

## EEG 335: Petroleum Geology and Geophysics Fall Term 2025

**NOTE:** this document may be hard to read on paper, so open up the pdf on the class folder in order to zoom in. The populated fields in the dialog boxes may differ from what you see on your screen because I used a different well than you are using to create some of the examples.

Copy the files from the course folder to your (Q:) folder. Duplicate the “lastname\_SESdatabase.mdb” file and rename it to have your last name.

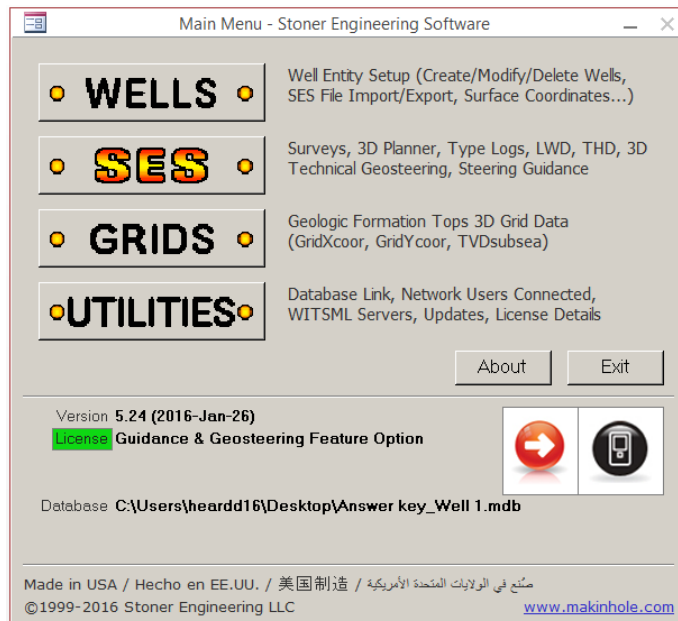
**SES Workflow** – *\*When exiting the SES Program, always navigate back to Main Menu screen and press “Exit.”*

Open SES Program

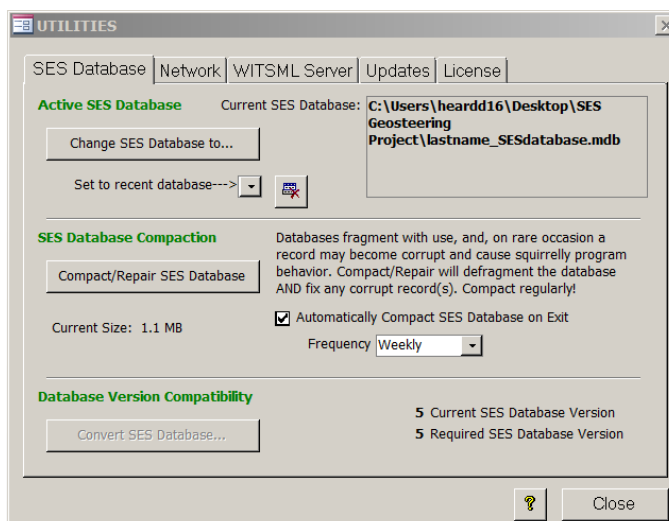
*If you get a message about installing the latest version, click OK and type in the number they show.*

The main buttons below are how to change screens

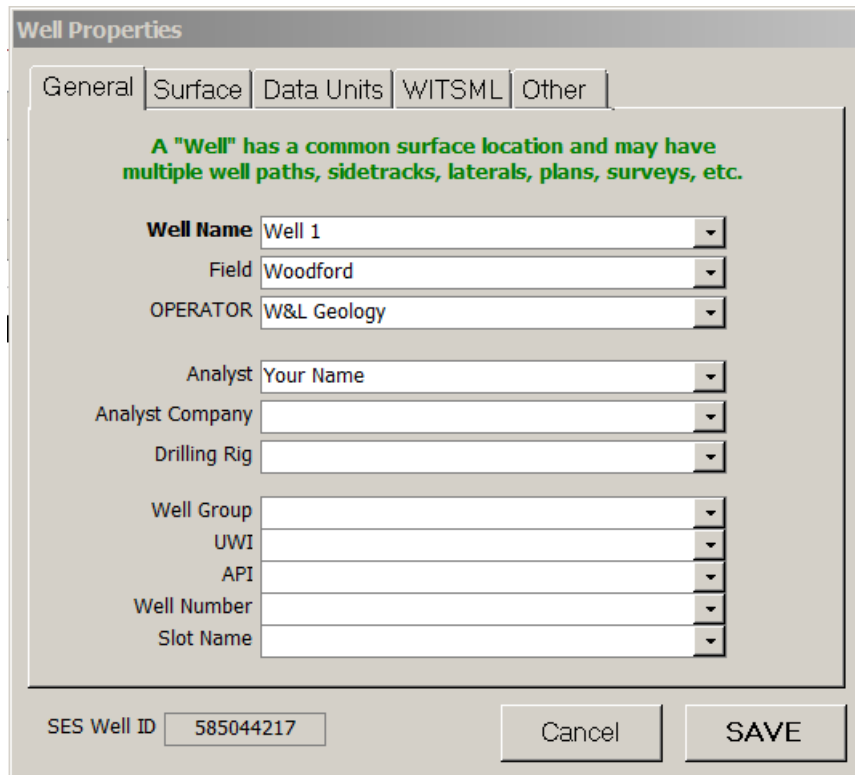
*If you get a message about a potential security flaw from editing a database file click OK.*



