NOGS Webinar Presentation

Paperless Office Tools for the Petroleum Geologist

“Working at a Distance”

By

Robert Rooney

May 11, 2020

Thanks to NOGS Field Study Contributors:

All of the authors, editors and committee members who shared their talents, sacrificed their time
And published this tremendous body of work.

They are credited with the individual and collective work products in these volumes which constitute
One of the largest compilations of geological subsurface work available to industry today.

Ed Picou for his continued service to NOGS in collaboration with stakeholders in the digitizing,
Marketing, and making online sales of the NOGS publications possible to the rest of industry.

Outline

Why strive for a paperless office?

Introduction to the NOGS Publications DVD Sets

Field Study Example
- Techniques for “modernization” of the subsurface data
- Integration / Links to SONRIS public information
- Building a quick GIS basemap
- Downloding Log Images to a project database
- Using publicly available well log data to do subsurface work

Geology of Greater New Orleans
- Overview of Selected Maps
- GIS Integration of some study figures

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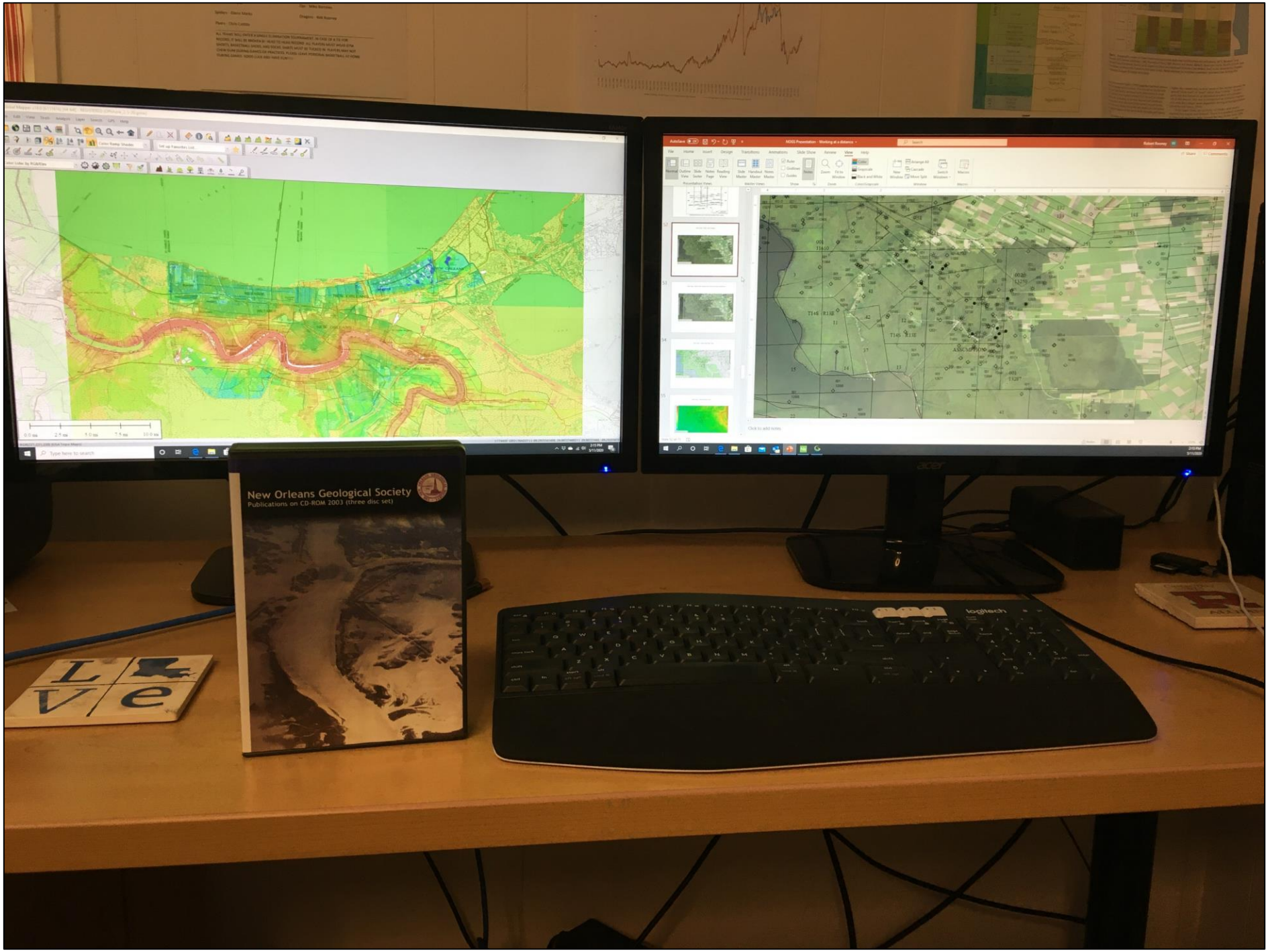
Why strive for a paperless office?

The case for having paperless office capability in the geosciences…

- Independent career path decision
- Lower-cost/overhead, more efficient that paper and ink
- Less office space required than paper and ink (no drafting table nor file cabinets required)
- Work-from-home / Lock-down society rules may make it necessary
- Necessitates digital communication and virtual team collaboration
- Less travel required - Web-ex meetings
- Work from anywhere
- It is the future and it is here

It allows you to do more.



Software Tools used in this presentation

- Global Mapper ©
- NeuraSection ©
- Louisiana Department of Natural Resources SONRIS
- NOGS 3-CD Publications Set

My Career Timeline…….

University experience → did not touch a computer prior to graduation

First professional job (1987) involved continued increasing computer use such as:

- helping prepare Banker's presentations through 3rd party graphics company
- input data for engineers, x-y plots, and map coordinates
- implemented a core-log description package for well-site usage
- observed for the first-time, a computer-generated contour map of a salt dome
- implemented the company's first computerized production morning report (trained staff offshore)

First consulting experience (1994) ……..

- purchased my first mapping software
- used word processing and spreadsheets for report presentations
- maps and cross-sections were still hand-drawn and drafted (many originals lost due to flooding)

Major oil company and independent oil company jobs (1997 - 2016)

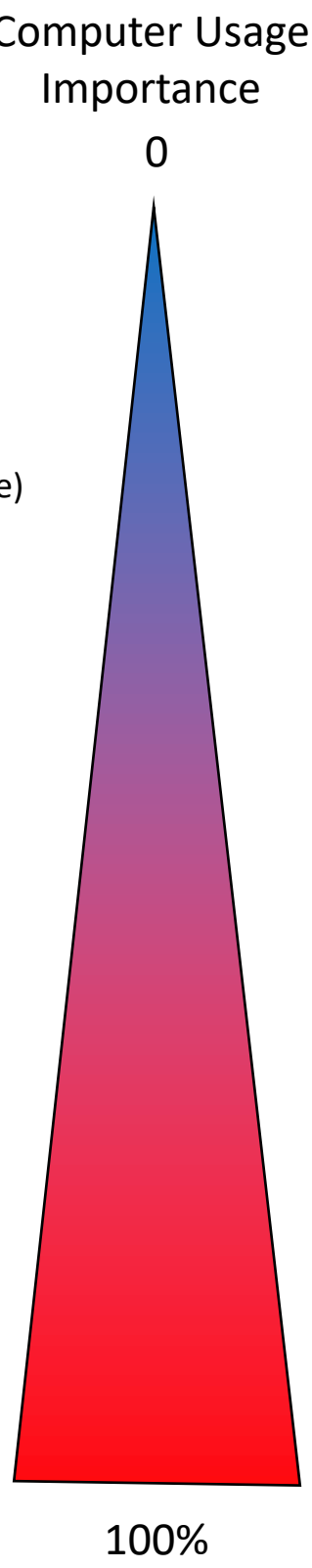
- fully digital workstation platforms
- 3D seismic, geo-databases, cutting edge technology
- company-provided overhead and licensing to software and data
- all I had to do was perform

Second consulting experience (2016)

- no budget, limited office space, no computer, no software
- big realization that the paper office would not save me this time
- took mental inventory of what was needed to interpret subsurface data
- settled on the tools described in the first slide

Most recent oil company job (2019-present)

- office set-up was open floor plan
- cloud-based integrated workstation platform required minimal office space (low overhead)
- current set-up was "ready-as-you-go" for transition to a home-based office



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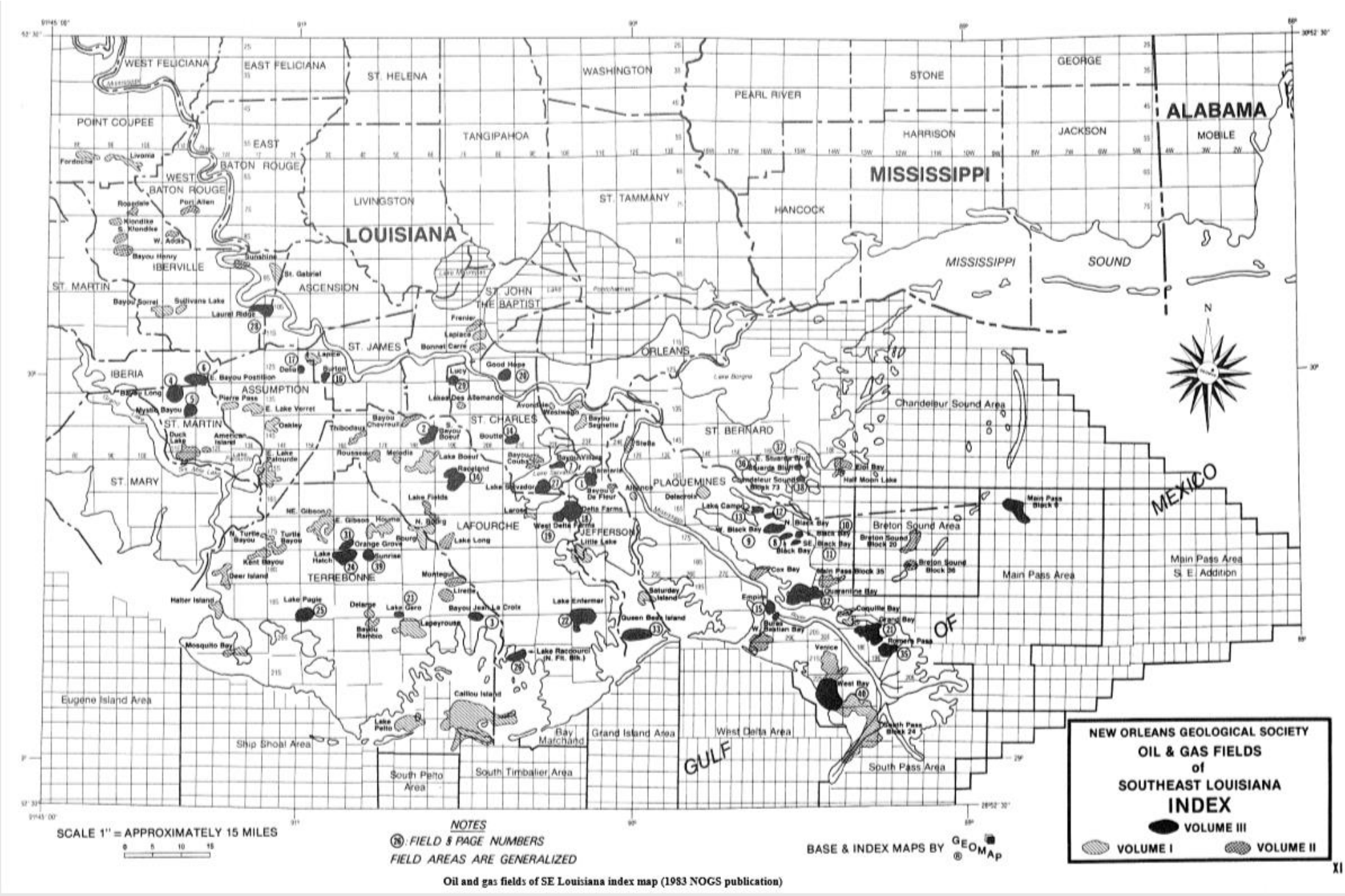
Introduction to the NOGS Publications 3-CD Set

Disc 1
Oilfields of Onshore South Louisiana (Volumes I, II, III, & IIIa)
Oilfields of Offshore South Louisiana (Volumes (I & II)
Salt Domes of South Louisiana (Volumes I, II, & III)
Tuscaloosa Trend Study

Disc 2

Disc 3

Onshore Fields Covered in Volumes I, II, & III



Oil and gas fields of SE Louisiana index map (1983 NOGS publication)

OIL AND GAS FIELDS
of
SOUTHEAST LOUISIANA

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Printing was done directly from typing by Mrs. Louis E. (Judy) Lemarie on the word processor of her employer. Drafting was by Raymond Botti, assisted by Gaynell Doll, both of Exxon. Dinah Smith and John Martinez of Pelto also helped with typing and drafting, respectively.

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Personally and on behalf of the Society we express our appreciation to the many individuals and companies for their contributions and for the release of data of which many were heretofore unpublished.

Louis L. McCormick
Pelto Oil Co.
Chairman

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Drafting was by Jeanne Boeckelman and Wayne Boeckelman. The text was typed by Judy Lemarie. Encouragement and direction was given by Claude Baker in his capacty as NOGS Technical Committee Chairman.

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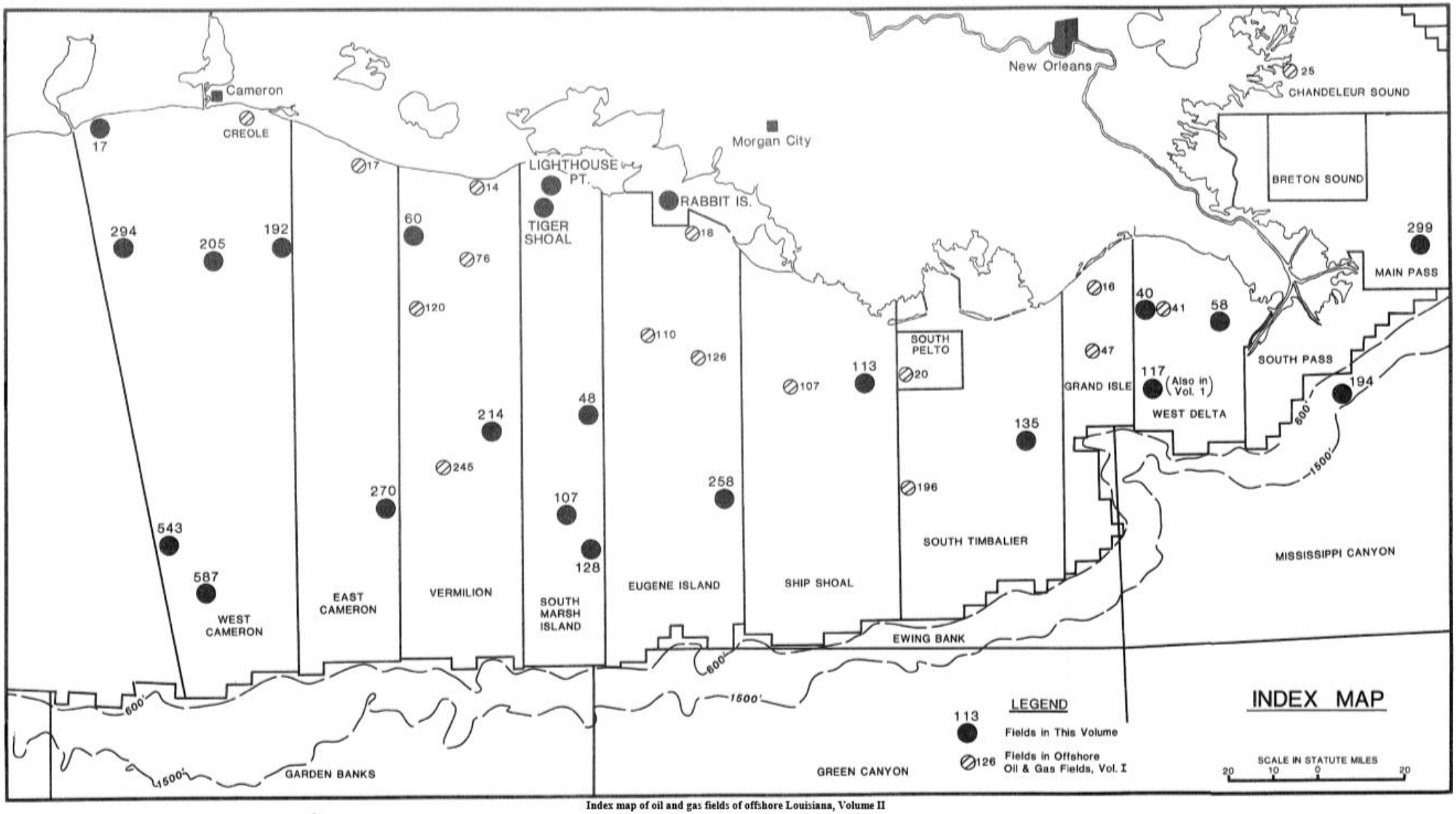

Index map of oil and gas fields of offshore Louisiana, Volume II

OFFSHORE LOUISIANA

OIL AND GAS FIELDS

Lafayette Geological Society
Founded December 1952

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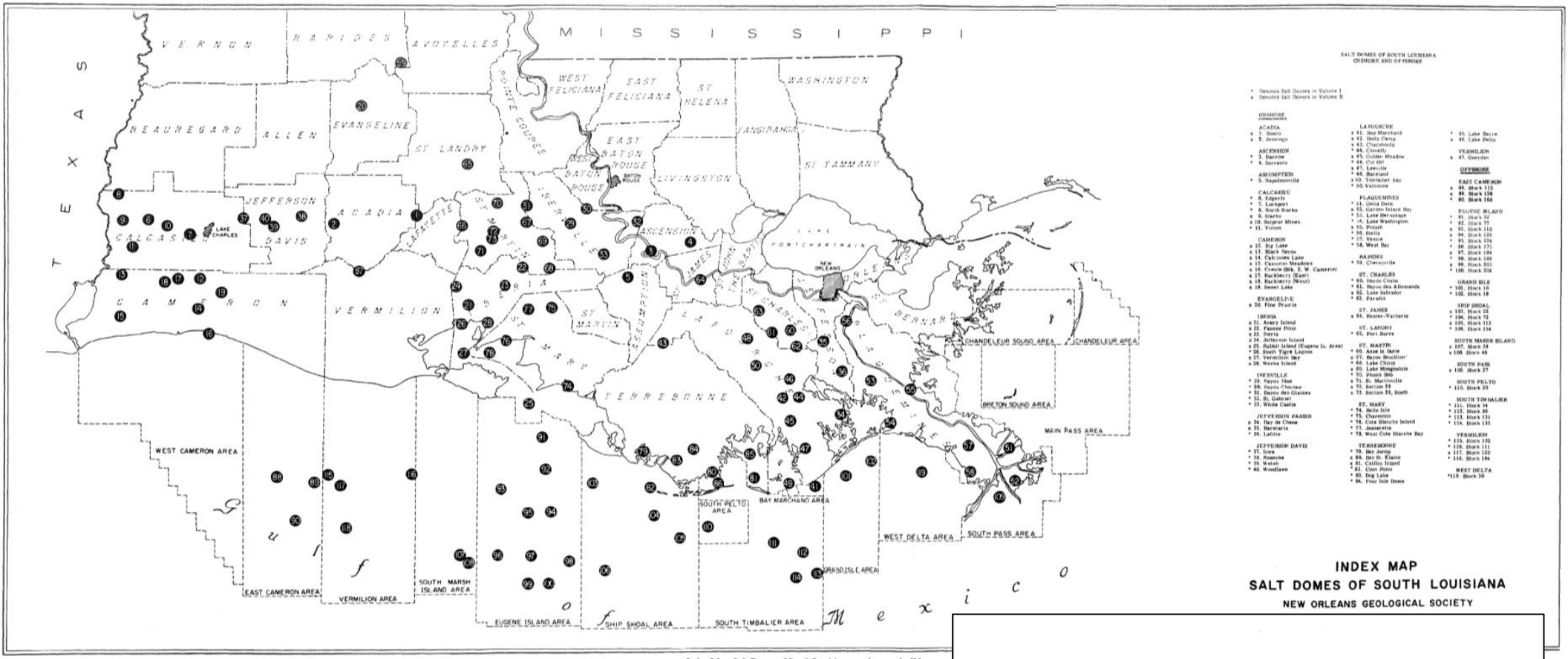
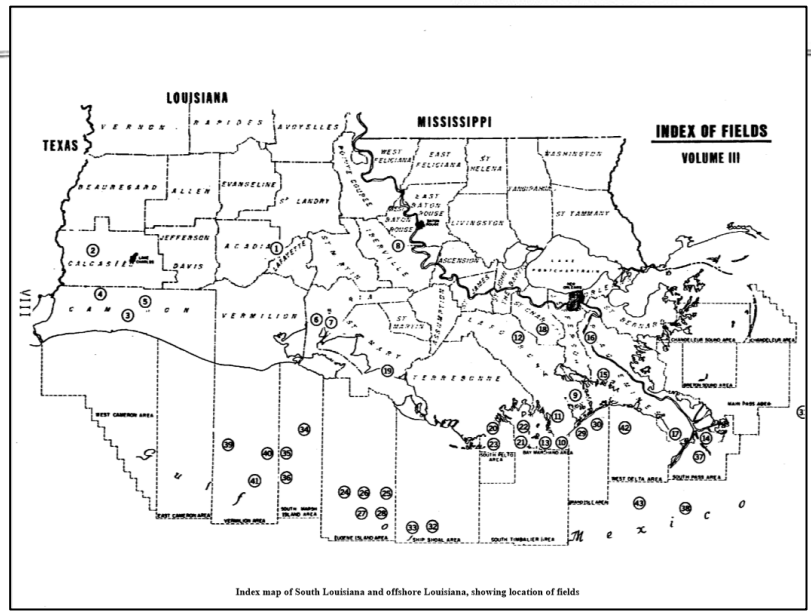
Salt Dome Studies



Index Map, Salt Domes of South Louisiana, onshore and offshore



Index map of South Louisiana and offshore Louisiana, showing location of fields

Each Study includes:

- Contour Map of Dome
- Data Sheet

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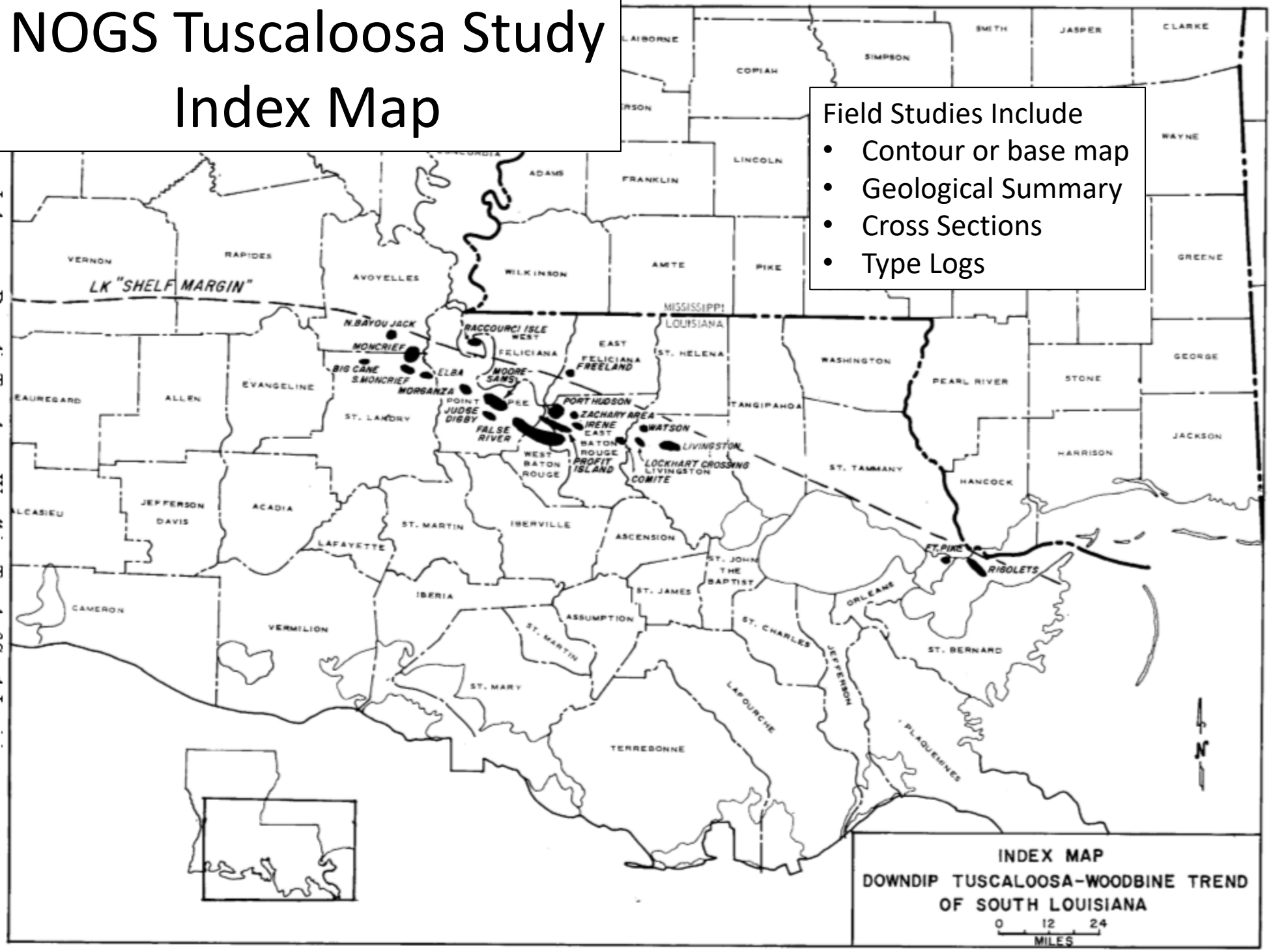
NOGS Tuscaloosa Study Index Map

Field Studies Include

- Contour or base map
- Geological Summary
- Cross Sections
- Type Logs



Index map, Downdip Tuscaloosa-Woodbine Trend of South Louisiana

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OF
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VOLUME I

FIELDS

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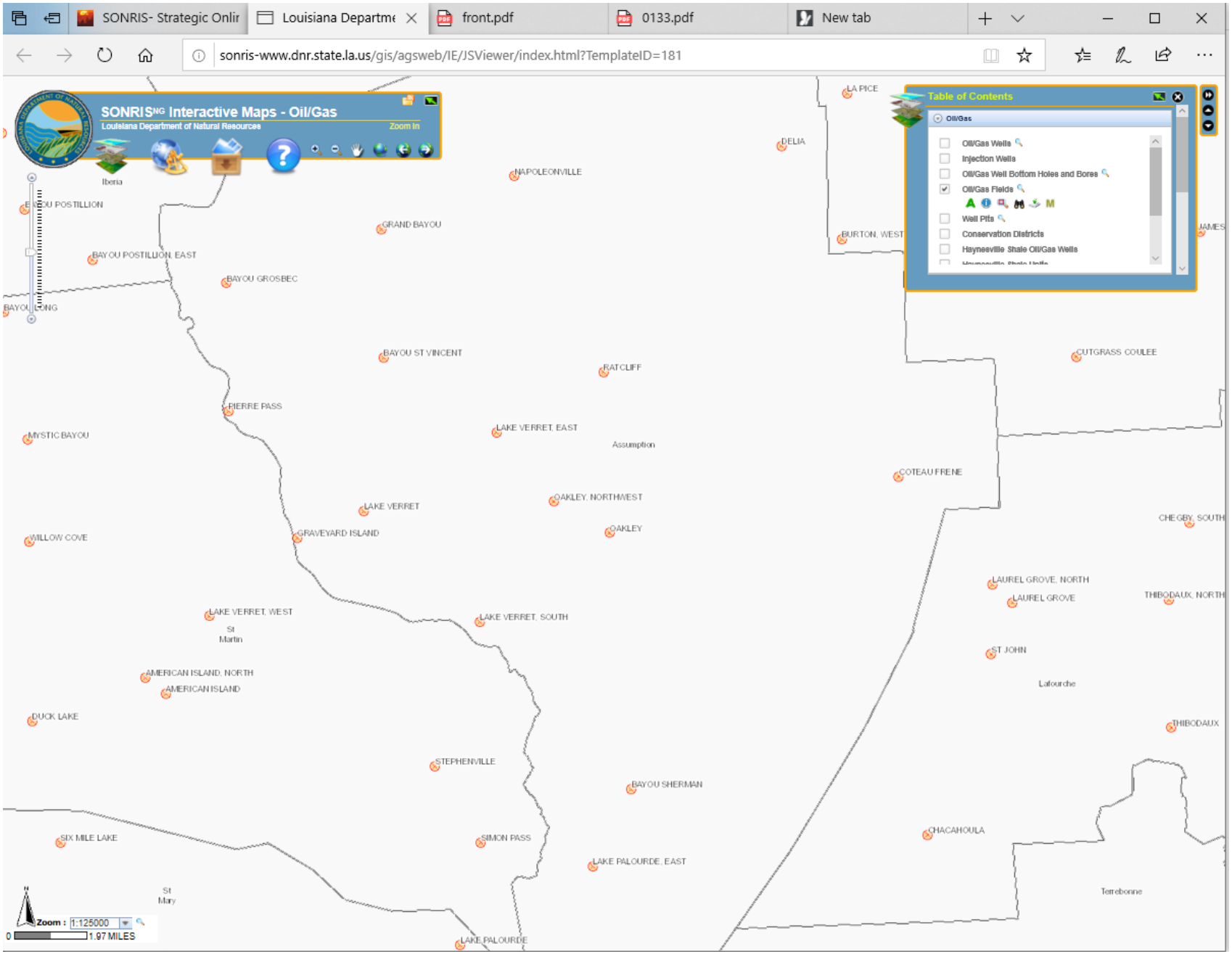
FIELDS

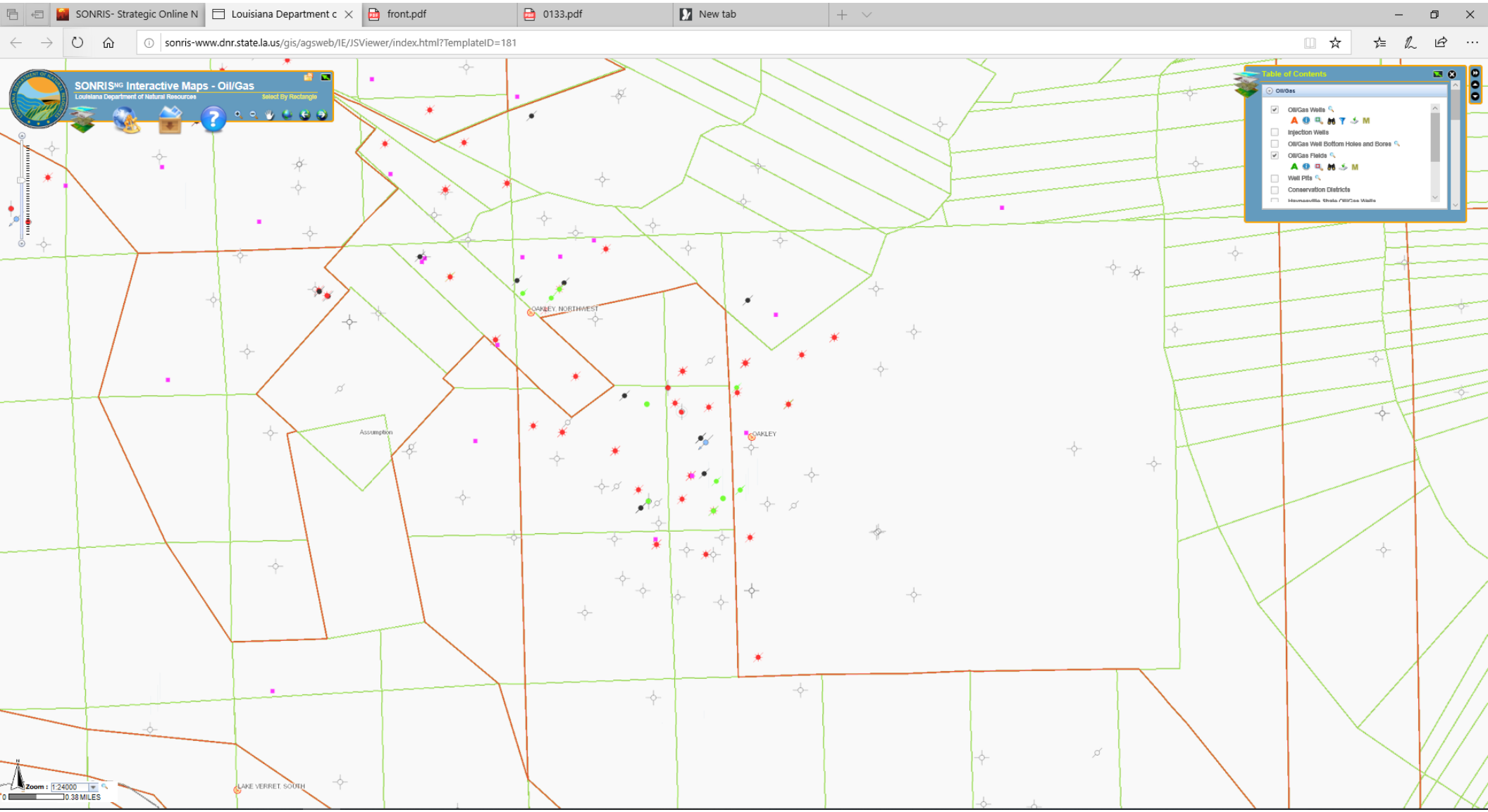
Chose this one
At random
As an example

The next 20 slides involve workflow procedures which I will move through quickly…….

SONRIS GIS Interface



SONRIS GIS Map With Wells



Typical of most NOGS Field Study Information Summaries

OAKLEY FIELD

ASSUMPTION PARISH, LOUISIANA

C. T. (TOM) HIGGINS, PAN-AMERICAN PETROLEUM CORP.

LOCATION: T 14 S, R 14 E, Assumption Parish, Louisiana, 20 miles northwest of Thibodaux city limits.

DISCOVERY WELL: Hassie Hunt Trust, No. 1 W. E. Kittridge.
Completion Date: March 10, 1955. I.P. 100 BOPD + 3000 MCFG per day; 10/64" ch; T.P. 3,600 psi., GOR. 30,000/1; GR. 58.2° A.P.I.

TOTAL WELLS (April 1, 1965): 27 Oil 4 Gas 11 Dry 12

DEEPEST WELL: Texas Crude & Union Texas No. 1 Kittridge T.D. 16,100 feet.
Oldest Zone Penetrated: *Planulina palmerae* (Lower Miocene)

PRODUCTIVE INTERVAL: 8,800 feet to 14,200 feet.
Cibicides opima (Middle Miocene) to *Siphonina davisi* (Lower Miocene)

NUMBER OF PRODUCTIVE ZONES: 16

PRINCIPAL OPERATORS: Texas Crude, Humble Oil & Refining Co.

MARKET OUTLET: Sugar Bowl Gas Company.

PRODUCTION:	YEAR	OIL AND CONDENSATE	GAS (MMCFG)
	1960	115,850	3,554
	1961	190,425	6,537
	1962	214,600	6,784
	1963	246,200	6,968
	1964	237,725	6,029
	Cumulative	1,100,525	30,541

ESTIMATED ULTIMATE RESERVES: 5,011,200 BBLS. 190,928

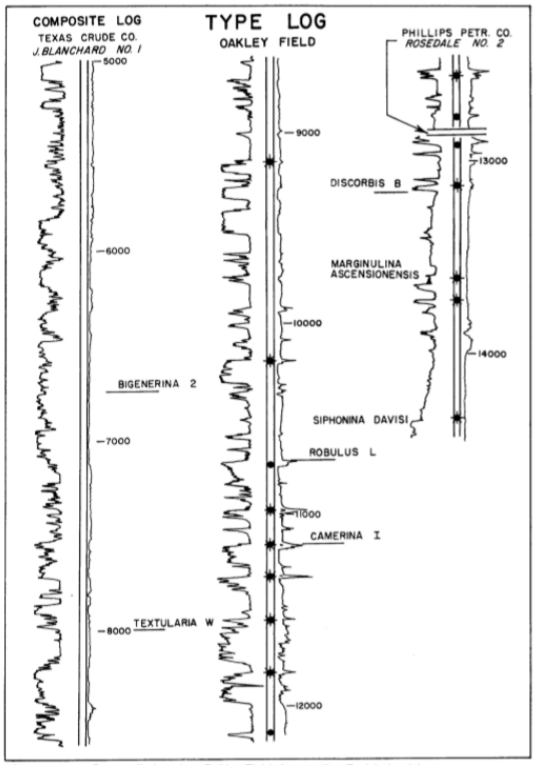
GEOLOGY

Although Oakley Field was discovered in 1955, development drilling was not begun until 1958. It is still in progress. Most of the production is gas.

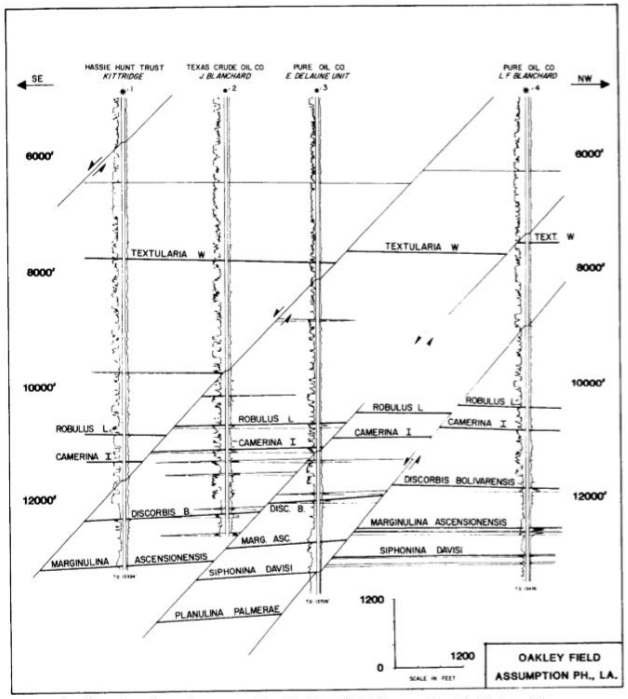
The field is in a trend of Middle and Lower Miocene sands. Accumulations apparently being controlled by faults, most of the production is from sands in the *Discorbis* (B) portion of the section. The average net thickness of these sands is 50 feet.

The oldest fault system is of *Siphonina davisi* age, and is in the northern part of the field. Fault systems in the southern part of the field had no effect on sedimentation.

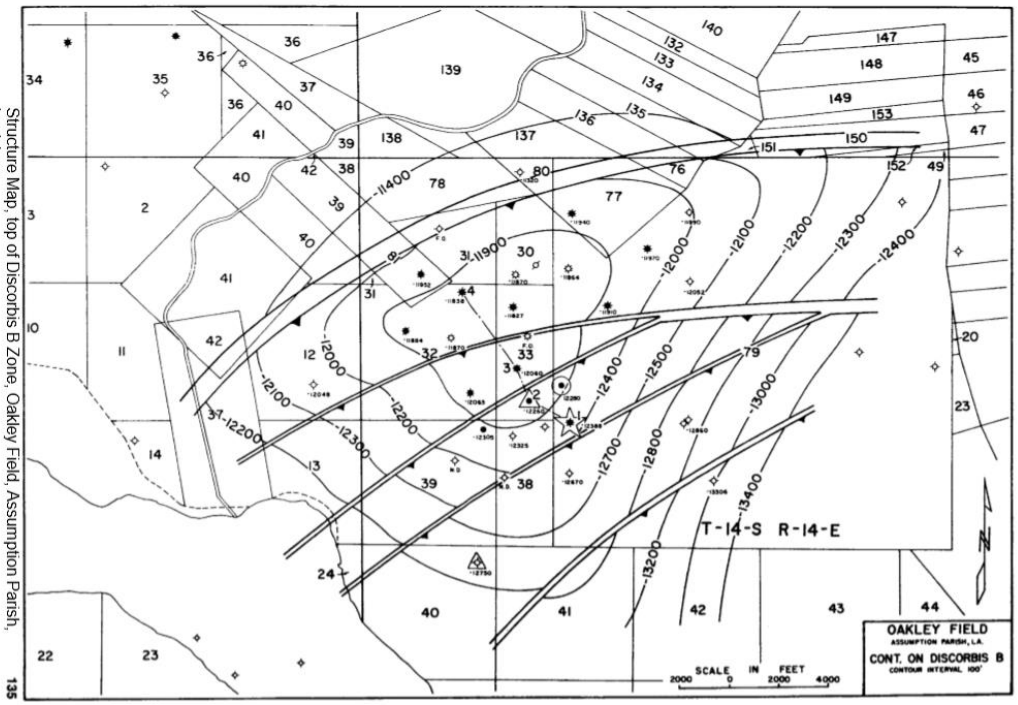
Oakley Field is a faulted asymmetrical anticline, whose east, west, and south flanks are clearly defined by well control. The north dip is into a depositional fault having a throw of 150 to 200 feet, down to the south. The north dip persists in the upthrown northerly block.



134 Composite type log, Oakley Field, Assumption Parish, Louisiana



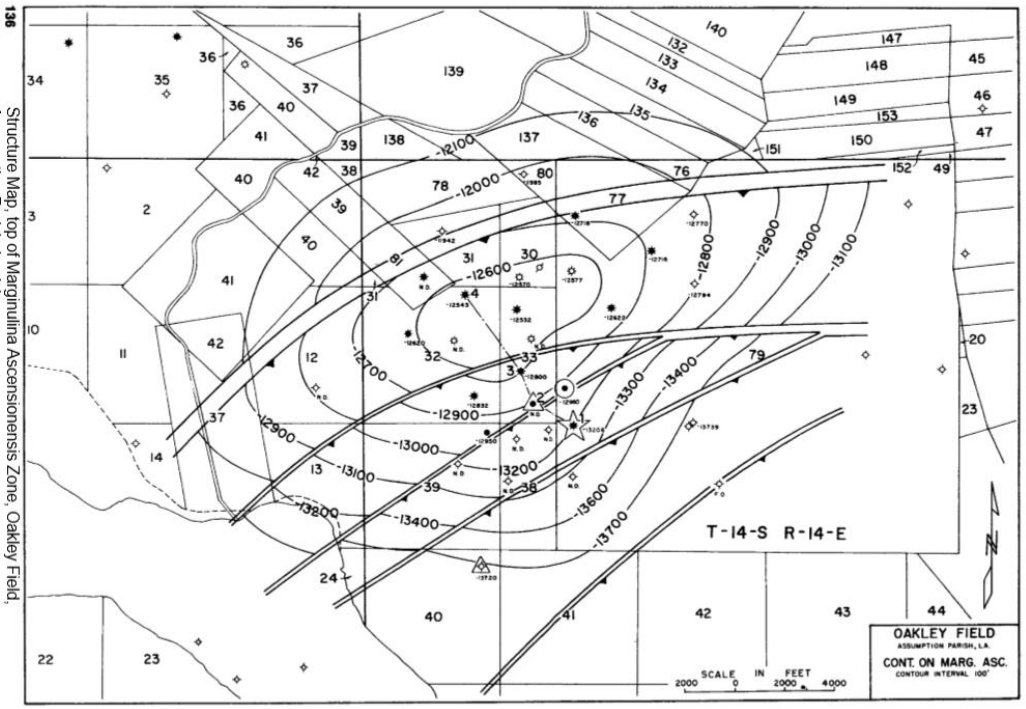
Southeast-northwest cross section, Oakley Field, Assumption Parish, Louisiana



Structure Map, top of Discorbis B Zone, Oakley Field, Assumption Parish, Louisiana

135

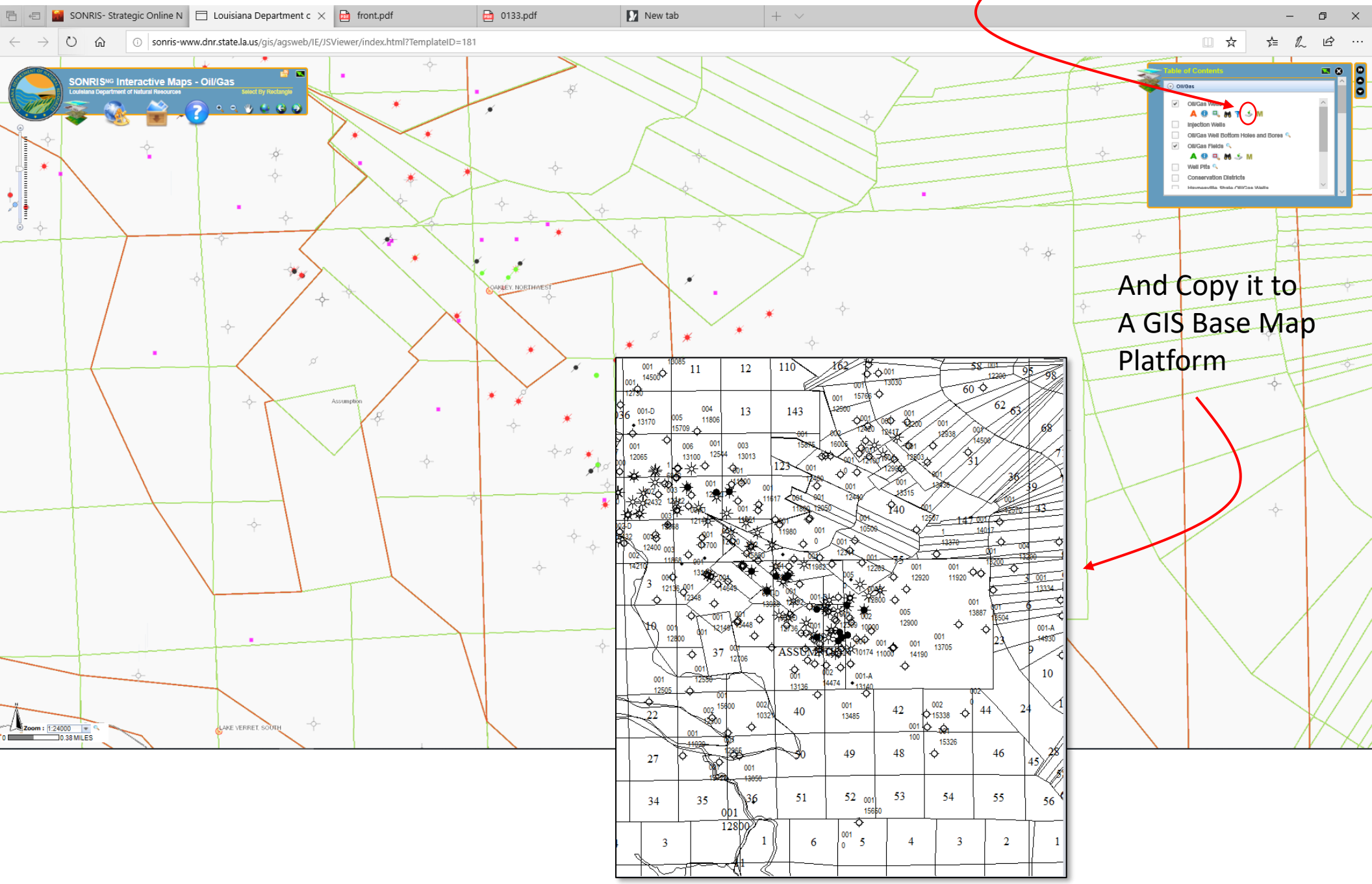
136



Structure Map, top of Marginulina Ascensionensis Zone, Oakley Field, Assumption Parish, Louisiana

