



# SPS Quality Assurance

# Shell Processing Support (SPS) Format

SPS format files encapsulate all the positioning and shot-receiver relationship data for a land (or transition) seismic survey. It is therefore critical that the information contained within these files be totally accurate and free from format or other errors.

There are three main SPS file types:

- R-File: Contains the Receiver information
- S-File: Contains the Source information
- X-File: Contains the Source-Receiver Relationship information

The format was adopted by the SEG Technical Standards Committee as an industry standard in 1993 and they publish a [Technical Standards Document](#) to which all SPS files should conform.

SPS files are typically produced by the acquisition crew and are a critical element of the total data produced by the crew in the field. Without the SPS files, and the information they contain, it would not be possible to process the recorded seismic data. Any errors in the SPS files can lead to errors in processing, or to the deletion of good data if the information to correct errors is not available.

It is therefore good practice to have SPS data undergo rigorous QA whilst the data is still being acquired so that any errors can be corrected and ensure that the final SPS data delivered from the crew is accurate and error-free.

SPS R-File extract showing header (H) and receiver (R) data records.

H26	Point Record Specification														
H26	Item	Definition of Field	Cols	Format	Min. to Max.	Default	Units								
H26	1	Record identification	1 -1	A1	R or S	None	-								
H26	2	Line Name	2 -17	4A4	Free	None	-								
H26	3	Point Number	18-25	2A4	Free	None	-								
H26	4	Point Index	26-26	I1	1 - 9	1	-								
H26	5	Point Code	27-28	A2	Defined	None	-								
H26	6	Static Correction	29-32	I4	-999 - 999	Blank	ms								
H26	7	Point Depth	33-36	F4.1	0 - 99.9	None	meter								
H26	8	Seismic Datum	37-40	I4	-999 - 999	None	meter								
H26	9	Uphole Time	41-42	I2	0 - 99	Blank	ms								
H26	10	Water Depth	43-46	F4.1	0 - 99.9/999	Blank	meter								
H26	11	Map Grid Easting	47-55	F9.1		None	-								
H26	12	Map Grid Northing	56-65	F10.1		None	-								
H26	13	Surface Elevation	66-71	F6.1	-999.9 - 9999.9	None	meter								
H26	14	Day of Year	72-74	I3	1 - 999	None	-								
H26	15	Time, HHMMSS	75-80	3I2	000000-235959	None	-								
H26	2	3	45 6	7	8	9	10	11	12	13	14	15			
H26	>	<	><><	><	><	><><	><	><	><	><	><><	><	>		
H26	1111111111222222222233333333333344444444445555555555666666666677777777778														
H26	567890123456789012345678901234567890123456789012345678901234567890														
R	1496	5634	1G1	0.0	0				827265.57	601907.18	160.3300064139				
R	1496	5636	1G1	0.0	0				827305.97	601937.18	160.0300064139				
R	1496	5638	1G1	0.0	0				827346.57	601966.58	159.1300064139				
R	1496	5640	1G1	0.0	0				827387.27	601995.88	158.4300064139				
R	1496	5642	1G1	0.0	0				827427.47	602024.98	157.8300064139				
R	1496	5644	1G1	0.0	0				827467.57	602054.48	157.4300064139				
R	1496	5646	1G1	0.0	0				827508.67	602083.58	156.9300064139				
R	1496	5648	1G1	0.0	0				827548.67	602112.98	158.7300064139				
R	1496	5650	1G1	0.0	0				827589.67	602142.58	157.0300064139				
R	1496	5652	1G1	0.0	0				827629.97	602171.78	156.5300064139				
R	1496	5654	1G1	0.0	0				827669.87	602201.38	158.0300064139				
R	1496	5656	1G1	0.0	0				827710.37	602230.78	157.2300064139				
R	1496	5658	1G1	0.0	0				827751.07	602260.58	156.9300064139				
R	1496	5660	1G1	0.0	0				827791.47	602289.68	156.9300064139				
R	1496	5662	1G1	0.0	0				827831.67	602319.08	158.3300064139				
R	1496	5664	1G1	0.0	0				827872.27	602348.28	157.0300064139				
R	1496	5666	1G1	0.0	0				827912.77	602377.98	158.2300064139				
R	1496	5668	1G1	0.0	0				827952.97	602407.18	160.2300064139				
R	1496	5670	1G1	0.0	0				827993.67	602436.48	160.2300064139				
R	1496	5672	1G1	0.0	0				828033.97	602465.98	160.1300064139				
R	1496	5674	1G1	0.0	0				828074.37	602495.38	161.0300064139				
R	1496	5676	1G1	0.0	0				828115.27	602524.88	163.3300064139				
R	1496	5678	1G1	0.0	0				828155.47	602554.28	163.3300064139				
R	1496	5680	1G1	0.0	0				828195.67	602583.38	163.6300064139				
R	1496	5682	1G1	0.0	0				828236.37	602612.98	164.2300064139				
R	1496	5684	1G1	0.0	0				828277.07	602642.48	165.4300064139				
R	1496	5686	1G1	0.0	0				828317.27	602671.68	165.9300064139				
R	1496	5688	1G1	0.0	0				828357.87	602700.98	165.8300064139				
R	1496	5690	1G1	0.0	0				828398.57	602730.48	166.8300064139				



# SPS Quality Assurance (QA)

This presentation details software that performs QA on SPS files. It was written to enable fully independent checking of SPS files without any reliance on any software or programs from the Acquisition Contractor.

For new surveys it is typically run on a regular basis during the acquisition as the Contractor produces updated SPS files. The QA can be performed on the crew or, as SPS files are small and easily transmitted, in any convenient location.

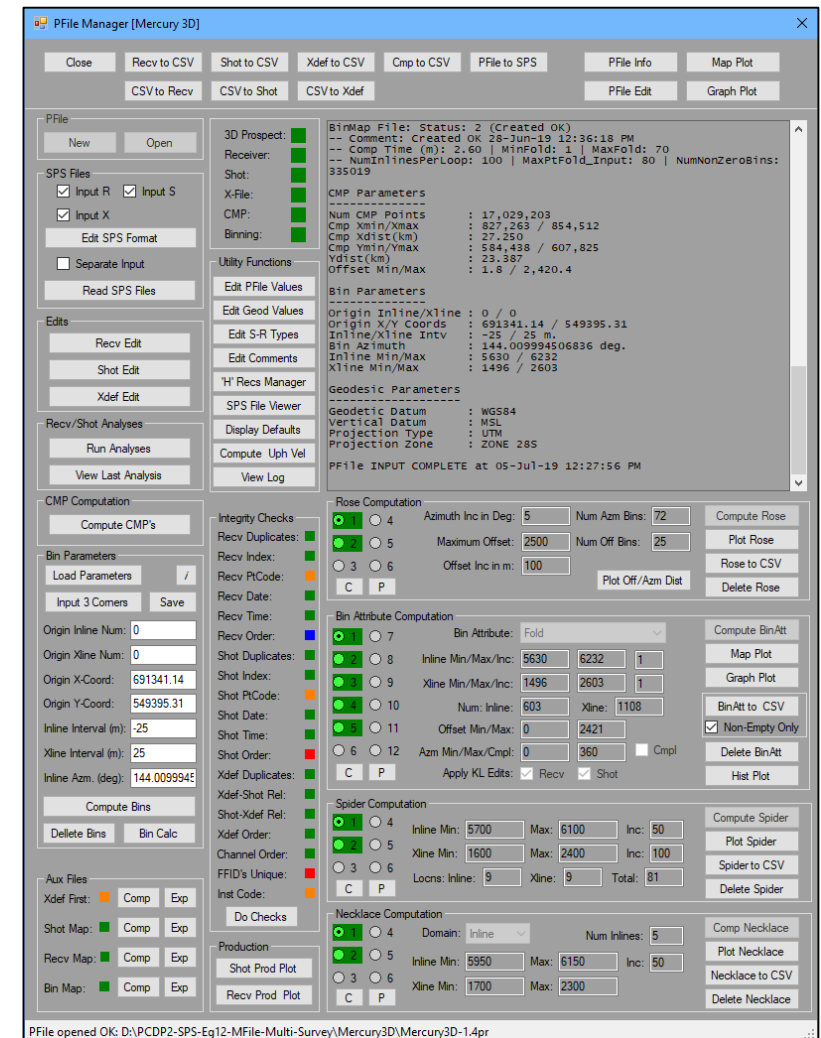
SPS QA can also be run on legacy surveys, particularly on old SPS files that may be suspected of having errors.

The software works on both 3D and 2D surveys.

Any format errors found on legacy data can be corrected and new error-free SPS files produced. Other error types, such as positioning or shot-receiver relationship errors, may or may not be fixable depending on the error and what information is available.

In addition to the QA function, the software can also be used to produce a large variety of displays on the data inherent within the files such as maps, line graphs and production plots as shown in the following slides.

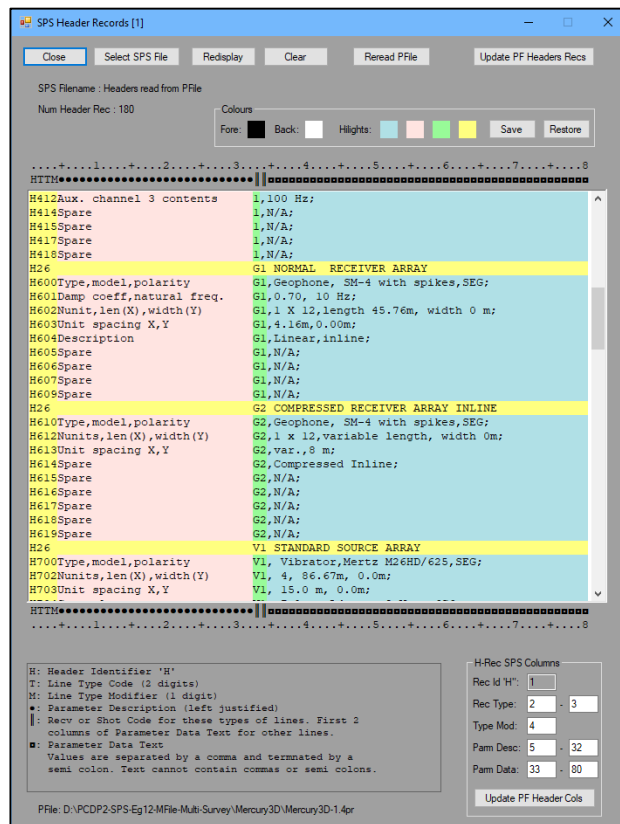
It is also possible to do binning of the computed CMP locations and do fold and other binned attribute displays. This is covered in a separate presentation.



# SPS File Viewer

Allows viewing of header and data records in SPS R, S and X Files. Columns are colour highlighted which allows quick visual checking that headers and data are contained in the correct columns. Data column values are stored in simple text files that can be edited to create survey specific format files for data that is non-standard or requires special formatting due to the nature of the survey.

Header record display.