1. In the **Utilities** screen, change the SES Database to the database yourlastname\_SESdatabase.mdb in your SES Geosteering Project folder



2. In the **Wells** screen from the Main Menu, select Well 1 and edit well properties as below. Save and Close, and then Close to get back to the main buttons.

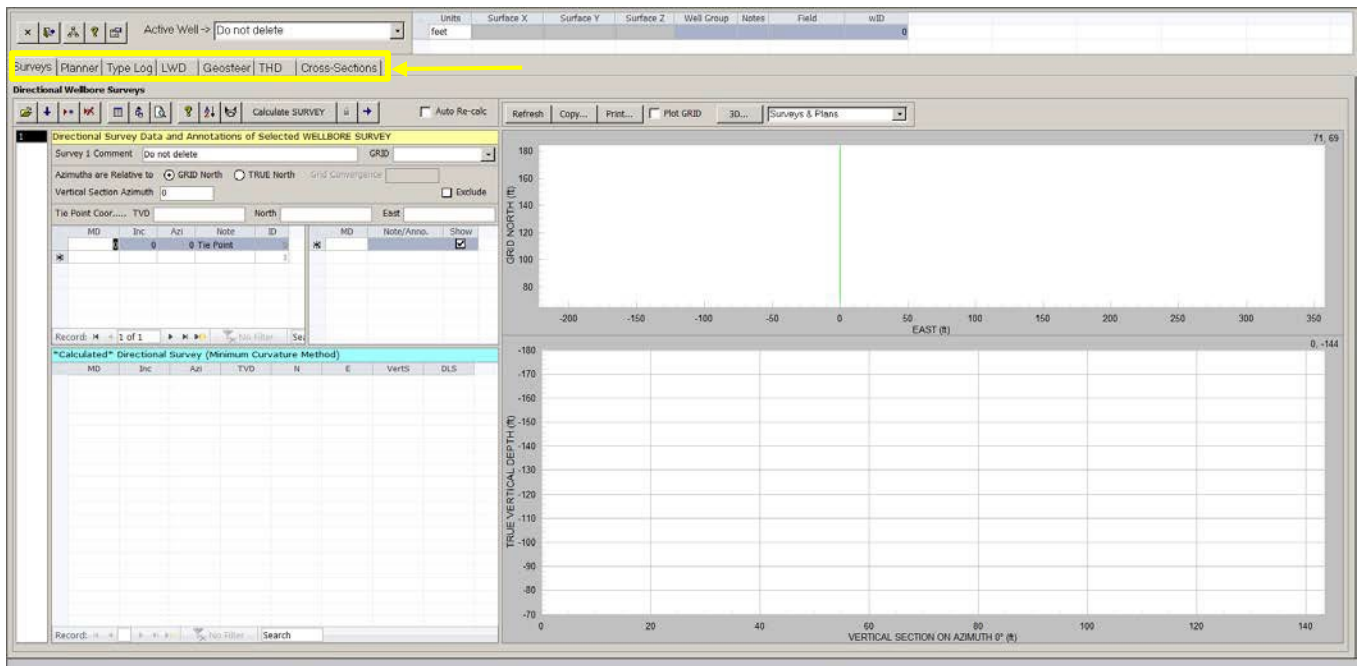


The 'Well Properties' dialog box has five tabs: General, Surface, Data Units, WITSML, and Other. The General tab is active. It contains a green instruction: 'A "Well" has a common surface location and may have multiple well paths, sidetracks, laterals, plans, surveys, etc.' Below this are several dropdown menus: Well Name (Well 1), Field (Woodford), OPERATOR (W&L Geology), Analyst (Your Name), Analyst Company, Drilling Rig, Well Group (UWI), API, Well Number, and Slot Name. At the bottom, there is a text field for 'SES Well ID' with the value '585044217', and two buttons: 'Cancel' and 'SAVE'.

