

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APPROVED
OMB No. 1004- 0137
Expires: March 31, 2007

SUNDRY NOTICES AND REPORTS ON WELLS
Do not use this form for proposals to drill or to re-enter an abandoned well. Use Form 3160-3 (APD) for such proposals.

SUBMIT IN TRIPLICATE - Other Instructions on reverse side.

1. Type of Well ☐ Oil Well ☒ Gas Well ☐ Other		5. Lease Serial No. Contract 764
2. Name of Operator Black Hills Gas Resources		6. If Indian, Allottee, or Tribe Name Jicarilla Apache
3a. Address 3200 N 1st Street PO Box 249 Bloomfield, NM 87413	3b. Phone No. (include area code) 505-634-1111 ext 27	7. If Unit or CA. Agreement Name and/or No. 210 FARMING
4. Location of Well (Footage, Sec., T., R., M., or Survey Description) Surface: 660' FNL 1050' FWL NE/NW Unit C Sec 31 T30N R3W Bottom Hole: ±2000' FNL ±50' FEL SE/NE Unit H Sec 31 T30N R3W		8. Well Name and No. Jicarilla 464-31 #11
		9. API Well No. 30-039-27731
		10. Field and Pool, or Exploratory Area E. Blanco/Pictured Cliffs
		11. County or Parish, State Rio Arriba, New Mexico

CHECK APPROPRIATE BOX(S) TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION			
☒ Notice of Intent	☐ Acidize	☐ Deepen	☐ Production (Start/ Resume)	☐ Water Shut-off
☐ Subsequent Report	☐ Altering Casing	☐ Fracture Treat	☐ Reclamation	☐ Well Integrity
☐ Final Abandonment Notice	☐ Casing Repair	☐ New Construction	☐ Recomplete	☐ Other
	☒ Change Plans	☐ Plug and abandon	☐ Temporarily Abandon	
	☐ Convert to Injection	☐ Plug back	☐ Water Disposal	

13. Describe Proposed or Completed Operation (clearly state all pertinent details including estimated starting date of any proposed work and approximate duration thereof. If the proposal is to deepen directionally or recompleate horizontally, give subsurface locations and measured and true vertical depths or pertinent markers and sands. Attach the Bond under which the work will be performed or provide the Bond No. on file with the BLM/ BIA. Required subsequent reports shall be filed within 30 days following completion of the involved operations. If the operation results in a multiple completion or recompleation in a new interval, a Form 3160-4 shall be filed once testing has been completed. Final Abandonment Notice shall be filed only after all requirements, including reclamantion, have been completed, and the operator has determined that the site is ready for final inspection.)

The APD for this well was permitted and approved on May 7, 2004. This new drilling plan modifies the sundry approved on July 25, 2007 to re-enter the Jicarilla 464-31 #11 and convert the well to a horizontal. After review by NMOCD the horizontal leg was not approved because it transected the same quarter/quarter (Unit B) of the Jicarilla 464 #5 well. This plan addresses drilling around unit B avoiding the conflict. The drill will also be cased from the surface location to 10 feet east of the half section line for section 31. Therefore an amended C-102, Drilling Plan, completion report, and Nevis plan are attached. BHGR proposes to horizontally drill around unit B using the existing resulting in no change to the surface location but there will be a new bottom hole footage which is ±2000' FNL ±50' FEL SE/NE Unit H.

RCVD AUG 14 '07
OIL CONS. DIV.

DIST. 3

HOLD 0104 FOR Directional survey

14. I hereby certify that the foregoing is true and correct.
Name (Printed/ Typed)

Lynn H. Benally

Title

Regulatory Specialist

Signature

Date

8/5/2007

THIS SPACE FOR FEDERAL OR STATE OFFICE USE

Approved by

Title

Date

Conditions of approval, if any are attached. Approval of this notice does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon.

Title 18 U.S.C. Section 1001 AND Title 43 U.S.C. Section 1212, make it a crime for any person knowingly and willfully to make any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

(Instructions on page 2)

NMOCD

DISTRICT I
1625 N. French Dr., Hobbs, N.M. 88240

DISTRICT II
1301 W. Grand Ave., Artesia, N.M. 88210

DISTRICT III
1000 Rio Brazos Rd., Aztec, N.M. 87410

DISTRICT IV
1220 South St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy, Minerals & Natural Resources Department

OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-102

Revised October 12, 2005

Submit to Appropriate District Office

State Lease - 4 Copies

Fee Lease - 3 Copies

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

*API Number 30-039-27731		*Pool Code 72400		*Pool Name EAST BLANCO PICTURED CLIFFS	
*Property Code 34022		*Property Name JICARILLA 464-31			*Well Number 11
*OGRD No. 0-3925		*Operator Name BLACK HILLS GAS RESOURCES			*Elevation 7138

