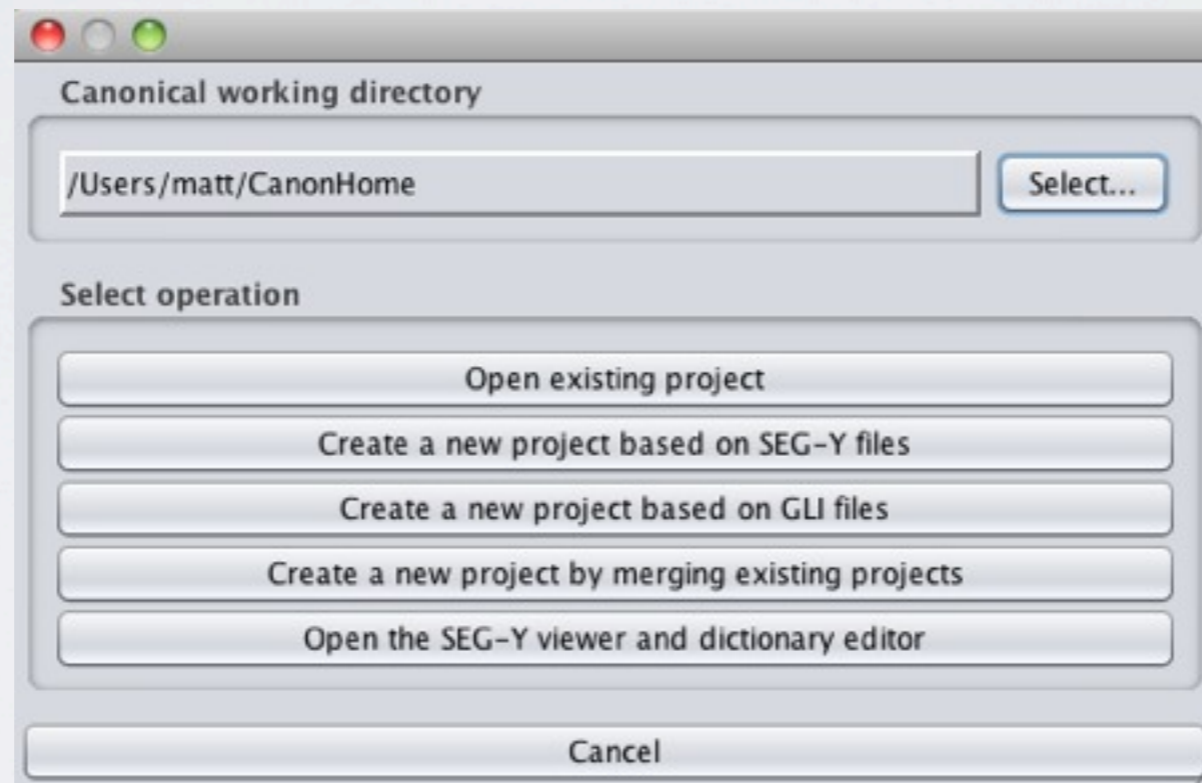
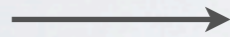


