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**Shell Exploration & Production Co., Inc.**

# **2009 Anvil Points Mine Core Recovery Program**

Piceance Creek Basin  
Rio Blanco County, Colorado

Anvil Points Mine Site

**Phillips P-19  
Core Hole**  
SEC. 36, T01S, R100W

2009

Summary Report and Well Data  
For  
United States Geological Survey



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### Phillips P-19 Core Hole

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Phillips P-19  
Anvil Points Mine Core Recovery  
Program Overview

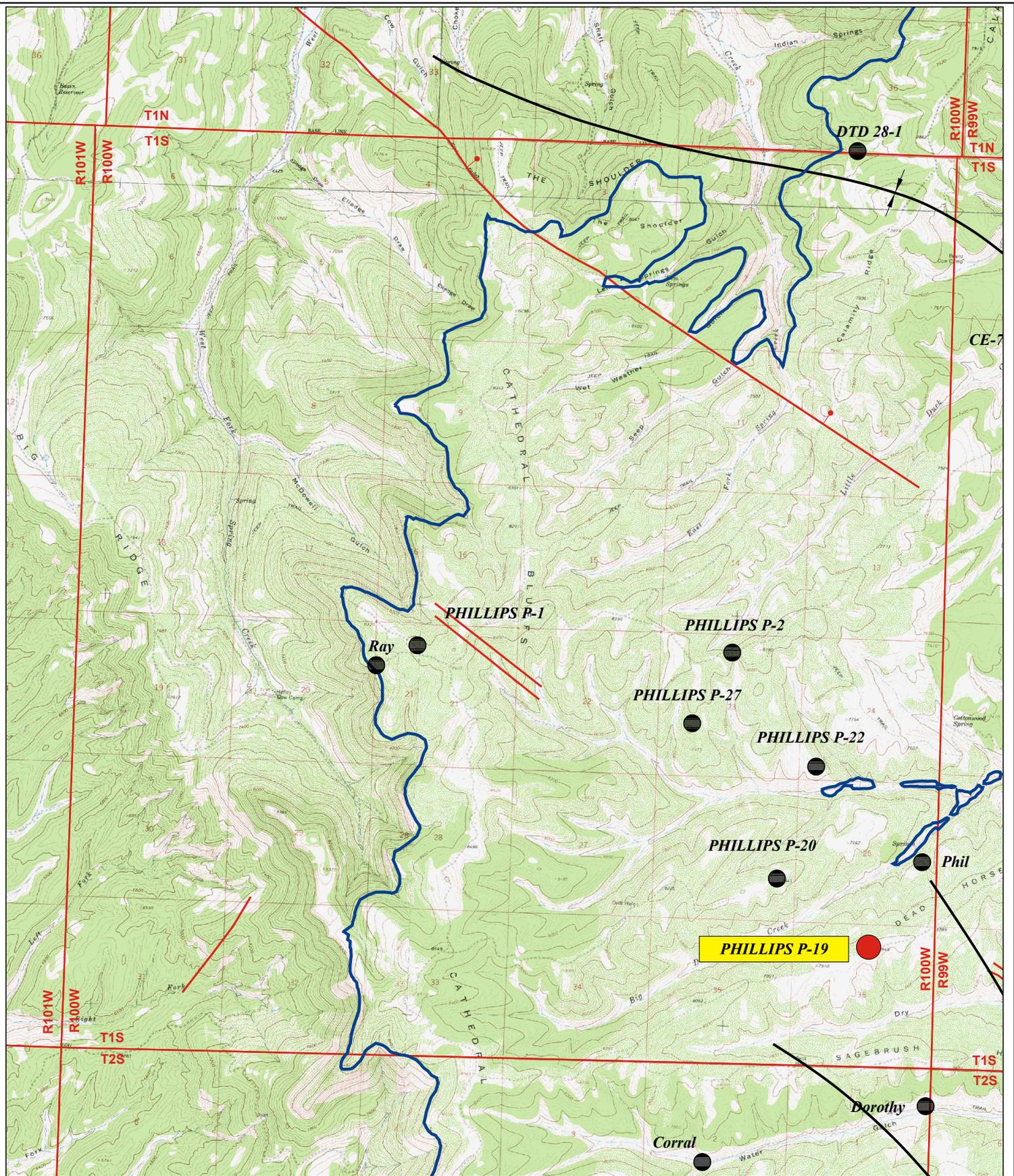




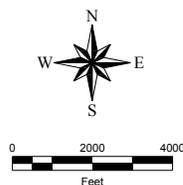




Phillips P-19  
General Core Hole Location Map



- Core Hole Location
- +— Anticline
- +— Fault - dashed where approximate
- +— Syncline



**2009 Anvil Points Mine Core Recovery Program  
Well Location Map - Phillips P-19  
T1S, R100W, Section 36  
Rio Blanco County, Colorado**

Daub & Associates, Inc.

Date:  
April 15, 2009

Phillips P-19  
Core Description Summary Report

**Core Hole P-19 (Phillips)**  
**Core Description Summary Report**  
Piceance Creek Basin, Northwestern Colorado  
Prepared by  
**Daub & Associates, Inc.**  
for  
**Shell Exploration & Production Co., Inc.**  
2009 Anvil Points Mine Recovered Core Description Program

## **Introduction**

The P-19 is a core hole originally drilled by Phillips Petroleum Company in 1981. Core hole P-19 is a continuation of P-19A, which was abandoned at a depth of 1322.1 feet for unknown reasons. As a separate core hole, P-19 started core sampling at 1281.1 feet, with a core overlap of 41.0 feet with P-19A to ensure core continuity. Please see the P-19A description summary report for core features associated with that well. The P-19 is located in Township 1 South, Range 100 West, Section 36, in Rio Blanco County, Colorado (Figure 1). This location is on Shell Mahogany Full Interest property at the southern margin of Dead Horse Ridge and north of the Dry Fork drainage in the NW quarter of the NE quarter of Section 36. Well information for this core hole is limited due to the fact that the core was obtained by the USGS from