SPS Header Records [1]

Close Select SPS File Redisplay Clear Reread PFile Update PF Headers Recs

SPS Filename: Headers read from PFile

Num Header Rec: 180

Colours

Fore: Back: Hlights: Save Restore

H412Aux. channel 3 contents 1,100 Hz;

H414Spare 1,N/A;

H415Spare 1,N/A;

H417Spare 1,N/A;

H418Spare 1,N/A;

H26 G1 NORMAL RECEIVER ARRAY

H600Type,model,polarity G1,Geophone, SM-4 with spikes,SEG;

H601Damp coeff,natural freq. G1,0.70, 10 Hz;

H602Nunit,len(X),width(Y) G1,1 X 12,length 45.76m, width 0 m;

H603Unit spacing X,Y G1,4.16m,0.00m;

H604Description G1,Linear,inline;

H605Spare G1,N/A;

H606Spare G1,N/A;

H607Spare G1,N/A;

H608Spare G1,N/A;

H26 G2 COMPRESSED RECEIVER ARRAY INLINE

H610Type,model,polarity G2,Geophone, SM-4 with spikes,SEG;

H612Nunits,len(X),width(Y) G2,1 x 12,variable length, width 0m;

H613Unit spacing X,Y G2,var., 8 m;

H614Spare G2,Compressed Inline;

H615Spare G2,N/A;

H616Spare G2,N/A;

H617Spare G2,N/A;

H618Spare G2,N/A;

H26 V1 STANDARD SOURCE ARRAY

H700Type,model,polarity V1,Vibrator,Mertz M26HD/625,SEG;

H702Nunits,len(X),width(Y) V1,4, 86.67m, 0.0m;

H703Unit spacing X,Y V1,15.0 m, 0.0m;

H: Header Identifier 'H'

T: Line Type Code (2 digits)

M: Line Type Modifier (1 digit)

Parameter Description (left justified)

Recv or Shot Code for these types of lines. First 3 columns of Parameter Data Text for other lines.

Parameter Data Text

Values are separated by a comma and terminated by a semi colon. Text cannot contain commas or semi colons.

H-Rec SPS Columns

Rec Id H: 1

Rec Type: 2 - 3

Type Mod: 4

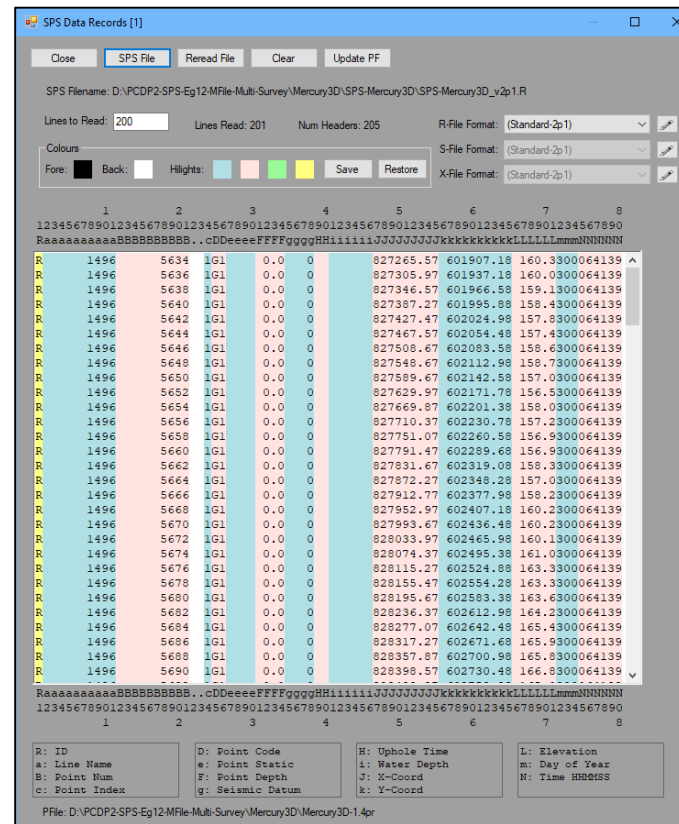
Param Desc: 5 - 32

Param Data: 33 - 80

Update PF Header Col

PFile: D:\PCDP2-SPS-Eg12-MFile-Multi-Survey\Mercury3D\Mercury3D-1.4pr

R-File data display.



SPS Data Records [1]

Close SPS File Reread File Clear Update PF

SPS Filename: D:\PCDP2-SPS-Eg12-MFile-Multi-Survey\Mercury3D\SPS-Mercury3D\SPS-Mercury3D\_v2p1.R

Lines to Read: 200 Lines Read: 201 Num Headers: 205 R-File Format: (Standard-2p1)

Colours

Fore: Back: Hlights: Save Restore

S-File Format: (Standard-2p1)

X-File Format: (Standard-2p1)

	1	2	3	4	5	6	7	8	
1234567890123456789012345678901234567890123456789012345678901234567890	R	1496	5634	IG1	0.0	0	827265.57	601907.18	160.3300064139
R	1496	5636	IG1	0.0	0	827305.97	601937.18	160.0300064139	
R	1496	5638	IG1	0.0	0	827346.57	601966.58	159.1300064139	
R	1496	5640	IG1	0.0	0	827387.27	601995.88	158.4300064139	
R	1496	5642	IG1	0.0	0	827427.47	602024.98	157.8300064139	
R	1496	5644	IG1	0.0	0	827467.57	602054.48	157.4300064139	
R	1496	5646	IG1	0.0	0	827508.67	602083.58	158.6300064139	
R	1496	5648	IG1	0.0	0	827548.67	602112.98	158.7300064139	
R	1496	5650	IG1	0.0	0	827589.67	602142.58	157.0300064139	
R	1496	5652	IG1	0.0	0	827629.97	602171.78	156.5300064139	
R	1496	5654	IG1	0.0	0	827669.87	602201.38	158.0300064139	
R	1496	5656	IG1	0.0	0	827710.37	602230.78	157.2300064139	
R	1496	5658	IG1	0.0	0	827751.07	602260.58	156.9300064139	
R	1496	5660	IG1	0.0	0	827791.47	602289.68	156.9300064139	
R	1496	5662	IG1	0.0	0	827831.67	602319.08	158.3300064139	
R	1496	5664	IG1	0.0	0	827872.27	602348.28	157.0300064139	
R	1496	5666	IG1	0.0	0	827912.77	602377.98	158.2300064139	
R	1496	5668	IG1	0.0	0	827952.97	602407.18	160.2300064139	
R	1496	5670	IG1	0.0	0	827993.67	602436.48	160.2300064139	
R	1496	5672	IG1	0.0	0	828033.97	602465.98	160.1300064139	
R	1496	5674	IG1	0.0	0	828074.37	602495.38	161.0300064139	
R	1496	5676	IG1	0.0	0	828115.27	602524.88	163.3300064139	
R	1496	5678	IG1	0.0	0	828155.47	602554.28	163.3300064139	
R	1496	5680	IG1	0.0	0	828195.67	602583.38	163.6300064139	
R	1496	5682	IG1	0.0	0	828236.37	602612.98	164.2300064139	
R	1496	5684	IG1	0.0	0	828277.07	602642.48	165.4300064139	
R	1496	5686	IG1	0.0	0	828317.27	602671.68	165.9300064139	
R	1496	5688	IG1	0.0	0	828357.87	602700.98	165.8300064139	
R	1496	5690	IG1	0.0	0	828398.57	602730.48	166.8300064139	

R: ID

a: Line Name

b: Point Num

c: Point Index

d: Point Code

e: Point Static

f: Point Depth

g: Seismic Datum

h: Uphole Time

i: Water Depth

j: X-Coord

k: Y-Coord

l: Elevation

m: Day of Year

n: Time HHMMSS

PFile: D:\PCDP2-SPS-Eg12-MFile-Multi-Survey\Mercury3D\Mercury3D-1.4pr

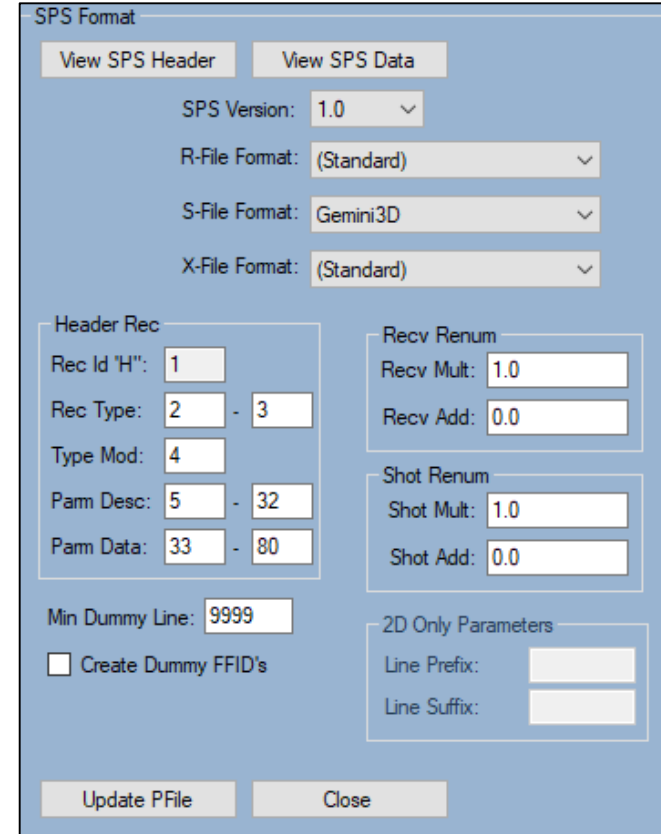
# SPS File Input

Once the SPS file format has been verified and, if necessary, survey specific format files created, the SPS Files are read into the program and the information stored in a database.

The database contains four main files:

- PFile – main database file containing all the ancillary information such as survey name, min/max values, volume sizes, header records, etc.
- Recv – contains all the Receiver information from the R-Files.
- Shot – contains all the Source information from the S-Files.
- Xdef – contains all the Relationship information from the X-Files.

Other file types may be created later depending on what computations are performed on the SPS data.



The SPS Format dialog box is a software interface for configuring SPS file input. It features a title bar 'SPS Format' and two tabs: 'View SPS Header' (selected) and 'View SPS Data'. The interface includes several configuration sections: 'SPS Version' (set to 1.0), 'R-File Format' (Standard), 'S-File Format' (Gemini3D), and 'X-File Format' (Standard). The 'Header Rec' section contains fields for 'Rec Id "H":' (1), 'Rec Type:' (2 - 3), 'Type Mod:' (4), 'Pam Desc:' (5 - 32), and 'Pam Data:' (33 - 80). The 'Recv Renum' section has 'Recv Mult:' (1.0) and 'Recv Add:' (0.0). The 'Shot Renum' section has 'Shot Mult:' (1.0) and 'Shot Add:' (0.0). A 'Min Dummy Line:' field is set to 9999, and there is a checkbox for 'Create Dummy FFID's'. The '2D Only Parameters' section includes 'Line Prefix:' and 'Line Suffix:' fields. At the bottom are 'Update PFile' and 'Close' buttons.

