



# United States Department of the Interior



MINERALS MANAGEMENT SERVICE  
Alaska Outer Continental Shelf Region  
949 East 36<sup>th</sup> Avenue, Suite 300  
Anchorage, Alaska 99508-4363

SEP 25 2003

Mr. Allen Sherritt  
Drilling Engineer  
BP Exploration (Alaska) Inc.  
900 East Benson Blvd.  
Anchorage, AK 99508

Dear Mr. Sherritt :

The Application for Permit to Drill (APD) for NS-32, Northstar Development Project, is hereby approved, subject to the conditions stated in this letter. Also enclosed is a signed copy of the APD. API number 50-029-23179 was issued by the State of Alaska AOGCC for this well.

This well, meets the criteria established for the diverter departure approved on October 13, 2001, therefore no diverter will be required during the drilling of the surface hole portion of the well.

Your request to set the Blowout Prevention Equipment (BOPE) test pressure at 4800 psi is hereby accepted.

The Northstar reservoir has been classified, as required under 30 CFR 250.417 (c), as hydrogen sulfide absent, therefore no hydrogen sulfide contingency plan is required for this well.

Well information for this well will be submitted as specified in our letter of March 26, 2001 and modified on November 15, 2001. BP Exploration (Alaska), Inc (BPXA) shall provide this office with a request for approval to commence injection operations for this well.

Because the well surface location lies within State of Alaska waters and the bottom hole location lies in the Federal Outer Continental Shelf, both the Environmental Protection Agency (EPA) and the Minerals Management Service (MMS) have a regulatory mandate to oversee the construction, operation and abandonment of this disposal injection well. It is the MMS' intention to be actively engaged in monitoring the operation of this well. Since NS-32 has already been issued permits by EPA Region X, to avoid duplicative regulatory requirements, the MMS will adopt the requirements contained in the current EPA permit AK 11002-A. BPXA is required to provide copies of all required reports and notifications of non-compliance to the MMS at the same time the information is provided to the EPA. You are also required to provide advance notice of planned physical alteration or additions to NS-32 or changes in the types of injected fluids. The MMS does require that BPXA request approval prior to accepting and disposing of wastes generated off-site. If you have questions pertaining to disposal injection operations, please contact Ms. Christy Bohl at (907) 271-6082.

**TAKE PRIDE**  
**IN AMERICA** 

This office plans to conduct periodic inspections of the drilling and injection operations and anticipates the need to utilize BP Exploration (Alaska) Inc. (BPXA) transportation and lodging. As allowed in 30 CFR 250.133, BPXA may request reimbursement for the cost of transportation and lodging provided for Minerals Management Service personnel. Your request must be submitted within 90 days of the inspection.

After office hours, weekends and holidays, all calls related to drilling activities or changes to the approved APD should be made to Mr. Kyle Monkeliën at the following numbers:

Home.           907-349-5083  
Cell Phone    907-250-0546

If you should have any questions regarding this approval during normal business hours, please call Mr. Monkeliën at 907-271-6431.

Sincerely,



Jeffrey Walker  
Regional Supervisor, Field Operations

Enclosure(s)

cc: Tom Maunder, Senior Petroleum Engineer, AOGCC  
Jonathan Williams, EPA, Region X

"Public Information"

U.S. Department of the Interior  
Minerals Management Service (MMS)

Submit ORIGINAL plus THREE copies,  
with one copy marked "Public Information"

OMB Control Number 1010-0044  
OMB Approval Expires 10/31/2005

# Application for Permit to Drill (APD)

1. PROPOSAL TO DRILL <input checked="" type="checkbox"/> NEW WELL <input type="checkbox"/> SIDETRACK <input type="checkbox"/> BYPASS <input type="checkbox"/> DEEPEN		2. MMS OPERATOR NO.  00113	3. OPERATOR NAME and ADDRESS (Submitting Office)  BP Exploration Alaska, Inc. P.O. Box 196612 Anchorage, AK 99519-6613
4. WELL NAME (Current)  NS32	5. SIDETRACK NO. (Current)  ST00	6. BYPASS NO. (Current)  BP00	
7. PROPOSED START DATE  10/01/03	8. PLAN CONTROL NO. (New Well Only)		
9. API WELL NO. (Current Sidetrack / Bypass) (12 Digits)  N/A			

WELL AT TOTAL DEPTH (PROPOSED)		WELL AT SURFACE	
10. LEASE NO.  OCS-Y0181	15. LEASE NO.  ADL312799	11. AREA NAME  Beechey Point	16. AREA NAME  Beechey Point
12. BLOCK NO.  516	17. BLOCK NO.  515	13. LATITUDE <input type="checkbox"/> NAD 27 (GOM & Pacific) <input checked="" type="checkbox"/> NAD 83 (Alaska)	19. LONGITUDE <input type="checkbox"/> NAD 27 (GOM & Pacific) <input checked="" type="checkbox"/> NAD 83 (Alaska)
14. LONGITUDE <input type="checkbox"/> NAD 27 (GOM & Pacific) <input checked="" type="checkbox"/> NAD 83 (Alaska)	18. LATITUDE <input type="checkbox"/> NAD 27 (GOM & Pacific) <input checked="" type="checkbox"/> NAD 83 (Alaska)		

LIST OF SIGNIFICANT MARKERS ANTICIPATED			
20. NAME  Top of Ugnu	21. TOP (MD)  6240'	20. NAME	21. TOP (MD)
Top of Schrader Bluff	8112'		

RECEIVED

Anchorage, Alaska

SEP 10 2003

22. LIST ALL ATTACHMENTS (Attach Complete Well Prognosis and Attachments Required by 30 CFR 250.114 (B) through (G) or 30 CFR 250.1617 (C) and (D), As Appropriate)  
NS32 Well Plan, NS32 Directional Survey, NS32 AOGCC Permit Application and a Supplemental APD Information Sheet MMS Form (MMS-123S).

REGIONAL SUPERVISOR  
FIELD OPERATION  
MINERALS MANAGEMENT SERVICE

23. AUTHORIZING OFFICIAL (Type or Print Name)  Allen Sherritt	24. TITLE  Drilling Engineer
25. AUTHORIZING SIGNATURE 	26. DATE  9/10/03

**THIS SPACE FOR MMS USE ONLY**

APPROVED: <input checked="" type="checkbox"/> With Attached Conditions <input type="checkbox"/> Without Conditions	BY 	TITLE Regional Supervisor Field Operations
API WELL NO. ASSIGNED TO THIS WELL  50-029-23179-00		DATE  9/29/03

**PAPERWORK REDUCTION ACT OF 1995 (PRA) STATEMENT:** The PRA (44 U.S.C. 3501 et seq. Requires us to inform you that we collect this information to obtain knowledge of equipment and procedures to be used in drilling operations. MMS uses the information to evaluate and approve or disapprove the adequacy of the equipment and/or procedures to safely perform the proposed drilling operation. Responses are mandatory (43 U.S.C. 1334). Proprietary data are covered under 30 CFR 250.198. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB Control Number. Public reporting burden for this form is estimated to average 2% hours per response, including the time for reviewing instructions, gathering and maintaining data, and completing and reviewing the form. Direct comments regarding the burden estimate or any other aspect of this form to the Information Collection Clearance Officer, Mail Stop 4230, Minerals Management Service, 1849 C Street, N.W., Washington, DC 20240.

### Supplemental APD Information Sheet

1. OPERATOR NAME BP Exploration Alaska, Inc.		5. WELL NAME (Proposed) NS32I		6. TYPE OF WELL <input type="checkbox"/> EXPLORATORY <input checked="" type="checkbox"/> DEVELOPMENT		11. WATER DEPTH 39'		12. ELEVATION AT KB Planned RKB = 55.3'	
2. API WELL NO. (Proposed) (12 Digits)		3. BOTTOM LEASE NO. (Proposed) OCS-Y0181		7. SIDETRACK NO. (Proposed) ST00		8. BYPASS NO. (Proposed) BP00		13. H <sub>2</sub> S DESIGNATION <input type="checkbox"/> KNOWN <input type="checkbox"/> UNKNOWN <input checked="" type="checkbox"/> ABSENT	
4. TOTAL DEPTH (Proposed) MD <u>8457'</u> TVD <u>6737'</u>		9. RIG NAME Nabors Rig 33E			10. RIG TYPE Rotary		14. H <sub>2</sub> S ACTIVATION PLAN DEPTH FT (TVD) N/A		

#### 15. ENGINEERING DATA

Hole Size (in)	Casing (Indicate if Liner)	Casing Size (in)	Weight (lb/ft)		Burst Rating (psi)	Type of Connection	MASP (psi)	Safety Factors			Top of Liner (MD)	Casing Depth (Feet)			Casing Shoe (ppg)			Well-head Rating (psi)	BCP Size (in)	Test Pressures				Cement (Feet)	Drilling Fluid Type (Oil Base, Water Base, Synthetic)
			Grade	Collapse Rating (psi)				B	C	T		MD	TVD	PP	MW	FG	Annular/ Divertor (psi)			Annular/ Divertor (psi)	Casing Test (psi)	Casing Shoe (psi)			
20"	Conductor	20"	109# X-56	4280 2590	Weld	-	-	-	-	Surface	201' 201'	-	-	-	-	-	-	-	-	-	-	-	-	Driven	WB
13-1/2"	Surface	10-3/4"	46.5# L-80	6210 2480	BTC	1092	1.44	3.86	1.76	Surface	3961' 3255'	8.65	9.5	13	5000	13-5/8"	3500 5000	3500 4800	3500 9.5	11.0	-	-	-	WB	
9-7/8"	Production	7-5/8"	29.7# L-80	6890 4790	BTC-Med	2281	1.3	1.52	1.4	Surface	8112' 6506'	8.65	9.3	12	5000	13-5/8"	3500 5000	3500 4800	4800 9.3	11.0	-	-	-	WB	
6-3/4"	Barefoot	N/A	N/A N/A	N/A N/A	N/A	2345	-	-	-	8112'	8312' 6687'	-	-	-	5000	13-5/8"	-	-	-	-	-	-	-	WB	

16. CONTACT NAME Allen Sherritt		17. CONTACT PHONE NO. (907) 564-5204		18. CONTACT E-MAIL ADDRESS SherrJA@BP.com	
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19. Will you maintain quantities of mud and mud material (including weight materials and additives) sufficient to raise the entire system mud weight 1/2 ppg or more?  YES  NO

20. REMARKS:  
 • 13-1/2" cement volumes 550 ex PF 'L', 394 ex Class 'G'  
 • 9-7/8" cement volumes 116 ex Silicalite, 159 ex PF 'L' and 1124 ex Class 'G'

PAPERWORK REDUCTION ACT OF 1996 (PRA) STATEMENT: The PRA (44 U.S.C. 3601 et seq.) requires us to inform you that we collect this information to obtain well status, well and casing test, and well casing configuration data. MMS uses this information to have accurate data and information on all wells under its jurisdiction and to ensure compliance with approved plans. Responses are mandatory (43 U.S.C. 1334). Proprietary data are covered under 30 CFR 250.186. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB Control Number. Public reporting burden for this form is estimated to average 1 1/2 hour per response, including the time for reviewing instructions, gathering and maintaining data, and completing and reviewing the form. Direct comments regarding the burden estimate or any other aspect of this form to the Information Collection Clearance Officer, Mail Stop 4230, Minerals Management Service, 1848 C Street, N.W., Washington, DC 20240.

bp



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BP Exploration Alaska Inc.

To: **Kyle Monkeliën - MMS**

Date: **September 2, 2003**

From: **Allen Sherritt  
Northstar Senior Drilling Engineer**

Subject: **NS32 Application for Drilling Permit**

Mr. Monkeliën,

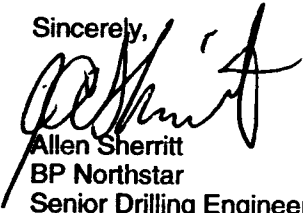
Well NS32 is currently scheduled for Nabors 33E on October 1, 2003.

