

Polaris SuperiorQC Integration

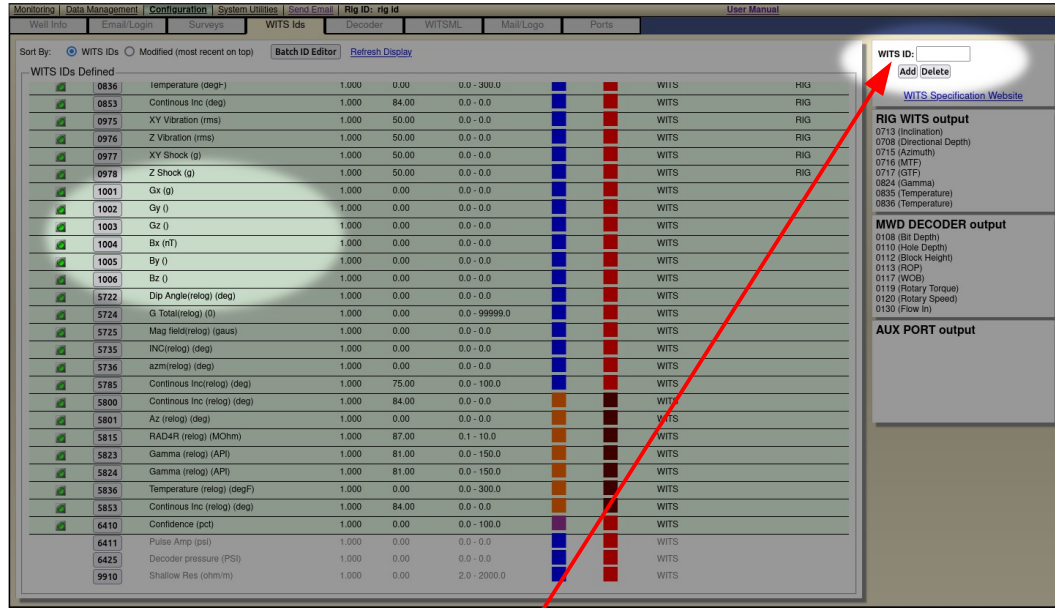
This slide show will illustrate how to configure and operate the interface to the Superior QC system for survey corrections

Configuration

In these steps:

- Define the 6-axis WITS IDs being received from the MWD decoder
- Add survey storage for the 6-axis data being received
- Configure the SuperiorQC API for transmitting the 6-axis data to their servers

STEP 1



The MWD decoder will transmit its data in WITS format which consists of a 4 digit ID followed by the data value

The WITS ID of each sensor is either vendor-specific or user programmed into the MWD decoder

Each sensor's WITS IDs must be defined in order to be recognized and processed by the system

Use the input on the top-right to add each WITS ID and a description for each

STEP 1

When configuring each WITS ID the name is important for easy identification

The decimal places are important for storage in the survey database

The default for all of the other parameters are usually acceptable

Configuration Editor

Close WITS ID 1001 - Gx

General Information

WITS Id: 1001

Enable Data Logging: ☒

Name: Gx

Units: g

Decimal places: 9

Scaling

Scale factor: 1

Bias offset: (normally 0) 0

Sensor to Bit spacing: 0

Output Data

Send to **AUX** port: ☐

Do not repeat: ☐

Send to **MWD DECODER** port: ☐

Do not repeat: ☐

Default to unchecked: Prevents repeating the same value

Monitor Colors - Scale Values

Left Right

0 0

Line Color Wrap Color

Depth Tracking

Tracks Hole Depth (default) depth

DEFAULT: Bit depth will be used for sensor positioning

Close Save Changes

LAS Settings ↓

LAS Tag:

