ABSTRACT

Sequence Stratigraphic and Depositional Controls on Reservoir Continuity within the Cretaceous Doe Creek Member of the Kaskapau Formation, Valhalla Field, Alberta, Canada

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The Doe Creek Member of the Late Cretaceous (Cenomanian) Kaskapau Formation is located in northwestern Alberta. Valhalla Field was discovered in 1979 and is the major producer of hydrocarbons from the Doe Creek Member. This study assesses the spatial and temporal distribution of reservoir facies by evaluating the sequence stratigraphic controls on reservoir quality and continuity across Valhalla Field. A total of ten retrogradationally-stacked parasequences and/or associated bedsets occur within the Doe Creek Member, of which, four include reservoir quality sandstone (I-1, I-Sand, I+1 and I+2). For these sandstones, maps are provided that depict the spatial distribution of reservoir facies, average effective porosity, gross pore volume and fraction of calcite cement. Comparison of these maps with fieldwide trends of total fluid and cumulative oil production suggest a strong correlation, and validate the utility of the sequence-keyed stratigraphic framework presented in this study as a guide for enhanced oil recovery.

Sequence Stratigraphic and Depositional Controls on Reservoir Continuity within the Cretaceous Doe Creek Member of the Kaskapau Formation, Valhalla Field, Alberta, Canada

by

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A Thesis

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CHAPTER ONE

Introduction

The Western Canada Sedimentary Basin (WCSB) is a retroarc foreland basin that developed during the Middle to Late Jurassic in response to the Columbian Orogeny (Porter et al., 1982). The basin is bound to the east by the Canadian Shield, and to the west by the fold and thrust belt generated during the Columbian and Laramide orogenic events (Cant and Stockmal, 1989). Sediments in excess of 6 km thick accumulated in the WCSB during the middle Jurassic to Paleocene (Porter et al., 1982). Late Cretaceous reservoirs account for 23% of the total conventional, initial-in-place oil of the WCSB and contain characteristically sweet (less than 0.5% sulfur), low gravity oil (API gravity less than 30 degrees) (Allan and Creaney, 1991). One such reservoir is the Late Cretaceous (Cenomanian) Doe Creek Member of the Kaskapau Formation (Hogg et al., 1998).

The Doe Creek Member is located in west-central Alberta on the southern flank of the Peace River Arch (Figure 1). The Doe Creek is the only unit of Cretaceous age that is producing in the Peace River Arch area and produces both oil and gas from six individual fields: Spirit River, Progress, Sinclair, Knopcik, Elmworth and Valhalla (Wallace-Dudley and Leckie, 1988). The Valhalla Field was discovered in 1979 and is the major producer of hydrocarbons from the Doe Creek interval (Hogg et al., 1998). Hydrocarbons are produced from isolated sandstone bodies that contain in-place volumes of 279 million barrels of oil and 44.7 billion cubic feet of gas (ERCB, 2008).

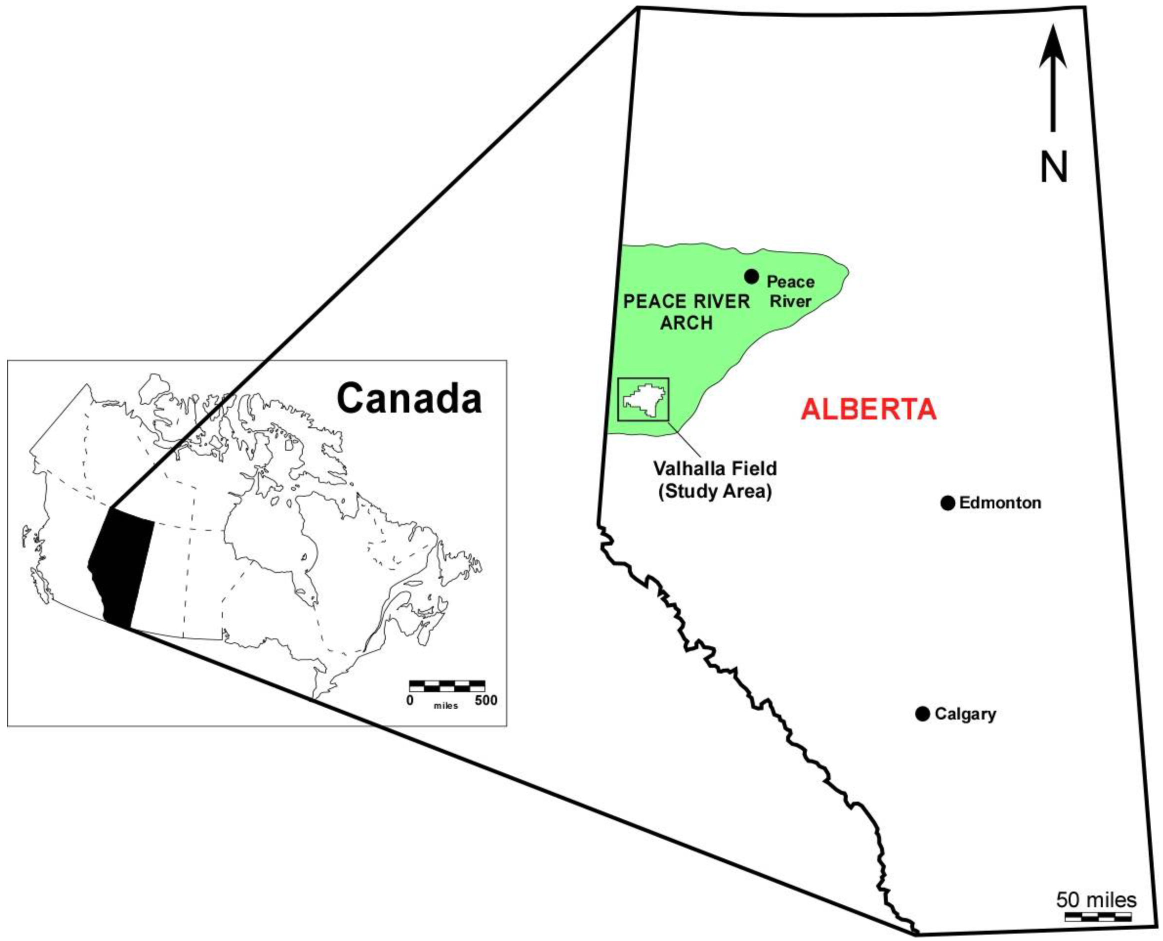


Figure 1. Valhalla Field is located in west-central Alberta, Canada on the southern flank of the Peace River Arch (modified from Wallace-Dudley and Leckie, 1988).

By 1982 an aggressive development drilling program had been initiated and by the mid 1980's production rates from the Doe Creek "I" Pool had reached a maximum (Hogg et al., 1998). In the early 1990's, a 40-acre patterned waterflood project was initiated to enhance recovery and by the end of 1996 more than 90% of the pool was producing through secondary recovery (Hogg et al., 1998). In 2004, a field-wide horizontal drilling program of production and water interjection wells was initiated in an effort to further enhance recovery. As of May 2008, 65 million barrels of oil (82% of recoverable reserves) and 13.5 billion cubic feet of gas (42% of recoverable reserves) have been recovered through primary and secondary depletion (ERCB, 2008).

As production from the Doe Creek "I" pool declines, increases in recoverable reserves will rely on the application of tertiary recovery methods. The effectiveness of both secondary and tertiary recovery is reliant upon a detailed understanding of the preferred pathways for fluid flow within the reservoir interval. Previous studies have incorporated both subsurface and outcrop data to characterize the sedimentology and stratigraphy of the Doe Creek Member in west-central Alberta and east-central British Columbia (Wallace-Dudley and Leckie, 1988; Bhattacharya and Walker, 1991; Hogg et al., 1998; Plint, 2000; Varban and Plint, 2005; 2008; Kreitner and Plint 2006; and Plint and Kreitner, 2007). This study evaluates the spatial and temporal distribution of reservoir facies within the Doe Creek Member at Valhalla Field through identification of the sequence stratigraphic controls on reservoir quality and continuity.

CHAPTER TWO

Paleogeography and Regional Stratigraphy

Western Canada Sedimentary Basin

The WCSB is comprised of a succession of Paleozoic to Early Jurassic passive margin deposits and Middle Jurassic to Eocene foreland basin deposits (Porter et al., 1982). The Doe Creek Member of the Kaskapau Formation was deposited during the Late Cretaceous (Late Cenomanian) as part of the foreland basin deposits along the western margin of the WCSB (Kauffman and Caldwell, 1993). Dickinson (1974) defined a foreland basin as a major continental depression associated with compressional zones along a deformation front. As a result of compression, a foreland basin forms as either 1) peripheral basins within the arc-trench gap of the continent-continent collision, or 2) retroarc basins resulting from flexural downwarping of the lithosphere due to tectonic loading associated with a fold and thrust belt (Dickinson, 1974). The WCSB is a retroarc basin that developed from flexural subsidence of the craton in response to the accretion of allocthonous terranes during the Middle to Late Jurassic Columbian Orogeny and Late Cretaceous Laramide Orogeny (Figure 2) (Cant and Stockmal, 1989). These accreted terranes along the western margin of North America provided sediment that was deposited in the foredeep of the basin (Cant and Stockmal, 1989).

Peace River Arch

The Peace River Arch (PRA) was a prominent tectonic feature during the formation of the WCSB (Cant, 1988). Discovered in the 1950's through examination

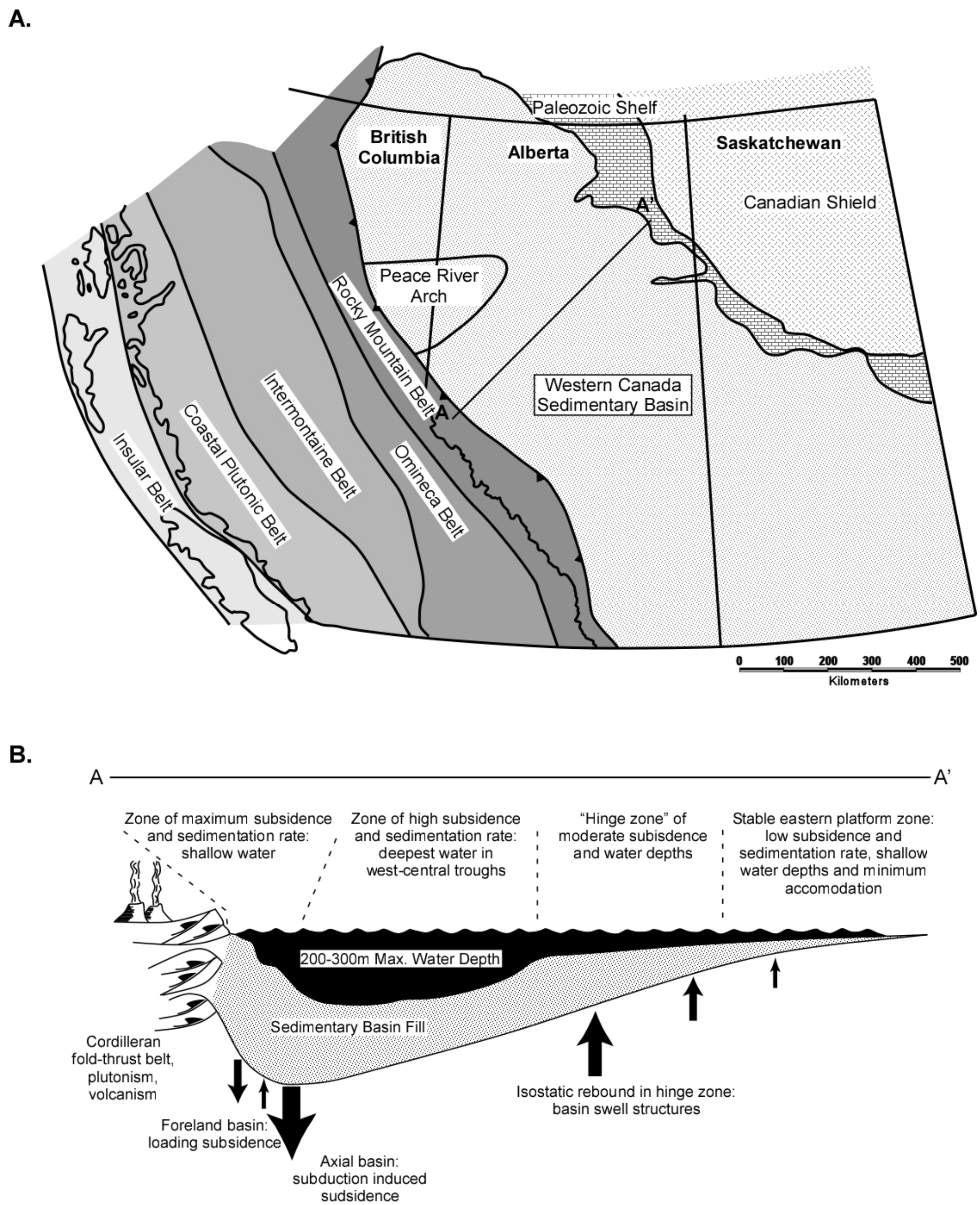


Figure 2. A) Map of the Western Canada Sedimentary Basin and the Canadian Cordillera with tectonic subdivisions labeled (Modified from Cant, 1988). B) Schematic cross section (A-A') across the Western Canada Sedimentary Basin during peak transgression (modified from Kauffman, 1984; *sensu* Reid, 2006). The position and location of arrows indicate relative vector direction and intensity of uplift/subsidence resulting from the Late Cretaceous Laramide Orogeny.

of well log data, the PRA represents a major crustal structure that spans the Alberta/British Columbia border (Figure 1) (Cant, 1988). The arch is 140 km wide and extends 400 km cratonward (east) from the cordillera (Chen and Bergman, 1999). Initial development of the PRA occurred in the Paleozoic, when the granitic basement was uplifted 800-1000 m above regional elevation along an ENE to WSW trend (Cant, 1988; Donaldson et al., 1998). Extensive faulting of the PRA began during the mid-Devonian and continued through the Pennsylvanian (Cant, 1988). During the Pennsylvanian, differential subsidence of fault-bounded blocks resulted in variable thickness of the sediment fill (Cant, 1988). In response to the Late Cretaceous Laramide Orogeny the PRA began to dip southwestward resulting in a change in stratal orientation from NE-SW in the Cenomanian to NW-SE in the mid Turonian (Cant, 1988).

The Doe Creek Member of the Kaskapau Formation was deposited on the southern flank of the PRA during the Late Cenomanian (Chen and Bergman, 1999). Locally, the variable stratal geometry associated with differential subsidence rates of fault bounded blocks influenced the thickness and distribution of Cretaceous age sediments (Donaldson et al., 1998). These Cretaceous units, including the Doe Creek Member, thin from south to north and lap onto the PRA complex as a result of contemporaneous uplift of the arch due to basement fault movement (Chen and Bergman, 1999; Donaldson et al., 1998; Hart and Plint, 1990).

Eustatic Sea Level Fluctuations

During the Late Cretaceous, rapid plate movement resulted in second-order sea level transgression and deposition of the Zuni cratonic sequence (Sloss, 1963; Plint, 2003). Across North America, second-order rise in sea level associated with the

Greenhorn transgression culminated at the Cenomanian-Turonian boundary (91.5 Ma) and coincides with deposition of the organic-rich Second White Speckled Shale in the WCSB (Hancock and Kauffman, 1979; Kauffman, 1984; Haq et al., 1987; Plint, 2003). The Second White Speckled Shale is the older of two shale units that contain abundant coccoliths, planktonic forams and calcareous rhabdoliths (Wallace-Dudley and Leckie, 1993).

During the initial phase of Zuni transgression, North America was flooded by warm, saline waters from the ancestral Gulf of Mexico to the south and by cooler, less saline waters from the Boreal Ocean to the north (Plint, 2003). The Western Interior Seaway (WIS) formed as these water bodies merged and remained open for 35 Ma until the Late Cretaceous to Early Paleogene Zuni regression (Sloss, 1963; Kauffman, 1984). The Kaskapau Formation conformably overlies the Dunvegan Formation, which contains thick sandstone bodies that were deposited in lowstand deltaic environments preceding the Greenhorn transgression and Kaskapau deposition (Haq et al., 1987; Wallace-Dudley and Leckie, 1988; Bhattacharya, 1989; Bhattacharya and Walker, 1991; Wallace-Dudley and Leckie 1993; Varban and Plint, 2008). The Cardium Formation overlies the Kaskapau Formation and contains conglomeritic sandstone deposited on incised shorefaces during sea level stillstands that occurred during a period of overall transgression (Pattison and Walker, 1992). The Kaskapau Formation was deposited immediately prior to the culmination of the Late Cretaceous transgression and is characterized by a series of retrogradationally-stacked sandstone bodies and interbedded marine shales that resulted from high frequency oscillations in sea level (Hancock and Kauffman, 1979; Plint and Kreitner, 2007). Hancock and Kauffman (1979) and Plint and

Kreitner (2007) attributed deposition of the transgressive marine shales to episodic periods of thrust loading and subsequent downwarping of the foreland basin, and lowstand sandstone bodies to forebulge emergence and subsequent erosion during intervening episodes of tectonic quiescence. In ascending chronological order the sandstone bodies of the Lower Kaskapau include the Doe Creek, Pouce Coupe and Howard Creek Members (Figure 3).

Regional Stratigraphy

The Kaskapau Formation is part of the Upper Cretaceous Smoky Group and is a north-eastward thinning clastic wedge composed predominantly of dark gray marine shale (Figure 3) (Varban and Plint, 2008). In the western part of the WIS, located in northeastern British Columbia, the Kaskapau Formation is greater than 950 m thick and thins to less than 50 m thick 350 km east of the foothills in west-central Alberta (Kreitner and Plint, 2006). Stelck and Wall (1954) divided the Kaskapau Formation into Lower, Central and Upper units (Figure 3). The Lower unit is defined by the contact with the Dunvegan Formation at the base and an erosional unconformity at the top. This erosional unconformity was later designated the K1 unconformity by Plint et al. (1993) and separates the Doe Creek and the overlying Pouce Coupe sandstones of the lower Kaskapau from the younger strata of the Central and Upper Kaskapau. The Central Kaskapau includes the Howard Creek Sandstone and the Second White Speckled Shale, whereas, the Upper unit is comprised of sediments from the top of the Second White Speckled Shale to the base of the Cardium Formation (Stelck and Wall, 1954). In outcrop, the Second White Speckled Shale occurs 11.6 m above the Howard Creek

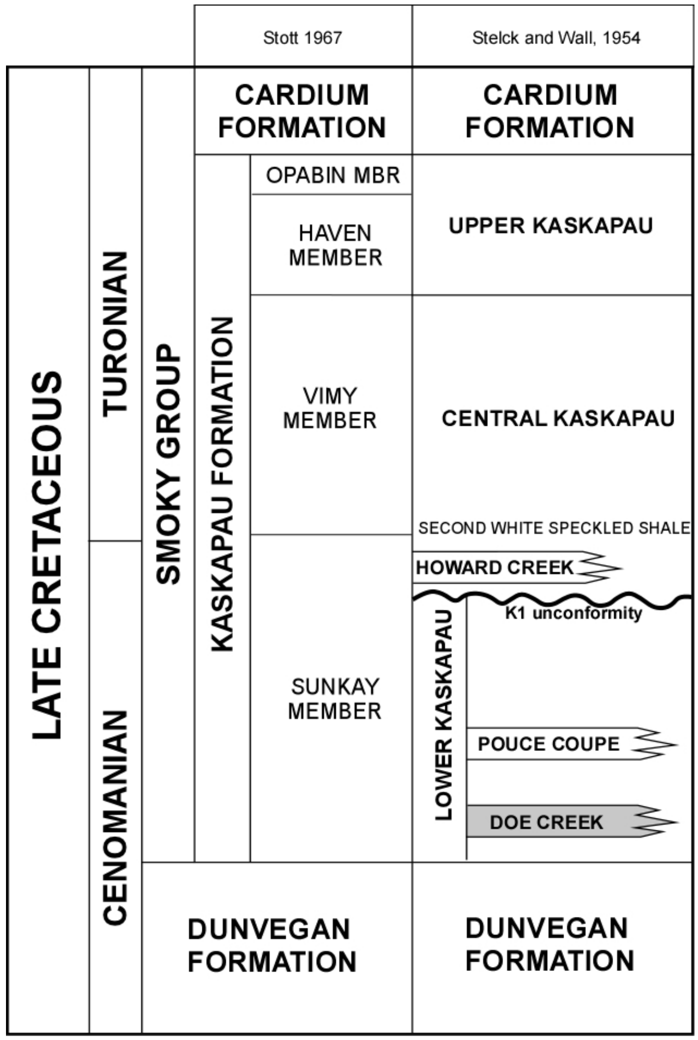


Figure 3. Stratigraphic correlation chart for the Upper Cretaceous in west-central Alberta (Stelck and Wall, 1954; Stott, 1967). In the Peace River Arch area, the Kaskapau Formation conformably overlies deltaic deposits of the Dunvegan Formation and is overlain by shoreline sediments of the Cardium Formation (Bhattacharya, 1989; Pattison and Walker, 1992). The Doe Creek Member is the oldest of three retrogradationally-stacked sandstone bodies within the Kaskapau Formation (Stelck and Wall, 1954).

Member and is characterized in well logs by high gamma-ray activity for up to 90 m of stratal thickness (Wallace-Dudley and Leckie, 1995).

Stott (1967) divided the Kaskapau into 4 members: the Sunkay, Vimy, Haven and Opabin based on calcite or siderite content and the presence of concretions (Figure 3).

The Sunkay Member is a predominantly dark gray, concretionary shale that includes the Doe Creek, Pouce Coupe and Howard Creek Members near the Peace River (Stott, 1967). The sandstone units of the Lower Kaskapau were first described by Warren and Stelck (1940) and include the Doe Creek and Pouce Coupe which pinch out westward to marine shales, and eastward, either pinch out or are truncated beneath the K1 unconformity.

Valhalla Field is situated within what was a coastal embayment along the western coast of the WIS during the Late Cretaceous (Figure 4) (Kreitner and Plint, 2006). At Valhalla Field, the Doe Creek Member ranges from 115 m to 30 m in thickness and is subdivided into the "I", "A" and "N" reservoir sandstones (Figure 5) (Wallace-Dudley and Leckie, 1988; Kreitner and Plint, 2006). At Valhalla Field, most oil production is from the Doe Creek "I" and "N" sandstones, whereas gas and lesser amounts of oil are produced from the "A" sandstone (Wallace-Dudley and Leckie, 1993). Reservoir sandstone bodies trend NE to SW, range from <1 m to 8 m in thickness and are composed of very-fine to fine-grained marine shoreface sandstone deposits. Sandstones grade both laterally and vertically into marine shales and in conjunction with a southwestward regional dip, provide the trapping mechanism that accounts for hydrocarbon accumulation at Valhalla (Figure 6) (Wallace-Dudley and Leckie, 1988; Cant, 1988).

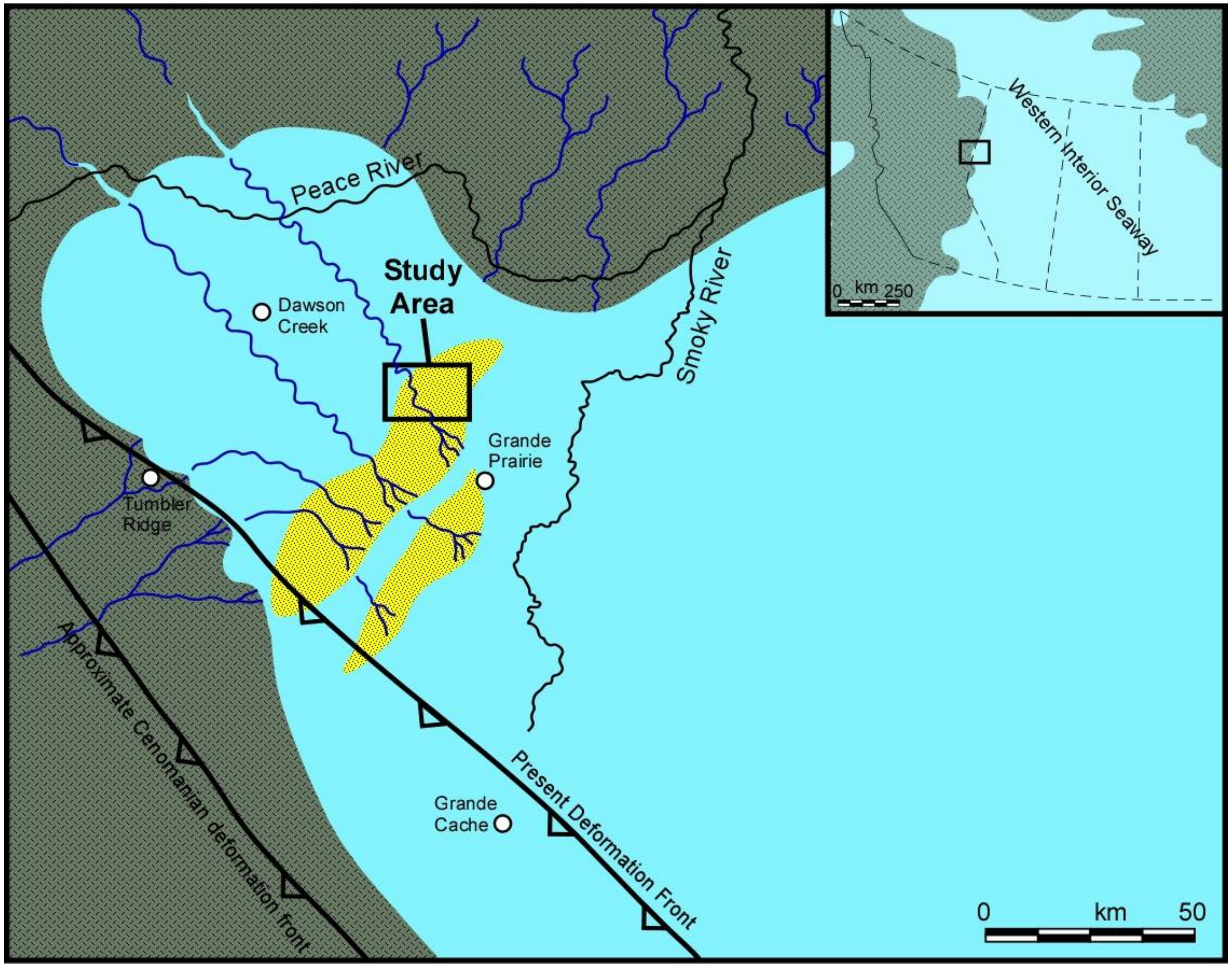


Figure 4. Late Cretaceous (Cenomanian) paleogeography of west-central Alberta and east-central British Columbia during Doe Creek deposition. Isolated, linear sandstone bodies of the Doe Creek occur in the central portion of a broad embayment to the WIS (modified from Kreitner and Plint 2006). The inset illustrates the location of the study area along the western margin of the WIS.

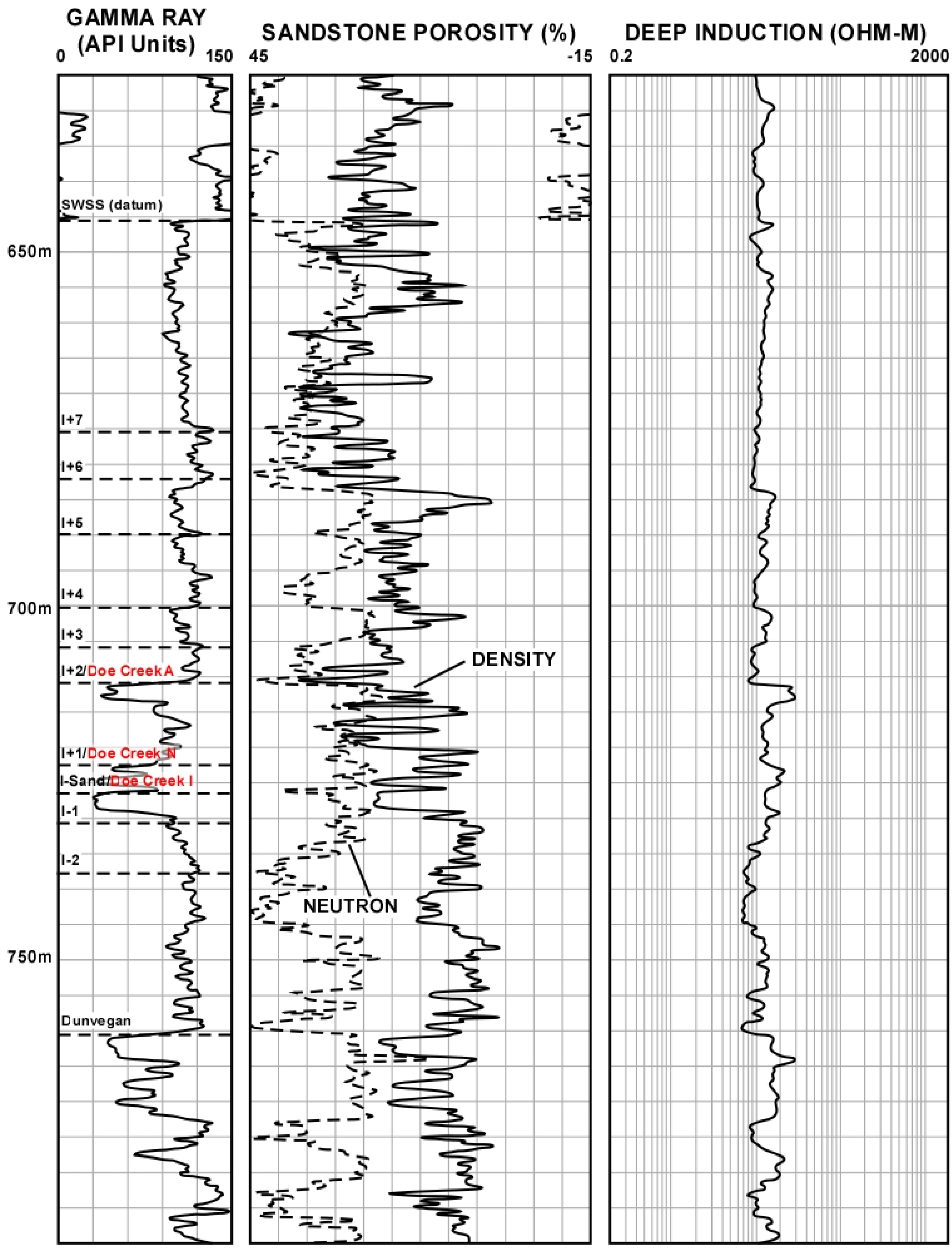


Figure 5. Type log for the 00/06-31-074-09W6/2 well illustrating the producing sandstone units ("I", "A" and "N") of the Doe Creek interval (red lettering), the underlying Dunvegan Formation and the overlying Second White Speckled Shale (SWSS) (Wallace-Dudley and Leckie, 1988). Stratigraphic tops correlated in the study are labeled sequentially above and below the reference top, I-Sand.

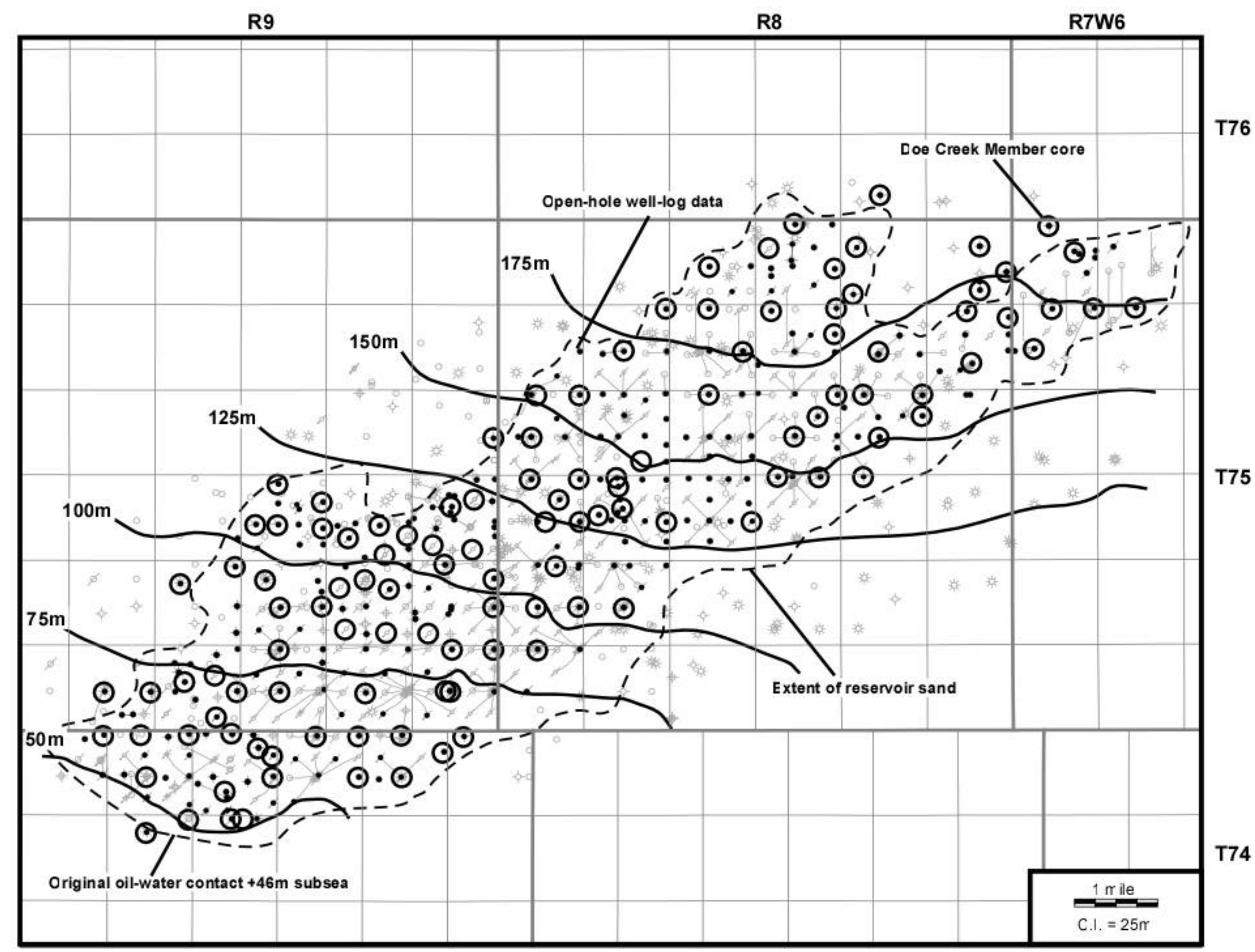


Figure 6. Structure contour map of the top of Doe Creek I-Sand interval. Well control includes both open-hole (black well symbols) and cased-hole (gray well symbols) well logs. Circled well symbols indicate cored wells. The dashed line represents the position of the original oil-water contact (+46 m) in the southwestern region and also delimits the extent of reservoir sandstone in the study area.

CHAPTER THREE

Methods

Stratigraphic Correlation

A detailed stratigraphic framework was constructed across Valhalla Field by correlating and loop-tying 487 well logs within a grid of 110 cross sections (Figure 7). Well logs were datumed on the Second White Speckled Shale, an interval of high gamma radiation that corresponds to 2^{nd}-order maximum flooding within the Western Canadian Sedimentary Basin (Figure 5) (Hancock and Kauffman, 1979; Kauffman, 1984; Haq et al., 1987; Plint, 2003). Within the Doe Creek interval a total of 10 parasequences and/or associated bedset boundaries were identified on the basis of an abrupt increase in gamma ray activity (shale) immediately above an interval of low gamma ray activity (sand) (Figure 5). These units were correlated across Valhalla Field and are labeled sequentially based on their stratigraphic position above or below the most productive "I" sandstone (Wallace-Dudley and Leckie, 1988). There are seven overlying units that in ascending order are termed the I+1 through I+7 (Figure 5). Below the "I" sandstone there are 2 units that in descending order are termed the I-1 and I-2 (Figure 5). The "N" and "A" sandstones identified by Wallace-Dudley and Leckie (1988) coincide with the I+1 and I+2, respectively (Figure 5).

Core Description

Core was described for 120 wells (~ 1350 m total) within the study area at the Alberta Energy Utilities Board Core Research Centre, Calgary, Alberta (Figure 8).

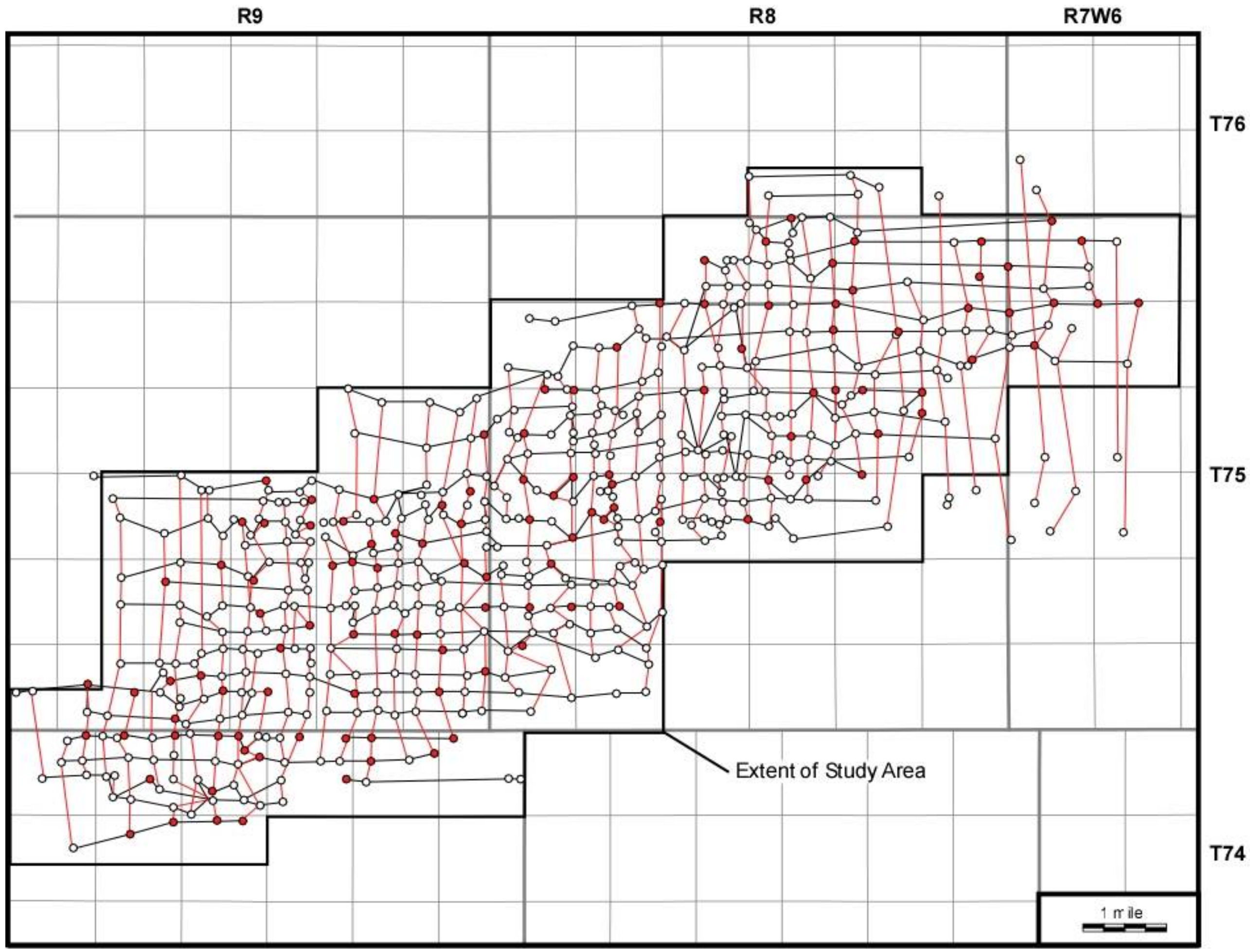


Figure 7. Valhalla Field cross section basemap. Data used in stratigraphic correlation include 487 well logs (white and red circles) within a grid of 110 cross sections and core from 120 wells (red circles). Cross sections running E-W are black and loop-tying N-S cross sections are red.

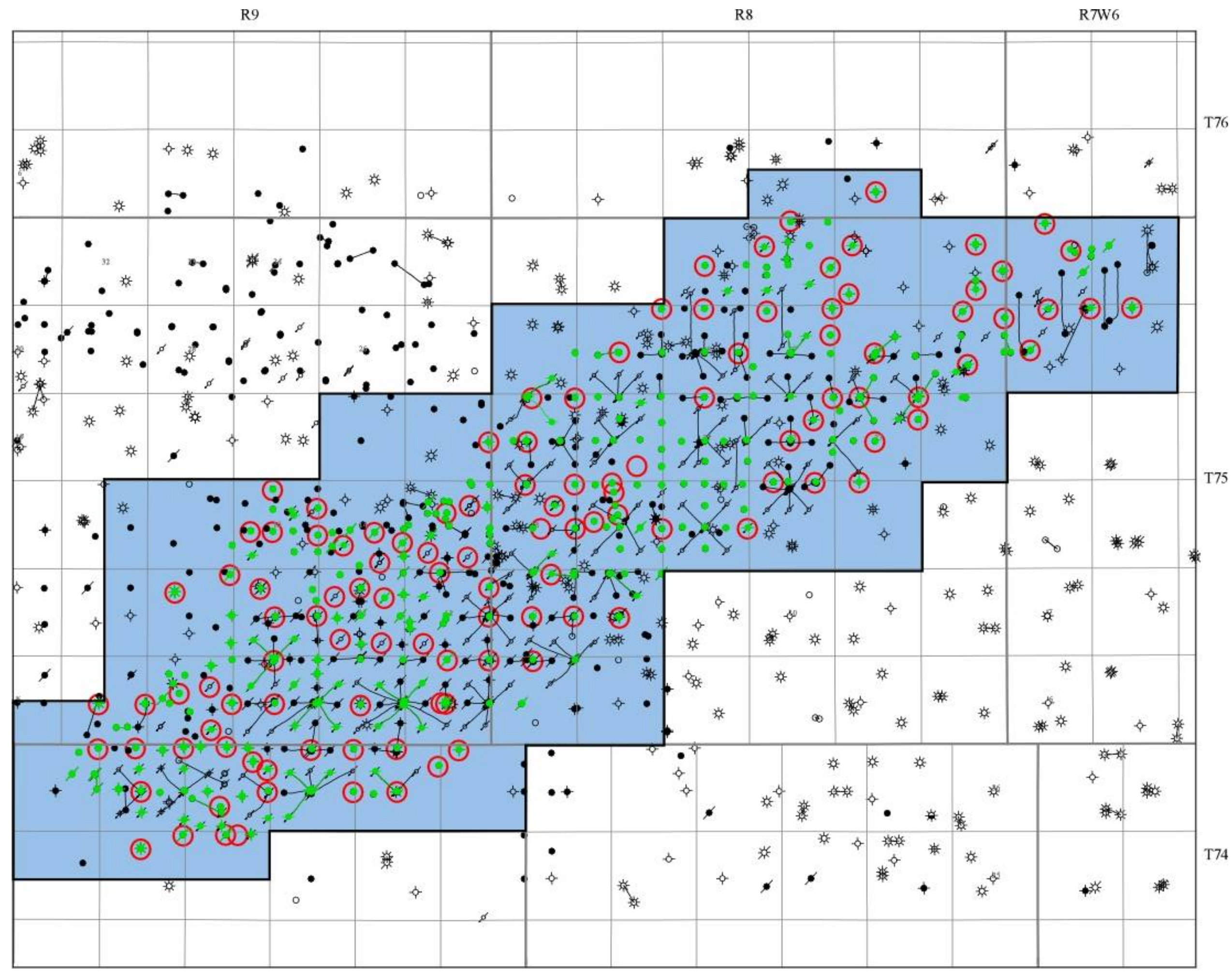


Figure 8. Basemap of Valhalla Field with study area shaded blue. Data incorporated in the study include wells with open-hole logs (green well symbols), cased-hole well logs (black well symbols) and cored wells (red circles).

Core descriptions include documentation of the vertical distribution of grain size, mud fraction, mechanical sedimentary structures, ichnofacies, depositional environment, ichnofabric index and ichnofaunal diversity (*sensu* Droser and Bottjer, 1986; Bottjer and Droser, 1991) and interparticle cement (Appendix F). Core descriptions were digitized, merged and depth-shifted to coincide with digital well log data. Digital photographs of features diagnostic of facies and cements were taken for each core at select locations and the corresponding depth was identified on the core description form (compare core descriptions within Appendix F and core photos within Appendix G).

Facies and Calcite Cement Prediction

Statistical analyses of facies-specific controls on porosity and permeability were completed to evaluate whether reservoir facies quality and distribution could be predicted in wells that lack core control (Ball, 2009). From this work, well log transforms were established that use Vshale and deep resistivity cutoffs to predict reservoir facies and the occurrence of calcite cement (Table 1) (Ball, 2009). In order to be detectable by the well log transform, calcite cement zones must be greater than 50 cm in thickness (Ball, 2009).

Structure Maps

Structure maps were completed for the top of all 10 units within the Doe Creek and are based upon tops correlated between 487 wells (cased hole and open hole) within the study area (Appendix A). Subsea values for each parasequence were generated using “Wellbase” (within Geographix^{TM}) and were then exported as a layer to “Basemap” (within Geographix^{TM}) for posting. Posted values were exported as a JPEG and imported

Table 1. Guidelines for facies prediction from open-hole well logs (Ball, 2009). Confidence in facies prediction increases when both Vshale and deep resistivity cutoffs are satisfied.

Predicted Well Log Facies	Depositional Facies Equivalent	Parameters for Well Log Prediction
4	primarily 3 and 4	Vsh ≤ 0.09 (average confidence); Vsh ≤ 0.09 and deep resistivity ≥ 38 ohm-m (increased confidence).
3	primarily 3 and lesser 2	Vsh > 0.09 to ≤ 0.12 (average confidence); Vsh > 0.09 to ≤ 0.12 and deep resistivity < 38 to ≥ 21 ohm-m (increased confidence).
2	primarily 2 and lesser 1	Vsh > 0.12 to ≤ 0.33 (average confidence); Vsh > 0.12 to ≤ 0.33 and deep resistivity < 21 to ≥ 14 ohm-m (increased confidence).
1	primarily 1 and lesser 2	Vsh > 0.33 (average confidence); Vsh > 0.33 and deep resistivity < 14 ohm-m (increased confidence).

Calcite cement was predicted for intervals represented by facies 2-4 having a neutron porosity > 12%. For such intervals, calcite-cemented sands are identified by a density-neutron separation ≥ 7%.

into ACD Canvas™ where detailed and more geologically representative contouring of the maps was completed.

Reservoir Facies Maps

Maps of reservoir facies distribution, gross pore volume (Appendix B), average hydrocarbon pore volume (Appendix C), average effective porosity (Appendix D) and calcite cement fraction (Appendix E) were generated for the hydrocarbon-bearing reservoir interval that includes parasequences and/or bedsets I-1, I-Sand, I+1 and I+2. These maps were constructed in a similar fashion to the structure maps; however, only 287 open-hole well logs were used. Data was limited to open-hole well logs as they contained gamma ray and porosity values that had been normalized and/or corrected by the project sponsor, Husky Energy.

Production Maps

Production maps of average total fluid production and cumulative oil production were constructed for the “Doe Creek I and Dunvegan B” pool using IHS Energy Accumap™ data. Posted values represent co-mingled production from the I-1 to I+1 reservoir interval. Production data values were imported into ACD Canvas™ where detailed contouring of the maps was completed.

CHAPTER FOUR

Facies Depositional Environments

Introduction

The Doe Creek Member has been extensively studied since 1940 (Warren and Stelck, 1940) with most reviews of sedimentology and stratigraphy published during the late 1970's and early 1980's in conjunction with the discovery of oil in the Doe Creek at Valhalla (Hogg et al., 1998). A number of interpretations of the Doe Creek suggest deposition across a wave-dominated, shallow marine shelf located within a brackish to normal marine embayment (Wallace-Dudley and Leckie, 1988; Hogg et al., 1998; Kreitner and Plint, 2006; Reid, 2006). Previous studies defined from 6 to 11 depositional facies within the Doe Creek (Wallace-Dudley and Leckie, 1988; Hogg et al., 1998; Reid, 2006). This study identifies 6 depositional facies at Valhalla that are distinguished on the basis of grain size, mud fraction, mechanical sedimentary structures, ichnofacies and the extent and nature of bioturbation (Table 2). The extent of bioturbation is documented as the "ichnofabric index", a numerical scale (1-5) which defines the degree of disturbance of mechanical sedimentary structures by burrowing organisms (Droser and Bottjer, 1986). An ichnofabric index value of 1 represents no bioturbation and preservation of all original sedimentary structures, whereas an ichnofabric index value of 5 corresponds to complete bioturbation and lack of preservation of original sedimentary structures (Droser and Bottjer, 1986). Consistent with previous studies, facies at Valhalla are interpreted as

Table 2. Facies summary table of the diagnostic criteria by which deposition facies are identified in core. Color designations for depositional environment will be used in reservoir facies mapping.

Facies	1	2	3	4	5	6
Name	Black Laminated Mudrock	Flaser-Bedded Mudrock	Intensely Burrowed Mudrock	Interbedded Massive to Laminated Sandstone and Mudrock	Laminated to Hummocky Cross Stratified Fine Sandstone	Planar-Tabular to Trough-Cross Stratified Sandstone
Environment	Offshore	Offshore	Offshore	Distal Lower Shoreface	Proximal Lower Shoreface	Upper Shoreface
Typical Mud Content	>90%	60-80%	55-85%	10-50%	0-10%	<5%
Grain Size	silt and clay	silt and clay	silt and clay	lower very-fine sand to lower fine sand	upper very-fine sand to upper fine sand	lower fine to upper fine sand
Ichnofabric Index	1-2	1-2	4-5	sands (1-2), muds (2-4)	1-5	1-2
Ichnofacies (representative ichnofauna)	restricted *Cruziana* (*Thalassinoides*, *Planolites*)	restricted *Cruziana* (*Thalassinoides*, *Planolites*)	*Cruziana* (*Thalassinoides*, *Planolites*, *Teichichnus*, *Zoophycos*, *Subphyllocorda*)	*Cruziana* (*Thalassinoides*, *Planolites*, *Teichichnus*, *Zoophycos*) *Skolithos* (*Ophiomorpha*, *Palaeophycus*)	*Skolithos* (*Ophiomorpha*, *Palaeophycus*, *Skolithos*, *Bergaueria*)	*Skolithos* (*Ophiomorpha*, *Palaeophycus*)
Mechanical Sedimentary Structures	mm lamina	mm lamina, flaser bedding	N/A	flaser bedding, hummocks, wave ripples	mm lamina, hummocks, wave ripples	trough-cross to planar-tabular bedding
Representative Core Photo	Figure 9a	Figure 9b	Figure 9c	Figure 9d	Figure 9e	Figure 9f

having accumulated within restricted to open marine offshore, distal and proximal lower-shoreface and upper-shoreface depositional environments (Wallace-Dudley and Leckie, 1988; Plint et al., 1993; Varban and Plint, 2005).

Facies 1 – Black Laminated Mudrock

Description: Facies 1 is a dark-colored mudrock composed predominantly of massive to mm-laminated silts and clays (Figure 9A). Mud may be either laminated or lightly bioturbated with ichnofabric indices ranging from 1-2. When present the trace fossil assemblage consists of *Planolites*, *Teichichnus* and *Thalassinoides* of the *Cruziana* ichnofacies.

Interpretation: The low diversity of *Cruziana* trace fossils and high mud content suggest deposition within a restricted offshore marine shelf setting (e.g., Pemberton et al., 1992b).

Facies 2 – Flaser-Bedded Mudrock

Description: Facies 2 is a light-colored mudrock that is composed of mm-laminated to flaser-bedded silts and clays with typical mud content between 60 and 80 percent. The remaining 20 to 40 percent of the sediment volume is comprised of very-fine sand (Figure 9B). Siltstone beds within Facies 2 are more abundant than Facies 1 and are lenticular, sharp-based, and range from a few millimeters to a few centimeters thick. Siltstone beds are laminated and often less bioturbated than the more clay-rich beds within Facies 2. The mudrock is lightly to moderately bioturbated (ichnofabric index 1-3) and contains a trace fossil assemblage dominated by *Planolites*, *Teichichnus*

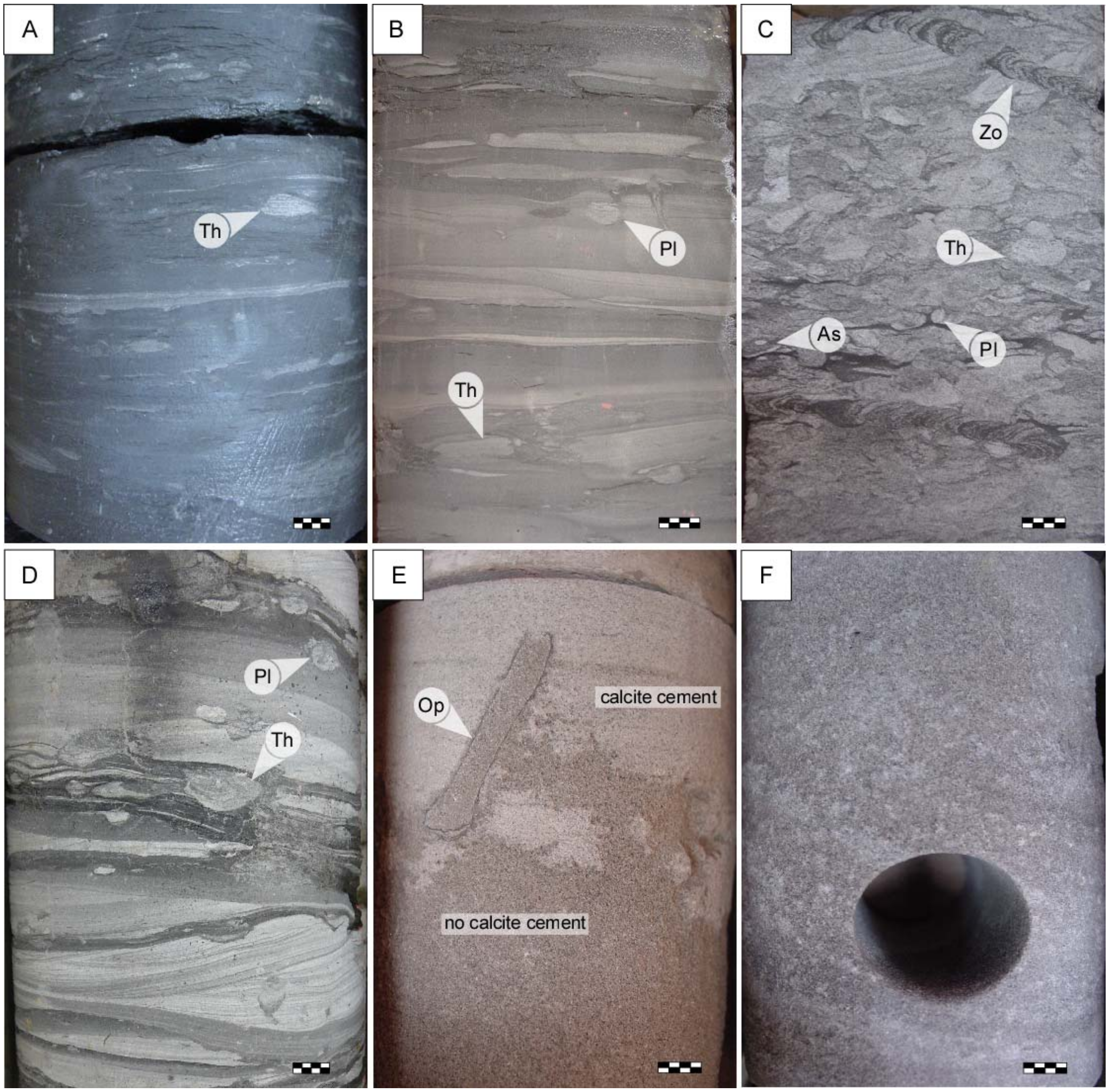


Figure 9. Representative core photos of each depositional facies. Scale bar is 1 cm. Trace fossils observed include Th–*Thalassinoides*, Pl–*Planolites*, Zo–*Zoophycos*, As–*Asterosoma*, Op–*Ophiomorpha*. A) 02/14-29-74-9W6/0 black laminated mudrock at 700.5 m B) 00/8-34-75-8W6/0 flaser-bedded mudrock at 781.5 m C) 00/16-29-74-9W6/0 intensely burrowed mudrock at 710.5 m D) 03/6-15-75-9W6/0 interbedded massive to laminated sandstone and mudrock at 737 m E) 00/10-11-75-9W6/0 laminated to hummocky cross-stratified fine sandstone at 751.5 m F) 00/14-33-74-9W6/0 planar-tabular to trough-cross stratified sandstone at 732 m.

and *Thalassinoides* of the *Cruziana* ichnofacies. Facies 2 is most often observed gradationally overlying Facies 1.

Interpretation: The reduction in mud content and an increase in trace fossil density and diversity suggest deposition within an offshore, relatively less restricted (in comparison to Facies 1) marine shelf (e.g., Walker and Plint, 1992; Pemberton et al., 1992b).

Facies 3 – Intensely Burrowed Mudrock

Description: Facies 3 is an intensely bioturbated, light-colored mudrock composed of silts and clays, with a typical mud (silt and clay) content ranging from 55-85 percent. The remaining 15-45 percent of the sediment volume is composed primarily of very-fine to fine sand (Figure 9C). Due to the extent of bioturbation (ichnofabric index 4-5) by both *Skolithos* and *Cruziana* association traces, no mechanical sedimentary structures are recognized. Commonly observed traces include: *Arenicolites*, *Diplocraterion*, *Palaeophycus*, *Skolithos*, *Cylindrichnus*, *Phycosiphon*, *Asterosoma*, *Chondrites*, *Planolites*, *Subphyllocorda*, *Teichichnus*, *Terebellina*, *Thalassinoides* and *Zoophycos*. This facies most often grades from Facies 2 below and into Facies 4 above, and ranges in thickness from 10's of centimeters to a few meters.

Interpretation: Very high trace fossil abundance and diversity in conjunction with high mud content suggest deposition under fully marine conditions below fair-weather wave base (e.g., Walker and Plint, 1992; Pemberton et al., 1992b).

Facies 4 – Interbedded Massive to Laminated Sandstone and Burrowed Mudrock

Description: Facies 4 consists of interbedded lower very-fine to lower fine sandstone and cm-scale laminated mud interbeds that comprise 10-50 percent of the total rock volume (Figure 9D). Sandstone beds are lenticular, sharp-based, and range in thickness from a few millimeters to 10 centimeters. Sandstone sedimentary structures include mm-lamina, wave ripples and hummocky cross-stratification. Mudrock often occurs as lenticular-bedded drapes across sandstone lamina and foresets. The abundance and thickness of sandstone beds increases upwards. This facies has sharp upper contacts into Facies 5 and gradational lower contacts from Facies 3. Facies 4 ranges from 10's of centimeters to 1 m in thickness. The degree of bioturbation is moderate to intense in the burrowed muds (ichnofabric index 3-5) and includes *Rhizocorallium*, *Rosselia*, *Subphyllocorda*, *Thalassinoides* and *Zoophyos* of the *Cruziana* ichnofacies. Bioturbation in the sandstone is low to moderate (ichnofabric 1-3) and includes *Arenicolites*, *Bergaueria*, *Diplocraterion*, *Ophiomorpha*, *Palaeophycus*, *Skolithos* and *Asterosoma*, of the *Skolithos* ichnofacies.

Interpretation: The increased proportion of sand and the presence of wave-generated sedimentary structures suggests deposition in the distal lower shoreface of a shallow marine shelf (e.g., Walker and Plint, 1992; Pemberton et al., 1992b).

Facies 5 – Laminated to Hummocked Fine Sandstone

Description: Facies 5 is a well-sorted, upper very-fine to fine sand with less than 10 percent mud (Figure 9E). Sandstone is parallel laminated, wave-rippled and hummocky cross-stratified, ranges in thickness from 10's of centimeters to a few meters, and has sharp upper and lower contacts. Thin mm- to cm-scale calcite cement patches are often observed at lithologic contacts with underlying and overlying mudrock, and is also occasionally observed in localized patches throughout the sandstone body. Bioturbation ranges from low to high (ichnofabric index 1-5) and is dominated by the *Skolithos* ichnofacies trace fossil *Ophiomorpha,* but also includes *Bergaueria*, *Conichnus*, *Palaeophycus*, *Skolithos*, *Asterosoma* and *Rosselia*.

Interpretation: Very low mud content, wave ripples, hummocky cross stratification and low trace fossil density composed of *Skolithos* ichnofacies components suggests deposition within the proximal lower shoreface of a shallow marine shelf (e.g., Walker and Plint, 1992; Pemberton et al., 1992b).

Facies 6 – Planar Tabular to Trough-Cross Stratified Sandstone

Description: Facies 6 is characterized by well-sorted, lower fine to upper fine planar tabular to trough-cross stratified sandstone with less than 5 percent mud content (Figure 9F). The sandstone has a sharp upper contact with overlying marine mudrock and a gradational contact with underlying laminated to hummocky fine sandstone. Bioturbation is uncommon (ichnofabric index 1-2), but when present is limited to the *Skolithos* ichnofacies traces *Ophiomorpha* and *Palaeophycus*. This facies was only observed in wells 00/14-28-75-8W6, 00/14-03-75-9W6 and 00/14-33-74-9W6, and in all occasions was only a few 10's of centimeters thick, and calcite cemented.

Interpretation: The coarser grain size, rare but present *Skolithos* association traces and planar tabular and trough-cross stratification suggests deposition within the upper shoreface of a shallow marine shelf (e.g., Walker and Plint, 1992; Pemberton et al., 1992b).

CHAPTER FIVE

Stratigraphic Controls on Reservoir Quality

Introduction

A detailed stratigraphic framework was constructed for the Doe Creek Member that includes 10 stratigraphic tops correlated across the study area (Figure 5). Hydrocarbon-charged units include the I-1, I-Sand, I+1 and I+2 and are the focus of reservoir mapping. A cross section highlighting the I-1 through I+2 sandstone bodies indicates westward progradation of the sandstone units (Figure 10).

Reservoir Facies

Based on core observations and predicted reservoir facies, maps of reservoir sandstone thickness and facies distribution were produced for the I-1, I-Sand, I+1 and I+2 intervals (Figures 11, 12, 13 and 14). Reservoir quality sandstone within the I-1 are constrained to the eastern-most portion of the study area and are dominated by reservoir facies 2 and, to a lesser extent, reservoir facies 3 (Figure 11). Reservoir sandstone is distributed further west within the I-Sand and is comprised of thick (up to 8 m) accumulations of facies 3 and 4, which are distributed as a northeast linear trend that bifurcates within T75NR8W6 (Figure 12). Both the I+1 and I+2 intervals are less than 2.5 m thick, restricted to the western-most portion of the study area, and dominated by reservoir facies 2 and lesser extents of facies 3 and facies 4 (Figures 13 and 14).

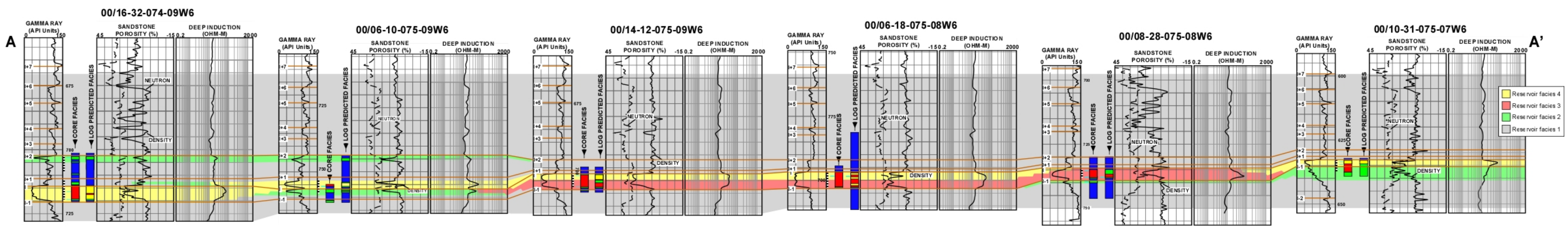


Figure 10. Cross section A-A' illustrating the stratigraphic relationship of Doe Creek units I-1 through I+7 across Valhalla Field. The location of the cross section is highlighted on Figure 11. Within the depth track of each well the core-observed and well log facies distributions predicted via the transform of Ball (2009) are displayed. Unit boundaries and facies distributions are correlated across the cross section. The distribution of stratal boundaries and facies suggest westward progradation of sandstone bodies through time.

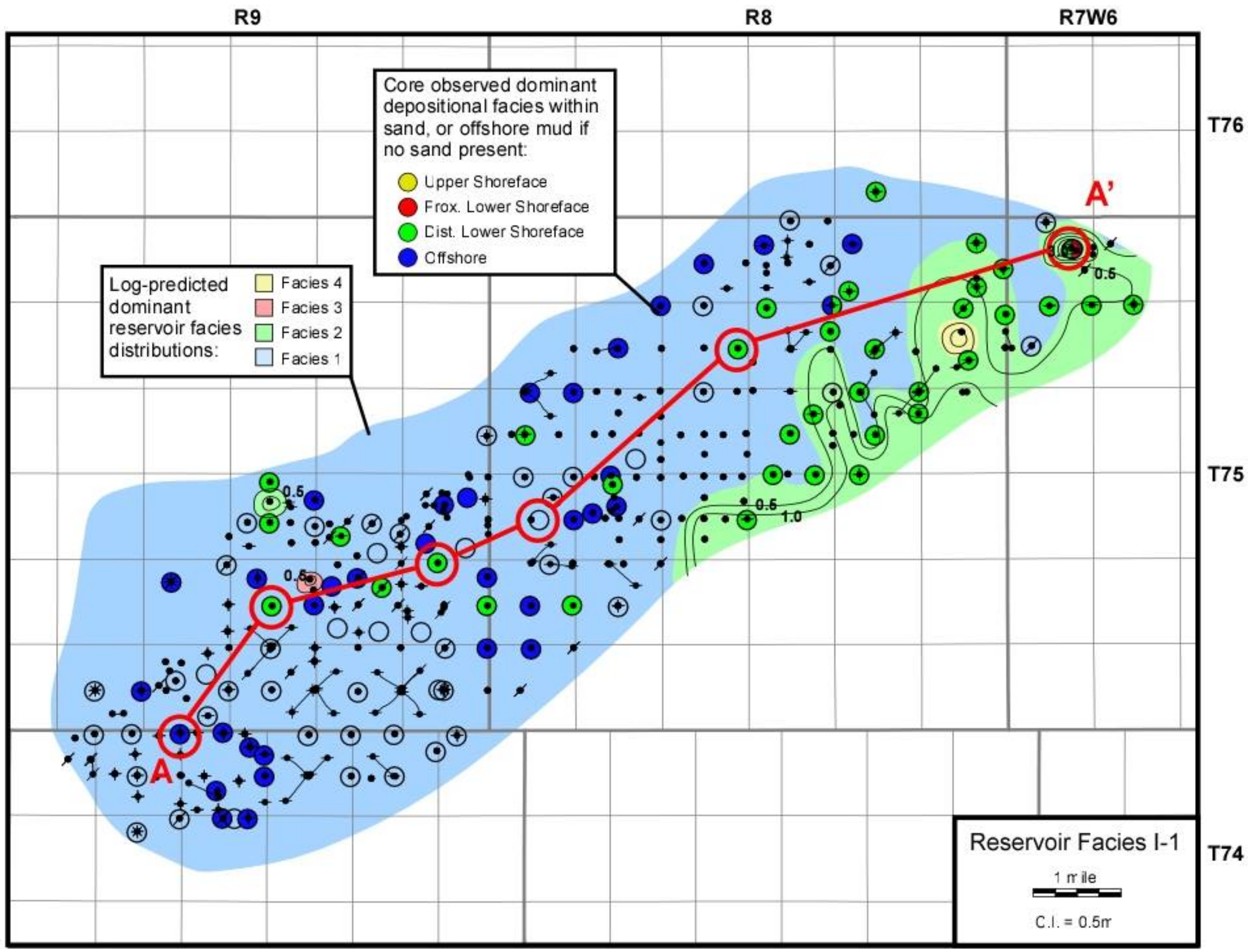


Figure 11. Reservoir sandstone thickness and predicted reservoir facies distribution maps for the I-1 interval. The cross section from Figure 10 is highlighted in red. Facies distributions are based on a combination of the dominant core observed facies and the predicted reservoir facies. Sandstone thickness (black contours) is determined only for intervals with >12% neutron porosity and which satisfy the Vshale cutoffs for facies 2, 3 and 4 (Table 1).

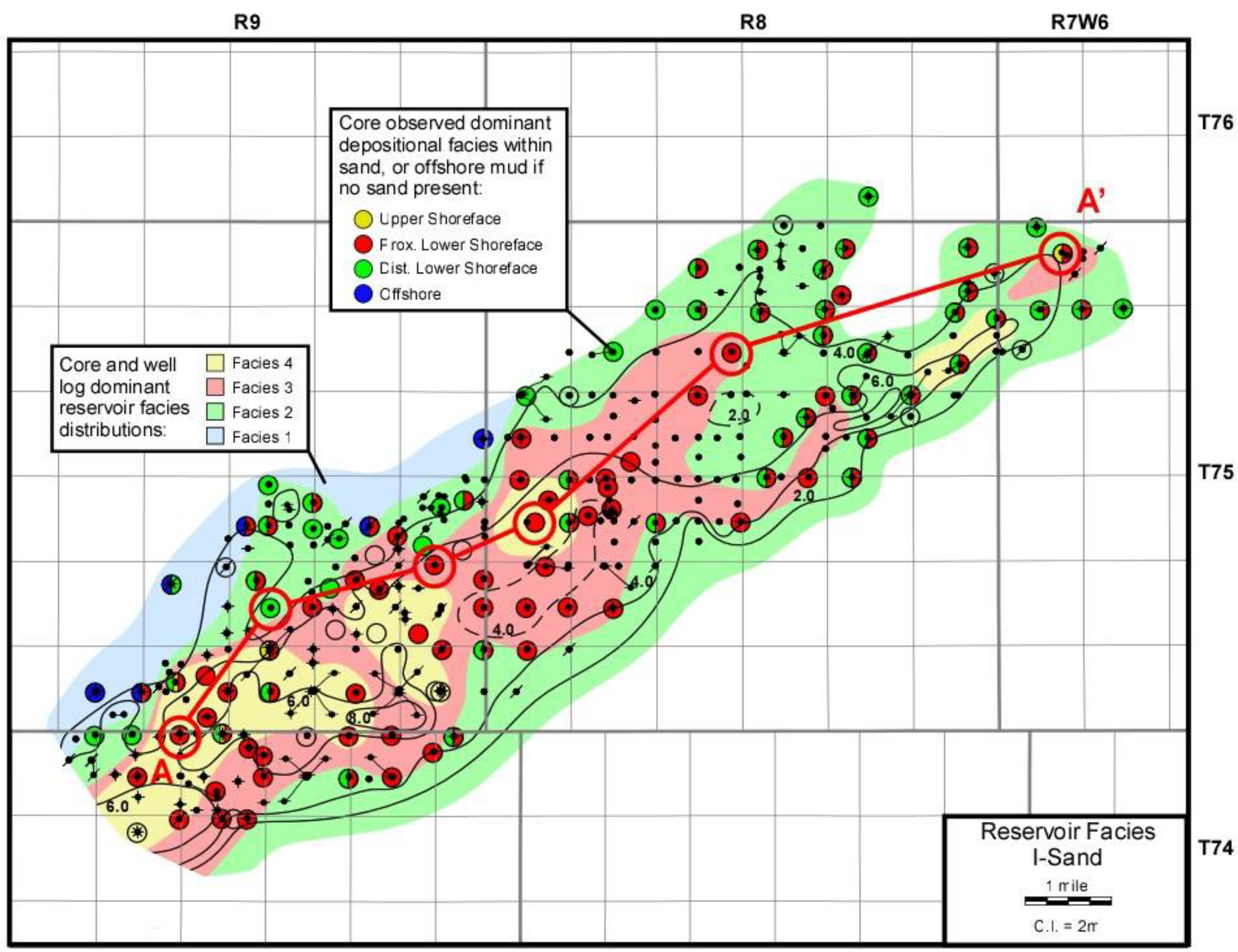


Figure 12. Reservoir sandstone thickness and predicted reservoir facies distribution maps for the I-Sand interval. The cross section from Figure 10 is highlighted in red. Facies distributions are based on a combination of the dominant core observed facies and the predicted reservoir facies. Sandstone thickness (black contours) is determined only for intervals with >12% neutron porosity and which satisfy the Vshale cutoffs for facies 2, 3 and 4 (Table 1). The I-Sand interval is the the most extensive sandstone body and is dominated by the highest reservoir quality facies 3 and 4. The I-Sand trends northeast and bifurcates within T75NR8W6.

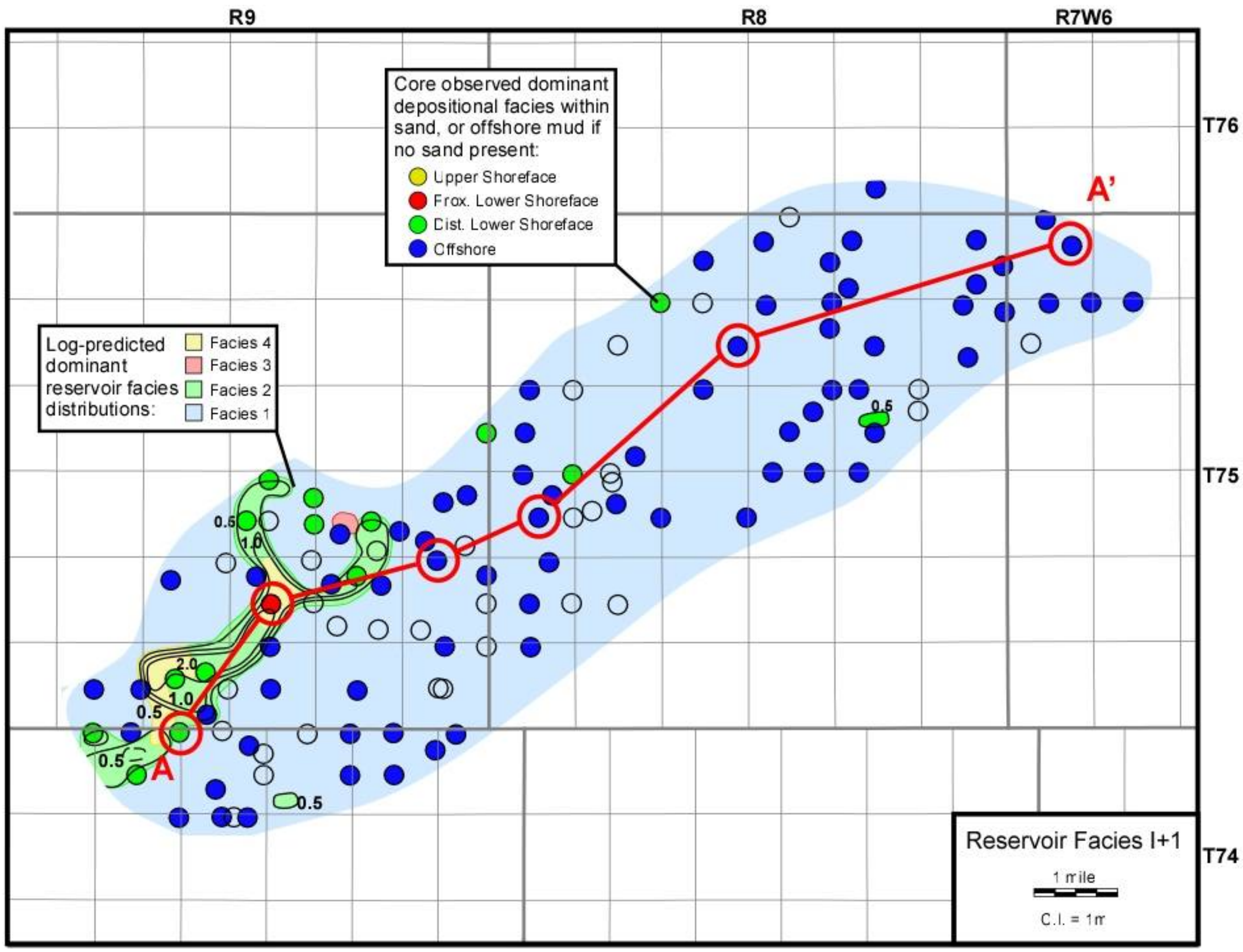


Figure 13. Reservoir sandstone thickness and predicted reservoir facies distribution maps for the I+1 interval. The cross section from Figure 10 is highlighted in red. Facies distributions are based on a combination of the dominant core observed facies and the predicted reservoir facies. Sandstone thickness (black contours) is determined only for intervals with >12% neutron porosity and which satisfy the Vshale cutoffs for facies 2, 3 and 4 (Table 1).

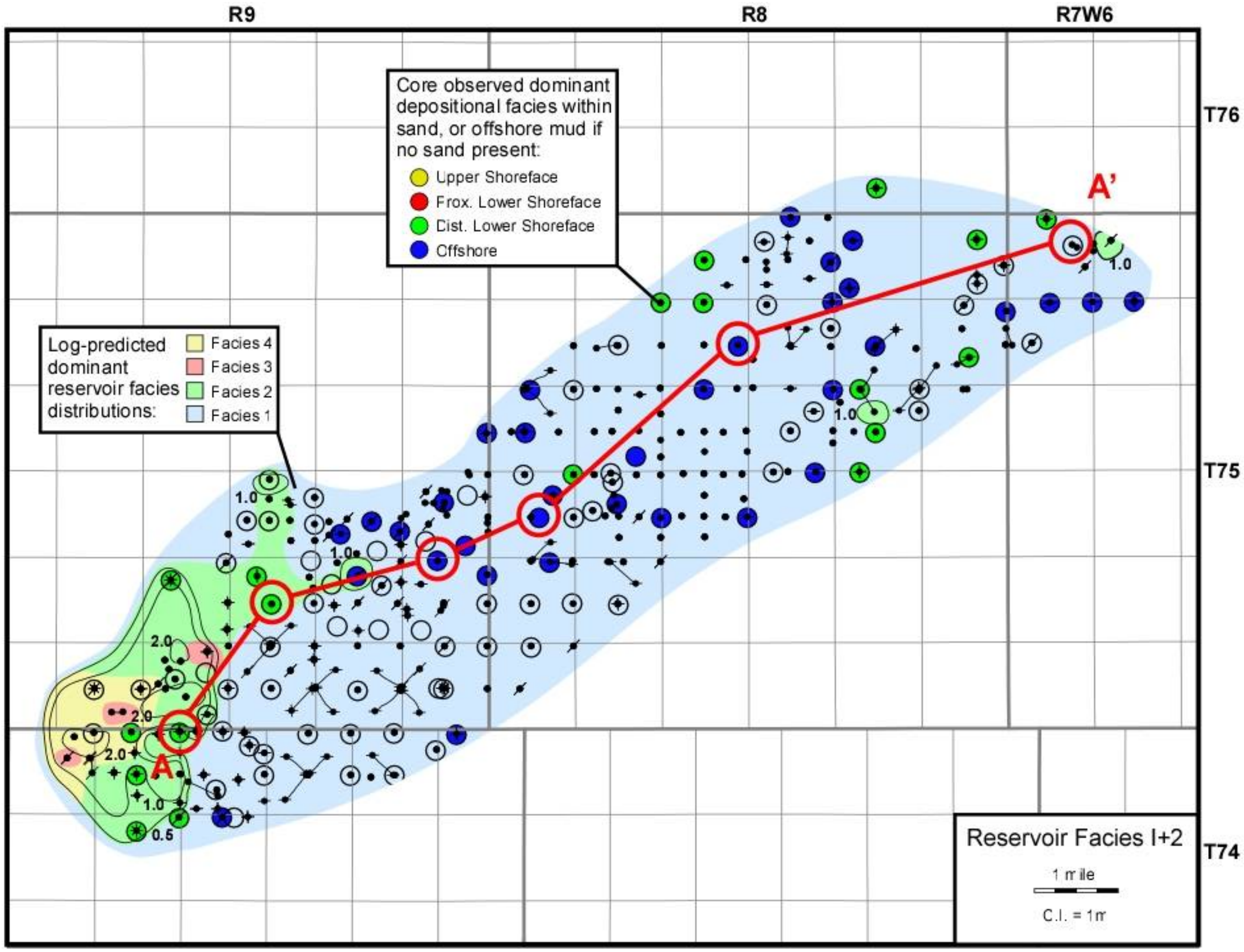


Figure 14. Reservoir sandstone thickness and predicted reservoir facies distribution maps for the I+2 interval. The cross section from Figure 10 is highlighted in red. Facies distributions are based on a combination of the dominant core observed facies and the predicted reservoir facies. Sandstone thickness (black contours) is determined only for intervals with >12% neutron porosity and which satisfy the Vshale cutoffs for facies 2, 3 and 4 (Table 1).

Average Effective Porosity (PHI-E)

Observed well log neutron porosity values are generally higher than actual formation porosity as a result of an increase in H^+ ions associated with water bound to clay particles (Asquith and Krygowski, 2004). Porosity values within sandstones were corrected using: 1) neutron log porosity, 2) neutron porosity of shale within the formation and 3) Vshale (derived from normalized gamma ray measurements) values. Normalized gamma ray, Vshale and shale-corrected neutron porosity (ΦN_e) calculations are based on the following formulae (Schlumberger, 1975; Asquith and Krygowksi, 2004).

$$I_{GR} = (GR_{log}-Gr_{min})/(GR_{max}-GR_{min})\text{, where:}$$

I_{GR} = gamma ray index
GR_{log} = gamma ray measurement from reservoir
GR_{min} = *14 API units
GR_{max} = *130 API units
*Valhalla fieldwide average minimum and maximum values observed in open-hole wireline logs.

$$Vshale = 0.33[2^{(2*I_{GR})}-1]\text{, where:}$$

Vshale = shale volume

$$\Phi N_e = \Phi N - [(\Phi N_{shale}/0.45)*0.03*Vshale]\text{, where:}$$

ΦN_e = shale-corrected neutron porosity
ΦN_{shale} = neutron porosity of nearby shale
Vshale = shale volume

ΦN_e calculated values were then averaged for each interval of study. Maps of average effective porosity were produced for the reservoir interval (I-1, I-Sand, I+1 and I+2) and illustrate a weak correlation with trends of reservoir thickness and reservoir facies distribution (compare Figure 15 to Figure 12). Decreases in average effective porosity in areas of thick sandstone are most likely due to the presence of calcite cement.

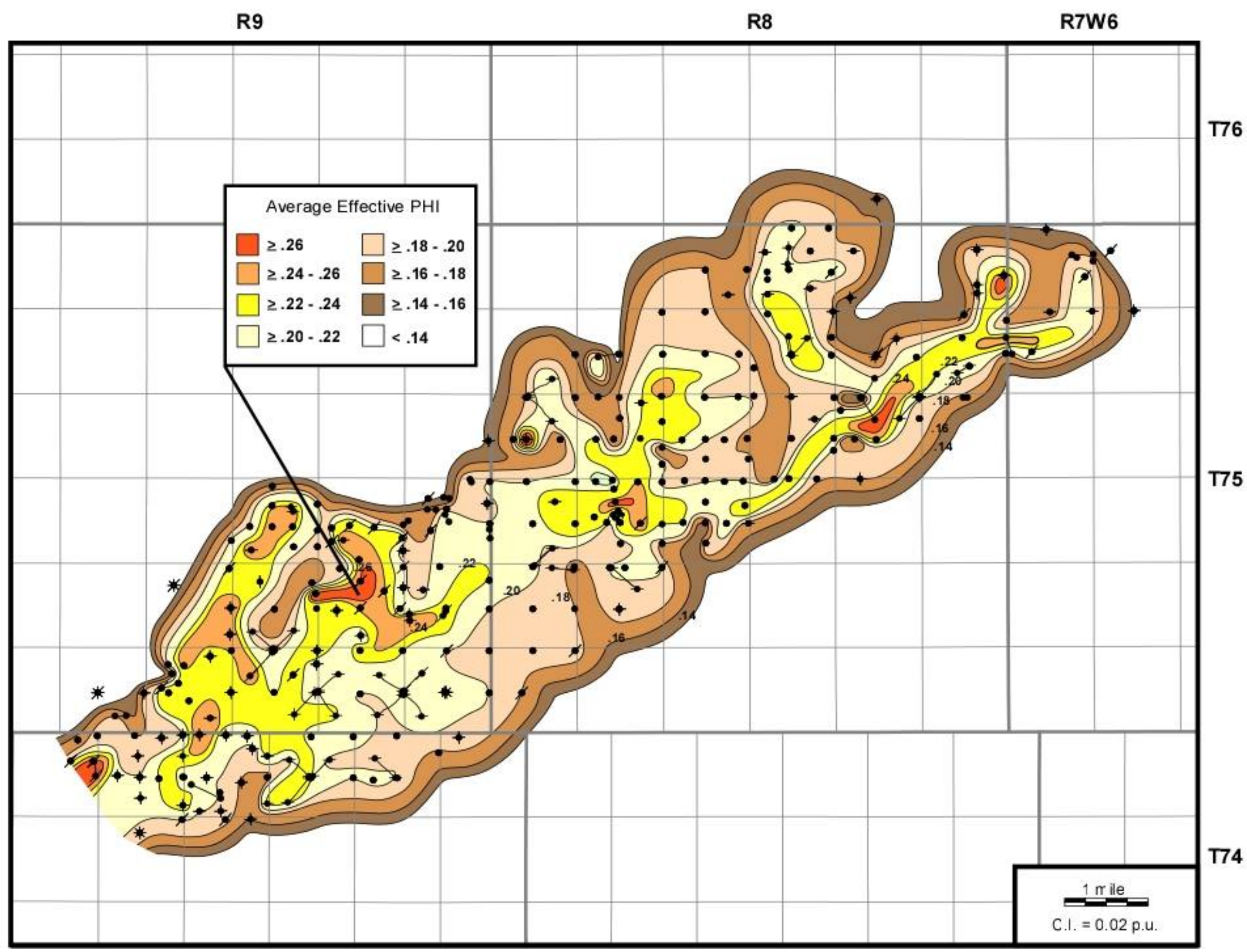


Figure 15. I-Sand average effective porosity map (I-1, I+1 and I+2 maps located in Appendix D). A less obvious correlation exists between trends of reservoir facies and average effective porosity (compare with Figure 12). Low average effective porosity values in areas of high quality sandstone are likely due to the presence of calcite cement (Figure 18).

Gross Pore Volume

Calculated neutron-corrected porosity values were averaged for intervals that satisfied the cutoffs for reservoir facies 2, 3 and 4 within the I-1, I-Sand, I+1 and I+2 units (Table 1). Cutoff interval thickness values were then multiplied by the aforementioned average ΦN_e porosity to produce a gross pore volume value. Trends of gross pore volume for the I-Sand closely mimic reservoir facies distributions. Areas of the highest pore volume correspond with the thickest and highest quality reservoir sandstone (compare Figure 16 and Figure 12).

Hydrocarbon Pore Volume

The volume of hydrocarbons cannot be determined directly from well logs and therefore must be inferred from the difference between total pore volume and water-saturated pore volume. In reservoirs that do not contain clay minerals, water saturation values can be determined directly from porosity and resistivity logs using the Archie equation (Asquith and Krygowski, 2004). In reservoirs that do contain clay minerals, the Ross-modified Simandoux equation is used to account for changes in resistivity associated with increased clay minerals (Simandoux, 1963; Aigbedion and Iyayi, 2007).

$$S_w = \left(\frac{0.5 * a * Rw}{\Phi N_e{}^m}\right) * \left[\left(\frac{4 * \Phi N_e{}^m}{Rw * RESD}\right) + \left(\frac{Vshale}{RESDshale}\right)^2\right]^{1/n} - \left(\frac{Vshale}{RESDshale}\right)$$, where:

S_w = water saturation
Rw = formation water resistivity at formation temperature (ohm-m)
ΦN_e = effective porosity
RESD = deep resistivity (ohm-m)
Vshale = shale volume
RESDshale = deep resistivity of shale (ohm-m)
a = 0.62, tortuosity
m = 2.15, cementation exponent
n = 2.0, saturation exponent

* Humble sandstone default values were used for constants a, m and n (Selley, 1998).

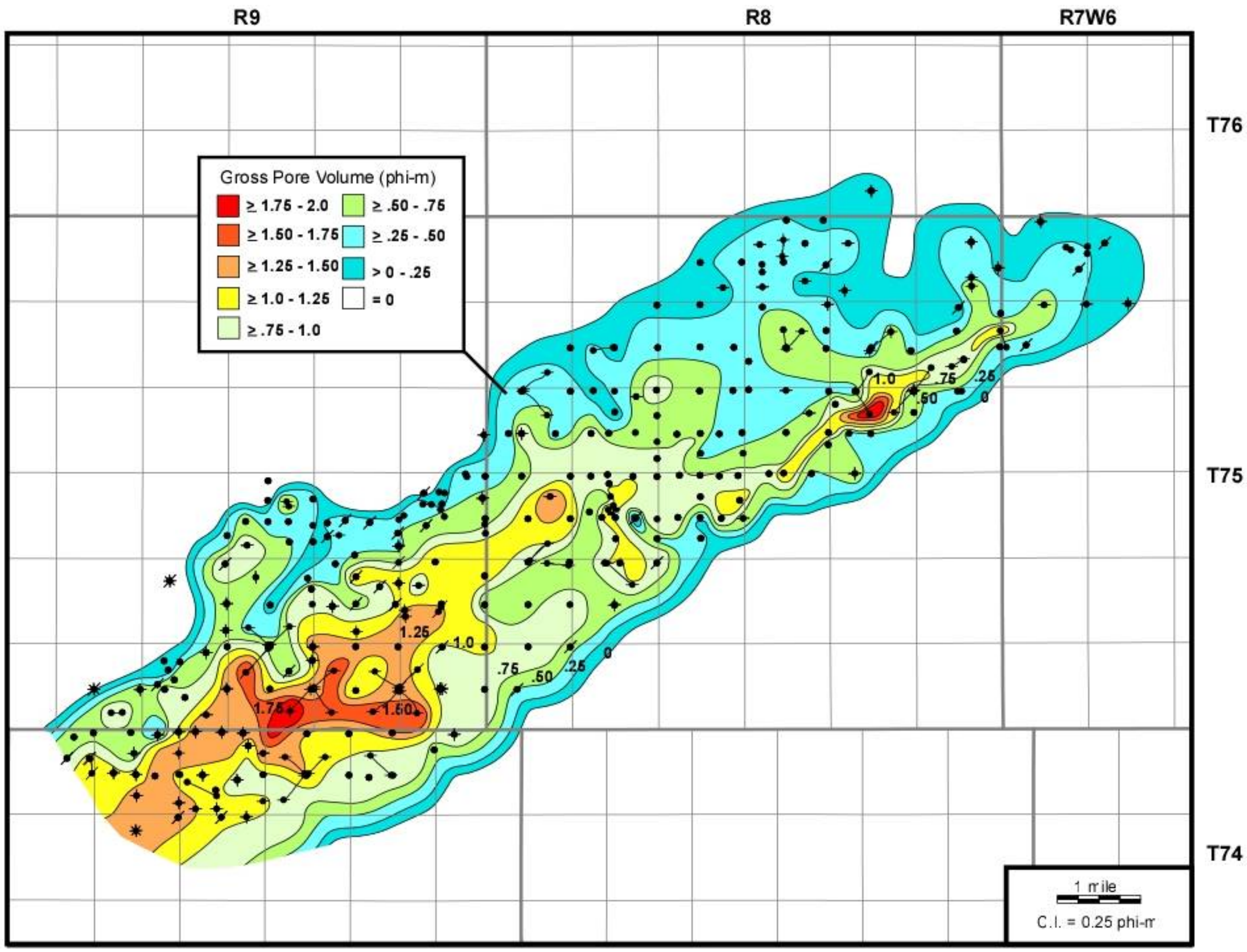


Figure 16. I-Sand gross pore volume map (I-1, I+1 and I+2 maps located in Appendix B). Trends of high gross pore volume coincide with the distribution of the highest quality reservoir sandstone (compare with Figure 12).

$$S_o = (1 - S_w), \text{ where:}$$

S_o = hydrocarbon saturation
S_w = water saturation

Hydrocarbon pore volume values were then calculated by multiplying the hydrocarbon saturation value and the gross pore volume value in areas that satisfied the cutoffs for reservoir facies 2, 3 and 4 and are stratigraphically located above the original oil-water contact of +46 m subsea (provided by the project sponsor Husky Energy). Trends of hydrocarbon pore volume for the I-Sand mimic trends of gross pore volume and closely coincide with trends of reservoir facies distribution. Areas of high hydrocarbon saturation correspond with the thickest and highest quality reservoir sandstone (compare Figure 17 and Figure 12).

