

District I  
1625 N. French Dr., Hobbs, NM 88240  
District II  
1301 W. Grand Avenue, Artesia, NM 88210  
District III  
1000 Rio Brazos Road, Aztec, NM 87410  
District IV  
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico  
Energy Minerals and Natural Resources

Oil Conservation Division  
1220 South St. Francis Dr.  
Santa Fe, NM 87505

Form C-141  
Revised October 10, 2003

Submit 2 Copies to appropriate  
District Office in accordance  
with Rule 116 on back  
side of form

### Release Notification and Corrective Action

#### OPERATOR

☐ Initial Report ☒ Final Report

Name of Company: BP	Contact: Courtney Cochran
Address: 200 Energy Court, Farmington, NM 87401	Telephone No.: 326-9457
Facility Name: Hughes A2	Facility Type: natural gas well API # 3004523345
Surface Owner: Federal	Mineral Owner: Federal Lease No. SF 078049

#### LOCATION OF RELEASE

Unit Letter B	Section 27	Township T29N	Range R8W	Feet from the 790	North/South Line North	Feet from the 1460	East/West Line East	County: San Juan
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Latitude 36.70176 Longitude 107.65981

#### NATURE OF RELEASE

Type of Release: condensate/produced water	Volume of Release: approx. 20 bbls	Volume Recovered: none
Source of Release: Above Ground Production Tank	Date and Hour of Occurrence: Historical	Date and Hour of Discovery: 2/15/2011
Was Immediate Notice Given? <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Not Required	If YES, To Whom?	
By Whom?	Date and Hour:	
Was a Watercourse Reached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If YES, Volume Impacting the Watercourse.	
If a Watercourse was Impacted, Describe Fully.*		
Describe Cause of Problem and Remedial Action Taken.* A pinhole leak on the AGT was discovered through the course of our tank inspection program. Tank was removed from location and soil excavation commenced. The leak was ongoing and a length of time of occurrence undeterminable. A mixture of condensate and produced water was released with an approximate total of 20 bbls released.		
Describe Area Affected and Cleanup Action Taken.* Soil excavation totaled 840 cubic feet or 31 cubic yards. Impacted soil was taken off location to landfarm and new soil put into its place. A new AGT was set in the place of the old.		
I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.		
Signature 	OIL CONSERVATION DIVISION	
Printed Name: Courtney Cochran	Approved by District Supervisor: 	
Title: Environmental Challenger	Approval Date: 3/11/11	Expiration Date:
E-mail Address: Courtney.Cochran@bp.com	Conditions of Approval:	Attached <input type="checkbox"/>
Date: March 8, 2011	Phone: 326-9457	

\* Attach Additional Sheets If Necessary

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**Release Notification and Corrective Action**

**OPERATOR**

☐ Initial Report ☒ Final Report

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Address: 200 Energy Court, Farmington, NM 87401	Telephone No.: 326-9457
Facility Name: Hughes A2	Facility Type: natural gas well API # 3004523345

Surface Owner: Federal	Mineral Owner: Federal	Lease No. SF 078049
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By Whom?	Date and Hour:	
Was a Watercourse Reached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If YES, Volume Impacting the Watercourse.	

If a Watercourse was Impacted, Describe Fully.\*

Describe Cause of Problem and Remedial Action Taken.\*

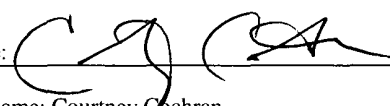
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Describe Area Affected and Cleanup Action Taken.\*

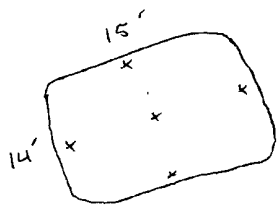
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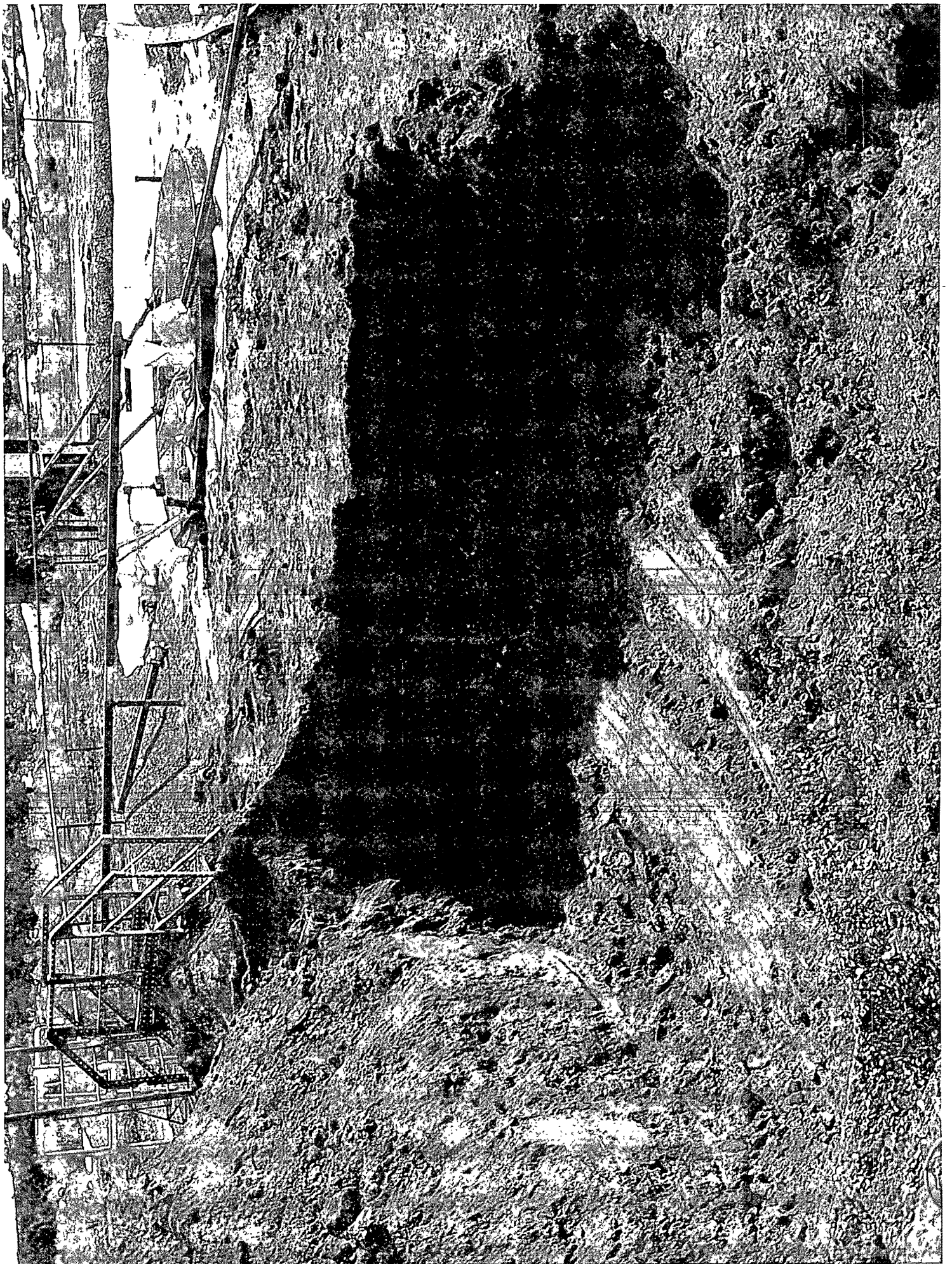
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**OIL CONSERVATION DIVISION**

Signature: 	Approved by District Supervisor:		
Printed Name: Courtney Cochran			
Title: Environmental Challenger	Approval Date:	Expiration Date:	
E-mail Address: Courtney.Cochran@bp.com	Conditions of Approval:		Attached <input type="checkbox"/>
Date: March 8, 2011	Phone: 326-9457		