LAS Description: Gx

LAS Filter: 0

Alarm Settings

Enable Alarm: ☐

Alarm Low: -9999.9

Alarm High: 99999.9

Data Input

Serial Port WITS Info

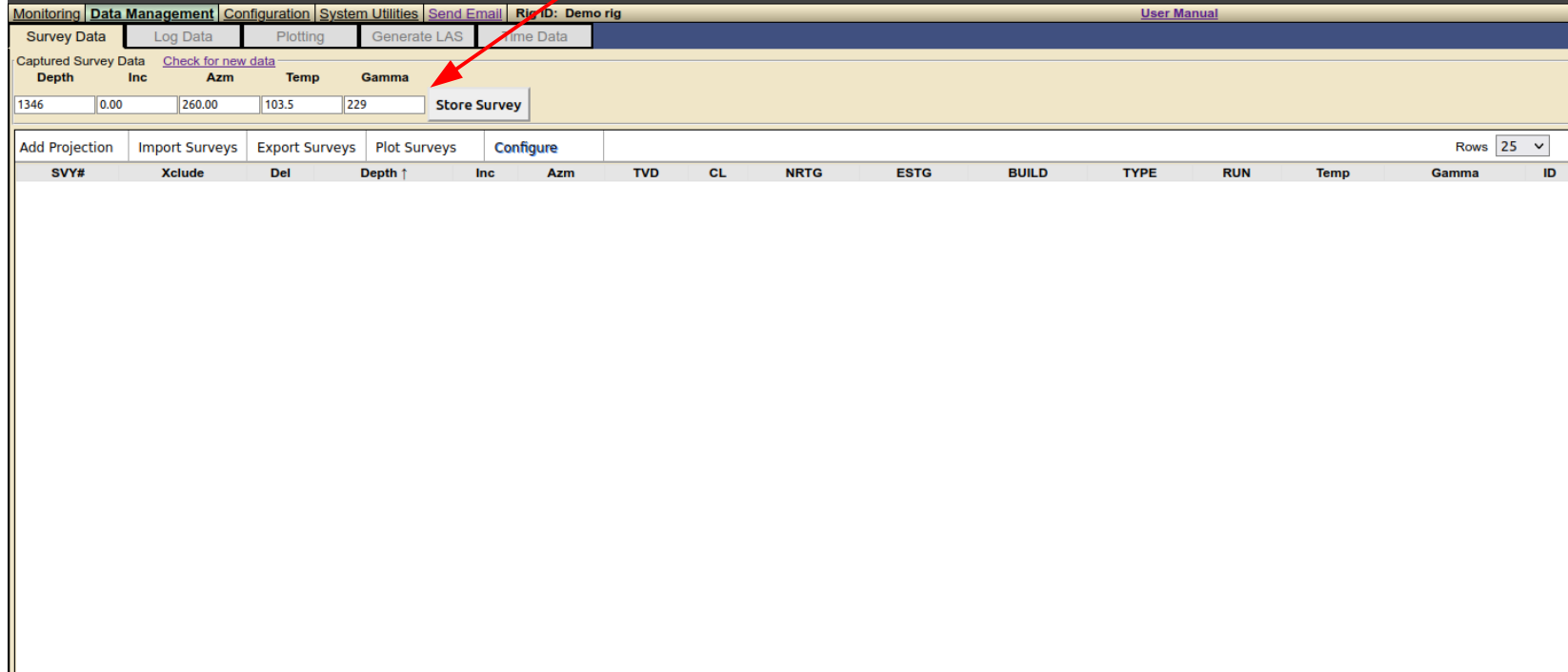
Choose where the data for this WITS ID is retrieved. Default is to receive data from the serial port. Optionally you can choose a function which will use other WITS IDs to calculate this value.

Value: 0.044729

END OF STEP 1

STEP 2

Survey data storage is defined in the **Data Management** section of the Polaris application. Data received from the MWD decoder is “captured” and displayed in the upper-left corner of the **Survey Data** tab



The screenshot displays the Polaris application interface. The top navigation bar includes tabs for Monitoring, Data Management (selected), Configuration, System Utilities, Send Email, and Rig ID: Demo rig. A User Manual link is also present. Below the navigation bar, the Survey Data tab is active, showing a form for capturing survey data. The form includes fields for Depth, Inc, Azm, Temp, and Gamma, with a Store Survey button. A red arrow points to the Store Survey button. Below the form, there is a table with columns for SVY#, Xclude, Del, Depth, Inc, Azm, TVD, CL, NRTG, ESTG, BUILD, TYPE, RUN, Temp, Gamma, and ID. The table is currently empty.