FLATIRONS TUTORIAL - SEG-Y DICTIONARY EDITOR

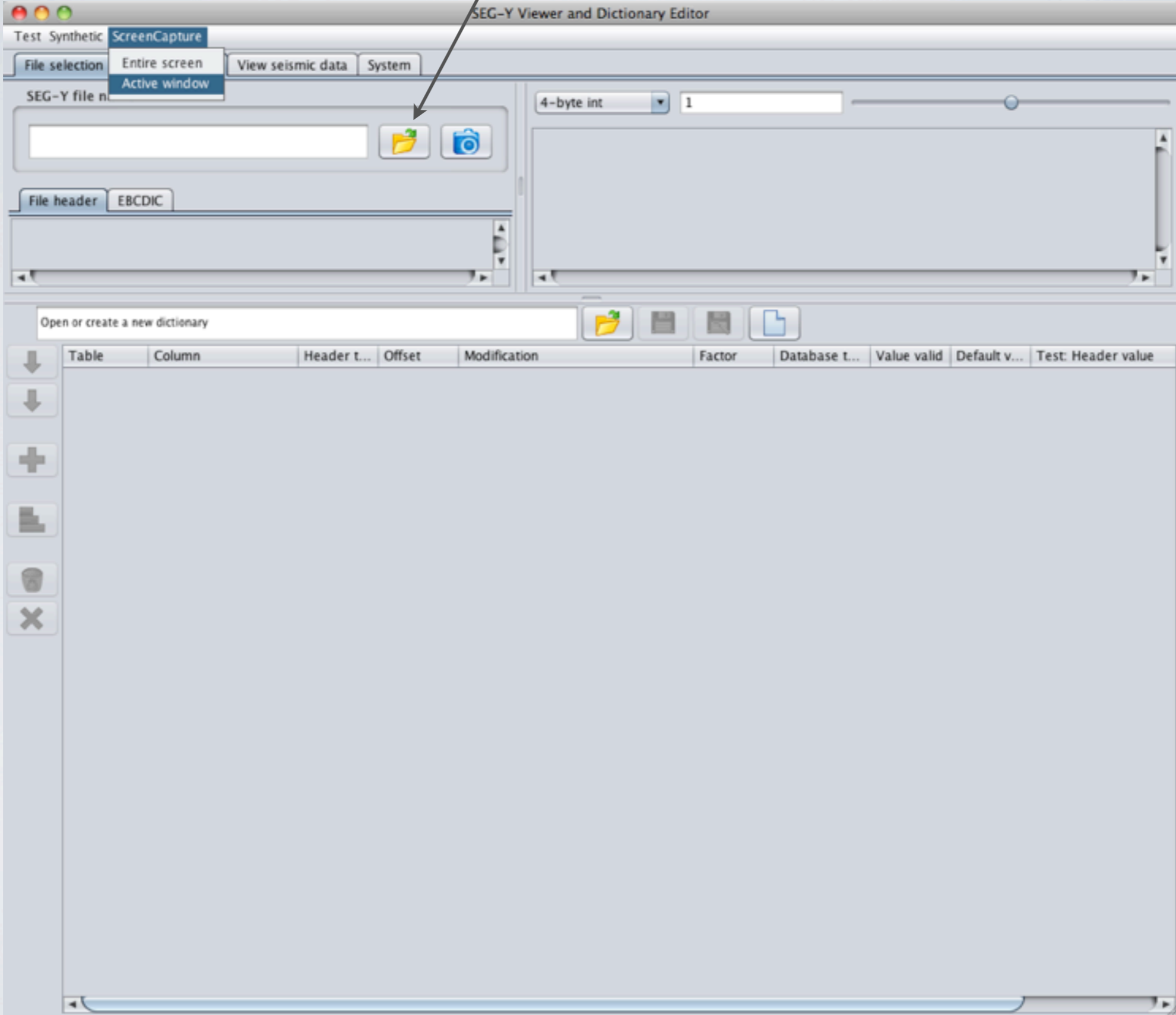
Canonical Geosciences LLC

PROJECT CREATION: START THE APPLICATION

- This varies from platform to platform, but for Linux/Mac:
- Open a terminal window
- CD into the application installation directory
- Run “java -Xmx1000M -Xms1000M -jar Flatirons.jar”
- Click “Open the SEG-Y viewer and dictionary editor”



SELECT A SEG-Y FILE



DRAG THE SPLITTER BAR

SEG-Y file name: /Users/matt/Data/Sample/Stratton0.sgy

| Header | Value | Bytes |
|-----------------------------|--------|---------|
| JobID | 9999 | 1 - 4 |
| LineNumber | 9999 | 5 - 8 |
| ReelNumber | 1 | 9 - 12 |
| EnsembleTraceCount | 605 | 13 - 14 |
| EnsembleTraceCountAuxiliary | -13922 | 15 - 16 |
| SampleIntervalMicro | 4000 | 17 - 18 |
| SampleIntervalMicroOriginal | 2000 | 19 - 20 |
| SamplesPerTrace | 288 | 21 - 22 |
| SamplesPerTraceOriginal | 326 | 23 - 24 |
| FormatCode | 1 | 25 - 26 |
| TracesPerEnsembleExpected | 1 | 27 - 28 |
| SortingCode | 1 | 29 - 30 |
| SweepType | 0 | 39 - 40 |
| Units | 2 | 55 - 56 |
| CorrelatedTraces | 2 | 49 - 50 |
| AmplitudeRecoveryMethod | 4 | 53 - 54 |
| ImpulseSignalPolarity | 0 | 57 - 58 |