10 Surface Location

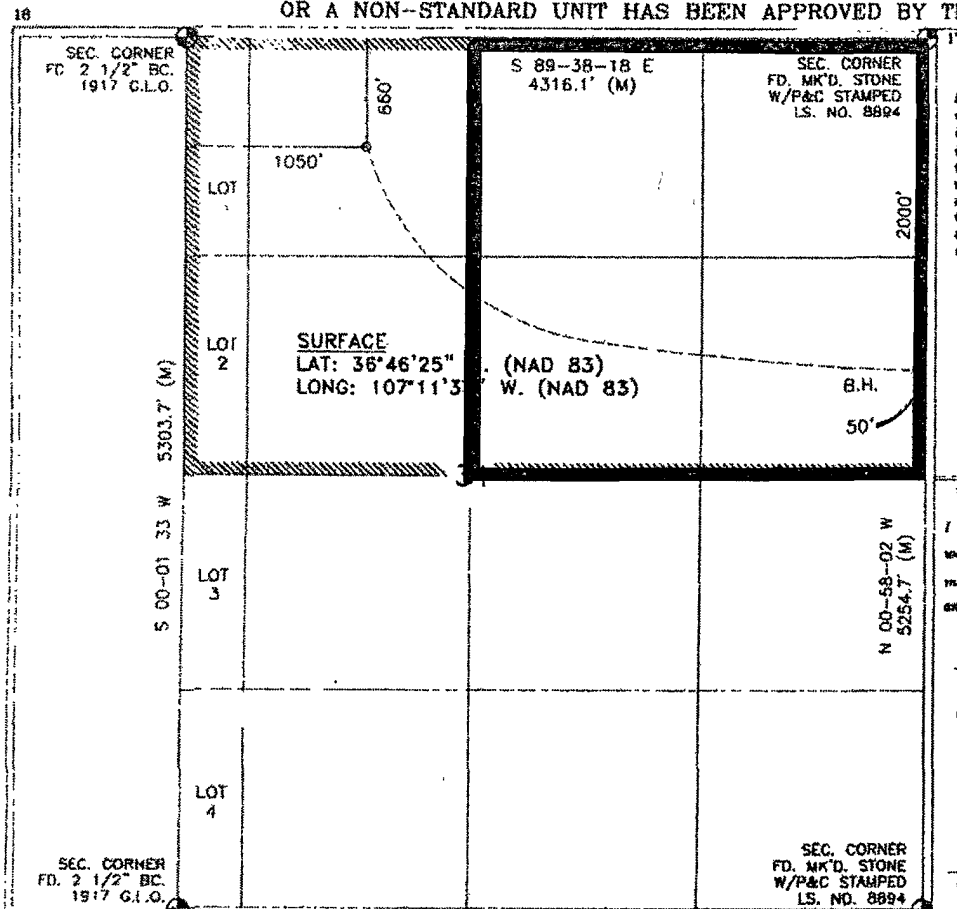
UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
C	31	30-N	3-W		560	NORTH	1050	WEST	RIO ARRIBA

11 Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
H	31	30-N	3-W		2000	NORTH	50	EAST	RIO ARRIBA

*Dedicated Acres 160 - NE / 4		*Joint or Infill		*Consolidation Code		*Order No.	
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NO ALLOWABLE WILL BE ASSIGNED TO THIS COMPLETION UNTIL ALL INTERESTS HAVE BEEN CONSOLIDATED
OR A NON-STANDARD UNIT HAS BEEN APPROVED BY THE DIVISION



OPERATOR CERTIFICATION

I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or undivided mineral interest in the land including the proposed bottom hole location or has a right to drill this well at this location pursuant to a contract with an owner of such a mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division.

[Signature] 8/3/2007
Signature Date

Lynn H. Benach
Printed Name

18 SURVEYOR CERTIFICATION

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.

DECEMBER 15, 2008 RUSH
Date of Survey

[Signature] Seal of Professional Surveyor
Signature and Seal of Professional Surveyor

8894
Certificate Number



Black Hills Gas Resources

Black Hills Gas Resources (BHGR)

Jicarilla 464-31 #11

Surface Location: 660' FNL 1050' FWL NE/NW Unit C

Bottom Hole Location: $\pm 2000'$ FNL $\pm 50'$ FEL SE/NE Unit H

Sec. 31 T30N R3W

Rio Arriba County, New Mexico

Jicarilla Contract 464

DRILLING PROGRAM

(Per Rule 320)

The Application for Permit to Drill (APD) was initiated under the NOS process as stated in Onshore Order No. 1 and supporting Bureau of Land Management (BLM) documents. This APD process includes an onsite meeting as determined by Bureau of Land Management (BLM) and the Jicarilla Nation.

