From: Miyoko Sakashita [mailto:miyoko@biologicaldiversity.org]
Sent: Tuesday, March 21, 2023 3:28 PM
To: CityClerk <CityClerk@longbeach.gov>
Subject: CBD Sources Part 1.5

-EXTERNAL-

Miyoko Sakashita

Oceans Director | Senior Counsel

Center for Biological Diversity
1212 Broadway, Suite 800
Oakland, CA 94612

tel. 510-844-7108 | miyoko@biologicaldiversity.org
@endangeredocean | Center for Biological Diversity

REPORT OF OCCURRENCE

TYPE C Date 8-8-11

LOCATION Midway-Sunset

Operator Berry Petroleum Representative Aubry Branson Phone 213-7508

Occurrence Detected August 8 (month, day), 2011 (year) ; 1000 am/pm

Occurrence Ended August 8 (month, day), 2011 (year) ; 2200 am/pm

Field Midway-Sunset Sec., T., R. 2 31S/22E Lease and Well Southwestern 4737

Other Location Description Nearest well is Southwestern 4737. This surface location is within a couple hundred yards of the June 12, 2011 reactivation of surface expression 24. This is the 34th surface expression in Berry's North Midway production area.

O.E.S. Notified? 11-4692 (toll-free number: 800-852-7550)

DOGGR Notified by (Name, Affiliation, Phone Number, and Time) Aubry Branson, Berry Safety Supervisor, 213-7508, 1130 hrs

Volume of Spill Less than 5 bbls bbls oil _____ bbls water

Areal Extent Diatomaceous earth mixed with water and oil. Mound 40' x 50' x 5', Spray 70' x 50', Debris expelled vertically to at least 60 '

Property or Waterways Damaged or Threatened N/A

Weather and Sea Conditions (Offshore Spills Only) N/A

Injuries N/A

Source and Cause of Occurrence Steam injection over formation fracture gradient into shallow diatomaceous oil reservoir, forcing formation material with water and oil to surface.

Containment and Cleanup After confidence is established that expression activity is finished, ground will be tested for stability, the expelled material removed, and the vent will be excavated to determine the subsurface cavity's extent, if any. Site will be backfilled and compacted. Markers and barriers will be placed.

Operator Plans to Prevent Reoccurrence Six wells have been shut in. Complete surface expression activity ceased 12 hours after wells shut in. Subsurface geological and reservoir studies will be conducted to determine future steam injection activity.

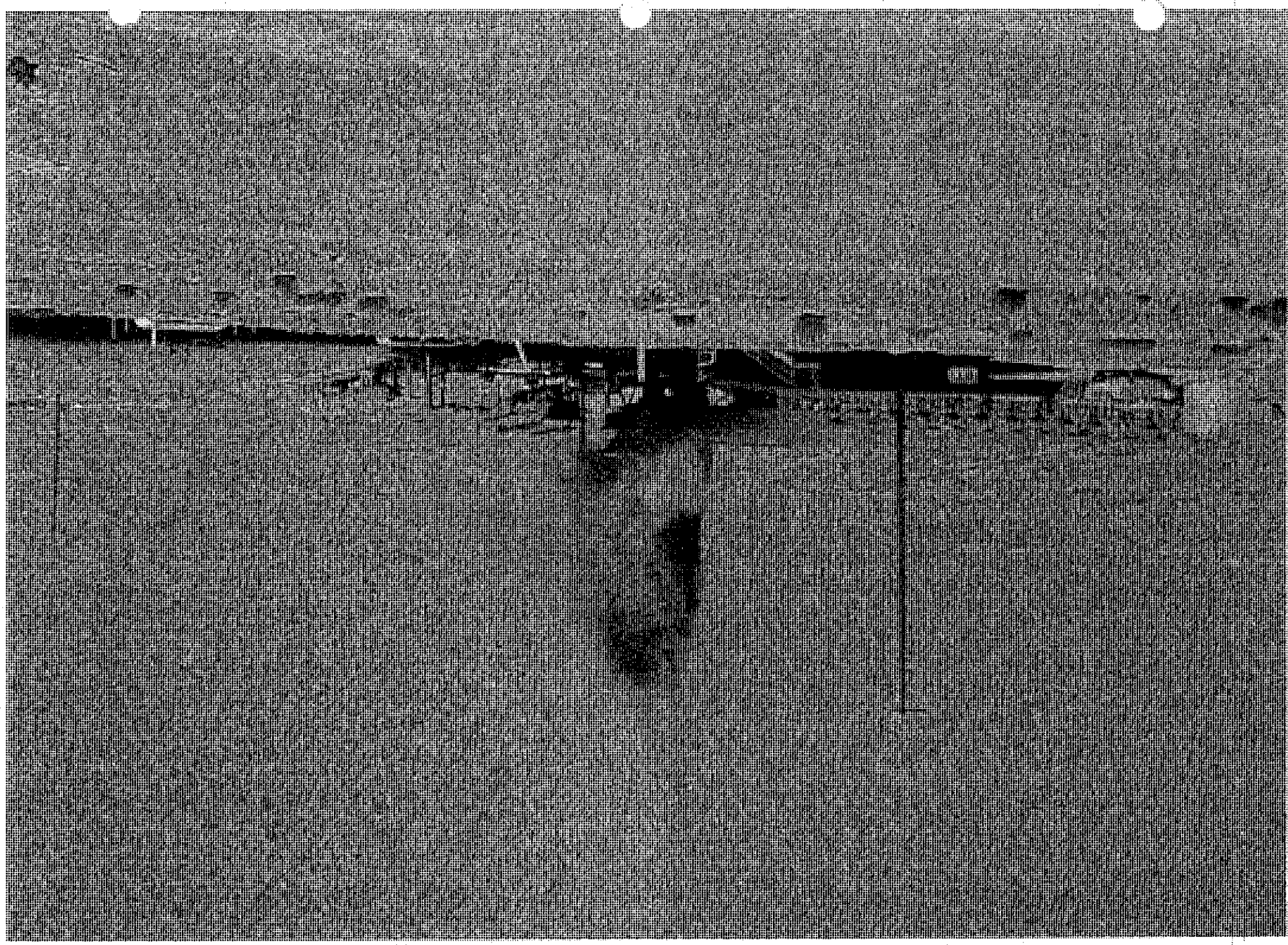
Estimate of Property Damage (dollar loss) _____ or Cleanup Cost _____

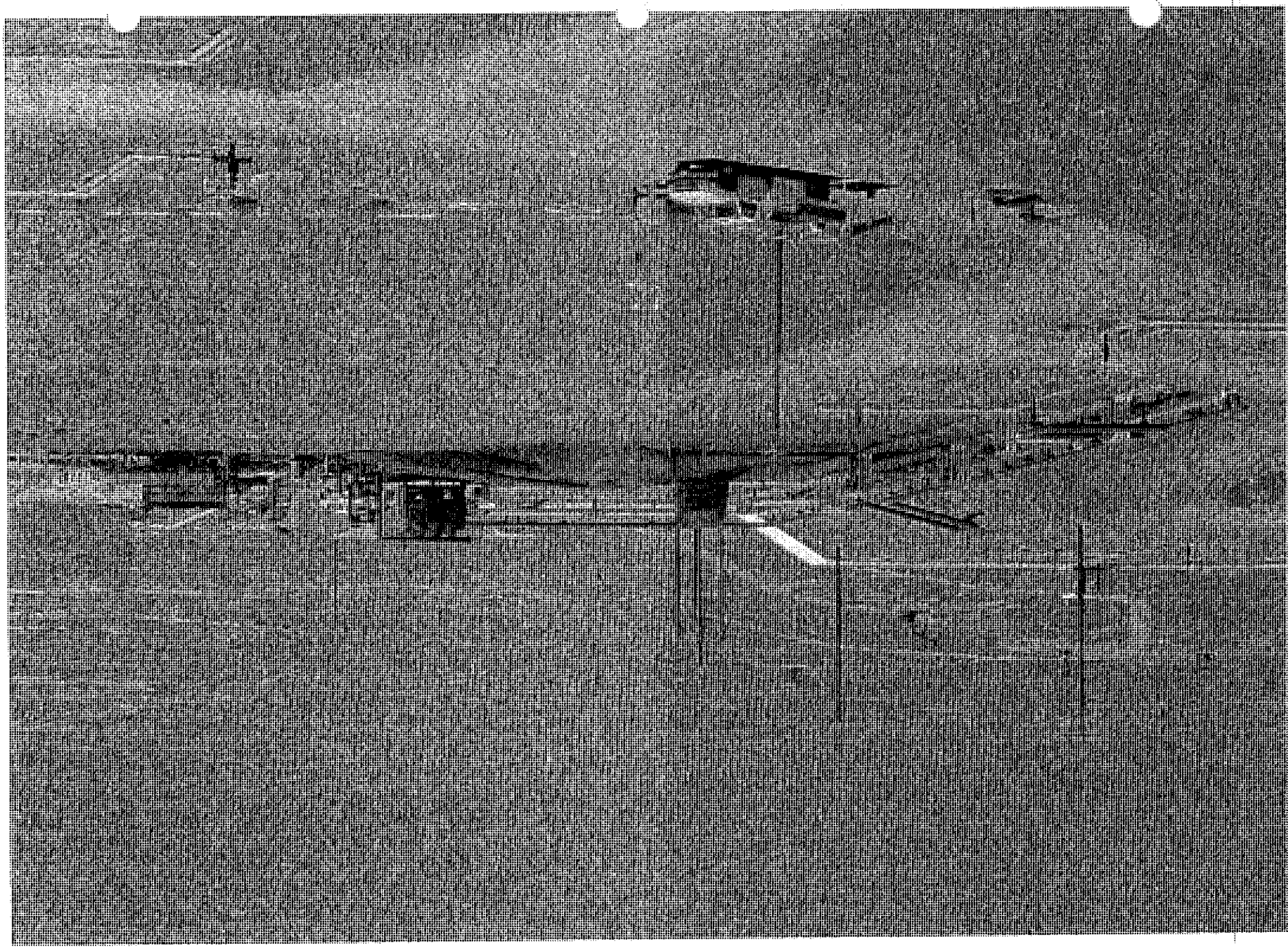
Additional Information This surface expression occurred at the corner of a terraced area that included many steam lines, steam line header, storage tanks and storage shed. A short time prior to the surface break through, a truck was driven over the vent location to near the storage shed. After the surface expression activity began the worker was isolated at the location, the surface expression blocking vehicle movement. The worker evacuated the site safely by walking around the surface expression. A 300' restriction zone around the site was established with 3 security guard stations at access points. This is a BLM lease and personnel from that agency responded to the event. According a Berry employee other past surface expressions have also ejected fluid and material tens of feet vertically.

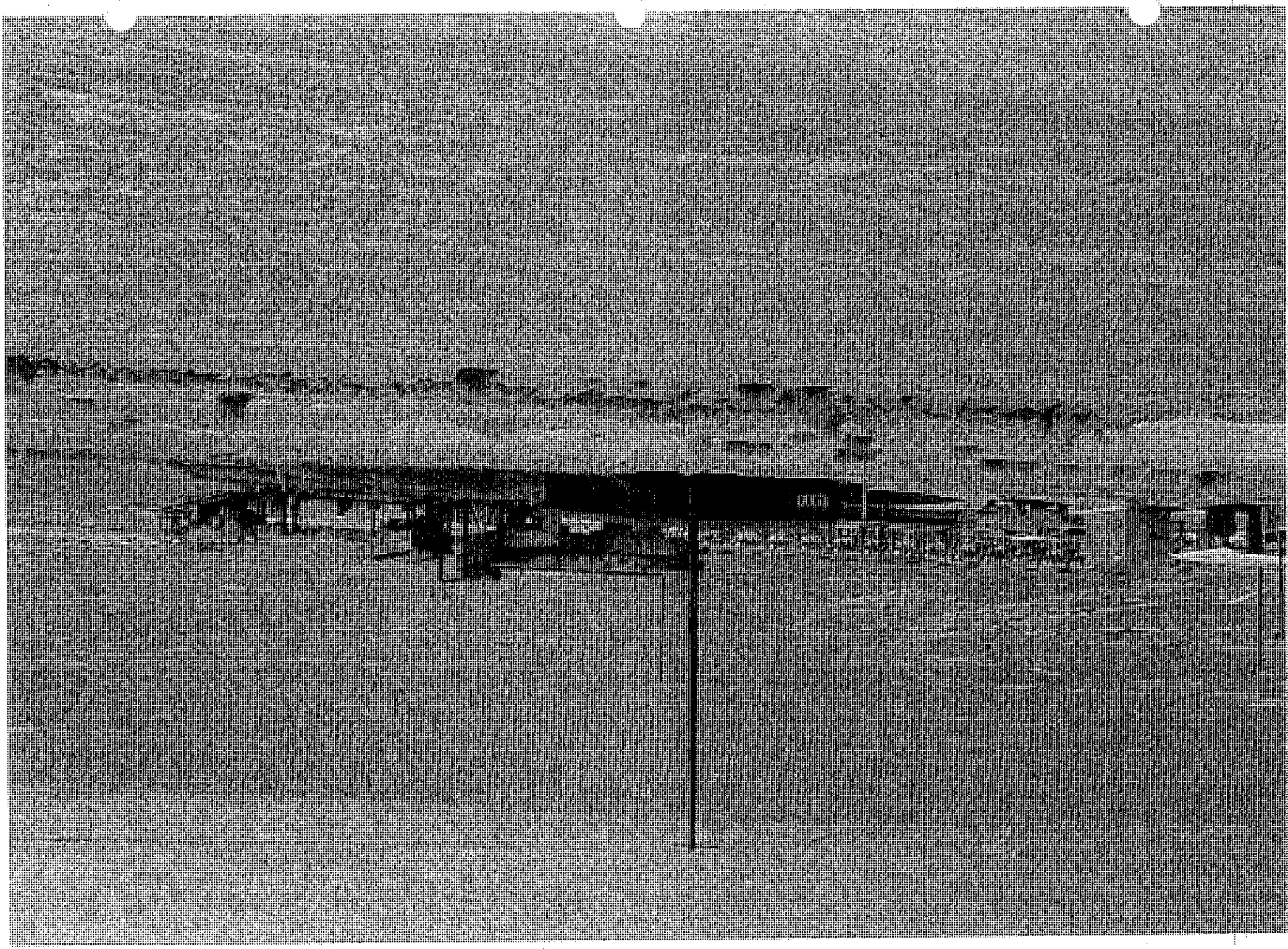
(Use reverse side if additional space is needed.)

Report Prepared by Michael Toland Date August 10, 2011

OG184 (3/98)







Berry Petroleum
8/28/11

REPORT OF OCCURRENCE

TYPE C Date 9-28-11

LOCATION Midway-Sunset

Operator Berry Petroleum Representative Aubrey Branson Phone 661-213-7508

Occurrence Detected August 28 (month, day), 2011 (year); 730 am/pm

Occurrence Ended August 29 (month, day), 2011 (year); 0400 am/pm

Field Midway-Sunset Sec., T., R. 2 T31S/R22E Lease and Well Southwestern

Other Location Description Near well 48-36. Approximately 100' northwest of surface expression 34

O.E.S. Notified? 11-5097 (toll-free number: 800-852-7550)

DOGGR Notified by (Name, Affiliation, Phone Number, and Time) Aubrey Branson 661-213-7508. On call engineer notified at 1130 hrs.

Volume of Spill 206 bbls fluid & mud bbls oil; _____ bbls water

Areal Extent Approximately 40' X 50', up to 4' high.

Property or Waterways Damaged or Threatened N/A

Weather and Sea Conditions (Offshore Spills Only) N/A

Injuries N/A

Source and Cause of Occurrence Steam injection over formation fracture gradient into shallow diatomaceous oil reservoir, forcing formation material with water and oil to surface.

Containment and Cleanup After confidence that expression activity has terminated, ground will be tested for stability, the expelled material removed, and the vent will be excavated to determine the subsurface cavity's extent, if any. Site will be backfilled and compacted. Markers and barriers will be placed.

Operator Plans to Prevent Reoccurrence After surface expression activity began, flow back on area wells was increased to help relieve pressure. Area has not been steamed since the August 8 surface expression 34 erupted.

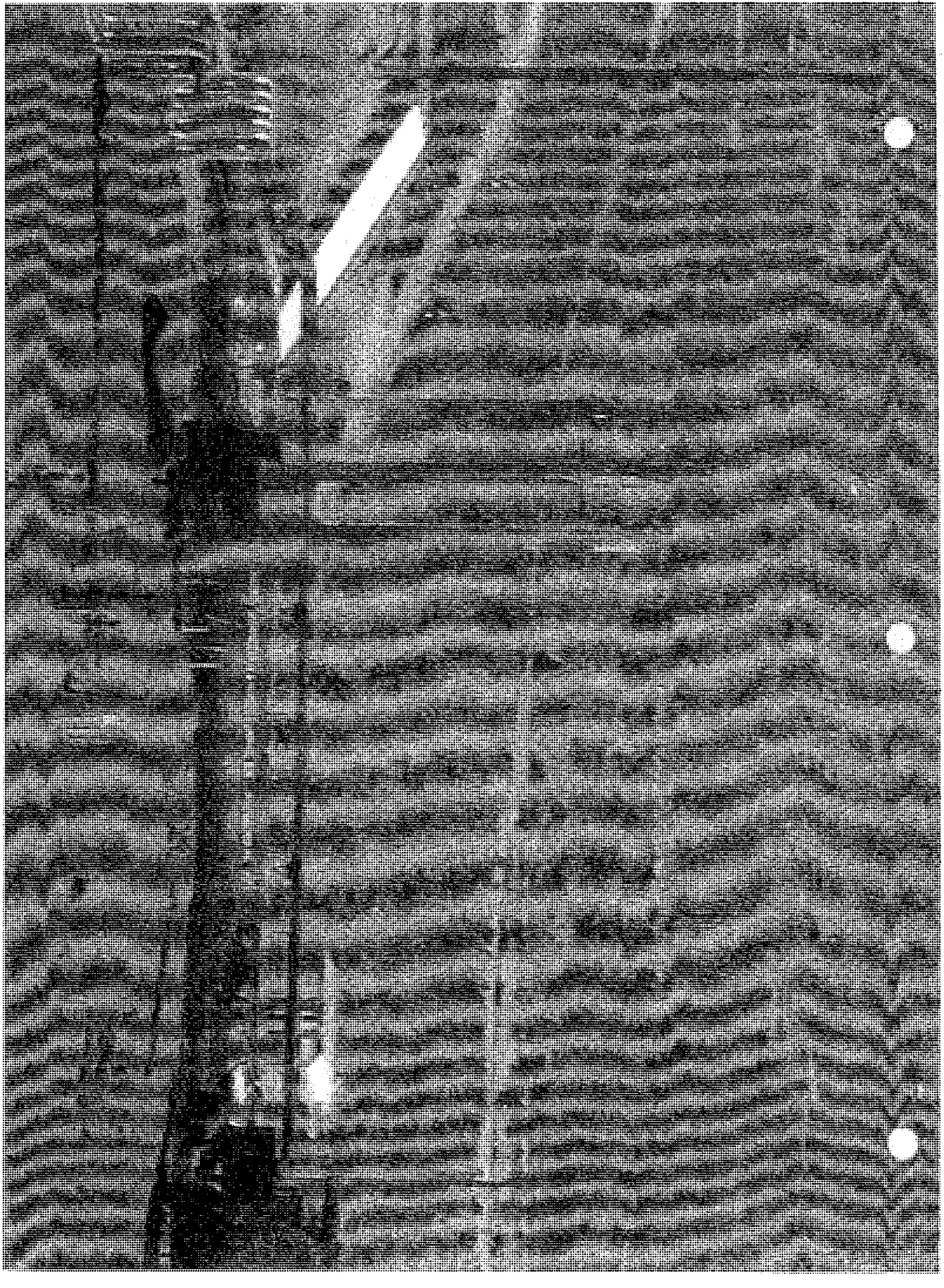
Estimate of Property Damage (dollar loss) _____ or Cleanup Cost _____

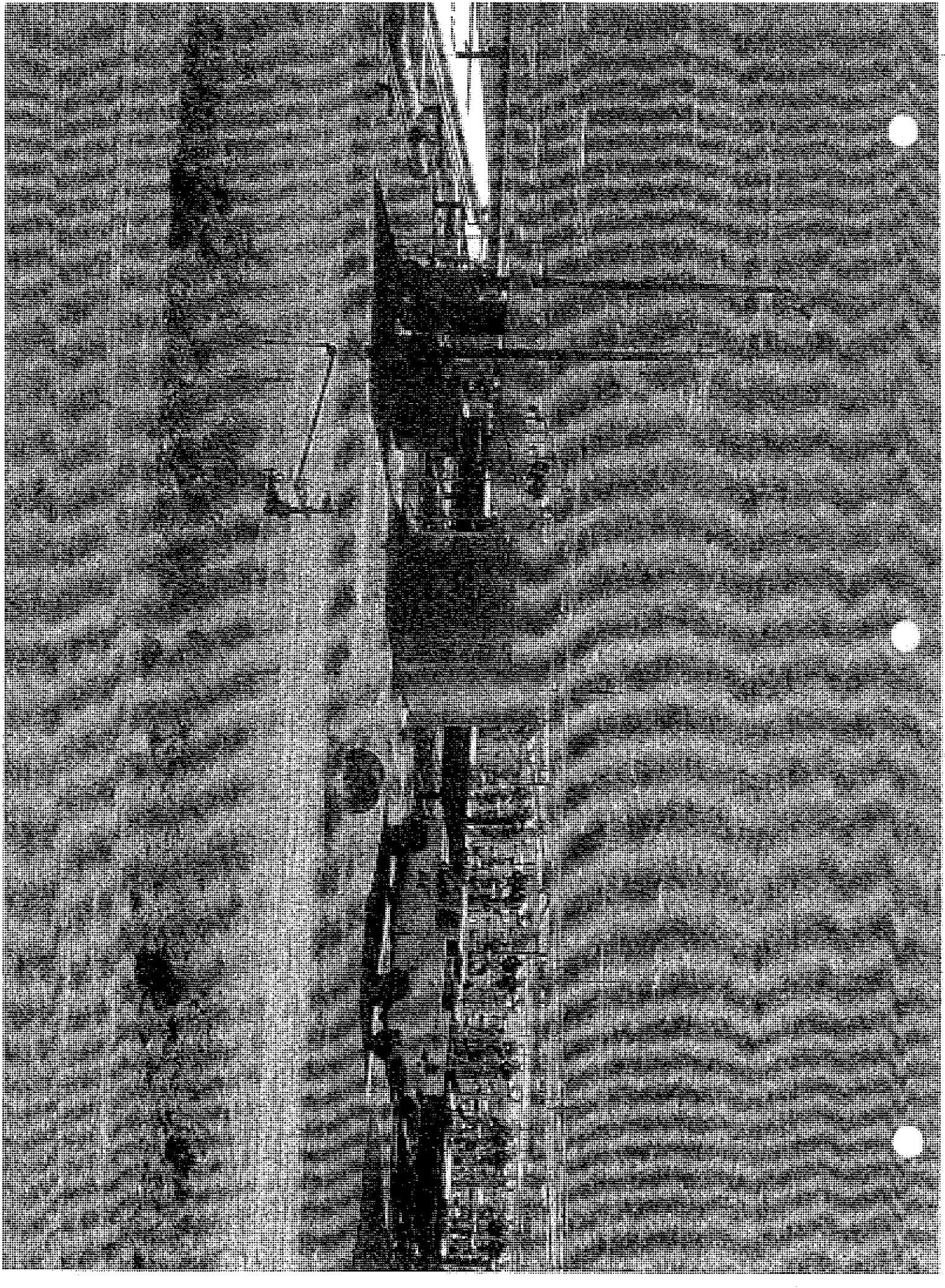
Additional Information Two brief high pressure releases occurred as activity began, both expelling fluid to an estimated height of 60'. The first release lasted 5 to 7 minutes followed 20 minutes later by a second release of shorter duration. After a few hours of low intermittent eruption activity, the surface expression continued to "bubble" until 0400 hrs on 8-29-11. Total from time from initiation of activity to complete inactivity was approximately 20.5 hrs. As reported by a Berry employee, a short, sharp ground tremor was felt immediately prior to first high pressure release.

Site visited by on call engineer Nancy Irving on August 28, 2011 at approximately 1245hrs and Michael Toland on August 29, 2011 at approximately 1000 hrs.

(Use reverse side if additional space is needed.)

