded Chips, %Line Fract., %Closed / Filled Fract., Fracture Fill Mineral ca,do,an,gy,si,b, Bedding Angle from Horizontal

Row	%Fract. Shards	%Loose Euhedral Spar	%Loose Massive Spar
(XL dol, brn-dk brn)	1	1	1

Diagenesis

Columns: Diagenetic # (1=good; 25= bad), Grain Contacts (p,l,c,s,m), Compaction Intensity (1-5), Silica Diss & Precip (1-5, lo to hi), %Replacement by SILICA, Cement Types (c,d,s,b,g,a,), Cement Intensity (1-5, lo to hi), %Authigenic minerals (k,I,s,c), Authigenic mineral growth, Description (dolomite, cements, clays, compactn, alteration, etc)

Sedimentology, Bioturbation, Fossils etc

Foss-Allochem: cri,bra,bryF,bryR,bryE,r cor,ccor,cep,gas,cal,ec h,fsh,for,gra,lum,int,onc, ooi,ost,pely,plt,pld,pis,sk el,spi,coat,tri,amp,strS,s tri,strM,strT,strB,alg,alg M,algF,das,ren,sca,wor, con,syr,shel,tha,etc

Biot-Burrow-Ped: I.F.= IchnoFacies: s=slight, m=mod, w=well, ch=churn; Ped=Pedogen, Tr=Tryp, Gl=Gloss, Ss=Skol, Cr=Cruz, Zo=Zooph, Ne=Nerei: ar,as,be,ch,co,cr,cy,di,gy,he,heda, ma,mo,mu,op,pa,ph,pl,ri,ro,ru,sc,sk ,ter,ted,th,ti,zo,root, etc (Deg | I.Fac | Traces, hz,vt)

Sedimentary Structures

Dep Systems & Environment

Columns: Deep (Basin, Slope, Shelf Edge Shoal or Reef, Deep Shelf / Muddy Shelf); Shallow (Shallow Shelf / Transition Zone, Shoal / Barrier Is / L & M Shoreface, Restr.Marine / Lagoon / U Shoreface, Pertidal / Foreshore); NonMarine (Supratidal / Back Beach, Evaporitic Salt Pans / Coastal Plain, Lacustrine / Paludal, Fluvial / Glacial / Alluvial, Soil / Karst / Eolian); Depositional Environment & Processes (carbonate-blue, clastic-yellow, mixed carb & clast-green, evaporite-brown)

Row	Diagenesis Description	Foss-Allochem	Sedimentary Structures	Pertidal / Foreshore	Supratidal / Back Beach	Soil / Karst / Eolian	Depositional Environment & Processes
(XL dol, brn-dk brn)	dolomite	pld		c			intertidal?
(Micro XL dolostone, lt gy/lt brn)	dolomite, dism pyr		very rare lam		c	C	supratidal?
1425 (XL dol, dk brn)	dolomite	pld		c			intertidal?
(row below 1425)	dolomite			c			intertidal?
(Micro XL dolostone, sabkha, lt brn)	dolomite				c		supratidal?

1:120

Interpreted Lithology & Facies — Diagenetic Feature; Dolomitization Mechanism; Tectonic Structural feature; VC ss / Xll dol, ls; C ss / Gnst dol, ls; M ss / Pkst dol, ls; F ss / Pkd Wackst dol, ls; VF ss / Sprs Wackst; Sltst: silicic, dol, ls; Mudst: silicic, dol, ls; Shale, bk, gy, gn: EVAP; Gamma Ray Trace 0 150

Facies & Resvr Summary

DolXll & SilicicGn Size, Sort, Rnd — < 5 um (clay & cryptoXll); 5-10u, vf slt (earthy); 10-20u, f slt (earthy); 20-40u, m slt (mic xll); 40-60u, c slt (mic xll); 60-125u, v fine; 125-250u, fine; 250-500u, med; 500u-1mm, crs; 1-2 mm, v crs; 2-4 mm, gran; 4-64 mm, pbl; 64-256, cob; >256 mm, bldr; SORTING (5=vp,4=p,3=m,2=w,1=vw); ROUNDING (a,sa,sr,r); sum

Sedimentology, Bioturbation, Fossils etc

Foss-Allochem: cri,bra,bryF,bryR,bryE,r cor,ccor,cep,gas,cal,ec h,fsh,for,gra,lum,int,onc, ooi,ost,pely,plt,pld,pis,sk el,spi,coat,tri,amp,strS,s trl,strM,strT,strB,alg,alg M,algF,das,ren,sca,wor, con,syr,shel,tha,etc

Biot-Burrow-Ped: I.F.= IchnoFacies: s=slight, m=mod, w=well, ch=churn; Ped=Pedogen, Tr=Tryp, Gl=Gloss, Ss=Skol, Cr=Cruz, Zo=Zooph, Ne=Nerei: ar,as,be,ch,co,cr,cy,di,gy,he,heda, ma,mo,mu,op,pa,ph,pl,ri,ro,ru,sc,sk ,ter,ted,th,ti,zo,root, etc — Deg; I.Fac; Traces, hz,vt

Sedimentary Structures

Dep Systems & Environment — Basin; Slope; Shelf Edge Shoal or Reef; Deep Shelf / Muddy Shelf; Shallow Shelf / Transition Zone; Shoal / Barrier Is / L & M Shore; Restr.Marine / Lagoon / U Shore; Pertidal / Foreshore; Supratidal / Back Beach; Evaporitic Salt Pans / Coastal P; Lacustrine / Paludal; Fluvial / Glacial / Alluvial; Soil / Karst / Eolian (Deep; Shallow; NonMarine)