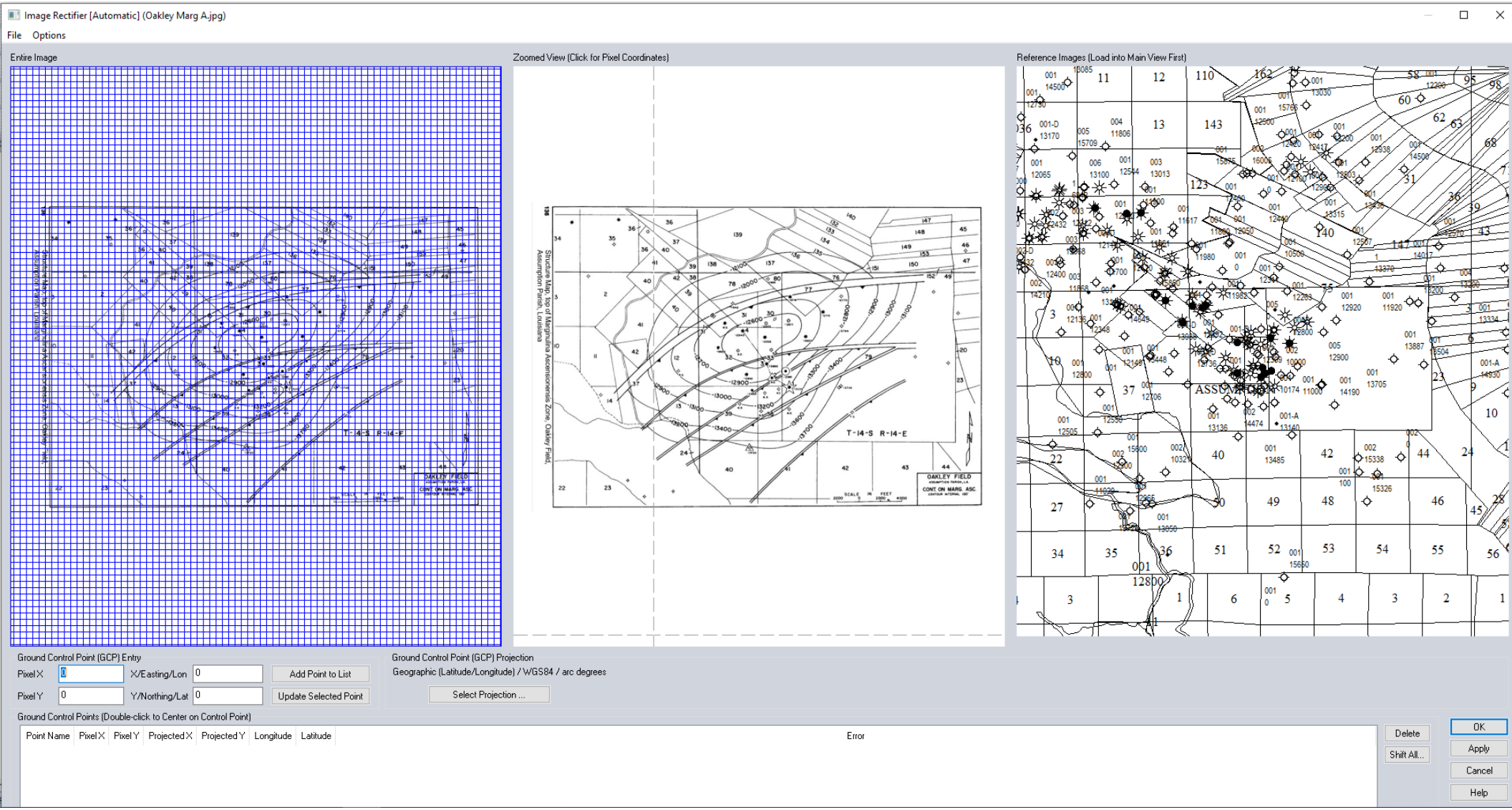
SONRIS Borehole Download and Import to GIS

Extract the well data feature, culture, etc. whatever you will need…

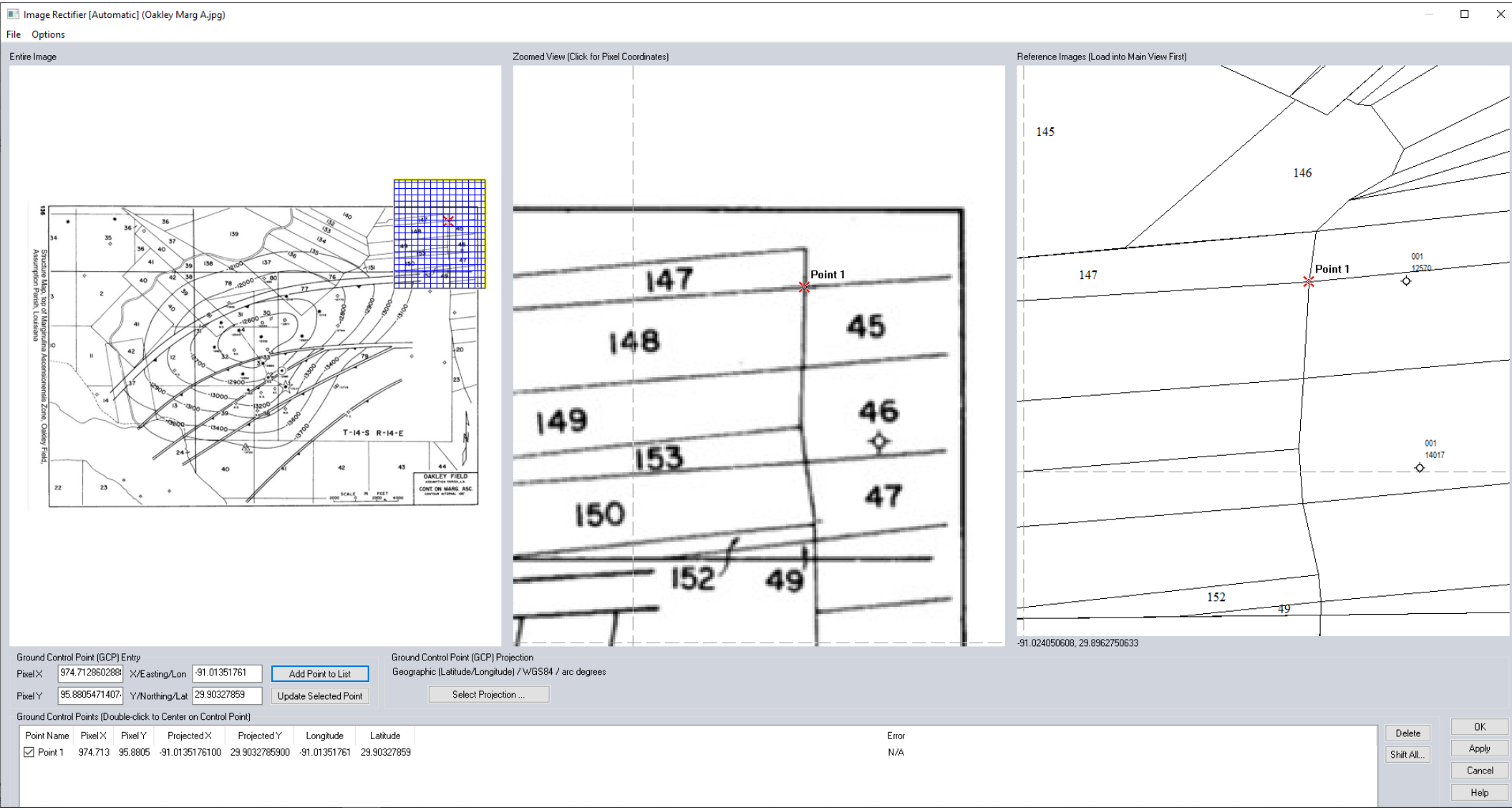


And Copy it to
A GIS Base Map
Platform

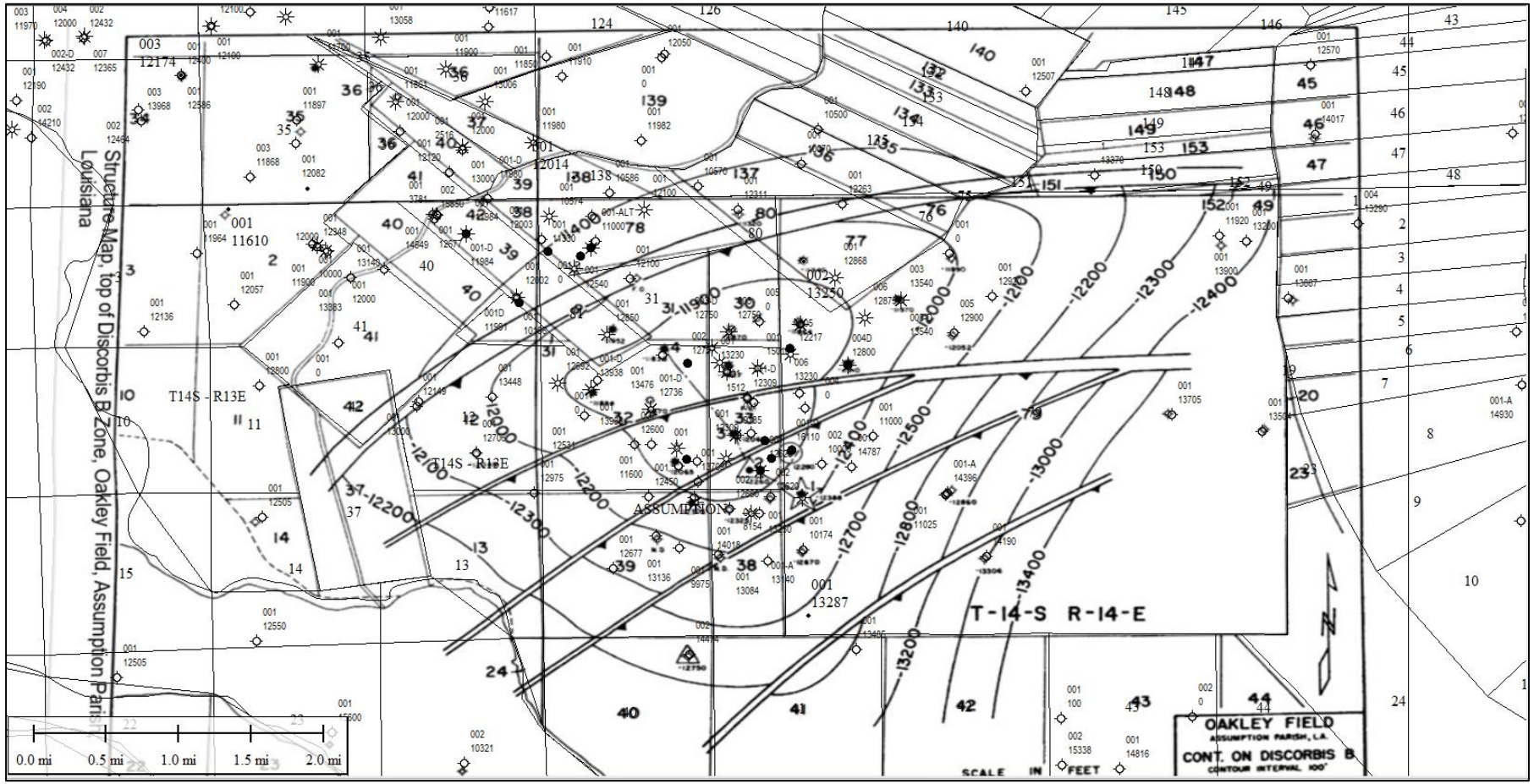
Global Mapper Georeferencing Process……very easy to do.