SVY#	Xclude	Del	Depth	Inc	Azm	TVD	CL	NRTG	ESTG	BUILD	TYPE	RUN	Temp	Gamma	ID
------	--------	-----	-------	-----	-----	-----	----	------	------	-------	------	-----	------	-------	----

STEP 2

The WITS IDs for depth, inclination and azimuth are captured by default

This screenshot shows the 'Captured Survey Data' form with the following fields and values:

Depth	Inc	Azm	Temp	Gamma
1346	0.00	260.00	103.5	229

Buttons: [Check for new data](#), [Store Survey](#)

Navigation buttons: [Add Projection](#), [Import Surveys](#), [Export Surveys](#), [Plot Surveys](#), [Configure](#)

Table headers: SVY#, Xclude, Del, Depth ↑, Inc, Azm

Additional WITS IDs can be captured as defined by the user

This screenshot shows the 'Captured Survey Data' form with an additional 'TVD' field highlighted. The fields and values are:

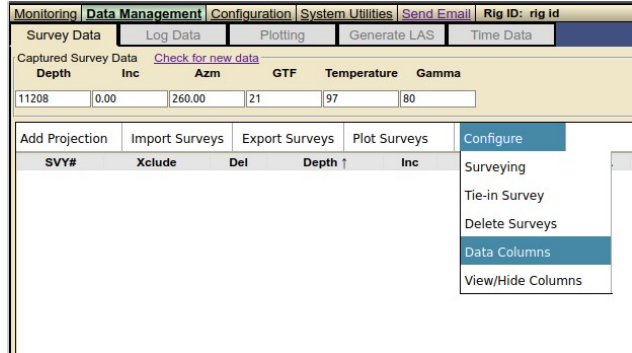
Depth	Inc	Azm	Temp	Gamma	TVD
1346	0.00	260.00	103.5	229	

Buttons: [Check for new data](#), [Store Survey](#)

Navigation buttons: [Add Projection](#), [Import Surveys](#), [Export Surveys](#), [Plot Surveys](#), [Configure](#)

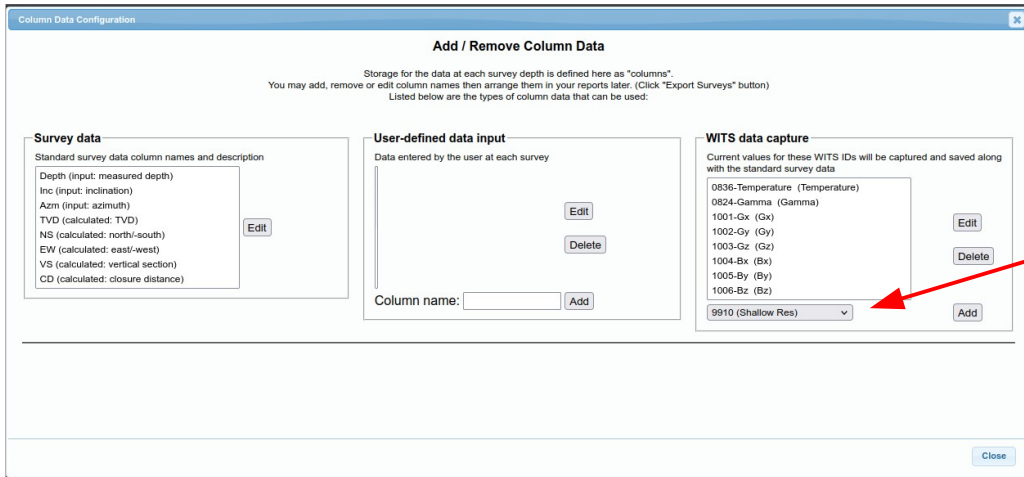
Table headers: SVY#, Xclude, Del, Depth ↑, Inc, Azm, TVD

