TABLES

TABLE 3-1
MODEL INPUT PARAMETERS-OPERATIONAL PRESSURE MODEL

Level		Thickness (feet)	Porosity	Permeability (darcy)	Fluid Viscosity (cp)	Compressibility (1/psi)
1	CONFINING LAYER	903	0.113	1.00E-15	0.60	1.3E-05
2	SAND LAYER	85	0.32	1.000	0.60	1.3E-06
3	ANAHUAC CONFINING LAYER	903	0.11	1.00E-15	0.60	1.3E-05
4	SAND LAYER	135	0.32	1.500	0.60	1.3E-06
5	CONFINING LAYER	755	0.102	1.00E-15	0.60	1.3E-05
6	SAND LAYER	90	0.32	1.000	0.60	1.3E-06
7	CONFINING LAYER	180	0.1	1.00E-15	0.60	1.3E-05
8	SAND LAYER	140	0.32	1.000	0.60	1.3E-06
9	CONFINING LAYER	255	0.098	1.00E-15	0.60	1.3E-05
10	SAND LAYER	45	0.32	1.000	0.60	1.3E-06
11	CONFINING LAYER	100	0.096	1.00E-15	0.0	1.3E-05
12	SAND LAYER	75	0.32	1.000	0.60	1.3E-06
13	FRIO CONFINING LAYER	335	0.095	1.00E-15	0.57	1.3E-05
14	D SAND INJECTION INTERVAL	15	0.30	1.000	0.56	1.3E-06
15	CONFINING LAYER 15	50	0.093	1.00E-15	0.55	1.3E-05
16	**E&F SAND* INJECTION INTERVAL**	**150**	**0.27**	**1.600**	**0.54**	**1.30E-06**
17	CONFINING LAYER	30	0.09	1.00E-15	0.54	1.25E-05
18	**A/B/C SAND* INJECTION INTERVAL**	**150**	**0.27**	**0.885**	**0.54**	**1.25E-06**
19	CONFINING LAYER	240	0.088	1.00E-15	0.53	1.25E-05
20	SAND LAYER	15	0.270	0.800	0.53	1.25E-6

* Active injection interval shown in dark gray shading, D Sand not present at Sasol Greens Bayou Plant.

TABLE 3-2

FRIO INJECTION INTERVAL SAND THICKNESSES USED IN THE OPERATIONAL PLUME MODELING AND POST-OPERATIONAL PLUME MODELING

FRIO SAND LAYER	THICKNESS USED IN THE OPERATIONAL PLUME AND HIGH SPECIFIC GRAVITY PLUME MODEL (feet)	THICKNESS USED IN THE LOW SPECIFIC GRAVITY 10,000 YEAR PLUME MODEL (feet)
Frio A/B/C Sand	50	Volumetric based on Isopach at dome
Frio E&F Sand	150	Volumetric based on isopach at dome

Table 3-3 Injection/Falloff Tests – Measured Reservoir Transmissibilities – Frio A/B/C Sand Injection Interval and Frio E and F Sand Injection Interval

FRIO E AND F SAND INJECTION INTERVAL

Test Date	Test Injection Rate (gpm)	Test Type	Gauge Depth (ft KB)	Wellbore Fluid Gradient (psi/ft)	Static Pressure at Gauge Depth (psia/psig)	Static Pressure at Datum Depth (psig)	Incremental Static Pressure (psi)	Flowing Pressure at Gauge Depth (psia/psig)	Flowing BHP at Datum Depth (psig)	Delta Pressue due to Skin (psi)	Skin adj FBHP at Datum Depth (psig)	Incremental Flowing Pressure (psi)	Well Test kh/u (md-ft/cp)	Net Thickness (feet)	Viscosity (cp)	Calculated Permeability (md)
Injection Well 1 (WDW47)				**Orig. Static Press=**		**2,824.2**	**psig**			**Datum=**	**6,548**	**ft GL**				
Jun-79	--	Static Survey	--	0.465	--	2,837.4	13.1	--	--	--	--	--	--	--	--	--
Mar-83	--	Static Survey	6,740	0.433	2,919.0	2,842.8	18.5	--	--	--	--	--	--	--	--	--
Jul-86	--	Static Survey	6,700	0.518	2,904.0	2,833.5	9.3	--	--	--	--	--	--	--	--	--
Feb-88	--	Static Survey	6,720	0.498	2,915.0	2,837.4	13.1	--	--	--	--	--	--	--	--	--
Jan-89	--	Static Survey	6,700	0.468	2,912.0	2,833.6	9.4	--	--	--	--	--	--	--	--	--
Mar-90	208	Falloff	6,700	0.490	2,904.8	2,838.2	13.9	3,106.5	3,040.0	186	2,854.0	29.73	589,004	218	0.54	1,459
Jan-91	200	Falloff	6,700	0.587	2,910.0	2,815.5	-8.8	3,098.7	3,004.1	177	2,827.1	2.90	694,774	218	0.54	1,721
Dec-91	84	Falloff	6,700	0.507	2,915.1	2,831.4	7.2	2,947.0	2,863.3	26	2,837.3	13.09	589,025	218	0.54	1,459
Dec-92	168	Falloff	6,680	0.517	2,898.9	2,824.2	0.0	3,138.3	3,063.6	233	2,830.6	6.40	871,609	218	0.54	2,159
Sep-93	153	Falloff	6,692	0.435	2,908.4	2,838.0	13.8	2,979.6	2,909.3	54	2,855.3	31.03	319,526	218	0.54	791
Sep-94	210	Falloff	6,700	0.438	2,905.9	2,831.7	7.4	2,983.5	2,909.2	62	2,847.2	22.92	576,834	218	0.54	1,429
Sep-95	210	Falloff	6,700	0.445	2,901.2	2,826.0	1.7	2,978.4	2,903.2	67	2,836.2	11.98	839,138	218	0.54	2,079
Nov-96	210	Falloff	6,700	0.449	2,907.5	2,831.9	7.6	3,095.5	3,019.8	178	2,841.8	17.52	838,896	218	0.54	2,078
Sep-97	210	Falloff	6,700	0.452	2,921.5	2,845.4	21.1	3,006.2	2,930.1	72	2,858.1	33.82	738,729	218	0.54	1,830
Oct-98	209	Falloff	6,700	0.436	2,919.3	2,845.3	21.0	3,030.6	2,956.6	99	2,857.6	33.36	728,344	218	0.54	1,804
Sep-99	210	Falloff	6,700	0.436	2,919.9	2,846.0	21.7	2,991.8	2,917.9	60	2,857.9	33.62	716,574	218	0.54	1,775
May-01	210	Falloff	6,620	0.430	2,872.1	2,833.3	9.0	2,976.2	2,937.4	95	2,842.4	18.18	984,633	218	0.54	2,439
Jul-02	214	Falloff	6,620	0.434	2,876.2	2,837.1	12.9	2,957.5	2,918.5	70	2,848.5	24.23	779,498	218	0.54	1,931
Jul-03	249	Falloff	6,620	0.435	2,875.5	2,836.5	12.2	2,942.8	2,903.8	51	2,852.8	28.55	645,522	218	0.54	1,599
Aug-04	258	Falloff	6,620	0.431	2,877.7	2,838.8	14.6	2,928.0	2,889.1	37	2,852.1	27.87	831,523	218	0.54	2,060
Jul-05	271	Falloff	6,620	0.429	2,885.2	2,846.1	21.9	2,939.3	2,900.2	41	2,859.2	35.00	945,119	218	0.54	2,341
Aug-06	250	Falloff	6,620	0.432	2,884.1	2,845.1	20.9	2,929.7	2,890.8	32	2,858.8	34.55	775,447	218	0.54	1,921
Aug-07	--	Static Survey	6,620	0.427	2,885.2	2,846.7	22.5	--	--	--	--	--	--	--	--	--
Aug-08	--	Static Survey	6,620	0.429	2,886.4	2,847.7	23.4	--	--	--	--	--	--	--	--	--
Aug-09	--	Static Survey	6,620	0.429	2,893.6	2,854.9	30.6	--	--	--	--	--	--	--	--	--
Dec-10	250	Falloff	6,620	0.432	2,897.3	2,858.4	34.1	2,972.0	2,933.1	57	2,876.1	51.84	575,596	218	0.54	1,426
Nov-11	252	Falloff	6,620	0.383	2,902.9	2,866.8	42.6	2,958.4	2,922.2	56	2,866.2	41.98	777,521	218	0.54	1,926
Nov-12	255	Falloff	6,620	0.433	2,899.5	2,860.5	36.3	2,959.4	2,920.4	47	2,873.4	49.17	865,702	218	0.54	2,144
Oct-13	252	Falloff	6,626	0.432	2,895.5	2,868.7	44.5	2,955.4	2,928.6	39	2,889.6	65.35	489,208	218	0.54	1,212
Oct-14	256	Falloff	6,615	0.432	2,910.9	2,874.1	49.9	2,978.1	2,941.4	52	2,889.4	65.16	701,485	218	0.54	1,738
Oct-15	260	Falloff	6,622	0.433	2,921.5	2,881.7	57.4	2,988.9	2,949.1	54	2,895.1	70.84	827,937	218	0.54	2,051
Oct-16	260	Falloff	6,605	0.429	2,910.7	2,878.3	54.1	2,983.2	2,950.9	53	2,897.9	73.66	532,698	218	0.54	1,320
Nov-17	263	Falloff	6,620	0.428	2,935.7	2,897.0	72.8	3,012.6	2,973.9	63	2,910.9	86.67	791,429	218	0.54	1,960
Nov-18	263	Falloff	6,622	0.430	2,927.5	2,887.8	63.6	3,009.3	2,969.6	62	2,907.6	83.38	540,316	218	0.54	1,338

