Introduction to Seismic Data Loading and Management in the Landmark® Environment

Volume 2

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Broader Understanding., Depth Team, Depth Team Explorer, Depth Team Express, Depth Team Extreme, Depth Team Interpreter, DepthTeam, DepthTeam Explorer, DepthTeam Express, DepthTeam Extreme, DepthTeam Interpreter, Desktop Navigator, DESKTOP-PVT, DESKTOP-VIP, DEX, DIMS, Discovery, Discovery 3D, Discovery Asset, Discovery Framebuilder, Discovery PowerStation, Discovery Suite, DMS, Drillability Suite, Drilling Desktop, DrillModel, DrillNET, Drill-to-the-Earth-Model, Drillworks, Drillworks ConnectML, Drillworks Predict, DSS, Dynamic Frameworks to Fill, Dynamic Reservoir Management, Dynamic Surveillance System, EDM, EDM AutoSync, EDT, eLandmark, Engineer's Data Model, Engineer's Desktop, Engineer's Link, ENGINEERING NOTES, eNotes, ESP, Event Similarity Prediction, ezFault, ezModel, ezSurface, ezTracker, ezTracker2D, ezValidator, FastTrack, Field Scenario Planner, FieldPlan, For Production, FrameBuilder, Frameworks to Fill, FZAP!, GeoAtlas, GeoDataLoad, GeoGraphix, GeoGraphix Exploration System, Geologic Interpretation Component, Geometric Kernel, GeoProbe, GeoProbe GF DataServer, GeoSmith, GES, GES97, GesFull, GESXplorer, GMAplus, GMI Imager, Grid3D, GRIDGENR, H. Clean, Handheld Field Operator, HHFO, High Science Simplified, Horizon Generation, I^2 Enterprise, iDIMS, iEnergy, Infrastructure, iNotes, Iso Core, IsoMap, iWellFile, KnowledgeSource, Landmark *(as service)*, Landmark *(as software)*, Landmark Decision Center, LandNetX, Landscape, Large Model, Lattix, LeaseMap, Limits, LithoTect, LogEdit, LogM, LogPrep, MagicDesk, Make Great Decisions, MathPack, MDS Connect, MicroTopology, MIMIC, MIMIC+, Model Builder, NETool, Nexus *(as service)*, Nexus *(as software)*, Nexus View, Object MP, OneCall, OpenBooks, OpenJournal, OpenLink, OpenSGM, OpenVision, OpenWells, OpenWire, OpenWire Client, OpenWire Server, OpenWorks, OpenWorks Development Kit, OpenWorks Production, OpenWorks Well File, Operations Management Suite, PAL, Parallel-VIP, Parametric Modeling, Permedia, Petris WINDS Enterprise, PetrisWINDS, PetroBank, PetroBank Explorer, PetroBank Master Data Store, PetroWorks, PetroWorks Asset, PetroWorks Pro, PetroWorks ULTRA, PLOT EXPRESS, PlotView, Point Gridding Plus, Pointing Dispatcher, PostStack, PostStack ESP, PostStack Family, Power Interpretation, PowerCalculator, PowerExplorer, PowerExplorer Connect, PowerGrid, PowerHub, PowerModel, PowerView, PrecisionTarget, Presgraf, PressWorks, PRIZM, Production, Production Asset Manager, PROFILE, Project Administrator, ProMAGIC Connect, ProMAGIC Server, ProMAX, ProMAX 2D, ProMax 3D, ProMAX 3DPSDM, ProMAX 4D, ProMAX Family, ProMAX MVA, ProMAX VSP, pSTAx, Query Builder, Quick, Quick+, QUICKDIF, Quickwell, Quickwell+, Quiklog, QUIKRAY, QUIKSHOT, QUIKVSP, RAVE, RAYMAP, RAYMAP+, Real Freedom, Real Time Asset Management Center, Real Time Decision Center, Real Time Operations Center, Real Time Production Surveillance, Real Time Surveillance, Real-time View, Recall, Reference Data Manager, Reservoir, Reservoir Framework Builder, RESev, ResMap, Resolve, RTOC, SCAN, SeisCube, SeisMap, SeisMapX, Seismic Data Check, SeisModel, SeisSpace, SeisVision, SeisWell, SeisWorks, SeisWorks 2D, SeisWorks 3D, SeisWorks PowerCalculator, SeisWorks PowerJournal, SeisWorks PowerSection, SeisWorks PowerView, SeisXchange, Semblance Computation and Analysis, Sierra Family, SigmaView, SimConnect, SimConvert, SimDataStudio, SimResults, SimResults+, SimResults+3D, SIVA+, SLAM, Smart Change, Smart Deploy, Smart Flow, Smart Skills, Smart Start, Smart Sustain, Smart Transform, Smart Vision, SmartFlow, smartSECTION, smartSTRAT, Spatializer, SpecDecomp, StrataMap, StrataModel, StratAmp, StrataSim, StratWorks, StratWorks 3D, StreamCalc, StressCheck, STRUCT, Structure Cube, Surf & Connect, SurfNet, SynTool, System Start for Servers, SystemStart, SystemStart for Clients, SystemStart for Servers, SystemStart for Storage, Tanks & Tubes, TDQ, Team Workspace, TERAS, T-Grid, The Engineer's DeskTop, Total Drilling Performance, TOW/cs, TOW/cs Revenue Interface, TracPlanner, TracPlanner Xpress, Trend Form Gridding, Trimmed Grid, Tubular Basic, Turbo Synthetics, Unconventional Essentials, VESPA, VESPA+, VIP, VIP-COMP, VIP-CORE, VIPDataStudio, VIP-DUAL, VIP-ENCORE, VIP-EXECUTIVE, VIP-Local Grid Refinement, VIP-THERM, vSpace, vSpace Blueprint, vSpace Onsite, WavX, Web Editor, Well H. 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Introduction to Seismic Data Loading and Management in the Landmark Environment: Volume 2

Chapter 5
Loading 2D Data

Loading 2D data includes creating or selecting a Project database, loading the navigation data for your 2D lines, creating seismic storage directories, loading seismic trace data, and viewing the data. This chapter describes each of these tasks, followed by exercises and optional workshops. The exercises use sets of 2D lines stored on your workstation in SEG-Y format.

Overview

In this chapter, you will learn how to:

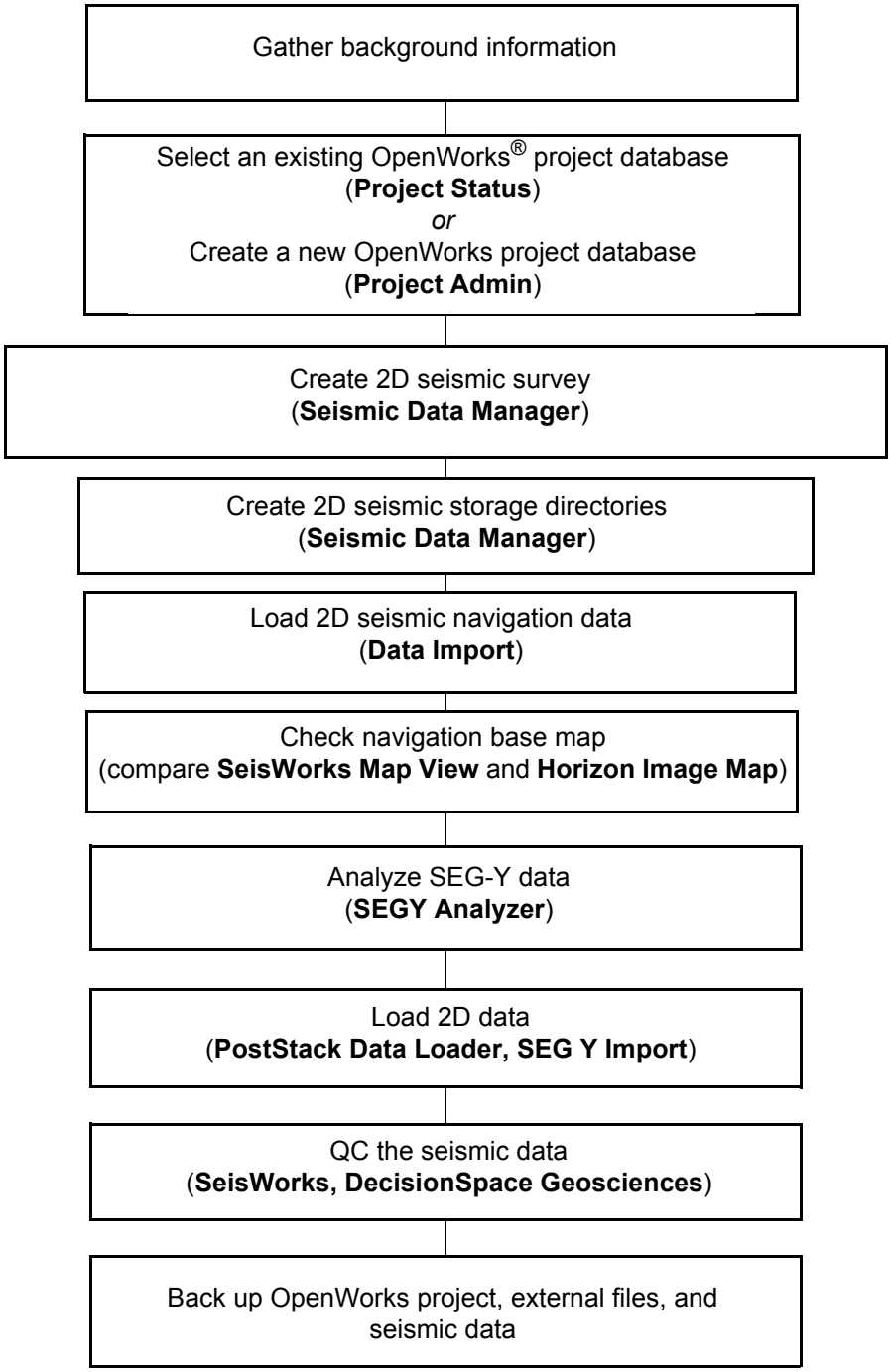
- Create a 2D Survey
- Create 2D Seismic Data Storage Areas
- Load 2D Navigation Data
- Review Navigation Data in a Seismic Data Manager
- Display Navigation Data in a Basemap
- Analyze SEG-Y Data Using SEGY Analyzer
- Load 2D Dataset Using PostStack or SEGY Import
- View 2D Seismic Data Load using SeisWorks® or DecisionSpace Geosciences®
- Trace Balance Multiple Seismic Lines
- Determine a Scaling Factor

Loading 2D Seismic Data

In the following exercise, you are going to load navigation and SEG-Y data for several 2D lines. These lines all reside within the bounds of the PSDL_FLATFISH project database.

The diagram below is a simplified workflow for general 2D data loading into Landmark formats.

Workflow for Loading 2D Seismic Data



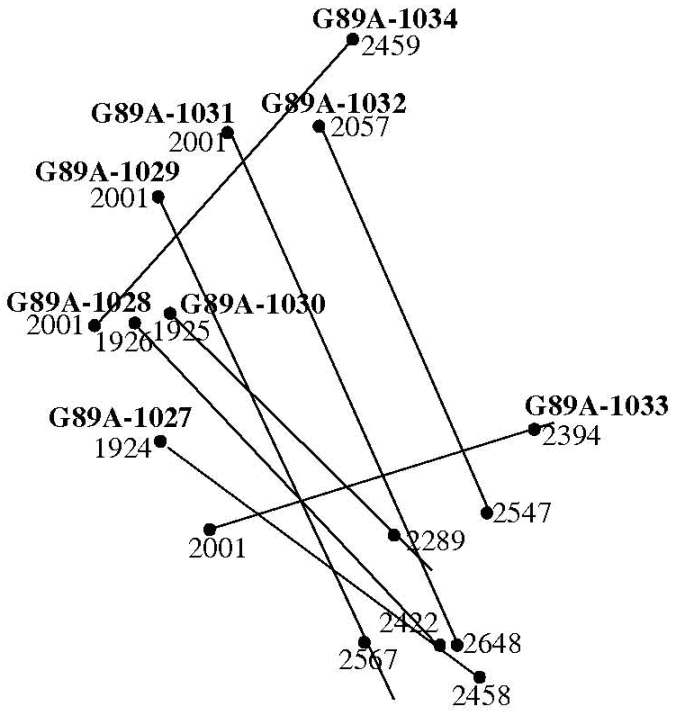
An alternative method for loading navigation data can be undertaken by loading 2D navigation and seismic trace data at the same time using PostStack Data Loader, or SEG Y Import.

There are several additions to this workflow which are covered in the exercises and the 2D workshops, including the workflow for loading 2D navigation data from the SEG-Y trace headers and trace balancing 2D data.

fldr2d Project
Projection: UTM 55S
Datum: Australian Geodetic 1984
Spheroid: Australian National 1965
Units: Meters

Line	SP	CDP	Line	SP	CDP
G89A-1027	1924-2458	1001-2067	G89A-1031	2001-2648	1001-2444
G89A-1028	1926-2422	1001-2142	G89A-1032	2057-2547	1001-2398
G89A-1029	2001-2647	1001-2442	G89A-1033	2001-2419	1001-1986
G89A-1030	1925-2348	1001-1996	G89A-1034	2001-2459	1001-2066

Basemap



Shotpoint to Trace Definitions:

Line	SP	Trace	Line	SP	Trace
G89A-1027	2001	1155	G89A-1031	2001	1155
	2014	1181		2019	1191
G89A-1028	1926	2148	G89A-1032	2057	2136
	1931	2138		2068	2114
G89A-1029	2001	1155	G89A-1033	2001	1155
	2016	1185		2024	1201
G89A-1030	1925	2002	G89A-1034	2001	1155
	1932	1988		2016	1185

Exercise 1: Create a 2D Seismic Survey

Seismic Data Manager allows you to define 2D data storage directories. You can create as many or as few 2D storage directories as required. The storage folder for the data is defined on a line by line basis. The location for the seismic file storage directories is defined by the dir.dat. Seismic storage directories are created at the survey name stage.

1. Use Project Status to select the ***PSDL_FLATFISH*** project database, US Oil Field, your interpreter (should already have been created).

2. Select **Data > Management > Seismic Data Manager**.

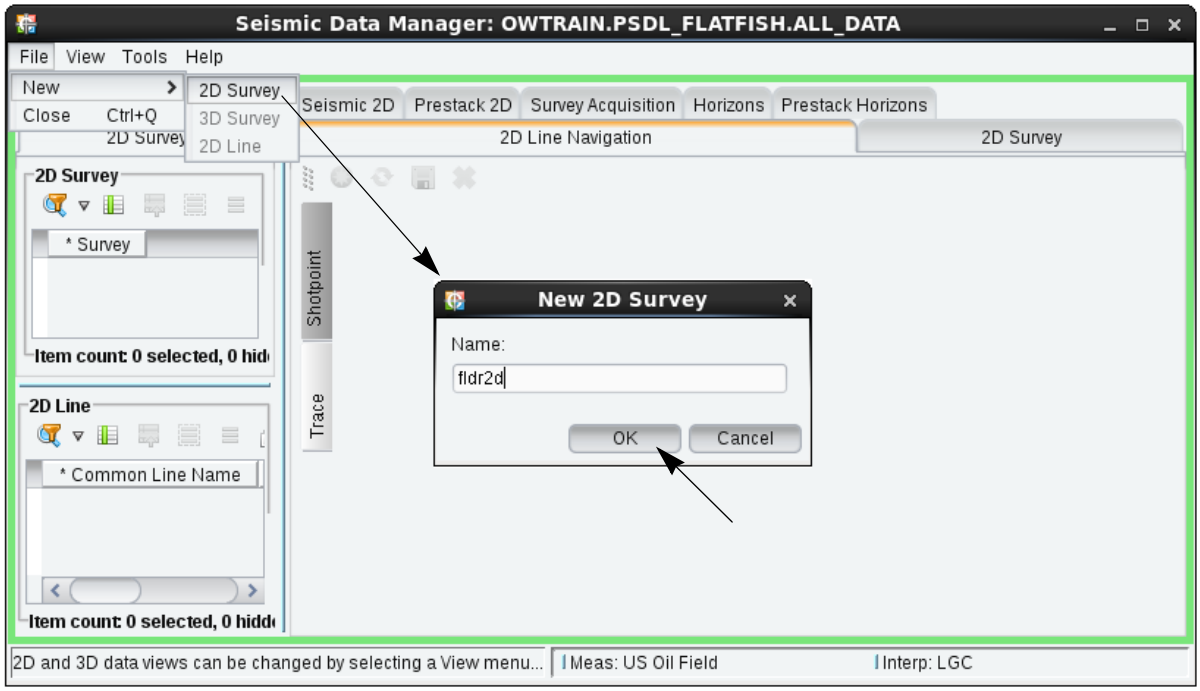
   The Seismic Data Manager opens. This time you will be using the 2D view to create and manipulate the 2D survey and navigation.

3. Select **View > 2D** from the menu (should be the default).

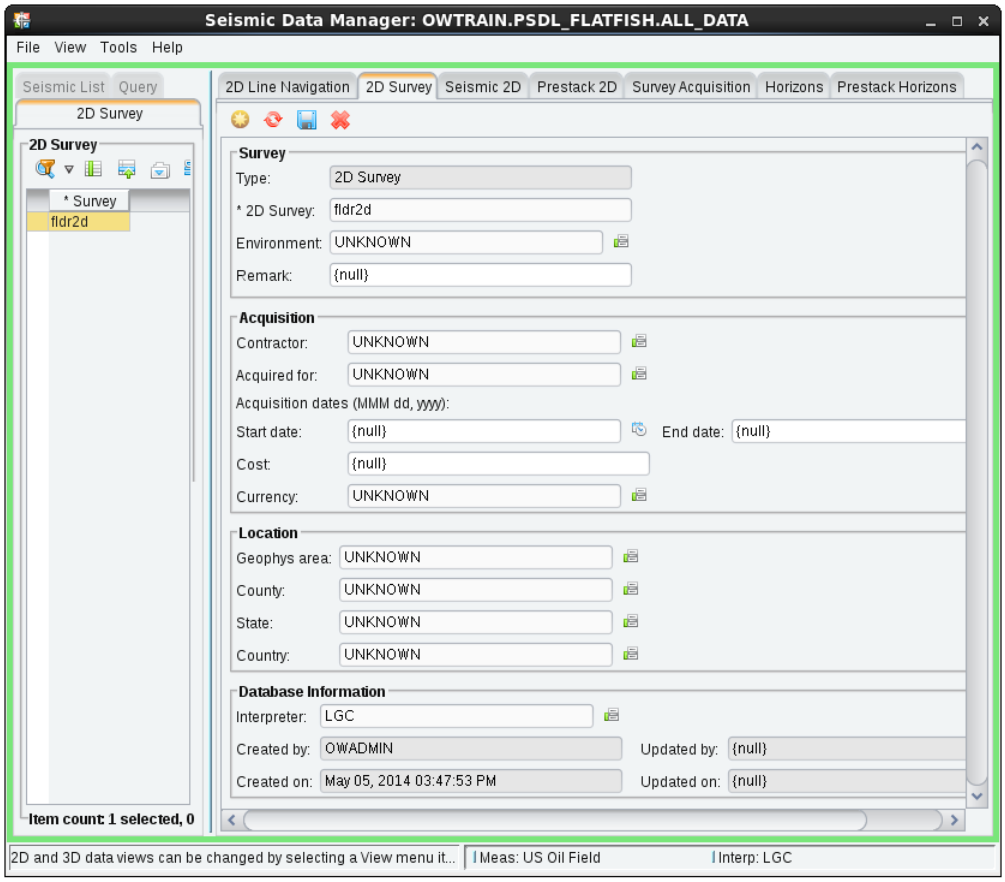
4. Select **File > New > 2D Survey**.

5. Type *fldr2d* in the **New 2D Survey** box.

6. Click **OK**.


Seismic Data Manager: OWTRAIN.PSDL_FLATFISH.ALL_DATA
File
View
Tools
Help
New
Close Ctrl+Q
2D Survey
3D Survey
2D Line
Seismic 2D
Prestack 2D
Survey Acquisition
Horizons
Prestack Horizons
2D Line Navigation
2D Survey
2D Survey
* Survey
Item count: 0 selected, 0 hid
2D Line
* Common Line Name
Item count: 0 selected, 0 hidd
Shotpoint
Trace
New 2D Survey
Name:
fldr2d
OK
Cancel
2D and 3D data views can be changed by selecting a View menu...
Meas: US Oil Field
Interp: LGC

The survey name is added to the left hand pane in the 2D Survey tab, and the right pane also becomes active displaying a 2D Survey tab. The 2D Survey tab allows you to add background information about this particular survey including costs, acquisition dates, contractors, clients, environments, and location information.



7. Fill out the 2D Survey tab with the following information.

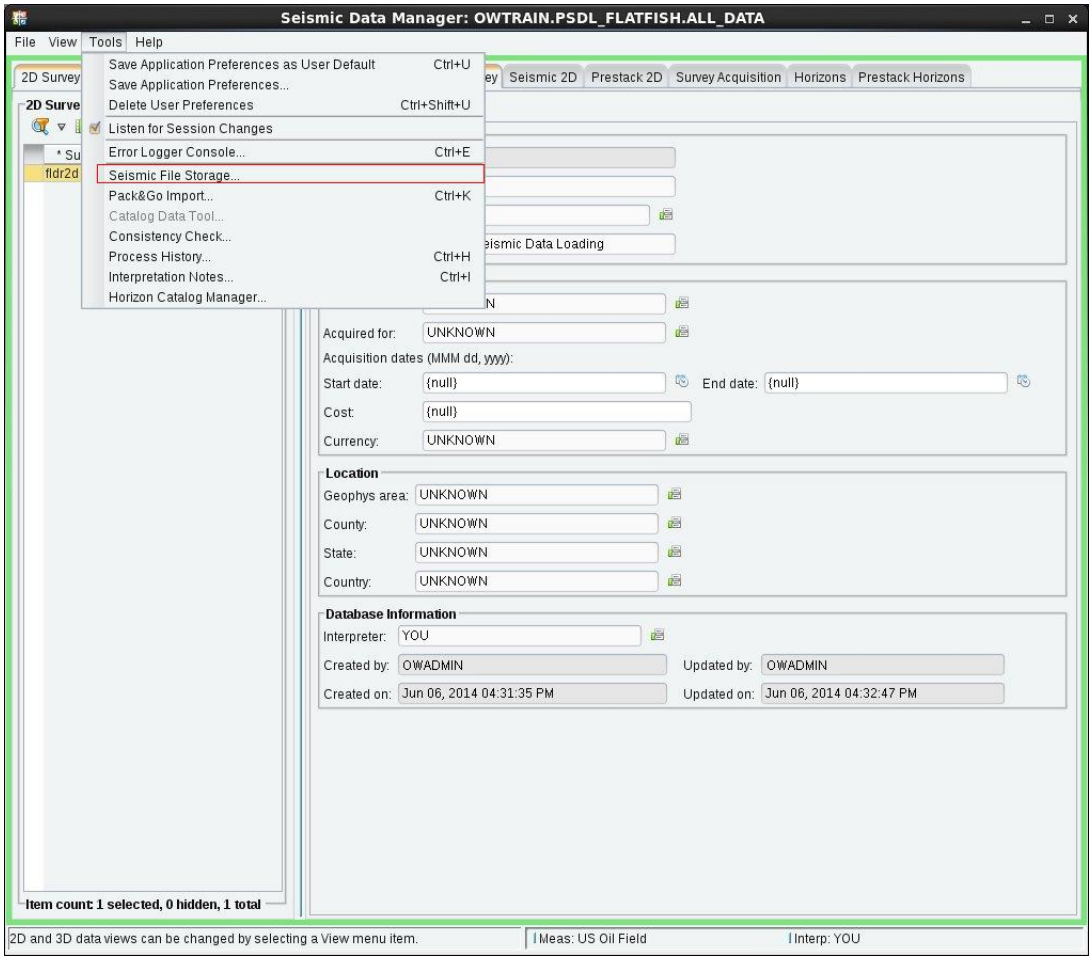
2D Survey	fldr2d
Environment	Marine (select from Popup pick list)
Remark	R5000 2D Seismic Data Loading

8. Click the **Save survey** icon ( ).

Exercise 2: Create 2D Seismic Data Storage Areas

Once the 2D survey name has been saved, the next step is to define the storage directory for the trace data. To do this, use the Seismic File Storage utility.

1. Select **Tools > Seismic File Storage…**.

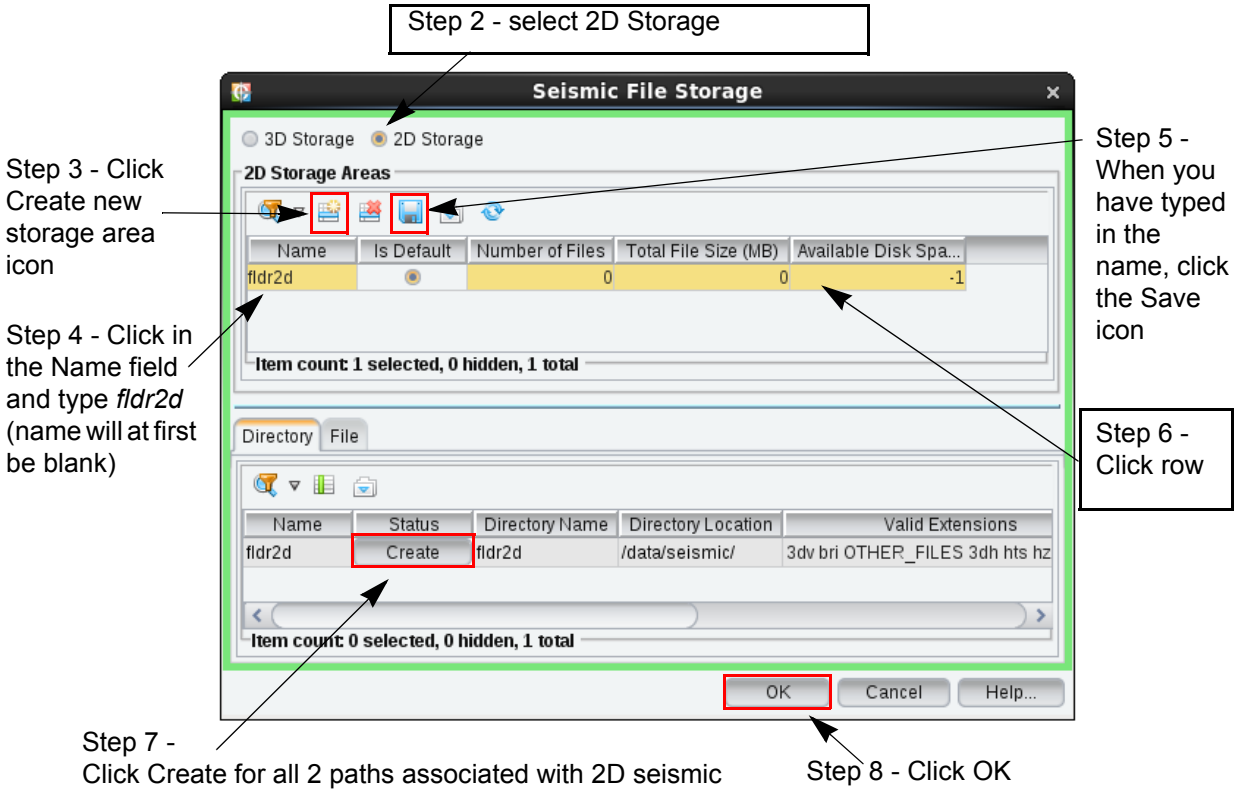


2. The default view is 3D. Select the **2D Storage** radio button at the top of the utility.

   The 2D Storage view contains an upper and lower pane. The upper pane displays the available 2D storage area names and details. The lower pane shows specific directories and files defined or located in the selected storage area.

3. Create a new storage area by clicking the **Create new storage area** icon ( ) in the upper pane.

4. In the new blank row, type *fldr2d* as the name.



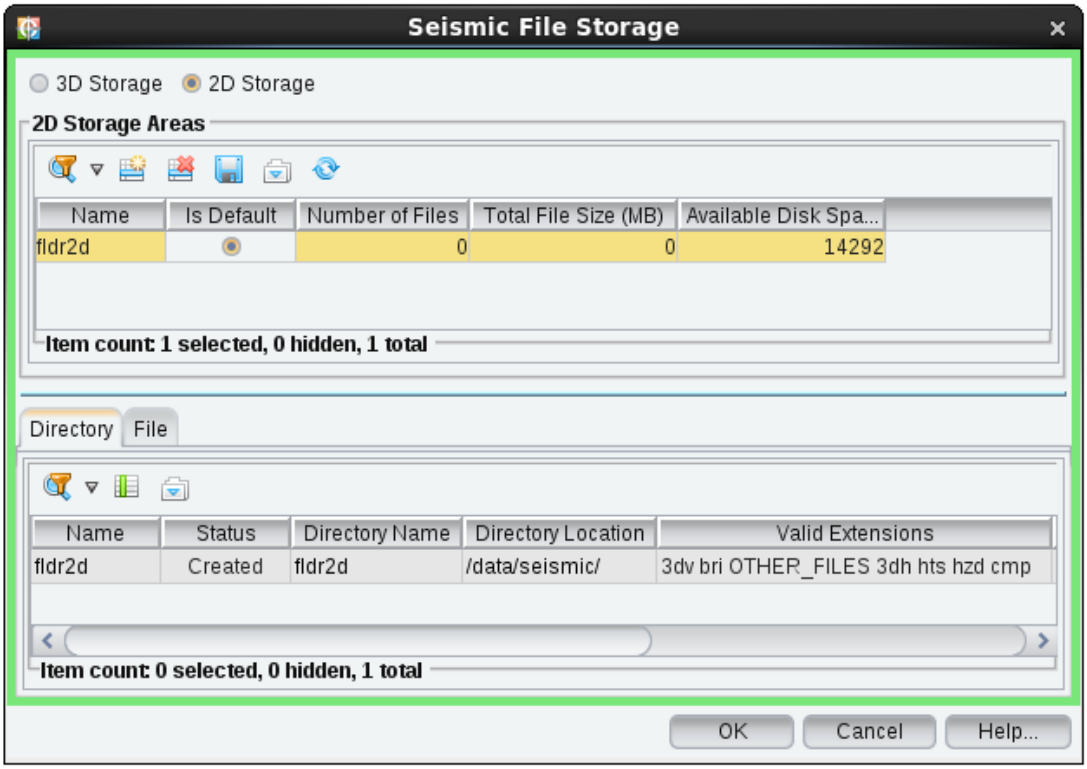
5. Click the **Save all rows** icon ( ).

6. Highlight the newly created **fldr2D** row.

   In the lower pane, make sure the Directory tab is active. The Directory tab shows the folder status for this particular storage area. Currently, the Status is **Create**.

7. Click over the **Create** button in the status column, the status will change for **Created** for the directory paths associated with 2D data. The path /data/seismic is designated for storage the 2D seismic data.

8. Click **Ok** button and then **Save** in the popup window.



You now have the storage locations available to load data, but first you must load the navigation for each individual line.

9. To prepare for the next exercise, make sure the Seismic Data Manager has a green border (click on the border to change color - green means that Seismic Data Manager is receiving data). If you would like to make more space on your screens, minimize Seismic Data Manager.

Components of 2D Seismic and Navigation Data

Before 2D seismic data can be displayed in OpenWorks seismic applications, two major components must be loaded:

- line navigation (shotpoint and trace location) data
- seismic trace data

Navigation for 2D data usually comes in ASCII files. Data Import Tool uses a format file to assign database definitions to data in the file, and then loads the navigation data into the selected database. Once the navigation data has been loaded and checked, the trace data can be loaded using PostStack Data Loader, or SEG Y Import.

In some instances, line location (navigation) data is included in the trace headers of your seismic data. If you don't have the navigation file available, PostStack and SEG Y Import can be used to extract this information.

The minimum required information to load 2D seismic navigation includes:

- Survey name (not necessarily in the file)
- Unique line name
- Common line name (may be the same as the unique name)
- Shotpoint x, y locations
- Minimum and maximum trace numbers (which may be in the line header file)
- Shotpoint-to-trace ratio

Generally, multiple seismic traces are grouped to each shotpoint location, and both shotpoints and traces have a different numbering system. Therefore a relationship (a shotpoint-to-trace ratio) must be established between these two major components, to enable the seismic traces to be displayed at the proper shotpoint location.

The Data Import utility reads the ASCII files that contain the navigation information and stores the data in your OpenWorks project database. The Seismic Data Manager allows you to manually create, delete, and edit header and navigation data within your project in the OpenWorks database.

Data Import Wizard

The Data Import Tool is used to import many types of ASCII data files into an OpenWorks database. This section explains how to create formats to load 2D navigation data from ASCII files.

Structure of ASCII Data Files

Data Import Tool uses a format file to assign database definitions to data in the file, and then loads the data into the selected database. Before you can load navigation data, you must know the structure of the ASCII file. You may choose to view and edit ASCII files with a text editor, such as nedit or vi, or you can look in WOW (if the data is accessible). The file format is usually columnar in style and contains one or more components of three sets of data (line header information, shotpoint coordinates, and shot-to-trace relationships).

The data for 2D seismic can be loaded in a variety of ways:

- Navigation information can be defined and imported all at once if the input file contains all necessary data

or:

- Seismic 2D navigation data can be initially imported with no column items (line header information only)
- Shotpoint and x,y (or latitude, longitude) locations can then be imported separately
- Shotpoint and trace can then be imported separately

It is common for 2D navigation data to imported in separate data loading workflows where the navigation header information is loaded first, followed by shotpoint, x and y data, and finally by the shotpoint-trace relationship data.

The asterisks (*s) shown below identify columns that are required to load the navigation data.

Data Items for Seismic 2D Lines

- ***2D Survey Name** - maximum 40-character name specifying the 2D survey name under which the line is to be grouped in the database
- ***Common 2D Line Name** - maximum 40-character name that specifies the common name for the line (common line name must be unique among all lines within a 2D Survey)
- ***Decimation Tolerance** - tolerance used in the decimation of the 2D location

- ***Directory Name** -
- ***Unique 2D Line Name** - - maximum 30-character name that specifies the unique name for the line within the project in the OpenWorks database
- ***Z Datum** - vertical seismic datum value
- **Decimation Indicator** - Indicate when it exist the 2D decimation
- **Interp** - Interpreter used
- **Latitude** - Degrees/Minutes/Seconds, either N or S, Sign
- **Longitude** - Degrees/Minutes/Seconds, either E or W, Sign
- **Overall Maximum Trace** -maximum seismic trace value for the line
- **Overall Minimum Trace** -minimum seismic trace value for the line
- **Remark** - Comments
- **Restricted Data Indicator** - flag indicating restricted data
- **Shotpoint** - floating-point shotpoint number value
- **Trace** - floating-point trace number value
- **Trimmed Maximum Trace** - maximum trace number in the 2D location vector
- **Trimmed Minimum Trace** - minimum trace number in the 2D location vector
- **X** - projection system X coordinate of the shotpoint in floating-point decimal
- **Y** - projection system Y coordinate of the shotpoint in floating-point decimal

Exercise 3: Data Import: Load 2D Seismic Navigation from ASCII Files

There are two methods for loading navigation data into OpenWorks, either from a separate ASCII file or from the SEG-Y file itself. For this exercise, you will load navigation data from an ASCII file.

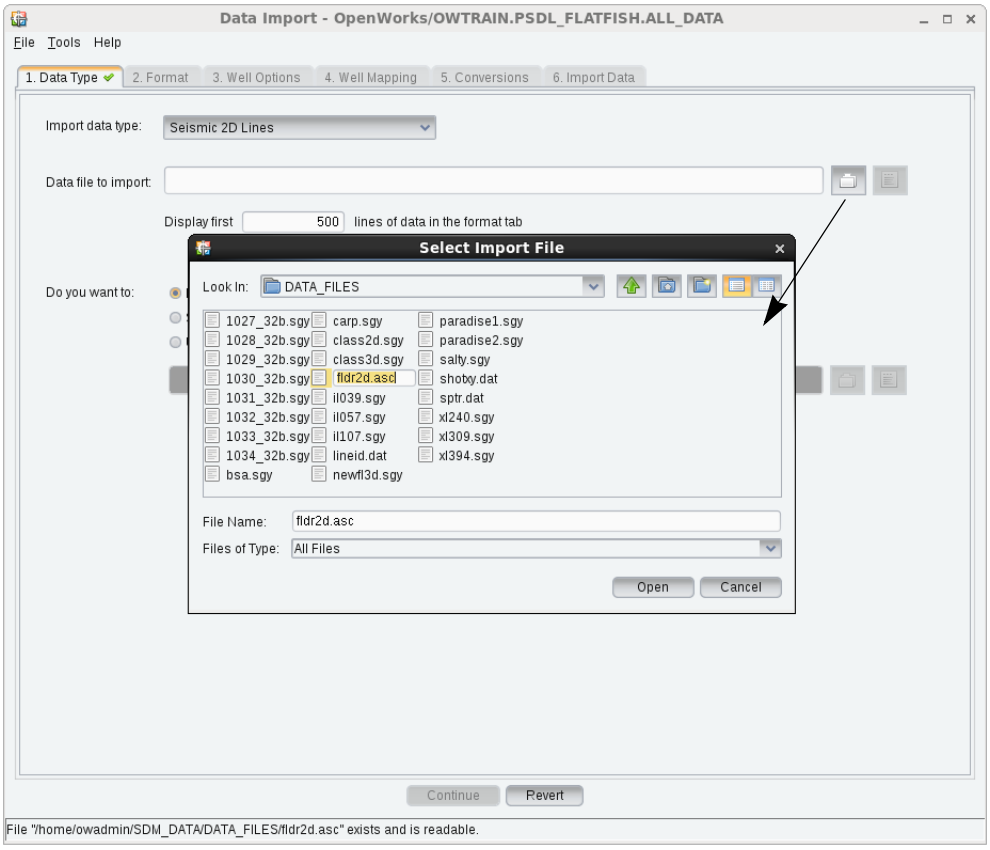
The format of the data must be determined before the data can be successfully imported into an OpenWorks project. Data Import Tool is used to select an existing format file or interactively create a format file to import the information in the data file.

> Format files are stored in an owioformats directory in the OpenWorks software. The path to this subdirectory is $OWHOME/OW_SYS_DATA/owioformats. The format file default name is *user_filename*.asc.afm.xml.

You will be loading the *fldr2d.asc* navigation file, which contains the navigation for all eight 2D lines that you will be loading into the PSDL_FLATFISH project database.

Currently, there is not a defined format for this file, so you must create one. Data Import Tool is used to create the format file and load the data.

1. Select **Data > Import > Data Import** from the OpenWorks Command Menu.



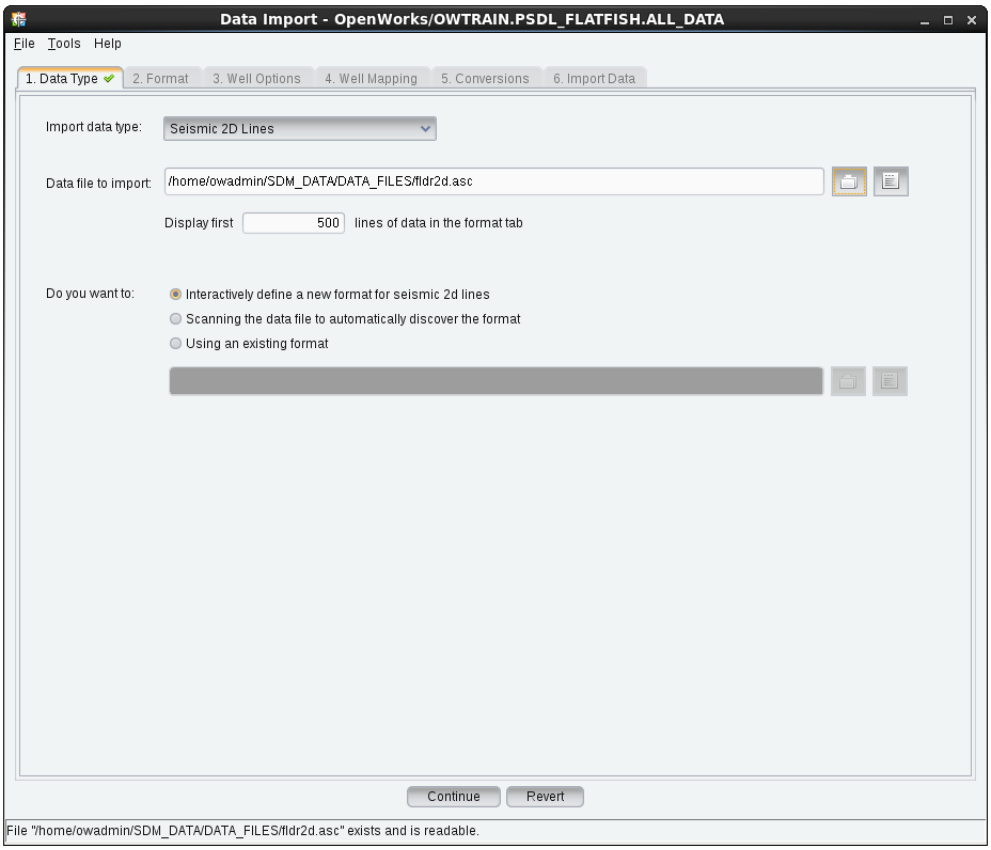
2. Select the category **Seismic 2D Lines** from the import data type.

3. Click **Select an input data file** button.

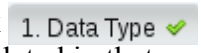
4. Select the **fldr2d.asc** file. Ask your instructor for the location of the data file. Click **Open**.

> **Hint**
>
> Set Files of Type: to **All Files**.

5. For the *Do you want to:* option, select **Interactively define a new format for seismic 2d lines** and click **Continue.**



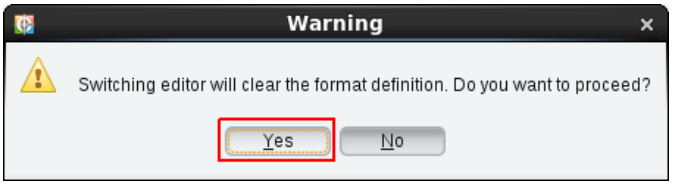
The format information tab opens. This tab allows you to define the type of data you want to import. The input file is displayed with the first 500 lines by default (configured in Data Type tab) in the lower part of this window which allows you to see the file position of the data fields. Use this preview as a guide to define the data.

Note that Tab 1 displays a green checkmark 

, indicating the minimum requirements have been completed in that pane.

6. We have two format editors of the Data Import tool that we can use, Generic Editor or **Spreadsheet Editor**, for this exercise we will be using Spreadsheet Editor, select this editor from the option **Use**.

When you change the editor used, you will receive the following message informing that the previously format definition opened will clear: click **Yes**.



Note that by default there are six items required properties that are undefined, all of these are required.

7. Select **Space** from the option Delimiter.

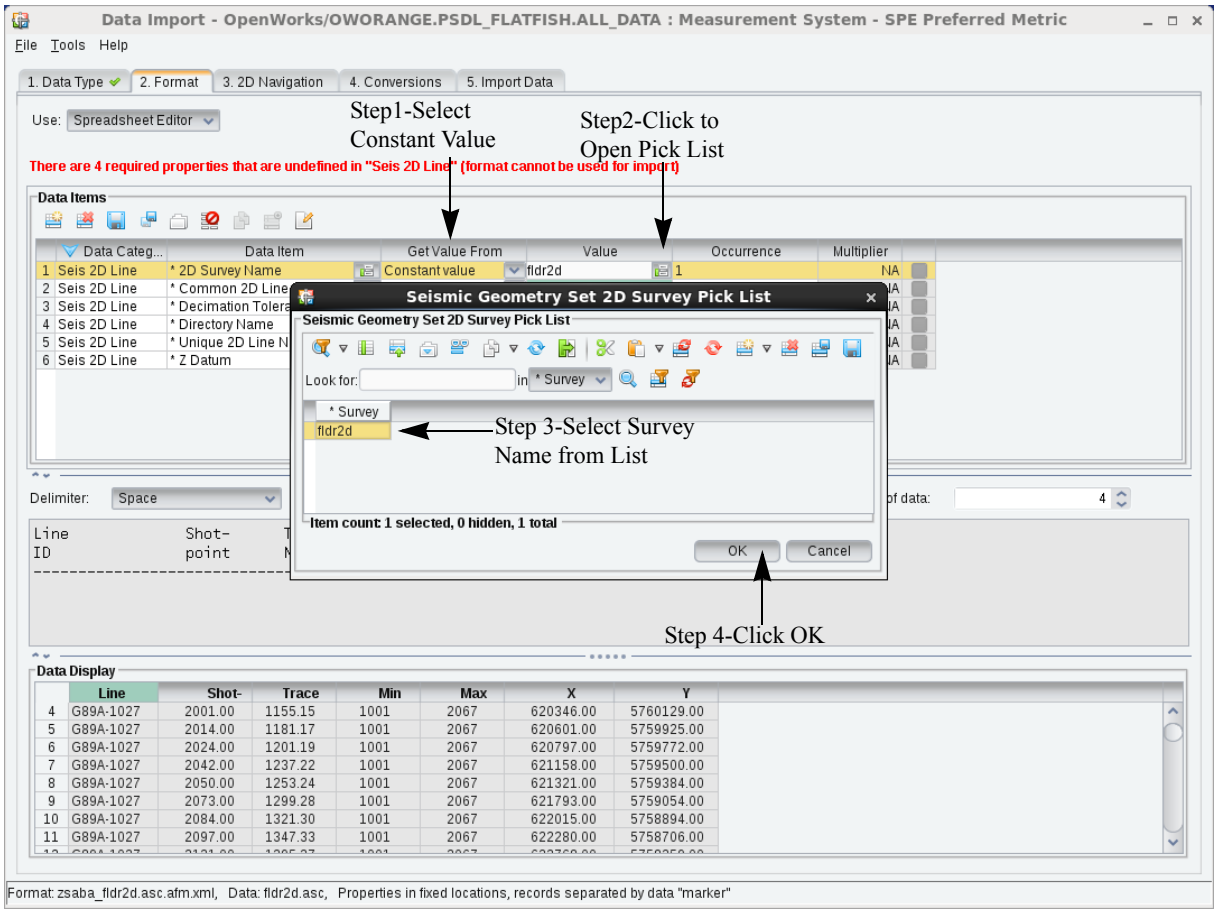
8. Toggle on the option **Column Header Lines** from **1** to **1**. This line will be the header for each column.

9. Set to **4** the option **First Line of Data**, in this option we are removing the first three comments lines and the first line of data will be from fourth line.

10. Define the Data Items Required:

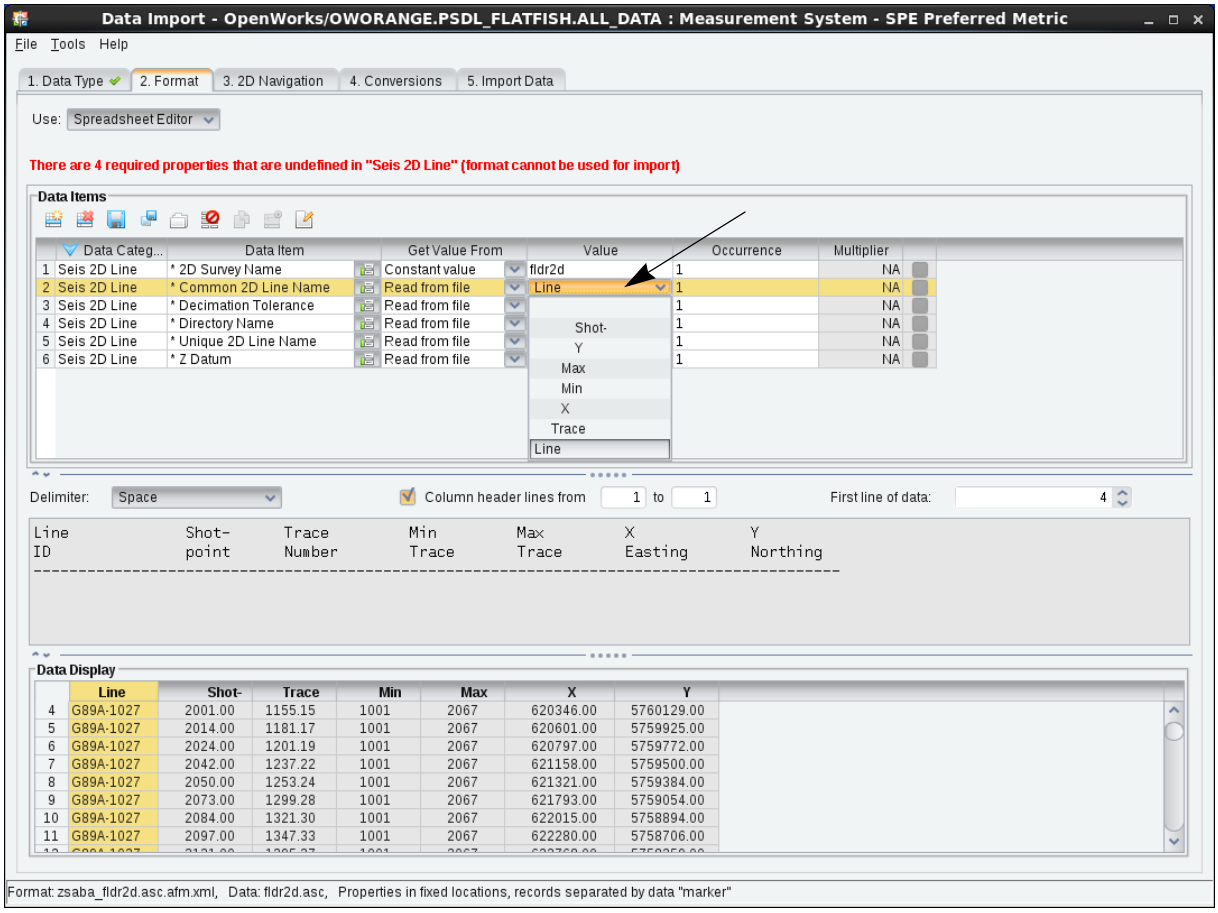
    - From the item **2D Survey Name**, select **Constant Value** from Get Value From drop-down list, and click on **Value** column to

activate the List button, click to open pick list and then select the survey **fldr2d**.



- From the item **Common 2D Line Name**, select **Read From File**, from Get Value From drop-down list, and click on **Value**

column to activate the List button, click to open pick list and then select the **Line** column.



- The next Data Item is **Decimation Tolerance** for 2D seismic lines, select **Constant Value** from Get Value From drop-down list, and click on **Value** column and type **0** (Zero).

Decimation:

When decimating 2D lines, you provide a decimation factor as a non-negative integer, where 0 is no decimation. The decimation tolerance is a linear distance that specifies the maximum distance any shotpoint coordinate can be from the decimated line.

Decimation is used to speed up display in the seismic views, but you must be careful to preserve the line location.

The OpenWorks software stores both the original shotpoints and the decimated data, so you can try various decimation factors by re-iteratively changing the decimation tolerance in Seismic Data Manager, and then displaying lines in SeisWorks or DecisionSpace Desktop to try to improve display time.

- From the item **Directory Name**, select **Constant Value** from Get Value From drop-down list, and click on **Value** column to activate the List button, click to open pick list and then select the Directory Name created **fldr2d**. If you don't see the directory name, go back to the previous step about Seismic File Storage to create it.

- From the item **Unique 2D Line Name**, select **Read From File**, from Get Value From drop-down list, and click on **Value** column to activate the List button, click to open pick list and then select the **Line** column.

- For the last one Data Item required **Z Datum** for 2D seismic lines, select **Constant Value** from Get Value From drop-down list, and click on **Value** column and type 0 (Zero).

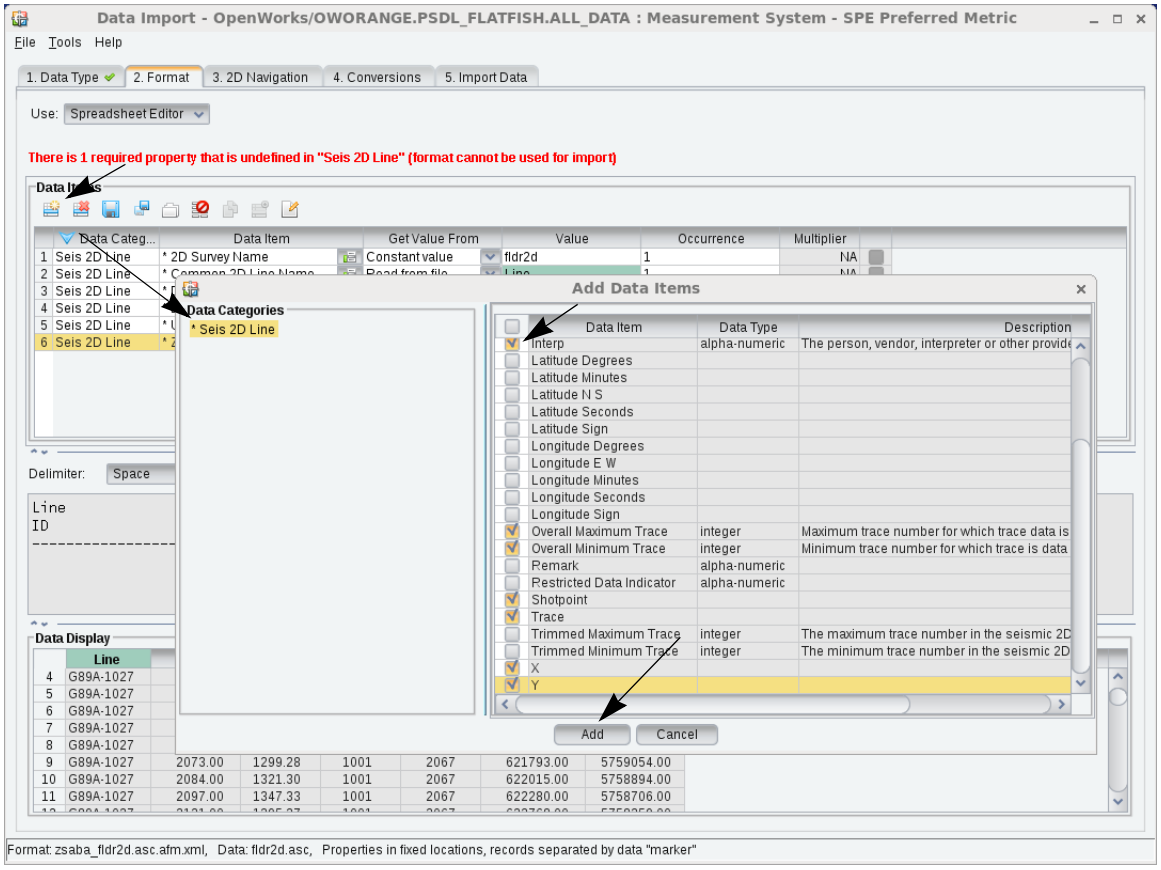
11. Add New Data Items:

    - Then click on Add new data item  icon on the Data Item sections. The Data Items window will open, you can select the rows or Data Items that you need in the category Seis 2D Line.

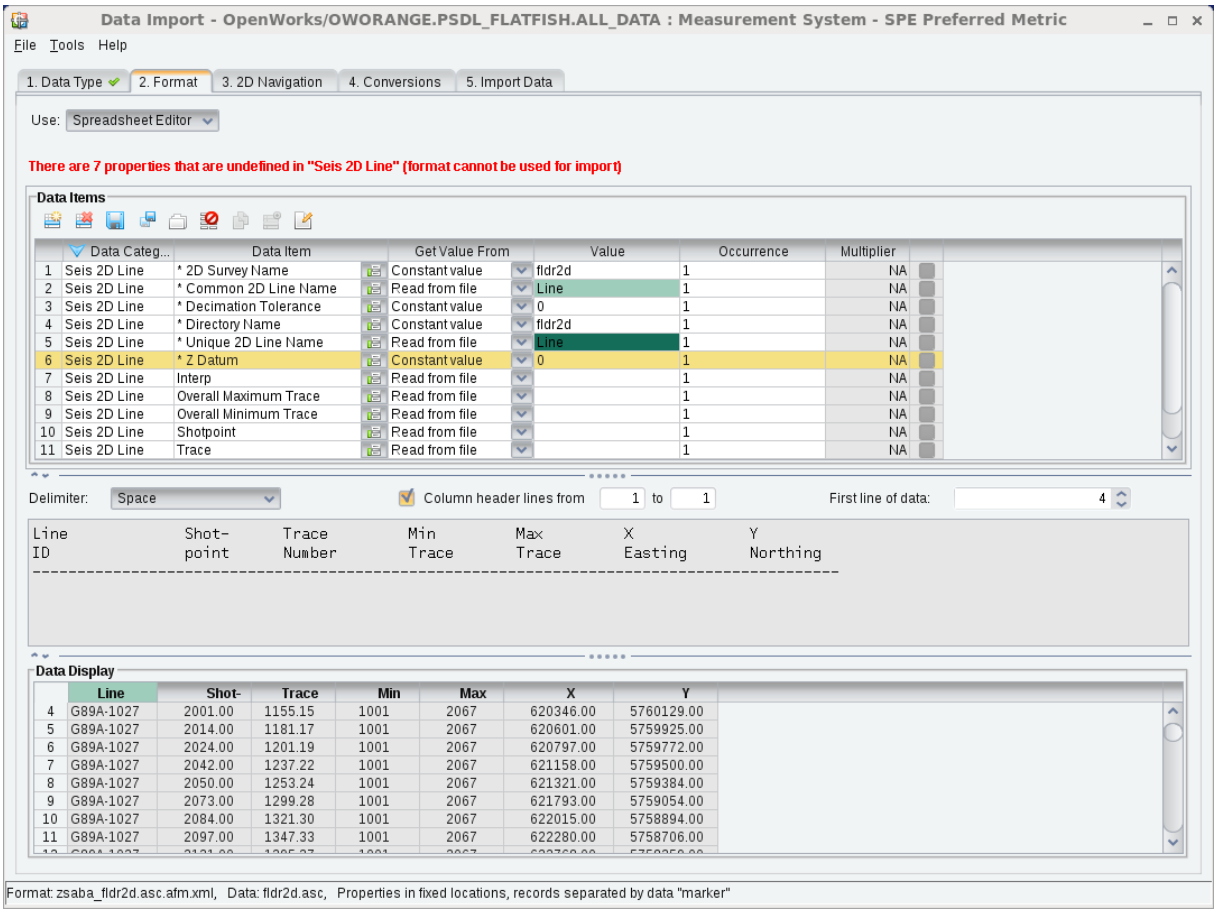
    Add the following Data Items:

    - Interp
    - Overall Maximum Trace
    - Overall Minimum Trace
    - Shotpoint
    - Trace
    - X
    - Y

When you have finished selected all the fields for the Seis 2D Line category, click the **Add** button.



12. Define the New Data Items:



- From the item **Interp**, select **Constant Value** from Get Value From drop-down list, and click on **Value** column to activate the List button, click to open pick list and then select the Your Interpreter created **YOU**.

- From the item **Overall Maximum Trace**, select **Read From File**, from Get Value From drop-down list, and click on **Value** column to activate the List button, click to open pick list and then select the **Max** column.

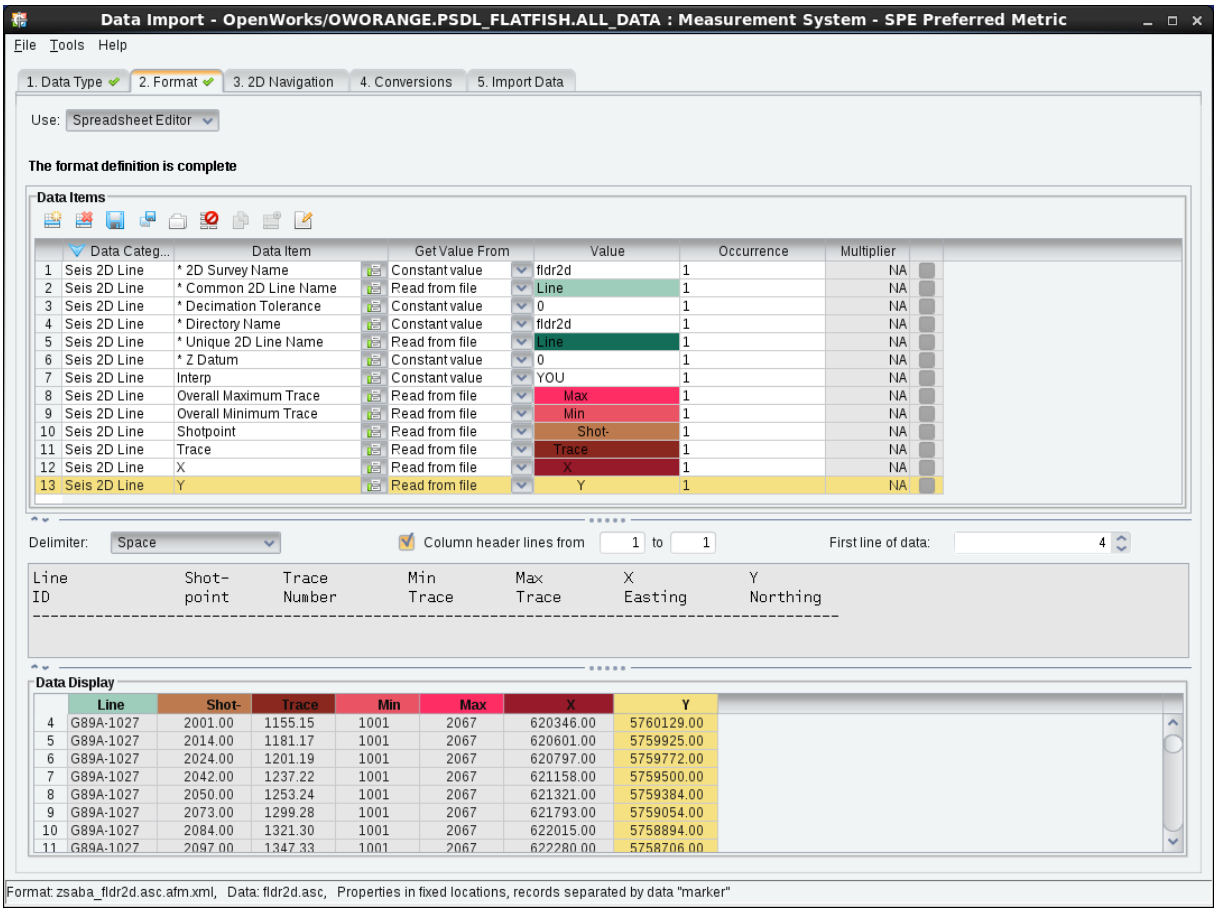
- Do the same with the rest of the columns. From the item **Overall Minimum Trace**, select **Read From File**, from Get Value From drop-down list, and click on **Value** column to activate the List button, click to open pick list and then select the **Min** column.

- From the item **Shotpoint**, select **Read From File**, from Get Value From drop-down list, and click on **Value** column to activate the List button, click to open pick list and then select the **Shot-** column.

- From the item **Trace**, select **Read From File**, from Get Value From drop-down list, and click on **Value** column to activate the List button, click to open pick list and then select the **Trace** column.

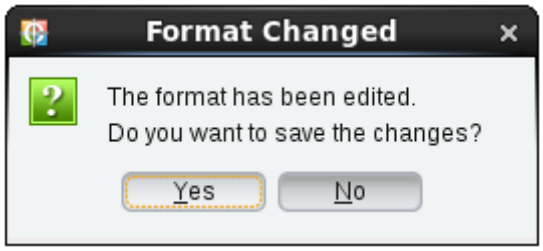
- From the item **X**, select **Read From File**, from Get Value From drop-down list, and click on **Value** column to activate the List button, click to open pick list and then select the **X** column.

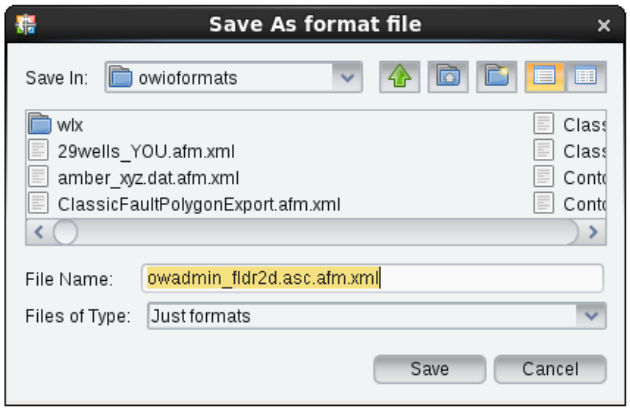
- And finally, from the item **Y**, select **Read From File**, from Get Value From drop-down list, and click on **Value** column to activate the List button, click to open pick list and then select the **Y** column.

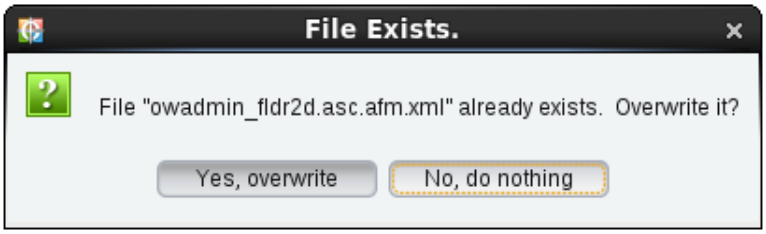


13. Once completed all Data Items, Click on the next **Tab 2D Navigation**. Note also that Tab 2 displays a green checkmark 2. Format ✔, indicating the minimum requirements have been completed in that pane.

If you have not saved the format, the following message is showed, click **Yes** Button, **Save** and then **Yes**, **Overwrite**.







14. Select the **Skip 2D line** option

It is possible that the files you are loading may contain duplicate shotpoints.

OpenWorks does not support duplicate shotpoints (same shotpoint assigned to different traces), so you will need to tell the Import tool how you want to handle this situation if it occurs.

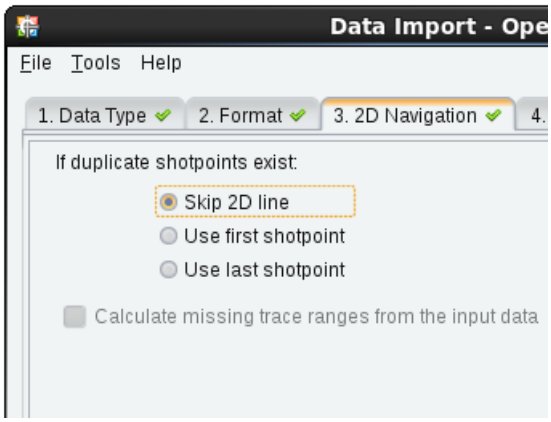
In this panel, you can choose how to handle this situation from the following methods:

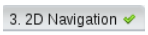
- skip 2D line - skips the duplicate line in the ASCII file; lines previously loaded remain unchanged
- use first shotpoint - uses the first 4-tuple (trace#, shotpoint#, x, y) encountered in a series of consecutive duplicate shotpoints
- use last shotpoint - uses the last 4-tuple encountered in a consecutive series

15. **Calculate missing trace range from the input data** option is Toggle off by default, to keep the complete range from the data file.

The Calculate new trace range from the input data option (the default) updates the minimum and maximum trace range for the given data.

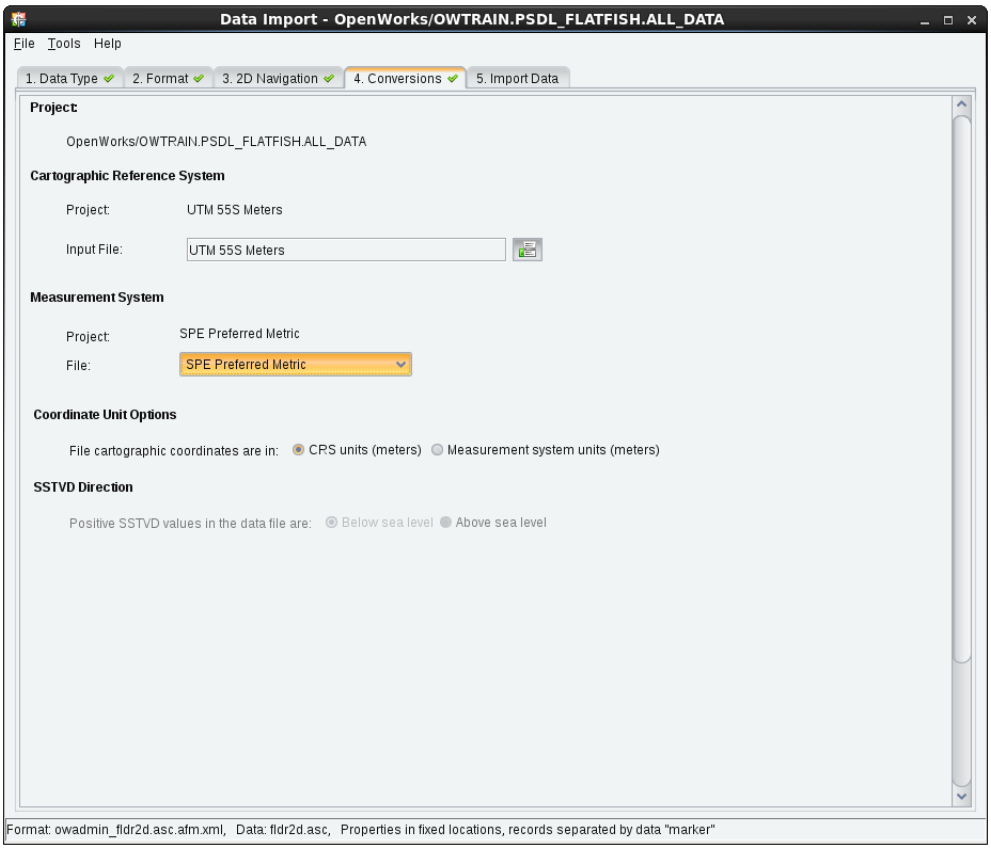
The first shotpoint corresponds to trace 1155. The minimum trace in the file is 1001. Toggling off the calculate option will keep 1001 as the minimum trace. If the option was toggled on, the minimum trace range would be 1155.



16. Click on the next Tab **Conversions**. Note also that Tab 3 displays a green checkmark 

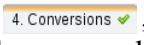
, indicating the minimum requirements have been completed in that pane.
This panel is used to define the CRS, measurement system and

coordinate units in your data file. For reference, the project parameters are listed in the panel.



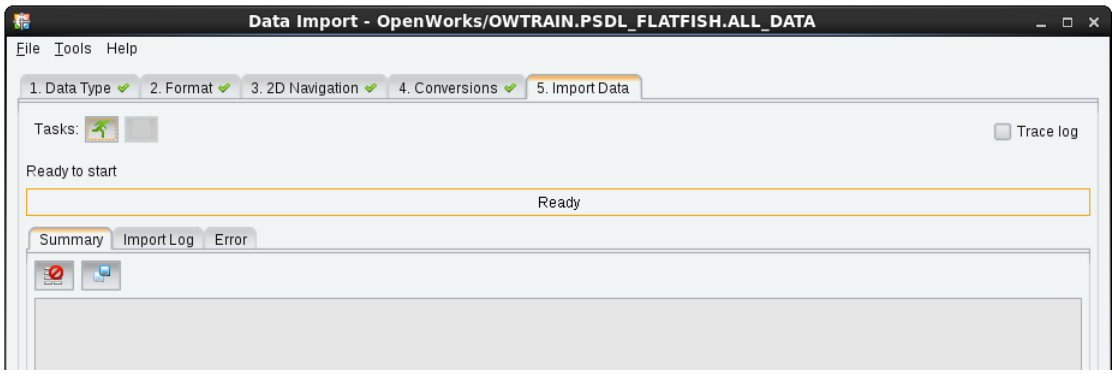
The CRS for the input data is UTM 55S Meters. The PSDL_FLATFISH project measurement system is SPE Preferred Metric. The file measurement system selection defaults to the project measurement system, but you can change it to match your file. You can also specify the units of the coordinates in the file to be taken from either the CRS or measurement system.

In the data file, the coordinates are in meters and the CRS for the coordinates is UTM 55S Meters, so there is no need to change the default selections.

17. Click on the next Tab **Import Data**. Note also that Tab 4 displays a green checkmark 

, indicating the minimum requirements have been completed in that pane.

