From:	Eckhart, Jeanne
To:	Moore, Jessica; Wills, Carl; Lister, Chris; Chang-Vaughan, Ellen; Lane, Willie; Saunders, Jerry; Sanborn, Kent
Subject:	Bird Creek - Finalizing Information Request
Attachments:	Information Needed from (b) and (b) (5) [redacted] .docx

All,

Another bird creek meeting to update on the action items that were previously emailed (below) and to verify the information requests we are pulling together. Attached is a list that Carl put together as well.

Let me know if you have any questions. This should work with everyone's schedule according to outlook and other conversations I've had today.

Thanks,

Jeanne Eckhart
Environmental Scientist
Water Resources Section, Enforcement Division
Region 6, U.S. EPA
Office: (214) 665 – 8174
Fax: (214) 665 – 2168

Action Items:
* Plot all injection wells, so we can see where they all are in the area
o Chris mentioned previously he would be doing this
* Verify information that we have on injection wells in area from what is in permits, including the files and discussions with permitting
o If there is information we need and permits doesn't have, we need to identify that information
o Jessica can initiate this process (if there's a meeting with Permits, please let us know)
* Is heat a pollutant under the CWA?
o Ellen will investigate potential use
* Previous SDWA-UIC information requests
o Jessica reaching out to other regions to see if they have done one previously
* Geological cross section of the area
o Jessica – Please let us know if you need assistance in getting this information
* BIA – Where is the (b) Well located from (b) (5) [redacted]
o Jessica mentioned she could assist in getting this information
* BIA – what information do we want to request from them regarding production wells?
o Decide what information we may need
o Decide who's requesting/how we are getting that information
* Continue monitoring the site
o Kent
* Water sample analysis from the two nearby groundwater wells
o Kent and Carl (please keep us all informed on when the results come in)

Eckhart, Jeanne

From: Eckhart, Jeanne
Sent: Thursday, November 03, 2016 1:22 PM
To: Wills, Carl; Lister, Chris; Chang-Vaughan, Ellen; Jessica Moore (Moore.Jessica@epa.gov); Sanborn, Kent
Cc: Lane, Willie
Subject: Bird Creek Information Continued Gathering - Action Items
Attachments: Information Needed from (b) and (b) (5) [redacted].docx

All,

Since there are many people involved on Bird Creek, here is a list of action items discussed in the meeting (as requested):

Action Items:

- Plot all injection wells, so we can see where they all are in the area
  - **Chris** mentioned previously he would be doing this
- Verify information that we have on injection wells in area from what is in permits, including the files and discussions with permitting
  - If there is information we need and permits doesn't have, we need to identify that information
  - **Jessica** can initiate this process (if there's a meeting with Permits, please let us know)
- Is heat a pollutant under the CWA?
  - **Ellen** will investigate
- Previous SDWA-UIC information requests
  - **Jessica** reaching out to other regions to see if they have done one previously
- Geological cross section of the area
  - **Jessica** – Please let us know if you need assistance in getting this information
- BIA – Where is the (b Well located from (b) (5) [redacted]
  - **Jessica** mentioned she could assist in getting this information
- BIA – what information do we want to request from them regarding production wells?
  - **Decide** what information we may need
  - **Decide** who's requesting/how we are getting that information
- Continue monitoring the site
  - **Kent**
- Water sample analysis from the two nearby groundwater wells
  - **Kent and Carl** (please keep us all informed on when the results come in)

Consensus at the meeting was that we will work through these items and have another meeting to assess if additional information is needed. Attached is a rough draft of information that Carl has put together that we may to request, depending on what our action items above produce.

Please let me know if you have any questions.

Thanks,

Jeanne Eckhart
Environmental Scientist
Water Resources Section, Enforcement Division

Region 6, U.S. EPA
Office: (214) 665 – 8174
Fax: (214) 665 – 2168

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Oklahoma State University Division of Agricultural Sciences and Natural Resources
045 Agricultural Hall
Stillwater, OK 74078
Email: soiltesting@okstate.edu
Website: www.soiltesting.okstate.edu

WATER QUALITY REPORT

CARL E. WILLS (6EN-WR)
CARL E WILLS (6EN-WR)
US EPA REGION 6
1445 ROSS AVE SUITE 1200
DALLAS, TX 75202
(214) 665-7276

Name : **1A-Upstream (North of Road)**

Location : **Bird Creek (SE 12-T27N-R7E)**
Osage County, OK

Lab ID No.: : **820711**
Customer Code : **1361**
Sample No. : **1**
Received : **10/6/2016**
Report Date : **10/10/2016**

Test Results for Irrigation Water

---------- Cations ----------		---------- Anions ----------		---------- Other ----------	
Sodium (ppm)	17	Nitrate-N (ppm)	<1	pH	7.5
Calcium (ppm)	47	Chloride (ppm)	87	EC (µmhos/cm)	454
Magnesium (ppm)	7	Sulfate (ppm)	35		
Potassium (ppm)	8	Boron (ppm)	0.02		
		Bicarbonate (ppm)	56		

---------- Derived Values ----------		-------- Derived Values(cont'd) ----------	
Total Dissolved Salts (TDS in ppm)	299.6	Sodium Percentage	19.9 %
Sodium Adsorption Ratio (SAR)	0.6	Hardness (ppm)	146.0
Potassium Adsorption Ratio (PAR)	0.2	Hardness Class	Hard
		Alkalinity (ppm as $CaCO_3$)	45.6

INTERPRETATION AND REQUIREMENTS FOR *Irrigation Water*

The total dissolved salt and sodium content of this water are low enough that no problem should result from its use.

Signature

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US EPA REGION 6
1445 ROSS AVE SUITE 1200
DALLAS, TX 75202
(214) 665-7276

Name : 1A-Upstream (North of Road)

Location : Bird Creek (SE 12-T27N-R7E)
Osage County, OK

Lab ID No.: : 820711
Customer Code : 1361
Sample No. : 1
Received : 10/6/2016
Report Date : 10/10/2016

Test Results for Livestock Water

Analysis	Sample Results	Livestock Water Limits
Boron (ppm)	0.02	< 5 ppm
Calcium (ppm)	47.33	No Guidelines
Chloride (ppm)	86.87	< 600 ppm
Copper (ppm)	<DL*	<0.5 ppm
Iron (ppm)	1.26	No Guidelines
Magnesium (ppm)	6.79	No Guidelines
Manganese (ppm)	0.01	No Guidelines
Nitrate-N (ppm)	0.64	< 100 ppm
Potassium (ppm)	8	No Guidelines
Sodium (ppm)	16.64	< 1000 ppm
Sulfate (ppm)	35.06	<1000 ppm
Zinc (ppm)	< DL*	< 25 ppm
EC (µmhos/cm)	454	No Guidelines
ICAP_P ppm	---	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	146.0	No Guidelines
Hardness Class	Hard	No Guidelines
pH	7.5	5.5-9.0
Total Dissolved Salts(TDS) (ppm)	299.6	<3000 ppm

* DL : Detection Limit

Signature

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CARL E WILLS (6EN-WR)
US EPA REGION 6
1445 ROSS AVE SUITE 1200
DALLAS, TX 75202
(214) 665-7276

Name : 1A-Upstream (North of Road)

Location : Bird Creek (SE 12-T27N-R7E)
Osage County, OK

Lab ID No.: : 820711
Customer Code : 1361
Sample No. : 1
Received : 10/6/2016
Report Date : 10/10/2016

Test Results for Household Water

Analysis	Sample Results	EPA Drinking Water Limits
Boron (ppm)	0.02	< 2.4
Calcium (ppm)	47.33	No Guidelines
Chloride (ppm)	86.87	< 250 ppm (#)
Copper (ppm)	< DL*	<1.0 ppm (#)
Iron (ppm)	1.26	< 0.3 ppm (#)
Magnesium (ppm)	6.79	No Guidelines
Manganese (ppm)	0.01	< 0.05 ppm (#)
Nitrate-N (ppm)	0.64	< 10 ppm
Potassium (ppm)	8	No Guidelines
Sodium (ppm)	16.64	No Guidelines
Sulfate (ppm)	35.06	< 250 ppm (#)
Zinc (ppm)	< DL*	< 5.0 ppm (#)
EC (µmhos/cm)	454	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	146.0	No Guidelines
Hardness Class	Hard	< 120
pH	7.5	6.5 - 8.5 (#)
Sodium Percentage (%)	19.9	No Guidelines
Total Dissolved Solids (TDS) (ppm)	299.6	<500 ppm (#)

* DL : Detection Limit

(#) Secondary standards are non-enforceable guidelines regulating contaminants that may cause cosmetic or aesthetic effects.
If any of the above analysis exceeds EPA standards, you should seek advise from the Oklahoma Department of Environmental Quality or local Health Department.
This water analysis does NOT include testing for bacteria, organic chemicals, and heavy metals. This lab is not certified by DEQ for drinking water analysis.

Signature

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CARL E WILLS (6EN-WR)
US EPA REGION 6
1445 ROSS AVE SUITE 1200
DALLAS, TX 75202
(214) 665-7276

Name : **1B-Pool (South of Road)**

Location : **Bird Creek (SE 12-T27N-R7E)**
Osage County, OK

Lab ID No.: : **820712**
Customer Code : **1361**
Sample No. : **2**
Received : **10/6/2016**
Report Date : **10/10/2016**

Test Results for Irrigation Water

---------- Cations ----------		---------- Anions ----------		---------- Other ----------	
Sodium (ppm)	20812	Nitrate-N (ppm)	<1	pH	6.9
Calcium (ppm)	4751	Chloride (ppm)	40699	EC (µmhos/cm)	99500
Magnesium (ppm)	1365	Sulfate (ppm)	49		
Potassium (ppm)	58	Boron (ppm)	1.47		
		Bicarbonate (ppm)	61		

---------- Derived Values ----------		-------- Derived Values(cont'd) ----------	
Total Dissolved Salts (TDS in ppm)	67795.3	Sodium Percentage	72.2 %
Sodium Adsorption Ratio (SAR)	68.5	Hardness (ppm)	17470.8
Potassium Adsorption Ratio (PAR)	0.1	Hardness Class	Very Hard
		Alkalinity (ppm as CaCO3)	49.8

INTERPRETATION AND REQUIREMENTS FOR *Irrigation Water*

Water of this quality is not recommended for crop irrigation due to its high total dissolved salts and/or sodium level.
Boron toxicity may occur in poorly drained soils.

Signature

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CARL E WILLS (6EN-WR)
US EPA REGION 6
1445 ROSS AVE SUITE 1200
DALLAS, TX 75202
(214) 665-7276

Name : 1B-Pool (South of Road)

Location : Bird Creek (SE 12-T27N-R7E)
Osage County, OK

Lab ID No.: : 820712
Customer Code : 1361
Sample No. : 2
Received : 10/6/2016
Report Date : 10/10/2016

Test Results for Livestock Water

Analysis	Sample Results	Livestock Water Limits
Boron (ppm)	1.47	< 5 ppm
Calcium (ppm)	4751.23	No Guidelines
Chloride (ppm)	40699	< 600 ppm
Copper (ppm)	0.10	< 0.5 ppm
Iron (ppm)	0.1	No Guidelines
Magnesium (ppm)	1365.04	No Guidelines
Manganese (ppm)	0.02	No Guidelines
Nitrate-N (ppm)	0.14	< 100 ppm
Potassium (ppm)	58	No Guidelines
Sodium (ppm)	20812.1	< 1000 ppm
Sulfate (ppm)	48.98	<1000 ppm
Zinc (ppm)	0.01	< 25 ppm
EC (µmhos/cm)	99500	No Guidelines
ICAP_P ppm	---	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	17470.8	No Guidelines
Hardness Class	Very Hard	No Guidelines
pH	6.9	5.5-9.0
Total Dissolved Salts(TDS) (ppm)	67795.3	<3000 ppm

* DL : Detection Limit

This water may be objectionable because it is less than the guideline of 1000mg Na/L.
Serious effects including death become likely at 5000mg/L.We recommend keeping drinking water Na concentration less than 1000mg/L(chronic exposure criteria).This assumes normal feedstuff Na concentration and no other water sources;these concentrations should protect against acute lethality or chronically poor performance.Short term exposure(days-weeks) should not exceed 4000 mg Na/L
This water may be objectionable because it exceeds the guideline of 600mg Chloride/L

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CARL E WILLS (6EN-WR)
US EPA REGION 6
1445 ROSS AVE SUITE 1200
DALLAS, TX 75202
(214) 665-7276

Name : 1B-Pool (South of Road)

Location : Bird Creek (SE 12-T27N-R7E)
Osage County, OK

Lab ID No.: : 820712
Customer Code : 1361
Sample No. : 2
Received : 10/6/2016
Report Date : 10/10/2016

Test Results for Household Water

Analysis	Sample Results	EPA Drinking Water Limits
Boron (ppm)	1.47	< 2.4
Calcium (ppm)	4751.23	No Guidelines
Chloride (ppm)	40699	< 250 ppm (#)
Copper (ppm)	0.10	< 1.0 ppm (#)
Iron (ppm)	0.1	< 0.3 ppm (#)
Magnesium (ppm)	1365.04	No Guidelines
Manganese (ppm)	0.02	< 0.05 ppm (#)
Nitrate-N (ppm)	0.14	< 10 ppm
Potassium (ppm)	58	No Guidelines
Sodium (ppm)	20812.1	No Guidelines
Sulfate (ppm)	48.98	< 250 ppm (#)
Zinc (ppm)	0.01	< 5.0 ppm (#)
EC (µmhos/cm)	99500	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	17470.8	No Guidelines
Hardness Class	Very Hard	< 120
pH	6.9	6.5 - 8.5 (#)
Sodium Percentage (%)	72.2	No Guidelines
Total Dissolved Solids (TDS) (ppm)	67795.3	<500 ppm (#)

* DL : Detection Limit

(#) Secondary standards are non-enforceable guidelines regulating contaminants that may cause cosmetic or aesthetic effects.
If any of the above analysis exceeds EPA standards, you should seek advise from the Oklahoma Department of Environmental Quality or local Health Department.
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CARL E WILLS (6EN-WR)
US EPA REGION 6
1445 ROSS AVE SUITE 1200
DALLAS, TX 75202
(214) 665-7276

Name : **1C-Duplicate(South of Road)**

Location : **Bird Creek (SE 12-T27N-R7E)**
Osage County, OK

Lab ID No.: : **820713**
Customer Code : **1361**
Sample No. : **3**
Received : **10/6/2016**
Report Date : **10/10/2016**

Test Results for Irrigation Water

---------- Cations ----------		---------- Anions ----------		---------- Other ----------	
Sodium (ppm)	20810	Nitrate-N (ppm)	<1	pH	6.9
Calcium (ppm)	4749	Chloride (ppm)	42655	EC (µmhos/cm)	100100
Magnesium (ppm)	1432	Sulfate (ppm)	51		
Potassium (ppm)	62	Boron (ppm)	1.59		
		Bicarbonate (ppm)	64		

---------- Derived Values ----------		-------- Derived Values(cont'd) ----------	
Total Dissolved Salts (TDS in ppm)	69821.9	Sodium Percentage	71.8 %
Sodium Adsorption Ratio (SAR)	68.0	Hardness (ppm)	17741.4
Potassium Adsorption Ratio (PAR)	0.1	Hardness Class	Very Hard
		Alkalinity (ppm as CaCO3)	52.1

INTERPRETATION AND REQUIREMENTS FOR *Irrigation Water*

Water of this quality is not recommended for crop irrigation due to its high total dissolved salts and/or sodium level.
Boron toxicity may occur in poorly drained soils.