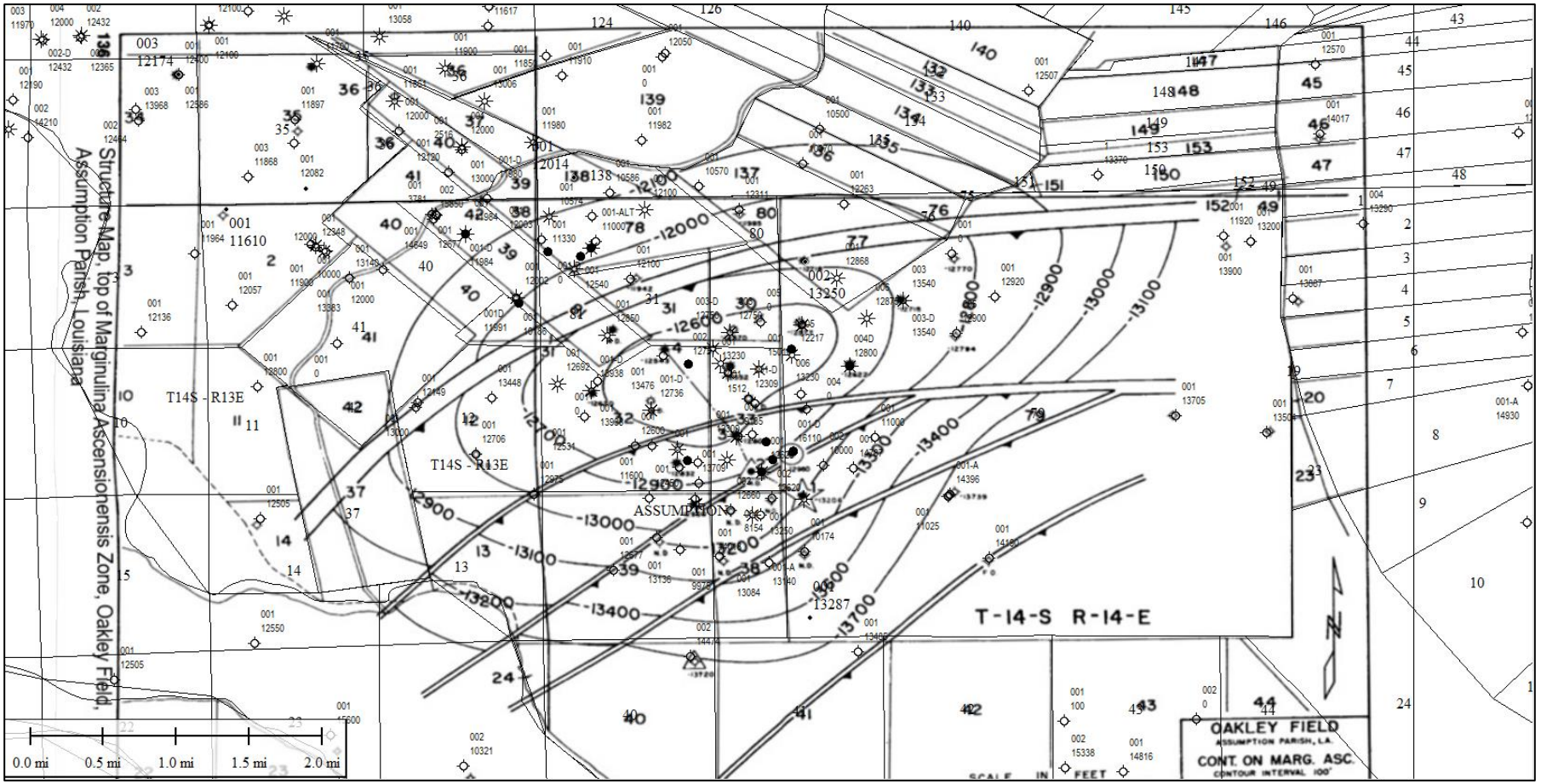
Reference Point Selections……



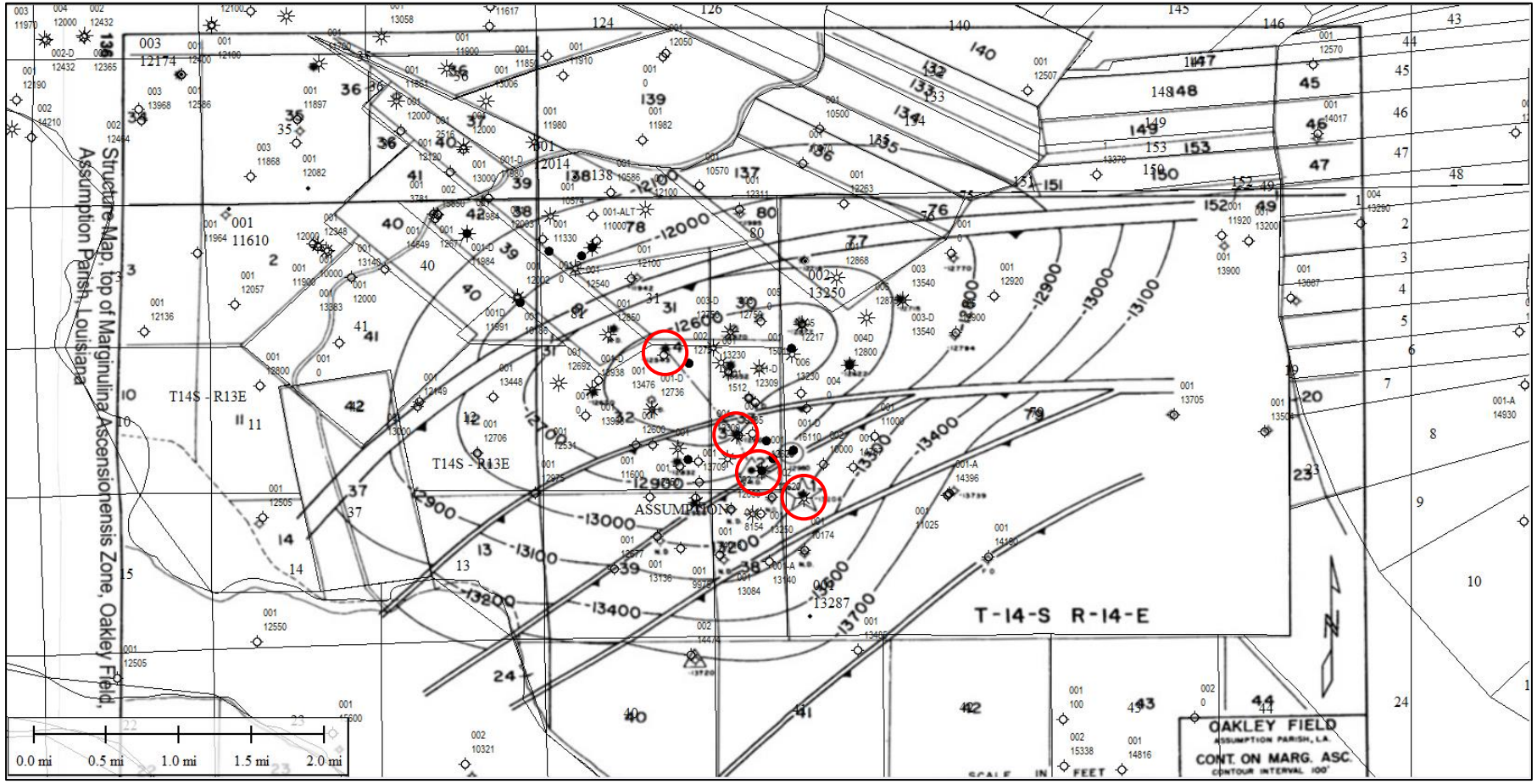
Geo-referenced Discorbis B



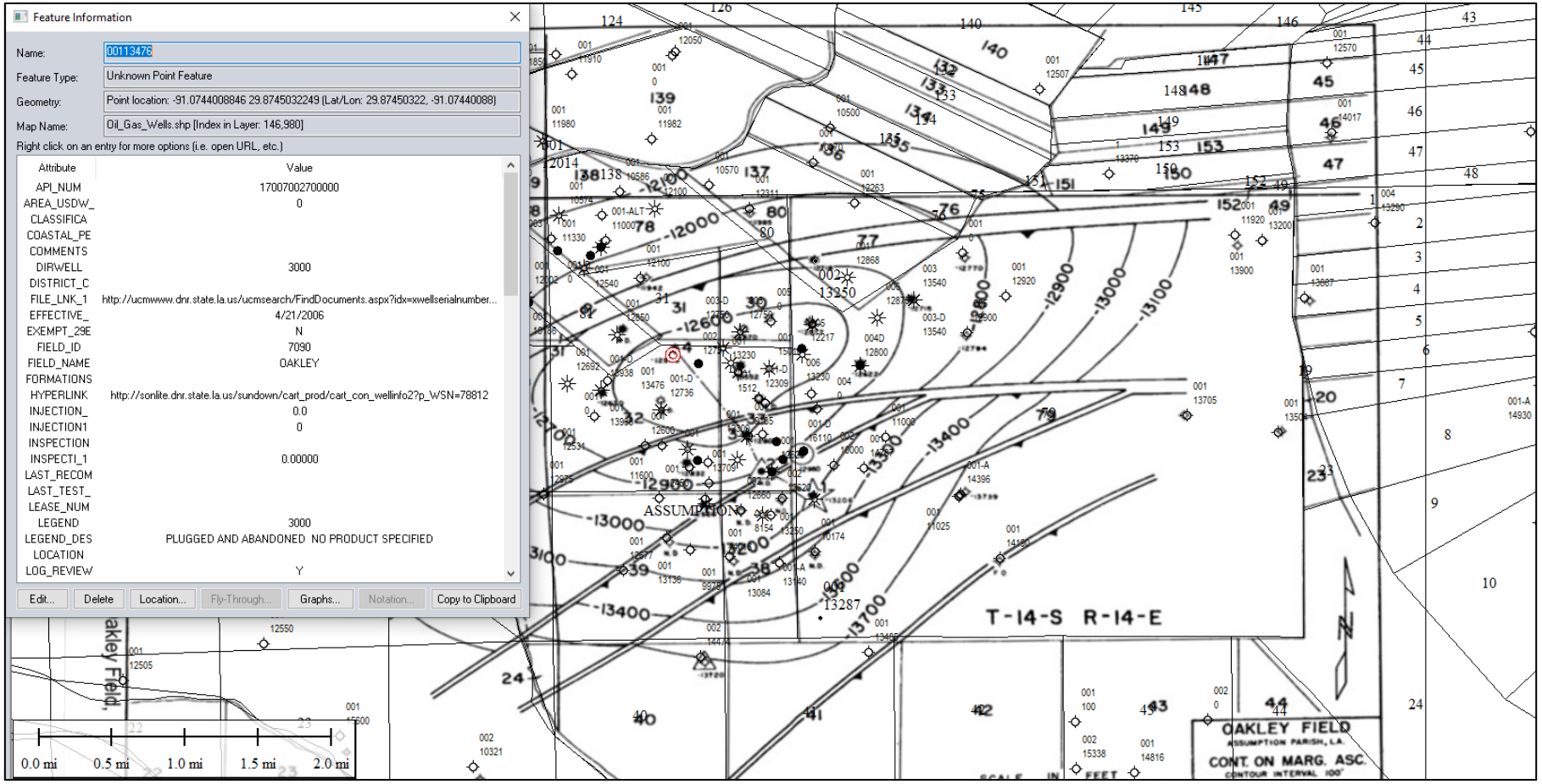
Geo-refrenced Marg A



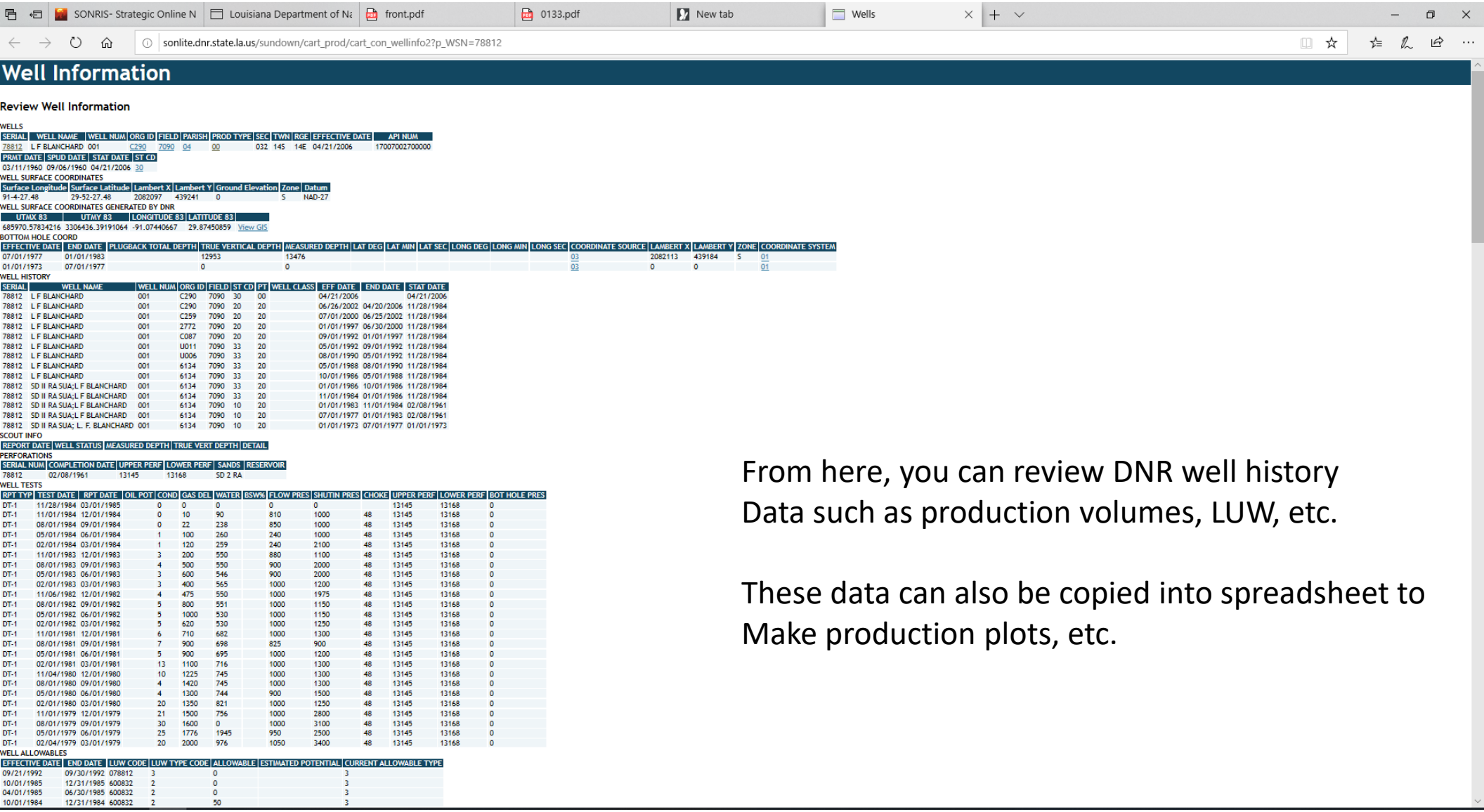
Identify Wells in the Cross Section Display



From the GIS Base Map – SONRIS data are easily retrieved



SONRIS Well File Interface



SONRIS- Strategic Online N | Louisiana Department of Na | front.pdf | 0133.pdf | New tab | Wells

sonlite.dnr.state.la.us/sundown/cart_prod/cart_con_wellinfo2?p_WSN=78812

Well Information

Review Well Information

WELLS

SERIAL	WELL NAME	WELL NUM	ORG ID	FIELD	PARISH	PROD TYPE	SEC	TWN	RGE	EFFECTIVE DATE	API NUM
78812	L F BLANCHARD	001	C290	7090	04	00	032	14S	14E	04/21/2006	17007002700000

PRMT DATE	SPUD DATE	STAT DATE	ST CD
03/11/1960	09/06/1960	04/21/2006	30

WELL SURFACE COORDINATES

Surface Longitude	Surface Latitude	Lambert X	Lambert Y	Ground Elevation	Zone	Datum
91-4-27.48	29-52-27.48	2082097	439241	0	5	NAD-27

WELL SURFACE COORDINATES GENERATED BY DNR

UTMX 83	UTMY 83	LONGITUDE 83	LATITUDE 83	
685970.57834216	3306436.39191064	-91.07440667	29.87450859	View GIS

BOTTOM HOLE COORD

EFFECTIVE DATE	END DATE	PLUGBACK TOTAL DEPTH	TRUE VERTICAL DEPTH	MEASURED DEPTH	LAT DEG	LAT MIN	LAT SEC	LONG DEG	LONG MIN	LONG SEC	COORDINATE SOURCE	LAMBERT X	LAMBERT Y	ZONE	COORDINATE SYSTEM
07/01/1977	01/01/1983		12953	13476							03	2082113	439184	5	01
01/01/1973	07/01/1977		0	0							03	0	0		01

WELL HISTORY

SERIAL	WELL NAME	WELL NUM	ORG ID	FIELD	ST CD	PT	WELL CLASS	EFF DATE	END DATE	STAT DATE
78812	L F BLANCHARD	001	C290	7090	30	00		04/21/2006		04/21/2006
78812	L F BLANCHARD	001	C290	7090	20	20		06/26/2002	04/20/2006	11/28/1984
78812	L F BLANCHARD	001	C259	7090	20	20		07/01/2000	06/25/2002	11/28/1984
78812	L F BLANCHARD	001	2772	7090	20	20		01/01/1997	06/30/2000	11/28/1984
78812	L F BLANCHARD	001	C087	7090	20	20		09/01/1992	01/01/1997	11/28/1984
78812	L F BLANCHARD	001	U011	7090	33	20		05/01/1992	09/01/1992	11/28/1984
78812	L F BLANCHARD	001	U006	7090	33	20		08/01/1990	05/01/1992	11/28/1984
78812	L F BLANCHARD	001	6134	7090	33	20		05/01/1988	08/01/1990	11/28/1984
78812	L F BLANCHARD	001	6134	7090	33	20		10/01/1986	05/01/1988	11/28/1984
78812	SD II RA SUA;L F BLANCHARD	001	6134	7090	33	20		01/01/1986	10/01/1986	11/28/1984
78812	SD II RA SUA;L F BLANCHARD	001	6134	7090	33	20		11/01/1984	01/01/1986	11/28/1984
78812	SD II RA SUA;L F BLANCHARD	001	6134	7090	10	20		01/01/1983	11/01/1984	02/08/1961
78812	SD II RA SUA;L F BLANCHARD	001	6134	7090	10	20		07/01/1977	01/01/1983	02/08/1961
78812	SD II RA SUA; L. F. BLANCHARD	001	6134	7090	10	20		01/01/1973	07/01/1977	01/01/1973

SCOUT INFO

REPORT DATE	WELL STATUS	MEASURED DEPTH	TRUE VERT DEPTH	DETAIL

PERFORATIONS

SERIAL NUM	COMPLETION DATE	UPPER PERF	LOWER PERF	SANDS	RESERVOIR
78812	02/08/1961	13145	13168	SD 2 RA	

WELL TESTS

RPT TYP	TEST DATE	RPT DATE	OIL POT	COND	GAS DEL	WATER	BSW%	FLOW PRES	SHUTIN PRES	CHOKE	UPPER PERF	LOWER PERF	BOT HOLE PRES
DT-1	11/28/1984	03/01/1985		0	0	0		0	0		13145	13168	0
DT-1	11/01/1984	12/01/1984		0	10	90		810	1000	48	13145	13168	0
DT-1	08/01/1984	09/01/1984		0	22	238		850	1000	48	13145	13168	0
DT-1	05/01/1984	06/01/1984		1	100	260		240	1000	48	13145	13168	0
DT-1	02/01/1984	03/01/1984		1	120	259		240	2100	48	13145	13168	0
DT-1	11/01/1983	12/01/1983		3	200	550		880	1100	48	13145	13168	0
DT-1	08/01/1983	09/01/1983		4	500	550		900	2000	48	13145	13168	0
DT-1	05/01/1983	06/01/1983		3	600	546		900	2000	48	13145	13168	0
DT-1	02/01/1983	03/01/1983		3	400	565		1000	1200	48	13145	13168	0
DT-1	11/06/1982	12/01/1982		4	475	550		1000	1975	48	13145	13168	0
DT-1	08/01/1982	09/01/1982		5	800	551		1000	1150	48	13145	13168	0
DT-1	05/01/1982	06/01/1982		5	1000	530		1000	1150	48	13145	13168	0
DT-1	02/01/1982	03/01/1982		5	620	530		1000	1250	48	13145	13168	0
DT-1	11/01/1981	12/01/1981		6	710	682		1000	1300	48	13145	13168	0
DT-1	08/01/1981	09/01/1981		7	900	698		825	900	48	13145	13168	0
DT-1	05/01/1981	06/01/1981		5	900	695		1000	1200	48	13145	13168	0
DT-1	02/01/1981	03/01/1981		13	1100	716		1000	1300	48	13145	13168	0
DT-1	11/04/1980	12/01/1980		10	1225	745		1000	1300	48	13145	13168	0
DT-1	08/01/1980	09/01/1980		4	1420	745		1000	1300	48	13145	13168	0
DT-1	05/01/1980	06/01/1980		4	1300	744		900	1500	48	13145	13168	0
DT-1	02/01/1980	03/01/1980		20	1350	821		1000	1250	48	13145	13168	0
DT-1	11/01/1979	12/01/1979		21	1500	756		1000	2800	48	13145	13168	0
DT-1	08/01/1979	09/01/1979		30	1600	0		1000	3100	48	13145	13168	0
DT-1	05/01/1979	06/01/1979		25	1776	1945		950	2500	48	13145	13168	0
DT-1	02/04/1979	03/01/1979		20	2000	976		1050	3400	48	13145	13168	0

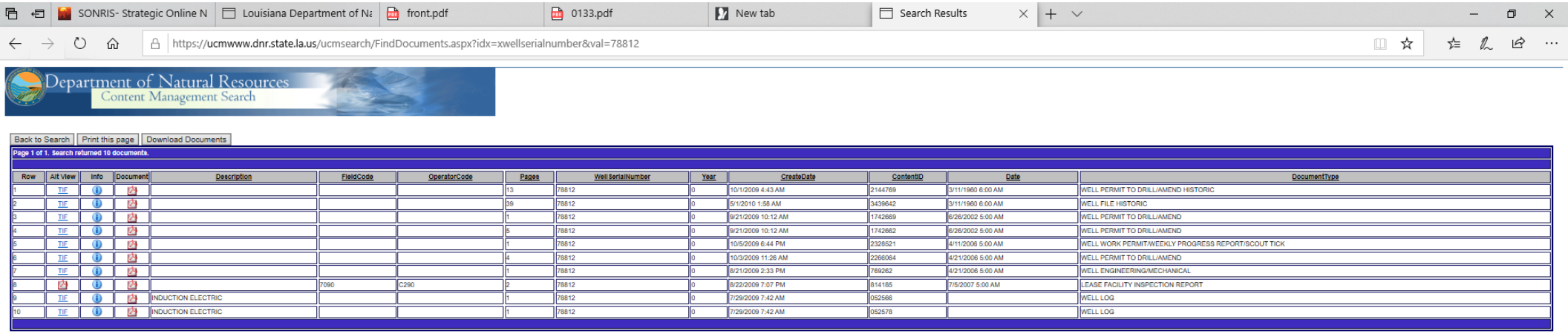
WELL ALLOWABLES

EFFECTIVE DATE	END DATE	LUW CODE	LUW TYPE CODE	ALLOWABLE	ESTIMATED POTENTIAL	CURRENT ALLOWABLE TYPE
09/21/1992	09/30/1992	078812	3	0		3
10/01/1985	12/31/1985	600832	2	0		3
04/01/1985	06/30/1985	600832	2	0		3
10/01/1984	12/31/1984	600832	2	50		3

From here, you can review DNR well history Data such as production volumes, LUW, etc.

These data can also be copied into spreadsheet to Make production plots, etc.

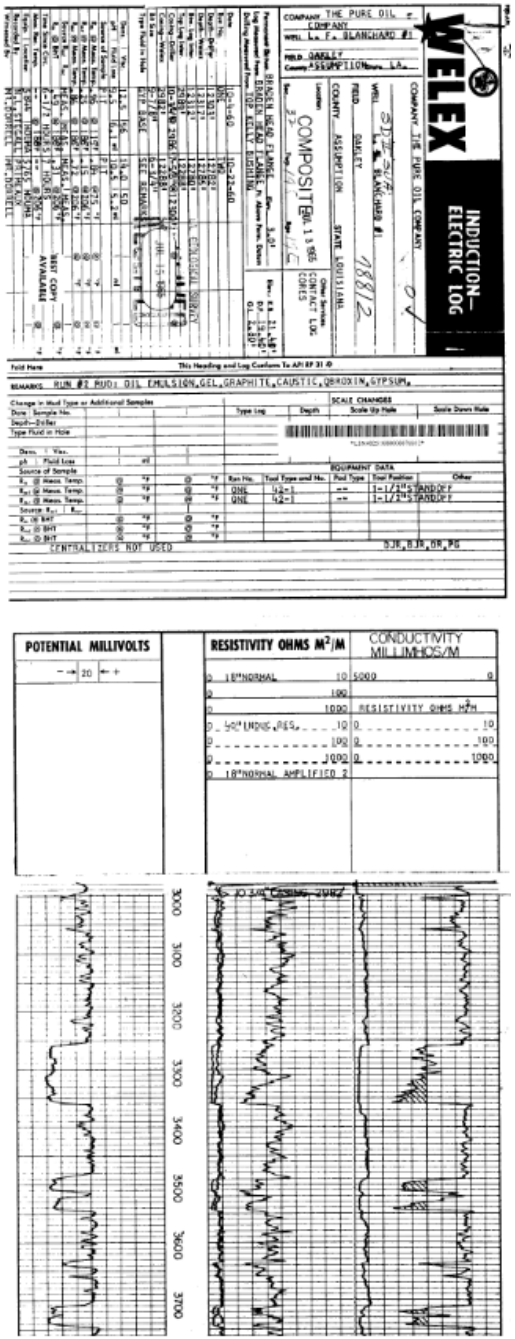
SONRIS Well Documents Interface



Row	Alt View	Info	Document	Description	FieldCode	OperatorCode	Pages	WellSerialNumber	Year	CreateDate	ContentID	Date	DocumentType
1	TIF						13	78812	0	10/1/2009 4:43 AM	2144769	3/11/1960 6:00 AM	WELL PERMIT TO DRILL/AMEND HISTORIC
2	TIF						39	78812	0	5/1/2010 1:58 AM	3439642	3/11/1960 6:00 AM	WELL FILE HISTORIC
3	TIF						1	78812	0	9/21/2009 10:12 AM	1742669	6/26/2002 5:00 AM	WELL PERMIT TO DRILL/AMEND
4	TIF						5	78812	0	9/21/2009 10:12 AM	1742662	6/26/2002 5:00 AM	WELL PERMIT TO DRILL/AMEND
5	TIF						1	78812	0	10/5/2009 6:44 PM	2328521	4/11/2006 5:00 AM	WELL WORK PERMIT/WEEKLY PROGRESS REPORT/SCOUT TICK
6	TIF						4	78812	0	10/3/2009 11:26 AM	2266064	4/21/2006 5:00 AM	WELL PERMIT TO DRILL/AMEND
7	TIF						1	78812	0	8/21/2009 2:33 PM	769262	4/21/2006 5:00 AM	WELL ENGINEERING/MECHANICAL
8					7090	C290	2	78812	0	8/22/2009 7:07 PM	814185	7/5/2007 5:00 AM	LEASE FACILITY INSPECTION REPORT
9	TIF			INDUCTION ELECTRIC			1	78812	0	7/29/2009 7:42 AM	052566		WELL LOG
10	TIF			INDUCTION ELECTRIC			1	78812	0	7/29/2009 7:42 AM	052578		WELL LOG

This is the point where you can check out the well file information…..
Directional or not, location plat, completion zones, etc.

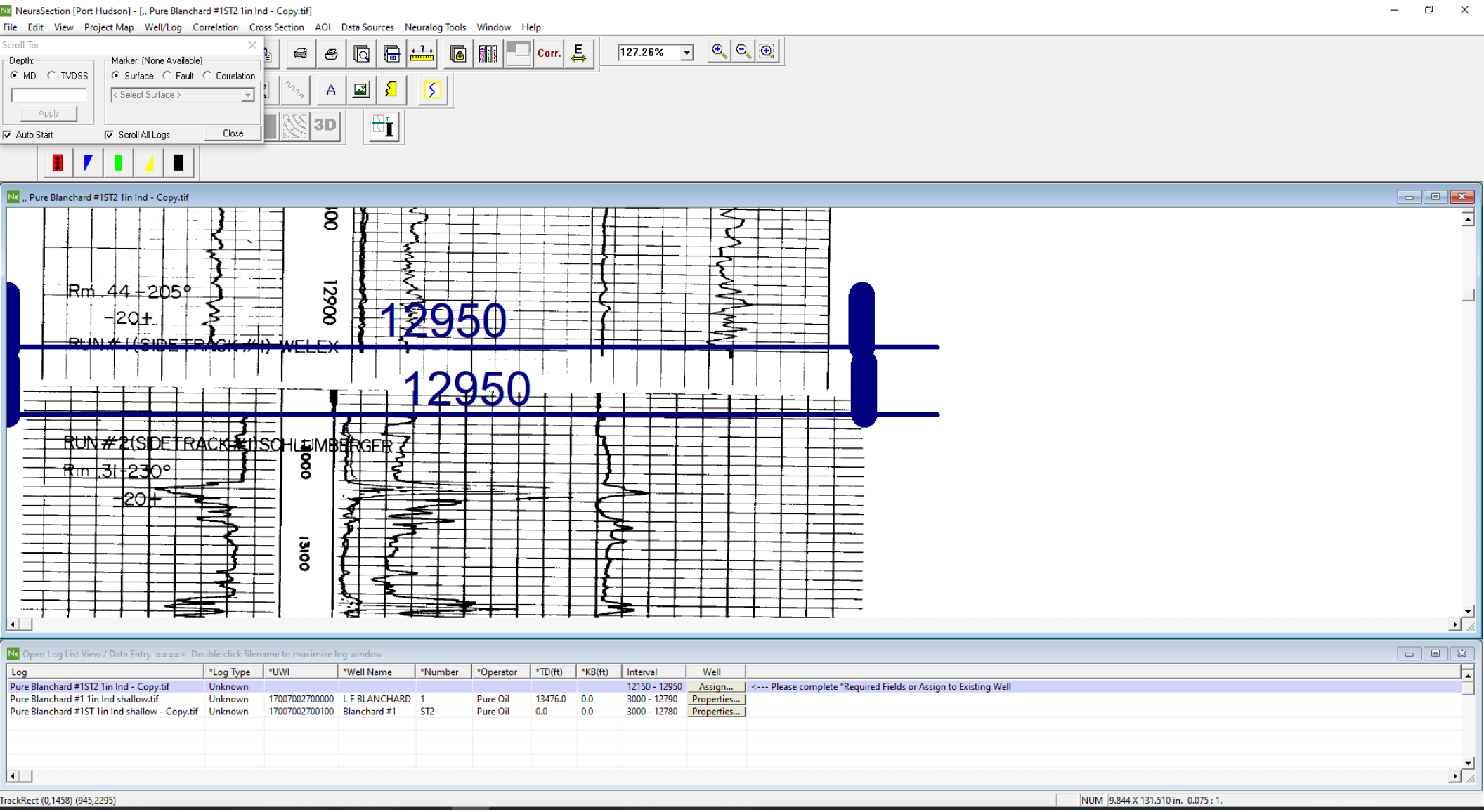
SONRIS Downloaded Log Image



At this point, save the file to
A specified directory that you
Have organized.

It is from this file location that you will put it into the cross section program.

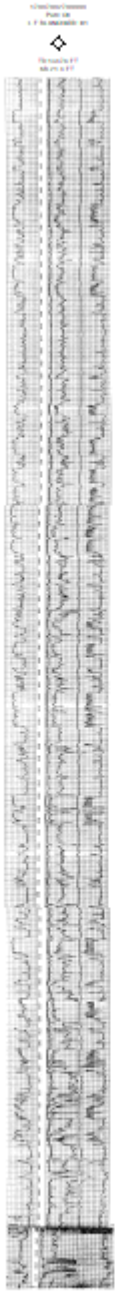
Depth Registering of Log Images in NeuraSection……..very easy and useful



Working with ST holes requires additional care……

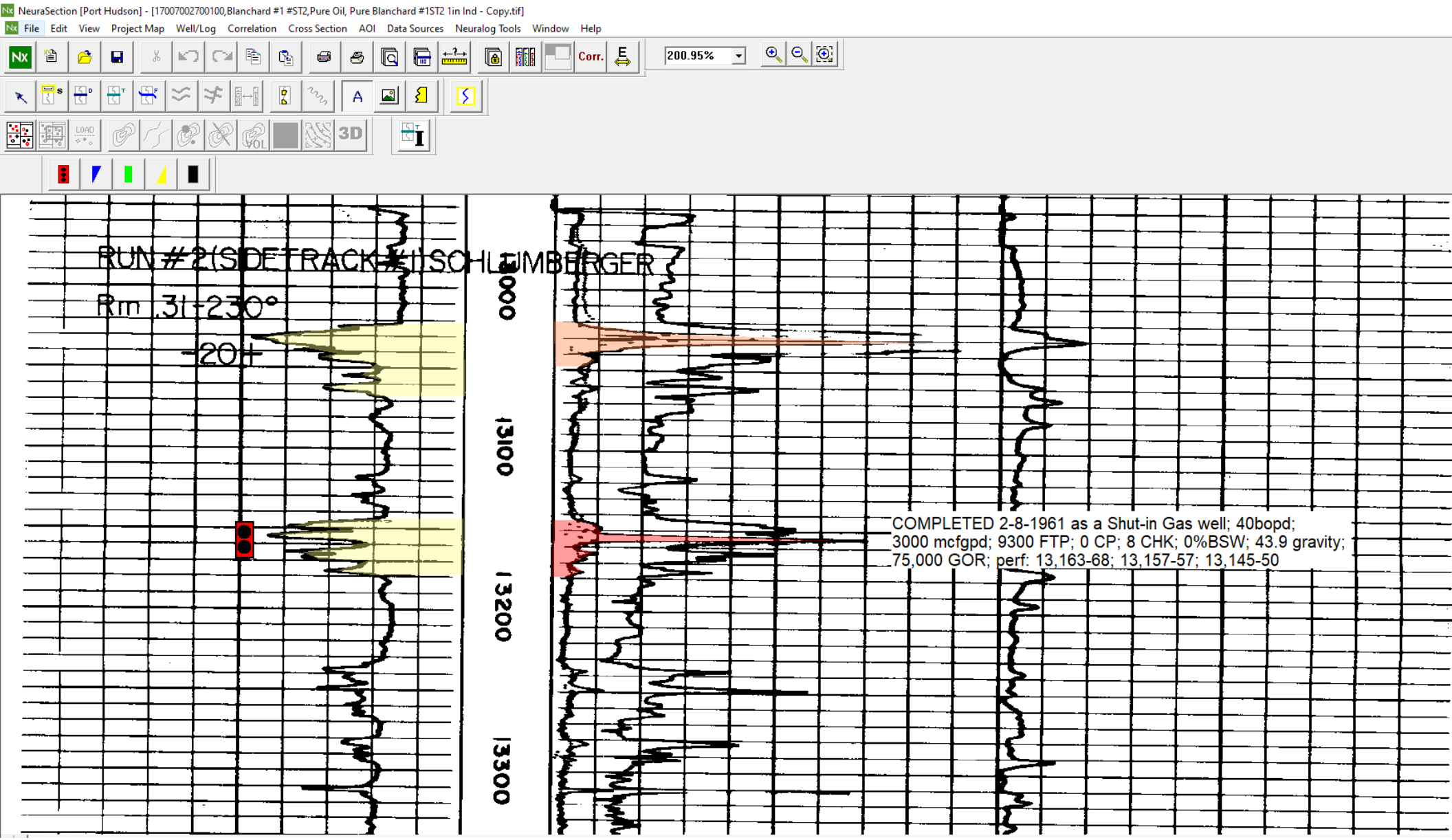
One issue is that the State of LA assigns same API to
The original and sidetracked holes, so it is necessary
To create a new borehole, and name the well similar to
BOEM's API criteria with a new API # and same SHL, but
with directional control to define the BHL.