This panel loads the data and reports summary, import log, and error information after the data is loaded.



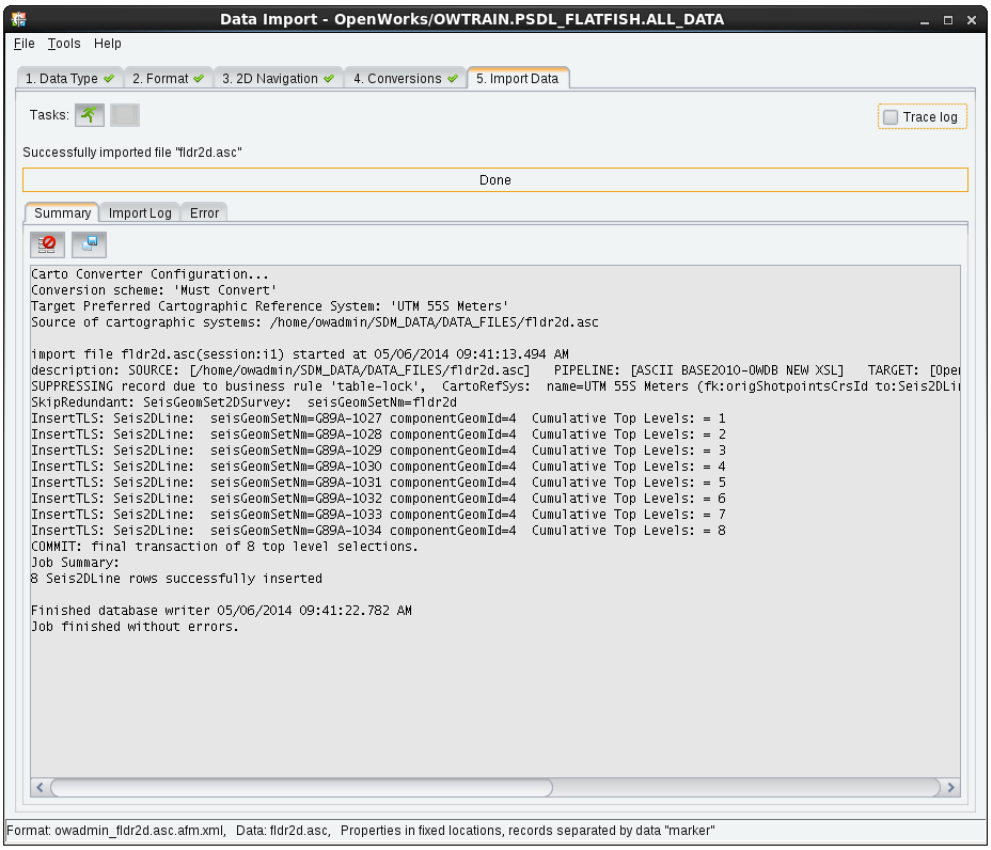
18. Click the Start job icon ( ) next to Tasks to load the navigation data.

If it is necessary to stop the job before the import is complete, click the Stop the Current Job icon ( ).

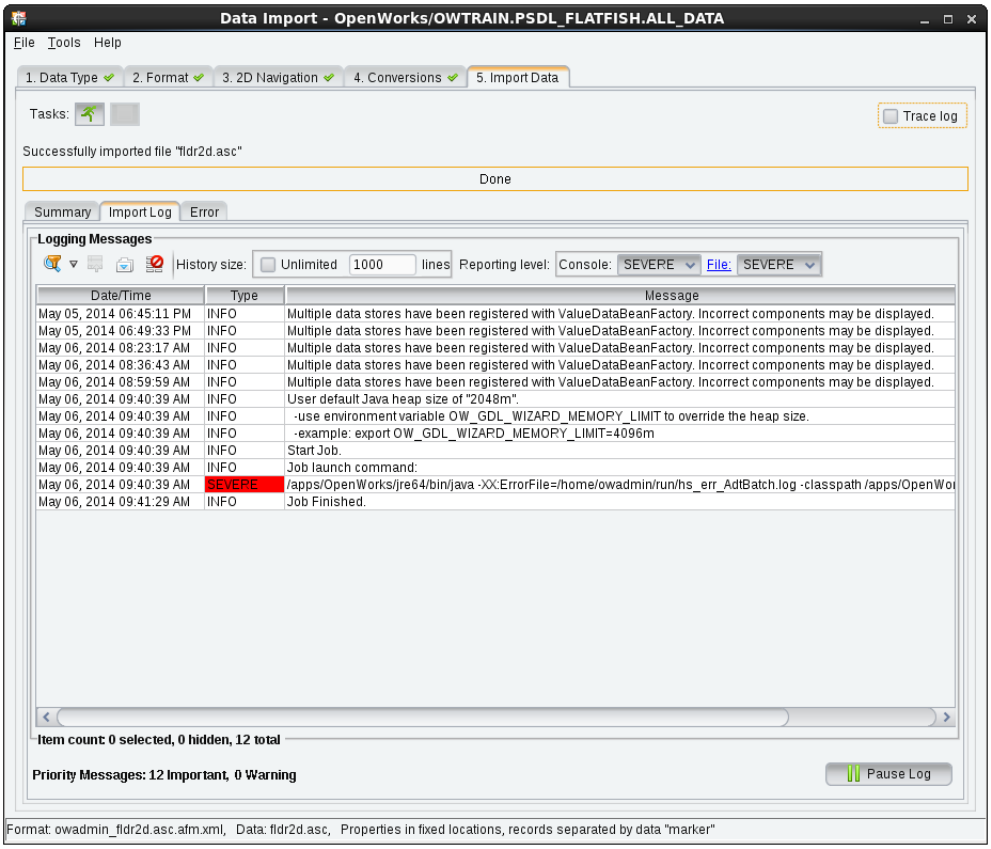
If errors occur during an import, select the Verbose log file option and run the job again. Checking this verbose file provides diagnostic information that may be helpful finding the source of the error. For more information about the messages and errors that may occur during an import, click Help at the bottom of this panel and click the Messages and Error Information While Importing Data link.

19. View the **summary** report that displays when the job is finished. Also check the **Import Log** and **Error** tabs for additional information.

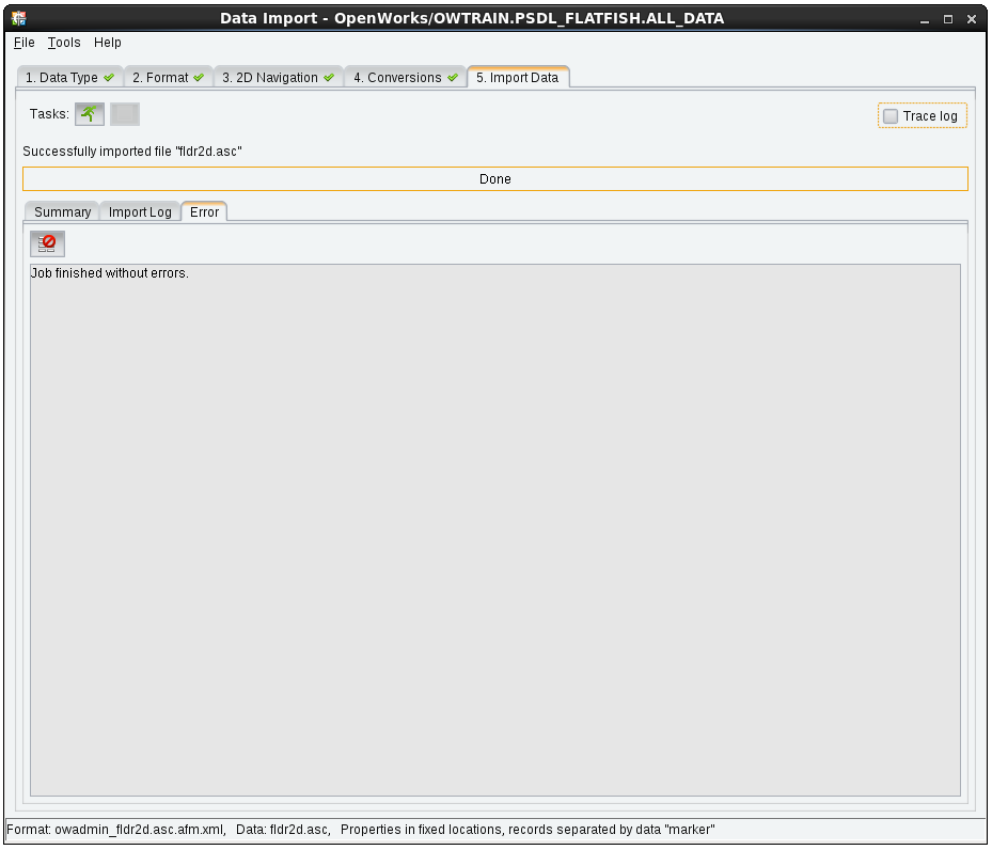
Summary tab:


Data Import - OpenWorks/OWTRAIN.PSDL_FLATFISH.ALL_DATA
File Tools Help
1. Data Type
2. Format
3. 2D Navigation
4. Conversions
5. Import Data
Tasks:
Trace log
Successfully imported file "fldr2d.asc"
Done
Summary
Import Log
Error
Carto Converter Configuration...
Conversion scheme: 'Must Convert'
Target Preferred Cartographic Reference System: 'UTM 55S Meters'
Source of cartographic systems: /home/owadmin/SDM_DATA/DATA_FILES/fldr2d.asc
import file fldr2d.asc(session:i1) started at 05/06/2014 09:41:13.494 AM
description: SOURCE: [/home/owadmin/SDM_DATA/DATA_FILES/fldr2d.asc] PIPELINE: [ASCII BASE2010-OWDB NEW XSL] TARGET: [Oper
SUPPRESSING record due to business rule 'table-lock', CartoRefSys: name=UTM 55S Meters (fk:origShotpointsCrsId to:Seis2DLi
SkipRedundant: SeisGeomSet2DSurvey: seisGeomSetNm=fldr2d
InsertTLS: Seis2DLine: seisGeomSetNm=G89A-1027 componentGeomId=4 Cumulative Top Levels: = 1
InsertTLS: Seis2DLine: seisGeomSetNm=G89A-1028 componentGeomId=4 Cumulative Top Levels: = 2
InsertTLS: Seis2DLine: seisGeomSetNm=G89A-1029 componentGeomId=4 Cumulative Top Levels: = 3
InsertTLS: Seis2DLine: seisGeomSetNm=G89A-1030 componentGeomId=4 Cumulative Top Levels: = 4
InsertTLS: Seis2DLine: seisGeomSetNm=G89A-1031 componentGeomId=4 Cumulative Top Levels: = 5
InsertTLS: Seis2DLine: seisGeomSetNm=G89A-1032 componentGeomId=4 Cumulative Top Levels: = 6
InsertTLS: Seis2DLine: seisGeomSetNm=G89A-1033 componentGeomId=4 Cumulative Top Levels: = 7
InsertTLS: Seis2DLine: seisGeomSetNm=G89A-1034 componentGeomId=4 Cumulative Top Levels: = 8
COMMIT: final transaction of 8 top level selections.
Job Summary:
8 Seis2DLine rows successfully inserted
Finished database writer 05/06/2014 09:41:22.782 AM
Job finished without errors.
Format: owadmin_fldr2d.asc.afm.xml, Data: fldr2d.asc, Properties in fixed locations, records separated by data "marker"

Import Log tab:



Error tab:


Data Import - OpenWorks/OWTRAIN.PSDL_FLATFISH.ALL_DATA
File Tools Help
1. Data Type
2. Format
3. 2D Navigation
4. Conversions
5. Import Data
Tasks:
Trace log
Successfully imported file "fldr2d.asc"
Done
Summary
Import Log
Error
Job finished without errors.
Format: owadmin_fldr2d.asc.afm.xml, Data: fldr2d.asc, Properties in fixed locations, records separated by data "marker"

Exercise 4: Check the Navigation Data Import in Seismic Data Manager

The Data Import Utility reports that 8 lines were successfully inserted. Use Seismic Data Manager to check that the lines loaded correctly.

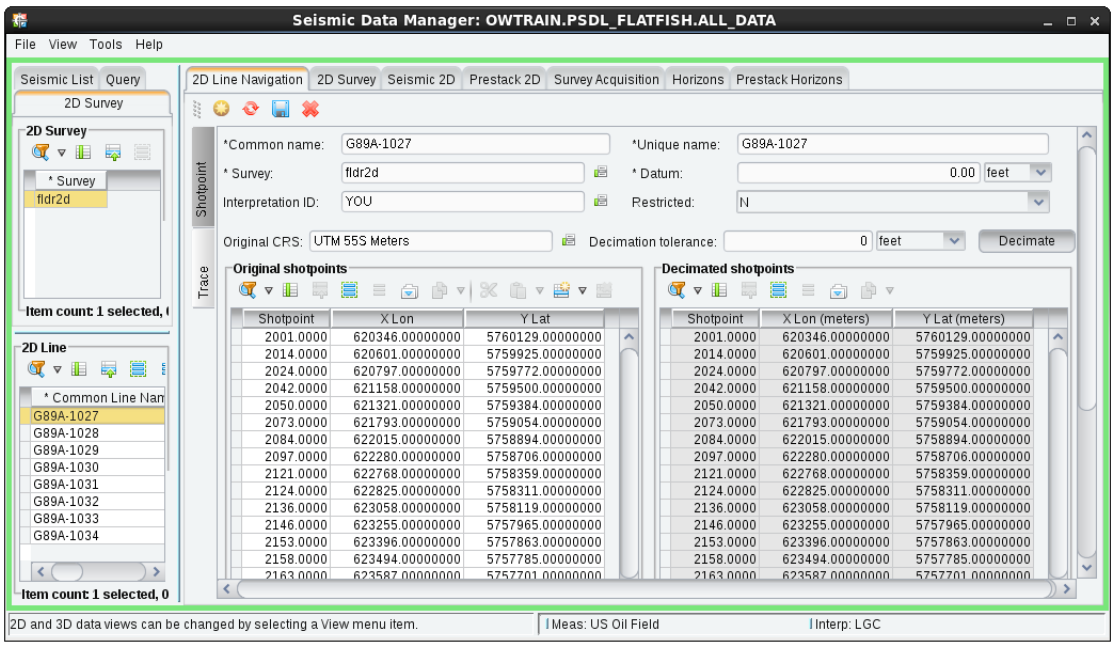
1. Open Seismic Data Manager (it should be minimized).

2. With the **fldr2D** survey selected in the left hand pane, click the **2D Line Navigation** tab in the right hand pane.

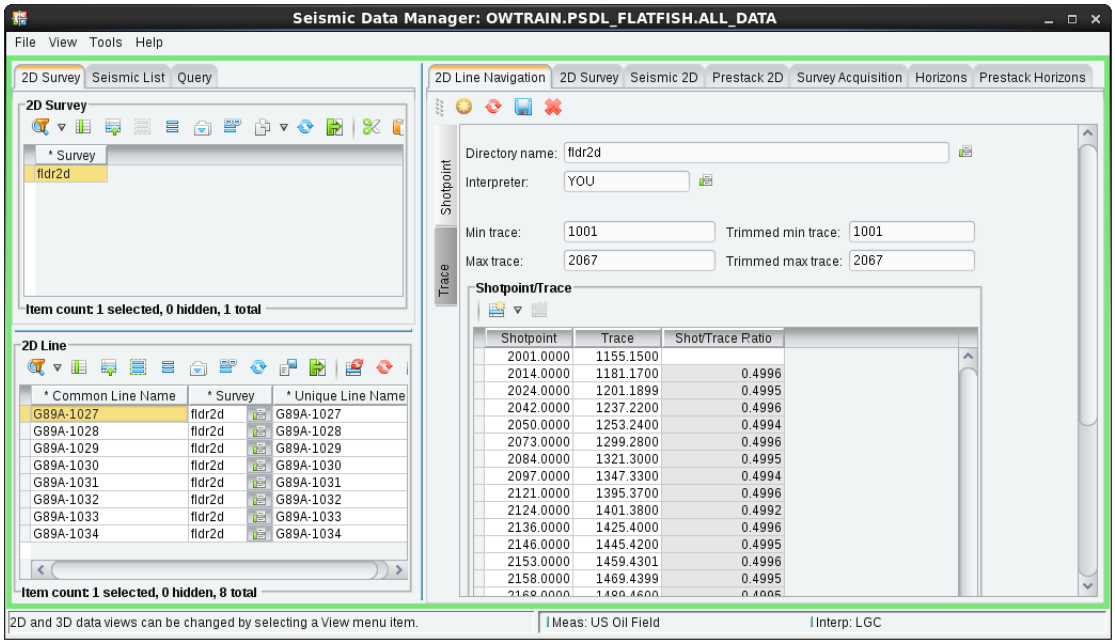
   The display updates showing the 2D Line Navigation tab currently blank and a new panel in the left hand pane showing all the available 2D lines linked to the fldr2D survey. Click the line names to display navigation information for the line.

3. Click **GA89A-1027** in the 2D Line pane.

   The right hand pane now displays the shotpoint navigation information for the **GA89A-1027** line.



4. Toggle between the **Shotpoint** and **Trace** tabs to view all the data stored for the G89A-1027 line.



5. Select several different 2D lines and review the loaded information. Check to see that the values loaded match the *fldr2d.asc* data file.

To view the data file, either:

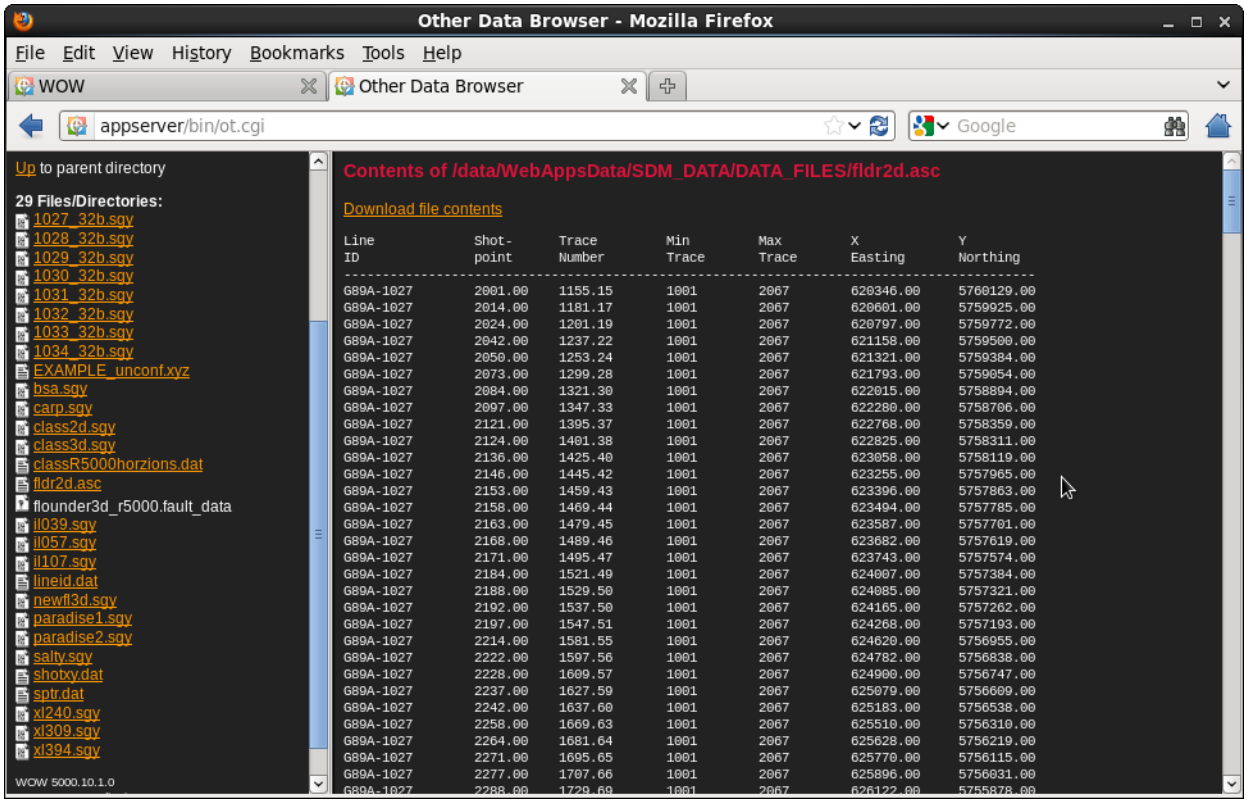
- Open an xterm, cd to the file directory and use the more command

Terminal

File Edit View Terminal Tabs Help

```
trn23{student}% cd /home/student/SDM_DATA
/home/student/SDM_DATA
trn23{student}% more fldr2d.asc
Line            Shot-      Trace        Min        Max        X            Y
ID              point      Number       Trace      Trace      Easting      Northing
-------------------------------------------------------------------------------------
G89A-1027       2001.00    1155.15      1001       2067       620346.00    5760129.00
G89A-1027       2014.00    1181.17      1001       2067       620601.00    5759925.00
G89A-1027       2024.00    1201.19      1001       2067       620797.00    5759772.00
G89A-1027       2042.00    1237.22      1001       2067       621158.00    5759500.00
G89A-1027       2050.00    1253.24      1001       2067       621321.00    5759384.00
G89A-1027       2073.00    1299.28      1001       2067       621793.00    5759054.00
G89A-1027       2084.00    1321.30      1001       2067       622015.00    5758894.00
G89A-1027       2097.00    1347.33      1001       2067       622280.00    5758706.00
G89A-1027       2121.00    1395.37      1001       2067       622768.00    5758359.00
G89A-1027       2124.00    1401.38      1001       2067       622825.00    5758311.00
G89A-1027       2136.00    1425.40      1001       2067       623058.00    5758119.00
G89A-1027       2146.00    1445.42      1001       2067       623255.00    5757965.00
G89A-1027       2153.00    1459.43      1001       2067       623396.00    5757863.00
G89A-1027       2158.00    1469.44      1001       2067       623494.00    5757785.00
G89A-1027       2163.00    1479.45      1001       2067       623587.00    5757701.00
G89A-1027       2168.00    1489.46      1001       2067       623682.00    5757619.00
G89A-1027       2171.00    1495.47      1001       2067       623743.00    5757574.00
G89A-1027       2184.00    1521.49      1001       2067       624007.00    5757384.00
G89A-1027       2188.00    1529.50      1001       2067       624085.00    5757321.00
G89A-1027       2192.00    1537.50      1001       2067       624165.00    5757262.00
G89A-1027       2197.00    1547.51      1001       2067       624268.00    5757193.00
G89A-1027       2214.00    1581.55      1001       2067       624620.00    5756955.00
G89A-1027       2222.00    1597.56      1001       2067       624782.00    5756838.00
G89A-1027       2228.00    1609.57      1001       2067       624900.00    5756747.00
G89A-1027       2237.00    1627.59      1001       2067       625079.00    5756609.00
G89A-1027       2242.00    1637.60      1001       2067       625183.00    5756538.00
G89A-1027       2258.00    1669.63      1001       2067       625510.00    5756310.00
G89A-1027       2264.00    1681.64      1001       2067       625628.00    5756219.00
G89A-1027       2271.00    1695.65      1001       2067       625770.00    5756115.00
```

- Open WOW (select **Other Data > /data/WebAppsData > SDM_DATA** and click **fldr2d.asc**)



Exercise 5: Check the Basemap in SeisWorks MapView and DecisionSpace Geosciences

Another important navigation QC step is to display a basemap. Since the Horizon Image Map is only relevant for 3D data, you may display the basemap in SeisWorks, DecisionSpace Geosciences, or WOW.

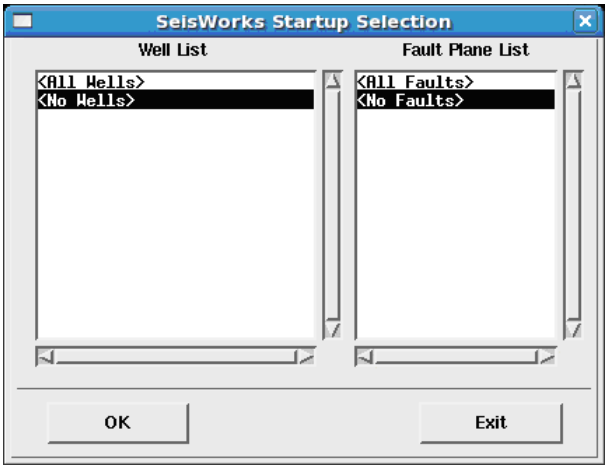
The exercise covers display in SeisWorks, DecisionSpace Geosciences and WOW. Try all three methods or choose the method you prefer (you only need to check one basemap), though for exercise continuity in this class you should complete the SeisWorks display.

Part 1: Display Basemap in the SeisWorks Software

Compare Map View basemap with the transmittal sheet.

1. Open the SeisWorks software (**Applications > SeisWorks**).

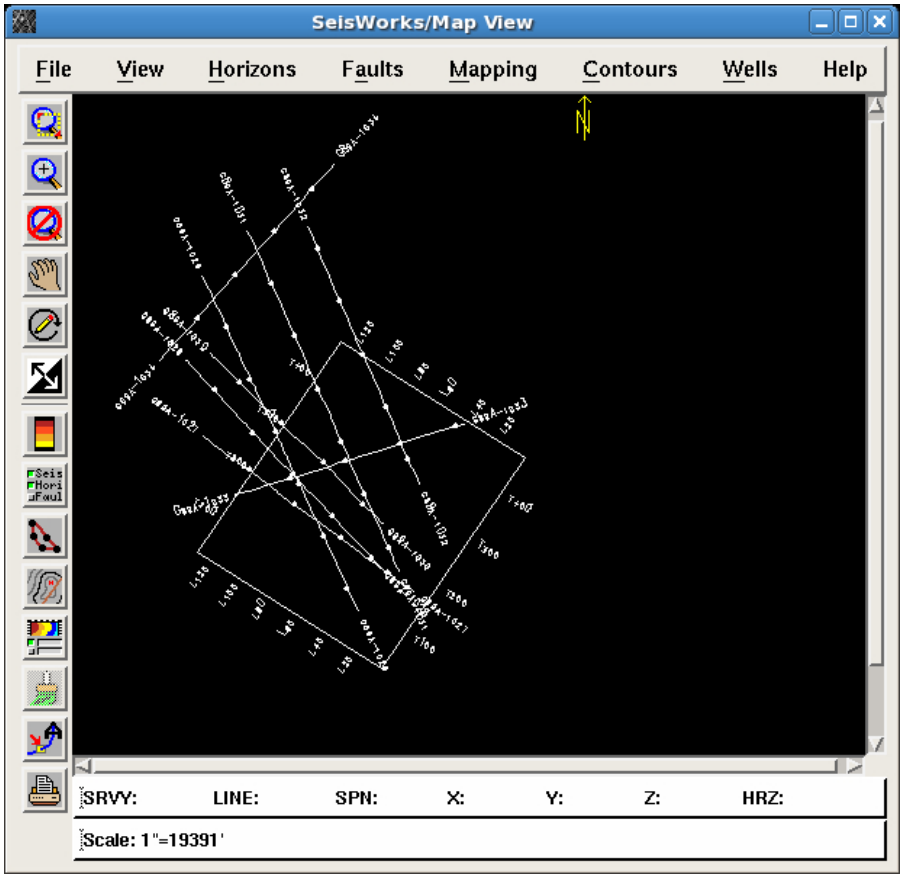
2. Start a new time session **Session > New (Time)** - No Wells, No Faults.



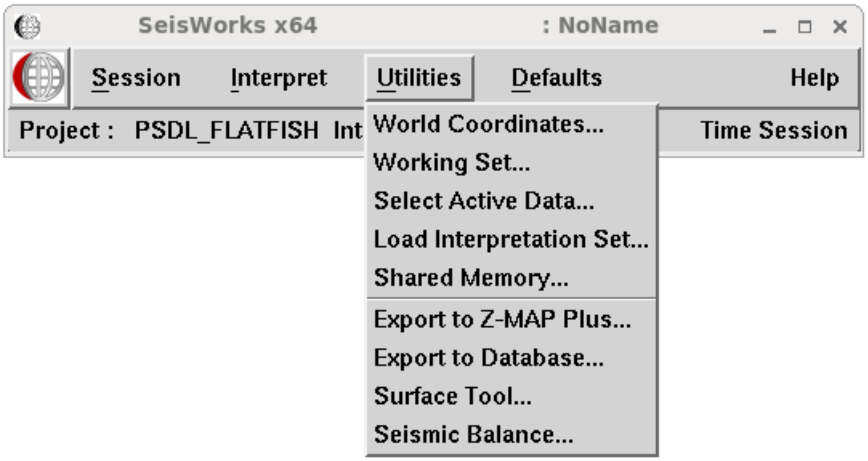
Map View and Seismic View windows display.

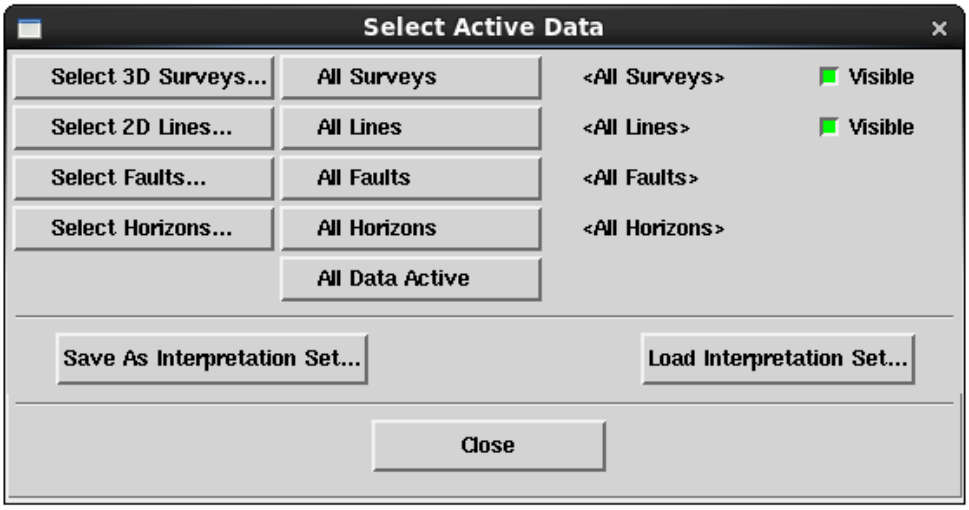
In the Map View you should see the 2D lines and one or more 3D surveys, depending on which exercises and 3D workshops you have completed in this class. In order to concentrate on the 2D lines, the

3D survey(s) may be temporarily removed from the views with the next steps.



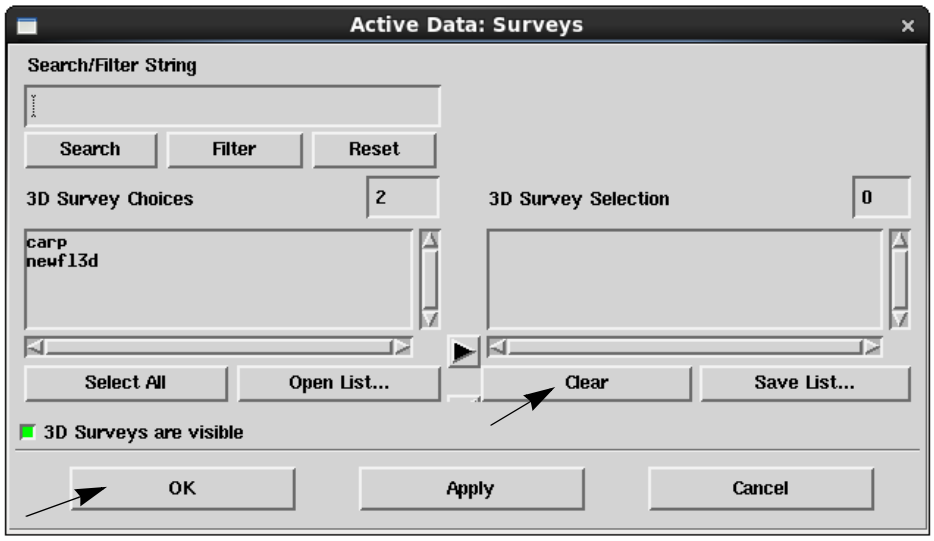
3. To see only the 2D lines, use **Utilities > Select Active Data…** to de-select the 3D surveys.





4. Click the **Select 3D Surveys…** button to move 3D surveys to/from SeisWorks displays.

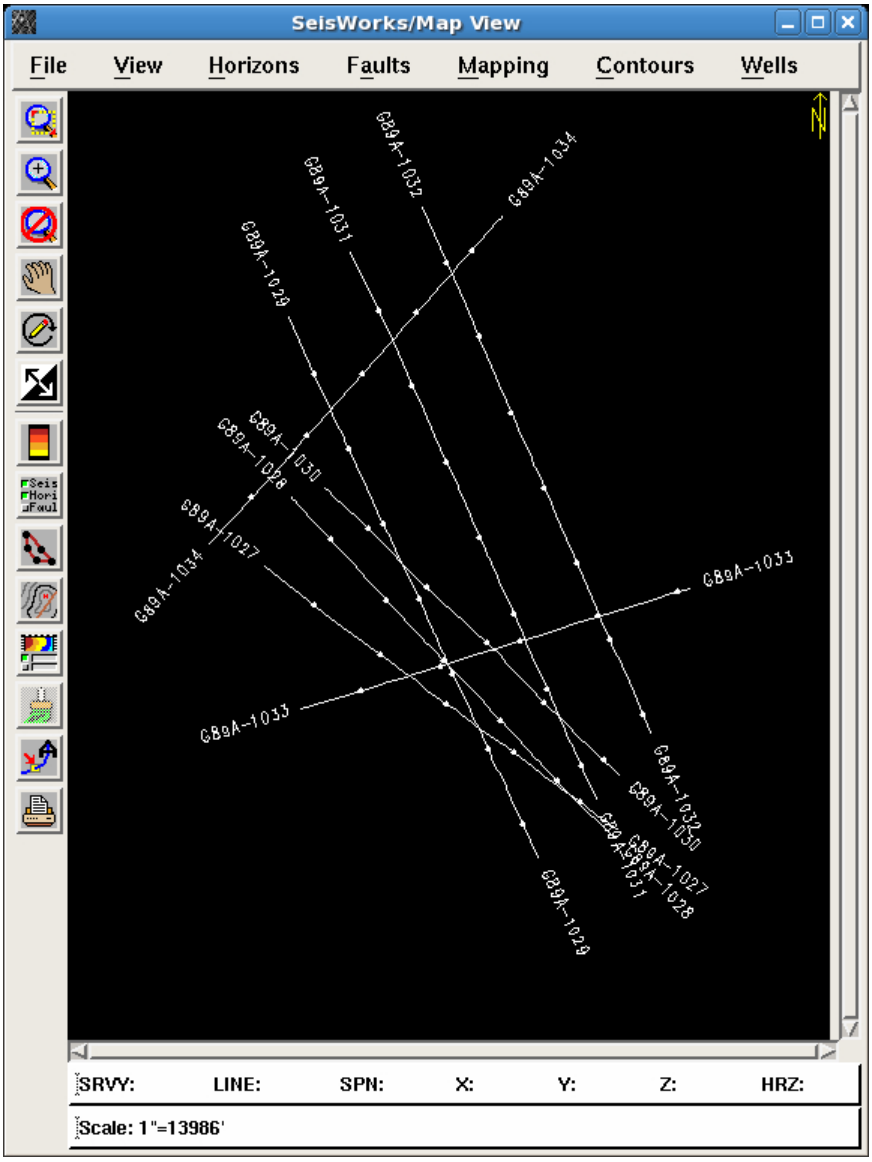
5. Click **Clear** to de-select any surveys in the 3D Survey Selection list. The surveys move to the 3D Survey Choice list.



You can add them back at any time by highlighting the survey you want and using the arrow to move them back to the selection list.

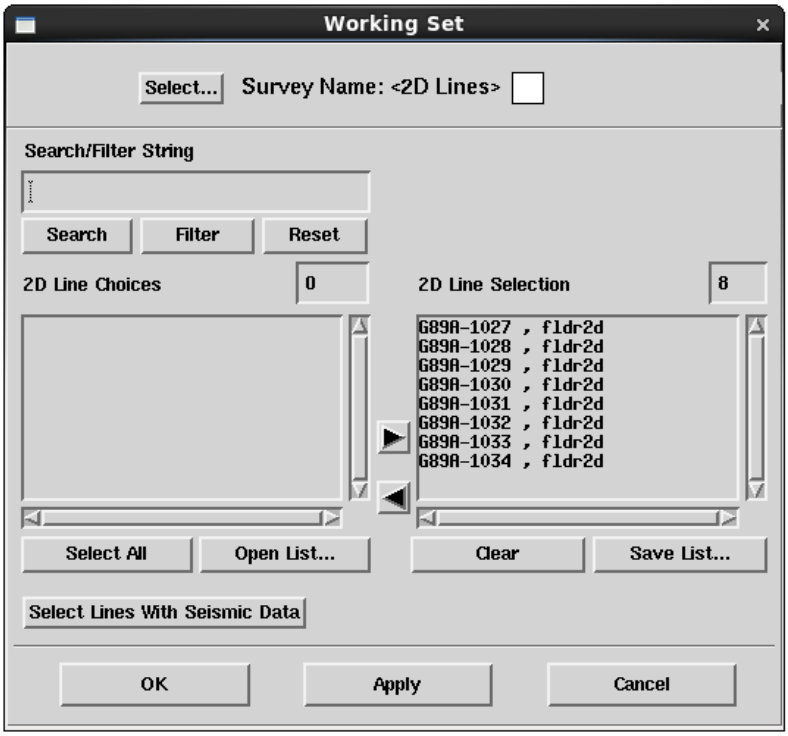
6. Click **OK**.

7. Click **Close** in the *Select Active Data* dialog.



The 2D lines selected in the view are controlled by the Working Set utility option.

8. Notice in the Working Set (**Utilities > Working Set…**) all the 2D lines are automatically selected. You can move them on and off as needed to look at specific lines in detail.

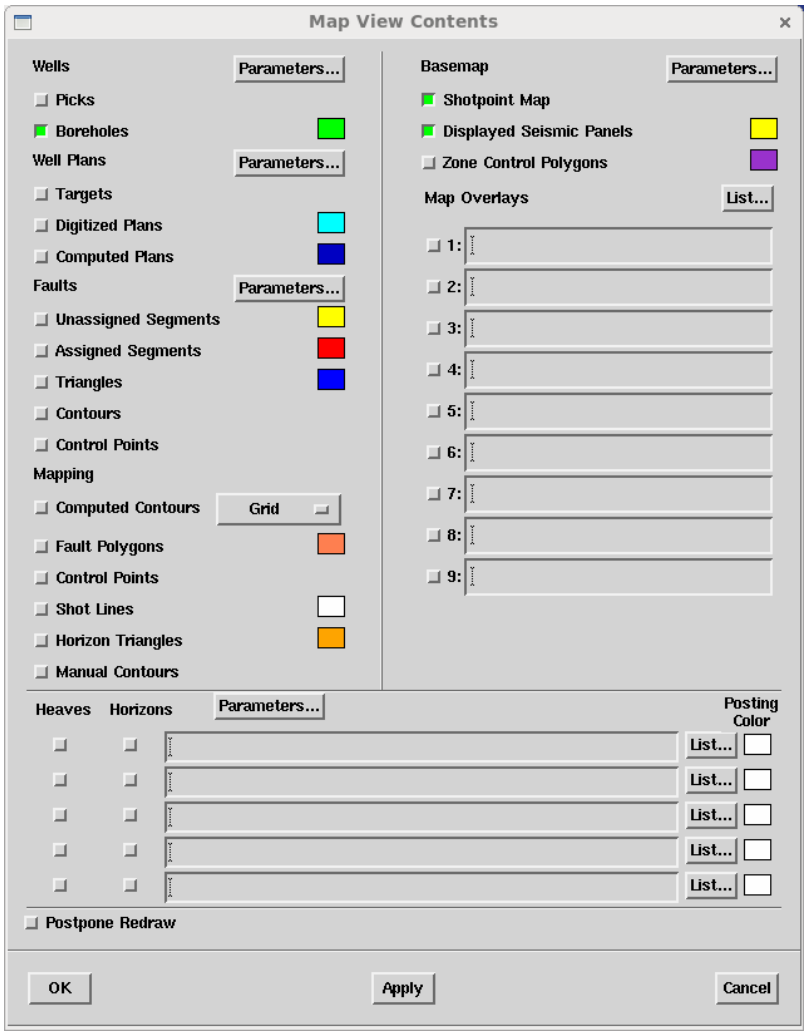


9. Click **Cancel** to close.

10. Re-draw the Map View ( ).

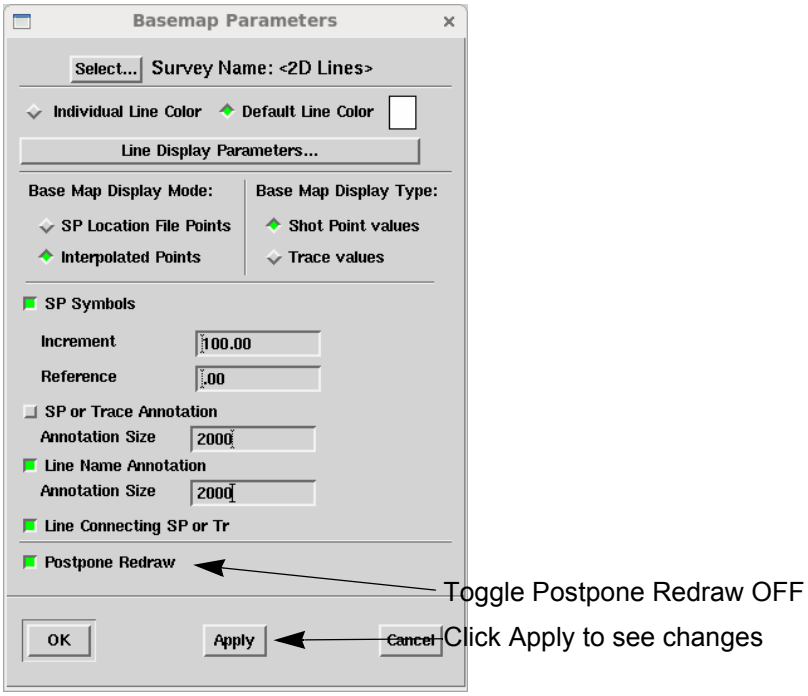
    Change the basemap display parameters as you like to improve the display.

11. In Map View, select the **View Contents** icon ( ).

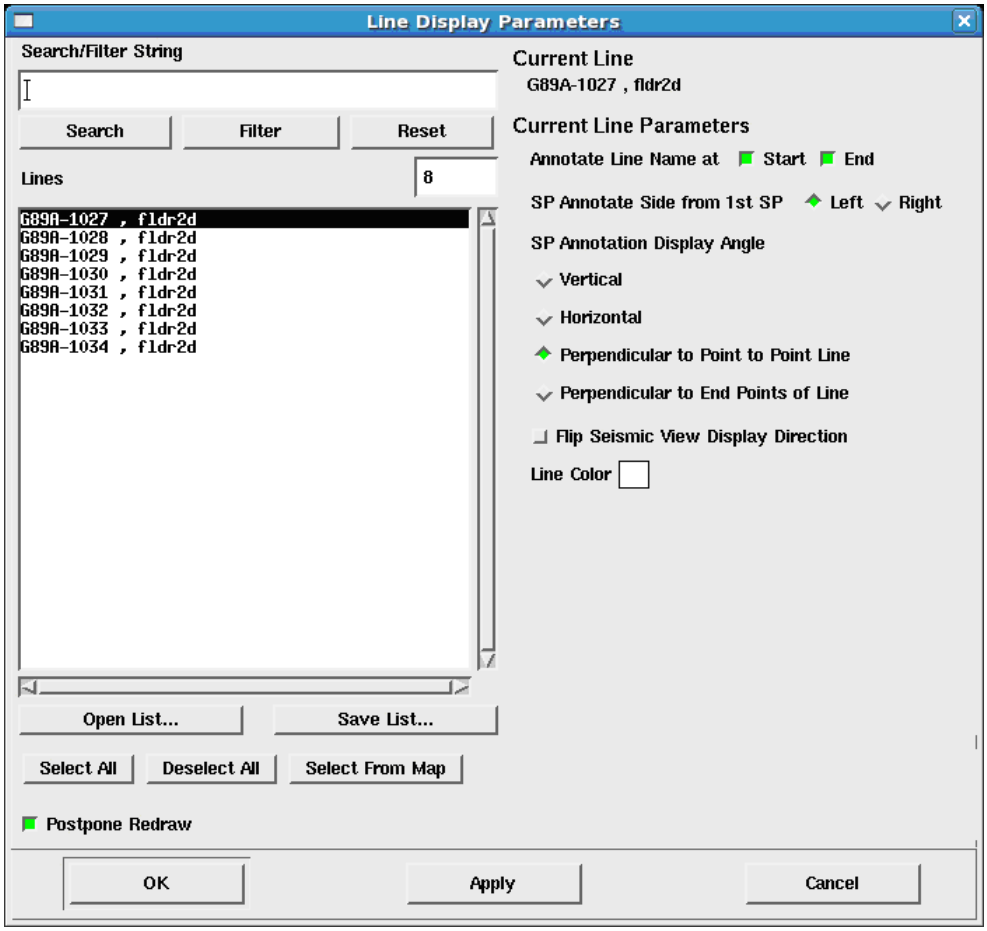


12. Click Basemap **Parameters…**.

Change annotation size and SP Symbol increment. Try a few different values then and pick what you like. Toggle off **Postpone Redraw** and click **Apply** to see changes.



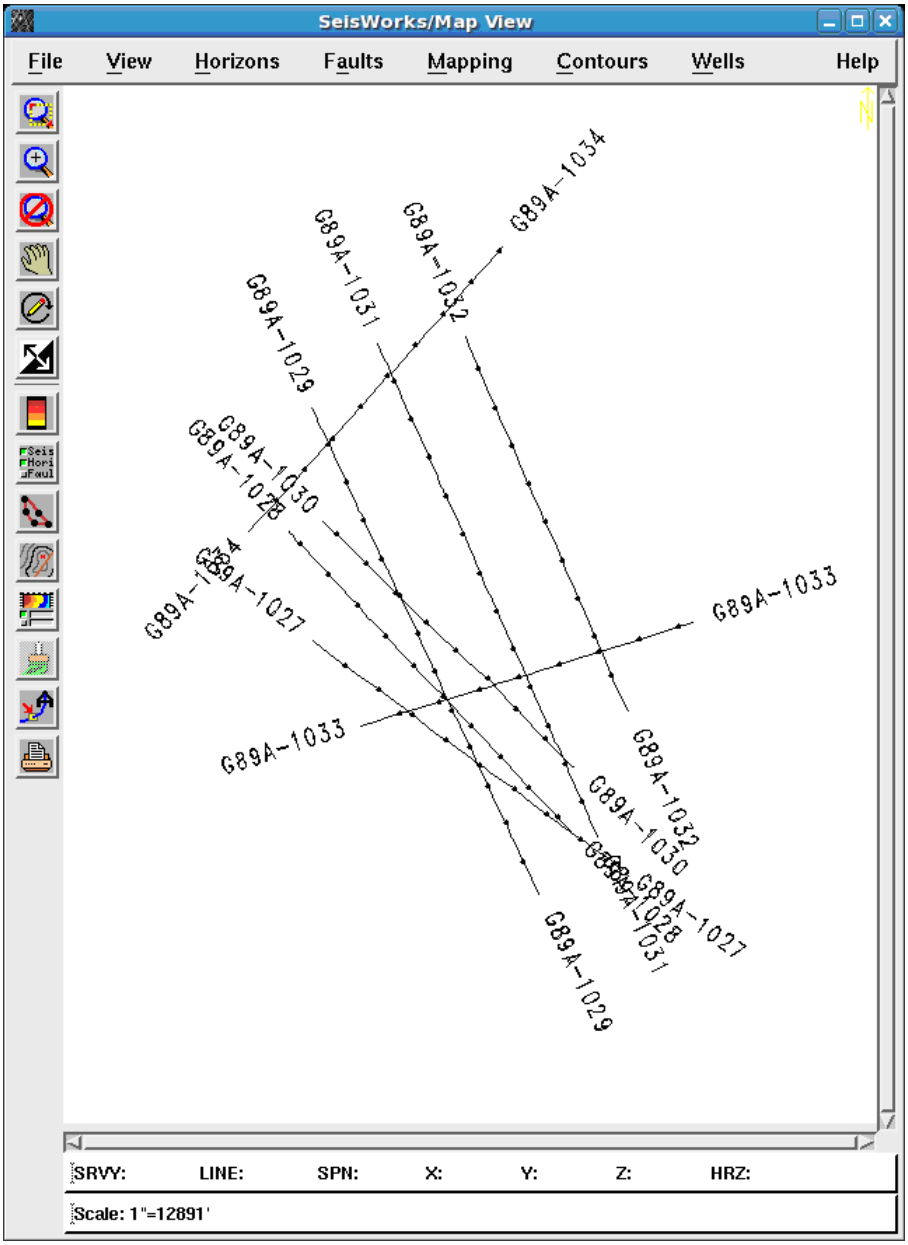
13. Click **Line Display Parameters…**.



14. Use Cancel to close all contents and display dialog boxes when you are satisfied with the display.

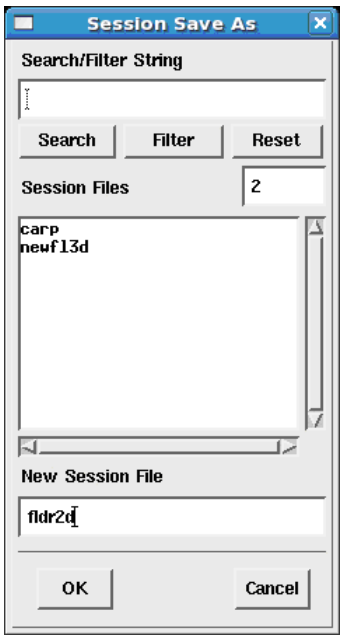
    To change the Map View background, click the toggle icon ( ).

Choose the background color you prefer.



Save your session to return to once you have loaded the seismic data.

15. Save the SeisWorks session (**Session > Save As...**).



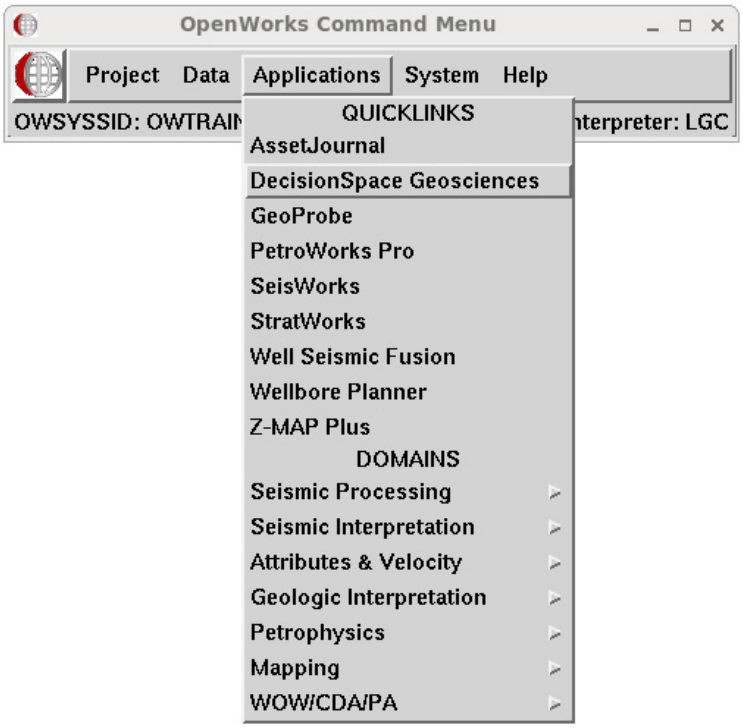
16. Type in a name and click **OK**.

17. Exit the SeisWorks software with **Session > Exit**.

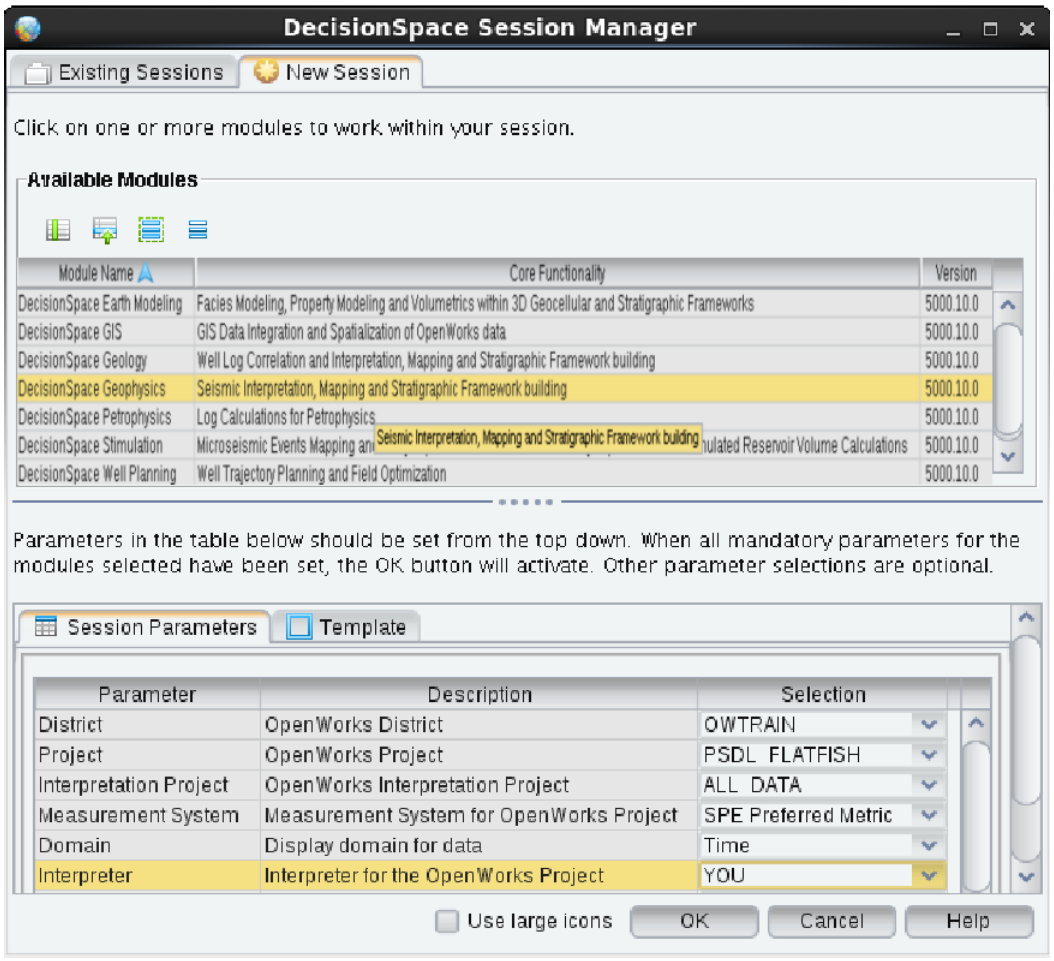
Part 2: Optional—DecisionSpace Geosciences Software Basemap Display

DecisionSpace Geosciences provides another option to view 2D navigation data. For 2D data, this check has no meaning, so DecisionSpace Geosciences Basemap or SeisWorks can be used to display 2D navigation data.

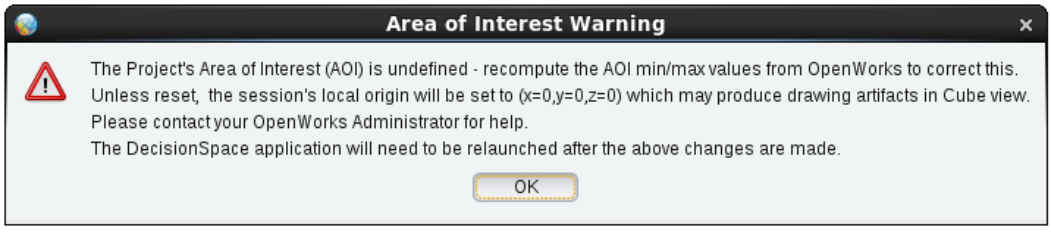
1. **Launch DecisionSpace Geosciences (Data > Management > DecisionSpace Geosciences).**



2. When the DecisionSpace Session Manager opens, click on the New Session tab and set the following parameters. Click **OK** when done.

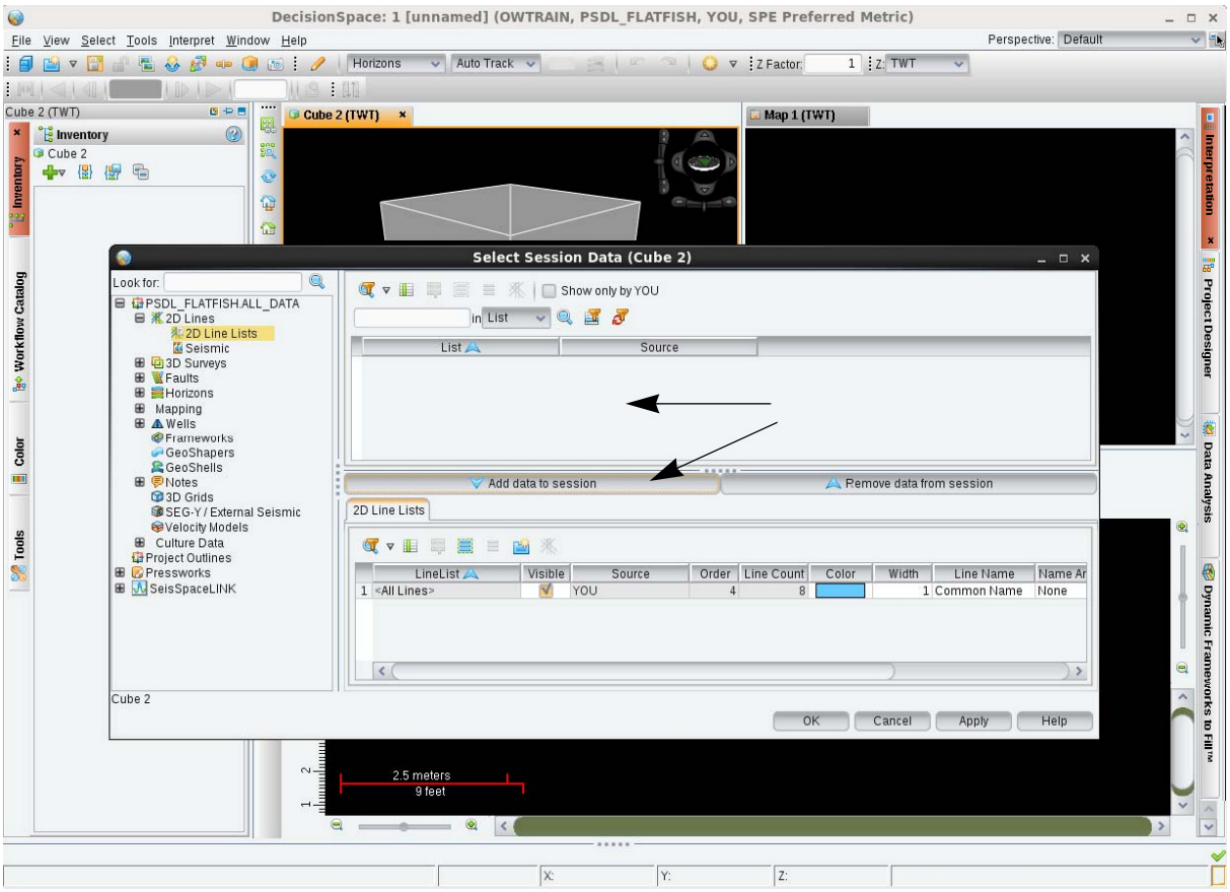


3. If you get the following warning, click **OK**.

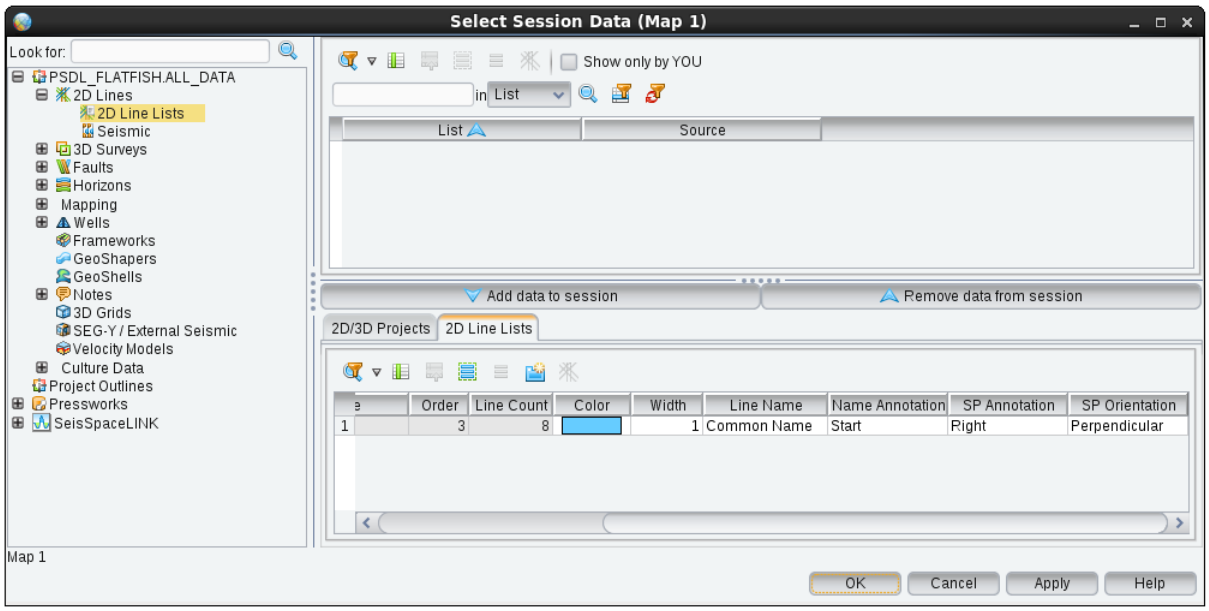


4. Click on the Map View tab then open Select Session Data by clicking on the icon or using File > Select Session Data. In the left panel, open the 2D Lines category and click on 2D Line List. In the

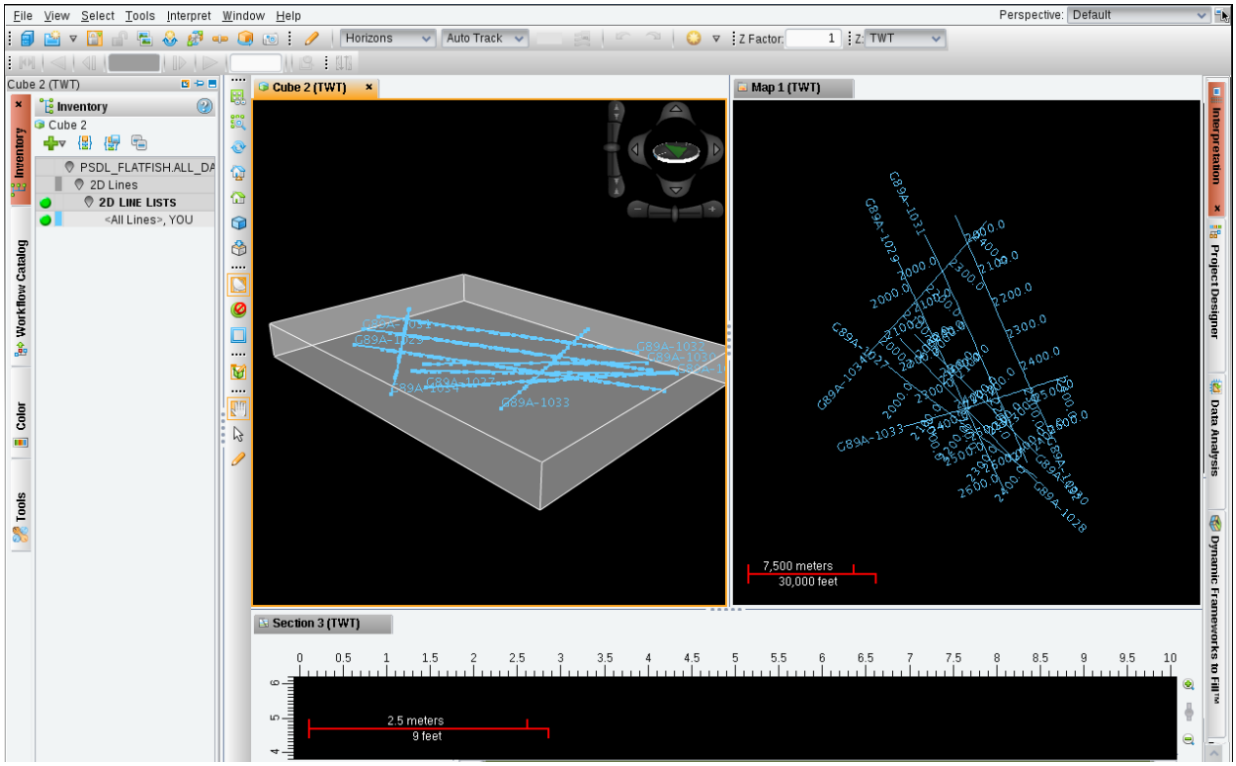
upper-right panel, select <All Lines> and click the **Add data to session** button.



5. In the lower-right panel, click on the **2D Line Lists** tab. Scroll to the right until you can see the **Name annotation** and **SP Annotation** columns. Select **Start** and **Right**, respectively.



6. Click **OK** and the *Select Session Data* dialog closes.



7. Compare the basemap with the transmittal sheet. When you are satisfied that the lines are positioned correctly, exit **DecisionSpace Geosciences** using **File > Exit**.

Part 3: Optional—Display the WOW Software Basemap

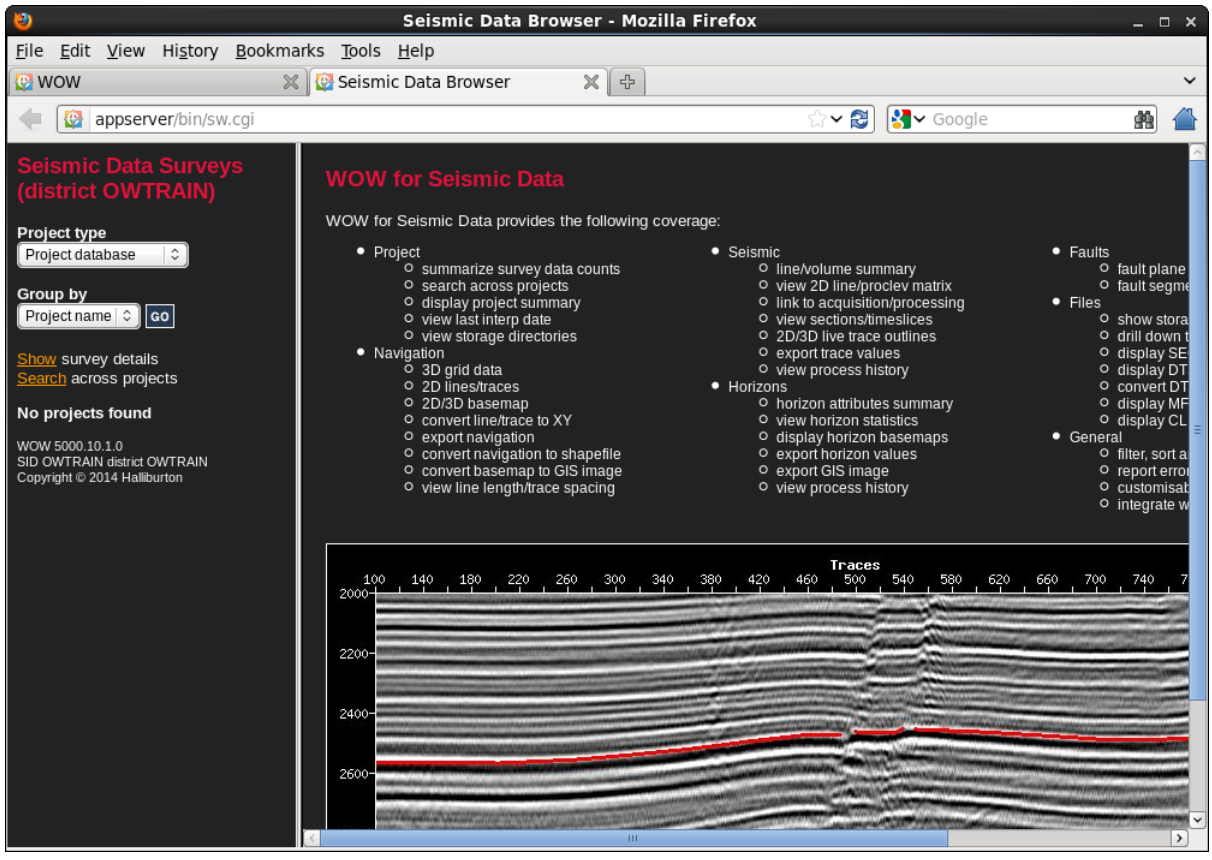
The WOW software will display the navigation data in a simple basemap and also display trace ranges and x, y coordinates for the 2D lines.