| Bytes | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 1 - 4 | 8059 | 8060 | 8061 | 8062 | 8063 | 8064 | 8065 |
| 2 - 5 | 2063104 | 2063360 | 2063616 | 2063872 | 2064128 | 2064384 | 2064640 |
| 3 - 6 | 528154... | 528220... | 528285... | 528351... | 528416... | 528482... | 528547... |
| 4 - 7 | 206359... | 208037... | 209715... | 211392... | 213070... | -21474... | -21307... |
| 5 - 8 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 6 - 9 | 256 | 512 | 768 | 1024 | 1280 | 1536 | 1792 |
| 7 - 10 | 65536 | 131072 | 196608 | 262144 | 327680 | 393216 | 458752 |
| 8 - 11 | 16777216 | 33554432 | 50331648 | 67108864 | 83886080 | 100663... | 117440... |
| 9 - 12 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| 10 - 13 | 1280 | 1280 | 1280 | 1280 | 1280 | 1280 | 1280 |
| 11 - 14 | 327680 | 327680 | 327680 | 327680 | 327680 | 327680 | 327680 |
| 12 - 15 | 83886080 | 83886080 | 83886080 | 83886080 | 83886080 | 83886080 | 83886080 |
| 13 - 16 | 75 | 76 | 77 | 78 | 79 | 80 | 81 |
| 14 - 17 | 19200 | 19456 | 19712 | 19968 | 20224 | 20480 | 20736 |
| 15 - 18 | 4915207 | 4980743 | 5046279 | 5111815 | 5177351 | 5242887 | 5308423 |
| 16 - 19 | 125829... | 127507... | 129184... | 130862... | 132540... | 134217... | 135895... |
| 17 - 20 | 494105 | 494105 | 494105 | 494105 | 494105 | 494105 | 494105 |
| 18 - 21 | 126490... | 126490... | 126490... | 126490... | 126490... | 126490... | 126490... |
| 19 - 22 | -19780... | -19780... | -19780... | -19780... | -19780... | -19780... | -19780... |
| 20 - 23 | 419430... | 419430... | 419430... | 419430... | 419430... | 419430... | 419430... |
| 21 - 24 | 1874 | 1873 | 1872 | 1871 | 1870 | 1869 | 1868 |
| 22 - 25 | 479744 | 479488 | 479232 | 478976 | 478720 | 478464 | 478208 |
| 23 - 26 | 122814... | 122748... | 122683... | 122617... | 122552... | 122486... | 122421... |
| 24 - 27 | 137573 | 135895 | 134217 | 132540 | 130862 | 129184 | 127506 |

Splitter →

View binary file header

View EBCDIC header

View "raw" trace headers in this section. They may be interpreted as 2 byte int, 4 byte int, IEEE, and IBM formats.

SEG-Y Viewer and Dictionary Editor

Test Synthetic ScreenCapture

File selection View seismic data System

SEG-Y file name: /Users/natt/Data/Sample/Stratton0.sgy

File header EBCDIC

| Header | Value | Bytes |
|-----------------------------|--------|---------|
| JobID | 9999 | 1 - 4 |
| LineNumber | 9999 | 5 - 8 |
| ReelNumber | 1 | 9 - 12 |
| EnsembleTraceCount | 605 | 13 - 14 |
| EnsembleTraceCountAuxiliary | -13922 | 15 - 16 |
| SampleIntervalMicro | 4000 | 17 - 18 |
| SampleIntervalMicroOriginal | 2000 | 19 - 20 |
| SamplesPerTrace | 288 | 21 - 22 |
| SamplesPerTraceOriginal | 326 | 23 - 24 |
| FormatCode | 1 | 25 - 26 |
| TracesPerEnsembleExpected | 1 | 27 - 28 |
| SortingCode | 1 | 29 - 30 |
| SweepType | 0 | 39 - 40 |
| Units | 2 | 55 - 56 |
| CorrelatedTraces | 2 | 49 - 50 |
| AmplitudeRecoveryMethod | 4 | 53 - 54 |
| ImpulseSignalPolarity | 0 | 57 - 58 |