OH



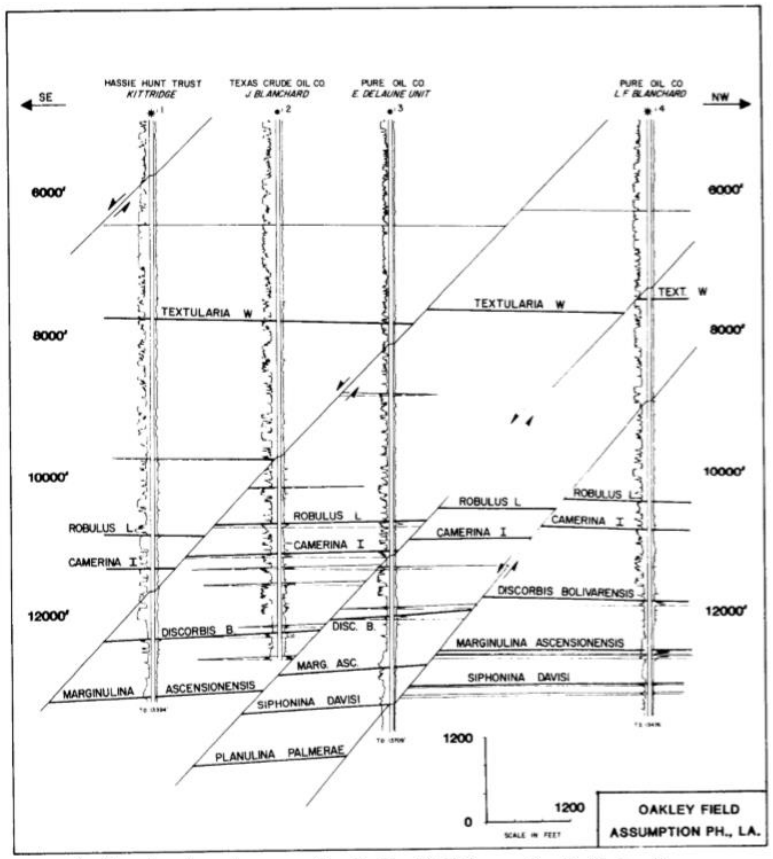
STH

Well Log Detail - NeuraSection

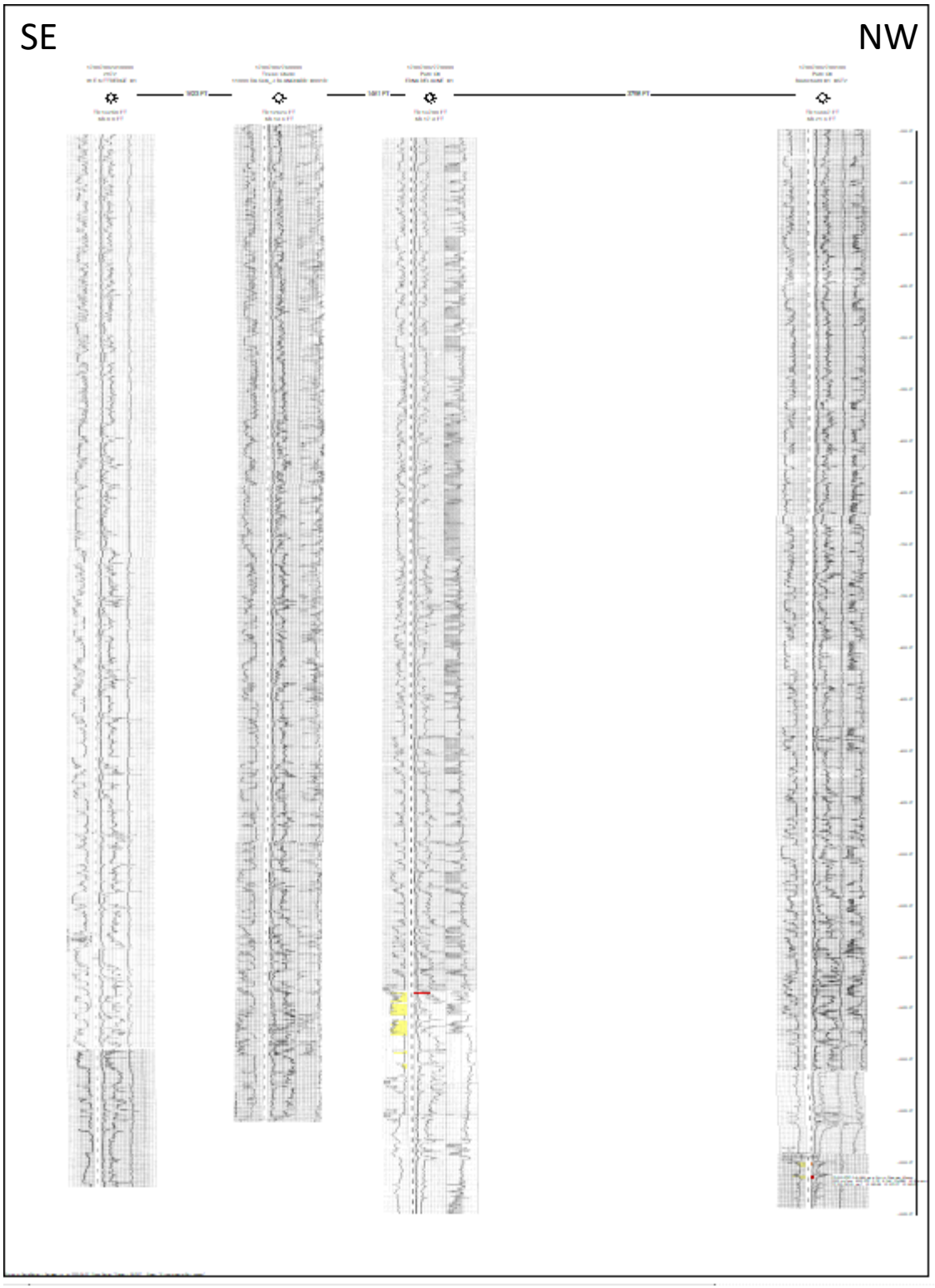


Repeat the process as needed to bring in additional wells.

Suggest starting a new field by mimicking the NOGS section line and then adding the tops and faults as labeled in the study to help ensure consistent field nomenclature.



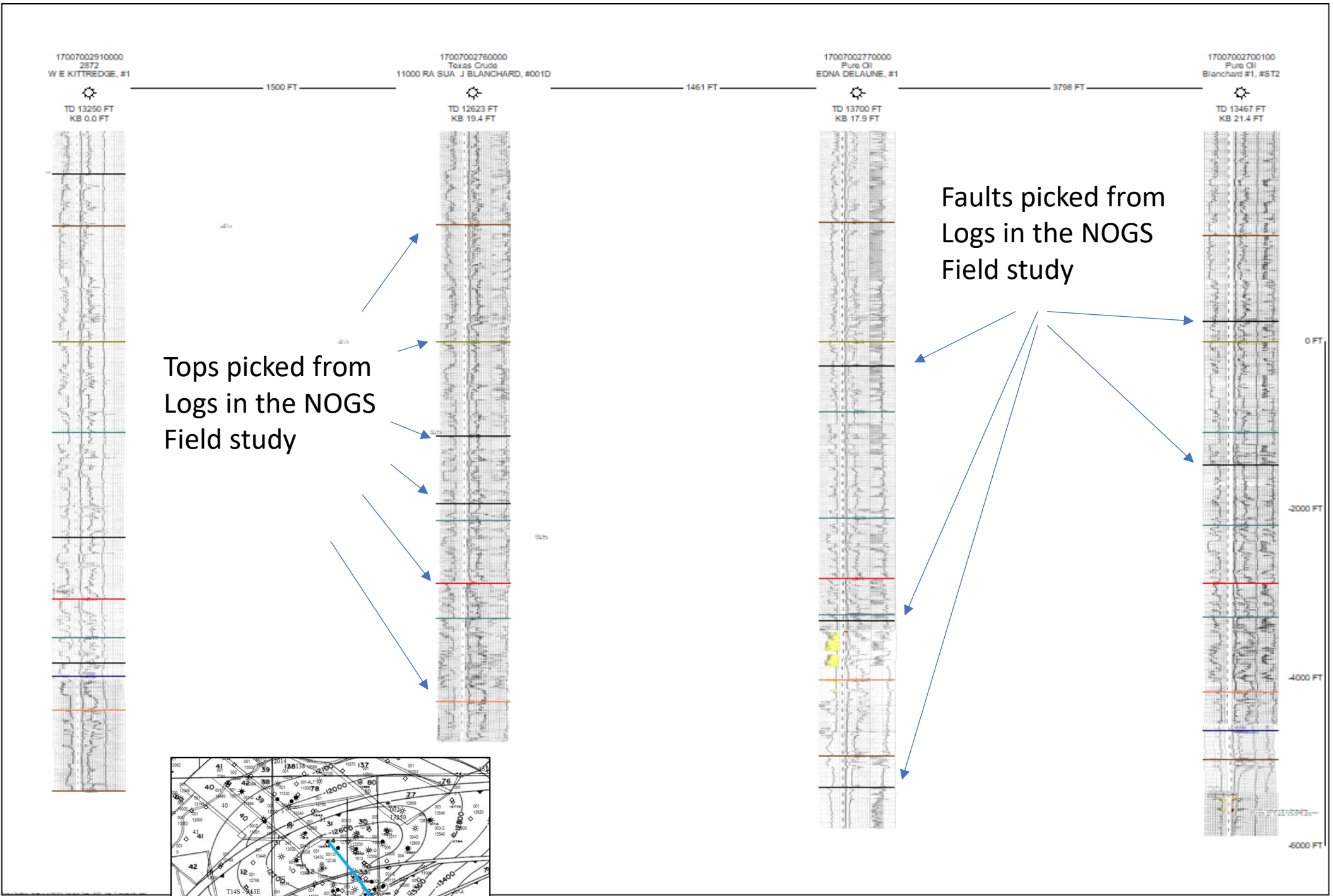
Southeast-northwest cross section, Oakley Field, Assumption Parish, Louisiana



SE

Oakley Cross Section – Tops and Fault Selection

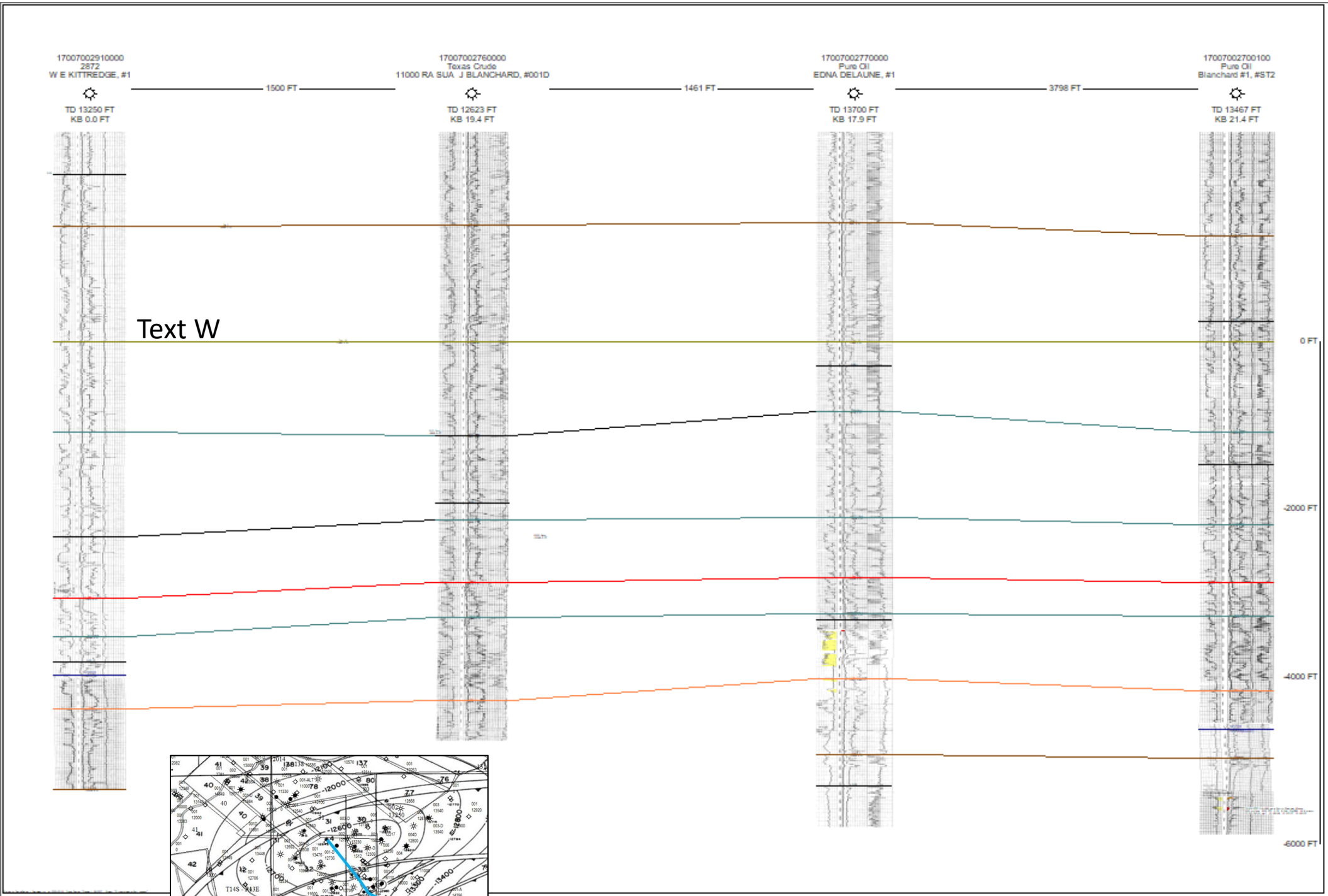
NW



SE

Oakley Cross Section – Stratigraphic Cross Section Datum = Text W

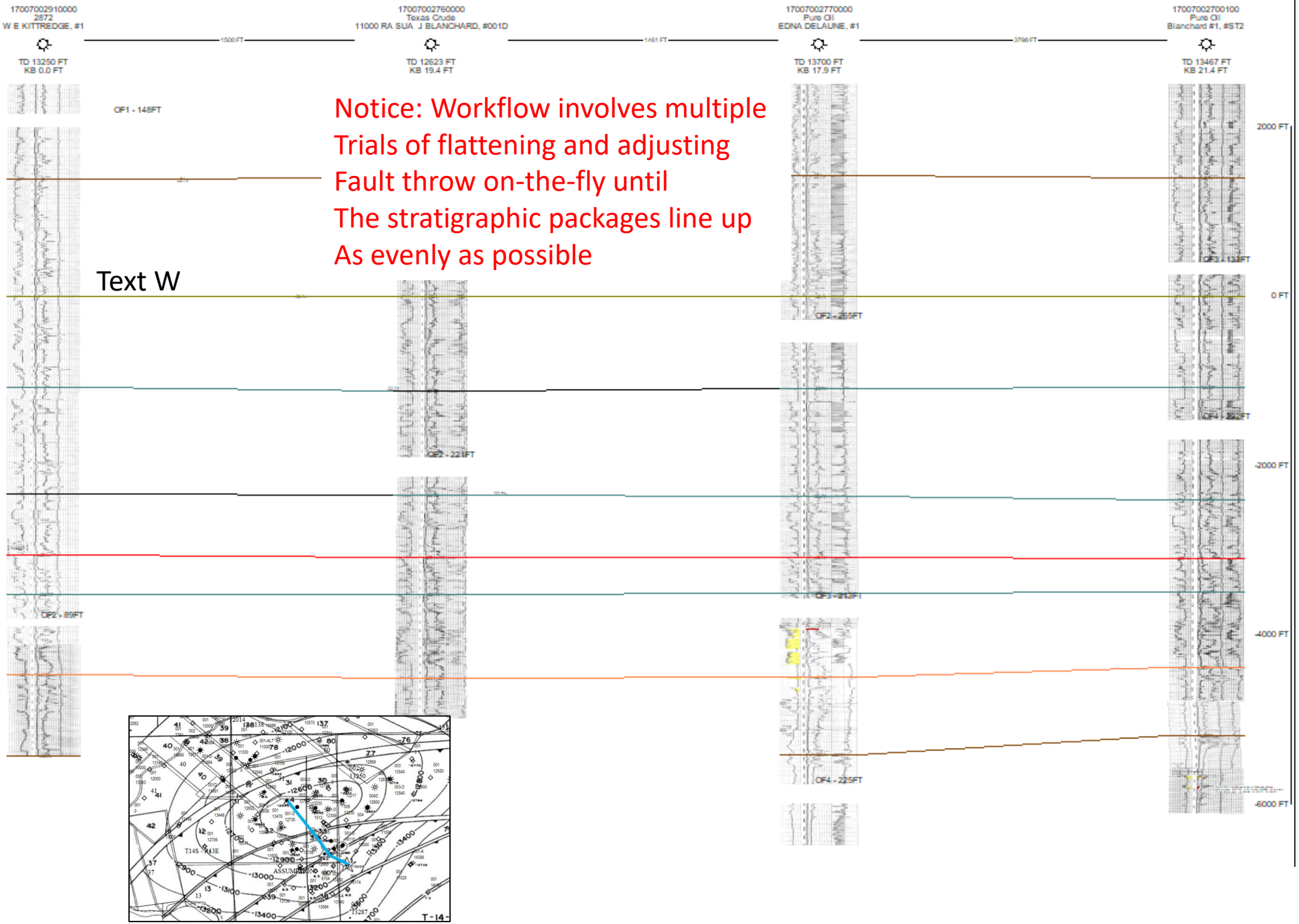
NW



SE

Oakley Cross Section – Stratigraphic Cross Section Datum = Text W, With Missing Section