A Diverter waiver is requested on NS32. To date, BP has successfully drilled all development wells through the Northstar upper strata-graphic intervals, absent any complications associated with shallow gas. All surface holes have been drilled and cemented to a common depth of approximately 3,170' TVDss depth, (~150' TVD below the top of the SV6), with one well extending into the SV5 ~3280' TVDss. Well mud logs and seismic data do not indicate the presence of a shallow gas hazard.

NS32 may perform an "Operation Shutdown" after drilling the surface hole. This will enable the Operations group an opportunity to tie-in the Northstar injectors after performing workovers for wellbore integrity. A Sundry for the Operation Shutdown will not be submitted, as the operations are covered in the ADP procedure.

Please find attached the NS32 Well Plan Summary, directional plan and proposed completion diagram. If you should have any questions or concerns, please contact me @ 564-5204

Sincerely,



Allen Sherritt  
BP Northstar  
Senior Drilling Engineer  
564-5204 work  
240-8070 cell

## **NS32 SUMMARY DRILLING OPERATIONS**

### **Pre-Rig Work:**

1. Set 20" conductor and weld an ABB Vetco landing ring for the ABB Vetco Multibowl Wellhead on the conductor. *(Already performed.)*
2. Install 7' x 7' cellar and polyshield same. *(Already performed.)*

### **Rig Operations:**

1. MIRU Nabors 33E.
2. Nipple up and function test 21-1/4" diverter system, if required.  
**NOTE:** A diverter dispensation has been requested. Confirm dispensation decision with the Drilling Engineer. A D7 Diverter Drill will be conducted prior to spud.
3. MU 13 1/2" drilling assembly with MWD/GR and directionally drill surface hole to the surface casing point 3255' TVD, 3961' MD. POOH.
4. RU Schlumberger Wireline for open hole logs. Logging suite to include gamma ray (GR), spontaneous potential (SP), resistivity, and caliper. Use caliper results to confirm the surface cement volumes. RD Schlumberger Wireline.
5. RU and run 10 3/4", 45.5# L-80 BTC surface casing with centralizers.
6. Cement the casing to surface in 1 stage (lead and tail slurries). A TAM port collar will be run at 1000' MD for a 2-stage contingency. In the event the cement does not circulate to surface, please contact the Anchorage Drilling Team.
7. ND diverter / riser system and NU casing / multi-bowl wellhead. NU BOPE and test to 250/4800 psi.
8. MU 9 7/8" drilling assembly for cleanout run. RIH to float collar. Test the 10 3/4" casing to 500 psi with 9.5-ppg mud for 15 min.
9. Swap fluids to clean seawater. POOH.
10. RU Schlumberger Wireline for cement evaluation logs. Logging suite to include USIT from the 10 3/4" shoe to 500' MD. RD Schlumberger Wireline.
11. Test the 10 3/4" casing to 3500 psi with 9.5-ppg mud for 30 min. This test pressure may change based on actual mud weight in the hole.
12. RIH with open ended drillpipe to 100' below the base of the permafrost and circulate 6.8 ppg diesel to freeze protect the well to surface. POOH
13. Install 4 1/2" tubing hanger and test to 5000 psi.
14. Set the TWC. ND BOP's. NU Tree. Test the tubing head adapter and tree to 5000 psi.
15. Pull TWC and install BPV (dry rod is acceptable). Test BPV from below to 3500 psi for 10 minutes.
16. RD and move off NS32 for NS27 workover.

### **Prepare to re-enter well**

17. Prepare to re-enter well.
18. MIRU Nabors 33E.
19. Verify there is no pressure on the tree. ND tree.
  - a. The well was left with a TWC, tested to 3500 psi from below.
20. NU BOPE, pull the tubing hanger and run the test plug. Open annulus valve and test to 250/4800 psi. Test annular to 3500 psi.
21. Pull the test plug. Install the wear bushing.
22. RIH with open-ended drillpipe to 2000' MD, circulating/displacing out diesel to the trip tank. Change over to seawater.
  - a. Have G&I and rig crew line up Trip Tank#1 sump to G&I disposal pump suction.
  - b. Coordinate with G&I and circulate one surface-to-surface volume of seawater, monitoring the volume in Trip Tank #1.
  - c. When the Mud Engineer is satisfied with the water quality, the hole can be lined up elsewhere on the rig.
  - d. POOH
- **See Baroid Mud Program: Well Clean-out/Displacement Procedure.**

23. Test 10 3/4" liner to 3500 psi for 30 minutes.
24. MU 9 7/8" directional assembly with MWD/GR/PWD. RIH and drill 20' of new formation below 10 3/4" shoe. Perform LOT, targeting 11.5 ppg EMW. (FIT/LOT procedure on file with AOGCC).
25. Drill 9 7/8" intermediate hole to casing point at 6505' TVD, 8112' MD. Minimum mud weight of 9.3 ppg will be required. POOH.
26. RU Schlumberger Wireline for open hole logs. Logging suite to include gamma ray (GR), spontaneous potential (SP), resistivity, density, neutron, and sonic. RD Schlumberger Wireline.
27. RU and run 7 5/8", 29.7# L-80 BTC-M intermediate casing with centralizers.
28. Cement the casing string from TD to surface in 3 stages. A Tam port collar will be at 4150' MD (upper portion of SV4) and an ES cementer will be at 6150' MD (lower portion of the SV1) to ensure sufficient cement coverage and isolation.
29. MU 6 3/4" drilling assembly for cleanout run. Drill stage tool closing plug(s). RIH to float collar. Test the 7 5/8" casing to 500 psi with 9.3-ppg mud for 15 min. POOH.
30. RU Schlumberger Wireline for cement evaluation logs. Logging suite to include USIT from the 7 5/8" shoe to 2960' MD (calculated top of lead) inside the surface casing shoe. RD Schlumberger Wireline.
31. PU 6 3/4" directional assembly with GR/MWD. RIH. Test the 7 5/8" casing to 4600 psi with 9.3-ppg mud for 30 min. This test pressure may change based on actual mud weight in the hole.
32. Drill 20' of new formation below 7 5/8" shoe. Perform LOT, targeting 11.0 ppg EMW. (FIT/LOT procedure on file with AOGCC).
33. Drill 6 3/4" hole to TD at 6687' TVD, 8312' MD. Minimum mud weight of 9.3 ppg will be required while drilling this hole section. POOH.
34. PU casing scraper on the 6 3/4" cleanout assembly.
35. RIH and displace the well to clean 9.8 ppg NaCl brine. POOH.
36. Run the 4 1/2" 12.6# L-80 IBT-M tubing string with heat trace. Ensure proper RAMS are run in the BOP for Well Control. Drill pipe elevators and a TIW crossover from 4 1/2" to DP will be on the rig floor at all times.
  - Please Reference Completion Section
  - Heat trace will be run from 2250' MD to surface.
  - An "X" nipple will be run at 2150' MD en lieu of a SSSV.
  - No fiber optics will be run on this well.
37. RIH to packer setting depth of 5155' MD. Record pick-up and slack off weights. Spaceout as per tally, do not tag TD. Run space out pups as required by tubing tally.
38. Land the hanger and RILDS. Pressure-test the tubing hanger seals to 5000 psi.
39. Rig up the manifolding (chicksan/hose) to allow U tube to equalize from the 7 5/8" x 4-1/2" annulus to the 4 1/2" tubing.
40. Displace corrosion inhibitor (Corexit-7726 at 25 gals/100 bbls) pill down the 7 5/8" x 4 1/2" annulus to treat from +/-5000' MD to packer setting depth. Displace annulus with heated inhibited diesel equivalent to annulus capacity plus tubing capacity to a depth of 4000' TVD (5008' MD). Maximum displacement rate 3 BPM as per Baker recommendation to prevent damaging the packer elements.
41. Allow diesel to U-tube and equalize. RD U-tube manifolding.
42. Drop ball and rod to set packer. Ensure that the proper ball size is dropped to match up with the RHC sub located in the 4 1/2" 12.6# 'XN' Nipple.
43. Increase the tubing pressure to 5000 psi with 9.8-ppg completion fluid and hold for 30 minutes. Monitor tubing pressure for leaks. Record on chart.
44. Bleed tubing to 2000 psi and maintain during MIT. Pressure test 7 5/8" x 4 1/2" annulus to 4500 psi for required mechanical integrity test (MIT). Monitor tubing pressure for leaks. Maintain pressure for 30 minutes and record annulus test on chart.
45. Bleed off annulus and tubing. Fax chart to ODE.
46. Back out and lay down landing joint. Set the TWC valve in the tubing hanger. Nipple down BOP's. Nipple up the tubing head adapter and tree. Install all flanges and needle valves.
47. Test the tubing head adapter and tree to 5000 psi. Confirm that there is no pressure on the annulus. Dry rod the "two way" check.
48. Ensure all valves are closed. RD and move off well.

**Post-Rig Work:**

1. MIRU slickline. Pull the ball and rod / RHC profile from 'XN' nipple below the production packer.
2. Conduct flow test and step rate injection test per EPA requirements.

Estimated Spud Date:

October 1, 2003

Allen Sherritt  
Senior Drilling Engineer  
564-5204



## NS32 WELL PLAN SUMMARY

<b>Type of Well (producer or injector):</b>	Class I Disposal Well
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<b>Northstar Slot:</b>	NS32
<b>Surface Location:</b>	1358' FSL, 649' FEL, Sec. 11, T13N, R13E, UM X = 659821 Y = 6031131
<b>Target (top of SAG): 300' Radius</b>	5112' FSL, 3526' FEL, Sec. 12, T13N, R13E, UM X = 662140 Y = 6034936 6505' TVDrkb
<b>Bottom Hole Location:</b>	5183' FSL, 3481' FEL, Sec. 12, T13N, R13E, UM X = 662184 Y = 6035008 6687' TVDrkb

<b>AFE Number:</b>	831333
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<b>Rig:</b>	Nabors 33E
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<b>Estimated Start Date:</b>	10/1/03
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<b>Operating days to complete:</b>	22.6
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<b>MD:</b>	8312
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<b>TVDrkb:</b>	6687
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<b>RKB/Surface Elevation: (a.m.s.l.)</b>	55.3' / 15.9'
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<b>Well Design (conventional, slimhole, etc.):</b>	Slim Hole Long String
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<b>Objective:</b>	Ugnu / Schrader Bluff non-hazardous disposal well
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<b>Well Name:</b>	NS32
<b>API Number:</b>	
<b>Well Type (proposed):</b>	Class I Disposal Well
<b>BHP:</b>	2925 psi @ 6500' TVDss
<b>EMW:</b>	8.65 ppg
<b>BHT:</b>	130 °F @ 6500' TVDss

<b>Land Use Permit:</b>	LO-N96-006
<b>Distance to Nearest Property:</b>	4,800 ft.
<b>Distance to Nearest Well within Pool:</b>	1,617 ft. from NS22

**MECHANICAL CONDITION:**

<b>Cellar box:</b>	Elevation above MSL = 15.9'
<b>RKB to Cellar box:</b>	39.4' (Estimated)
<b>Rig Elevation:</b>	RKB + MSL = 55.3'
<b>Conductor:</b>	201' MDrkb of 20", 169#, X-56 (pre-driven)

**MUD PROGRAM:****Surface Hole Mud Properties: Seawater Spud Mud 13 1/2" Hole Section**

From Surface to ~3961' MD / 3255' TVD (~150' TVD below top SV6).							
Interval	Density (ppg)	Viscosity (seconds)	YP	Tau <sub>0</sub>	Gel 10 sec	API FL	pH
Initial	8.8 - 9.5	100 - 200	50 - 70	> 8	25 - 40	15 - 20	8.5 - 9.5
from ~1555'	*9.0 - 9.5	100 - 150	30 - 45	> 6	15 - 25	6 - 10	8.5 - 9.5
SV6 @ Interval TD	*9.5 max	75 - 100	20 - 35	> 6	10 - 25	6 - 10	8.5 - 9.5

\* Should gas hydrates be encountered, mud densities up to 10.2 ppg may prove necessary.