\* Attach Additional Sheets If Necessary

CLIENT: <u>BP</u>	<b>BLAGG ENGINEERING, INC.</b> <b>P.O. BOX 87, BLOOMFIELD, NM 87413</b> <b>(505) 632-1199</b>	API #: <u>30-045-23345</u> TANK ID (if applicable): <u>NA</u>
<b>FIELD REPORT:</b> (circle one): BGT CONFIRMATION / <u>RELEASE INVESTIGATION</u> / OTHER: <u>300 AST Pinhole Leak</u>		PAGE #: <u>1</u> of <u>1</u>
<b>SITE INFORMATION:</b> SITE NAME: <u>HUGHES A #2</u> QUAD/UNIT: <u>B</u> SEC: <u>27</u> TWP: <u>29N</u> RNG: <u>8W</u> PM: <u>NM</u> CNTY: <u>SJ</u> ST: <u>NM</u> 1/4 - 1/4 FOOTAGE: LEASE TYPE: <u>FEDERAL</u> / STATE / FEE / INDIAN LEASE #: <u>NMSF 078049</u> PROD. FORMATION: CONTRACTOR: <u>ELKHORN</u>		DATE STARTED: <u>2-15-11</u> DATE FINISHED: <u>2-15-11</u> ENVIRONMENTAL SPECIALIST(S): <u>JCB</u>
<b>REFERENCE POINT:</b> WELL HEAD (W.H.) GPS COORD.: <u>36.70180 x 107.65974</u> GL ELEV.: <u>6739</u> 1) <u>Excavation Center</u> GPS COORD.: <u>36.70173 x 107.66006</u> DISTANCE/BEARING FROM W.H.: <u>100' S 78 W</u> 2) GPS COORD.: DISTANCE/BEARING FROM W.H.: 3) GPS COORD.: DISTANCE/BEARING FROM W.H.: 4) GPS COORD.: DISTANCE/BEARING FROM W.H.:		
<b>LAB INFORMATION:</b> CHAIN OF CUSTODY RECORD(S) # OR LAB USED: <u>HALL</u> 1) SAMPLE ID: <u>S-Pt @ -4'</u> SAMPLE DATE: <u>2/15/11</u> SAMPLE TIME: <u>1400</u> LAB ANALYSIS: <u>TPH/BTEX/CI-</u> 2) SAMPLE ID: SAMPLE DATE: SAMPLE TIME: LAB ANALYSIS: 3) SAMPLE ID: SAMPLE DATE: SAMPLE TIME: LAB ANALYSIS: 4) SAMPLE ID: SAMPLE DATE: SAMPLE TIME: LAB ANALYSIS:		OVM READING (ppm) <u>56</u>
<b>SOIL DESCRIPTION:</b> SOIL TYPE: SAND / SILTY SAND / SILT / SILTY CLAY / CLAY / GRAVEL / <u>OTHER</u> <u>SANDSTONE @ -4'</u> SOIL COLOR: COHESION (ALL OTHERS): NON COHESIVE / SLIGHTLY COHESIVE / <u>COHESIVE</u> / HIGHLY COHESIVE CONSISTENCY (NON COHESIVE SOILS): LOOSE / <u>FIRM</u> / DENSE / VERY DENSE MOISTURE: DRY / <u>SLIGHTLY MOIST</u> / MOIST / WET / SATURATED / SUPER SATURATED SAMPLE TYPE: GRAB / <u>COMPOSITE</u> # OF PTS: <u>5</u> DISCOLORATION/STAINING OBSERVED: YES / <u>NO</u> EXPLANATION -		PLASTICITY (CLAYS): NON PLASTIC / SLIGHTLY PLASTIC / COHESIVE / MEDIUM PLASTIC / HIGHLY PLASTIC DENSITY (COHESIVE CLAYS & SILTS): SOFT / FIRM / STIFF / VERY STIFF / HARD HC ODOR DETECTED: YES / <u>NO</u> EXPLANATION -
ANY AREAS DISPLAYING WETNESS: YES / <u>NO</u> EXPLANATION - ADDITIONAL COMMENTS: <u>FIRM BEDROCK SANDSTONE @ -4' Below Grade.</u>		
EXCAVATION DIMENSIONS (if applicable): <u>15</u> ft. X <u>14</u> ft. X <u>4</u> ft. cubic yards excavated (if applicable): <u>30±</u> DEPTH TO GROUNDWATER: <u>&gt;100</u> NEAREST WATER SOURCE: <u>&gt;1000</u> NEAREST SURFACE WATER: <u>&gt;1000</u> NMOC DTPH CLOSURE STD: <u>5000</u> PPM		
<b>SITE SKETCH</b> 		<b>PLOT PLAN</b> circle: <u>attached</u> OVM CALIB READ = ppm RF = 0.52 OVM CALIB GAS = ppm TIME: apm DATE:
x = 5-POINT COMPOSITE SAMPLE POINT NOTES: BGT = BELOW-GRADE TANK; E.D. = EXCAVATION DEPRESSION; B.G. = BELOW GRADE; B = BELOW; T.H. = TEST HOLE; ~ = APPROX. T.B. = TANK BOTTOM; PBGT = PREVIOUS BELOW-GRADE TANK LOCATION; SPD = SAMPLE POINT DESIGNATION; R.W. = RETAINING WALL; NA - NOT APPLICABLE OR NOT AVAILABLE; SW - SINGLE WALL; DW - DOUBLE WALL; SB - SINGLE BOTTOM; DB - DOUBLE BOTTOM.		<b>MISCELL. NOTES</b> BGT Sidewalls Visible: Y / N / <u>NA</u> Magnetic declination: <u>10</u> ° E
TRAVEL NOTES: CALLOUT: _____ ONSITE: <u>2/14-15/2011</u>		







## COVER LETTER

Thursday, March 03, 2011

Jeff Blagg  
Blagg Engineering  
P. O. Box 87  
Bloomfield, NM 87413

TEL: (505) 632-1199  
FAX (505) 632-3903

RE: Hughes A #2

Order No.: 1102773

Dear Jeff Blagg:

Hall Environmental Analysis Laboratory, Inc. received 1 sample(s) on 2/24/2011 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. Below is a list of our accreditations. To access our accredited tests please go to [www.hallenvironmental.com](http://www.hallenvironmental.com) or the state specific web sites.

Reporting limits are determined by EPA methodology.

Please do not hesitate to contact HEAL for any additional information or clarifications.

Sincerely,

A handwritten signature in black ink, appearing to read "Andy Freeman", is written over a horizontal line.

Andy Freeman, Laboratory Manager

NM Lab # NM9425 NM0901  
AZ license # AZ0682  
ORELAP Lab # NM100001  
Texas Lab# T104704424-08-TX



4901 Hawkins NE ■ Suite D ■ Albuquerque, NM 87109  
505.345.3975 ■ Fax 505.345.4107  
[www.hallenvironmental.com](http://www.hallenvironmental.com)

**Hall Environmental Analysis Laboratory, Inc.**

Date: 03-Mar-11

**CLIENT:** Blagg Engineering**Client Sample ID:** 300 AST 5-Point@ -4'**Lab Order:** 1102773**Collection Date:** 2/15/2011 2:00:00 PM**Project:** Hughes A #2**Date Received:** 2/24/2011**Lab ID:** 1102773-01**Matrix:** SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 8015B: DIESEL RANGE ORGANICS</b>						Analyst: <b>JB</b>
Diesel Range Organics (DRO)	ND	10		mg/Kg	1	3/1/2011 5:52:49 PM
Surr: DNOP	108	81.8-129		%REC	1	3/1/2011 5:52:49 PM
<b>EPA METHOD 8015B: GASOLINE RANGE</b>						Analyst: <b>NSB</b>
Gasoline Range Organics (GRO)	ND	5.0		mg/Kg	1	2/28/2011 7:35:57 PM
Surr: BFB	98.6	89.7-125		%REC	1	2/28/2011 7:35:57 PM
<b>EPA METHOD 8021B: VOLATILES</b>						Analyst: <b>NSB</b>
Benzene	ND	0.050		mg/Kg	1	2/28/2011 7:35:57 PM
Toluene	ND	0.050		mg/Kg	1	2/28/2011 7:35:57 PM
Ethylbenzene	ND	0.050		mg/Kg	1	2/28/2011 7:35:57 PM
Xylenes, Total	ND	0.10		mg/Kg	1	2/28/2011 7:35:57 PM
Surr: 4-Bromofluorobenzene	107	85.3-139		%REC	1	2/28/2011 7:35:57 PM
<b>EPA METHOD 300.0: ANIONS</b>						Analyst: <b>SRM</b>
Chloride	10	7.5		mg/Kg	5	3/2/2011 4:40:14 PM

