

DEPARTMENT OF THE INTERIOR
MINERALS MANAGEMENT SERVICE

**DIRECTIONAL SURVEY
REPORTER'S HANDBOOK**

Revised June 25, 2007

For Use in Reporting Directional Surveys for Wells Drilled on the Outer Continental Shelf

Foreword

This Directional Survey Reporter's Handbook is designed to aid in the submission of data required by regulation 30 CFR Part 250 and provides specific guidance for lessees/operators to submit directional survey data to the Minerals Management Service (MMS).

That document is found online at:

http://www.gomr.mms.gov/homepg/mmsforms/REPHANDBK_DIRSVY.pdf

This Directional Survey Reporting Handbook provides guidance for lessees/operators to submit directional survey data to MMS in accordance with reporting requirements under 30 CFR 250

and NTL Nos. 2006-G16 ([http://www.gomr.mms.gov/homepg/regulate/regs/ntls/2006 NTLs/06-g16.pdf](http://www.gomr.mms.gov/homepg/regulate/regs/ntls/2006%20NTLs/06-g16.pdf)) and 2004-N03 (<http://www.gomr.mms.gov/homepg/regulate/regs/ntls/ntl04-n03.html>). This document was revised to show active NTLs only.

CODE OF FEDERAL REGULATIONS (CFR)

The Code of Federal Regulations (CFR) (e.g. 30 CFR 250) provides general and permanent rules published in the Federal Register. The Code is divided into 50 titles (e.g. Title 30 – Mineral Resources) which represent broad areas subject to Federal regulations. Each title is divided into chapters (e.g. Chapter II – Minerals Management Service, Department of the Interior) which usually bear the name of the issuing agency. Each chapter is further sub-divided into parts (e.g. Part 250 – Oil and Gas and Sulfur Operations in the Outer Continental Shelf) covering specific regulatory areas. Title 30 – Mineral Resources – Chapter II – Minerals Management Service (MMS), Department of the Interior, Part 250 – Oil and Gas and Sulphur Operations in the Outer Continental Shelf (OCS) contains regulations for OCS mineral activities. The CFR can be found online at: <http://www.gpoaccess.gov/cfr/index.html> and 30 CFR 250 can be found online at: http://www.access.gpo.gov/nara/cfr/waisidx_06/30cfr250_06.html.

WHO MUST FILE?

Any operator of a lease or unit on the Federal OCS who has drilled a well for the purposes of exploration for, or development of, oil or gas resources is required to submit directional surveys. This includes wells currently drilling, previously drilled and temporarily abandoned, or previously drilled and completed. 30 CFR 250.461, 468, and 469 require lessees/operators to submit directional surveys.

WHAT ARE THE REQUIREMENTS FOR DIRECTIONAL AND INCLINATION SURVEYS?

The regulations at 30 CFR 250.461 contain the requirements for directional and inclination surveys. For this subpart, MMS classifies a well as vertical if the calculated average of inclination readings does not exceed 3 degrees from the vertical.

(a) Survey requirements for a vertical well:

- (1) You must conduct inclinational surveys on each vertical well and record the results. Survey intervals may not exceed 1,000 feet during the normal course of drilling;
- (2) You must also conduct a directional survey that provides both inclination and azimuth and digitally record the results in electronic format:
 - (i) Within 500 feet of setting surface or intermediate casing;
 - (ii) Within 500 feet of setting any liner; and
 - (iii) When you reach total depth.

(b) Survey requirements for directional well:

You must conduct directional surveys on each directional well and digitally record the results. Surveys must give both inclination and azimuth at intervals not to exceed 500 feet

during the normal course of drilling. Intervals during angle-changing portions of the hole may not exceed 100 feet.

(c) Measurement while drilling:

You may use measurement-while-drilling technology if it meets the requirements of this section.

(d) Composite survey requirements:

- (1) Your composite directional survey must show the interval from the bottom of the conductor casing to total depth. In the absence of conductor casing, the survey must show the interval from the bottom of the drive or structural casing to total depth; and
- (2) You must correct all surveys to Universal-Transverse-Mercator-Grid-north or Lambert-Grid-north after making the magnetic-to-true-north correction. Surveys must show the magnetic and grid corrections used and include a listing of the directionally computed inclinations and azimuths.