4-byte int 1

| Bytes | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 1 - 4 | 8059 | 8060 | 8061 | 8062 | 8063 | 8064 | 8065 |
| 2 - 5 | 2063104 | 2063360 | 2063616 | 2063872 | 2064128 | 2064384 | 2064640 |
| 3 - 6 | 528154... | 528220... | 528285... | 528351... | 528416... | 528482... | 528547... |
| 4 - 7 | 206359... | 208037... | 209715... | 211392... | 213070... | -21474... | -21307... |
| 5 - 8 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 6 - 9 | 256 | 512 | 768 | 1024 | 1280 | 1536 | 1792 |
| 7 - 10 | 65536 | 131072 | 196608 | 262144 | 327680 | 393216 | 458752 |
| 8 - 11 | 16777216 | 33554432 | 50331648 | 67108864 | 83886080 | 100663... | 117440... |
| 9 - 12 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| 10 - 13 | 1280 | 1280 | 1280 | 1280 | 1280 | 1280 | 1280 |
| 11 - 14 | 327680 | 327680 | 327680 | 327680 | 327680 | 327680 | 327680 |
| 12 - 15 | 83886080 | 83886080 | 83886080 | 83886080 | 83886080 | 83886080 | 83886080 |
| 13 - 16 | 75 | 76 | 77 | 78 | 79 | 80 | 81 |
| 14 - 17 | 19200 | 19456 | 19712 | 19968 | 20224 | 20480 | 20736 |
| 15 - 18 | 4915207 | 4980743 | 5046279 | 5111815 | 5177351 | 5242887 | 5308423 |
| 16 - 19 | 125829... | 127507... | 129184... | 130862... | 132540... | 134217... | 135895... |
| 17 - 20 | 494105 | 494105 | 494105 | 494105 | 494105 | 494105 | 494105 |
| 18 - 21 | 126490... | 126490... | 126490... | 126490... | 126490... | 126490... | 126490... |
| 19 - 22 | -19780... | -19780... | -19780... | -19780... | -19780... | -19780... | -19780... |
| 20 - 23 | 419430... | 419430... | 419430... | 419430... | 419430... | 419430... | 419430... |
| 21 - 24 | 1874 | 1873 | 1872 | 1871 | 1870 | 1869 | 1868 |
| 22 - 25 | 479744 | 479488 | 479232 | 478976 | 478720 | 478464 | 478208 |
| 23 - 26 | 122814... | 122748... | 122683... | 122617... | 122552... | 122486... | 122421... |
| 24 - 27 | 137573 | 135895 | 134217 | 132540 | 130862 | 129184 | 127506 |

Open or create a new dictionary

| Table | Column | Header t... | Offset | Modification | Factor | Database t... | Value valid | Default v... | Test: Header value |
|-------|--------|-------------|--------|--------------|--------|---------------|-------------|--------------|--------------------|
|-------|--------|-------------|--------|--------------|--------|---------------|-------------|--------------|--------------------|

HEADERS USED BY FLATIRONS STATICS SOFTWARE

Download the *SEG-Y standards document* from seg.org for a complete description of these values