Section	Field	Value
SPS Version	SPS Version:	1.0
	R-File Format:	(Standard)
	S-File Format:	Gemini3D
	X-File Format:	(Standard)
Header Rec	Rec Id "H":	1
	Rec Type:	2 - 3
	Type Mod:	4
	Pam Desc:	5 - 32
	Pam Data:	33 - 80
Recv Renum	Recv Mult:	1.0
	Recv Add:	0.0
Shot Renum	Shot Mult:	1.0
	Shot Add:	0.0
2D Only Parameters	Line Prefix:	
	Line Suffix:	
Miscellaneous	Min Dummy Line:	9999
	Create Dummy FFID's	<input type="checkbox"/>

# Integrity Checking

As shown at the right, nineteen different Integrity Checks can be run on the Recv, Shot and Xdef data and header values after they have been read into the program.

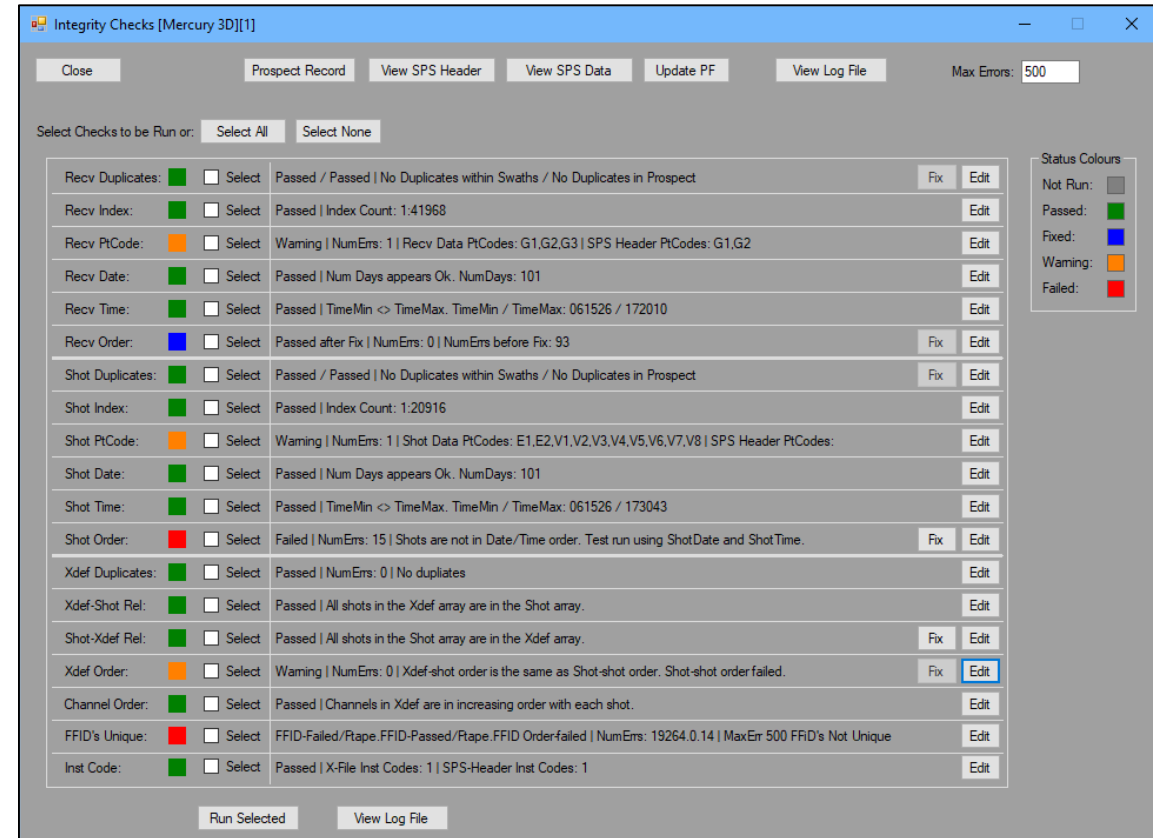
Each Check produces a detailed report that is written to a log file for possible later analysis. (See next slide.)

Some types of Failed Checks can be fixed by the program automatically. However, care must be taken if there is any inter-dependency between Checks. For example if the “Recv Order” is incorrect and there are “Recv Duplicates” then the Recv duplicates should be deleted before the Recv order is fixed.

Other types of Failed Checks can be harder to fix. For example, errors in the relationship between the Shot and Xdef data can prove difficult to correct due to their high inter-dependence.

Other Failed Check types may not be fixable. For example, if the “FFID’s Unique” Check fails then this is not fixable but warns that the FFID cannot be used to uniquely identify a particular shot or to order the shot data for the complete survey.

Main Integrity Checks form.



Check Name	Status	Select	Description	Fix	Edit
Recv Duplicates:	Passed	<input type="checkbox"/>	Passed / Passed   No Duplicates within Swaths / No Duplicates in Prospect	Fix	Edit
Recv Index:	Passed	<input type="checkbox"/>	Passed   Index Count: 1:41968		Edit
Recv PtCode:	Warning	<input type="checkbox"/>	Warning   NumErrs: 1   Recv Data PtCodes: G1,G2,G3   SPS Header PtCodes: G1,G2		Edit
Recv Date:	Passed	<input type="checkbox"/>	Passed   Num Days appears Ok. NumDays: 101		Edit
Recv Time:	Passed	<input type="checkbox"/>	Passed   TimeMin <> TimeMax. TimeMin / TimeMax: 061526 / 172010		Edit
Recv Order:	Fixed	<input type="checkbox"/>	Passed after Fix   NumErrs: 0   NumErrs before Fix: 93	Fix	Edit
Shot Duplicates:	Passed	<input type="checkbox"/>	Passed / Passed   No Duplicates within Swaths / No Duplicates in Prospect	Fix	Edit
Shot Index:	Passed	<input type="checkbox"/>	Passed   Index Count: 1:20916		Edit
Shot PtCode:	Warning	<input type="checkbox"/>	Warning   NumErrs: 1   Shot Data PtCodes: E1,E2,V1,V2,V3,V4,V5,V6,V7,V8   SPS Header PtCodes:		Edit
Shot Date:	Passed	<input type="checkbox"/>	Passed   Num Days appears Ok. NumDays: 101		Edit
Shot Time:	Passed	<input type="checkbox"/>	Passed   TimeMin <> TimeMax. TimeMin / TimeMax: 061526 / 173043		Edit
Shot Order:	Failed	<input type="checkbox"/>	Failed   NumErrs: 15   Shots are not in Date/Time order. Test run using ShotDate and ShotTime.	Fix	Edit
Xdef Duplicates:	Passed	<input type="checkbox"/>	Passed   NumErrs: 0   No duplicates		Edit
Xdef-Shot Rel:	Passed	<input type="checkbox"/>	Passed   All shots in the Xdef array are in the Shot array.		Edit
Shot-Xdef Rel:	Passed	<input type="checkbox"/>	Passed   All shots in the Shot array are in the Xdef array.	Fix	Edit
Xdef Order:	Warning	<input type="checkbox"/>	Warning   NumErrs: 0   Xdef-shot order is the same as Shot-shot order. Shot-shot order failed.	Fix	Edit
Channel Order:	Passed	<input type="checkbox"/>	Passed   Channels in Xdef are in increasing order with each shot.		Edit
FFID's Unique:	Failed	<input type="checkbox"/>	FFID-Failed/Rtape: FFID-Passed/Rtape: FFID OrderFailed   NumErrs: 19264 0.14   MaxErr 500 FFID's Not Unique		Edit
Inst Code:	Passed	<input type="checkbox"/>	Passed   X-File Inst Codes: 1   SPS-Header Inst Codes: 1		Edit

Run Selected View Log File

# Error Correction

Each Integrity Check produces a detailed report when it is run that is saved to a log file. This can report can be later accessed within the program as shown at the right.

For Checks that Fail the detailed report will give information that can be analysed to help understand how to correct the error if it is of a type that cannot be automatically corrected.



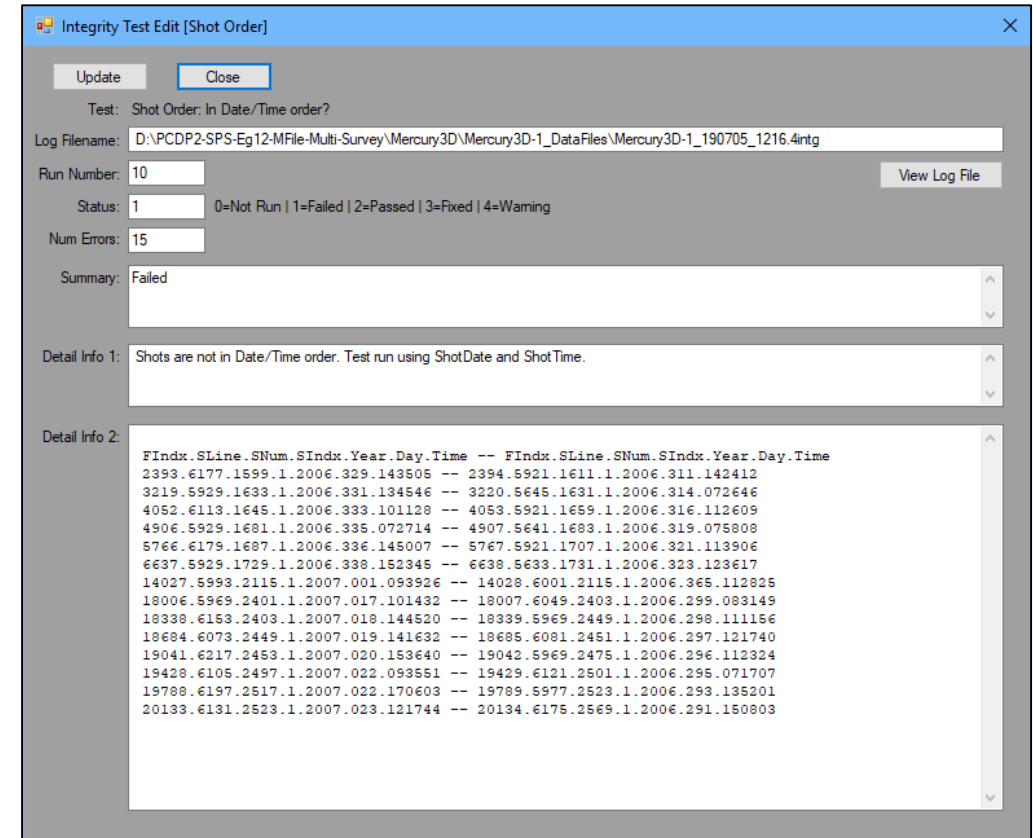
Some errors can be corrected by using the inbuilt editing functions that can do edits such as applying mathematical operations to data attributes that fall between specified values.

Selected subsets or all the Recv, Shot and/or Xdef data can also be exported for loading into a spreadsheet program such as Excel. This allows the powerful sorting and editing functions of these programs to be utilised in editing the SPS data. After editing the data from the spreadsheet can be imported back into the program.

All editing done is documented for future reference and reporting.

Once all the data has been edited to correct any errors, new error-free SPS files can be created and exported from the program.

Detailed report from a failed Integrity Check.