**Intermediate Hole Mud Properties: Seawater Polymer 9 7/8" Hole Section**

From Surface Casing Shoe to 8112' MD / 6505' TVD.						
Interval	Density (ppg)	PV	YP	Tau <sub>0</sub>	API / HTTP FL	pH
All	8.6 - 9.3	12 - 17	15 - 25	3 - 6	<10 initial <8 at TD	8.5 - 9.5

**Injection Interval Mud Properties: Seawater Polymer 6 3/4" Hole Section**

From Intermediate Casing Shoe to 8312' MD / 6687' TVD						
Interval	Density (ppg)	PV	YP	Tau <sub>0</sub>	API FL	pH
All	9.0 - 9.3	12 - 17	15 - 25	3 - 6	<6	8.5 - 9.5

**DIRECTIONAL:(P6)**

<b>KOP:</b>	±300' MD Cantenary curve 1.5°/100' to 2.5°/100' build
<b>Maximum Hole Angle:</b>	±44.67°
<b>Close Approach Wells:</b>	Surface- 10' well spacing to well NS31 and no wells to the North Gyro will be used for initial surveys and kickoff
<b>Survey Program:</b>	Gyros as required from surface to +/-1000'. <b>IFR+MS corrected MWD surveys from +/-1000' to TD.</b>

**SURFACE AND ANTI-COLLISION ISSUES:**

All wells pass the major risk rule; however, NS31 will be risked based at 1/200 to allow more flexibility while drilling the surface hole.

**Surface Shut-in Wells:** See Northstar Anti-Collision and Well Shut-In checklist.

**LOGGING PROGRAM:**

<b>13 1/2" Section:</b>	
Drilling:	<b>GR/Directional - Gyro as needed to ~1000' MD. IFR-MS corrected surveys</b>
	<b>Mud Logging - Gas analysis/detection, show kit with indexed sample bottles, lithology samples (100' intervals)</b>
Open Hole:	<b>Gamma ray (GR), spontaneous potential (SP), resistivity, and caliper</b>
Cased Hole:	<b>USIT from the 10 3/4" shoe to 500' MD</b>
<b>9 7/8" Section:</b>	
Drilling:	<b>GR/Directional, PWD. IFR-MS corrected surveys</b>
	<b>Mud Logging - Gas analysis/detection, show kit with indexed sample bottles, lithology samples (100' intervals)</b>
Open Hole:	<b>Gamma ray (GR), spontaneous potential (SP), resistivity, density, neutron, sonic</b>
Cased Hole:	<b>USIT from the 7 5/8" shoe to 2960' MD</b>
<b>6 3/4" Section:</b>	
Drilling:	<b>GR/Directional. IFR-MS corrected surveys</b>
	<b>Mud Logging - Gas analysis/detection, show kit with indexed sample bottles, lithology samples (100' intervals)</b>
Open Hole:	<b>None</b>
Cased Hole:	<b>None</b>

**Integrity Testing:**

Test Point	Depth	Shoe Test Type	EMW	Estimated Casing/Liner Test
13 1/2" Surface	20' min from 10 3/4" shoe	LOT	11.5 ppg EMW Target	3500 psi w/ 9.5 ppg
9 7/8" Intermediate	20' min from 7 5/8" shoe	LOT	11.0 ppg EMW Target	4600 psi w/ 9.3 ppg
6 3/4" Injection interval	NA	NA	NA	NA
4 1/2" Injection Tubing	NA	NA	NA	5000 psi w/ 9.8 ppg
4 1/2" x 7 5/8" Annulus	NA	NA	NA	4500 psi w/ 9.8 ppg

**CASING/TUBING PROGRAM:**

Hole Size	Casing/Tbg O.D.	W/Ft	Grade	Conn.	Casing Length	Casing Top MD/TVDrkb	Hole Btm MD/TVDrkb
20"	20"	169#	X-56	WELD	201'	Surface	201'/201'
13 1/2"	10 3/4"	45.5#	L-80	BTC	3961'	Surface	3961'/3255'
9 7/8"	7 5/8"	29.7#	L-80	BTC-Mod	8112'	Surface	8112'/6505'
6 3/4"	Barefoot	NA	NA	NA	NA	8112'/6505'	8312'/6687'
Tubing	4 1/2"	12.6#	L-80	IBT-Mod	8112'	Surface	8112'/6505'

**FORMATION MARKERS:**

<i>Formation</i>	<i>TVDrkb</i>	<i>MDrkb</i>	<i>(ppg EMW)</i>	<i>Comments</i>
Top Permafrost	1,204	1226	8.65	
Base Permafrost	1,574	1643	8.65	
SV6 - top confining zone	3,105	3750	8.65	
Surface casing point	3,255	3961		
SV5 - base confining zone	3,364	4114	8.65	
SV4	3,725	4621	8.65	
SV3	3,958	4949	8.65	
SV2 - top upper injection zone	4,140	5205	8.65	
SV1 - top major shale barrier	4,527	5749	8.65	
TMBK - top lower injection zone - Top Ugnu	4,876	6240	8.65	
WS1 - top Schrader Bluff - Base Ugnu	6,505	8112	8.65	Geologic target - 300' radius
Production casing point	6,505	8112		
Total Depth	6687	8312	8.65	

**REQUIRED MATERIALS:**

<b>L-80 Surface:</b>	3961'	10 3/4", 45.5# L-80 BTC
	1	10 3/4" HES Super Seal II Float Shoe (4.25" valve)
	1	10 3/4" HES Super Seal II Float Collar (4.25" valve)
	17	10 3/4" x 13 1/4" SV Rigid Centralizers
	1	10 3/4" Port collar 45.5# L-80 BTC
	1	20" x 10 3/4" ABB-VGI Fluted hanger BTC down, 12 3/4" ACME landing thread
	1	ABB-VGI Casing Head/Tbg head; 11" 5000 psi top flange, 10 3/4" quick connect
<b>L-80 Intermediate:</b>	8112'	7 5/8", 29.7# L-80 BTC-M
	1	7 5/8", HES Super Seal II Float Shoe
	1	7 5/8", HES Super Seal II Float Collar
	1	7 5/8", ES cementer, 1 <sup>st</sup> stage and 2 <sup>nd</sup> stage plug set, 29.7#, L-80, BTC-M
	1	7 5/8", HES Baffle adapter <i>and</i> bypass baffle
	1 - set	HES Cement Plug Set
	1	7 5/8", Tam Port Collar, 29.7#, L-80 BTC-M
	1	10 3/4" x 7 5/8" ABB-VGI Casing Hanger BTC-Mod down, 8 1/4" stub ACME
	120	7 5/8" x 9 5/8" SV Rigid Centralizers
<b>Completion:</b>	8112'	4 1/2" 12.6# L-80 IBT-M
	1	10 3/4" x 4 1/2" ABB-VGI tubing hanger
	1	4 1/2" ABB-VGI adapter flange <b>with heat trace</b>
	1	4 1/2" ABB-VGI 4 1/2" 5K Swab Valve w/ tree cap
	1	4 1/2" 'X' nipple
	1	7" x 4 1/2" Baker packer S-3, IBT-Mod
	1	4 1/2" 'XN' nipple
	1	4 1/2" WLEG

**PERMAFROST:**

The 10 3/4" surface casing will be run approximately 1600' TVD below the permafrost to ~3961' MD / 3255' TVD. The casing will be cemented to surface with a Premium 'G' with 2% calcium chloride tail slurry and a Permafrost 'L' lead slurry. The tail slurry allows sufficient compressive strength to prevent the shoe from breaking down as well as an accelerator to decrease thickening time. The lead slurry is light slurry that contains a freezing point depressant which enables the cement to set up rather than freeze.

**CEMENT CALCULATIONS:**

<b>Casing Size</b>	10.75-in 45.5-lb/ft L-80 BTC surface casing	
<b>Basis</b>	125% excess over gauge hole in permafrost interval. 50% excess over gauge hole below permafrost. Top of tail cement 750-ft MD above casing shoe.	
<b>Total Cement Vol: 488-bbl</b>	Wash	20-bbl Water Spacer
	Spacer	75-bbl 10.5-lb/gal Alpha spacer
	Lead	407-bbl, 550-sx 10.7-lb/gal Permafrost L - 4.15 ft <sup>3</sup> /sx <b>(Cement to surface)</b>
	Tail	81-bbl, 394-sx 15.8-lb/gal Premium G 2% CaCl- 1.15 ft <sup>3</sup> /sx <b>(Top of tail at 3,211-ft MD)</b>
	Temp	BHST ≈ 90°F from SOR, BHCT 70°F

<b>Casing Size</b>	7.625-in 29.7-lb/ft L-80 BTC-M intermediate casing, 1 <sup>st</sup> Stage	
<b>Basis</b>	Top of tail cement 6,150-ft MD, 60% excess over gauge - ES CEMENTER Depth	
<b>Total Cement Vol: 124-bbl</b>	Wash	10-bbl Water
	Spacer	45-bbl 10.5-lb/gal Alpha Spacer
	Tail	124-bbl, 605-sx 15.8-lb/gal Premium G - 1.15 ft <sup>3</sup> /sx <b>(Top of tail at 6,150-ft MD)</b>
	Temp	BHST ≈ 140°F from SOR, BHCT 105°F

<b>Casing Size</b>	7.625-in 29.7-lb/ft L-80 BTC-M intermediate casing 2 <sup>nd</sup> Stage	
<b>Basis</b>	Top of tail cement 5,000-ft MD, Top of Lead 4,150 ft. MD - TAM Port Collar depth	
<b>Total Cement Vol: 99-bbl</b>	Wash	20-bbl Water
	Spacer	45-bbl 10.5-lb/gal Alpha Spacer
	Lead	42-bbl, 116-sx 13.1-lb/gal Silicalite - 2.05 ft <sup>3</sup> /sx <b>(Top of Lead 4,150 ft. MD)</b>
	Tail	57-bbl, 279-sx 15.8-lb/gal Premium G - 1.15 ft <sup>3</sup> /sx <b>(Top of tail at 5,000-ft MD)</b>
	Temp	BHST ≈ 90°F from SOR, BHCT 70°F

<b>Casing Size</b>	7.625-in 29.7-lb/ft L-80 BTC-M intermediate casing 3 <sup>rd</sup> Stage	
<b>Basis</b>	Top of tail cement 2,960-ft MD, top of lead Surface 0% Excess	
<b>Total Cement Vol: 166-bbl</b>	Wash	10-bbl Water Spacer
	Spacer	45-bbl 10.5-lb/gal Alpha spacer
	Lead	117-bbl, 159-sx 10.7-lb/gal Permafrost L - 4.15 ft <sup>3</sup> /sx <b>(Cement to surface)</b>
	Tail	49-bbl, 240sx 15.8-lb/gal Premium G 2% CaCl- 1.15 ft <sup>3</sup> /sx <b>(Top of tail at 2,960-ft MD)</b>
		Temp

## NS32 Permit to Drill

### WELL CONTROL:

- ↳ A Diverter waiver has been requested on well NS32. To date, BP has successfully drilled all development wells through the Northstar upper strata-graphic intervals, absent any complications associated with shallow gas. All surface holes have been drilled and cemented to a common depth of approximately 3,170' TVDss depth, (~150' TVD below the top of the SV6), with one well extending into the SV5 ~3280' TVDss. Well mud logs and seismic data do not indicate the presence of a shallow gas hazard.
- ↳ Equipment to be Installed and capable of handling maximum potential surface pressures. (Schematics are on file with the AOGCC and MMS.)
  - ▶ 5000 psi working pressure pipe rams (2)
  - ▶ Blind/shear rams
  - ▶ Annular preventer
- ↳ Based upon the calculations below, BOP equipment will be tested to 4800 psi.