Table 3-3 Injection/Falloff Tests – Measured Reservoir Transmissibilities – Frio A/B/C Sand Injection Interval and Frio E and F Sand Injection Interval

FRIO A/B/C SAND INJECTION INTERVAL

Test Date	Test Injection Rate (gpm)	Test Type	Gauge Depth (ft KB)	Wellbore Fluid Gradient (psi/ft)	Static Pressure at Gauge Depth (psia/psig)*	Static Pressure at Datum Depth (psig)	Incremental Static Pressure (psi)	Flowing Pressure at Gauge Depth (psia/psig)	Flowing BHP at Datum Depth (psig)	Delta Pressue due to Skin (psi)	Skin adj FBHP at Datum Depth (psig)	Incremental Flowing Pressure (psi)	Well Test kh/u (md-ft/cp)	Net Thickness (feet)	Viscosity (cp)	Calculated Permeability (md)
Injection Well 2 (WDW319)				**Orig. Static Press=**		**2,956.2**	**psig**			**Datum=**	**6,820.5**	**ft GL**				
Sep-00	210	Falloff	6,950	0.437	3,037.7	2,974.9	18.7	3,059.1	2,996.3	2	2,994.3	38.1	507,532	240	0.54	1,142
Sep-01	250	Falloff	6,850	0.433	2,975.2	2,956.2	0.0	3,639.4	3,620.3	580	3,040.3	84.1	131,027	240	0.54	295
Mar-02	350	Falloff	6,850	0.438	2,980.7	2,961.7	5.5	3,121.3	3,102.2	102	3,000.2	44.0	372,018	240	0.54	837
Mar-03	350	Falloff	6,850	0.433	2,994.8	2,975.8	19.6	3,347.0	3,328.0	319	3,009.0	52.8	343,834	240	0.54	774
Jul-04	355	Falloff	6,850	0.432	2,980.2	2,961.2	5.0	3,072.6	3,053.6	57	2,996.6	40.4	349,549	240	0.54	786
Jul-05	280	Falloff	6,850	0.412	2,994.6	2,975.8	19.6	3,358.1	3,339.3	337	3,002.3	46.1	384,198	240	0.54	864
Aug-06	276	Falloff	6,850	0.435	2,981.0	2,962.0	5.8	3,524.9	3,505.8	506	2,999.8	43.6	288,875	240	0.54	650
Aug-07	350	Falloff	6,820	0.431	2,969.5	2,963.4	7.2	3,140.3	3,134.2	116	3,018.2	62.0	258,137	240	0.54	581
Aug-08	355	Falloff	6,820	0.433	2,978.6	2,972.6	16.4	3,619.0	3,612.9	623	2,989.9	33.7	686,303	240	0.54	1,544
Aug-09	320	Falloff	6,852	0.432	2,987.0	2,967.1	10.9	3,407.2	3,387.3	391	2,996.3	40.1	424,930	240	0.54	956
Dec-10	300	Falloff	6,820	0.433	2,979.9	2,973.9	17.7	3,337.5	3,331.4	324	3,007.4	51.2	344,639	240	0.54	775
Nov-11	309	Falloff	6,824	0.438	2,988.4	2,980.7	24.5	3,312.6	3,304.9	296	3,008.9	52.7	426,986	240	0.54	961
Nov-12	324	Falloff	6,819	0.438	2,984.1	2,978.5	22.3	3,310.3	3,304.8	293	3,011.8	55.6	384,473	240	0.54	865
Oct-13	320	Falloff	6,827	0.435	2,976.0	2,981.7	25.5	3,292.7	3,298.4	273	3,025.4	69.2	285,833	240	0.54	643
Oct-14	325	Falloff	6,830	0.436	2,994.2	2,983.9	27.7	3,298.7	3,288.3	269	3,019.3	63.1	356,316	240	0.54	802
Oct-15	315	Falloff	6,820	0.437	3,006.5	3,000.6	44.4	3,276.8	3,270.8	229	3,041.8	85.6	288,939	240	0.54	650
Oct-16	306	Falloff	6,800	0.433	3,000.0	3,002.6	46.4	3,265.6	3,268.2	226	3,042.2	86.0	294,511	240	0.54	663
Nov-17	303	Falloff	6,819	0.436	3,015.5	3,009.9	53.7	3,270.3	3,264.7	206	3,058.7	102.5	236,384	240	0.54	532
Nov-18	294	Falloff	6,826	0.434	3,011	3,002.1	45.9	3,246	3,237	191	3046.1	89.9	255,394	240	0.54	575

TABLE 3-4
SHALE CORE VERTICAL PERMEABILITIES – ARKEMA., PLANT WELL 2 (WDW-230)

Sample Depth	Permeability (Darcies)
3,043.3	$< 1 \times 10^{-6}$
3,046.3	$< 1 \times 10^{-6}$
3,830.4	$< 1 \times 10^{-6}$
4,536.8	$< 1 \times 10^{-6}$