The APD for this well was permitted and approved on May 7, 2004. This new drilling plan modifies the sundry approved on July 25, 2007 to re-entry the Jicarilla 464-31 #11 and convert the well to a horizontal. After review by NMOCD the horizontal leg was not approved because it transected the same quarter/quarter (Unit B) of the Jicarilla 464 #5 well. This plan addresses drilling around unit B avoiding the conflict.

SURFACE FORMATION – San Jose

GROUND ELEVATION – 7,138'

ESTIMATED FORMATION TOPS - (Water, oil, gas and/or other mineral-bearing formations)

San Jose	Surface	Sandstone, shales & siltstones
Nacimiento	2074'V	Sandstone, shales & siltstones
Ojo Alamo	3288'V	Sandstone, shales & siltstones
Kirtland	3,519'V	Sandstone, shales & siltstones
Fruitland	3,727'V	Sandstone, shales & siltstones
Pictured Cliffs	3,821'V	Sandstone, shales & siltstones

TOTAL DEPTH 3,831' TVD

Estimated depths of anticipated fresh water, oil, or gas:

San Jose	surface	Gas
Nacimiento	2074'V	Gas
Ojo Alamo	3288'V	Gas
Kirtland	3519'V	Gas
Fruitland	3727'V	Gas
Pictured Cliffs	3821'V	Gas

HORIZONTAL DRILLING PROGRAM

Kick Off Point (KOP) is estimated to be $\pm 300'$ TVD

CASING PROGRAM

Depth	Hole Diameter	Casing Diameter	Casing Weight and Grade	Cement
0-278' TVD	11"	8 5/8"	Existing Casing J-55 24#	Cemented to surface
278' - $\pm 3816'$ TVD	7-7/8	5-1/2 "	J-55 15.5# ST&C New	TD to surface (Lead: ± 375 sxs lite standard cement. Tail: 500 sxs 50:50 poz containing 0.25 lb/sx LCM) * **
$\pm 3816'$ TVD- End of Lateral Bore	4-3/4"	Open Hole		Open Hole

* Actual cement volume to be determined by caliper log.

** Cement will be circulated to surface

Yields:

Surface: Standard cement yield = $1.2 \text{ ft}^3/\text{sx}$ (mixed at 15.6 lb/gal)

Production: Lite Standard Cement yield: = $1.59 \text{ ft}^3/\text{sx}$ (mixed at 13.4 lb/gal)
50:50 poz yield = $1.27 \text{ ft}^3/\text{sx}$ (mixed at 14.15 lb/gal)

All fresh water and prospectively valuable minerals encountered during drilling will be recorded by depth and protected.

PRESSURE CONTROL

BOPs and choke manifold will be installed and pressure tested before drilling out under surface casing (subsequent pressure test will be performed whenever pressure seals are broken), and then will be checked daily as to mechanical operating conditions. BOP's will be pressure tested at least once every 30 days. Ram type preventors and related pressure control equipment will be pressure tested to 1,000 psi. Annular type preventor will be pressure tested to 50% of the rated working pressure, not to exceed 1,000 psi. All casing strings will be pressure tested to 0.22 psi/ft. or 1,000 psi, whichever is greater, not to exceed 70% of internal yield.

BOP to be either double gate rams or an annular preventor as per Onshore Order No. 2.

Statement on Accumulator System and Location of Hydraulic Controls

The drilling rig has not yet been selected for this well. Selection will take place after approval of this application. Manual and/or hydraulic controls will be in compliance with Onshore Order No. 2 for 2M systems.

A remote accumulator will be used. Pressures, capacities, location of remote hydraulic and manual controls will be identified at the time of the BLM supervised BOP test.

MUD PROGRAM

0' - TD' Clean Faze - Low solids non-dispersed
M.W. 8.5 – 9.2 ppg
Vis – 28 – 50 sec
W.L. 10cc or less

Sufficient mud materials to maintain mud properties, control lost circulation and to contain “kick” will be available at well site.