(e) If you drill within 500 feet of an adjacent lease, the Regional Supervisor may require you to furnish a copy of the well's directional survey to the affected leaseholder. This could occur when the adjoining leaseholder request a copy of the survey for the protection of correlative rights.

WHAT INFORMATION MUST BE FILED?

According to 30 CFR 250.468(a), "you must submit copies of logs or charts of electrical, radioactive, sonic, and other well-logging operations; directional and vertical-well surveys; velocity profiles and surveys; and analysis of cores to MMS." The MMS may also require additional well reports and records of operations (30 CFR 250.469). NTL Nos. 2006-G16 and 2004-N03 provide information on directional and inclination survey data submission requirements.

Under these authorities, the directional or inclination survey records that you must submit to the MMS include the following:

- **One digital copy of the final composite directional survey.**
- Submit these survey results on CD-ROM or DVD-ROM, stored in ASCII format.
- According to 30 CFR 250.461(d) (2), "You must correct all surveys to Universal-Transverse-Mercator-Grid-north or Lambert-Grid-north after making the magnetic-to-true-north correction."
- Use the specific formatting for directional data described in "*Directional Survey Exchange Format*" in NTL No. 2004-N03, Attachment 1
<http://www.gomr.mms.gov/homepg/regulate/regs/attachNTL2004-N03.pdf>
- NTL No. 2006-G16 eliminates the submittal of all paper copies of borehole data submitted to MMS, including directional survey paper copies.

Do not submit copies of separate interim runs to the MMS GOMR. Send final composites only. If your use of more than one vendor prevents the consolidation of the separate surveys within a well, submit the final composite survey from each vendor.

We encourage direct submittal of the completed survey from the acquiring service company.

WHEN MUST THE SURVEY BE SUBMITTED?

30 CFR 250.468(a) allows each Region to specify well records reporting and submission guidelines. NTL No. 2004-G16 redefines procedures for GOMR well records submittal requirements and delinquent dates. It specifies that **directional surveys must be submitted within 30 days of the “Date Operations Completed”** of the last logging run (MWD/LWD or wireline) that you report in Item 13 of the Well Activity Report (Form MMS-133S) for each 12-digit wellbore, sidetrack, and/or bypass.

The MMS GOMR recognizes that in certain situations (e.g., borehole or mechanical problems) it is not practical to submit individual sidetrack or bypass data for short penetrated intervals. In those cases, you may request a departure from us for the timely submittal of such data. If you request it, the MMS GOMR Technical Data Management Section (TDMS) Office may grant you a departure under 30 CFR 250.142 for a new required date for submitting the data pertaining to that well.

The MMS will provide reminders and notices or initiate remedies such as issuing Incidents of Non-compliance when the required data are not received in a timely manner.

WHERE MUST DIRECTIONAL SURVEYS, REPORTS AND RELATED CORRESPONDENCE BE SENT?

Related correspondence, inquiries, and data should be submitted to the appropriate OCS Region at the corresponding address below.

Region	Mail Directional Surveys to:	Send comments or questions to:
Gulf of Mexico and Atlantic Region	Minerals Management Service (MS 5020) Technical Data Management Section 1201 Elmwood Park Boulevard New Orleans, Louisiana 70123-2394 E-mail: tdms@mms.gov Phone: (504) 736-2887 Fax: (504) 736-2857	Terri Keller 504-736-2955 or Theresa.Keller@mms.gov
Alaska Region	Minerals Management Service (MS8200) Office of Field Operations 3801 Centerpoint Drive, Suite 500 Anchorage, Alaska Phone: (907) 334-5300	Doug Choromanski 907-334 5308 or Douglas.Choromanski@mms.gov
Pacific Region	Minerals Management Service (MS 7100) Office of Reservoir Evaluation and Production 770 Paseo Camarillo Camarillo, California 93010 E-mail: rep@mms.gov Phone: (805) 389-7700 Fax: (504) 736-2857	Mike Brickey 805-389-7701 or Michael.Brickey@mms.gov

AMENDED REPORTING AND SITUATIONS REQUIRING CORRECTION.