industry, stored in Denver, Colorado at the USGS core repository, and then subsequently moved into storage at the Anvil Points Mine near Rifle, Colorado. The core description referenced in this summary report was conducted post-removal (Fall 2008) from the Anvil Points Mine some 28 years after the core was originally drilled. Please refer to the Anvil Points Mine Boxed Core Processing Project document for information detailing the core handling and logging procedure (Appendix 1).

## **Phillips P-19 General and Unique Findings Noted During Core Description**

The Phillips P-19 well was cored from 1281.1 to 2006.5 feet. The core was slabbed approximately in half from 1281.1 feet to 1923.3 feet for FA analysis. The remaining core was left whole. A single interval of core from 1452.0 to 1452.8 feet had been removed for gas identification. Core box numbers 197 and 198 (1942.7 to 1962.4 feet) were not received at Daub & Associates Core Processing Facility in Grand Junction, Colorado. At the time of this report, the location of these core boxes is unknown. Several boxes of core were in poor shape, and contained core that appeared rearranged due to factors unknown. In these rearranged boxes of jumbled core, appropriate depths and core orientation were often indiscernible and the core was described as it lay in the box, or was described after a best attempt at reconstruction was conducted.

Hydrocarbons in the form of **bitumen** (a reddish brown to black near-solid to solid hydrocarbon) and **oil stains** were noted in fractures, tuffs, and porous clastic bands at depths of 1281'-1282' (R-3 zone), 1293'-1295' (R-3 zone), 1418'-1419' (R-2 zone), 1649'-1650' (R-1 zone), and 1822'-1823' (R-0 zone). Gilsonite was noted as fracture infilling between 1813'-1814' in the R-0 stratigraphic zone. Fractures were largely absent within these lower stratigraphic units (R-3 thru R-0 zones), with no major or minor fracture zones present. Additionally, there were no vugs or nahcolite noted within the cored interval for the P-19. The only tuff band greater than or equal to 0.3 feet thick was present between 1293.75 and 1294.05 feet (R-3 zone).