AUXILIARY EQUIPMENT

- A) A Kelly cock will be kept in the drill string at all times
- B) Inside BOP or stab-in valve (available on rig floor)
- C) Mud monitoring will be visually observed

LOGGING, CORING, TESTING PROGRAM

- A) Logging: None
- B) Coring: None
- C) Testing: Possible DST – None anticipated. Drill stem tests may be run on shows of interest

ABNORMAL CONDITIONS

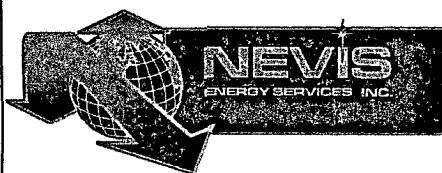
- A) Pressures: No abnormal conditions are anticipated
Bottom hole pressure gradient – 0.31 psi/ft
- B) Temperatures: No abnormal conditions are anticipated
- C) H₂S: See attached H₂S plan in event H₂S is encountered.
- D) Estimated bottomhole pressure: 1,188 psi

ANTICIPATED START DATE

August 13, 2007

COMPLETION

The location pad will be of sufficient size to accommodate all completion activities and equipment. A string of 2-3/8” #4.7 J-55 tubing will be run for flowing string. A Sundry Notice will be submitted with a revised completion program if warranted.



1724-B Townhurst Dr, Houston, Tx 77043
(713) 827-8302
www.nevisenergy.com

Job Number: 71xxx
Company: Black Hills Gas Resources
Lease/Well: Jicarilla 464-31 #11
Location: Rio Arriba County, NM
Rig Name: Patt 744
RKB: ☐
G.L. or M.S.L.: ☐

State/Country: NM/USA
Declination: ☐
Grid: ☐
File name: Z:\BLACKH-1\NEWWEL-1\464-31-1\46431#11.SVY
Date/Time: 01-Aug-07 / 12:53
Curve Name: Jic 464-31 #11 Plan 8-01-07

Jic 464-31 #11 Plan 8-01-07

WINSERVE PROPOSAL REPORT
Minimum Curvature Method
Vertical Section Plane 112.62
Vertical Section Referenced to Wellhead
Rectangular Coordinates Referenced to Wellhead