Calcite Cement

Calcite cement is most commonly observed at the lithologic contact between sandstone bodies and overlying marine shales, and is less commonly observed as discontinuous patches within sandstone bodies (Figure 9E). Calcite cement diminishes reservoir quality within the Valhalla reservoir interval by reducing both porosity and permeability (Ball, 2009). The occurrence of calcite cement is predicted from well logs for sandstones that have greater than 12 percent neutron porosity and satisfy the Vshale cutoffs for reservoir facies 2, 3 and 4 (Table 1). Calcite cement is most common within relatively shallower-water, coarser-grained facies 3 and 4 sandstones (Ball, 2009). The heterogeneous distribution of calcite is thought to be related to the flow of carbonate-saturated fluids through preferred permeability pathways within the Doe Creek (Taylor et al., 2000). Due to the limited open-hole well log data used in mapping, calcite cement

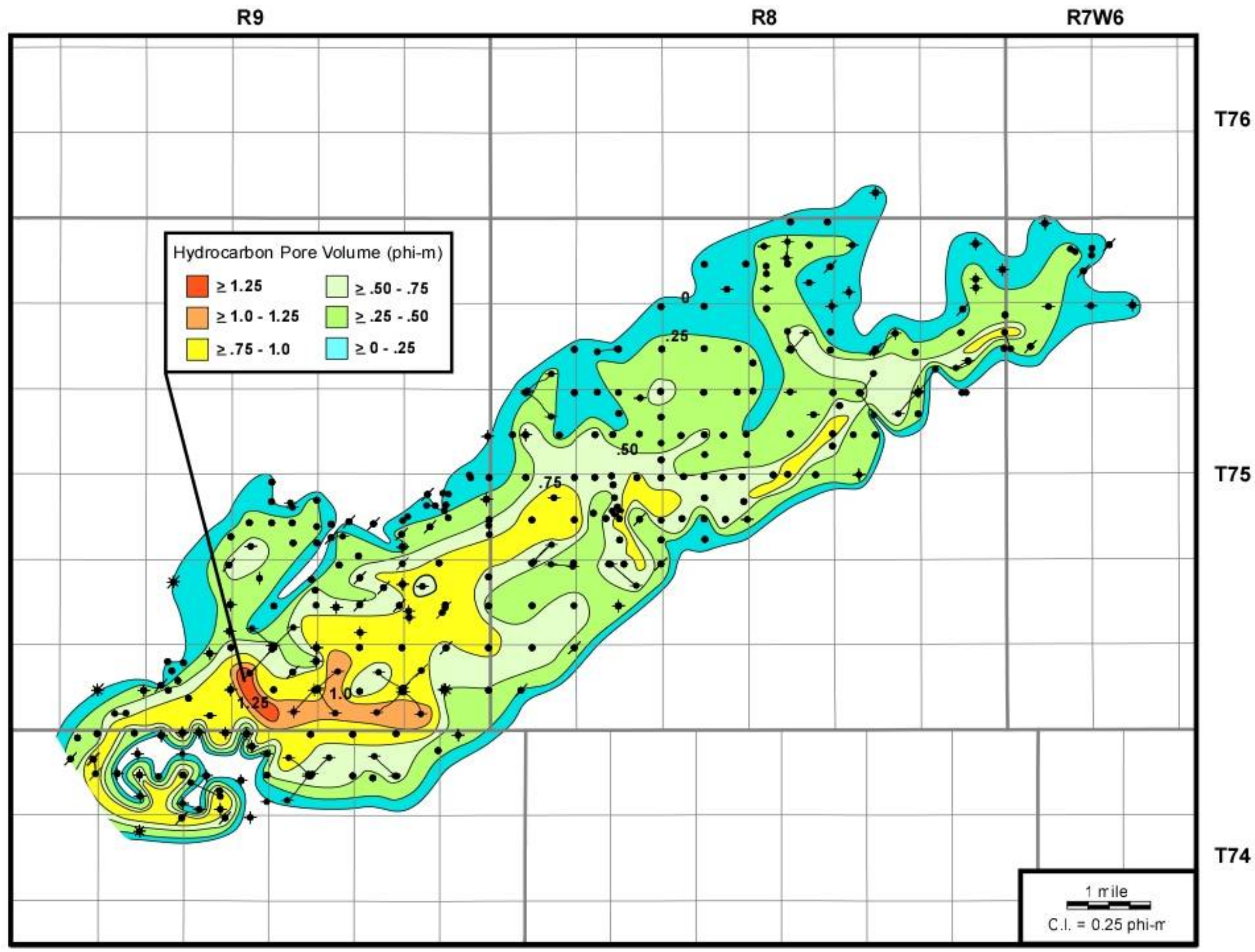


Figure 17. I-Sand hydrocarbon pore volume map (I-1, I+1 and I+2 maps located in Appendix C). Trends of hydrocarbon pore volume mimic trends of gross pore volume and coincide with the distribution of the highest quality reservoir sandstone (compare with Figure 12).

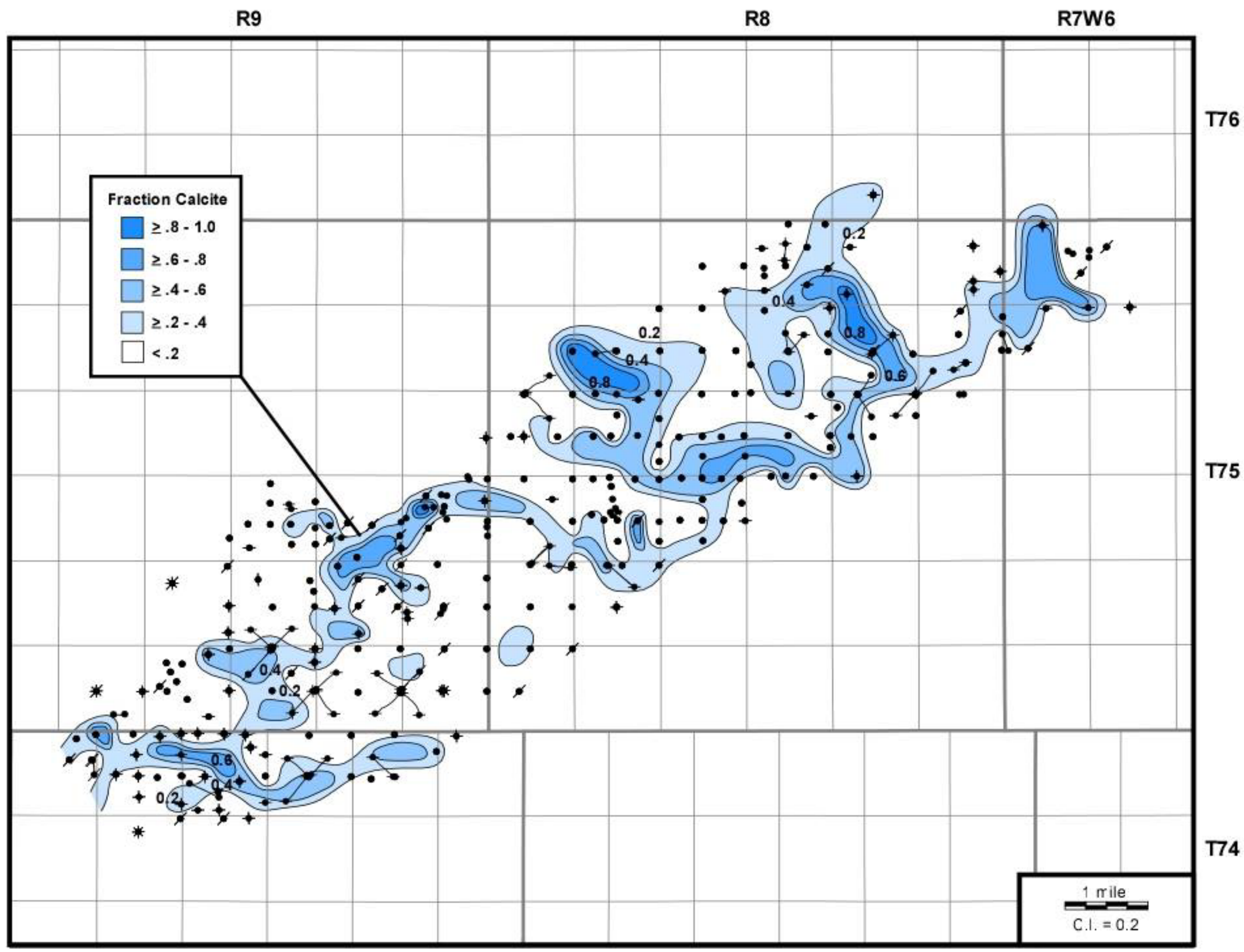


Figure 18. I-Sand calcite cement map (I-1, I+1 and I+2 maps located in Appendix E). Calcite cement is predicted where facies 2-4 have >12% neutron porosity and $\geq$7% density-neutron separation (Table 1). Due to wide spacing of control points, the lateral extent and continuity of calcite cement fairways is most likely exaggerated.

distributions within the I-Sand are characterized as relatively-continuous, sinuous bodies (Figure 18). Cement distributions are likely more discontinuous than represented and Hogg et al. (1998) suggests calcite-cemented sand continuity of less than 4 m.

Ichnofabric Index and Ichnofaunal Diversity

Trends of ichnofabric index (thoroughness of bioturbation) and ichnofaunal diversity (number of ichnogenera observed) were mapped for the I-Sand to better evaluate the depositional environment and to determine what (if any) relationship there may be on reservoir quality (Figures 19 and 20). Within the cored interval, most commonly including the I-1, I-Sand, I+1 and I+2 units, ichnofaunal diversity ranges from 1 to 6 ichnogenera/meter with the highest values coinciding with offshore deposits (facies 1) that are dominated by the *Cruziana* forms *Thalassinoides*, *Planolites*, *Teichichnus*, *Zoophycos* and less commonly *Rhizocorallium* and *Asterosoma.* In contrast to the offshore deposits, those of the lower and upper shoreface (Facies 3 and 4) often have a much lower ichnofaunal diversity (1 to 3), and are dominated by the *Skolithos* forms *Ophiomorpha*, *Skolithos*, *Palaeophycus* and *Bergaueria*. Lower shoreface deposits with higher values of ichnofaunal diversity tend to coincide with lower reservoir quality sandstone (reservoir facies 2 and to a lesser extent reservoir facies 3) for the I-Sand interval (compare Figure 19 with Figure 12). Variable environmental conditions associated with reservoir facies 2 allowed for a combination of opportunistic colonization of storm-deposited sands by *Skolithos* ichnofacies trace makers and the colonization of interbedded muds by *Cruziana* ichnofacies trace makers. The reduction in reservoir quality is likely due to the introduction of mud into interparticle pore space by trace makers.

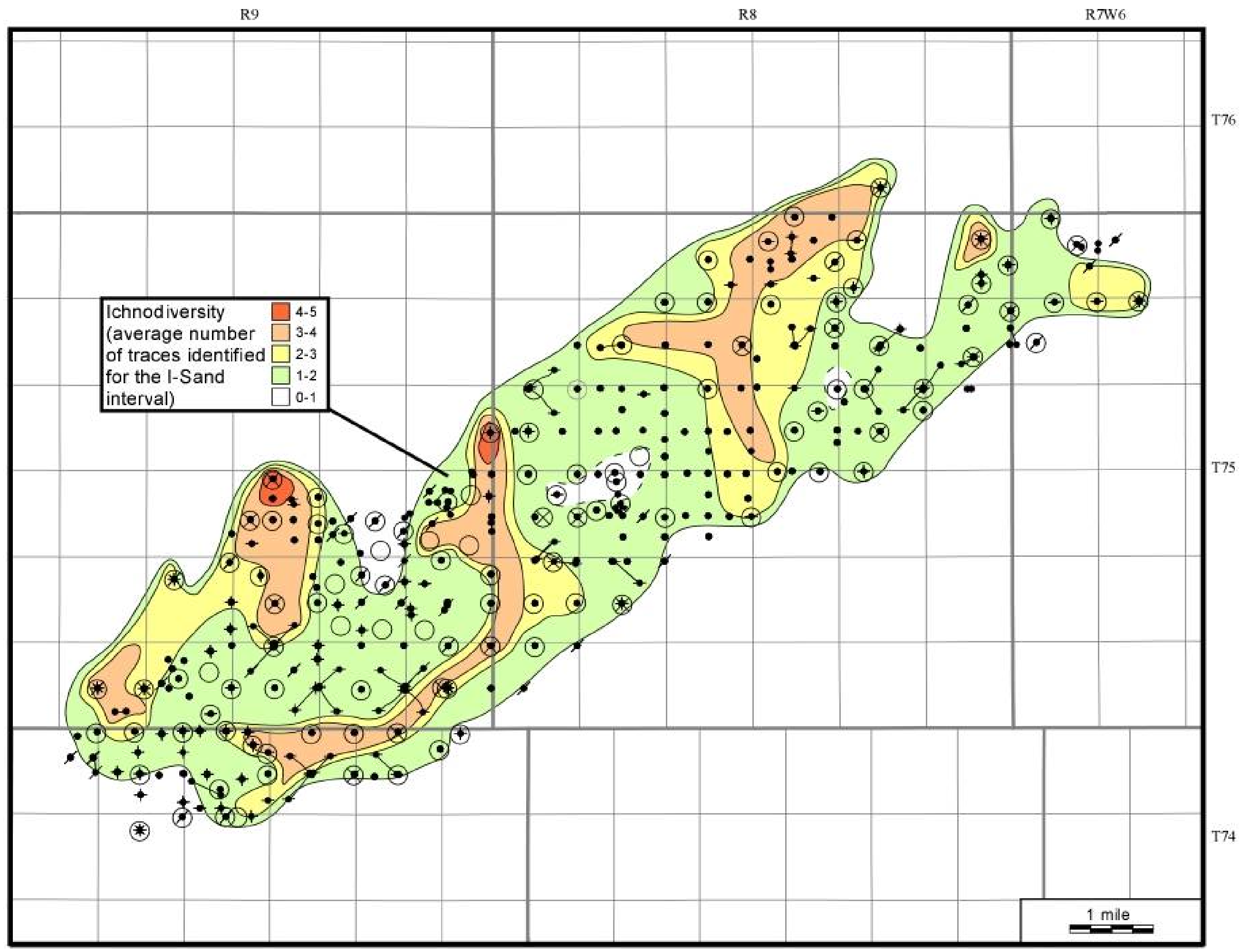


Figure 19. I-Sand ichnofaunal diversity map. Trends of high ichnofaunal diversity correspond with both offshore mudrocks and lower shoreface sandstones (compare with Figure 12).

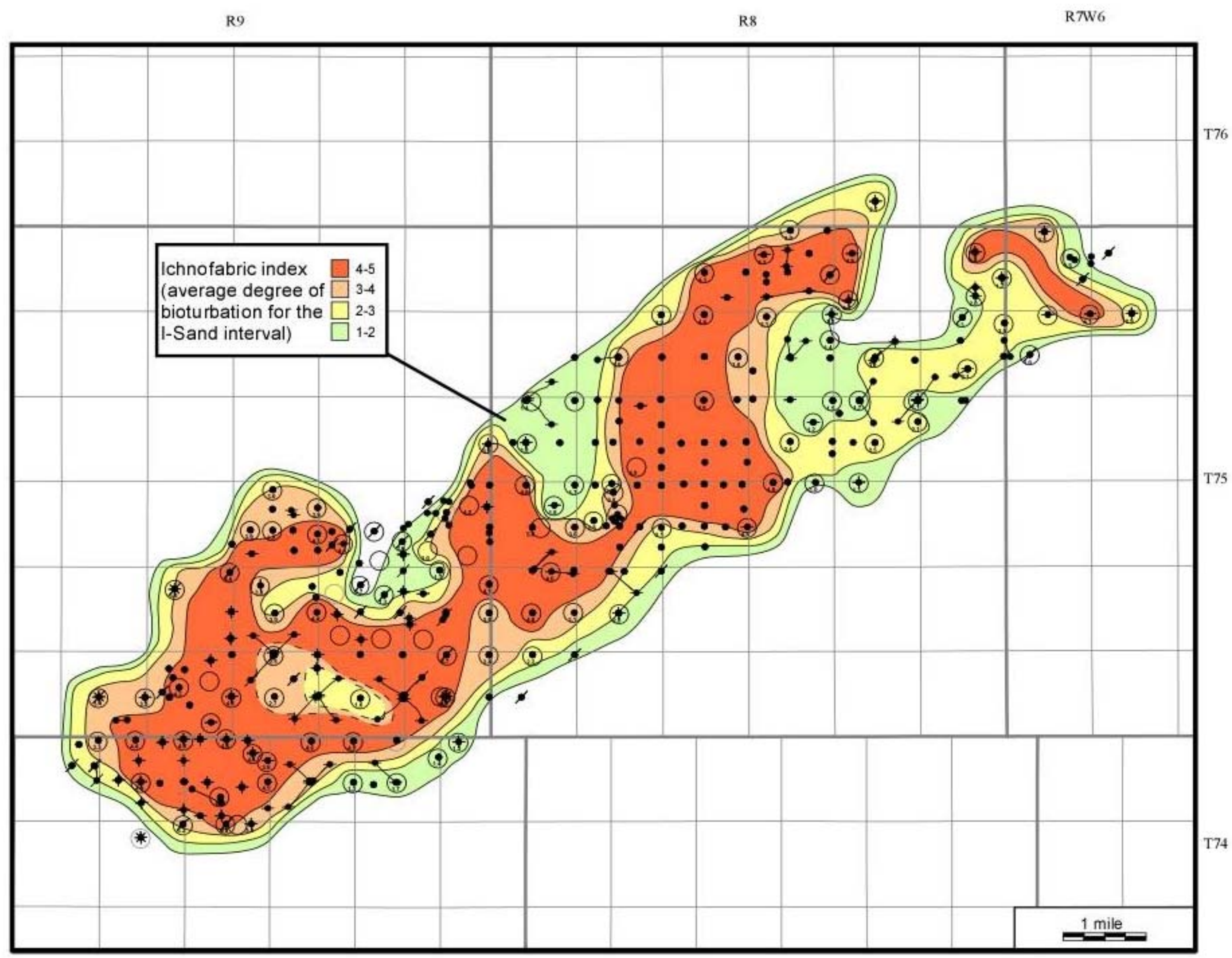


Figure 20. I-Sand ichnofabric index map. Trends of high ichnofabric index coincide with the thickest I-Sand interval shoreface sandstones (compare with figure 12).

Trends of ichnofabric index closely coincide with trends of reservoir facies. Increasing values of ichnofabric index (from 3 to 5) mimic the distribution of reservoir facies 3 and 4 (compare Figure 20 with Figure 12). Although thick sandstone deposits corresponding with reservoir facies 3 and 4 have low ichnofaunal diversity, the general lack of mechanical sedimentary structures warrants classification as an ichnofabric index of 5. An ichnofabric index of 5 is coincident with, but not causal to, an increase in reservoir quality associated with reservoir facies 3 and 4 (Ball, 2009). Rather, increased reservoir quality is associated with thick clean sandstone bodies deposited during storm events (Walker and Plint, 1992).

CHAPTER SIX

Relation of Stratigraphic Controls to Production Trends

Hydrocarbons at Valhalla Field are produced from the I-1 through I+2 units, and maps of gross pore volume (Appendix B), hydrocarbon pore volume (Appendix C), average effective porosity (Appendix D) and calcite cement (Appendix E) are provided for each. Most production is from the I-Sand, and therefore, maps of daily total fluid production and cumulative oil production largely reflect production from this unit (Figures 21 and 22). As such, spatial variability in I-Sand attributes likely influence, if not control, production trends. Distributions of reservoir facies, gross pore volume and hydrocarbon pore volume closely compare to trends of average total fluid and cumulative oil production for the I-Sand interval (compare Figures 12, 16, 17, 21 and 22). An exception to this trend is observed in the southern portion of T75R9W6 and northern portion of T74R9W6 (Figure 21 and 22). Here, low production values are associated with the thickest and highest reservoir quality sandstone. Relatively low production rates in this area may be the result of lateral water incursion due to completions in close proximity to the oil-water contact (Figure 6). Generally, the distribution of the highest quality reservoir sandstone, facies 3 and 4, coincides with the thickest and most extensive regions of gross pore volume and hydrocarbon pore volume (compare Figure 12 with Figures 16 and 17). A less obvious correlation is made between predicted reservoir facies and average effective porosity, and may reflect the irregular distribution of calcite-cemented sandstone (compare Figure 12 with Figure 15). The distribution of

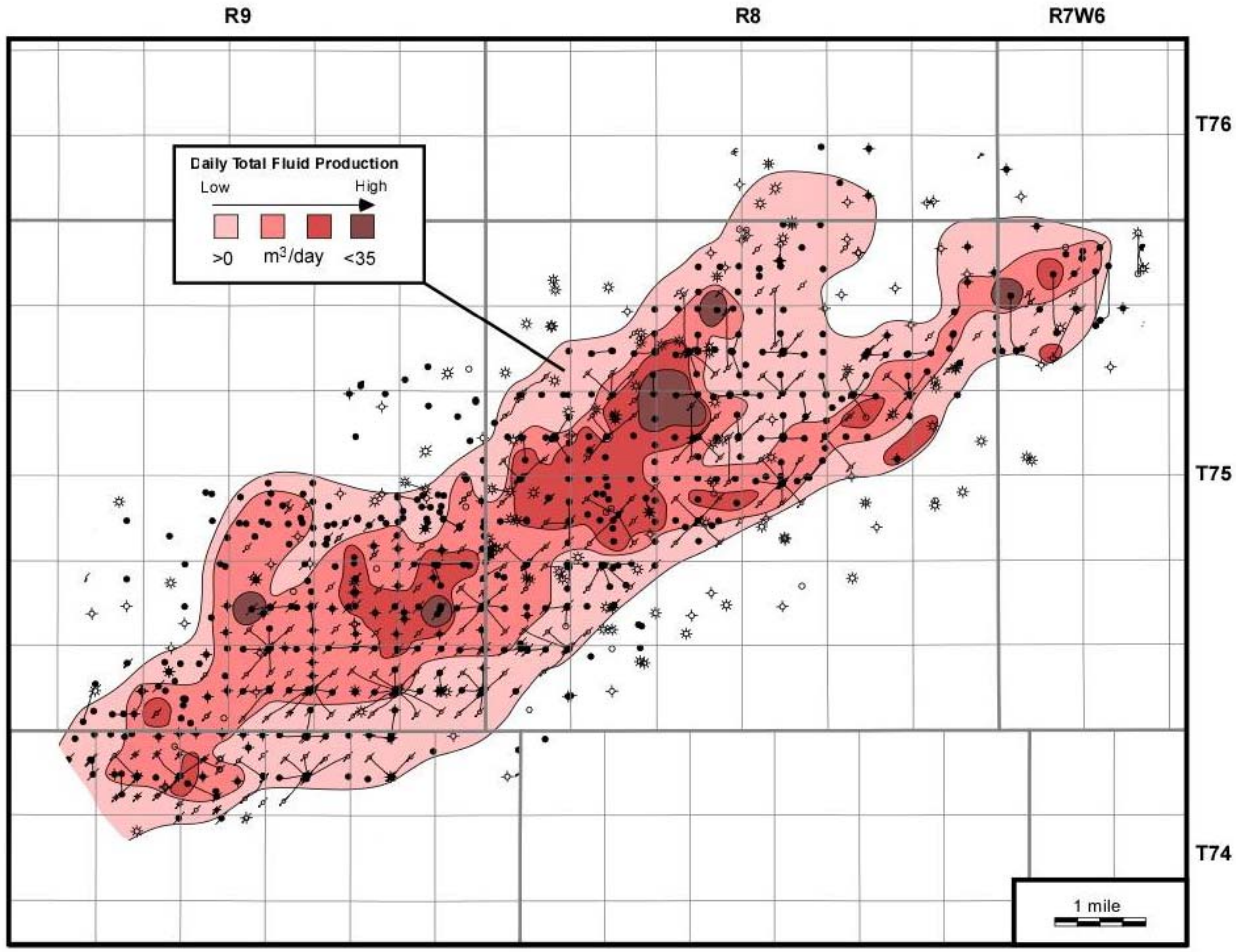


Figure 21. Average daily total fluid production for the "Doe Creek I and Dunvegan B" pool. Most oil is produced from the I-Sandstone, and therefore, variations in production trends generally reflect variations in I-Sandstone reservoir properties. Trends of average total daily fluid production closely correspond with the distribution of the thickest and highest reservoir quality sandstone of the I-Sand interval (compare with Figure 12).

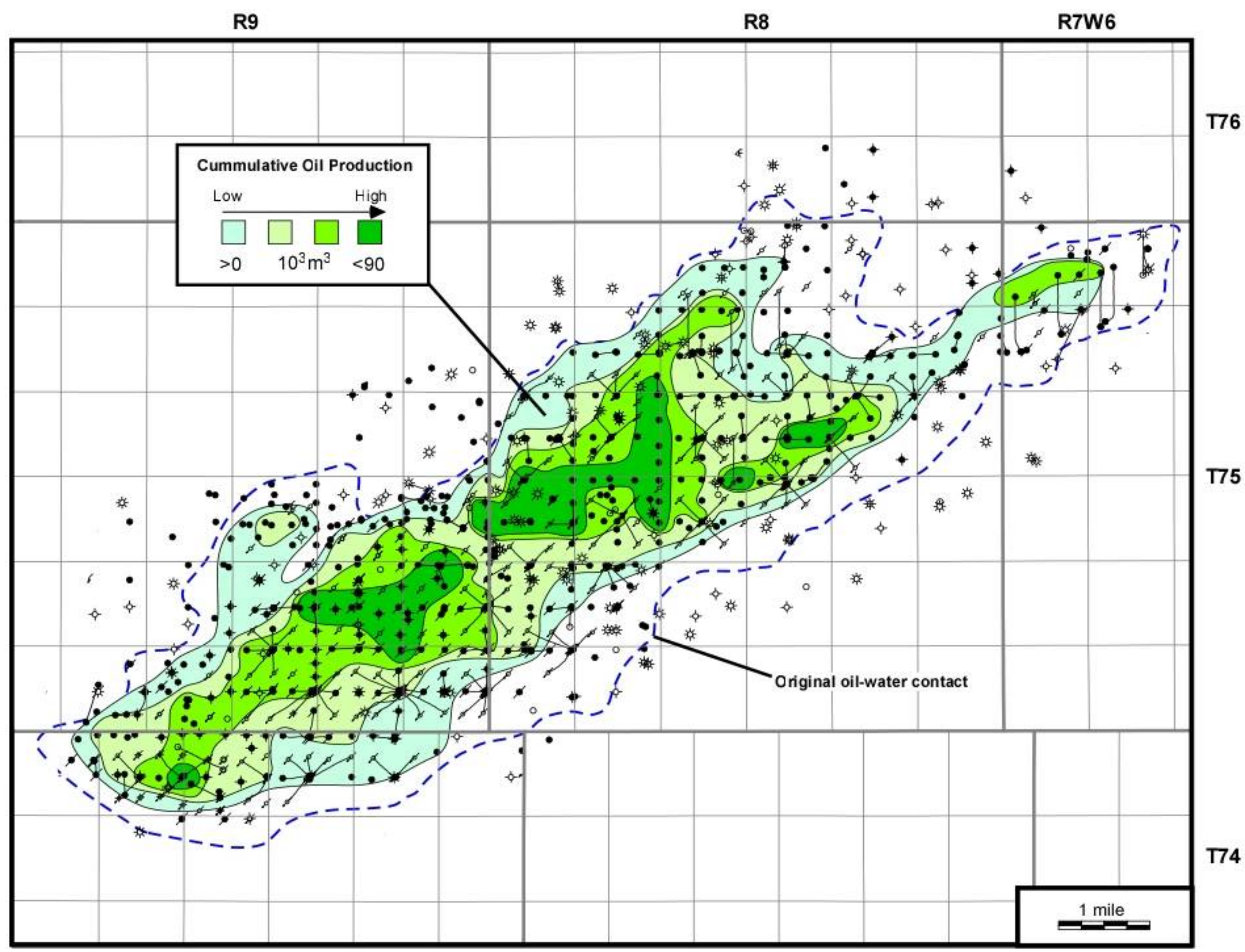


Figure 22. Cumulative oil production for the "Doe Creek I and Dunvegan B" pool. Most oil is produced from the I-Sand, and therefore, variations in production trends generally reflect variations in I-Sandstone reservoir properties. Trends of cumulative oil production closely correspond with the distribution of the thickest and highest reservoir quality sandstone of the I-Sand interval (compare with Figure 12). The extent of the original oil-water contact is indicated by the dashed blue line.

calcite-cemented reservoir sandstone, however, does not clearly correlate with reduced production (compare Figures 21 and 22 with Figure 18). This is inconsistent with statistical analyses provided by Ball (2009) which document a clear correlation between calcite-cemented sandstone and porosity and permeability reduction. Although the presence of calcite cement is associated with reduced reservoir quality, many of the porosity values still lie above the reservoir cutoffs (Table 1) and may account for the lack of correlation (Ball, 2009).

CHAPTER SEVEN

Depositional History

The western margin of the Late Cretaceous WIS includes numerous isolated elongate sandstone bodies and associated marine mudrocks (Nielsen and Johannessen, 2008). The Doe Creek and Pouce Coupe sandstones of the Kaskapau Formation are two examples. Three explanations are provided in the literature that account for the isolated nature of the Doe Creek and Pouce Coupe: 1) Sand shoals on the lee side of Dunvegan delta lobes that formed during transgression (Wallace-Dudley and Leckie, 1988); 2) transgressive erosional remnants of delta-front lowstand deposits that prograded across the shelf in response to forced regression (Wallace-Dudley and Leckie, 1993; Kreitner and Plint, 2006); and 3) periodic forebulge uplift and erosion, and subsequent westward sand transport and deposition into a subsiding foredeep (Plint et al., 1993; Plint 2000).

Sedimentological characteristics and stratal relations of the Doe Creek Member at Valhalla Field presented in this study are most consistent with the forebulge erosion model proposed by Plint et al. (1993) and Plint (2000). This model suggests that shallow marine sandstone units were derived from the erosion of an emerging forebulge to the northeast of Valhalla and were subsequently transported southwest towards a subsiding basin (Figure 23) (Plint et al., 1993; Plint, 2000). Sandstone units of the Doe Creek thicken towards the southwest and grade into marine shales of the foredeep. To the northeast, the Doe Creek sandstone units thin and/or are truncated beneath the K1 unconformity (Plint et al., 1993).

The Doe Creek at Valhalla Field is interpreted to have been deposited upon a slightly restricted, wave-dominated shelf. This interpretation is based on observed facies relationships that include *Zoophycos* burrowed offshore mudrock and distal and proximal lower to upper shoreface hummocky cross-stratified and wave-rippled sandstone. The abundance of *Zoophycos* is consistent with the lack of turbidity currents and/or reduced bottom-water oxygen levels (Seilacher, 1967; Frey and Seilacher, 1980). The interpretation of these sediments as being deposited on a slightly restricted wave-dominated shelf is in contrast with previous interpretations that the Doe Creek is deltaic in origin (Wallace-Dudley and Leckie, 1988; Wallace-Dudley and Leckie, 1993; Kreitner and Plint, 2006; Reid, 2006). No deltaic indicators such as lobate shoreline-protruding delta front deposits with turbidites are observed. In addition, relatively uniform and high ichnofabric indices in both the Doe Creek sandstone and offshore mudrocks suggest low sediment and/or salinity stress (Gani et al., 2008).

Generally, the ichnofaunal diversity present in the Doe Creek Member at Valhalla Field is comparably lower than those documented for other Cretaceous-age wave-dominated successions in the Western Interior Seaway (MacEachern and Pemberton, 1992; Pemberton et al., 1992a). Although reduced, ichnofauna do not display the characteristics of a conventional brackish-water assemblage such as a reduction in trace-size, and high trace fossil density coupled with low diversity (MacEachern and Gingras, 2007). The slight decrease in inchnofaunal diversity is likely a result of deposition within a coastal embayment where environmental conditions are more likely susceptible to variations in salinity and/or turbidity.

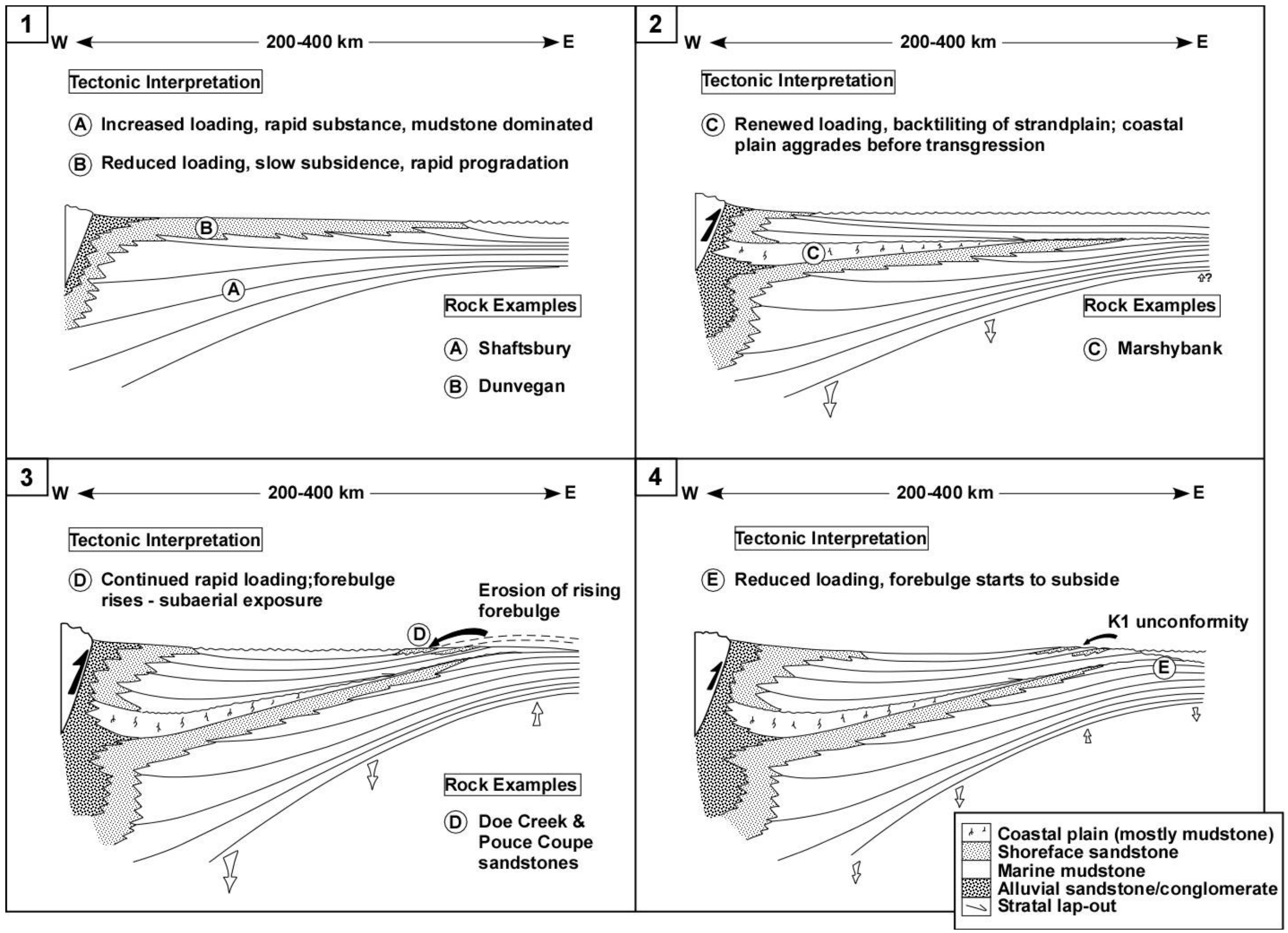


Figure 23. Summary of interpreted relationships between thrust loading, basin floor movement, broad facies deposits and erosional surfaces. Inferred rate and location of subsidence/uplift are indicated by open arrows. Circled letters above each diagram represent tectonic interpretation while circled letters below each diagram represent associated geological interpretations (modified from Plint et al., 1993).

CHAPTER EIGHT

Conclusions

1. The Late Cretaceous (Cenomanian) Doe Creek Member of the Lower Kaskapau Formation is comprised of 6 depositional facies that accumulated in nearshore, wave-dominated marine environments.

2. The Doe Creek Member at Valhalla Field is comprised of 10 retrogradationally-stacked parasequences and/or associated bedsets, of which, four include reservoir quality sandstone (I-1, I-Sand, I+1 and I+2). Associated sandbodies are up to 8 m thick, occur along a linear northeast to southwest trend, and transition both laterally and vertically to marine mudrocks.

3. The reservoir quality sandstone bodies of the Doe Creek Member formed as a westward-prograding succession across Valhalla Field. The I-1 sandstone is restricted to the eastern portion of the study area, the I-Sand interval is the primary reservoir and extends across the entire field, and the I+1 and I+2 sandstones are limited to the western region of the study area. The thickest and highest reservoir quality sandstones coincide with reservoir facies 3 and 4 of the I-Sand interval.

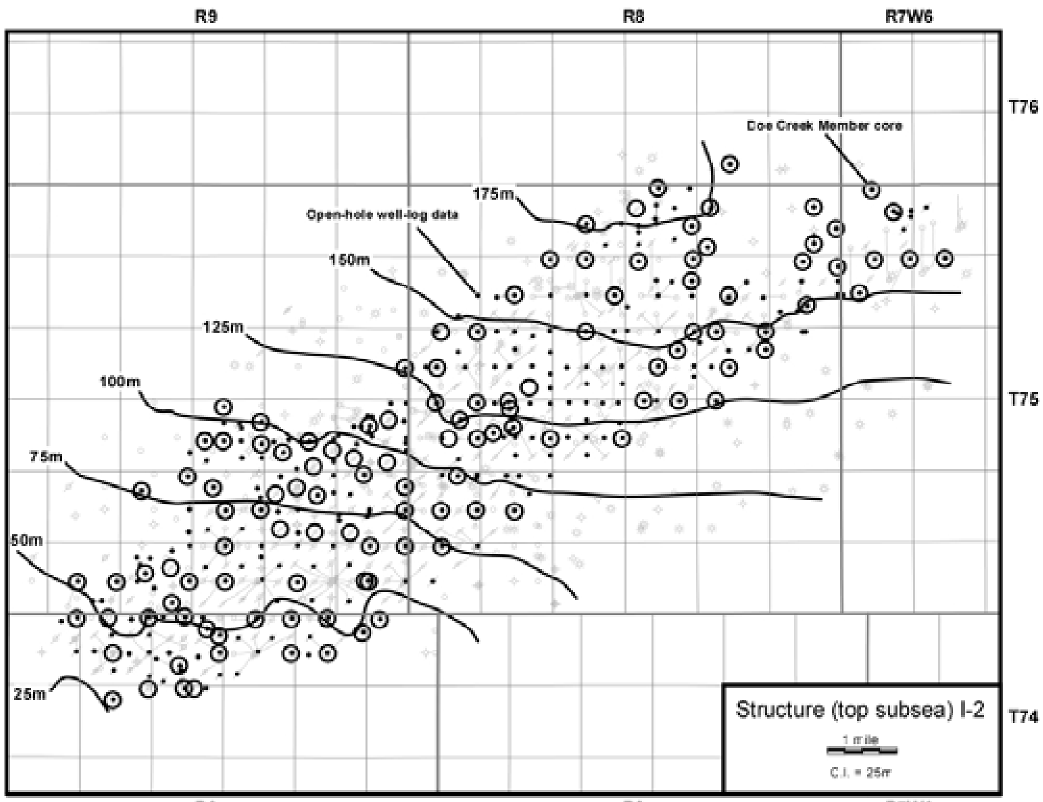
4. Within the I-Sand, the highest quality reservoir facies (facies 3 and 4) correlate with the thickest gross pore volume, and highest average daily total fluid production and cumulative oil production. One exception occurs along the western-most portion of the study area at T74NR9W6. Low production in this area may be the result of well completions close to the original oil-water contact.

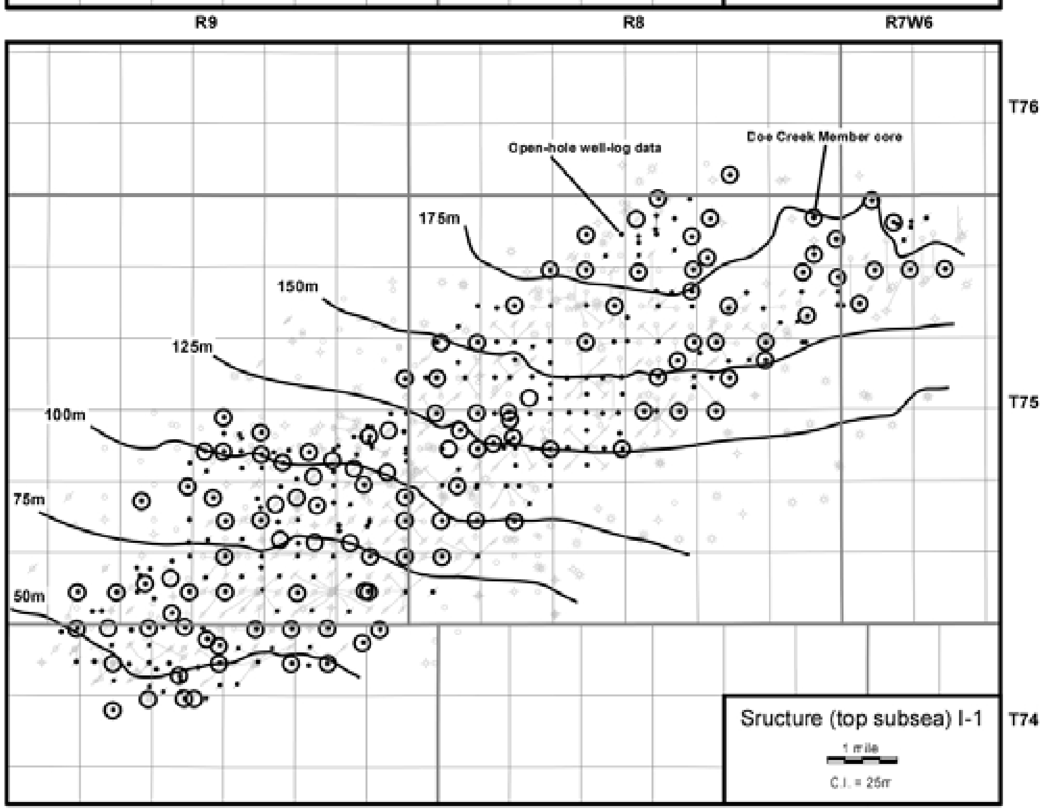
5. Sedimentological and ichnological features within the Doe Creek Member are most consistent with erosion of an emerging forebulge located east of Valhalla Field, and subsequent southwestward sand transport and accumulation within a subsiding foredeep (*sensu* Plint et al., 1993; Plint, 2000). In addition, deltaic indicators such as turbidites are absent from the sedimentological record within Doe Creek Member core. Although relatively high ichnofabric index values are indicative of open marine shelf conditions, the ichnofaunal diversity observed within Doe Creek Member at Valhalla Field is lower than comparable wave dominated successions of the Western Interior Seaway. This suggests deposition within a coastal embayment prone to variations in salinity and/or turbidity.

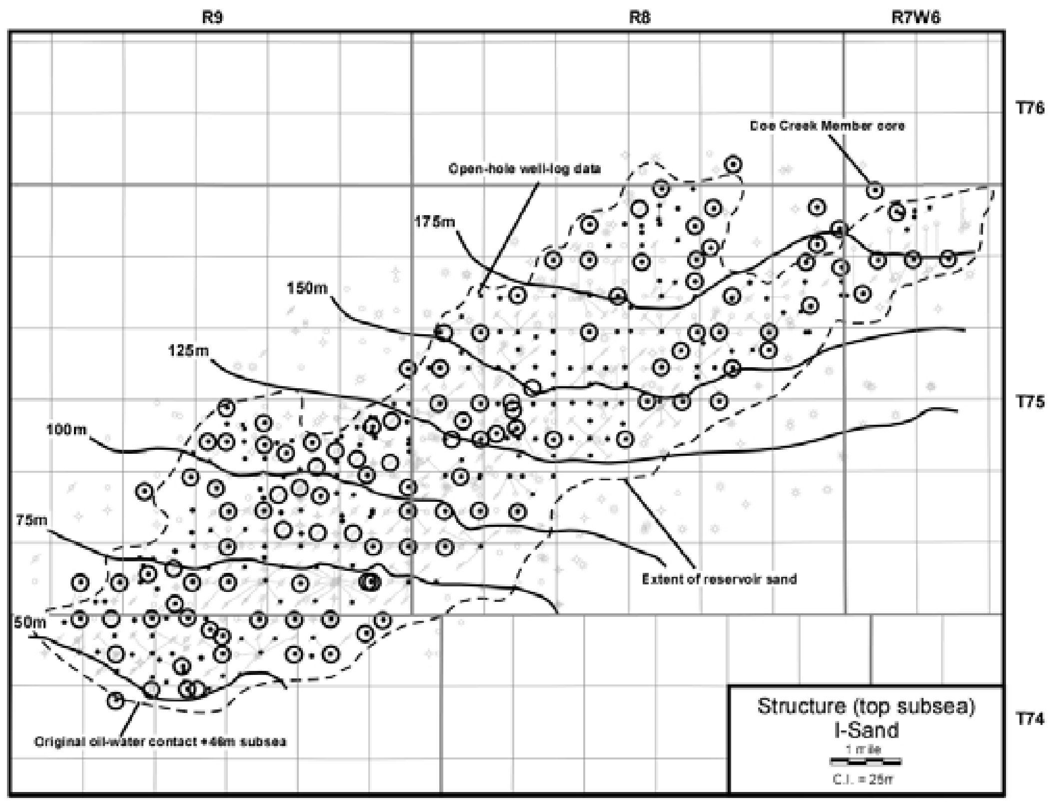
APPENDICES

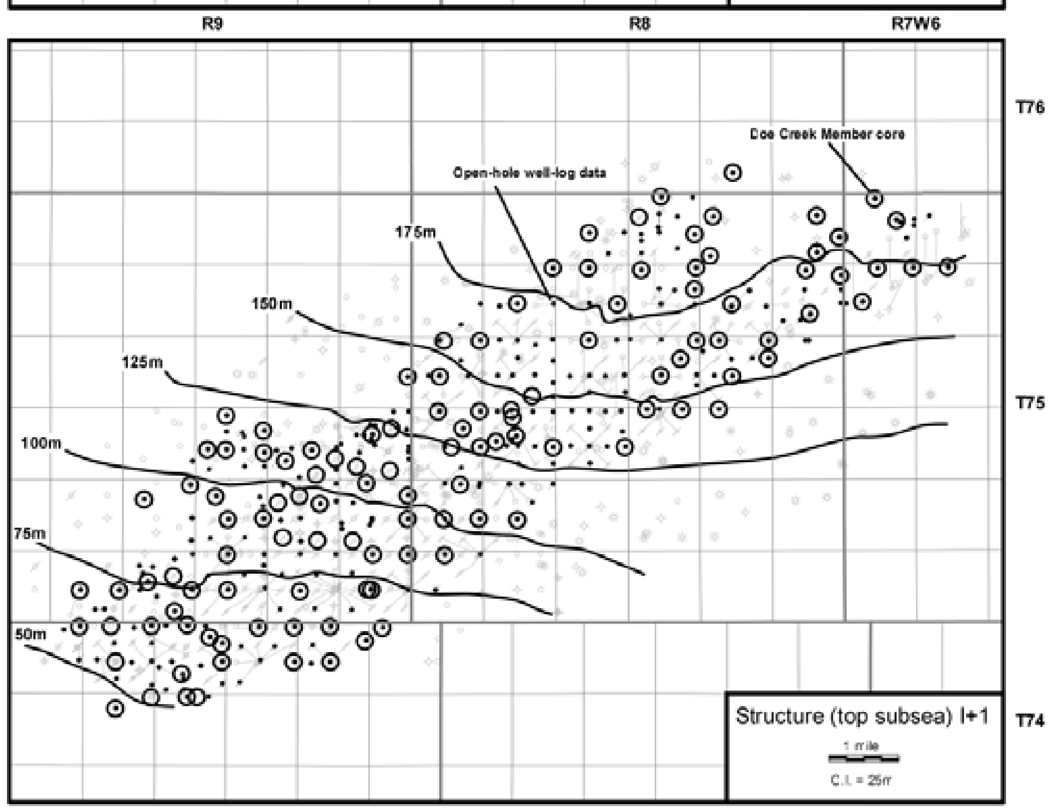
APPENDIX A

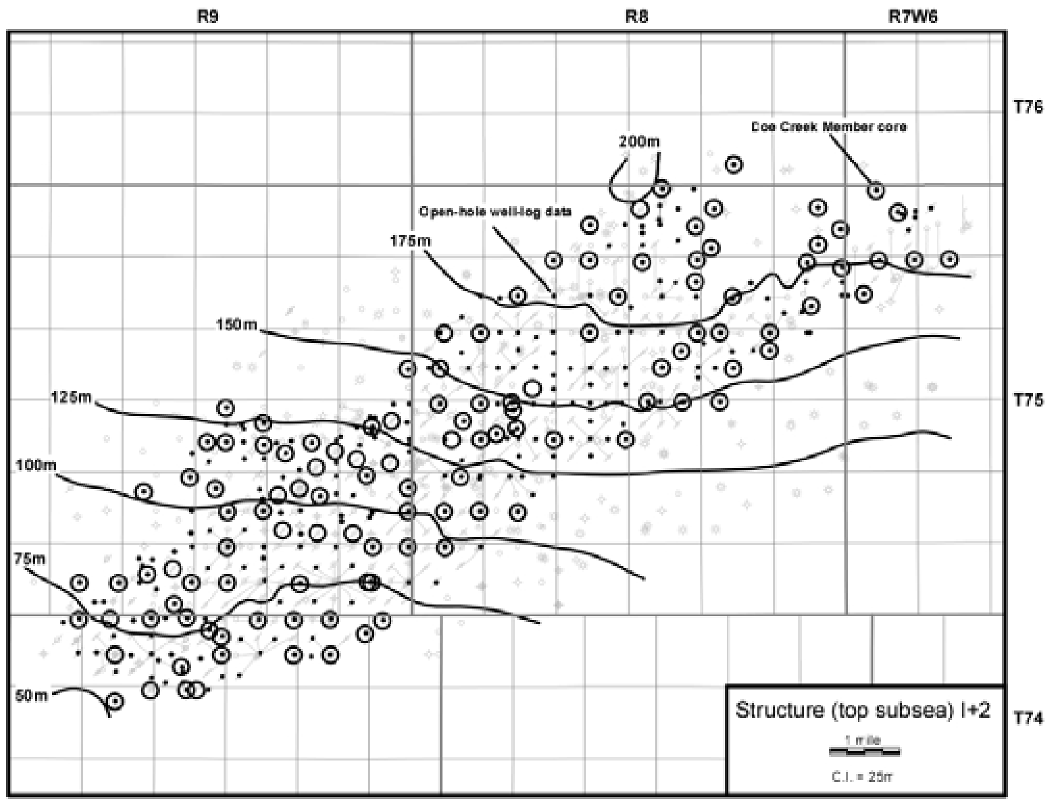
Structure Maps

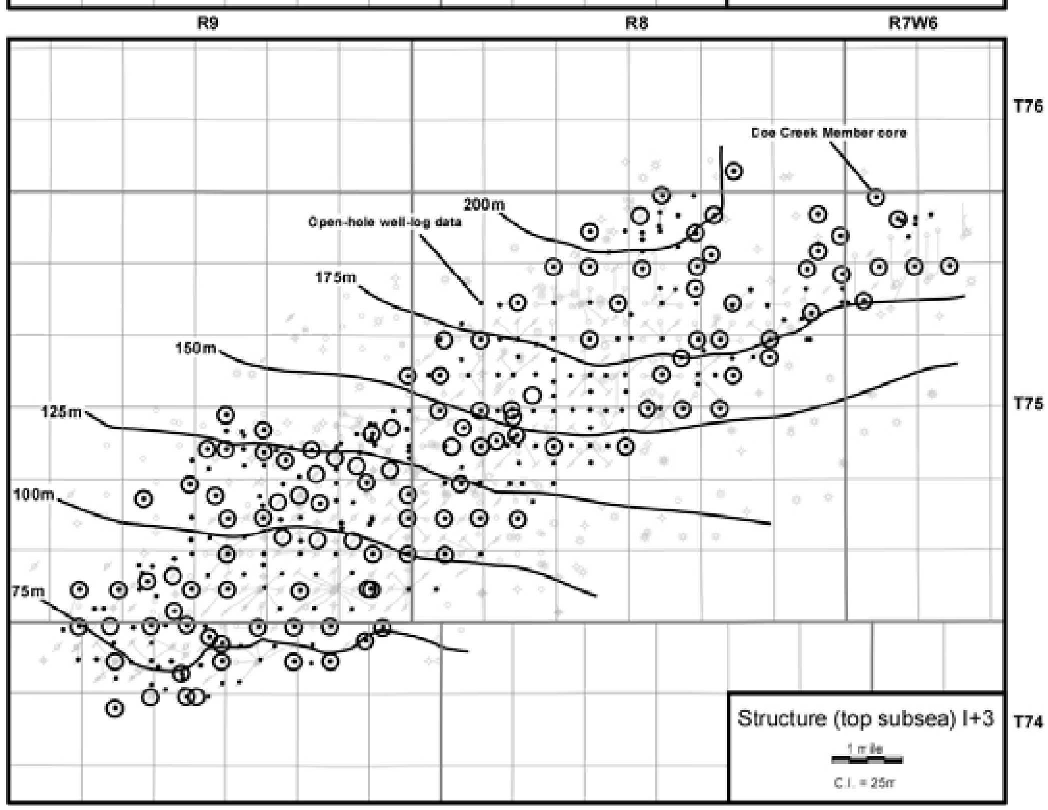

R9
R8
R7W6
T76
T75
T74
Doe Creek Member core
Open-hole well-log data
175m
150m
125m
100m
75m
50m
25m
Structure (top subsea) I-2
1 mile
C.I. = 25m

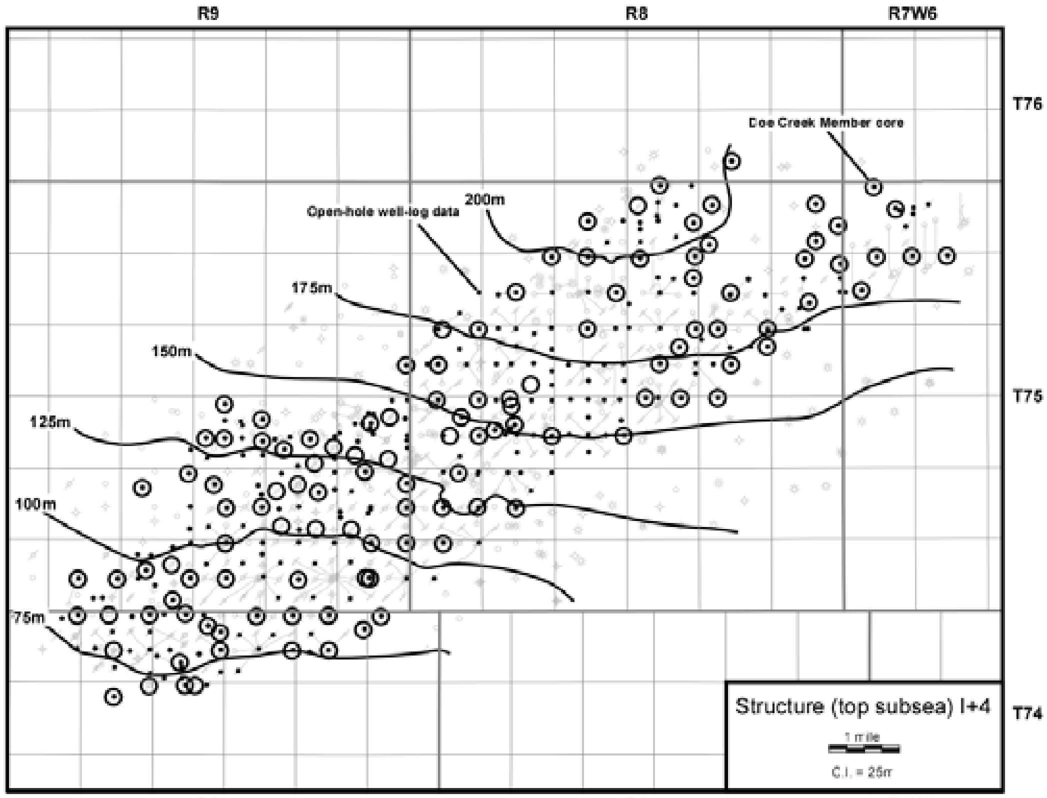

R9
R8
R7W6
T76
T75
T74
Open-hole well-log data
Doe Creek Member core
175m
150m
125m
100m
75m
50m
Sructure (top subsea) I-1
1 mile
C.I. = 25m

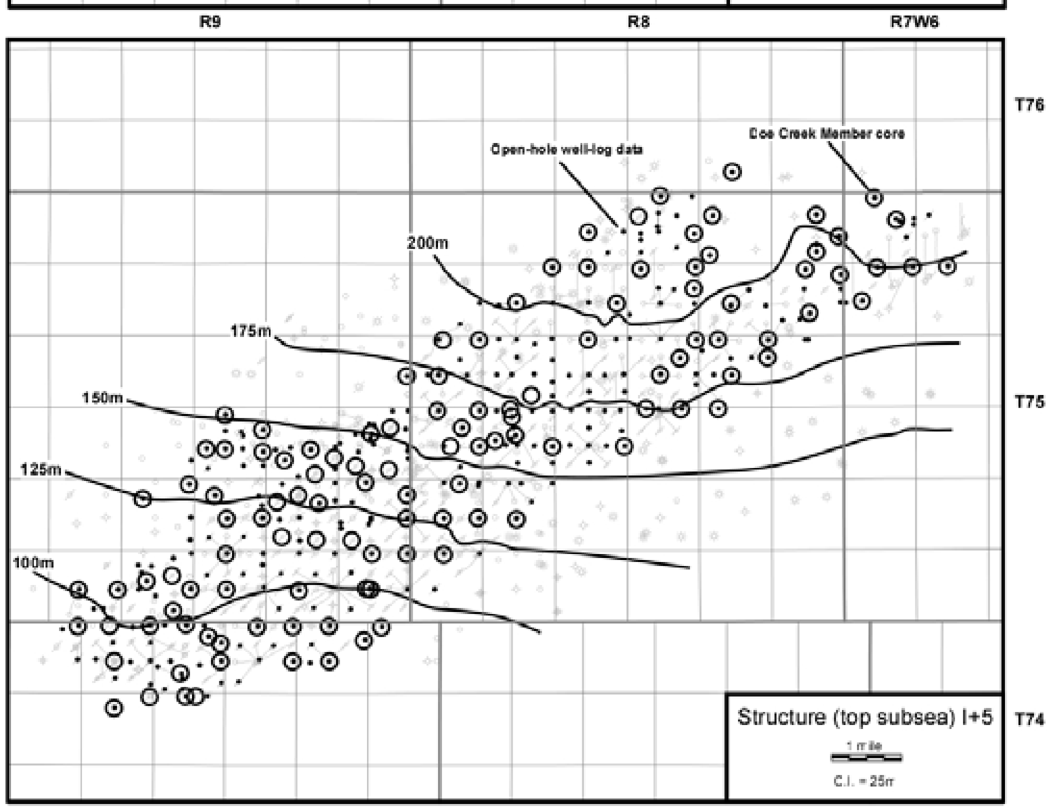

R9
R8
R7W6
T76
T75
T74
Doe Creek Member core
Open-hole well-log data
175m
150m
125m
100m
75m
50m
Extent of reservoir sand
Original oil-water contact +46m subsea
Structure (top subsea)
I-Sand
1 mile
C.I. = 25m

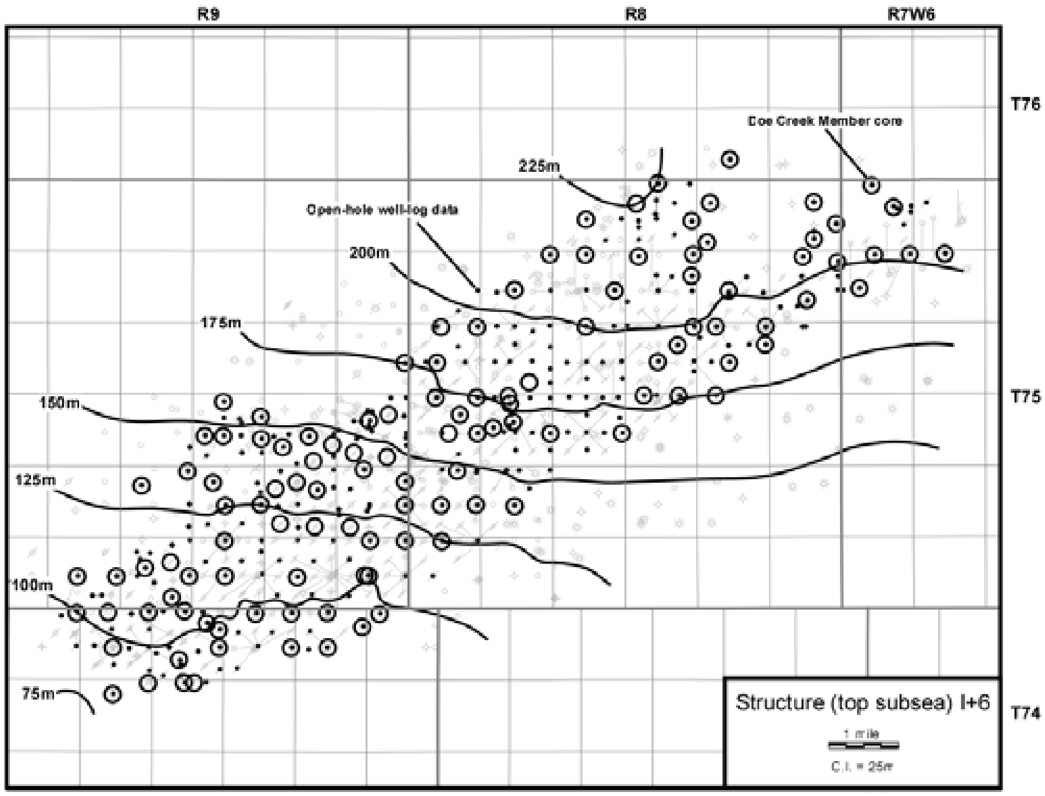

R9
R8
R7W6
T76
T75
T74
Doe Creek Member core
Open-hole well-log data
175m
150m
125m
100m
75m
50m
Structure (top subsea) I+1
1 mile
C.I. = 25m

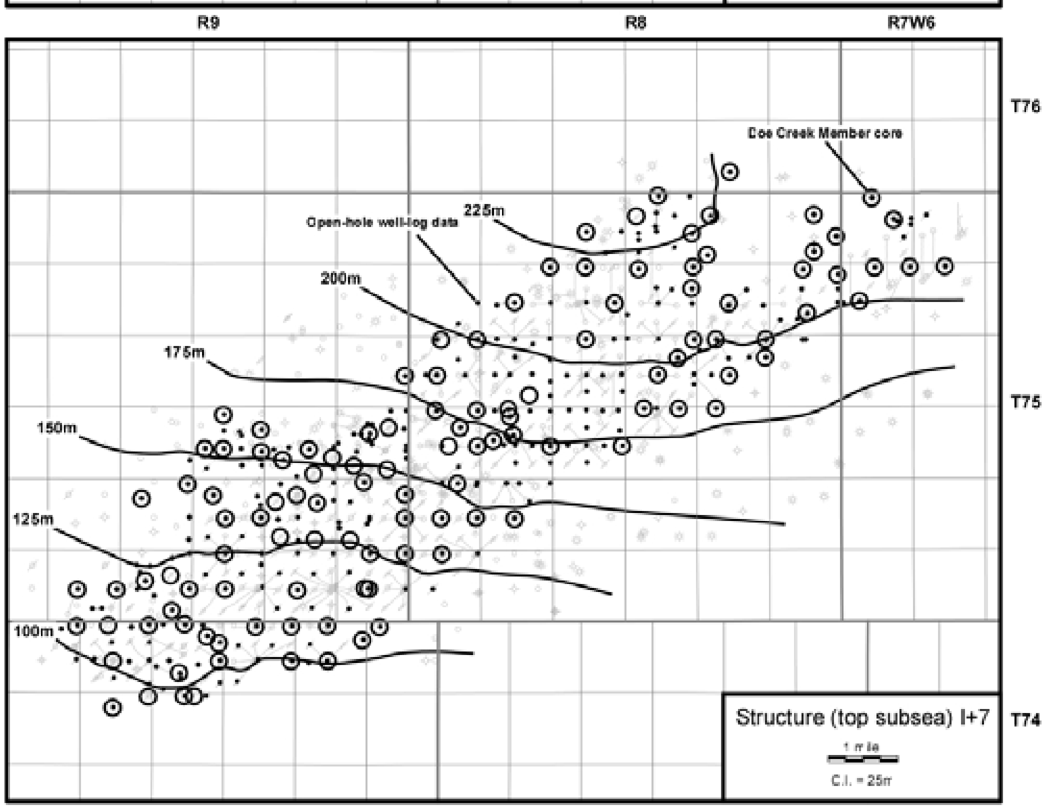

R9
R8
R7W6
T76
T75
T74
Doe Creek Member core
200m
Open-hole well-log data
175m
150m
125m
100m
75m
50m
Structure (top subsea) I+2
1 mile
C.I. = 25m


R9
R8
R7W6
T76
T75
T74
Doe Creek Member core
200m
Open-hole well-log data
175m
150m
125m
100m
75m
Structure (top subsea) I+3
1 mile
C.I. = 25m


R9
R8
R7W6
T76
T75
T74
Doe Creek Member core
Open-hole well-log data
200m
175m
150m
125m
100m
75m
Structure (top subsea) I+4
1 mile
C.I. = 25m

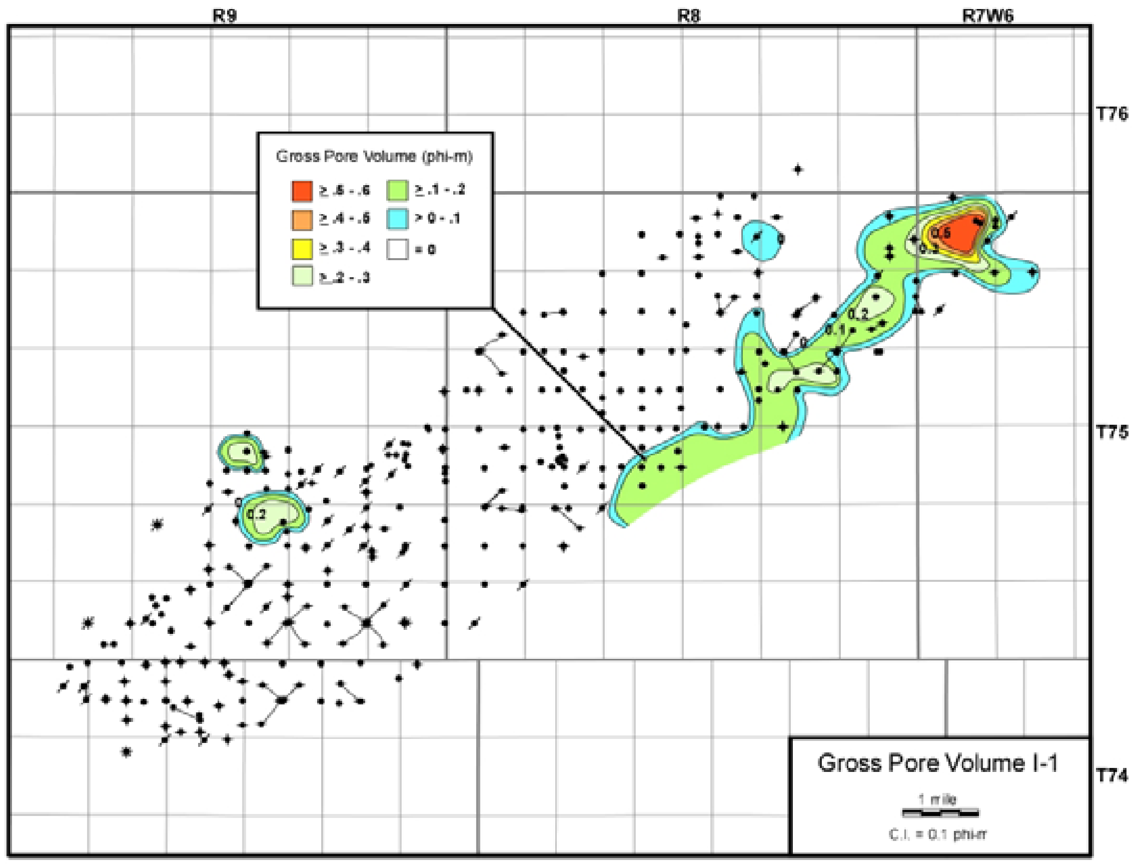

R9
R8
R7W6
T76
T75
T74
Open-hole well-log data
Doe Creek Member core
200m
175m
150m
125m
100m
Structure (top subsea) I+5
1 mile
C.I. = 25m

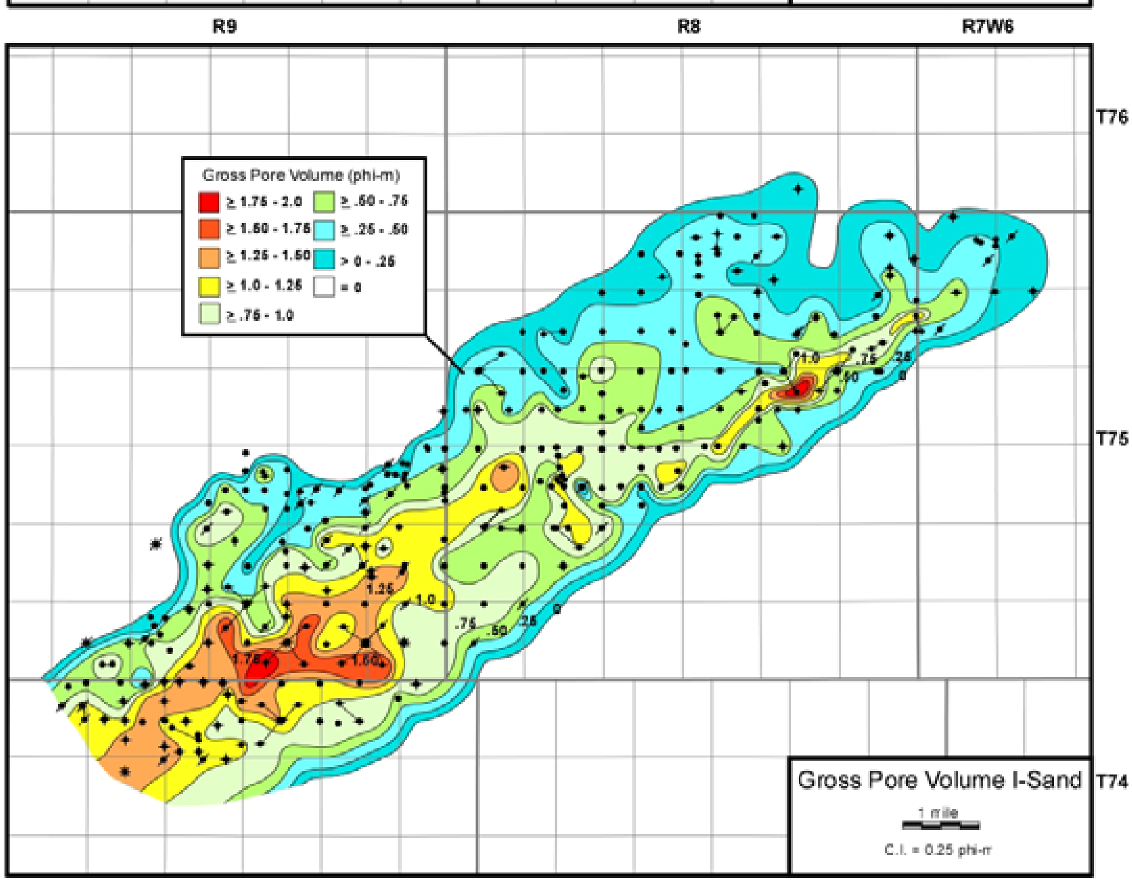

R9
R8
R7W6
T76
T75
T74
Doe Creek Member core
Open-hole well-log data
225m
200m
175m
150m
125m
100m
75m
Structure (top subsea) I+6
1 mile
C.I. = 25m

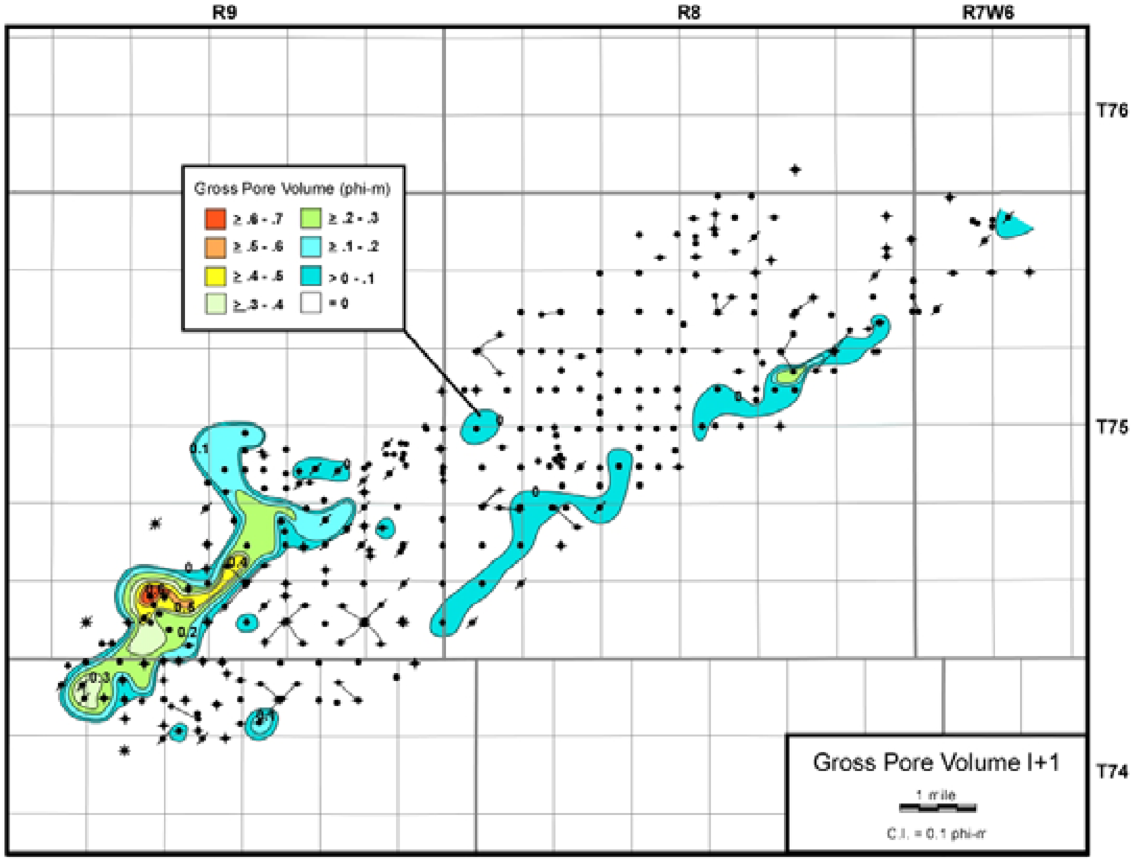

R9
R8
R7W6
T76
T75
T74
Doe Creek Member core
Open-hole well-log data
225m
200m
175m
150m
125m
100m
Structure (top subsea) I+7
1 mile
C.I. = 25m

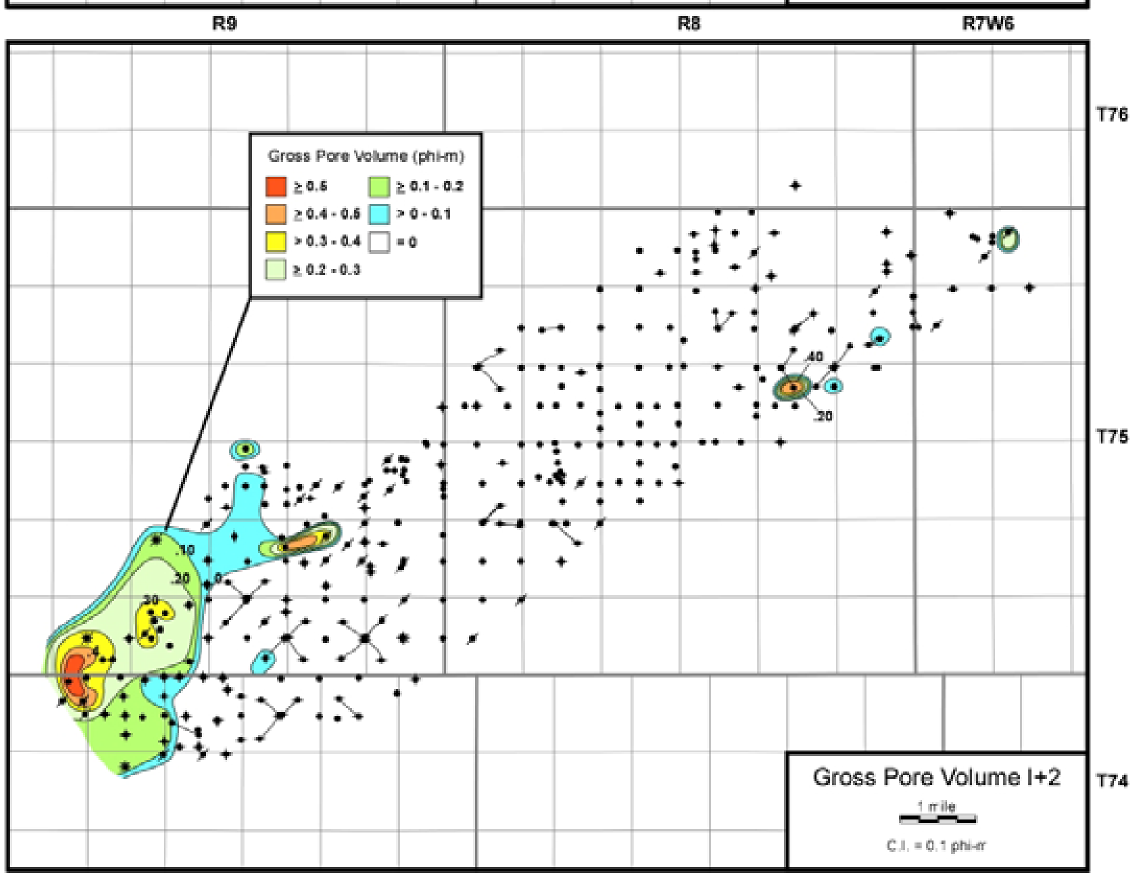
APPENDIX B

Gross Pore Volume Maps


R9
R8
R7W6
T76
T75
T74
Gross Pore Volume (phi-m)
≥ .5 - .6
≥ .4 - .5
≥ .3 - .4
≥ .2 - .3
≥ .1 - .2
> 0 - .1
= 0
Gross Pore Volume I-1
1 mile
C.I. = 0.1 phi-m

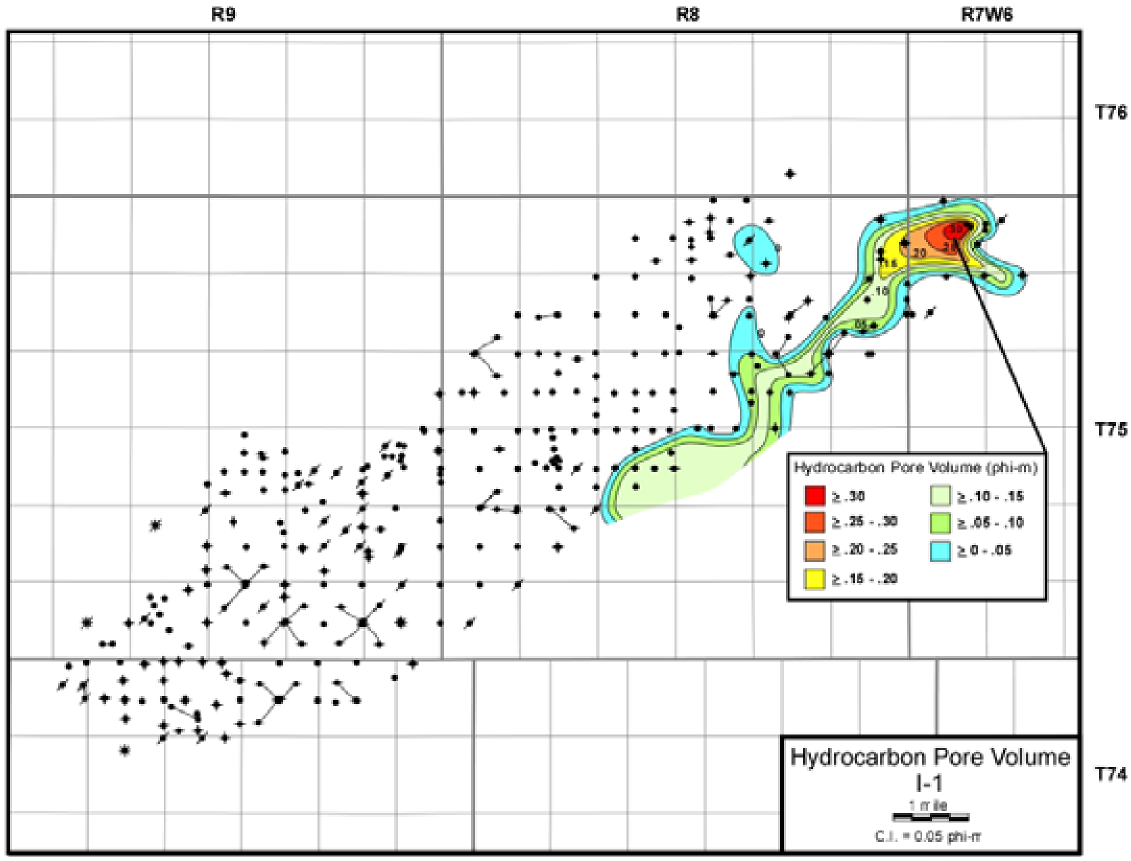

R9
R8
R7W6
T76
T75
T74
Gross Pore Volume (phi-m)
≥ 1.75 - 2.0
≥ 1.50 - 1.75
≥ 1.25 - 1.50
≥ 1.0 - 1.25
≥ .75 - 1.0
≥ .50 - .75
≥ .25 - .50
> 0 - .25
= 0
Gross Pore Volume I-Sand
1 mile
C.I. = 0.25 phi-m


R9
R8
R7W6
T76
T75
T74
Gross Pore Volume (phi-m)
≥ .6 - .7
≥ .5 - .6
≥ .4 - .5
≥ .3 - .4
≥ .2 - .3
≥ .1 - .2
> 0 - .1
= 0
Gross Pore Volume I+1
1 mile
C.I. = 0.1 phi-m

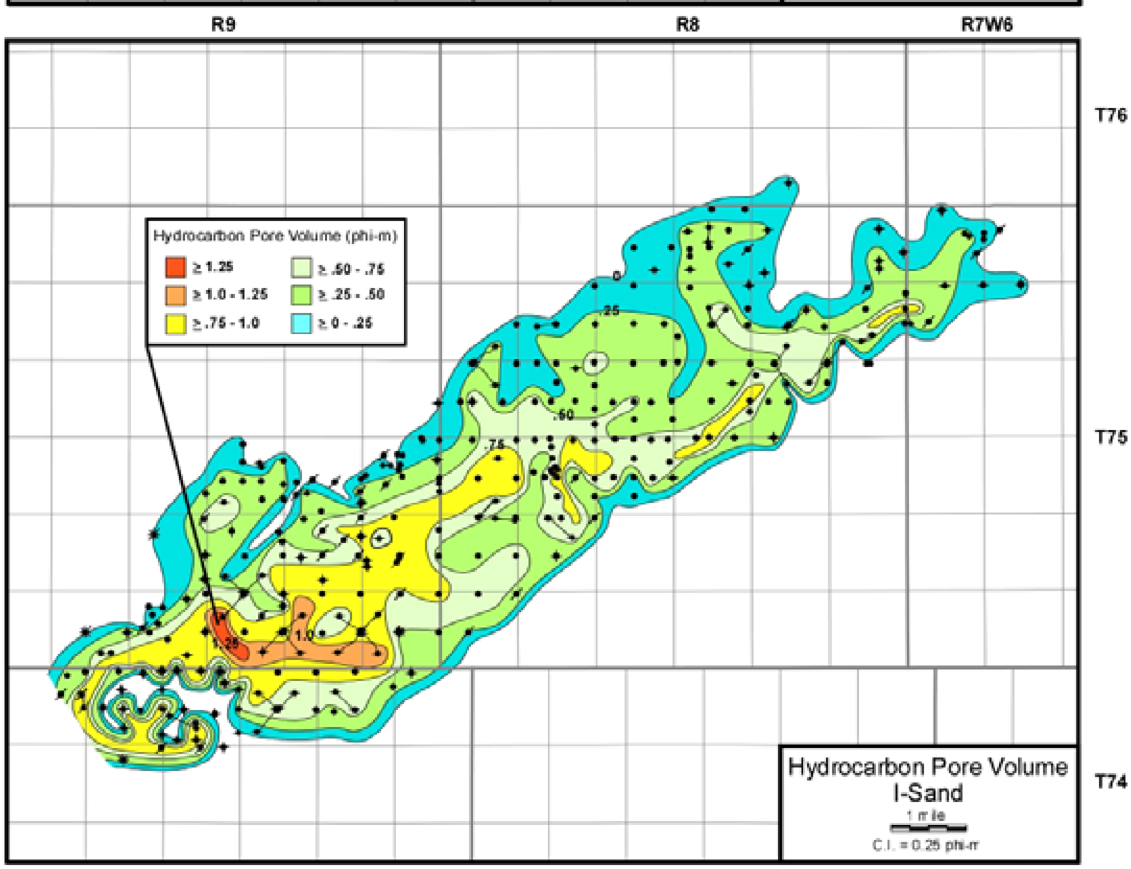

R9
R8
R7W6
T76
T75
T74
Gross Pore Volume (phi-m)
≥ 0.5
≥ 0.4 - 0.5
> 0.3 - 0.4
≥ 0.2 - 0.3
≥ 0.1 - 0.2
> 0 - 0.1
= 0
Gross Pore Volume I+2
1 mile
C.I. = 0.1 phi-m

APPENDIX C

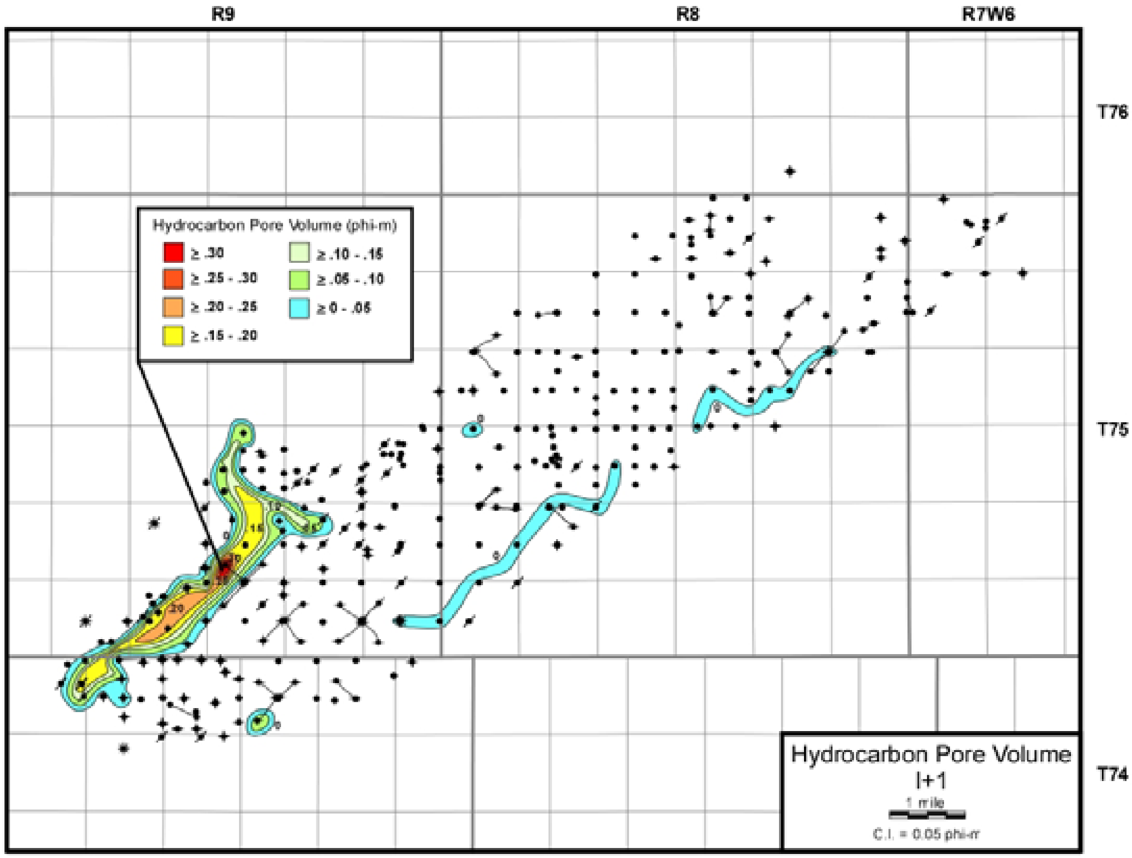
Hydrocarbon Pore Volume Maps

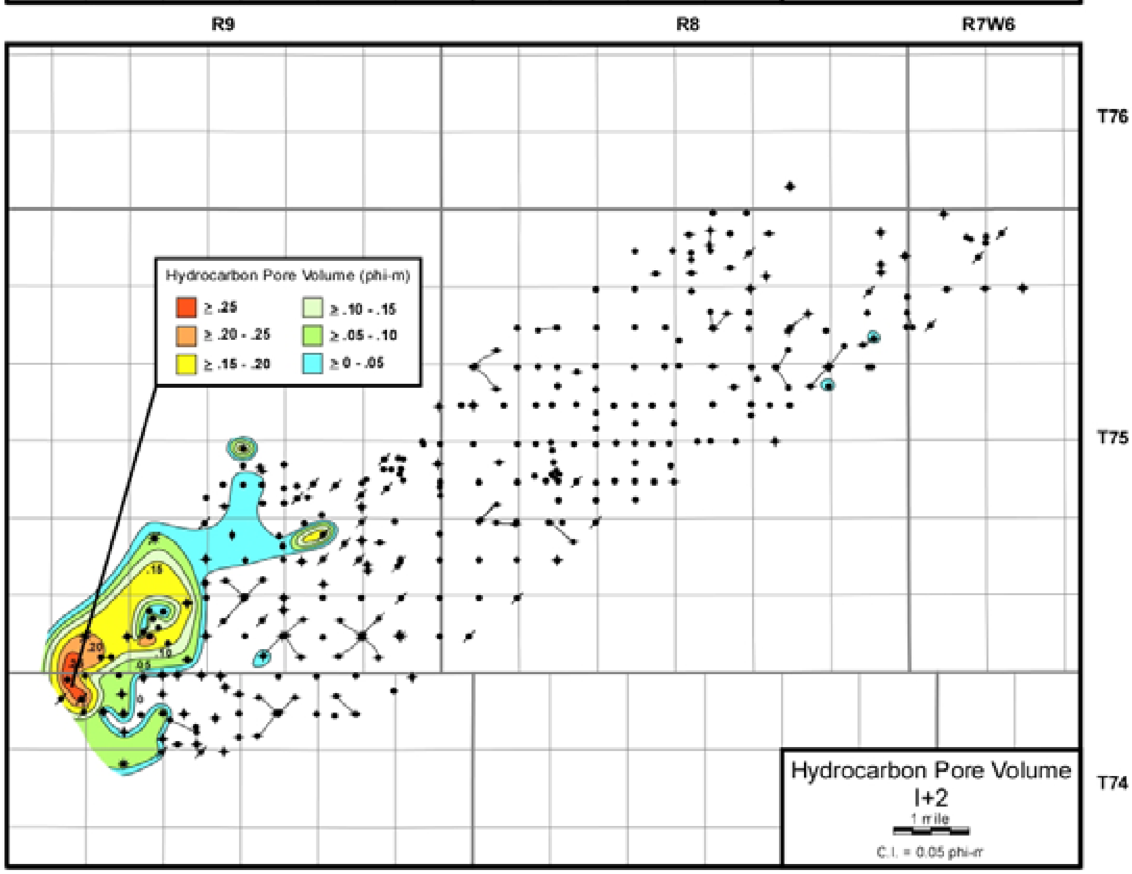


R9
R8
R7W6
T76
T75
T74
Hydrocarbon Pore Volume (phi-m)
≥ .30
≥ .25 - .30
≥ .20 - .25
≥ .15 - .20
≥ .10 - .15
≥ .05 - .10
≥ 0 - .05
Hydrocarbon Pore Volume
I-1
1 mile
C.I. = 0.05 phi-m



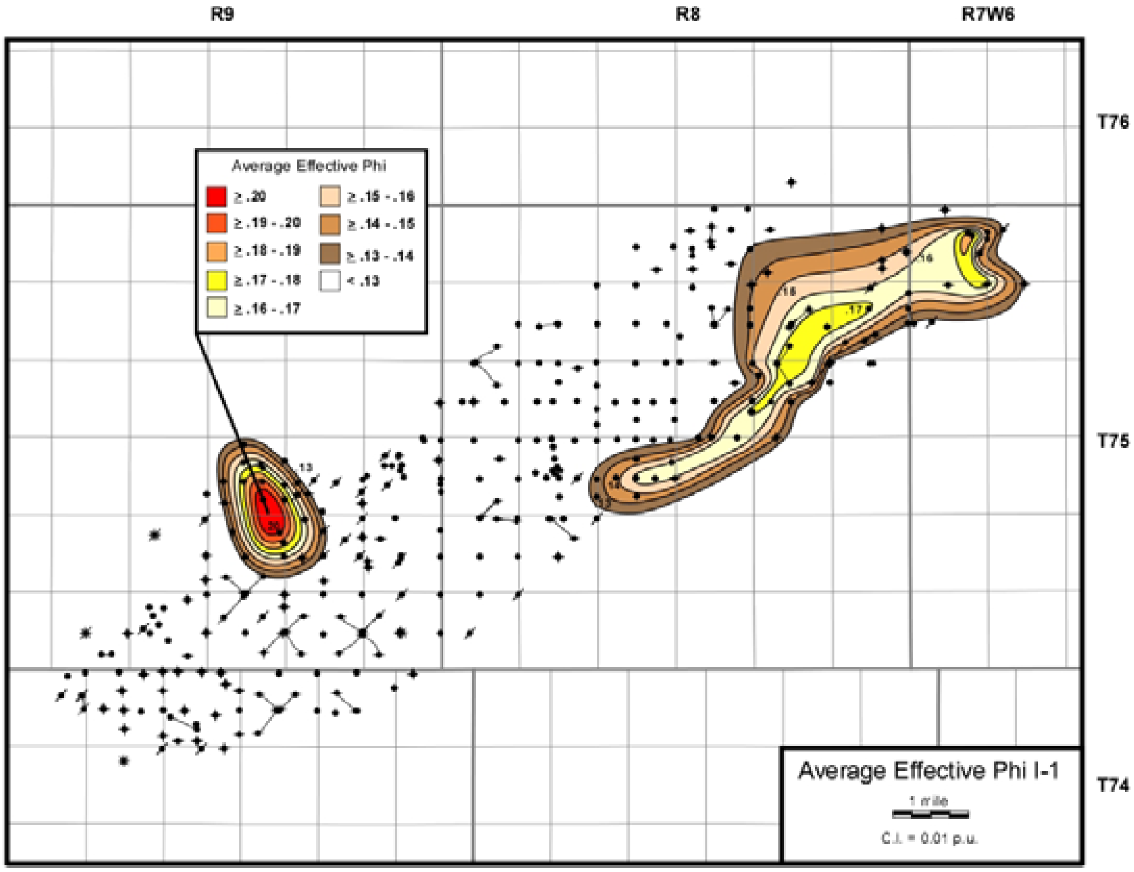
R9
R8
R7W6
T76
T75
T74
Hydrocarbon Pore Volume (phi-m)
≥ 1.25
≥ 1.0 - 1.25
≥ .75 - 1.0
≥ .50 - .75
≥ .25 - .50
≥ 0 - .25
Hydrocarbon Pore Volume
I-Sand
1 mile
C.I. = 0.25 phi-m

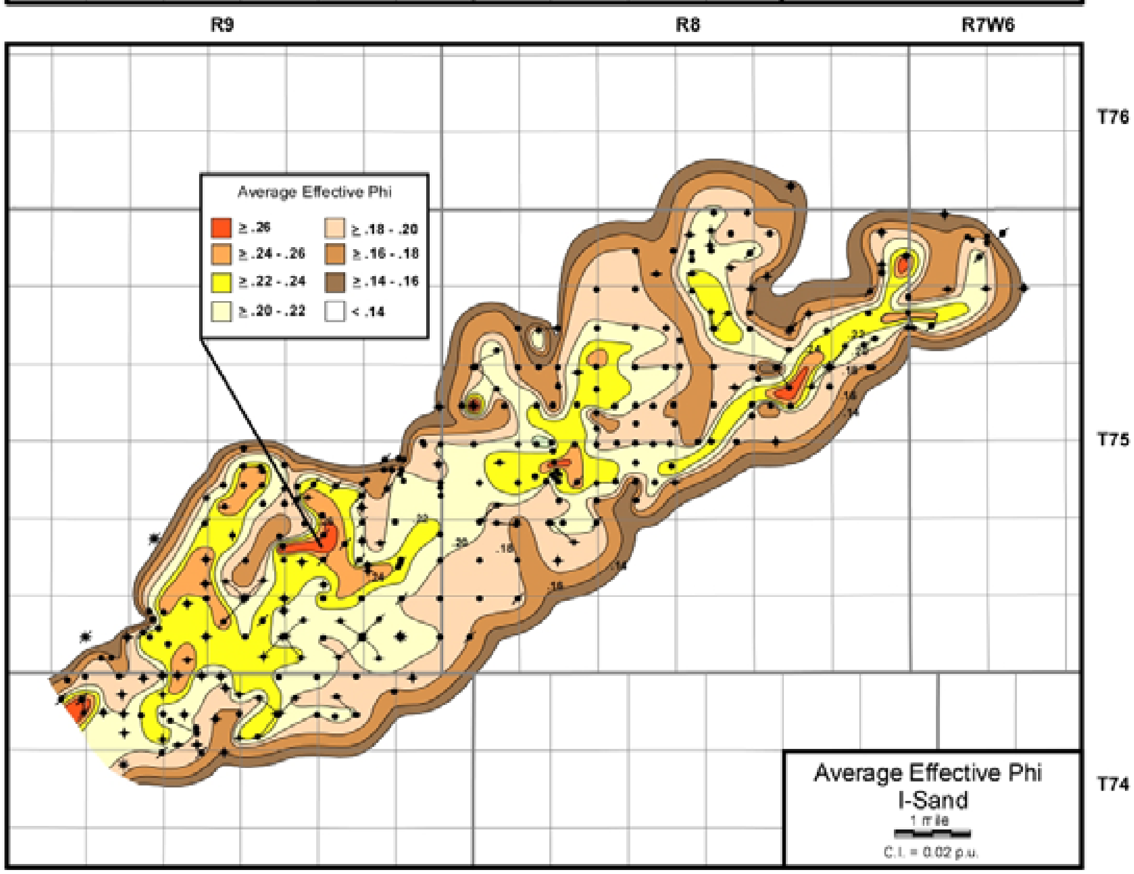

R9
R8
R7W6
T76
T75
T74
Hydrocarbon Pore Volume (phi-m)
≥ .30
≥ .25 - .30
≥ .20 - .25
≥ .15 - .20
≥ .10 - .15
≥ .05 - .10
≥ 0 - .05
Hydrocarbon Pore Volume
I+1
1 mile
C.I. = 0.05 phi-m

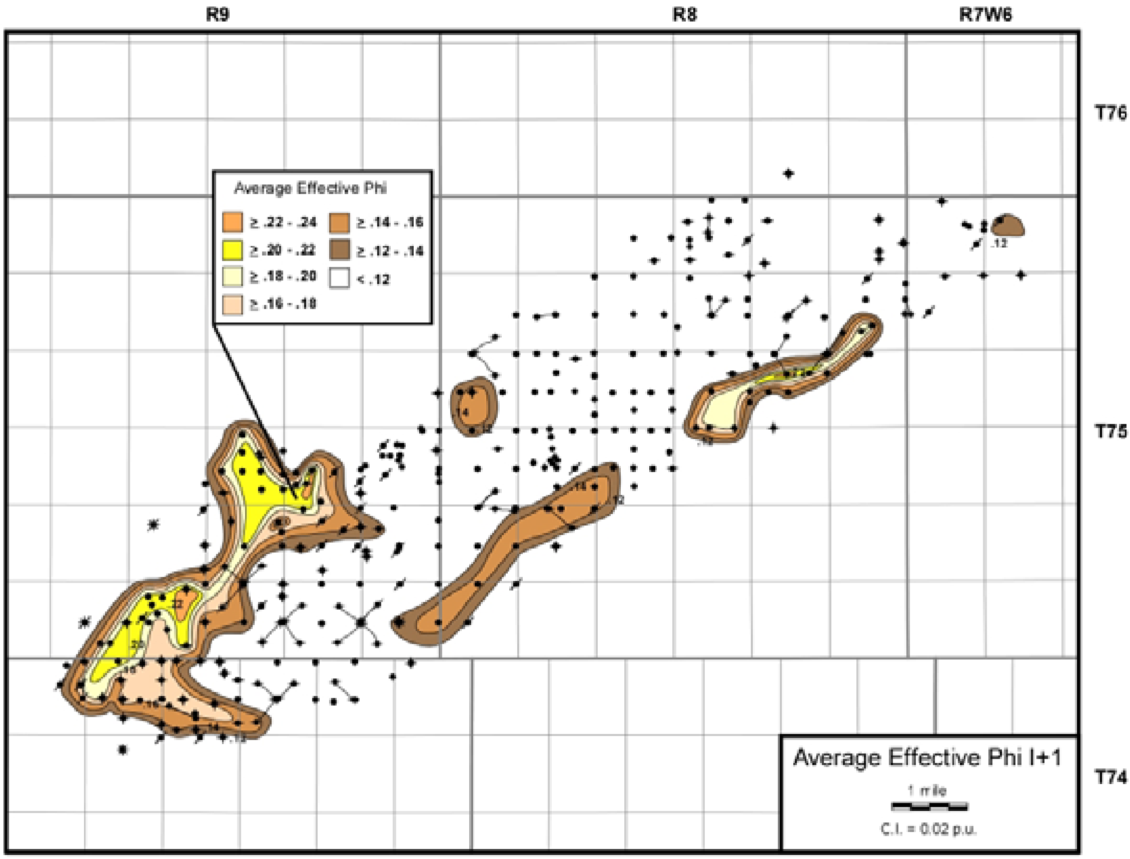

R9
R8
R7W6
T76
T75
T74
Hydrocarbon Pore Volume (phi-m)
≥ .25
≥ .20 - .25
≥ .15 - .20
≥ .10 - .15
≥ .05 - .10
≥ 0 - .05
Hydrocarbon Pore Volume
I+2
1 mile
C.I. = 0.05 phi-m

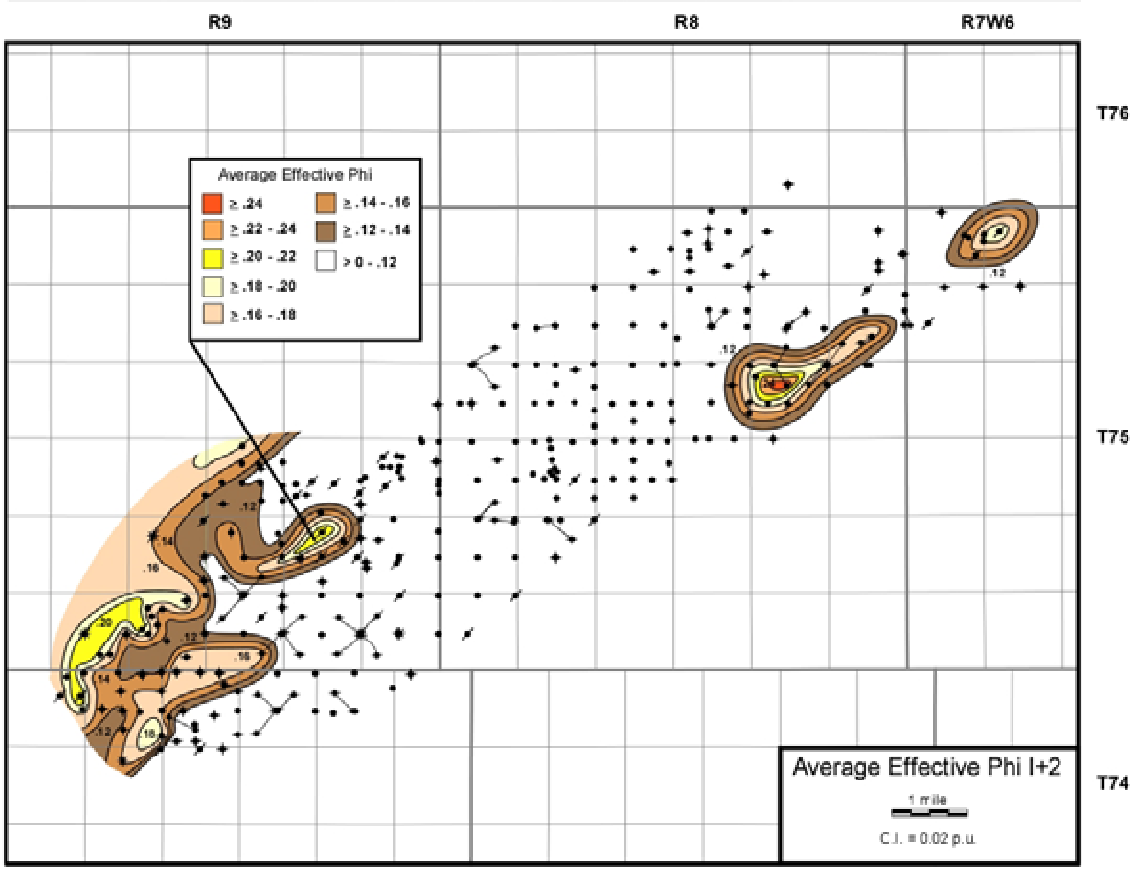
APPENDIX D

Average Effective Phi Maps


R9
R8
R7W6
T76
T75
T74
Average Effective Phi
≥ .20
≥ .19 - .20
≥ .18 - .19
≥ .17 - .18
≥ .16 - .17
≥ .15 - .16
≥ .14 - .15
≥ .13 - .14
< .13
Average Effective Phi I-1
1 mile
C.I. = 0.01 p.u.