Report Prepared by Michael Toland Date August 29, 2011





Berry Petroleum
10/4/11

REPORT OF OCCURRENCE

TYPE C/D Date 10/4/11

LOCATION Midway-Sunset

Operator Berry Petroleum Representative Aubrey Branson Phone 661-213-7508

Occurrence Detected October 4 (month, day), 2011 (year) ; 0115 am/pm

Occurrence Ended Ongoing as of 10/7 (month, day), 2011 (year) ; _____ am/pm

Field Midway-Sunset Sec., T., R. 3 31S/22E Lease and Well Belgian

Other Location Description Reactivation of surface expression #18, approximately 200' northwest of well 23-19. Fluid surfaced from 12" to 14" hole adjacent to the cement base pad for the French drain installed to capture fluid from surface expression #18

O.E.S. Notified? 11-5885 (toll-free number: 800-852-7550)

DOGGR Notified by (Name, Affiliation, Phone Number, and Time) Aubrey Branson, Berry Petroleum, 213-7508, 0945 hrs.

Note: This is 8 ½ hours after detection. Cal EMA was notified at 0938 hrs.

Volume of Spill 175 bbls as of 10/6/11 bbls oil; 475 bbls as of 10/6/11 bbls water

Areal Extent Approximately 2 to 10 yds x 300 yds across terrace and down surface road, approximately 50 yds down terrace slope and 50 yds down dry creek bed.

Property or Waterways Damaged or Threatened Approximately 50 yds of a dry, unnamed, ephemeral stream bed.

Weather and Sea Conditions (Offshore Spills Only) N/A

Injuries N/A

Source and Cause of Occurrence Steam injection over formation fracture gradient into shallow diatomaceous oil reservoir, creating fractures that allow formation water and oil to surface.

Containment and Cleanup Backhoe, vacuum trucks and hand crews. Biologist from McCormick Environmental confirmed no wildlife take during spill and no threat to wildlife during cleanup. Accelerated Environmental was contracted to perform removal of fluid from terrace slope and creek bed. Fish and Game approved cleanup plan and signed off on completion of cleanup on 10/6/11.

Operator Plans to Prevent Reoccurrence Three vicinity wells that were on injection, 27-19, 24-18 and 23-21 and were immediately shut-in. Evaluation of area steam injection history, as well as tilt meter data to be performed.

Estimate of Property Damage (dollar loss) _____ or Cleanup Cost _____

Additional Information This is a low energy reactivation of surface expression #18 that first occurred approximately two years ago and reportedly had several reoccurrences of breakthroughs in the immediate vicinity over an unconfirmed amount of time. Information regarding surface expressions is incomplete during this period. An indication of the area of concern for surface expression #18 is the approximate 100' x 30' restrictive barrier around the site. This particular site, however, has not had any surface expression activity during the past year. A 73 bbl surface expression occurred approximately 300' northwest of this site, near well 24-18 on 10/8/10.

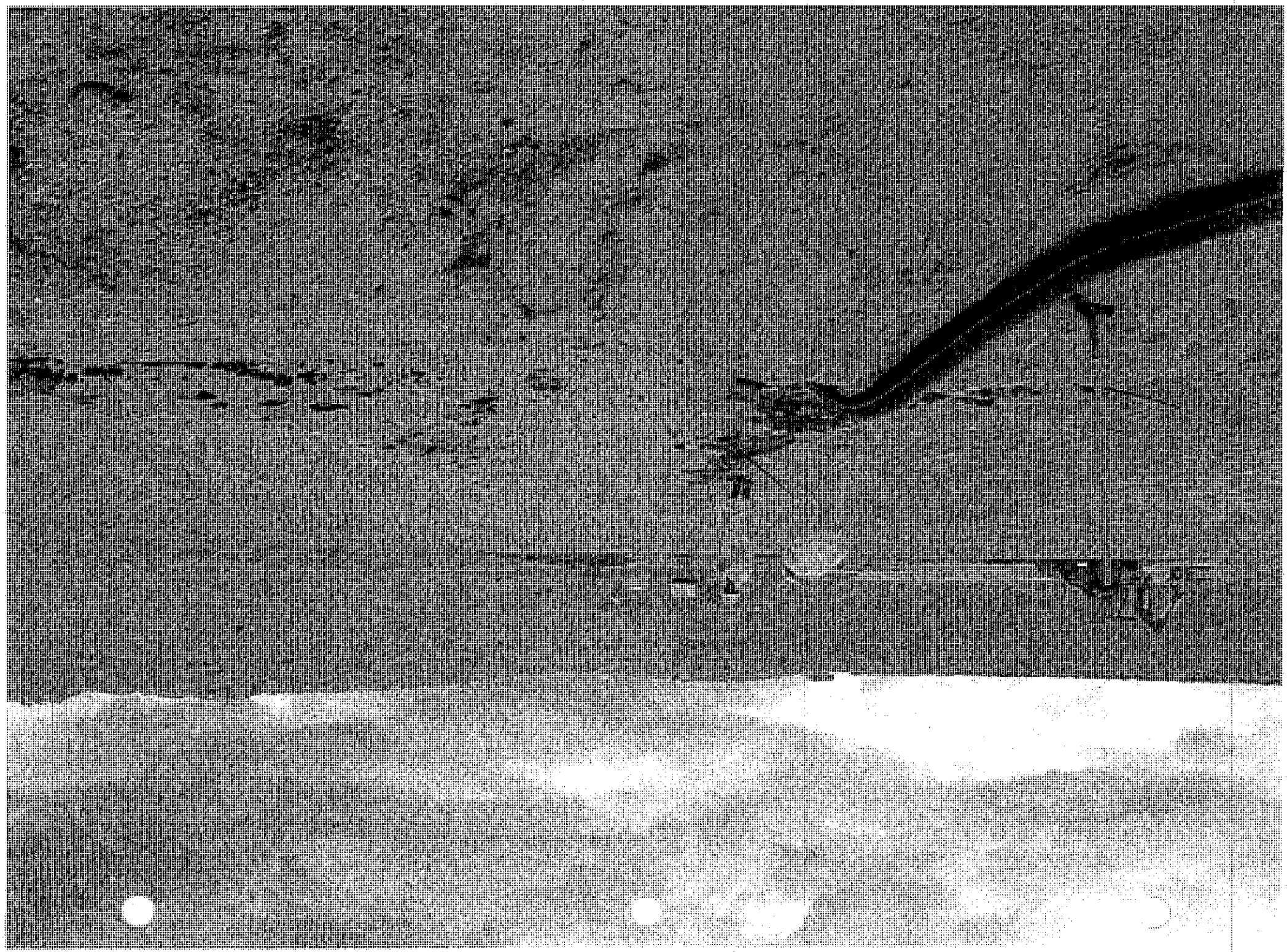
A vertical French Drain and pump were placed at the surface expression #18 location. Pumps are installed with a French drain over a surface expression when the amount of seepage economically warrants the cost, replacing of vacuum trucks. A horizontal drain was also installed in the subsurface at this location after the initial surface expression activity.

Area around surface expression has been bermed to capture the continuing minor flow of fluid.

(Use reverse side if additional space is needed.)

Report Prepared by Michael Toland Date 10/7/11

OG184 (3/98)



August 24, 2011

Mr. Dan Wermiel
State of California, Department of Conservation
Division of Oil, Gas and Geothermal Resources
4800 Stockdale Highway
Suite 417
Bakersfield, CA 93309

Subject: Cause and Prevention Plan for Surface Event SE 2011-8-8
Berry Petroleum Company, Project #46400390
Southwestern Lease, Section 2, T31S, R22E, MDBM
Midway Sunset Field
Kern County, CA

Dear Mr. Wermiel:

Included in this document is a description of the activity that caused surface event SE 2011-8-8, including ground monitoring daily reports for the five previous days leading up to the surface expressions, and what steps Berry Petroleum Company (Berry) is taking to prevent further surface expressions in the area. Following the corrective action outlined in this report, there has been no reoccurrence of flow at the surface event location.

Summary of Event:

The event was identified around 11:00am on August 8, 2011. All activity at the event had completely ceased by 10:00pm the same day following actions taken to remove steam from the area. The event consisted primarily of dry steam with trace amounts of oil, affecting an area approximately 20 feet by 20 feet. The flow of steam carried with it soil, creating a cone of soil material surrounding the source of the flow. See Attachment 1 for the approximate location of SE 2011-8-8.

Summary of Injection Activity and Response:

No wells within 300 feet of the surface event location were on injection at the time of the event. The nearest wells and their respective distances from SE 2011-8-8 were as follows:

- SW 48-42 (API# 04030417060000), 500'
- SW 41-37 (API# 04030337470000), 590'
- SW 41-35 (API# 04030337460000), 590'

Based on an analysis of wells with highest cumulative injection volumes, SW 41-35 and SW 41-37 were removed from steam immediately. Activity at the event location gradually subsided until completely stopping around 10:00pm that evening. Refer to Attachment 2 for a summary

of injection pressure and rate data for these wells for the five days prior to the event, and those noted during and subsequent to the surface expression.

It should be noted that tiltmeter ground monitoring reports did not indicate any fracture activity in the area of the surface event at the time of the event. Please see Attachment 3 for a copy of all fracture reports received by Berry over the five days prior to the surface event and including the day of.

Berry followed all company safety response procedures in responding to the surface event. See Attachment 4 for a copy of Berry's standard safety response for surface events.

Cause:

An analysis of well performance in the area of the surface event indicates that the wells removed from steam in response to the surface event were not directly connected to the surface event. No abnormal injection rate or pressure behavior was observed with either of the wells. The subsequent flowbacks for each well exhibit a sustained pressure response, indicating the injected fluid was contained local to the wellbore making it highly unlikely the wells were connected to the event located 590 feet away. See Attachment 1 for the injection pressure and rate data for the five days prior to the surface event.

The analysis instead identified two wells, on flowback at the time of the event, with abnormal pressure profiles preceding the event which were determined to be the cause of the event. The two wells identified are as follows:

- SW 45-37 (API# 04030336950000)
- SW 42-40 (API# 04030337510000)

Neither of the two wells were on steam at the time of the surface event, but both experienced similar increasing pressure trends over the month prior indicating the wells were in communication with each other. Based on the pressure and temperature data recorded over this time period, it was determined that the well SW 42-40 was on steam injection, although its operating status was set to flowback. SW 45-37 exhibits a similar, lower magnitude pressure trend over the same time period, indicating it was likely providing pressure relief to the prolonged steam injection into SW 42-40. On 8/7/2011 at 9:00pm, SW 45-37 was removed from flowback and placed on soak in response to high facility pressures resulting from field compression constraints. SE 2011-8-8 was reported at 11:00am the following morning, located 200 feet away from SW 45-37. See Attachment 5 for the pressure and temperature data for the two wells for the 30 days prior to the event.

Prevention Measures:

To prevent future flow activity at SE 2011-8-8 the two wells identified above (SW 45-37, SW 42-40) have been locked and tagged out and removed from the active steam rotation. The wells will continue to be used for pressure surveillance in the area to identify any abnormal pressure trends that could precede a reactivation of the surface event. The wells will be evaluated for

recompletion or workover potential and the DOGGR will be notified of any proposed alterations to the wells.

Berry performed a cause mapping exercise following the conclusion of the event to determine how a well was on injection with an incorrect status. The outcome of the cause mapping exercise was to determine why it happened, and how it can be prevented from happening again. The root cause was determined to be that a special event (power failure, communication errors, facility upsets) distracted the operator that originally switched the well into steam from correctly updating the status of the well in the computer system. To prevent this same mistake from happening again, a number of action items were identified as follows:

- Operations team to walk headers daily to verify well status matches actual status
- Create visual aids to identify which wells are actively injecting on a header
- Add limit switch to the steam valve that automatically updates well status (no operator input required)
- Evaluate automation of on/off steam control to automatically update status (no operator input required)
- Create a visual aid to identify abnormal pressure conditions while on flowback

Berry has implemented, and is in the process of implementing each of these action items to ensure that the root cause for this failure is not repeated. Berry continues to utilize Cause Mapping and Root Cause Failure Analysis to continuously improve its efforts to prevent surface events.

Steam Re-Initiation Plan:

It is proposed that steam be re-introduced to the surrounding area. For all wells that fall within a 150 foot radius of the surface event location and the two wells identified as being connected to the surface event (SW 45-37, SW 42-40) it is proposed that steam be re-initiated one well at a time. This strategy will allow Berry to quickly identify and remove steam from the offending well if any activity is noted at the surface event location during the steam re-initiation process. Once each well has been cycled, and confirmed to not be connected to the surface event, cyclic operations will continue as normal. Any additional activity at SE 2011-8-8 resulting from re-initiation of steam to the area will be reported to the DOGGR immediately.

Sincerely, Date:

_____ _____

Marc Whitezell
Diatomite Technical Team Lead
Berry Petroleum Company
5201 Truxtun Avenue, Suite 300
Bakersfield, CA 93309-0640

Approval of Steam Re-Initiation Plan: Date:

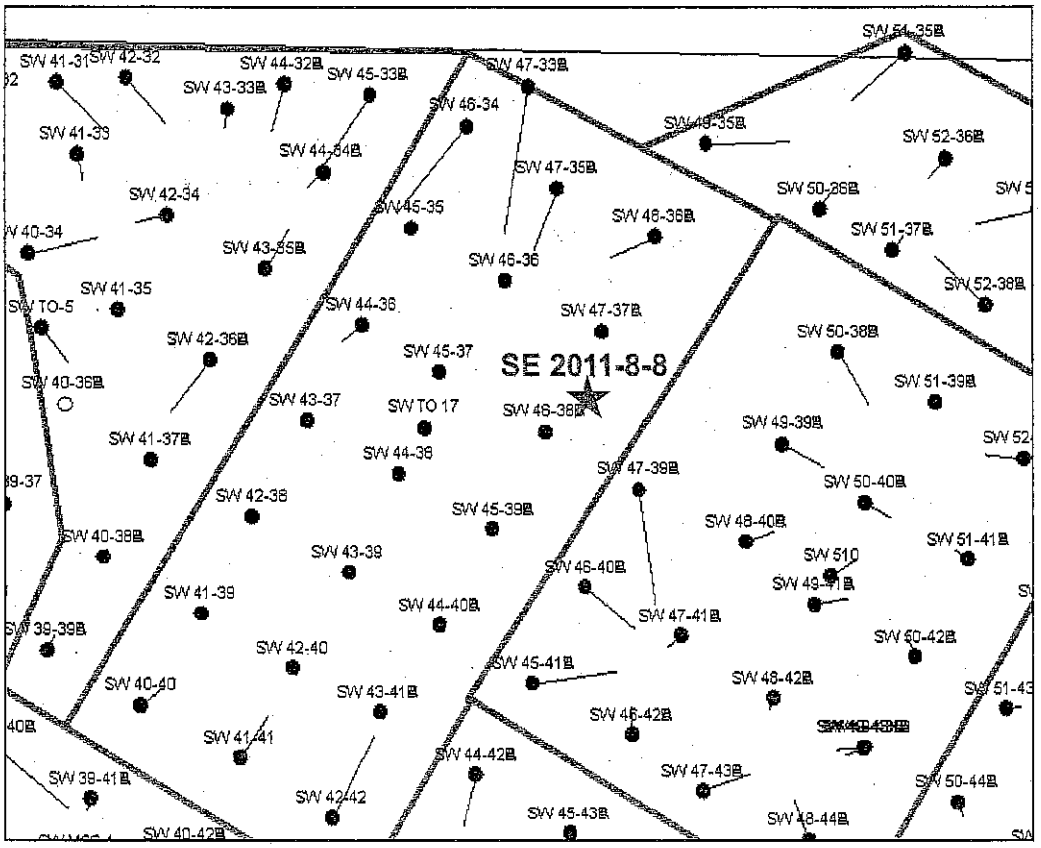
_____ _____

Dan E. Wermiel
Senior Oil and Gas Engineer
State of California, Department of Conservation
Division of Oil, Gas and Geothermal Resources
4800 Stockdale Highway
Suite 417
Bakersfield, CA 93309

Attachment 1

Approximate Location of SE 2011-8-8

Southwestern Lease, Section 2, T31S, R22E, MDBM
Midway Sunset Field
Kern County, CA


SE 2011-8-8
SW 41-31
SW 42-32
SW 44-32B
SW 45-33B
SW 43-33B
SW 47-33B
SW 46-34
SW 41-33
SW 44-34B
SW 47-35B
SW 42-34
SW 45-35
SW 46-36B
SW 40-34
SW 43-35B
SW 46-36
SW 41-35
SW TO-5
SW 44-36
SW 47-37B
SW 42-36B
SW 45-37
SW 40-36B
SW 43-37
SW TO 17
SW 46-38B
SW 41-37B
SW 44-38
SW 42-38
SW 45-39B
SW 40-38B
SW 43-39
SW 41-39
SW 44-40B
SW 39-39B
SW 42-40
SW 40-40
SW 43-41B
SW 41-41
SW 39-41B
SW 42-42
SW 40-42B
SW 54-35B
SW 49-35B
SW 52-36B
SW 50-36B
SW 51-37B
SW 52-38B
SW 50-38B
SW 51-39B
SW 49-39B
SW 47-39B
SW 50-40B
SW 48-40B
SW 51-41B
SW 46-40B
SW 510
SW 47-41B
SW 50-42B
SW 45-41B
SW 48-42B
SW 46-42B
SW 44-42B
SW 47-43B
SW 50-44B
SW 45-43B
SW 48-44B

Attachment 2

Pressure/Rate Data for wells: SW 41-35, 41-37A&B, 48-42A&B

Date	Completion Name	Pressure (psig)	Injection Rate (bspd)
8/3/2011	SW 41-35	1500	0
8/4/2011	SW 41-35	1500	0
8/5/2011	SW 41-35	1500	0
8/6/2011	SW 41-35	1500	0
8/7/2011	SW 41-35	1500	0
8/8/2011	SW 41-35	1500	0
8/3/2011	SW 41-37A	283	0
8/4/2011	SW 41-37A	298	0
8/5/2011	SW 41-37A	301	0
8/6/2011	SW 41-37A	277	0
8/7/2011	SW 41-37A	449	478
8/8/2011	SW 41-37A	597	438
8/3/2011	SW 41-37B	288	0
8/4/2011	SW 41-37B	283	0
8/5/2011	SW 41-37B	269	0
8/6/2011	SW 41-37B	244	0
8/7/2011	SW 41-37B	459	488
8/8/2011	SW 41-37B	587	437
8/3/2011	SW 48-42A	247	0
8/4/2011	SW 48-42A	250	0
8/5/2011	SW 48-42A	241	0
8/6/2011	SW 48-42A	229	0
8/7/2011	SW 48-42A	223	0
8/8/2011	SW 48-42A	509	246
8/3/2011	SW 48-42B	246	0
8/4/2011	SW 48-42B	238	0
8/5/2011	SW 48-42B	226	0
8/6/2011	SW 48-42B	220	0
8/7/2011	SW 48-42B	216	0
8/8/2011	SW 48-42B	572	515

Attachment 3

Tiltmeter reports during 5 days prior to SE 2011-8-8

Approximate location of SE 2011-8-8 identified by red star

Berry Southwestern Lease
Reservoir Monitoring Event Locator

EVENT START: 08/01/2011 10:10 hrs
EVENT END: 08/04/2011 09:30 hrs
Event Fracture Parameters
Depth = 680 ft. Top Diatomite = 459 ft Difference = -221 ft
Error Bounds = 620' to 710'
Fracture Strike Azimuth = 85 deg.
Fracture Dip = 20 deg. SE
Estimated Fracture Diameter = 590 ft.
Growth Center Coordinates
NAD27 Easting = 1527966 Northing = 643569
NAD83 Easting = 6089358 Northing = 2283995

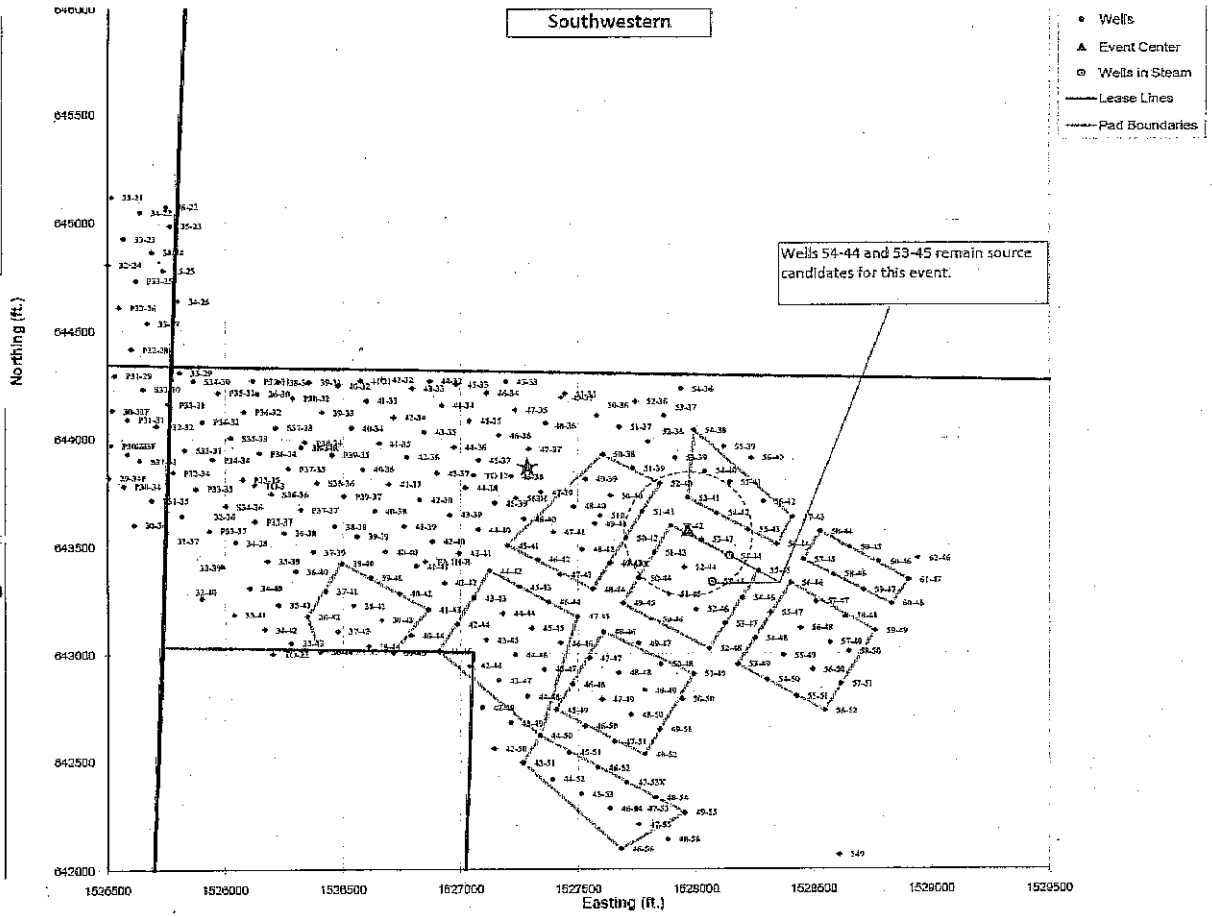
Nearest Wells

Well	Dist. (ft)
SW 53-43	71
SW 52-42	75
SW 54-42	147
SW 53-41	150
SW 53-41	152
SW 52-44	170

Wells On Steam

Well	Dist. (ft)	Well	Dist. (ft)
SW 54-44	212		#N/A
SW 53-45	259		#N/A
	#N/A		#N/A
	#N/A		#N/A
	#N/A		#N/A

Notes:
According to daily injection information, this event began and ended concurrently with the steam and soak times for nearby SW wells 54-44 and 53-45. Both wells remain source candidates for this event. This analysis supersedes previously reported results.