Depositional Environment & Processes (carbonate-blue, clastic-yellow, mixed carb & clast-green, evaporite-brown)

Interpreted Structure / Structural Processes

m (0)	Dist from top core	Adjusted Depth	Fmtn	Unit	Basal Cont	Diagenetic Feature	Dolomitization Mechanism	Tectonic Structural feature	Color: Weath / Fresh: (dk, lt, me, pal, mot; bn,gy,bk,yl, gn,ppl,red, bl,ong,olv, wt)	Long Facies Desc. & Comments (lith, alloch, mineralogy, porosity, defining features, etc)	Res. Pot. good, poor, questble	Resvr Type: m,ss,sl,ts,tl,fa,fd,f	Core Analysis Porosity	Core Analysis Perm (md)	Pore Types; e, mx, x, xi, g, gi, fe, m, vi, vt, sh, sc, p, fr, art: Dm	Mn	Tr	HC Show; P=pyrobit, D=dissem, F=film, O=odor: Dm	Mn	Tr	Analysis c=core, p=plug	Sample
			Sulphur Pt.	LS		s			gy	Peloidal lime grainstone, karst features including reduction mottling, fractures, green clay from Watt Mtn. soil diagenesis.	p		3.0	0.0								
				LS		s					p		0.0	0.0								
				LS		s					p		0.0	0.0								
1420	1			LS	stylolite	s					p		0.0	0.0							FD1	
				LS		r			lt brn	Peloidal GS-WS, mosaic to chaotic breccia, healed breccia. This appearance is due to soil textures.	p		3.0	0.0							SP1P	
				LS		r					p		0.0	0.0							FD2	
				LS		r					p		0.0	0.0							FD3	
1421	2			LS	karst	r					p		0.0	0.0							P4	
				LS		r			v dk gy	Peloidal wi mnr skeletal fragment GS wi mnr WS, early calc cmt, tr Gast. Roof collapse breccia, chaotic.	p		3.0	0.0							FD5	
				LS		r					p		0.0	0.0								
				LS		r					p		0.0	0.0								
1422	3			LS		r					p		0.0	0.0							FD6	
				LS		r					p		0.0	0.0								
				LS		r					p		0.0	0.0								
				LS		r					p		0.0	0.0							FD7	
1423	4			LS	karst	r					p		0.0	0.0								
				LS					gy-brn	Peloidal GS-WS, some faint bedding, bioturbated, intertidal.	p		0.0	0.0							FD8	
				LS	stylolite						p		0.0	0.0								
				LS		r			gy	Peloidal GS, mosaic to chaotic brec, tr blk shale filled karst cavities, fratures filled wi	p		0.0	0.0							FD9	
1424	5			LS	karst	r					p		0.0	0.0								
				LS				b	gy-brn	Peloidal GS-WS, peloidal and rnd clasts of pel GS. Supratidal.	p		O	0.0								
		1423.5	Sulphur Pt.	LS	stylolite			b			p		2.0	0.1							FD10	
		(-1.0m)	Sulphur Pt.	DS			b	b	lt brn-dk brn	Interbedded peloidal GS and MS/WS, cryptalgal lam, early brecciation	p		2.0	0.2	mx						FD11	
1425	6			DS			b	b			p		3.8	0.1	X						SP12	
										missing core			0.0	0.0								
					Core #2					Core #2			0.0	0.0								
			Sulphur Pt.	DS		c	b		lt brn-brn	Marine deposition of soft carbonate clasts	q		28.0	23.6	p	X					FD13	
1426				DS		c	b		brn	Regolith/Cave fill, chaotic breccia, matrix supported, some arg beds up to 2 cm, some porosity development within cryptalagal GS clasts, some semi conormed carbonate clasts. Looks like a sinkhole infill with a fluvial sourced argillaceous matrix.	q		22.4	11.7	p	X					SP2P	Thin sections
				DS		c	b				q		15.6	19.9	p	X					FD14	
	1			DS		c	b				q		13.9	1.5	p	X					FD15	
				DS		c	b				q		15.0	0.5	X						FD16	
1427				DS		c	b				q		11.7	0.1	X						SP17	
				DS		c	b				q		14.3	1.5	X		F				SP18	Thin ssection
	2			DS		c	b				q		16.0	2.3	p	X					FD19	
				DS		c	b				q		13.1	0.3	p	X					SP3P	
1428				DS		c	b				q		14.2	4.3	p	X					FD21	
				DS		c	b				q		9.4	0.1	X						FD22	
	3			DS	karst	c	b				q		11.9	3.8	X						FD24	
				DS			b	b	dk brn	cryptalgal laminated pld GS, soft sed deformation, syndepositional deformation, looks like a mix of supratidal and upper	p		4.0	1.1	X		F				FD25	
1429				DS			b	b			q		10.0	3.7	X	V					FD26	
				DS			b	b			g		12.6	17.0	p	X					FD27	
	4			DS			b	b	lt brn/dk brn	Cryptalgal lam pld GS, suprtidal and up intertidal. Karst features.	p		7.6	1.0	X						FD29	
				DS			b	b			p		4.4	0.2	p	X					SP6P	
1430				DS			b				p		8.9	3.2	X		F				SP31	
				DS	karst	c	b		lt brn	Marine regolith sediment. Lt brn dolostone	p		6.0	1.5	p	X					FD32	
	5			DS			b		dk brn	Bioturbated pld WS-GS grdg to a laminated	p		0.3	1.6	p		X				FD33	
				DS	karst	c	b		lt brn	Marine regolith sediment. Lt brn dolostone	g		14.8	18.0	p	X	FS				FD34	
1431				DS			b		brn/dk brn	GS, Supratidal, cryptalgal, secondary por, abdnt oil stn, res unit.	g		12.4	63.7	p		X				P35	
				DS			b				g		10.0	6.5	p						FD36	
	6			DS			b				g		9.0	11.7	p						SP007P	Thin section
				DS			b		dk brn	Pld GS, up-mid inter tidal.	p		5.5	1.3	X						FD37	
1432				DS			b				g		3.2	26.3	p		F				FD38	
				DS			b				g		5.3	34.4	p		FS				FD39	
	1			DS			b				g		11.0	19.0	p						P40&41	
				DS	karst		b				p		8.0	0.8	p		F				FD42	
1433				DS			b		lt brn	Marine regolith sediment. Lt brn dolostone	p		3.7	0.3	p		F				P43	
					Core #3						p		0.0	0.0								
				DS		c	b			Dolo GS, pld, mnr algal lam, com hz burrows, hz to low angle bedding, mnr vert and hz frac wi mxl dol cmt, partially open	p		5.0	2.2	X		F				FD 44	
				DS		c	b		dk brn		p		0.0	0.0								
1434				DS	karst	c	b				p		2.0	0.6	X		F				FD45	
				DS		r	b		brn	dolo GS, pld, some cryptalgal lam, supra tidal?, bank edge colllapse and karst breccia, dissolution surfaces, some soil overprinting. Meteoric leaching is evident in thin sections; inter granular, moldic, pin point vug and intercrystalline porosity.		m, fra	12.2	12.9	g		FS	f			FD46	
	1			DS		r	b					m, fra	20.6	57.6	g		FS	f			SP47	Thin section
				DS		r	b					m, fra	23.8	1070.0	g		FS	f			FD50	
1435				DS		r	b					m, fra	19.0	142.0	g		FS	f			SP10	
				DS		r	b					m, fra	21.5	127.0	g		FS	f			P53	Thin section
	2			DS	karst	r	b					m, fra	12.1	54.6	g		FS	f			FD54	
				DS			b		dk brn	GS, pld, low intertidal to sub tidal.	p		4.3	4.2	p		FS				FD55	
1436				DS			b				p		7.0	7.4	p		FS				FD56	
				DS			b				p		7.6	0.7	p		FS				FD58	
	3			DS			b		lt brn	GS, pld, Supratidal.	p		15.7	13.2	p						P59	
				DS			b				g		18.4	780.0	p		f				FD62	
1437				DS			b		dk brn	GS, pld, intertidal, shallowing upwards	p		6.4	1.2	p						FD63	
				DS			b				g		16.3	14.8	p		F				P64	
	4			DS			b			roof type fratures with coarse calcite	p		2.0	0.1	X						P65	
				DS	karst		b				p		0.0	0.0								
1438				DS		c	b		dk brn	Marine regolith, Intertidal clasts in a pld carbonate matrix.	p		0.0	0.0								
				DS		c	b				p		0.0	0.0								
	5												0.0	0.0								
													0.0	0.0								
1439													0.0	0.0								