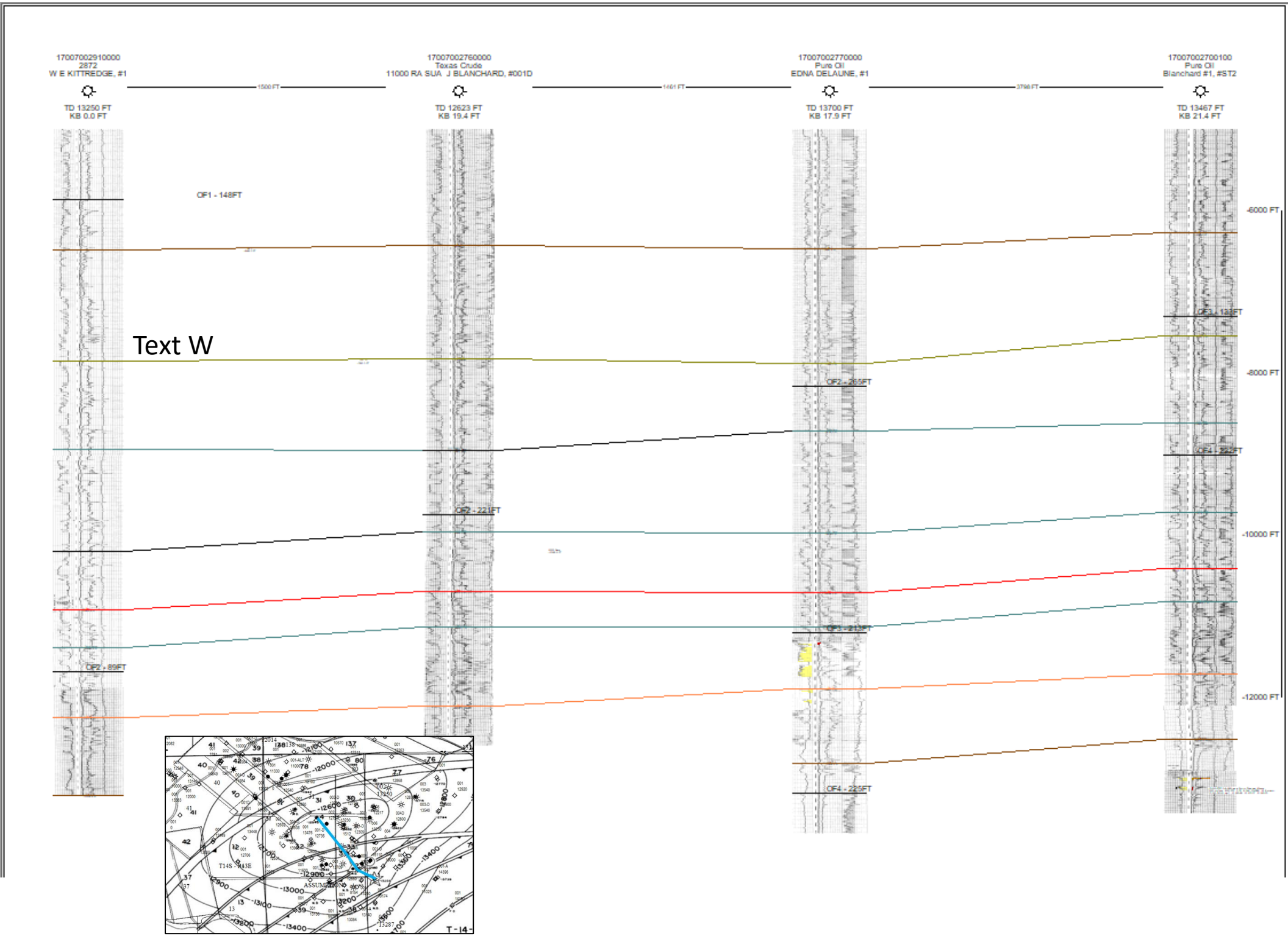
NW



Oakley Cross Section – Structural Cross Section

SE

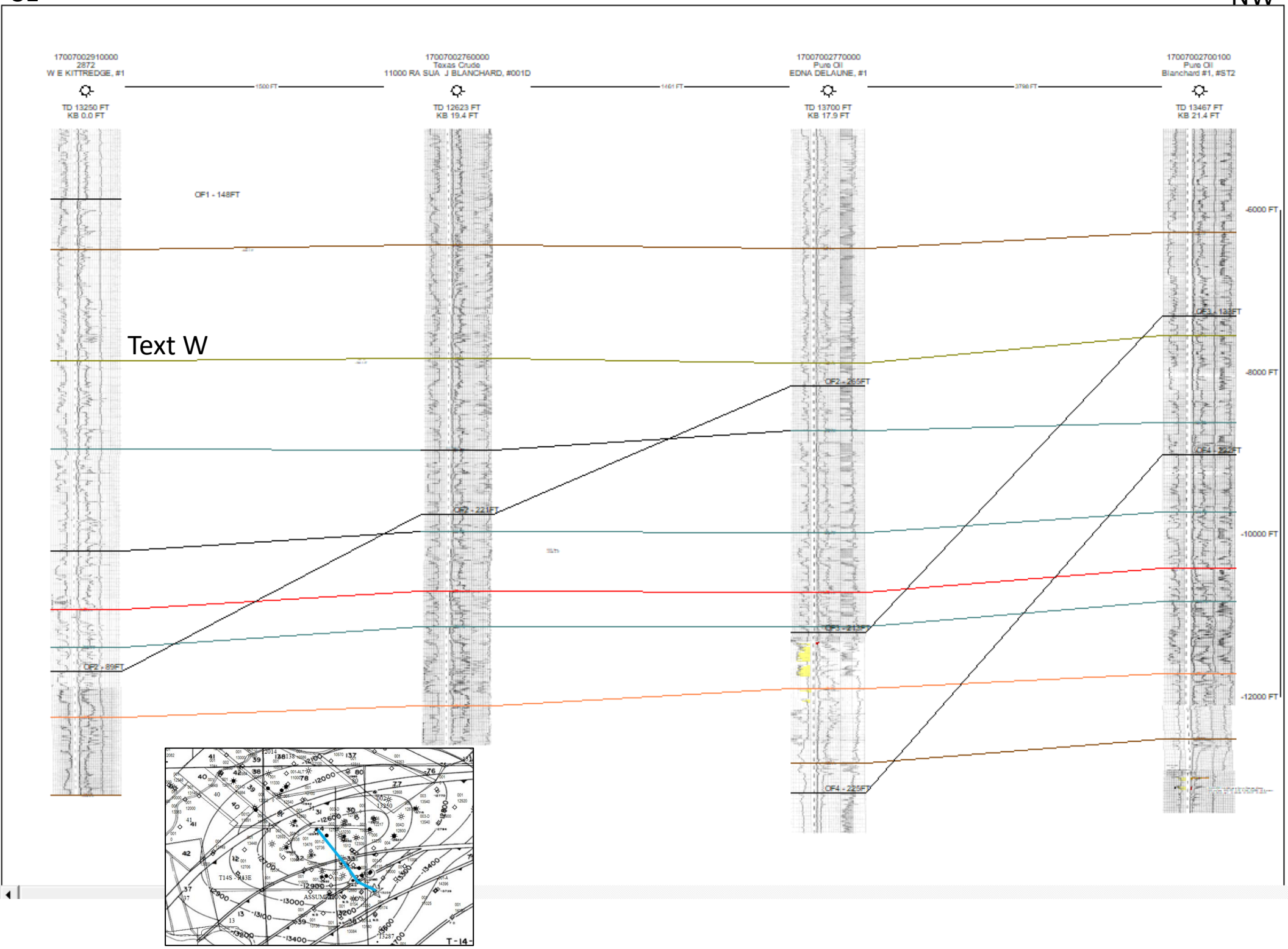
NW



Oakley Cross Section – Structural Cross Section

SE

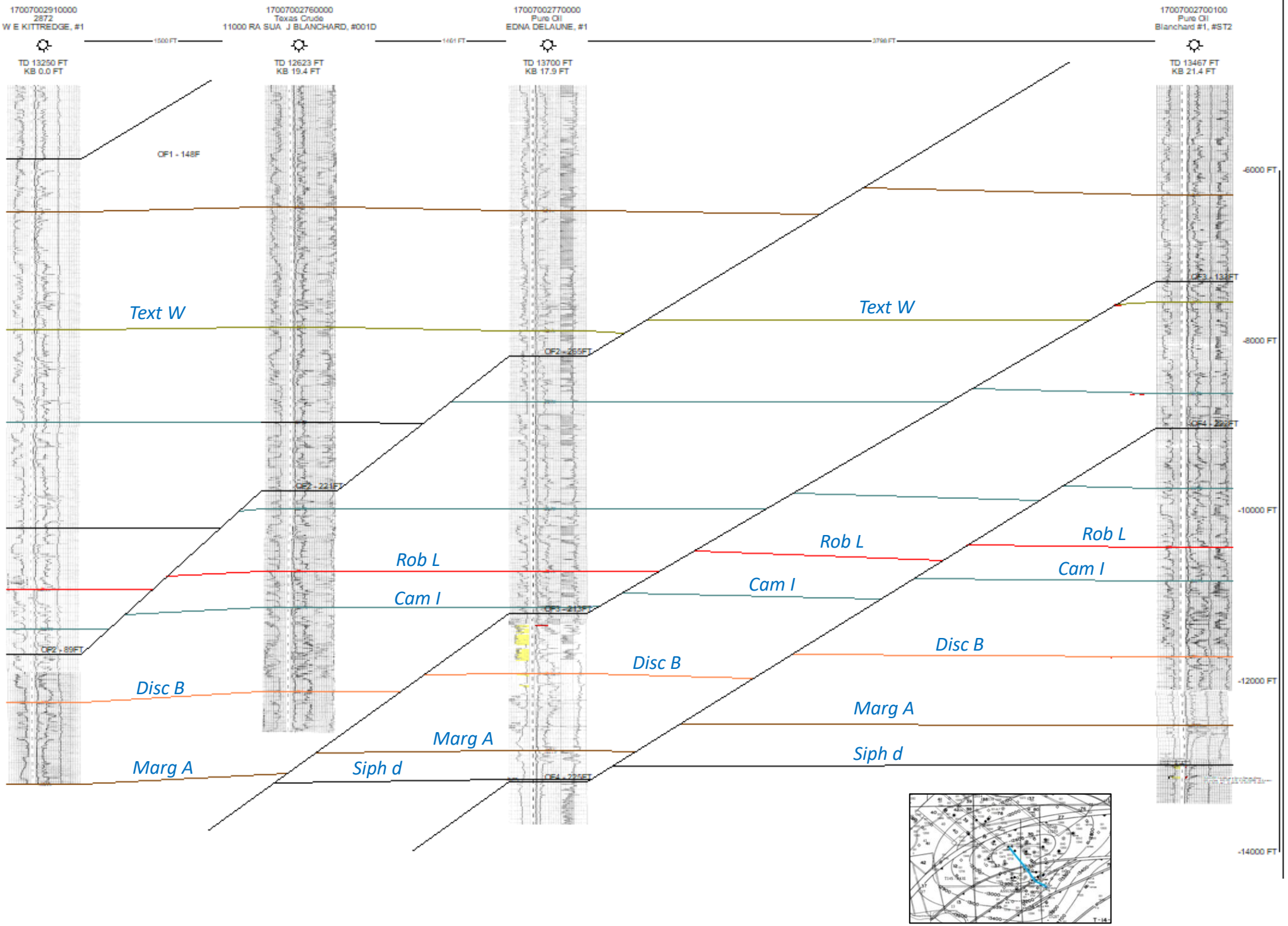
NW

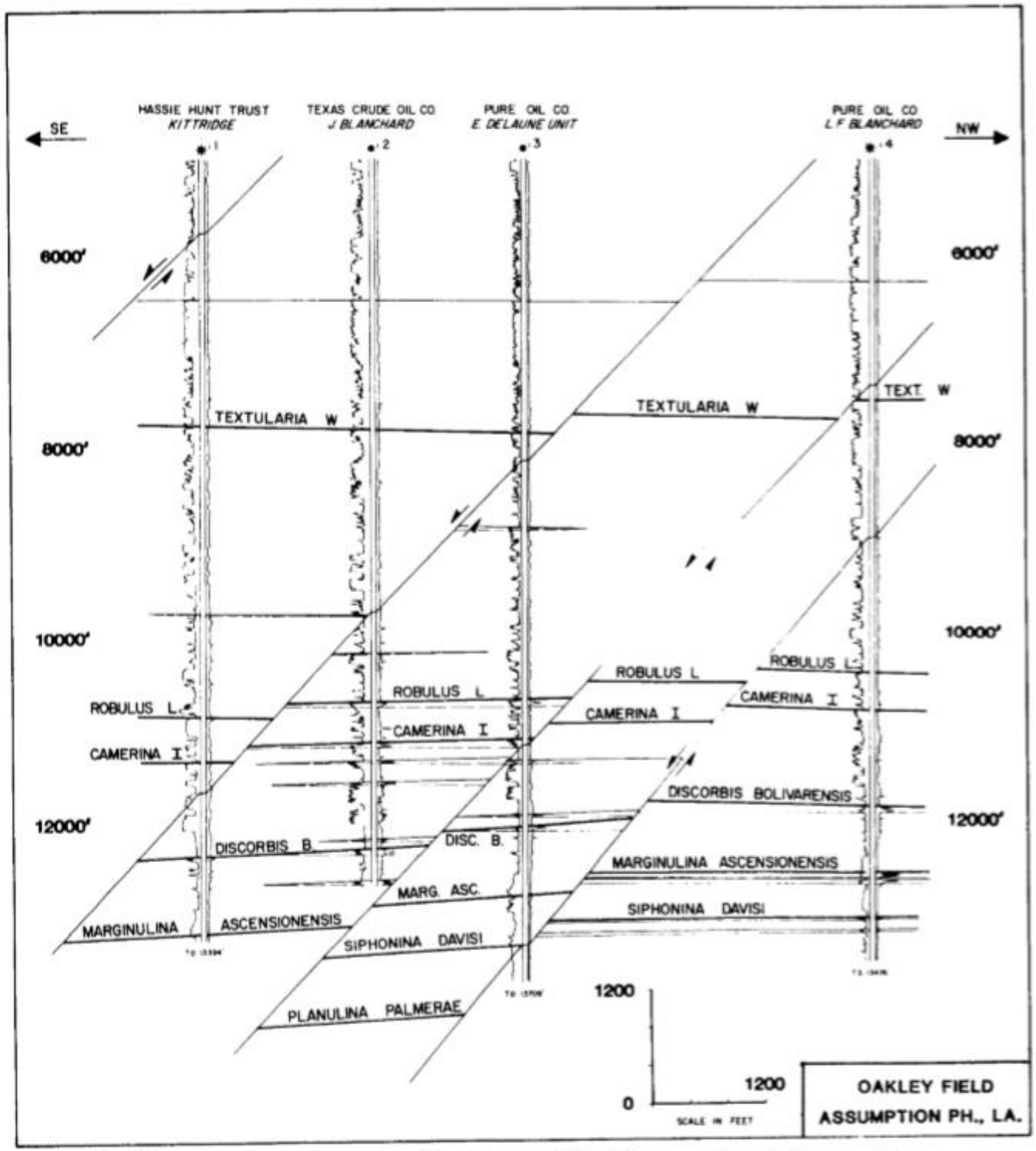


SE

Oakley Field Cross Section – Balanced and Geo-proportional

NW

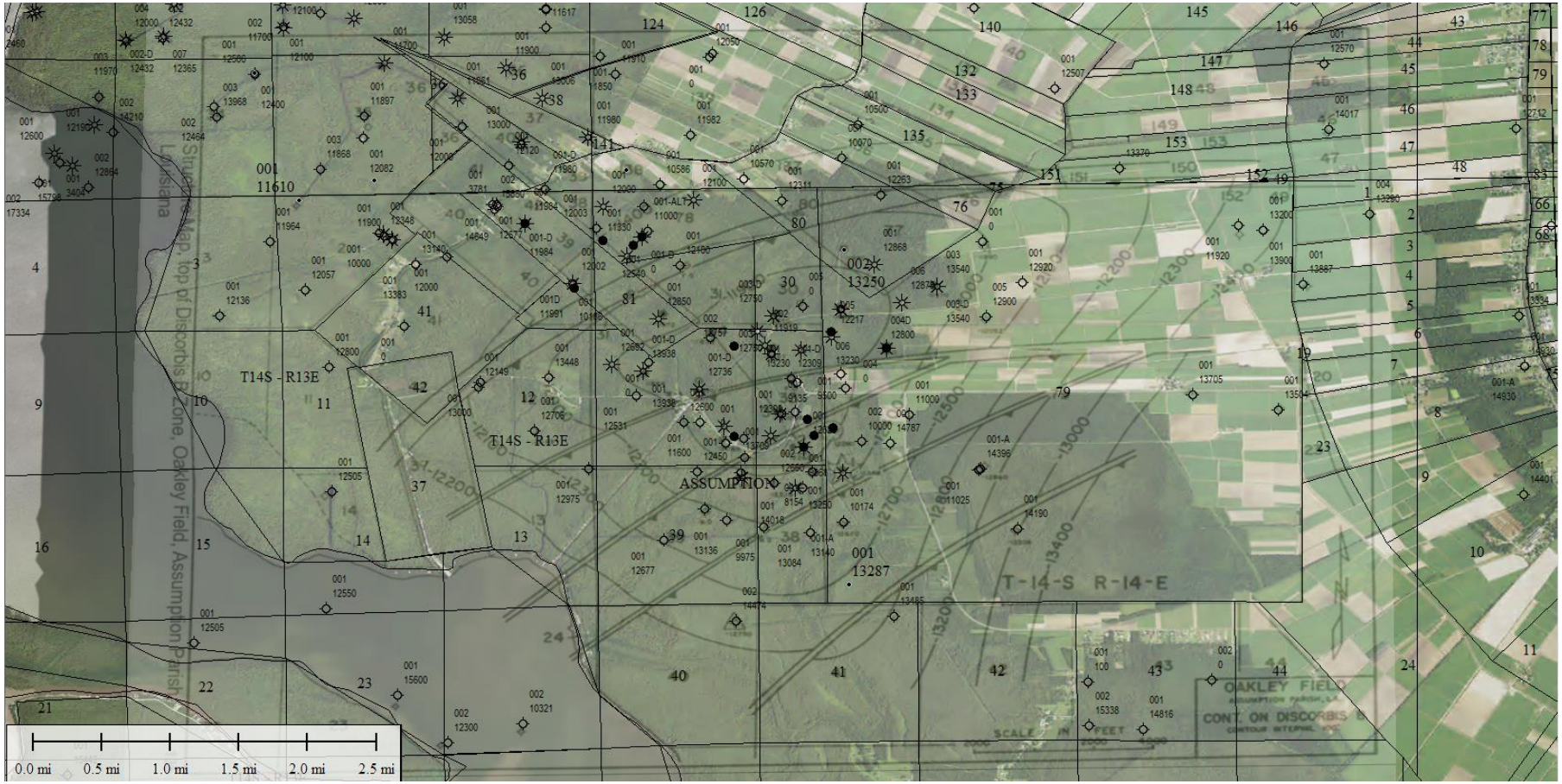




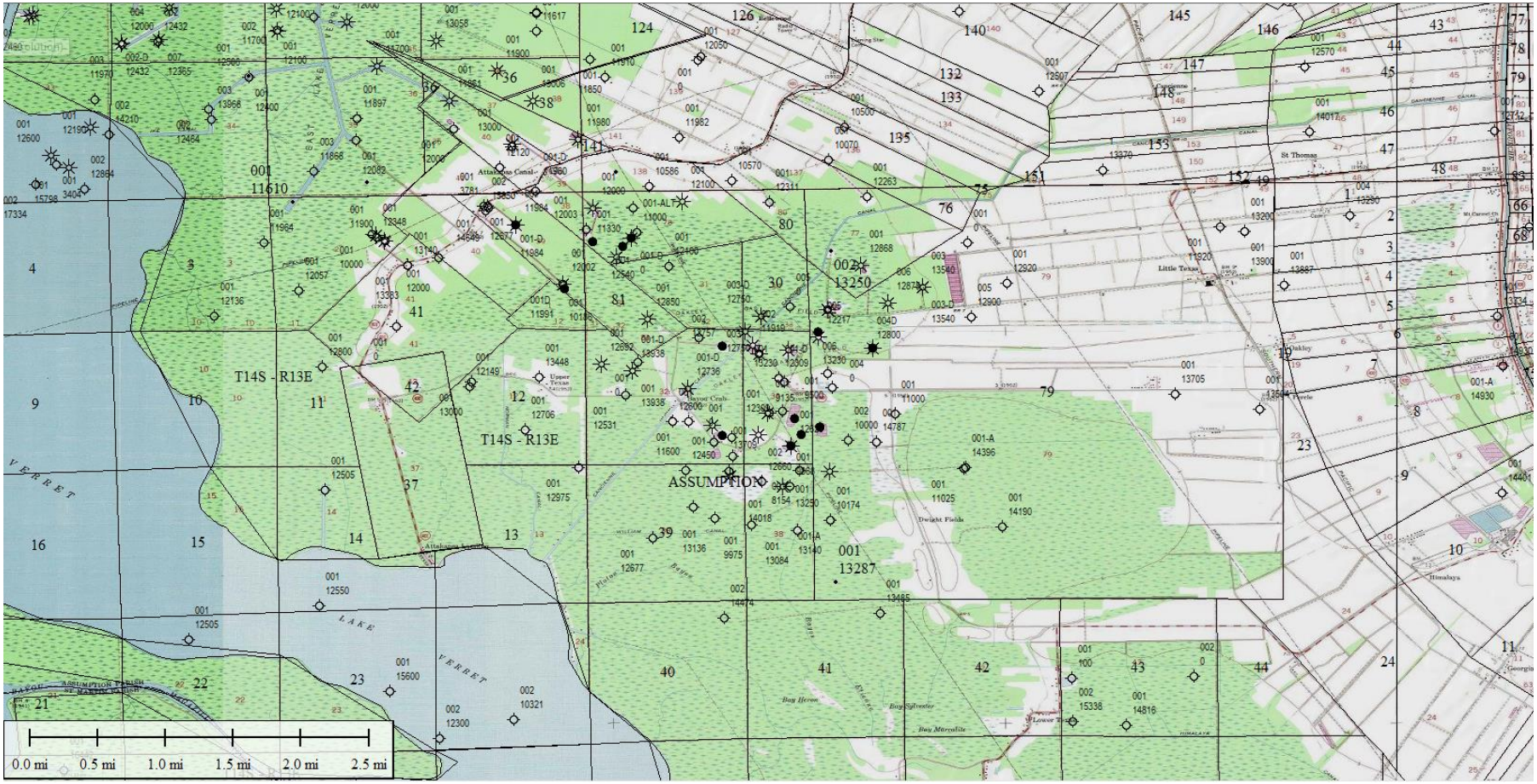
Southeast-northwest cross section, Oakley Field, Assumption Parish, Louisiana

Base Map – With Land Imagery

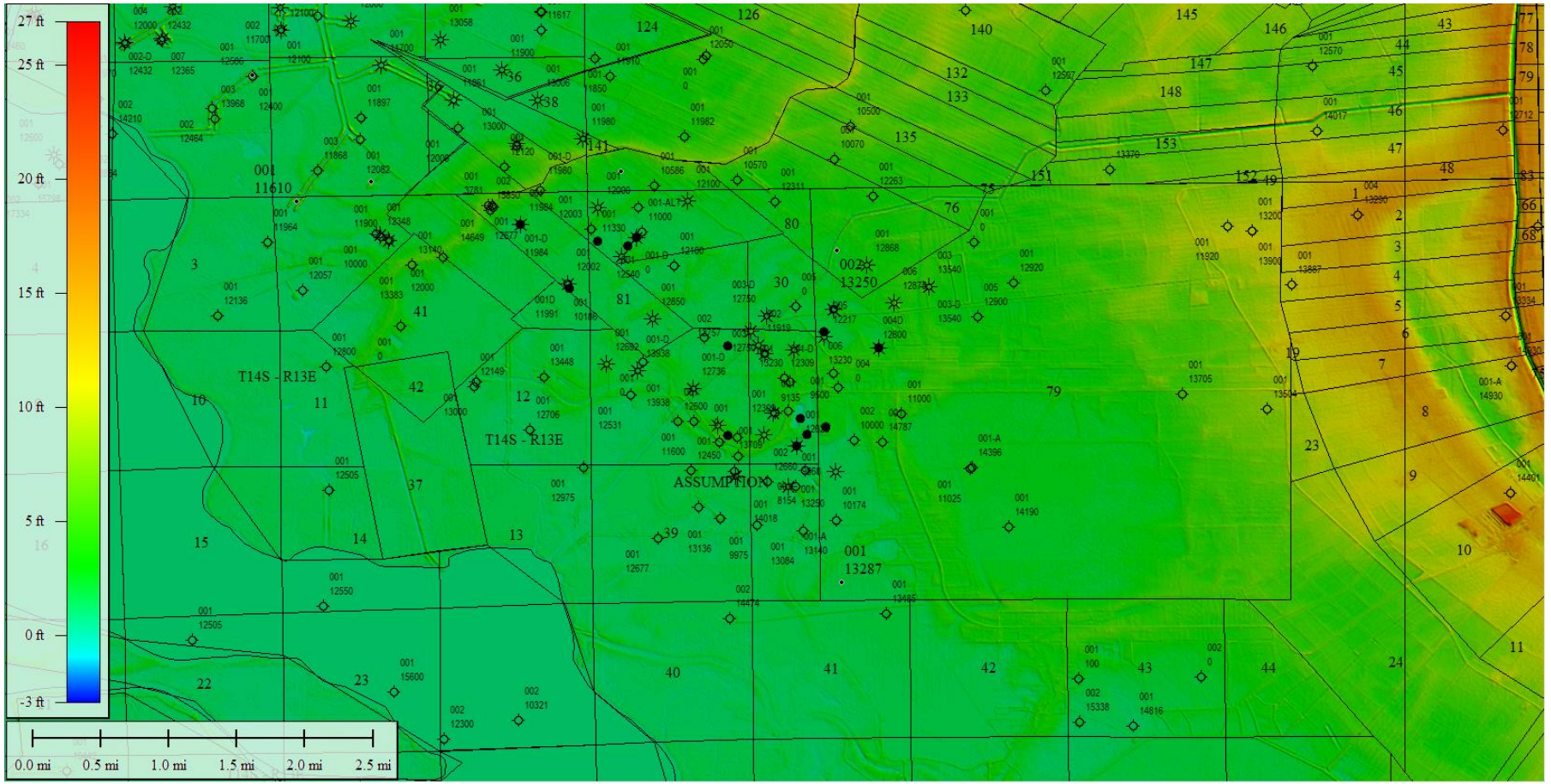
Base Map – With Land Imagery and structure map transparency



Base Map – With USGS Topo Map



Base Map – With Elevation Data



Outline

Why strive for a paperless office?