In the event of an incorrectly identified survey or misidentified survey information, please submit corrected information to the appropriate address cited above with a notation to indicate that information is a corrected copy. Examples of misidentified information may include wrong API number, wrong well name suffix, wrong well bore name, or invalid survey data points, etc.

RELATED LINKS:

The Code of Federal Regulations can be found at:

<http://www.gpoaccess.gov/cfr/index.html> (CFR main link)

http://www.access.gpo.gov/nara/cfr/waisidx_06/30cfr250_06.html (30 CFR 250)

An overview of OCS Regulations and Auxiliary links can be found at:

http://www.gomr.mms.gov/homepg/regulate/regs/reg_sum.html

National Level NTLs:

[NTL No. 2000-N07 Well Naming and Numbering Standards](#)

Effective Date: May 1, 2001

[NTL No. 2004-N03 Directional and Inclination Survey Data Submission Requirements](#)

Effective Date: July 26, 2004

Gulf of Mexico OCS NTLs:

All Gulf of Mexico Notice to Lessees and Information to Lessees and Operators can be found at:

<http://www.gomr.mms.gov/homepg/regulate/regs/ntlntl.html>

[NTL 2006-G16 \(Addendum 1\) Well Records Submittal \(Updated\) Elimination of Paper Copy Data Submittals \(Addendum No. 1\)](#)

Effective February 1, 2007

[NTL No. 2006-G16 Well Records Submittal \(Updated\) Elimination of Paper Copy Data Submittals](#)

Effective Date: July 15, 2006

[NTL No. 2000-G03 Functional Responsibility of MMS Regulations](#)

Effective Date: January 28, 2000

All NTLs for the Alaska OCS Region can be found at:

<http://www.mms.gov/alaska/regs/NTLS.HTM>

All NTLs for the Pacific OCS Region can be found at:

<http://www.mms.gov/omm/pacific/offshore/ntls/ntllist.htm>

Directional Survey Exchange Format

Definition of terms

- A record consists of 130 bytes, including the carriage-return and line-feed (HEX 'ODOA').
- A file is a group of header records and data records physically separated by an inter-record gap (a blank record) and terminating with a control Z (HEX '1A').

Specifications for digital reporting of data on CD-ROM (compact disc, read only memory) or DVD-ROM (digital versatile disc, read only memory)

- CD-ROM or DVD-ROM coded in ASCII mode standard as shown in the examples.
- A file cannot span multiple CD-ROMs or DVD-ROMs.
- The CD-ROM or DVD-ROM may contain numerous surveys as long as each file has the appropriate header and data points.
- Label each disc so that its format and content can be readily ascertained. This labeling shall include; MMS assigned unique 12-digit API Number: (e.g. 700123456000), the Well Name/Number (e.g. AA001), the Well Name Sidetrack-Bypass Suffix (e.g. ST01BP01), and Bottom Hole Lease Number (e.g. G1000), and the contractor, if available.
- The disc label should identify the name, address, and telephone number of the person to contact should problems occur.

Subdivision of content

- A directional survey should contain header records (indicated with an "H"), data records (indicated with a "D"), and terminate with an end-of-file marker.
- Header records should precede the first data record in the file. There should be a set of header records for each borehole with a unique 12-digit API number. Identify each header record with an "H" as the first character of the record, an MMS header type code, a blank space, then the relevant data.
 - The "H" and MMS type code cover columns 1-5,
 - the MMS Item name covers columns 7-41 (do not include any spacing between words in the MMS Item name, as shown in the chart and example in the Appendix),
 - and the MMS format statement begins in column 43 and ends in column 130 with no leading spaces.
 - In addition, enter a <carriage return> after the last column used in each header record in lieu of blank spaces. Insert one blank line (do not insert any data or information) between the last header record and the first set of data points.
- Identify each data record with a "D" as the first character of the record. As many data records as necessary may be used within a file. Data records will start with Data Column Descriptions on the first line of the data followed by "|" between each item (i.e., D|MeasuredDepth|Azimuth|ToolType).
 - The Data Section Identifier (D) is in column 1,
 - the Measured Depth spans columns 3-10,
 - the Inclination starts at column 12 and ends at column 18,
 - the Azimuth covers columns 20-26,
 - the Tool Type extends over columns 28-30
 - and the Station Type is in column 32.
 - In addition, enter a <carriage return> after the last column used in each record in lieu of blank spaces.