A couple other features were notable for this well. A number of oil-wet massive and lean bands were present between the depths of 1537 and 1762 feet (R-1 to R-0). A highly fossiliferous mudstone unit containing abundant pelecypods and gastropods was found in the R-0 stratigraphic zone from 1884.6' to the core TD of 2006.5'. This unit was found to be interbedded with thick units of fissile, featureless claystone throughout this interval.

# Phillips P-19 Core Data Examples

# Anvil Points Mine Core Description Legend

FEATURES	
CODE	DESCRIPTION
BIT	bitumen
CB	collapsed breccia
CLB	clay band
CV	collapsed vug
DZ	dissolution zone
F	featureless rock
FxS	fracture swarm
FZ	fissile zone
LB	lean band
MARL	marlstone band
MB	massive band
MF	microfaults
NB	nahcolite band/bedded
NM	nahcolite microcrystalline
NN	nahcolite nodules
O	other
OF	oxidation feature
ORG	organic band
PB	porous band
R	rubble
RB	rich band
SBB	streaked-blebby band
SLTB	siltstone band
SLTL	siltstone lens
SSB	sandstone band
SSD	soft sediment deformation
SSL	sandstone lens
TB	tuff band
TL	tuff lens
V	vug

LITHOLOGY	
CODE	DESCRIPTION
CB	collapsed breccia
CLYST	claystone
CS	crushed sample
CSR	core sample removed
INTRBD	interbedded
LC	lost core
MARL	marlstone
MRLSS	marly sandstone
MC	missing core
MS	mudstone
NAHC	nahcolite
OS	oil shale
SLTCS	silty claystone
SLTMRL	silty marlstone
SLTMS	silty mudstone
SLTST	siltstone
SS	sandstone

RICHNESS	
CODE	DESCRIPTION
L	lean (0-10 gal/ton)
M	moderate (10-20 gal/ton)
MR	moderately rich (20-30 gal/ton)
R	rich (30-40 gal/ton)
VR	very rich (40-50 gal/ton)

LITHOLOGIC FABRIC	
CODE	DESCRIPTION
B	blebby
L	laminated
M	massive
S	streaked

FRACTURE STATUS	
CODE	DESCRIPTION
C	closed
O	open
PO	partially open

FRACTURE INFILLING	
CODE	DESCRIPTION
BIT	bitumen
Ca	calcite
CaP	calcite/pyrite
Cl	clay
D	dolomite
FeO	Fe oxide
GIL	gilsonite
N	none
NAHC	nahcolite
O	other
Org	organic
P	pyrite
UNK	unknown

PYRITE AMOUNT	
CODE	DESCRIPTION
N	none
SL	slight
M	moderate
A	abundant







**Phillips P-19**  
**Sec.36, T01S, R100W**  
**Box 141 (1388.2-1398)**  
**1397 - 1398 Dry**



DAUB & ASSOCIATES, INC.



GRAND JUNCTION, CO - ESTABLISHED IN 1982  
Geology, Hydrology & Project Management



**Phillips P-19**  
**Sec.36, T01S, R100W**  
**Box 141 (1388.2-1398)**  
**1397 - 1398 Wet**



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**Phillips P-19  
Electronic Data CDs**

# Phillips P-19

## List of Abbreviations

## Abbreviations Commonly Found in Daub & Associates, Inc. Reports

### Abbreviations Commonly Found with Survey Information

FEL	From East Section Line
FNL	From North Section Line
FSL	From South Section Line
FWL	From West Section Line
GL	Ground Level
NAD	North American Datum
TOC	Top of Casing

### Abbreviations Commonly Found in Daily Drilling Reports

Circ	Circulation or Circulate
Cmt	Cement
Csg	Casing
gpm	gallons per minute
LEL	Lower Explosion Limit
Prog	Prognosis
psi	pounds per square inch
rpm	revolutions per minute
TD	Total Depth
TIH	Trip in Hole
TOC	Top of Cement
TOH/TOOH	Trip out of Hole