Berry Southwestern Lease
Reservoir Monitoring Event Locator

EVENT START: 08/02/2011 09:45 hrs
EVENT END: 08/04/2011 09:00 hrs
Event Fracture Parameters
Depth = 415 ft. Top Diatomite = 514 ft Difference = +99 ft
Error Bounds = 345' to 480'
Fracture Strike Azimuth = 202 deg.
Fracture Dip = 17 deg. NW
Estimated Fracture Diameter = 340 ft.
Growth Center Coordinates
NAD27 Easting = 1527345 Northing = 643707
NAD83 Easting = 6088737 Northing = 2284134

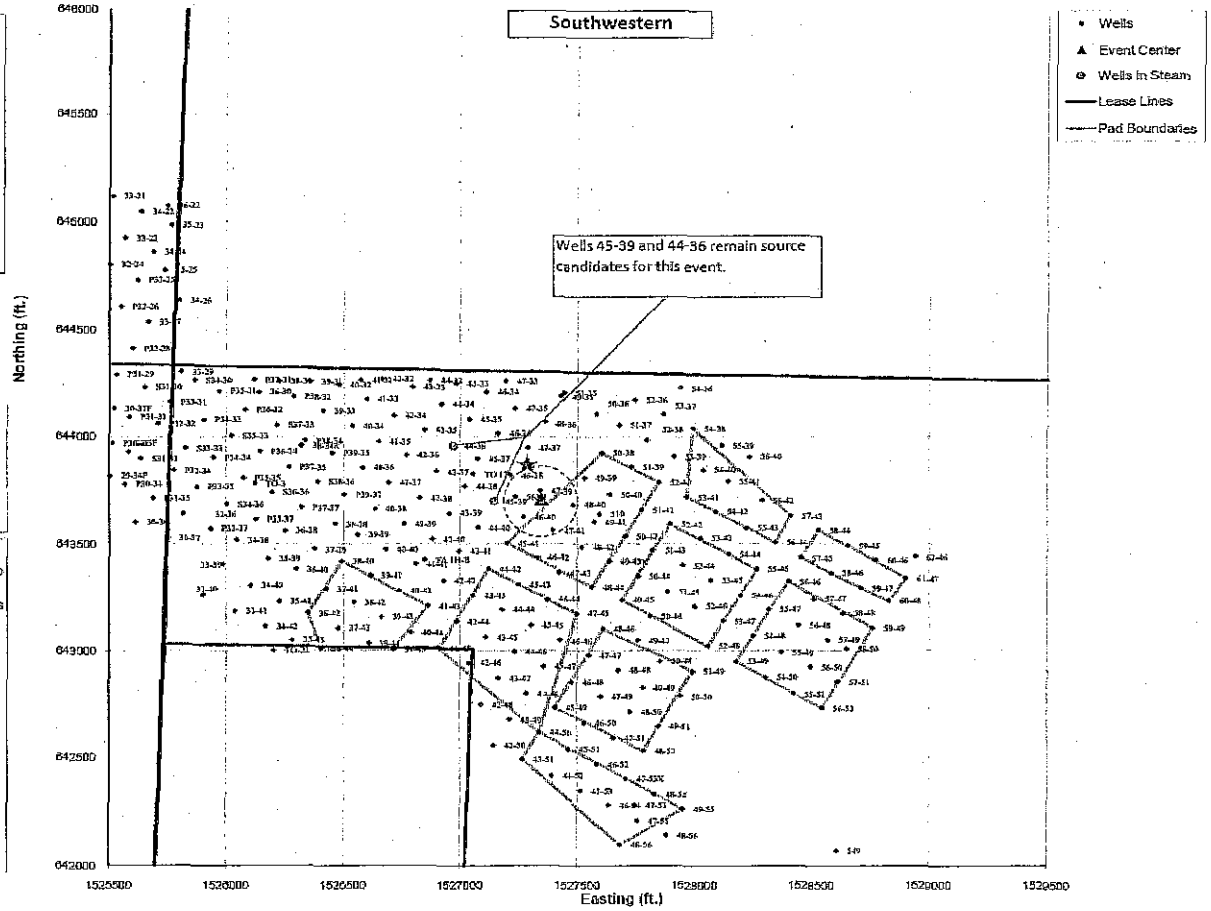
Nearest Wells

Well	Dist. (ft)
SW 47-39	42
SW 47-39	47
SW 48-40	96
FA 563H	111
SW 45-30	112
SW 46-40	129

Wells On Steam

Well	Dist. (ft)	Well	Dist. (ft)
SW 45-39	200		#N/A
SW 44-36	449		#N/A
	#N/A		#N/A
	#N/A		#N/A
	#N/A		#N/A

Notes:
According to daily injection information, this event began one and two days after the steam start times for nearby SW wells 44-36 and 45 39. Event ended shortly prior to the soak times for these wells. Both wells remain source candidates for this event. This analysis supersedes previously reported results.



Berry Southwestern Lease
Reservoir Monitoring Event Locator

EVENT START: 08/02/2011 09:45 hrs
EVENT END: 08/04/2011 09:00 hrs

Event Fracture Parameters
Depth = 540 ft. Top Diatomite = 629 ft Difference = +89 ft
Error Bounds = 450' to 660'
Fracture Strike Azimuth = 29 deg.
Fracture Dip = 18 deg. SE
Estimated Fracture Diameter = 410 ft.

Growth Center Coordinates
NAD27 Easting = 1527461 Northing = 643203
NAD83 Easting = 6088853 Northing = 2283629

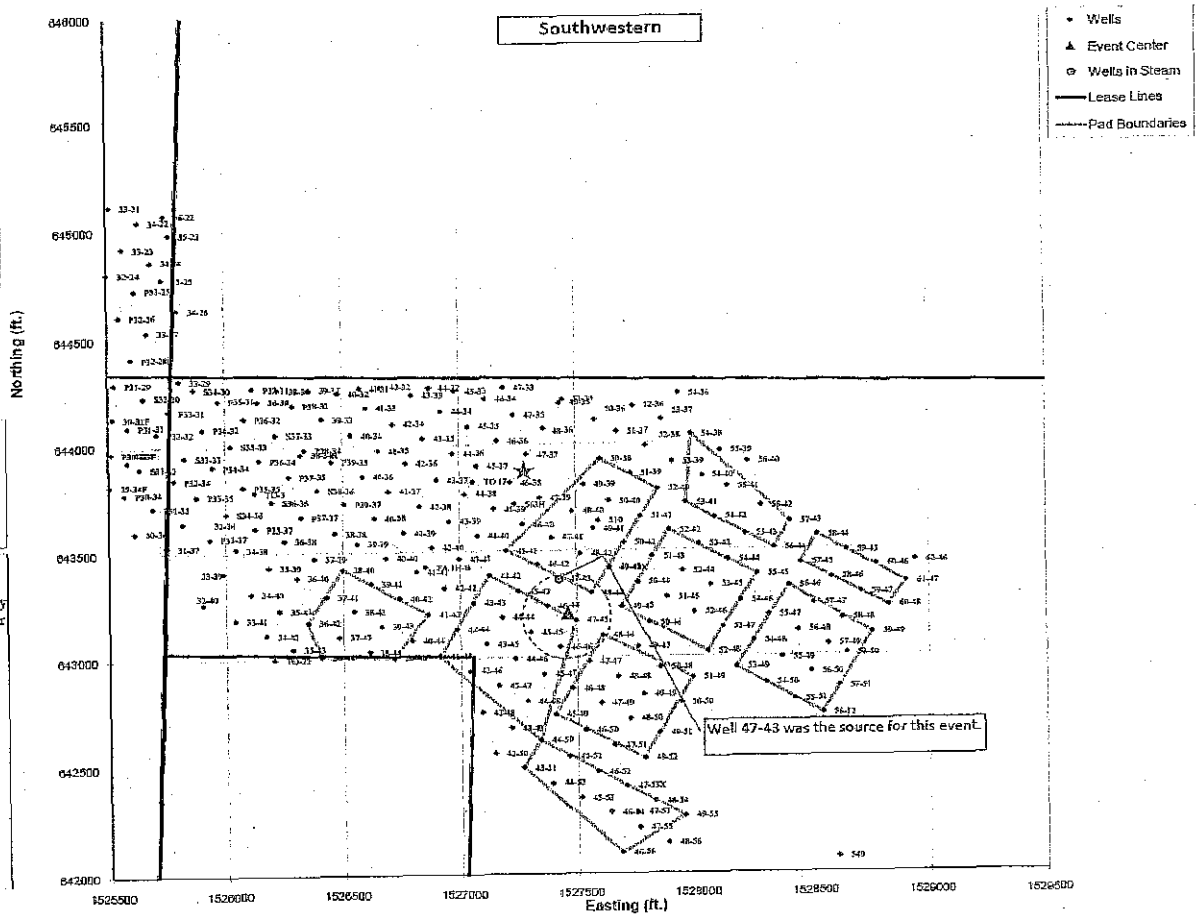
Nearest Wells

Well	Dist. (ft)
SW 47-45	46
SW 45-44	96
SW 48-44	141
SW 45-45	157
SW 47-43	167
SW 48-46	177

Wells On Steam

Well	Dist. (ft)	Well	Dist. (ft)
SW 47-43	167		#N/A
	#N/A		#N/A
	#N/A		#N/A
	#N/A		#N/A
	#N/A		#N/A

Notes:
According to daily injection information, this event began two days after the steam start time for nearby well 47-43 and ended concurrently with the soak time for this well. This well was therefore the source for this event. This analysis supersedes previously reported results.



Berry Southwestern Lease
Reservoir Monitoring Event Locator

EVENT START: 08/04/2011 09:30 hrs
EVENT END: 08/08/2011 08:20 hrs

Event Fracture Parameters
Depth = 465 ft. Top Diatomite = 533 ft Difference = +68 ft
Error Bounds = 410' to 535'
Fracture Strike Azimuth = 140 deg.
Fracture Dip = 23 deg. SW
Estimated Fracture Diameter = 225 ft.
Growth Center Coordinates
NAD27 Easting = 1527646 Northing = 643519
NAD83 Easting = 6089038 Northing = 2283945

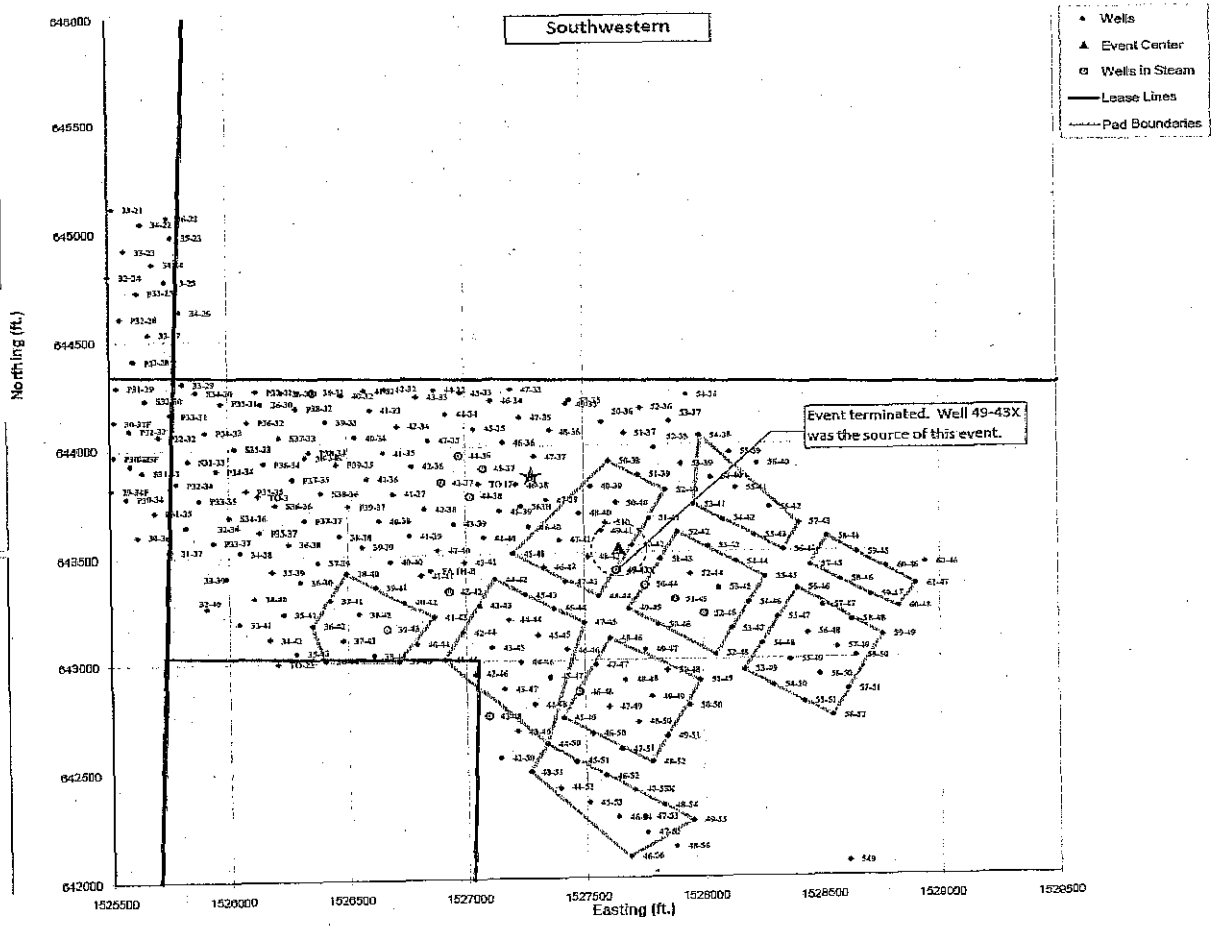
Nearest Wells

Well	Dist. (ft)
SW 50-42	59
SW 49-43	85
SW 49-43	100
SW 49-43X	100
SW 49-41	113
SW 510	152

Wells Switched To Soak

Well	Dist. (ft)	Well	Dist. (ft)
SW 49-43X	100	SW 46-48	683
SW 50-41	303	SW 45-37	685
SW 51-45	338	SW 44-36	804
SW 52-46	473	SW 43-37	811
SW 44-38	673	SW 42-48	948

Notes:
Event 2011/08/04A terminated at 08:20 hrs on August 8, 2011. This event started shortly after the steam start time of nearby well 49-43X and event end correlated with the steam end time of this same well. SW 49-43X was the source of this event. This report supersedes previously reported results.



Berry Southwestern Lease
Reservoir Monitoring Event Locator

EVENT START: 08/04/2011 09:10 hrs
EVENT END: 08/07/2011 10:20 hrs
Event Fracture Parameters
Depth = 610 ft. Top Diatomite = 591 ft Difference = -19 ft
Error Bounds = 520' to 750'
Fracture Strike Azimuth = 119 deg.
Fracture Dip = 18 deg. SW
Estimated Fracture Diameter = 380 ft.
Growth Center Coordinates
NAD27 Easting = 1527735 Northing = 643100
NAD83 Easting = 6089127 Northing = 2283526

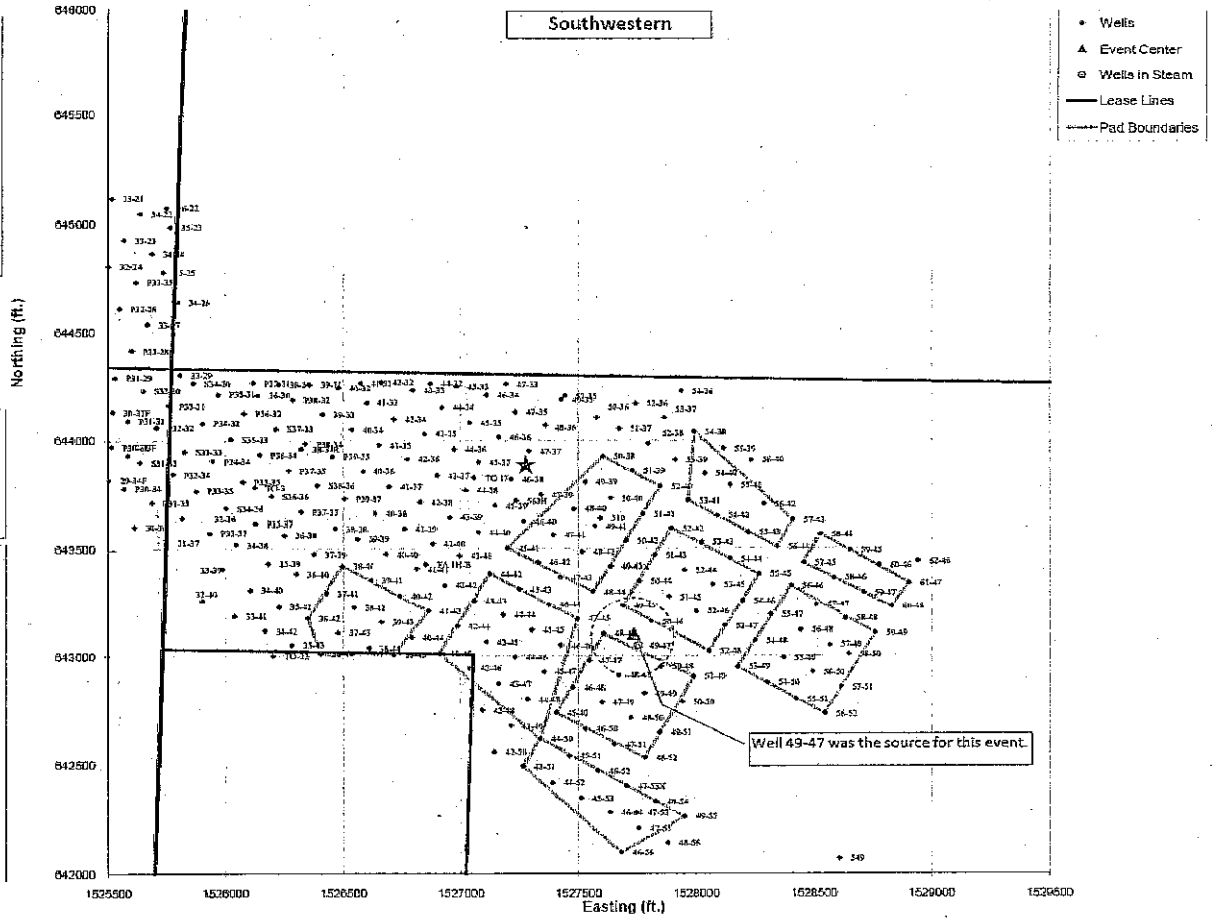
Nearest Wells

Well	Dist. (ft)
SW 49-47	54
SW 50-46	96
SW 48-46	128
SW 48-45	144
SW 50-48	189
SW 48-48	200

Wells On Steam

Well	Dist. (ft)	Well	Dist. (ft)
SW 49-47	54		#N/A
	#N/A		#N/A
	#N/A		#N/A
	#N/A		#N/A
	#N/A		#N/A

Notes:
According to daily injection information, this event began and ended concurrently with the steam and soak times for nearby well 49-47. This well was therefore the source for this event. This analysis supersedes previously reported results.



Berry Southwestern Lease
Reservoir Monitoring Event Locator

EVENT START: 08/04/2011 05:45 hrs
EVENT END: 08/04/2011 17:40 hrs

Event Fracture Parameters
Depth = 680 ft. Top Diatomite = 870 ft Difference = +190 ft
Error Bounds = 610' to 760'
Fracture Strike Azimuth = 12 deg.
Fracture Dip = 18 deg. SE
Estimated Fracture Diameter = 220 ft

Growth Center Coordinates
NAD27 Easting = 1526128 Northing = 643329
NAD83 Easting = 6087520 Northing = 2283755

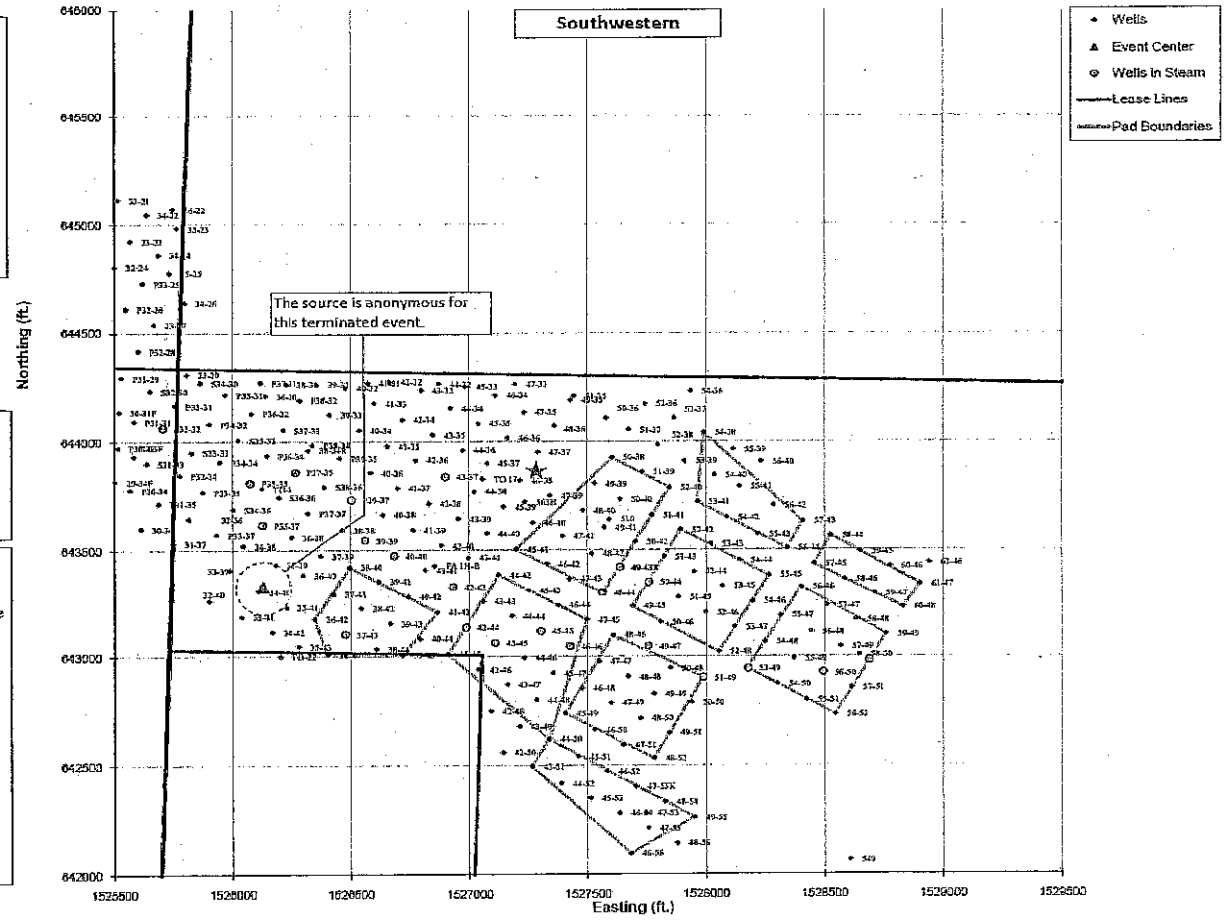
Nearest Wells

Well	Dist. (ft)
SW 34-40	31
SW 35-39	116
SW 35-41	140
SW 33-39	160
SW 33-41	168
SW 36-40	181

Wells On Steam

Well	Dist. (ft)	Well	Dist. (ft)
SW P35-37	286	SW P39-37	550
SW 37-43	414	SW 40-40	574
SW P35-35	482	SEV P32-32	844
SW 39-39	483	SW 42-44	879
SW P37-35	548	SW 43-37	934

Notes:
Event 2011/08/04C began and ended on August 4, 2011. Reported injection information did not correlate with the occurrence of this event. A source has not been identified for this terminated event. We will continue to monitor this area for any signs of re-inflation.



Berry Southwestern Lease
Reservoir Monitoring Event Locator

EVENT START: 08/06/2011 09:15 hrs
EVENT END: 08/07/2011 22:00 hrs

Event Fracture Parameters
Depth = 660 ft. Top Diatomite = 700 ft Difference = +40 ft
Error Bounds = 560' to 820'
Fracture Strike Azimuth = 22 deg.
Fracture Dip = 17 deg. SE
Estimated Fracture Diameter = 360 ft.