#### **Surface Section:**

- Maximum anticipated BHP: 1397 psi @ 3050' TVDss – SV6
- Maximum surface pressure: 1092 psi @ surface  
(Based on BHP and a full column of gas from TD @ 0.1 psi/ft)

#### **Intermediate Section:**

- Maximum anticipated BHP: 2926 psi @ 6450' TVDss – Base Ugnu
- Maximum surface pressure: 2281 psi @ surface  
(Based on BHP and a full column of gas from TD @ 0.1 psi/ft)

#### **Injection Interval (barefoot) Section:**

- Maximum anticipated BHP: 3008 psi @ 6631' TVDss – Total Depth
- Maximum surface pressure: 2345 psi @ surface  
(Based on BHP and a full column of gas from TD @ 0.1 psi/ft)
- **Planned BOP test pressure: 4800 psi (annular to 3500 psi)**
- **Planned completion fluid: 9.8 ppg Seawater / 6.8 ppg Diesel**

### DRILLING HAZARDS/CONTINGENCIES:

#### **HYDROGEN SULFIDE - H<sub>2</sub>S:**

- ✓ Northstar is not designated as an H<sub>2</sub>S drill site, however Standard Operating Procedures for H<sub>2</sub>S precautions should be followed at all times.
- ✓ No H<sub>2</sub>S was detected at Northstar while drilling or testing the Seal Island A-01, A-02, or A-03 exploration/appraisal wells.
- ✓ No H<sub>2</sub>S was detected while drilling the NS10 waste disposal well, or any subsequent Northstar wells.

#### **Reference information below on file with AOGCC:**

- ↳ *Northstar/Nabors 33E H2S contingency plan.*
- ↳ *Well test hydrocarbon analyses for Seal Island A-01, A-02, and A-03.*

#### **DISPOSAL:**

**Annular Injection:** There will be no annular injection in this well.

**Cuttings Handling:** Cuttings generated from drilling operations will be processed in the Grind and Inject Facility on Nabors 33E and will be disposed of in the NS10 Class I Waste Disposal Well.

**Fluid Handling:** All Class I and Class II fluids will be processed by the Grind and Inject Facility on Nabors 33E and will be disposed of in the Northstar NS10 Class I Waste Disposal Well.

**SURFACE HOLE SECTION:**

- Mudloggers will be rigged up throughout the entire section.
- No significant drilling problems have been identified in the surface hole interval based on offset data. Good hole cleaning and management of required mud properties are key to a successful interval.
- Minor tight hole conditions have been noted in the shale intervals immediately below the permafrost during short trips.
- Differential sticking could be problematic in this hole section adjacent to the permeable SV Sands. Avoid leaving drill string stationary for extended periods; tighten fluid loss properties of mud.
- Lost circulation has only been noted while drilling during hole opening runs and was most likely induced by poor hole cleaning. Losses have occurred while running and cementing surface casing. The NS27 experienced losses on the surface cement job at a rate of 12 BPM. The displacement rate was lowered to 10 BPM and full returns were re-established. Be sure to condition and thin mud appropriately prior to pulling out of the hole to run casing, and once on bottom with casing, bring circulation up slowly and reduce mud viscosities before pumping cement. Minor losses were seen on NS29 while running the 13 3/8" surface casing. Reduced running speed eliminated losses and the casing was cemented at 10 BPM displacement rate.
- Gas hydrates may be present near the base of the permafrost. Wells drilled in the 2000-2003 drilling season have not experienced hydrates. Mudloggers will be used continuously on NS32 to help identify and trend any increase in background gas readings. If gas hydrates are encountered, mud weight may be increased to 10.2 ppg and treated with 2 ppb DriItreat (Lecithin). Additional measures include reducing flow rates to ~450 to 500 gpm and keeping the mud temperature cool.

**INTERMEDIATE / INJECTION INTERVAL SECTION:**

- Mudloggers will be rigged up throughout these sections.
- Minor gas shows have been reported in the four (4) Seal Island wells and have been identified as coal associated methane. No indications of shallow gas were seen while drilling during the 2000-2003 drilling season. Mudloggers will be used continuously on this well to help identify and trend any increase in background gas readings. Surface casing will be set prior to any intervals with previously noted gas shows to facilitate nipping up the BOP's. A minimum of 9.0 ppg is recommended.
- The shallow intervals beneath Northstar are, by interpretation, not faulted. To be prepared for any potential lost circulation, a copy of the 'Non-Payzone Lost Circulation Decision Tree' can be found in the last section of the Master Well Plan, which can be found on the rig.
- Pressure While Drilling (PWD) will be used to monitor the annular pressure. The pressure data will be used to minimize the equivalent circulating density (ECD), minimize lost circulation due to packing off due to loading up the wellbore with solids and provide for an additional well control tool to make sure the well does not become under-balanced.
- Differential sticking can be a problem if lost circulation is occurring or if the drill string is left stationary for an extended period or time across the permeable SV Sands.
- The kick tolerance for the 9 7/8" open hole section would be 62.7 bbls assuming an influx from the Schrader Bluff interval at 6505' TVD. This is the worst-case scenario based on a 9.15 ppg (0.5 ppg over the known pore pressure) pore pressure gradient, a fracture gradient (LOT) of 11.5 ppg at the 10 3/4" shoe, and 9.3 ppg mud in the hole.
- The kick tolerance for the 6 3/4" open hole section would be infinite bbls assuming an influx from the Schrader Bluff interval at 6687' TVD. This is the worst-case scenario based on a 9.15 ppg (0.5 ppg over the known pore pressure) pore pressure gradient, a fracture gradient (LOT) of 11.0 ppg at the 7 5/8" shoe, and 9.3 ppg mud in the hole.

**NS32 Rig-site**  
**Summary of Drilling Hazards**

**\*\*POST THIS NOTICE IN THE DOGHOUSE\*\***

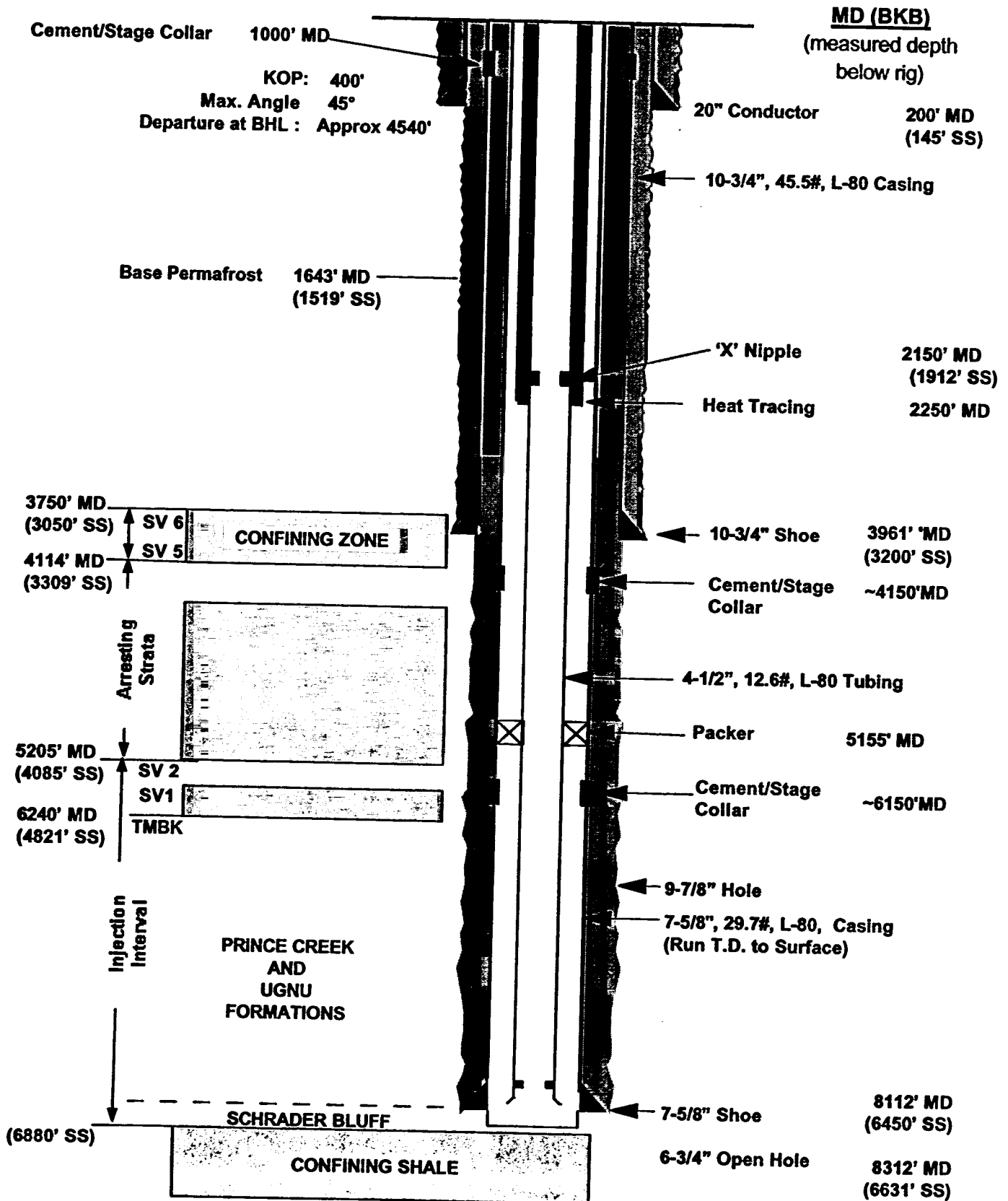
- √ ***Mudloggers will be used continuously on NS32 to help identify and trend any increase in background gas readings***
  - ↳ Gas hydrates may be present near the base of the permafrost. If gas hydrates are encountered, mud weight may be increased to 10.2 ppg and treated with 2 ppb Driltreat (Lecithin). Additional measures include reducing flow rates to ~450 to 500 gpm and keeping the mud temperature cool.
  - ↳ Minor gas shows have been reported in the four (4) Seal Island wells and have been identified as coal associated methane. No indication of shallow gas was seen in any previously drilled Northstar wells. . Surface casing will be set prior to any intervals with previously noted gas shows to facilitate nipping up the BOP's.
- √ Differential sticking could be problematic in both the surface and intermediate hole sections adjacent to the permeable SV Sands. Avoid leaving drill string stationary for extended periods; tighten fluid loss properties of mud.
- √ Packing off due to improper hole cleaning can lead to stuck pipe. The PWD data, pick-up/slack-off weights and other drilling parameters must be monitored at all times. If in doubt, stop and condition the hole prior to drilling ahead or tripping.
- √ Though no faulting has been identified, be prepared for any potential lost circulation. A copy of the 'Non-Payzone Lost Circulation Decision Tree' can be found in the last section of the Master Well Plan, which can be found on the Rig.
- √ Northstar is not a designated H2S pad.