APPENDIX

EXCHANGE FORMAT FOR DIRECTIONAL SURVEYS (Refer to NTL 2004-N03)

An example of a complete MMS ASCII file is shown below. The first column in the table represents the equivalent header type codes and column numbers for the UKOOA P7/2000 data exchange format for well deviation data for format comparison. The MMS Type codes cover columns 1-5, the MMS Item name cover columns 7-41, and the MMS format statements begin in column 43 and end in column 130 with no leading spaces. MMS has added the following cards: “H0112 WellNameSuffix”, “H0114 BottomHoleLeaseNumber”, “H0624 TieinMeasuredDepth” and “H00625 TieinTotalVerticalDepth”. The format description is given in FORTRAN style (i.e. F-float, A-character, I-integer, X-space). Example (A4, 2X, F6.3) = ABCD 11.111.

UKOOA Type	MMS Type	MMS Item	MMS Format	Description
H0001	H0001	FormatNameVersion	A20	Format Name and Version: MMS-P7/2000_v1.0 or UKOOA P7_v2000 1.01
H0002	H0002	FormatType	I1	Format Type: ASCII = 1, XML = 2
H0110	H0110	WellName	A58	Well Name: The name assigned to the well. It may be a special name or the name of the property to which the well belongs. More information and specific details on Well Naming and Numbering Standards can be found in NTL 2000-N07 (e.g., AJ001).
	H0112 Added Card	WellNameSuffix	A8	Well Name Suffix: The well name suffix is an extension to the well name which identifies each wellbore and indicates the number of times a well has been sidetracked or bypassed. An 8-character suffix to the well number that identifies a sidetrack (ST) or bypass (BP) and the sidetrack and bypass number (e.g., STNNBPNN). An original hole will have a suffix of ST00BP00, the first sidetrack off the original borehole will have a suffix of ST01BP00, the first bypass off the original borehole will have a suffix of ST00BP01. If the first sidetrack is bypassed, the suffix will be ST01B01. More information and specific details on Well Naming and Numbering Standards can be found in NTL 2000-N07 (e.g., ST00BP01).
	H0114 Added Card	BottomHoleLeaseNumber	A6	Lease Number: The lease number assigned by the Minerals Management Service to the lease that contains the bottomhole location of a borehole. More information and specific details on Well Naming and Numbering Standards can be found in NTL 2000-N07 (e.g., G09999, Y09999, A09999, or P09999).

H0130	H0130	UniqueWellIdentifier	A58	API number: A unique well identification number consisting of (left justified) a two-digit state code (or pseudo for Offshore), a three-digit county code (or pseudo for Offshore), a five-digit unique well code and, a two-digit sidetrack code as defined in API Bulletin D12A (e.g., 177561234501).
H0170	H0170	ParentWellIdentifier	A58	Parent Well Identifier: The unique well identification number or API number of the borehole that establishes a hierarchy of wellbores. The Parent Well Identifier References the wellbore from which the current wellbore was kicked off. The first ten digits of the 12-digit API Number of the parent wellbore must be equivalent to the subsequent sidetrack or bypass boreholes. The 11th and 12th digits will be "00" for the original borehole (e.g., 177671234500).
H0200	H0200	GeodeticDatum	A58	Geodetic Datum Code: A common abbreviation for the reference horizontal datum that specifies the type of geodetic reference systems used in the collection of spatial data. Refer to NTL No. 2002-G12 for more specific instructions (e.g., NAD27).
H0210	H0210	ProjectionIdentification	A53	Projection Identification: The type of projection used to represent the Earth as a 2-deminisional map. More specifically, a specific type of representation that identifies the type of coordinate projection used to describe the point (x-y) values. Examples of map projections: UTM Zones, Transverse Mercator, Lambert and State Plans such as UTM 15 or Louisiana Lambert.
H0300	H0300	ElevationReference	A58	Elevation Reference: The physical reference point used to measure depth elevations. The following Operator elevation reference codes can be used: KB Kelly Bushing, DF Drill Floor, RT Rotary Table, RB Rotary Bushing, MT Drill Floor Mat, GL Ground Level, CE Casing Flange, SL Sea Level, TS Topographic Sheet, EY Estimated, IN Interpolated, ES Echo Sounder, or UN Unknown. In addition, the elevation reference is equal to the UKOOA's Well Reference Point (WRP) (e.g., KB or Kelly Bushing).
H0390	H0390	Elevation	F8.2	Elevation: The distance from the physical reference point to the datum. The Measured Depth Elevation in units from the Elevation Reference to mean sea level. For the MMS, mean sea level will be considered equal to the UKOOA's Vertical Reference Datum (VRD) (e.g., 109.00).
H0400	H0400	Operator	A58	Operator: The person the lessee(s) designates as having control or management of operations on the leased area or a portion thereof. An operator can be a lessee; the MMS-approved designated agent of the lessee(s), or holder of operating rights under an MMS- approved operating rights assignment. If multiple vendors have run the survey, list the survey company that created the composite survey (e.g., Big Exploration Inc.).
H0440	H0440	SurveyCompany	A58	Survey Company: The Contractor, Service Provider, or business associate, such as

