File Review
AP-72
Chesapeake/State M #1 Tank Battery

Chesapeake: Bradley Blevins 575-391-1462 bblevins@chkenergy.com
Arcadis: Sharon Hall 432-687-5400 shall@arcadis-us.com

East of Buckeye. O-18-17S-36E

State M #1/Chesapeake 30-025-23776, 330 FSL 1650 FEL Completed in Sept., 1971 by Tom Ingram. Became SWD in July, 1978. Change of operator from Permian Resources to Chesapeake effective 3/1/04. PA'd 2/21/07.

Mustang State #2/Mack 30-025-37436, 977 FSL 1681 FEL

• 5/30/07 (sent 6:15 PM) email from Cliff Brunson of BBC to Wayne Price of OCD

Notification to OCD that groundwater impact noted during an investigation prior to reclamation of an abandoned facility. Hydrocarbons observed in soil, well installed, and after development 5.9 ft of product observed. Awaiting direction from OCD.

• 6/19/07 letter from Wayne Price to Brad Blevins of Chesapeake.

Directing Chesapeake to submit a Stage 1 Abatement Plan under Rule 19. Plan is due in 60 days of receipt of this letter. Chesapeake must also submit C-141.

• 4/24/10 email from Cliff Brunson to Glenn VonGonten of OCD

Checking on status of three APs submitted by BBC including AP-72 and AP-73 (State L #2 which is nearby). No response by OCD to date. Land owner anxious.

• 4/27/10 email from Glenn VonGonten to Cliff Brunson

All three APs cited in 4/24/10 email are in queue to be processed, but review constrained by staffing level. Suggests monthly pestergrams.

• 6/23/10 email from Brunson to VonGonten

Requesting waiver to public notice requirements such that they can begin investigation

• 6/23/10 email from VonGonten to Brunson.

Response to prior email. Chesapeake can proceed "at risk" until OCD can review plan, but notice requirements cannot be waived.

• 7/12/10 registered letter to VonGonten from Brunson.

Planning to start field work on 8/23/10. Will provide public notice and proceed 30 days thereafter.

• 8/31/10 EM Survey Report by Larson & Associates.

Field work undertaken 8/4 to 8/6/10. Horizontal readings 14 times greater than background recorded south of former tank battery in an area where a pit is suspected. Indications of vertical impact to ~50 feet.

• **Stage 1 Abatement Report by Arcadis dated 3/20/12**

7 monitoring wells and 9 soil borings. Elevated chloride in soils and groundwater. LNAPL in MW-1. Product recovery piloted, but not fully implemented.

8 soil borings with one (SB-7) converted to well advanced by BBC in May 2007 following abandonment of battery.

In August 2010, Larson & Associates conducts EM survey to qualitatively assess chlorides. Indicative of contamination in soil and/or water south of battery in area of former pit. Report included as Appendix C.

Also in August 2010, BBC advances one boring and 6 monitoring wells. Wells sampled in September 2010.

Arcadis gathers water samples in September 2011. 5.58 ft of product in MW-1. Chlorides in excess of standard in only two wells; MWs-1 and -4. BTEX in excess only in MW-1.

DTW is 45 ft. flowing toward the SSE.