STEP 2



The screenshot shows a software interface with a menu bar at the top: Monitoring, Data Management, Configuration, System Utilities, Send Email, and Rig ID: rig id. Below the menu bar are tabs: Survey Data, Log Data, Plotting, Generate LAS, and Time Data. The 'Survey Data' tab is active, showing a 'Captured Survey Data' section with fields for Depth (11208), Inc (0.00), Azm (260.00), GTF (21), Temperature (97), and Gamma (80). Below this is a table with columns: Add Projection, Import Surveys, Export Surveys, Plot Surveys, and Configure. The 'Configure' button is highlighted, and a dropdown menu is open, showing options: Surveying, Tie-in Survey, Delete Surveys, Data Columns (highlighted), and View/Hide Columns.

Use “Data Columns” to add WITS ID storage in the survey database



The screenshot shows a 'Column Data Configuration' dialog box with the title 'Add / Remove Column Data'. It contains three sections: 'Survey data', 'User-defined data input', and 'WITS data capture'. The 'WITS data capture' section is active, showing a list of WITS IDs: 0836-Temperature (Temperature), 0824-Gamma (Gamma), 1001-Gx (Gx), 1002-Gy (Gy), 1003-Gz (Gz), 1004-Bx (Bx), 1005-By (By), 1006-Bz (Bz), and 9910 (Shallow Res). A red arrow points to the '9910 (Shallow Res)' entry in the list. The 'Add' button is highlighted.

Add the 6-axis WITS IDs to be captured using the drop-down list

STEP 2

The received data for the additional WITS IDs will be captured and displayed here

The screenshot displays the 'SuperiorQC Well: Polaris Test Well 2 Run:1' interface. The top navigation bar includes tabs for Monitoring, Data Management, Configuration, System Utilities, Send Email, and Rig ID: rig id. The 'Data Management' tab is active, showing sub-tabs for Log Data, Plotting, Generate LAS, and Time Data. Below these, there's a 'Captured Survey Data' section with a 'Check for new data' link. A data entry row is visible with fields for Depth (1400), Inc (0.00), Azm (260.00), Gamma (229), Temperature (104), and six 6-axis data fields (Gx, Gy, Gz, Bx, By, Bz) all containing -9999.000000. A 'Store Survey' button is to the right. Below this is a table with columns for SVY#, Xclude, Del, Depth, Inc, Azm, TVD, CL, NRTG, ESTG, BUILD, TYPE, RUN, Gx, Gy, Gz, Bx, By, Bz, Gamma, Temperature, and ID. A red arrow points from the text above to the Gy field in the data entry row, and another red arrow points from the text below to the Bx column in the table.

SVY#	Xclude	Del	Depth	Inc	Azm	TVD	CL	NRTG	ESTG	BUILD	TYPE	RUN	Gx	Gy	Gz	Bx	By	Bz	Gamma	Temperature	ID

The survey editor/viewer will also display the additional columns for the 6-axis data storage

END OF STEP 2

STEP 3

The configuration for the SuperiorQC API is pretty straight-forward:

The screenshot shows the 'Configuration' tab of the SuperiorQC web interface. The interface is divided into several sections:

- Units of Measurement:** Includes radio buttons for 'U.S.' (selected) and 'Metric', and a 'Dogleg' section with a value of '1/100' and 'Paper: Letter 8.5" X 11.0"'. Below this are input fields for 'Proposed Azimuth: 262', 'Survey Depth Offset: 0', 'North Reference: Grid', and 'Declination: 1.47'.
- Geographic Coordinates:** Includes input fields for 'Latitude: 32.179354', 'Longitude: -93.583441', 'Northing: 0', and 'Easting: 0'. Below these are fields for 'KB: 0', 'DF: 0', 'GL: 0', and 'Subsea Depth: 0'.
- Columns on survey reports:** A section with a link to 'Open Survey Reports Tab'.
- Survey data sent to Rig port:** Includes radio buttons for 'From Survey Database' (selected) and 'Real-time MWD Decoder'.
- Survey Corrections:** Includes a 'SuperiorQC' logo, an 'Enable' checkbox (checked), a 'Login' field with 'polaris_api_xfer', a 'Password' field with 'NR4v9!2', a 'Well name' dropdown menu (set to 'Polaris Test Well 1'), a 'Run Number' dropdown menu (set to '1'), and an 'Include HiFi' checkbox (unchecked). Below this is a link 'List SuperiorQC Surveys' and a 'Save Settings' button.
- Sensor WITS IDs:** A section with a table of sensor IDs: Gx (1001), Gy (1002), Gz (1003), Bx (1004), By (1005), and Bz (1006).
- Survey Data on Plots:** Includes checkboxes for 'Inclination' (checked), 'Azimuth' (checked), 'TVD' (checked), 'Vertical Section' (unchecked), 'North-South' (unchecked), 'East-West' (unchecked), and 'Dogleg Severity' (checked).