Introduction to the NOGS Publications DVD Sets

Field Study Example
- Techniques for “modernization” of the subsurface data
- Integration / Links to SONRIS public information
- Building a quick GIS basemap
- Downloding Log Images to a project database
- Using publicly available well log data to do subsurface work

Geology of Greater New Orleans
- Overview of Selected Maps
- GIS Integration of some study figures

NOGS CD Availability

GEOLOGY OF GREATER NEW ORLEANS:

Its Relationship to Land Subsidence and Flooding

J. O. Snowden
W. C. Ward
J. R. J. Studlick

With a Geologic Walking Tour of Downtown
New Orleans
by
L. E. Rieg

PUBLISHED BY:

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James A. Seglund, President-Elect

February 1980

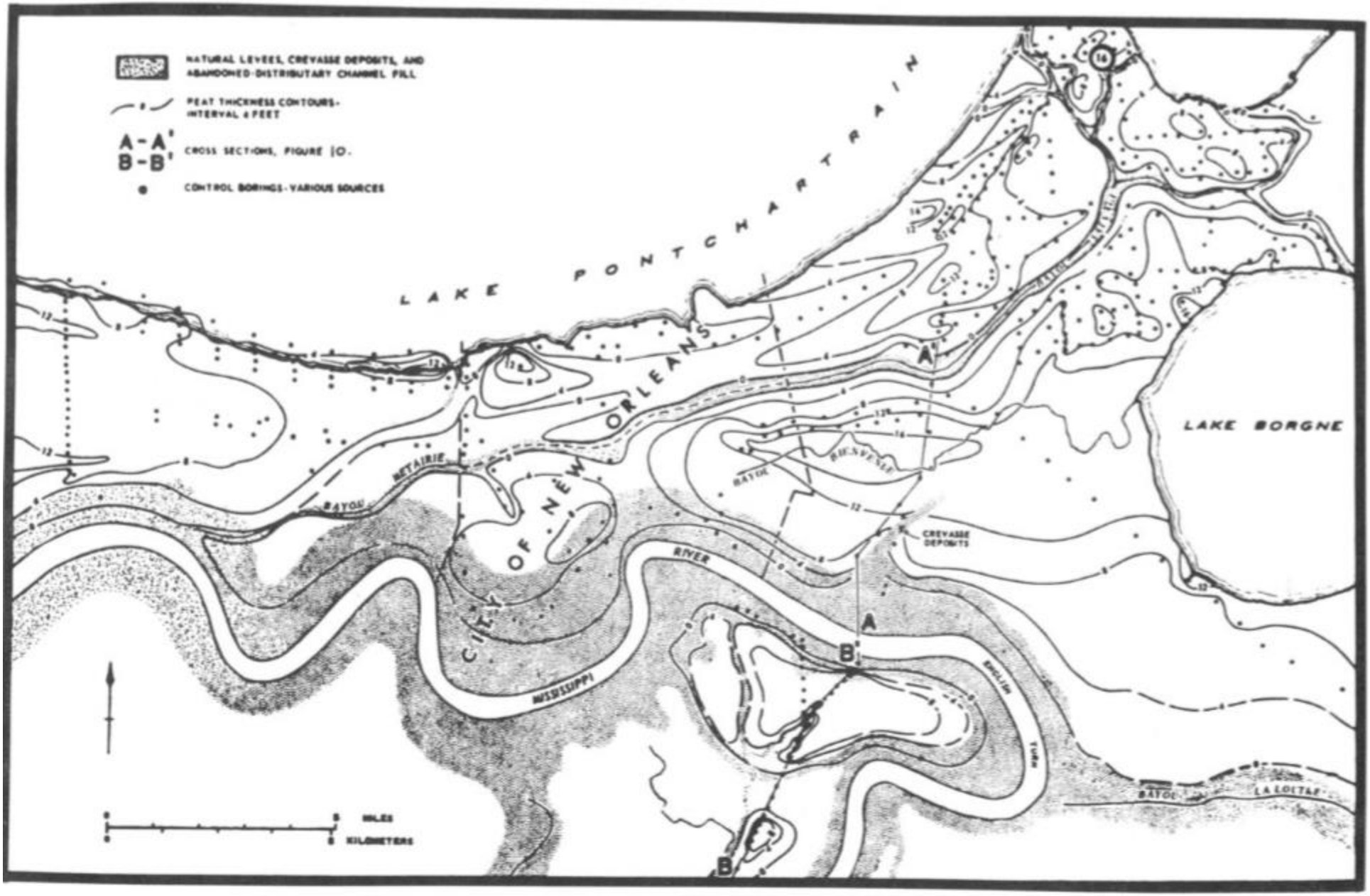


FIGURE 9 — *Distribution and thickness of peat deposits in the vicinity of New Orleans (from Fisk, 1960).*

Stratigraphic Relationship of Peat Deposits

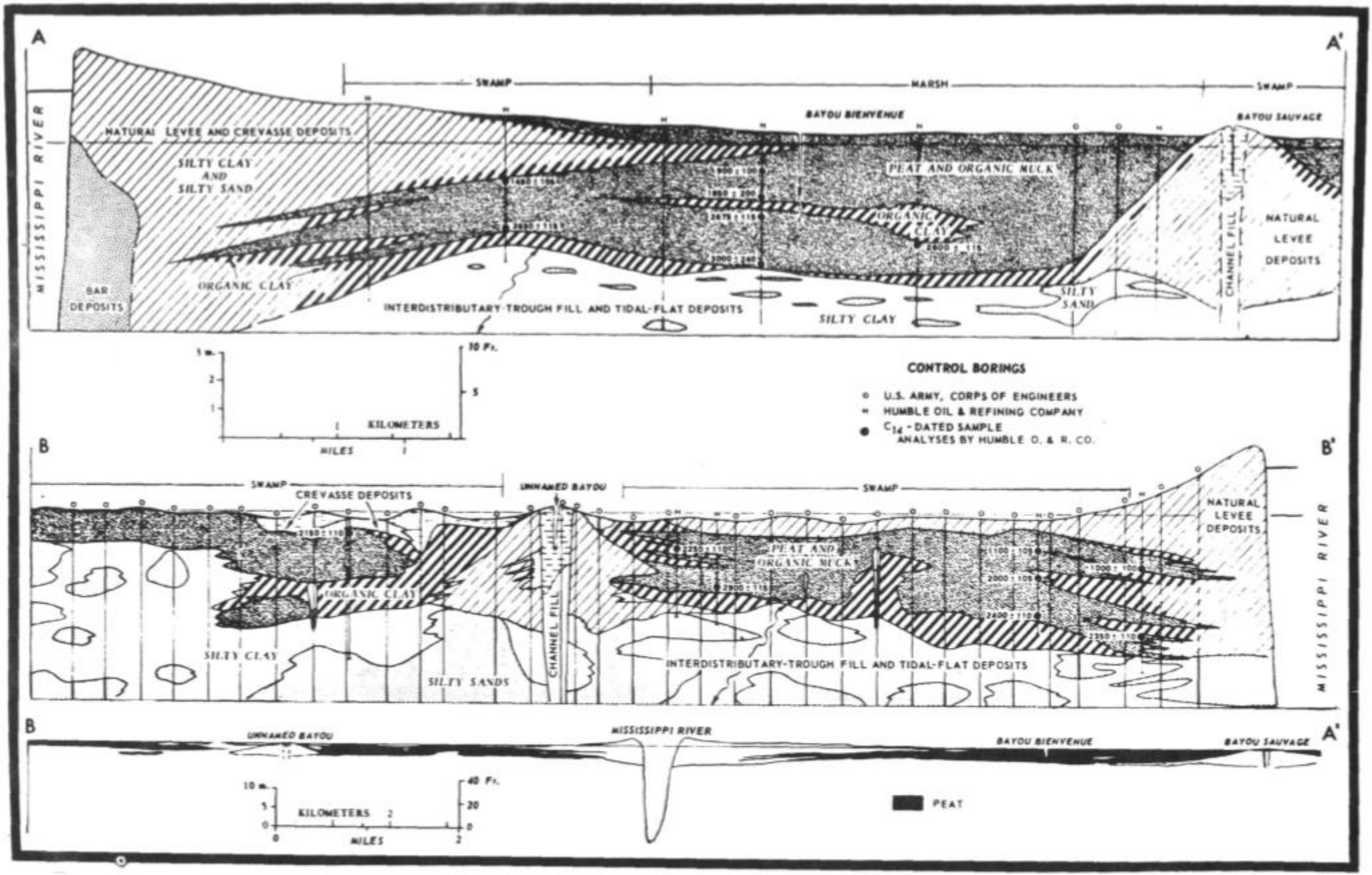


FIGURE 10 — Stratigraphic relationships and radiocarbon ages of peat deposits in the vicinity of New Orleans. Locations of the cross-sections are shown in Figure 9 (from Fisk, 1960).

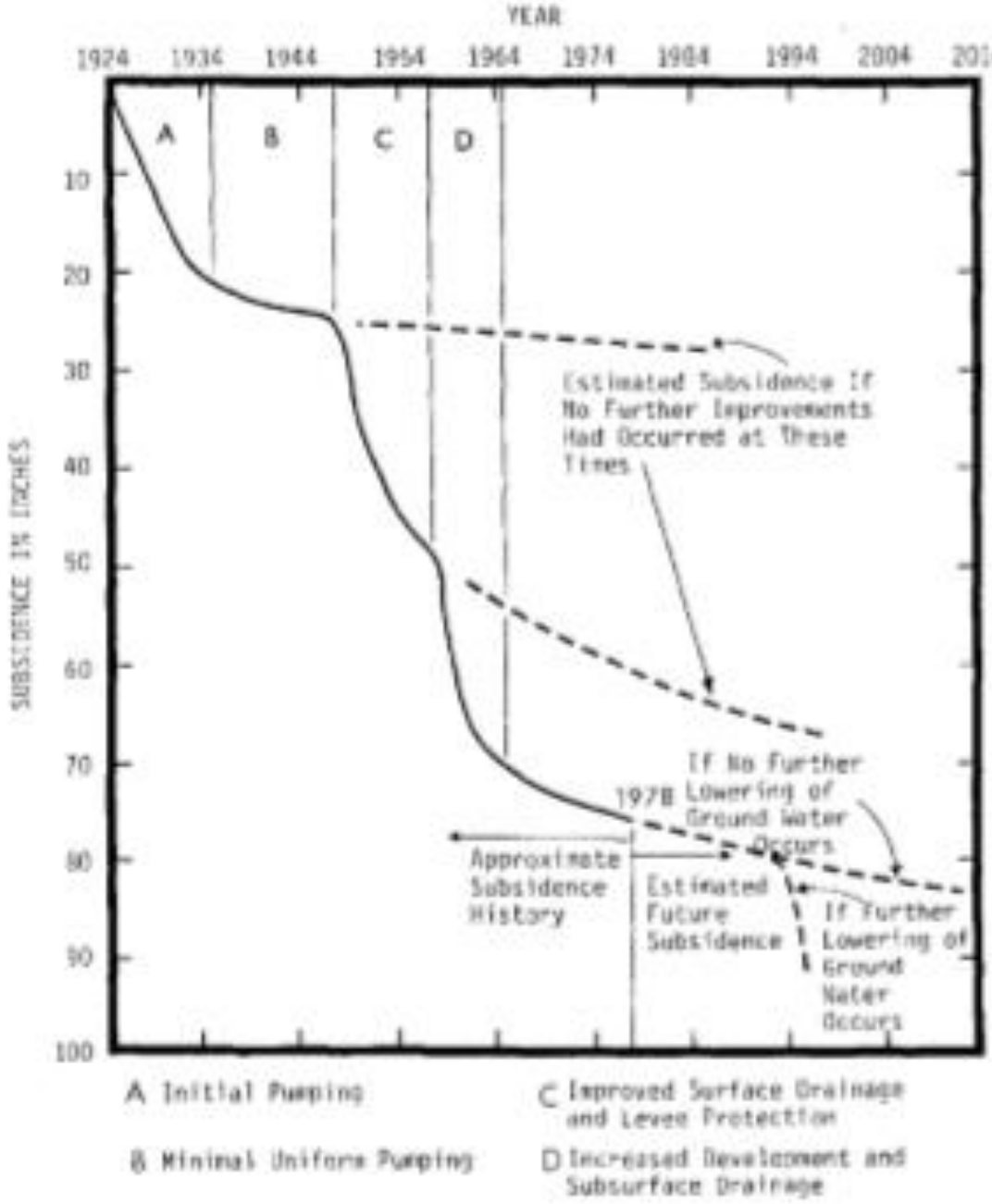
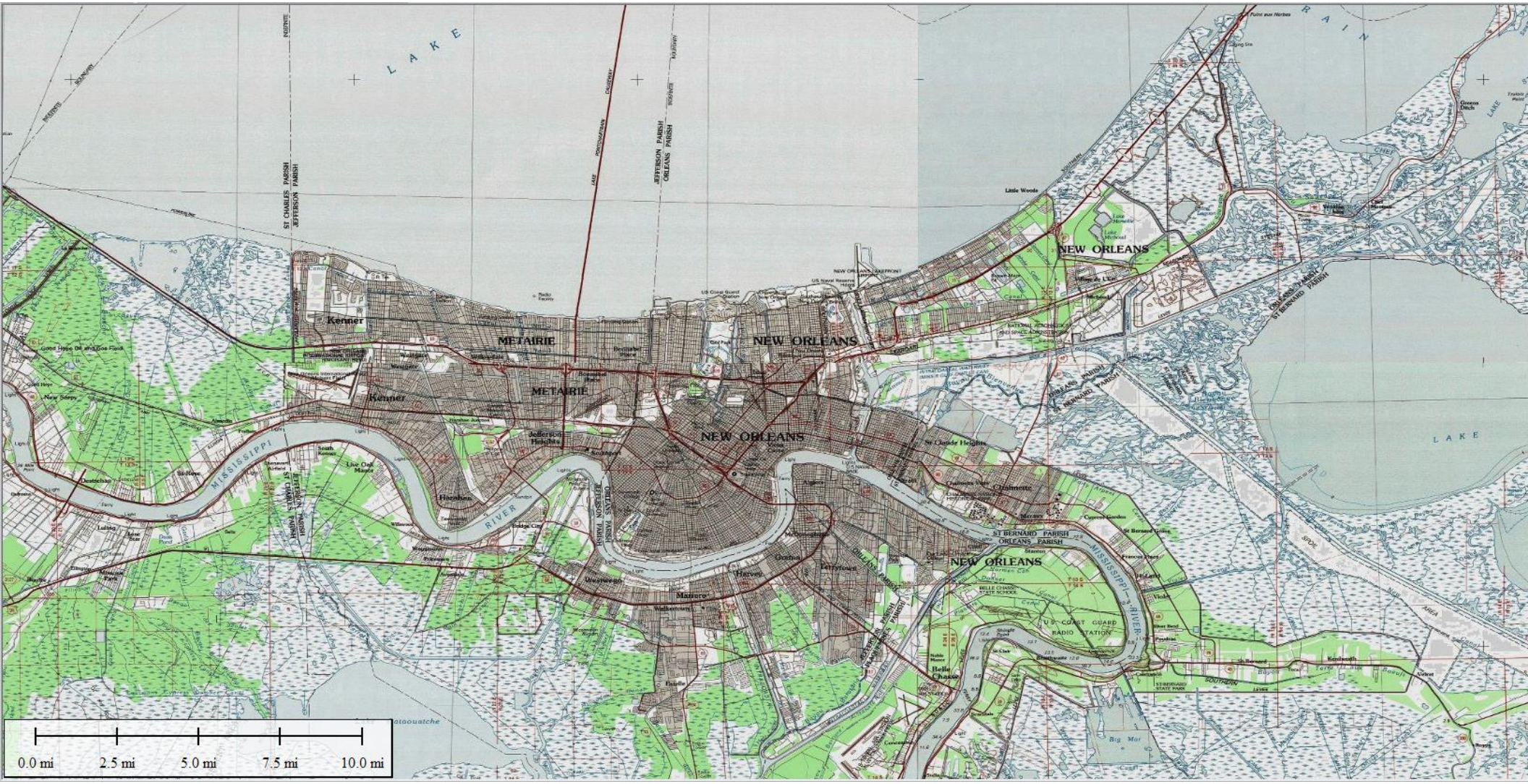


FIGURE 14 – Approximate subsidence history and estimated future subsidence for Kenner, Louisiana, north of Interstate 10. Normalized for peat thickness of 8 feet (from Traughber, Snowden, and Simmons, 1978).

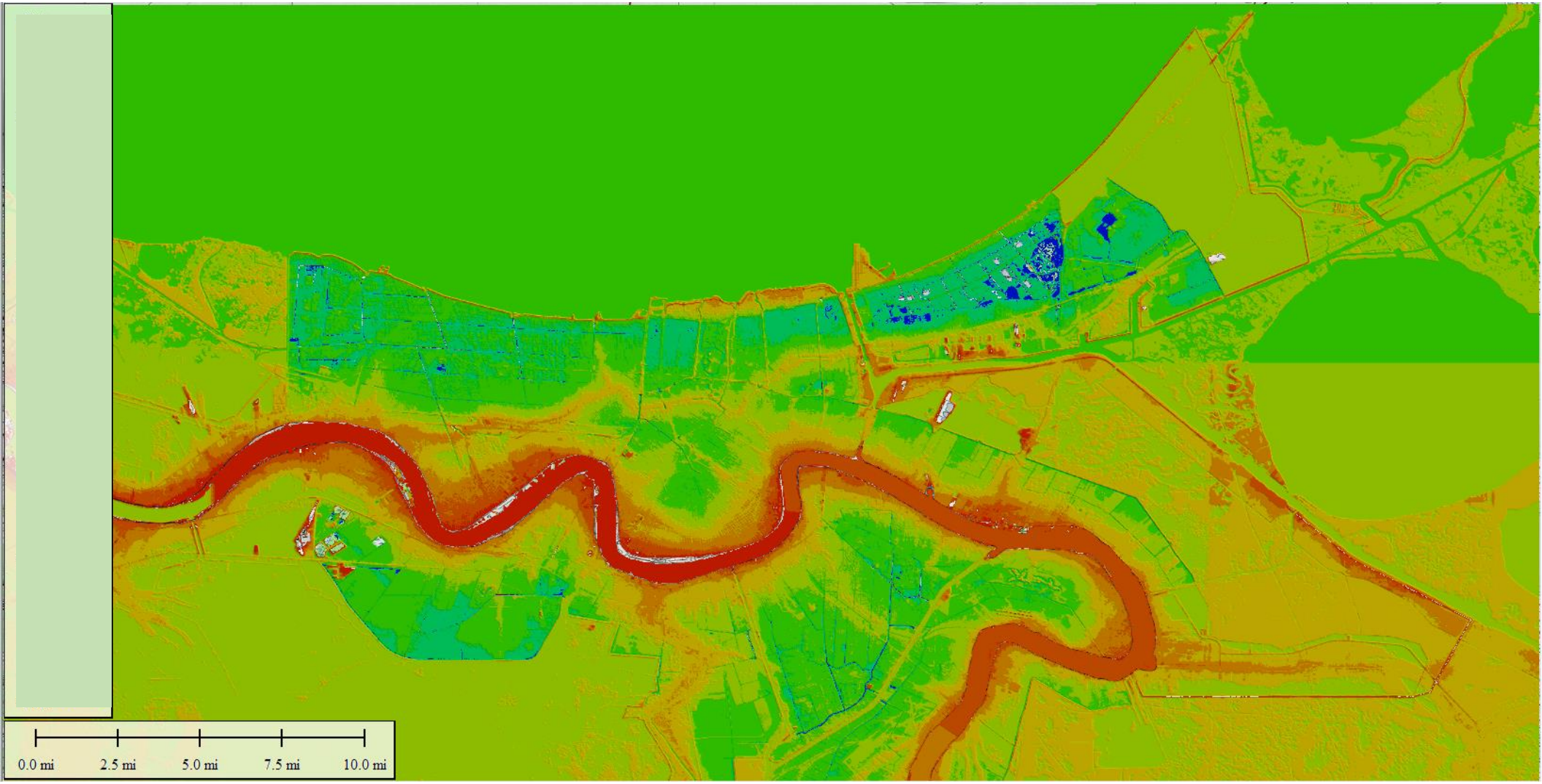
USGC Topographic Map of GNO



USGC Topographic Map of GNO With Georeferenced Fisk Peat Isopach (1960)

FIGURE 9 – Distribution and thickness of peat deposits in the vicinity of New Orleans (from Fisk, 1960)

Relative Elevation Display of GNO



Relative Elevation Display of GNO With Fisk Peat Isopach (1960)

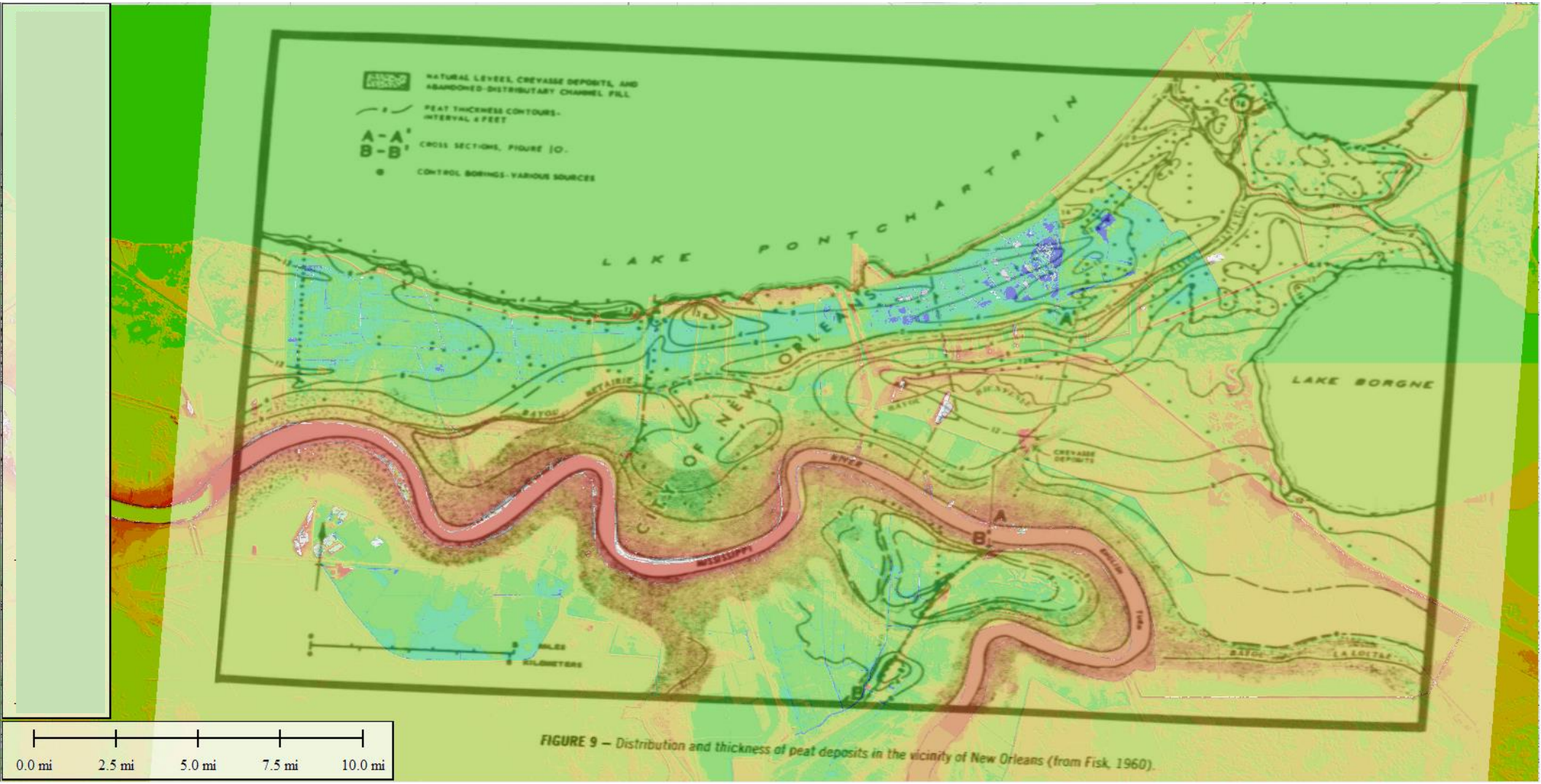
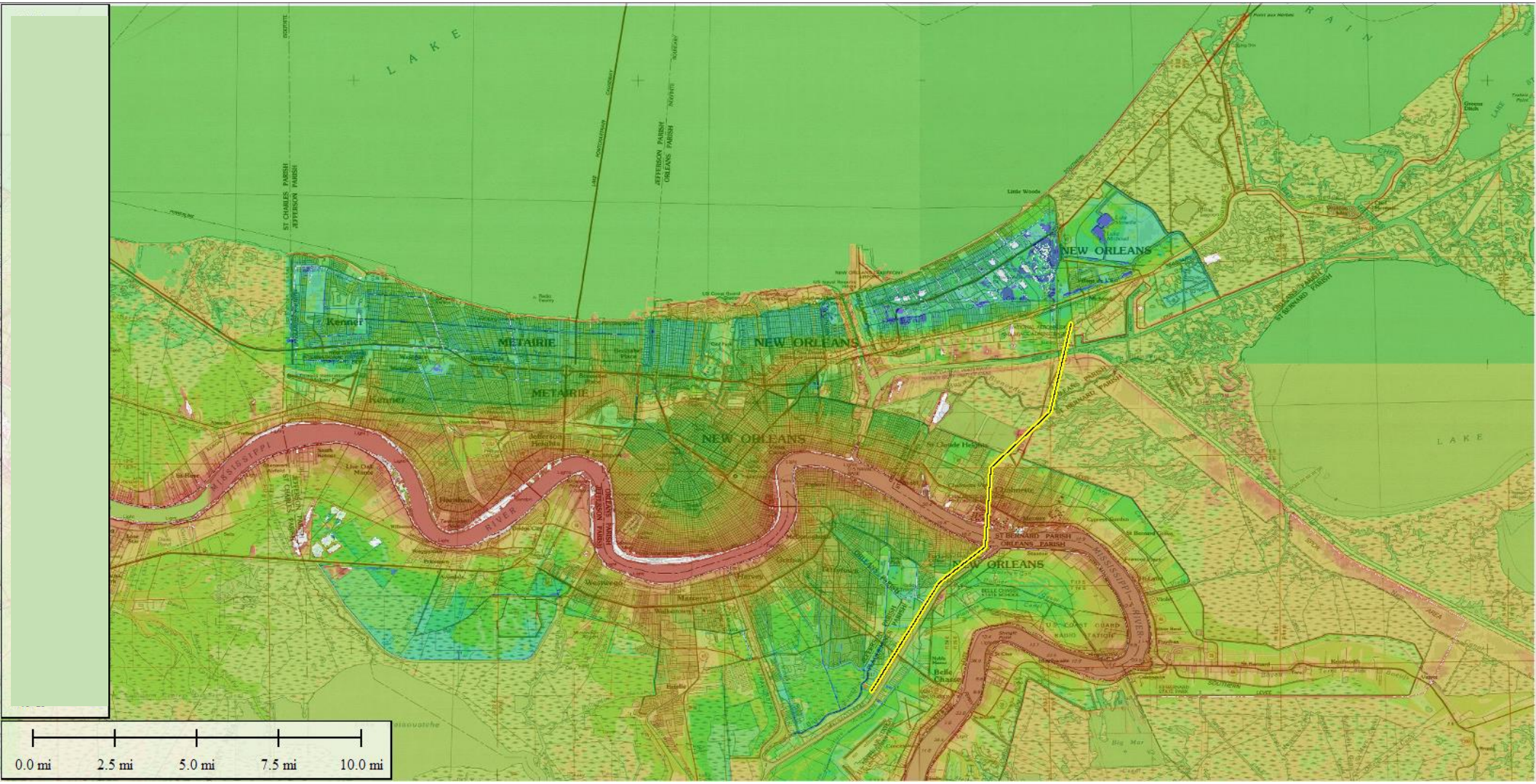


FIGURE 9 — Distribution and thickness of peat deposits in the vicinity of New Orleans (from Fisk, 1960).