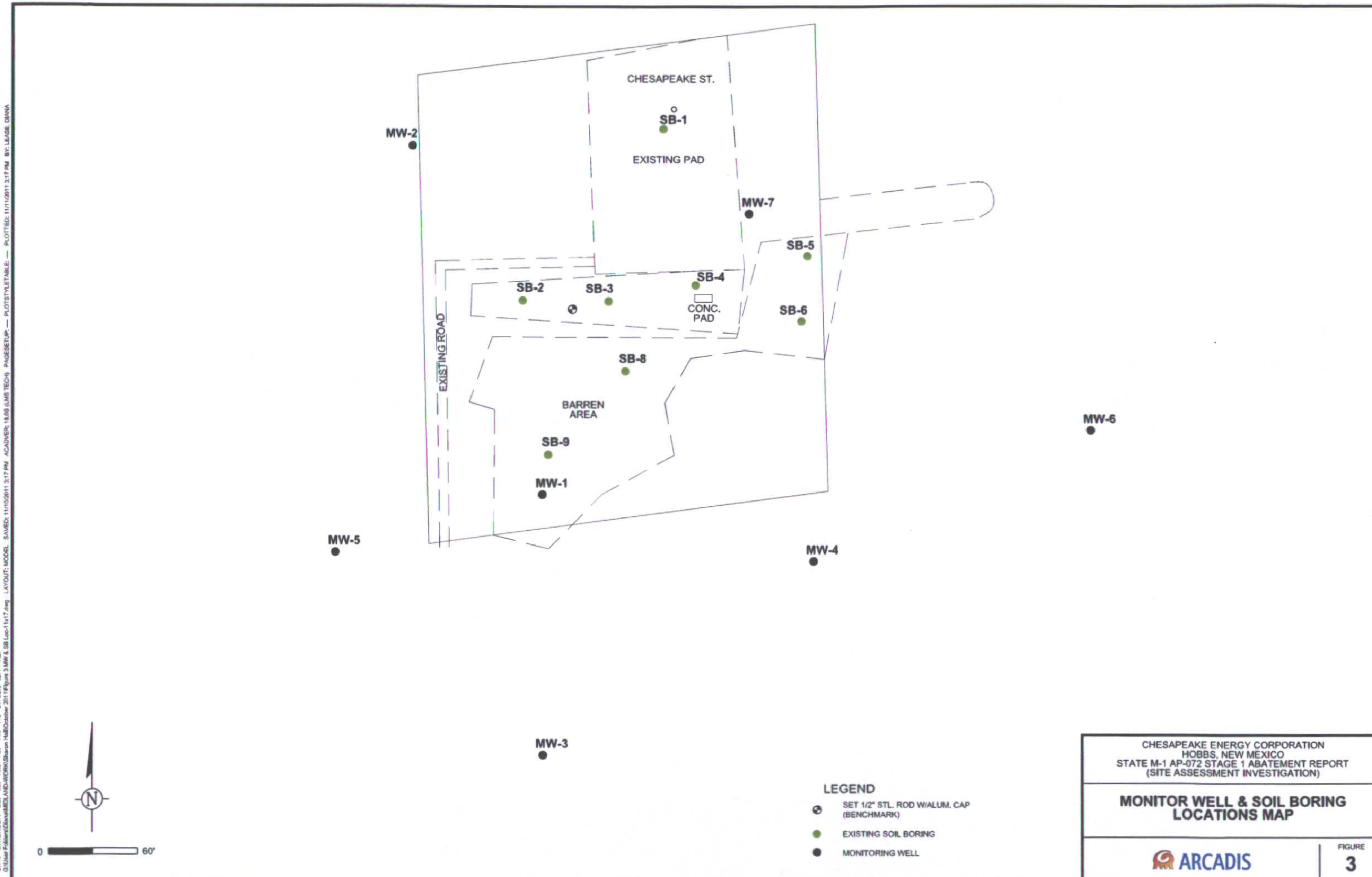
Recommendations: Advance additional well downgradient to delineate chlorides. Submit Stage 2 Plan for remedial activities including product recovery, excavation of chloride-contaminated soils, followed by semi-annual groundwater monitoring. Might include modeling of vadose zone to evaluate use of an infiltration barrier.

The location of MW-1 (the well with product) seems to be located somewhat remote from an obvious source such as the tanks at the surface. Was there pipe in that area? Boring log for MW-1 indicates “black and gray green stained sludge (old pit)” from 1 to 8 ft bgs.

Headspace data never provided in any report.

The distance between MW-2 and MW-4, based on the site map provided, is approximately 390 feet. The difference in water table elevation is 1.76 ft. Thus, the potentiometric gradient is 0.00451 feet/foot or 24 feet per mile.

The vertical spacing on the soil samples is odd. There is a significant gap between 5 feet in depth and the next sample at about 20 feet and then not again until about 40 feet. But this may be just due to the fact these are lab samples. I’ll have to look at the actual investigation report(s) from BBC.