### Abbreviations Commonly Found in Diagrams or Data Sheets

#	Number	MB	Mahogany Bed
API#	American Petroleum Institute number	MD	Measured Depth
BHP	Bottom Hole Pressure	N/A or na	not applicable
BHT	Bottom Hole Temperature	nd	no data
BST	Bottom Seal Test	nr	not recorded
BTC	Bellaire Technology Center	OD	Outside Diameter
D & A	Daub & Associates, Inc	P&A	Plugged and Abandoned
Deg C	Degrees Celsius	P atm	Pressure, atmospheric
Dirr Thick	Directional Thickness	R/L Zone	Rich/Lean Zone
DS	Dissolution Surface	RQD	Rock Quality Designation
Est	Estimated	sks	sacks
FA Grade (Gal/Ton)	Fischer Assay Grade	T amb	Temperture, ambient
Grv	Groove	TI	TI Nahcolite Bed
GW	Groundwater		
HD	High Density Marker	TVD	True Vertical Depth
ID	Inside Diameter	UT	Uinta Transition
in Hg	inches Mercury	Vert	Vertical
lb/ft	pounds per foot		

## Abbreviations Commonly Found in Daub & Associates, Inc. Reports

### Abbreviations used for Rock Descriptions (Core, cuttings and outcrop)

abt	abundant	com	common
agg	aggregate	cont	contorted
ang	angular	crm	cream
app	appearance	xln	crystalline
ard	around	xtals	crystals
aa	as above	def	deformed
band	banded	dk	dark
bed	bedded, bedding	descr	description
biot	biotite	difus	diffuse
bit	bitumen	dissem	disseminated
blb	blebby	dissl	dissolved
blk	black	discont	discontinuous
blu	blue	dis	disturbed
brec	breccia, brecciated	dol	dolomite
br	bright	f	fine-grained
brn	brown	fx	fracture
calc	calcareous, calcite	gy	gray
carb	carbonaceous	grn	green
cmt	cement, cementing	hd	hard
clayst	claystone	HC	honeycomb
c	coarse-grained	indst	indistinct
coat	coatings	intbd	interbedded
CB	collapse breccia	IB	interbedded
incr	increasing	spl	sample
IP	in part	ss	sandstone
lam	laminations	scat	scattered
ln	lean	sh	shale
lt	light	shle	shale
mkr	marker	slt	silt
med	medium	sltst	siltstone
m	medium-grained	mrlst	marlstone
MFlt	microfaulted	mass	massive
Mfrac	microfractured	mat	material
mod	moderate	sl	slight
mudst	mudstone	sp	specks
nahc	nahcolite	str	streaky, streaked
occ	occasional	strless	structureless
os	oil shale	tan	tan
orn	orange	tx	texture, textured
org	organic	thru	throughout
ox	oxidized	tt	tight
pale	pale	tr	trace
pnk	pink	v	very
por	porous	vf	very fine
poss	possibly	vv	very, very
pyr	pyrite	vvf	very, very fine
Qtz	quartz	wav	wavy
rr	rare	wk	weak
red	red	wht	white
rch	rich	xln	crystalline
rgh	rough	xtals	crystals
rnd	round	ylw	yellow