Property	Value
Well Name	Well 1
Field	Woodford
OPERATOR	W&L Geology
Analyst	Your Name
Analyst Company	
Drilling Rig	
Well Group	UWI
API	
Well Number	
Slot Name	

SES Well ID: 585044217

3. Enter the **SES** screen from the Main Menu



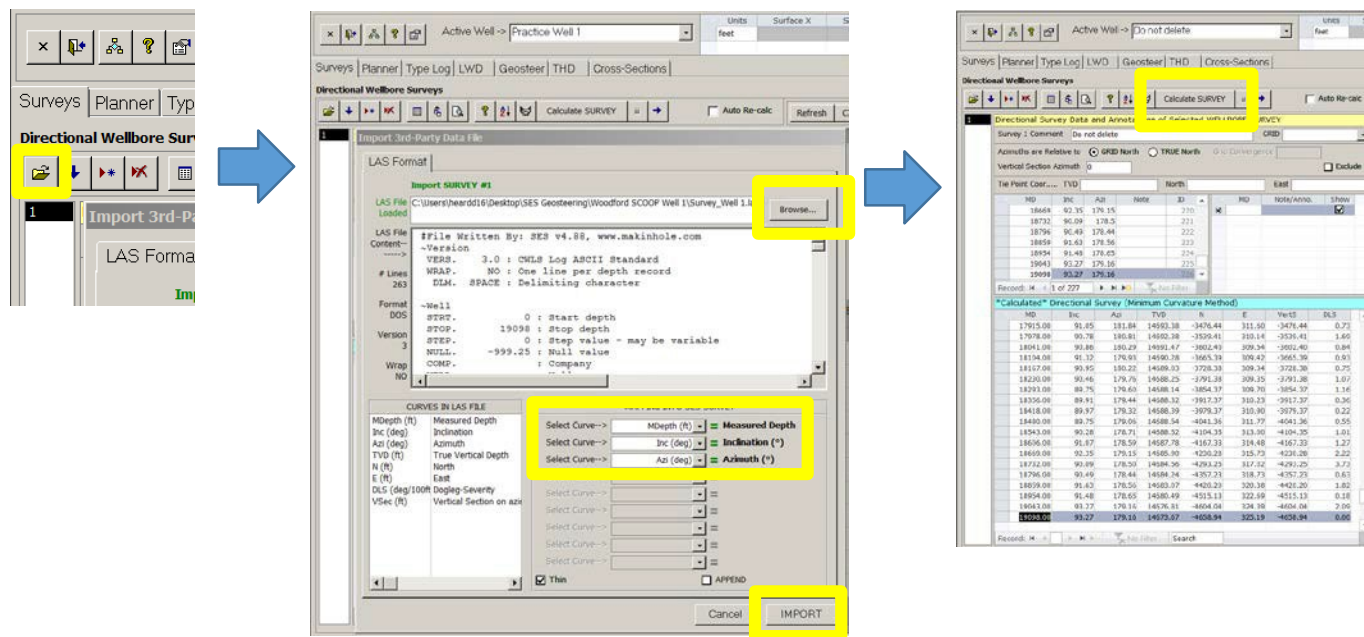
Notice the tabs listed across the top of the SES screen. From this screen you will enter survey, type log, and LWD data with which you will geosteer the well and produce the final cross section.

4. Under the **Surveys** tab is a list of icons. Click the import icon at the top left.

From the import window, click the Browse button. Navigate to your SES Geosteering Project\Woodford SCOOP Well 1\Survey\_Well 1.las. This is the deviation survey (positioning information) for the well.

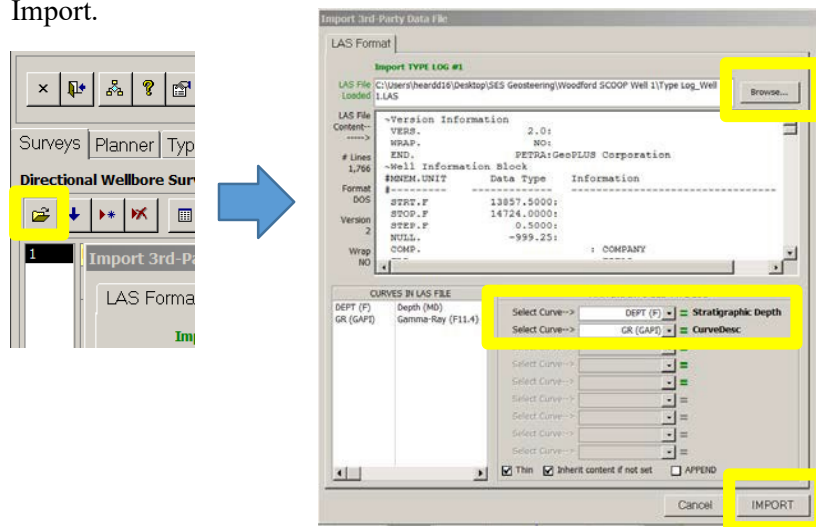
Select the correct curves (logs) to be imported from the LAS file as shown below, and Import.