1. To open the WOW software, web browser and type the following in the address bar:

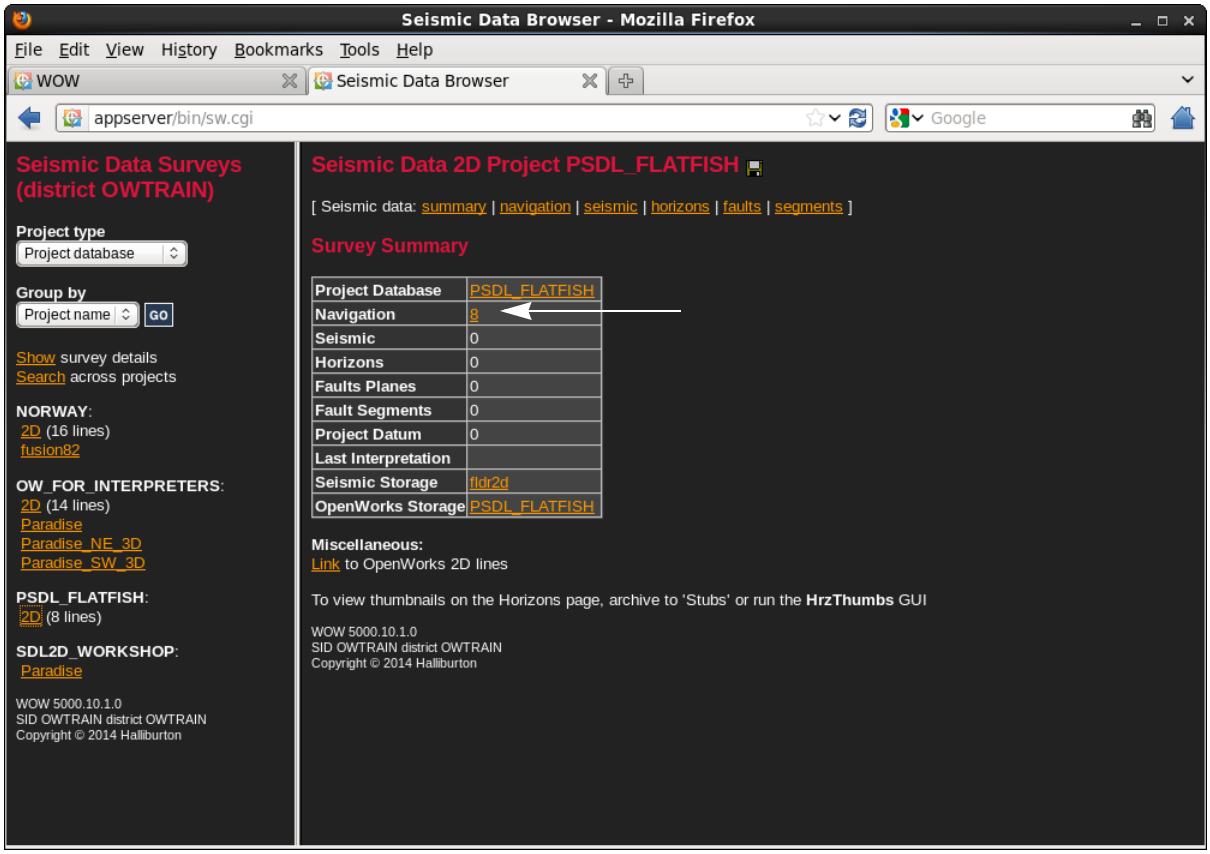
   ```
   http://<your machine name here>/
   ```

2. Click **Seismic Data**.

3. Change OW project type to **Project database** and then click the **GO** button.

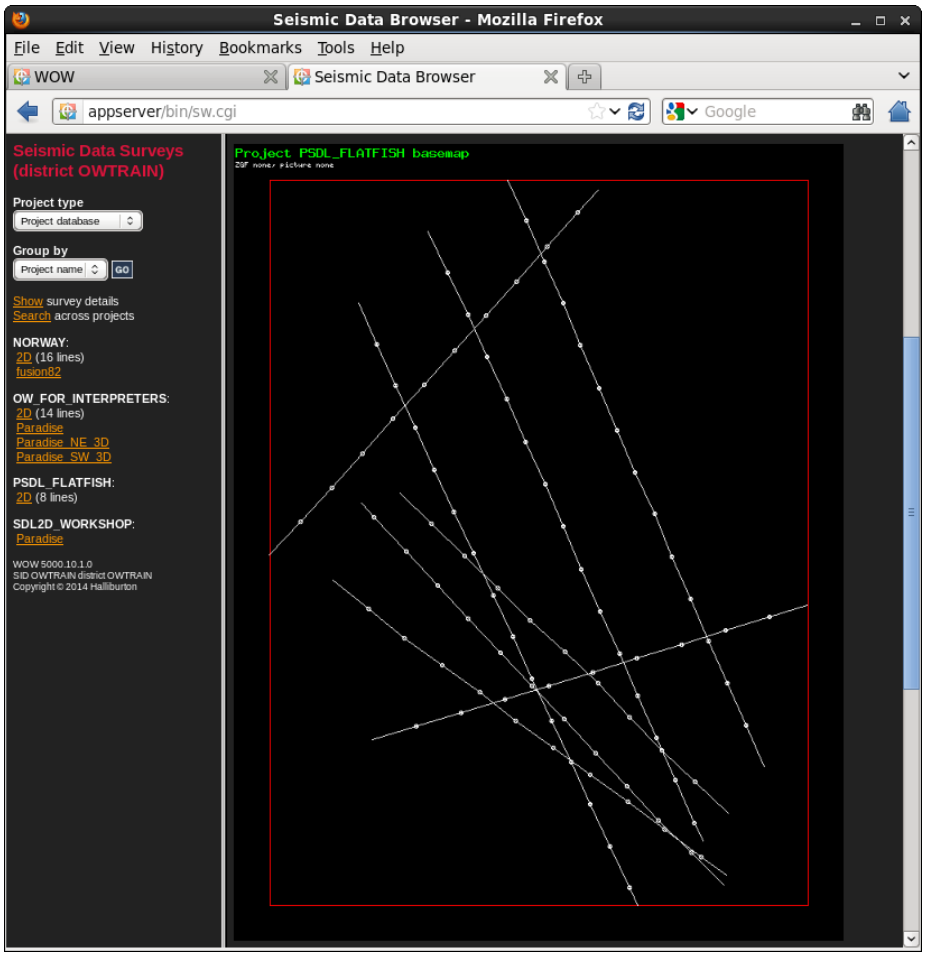


4. Click **2D** under **PSDL_FLATFISH** Project.

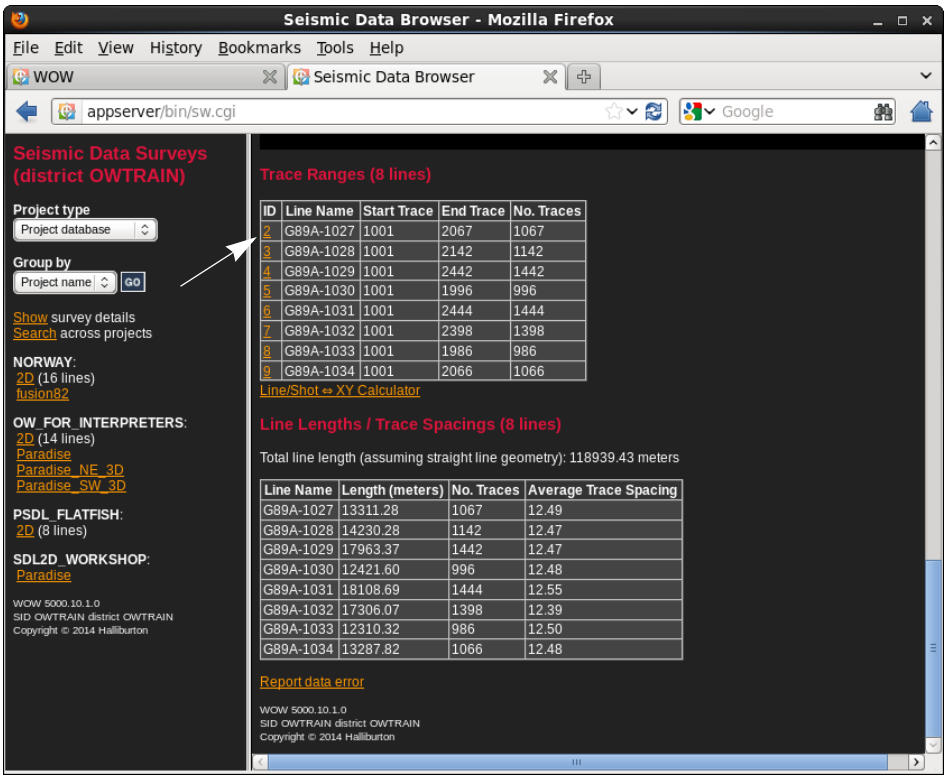


5. Click the number **8** next to Navigation in the Survey Summary.

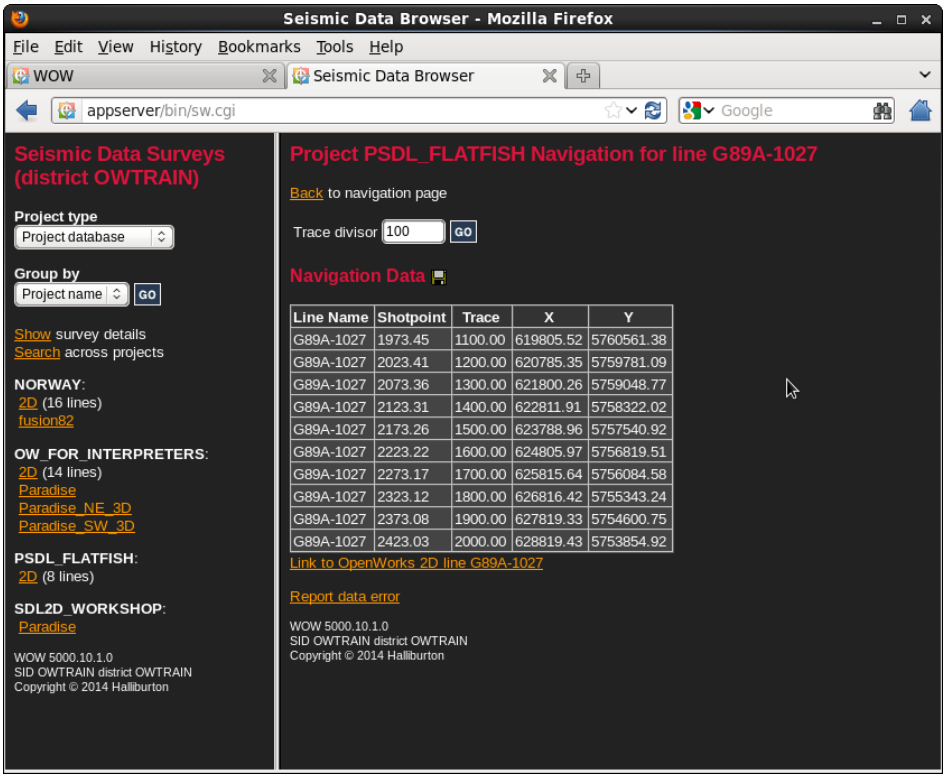
6. Scroll through the display to locate the basemap.



7. Scroll to the Trace Range display.



8. Click on the ID number for a line to see the coordinate information.



Any of these methods will display a basemap to compare with a map of the area or transmittal sheet diagram. Checking the values loaded in Seismic Data Manager and viewing the basemap comprise the navigation QC process. If the navigation is correct, the next step is to analyze the SEG-Y data to prepare to load into Landmark 2D format.

Analyzing SEG-Y Seismic Data

You will need to know a number of things about the data on the SEG-Y formatted tape before loading trace data using the PostStack Data Loader. As in previous exercises, the necessary information can be gathered using the SEGY Analyzer, a utility that allows easy analysis of SEG-Y data files from tape or disk.

Information Required before Loading 2D Data

Before you can load trace data, you need to have information about tape format, data format, and about the location of several key pieces of information in the trace header.

Media (tape or disk) Format Questions

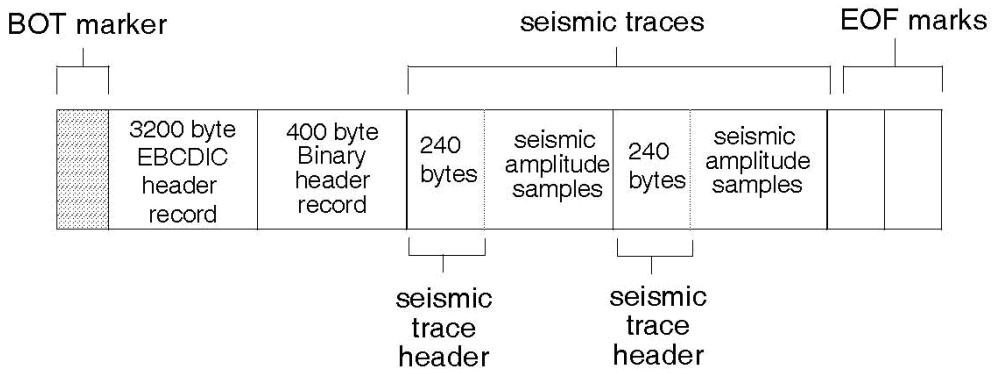
- How many header records are at the beginning of the tape?

  According to SEG-Y standard, there should be two: the EBCDIC header and the binary header. Non-standard tapes may be different.

- Are there End-Of-File (EOF) markers between the lines?

  Most 2D tapes have EOFs between lines, but some do not.

  Sometimes EOF markers are followed by header records. These may be repeats of the EBCDIC and binary records at the beginning of the tape, or they may have new data. You could have just an EBCDIC record, just a binary, or both.



Parts of a SEG-Y Formatted Tape

Data Format Questions

You need to answer the following questions about the seismic trace data, generally found in the binary header record:

- What is the sample format?
- What is the sample rate?
- What is the number of samples per trace?

Line name question

You need to determine:

- Is there a line number in a tape header record?

Trace Header Information Questions

In order to load the data, you must be able to specify:

- Byte position and format for the trace number
- Byte position and format for the shotpoint field
- Byte position and format for the x and y coordinates

Exercise 6: Analyzing the SEG-Y Data

The seismic data you load in this exercise deviates slightly from standard SEG-Y format. You will use the SEGY Analyzer to verify location and format of required information and create a template defining this information.

When you load 2D data from SEG-Y files using the PostStack Data Loader, each line must be in a separate file. Thus, you will need to analyze eight SEG-Y files before you load seismic traces for the eight lines.

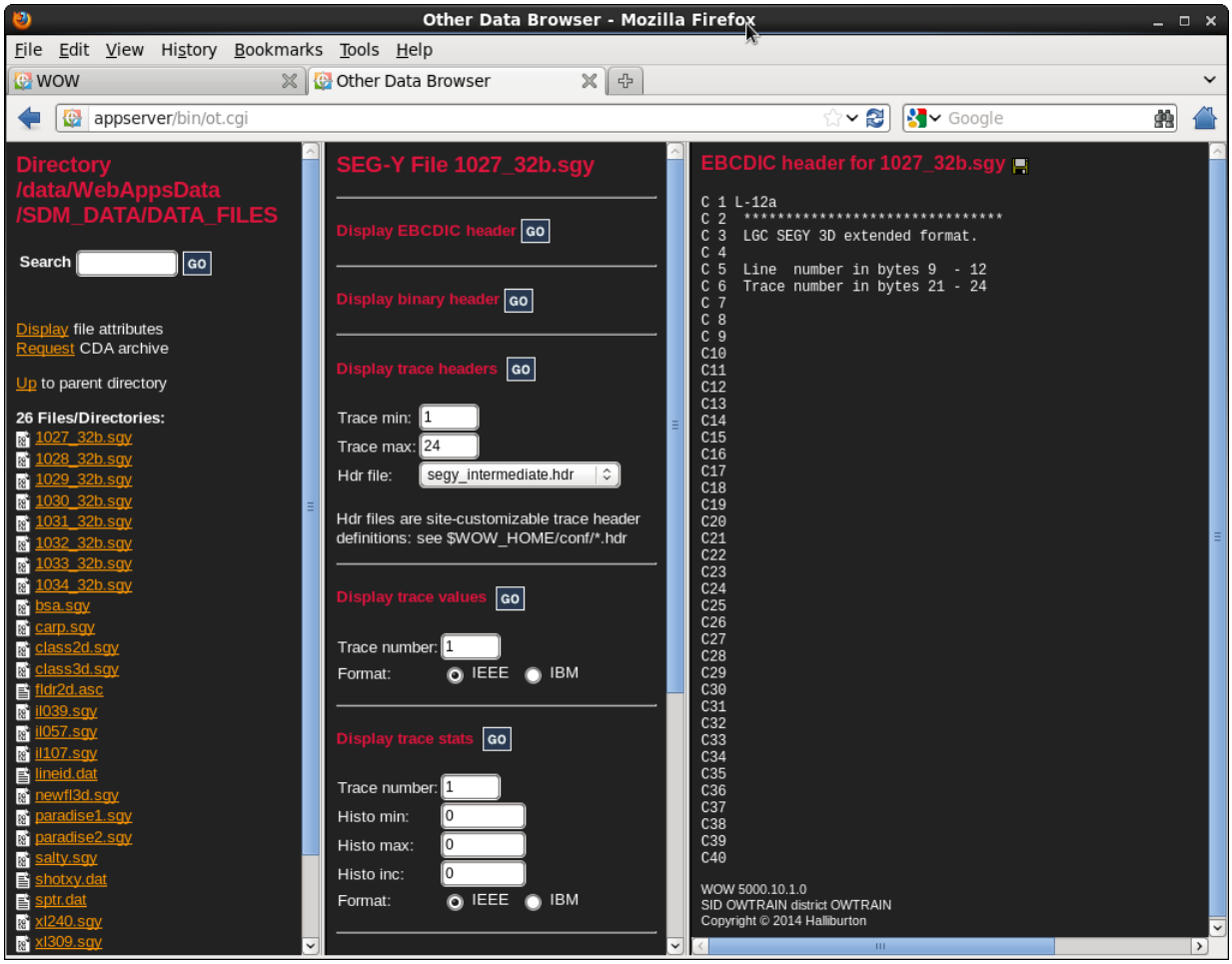
First, you will create a histogram that will generate a distribution curve for the seismic data you are about to load. This histogram can be used as a visual reference as you analyze and scale your data in later exercises.

Part 1: View SEG-Y Files in the WOW Software

1. Access the WOW software to view the SEG-Y files you will be analyzing in the exercise.

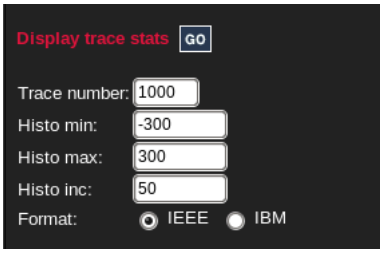
   - Click **Other Data** in the sidebar on the left.
   - Click **/data/WebAppsData**.
   - Click **SDM_Data** and then **DATA_FILES** in the Directory list.
   - Click **1027_32b.sgy**.

The WOW software displays the EBCDIC header, binary header, trace headers, values, and amplitude statistics, and will also display a seismic image from the SEG-Y file.

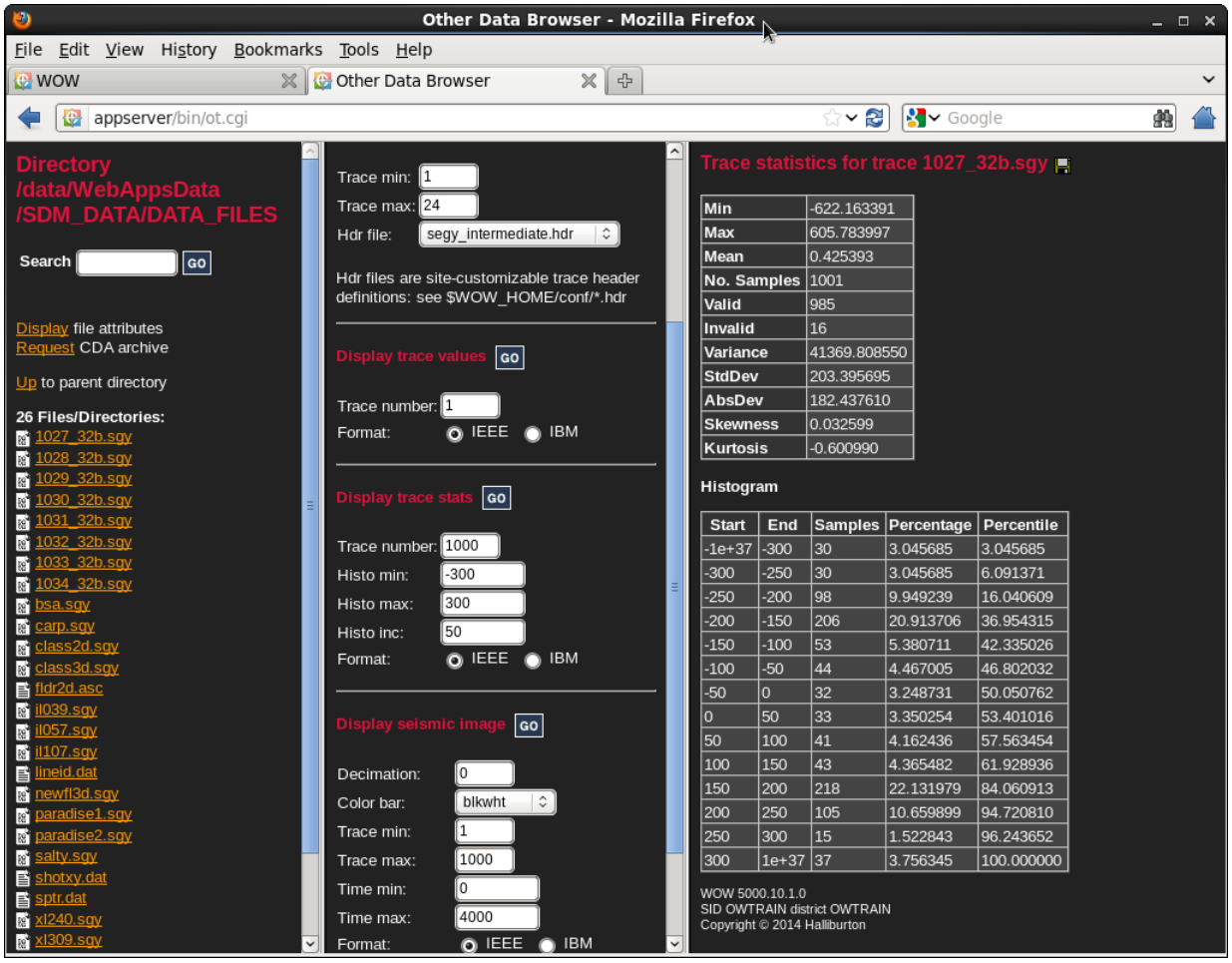


Trace statistics may also be viewed in the WOW software.

2. Scroll down to *Display trace stats*. Fill out the fields according to the screen below.



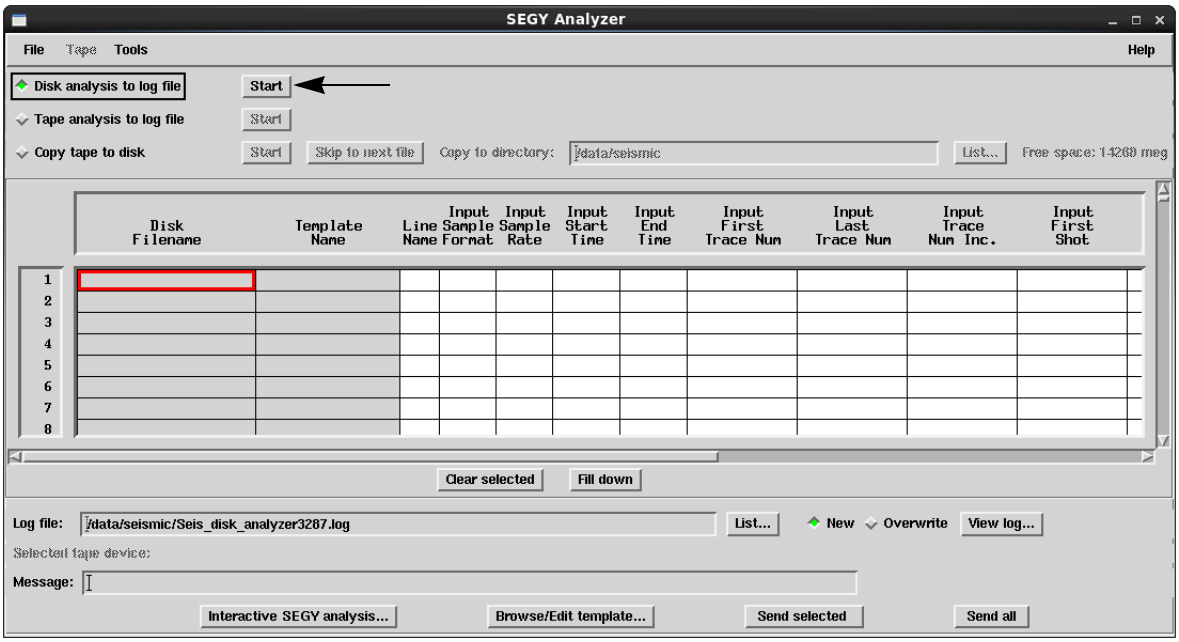
Note that unlike PostStack, these statistics are run for one trace at a time. Display statistics from a few traces and compare them to the statistics for the entire SEG-Y file as seen in PostStack.



Leave the WOW software open for reference as you progress through the exercise.

Part 2: Create a Histogram

1. Open Seismic Tools (from the OpenWorks Command Menu, select **Data > Management > Seismic Tools**) and select **Seismic > SEGY Analyzer**.



2. Confirm that the Disk analysis to log file radio button is selected.

   To list the files that you wish to analyze, begin by clicking the first cell under Disk Filename; the cell turns red to show that it has been selected.

3. Select **File > Select…** to open the *Disk File Selection* dialog box.

   Navigate to the directory where the data resides - your instructor will provide this directory path.

4. Click MB1 and drag to highlight the following .sgy files:

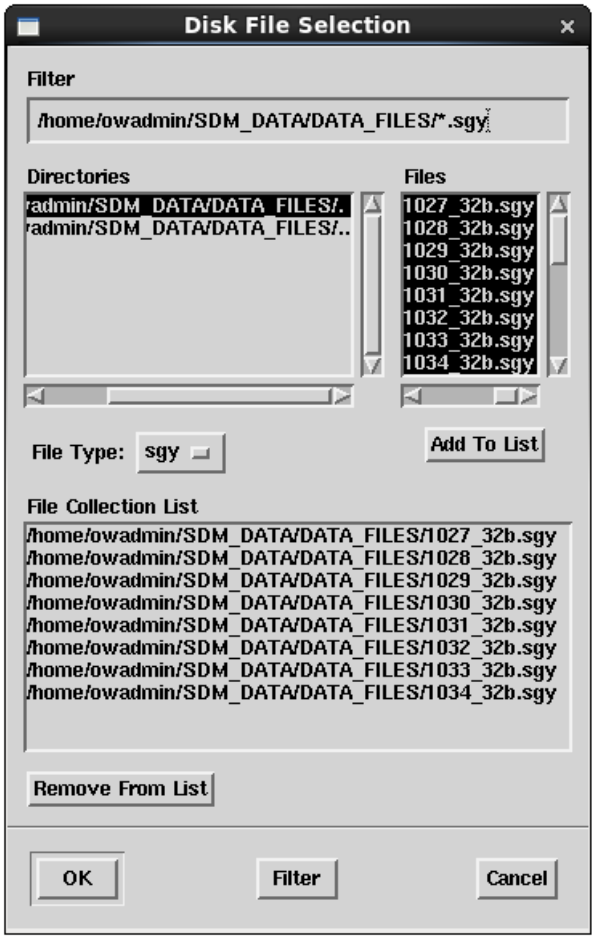
   1027_32b.sgy
   1028_32b.sgy
   1029_32b.sgy
   1030_32b.sgy
   1031_32b.sgy

1032_32b.sgy
1033_32b.sgy
1034_32b.sgy

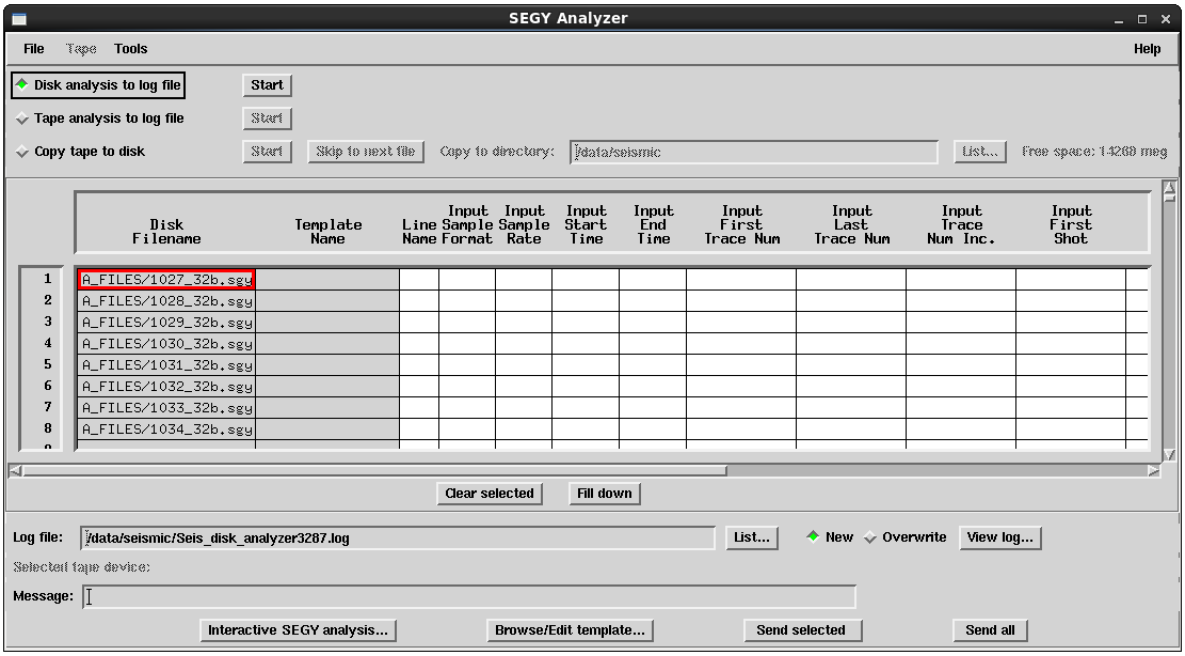
Because these files are listed consecutively, you can select them all by clicking once on the first file using MB1 and once on the last file using Shift-MB1, or by clicking and dragging.

If the files are not listed consecutively, you may select more than one by using Ctrl-MB1 to select the desired lines.

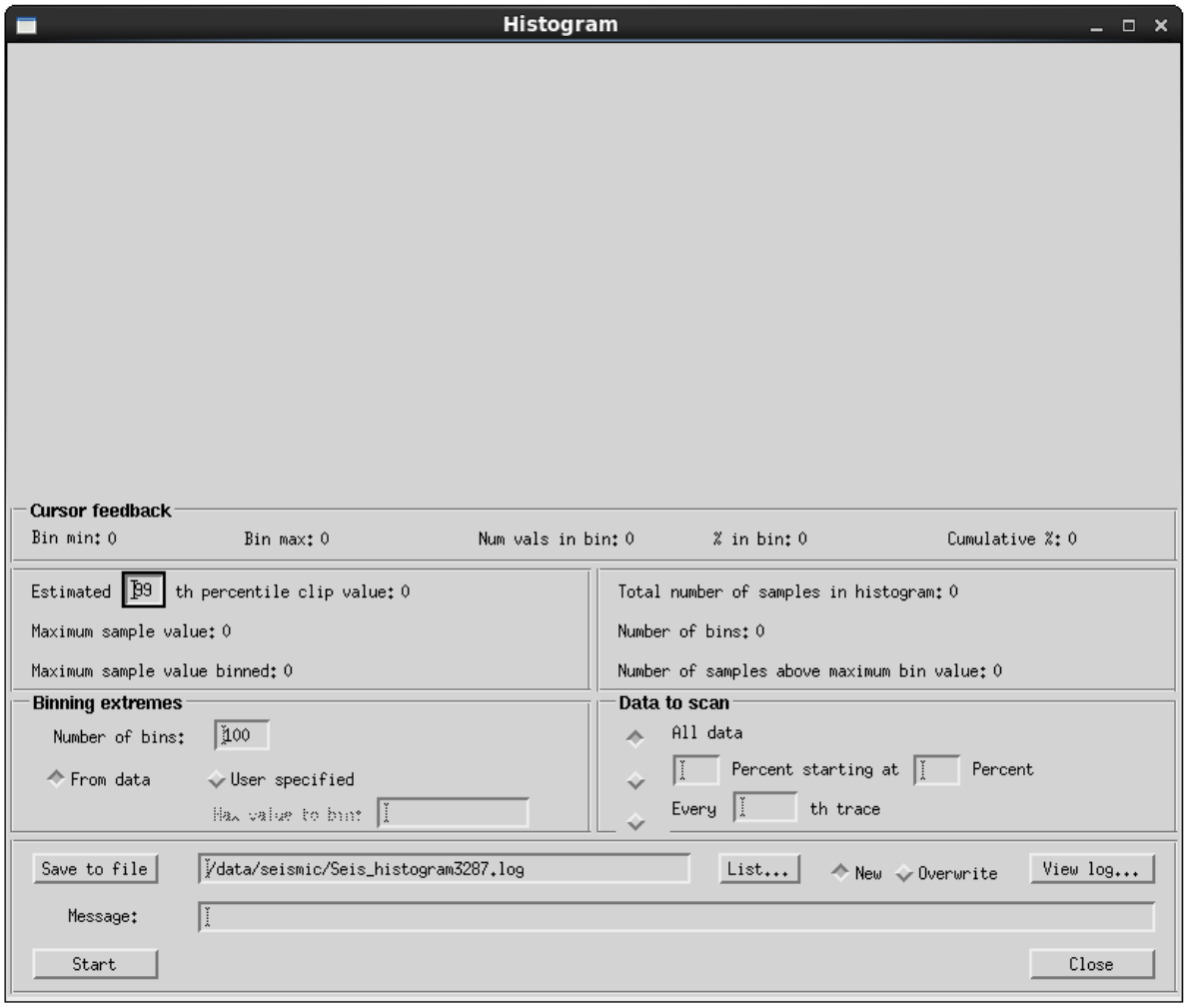
5. Once all your selected lines are highlighted, click on **Add to List**.



6. When the files are in the File Collection List, click **OK**. Rows 1 through 8 in SEGY Analyzer should now contain the full path names of the eight SEG-Y data files.



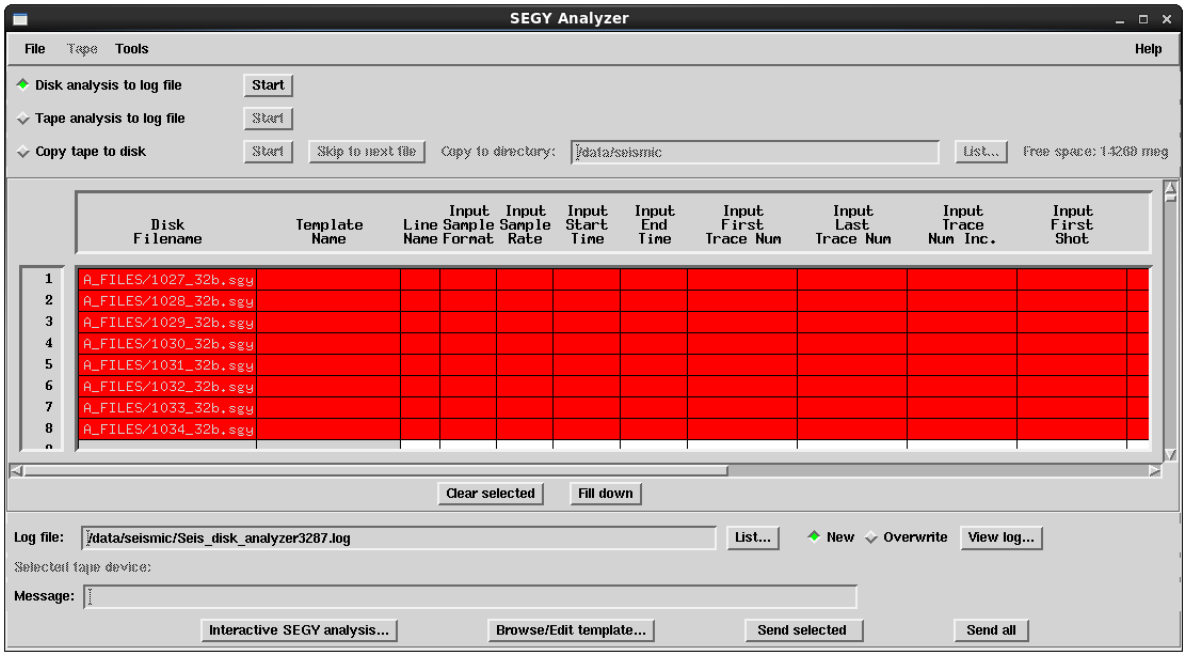
7. In the SEGY Analyzer menu, select **Tools > Histogram**.



One or more SEG-Y files may be selected to generate a histogram. You may want to create individual histograms for each line if the data amplitudes vary from file to file.

Select the files to be used for the histogram:

8. In the SEGY Analyzer, click and hold **MB1** on the row in the Disk Filename column that holds the pathname for *1027_32b.sgy* and drag your cursor down to the row with the pathname for *1034_32.sgy*. All 8 files should now be highlighted red.



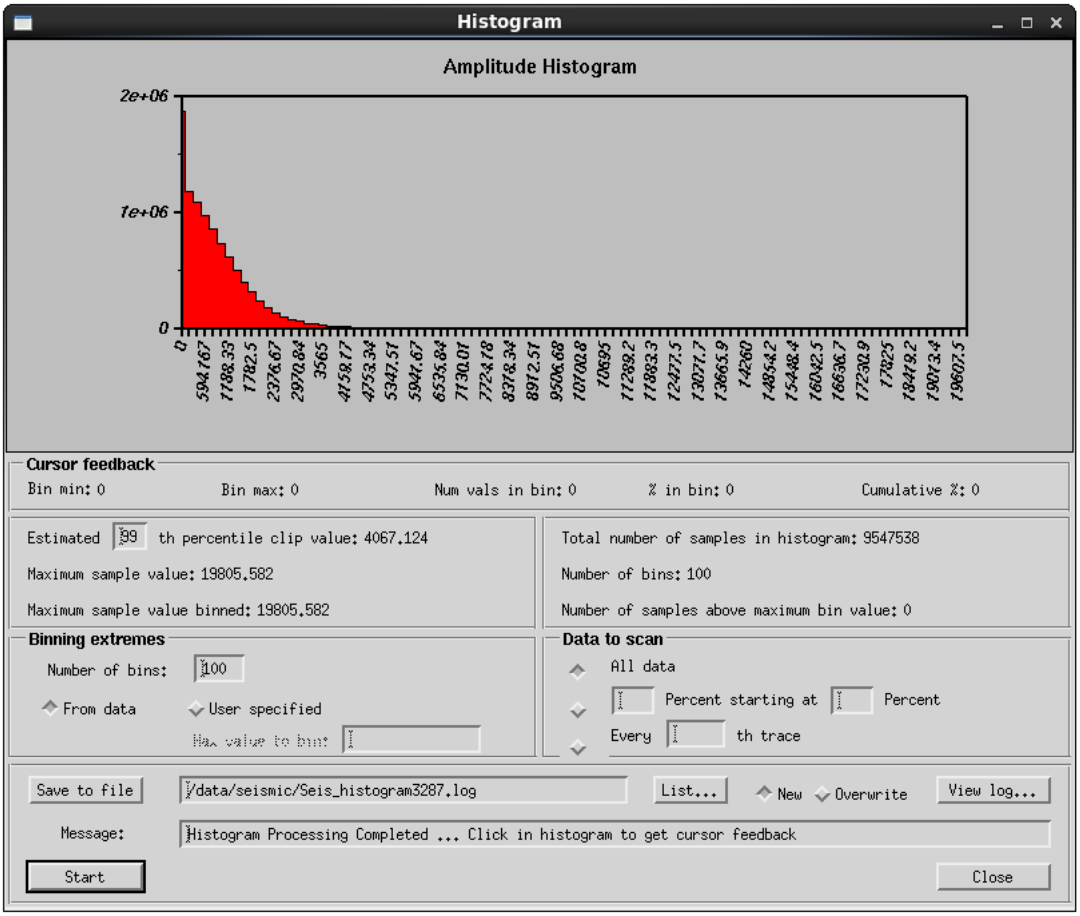
9. In the *Histogram* dialog box leave the default settings. Verify that **Estimated Nth percentile clip value** is 99, **Number of bins** is 100, the radio button **From data** is toggled on, and the **All data** radio button is selected under **Data to scan**.

   For additional information on these options, see the online help manual. (From the Seismic Tools select **Help > Online Manual > Seismic Utilities**. Look for the **Using the Histogram** topic in the section for **SEGY Analyzer**.)

10. Click the **Start** button.

    As the Histogram analyzes data, it will show its progress in the Message text field at the bottom of the dialogue box. Note that the Start button reads Stop while the process is running. You can stop the process at anytime, but if stopped, no histogram will appear.

When the process is complete, the histogram will appear at the top of the window.



By positioning your cursor over the graph and clicking **MB1**, you can display the information about the bin at any point in the **Cursor feedback** area.

You can rerun the Histogram at any time by re-selecting the file (or files) in the SEGY Analyzer, re-selecting options, and clicking the **Start** button.

The histogram results may be saved to a file using the Save to file pushbutton. As in the 3D SEGY Analyzer exercise, OpenWorks creates a default name for the file in your home directory. You may change this default path and name by either typing a new path and name in the Save to file field box, or click the List… button and type a new name or path in the Selection box.

11. Save the histogram information to the log file specified by clicking the **Save to file** button.

Leave the Histogram open for the next exercise.

Part 3: Analyzing the Data

SEGY Analyzer writes a log file of the data it processes. By default, this log file is written to your home directory (same as the histogram). The software automatically names the log file using the following syntax:

```
<option_name><process_id>.log
```

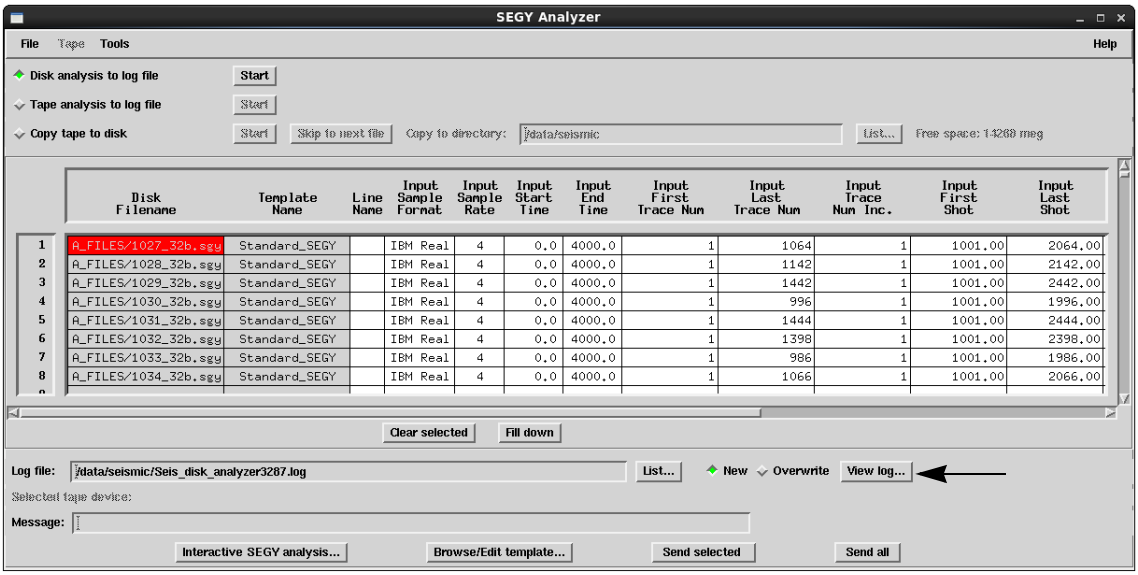
You may change the directory path and file name for this log file to something more meaningful. It is not strictly necessary to save this information as it is stored in the database when the data is loaded with PostStack (look at Process History in Seismic Data Manager), though it might be useful to have a copy until the data load is verified.

1. Start the analysis by clicking the **Start** button located next to the Disk Analysis to Log File option. The button changes to **Stop** so that you can interrupt the analysis when you are satisfied with the samples already read.

   The Template Name field is automatically filled in with the default template, Standard_SEGY.

   As the data is read, the software posts status messages in the Message area of the main window. The columns in the spreadsheet become populated.

2. Use the horizontal scroll bar to view all of the populated cells in the spreadsheet.

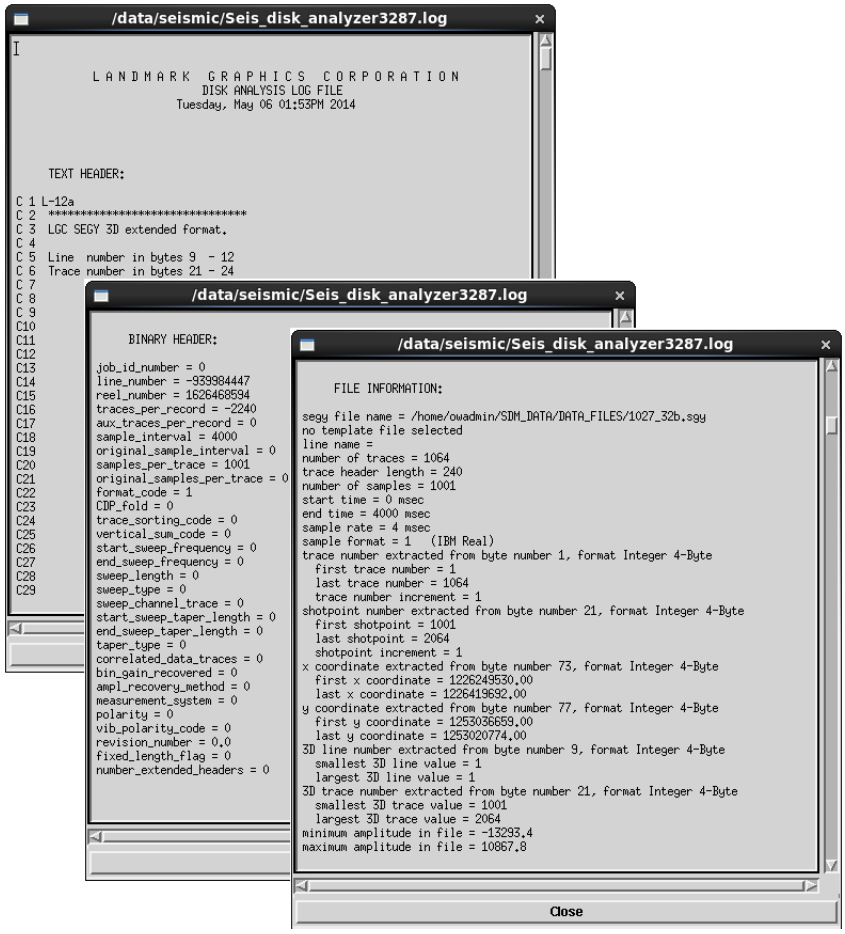


3. View the log by clicking on the View log… button. At the bottom of the SEGY Analyzer main window. Use the scroll bar to see the following information for each file analyzed, which is written to the log file:

   - Date and time the analysis was performed
   - Complete SEG-Y text (EBCDIC or ASCII) header
   - Complete SEG-Y binary header
   - Disk file name or Tape file sequence number
   - Template name
   - Line name extracted from SEG-Y file
   - Number of traces
   - Trace header length
   - Number of samples
   - Start and end times
   - Sample rate and format

- Byte number from which the trace number was extracted and the trace number format
- First and last trace numbers and trace number increment
- Byte number from which the shotpoint number was extracted and the shotpoint format
- First and last shotpoint numbers and shotpoint increment
- Byte number from which the x coordinate was extracted and the x coordinate format
- First and last x coordinates
- Byte number from which the y coordinate was extracted and the y coordinate format
- First and last y coordinates
- Byte number from which the 3D line number was extracted from and the 3D line number format
- Smallest and largest 3D line values
- Byte number the 3D trace number was extracted from and the 3D trace number format
- Smallest and largest 3D trace values
- Minimum and maximum amplitudes in the file

Portions of the log file produced from the analysis of the *10**_32b.sgy* files are shown below.



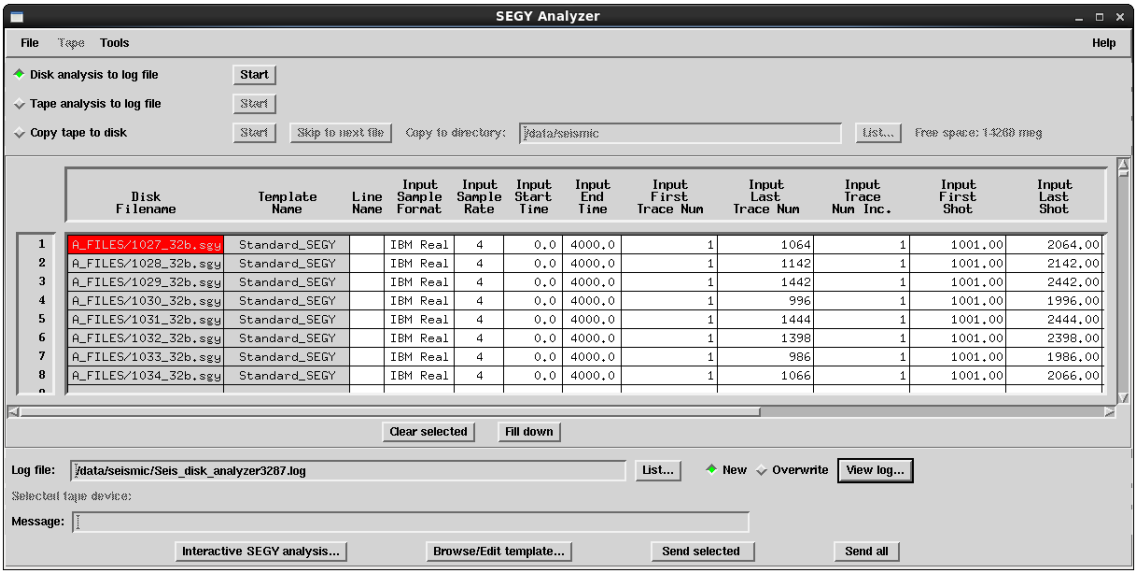
4. Using the log, find the following information:

   Sample Rate:

   Sample Format:

5. Examine the data in the SEGY Analyzer spreadsheet to determine if the Standard_SEGY template correctly describes the data. Check

the spreadsheet against the information provided in the binary record and the information gathered previously.



Do the values in the Input Start Time and Input End Time columns appear to be correct?

Do the values in the Input First Trace Num and Input Last Trace Num appear to be correct?

Do the values in the Input First Shot and Input Last Shot appear to be correct?

Is the shot increment (Input Shot Inc.) consistent with the shotpoint to trace relationship calculated from your navigation data and recorded in the Seismic Data Manager?

Do the values for the x, y coordinates appear to be correct?

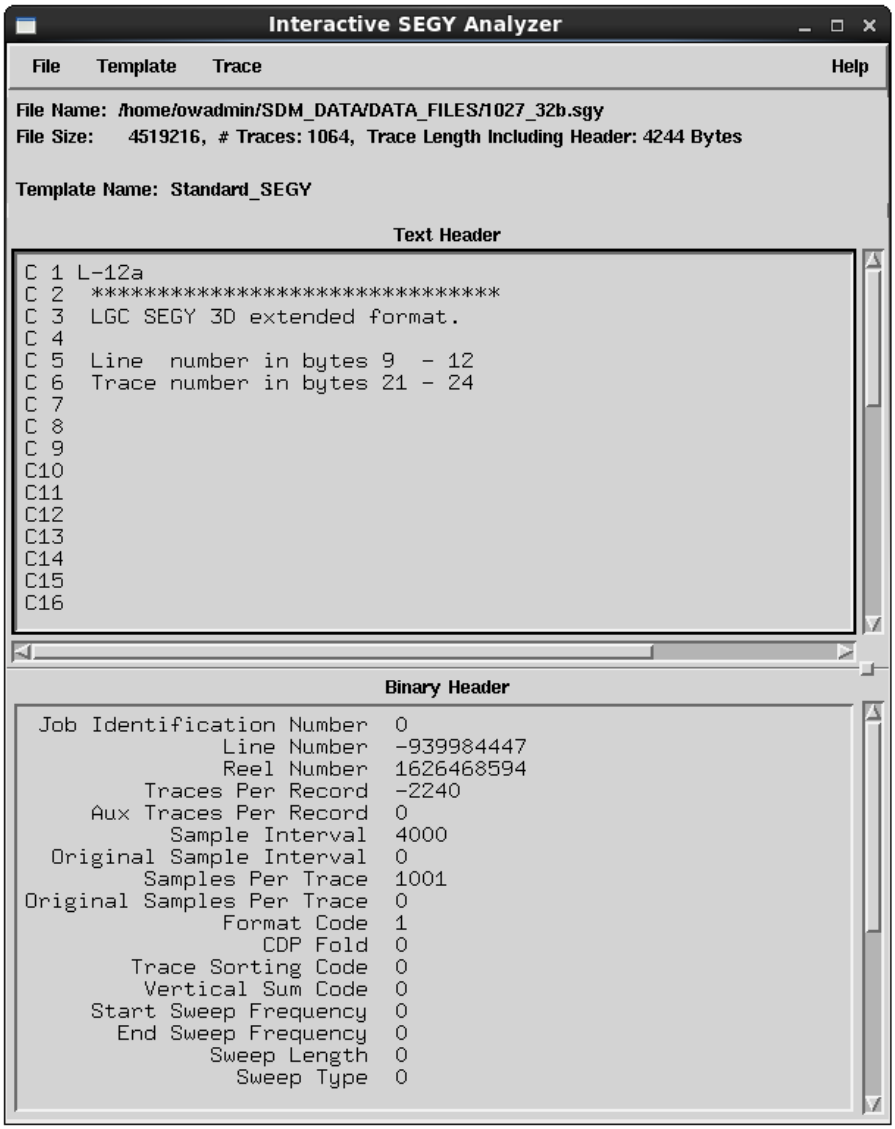
6. For a more in-depth analysis of your SEG-Y files, click on the Disk Filename *1027_32b.sgy*, then click on the **Interactive SEGY analysis…** button at the bottom of the SEGY Analyzer window.

   When this tool first opens, it uses the template associated with the selected file. If a template is not associated with the file, the analyzer uses the Standard_SEGY template.

   If the software encounters any problems or irregularities reading the data using the specified template, a message identifying the problem is posted in red in the top portion of the Interactive SEGY Analyzer

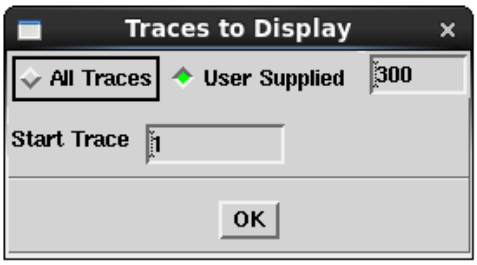
window. However, the absence of a message does not mean that the template is correct.

The main window of the Interactive SEGY Analyzer, as shown below, displays information from the text (EBCDIC or ASCII) and binary headers.

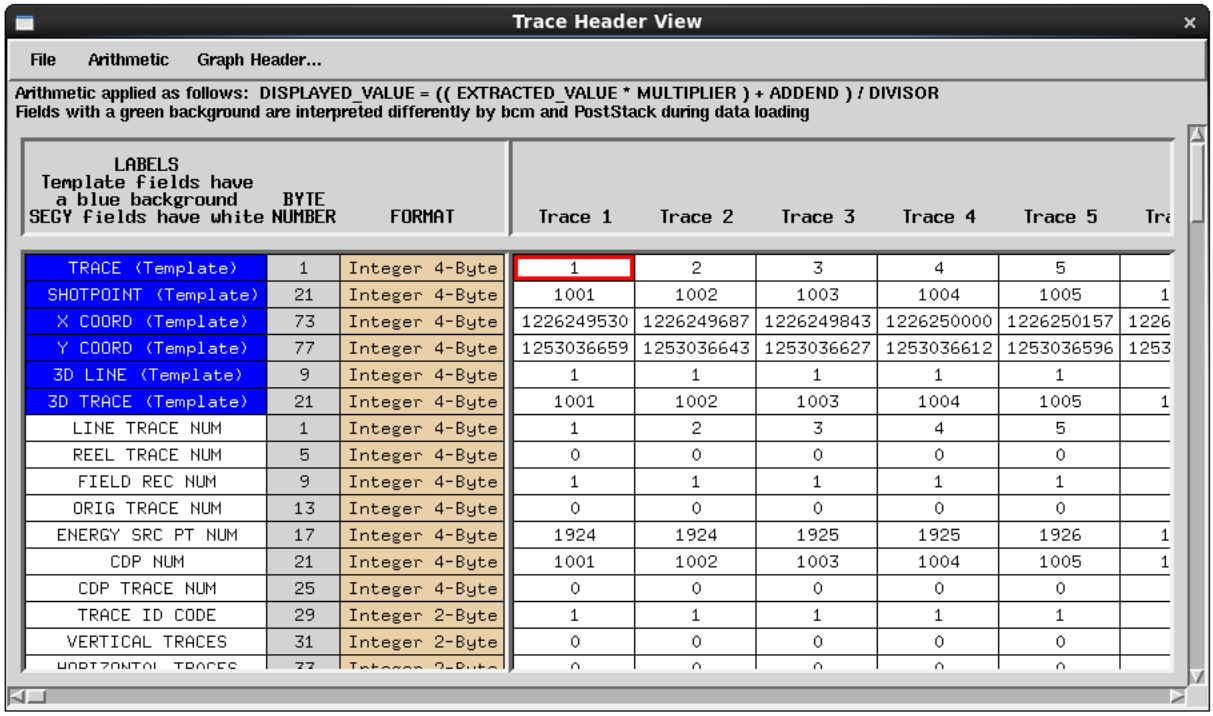


7. Select **Trace > Header View**. You use the Trace Header window to view all the trace headers in a SEG-Y file and to resolve any byte number and format problems.

If the data has more than 300 traces, a dialog box for defining the number of traces appears. Accept the default number of 300 traces and the Start Trace of 1 by clicking **OK** in the dialog box.



The software uses the byte number and format from the template to display each item in the data files. On the spreadsheet, white cells are editable, gray cells are not editable, and buff-colored cells have a popup menu accessed using MB3.



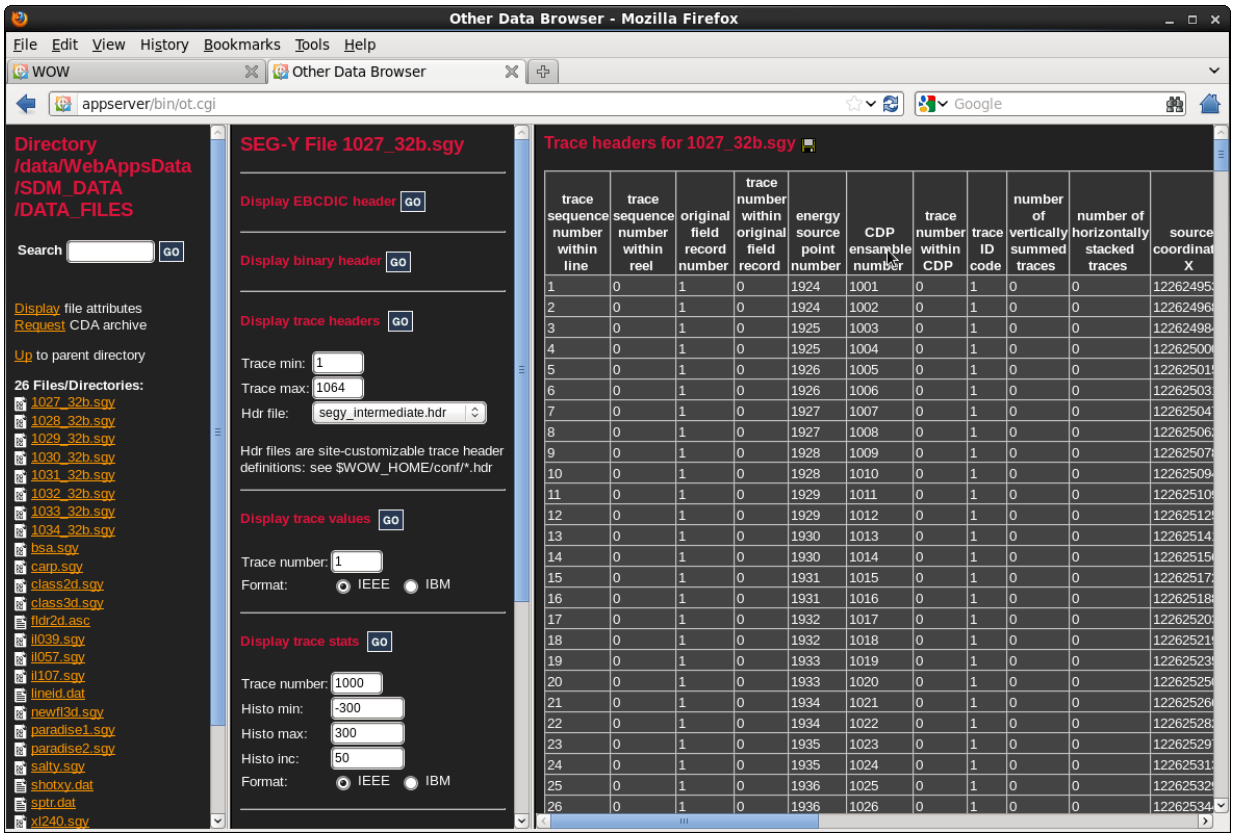
LABELS Template fields have a blue background SEGY fields have white	BYTE NUMBER	FORMAT	Trace 1	Trace 2	Trace 3	Trace 4	Trace 5	Tr
TRACE (Template)	1	Integer 4-Byte	1	2	3	4	5	
SHOTPOINT (Template)	21	Integer 4-Byte	1001	1002	1003	1004	1005	1
X COORD (Template)	73	Integer 4-Byte	1226249530	1226249687	1226249843	1226250000	1226250157	1226
Y COORD (Template)	77	Integer 4-Byte	1253036659	1253036643	1253036627	1253036612	1253036596	1253
3D LINE (Template)	9	Integer 4-Byte	1	1	1	1	1	
3D TRACE (Template)	21	Integer 4-Byte	1001	1002	1003	1004	1005	1
LINE TRACE NUM	1	Integer 4-Byte	1	2	3	4	5	
REEL TRACE NUM	5	Integer 4-Byte	0	0	0	0	0	
FIELD REC NUM	9	Integer 4-Byte	1	1	1	1	1	
ORIG TRACE NUM	13	Integer 4-Byte	0	0	0	0	0	
ENERGY SRC PT NUM	17	Integer 4-Byte	1924	1924	1925	1925	1926	1
CDP NUM	21	Integer 4-Byte	1001	1002	1003	1004	1005	1
CDP TRACE NUM	25	Integer 4-Byte	0	0	0	0	0	
TRACE ID CODE	29	Integer 2-Byte	1	1	1	1	1	
VERTICAL TRACES	31	Integer 2-Byte	0	0	0	0	0	
HORIZONTAL TRACES	33	Integer 2-Byte	0	0	0	0	0	

You can also see the trace headers displayed in the WOW software using standard SEG-Y format, but you cannot edit the format or graph in the WOW software.

8. Display the trace headers in WOW. Bring up the web browser that you opened earlier to the 1027_32b.sgy file.

   - Click **GO** under display EBDIC header to view the EBDIC header. Then do the same for the binary header.

- Change the Trace max field under Display trace headers to 1064 and click **GO**.



- Return to the Trace Header View from SEGY Analyzer; use the information in the WOW software as a reference while completing the following steps.

9. Use the horizontal and vertical scroll bars to move around the window. Look for irregularities in the locations of time, traces, shotpoints, and x, y coordinates. Use your observations of the SEGY Analyzer spreadsheet to help guide you.

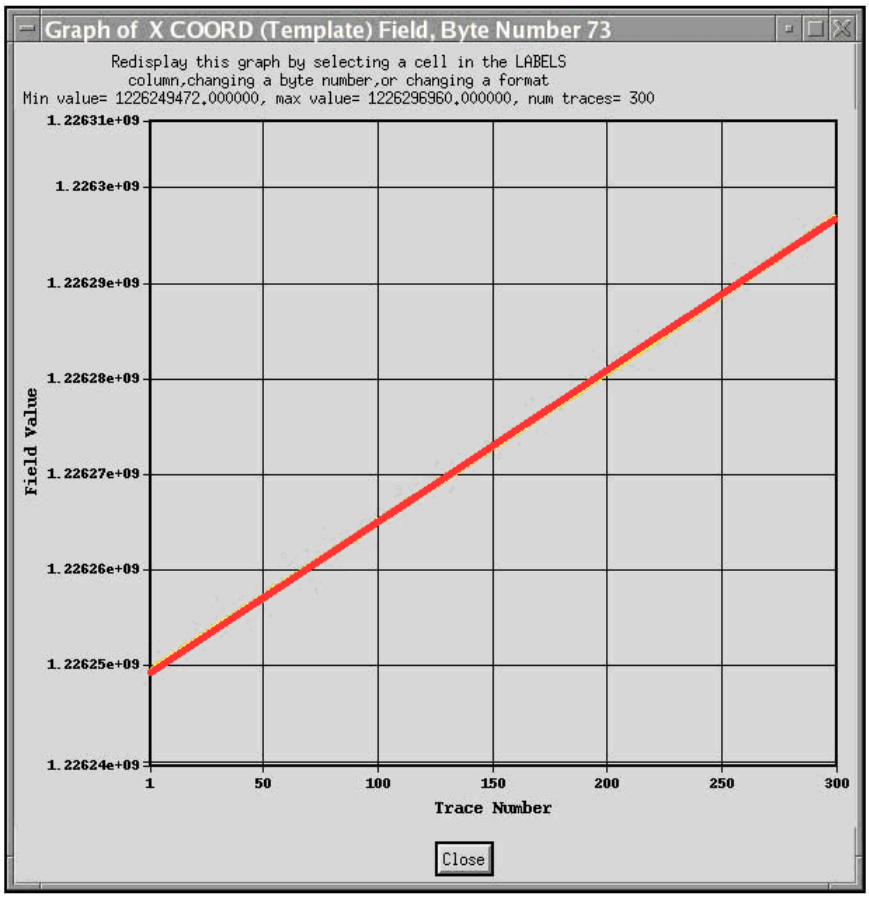
10. Open the Trace Header Graph to help determine the format and location of the required information in the file.

    To set up the trace header graph, do as follows:

    - In the Trace Header View, click on the XCOORD cell in the LABELS column to select it.

    - Select Graph Header... from the Trace Header View main menu. Place the graph in the left screen.

A graph of the XCOORD trace header field is displayed from the given byte number and format defined for that field. The graph shows only the number of traces that are displayed in the Trace Header View. It also gives the trace header minimum and trace header maximum values.



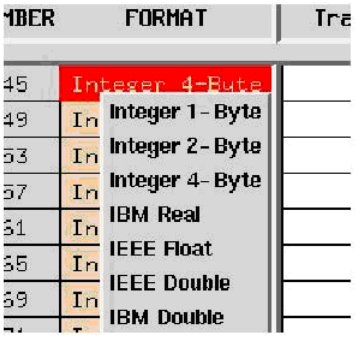
- Click on the **YCOORD** cell in the LABELS column in the Trace Header View. The graph will automatically update to display the traces for this field.

> **Note**
>
> The graph will also update if you change either the byte number or the format of the displayed trace head field.

Look for irregularities in format. The most common format problems are with shotpoint numbers, CDP numbers, and x, y coordinates.

The graphs for the x and y coordinates (in the standard SEG-Y locations, x in byte position 73 and y in byte position 77) look like what you might expect, except the values are very different from the coordinates loaded from the navigation file. Look at Seismic Data Manager or WOW to see the coordinates for the lines. Maybe they are just not in Integer 4-Byte format.

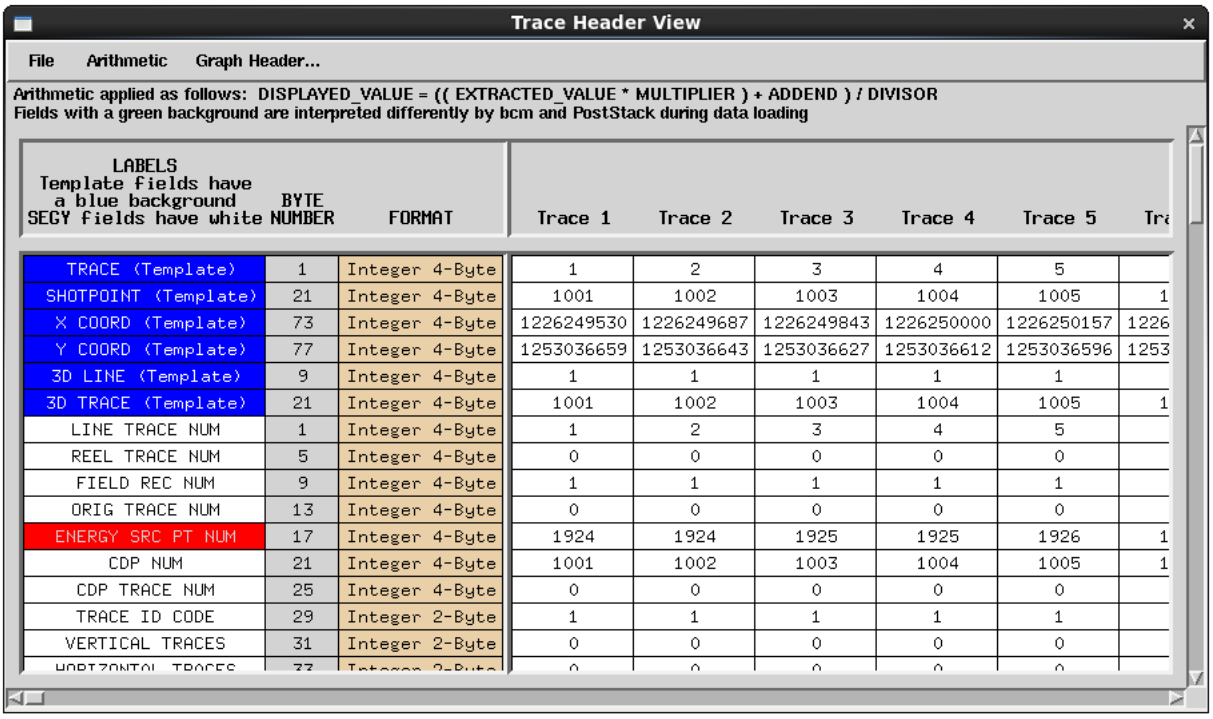
To try a different format for a given field, press **MB3** over the buff-colored Format field, which brings up a menu listing possible formats. Select a new format from the list. The values in that row will be redisplayed in the new format.



Focus on the location and formats of the traces, shotpoints, and x, y coordinates. Record your results.

Hint

Check the format for the values in the *X COORD* and *Y COORD* rows as a start.

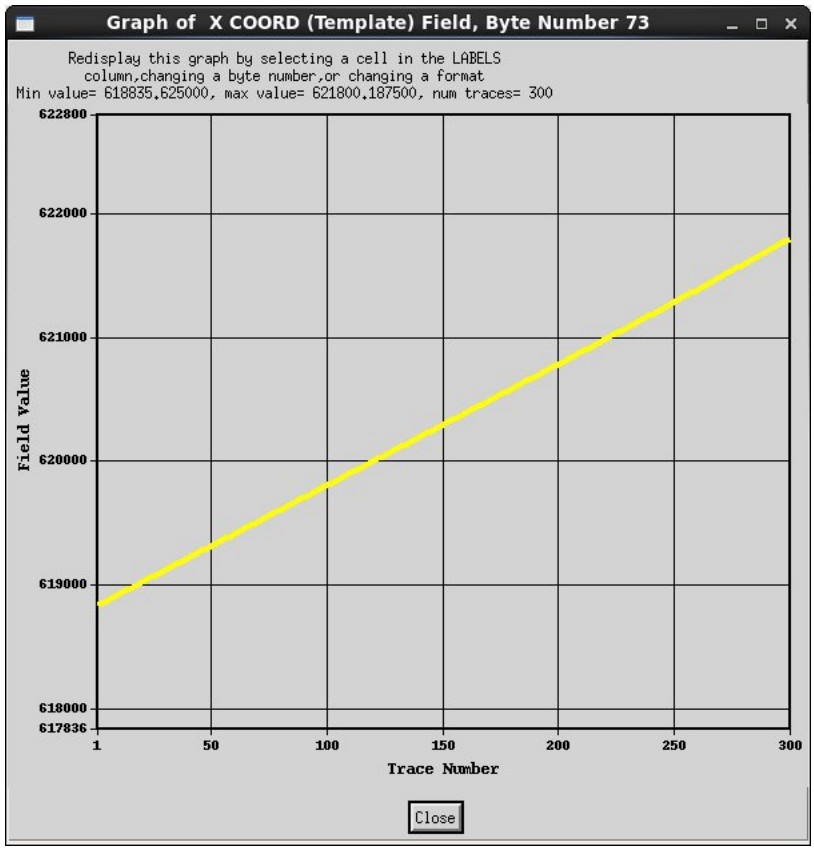


LABELS Template fields have a blue background SEGY fields have white	BYTE NUMBER	FORMAT	Trace 1	Trace 2	Trace 3	Trace 4	Trace 5	Tr
TRACE (Template)	1	Integer 4-Byte	1	2	3	4	5	
SHOTPOINT (Template)	21	Integer 4-Byte	1001	1002	1003	1004	1005	1
X COORD (Template)	73	Integer 4-Byte	1226249530	1226249687	1226249843	1226250000	1226250157	1226
Y COORD (Template)	77	Integer 4-Byte	1253036659	1253036643	1253036627	1253036612	1253036596	1253
3D LINE (Template)	9	Integer 4-Byte	1	1	1	1	1	
3D TRACE (Template)	21	Integer 4-Byte	1001	1002	1003	1004	1005	1
LINE TRACE NUM	1	Integer 4-Byte	1	2	3	4	5	
REEL TRACE NUM	5	Integer 4-Byte	0	0	0	0	0	
FIELD REC NUM	9	Integer 4-Byte	1	1	1	1	1	
ORIG TRACE NUM	13	Integer 4-Byte	0	0	0	0	0	
ENERGY SRC PT NUM	17	Integer 4-Byte	1924	1924	1925	1925	1926	1
CDP NUM	21	Integer 4-Byte	1001	1002	1003	1004	1005	1
CDP TRACE NUM	25	Integer 4-Byte	0	0	0	0	0	
TRACE ID CODE	29	Integer 2-Byte	1	1	1	1	1	
VERTICAL TRACES	31	Integer 2-Byte	0	0	0	0	0	

Try graphing the traces, shotpoints, and x, y coordinates position and formats you think may be correct.