				an individual or company that conducts the inclination survey (e.g., Hamberger Well Services).
H0450	H0450	SurveyDate	I4,2(I2)	Survey Completion Date: The full date on which the last run of the composite survey is completed. The required format is a four-digit year, the month, and day in YYYYMMDD form. January 1, 2000 would be 20000101.
H0500	H0500	AzimuthReference	A16	North Reference: The geographic reference used to measure azimuths. (T-True, M-Magnetic, G-Grid, and U-Unknown.). A directional survey submitted in Grid North is the current requirement in 30 CFR250 Subpart D – Oil and Gas Drilling Operations (e.g., G or Grid).
H0510	H0510	MagneticDeclination	F6.3	Magnetic Declinations: The angle between magnetic and geographical meridians at any location, expressed in (+/-) degrees east or west to indicate the direction of magnetic north from true north. West of the zero declination line is negative, East of the zero declination line is positive (e.g., +0.894).
H0520	H0520	GridConvergence	F6.3	Grid Convergence: The horizontal angle in (+/-) degrees at a point between true north and grid north. The angle is proportional to the longitude difference between a location and central meridian. Grid convergence is positive east of the central meridian of a projection and negative west of the central meridian (e.g., -1.252).
	H0624 Added Card	TieinMeasuredDepth	F8.2	Tie in Measured Depth: The measured depth or distance from the Elevation Reference to the tie-in-point of the survey when a survey begins below the Elevation Reference. The tie-in-point is the shallowest point of a survey that is used to link its depth to an original wellbore, previous wellbore, or from a lateral to a spoke in a horizontal well (e.g., 011309.00).
	H0625 Added Card	TieinTotalVerticalDepth	F8.2	Tie in Total Vertical Depth: The vertical depth or distance from the Elevation Reference point to the tie-in point of the survey (e.g., 011292.27).
H0630	H0630	TieinYoffset	F8.2	Tie in Y Offset: The North or South distance between a vertical axis passing through the tie in point and a vertical axis passing through the zero vertical elevation point. A positive number denotes North, a negative number South (e.g., 475.60).
H0635	H0635	TieinXoffset	F8.2	Tie in X Offset: The East or West distance between a vertical axis passing through the tie in point and a vertical axis passing through the zero vertical elevation point. A positive number denotes East, a negative number West (e.g., 2668.50).
H0700	H0700	Remarks	A58	Remarks: Information describing or explaining the reason data were not collected, lost, or not timely provided to the Minerals Management Service (e.g., “Survey does not reach TD because the borehole collapsed & stuck bit.”).

An example of a complete MMS ASCII file is shown below. Data records will start with Data Column Descriptions on the first line of the data followed by “|” between each item (i.e., D|MeasuredDepth|Inclination|Azimuth|ToolType|StationType). The Data Section Identifier (D) covers columns 1, the Measured Depth columns 3-10, the Inclination columns 12-18, the Azimuth columns 20-26, the Tool Type columns 28-30 and the Station Type in column 32. The format description is given in FORTRAN style (i.e., F=float, A=character, I=integer, X=space). Example (A4, 2X, F6.3) = ABCD 11.111.