TABLE 3-5

FRIO INJECTION INTERVAL SANDS - MODELED POROSITIES

SAND LAYER	MODEL ASSIGNED SAND POROSITY (%)
Frio A/B/C Sand	27
Frio E&F Sand	27

TABLE 3-6
OPERATIONAL MODEL FLUID PROPERTIES SUMMARY

Sand Layer	Depth[1] (feet)	Temperature[2] (°F)	Viscosity (cp)
Frio A/B/C	6,820.5	145	0.54
Frio E&F	6,548	143	0.54

1 Top of sand used as reference depth.
2 Coolest temperature used to be conservative.

TABLE 3-7
CALCULATION OF LOWER FRIO SAND
MULTIPLYING FACTOR FOR INPUT INTO DUPONT BASIC PLUME MODEL

Sasol Well 1 (WDW147) Sidewall Cores K/phi Value	Sasol Well 1 (WDW147) Whole Cores K/phi Value	Sasol Well 2 (WDW319) Sidewall Cores K/phi Value	Sasol Well 2 (WDW319) Whole Cores K/phi Value	Lyondell Well 1 (WDW148) Sidewall Cores K/phi Value	Equistar Well 1 (WDW036) Sidewall Cores K/phi Value	
48.08	59.23	42.24	59.26	61.69	37.38	
74.18	102.93	51.51	31.76	61.69	21.99	
50.46	66.47	16.96	49.68	93.75	69.57	
88.24	100.59	35.7	41.87	56.75	14.07	
95.54	50.59	5.82	4.18	75.3	27.84	
22.1	132.04	40	66.56	7.62	29.84	
25.35	53.85	6.75	50.72	40.72	64.43	
33.65	100.6	14.52	46.63	68.66	52.48	
33.65	77.55	25.17	16.15	28.24	28.20	
29.8	46.77	7.51	12.55	33.44	53.44	
29.8	40.3	24.5	37.11	20.83	70.59	
44.41	10.26	5.13	32.68	27.61		
36.44	28.31	6.46	37.67	66.01		
	22.75	3.42	74.23	19.38		
	4.79	11.81	149.84	4.92		
	26.93	36.48	164.38	3.58		
	34.84	7.69	14.17	53.25		
		37.98	7.91	59.7		
		15.73	10.31	74.07		
		22.65	129.41	119.19		
		24.5	81.38	9.43		
		20.27	97.64	24.44		
		12.68	16.36	40.72		
		23.33	36.39	45.77		
		6.43	100.09	98.1		
		9.61	62.5	53.69		
		6.39	106.43	57.18		
		3.91	15.14	56.23		
		4.23	23.56	50.93		
		4.98	17.4	49.69		
		62.69	50.8	36.7		
		40.19	58.35	59.12		
		50.3	63.03	3.61		
		43.13	42.32	72.1		
			29.98	102.4		
				5.12		
				89.46		
		Maximum k/phi =	164.38		Average k/phi =	43.81
		Mininum k/phi =	3.42			
					Multiplying Factor =	**3.8**
* Disregarded abnormally low and high permeability/porosity pairs						

TABLE 3-8

FRIO INJECTION INTERVAL SANDS

CALCULATED GAUSSIAN AND MODELED MULTIPLYING FACTORS – OPERATIONAL DUPONT BASIC PLUME MODEL

Injection Interval	Nominal Volumetric Plume Radius (feet)	Calculated Multiplying Factor Based on Dispersion*	Conservative Model Multiplying Factor Employed
Frio A/B/C Sand	6,664	3.3	3.8

* Using a maximum dispersivity from Xu and Eckstein, 1995

TABLE 3-9
MODELED FREE WATER AND EFFECTIVE SHALE DIFFUSIVITIES FOR CONSTITUENTS OF CONCERN

CAS No.	Waste Codes	Chemical Name	LaBas Molar Volume	Formation Fluid Viscosity (cp)	Free Water Diffusion Coefficient (cm2/sec)	Shale Diffusion Coefficient (cm2/sec)	Dimensionless Vertical Distance (Z)	Time (sec)	Shale Porosity	Diffusion Distance Shale (feet)	Uncertainty (5%)	Total Diffusion Distance Shale (feet)
83-32-9	F039	Acenaphthene	208.6	0.44	1.46E-05	6.42E-07	3.35	3.156E+11	0.21	100	5	105
208-96-8	F039	Acenapthylene	201.2	0.44	1.49E-05	6.56E-07	4.05	3.156E+11	0.21	122	7	129
62-53-3	F039, U012	Aniline	125.2	0.44	1.97E-05	8.67E-07	4.11	3.156E+11	0.21	142	8	150
120-12-7	F039	Anthracene	196.7	0.44	1.51E-05	6.64E-07	3.11	3.156E+11	0.21	94	5	99
56-55-3	F039, U018	Benz(a)-anthracene	302.3	0.44	1.17E-05	5.16E-07	4.54	3.156E+11	0.21	121	7	128
71-43-2	D018, U019, F005, F039	Benzene	96	0.44	2.30E-05	1.01E-06	4.13	3.156E+11	0.21	154	8	162
205-99-2	F039	Benzo(b)-fluoranthene	294.9	0.44	1.19E-05	5.23E-07	4.51	3.156E+11	0.21	121	7	128
207-08-9	F039	Benzo(k)-fluoranthene	331.9	0.44	1.11E-05	4.88E-07	4.52	3.156E+11	0.21	117	6	123
191-24-2	F039	Benzo(g,h,i)-perylene	402.9	0.44	9.88E-06	4.35E-07	4.35	3.156E+11	0.21	107	6	113
50-32-8	F039, U022	Benzo(a)-pyrene	331.9	0.44	1.11E-05	4.88E-07	4.50	3.156E+11	0.21	117	6	123
108-90-7	D021, U037, F002, FO39	Chlorobenzene	116.9	0.44	2.05E-05	9.03E-07	3.77	3.156E+11	0.21	133	7	140
218-01-9	F039, U050	Chrysene	302.3	0.44	1.17E-05	5.16E-07	4.27	3.156E+11	0.21	114	6	120
1319-77-3	D026, U052, F039	Cresol	125.6	0.44	1.96E-05	8.65E-07	4.05	3.156E+11	0.21	140	7	147
95-48-7	D023, U052, F039	o-Cresol	125.6	0.44	1.96E-05	8.65E-07	3.38	3.156E+11	0.21	117	6	123
108-39-4	D024, U052, F039	m-Cresol	125.6	0.44	1.96E-05	8.65E-07	3.38	3.156E+11	0.21	117	6	123
106-44-5	D025, U052, FO39	p-Cresol	125.6	0.44	1.96E-05	8.65E-07	4.05	3.156E+11	0.21	140	7	147
53-70-3	F039, U063	Dibenz(a,h)anthracene	365.9	0.44	1.05E-05	4.61E-07	4.45	3.156E+11	0.21	112	6	118
192-65-4	F039	Dibenz(a,e)pyrene	458.6	0.44	9.15E-06	4.04E-07	4.05	3.156E+11	0.21	96	5	101
541-73-1	F039, U071	m-Dichlorobenzene	137.8	0.44	1.86E-05	8.19E-07	3.53	3.156E+11	0.21	119	6	125
95-50-1	F039, U070	o-Dichlorobenzene	137.8	0.44	1.86E-05	8.19E-07	3.53	3.156E+11	0.21	119	6	125
106-46-7	F039, U072	p-Dichlorobenzene	137.8	0.44	1.86E-05	8.19E-07	3.80	3.156E+11	0.21	128	7	135
105-67-9	F039, U101	2,4-Dimethylphenol	156.8	0.44	1.72E-05	7.59E-07	3.51	3.156E+11	0.21	114	6	120
100-41-4	F039	Ethyl benzene	140.4	0.44	1.84E-05	8.10E-07	3.51	3.156E+11	0.21	117	6	123
206-44-0	F039, U120	Fluoranthene	265.3	0.44	1.26E-05	5.57E-07	3.41	3.156E+11	0.21	95	5	100
86-73-7	F039	Fluorene	227.1	0.44	1.38E-05	6.10E-07	2.90	3.156E+11	0.21	84	5	89
	D002	Hydroxyl (OH)		0.44	6.16E-05	2.72E-06	1.52	3.156E+11	0.21	93	5	98
193-39-5	F039, U137	Indeno(1,2,3-c,d)pyrene	488.2	0.44	8.82E-06	3.89E-07	4.41	3.156E+11	0.21	102	6	108
91-20-3	F039, U165	Naphthalene	147.6	0.44	1.78E-05	7.87E-07	4.38	3.156E+11	0.21	144	8	152
85-01-8	F039	Phenanthrene	238.2	0.44	1.35E-05	5.94E-07	4.11	3.156E+11	0.21	117	6	123
108-95-2	U188, F039	Phenol	105.1	0.44	2.18E-05	9.61E-07	3.01	3.156E+11	0.21	110	6	116
129-00-0	F039	Pyrene	265.3	0.44	1.26E-05	5.57E-07	3.45	3.156E+11	0.21	96	5	101
110-86-1	D038, U196, F005, F039	Pyridine	93.1	0.44	2.34E-05	1.03E-06	3.90	3.156E+11	0.21	147	8	155
	D003	Sodium Sulfide		0.44	1.12E-05	4.94E-07	2.96	3.156E+11	0.21	78	4	82
	D003	Sodium Hydrosulfide		0.44	1.11E-05	4.90E-07	3.46	3.156E+11	0.21	90	5	95
108-88-3	U220, F005, F039	Toluene	118.2	0.44	2.03E-05	8.97E-07	3.46	3.156E+11	0.21	122	7	129
1330-20-7	F039, U239	Xylene	134.6	0.44	1.88E-05	8.31E-07	3.12	3.156E+11	0.21	106	6	112
		Worst Case Constituent*			6.16E-05	2.72E-06	5.04	3.156E+11	0.21	308	16	324