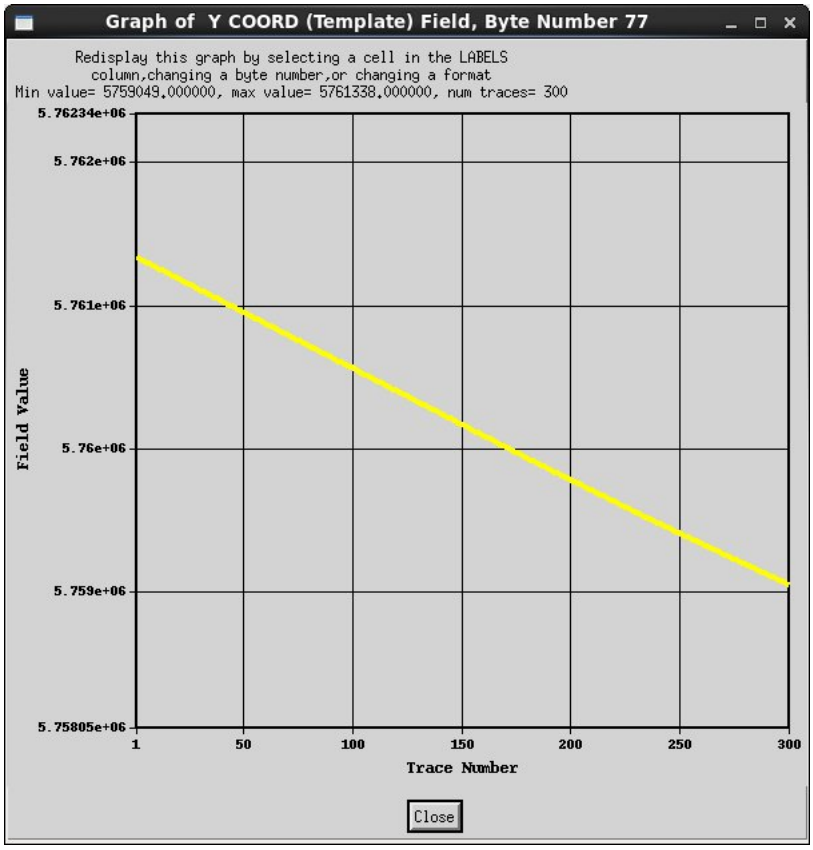
- In the Trace Header View, click the **XCOORD** cell in the LABELS column to select it.
- Change the format field to try other options.
- Select **Graph Header...** from the Trace Header View main menu.

By changing the format and viewing the resulting header values, you may find a match for your data.



- In the Trace Header View, click the **YCOORD** cell in the LABELS column to select it.
- Change the format field to try other options (generally x and y will have the same format)

- Select **Graph Header...** from the Trace Header View main menu.



- In the Trace Header View, click the **TRACE** cell in the LABELS column to select it.

- Select **Graph Header...** from the Trace Header View main menu.

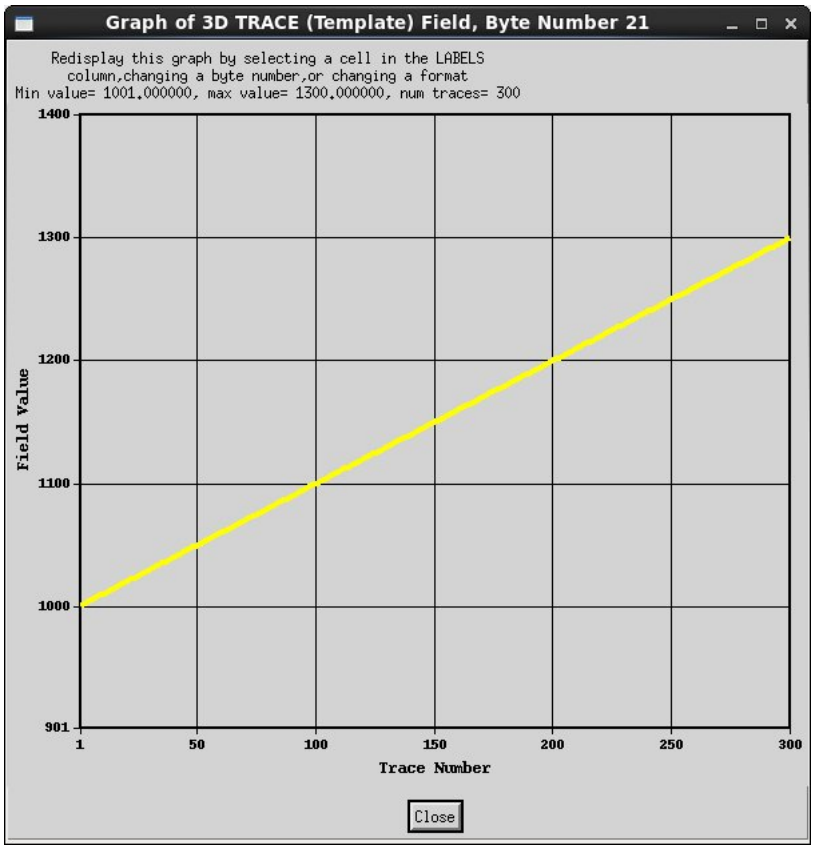
The values are increasing by one as you might expect for traces; however, the value range does not correspond to the trace range.

Looking through the trace headers, the values in Byte position 21 seem to correspond to the trace values for this line. Graph this position to see if the values behave as you would expect for traces (again, generally increasing or decreasing depending on line direction).

- In the Trace Header View, click the **3D TRACE** cell in the LABELS column to select it.

- Select **Graph Header...** from the Trace Header View main menu.

The values are increasing by one as you might expect for traces. The values range from 1001 to 1300 for the first 300 traces, which does match the expected trace values.

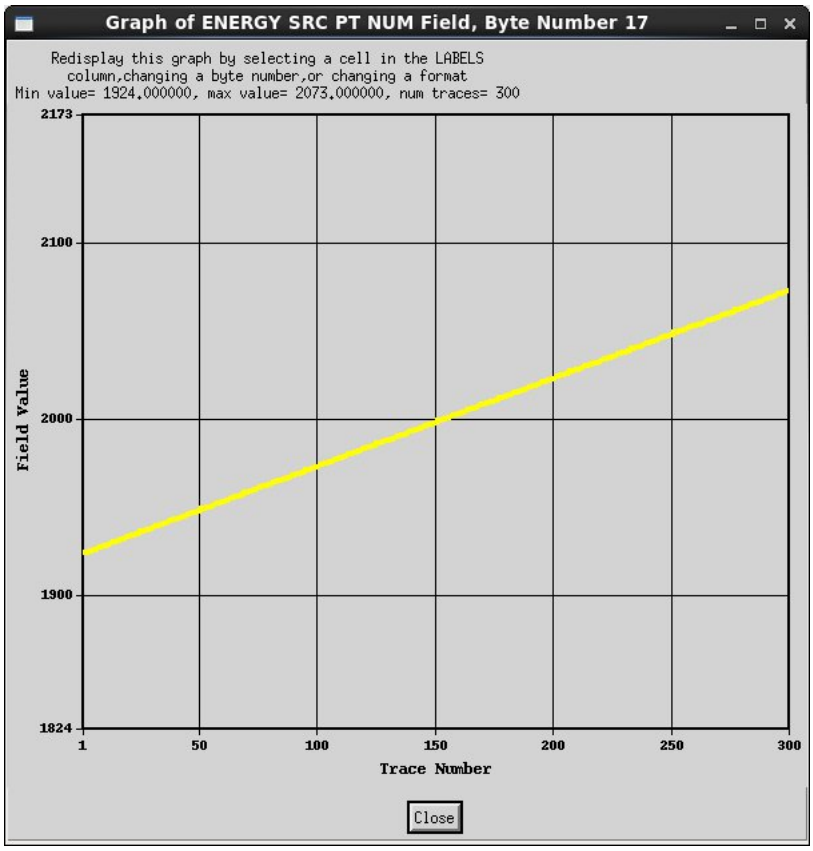


Look through the trace headers again to see if you can find values representing the shotpoint range for this line. The values in Byte position 17 seem to correspond to the shotpoint numbers for this line. Graph this position to see if the values behave as you would expect for traces (again, generally increasing or decreasing depending on line direction).

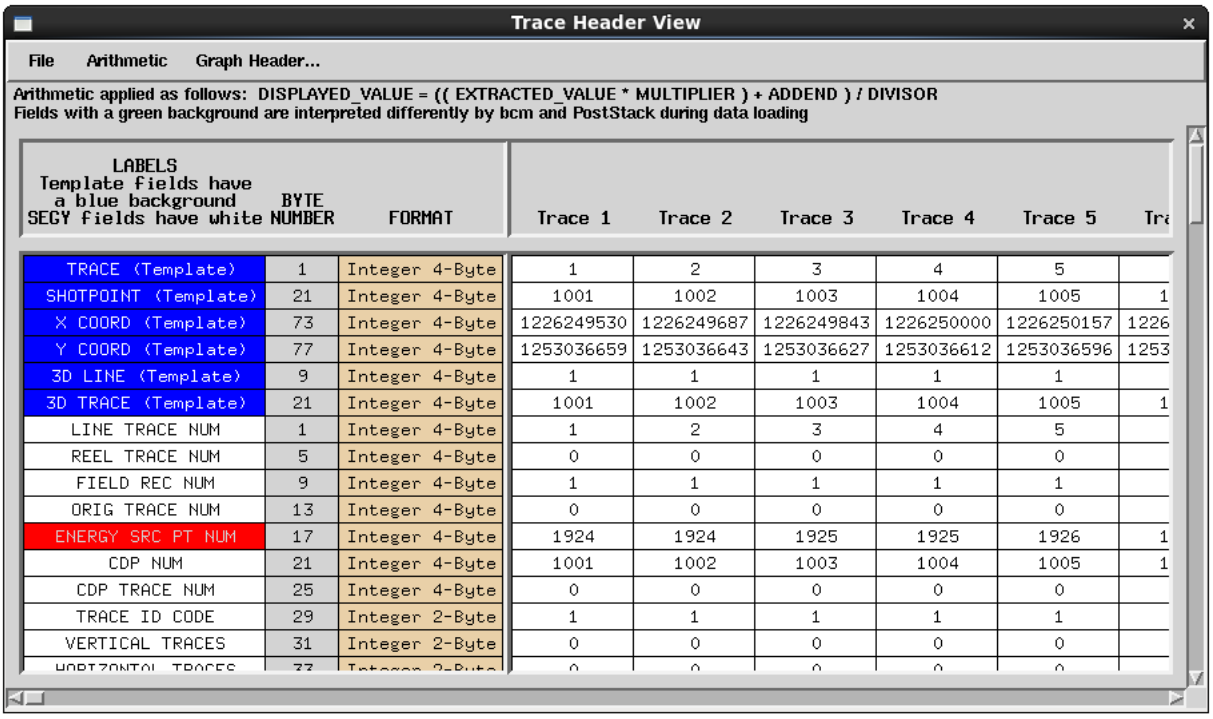
- In the Trace Header View, click on **ENERGY SRC PT NUM** cell in the LABELS column to select it.

- Select **Graph Header...** from the Trace Header View main menu.

The values range from 1924 to 2073 for the first 300 traces, which does match the expected shotpoint values (remember the shotpoint to trace ratio is 0.5).



Processors can put information anywhere in the trace headers. If your processing service does not supply the information and if the SEG-Y data does not correspond to standard SEG-Y format, you need to look at the values in the headers and change formats if necessary to try to find the required information needed to load the data.



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LINE TRACE NUM	1	Integer 4-Byte	1	2	3	4	5	
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FIELD REC NUM	9	Integer 4-Byte	1	1	1	1	1	
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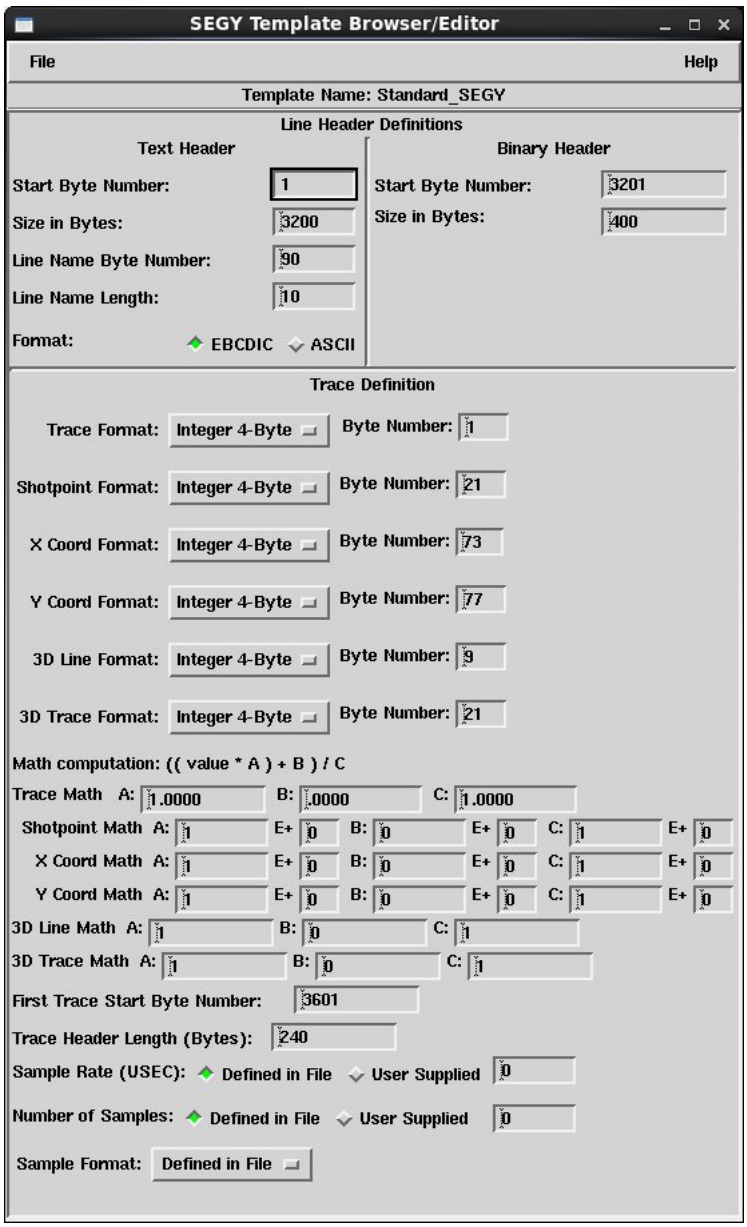
ENERGY SRC PT NUM	17	Integer 4-Byte	1924	1924	1925	1925	1926	1
CDP NUM	21	Integer 4-Byte	1001	1002	1003	1004	1005	1
CDP TRACE NUM	25	Integer 4-Byte	0	0	0	0	0	
TRACE ID CODE	29	Integer 2-Byte	1	1	1	1	1	
VERTICAL TRACES	31	Integer 2-Byte	0	0	0	0	0	

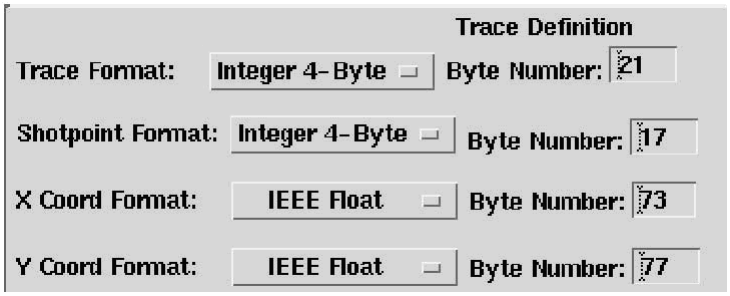
When the formats and byte numbers displayed in the Trace Header View window are set to your satisfaction, you can create or edit the SEG-Y template for your data. SEG-Y templates contain the specifications for the differences between the format of the seismic data being examined and Landmark's Standard_SEGY template. This template can be used when you pass the data file to PostStack.

In the next step you create a template with the required trace header information for loading 2D data. This template can be used in PostStack and is available for future use.

11. Open the SEGY Template Browser/Editor by selecting **Template > Browse/Edit** from the Interactive SEGY Analyzer (you can also open it by clicking on the **Browse/Edit template…** button in the SEGY Analyzer main window). The template editor opens with the definitions for the active template listed at the top.



12. Change the Byte Number next to Trace Format to 21. Change the Byte Number next to Shotpoint Format to 17. Change the format of both the x and y coordinates to *IEEE Float*.



13. In the template editor, select **File > Save As…**. Type `G89A1027_1034` in the Selection Field and click **OK**.

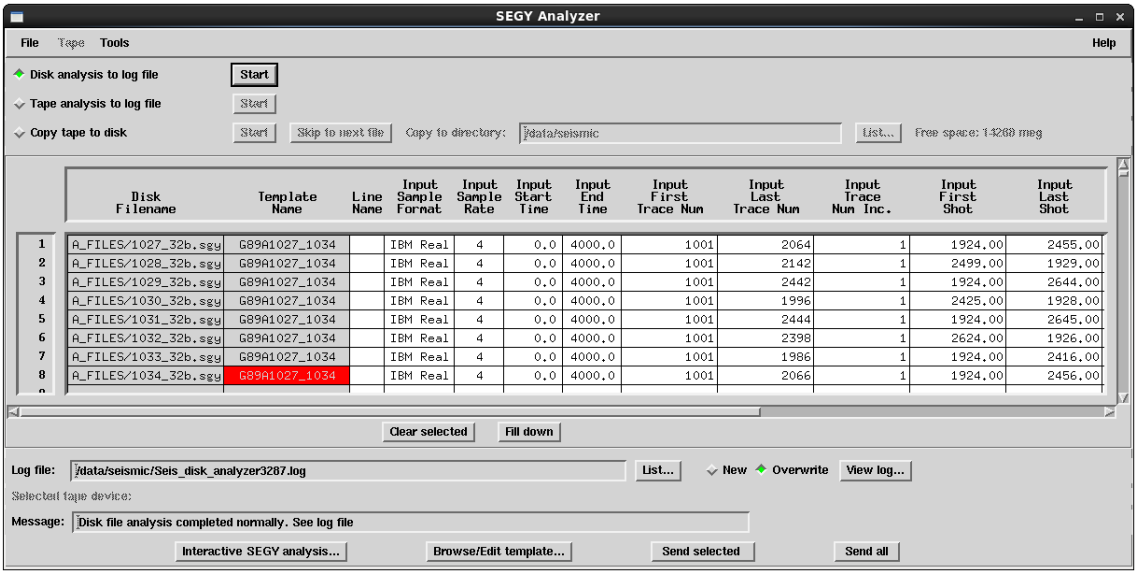
> **Where Seismic Templates are Saved**
>
> New templates are saved in your *$HOME* directory with a *.SegyTemplate* extension.
>
> If you would like to share your templates with other users, you may move your templates to *$SEISUTILSHOME/dat* (or *$OWHOME/SeisUtils/dat*).
>
> Files with a *.SegyTemplate* extension located there will be listed in the *Open Template* dialog box.

14. Close the SEGY Template Browser/Editor using **File > Exit**. You can also close the Interactive SEGY Analysis window using **File > Exit**.

15. In the SEGY Analyzer main window, analyze your files again using your new template.

    To change your choice of template, click once on the template name field of the first line. In this example, click on Standard_SEGY in line 1. In the Template Selection window, click once on *G89A1027_1034* and click **OK**. Click **Fill down** to change the template for the other seven files.

    - Select the **Overwrite** radio button next to Log file.
    - Click the **Start** button next to Disk analysis to log file.



    Use the Browse/Edit template if you need to do more editing on your template.

16. When you are satisfied that your template accurately represents your data, minimize SEGY Analyzer.

Loading 2D Data Using PostStack™ Software Data Loader

PostStack Data Loader launched from Seismic Tools allows you to load SEG-Y data without tying up a fully licensed version of PostStack. This option allows the person responsible for data management to learn only a small part of PostStack to lay the groundwork for the interpreter.

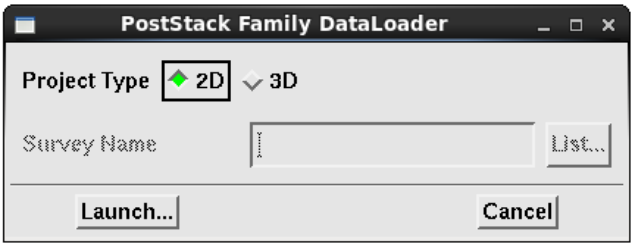
The basic procedures to set up and run a PostStack Data Loader job are:

- Start PostStack Data Loader from Seismic Tools
- Specify input data
- Specify output name and version and select output format

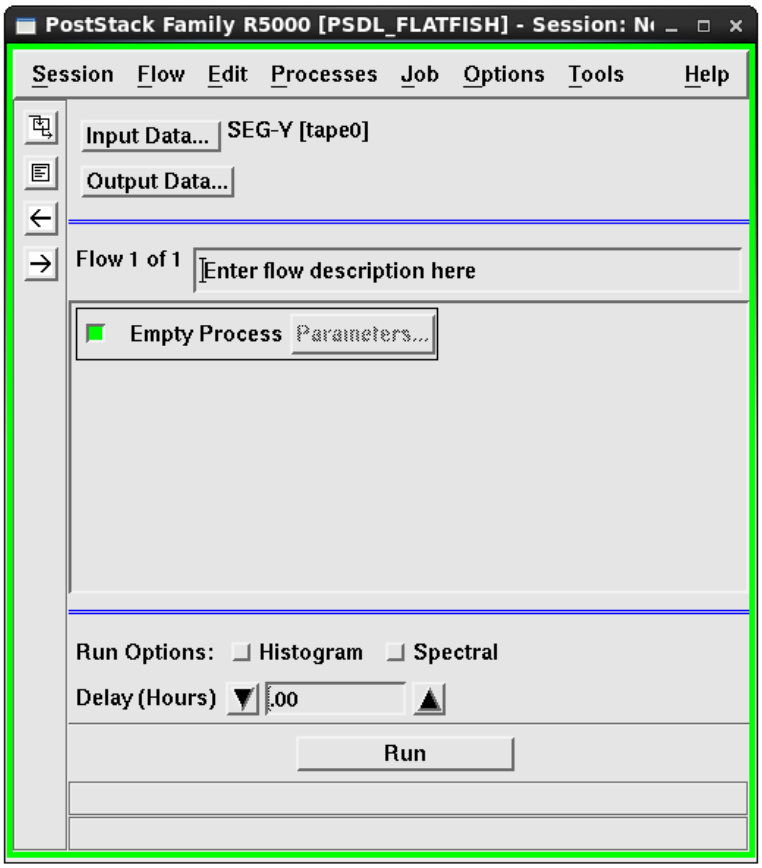
Exercise 1: Load the 2D Lines

In this exercise, you will load your 2D survey in floating point format.

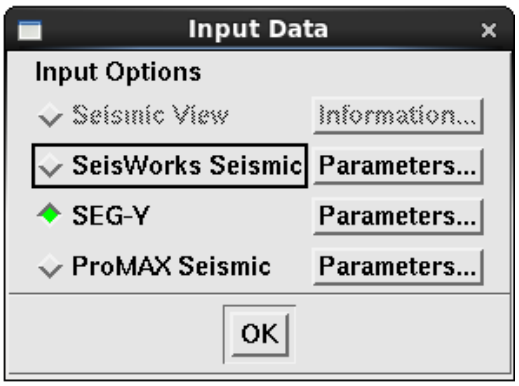
1. To launch the PostStack Data Loader from Seismic Tools, select **Seismic > PostStack Data Loader**.



2. Select the **2D** radio button. Click **Launch**.



3. In the PostStack Family start-up window, click the **Input Data…** button.

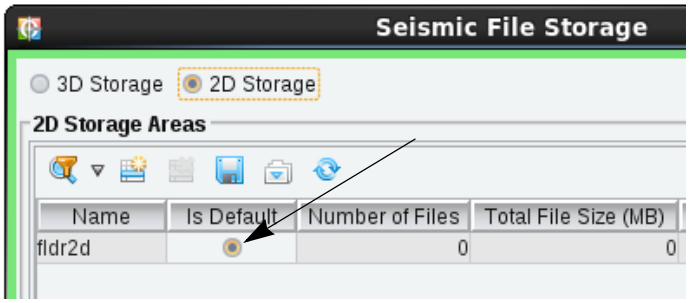


Because you are running PostStack from Seismic Tools (as opposed to running the full PostStack/PAL application) the *SEG-Y* input option is automatically selected.

4. Click **Parameters…** for the SEG-Y option.

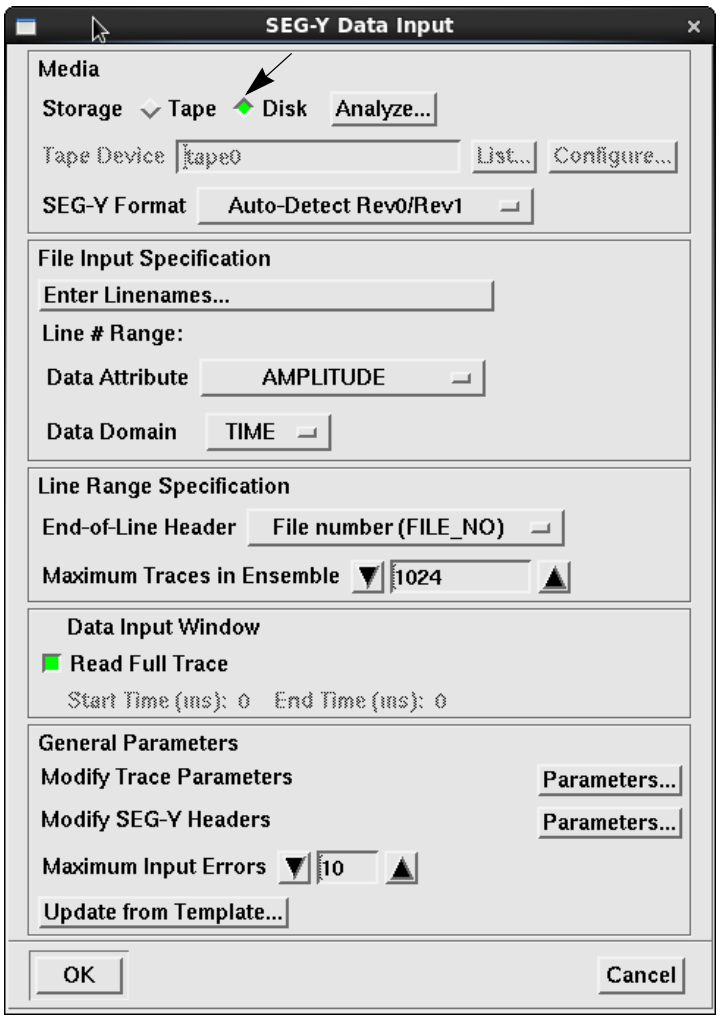
Note

If PostStack "disappears" when you click **Parameters…**, check that the *Is Default* option is selected for the storage directory in **Seismic Data Manager > Tools > Seismic File Storage…** (for 2D).



Try steps 1 through 3 again.

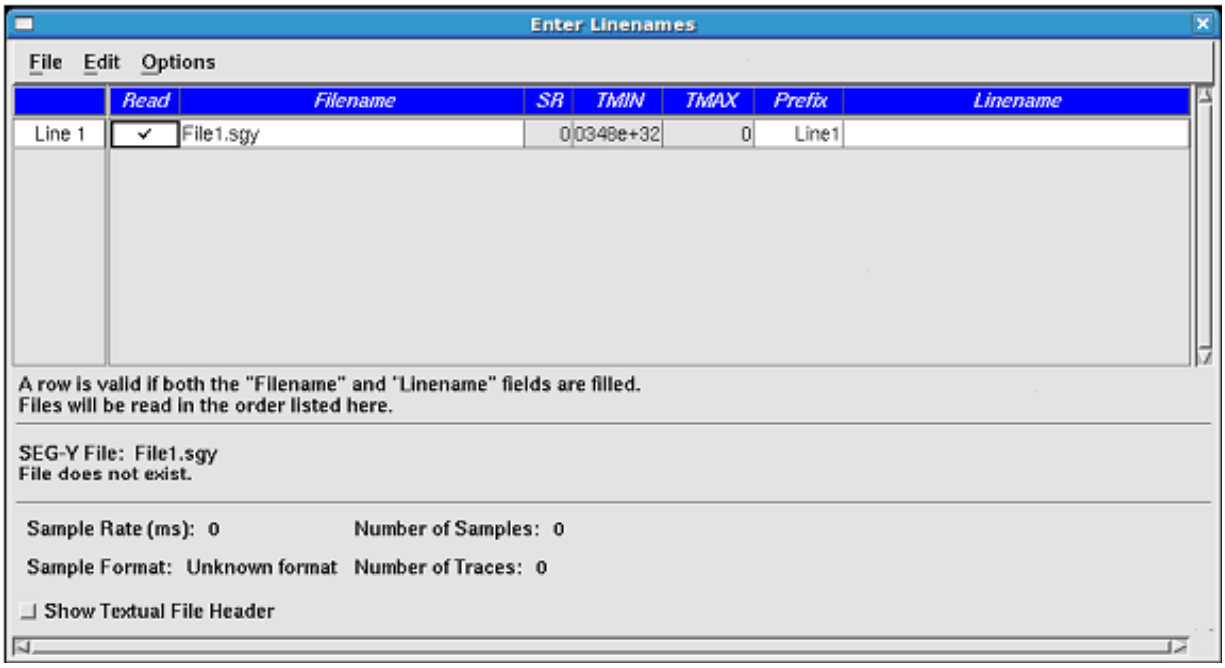
5. Select the Disk storage option (input files are on disk).



6. Let the SEG-Y Format option default to the **Auto-Detect Rev0/Rev1**.

   For 2D data, the input files are associated with line names. You will need to select the SEG-Y files and assign a line name to each file.

7. In the File Input Specification area, click the **Enter Linenames…** box.

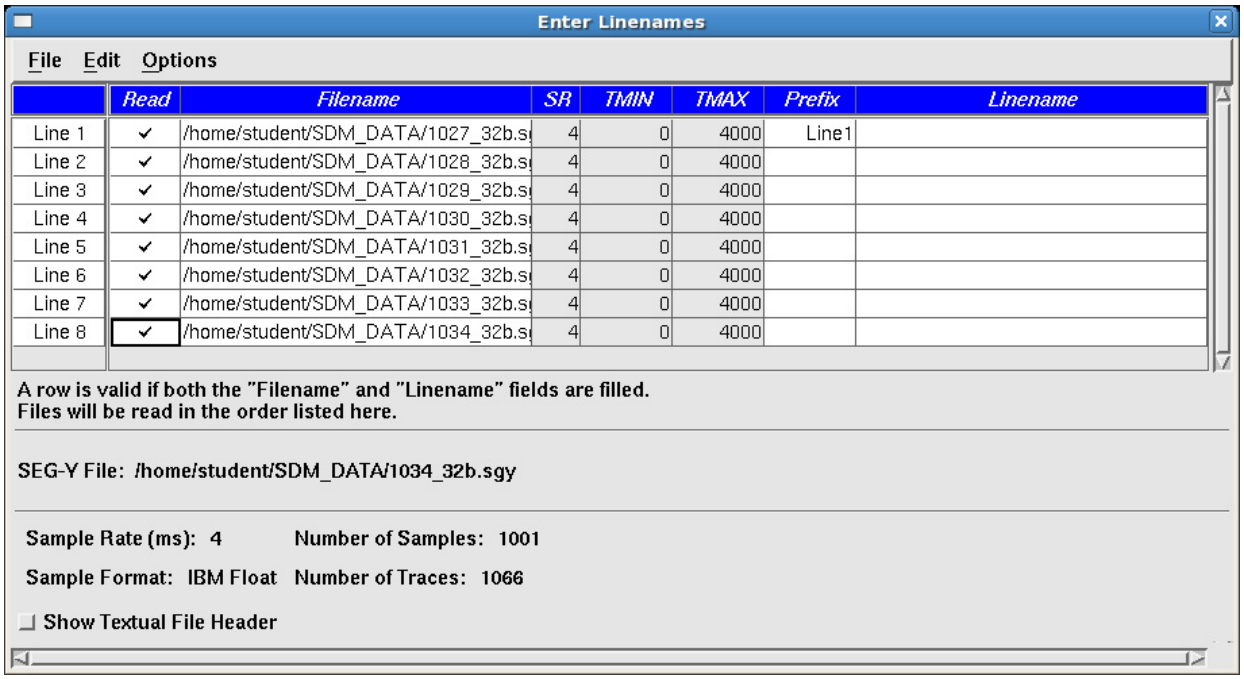


First, select the SEG-Y files.

8. Enter the absolute path names of your eight SEG-Y files using ***ONE*** of the following two methods:

   Method #1:

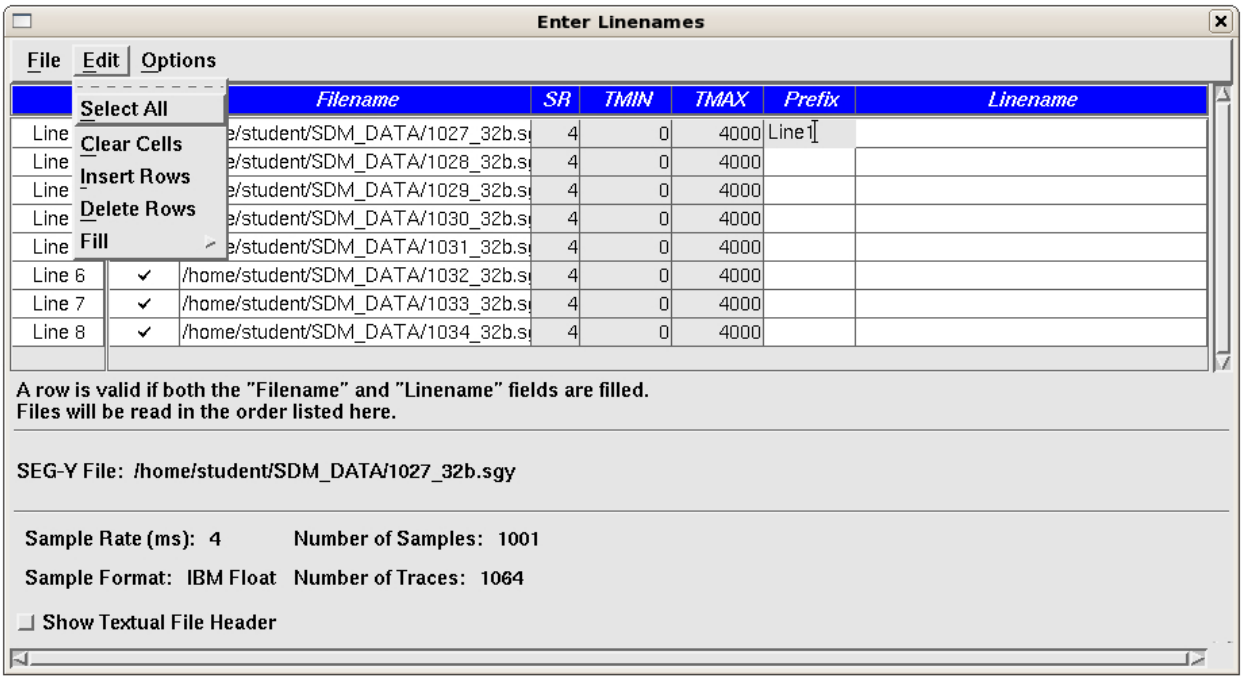
   - Open the *Select SEG-Y Files* dialog by selecting **File > Select SEG-Y Files**.
   - Use the filter to find the files.
   - Select 1027_32b.sgy and click **Replace**.
   - Select 1028_32b.sgy and click **Insert**.
   - Continue until all eight filenames are listed in the **Enter Linenames** window.



You need to clear the *Line1* in the Prefix cell for the first SEG-Y file. This value is a remnant of the sample line row present when the dialog opens.

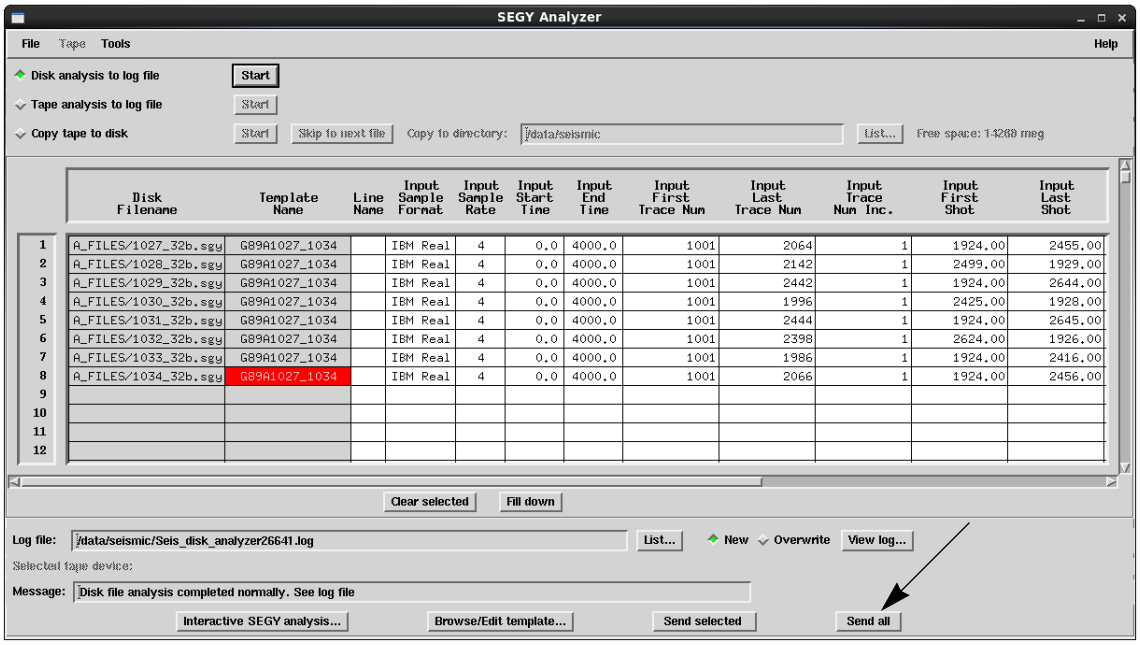
- Click in the Prefix cell containing *Line 1*

- Select **Edit > Clear Cells** to eliminate the *Line1* prefix specification

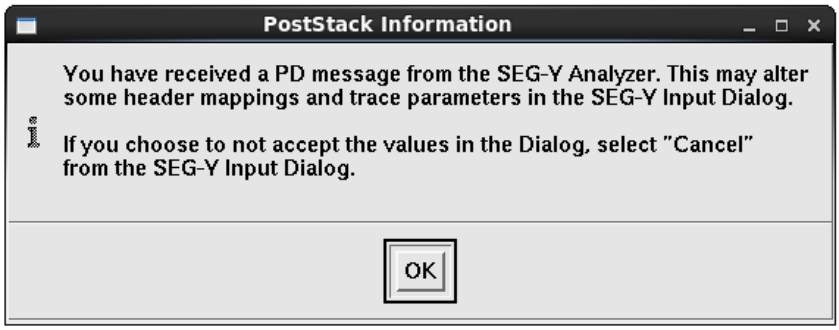


Method #2:

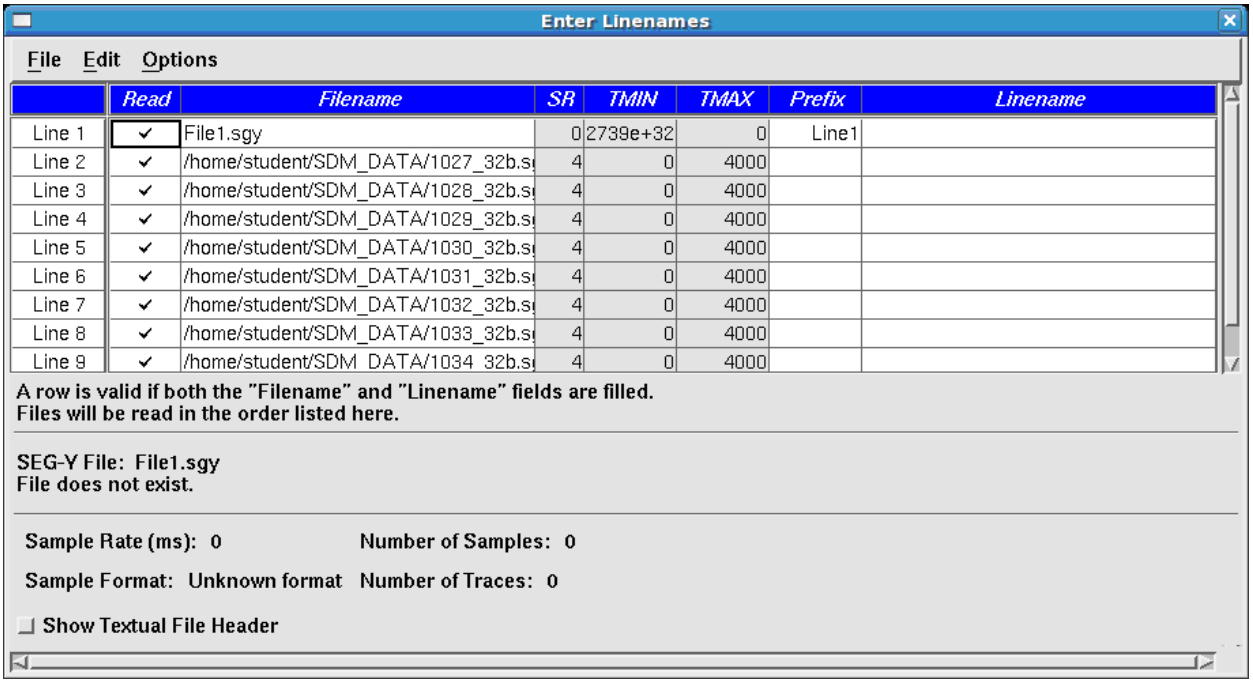
- Open SEGY Analyzer (should be minimized). Click the **Send all** button in the lower right corner of the window.



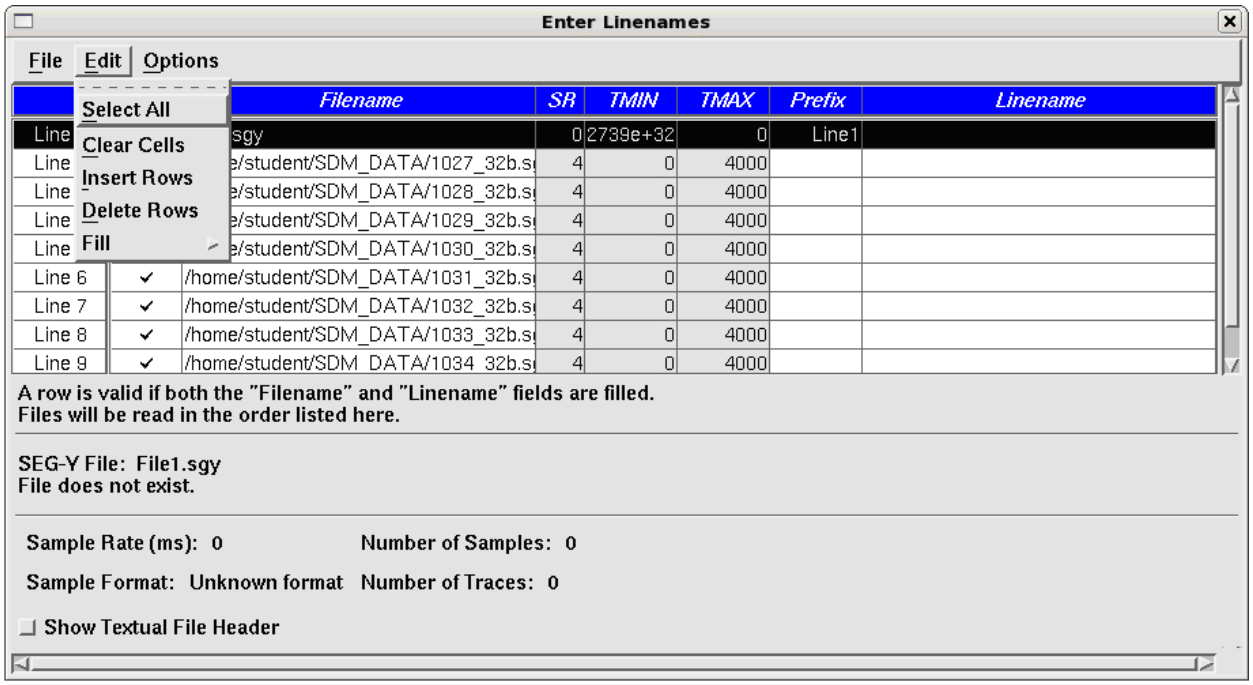
- The Point Dispatcher (PD) will send the information. A PostStack Information box will appear; dismiss it by clicking **OK**.



- The files will be in Lines 2 through 9.



- To remove the first line (with example data that was present when the window opened), click *Line 1*, and select **Edit > Delete Rows**.

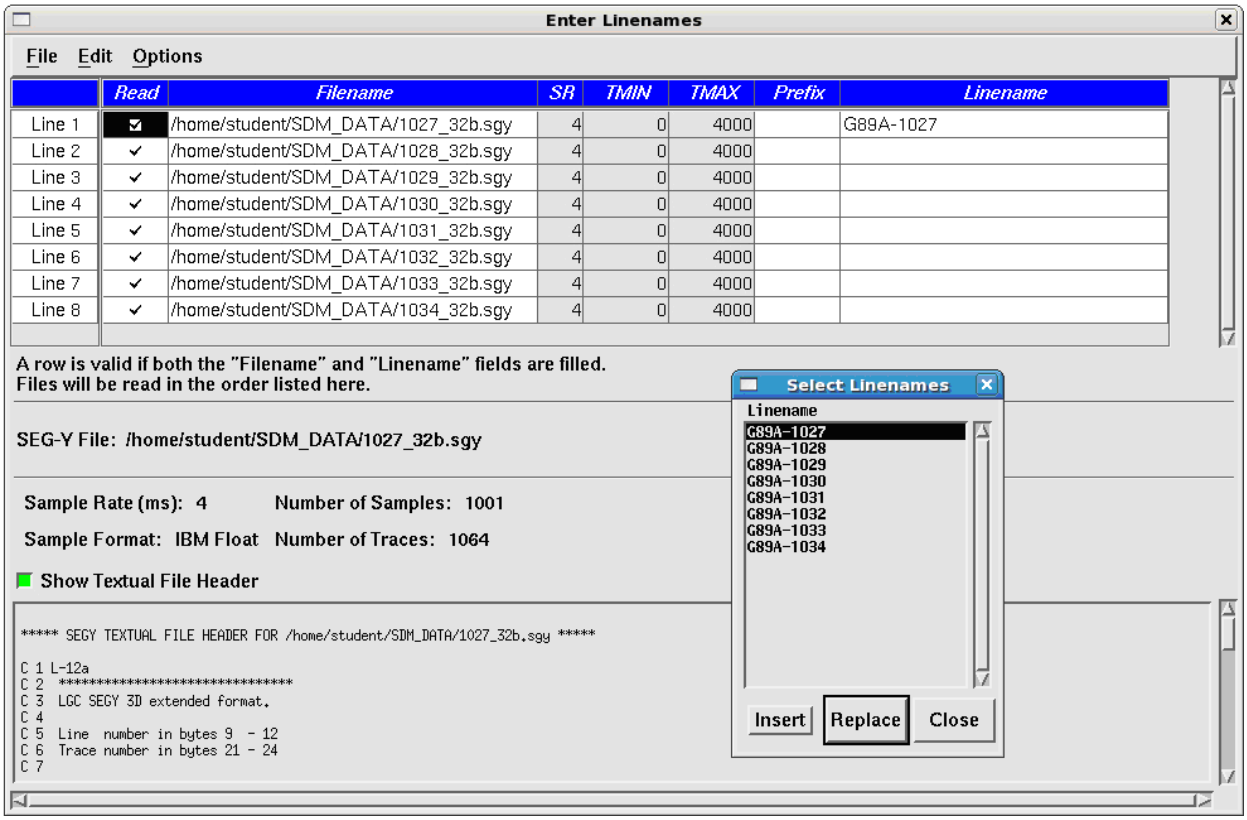


The columns can be resized if you cannot see all the data in a column of interest. Place your cursor at the edges of the column fields in the blue title row, press **MB1** when you see a double arrow to drag to resize columns.

The next steps assign line names to the SEG-Y files.

9. Highlight the row starting with *Line 1*.

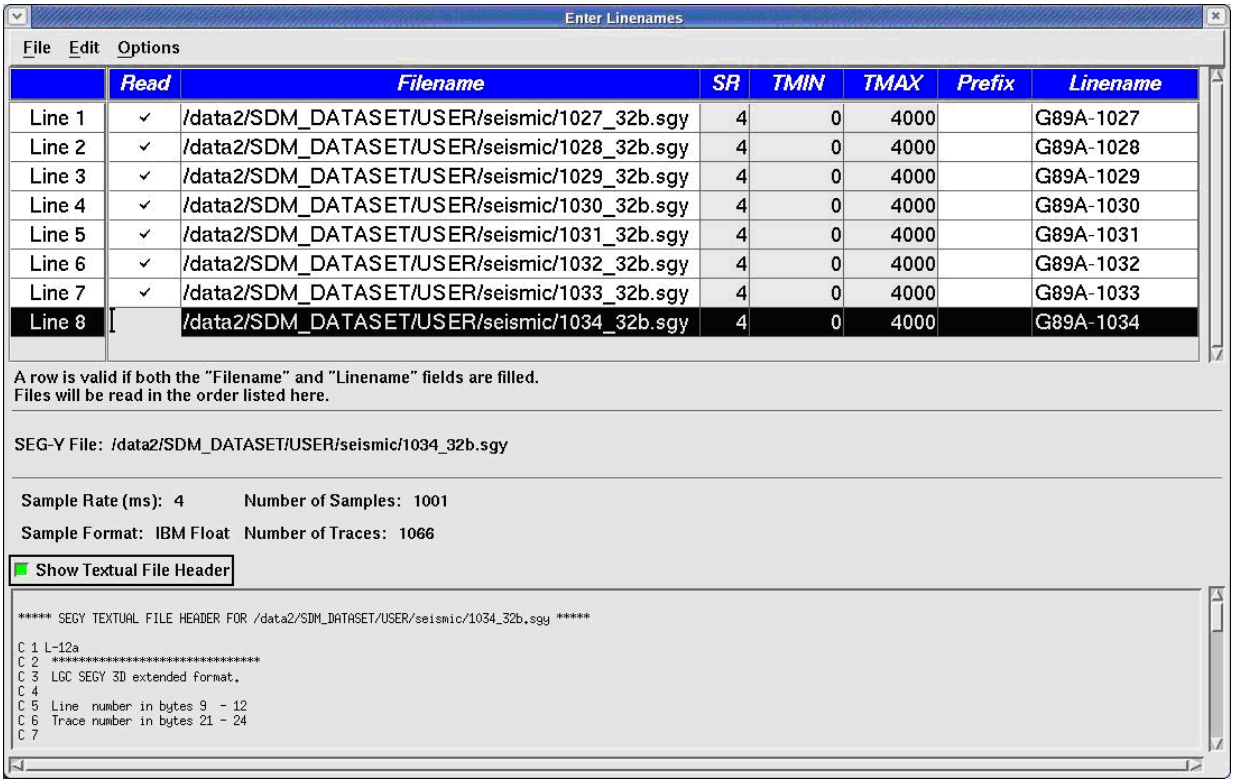
10. Select **File > Select Linenames…**.



11. Highlight *G89A-1027* in the Select Linenames list; click **Replace**.

    When you use Replace, ensure that the cursor is not in the *Linename* field.

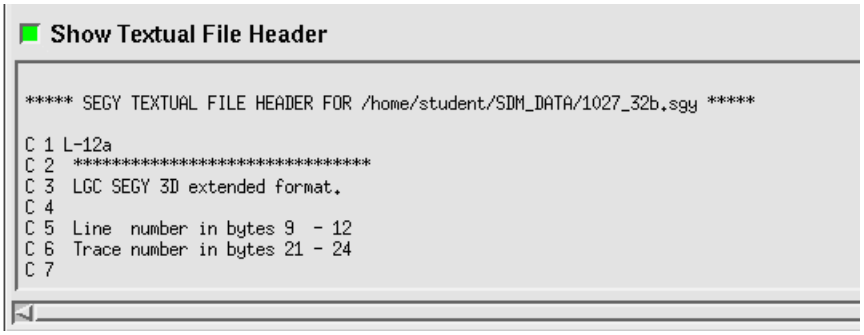
12. Add the rest of the line names to the appropriate cells.



Make sure that each *.sgy* file has the correct filename associated with it or it will not load correctly.

13. Select **Close** to close the **Select Linenames** box.

14. Note that basic information is displayed at the bottom for the file in the row with the active cell. You can also see the EBCDIC header for that file by toggling on **Show Textural File Header**.



15. Select **File > Close** to exit the **Enter Linenames** window.

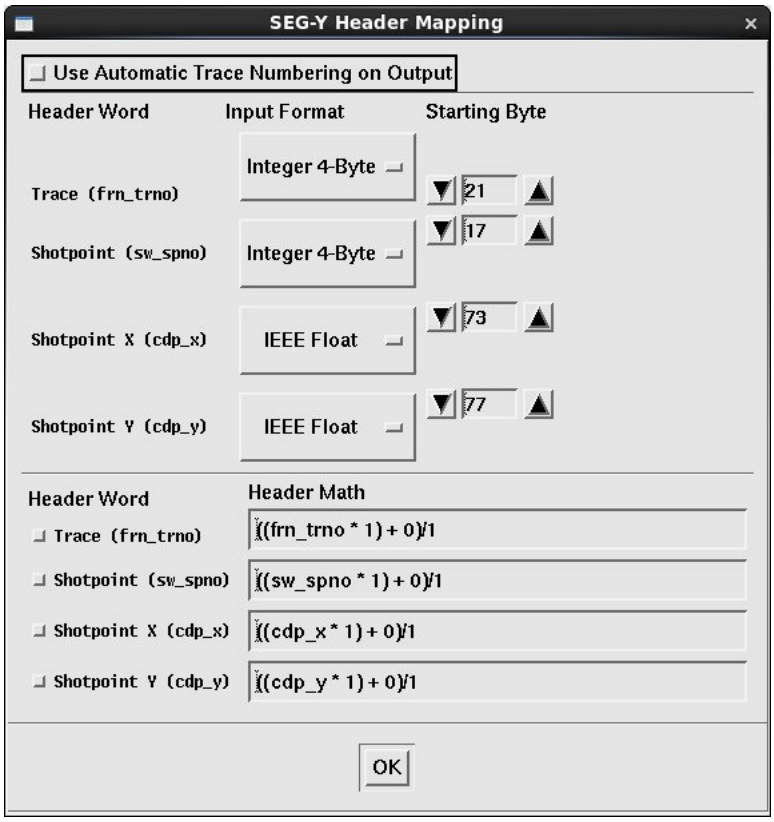
    The **General Parameters** section allows you to modify both Trace Parameters and SEG-Y Headers and set Maximum Input Errors.

    Instead of modifying these parameters here, you will set the parameters using the template created with the SEGY Analyzer.

    - If you used the PD option to send your filenames from SEGY Analyzer, then your template, G89A1027_1034 was already read and the appropriate parameters have already been modified.

    - If you used the *Select SEG-Y Files* dialog box to enter the files, you will need to select the template by first clicking **Update from Template**. Select G89A1027_1034 template and click **OK**.

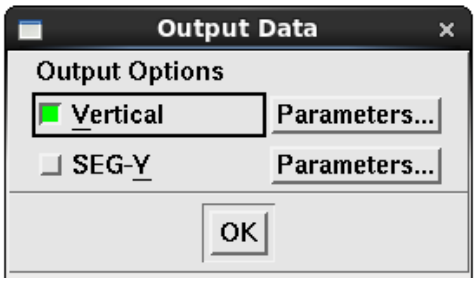
16. Select the **Parameters…** button next to Modify SEG-Y Headers. They should reflect the byte locations and formats in your template.



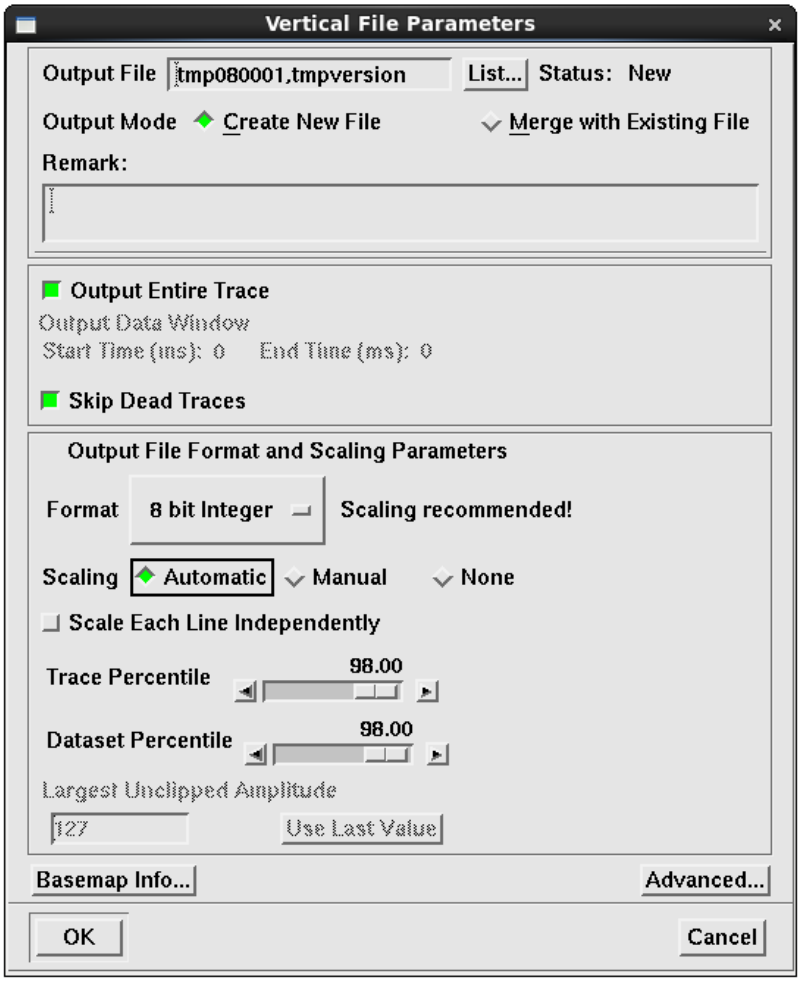
17. Dismiss this window by clicking **OK**.

18. Click **OK** to close the *SEG-Y Data Input* dialog box and **OK** in the *Input Data* dialog box.

19. In the *PostStack* main dialog box, click **Output Data…**. The only Landmark format output option available for 2D data is **Vertical File**.

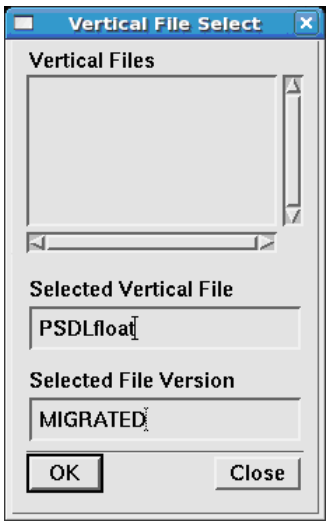


20. Click **Parameters…**. The *Vertical File Parameters* dialog box opens.



21. Click the Output File **List…** button. In the Selected Vertical File box type:

- Selected Vertical File: **PSDLFloat**
- Selected File Version: **Migrated**



22. Leave the **Output Entire Trace** toggled on. The trace data will be output from 0 ms to the maximum time in the dataset.

    If you wish to limit the time range of the output data, you must toggle off **Output Entire Trace** and enter the desired Start Time and End Time.

    To extend the time range, use **Processes > Utilities > Trace Length** from the PostStack Family window.

23. Specify the Format for the output file by clicking on the option button and choosing **Floating Point**.

24. Click the **Basemap Info…** button in the lower left corner of the *Vertical Files Parameters* dialog box.

25. Click **List…** next to Survey. Select **fldr2d** and click **OK**.

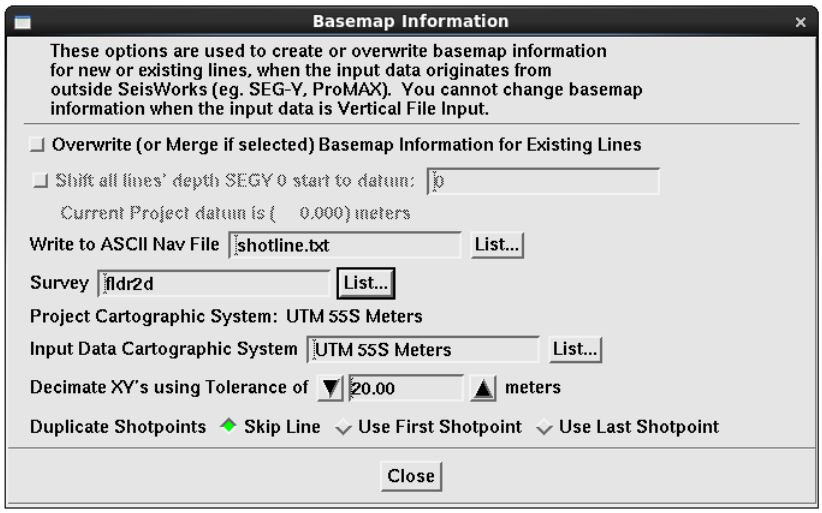
    The Input Data Cartographic Reference System is the same as the Project CRS. If it was different, you would set the input data's cartographic system here and it would be converted to the project's cartographic system.

    Next, select the option you wish to use for Duplicate Shotpoints, if duplicate coordinates exist in your file.

You can choose how to handle files that contain duplicate or multiple coordinates for a shotpoint location (OpenWorks must have one coordinate for a shotpoint) from the following methods:

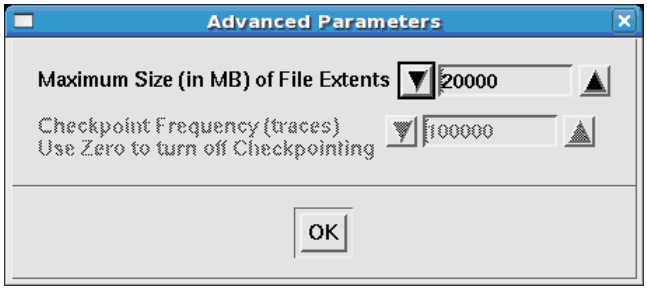
- Skip line—skips the duplicate line in the ASCII file; lines previously loaded remain unchanged
- Use First Shotpoint—uses the first 4-tuple (trace#, shotpoint#, x, y) encountered in a series of consecutive duplicate shotpoints
- Use Last Shotpoint—uses the last 4-tuple encountered in a consecutive series

26. Use *Skip Line* option.

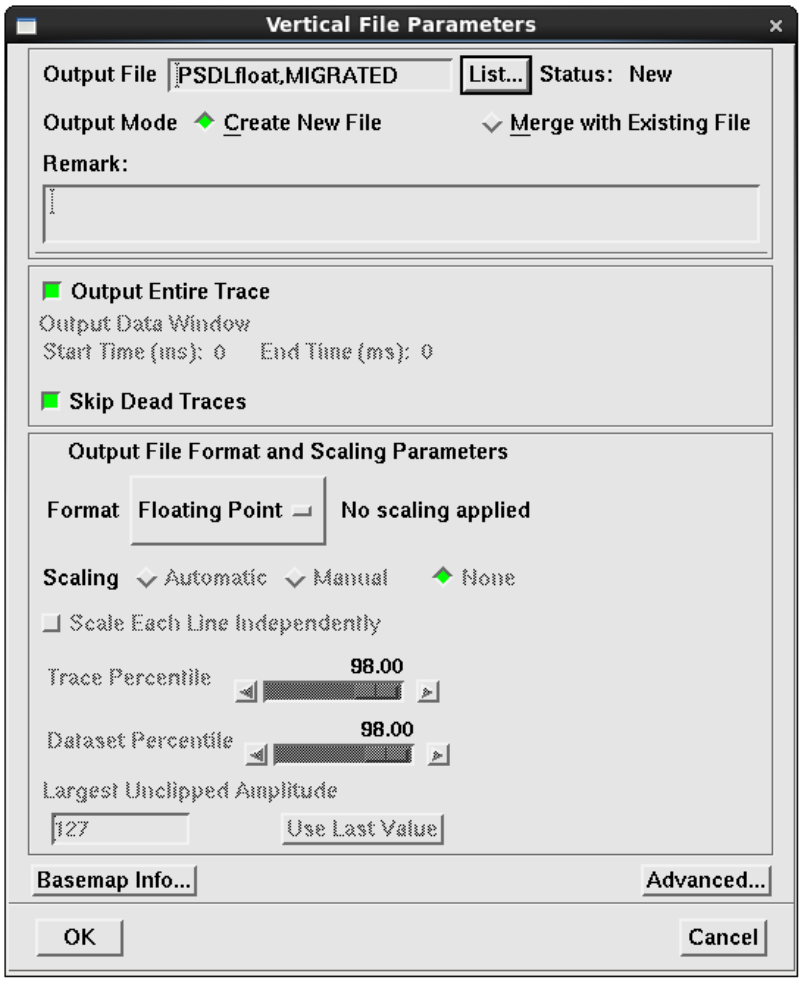


27. **Close** the Basemap Information box.

28. Click the **Advanced…** button in the lower left corner of the *Vertical File Parameters* dialog box.



29. Click **OK** to accept the defaults for Advanced Parameters and close the dialog box.



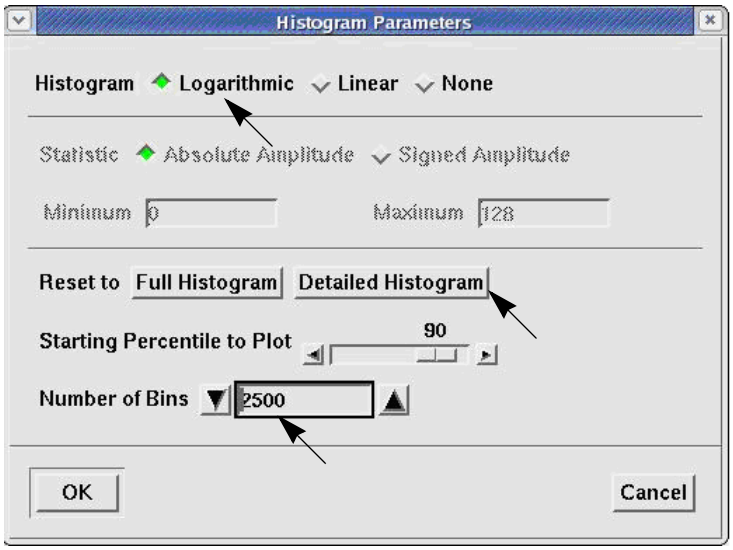
30. Close the *Vertical File Parameters* dialog box by clicking **OK**. Click **OK** in the *Output Data* dialog box.

31. Select **Histogram** as your Run Option, which will create a frequency distribution report in the job.output file and also be saved in the database (**Seismic Data Manager > Tools > Process History**).

    - Press **MB3** while your cursor is on the Histogram option and select **Parameters…**.

    - Set the following parameters for an easy to read output:
      — **Logarithmic**
      — **Detailed Histogram**
      — Change the **Number of Bins** to 2500

- Click **OK**.



32. To submit the job to the job queue, use *one* of these methods:

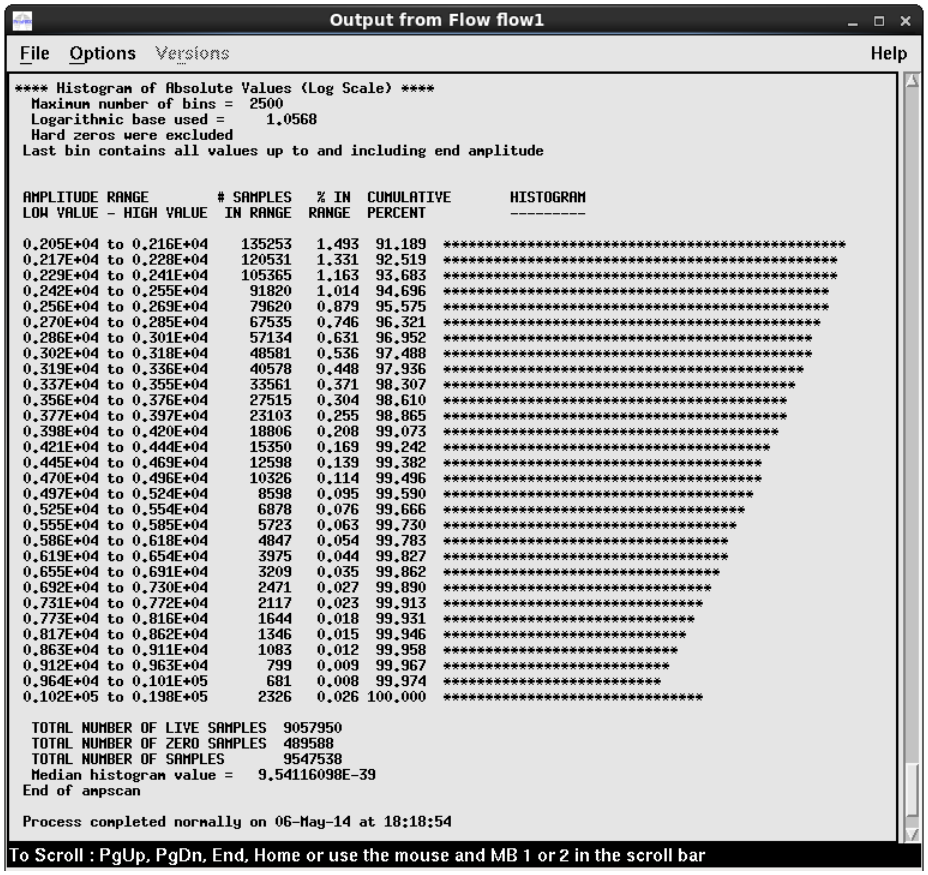
    - Click the **Submit Job** icon ( ).
    - Click **Run** at the bottom of the dialog box.
    - Select **Job > Run** from the menu bar.

    Status messages in the message bar at the bottom of the dialog box tell you when the job is initiated and if it finished normally. A beep will sound when the job is completed.

33. Select **Job > View…** or click the **View Job** icon ( ) to view the job as it runs, along with the Histogram results.

    From the Output from **Flow flow 1** menu bar, select **File > Monitor** (updates the window every three seconds).

Below is a copy of the histogram you should see on your screen.



When the job is complete, to stop the updates, turn off the monitor by selecting **File > Monitor**.