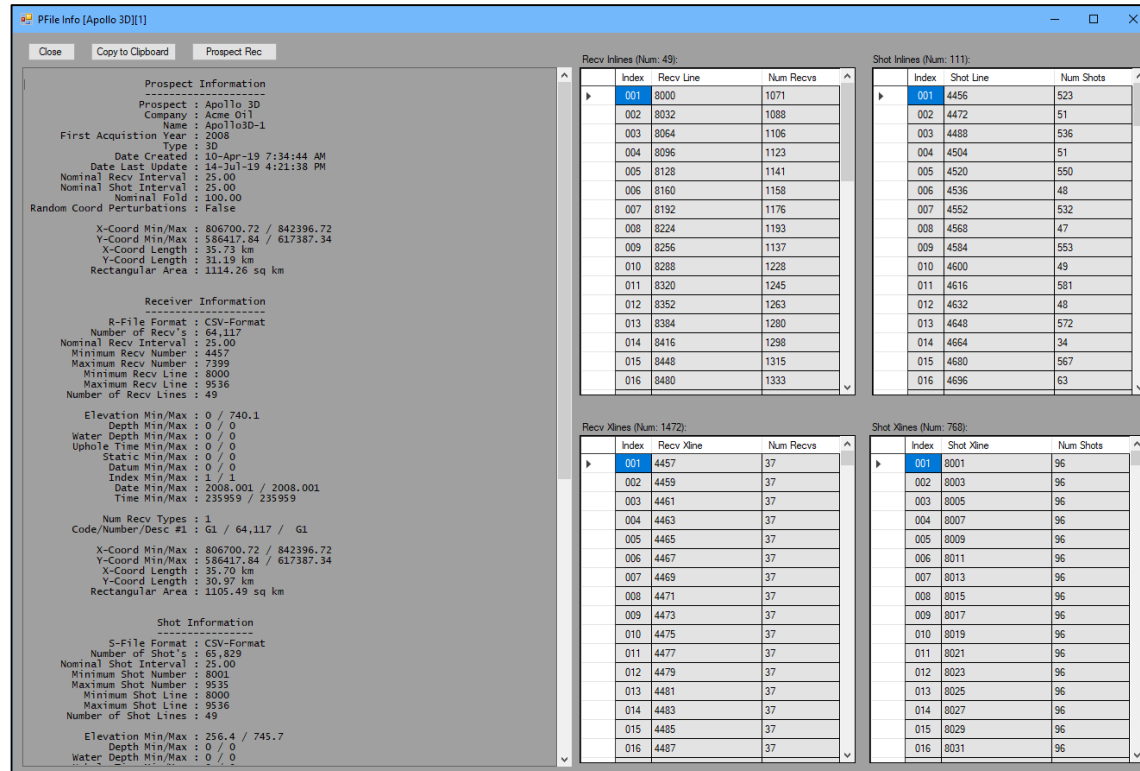


# Survey Information and Analysis

A listing of the Survey Information read from the SPS files can be produced. This gives a detailed summary of all the Shot, Recv and Xdef information including listings of all the Shot and Recv line information in both Inline and Xline directions.

An analysis can be performed on the Shot and Recv data producing a report showing values such as the average interval in the Inline and Xline direction, the inline azimuth and the average coordinates.

Detailed Survey Information form.



**Prospect Information**

Prospect : Apollo 3D  
Company : Acne Oil  
Name : Apollo3D-1  
First Acquisition Year : 2008  
Type : 3D  
Date Created : 10-Apr-19 7:34:44 AM  
Date Last Update : 14-Jul-19 4:21:38 PM  
Nominal Recv Interval : 25.00  
Nominal Shot Interval : 25.00  
Nominal Fold : 100.00  
Random Coord Perturbations : False

**Receiver Information**

R-File Format : CSV-Format  
Number of Recv's : 64,117  
Nominal Recv Interval : 25.00  
Minimum Recv Number : 4457  
Maximum Recv Number : 7399  
Minimum Recv Line : 8000  
Maximum Recv Line : 9536  
Number of Recv Lines : 49

Elevation Min/Max : 0 / 740.1  
Depth Min/Max : 0 / 0  
Water Depth Min/Max : 0 / 0  
Uphole Time Min/Max : 0 / 0  
Static Min/Max : 0 / 0  
Datum Min/Max : 0 / 0  
Index Min/Max : 1 / 1  
Date Min/Max : 2008.001 / 2008.001  
Time Min/Max : 235959 / 235959

**Shot Information**

S-File Format : CSV-Format  
Number of Shot's : 65,829  
Nominal Shot Interval : 25.00  
Minimum Shot Number : 8001  
Maximum Shot Number : 9535  
Minimum Shot Line : 8000  
Maximum Shot Line : 9536  
Number of Shot Lines : 49

Elevation Min/Max : 256.4 / 745.7  
Depth Min/Max : 0 / 0  
Water Depth Min/Max : 0 / 0

**Recv Inlines (Num: 49):**

Index	Recv Line	Num Recvs
001	8000	1071
002	8032	1088
003	8064	1106
004	8096	1123
005	8128	1141
006	8160	1158
007	8192	1176
008	8224	1193
009	8256	1137
010	8288	1228
011	8320	1245
012	8352	1263
013	8384	1280
014	8416	1298
015	8448	1315
016	8480	1333

**Shot Inlines (Num: 111):**

Index	Shot Line	Num Shots
001	4456	523
002	4472	51
003	4488	536
004	4504	51
005	4520	550
006	4536	48
007	4552	532
008	4568	47
009	4584	553
010	4600	49
011	4616	581
012	4632	48
013	4648	572
014	4664	34
015	4680	567
016	4696	63

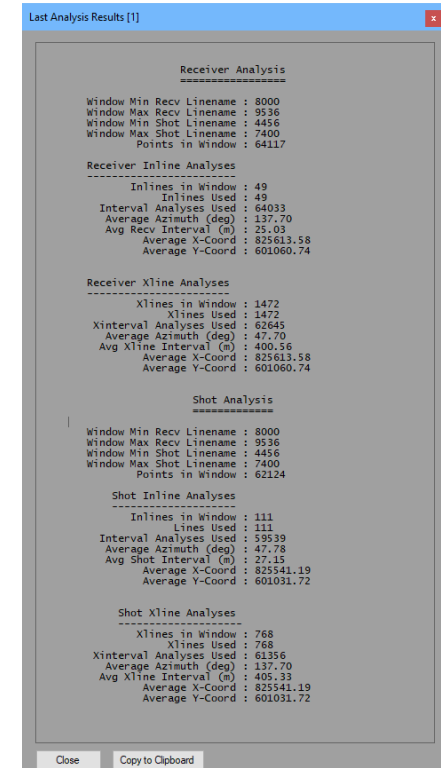
**Recv Xlines (Num: 1472):**

Index	Recv Xline	Num Recvs
001	4457	37
002	4459	37
003	4461	37
004	4463	37
005	4465	37
006	4467	37
007	4469	37
008	4471	37
009	4473	37
010	4475	37
011	4477	37
012	4479	37
013	4481	37
014	4483	37
015	4485	37
016	4487	37

**Shot Xlines (Num: 768):**

Index	Shot Xline	Num Shots
001	8001	96
002	8003	96
003	8005	96
004	8007	96
005	8009	96
006	8011	96
007	8013	96
008	8015	96
009	8017	96
010	8019	96
011	8021	96
012	8023	96
013	8025	96
014	8027	96
015	8029	96
016	8031	96

Analysis results form.



**Receiver Analysis**

Window Min Recv Linename : 8000  
Window Max Recv Linename : 9536  
Window Min Shot Linename : 4456  
Window Max Shot Linename : 7400  
Points in Window : 64117

**Receiver Inline Analyses**

Inlines in Window : 49  
Inlines Used : 49  
Interval Analyses Used : 64033  
Average Azimuth (deg) : 137.70  
Avg Recv Interval (m) : 25.03  
Average X-Coord : 825613.58  
Average Y-Coord : 601060.74

**Receiver Xline Analyses**

Xlines in Window : 1472  
Xlines Used : 1472  
Xinterval Analyses Used : 62645  
Average Azimuth (deg) : 47.70  
Avg Xline Interval (m) : 400.56  
Average X-Coord : 825613.58  
Average Y-Coord : 601060.74

**Shot Analysis**

Window Min Recv Linename : 8000  
Window Max Recv Linename : 9536  
Window Min Shot Linename : 4456  
Window Max Shot Linename : 7400  
Points in Window : 62124

**Shot Inline Analyses**

Inlines in Window : 111  
Inlines Used : 111  
Interval Analyses Used : 59539  
Average Azimuth (deg) : 47.78  
Avg Shot Interval (m) : 27.15  
Average X-Coord : 825541.19  
Average Y-Coord : 601031.72

**Shot Xline Analyses**

Xlines in Window : 768  
Xlines Used : 768  
Xinterval Analyses Used : 61356  
Average Azimuth (deg) : 137.70  
Avg Xline Interval (m) : 405.33  
Average X-Coord : 825541.19  
Average Y-Coord : 601031.72



# Map Plots

Shot/Recv maps can be plotted with the following features

- Colour coding of Shot and/or Recv attributes such as Elevation, Depth, Type, etc.
- Annotation of Shot and/or Recv line numbers
- Geo-referenced background image files.
- Over-plot files containing locations of wells, boundaries, roads, cultural features, etc.

For files that have had Bin attributes computed the following features can additionally be plotted:

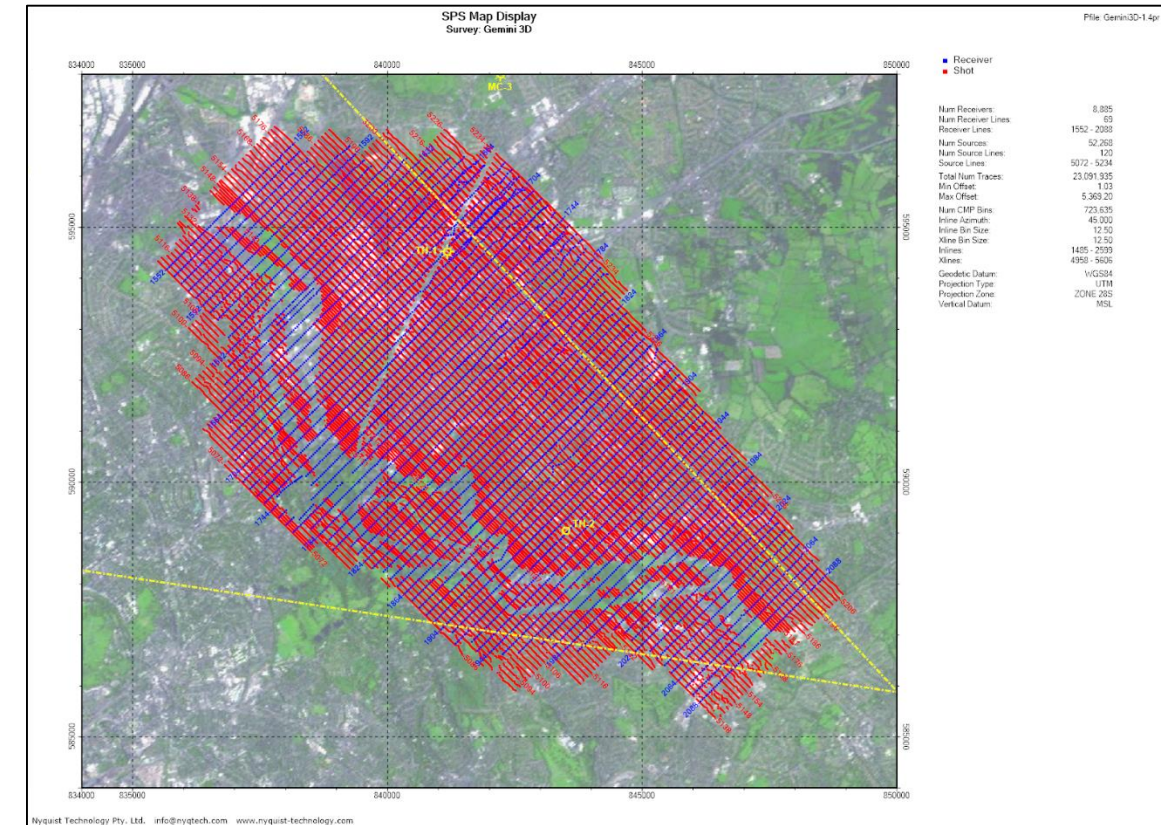
- The Inline/Xline grid with optional line annotation.
- Bin attributes such as fold, near offset, etc. These can be under- or over-plotted on the Shot/Recv lines.
- Spider and/or Necklace plot locations.