**Qualifiers:**

\* Value exceeds Maximum Contaminant Level  
E Estimated value  
J Analyte detected below quantitation limits  
NC Non-Chlorinated  
PQL Practical Quantitation Limit

B Analyte detected in the associated Method Blank  
H Holding times for preparation or analysis exceeded  
MCL Maximum Contaminant Level  
ND Not Detected at the Reporting Limit  
S Spike recovery outside accepted recovery limits

## QA/QC SUMMARY REPORT

Client: Blagg Engineering  
Project: Hughes A #2

Work Order: 1102773

Analyte	Result	Units	PQL	SPK Va	SPK ref	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
<b>Method: EPA Method 300.0: Anions</b>											
Sample ID: MB-25811		MBLK									
Chloride	ND	mg/Kg	1.5								
Sample ID: LCS-25811		LCS									
Chloride	14.10	mg/Kg	1.5	15	0	94.0	90	110			
<b>Method: EPA Method 8015B: Diesel Range Organics</b>											
Sample ID: MB-25770		MBLK									
Diesel Range Organics (DRO)	ND	mg/Kg	10								
Motor Oil Range Organics (MRO)	ND	mg/Kg	50								
Sample ID: LCS-25770		LCS									
Diesel Range Organics (DRO)	53.06	mg/Kg	10	50	0	106	66.2	120			
Sample ID: LCSD-25770		LCSD									
Diesel Range Organics (DRO)	55.66	mg/Kg	10	50	0	111	66.2	120	4.80	14.3	
<b>Method: EPA Method 8015B: Gasoline Range</b>											
Sample ID: MB-25764		MBLK									
Gasoline Range Organics (GRO)	ND	mg/Kg	5.0								
Sample ID: LCS-25764		LCS									
Gasoline Range Organics (GRO)	27.11	mg/Kg	5.0	25	0	108	95.7	120			
<b>Method: EPA Method 8021B: Volatiles</b>											
Sample ID: MB-25764		MBLK									
Benzene	ND	mg/Kg	0.050								
Toluene	ND	mg/Kg	0.050								
Ethylbenzene	ND	mg/Kg	0.050								
Xylenes, Total	ND	mg/Kg	0.10								
Sample ID: LCS-25764		LCS									
Benzene	1.006	mg/Kg	0.050	1	0	101	83.3	107			
Toluene	0.9696	mg/Kg	0.050	1	0	97.0	74.3	115			
Ethylbenzene	1.026	mg/Kg	0.050	1	0.0064	102	80.9	122			
Xylenes, Total	3.201	mg/Kg	0.10	3	0	107	85.2	123			

## Qualifiers:

E Estimated value  
J Analyte detected below quantitation limits  
ND Not Detected at the Reporting Limit

H Holding times for preparation or analysis exceeded  
NC Non-Chlorinated  
R RPD outside accepted recovery limits

# Hall Environmental Analysis Laboratory, Inc.

## Sample Receipt Checklist

Client Name **BLAGG**

Date Received:

2/24/2011

Work Order Number **1102773**

Received by: **AMG**

Checklist completed by:

Signature

2/24/11  
Date

Sample ID labels checked by:

Initials **MG**

Matrix:

Carrier name: Greyhound

Shipping container/cooler in good condition?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Not Present <input type="checkbox"/>	
Custody seals intact on shipping container/cooler?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Not Present <input type="checkbox"/>	Not Shipped <input type="checkbox"/>
Custody seals intact on sample bottles?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N/A <input checked="" type="checkbox"/>	
Chain of custody present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>		
Chain of custody signed when relinquished and received?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>		
Chain of custody agrees with sample labels?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>		
Samples in proper container/bottle?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>		
Sample containers intact?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>		
Sufficient sample volume for indicated test?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>		
All samples received within holding time?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>		
Water - VOA vials have zero headspace?	No VOA vials submitted <input checked="" type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Number of preserved bottles checked for pH: _____
Water - Preservation labels on bottle and cap match?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N/A <input checked="" type="checkbox"/>	
Water - pH acceptable upon receipt?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N/A <input checked="" type="checkbox"/>	<2 >12 unless noted below.
Container/Temp Blank temperature?	<b>6.4°</b>	<6° C Acceptable If given sufficient time to cool		

COMMENTS:

Client contacted \_\_\_\_\_ Date contacted: \_\_\_\_\_ Person contacted \_\_\_\_\_

Contacted by: \_\_\_\_\_ Regarding: \_\_\_\_\_

Comments: \_\_\_\_\_

Corrective Action \_\_\_\_\_

Client: BLAGG ENGINEERING INC

Client: BLAGG ENGINEERING INC

Mailing Address: P.O. Box 87

Bloomfield NM 87413

Phone #: 505-632-1199

email or Fax#:

**QA/QC Package:**

☒ Standard ☐ Level 4 (Full Validation)

## Accreditation

☐ NELAP      ☐ Other \_\_\_\_\_☐ EDD (Type)

**Turn-Around Time:**

☒ **Standard**      ☐ **Rush**

Project Name:

HUGHES A #2

Project #:

**Project Manager:**

Jeff Blago

Sampler: Jeff B. Allen

On Ice ☒ Yes ☐ No

Sample Temperature ( )

Container  
Type and #Preservative  
Type

## HEALING

## HALL ENVIRONMENTAL ANALYSIS LABORATORY

[www.hallenvironmental.com](http://www.hallenvironmental.com)

4901 Hawkins NE - Albuquerque, NM 87109

Tel. 505-345-3975      Fax 505-345-4107

## Analysis Request

[illegible]

Date:	Time:
3/23/11	1500


Relinquished by: JH Blegg

Received by: Christina Lopez Date 2/23/11 Time 1:55

Remarks: GRO + BRO ON 2015 B

Date:	Time:
2/23/11	1:00

Relinquished by: Christine Wacker

Received by:  Date: 2/24/11 Time: 10:09

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.



## **SITING AND HYDRO-GEOLOGICAL REPORT FOR HUGHES A 002**

### **Siting Criteria 19.15.17.10 NMAC**

Depth to groundwater at the site is estimated to be greater than 100 feet. This estimation is based on data from Stone and others (1983), and depth to groundwater data obtained from water wells permitted by the New Mexico State Engineer's Office (OSE, Figure 1). Local topography and proximity to adjacent water features are also considered. A topographic map of the site is provided as Figure 2 and demonstrates that the below grade tank (BGT) is not within 300 feet of any continuously flowing watercourse, or within 200 feet of any other significant watercourse, lakebed, sinkhole or playa lake as measured from the ordinary high water mark. Figure 3 demonstrates that the BGT is not within 300 feet of a permanent residence, school, hospital, institution or church. Figure 4 demonstrates, based on a search of the OSE database and USGS topographic maps, that there are no freshwater wells or springs within 1000 feet of the BGT. Figure 5 demonstrates that the BGT is not within a municipal boundary or a defined municipal freshwater well field. Figure 6 demonstrates that the BGT is not within 500 feet of a wetland. Figure 7 demonstrates that the BGT is not in an area overlying a subsurface mine. The BGT is not located in an unstable area. Figure 8 demonstrates that the BGT is not within the mapped FEMA 100-year floodplain.