* Uses Hydroxyl as the worst case most mobile constituent

TABLE 3-10
Concentration Reduction Factors and Molecular Diffusion Critical Constituent Parameters

CAS No.	Current Injectate Possible Waste Codes	Chemical Name	Reference Molecule	Land Ban HBL (mg/l)	Source	Detection Limit (mg/l)	SW-846 Test Method	Maximum Wellhead Concentration (mg/l)	Concentration Reduction Factor
83-32-9	F039	Acenaphthene		2.10E+00	RFD			1,000,000	2.10E-06
208-96-8	F039	Acenapthylene		1.00E-02	DL	1.00E-02	8270	1,000,000	1.00E-08
62-53-3	F039, U012	Aniline		6.00E-03	RSD			1,000,000	6.00E-09
120-12-7	F039	Anthracene		1.10E+01	RFD			1,000,000	1.10E-05
56-55-3	F039, U018	Benz(a)-anthracene		1.30E-04	DL	1.30E-04	8310	1,000,000	1.30E-10
71-43-2	D018, U019, F005, F039	Benzene		5.00E-03	MCL			1,000,000	5.00E-09
205-99-2	F039	Benzo(b)-fluoranthene		1.80E-04	DL	1.80E-04	8310	1,000,000	1.80E-10
207-08-9	F039	Benzo(k)-fluoranthene		1.70E-04	DL	1.70E-04	8310	1,000,000	1.70E-10
191-24-2	F039	Benzo(g,h,i)-perylene		7.60E-04	DL	7.60E-04	8310	1,000,000	7.60E-10
50-32-8	F039, U022	Benzo(a)-pyrene		2.00E-04	MCL			1,000,000	2.00E-10
108-90-7	D021, U037, F002, FO39	Chlorobenzene		1.00E-01	MCL			1,000,000	1.00E-07
218-01-9	F039, U050	Chrysene		1.50E-03	DL	1.50E-03	8310	1,000,000	1.50E-09
1319-77-3	D026, U052, F039	Cresol	p-Cresol	1.00E-02	DL	1.00E-02	8270	1,000,000	1.00E-08
95-48-7	D023, U052, F039	o-Cresol		1.80E+00	RFD			1,000,000	1.80E-06
108-39-4	D024, U052, F039	m-Cresol		1.80E+00	RFD			1,000,000	1.80E-06
106-44-5	D025, U052, FO39	p-Cresol		1.00E-02	DL	1.00E-02	8270	1,000,000	1.00E-08
53-70-3	F039, U063	Dibenz(a,h)anthracene		3.00E-04	DL	3.00E-04	8310	1,000,000	3.00E-10
192-65-4	F039	Dibenz(a,e)pyrene		1.00E-02	DL	1.00E-02	8270	1,000,000	1.00E-08
541-73-1	F039, U071	m-Dichlorobenzene		6.00E-01	MCL			1,000,000	6.00E-07
95-50-1	F039, U070	o-Dichlorobenzene		6.00E-01	MCL			1,000,000	6.00E-07
106-46-7	F039, U072	p-Dichlorobenzene		7.50E-02	MCL			1,000,000	7.50E-08
105-67-9	F039, U101	2,4-Dimethylphenol		7.00E-01	RFD			1,000,000	7.00E-07
100-41-4	F039	Ethyl benzene		7.00E-01	MCL			1,000,000	7.00E-07
206-44-0	F039, U120	Fluoranthene		1.40E+00	RFD			1,000,000	1.40E-06
86-73-7	F039	Fluorene		1.40E+00	RFD			1,000,000	4.00E-05
	D002	Hydroxil (OH)							3.20E-02
193-39-5	F039, U137	Indeno(1,2,3-c,d)pyrene		4.30E-04	DL	4.30E-04	8310	1,000,000	4.30E-10
91-20-3	F039, U165	Naphthalene		6.00E-04	DL	6.00E-04	8021	1,000,000	6.00E-10
85-01-8	F039	Phenanthrene		6.40E-03	DL	6.40E-03	8310	1,000,000	6.40E-09
108-95-2	U188, F039	Phenol		2.10E+01	RFD			1,000,000	2.10E-05
129-00-0	F039	Pyrene		1.10E+00	RFD			1,000,000	1.10E-06
110-86-1	D038, U196, F005, FO39	Pyridine		3.50E-02	RFD			1,000,000	3.50E-08
	D003	Sodium Sulfide		1.00E+00	Total Sulfide			1,000,000	2.76E-05
	D003	Sodium Hydrosulfide		1.00E+00	Total Sulfide			1,000,000	1.00E-06
108-88-3	U220, F005, F039	Toluene		1.00E+00	MCL			1,000,000	1.00E-06
1330-20-7	F039, U239	Xylene		1.00E+01	MCL			1,000,000	1.00E-05

