



# Where is my Well?

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16<sup>th</sup> April, 2026

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# Where is my Survey Program?

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## Speaker Bio

Schlumberger  
Gearhart  
Develco / Baker Hughes  
Halliburton  
MicroTesla  
NOV  
xnDrilling  
Consultant

Physicist?

Field Operations in Wireline, MWD

Engineering, R&D

Manufacturing, Downhole Sensors

Product Management

Drilling automation

Wellbore Positioning



## ISCWSA online Course

### “Introduction to Wellbore Positioning”

#### Module 6.3:

### “Understanding and Using the ISCWSA Error Model”

## TERMINOLOGY

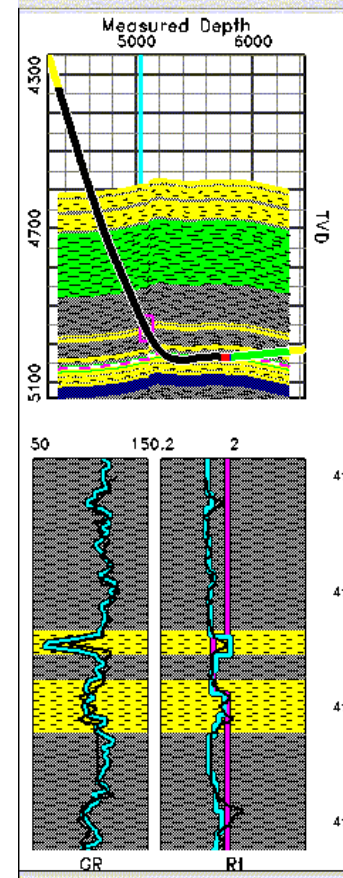
- ISCWSA Error Model
- Mathematical Framework
- Weighting Function
- Propagation Mode
- Tool Code
- Position Uncertainty Model (PUM)
- IPM
- Survey Program

## ISCWSA online Course

# “Introduction to Wellbore Positioning”

## From Module 6.3:

# “Developing and using the Survey Program”



## • What is a Survey Program

The ADSP (Actual Design Survey Program) is

- the survey or sequence of surveys :  
used to generate the “definitive” well path for the “as-drilled” Actual Well using a single survey or multiple surveys.

## • Why

Safety.

Economics

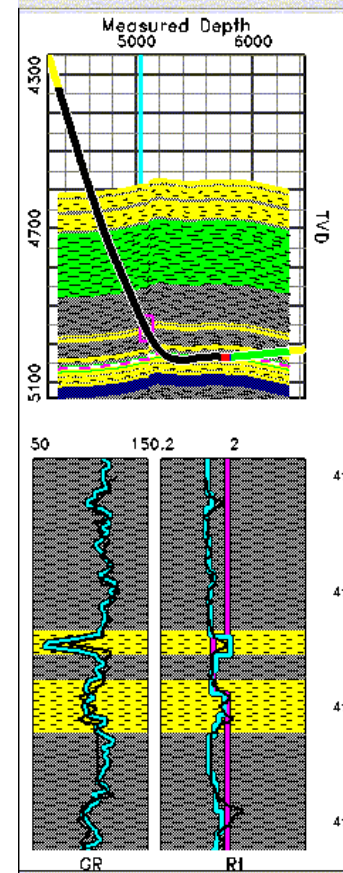
- Meet Well Positional Uncertainty goals
- Drilling, completions, reservoir, recompletions