### **Local Geology and Hydrology**

This particular site is located on a mesa top close to the main channel of Largo Wash, next to Cutter Canyon, but hundreds of feet higher in elevation than the surface of the wash. Regional topography of Largo Canyon is composed of mesas dissected by deep, narrow canyons and arroyos. The more resistant cliff-forming sandstones of the San Jose Formation cap the interbedded siltstones, shales and sandstones of the Nacimiento Formation. Accumulations of talus and eroded sands at the base of canyon walls form steep to gentle slopes that transition into flat-bottomed arroyos within the canyons. Deposits of Quaternary alluvial and eolian sands occur prominently near the surface of Largo Canyon, especially near streams and washes.

### **Regional Geology and Hydrology**

The San Juan Basin is situated in the Navajo section of the Colorado Plateau and is characterized by broad open valleys, mesas, buttes and hogbacks. Away from major valleys and canyons topographic relief is generally low. Native vegetation is sparse and shrubby. Drainage is mainly by the San Juan River, the only permanent stream in the Navajo Section of the Colorado Plateau. The San Juan River is a tributary of the Colorado River. Major tributaries include the Animas, Chaco and La Plata Rivers. Flow of the San Juan River across the basin is regulated by the Navajo Dam, located about 30 miles northeast of Farmington, New Mexico. The climate is arid to semiarid with an average annual precipitation of 8 to 10 inches. Soils within the basin consist of weathered parent rock derived from predominantly physical means mostly from eolian depositional system with fluvial having a lesser impact.

Cretaceous and Tertiary sandstones, as well as Quaternary Alluvial deposits, serve as the primary aquifers in the San Juan Basin (Stone et al., 1983). The San Jose Formation of Eocene age

occurs in both New Mexico and Colorado, and its outcrop forms the land surface over much of the eastern half of the central basin. It overlies the Nacimiento Formation in the area generally south of the Colorado-New Mexico border and overlies the Animas Formation in the general area north of the State Line. The San Jose Formation was deposited in various fluvial-type environments. In general, the unit consists of an interbedded sequence of sandstone, siltstone, and shale. Thickness of the San Jose Formation increases from west to east. Groundwater is associated with alluvial and fluvial sandstone aquifers. The occurrence of groundwater is mainly controlled by distribution of sandstone in the formation. The reported or measured discharge from numerous water wells completed in the formation range from 0.15 to 61 gallons per minute (gpm) and with a median of 5 gpm. Most of the wells provide water for livestock and domestic purposes. The formation is suitable for recharge from precipitation due to overlying soils being sandy, highly permeable and absorbent. Low annual precipitation, relatively high transpiration and evaporation rates and deep dissection of the formation by the San Juan River and its main tributaries all tend to reduce the effective recharge to the formation. Aquifers within the coarser and continuous sandstone bodies of the Nacimiento Formation of Paleocene age are between 0 and 1000 feet deep in the majority of the basin as well (Stone et al., 1983).

### **References**

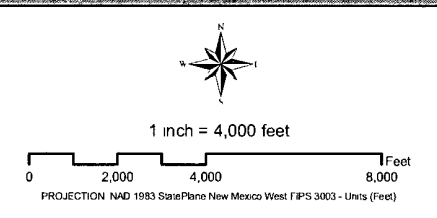
Circular 154—Guidebook to coal geology of northwest New Mexico By E. C. Beaumont, J. W. Shomaker, W. J. Stone, and others, 1976

Stone, et al., 1983, Hydrogeology and Water Resources of the San Juan Basin, New Mexico, Socorro, New Mexico Bureau of Mines and Mineral Resources Hydrologic Report 6, 70 p

# LEGEND

- BGT Location
- Water Well Location
- Distance to BGT (Line of Sight)
- 1 Mile Buffer
- Groundwater Evaluation (Alluvial Geology)
  - Groundwater Likely Less Than 50 Feet BGS
  - Groundwater Suspected to be Less Than 50 Feet BGS

- ## Surficial Geology Units
- |   |                                 |                           |
|---|---------------------------------|---------------------------|
| Ka - Animas formation                             | Kpc - Pictured Cliffs sandstone | Qg - Terrace gravel       |
| Kch - Cliff House sandstone                       | Kpl - Point Lookout sandstone   | Qgs - Gravelly sand       |
| Kf - Fruitland formation                          | Lake                            | Qsw - Sheetwash alluvium  |
| Kkl - Kirtland shale, lower shale member          | Qa - Alluvium                   | Tbg - Bridgetimber Gravel |
| Kkm - Kirtland shale, Farmington sandstone member | Qal - Alluvium                  | Ti - Intrusive rocks      |
| Kku - Kirtland shale, upper shale member          | Qap - Pediment gravel           | Tn - Nacimiento formation |
| Kl - Lewis shale                                  | Qat - Terrace gravel            | Tsc - Cuba Mesa Member    |
| Kmf - Menefee formation                           | Qes - Eolian sand               | Tsj - San Jose Formation  |
| Koa - Ojo Alamo sandstone                         |                                 | Tsr - Regina Member       |



POD Number	Well Depth	Water Depth	Elevation
SJ 00006	560	0	6349
SJ 00005	606	406	6435
SJ 00025	606	406	6435
SJ 00019	502	0	6473
SJ 00196	1624	500	6489

Creation Date: 5/3/2010

Created by: PRW

Reviewed by: AGH

File Path: X:\BPPASS\Sector\_7\CMDs\3004523345A.mxd



## GROUNDWATER LESS THAN 50 FT.

WELL NAME: HUGHES A 002


API NUMBER: 3004523345 TANK ID: 3004523345A

SECTION 27, TOWNSHIP 29.0N, RANGE 08W, P.M. NM23

FIGURE

1





bp

## PROXIMITY TO WATERCOURSES

**WELL NAME: HUGHES A 002**

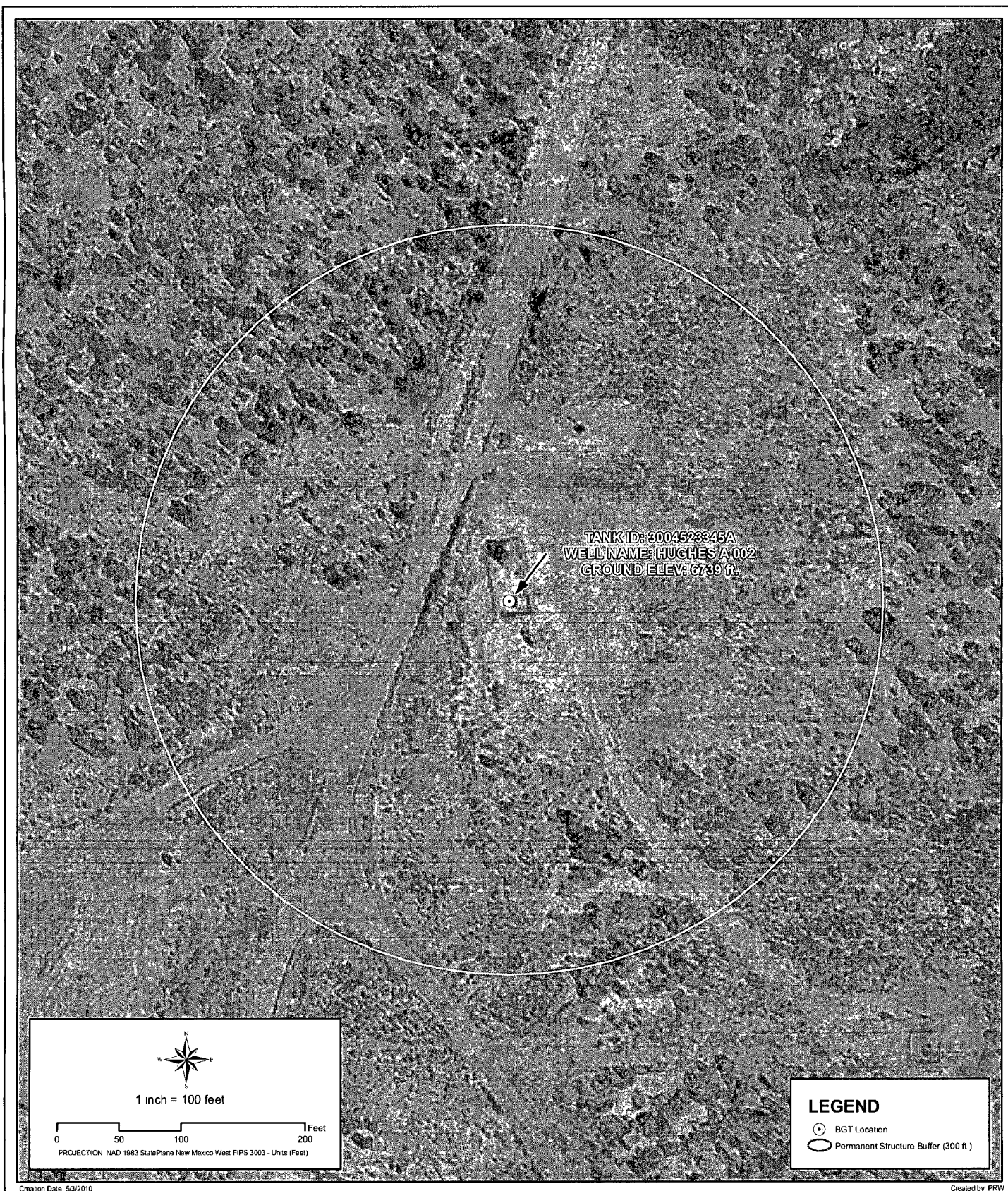
API NUMBER: 3004523345 TANK ID: 3004523345A