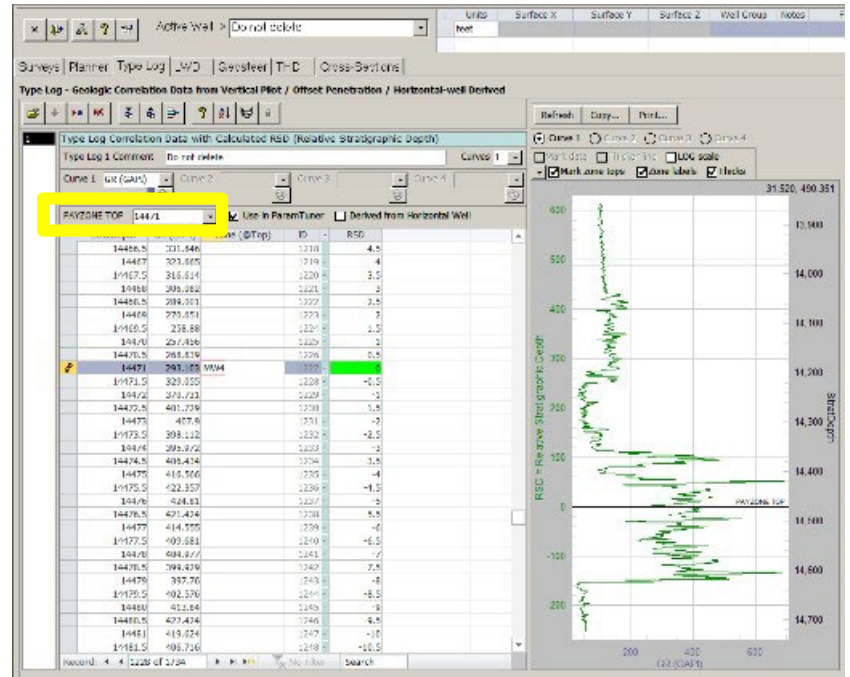
Click the Calculate SURVEY button to interpolate TVD and wellbore location relative to surface location.



5. Under the **Type Log** tab, click the import button in the top left.

From the import window, click the browse button. Navigate to your SES Geosteering Project\Woodford SCOOP Well 1\Type Log\_Well1.LAS, select the correct curves to be imported from the LAS file, and Import.

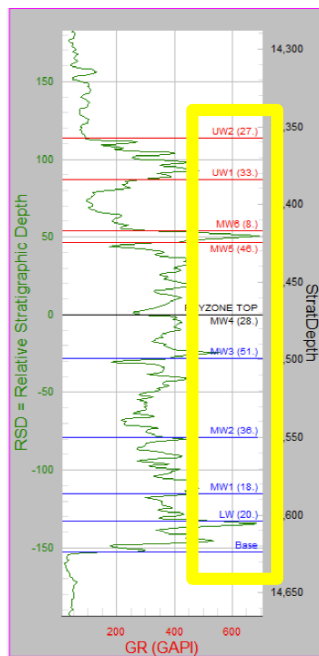




7. Under the **LWD tab**, click the import button in the top left.

From the import window, click the browse button. Navigate to your SES Geosteering Project\Woodford SCOOP Well 1\LWD\_Well1.las, select the correct curves to be imported from the LAS file, and Import (same process as with Survey and Type Log data). MD is sometimes just called DEPTH. Click the **Interpolate SURVEY** icon in the ribbon.

8. Under the **Geosteer** tab, select the Bed Thickness & Color tab. From your Type Log PDF, enter the name and relative thickness of each bed from the Base to Upper Woodford 2. The relative thickness of each bed is given in parentheses next to the name of the section on the type curve.