Signature

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045 Agricultural Hall
Stillwater, OK 74078
Email: soiltesting@okstate.edu
Website: www.soiltesting.okstate.edu

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CARL E. WILLS (6EN-WR)
CARL E WILLS (6EN-WR)
US EPA REGION 6
1445 ROSS AVE SUITE 1200
DALLAS, TX 75202
(214) 665-7276

Name : 1C-Duplicate(South of Road)

Location : Bird Creek (SE 12-T27N-R7E)
Osage County, OK

Lab ID No.: : 820713
Customer Code : 1361
Sample No. : 3
Received : 10/6/2016
Report Date : 10/10/2016

Test Results for Livestock Water

Analysis	Sample Results	Livestock Water Limits
Boron (ppm)	1.59	< 5 ppm
Calcium (ppm)	4748.7	No Guidelines
Chloride (ppm)	42655	< 600 ppm
Copper (ppm)	0.10	< 0.5 ppm
Iron (ppm)	0.1	No Guidelines
Magnesium (ppm)	1432.35	No Guidelines
Manganese (ppm)	<DL*	No Guidelines
Nitrate-N (ppm)	0.13	< 100 ppm
Potassium (ppm)	62	No Guidelines
Sodium (ppm)	20809.6	< 1000 ppm
Sulfate (ppm)	50.51	<1000 ppm
Zinc (ppm)	0.01	< 25 ppm
EC (µmhos/cm)	100100	No Guidelines
ICAP_P ppm	---	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	17741.4	No Guidelines
Hardness Class	Very Hard	No Guidelines
pH	6.9	5.5-9.0
Total Dissolved Salts(TDS) (ppm)	69821.9	<3000 ppm

* DL : Detection Limit

This water may be objectionable because it is less than the guideline of 1000mg Na/L.
Serious effects including death become likely at 5000mg/L.We recommend keeping drinking water Na concentration less than 1000mg/L(chronic exposure criteria).This assumes normal feedstuff Na concentration and no other water sources;these concentrations should protect against acute lethality or chronically poor performance.Short term exposure(days-weeks) should not exceed 4000 mg Na/L
This water may be objectionable because it exceeds the guideline of 600mg Chloride/L

Signature

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(214) 665-7276

Name : 1C-Duplicate(South of Road)

Location : Bird Creek (SE 12-T27N-R7E)
Osage County, OK

Lab ID No.: : 820713
Customer Code : 1361
Sample No. : 3
Received : 10/6/2016
Report Date : 10/10/2016

Test Results for Household Water

Analysis	Sample Results	EPA Drinking Water Limits
Boron (ppm)	1.59	< 2.4
Calcium (ppm)	4748.7	No Guidelines
Chloride (ppm)	42655	< 250 ppm (#)
Copper (ppm)	0.10	< 1.0 ppm (#)
Iron (ppm)	0.1	< 0.3 ppm (#)
Magnesium (ppm)	1432.35	No Guidelines
Manganese (ppm)	< DL*	< 0.05 ppm (#)
Nitrate-N (ppm)	0.13	< 10 ppm
Potassium (ppm)	62	No Guidelines
Sodium (ppm)	20809.6	No Guidelines
Sulfate (ppm)	50.51	< 250 ppm (#)
Zinc (ppm)	0.01	< 5.0 ppm (#)
EC (µmhos/cm)	100100	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	17741.4	No Guidelines
Hardness Class	Very Hard	< 120
pH	6.9	6.5 - 8.5 (#)
Sodium Percentage (%)	71.8	No Guidelines
Total Dissolved Solids (TDS) (ppm)	69821.9	<500 ppm (#)

* DL : Detection Limit

(#) Secondary standards are non-enforceable guidelines regulating contaminants that may cause cosmetic or aesthetic effects.
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Signature

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CARL E WILLS (6EN-WR)
US EPA REGION 6
1445 ROSS AVE SUITE 1200
DALLAS, TX 75202
(214) 665-7276

Name : **2-Jireh (@ Well 18W)**

Location : **Bird Creek (SW 1-T27N-R7E)**
Osage County, OK

Lab ID No.: : **820714**
Customer Code : **1361**
Sample No. : **4**
Received : **10/6/2016**
Report Date : **10/10/2016**

Test Results for Irrigation Water

---------- Cations ----------		---------- Anions ----------		---------- Other ----------	
Sodium (ppm)	49111	Nitrate-N (ppm)	<1	pH	6.3
Calcium (ppm)	9627	Chloride (ppm)	99594	EC (µmhos/cm)	179600
Magnesium (ppm)	1770	Sulfate (ppm)	41		
Potassium (ppm)	531	Boron (ppm)	8.54		
		Bicarbonate (ppm)	104		

---------- Derived Values ----------		-------- Derived Values(cont'd) ----------	
Total Dissolved Salts (TDS in ppm)	160778.6	Sodium Percentage	77.3 %
Sodium Adsorption Ratio (SAR)	120.7	Hardness (ppm)	31304.2
Potassium Adsorption Ratio (PAR)	0.8	Hardness Class	Very Hard
		Alkalinity (ppm as CaCO3)	85.1

INTERPRETATION AND REQUIREMENTS FOR *Irrigation Water*

Water of this quality is not recommended for crop irrigation due to its high total dissolved salts and/or sodium level.

This water is not recommended for irrigation use because of its high boron content.

Signature

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CARL E WILLS (6EN-WR)
US EPA REGION 6
1445 ROSS AVE SUITE 1200
DALLAS, TX 75202
(214) 665-7276

Name : 2-Jireh (@ Well 18W)

Location : Bird Creek (SW 1-T27N-R7E)
Osage County, OK

Lab ID No.: : 820714
Customer Code : 1361
Sample No. : 4
Received : 10/6/2016
Report Date : 10/10/2016

Test Results for Livestock Water

Analysis	Sample Results	Livestock Water Limits
Boron (ppm)	8.54	< 5 ppm
Calcium (ppm)	9627.19	No Guidelines
Chloride (ppm)	99594	< 600 ppm
Copper (ppm)	0.10	< 0.5 ppm
Iron (ppm)	10.41	No Guidelines
Magnesium (ppm)	1770.4	No Guidelines
Manganese (ppm)	2.49	No Guidelines
Nitrate-N (ppm)	< DL*	< 100 ppm
Potassium (ppm)	531	No Guidelines
Sodium (ppm)	49110.8	< 1000 ppm
Sulfate (ppm)	41.26	<1000 ppm
Zinc (ppm)	0.85	< 25 ppm
EC (µmhos/cm)	179600	No Guidelines
ICAP_P ppm	---	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	31304.2	No Guidelines
Hardness Class	Very Hard	No Guidelines
pH	6.3	5.5-9.0
Total Dissolved Salts(TDS) (ppm)	160778.6	<3000 ppm

* DL : Detection Limit

This water may be objectionable because it is less than the guideline of 1000mg Na/L.
Serious effects including death become likely at 5000mg/L.We recommend keeping drinking water Na concentration less than 1000mg/L(chronic exposure criteria).This assumes normal feedstuff Na concentration and no other water sources;these concentrations should protect against acute lethality or chronically poor performance.Short term exposure(days-weeks) should not exceed 4000 mg Na/L
This water may be objectionable for some livestock because it exceeds the guideline of 5mg Boron/L.Excess boron in the diets of livestock may decrease feed consumption and cause weight loss
This water may be objectionable because it exceeds the guideline of 600mg Chloride/L

Signature

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Soil, Water & Forage Analytical Laboratory

Oklahoma State University Division of Agricultural Sciences and Natural Resources
045 Agricultural Hall
Stillwater, OK 74078
Email: soiltesting@okstate.edu
Website: www.soiltesting.okstate.edu

WATER QUALITY REPORT

CARL E. WILLS (6EN-WR)
CARL E WILLS (6EN-WR)
US EPA REGION 6
1445 ROSS AVE SUITE 1200
DALLAS, TX 75202
(214) 665-7276

Name : 2-Jireh (@ Well 18W)

Location : Bird Creek (SW 1-T27N-R7E)
Osage County, OK

Lab ID No.: : 820714
Customer Code : 1361
Sample No. : 4
Received : 10/6/2016
Report Date : 10/10/2016

Test Results for Household Water

Analysis	Sample Results	EPA Drinking Water Limits
Boron (ppm)	8.54	< 2.4
Calcium (ppm)	9627.19	No Guidelines
Chloride (ppm)	99594	< 250 ppm (#)
Copper (ppm)	0.10	< 1.0 ppm (#)
Iron (ppm)	10.41	< 0.3 ppm (#)
Magnesium (ppm)	1770.4	No Guidelines
Manganese (ppm)	2.49	< 0.05 ppm (#)
NO3N (ppm)	< DL*	< 10 ppm
Potassium (ppm)	531	No Guidelines
Sodium (ppm)	49110.8	No Guidelines
Sulfate (ppm)	41.26	< 250 ppm (#)
Zinc (ppm)	0.85	< 5.0 ppm (#)
EC (µmhos/cm)	179600	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	31304.2	No Guidelines
Hardness Class	Very Hard	< 120
pH	6.3	6.5 - 8.5 (#)
Sodium Percentage (%)	77.3	No Guidelines
Total Dissolved Solids (TDS) (ppm)	160778.6	<500 ppm (#)

* DL : Detection Limit

(#) Secondary standards are non-enforceable guidelines regulating contaminants that may cause cosmetic or aesthetic effects.
If any of the above analysis exceeds EPA standards, you should seek advise from the Oklahoma Department of Environmental Quality or local Health Department.
This water analysis does NOT include testing for bacteria, organic chemicals, and heavy metals. This lab is not certified by DEQ for drinking water analysis.

Signature

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WATER QUALITY REPORT

CARL E. WILLS (6EN-WR)
CARL E WILLS (6EN-WR)
US EPA REGION 6
1445 ROSS AVE SUITE 1200
DALLAS, TX 75202
(214) 665-7276

Name : **3-Grayhorse(@ Tank Battery)**

Location : **Bird Creek (NW 18-T27N-R8E)**
Osage County, OK

Lab ID No.: : **820715**
Customer Code : **1361**
Sample No. : **5**
Received : **10/6/2016**
Report Date : **10/10/2016**

Test Results for Irrigation Water

---------- Cations ----------		---------- Anions ----------		---------- Other ----------	
Sodium (ppm)	45675	Nitrate-N (ppm)	<1	pH	6.5
Calcium (ppm)	8236	Chloride (ppm)	90403	EC (µmhos/cm)	170900
Magnesium (ppm)	1737	Sulfate (ppm)	10		
Potassium (ppm)	463	Boron (ppm)	8.11		
		Bicarbonate (ppm)	64		

---------- Derived Values ----------		-------- Derived Values(cont'd) ----------	
Total Dissolved Salts (TDS in ppm)	146587.9	Sodium Percentage	78.2 %
Sodium Adsorption Ratio (SAR)	119.4	Hardness (ppm)	27696
Potassium Adsorption Ratio (PAR)	0.7	Hardness Class	Very Hard
		Alkalinity (ppm as CaCO3)	52.0

INTERPRETATION AND REQUIREMENTS FOR *Irrigation Water*

Water of this quality is not recommended for crop irrigation due to its high total dissolved salts and/or sodium level.

This water is not recommended for irrigation use because of its high boron content.

Signature

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WATER QUALITY REPORT

CARL E. WILLS (6EN-WR)
CARL E WILLS (6EN-WR)
US EPA REGION 6
1445 ROSS AVE SUITE 1200
DALLAS, TX 75202
(214) 665-7276

Name : 3-Grayhorse(@ Tank Battery)

Location : Bird Creek (NW 18-T27N-R8E)
Osage County, OK

Lab ID No.: : 820715
Customer Code : 1361
Sample No. : 5
Received : 10/6/2016
Report Date : 10/10/2016

Test Results for Livestock Water

Analysis	Sample Results	Livestock Water Limits
Boron (ppm)	8.11	< 5 ppm
Calcium (ppm)	8236.48	No Guidelines
Chloride (ppm)	90403	< 600 ppm
Copper (ppm)	0.10	< 0.5 ppm
Iron (ppm)	2.96	No Guidelines
Magnesium (ppm)	1736.78	No Guidelines
Manganese (ppm)	2.40	No Guidelines
Nitrate-N (ppm)	< DL*	< 100 ppm
Potassium (ppm)	463	No Guidelines
Sodium (ppm)	45675	< 1000 ppm
Sulfate (ppm)	10.15	<1000 ppm
Zinc (ppm)	11.34	< 25 ppm
EC (µmhos/cm)	170900	No Guidelines
ICAP_P ppm	---	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	27696	No Guidelines
Hardness Class	Very Hard	No Guidelines
pH	6.5	5.5-9.0
Total Dissolved Salts(TDS) (ppm)	146587.9	<3000 ppm

* DL : Detection Limit

This water may be objectionable because it is less than the guideline of 1000mg Na/L.
Serious effects including death become likely at 5000mg/L.We recommend keeping drinking water Na concentration less than 1000mg/L(chronic exposure criteria).This assumes normal feedstuff Na concentration and no other water sources;these concentrations should protect against acute lethality or chronically poor performance.Short term exposure(days-weeks) should not exceed 4000 mg Na/L
This water may be objectionable for some livestock because it exceeds the guideline of 5mg Boron/L.Excess boron in the diets of livestock may decrease feed consumption and cause weight loss
This water may be objectionable because it exceeds the guideline of 600mg Chloride/L

Signature

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WATER QUALITY REPORT

CARL E. WILLS (6EN-WR)
CARL E WILLS (6EN-WR)
US EPA REGION 6
1445 ROSS AVE SUITE 1200
DALLAS, TX 75202
(214) 665-7276

Name : 3-Grayhorse(@ Tank Battery)

Location : Bird Creek (NW 18-T27N-R8E)
Osage County, OK

Lab ID No.: : 820715
Customer Code : 1361
Sample No. : 5
Received : 10/6/2016
Report Date : 10/10/2016

Test Results for Household Water

Analysis	Sample Results	EPA Drinking Water Limits
Boron (ppm)	8.11	< 2.4
Calcium (ppm)	8236.48	No Guidelines
Chloride (ppm)	90403	< 250 ppm (#)
Copper (ppm)	0.10	< 1.0 ppm (#)
Iron (ppm)	2.96	< 0.3 ppm (#)
Magnesium (ppm)	1736.78	No Guidelines
Manganese (ppm)	2.40	< 0.05 ppm (#)
NO3N (ppm)	< DL*	< 10 ppm
Potassium (ppm)	463	No Guidelines
Sodium (ppm)	45675	No Guidelines
Sulfate (ppm)	10.15	< 250 ppm (#)
Zinc (ppm)	11.34	< 5.0 ppm (#)
EC (µmhos/cm)	170900	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	27696	No Guidelines
Hardness Class	Very Hard	< 120
pH	6.5	6.5 - 8.5 (#)
Sodium Percentage (%)	78.2	No Guidelines
Total Dissolved Solids (TDS) (ppm)	146587.9	<500 ppm (#)

* DL : Detection Limit

(#) Secondary standards are non-enforceable guidelines regulating contaminants that may cause cosmetic or aesthetic effects.
If any of the above analysis exceeds EPA standards, you should seek advise from the Oklahoma Department of Environmental Quality or local Health Department.
This water analysis does NOT include testing for bacteria, organic chemicals, and heavy metals. This lab is not certified by DEQ for drinking water analysis.