m	Analysis	20-40u, m slt (mic xll)	60-125u, v fine	sum	Foss-Allochem	Deg	I.Fac	Traces, hz,vt	Sedimentary Structures	Depositional Environment & Processes	Interpreted Structure / Structural Processes
				0	pld					intertidal zone	karst and soil
				0	pld						
				0	pld						
1420	FD1			0	pld						
	SP1P			0	pld, gas						karst beccia
	FD2			0	pld, gas						soils
	FD3			0	pld, gas						roof collapse
1421	P4			0	pld, gas						
	FD5			0	pld						karst beccia
				0	pld						roof collapse
				0	pld						
1422	FD6			0	pld						
				0	pld						
				0	pld						
	FD7			0	pld						
1423				0	pld						
	FD8			0	pld	m	cr	hz		lower intertidal	
				0	pld						
	FD9			0	pld						karst beccia
1424				0	pld						roof collapse
				0	pld					lower intertidal	
	FD10			0	pld						
	FD11		d	0	pld				algal lam	supratidal and up intertida	
1425	SP12		d	0	pld						karst beccia
				0							
				0							
	FD13		d	0	pld					Regolith	
1426	SP2P		d	0	pld					Regolith	
	FD14		d	0	pld					Regolith	
	FD15		d	0	pld					Regolith	
	FD16		d	0	pld					Regolith	
1427	SP17		d	0	pld					Regolith	
	SP18		d	0	pld					Regolith	
	FD19		d	0	pld					Regolith	
	SP3P		d	0	pld					Regolith	
1428	FD21		d	0	pld					Regolith	
	FD22		d	0	pld					Regolith	
	FD24		d	0	pld					Regolith	
	FD25		d	0	pld				algal lam, SSD, mud	supratidal and up intertida	mnr karst related fractures
1429	FD26		d	0	pld						
	FD27		d	0	pld						
	FD29		d	0	pld				algal lam		karst fractures filled
	SP6P		d	0	pld						
1430	SP31		d	0	pld						
	FD32		d	0							small fault
	FD33		d	0	pld						
	FD34		d	0							small fault
1431	P35		d	0	pld					supratidal	
	FD36		d	0	pld						
	SP007P		d	0	pld						
	FD37		d	0	pld					intertidal, decrease in algal lam.	
1432	FD38		d	0	pld						
	FD39		d	0	pld						
	P40&41		d	0	pld						
	FD42		d	0	pld						
1433	P43		d	0							small fault
				0							
	FD 44		d	0	pld	m	Cr	hz	mnr algal lam	middle to low intertidal	
			d	0	pld						
1434	FD45		d	0	pld						
	FD46		d	0	pld				cryptalgal lam	supra tidal	
	SP47		d	0	pld						
	FD50		d	0	pld						
1435	SP10		d	0	pld						
	P53		d	0	pld						
	FD54		d	0	pld						
	FD55		d	0	pld					intertidal-subtidal	
1436	FD56		d	0	pld						
	FD58		d	0	strm						
	P59	d		0	pld					supra tidal	
	FD62		d	0	pld						
1437	FD63		d	0	pld					shallowing upwards intertidal	
	P64		d	0	pld						
	P65		d	0	pld						
			d	0	pld						
1438			d	0	pld					roof collapse	
			d	0	pld						
				0							
				0							
1439				0							