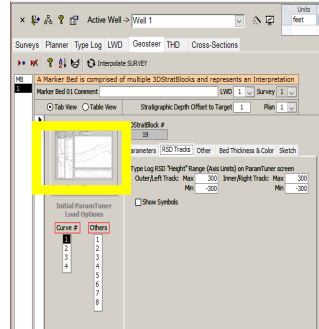


Label/Bed (optional)	Thickness	Color
10th Bed Above		
9th Bed Above		
8th Bed Above		
7th Bed Above		
6th Bed Above		
5th Bed Above		
4th Bed Above UW2	27	
3rd Bed Above UW1	33	
2nd Bed Above MW6	8	
1st Bed Above MW5	46	
PAY ZONE MW4	28	
1st Bed Below MW3	51	
2nd Bed Below MW2	36	
3rd Bed Below MW1	18	
4th Bed Below LW	20	
5th Bed Below		

9. Under the Parameters tab, enter parameters for starting and stopping MD of the strat block, and beginning TVD and MD, and a starting Dip value. These values only need to be your best estimation of the average TVD of the wells lateral. For this case use 14500 and 15000. Basically, you want to have increasing intervals to compare. If you do not have that it will not work right. Double click the third field to get the Easting and Northing. Use a 3 deg Dip and 180 deg Dip Azi.

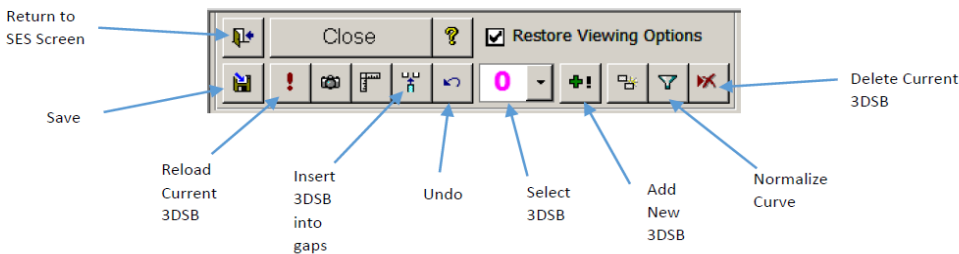
Parameters	Value
14500 MD to Start using this 3DStratBlock	
15000 MD to Stop using this 3DStratBlock	
14500 TVD	
Dip	
180 Dip Azi	

EASTING	NORTHING	Strike
262.47	-132.69	90.00

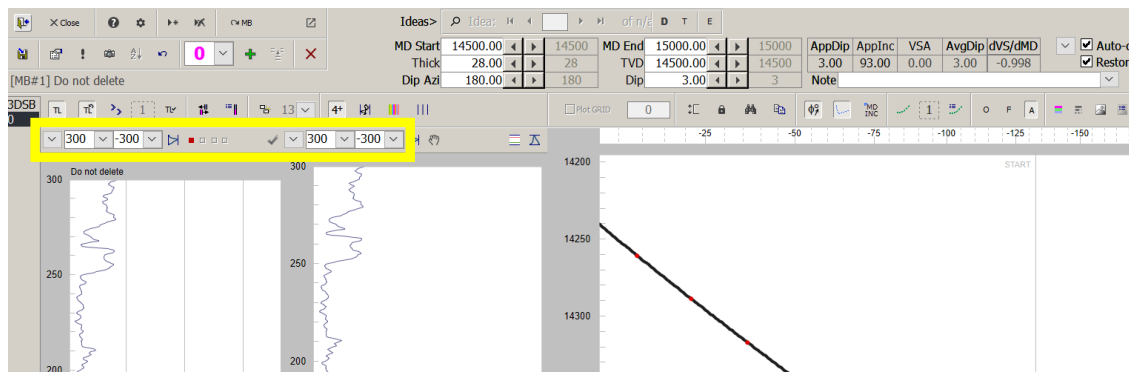


10. Select the **ParamTuner...** left button under the Geosteer tab.

ParamTuner is the core function of the SES geosteering program.



Enter 300 and -300 for the maximum and minimum, respectively, of both tracks at the top of the tracks.