## • When

- Planning phase
- Drilling phase
- Entire Life of well

- Development
- Implementation
- Recording and understanding

Title of slide

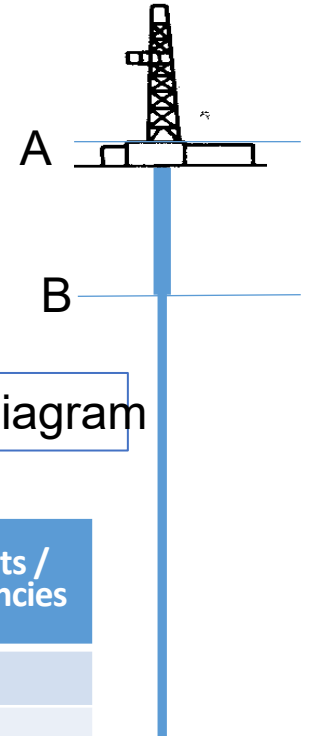




1. The survey program shall be considered part of the well design and **included in the drilling program**.
2. The survey program shall define the **required wellbore positioning requirements**, as they are required during various stages of operations and well construction activities acting as a set of instructions to the operations.
3. The survey program shall be **detailed enough** to ensure the requirements are clearly understood so that when executed the positional uncertainty assumptions for the well design remain valid.
4. A **fit-for-purpose** survey program shall:
  1. prescribe sufficient data to determine the well position with the accuracy estimation prescribed to **meet the defined well's positioning objectives**, and
  2. provide **sufficient survey interval** to accurately characterize the wellbore as it is mathematically interpolated between stations within **the bounds of the prescribed survey tool PUM**.

**API RP-78 basic Survey Program Contents reflecting the sequence of survey operations including**

1. survey tool type
2. survey interval
3. start/end depth
4. positional uncertainty model assignment
5. north reference



Simple Well Diagram

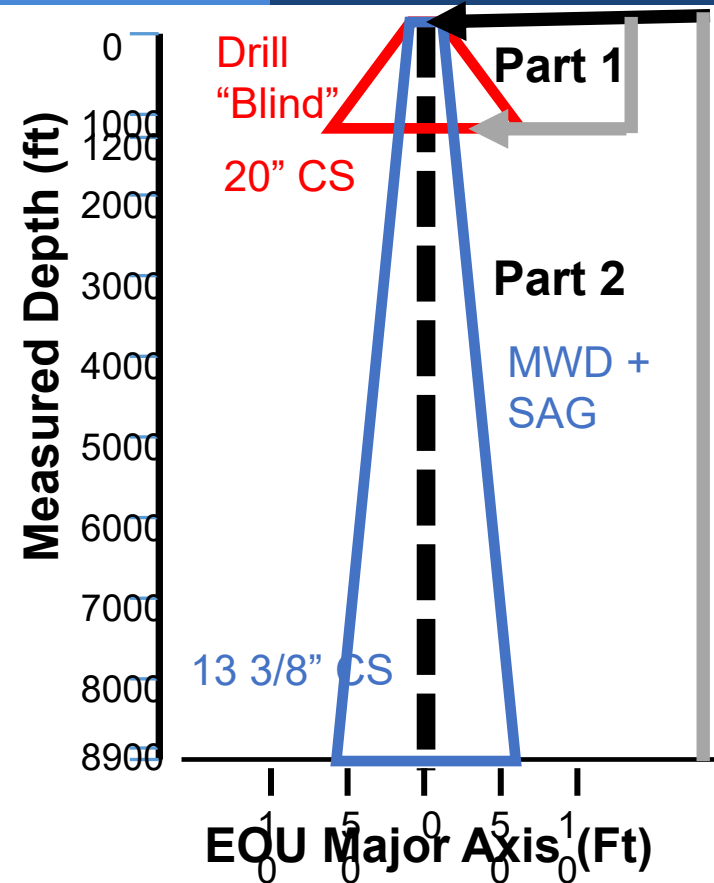
Part	Seq.	Survey Tool (survey tool code)	Service Provider	Hole Size (in.)	Casing Size (in.)	Well Depth Interval (ft)		Survey Frequency	Comments / contingencies
						From	To		
1	1	None	N/A	26	20	0	1200	Not Applicable	
2	1	MWD (MWD+SAG )	N/A	17 1/2	13 3/8	0	8900	1 per stand	

## Tree Diagram

A graphic representation of the Parts of the Well, and the Positional Uncertainties that are applicable at different points of the life of the well.