m	Dist from top core	Adjusted Depth	Fmtn	Unit	Basal Cont	Color: Weath / Fresh: (dk, lt, me, pal, mot; bn,gy,bk,yl, gn,ppl,red, bl,ong,olv, wt)	Long Facies Desc. & Comments (lith, alloch, mineralogy, porosity, defining features, etc)	Res. Pot. good, poor, questible	Resvr Type: m,ss,sl,ts,tl,fa,fd,f	Core Analysis Porosity	Core Analysis perm (md)	Pore Types; e, mx, x, xi, g, gi, fe, m, vi, vt, sh, sc, p, fr, art: Dm	Mn	Tr	HC Show; P=pyrobit, D= dissem, F=film, O=odor: Dm/Mn/Tr	Analysis c=core, p=plug	DolXll & SilicicGn Size, Sort, Rnd	sum	Foss-Allochem	Biot-Burrow-Ped: Deg	I.Fac	Traces, hz,vt	Sedimentary Structures	Depositional Environment & Processes	Interpreted Structure / Structural Processes
1363																									
			Watt Mountain			grn				0.0	0.0							0							
							Shale, grn, paleosol, ped, pyrite.			0.0	0.0							0							
										0.0	0.0							0							
1364	1									0.0	0.0							0							
		1366.0	Sulphur Point	LS		lt brn-dk brn				0.0	0.0							0	pld wi mnr shl	m	cr	hz	cryptalgal lam	Intertidal wi mnr supra tidal	roof collapse wi some
				LS			Limes GS and PS wi mnr WS, pld wi mnr skeletal frags, soil overprint below Watt Mtn, all roof collapse wi some early karst and SSD, clay matrix infill around hard clasts.			0.0	0.0							0	pld wi mnr shl						
				LS						0.0	0.0							0	pld wi mnr shl						
1365	2			LS						0.0	0.0							0	pld wi mnr shl						
				LS						0.0	0.0							0	pld wi mnr shl						
				LS						0.0	0.0							0	pld wi mnr shl					supratidal	possible unconformity
				LS						0.0	0.0							0	pld wi mnr shl						
1366	3			LS						2.5	0.0					SP1P		0	pld wi mnr shl						
				LS						0.0	0.0							0	pld wi mnr shl						
				LS						0.0	0.0							0	pld wi mnr shl						
				LS						0.0	0.0							0	pld wi mnr shl						
1367	4			LS						0.0	0.0							0	pld wi mnr shl						
				LS						0.0	0.0							0	pld wi mnr shl						
				LS						1.4	0.0					FD1		0	pld wi mnr shl						
				LS						0.0	0.0							0	pld wi mnr shl						
1368	5			LS						0.0	0.0							0	pld wi mnr shl						
				LS						0.0	0.0							0	pld wi mnr shl						
				LS						0.0	0.0							0	pld wi mnr shl						
				LS						0.0	0.0							0	pld wi mnr shl						
1369	6			LS						0.0	0.0							0	pld wi mnr shl						
				LS						0.0	0.0							0	pld wi mnr shl						
				LS						0.0	0.0							0	pld wi mnr shl						
				LS						0.0	0.0							0	pld wi mnr shl						
1370	7			LS						0.0	0.0							0	pld wi mnr shl						
				LS						0.0	0.0							0	pld wi mnr shl						
				LS			soft sediment deformation features present within some clasts that indicate that syndepositional tectonics			0.0	0.0							0	pld wi mnr shl						
				LS						0.0	0.0							0	pld wi mnr shl						
				LS						0.0	0.0							0	pld wi mnr shl						
1371	8		Sulphur Point	DS		LT BRN-BRN	GS, pld, supra tidal, roof collapse			2.0	0.0	E			f	SP2		0	pld				crytalgal lam	supratidal	roof collapse
				DS		blk-lt brn	Cave sediments, dk arg matrix wi carbonate rock clasts which are partly semi conformed.			8.0	0.9	E			f	FD3		0						cave sediment	karst wi cave infill
				DS						5.0	0.0	E			f	FD4		0							
				DS						6.6	0.1	E			f	FD5		0							
1372	9			DS		lt brn-brn	Semi conformed breccia in a carbonate matrix, early, syndep tect cm scale karst shale overlaying			12.0	1.8	E			f	SP6		0						intertidal	early breccia,
				DS						7.8	3.0	X	V		f	FD7		0						intertidal	
				DS						13.0	4.4	e		v	f	SP8		0						intertidal	
				DS		lt brn	Sub tidal and low inter tidal, pld			15.3	13.4	e	v	fr	f	FD9	d	0	pld				mnr crytalgal lam	intertidal	
1373	10			DS		lt brn-brn	roof collapse clasts in a soft carbonate matrix, clasts are lower intertidal, mm			12.0	2.0	e	x	p	f	FD10		0						intertidal	cave seds, roof clasts,
				DS						0.0	0.0				f			0						intertidal	
				DS		brn	GS, pld, mottled wi mnr cryptalgal lam, intertidal.			4.4	0.1	x			f	FD11	d	0	pld				mnr crytalgal lam	intertidal	
				DS						7.0	5.5	p	x		f	FD13	d	0	pld					intertidal	
1374	11			DS						5.7	1.6	p	x		f	FD14	d	0	pld					intertidal	
				DS						2.0	0.0	p			f	FD15	d	0	pld					intertidal	
				DS			GS, pld, mottled wi mnr cryptalgal lam, intertidal.			10.0	5.8	x	p		f	FD16	d	0	pld					intertidal	
				DS						0.0	0.0				f		d	0	pld					intertidal	
1375	12			DS						11.0	214.0	p	x	FR	f	FD17	d	0	pld					intertidal	
				DS		brn	roof collapse, mid int tidal			10.6	13.0	p	x		f	FD18	d	0						roof collapse	roof collapse
				DS		brn	dolo GS, pld, sub tidal			7.7	3.2	x			f	SP5P	d	0	pld				mnr crytalgal lam	intertidal	
				DS						7.7	5.5	p	x		f	FD19	d	0	pld					intertidal	
1376	13			DS		brn	roof collapse with arg infill on top of lt			4.0	4.0	e		fr	f	FD20	m m m m m m	0						karst roof collapse and cave infill	roof collapse
				DS		brn	dolo GS, pld, sub tidal			13.0	52.0	p	x		f	FD21	d	0	pld				mnr crytalgal lam	intertidal	
				DS						3.0	0.0			x	f	SP22	d	0	pld					intertidal	
				DS						11.6	31.0	x	p		f	FD23	d	0	pld					intertidal	
1377	14			DS						5.5	0.2			x	f	SP24	d	0	pld					intertidal	
				DS						6.0	0.1	x			f	FD25	d	0						intertidal	
				DS		brn	roof collapse breccia, early, carb clasts			8.0	1.2	x	p		f	FD26	m m d	0							early breccia
				DS		lt brn-blk	Cave sediments, semi conformed carb clasts and gy-blk shale, cave wall.			4.0	0.0	P			f	SP6P	m m m m m m	0						cave infill sediment	
1378	15			DS				P		12.0	36.0	E			f	FD27	m m m m m m	0							
				DS						0.0	0.0				f		m m m m m m	0							
				DS		lt brn	dolo GS, pld, one thin bed of stroms, mottled and brecciated beds interbedded wi thin undisturbed beds wi cryptalagal lam, subtidal, abundant oil stain. Two tectonic microfractures above the fossil bed. Some areas have a soil overprint as well.		m	24.0	215.0	P	X	G	f	FD28	d	0	pld	w	Cr		rare cryptalgal lam	intertidal	
				DS					m	21.0	203.0	P	X	G	f	FD29	d	0	pld					intertidal	
1379	16			DS					m	18.0	60.0	P	X	G	f	SP7P	d	0	pld					intertidal	
				DS					m	7.0	1.0	Gl	P		f	FD31	d	0	strS, strA					subtidal	
				DS					m	25.0	653.0	G	P	X	f	SP32	d	0	pld				soft sed deformation	intertidal	
				DS					m	20.0	200.0	G	P	X	f	SP8P	d	0	pld					intertidal	
1380	17			DS					m	18.5	421.0	P		X	f	SP34	d	0	pld					intertidal	
				DS	karst				m	10.0	11.0	P		X	f	SP36	d	0	pld				mnr cryptalagal lam	intertidal	
				DS			Dolo GS, pld. Some tectonic liquefaction breccia, some soil overprint on the sediments		m	13.4	166.0	P	X		f	FD37	d	0	pld					early breccia, tectonic liquafaction	tectonic liquafaction
				DS					m	11.0	47.0	P	X		f	FD38	d	0	pld						
1381	18			DS	core break				m	14.4	94.0	P	X		f	SP9P	d	0	pld						
				DS		lt brn-brn	GS, pld, mostly intertidal with mnr supratidal, common cryptalgal lam, early sabkha dolomite in supra tidal facies, tectonic liquefaction in subtidal rocks and soil overprinting.		m	10.0	25.0	p	x		f	FD39	d	0	pld				mnr cryptalagal lam	intertidal	
				DS						5.0	1.0	p	x		f	FD40	d	0	pld					intertidal	
				DS						4.0	0.4	x			f	FD41	d	0	pld					intertidal	
1382	1			DS						6.0	1.0	x			f	FD42	d	0	pld					supratidal	
				DS						0.0	0.0				f		d	0	pld						
				DS	unconform	lt brn	MS. Supratidal, anhy, cryptalgal lam,			8.0	0.7	e			f	FD43	d	0					cryptalagal lam	supratidal	
				DS			Karst breccia of dolo GS, pld, combination of roof collapse and cave			3.0	0.0	x			f	FD44		0	pld						Karst breccia and soil
1383	2			DS	unconform					3.7	0.0	x			f	SP11P		0							
		1386.0	Sulphur Point	DS	unconform		Dolo MS, sub aerial exposure at the Anhydrite. Supratidal.			0.0	0.0				f		d	0					cryptalagal lam		Karst and soil
			Muskeg	An		gy-brn				0.0	0.0							0						supratidal	
			Anhydrite							0.0	0.0							0							
1384	3					lt brn	Dolomudstone, earthy, some cryptalgal			0.0	0.0						d	0					cryptalagal lam	supratidal	
										0.0	0.0							0						supratidal	
										0.0	0.0							0							
						brn	Dolo GS, pld, supratidal.			0.0	0.0					FD45		0	pld					supratidal	
1385	4									0.0	0.0							0							
										0.0	0.0							0							
										0.0	0.0							0							
										0.0	0.0							0							
1386	5									0.0	0.0							0							
										0.0	0.0							0						supratidal	
										0.0	0.0							0							
										0.0	0.0							0							
1387	6									0.0	0.0							0							