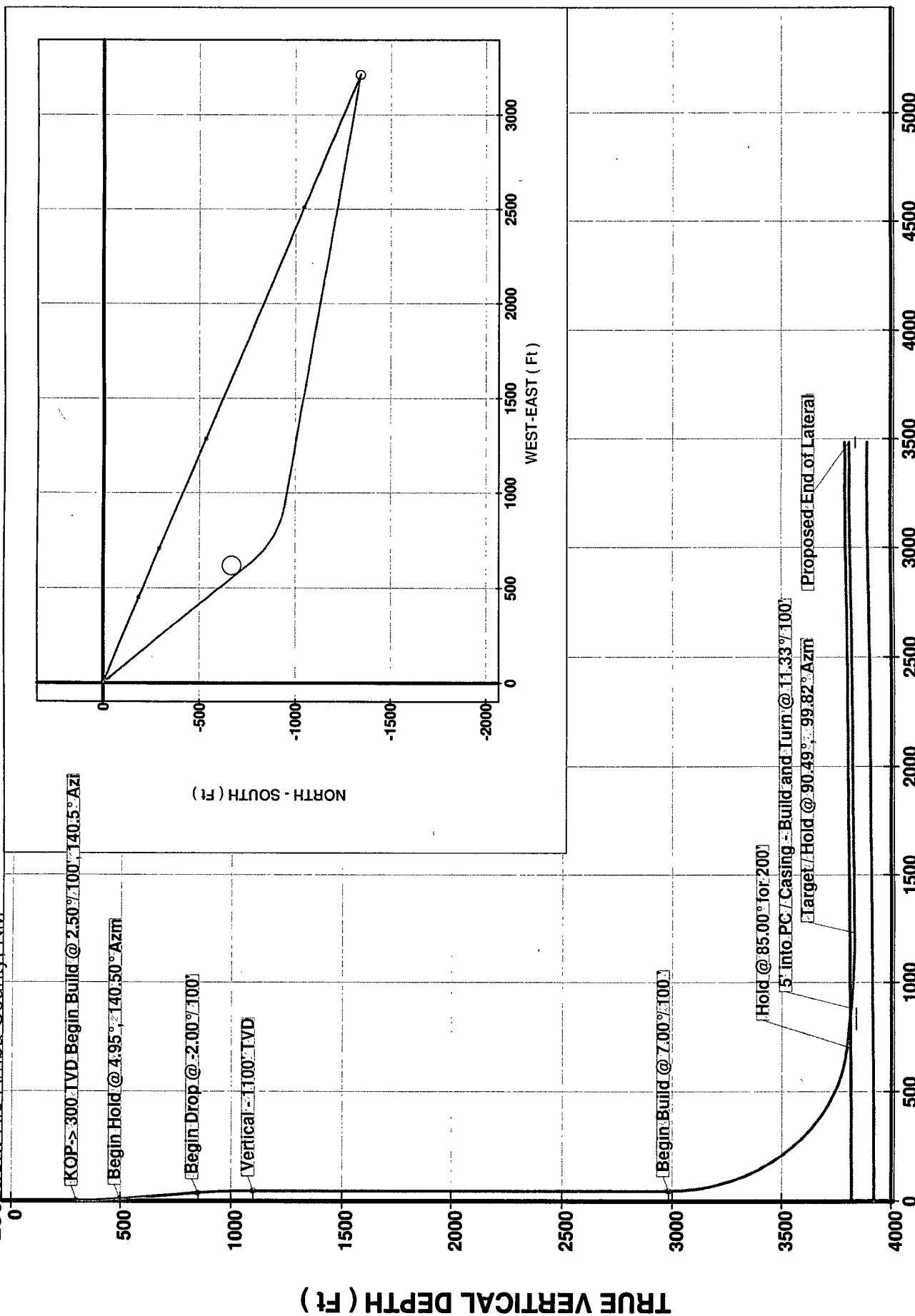
Measured Depth FT	Incl Angle Deg	Drift Direction Deg	True Vertical Depth	Vertical Section FT	N-S FT	E-W FT	CLOSURE Distance FT	Direction Deg	Dogleg Severity Deg/100
KOP-> 300 TVD Begin Build @ 2.50% 100', 140.5° Azi									
300.00	.00	.00	300.00	.00	.00	.00	.00	.00	.00
330.00	.75	140.50	330.00	.17	-.15	.12	.20	140.50	2.50
360.00	1.50	140.50	359.99	.69	-.61	.50	.79	140.50	2.50
390.00	2.25	140.50	389.98	1.56	-1.36	1.12	1.77	140.50	2.50
420.00	3.00	140.50	419.95	2.78	-2.42	2.00	3.14	140.50	2.50
450.00	3.75	140.50	449.89	4.34	-3.79	3.12	4.91	140.50	2.50
480.00	4.50	140.50	479.82	6.24	-5.45	4.49	7.06	140.50	2.50
Begin Hold @ 4.95°, 140.50° Azm									
498.11	4.95	140.50	497.86	7.56	-6.60	5.44	8.56	140.50	2.50
598.11	4.95	140.50	597.49	15.19	-13.26	10.93	17.19	140.50	.00
698.11	4.95	140.50	697.11	22.83	-19.93	16.43	25.82	140.50	.00
798.11	4.95	140.50	796.74	30.46	-26.59	21.92	34.46	140.50	.00
Begin Drop @ -2.00% 100'									
854.25	4.95	140.50	852.67	34.74	-30.33	25.00	39.30	140.50	.00
884.25	4.35	140.50	882.58	36.89	-32.21	26.55	41.74	140.50	2.00
914.25	3.75	140.50	912.50	38.77	-33.84	27.90	43.86	140.50	2.00
944.25	3.15	140.50	942.45	40.36	-35.24	29.05	45.66	140.50	2.00
974.25	2.55	140.50	972.41	41.68	-36.39	30.00	47.16	140.50	2.00
1004.25	1.95	140.50	1002.38	42.73	-37.30	30.75	48.34	140.50	2.00
1034.25	1.35	140.50	1032.37	43.49	-37.97	31.30	49.20	140.50	2.00
1064.25	.75	140.50	1062.37	43.98	-38.39	31.65	49.75	140.50	2.00
1094.25	.15	140.50	1092.37	44.19	-38.57	31.80	49.99	140.50	2.00
Vertical - 1100' TVD									
1101.88	.00	140.50	1100.00	44.20	-38.58	31.80	50.00	140.50	2.00