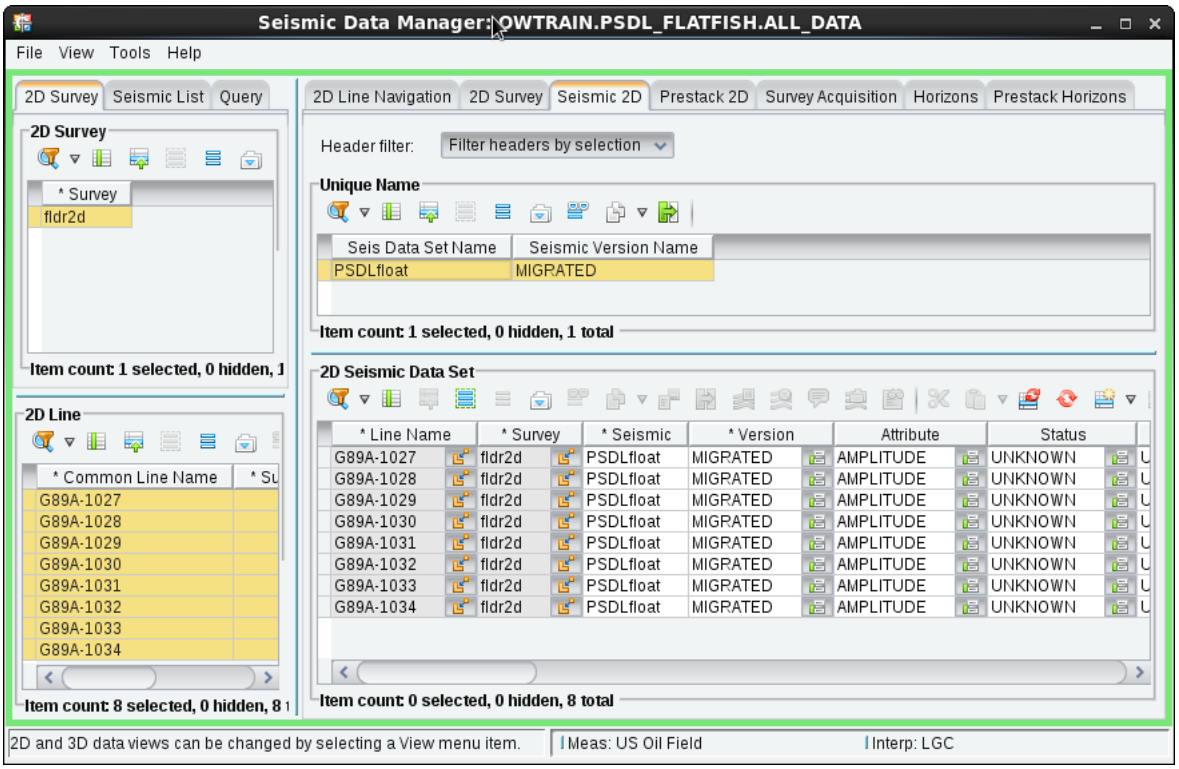
34. Minimize PostStack Data Loader and SEGY Analyzer.

Exercise 2: QC the Data Load in Seismic Data Manager

Use Seismic Data Manager to check the seismic volumes loaded for the 2D lines.

1. Open Seismic Data Manager (it should be minimized).

2. Highlight a line in the 2D Line list and click the **Seismic 2D** tab.

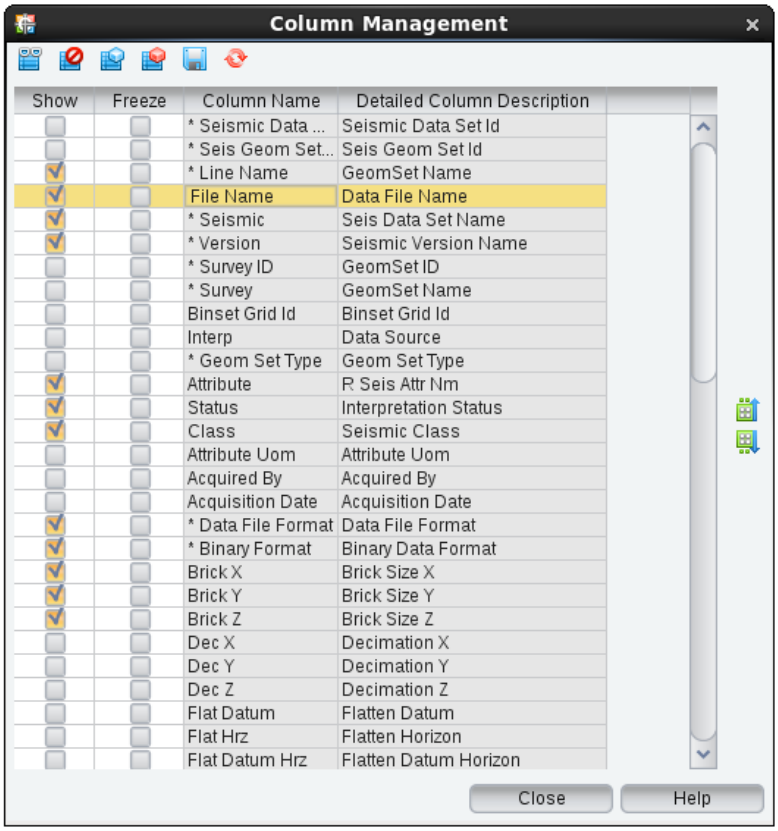


The physical files created for all the lines can be viewed in this manager.

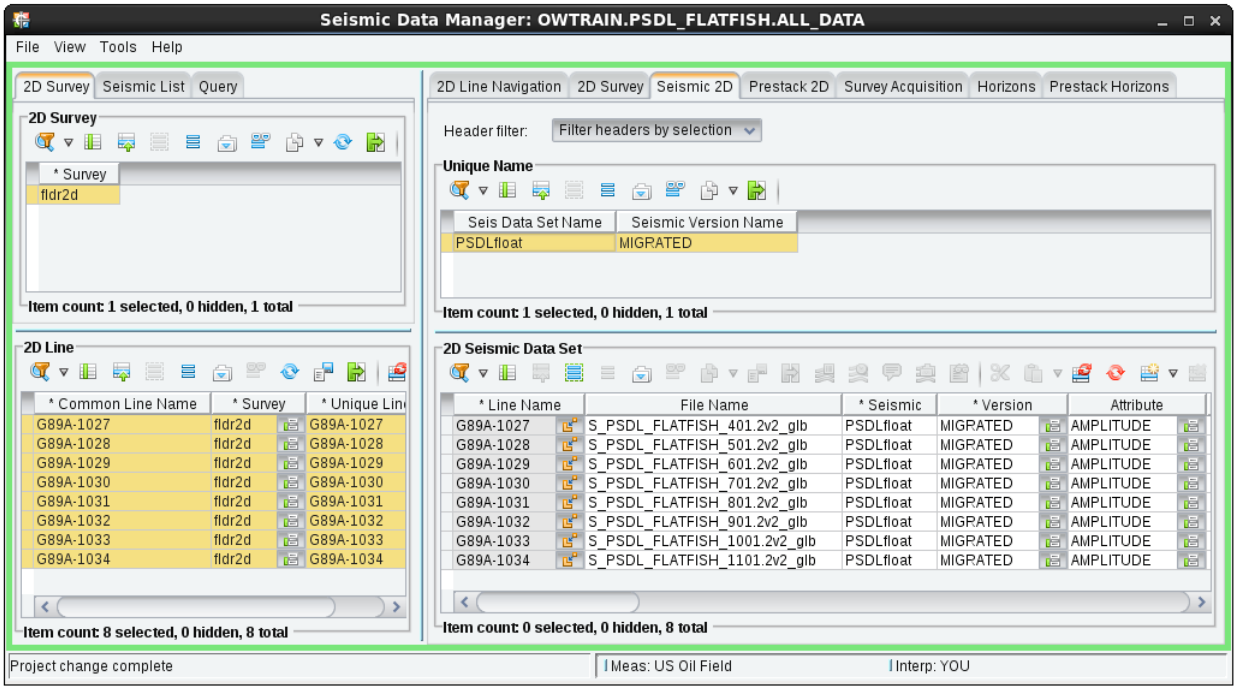
If the name of the physical file does not show up in the 2D Seismic Data Set pane, use the following steps to add the physical name and set this selection as your user preference.

- In the lower pane, select the column Management icon ( ) to toggle on File Name.

- Use the Move selected rows up icon ( ) on the side of the dialog to place the column position next to the Line Name (you can also drag the column to a different position in the spread sheet view).

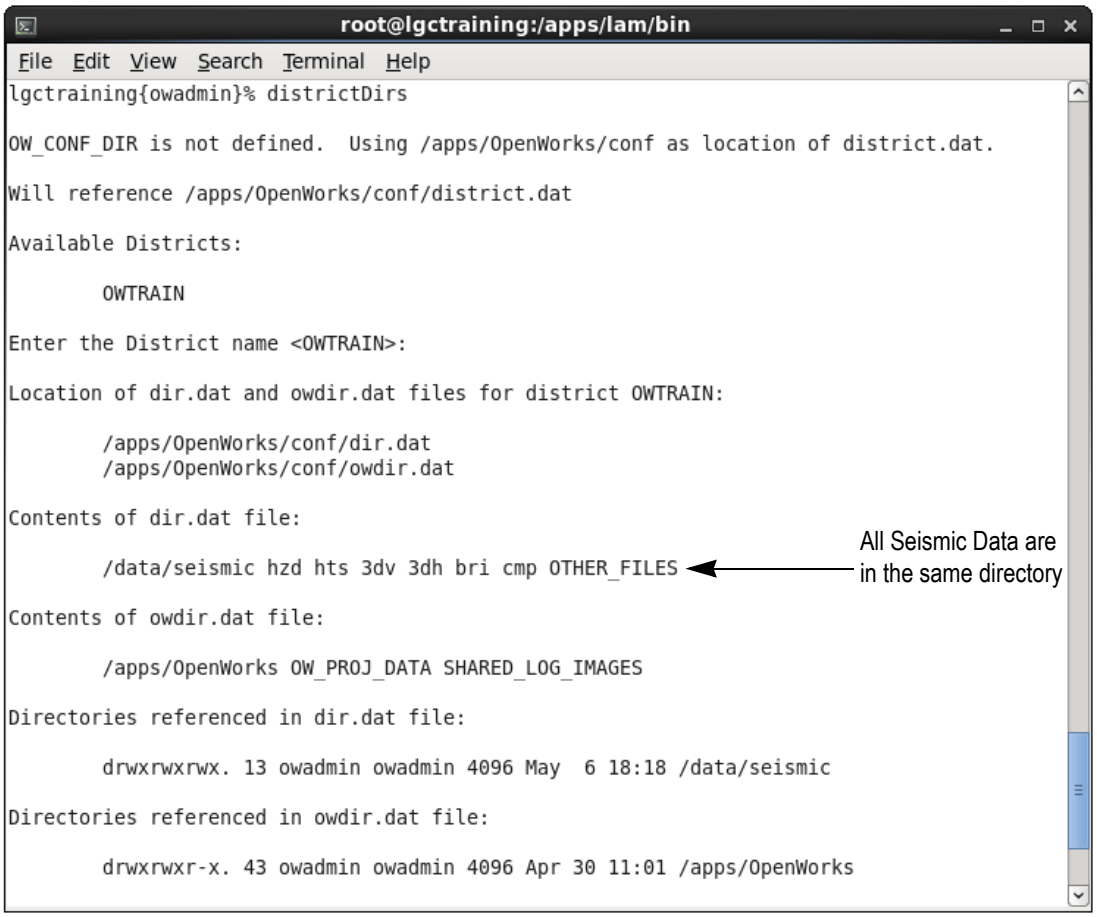


- Select **Tools > Save Application Preferences as User Default**.

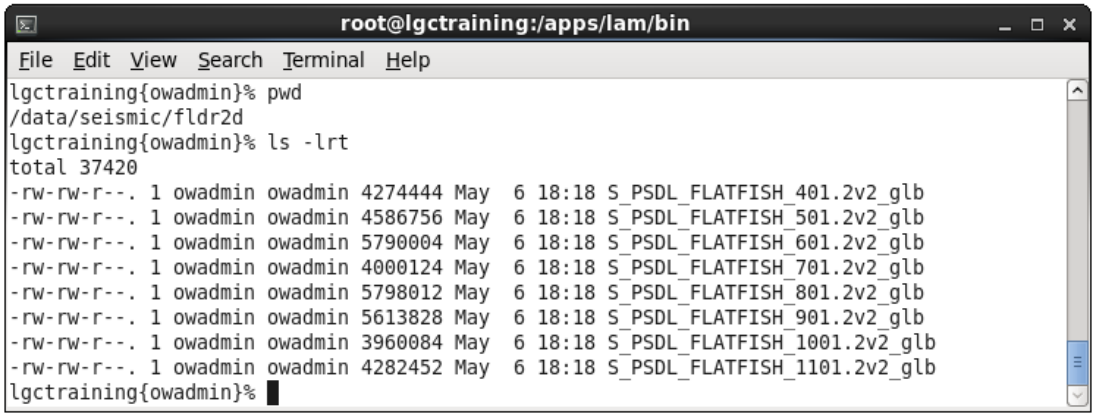


3. Review the results in the lower pane. You now know the actual disk file name.

4. To find the directory where these files reside, use **Tools > Seismic File Storage…** to see the possible directory paths, or use the utility command *districtDirs* (type in an xterm).



5. In an xterm, *cd* to the directory (remember to add the survey name to the path where the .2v2_glb files are stored). Use the *ls* or *ls -lrt* command to view the physical files.

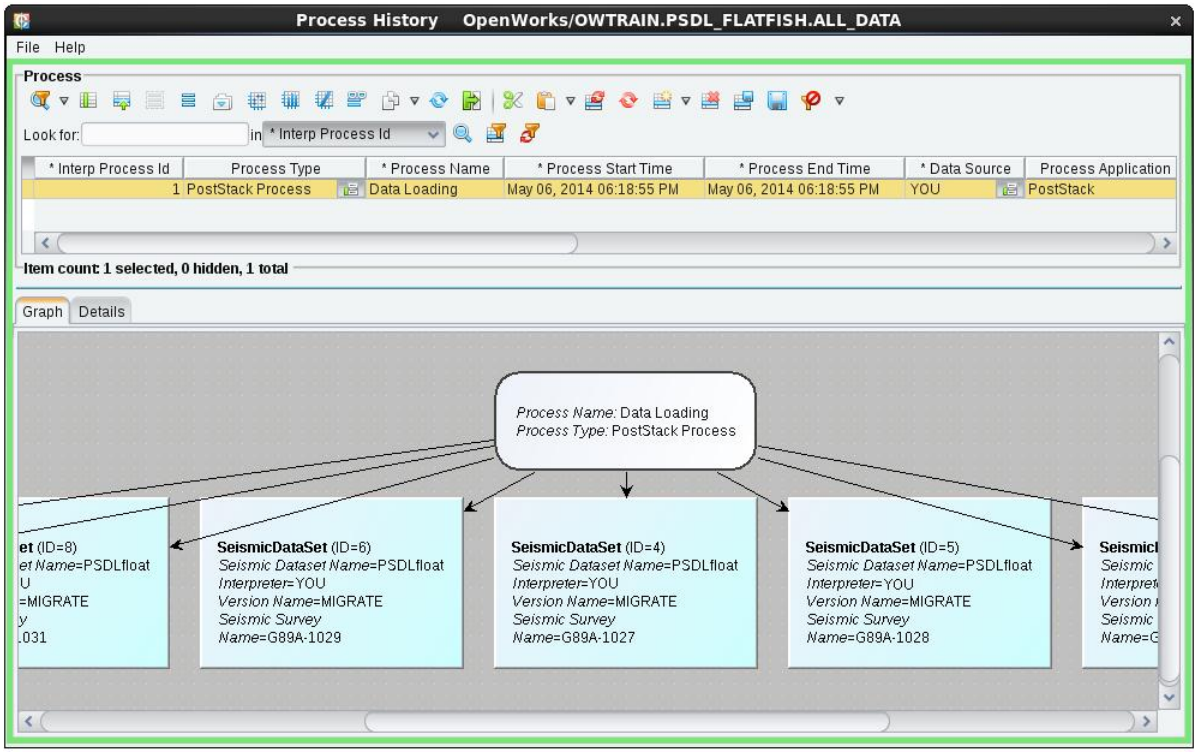


Also, view the process history for the PostStack job stored in the database.

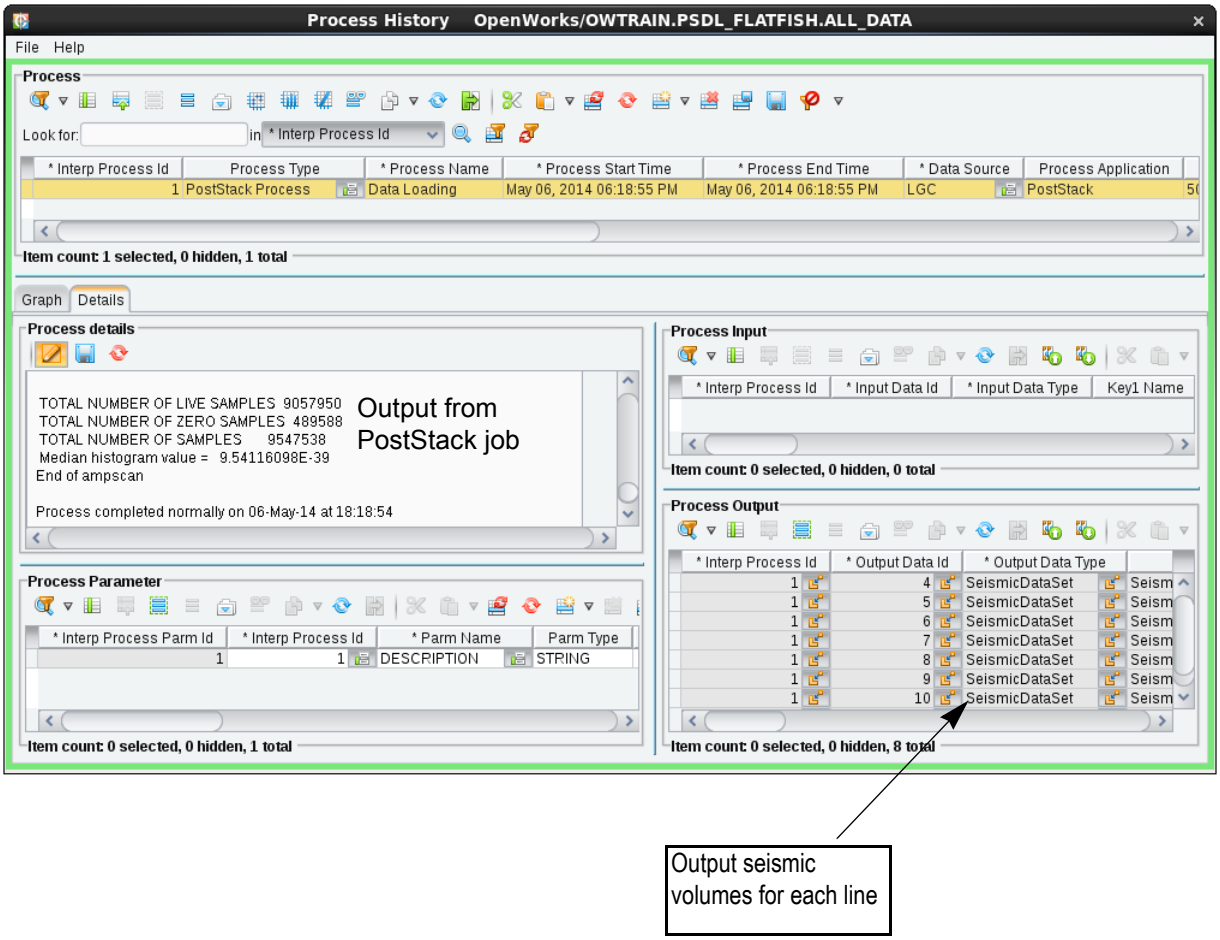
6. Check the process History (**Tools > Process History…**).

7. Select **All Interpretation Processes** in the *Filter Interpretation process Data* dialog box.

8. Select the dataset you are interested in viewing. Use the creation date and Process Application to help select the dataset.



9. Click the **Details** tab.



10. Select **File > Exit** to close.

11. Minimize Seismic Data Manager.

Exercise 3: View the 2D Seismic Data

Part 1: QC the 2D in the SeisWorks Software

The purpose of this exercise is to examine the 2D data you just loaded.

1. To start the SeisWorks software, *either*:

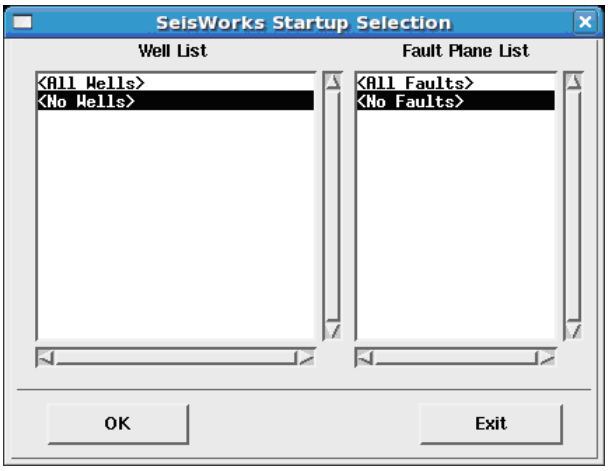
   - Open the session you used for the navigation QC (if you used the the SeisWorks software).

   or

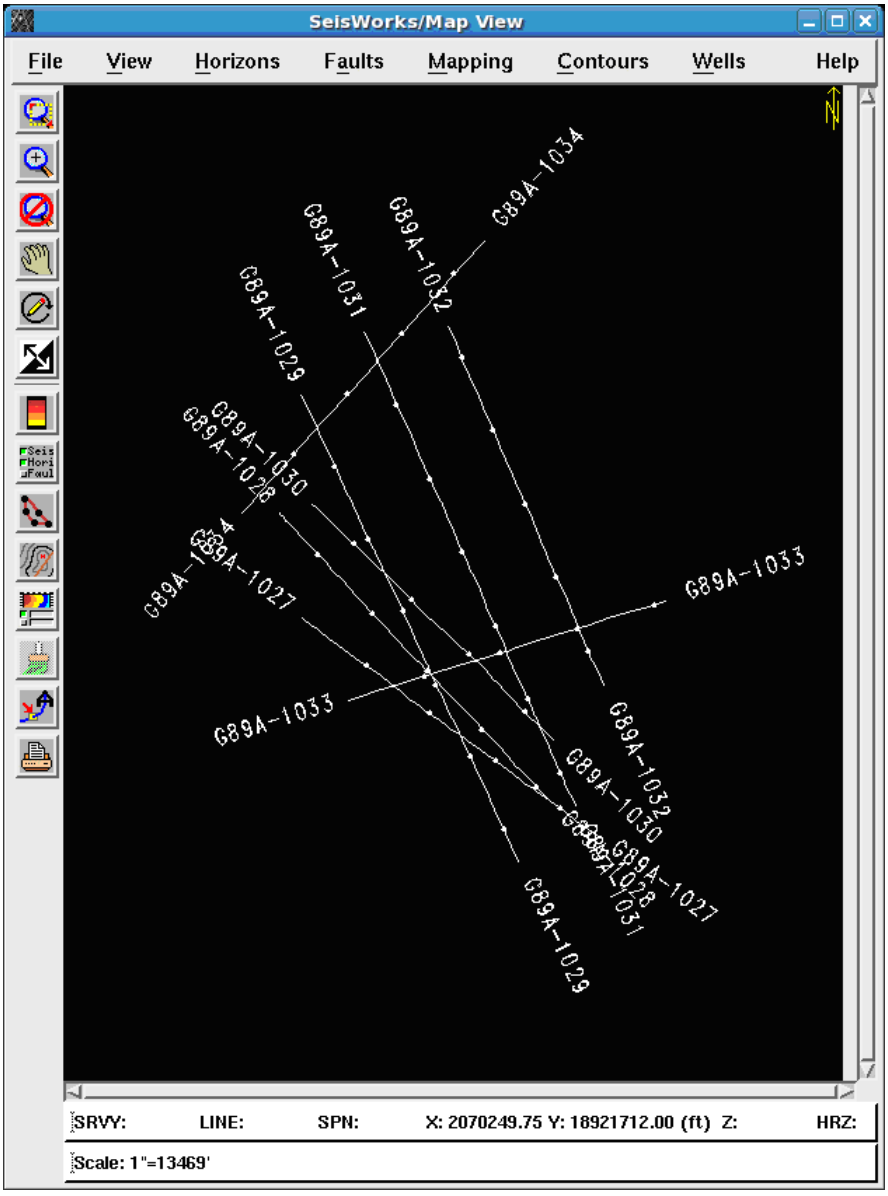
   Start a new session:

- Select from the OpenWorks Command Menu **Applications > SeisWorks**. Select **Session > New (Time)** from the SeisWorks menu.

2. Select **No Wells**, and **No Faults** in the startup dialog. Click **OK**.



Eight lines should be displayed in the Map View.



You can resize the window by grabbing any corner of the window border with the MB1 and dragging.

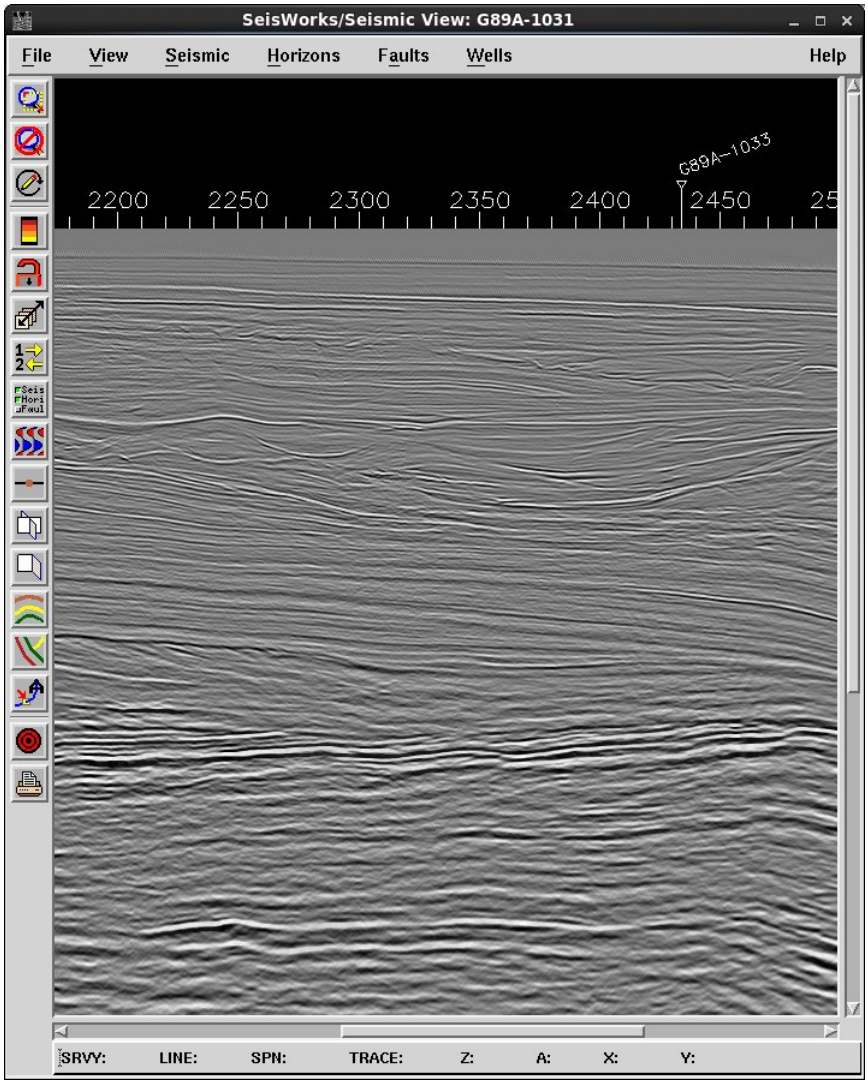
3. Display Line *G89A-1031* in the Seismic View using the following steps:

   - Click on the Midpoint icon ( ) found on the Seismic View window.

- In Map View, select Line *G89A-1031* by moving the cursor over the line until a graphic "box" appears around the line, then click **MB2**.

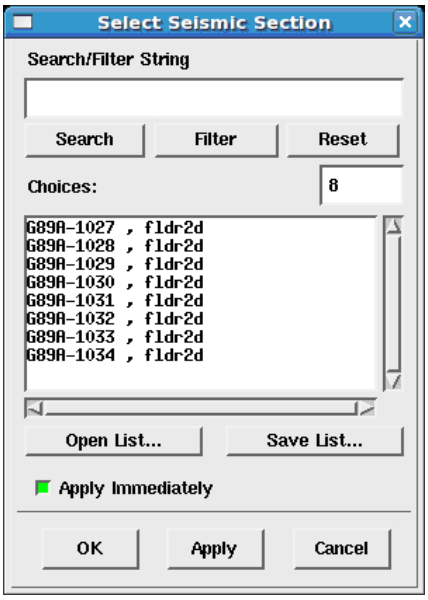
The *Seismic Time Selection* dialog box opens. Accept the default Start time of *0* and display the entire Interval of *4000*.

- Click **OK**.



4. View all eight lines. Select the lines using the map midpoint option used in the previous step, or in the Seismic View, use the **Seismic >**

Select from List… option. A selection dialog opens with a list of the lines. Click any line to display the line.

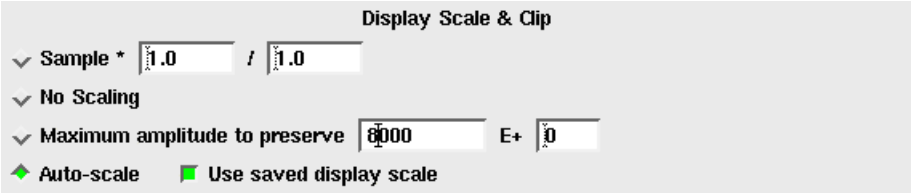


5. Save the SeisWorks session for use in following exercises. Use **Session > Save** or **Save As…**.

   Notice that some of the lines appear lighter than others. The reason this occurs is that each line is being scaled to an 8-bit display (SeisWorks display is 8-bit).

   DecisionSpace Desktop and PowerView Basemap do not have this limit.

   The default automatic scaling in SeisWorks (in Seismic Display Parameters) takes the largest amplitude value for the line displayed and scales that value to 127, then applies that scalar to each sample, and so preserves the relative amplitude of each sample.



The interpreter can dynamically scale the lines in SeisWorks to suit the needs of a workflow, so in most cases the data loading step is finished at this point, though there are various ways to make the interpreter's job easier when dealing with 2D lines with drastic amplitude variation (due to recording, processing, and different vintage issues). Different 3D volumes may have similar issues, and can be scaled or trace balanced in a similar manner if necessary.

The best way to match 2D data is using the Seismic Balance utility, which can be started from **SeisWorks > Utilities >Seismic Balance**, or from the OpenWorks Command Line, **Applications > Seismic Interpretation > Seismic Balance**. The balancing process is rather involved, allowing mistie resolution in amplitude, phase, and time. With 2D data, corrections can be derived from the balance software or manually specified (or a combination of the two). With 3D data, the corrections are manually specified and applied to the uniformly to the 3D volume. This utility is covered in the Landmark *Seismic Balance* class.

Other ways to adjust for these amplitude variations are:

- Scaling and clipping all the data to 8-bit format - at this point SeisWorks would use the *No Scaling* option for all lines and displays would be relatively consistent

- Trace balancing the amplitudes by adjusting the amplitudes form each line to a common range

- Save a display scale value for the seismic volume - the value specified will be used to scale to 127, instead of the largest amplitude found for the display when using the automatic scaling option

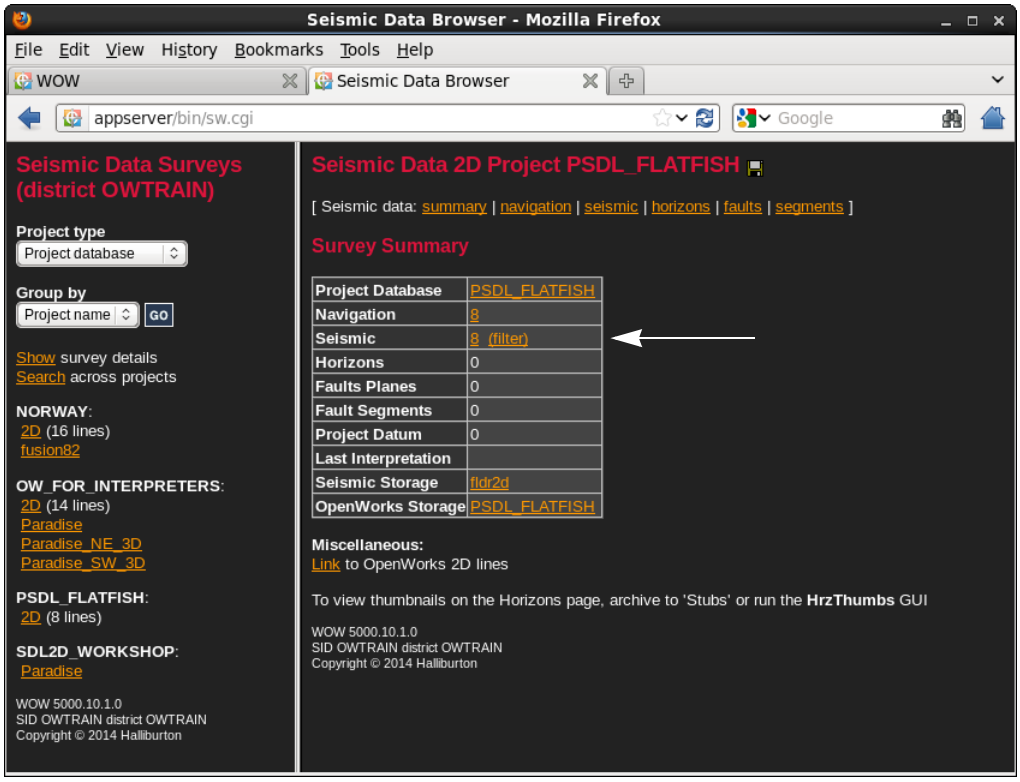
These options will be covered in this chapter. Permanently scaling and clipping data and trace balancing can be done in PostStack Data Loader. Another option, setting a display scale value can be done in SeisWorks.

Part 2: Display Seismic in the WOW Software

1. Access the WOW software.

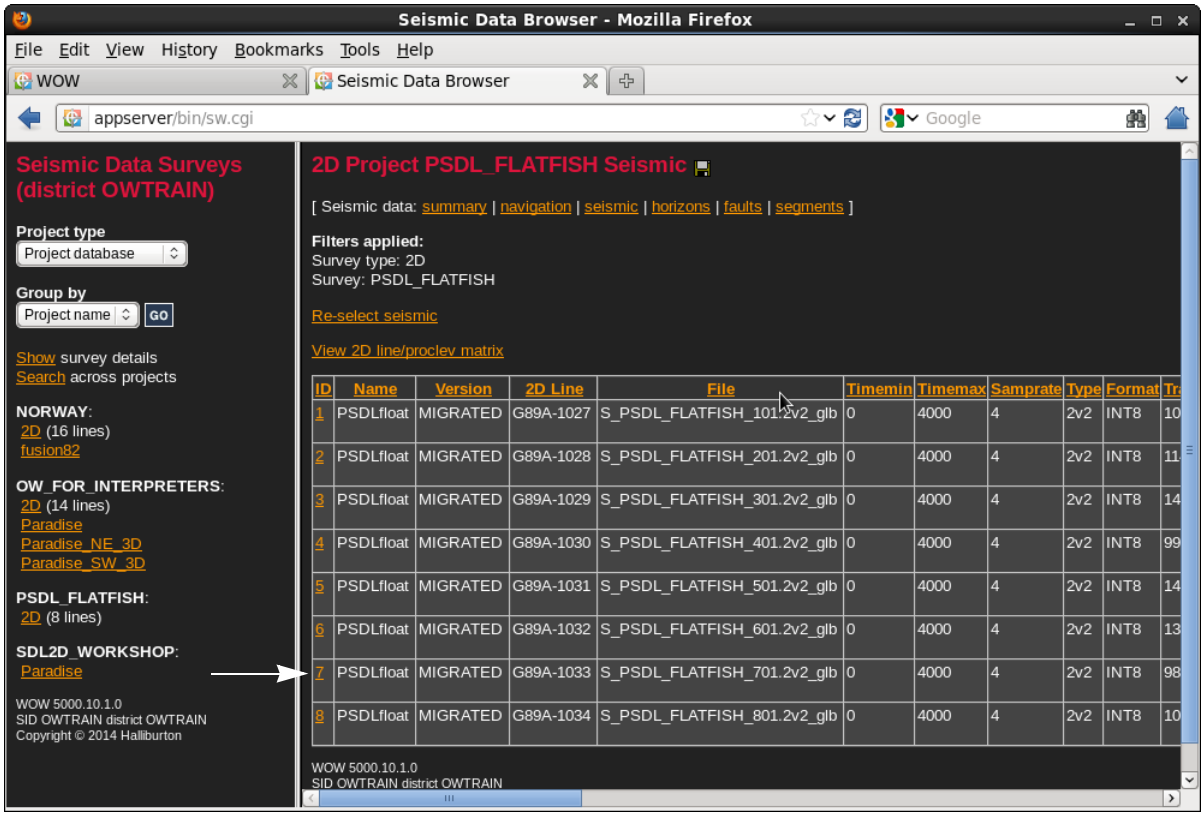
2. Click:

   - **Seismic Data** in the sidebar
   - Select **Project database** for the OW project type; click GO
   - Select **2D** under **PSDL_FLATFISH** project

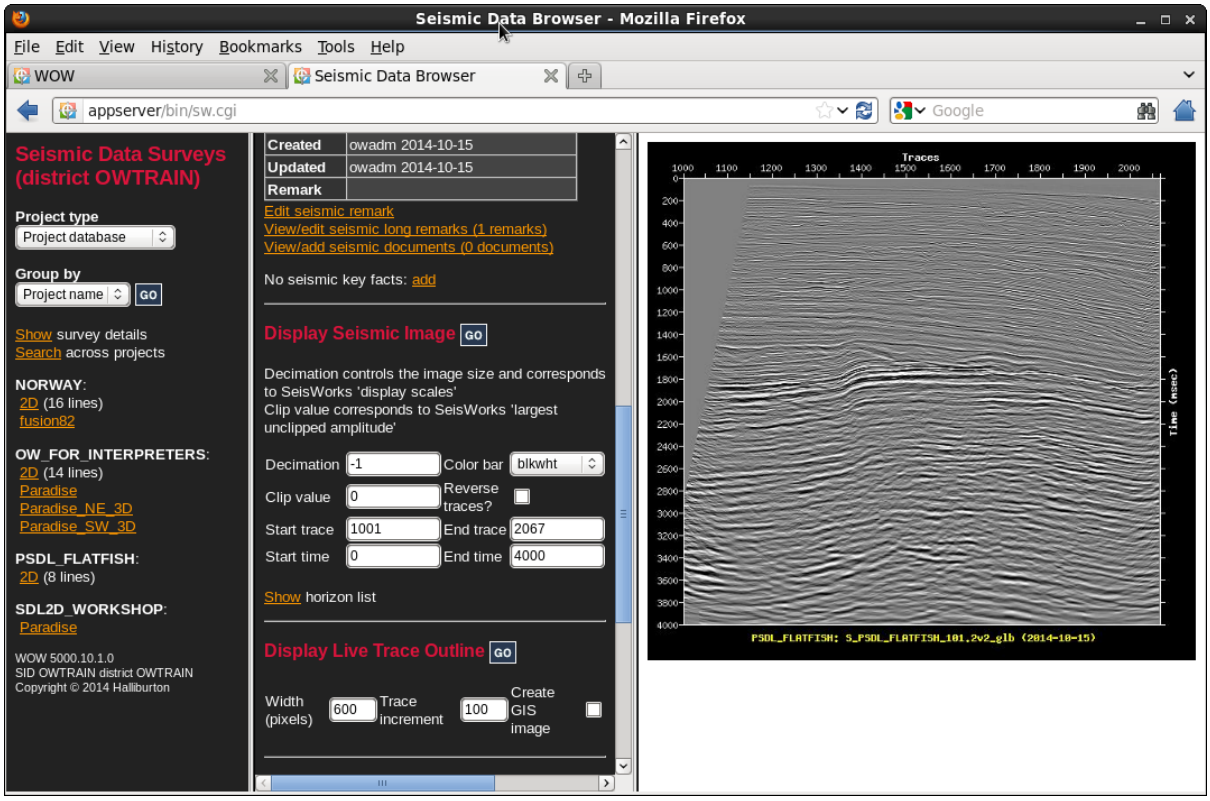


3. Click the number **8** next to Seismic.

4. Click the ID number for a 2D line.



5. Scroll down to Display Seismic Image; click **GO**.



6. View the other lines.

7. Minimize the WOW software.

Determining a Scale Factor

SEG-Y data is frequently stored as 32-bit data. Many times, there is a desire to reduce the size of the data set. The same seismic volume loaded as 16-bit data requires about 1/2 as much space as the original 32-bit data and 8-bit data requires 1/4 as much space. If you chose to load 32-bit data into 16- or 8-bit .2v2_glb files, you will usually need to provide a scale factor when you load the data.

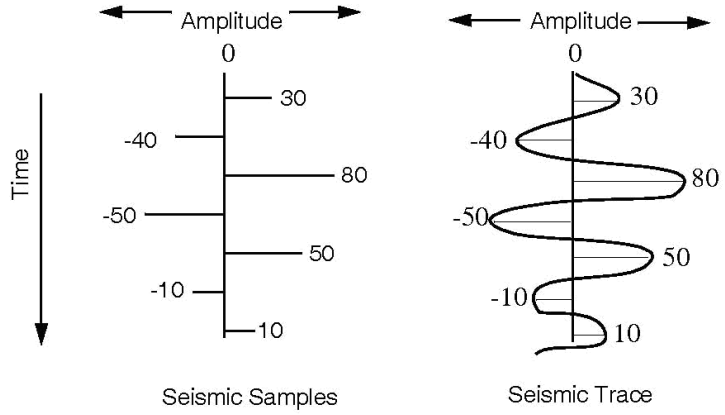
To be properly displayed in SeisWorks, 16-bit and 32-bit data must be scaled to 8 bits. As a result, only amplitudes ranging from -128 to +127 can be properly displayed. Values exceeding that range will be misinterpreted unless they are first scaled and clipped. If you load a file format other than 8-bit without setting scaling options, SeisWorks will automatically scale it.

In this section, the concepts of scaling and clipping seismic data for storage and/or for viewing are discussed. In the exercise, you will have an opportunity to work with the interactive scaling functionality in SeisWorks and learn a workflow for determining a scale factor to use when loading 32-bit SEG-Y data into an 8-bit *.2v2_glb* file.

Seismic Traces and Amplitudes

To understand why you scale and clip data for display in SeisWorks, you should understand the significance of seismic samples and their amplitudes.

A seismic trace is made up of a series of samples, displayed in time. Each sample is a number. The size of that number is the amplitude. In the figure below, the amplitudes range from +80 to -50.



When the seismic data (the samples) are stored on tape or disk, the format of the actual number of the amplitude determines how much space the number takes up.

Seismic Amplitude Formats

Seismic samples are commonly stored on tape or disk in one of four formats. The format also determines the range of the numbers that can be assigned to amplitudes. The formats and their range of values are listed below.

Format	Range of Values
32-bit floating point	-5.4E+79 to 7.2E+75
8-bit integer	-128 to +127
16-bit integer	-32768 to +32768
32-bit integer	-2147483648 to +2147483647

What is Scaling and Clipping?

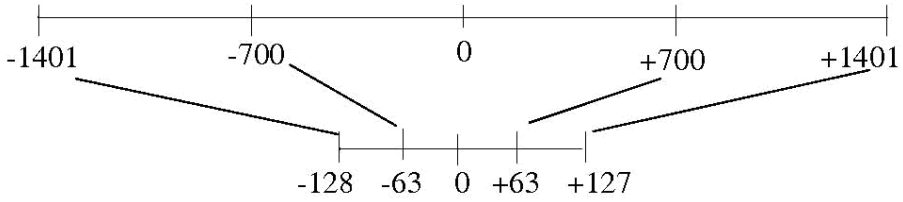
Scaling and clipping are two separate processes that can be used independently; however, they are generally used together.

- Scaling is the process of bringing a user-defined percentage of amplitudes (usually 97% to 99%) within the 8-bit range.
- Clipping “cuts off” those few amplitudes that exceed the 8-bit maximum after scaling.

The information that you need to scale data is the histogram produced when you ran the PostStack Data Loader. This histogram gives you the range of amplitude values in your test data set and the percentage of data that falls within each amplitude range. Using the histogram, you can determine what scaling factor you want to use and whether you want to clip the data.

What is the Scaling Factor?

When you scale data to 8-bit format, you want to preserve as much of the dynamic range of the original amplitudes as possible. The goal is to fit the amplitudes into the range of -128 to +127, while preserving the relative differences in the amplitudes.



Original Amplitudes (top scale) and Scaled Amplitudes (bottom scale)

In order to preserve the dynamic range of the original amplitudes, you multiply each sample by a **scaling factor**. The scaling factor is a number that, when multiplied by your maximum amplitude, produces a value of about -128 or +127 (the maximum amplitudes allowed in 8-bit displays).

For example, if the maximum amplitude is 1401, then:

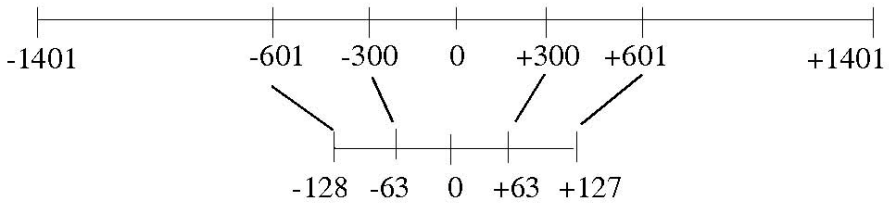
- 1401 * (scaling factor) = 127
- scaling factor = 127/1401 =.09

Preserving Dynamic Range

As mentioned previously, only a small percentage of your data may fall towards the minimum and maximum amplitude range. For example, if your maximum amplitude is 1401, but 98% of your data falls between 1 and 601, you might want to use 601 as your maximum amplitude:

- 601* (scaling factor) = 127
- scaling factor = 127/601 =.21

With the second scaling factor, you have a better chance of preserving the dynamic range of your original data.



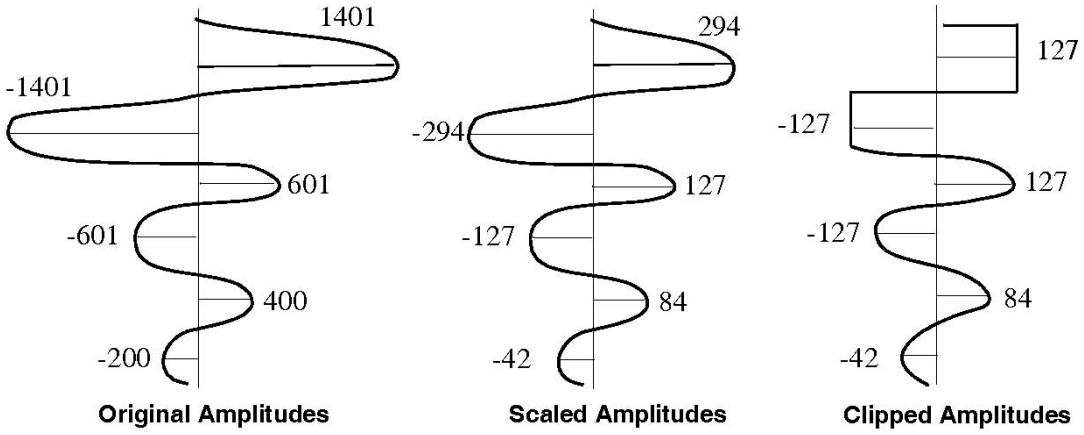
Original Amplitudes (top scale) and Scaled Amplitudes (bottom scale)

You can then clip the amplitudes that fall in the range of 601 to 1401. Clipping is explained in the next section.

What is Clipping?

When you clip data, you set a maximum amplitude value for your data; higher amplitudes are cut-off (clipped) at the value of the designated maximum amplitude.

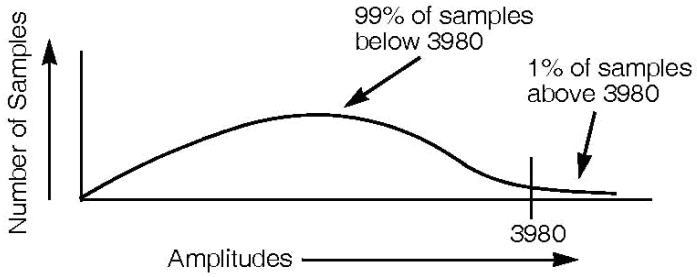
For example, the trace on the left in the diagram below shows amplitudes ranging from -1401 to +1401. The trace in the middle shows amplitudes scaled to 294. The trace on the right shows amplitude values clipped to 127; that is, all amplitude values greater than 127 are set to 127.



Clipping and scaling can be done independently, either when a section is displayed in SeisWorks, or when data is loaded using the PostStack Data Loader. When you scale data it is likely that you will also clip some of the data.

Clipping and Scaling the fldr2d Data Set

The graph below shows the distribution of the amplitude values in the fldr2d data set:

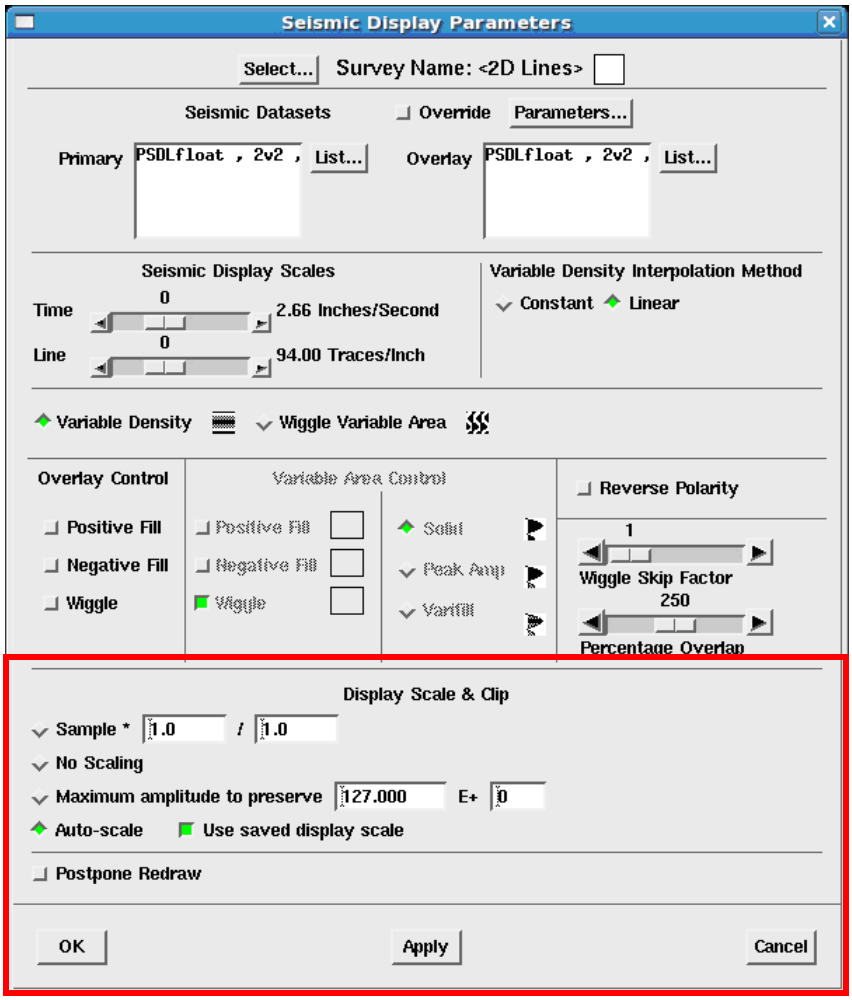


In this case, scaling the data below 3980 and clipping the values above 3980 will give you greater resolution in your data.

SeisWorks Software Interactive Dynamic Scale and Clip

You can use the SeisWorks software to dynamically scale and clip your seismic data. This provides the opportunity to test and evaluate a number of different scale and clip factors. Your goal is to determine a scaling factor that meets both the geoscientist's interpretation needs and the system manager's space requirements. This is the time in the data loading process where it is critical to get input from the interpreter, who, if at all possible, should make the final decision on the scaling factor.

Below is the *Seismic Display Parameters* dialog box. The lower section of the box contains the parameters for **Display Scale and Clip**.



Scaling Options

The first (*Sample*) and third (*Maximum amplitude to preserve*) scaling options are mathematically equivalent. *Sample* offers maximum flexibility is specifications, whereas *Maximum amplitude to preserve* in more automatic. *Auto-scale* is the default option and it will automatically scale data. If *No Scaling* is selected, amplitudes (in the display only) are clipped to 8-bit range (-128 to127), so only 8-bit files will display correctly.

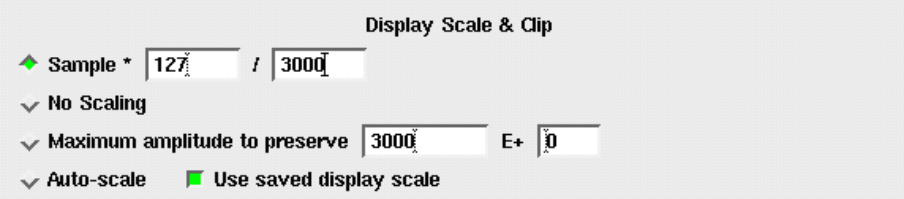
Sample

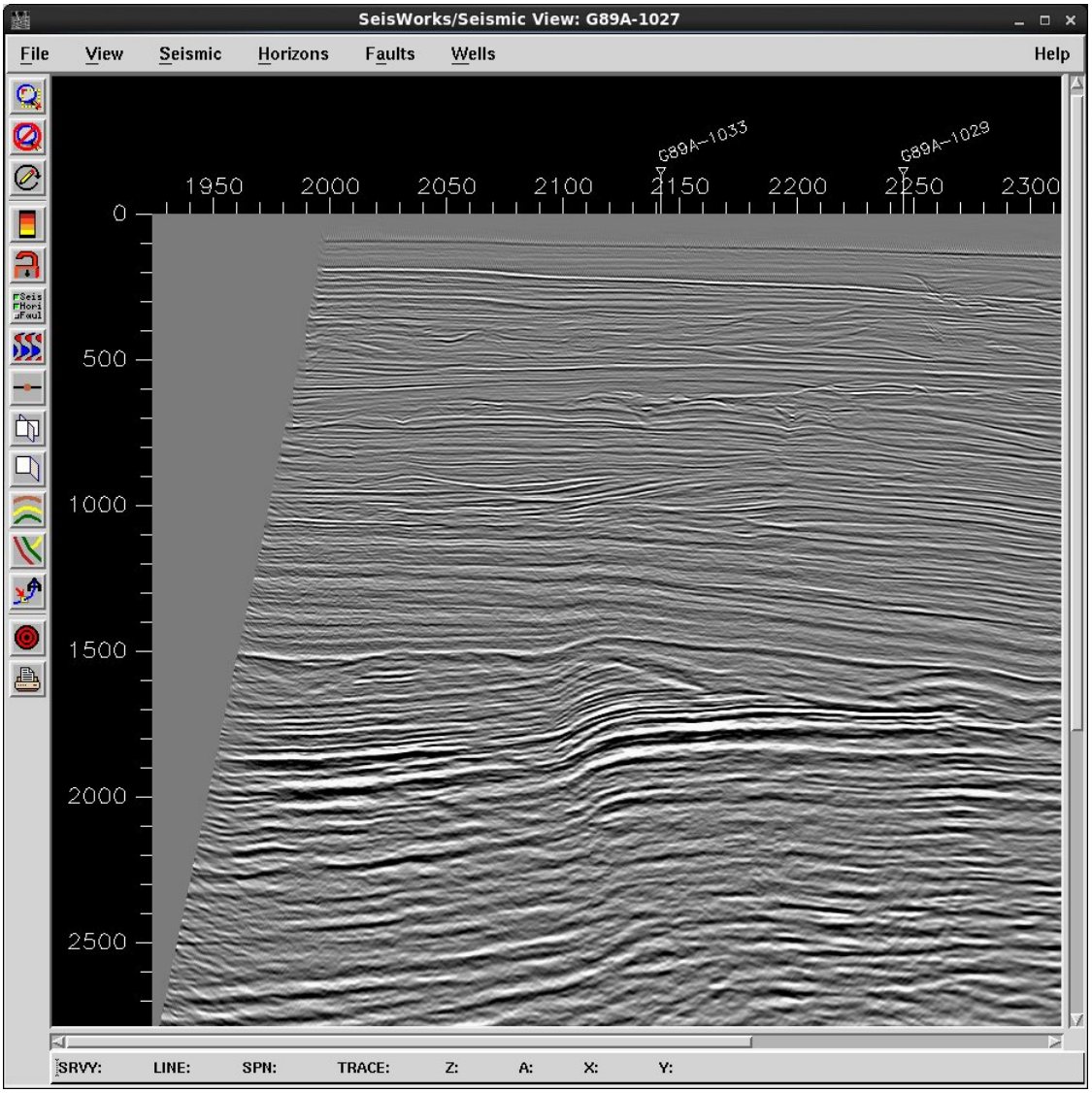
Sample is a straight scalar method. The two input boxes in the Sample field allow you to enter a numerator (left input field) and a denominator (right input field.)

- The numerator is the desired maximum value; that is, 127 for an 8-bit data display
- The denominator is the maximum value you want to preserve from your data set.

This mode can be used to reverse polarity in a variable density display by entering a -1 in either the numerator or denominator field.

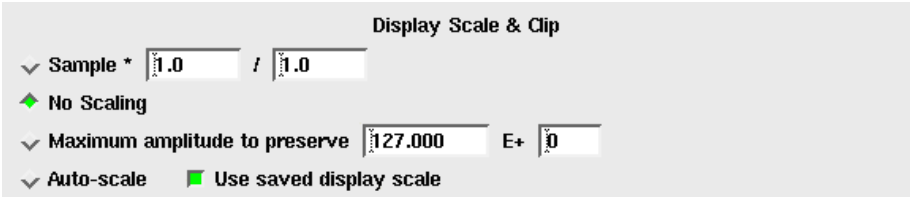
For an example, using the *Sample* option with parameters set to 127/ 3000 is the same as using *Maximum amplitude to preserve* with a value of 3000.

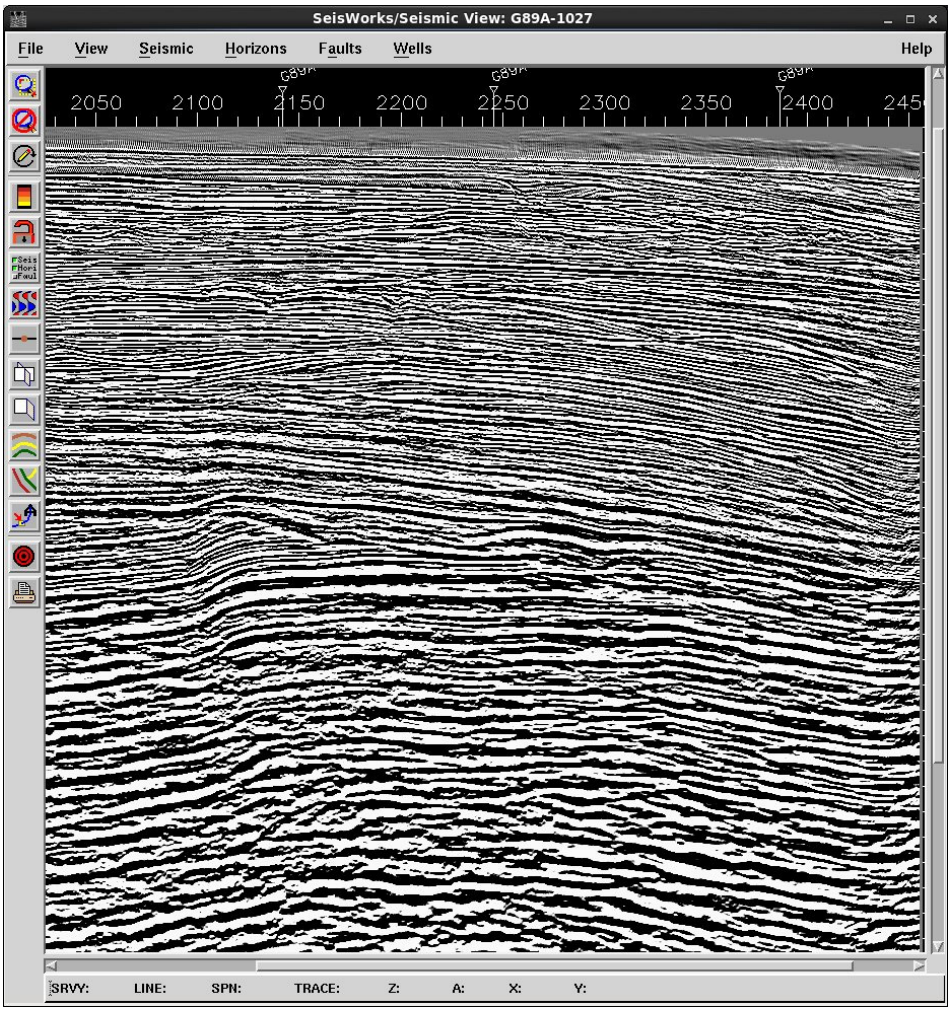




No Scaling

This option clips data with amplitudes greater than 127 and less than -128.

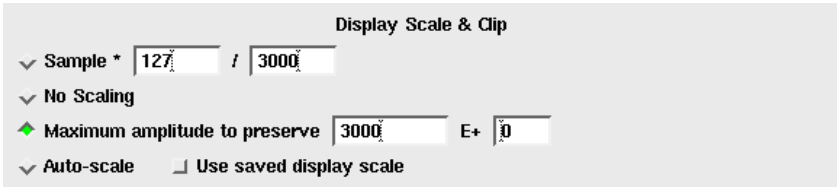




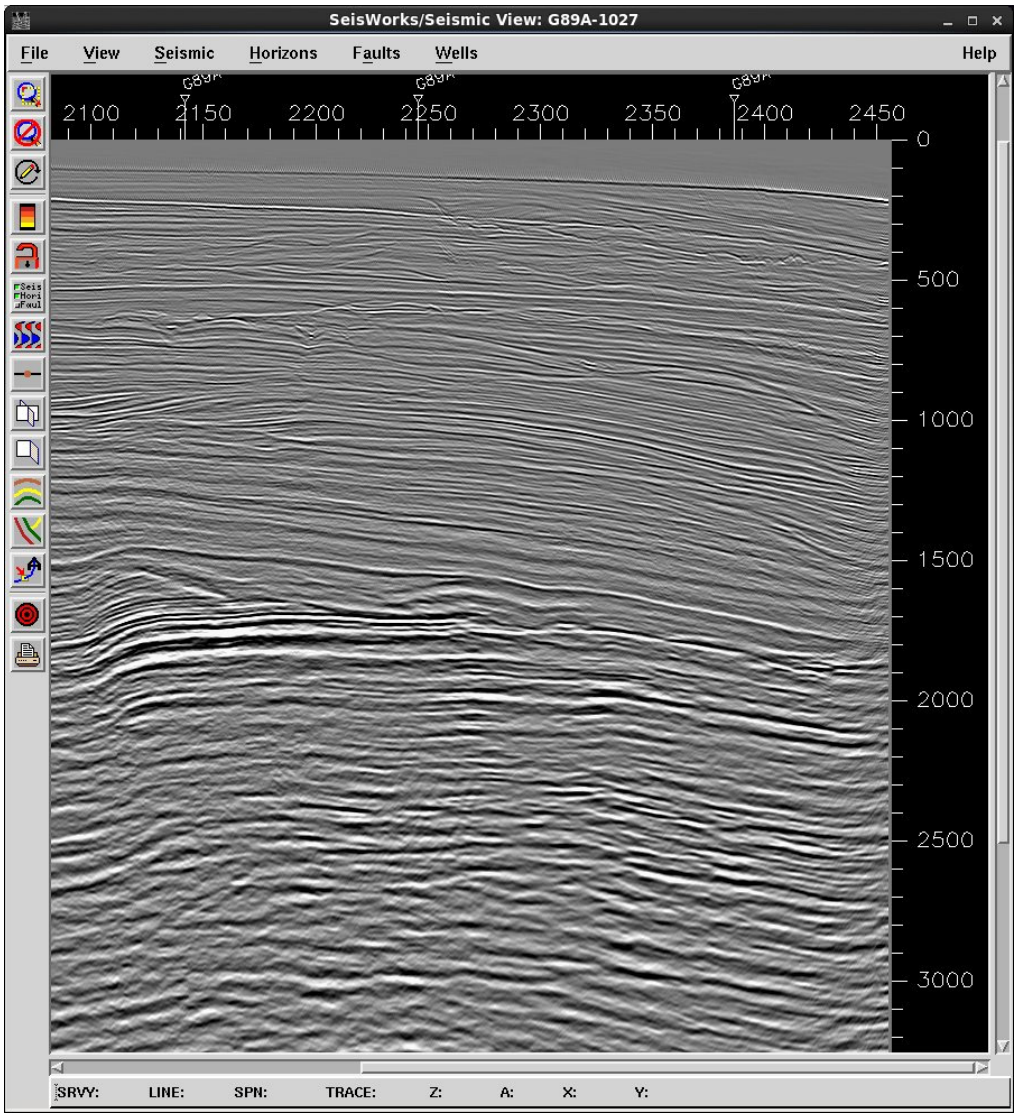
If the data is not 8-bit, it will not display correctly (clipped in the above view).

Maximum amplitude to preserve

This value is used as the denominator of the scaling factor, not the clipping value. Clipping is automatically activated with a clipping value of 127. To raise the value by a power of 10 using scientific notation, key the exponent value into the E+ text field. For example, to raise a value by 10^4, you would key a value of 4 into the E+ text field.

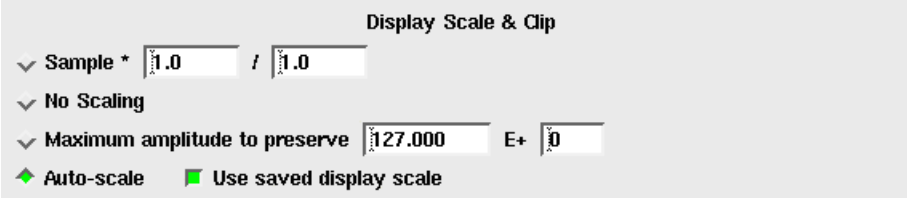


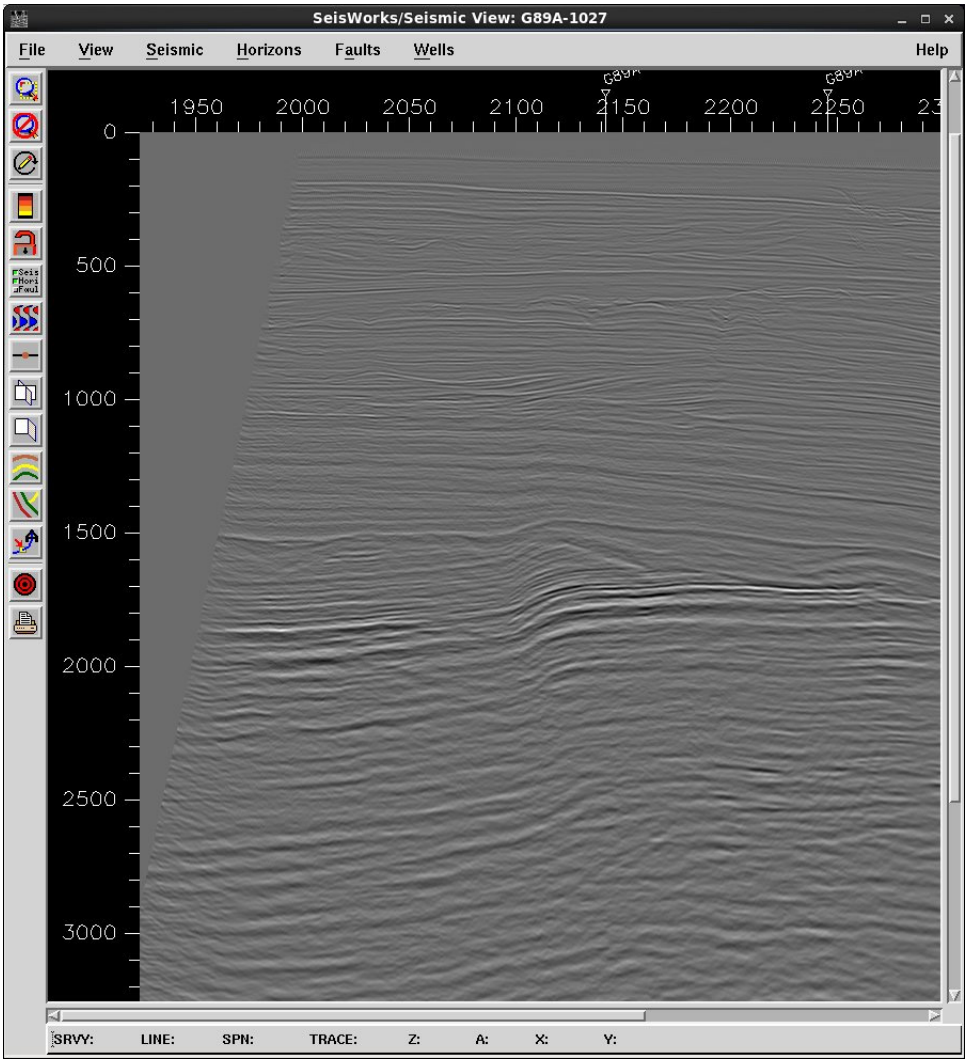
In this example, parameters are set to be equivalent to the Sample mode example.



Auto-scale and Use saved display scale

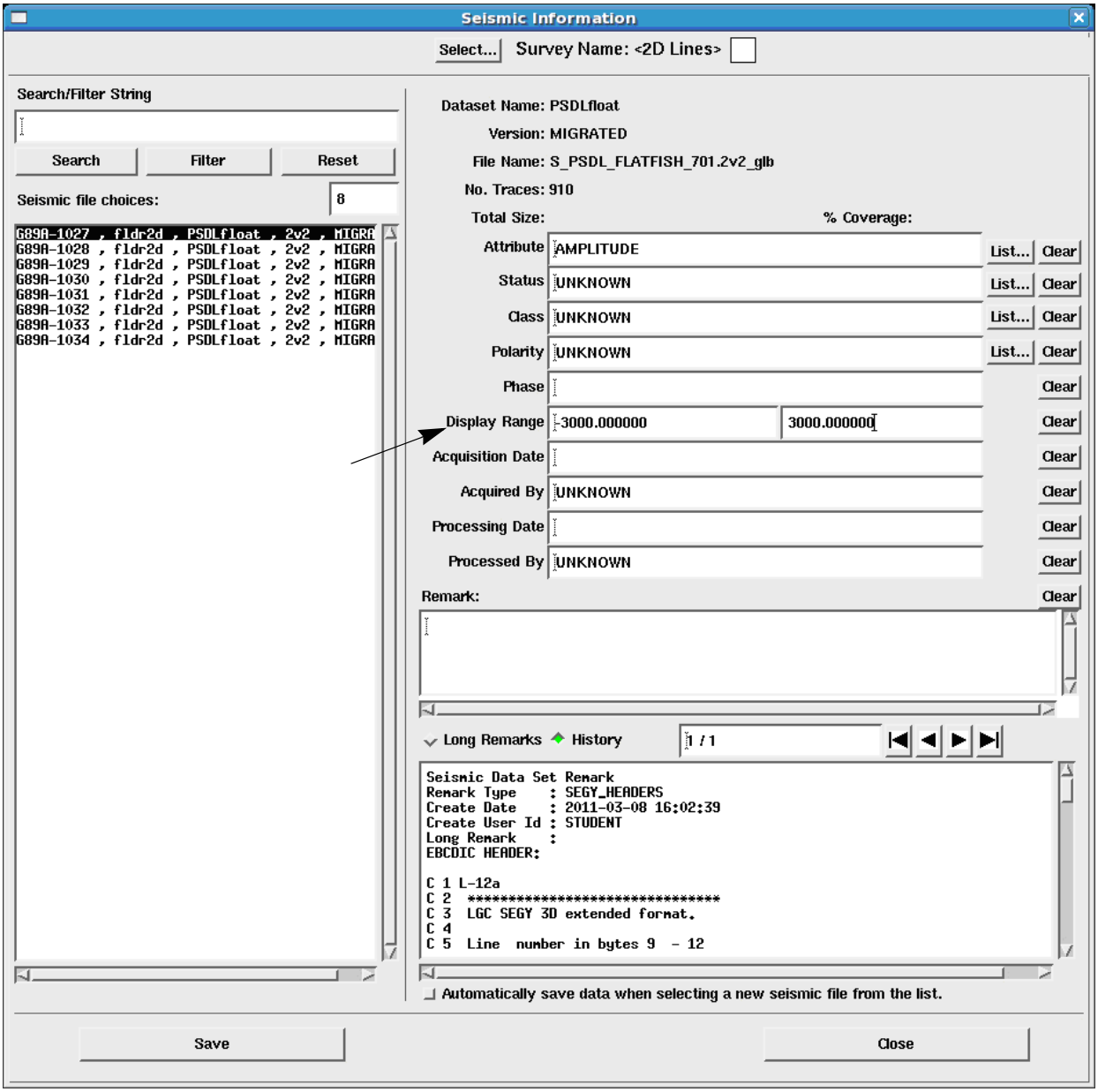
These are the defaults. *Auto-scale* makes the software automatically scale the data if you are working with a file format other than int8.