m (1:240)	Sample Quality	Bulk Lithology % of Sample; 5% increments	Fmtn	Color: Weath / Fresh	Long Facies Desc. & Comments (lith, alloch, mineralogy, porosity, defining features, etc)	Res. Pot.	Resvr Type	Est. Total Effective Por	Est. Total Perm (md)	Pore Types Dm	Pore Types Mn	Pore Types Tr	HC Show Dm	DolXll 10-20u	DolXll 20-40u	DolXll 60-125u	Diagenesis Description	Foss-Allochem	Sedimentary Structures	Peritidal / Foreshore	Supratidal / Back Beach	Depositional Environment & Processes
1520																						
								0.0	0.0													
								0.0	0.0													
								0.0	0.0													
1525			Sulphur					0.0	0.0													
	fair	P	Point	brn	PS, 5-150um xl dolostone with mxl crystals between grains, some pp vug por, tr inter gran por (meteoric leaching), probably intertidal.		m	5.0	1.0	p		g	f	d	d	m				c		
			Dolostone				m	5.0	1.0	p		g	f	d	d	m	dolomitzed	pld	no visible sed	c		mixed intertidal and sabkha, common sub aerial exposure
					MS-PS, crypto and micro xl, 5-50um xl dolostone, micro xl porosity, some pp vug por, tr inter gran por, probably a mix of sub aerially exposed sabkha and upper intertidal beds, mostly tight.		m	5.0	1.0	p		g	f	d	d	m		pld	structures in cuttings	c		
							m	5.0	1.0	p		g	f	d	d	m		pld		c		
1530							m	5.0	1.0	p		g	f	d	d	m		pld		c		
	fair	P, Xll		lt brn	Mxl dolostone, sabkha, mottled, probably some sub aerial exposure.		m	5.0	1.0	e		p	f	d	d						c	Sabkha
		An	Muskeg		Muskeg anhydrite			0.0	0.0												c	evaporite pan
			Anhydrite					0.0	0.0												c	
								0.0	0.0													
1535								0.0	0.0													
	fair	P, An						0.0	0.0													
								0.0	0.0													
								0.0	0.0													
								0.0	0.0													
1540								0.0	0.0													
	fair	An						0.0	0.0													
								0.0	0.0													
								0.0	0.0													
								0.0	0.0													
1545								0.0	0.0													