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	True Vertical Depth	Vertical Section FT	N-S FT	E-W FT	CLOSURE		Dogleg Severity Deg/100
							Distance FT	Direction Deg	
1201.88	.00	140.50	1200.00	44.20	-38.58	31.80	50.00	140.50	.00
1301.88	.00	140.50	1300.00	44.20	-38.58	31.80	50.00	140.50	.00
1401.88	.00	140.50	1400.00	44.20	-38.58	31.80	50.00	140.50	.00
1501.88	.00	140.50	1500.00	44.20	-38.58	31.80	50.00	140.50	.00
1601.88	.00	140.50	1600.00	44.20	-38.58	31.80	50.00	140.50	.00
1701.88	.00	140.50	1700.00	44.20	-38.58	31.80	50.00	140.50	.00
1801.88	.00	140.50	1800.00	44.20	-38.58	31.80	50.00	140.50	.00
1901.88	.00	140.50	1900.00	44.20	-38.58	31.80	50.00	140.50	.00
2001.88	.00	140.50	2000.00	44.20	-38.58	31.80	50.00	140.50	.00
2101.88	.00	140.50	2100.00	44.20	-38.58	31.80	50.00	140.50	.00
2201.88	.00	140.50	2200.00	44.20	-38.58	31.80	50.00	140.50	.00
2301.88	.00	140.50	2300.00	44.20	-38.58	31.80	50.00	140.50	.00
2401.88	.00	140.50	2400.00	44.20	-38.58	31.80	50.00	140.50	.00
2501.88	.00	140.50	2500.00	44.20	-38.58	31.80	50.00	140.50	.00
2601.88	.00	140.50	2600.00	44.20	-38.58	31.80	50.00	140.50	.00
2701.88	.00	140.50	2700.00	44.20	-38.58	31.80	50.00	140.50	.00
2801.88	.00	140.50	2800.00	44.20	-38.58	31.80	50.00	140.50	.00
2901.88	.00	140.50	2900.00	44.20	-38.58	31.80	50.00	140.50	.00
Begin Build @ 7.00% 100 '									
2985.00	.00	140.50	2983.12	44.20	-38.58	31.80	50.00	140.50	.00
3015.00	2.10	140.50	3013.11	44.68	-39.01	32.15	50.55	140.50	7.00
3045.00	4.20	140.50	3043.06	46.14	-40.28	33.20	52.20	140.50	7.01
3075.00	6.30	140.50	3072.93	48.57	-42.40	34.95	54.94	140.50	7.00
3105.00	8.40	140.50	3102.69	51.96	-45.36	37.39	58.78	140.50	7.00
3135.00	10.51	140.50	3132.28	56.32	-49.16	40.53	63.71	140.50	7.00
3165.00	12.61	140.50	3161.67	61.63	-53.80	44.35	69.72	140.50	7.00
3195.00	14.71	140.50	3190.82	67.89	-59.26	48.85	76.80	140.50	7.00
3225.00	16.81	140.50	3219.69	75.09	-65.55	54.04	84.95	140.50	7.00
3255.00	18.91	140.50	3248.24	83.22	-72.65	59.89	94.15	140.50	7.00
3285.00	21.01	140.50	3276.44	92.27	-80.55	66.40	104.39	140.50	7.00
3315.00	23.11	140.50	3304.24	102.23	-89.24	73.57	115.66	140.50	7.00
3345.00	25.21	140.50	3331.61	113.09	-98.72	81.38	127.94	140.50	7.00
3375.00	27.31	140.50	3358.51	124.82	-108.96	89.82	141.21	140.50	7.00
3405.00	29.41	140.50	3384.91	137.42	-119.96	98.89	155.46	140.50	7.00
3435.00	31.52	140.50	3410.76	150.86	-131.69	108.56	170.67	140.50	7.00
3465.00	33.62	140.50	3436.05	165.13	-144.15	118.83	186.82	140.50	7.00
3495.00	35.72	140.50	3460.72	180.22	-157.32	129.68	203.88	140.50	7.00
3525.00	37.82	140.50	3484.75	196.09	-171.18	141.11	221.84	140.50	7.00
3555.00	39.92	140.50	3508.11	212.73	-185.70	153.08	240.66	140.50	7.00
3585.00	42.02	140.50	3530.76	230.11	-200.88	165.59	260.33	140.50	7.00
3615.00	44.12	140.50	3552.67	248.22	-216.69	178.62	280.82	140.50	7.00
3645.00	46.22	140.50	3573.82	267.03	-233.10	192.15	302.09	140.50	7.00
3675.00	48.32	140.50	3594.17	286.51	-250.11	206.17	324.13	140.50	7.00
3705.00	50.42	140.50	3613.71	306.63	-267.67	220.65	346.90	140.50	7.00