Part	Seq.	Survey Tool (survey tool code)	Service Provider	Hole Size (in.)	Casing Size (in.)	Well Depth Interval (ft)	
						From	To
1	1	None	N/A	26	20	0	1200
2	1	MWD (MWD+SAG)	N/A	17 1/2	13 3/8	0	8900

Tree Diagram





## Wellbore Positioning Technical Section

Part	Seq.	Survey Tool (survey tool code)	Service Provider	Hole Size (in.)	Casing Size (in.)	Well Depth Interval (m)		Survey Frequency	Comments / contingencies
						From	To		
1	1	None	N/A	32	26	0	113	N/A	
2	1	MWD (MWD-INC_ONLY)	N/A	32	26	0	113	1/stand	
	2	MWD (MWD+SAG)	N/A	24	18 <sup>5</sup> / <sub>8</sub>	113	1660	1/stand	
3	1	Gyro Casing Multishot (Gyro_CNSG+CASIN G)	N/A	24	18 <sup>5</sup> / <sub>8</sub>	0	1660	10m or less	
	2	MWD (MWD+IFR)	N/A	17	13 <sup>3</sup> / <sub>8</sub>	1660	2040	1/stand	
	3	MWD (MWD + IFR)	N/A	12 <sup>1</sup> / <sub>4</sub>	9 <sup>7</sup> / <sub>8</sub>	2040	3067	1/stand	
	4	MWD (MWD + IFR)	N/A	8 <sup>1</sup> / <sub>2</sub>	7	3067	3515	1/stand	



Wellbore Positioning Technical Section



The Industry Steering Committee on  
Wellbore Survey Accuracy (ISCWSA)

### Directional Survey Program

Part	Hole	Casing	Depth From	Depth To	Survey Tool	Vendor	Survey Frequency	QC Requirements	Tool Code
1	26"	-	Seabed @342 ft	865 ft	Keeper GyroMWD	Scientific Drilling	Maximum 30 ft	SDI JORPS	SDI_C510Gb_KPR_gyroMWD
	17 1/2"		865 ft	2975 ft	MWD+IFR1+SAG	slb	Stand (~96 ft)	SLB JORPS; MWD to be SAG corrected	A009Mc_MWD+IFR1+SAG_R5
2	-	13 3/8"	Seabed @342 ft	2950 ft	Keeper Continuous Gyro Multishot	Scientific Drilling	25 ft	SDI JORPS; S/Specialist Acceptance Req'd	SDI_C505Gb_KPR_WL_NS-CT
	12 1/4"	-	2975 ft	7455 ft	MWD+IFR1+SAG	slb	Stand (~96 ft); 6 overlapping repeats	SLB JORPS; MWD to be SAG corrected	A009Mc_MWD+IFR1+SAG_R5
C	12 1/4"	-	2975 ft	7455 ft	EMS	Scientific Drilling	Stand (~96 ft)	SDI JORPS; EMS to be SAG corrected	B010Mc_EMS+IFR1+SAG+MS_R5
3	-	9 5/8"	Seabed @342 ft	7400 ft	Keeper Continuous Gyro Multishot	Scientific Drilling	25 ft	SDI JORPS; S/Specialist Acceptance Req'd	SDI_C505Gb_KPR_WL_NS-CT
	8 1/2"	-	7455 ft	11200 ft	MWD+IFR1+SAG	slb	Stand (~96 ft); 6 overlapping repeats	SLB JORPS; MWD to be SAG corrected	A009Mc_MWD+IFR1+SAG_R5
C	8 1/2"	-	7455 ft	11200 ft	EMS	Scientific Drilling	Stand (~96 ft)	SDI JORPS; EMS to be SAG corrected	B010Mc_EMS+IFR1+SAG+MS_R5