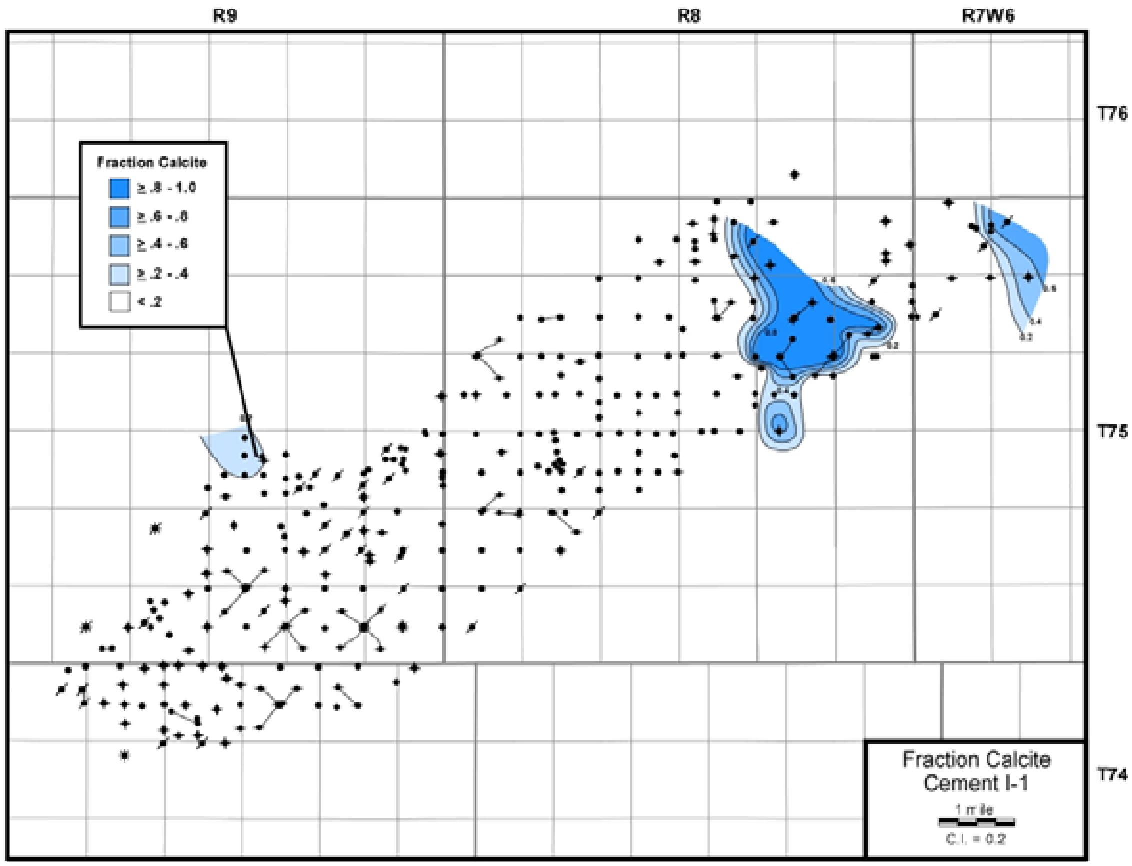

R9
R8
R7W6
T76
T75
T74
Average Effective Phi
≥ .26
≥ .24 - .26
≥ .22 - .24
≥ .20 - .22
≥ .18 - .20
≥ .16 - .18
≥ .14 - .16
< .14
Average Effective Phi
I-Sand
1 mile
C.I. = 0.02 p.u.

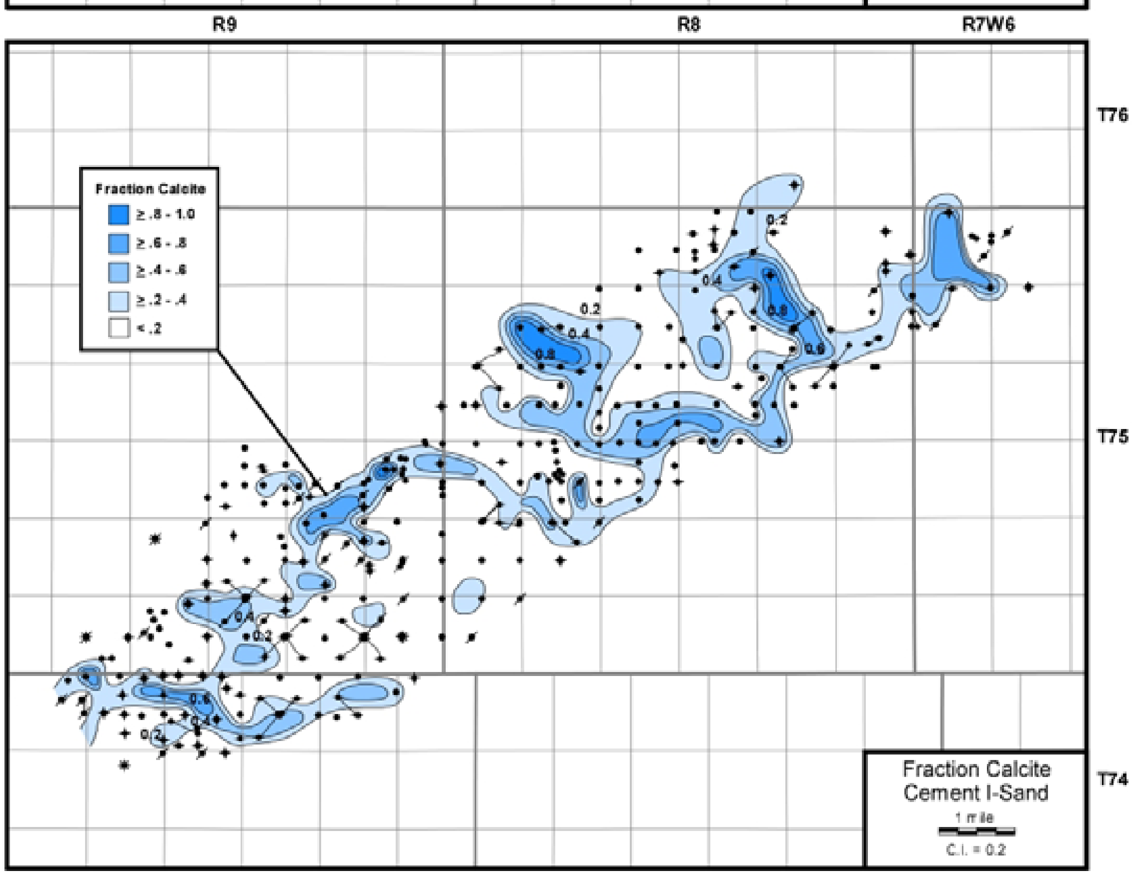

R9
R8
R7W6
T76
T75
T74
Average Effective Phi
≥ .22 - .24
≥ .20 - .22
≥ .18 - .20
≥ .16 - .18
≥ .14 - .16
≥ .12 - .14
< .12
Average Effective Phi I+1
1 mile
C.I. = 0.02 p.u.

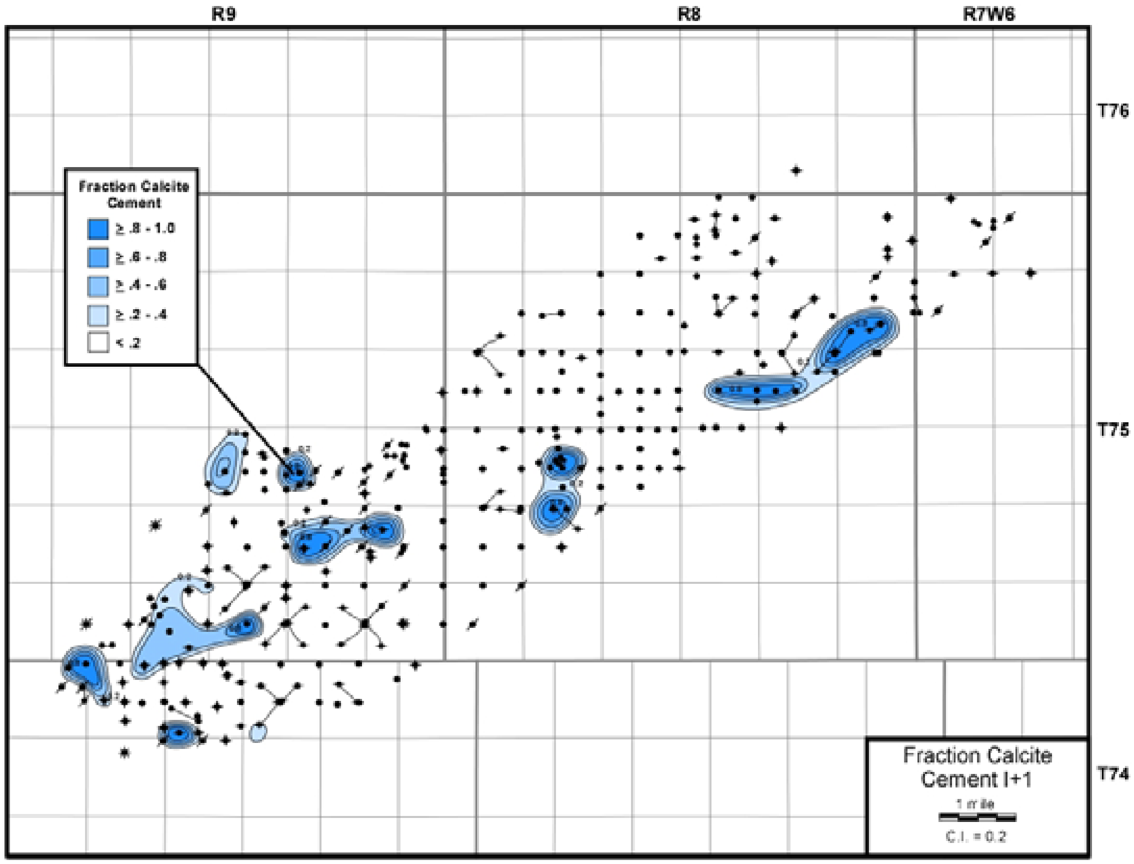

R9
R8
R7W6
T76
T75
T74
Average Effective Phi
≥ .24
≥ .22 - .24
≥ .20 - .22
≥ .18 - .20
≥ .16 - .18
≥ .14 - .16
≥ .12 - .14
> 0 - .12
Average Effective Phi I+2
1 mile
C.I. = 0.02 p.u.

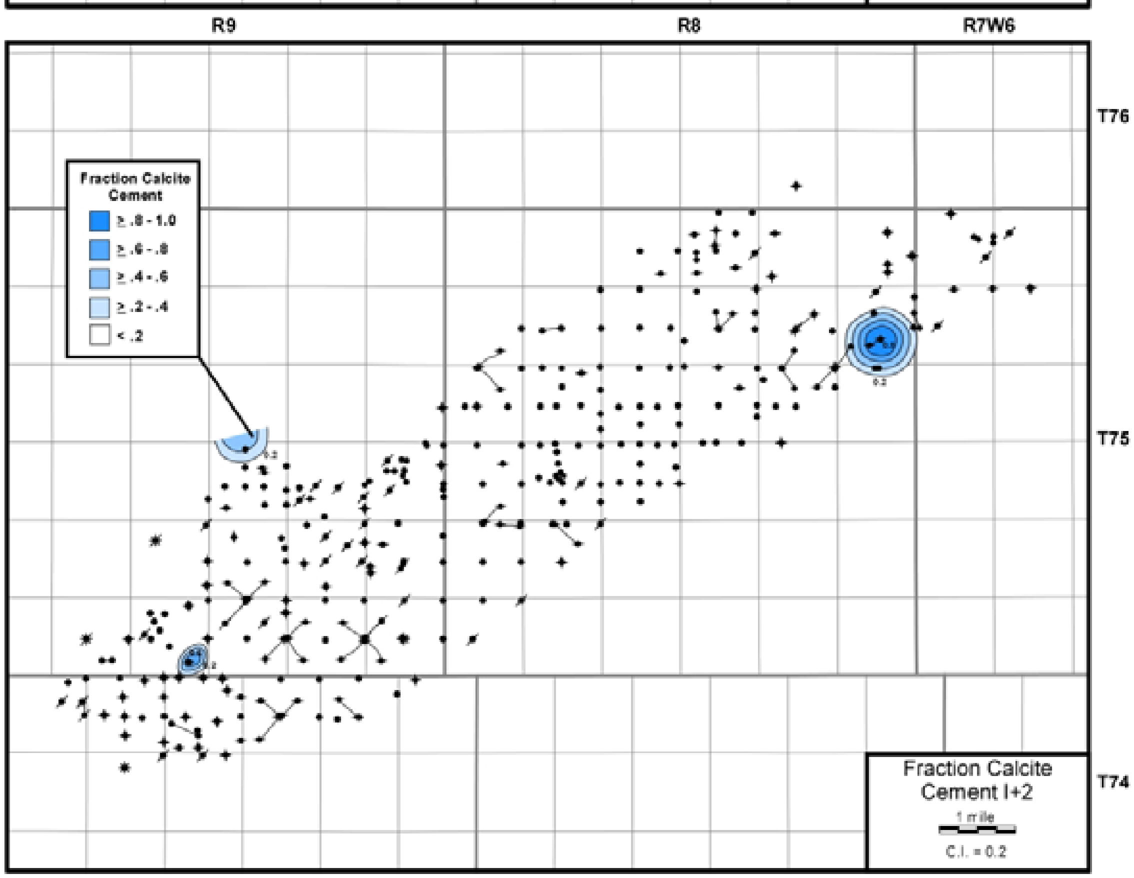
APPENDIX E

Calcite Cement Maps


R9
R8
R7W6
T76
T75
T74
Fraction Calcite
≥ .8 - 1.0
≥ .6 - .8
≥ .4 - .6
≥ .2 - .4
< .2
Fraction Calcite
Cement I-1
1 mile
C.I. = 0.2


R9
R8
R7W6
T76
T75
T74
Fraction Calcite
≥ .8 - 1.0
≥ .6 - .8
≥ .4 - .6
≥ .2 - .4
< .2
0.2
0.4
0.8
0.6
Fraction Calcite
Cement I-Sand
1 mile
C.I. = 0.2


R9
R8
R7W6
T76
T75
T74
Fraction Calcite Cement
≥ .8 - 1.0
≥ .6 - .8
≥ .4 - .6
≥ .2 - .4
< .2
Fraction Calcite Cement I+1
1 mile
C.I. = 0.2


R9
R8
R7W6
T76
T75
T74
Fraction Calcite Cement
≥ .8 - 1.0
≥ .6 - .8
≥ .4 - .6
≥ .2 - .4
< .2
Fraction Calcite Cement I+2
1 mile
C.I. = 0.2

APPENDIX F

Core Description Forms

T74R9

Core Description Legend

Grain Size

0 - Silt/Clay
1 - Lower Very Fine
2 - Upper Very Fine
3 - Lower Fine
4 - Upper Fine
5 - Lower Medium
6 - Upper Medium
7 - Lower Coarse
8 - Upper Coarse
9 - Lower Very Coarse
10 - Upper Very Coarse

Photos

6-16-08-nnn(initials of author)

Sedimentary Structures

- Planar Horizontal
- Planar Laminations
- Trough Cross Bedding
- Soft Sediment Deformation
- Planar Tabular
- mm Laminations
- Climbing Ripple
- Firmground
- Hummocks
- Current Ripple
- Wave Ripple
- Flaser Bedding
- Lithoclast
- Intraclast
- Bivalve undiff.

Ichnofabric Index

1 - No bioturbation recorded; all original sedimentary structures preserved
2 - Discrete, isolated trace fossils; up to 10 percent of original bedding disturbed
3 - Approximately 10 to 40 percent of original bedding disturbed
4 - Last vestiges of bedding discernable; approximately 40-60 percent disturbed. Burrows overlap and are not always well defined.
5 - Bedding is completely disturbed, but burrows are still discrete in places and the fabric is not mixed. May also represent totally homogenized sediment in the absence of trace fossils.

Ichnofauna

Pl - *Planolites*
Th - *Thalassinoides*
Teich - *Teichichnus*
Pal - *Palaeophycus*
Zoo - *Zoophycos*
Cyl - *Cylindrichnus*
Sub - *Subphyllocorda*
O - *Ophiomorpha*
Ber - *Bergaueria*
Rh - *Rhizocorallium*
Sk - *Skolithos*
Ast - *Asterosoma*
Aren - *Arenicolites*
Ros - *Rosselia*
Diplo - *Diplocraterion*
Con - *Conichnus*
Chon - *Chondrites*
Phy - *Phycosiphon*
Ter - *Terebellina*

Ichnodiversity

n - number of taxa observed

Ichnofacies

1 - *Nereites*
2 - *Zoophycos*
3 - *Cruziana* (Restricted)
4 - *Cruziana* (Open)
5 - *Skolithos*

Depositional Environment

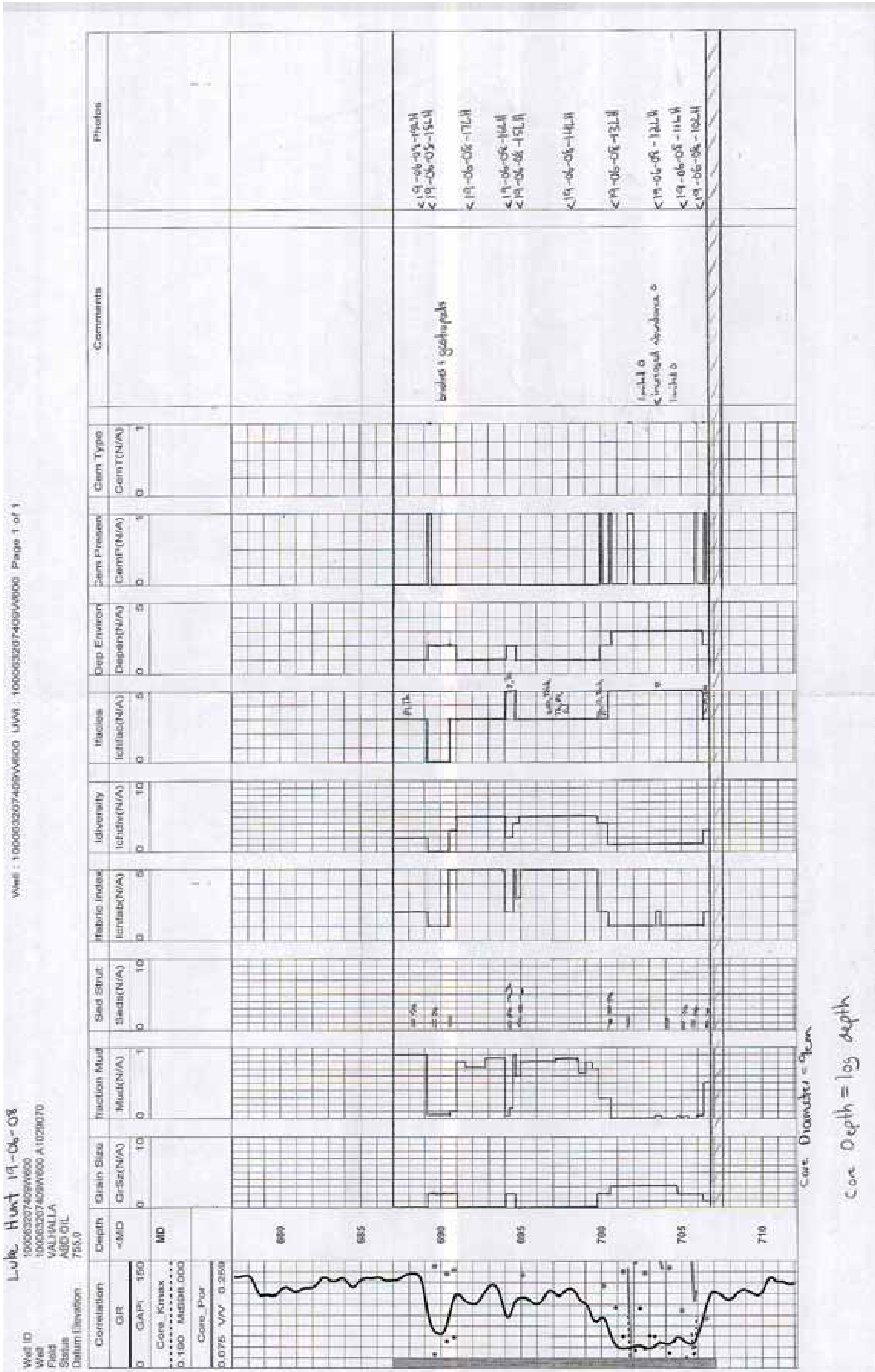
1 - Offshore
2 - Distal Lower Shoreface
3 - Proximal Lower Shoreface
4 - Upper Shoreface
5 - Foreshore

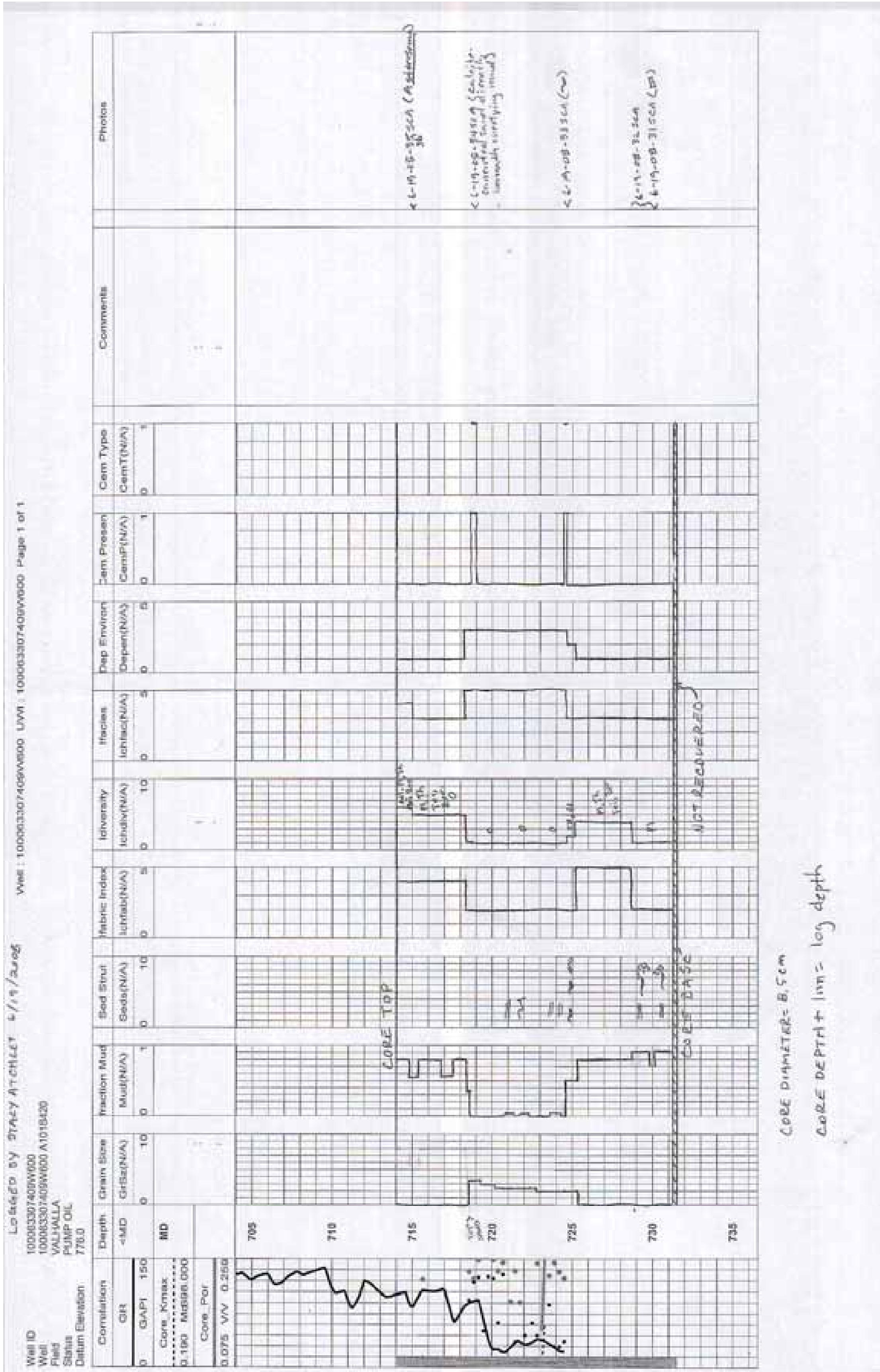
Cement

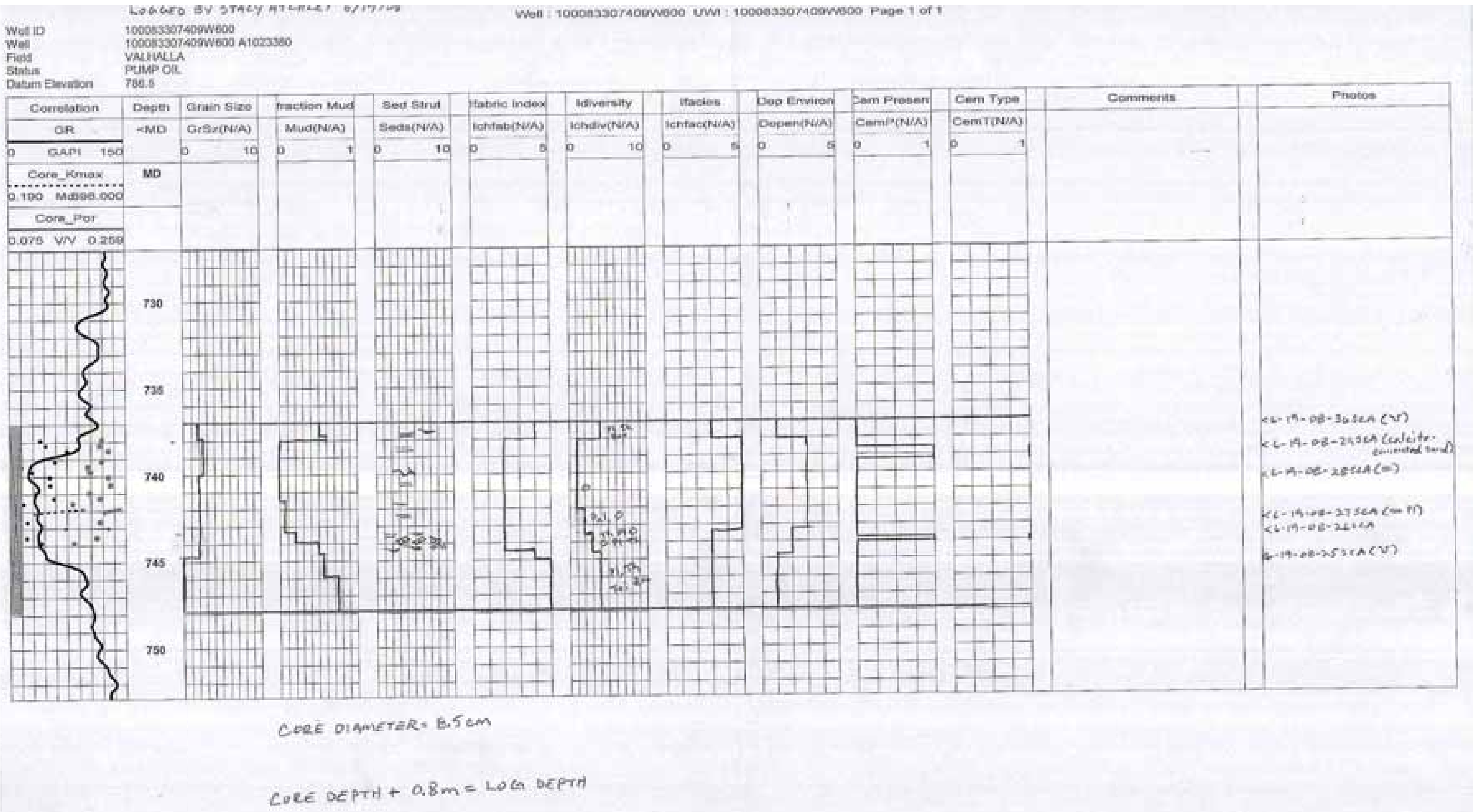
0 - No Cement Present
1 - Cement Present

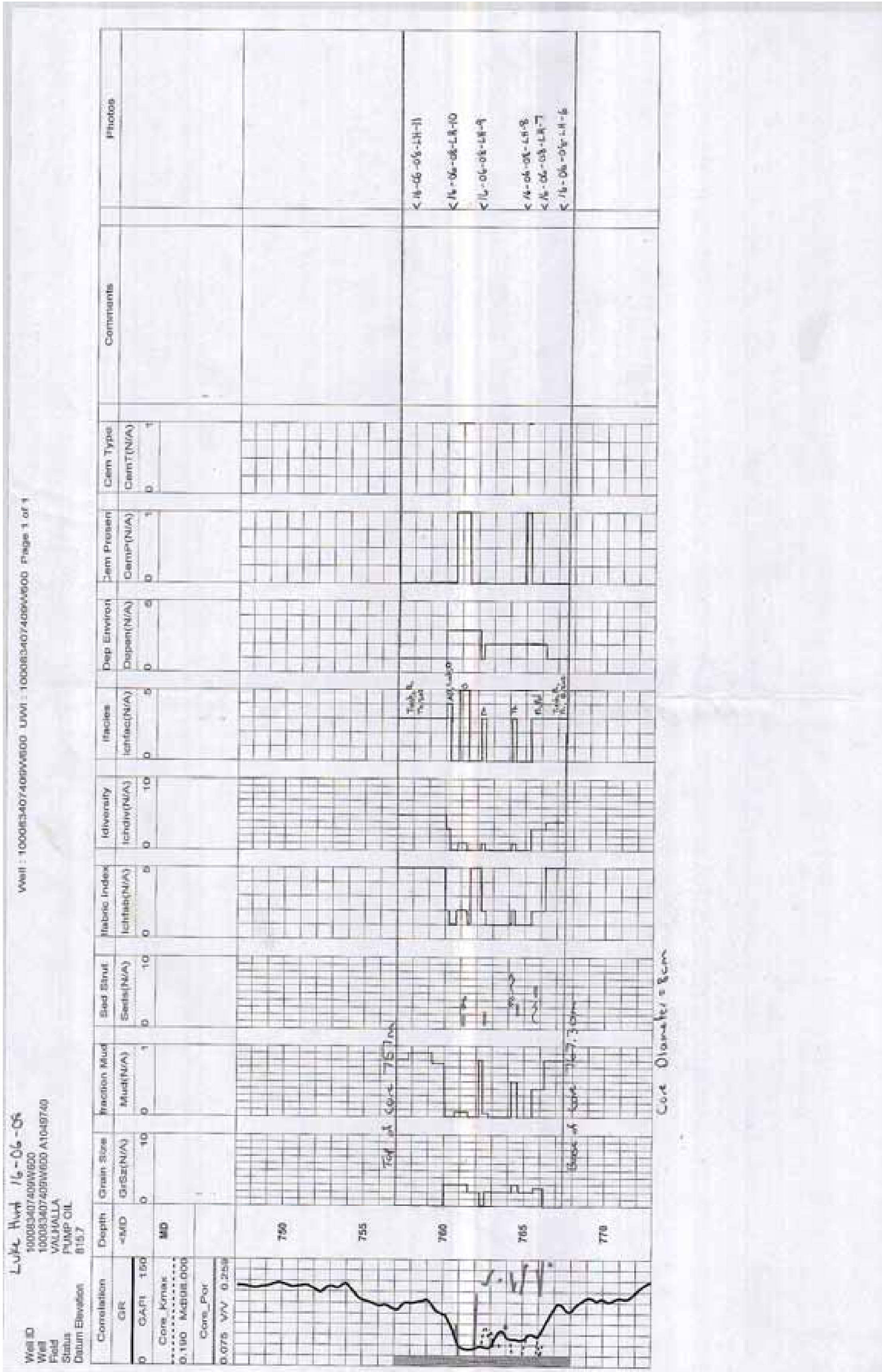
Cement Type

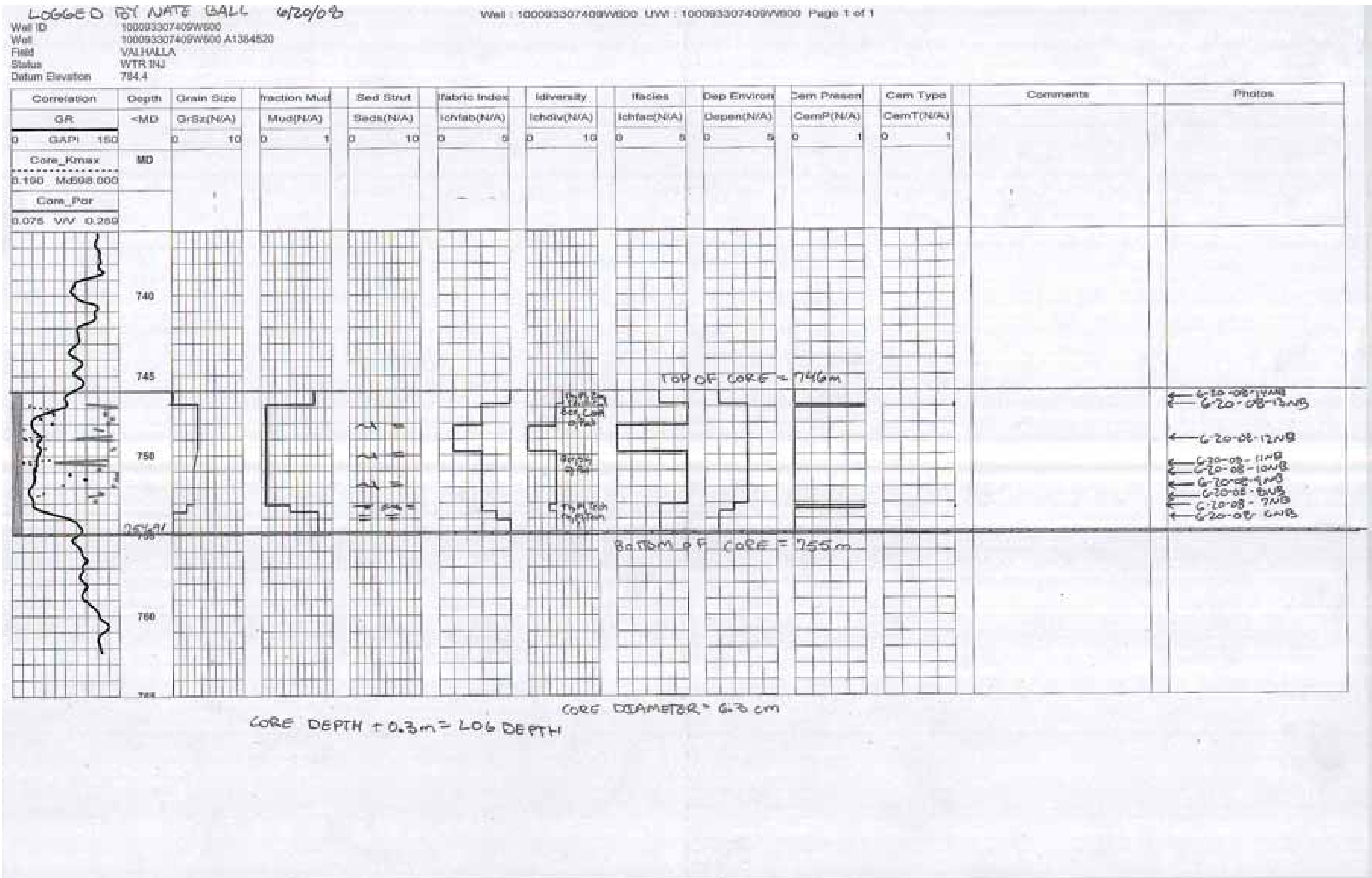
0 - Quartz
1 - Calcite

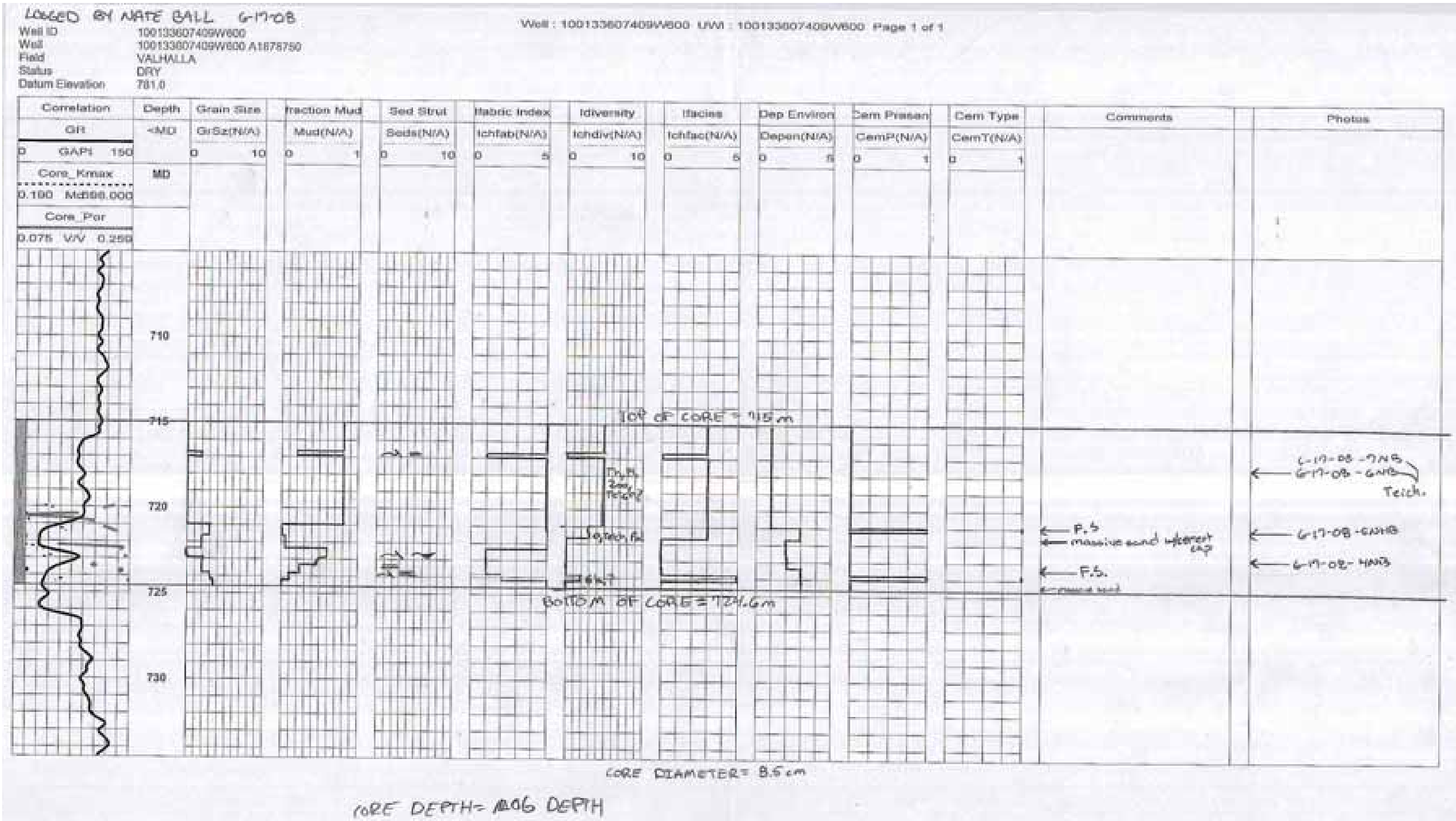

Luke Hunt 19-06-08
Correlation
Depth
Grain Size
Traction Mud
Sed Strut
Ifabric Index
Idiversity
Ifacies
Dep Environ
Cem Presen
Cem Type
Comments
Photos
Core Diameter = 9cm
Core Depth = log depth


LOGGED BY STACY ATCHLEY 6/19/2008
Well : 100063307409W600 UWI : 100063307409W600 Page 1 of 1
Well ID
Well
Field
Status
Datum Elevation
VALHALLA
PUMP OIL
778.0
Correlation
Depth
Grain Size
fraction Mud
Sed Strut
fabric Index
Idiversity
Ifacies
Dep Environ
Cem Presen
Cem Type
Comments
Photos
GR
GAPI
Core_Kmax
Core_Por
MD
705
710
715
720
725
730
735
CORE TOP
CORE BASE
NOT RECOVERED
CORE DIAMETER= 8.5cm
CORE DEPTH + 1m = log depth

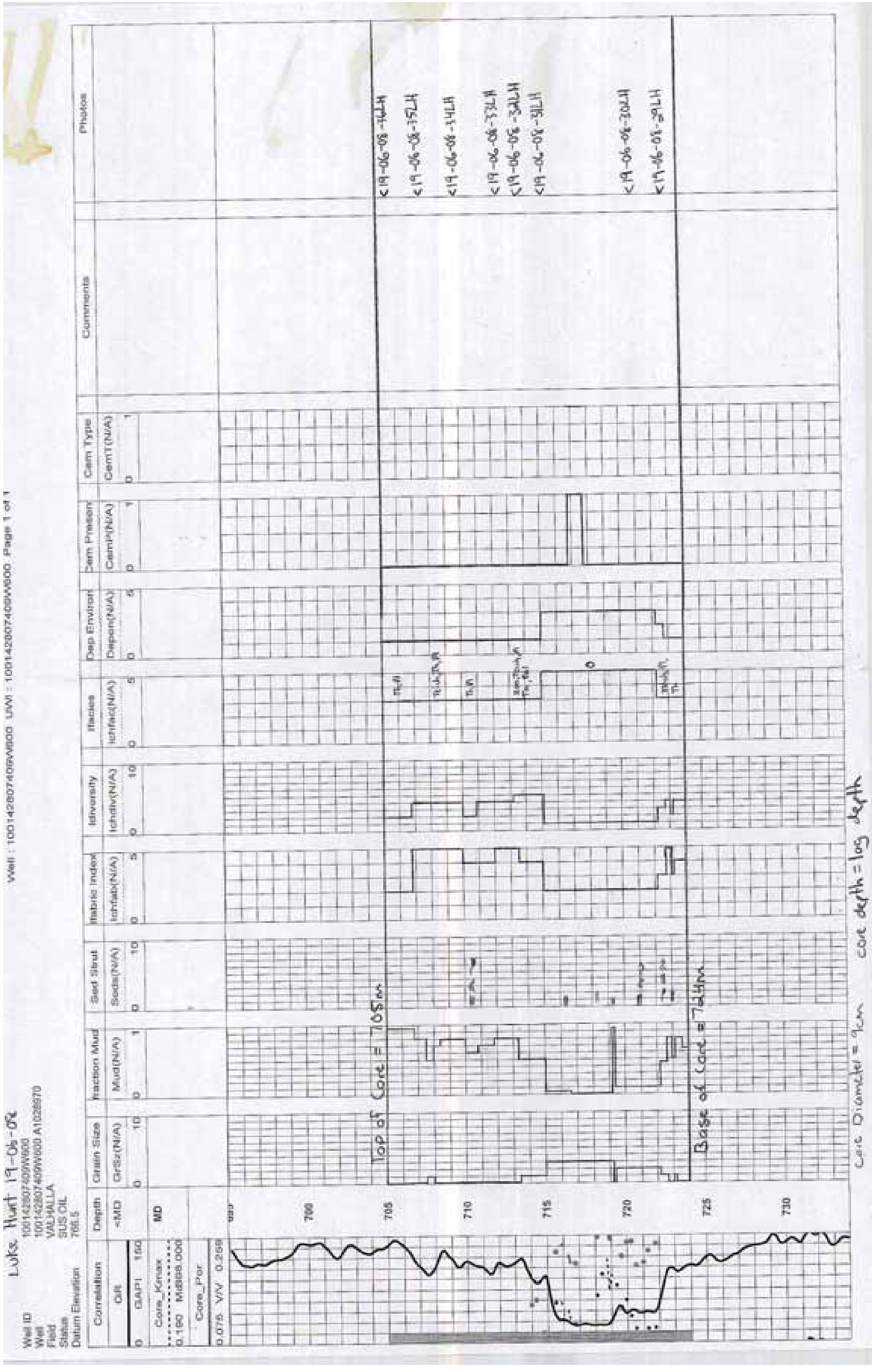

LOGGED BY STACY ATCHLEY
Well : 100083307409W600 UWI : 100083307409W600 Page 1 of 1
Well ID 100083307409W600
Well 100083307409W600 A1023380
Field VALHALLA
Status PUMP OIL
Datum Elevation 786.5
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 Md998.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
730
735
740
745
750
Grain Size
GrSz(N/A)
fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
CORE DIAMETER= 8.5cm
CORE DEPTH + 0.8m = LOG DEPTH


Well : 100063407409W600 UWI : 100063407409W600 Page 1 of 1
Well ID
Well
Field
Status
Datum Elevation
VALHALLA
PUMP OIL
815.7
Correlation
GR
Depth
Grain Size
Fraction Mud
Sed Strut
Fabric Index
Idiversity
Ifacies
Dep Environ
Cem Presen
Cem Type
Comments
Photos
Core_Kmax
Core_Por
MD
750
755
760
765
770

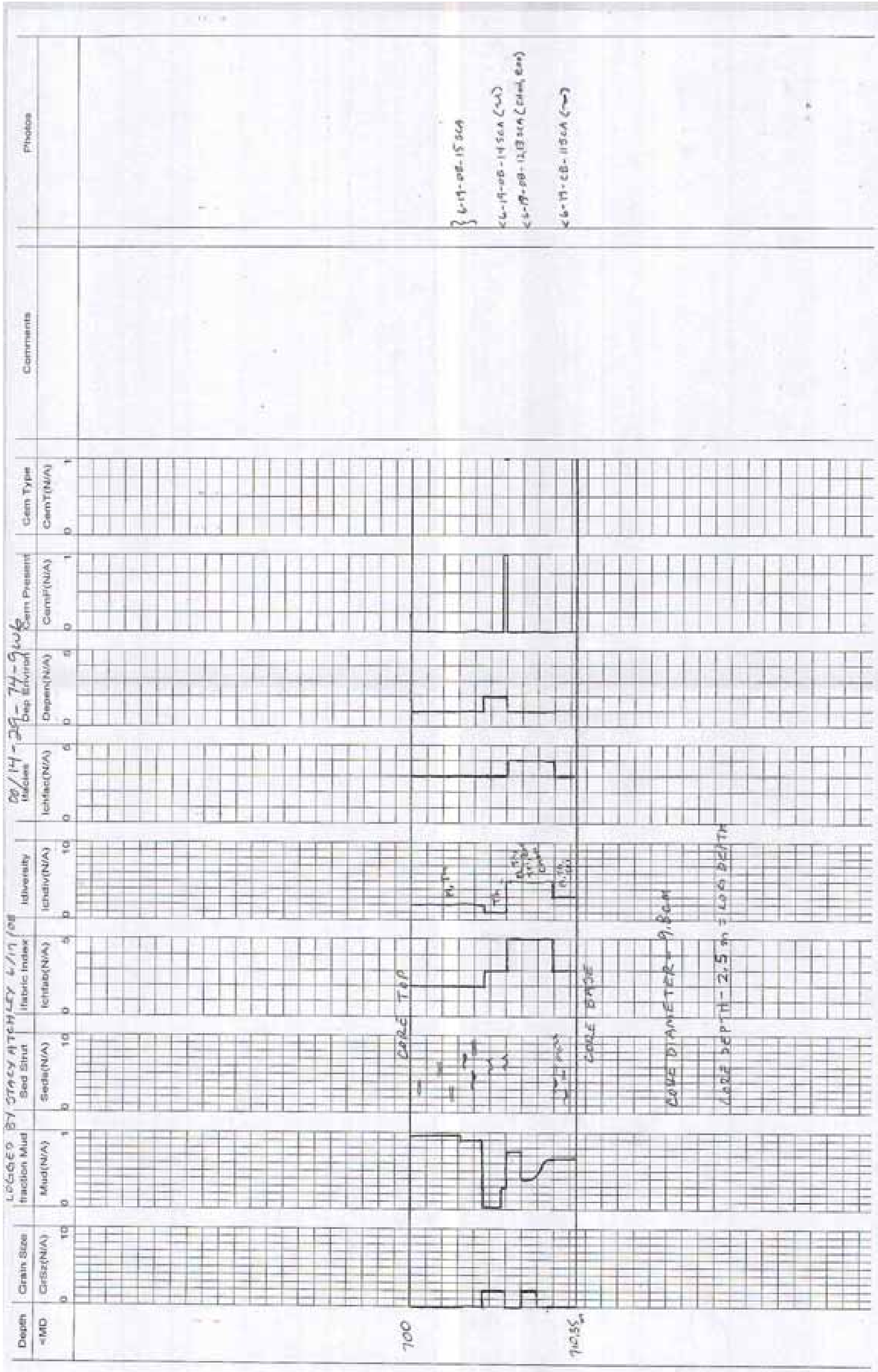

LOGGED BY NATE BALL 6/20/08
Well : 100093307409W600 UWI : 100093307409W600 Page 1 of 1
Well ID 100093307409W600
Well 100093307409W600 A1384520
Field VALHALLA
Status WTR INJ
Datum Elevation 784.4
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 Md698.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
740
745
750
760
Grain Size
GrSz(N/A)
0 10
fraction Mud
Mud(N/A)
0 1
Sed Strut
Seds(N/A)
0 10
Ifabric Index
Ichfab(N/A)
0 5
Idiversity
Ichdiv(N/A)
0 10
Ifacies
Ichfac(N/A)
0 5
Dep Environ
Depen(N/A)
0 5
Cem Presen
CemP(N/A)
0 1
Cem Type
CemT(N/A)
0 1
Comments
Photos
TOP OF CORE = 746m
BOTTOM OF CORE = 755m
6-20-08-14NB
6-20-08-13NB
6-20-08-12NB
6-20-08-11NB
6-20-08-10NB
6-20-08-9NB
6-20-08-8NB
6-20-08-7NB
6-20-08-6NB
CORE DIAMETER = 6.3 cm
CORE DEPTH + 0.3m = LOG DEPTH

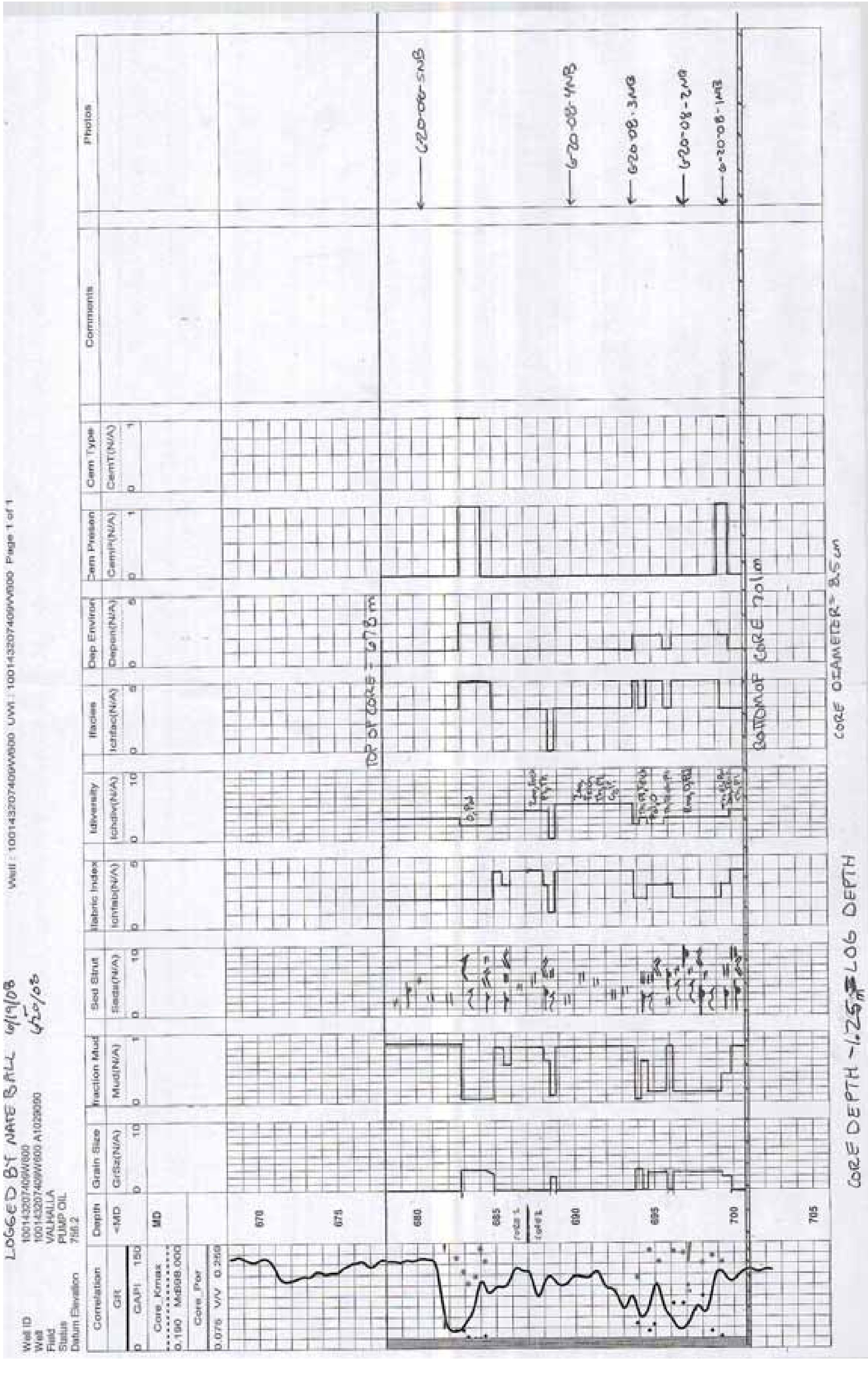


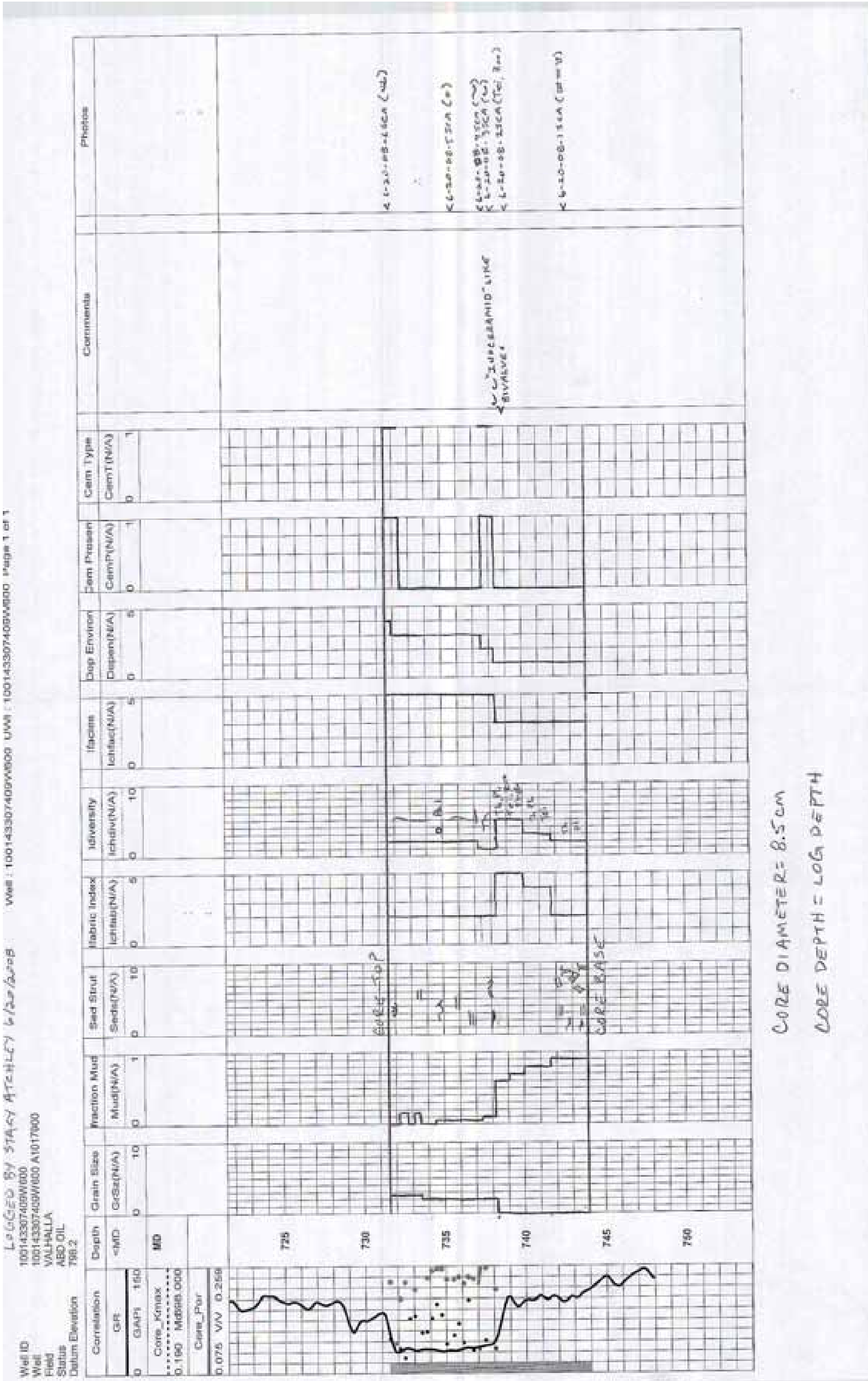
LOGGED BY NATE BALL 6-17-08
Well ID 100133607409W600
Well 100133607409W600 A1678750
Field VALHALLA
Status DRY
Datum Elevation 781.0
Well : 100133607409W600 UWI : 100133607409W600 Page 1 of 1
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 MD 86.000
Core_Por
0.075 V/V 0.250
Depth
<MD
MD
Grain Size
GrSz(N/A)
Fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
710
715
720
725
730
TOP OF CORE = 715 m
BOTTOM OF CORE = 724.6m
P.S
massive sand coherent cap
F.S.
6-17-08 - 7NB
6-17-08 - 6NB
Teich.
6-17-08 - 5NHB
6-17-08 - 4NB
CORE DIAMETER = 8.5 cm
CORE DEPTH = LOG DEPTH

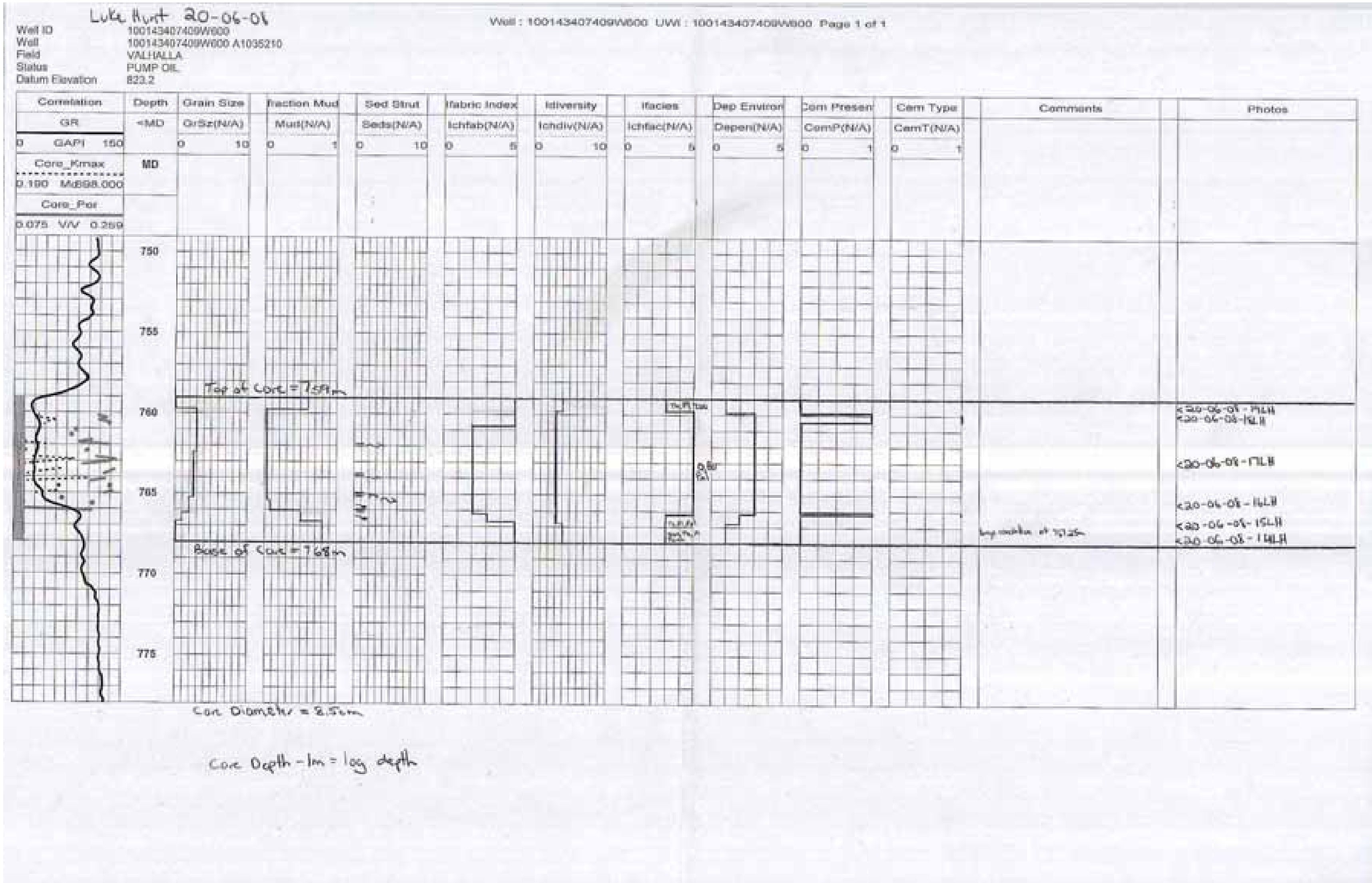


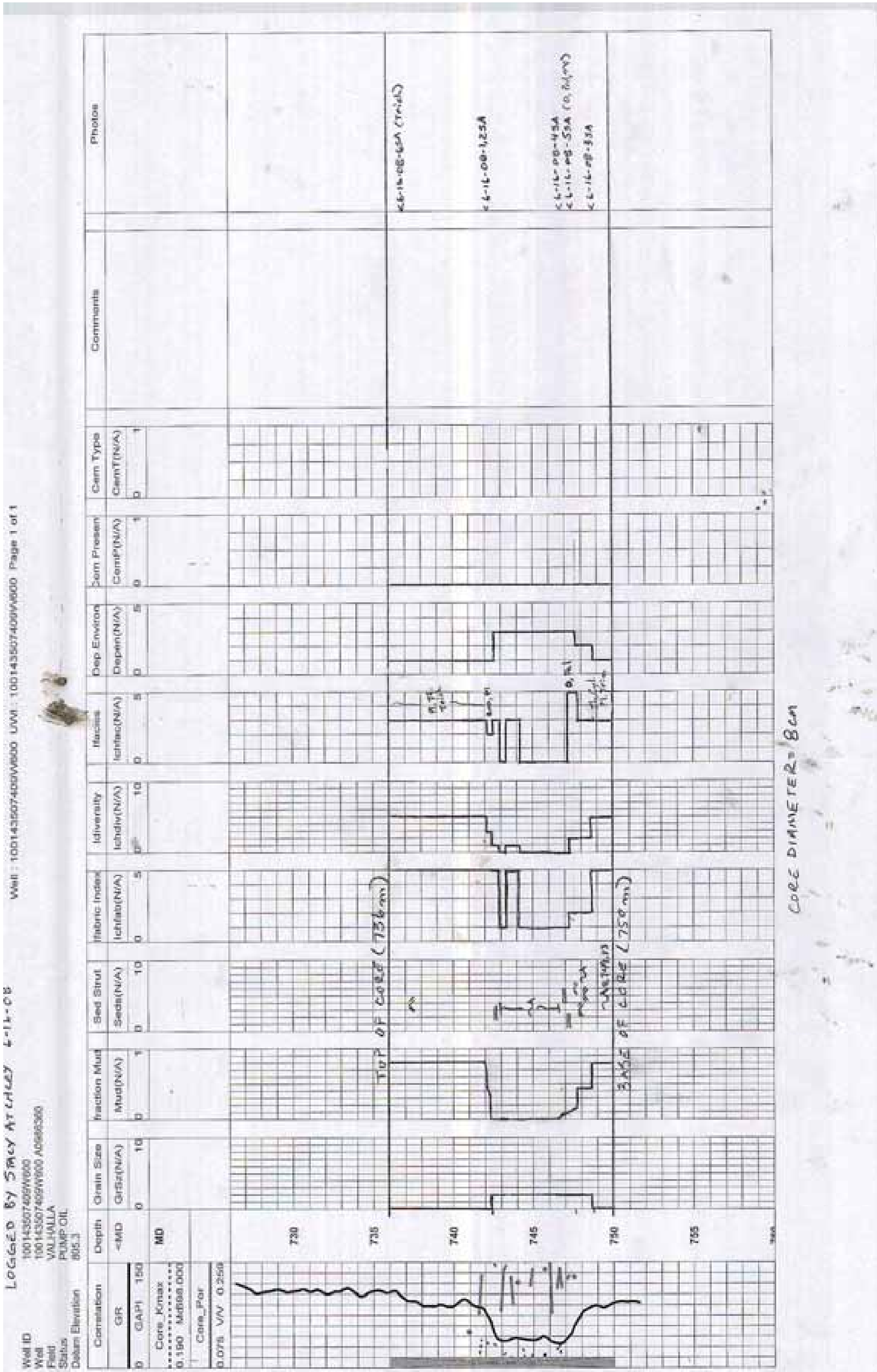
Luke Hunt 19-06-08
Well : 100142807409W600 UWI : 100142807409W600 Page 1 of 1
Well ID
Well
Field
Status
Datum Elevation
VALHALLA
SUS OIL
Correlation
Depth
Grain Size
fraction Mud
Sed Strut
fabric index
Idiversity
Ifacies
Dep Environ
Cem Preson
Cem Type
Comments
Photos
GR
Core_Kmax
Core_Por
700
705
710
715
720
725
730
Top of Core = 705m
Base of Core = 724m
Core Diameter = 9cm
core depth = log depth

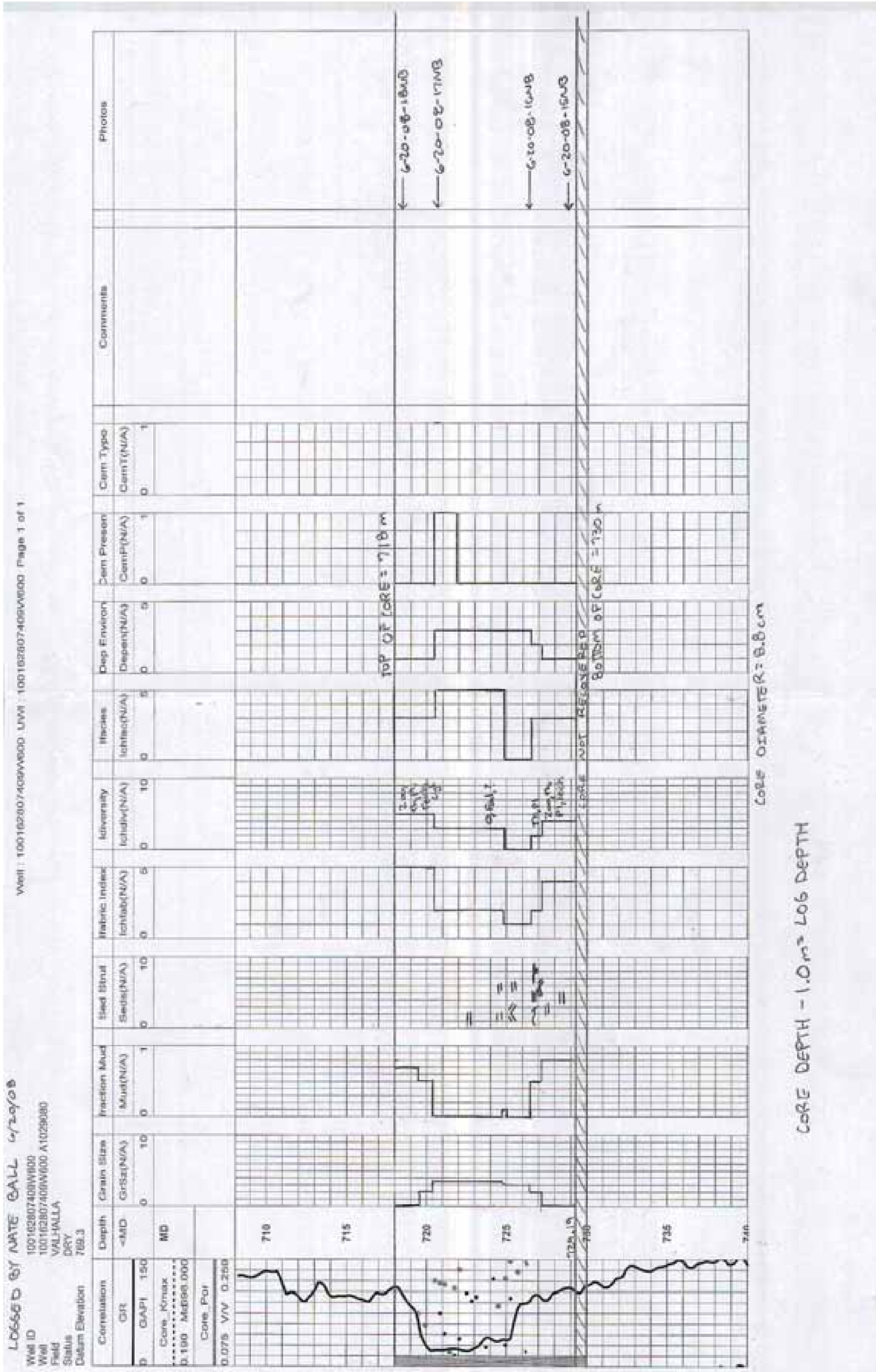

Depth
Grain Size
GrSz(N/A)
fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Present
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
LOGGED BY STACY ATCHLEY 6/17/08
08/14-29-74-9W6
CORE TOP
CORE BASE
CORE DIAMETER - 9.8CM
CORE DEPTH - 2.5m = LOG DEPTH
700

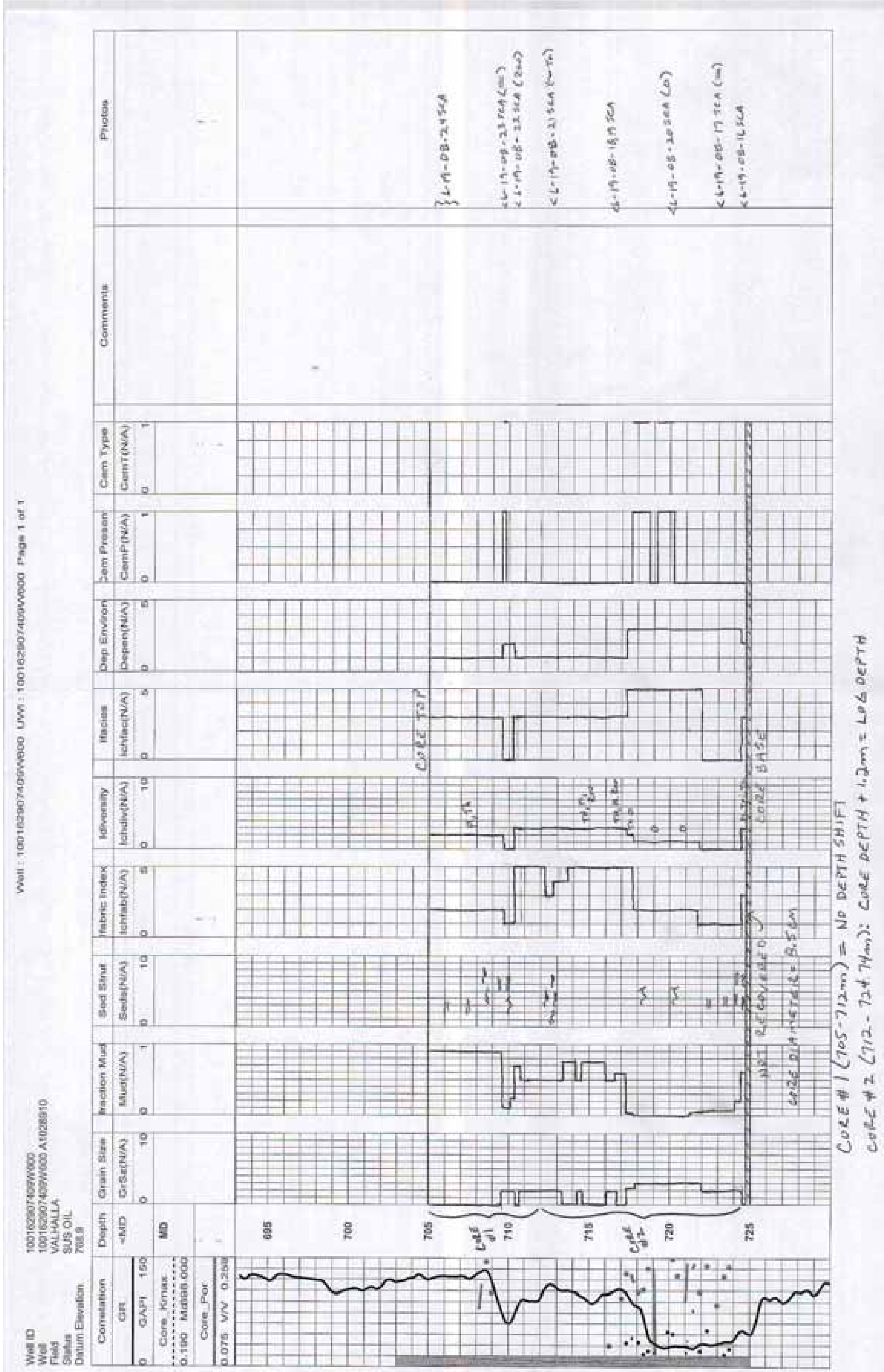

LOGGED BY NATE BALL 6/19/08 6/20/08
Well ID
Well
Field
Status
Datum Elevation
VALHALLA
PUMP OIL
756.2
Correlation
Depth
Grain Size
Fraction Mud
Sed Strut
Fabric Index
Idiversity
Ifacies
Dep Environ
Cem Type
Comments
Photos
670
675
680
685
690
695
700
705
TOP OF CORE = 678 m
BOTTOM OF CORE 701 m
CORE DIAMETER = 8.5 cm
CORE DEPTH ~1.25 m = LOG DEPTH

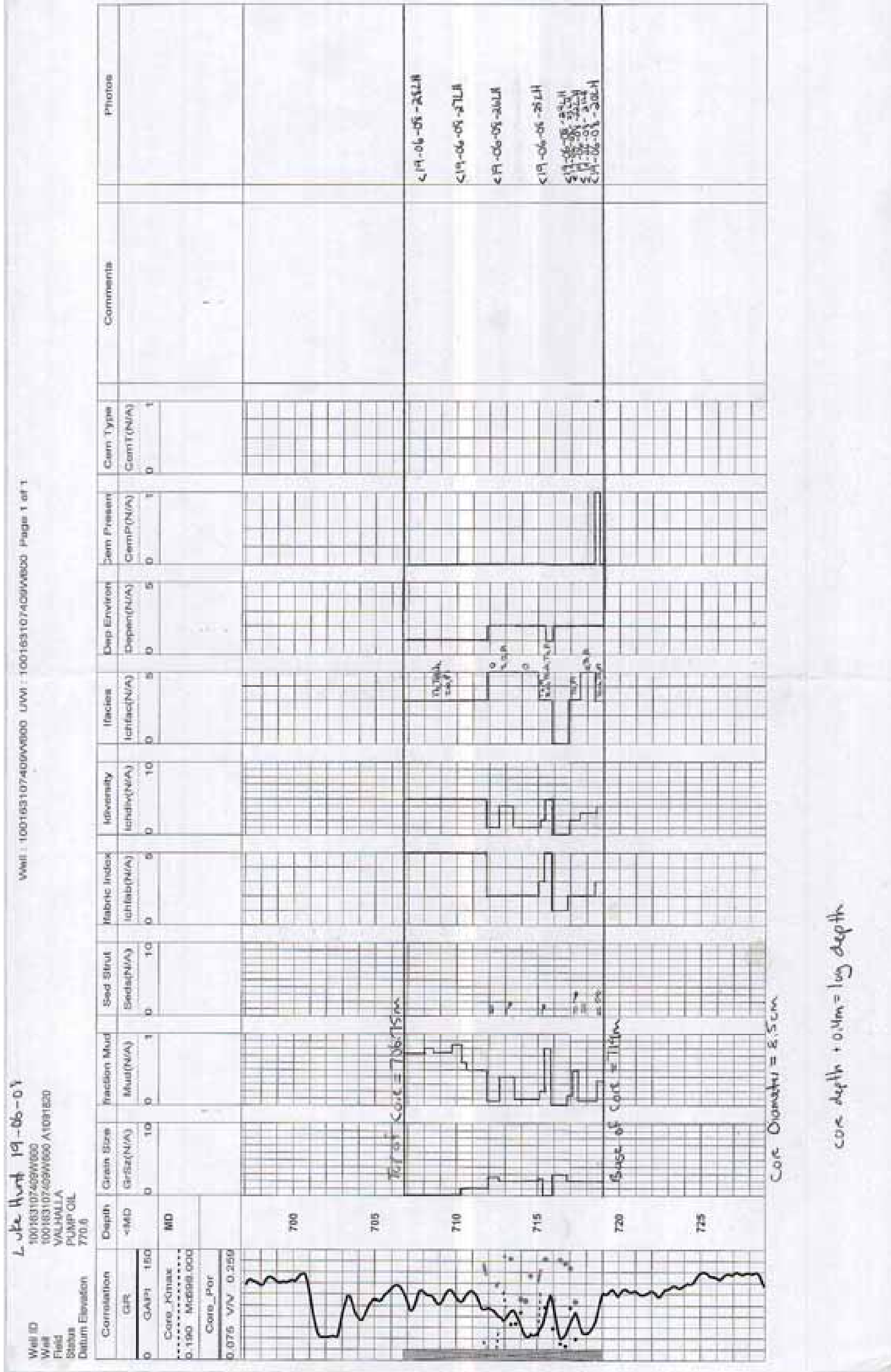

LOGGED BY STACY ATCHLEY 6/20/2008
Well ID
Well
Field
Status
Datum Elevation
100143307409W600
VALHALLA
Well : 100143307409W600 UWI : 100143307409W600 Page 1 of 1
Correlation
Depth
Grain Size
Fraction Mud
Sed Strut
Fabric Index
Idiversity
Ifacies
Dep Envion
Cem Presen
Cem Type
Comments
Photos
GR
GAPI
Core_Kmax
Core_Por
MD
725
730
735
740
745
750
CORE TOP
CORE BASE
CORE DIAMETER= 8.5cm
CORE DEPTH = LOG DEPTH

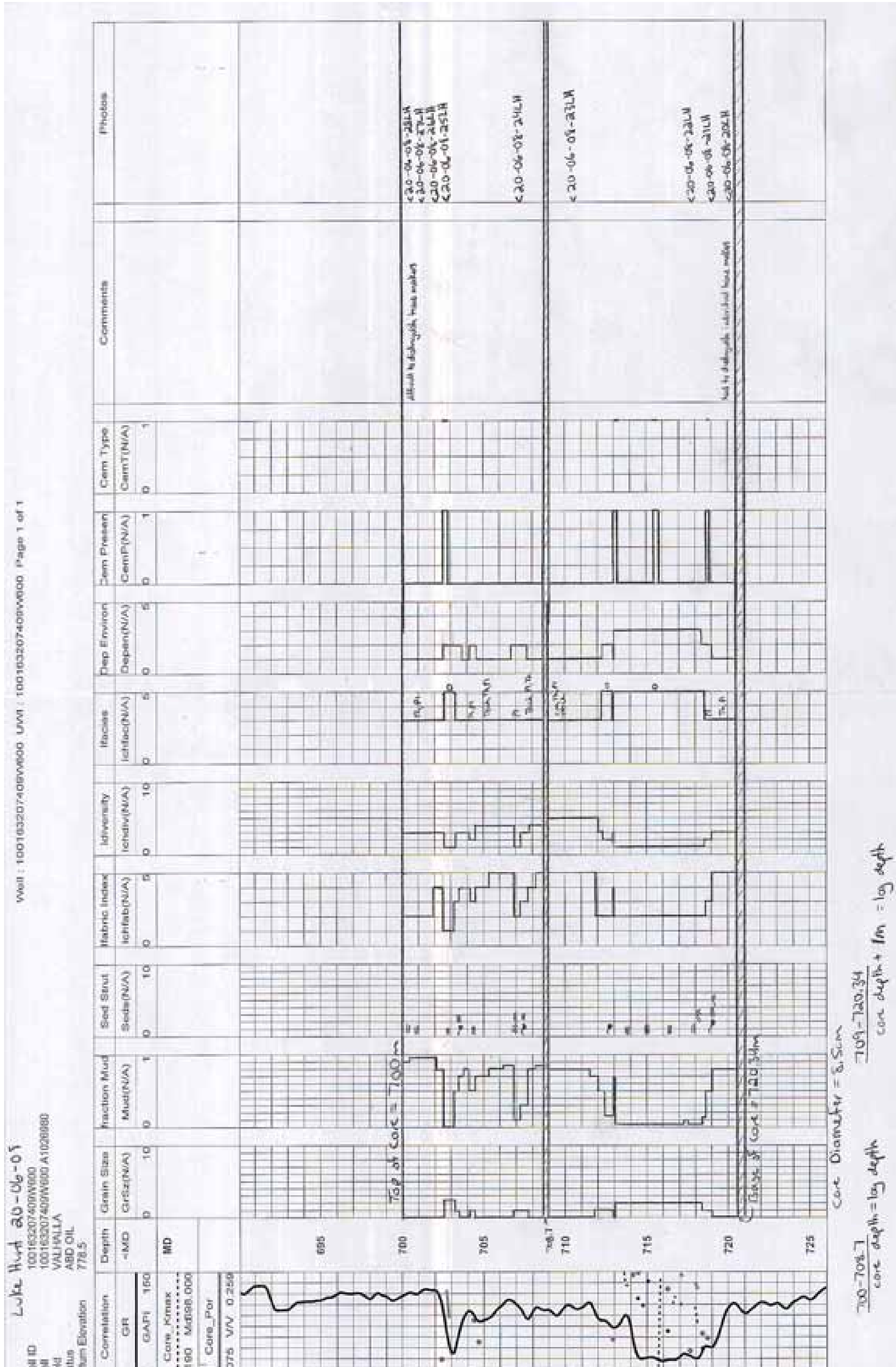

Luke Hunt 20-06-08
Well ID 100143407409W600
Well 100143407409W600 A1035210
Field VALHALLA
Status PUMP OIL
Datum Elevation 823.2
Well : 100143407409W600 UWI : 100143407409W600 Page 1 of 1
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 Md898.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
Grain Size
GrSz(N/A)
fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
750
755
760
765
770
775
Top of Core = 759m
Base of Core = 768m
<20-06-08-17LH
<20-06-08-16LH
<20-06-08-15LH
<20-06-08-14LH
Core Diameter = 8.5cm
Core Depth - 1m = log depth