m (1:120)	Dist from top core	Fmtn	Unit	Basal Cont	Karst Feature	Dolomitization Mechanism	Tectonic Structural feature	Color: Weath / Fresh	Long Facies Desc. & Comments	Res. Pot	Resvr Type	Est. Total Effective Por	Est. Total Perm (md)	Pore Types	HC Show	Analysis	Samples	DolXl & SilicicGn Size	sum	Foss-Allochem	Biot Deg	Sedimentary Structures	Depositional Environment & Processes
1397																							
		Sulphur Pt.	LS			?		dk gy	Dolo GS, pld, 150um xl, abdnt dism	p		0.0	0.0					125-250u, fine	0	pld		mnr lam	
			LS					brn	GS, pld, partly dolomitized, partly	p		0.0	0.0		f			< 5 um	0	pld		cryptalgal lam	mid inter tidal
			LS	subaerial						p		6.0	0.2	p g f	f	SP63		< 5 um	0	pld			
1398	1		LS		s			v dk gy	LS, soil overprint, mnr grn shale, dol	p		0.0	0.0					< 5 um	0	pld			
			LS		s			brn	GS, pld, soil overprint.	p		0.0	0.0		f			< 5 um	0	pld			lwr int tidal
			LS	subaerial	s					p		0.0	0.0		f			< 5 um	0	pld			
			LS					brn	GS, pld, intra clast, tr ooid, skel frag,	g		12.3	13.7	g p	f	FD65		< 5 um	0	pld	w		lwr int tidal
1399	2		LS							f		7.4	1.6	g p	f	FD66		< 5 um	0	pld	ch		subtidal
			LS	subaerial	s			brn	PS/GS, pld, tr skel gr, some soil diag,	p		0.0	0.0		f			< 5 um	0				subtidal?
			LS				f	brn	GS, pld, syn dep tect frac at top, last	p		7.0	0.4	g	f	FD67		< 5 um	0	pld	m	syn dep tect frac	subtidal
			LS							p		0.0	0.0		f			< 5 um	0	pld	w		subtidal
1400	3		LS	subaerial			f			p		0.0	0.0		f			< 5 um	0	pld	m	early brec	subtidal
			LS	subaerial	s			dk brn	LS, mottled and brecciated in part, soil	p		0.0	0.0		f			< 5 um	0				
			LS	subaerial			b	brn	GS, intertidal, partly brec, hd clast	p		0.0	0.0		f			< 5 um	0	pld		mnr bedding, mnr	intertidal
			LS		s			brn	GS, mottled soil diagenesis	p		5.0	0.9		f	FD68		< 5 um	0				
1401	4		LS	subaerial	s					p		0.0	0.0		f			< 5 um	0				
			LS				f	brn	GS/PS, pld, shallowing upwards cycle,	p		0.0	0.0		f			< 5 um	0	pld		well laminated	intertidal
			LS				b		laminations decrease with depth, syn	p		5.8	0.0		f	SP2P		< 5 um	0	pld		well laminated	intertidal
			LS				b		tec faulting and liquefaction, and	f		8.0	1.2	g	f	FD69		< 5 um	0	pld		mod lam	intertidal
1402	5		LS				b		brecciation. Some secondary porosity	g		13.4	34.5	g	f	FD70		< 5 um	0	pld		mod lam	intertidal
			LS				b		(meteoric leaching) and oil stained.	g		15.4	35.0	g	f	FD71		< 5 um	0	pld		mod lam	intertidal
			LS	karst			b		throughout.	g		12.7	15.0	g	f	FD72		< 5 um	0	pld		mod lam	intertidal
			LS		?		?	brn	Marine regolith. GS, pld, clasts of pld	p		9.0	5.0	g		SP73		< 5 um; 10-20u	0				marine regolith
1403	6		LS						GS in a pld matrix, no bedding.	p		6.6	0.7	g		FD74			0				
			LS					blk, gy	Regolith, Fluvial, carbonate clasts in a	p		0.0	0.0						0				Fluvial regolith, cave fill?
			LS						arg matrix.	p		0.0	0.0						0				
			LS	Subaerial						p		0.0	0.0			SP3P			0				
1404	7		LS		s			dk brn	LS, GS?, laminated, diagenetically	p		0.0	0.0					< 5 um	0			mod lam	intertidal
			LS	karst	s				altered, fractures filled with dol cmt,	p		0.0	0.0						0			mod lam	intertidal
			LS					dk brn/dk gy	Roof collapse and underlying cave	p		0.0	0.0						0				roof col and cave fill
			LS					brn	Large clast breccia with some beds	p		0.0	0.0						0				series of roof collapses
1405	8		LS						that appear to be in place, series of	p		0.0	0.0						0				
			LS						roof collapse features, later fine	p		0.0	0.0						0				
			LS						grained sediment infill. (supratidal on	p		0.0	0.0						0				
			LS						top)	p		0.0	0.0			SP4P			0				
1406	9		LS						core is mostly rubble from here to	p		0.0	0.0			FD75			0				
			LS							p		0.0	0.0						0				
			LS							p		0.0	0.0						0				
		Sulphur Pt.	DS			?		gy/brn	dolomitized rocks as above	p		0.0	0.0			SP76		125-250u, fine	0				
1407	10		DS			?				p		0.0	0.0					125-250u, fine	0				
			DS			h			Hydrothermal dolomite, gy dol xl are	p		0.0	0.0			FD77	Thin section	1-2 mm, v crs	0				
			DS			h			up to 2mm, brn pld GS clasts are 100-	p		0.0	0.0					1-2 mm, v crs	0				
			DS		c	?		blk/gy	Regolith, fluvial, carbonate clasts with	p		0.0	0.0					60-125u, v fine	0				regolith, cave fill?
1408	11		DS		c				a arg matrix.	p		0.0	0.0					60-125u, v fine	0				
			DS		f				large supratidal clasts here	p		0.0	0.0			SP5P		60-125u, v fine	0				
			DS		c					p		0.0	0.0					60-125u, v fine	0				
			DS	Subaerial	c					p		0.0	0.0					60-125u, v fine	0				
1409	12		DS		s	b		brn	GS, some lam, top is gray, mottled like	p		0.0	0.0			SP78		60-125u, v fine	0	pld		ssd, laminations	intertidal?, soil diagenesis