(Note: Bin attributes are covered in a separate presentation.)

Automatic highlighting of line and cursor tracking from other line-orientated plots can optionally be turned on.

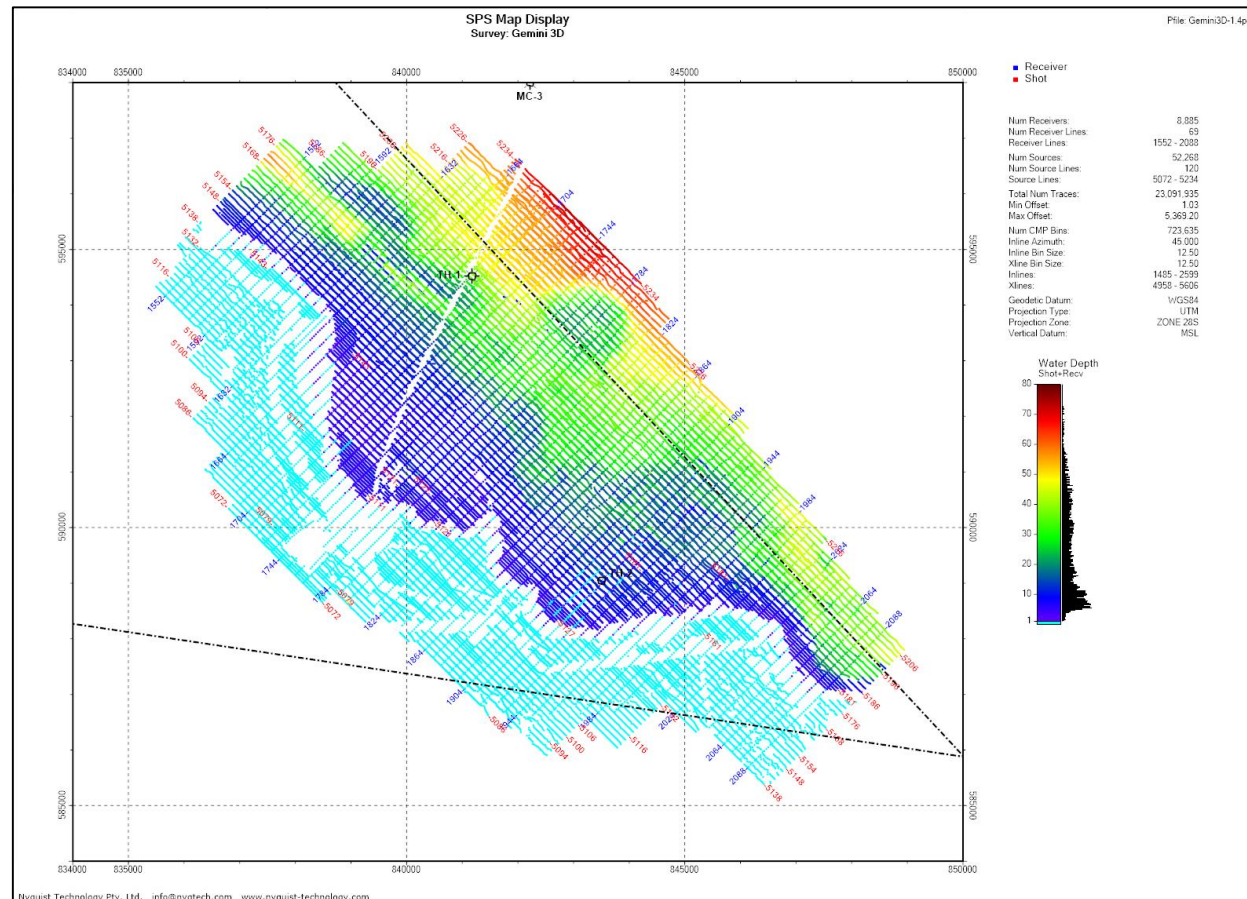
The display can be used as a digitized using the inbuilt digitizer function.

Basic Shot/Recv map showing receivers in blue and shots in red.

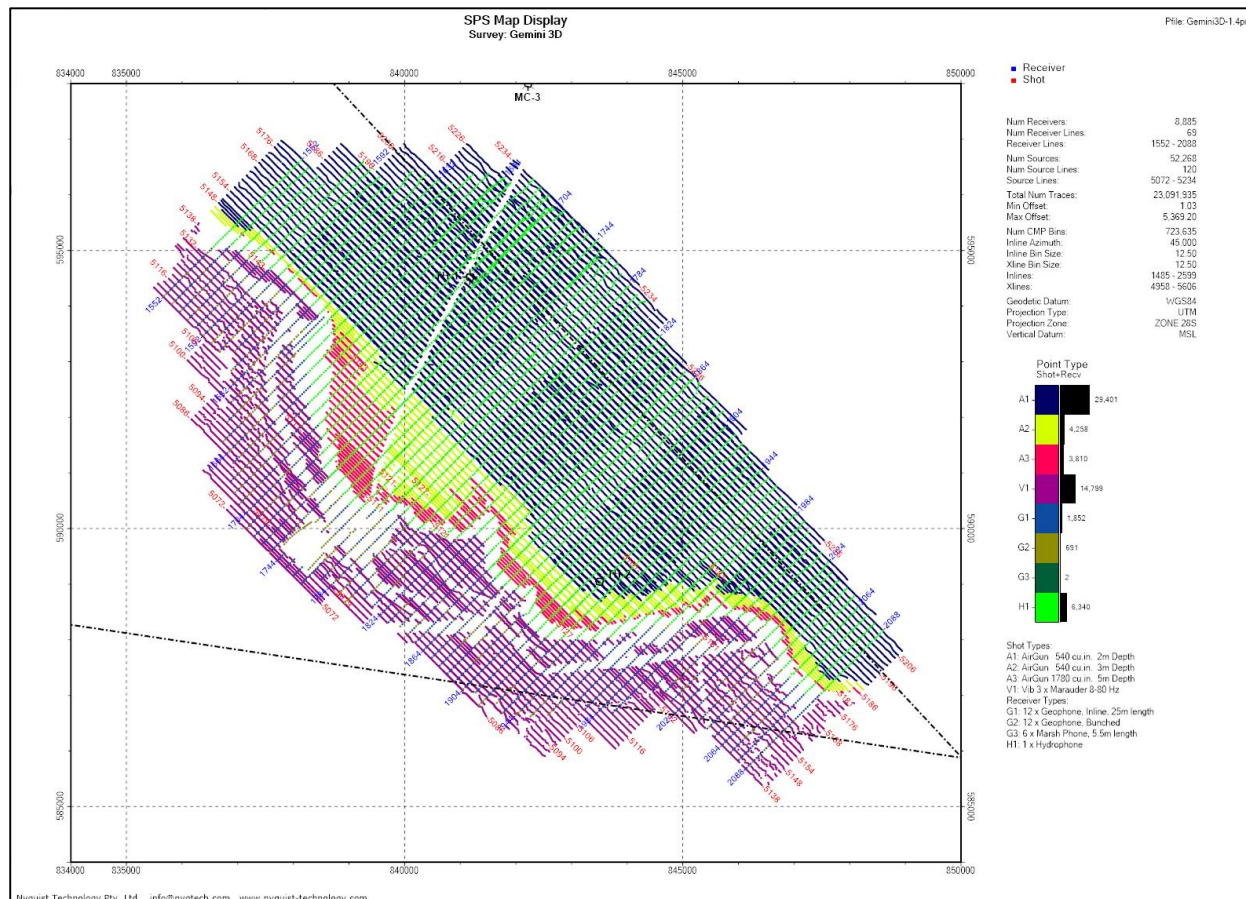


# Map Plot Examples

Shot/Recv map with the Water Depth colour coded.



Shot/Recv map with the Point Type as the colour attribute.