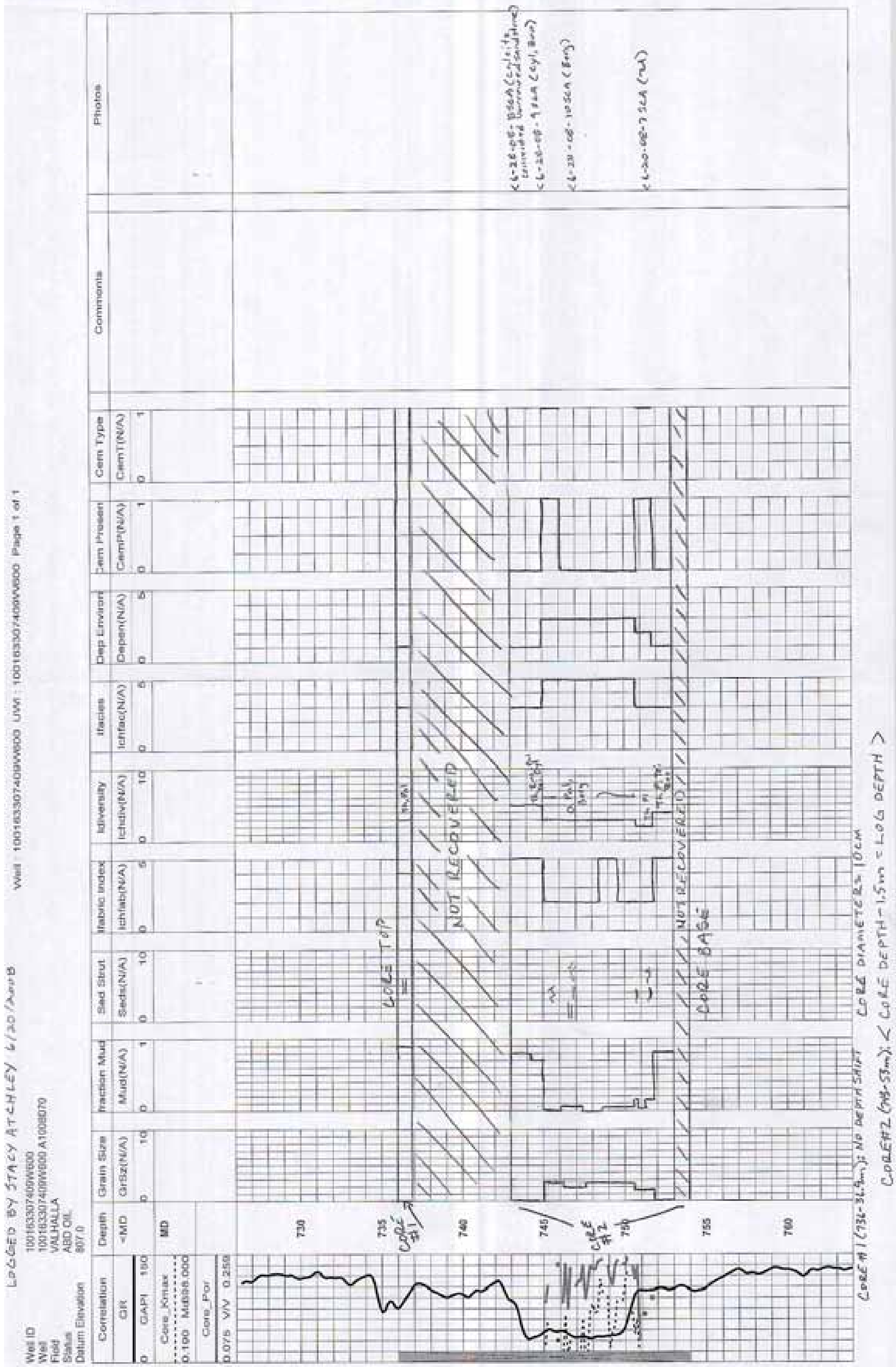

LOGGED BY STACY ATCHLEY 6-11-08
Well : 100143507409W600 UWI : 100143507409W600 Page 1 of 1
Well ID
Well
Field
Status
Datum Elevation
VALHALLA
PUMP OIL
805.3
Correlation
GR
GAPI
Core_Kmax
Core_Por
Depth
MD
Grain Size
Fraction Mud
Sed Strut
Fabric Index
Idiversity
Ifacies
Dep Environ
Cem Presen
Cem Type
Comments
Photos
730
735
740
745
750
755
TOP OF CORE (736 m)
BASE OF CORE (750 m)
CORE DIAMETER = 8cm

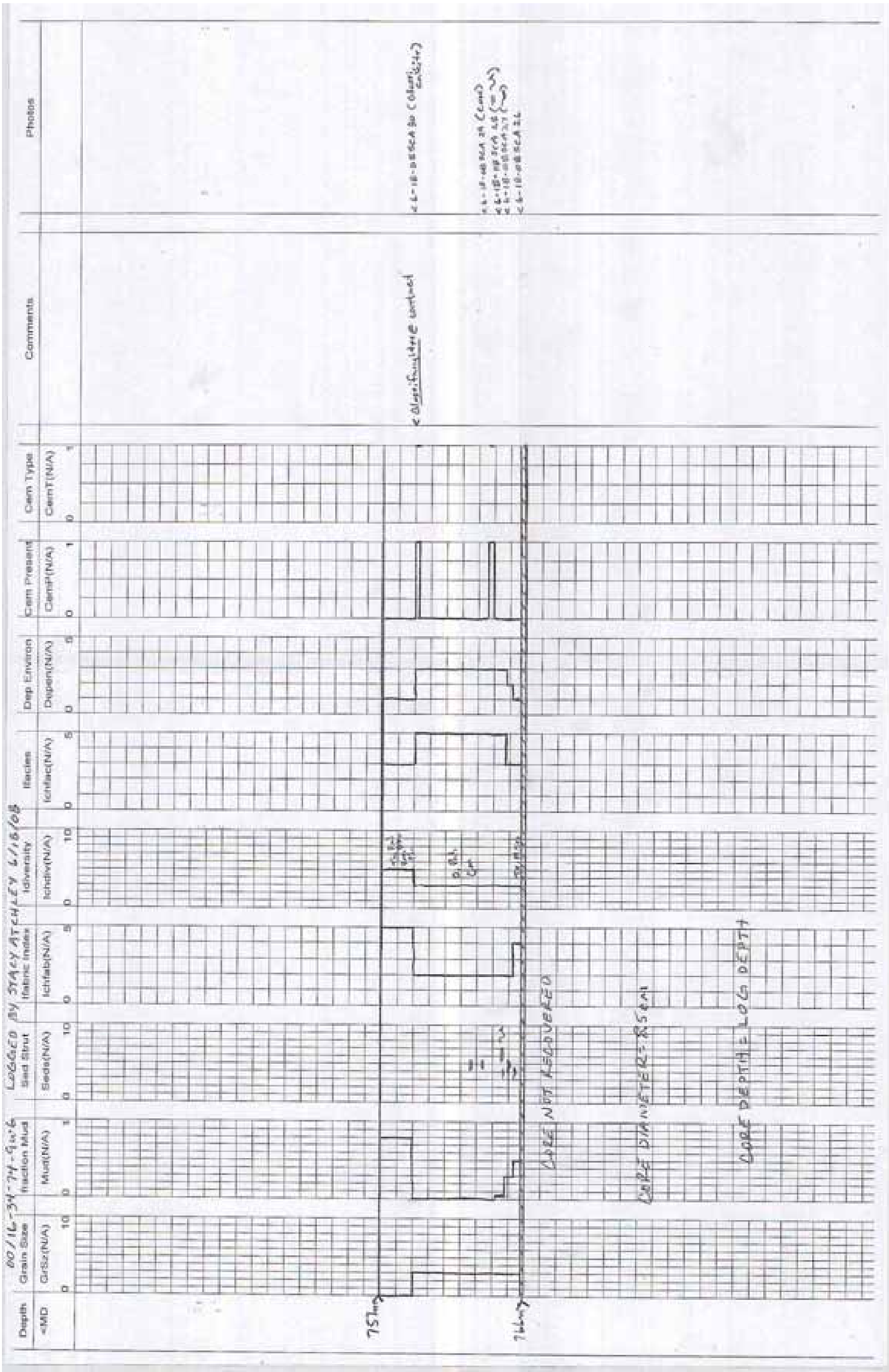

LOGGED BY NATE GALL 6/20/08
Well ID
Well
Field
Status
Datum Elevation
VALHALLA
DRY
769.3
Correlation
Depth
Grain Size
Fraction Mud
Sed Struct
Fabric Index
Idiversity
Ifacies
Dep Environ
Cem Presen
Cem Type
Comments
Photos
GR
GAPI 150
Core_Kmax
Core_Por
MD
710
715
720
725
730
735
740
TOP OF CORE = 718 m
BOTTOM OF CORE = 730 m
CORE NOT RECOVERED
CORE DIAMETER = 8.8 cm
CORE DEPTH - 1.0 m = LOG DEPTH

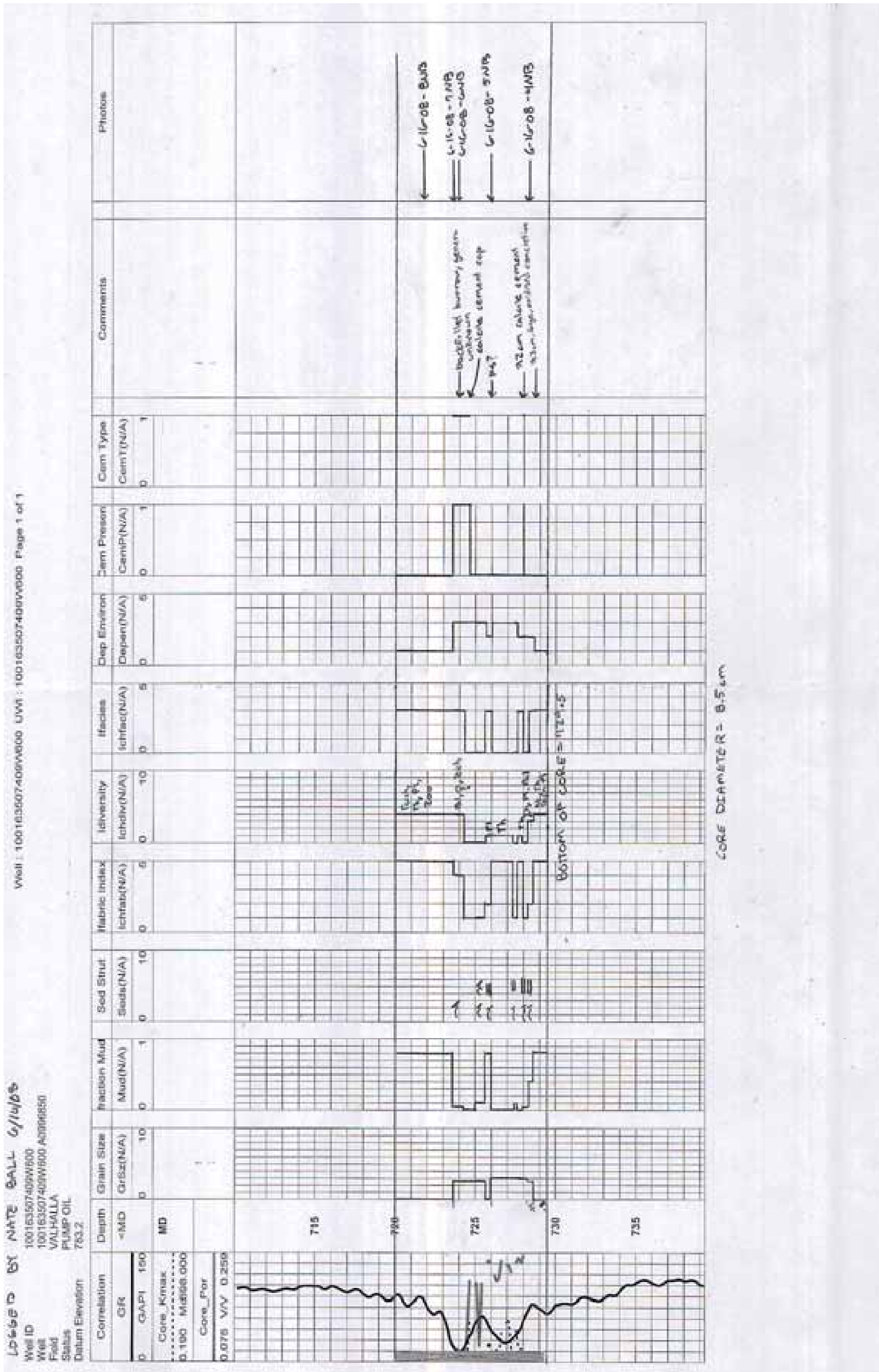

Well ID
Well
Field
Status
Datum Elevation
VALHALLA
Correlation
Depth
Grain Size
Fraction Mud
Sed Strut
Fabric Index
IDiversity
Ifacies
Dep Environ
Cem Presen
Cem Type
Comments
Photos
GR
GAPI
Core_Kmax
Core_Por
MD
695
700
705
710
715
720
725
CORE TOP
CORE BASE
NOT RECOVERED
CORE DIAMETER = 8.5 CM
CORE # 1 (705-712m) = NO DEPTH SHIFT
CORE # 2 (712-724m): CORE DEPTH + 1.2m = LOG DEPTH

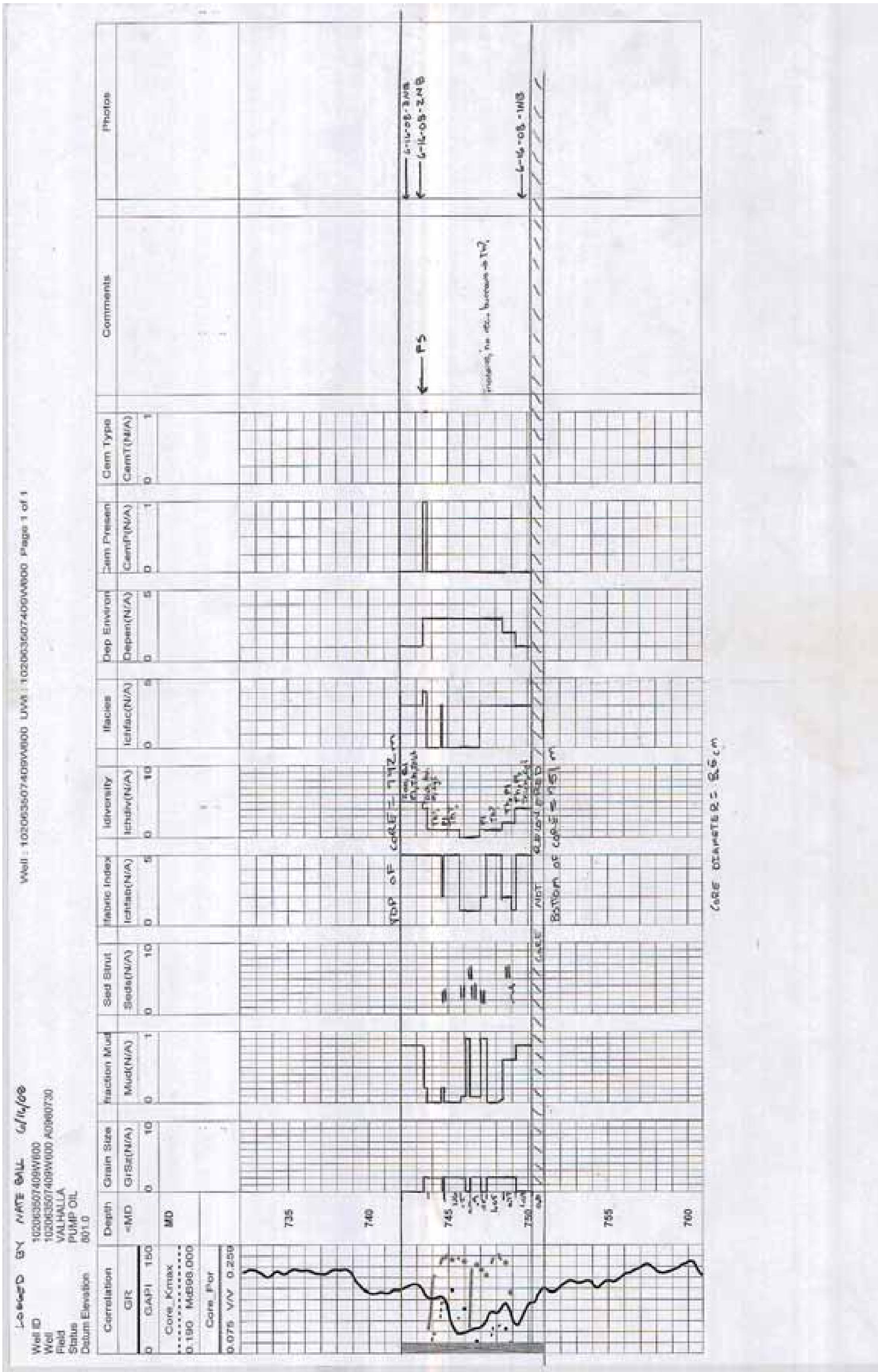

Luke Hurd 19-06-07
Well : 100163107409W600 UWI : 100163107409W600 Page 1 of 1
Well ID
Well
Field
Status
Datum Elevation
100163107409W600
100163107409W600 A101820
VALHALLA
PUMP OIL
770.6
Correlation
Depth
Grain Size
fraction Mud
Sed Strut
fabric Index
Idiversity
Ifacies
Dep Environ
Cem Presen
Cem Type
Comments
Photos
GR
0 GAPI 150
Core_Kmax
0.190 MD
Core_Por
0.075 V/V 0.259
MD
GrSz(N/A)
Mud(N/A)
Seds(N/A)
Ichfab(N/A)
Ichdiv(N/A)
Ichfac(N/A)
Depen(N/A)
CemP(N/A)
CemT(N/A)
700
705
710
715
720
725
Top of Core = 706.75m
Base of Core = 719m
Core Diameter = 8.5cm
core depth + 0.4m = log depth


Well : 100163207409W600 UWI : 100163207409W600 Page 1 of 1
Well ID
Well
Field
Status
Datum Elevation
VALHALLA
Correlation
Depth
Grain Size
Fraction Mud
Sed Strut
Ifabric Index
Idiversity
Ifacies
Dep Environ
Cem Presen
Cem Type
Comments
Photos
Top of Core = 700m
Core Diameter = 8.5cm


Correlation
Depth
Grain Size
Sed Strut
Dep Environ
Comments
Photos
GR
GAPI
Core_Kmax
Core_Por
MD
730
735
740
745
750
755
760
CORE TOP
NOT RECOVERED
CORE BASE
CORE DIAMETER = 10CM


Depth
<MD
Grain Size
GrSz(N/A)
Fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Present
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
LOGGED BY STACY ATCHLEY
CORE NOT RECOVERED
CORE DEPTH = LOG DEPTH


LOGGED BY NATE BALL 6/16/08
Well ID 100163507409W600
Well 100163507409W600 A0996850
Field VALHALLA
Status PUMP OIL
Datum Elevation 783.2
Well : 100163507409W600 UWI : 100163507409W600 Page 1 of 1
Correlation
GR
GAPI
Core_Kmax
Core_Por
Depth
MD
Grain Size
Fraction Mud
Sed Strut
Ifabric Index
Idiversity
Ifacies
Dep Environ
Cem Presen
Cem Type
Comments
Photos
715
720
725
730
735
BOTTOM OF CORE = 729.5
CORE DIAMETER = 8.5 cm



Well : 102063507409W600 UWI : 102063507409W600 Page 1 of 1
LOGGED BY NATE BALL 6/16/08
Well ID
Well
Field
Status
Datum Elevation
VALHALLA
PUMP OIL
Correlation
GR
GAPI
Core_Kmax
Core_Por
Depth
MD
Grain Size
Fraction Mud
Sed Strut
fabric Index
Idiversity
Ifacies
Dep Environ
Cem Presen
Cem Type
Comments
Photos
735
740
745
750
755
760
TOP OF CORE = 742 m
BOTTOM OF CORE = 751 m
CORE NOT RECOVERED
CORE DIAMETER = 8.6 cm

T75R7

Core Description Legend

Grain Size

0 - Silt/Clay
1 - Lower Very Fine
2 - Upper Very Fine
3 - Lower Fine
4 - Upper Fine
5 - Lower Medium
6 - Upper Medium
7 - Lower Coarse
8 - Upper Coarse
9 - Lower Very Coarse
10 - Upper Very Coarse

Sedimentary Structures

Planar Horizontal
Planar Laminations
Trough Cross Bedding
Soft Sediment Deformation
Planar Tabular
mm Laminations
Climbing Ripple
Firmground
Hummocks
Current Ripple
Wave Ripple
Flaser Bedding
Lithoclast
Intraclast
Bivalve undiff.

Photos

6-16-08-nnn(initials of author)

Ichnofabric Index

1 - No bioturbation recorded; all original sedimentary structures preserved
2 - Discrete, isolated trace fossils; up to 10 percent of original bedding disturbed
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Ichnofauna

Pl - *Planolites*
Th - *Thalassinoides*
Teich - *Teichichnus*
Pal - *Palaeophycus*
Zoo - *Zoophycos*
Cyl - *Cylindrichnus*
Sub - *Subphyllocorda*
O - *Ophiomorpha*
Ber - *Bergaueria*
Rh - *Rhizocorallium*
Sk - *Skolithos*
Ast - *Asterosoma*
Aren - *Arenicolites*
Ros - *Rosselia*
Diplo - *Diplocraterion*
Con - *Conichnus*
Chon - *Chondrites*
Phy - *Phycosiphon*
Ter - *Terebellina*

Ichnodiversity

n - number of taxa observed

Ichnofacies

1 - *Nereites*
2 - *Zoophycos*
3 - *Cruziana* (Restricted)
4 - *Cruziana* (Open)
5 - *Skolithos*

Depositional Environment

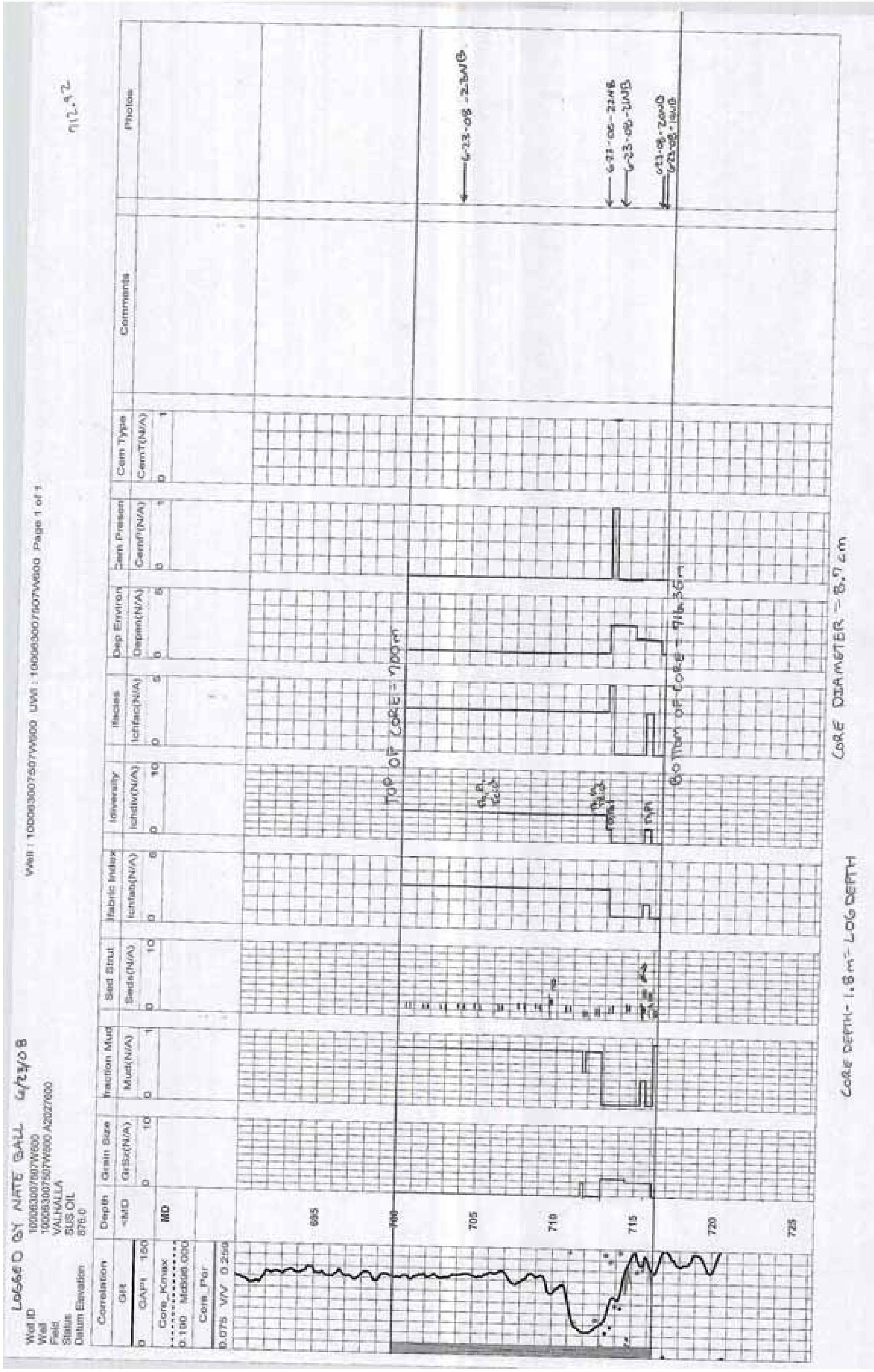
1 - Offshore
2 - Distal Lower Shoreface
3 - Proximal Lower Shoreface
4 - Upper Shoreface
5 - Foreshore

Cement

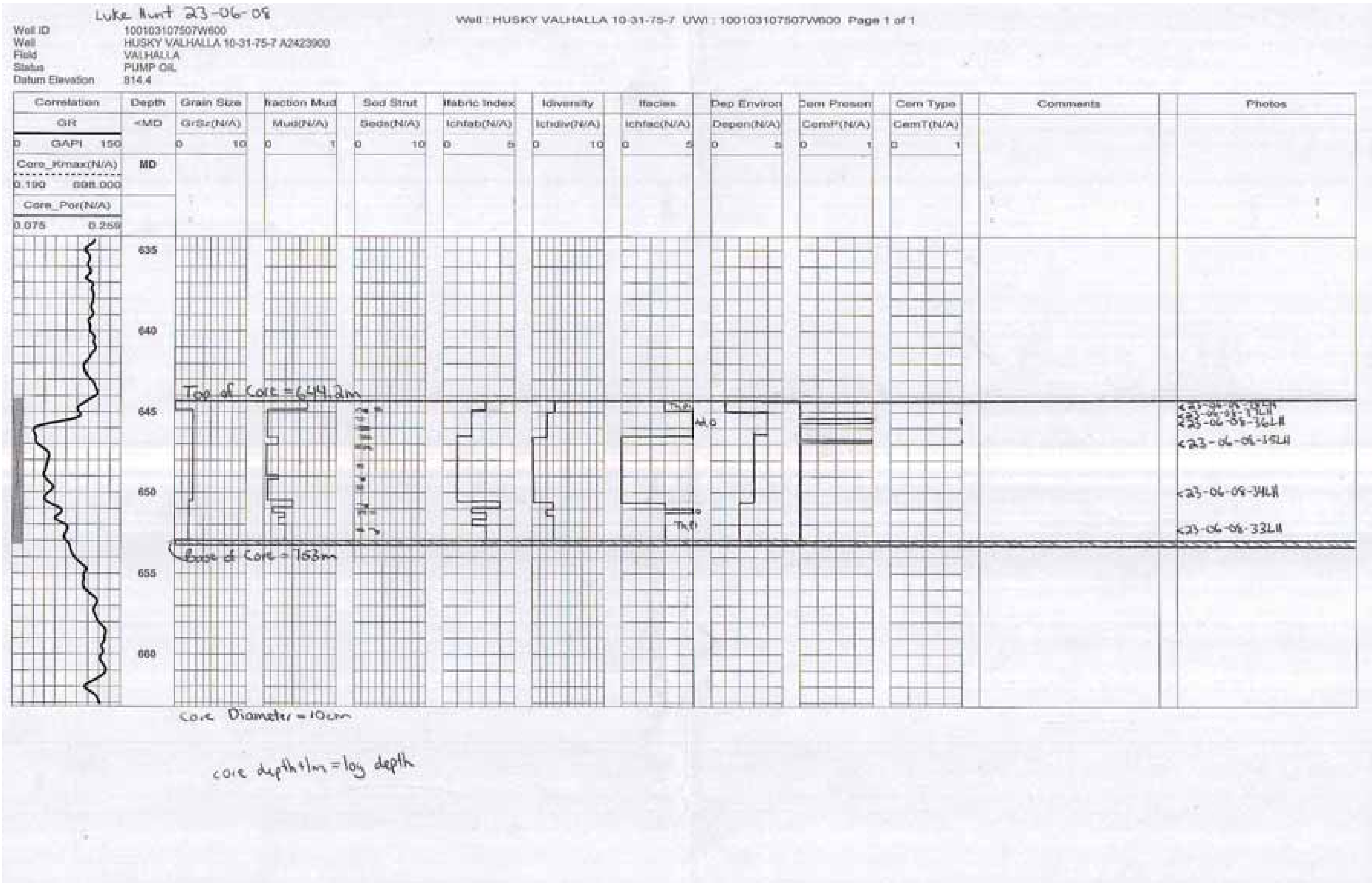
0 - No Cement Present
1 - Cement Present

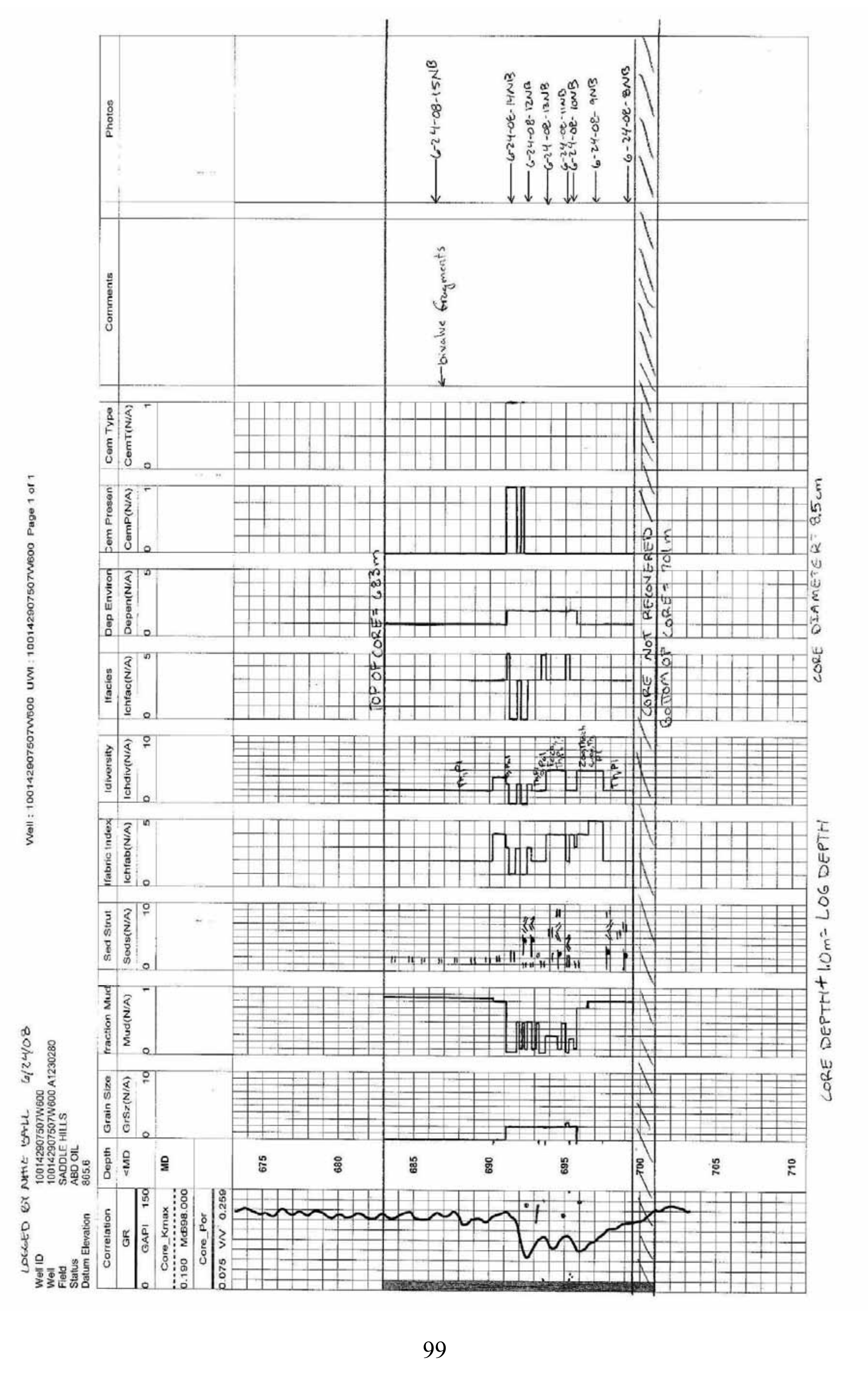
Cement Type

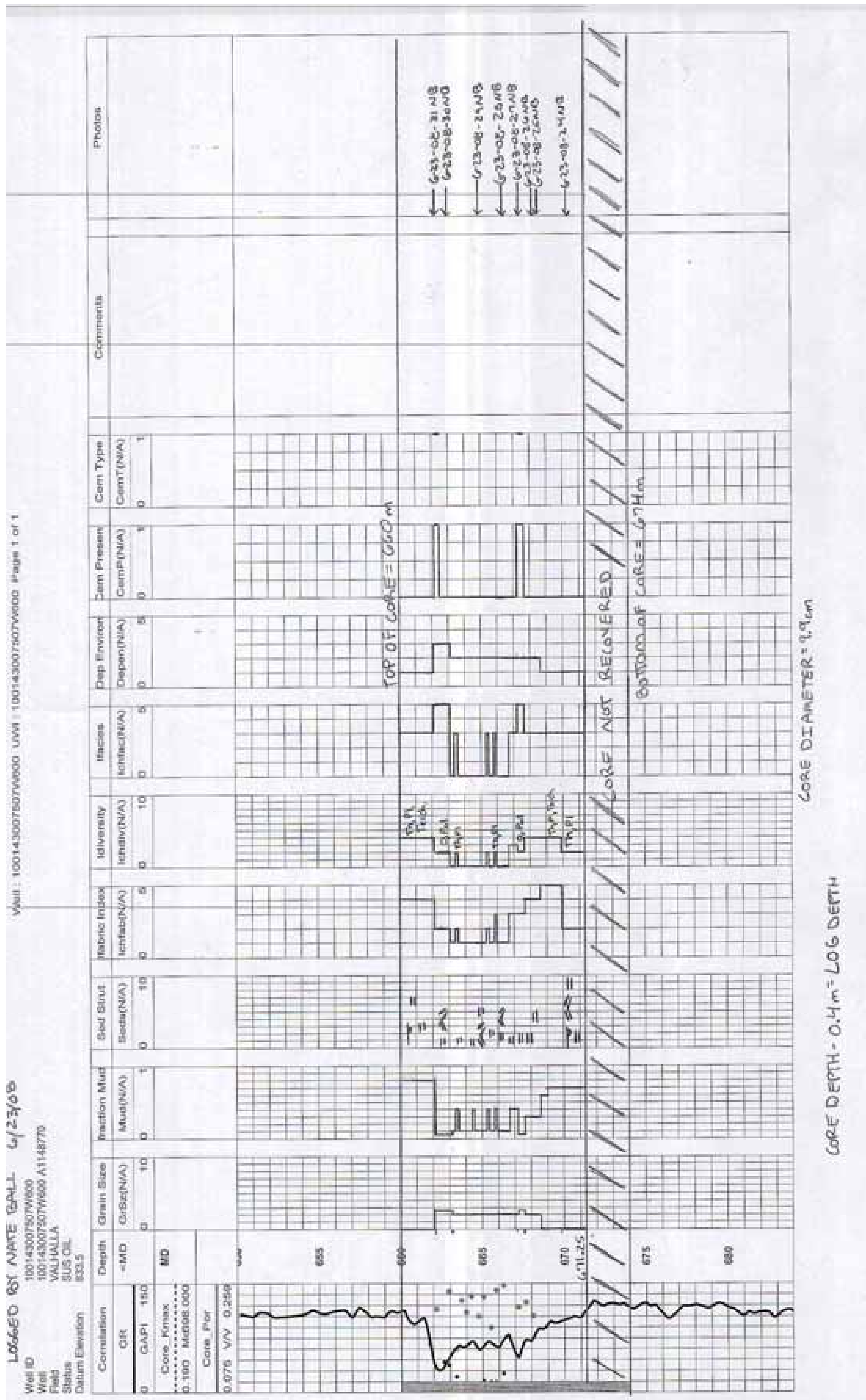
0 - Quartz
1 - Calcite

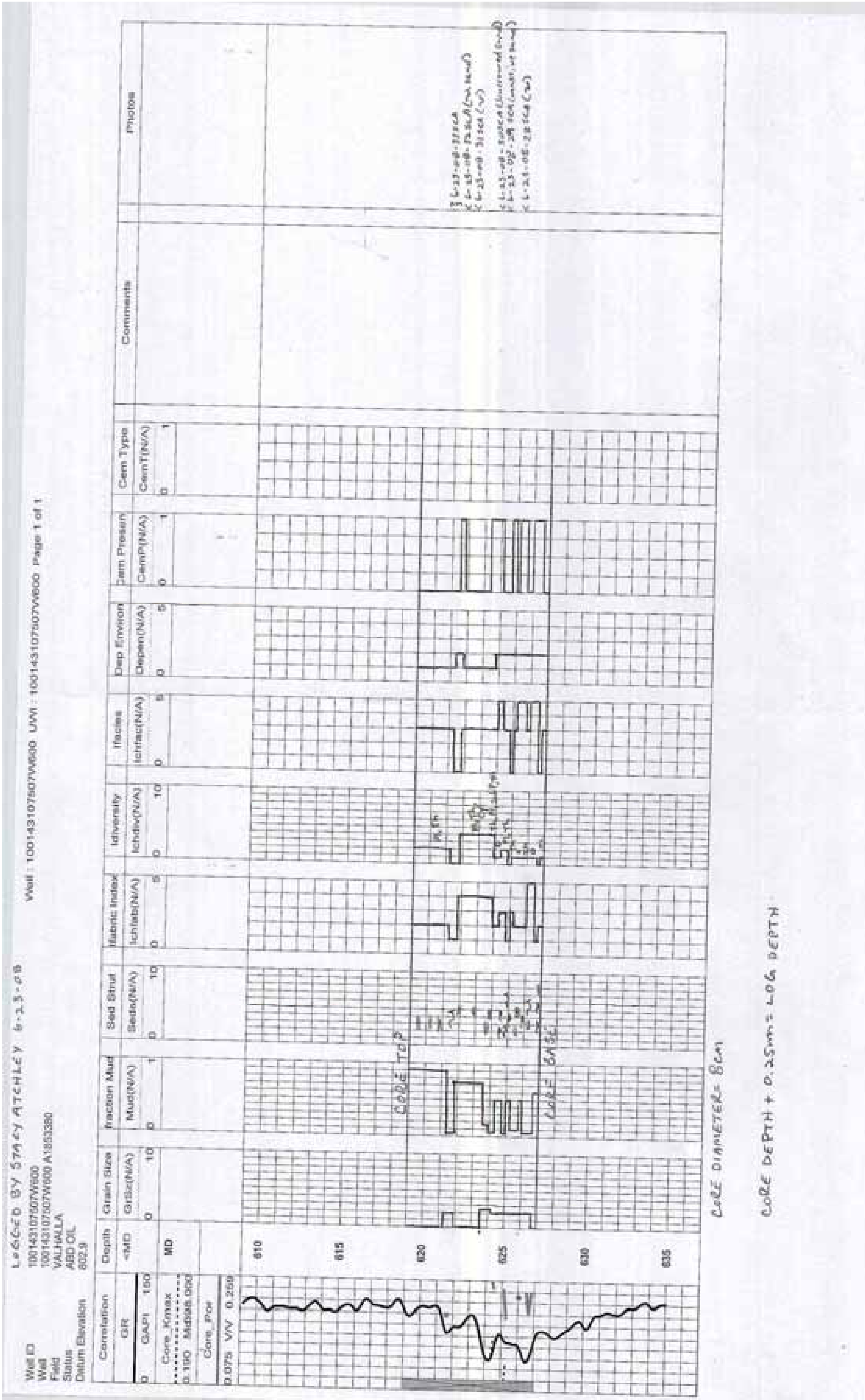


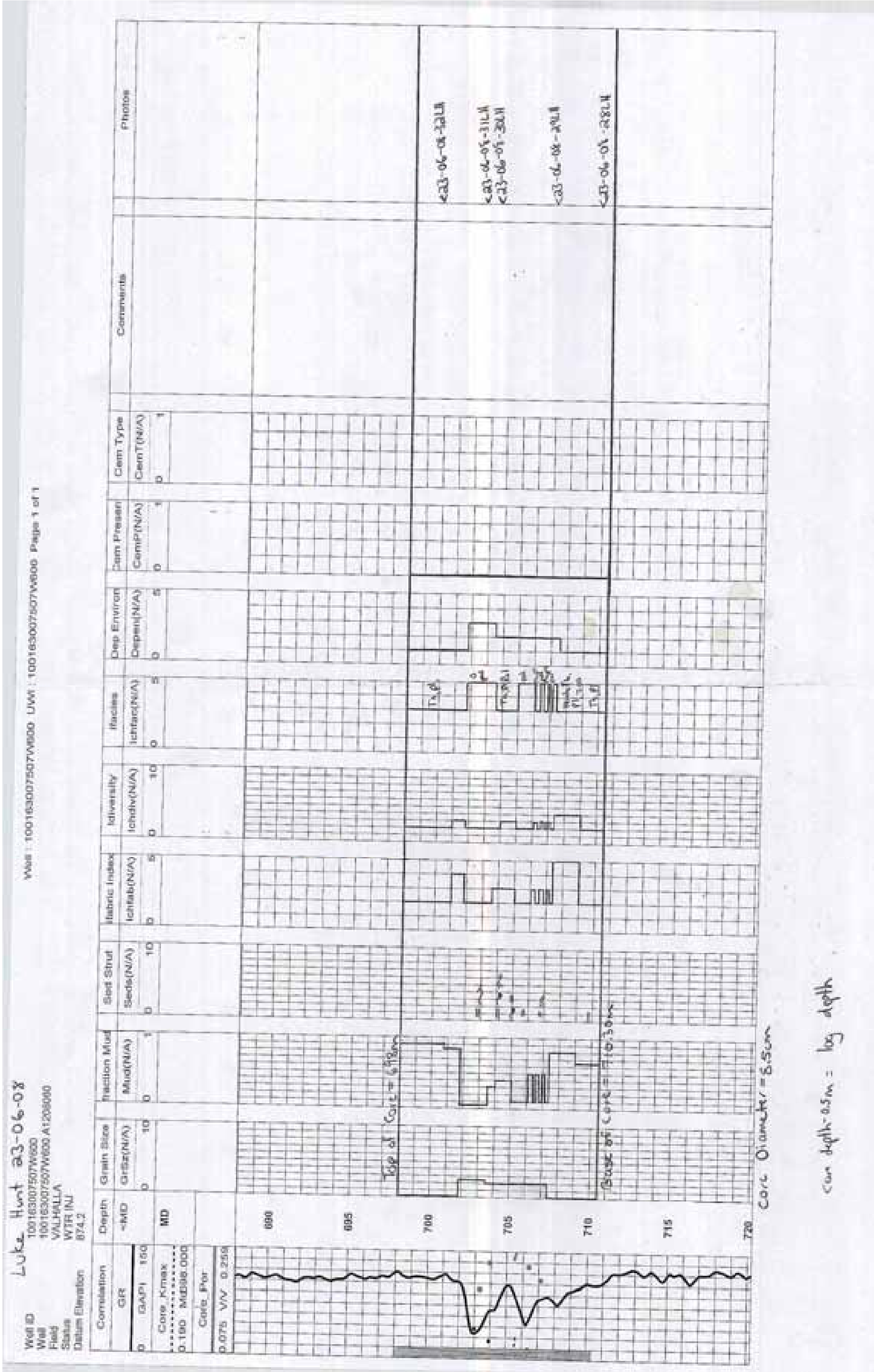
LOGGED BY NATE BALL 6/23/08
Well ID 100063007507W600
Well 100063007507W600 A2027600
Field VALHALLA
Status SUS OIL
Datum Elevation 876.0
Well : 100063007507W600 UWI : 100063007507W600 Page 1 of 1
Correlation
GR
GAPI
Core_Kmax
Core_Por
Depth
MD
Grain Size
Fraction Mud
Sed Strut
Fabric Index
Idiversity
facies
Dep Environ
Cem Presen
Cem Type
Comments
Photos
695
700
705
710
715
720
725
TOP OF CORE = 700m
BOTTOM OF CORE = 716.36m
CORE DEPTH - 1.8m = LOG DEPTH
CORE DIAMETER = 8.7 cm
712.92


Luke Hunt 23-06-08
Well : HUSKY VALHALLA 10-31-75-7 UWI : 100103107507W600 Page 1 of 1
Well ID 100103107507W600
Well HUSKY VALHALLA 10-31-75-7 A2423900
Field VALHALLA
Status PUMP OIL
Datum Elevation 814.4
Correlation
GR
0 GAPI 150
Core_Kmax(N/A)
0.190 698.000
Core_Por(N/A)
0.075 0.259
Depth
<MD
MD
Grain Size
GrSz(N/A)
fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Preson
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
635
640
645
650
655
660
Top of Core = 644.2m
Base of Core = 753m
<23-06-08-36LH
<23-06-08-35LH
<23-06-08-34LH
<23-06-08-33LH
Core Diameter = 10cm
core depth+1m = log depth


LOGGED BY NATE BALL 6/24/08
Well ID 100142907507W600
Well 100142907507W600 A1230280
Field SADDLE HILLS
Status ABD OIL
Datum Elevation 865.6
Well : 100142907507W600 UWI : 100142907507W600 Page 1 of 1
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 MD698.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
Grain Size
GrSz(N/A)
fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
675
680
685
690
695
700
705
710
TOP OF CORE = 683m
CORE NOT RECOVERED
BOTTOM OF CORE = 701 m
bivalve fragments
6-24-08-15NB
6-24-08-14NB
6-24-08-12NB
6-24-08-13NB
6-24-08-11NB
6-24-08-10NB
6-24-08-9NB
6-24-08-8NB
CORE DEPTH + 1.0m = LOG DEPTH
CORE DIAMETER 8.5cm


LOGGED BY NATE BALL 6/23/08
Correlation
Depth
Grain Size
Fraction Mud
Sed Strut
Comments
Photos
TOP OF CORE = 660 m
CORE NOT RECOVERED
BOTTOM OF CORE = 674 m
CORE DEPTH - 0.4m = LOG DEPTH


LOGGED BY STACY ATCHLEY 6-23-08
Well ID 100143107507W600
Well 100143107507W600 A1853380
Field VALHALLA
Status ABD OIL
Datum Elevation 802.9
Well : 100143107507W600 UWI : 100143107507W600 Page 1 of 1
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 Md998.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
610
615
620
625
630
635
Grain Size
GrSz(N/A)
0 10
fraction Mud
Mud(N/A)
0 1
Sed Strut
Seds(N/A)
0 10
Ifabric Index
Ichfab(N/A)
0 5
Idiversity
Ichdiv(N/A)
0 10
Ifacies
Ichfac(N/A)
0 5
Dep Environ
Depen(N/A)
0 5
Cem Presen
CemP(N/A)
0 1
Cem Type
CemT(N/A)
0 1
Comments
Photos
CORE TOP
CORE BASE
CORE DIAMETER= 8cm
CORE DEPTH + 0.25m = LOG DEPTH


Luke Hunt 23-06-08
Well ID
Well
Field
Status
Datum Elevation
VALHALLA
WTR INJ
874.2
Correlation
GR
Depth
Grain Size
Traction Mud
Sed Strut
Dep Environ
Comments
Photos
690
695
700
705
710
715
720
Top of Core = 698m
Base of Core = 710.30m
Core Diameter = 8.5cm
core depth - 0.5m = log depth

T75R8

Core Description Legend

Grain Size

0 - Silt/Clay
1 - Lower Very Fine
2 - Upper Very Fine
3 - Lower Fine
4 - Upper Fine
5 - Lower Medium
6 - Upper Medium
7 - Lower Coarse
8 - Upper Coarse
9 - Lower Very Coarse
10 - Upper Very Coarse

Photos

6-16-08-nnn(initials of author)

Sedimentary Structures

- Planar Horizontal
- Planar Laminations
- Trough Cross Bedding
- Soft Sediment Deformation
- Planar Tabular
- mm Laminations
- Climbing Ripple
- Firmground
- Hummocks
- Current Ripple
- Wave Ripple
- Flaser Bedding
- Lithoclast
- Intraclast
- Bivalve undiff.

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Ast - *Asterosoma*
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Ros - *Rosselia*
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4 - *Cruziana* (Open)
5 - *Skolithos*

Depositional Environment

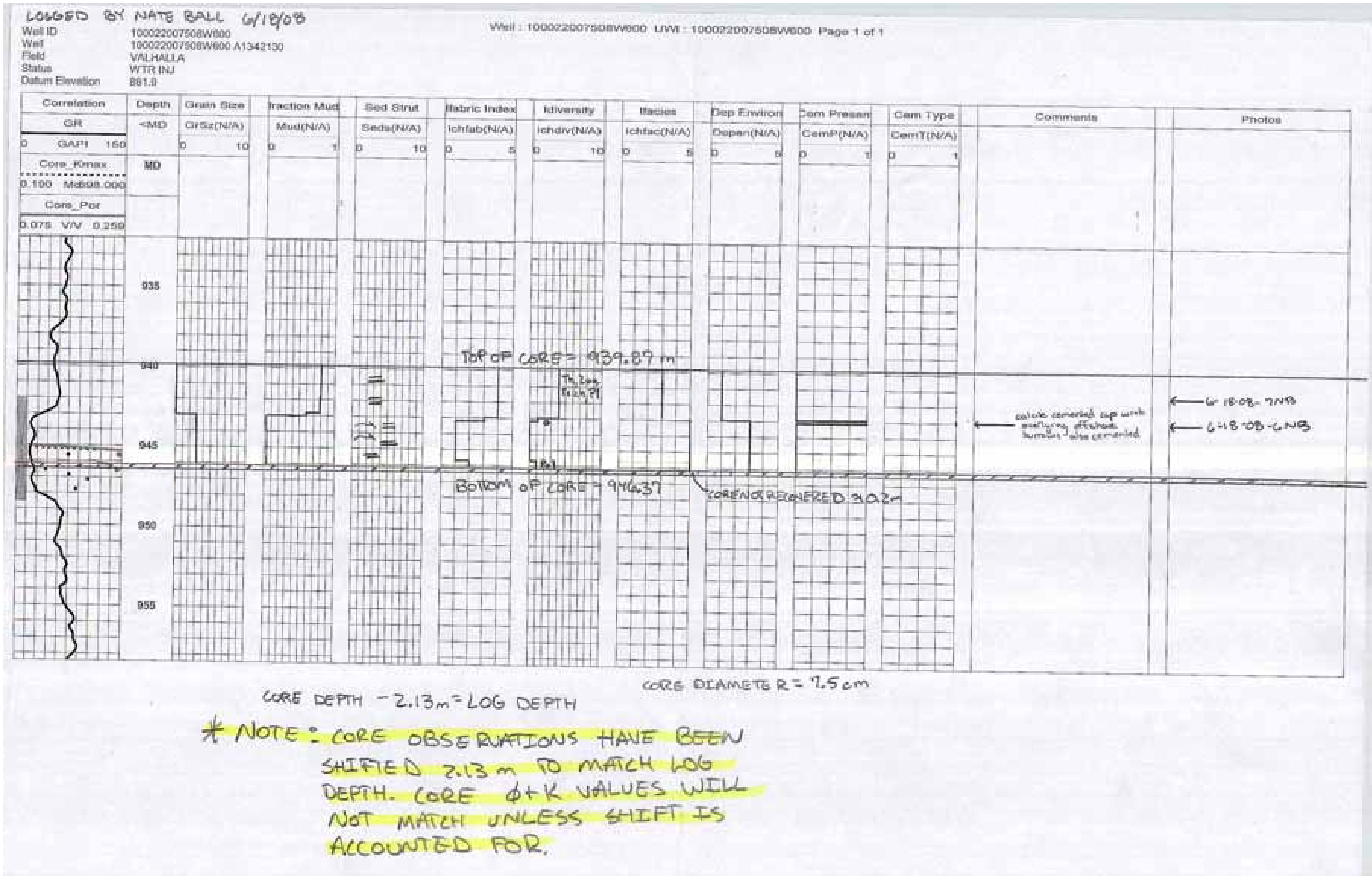
1 - Offshore
2 - Distal Lower Shoreface
3 - Proximal Lower Shoreface
4 - Upper Shoreface
5 - Foreshore

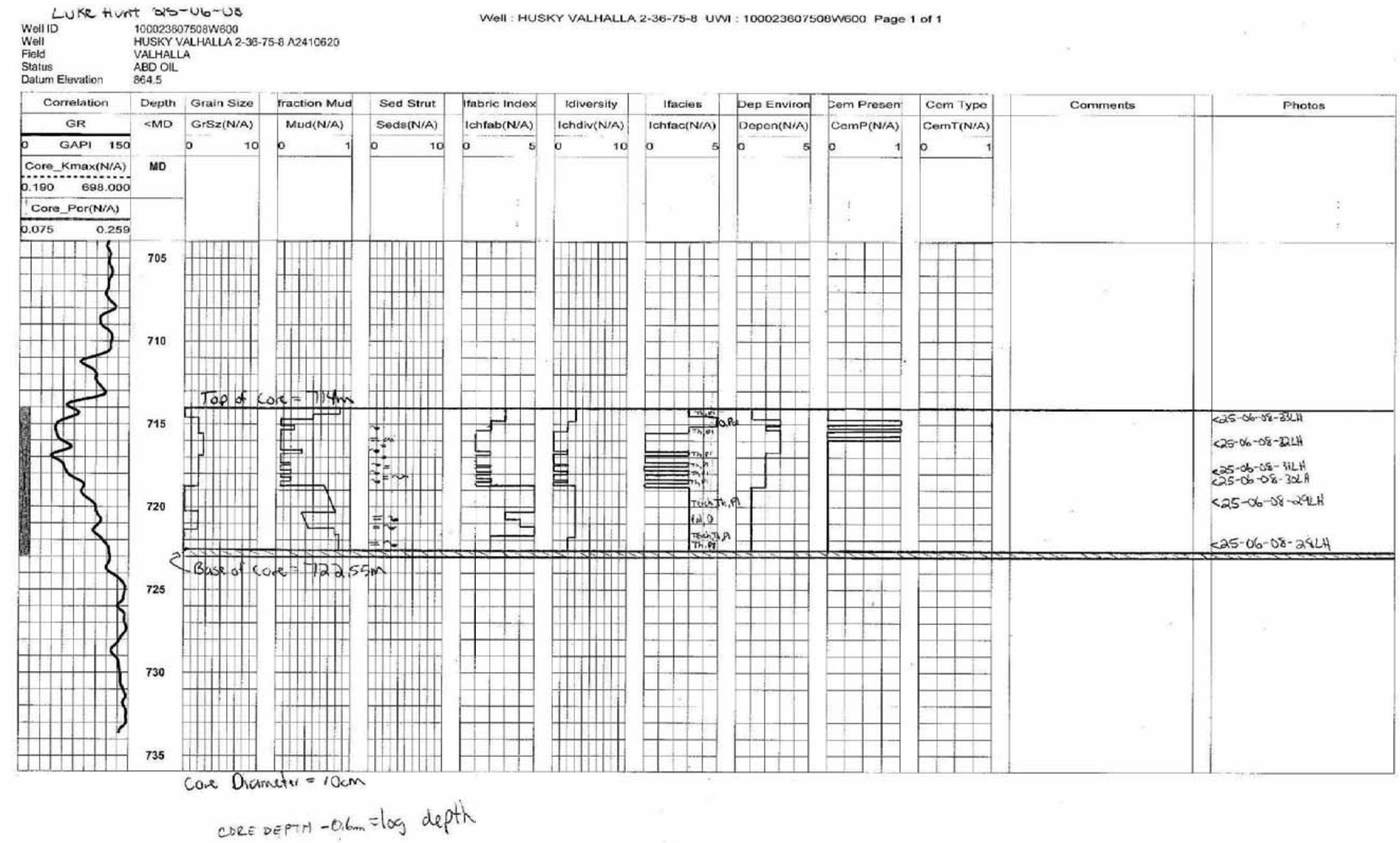
Cement

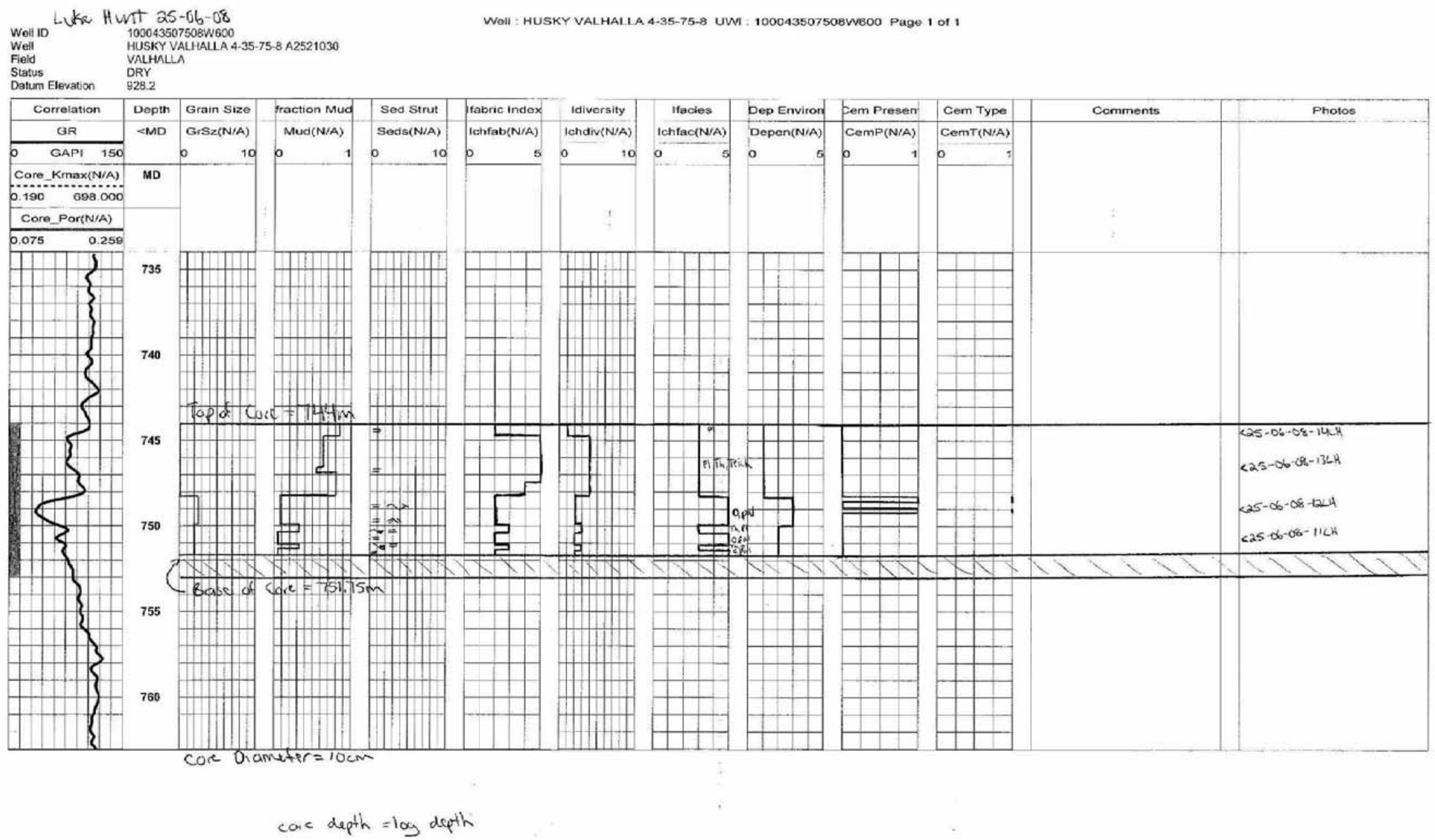
0 - No Cement Present
1 - Cement Present

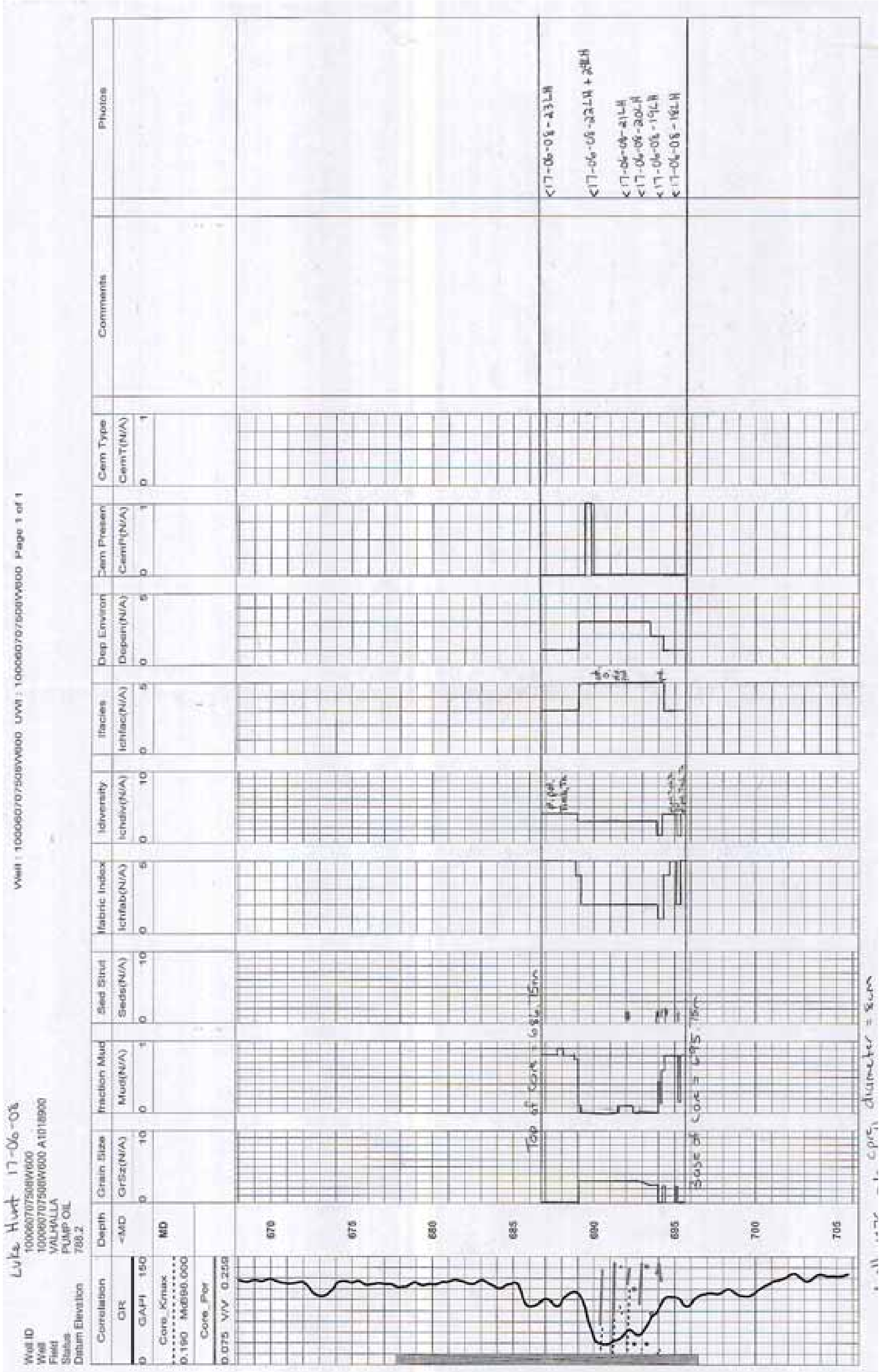
Cement Type

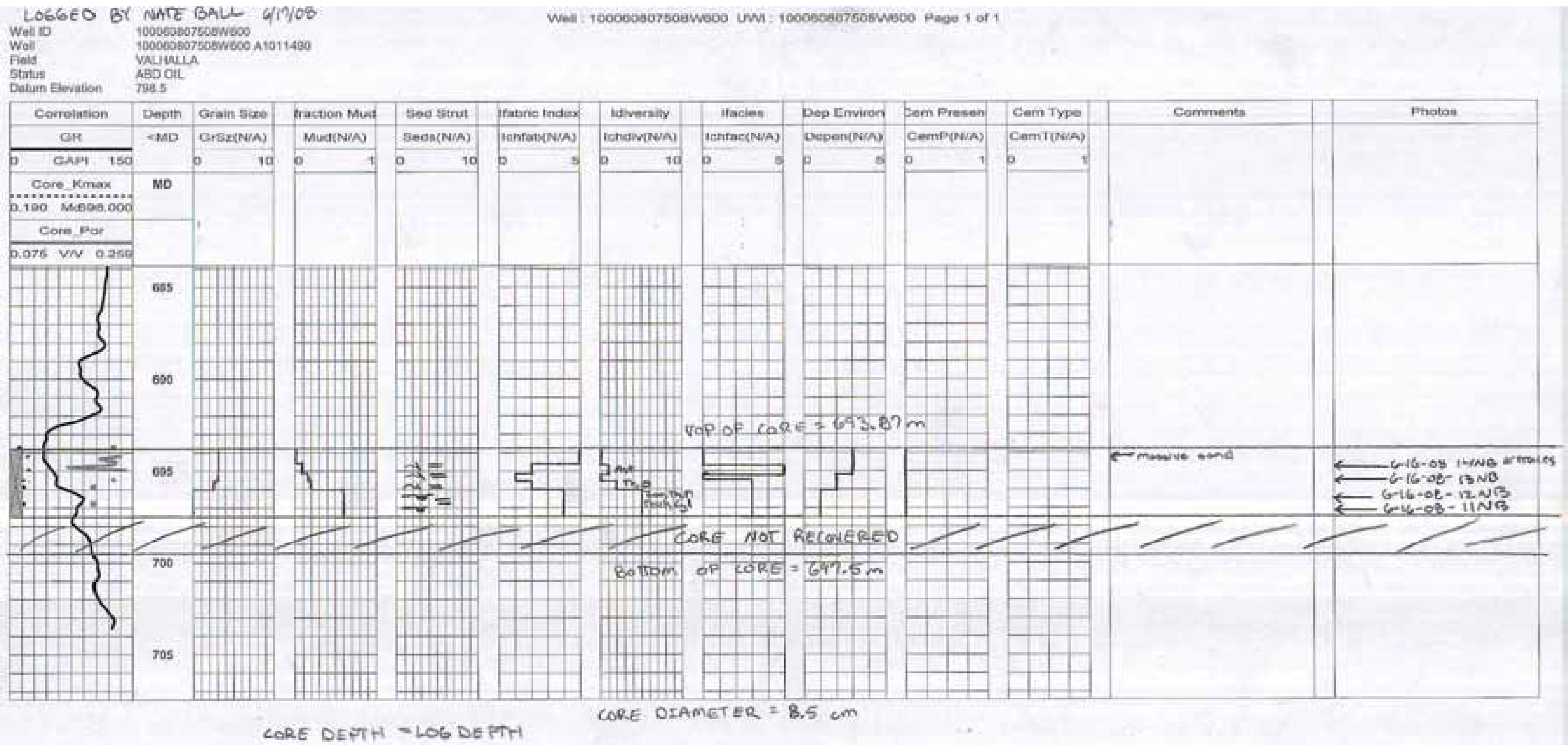
0 - Quartz
1 - Calcite


LOGGED BY NATE BALL 6/18/08
Well ID 100022007508W600
Well 100022007508W600 A1342130
Field VALHALLA
Status WTR INJ
Datum Elevation 861.9
Well : 100022007508W600 UWI : 100022007508W600 Page 1 of 1
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 Md698.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
Grain Size
GrSz(N/A)
Fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Fabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
935
940
945
950
955
TOP OF CORE = 939.87 m
BOTTOM OF CORE = 944.37
CORE NOT RECOVERED 3.02m
6-18-08-7NB
6-18-08-6NB
CORE DEPTH - 2.13m = LOG DEPTH
CORE DIAMETER = 7.5cm
* NOTE: CORE OBSERVATIONS HAVE BEEN SHIFTED 2.13 m TO MATCH LOG DEPTH. CORE φ+K VALUES WILL NOT MATCH UNLESS SHIFT IS ACCOUNTED FOR.

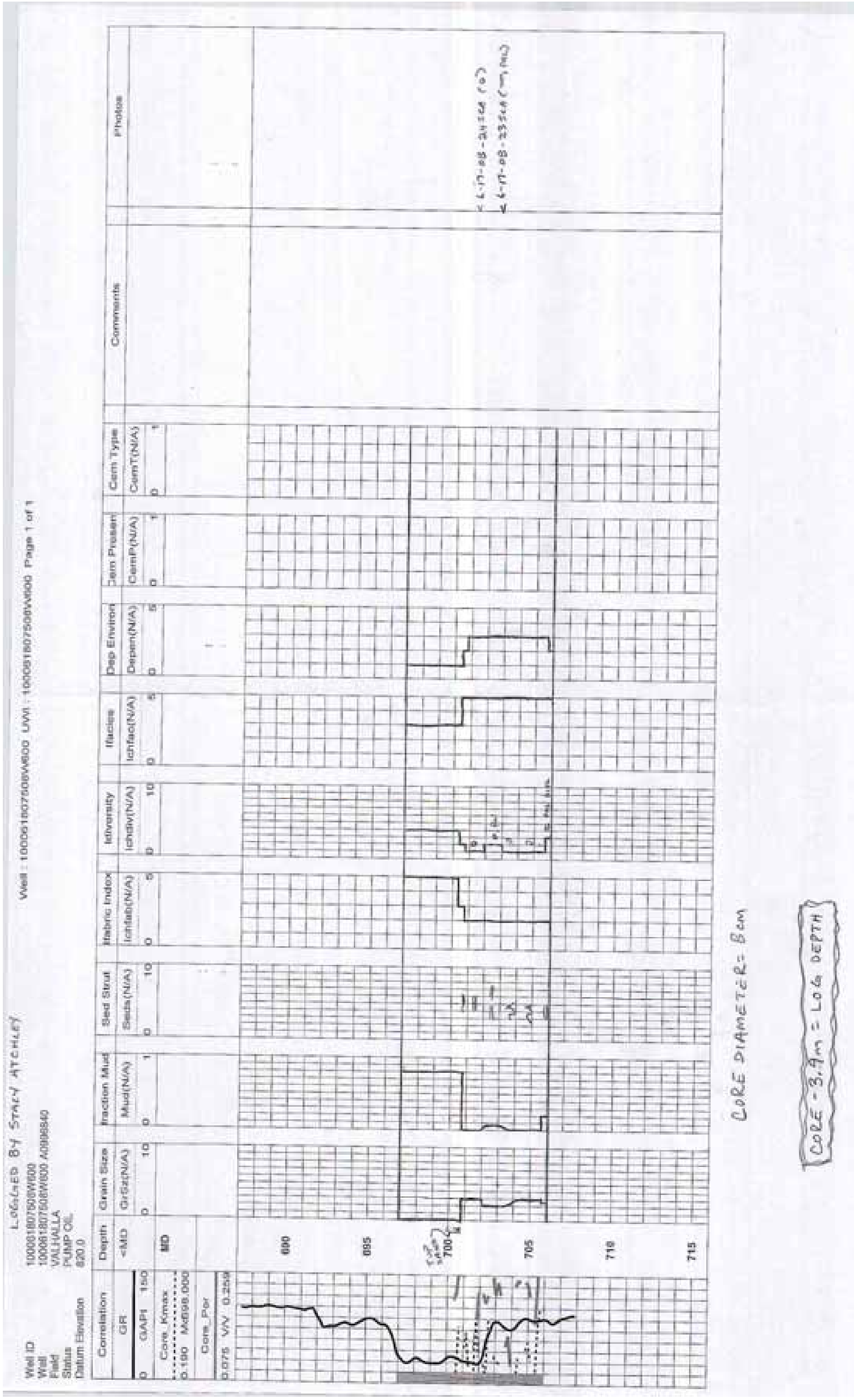

Luke Hunt 25-06-08
Well ID 100023607508W600
Well HUSKY VALHALLA 2-36-75-8 A2410620
Field VALHALLA
Status ABD OIL
Datum Elevation 864.5
Well : HUSKY VALHALLA 2-36-75-8 UWI : 100023607508W600 Page 1 of 1
Correlation
GR
0 GAPI 150
Core_Kmax(N/A)
0.190 698.000
Core_Por(N/A)
0.075 0.259
Depth
<MD
MD
705
710
715
720
725
730
735
Grain Size
GrSz(N/A)
fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depon(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
Top of Core = 714m
Base of Core = 722.55m
<25-06-08-33LH
<25-06-08-32LH
<25-06-08-31LH
<25-06-08-30LA
<25-06-08-29LH
<25-06-08-28LH
Core Diameter = 10cm
CORE DEPTH - 0.6m = log depth

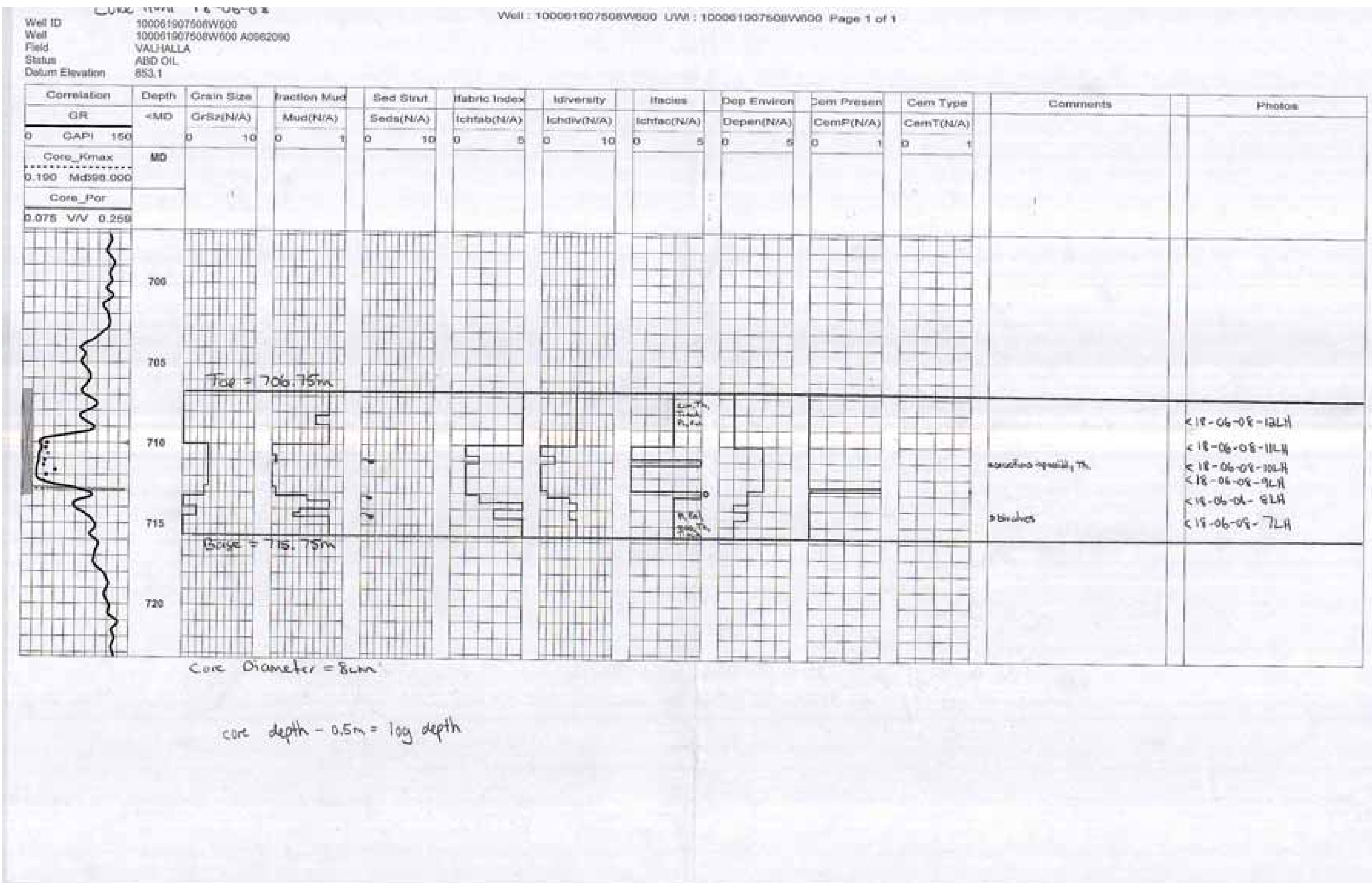

Luke Hunt 25-06-08
Well ID 100043507508W600
Well HUSKY VALHALLA 4-35-75-8 A2521030
Field VALHALLA
Status DRY
Datum Elevation 928.2
Well : HUSKY VALHALLA 4-35-75-8 UWI : 100043507508W600 Page 1 of 1
Correlation
GR
0 GAPI 150
Core_Kmax(N/A)
0.190 698.000
Core_Por(N/A)
0.075 0.259
Depth
<MD
MD
Grain Size
GrSz(N/A)
0 10
fraction Mud
Mud(N/A)
0 1
Sed Strut
Seds(N/A)
0 10
Ifabric Index
Ichfab(N/A)
0 5
Idiversity
Ichdiv(N/A)
0 10
Ifacies
Ichfac(N/A)
0 5
Dep Environ
Depen(N/A)
0 5
Cem Presen
CemP(N/A)
0 1
Cem Type
CemT(N/A)
0 1
Comments
Photos
735
740
745
750
755
760
Top of Core = 744m
Base of Core = 751.75m
<25-06-08-14LH
<25-06-08-13LH
<25-06-08-12LH
<25-06-08-11LH
Core Diameter = 10cm
core depth = log depth

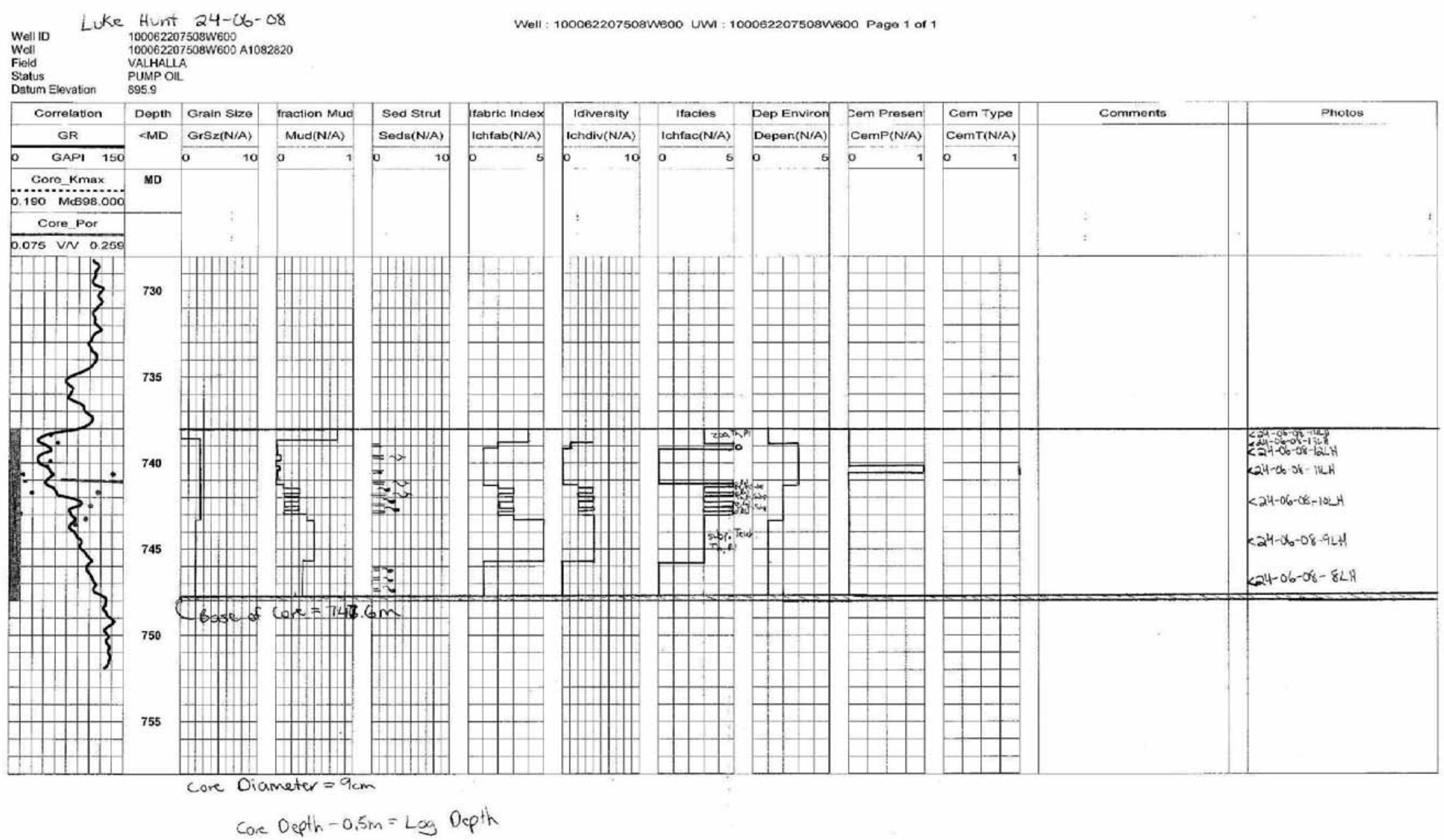

Well : 100060707508W600 UWI : 100060707508W600 Page 1 of 1
Well ID
Well
Field
Status
Datum Elevation
VALHALLA
PUMP OIL
788.2
Correlation
Depth
Grain Size
Fraction Mud
Sed Strut
Fabric Index
Idiversity
Ifacies
Dep Environ
Cem Presen
Cem Type
Comments
Photos
670
675
680
685
690
695
700
705
Top of Core = 686.15m
Base of Core = 695.75m

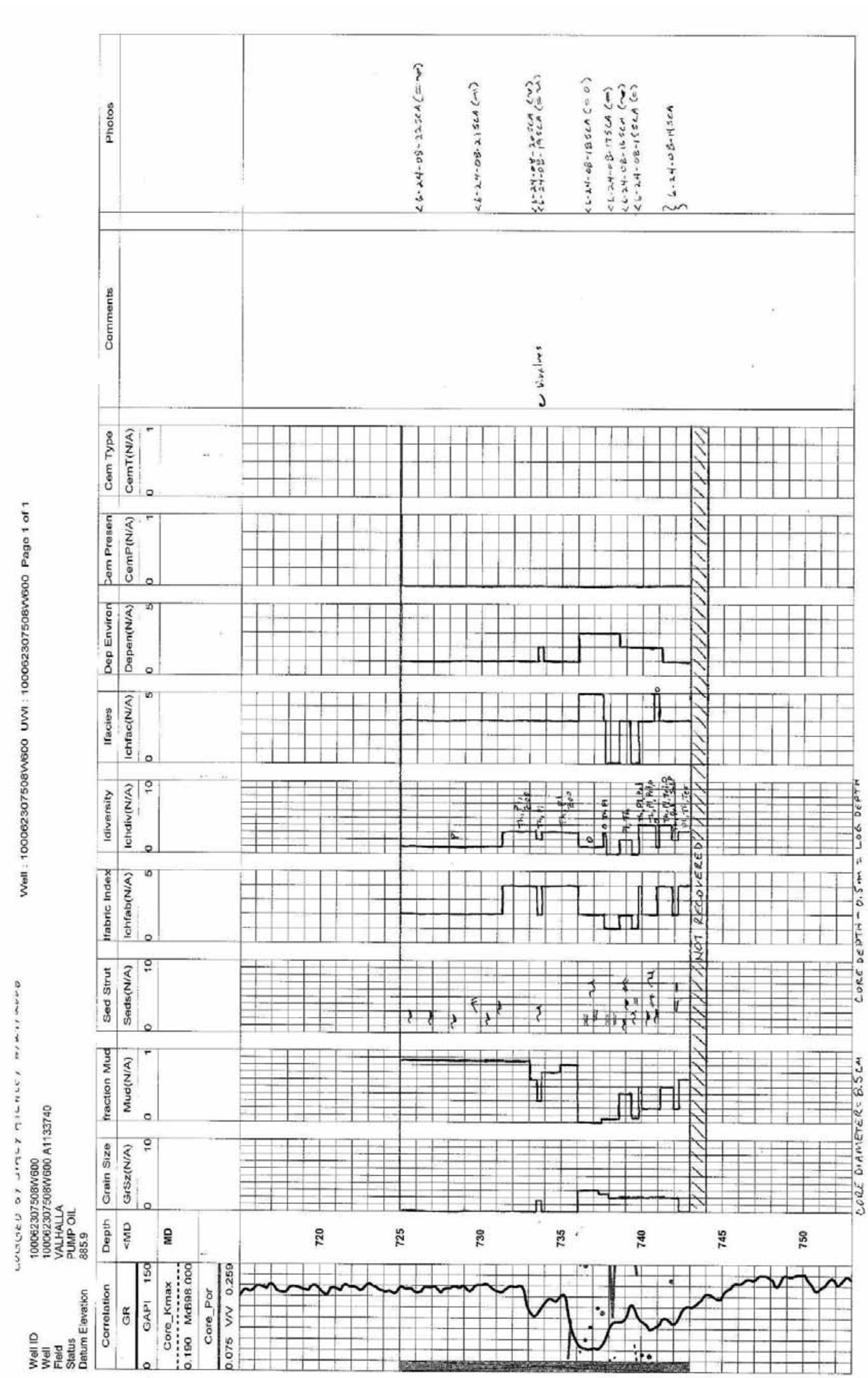


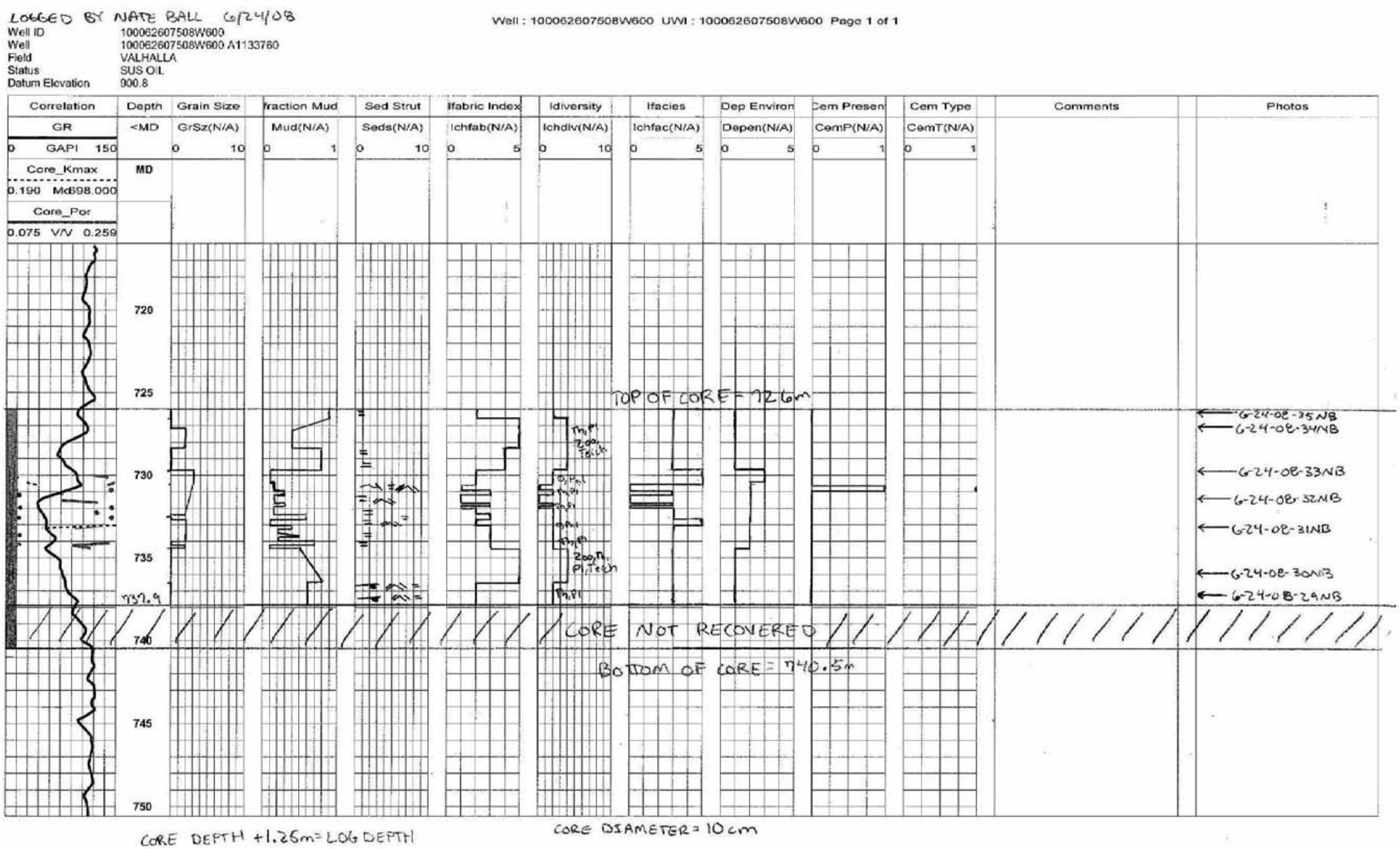
LOGGED BY NATE BALL 6/17/08
Well : 100060807508W600 UWI : 100060807508W600 Page 1 of 1
Well ID 100060807508W600
Well 100060807508W600 A1011480
Field VALHALLA
Status ABD OIL
Datum Elevation 798.5
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 M 698.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
685
690
695
700
705
Grain Size
GrSz(N/A)
Fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
TOP OF CORE = 693.87 m
massive sand
6-16-08 14NB
6-16-08 13NB
6-16-08 12NB
6-16-08 11NB
CORE NOT RECOVERED
BOTTOM OF CORE = 697.5 m
CORE DIAMETER = 8.5 cm
CORE DEPTH = LOG DEPTH

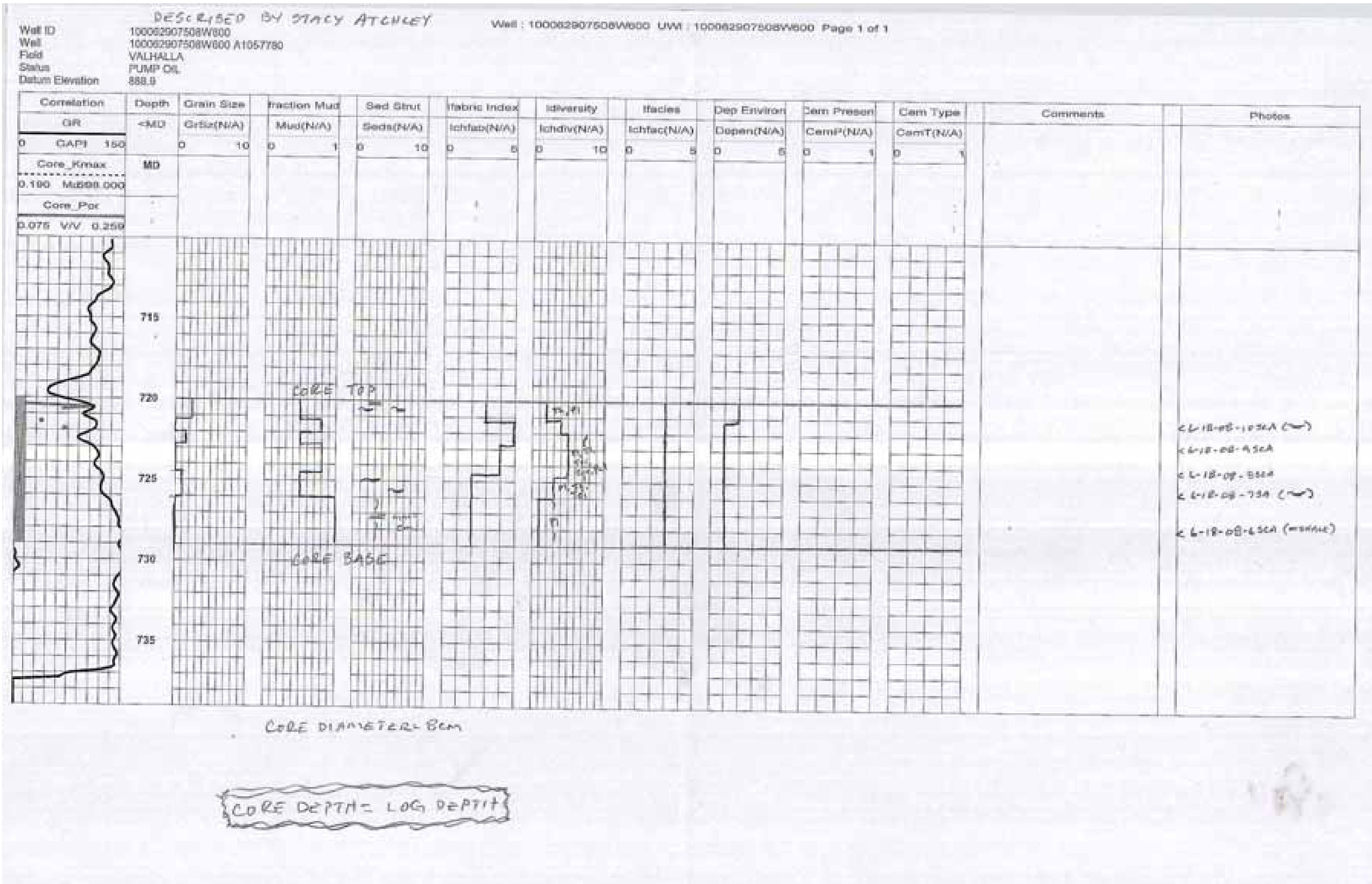

LOGGED BY STACY ATCHLEY
Well : 100061807508W600 UWI : 100061807508W600 Page 1 of 1
Well ID
Well
Field
Status
Datum Elevation
100061807508W600
100061807508W600 A096840
VALHALLA
PUMP OIL
820.0
Correlation
GR
GAPI
Core_Kmax
Core_Por
Depth
<MD
MD
690
695
700
705
710
715
Grain Size
GrSz(N/A)
Fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Fabric Index
Ichfab(N/A)
Ichdiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
CORE DIAMETER: 8cm
CORE - 3.9m = LOG DEPTH