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	True Vertical Depth	Vertical Section FT	N-S FT	E-W FT	C L O S U R E		Dogleg Severity Deg/100
							Distance FT	Direction Deg	
3735.00	52.53	140.50	3632.39	327.38	-285.78	235.58	370.37	140.50	7.00
3765.00	54.63	140.50	3650.20	348.71	-304.41	250.94	394.50	140.50	7.00
3795.00	56.73	140.50	3667.12	370.61	-323.53	266.69	419.28	140.50	7.00
3825.00	58.83	140.50	3683.11	393.05	-343.11	282.84	444.66	140.50	7.00
3855.00	60.93	140.50	3698.17	415.98	-363.13	299.34	470.60	140.50	7.00
3885.00	63.03	140.50	3712.26	439.39	-383.56	316.19	497.09	140.50	7.00
3915.00	65.13	140.50	3725.37	463.24	-404.38	333.35	524.07	140.50	7.00
3945.00	67.23	140.50	3737.48	487.50	-425.56	350.80	551.51	140.50	7.00
3975.00	69.33	140.50	3748.58	512.13	-447.06	368.53	579.38	140.50	7.00
4005.00	71.43	140.50	3758.66	537.11	-468.87	386.51	607.64	140.50	7.00
4035.00	73.54	140.50	3767.68	562.40	-490.94	404.70	636.25	140.50	7.00
4065.00	75.64	140.50	3775.66	587.96	-513.26	423.10	665.16	140.50	7.00
4095.00	77.74	140.50	3782.56	613.76	-535.78	441.67	694.36	140.50	7.00
4125.00	79.84	140.50	3788.40	639.77	-558.49	460.38	723.78	140.50	7.00
4155.00	81.94	140.50	3793.15	665.95	-581.34	479.22	753.40	140.50	7.00
4185.00	84.04	140.50	3796.81	692.27	-604.32	498.16	783.18	140.50	7.00
Hold @ 85.00° for 200'									
4198.70	85.00	140.50	3798.12	704.32	-614.84	506.83	796.81	140.50	7.00
4298.70	85.00	140.50	3806.83	792.38	-691.71	570.20	896.43	140.50	.00
5' into PC / Casing - Build and Turn @ 11.33 % 100'									
4398.70	85.00	140.50	3815.55	880.44	-768.58	633.57	996.05	140.50	.00
4428.70	85.40	137.11	3818.06	907.26	-791.07	653.25	1025.93	140.45	11.33
4458.70	85.81	133.73	3820.36	934.83	-812.37	674.24	1055.72	140.31	11.33
4488.70	86.23	130.35	3822.44	963.05	-832.41	696.47	1085.34	140.08	11.33
4518.70	86.67	126.97	3824.30	991.82	-851.11	719.85	1114.70	139.78	11.33
4548.70	87.12	123.60	3825.93	1021.05	-868.41	744.30	1143.73	139.40	11.33
4578.70	87.58	120.23	3827.31	1050.62	-884.25	769.73	1172.34	138.96	11.33
4608.70	88.05	116.86	3828.46	1080.43	-898.57	796.06	1200.47	138.46	11.33
4638.70	88.53	113.49	3829.35	1110.38	-911.32	823.20	1228.07	137.91	11.33
4668.70	89.01	110.12	3830.00	1140.37	-922.46	851.04	1255.07	137.31	11.33
4698.70	89.49	106.76	3830.39	1170.28	-931.95	879.49	1281.42	136.66	11.33
4728.70	89.98	103.39	3830.53	1200.02	-939.75	908.46	1307.07	135.97	11.33
4758.70	90.46	100.03	3830.42	1229.47	-945.84	937.83	1331.96	135.24	11.33
Target / Hold @ 90.49°, 99.82° Azm									
4760.56	90.49	99.82	3830.40	1231.29	-946.16	939.66	1333.49	135.20	11.33
4760.61	90.49	99.82	3830.40	1231.34	-946.17	939.71	1333.53	135.20	.51
4860.61	90.49	99.82	3829.54	1328.85	-963.23	1038.24	1416.25	132.85	.00
4960.61	90.49	99.82	3828.68	1426.36	-980.28	1136.77	1501.07	130.77	.00
5060.61	90.49	99.82	3827.82	1523.87	-997.34	1235.30	1587.66	128.92	.00
5160.61	90.49	99.82	3826.96	1621.39	-1014.39	1333.84	1675.74	127.25	.00
5260.61	90.49	99.82	3826.10	1718.90	-1031.45	1432.37	1765.10	125.76	.00
5360.61	90.49	99.82	3825.24	1816.41	-1048.51	1530.90	1855.54	124.41	.00
5460.61	90.49	99.82	3824.38	1913.92	-1065.56	1629.43	1946.91	123.18	.00
5560.61	90.49	99.82	3823.52	2011.43	-1082.62	1727.96	2039.10	122.07	.00