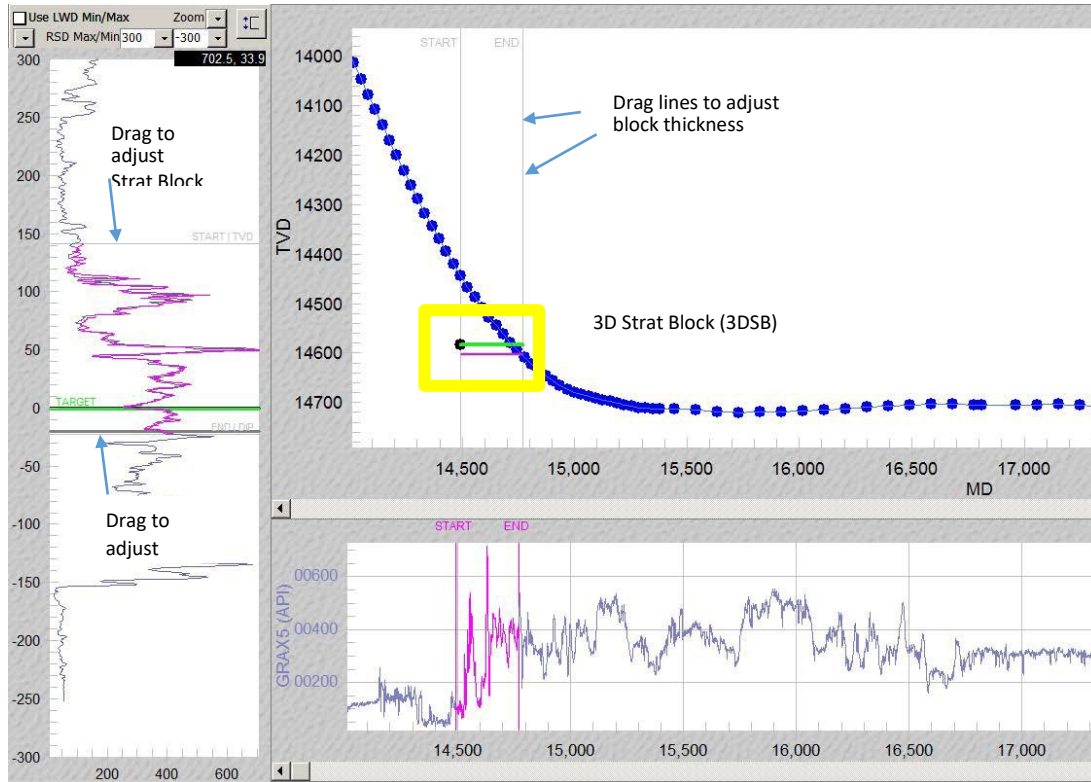


Using the inner left Relative Stratigraphic Depth (RSD) track, the operations geologist matches the log curve from the well (from the LWD LAS file) to the type log curve. This is done by dragging the Start | TVD and END | DIP gray lines until the LWD gamma ray and the type curve gamma ray align. If you alter the Start | TVD you are changing its starting depth relative to the block before. That is, you are making a fault between this block and one before. For the very first block, adjust the Start | TVD first, then the END | DIP. This is to get you closer than the starting estimated depth. For all additional blocks, you should always try and adjust the END | DIP first, using a few deg as the max. If the fit is pretty good, then don't change the Start | TVD. The reason is that most unconventional plays are in generally in gently dipping, modestly faulted rocks. You can also adjust the thickness of a layer in the right window if it is hard to match one dip for an entire thickness.