Well ID 100061907508W600
Well 100061907508W600 A0562090
Field VALHALLA
Status ABD OIL
Datum Elevation 853.1
Well : 100061907508W600 UWI : 100061907508W600 Page 1 of 1
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 Md598.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
Grain Size
GrSz(N/A)
fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
700
705
710
715
720
Top = 706.75m
Base = 715.75m
<18-06-08-12LH
<18-06-08-11LH
<18-06-08-10LH
<18-06-08-9LH
<18-06-08-8LH
<18-06-08-7LH
Core Diameter = 8cm
core depth - 0.5m = log depth

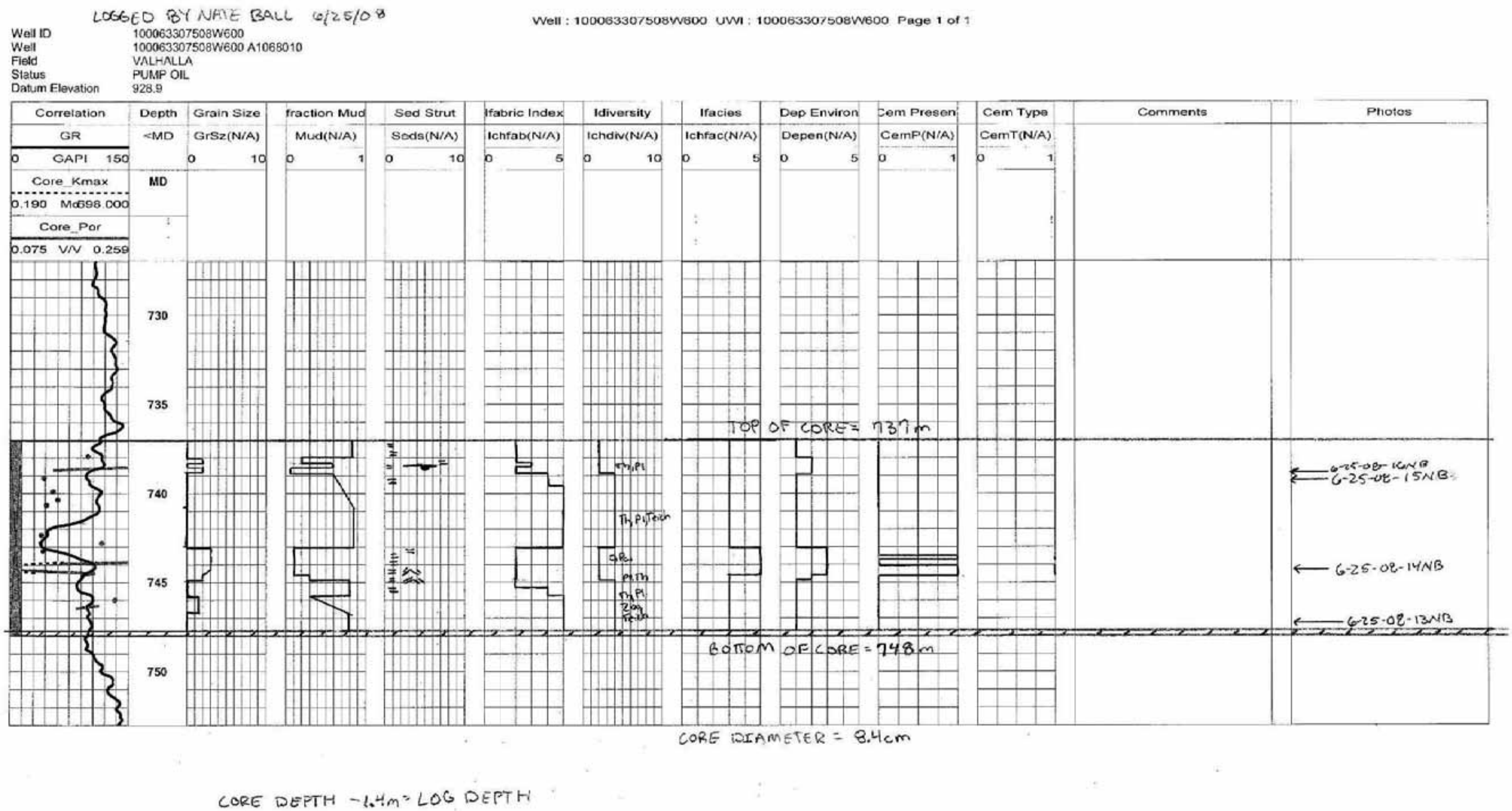

Luke Hunt 24-06-08
Well : 100062207508W600 UWI : 100062207508W600 Page 1 of 1
Well ID 100062207508W600
Well 100062207508W600 A1082820
Field VALHALLA
Status PUMP OIL
Datum Elevation 895.9
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 Md598.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
730
735
740
745
750
755
Grain Size
GrSz(N/A)
0 10
fraction Mud
Mud(N/A)
0 1
Sed Strut
Seds(N/A)
0 10
Ifabric Index
Ichfab(N/A)
0 5
Idiversity
Ichdiv(N/A)
0 10
Ifacies
Ichfac(N/A)
0 5
Dep Environ
Depen(N/A)
0 5
Cem Presen
CemP(N/A)
0 1
Cem Type
CemT(N/A)
0 1
Comments
Photos
<24-06-08-12LH
<24-06-08-11LH
<24-06-08-10LH
<24-06-08-9LH
<24-06-08-8LH
Base of Core
Core Diameter = 9cm
Core Depth - 0.5m = Log Depth

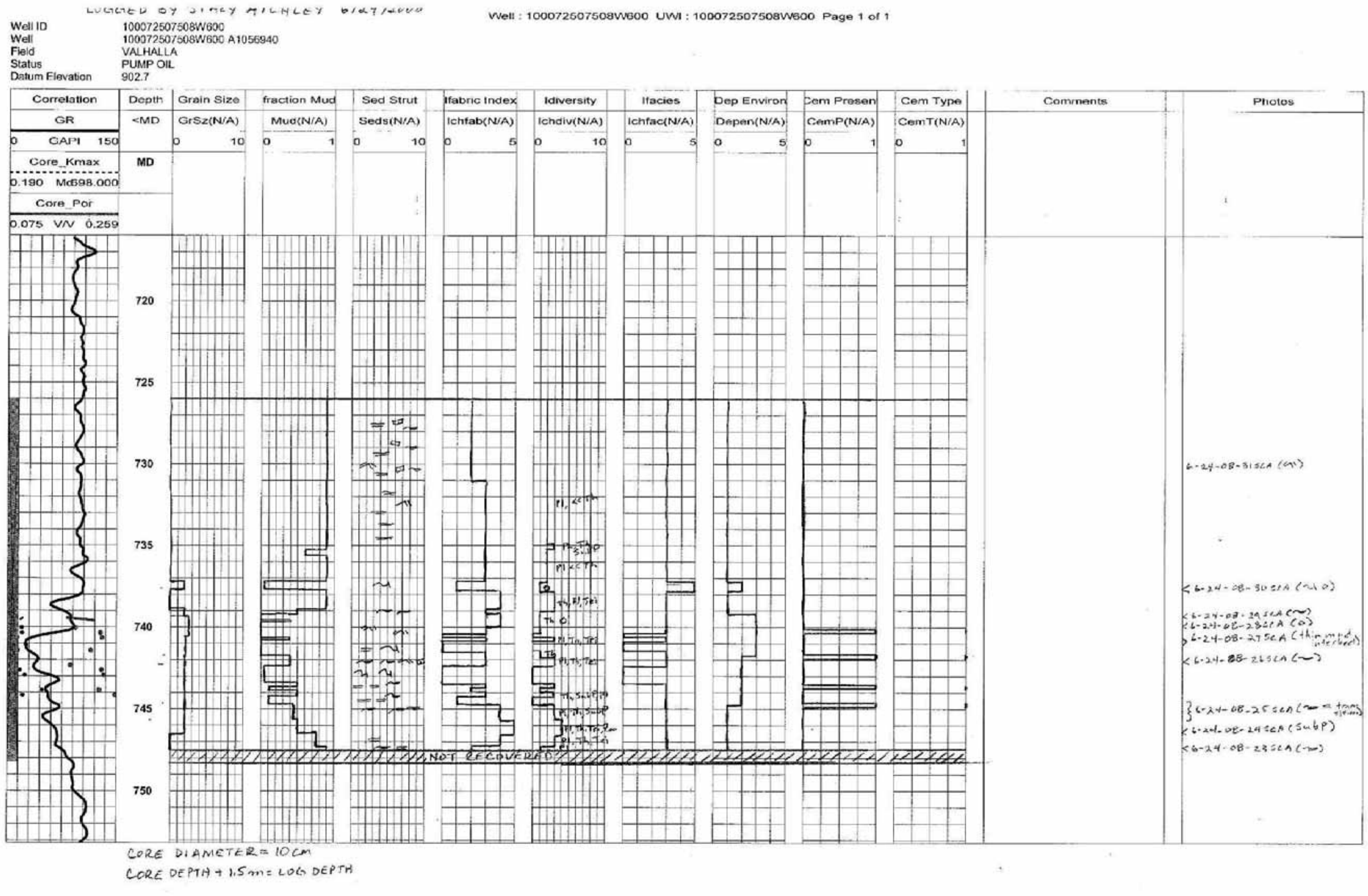

Well ID 100062307508W600
Well 100062307508W600 A1133740
Field VALHALLA
Status PUMP OIL
Datum Elevation 885.9
Well : 100062307508W600 UWI : 100062307508W600 Page 1 of 1
Correlation
GR
GAPI
Core_Kmax
Core_Por
Depth
MD
Grain Size
GrSz(N/A)
fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
720
725
730
735
740
745
750
NOT RECOVERED
CORE DIAMETER = 8.5 CM
CORE DEPTH - 0.5 m = LOG DEPTH


LOGGED BY NATE BALL 6/24/08
Well ID 100062607508W600
Well 100062607508W600 A1133760
Field VALHALLA
Status SUS OIL
Datum Elevation 900.8
Well : 100062607508W600 UWI : 100062607508W600 Page 1 of 1
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 Md698.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
Grain Size
GrSz(N/A)
0 10
fraction Mud
Mud(N/A)
0 1
Sed Strut
Seds(N/A)
0 10
Ifabric Index
Ichfab(N/A)
0 5
Idiversity
Ichdiv(N/A)
0 10
Ifacies
Ichfac(N/A)
0 5
Dep Environ
Depen(N/A)
0 5
Cem Presen
CemP(N/A)
0 1
Cem Type
CemT(N/A)
0 1
Comments
Photos
720
725
730
735
737.9
740
745
750
TOP OF CORE = 726m
CORE NOT RECOVERED
BOTTOM OF CORE = 740.5m
6-24-08-35NB
6-24-08-34NB
6-24-08-33NB
6-24-08-32NB
6-24-08-31NB
6-24-08-30NB
6-24-08-29NB
CORE DEPTH +1.26m = LOG DEPTH
CORE DIAMETER = 10cm

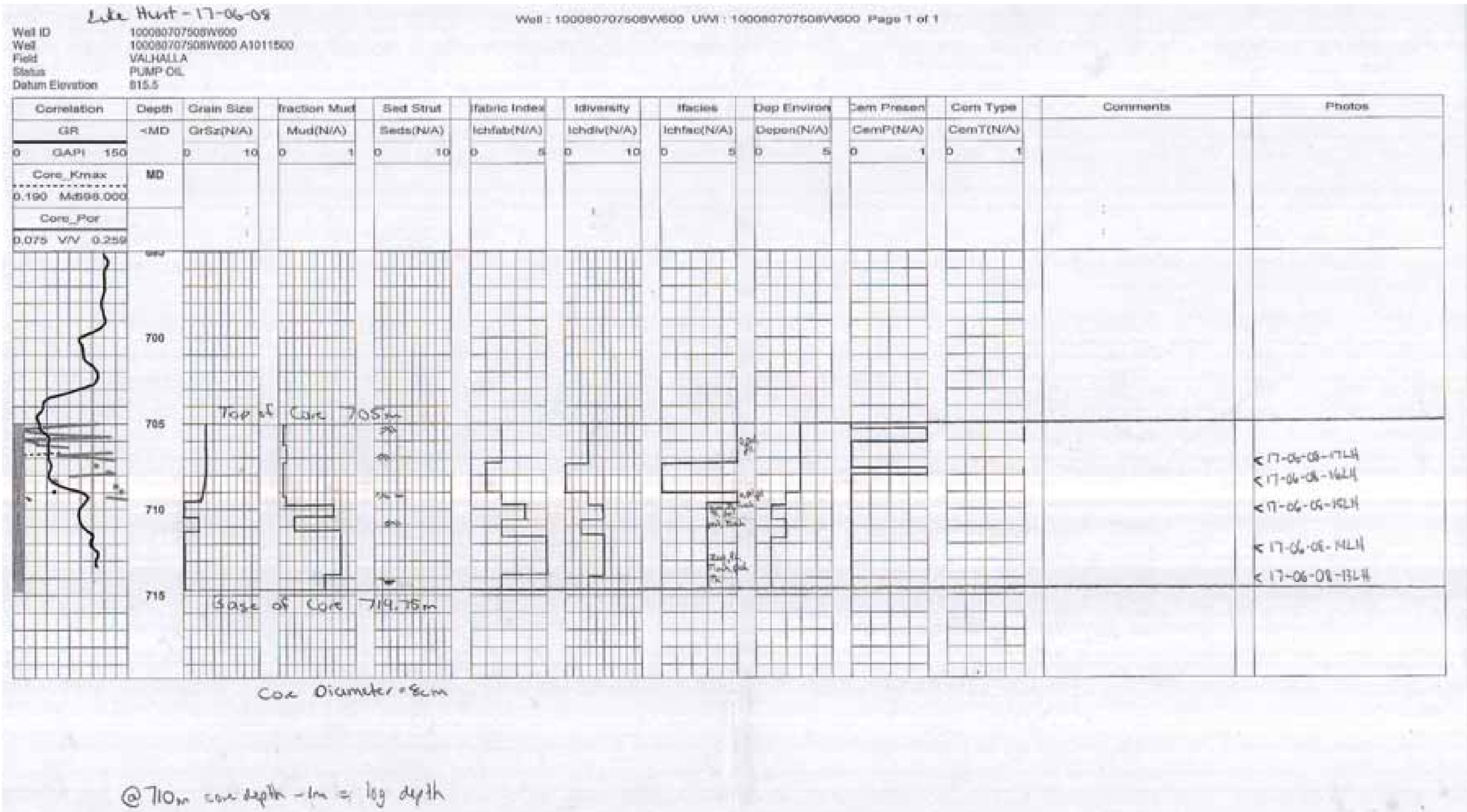


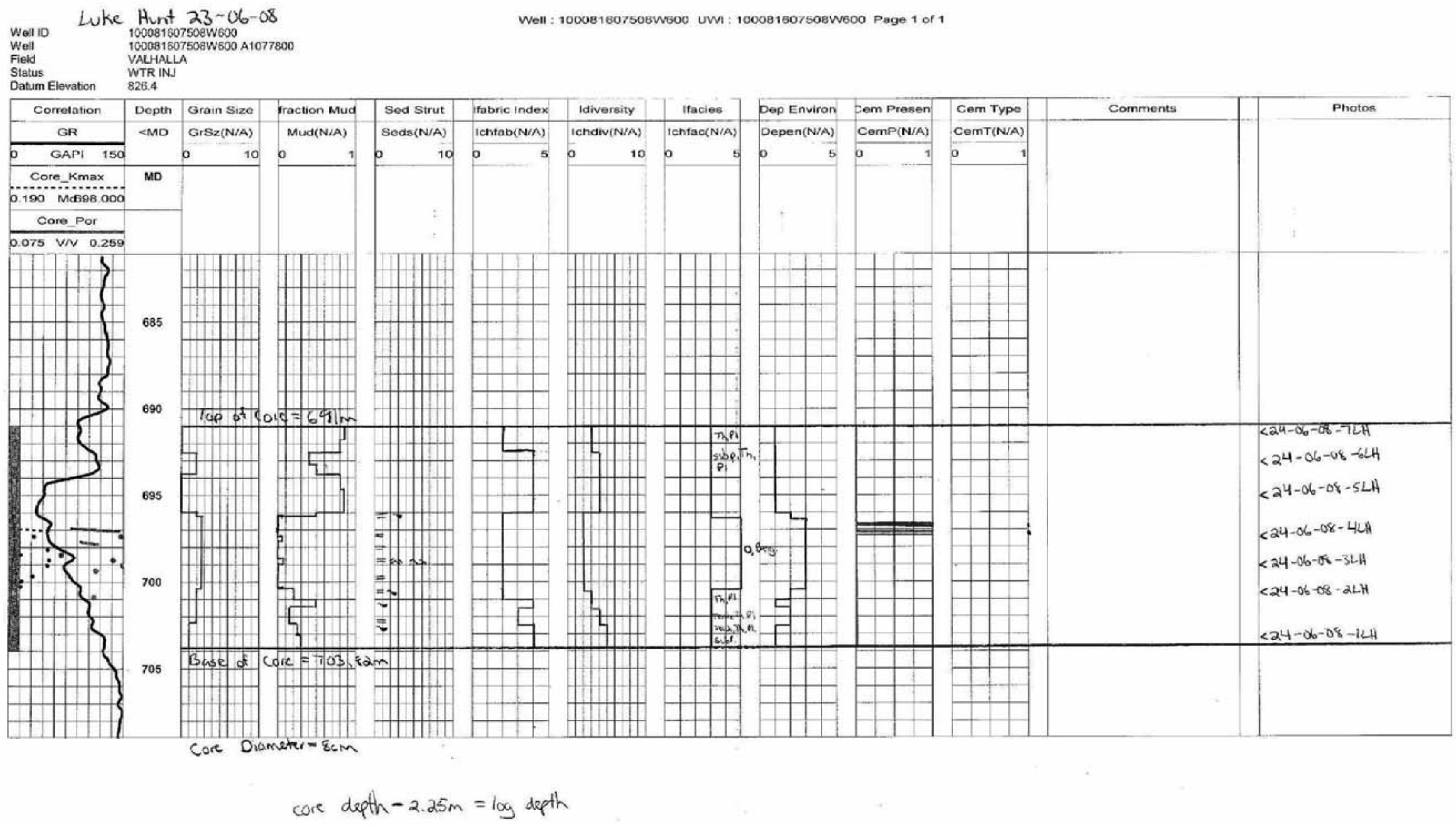
DESCRIBED BY STACY ATCHLEY
Well ID 100062907508W600
Well 100062907508W600 A1057780
Field VALHALLA
Status PUMP OIL
Datum Elevation 888.9
Well : 100062907508W600 UWI : 100062907508W600 Page 1 of 1
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 Md888.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
715
720
725
730
735
Grain Size
GrSiz(N/A)
Fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Preson
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
CORE TOP
CORE BASE
CORE DIAMETER = 8cm
CORE DEPTH = LOG DEPTH

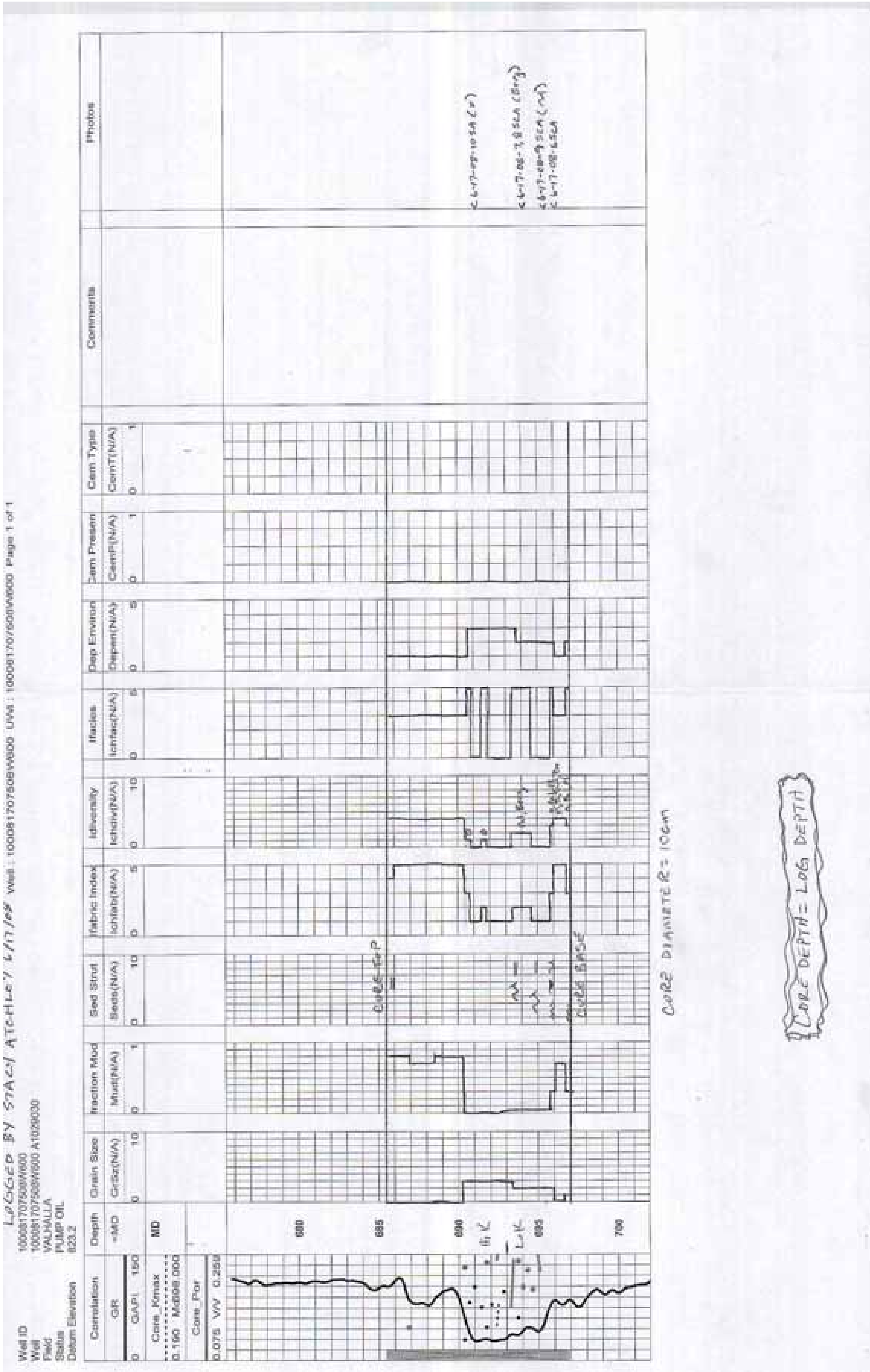

LOGGED BY NATE BALL 6/25/08
Well : 100063307508W600 UWI : 100063307508W600 Page 1 of 1
Well ID 100063307508W600
Well 100063307508W600 A1068010
Field VALHALLA
Status PUMP OIL
Datum Elevation 928.9
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 Md698.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
730
735
740
745
750
Grain Size
GrSz(N/A)
0 10
fraction Mud
Mud(N/A)
0 1
Sed Strut
Seds(N/A)
0 10
Ifabric Index
Ichfab(N/A)
0 5
Idiversity
Ichdiv(N/A)
0 10
Ifacies
Ichfac(N/A)
0 5
Dep Environ
Depen(N/A)
0 5
Cem Presen
CemP(N/A)
0 1
Cem Type
CemT(N/A)
0 1
Comments
Photos
TOP OF CORE = 737m
6-25-08-15NB
6-25-08-14NB
6-25-08-13NB
BOTTOM OF CORE = 748m
CORE DIAMETER = 8.4cm
CORE DEPTH -1.4m = LOG DEPTH

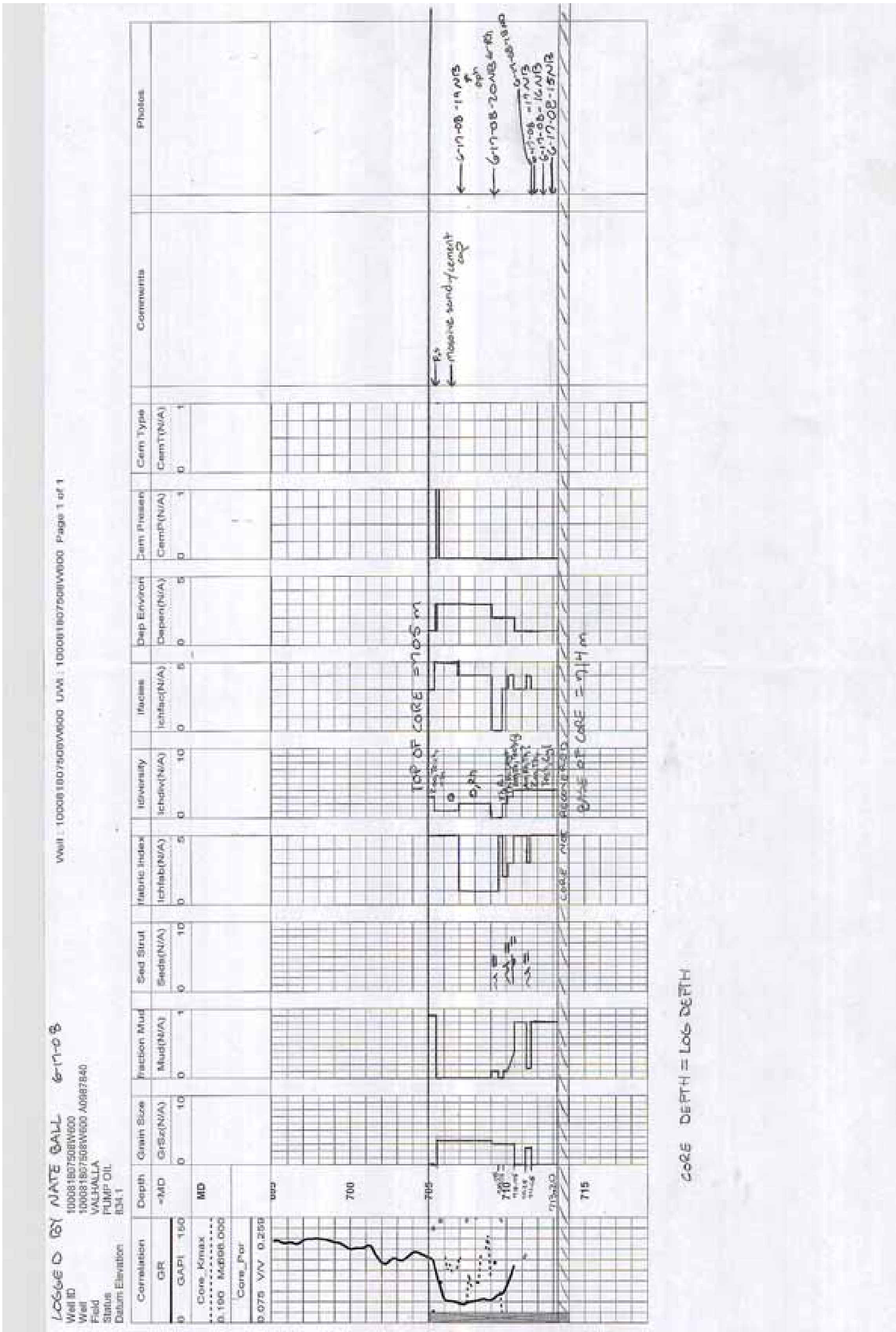


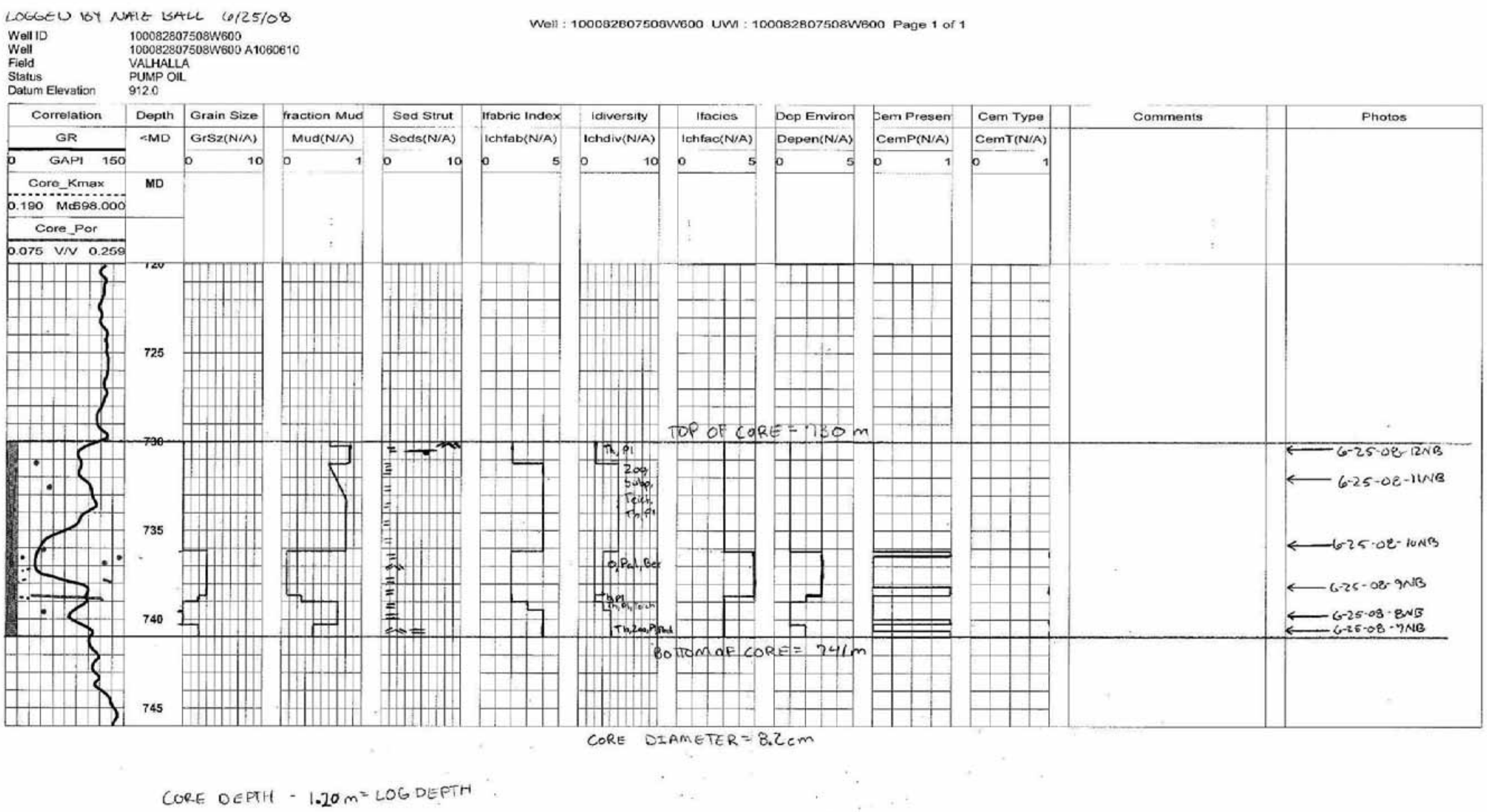
Well : 100072507508W600 UWI : 100072507508W600 Page 1 of 1
Well ID 100072507508W600
Well 100072507508W600 A1056940
Field VALHALLA
Status PUMP OIL
Datum Elevation 902.7
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 Md698.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
720
725
730
735
740
745
750
Grain Size
GrSz(N/A)
fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
NOT RECOVERED
CORE DIAMETER = 10 cm
CORE DEPTH + 1.5 m = LOG DEPTH

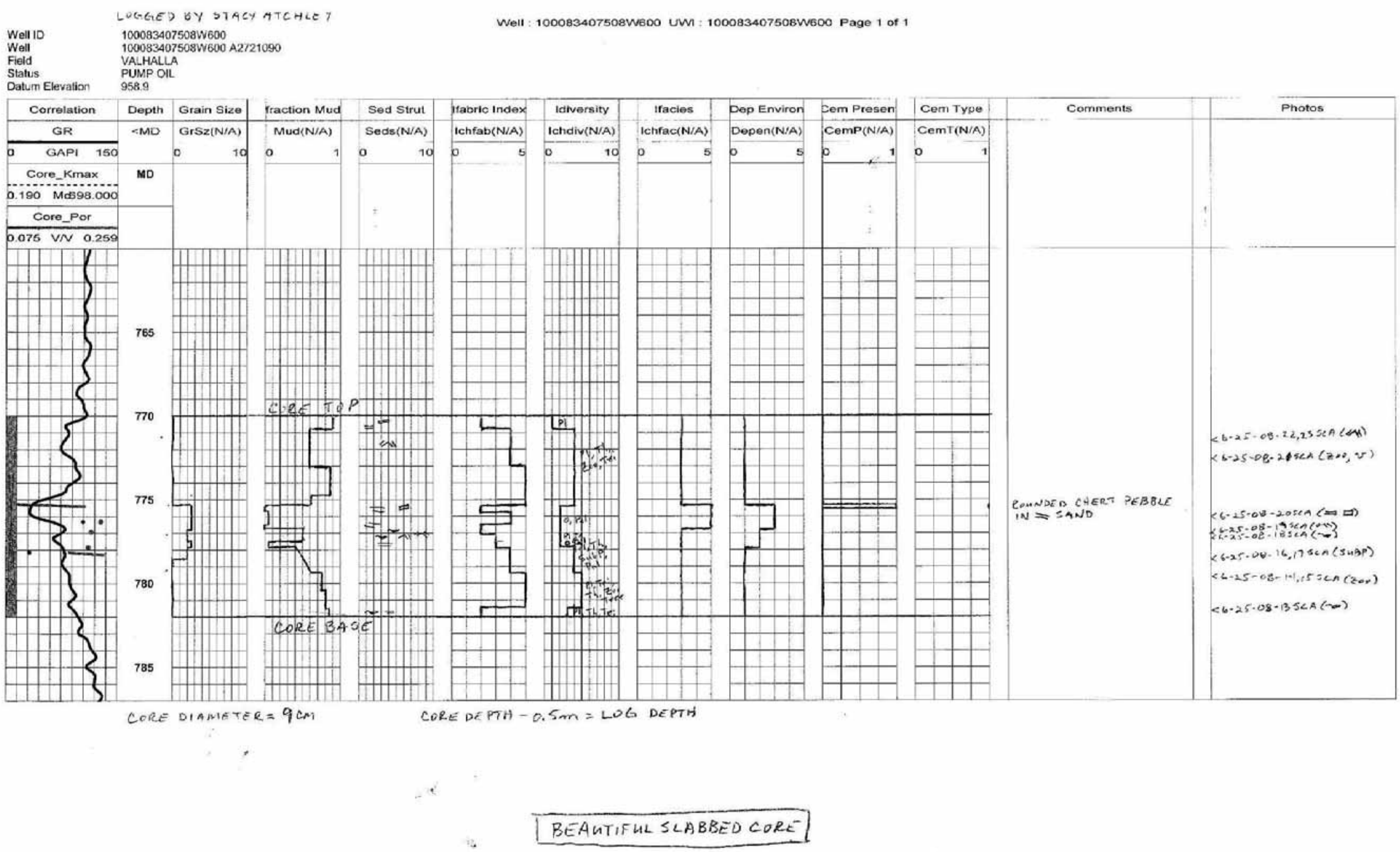

Luke Hurt - 17-06-08
Well : 100080707508W600 UWI : 100080707508W600 Page 1 of 1
Well ID 100080707508W600
Well 100080707508W600 A1011500
Field VALHALLA
Status PUMP OIL
Datum Elevation 815.5
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 Md898.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
700
705
710
715
Grain Size
GrSz(N/A)
0 10
fraction Mud
Mud(N/A)
0 1
Sed Strut
Seds(N/A)
0 10
Ifabric Index
Ichfab(N/A)
0 5
Idiversity
Ichdiv(N/A)
0 10
Ifacies
Ichfac(N/A)
0 5
Dep Environ
Depen(N/A)
0 5
Cem Presen
CemP(N/A)
0 1
Cem Type
CemT(N/A)
0 1
Comments
Photos
Top of Core 705m
Base of Core 719.75m
< 17-06-08-17LH
< 17-06-08-16LH
< 17-06-08-15LH
< 17-06-08-14LH
< 17-06-08-13LH
Core Diameter = 8cm
@ 710m core depth - 1m = log depth


Luke Hunt 23-06-08
Well ID 100081607508W600
Well 100081607508W600 A1077800
Field VALHALLA
Status WTR INJ
Datum Elevation 826.4
Well : 100081607508W600 UWI : 100081607508W600 Page 1 of 1
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 Md698.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
Grain Size
GrSz(N/A)
0 10
fraction Mud
Mud(N/A)
0 1
Sed Strut
Seds(N/A)
0 10
Ifabric Index
Ichfab(N/A)
0 5
Idiversity
Ichdiv(N/A)
0 10
Ifacies
Ichfac(N/A)
0 5
Dep Environ
Depen(N/A)
0 5
Cem Presen
CemP(N/A)
0 1
Cem Type
CemT(N/A)
0 1
Comments
Photos
685
690
695
700
705
Top of Core = 691m
Base of Core = 703.62m
<24-06-08-7LH
<24-06-08-6LH
<24-06-08-5LH
<24-06-08-4LH
<24-06-08-3LH
<24-06-08-2LH
<24-06-08-1LH
Core Diameter = 8cm
core depth - 2.25m = log depth


LOGGED BY STACY ATCHLEY 6/17/09
Well ID
Well
Field
Status
Datum Elevation
VALHALLA
PUMP OIL
Correlation
Depth
Grain Size
fraction Mud
Sed Strut
fabric Index
Idiversity
Ifacies
Dep Environ
Cem Presen
Cem Type
Comments
Photos
GR
Core_Kmax
Core_Por
680
685
690
695
700
CORE TOP
CORE BASE
CORE DIAMETER = 10cm
CORE DEPTH = LOG DEPTH

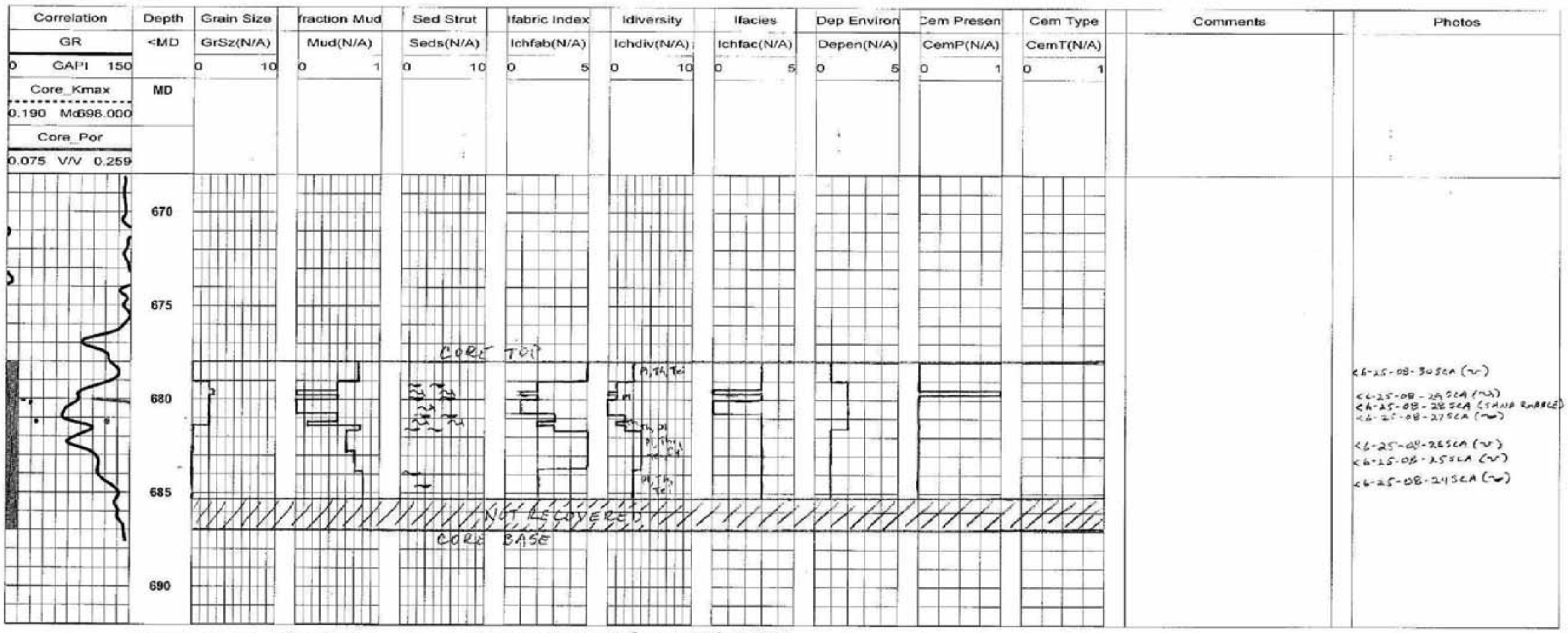

LOGGED BY NATE GALL 6-17-08
Well ID
Well
Field
Status
Datum Elevation
VALHALLA
PUMP OIL
Well : 100081807508W600 UWI : 100081807508W600 Page 1 of 1
Correlation
GR
GAPI
Core_Kmax
Core_Por
Depth
MD
Grain Size
Fraction Mud
Sed Strut
Ifabric Index
IDiversity
Ifacies
Dep Environ
Cem Presen
Cem Type
Comments
Photos
700
705
710
715
TOP OF CORE = 705 m
BASE OF CORE = 714 m
CORE NOT RECOVERED
massive sand / cement cap
CORE DEPTH = LOG DEPTH


LOGGED BY NATE BALL 6/25/08
Well ID 100082807508W600
Well 100082807508W600 A1060610
Field VALHALLA
Status PUMP OIL
Datum Elevation 912.0
Well : 100082807508W600 UWI : 100082807508W600 Page 1 of 1
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 Md598.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
Grain Size
GrSz(N/A)
fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
720
725
730
735
740
745
TOP OF CORE = 730 m
BOTTOM OF CORE = 741 m
6-25-08-12NB
6-25-08-11NB
6-25-08-10NB
6-25-08-9NB
6-25-08-8NB
6-25-08-7NB
CORE DIAMETER = 8.2cm
CORE DEPTH - 1.20 m = LOG DEPTH

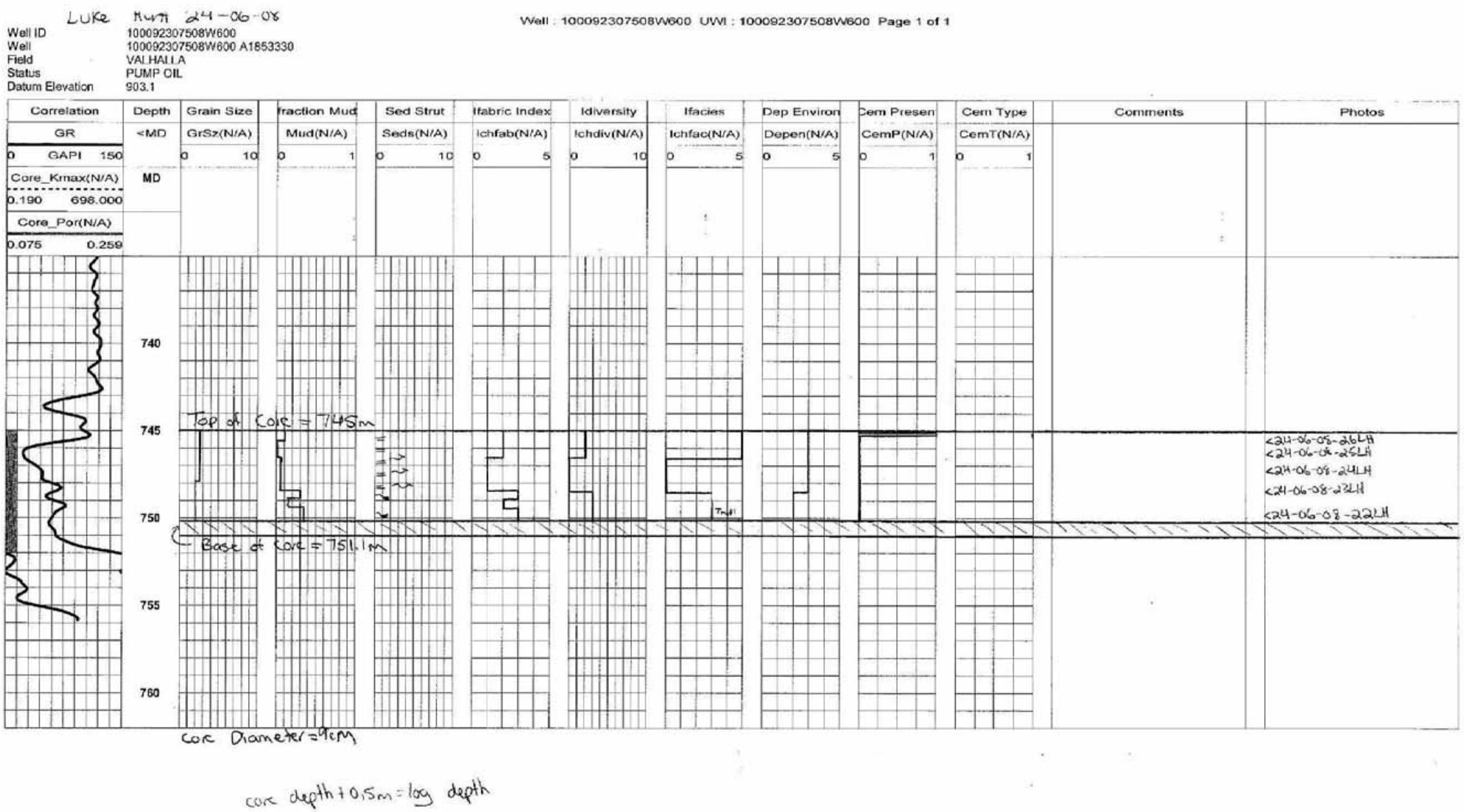

LOGGED BY STACY ATCHLEY
Well : 100083407508W600 UWI : 100083407508W600 Page 1 of 1
Well ID 100083407508W600
Well 100083407508W600 A2721090
Field VALHALLA
Status PUMP OIL
Datum Elevation 958.9
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 Md898.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
765
770
775
780
785
Grain Size
GrSz(N/A)
fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
CORE TOP
CORE BASE
ROUNDED CHERT PEBBLE IN = SAND
CORE DIAMETER = 9CM
CORE DEPTH - 0.5m = LOG DEPTH
BEAUTIFUL SLABBED CORE

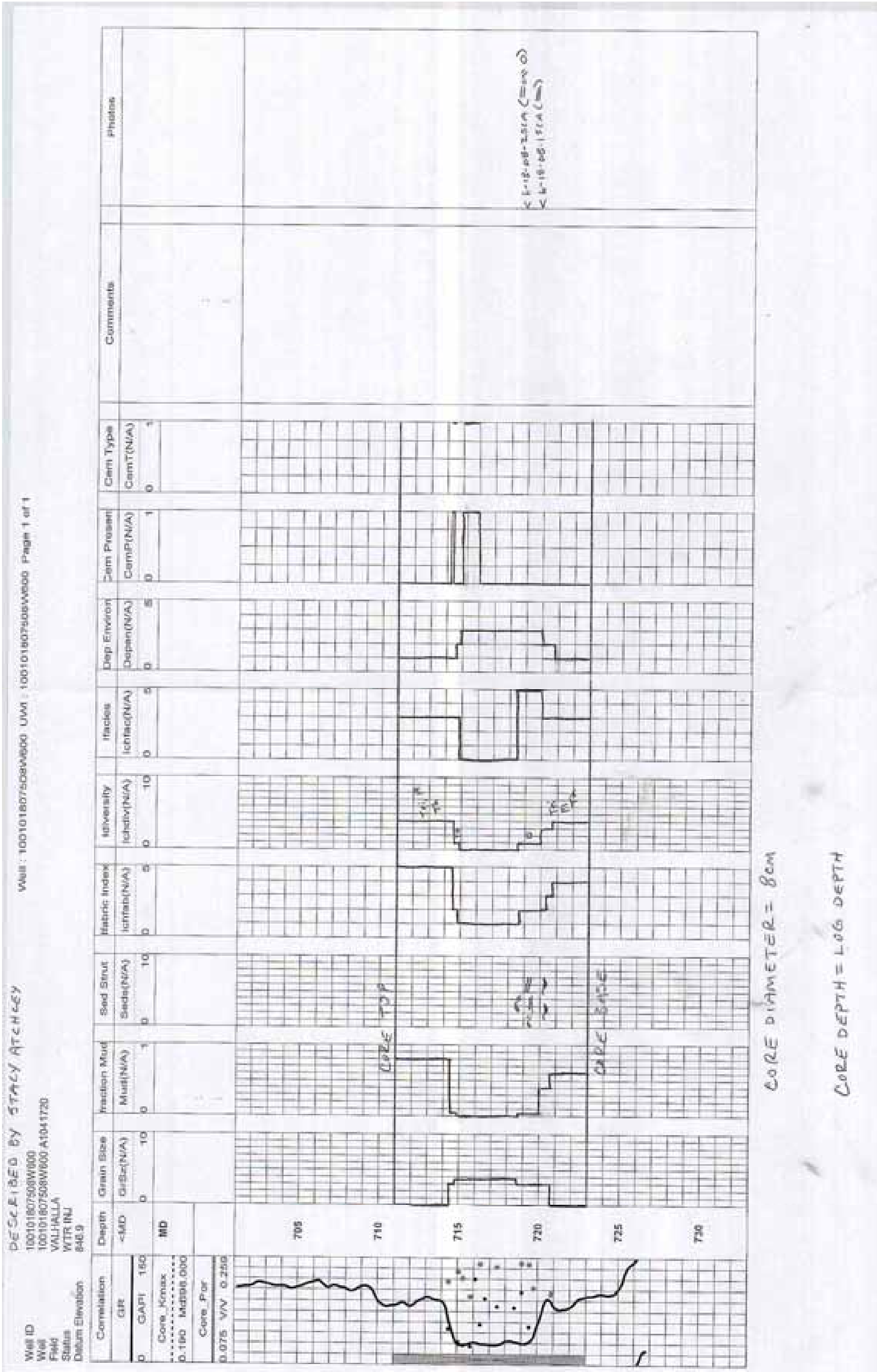
Well: 100083607508W600 UWI: 100083607508W600 Page 1 of 1

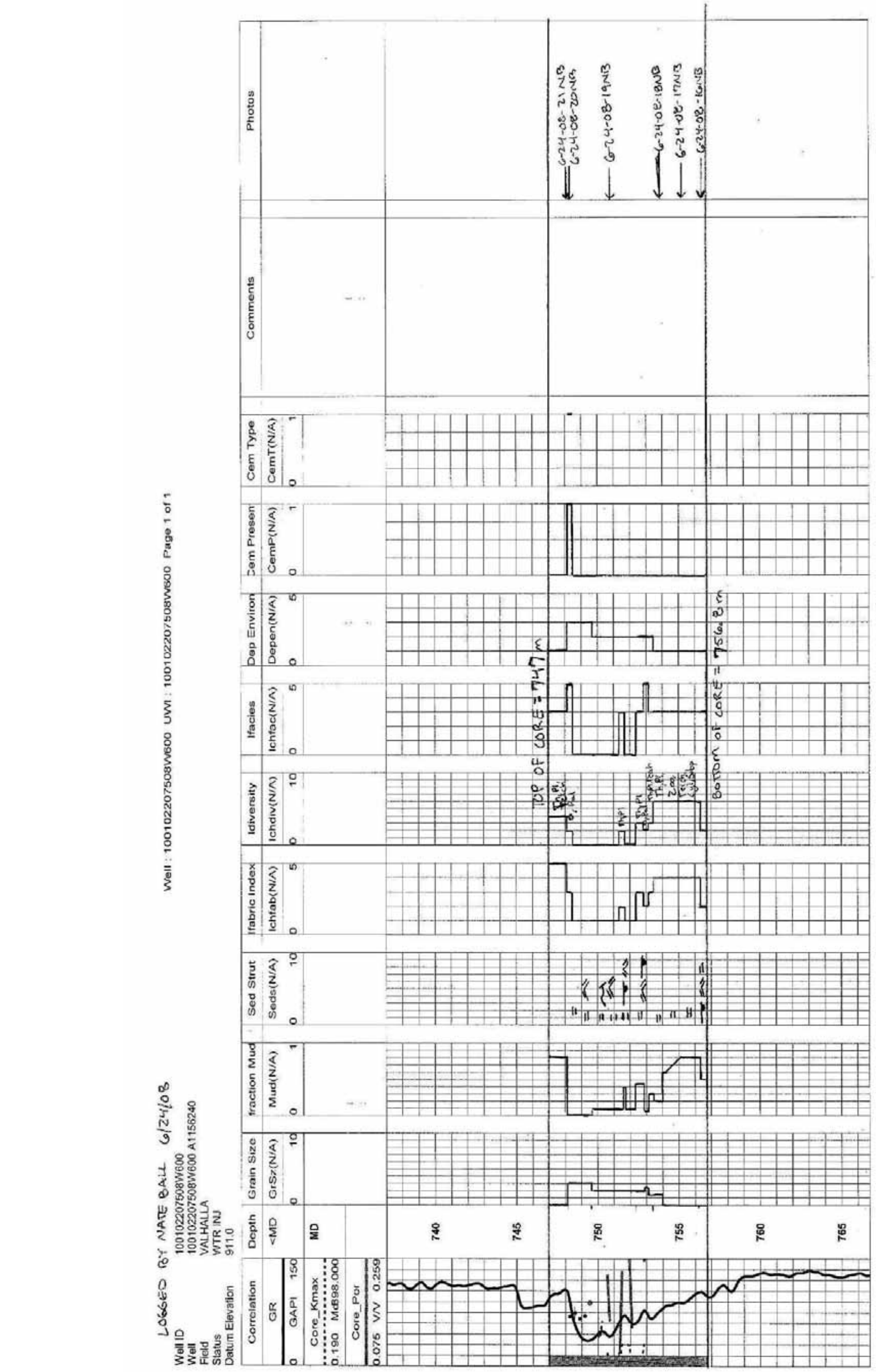
Well ID 100083607508W600
Well 100083607508W600 A1853340
Field VALHALLA
Status ABD OIL
Datum Elevation 853.8

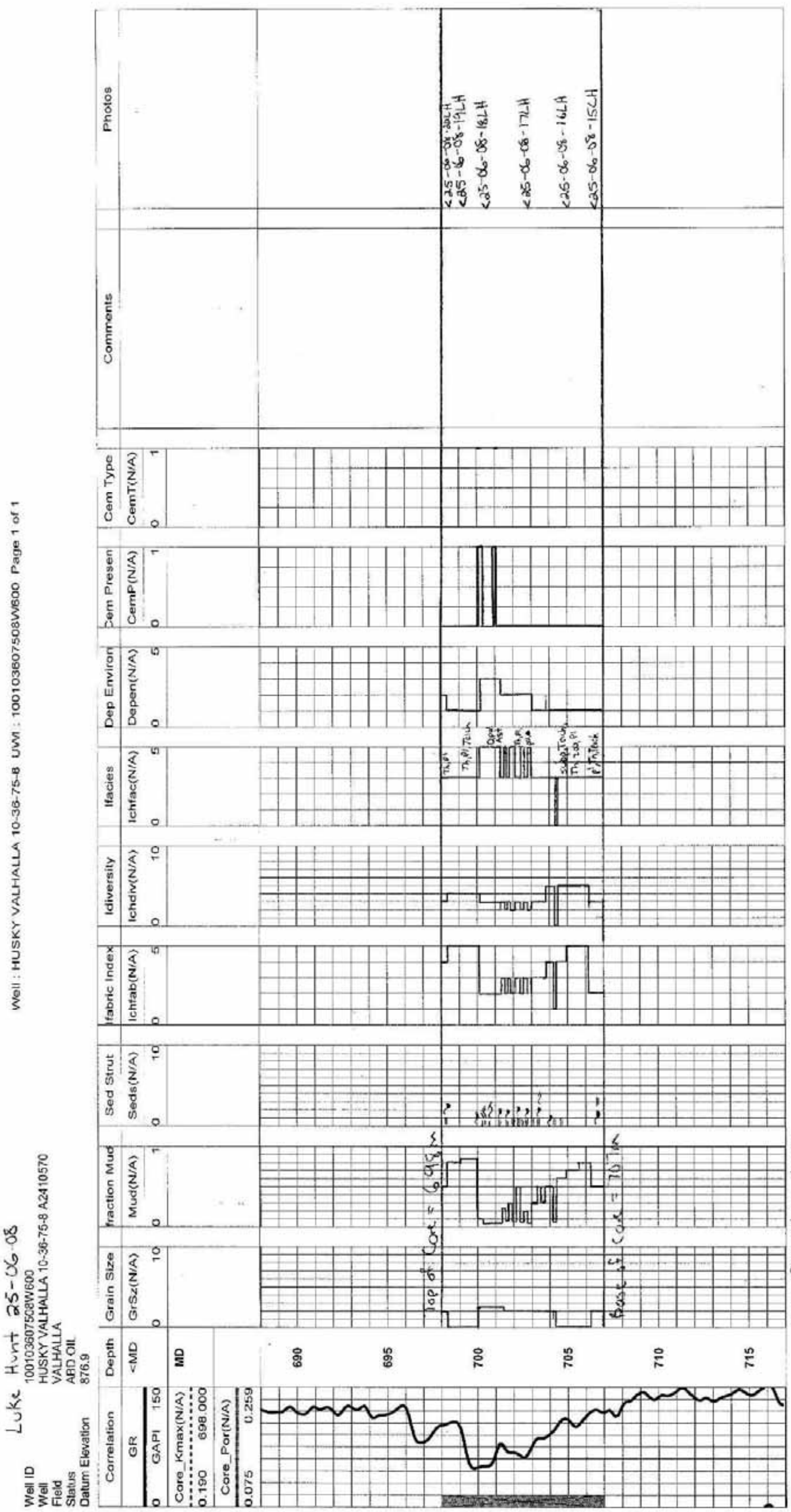


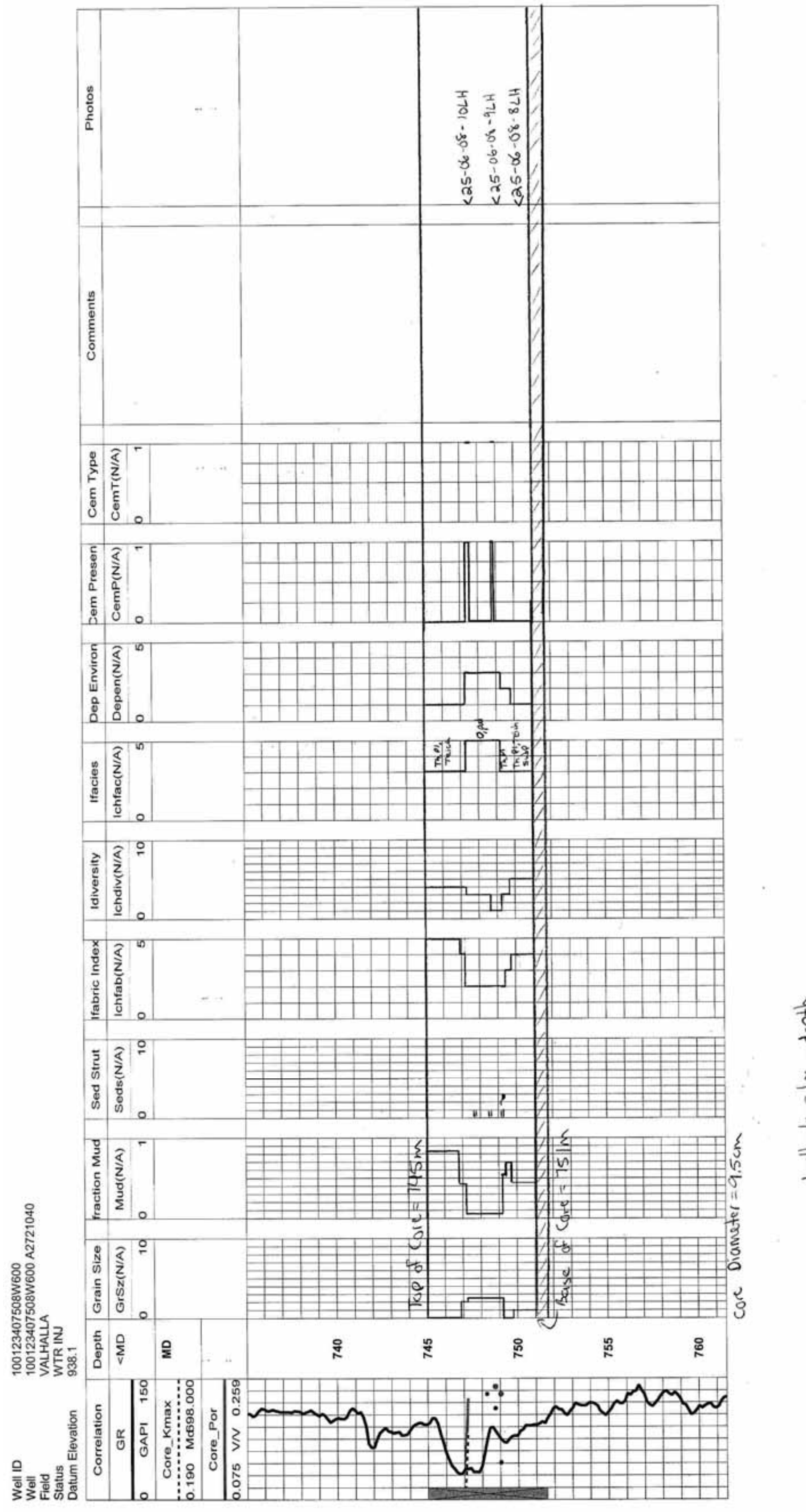
CORE DIAMETER = 8.5 cm CORE DEPTH + 0.5 m = LOG DEPTH


LUKE Kurt 24-06-08
Well ID 100092307508W600
Well 100092307508W600 A1853330
Field VALHALLA
Status PUMP OIL
Datum Elevation 903.1
Well : 100092307508W600 UWI : 100092307508W600 Page 1 of 1
Correlation
GR
0 GAPI 150
Core_Kmax(N/A)
0.190 698.000
Core_Por(N/A)
0.075 0.259
Depth
<MD
MD
Grain Size
GrSz(N/A)
Fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
740
745
750
755
760
Top of Core = 745m
Base of Core = 751.1m
<24-06-08-26LH
<24-06-08-25LH
<24-06-08-24LH
<24-06-08-23LH
<24-06-08-22LH
Core Diameter = 9cm
core depth + 0.5m = log depth

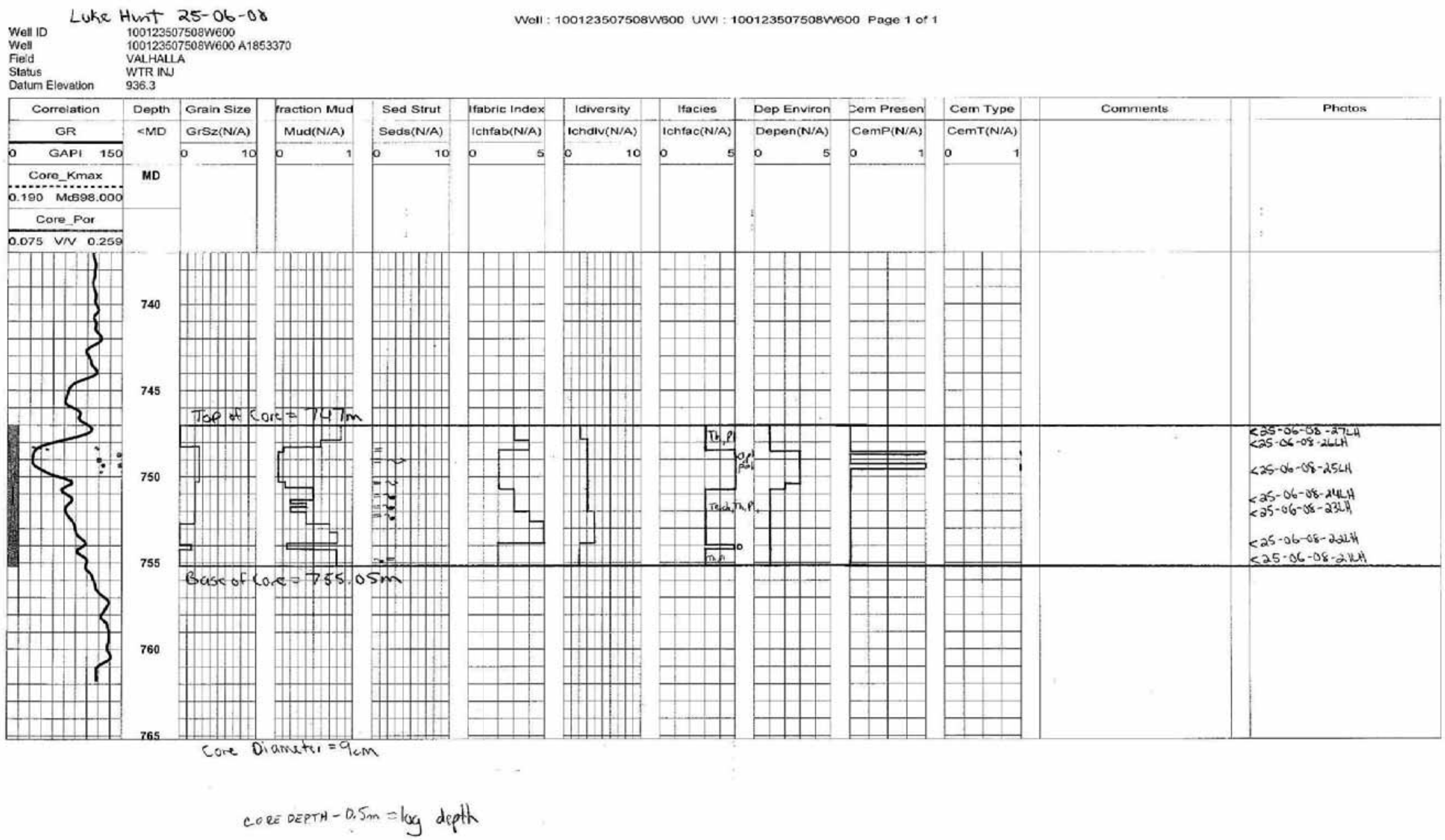

DESCRIBED BY STACY ATCHLEY
Well ID
Well
Field
Status
Datum Elevation
VALHALLA
WTR INJ
846.0
Correlation
GR
GAPI
Core_Kmax
Core_Por
Depth
MD
Grain Size
Traction Mud
Sed Strut
Fabric Index
Idiversity
Ifacies
Dep Environ
Cem Presen
Cem Type
Comments
Photos
705
710
715
720
725
730
CORE TOP
CORE BASE
CORE DIAMETER = 8cm
CORE DEPTH = LOG DEPTH


LOGGED BY NATE BALL 6/24/08
Well ID 100102207508W600
Well 100102207508W600 A1156240
Field VALHALLA
Status WTR INJ
Datum Elevation 911.0
Well : 100102207508W600 UWI : 100102207508W600 Page 1 of 1
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 MD898.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
Grain Size
GrSz(N/A)
0 10
fraction Mud
Mud(N/A)
0 1
Sed Strut
Seds(N/A)
0 10
Ifabric Index
Ichfab(N/A)
0 5
Idiversity
Ichdiv(N/A)
0 10
Ifacies
Ichfac(N/A)
0 5
Dep Environ
Depen(N/A)
0 5
Cem Presen
CemP(N/A)
0 1
Cem Type
CemT(N/A)
0 1
Comments
Photos
740
745
750
755
760
765
TOP OF CORE = 747 m
Bottom of CORE = 756.8 m
6-24-08-21NB
6-24-08-20NB
6-24-08-19NB
6-24-08-18NB
6-24-08-17NB
6-24-08-16NB
CORE DIAMETER: 8.8cm
CORE DEPTH +0.4m = LOG DEPTH


Luke Hunt 25-06-08
Well : HUSKY VALHALLA 10-36-75-8 UWI : 100103607508W600 Page 1 of 1
Well ID 100103607508W600
Well HUSKY VALHALLA 10-36-75-8 A2410570
Field VALHALLA
Status ABD OIL
Datum Elevation 876.9
Correlation
GR
GAPI
Core_Kmax(N/A)
Core_Por(N/A)
Depth
MD
Grain Size
GrSz(N/A)
fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
690
695
700
705
710
715
Core Diameter = 10cm
core depth -1m = log depth

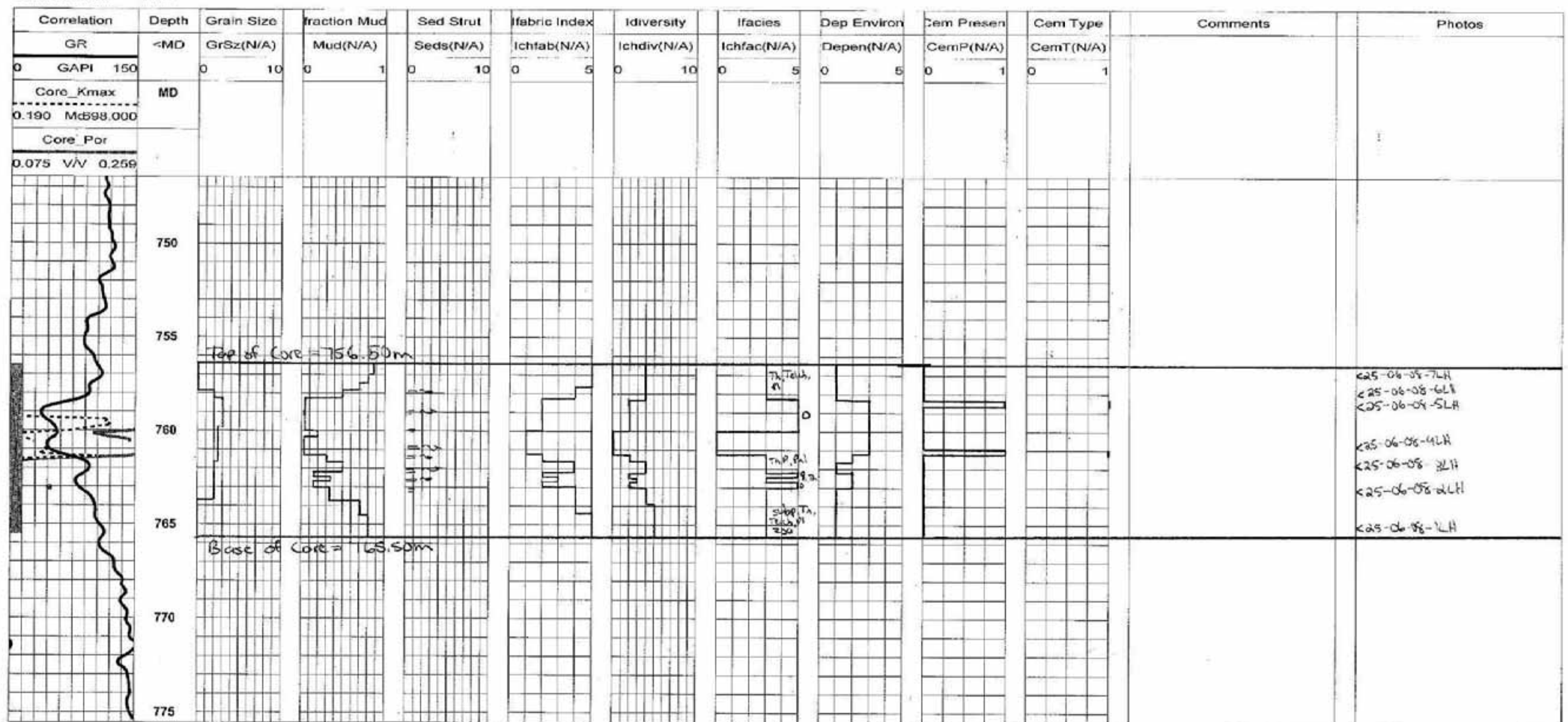


Well ID
Well
Field
Status
Datum Elevation
100123407508W600
100123407508W600 A2721040
VALHALLA
WTR INJ
938.1
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 Md698.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
740
745
750
755
760
Grain Size
GrSz(N/A)
0 10
Fraction Mud
Mud(N/A)
0 1
Sed Strut
Seds(N/A)
0 10
Ifabric Index
Ichfab(N/A)
0 5
Idiversity
Ichdiv(N/A)
0 10
Ifacies
Ichfac(N/A)
0 5
Dep Environ
Depen(N/A)
0 5
Cem Presen
CemP(N/A)
0 1
Cem Type
CemT(N/A)
0 1
Comments
Photos
<25-06-08-10LH
<25-06-08-9LH
<25-06-08-8LH
Top of Core = 745m
Base of Core = 751m
Core Diameter = 9.5cm
core depth - 1m = log depth


Luke Hunt 25-06-08
Well : 100123507508W600 UWI : 100123507508W600 Page 1 of 1
Well ID 100123507508W600
Well 100123507508W600 A1853370
Field VALHALLA
Status WTR INJ
Datum Elevation 936.3
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 Md898.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
740
745
750
755
760
765
Grain Size
GrSz(N/A)
fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
Top of Core = 747m
Base of Core = 755.05m
<25-06-08-27LH
<25-06-08-26LH
<25-06-08-25LH
<25-06-08-24LH
<25-06-08-23LH
<25-06-08-22LH
<25-06-08-21LH
Core Diameter = 9cm
CORE DEPTH - 0.5m = log depth

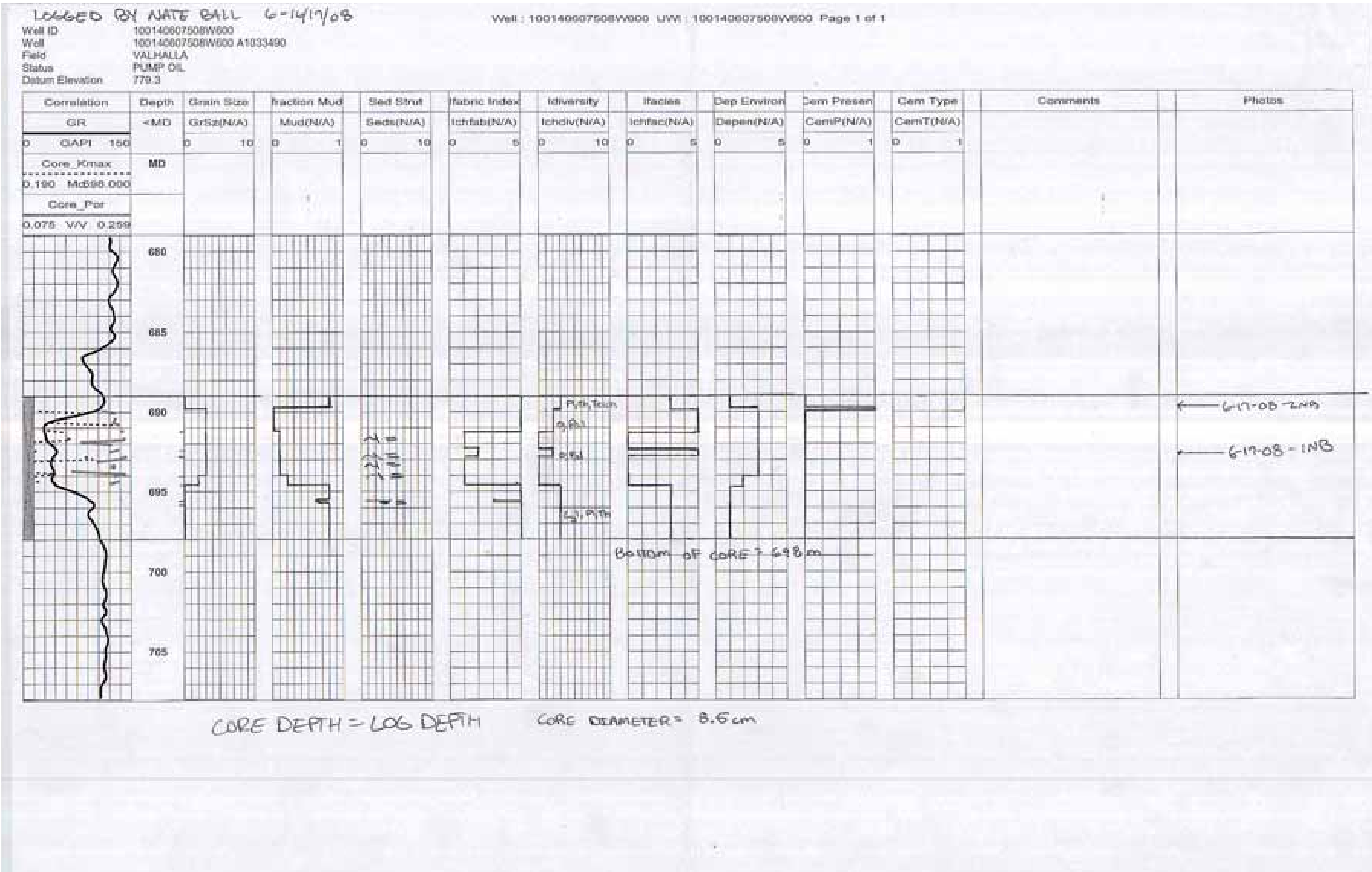
LUKE HUNT 24-06-08

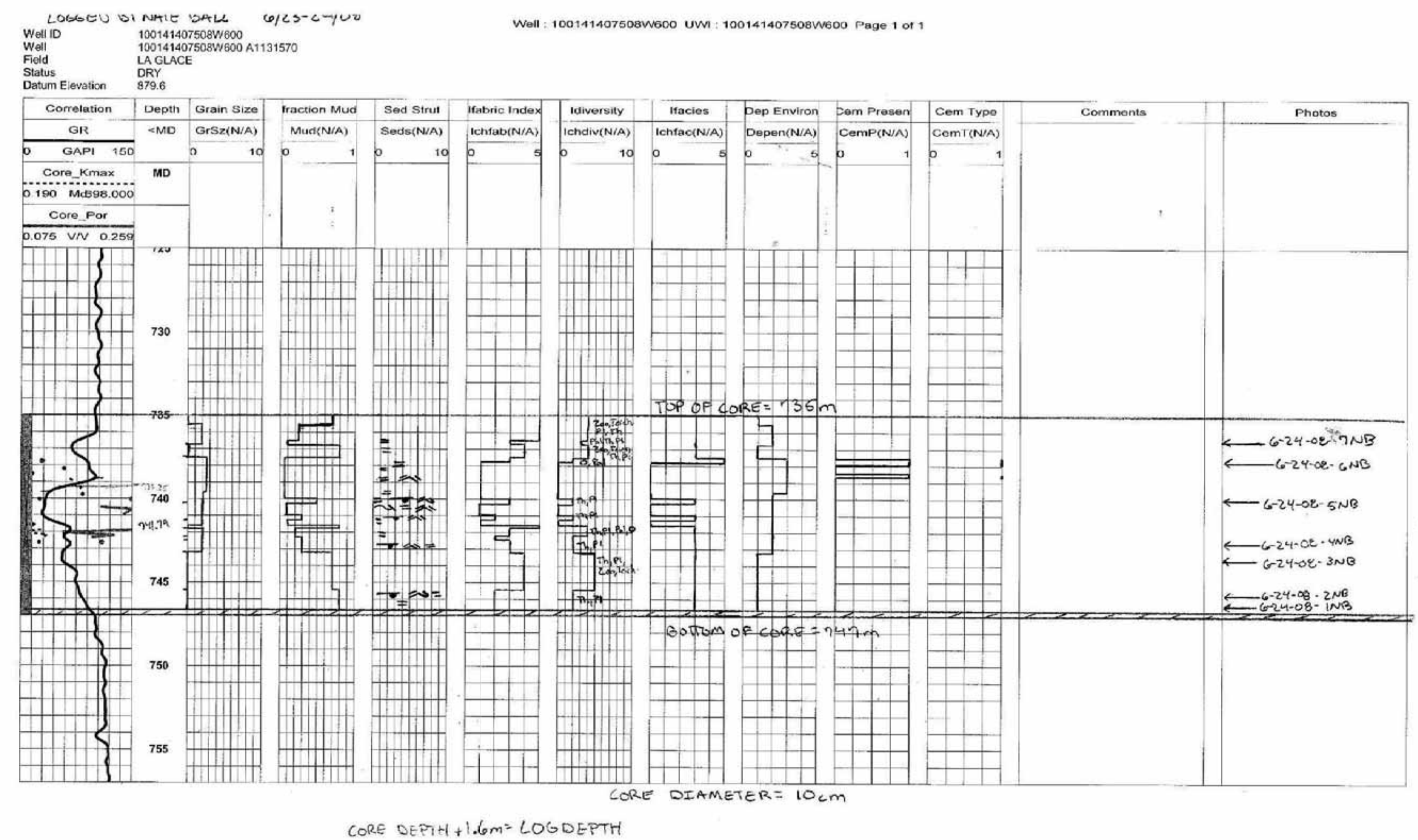
Well ID 100132707508W600
Well 100132707508W600 A2612710
Field VALHALLA
Status PUMP OIL
Datum Elevation 941.1

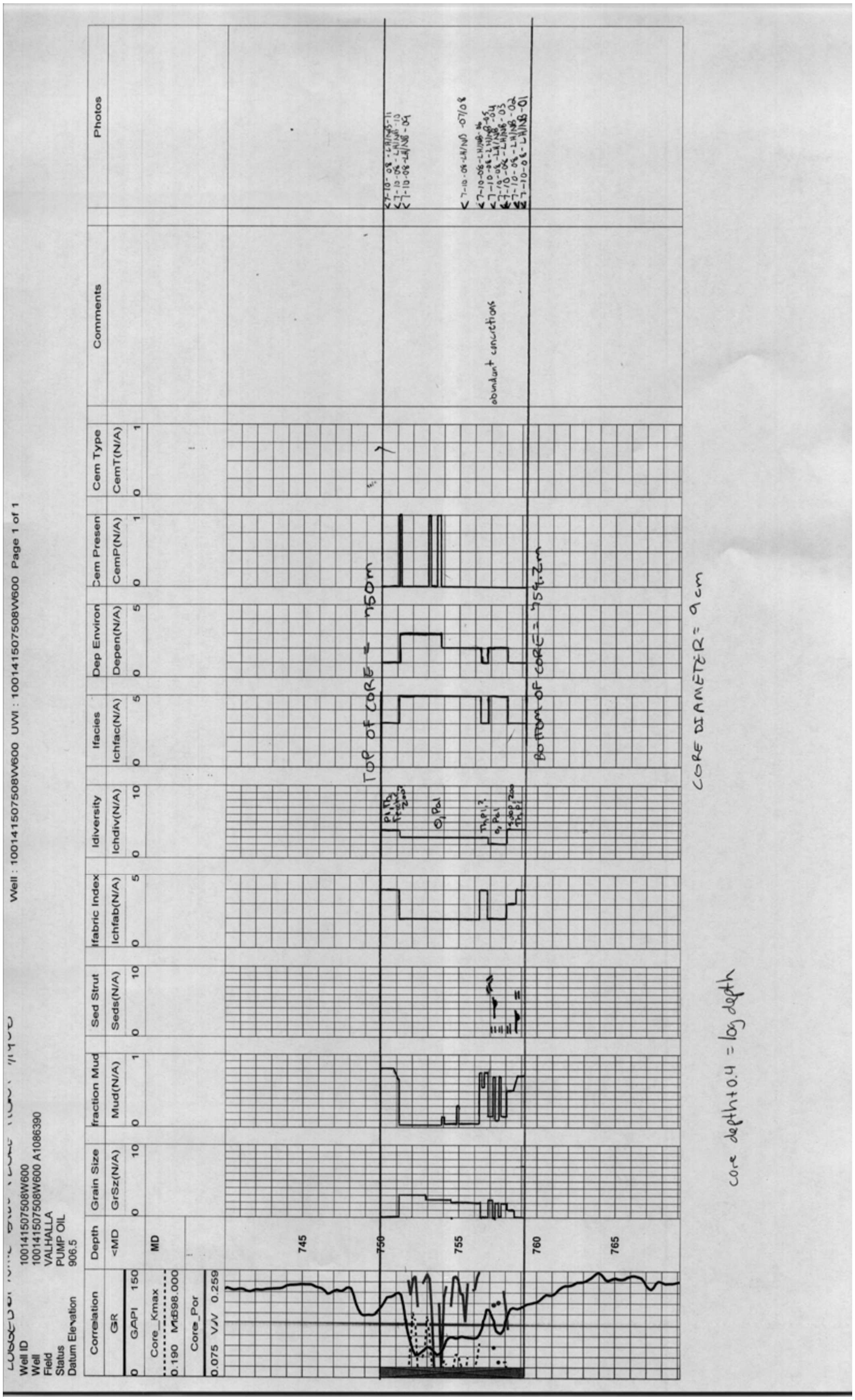


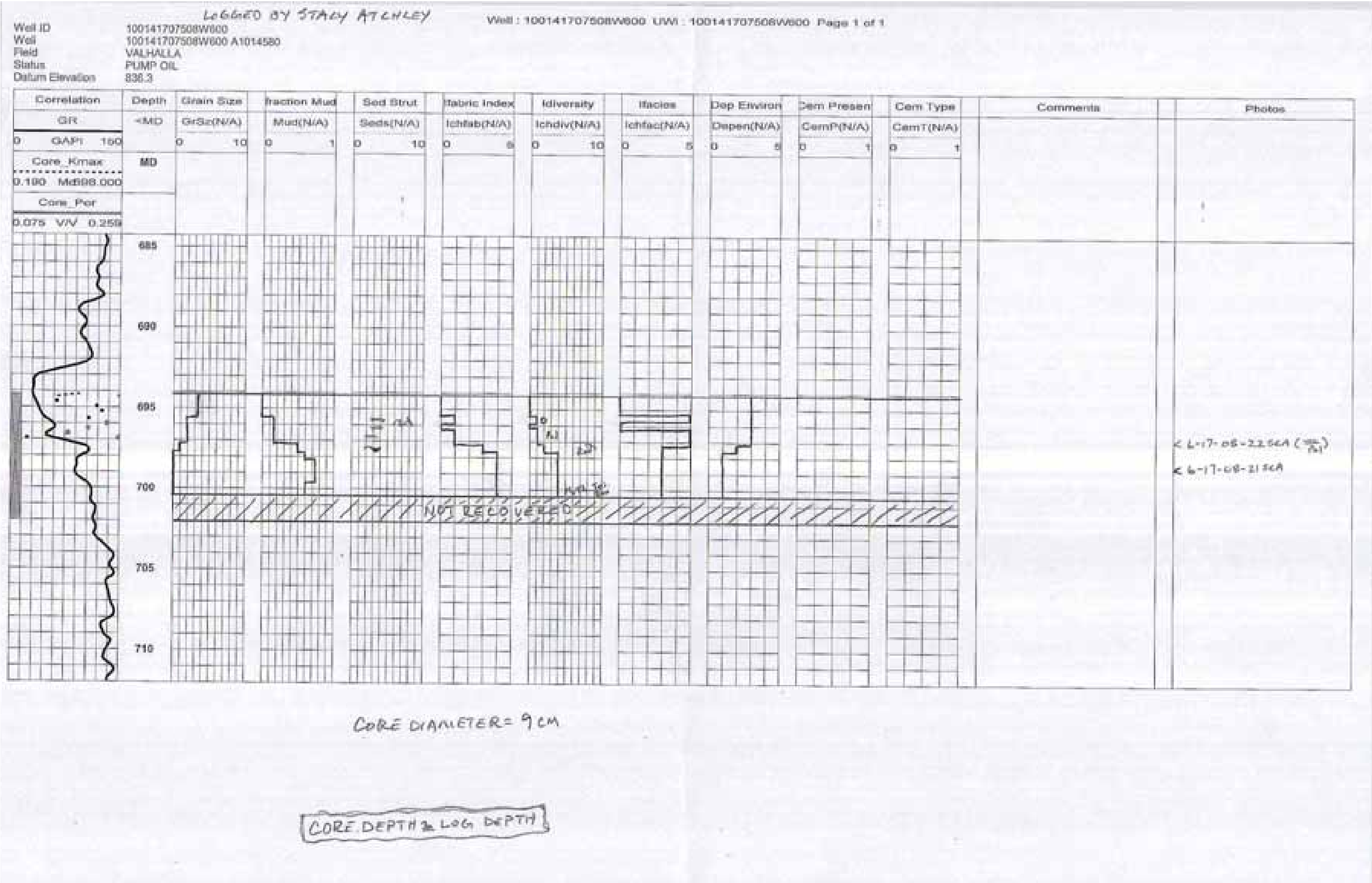
Core Diameter = 10cm

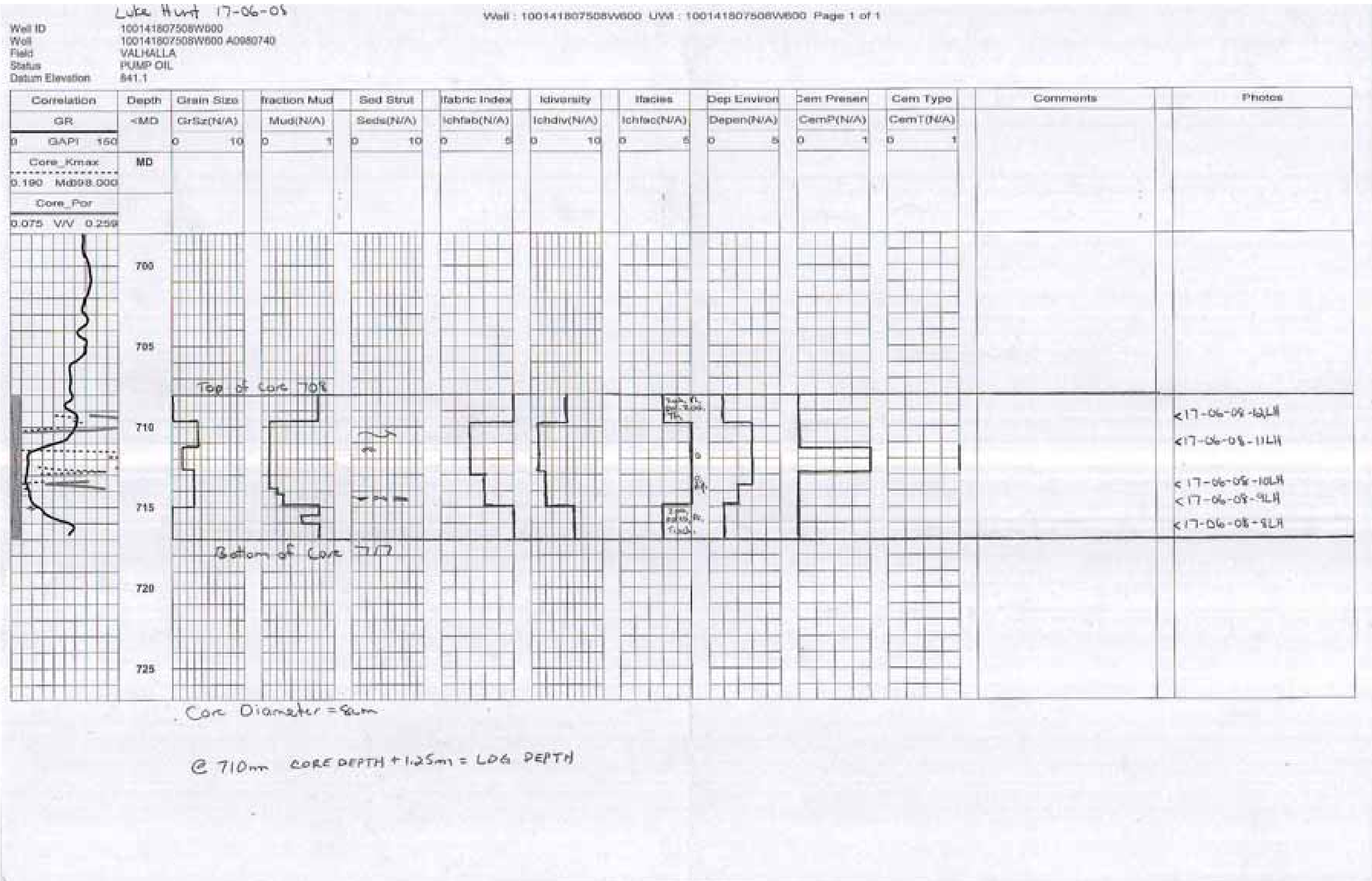
core depth = log depth

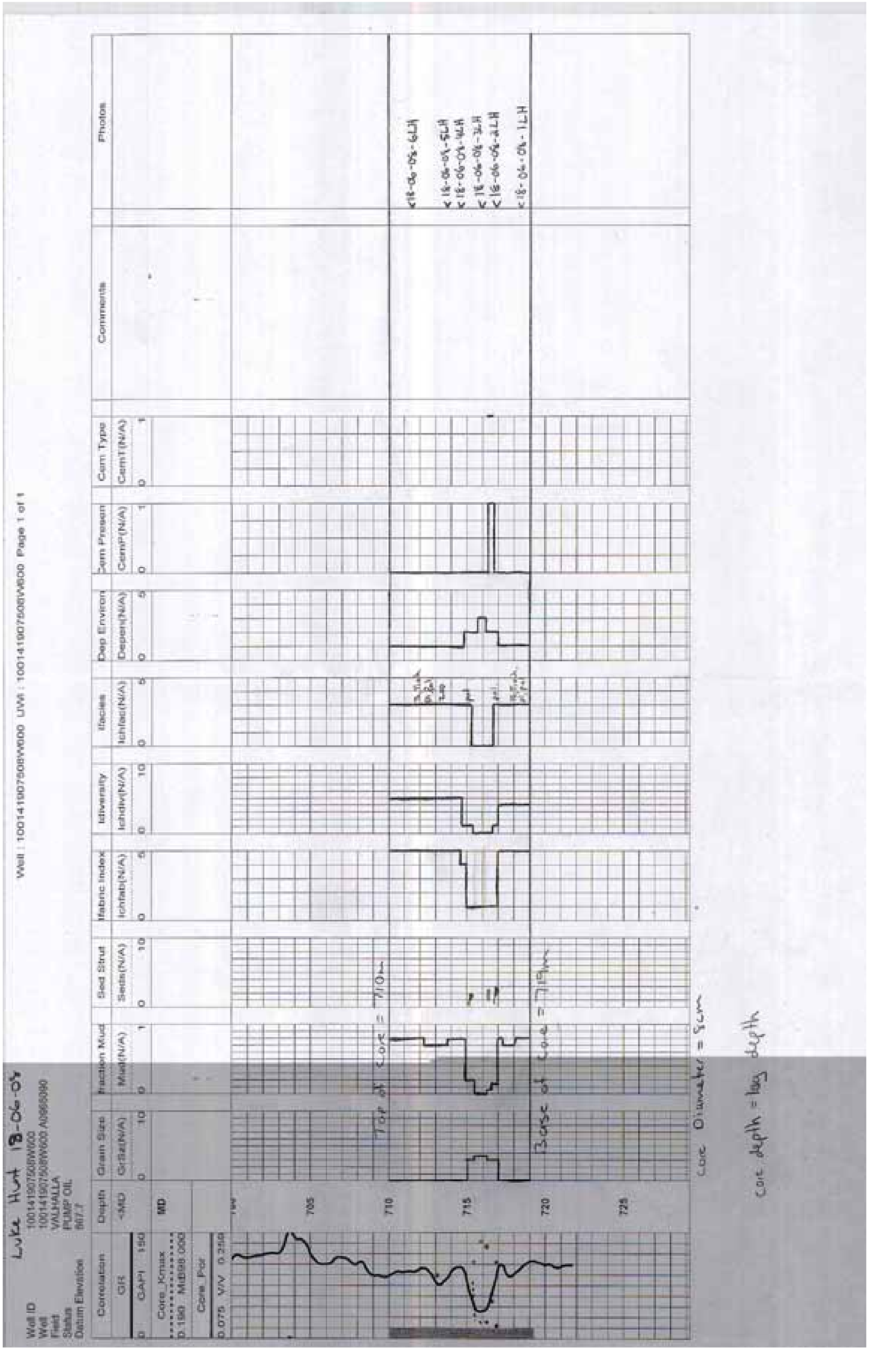

LOGGED BY NATE BALL 6-14/17/08
Well ID 100140607508W600
Well 100140607508W600 A1033490
Field VALHALLA
Status PUMP OIL
Datum Elevation 779.3
Well : 100140607508W600 UWI : 100140607508W600 Page 1 of 1
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 Md598.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
Grain Size
GrSz(N/A)
Fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
680
685
690
695
700
705
6-17-08-2NB
6-17-08-1NB
Bottom of CORE = 698 m
CORE DEPTH = LOG DEPTH
CORE DIAMETER = 8.6 cm