| Database table | Database column | Default location | Default data type | Default conversion | Required? |
|----------------|------------------|------------------|-------------------|-------------------------|-----------|
| Shot | Easting | 73 | 4 byte int | Apply coordinate scalar | Yes |
| Shot | Northing | 77 | 4 byte int | Apply coordinate scalar | Yes |
| Shot | Elevation | 45 | 4 byte int | Apply elevation scalar | Yes |
| Shot | LineNumber | N/A | N/A | None | |
| Shot | PointNumber | N/A | N/A | None | Yes |
| Shot | PointIndex | 9 (Uses FFID) | 4 byte int | None | |
| Shot | PointDepth | 49 | 4 byte int | Apply elevation scalar | |
| Shot | UpholeTime | 95 | 2 byte int | None | |
| Shot | FFID | 9 | 4 byte int | None | |
| Receiver | Easting | 81 | 4 byte int | Apply coordinate scalar | Yes |
| Receiver | Northing | 85 | 4 byte int | Apply coordinate scalar | Yes |
| Receiver | Elevation | 41 | 4 byte int | Apply elevation scalar | Yes |
| Receiver | LineNumber | N/A | N/A | None | |
| Receiver | PointNumber | N/A | N/A | None | Yes |
| Receiver | PointIndex | N/A | N/A | None | |
| Trace | TraceCode | 29 | 2 byte int | None | Yes |
| Trace | Channel | 13 | 4 byte int | None | |
| None | SegyScalar_Time | 215 | 2 byte int | None | |
| None | SegyScalar_Coord | 71 | 2 byte int | None | Yes |
| None | SegyScalar_Elev | 69 | 2 byte int | None | Yes |

LINENUMBER, POINTNUMBER, POINTINDEX

- Each processing systems uses a different approach to labeling shots and receivers
- Therefore Flatirons uses the SPS standard to identify unique shots and receivers
- The SPS document may be downloaded from the seg.org website
- The combination (LineNumber, PointNumber, PointIndex) must uniquely identify a shot
- Only PointNumber is required - LineNumber and PointIndex may be given default values
- **Identifying the header locations for these values is by far the most error-prone step - there are effectively no default header locations**

CREATE A NEW DICTIONARY

The screenshot shows the 'SEG-Y Viewer and Dictionary Editor' interface. On the left, the 'File header' tab is active, displaying a table of header fields. On the right, a data preview window shows a grid of values. At the bottom, the 'Dictionary' tab is active, displaying a table of dictionary entries with various columns like 'Table', 'Column', 'Header type', 'Offset', 'Modification', 'Factor', 'Database type', 'Value valid', 'Default value', 'Test: Header value', and 'Test: Database value'.

| Header | Value | Bytes |
|-----------------------------|--------|---------|
| JobID | 9999 | 1 - 4 |
| LineNumber | 9999 | 5 - 8 |
| ReelNumber | 1 | 9 - 12 |
| EnsembleTraceCount | 605 | 13 - 14 |
| EnsembleTraceCountAuxiliary | -13922 | 15 - 16 |
| SampleIntervalMicro | 4000 | 17 - 18 |
| SampleIntervalMicroOriginal | 2000 | 19 - 20 |
| SamplesPerTrace | 288 | 21 - 22 |
| SamplesPerTraceOriginal | 326 | 23 - 24 |
| FormatCode | 1 | 25 - 26 |
| TracesPerEnsembleExpected | 1 | 27 - 28 |
| SortingCode | 1 | 29 - 30 |
| SweepType | 0 | 39 - 40 |
| Units | 2 | 55 - 56 |
| CorrelatedTraces | 2 | 49 - 50 |