			DS	karst	c	b		blk/gy	Regolith, fluvial, carbonate clasts with	p		0.0	0.0					60-125u, v fine	0				regolith, cave fill?
			DS	Subaerial	s	b		lt brn	MS, mottled with some bedding is	f		8.6	2.9	p mx f		FD79		20-40u	0			mottled, mnr bedding at	soil diagenesis or marine cave fill?
			DS		s	b		dk brn	GS, Pld, top has lots of dism pyr, is	p		6.5	0.5	p		SP6P		60-125u, v fine	0	pld		lam, ssd	supratidal
1410	13		DS			b			this a vadose/phreatic contact?,	f		6.0	2.4	x p f		FD80		60-125u, v fine	0				
			DS			b			erosional contact at 12.75m,	f		7.4	8.8	x p f		FD81		60-125u, v fine	0				intertidal
			DS			b	b		supratidal/upper intertidal. Bottom half	f		8.0	6.0	x p fs		FD82		60-125u, v fine	0				
			DS			b		gy/blk	Regolith, fluvial, breccia, large			0.0	0.0					20-40u	0				
1411	14		DS		s	b		gy	Marine regolith, erosional top?, gy			0.0	0.0					20-40u	0				
			DS		c	b		lt gy	Marine regolith, carbonate clasts in a	g		16.0	27.0	e p		FD83		20-40u	0				
			DS	Subaerial	c	b		lt gy	Regolith, fluvial, carbonate clasts wi a	f		12.7	1.8	e p		FD84	Thin section	20-40u	0				
			DS		s	b		gy/brn	GS, pld, soil diagenesis, some	g		8.7	16.0	p f		FD85	Thin section	60-125u, v fine	0	pld		rare laminations	
1412	15		DS			b			solution enhanced fractures in the top	g		6.0	1430.0	fs x		FD86		60-125u, v fine	0				intertidal
			DS	karst	c	b		lt gy/blk	Karst cave fill, lt gy carbonate clasts	f		8.0	7.5	fs p		FD87		20-40u	0				
			DS			b	b	brn	GS, pld, core is mostly rubble from		m, fra	22.0	112.0	p gi	f	SP8P	Thin section	60-125u, v fine	0	pld		SSD	either upper inter or supra
			DS			b	b		analysis, some SSD at top, early			7.6	29.0	p gi	f	SP88		60-125u, v fine	0				
1413	16		DS			b	b		breccia. Oil stn wi por			13.8	140.0	p gi	f	FD89		60-125u, v fine	0				
			DS			b		dk brn/dk gy	GS, pld, common lam, some SSD, up			22.0	21.0	p x fs		FD90		40-60u	0				intertidal
			DS			b						0.0	0.0	p fs				40-60u	0				
			DS			b	b		syn tect SSD	g		6.0	12.0	p f		FD92		40-60u	0			SSD	
1414	17		DS			b						0.0	0.0					40-60u	0				
			DS			b				g		4.0	321.0	p f art		FD93		40-60u	0				
			DS			b						0.0	0.0					40-60u	0				
			DS	Subaerial	s	b		lt gy-gy	GS?, Karst surface and soil	g		9.0	15.0	art p		FD94		20-40u	0				
1415	18		DS			b			diagenesis, mottled, top 5 cm is lt gy	f		2.0	3.0	x f		FD95		20-40u	0				
			DS			b			mxl dol, then 2cm thick shale (possible			0.0	0.0					20-40u	0				
			DS			b		dk gy	GS, low inter tidal			0.0	0.0					125-250u, fine	0				
			DS			b	b	dk gy	Early healed breccia.			0.0	0.0					125-250u, fine	0				probably intertidal
1416	19		DS	Subaerial		b	b					4.0	3.0	fs		FD96		125-250u, fine	0				
			DS		s	b		gy/brn	GS, soil diagenesis on top 1/2 meter,			6.0	134.0	e fs		FD97		20-40u	0	pld			soil overprint
			DS		s	b			remainder is mottled algal lam,			0.0	0.0					20-40u	0	pld			
			DS		s	b			intertidal?			9.0	2.5	g m p	f	SP98	Thin section	40-60u	0	pld			upper inter or supratidal
1417	20		DS			b						3.5	7.9	e f	f	SP10P		60-125u, v fine	0	pld			
			DS			b	b	brn/dk brn	GS, with stroms, early brecciated,			7.7	0.8	p		SP11P		60-125u, v fine	0	strA			subtidal, tect breccia?
			DS			b	b	dk brn	GS, mottled and syn dep breccia.		m, fra	9.0	23.0	p gi fs	f	SP99	Hycal TS	60-125u, v fine	0	pld			intertidal syn dep tect
			DS		s	b		lt brn			m, fra	11.0	14.0	g m e		FD100	Thin section	40-60u	0	pld		low to high angle lam	
1418	21		DS		s	b	b				m, fra	6.0	91.0	p e fs		FD101		40-60u	0	pld			intertidal
			DS			b	b	dk brn	GS, pld, top 1/2 meter has soil		m, fra	7.0	29.0	p g fs		FD102		40-60u	0	pld			
			DS			b	b		diagenesis, mottled, light colour.			3.7	60.0	p fs		FD103		40-60u	0	pld			
			DS			b			Remainder is intertidal seds with low	f		15.0	55.0	p		SP12P		40-60u	0	pld			
1419	22		DS			b	b		to high angle bedding and one large	f		6.7	27.6	p f		FD104	Hycal TS	40-60u	0	pld			
			DS			b			clast that is 10cm in size, some beds			5.0	0.1	p		SP105		40-60u	0	pld			
			DS			b			are brecciated (early) or mottled.			7.0	1.0	p		FD106		40-60u	0	pld			
			DS			b						6.0	438.0	p art		FD107		40-60u	0	pld			
1420	23		DS	karst		b						0.0	0.0					40-60u	0	pld			
			DS		c	s		lt bnr	GS, pld, supratidal, top contact is cm			10.0	1.7	e		SP108		20-40u	0	pld		agal lam	supratidal
			DS			s			scale cave fill (lt gy dol and blk shale).			6.7	0.2	e		SP13P		20-40u	0	pld			
			DS	erosional		s						0.0	0.0	e		FD110		20-40u	0	pld			
1421	24		DS		s	?		dk gy	Dolostone, brecciated and mottled			1.4	170.0	f		FD111		10-20u	0				probably supratidal
			DS		s	?			from soil diagenesis and karst. Shale			0.0	0.0					10-20u	0				