CHESAPEAKE ST.
SB-1
EXISTING PAD
MW-2
MW-7
SB-5
SB-4
SB-2
SB-3
CONC. PAD
SB-6
EXISTING ROAD
SB-8
BARREN AREA
SB-9
MW-1
MW-6
MW-5
MW-4
MW-3
N
0
60'
LEGEND
SET 1/2" STL. ROD W/ALUM. CAP (BENCHMARK)
EXISTING SOIL BORING
MONITORING WELL
CHESAPEAKE ENERGY CORPORATION
HOBBS, NEW MEXICO
STATE M-1 AP-072 STAGE 1 ABATEMENT REPORT
(SITE ASSESSMENT INVESTIGATION)
MONITOR WELL & SOIL BORING LOCATIONS MAP
ARCADIS
FIGURE
3

Well	Date	DTP	DTW	Product Thickness	TOP	GW Elevation
MW-1	5/29/07			5.90		
	9/14/11		49.00	5.58		
MW-2	9/14/11		45.50		3890.51	3845.01
MW-3	9/14/11		45.65		3889.34	3843.69
MW-4	9/14/11		45.65		3888.90	3843.25
MW-5	9/14/11		45.87		3890.41	3844.54
MW-6	9/14/11		45.48		3888.25	3842.77
MW-7	9/14/11		45.22		3889.23	3844.01

Boring	Date	Depth (ft)	Chloride (mg/kg)	DRO (mg/kg)	GRO (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)
MW-2	8/26/10	1	37.7	nd	nd	nd	nd	nd
		3	28.3	nd	nd	nd	nd	nd
		5	37.7	nd	nd	nd	nd	nd
		25	nd	nd	nd	nd	nd	nd
		40	151	nd	nd	nd	nd	nd
MW-3	8/27/10	1	nd	nd	nd	nd	nd	nd
		3	28	nd	nd	nd	nd	nd
		5	28	nd	nd	nd	nd	nd
		25	nd	nd	nd	nd	nd	nd
		40	nd	81.4	nd	nd	nd	nd
MW-4	8/27/10	1	nd	nd	nd	nd	nd	nd
		3	nd	nd	nd	nd	nd	nd
		5	nd	nd	nd	nd	nd	nd
		25	nd	nd	nd	nd	nd	nd
		40	nd	nd	nd	nd	nd	nd
MW-5	8/26/10	1	nd	nd	nd	nd	nd	nd
		3	28.2	nd	nd	nd	nd	nd
		5	nd	nd	nd	nd	nd	nd
		25	47	nd	nd	nd	nd	nd
		40	nd	nd	nd	nd	nd	nd
MW-6	8/26/10	1	nd	nd	nd	nd	nd	nd
		3	nd	nd	nd	nd	nd	nd
		5	nd	nd	nd	nd	nd	nd
		25	nd	nd	nd	nd	nd	nd
		40	28.2	nd	nd	nd	nd	nd
MW-7	8/26/10	1	nd	nd	nd	nd	nd	nd
		3	nd	nd	nd	nd	nd	nd
		5	nd	nd	nd	nd	nd	nd
		25	nd	nd	nd	nd	nd	nd
		40	nd	nd	nd	nd	nd	nd
SB-1	5/3/07	1	1790	110	36.4	<0.01	<0.01	<0.01
		3	617	<50	<1	<0.01	<0.01	<0.01
		5	2120	<50	<1	<0.01	<0.01	<0.01
		20	5140	<50	<1	<0.01	<0.01	<0.01
		39	408	<50	<1	<0.01	<0.01	<0.01
SB-2	5/22/07	1	2020	1430	657	<0.2	<0.2	2.56
		3	402	288	45.4	<0.01	<0.01	0.0382