**CONSULT THE NORTHSTAR PAD DATA SHEET AND THE WELL  
PLAN FOR ADDITIONAL INFORMATION**



July 29, 2003

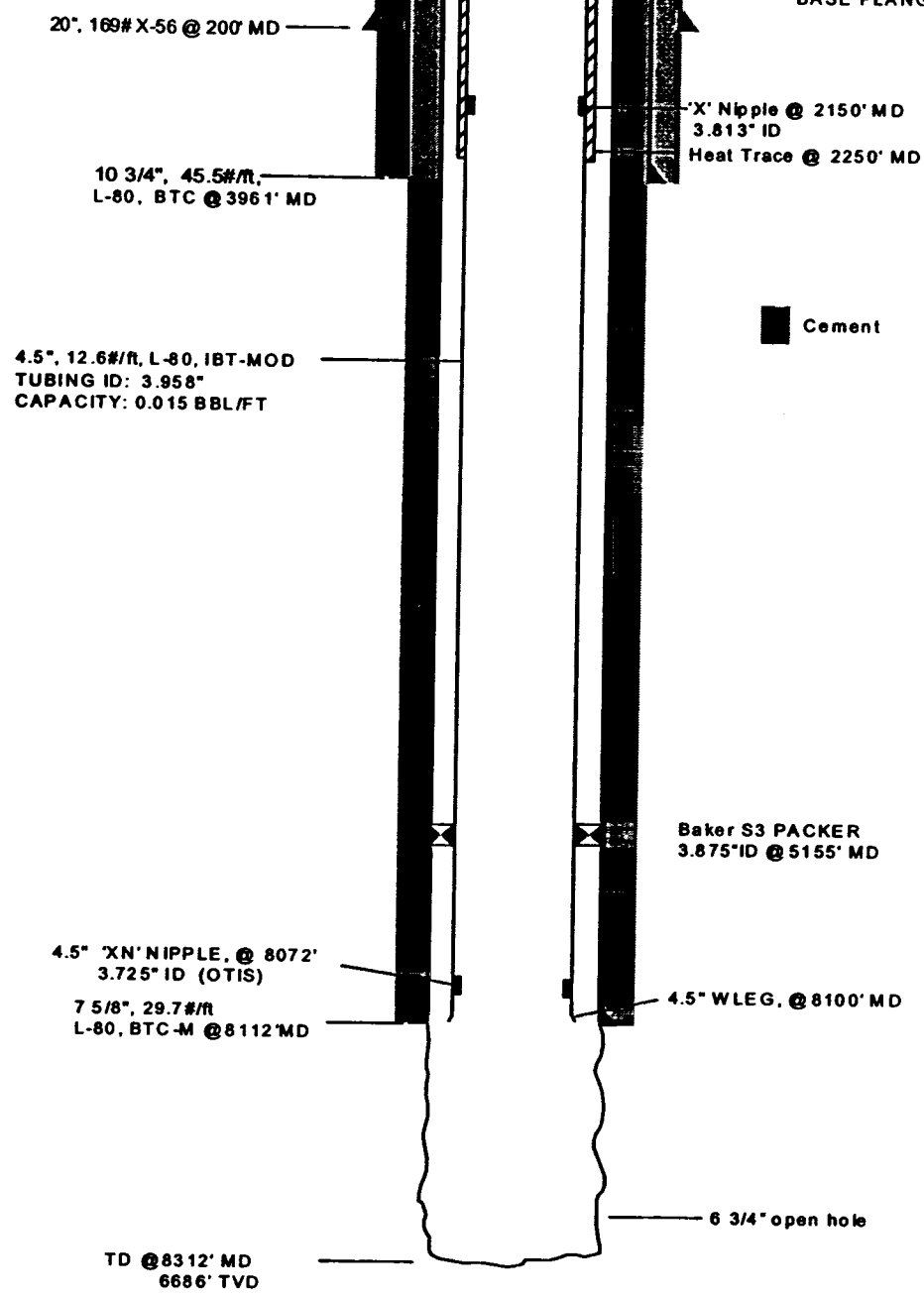
### Proposed Completion Diagram Northstar Well NS32 / WD-02



TREE: ABB-VG15 1/8" 5ksi  
 WELLHEAD: ABB-VG111"  
 Multibowl 5ksi

# NS32

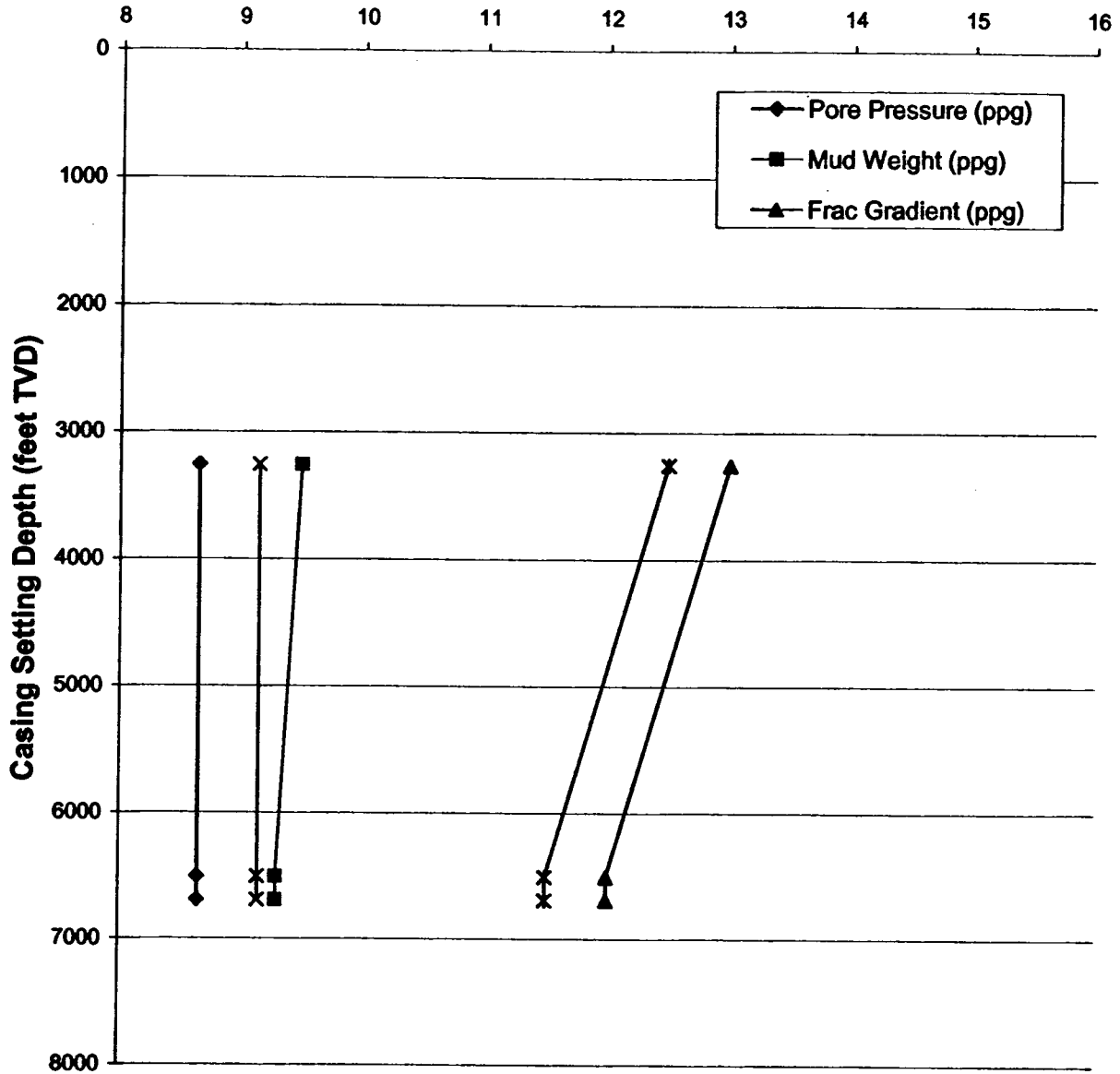
RKB. ELEV = 55.30'  
 KB-BF. ELEV = 39.40'  
 BASE FLANGE ELEV = 15.9'



DATE	REV. BY	COMMENTS	<p align="center"><b>Northstar</b>  <b>WELL: NS32</b>  <b>API NO: 50-029-</b></p> <p align="center"><b>BP Exploration (Alaska)</b></p>
6/18/03	JAS	Initial Diagram	
7/15/03	FH	Proposed Completion	

**Permit to Drill  
MMS Section 250.414 (f) (5) (iv) (9)**

**Estimated Values (ppg)**



Casing Depth (TVD)	Pore Pressure (ppg)	Mud Weight (ppg)	Frac Gradient (ppg)	Trip Margin (ppg)	Surge Margin (ppg)
3255	8.65	9.5	13	9.15	12.5
6505	8.65	9.3	12	9.15	11.5
6687	8.65	9.3	12	9.15	11.5

Oilfield Services, Alaska  
Schlumberger Drilling & Measurements

**Schlumberger**

3940 Arctic Blvd, Site 300  
Anchorage, AK 99503  
Tel (907) 273-1766  
Fax (907) 561-8357

Monday, August 25, 2003

Barbara Holt

Northstar NS32 (P6)

BP Exploration Alaska

Nabors 33E

**Close Approach Analysis**

We have examined the potential intersections of subject well with all other potentially conflicting wells, according to the BPA Directional Survey handbook (BPA-D-004) dated 09/99.

Method of analysis:

1. A list of wells to be analyzed is created in Compass by performing a global scan with an initial search radius of two thousand feet with an increment of one hundred feet for every one thousand feet of measured depth in the subject well.
2. Wells are analyzed using the Compass Anti-collision module (BP Company setup) with major risk safety factors applied. For problem wells that are plugged and abandoned or that can be shut in, risk-based safety factor may be used, with client notification.
3. All depths are relative to the planned well profile.

Survey Program:

Instrument Type	Start Depth	End Depth
GYD-GC-SS	40.20' md	1,200' md
MWD - IFR - MS	1,200' md	8,311.93' md

Close Approach Analysis results:

Under method (2): All wells pass. Note, it is recommended to use the risk base rule set (1:200) to increase the drilling space around NS31 in the surface hole.

All data documenting these procedures is available for inspection at the Anadrill Directional Planning Center.

Close Approach Drilling Aids to be provided:

A drilling map, with offset wells on the plan view, and traveling cylinder will be provided.

Checked by:           Scott DeLapp 08/25/03          

Schlumberger Private



# NS32 (P6) Proposal



**Approved 8/24/3**

Report Date: August 26, 2003  
 Client: BP Exploration Alaska  
 Field: Northstar  
 Structure / Slot: Northstar PF / NS32  
 Well: NS32  
 Borehole: Plan NS32  
 UWI/API#: 50029  
 Survey Name / Date: NS32 (P6) / July 16, 2003  
 Tort / AHD / DDI / ERD ratio: 64.343° / 4540.40 ft / 5.560 / 0.679  
 Grid Coordinate System: NAD27 Alaska State Planes, Zone 04, US Feet  
 Location Lat/Long: N 70.49159610, W 148.69333956  
 Location Grid N/E Y/X: N 6031131.220 NUS, E 659821.460 NUS  
 Grid Convergence Angle: +1.23167222°  
 Grid Scale Factor: 0.99992902

Survey / DLS Computation Method: Minimum Curvature / Lubinski  
 Vertical Section Azimuth: 32.590°  
 Vertical Section Origin: N 0.000 ft, E 0.000 ft  
 TVD Reference Datum: KB  
 TVD Reference Elevation: 55.3 ft relative to MSL  
 Sea Bed / Ground Level Elevation: 15.670 ft relative to MSL  
 Magnetic Declination: 25.646°  
 Total Field Strength: 57584.406 nT  
 Magnetic Dip: 80.983°  
 Declination Date: September 20, 2003  
 Magnetic Declination Model: BGGM 2003  
 North Reference: True North  
 Total Corr Mag North -> True North: +25.646°  
 Local Coordinates Referenced To: Well Head