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11-9-16

@ Bird Creek profile of ~~Salinity~~ TEMP / SALINITY

NOW

@ 36.817523, -96.495463

TSS = 4200 Temp 14°C

evenly Mixed. (fish)

→ (3200 LAST TIME ON 10-27-15, TEMP 19°C)

Crossing 47 mile S. of house

5200 18.5°C → 36.8252, -96.4996

(LAST TIME 9300 PPM - 29°C)

- deep pool = 50K, Bottom 24.5°C

Top 3' feet 48K, 31°C

36.8278, -96.5013 - SAME AS LAST TIME

- Creek from WEST 300 PPM

@ 19°C (LIUC MOSS)

36.8249, -96.5002

- bridge (1st hole)

54K-65K 38.8°C

- bridge (2nd hole)

50,100 - 35.1°C Bottom

3K - 5.5K 16° - 20°

36.8338
-96.4985

1ST CORNER

3500, 18°C Surface

36.8320, -96.4985

2nd CORNER

8K, 24°C → 36.8321, -96.4995

1600 20°C - Surface

Eckhart, Jeanne

From: Sanborn, Kent
Sent: Wednesday, November 09, 2016 2:14 PM
To: Lane, Willie; Lister, Chris; Wills, Carl; Moore, Jessica; Eckhart, Jeanne
Cc: Saunders, Jerry
Subject: FW: [WARNING: DKIM validation failed]
Attachments: 20161109_135859.jpg

Follow Up Flag: Follow up
Flag Status: Completed

Profile of Bird Creek today.

From: kentwsanborn@aol.com [mailto:kentwsanborn@aol.com]
Sent: Wednesday, November 09, 2016 2:03 PM
To: Sanborn, Kent
Subject: [WARNING: DKIM validation failed]

Sent from my LG G2, an AT&T 4G LTE smartphone

Eckhart, Jeanne

From: Sanborn, Kent
Sent: Friday, August 19, 2016 3:38 PM
To: Eckhart, Jeanne
Subject: FW: Bird Creek spill

Follow Up Flag: Follow up
Flag Status: Flagged

From: Sanborn, Kent
Sent: Friday, August 19, 2016 10:08 AM
To: Willie Lane
Subject: Bird Creek spill

After I talked to you yesterday I walked the creek south quite a distance. Oddly there was no fish either dead or alive. I saw two dead turtles. I got readings as high as 60k. There is a ton of water in deep holes waiting to flush south with the rain. I did notice a side branch entering the creek from the west was full of fish but of course was unaffected being upstream. There were no dead crayfish (or live ones) and no tracks from animals you normally see in a recent brine kill. Not sure if it is as recent as we first believed.

I did call ODEQ and talked with their inspector. They said they defer back to the BIA when oilfield sources are suspected. He did say that the creek should be monitored as the brine travels south toward the Pawhuska water plant. I will do so on Monday. The map shows this branch of the creek does not enter the lake but joins the main branch closer to Pawhuska. I will check on MIT status of UIC wells on Monday.

Eckhart, Jeanne

From: Eckhart, Jeanne
Sent: Tuesday, September 06, 2016 3:08 PM
To: Sanborn, Kent
Subject: Fw: FYI - Referral of Injection Wells in Osage from Brine Team
Attachments: InspRptSDWAGrayhorseEnergyLLCOsageBLease20160818.pdf; InspRptSDWAJirehResourcesLLCMcComb18WSWD20160822.pdf

FYI - I referred these two injection well reports you did inspections (near Bird Creek) to Jessica, in UIC. There's been a big amount of discussion related to injection wells in Osage county after the earthquake this weekend, so I wanted to make sure she had this information ASAP in case she may need it.

From: Eckhart, Jeanne
Sent: Tuesday, September 6, 2016 2:58 PM
To: Moore, Jessica
Cc: Lane, Willie
Subject: FYI - Referral of Injection Wells in Osage from Brine Team

Jessica,

As discussed earlier today, I wanted to make sure you had the draft versions of the two facilities Kent inspected near the Bird Creek spill he has been investigating recently north of Pawhuska in Osage County.

There's two facilities being referred, please see attached.

Let me know if you need the final copies later on.

Thanks,

Jeanne

Eckhart, Jeanne

From: Sanborn, Kent
Sent: Friday, August 19, 2016 3:53 PM
To: Eckhart, Jeanne
Subject: FW: Saltwater in Foraker

Follow Up Flag: Follow up
Flag Status: Flagged

They want to be advised of any possible encroachment of the spill. Dilution should occur assuming there is not a continuing source

---

From: Bersche, Mark D. [mailto:Mark.Bersche@deq.ok.gov]
Sent: Friday, August 19, 2016 1:34 PM
To: Sanborn, Kent
Subject: Saltwater in Foraker

Hello Ken,
I was talking to the water folks in Pawhuska and they wanted to know an estimate of how much volume and of what concentration was coming their way. From the lat and long, it is not going to pass through Bluestem and eventually will pass their water intake.
If a slug does come down behind their low water dam, they do have the ability to empty it and let water out of Bluestem to re-fill their basin, but they weren't sure if the spill was substantial enough to start laying the groundwork in case they need to pull that trigger.

Thanks,
Mark

Eckhart, Jeanne

From: Sanborn, Kent
Sent: Tuesday, November 15, 2016 10:22 AM
To: Lane, Willie; Wills, Carl; Lister, Chris; Eckhart, Jeanne
Subject: FW: [WARNING: DKIM validation failed]
Attachments: IMG_1046.jpg

This is a measurement taken by BIA downstream behind a house SE of the bridge today.
36.7943, -96.4516. 1200ppm. Willie: this is where you and Jessica followed all of us down to a creek…about 5 creek miles SE of the bridge. The previous reading was 1,000 ppm.

From: kentwsanborn@aol.com [mailto:kentwsanborn@aol.com]
Sent: Tuesday, November 15, 2016 10:15 AM
To: Sanborn, Kent
Subject: [WARNING: DKIM validation failed]

Sent from my LG G2, an AT&T 4G LTE smartphone

10-18-16

(9) Bird Creek (S. of Grayhorse ap)

- @ 36.81668, -96.495657
  TSS = 2400 ppm 21°C

- @ 36.8247, -96.4994
  10K → 12.5K
  Temp = 21.5°C → 26.5° MAX
  flowing

- @ bridge 36.8321, -96.4979
  highest TSS = 65K (29°C)
  2nd hole 56K → 33°C
  first corner = 18K - 26°C
  Smell Brine - No oil.

Most surface < 1' = 2-3K
Minnows (New) Top 6" only.
- creek coming from North = 400 pp
- 76°F Tuelay.

Eckhart, Jeanne

From: kentwsanborn@aol.com
Sent: Tuesday, October 18, 2016 2:14 PM
To: Eckhart, Jeanne
Subject: Fw:
Attachments: 20161018_140151.jpg

Follow Up Flag: Follow up
Flag Status: Flagged

Sent from my LG G2, an AT&T 4G LTE smartphone

------ Original message------
From: kentwsanborn@aol.com
Date: Tue, Oct 18, 2016 2:05 PM
To: wills.carl@epa.gov;
Subject:

Sent from my LG G2, an AT&T 4G LTE smartphone

Warren American Oil Company
Fluid Levels
Chapman Lease

WELL NAME & No.	Date	Approx Ft to Fluid From Surface
Chapman A-1	9-6-16	2048’
Chapman A-2	9-6-16	18’ Appears to be BS
Chapman A-3	9-6-16	509’
Chapman B-2	9-6-16	960’
Chapman B-3	9-6-16	464’
Chapman B-6	9-6-16	651’
Chapman B-9	9-6-16	1056’
Chapman B-9	10-20-16	1056’
Chapman C-1 (also called CW-4)	9-6-16	976’
Chapman C-1	10-20-16	896’
Chapman D-5	9-6-16	1664’
Chapman E-1	9-6-16	544’
Chapman E-2	9-6-16	1638’
Chapman E-3	9-6-16	60’ Swabbed 45 Bbls Oil from casing
Chapman E-3	9-28-16	672’
Chapman E-3	10-19-16	672’

Eckhart, Jeanne

From: Sanborn, Kent
Sent: Thursday, October 27, 2016 10:04 AM
To: Eckhart, Jeanne; Wills, Carl; Lister, Chris; Moore, Jessica; Lane, Willie
Subject: FW: Fluid Levels
Attachments: Fluid Levels to EPA Oct 2016.docx

Follow Up Flag: Follow up
Flag Status: Completed

-----Original Message-----
From: John D. Burroughs [mailto:jdburroughs@warrenamerican.com]
Sent: Thursday, October 27, 2016 10:01 AM
To: Sanborn, Kent <Sanborn.Kent@epa.gov>
Subject: Fluid Levels

Kent

Let me know if you received it this time. I didn't get a email saying the one I sent yesterday was "Undeliverable" so no telling where it went

John Burroughs
Vice-President Drilling/Operations
Warren American Oil Co.
6585 S. Yale, Suite 800
Tulsa, OK 74136
918-481-7925 OFFICE
918-344-6185 CELL
918-481-7922 FAX
E-Mail: jdburroughs@warrenamerican.com

Eckhart, Jeanne

From: Eckhart, Jeanne
Sent: Tuesday, October 25, 2016 11:46 AM
To: Jessica Moore (Moore.Jessica@epa.gov); Lister, Chris; Wills, Carl
Cc: Lane, Willie; Sanborn, Kent
Subject: FW: FYI - Jireh Production data - Part 1

All,

Picture that Kent sent yesterday that display Jireh production data.

SW-01-27-07

2016

GROSS BBls:

	Oil Sales	Gas
January:	1021.51	0
Febuary:	1002.6	0

SW-01-27-07 | 2016 | Go | Print

GROSS BBls:

	Oil Sales	Gas Sales
January:	1021.51	0
Febuary:	1002.6	0
March:	1168.39	0
April:	1035.43	0
May:	821.29	0
June:	841.23	0
July:	846.23	0
August:	781.68	0
Setpember:	0	0
October:	0	0
November:	0	0
December:	0	0
Totals:	**7518.36**	**0**

Sept. will
Be posted
in a few w

Google Earth Pro

File Edit View Tools Add Help

Search

Search

ex: 37 25' 19.1"N, 122 05' 06"W

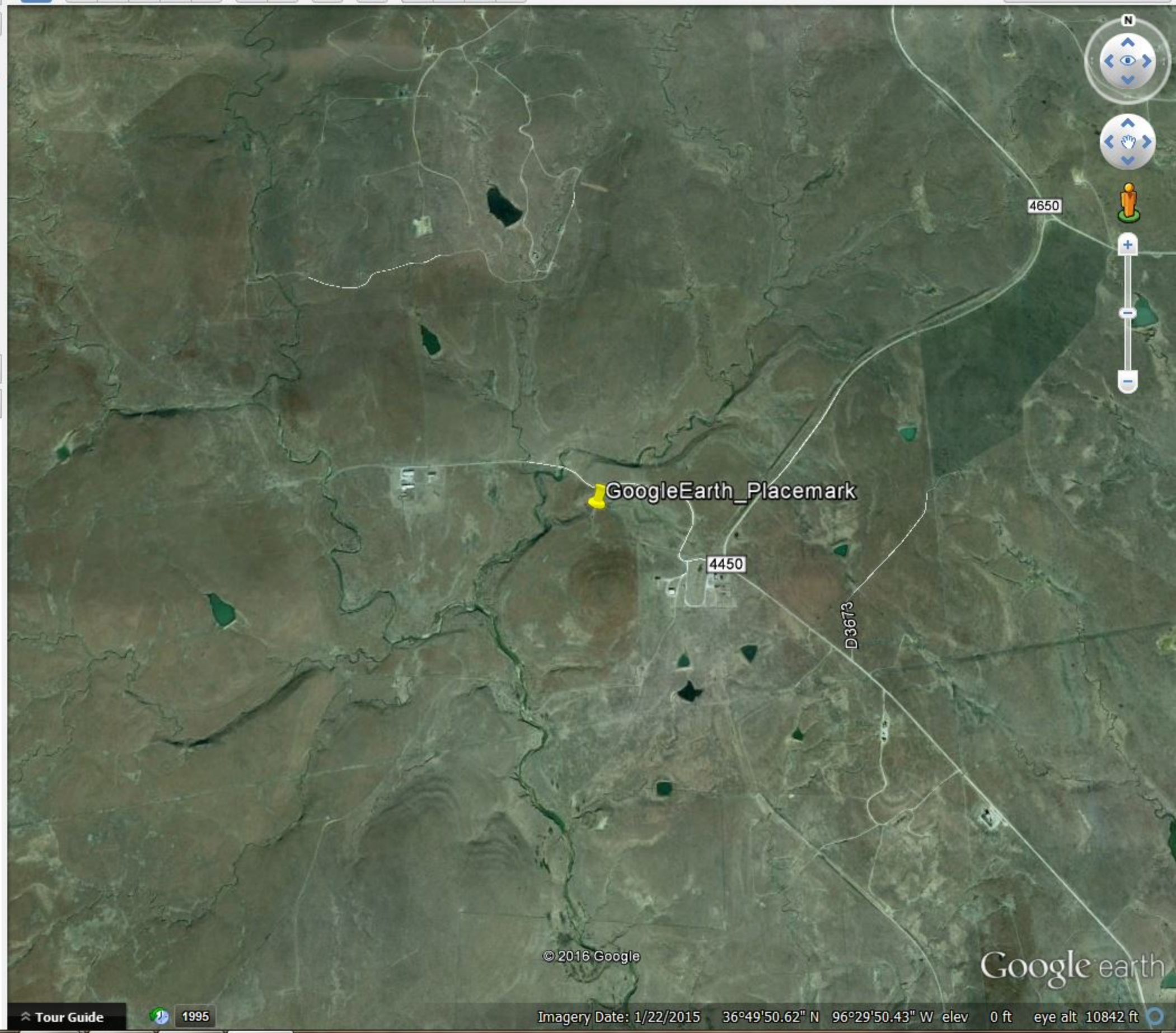
Get Directions History

Places

Layers Earth Gallery »

- Primary Database
  - Voyager
  - Borders and Labels
  - Places
  - Photos
  - Roads
  - 3D Buildings
  - Ocean
  - Weather
  - Gallery
  - Global Awareness
  - More
  - Terrain

Sign in



Tour Guide 1995 Imagery Date: 1/22/2015 36°49'50.62" N 96°29'50.43" W elev 0 ft eye alt 10842 ft

Eckhart, Jeanne

From: Sanborn, Kent
Sent: Tuesday, August 30, 2016 1:22 PM
To: Eckhart, Jeanne
Subject: FW: Google Earth Placemark
Attachments: GoogleEarth_Placemark.kmz

Follow Up Flag: Follow up
Flag Status: Flagged

Try to use this please

-----Original Message-----
From: Sanborn, Kent
Sent: Tuesday, August 30, 2016 1:16 PM
To: Willie Lane <Lane.Willie@epa.gov>
Subject: Google Earth Placemark

Expand the photo to see the reading of 1600 ppm SE of the main site.