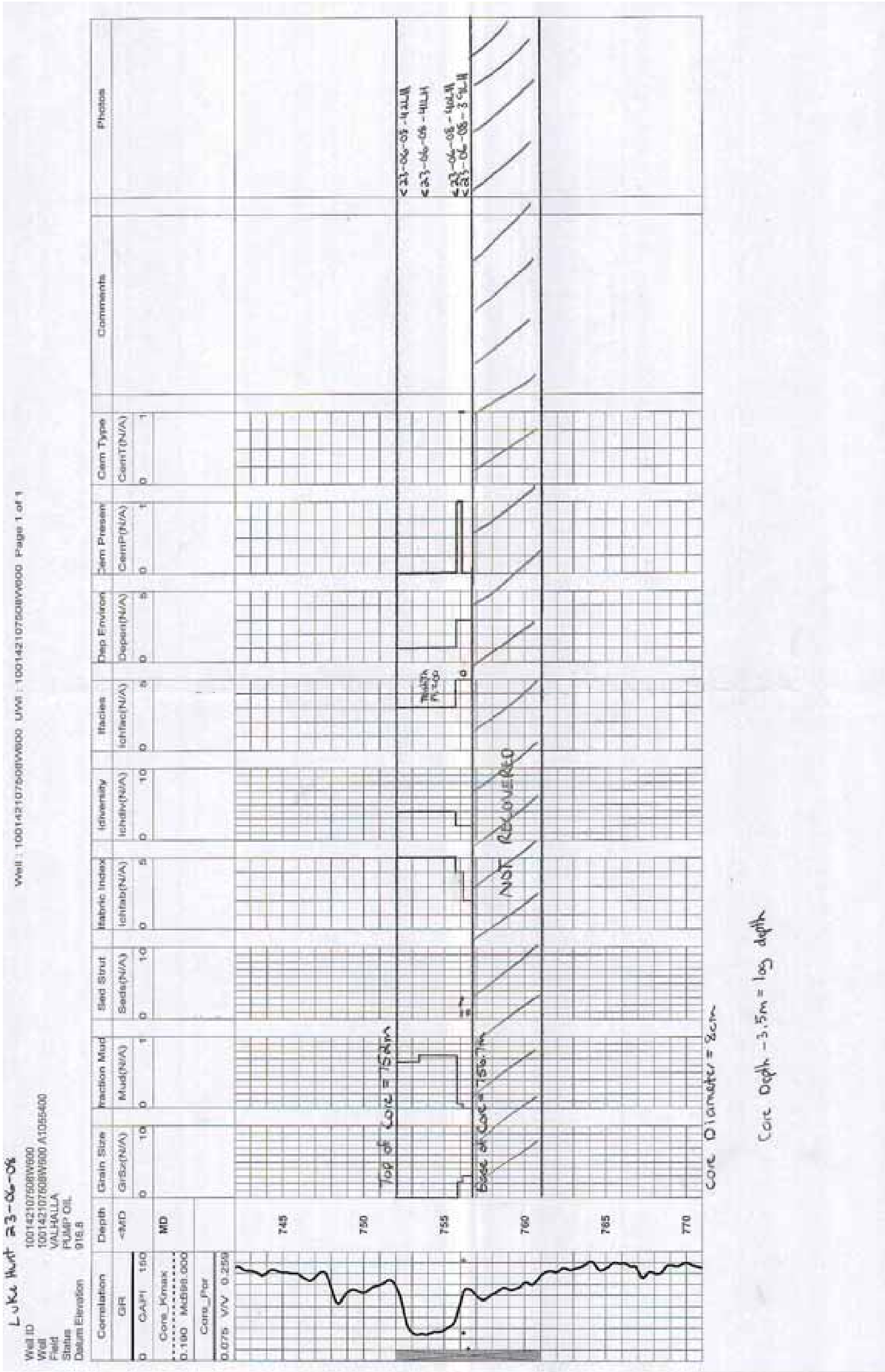

Well ID 100141407508W600
Well 100141407508W600 A1131570
Field LA GLACE
Status DRY
Datum Elevation 879.6
Well : 100141407508W600 UWI : 100141407508W600 Page 1 of 1
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 Md598.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
Grain Size
GrSz(N/A)
Fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
730
735
740
745
750
755
TOP OF CORE = 736m
BOTTOM OF CORE = 747m
6-24-08-7NB
6-24-08-6NB
6-24-08-5NB
6-24-08-4NB
6-24-08-3NB
6-24-08-2NB
6-24-08-1NB
CORE DIAMETER = 10cm
CORE DEPTH + 1.6m = LOGDEPTH

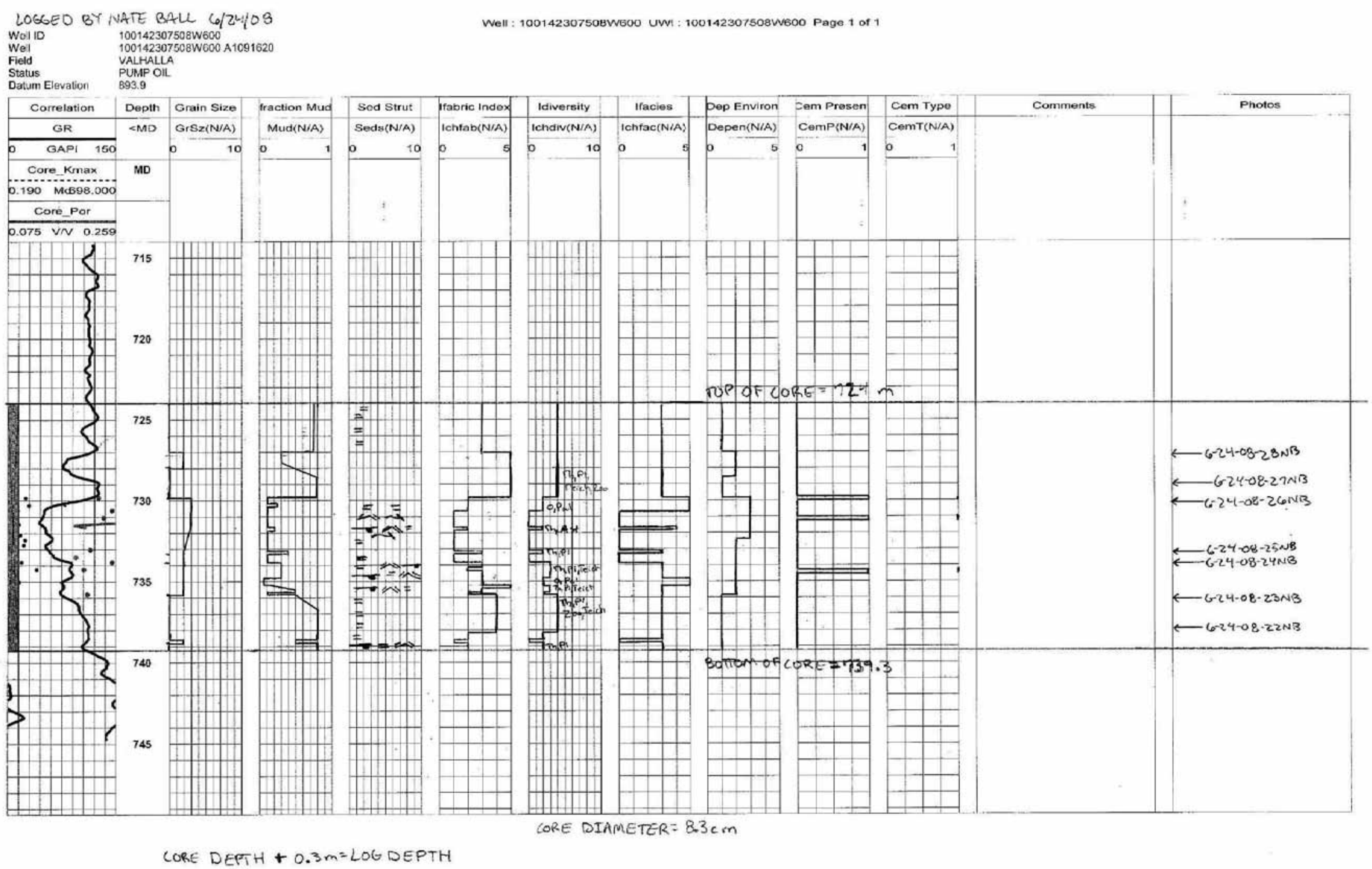

Well : 100141507508W600 UWI : 100141507508W600 Page 1 of 1
Well ID 100141507508W600
Well 100141507508W600 A1086390
Field VALHALLA
Status PUMP OIL
Datum Elevation 906.5
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 MD 898.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
745
750
755
760
765
Grain Size
GrSz(N/A)
0 10
fraction Mud
Mud(N/A)
0 1
Sed Strut
Seds(N/A)
0 10
Ifabric Index
Ichfab(N/A)
0 5
Idiversity
Ichdiv(N/A)
0 10
Ifacies
Ichfac(N/A)
0 5
Dep Environ
Depen(N/A)
0 5
Cem Presen
CemP(N/A)
0 1
Cem Type
CemT(N/A)
0 1
Comments
Photos
TOP OF CORE = 750m
BOTTOM OF CORE = 754.2m
abundant concretions
CORE DIAMETER = 9cm
core depth+0.4 = log depth


LOGGED BY STACY ATCHLEY
Well : 100141707508W600 UWI : 100141707508W600 Page 1 of 1
Well ID 100141707508W600
Well 100141707508W600 A1014580
Field VALHALLA
Status PUMP OIL
Datum Elevation 836.3
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 Md598.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
685
690
695
700
705
710
Grain Size
GrSz(N/A)
0 10
Traction Mud
Mud(N/A)
0 1
Sed Strut
Seds(N/A)
0 10
Ifabric Index
Ichfab(N/A)
0 5
Idiversity
Ichdiv(N/A)
0 10
Ifacies
Ichfac(N/A)
0 5
Dep Environ
Depen(N/A)
0 5
Cem Presen
CemP(N/A)
0 1
Cem Type
CemT(N/A)
0 1
Comments
Photos
NOT RECOVERED
< 6-17-08-22 SCA
< 6-17-08-21 SCA
CORE DIAMETER = 9 CM
CORE DEPTH ≥ LOG DEPTH


Luke Hunt 17-06-08
Well ID 100141807508W600
Well 100141807508W600 A0980740
Field VALHALLA
Status PUMP OIL
Datum Elevation 841.1
Well : 100141807508W600 UWI : 100141807508W600 Page 1 of 1
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 Md898.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
700
705
710
715
720
725
Grain Size
GrSz(N/A)
fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
Top of Core 708
Bottom of Core 717
<17-06-08-12LH
<17-06-08-11LH
<17-06-08-10LH
<17-06-08-9LH
<17-06-08-8LH
Core Diameter = 8cm
@ 710m CORE DEPTH + 1.25m = LOG DEPTH


Luke Hunt 18-06-08
Well : 100141907508W600 UWI : 100141907508W600 Page 1 of 1
Well ID 100141907508W600
Well 100141907508W600 A0965090
Field VALHALLA
Status PUMP OIL
Datum Elevation 667.7
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 MD 98.000
Core_Por
0.075 V/V 0.250
Depth
<MD
MD
Grain Size
GrSz(N/A)
Fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
705
710
715
720
725
Top of Core = 710m
Base of Core = 719m
<18-06-08-6LH
<18-06-08-5LH
<18-06-08-4LH
<18-06-08-3LH
<18-06-08-2LH
<18-06-08-1LH
Core Diameter = 8cm
Core depth = log depth

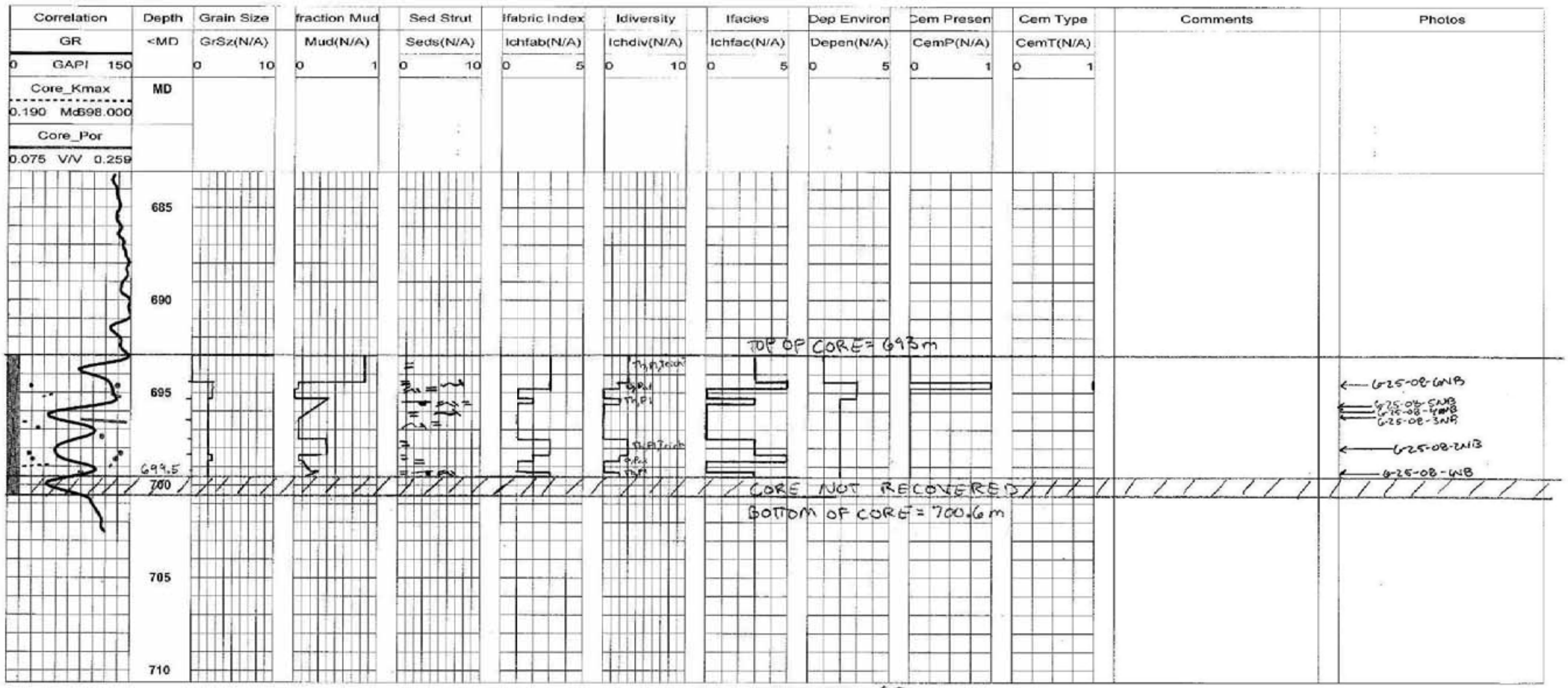

Luke Hunt 23-06-08
Well ID
Well
Field
Status
Datum Elevation
VALHALLA
PUMP OIL
Correlation
Depth
Grain Size
Fraction Mud
Sed Strut
Fabric Index
Ichdiversity
Ifacies
Dep Environ
Cem Present
Cem Type
Comments
Photos
GR
Core_Kmax
Core_Por
MD
745
750
755
760
765
770
Top of Core = 752m
Base of Core = 756.7m
NOT RECOVERED
Core Diameter = 8cm
Core Depth - 3.5m = log depth


LOGGED BY NATE BALL 6/24/08
Well : 100142307508W600 UWI : 100142307508W600 Page 1 of 1
Well ID 100142307508W600
Well 100142307508W600 A1091620
Field VALHALLA
Status PUMP OIL
Datum Elevation 893.9
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 Md698.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
Grain Size
GrSz(N/A)
0 10
fraction Mud
Mud(N/A)
0 1
Sed Strut
Seds(N/A)
0 10
Ifabric Index
Ichfab(N/A)
0 5
Idiversity
Ichdiv(N/A)
0 10
Ifacies
Ichfac(N/A)
0 5
Dep Environ
Depen(N/A)
0 5
Cem Presen
CemP(N/A)
0 1
Cem Type
CemT(N/A)
0 1
Comments
Photos
715
720
725
730
735
740
745
TOP OF CORE = 724 m
BOTTOM OF CORE = 739.3
6-24-08-28NB
6-24-08-27NB
6-24-08-26NB
6-24-08-25NB
6-24-08-24NB
6-24-08-23NB
6-24-08-22NB
CORE DIAMETER = 8.3cm
CORE DEPTH + 0.3m = LOG DEPTH

LOGGED BY NATE BALL 6/25/08

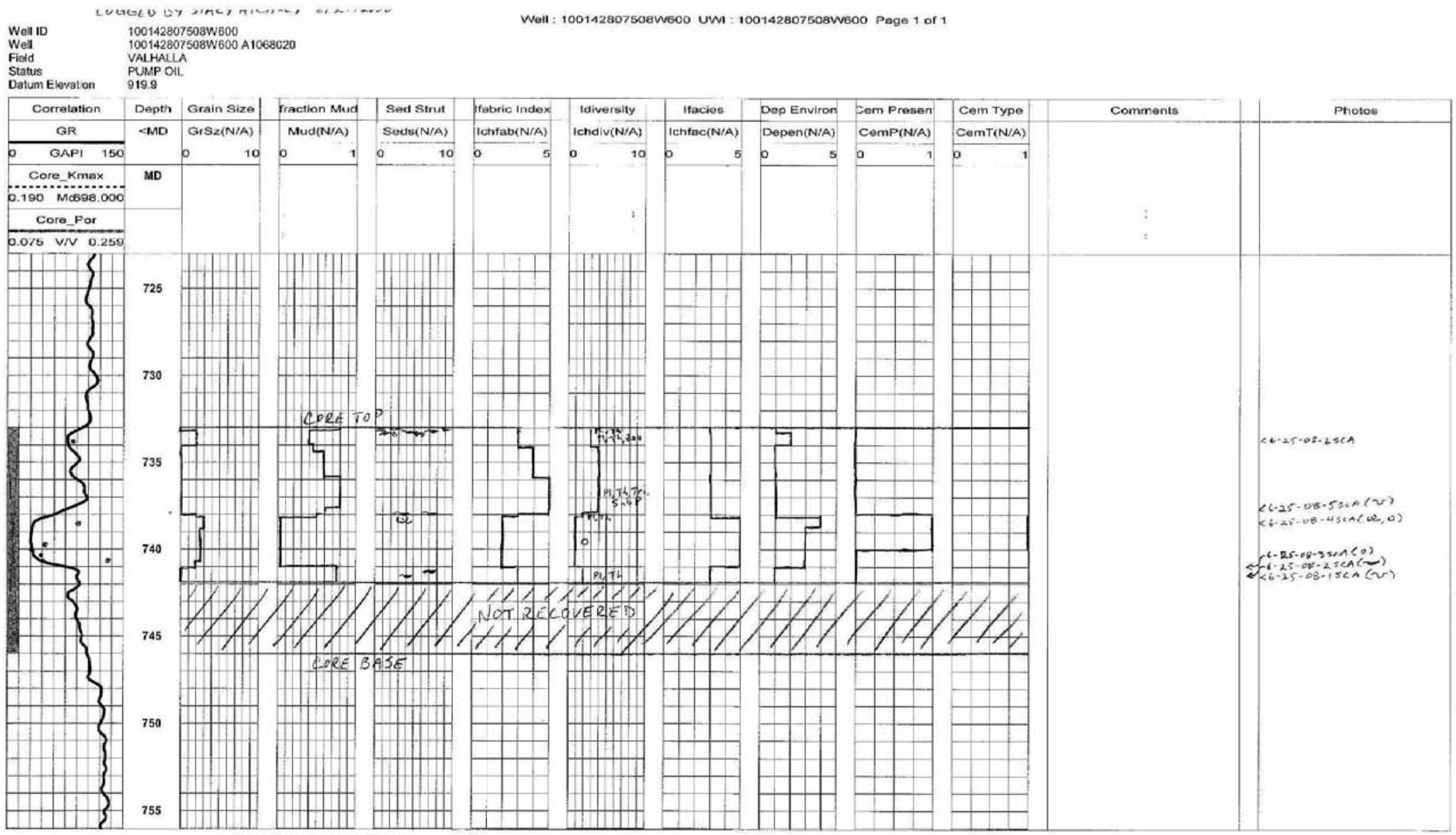
Well : 100142507508W600 UWI : 100142507508W600 Page 1 of 1

Well ID	100142507508W600
Well	100142507508W600 A1853360
Field	VALHALLA
Status	SUS OIL
Datum Elevation	868.2



CORE DEPTH +1.4m = LOG DEPTH

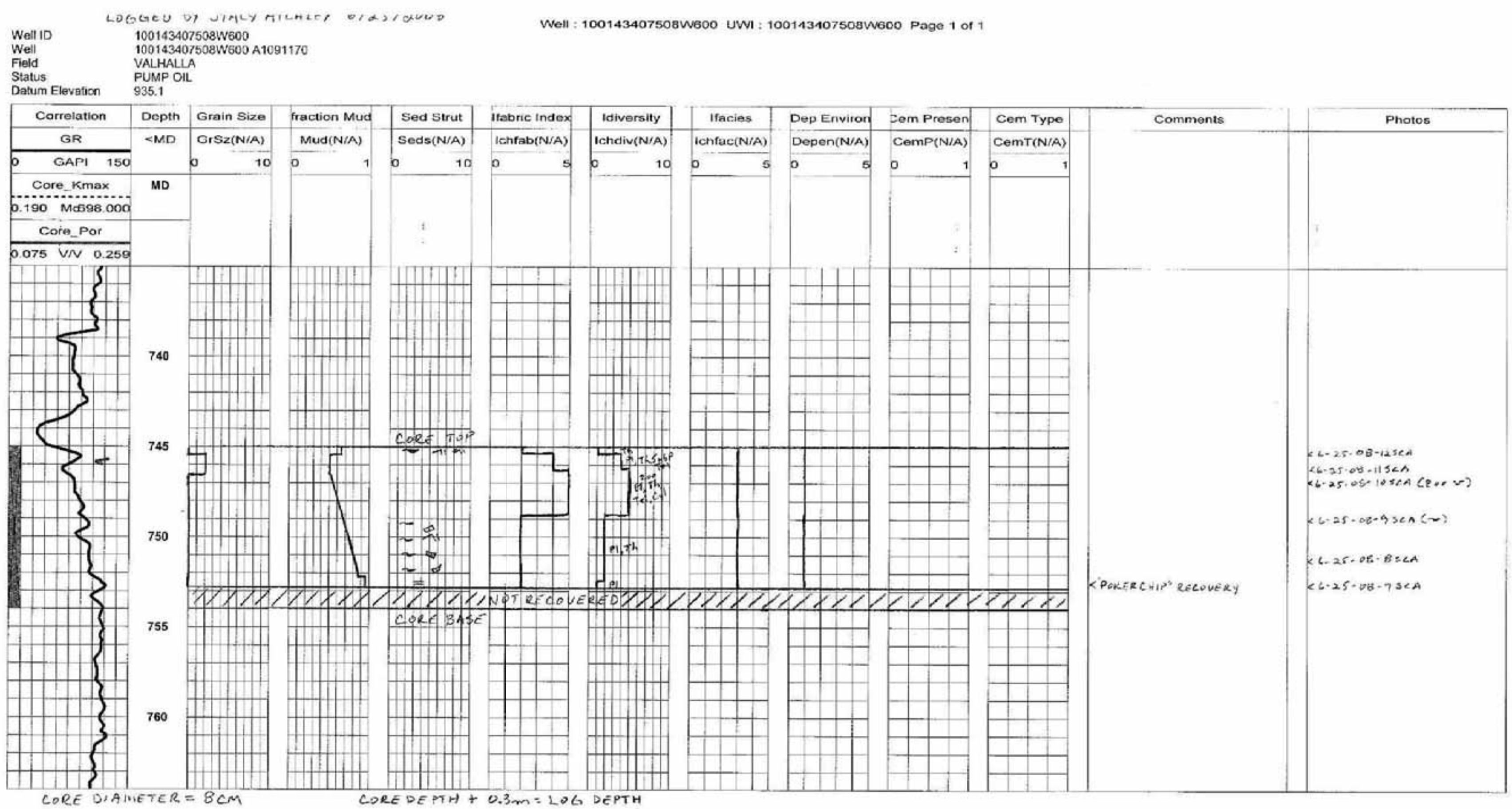
CORE DIAMETER = 8.7cm

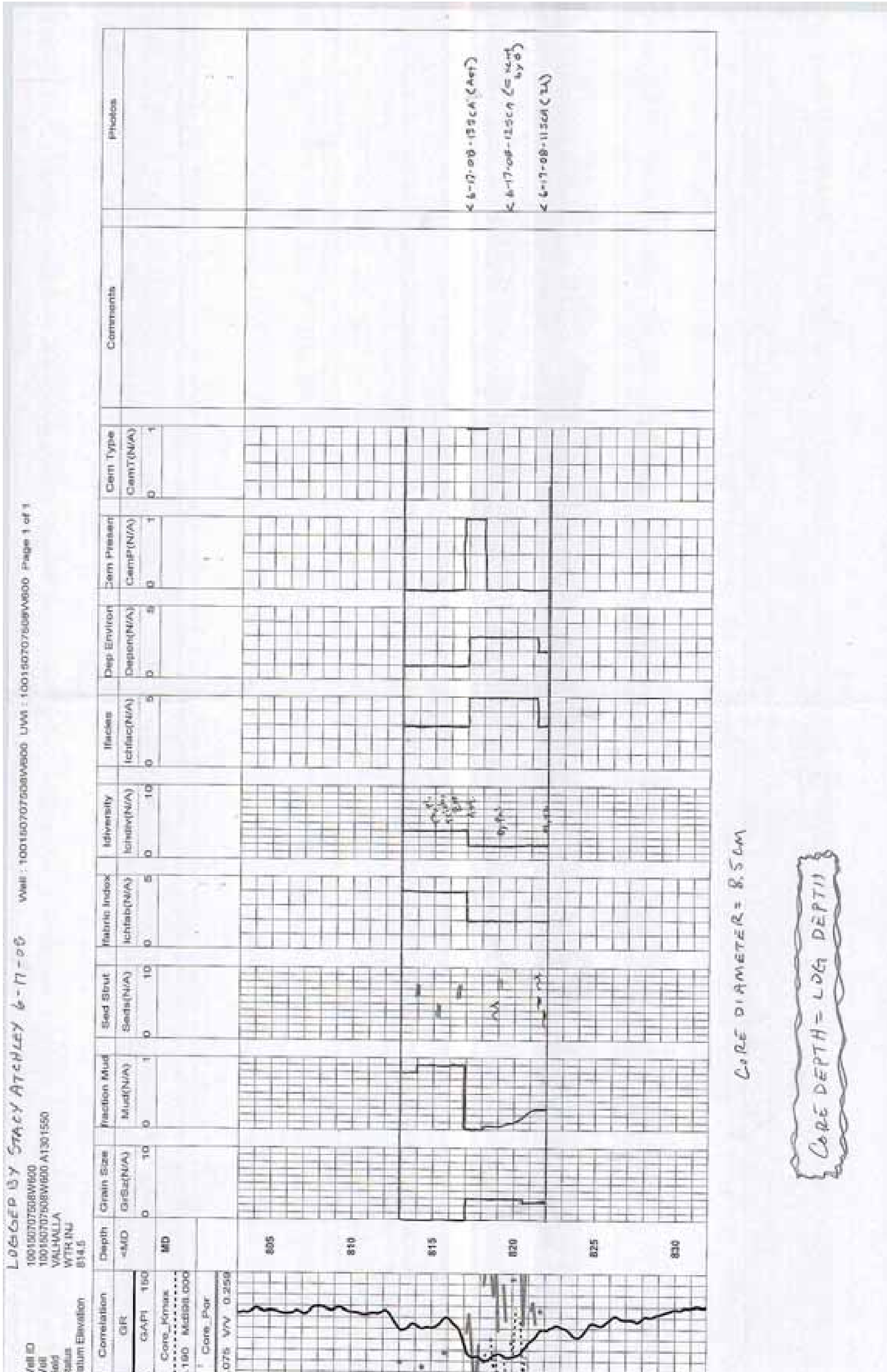


CORE DIAMETER = 8cm

736-742m: CORE DEPTH - 0.25m = LOG DEPTH

733-736m: CORE DEPTH = LOG DEPTH

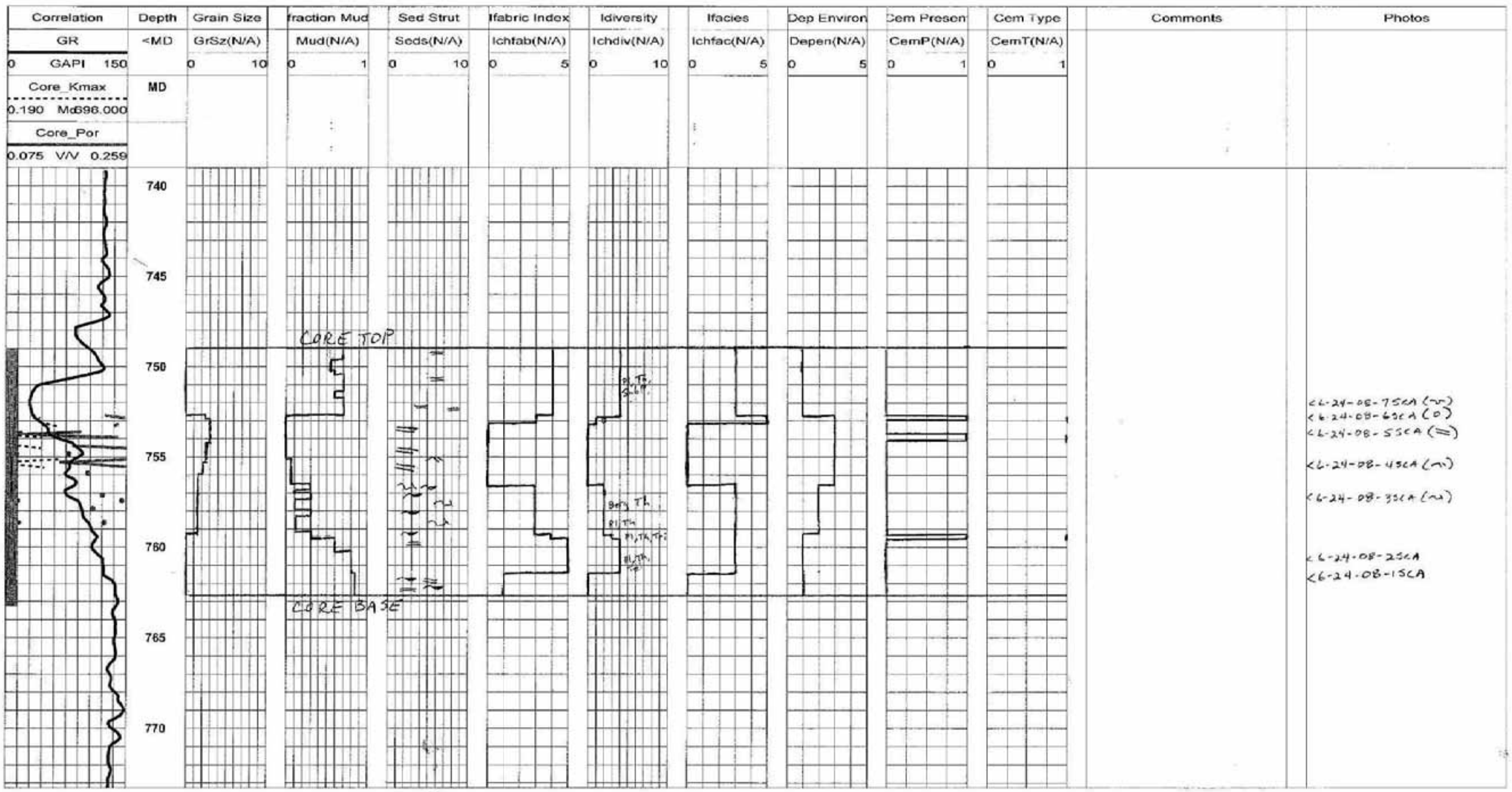

Well : 100143407508W600 UWI : 100143407508W600 Page 1 of 1
Well ID 100143407508W600
Well 100143407508W600 A1091170
Field VALHALLA
Status PUMP OIL
Datum Elevation 935.1
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 Md598.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
740
745
750
755
760
Grain Size
GrSz(N/A)
fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
CORE TOP
NOT RECOVERED
CORE BASE
"POKERCHIP" RECOVERY
CORE DIAMETER = 8CM
CORE DEPTH + 0.3m = LOG DEPTH



LOGGED BY STACY ATCHLEY 6-17-08
Well : 100150707508W600 UWI : 100150707508W600 Page 1 of 1
Well ID
Well
Field
Status
Datum Elevation
100150707508W600
100150707508W600 A1301550
VALHALLA
WTR INJ
814.5
Correlation
GR
GAPI
Core_Kmax
Core_Por
Depth
MD
Grain Size
GrSz(N/A)
Fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Fabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
805
810
815
820
825
830
CORE DIAMETER = 8.5 cm
CORE DEPTH = LOG DEPTH

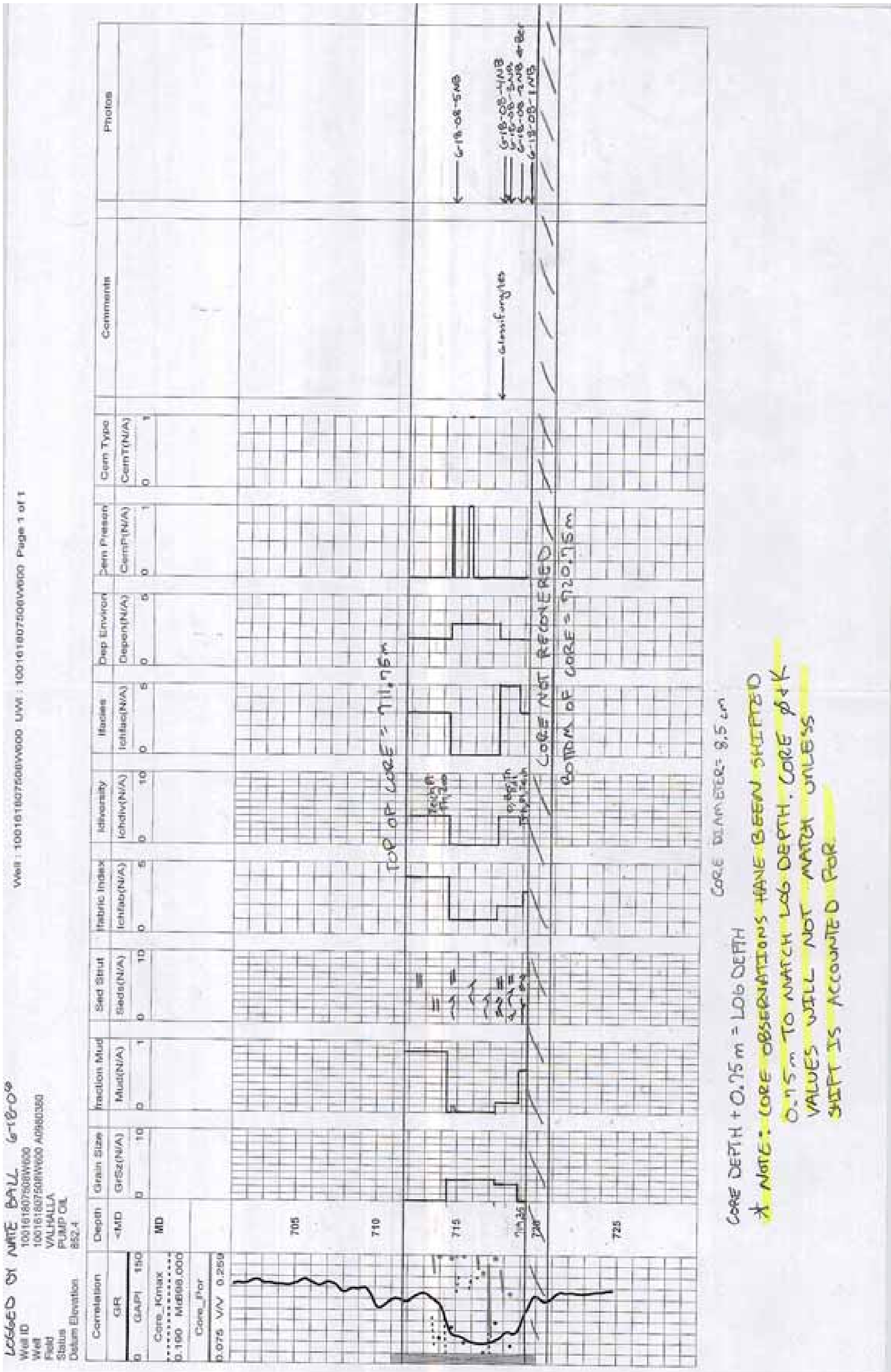
LOGGED BY STACY ATCHLEY 6/23/08 Well : 100161507508W600 UWI : 100161507508W600 Page 1 of 1

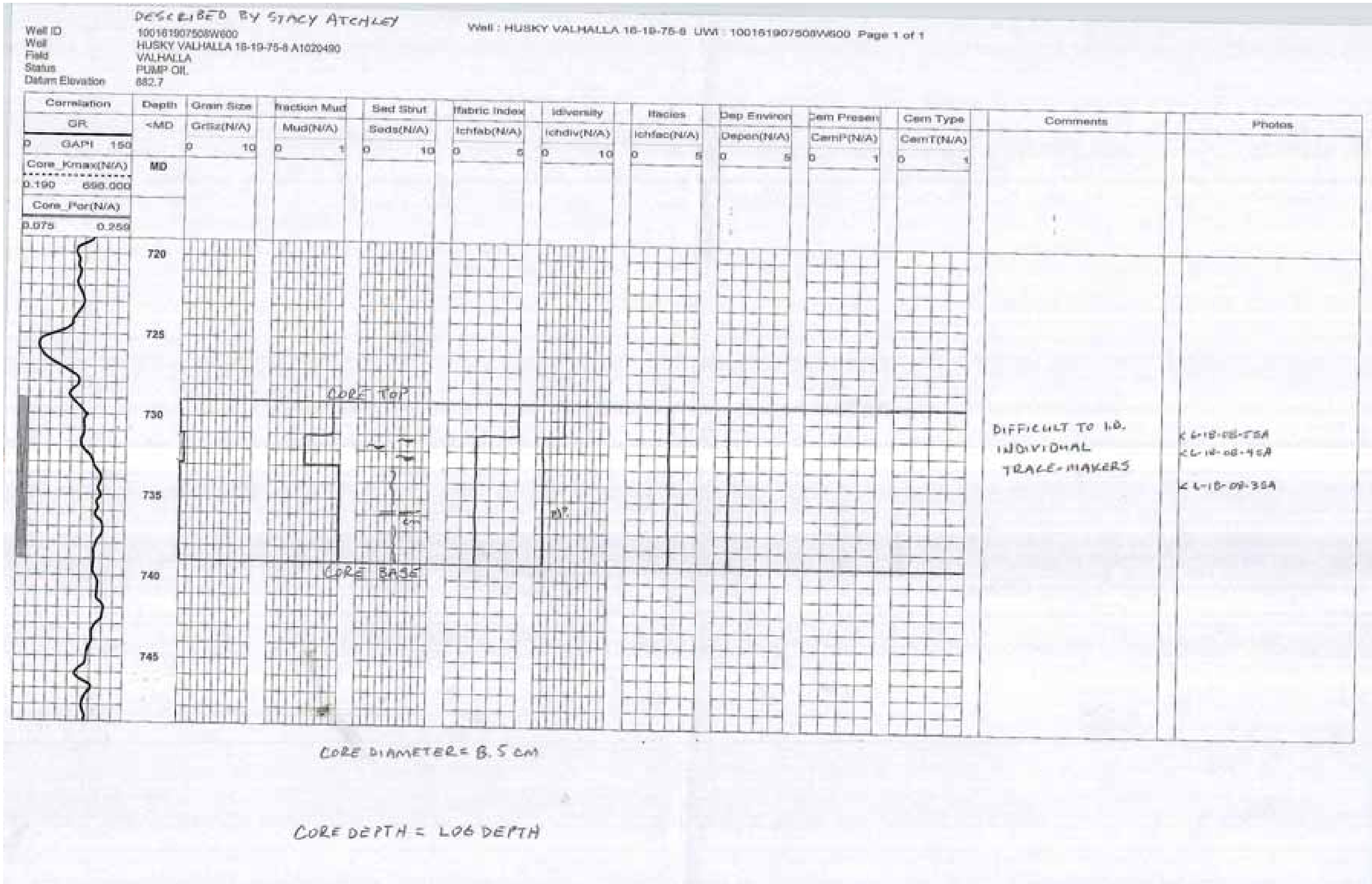
Well ID	100161507508W600
Well	100161507508W600 A1127030
Field	VALHALLA
Status	PUMP OIL
Datum Elevation	895.9

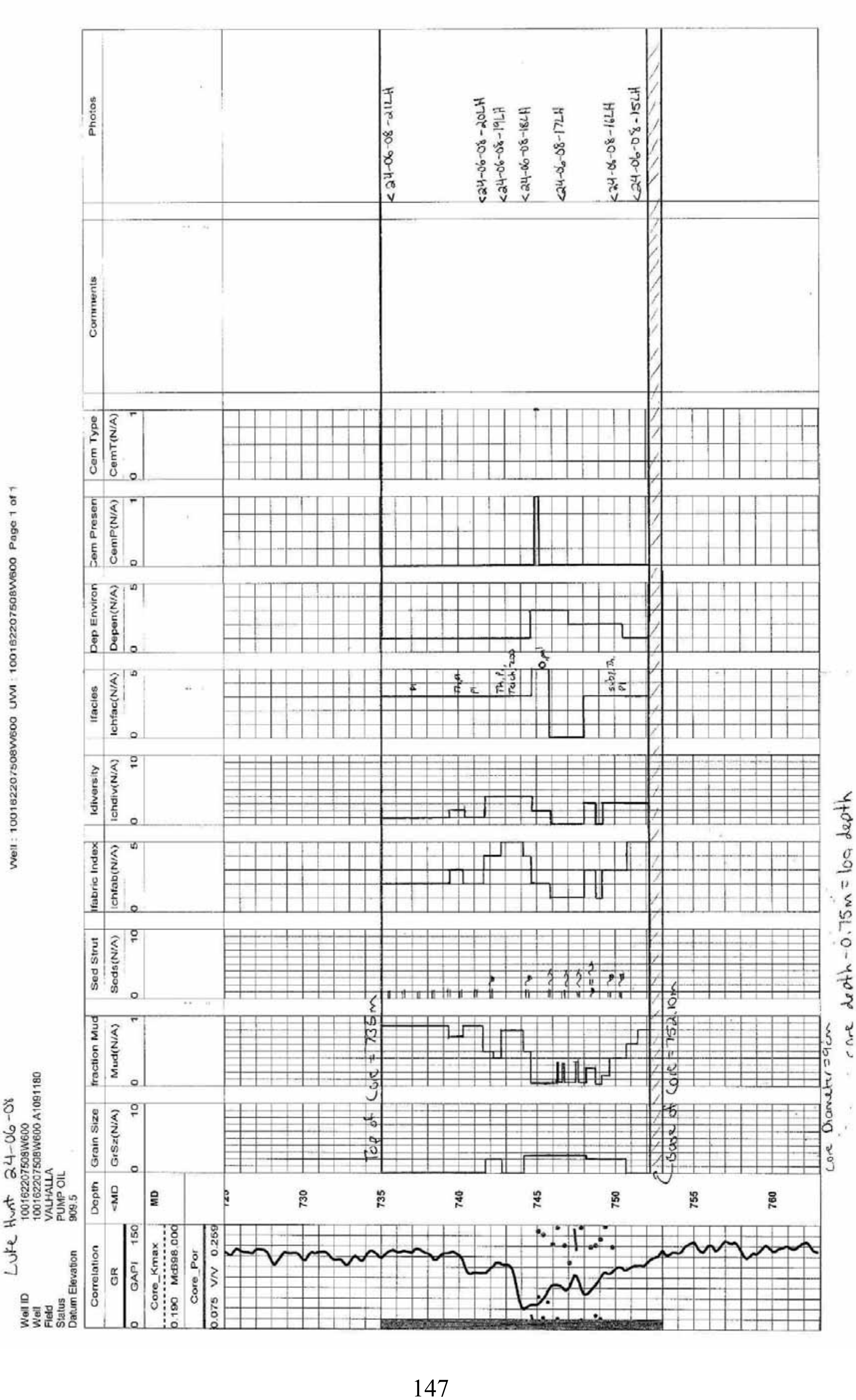


CORE DIAMETER= 9 Cm

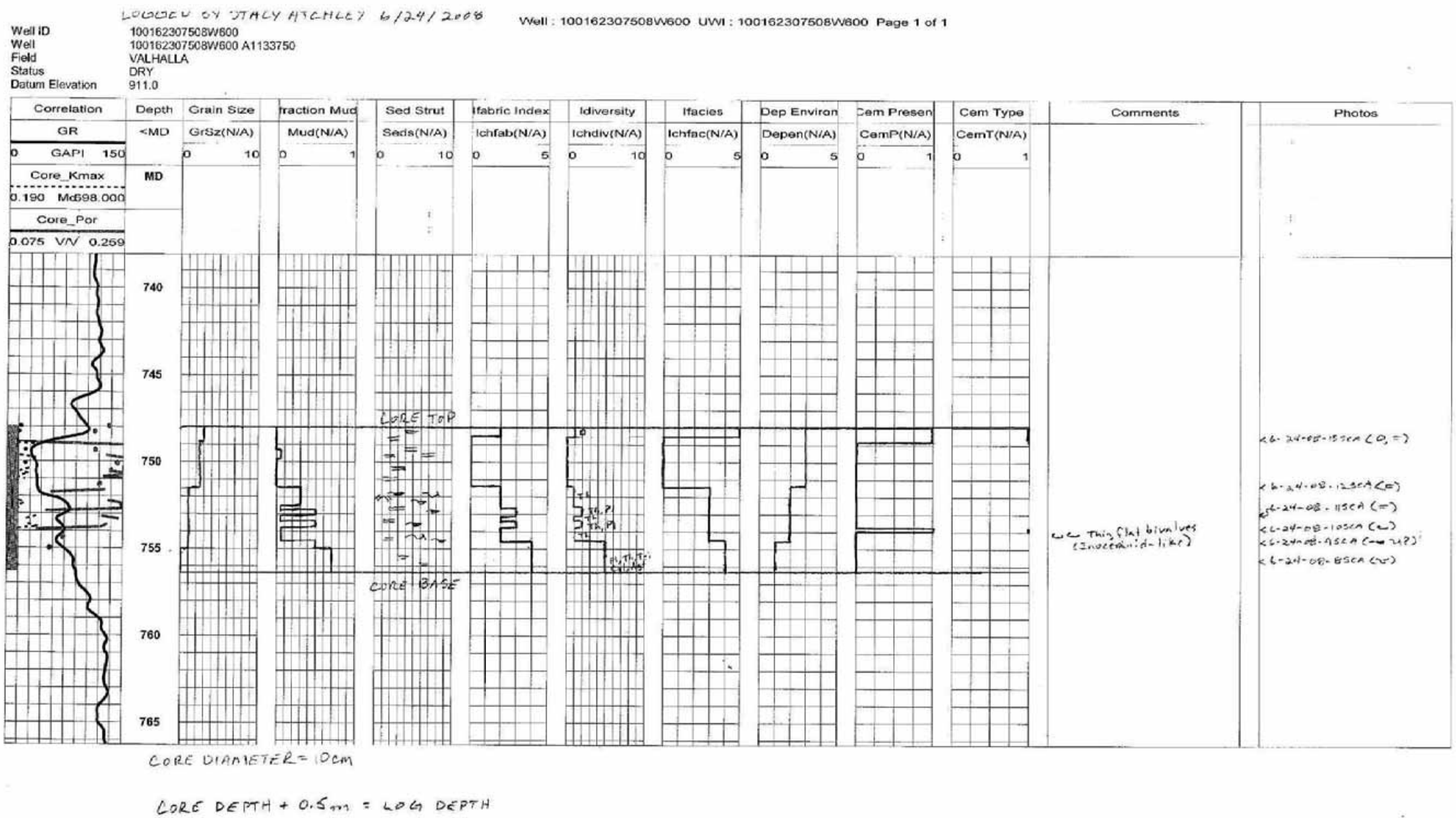
CORE DEPTH - 2m = LOG DEPTH

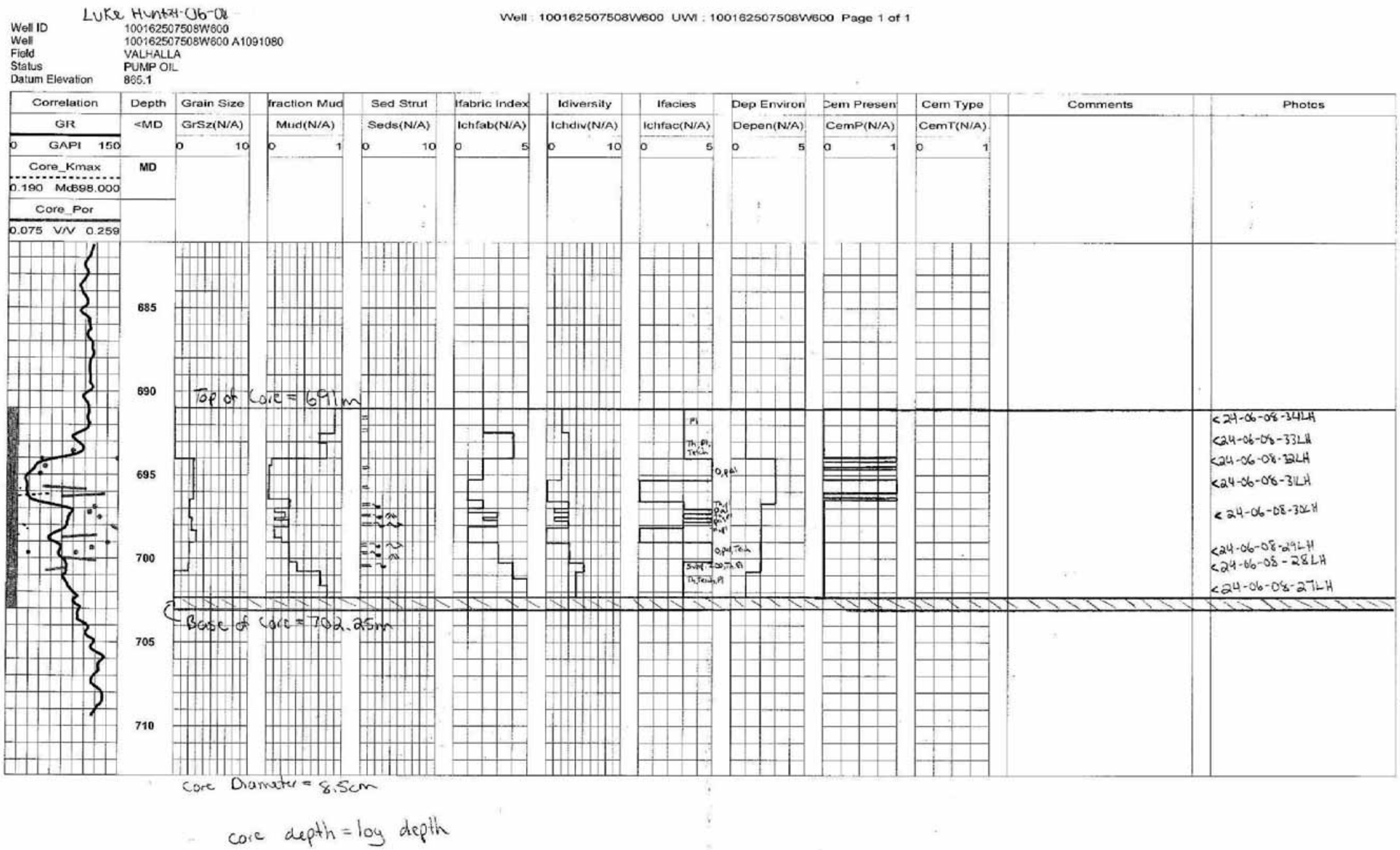

LOGGED BY NATE BALL 6-18-08
Well ID 100161807508W600
Well 100161807508W600 A098380
Field VALHALLA
Status PUMP OIL
Datum Elevation 852.4
Well : 100161807508W600 UWI : 100161807508W600 Page 1 of 1
Correlation
GR
GAPI
Core_Kmax
Core_Por
Depth
MD
Grain Size
GrSz(N/A)
Fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Fabric Index
Ichfab(N/A)
Ichdiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
705
710
715
720
725
TOP OF CORE = 711.75m
CORE NOT RECOVERED
BOTTOM OF CORE = 720.75m
glossifungites
CORE DIAMETER = 8.5 cm
CORE DEPTH + 0.75m = LOG DEPTH
* NOTE: CORE OBSERVATIONS HAVE BEEN SHIFTED 0.75m TO MATCH LOG DEPTH. CORE ϕ+K VALUES WILL NOT MATCH UNLESS SHIFT IS ACCOUNTED FOR

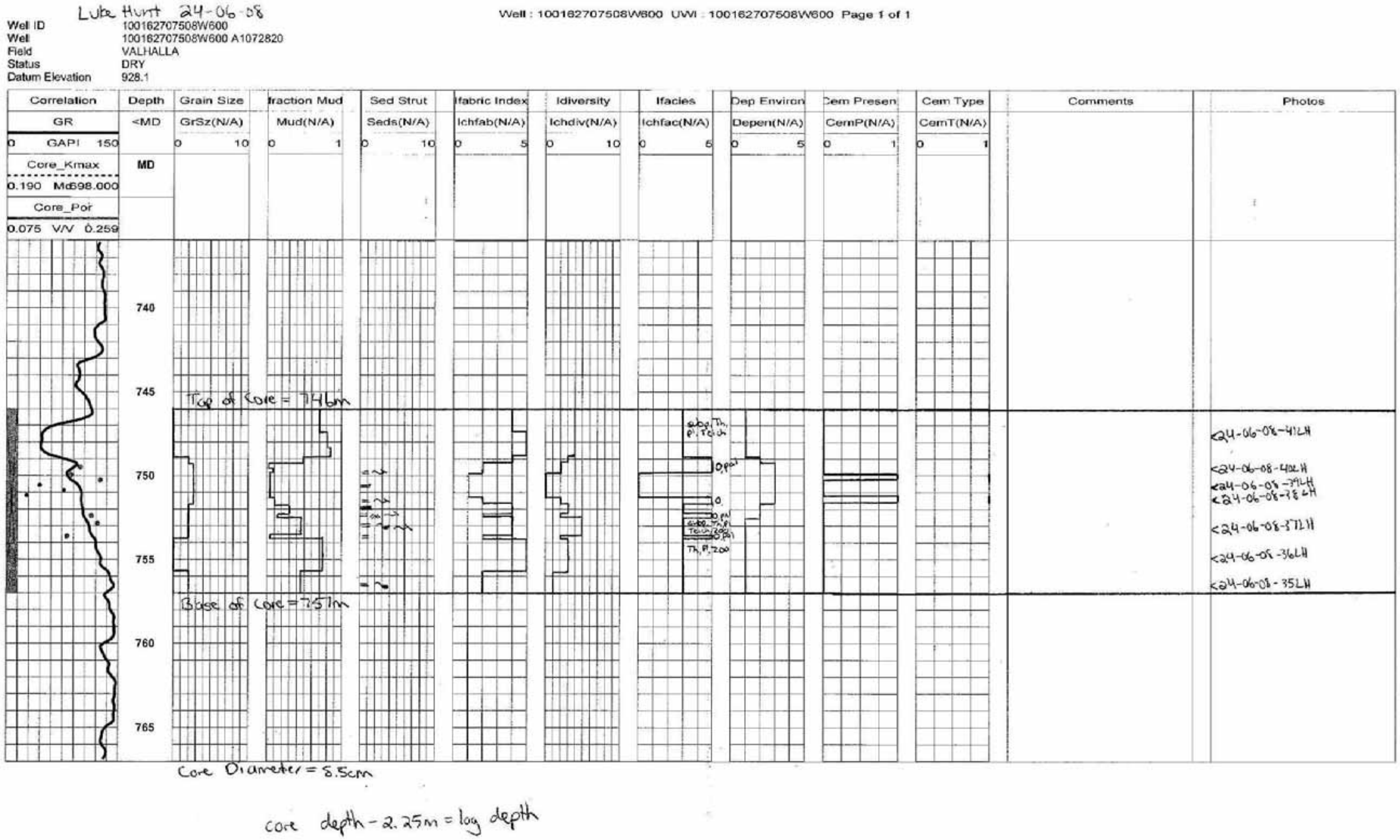

DESCRIBED BY STACY ATCHLEY
Well ID 100161907508W600
Well HUSKY VALHALLA 16-19-75-8 A1020490
Field VALHALLA
Status PUMP OIL
Datum Elevation 882.7
Well : HUSKY VALHALLA 16-19-75-8 UWI : 100161907508W600 Page 1 of 1
Correlation
GR
0 GAPI 150
Core_Kmax(N/A)
0.190 698.000
Core_Por(N/A)
0.075 0.259
Depth
<MD
MD
720
725
730
735
740
745
Grain Size
GrSz(N/A)
Fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
CORE TOP
CORE BASE
DIFFICULT TO I.D.
INDIVIDUAL
TRACE-MAKERS
CORE DIAMETER = 8.5 cm
CORE DEPTH = LOG DEPTH

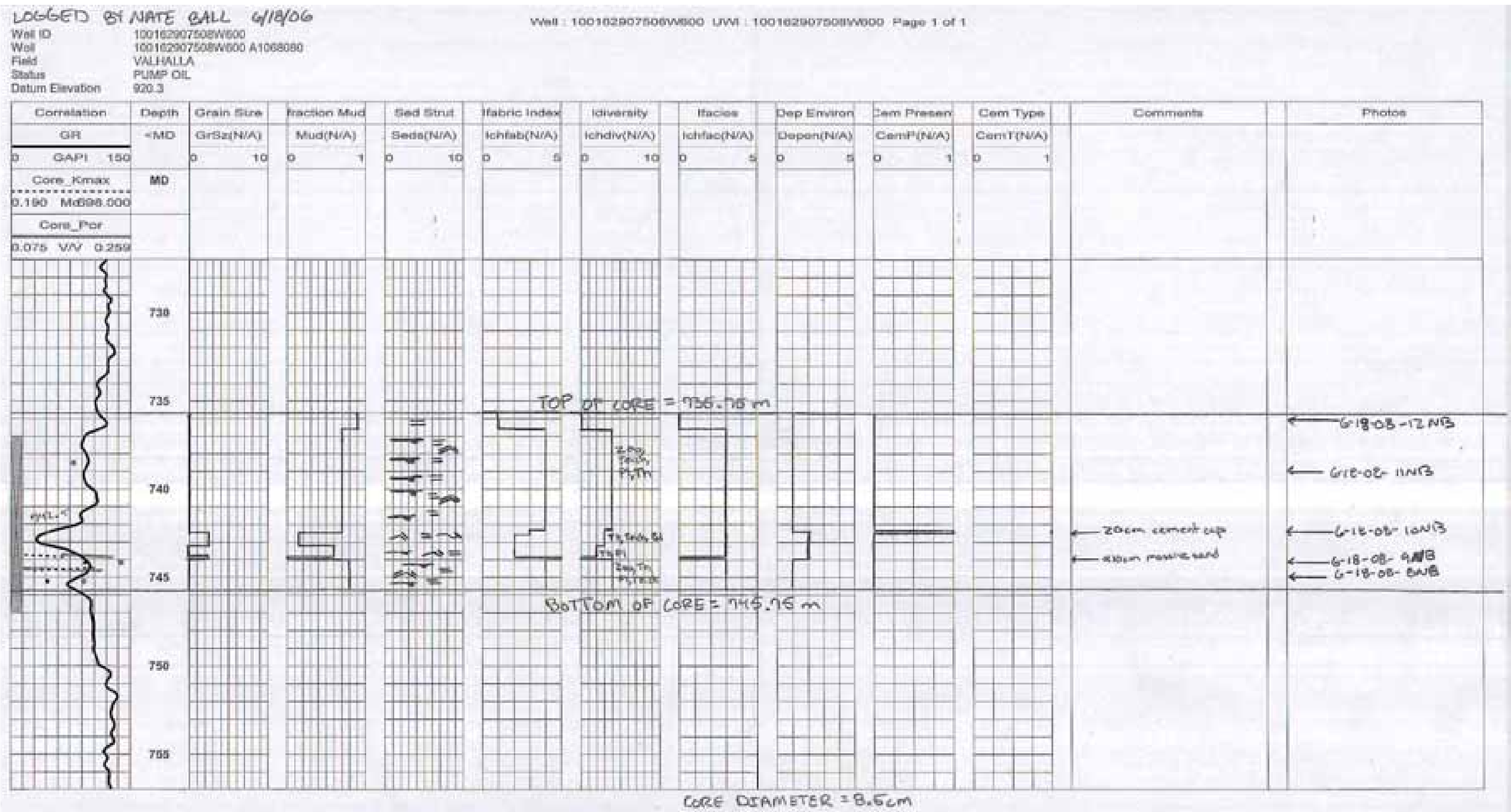


Luke Hunt 24-06-08
Well ID 100162207508W600
Well 100162207508W600 A1091180
Field VALHALLA
Status PUMP OIL
Datum Elevation 909.5
Well : 100162207508W600 UWI : 100162207508W600 Page 1 of 1
Correlation
GR
GAPI
Core_Kmax
Core_Por
Depth
MD
Grain Size
GrSz(N/A)
fraction Mud
Mud(N/A)
Sed Strut
Scds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
730
735
740
745
750
755
760
Top of Core = 735m
Base of Core = 752.10m
Core Diameter = 9cm
core depth - 0.75m = log depth
<24-06-08-21LH
<24-06-08-20LH
<24-06-08-19LH
<24-06-08-18LH
<24-06-08-17LH
<24-06-08-16LH
<24-06-08-15LH


LOGGED BY STACY ATCHLEY 6/24/2008
Well : 100162307508W600 UWI : 100162307508W600 Page 1 of 1
Well ID 100162307508W600
Well 100162307508W600 A1133750
Field VALHALLA
Status DRY
Datum Elevation 911.0
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 Md598.000
Core_Por
0.075 V/V 0.269
Depth
<MD
MD
Grain Size
GrSz(N/A)
Fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
740
745
750
755
760
765
CORE TOP
CORE BASE
Thin flat bivalves (Inoceramid-like)
CORE DIAMETER = 10cm
CORE DEPTH + 0.5m = LOG DEPTH

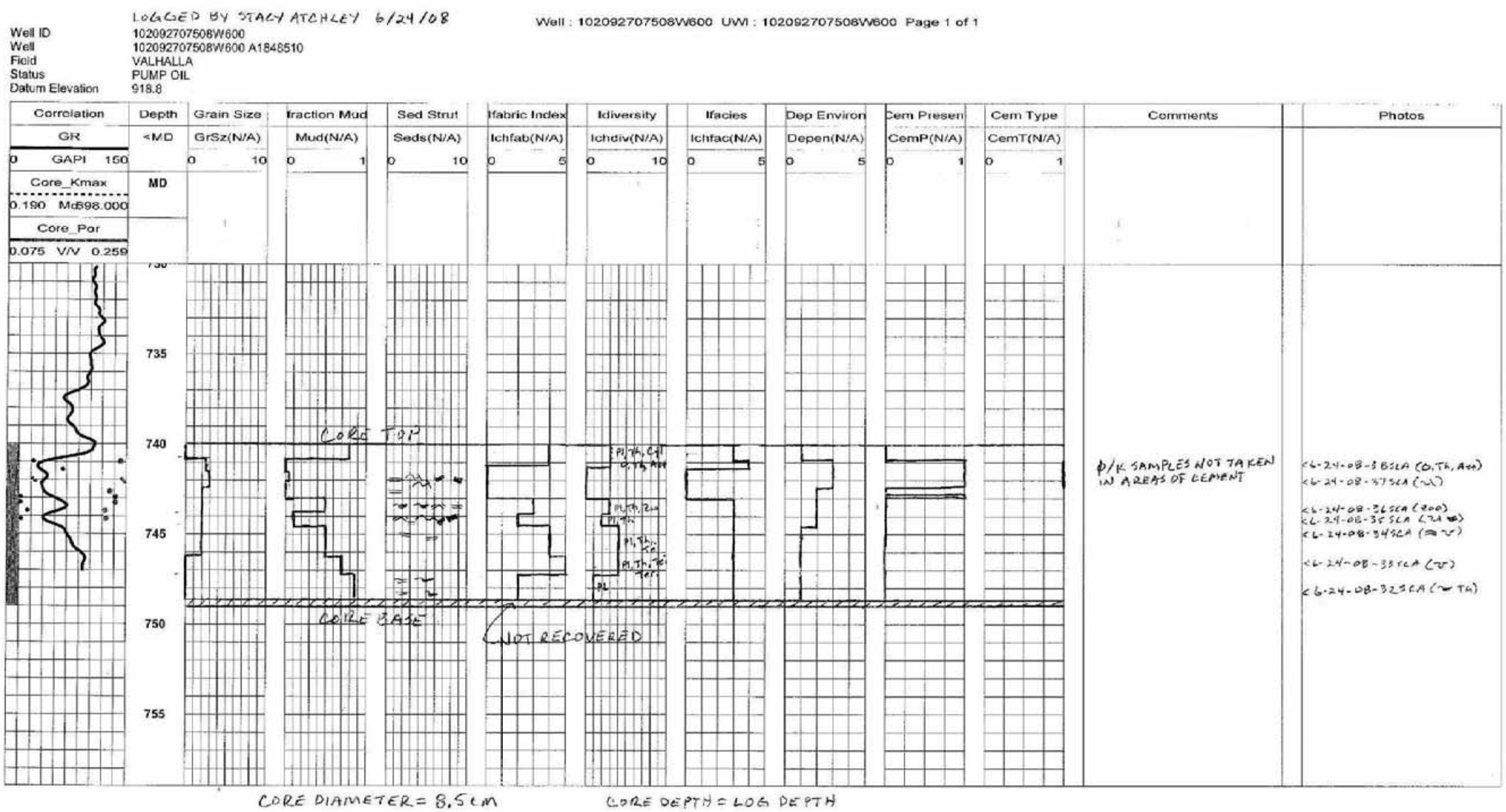

Luke Hunter-06-08
Well ID 100162507508W600
Well 100162507508W600 A1091080
Field VALHALLA
Status PUMP OIL
Datum Elevation 865.1
Well : 100162507508W600 UWI : 100162507508W600 Page 1 of 1
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 Md898.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
Grain Size
GrSz(N/A)
fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
685
690
695
700
705
710
Top of Core = 691m
Base of Core = 702.25m
<24-06-08-34LH
<24-06-08-33LH
<24-06-08-32LH
<24-06-08-31LH
<24-06-08-30LH
<24-06-08-29LH
<24-06-08-28LH
<24-06-08-27LH
Core Diameter = 8.5cm
core depth = log depth

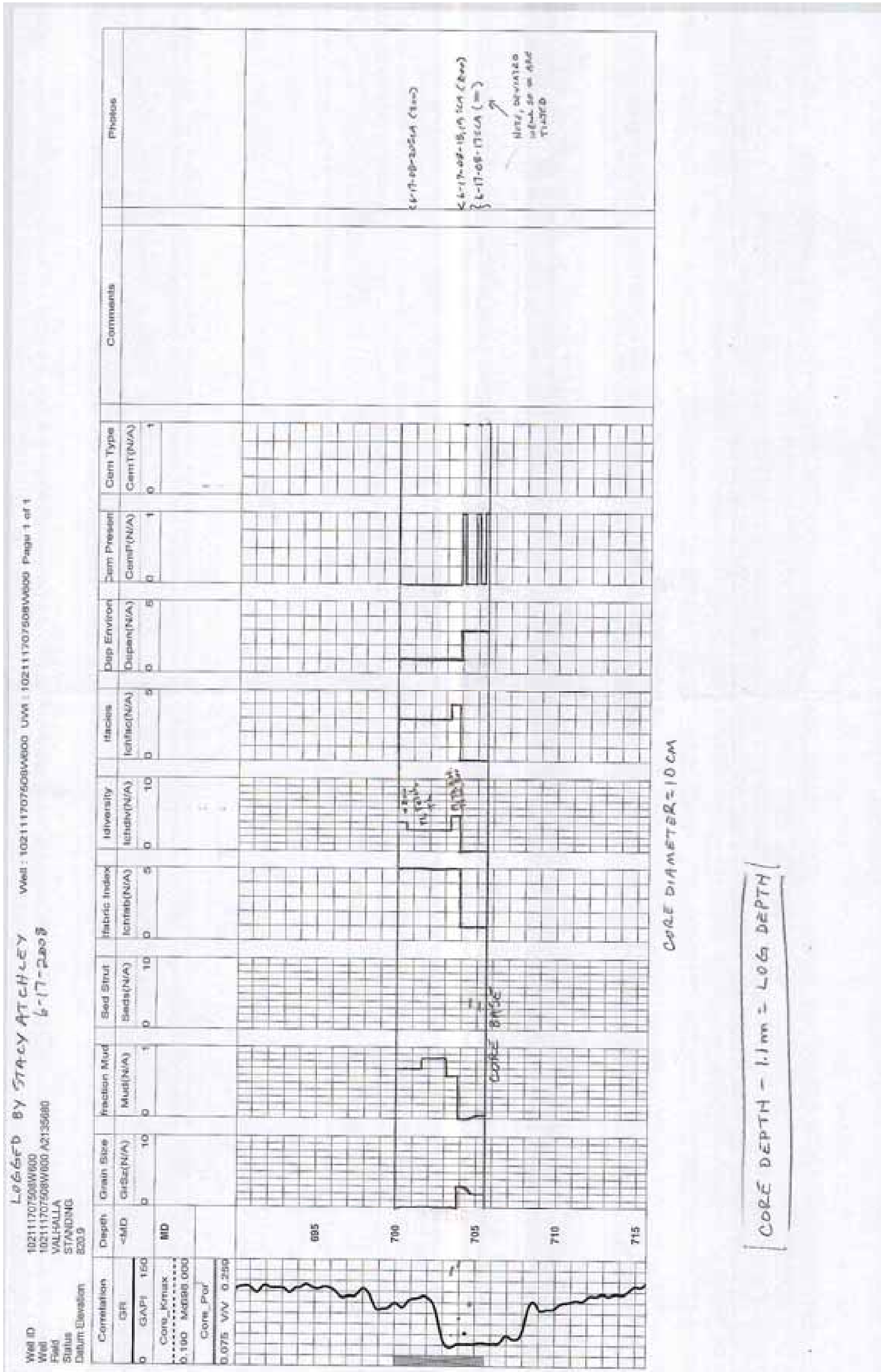

Luke Hunt 24-06-08
Well ID 100162707508W600
Well 100162707508W600 A1072820
Field VALHALLA
Status DRY
Datum Elevation 928.1
Well : 100162707508W600 UWI : 100162707508W600 Page 1 of 1
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 Md698.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
740
745
750
755
760
765
Grain Size
GrSz(N/A)
0 10
Iraction Mud
Mud(N/A)
0 1
Sed Strut
Seds(N/A)
0 10
Ifabric Index
Ichfab(N/A)
0 5
Idiversity
Ichdiv(N/A)
0 10
Ifacies
Ichfac(N/A)
0 5
Dep Environ
Depen(N/A)
0 5
Cem Presen
CemP(N/A)
0 1
Cem Type
CemT(N/A)
0 1
Comments
Photos
Top of Core = 746m
Base of Core = 757m
<24-06-08-41LH
<24-06-08-40LH
<24-06-08-39LH
<24-06-08-38LH
<24-06-08-37LH
<24-06-08-36LH
<24-06-08-35LH
Core Diameter = 8.5cm
core depth - 2.25m = log depth

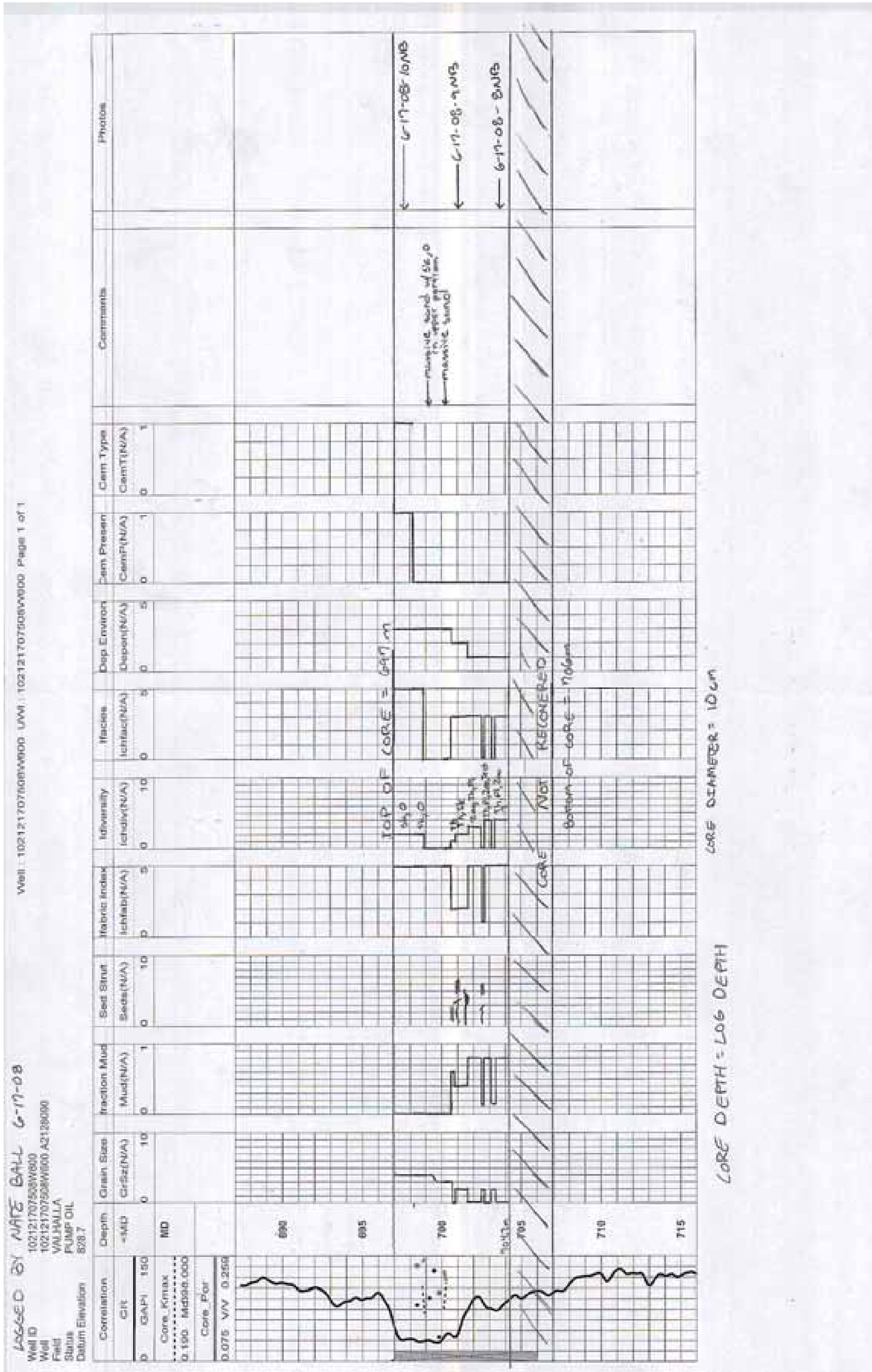


CORE DEPTH -1.25 m = LOG DEPTH

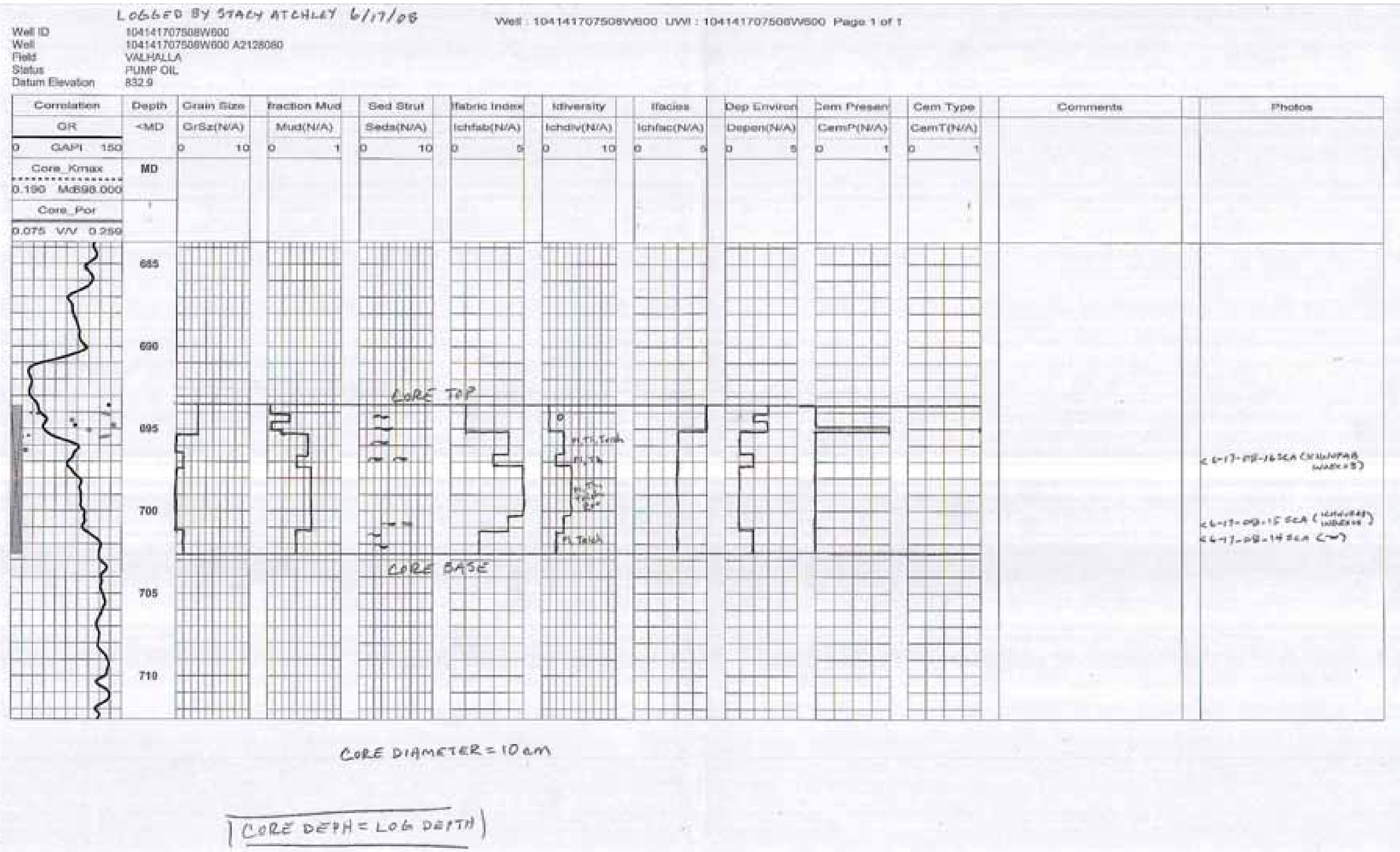
*NOTE: CORE DESCRIPTION HAS BEEN SHIFTED 1.25m TO MATCH LOG DEPTH. CORE ϕ + K VALUES WILL NOT MATCH UNLESS SHIFTED.


LOGGED BY STACY ATCHLEY 6/24/08
Well ID 102092707508W600
Well 102092707508W600 A1848510
Field VALHALLA
Status PUMP OIL
Datum Elevation 918.8
Well : 102092707508W600 UWI : 102092707508W600 Page 1 of 1
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 MD 698.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
Grain Size
GrSz(N/A)
fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
735
740
745
750
755
CORE TOP
CORE BASE
NOT RECOVERED
φ/K SAMPLES NOT TAKEN IN AREAS OF CEMENT
CORE DIAMETER = 8.5cm
CORE DEPTH = LOG DEPTH


LOGGED BY STACY ATCHLEY
6-17-2008
Well ID 102111707508W600
Well 102111707508W600 A2135680
Field VALHALLA
Status STANDING
Datum Elevation 820.9
Well : 102111707508W600 UWI : 102111707508W600 Page 1 of 1
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 Md698.000
Core_Por
0.075 V/V 0.250
Depth
<MD
MD
695
700
705
710
715
Grain Size
GrSz(N/A)
fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
CORE BASE
CORE DIAMETER = 10 CM
CORE DEPTH - 1.1m = LOG DEPTH



LOGGED BY NATE BALL 6-17-08
Well ID 102121707508W600
Well 102121707508W600 A2128090
Field VALHALLA
Status PUMP OIL
Datum Elevation 828.7
Well : 102121707508W600 UWI : 102121707508W600 Page 1 of 1
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 Md98.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
Grain Size
GrSz(N/A)
fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
690
695
700
705
710
715
TOP OF CORE = 697 m
CORE NOT RECOVERED
BOTTOM OF CORE = 706m
massive sand
6-17-08-10NB
6-17-08-9NB
6-17-08-8NB
CORE DEPTH = LOG DEPTH
CORE DIAMETER = 10cm



LOGGED BY STACY ATCHLEY 6/17/08
Well : 104141707508W600 UWI : 104141707508W600 Page 1 of 1
Well ID 104141707508W600
Well 104141707508W600 A2128080
Field VALHALLA
Status PUMP OIL
Datum Elevation 832.9
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 Md898.000
Core_Por
0.075 V/V 0.250
Depth
<MD
MD
685
690
695
700
705
710
Grain Size
GrSz(N/A)
Fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
CORE TOP
CORE BASE
CORE DIAMETER = 10 cm
CORE DEPTH = LOG DEPTH

T75R9

Core Description Legend

Grain Size

0 - Silt/Clay
1 - Lower Very Fine
2 - Upper Very Fine
3 - Lower Fine
4 - Upper Fine
5 - Lower Medium
6 - Upper Medium
7 - Lower Coarse
8 - Upper Coarse
9 - Lower Very Coarse
10 - Upper Very Coarse

Sedimentary Structures

- Planar Horizontal
- Planar Laminations
- Trough Cross Bedding
- Soft Sediment Deformation
- Planar Tabular
- mm Laminations
- Climbing Ripple
- Firmground
- Hummocks
- Current Ripple
- Wave Ripple
- Flaser Bedding
- Lithoclast
- Intraclast
- Bivalve undiff.

Photos

6-16-08-nnn(initials of author)

Ichnofabric Index

1 - No bioturbation recorded; all original sedimentary structures preserved
2 - Discrete, isolated trace fossils; up to 10 percent of original bedding disturbed
3 - Approximately 10 to 40 percent of original bedding disturbed
4 - Last vestiges of bedding discernable; approximately 40-60 percent disturbed. Burrows overlap and are not always well defined.
5 - Bedding is completely disturbed, but burrows are still discrete in places and the fabric is not mixed. May also represent totally homogenized sediment in the absence of trace fossils.