Comments	Measured Depth (ft)	Inclination (deg)	Azimuth (deg)	TVD (ft)	Sub-Sea TVD (ft)	Vertical Section (ft)	NS (ft)	EW (ft)	DLS (deg/100 ft)	Tool Face (deg)	Northing (ftUS)	Easting (ftUS)	Latitude	Longitude
KBE	0.00	0.00	32.59	0.00	-55.30	0.00	0.00	0.00	0.00	32.59M	6031131.22	659821.46	N 70.49159610	W 148.69333956
KOP Bld 1.5/100	300.00	0.00	32.59	300.00	244.70	0.00	0.00	0.00	0.00	32.59M	6031131.22	659821.46	N 70.49159610	W 148.69333956
Bld 2.5/100	400.00	1.50	32.59	399.99	344.69	1.31	1.10	0.71	1.50	32.59M	6031132.34	659822.14	N 70.49159911	W 148.69333380
	500.00	4.00	32.59	499.87	444.57	6.11	5.14	3.29	2.50	32.59M	6031136.43	659824.64	N 70.49181015	W 148.69331268
	600.00	6.50	32.59	599.44	544.14	15.26	12.85	8.22	2.50	0.00G	6031144.25	659829.40	N 70.49163121	W 148.69327240
	700.00	9.00	32.59	698.52	643.22	28.74	24.21	15.48	2.50	0.00G	6031155.76	659836.41	N 70.49166225	W 148.69321303
	800.00	11.50	32.59	796.91	741.61	46.53	39.21	25.06	2.50	0.00G	6031170.95	659845.67	N 70.49170321	W 148.69313469
	900.00	14.00	32.59	894.44	839.14	68.60	57.80	36.95	2.50	0.00G	6031189.80	659857.16	N 70.49175400	W 148.69303753
	1000.00	16.50	32.59	990.91	935.61	94.90	79.96	51.11	2.50	0.00G	6031212.25	659870.84	N 70.49181454	W 148.69292173
	1100.00	19.00	32.59	1086.14	1030.84	125.39	105.64	67.53	2.50	0.00G	6031238.28	659886.70	N 70.49188471	W 148.69278751
Top Perm	1200.00	21.50	32.59	1179.95	1124.65	159.99	134.81	86.17	2.50	0.00G	6031267.84	659904.71	N 70.49196437	W 148.69263513
	1226.23	22.16	32.59	1204.30	1149.00	169.75	143.02	91.43	2.50	0.00G	6031276.16	659909.78	N 70.49198681	W 148.69259220
	1300.00	24.00	32.59	1272.17	1216.87	198.66	167.39	107.00	2.50	0.00G	6031300.85	659924.83	N 70.49205337	W 148.69246488
	1400.00	26.50	32.59	1362.81	1307.31	241.32	203.32	129.97	2.50	0.00G	6031337.28	659947.02	N 70.49215155	W 148.69227708
	1500.00	29.00	32.59	1451.10	1395.80	287.87	242.55	155.05	2.50	0.00G	6031377.03	659971.25	N 70.49225871	W 148.69207209
Base Perm	1600.00	31.50	32.59	1537.47	1482.17	338.25	284.99	182.18	2.50	0.00G	6031420.04	659997.48	N 70.49237466	W 148.69185029
	1643.45	32.59	32.59	1574.30	1519.00	361.30	304.41	194.60	2.50	0.00G	6031439.72	660009.45	N 70.49242771	W 148.69174880
	1700.00	34.00	32.59	1621.57	1566.27	392.34	330.57	211.32	2.50	0.00G	6031466.23	660025.61	N 70.49249916	W 148.69161211
	1800.00	36.50	32.59	1703.23	1647.93	450.05	379.19	242.40	2.50	0.00G	6031515.51	660055.63	N 70.49263200	W 148.69135801
	1900.00	39.00	32.59	1782.29	1726.99	511.27	430.77	275.37	2.50	0.00G	6031567.78	660087.49	N 70.49277290	W 148.69108646

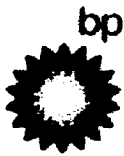
Comments	Measured Depth (ft)	Inclination (deg)	Azimuth (deg)	TVD (ft)	Sub-Sea TVD (ft)	Vertical Section (ft)	NS (ft)	EW (ft)	DLS (deg/100 ft)	Tool Face (deg)	Northing (ftUS)	Easting (ftUS)	Latitude	Longitude
	2000.00	41.50	32.59	1858.81	1803.31	575.87	485.21	310.17						
End Bld	2100.00	44.00	32.59	1932.04	1876.74	643.75	542.40	346.73	2.50	0.00G	6031622.95	660121.10	N 70.49292161	W 148.69080397
SV6 (Top Confining Zone)	2126.86	44.67	32.59	1951.25	1895.95	662.52	558.21	356.84	2.50	0.00G	6031680.90	660156.42	N 70.49307783	W 148.69050510
10-3/4" Csg Pt	3749.66	44.67	32.59	3105.30	3050.00	1803.42	1519.49	971.32	0.00	0.00G	6031696.93	660166.19	N 70.49312104	W 148.69042243
	3960.59	44.67	32.59	3255.30	3200.00	1951.71	1644.43	1051.19	0.00	0.00G	6032671.12	660759.83	N 70.49574696	W 148.68539797
SV5 (Base Confining Zone)	4113.86	44.67	32.59	3364.30	3309.00	2059.47	1735.22	1109.23	0.00	0.00G	6032797.75	660836.99	N 70.49608826	W 148.68474481
SV4	4621.49	44.67	32.59	3725.30	3670.00	2416.35	2035.92	1301.45	0.00	0.00G	6032889.76	660893.06	N 70.49633627	W 148.68427017
SV3	4949.13	44.67	32.59	3958.30	3903.00	2646.69	2230.00	1425.52	0.00	0.00G	6033194.50	661078.76	N 70.49715764	W 148.68269811
(Top Upper Injection Zone)	5205.05	44.67	32.59	4140.30	4085.00	2826.62	2381.60	1522.42	0.00	0.00G	6033391.18	661198.61	N 70.49768778	W 148.68168338
SV1 (Top Major Shale Barrier)	5749.24	44.67	32.59	4527.30	4472.00	3209.21	2703.95	1728.49	0.00	0.00G	6033544.82	661292.23	N 70.49810187	W 148.68089073
Drp 2.5/100	6225.06	44.67	32.59	4865.68	4810.38	3543.73	2985.81	1908.66	0.00	180.00G	6033871.50	661491.30	N 70.49898237	W 148.67920514
TMBK (Top Lower Injection Zone - Top UGNU)	6239.95	44.30	32.59	4876.30	4821.00	3554.16	2994.60	1914.26	2.50	180.00G	6034157.14	661665.36	N 70.49975224	W 148.67773121
	6300.00	42.80	32.59	4919.82	4864.52	3595.53	3029.45	1936.56	2.50	180.00G	6034166.05	661670.79	N 70.49977625	W 148.67768524
	6400.00	40.30	32.59	4994.65	4939.35	3661.85	3085.33	1972.28	2.50	180.00G	6034201.38	661692.32	N 70.49987145	W 148.67750295
	6500.00	37.80	32.59	5072.31	5017.01	3724.84	3138.41	2006.21	2.50	180.00G	6034258.00	661726.83	N 70.50002408	W 148.67721072
	6600.00	35.30	32.59	5152.64	5097.34	3784.39	3188.58	2038.28	2.50	180.00G	6034311.79	661759.60	N 70.50016905	W 148.67693315
	6700.00	32.80	32.59	5235.49	5180.19	3840.37	3235.75	2068.43	2.50	180.00G	6034362.64	661790.59	N 70.50030608	W 148.67667076
	6800.00	30.30	32.59	5320.70	5265.40	3892.69	3279.83	2096.61	2.50	180.00G	6034410.44	661819.72	N 70.50043492	W 148.67642406
	6900.00	27.80	32.59	5408.12	5352.82	3941.24	3320.73	2122.76	2.50	180.00G	6034455.11	661846.94	N 70.50055532	W 148.67619351
	7000.00	25.30	32.59	5497.57	5442.27	3985.93	3358.39	2146.83	2.50	180.00G	6034496.57	661872.20	N 70.50068705	W 148.67597956
End Drp	7011.93	25.00	32.59	5508.36	5453.06	3991.00	3362.66	2149.56	2.50	180.00G	6034534.73	661895.46	N 70.50076990	W 148.67578261
7-5/8" Csg Pt	8111.91	25.00	32.59	6505.29	6449.99	4455.88	3754.34	2399.96	0.00	0.00G	6034539.06	661898.10	N 70.50078156	W 148.67576028
Target	8111.93	25.00	32.59	6505.30	6450.00	4455.88	3754.34	2399.96	0.00	0.00G	6034936.00	662139.99	N 70.50185136	W 148.67371151
WS1 (Top Schrader Bluff - Base UGNU)	8111.94	25.00	32.59	6505.31	6450.01	4455.89	3754.34	2399.96	0.00	0.00G	6034936.00	662140.00	N 70.50185137	W 148.67371149
TD	8311.93	25.00	32.59	6686.56	6631.26	4540.40	3825.56	2445.49	0.00	0.00G	6034936.01	662140.00	N 70.50185138	W 148.67371147
											6035008.17	662183.98	N 70.50204588	W 148.67333896

**Legal Description:**

Surface : 1358 FSL 649 FEL S11 T13N R13E UM  
 Target : 5112 FSL 3526 FEL S12 T13N R13E UM  
 BHL : 5183 FSL 3481 FEL S12 T13N R13E UM

**Northings (Y) (ftUS)**  
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 6035008.17

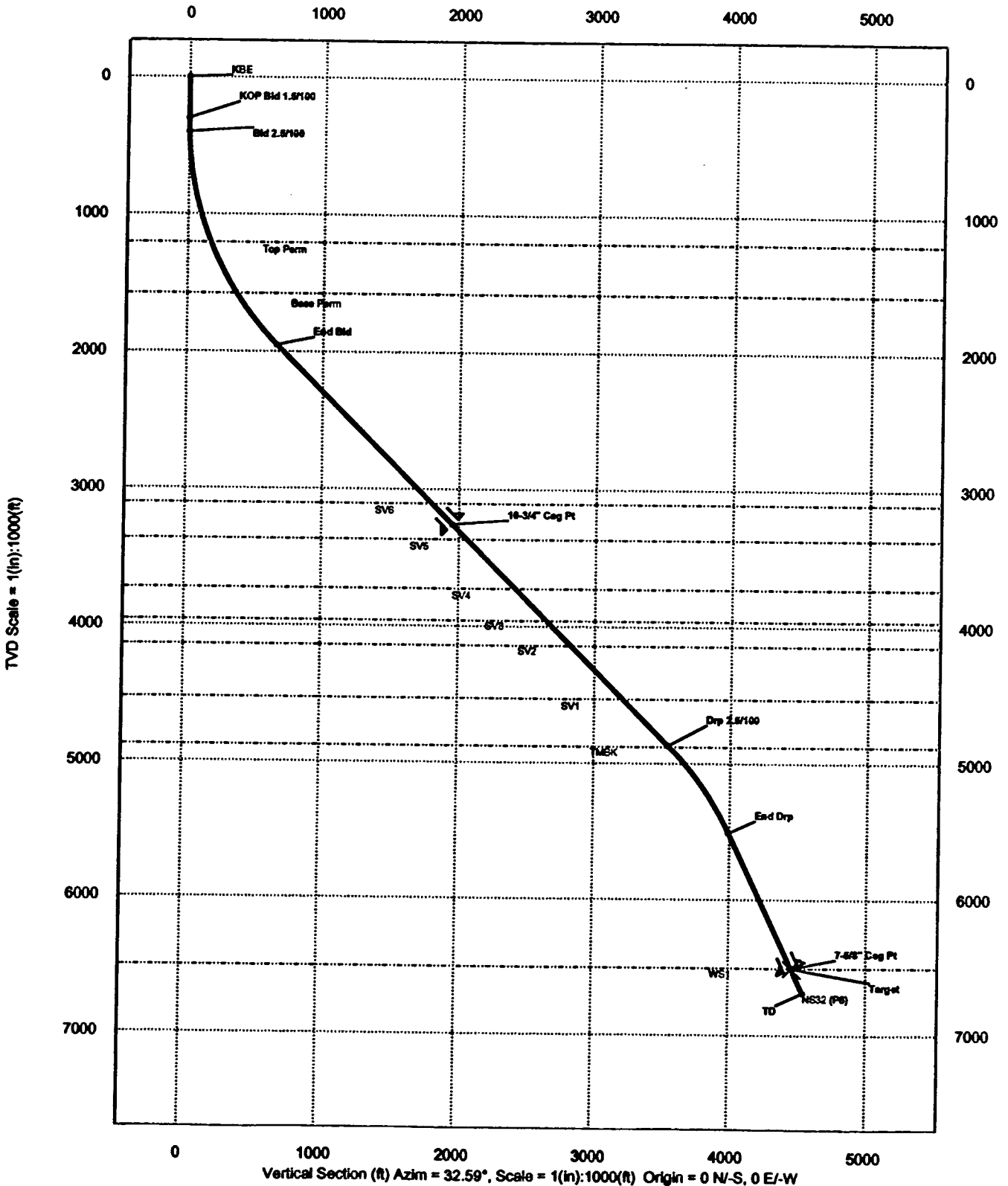
**Eastings (X) (ftUS)**  
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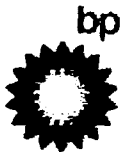