Google Earth streams the world over wired and wireless networks enabling users to virtually go anywhere on the planet and see places in photographic detail. This is not like any map you have ever seen. This is a 3D model of the real world, based on real satellite images combined with maps, guides to restaurants, hotels, entertainment, businesses and more. You can zoom from space to street level instantly and then pan or jump from place to place, city to city, even country to country.

Get Google Earth. Put the world in perspective.

(http://earth.google.com)

Eckhart, Jeanne

From: Eckhart, Jeanne
Sent: Tuesday, October 25, 2016 11:47 AM
To: Lister, Chris; Jessica Moore (Moore.Jessica@epa.gov); Wills, Carl
Cc: Lane, Willie; Sanborn, Kent
Subject: FW: Jireh Production data - Part 2

All,

Second picture that Kent sent for Jireh Production data

SW-01-27-07

2015

Gross BBls:

	Oil Sales
January:	1206.99
Febuary:	1200.49
March:	1210.42
April:	1177.72

SW-01-27-07 | 2015 | Go | Print

Gross BBls:

	Oil Sales	Gas Sales
January:	1206.99	0
Febuary:	1200.49	0
March:	1210.42	0
April:	1177.72	0
May:	1214.65	0
June:	1151.59	0
July:	993.22	0
August:	1319.36	0
Setpember:	1182.5	0
October:	1300.84	0
November:	1174.52	0
December:	1030.86	0
Totals:	**14163.16**	**0**

Eckhart, Jeanne

From: Eckhart, Jeanne
Sent: Monday, October 17, 2016 3:55 PM
To: Sanborn, Kent
Subject: FW: Water Plots - Bird Creek, Osage County

FYI – see the first message

From: Wills, Carl
Sent: Monday, October 17, 2016 11:02 AM
To: Eckhart, Jeanne ; Moore, Jessica
Subject: RE: Water Plots - Bird Creek, Osage County

Jeanne,

I was planning on sending all of my stuff to Deanna.

Thanks,
Carl

From: Eckhart, Jeanne
Sent: Monday, October 17, 2016 9:54 AM
To: Wills, Carl <Wills.Carl@epa.gov>; Moore, Jessica <Moore.Jessica@epa.gov>
Subject: RE: Water Plots - Bird Creek, Osage County

Thanks Carl!

Also, we got a FOIA request for this for Bird Creek. If you have any further information that we may need to include in the FOIA related to what you guys did, please let me know.

Thanks,

Jeanne Eckhart
Environmental Scientist
Water Resources Section, Enforcement Division
Region 6, U.S. EPA
Office: (214) 665 – 8174
Fax: (214) 665 – 2168

From: Wills, Carl
Sent: Monday, October 17, 2016 9:51 AM
To: Eckhart, Jeanne <Eckhart.Jeanne@epa.gov>; Moore, Jessica <Moore.Jessica@epa.gov>
Subject: Water Plots - Bird Creek, Osage County

All,

Just wanted to make sure that you both had the analytical and the plots. If you have any questions, please don't hesitate to ask. I believe that Jessica might have some of this information, but I wasn't for sure.

You can tell that the upstream sample, 1A, is not impacted with brine. Samples 1B and 1C are the same as they should be for a sample and a blind replicate. The other samples, Jireh (2) and Grayhorse (3), are also what I would call as identical as you can get for the same produced zone, Mississippian Chat. When you compare 1B and 1C to 2 and 3 you can tell that 1B and 1C came from the same source as 2 and 3. (b) (5) [redacted] Let me know what you think?

Respectfully,

Carl E. Wills

U.S. Environmental Protection Agency
Compliance Assurance and Enforcement
Water Enforcement Branch (6EN-WR)
1445 Ross Avenue, Suite 1200
Dallas, TX 75202
214-665-7276
fax 214-665-2168
wills.carl@epa.gov
www.epa.gov

****

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Eckhart, Jeanne

From: Daniels, Benjamin <benjaminl.daniels@bia.gov>
Sent: Monday, August 22, 2016 7:30 AM
To: Shelby Hanchera; Michael Swift
Cc: Ruhl, Christopher; Sanborn, Kent; Beverly LaCrone; McKay, Tom; Eckhart, Jeanne; Arias, Jack
Subject: Fwd: Incident Report # 1156565, # 1156568

This spill impacted water.

Benjamin Daniels
Supervisory Environmental Protection Specialist
Chief, Branch of Enforcement and Lease Compliance
Bureau of Indian Affairs - Osage Agency
Office: (918) 287-5767
benjamin.daniels@bia.gov

BIA Osage Agency
Complaint and Spill Hotline
Phone (918) 287-3107
Toll Free 1(855) 495-0373

---------- Forwarded message ----------
From: **Spencer, Stephen** <stephen_spencer@ios.doi.gov>
Date: Thu, Aug 18, 2016 at 1:44 PM
Subject: Incident Report # 1156565, # 1156568
To: Mosby Halterman <mosby.halterman@bia.gov>, Richard Winlock <Richard.Winlock@bia.gov>, Benjamin Daniels <benjamin.daniels@bia.gov>, Lee Burnett <lee.burnett@bia.gov>, Mark Hendricks <mark.hendricks@bia.gov>, Suzanne Dunn <suzanne_dunn@fws.gov>, Todd Adornato <Todd_Adornato@fws.gov>, Jonathan Fisher <jonathan_fisher@fws.gov>, John Nelson <John_Nelson@ios.doi.gov>

```
                NATIONAL RESPONSE CENTER 1-800-424-8802
            ***GOVERNMENT USE ONLY***GOVERNMENT USE ONLY***
      Information released to a third party shall comply with any
 applicable federal and/or state Freedom of Information and Privacy Laws

                        Incident Report # 1156568

                           INCIDENT DESCRIPTION

 *Report taken by: YN2 RUDY GANTHER at 17:15 on 17-AUG-16
 Incident Type: UNKNOWN SHEEN
 Incident Cause: UNKNOWN
 Affected Area: SMALL CREEK
 Incident was discovered on 17-AUG-16 at 10:30 local incident time.
 Affected Medium: WATER   SMALL CREEK
```

REPORTING PARTY

Name: JOE NAVE
Organization: BIA
OSAGE, OK
Email Address: joe.nave@bia.gov

PRIMARY Phone: (918)6371035
Type of Organization: FEDERAL GOVERNMENT

SUSPECTED RESPONSIBLE PARTY

Name: UNKNOWN

XX

INCIDENT LOCATION

SEE LEGAL DESCRIPTION County: OSAGE
State: OK
Section: 12 Township: 27 Range: 7
UNKNOWN SHEEN INCIDENT

RELEASED MATERIAL(S)

CHRIS Code: DZB Official Material Name: DRILLING BRINE (WITH ZINC SALTS)
Also Known As:
Qty Released: 0 UNKNOWN AMOUNT Qty in Water: 0 UNKNOWN AMOUNT
CHRIS Code: OUN Official Material Name: UNKNOWN OIL
Also Known As:
Qty Released: 1 BARREL(S) Qty in Water: 1 BARREL(S)

DESCRIPTION OF INCIDENT

///THIS IS AN UPDATE TO REPORT 1156565///
CALLER REPORTED A SPILL OF AN ESTIMATED ON BARREL OF AN UNKNOWN OIL FROM AN UNKNOWN SOURCE TO A CREEK.
THE CALLER ALSO DETERMINED THAT THERE WAS A SPILL OF SALT WATER TO THE CREEK. THE SALT WATER HAS AFFECTED AT LEAST TWO MILES OF THE CREEK.

SENSITIVE INFORMATION

INCIDENT DETAILS

Platform Rig Name:
Platform Letter:
Location Area ID:
Location Block ID:
OCSG Number:

OCSP Number:
State Lease Number:
Pier Dock Number:
Berth Slip Number:
---SHEEN INFORMATION---
Sheen Color: DARK BLACK
Sheen Odor Description:
Sheen Travel Direction:
Sheen Size Length: 1 MILES
Sheen Size Width:
---WATER INFORMATION---
Body of Water: SMALL CREEK
Tributary of:
Nearest River Mile Marker:
Water Supply Contaminated: UNKNOWN

IMPACT

Fire Involved: NO Fire Extinguished: UNKNOWN

INJURIES: NO Hospitalized: Empl/Crew: Passenger:
FATALITIES: NO Empl/Crew: Passenger: Occupant:
EVACUATIONS:NO Who Evacuated: Radius/Area:

Damages: NO

Closure Type	Description of Closure	Hours Closed	Direction of Closure
Air:	N		
Road:	N		Major Artery:N
Waterway:	N		
Track:	N		

Environmental Impact: UNKNOWN
Media Interest: UNKNOWN Community Impact due to Material:

REMEDIAL ACTIONS

Release Secured: UNKNOWN
Release Rate:
Estimated Release Duration:

WEATHER

Weather: PARTLY CLOUDY, ºF

ADDITIONAL AGENCIES NOTIFIED

Federal: BIA
State/Local:
State/Local On Scene:
State Agency Number:

NOTIFICATIONS BY NRC

CENTERS FOR DISEASE CONTROL (GRASP)
17-AUG-16 17:27 (770)4887100
DHS NOC (NOC)
17-AUG-16 17:27 (202)2828114
COLORADO INFO ANALYSIS CENTER (FUSION CENTER)
17-AUG-16 17:27 (720)8526705
DOT CRISIS MANAGEMENT CENTER (MAIN OFFICE)
17-AUG-16 17:27 (202)3661863
U.S. EPA VI (MAIN OFFICE)
(866)3727745
KANSAS INTEL FUSION CENTER (US DHS I&A, SLPO)
17-AUG-16 17:27 (307)2861092
NATIONAL INFRASTRUCTURE COORD CTR (MAIN OFFICE)
17-AUG-16 17:27 (202)2829201
NOAA RPTS FOR OK (MAIN OFFICE)
17-AUG-16 17:27 (206)5264911
NATIONAL RESPONSE CENTER HQ (AUTOMATIC REPORTS)
17-AUG-16 17:27 (202)2671136
OFC OF ENV SVC CHEROKEE NATIONS OK (MAIN OFFICE)
17-AUG-16 17:27 (918)4585496
OKLAHOMA INFORMATION FUSION CENTER (FUSION COMMAND CENTER)
17-AUG-16 17:27 (405)8792608
REPORTING PARTY (RP SUBMITTER)
17-AUG-16 17:27
SECTOR LOWER MISSISSIPPI RIVER (AUTO NRC NOTIFICATIONS)
17-AUG-16 17:27 (225)2985400
DEQ OKLAHOMA (MAIN OFFICE)
17-AUG-16 17:27 (405)7026206
USCG DISTRICT 8 (MAIN OFFICE)
17-AUG-16 17:27 (504)5896225

ADDITIONAL INFORMATION

///THIS IS AN UPDATE TO REPORT 1156565///

*** END INCIDENT REPORT #1156568 ***
Report any problems by calling 1-800-424-8802
PLEASE VISIT OUR WEB SITE AT http://www.nrc.uscg.mil

NATIONAL RESPONSE CENTER 1-800-424-8802
GOVERNMENT USE ONLYGOVERNMENT USE ONLY***
Information released to a third party shall comply with any applicable federal and/or state Freedom of Information and Privacy Laws

Incident Report # 1156565

INCIDENT DESCRIPTION

*Report taken by: CIV BRENT TALIAFERRO at 16:57 on 17-AUG-16
Incident Type: UNKNOWN SHEEN
Incident Cause: UNKNOWN
Affected Area: SMALL CREEK
Incident was discovered on 17-AUG-16 at 10:30 local incident time.
Affected Medium: WATER SMALL CREEK

REPORTING PARTY

Name: JOE NAVE
Organization: BIA
OSAGE, OK

PRIMARY Phone: (918)6371035
Type of Organization: STATE GOVERNMENT

SUSPECTED RESPONSIBLE PARTY

Name: UNKNOWN

XX

INCIDENT LOCATION

LEGAL County: OSAGE
State: OK
Section: 12 Township: 27 Range: 7
UNKNOWN SHEEN INCIDENT

RELEASED MATERIAL(S)

CHRIS Code: OUN Official Material Name: UNKNOWN OIL
Also Known As:
Qty Released: 1 BARREL(S) Qty in Water: 1 BARREL(S)

DESCRIPTION OF INCIDENT

CALLER REPORTED AN UNKNOWN SHEEN FROM AN UNKNOWN SOURCE.