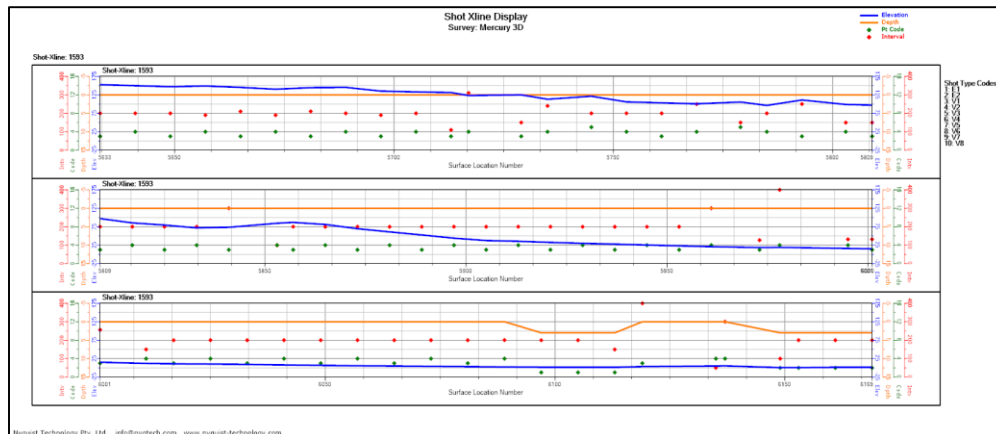


# Line Graph Plots

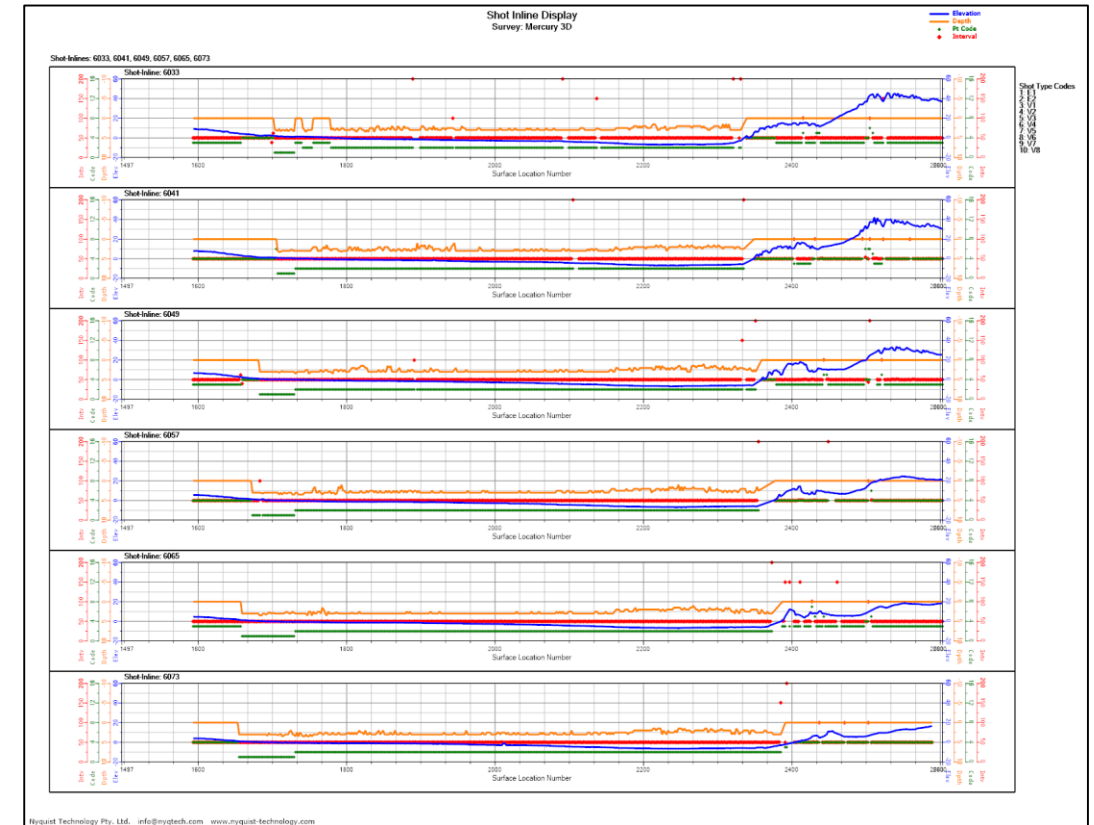
Shot and Recv Line Graph plots can be produced with the following features:

- Plots can be in the Inline or Xline direction.
- Up to five attributes can be shown per graph.
- Multiple graph windows can be shown per plot.
- Each graph window can contain a different line or the same line can be displayed across multiple windows.
- For multi-line graphs the increment between lines plotted can be set to any desired value.
- The X-axis can be the Point Number, X-coordinate or Y-coordinate value.
- The X-axis extent can be set to the survey extent, each lines extend or user defined.

Shot Xline Graph Plot showing the same line displayed over three graph windows.

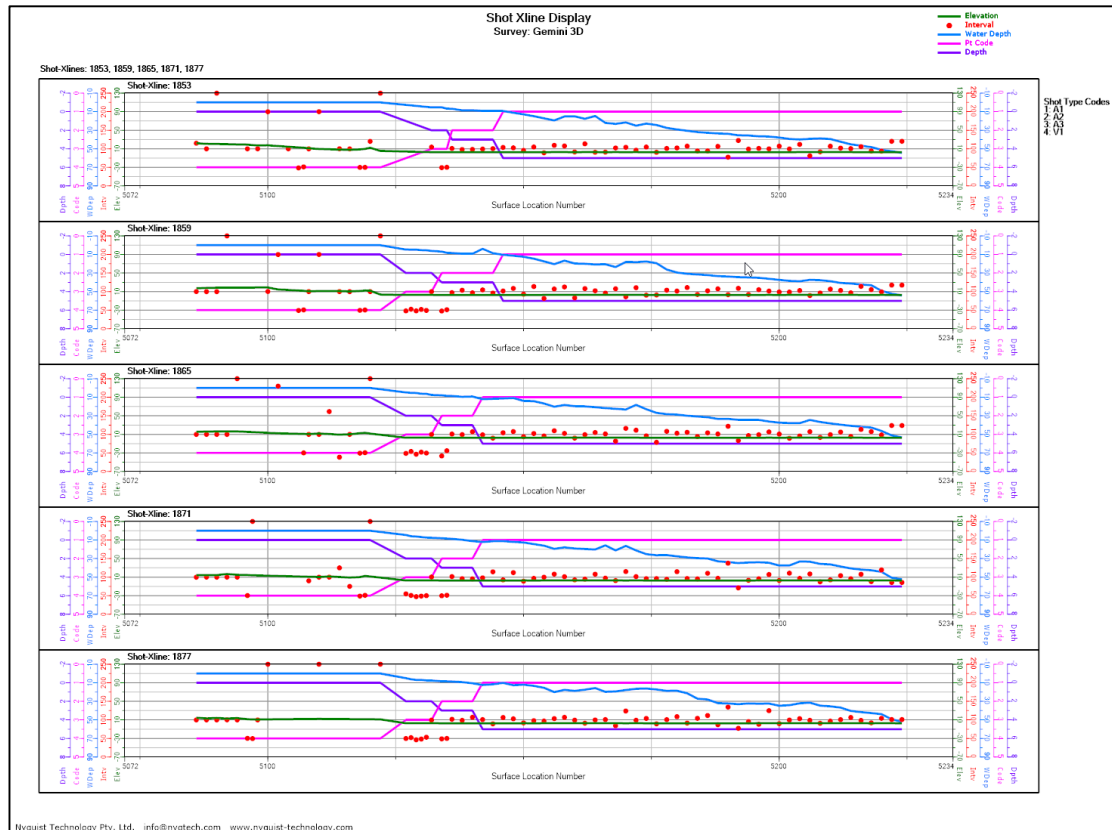


Shot Inline Graph Plot showing six graph windows with a different line in each window.

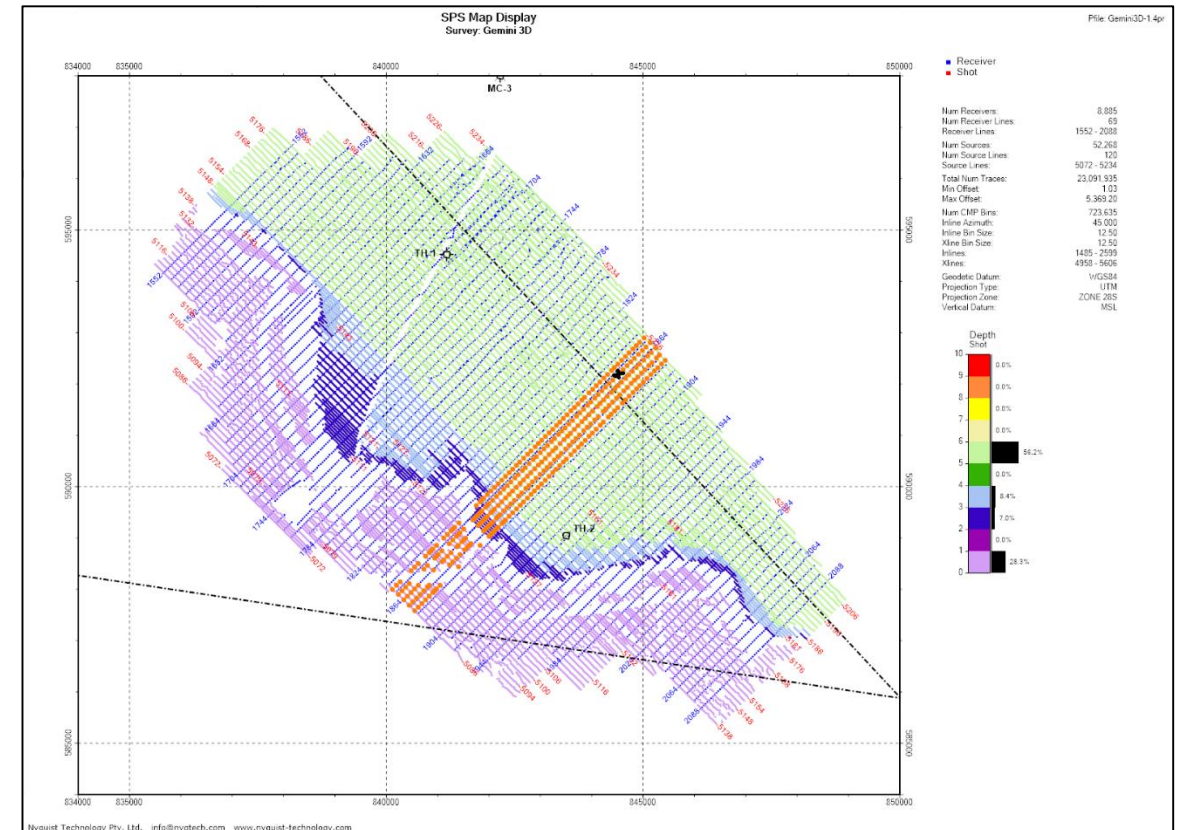


# Line Graph / Map Plot Example

Shot Xline Graph plot with five lines displayed.



Map display with Xlines from Graph plot automatically highlighted.





# Survey “Shooting” Animations

The survey can be “shot” as an animation to simulate the acquisition done in the field. Animations can be produced in 3 domains:

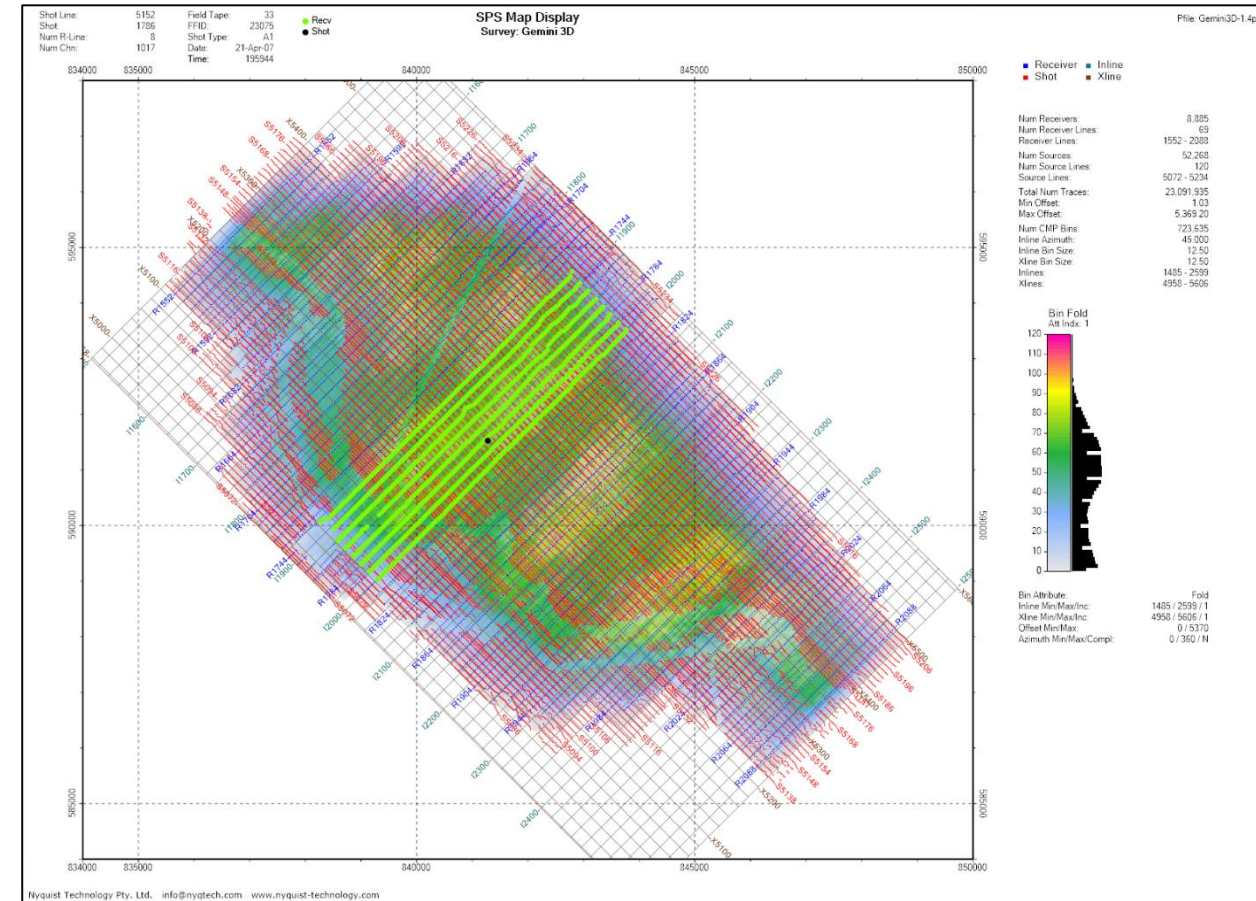
1. Shot Domain – highlights the Receivers that were live when a shot was acquired. Shots are animated in the order they were shot in. This corresponds to how the data was actually recorded in the field.
2. Receiver Domain – for a given Receiver, highlights all the Shots that were “shot” into that receiver. Receivers are animated in Receiver number order.
3. Bin Domain – highlights all the Shot/Receiver Pairs that contribute to the CMP’s in any Bin. Bins can be animated in Bin number, Inline or Xline order.

Animations can be used to visually check that the X-File relationship information is error-free and has been read correctly. They are also a good way of showing how a survey was recorded, particularly to non-geophysicists.

The first, last and increment are used to control the locations included in the animation. The animation can be done automatically or by manual stepping. In either case, the animation can be run in forward or backward directions.

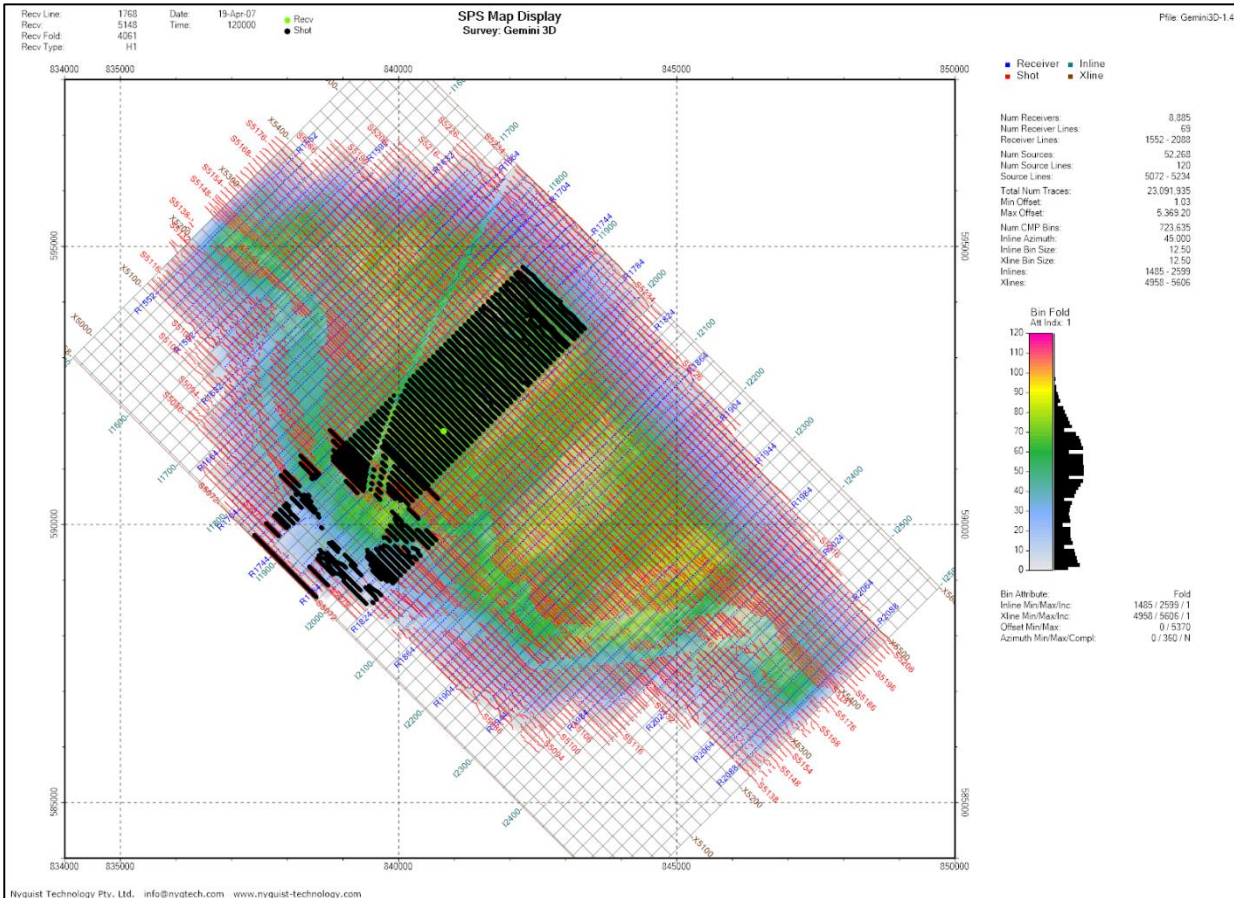
Each animation location can optionally be automatically saved as a picture file to enable a movie to be made of the animation.

Shot Domain Animation: Shows the swath of receivers (green) that were live when the highlighted Shot (black) was recorded.

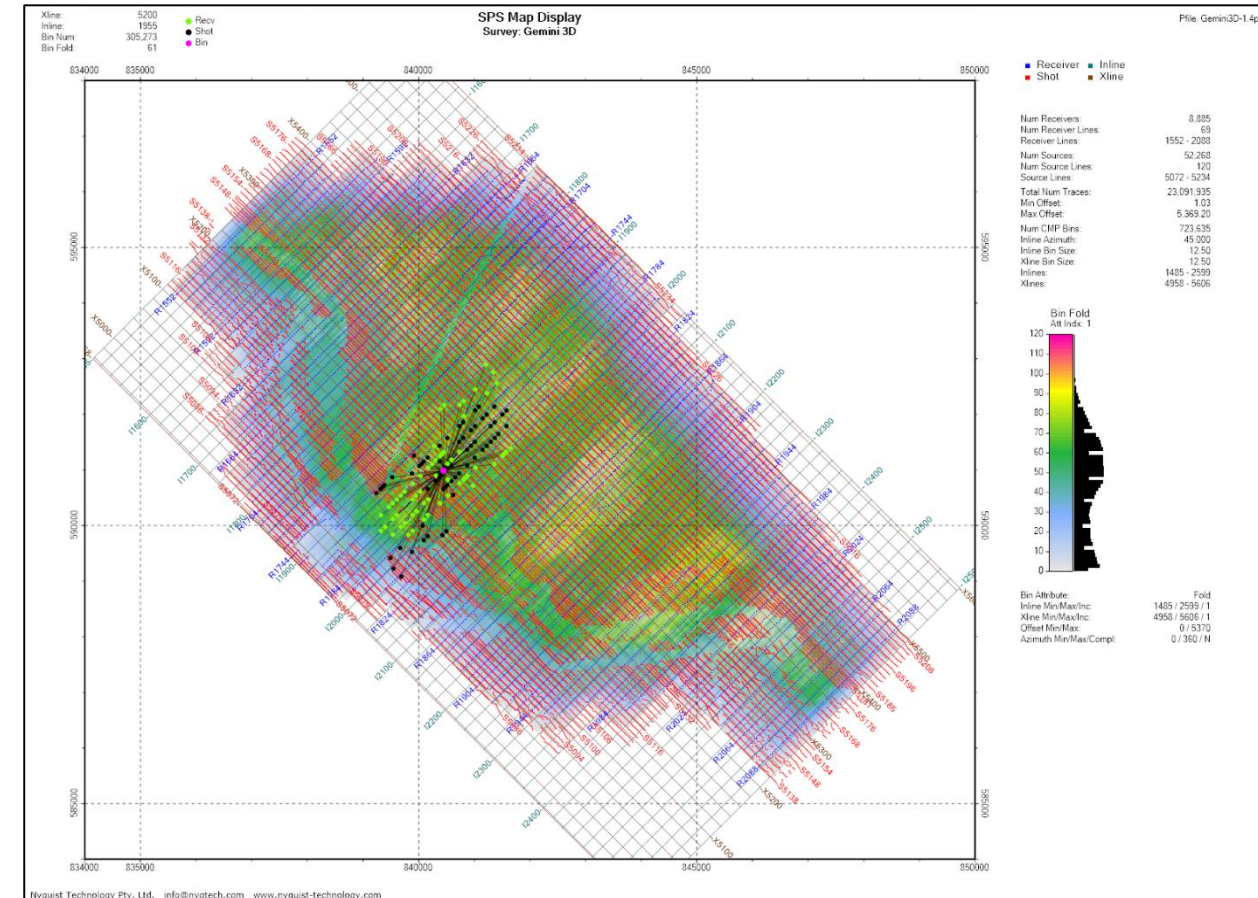


# Survey “Shooting” Animations

Receiver Domain Animation: Shows the all the Shots (black) that used the highlighted Receiver (green) when the data was recorded.



Bin Domain Animation: Shows the Shots (black) and Receivers (green) that make up all the CMP's that contribute to the highlighted bin (magenta). A line is drawn between Shot/Receiver pairs.