Growth Center Coordinates
NAD27 Easting = 1526597 Northing = 643566
NAD83 Easting = 6087989 Northing = 2283992

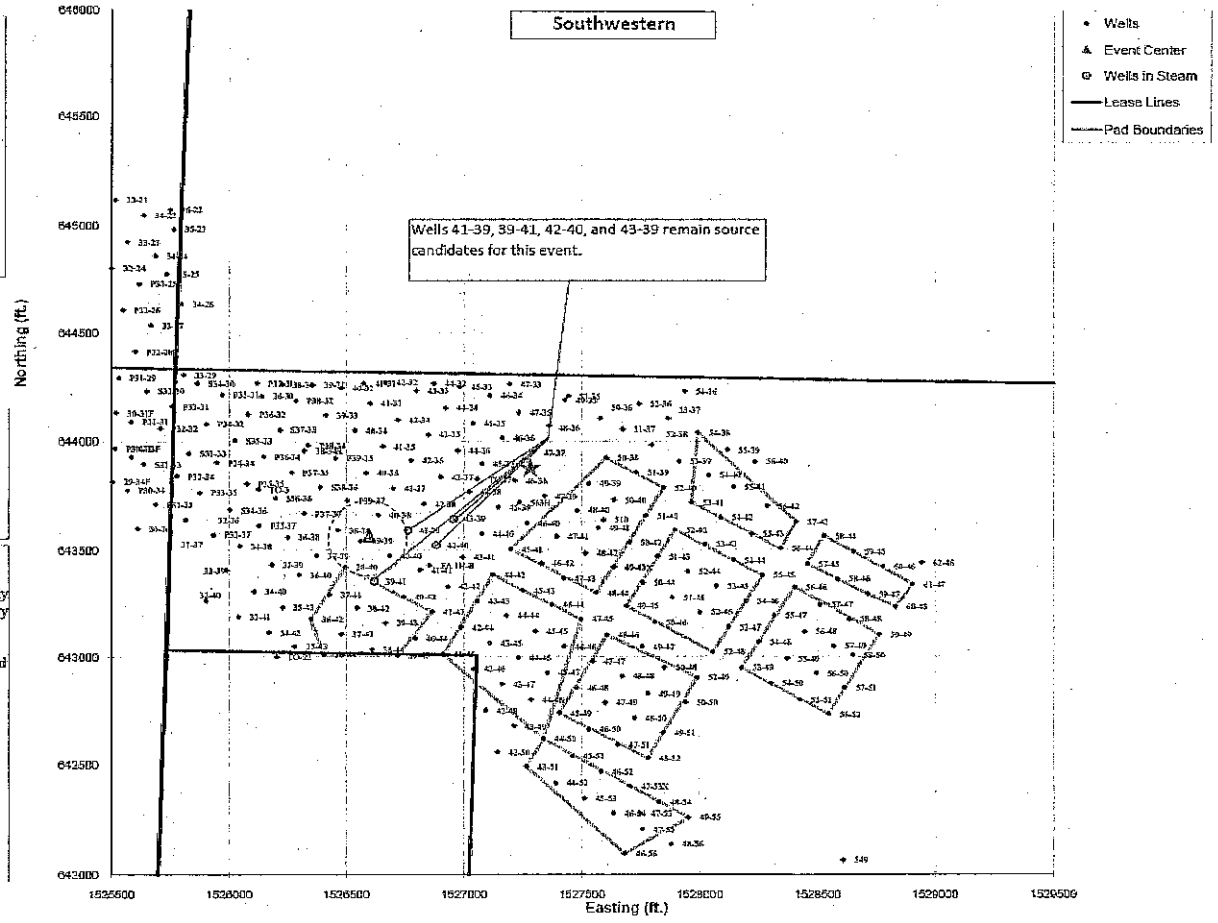
Nearest Wells

Well	Dist. (ft)
SW 39-39	43
SW 40-38	104
SW 40-40	126
SW 38-38	136
SW 41-39	167
SW 38-40	178

Wells On Steam

Well	Dist. (ft)	Well	Dist. (ft)
SW 41-39	167		#N/A
SW 39-41	212		#N/A
SW 42-40	288		#N/A
SW 43-39	366		#N/A
	#N/A		#N/A

Notes:
Event 2011/08/06A terminated at 22:00 hrs on August 7, 2011.
According to daily injection information, this event began concurrently with the steam start time for nearby wells 41-39 and 39-41 and one day after nearby wells 42-40 and 43-39 were switched in. These wells were still in steam during event termination and remain source candidates for this event. This analysis supersedes previously reported results.



Berry Southwestern Lease
Reservoir Monitoring Event Locator

EVENT START: 08/07/2011 19:40 hrs
EVENT END: 08/08/2011 11:30 hrs
Event Fracture Parameters
Depth = 290 ft. Top Diatomite = 591 ft Difference = +301 ft
Error Bounds = 240' to 340'
Fracture Strike Azimuth = 32 deg.
Fracture Dip = 1 deg. SE
Estimated Fracture Diameter = 170 ft.
Growth Center Coordinates
NAD27 Easting = 1526817 Northing = 643837
NAD83 Easting = 6088209 Northing = 2284263

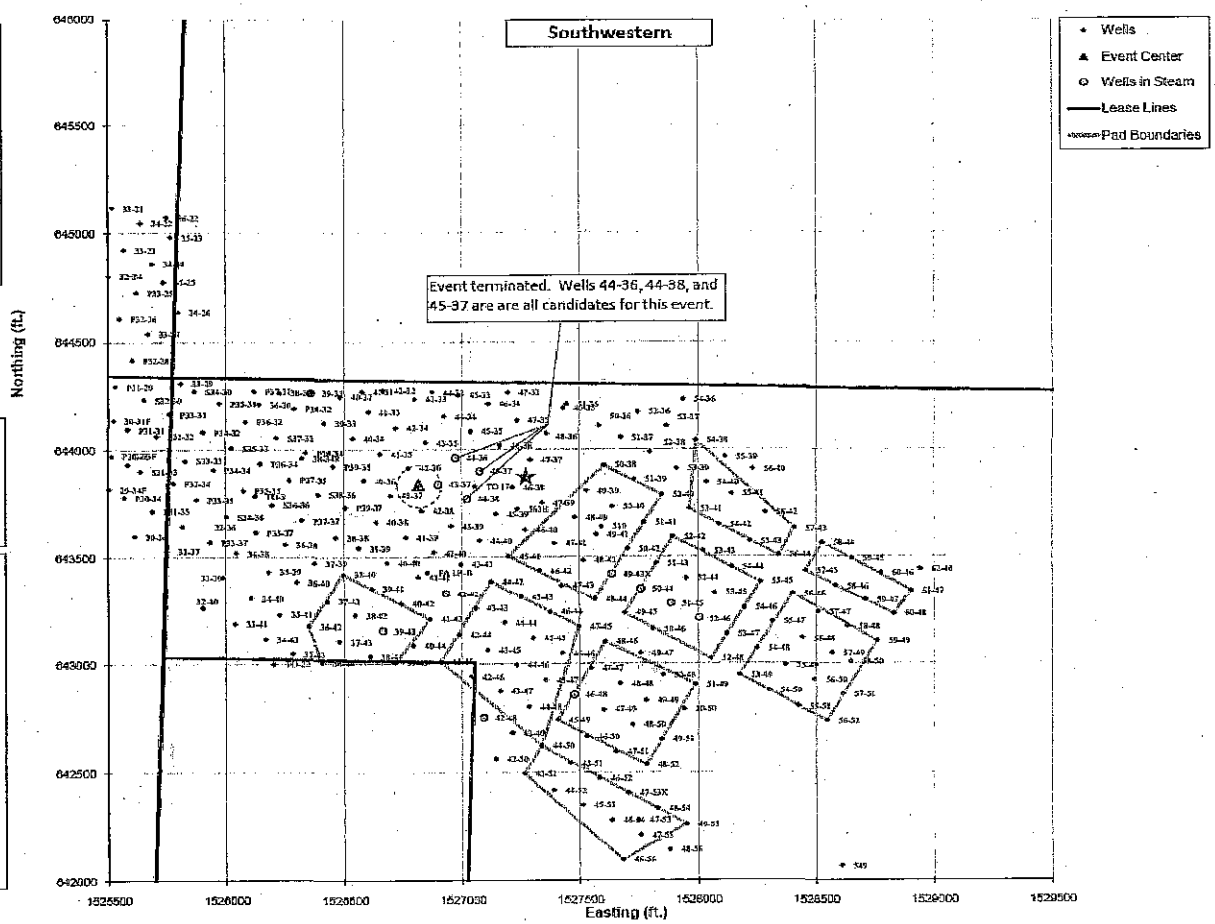
Nearest Wells

Well	Dist. (ft)
SW 42-37	83
SW 42-36	88
SW 42-38	123
SW 41-37	130
SW 43-35	196
SW 44-36	198

Wells Switched To Soak

Well	Dist. (ft)	Well	Dist. (ft)
0-Jan	#N/A	0-Jan	#N/A
0-Jan	#N/A	0-Jan	#N/A
0-Jan	#N/A	0-Jan	#N/A
0-Jan	#N/A	0-Jan	#N/A
0-Jan	#N/A	0-Jan	#N/A

Notes:
Event 2011/08/07A terminated at 11:30 hrs on August 8, 2011 after several subsidence/re-inflation cycles. Previously named source candidates remained in steam. Based on injection data, event appears to be related to the steaming of nearby SW wells 44-36, 44-38, and/or 45-37. These wells were removed from steam approximately 2 hours after event initiation. This report supersedes previously reported results.



Berry Southwestern Lease
Reservoir Monitoring Event Locator

EVENT START: 08/08/2011 08:45 hrs
EVENT END: 08/10/2011 15:30 hrs

Event Fracture Parameters

Depth = 165 ft. Top Diatomite = 521 ft Difference = +356 ft
Error Bounds = 140' to 185'
Fracture Strike Azimuth = 330 deg.
Fracture Dip = 23 deg. NE
Estimated Fracture Diameter = 200 ft.

Growth Center Coordinates

NAD27 Easting = 1527461 Northing = 643514
NAD83 Easting = 6088853 Northing = 2283940

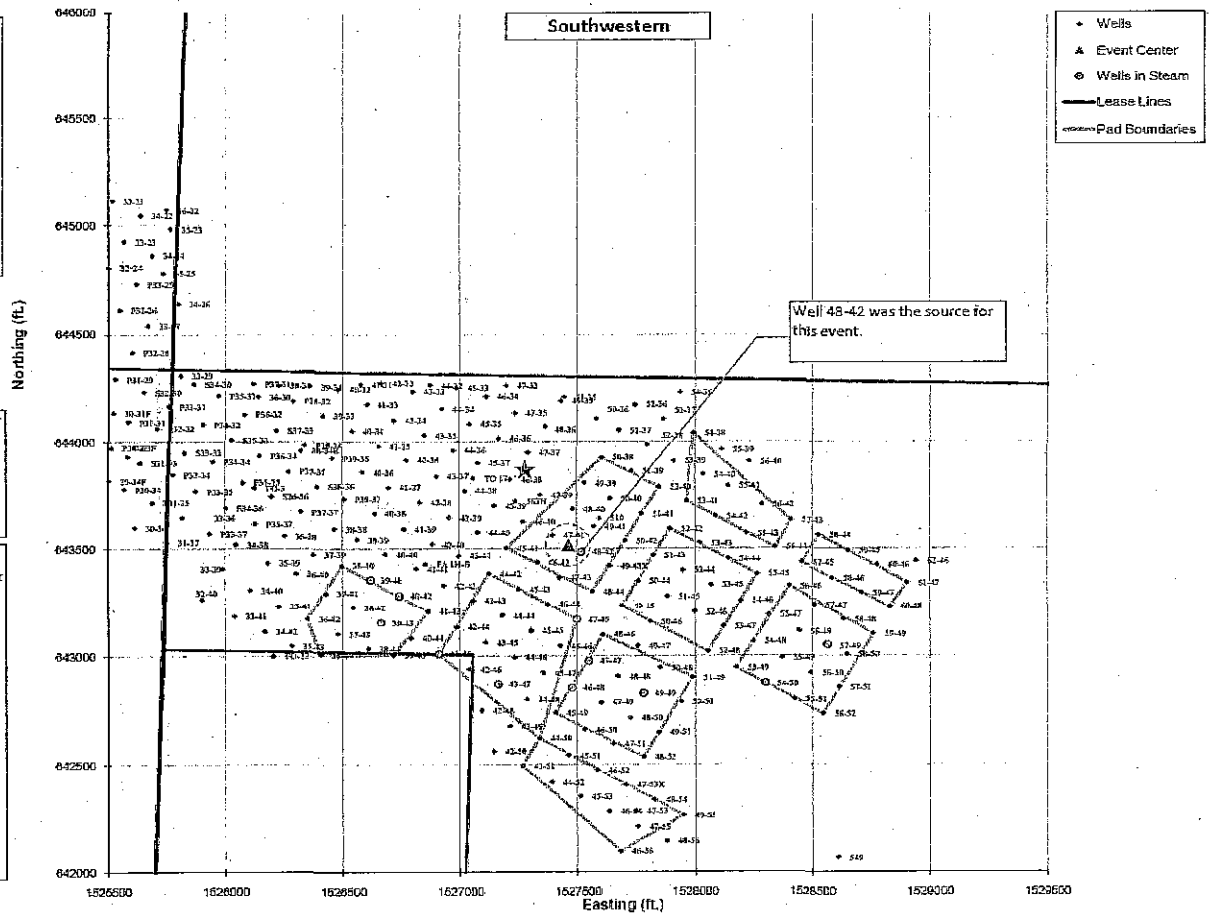
Nearest Wells

Well	Dist. (ft)
SW 48-42	63
SW 47-41	83
SW 49-41	141
SW 47-43	153
SW 46-42	154
SW 49-41	158

Wells Switched To Soak

Well	Dist. (ft)	Well	Dist. (ft)
SW 48-42	63	SW 41-45	745
SW 47-45	342	SW 49-49	755
SW 47-47	541	SW 39-41	858
SW 46-48	657	SW 39-43	872
SW 43-47	207	SW 54-50	1054

Notes:
According to daily injection infoomation, this event began shortly after the steam start time for nearby well 48-42 and ended concurrent to the soak time for this well. Therefore, well 48-42 was the source for this event. This analysis supersedes previously reported results.



Attachment 4

Berry Petroleum Company Surface Event Emergency Response Procedure

Berry Petroleum Company
NMWSS Production Office
25072 Hwy 33
Fellows, California 93224
(661) 768-4554

TO: All NMWSS Employees DATE: 10/1/07

FROM: Chuck Jaster

SUBJECT: NMWSS Surface Event E.R.P.

Below is a list of action items to be followed in the event of a "Surface Event". A surface event is defined as an unplanned release of steam, oil, water or gas separately or in combination. This list applies to both Diatomite and Non-Diatomite operations.

1. Check area for any company or contract personnel who may have been exposed to the release. Shut down any ongoing construction, well servicing or maintenance operations and evacuate area.

2. Monitor wind direction for H2S. Call 911 if necessary and alert emergency response personnel. Meet emergency response vehicles/personnel at intersection of Hwy 33 and Pacific Perforating. Approximately 1 mile south of Derby Acres.

3. Contact your supervisor ASAP. If on a weekend or after hours call the duty supervisor.

4. Restrict access to the area using barricades and caution tape.

5. Monitor area for possible sources of ignition (electric or open flame).

6. If applicable, shut steam out of any offset cyclic or continuous injectors that are adjacent or in close proximity of the surface release.

7. If applicable, begin designed flowback(s) of nearby shut in or idle wells to reduce reservoir pressure.

8. If applicable, providing it is safe to do so, make arrangements to install a steel "blow out" box over and or around the well/vent to contain/reduce any aerosol spray.

9. If applicable, construct a secondary containment berm to contain any liquids.

10. If applicable, local supervision may elect to make arrangements for 24 hour surveillance to monitor the area for any additional or new activity.

Chuck Jaster

MNDI Operations Superintendent
NMWSS Asset Team

Attachment 5

Pressure/Rate Data for 30 Days Prior to SE 2011-8-8 for wells: SW 42-40, SW 45-37

Date	Well Name	Pressure (psig)	Injection Rate (bspd)
7/8/2011	SW 42-40	263	674
7/9/2011	SW 42-40	422	0
7/10/2011	SW 42-40	480	0
7/11/2011	SW 42-40	529	0
7/12/2011	SW 42-40	496	0
7/13/2011	SW 42-40	576	0
7/14/2011	SW 42-40	603	0
7/15/2011	SW 42-40	604	0
7/16/2011	SW 42-40	628	0
7/17/2011	SW 42-40	632	0
7/18/2011	SW 42-40	641	0
7/19/2011	SW 42-40	645	0
7/20/2011	SW 42-40	654	0
7/21/2011	SW 42-40	667	0
7/22/2011	SW 42-40	671	0
7/23/2011	SW 42-40	718	0
7/24/2011	SW 42-40	789	0
7/25/2011	SW 42-40	817	0
7/26/2011	SW 42-40	820	0
7/27/2011	SW 42-40	824	0
7/28/2011	SW 42-40	826	0
7/29/2011	SW 42-40	820	0
7/30/2011	SW 42-40	831	0
7/31/2011	SW 42-40	830	0
8/1/2011	SW 42-40	832	0
8/2/2011	SW 42-40	824	0
8/3/2011	SW 42-40	819	0
8/4/2011	SW 42-40	815	0
8/5/2011	SW 42-40	848	172
8/6/2011	SW 42-40	745	0
8/7/2011	SW 42-40	741	106
8/8/2011	SW 42-40	681	0
7/8/2011	SW 45-37	294	0
7/9/2011	SW 45-37	303	0
7/10/2011	SW 45-37	296	0
7/11/2011	SW 45-37	305	0
7/12/2011	SW 45-37	261	0
7/13/2011	SW 45-37	292	0
7/14/2011	SW 45-37	294	0
7/15/2011	SW 45-37	287	0
7/16/2011	SW 45-37	299	0

7/17/2011	SW 45-37	301	0
7/18/2011	SW 45-37	305	0
7/19/2011	SW 45-37	304	0
7/20/2011	SW 45-37	308	0
7/21/2011	SW 45-37	306	0
7/22/2011	SW 45-37	304	0
7/23/2011	SW 45-37	362	0
7/24/2011	SW 45-37	416	0
7/25/2011	SW 45-37	417	0
7/26/2011	SW 45-37	425	0
7/27/2011	SW 45-37	437	0
7/28/2011	SW 45-37	451	0
7/29/2011	SW 45-37	463	0
7/30/2011	SW 45-37	478	0
7/31/2011	SW 45-37	469	0
8/1/2011	SW 45-37	463	0
8/2/2011	SW 45-37	462	0
8/3/2011	SW 45-37	472	0
8/4/2011	SW 45-37	477	0
8/5/2011	SW 45-37	477	0
8/6/2011	SW 45-37	483	0
8/7/2011	SW 45-37	469	0
8/8/2011	SW 45-37	235	0

PXP

Cymric
7/31/11

REPORT OF OCCURRENCE

TYPE C/D _____ Date 7/31/11

LOCATION Cymric, Star Fee Lease

Operator PXP Representative Charlotte Campbell Phone 661-9120-7518

Occurrence Detected July 31, (month, day) , 2011 (year) ; 0600 am/pm

Occurrence Ended Ongoing (month, day) , _____ (year) ; _____ am/pm

Field Cymric Sec., T., R. 6 T30S/R22E Lease and Well Star Fee

Other Location Description Star Fee lease, nearest well is 463U

O.E.S. Notified? 11-4547 (toll-free number: 800-852-7550)

DOGGR Notified by (Name, Affiliation, Phone Number, and Time) Charlotte Campbell

Volume of Spill See Comments bbls oil; _____ bbls water

Areal Extent 6'-8' diameter vent with approx. 60' x 25' spray covered ground and a fluid filled depression approximately 75'x30'x4'.

Property or Waterways Damaged or Threatened N/A

Weather and Sea Conditions (Offshore Spills Only) N/A

Injuries N/A

Source and Cause of Occurrence Steam injection into shallow diatomite reservoir over fracture gradient resulting surface rupture of steam, water and oil. The producing diatomite reservoir in this area is at a depth of 1000' to 1500' .

Containment and Cleanup Fluid is flowing into a bermed depression and being removed by vacuum trucks. To keep the depression from overflowing, soil was also mixed with the fluid and stockpiled.

Operator Plans to Prevent Reoccurrence Steam injection on the entire Star Fee lease was shut-in. Two wells 445L and 445N , located approx. 200 yards to the east, have been identified as the likely source. The two wells will be evaluated for rework or ab'd.

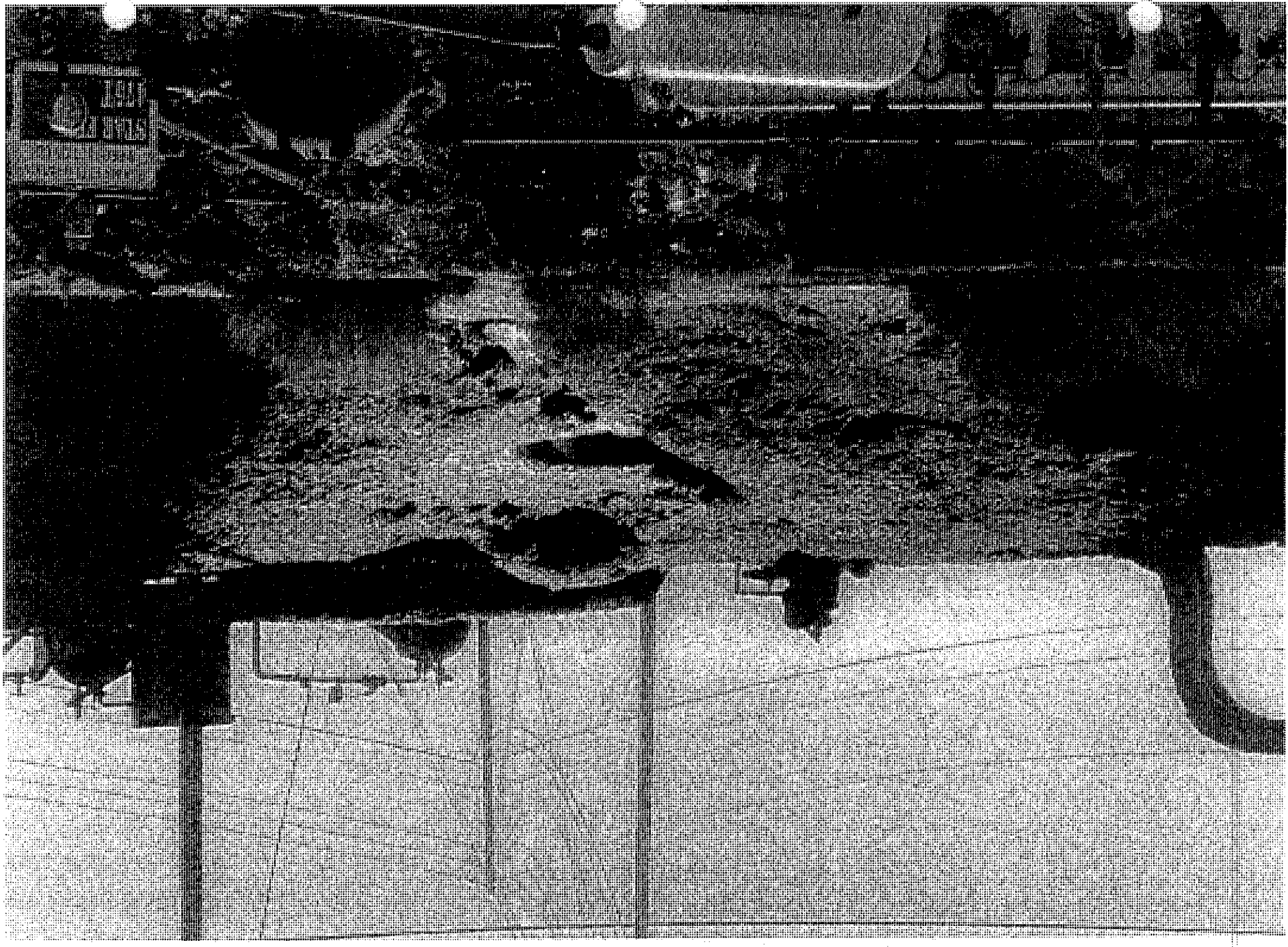
Estimate of Property Damage (dollar loss) _____ or Cleanup Cost _____