Schlumberger

WELL	<b>NS32 (P6)</b>	FIELD	<b>Northstar</b>	STRUCTURE	<b>Northstar PF</b>
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Magnetic Parameters		Well Location		MWD/Logging		Miscellaneous															
Model	BGCM 2003	Sp	00.002"	Date	September 20, 2003	Lat	49° 20' 20.740"	Mag Dec	-93.040°	FB	57804 490 07	Long	101° 42' 41.302"	Heading	00027 Alaska State Plane, Zone 04, US Foot	Grid Conv.	+1.23167222"	Master Well	NS32	TVD Ref.	MS (50.30 ft above MS)
						Lon	101° 42' 41.302"	Ending	00021 00 00.0	Grade Fact.	0.0000240 55	Plan	NS32 (P6)	Day Date	July 10, 2003						

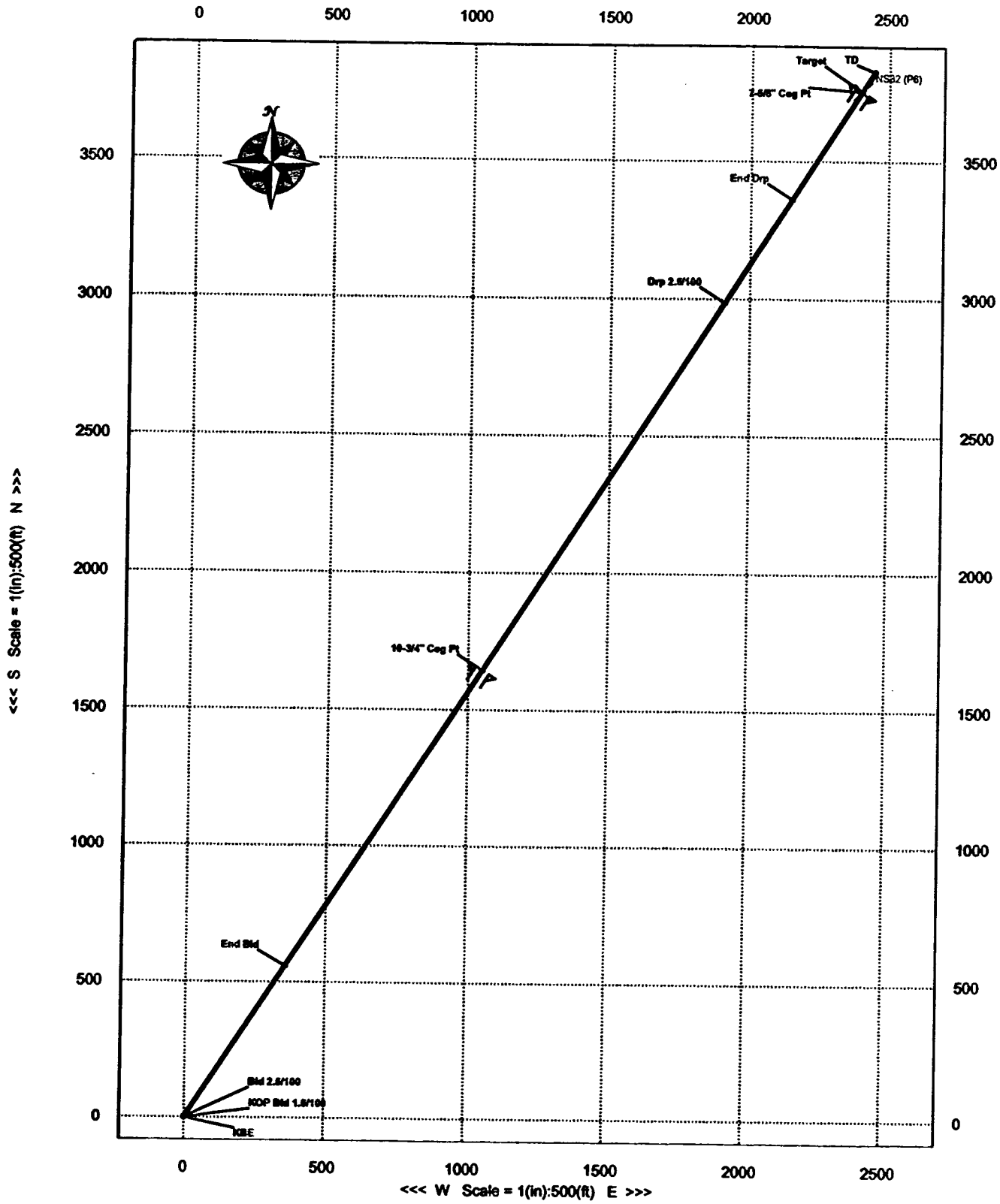




Schlumberger

WELL <b>NS32 (P6)</b>	FIELD <b>Northstar</b>	STRUCTURE <b>Northstar PF</b>
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Magnetic Parameters Model: BDCM 2003 Dip: 88.953° Mag Dec: +28.940°	Date: September 26, 2003 PB: 67884.000 nT	Surface Location Lat: 80° 20' 20.748" Lon: W148° 41' 38.022"	WAG27 Alaska State Plane, Zone 04, 48 Feet NAD83 (11.22 RL8) Grid Conv: +1.22147232" Datum: 0002148 RL8 Scale Fact: 0.0004250 155	Manufacturer Site: NS32 Plan: NS32 (P6)	TVD Ref: NS 05 36 ft above MSL Dry Date: July 16, 2003
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# BPX AK

## Anticollision Report

Company: BP Amoco	Date: 8/26/2003	Time: 13:34:50	Page: 1
Field: Northstar	Co-ordinate(NE) Reference: Well: NS32, True North	Vertical (TVD) Reference: NS32 plan 55.3	Db: Sybase
Reference Site: Northstar PF			
Reference Well: NS32			
Reference Wellpath: Plan NS32			

NO GLOBAL SCAN: Using user defined selection & scan criteria		Reference: Principal Plan & PLANNED PROGRAM
Interpolation Method: MD	Interval: 50.00 ft	Error Model: ISCWSA Ellipse
Depth Range: 39.40 to 8311.93 ft		Scan Method: Trav Cylinder North
Maximum Radius: 3000.00 ft		Error Surface: Ellipse + Casing

Survey Program for Definitive Wellpath			
Date: 3/18/2002	Validated: No	Version: 3	
Planned From To	Survey	Toolcode	Tool Name
ft ft			
39.40 1200.00	Planned: Plan #6 V2	GYD-GC-SS	Gyrodata gyro single shots
1200.00 8311.93	Planned: Plan #6 V2	MWD+IFR:AK	MWD + IFR [Alaska]

Casing Points				
MD	TVD	Diameter	Hole Size	Name
ft	ft	in	in	
3960.59	3255.30	10.750	13.500	10 3/4"
8111.93	6505.30	7.625	9.875	7-5/8"
8311.93	6686.57	6.750	6.750	open

Summary								
Site	Offset Wellpath		Reference MD	Offset MD	Ctr-Ctr Distance	No-Go Area	Allowable Deviation	Warning
	Well	Wellpath						
Northstar PF	NS06	NS06 V34	348.64	350.00	260.75	6.48	254.27	Pass: Major Risk
Northstar PF	NS07	NS07 V33	149.17	150.00	251.19	3.01	248.18	Pass: Major Risk
Northstar PF	NS08	NS08 V18	299.29	300.00	239.76	5.39	234.36	Pass: Major Risk
Northstar PF	NS09	NS09 V14	394.36	400.00	235.08	6.92	228.16	Pass: Major Risk
Northstar PF	NS10	NS10 V17	441.60	450.00	215.00	7.29	207.70	Pass: Major Risk
Northstar PF	NS12	NS12 V28	346.91	350.00	194.92	6.85	188.07	Pass: Major Risk
Northstar PF	NS13	NS13 V12	395.13	400.00	193.86	7.04	186.82	Pass: Major Risk
Northstar PF	NS14	NS14 V11	396.09	400.00	177.65	7.26	170.39	Pass: Major Risk
Northstar PF	NS15	NS15 V19	347.55	350.00	171.19	6.40	164.79	Pass: Major Risk
Northstar PF	NS16	NS16 V39	395.12	400.00	159.45	7.47	151.98	Pass: Major Risk
Northstar PF	NS17	NS17 V12	395.71	400.00	152.80	6.48	146.32	Pass: Major Risk
Northstar PF	NS18	NS18 V12	396.48	400.00	138.92	8.06	130.86	Pass: Major Risk
Northstar PF	NS19	NS19 V17	396.28	400.00	128.97	7.23	121.74	Pass: Major Risk
Northstar PF	NS20	NS20 V4	397.45	400.00	120.78	6.58	114.19	Pass: Major Risk
Northstar PF	NS20	NS20PB1 V10	397.45	400.00	120.78	6.58	114.19	Pass: Major Risk
Northstar PF	NS21	NS21 V46	444.58	450.00	108.32	8.25	100.07	Pass: Major Risk
Northstar PF	NS22	NS22 V13	48.79	50.00	99.87	1.26	98.61	Pass: Major Risk
Northstar PF	NS23	NS23 V33	396.86	400.00	88.84	7.26	81.58	Pass: Major Risk
Northstar PF	NS24	NS24 V15	397.63	400.00	78.94	7.32	71.62	Pass: Major Risk
Northstar PF	NS25	Plan NS25 V7 Plan: Pla	398.04	400.00	70.85	7.68	63.17	Pass: Major Risk
Northstar PF	NS26	NS26 V22	349.26	350.00	61.65	6.55	55.10	Pass: Major Risk
Northstar PF	NS27	NS27 V29	348.96	350.00	48.35	6.77	41.58	Pass: Major Risk
Northstar PF	NS29	NS29 V22	447.84	450.00	30.87	7.98	22.89	Pass: Major Risk
Northstar PF	NS31	NS31 V14	399.10	400.00	10.21	7.29	2.92	Pass: Major Risk
Seal Island	SEAL-A-01	SEAL-A-01 V4	1270.45	1250.00	79.64	24.21	55.43	Pass: Major Risk
Seal Island	SEAL-A-02	SEAL-A-02 V0	1217.05	1200.00	93.39	25.87	67.52	Pass: Major Risk
Seal Island	SEAL-A-02	SEAL-A-02A V4	1217.59	1200.00	91.31	22.47	68.84	Pass: Major Risk
Seal Island	SEAL-A-03	SEAL-A-03 V4	1218.53	1200.00	81.71	20.59	61.13	Pass: Major Risk
Seal Island	SEAL-A-04	SEAL-A-04 V4	1335.67	1300.00	76.95	24.80	52.15	Pass: Major Risk

# BPX AK

## Anticollision Report

Company: BP Amoco	Date: 8/26/2003	Time: 14:14:53	Page: 1
Field: Northstar			
Reference Site: Northstar PF	Co-ordinate(NE) Reference: Well: NS32, True North		
Reference Well: NS32	Vertical (TVD) Reference: NS32 plan 55.3		
Reference Wellpath: Plan NS32			Db: Sybase

NO GLOBAL SCAN: Using user defined selection & scan criteria		Reference: Principal Plan & PLANNED PROGRAM
Interpolation Method: MD	Interval: 50.00 ft	Error Model: ISCWSA Ellipse
Depth Range: 39.40 to 8311.93 ft		Scan Method: Trav Cylinder North
Maximum Radius: 3000.00 ft		Error Surface: Ellipse + Casing

### Survey Program for Definitive Wellpath

Date: 3/18/2002	Validated: No	Version: 3
Planned From To	Survey	Toolcode
ft	ft	Tool Name
39.40 1200.00	Planned: Plan #6 V2	GYD-GC-SS
1200.00 8311.93	Planned: Plan #6 V2	MWD+IFR:AK
		Gyrodata gyro single shots
		MWD + IFR [Alaska]

### Casing Points

MD ft	TVD ft	Diameter in	Hole Size in	Name
3960.59	3255.30	10.750	13.500	10 3/4"
8111.93	6505.30	7.625	9.875	7-5/8"
8311.93	6686.57	6.750	6.750	open