SENSITIVE INFORMATION

INCIDENT DETAILS

Platform Rig Name:
Platform Letter:
Location Area ID:
Location Block ID:
OCSG Number:
OCSP Number:
State Lease Number:

Pier Dock Number:
Berth Slip Number:
---WATER INFORMATION---
Body of Water: SMALL CREEK
Tributary of:
Nearest River Mile Marker:
Water Supply Contaminated: UNKNOWN

IMPACT

Fire Involved: NO Fire Extinguished: UNKNOWN

INJURIES: NO Hospitalized: Empl/Crew: Passenger:
FATALITIES: NO Empl/Crew: Passenger: Occupant:
EVACUATIONS:NO Who Evacuated: Radius/Area:

Damages: NO

Closure Type	Description of Closure	Hours Closed	Direction of Closure
Air:	N		
Road:	N		Major Artery:N
Waterway:	N		
Track:	N		

Environmental Impact: UNKNOWN
Media Interest: UNKNOWN Community Impact due to Material:

REMEDIAL ACTIONS

NONE
Release Secured: UNKNOWN
Release Rate:
Estimated Release Duration:

WEATHER

Weather: PARTLY CLOUDY, ºF

ADDITIONAL AGENCIES NOTIFIED

Federal:
State/Local:
State/Local On Scene:
State Agency Number:

NOTIFICATIONS BY NRC

CENTERS FOR DISEASE CONTROL (GRASP)
  17-AUG-16 17:01 (770)4887100
DHS NOC (NOC)
  17-AUG-16 17:01 (202)2828114
COLORADO INFO ANALYSIS CENTER (FUSION CENTER)
  17-AUG-16 17:01 (720)8526705
DOT CRISIS MANAGEMENT CENTER (MAIN OFFICE)
  17-AUG-16 17:01 (202)3661863
U.S. EPA VI (MAIN OFFICE)
  (866)3727745
KANSAS INTEL FUSION CENTER (US DHS I&A, SLPO)
  17-AUG-16 17:01 (307)2861092
NATIONAL INFRASTRUCTURE COORD CTR (MAIN OFFICE)
  17-AUG-16 17:01 (202)2829201

```
NOAA RPTS FOR OK (MAIN OFFICE)
   17-AUG-16 17:01 (206)5264911
NATIONAL RESPONSE CENTER HQ (AUTOMATIC REPORTS)
   17-AUG-16 17:01 (202)2671136
OFC OF ENV SVC CHEROKEE NATIONS OK (MAIN OFFICE)
   17-AUG-16 17:01 (918)4585496
OKLAHOMA INFORMATION FUSION CENTER (FUSION COMMAND CENTER)
   17-AUG-16 17:01 (405)8792608
SECTOR LOWER MISSISSIPPI RIVER (AUTO NRC NOTIFICATIONS)
   17-AUG-16 17:01 (225)2985400
DEQ OKLAHOMA (MAIN OFFICE)
   17-AUG-16 17:01 (405)7026206
USCG DISTRICT 8 (MAIN OFFICE)
   17-AUG-16 17:01 (504)5896225
_____________________________________________________________________
                        ADDITIONAL INFORMATION

_____________________________________________________________________
                *** END INCIDENT REPORT #1156565 ***
           Report any problems by calling 1-800-424-8802
        PLEASE VISIT OUR WEB SITE AT http://www.nrc.uscg.mil
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Stephen R. Spencer, PhD
Regional Environmental Officer
Office of Environmental Policy and Compliance
U.S. Department of the Interior
1001 Indian School Road NW, Suite 348
Albuquerque, NM 87104
Phone: (505) 563-3572 Fax: (505) 563-3066 Cell: (505) 249-2462
Stephen_Spencer@ios.doi.gov
Web Site: https://www.doi.gov/oepc/regional-offices/albuquerque

Eckhart, Jeanne

From: Eckhart, Jeanne
Sent: Tuesday, September 06, 2016 2:58 PM
To: Moore, Jessica
Cc: Lane, Willie
Subject: FYI - Referral of Injection Wells in Osage from Brine Team
Attachments: InspRptSDWAGrayhorseEnergyLLCOsageBLease20160818.pdf; InspRptSDWAJirehResourcesLLCMcComb18WSWD20160822.pdf

Jessica,

As discussed earlier today, I wanted to make sure you had the draft versions of the two facilities Kent inspected near the Bird Creek spill he has been investigating recently north of Pawhuska in Osage County.

There's two facilities being referred, please see attached.

Let me know if you need the final copies later on.

Thanks,

Jeanne

Eckhart, Jeanne

From: Sanborn, Kent
Sent: Friday, August 19, 2016 3:50 PM
To: Eckhart, Jeanne
Subject: Google Earth Image
Attachments: GoogleEarth_Image.jpg

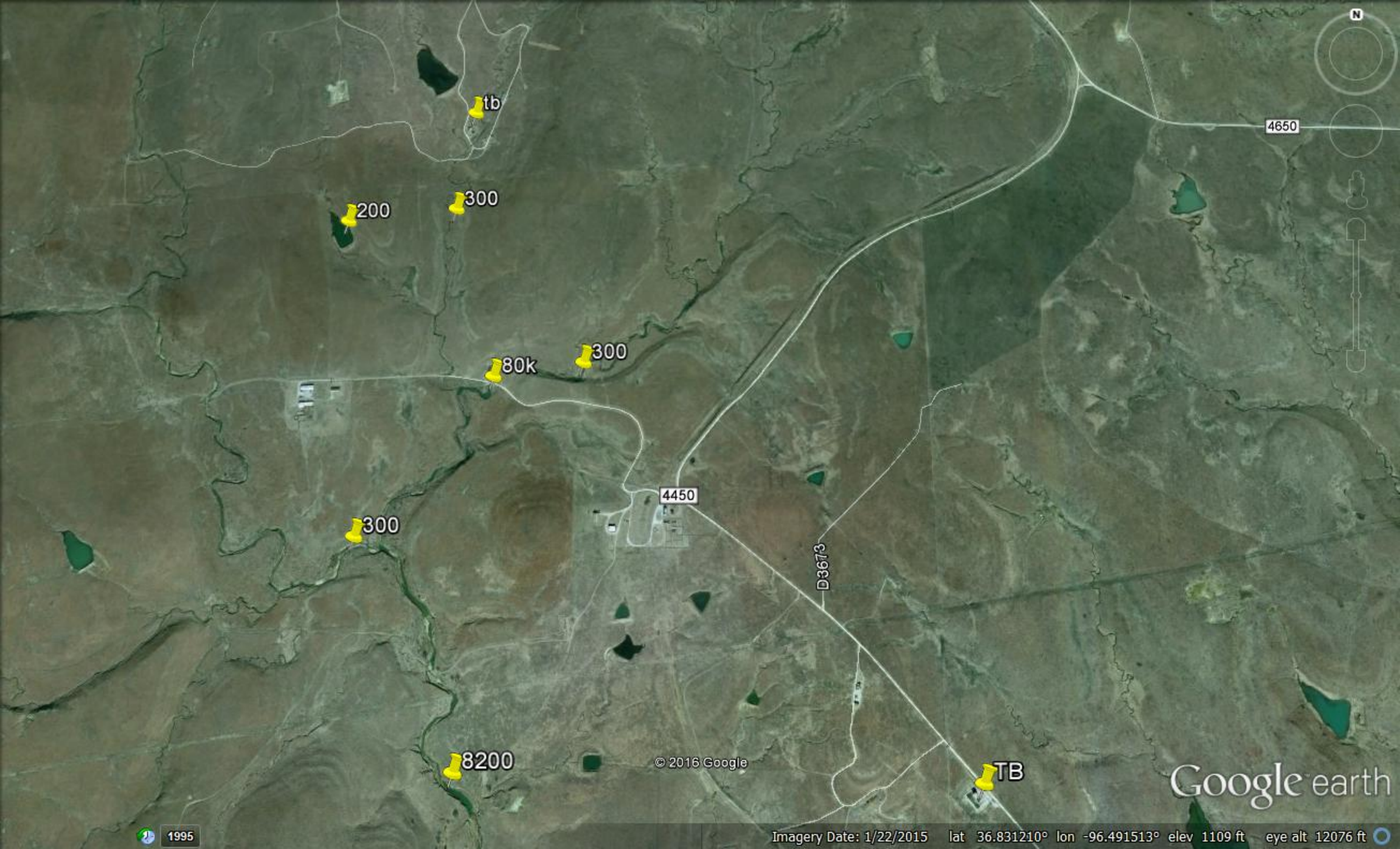
Follow Up Flag: Follow up
Flag Status: Flagged

Bird Creek spill

Google Earth streams the world over wired and wireless networks enabling users to virtually go anywhere on the planet and see places in photographic detail. This is not like any map you have ever seen. This is a 3D model of the real world, based on real satellite images combined with maps, guides to restaurants, hotels, entertainment, businesses and more. You can zoom from space to street level instantly and then pan or jump from place to place, city to city, even country to country.

Get Google Earth. Put the world in perspective.

(http://earth.google.com)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© 2016 Google
TB
4650
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Google earth
1995
Imagery Date: 1/22/2015 lat 36.831210° lon -96.491513° elev 1109 ft eye alt 12076 ft

Pro 30
1692 AS uS cond cm
2275 AS uS spc cm
1.2 AS sal ppt
1479 AS mg TDS L
529 °F
SAVE
DATA

Information Needed:

(b) (5) [redacted] (January 1, 2015, to present - W/2 Section 1-T27N-R7E and SE/4 Section 2-T27N-R7E)

Provide all production volumes (by quarter section and month) with an additional list (including location, elevation, production formation and total depth – what else do we want?) of all active wells.

If a production well is TA'ed provide a fluid level (not only current fluid levels, but if you have additional fluid level information during the requested timeframe referenced above, please provide it as well).

Additionally, for the TA'ed production wells provide location, elevation, production formation and total depth – what else do we want?

All injection volumes and pressures by month – don't we already have this except for the information after March 2016? Do we want to get the following too? Location, elevation, injection formation and total depth - what else do we want?

If an injection well is TA'ed provide a fluid level (not only current information, but if you have additional information during the requested timeframe referenced above, please provide it as well). Location, elevation, injection formation and total depth - what else do we want?

(b) (5) [redacted] (January 1, 2015, to present - E/2 Section 1-T27N-R7E, NE/4 Section 11-T27N-R7E, N/2 Section 12-T27N-R7E)

Provide all production volumes (by quarter section and month) with an additional list (including location, elevation, production formation and total depth – what else do we want?) of all active wells.

If a production well is TA'ed provide a fluid level (not only current fluid levels, but if you have additional fluid level information during the requested timeframe referenced above, please provide it as well).

Additionally, for the TA'ed production wells provide location, elevation, production formation and total depth – what else do we want?

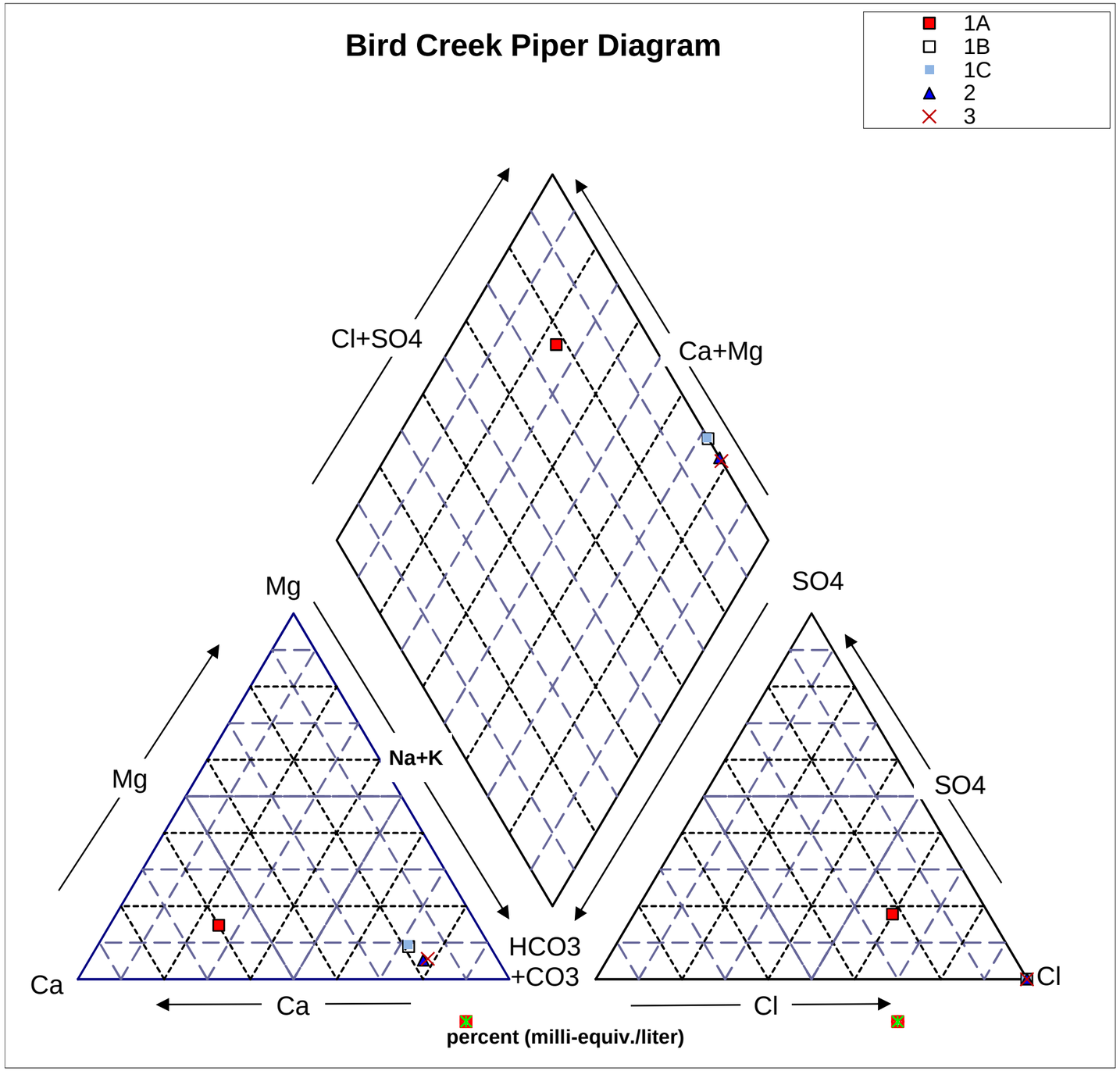
All injection volumes and pressures by month – don't we already have this except for the information after March 2016? Do we want to get the following too? Location, elevation, injection formation and total depth - what else do we want?

If an injection well is TA'ed provide a fluid level (not only current information, but if you have additional information during the requested timeframe referenced above, please provide it as well). Location, elevation, injection formation and total depth - what else do we want?

Eckhart, Jeanne

From: smtp@epa.gov
Sent: Monday, September 19, 2016 2:15 PM
To: Eckhart, Jeanne
Subject: Scanned Document
Attachments: [Untitled].pdf

Please open the attached document. This document was digitally sent to you using an HP Digital Sending device.


Bird Creek Piper Diagram
1A
1B
1C
2
3
Cl+SO4
Ca+Mg
Mg
SO4
Na+K
Mg
SO4
HCO3
+CO3
Ca
Cl
Ca
Cl
percent (milli-equiv./liter)

Eckhart, Jeanne

From: Sanborn, Kent
Sent: Wednesday, November 09, 2016 2:41 PM
To: Eckhart, Jeanne
Subject: RE: [WARNING: DKIM validation failed]

3 to 6 gal/min visible. ? subsurface

From: Eckhart, Jeanne
Sent: Wednesday, November 09, 2016 2:26 PM
To: Sanborn, Kent
Subject: RE: [WARNING: DKIM validation failed]

Could you guess/estimate flow rate?

From: Sanborn, Kent
Sent: Wednesday, November 09, 2016 2:25 PM
To: Eckhart, Jeanne <Eckhart.Jeanne@epa.gov>
Subject: RE: [WARNING: DKIM validation failed]

Looks the same. Middle portions of the creek are overall lower TSS but farther point increased. No water entering now at the bridge but creek is flowing when you get about 1/3 mile south. Almost 102 degrees. Temp today is 60. Surface flowing water is 15 degrees C.

From: Eckhart, Jeanne
Sent: Wednesday, November 09, 2016 2:21 PM
To: Sanborn, Kent <Sanborn.Kent@epa.gov>
Subject: RE: [WARNING: DKIM validation failed]

101 degrees F! Wow.

From: Sanborn, Kent
Sent: Wednesday, November 09, 2016 2:14 PM
To: Lane, Willie <Lane.Willie@epa.gov>; Lister, Chris <Lister.Chris@epa.gov>; Wills, Carl <Wills.Carl@epa.gov>; Moore, Jessica <Moore.Jessica@epa.gov>; Eckhart, Jeanne <Eckhart.Jeanne@epa.gov>
Cc: Saunders, Jerry <Saunders.Jerry@epa.gov>
Subject: FW: [WARNING: DKIM validation failed]

Profile of Bird Creek today.

From: kentwsanborn@aol.com [mailto:kentwsanborn@aol.com]
Sent: Wednesday, November 09, 2016 2:03 PM
To: Sanborn, Kent <Sanborn.Kent@epa.gov>
Subject: [WARNING: DKIM validation failed]

Sent from my LG G2, an AT&T 4G LTE smartphone

Eckhart, Jeanne

From: Eckhart, Jeanne
Sent: Monday, October 17, 2016 10:55 AM
To: Sanborn, Kent
Subject: RE: FOIA# 10280

Ok, I don't think we need those, but I will confirm tomorrow.

From: Sanborn, Kent
Sent: Monday, October 17, 2016 10:54 AM
To: Eckhart, Jeanne
Subject: RE: FOIA# 10280

Only field notes that I took last week on a brief creek survey. They have not reached the "report" level yet and wont until the end of the month.

From: Eckhart, Jeanne
Sent: Monday, October 17, 2016 10:04 AM
To: Sanborn, Kent <Sanborn.Kent@epa.gov>
Subject: RE: FOIA# 10280

Kent,

Did you have anything else for bird creek, besides the inspection reports you have done out there (which I have a copy of)?

I'm getting information from Carl and Jessica is pulling UIC stuff.

Thanks,

Jeanne Eckhart
Environmental Scientist
Water Resources Section, Enforcement Division
Region 6, U.S. EPA
Office: (214) 665 – 8174
Fax: (214) 665 – 2168

From: Sanborn, Kent
Sent: Monday, October 17, 2016 9:09 AM
To: Eckhart, Jeanne <Eckhart.Jeanne@epa.gov>
Subject: RE: FOIA# 10280

Yes he wants pretty much all data on any oil and gas operation on the ranch. That means every well, pipeline, spill, SPCC plans, you name it.

From: Eckhart, Jeanne
Sent: Monday, October 17, 2016 9:07 AM
To: Sanborn, Kent <Sanborn.Kent@epa.gov>
Cc: Moore, Jessica <Moore.Jessica@epa.gov>
Subject: RE: FOIA# 10280

Ok, so this is related to the bird creek spill?

Jessica has also been informed about the FOIA request.

From: Sanborn, Kent
Sent: Monday, October 17, 2016 9:04 AM
To: Eckhart, Jeanne <Eckhart.Jeanne@epa.gov>
Subject: RE: FOIA# 10280

You'd better talk to Bill in Water about this. This could amount to a huge amount of data (and cost to the requester) and time for all involved. The request is very vague. Prompted by the brine in Bird Creek.

From: Eckhart, Jeanne
Sent: Monday, October 17, 2016 8:08 AM
To: Sanborn, Kent <Sanborn.Kent@epa.gov>
Subject: FW: FOIA# 10280

Kent,

Do you have anything related to the attached FOIA request? I believe that this is related to the (b) (5) [redacted] Chapman Lease.

Thanks,

Jeanne Eckhart
Environmental Scientist
Water Resources Section, Enforcement Division
Region 6, U.S. EPA
Office: (214) 665 – 8174
Fax: (214) 665 – 2168

From: Lane, Willie
Sent: Friday, October 14, 2016 7:49 AM
To: Eckhart, Jeanne <Eckhart.Jeanne@epa.gov>
Subject: FW: FOIA# 10280

From: Bradford, Deanna
Sent: Thursday, October 13, 2016 3:34 PM
To: Arias, Jack <Arias.Jack@epa.gov>; Rudolph, Matthew <rudolph.matthew@epa.gov>; Selgrath, Dale

Eckhart, Jeanne

From: Eckhart, Jeanne
Sent: Monday, October 17, 2016 11:04 AM
To: Wills, Carl
Subject: RE: Water Plots - Bird Creek, Osage County

Ok, sounds like a plan. Can you cc me and Willie on it, so I can make sure we don't double send any information? (I highly doubt that will occur, but just want to verify).

Thank you,

Jeanne Eckhart
Environmental Scientist
Water Resources Section, Enforcement Division
Region 6, U.S. EPA
Office: (214) 665 – 8174
Fax: (214) 665 – 2168

From: Wills, Carl
Sent: Monday, October 17, 2016 11:02 AM
To: Eckhart, Jeanne ; Moore, Jessica
Subject: RE: Water Plots - Bird Creek, Osage County

Jeanne,

I was planning on sending all of my stuff to Deanna.

Thanks,
Carl

From: Eckhart, Jeanne
Sent: Monday, October 17, 2016 9:54 AM
To: Wills, Carl <Wills.Carl@epa.gov>; Moore, Jessica <Moore.Jessica@epa.gov>
Subject: RE: Water Plots - Bird Creek, Osage County

Thanks Carl!

Also, we got a FOIA request for this for Bird Creek. If you have any further information that we may need to include in the FOIA related to what you guys did, please let me know.

Thanks,

Jeanne Eckhart
Environmental Scientist
Water Resources Section, Enforcement Division
Region 6, U.S. EPA

Office: (214) 665 – 8174
Fax: (214) 665 – 2168

From: Wills, Carl
Sent: Monday, October 17, 2016 9:51 AM
To: Eckhart, Jeanne <Eckhart.Jeanne@epa.gov>; Moore, Jessica <Moore.Jessica@epa.gov>
Subject: Water Plots - Bird Creek, Osage County

All,

Just wanted to make sure that you both had the analytical and the plots. If you have any questions, please don't hesitate to ask. I believe that Jessica might have some of this information, but I wasn't for sure.

You can tell that the upstream sample, 1A, is not impacted with brine. Samples 1B and 1C are the same as they should be for a sample and a blind replicate. The other samples, Jireh (2) and Grayhorse (3), are also what I would call as identical as you can get for the same produced zone, Mississippian Chat. When you compare 1B and 1C to 2 and 3 you can tell that 1B and 1C came from the same source as 2 and 3. (b) (5) [redacted] Let me know what you think?

Respectfully,

Carl E. Wills

U.S. Environmental Protection Agency
Compliance Assurance and Enforcement
Water Enforcement Branch (6EN-WR)
1445 Ross Avenue, Suite 1200
Dallas, TX 75202
214-665-7276
fax 214-665-2168
wills.carl@epa.gov
www.epa.gov

****

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Eckhart, Jeanne

From: Eckhart, Jeanne
Sent: Wednesday, October 19, 2016 3:14 PM
To: Sanborn, Kent
Subject: RE: Bird Creek Conference Call

yes

-----Original Appointment-----
From: Sanborn, Kent
Sent: Wednesday, October 19, 2016 3:06 PM
To: Eckhart, Jeanne
Subject: Accepted: Bird Creek Conference Call
When: Thursday, October 20, 2016 9:30 AM-10:30 AM (UTC-06:00) Central Time (US & Canada).
Where: R6-ConfRm-Trout-13J02/R6---13th-Floor

Is the meeting still on?

Eckhart, Jeanne

From: Sanborn, Kent
Sent: Monday, October 31, 2016 12:49 PM
To: Eckhart, Jeanne
Subject: RE: Bird Creek Inspection on 10-27-2016

It's so hot (100 degrees) at the bridge that draining that pool would point to something

---

From: Sanborn, Kent
Sent: Monday, October 31, 2016 12:47 PM
To: Eckhart, Jeanne
Cc: Moore, Jessica ; Wills, Carl ; Lister, Chris
Subject: RE: Bird Creek Inspection on 10-27-2016

Jessica was supposed to send out a request for detailed info on the (b) (5) well. That won't stop the brine however. No RP means no money to find the source. I think we should relay that to landowner. Seems unlikely that brine came from (b) (5) or (b) (5). Outside chance there is a plastic pipe buried along the road that a metal detector can't locate too. Maybe we or Willie or Jerry can discuss with BIA to see if emergency money on their end could be used.