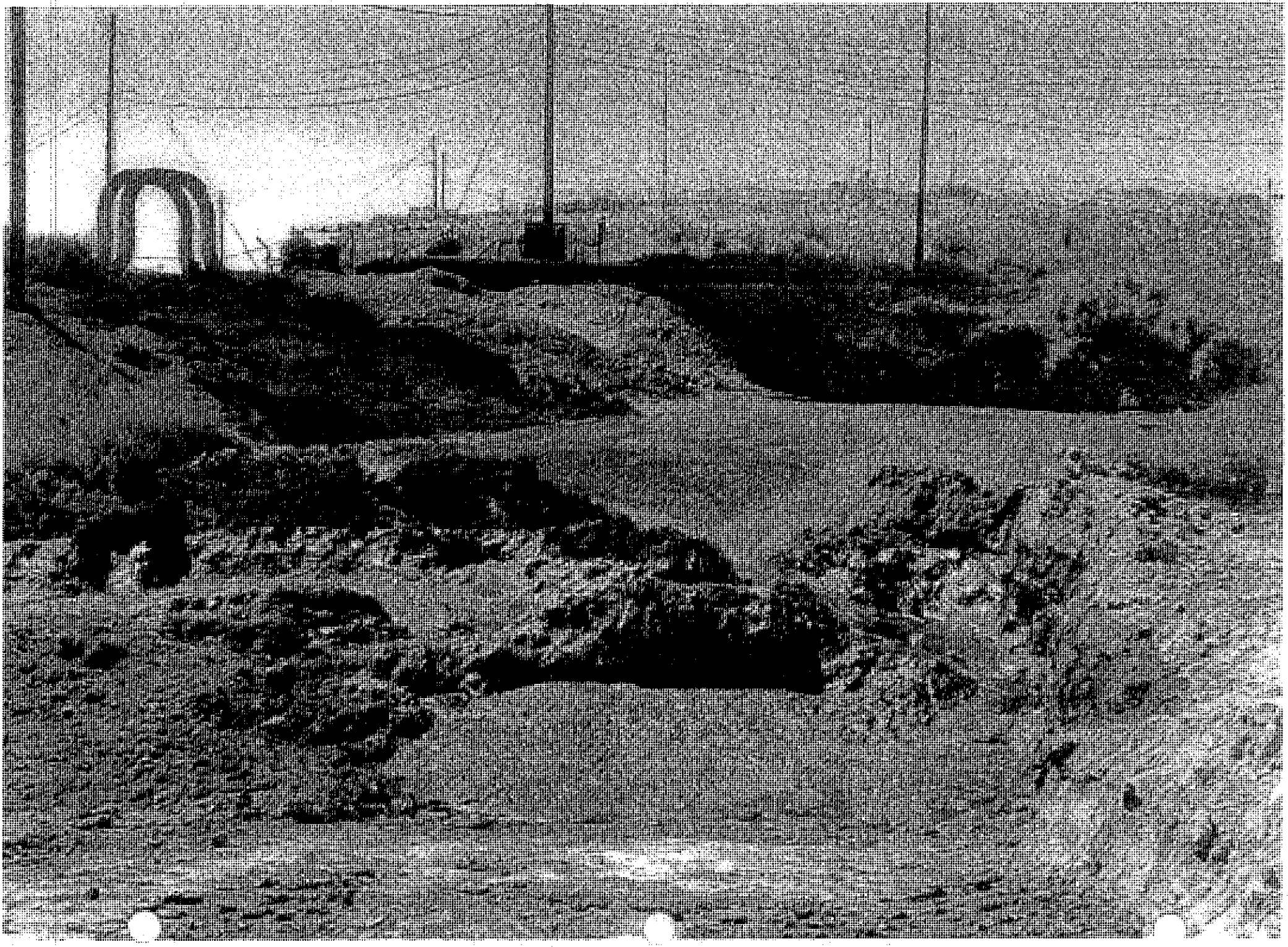
Additional Information On Sunday July 31, 2011, PXP reported to the District 4 on call engineer the occurrence of a 2 bbl oil and 50 bbl mud surface expression, covering an area of appox. 800 sq. ft. The location was visited on the morning of Aug 2. The extent of the surface expression fluid covered an existing depression approx 75'x 30'x 4'deep or approx. 1600 bbls of fluid/mud. It was reported that another 1000 bbls of fluid had been removed by vacuum trucks. A tilt meter event reportedly occurred on June 30th at 2200hrs near the actual surface expression location. There is an approx. 24 hour interpretation tilt meter lag time. Plans are being made to slowly resume steam injection with a 150' restriction around the surface expression and the two wells thought to be responsible. Status on 8-3-11 reported approximately 5 bbls/day of flowing fluid. The surface expression location is reportedly very near a 2003 event of lesser severity. The bermed depression was constructed for the 2003 event.

(Use reverse side if additional space is needed.)

Report Prepared by Michael Toland Date 8-3-11

OG184 (3/98)





FORMAL ORDERS

DEPARTMENT OF CONSERVATION

Managing California's Working Lands

Division of Oil, Gas, & Geothermal Resources

801 K STREET • MS 20-20 • SACRAMENTO, CALIFORNIA 95814

PHONE 916 / 445-9686 • FAX 916 / 323-0424 • TDD 916 / 324-2555 • WEB SITE conservation.ca.gov

ORDER NO. 1012

by

Elena M. Miller

STATE OIL AND GAS SUPERVISOR

DATED

July 6, 2011

Chevron U.S.A. Inc.

Midway Sunset Field
Antelope/Diatomite Zones

Kern County

On June 21, 2011, Chevron U.S.A. Inc (Chevron) reported to the Department of Conservation, Division of Oil, Gas, and Geothermal Resources (DOGGR) that a surface expression of steam was occurring in the vicinity of Well 20 and Well K210 in the Midway-Sunset Field (Section 21, T. 32S, R. 23E). Chevron dispatched staff to investigate the surface expression and while investigating a Chevron employee fell through the surface and died. The fatality occurred at Midway-Sunset Field at the southeast corner of the Well 20 site and was reported to DOGGR on June 21, 2011 at 10:45 a.m.

Cyclic steaming injection operations are conducted in the Midway-Sunset Field to provide enhanced oil recovery from diatomite formations. Well 20 is a damaged well and surface expressions of fluids and gases in the vicinity of Well 20 were first reported to DOGGR prior to 2008. Attempts by Chevron to plug and abandon Well 20 have failed and in Spring 2011, Chevron commenced efforts to construct containment of the surface expression in the vicinity of Well 20.

The surface expression in the vicinity of Well 20 is directly related to cyclic steaming injection operations in the field. Although there may be some natural seepage of oil and water in the area, any expression of steam at the surface can only be attributed to steaming or cyclic steaming injection operations. The State Oil and Gas Supervisor (Supervisor) has determined that immediate steps must be taken in order to prevent further harm from occurring as a result of the surface expression.

Public Resources Code section 3106 states: "The supervisor shall so supervise the drilling, operations, maintenance, and abandonment of wells and the operation, maintenance, and removal or abandonment of tanks and facilities attendant to oil and gas production ... so as to prevent, as far as possible, damage to life, health, property, and natural resources ...." In reference to underground injection projects, California Code of Regulations, title 14, section 1724.10, subdivision (h) states: "Data shall be maintained to show performance of the project and to establish that no damage to life, health, property, or natural resources is occurring by reason of the project. Injection shall be stopped if there is evidence of such damage, or loss of hydrocarbons, or upon written notice from the Division. ..."

Therefore, to protect public health and safety in furtherance of the authorities cited above, and acting pursuant to Public Resources Code sections 3224 and 3226, the Supervisor orders that, in order to prevent steam and fluids from coming to the surface, Chevron will immediately cease all injection operations within a 150 foot radius of the surface expression of steam being investigated by Chevron employees at the time of the accident. If after five days steam or fluids continue to come to the surface, Chevron shall immediately cease all injection operations within a 300 foot radius of the subject surface expression.

Injection operations shall not resume until the Supervisor is satisfied that the cause of the surface expression is determined and remediated.

With permission from the Division, injection may be conducted for the limited purpose of conducting testing while this order is in effect.

This order may be appealed by filing a written statement with the Supervisor or district deputy that the order is not acceptable within ten (10) days of receipt of the order.

Elena M. Miller
State Oil and Gas Supervisor

by Robert S Habel
Robert S. Habel
Chief Deputy State Oil and Gas Supervisor

cc: DOGGR-HQ
James Pierce, Senior Staff Counsel

Certified Mail Receipt No. 7006 0810 0005 0961 7633

1012
Amended

DEPARTMENT OF CONSERVATION

Managing California's Working Lands

Division of Oil, Gas, & Geothermal Resources

801 K STREET • MS 20-20 • SACRAMENTO, CALIFORNIA 95814

PHONE 916 / 445-9686 • FAX 916 / 323-0424 • TDD 916 / 324-2555 • WEB SITE conservation.ca.gov

AMENDED

ORDER NO. 1012

by

Elena M. Miller

STATE OIL AND GAS SUPERVISOR

DATED

July 28, 2011

Chevron U.S.A. Inc.

Midway Sunset Field
Antelope/Diatomite Zones

Kern County

This Amended Order No. 1012 rescinds, supersedes, and replaces Order No. 1012, issued on July 6, 2011.

On June 21, 2011, a fatality occurred in the vicinity of "Well 20" (API 029-23672) in the Midway-Sunset Field (Section 21, T. 32S, R. 23E). Well 20 is operated by Chevron U.S.A. Inc. (Chevron). Chevron reported to the Division of Oil, Gas, and Geothermal Resources (DOGGR) that one of its employees fell into a hole that contained steam, hot water, and H_2S gas.

Cyclic steaming injection operations are conducted in the Midway-Sunset Field to provide enhanced oil recovery from diatomite formations. Cyclic steaming injection operations at times lead to "surface expressions" of oil, gases, and other fluids. Chevron has informed DOGGR that it was not conducting cyclic steaming injection operations in the vicinity of Well 20 since December 2008, yet a surface expression exists in the vicinity of Well 20. DOGGR believes that the surface expression in the vicinity of Well 20 is directly related to cyclic steaming injection operations in the field. Although seepage of oil and water may occur in the area, any expression of steam at the surface can only reasonably be attributed to steaming or cyclic steaming injection operations. The State Oil and Gas Supervisor (Supervisor) has determined that immediate steps must be taken in order to prevent further harm from occurring as a result of the surface expression in the vicinity of Well 20.

Public Resources Code Section 3106 states: "The supervisor shall so supervise the drilling, operations, maintenance, and abandonment of wells and the operation, maintenance, and removal or abandonment of tanks and facilities attendant to oil and gas production ... so as to prevent, as far as possible, damage to life, health, property, and natural resources ...." In reference to underground injection projects, California Code of Regulations, Title 14, Section 1724.10, subdivision (h) states: "Data shall be maintained . . . to establish that no damage to life, health, property, or natural resources is occurring by reason of the project. Injection shall be stopped if there is evidence of such damage, or loss of hydrocarbons, or upon written notice from the Division . . . ."

To protect public health and safety in furtherance of the authorities cited above, and acting pursuant to Public Resources Code Sections 3224 and 3226, the Supervisor orders that, in order to prevent steam and fluids from coming to the surface, Chevron shall not conduct injection operations within a 300 foot radius of the surface expression in the vicinity of Well 20. Injection operations shall not resume within the 300 foot radius until the Supervisor is satisfied that the cause of the surface expression in the vicinity of Well 20 is determined and remediated.

With permission from the Division, injection may be conducted for the limited purpose of conducting testing while this order is in effect.

This order may be appealed by filing a written statement with the Supervisor or district deputy that the order is not acceptable within ten (10) days of receipt of the order.

Elena M. Miller
State Oil and Gas Supervisor

cc: DOGGR-Headquarters
James Pierce, Senior Staff Counsel

Certified Mail Receipt No. 70060810000509617657

DEPARTMENT OF CONSERVATION
Managing California's Working Lands
Division of Oil, Gas, & Geothermal Resources
801 K STREET • MS 20-20 • SACRAMENTO, CALIFORNIA 95814
PHONE 916 / 445-9686 • FAX 916 / 323-0424 • TDD 916 / 324-2555 • WEB SITE conservation.ca.gov

ORDER NO. 1014

by

Elena M. Miller

STATE OIL AND GAS SUPERVISOR

DATED

July 19, 2011

TRC Operating Company Inc.

Midway Sunset Field
Antelope/Diatomite Zones

Kern County

On June 21, 2011, Chevron U.S.A. Inc. (Chevron) reported to the Department of Conservation, Division of Oil, Gas, and Geothermal Resources (DOGGR) that a surface expression of steam was occurring in the vicinity of Well 20 and Well K210 in the Midway-Sunset Field (Section 21, T. 32S, R. 23E). While in the area of the surface expression, a Chevron employee fell through the surface and died. It was reported to DOGGR that the employee fell several feet below ground level into a hole that contained steam, hot water, and H2S gas. Efforts to rescue the employee were not successful. The fatality occurred at Midway-Sunset Field at the southeast corner of the Well 20 site and was reported to DOGGR on June 21, 2011.

In addition to the surface expression on Chevron's lease, a surface expression on TRC Operating Company Inc.'s (TRC) lease, near well "Bull" 9 (API# 030-08852) located in Section 22, T. 32S, R. 23E, also began on June 21, 2011. A volume of oil and water is coming to the surface from this expression that merits immediate remediation. Based on observation and statements by TRC, DOGGR estimates that as much as 100 barrels of oil and water are coming to the surface each day from the expression near well "Bull" 9.

Cyclic steaming injection operations are conducted in the Midway-Sunset Field to provide enhanced oil recovery from diatomite formations. TRC has been conducting cyclic steaming injection operations in the Midway-Sunset Field since November 1997.

The surface expressions of steam, water, and oil in the vicinity of Well 20 and in the vicinity of well "Bull" 9 are directly related to cyclic steaming injection operations in the field. Although there may be some natural seepage of oil and water in the area, any expression of steam or significant quantities of oil or water at the surface can only be reasonably attributed to cyclic steaming injection operations.

The State Oil and Gas Supervisor (Supervisor) has determined that immediate steps must be taken in order to prevent further harm from occurring as a result of these surface expressions. Public Resources Code section 3106 states: "The supervisor shall so supervise the drilling, operations, maintenance, and abandonment of wells and the operation, maintenance, and removal or abandonment of tanks and facilities attendant to oil and gas production ... so as to prevent, as far as possible, damage to life, health, property, and natural resources ...." In reference to underground injection projects, California Code of Regulations, title 14, section 1724.10, subdivision (h) states: "Data shall be maintained to show performance of the project and to establish that no damage to life, health, property, or natural resources is occurring by reason of the project. Injection shall be stopped if there is evidence of such damage, or loss of hydrocarbons, or upon written notice from the Division. ..."

Therefore, to protect public health and safety in furtherance of the authorities cited above, and acting pursuant to Public Resources Code sections 3224 and 3226, the Supervisor orders that, in order to prevent steam and fluids from

coming to the surface, TRC will immediately cease all injection operations within a 150 foot radius of the surface expression of steam, water, and oil in the vicinity of Well 20. If after five days steam or fluids continue to come to the surface, TRC will immediately cease all injection operations within a 300 foot radius of the surface expression in the vicinity of Well 20. In addition, TRC will immediately cease all injection operations within a 150 foot radius of the surface expression of steam, water, and oil in the vicinity of well "Bull" 9. If after five days steam or fluids continue to come to the surface, TRC will immediately cease all injection operations within a 300 foot radius of the surface expression in the vicinity of well "Bull" 9. Injection operations shall not resume within the vicinity of either surface expression until the Supervisor is satisfied that the cause of the surface expression is determined and remediated.

Be further advised, DOGGR has no record of providing TRC with approval to conduct cyclic steaming injection operations in the Midway-Sunset Field. California Code of Regulations, title 14, section 1724.6 states: "Approval must be obtained from this Division before any subsurface injection or disposal project can begin. ..." This order is not an approval for any injection operations that have not previously been approved by DOGGR. With permission from DOGGR, injection may be conducted for the limited purpose of conducting testing while this order is in effect.

This order may be appealed by filing a written statement with the Supervisor or district deputy that the order is not acceptable within ten (10) days of receipt of the order.

Elena M. Miller
State Oil and Gas Supervisor

by Robert S Habel
Robert S. Habel
Chief Deputy State Oil and Gas Supervisor

cc: DOGGR-HQ
James Pierce, Senior Staff Counsel

Certified Mail Receipt No. 7008 1830 0004 2780 0574

DEPARTMENT OF CONSERVATION

Managing California's Working Lands

Division of Oil, Gas, & Geothermal Resources

801 K STREET • MS 20-20 • SACRAMENTO, CALIFORNIA 95814

PHONE 916 / 445-9686 • FAX 916 / 323-0424 • TDD 916 / 324-2555 • WEB SITE conservation.ca.gov

EMERGENCY
ORDER NO. 1015

by

Elena M. Miller

STATE OIL AND GAS SUPERVISOR

DATED

August 5, 2011

TRC Operating Company Inc.

Midway Sunset Field
Antelope/Diatomite Zones

Kern County

On June 21, 2011 a fatality occurred in the vicinity of "Well 20" (API# 029-23672) in the Midway-Sunset Field (Section 21, T. 32S, R. 23E). Well 20 is operated by Chevron U.S.A. Inc (Chevron). Chevron reported to the Division of Oil, Gas and Geothermal Resources (DOGGR) that one of its employees fell into a hole that contained steam, hot water, and H2S gas.

Cyclic steaming injection operations are conducted in the Midway-Sunset Field to provide enhanced oil recovery from diatomite formations, and TRC Operating Company Inc. (TRC) has been conducting cyclic steaming injection operations in the Midway-Sunset Field since November 1997. Cyclic steaming injection operations at times lead to "surface expressions" of oil, gases, and other fluids. Chevron has informed DOGGR that it was not conducting cyclic steaming injection operations in the immediate vicinity of Well 20 since December 2008, yet one or more surface expressions exist in the vicinity of Well 20.

In addition to the surface expressions on Chevron's lease, on June 21, 2011, one or more surface expressions appeared on TRC's lease, near well "Bull 9" (API# 030-08852) also located in Section 22, T. 32S, R. 23E. A volume of oil and water is coming to the surface from this expression that merits immediate remediation. Based on observation and statements by TRC, DOGGR estimates that as much as 100 barrels of oil and water are coming to the surface each day from the expressions near well Bull 9.

DOGGR believes that the surface expressions in the vicinity of Well 20 and in the vicinity of well Bull 9 are directly related to cyclic steaming injection operations in the field. Although seepage of oil and water may occur in the area, any expression of steam at the surface can only reasonably be attributed to steaming or cyclic steaming injection operations. The State Oil and Gas Supervisor has determined that immediate steps must be taken in order to prevent further harm from occurring as a result of the surface expressions in the vicinity of Well 20.

On July 19, 2011, the Supervisor issued Order No. 1014 requiring that TRC cease cyclic steaming injection operations in the vicinity of the surface expression until the Supervisor is satisfied that the cause of the surface expressions are determined and remediated. TRC has filed an appeal of Order No. 1014 and the order is stayed pending appeal. Based on reports from Chevron and TRC itself, DOGGR believes that since July 19, 2011 TRC has conducted cyclic steaming injection operations in the vicinity of the surface expressions.

Since July 19, 2011, the following has occurred:

- On August 3, 2011, at least two new surface expressions, one of them five feet in radius, began within forty feet of the existing surface expression in the vicinity of Well 20.

- On August 5, 2011, a volatile eruption began from the existing surface expression in the vicinity of Well 20, expelling rocks, other material, and emitting fluid and steam.

- On August 5, 2011, in response to inquiry TRC reported to DOGGR that it had been conducting cyclic steam injection into well "Bull 38" on August 3 and 4, 2011, in the vicinity of Well 20.

- The eruptive and continuing surface expressions in the vicinity of Well 20 have created an unpredictable, unstable, and dangerous situation such that life, health, property, and/or natural resources are at further risk.

Public Resources Code section 3106 states: "The supervisor shall so supervise the drilling, operations, maintenance, and abandonment of wells and the operation, maintenance, and removal or abandonment of tanks and facilities attendant to oil and gas production ... so as to prevent, as far as possible, damage to life, health, property, and natural resources ...." In reference to underground injection projects, California Code of Regulations, title 14, section 1724.10, subdivision (h) states: "Data shall be maintained to show performance of the project and to establish that no damage to life, health, property, or natural resources is occurring by reason of the project. Injection shall be stopped if there is evidence of such damage, or loss of hydrocarbons, or upon written notice from the Division. ..."

Based on the facts described above, pursuant to Public Resources Code section 3226, the Supervisor has determined that an emergency exists and that immediate steps must taken to in order to protect life, health, property, and natural resources.

Therefore, to protect public health and safety in furtherance of the authorities cited above, and acting pursuant to Public Resources Code sections 3224 and 3226, the State Oil and Gas Supervisor orders that, in order to prevent solid material, oil, steam and fluids from coming to the surface, and to minimize potentially unsafe oilfield conditions, TRC will immediately cease, and shall not resume, any and all injection operations within a 500 foot radius of the surface expressions in the vicinity of Well 20. Injection operations shall not resume within the vicinity of the surface expression until the State Oil and Gas Supervisor is satisfied that the cause of the surface expression is determined and remediated.

Be further advised, DOGGR has no record of providing TRC with approval to conduct cyclic steaming injection operations in the Midway-Sunset Field. California Code of Regulations, title 14, section 1724.6 states: "Approval must be obtained from this Division before any subsurface injection or disposal project can begin. ..." This order is not an approval for any injection operations that have not previously been permitted by DOGGR. With permission from DOGGR, injection may be conducted for the limited purpose of conducting testing while this order is in effect.

This order may be appealed by filing a written statement with the State Oil and Gas Supervisor or district deputy that the order is not acceptable within ten (10) days of receipt of the order. **However, please note that because this is an emergency order issued pursuant to Public Resources Code section 3226 and, pursuant to Public Resources Code section 3350, subdivision (b), the filing of an appeal of this emergency order shall not operate as a stay of the order.**

by Elena M. Miller
Elena M. Miller
State Oil and Gas Supervisor

cc: DOGGR-HQ
James Pierce, Senior Staff Counsel

Certified Mail Receipt No. 7006 0810 0005 0961 7664

DEPARTMENT OF CONSERVATION

Managing California's Working Lands

Division of Oil, Gas, & Geothermal Resources

801 K STREET • MS 20-20 • SACRAMENTO, CALIFORNIA 95814

PHONE 916 / 445-9686 • FAX 916 / 323-0424 • TDD 916 / 324-2555 • WEB SITE conservation.ca.gov

EMERGENCY
ORDER NO. 1016

by

Elena M. Miller

STATE OIL AND GAS SUPERVISOR

DATED

August 26, 2011

TRC Operating Company Inc.
Chevron U.S.A. Inc

Midway Sunset Field
Antelope/Diatomite Zones

Kern County

This Emergency Order No. 1016 incorporates or expands the requirements of, and therefore rescinds, supersedes, and replaces the following orders previously issued by the Department of Conservation Division of Oil, Gas and Geothermal Resources (DOGGR):

- ***Order No. 1012, issued to Chevron U.S.A. Inc. (Chevron) on July 6, 2011;***
- ***Amended Order No. 1012, issued to Chevron on July 28, 2011;***
- ***Order No. 1014, issued to TRC Operating Company Inc. (TRC) on July 19, 201; and***
- ***Emergency Order 1015, issued to TRC on August 5, 2011.***

This Order is issued to address an ongoing emergency situation caused by the "surface expressions" of oil, gases, and other fluids in the vicinity of "Well 20" (API# 029-23672) in the Midway-Sunset Field (Section 21, T. 32S, R. 23E). On June 21, 2011 a fatality occurred in the vicinity of Well 20 leading Chevron to report to DOGGR that one of its employees fell into a hole in the vicinity of Well 20 that contained steam, hot water, and H2S gas. Cyclic steaming injection operations are conducted in the Midway-Sunset Field by several operators to provide enhanced oil recovery from diatomite formations. Cyclic steaming injection operations have at times produced surface expressions. The hole where the fatality occurred is related to the surface expressions in the vicinity of Well 20.

Well 20 is operated by Chevron and is situated within 120 feet of TRC's lease boundary. TRC has been conducting cyclic steaming injection operations in the Midway-Sunset Field since November 1997. Chevron has reported to DOGGR that it suspended all of its injection operations within a 300 foot radius of Well 20 in December 2008, and that immediately after the June 21 fatality it ceased all injection operations within a 500 foot radius of Well 20.

In addition to the surface expression in the vicinity of Well 20, also on June 21, 2011, one or more surface expressions appeared on TRC's lease, near well "Bull" 9 (API# 030-08852) located in Section 22, T. 32S, R. 23E. A volume of oil and water has come to the surface from this expression. Based on observation and statements by TRC, DOGGR estimates that as much as 40 barrels of oil and water are coming to the surface each day from the expressions near well "Bull" 9.

DOGGR believes that the surface expressions in the vicinity of Well 20 and in the vicinity of well "Bull" 9 are directly related to cyclic steaming injection operations in the field. Although seepage of oil and water may occur in the area, any expression of steam at the surface can only reasonably be attributed to steaming or cyclic steaming injection operations. The State Oil and Gas Supervisor has determined that

immediate steps must be taken in order to prevent further harm from occurring as a result of the surface expressions in the vicinity of Well 20.