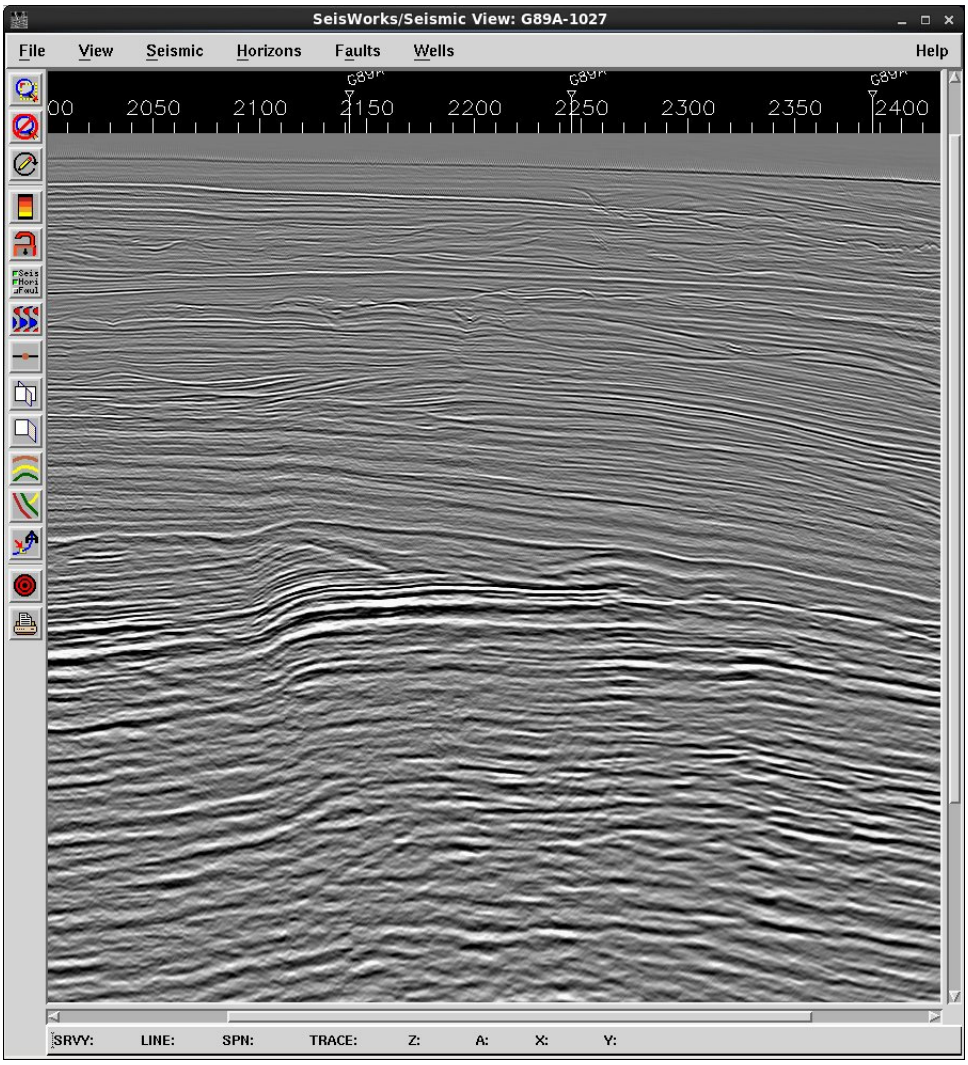




Because the dynamic range of the displayed data is greater than the previous examples, the data have a washed out appearance.

With *Use saved display scale* turned on, a display scale saved as part of the seismic dataset metadata is used. Set the range in the SeisWorks software in **Seismic View > Seismic > Info…**. Specify the Display Range from negative to positive amplitude values.





With the range set from -3000 to 3000, the results are similar to the Sample and Maximum amplitude to preserve example above, except the interpreter doesn't have to remember what amplitude value to use for preservation.

What Are the Steps in Scaling and Clipping?

In the previous exercise, you:

- Loaded lines that were in 32-bit floating point format
- Obtained a histogram of the amplitude values of your data

Use this histogram to obtain a value to test for the maximum unclipped amplitude:

- Display a line from your survey in SeisWorks
- Use the dynamic scale and clip capabilities within SeisWorks
- Check the values you chose for the maximum unclipped amplitude

When you are satisfied with the value you want to use as the maximum unclipped amplitude, run the PostStack Data Loader again and specify the desired scale factor.

Exercise 1: Determining a Scale Factor

The purpose of this exercise is to determine a scaling factor that meets both the geoscientist's interpretation needs and the system manager's space requirements. Different display tools are used to evaluate the data.

1. Return to the SeisWorks software (open the last saved session or a new one if necessary).

2. Select **No Wells**, and **No Faults** in the startup dialog. Click **OK**.

   Make sure that you have a Map View and a Seismic View displayed.

3. Display line G89A-1031 in a seismic view using the method you prefer:

   - **Midpoint** icon ()

     To select G89A-1031 in Map View, move the cursor over the line and click **MB2**.

     Another way to select the line in Map View is to click the line with **MB1**, then press and hold **MB3** to open a drop down menu. Slide to **Begin Display** in this menu and release **MB3**.

   or

   - **Seismic > Select from List…** option

4. Open three Seismic Views by selecting **File > New Task > Seismic** twice from your existing Seismic View window.

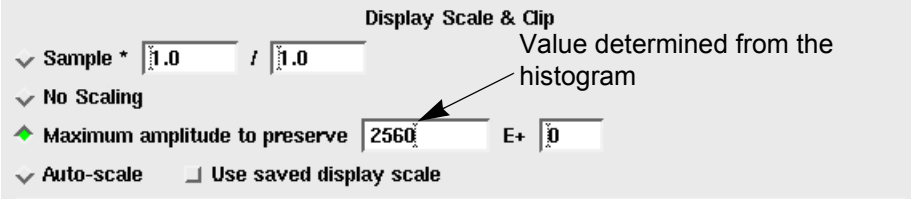
   The "daughter" Seismic Views will have the same settings and display the same line as the "parent" Seismic View.

5. Choose one of your seismic views to define a Display Scale and Clip factor as follows:

   - Click on the Seismic Display Parameters icon ( ).

   - Locate the Display Scale & Clip section near the bottom of the *Seismic Display Parameters* dialog box.

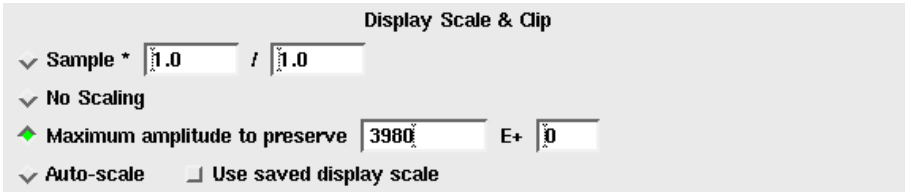
   - In the **Maximum amplitude to preserve** entry field, enter the value that corresponds to approximately 95% of your data as shown on the histogram from your first *PostStack* run. Open the minimized PostStack Data Loader and select **Job > View** to see your histogram again (or view the process history in Seismic Data Manager).



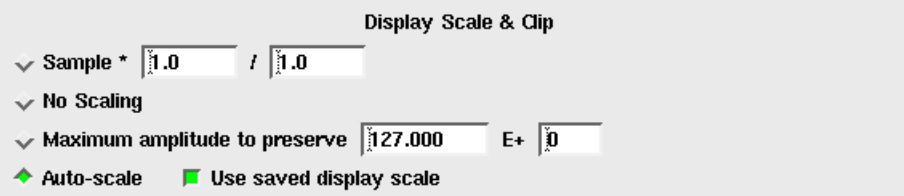
   While seismic data is rarely scaled in the field to 95%, this factor will help emphasize the differences in the various scale factors.

   - Click on the **OK** button at the bottom of the Seismic Display Parameters dialog box.

6. Move to the second Seismic View and repeat the above steps using the histogram value that corresponds to approximately 99% of the data.



7. Use the third Seismic View to scale your seismic data with the auto-scale.



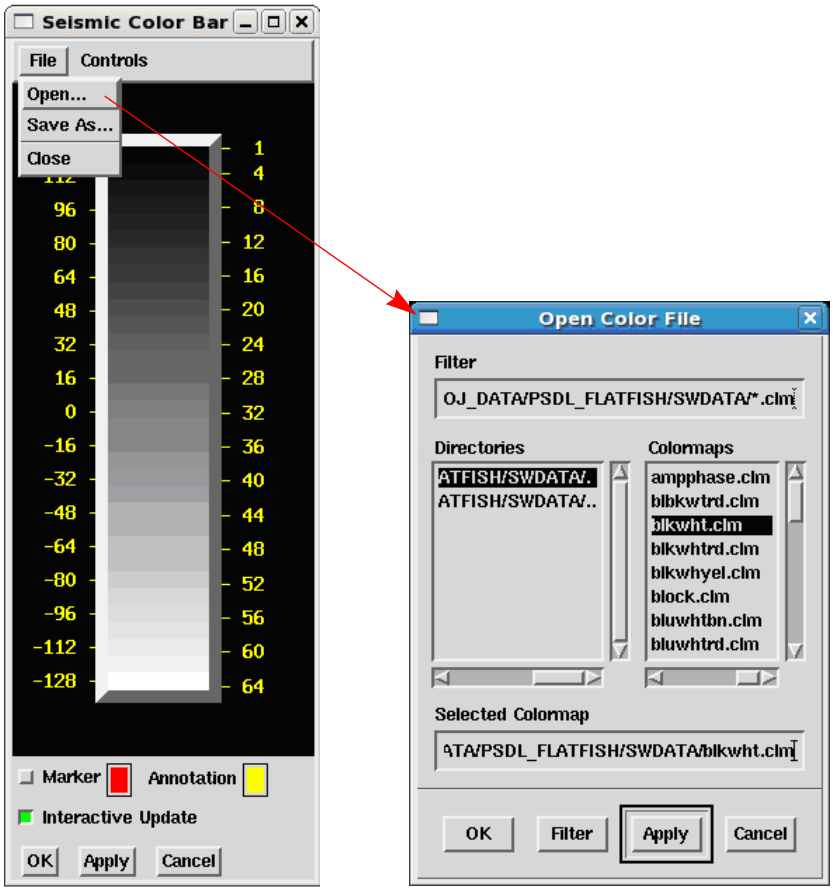
Note that in each Seismic View, the line is displayed with a slightly different level of contrast.

One of the more useful ways to evaluate your data is to use colors.

8. To bring up the SeisWorks Color Bar, select the Color Control icon ( ).

9. To change the display colors, select **File > Open** from the Color Bar window.

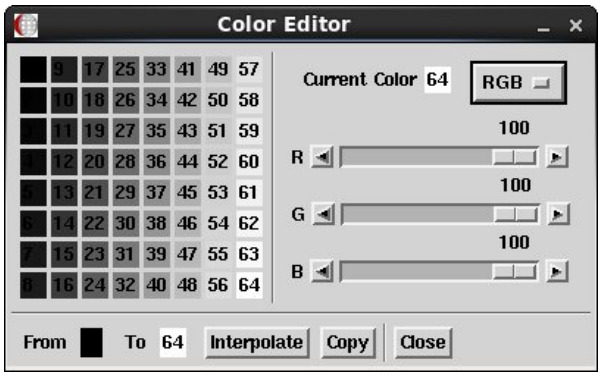
A file browser opens. Color map files (.clm) are stored in the SWDATA directory. This directory is populated with default color maps using the *seisDatCopy* utility after the OpenWorks projects are created.



10. Find and select *blkwht*, then click **OK**.

11. To evaluate the amount of data that has been clipped at both the upper and lower range, use the following steps to modify the *blkwht* color map:

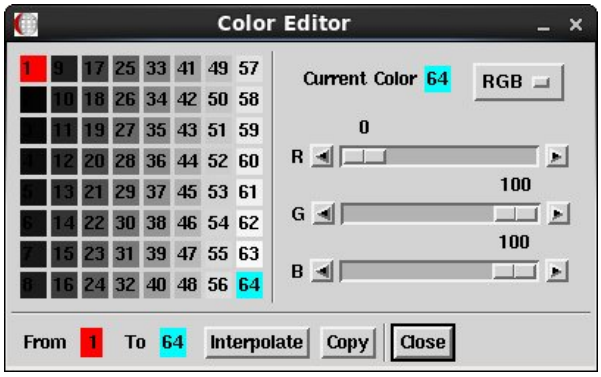
    - In the Color Bar, select **Controls > Editors… > RGB**.



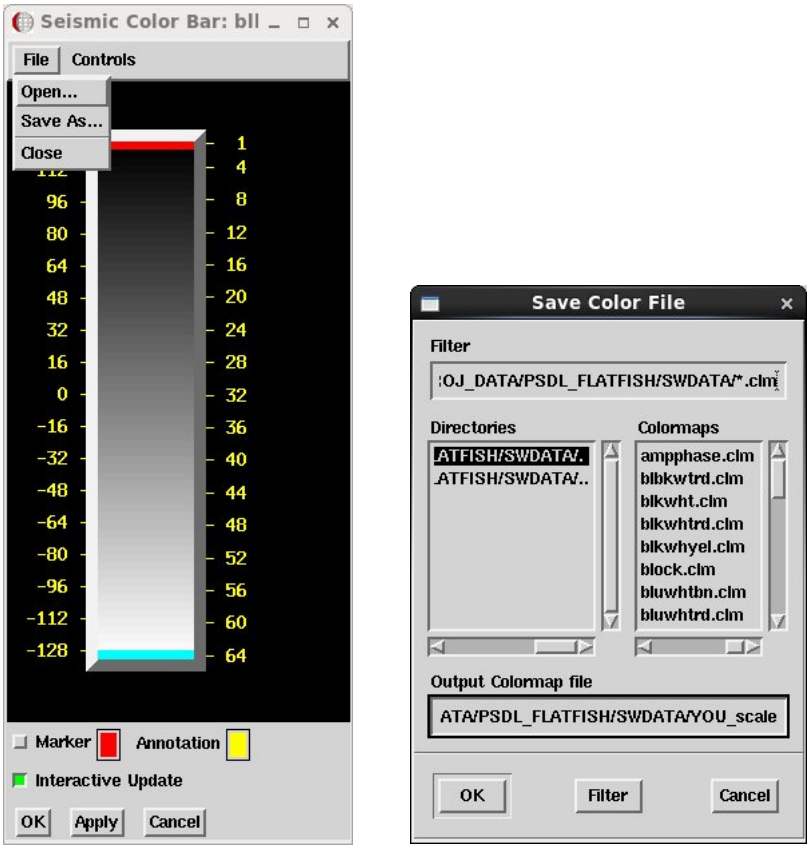
    - Click the upper left corner (box 1). The RGB sliders will all move to 0. Slide the R slider to 100. This will make box 1 bright red.

    - Click the lower right corner (box 64). The RGB sliders will all move to 100. Slide the R slider to 0. This will make box 64 cyan in color.

    - Click **Close**. Your altered color map will show amplitudes at 127 as red and those at -128 as cyan.



- To save this color map for future use, select **File > Save As….** Enter <*your_initials*>*_scale* in the *Save Color File* dialog box and click **OK**.



12. Click the redraw button to update the color map selection in each Seismic View window and examine the results. The amount of red and cyan present will give you a visual estimation of how much data is lost to clipping. You can also see if more data was clipped at the maxima or minima.

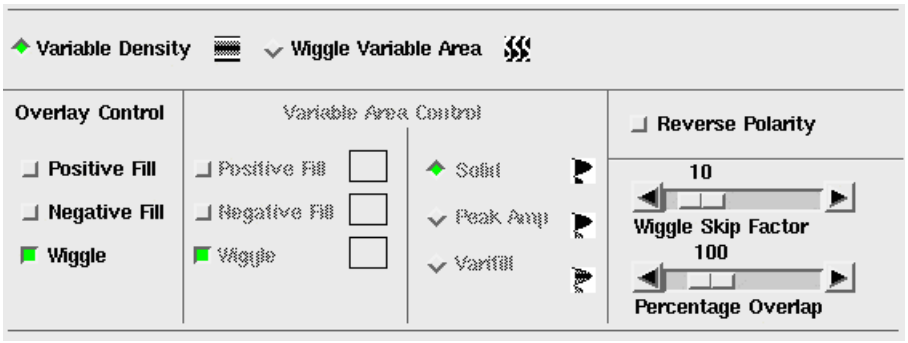
13. Finally, you can evaluate the data when it is displayed as wiggle overlays combined with variable density as follows:

    - In the 99% scale factor Seismic View window, click the Seismic Display Parameters icon ( ).

    The *Seismic Display Parameters* dialog box appears.

    - Locate the **Overlay Control** area in the left side of the window. Toggle on *Wiggle*.

- Set the wiggle skip factor to *10* and the Percentage Overlap to *100*.



- Click **OK** in Display Parameters. The data in the Seismic View window is re-displayed with the new display parameters.

- To change the overlay color, open the Seismic Color Bar ( ) click the color box next to Annotation. Click any color in the select box that displays. Click **Close** when you are satisfied with your choice.

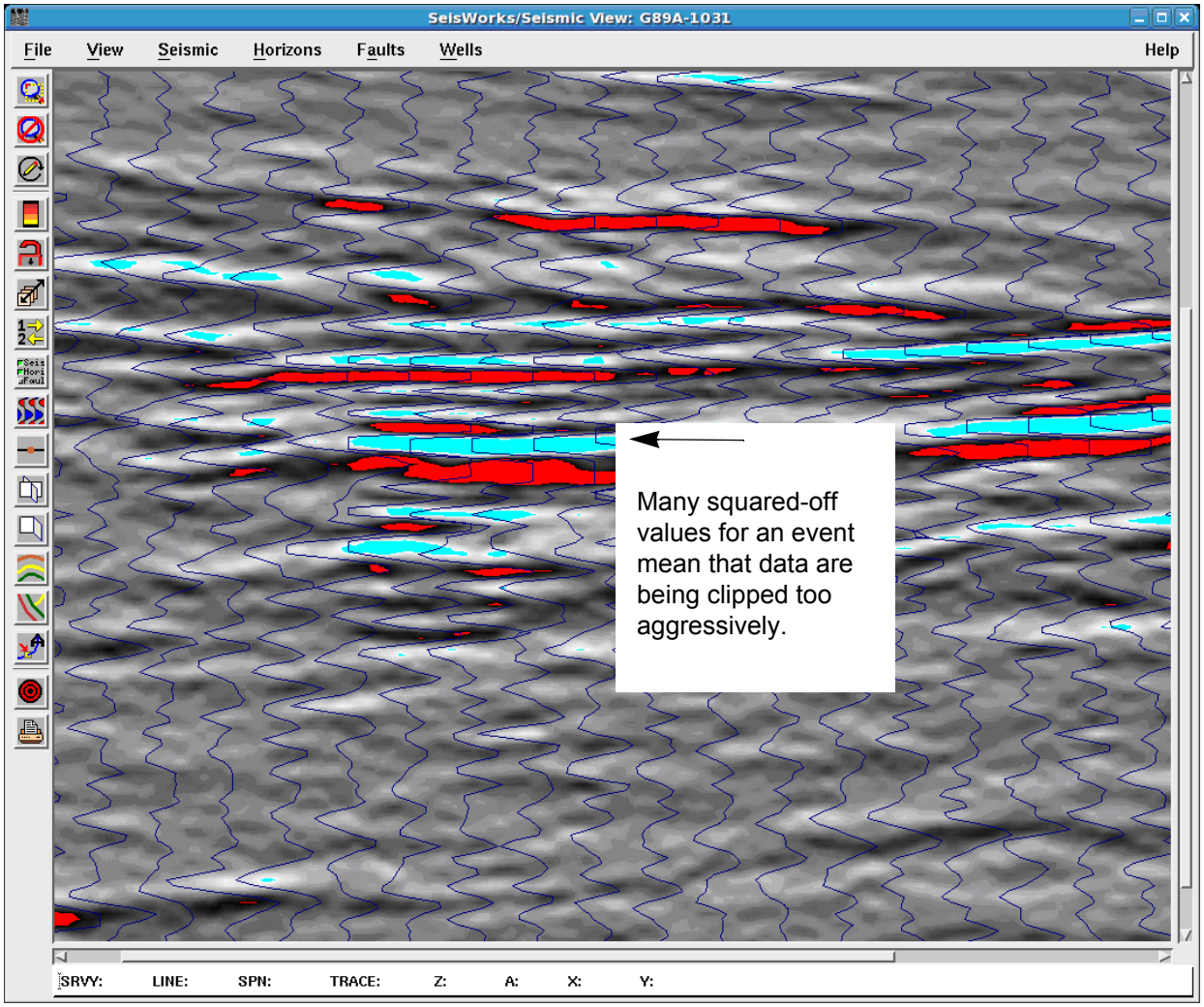
14. Look for wiggles that are "squared off" indicating clip. Zoom in on an event to see the clipping more closely.

    To zoom in Seismic View, click the Zoom icon ( ) (the data are outlined with a box in the colormap annotation color). The size of the box reflects the area that will zoom. To resize the box, click the + key on your keyboard until the box size reflects the data you want to examine. Move the box to the location you want to zoom with the mouse. Press **MB1** when the box surrounds the area you want to zoom.

    Use the Unzoom icon ( ) to return to the full display.

15. Continue working with your data. Try other scaling factors, looking for the best balance of retaining as much data as possible without concentrating too much data at the lower amplitudes.

In the next exercise, you will load the entire survey using your best value for maximum unclipped amplitude.



16. Select **Session > Save As…** from the SeisWorks main menu. Type in a session name.

17. Select **Session > Exit**.

How PostStack Software Scales Data

No matter what the format of the input data, PostStack converts it to 32-bit floating point for internal calculations. This conversion maximizes the allowable range for values resulting from those calculations, but does not increase the resolution of the original data.

If you plan to output the processed data to a file format with less dynamic range than 32-bit floating point, you must scale the data.

The PostStack software offers three options for scaling data:

- automatic scaling
- manual scaling
- no scaling; clipping only

Automatic Scaling

Automatic scaling is a two-stage process. PostStack scales each trace individually and then scales the full dataset as a whole.

You select a file format (8-bit or 16-bit integer). The numerator of the scaling factor is automatically set to the largest value allowed by that file format (127 for 8-bit, 32768 for 16-bit).

You also specify a **Trace Percentile** and a **Dataset Percentile**. Using these specifications, the PostStack software calculates the denominators for the scaling factors.

For each trace, the PostStack software produces a histogram of amplitudes. The amplitude that corresponds to the trace percentile you have specified is used as the denominator of the scaling factor for this trace. Any values that correspond to higher percentiles are clipped.

After scaling each trace, the PostStack software produces an amplitude histogram for the full dataset. The amplitude that corresponds to the dataset percentile you have specified is used as the denominator of the scaling factor for the full dataset. Any values that correspond to higher percentiles are clipped.

When Not to Use Automatic Scaling

When you use automatic scaling, each individual trace has its own scale factor. We recommend, therefore, that you do not use automatic scaling when you:

- plan to do statistical analysis on the loaded data
- want to preserve relative amplitude sections

Manual Scaling

For manual scaling, you select the file format (8-bit or 16-bit). The numerator of the scaling factor is automatically set to the largest value allowed by that file format (127 for 8-bit, 32768 for 16-bit).

You also specify the **Largest Unclipped Amplitude**. This value is used as the denominator of the scaling factor.

Any values in the dataset greater than the **Largest Unclipped Amplitude** are clipped. Then every value is multiplied by the scaling factor.

If you are outputting to an existing file in which **Largest Unclipped Amplitude** values were set, you can click on **Use Last Value** to apply those values.

Manual scaling is faster than automatic scaling.

No Scaling

With this option, data is clipped but not scaled. Any values in the processed data greater than the maximum allowed by your chosen file format are clipped (127 for 8-bit, 32768 for 16-bit).

A Final Word About Scaling

Landmark has provided you general guidelines on how to scale and clip your data and guidelines on when scaling and clipping is necessary or recommended. Ultimately, the decision on how to scale data is subjective and is based on interpretation goals, disk space, corporate guidelines, geology of the area, and individual interpreter preferences. Always attempt to involve the interpreter in the decision.

As a last word, if you are still unsure, data that is under-clipped is easier to recover by interactive scaling and clipping than data that has been over-clipped.

Trace Balancing

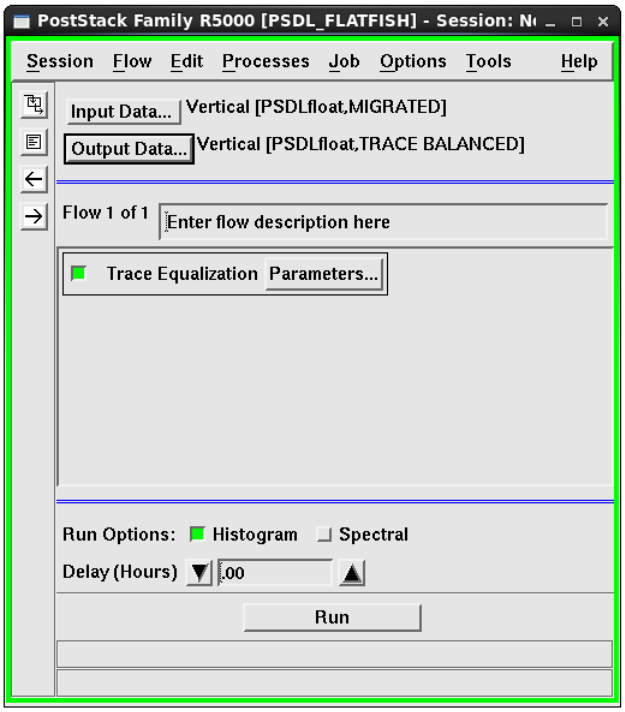
Interpreting 2D seismic data of different vintages (with different contractors, equipment, or processing techniques) may be difficult because of the potential variability in amplitude range of the different vintage data.

You can use PostStack Data Loader to balance the traces such that your series of 2D lines have the same average amplitude value. This does not change the relative amplitude of the data samples, only the overall average amplitude of a trace.

For example, suppose that the average amplitude on Line A is 10000 and Line B is 2000. Line A will appear "hotter" than Line B when displayed on the screen. Using Trace Equalization in PostStack Data Loader, you can apply a multiplier to Line A and Line B so that both have an average amplitude of 1. The relative amplitude of the data within a line does not change.

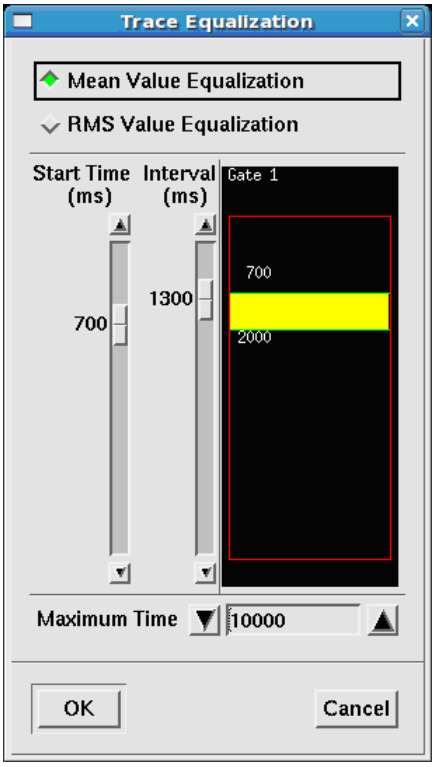
To trace balance 2D lines using the PostStack Data Loader, use the following steps:

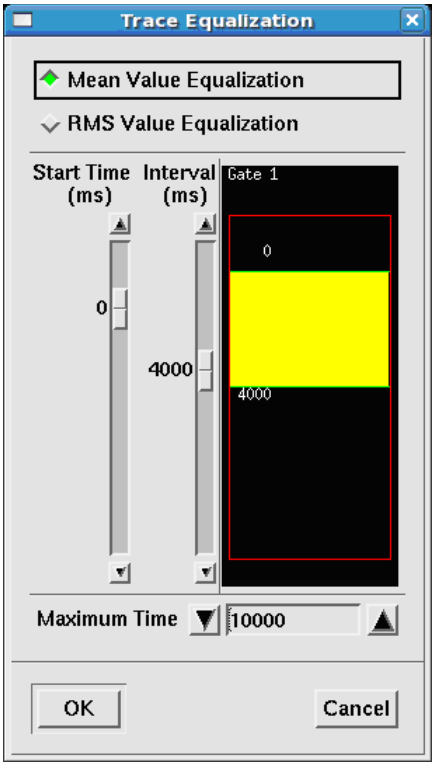
- In the Input Data Parameters box, set up the information for the lines you want to trace balance.
- Set up your Output File Parameters. If you plan to scale/clip your data, you will need to determine your scale factor from the trace balanced data. Thus, you will need to do a trace balance test load with no scaling so that you can determine the proper scale factor for your final load.
- In the PostStack Data Loader main menu, select **Processes > Gain/Scale > Trace Equalization**.



- Click **Parameters…**.

- Verify that Mean Value Equalization is selected, set Start Time at 0 (assuming this is the start time of your data), and set the interval to equal the trace length.

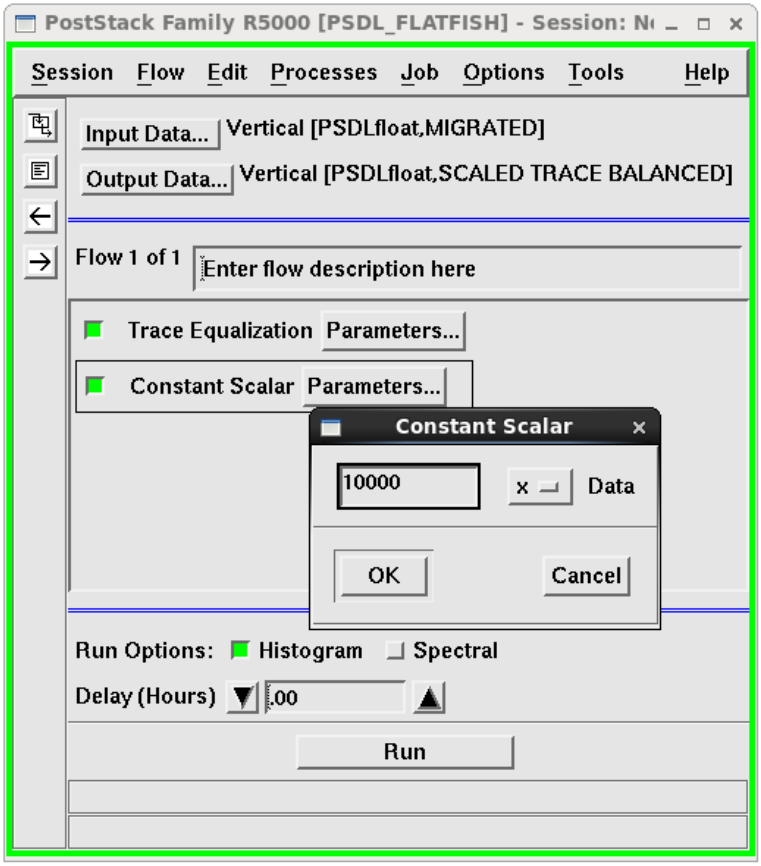




- Click **OK** in the Trace Equalization box.
- Run the job.

This process will make the average mean values of each trace equal to 1.

If you would like a mean other than 1, change the Constant Scalar Parameters (**Processes > Gain/Scale > Constant Scalar**) after setting the Trace Equalization. For example, you could set a scalar value of 10000 if you wished, so that all lines have mean amplitude of 10000.



Exercise 2: Load 2D Data into 8-bit Format

In a final load, if it is necessary due to constraints due to workflow, performance, and resources, you might load the entire data set using one of the following methods:

- Load data and scale to 16 bits to conserve disk space and maintain a good dynamic range
- Load data and scale to 8 bits to conserve disk space and maintain adequate dynamic range

In this exercise, you will load your data into 8-bit .2v2_glb files.

If you needed to, you could set up your PostStack Flow to include trace balancing as well as scaling of the data during loading. For this dataset, trace balancing is not necessary.

1. Open (the minimized) **PostStack Data Loader**. Close the Output window with the histogram if it is still open.

   If you closed PostStack prior to this exercise, launch it from Seismic Tools and select the input data (remember to update the SEG_Y template).

Verify or set the following information:

2. Click the Input Data button, and set the **Input Option** to SEG-Y. Click on Parameters…. The *SEG-Y Data Input* dialog box for 2D data opens.

3. Select **Disk** as your form of storage.

4. Leave the SEG-Y Format option set to the **Auto-Detect Rev0/Rev1** default.

5. In the File Input Specification area, click **Enter Linenames…**. Verify that all of your lines are still listed. Close the box.

6. Verify the values of the SEG-Y Header parameters.

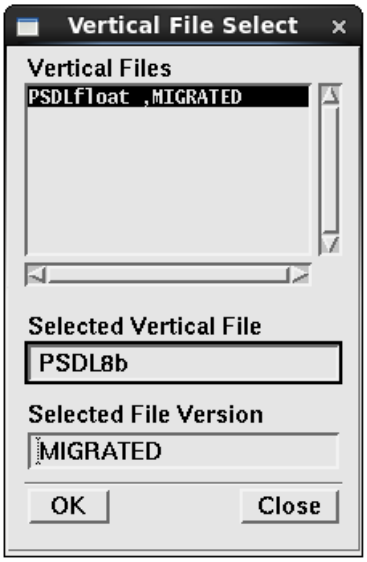
7. Click **OK** to close the *SEG-Y Data Input* dialog box.

8. Click **OK** in the *Input Data* dialog box.

9. In the *PostStack* main dialog box, click **Output Data**.

10. Select **Vertical File**, and click **Parameters…**.

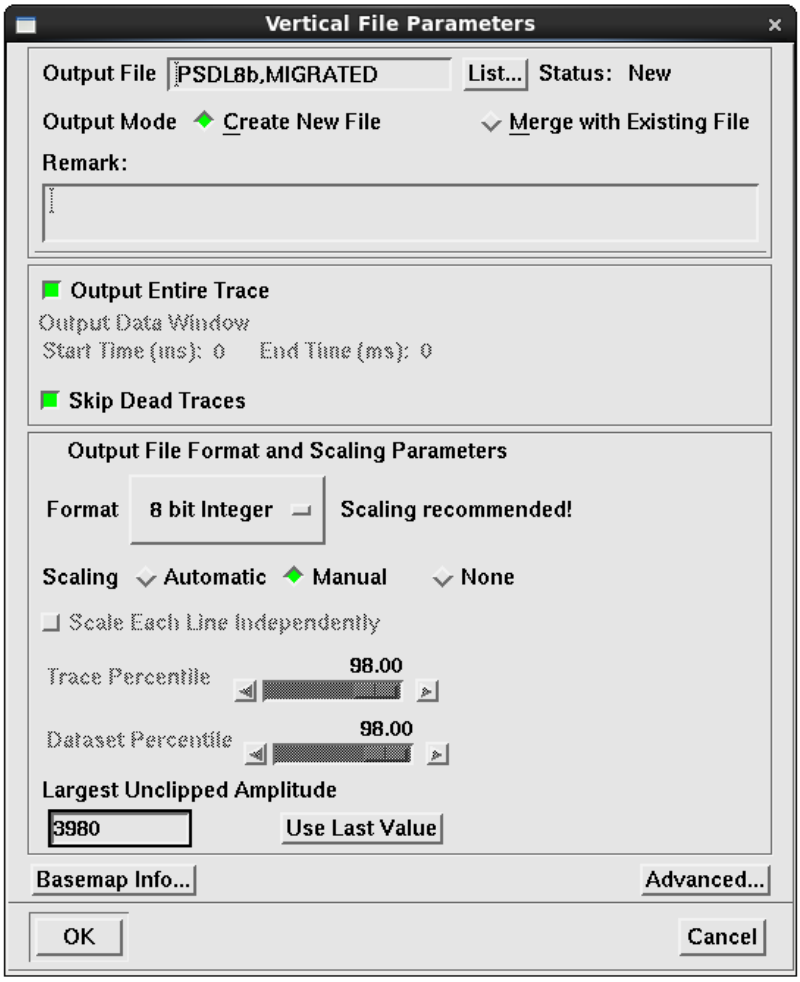
11. Click on **List…** next to Output File. Type PSDL8b in the Selected Vertical File field. Version should be MIGRATED. Click **OK**.



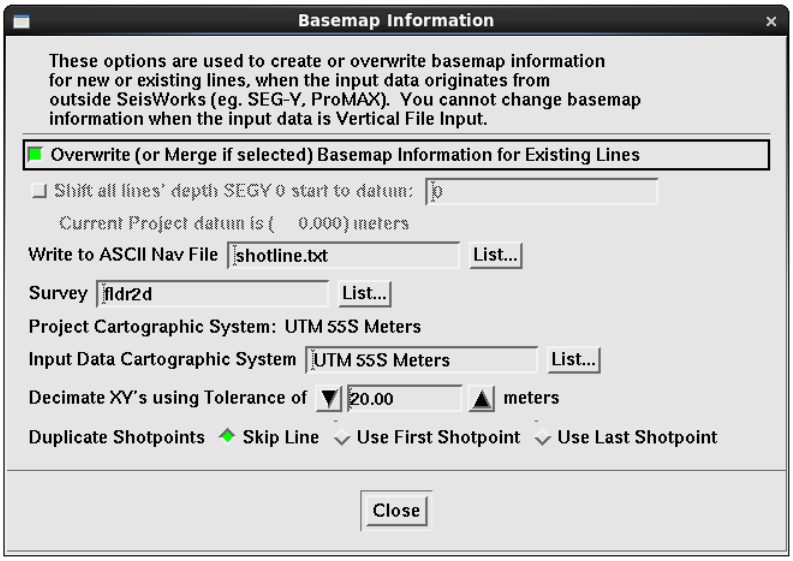
12. Leave **Output Entire Trace** toggled on.

13. Specify the **Format** for the output file by clicking on the option button and choosing 8-bit Integer.

14. Select **Manual** scaling. Set **Largest Unclipped Amplitude** to the maximum value you want to preserve as determined in the previous workshop.



15. Click **Basemap Info…** and verify that Overwrite Basemap Information for Existing Lines is toggled *off*, the Survey listed is fldr2d, and the cartographic system used is UTM 55S Meters. Click **Close**.

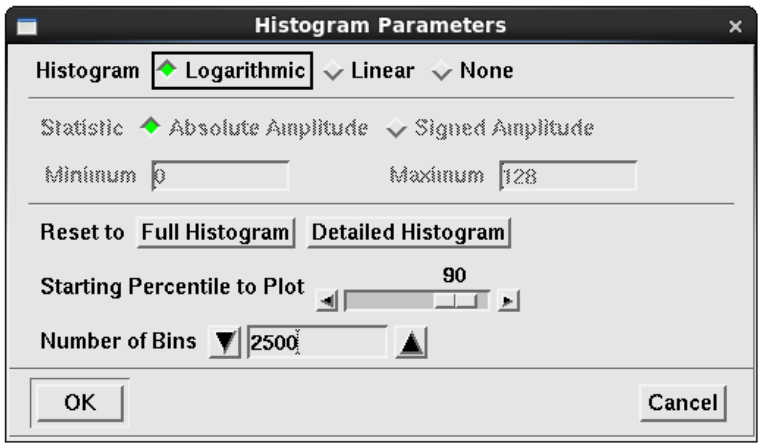


16. Close the *Vertical File Parameters* dialog box by clicking **OK**.

17. Close the *Output Data* dialog box by clicking **OK**.

18. Select **Histogram** for the Run Option, which will create a frequency distribution report in the job.output file and saved in process history in the database.

    Press **MB3** while your cursor is on the Histogram option and select **Parameters…**. Select *Logarithmic*, *Detailed Histogram*. Change the Number of Bins to *2500*. Click **OK**.



19. Click **Run** at the bottom of the *PostStack Family* dialog box.

Status messages in the message bar at the bottom of the dialog box tell you when the job is initiated and if it finished normally. A beep sounds when the job is completed.

20. Click on **Job > View** or the View Job icon ( ) to view the progress of the job as it runs.

21. After examining the output, exit from the Output from Flow window by selecting **File > Exit**.

22. When your data has been successfully loaded, save your PostStack session by selecting **Session > Save As…**.

    - Type a descriptive name in the Session Name field (limit is 10 characters; do not use any symbols that have special Unix meaning).
    - Add a description in the Session Description field.
    - Make sure both Save Flow Information and Save I/O Information are toggled on.
    - Click **OK**.

23. Use **Session > Exit** to exit PostStack Data Loader.

Exercise 3: QC Data Load

1. Open (if still minimized) or start the Seismic Data Manager (**Data > Management > Seismic Data Manager**).

2. Select **fldr2D** in the 2D Survey tab in the left pane.

3. Click the **Select All** icon in the 2D Line pane.

4. Click the **Seismic 2D** tab in the right pane.

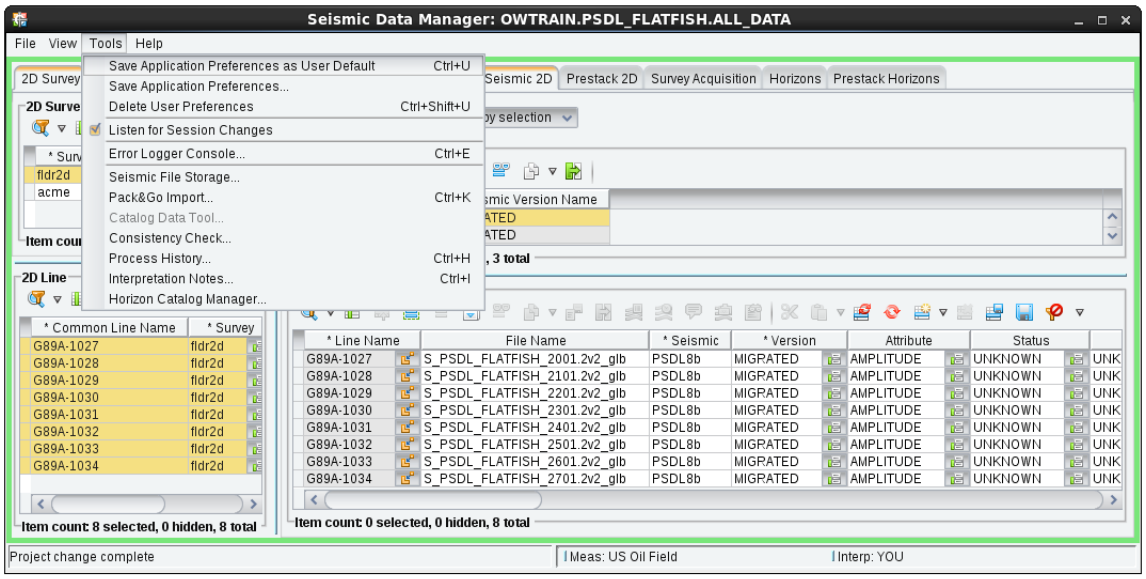
5. Highlight the **PSDL8b, MIGRATED** entry to display all the individual 2D Seismic Data Set files.

   In the Seismic Data Manager *2D Seismic Data Set* pane display, the **** Seismic*** column is the user-supplied name and the **** Version*** column is the user-supplied version name.

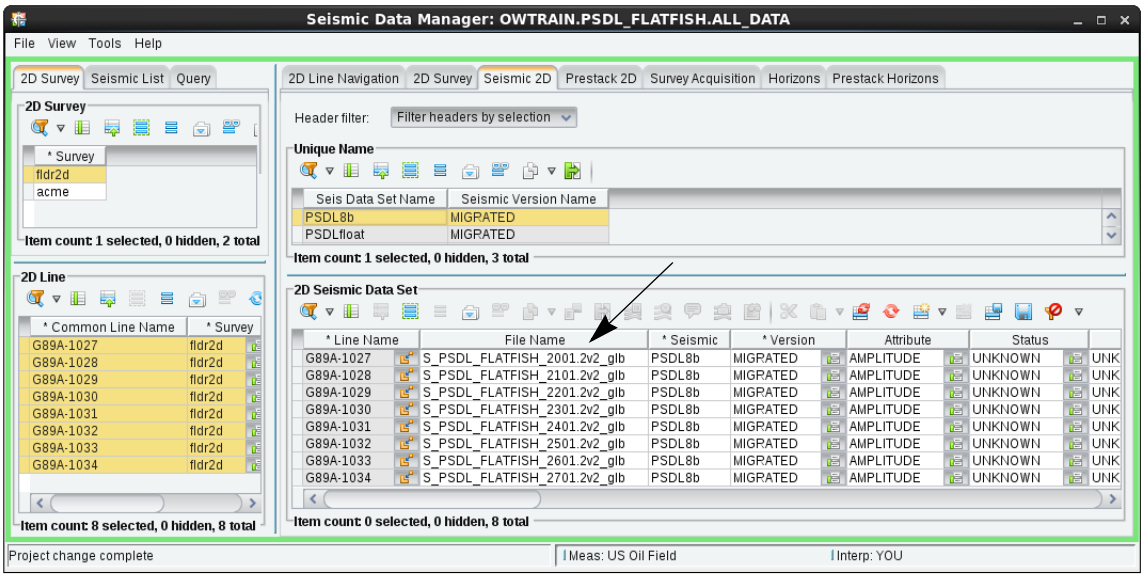
The physical file name (**File Name**) should already have been added to the spread sheet preferences from a previous exercise. If not, add it now:

- Click the **Select Columns** icon ( ).
- Click the Show box the **File Name** column.
- Move the File Name column next to the Line Name column using the **Move selected rows up** icon.
- Click **Close**.

- Select **Tools > Save Application Preferences as User Defaults** to automatically add the file name to this view.



Full details for each line of data are displayed in the bottom panel on the right pane. There are some filter options allowing you to display all headers or only those for the lines you have highlighted. One .2v2_glb file is created for every 2D line specified in the data load. These files are stored in the Seismic File Storage Areas defined earlier.

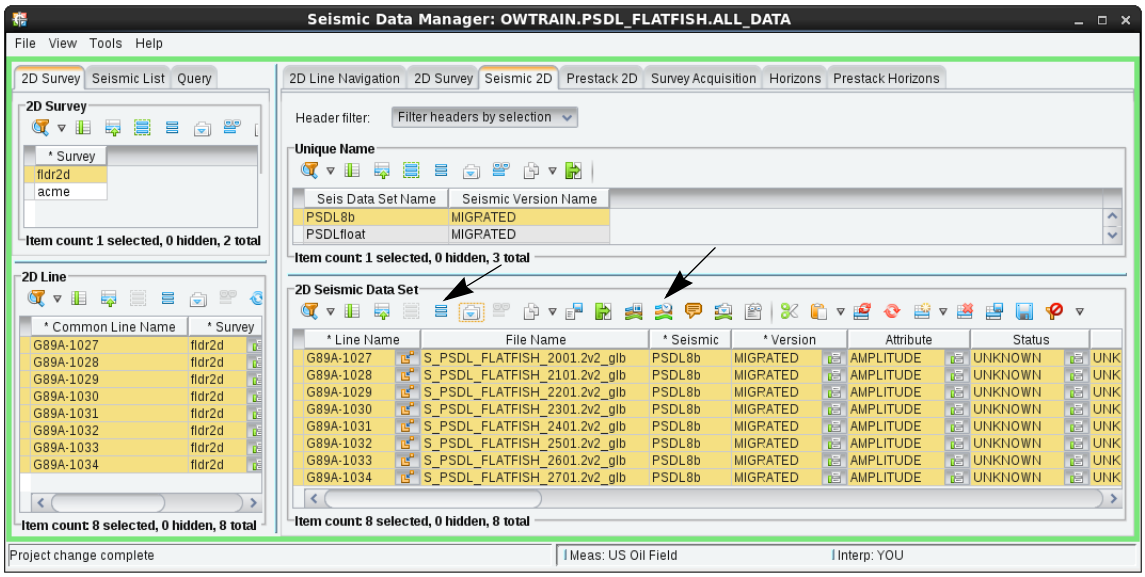


Physical file names (File Name column) are generated by OpenWorks and start with an S (seismic) or H (horizon), followed by the project name, followed by a unique identifier number. It is not evident which line and volume (user-supplied name) correspond to a particular file when viewing the data files in a terminal window.

Processing history is automatically stored in the database from the PostStack Data Loader software and can be accessed through Seismic Data Manager.

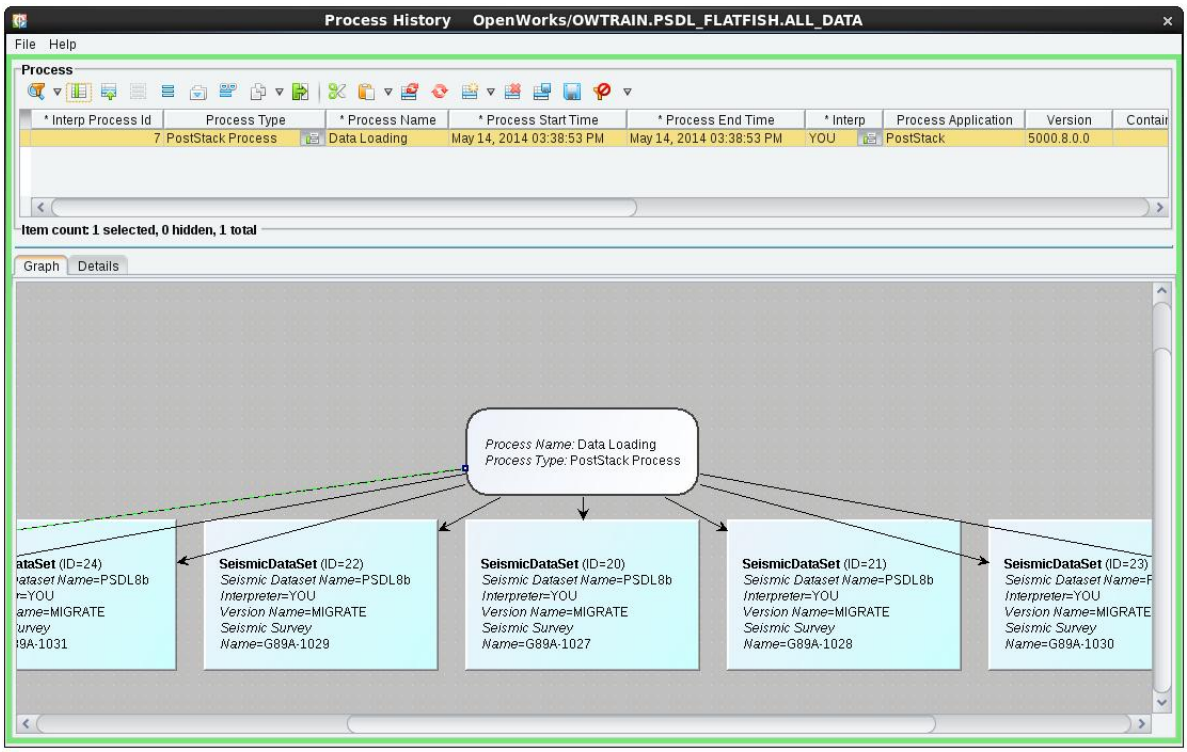
6. In the 2D Seismic Data Set section (bottom of the Seismic 2D tab in the right hand pane), click the **Select All** icon.

7. Click the **Show process history** icon ( ).



The Processing History window opens showing the relevant process for those 2D lines.

Graph tab:

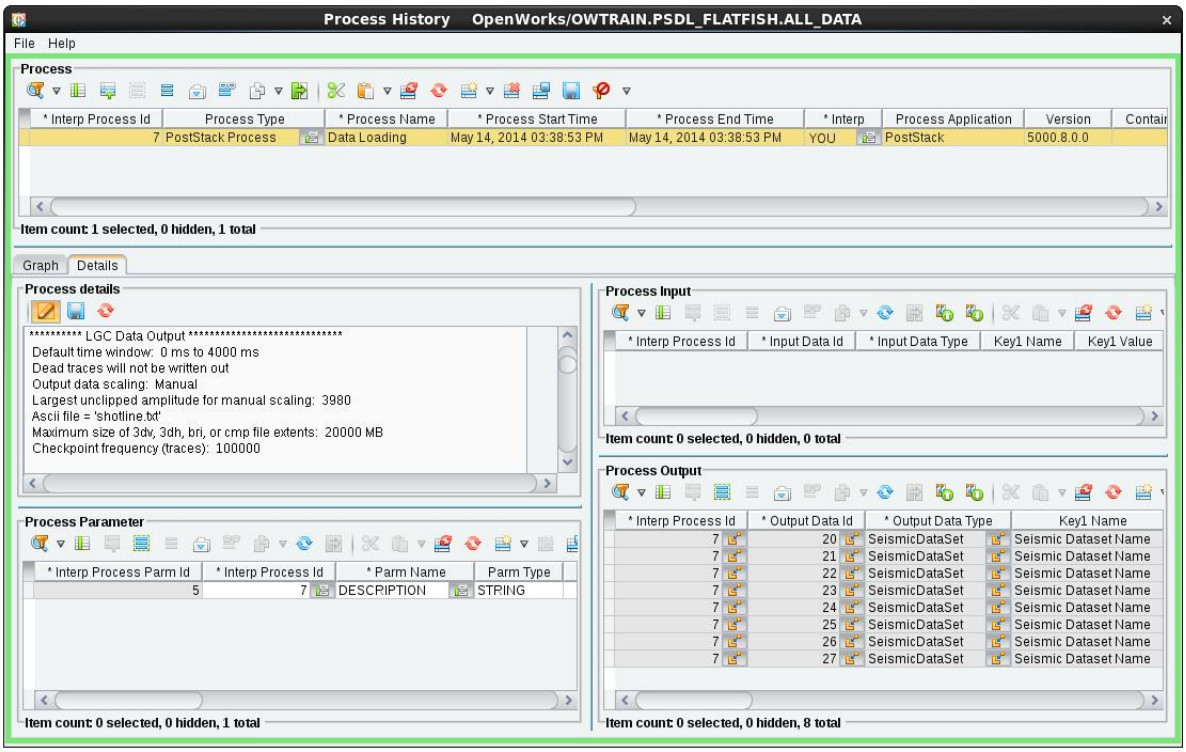


The Processing History window has been filtered to only show the relevant processing job. The graph tab is automatically selected

showing the inputs, process, and outputs for this particular job. In this case, the process is a data loading task in PostStack software, and outputs are several seismic dataset files—one for each 2D line.

All of this information has been collected automatically, but you have full control over the data from this point. You can add information, remove it, add an entry, or delete the entry completely.

8. Click the **Details** tab.



Similar to the 3D volume processing history you have seen before, *Process Details* displays the job output from PostStack software. There is no entry in *Process Input*, because you were loading from a location outside of OpenWorks software so that data is unknown, although you can add an entry. In Process Output, you have one entry for each 2D line loaded listing its details.

9. Select **File > Exit** to close the Processing History window.

10. Select **File > Exit** to close the Seismic Data Manager.

    Use SeisWorks to quickly view the newly loaded seismic data.

Open the saved SeisWorks session (or start a new session):

11. Select **Applications > SeisWorks** from the command menu.

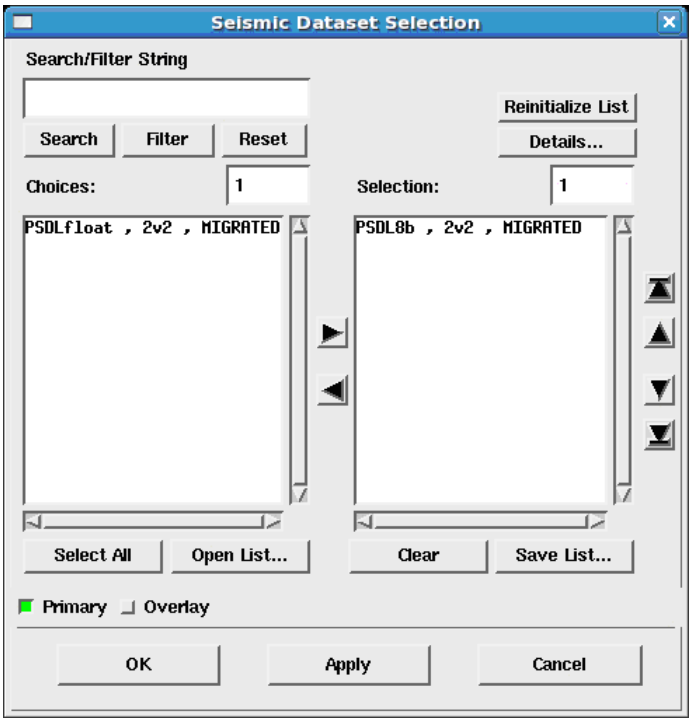
12. Select **Session > Open…**. Select your saved session.

13. Select **<No Wells>** and **<No Faults>**.

14. In the Seismic View, click the Seismic Parameters icon ( ).

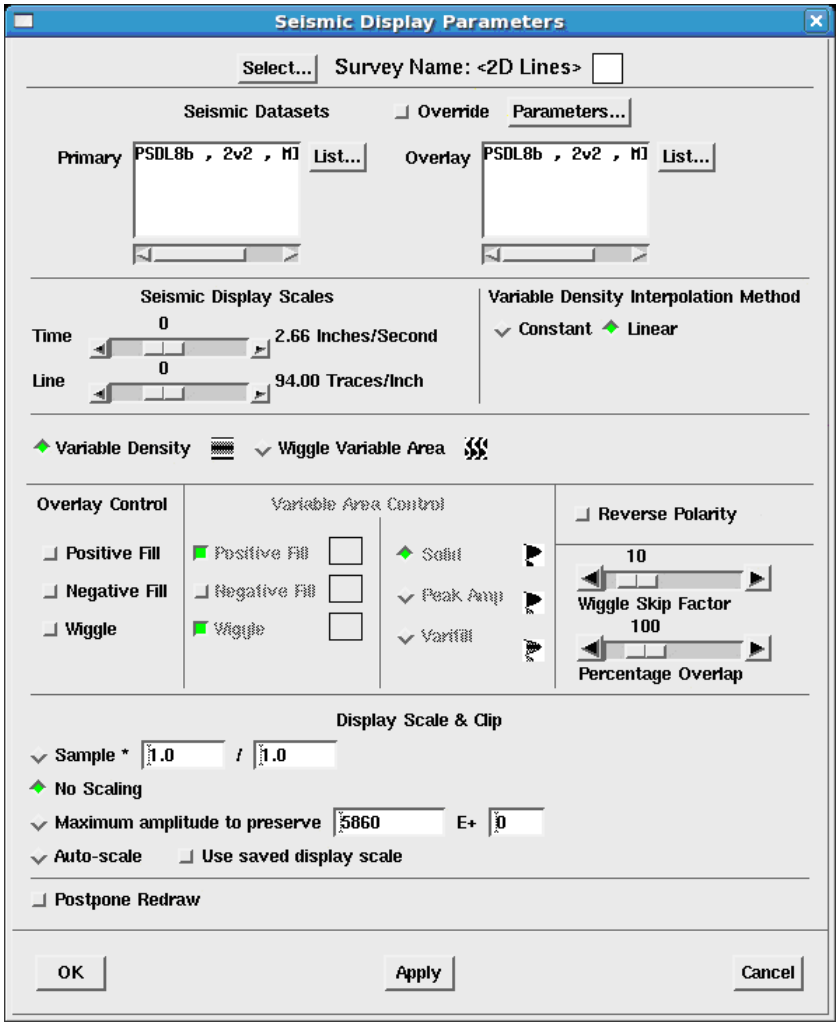
15. Click the **List…** button next to the Primary selection for Seismic Datasets.

16. Move the new dataset to the Selection list. Either move the other dataset into the Choices list or make sure that PSDL8b is listed first in the Selection list (this is a prioritized list).



17. Click **OK**.

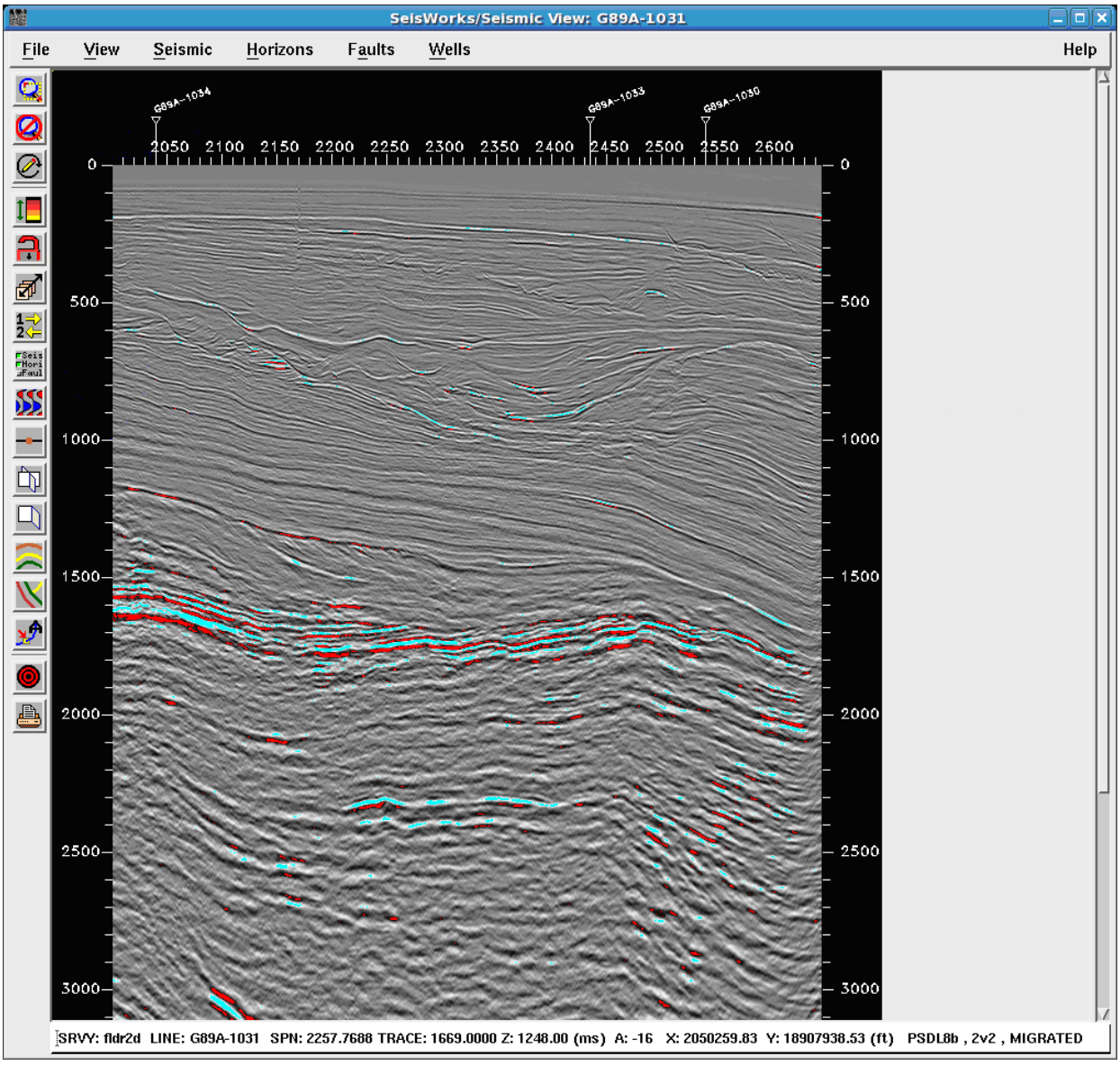
18. In Seismic Display Parameters, select **No Scaling** for the Display Scale & Clip option.



Remember, the data is output in the 8-bit format SeisWorks uses for display.

19. Click **OK**.

20. View all the 2D lines for this dataset. Use either the select from map midpoint option or select from list option to move from line to line.



All of the lines should look pretty balanced with no scaling, though the 99% value used in this example for permanently scaling and clipping the data may actually be clipping too much data (especially if the zone of interest for this survey is between 1500-2000 ms).

21. Save your session and exit the SeisWorks software.

Loading 2D Data Using SEG Y Import

The SEG Y Import is one of the tools that you can use to load seismic data into a Landmark format. In addition to loading the seismic trace data, SEG Y Import can load navigation data and analyze SEG-Y data.

For this exercise, you will load line G89A-1027 again. The SEG-Y tape has already been analyzed and navigation data loaded, so the exercise goes through just the loading process.

The complete workflow, including SEG-Y analysis, loading navigation, and loading seismic trace data is covered in Workshop 4: Complete 2D Data Load Using SEG Y Import.

Exercise 1: Load Line G89A-1027 using SEG Y Import

1. Start SEG Y Data Loader from the **OpenWorks Command Menu > Data > Import > SEG Y Import**.

The SEG Y Data Import is composed of four main tabs:

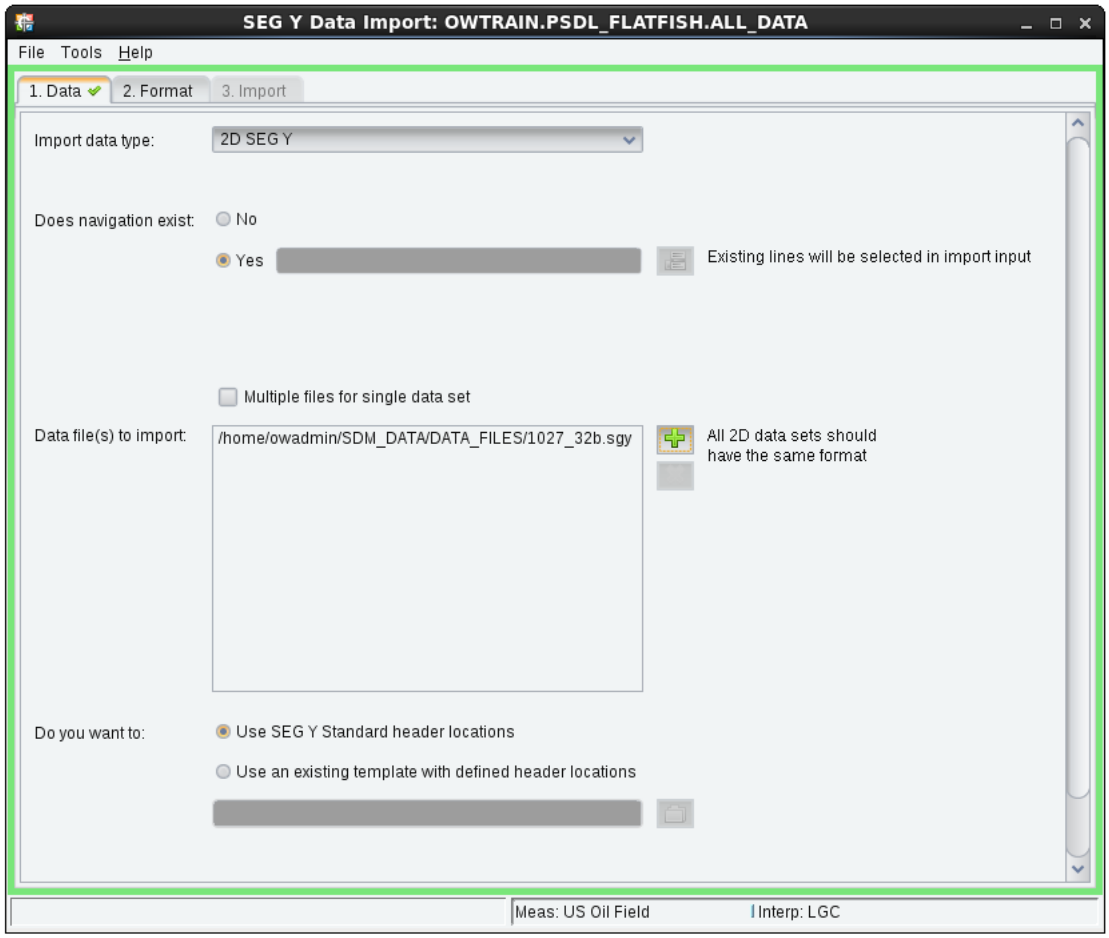
- Data
- Format
- Navigation
- Import

Once you open the dialog you will only see 3 tabs.

A fourth tab (Navigation) shows up if you toggle No to the option: Does navigation exist.

2. Set the Import Data Type to **2D SEG Y** from the drop-down menu. Set Does navigation exist to **Yes**. Click on the **Select Data Files**  icon. Navigate to the DATA FILES directory in your home

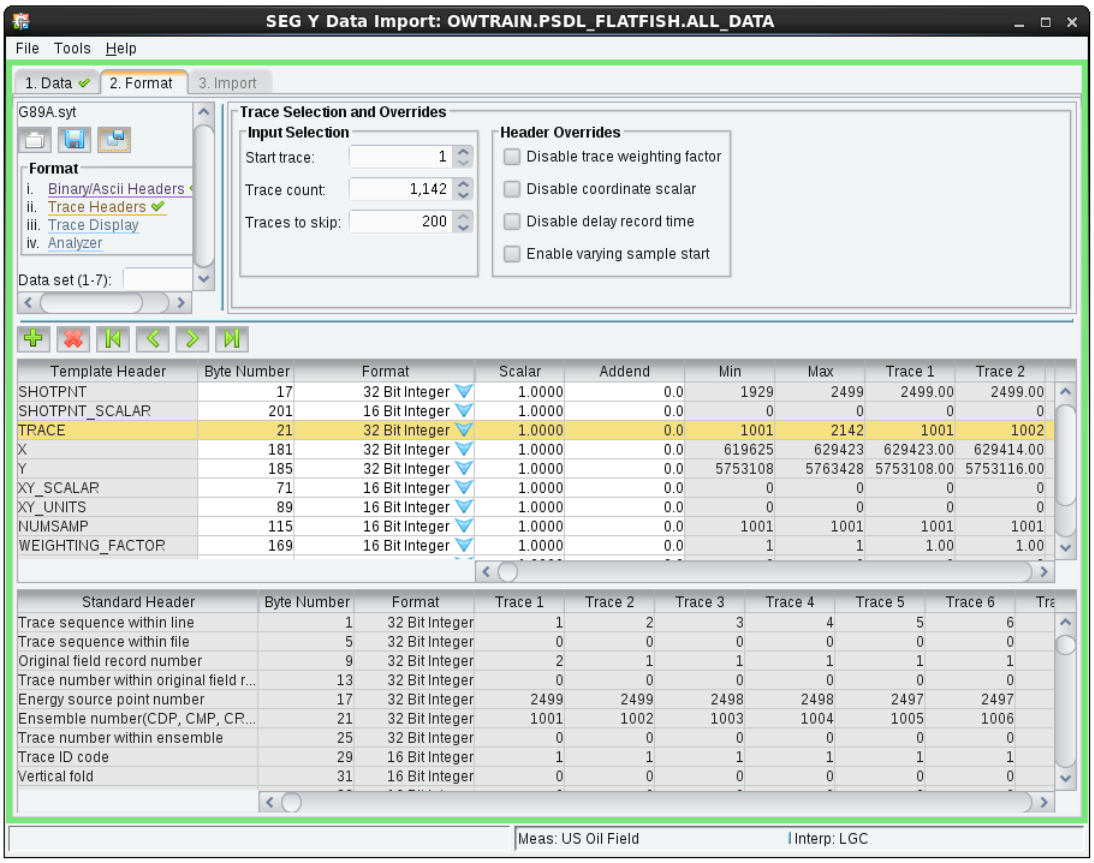
folder and select **1027_32b.sgy**. For the format, choose the **Use SEG Y Standard header locations** option.