Ichnofauna

Pl - *Planolites*
Th - *Thalassinoides*
Teich - *Teichichnus*
Pal - *Palaeophycus*
Zoo - *Zoophycos*
Cyl - *Cylindrichnus*
Sub - *Subphyllocorda*
O - *Ophiomorpha*
Ber - *Bergaueria*
Rh - *Rhizocorallium*
Sk - *Skolithos*
Ast - *Asterosoma*
Aren - *Arenicolites*
Ros - *Rosselia*
Diplo - *Diplocraterion*
Con - *Conichnus*
Chon - *Chondrites*
Phy - *Phycosiphon*
Ter - *Terebellina*

Ichnodiversity

n - number of taxa observed

Ichnofacies

1 - *Nereites*
2 - *Zoophycos*
3 - *Cruziana* (Restricted)
4 - *Cruziana* (Open)
5 - *Skolithos*

Depositional Environment

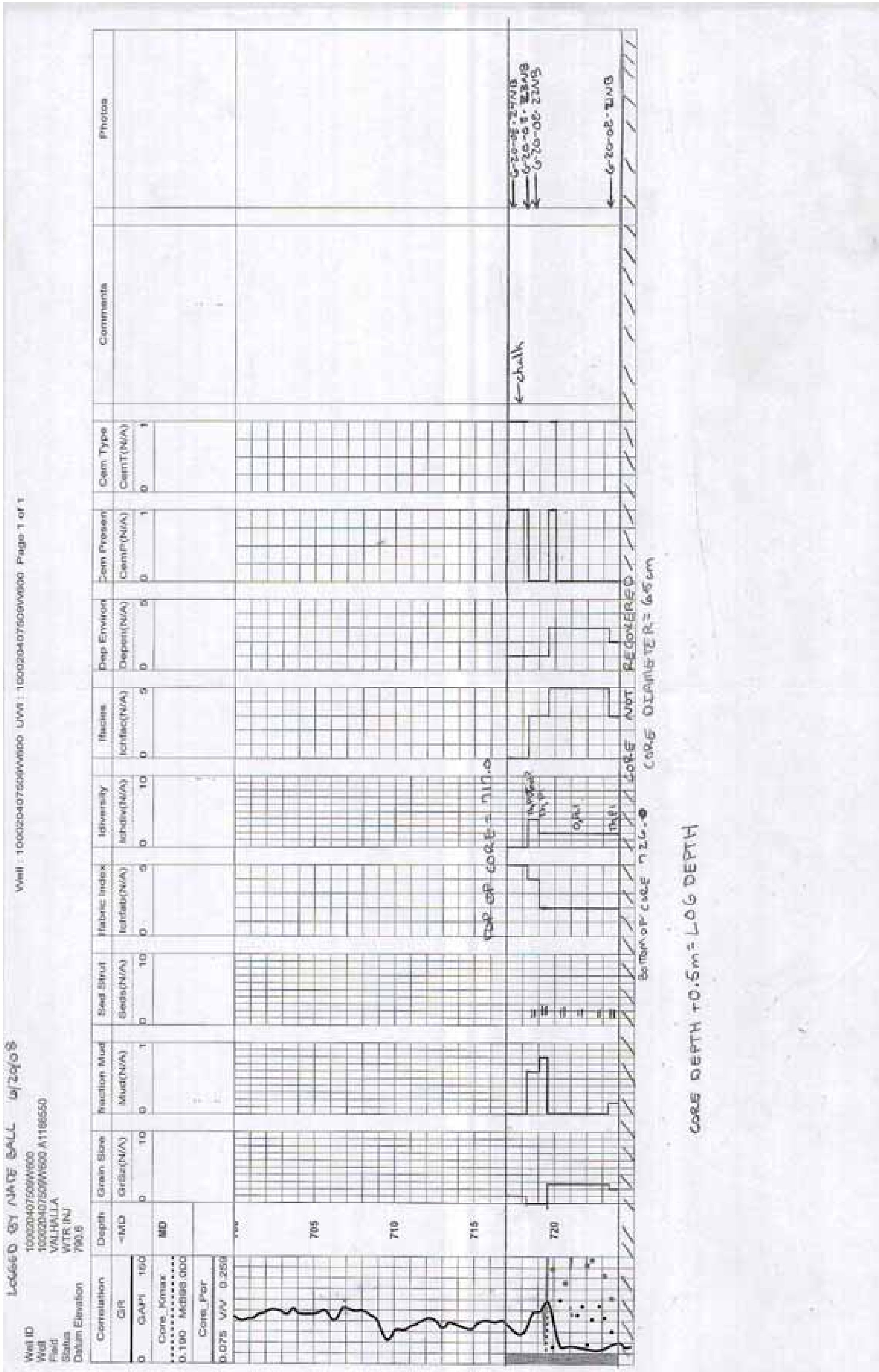
1 - Offshore
2 - Distal Lower Shoreface
3 - Proximal Lower Shoreface
4 - Upper Shoreface
5 - Foreshore

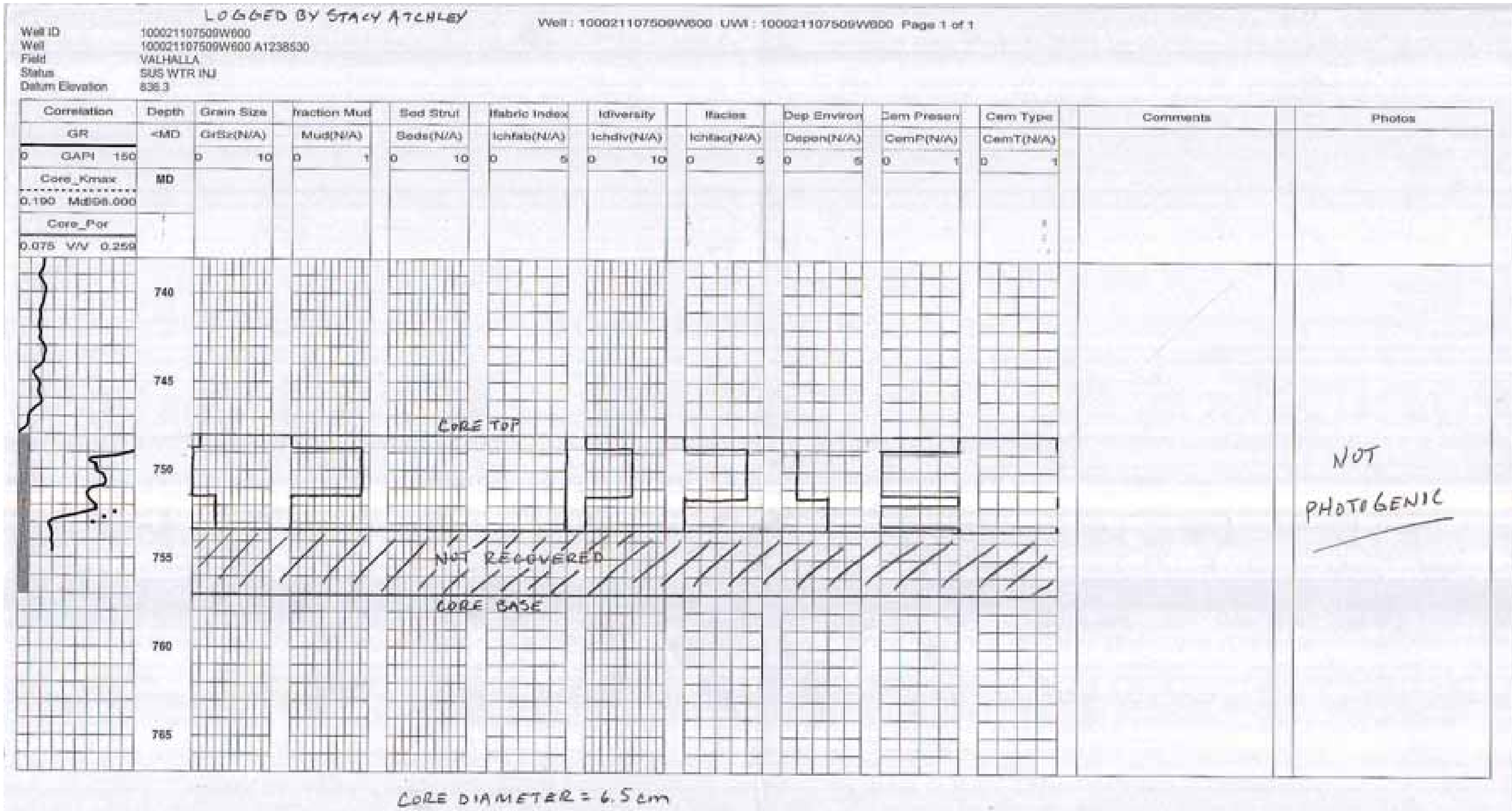
Cement

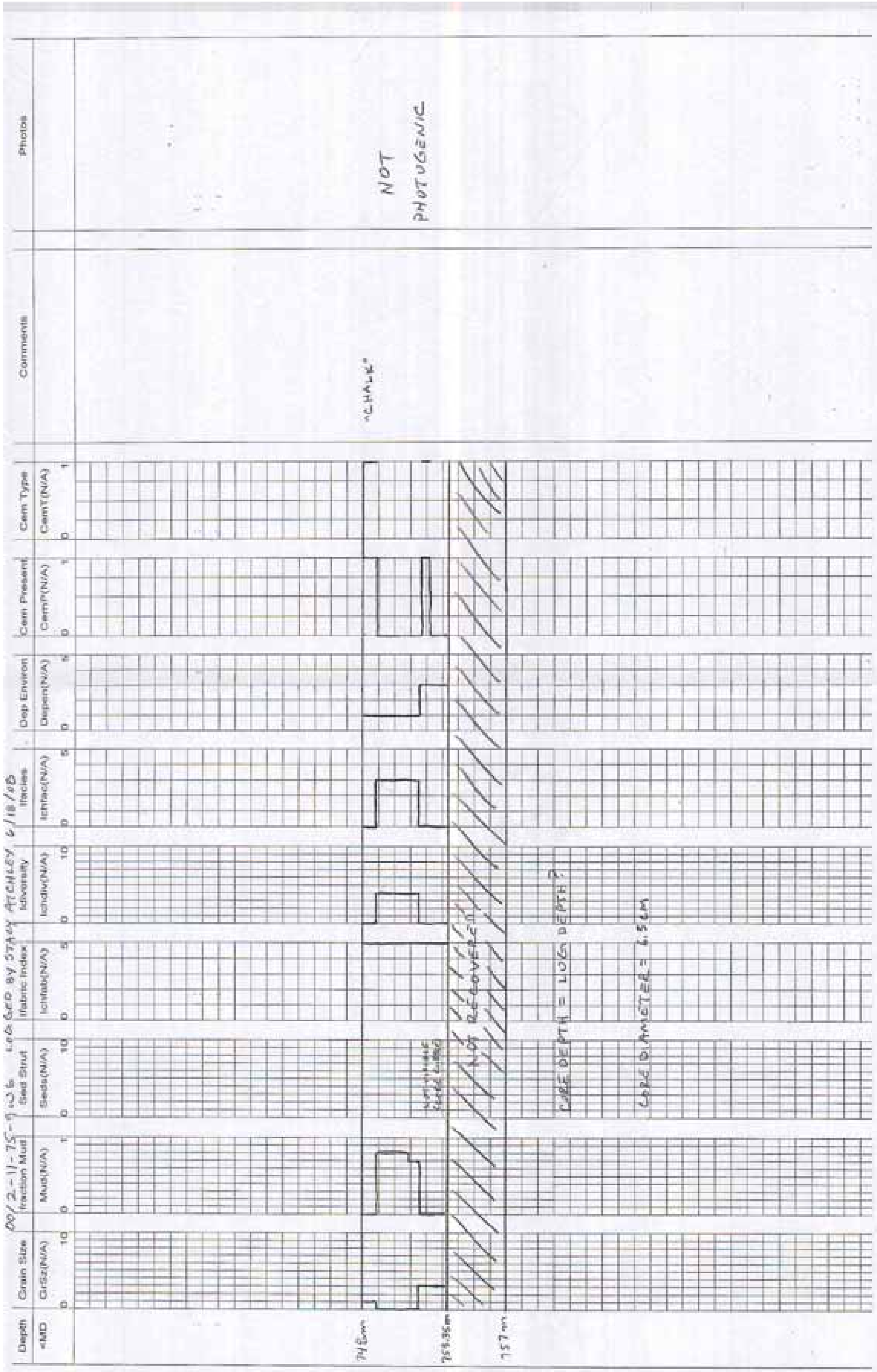
0 - No Cement Present
1 - Cement Present

Cement Type

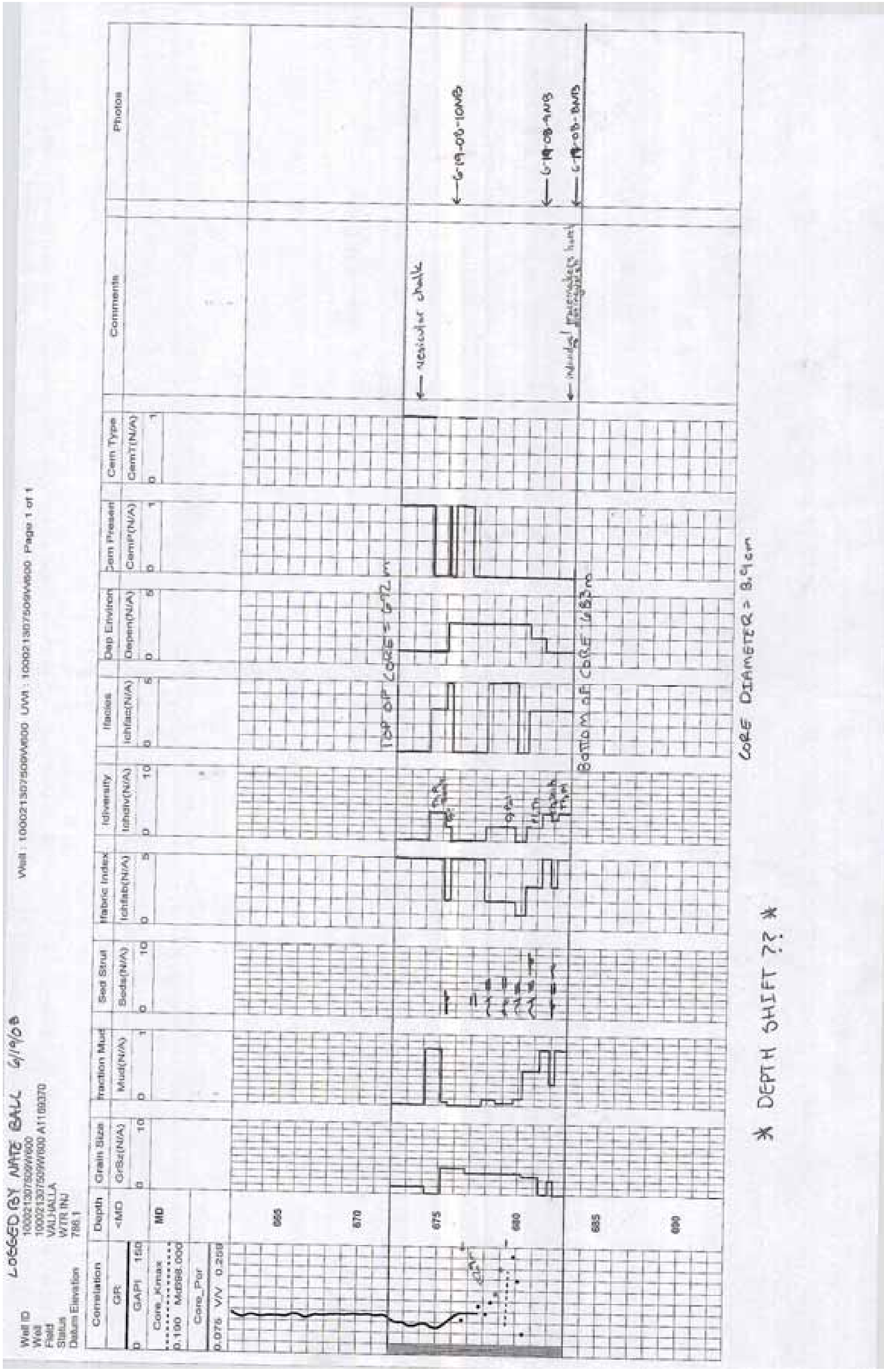
0 - Quartz
1 - Calcite

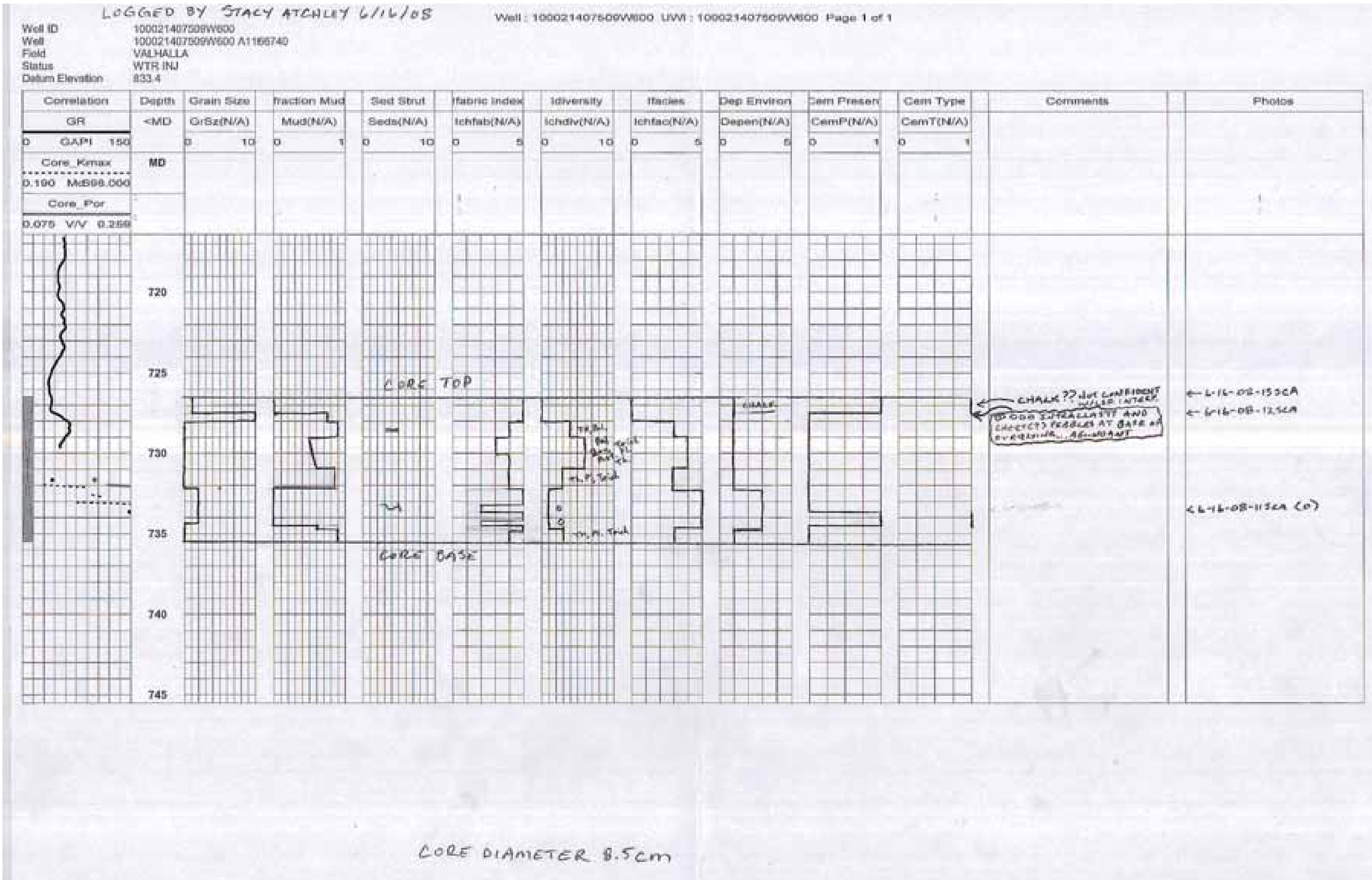

LOGGED BY NATE BALL 6/20/08
Well ID
Well
Field
Status
Datum Elevation
VALHALLA
WTR INJ
790.6
Correlation
Depth
Grain Size
Traction Mud
Sed Strut
Fabric Index
Idiversity
Ifacies
Dep Environ
Cem Presen
Cem Type
Comments
Photos
GR
GAPI
Core_Kmax
Core_Por
705
710
715
720
TOP OF CORE = 717.0
BOTTOM OF CORE 726.0
CORE NOT RECOVERED
CORE DIAMETER = 6.5cm
CORE DEPTH +0.5m = LOG DEPTH
←chalk

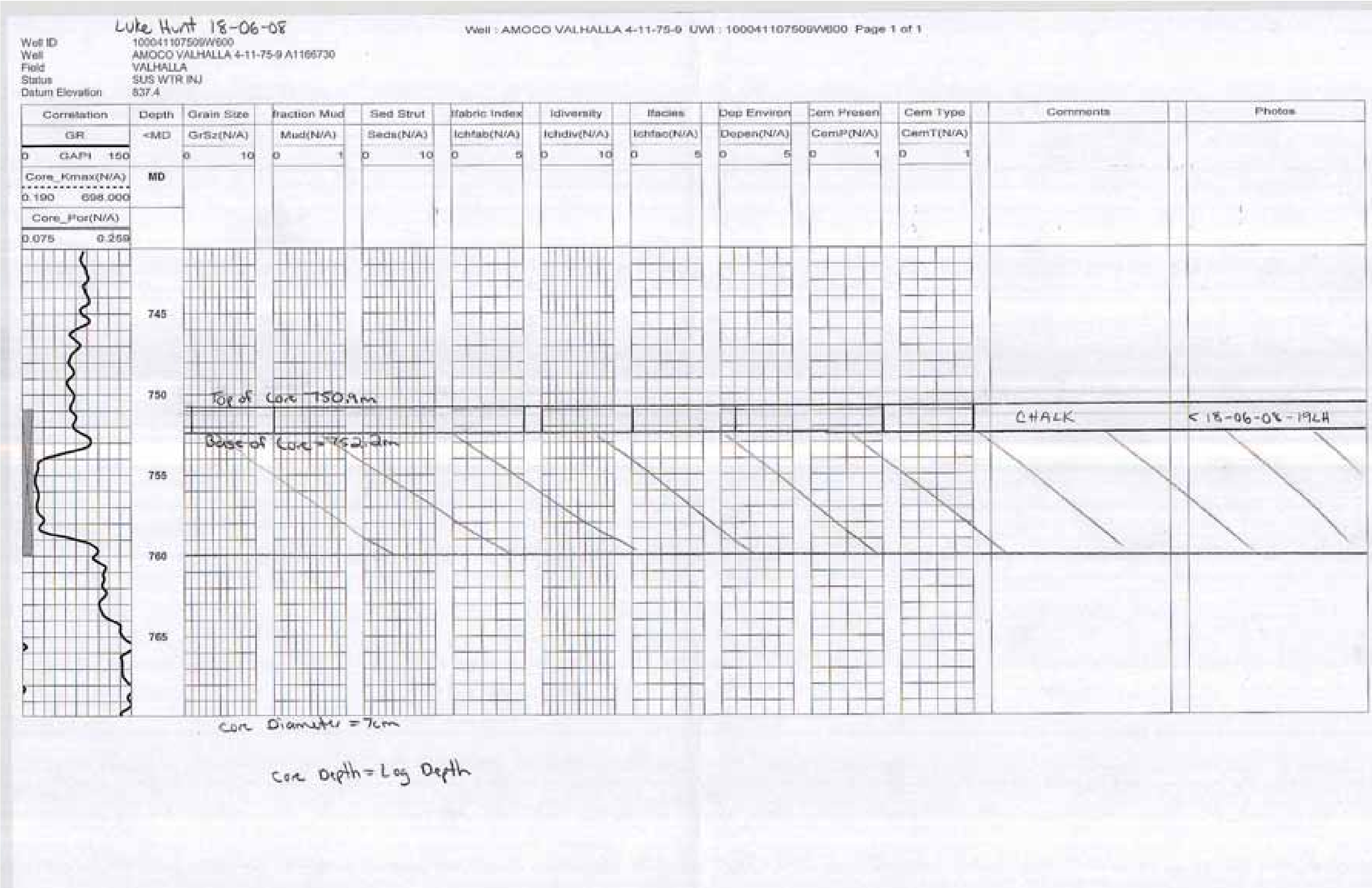

LOGGED BY STACY ATCHLEY
Well : 100021107509W600 UWI : 100021107509W600 Page 1 of 1
Well ID 100021107509W600
Well 100021107509W600 A1238530
Field VALHALLA
Status SUS WTR INJ
Datum Elevation 836.3
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 Md|98.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
740
745
750
755
760
765
Grain Size
GrSz(N/A)
0 10
fraction Mud
Mud(N/A)
0 1
Sed Strut
Seds(N/A)
0 10
Ifabric Index
Ichfab(N/A)
0 5
Idiversity
Ichdiv(N/A)
0 10
Ifacies
Ichfac(N/A)
0 5
Dep Environ
Depen(N/A)
0 5
Cem Presen
CemP(N/A)
0 1
Cem Type
CemT(N/A)
0 1
Comments
Photos
CORE TOP
NOT RECOVERED
CORE BASE
NOT PHOTOGENIC
CORE DIAMETER = 6.5 cm

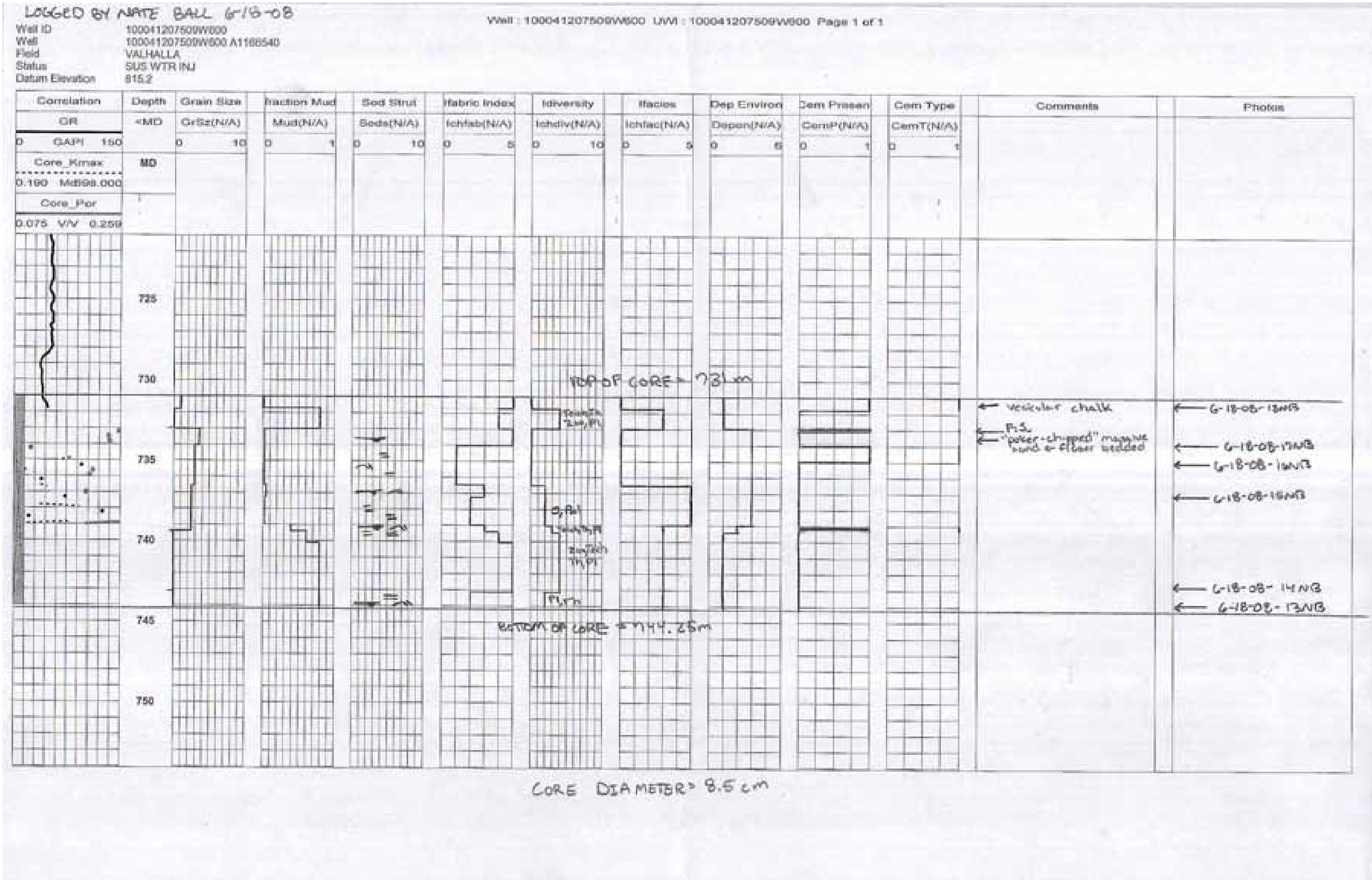


Depth
Grain Size
GrSz(N/A)
fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Ichdiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Present
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
NOT RECOVERED
CORE DEPTH = LOG DEPTH?
CORE DIAMETER = 6.5CM
"CHALK"
NOT PHOTOGENIC

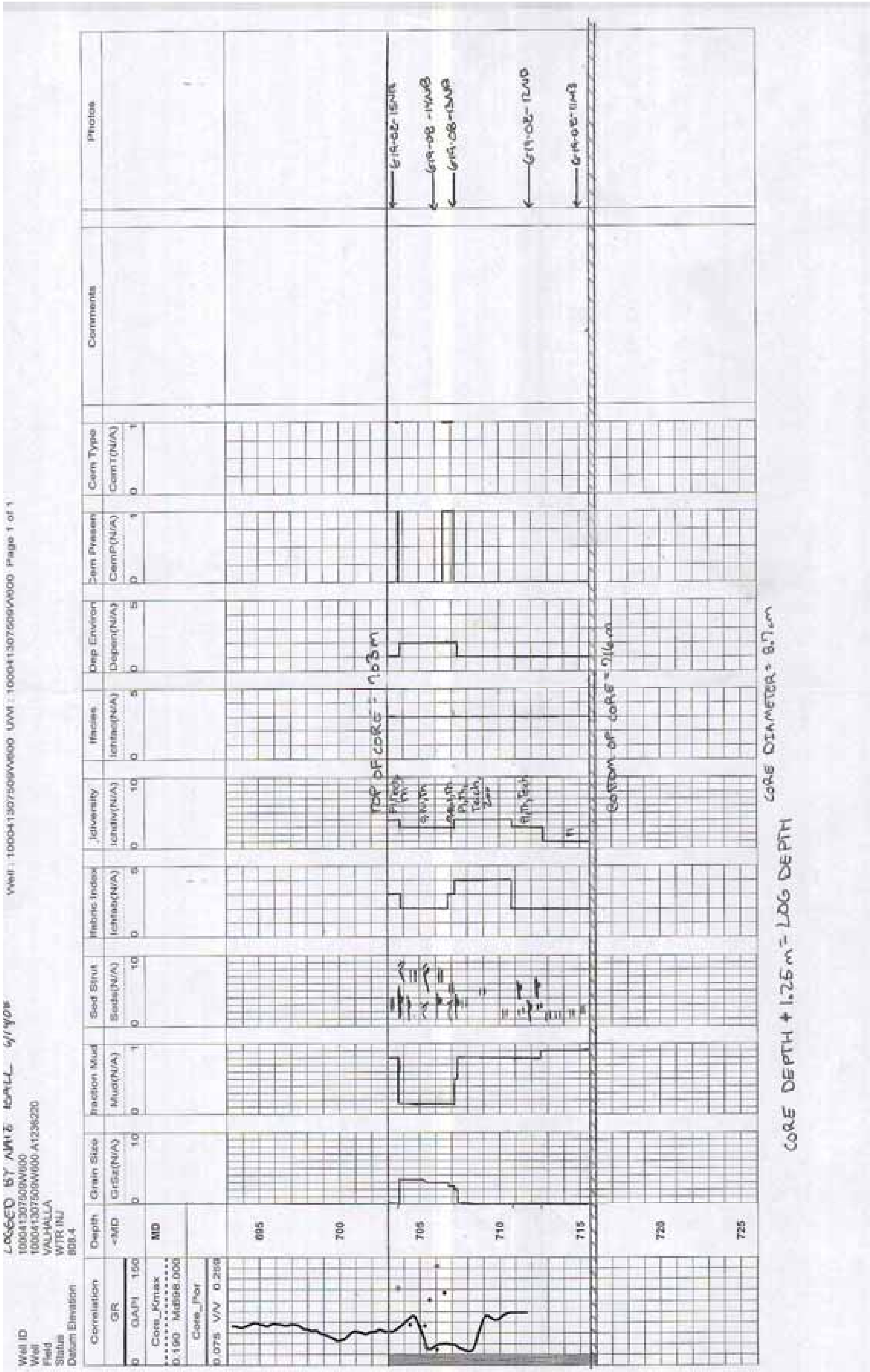

LOGGED BY NATE BALL 6/19/08
TOP OF CORE = 672 m
BOTTOM OF CORE 683m
CORE DIAMETER = 8.9cm
* DEPTH SHIFT ?? *
vesicular chalk

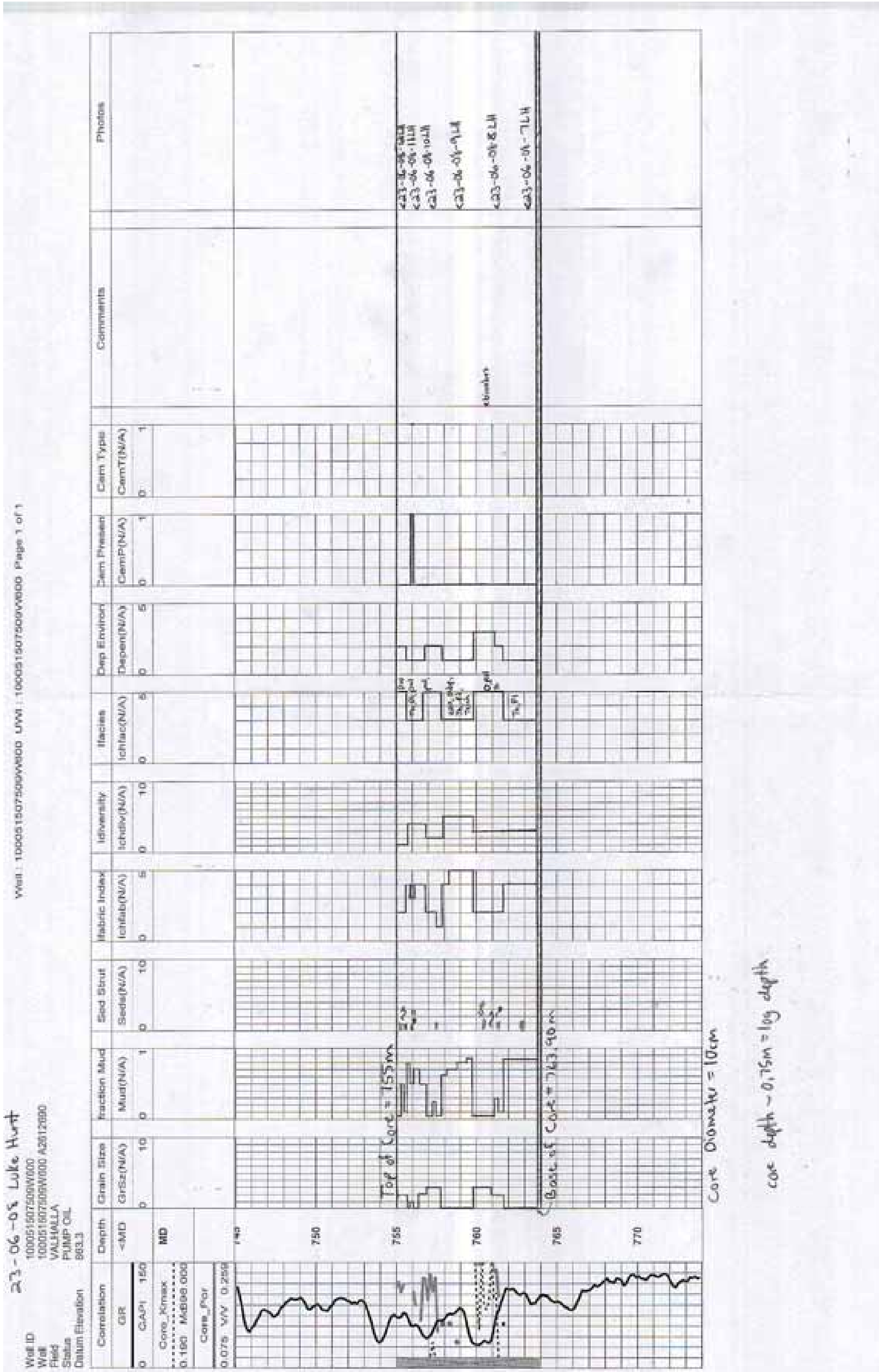

LOGGED BY STACY ATCHLEY 6/16/08
Well : 100021407509W600 UWI : 100021407509W600 Page 1 of 1
Well ID 100021407509W600
Well 100021407509W600 A1166740
Field VALHALLA
Status WTR INJ
Datum Elevation 833.4
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 MdS98.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
720
725
730
735
740
745
Grain Size
GrSz(N/A)
Fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
CORE TOP
CORE BASE
CHALK
CORE DIAMETER 8.5cm

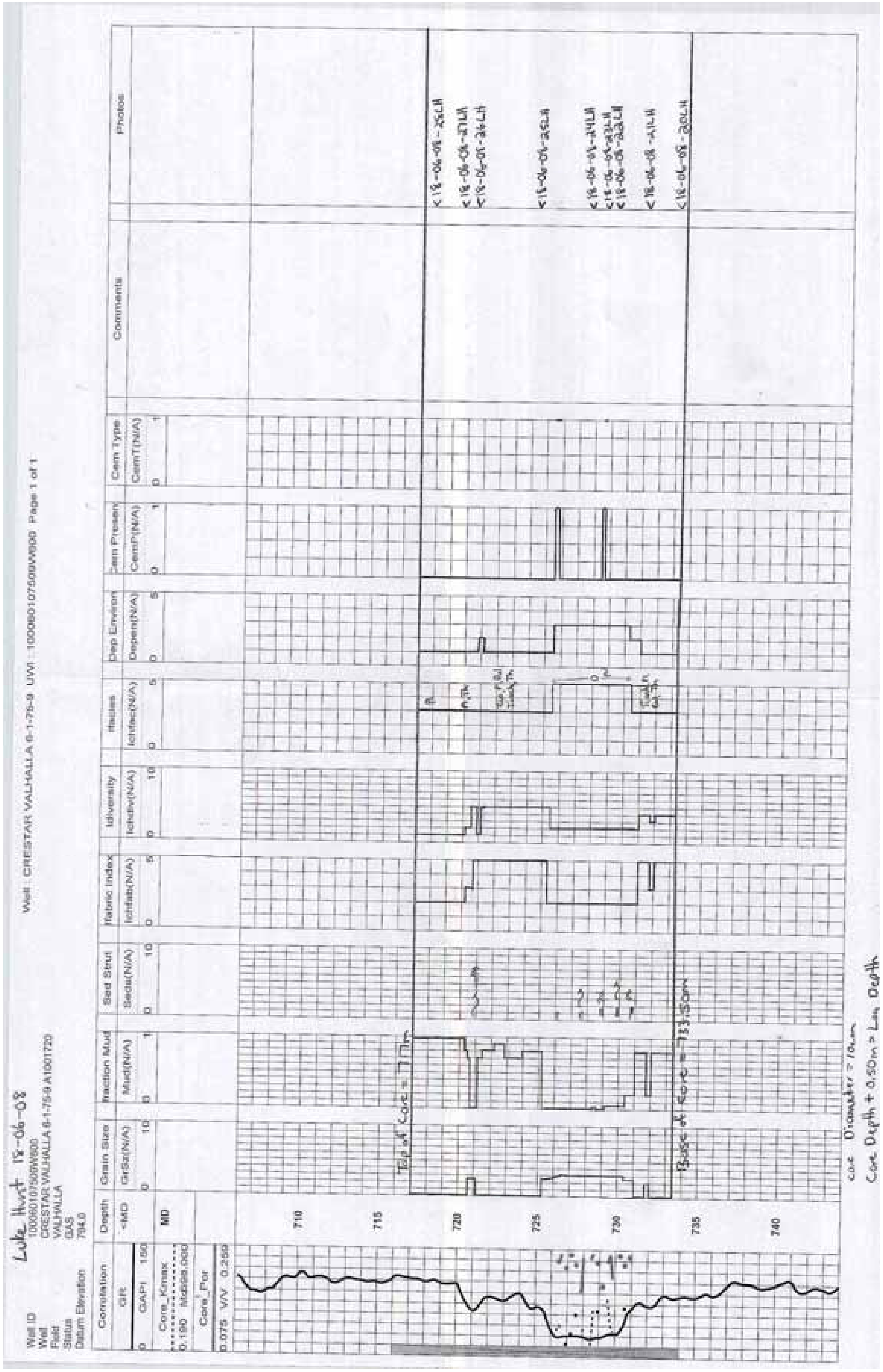

Luke Hunt 18-06-08
Well : AMOCO VALHALLA 4-11-75-9 UWI : 100041107509W600 Page 1 of 1
Well ID 100041107509W600
Well AMOCO VALHALLA 4-11-75-9 A1166730
Field VALHALLA
Status SUS WTR INJ
Datum Elevation 837.4
Correlation
GR
0 GAPI 150
Core_Kmax(N/A)
0.190 698.000
Core_Por(N/A)
0.075 0.259
Depth
<MD
MD
745
750
755
760
765
Grain Size
GrSz(N/A)
fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
Top of Core 750.9m
Base of Core = 752.2m
CHALK
< 18-06-08-19LH
Core Diameter = 7cm
Core Depth = Log Depth

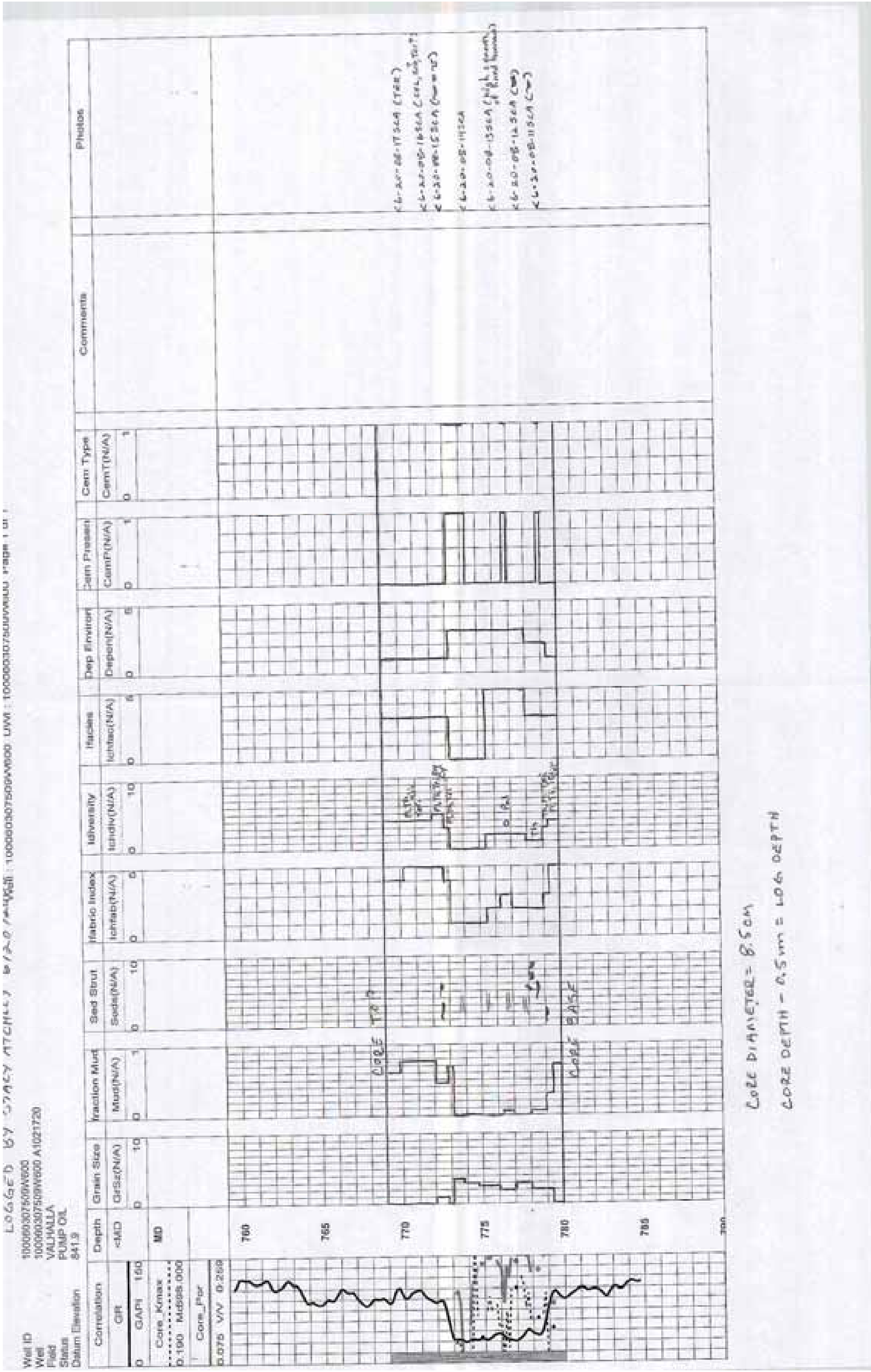


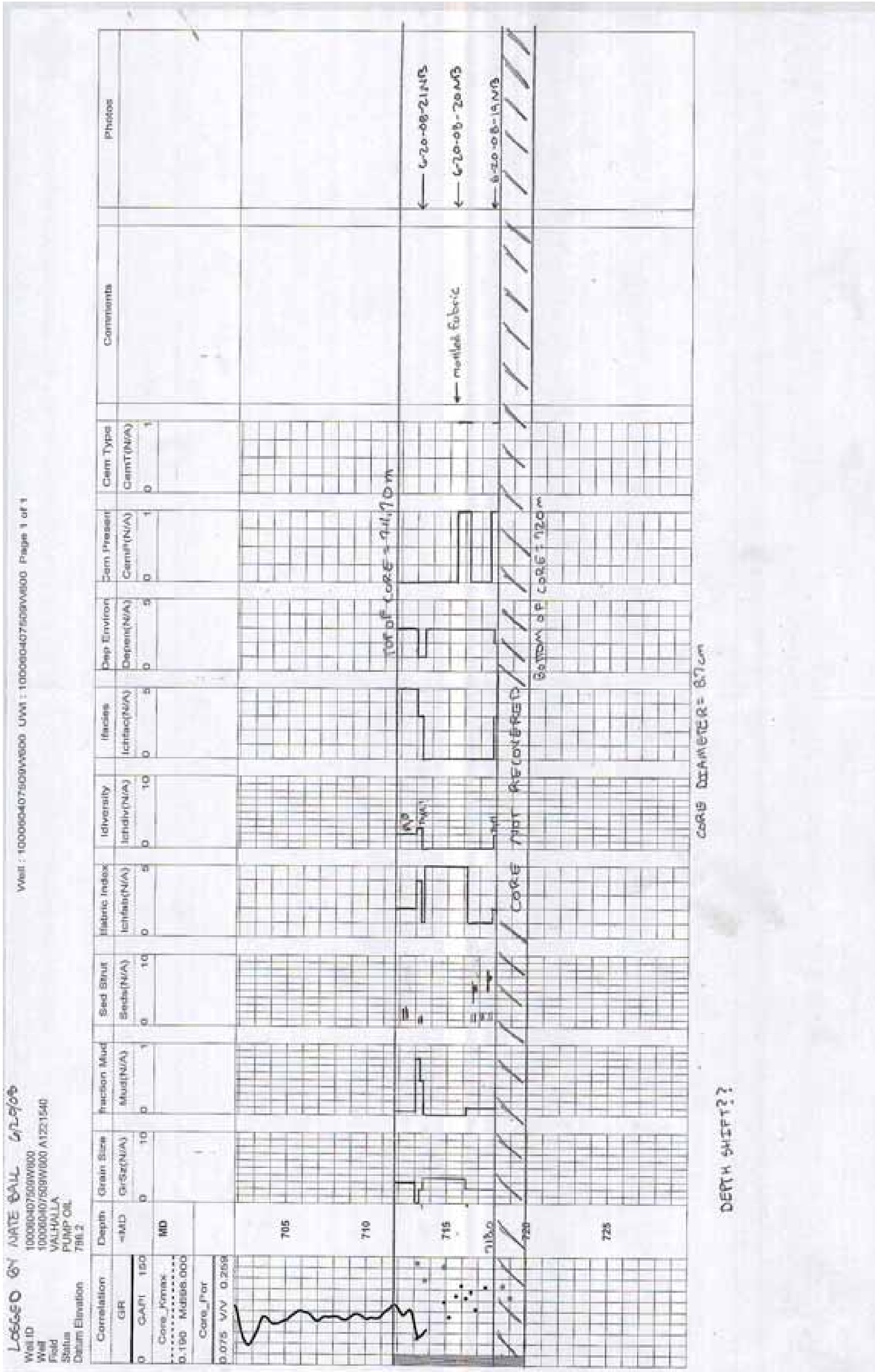
LOGGED BY NATE BALL 6/18-08
Well : 100041207509W600 UWI : 100041207509W600 Page 1 of 1
Well ID 100041207509W600
Well 100041207509W600 A1166540
Field VALHALLA
Status SUS WTR INJ
Datum Elevation 815.2
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 MD 898.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
Grain Size
GrSz(N/A)
Fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
725
730
735
740
745
750
TOP OF CORE = 731 m
BOTTOM OF CORE = 744.25 m
vesicular chalk
F.S.
"poker-chipped" massive sand & fissile bedded
6-18-08-13NB
6-18-08-17NB
6-18-08-16NB
6-18-08-15NB
6-18-08-14NB
6-18-08-13NB
CORE DIAMETER = 8.5 cm

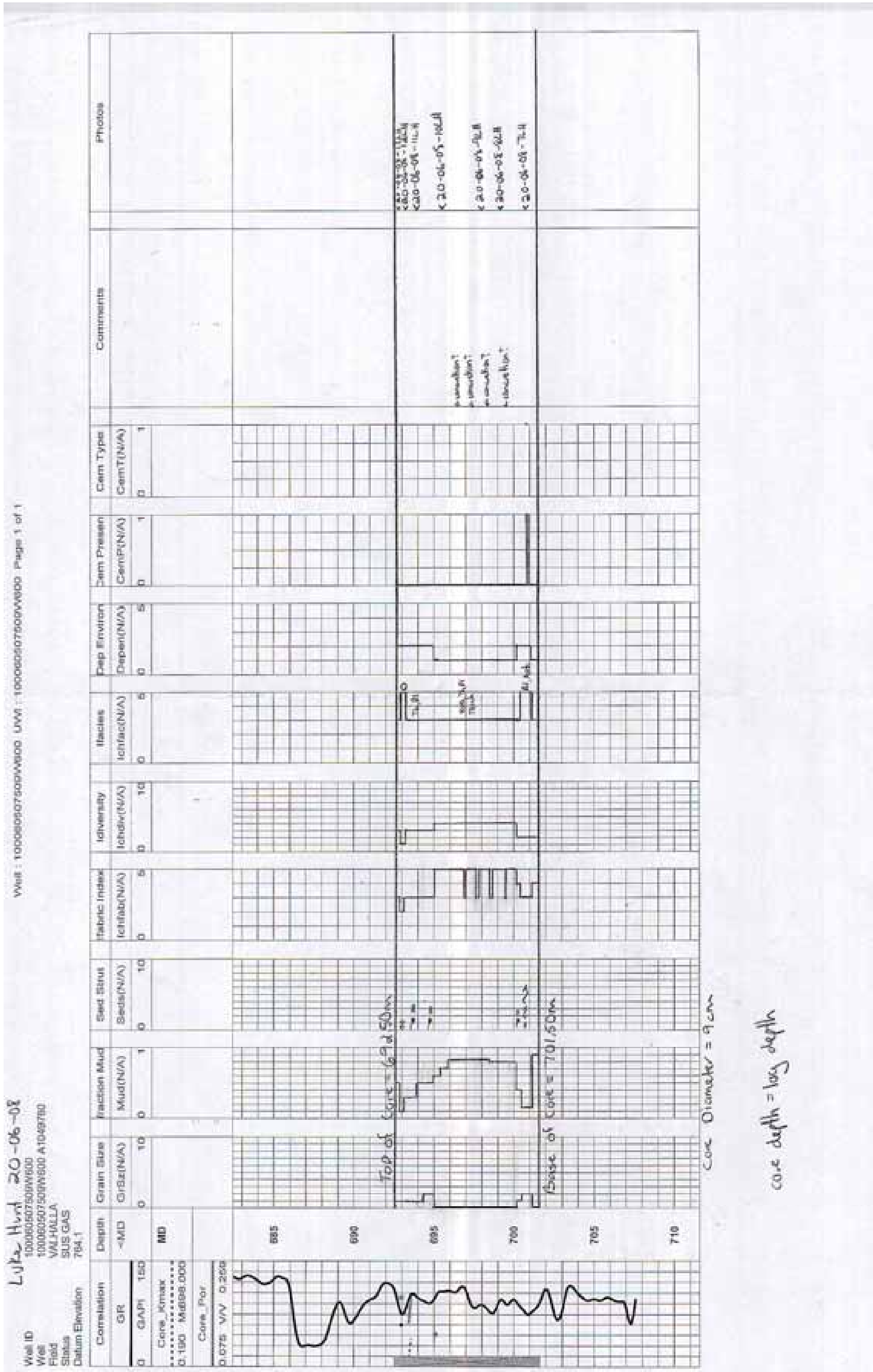

LOGGED BY NATE BALL
Well ID
Well
Field
Status
Datum Elevation
VALHALLA
WTR INJ
Well : 100041307509W600 UWI : 100041307509W600 Page 1 of 1
Correlation
Depth
Grain Size
Fraction Mud
Sed Strut
Fabric Index
Idiversity
Ifacies
Dep Environ
Cem Presen
Cem Type
Comments
Photos
GR
Core_Kmax
Core_Por
MD
695
700
705
710
715
720
725
TOP OF CORE = 703 m
BOTTOM OF CORE = 716 m
CORE DEPTH + 1.25 m = LOG DEPTH
CORE DIAMETER = 8.7 cm

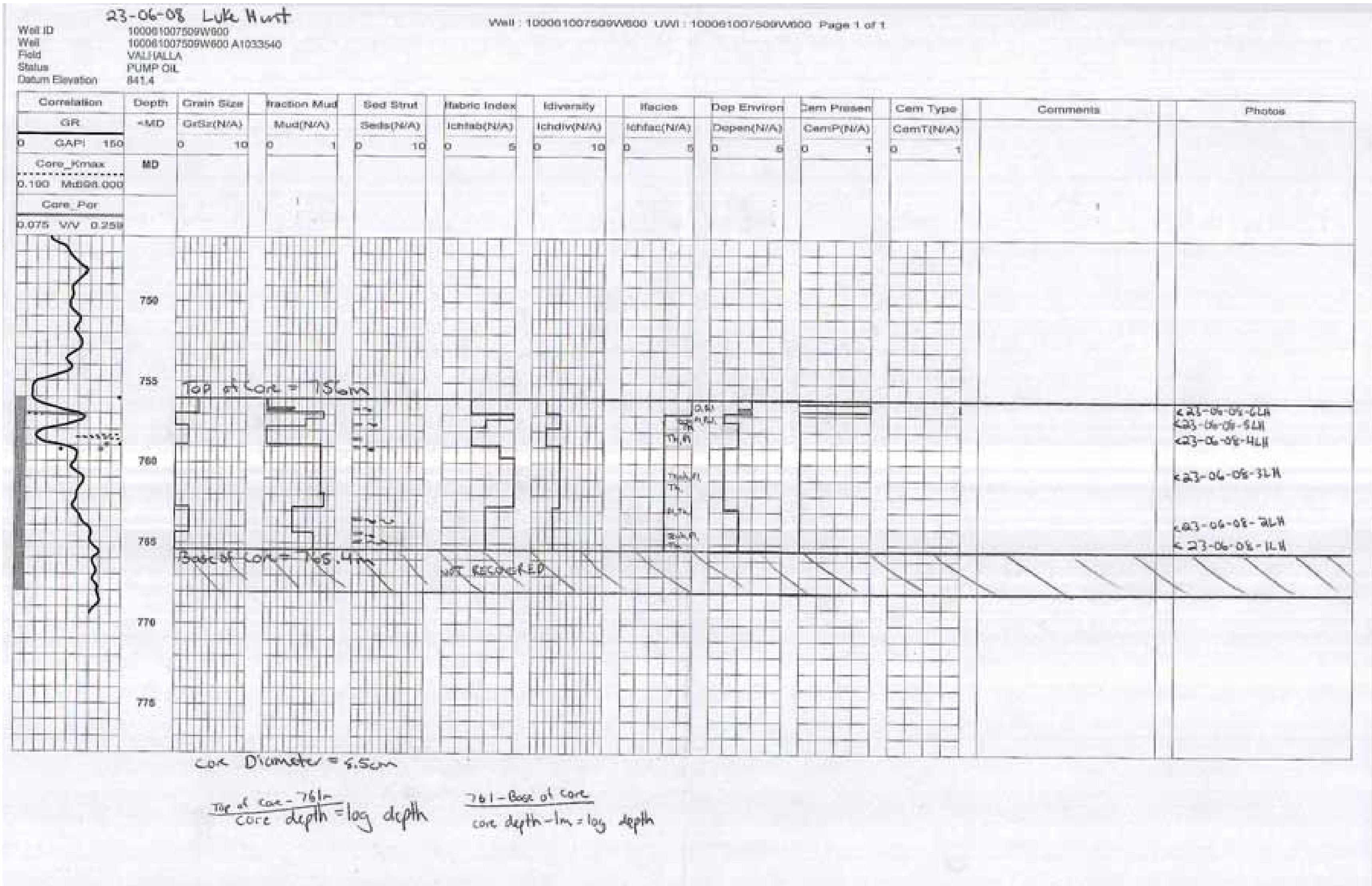

23-06-08 Luke Hurt
Well : 100051507509W600 UWI : 100051507509W600 Page 1 of 1
Well ID 100051507509W600
Well 100051507509W600 A2612690
Field VALHALLA
Status PUMP OIL
Datum Elevation 863.3
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 MD96.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
Grain Size
GrSz(N/A)
Fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
750
755
760
765
770
Top of Core = 755m
Base of Core = 763.90m
Core Diameter = 10cm
core depth - 0.75m = log depth

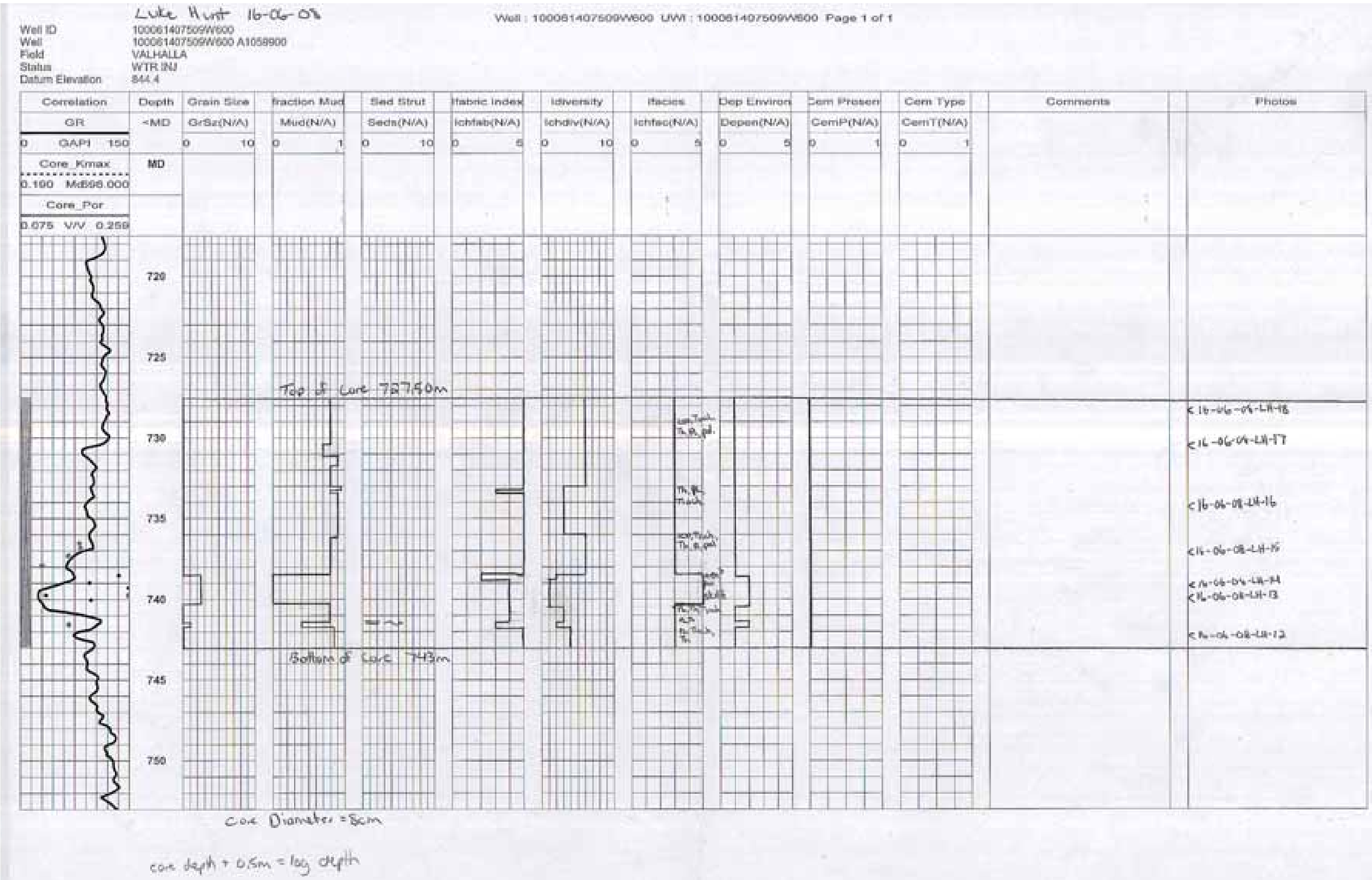

Luke Hurst 18-06-08
Well ID
Well
Field
Status
Datum Elevation
100060107509W600
CRESTAR VALHALLA 6-1-75-9 A100T720
VALHALLA
GAS
794.0
Well: CRESTAR VALHALLA 6-1-75-9 UWI: 100060107509W600 Page 1 of 1
Correlation
GR
GAPI
Core_Kmax
Core_Por
Depth
MD
Grain Size
Fraction Mud
Sed Strut
Fabric Index
Idiversity
Facies
Dep Environ
Cem Present
Cem Type
Comments
Photos
710
715
720
725
730
735
740
Top of Core = 717m
Base of Core = 733.150m
Core Diameter = 10cm
Core Depth + 0.50m = Log Depth


Well ID
Well
Field
Status
Datum Elevation
VALHALLA
PUMP OIL
841.9
Correlation
GR
GAPI
Core_Kmax
Core_Por
Depth
MD
Grain Size
Fraction Mud
Sed Strut
Fabric Index
Idiversity
Ifacies
Dep Environ
Cem Present
Cem Type
Comments
Photos
CORE TOP
CORE BASE
CORE DIAMETER = 8.5 CM
CORE DEPTH − 0.5 m = LOG DEPTH

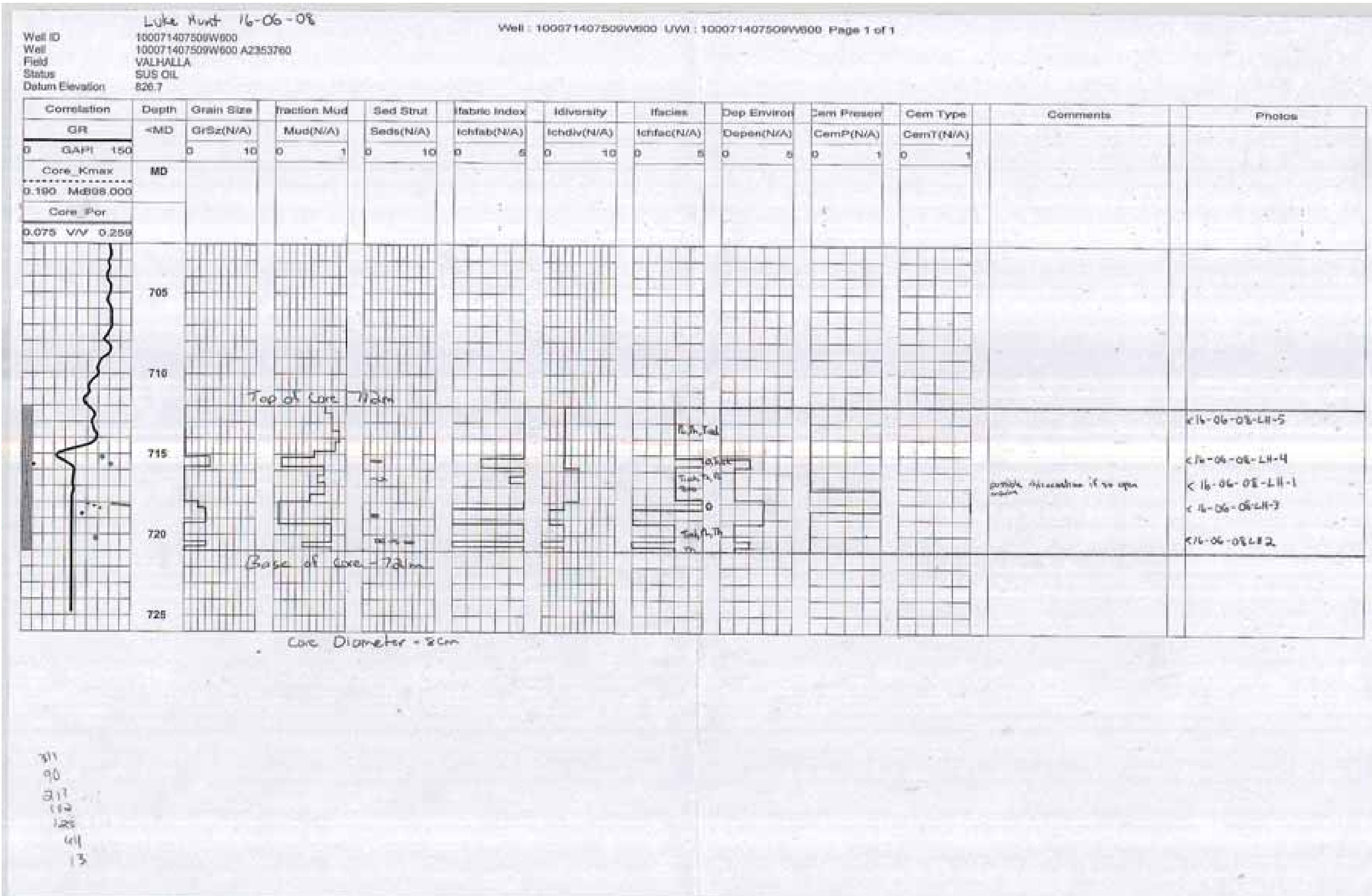

Correlation
Depth
Grain Size
Fraction Mud
Sed Strut
Fabric Index
Idiversity
Ifacies
Dep Environ
Cem Presen
Cem Type
Comments
Photos
TOP OF CORE = 711.70 m
BOTTOM OF CORE = 720 m
CORE NOT RECOVERED
mottled fabric
CORE DIAMETER = 8.7cm
DEPTH SHIFT??

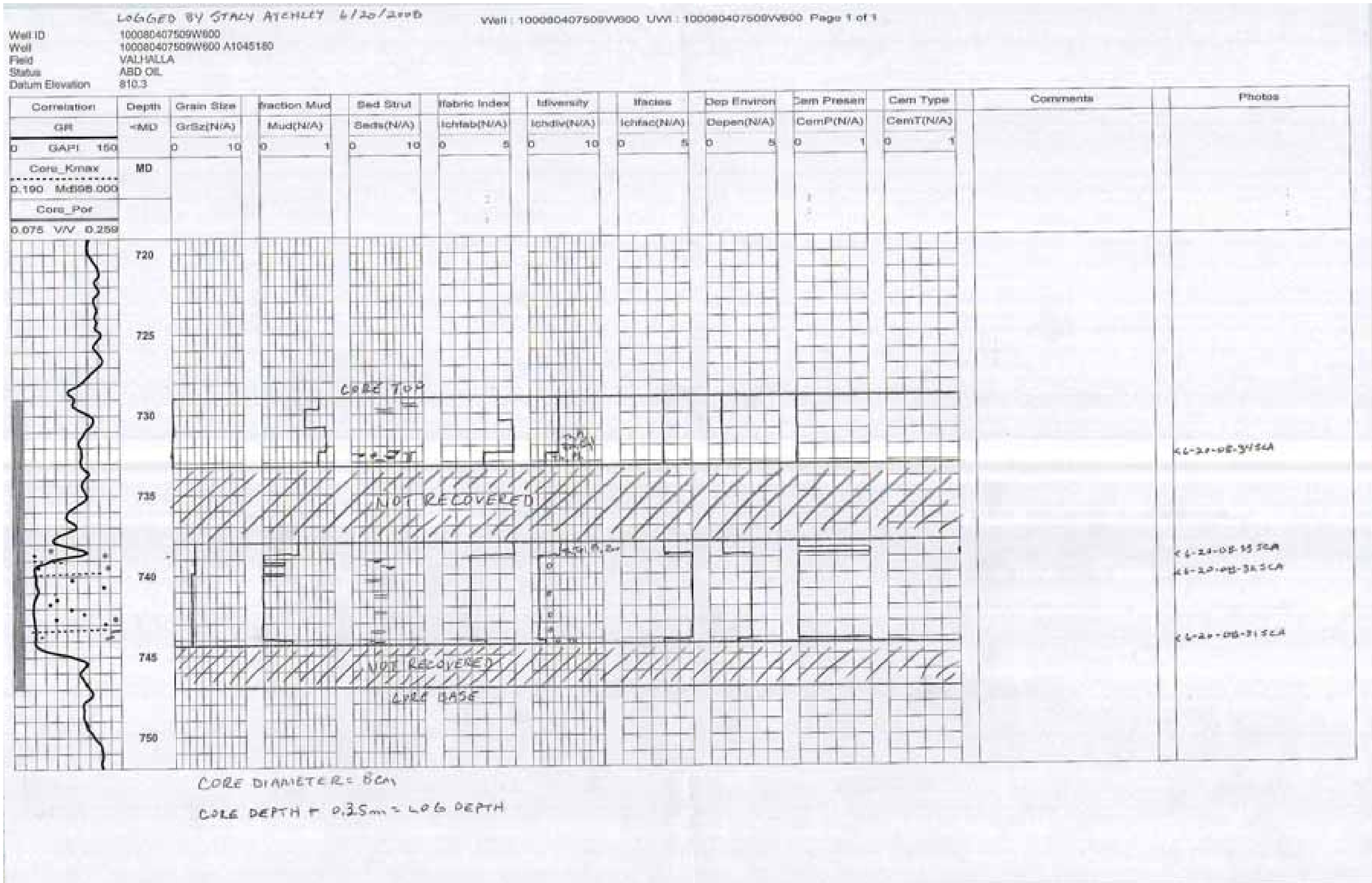

Luke Hunt 20-06-08
Well ID
Well
Field
Status
Datum Elevation
VALHALLA
SUS GAS
764.1
Correlation
Depth
Grain Size
Fraction Mud
Sed Struc
Fabric Index
Idiversity
Ifacies
Dep Environ
Cem Presen
Cem Type
Comments
Photos
GR
GAPI
Core_Kmax
Core_Por
MD
685
690
695
700
705
710
Top of Core = 692.50m
Base of Core = 701.50m
Core Diameter = 9cm
core depth = log depth

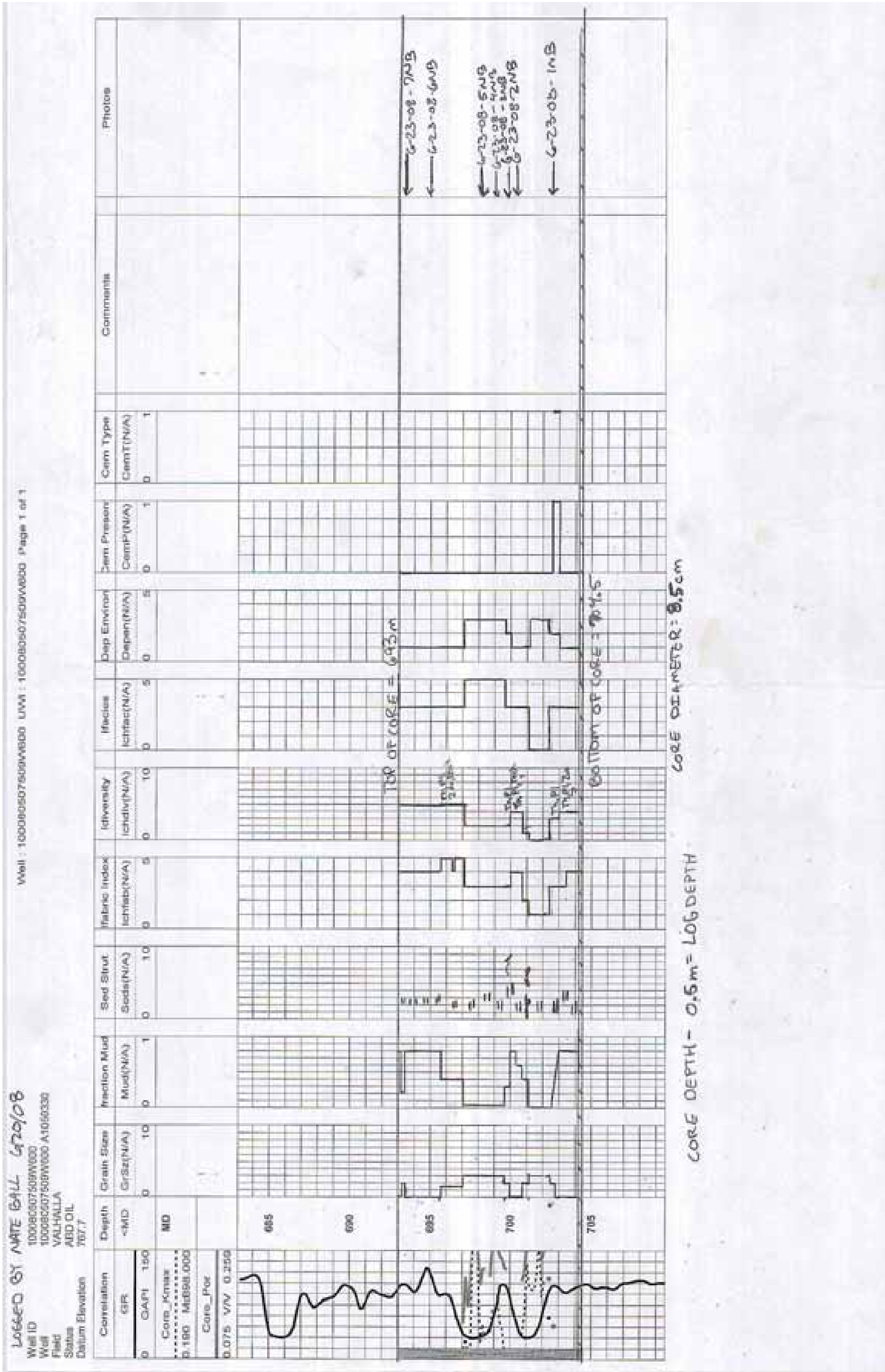

23-06-08 Luke Hurst
Well ID 100061007509W600
Well 100061007509W600 A1033540
Field VALHALLA
Status PUMP OIL
Datum Elevation 841.4
Well : 100061007509W600 UWI : 100061007509W600 Page 1 of 1
Correlation
GR
0 GAPI 150
Core_Kmax
0.100 Md598.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
Grain Size
GrSz(N/A)
Fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Fabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
750
755
760
765
770
775
Top of Core = 756m
Base of Core = 765.4m
NOT RECOVERED
<23-06-08-6LH
<23-06-08-5LH
<23-06-08-4LH
<23-06-08-3LH
<23-06-08-2LH
<23-06-08-1LH
Core Diameter = 6.5cm
Top of core - 761m / core depth = log depth
761 - Base of core / core depth - 1m = log depth

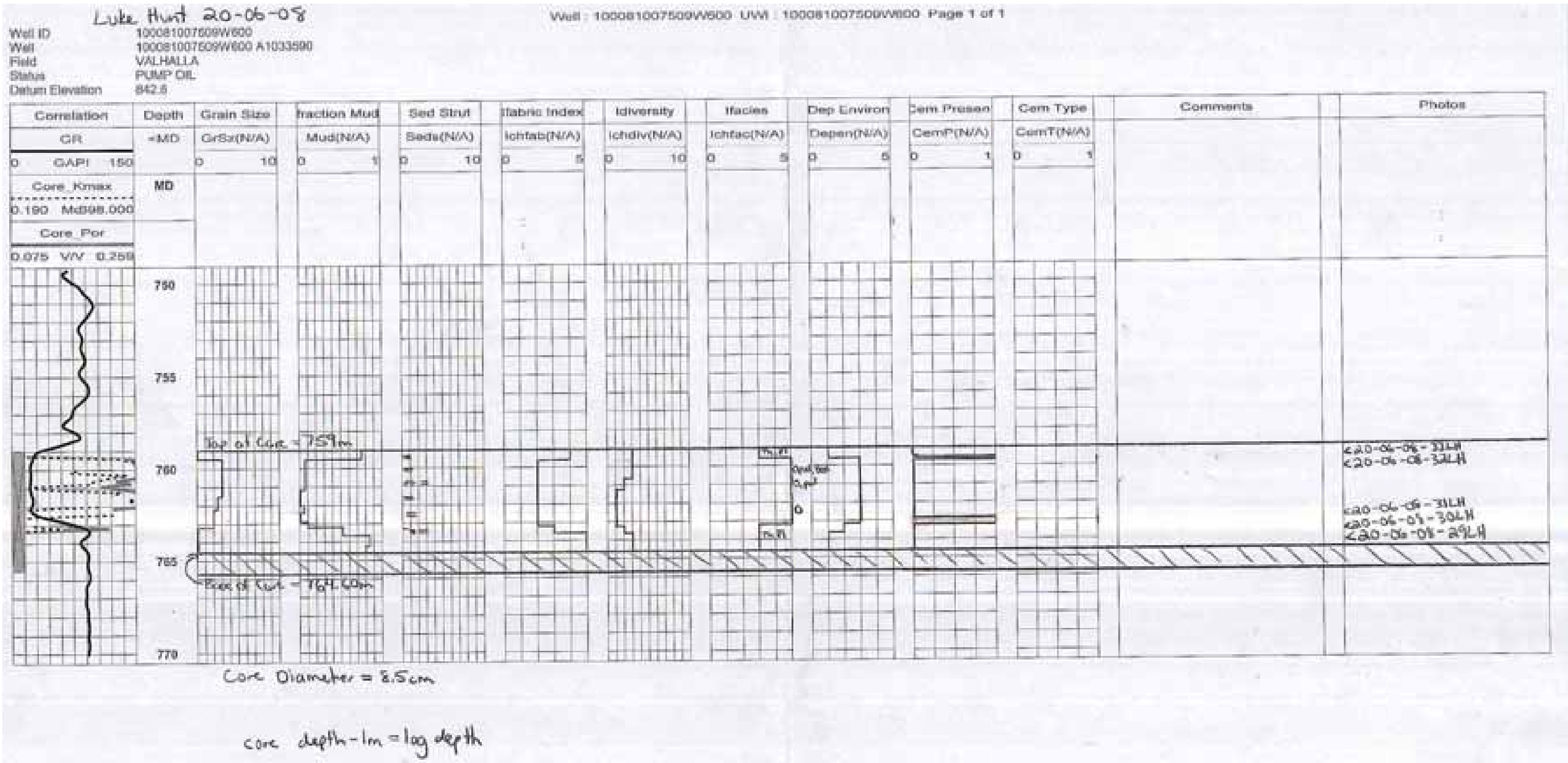


Luke Hunt 16-06-08
Well : 100061407509W600 UWI : 100061407509W600 Page 1 of 1
Well ID 100061407509W600
Well 100061407509W600 A1058900
Field VALHALLA
Status WTR INJ
Datum Elevation 844.4
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 Md696.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
720
725
730
735
740
745
750
Grain Size
GrSz(N/A)
Fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
Top of Core 727.50m
Bottom of Core 743m
Core Diameter = 8cm
core depth + 0.5m = log depth

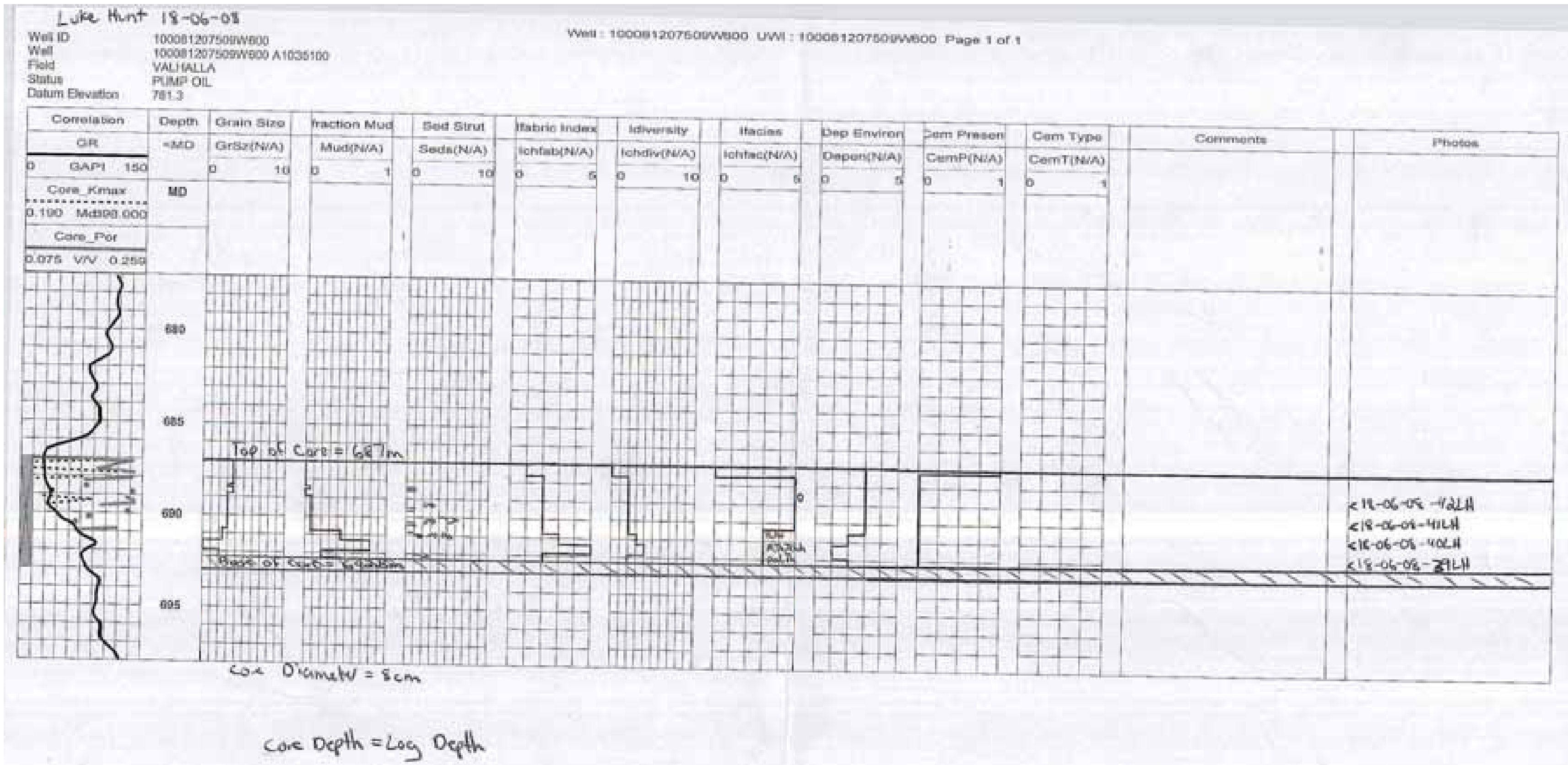

Luke Hunt 16-06-08
Well : 100071407509W600 UWI : 100071407509W600 Page 1 of 1
Well ID 100071407509W600
Well 100071407509W600 A2353760
Field VALHALLA
Status SUS OIL
Datum Elevation 826.7
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 Md808.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
Grain Size
GrSz(N/A)
Fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
705
710
715
720
725
Top of Core 712m
Base of Core - 721m
Core Diameter - 8cm
<16-06-08-LH-5
<16-06-08-LH-4
<16-06-08-LH-1
<16-06-08-LH-3
<16-06-08LH2

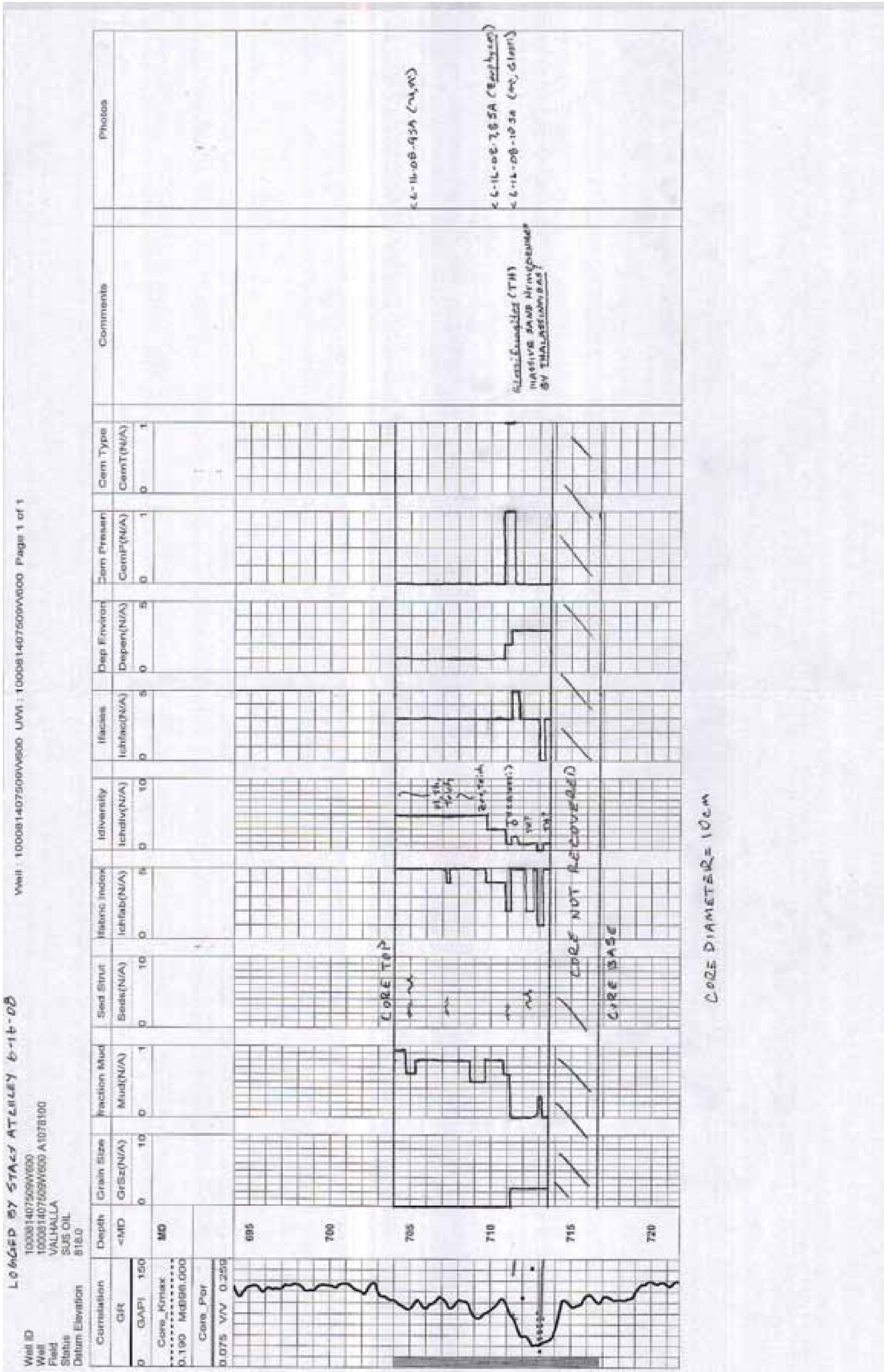

LOGGED BY STACY ATCHLEY 6/20/2006
Well : 100080407509W600 UWI : 100080407509W600 Page 1 of 1
Well ID 100080407509W600
Well 100080407509W600 A1045180
Field VALHALLA
Status ABD OIL
Datum Elevation 810.3
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 Md698.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
Grain Size
GrSz(N/A)
Fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
720
725
730
735
740
745
750
CORE TOP
NOT RECOVERED
NOT RECOVERED
CORE BASE
CORE DIAMETER = 8cm
CORE DEPTH + 0.35m = LOG DEPTH

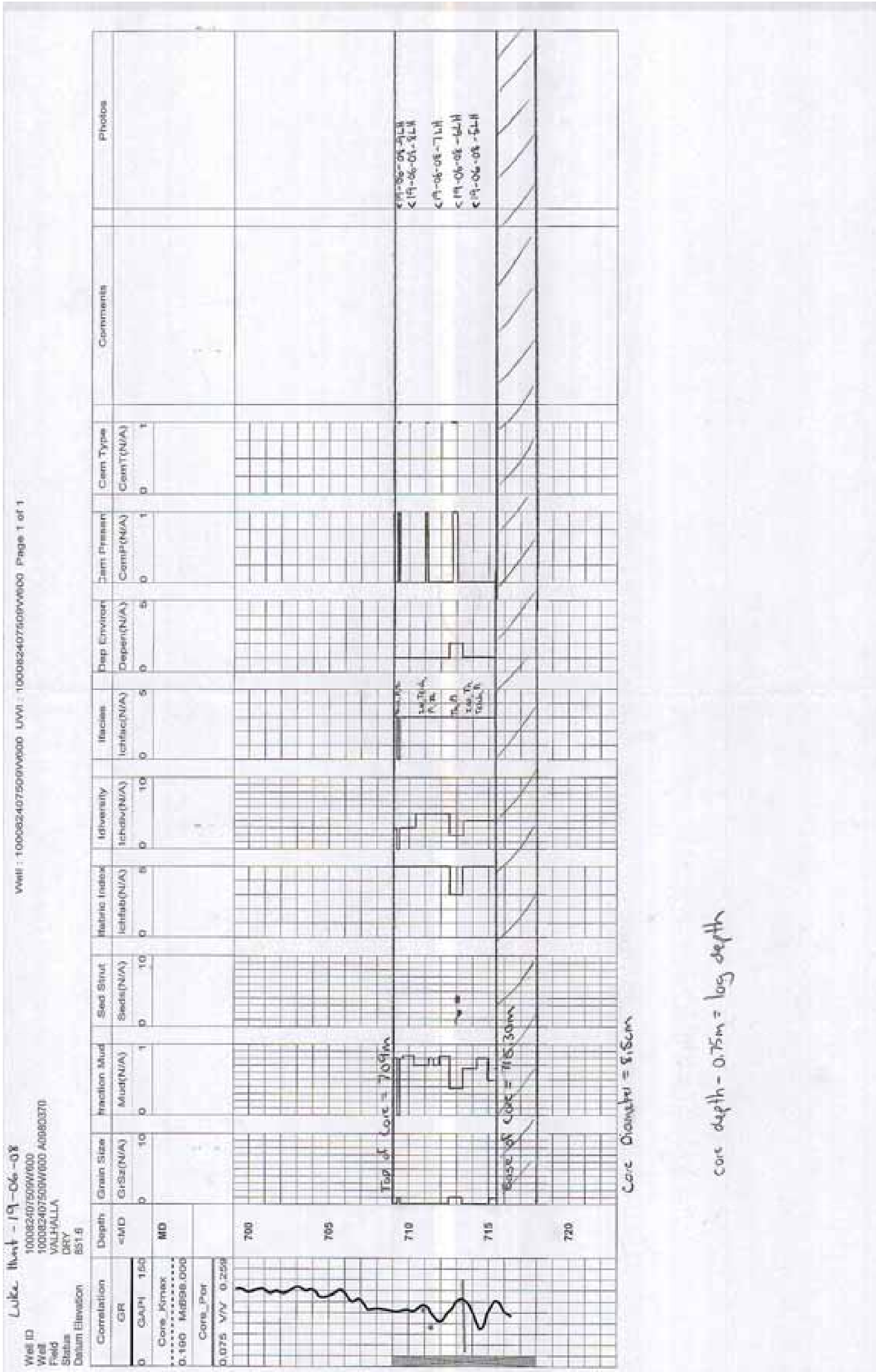

LOGGED BY NATE BALL 6/20/08
Well : 100080507509W600 UWI : 100080507509W600 Page 1 of 1
Well ID
Well
Field
Status
Datum Elevation
VALHALLA
ABD OIL
767.7
Correlation
Depth
Grain Size
fraction Mud
Sed Strut
fabric Index
Idiversity
Ifacies
Dep Environ
Cem Presen
Cem Type
Comments
Photos
GR
GAPI
Core_Kmax
Core_Por
MD
695
700
705
TOP OF CORE = 693m
BOTTOM OF CORE = 704.5
CORE DIAMETER: 8.5cm
CORE DEPTH - 0.5m = LOG DEPTH

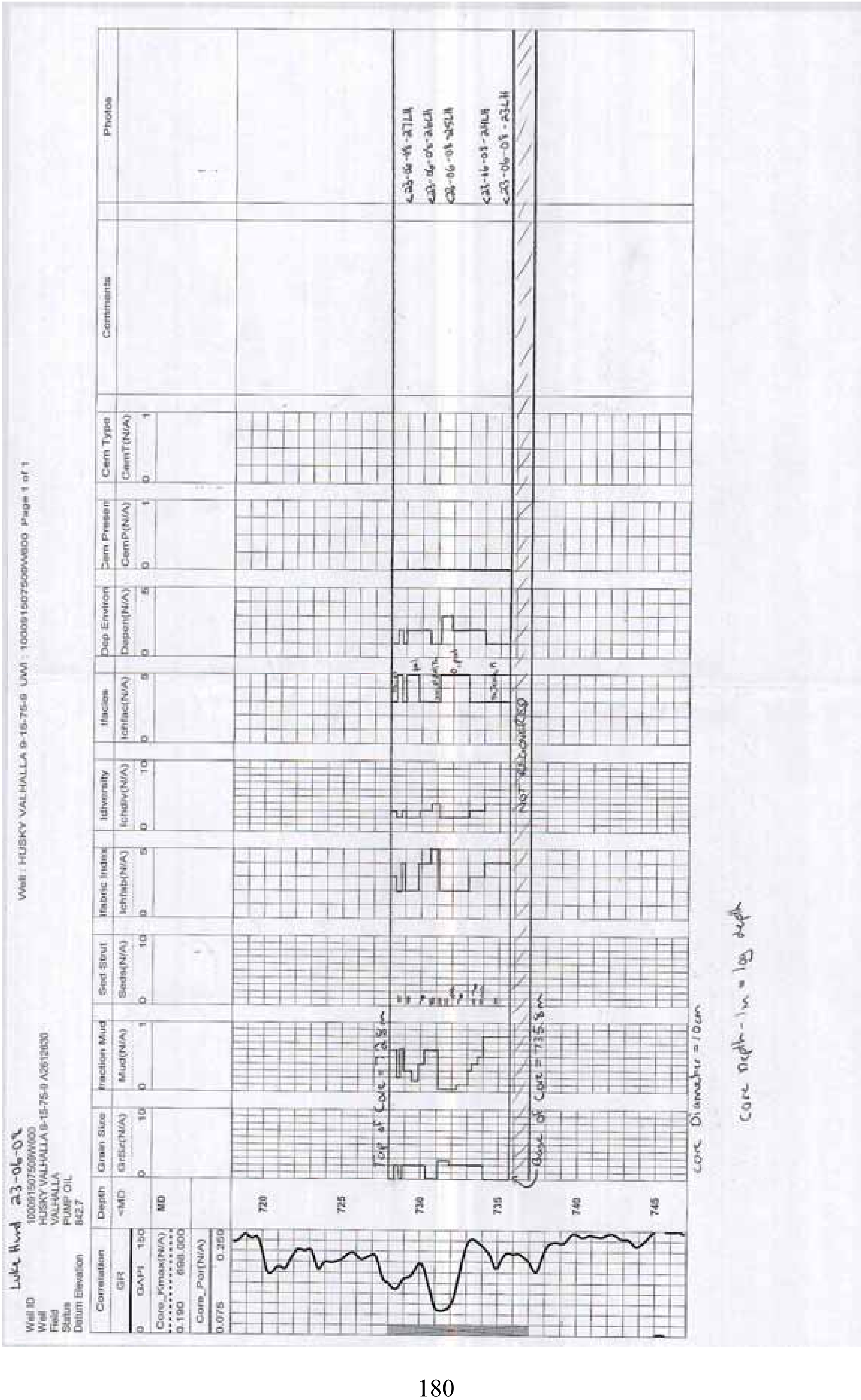


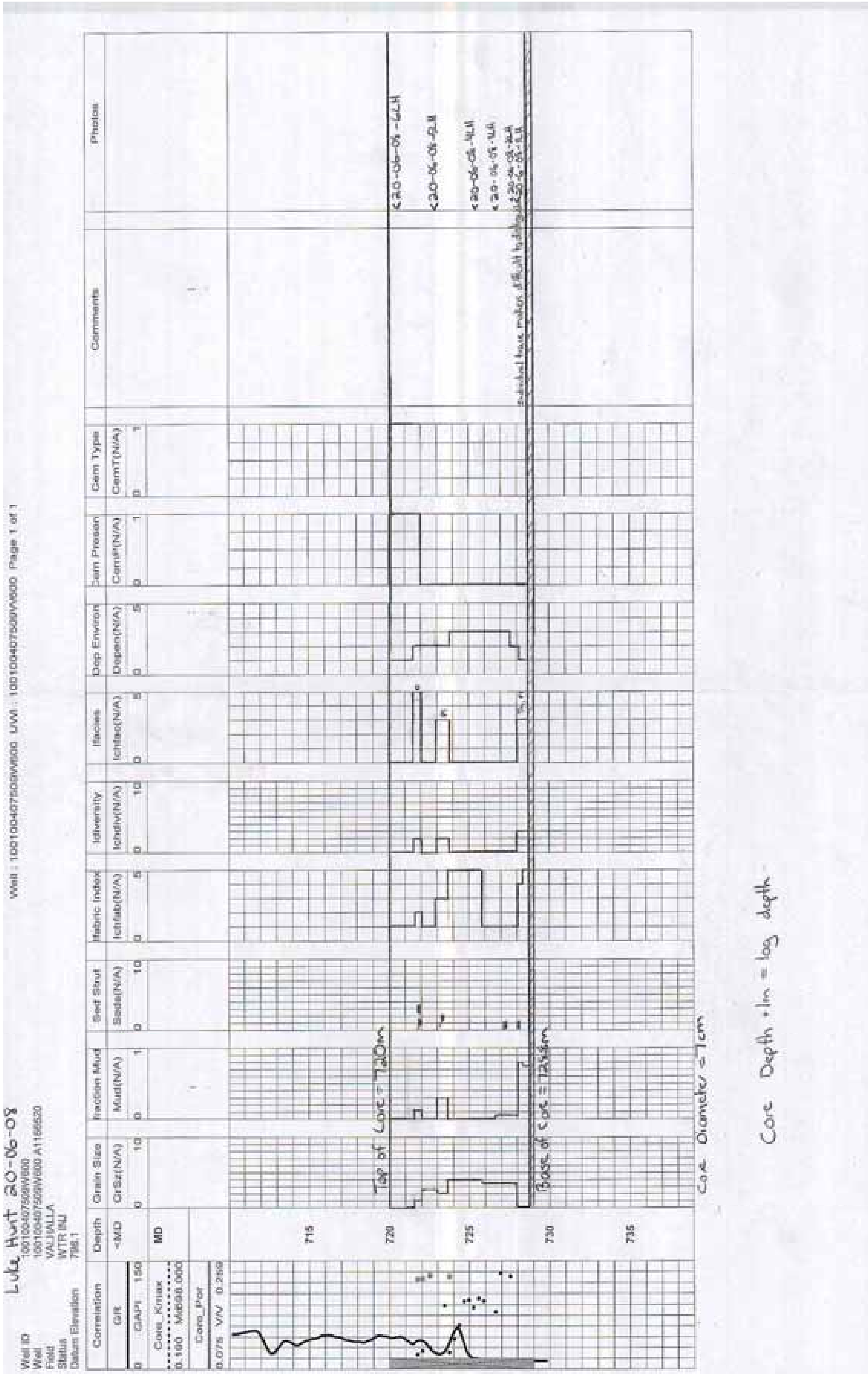
Luke Hunt 20-06-08
Well : 100081007509W600 UWI : 100081007509W600 Page 1 of 1
Well ID 100081007509W600
Well 100081007509W600 A1033590
Field VALHALLA
Status PUMP OIL
Datum Elevation 842.6
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 Md98.000
Core_Por
0.075 V/V 0.259
Depth
=MD
MD
750
755
760
765
770
Grain Size
GrSz(N/A)
0 10
fraction Mud
Mud(N/A)
0 1
Sed Strut
Seds(N/A)
0 10
Ifabric Index
Ichfab(N/A)
0 5
Idiversity
Ichdiv(N/A)
0 10
Ifacies
Ichfac(N/A)
0 5
Dep Environ
Depen(N/A)
0 5
Cem Presen
CemP(N/A)
0 1
Cem Type
CemT(N/A)
0 1
Comments
Photos
Top of Core = 759m
Base of Core = 764.60m
<20-06-08-33LH
<20-06-08-32LH
<20-06-08-31LH
<20-06-08-30LH
<20-06-08-29LH
Core Diameter = 8.5cm
core depth - 1m = log depth