SECTION 27, TOWNSHIP 29.0N, RANGE 08W, P.M. NM23

FIGURE

# 2





## PROXIMITY TO PERMANENT STRUCTURE

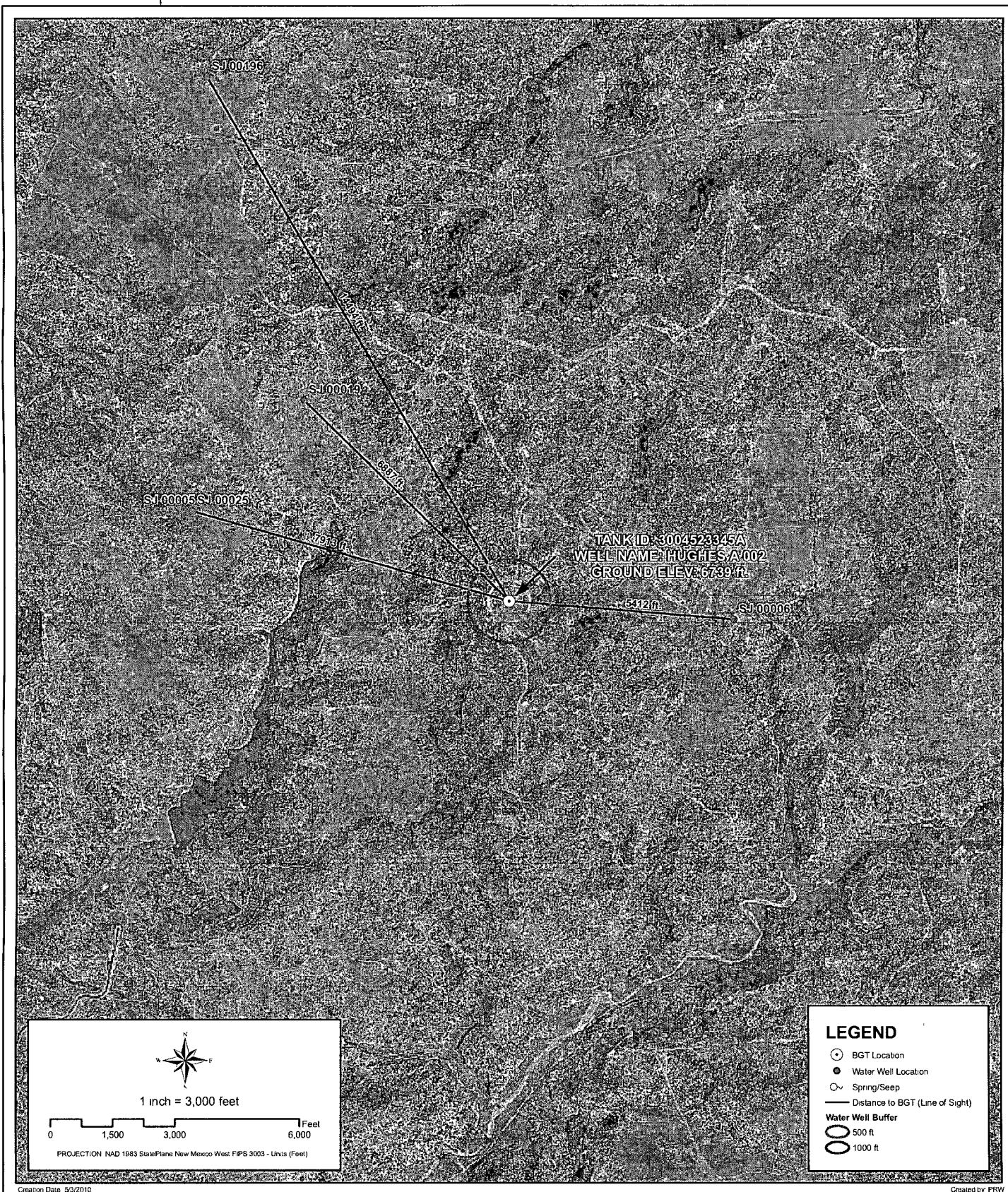
**WELL NAME: HUGHES A 002**

API NUMBER: 3004523345 TANK ID: 3004523345A  
SECTION 27, TOWNSHIP 29.0N, RANGE 08W, P.M. NM23

FIGURE

3





bp



## PROXIMITY TO WATER WELLS

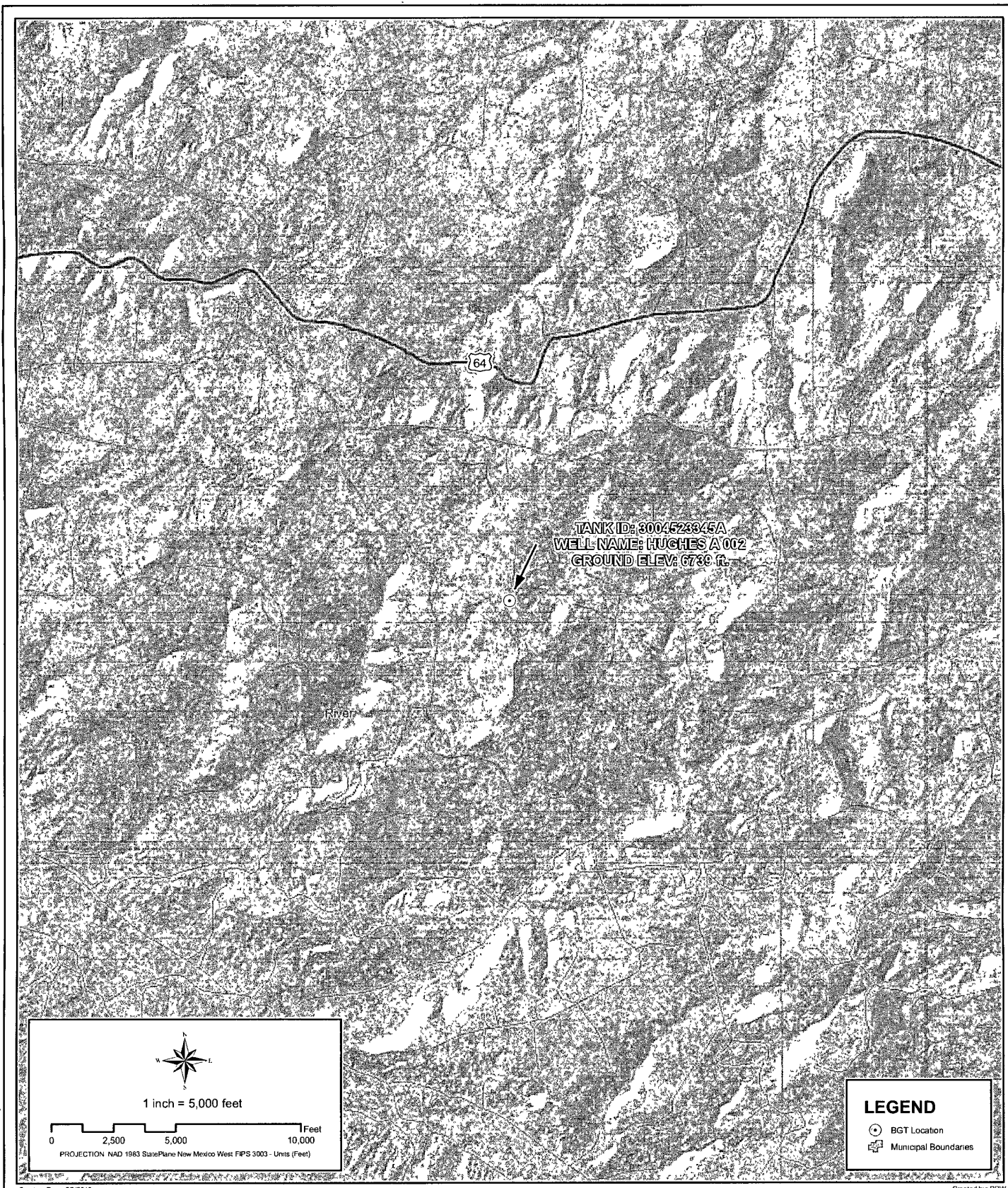
**WELL NAME: HUGHES A 002**

API NUMBER: 3004523345 TANK ID: 3004523345A

SECTION 27, TOWNSHIP 29.0N, RANGE 08W, P.M. NM23

FIGURE