Annotations with red arrows point to specific elements:

- An arrow points to the 'From Survey Database' radio button with the text: "This should always be 'From Survey Database'"
- An arrow points to the 'Well name' dropdown menu with the text: "Select from list of available wells"
- An arrow points to the 'Run Number' dropdown menu with the text: "The run numbers should be maintained by the user"
- An arrow points to the 'List SuperiorQC Surveys' link with the text: "This link displays the data on the Superior server (diagnostics)"
- An arrow points to the 'Sensor WITS IDs' section with the text: "Each drop-down will contain a list of captured WITS IDs from the previous step. Select accordingly."

This should always be "From Survey Database"

Each drop-down will contain a list of captured WITS IDs from the previous step. Select accordingly.

This link displays the data on the Superior server (diagnostics)

END OF STEP 3

END OF CONFIGURATION

Operations

The screenshot displays the SuperiorQC software interface. At the top, there are tabs for Monitoring, Data Management, Configuration, System Utilities, Send Email, and Rig ID: rig id. Below these, there are sub-tabs for Survey Data, Log Data, Plotting, Generate LAS, and Time Data. The main window shows a table of survey data with columns for Depth, Inc, Azm, Gamma, Temperature, Gx, Gy, Gz, Bx, By, Bz, and G. A red arrow points to the 'Store Survey' button in the top right corner of the data table. Below the data table, there is a 'Store Survey Data' dialog box with a 'Survey depth' field set to 1200 and a 'Type' dropdown menu set to 'STANDARD'. A red arrow points to the 'OK' button in the dialog box.

SVY#	Xclude	Del	Depth	Inc	Azm	TVD	CL	NRTG	ESTG	BUILD	TYPE	RUN	Gx	Gy	Gz	Bx	By	Bz	G
11	☐	☒	1100.00	0.16	46.25	1099.98	100.00	0.79	0.51	-0.08	CORRECTED	1	0.003564078	-0.026349328	9.803080188	12669.031740	20303.493790	40214.814370	229
10	☐	☒	1000.00	0.23	106.46	999.98	100.00	0.76	0.22	0.00	CORRECTED	1	-0.039047554	0.005251456	9.795709611	-7382.380956	-23066.291510	40110.090460	104
9	☐	☒	900.00	0.23	96.10	899.98	100.00	0.84	-0.17	-0.20	CORRECTED	1	0.006596513	-0.038258472	9.795354907	23632.272460	4188.160752	40182.930420	
8	☐	☒	800.00	0.43	102.16	799.98	100.00	0.94	-0.73	-0.13	CORRECTED	1	-0.040133256	0.061274049	9.795380607	-21560.081040	-11035.053130	40102.933320	
7	☐	☒	700.00	0.56	157.00	699.98	100.00	1.46	-1.29	-0.08	CORRECTED	1	-0.078492655	0.053457899	9.798655355	-24439.208220	2120.447139	39919.688820	
6	☐	☒	600.00	0.64	318.58	599.99	100.00	1.49	-1.11	0.17	CORRECTED	1	-0.091081269	0.059401308	9.799042179	22771.842240	6471.981916	40312.452280	
5	☐	☒	500.00	0.46	265.75	499.99	100.00	1.10	-0.34	0.06	CORRECTED	1	0.054635266	-0.057505488	9.791196709	-13795.187900	-19913.845070	40116.929050	
4	☐	☒	400.00	0.40	238.27	399.99	100.00	1.32	0.36	0.25	CORRECTED	1	0.054635266	-0.057505488	9.791196709	-13795.187900	-19913.845070	40116.929050	
3	☐	☒	300.00	0.14	83.18	299.99	100.00	1.49	0.53	-0.15	CORRECTED	1	0.054635266	-0.057505488	9.791196709	-13795.187900	-19913.845070	40116.929050	
2	☐	☒	200.00	0.30	340.21	199.99	100.00	1.23	0.50	-0.27	CORRECTED	1	0.054635266	-0.057505488	9.791196709	-13795.187900	-19913.845070	40116.929050	
1	☐	☒	100.00	0.56	11.05	100.00	99.00	0.50	0.49	0.11	CORRECTED	1	0.054635266	-0.057505488	9.791196709	-13795.187900	-19913.845070	40116.929050	
Tien	☐	☒	1.00	0.46	87.15	1.00	-	0.00	0.00	0.00	CORRECTED	1	0.054635266	-0.057505488	9.791196709	-13795.187900	-19913.845070	40116.929050	