On July 19, 2011, DOGGR issued Order No. 1014 requiring that TRC cease cyclic steaming injection operations within a 300 foot radius of the surface expressions near Well 20 and within a 300 foot radius of the surface expressions near well "Bull" 9 until the Supervisor is satisfied that the cause of the surface expressions is determined and remediated. TRC filed an appeal of Order No. 1014 and that order was stayed pending appeal. Based on reports from Chevron, DOGGR believes that since July 19, 2011 TRC has conducted cyclic steaming injection operations in the vicinity of the surface expressions.

Since July 19, 2011, the following has occurred:

- On August 3, 2011, at least two new surface expressions, one of them ten feet in diameter, began within forty feet of the existing surface expression in the vicinity of Well 20.

- On August 5, 2011, a volatile eruption began from the existing surface expression in the vicinity of Well 20, expelling rocks, other material, and emitting fluid and steam.

- On August 5, 2011, in response to inquiry, TRC reported to DOGGR that it had been conducting cyclic steam injection into well "Bull 38" on August 3 and 4, 2011, in the vicinity of Well 20.

- On August 5, 2011, DOGGR issued Emergency Order 1015 requiring that TRC immediately cease cyclic steam injection operations within a 500 foot radius of the surface expressions near Well 20.

- On August 17, 2011, Chevron reported to DOGGR that another eruption had begun from the surface expression in the vicinity of Well 20 and that it was significantly larger than the eruption that began on August 5. Chevron reported that the August 17 eruption sent fluid approximately 100 feet high and steam vapor even higher. It was estimated that fluids were sprayed as far as 240 feet from the erupting surface expression.

- As recently as August 25, 2011, DOGGR staff has observed that the expressions in the vicinity of Well 20 have increased in size and intensity since August 5, and that steam continues to emanate from the surface expression at this location.

- The eruptive and continuing surface expressions in the vicinity of Well 20 have created an unpredictable, unstable, and dangerous situation such that life, health, property, and/or natural resources are at further risk.

The fact that the surface expressions near Well 20 have continued since the issuance of Emergency Order 1015 indicates that the surface expressions are likely caused or significantly contributed to by cyclic steam injection operations occurring more than 500 feet away from the surface expressions. DOGGR believes that the surface expressions may be caused by cyclic steam operations conducted in wells as far as 800 feet from the surface expressions. Since August 5, 2011, both TRC and Chevron have conducted cyclic steam injection operations on wells within a radius of 800 feet of the surface expressions in the vicinity of Well 20. Based on reports from Chevron, DOGGR believes that TRC has conducted cyclic steam injection on wells as close as 640 feet from the surface expressions, and Chevron has conducted cyclic steam injection on wells as close as 766 feet from the surface expressions.

Public Resources Code section 3106 states: "The supervisor shall so supervise the drilling, operations, maintenance, and abandonment of wells and the operation, maintenance, and removal or abandonment of tanks and facilities attendant to oil and gas production ... so as to prevent, as far as possible, damage to life, health, property, and natural resources ...." In reference to underground injection projects, California Code of Regulations, title 14, section 1724.10, subdivision (h) states: "Data shall be maintained to show performance of the project and to establish that no damage to life, health, property, or natural resources is occurring by reason of the project. Injection shall be stopped if there is evidence of such damage, or loss of hydrocarbons, or upon written notice from the Division. ..."

Based on the facts described above, pursuant to Public Resources Code section 3226, the Supervisor has determined that an emergency exists and that immediate steps must taken to in order to protect life, health, property, and natural resources.

Therefore, to protect public health and safety in furtherance of the authorities cited above, and acting pursuant to Public Resources Code sections 3224 and 3226, the State Oil and Gas Supervisor orders that, in order to prevent steam and fluids from coming to the surface, TRC and Chevron will immediately cease all injection operations within an 800 foot radius of the surface expressions in the vicinity of Well 20, more specifically, within an 800 foot radius of the approximate center point of the primary surface expression in the vicinity of Well 20, which DOGGR has calculated to be at Longitude -119.500118, Latitude 35.128592 (GCS NAD83). TRC and Chevron will also immediately cease injection operations in well J262 (API# 030-36384) and well "Bull" 49 (API# 030-32740). (The wells within the specified radius, together with the two specified wells, will hereafter be referred to as "the restricted wells.")

Injection operations in the restricted wells shall not resume until the State Oil and Gas Supervisor is satisfied that the cause of the surface expression is determined and remediated so as to prevent, as far as possible, damage to life, health, property, and natural resources; damage to underground oil and gas deposits from infiltrating water and other causes; loss of oil, gas, or reservoir energy, and damage to underground

and surface waters suitable for irrigation or domestic purposes by the infiltration of, or the addition of, detrimental substances. With permission from DOGGR, injection may be conducted in the restricted wells for the limited purpose of determining the cause of surface expression(s) while this order is in effect.

It is further ordered that on or before September 2, 2011 TRC and Chevron shall each provide DOGGR with a list of all the restricted wells they operate. With respect to each such well, TRC and Chevron shall identify the date and time they were shut in, and shall provide the injection history for the wells from June 1, 2011 to the present. While this order is in effect, TRC and Chevron shall each certify to DOGGR in writing on a weekly basis that cyclic steam injection operations are not occurring at any of the restricted wells that they operate.

California Code of Regulations, title 14, section 1724.6 states: "Approval must be obtained from this Division before any subsurface injection or disposal project can begin. ..." TRC has submitted an application for injection project approval to DOGGR and review of TRC's application is still pending. Neither the issuance of this order, compliance with this order, nor any lifting of this order should be construed as a determination upon TRC's pending injection project application. DOGGR may take additional action in the future to address this issue.

This order may be appealed by filing a written statement with the State Oil and Gas Supervisor or district deputy that the order is not acceptable within ten (10) days of receipt of the order. **However, please note that this is an emergency order issued pursuant to Public Resources Code section 3225 and, pursuant to Public Resources Code section 3350, subdivision (b), the filing of an appeal of this emergency order shall not operate as a stay of the order.**

Elena M. Miller
State Oil and Gas Supervisor

by Robert S Habel
Robert S. Habel
Chief Deputy State Oil and Gas Supervisor

cc: DOGGR-HQ
James Pierce, Senior Staff Counsel

Certified Mail Receipt No. 7006 0810 0005 0961 7695 (TRC)
Certified Mail Receipt No. 7006 0810 0005 0961 7701 (Chevron)

Chevron

San Joaquin Valley SBU
Chevron North America
Exploration and Production
9525 Camino Media
Bakersfield, CA 93311
661-319-4742
DallasTubbs@chevron.com

August 26, 2011

VIA EMAIL AND U.S. MAIL

Mr. Burt Ellison
Division of Oil, Gas and Geothermal Resources, District 4
4800 Stockdale Hwy., Suite 417
Bakersfield, CA 93309-0279

RE: Proposed activity in the areas covered DOGGR Amended Formal Order No. 1012, Formal Order No. 1014 and Emergency Order 1015

Dear Mr. Ellison:

As a follow up to Chevron U.S.A. Inc.'s (Chevron's) letter dated Thursday, August 18, 2011, Chevron wants to reiterate our strong desire to meet in the near future with the Division of Oil, Gas and Geothermal Resources (DOGGR) to discuss a proposed subsurface diagnostic program, action plan, and technical data, that we believe will address the current K210 surface expression and support safe operations in the impacted area. Many of the activities in the proposed diagnostic program and action plan will need either DOGGR's permission, or permits from DOGGR, which is why it is imperative that we meet with you on an expedited basis.

Unfortunately, DOGGR was unable to meet with us today so we could share our plans in person. We are hopeful that meeting can happen soon. However, we did want to let you know that on Monday, August 29, 2011, Chevron intends to begin wire line temperatures surveys of all wells on its side of the lease line within a 500' radius of the K210 surface expression. We also plan to include the well 21S J262. These surveys should determine or confirm mechanical integrity of all of the referenced Chevron wells. If you are interested in attending and observing our activity, please let us know, and we will provided a schedule of the wells being surveyed.

Chevron will be meeting with TRC Operating Company Inc. (TRC) on Monday, August 29, 2011, to discuss alignment between both Chevron and TRC for the purpose of conducting additional subsurface diagnostic testing of all wells currently impacted by Amended Formal Order No. 1012, Formal Order No. 1014, Emergency Order 1015, and the wells mentioned in the August 18 letter, specifically TRC Bull 27, Bull 40, Bull 49, Bull 53 and Chevron 21S J262. To that effect, Chevron's long-term schedule for planned wire line surveys in and around the K210 surface expression will require coordination between Chevron and TRC to ensure a safe working environment for personnel and equipment. We are also hopeful that both companies can agree on a cooperative plan forward to deal with issues such as workovers, abandonments and re-abandoments in the impacted area; any other subsurface mitigation

activity that is necessary in the impacted area; and future operating practices. Those plans will also likely involve activities that need either DOGGR's permission or permits from DOGGR.

We continue to believe that a cooperative approach between Chevron, DOGGR, and TRC, is the best and most proactive way to address the surface and subsurface issues in the impacted area. We all have the common goal of first making sure that the area is safe for people and the environment, and then returning the area to production. We look forward to continued work with you to achieve those common goals.

Sincerely,

Dallas H. Tubbs
Lead Petroleum Engineer
Temblor Thermal Area

cc: Elena Miller, Supervisor of the Division of Oil, Gas and Geothermal Resources
James Pierce, Senior Staff Counsel, California Department of Conservation

DEPARTMENT OF CONSERVATION
DIVISION OF OIL, GAS AND GEOTHERMAL RESOURCES

REPORT OF OCCURRENCES

THE CHEVRON FATALITY ACCIDENT JUNE 21, 2011 AND AREA SURFACE EXPRESSION ACTIVITY PRE AND POST ACCIDENT

SECTIONS 21 & 22 T.32S./R.23E.,
MIDWAY-SUNSET OIL FIELD
KERN COUNTY

May 2012

REPORT OF OCCURRENCES

Accident Response

At 1243 hours on June 21, 2011 the Division of Oil, Gas and Geothermal Resources' (DOGGR) District 4 office received a telephone call from Chevron Corporation (Chevron) employee Darren Walrath, reporting a fatality accident had occurred that morning at approximately 1045 hours on Chevron property section 21 T32S,R23E, in the Midway-Sunset Oil Field. According to Mr. Walrath, on the morning of June 21, 2011, a release of steam had been noticed by workers coming from near a known and previously open surface expression location. An engineered subsurface containment structure had recently been constructed to capture fluid and steam emissions migrating from the surrounding underground area to this surface location. Because of the proximity to a Chevron Well 20 (API 029-23672), it had come to be known as the Well 20 surface expression. As stated in the District 4 dispatch report (*attached)* taken from Mr. Walrath, "Three men were checking steam emanating from the ground. Ground gave way, one worker slipped feet first into a hole. Other workers could not react in time to save him from falling." The attached photographs show the condition of the area before *(Photographs 1-8 & Aerial Photograph 2)* and after placement *(Photographs 9-11)* of the subsurface containment structure, additional descriptions are to follow. The attached diagram is of the proposed subsurface containment structure and may not represent the completed project at the site.

DOGGR representatives Burt Ellison and Michael Toland responded to the incident arriving onsite at approximately 1430 hours. A staging area, manned by Chevron emergency response personnel, was set up near the accident location. Chevron representatives onsite included Darren Walrath, Art Lewis, Tim Nishikubo and Bob Alan. Also present at the staging area were members of the Kern County Sheriff's Department, the Kern County Fire Department, as well as, CalOSHA representative Paul Ricker. It was reported by Chevron that the Kern County Health Department and County Coroner had been notified of the incident. Chevron construction engineer David Taylor was reported to be the victim of the accident. It was also reported by Chevron that Mr. Taylor had been a member of the engineering team involved in the construction of the aforementioned subsurface containment structure.

Due to the uncertain stability of the surrounding ground, access to the actual accident location was restricted. Viewing of the site was from a distance of approximately 50 to 60 yards. The scenario explained onsite to DOGGR personnel by Chevron representatives agreed with the initial report that several men had approached a plume of steam to investigate, when one fell into a small sink hole. It was also reported by

Chevron that the men had approached the location with caution and avoided any ground that appeared wet on the surface. An attempt was made by the other men to rescue the trapped man with an object long enough reach him, but he continued to sink further into the ground. Although the location was restricted with yellow caution tape after the accident, no warning or caution signs were observed indicating that previous open surface expressions had once occupied the site.

The surface expression site, prior to the construction of the subsurface containment structure, had included: an open surface expression pit of hot water and oil on a lower terrace *(Photograph 2)*, several smaller steam/water/oil surface expression vents on an upper terrace *(Photographs 5-8)* and a large steaming crater on the slope between the two terraces *(Photograph 1)*. The reported project that included the subsurface containment structure, subsequent backfilling, ground leveling, and placement of associated surface equipment of the subsurface containment structure, appeared to have removed any indication that open surface expressions had once occupied the site *(Photographs 9 & 10)*.

It was confirmed by Chevron that their steam injection operations in the area had been shut-in and that neighboring TRC Operating Company, Inc. (TRC) had been contacted to inquire on the status of their cyclic steam injection wells. It was later reported that Chevron had been maintaining a 500 foot radius restriction of steam injection around this location for many months. It was also later reported by TRC that their normal schedule of steam injection had ended on June 21 and their wells had begun their flow back phase. The property lease line dividing Chevron and TRC is approximately 100 feet from the Well 20 surface expression area.

Along with the CalOSHA representative, DOGGR staff traveled to a vantage point for an improved view of the accident location *(Photograph 9).* From this location the surface equipment associated with the subsurface containment structure could also be viewed in relation to the accident site. A Chevron employee was present to explain operations of the recently constructed containment stucture. After returning to the staging area to drop off the CalOSHA employee, DOGGR personnel left the area at approximately 1530 hours and noticed excavation equipment beginning to be staged near the accident site.

The accident command center at Chevron's Midway-Sunset field office, approximately eight miles from the accident site, was visited at approximately 1545 hrs and contact was made with Incident Commander, Chevron Operations Supervisor Kevin Smith. A meeting with all emergency personnel had just been conducted, and a plan of action had been determined. Limited excavation of the site for retrieval of the accident victim was to begin that evening. If discovery was at a shallow depth, retrieval was then to be

completed. However, if after several feet of excavation the victim was not encountered, excavation would resume the following day. DOGGR representatives requested that they be notified when operations were expected to begin.

Upon returning to the District 4 office that evening, photographs of the surface expression prior to construction of the subsurface containment structure *(Photographs 1 and 2)* were reviewed and compared to the photographs taken after the accident *(Photographs 9-11).* Also reviewed was a schematic drawing of the proposed containment structure, sent to the District 4 office by Chevron prior to the incident *(Diagram 1)*. Evaluating the data, it was determined that the probable location of the accident was near or over the site once occupied by the steaming crater.

At approximately 1910 hours Michael Toland was notified by Chevron Incident Commander Kevin Smith that the limited excavation operations were to begin in approximately one hour. DOGGR representative Michael Toland arrived onsite at 2040 hours just as excavations operations were commencing. A discernible amount of steam increased from the location. After excavating approximately 4 to 5 feet the accident victim was discovered.

The DOGGR representative left the location at 2300 hours and notification was made to him at 0700 hrs on June 22, by Incident Commander Kevin Smith, that the operations were completed at 0400 hours. All emergency personnel and most of the equipment were removed from the Chevron location. The site and all access routes to the location were restricted and a private security guard was stationed to restrict access.

TRC's "Bull 9" Surface Expression

On June 22, at approximately 1500 hours, Michael Toland visited the Chevron accident area in conjunction with an inspection of a large surface expression that had occurred that morning on the adjacent lease property of TRC. This new surface expression would become known as the "Bull 9" surface expression. The surface expression near TRC's "Bull 9" well is approximately 400 feet from the Chevron accident site *(Photographs 12 and 13)*. Michael Toland was met by TRC Safety Director, Bill Davidson. It was reported that the surface expression was discovered at approximately 0600 hours on June 22, and that it broke the ground surface unexpectedly and began flowing quickly. According to Bill Davidson, within the first 24 hours approximately 500 barrels (bbls) of fluid had been removed from the site and approximately 150 bbls had been removed during the second 24 hours.

On June 28, Michael Toland visited the "Bull 9" site. An estimated 2 to 3 bbls of fluid an hour was seen flowing from the site. TRC Lease Supervisor, Mike Hudgens, reported that approximately 1000 bbls of fluid had been removed from the location since the surface expression began. Fluid was reported to have been flowing intermittently. The estimated water cut from this fluid is at least 90% (10% oil and 90% water).

Although not reported by TRC, a reactivation of another surface expression was discovered on the June 28 visit. The event was located approximately 150' east of the Chevron containment structure and the June 21 fatal accident site. After being contacted by District 4, Mike Hudgens reported on June 29 that the reactivation had begun on June 27 and approximately 30 bbls of fluid had been removed. An area of approximately 20'x 20' area had been bermed and netted *(Photograph 14).*

Additional excavation, and a significant increase in the amount of steam coming from the Chevron accident site, was noted during the June 28 area visit.

Tilt Meter Data

On July 1 the DOGGR's District 4 office received requested information from Chevron regarding area tilt meter activity for the 10 days preceding the accident, as well as reports of tilt meter events that have been observed since June 21. Numerous tilt meter instruments positioned in the area continually monitor local ground movement. Ground movement may occur when steam is injected into the subsurface oil reservoir. The data, received and analyzed by the contractor (Pinnacle), indicates that 4 separate tilt meter events (June 13-14, 17-19, 18-19 and 20-21) occurred in the area prior to and the day of the accident *(Attachments 1- 4)*. All four events happened on Chevron property, but three of the events occurred along the boundary between Chevron and TRC leases. Interpretation of the data received was from Pinnacle, the contracting company that monitors the tilt meters. Chevron has requested confidential status for the tilt meter information.

Tilt Meter Data Interpretation from Pinnacle

The following are descriptions of Pinnacle interpreted data from tilt meter events occurring 10 days prior to the June 21 accident and until June 27.

June 13-14, a tilt meter event occurred at the Well 20 surface expression/accident site at a depth of 378 feet, with 3 TRC wells and two Chevron wells as possible source candidates (*Attachment 1*).

June 17-19, a tilt meter event occurred approximately 2100 feet to the northwest of the Well 20 surface expression at a depth of 1020 feet, with one Chevron well suspected as the event source (*Attachment 2)*.

June 18-19, a tilt meter event occurred approximately 400 feet south of the Well 20 surface expression at a depth of 605 feet, with one Chevron well suspected as the event source (*Attachment 3*).

June 20-21, a tilt meter event occurred approximately 500 feet north of the Well 20 surface expression at a extremely shallow depth of 50 feet, with one Chevron well suspected as the event source *(Attachment 4).*

June 22-24, a tilt meter event occurred within 250 feet of the large surface expression on the "Bull' lease, as reported by TRC on June 22. This event occurred at a depth of 275 feet, with two Chevron wells interpreted as being candidates for initiating the event. This event is approximately 500 feet north of the Well 20 surface expression/accident site *(Attachment 5).*

June 24-26 and 26-27, two other tilt meter events occurred approximately 700 feet north and 1500 feet northwest of the Well 20 surface expression at depths of 675 feet and 880 feet, respectfully. Based on the Pinnacle data, Chevron wells are interpreted to be the source of these events *(Attachments 6 & 7).*

Follow-up Site Inspections

During the afternoon of July 7, Michael Toland visited the Chevron accident location and the surface expressions on TRC's "Bull" lease. The site of the accident, and subsequent excavation, had continued as an active surface expression, with a crater approximately 10 feet in diameter expelling water and oil on the surrounding ground and audible sounds of fluid movement from inside the crater from approximately 40 yards distance *(Photographs 15 and 16)*. Chevron's explanation of the increased activity was that some fluid was removed from the crater. The release of the pressure caused by the removal of the fluid was sufficient enough to allow the activity to begin. There were plans to put fluid back in the crater and observe any change in activity. DOGGR requested to be informed of the results.

The "Bull 9" surface expression on the TRC lease appeared similar to the previous week's observation. The surface expression's crater had increased in size and deeper

erosion of the terrace slope had occurred *(Photograph 17).* It was reported by TRC's field supervisor that approximately 100 bbls/day of fluid continued to be removed from the site. Activity at the smaller TRC surface expression, east of the Chevron accident site, had also increased with approximately 30 bbls/day of fluid reportedly removed *(Photograph 18).* It was reported that steam injection in the area had not been resumed by TRC.

On July 13, DOGGR staff again visited the Chevron accident site and the TRC "Bull 9" surface expression. The crater at the accident site, that was expelling fluid the previous week, had no visible activity. The TRC "Bull 9" surface expression appeared more active than the previous week and approximately 100 bbls/day of fluid was reportedly being removed from the bermed containment area, according to a TRC representative.

The sites were viewed again on July 21 in conjunction with a visit to the area's surface expressions by DOGGR personnel and other state officials. The crater at the accident site had no visible activity, but evidence of a minor amount of fluid having being recently expelled was noticed. Fluid flowing from the TRC "Bull 9" surface expression had diminished significantly to an estimated 1 to 2 bbls/hour.

Additional Surface Expression Activity

On August 3, at 1000 hrs, Chevron reported that a 5 foot surface expression, of less than one barrel of fluid, had appeared 40 feet northeast of the accident location and the present crater site. On August 5 at approximately 1100 hours, the site was visited by Michael Toland. Sometime during the previous night, the existing crater site had experienced a sudden and large explosive eruption that had expelled large rocks and spray of water and oil a distance of 30 to 150 feet *(Photographs 19- 21).* In addition, two new surface expressions were observed to have broken the ground along the TRC side of the terrace slope that divides TRC from Chevron *(Photographs 22 and 23).* The combined rate of flow of the two new TRC surface expressions appeared to be approximately 2-3 bbls/hour. Although continually venting steam, no additional eruptive activity was observed from the Chevron crater.

On August 5, Chevron Operational Supervisor Bob Allen was onsite to report additional surface expression activity. Mr. Allen reported that Chevron's current steam injection radius restriction was at least 500 feet and that tilt meter events had been recorded during the week. He also reported that on August 3, the two new TRC surface expressions were significantly more active than present, and that the fluid flowing from them had overflowed the containment berm. No report has been received by DOGGR

from TRC regarding the two new surface expression events. Mr. Allen also reported that TRC well 'Bull" 38 had been observed under steam injection during the past week. At approximately 300 feet from the crater eruption, it may have been the closest TRC well under injection.

On the morning August 17 the DOGGR was notified by Chevron that an even larger eruption had occurred from the Chevron Well 20 surface expression crater, expelling fluid and spray to a height of approximately 100 feet, and releasing a steam plume to an even greater height. Onsite field personnel reported ground trembling and that the eruptive event lasted 15 to 20 seconds. A considerable amount of steam continued to be observed coming from the crater by DOGGR representative Michael Toland on the afternoon of August 17 *(Photograph 24).* Fluid and spray surrounded the site up to a distance of approximately 150 feet *(Photograph 25).* Fluid flow from the two smaller surface expressions near the crater, first reported on August 3, also had increased to approximately 5 bbls/hour.

DOGGR Steam Injection Restriction and CalOSHA Work Exclusion Zone Orders

On July 7, DOGGR issued the first of three orders to Chevron and TRC restricting steam injection around the Well 20 surface expression accident location. The first restriction, Order 1012, was for a 150 foot radius around the accident location. The order was ammended on July 11, and increased to 300 feet. On August 5, the day of the first eruption of the Well 20 surface expression crater, Order 1015 was issued increasing the steam restriction radius to 500 feet. Following the larger eruption event on August 17, Order 1016 was issued on August 26, increasing the steam restriction radius to 800 feet.

Thermal activity at the Well 20 surface expression crater, including the release of steam, water and oil, continued, and during the months of September through November intensified along with the enlargement of the crater *(Photograph 26)*. Since late November, the amount of fluid released has declined from approximately 300 to 400 bbls/day to 30 to 40 bbls/day. The associated emission of steam is intermittent. Fluid release at the "Bull 9" surface expression remained consistent at approximately 30 bbbls/day into November and has since gradually declined to approximately 1 to 2 bbls/day. The "Bull 9" surface expression has not experienced a significant release of steam.

On September 29, CalOSHA issued to Chevron a work exclusion zone order prohibiting access to the Well 20 surface expression area. The order also included the area extent

of the lateral drains associated with subsurface containment structure. TRC was not included in the order. A work safety plan prepared by Chevron allowed access by CalOSHA to the surface expression area to begin remedial and investigative excavation. Operations began in early December *(Photograph 27)*.