| Table | Column | Header type | Offset | Modification | Factor | Database type | Value valid | Default value | Test: Header value | Test: Database value |
|----------|----------------------|-------------|--------|---------------------------------|--------|---------------|-------------------------------------|---------------|--------------------|----------------------|
| None | SegyScalar_Time | short | 215 | None | | double | <input checked="" type="checkbox"/> | 0.0 | 0 | 0.0 |
| None | SegyScalar_Coord | short | 71 | None | | double | <input checked="" type="checkbox"/> | 0.0 | 1 | 1.0 |
| None | SegyScalar_Elevation | short | 69 | None | | double | <input checked="" type="checkbox"/> | 0.0 | -10000 | -10000.0 |
| Trace | Channel | int | 13 | None | | int | <input checked="" type="checkbox"/> | 0.0 | 75 | 75 |
| Trace | TraceCode | short | 29 | None | | int | <input checked="" type="checkbox"/> | 0.0 | 1 | 1 |
| Receiver | Easting | int | 81 | Apply the coordinate scalar | | double | <input checked="" type="checkbox"/> | 0.0 | 2192499 | 2192499.0 |
| Receiver | Northing | int | 85 | Apply the coordinate scalar | | double | <input checked="" type="checkbox"/> | 0.0 | 704852 | 704852.0 |
| Receiver | Elevation | int | 41 | Apply the elevation scalar | | double | <input checked="" type="checkbox"/> | 0.0 | 910000 | 91.0 |
| Receiver | PointNumber | int | 185 | Divide by factor, use remainder | 1000 | int | <input checked="" type="checkbox"/> | 0.0 | 101109 | 109 |
| Receiver | LineNumber | int | 185 | Divide by factor | 1000 | int | <input checked="" type="checkbox"/> | 0.0 | 101109 | 101 |
| Shot | Easting | int | 73 | Apply the coordinate scalar | | double | <input checked="" type="checkbox"/> | 0.0 | 2194122 | 2194122.0 |
| Shot | Northing | int | 77 | Apply the coordinate scalar | | double | <input checked="" type="checkbox"/> | 0.0 | 707161 | 707161.0 |
| Shot | Elevation | int | 45 | Apply the elevation scalar | | double | <input checked="" type="checkbox"/> | 0.0 | 900000 | 90.0 |
| Shot | PointDepth | int | 49 | Apply the elevation scalar | | double | <input checked="" type="checkbox"/> | 0.0 | 0 | 0.0 |
| Shot | UpholeTime | short | 95 | None | | int | <input checked="" type="checkbox"/> | 0.0 | 0 | 0 |
| Shot | PointNumber | int | 181 | Divide by factor, use remainder | 1000 | int | <input checked="" type="checkbox"/> | 0.0 | 494105 | 105 |
| Shot | LineNumber | int | 181 | Divide by factor | 1000 | int | <input checked="" type="checkbox"/> | 0.0 | 494105 | 494 |
| Shot | PointIndex | int | 9 | None | | int | <input checked="" type="checkbox"/> | 0.0 | 5 | 5 |
| Shot | FFID | int | 9 | None | | int | <input checked="" type="checkbox"/> | 0.0 | 5 | 5 |

The application fills in all required default values

However, the LineNumber and PointNumber entries will need to be edited

DICTIONARY EDITOR

| Column | Meaning |
|---------------|---|
| Table | Which database table the entry is mapped to. Common values are Shot, Receiver, and Trace. "None" is a special case used to identify the coordinate and elevation scalars |
| Column | Which database column the entry is mapped to |
| Header type | Possible values are int (4 byte integer), short (2 byte integer), float (IEEE format), and float ibm |
| Offset | Offset in the SEG-Y header. |
| Modification | Conversion applied to the "raw" SEG-Y header value: None: The input value is not modified Apply the coordinate scalar: See SEG-Y documentation Apply the elevation scalar: See SEG-Y documentation Apply the time scalar: See SEG-Y documentation Divide by factor: $\text{Output} = \text{input value} / \text{value in the "Factor" column}$ Divide by factor, use remainder: $\text{Output} = \text{Remainder of input value} / \text{value in the "Factor" column}$ |
| Factor | Used only if Modification value is either "Divide by factor" or "Divide by factor, use remainder" |
| Database type | Possible values are int (4 byte integer), double (8 byte float), and float (4 byte float) |
| Value valid | Is the value in the SEG-Y header valid? If not, the the Default value will be used |
| Default value | Used if "Value valid" is not checked |