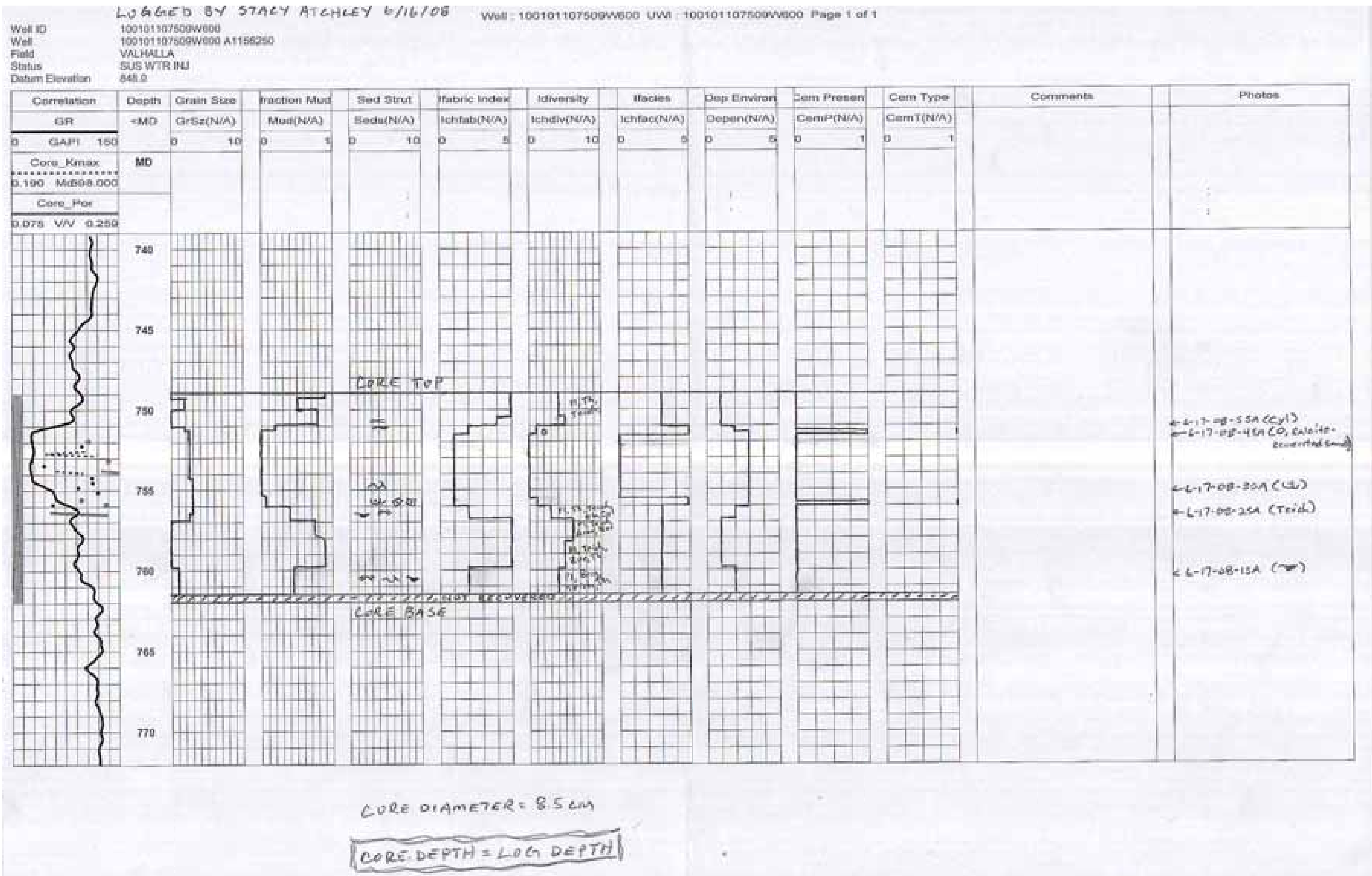

Luke Hunt 18-06-08
Well ID 100081207509W600
Well 100081207509W600 A1035100
Field VALHALLA
Status PUMP OIL
Datum Elevation 781.3
Well : 100081207509W600 UWI : 100081207509W600 Page 1 of 1
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 MD 98.000
Core_Por
0.075 V/V 0.250
Depth
<MD
MD
680
685
690
695
Grain Size
GrSz(N/A)
0 10
fraction Mud
Mud(N/A)
0 1
Sed Strut
Seds(N/A)
0 10
Ifabric Index
Ichfab(N/A)
0 5
Idiversity
Ichdiv(N/A)
0 10
Ifacies
Ichfac(N/A)
0 5
Dep Environ
Depen(N/A)
0 5
Cem Presen
CemP(N/A)
0 1
Cem Type
CemT(N/A)
0 1
Comments
Photos
Top of Core = 687m
Core Diameter = 8cm
Core Depth = Log Depth

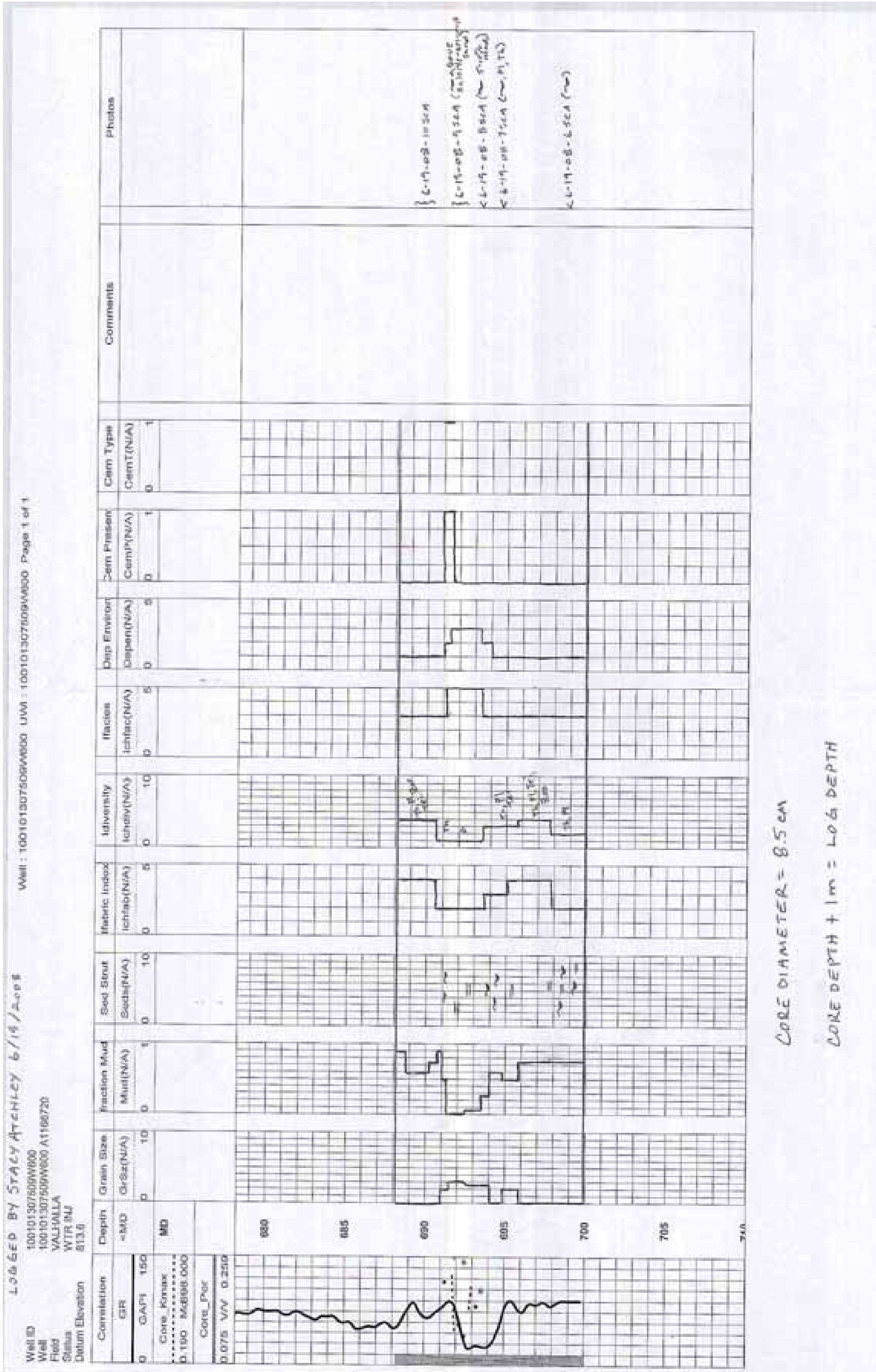


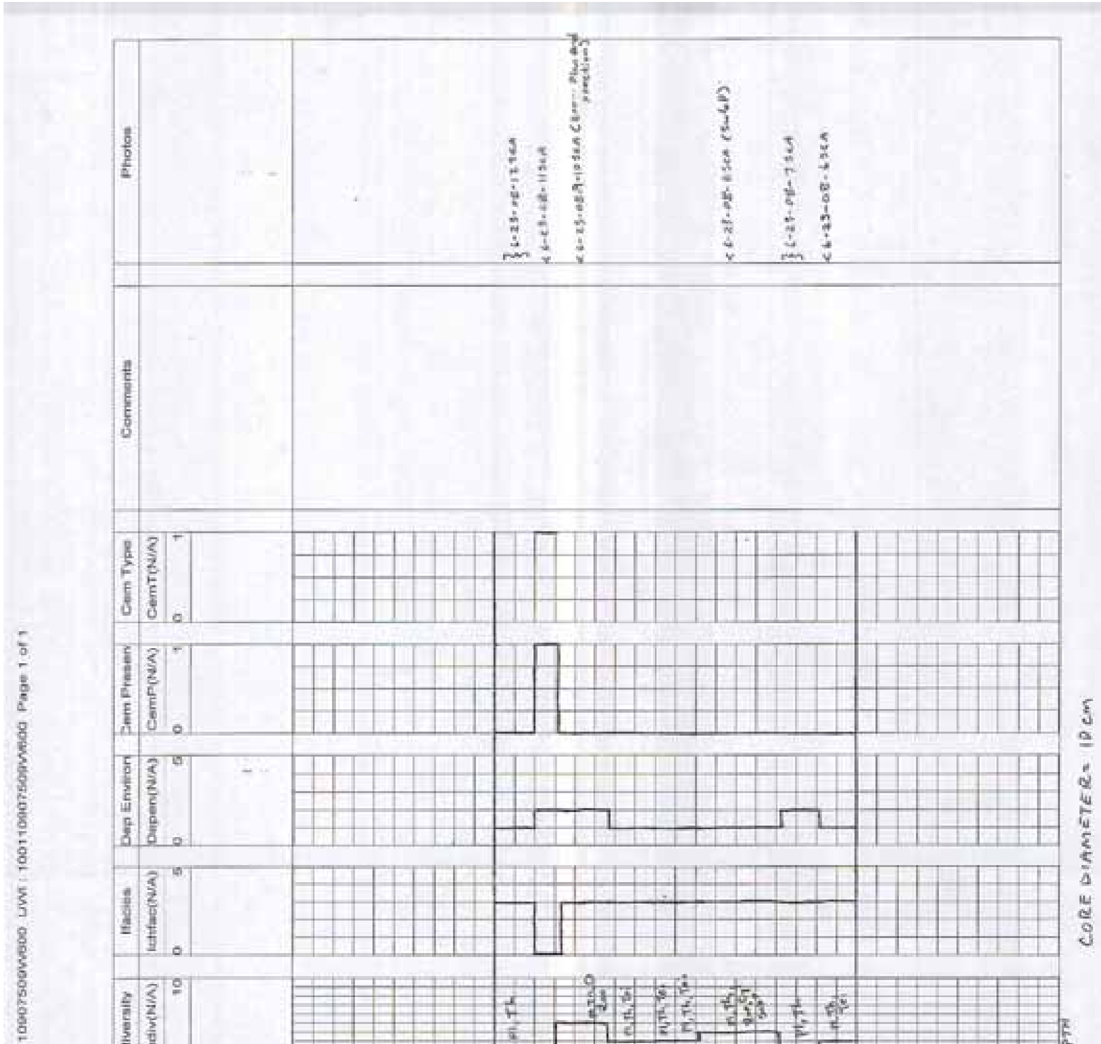

Luke Hunt - 19-06-08
Well ID 100082407509W600
Well 100082407509W600 A0980370
Field VALHALLA
Status DRY
Datum Elevation 851.6
Well : 100082407509W600 UWI : 100082407509W600 Page 1 of 1
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 MdB98.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
700
705
710
715
720
Grain Size
GrSz(N/A)
fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
Top of Core = 709m
Base of Core = 715.30m
<19-06-08-9LH
<19-06-08-8LH
<19-06-08-7LH
<19-06-08-6LH
<19-06-08-5LH
Core Diameter = 8.5cm
core depth - 0.75m = log depth

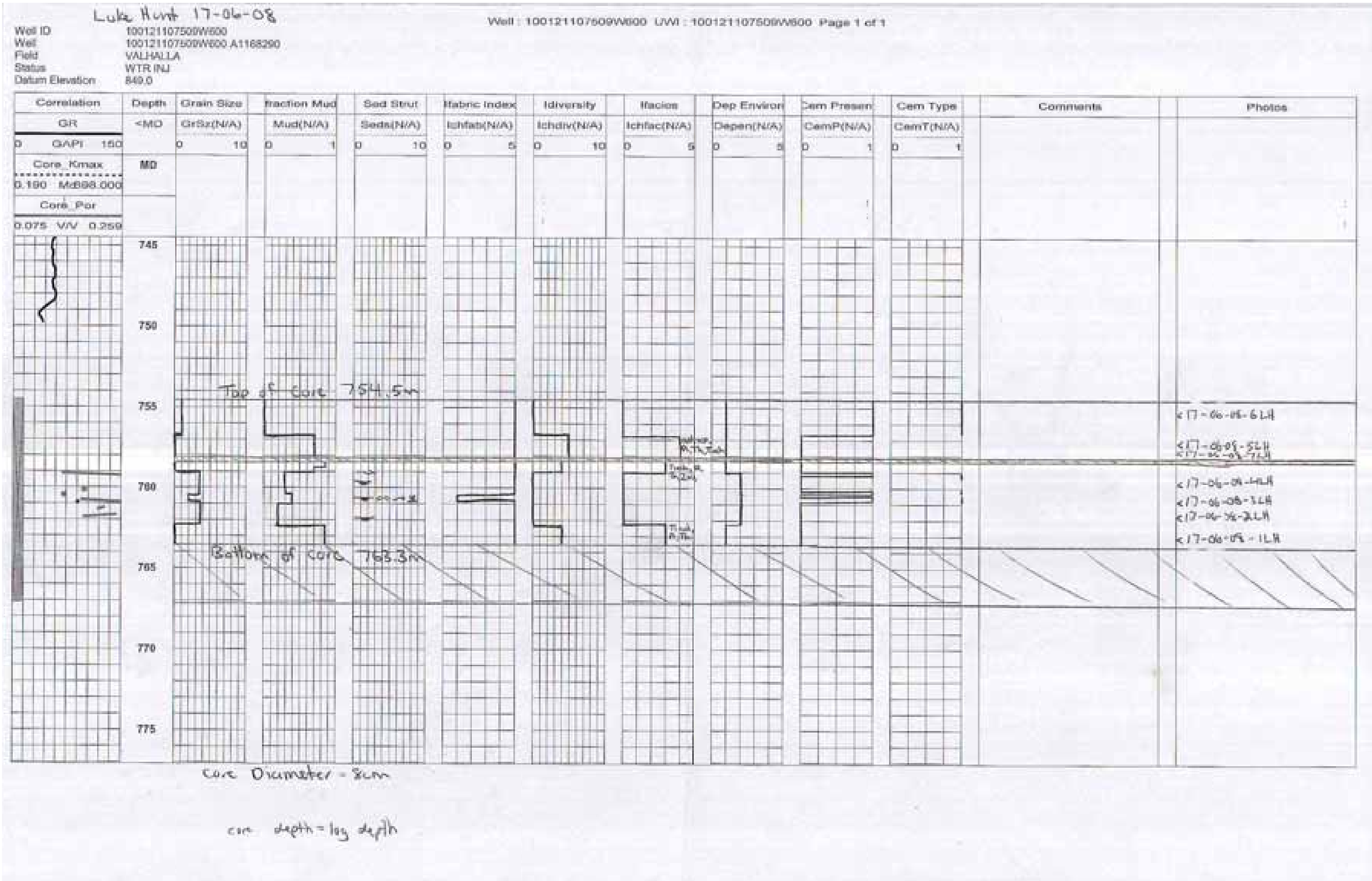

Well : HUSKY VALHALLA 9-15-75-9 UWI : 100091507509W600 Page 1 of 1
Well ID
Well
Field
Status
Datum Elevation
HUSKY VALHALLA
VALHALLA
PUMP OIL
Correlation
Depth
Grain Size
Fraction Mud
Sed Strut
Fabric Index
Idiversity
Ifacies
Dep Environ
Cem Presen
Cem Type
Comments
Photos
GR
GAPI
Core_Kmax(N/A)
Core_Por(N/A)
MD
720
725
730
735
740
745
Top of Core = 728.8m
Base of Core = 735.8m
NOT RECOVERED
Core Diameter = 10cm
Core Depth - 1m = log depth


Luke Hunt 20-06-08
Well : 100100407509W600 UWI : 100100407509W600 Page 1 of 1
Well ID
Well
Field
Status
Datum Elevation
VALHALLA
Correlation
Depth
Grain Size
fraction Mud
Sed Strut
fabric Index
Idiversity
Ifacies
Dep Environ
Cem Proson
Cem Type
Comments
Photos
GR
GAPI 150
Core_Kmax
Core_Por
MD
715
720
725
730
735
Top of Core = 720m
Base of Core = 7258m
Core Diameter = 7cm
Core Depth + 1m = log depth


LOGGED BY STACY ATCHLEY 6/16/08
Well : 100101107509W600 UWI : 100101107509W600 Page 1 of 1
Well ID 100101107509W600
Well 100101107509W600 A1156250
Field VALHALLA
Status SUS WTR INJ
Datum Elevation 848.0
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 MD 698.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
Grain Size
GrSz(N/A)
Fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
740
745
750
755
760
765
770
CORE TOP
NOT RECOVERED
CORE BASE
6-17-08-55A (cyl)
6-17-08-45A (O, calcite-cemented sand)
6-17-08-30A
6-17-08-25A (Teich)
6-17-08-15A
CORE DIAMETER = 8.5 cm
CORE DEPTH = LOG DEPTH


LOGGED BY STACY ATCHLEY 6/19/2008
Well : 100101307509W600 UWI : 100101307509W600 Page 1 of 1
Well ID 100101307509W600
Well 100101307509W600 A1166720
Field VALHALLA
Status WTR INJ
Datum Elevation 813.6
Correlation
GR
Core_Kmax
Core_Por
Depth
MD
Grain Size
Fraction Mud
Sed Strut
Fabric Index
Idiversity
Ifacies
Dep Environ
Cem Presen
Cem Type
Comments
Photos
680
685
690
695
700
705
CORE DIAMETER = 8.5 cm
CORE DEPTH + 1m = LOG DEPTH


Well ID
Well
Field
Status
Datum Elevation
LOGGED BY STACY ATCHLEY 6-23-2008
Correlation
Depth
Grain Size
Fraction Mud
Sed Strut
Fabric Index
Idiversity
Facies
Dep Environ
Cem Presen
Cem Type
Comments
Photos
CORE TOP
CORE BASE
CORE DIAMETER = 10 cm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Well 100121107509W600 A1168290
Field VALHALLA
Status WTR INJ
Datum Elevation 849.0
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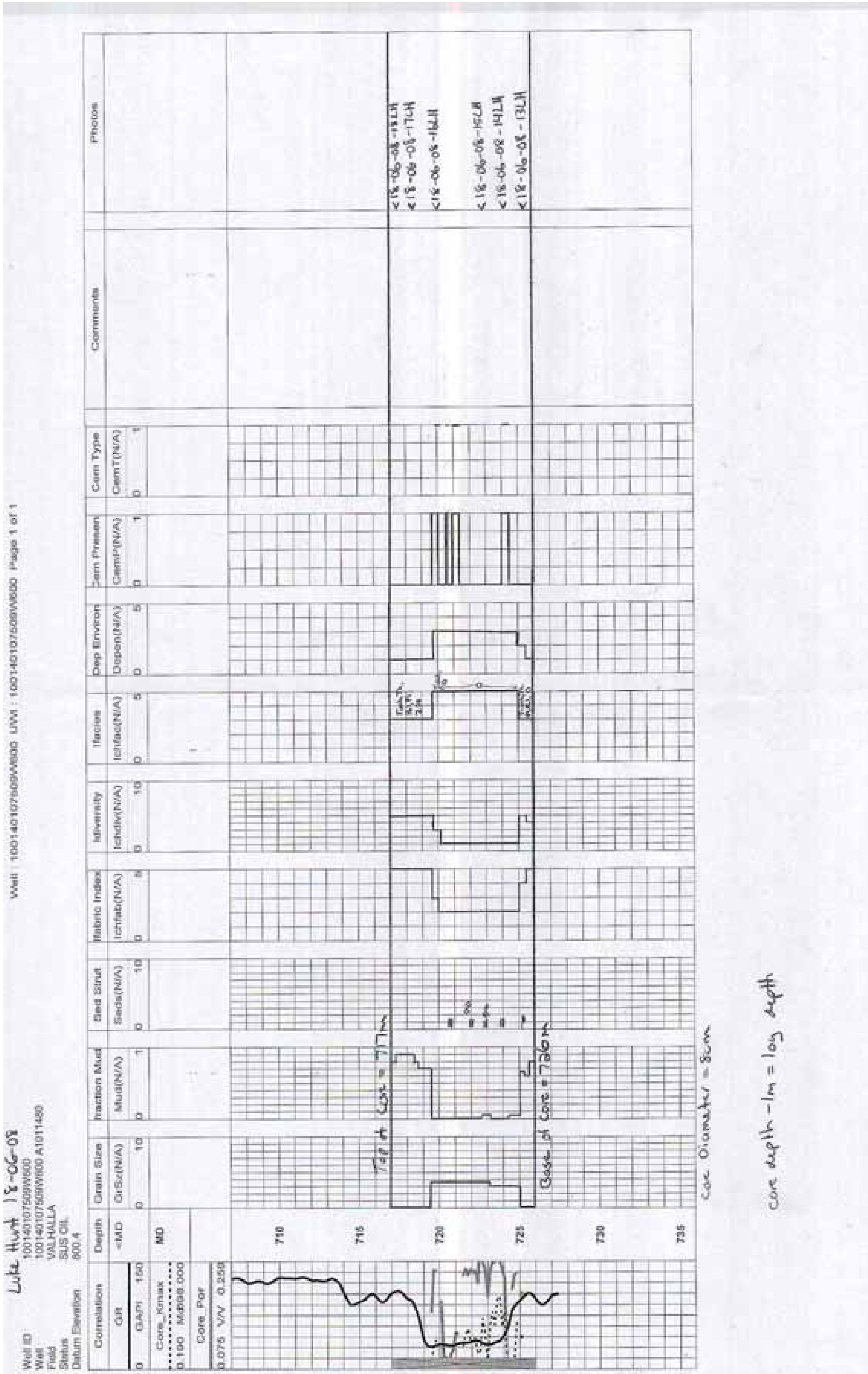
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 MD898.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
Grain Size
GrSz(N/A)
fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
745
750
755
760
765
770
775
Top of Core 754.5m
Bottom of core 763.3m
Core Diameter = 8cm
core depth = log depth


Luke Hunt 18-06-08
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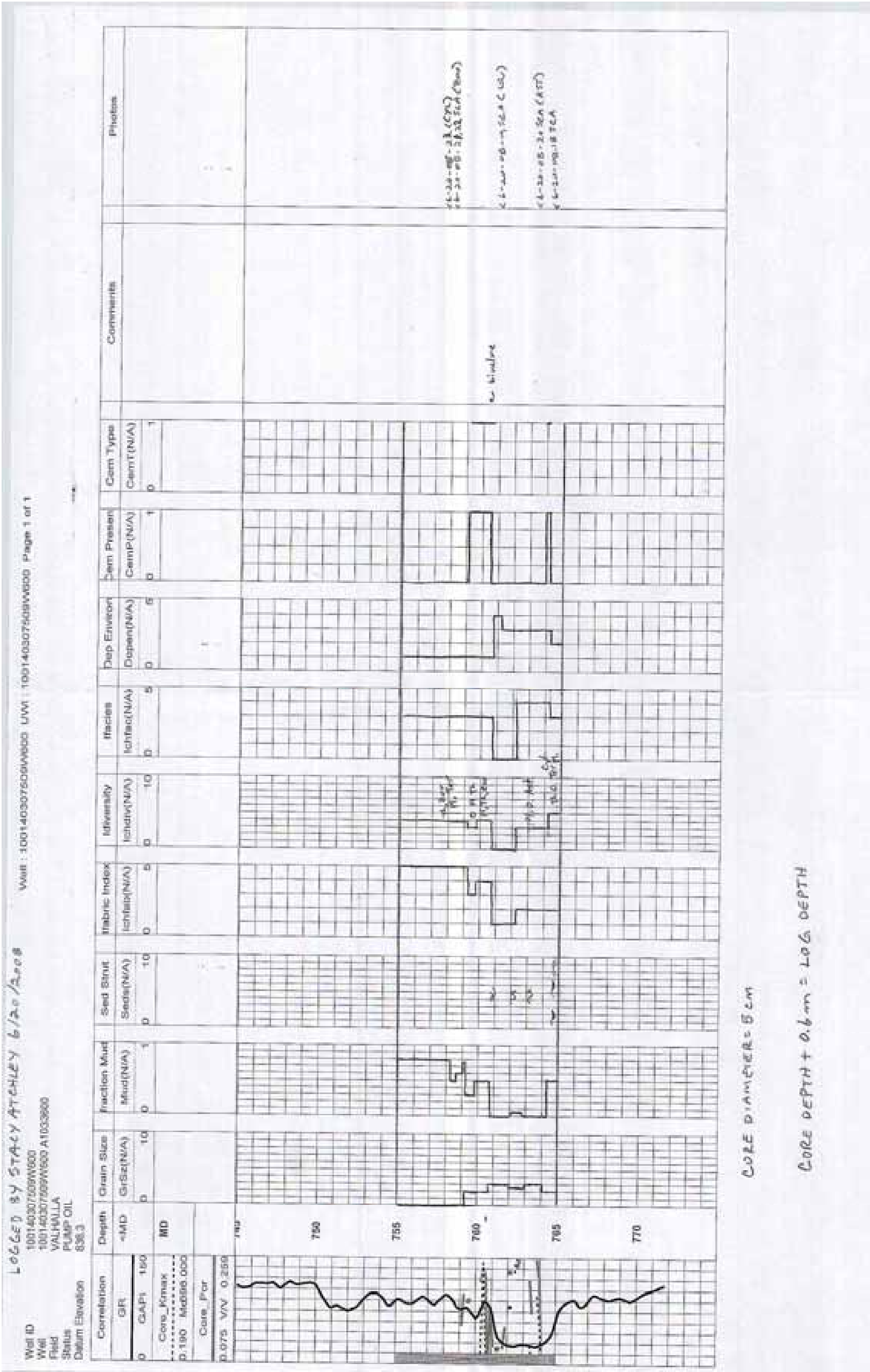
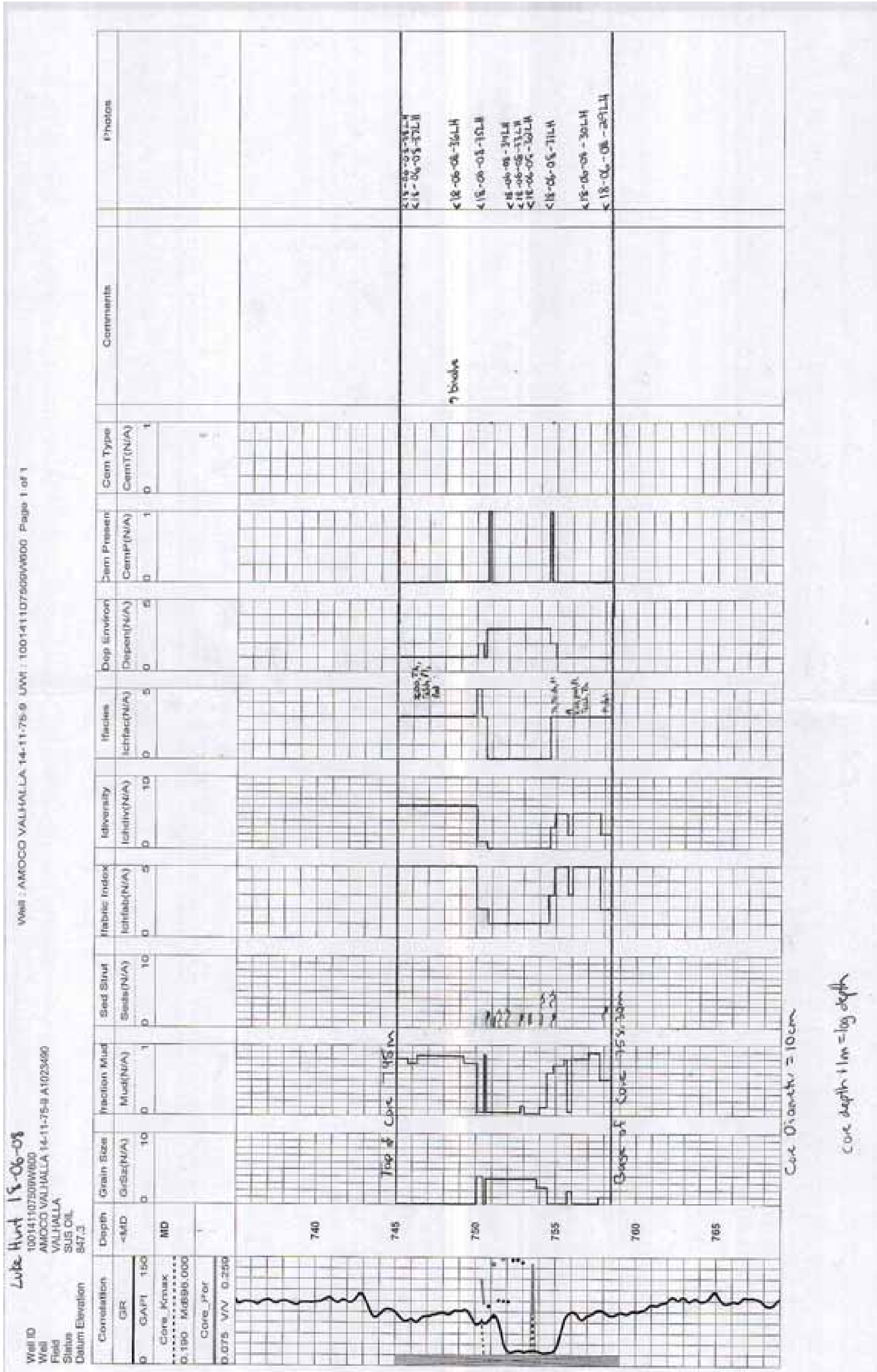
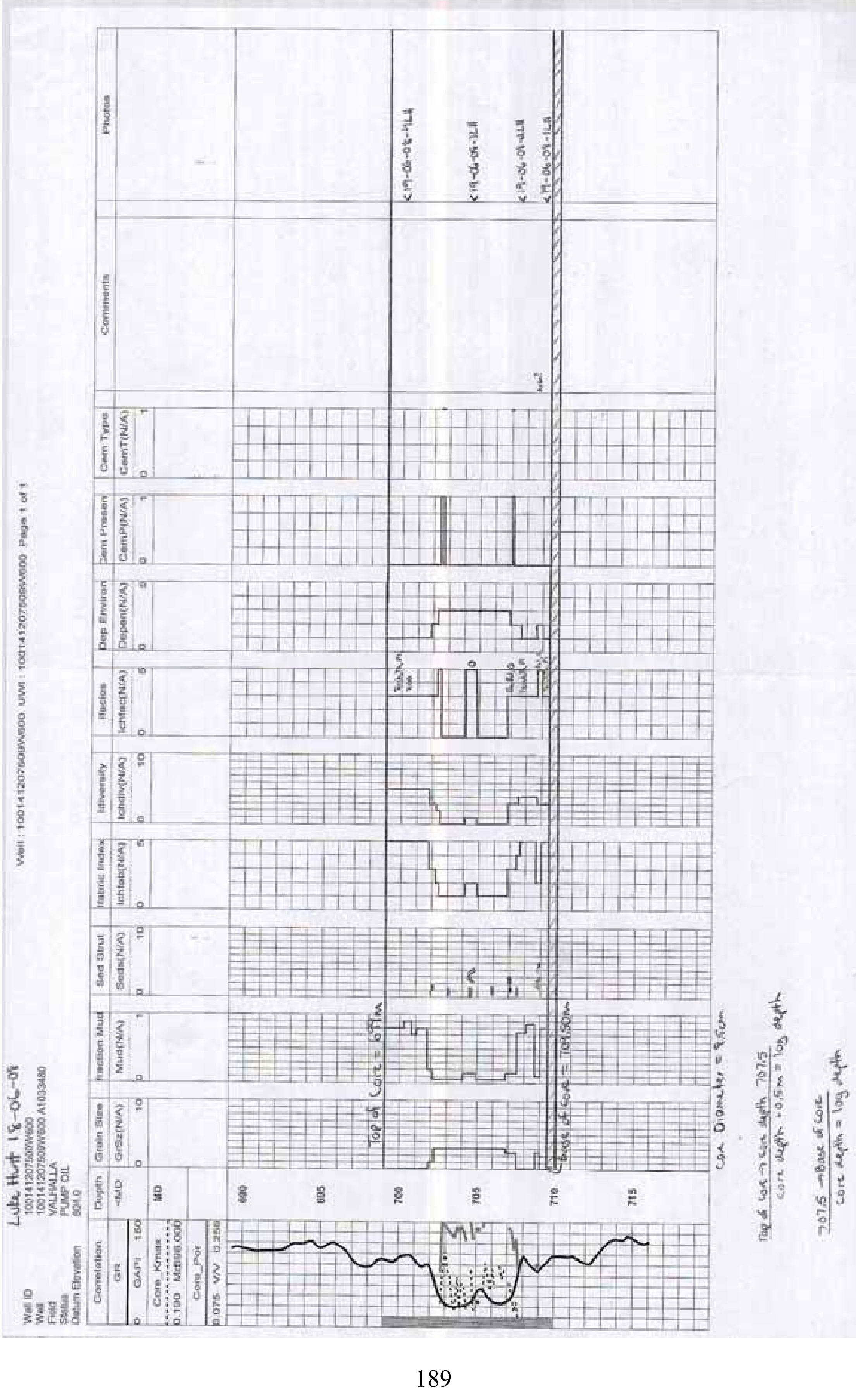
Field
Status
Datum Elevation
100140107509W600
100140107509W600 A1011480
VALHALLA
SUS OIL
800.4
Correlation
Depth
Grain Size
Fraction Mud
Sed Struct
Fabric Index
Idiversity
Ifacies
Dep Environ
Cem Present
Cem Type
Comments
Photos
710
715
720
725
730
735
Top of Core = 717m
core depth - 1m = log depth


LOGGED BY STACY ATCHLEY 6/20/2008
Well ID
Well
Field
Status
Datum Elevation
100140307509W600
100140307509W600 A103960
VALHALLA
PUMP OIL
836.3
Well : 100140307509W600 UWI : 100140307509W600 Page 1 of 1
Correlation
GR
Core_Kmax
Core_Por
Depth
Grain Size
Fraction Mud
Sed Strut
Fabric Index
Idiversity
Ifacies
Dep Environ
Cem Presen
Cem Type
Comments
Photos
750
755
760
765
770
CORE DIAMETER = 5 cm
CORE DEPTH + 0.6 m = LOG DEPTH


Luke Hunt 18-06-08
Well : AMOCO VALHALLA 14-11-75-9 UWI : 100141107509W600 Page 1 of 1
Well ID
Well
Field
Status
Datum Elevation
AMOCO VALHALLA 14-11-75-9
VALHALLA
SUS OIL
847.3
Correlation
GR
GAPI
Core_Kmax
Core_Por
Depth
MD
Grain Size
GrSz(N/A)
fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
740
745
750
755
760
765
Top of Core 745m
Base of Core 758.30m
Core Diameter = 10cm
core depth + 1m = log depth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Well 100141207509W600 A1033480
Field VALHALLA
Status PUMP OIL
Datum Elevation 804.0
Well : 100141207509W600 UWI : 100141207509W600 Page 1 of 1
Correlation
GR
0 GAPI 150
Core_Kmax
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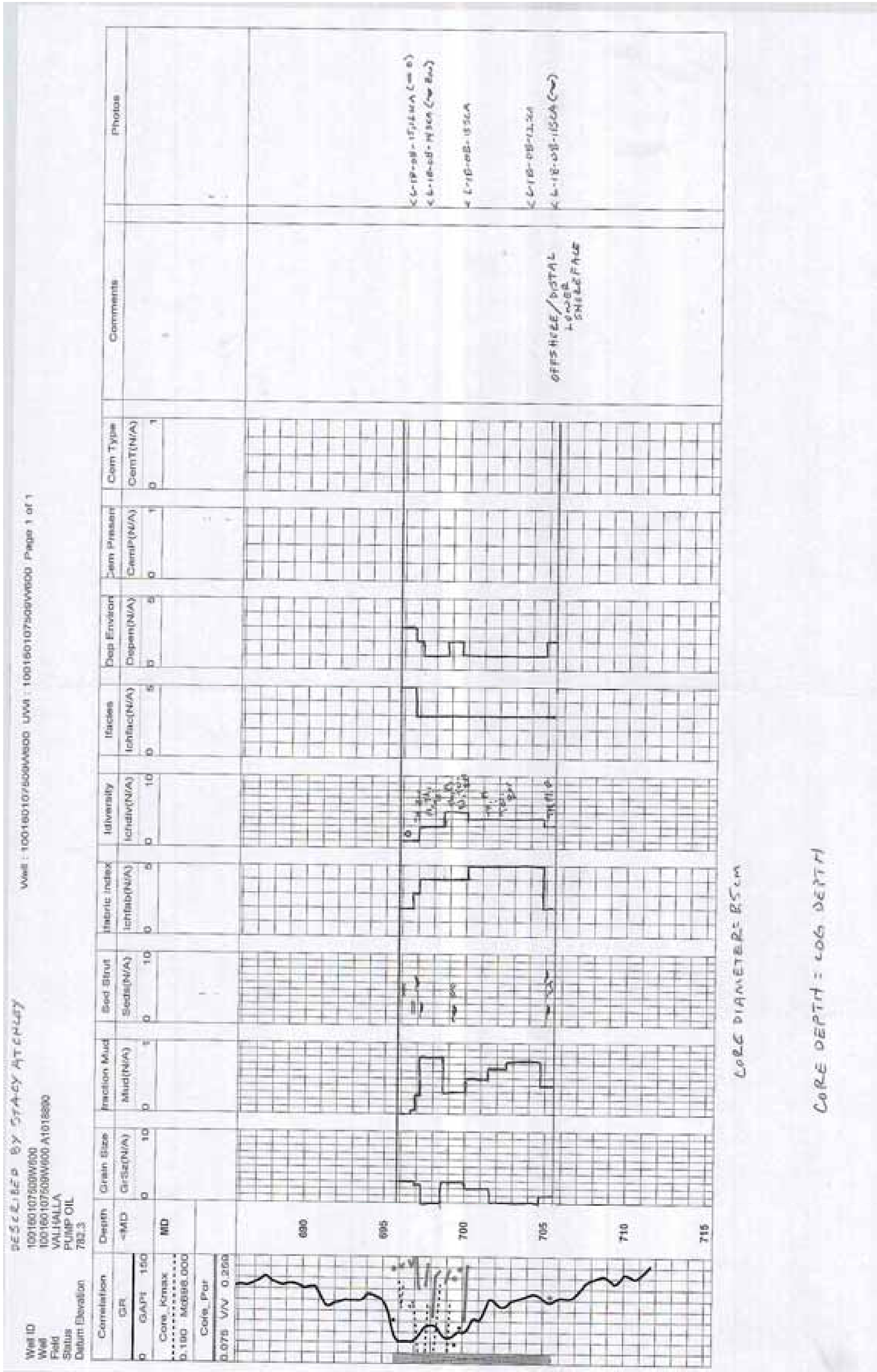
Core_Por
0.075 V/V 0.250
Depth
<MD
MD
690
695
700
705
710
715
Grain Size
GrSz(N/A)
Fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
Top of Core = 699m
Base of Core = 709.50m
Core Diameter = 9.5cm
Top of Core → core depth 707.5
core depth +0.5m = log depth
707.5 → Base of Core
core depth = log depth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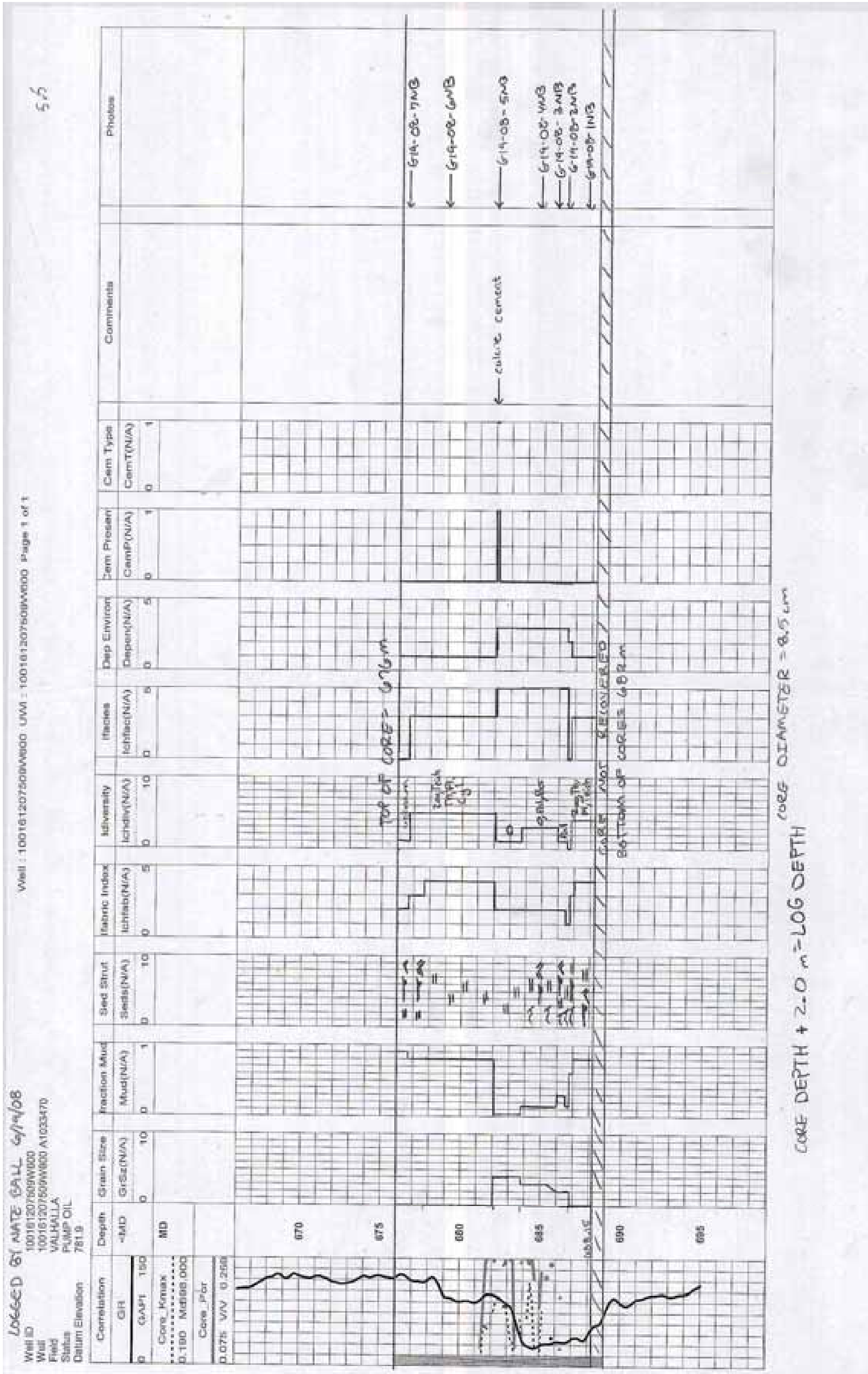
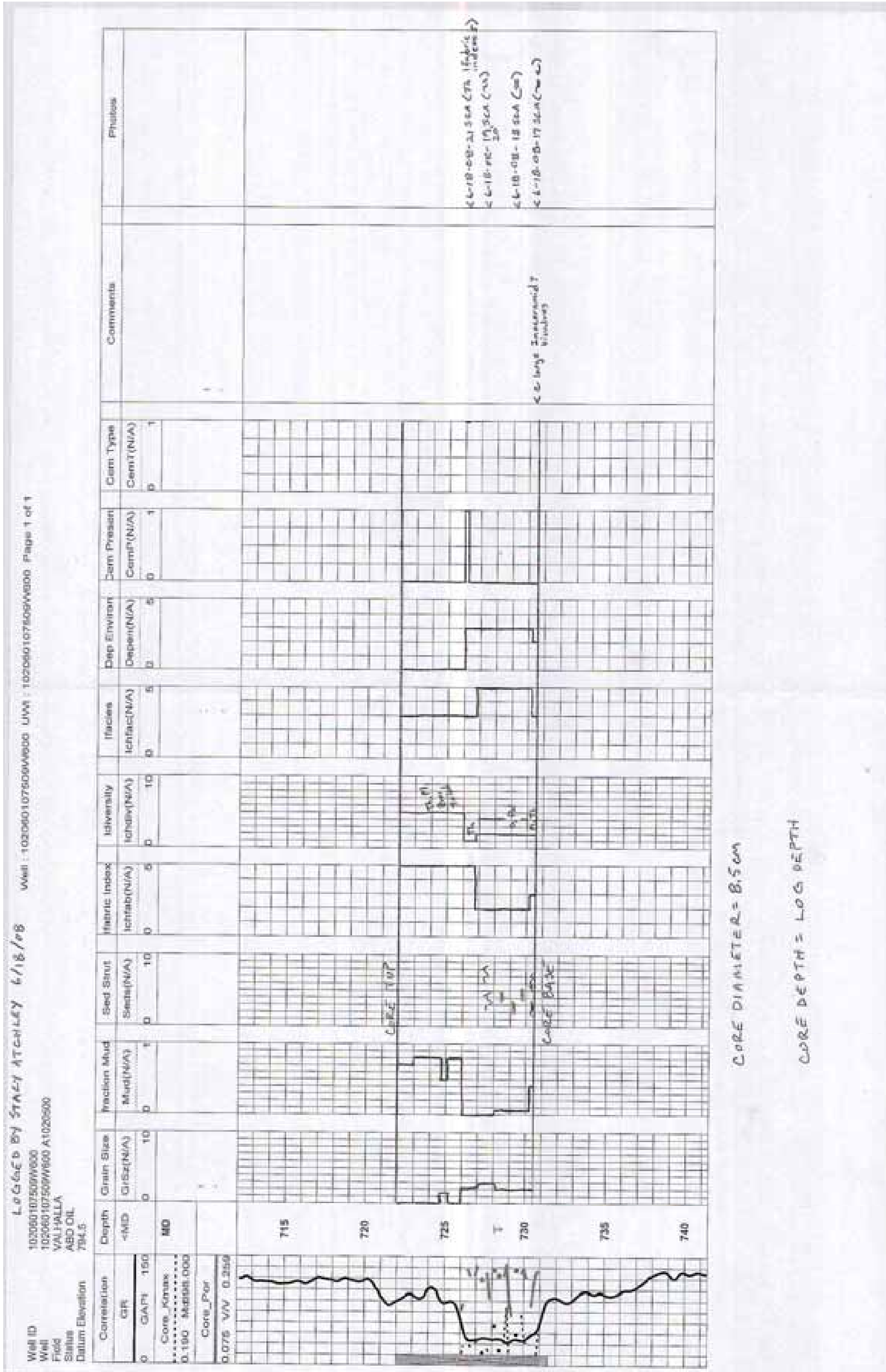
Well
Field
Status
Datum Elevation
100160107509W600
100160107509W600 A1018890
VALHALLA
PUMP OIL
782.3
DESCRIBED BY STACY ATCHLEY
Well : 100160107509W600 UWI : 100160107509W600 Page 1 of 1
Correlation
Depth
Grain Size
Fraction Mud
Sed Strut
Ifabric Index
Idiversity
Ifacies
Dep Environ
Cem Presen
Cem Type
Comments
Photos
OFFSHORE/DISTAL LOWER SHOREFACE
CORE DIAMETER: 8.5cm
CORE DEPTH = LOG DEPTH



LOGGED BY NATE BALL 6/19/08
Well : 100161207509W600 UWI : 100161207509W600 Page 1 of 1
Well ID
Well
Field
Status
Datum Elevation
VALHALLA
PUMP OIL
781.9
Correlation
Depth
Grain Size
Fraction Mud
Sed Strut
Fabric Index
Ichdiversity
Ifacies
Dep Environ
Cem Presen
Cem Type
Comments
Photos
670
675
680
685
690
695
TOP OF CORE - 676 m
CORE NOT RECOVERED
BOTTOM OF CORE 682 m
calcite cement
CORE DEPTH + 2.0 m = LOG DEPTH
CORE DIAMETER = 8.5 cm


LOGGED BY STACY ATCHLEY 6/18/08
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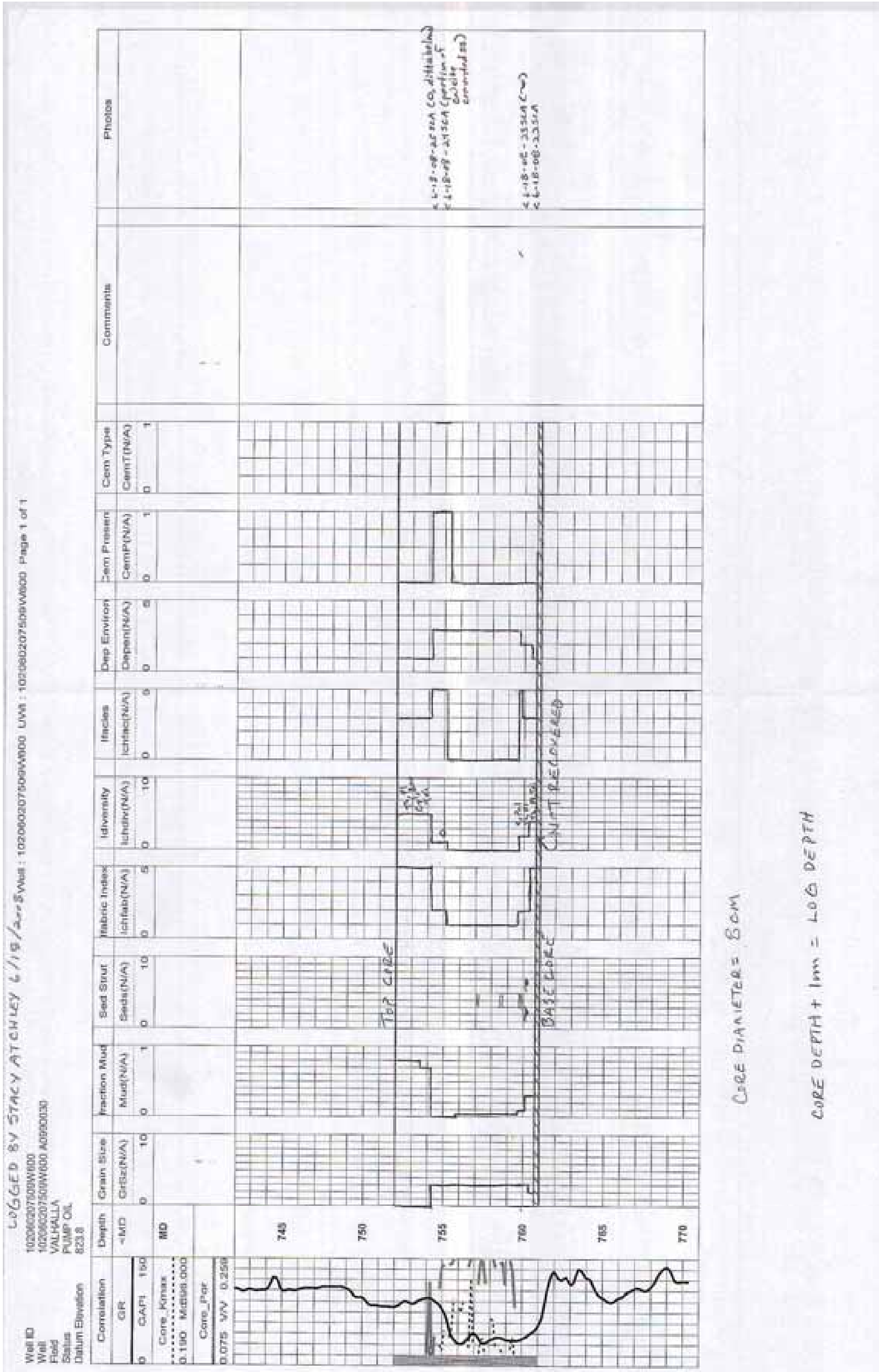
Well ID 102060107509W600
Well 102060107509W600 A1020500
Field VALHALLA
Status ABD OIL
Datum Elevation 794.5
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 Md898.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
Grain Size
GrSz(N/A)
Fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
715
720
725
730
735
740
CORE TOP
CORE BASE
CORE DIAMETER = 8.5cm
CORE DEPTH = LOG DEPTH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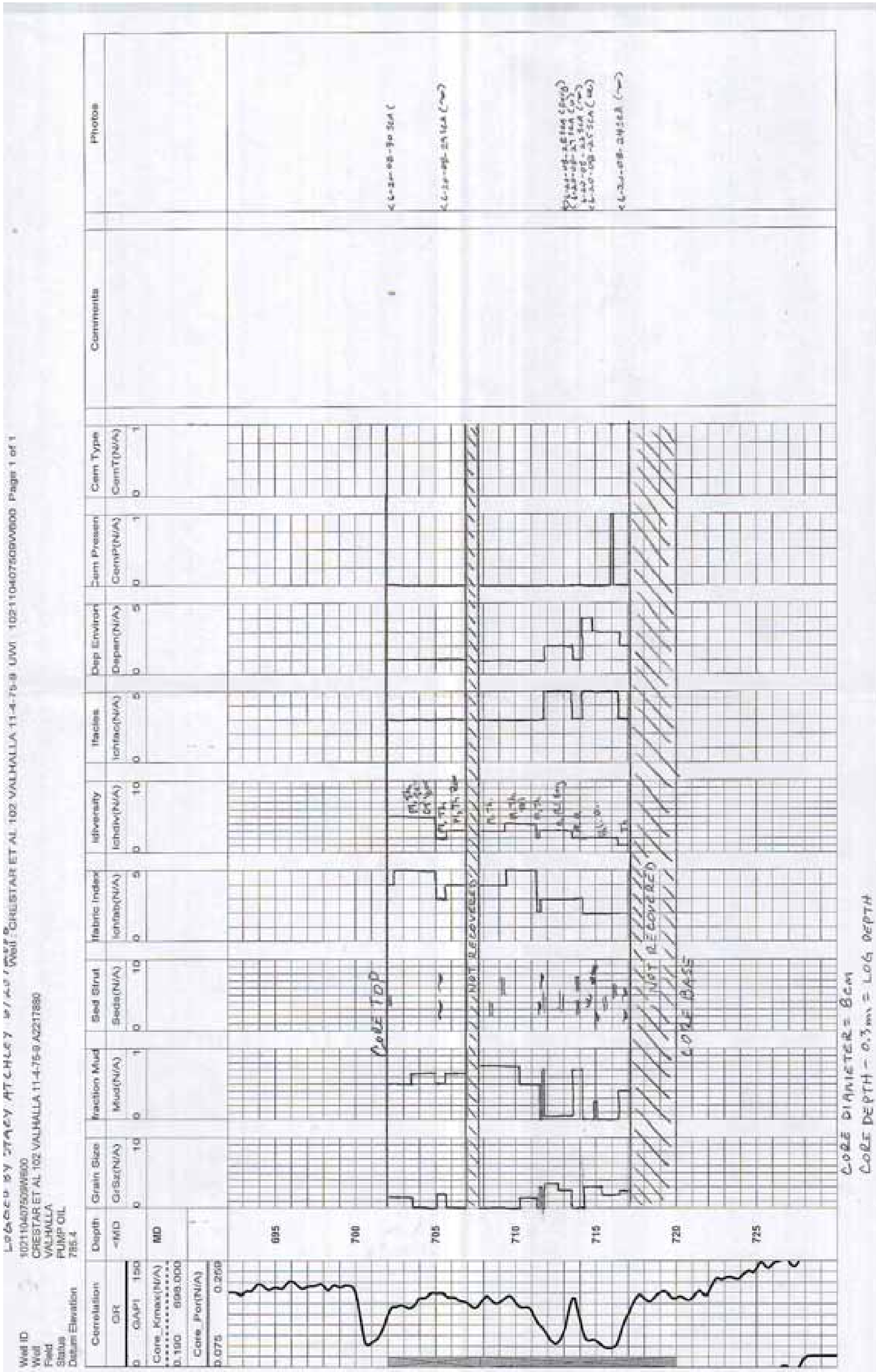
Well ID 102060207509W600
Well 102060207509W600
Field VALHALLA
Status PUMP OIL
Datum Elevation 823.8
Correlation
GR
0 GAPI 150
Core_Kmax
Core_Por
Depth
MD
Grain Size
GrSz(N/A)
Fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Fabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
745
750
755
760
765
770
TOP CORE
BASE CORE
NOT RECOVERED
CORE DIAMETER = 8CM
CORE DEPTH + 1m = LOG DEPTH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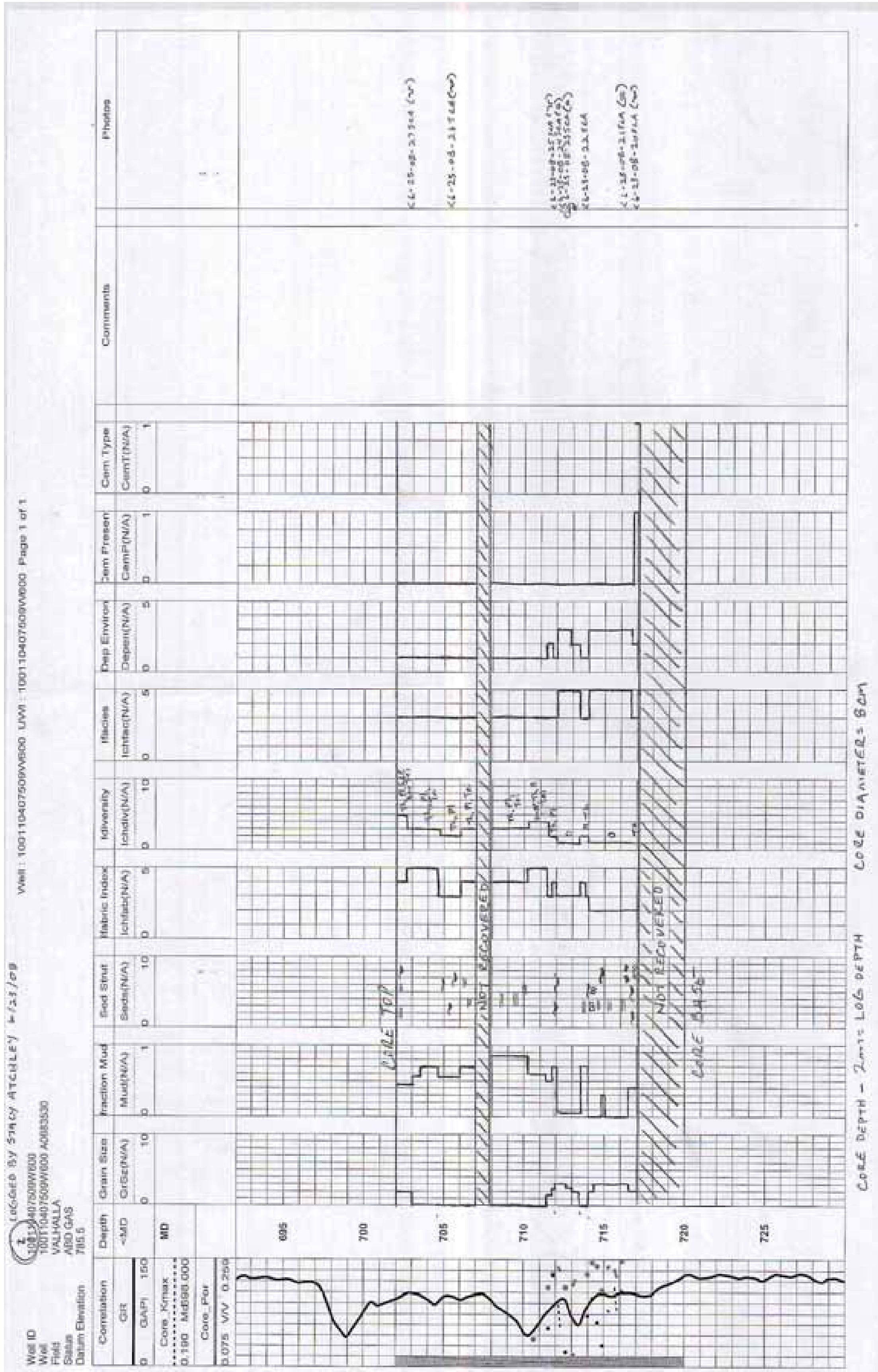
Well : CRESTAR ET AL 102 VALHALLA 11-4-75-9 UWI 102110407509W600 Page 1 of 1
Well ID 102110407509W600
Well CRESTAR ET AL 102 VALHALLA 11-4-75-9 A2217880
Field VALHALLA
Status PUMP OIL
Datum Elevation 785.4
Correlation
GR
0 GAPI 150
Core_Kmax(N/A)
0.190 698.000
Core_Por(N/A)
0.075 0.259
Depth
<MD
MD
695
700
705
710
715
720
725
Grain Size
GrSz(N/A)
0 10
fraction Mud
Mud(N/A)
0 1
Sed Strut
Seds(N/A)
0 10
Ifabric Index
Ichfab(N/A)
0 5
Idiversity
Ichdiv(N/A)
0 10
Ifacies
Ichfac(N/A)
0 5
Dep Environ
Depen(N/A)
0 5
Cem Presen
CemP(N/A)
0 1
Cem Type
CemT(N/A)
0 1
Comments
Photos
CORE TOP
NOT RECOVERED
NOT RECOVERED
CORE BASE
CORE DIAMETER = 8cm
CORE DEPTH - 0.3m = LOG DEPTH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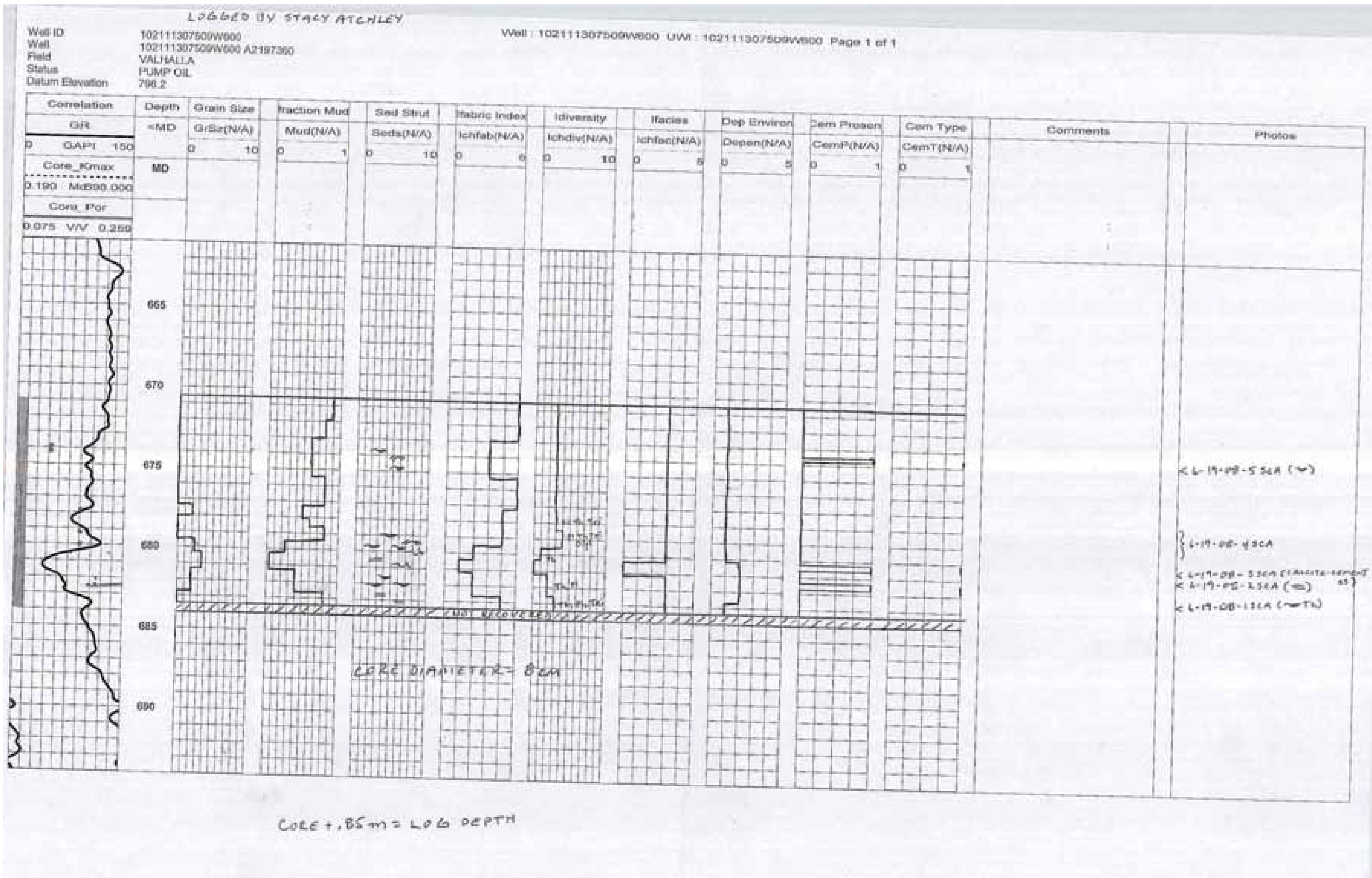
Well ID
Well
Field
Status
Datum Elevation
VALHALLA
ABD GAS
765.5
Correlation
GR
GAPI
Core_Kmax
Core_Por
Depth
MD
Grain Size
Fraction Mud
Sed Strut
Fabric Index
Idiversity
Ifacies
Dep Environ
Cem Presen
Cem Type
Comments
Photos
695
700
705
710
715
720
725
CORE TOP
NOT RECOVERED
CORE BASE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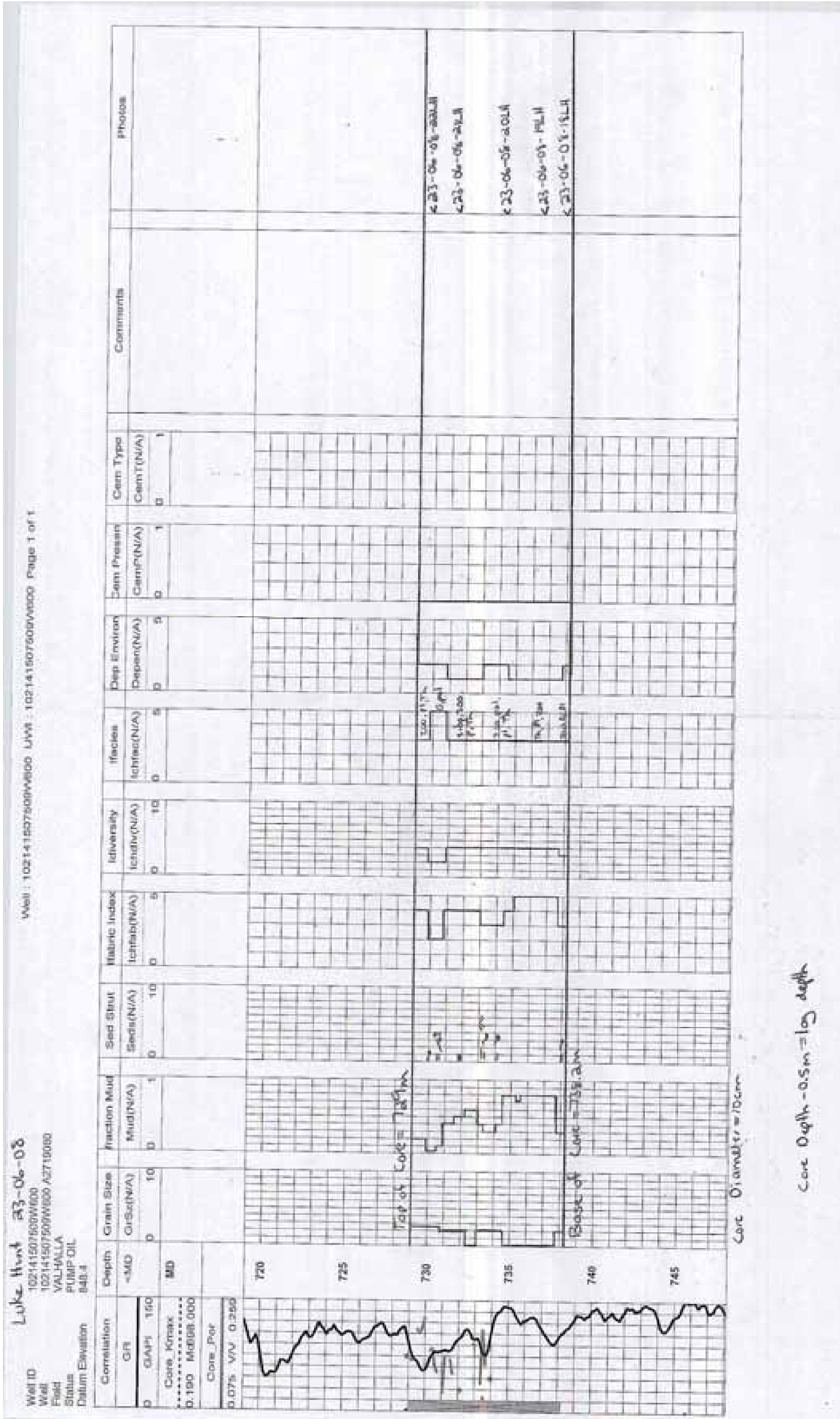
Well 102111307509W600 A2197360
Field VALHALLA
Status PUMP OIL
Datum Elevation 796.2
Well : 102111307509W600 UWI : 102111307509W600 Page 1 of 1
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 Md598.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
Grain Size
GrSz(N/A)
Fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Fabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
665
670
675
680
685
690
NOT RECOVERED
CORE DIAMETER = 8cm
CORE + .85m = LOG DEPTH


Luke Hunt 23-06-08
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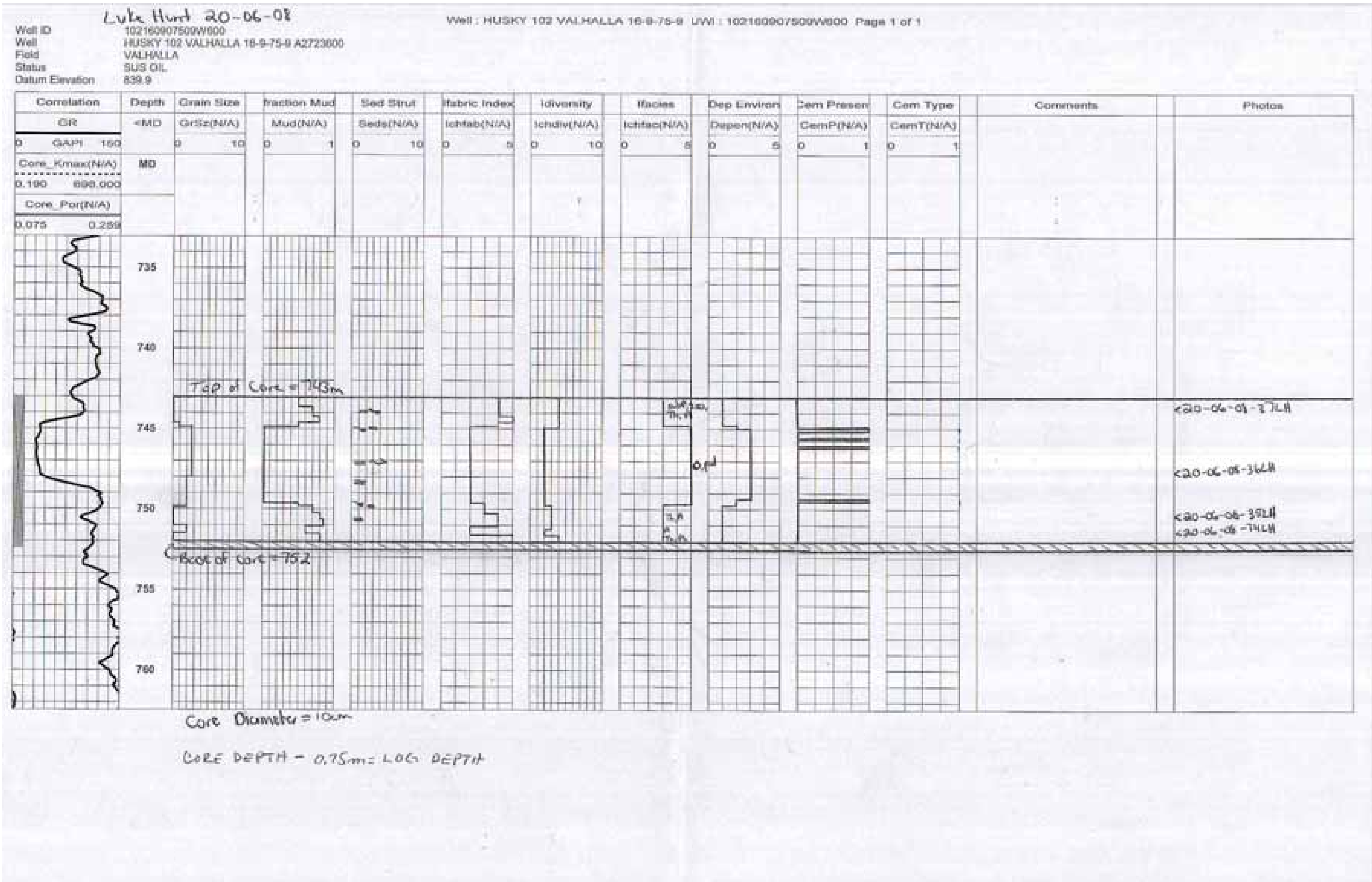
Well
Field
Status
Datum Elevation
VALHALLA
PUMP OIL
Well : 102141507509W600 UWI : 102141507509W600 Page 1 of 1
Correlation
Depth
Grain Size
Fraction Mud
Sed Strut
Fabric Index
Idiversity
Ifacies
Dep Environ
Cem Presen
Cem Type
Comments
Photos
MD
720
725
730
735
740
745
Top of Core
Base of Core
Core Diameter = 10cm
Core Depth - 0.5m = log depth


Luke Hunt 20-06-08
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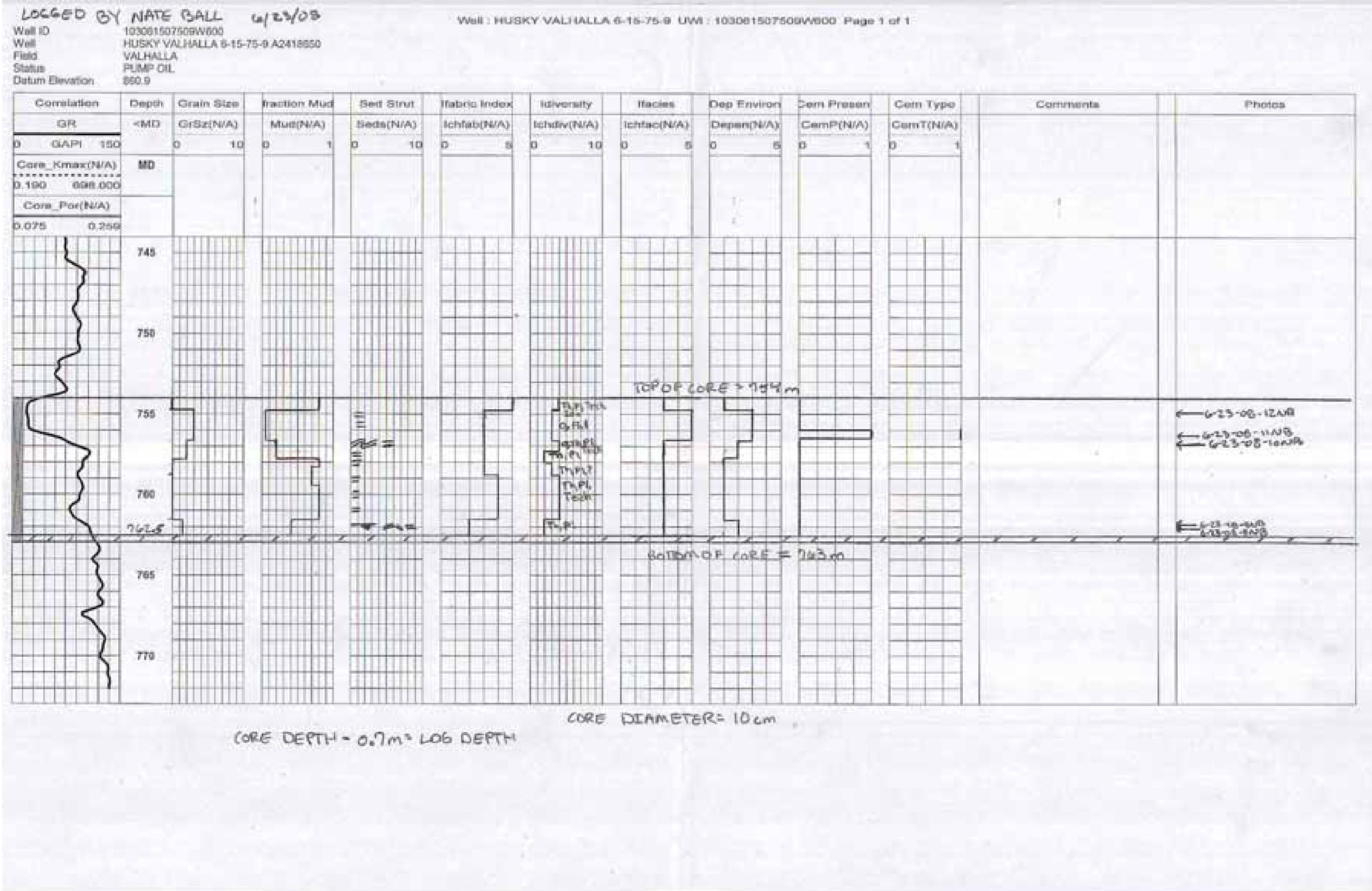
Well HUSKY 102 VALHALLA 16-9-75-9 A2723600
Field VALHALLA
Status SUS OIL
Datum Elevation 839.9
Well : HUSKY 102 VALHALLA 16-9-75-9 UWI : 102160907509W600 Page 1 of 1
Correlation
GR
0 GAPI 150
Core_Kmax(N/A)
0.190 698.000
Core_Por(N/A)
0.075 0.259
Depth
<MD
MD
Grain Size
GrSz(N/A)
fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
735
740
745
750
755
760
Top of Core = 743m
Base of Core = 752
<20-06-08-37LH
<20-06-08-36LH
<20-06-08-35LH
<20-06-08-74LH
Core Diameter = 10cm
CORE DEPTH - 0.75m = LOG DEPTH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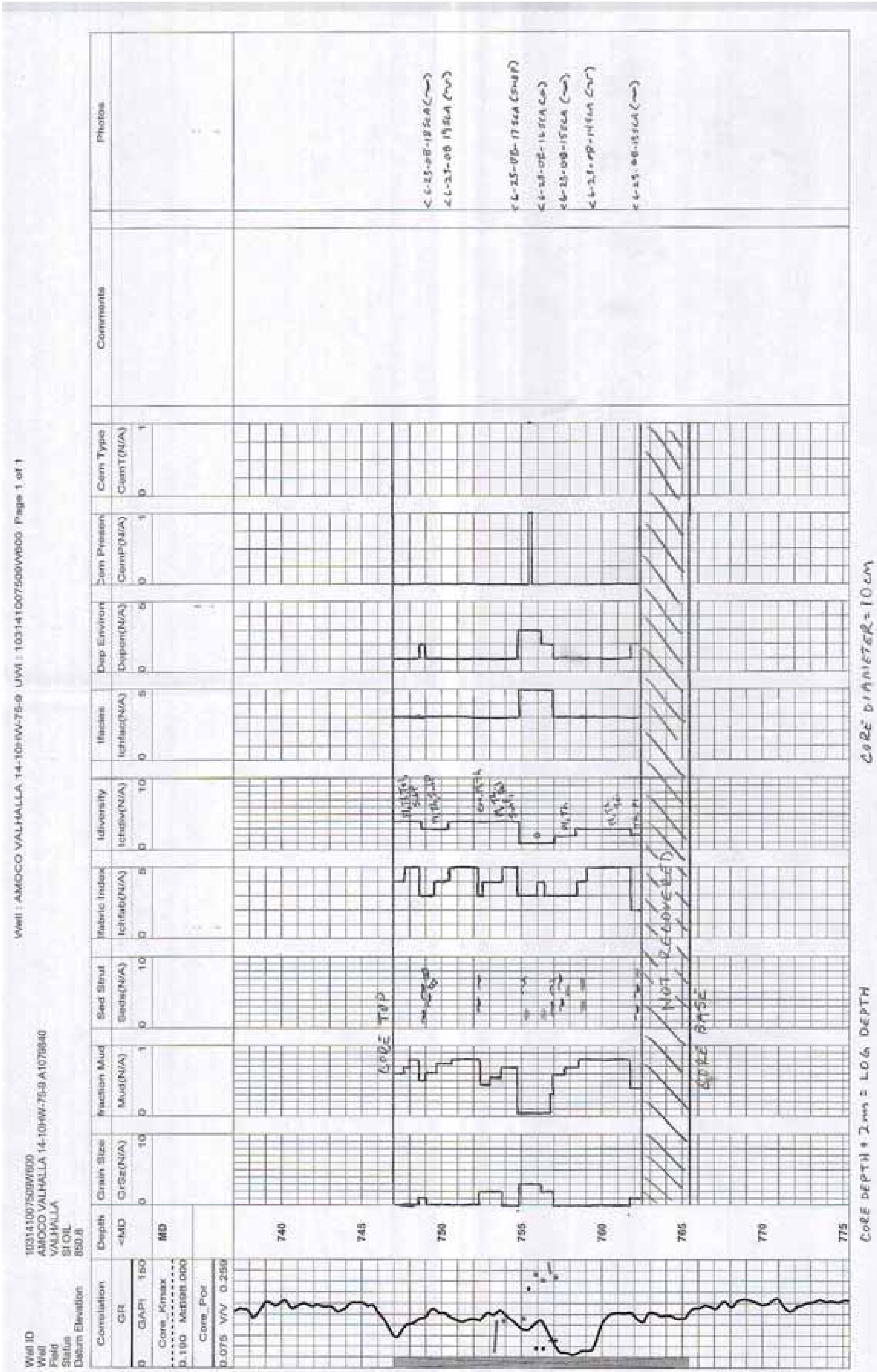
Well HUSKY VALHALLA 6-15-75-9 A2418650
Field VALHALLA
Status PUMP OIL
Datum Elevation 860.9
Correlation
GR
0 GAPI 150
Core_Kmax(N/A)
0.190 698.000
Core_Por(N/A)
0.075 0.259
Depth
<MD
MD
Grain Size
GrSz(N/A)
0 10
fraction Mud
Mud(N/A)
0 1
Sed Strut
Seds(N/A)
0 10
Ifabric Index
Ichfab(N/A)
0 5
Idiversity
Ichdiv(N/A)
0 10
Ifacies
Ichfac(N/A)
0 5
Dep Environ
Depen(N/A)
0 5
Cem Presen
CemP(N/A)
0 1
Cem Type
CemT(N/A)
0 1
Comments
Photos
745
750
755
760
762.5
765
770
TOP OF CORE = 754 m
BOTTOM OF CORE = 763 m
6-23-08-12NB
6-23-08-11NB
6-23-08-10NB
CORE DIAMETER= 10 cm
CORE DEPTH - 0.7m = LOG DEPTH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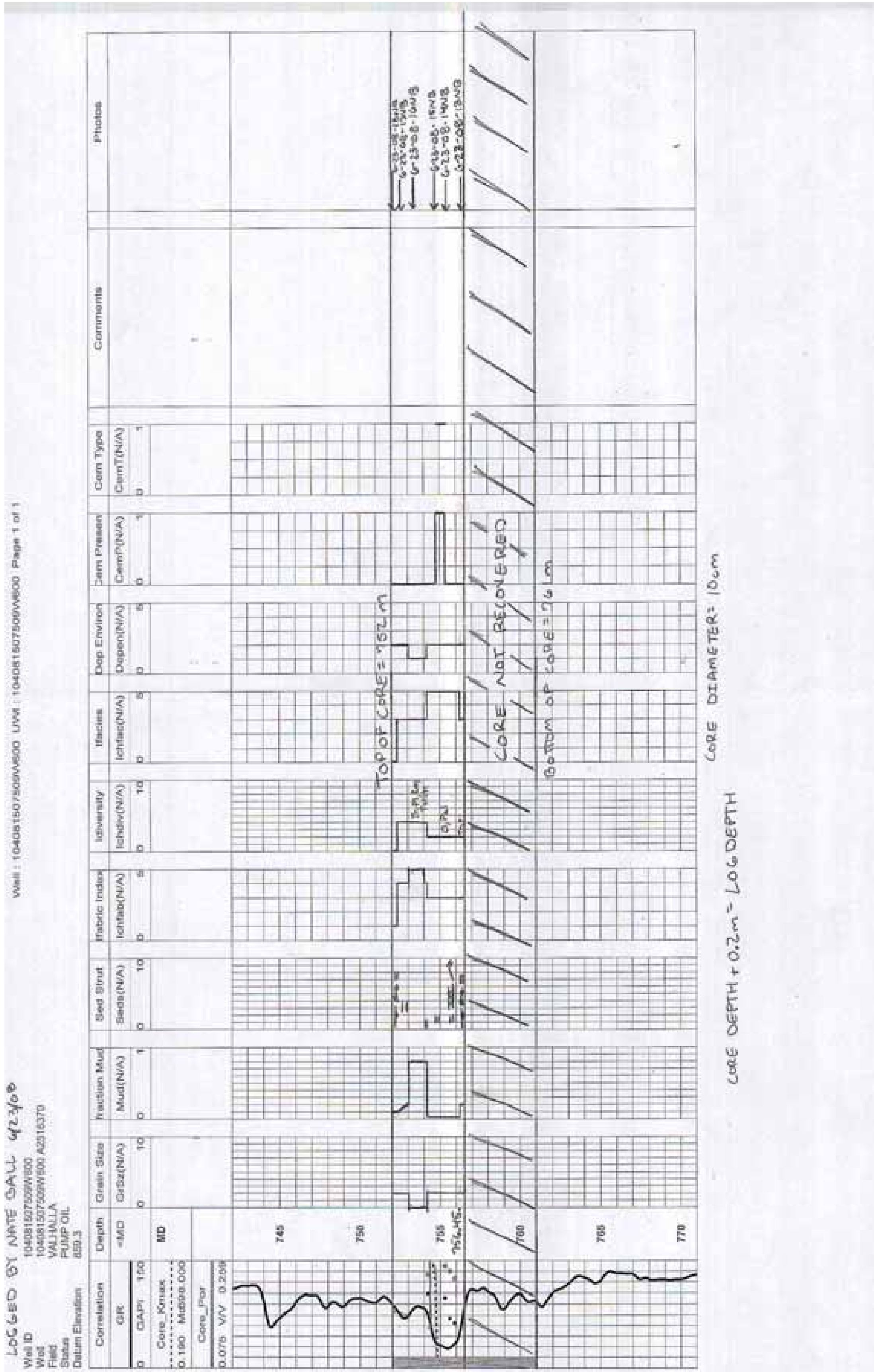
Well ID 103141007509W600
Well AMOCO VALHALLA 14-10HW-75-9 A1079840
Field VALHALLA
Status SI OIL
Datum Elevation 850.8
Correlation
GR
0 GAPI 150
Core_Kmax
0.100 MD698.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
Grain Size
GrSz(N/A)
fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
CemP(N/A)
Cem Type
CemT(N/A)
Comments
Photos
740
745
750
755
760
765
770
775
CORE TOP
NOT RECOVERED
CORE BASE
CORE DEPTH + 2mm = LOG DEPTH
CORE DIAMETER = 10cm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Well ID
Well
Field
Status
Datum Elevation
VALHALLA
PUMP OIL
659.3
Correlation
Depth
Grain Size
Traction Mud
Sed Strut
Fabric Index
Idiversity
Ifacies
Dep Environ
Cem Presen
Cem Type
Comments
Photos
GR
GAPI
Core_Kmax
Core_Por
MD
745
750
755
760
765
770
TOP OF CORE = 752 m
CORE NOT RECOVERED
CORE DIAMETER: 10cm
CORE DEPTH + 0.2m = LOG DEPTH

T76R8

Core Description Legend

Grain Size

0 - Silt/Clay
1 - Lower Very Fine
2 - Upper Very Fine
3 - Lower Fine
4 - Upper Fine
5 - Lower Medium
6 - Upper Medium
7 - Lower Coarse
8 - Upper Coarse
9 - Lower Very Coarse
10 - Upper Very Coarse

Photos

6-16-08-nnn(initials of author)

Sedimentary Structures

- Planar Horizontal
- Planar Laminations
- Trough Cross Bedding
- Soft Sediment Deformation
- Planar Tabular
- mm Laminations
- Climbing Ripple
- Firmground
- Hummocks
- Current Ripple
- Wave Ripple
- Flaser Bedding
- Lithoclast
- Intraclast
- Bivalve undiff.

Ichnofabric Index

1 - No bioturbation recorded; all original sedimentary structures preserved
2 - Discrete, isolated trace fossils; up to 10 percent of original bedding disturbed
3 - Approximately 10 to 40 percent of original bedding disturbed
4 - Last vestiges of bedding discernable; approximately 40-60 percent disturbed. Burrows overlap and are not always well defined.
5 - Bedding is completely disturbed, but burrows are still discrete in places and the fabric is not mixed. May also represent totally homogenized sediment in the absence of trace fossils.

Ichnofauna

Pl - *Planolites*
Th - *Thalassinoides*
Teich - *Teichichnus*
Pal - *Palaeophycus*
Zoo - *Zoophycos*
Cyl - *Cylindrichnus*
Sub - *Subphyllocorda*
O - *Ophiomorpha*
Ber - *Bergaueria*
Rh - *Rhizocorallium*
Sk - *Skolithos*
Ast - *Asterosoma*
Aren - *Arenicolites*
Ros - *Rosselia*
Diplo - *Diplocraterion*
Con - *Conichnus*
Chon - *Chondrites*
Phy - *Phycosiphon*
Ter - *Terebellina*

Ichnodiversity

n - number of taxa observed

Ichnofacies

1 - *Nereites*
2 - *Zoophycos*
3 - *Cruziana* (Restricted)
4 - *Cruziana* (Open)
5 - *Skolithos*

Depositional Environment

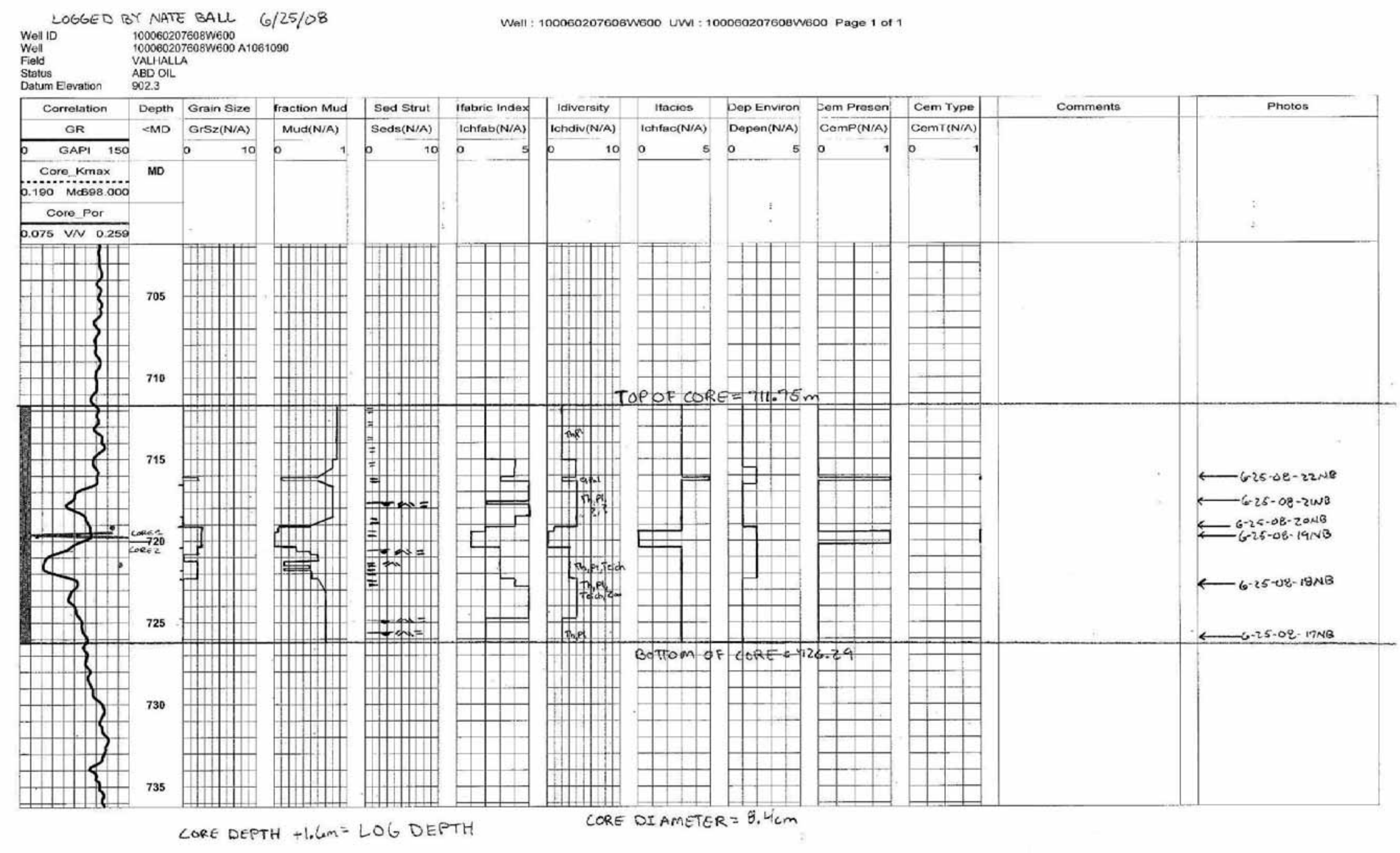
1 - Offshore
2 - Distal Lower Shoreface
3 - Proximal Lower Shoreface
4 - Upper Shoreface
5 - Foreshore

Cement

0 - No Cement Present
1 - Cement Present

Cement Type

0 - Quartz
1 - Calcite


LOGGED BY NATE BALL 6/25/08
Well : 100060207608W600 UWI : 100060207608W600 Page 1 of 1
Well ID 100060207608W600
Well 100060207608W600 A1061090
Field VALHALLA
Status ABD OIL
Datum Elevation 902.3
Correlation
GR
0 GAPI 150
Core_Kmax
0.190 Md598.000
Core_Por
0.075 V/V 0.259
Depth
<MD
MD
705
710
715
720
725
730
735
Grain Size
GrSz(N/A)
Fraction Mud
Mud(N/A)
Sed Strut
Seds(N/A)
Ifabric Index
Ichfab(N/A)
Idiversity
Ichdiv(N/A)
Ifacies
Ichfac(N/A)
Dep Environ
Depen(N/A)
Cem Presen
ComP(N/A)
Cem Type
ComT(N/A)
Comments
Photos
TOP OF CORE = 711.75m
BOTTOM OF CORE = 726.29
6-25-08-22NB
6-25-08-21NB
6-25-08-20NB
6-25-08-19NB
6-25-08-18NB
6-25-08-17NB
CORE DEPTH +1.6m = LOG DEPTH
CORE DIAMETER = 8.4cm

REFERENCES

Aigbedion, J., and S. E. Iyayi, 2007, Formation evaluation of Oshioka Field using geophysical well logs: Middle-East Journal of Scientific Research, v. 2, p. 107-110.

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