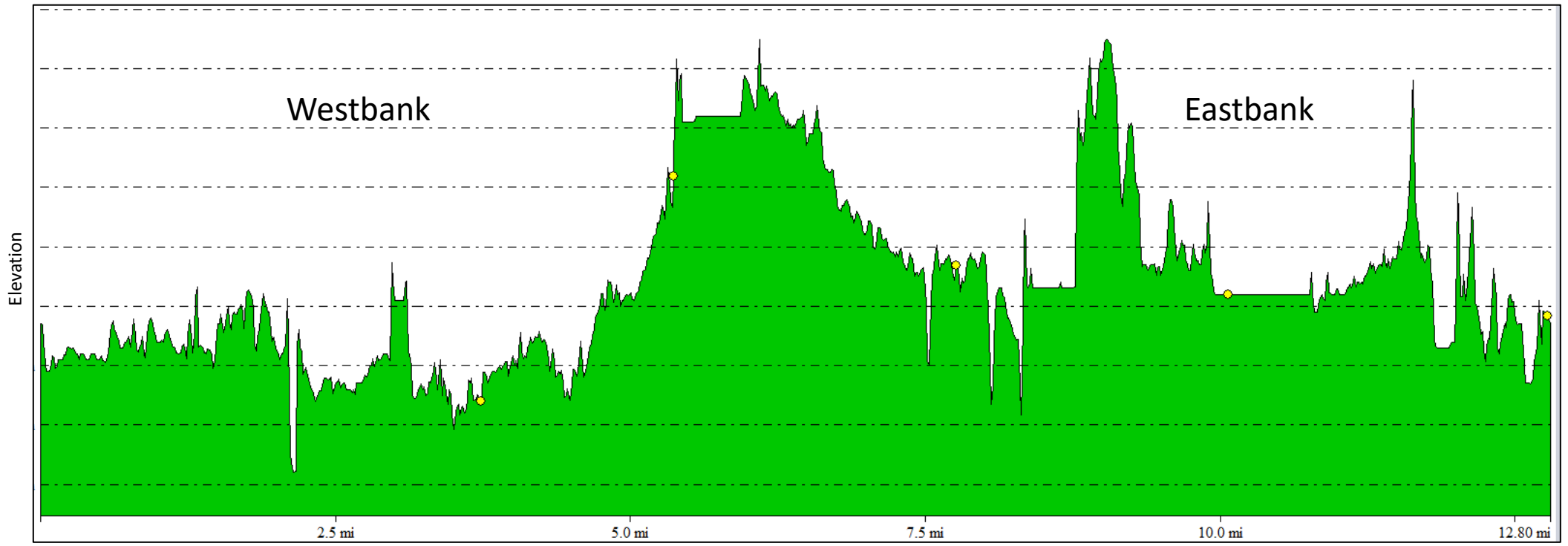
Relative Elevation Display of GNO With USGS Topo Map Overlay

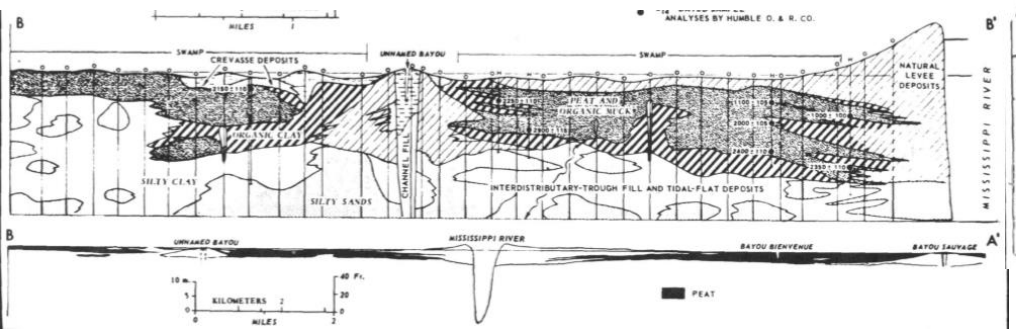


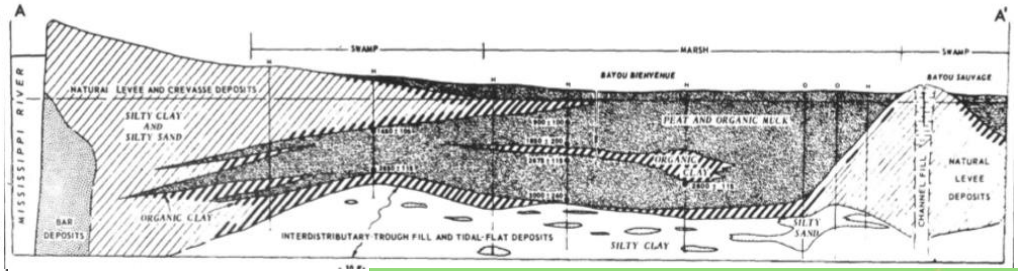
SW

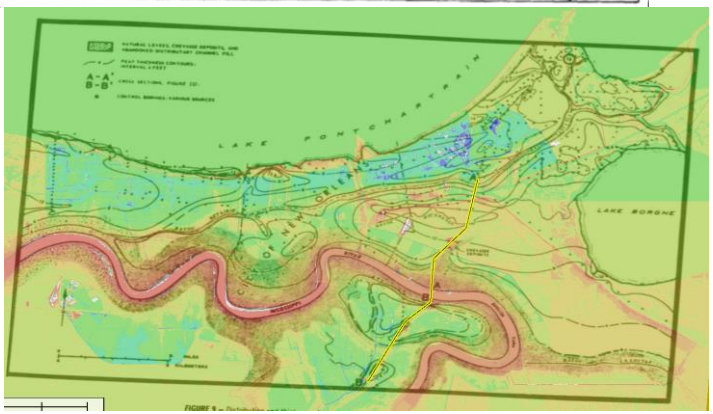
Elevation Transect of Lidar Elevation

NE





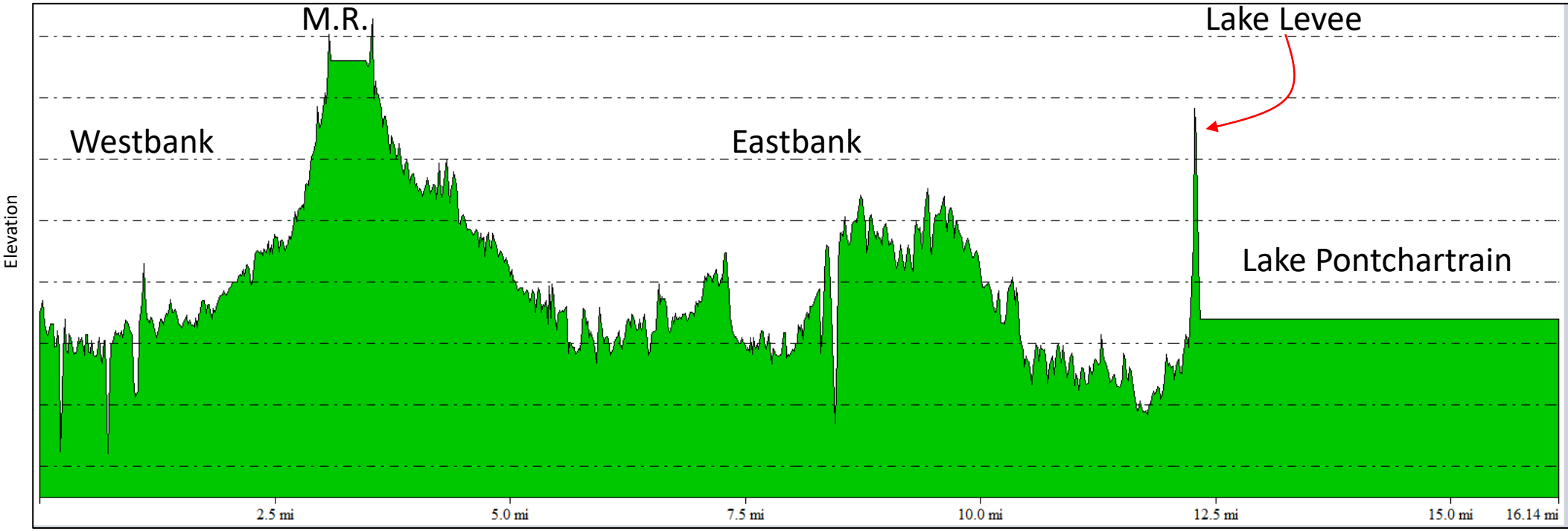


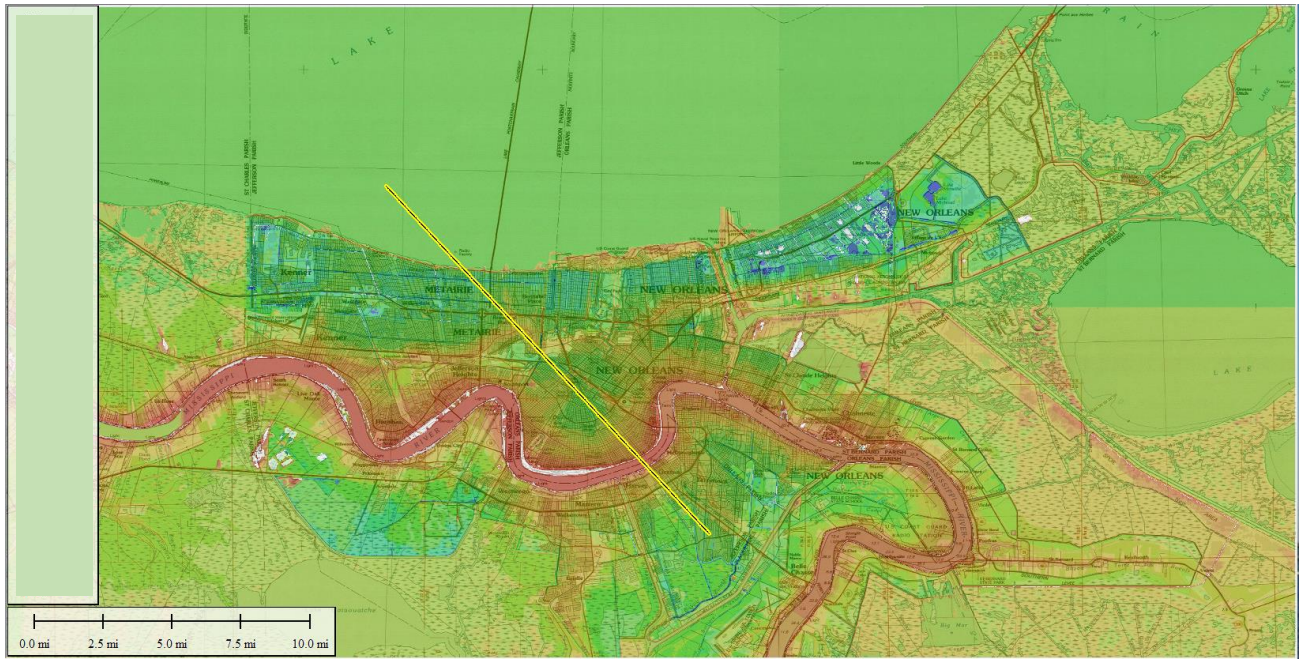


SE

GNO Transect 1

NW

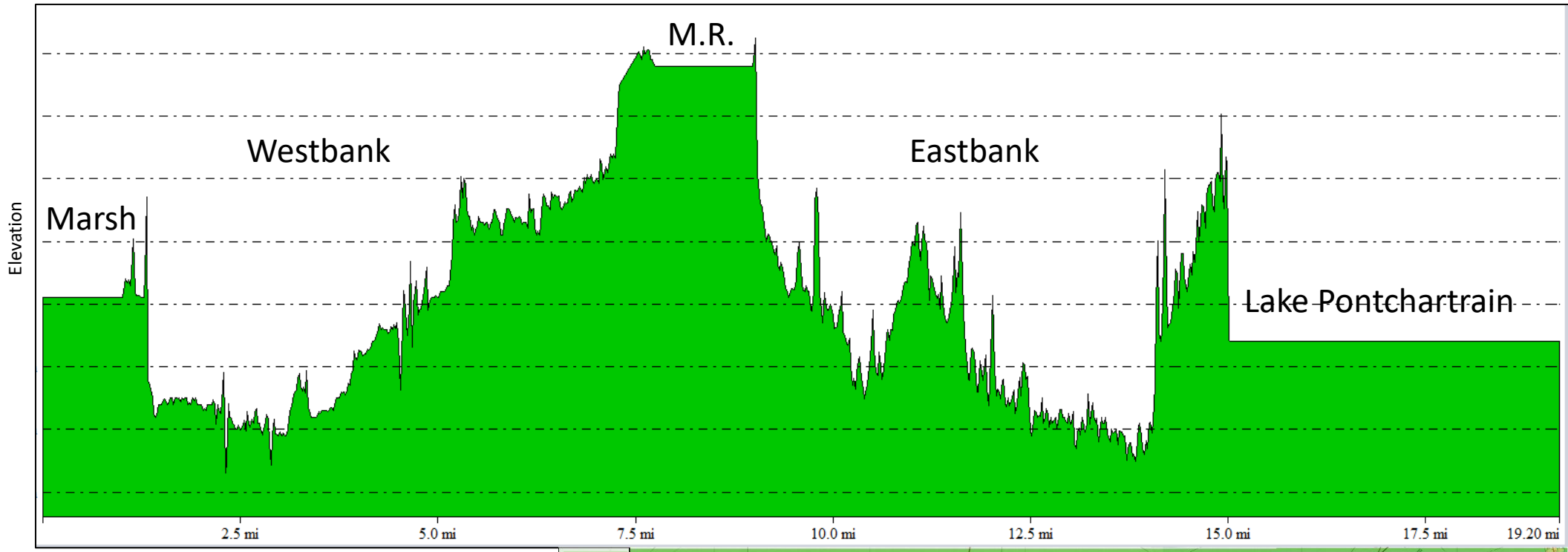


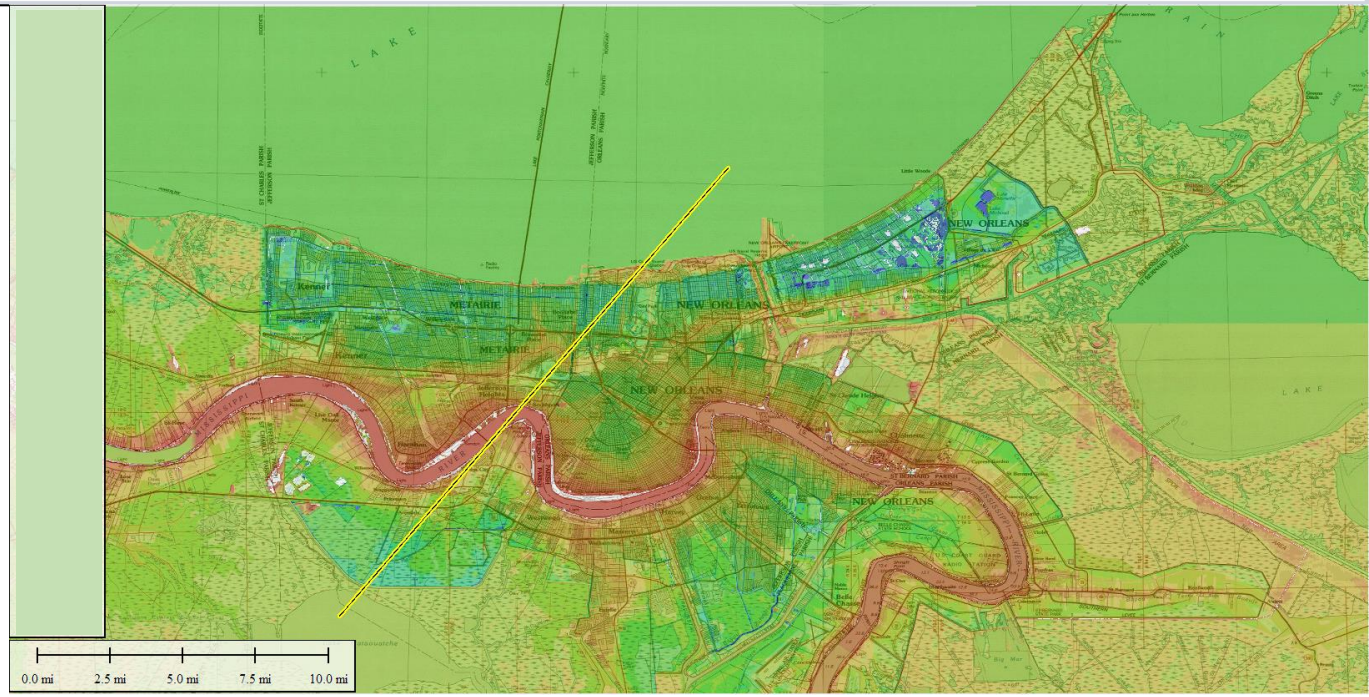


SW

GNO Transect 2

NE





GNO Transect 3

W

E

Parish Canal

Intracoastal Waterway

St. Charles Parish

Jefferson

Lakeview

N.O. East

Kenner

Metairie

Lake Borgne

Elevation

5 mi

10 mi

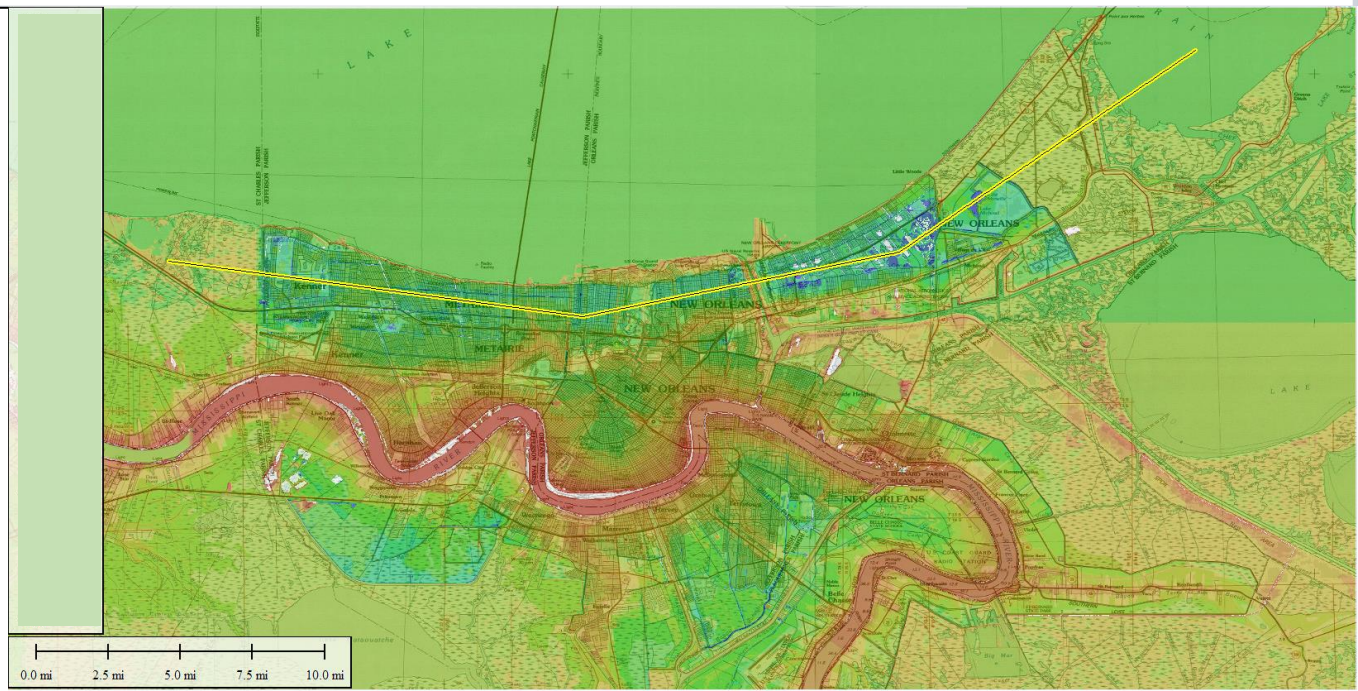
15 mi

20 mi

25 mi

30 mi

33.6 mi



Outline

Why strive for a paperless office?

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Field Study Example
- Techniques for “modernization” of the subsurface data
- Integration / Links to SONRIS public information
- Building a quick GIS basemap
- Downloding Log Images to a project database
- Using publicly available well log data to do subsurface work

Geology of Greater New Orleans
- Overview of Selected Maps
- GIS Integration of some study figures

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Thank you.