*Updated per Land Ban Health Limits Guideline - Revised 12-10-18

Table 3-11
MODELED CLASS I AND CLASS II LOWER FRIO INJECTION WELLS - COMPLETION HISTORIES

Model Well Number*	Operator	Well	TCEQ/RRC Permit	Original Completion Date	Original Completion Interval	Original Completion Sand(s)	Recompletion Date	Recompletion Activity	Recompletion Interval	Recompletion Sand(s)	Current Completion Interval	Current Completion Sand(s)
1	Sasol	Plant Well 1	WDW147	8/1979	6700 - 6780	Frio E&F	7/1986	Added Perforations	6620 - 6680	No Change	6620 - 6780	Frio E&F
2	Sasol	Plant Well 2	WDW319	9/2000	6850 - 7260	Frio A/B/C	--	--	--	--	6850 - 7260	Frio A/B/C
3	Equistar	Plant Well 1	WDW036	6/1968	6706 - 6875	Frio B/C	6/1977	Abandoned Lower Perforations	6315 - 6620	Frio E/F/A	--	Plugged - 2015
4 & 5	Lyondell	Plant Well 1	WDW148	7/1978	6681 - 7167	Frio A/B/C	05/2004 '10/1996	Adandoned Lower Perforations Sidetrack Well	6690 - 6818 6884 - 7176	Frio E&F Frio A/B/C	6690 - 6818 6884 - 7176	Frio E&F
6	Lyondell	Plant Well 2	WDW162	11/1979	6692 - 7146	Frio A/B/C	3/2003	Abandoned Lower Perforations	6700 - 6800	Frio E&F	6700 - 6800	Frio E&F
7	Arkema	Plant Well 1	WDW122	6/30/1976	6080 - 6752	Frio E&F/Frio A&B/Frio C	12/2005 12/9/1991	Abandoned Lower Completion Replace Screen	5470 - 5644 6080 - 6752	Middle Frio Interval No Change	5470 - 5644 6080 - 6752	Middle Frio Interval Frio E&F/Frio A&B/Frio C
8	Arkema	Plant Well 2	WDW230	8/22/1994	6180 - 6486	Frio E&F/Frio A&B	9/2012	Abandoned Lower Completion	5462 - 5630	Middle Frio Interval	5462 - 5630	Middle Frio Interval
9	ExxonMobil	Plant Well 1	WDW397		6264-7260	Frio E&F/Frio A&B	--	--	--	--	6264-7260	Frio E&F/Frio A&B
10	ExxonMobil	Plant Well 2	WDW398		6547-7225	Frio E&F/Frio A&B	--	--	--	--	6547-7225	Frio E&F/Frio A&B
11	Texas Molecular	Plant Well 1	WDW169	6/1981	7103 - 7350	Frio E&F/Frio A&B	3/2007 1/1998 1/2000 2/2000	Added Perforations Added Perforations Added Perforations Insert Liner & Reperforate	7118 - 7190 6958 - 7050 6595 - 6685 7236 - 7318	Frio E&F Frio E&F/Frio A&B Mid Frio & Frio E&F/Frio A&B Frio A&B**	7118 - 7318	Frio E&F and Frio A&B
12	Texas Molecular	Plant Well 2	WDW249	4/1993	7208 - 7336	Frio A&B	1/2007 12/2000 11/1999	Added Perforations Sidetrack Well Added Perforations	7117-7231 7244 - 7315 6056-6320	Frio E&F Frio A&B Middle Frio & Frio A&B	7117 - 7315	Frio E&F and Frio A&B
13	Vopak	Plant Well 1	WDW157	2/1980	7280 - 7330	Frio A&B	6/2003 1980 to 1982 11/92 1992 to 2000	Added Perforations Added Perforations Insert Liner & Reperforate Added Perforations	6990 - 7070 7096 - ? 7096 - 7274 6875 - 6915	Frio E&F Interval Frio E&F/Frio A&B Frio E&F/Frio A&B Frio E&F/Frio A&B	6875 - 7274	Frio E&F/Frio A&B
14	GeoSpecialty	Plant Well 1	WDW222	6/1983	7194 - 7508	Frio E&F to Lower A&B	--	Insert Liner & Reperforate	7220 - 7405	Frio E&F to Lower A&B	7220 - 7405	Frio E&F to Lower A&B
15	GeoSpecialty	Plant Well 2	WDW223	5/2008 '6/1983	7240 - 7488	Frio E&F/Frio A&B	8/1989	Perfed Shallower due to Obstruction Abandoned Lower Perforations	6662 - 6667 6830 - 7128	Middle Frio Interval Frio D' to Frio E&F	6662 - 6667 6830 - 7128	Middle Frio Interval Frio D' to Frio E&F
16	Shell	Plant Well 1	WDW172	9/1957	7226 - 7533	Frio A&B/Lower A&B	2/1963	Added Perforations	7152 - 7218	Frio E&F to Lower A&B	Plugged - 7/90	Plugged - 7/90
17	Shell	Plant Well 2	WDW173	7/1980	7252 - 7518	Frio A&B/Lower A&B	--	--	--	--	Plugged - 10/99	Plugged - 10/99
18	Cobra	TNR #6	TRC-15553	10/1999	7035 - 7181	Frio C	--	--	--	--	7035 - 7181	Frio C
19	Etoco	Jack-Peace Unit 1	TRC-12052	04/2005	7250 - 7292	Frio C	--	--	--	--	7250 - 7292	Frio C
20	Etoco	Destec 2D	TRC-11994	12/2004	6515 - 7094	Frio B	--	--	--	--	6515 - 7094	Frio B
21	Etoco	S. Hous. Unit 4	TRC-11585	02/2002	7300 - 7350	Frio A&B	--	--	--	--	7300 - 7350	Frio A&B
22	Columbus	Willits 1	TRC-11650	7/2002	7400 - 7460	Frio A&B	--	--	--	--	7400 - 7460	Frio A&B
23	Columbus	Davis OU 2V	TRC-11180	02/1999	7300 - 7680	Frio A&B	--	--	--	--	7300 - 7680	Frio A&B
24	Lyondell	Plant Well 3	WDW438	--	Proposed	Proposed A/B/C	--	--	--	--	Proposed	Frio A/B C Proposed