After a full set of survey data has been captured click the **“Store Survey”** button

Verify the depth and press OK (leave type as **“STANDARD”**)

Operations

The screenshot displays the SuperiorQC software interface. At the top, there are tabs for Monitoring, Data Management, Configuration, System Utilities, Send Email, and Rig ID: rig id. Below these, there are sections for Survey Data, Log Data, Plotting, Generate LAS, and Time Data. A table of captured survey data is visible, with columns for Depth, Inc, Azm, Gamma, Temperature, Gx, Gy, Gz, Bx, By, and Bz. A 'Store Survey' button is present. Below the table, there are sections for Import Surveys, Export Surveys, Plot Surveys, and Configuration. A 'SuperiorQC' section shows a table of survey data with columns for SVY#, Xclude, Del, Depth, Inc, Azm, TVD, CL, NRTG, ESTG, BUILD, TYPE, RUN, Gx, Gy, Gz, Bx, By, Bz, Gamma, Temperature, and ID. A dialog box is open in the foreground, displaying the text: 'Data submitted to the SuperiorQC server. Use "Synchronize with SuperiorQC" to update locally.' and an 'OK' button. The background of the dialog box shows the text 'Processing...'.

At this point the 6-axis data and survey depth has been transmitted to the SuperiorQC server for processing

The amount of time for processing varies so the user should synchronize the Polaris database with the SuperiorQC servers to get the survey results

Operations

Survey Data		Log Data		Plotting		Generate LAS		Time Data	
Captured Survey Data		Check for new data							
Depth	Inc	Azm	Gamma	Temperature	Gx	Gy	Gz	Bx	
1200	0.00	260.00	229	104	0.020848278	0.036749490	9.798235177	5032.617	

Import Surveys

Export Surveys

Plot Surveys

Configure

SuperiorQC

SVY#	Xclude	Del	Depth	Inc	Azm	TVD	CL	NRTG	ESTG	
12	☐	☒	1200.00	0.00	260.00	1199.98	100.00	0.89	0.6	Synchronize with SuperiorQC
11	☐	☒	1100.00	0.16	46.25	1099.98	100.00	0.79	0.5	Send all surveys
10	☐	☒	1000.00	0.23	106.46	999.98	100.00	0.76	0.2	View SuperiorQC Surveys
9	☐	☒	900.00	0.23	96.10	899.98	100.00	0.84	-0.1	WEB Portal Login
8	☐	☒	800.00	0.43	102.16	799.98	100.00	0.94	-0.75	DATA CORRECTED
7	☐	☒	700.00	0.55	157.00	699.98	100.00	1.10	1.00	DATA CORRECTED

Use the first menu item in the SuperiorQC menu “**Synchronize with SuperiorQC**” to fetch and update the results in the survey database. The survey editor/viewer will refresh with the results of the Polaris curvature calculations.