Additional Information

Steam injection into the shallow (400 to 1000 feet) diatomite heavy oil reservoir began in this area of the Midway-Sunset Oil Field during the mid 1990s. Above the diatomite oil reservoir are porous sands. Surface expressions began occuring approximately a year after steam injection commenced. Approximately thirty surface expressions have occurred in this area of approximately one half mile by one quarter mile. All of the area's surface expressions, except for the Well 20 surface expression and the "Bull 9" surface expression, could be described as having a seep-like characteristic, in that the oil and water comes to the surface of the ground slowly and there is minimal associated steam.

The surface release of steam and fluid in the Well 20 surface expression area has been reported by Chevron to have begun in 2006. The Well 20 surface expression containment pit as well as other minor surface expressions can be seen in a 2008 aerial photograph *(Aerial Photograph 1).* A 2010 aerial photograph shows fence and netting enclosing the Well 20 surface expression containment pit, crater and surface expressions on the upper terrace *(Aerial Photograph 2).* The 2010 aerial photograph also displays TRC surface expression sites, including the approximate location of the "Bull 9" surface expression.

In 2008, Chevron Well 20 (API 029-23672), adjacent to the Well 20 surface expression, was re-abandoned. It was the third abandonment operation on this well. The first two abandonment operations were in 1997 and 2003. Damaged well casings may be, in some cases, partially responsible for the occurrence of surface expressions. Chevron has stated that Well 20 is a complex damaged well, that it is unclear whether it is potentially a conduit for the surface expression and may be re-entered to perform additional abandoment work if it is determined to be in communication with the Well 20 surface expression.

In the months prior to the construction of the subsurface containment structure, the fenced and screened surface expression activity area on the upper and lower terraces, in the vicinity of the original Well 20 surface expression, covered an area of thousands of square feet.

The history of occurrence and reactivation of surface expressions involving steam, water and oil in the Well 20 surface expression area, on both the upper and lower terraces, is intermittent and unpredictable.

Along with the subsurface containment structure, the pre-June 21, 2011 remediation of surface expressions on the upper terrace, lower terrace and the main crater most likely included the backfilling of soil and compaction with heavy equipment.

Despite a self-imposed 500 foot radius restriction of steam injection around the Well 20 surface expression by Chevron prior to the June 21 accident, and the 800 foot DOGGR-imposed radius restriction of steam injection after the August 17 eruption, the release of steam water and oil at that Well 20 surface expression has continued.

There are TRC injection wells within the 500' radius of Chevron's Well 20 surface expression. Prior to the June 21 accident, TRC did not have a steam injection restriction radius from the Well 20 surface expression.

Pinnacle interpreted tilt meter data, available to both Chevron and TRC, indicated 3 separate ground movement events at or in close proximity of the Well 20 surface expression within 8 days of the accident. The Pinnacle data suggest that both Chevron and TRC steam injections wells are candidates for the tilt meter events.

Of the area's approximately 30 surface expressions, the Well 20 surface expression has been the area's single most continually volatile event for several years. The June 22 surface expression near TRC "Bull 9" may have the potential to be in the same category, having flowed thousands of bbls of fluid in the subsequent months. At approximately 400 feet apart and on the same geographical plane, the two events are evidently geological "focal points" for the steam and fluid that migrates through the subsurface due to steam injection.

It may be possible, because of the subsurface conduits created by steam injected over fracture gradient during the previous years, that steam, water and oil may continue to travel along these pathways even if steam is injected at or below fracture gradient.

Additional Information Needed

Did Chevron have any safety concerns regarding the area after completion of the subsurface containment structure and terrace re-construction?

Was the subsurface vent to the crater of the original surface expression, prior to the construction of the subsurface containment, captured by the containment structure?

How were the crater and other surface expression vents on the upper terrace mitigated/remediated?

Was the possible re-emergence or expansion of the original surface expression crater and upper terrace vents considered when designing the subsurface containment structure and subsequent terrace re-construction?

What communication regarding steam injection cycles, steam volumes and interpretation of tilt meter events existed between Chevron and TRC prior to the June 21 accident?

What is the reason for the apparent contrariety of Pinnacle interpretated data indicating Chevron wells as potential candidates for tilt meter events, presented in this report, and Chevron's assertion that there had been a 500 foot self imposed steam restriction radius around the Well 20 surface expression in the months prior to the accident?

Summary

Due to the shallowness of a heavy oil diatomite reservoir, the proximity of the reservoir to the axis of a structural anticline, and the injection of steam over formation fracture gradient into the reservoir to assist in the extraction of the heavy oil, surface expressions have been occuring in this confined area of the Midway-Sunset Oil Field since the late 1990s, shortly after steam injection began. Surface expression activity at the Well 20 surface expression area began in 2006. The uncontrolled release of steam, water and oil at the Well 20 surface expression has been intermittent.

A re-abandoment operation of Chevron Well 20 (API 029-23672) near the surface surface expression area, was conducted in 2008. It was the third abandonment operation to be performed on Well 20. Damaged well bores near the Well 20 surface

expression may be responsible, at least in part, for the high intensity of thermal activity of that surface expression. Other wells may be abandoned near the Well 20 surface expression in the future.

Known surface expression locations have been required by DOGGR to be netted for safety and the protection of wildlife. Oil and gas operators have been requested to notify DOGGR of any new surface expression, regardless of volume. In 2010 the Well 20 surface expression area, containing several surface expression vents, was fenced and netted *(Photographs 1-4 and Aerial Photograph 2)*.

In an attempt to control steam and fluids from surfacing, Chevron reportedly began in the early months of 2011 construction of a subsurface containment structure at the Well 20 surface expression site. The engineered structure would be placed over the principle portion of the Well 20 surface expression and include three radial drains and associated surface equipment. The project required terrace excavation and remediation of surface expression vents on the upper and lower terraces and the removal of the fence and netting. It is not known if there were plans to replace the fence and netting after completion of the subsurface containment structure. The project was reportedly completed in April/May 2011.

Chevron reported on June 21, 2011 that an employee had fallen into a sink hole and that co-workers were unable to rescue him. DOGGR representatives responded to the scene and observed that there was no indication that a large surface expression area had once occupied the site. It was determined by DOGGR that the accident location was at or near the site of a large crater associated with the Well 20 surface expression *(Photographs 9-11).*

During the ensuing weeks after the June 21 accident, thermal activity at the accident site increased significantly as steam, water and oil began to be expelled from an emerging and enlarging crater. Two large eruptions of steam, water, oil and rocks occurred on August 5 and August 17 (*Photographs 19 & 25)*. Oil and water began to be released at the surface above the subsurface containment structure.

On July 6, July 11, August 5 and August 26, DOGGR issued steam injection restriction orders of 150, 300, 500 and 800 feet, respectively, around the accident location to Chevron and TRC. Prior to the June 21 accident, Chevron reportedly had, for many months, a self imposed 500 foot steam injection restriction radius around the Well 20 surface expression area. TRC, with numerous steam injection wells within 500 feet of the Well 20 surface expression, had no steam injection restriction until the DOGGR

orders. On September 29, CalOSHA issued to Chevron a work exclusion zone order prohibiting access to the Well 20 surface expression area.

With a work safety plan approved by CalOSHA and thermal activity at the Well 20 surface expression crater still active, Chevron began investigative and remedial excavation of the Well 20 surface expression area in early December *(Photograph 27)*. Three radial drains have reportedly been removed and a large diameter metal culvert has been placed over the surface expression crater's vent *(Photograph 28).* The subsurface containment structure, reportedly buried to a depth of 20 to 30 feet, as of the date of this report, has yet to be unearthed and its conditon is unknown.

Prepared an Written by;
Michael Toland
Associate Oil and Gas Engineer
District 4

Reviewed and Approved by;
Burton Ellison
Senior Oil and Gas Engineer
District 4

~~SPILLS~~ ACCIDENT

Lease #: Section 21 Field: MIDWAY-SUNSET

Operator: CUSA

Lease: Section: 21 T. 32S R. 23E

Location: (Ask where the leak is located, nearest well) Near well 20 and K210 over engineered containment structure / surface expression

Oil Volume: (in BBL) Water Volume: (in BBL)

Areal Extent: (area of sq. footage covered by spill)

Occurrence date: 6/21/11 Time: ~~1249~~ 1045

DOCUMENTATION

Co. Rep.: Darrell Walrath Phone: 979-5690 OES: 05 xxxx
800-852-7550

CDOG Notified By: Darrell Walrath Date: 6/21/11 Time: 1243

Report Taken By: Dayne Frary

0-23 BBL (Oil and Water)
24-240 BBL
>240 BBL (circle one)

(Media etc.)
Special
Event

Spill Inspected By: M Tolhd Date: 6/21/11

DETAILS ("X" all that apply)

PRIMARY CAUSE OF OCCURRENCE Surface Expression (based on current information)

___ Corrosion ___ Property/Waterways Damaged (see remarks)

___ Mechanical Failure 1 Fatality Injuries (see remarks)

✓ Other 3 workers were checking ~~on~~ steam emanating ~~[illegible]~~ from ground. ~~[illegible]~~ Ground gave way; one worker slipped feet first into hidden hole; other workers could not react in time to save him from falling.

Containment / Cleanup Methods:

Plans to Prevent Reoccurrence:

Pipe: ___ Well: ___ Tank: ___ Other: ✓

Remarks: Engineered containment structure to be investigated

Photograph 1 - View of Well 20 surface expression site, fluid pit and associated crater on 10/11/10. Accident location is in the vicinity or to the left of crater rim.

Photograph 2 - View of Chevron Well 20 surface expression site and fluid pit on 10/11/10. Location was continually active with surfacing water, oil and steam. A road at the end of the netting leads to the upper terrace.

Photograph 3 - View of the Well 20 surface expression area on October 11, 2010. The crater and fluid pit are located on the lower terrace under the netting in the middle of the photograph. Netting is also seen extending around a large area on the upper terrace due to surface expression activity.

Photograph 4 - Well K210 is located on the upper terrace above the Well 20 surface expression, approximately 30' to 40' from the accident location. This area had surface expressions and was also fenced and netted. Date of photograph is October 11, 2010.

Photographs 5 and 6 – View of surface expression activity on the upper terrace near well K210 on February 16, 2010, prior to the placement of the fencing and netting.

Photographs 7 and 8 – View of upper terrace surface expressions near well K210 on February 16, 2010, prior to the placement of fencing and netting.

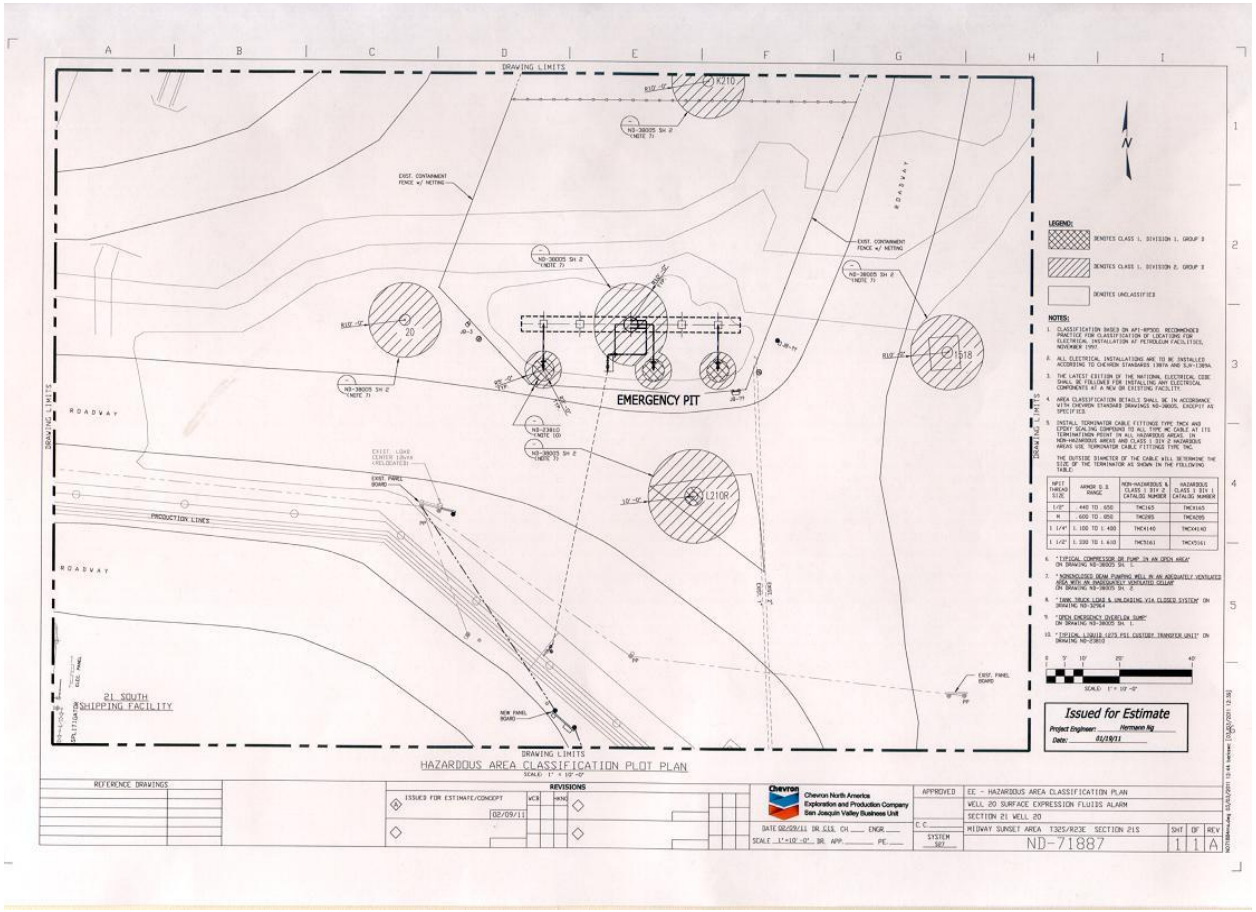


Diagram 1- Plan view of the proposed containment structure built over the Well 20 surface expression. The emergency fluid pit is labeled. The crater seen in the previous picture would be located above and to the right of the emergency pit. The subsurface containment structure includes the elongated cylinder shaped object. Not shown in this diagram is the location of three French drains that were reportedly placed radiating from the containment structure. The large circles in the diagram are area wells. Well K210, on the upper terrace, can be seen as a half circle at the top of the diagram. The road that connects the upper and lower terraces is to the right of the containment structure.

Photograph No. 9 - View of the surface equipment above the subsurface containment structure and remediated surface expression site on the day of the accident, June 21, 2011. The previous surface expression fluid pit was located at the base of the slope above where the present subsurface containment structure exists (the ladder in the picture is a good reference). The crater would have been somewhere between the right of the brown pipe running up the slope of the terrace and the corner of the upper terrace. Well K210 can be seen to the right of the yellow wind sock pole. The accident location is to the right of the wind sock pole approximately 15 feet to 20 feet, at the edge of the terrace. The two vertical cylinders on the upper terrace provide elevated steam release from the subsurface containment structure on the lower terrace. The road connecting the lower and upper terraces is at the extreme right of the picture.

Photograph No. 10 - View of the accident site on the upper terrace overlooking the surface equipment of the subsurface containment structure and the remediated surface expression on June 21, 2011. Well K210 is located on the far right of the picture. The accident spot is 15 feet to 20 feet to the left of the yellow wind sock pole, at the base of the berm. The reddish discoloration of the bermed soil at the accident site, and the future location of the crater, is of interest and may be an early indication of steam migrating to the surface.

Photograph No. 11 - View of the accident spot. The victim's hard hat can be seen at the base of the berm at the edge of the sink hole.

Photograph No. 12 - View of the June 22, 2011 surface expression on TRC Operating Company's "Bull" lease, section 22 T32S/R23E. Crater of the surface expression can be seen on the upper terrace above yellow horizontal guard post. Approximately 600 bbls of fluid were reportedly removed from the bermed pit in 48 hours and approximately 1000 bbls of fluid over the first week of activity. This location is approximately 400 feet from the Chevron accident site.

Photograph No. 13 – View of the TRC June 22 surface expression location in relationship to the June 21 Chevron accident site. The TRC surface expression is on the left and the accident site is on the right, approximately 40 yards beyond the yellow excavator, near the base of the orange wind sock's pole. This surface expression was recorded as tilt meter event on June 22.

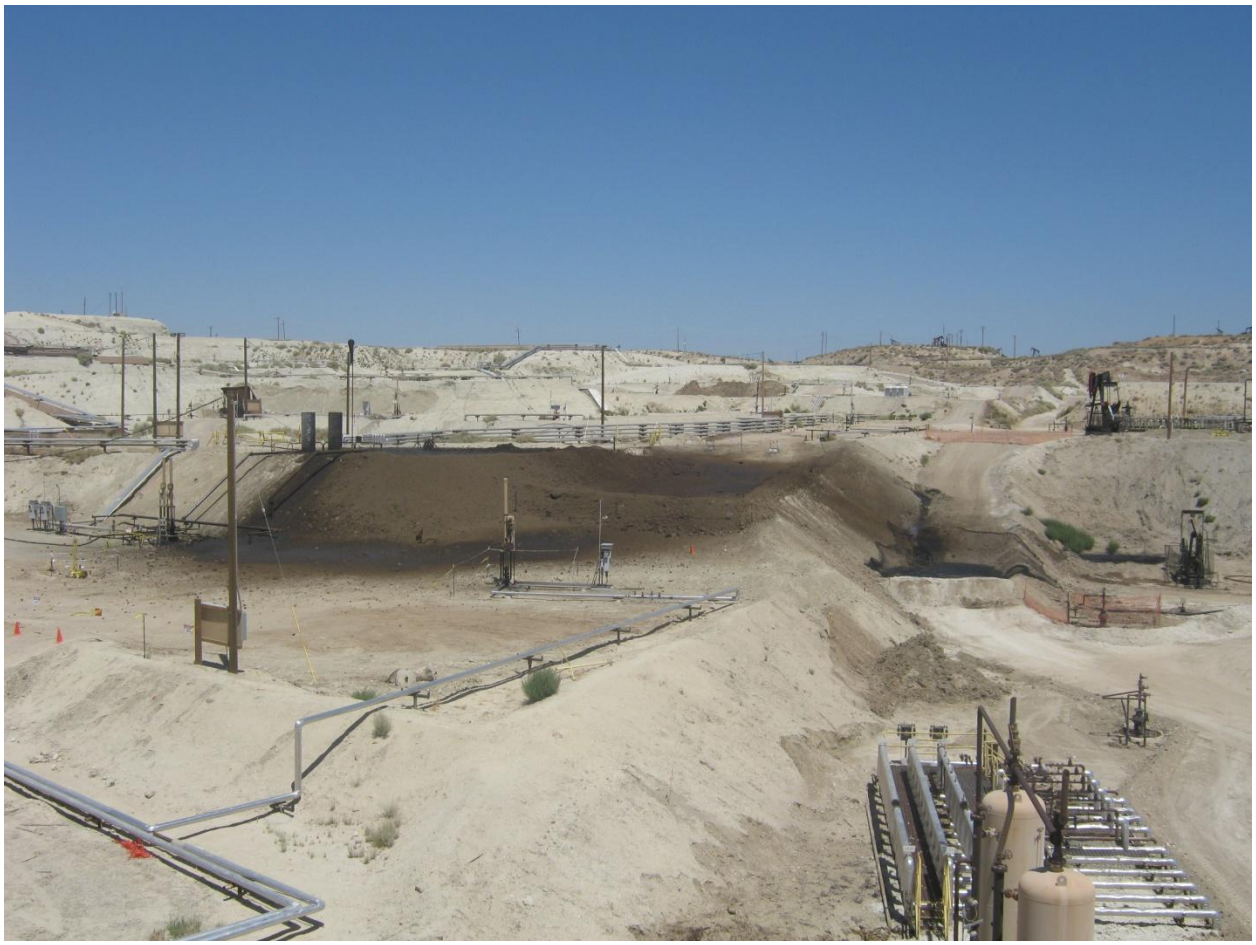
Photograph 14 – View of the June 27 reactivated surface expression location on TRC Operating Company's "Bull" lease in relationship to the June 21 Chevron accident site and surface equipment of the subsurface containment structure. The reactivated surface expression is the bermed and netted area on the right. The accident site is 15 feet to 20 feet to the right of the wind sock pole. The surface equipment is on the left at the base of the slope. The two pipes running up the slope carry steam from the buried surface containment structure to be vented in the two silver cylinders. The boundary between Chevron and TRC is essentially the slope leading to the yellow excavator.

Photograph 15 – View of the Chevron accident location on July 7, 2011. The release of fluid and steam to surface had increased significantly since the June 21 accident, as well as the enlargement of the associated crater.

Photograph 16 – View of Chevron accident site on July 7, 2011. The Crater is approximately 10' wide , intermittently expelling oil and water onto the surrounding ground.

Photograph 17 – View of surface expression on TRC's "Bull" lease, July 7, 2011. An increase in the crater diameter on the upper terrace and deeper erosion of the terrace slope was noted. Approximately 100 bbls/day of fluid was being removed from the containment berm on the lower terrace.

Photograph 18 – View of the TRC reactivated surface expression to the east of the Chevron accident site on July 7, 2011. The TRC reactivated surface expression is at the base of the slope that is essentially the boundary between TRC and Chevron. The crater near the accident site is in the distance with steam rising and oil staining along the terrace slope from fluid recently expelled.



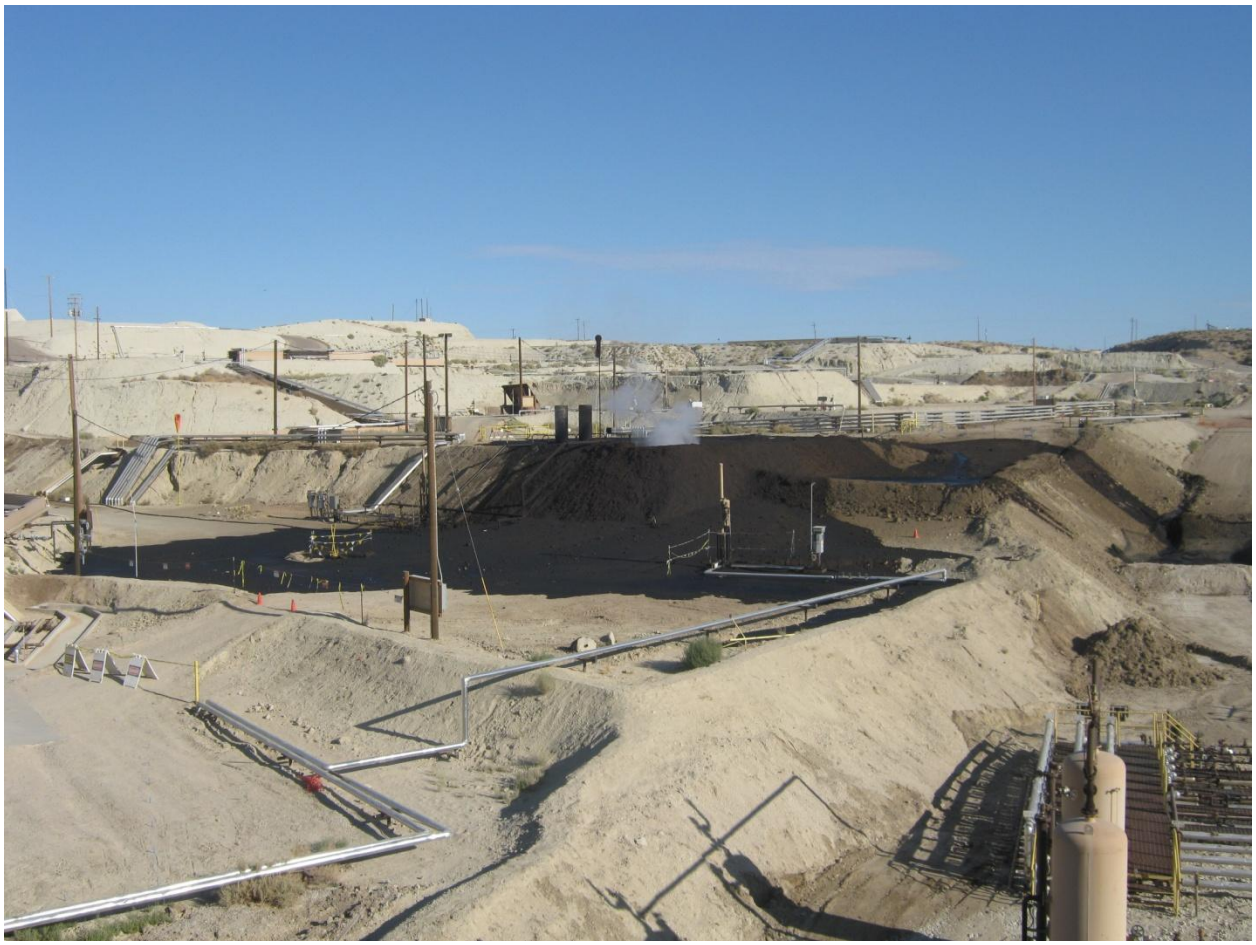
Photograph 19 – View of the Chevron Well 20 and the nearby TRC surface expression areas, on August 5, 2011. The eruption expelling rocks, water and oil occurred sometime during the night of August 4.