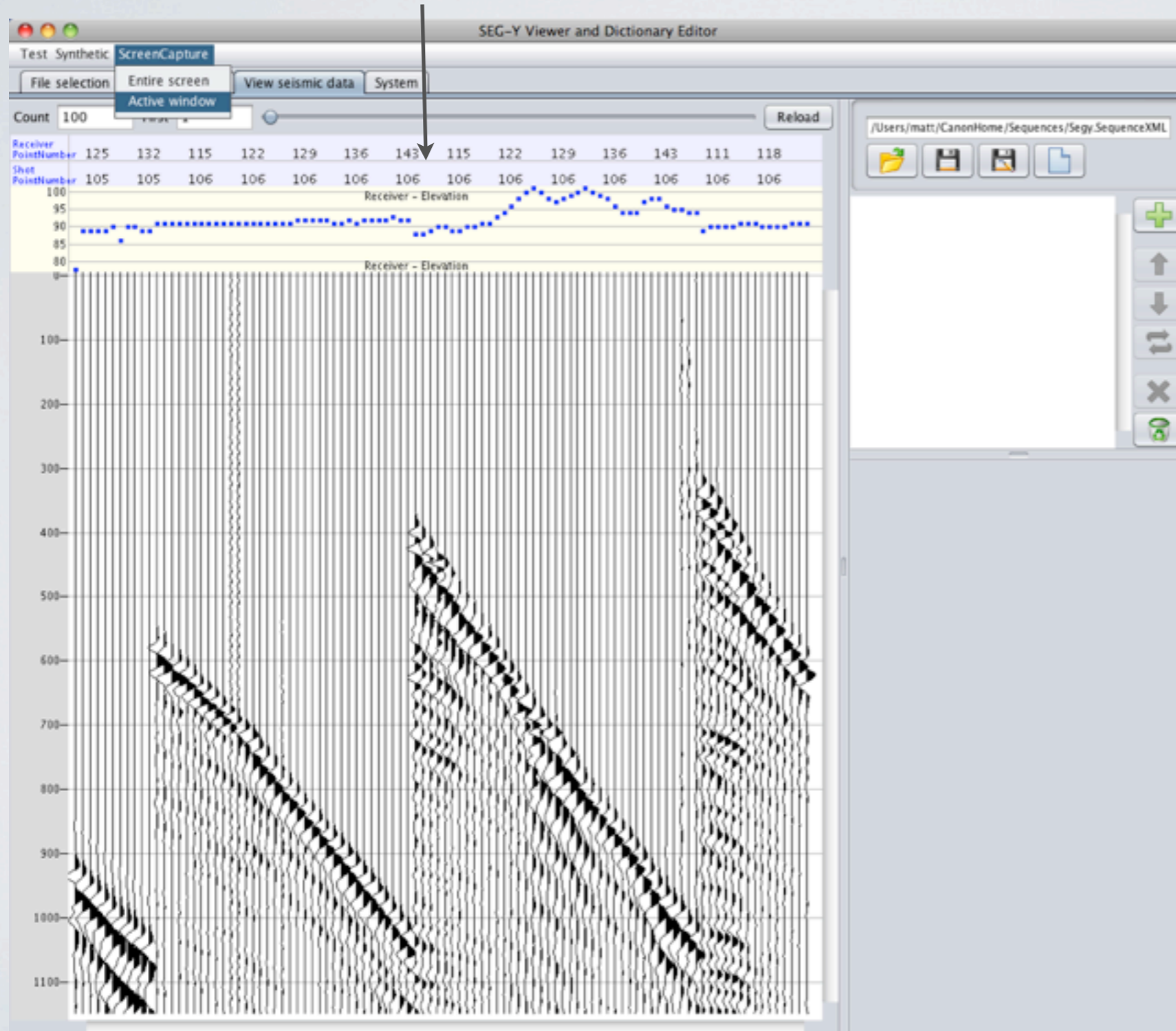
EXAMPLE

- The value stored at Offset 181 is equal to $(\text{PointNumber} + 1000 * \text{LineNumber})$
 - * So if $\text{LineNumber} = 494$ and $\text{PointNumber} = 105$ the value in the header is 494,105
 - * Here are the dictionary entries used to extract this information:

| Table | Column | Header t... | Offset | Modification | Factor | Database t... | Value valid | Default value |
|-------|-------------|-------------|--------|---------------------------------|--------|---------------|-------------------------------------|---------------|
| Shot | PointNumber | int | 181 | Divide by factor, use remainder | 1000 | int | <input checked="" type="checkbox"/> | 0.0 |
| Shot | LineNumber | int | 181 | Divide by factor | 1000 | int | <input checked="" type="checkbox"/> | 0.0 |