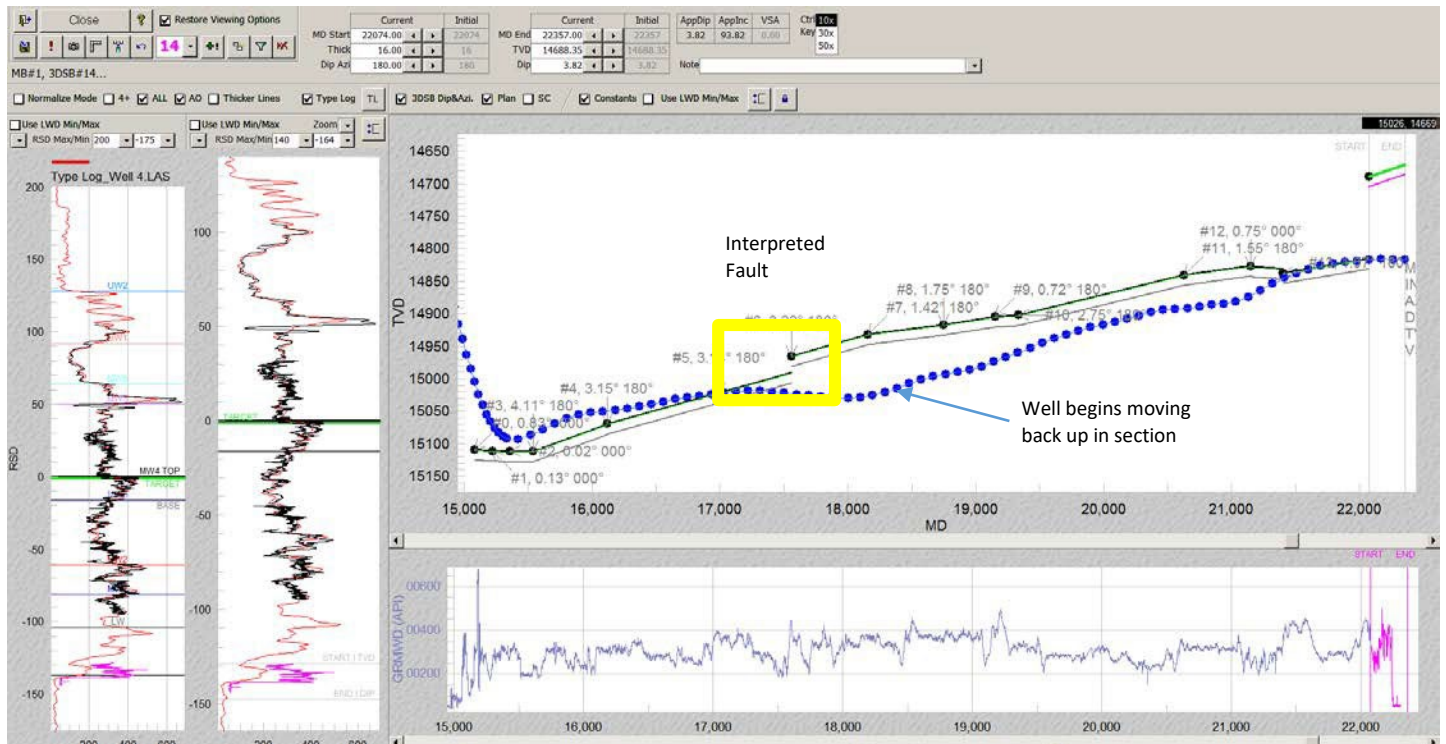
Once you feel good about the fit, add another 3DStratBlock (3DSB). See the Start Block Management Ribbon4for the main commands with the plus symbol. **Make sure to save often.**



If interpreted correctly, the geologist is left with an accurate idea of the apparent dip and relative location of beds relative to the well bore.



A fully interpreted well will look something like the product below. Note, the image below is NOT for Well 1, but another well.



Notice that the well passes through the “payzone” bed multiple times. You can expect to frequently encounter the same LWD signatures as the well moves laterally, which requires stretching, shrinking, and reversing the direction of the log curve on the interpretation track. The well may also encounter faults, in which case you will have to adjust the depth of a strat block by detaching it from the previous strat block.

After interpreting, close the ParamTuner window.



- Under the **Cross-Sections** tab, set the desired parameters for the stratigraphic cross section of the drilled region. After setting the parameters, select the print preview button to view the final product and then make a pdf of your cross section.

Surveys Planner Type Log LWD Geosteer THD Cross-Sections

Zoom Preview 200 Preview Cross Section Print...