**Munsell Color Code Abbreviations Commonly Found in Daub and Associates, Inc.  
Reports**

<b>CODE</b>	<b>DESCRIPTION</b>		5BG 3/2	DUSKY BLUE GREEN
5R 8/2	GRAYISH PINK		5B 8/2	VERY PALE BLUE
5R 7/4	MODERATE PINK		5B 7/6	LIGHT BLUE
5R 6/2	PALE RED		5B 6/2	PALE BLUE
5R 6/6	LIGHT RED		5B 5/6	MODERATE BLUE
5R 5/4	MODERATE RED		5PB 7/2	PALE BLUE
5R 4/2	GRAYISH RED		5PB 5/2	GRAYISH BLUE
5R 4/6	MODERATE RED		5PB 3/2	DUSKY BLUE
5R 3/4	DUSKY RED		5RP 8/2	PALE PINK
5R 2/2	BLACKISH RED		5RP 6/2	PALE RED PURPLE
5R 2/6	VERY DARK RED		5RP 4/2	GRAYISH RED PURPLE
5R 8/4	MODERATE ORANGE PINK		5RP 2/2	VERY DUSKY PURPLE
5YR 7/2	GRAYISH ORANGE PINK		10R 8/2	GRAYISH ORANGE PINK
5YR 6/4	LIGHT BROWN		10R 7/4	MODERATE ORANGE PINK
5YR 5/2	PALE BROWN		10R 6/2	PALE RED
5YR 5/6	LIGHT BROWN		10R 6/6	MODERATE REDDISH ORANGE
5YR 3/4	MODERATE BROWN		10R 5/4	PALE REDDISH BROWN
5YR 4/4	MODERATE BROWN		10R 4/2	GRAYISH RED
5YR 3/2	GRAYISH BROWN		10R 4/6	MODERATE REDDISH BROWN
5YR 2/2	DUSKY BROWN		10R 3/4	DARK REDDISH BROWN
5YR 8/1	PINKISH GRAY		10R 2/2	VERY DUSKY RED
5YR 6/1	LIGHT BROWNISH GRAY		10YR 8/2	VERY PALE ORANGE
5YR 4/1	BROWNISH GRAY		10YR 8/6	PALE YELLOWISH ORANGE
5YR 2/1	BROWNISH BLACK		10YR 7/4	GRAYISH ORANGE
5Y 8/4	GRAYISH YELLOW		10YR 6/2	PALE YELLOWISH BROWN
5Y 7/2	YELLOWISH GRAY		10YR 6/6	DARK YELLOWISH ORANGE
5Y 7/6	MODERATE YELLOW		10YR 5/4	MODERATE YELLOW BROWN
5Y 6/4	DUSKY YELLOW		10YR 4/2	DARK YELLOWISH BROWN
5Y 7/6	LIGHT OLIVE GRAY		10YR 2/2	DUSKY YELLOWISH BROWN
5Y 5/6	LIGHT LIVE BROWN		10Y 8/2	PALE GREENISH YELLOW
5Y 4/4	MODERATE OLIVE BROWN		10Y 7/4	MODERATE GREENISH YELLOW
5Y 3/2	OLIVE GRAY		10Y 6/2	PALE OLIVE
5Y 8/1	YELLOWISH GRAY		10Y 6/6	DARK GREENISH YELLOW
5Y 6/1	LIGHT OLIVE GRAY		10Y 5/4	LIGHT OLIVE
5Y 4/1	OLIVE GRAY		10Y 4/2	GRAYISH OLIVE
5Y 2/1	OLIVE BLACK		10GY 7/2	PALE YELLOWISH GREEN
5GY 7/2	GRAYISH YELLOW GREEN		10GY 6/4	MODERATE YELLOWISH GREEN
5GY 7/4	MODERATE YELLOW GREEN		10GY 5/2	GRAYISH GREEN
5GY 5/2	DUSKY YELLOW GREEN		10GY 4/4	DARK YELLOWISH GREEN
5GY 3/2	GRAYISH OLIVE GREEN		10GY 3/2	DUSKY YELLOWISH BROWN
5GY 8/1	LIGHT GREENISH GRAY		10G 8/2	VERY PALE GREEN
5GY 6/1	GREENISH GRAY		10G 6/2	PALE GREEN
5GY 4/1	DARK GREENISH GRAY		10G 4/2	GRAYISH GREEN
5G 7/2	PALE GREEN		N 9	WHITE
5G 7/4	LIGHT GREEN		N 8	VERY LIGHT GRAY
5G 6/6	BRILLIANT GREEN		N 7	LIGHT GRAY
5G 5/2	GRAYISH GREEN		N 6	MEDIUM LIGHT GRAY
5G 5/6	MODERATE GREEN		N 5	MEDIUM GRAY
5G 3/2	DUSKY GREEN		N 4	MEDIUM DARK GRAY
5G 2/1	GREENISH BLACK		N 3	DARK GRAY
5BG 5/2	GRAYISH BLUE GREEN		N 2	GRAYISH BLACK
5BG 4/6	MODERATE BLUE GREEN		N 1	BLACK