3. Click on the **Format** tab. Keep the default settings under Binary/ ASCII Headers.

4. Click on **Trace Headers** in the Format section. The middle panel of the Trace Headers section displays the byte locations and number format used by the SEG Y Format file for each Header item.

5. Change the **SHOTPNT** Byte Number to **17** and set the **TRACE** Byte Number to **21**, the values found in a previous exercise in SEGY Analyzer.

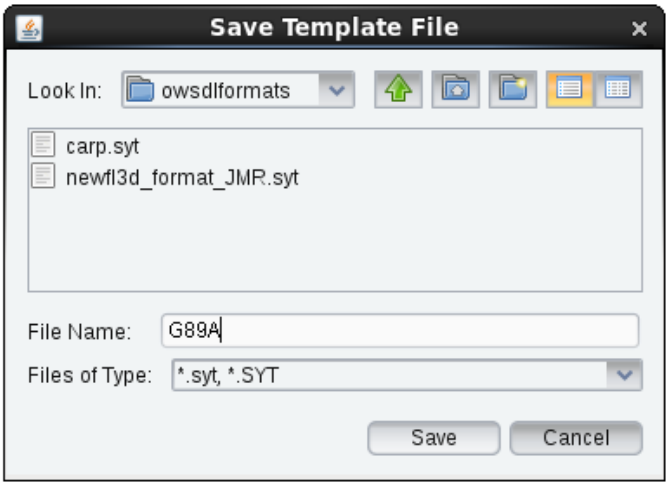


The lower panel displays the byte locations and number formats used in the Standard SEG Y format and shows the values as read from the file for each trace at that byte location.

The navigation is already loaded, so the trace and shot point information is all the loader needs to correctly load and position the data.

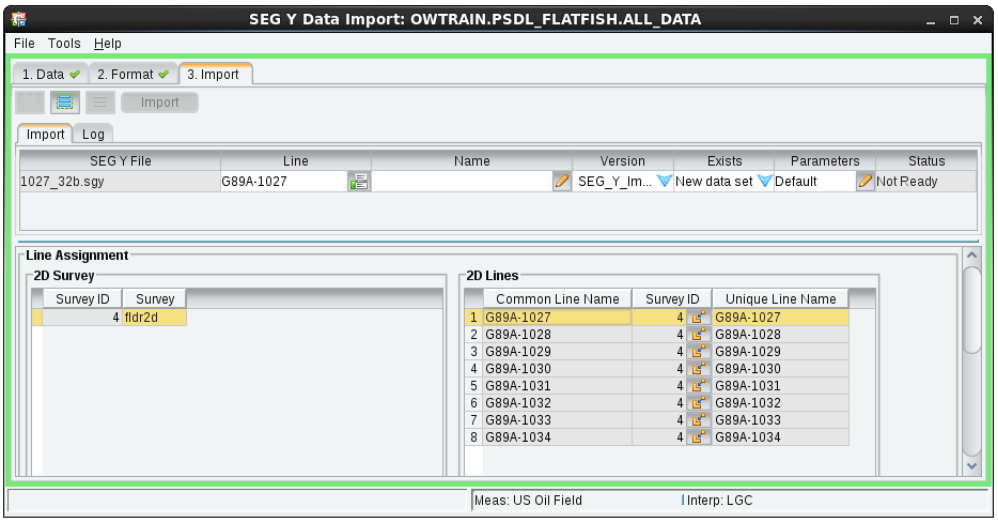
6. Click **Save as** button to open the *Save Template File* dialog and name the format file **G89A**.

You will use this format to load the rest of the G89A lines.



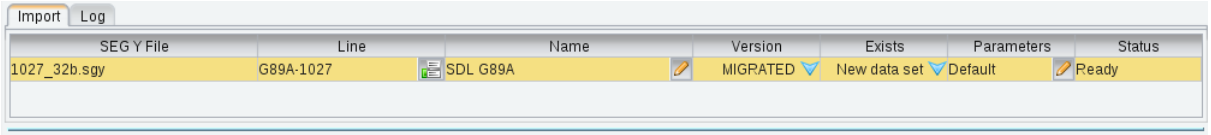
7. Click the **Import** tab.

8. Click under icon in the **Line** column to select existing 2D Line from the survey fldr2d.

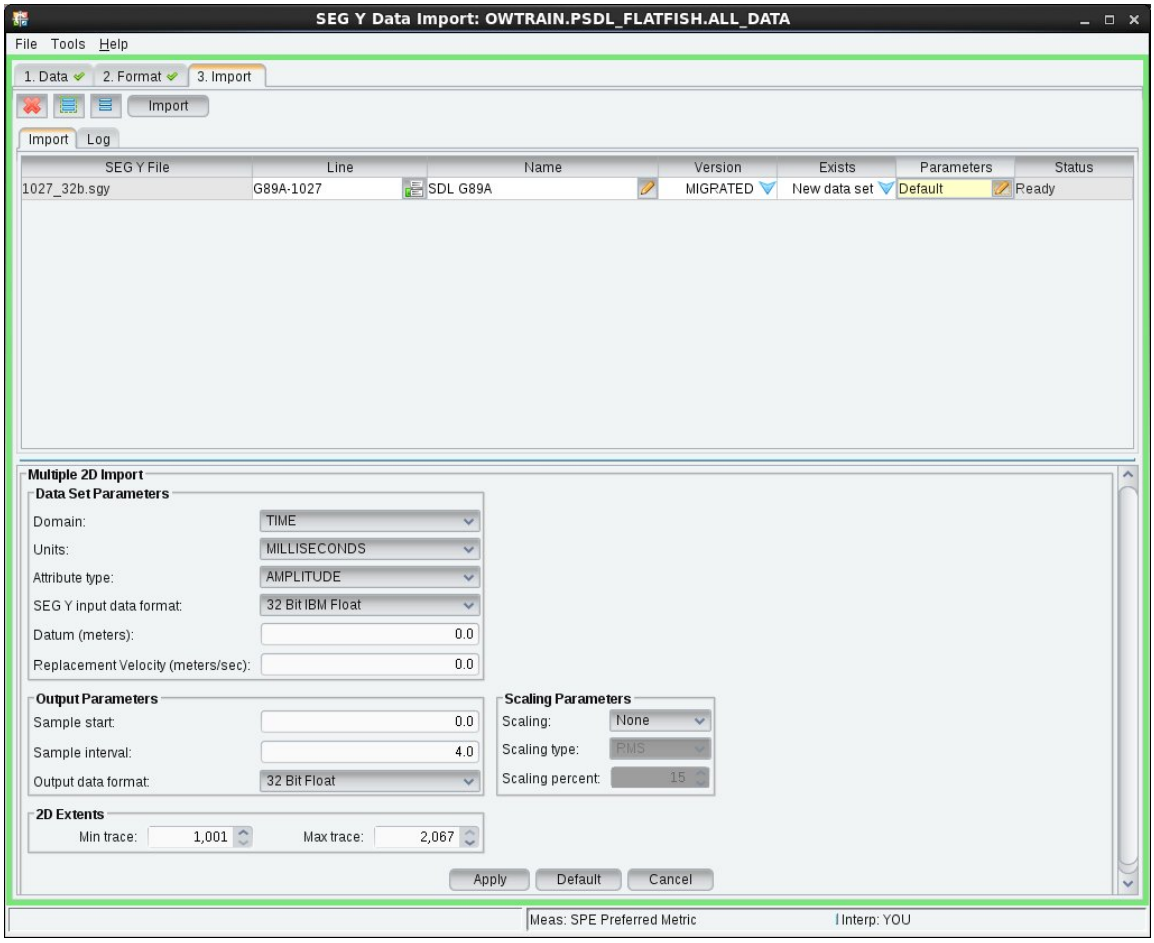


9. Click under **Name** column and type **SDL G89A** and press Enter.

10. Click the **Version** field and select **MIGRATED** from the dropdown list.



11. Click  under **Parameters**. The bottom pane shows the parameters for the SEG Y file. Leave the default parameters.



Data Set Parameters Section

The Data Set Parameters section allows you to change key SEG Y binary header values that characterize the data. The values are from the input data file and from any subsequent modification(s) on the **Format** tab, if any. They characterize the data when it is imported into the OpenWorks project. Only in rare cases do these values need to be changed.

Output Parameters Section

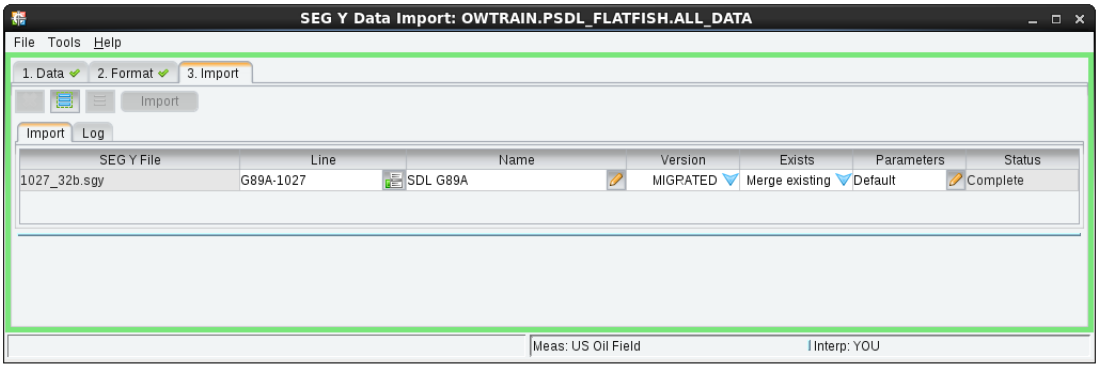
The Output Parameters section allows you to set the sample start and sample interval extracted from the input file. The values must be even numbers, not odd numbers. Only in rare cases do these values need to be changed.

Scaling Parameters

You can dynamically scale the lines using the SEG Y Import utility, according to the requirement(s). You can activate scaling by selecting an item other than None in the Scale Type drop-down list If additional scaling is desired for the SEG Y data, or if the data should be downscaled to a format of less than 32-bit. The options available in the Scale Type drop-down list are:

- **Trace**: Scale Factor is calculated from the amplitudes of each individual trace and applied to each individual trace. It helps eliminate some of the trace to trace variations that may exist.
- **Global**: Random subset of traces are scanned to calculate the Scale Factor and applied to every trace in the SEG Y file. It helps preserve some of the trace to trace variations.
- **None**: Scaling is not applied to any trace.

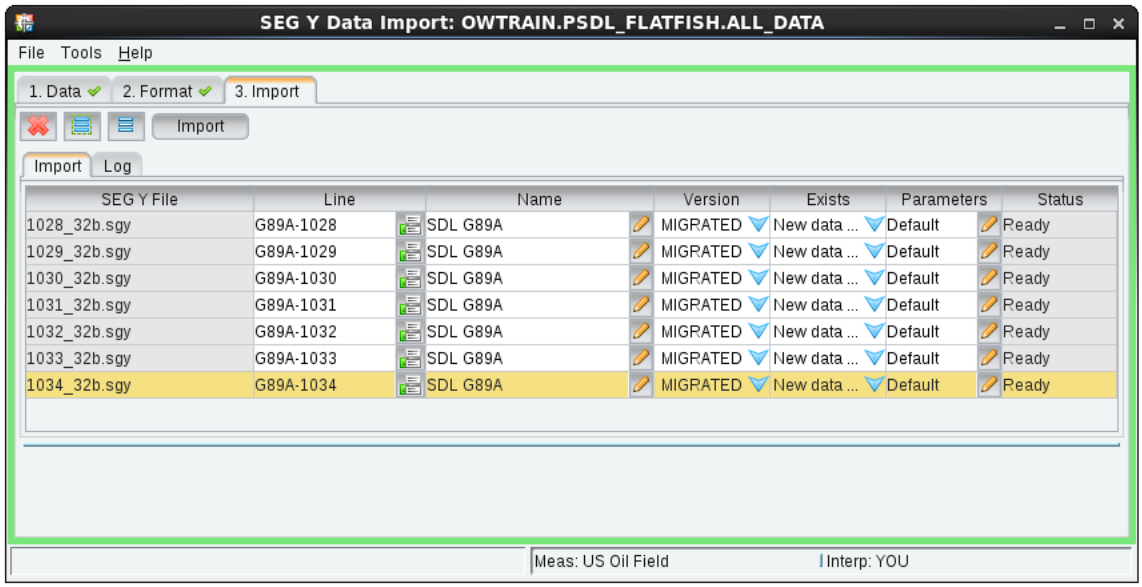
12. Click the **Import** button.



When the data has been loaded, the Status reports the job as *Complete*. Use **Tools > Error Logger Console…** to view any errors.

To load the rest of the lines, in the **Import** tab, click the **Remove** button to clear the line you just loaded and click the Add the 7remaining lines and fill out the fields for each line. You can use the same template file and output dataset name and version for all the lines - just make sure you assign the correct navigation to the SEG-Y files.

Repeat the process to load the other lines. Use the same template format file (**G89A.syt**) you created for line **G89A-1027**. Give the lines the same dataset name (in the example below, the name is **SDL G89A**, and the version is **MIGRATED**.



Check Seismic Data Manager

13. Open Seismic Data Manager if it is not already open. (**OpenWorks Command Menu > Data > Management > Seismic Data Management**).

    If it is not displaying the 2D data, select **View > 2D**.

14. Highlight the **fldr2d** survey.

15. Highlight the **G89A-1027** line in the **2D Line** pane.

16. Click the **Seismic 2D** tab.

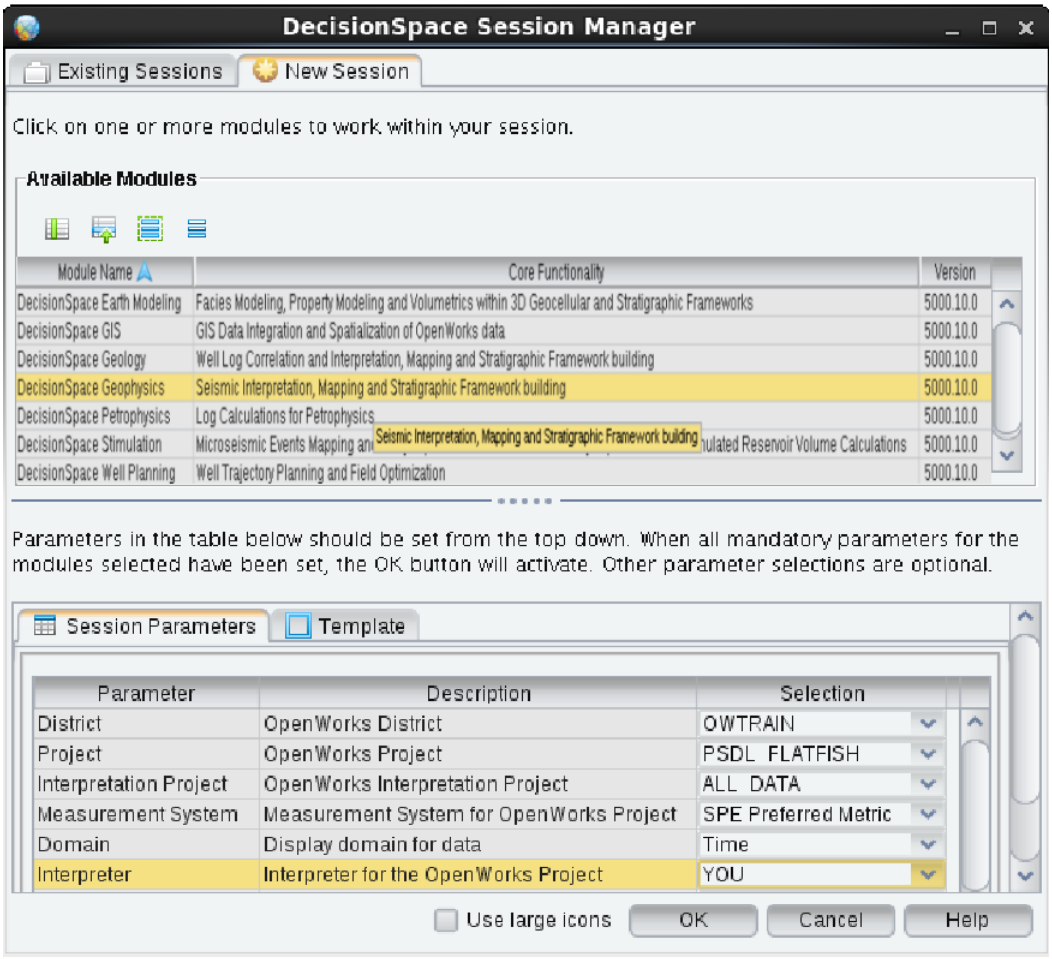
17. Highlight **SDL G89A**.

    The 2D Seismic Data Set pane displays information about the dataset you just loaded. Scroll to view the information.

    Unlike the PostStack software, **SEG Y Data Import** does not store information in process history.

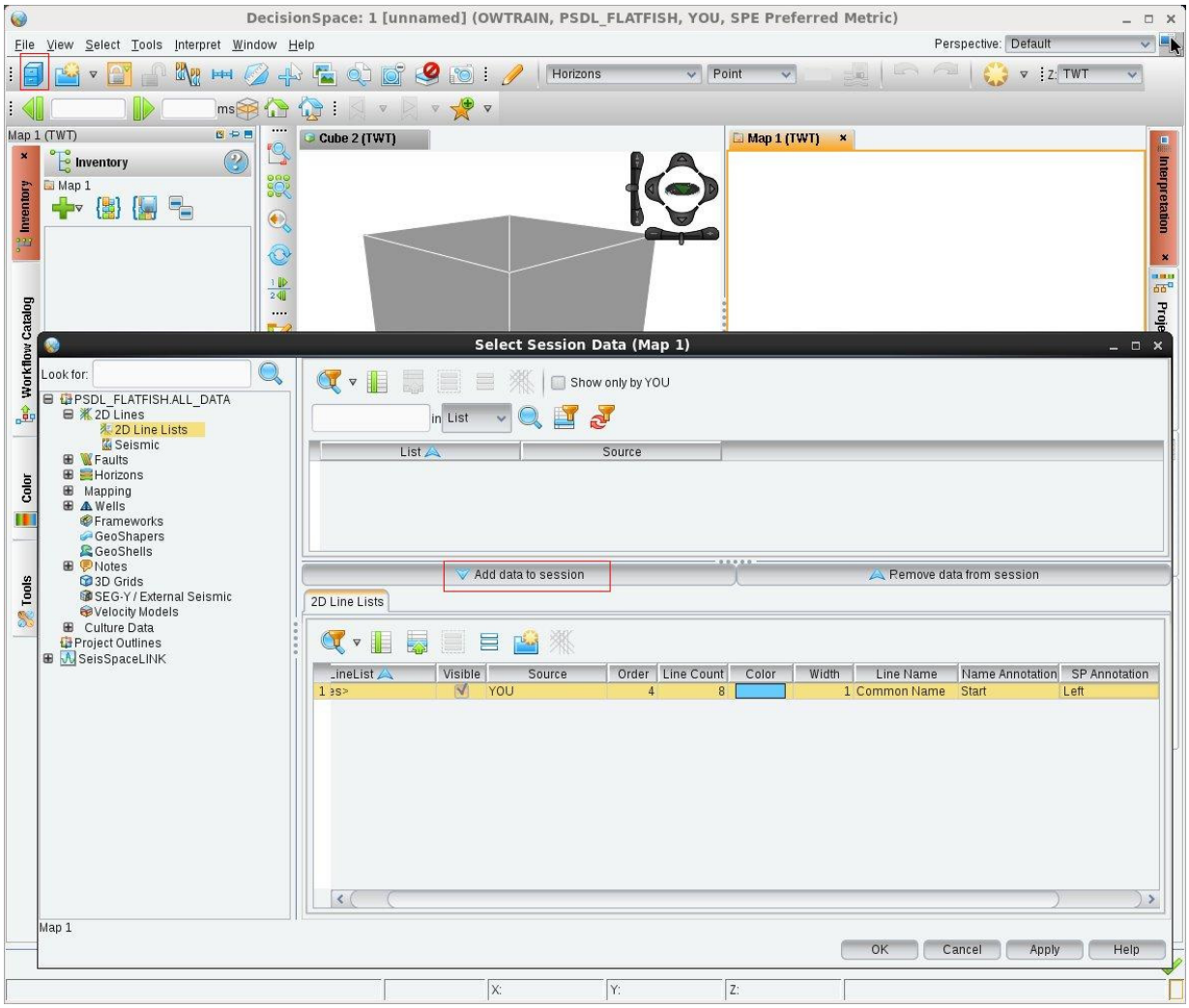
Check the DecisionSpace Geosciences Software

1. Launch the DecisionSpace Geosciences software (**OpenWorks Command menu > Applications > DecisionSpace Geosciences**).

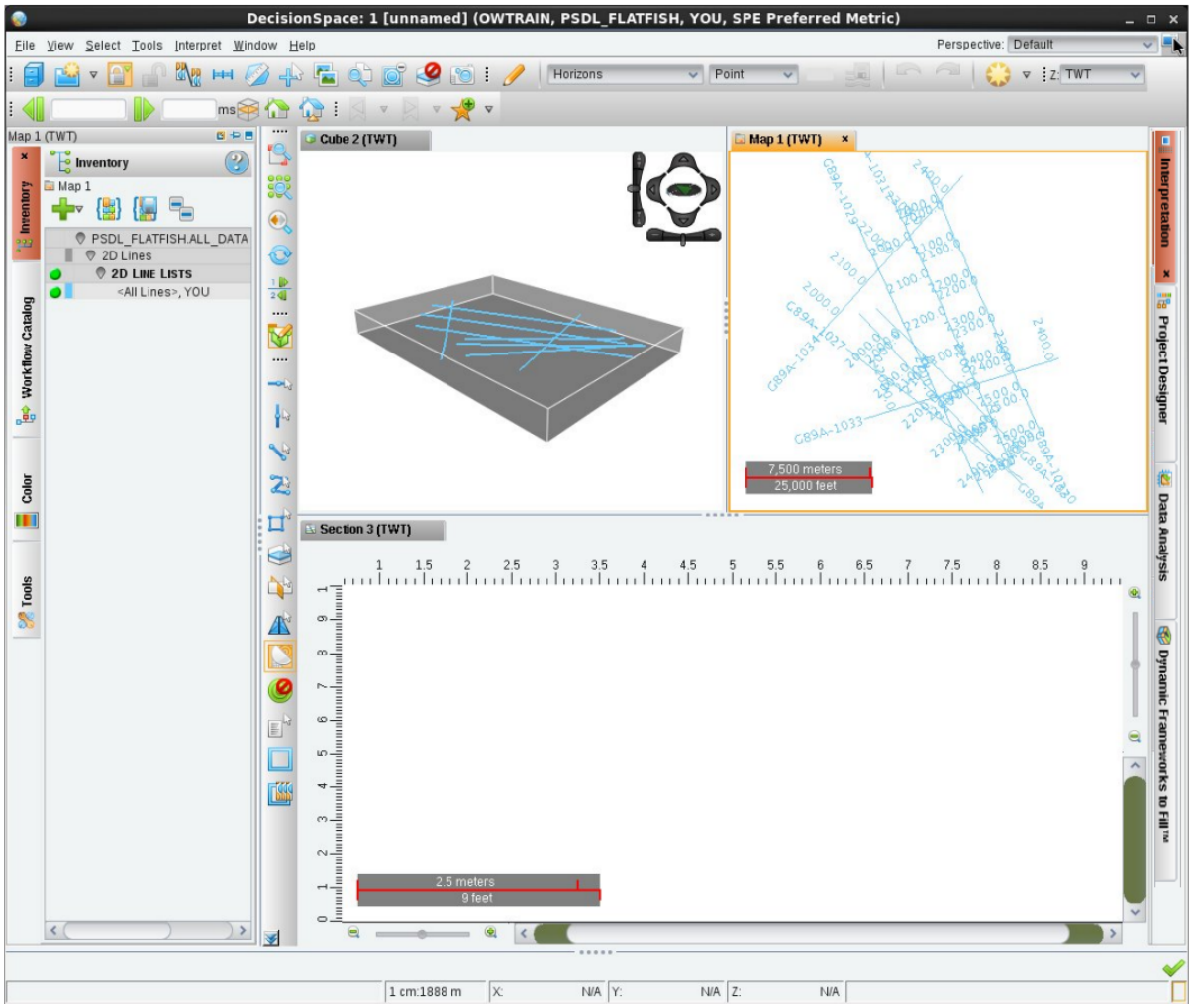


2. Click the **OK** button.

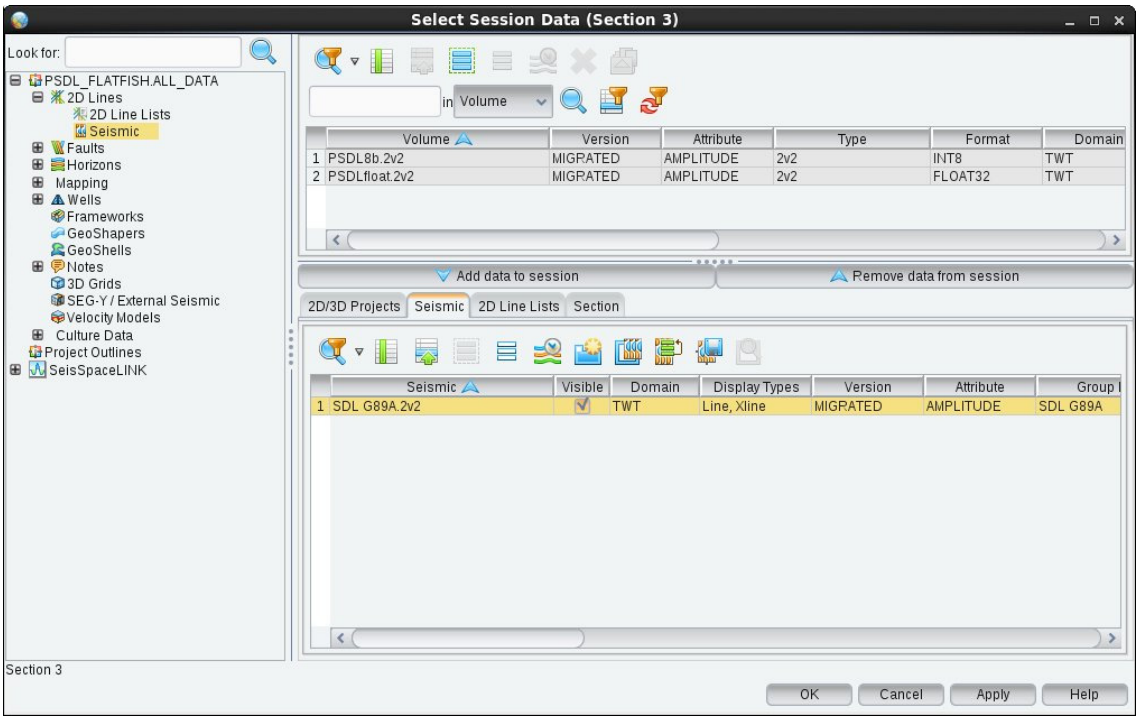
3. Add to the session data of DecisionSpace Geosciences and change the **Name Annotation** to *Start* and **SP Annotation** to *Left*.



4. Click **OK**.

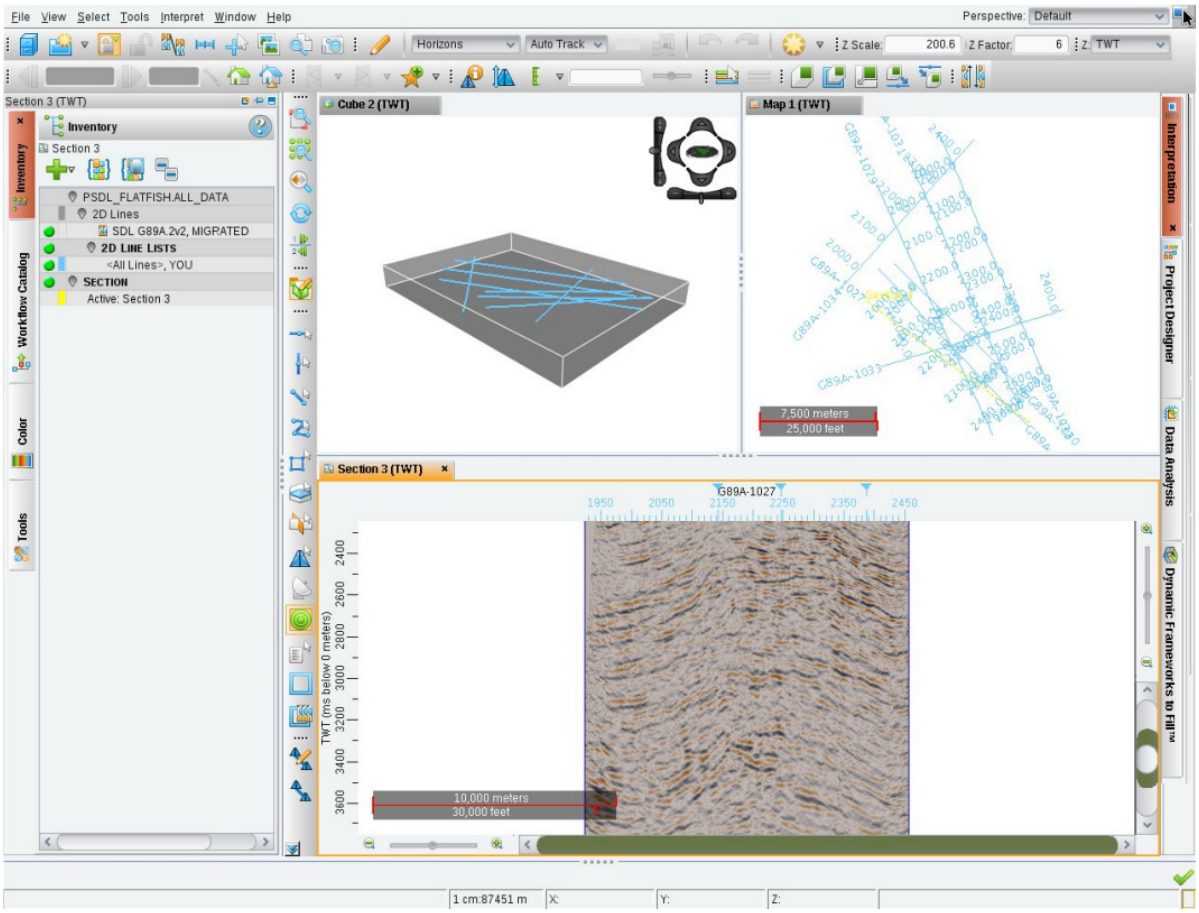

DecisionSpace: 1 [unnamed] (OWTRAIN, PSDL_FLATFISH, YOU, SPE Preferred Metric)
File View Select Tools Interpret Window Help
Perspective: Default
Horizons
Point
Z: TWT
Map 1 (TWT)
Inventory
Map 1
PSDL_FLATFISH.ALL_DATA
2D Lines
2D LINE LISTS
<All Lines>, YOU
Cube 2 (TWT)
Map 1 (TWT)
7,500 meters
25,000 feet
Section 3 (TWT)
2.5 meters
9 feet
1 cm:1888 m
X: N/A
Y: N/A
Z: N/A
Inventory
Workflow Catalog
Color
Tools
Interpretation
Project Designer
Data Analysis
Dynamic Frameworks to Fill™

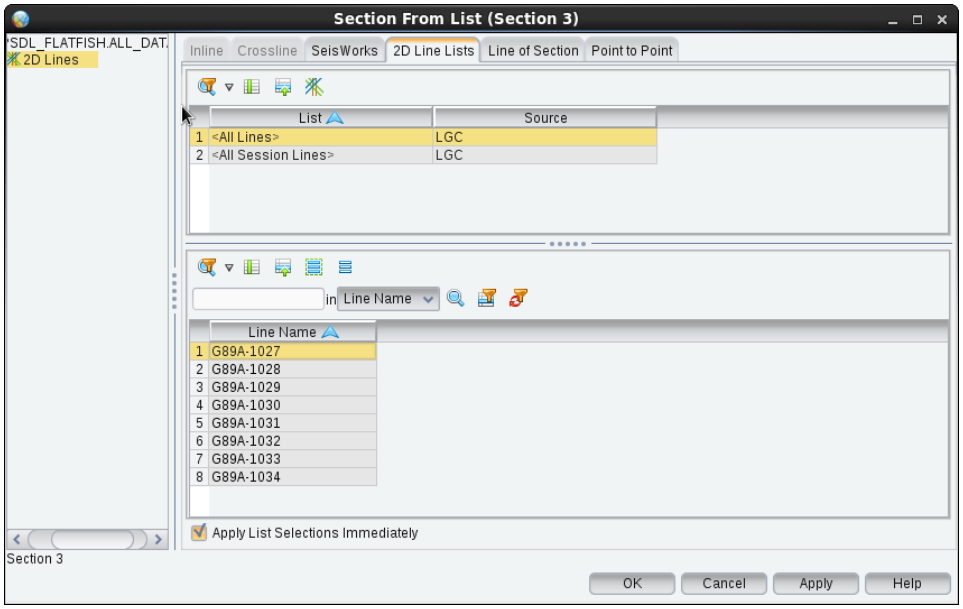
5. Add the loaded seismic data to the session in order to display the line in the Section View of DecisionSpace Geosciences.



6. Click **OK**.

7. From the menu, **Select > Selection** to display the line G89A-1027. Click the **OK** button.

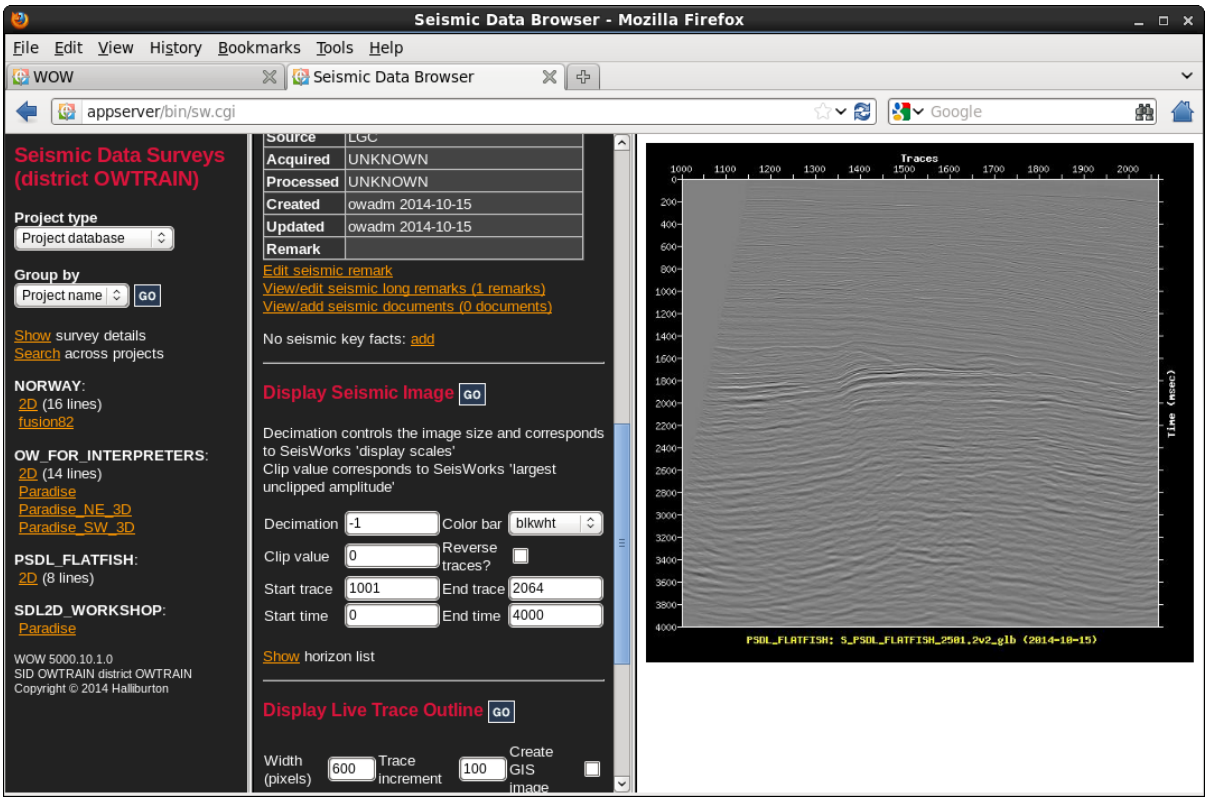




Similarly, the rest of the lines can also be verified.

Check the WOW Software (optional)

As in the previous exercises, you can use the WOW software to check the loaded data. Try to remember how to display a seismic image in the WOW software. Refer to instructions in previous exercises if you need help.



You have loaded the same line (or lines) using PostStack, and SEG Y Import Utility. There are four 2D workshops available for practice loading different 2D datasets. Pick the one you think might be of the most beneficial to your data loading needs. If you have extra time at the end of the class, you can always return to finish the other workshops.

2D Data Loading Workshops

The 2D data loading exercises covered the basics of loading in each of the two Landmark options for loading seismic data. Several 2D workshops are available to practice the data loading workflow. The workshops cover different aspects of loading data, giving you valuable practice for the some of the various data loading situations you may encounter.

These workshops are optional and you probably won't have a chance to do them all. If you have time, choose the workshop that you think you might benefit from the most. If you can't decide which one to do, ask your instructor for guidance.

Workshop 1: PSDL - Loading 2D Data without ASCII Navigation Files

Workshop 2: Complete 2D Data Load Using SEG Y Data Import

Workshop 1: PSDL—Loading 2D Data without ASCII Navigation Files

New to the workflow:

- Extracting Navigation Data from the SEG-Y Files
- Autoname Line option in PostStack Data Loader
- Load into Existing Dataset Names

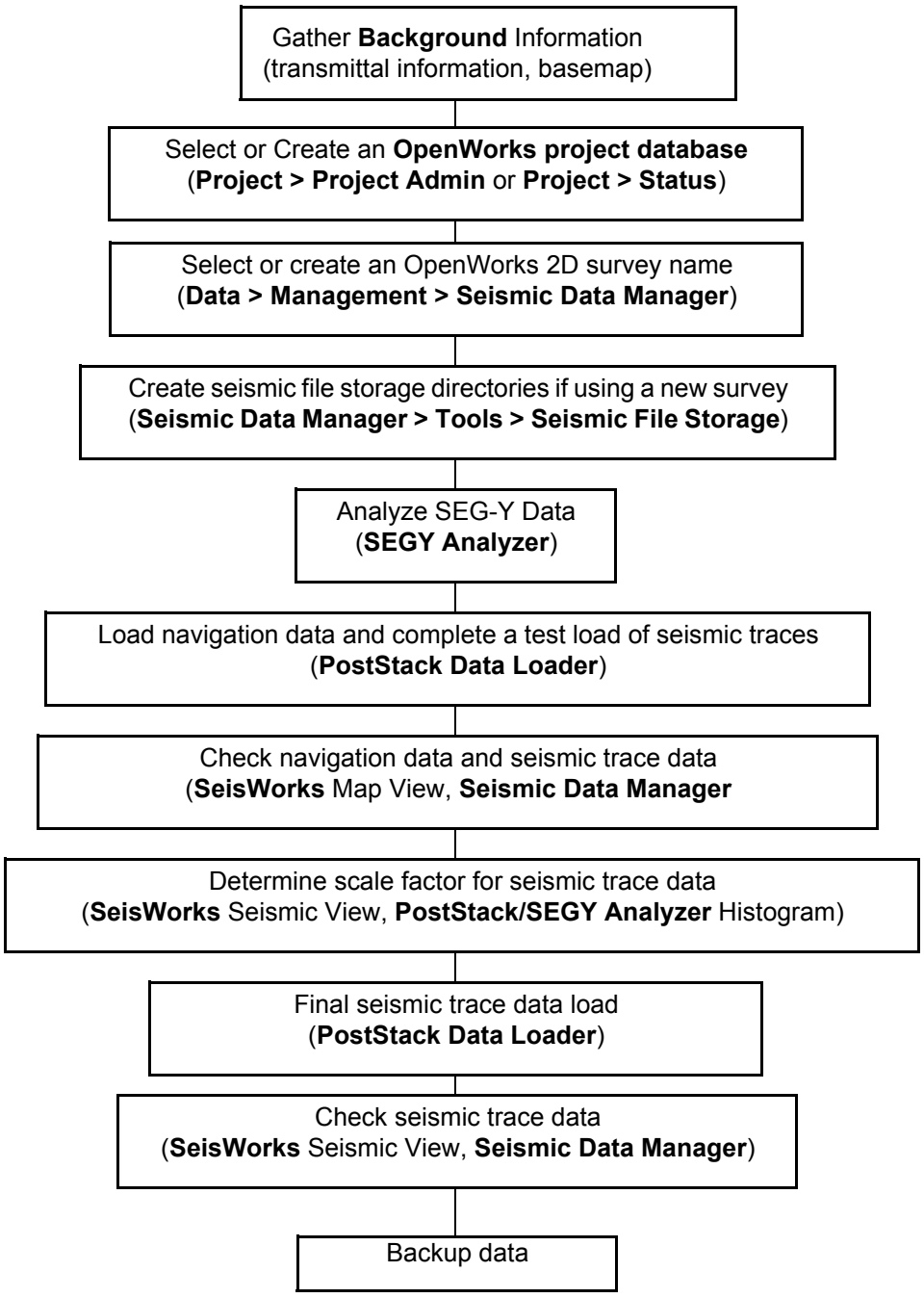
The goal of this workshop is to load six additional lines into your *PSDL_FLATFISH* OpenWorks project database. You are handed SEG-Y data files and a sketch map of the lines; a separate ASCII file containing navigation data is NOT provided. Your goal is to load these lines into the floating point dataset, and scale and load the data to the PSDL8b, MIGRATED dataset.

The PostStack Data Loader has the capability of loading navigation data taken from trace headers into the OpenWorks software while loading seismic trace data. The workflow for loading navigation data and seismic trace data at the same time, shown on the next page, is slightly different than the workflow used to load the two data types separately.

Although the data is from the same geographical area as the previous PostStack 2D data load, do not assume that the Trace Header information is in the same location or that the data has undergone the same processing.

Most of this data load workflow follows the same procedures previously used in the PostStack 2D exercise. Please refer to the appropriate pages in this chapter when you need more detailed instruction.

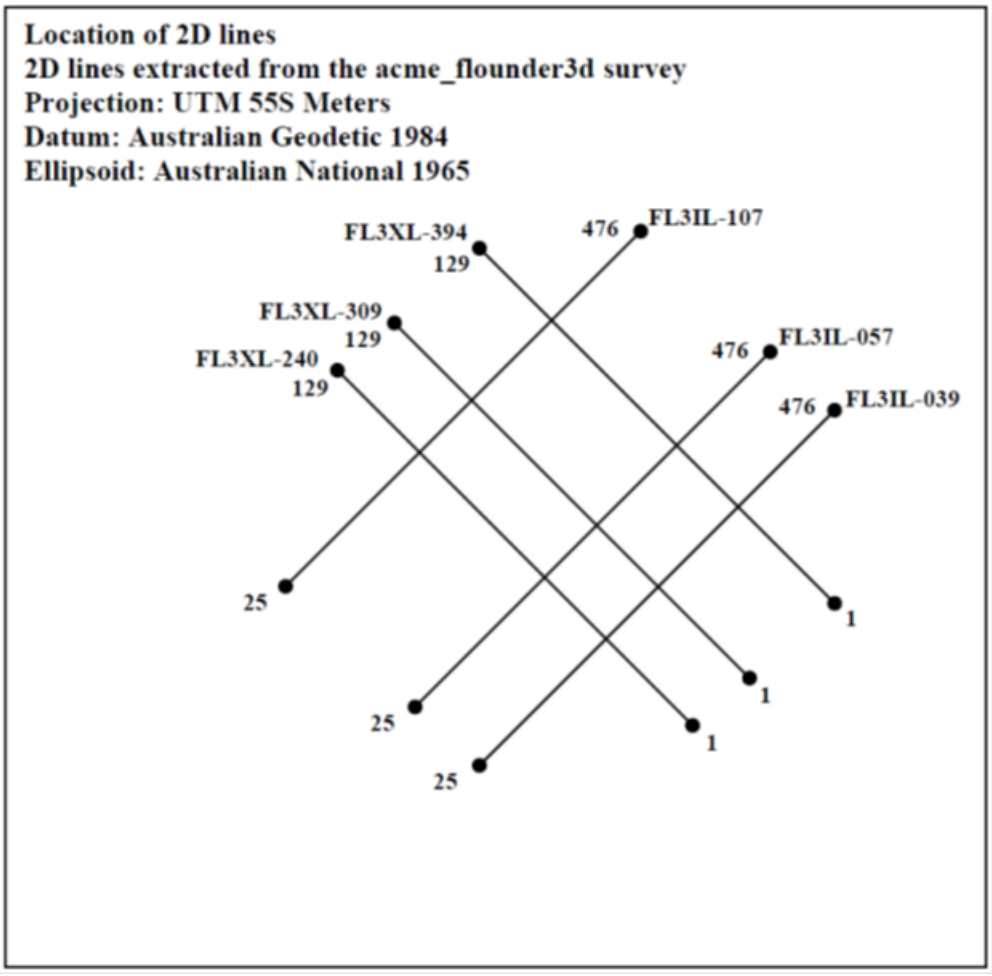
Workflow 2 for Loading 2D Data
Loading Navigation and Trace Data Together



Gather Background Information

The lines to be loaded were extracted from a 3D survey of the area. The following sketch map was provided along with the following SEG-Y files:

- il039.sgy
- il057.sgy
- il107.sgy
- xl240.sgy
- xl309.sgy
- xl394.sgy



Select or Create an OpenWorks Software Project

Since you are loading this data into an existing seismic project, select the OpenWorks project *PSDL_ FLATFISH*. Set your interpreter ID for the OpenWorks session.

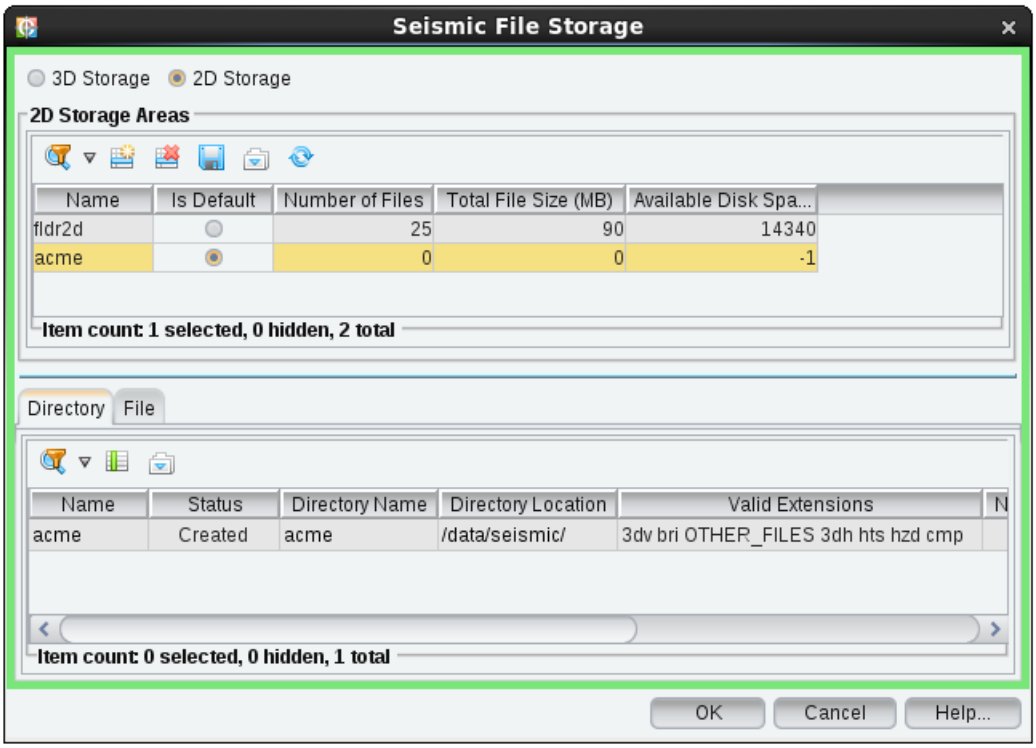
Select or Create a 2D Survey

If you load the lines to an existing survey, the software knows where to store the navigation data and the directory file system for seismic data storage.

If you did not already have an existing 2D survey appropriate for this data, it would be best to create the survey in Seismic Data Manager and assign seismic file storage locations at this point in the workflow.

For this workshop, in Seismic Data Manager, create a 2D survey called *acme* and create storage directories on the available directory paths for 2D seismic (**Tools > Seismic Files Storage…**).

Remember to toggle *acme* for *Is Default*.



Analyze SEG-Y Data

You will need to analyze the SEG-Y data for the following data files: *il107.sgy*, *il039.sgy*, *il057.segy*, *xl240.sgy*, *xl309.sgy*, and *xl394.sgy*.

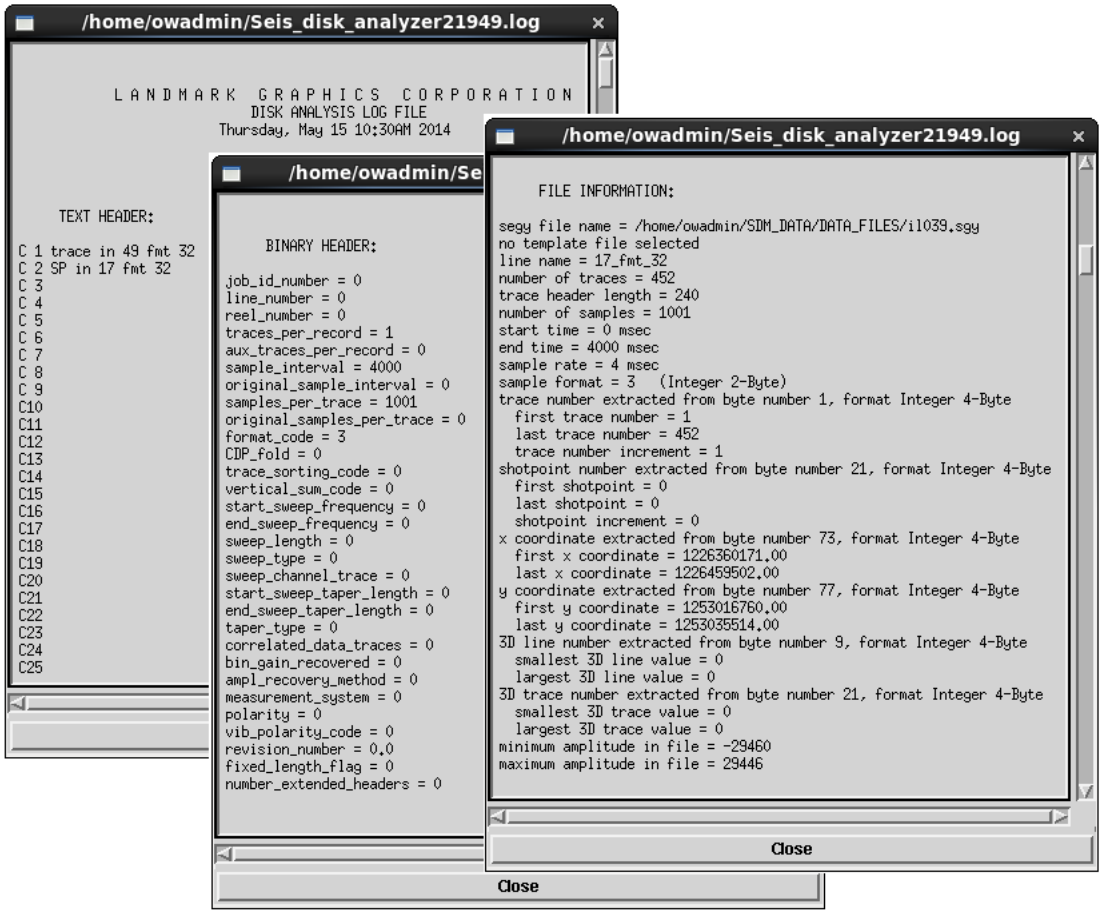
Your instructor will give you the pathway to the location of these files.

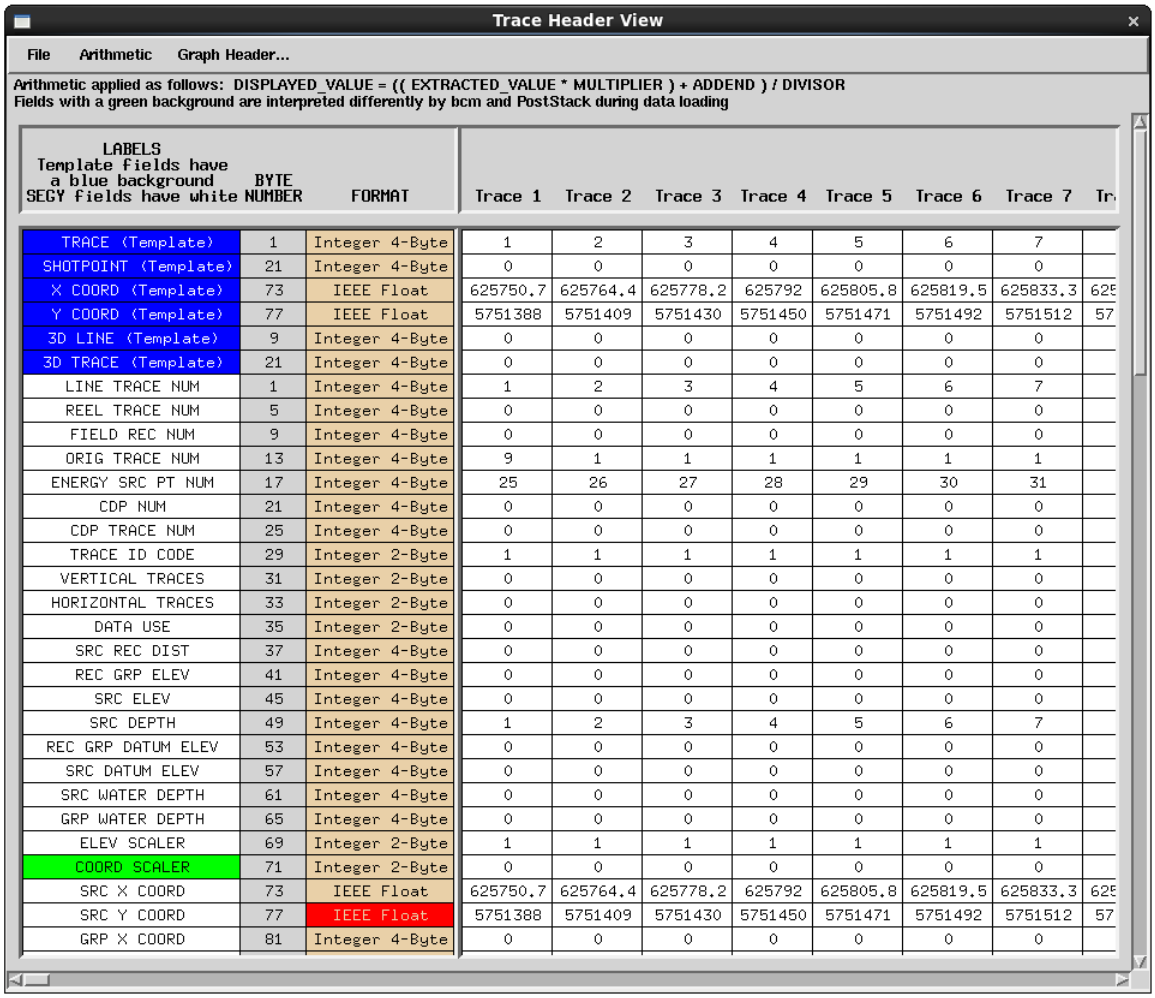
Instructions for using SEGY Analyzer were given previously in this chapter. Refer to those instructions as necessary.

You will need to create a new SEG-Y template for PostStack Data Loader to load this data set.

Hints:

Run Disk analysis to log file using the Standard SEGY (default) template. Check the SEGY Analyzer log for trace, shotpoint, x, y coordinate information, and verify the information by graphing the headers in the Trace Header View (**Interactive SEGY analysis…**).





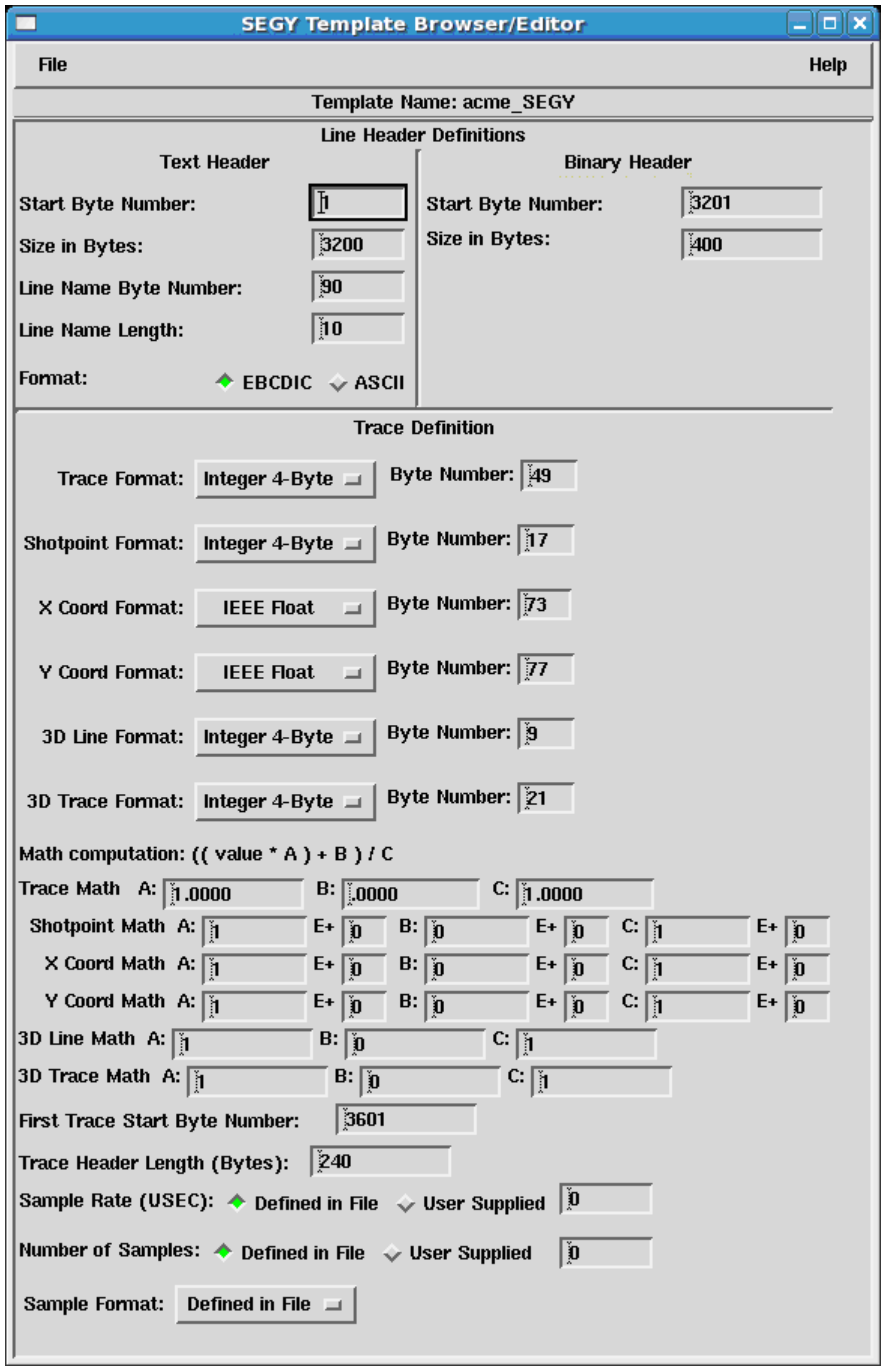
Trace Header View

File Arithmetic Graph Header...

Arithmetic applied as follows: DISPLAYED_VALUE = ((EXTRACTED_VALUE * MULTIPLIER) + ADDEND) / DIVISOR
Fields with a green background are interpreted differently by bcm and PostStack during data loading

LABELS Template fields have a blue background SEGY fields have white	BYTE NUMBER	FORMAT	Trace 1	Trace 2	Trace 3	Trace 4	Trace 5	Trace 6	Trace 7	Tr
TRACE (Template)	1	Integer 4-Byte	1	2	3	4	5	6	7	
SHOTPOINT (Template)	21	Integer 4-Byte	0	0	0	0	0	0	0	
X COORD (Template)	73	IEEE Float	625750.7	625764.4	625778.2	625792	625805.8	625819.5	625833.3	625
Y COORD (Template)	77	IEEE Float	5751388	5751409	5751430	5751450	5751471	5751492	5751512	57
3D LINE (Template)	9	Integer 4-Byte	0	0	0	0	0	0	0	
3D TRACE (Template)	21	Integer 4-Byte	0	0	0	0	0	0	0	
LINE TRACE NUM	1	Integer 4-Byte	1	2	3	4	5	6	7	
REEL TRACE NUM	5	Integer 4-Byte	0	0	0	0	0	0	0	
FIELD REC NUM	9	Integer 4-Byte	0	0	0	0	0	0	0	
ORIG TRACE NUM	13	Integer 4-Byte	9	1	1	1	1	1	1	
ENERGY SRC PT NUM	17	Integer 4-Byte	25	26	27	28	29	30	31	
CDP NUM	21	Integer 4-Byte	0	0	0	0	0	0	0	
CDP TRACE NUM	25	Integer 4-Byte	0	0	0	0	0	0	0	
TRACE ID CODE	29	Integer 2-Byte	1	1	1	1	1	1	1	
VERTICAL TRACES	31	Integer 2-Byte	0	0	0	0	0	0	0	
HORIZONTAL TRACES	33	Integer 2-Byte	0	0	0	0	0	0	0	
DATA USE	35	Integer 2-Byte	0	0	0	0	0	0	0	
SRC REC DIST	37	Integer 4-Byte	0	0	0	0	0	0	0	
REC GRP ELEV	41	Integer 4-Byte	0	0	0	0	0	0	0	
SRC ELEV	45	Integer 4-Byte	0	0	0	0	0	0	0	
SRC DEPTH	49	Integer 4-Byte	1	2	3	4	5	6	7	
REC GRP DATUM ELEV	53	Integer 4-Byte	0	0	0	0	0	0	0	
SRC DATUM ELEV	57	Integer 4-Byte	0	0	0	0	0	0	0	
SRC WATER DEPTH	61	Integer 4-Byte	0	0	0	0	0	0	0	
GRP WATER DEPTH	65	Integer 4-Byte	0	0	0	0	0	0	0	
ELEV SCALER	69	Integer 2-Byte	1	1	1	1	1	1	1	
COORD SCALER	71	Integer 2-Byte	0	0	0	0	0	0	0	
SRC X COORD	73	IEEE Float	625750.7	625764.4	625778.2	625792	625805.8	625819.5	625833.3	625
SRC Y COORD	77	IEEE Float	5751388	5751409	5751430	5751450	5751471	5751492	5751512	57
GRP X COORD	81	Integer 4-Byte	0	0	0	0	0	0	0	

Create Template and Save (**File > Save As…**) in Browse/Edit template…



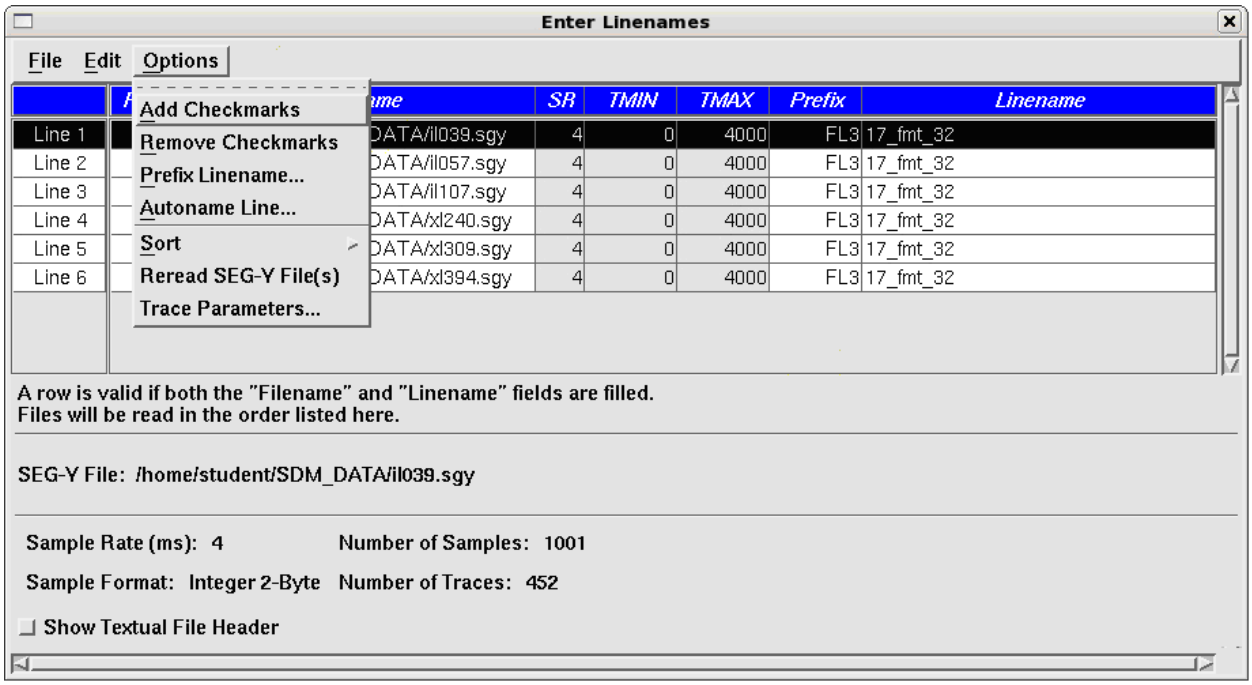
Run *Disk analysis to log file* using the new template. Verify reported trace, shotpoint, and coordinate values (you do not know the actual coordinate values, but they should be similar to the OpenWorks project coordinates as they are in the same CRS).

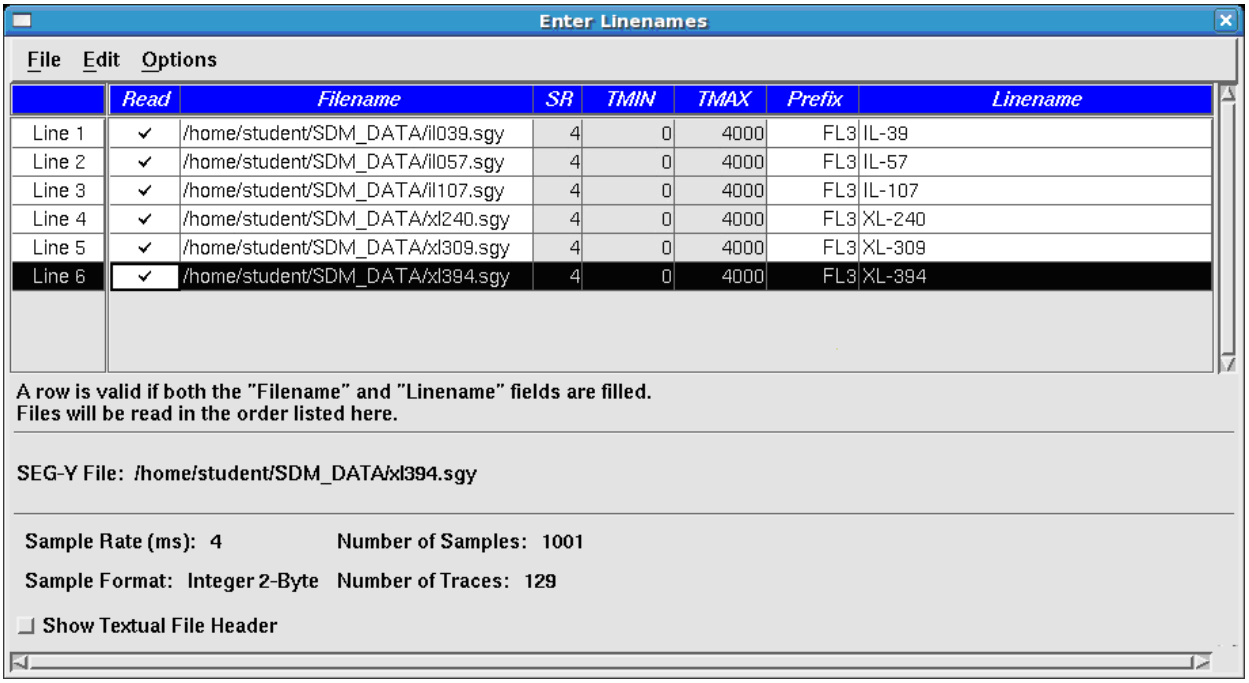
Load Navigation Data and Trace Data

For this step, you will use the PostStack Data Loader, just as you did when you loaded seismic trace data in a previous exercise. Refer to previous instructions as necessary.

There are a few differences that should be noted.

- When setting up the parameters for the Input, you will have to type in the names of the lines using the *Autoname Line* option since this data is not yet in OpenWorks. When using the Autoname Line option, make sure your cursor is not in the *Linename* field; just highlight the row where you want to add the correct line name. Use the *Prefix Linename…* option if you want to add FL3 as a prefix to each line name, or just use the whole line name in *Autoname Line….*





- When setting up parameters for Output Data, use a unique file/version name. You could merge these lines with the existing PSDLfloat, MIGRATED dataset. However, as the amplitude range is different, it would be better to balance the data before merging the datasets. In the next part of the workshop, you will scale the data and merge into the same 8-bit format seismic dataset as the existing G89A lines.

- You will also need to add additional information in the *Basemap Information* dialog box as follows:

1. Click on the **Basemap Info...** box at the bottom of the *Vertical File Parameters* dialog box.

2. Toggle *on* **Overwrite Basemap Information for Existing Lines**.

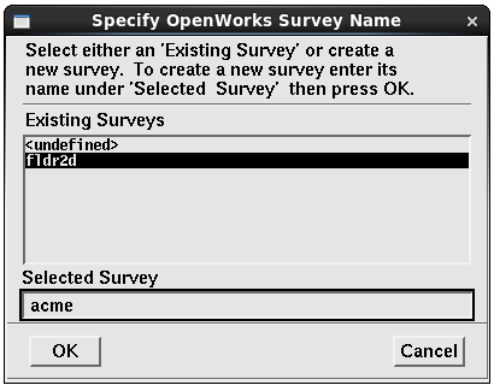
3. The ASCII navigation data is written to a text file. You can accept the default name or designate a different name by clicking on **List…** next to the Write to ASCII Nav File field.

   Two files are created. The default file names are *shotline.txt_lineinfo* and *shotline.txt*.

   The files are located in the <path>/OW_PROJ_DATA/<OpenWorks_project>/PostStack directory.

You do not need to load these separately if you toggle *on* the *Overwrite* option.

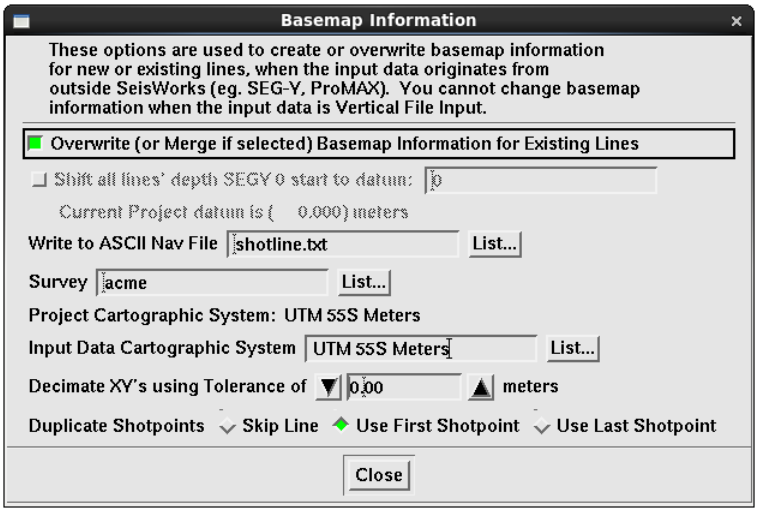
4. Next to Survey, click **List…**. At this point, you will create or select the seismic survey for these lines. Type `acme` for your survey and click **OK**.