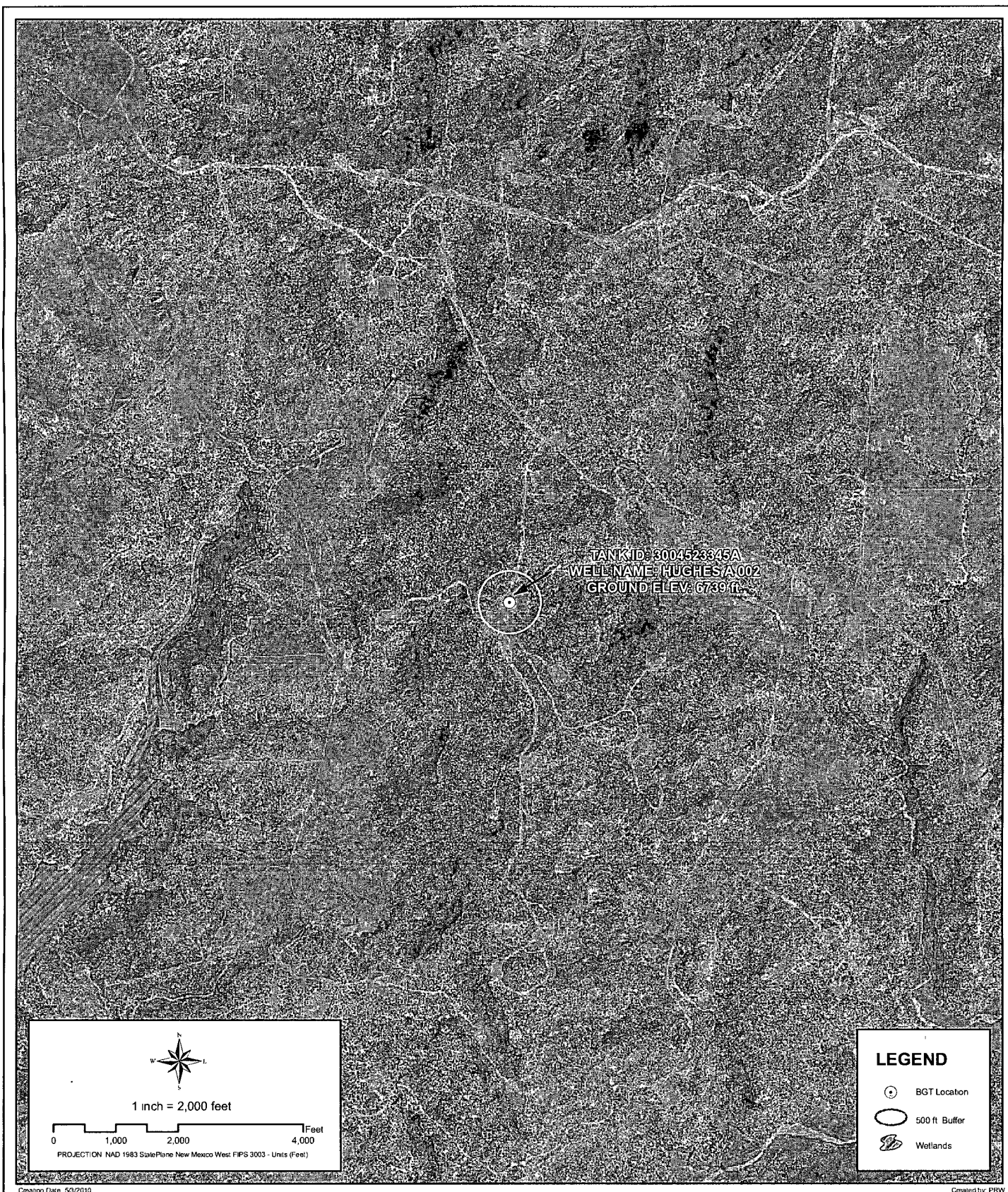
4



Creation Date: 5/9/2010  
 File Path: X:\BPP\FAS\Sector\_7\Sector\_7C\MXD\3004523345A.mxd  
 Created by: PRW  
 Reviewed by: AGH

	<p><b>PROXIMITY TO MUNICIPAL BOUNDARY</b></p> <p><b>WELL NAME: HUGHES A 002</b></p> <p>API NUMBER: 3004523345    TANK ID: 3004523345A</p> <p><b>SECTION 27, TOWNSHIP 29.0N, RANGE 08W, P.M. NM23</b></p>	<p><b>FIGURE</b></p> <p><b>5</b></p>
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Creation Date: 5/3/2010