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	True Vertical Depth	Vertical Section FT	N-S FT	E-W FT	C L O S U R E		Dogleg Severity Deg/100
							Distance FT	Direction Deg	
5660.61	90.49	99.82	3822.66	2108.94	-1099.68	1826.49	2131.98	121.05	.00
5760.61	90.49	99.82	3821.80	2206.46	-1116.73	1925.02	2225.49	120.12	.00
5860.61	90.49	99.82	3820.94	2303.97	-1133.79	2023.55	2319.53	119.26	.00
5960.61	90.49	99.82	3820.09	2401.48	-1150.85	2122.08	2414.06	118.47	.00
6060.61	90.49	99.82	3819.23	2498.99	-1167.90	2220.61	2509.01	117.74	.00
6160.61	90.49	99.82	3818.37	2596.50	-1184.96	2319.14	2604.33	117.06	.00
6260.61	90.49	99.82	3817.51	2694.01	-1202.02	2417.68	2700.00	116.44	.00
6360.61	90.49	99.82	3816.65	2791.53	-1219.07	2516.21	2795.97	115.85	.00
6460.61	90.49	99.82	3815.79	2889.04	-1236.13	2614.74	2892.21	115.30	.00
6560.61	90.49	99.82	3814.93	2986.55	-1253.18	2713.27	2988.69	114.79	.00
6660.61	90.49	99.82	3814.07	3084.06	-1270.24	2811.80	3085.41	114.31	.00
6760.61	90.49	99.82	3813.21	3181.57	-1287.30	2910.33	3182.32	113.86	.00
6860.61	90.49	99.82	3812.35	3279.08	-1304.35	3008.86	3279.42	113.44	.00
6960.61	90.49	99.82	3811.49	3376.60	-1321.41	3107.39	3376.69	113.04	.00
7060.61	90.49	99.82	3810.63	3474.11	-1338.47	3205.92	3474.11	112.66	.00
Proposed End of Lateral									
7070.94	90.49	99.82	3810.54	3484.18	-1340.23	3216.10	3484.18	112.62	.00

Job Number: 71xxx
Company: Black Hills Gas Resources
Lease/Well: Jicarilla 464-31 #11
Location: Rio Arriba County, NM



VERTICAL SECTION (Ft) @ 112.62°

BLACK HILLS GAS RESOURCES

Jicarilla 464-31 #11

Surface Location: 660' FNL 1050' FWL NE/NW Unit C

Bottom Hole Location: 2000' FNL 50' FEL SE/NE Unit H

Sec. 31 T 30 N R 3 W

Rio Arriba County, New Mexico

Contract 464

CASING AND CENTRALIZER DESIGN

Proposed Total Depth: 3,831 '
 Proposed Depth of Surface Casing: 278 '
 Estimated Pressure Gradient: 0.31 psi/ft
 Bottom Hole Pressure at 3,831 ' = 1,188 psi
 $0.31 \text{ psi/ft} \times 3,831' = 1,188 \text{ psi}$
 Hydrostatic Head of gas/oil mud: 0.22 psi/ft
 $0.22 \text{ psi/ft} \times 3,831' = 843 \text{ psi}$

Maximum Design Surface Pressure

Bottom Hole Pressure – Hydrostatic Head =
 $(0.31 \text{ psi/ft} \times 3,831') - (0.22 \text{ psi/ft} \times 3,831') =$
 $1,188 \text{ psi} - 843 \text{ psi} = 345 \text{ psi}$

Casing Strengths 5 1/2 J-55 15.5# ST&C

Wt.	Tension (lbs)	Burst (psi)	Collapse (psi)
5.5 15.5 #	222,000	4,810	4,040

Safety Factors

Tension (Dry): 1.8 Burst: 1.0 Collapse: 1.125
 Tension (Dry): $15.5 \text{ #/ft} \times 278' = 4,309 \text{ #}$
 Safety Factor = $\frac{222,000}{4,309} = 51.52$ ok
 Burst: Safety Factor = $\frac{4,810 \text{ psi}}{345 \text{ psi}} = 13.95$ ok
 Collapse: Hydrostatic = $0.052 \times 9.0 \text{ ppg} \times 278' = 130 \text{ psi}$
 Safety Factor = $\frac{4,040 \text{ psi}}{130 \text{ psi}} = 31.05$ ok

Use 278' 5 1/2 J-55 15.5# ST&CUse 2,000 psi minimum casinghead and BOP's but will test to 1,000 psiCentralizers

5 Total

1 near surface at 40'

2 -1 each at middle of bottom joint, second joint

2 -1 each at every other joint 80' spacing

Total centralized $\pm 240' (38' - 278')$

Note that field experience indicates that additional centralizers greatly increase the chance of "sticking" the surface casing prior to reaching surface casing total depth.