*Model Well Number from the Open Case

TABLE 3-12
DISTANCES BETWEEN INJECTION WELLS IN THE OPERATIONAL MODELS

#	INJECTION WELL ID	COORDINATES	DIST TO OTHER INJ WELLS (FT) (SA1) (TX1) (ET4)	(SA2) (TX2) (CO1)	(E1) (V1) (CO2)	(L1) (G1) (L3)	(L1A) (G2)	(L2) (S1)	(AR1) (S2)	(AR2) (C6)	(EX1) (ET1)	(EX2) (ET2)
1	(SA1)	-17104. -19823.	0.0	358.3	39444.2	29950.0	30011.3	29590.5	84619.8	85355.8	9341.6	10949.5
			28448.5	30814.6	27116.9	29628.3	30114.1	22527.7	24704.2	29700.0	35754.0	15583.3
			15744.5	57488.8	59115.4	30144.3						
2	(SA2)	-17421. -19990.	358.3	0.0	39719.5	30294.9	30356.5	29934.2	84933.9	85670.4	9049.6	10616.8
			28707.7	31054.9	27388.5	29832.2	30318.8	22659.9	24846.7	30058.3	36108.7	15933.6
			16044.3	57843.2	59467.8	30490.8						
3	(E1)	-2168. 16684.	39444.2	39719.5	0.0	17232.7	17304.8	17031.6	46547.9	47316.9	48754.9	49947.4
			46105.8	49240.2	44197.7	51579.8	51830.6	51325.7	52279.4	25427.7	20914.5	32337.1
			38094.0	31529.7	31497.1	17662.4						
4	(L1)	4586. 830.	29950.0	30294.9	17232.7	0.0	116.9	508.1	55846.8	56546.2	38903.0	40860.9
			29106.5	32183.2	27241.0	34774.2	34986.8	35738.5	36343.6	8294.8	7267.5	17783.3
			23034.9	28048.3	29429.7	559.0						
5	(L1A)	4699. 800.	30011.3	30356.5	17304.8	116.9	0.0	622.2	55823.4	56522.1	38956.3	40919.6
			29055.3	32128.8	27192.1	34730.0	34941.2	35723.8	36321.7	8207.2	7156.0	17798.3
			23035.8	27963.2	29351.1	445.2						
6	(L2)	4078. 839.	29590.5	29934.2	17031.6	508.1	622.2	0.0	56067.0	56769.2	38572.2	40510.4
			29217.9	32309.4	27342.3	34852.7	35071.7	35684.4	36320.7	8595.6	7774.6	17607.3
			22916.0	28492.0	29853.3	1040.7						
7	(AR1)	29471. 50826.	84619.8	84933.9	46547.9	55846.8	55823.4	56067.0	0.0	781.4	93915.9	95488.8
			80874.4	83262.4	79429.9	86897.5	86934.5	90399.4	90505.0	60381.1	52701.5	73590.0
			78565.0	36660.6	34062.3	55850.6						
8	(AR2)	30096. 51295.	85355.8	85670.4	47316.9	56546.2	56522.1	56769.2	781.4	0.0	94649.1	96228.5
			81480.2	83855.0	80043.7	87501.3	87535.6	91048.1	91142.4	61034.1	53354.3	74282.6
			79243.0	37138.4	34539.5	56546.5						
9	(EX1)	-21408. -28114.	9341.6	9049.6	48754.9	38903.0	38956.3	38572.2	93915.9	94649.1	0.0	2848.0
			31635.4	33284.3	30780.7	31006.2	31495.5	22273.3	24570.9	37738.4	44302.8	22989.1
			21066.5	65992.0	67736.8	39054.8						
10	(EX2)	-24256. -28114.	10949.5	10616.8	49947.4	40860.9	40919.6	40510.4	95488.8	96228.5	2848.0	0.0
			34483.2	36125.3	33622.5	33812.3	34300.6	25011.6	27303.0	40083.7	46478.6	25429.4
			23783.5	68203.1	69895.5	41040.2						
11	(TX1)	10225. -27725.	28448.5	28707.7	46105.8	29106.5	29055.3	29217.9	80874.4	81480.2	31635.4	34483.2
			0.0	3217.2	1957.4	6030.9	6110.2	12404.5	11230.3	21693.7	28929.5	17244.4
			13267.1	46013.3	48417.3	28767.7						
12	(TX2)	11788. -30537.	30814.6	31054.9	49240.2	32183.2	32128.8	32309.4	83262.4	83855.0	33284.3	36125.3
			3217.2	0.0	5174.4	4112.9	3945.5	12563.1	10895.9	24617.2	31696.1	20349.6
			16074.3	47996.5	50448.7	31830.6						
13	(V1)	9300. -26000.	27116.9	27388.5	44197.7	27241.0	27192.1	27342.3	79429.9	80043.7	30780.7	33622.5
			1957.4	5174.4	0.0	7652.6	7804.7	12740.5	11890.9	19945.2	27278.1	15387.3
			11681.5	44852.5	47222.0	26912.0						
14	(G1)	9100. -33650.	29628.3	29832.2	51579.8	34774.2	34730.0	34852.7	86897.5	87501.3	31006.2	33812.3
			6030.9	4112.9	7652.6	0.0	493.4	9248.9	7270.0	27595.2	34917.1	21191.6
			16157.3	51892.5	54321.1	34464.5						
15	(G2)	9570. -33800.	30114.1	30318.8	51830.6	34986.8	34941.2	35071.7	86934.5	87535.6	31495.5	34300.6
			6110.2	3945.5	7804.7	493.4	0.0	9703.0	7693.6	27747.3	35033.0	21569.6
			16579.6	51850.5	54287.5	34671.2						
16	(S1)	-100. -34600.	22527.7	22659.9	51325.7	35738.5	35723.8	35684.4	90399.4	91048.1	22273.3	25011.6
			12404.5	12563.1	12740.5	9248.9	9703.0	0.0	2302.9	30025.5	37701.6	19051.1
			13264.8	56922.7	59197.4	35560.2						
17	(S2)	2050. -35425.	24704.2	24846.7	52279.4	36343.6	36321.7	36320.7	90505.0	91142.4	24570.9	27303.0
			11230.3	10895.9	11890.9	7270.0	7693.6	2302.9	0.0	30230.6	37872.8	20200.6
			14449.6	56565.9	58888.3	36132.8						
18	(C6)	9212. -6055.	29700.0	30058.3	25427.7	8294.8	8207.2	8595.6	60381.1	61034.1	37738.4	40083.7
			21693.7	24617.2	19945.2	27595.2	27747.3	30025.5	30230.6	0.0	7679.8	14826.8
			18681.7	28475.4	30420.4	7813.3						
19	(ET1)	11846. 1159.	35754.0	36108.7	20914.5	7267.5	7156.0	7774.6	52701.5	53354.3	44302.8	46478.6
			28929.5	31696.1	27278.1	34917.1	35033.0	37701.6	37872.8	7679.8	0.0	21836.4
			26182.7	21736.2	23434.4	6784.8						
20	(ET2)	-2089. -15653.	15583.3	15933.6	32337.1	17783.3	17798.3	17607.3	73590.0	74282.6	22989.1	25429.4
			17244.4	20349.6	15387.3	21191.6	21569.6	19051.1	20200.6	14826.8	21836.4	0.0
			5786.6	43266.6	45143.7	17748.0						
21	(ET4)	-1439. -21403.	15744.5	16044.3	38094.0	23034.9	23035.8	22916.0	78565.0	79243.0	21066.5	23783.5
			13267.1	16074.3	11681.5	16157.3	16579.6	13264.8	14449.6	18681.7	26182.7	5786.6

```
                                0.0 46985.6 49024.4 22930.9
22 (CO1)  29261.  14166.   57488.8 57843.2 31529.7 28048.3 27963.2 28492.0 36660.6 37138.4 65992.0 68203.1
                           46013.3 47996.5 44852.5 51892.5 51850.5 56922.7 56565.9 28475.4 21736.2 43266.6
                           46985.6     0.0  2598.9 27731.0
23 (CO2)  29329.  16764.   59115.4 59467.8 31497.1 29429.7 29351.1 29853.3 34062.3 34539.5 67736.8 69895.5
                           48417.3 50448.7 47222.0 54321.1 54287.5 59197.4 58888.3 30420.4 23434.4 45143.7
                           49024.4  2598.9     0.0 29148.7
24 ( L3)   5086.    580.   30144.3 30490.8 17662.4   559.0   445.2  1040.7 55850.6 56546.5 39054.8 41040.2
                           28767.7 31830.6 26912.0 34464.5 34671.2 35560.2 36132.8  7813.3  6784.8 17748.0
                           22930.9 27731.0 29148.7     0.0
```