Created by: PRW

File Path X:\BP\IPASS\Sector\_7\Sector\_7C\MXD\3004523345A.mxd

Reviewed by: AGH



## PROXIMITY TO WETLANDS

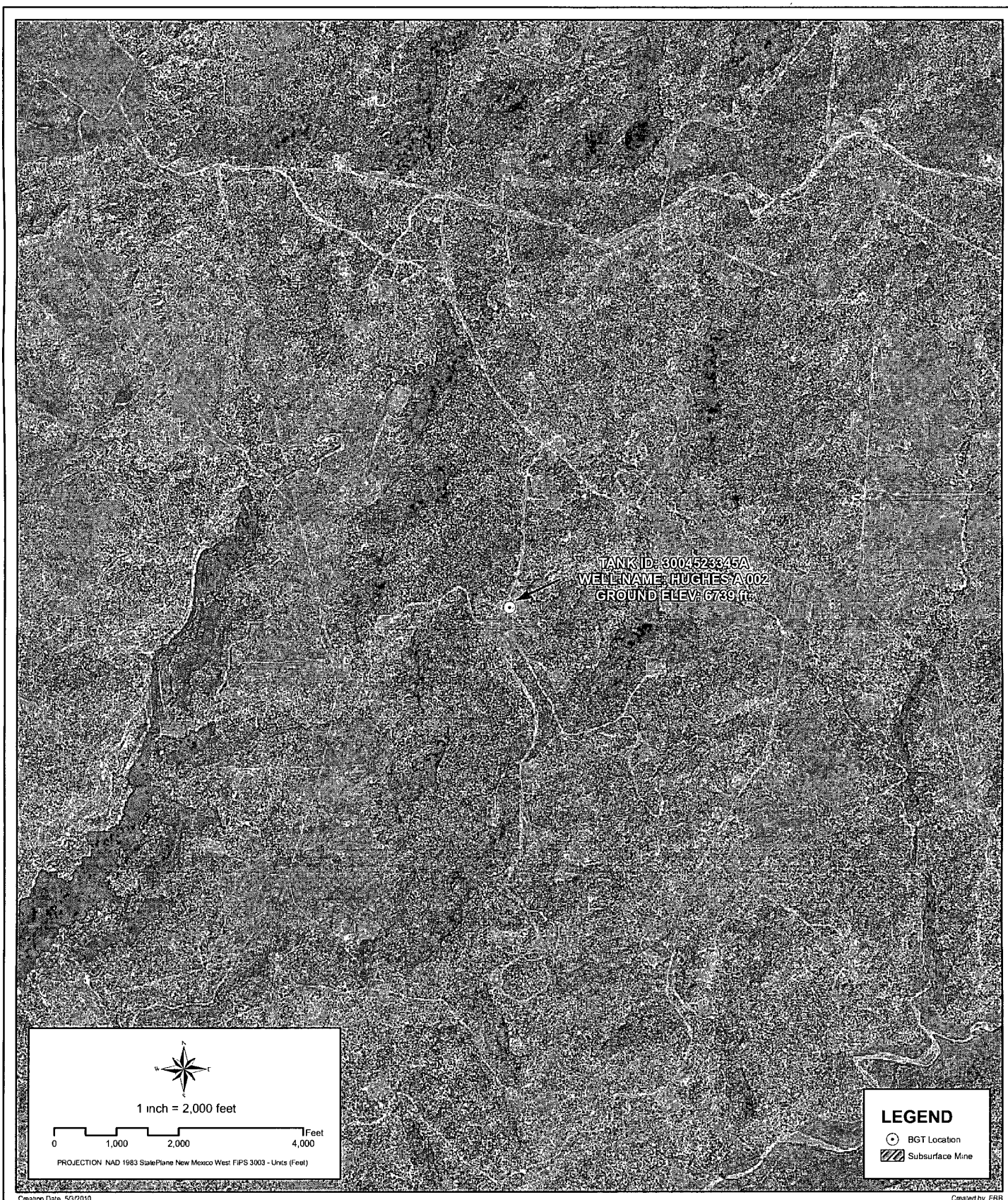
**WELL NAME: HUGHES A 002**

API NUMBER: 3004523345 TANK ID: 3004523345A  
SECTION 27, TOWNSHIP 29.0N, RANGE 08W, P.M. NM23

FIGURE

6





Creation Date: 5/3/2010

Created by: EBB

File Path: X:\BP\PASS\Sector\_7\Sector\_7\CMXD\3004523345A.mxd

Reviewed by: AGH

bp



## PROXIMITY TO SUBSURFACE MINES

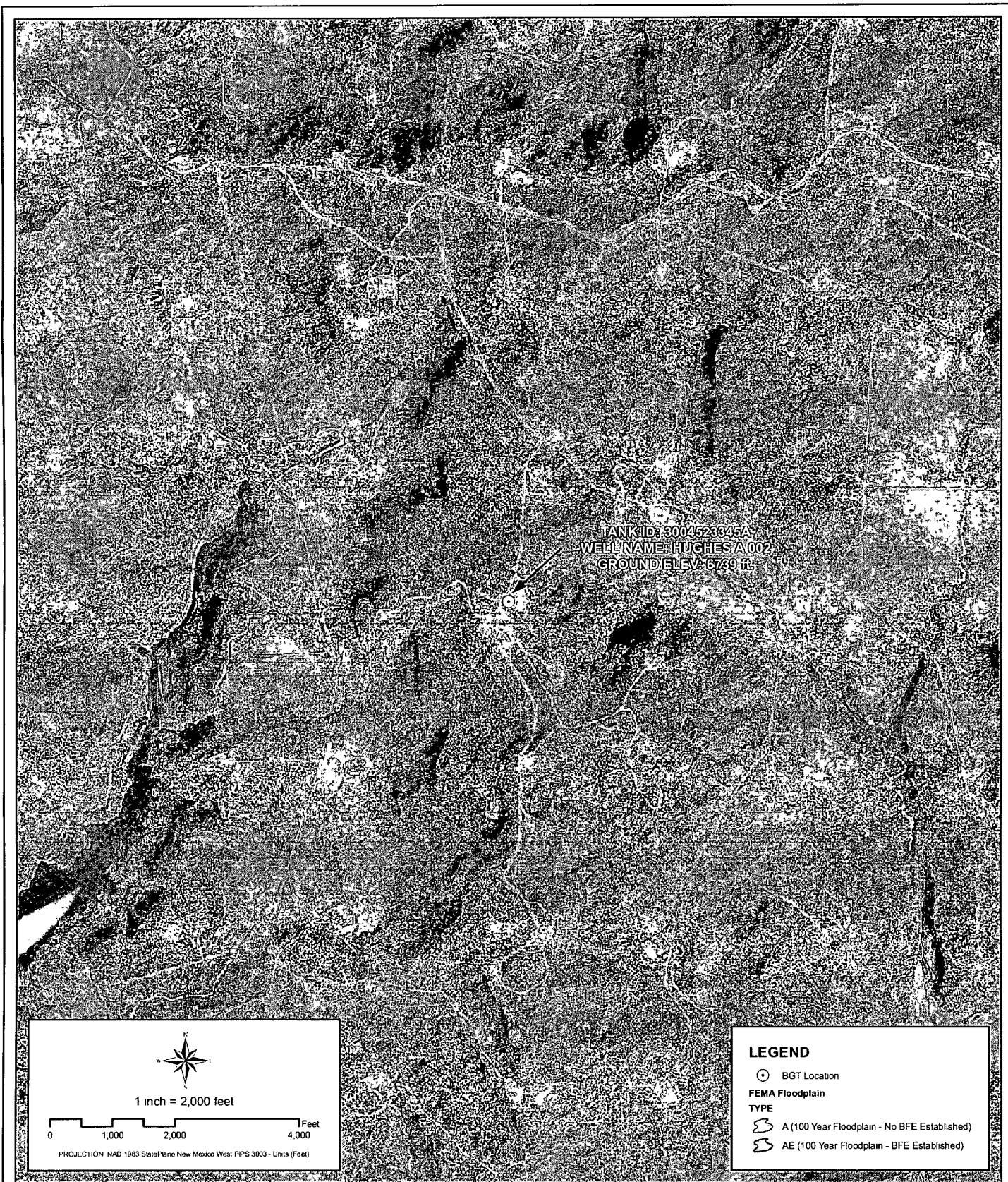
**WELL NAME: HUGHES A 002**

**API NUMBER: 3004523345 TANK ID: 3004523345A**

**SECTION 27, TOWNSHIP 29.0N, RANGE 08W, P.M.NM23**

**FIGURE**

**7**



Creation Date: 5/3/2010

Created by: PRW

File Path: X:\BPPASS\Sector\_7\CMXD\3004523345A.mxd

Reviewed by: AGH

bp



## PROXIMITY TO FLOODPLAIN

**WELL NAME: HUGHES A 002**

API NUMBER: 3004523345 TANK ID: 3004523345A

SECTION 27, TOWNSHIP 29.0N, RANGE 08W, P.M. NM23

FIGURE

8



# **SOUTHERN SAN JUAN BASIN (SSJB)**

## **Figure Citation List**

**March 2010**

### **Figure 1: Groundwater Less Than 50 ft.**

#### **Layers:**

##### **Water Wells: iWaters Database: NMOSE/ISC (Dec. 2009)**

New Mexico Office of the State Engineer (OSE) /ISC iWaters database. (Data updated: 12/2009; Data received: 03/09/2010). Data available from:  
[http://www.ose.state.nm.us/waters\\_db\\_index.html](http://www.ose.state.nm.us/waters_db_index.html).