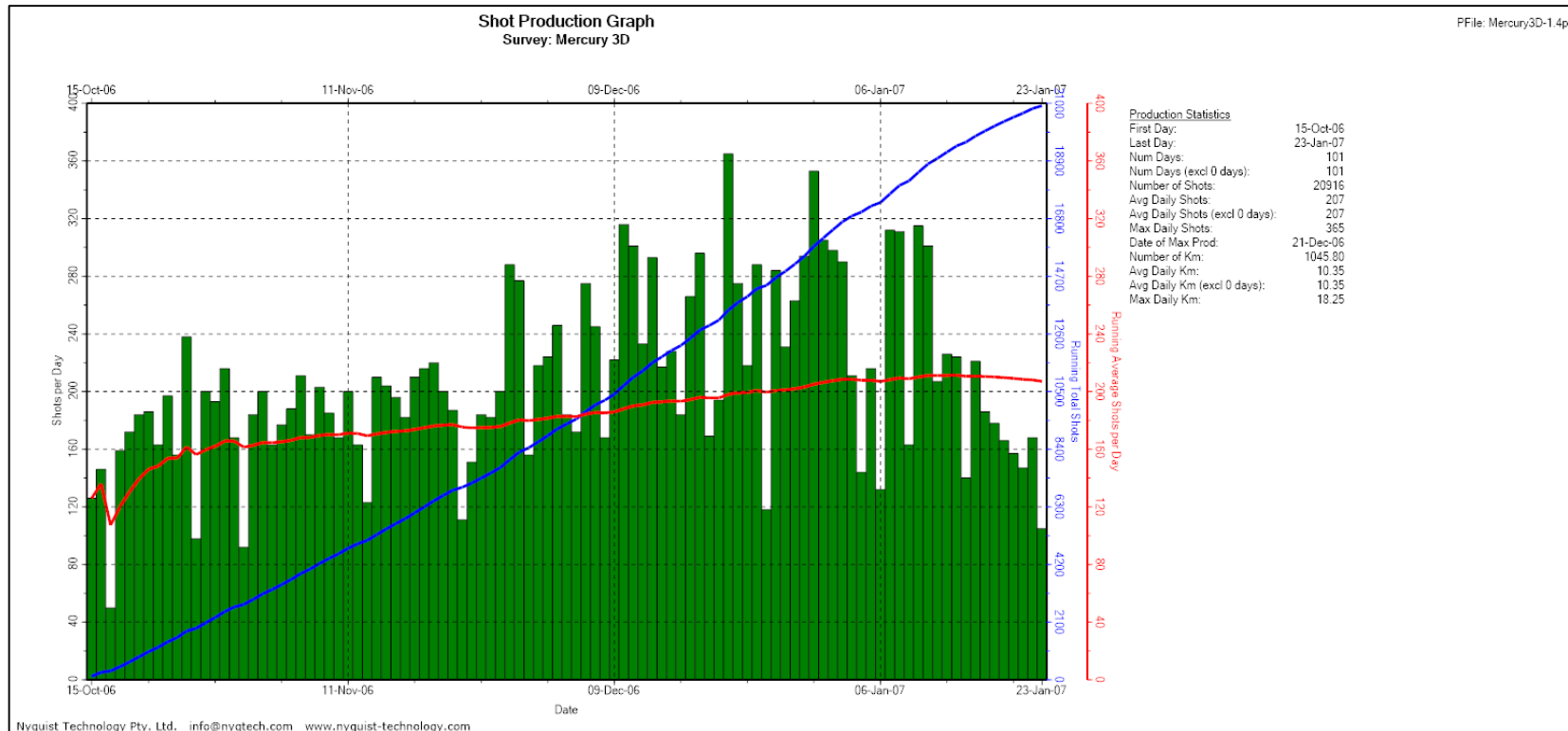


Note: This requires that CMP's have been calculated and the data Binned. Binning is covered later.

# Production Plots

Production Plots for both Shot and Receiver production can be produced. Each plot consists of a main histogram plot and up to four graph plots. The production data can be plotted in either Quantity or Km values. Available attributes that can be plotted include the daily production, total production, average daily production, daily start and/or end time, production hours and average daily speed.

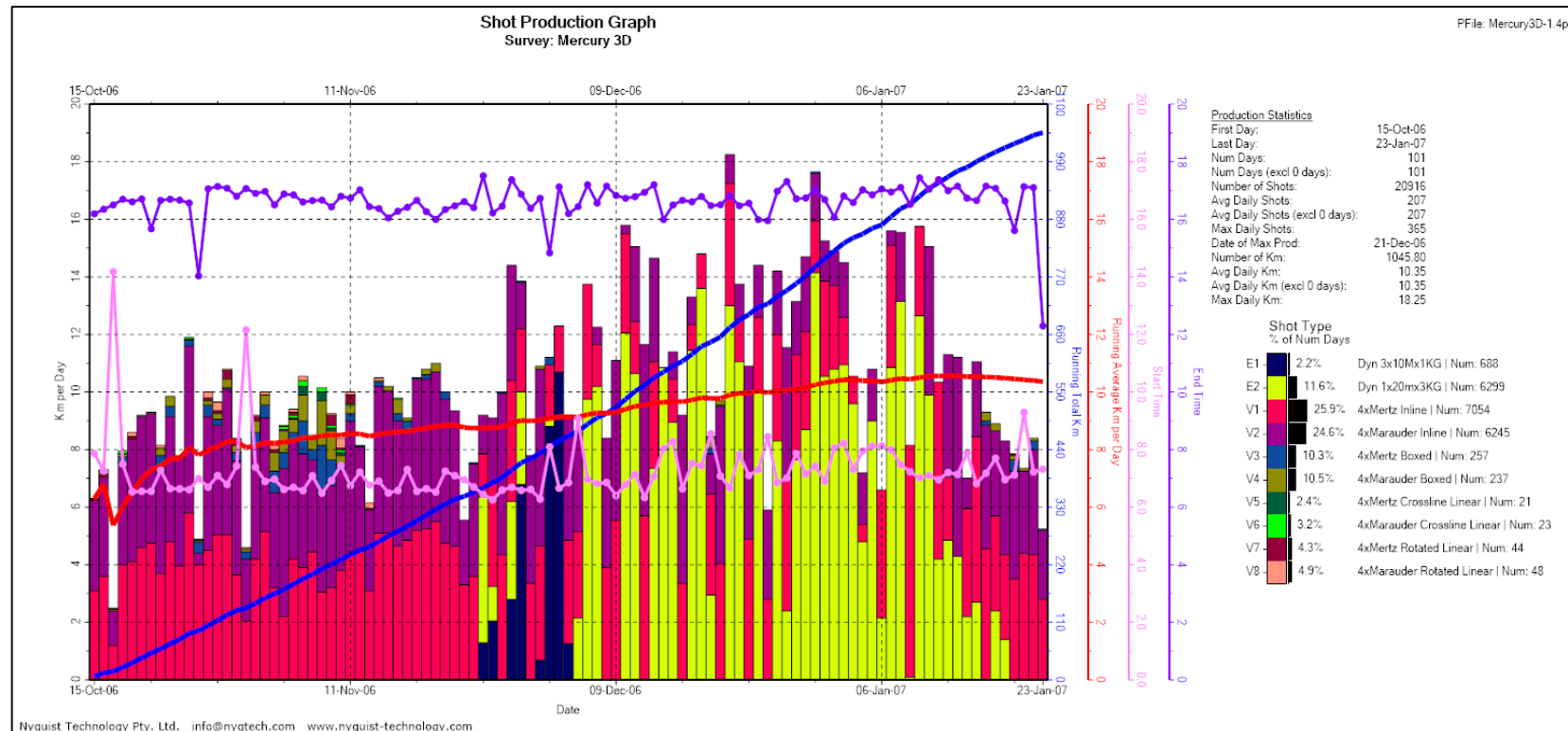
Shot Production Plot showing the shots per day (histogram), the running total shots (blue graph) and the running average shots per day (red graph).



# Production Plots

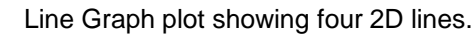
The histogram plot can also use the Shot (or Recv) Type for colour coding to provide further detail in the Production Plot.

Shot Production Plot showing the kms per day (histogram) colour coded by the Shot Type, the running total kms (blue graph), running average kms per day (red graph), the daily start time (pink graph) and the daily end time (purple graph).





Map of 2D survey with elevation colour coded.

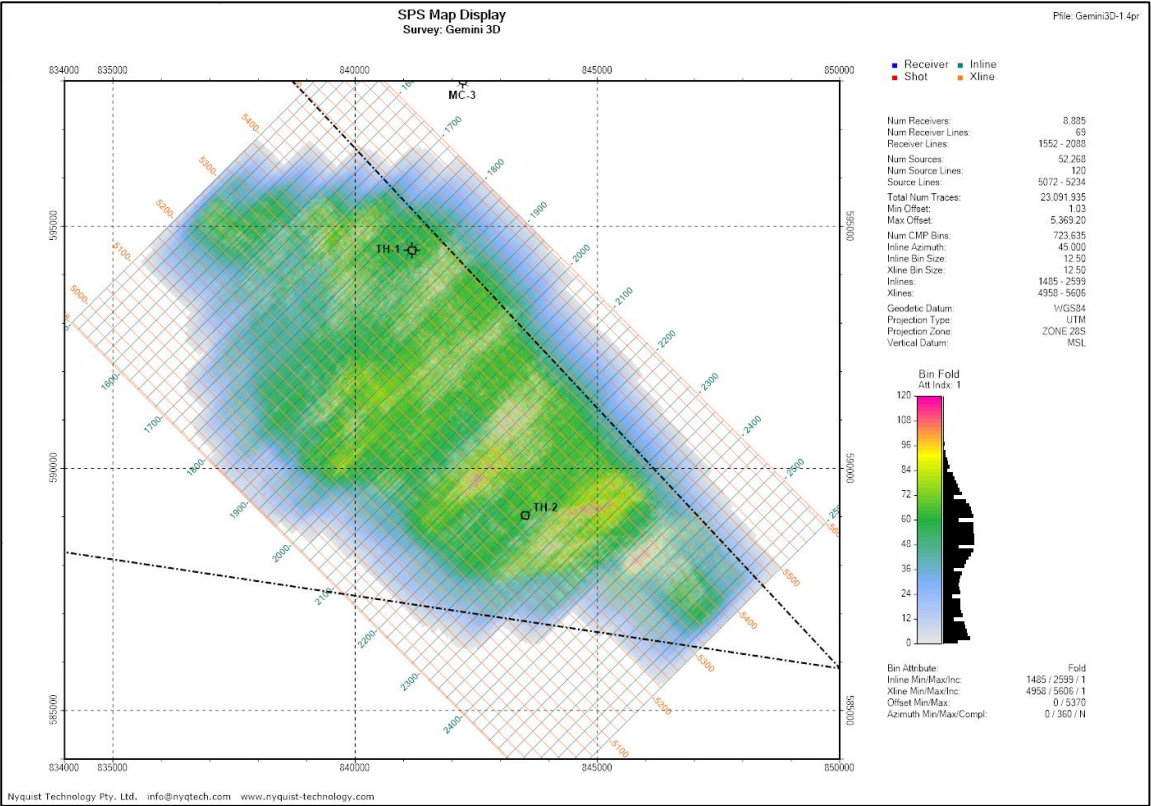


# Binned Attribute Displays

Binned Attribute displays and computations are covered in a separate presentation.

Shown below are two examples of the type of plots that can be produced as discussed in that presentation.

Bin Fold Map.



Rose Plot.