- Only Inclination, Azimuth and Type are synchronized between Polaris and SuperiorQC
- Depth, Inclination and Azimuth are used in the Polaris survey curvature calculations
- TVD, Northing/Eastings from SuperiorQC are not used in Polaris
- “**View SuperiorQC Surveys**” will show the contents of the SuperiorQC server

END OF OPERATIONS

Comments

- The Polaris end user has very little control over surveys. If a survey is removed from SuperiorQC's database then the user must also manually remove that survey from the Polaris database.
- All SuperiorQC surveys that are marked as not used in positional calculations are also automatically excluded in the Polaris calculations but not deleted. Deletion must be performed manually.
- If a user erroneously deletes any or all surveys in the Polaris database each of them will be restored from SuperiorQC's database on the next synchronization pass
- In essence, SuperiorQC is in complete control of the survey data submitted and Polaris merges its survey data storage with the survey data from SuperiorQC.
- It is important to note that the survey IDs in the Polaris database are identical to the Tracking IDs on the SuperiorQC database and **when synchronizing between Polaris and SuperiorQC these IDs must match**
- HiFi trajectories are not displayed in the survey editor/viewer but are cached locally. Only when exported to PDF or XLS(X) file formats will they show up.
- If the end user wishes to view the HiFi trajectories they may do so with the “**View SuperiorQC Surveys**” menu item shown on the next slide

View SuperiorQC Surveys



Actionable Information in Seconds

Well: Polaris Test Well 2
Run: 1

Rows per page

20 ▼

Include Sensors: ☐

Include HiFi Trajectory Points: ☐

Close

Run	Tracking ID	Last Changed	INC	AZM	Corrected	MD(c) ↓	INC(c)	AZM(c)	TVD	Northing	Easting
1	1658174215	2022-07-18 14:56:55	0.00	260.00	CORRECTED	1400.00	0.51	79.36	1399.98	0.27	0.92
1	1658174203	2022-07-18 14:56:43	0.00	260.00	CORRECTED	1300.00	0.24	214.81	1299.98	0.36	0.60
1	1658174098	2022-07-18 14:54:58	0.00	260.00	CORRECTED	1200.00	0.24	166.80	1199.98	0.74	0.68
1	1658172993	2022-07-18 14:36:33	0.00	260.00	CORRECTED	1100.00	0.17	43.87	1099.98	0.84	0.53
1	1657748544	2022-07-13 16:42:24	0.00	260.00	CORRECTED	1000.00	0.24	106.96	999.98	0.80	0.22
1	1657748430	2022-07-13 16:40:30	0.00	260.00	CORRECTED	900.00	0.23	92.92	899.98	0.87	-0.18
1	1657748028	2022-07-13 16:33:48	0.00	260.00	CORRECTED	800.00	0.43	103.64	799.98	0.97	-0.75
1	1657747873	2022-07-13 16:31:13	0.00	260.00	CORRECTED	700.00	0.57	156.61	699.98	1.52	-1.31
1	1657747813	2022-07-13 16:30:13	0.00	260.00	CORRECTED	600.00	0.62	318.37	599.99	1.56	-1.15
1	1657747486	2022-07-13 16:24:46	0.00	260.00	CORRECTED	500.00	0.48	266.72	499.99	1.18	-0.37
1	1657747033	2022-07-13 16:17:13	0.00	260.00	CORRECTED	400.00	0.40	240.32	399.99	1.38	0.34
1	1657746846	2022-07-13 16:14:06	0.00	260.00	CORRECTED	300.00	0.13	83.68	299.99	1.54	0.53
1	1657746783	2022-07-13 16:13:03	0.00	260.00	CORRECTED	200.00	0.30	342.64	199.99	1.27	0.49
1	1657743957	2022-07-13 15:25:57	0.00	260.00	CORRECTED	100.00	0.55	10.21	100.00	0.55	0.49
1	1657743957	2022-07-13 15:25:57	0.00	260.00	CORRECTED	100.00	0.55	10.21	100.00	0.55	0.49
1	1657743900	2022-07-13 15:25:00	0.00	260.00	CORRECTED	1.00	0.47	79.18	1.00	0.00	0.00