1:120 | Interpreted Lithology & Facies | Facies & Resvr Summary | DolXll & SiliciclGn Size, Sort, Rnd | Sedimentology, Bioturbation, Fossils etc | Dep Systems & Environment

m	Dist from top core	Adjusted Depth	Fmtn	Unit	Basal Cont	Karst Feature	Dolomitization Mechanism	Lithology (Mudst / Shale, EVAP)	Long Facies Desc. & Comments	Est. Total Effective Por	Est. Total Perm (md)	10-20u, f slt (earthy)	sum	Supratidal / Back Beach	Evaporitic Salt Pans / Coastal Plain	Soil / Karst / Eolian
1397		1421.3	Sulphur Pt	DS		s	?		beds from rooting and karst	0.0	0.0	d	0			c
			Muskeg	An				An	Anhydrite	0.0	0.0		0		■	
1422	25		Evaporite							0.0	0.0		0		■	
										0.0	0.0		0		■	
										0.0	0.0		0		■	
										0.0	0.0		0		■	
1423	26									0.0	0.0		0		■	
										0.0	0.0		0		■	
										0.0	0.0		0		■	
										0.0	0.0		0		■	
1424	27									0.0	0.0		0		■	
										0.0	0.0		0		■	
										0.0	0.0		0		■	
										0.0	0.0		0		■	
1425	28						s	M		0.0	0.0		0	c		
							s			0.0	0.0		0	c		
										0.0	0.0		0			
										0.0	0.0		0			
1426	29									0.0	0.0		0			