From: Eckhart, Jeanne
Sent: Monday, October 31, 2016 12:23 PM
To: Sanborn, Kent <Sanborn.Kent@epa.gov>; Wills, Carl <Wills.Carl@epa.gov>; Lister, Chris <Lister.Chris@epa.gov>; Moore, Jessica <Moore.Jessica@epa.gov>; Lane, Willie <Lane.Willie@epa.gov>
Subject: RE: Bird Creek Inspection on 10-27-2016

Are there any other options we can come up with on how to identify the source of the brine in the creek?

How are the information requests coming along? Do we have all the information we wanted to gather?

From: Sanborn, Kent
Sent: Monday, October 31, 2016 11:51 AM
To: Eckhart, Jeanne <Eckhart.Jeanne@epa.gov>; Wills, Carl <Wills.Carl@epa.gov>; Lister, Chris <Lister.Chris@epa.gov>; Moore, Jessica <Moore.Jessica@epa.gov>; Lane, Willie <Lane.Willie@epa.gov>
Subject: Bird Creek Inspection on 10-27-2016

Creek was down to a trickle. Checked at the bridge and found TSS at 70k ppm. Temp on the bottom nearest the bridge was 38 degrees C. (100 degrees F). That is the highest I have seen. At the first bend going south the TSS was 12k ppm and temp was 28 degrees C. Top 6 inch section of water from the bridge to the first bend has a TSS of 1200 ppm and temp of 19 degrees C. Still found that hole at 36.8246, -96.4996 to be nearly 50k ppm. That is where that fresh creek comes in from the west. When you get to the farthest point that I have routinely measured at 36.8164, -96.4943 the water is mixed from top to bottom and is the same across the entire creek. Those values ranged from 8200 when first discovered to 2400 after the big rains to 3200 ppm on the 27th. I did see fish but not on the bottom. Overall I think the total amount of brine has been reduced especially downstream but the increasing temps are a real concern. I wish we could pump out those first few holes to see what was coming in. Also staked the mystery well that is listed on several maps but haves no records. Scraping the ground there could answer the question of whether there is a well there.

I'm open to suggestions:

Oh, There are 2 water wells out there. The west house well is 300’ deep and had a TSS of 800 ppm. Brody said there test should a lot less but he didn’t have it with him.
The east house well is 430’ deep and had a TSS of 500 ppm.

I advised him to gather samples and have them retested at OSU

Eckhart, Jeanne

From: Wills, Carl
Sent: Monday, October 31, 2016 1:31 PM
To: Sanborn, Kent; Eckhart, Jeanne
Cc: Moore, Jessica; Lister, Chris
Subject: RE: Bird Creek Inspection on 10-27-2016

Kent,

I agree that the bottom creek temperature of 38 degrees C on the south side of the road crossing is a major concern. Do we know what the current fluid level is in (b) (5) NW/4 of Section 12? I might be helpful to find the construction information on that well too. Thanks so much Kent for staying on top of this situation.

Carl

From: Sanborn, Kent
Sent: Monday, October 31, 2016 12:48 PM
To: Eckhart, Jeanne
Cc: Moore, Jessica ; Wills, Carl ; Lister, Chris
Subject: RE: Bird Creek Inspection on 10-27-2016

Jessica was supposed to send out a request for detailed info on the (b) (5) well. That won't stop the brine however. No RP means no money to find the source. I think we should relay that to landowner. Seems unlikely that brine came from (b) (5) or (b) (5). Outside chance there is a plastic pipe buried along the road that a metal detector can't locate too. Maybe we or Willie or Jerry can discuss with BIA to see if emergency money on their end could be used.

From: Eckhart, Jeanne
Sent: Monday, October 31, 2016 12:23 PM
To: Sanborn, Kent <Sanborn.Kent@epa.gov>; Wills, Carl <Wills.Carl@epa.gov>; Lister, Chris <Lister.Chris@epa.gov>; Moore, Jessica <Moore.Jessica@epa.gov>; Lane, Willie <Lane.Willie@epa.gov>
Subject: RE: Bird Creek Inspection on 10-27-2016

Are there any other options we can come up with on how to identify the source of the brine in the creek?

How are the information requests coming along? Do we have all the information we wanted to gather?

From: Sanborn, Kent
Sent: Monday, October 31, 2016 11:51 AM
To: Eckhart, Jeanne <Eckhart.Jeanne@epa.gov>; Wills, Carl <Wills.Carl@epa.gov>; Lister, Chris <Lister.Chris@epa.gov>; Moore, Jessica <Moore.Jessica@epa.gov>; Lane, Willie <Lane.Willie@epa.gov>
Subject: Bird Creek Inspection on 10-27-2016

Creek was down to a trickle. Checked at the bridge and found TSS at 70k ppm. Temp on the bottom nearest the bridge was 38 degrees C. (100 degrees F). That is the highest I have seen. At the first bend going south the TSS was 12k ppm and temp was 28 degrees C. Top 6 inch section of water from the bridge to the first bend has a TSS of 1200 ppm and temp of 19 degrees C. Still found that hole at 36.8246, -96.4996 to be nearly 50k ppm. That is where that fresh creek comes in from the west. When you get to the farthest point that I have routinely measured at 36.8164, -96.4943 the

water is mixed from top to bottom and is the same across the entire creek. Those values ranged from 8200 when first discovered to 2400 after the big rains to 3200 ppm on the 27th. I did see fish but not on the bottom. Overall I think the total amount of brine has been reduced especially downstream but the increasing temps are a real concern. I wish we could pump out those first few holes to see what was coming in. Also staked the mystery well that is listed on several maps but haves no records. Scraping the ground there could answer the question of whether there is a well there.

I'm open to suggestions:

Oh, There are 2 water wells out there. The west house well is 300' deep and had a TSS of 800 ppm. Brody said there test should a lot less but he didn't have it with him.
The east house well is 430' deep and had a TSS of 500 ppm.

I advised him to gather samples and have them retested at OSU

Eckhart, Jeanne

From: Eckhart, Jeanne
Sent: Thursday, October 27, 2016 10:45 AM
To: Sanborn, Kent; Wills, Carl; Lister, Chris; Moore, Jessica; Lane, Willie
Subject: RE: Bird Creek

When's the meeting?

The direction we are going, as I understand it, is that we are still investigating where the source of the produced water came from and it's under review.

From: Sanborn, Kent
Sent: Thursday, October 27, 2016 10:08 AM
To: Eckhart, Jeanne ; Wills, Carl ; Lister, Chris ; Moore, Jessica ; Lane, Willie
Subject: Bird Creek

Meeting Brody Wallace again today at the site to update creek numbers. Any suggestions from the group as to a direction we may be going? I will get info on the water wells.

Eckhart, Jeanne

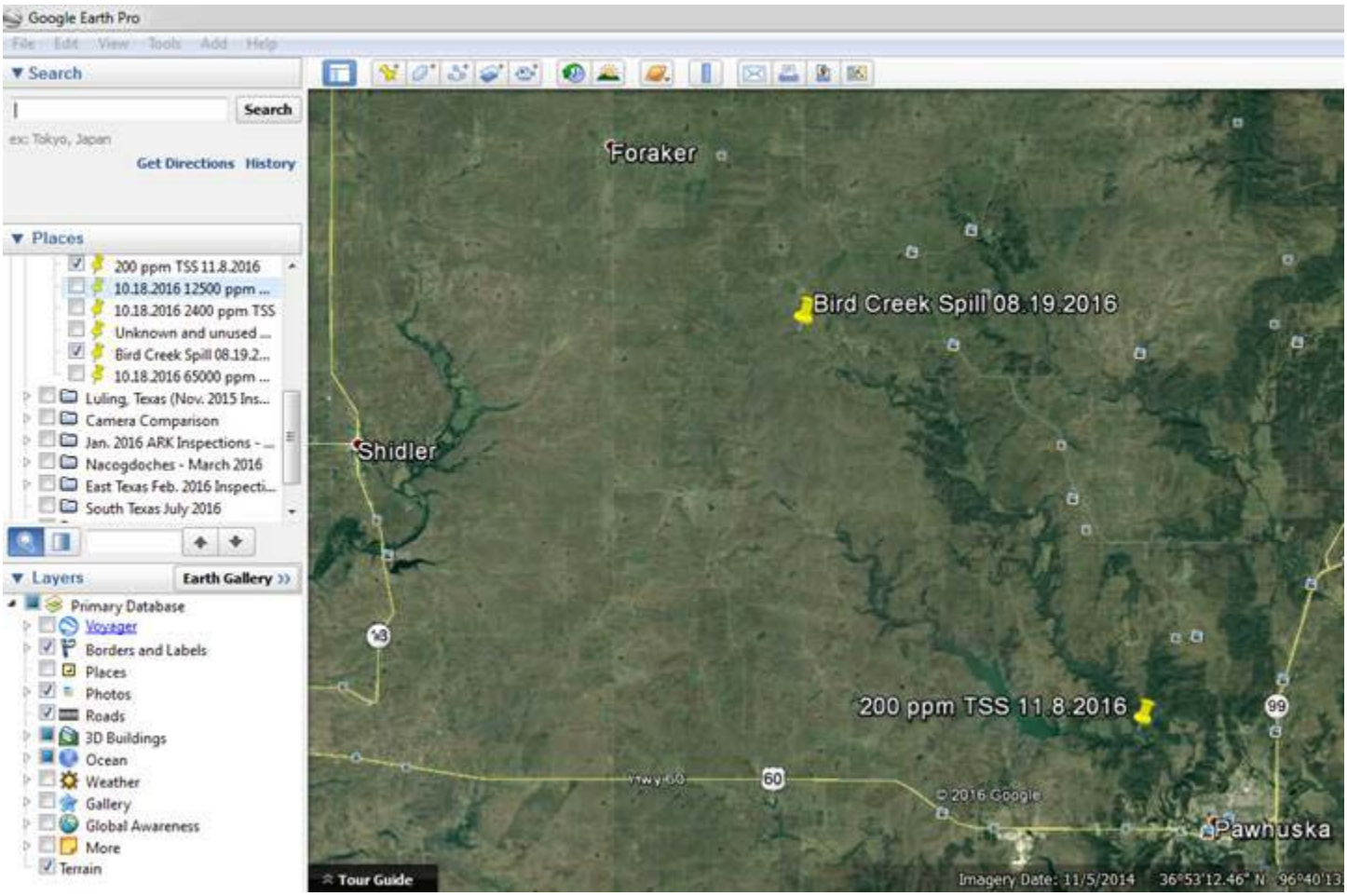
From: Eckhart, Jeanne
Sent: Tuesday, November 08, 2016 2:56 PM
To: Lane, Willie
Subject: RE: Can you locate coord on a map for me.

Willie,

Here it is in google maps:
https://www.google.com/maps/place/36%C2%B041'42.5%22N+96%C2%B021'57.9%22W/@36.695135,-96.3682587,17z/data=!3m1!4b1!4m5!3m4!1s0x0:0x0!8m2!3d36.695135!4d-96.36607

OR,

The google earth image below.



From: Lane, Willie
Sent: Tuesday, November 08, 2016 2:48 PM
To: Eckhart, Jeanne
Subject: Can you locate coord on a map for me.

Bird Creek at 36.695135, 96.366070 is 200 ppm

Sent from my iPhone

Eckhart, Jeanne

From: Sanborn, Kent
Sent: Monday, October 24, 2016 11:43 AM
To: Eckhart, Jeanne
Cc: Wills, Carl; Moore, Jessica; Lister, Chris
Subject: RE: Check Domestic Supply Wells

Follow Up Flag: Follow up
Flag Status: Flagged

Just left BIA. No report filed yet by (b) [redacted] at BIA for the recent work. I think we should ask for directly since it is a disposal well. I have their production records for 2015 up through August 2016. Sept. 2016 will be posted shortly. Might ask for September from them and see if they will provide. I will call John Burrows this afternoon and ask for the fluid level data he already shot. Some interesting completion methods noted on those (b) [redacted] wells. I call later and explain.

From: Eckhart, Jeanne
Sent: Thursday, October 20, 2016 3:10 PM
To: Wills, Carl ; Sanborn, Kent
Cc: Moore, Jessica ; Lister, Chris
Subject: RE: Check Domestic Supply Wells

Kent,

I was able to discuss with Carl and Chris and we think if we could also get the production data and the work over log from the BIA on the (b) [redacted] well, that would be useful.

Please let us know what you think and if you want us to pursue getting that information.

Thanks,

Jeanne Eckhart
Environmental Scientist
Water Resources Section, Enforcement Division
Region 6, U.S. EPA
Office: (214) 665 – 8174
Fax: (214) 665 – 2168

From: Wills, Carl
Sent: Thursday, October 20, 2016 11:08 AM
To: Sanborn, Kent <Sanborn.Kent@epa.gov>
Cc: Moore, Jessica <Moore.Jessica@epa.gov>; Eckhart, Jeanne <Eckhart.Jeanne@epa.gov>; Lister, Chris <Lister.Chris@epa.gov>
Subject: Check Domestic Supply Wells

Kent,

Would you mind checking the domestic supply wells near the ranch facilities with your YSI (for general water quality) and get all of the construction information along with lat./long.

Respectfully,

Carl E. Wills

U.S. Environmental Protection Agency
Compliance Assurance and Enforcement
Water Enforcement Branch (6EN-WR)
1445 Ross Avenue, Suite 1200
Dallas, TX 75202
214-665-7276
fax 214-665-2168
wills.carl@epa.gov
www.epa.gov

****

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Eckhart, Jeanne

From: Sanborn, Kent
Sent: Thursday, October 20, 2016 3:16 PM
To: Eckhart, Jeanne
Subject: RE: Check Domestic Supply Wells

I'll go over to BIA next week and request that data next week. Not sure though if 139 will be submitted yet>

From: Eckhart, Jeanne
Sent: Thursday, October 20, 2016 3:10 PM
To: Wills, Carl ; Sanborn, Kent
Cc: Moore, Jessica ; Lister, Chris
Subject: RE: Check Domestic Supply Wells

Kent,

I was able to discuss with Carl and Chris and we think if we could also get the production data and the work over log from the BIA on the (b) [redacted] well, that would be useful.

Please let us know what you think and if you want us to pursue getting that information.

Thanks,

Jeanne Eckhart
Environmental Scientist
Water Resources Section, Enforcement Division
Region 6, U.S. EPA
Office: (214) 665 – 8174
Fax: (214) 665 – 2168

From: Wills, Carl
Sent: Thursday, October 20, 2016 11:08 AM
To: Sanborn, Kent <Sanborn.Kent@epa.gov>
Cc: Moore, Jessica <Moore.Jessica@epa.gov>; Eckhart, Jeanne <Eckhart.Jeanne@epa.gov>; Lister, Chris <Lister.Chris@epa.gov>
Subject: Check Domestic Supply Wells

Kent,

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Respectfully,

Carl E. Wills

U.S. Environmental Protection Agency
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Eckhart, Jeanne

From: Eckhart, Jeanne
Sent: Thursday, October 20, 2016 3:10 PM
To: Wills, Carl; Sanborn, Kent
Cc: Moore, Jessica; Lister, Chris
Subject: RE: Check Domestic Supply Wells

Kent,

I was able to discuss with Carl and Chris and we think if we could also get the production data and the work over log from the BIA on the (b) [redacted] well, that would be useful.

Please let us know what you think and if you want us to pursue getting that information.

Thanks,

Jeanne Eckhart
Environmental Scientist
Water Resources Section, Enforcement Division
Region 6, U.S. EPA
Office: (214) 665 – 8174
Fax: (214) 665 – 2168

From: Wills, Carl
Sent: Thursday, October 20, 2016 11:08 AM
To: Sanborn, Kent
Cc: Moore, Jessica ; Eckhart, Jeanne ; Lister, Chris
Subject: Check Domestic Supply Wells

Kent,

Would you mind checking the domestic supply wells near the ranch facilities with your YSI (for general water quality) and get all of the construction information along with lat./long.

Respectfully,

Carl E. Wills

U.S. Environmental Protection Agency
Compliance Assurance and Enforcement
Water Enforcement Branch (6EN-WR)
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Eckhart, Jeanne

From: Sanborn, Kent
Sent: Tuesday, October 25, 2016 3:19 PM
To: Wills, Carl
Cc: Eckhart, Jeanne
Subject: RE: Check Domestic Supply Wells

I'll get the water well info on Thursday. I should get the FLs today or tomorrow from Warren.

From: Wills, Carl
Sent: Thursday, October 20, 2016 11:08 AM
To: Sanborn, Kent
Cc: Moore, Jessica ; Eckhart, Jeanne ; Lister, Chris
Subject: Check Domestic Supply Wells

Kent,

Would you mind checking the domestic supply wells near the ranch facilities with your YSI (for general water quality) and get all of the construction information along with lat./long.

Respectfully,

Carl E. Wills

U.S. Environmental Protection Agency
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From: Moore, Jessica
Sent: Tuesday, October 25, 2016 12:11 PM
To: Eckhart, Jeanne <Eckhart.Jeanne@epa.gov>; Sanborn, Kent <Sanborn.Kent@epa.gov>
Cc: Lister, Chris <Lister.Chris@epa.gov>; Wills, Carl <Wills.Carl@epa.gov>
Subject: FW: FW: FOIA request for Bird Creek Area #10280

Please see the beginning of this document for information regarding the permit modification that was requested for the Jireh 18W well.

From: Moore, Jessica
Sent: Tuesday, October 18, 2016 10:27 AM
To: Bradford, Deanna <Bradford.Deanna@epa.gov>
Subject: FW: FW: FOIA request for Bird Creek Area #10280

4/4 Please let me know if there is anything else I need to do.
Thanks,
Jessica

From: Moore, Jessica
Sent: Tuesday, October 18, 2016 10:07 AM
To: Bradford, Deanna <Bradford.Deanna@epa.gov>
Subject: FW: FW: FOIA request for Bird Creek Area #10280

3/4

From:
Sent: Tuesday, October 18, 2016 10:06 AM
To: Bradford, Deanna <Bradford.Deanna@epa.gov>
Subject: FW: FOIA request for Bird Creek Area #10280

Here is one set of well data. Other to follow.
Thanks,

Jessica Moore
U.S. Environmental Protection Agency
Water Enforcement Branch (6EN-WR)
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202
Office: 214.665.6495

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Eckhart, Jeanne

From: Eckhart, Jeanne
Sent: Tuesday, November 08, 2016 9:14 AM
To: Lane, Willie
Cc: Sanborn, Kent
Subject: RE: Saltwater in Bird Creek, Osage County

Ok, let me know if you need me to do anything.

From: Lane, Willie
Sent: Tuesday, November 08, 2016 9:09 AM
To: Eckhart, Jeanne
Cc: Sanborn, Kent