##### **Cathodic Wells: Tierra Corrosion Control, Inc. (Aug. 2008)**

Tierra Corrosion Control, Inc. 1700 Schofield Ln. Farmington, NM 87401. Driller's Data Log. (Data collected: All data are associated with cathodic protection wells installed at BP facilities between 2008-2009. Data received: 05/06/2010).

##### **Hydrogeological Evaluation: Wright Water Engineers, Inc. (2008)**

Evaluation completed by Wright Water Engineers, Inc. Durango Office. Data created using digital statewide geology at 1:500,000 from USGS in combination with 10m Digital Elevation Model (DEM) from NRCS. (Data compiled: 2008.)

Results: Spatial Polygons representing "Groundwater likely to be less than 50 ft." and "Groundwater suspected to be less than 50 ft.".

##### **Surficial Geology: USGS (1963/1987)**

Data digitized and rectified by Geospatial Consultants. (Data digitized: 03/23/ 2010). Original hard copy maps sourced from United States Geological Survey (USGS). Data available from:  
<http://pubs.er.usgs.gov/>.

*Geology, Structure and Uranium Deposits of the Shiprock Quadrangle, New Mexico and Arizona.* 1:250,000. I - 345. Compiled by Robert B. O'Sullivan and Helen M. Beikman. 1963.

*Geologic Map of the Aztec 1 x 2 Quadrangle, Northwestern New Mexico and Southern Colorado.* 1:250,000. I - 1730. Compiled by Kim Manley, Glenn R. Scott, and Reinhard A. Wobus. 1987.

##### **Aerial Imagery: Conoco (Summer 2009)**

ConocoPhillips Company. (Flown: Summer 2009). 12 in. High Resolution Orthoimagery. Projected coordinate system name:  
NAD\_1983\_StatePlane\_New\_Mexico\_West\_FIPS\_3003\_Feet.

Provided as tiled .tiff images and indexed using polygon index layer.

## **Figure 2: Proximity to Watercourses**

### **Layers:**

#### **Perennial Streams:**

**NHD, USGS (2010)**

National Hydrography Dataset (NHD). U.S. Geological Survey. (Data last updated: 02/19/2010. Data received: 03/09/2010). High-resolution: 1:24,000. Digital Representation of USGS 24k Topographic map series with field updates as required. Data available from: <http://nhd.usgs.gov/>.

#### **Intermittent Streams:**

**NHD, USGS (2010)**

National Hydrography Dataset (NHD). U.S. Geological Survey. (Data last updated: 02/19/2010. Data received: 03/09/2010). High-resolution: 1:24,000. Digital Representation of USGS 24k Topographic map series with field updates as required. Data available from: <http://nhd.usgs.gov/>.

#### **Water Bodies:**

**NHD, USGS (2010)**

National Hydrography Dataset (NHD). U.S. Geological Survey. (Data last updated: 02/19/2010. Data received: 03/09/2010). High-resolution: 1:24,000. Digital representation of USGS 24k Topographic map series with field updates as required. Data available from: <http://nhd.usgs.gov/>.

#### **USGS Topographic Maps:**

**USGS (2007)**

USGS 24k Topographic map series. 1:24000. Maps are seamless, scanned images of USGS paper topographic maps. Data available from: <http://store.usgs.gov>.

## **Figure 3: Proximity to Permanent Structure**

### **Layers:**

#### **Aerial Imagery:**

**Conoco (Summer 2009)**

ConocoPhillips Company. (Flown: Summer 2009). 12 in. High Resolution Orthoimagery. Projected coordinate system name: NAD\_1983\_StatePlane\_New\_Mexico\_West\_FIPS\_3003\_Feet.

Provided as tiled .tiff images and indexed using polygon index layer.

#### **Figure 4: Proximity to Water Wells**

##### **Layers:**

###### **Water Wells: iWaters Database: NMOSE/ISC (Dec. 2009)**

New Mexico Office of the State Engineer (OSE) /ISC iWaters database. (Data updated: 12/2009. Data received: 03/09/2010). Data available from: [http://www.ose.state.nm.us/waters\\_db\\_index.html](http://www.ose.state.nm.us/waters_db_index.html).

###### **Springs/Seeps: NHD, USGS (2010)**

National Hydrography Dataset (NHD). U.S. Geological Survey. (Data last updated: 02/19/2010. Data received: 03/09/2010). High-resolution: 1:24,000. Digital representation of USGS 24k Topographic map series with field updates as required. Data available from: <http://nhd.usgs.gov/>.

###### **Aerial Imagery: Conoco (Summer 2009)**

ConocoPhillips Company. (Flown: Summer 2009). 12 in. High Resolution Orthoimagery. Projected coordinate system name: NAD\_1983\_StatePlane\_New\_Mexico\_West\_FIPS\_3003\_Feet. Provided as tiled .tiff images and indexed using polygon index layer.

#### **Figure 5: Proximity to Municipal Boundary**

##### **Layers:**

###### **Municipal Boundary: San Juan County, New Mexico (2010)**

Data provided by San Juan County GIS Division. (Data received: 03/25/2010).

###### **Shaded Relief: NED, USGS (1999)**

National Elevation Dataset (NED). U.S. Geological Survey, EROS Data Center. (Data created: 1999. Data downloaded: April, 2010). Resolution: 10 meter (1/3 arc-second). Data available from: <http://ned.usgs.gov/>.

###### **StreetMap North America: Tele Atlas North America, Inc., ESRI (2008)**

Data derived from Tele Atlas Dynamap/Transportation North America, version 5.2. (Data updated: annually. Data series issue: 2008).

### **Figure 6: Proximity to Wetlands**

#### **Layers:**

##### **Wetlands:**

##### **NWI (2010)**

National Wetlands Inventory (NWI). U.S Fish and Wildlife Service. (Data last updated: 09/25/2009. Data received: 03/21/2010). Data available from: <http://www.fws.gov/wetlands/>.

##### **Aerial Imagery:**

##### **Conoco (Summer 2009)**

ConocoPhillips Company. (Flown: Summer 2009). 12 in. High Resolution Orthoimagery. Projected coordinate system name:

NAD\_1983\_StatePlane\_New\_Mexico\_West\_FIPS\_3003\_Feet.

Provided as tiled .tiff images and indexed using polygon index layer.

### **Figure 7: Proximity to Subsurface Mine**

#### **Layers:**

##### **Subsurface Mine:**

##### **NM Mining and Minerals Division ( 2010)**

New Mexico Mining and Minerals Division. (Data received: 03/12/2010). Contact: Susan Lucas Kamat, Geologist. Provided PLSS NM locations (Sections) for the two subsurface mines located in San Juan and Rio Arriba counties.

##### **Aerial Imagery:**

##### **Conoco (Summer 2009)**

ConocoPhillips Company. (Flown: Summer 2009). 12 in. High Resolution Orthoimagery. Projected coordinate system name:

NAD\_1983\_StatePlane\_New\_Mexico\_West\_FIPS\_3003\_Feet.

Provided as tiled .tiff images and indexed using polygon index layer.

**Figure 8: Proximity to FEMA Floodplain**

**Layers:**

**FEMA Floodplain:**

**FEMA (varying years)**

Data digitized and rectified by Wright Water Engineers, Inc. (Data digitized: August 2008).

Digitized from hard copy Flood Insurance Rate Maps (FIRMs) (varying years) of San Juan County.

**Aerial Imagery:**

**Conoco (Summer 2009)**

ConocoPhillips Company. (Flown: Summer 2009). 12 in. High Resolution Orthoimagery.

Projected coordinate system name:

NAD\_1983\_StatePlane\_New\_Mexico\_West\_FIPS\_3003\_Feet.

Provided as tiled .tiff images and indexed using polygon index layer.