5. If your Input Data Cartographic System is different than listed, you could change it. For these lines, UTM 55S Meters is the correct cartographic system.

6. Enter Decimate XY's using Tolerance of *0* meters.

7. Select the **Use First Shotpoint** radio button.



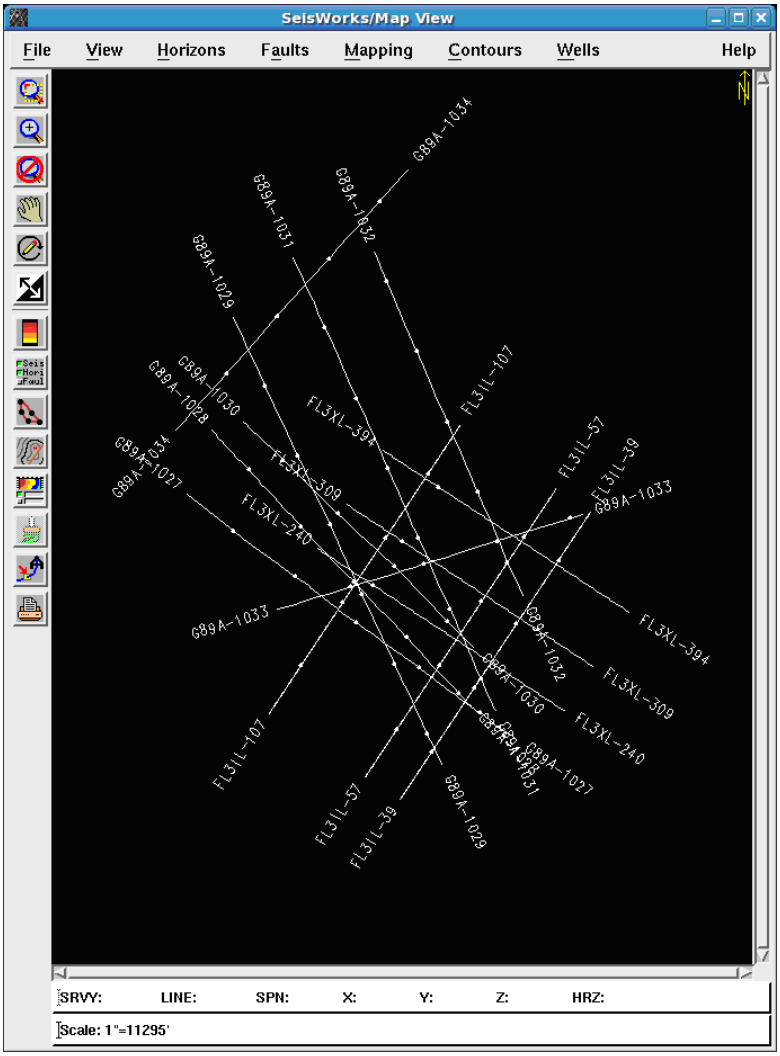
8. Click **Close**.

9. Load your six lines to a new dataset name (name - PSDL WS1 float, version - MIGRATED). Continue with the procedure used in the previous PostStack 2D data load exercise.

Check Navigation Data and Seismic Trace Data

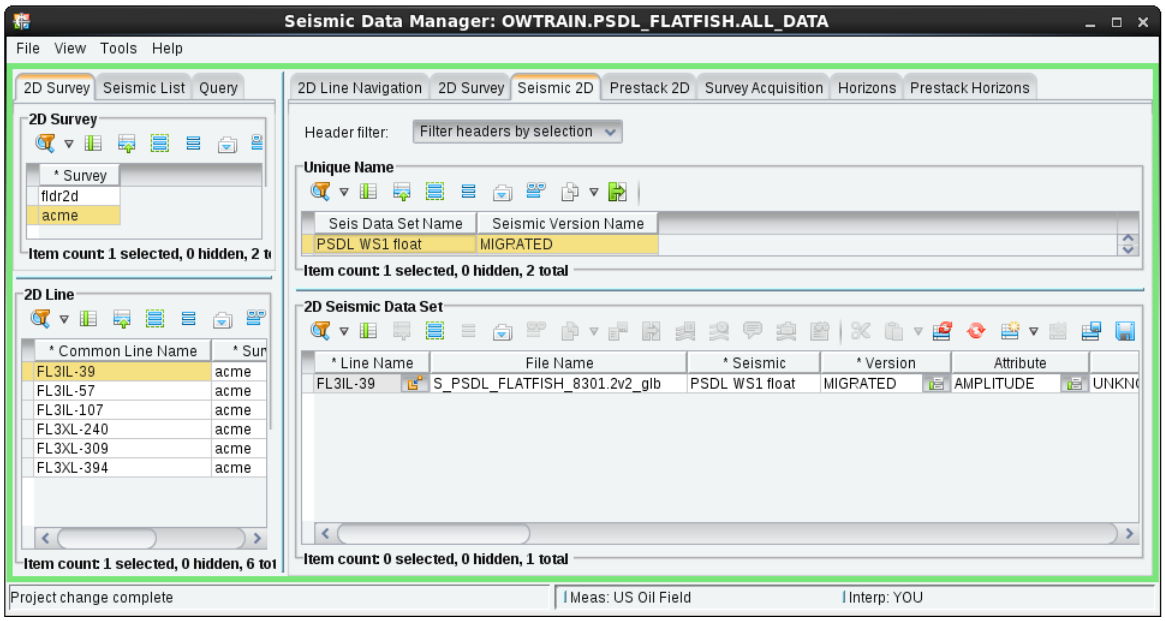
It is important to check the navigation data loaded into OpenWorks. You need to examine the data using both Seismic Data Manager and in a basemap in SeisWorks Map View, DecisionSpace Geosciences Map section, or WOW. Step-by-step instructions were given for SeisWorks Map View, and WOW in the previous exercises.

Basemap:

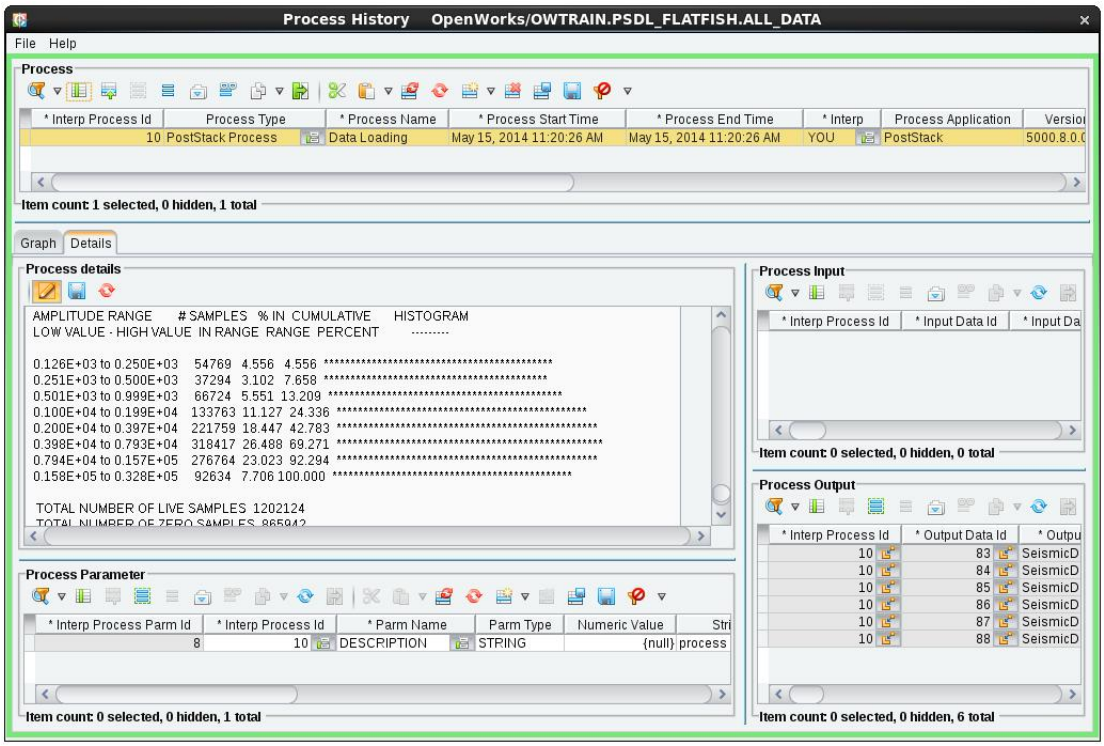


Check Seismic Data Manager:

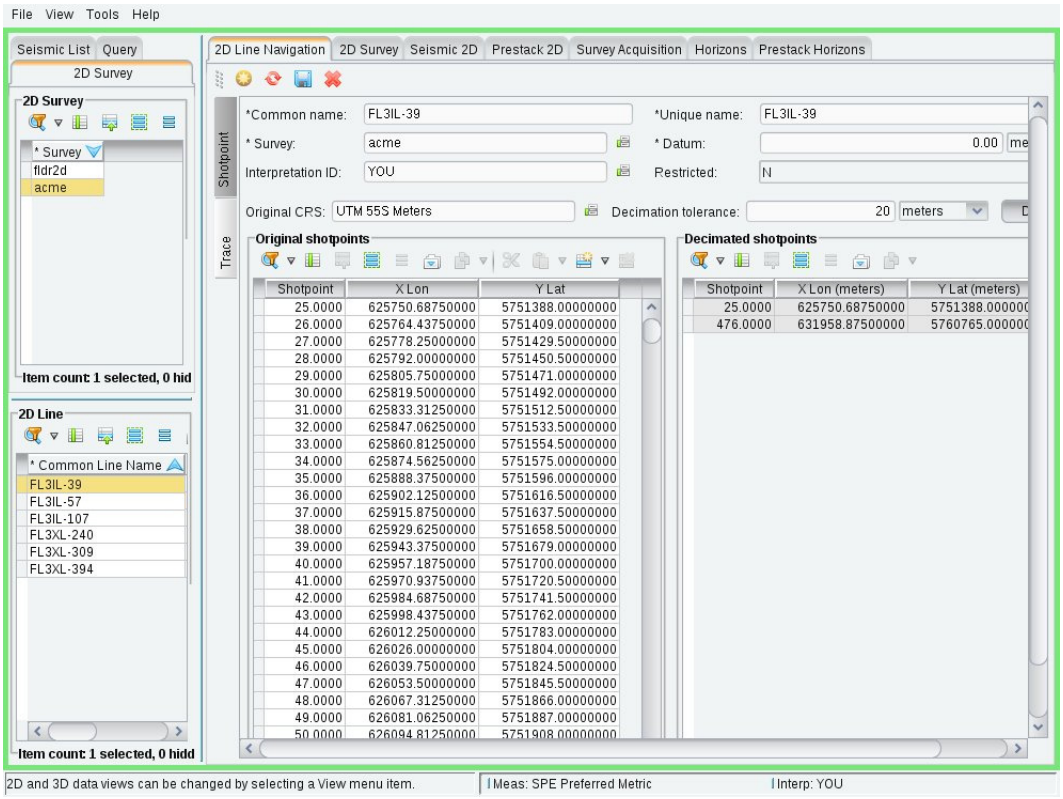
Dataset Information

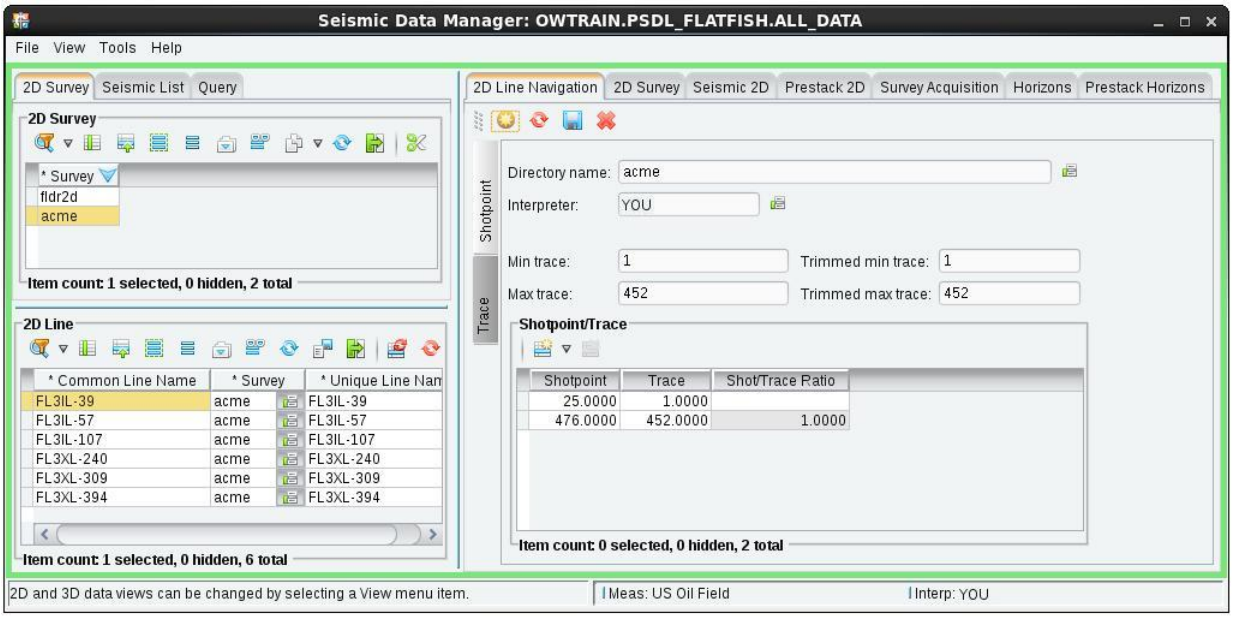


Process History

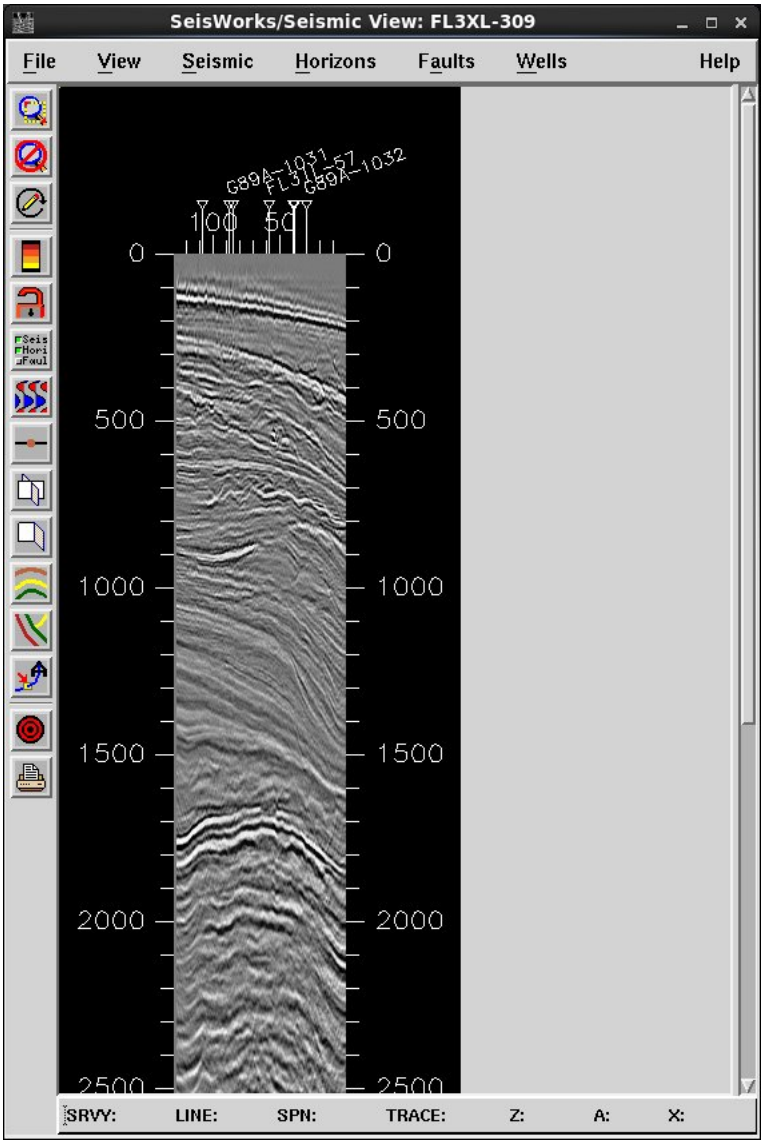


Shotpoint and Trace Navigation for each line:





Seismic:



Depending on your site preferences, you may be finished loading the data at this point.

Remember that amplitude ranges for 2D data may vary quite a bit from different vintages or processing. An option to handle these differences is to output an 8-bit scaled dataset so that all amplitudes will range from -128 to 127. Other options include trace balancing in PostStack, or using the Landmark's Seismic Balance Utility, which will balance the data in amplitude, phase, and time.

Instructions to generate the 8-bit scaled dataset are given in the optional section below. Instructions for Seismic Balance are offered in another Landmark class.

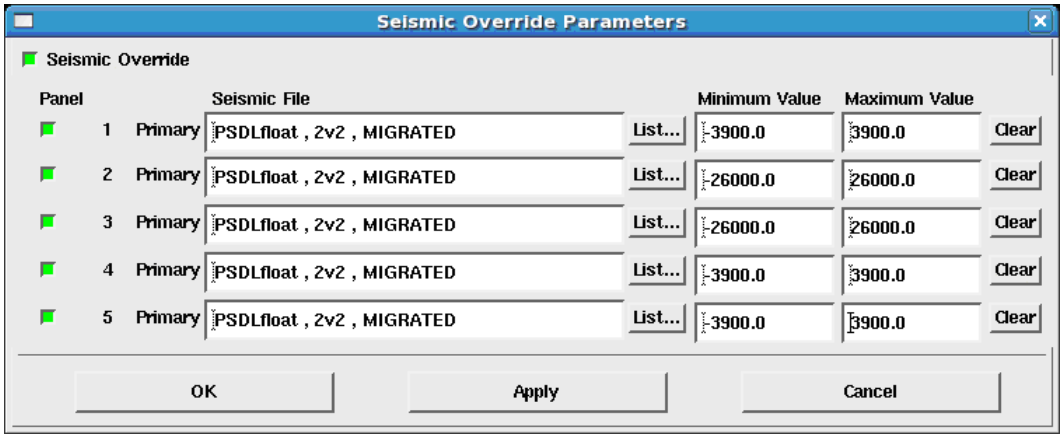
Output a Scaled 8-bit Dataset

Determine Scale Factor

The instructions to determine a scaling factor were given in the previous PostStack 2D data loading exercise. Since your goal for this part of the workshop is to load this data into the PSDL8b, MIGRATED seismic trace dataset, you will want to compare the load from the first part of this workshop to the lines already loaded.

You can display more than one kind of scaling on a single Seismic View if the view is paneled and parameters set to specific scale ranges for each panel.

To set the panel display range, in SeisWorks Seismic Parameters, select Override **Parameters...**, and type in the range for each panel.



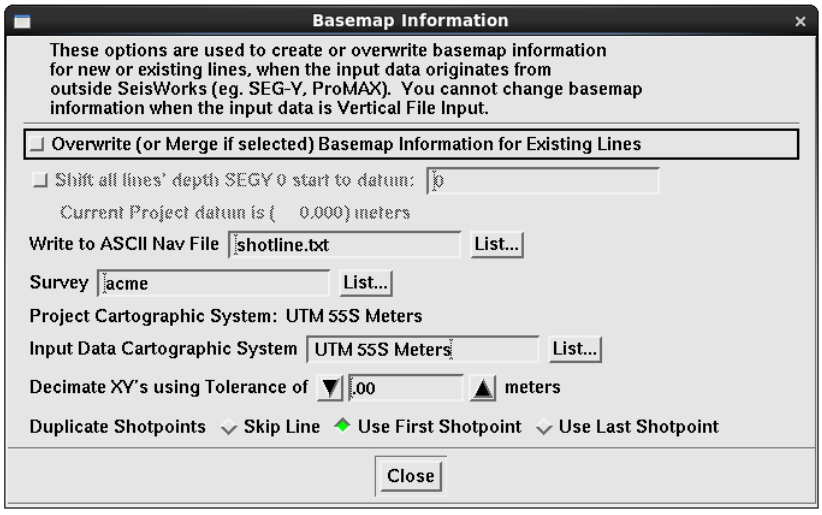
This process can become rather tedious, so you may want to output a single volume that does not require different scaling parameters if this type of output is helpful for the interpreter's workflow. In this workshop, you load the data into a scaled 8-bit dataset that requires no further scaling in SeisWorks.

Final 8-bit Data Load

Load your six lines into the PSDL8b, MIGRATED seismic trace dataset.

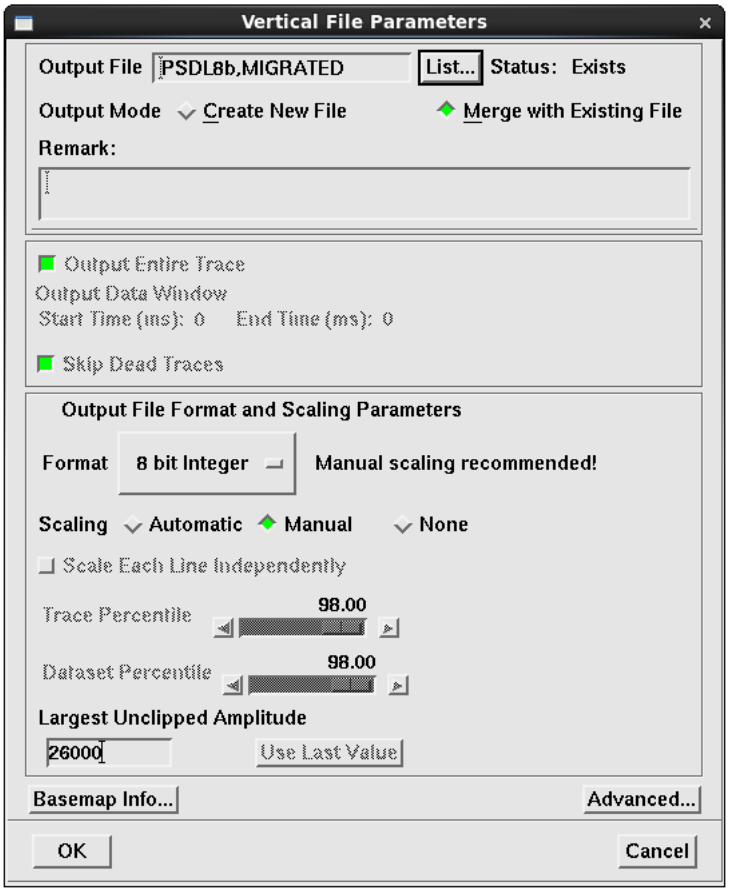
You will need to determine a value for the *Largest Unclipped Amplitude* and enter the value in the PostStack software.

You can load from the SEG-Y files, or from the dataset you just loaded (instead of SEG-Y input, select the SeisWorks Seismic option and set appropriate input parameters). If you load from the SEG-Y files, in the Basemap Info…, toggle *off* the Overwrite Basemap option, as the navigation has already been loaded.

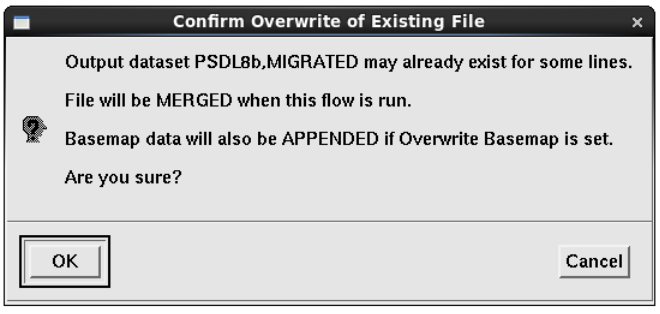


IMPORTANT!!!

IMPORTANT!!! Make sure that you click on the **Merge with Existing File** radio button when setting up your Vertical File Parameters for your Output Data. If you do not, then you will erase the eight lines that you loaded previously.



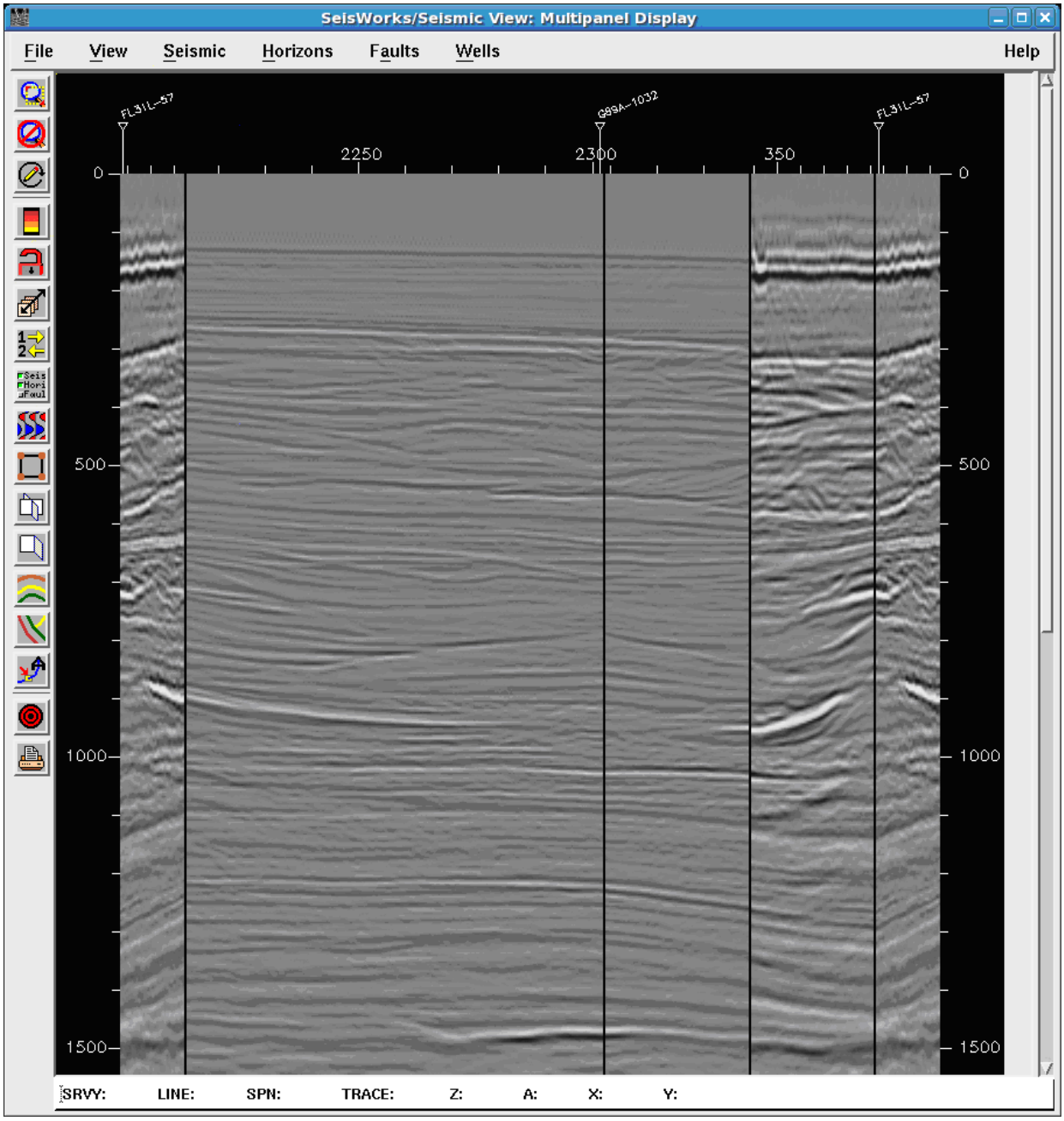
When you merge datasets this way, a confirmation dialog displays. Click **OK** to merge the datasets.

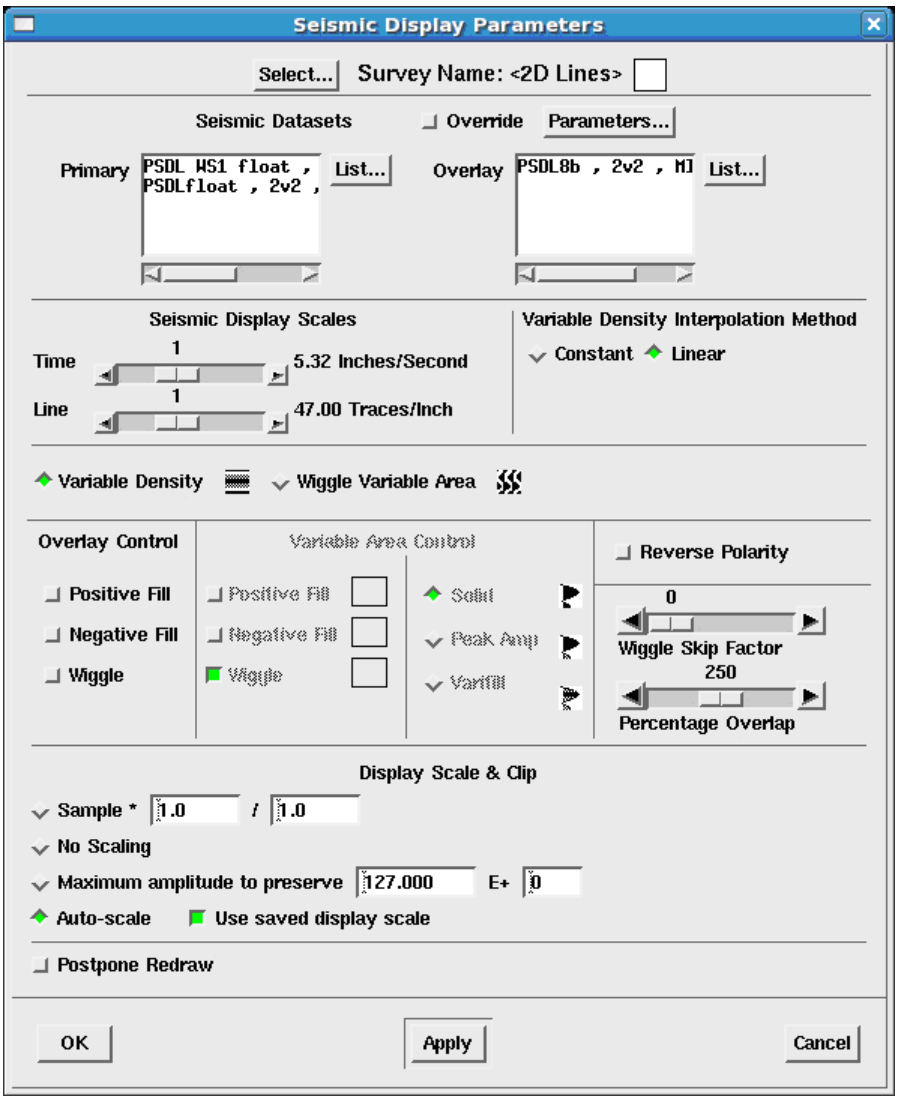


As always, you should QC the results of the load.

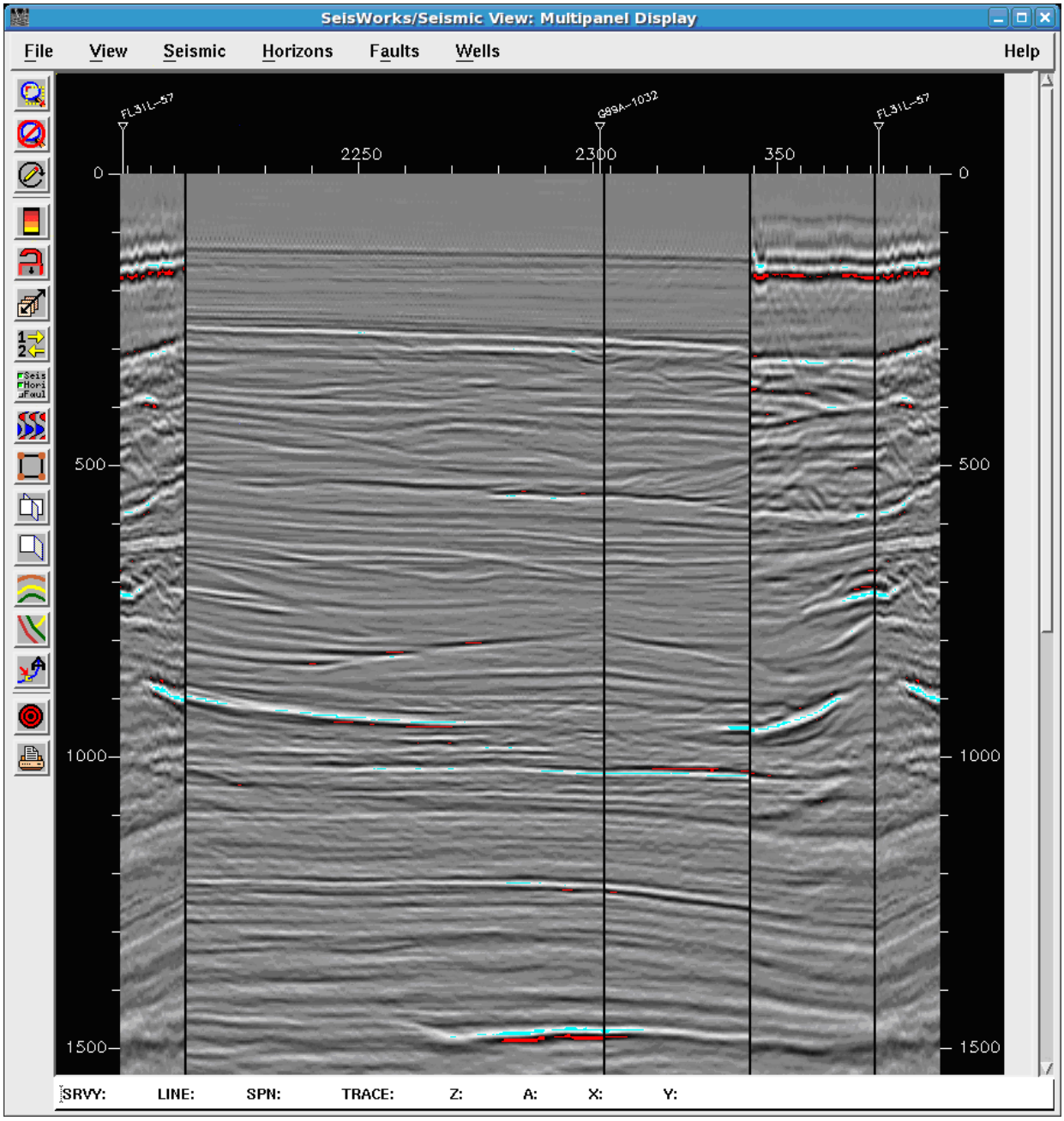
The views below show data display comparisons between using the various datasets.

View #1: Floating point format dataset with Auto-scale

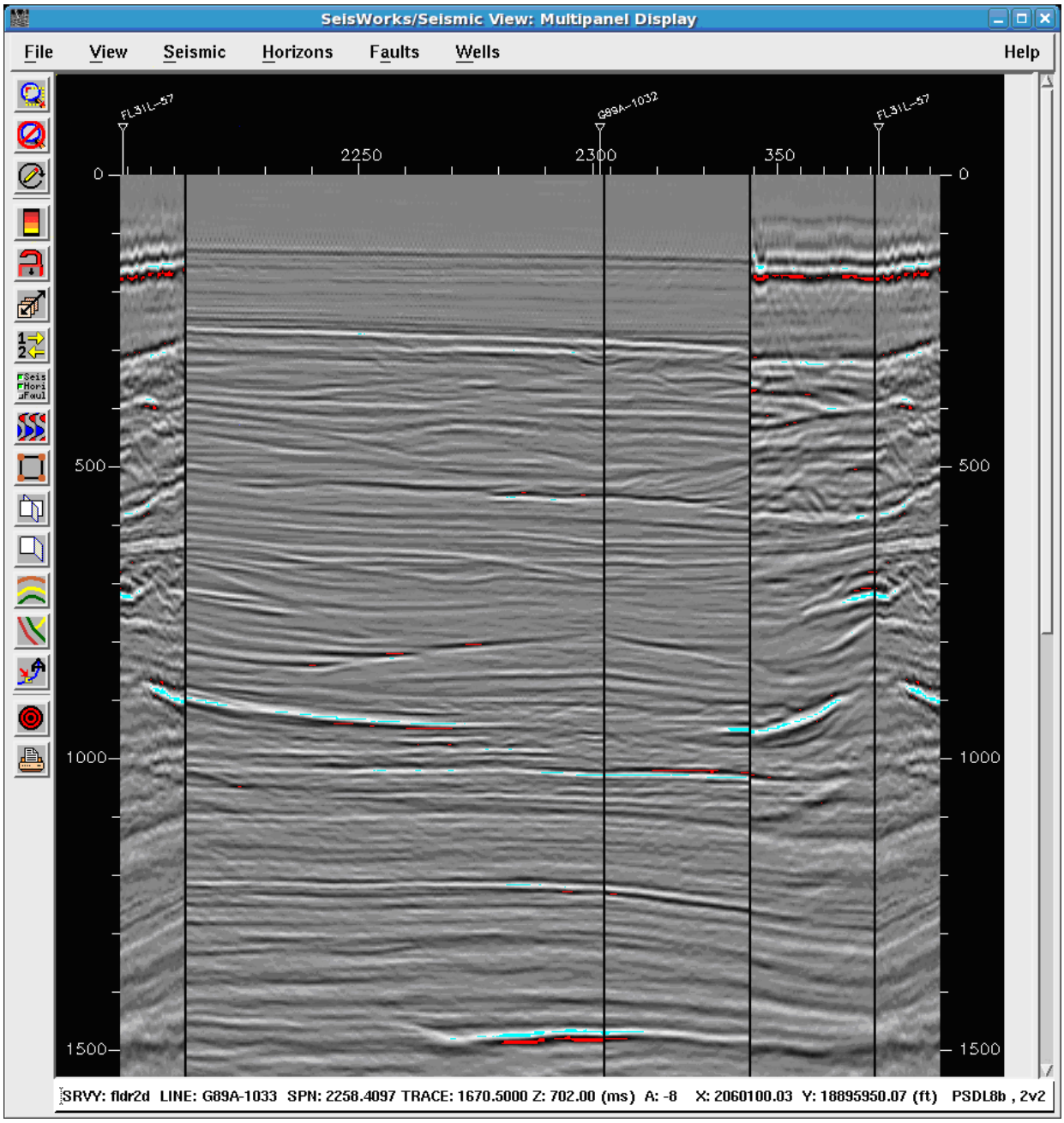



Seismic Display Parameters
Select...
Survey Name: <2D Lines>
Seismic Datasets
Override
Parameters...
Primary
PSDL WS1 float , PSDLfloat , 2v2 ,
List...
Overlay
PSDL8b , 2v2 , MI
List...
Seismic Display Scales
Time
1
5.32 Inches/Second
Line
1
47.00 Traces/Inch
Variable Density Interpolation Method
Constant
Linear
Variable Density
Wiggle Variable Area
Overlay Control
Positive Fill
Negative Fill
Wiggle
Variable Area Control
Positive Fill
Negative Fill
Wiggle
Solid
Peak Amp
Varifill
Reverse Polarity
0
Wiggle Skip Factor
250
Percentage Overlap
Display Scale & Clip
Sample *
1.0
/
1.0
No Scaling
Maximum amplitude to preserve
127.000
E+
0
Auto-scale
Use saved display scale
Postpone Redraw
OK
Apply
Cancel

View #2: Floating point with panels overrides set



View #3: 8-bit data with the *No Scaling* option.



Workshop 2: Complete 2D Data Load Using SEG Y Data Import

In this workshop you will load 2D navigation and trace data loading using SEG Y Data Import. You will use data you have loaded previously, but you will load the data into a new OpenWorks project for this workshop.

New to this workshop:

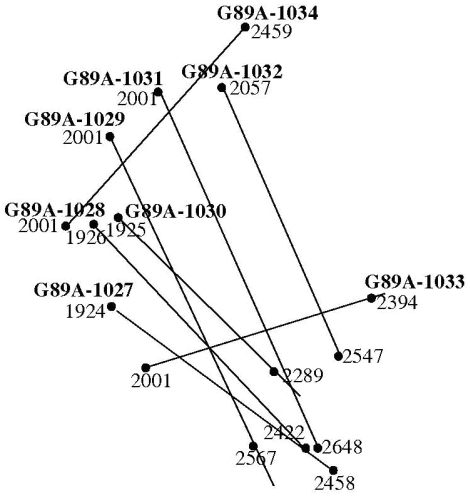
- Extracting Navigation Data from SEG Y Data Import

Transmittal sheet:

Projection: UTM 55S
Datum: Australian Geodetic 1984
Spheroid: Australian National 1965
Units: Meters

Line	SP	CDP	Line	SP	CDP
G89A-1027	1924-2458	1001-2067	G89A-1031	2001-2648	1001-2444
G89A-1028	1926-2422	1001-2142	G89A-1032	2057-2547	1001-2398
G89A-1029	2001-2647	1001-2442	G89A-1033	2001-2419	1001-1986
G89A-1030	1925-2348	1001-1996	G89A-1034	2001-2459	1001-2066

Basemap



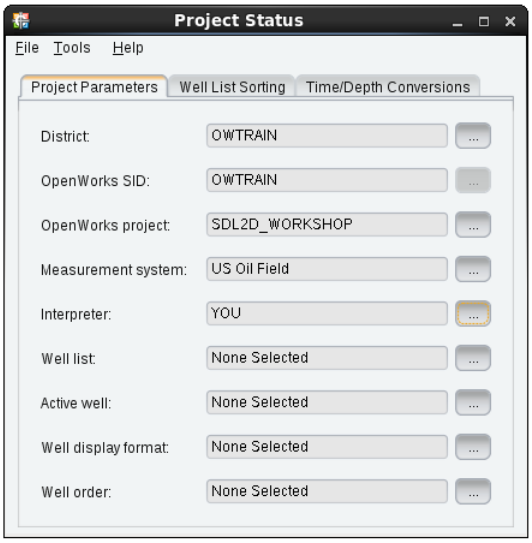
Shotpoint to Trace Definitions:

Line	SP	Trace	Line	SP	Trace
G89A-1027	2001	1155	G89A-1031	2001	1155
	2014	1181		2019	1191
G89A-1028	1926	2148	G89A-1032	2057	2136
	1931	2138		2068	2114
G89A-1029	2001	1155	G89A-1033	2001	1155
	2016	1185		2024	1201
G89A-1030	1925	2002	G89A-1034	2001	1155
	1932	1988		2016	1185

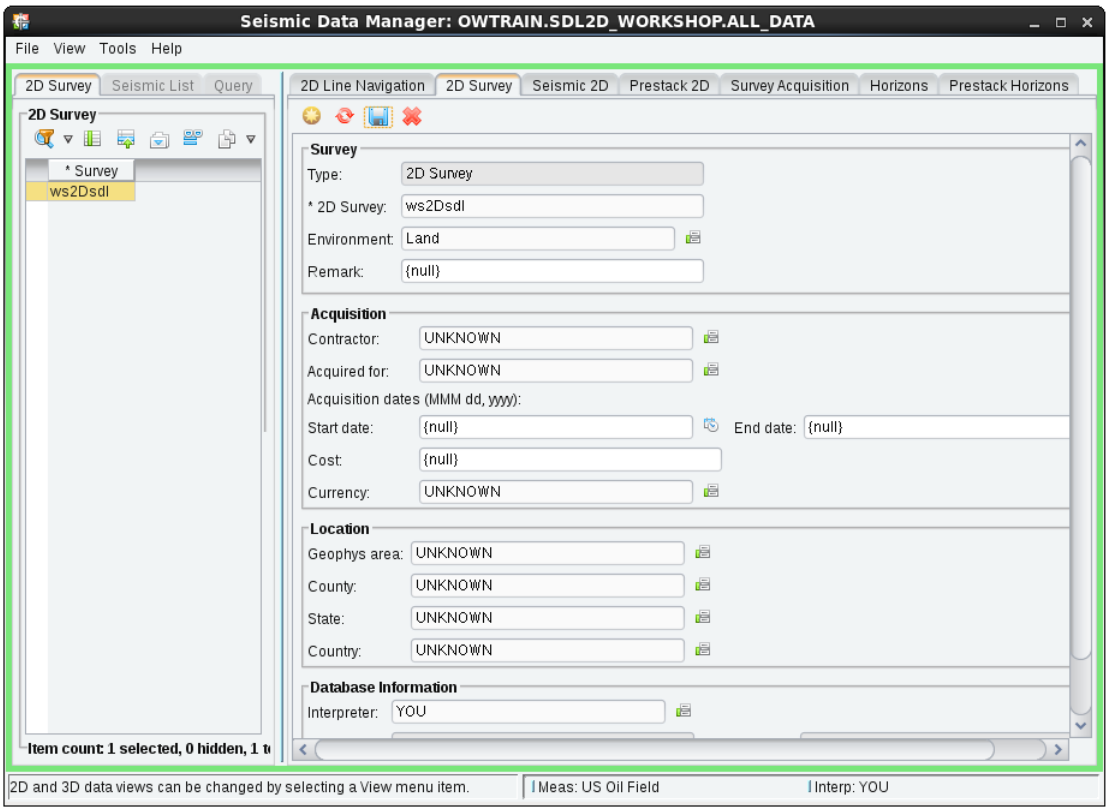
Listed below are abbreviated directions for steps in previous exercises, with more detail for the new workshop specific additions.

1. OpenWorks Project: SDL2D_WORKSHOP

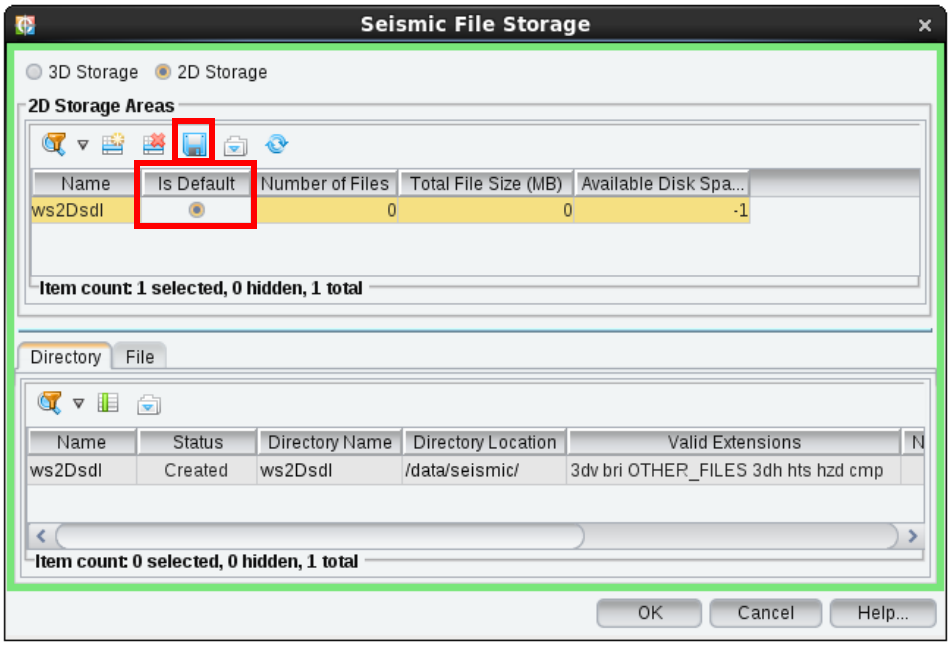
2. Create Interpretation ID (**Interpretation ID Manager**)



3. Create 2D Seismic Survey (**Seismic Data Manager**)



4. Create 2D Seismic File Storage Directories
   (**Seismic Data Manager > Tools > Seismic File Storage...**)



   Make sure that the **Is Default** option is selected and remember to click **Save All Rows** icon ( ) to create directories.

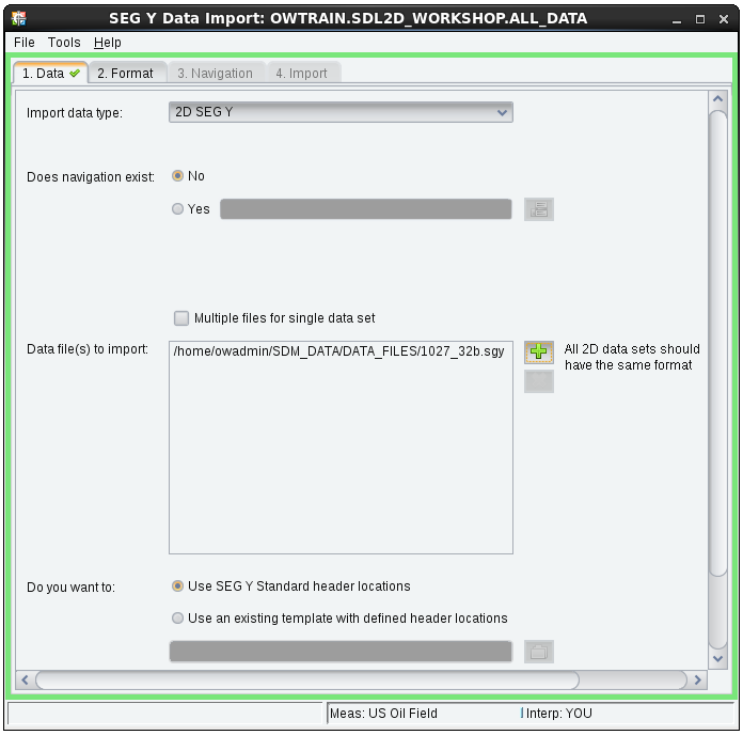
Load Navigation and Trace Data Using SEG Y Data Loader:

5. **Data > Import > SEG Y Import**

6. Set the **Import Data Type** to **2D SEG Y** from the drop-down menu. **Set Does navigation exist** to **No**. Click the **Select Data Files** icon. Navigate to the DATA FILES directory in your home folder and select **1027_32b.sgy**. For the format, choose the **Use SEG Y Standard header locations** option.

   Navigation data will be loaded from the information in the SEG-Y trace headers. To correctly load the navigation data, you need to specify the required 2D information for **shotpoint**, **trace**, **x** coordinate and **y** coordinate. You analyze and create a template for the navigation data in the *Format* tab.

Templates tab – analyze the SEG-Y files and save a template

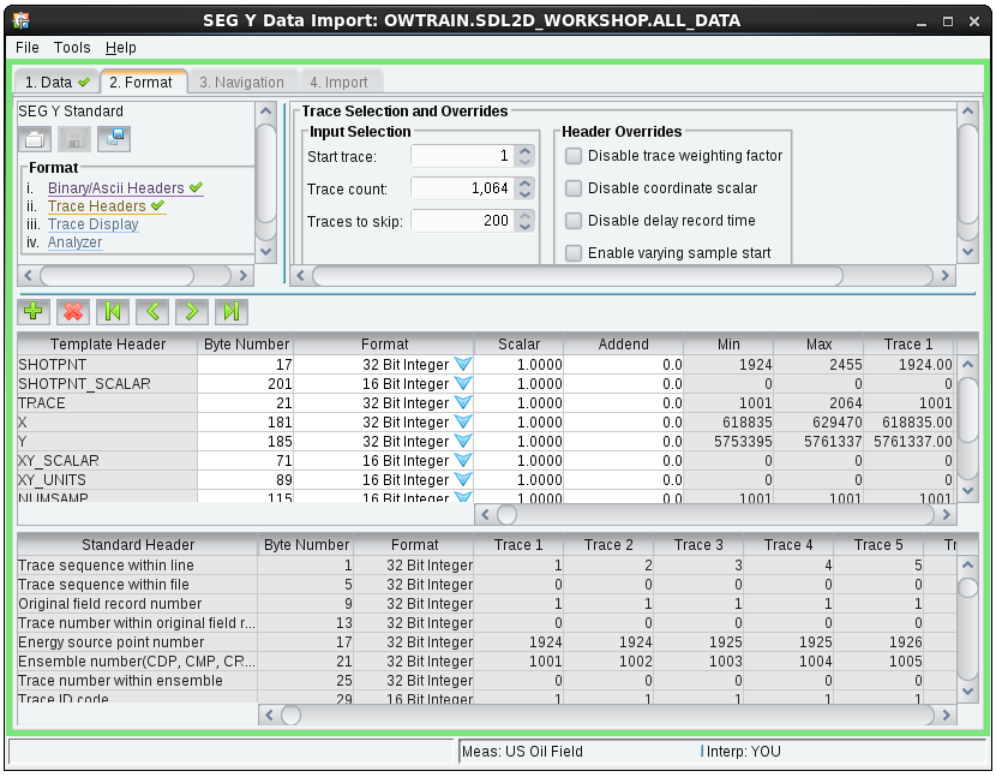


7. Click on the **Format** tab. Keep the default settings under Binary/ Ascii Headers.

8. Click on **Trace Headers** in the Format section. The middle panel of the Trace Headers section displays the byte locations and number format used by the SEG Y Format file for each Header item.

9. Change the template header in Byte Number column with the following information.

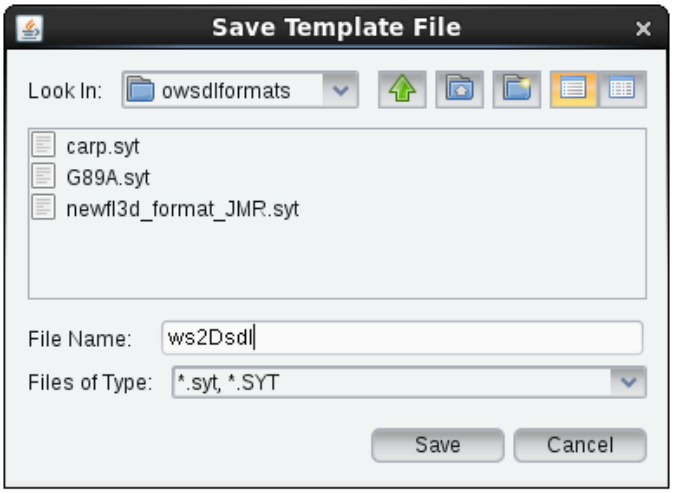
   - SHOTPNT 17 32 Bit Integer
   - TRACE 21 32 Bit Integer
   - X 181 32 Bit Integer
   - Y 185 32 Bit Integer



10. Click on *Trace Display* to view the graphical representation of the seismic data and then on Analyzer to *scan* the data file and review the values found.

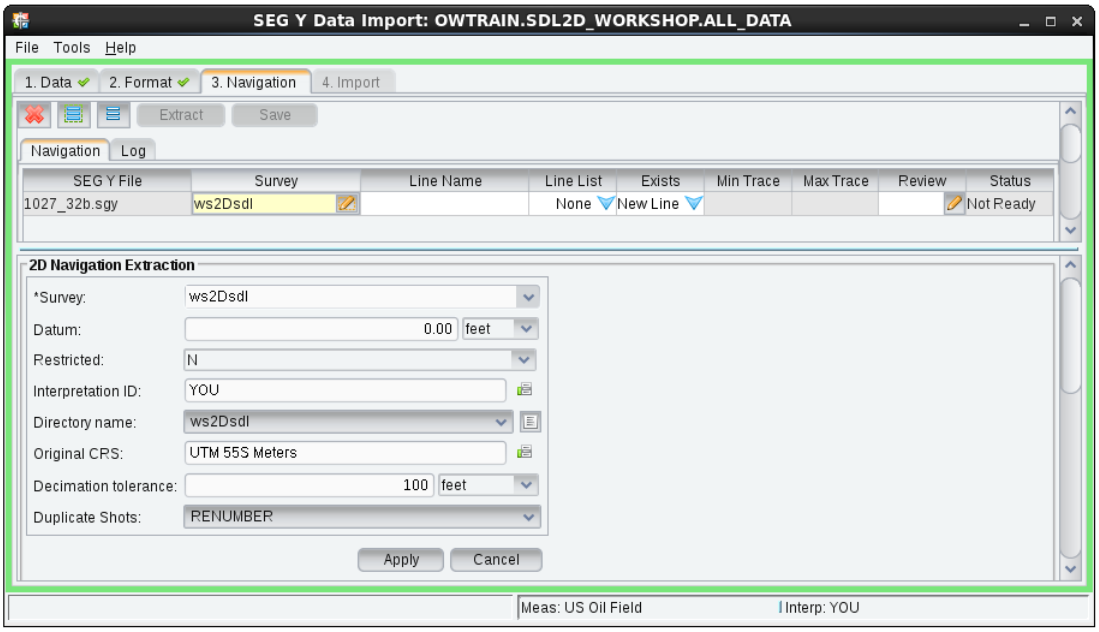
11. Click the **Save as** icon ( ) to open the *Save Template File* dialog and name the format file **ws2Dsdl**.syt.

You will use this format to load the rest of the lines.

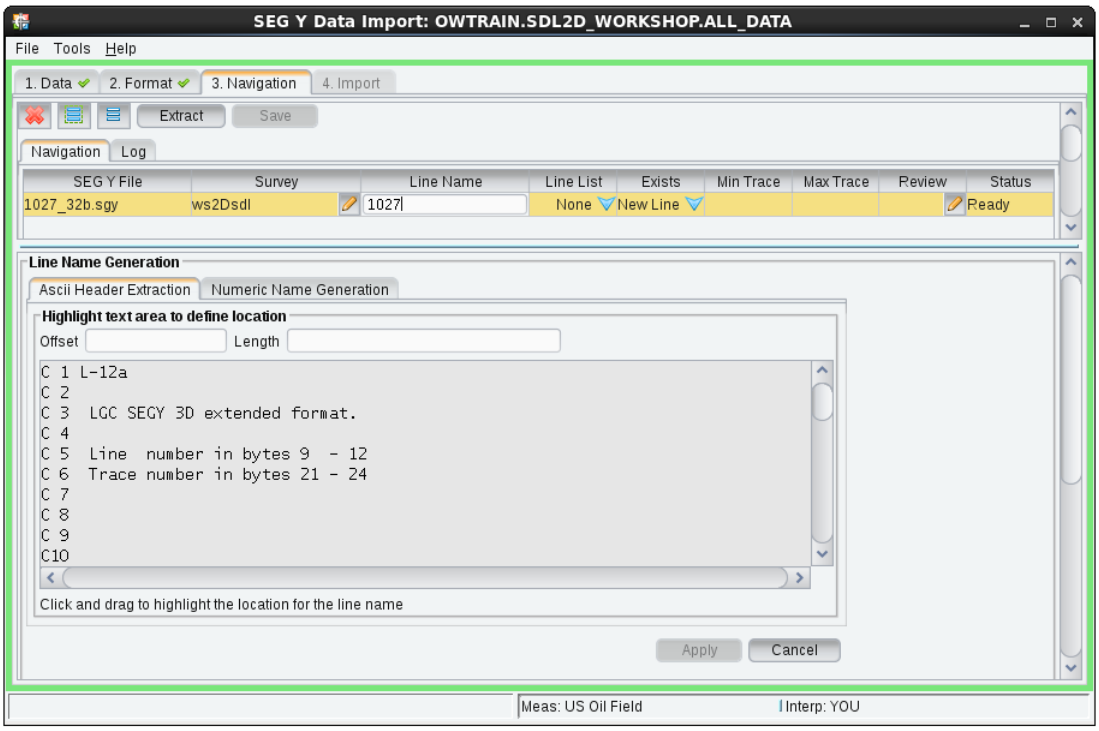


12. Click the **Navigation** tab.

13. Click under  icon in the **Survey** column to select existing 2D Line from the survey ws2Dsdl and then click **Apply**.



14. Click under **Line Name** column and type 1021 and press **<Enter>,** the **Extract** button will be enabled.



15. Click **Extract** to extract all navigation information from the headers. You will receive a confirmation message when the process completes.

16. To review the Navigation, click on the icon under **Review** column and check shotpoint and trace tabs.

17. Click **Save** button under Navigation tab.

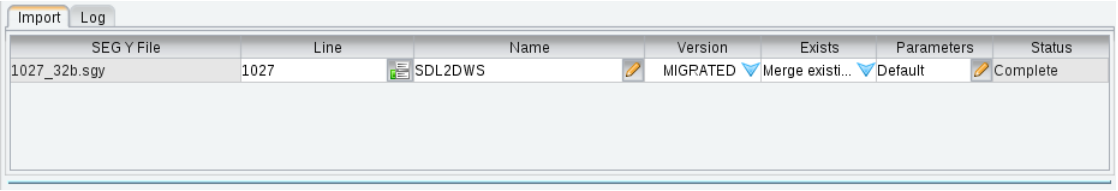
18. Click the **Import** tab.

19. Click under **Name** column and type **SDL2DWS** and press <**Enter**>.

20. Click the **Version** field and enter **MIGRATED**.

When all the necessary fields are filled out, the **Status** reports **Ready** and it is OK to import the data.

21. Click the **Import** button.



22. Repeat the process to load the following SEG-Y files:

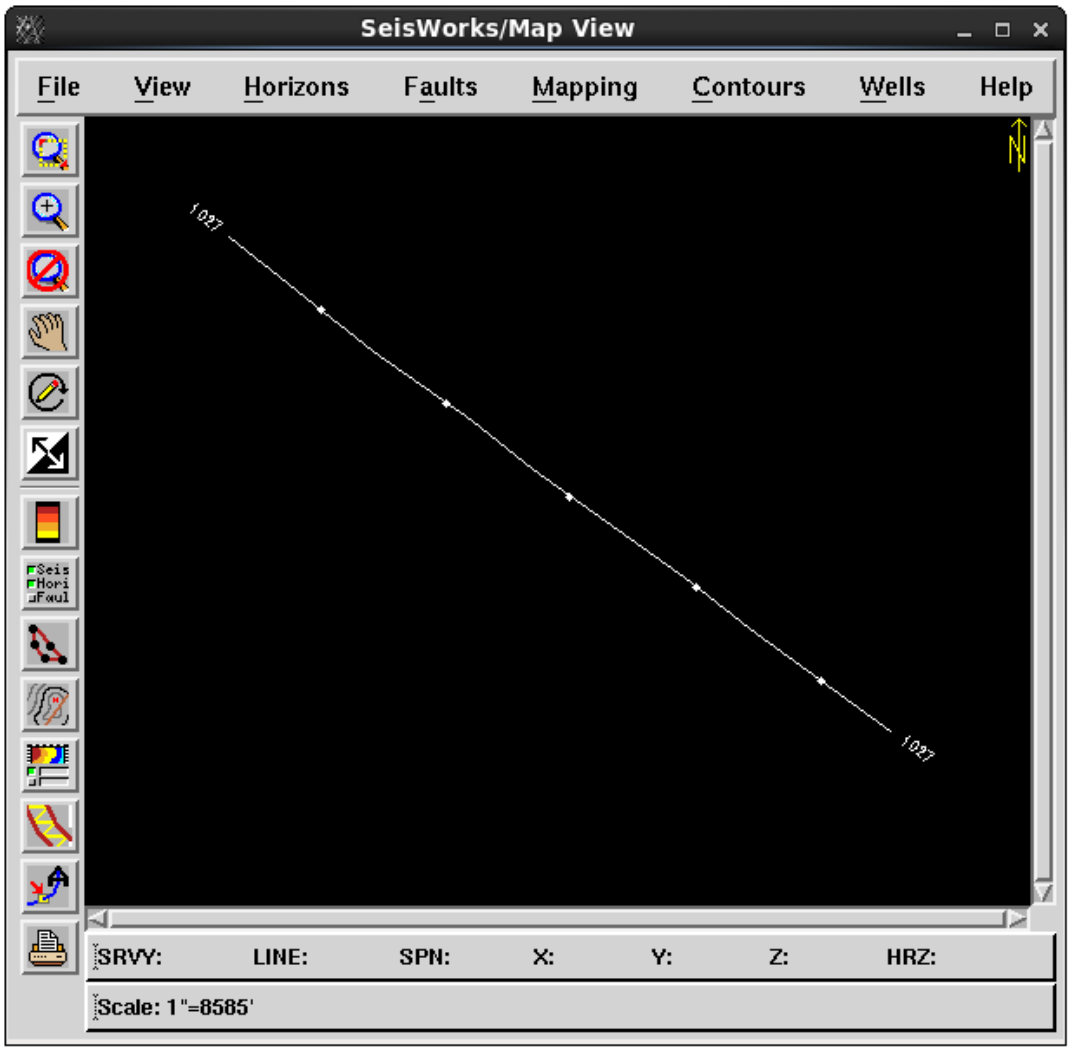
    1028_32b.sgy 1031_32b.sgy 1034_32b.sgy

    1029_32b.sgy 1032_32b.sgy

    1030_32b.sgy 1033_32b.sgy

Before you proceed to load the data, it is a good idea to check the basemap.

Leave the SEG Y Data Import open so you can set up the import if there are no navigation problems.



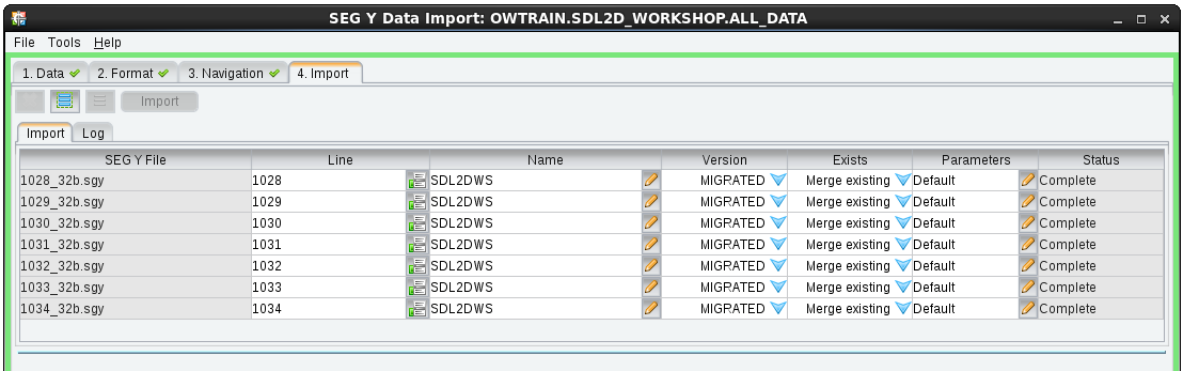
23. After complete to extract the navigation for all files, click **select all rows in the table** icon ( ) and then the **Save** button. The status column changes to **Saved**.

24. Click under **Name** column and type **SDL2DWS** for each record and press <**Enter**>.

25. Click the **Version** field and select **MIGRATED** from the drop-down list.

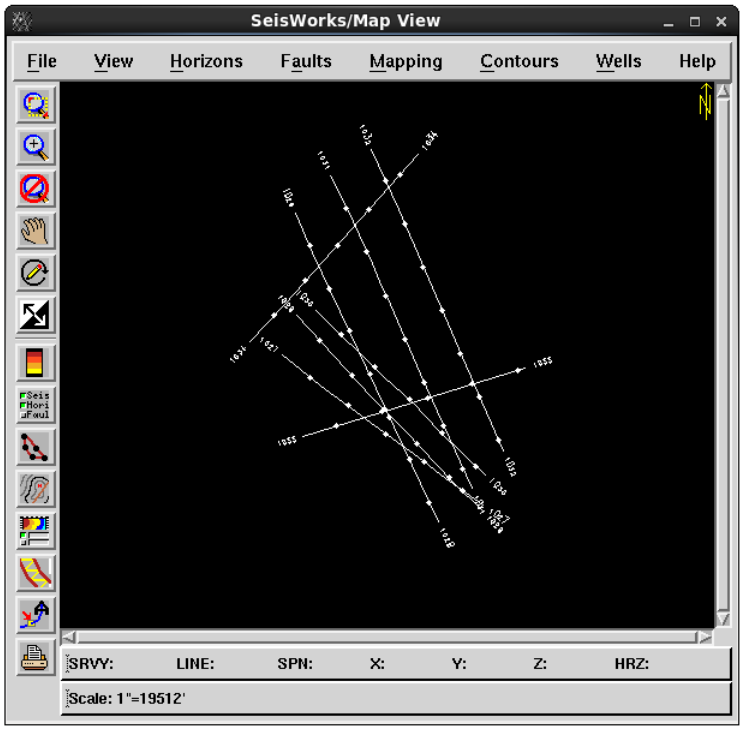
When all the necessary fields are filled out for each file, the **Status** reports **Ready** and it is OK to import the data.

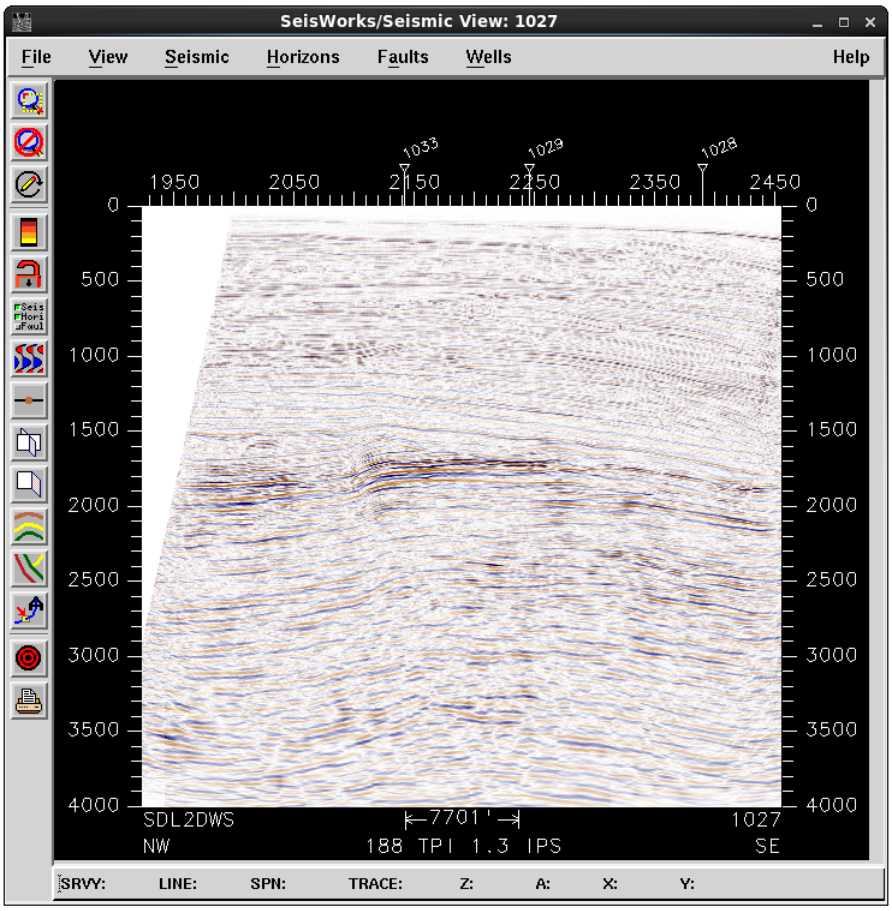
26. Click the **Import** button.



If the status reports the loads are complete, you are ready to check the data. If the status reports an error, click **Tools > Error Logger Console...** for more information.

Use whatever application you prefer to view the seismic data.




SeisWorks/Seismic View: 1027
File
View
Seismic
Horizons
Faults
Wells
Help
1033
1029
1028
1950
2050
2150
2250
2350
2450
0
500
1000
1500
2000
2500
3000
3500
4000
SDL2DWS
7701'
1027
NW
188 TPI 1.3 IPS
SE
SRVY:
LINE:
SPN:
TRACE:
Z:
A:
X:
Y:

It is a good idea to check Seismic Data Manager Seismic 2D tab. You can view the physical file name, output format (SEG Y Data Import 2D will only output 32-bit floating point format) and details about the seismic dataset, but notice that for SEG Y Data Import, no Process History is saved.