Well key:

```
                    24 INJECTION WELLS
                      SA1   -17104.   -19823.            Sasol Well 1 (WDW-147)
                      SA2   -17421.   -19990.            Sasol Well 2 (WDW-319)
                       E1    -2168.    16684.            Equistar Well 1 (WDW-36)
                       L1     4586.      830.            Lyondell Well 1 (WDW-148)
                      L1A     4699.      800.            Lyondell Well 1-Sidetrack 1 (WDW-148)
                       L2     4078.      839.            Lyondell Well 2 (WDW-162)
                      AR1    29471.    50826.            Arkema Well 1 (WDW122)
                      AR2    30096.    51295.            Arkema Well 2 (WDW230)
                      EX1   -21408.   -28114.            ExxonMobil Well 1 (WDW397)
                      EX2   -24256.   -28114.            ExxonMobil Well 2 (WDW398)
                      TX1    10225.   -27725.            Texas Molecular (WDW169)
                      TX2    11788.   -30537.            Texas Molecular (WDW249)
                       V1     9300.   -26000.            Vopak Well 1 (WDW157)
                       G1     9100.   -33650.            GeoSpecialties Well 1 (WDW222)
                       G2     9570.   -33800.            GeoSpecialties Well 2 (WDW223)
                       S1     -100.   -34600.            Shell Well  1 (WDW172)
                       S2     2050.   -35425.            Shell Well  2 (WDW173)
                       C6     9212.    -6055.            Cobra Tex Nat Railway # 6 SWD
                      ET1    11846.     1159.            Etoco Jackson-Peace Unit 1 SWD
                      ET2    -2089.   -15653.            Etoco Destec 2D SWD
                      ET4    -1439.   -21403.            Etoco S Houston Unit 4 SWD
                      CO1    29261.    14166.            Columbus Willits 1 SDW
                      CO2    29329.    16764.            Columbus Davis OU 2V SWD
                       L3     5086.      580.            Lyondell Proposed Well 3 (WDW438)
```

TABLE 3-13

PROJECTED CUMULATIVE INJECTION RATES THROUGH YEAR-END 2050 IN THE FRIO A/B/C INJECTION INTERVAL SAND

Site	Cumulative Rate Modeled (gpm)
Lyondell Chemical Company	425
Equistar	0
Sasol	750*
Exxon Mobil	700
Arkema	90
Cobra Operating TNR #6 SWD	1
Etoco Jackson/Peace Unit 1 SWD	26
Etoco Destec 2D SWD	20
Etoco S Houston Unit 4 SWD	5
Columbus Willits 1 SWD	10
Columbus Davis OU 2V SWD	0
Vopak	25
Texas Molecular	135
GeoSpecialties	65
Etoco S. Houston Unit #4 SWD	5
Shell	0

* Sasol maximum permitted rate

TABLE 3-14

PROJECTED CUMULATIVE INJECTION RATES THROUGH YEAR END 2050 IN THE FRIO E&F SAND INJECTION INTERVAL

Site	Cumulative Rate Modeled (gpm)
Lyondell Chemical Company	425
Equistar	0
Sasol	750*
Exxon Mobil	700
Arkema	90
Cobra Operating TNR #6 SWD	0
Etoco Jackson/Peace Unit 1 SWD	0
Etoco Destec 2D SWD	0
Etoco S Houston Unit 4 SWD	0
Columbus Willits 1 SWD	0
Columbus Davis OU 2V SWD	0
Vopak	25
Texas Molecular	135
GeoSpecialties	65
Etoco S. Houston Unit #4 SWD	5
Shell	0

* Sasol maximum permitted rate

TABLE 3-15

MODELED NOMINAL PLUME DIAMETERS – DUPONT BASIC PLUIME MODEL

INJECTION INTERVAL	CUMULATIVE VOLUME THROUGH YEAR-END 2050 (BILLIONS OF GALLONS)	VOLUMETRIC PLUME DIAMETER (FEET)
Frio A/B/C Sand	14.088	6,664
Frio E&F Sand	14.822	3,946

TABLE 3-16
ANNUAL MODEL PREDICTED FORMATION PRESSURES IN THE FRIO INJECTION INTERVAL SANDS

CASE 1 - SEALED FAULT CASES

	Frio A/B/C Sand Injection Interval- Sealed Fault A Case (Case 1 Models)		Frio E&F Sand Injection Interval - Sealed Fault A Case (Case 1 Models)	
Date	Well 2 Incremental Pressure Increase Fault Case (psi)	Well 2 Reservoir Pressure at 6,820.5 Feet (psig)	Well 1 Incremental Pressure Increase Fault Case (psi)	Well 1 Reservoir Pressure at 6,548 Feet (psig)
Jan-69	0.0	2,956.2	0.0	2,824.2
31-Dec-17	147.4	3,103.6	91.9	2,916.1
31-Dec-18	268.7	3,224.9	221.2	3,045.4
31-Dec-19	290.3	3,246.5	230.8	3,055.0
31-Dec-20	303.6	3,259.8	236.8	3,061.0
31-Dec-21	313.4	3,269.6	241.4	3,065.6
31-Dec-22	321.2	3,277.4	245.1	3,069.3
31-Dec-23	327.7	3,283.9	248.2	3,072.4
31-Dec-24	333.4	3,289.6	251.0	3,075.2
31-Dec-25	338.4	3,294.6	253.4	3,077.6
31-Dec-26	342.9	3,299.1	255.6	3,079.8
31-Dec-27	346.9	3,303.1	257.6	3,081.8
31-Dec-28	350.7	3,306.9	259.5	3,083.7
31-Dec-29	354.1	3,310.3	261.2	3,085.4
31-Dec-30	357.3	3,313.5	262.9	3,087.1
31-Dec-31	360.3	3,316.5	264.4	3,088.6
31-Dec-32	363.1	3,319.3	265.8	3,090.0
31-Dec-33	365.7	3,321.9	267.2	3,091.4
31-Dec-34	368.2	3,324.4	268.5	3,092.7
31-Dec-35	370.6	3,326.8	269.7	3,093.9
31-Dec-36	372.9	3,329.1	270.9	3,095.1
31-Dec-37	375.1	3,331.3	272.0	3,096.2
31-Dec-38	377.1	3,333.3	273.1	3,097.3
31-Dec-39	379.1	3,335.3	274.1	3,098.3
31-Dec-40	381	3,337.2	275.1	3,099.3
31-Dec-41	382.9	3,339.1	276.1	3,100.3
31-Dec-42	384.6	3,340.8	277.0	3,101.2
31-Dec-43	386.3	3,342.5	277.9	3,102.1
31-Dec-44	388	3,344.2	278.8	3,103.0
31-Dec-45	389.6	3,345.8	279.6	3,103.8
31-Dec-46	391.1	3,347.3	280.4	3,104.6
31-Dec-47	392.7	3,348.9	281.2	3,105.4
31-Dec-48	394.1	3,350.3	282.0	3,106.2
31-Dec-49	395.5	3,351.7	282.8	3,107.0
31-Dec-50	396.9	3,353.1	283.5	3,107.7
31-Dec-80	46.5	3,002.7	24.6	2,848.8