XSec 1 Cross Section 01 Comment Do not delete Paper Letter Width 10

**General Main Plot Settings**

SURVEY MD MIN MD MAX TVD  
 1 14500 19500 14100 MIN  
 or Inc or SR 15100 MAX

☐ PLAN 1 ☒ Major Gridlines ☐ Minor Gridlines

☐ V.S. Mode ☒ Auto Min Max

☐ Survey Annotations ☐ Other Surveys

☒ Survey TD Values ☒ ☒ ☒ ☒ ☒ ☒

☐ Plot GRID ☒ Interp ☒ Extrap Method P-Azi

**Marker Bed (Interpretation) Settings**

☒ Plot Marker Bed (Interpretation) 1

☒ Target ☒ Offset Beds ☒ Labels

☒ Fill Beds Fill Density Fine ☐ ☒

☐ Zone In/Out Stats ☒ Auto In-zone Start

☐ Annotate Survey MD Values ☒ 3DSB Number

☐ Export Coordinates, Properties Default CSV

☐ ☒ ☒ ☐ ☐ ☐ ☐ ☐ ☐

**Centerline Settings for Revised Planned Path**

☐ Plot Centerline as defined below

☒ Interp ☒ Extrap ☒ Definition ☒ Rotated

☐ Parallel Lines Above Below Others

MD Verical Section Azimuth 0

TVD V.S. Northing

Dip Inc Easting

DIP, DRILLER Dip & DipAzi & V.S.A. need set

**LWD Data along bottom/top of Cross Section**

☒ Show LWD Curve Data

LWD	Track	LWD	Track
<input checked="" type="checkbox"/> GRAX5 (API)	1	<input type="checkbox"/> Curve 1	1
<input type="checkbox"/> Curve 2	1	<input type="checkbox"/> Curve 2	1
<input type="checkbox"/> Curve 3	1	<input type="checkbox"/> Curve 3	1
<input type="checkbox"/> Curve 4	1	<input type="checkbox"/> Curve 4	1
<input type="checkbox"/> Curve 5	3	<input type="checkbox"/> Curve 5	3
<input type="checkbox"/> Curve 6	3	<input type="checkbox"/> Curve 6	3
<input type="checkbox"/> Curve 7	3	<input type="checkbox"/> Curve 7	3
<input type="checkbox"/> Curve 8	3	<input type="checkbox"/> Curve 8	3

**Track(s) Setup**

top (3) M ☒ ☐

below (4) M ☒ ☐

above (2) M ☒ ☐

bottom (1) M ☒ ☐

☐ 8-Sector Azimuthal Image Log

**Curve Options**

☒ Apply Min/Max

☒ Apply Log10

☒ Constants

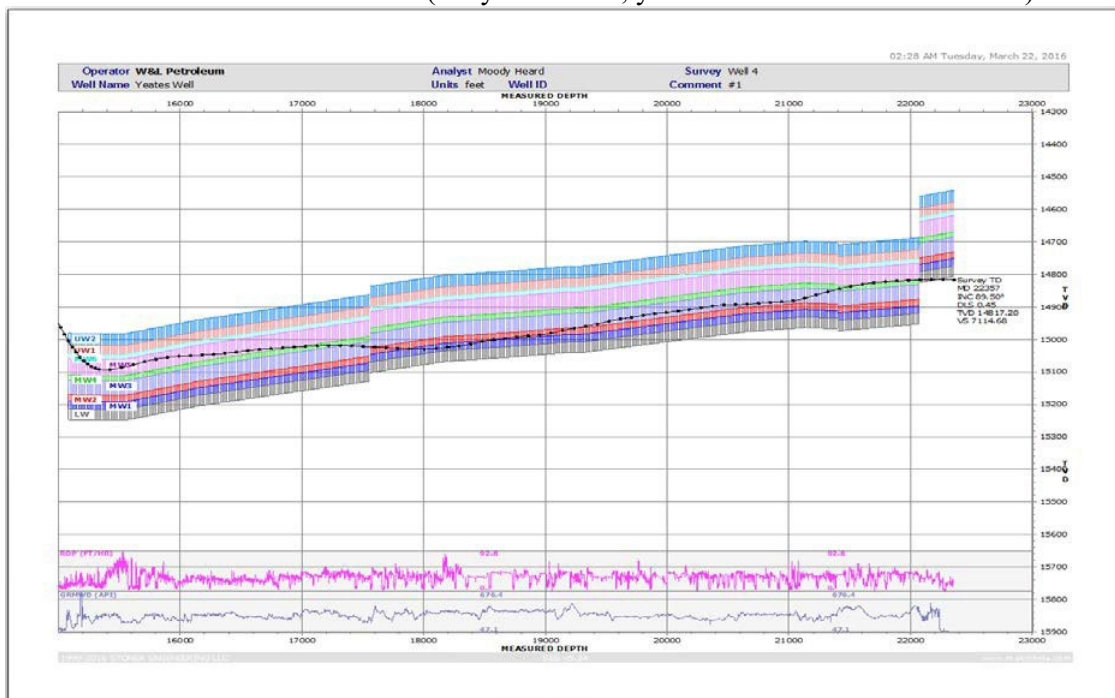
☒ Axis Limits

Smooth Az/Step MHPixel

LWD 3 3 3 3 5 5 5 5

LWD 4 4 4 4 5 5 5 5

Below is a finished cross section (not your Well 1; yours will look different in detail).



### Directions for Well 2

I have updated the files for Well 2. So copy over from the class folder the “Woodford SCOOP Well 2 NEW” folder to your (Q:) folder. As with Well 1, inspect all of the data in the folder, including the maps and type log, tops.

All of the data has been loaded for you in this second well in the database “lastname\_Well\_2\_SESdata.mdb” that is in the class folder. So, copy this as well to your (Q:) folder.

Make sure to rename the database, and then in the program change the database (Step 1).

Then all you have to do is steer the well (Steps 10 and 11).

I started a couple of blocks for you. The printer settings for this well are correct and do not need to be changed.

Note this one is slightly more complicated, and may have small faults, and/or move up and down through the target interval. Furthermore, the section is likely steeper than implied by the structure map.