Subject: RE: Saltwater in Bird Creek, Osage County

No, this is getting complicated quickl. Everything needs to go through me. I will call Jann.

From: Eckhart, Jeanne
Sent: Monday, November 07, 2016 3:45 PM
To: Lane, Willie <Lane.Willie@epa.gov>
Cc: Sanborn, Kent <Sanborn.Kent@epa.gov>
Subject: RE: Saltwater in Bird Creek, Osage County

Willie,

Please let us know if you need Kent or me to follow up with the Osage nation ENR Department.

Thanks,

Jeanne Eckhart
Environmental Scientist
Water Resources Section, Enforcement Division
Region 6, U.S. EPA
Office: (214) 665 – 8174
Fax: (214) 665 – 2168

From: Moore, Jessica
Sent: Monday, November 07, 2016 3:28 PM
To: Lane, Willie <Lane.Willie@epa.gov>; Eckhart, Jeanne <Eckhart.Jeanne@epa.gov>
Subject: FW: Saltwater in Bird Creek, Osage County

Please disregard previous comment. I suppose they have not been directly involved up until now. I was thinking of the BIA.
Thanks,

Jessica

From: Jann Hayman [mailto:jannhayman@osagenation-nsn.gov]
Sent: Monday, November 07, 2016 3:24 PM
To: Aguinaga, David <Aguinaga.David@epa.gov>; Moore, Jessica <Moore.Jessica@epa.gov>
Subject: Saltwater in Bird Creek, Osage County

Good afternoon,

I wasn't sure who to contact, so I thought I'd try you first. We have been aware of a potential saltwater contamination in Bird Creek north of Pawhuska, Osage County. I have been asked by Chief to follow up and see if there is any information available on if the source of that contamination has been found. I appreciate any information you have. I apologize that I don't have much more information than this. Thank you!

Jann S. Hayman
Director
Osage Nation ENR Department
100 West Main, Suite 304
Pawhuska, Oklahoma 74056
Office: 918.287.5531
Fax: 918.287.5581
Email: jannhayman@osagenation-nsn.gov

Eckhart, Jeanne

From: Wills, Carl
Sent: Tuesday, October 18, 2016 12:55 PM
To: Eckhart, Jeanne; Moore, Jessica
Cc: Sanborn, Kent
Subject: RE: Water Plots - Bird Creek, Osage County

Thanks!

From: Eckhart, Jeanne
Sent: Tuesday, October 18, 2016 12:07 PM
To: Wills, Carl ; Moore, Jessica
Cc: Sanborn, Kent
Subject: RE: Water Plots - Bird Creek, Osage County

Carl,

Kent asked me to forward this information to you, as he is out at the Bird Creek area today:

The well that was swabbed is (b) [redacted] (36.839338, -96.505062) (NW 12.27.7)

Let us know if you need some further information about the well.

Thanks,

Jeanne Eckhart
Environmental Scientist
Water Resources Section, Enforcement Division
Region 6, U.S. EPA
Office: (214) 665 – 8174
Fax: (214) 665 – 2168

From: Wills, Carl
Sent: Monday, October 17, 2016 9:51 AM
To: Eckhart, Jeanne <Eckhart.Jeanne@epa.gov>; Moore, Jessica <Moore.Jessica@epa.gov>
Subject: Water Plots - Bird Creek, Osage County

All,

Just wanted to make sure that you both had the analytical and the plots. If you have any questions, please don't hesitate to ask. I believe that Jessica might have some of this information, but I wasn't for sure.

You can tell that the upstream sample, 1A, is not impacted with brine. Samples 1B and 1C are the same as they should be for a sample and a blind replicate. The other samples, Jireh (2) and Grayhorse (3), are also what I would call as identical as you can get for the same produced zone, Mississippian Chat. When you compare 1B and 1C to 2 and 3 you can tell that 1B and 1C came from the same source as 2 and 3. (b) (5) [redacted]

(b) (5)
[redacted] t me know what you think?

Respectfully,

Carl E. Wills

U.S. Environmental Protection Agency
Compliance Assurance and Enforcement
Water Enforcement Branch (6EN-WR)
1445 Ross Avenue, Suite 1200
Dallas, TX 75202
214-665-7276
fax 214-665-2168
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From: Sanborn, Kent
To: Eckhart, Jeanne; Wills, Carl; Moore, Jessica
Subject: RE: Water Plots - Bird Creek, Osage County
Date: Monday, October 17, 2016 4:03:30 PM

And if they did fix the hole by running in that new liner we should see a gradual reduction in TSS over time. The story from (b) [redacted] seemed to change somewhat on how long the hole was there. I'll be out there this Weds. To check again. If temps come back up then forget everything I said.

From: Eckhart, Jeanne
Sent: Monday, October 17, 2016 3:55 PM
To: Sanborn, Kent
Subject: FW: Water Plots - Bird Creek, Osage County
FYI – see the first message

From: Wills, Carl
Sent: Monday, October 17, 2016 11:02 AM
To: Eckhart, Jeanne <Eckhart.Jeanne@epa.gov>; Moore, Jessica <Moore.Jessica@epa.gov>
Subject: RE: Water Plots - Bird Creek, Osage County
Jeanne,
I was planning on sending all of my stuff to Deanna.
Thanks,
Carl

From: Eckhart, Jeanne
Sent: Monday, October 17, 2016 9:54 AM
To: Wills, Carl <Wills.Carl@epa.gov>; Moore, Jessica <Moore.Jessica@epa.gov>
Subject: RE: Water Plots - Bird Creek, Osage County
Thanks Carl!
Also, we got a FOIA request for this for Bird Creek. If you have any further information that we may need to include in the FOIA related to what you guys did, please let me know.
Thanks,
Jeanne Eckhart
Environmental Scientist
Water Resources Section, Enforcement Division
Region 6, U.S. EPA
Office: (214) 665 – 8174
Fax: (214) 665 – 2168

From: Wills, Carl
Sent: Monday, October 17, 2016 9:51 AM
To: Eckhart, Jeanne <Eckhart.Jeanne@epa.gov>; Moore, Jessica <Moore.Jessica@epa.gov>
Subject: Water Plots - Bird Creek, Osage County
All,
Just wanted to make sure that you both had the analytical and the plots. If you have any questions, please don't hesitate to ask. I believe that Jessica might have some of this information, but I wasn't for sure.
You can tell that the upstream sample, 1A, is not impacted with brine. Samples 1B and 1C are the same as they should be for a sample and a blind replicate. The other samples, Jireh (2) and

Grayhorse (3), are also what I would call as identical as you can get for the same produced zone, Mississippian Chat. When you compare 1B and 1C to 2 and 3 you can tell that 1B and 1C came from the same source as 2 and 3. (b) (5) [redacted] Let me know what you think?

Respectfully,

Carl E. Wills

U.S. Environmental Protection Agency
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Water Enforcement Branch (6EN-WR)
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	1A (North c	1B (South c	1C (South c	2 Jireh @ 1	3 G.horse c	:	:	:
Na+K	-12.14%	-36.09%	-35.94%	-38.72%	-39.15%			
Ca	-30.16%	-9.44%	-9.39%	-8.65%	-8.05%			
Mg	-7.41%	-4.47%	-4.67%	-2.62%	-2.80%			
Cl-	30.10%	49.91%	49.91%	49.96%	49.98%			
HCO3-	11.26%	0.04%	0.04%	0.03%	0.02%			
SO4-	8.94%	0.04%	0.04%	0.02%	0.00%			

short name	1A	1B	1C	2	3				
Cations	1A Cations	1B Cations	1C Cations	2 Cations	3 Cations	: Cations	: Cations	: Cations	
Na+K			1						
Ca			0						
Mg			-1						
Anions	1A Anions	1B Anions	1C Anions	2 Anions	3 Anions	: Anions	: Anions	: Anions	
Cl-			1						
HCO3-			0						
SO4-			-1						

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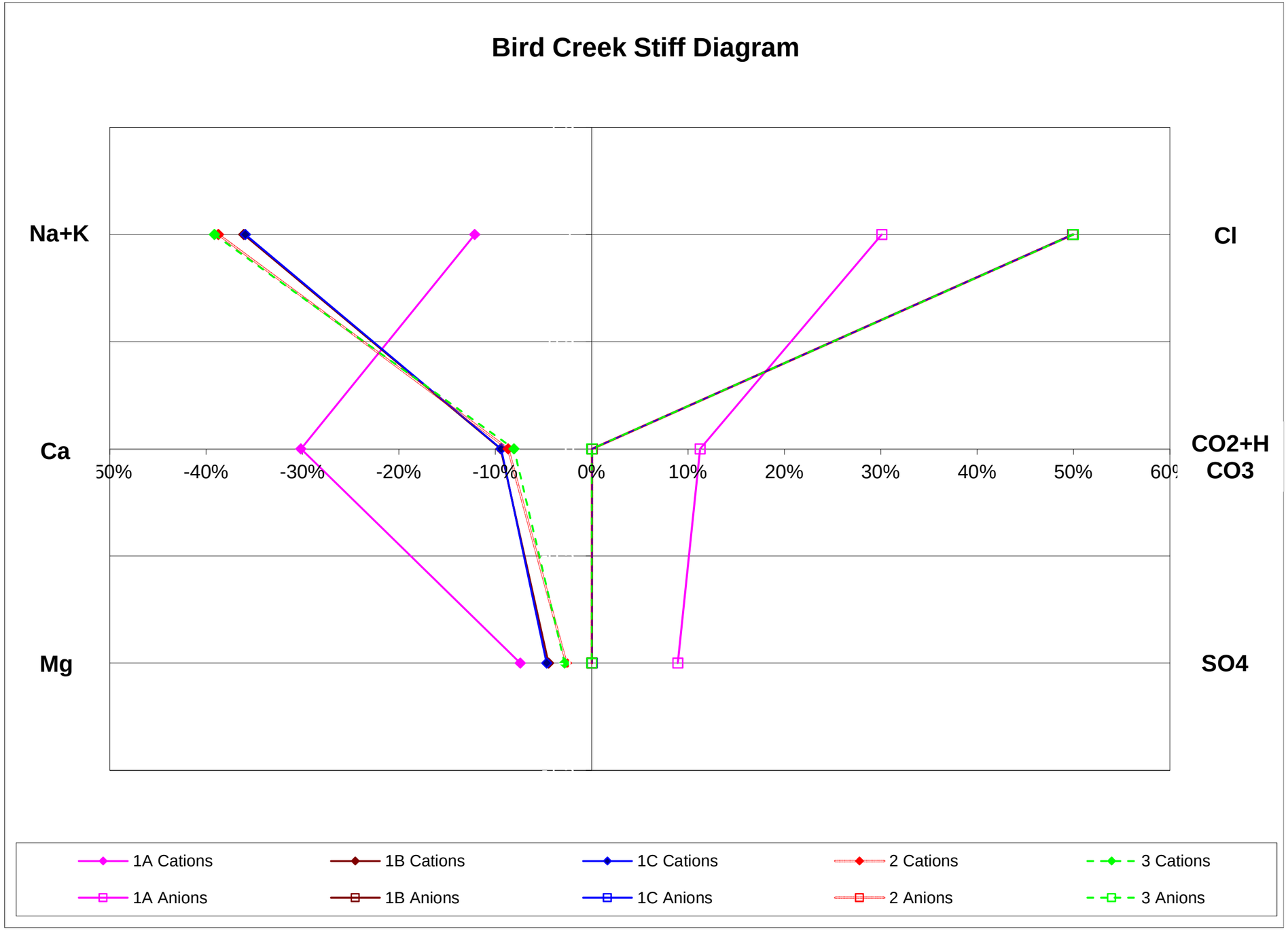
: Anions : Anions : Anions : Anions : Anions : Anions : Anions : Anions


Bird Creek Stiff Diagram
Na+K
Ca
Mg
Cl
CO2+H
CO3
SO4
50%
-40%
-30%
-20%
-10%
0%
10%
20%
30%
40%
50%
60%
1A Cations
1B Cations
1C Cations
2 Cations
3 Cations
1A Anions
1B Anions
1C Anions
2 Anions
3 Anions

Eckhart, Jeanne

From: Eckhart, Jeanne
Sent: Monday, November 28, 2016 8:39 AM
To: Moore, Jessica; Lister, Chris; Chang-Vaughan, Ellen; Lane, Willie; Wills, Carl; Sanborn, Kent
Cc: Saunders, Jerry; Eckhart, Jeanne
Subject: Summary from 11.17.2016 Meeting

Follow Up Flag: Follow up
Flag Status: Completed

All,

Below is a recap of the meeting/action items about Bird Creek. Please pay attention to bolded print.

- FOIA request
  - Please place appropriate documents in the appropriate FOIA folder – if you originated emails you place them in the folder in the H:drive – **Is there a link for that yet?**
- Information request (**Jessica/Kent/Ellen**):
  - **Jessica:**
    - If a production well is TA'ed provide a fluid level (not only current fluid levels, but if you have additional fluid level information during the requested timeframe referenced below, please provide it as well), including static levels.
    - All injection volumes and pressures by month – don't we already have this except for the information after March 2016? Location, elevation, injection formation and total depth?
    - If an injection well is TA'ed provide a fluid level (not only current information, but if you have additional information during the requested timeframe referenced below, please provide it as well), include location, elevation, injection formation and total depth?
    - (b) (5) well that was worked on (Jessica got the (b) (5))
    - Cement bond logs of disposal wells
    - Fluid levels in information request for all injection wells
    - Any chemical additives being added to the fluids at any part of the process (production and injection)
  - **Kent**:
    - Operator:
      - Request for fluids levels on (b) production well (What is status and the possibility of putting that well on production?)
      - Information on (b and the other injection wells (completion reports) – **Jessica will** send a list; and cement bond logs for all disposal wells;
    - BIA:
      - All production volumes (by quarter section and month) with an additional list (including location, elevation, production formation and total depth – what else do we want?) of all active wells. (it might just be reported on unit, not by quarter) – there may be production reports where they would estimate what the wells were making on each quarter
      - Additionally, for the TA'ed production wells provide location, elevation, production formation and total depth – in records?
      - Verify that they had a well at potential dry hole location or not (Well No. 1), which is present according to various maps (Where did Ben get the map?)

            - Information about what kind of things they are adding/additive chemicals into the fluids for Grayhorse, Jireh, and Warren
    - Locational Information:
        - Jireh Resources - W/2 Section 1-T27N-R7E and SE/4 Section 2-T27N-R7E
        - Warren American – E/2 Section 1-T27N-R7E, NE/4 Section 11-T27N-R7E, N/2 Section 12-T27N-R7E
        - Grayhorse – I do not have that
    - Timing Information:
        - January 1, 2015, to present
- Sampling plan (**Chris/Carl, and if needed Jeanne**):
    - Get a cost estimate
    - Add appropriate upstream/downstream sampling locations to the plan and include sampling from the bottom of the stream

- Update permits on what is happening/situation (**Jessica/Willie**)
- Plot appropriate map, as deemed appropriate (**Chris**)
- Heat as a pollutant in the CWA (**Ellen**)
- Follow up with Landowner (**Willie**)
- Continue monitoring site (**Kent**)

Thank you,

Jeanne Eckhart
Environmental Scientist
Water Resources Section, Enforcement Division
Region 6, U.S. EPA
Office: (214) 665 – 8174
Fax: (214) 665 – 2168

Eckhart, Jeanne

From: Sanborn, Kent
Sent: Tuesday, October 25, 2016 11:00 AM
To: Eckhart, Jeanne; Wills, Carl; Moore, Jessica; Lister, Chris; Lane, Willie

Did you notice that production data began to show lower oil production back in May 2016 at (b) [redacted]? I called Jessica and left a message because I think we should demand the procedures used and all info on the repair of well (b) [redacted] (daily logs). I'm afraid the 139 will end up being the short form and not tell us the details. Also noticed that the (b) [redacted] wells on (b) (5) [redacted] were completed using a method of running 1" down beside the casing a circulating cement to the top. Usually from 600' to the top with nothing on the bottom. (b) (5) [redacted] John Burrows sending me the fluid levels on all TA wells today.

From:	Wills, Carl
To:	Eckhart, Jeanne; Moore, Jessica
Subject:	Water Plots - Bird Creek, Osage County
Date:	Monday, October 17, 2016 9:50:58 AM
Attachments:	Combined Analytiical - Bird Creek Water Samples Final.pdf Stiff-diagrams Data Kent"s Samples Corrected.pdf Stiff-diagrams with Kent"s Samples Corrected.pdf Piper-diagrams with Kent"s Samples Corrected.pdf

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All,

Just wanted to make sure that you both had the analytical and the plots. If you have any questions, please don't hesitate to ask. I believe that Jessica might have some of this information, but I wasn't for sure.

You can tell that the upstream sample, 1A, is not impacted with brine. Samples 1B and 1C are the same as they should be for a sample and a blind replicate. The other samples, Jireh (2) and Grayhorse (3), are also what I would call as identical as you can get for the same produced zone, Mississippian Chat. When you compare 1B and 1C to 2 and 3 you can tell that 1B and 1C came from the same source as 2 and 3.(b) (5) [redacted] Let me know what you think?

Respectfully,

Carl E. Wills

U.S. Environmental Protection Agency
Compliance Assurance and Enforcement
Water Enforcement Branch (6EN-WR)
1445 Ross Avenue, Suite 1200
Dallas, TX 75202
214-665-7276
fax 214-665-2168
wills.carl@epa.gov
www.epa.gov

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SCOTT A. THOMPSON
Executive Director

OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY

MARY FALLIN
Governor

August 23, 2016

Kent Sanborn
EPA Region 6
1445 Ross Ave
Dallas, TX 75202

RE: Complaint number 146816

Dear Kent Sanborn:

On August 18, 2016, you filed a complaint with the Department of Environmental Quality (DEQ) concerning salt water that was dumped into a tributary of Bird Creek.

The facts and circumstances surrounding your complaint indicate that it is not within the jurisdiction of the DEQ. We do not have legal authority to take action.

We have determined that this matter is within the jurisdiction of the Bureau of Indian Affairs. Your complaint was referred to that agency on August 19, 2016. A contact within that agency is Richard Winlock and he can be reached at 918-287-5700.

We appreciate the opportunity to be of service to you. If any further problems arise, please contact us at 1-800-522-0206 or (405) 702-6185.

Sincerely,

Debbie Nichols
Complaints Manager

cc: Local DEQ Office