### Survey Tool Details

OWSG Prefix	Short Name	Long Name	Application	Technology Type
A009Mc	A009Mc_MWD+IFR1+SAG_R5	ISCWSA MWD + IFR1 + Sag Correction	MWD with IFR1 (IFR or Crustal Anomaly Correction) and Sag Correction. NOT TO BE USED WHILE PLANNING A WELL UNLESS THE IFR MODEL WILL BE AVAILABLE AND USED DURING THE DRILLING OPERATION.	Generic Magnetic Tool
B009Mc	B009Mc_MWD+LRGM+SAG_R5	ISCWSA MWD + LRGM or WMM + Sag Correction	MWD Using IGRF or WMM with Sag Correction	Generic Magnetic Tool
B010Mc	B010Mc_EMS+IFR1+SAG+MS_R5	ISCWSA EMS + IFR1 + Axial Corr + Sag Correction	EMS with IFR1 (IFR or Crustal Anomaly Correction) and Axial Correction and Sag Correction	Generic Magnetic Tool
SDI_C505Gb	SDI_C505Gb_KPR_WL_NS-CT	SDI Keeper Wireline Gyrocompass-Initialized Continuous	Standard Keeper Wireline (drill pipe or casing depth correlated)	Contractor Specific Gyro Tool
SDI_C510Gb	SDI_C510Gb_KPR_gyroMWD	SDI Keeper gyroMWD	Keeper gyroMWD North-Seeking Gyrocompass	Contractor Specific Gyro Tool



## Wellbore Positioning Technical Section



The Industry Steering Committee on  
Wellbore Survey Accuracy (ISCWSA)

Actual Design Properties

General | Survey Program | Vert Section | Validation | Audit Information | Change History

Path Details

Make Definitive from Survey Tie-ons     Lock The Definitive Survey

Path is projected to TD: 13610.00 ft    TD Annotation: VERIFIED BY

Sidetrack Surveys run back into original hole, therefore enter Sidetrack Depth: 1460.00 ft

	MD From (ft)	MD To (ft)	Survey (Wellbore)	Survey Tool
1	16.00	1285.00	13.5" SURFACE MWD SURVEYS (ORIG HOLE) 16-1285	B006Mb_MWD+IGRF
2	1365.00	1460.00	8.75" INTERMEDIATE MWD SURVEYS (ORIG HOLE) 1365-8400	A005Mb_MWD+IFR1
3	1553.00	8464.00	8.75" INTERMEDIATE SIDETRACK MWD SURVEYS (ST 1) 1553-846	A005Mb_MWD+IFR1
4	8505.00	13556.00	6.125" PRODUCTION MWD SURVEYS (ST 1) 8505-13556	A005Mb_MWD+IFR1
5				

OK    Cancel    Apply    Help

### Well Information

Well Name:	Example Well 1	Rig:	Example Rig
Revision:	2	Field:	Denver-Julesburg
Operator:	Example Operator	Pad:	Example Pad
Survey Contractor:	Example MWD	State, Country:	Colorado, USA
AFE #:	MV1234567	County:	Weld

Coordinate System: US State Plane

Geo Datum: NAD83

Map Zone: Colorado North (ftUS)

Vertical Datum: Mean Sea Level

North Reference: GRID

TVD Reference: 4930

Latitude: 40.549018 N

Longitude: 104.553952 W

Northings: 1,444,250.70 US Feet

Eastings: 3,262,900.10 US Feet

Survey Calculation Method: Minimum Curvature

FAC Sigma Level: 2.00

### Survey Program

Hole Section	Start Depth (ft)	End Depth (ft)	Survey Method	Magnetic Reference	Corrections	Error Model for Survey QC
Surface	0	2,000	Wireline Gyro	None	None	OWSG Rev. 5 - Gyro NS+CT
Intermediate	2,000	5,000	MWD+IFR1	IFR1	None	OWSG Rev. 5 - MWD+IFR1
Production	5,000	20,000	MWD+IFR1+SAG+MS	IFR1	MSA + Sag	OWSG Rev 5 - MWD+IFR1+SAG+MS

### Geomagnetics

Date	Total Field (nT)	Declination (deg)	Dip Angle (deg)	Grid Conv. (deg)	Total Correction	Hole section
2/23/2023	51743.8	7.48	66.72	0.61	6.87	Intermediate / Production

Refer to the survey program for more details on individual survey types and how to account for 2D magnetic corrections.

- Well Planning Software and Reports
- Sections of the Drilling Program
- Survey Management Company



## QUESTIONS?

Can YOU give me the Survey Program for the well you are working on?