Photographs 20 and 21 – Views on August 5 of the material; water, oil and rocks, expelled from the crater during the night of August 4.

Photograph 22 – View of the two new TRC surface expressions that became active on August 3. They are located at the top and bottom of the stream of fluid. The bermed pit was put in place after the reactivation of a surface expression at that location on June 27.

Photograph 23 – View of the eastern extent of the crater eruption onto TRC property and the two new TRC surface expressions located at the base of the oil stained slope.

Photograph 24 – View of Chevron Well 20 surface expression crater on August 18, 2011 one day after the large August 17 eruption. Plumes of steam continued to rise from crater for several days following the event.



Photograph 25 – View of area extent of fluid flow from the Well 20 surface expression crater during the August 17, 2011 eruption event.

Photograph 26 – View of the Well 20 surface expression area on November 17, 2011. The enlargement of the crater and subsequent collapse of its walls released water and oil onto the lower terrace. Water and oil also flowed to surface at the location of the equipment above the subsurface containment structure.

Photograph 27 – View of the start of investigative and remedial excavation of the Well 20 surface expression area on December 1, 2011. Spot locations were excavated to determine the stability of the ground and subsurface. No ground or subsurface instability was discovered.

Photograph 28 – View of Well 20 surface expression area on January 20, 2012 after crater and terrace excavation. As seen in the middle of the photograph, a large diameter metal culvert has been placed over the crater vent. Trenches excavated to remove the radial drains can be seen extending from the culvert. Minor amounts of energy, in the form of bubbles, rise to the surface inside the trenches. The subsurface containment structure has not been excavated.

Aerial Photograph 1 – 2008 aerial view of the Chevron Well 20 surface expression area, showing the surface expression containment pit as well as other surface expressions in the immediate vicinity.

Aerial Photograph 2 – 2010 aerial view of the Chevron Well 20 surface expression area and location of TRC surface expressions, including the approximate future location of the "Bull 9" surface expression.

Attachment 1 – Tilt Meter Event 6/13-14/11 The red triangle represents the location of the tilt meter event and for this slide only, is the approximate location of the Well 20 surface expression. The gray circles are the wells interpreted to be source candidates for the tilt meter event. The line running through the middle of the map is the dividing property line between Chevron and TRC.

MWSS EVENT LOCATOR

EVENT START: 06/13/11 9:25 hrs
EVENT END: 06/14/11 9:30 hrs
Event Fracture Parameters
Depth = 420 ft. Top Diatomite = 378 ft Difference = -42 ft
Error Bounds = 360' to 465'
Fracture Strike Azimuth = 212 deg.
Fracture Dip = 33 deg. NW
Estimated Fracture Diameter = 115 ft.
Growth Center Coordinates
NAD27 Easting = 1551795 Northing = 595985
NAD83 Easting = 6113187 Northing = 2236411

Nearest Wells		Nearest Abandoned Wells	
Well	Dist. (ft)	Well	Dist. (ft)
202R	13	0	0
Bull 16R2	86	0	0
Bull 16R	97	0	0
Birch 8	109	0	0
Birch 8-1	111	0	0
Birch 13	127	0	0

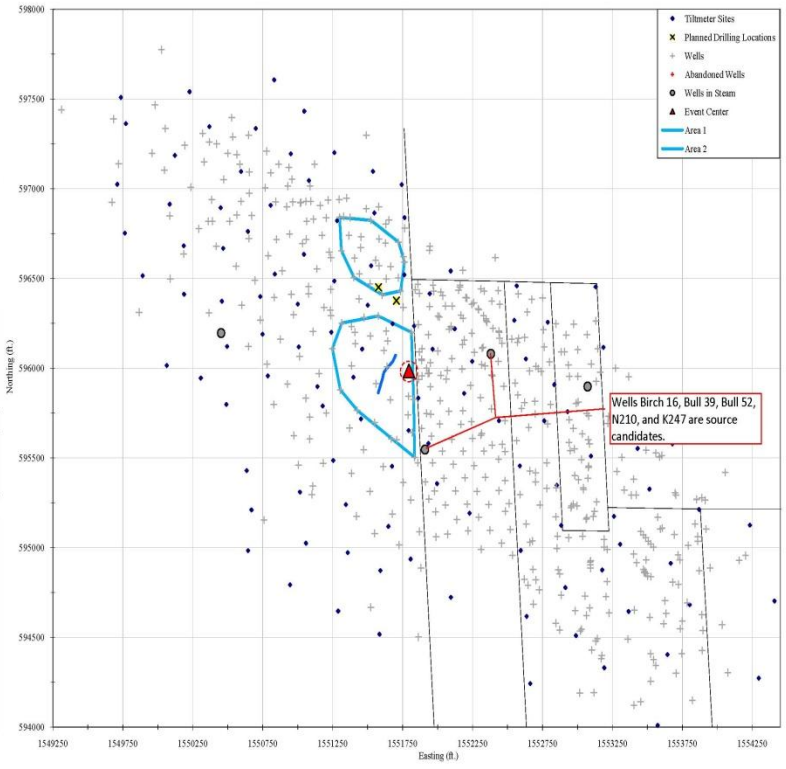
Wells Switched To Soak

Well	Dist. (ft)	Well	Dist. (ft)	Well	Dist. (ft)
Bull 52	454	289	1359		
Bull 25	593				
Cypress 41	1280				

Planned Drilling Locations

Well	Dist. (ft)	Well	Dist. (ft)
H220	401	0	0
H232	513	0	0
0	0	0	0

Notes:
According to daily injection information, this event began two days after the steam start times for TRC wells Bull 52 and Bull 25. Bull 25 was removed from steam shortly prior to event termination and well Bull 52 was removed from steam shortly after event termination. Both wells remain as source candidates. This analysis supersedes previously reported results.



MWSS EVENT LOCATOR

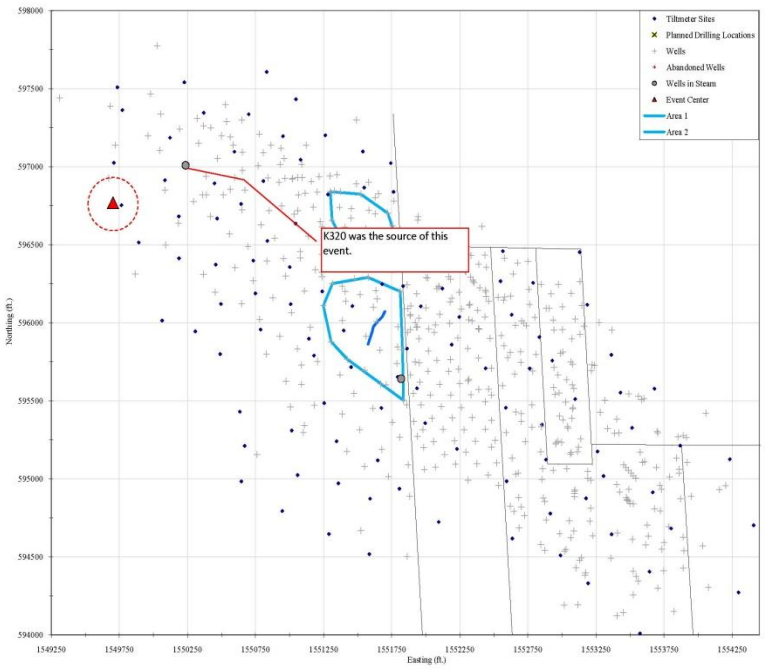
EVENT START: 06/17/11 9:00 hrs
EVENT END: 06/19/11 8:50 hrs
Event Fracture Parameters
Depth = 1020 ft. Top Diatomite = 779 ft Difference = -241 ft
Error Bounds = 970' to 1110'
Fracture Strike Azimuth = 266 deg.
Fracture Dip = 8 deg. NW
Estimated Fracture Diameter = 360 ft.
Growth Center Coordinates
NAD27 Easting = 1549703 Northing = 596768
NAD83 Easting = 6111094 Northing = 2237193

Nearest Wells		Nearest Abandoned Wells	
Well	Dist. (ft)	Well	Dist. (ft)
427	160	0	0
L350	370	0	0
L320	390	0	0
N310	471	0	0
K330	480	0	0
525	485	0	0

Wells On Steam					
Well	Dist. (ft)	Well	Dist. (ft)	Well	Dist. (ft)
K320	585				
L200	2397				

Planned Drilling Locations			
Well	Dist. (ft)	Well	Dist. (ft)
0	0	0	0
0	0	0	0
0	0	0	0

Notes:
This event began and ended concurrently with the steam start and soak times for nearby well K320. This well was therefore the source of this event. This report supersedes previously reported results.



Attachment 2 – Tilt Meter Event 6/17-19/11

Attachment 3 – Tilt Meter Event 6/18-19/11

MWSS EVENT LOCATOR

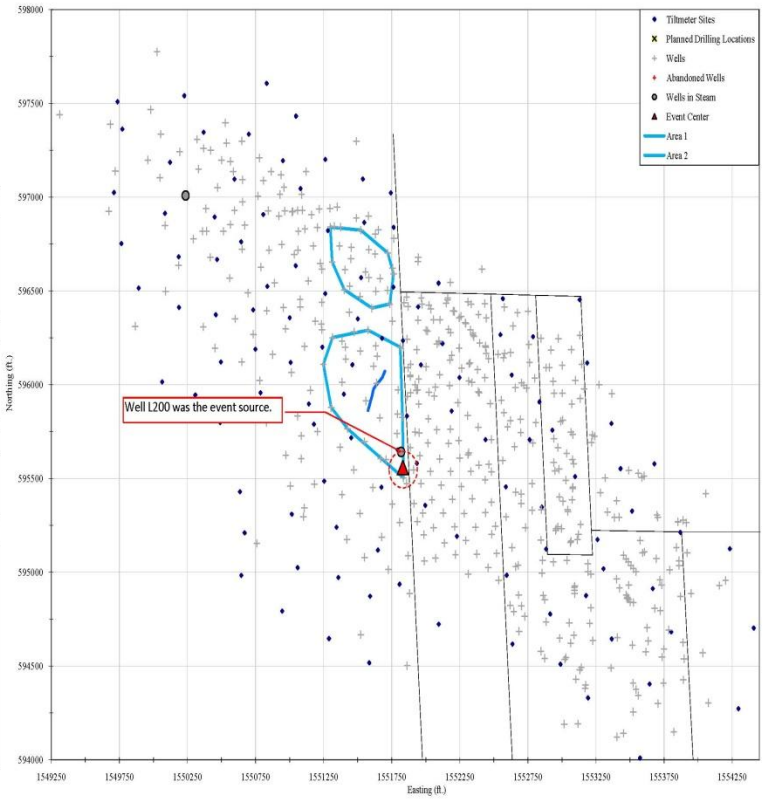
EVENT START: 06/18/11 9:30 hrs
EVENT END: 06/19/11 15:35 hrs
Event Fracture Parameters
Depth = 605 ft. Top Diatomite = 540 ft Difference = -65 ft
Error Bounds = 560' to 660'
Fracture Strike Azimuth = 179 deg.
Fracture Dip = 18 deg. SW
Estimated Fracture Diameter = 140 ft.
Growth Center Coordinates
NAD27 Easting = 1551831 Northing = 595558
NAD83 Easting = 6113223 Northing = 2235984

Nearest Wells		Nearest Abandoned Wells	
Well	Dist. (ft)	Well	Dist. (ft)
M190	56	0	0
Bull 52	79	0	0
L200	84	0	0
31	89	0	0
Bull 45	120	0	0
M200	130	0	0

Wells Switched To Soak					
Well	Dist. (ft)	Well	Dist. (ft)	Well	Dist. (ft)
L200	84				
K320	2156				

Planned Drilling Locations			
Well	Dist. (ft)	Well	Dist. (ft)
0	0	0	0
0	0	0	0
0	0	0	0

Notes:
Event 2011/06/18A terminated at 15:35 hrs on June 19, 2011, concurrent with the steam end time of nearby well L200. This well was the event source. This report supersedes previously reported results.



Attachment 4 – Tilt Meter Event 6/20-21/11

MWSS EVENT LOCATOR

EVENT START: 06/20/11 18:00 hrs
EVENT END: 06/21/11 1:30 hrs
Event Fracture Parameters
Depth = 50 ft. Top Diatomite = 277 ft Difference = +227 ft
Fracture Strike Azimuth = 67 deg.
Fracture Dip = 3 deg. SE
Estimated Fracture Diameter = 250 ft.

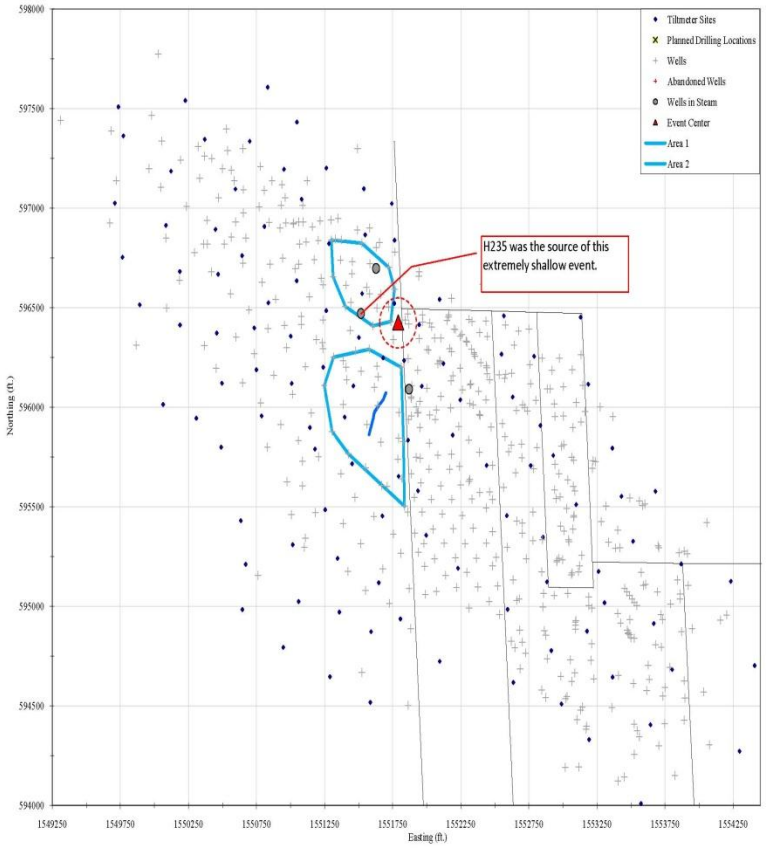
Growth Center Coordinates
NAD27 Easting = 1551790 Northing = 596425
NAD83 Easting = 6113181 Northing = 2236850

Nearest Wells		Nearest Abandoned Wells	
Well	Dist. (ft)	Well	Dist. (ft)
Bull 31	52	0	0
Bull 31ST1	52	0	0
H225	55	0	0
Bull 10	79	0	0
Bull 31R	81	0	0
204R	93	0	0

Wells On Steam					
Well	Dist. (ft)	Well	Dist. (ft)	Well	Dist. (ft)
H235	278				
G240	317				
Birch 8R2	344				

Planned Drilling Locations			
Well	Dist. (ft)	Well	Dist. (ft)
0	0	0	0
0	0	0	0
0	0	0	0

Notes:
Event termination was observed at 1:25 AM on June 21, 2011. Presumably, no steam changes took place at this time. A re-inflation of this event occurred at 7:55 AM with ultimate termination at 8:50 AM. This time correlates to the removal of H235 from steam. This well remains the best candidate as the source of this event. Chevron well G240 and TRC Birch-8R2 remain possible contributors to event growth. This report supersedes previously reported results.



Attachment 5 – Tilt Meter Event 6/22/11

MWSS EVENT LOCATOR

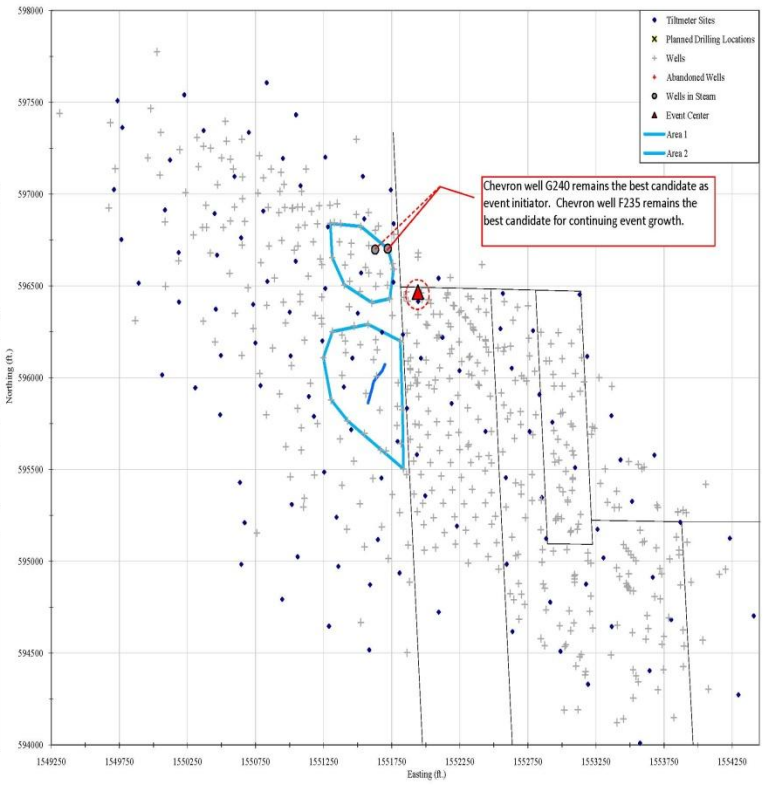
EVENT START: 06/22/11 13:45 hrs
EVENT END: 06/24/11 14:30 hrs
Event Fracture Parameters
Depth = 275 ft.
Error Bounds = 260' to 305'
Fracture Strike Azimuth = 68 deg.
Fracture Dip = 18 deg. SE
Estimated Fracture Diameter = 160 ft.
Growth Center Coordinates
NAD27 Easting = 1551942 Northing = 596466
NAD83 Easting = 6113334 Northing = 2236892

Nearest Wells		Nearest Abandoned Wells	
Well	Dist. (ft)	Well	Dist. (ft)
Bull 30R	25	0	0
Bull 30	48	0	0
Bull 31R	83	0	0
Bull 10	88	0	0
Bull 29	91	0	0
Bull 29ST1	91	0	0

Wells On Steam					
Well	Dist. (ft)	Well	Dist. (ft)	Well	Dist. (ft)
F235	324				
G240	390				

Planned Drilling Locations			
Well	Dist. (ft)	Well	Dist. (ft)
0	0	0	0
0	0	0	0
0	0	0	0

Notes:
According to daily injection information, this event began two days after the steam start time for Chevron well G240. This well was removed from steam on 6/23 and remains the best candidate as event initiator. Chevron well F235 was switched into steam on 6/23 and was removed from steam on 6/26. This well remains the best candidate for continuing event growth. This analysis supersedes previously reported results.



Attachment 6 – Tilt Meter Event 6/24/11

MWSS EVENT LOCATOR

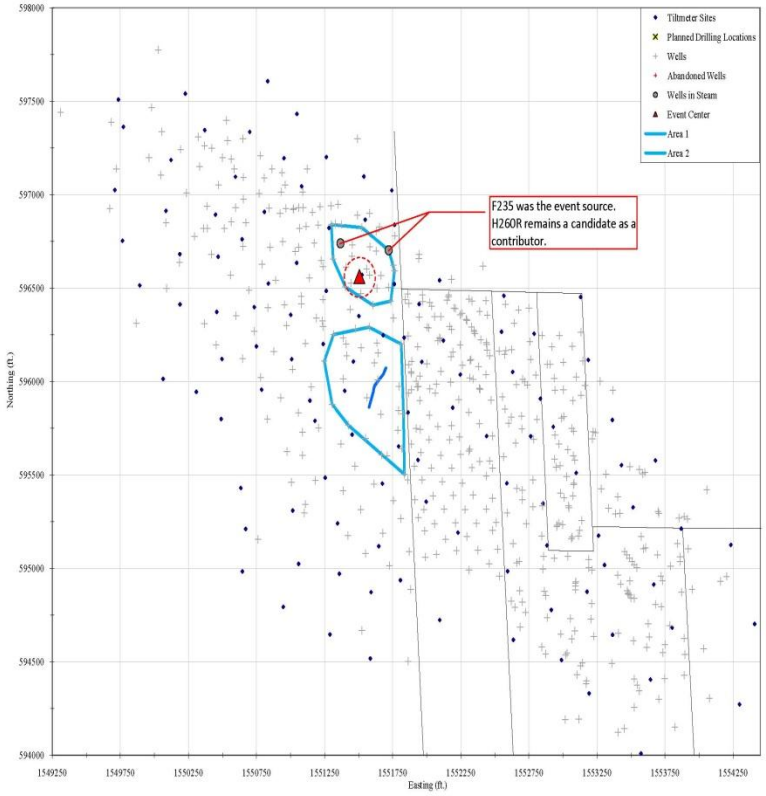
EVENT START: 06/24/11 14:30 hrs
EVENT END: 06/26/11 9:55 hrs
Event Fracture Parameters
Depth = 675 ft. Top Diatomite = 356 ft Difference = -319 ft
Error Bounds = 605' to 785'
Fracture Strike Azimuth = 187 deg.
Fracture Dip = 19 deg. NW
Estimated Fracture Diameter = 195 ft.
Growth Center Coordinates
NAD27 Easting = 1551505 Northing = 596561
NAD83 Easting = 6112896 Northing = 2236986

Nearest Wells		Nearest Abandoned Wells	
Well	Dist. (ft)	Well	Dist. (ft)
H240R	66	0	0
224R	73	0	0
H240	76	0	0
H235	91	0	0
H250R	111	0	0
224	117	0	0

Wells On Steam					
Well	Dist. (ft)	Well	Dist. (ft)	Well	Dist. (ft)
H260R	226				
F235	257				

Planned Drilling Locations			
Well	Dist. (ft)	Well	Dist. (ft)
0	0	0	0
0	0	0	0
0	0	0	0

Notes:
This event began one day after nearby Chevron well F235 was switched into steam and ended concurrently with the soak time for this well. F235 was therefore the source of this event. H260R remains a candidate as a contributor to event growth. This report supersedes previously reported results.



Attachment 7 – Tilt Meter Event 6/26/11

MWSS EVENT LOCATOR

EVENT START: 06/26/11 9:45 hrs
EVENT END: 06/27/11 15:30 hrs
Event Fracture Parameters
Depth = 880 ft. Top Diatomite = 811 ft Difference = -69 ft
Error Bounds = 820' to 950'
Fracture Strike Azimuth = 63 deg.
Fracture Dip = 19 deg. SE
Estimated Fracture Diameter = 205 ft.
Growth Center Coordinates
NAD27 Easting = 1550363 Northing = 596725
NAD83 Easting = 6111755 Northing = 2237151

Nearest Wells		Nearest Abandoned Wells	
Well	Dist. (ft)	Well	Dist. (ft)
L300	71	0	0
L310	86	0	0
L305	93	0	0
282	98	0	0
K300	176	0	0
M310	199	0	0

Wells Switched To Soak					
Well	Dist. (ft)	Well	Dist. (ft)	Well	Dist. (ft)
L300	71				
J270	672				

Planned Drilling Locations			
Well	Dist. (ft)	Well	Dist. (ft)
0	0	0	0
0	0	0	0
0	0	0	0

Notes:
According to daily injection information, this event began shortly after nearby Chevron well L300 was put into steam and ended concurrent to the soak time for this well. Therefore, well L300 was there source for this event. This analysis supersedes previously reported results.