Data Records are as follows:

UKOOA Column Description	MMS Column Description	Column No.	Format	Data Description
Col 1: Data Section Identifier	Col 1: D	1	A1	Data Section Identifier: In order to recognize data records (e.g., D).
Col 2: Measured Depth	Col 2: MeasuredDepth	3-10	F8.2	Measured Depth: The distance in depth units increasing along path of the wellbore from the elevation reference to the measurement point. Each field will have the 2 decimal places recorded with real data or zeros and right justified (e.g., 11309.00).
Col 3: Inclination	Col 3: Inclination	12-18	F7.3	Inclination: The vertical angular measurement of deviation of the well path from its vertical orientation. Submit this number in degrees decimal to the accuracy of three decimal places where zero degrees is vertical downwards and 90 degrees is horizontal (e.g., 015.250).
Col 4: Azimuth	Col 4: Azimuth	20-26	F7.3	Azimuth: The horizontal angular measurement azimuth of the well path projected into a horizontal plane. Submit this number in degrees decimal where the range of the azimuth is between zero and 360 degrees (e.g., 092.66).
Col 5: Survey Tool Type	Col 5: ToolType	28-30	I3	Tool Type: Choose from types of instruments used to take the measurements: 1. Inclination Only 2. Magnetic (Film based on single shot or multishot) 3. Electronic Magnetic Single Shot or multishot 4. Dipmeter or other FE wireline log 5. MWD or steering tool 6. Conventional Gyro (Film based on single shot or multishot) 7. North seeking Gyro 8. Inertial 9. Unknown
Col. 6: Station Type	Col 6: Station Type	32	A1	Station Type: S=Surveyed, P=Planned, E=Projected or Estimated, or O=Other (e.g., S).

EXAMPLE OF AN ASCII FILE FOR DIRECTIONAL SURVEYS
(Refer to NTL 2004-N03)

00000000111111111222222222333333333333334444444444555555555566666666667777777777888888888899999999
99000000000011111111122222222223
123456789012345678901234567890123456789012345678901234567890123456789012345678901234567
890123456789012345678901234567890

H0001	FormatNameVersion	MMS-P7/2000_v1.0
H0002	Format Type	1
H0110	WellName	AJ001
H0112	WellNameSuffix	ST01BP00
H0114	BottomHoleLeaseNumber	G 1000
H0130	UniqueWellIdentifier	177671234501
H0170	ParentWellIdentifier	177671234500
H0200	GeodeticDatum	NAD27
H0210	ProjectionIdentification	Louisiana Lambert
H0300	ElevationReference	KB
H0390	Elevation	109.00
H0400	Operator	Big Exploration Inc.
H0440	SurveyCompany	Hamberger Well Services
H0450	SurveyDate	20000101
H0500	AzimuthReference	Grid
H0510	MagneticDeclination	+0.894
H0520	GridConvergence	-1.252
H0624	TieinMeasuredDepth	11309.00
H0625	TieinTotalVerticalDepth	11292.27
H0630	TieinYoffset	-080.00
H0635	TieinXoffset	0154.00
H0700	Remarks	Survey does not reach total depth because the borehole collapsed & stuck bit in hole.

D 10300.00 003.135 062.299 2 S
D 10400.00 003.906 064.918 2 S
D 10500.00 005.060 068.945 2 S
D 10600.00 006.243 072.882 2 S
D 10700.00 007.721 075.160 2 S
D 10800.00 009.710 078.994 2 S
D 10900.00 010.440 093.918 2 S
D 11000.00 011.710 087.837 2 S
D 11100.00 013.260 090.148 2 S
D 11200.00 014.310 091.365 2 S
D 11309.00 000.000 092.660 2 S
D 11475.00 000.710 087.550 2 S
D 11570.00 001.370 092.460 2 S
D 11665.00 000.220 112.590 2 S
D 11761.00 002.440 239.350 2 S
D 11855.00 003.510 235.450 2 S
D 11951.00 004.090 237.720 2 S
D 12047.00 004.240 237.310 2 S
D 12143.00 004.490 236.770 5 S
D 12248.00 005.070 241.740 5 E

00000000111111111222222222333333333333334444444444555555555566666666667777777777888888888899999999
99000000000011111111122222222223
123456789012345678901234567890123456789012345678901234567890123456789012345678901234567
890123456789012345678901234567890