		5	306	<50	<1	<0.01	<0.01	<0.01
		30	2060	<50	<1	<0.01	<0.01	<0.01
		50	43.5	<50	<1	<0.01	<0.01	<0.01
SB-3	5/22/07	1	2720	2710	270	<0.2	<0.2	2.28
		3	1270	<50	2.26	<0.01	<0.01	<0.01
		5	1400	<50	1.11	<0.01	<0.01	<0.01
		25	2530	<50	<1	<0.01	<0.01	<0.01
		39	328	<50	<1	<0.01	<0.01	<0.01
SB-4	5/22/07	1	120	<50	16.4	<0.01	<0.01	<0.01
		3	117	<50	<1	<0.01	<0.01	<0.01
		5	238	<50	<1	<0.01	<0.01	<0.01
		20	3310	<50	<1	<0.01	<0.01	<0.01
		39	144	<50	<1	<0.01	<0.01	<0.01
SB-5	5/22/07	1	1210	<50	<1	<0.01	<0.01	<0.01
		3	882	<50	<1	<0.01	<0.01	<0.01
		5	1490	<50	<1	<0.01	<0.01	<0.01
		20	2080	<50	<1	<0.01	<0.01	<0.01
		35	49.1	<50	<1	<0.01	<0.01	<0.01
SB-6	5/22/07	1	414	<50	<1	<0.01	<0.01	<0.01
		3	243	<50	<1	<0.01	<0.01	<0.01
		5	705	1300	<1	<0.01	<0.01	<0.01
		15	1460	<50	<1	<0.01	<0.01	<0.01
		35	461	<50	<1	<0.01	<0.01	<0.01
SB-7 (MW-1)	5/23/07	1	42.8	814	21.1	0.0717	0.0699	0.157
		3	41.6	4380	73.9	<0.01	<0.01	<0.01
		5	210	16700	377	1.24	<0.2	0.948
		20	19	6620	1010	6.46	0.77	21.4
		39	24.9	21600	8800	73.8	46.5	170
SB-8	5/23/07	1	10800	<50	5.65	<0.01	<0.01	<0.01
		3	290	<50	<1	<0.01	<0.01	<0.01
		5	303	<50	<1	<0.01	<0.01	<0.01
		20	2190	<50	<1	<0.01	<0.01	<0.01
		39	263	<50	<1	<0.01	<0.01	<0.01
SB-9	8/30/10	1	nd	nd	nd	nd	nd	nd
		3	nd	nd	nd	nd	nd	nd
		5	nd	nd	nd	nd	nd	nd
		20	nd	nd	nd	nd	nd	nd

Total Xylenes (mg/kg)	Naphthalene (mg/kg)
nd	nd
nd	nd
nd	nd
nd	nd
nd	nd
nd	nd
nd	nd
nd	nd
nd	nd
nd	nd
nd	nd
nd	nd
nd	nd
nd	nd
nd	nd
nd	nd
nd	nd
nd	nd
nd	nd
nd	nd
nd	nd
nd	nd
nd	nd
nd	nd
nd	nd
nd	nd
nd	nd
nd	nd
nd	nd
nd	nd
0.168	nd
<0.01	nd
<0.01	nd
<0.01	nd
<0.01	nd
11.5	nd
0.21	nd

<0.01	nd
<0.01	nd
<0.01	nd
3.17	nd
<0.01	nd
<0.01	nd
<0.01	nd
<0.01	nd
0.0408	nd
<0.01	nd
<0.01	nd
<0.01	nd
<0.01	nd
<0.01	nd
<0.01	nd
<0.01	nd
<0.01	nd
<0.01	nd
<0.01	nd
<0.01	nd
<0.01	nd
<0.01	nd
<0.01	nd
0.244	nd
0.478	nd
4.05	nd
40	nd
269	nd
<0.01	nd
<0.01	nd
<0.01	nd
<0.01	nd
<0.01	nd
nd	nd
nd	nd
nd	nd
nd	nd

Well	Date	Chloride (mg/l)	Benzene (ug/l)	Toluene (ug/l)	Ethylbenzene (ug/l)	Total Xylenes (ug/l)	Naphthalene (ug/l)
MW-1	5/23/07	108	<1	<1	<1	<1	<1
	9/14/10	411	4280	956	1510	2231	1860
MW-2	9/9/10	21.3	nd	nd	nd	nd	nd
	9/14/11	16.9	nd	nd	nd	nd	nd
MW-3	9/9/10	35.9	nd	nd	nd	nd	nd
	9/14/11	46.1	nd	nd	nd	nd	nd
MW-4	9/9/10	273	nd	nd	nd	nd	nd
	11/1/10	364	nd	nd	nd	nd	nd
	9/14/11	472	nd	nd	nd	nd	nd
MW-5	9/9/10	24.5	nd	nd	nd	nd	nd
	9/14/11	24	nd	nd	nd	nd	nd
MW-6	9/9/10	193	nd	nd	nd	nd	nd
	11/1/10	239	nd	nd	nd	nd	nd
	9/14/11	164	nd	nd	nd	nd	nd
MW-7	9/9/10	18.8	nd	nd	nd	nd	nd
	9/14/11	84.1	nd	nd	nd	nd	nd

Product