### Summary

Site	Offset Wellpath		Reference MD ft	Offset MD ft	Ctr-Ctr Distance ft	No-Go Area ft	Allowable Deviation ft	Warning
	Well	Wellpath						
Northstar PF	NS06	NS06 V34	346.64	350.00	260.75	6.48	254.27	Pass: Major Risk
Northstar PF	NS07	NS07 V33	149.17	150.00	251.19	3.01	248.18	Pass: Major Risk
Northstar PF	NS08	NS08 V18	299.29	300.00	239.76	5.39	234.36	Pass: Major Risk
Northstar PF	NS09	NS09 V14	394.36	400.00	235.08	6.92	228.16	Pass: Major Risk
Northstar PF	NS10	NS10 V17	441.60	450.00	215.00	7.29	207.70	Pass: Major Risk
Northstar PF	NS12	NS12 V28	346.91	350.00	194.92	6.85	188.07	Pass: Major Risk
Northstar PF	NS13	NS13 V12	395.13	400.00	193.86	7.04	186.82	Pass: Major Risk
Northstar PF	NS14	NS14 V11	396.09	400.00	177.65	7.26	170.39	Pass: Major Risk
Northstar PF	NS15	NS15 V19	347.55	350.00	171.19	6.40	164.79	Pass: Major Risk
Northstar PF	NS16	NS16 V39	395.12	400.00	159.45	7.47	151.98	Pass: Major Risk
Northstar PF	NS17	NS17 V12	395.71	400.00	152.80	6.48	146.32	Pass: Major Risk
Northstar PF	NS18	NS18 V12	396.48	400.00	138.92	8.06	130.86	Pass: Major Risk
Northstar PF	NS19	NS19 V17	396.28	400.00	128.97	7.23	121.74	Pass: Major Risk
Northstar PF	NS20	NS20 V4	397.45	400.00	120.78	6.58	114.19	Pass: Major Risk
Northstar PF	NS20	NS20PB1 V10	397.45	400.00	120.78	6.58	114.19	Pass: Major Risk
Northstar PF	NS21	NS21 V46	444.58	450.00	108.32	8.25	100.07	Pass: Major Risk
Northstar PF	NS22	NS22 V13	48.79	50.00	99.87	1.26	98.61	Pass: Major Risk
Northstar PF	NS23	NS23 V33	396.86	400.00	88.84	7.26	81.58	Pass: Major Risk
Northstar PF	NS24	NS24 V15	397.63	400.00	78.94	7.32	71.62	Pass: Major Risk
Northstar PF	NS25	Plan NS25 V7 Plan: Pla	398.04	400.00	70.85	7.68	63.17	Pass: Major Risk
Northstar PF	NS26	NS26 V22	349.26	350.00	61.65	6.55	55.10	Pass: Major Risk
Northstar PF	NS27	NS27 V29	348.96	350.00	48.35	6.77	41.58	Pass: Major Risk
Northstar PF	NS29	NS29 V22	447.84	450.00	30.87	7.98	22.89	Pass: Major Risk
Northstar PF	NS31	NS31 V14	349.20	350.00	9.57	2.81	6.76	Pass: Minor 1/200
Seal Island	SEAL-A-01	SEAL-A-01 V4	1270.45	1250.00	79.64	24.21	55.43	Pass: Major Risk
Seal Island	SEAL-A-02	SEAL-A-02 V0	1217.05	1200.00	93.39	25.87	67.52	Pass: Major Risk
Seal Island	SEAL-A-02	SEAL-A-02A V4	1217.59	1200.00	91.31	22.47	68.84	Pass: Major Risk
Seal Island	SEAL-A-03	SEAL-A-03 V4	1218.53	1200.00	81.71	20.59	61.13	Pass: Major Risk
Seal Island	SEAL-A-04	SEAL-A-04 V4	1335.67	1300.00	76.95	24.80	52.15	Pass: Major Risk

**FIELD DETAILS**

Northstar  
North Slope  
UNITED STATES

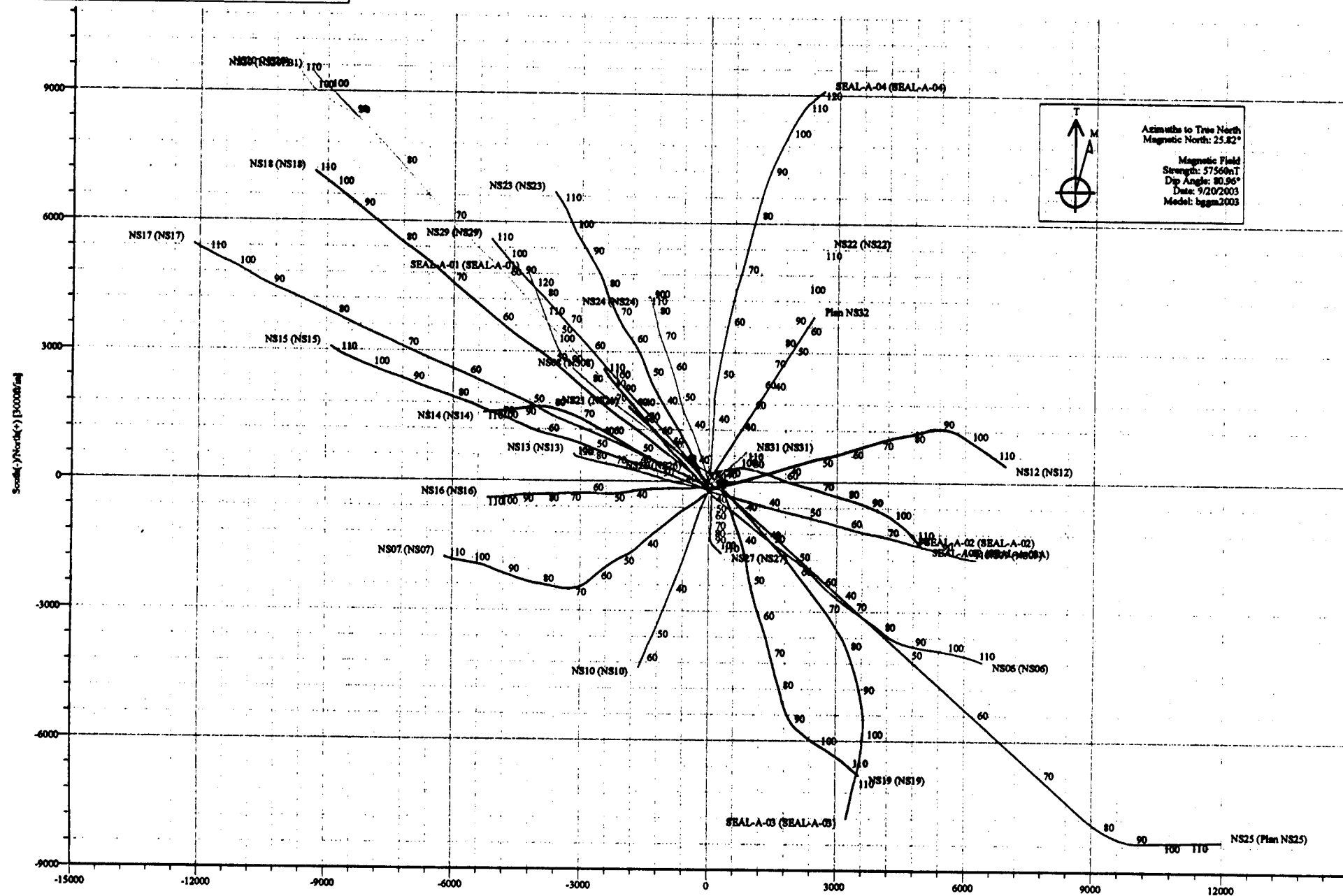
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Ellipsoid: NAD27 (Clarke 1866)  
Zone: Alaska, Zone 4  
Magnetic Model: bggm2003

System Datum: Mean Sea Level  
Local North: True North

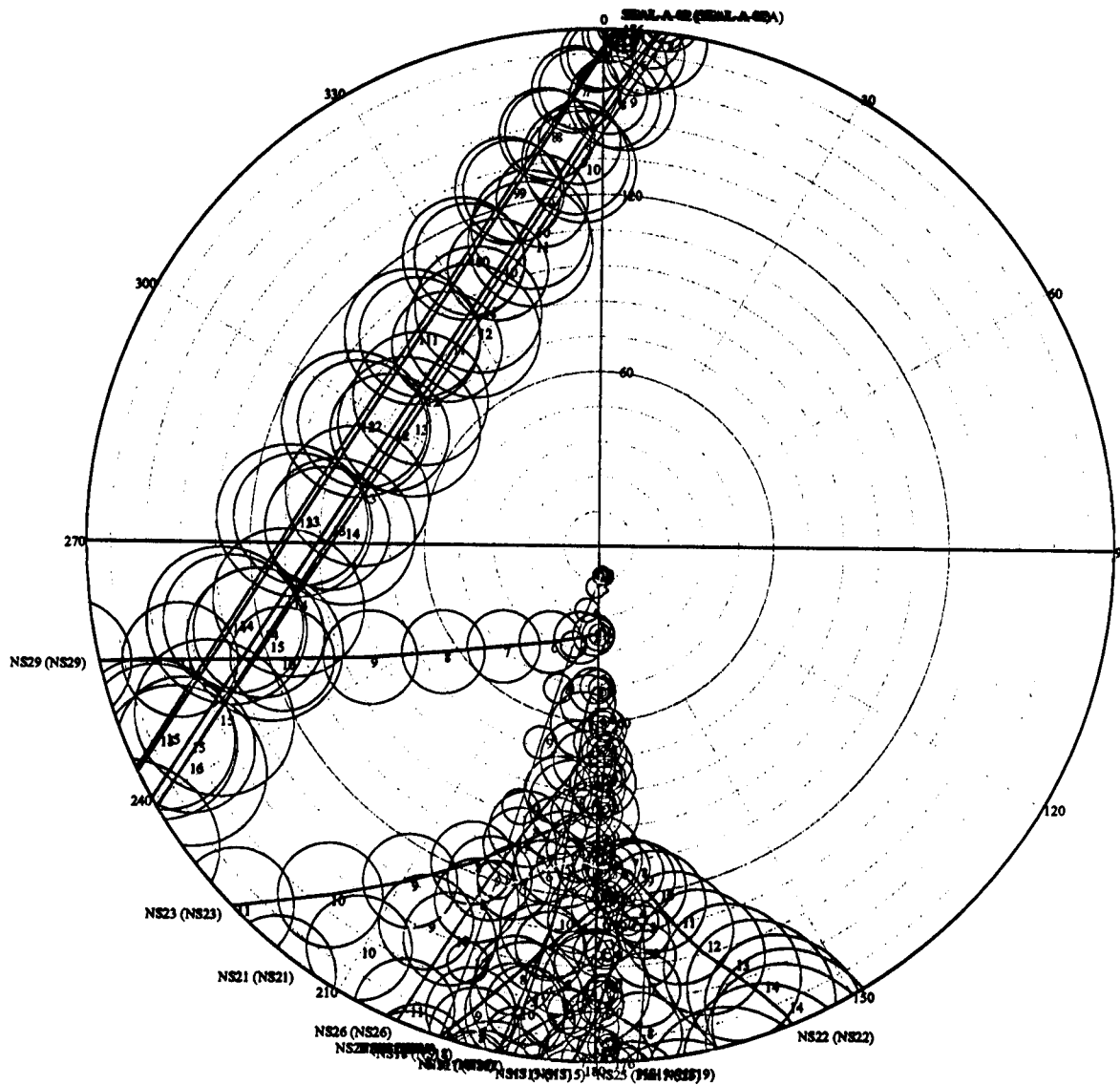
**Field: Northstar**  
**Site: Northstar PF**  
**Well: NS32**  
**Wellpath: Plan NS32**

**REFERENCE INFORMATION**

Co-ordinate (N/E) Reference: Well Centre: NS32, Tree North  
Vertical (TVD) Reference: NS32 plan 53.30  
Section (VS) Reference: Slot - (0.00N,0.00E)  
Measured Depth Reference: NS32 plan 53.30  
Calculation Method: Minimum Curvature



Field: Northstar  
Site: Northstar PF  
Well: NS32  
Wellpath: Plan NS32



Travelling Cylinder Azimuth (TFO+AZI) [deg] vs Centre to Centre Separation [600/in]