USE THE TRACE VIEWER TO QC THE DICTIONARY

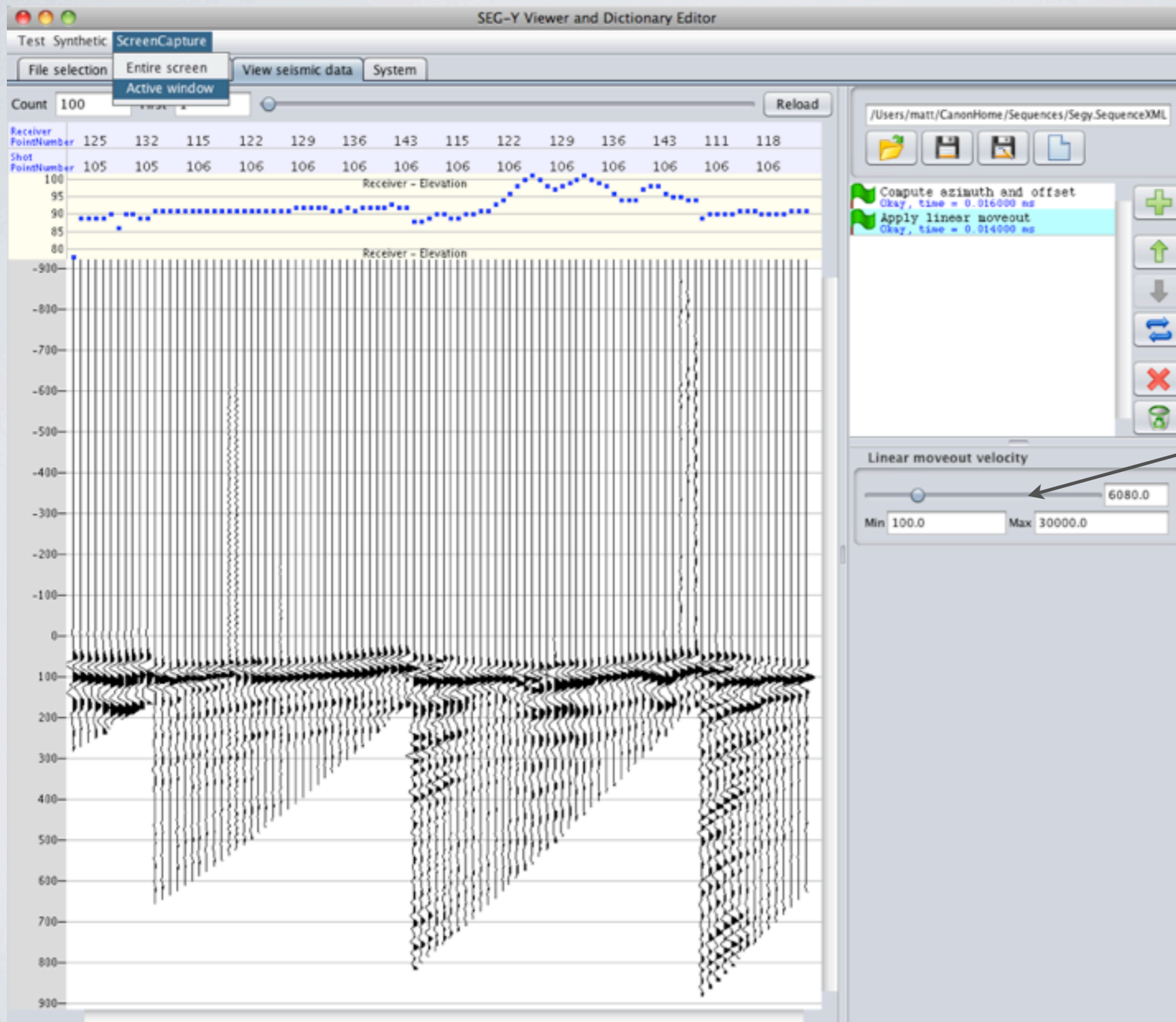
Click on the header plots to display the shot and receiver LineNumber and PointNumber values. Are they correct?



Click on the “+”, select “Geometry”, then select “Compute offset and azimuth”

Then click on the “+”, select “Moveout”, then select “Apply linear moveout”

USE THE TRACE VIEWER TO QC THE DICTIONARY



Drag the slider to modify the LMO velocity

Does the LMO velocity make sense?