CASE 2 - OPEN FAULT CASES

	Frio A/B/C Sand Injection Interval- Sealed Fault A Case (Case 1 Models)		Frio E&F Sand Injection Interval - Sealed Fault A Case (Case 1 Models)	
Date	Well 2 Incremental Pressure Increase Open Case (psi)	Well 2 Reservoir Pressure at 6,820.5 Feet (psig)	Well 1 Incremental Pressure Increase Open Case (psi)	Well 1 Reservoir Pressure at 6,548 Feet (psig)
Jan-57	0.0	2,956.2	0.0	2,824.2
31-Dec-17	146.0	3,102.2	72.8	2,897.0
31-Dec-18	322.1	3,278.3	185.9	3,010.1
31-Dec-19	338.6	3,294.8	193.3	3,017.5
31-Dec-20	348.8	3,305.0	197.9	3,022.1
31-Dec-21	356.4	3,312.6	201.5	3,025.7
31-Dec-22	362.5	3,318.7	204.3	3,028.5
31-Dec-23	367.6	3,323.8	206.7	3,030.9
31-Dec-24	372.1	3,328.3	208.9	3,033.1
31-Dec-25	376.0	3,332.2	210.8	3,035.0
31-Dec-26	379.5	3,335.7	212.5	3,036.7
31-Dec-27	382.7	3,338.9	214.0	3,038.2
31-Dec-28	385.6	3,341.8	215.5	3,039.7
31-Dec-29	388.3	3,344.5	216.8	3,041.0
31-Dec-30	390.9	3,347.1	218.1	3,042.3
31-Dec-31	393.2	3,349.4	219.3	3,043.5
31-Dec-32	395.4	3,351.6	220.4	3,044.6
31-Dec-33	397.5	3,353.7	221.4	3,045.6
31-Dec-34	399.5	3,355.7	222.4	3,046.6
31-Dec-35	401.4	3,357.6	223.4	3,047.6
31-Dec-36	403.2	3,359.4	224.3	3,048.5
31-Dec-37	404.9	3,361.1	225.2	3,049.4
31-Dec-38	406.5	3,362.7	226.0	3,050.2
31-Dec-39	408.1	3,364.3	226.8	3,051.0
31-Dec-40	409.6	3,365.8	227.6	3,051.8
31-Dec-41	411.1	3,367.3	228.3	3,052.5
31-Dec-42	412.5	3,368.7	229.0	3,053.2
31-Dec-43	413.9	3,370.1	229.7	3,053.9
31-Dec-44	415.2	3,371.4	230.4	3,054.6
31-Dec-45	416.5	3,372.7	231.1	3,055.3
31-Dec-46	417.7	3,373.9	231.7	3,055.9
31-Dec-47	418.9	3,375.1	232.3	3,056.5
31-Dec-48	420.1	3,376.3	233.0	3,057.2
31-Dec-49	421.2	3,377.4	233.5	3,057.7
31-Dec-50	422.3	3,378.5	234.1	3,058.3
31-Dec-80	41.3	2,997.5	21.3	2,845.5

TABLE 3-17
10,000-YEAR WASTE PLUME MODEL INPUTS – LOW SPECIFIC GRAVITY LONG-TERM MODEL INPUTS

Model Parameter	Low Specific Gravity Plume
Natural Background Velocity (feet/year) [(a)]	0
Formation Dip (feet/mile)[(b)]	720
Evaluation Period (years)	10,000
Waste Specific Gravity (at 20 °C)	1.000
Formation Fluid Specific Gravity (at 20 °C)	1.091
Permeability (Darcy)	3.000
Porosity (percent)	27
Viscosity (cp)	0.52
Longitudinal Dispersivity/Sensitivity (feet)[(c)]	216
Transverse Dispersivity (feet)	21.6
Nominal Plume Radius (feet)[(d)]	3,526

(a) A natural background velocity of 0.0 feet/year was used when modeling the low specific gravity plume to provide a conservative estimate of the location of the waste plume after 10,000 years.

(b) Structure at the Top of the Vicksburg Marker

(c) Longitudinal dispersivity and a sensitivity case (upper end dispersivity) was run for Low Specific Gravity model.

(d) Radius based on volume limit for low specific gravity waste

TABLE 3-18
DUPONT 10,000-YEAR WASTE PLUME MODEL INPUTS – HIGH SPECIFIC GRAVITY LONG-TERM MODEL INPUTS

Model Parameter	High Specific Gravity Plume
Natural Background Velocity (feet/year)	1.62
Formation Dip (feet/mile)	230
Evaluation Period	200
Waste Specific Gravity (at 20 ºC)	1.200
Formation Fluid Specific Gravity (at 20 ºC)	1.073
Permeability (Darcy)	3.000
Porosity (percent)	27
Viscosity (cp)	0.52
Longitudinal Dispersivity/Sensitivity (feet)	300.0
Transverse Dispersivity (feet)	30.0
Nominal Plume Radius (feet)	6,664 feet

(a) A natural background velocity of 1.62 feet/year was used in the direction of plume movement.

TABLE 3-19
RELATIVE CONCENTRATION REDUCTION VERSUS FLUID DENSITY

Relative Concentration Reduction	Relative Reduction	Fluid Density/Specific Gravity
1×10^{-1}	$(\rho_w - \rho_f)/10$	$\rho_f + (\rho_w - \rho_f)/10$
1×10^{-2}	$(\rho_w - \rho_f)/100$	$\rho_f + (\rho_w - \rho_f)/100$
1×10^{-3}	$(\rho_w - \rho_f)/1{,}000$	$\rho_f + (\rho_w - \rho_f)/1{,}000$
1×10^{-4}	$(\rho_w - \rho_f)/10{,}000$	$\rho_f + (\rho_w - \rho_f)/10{,}000$
1×10^{-5}	$(\rho_w - \rho_f)/100{,}000$	$\rho_f + (\rho_w - \rho_f)/100{,}000$
to		
1×10^{-12}	$(\rho_w - \rho_f)/1{,}000{,}000{,}000{,}000$	$\rho_f + (\rho_w - \rho_f)/1{,}000{,}000{,}000{,}000$

TABLE 3-20
DETERMINATION OF PLUME DRIFT RATE FOR SPECIFIC PLUME POINTS

Relative Concentration	Permeability (darcys)	Porosity (fraction)	Fluid Viscosity (cp)	Specific Gravity Contrast (gm/cm^3)	Formation Dip Rate (ft/mile)	Calculated Drift Rate (ft/yr)
1	3.0	0.27	0.52	0.091	800	147.6010101
1.E-01	3.0	0.27	0.52	0.0091	800	14.76010101
1.E-02	3.0	0.27	0.52	0.00091	800	1.476010101
1.E-03	3.0	0.27	0.52	0.000091	800	0.14760101
1.E-04	3.0	0.27	0.52	0.0000091	800	0.014760101
1.E-05	3.0	0.27	0.52	0.00000091	800	0.00147601
1.E-06	3.0	0.27	0.52	0.000000091	800	0.000147601
1.E-07	3.0	0.27	0.52	9.1E-09	800	1.47601E-05
1.E-08	3.0	0.27	0.52	9.1E-10	800	1.47601E-06
1.E-09	3.0	0.27	0.52	9.1E-11	800	1.47601E-07
1E-10	3.0	0.27	0.52	9.1E-12	800	1.47601E-08
1E-11	3.0	0.27	0.52	9.1E-13	800	1.47601E-09
1E-12	3.0	0.27	0.52	9.1E-14	800	1.47601E-10

TABLE 3-21
AVAILABLE CLOSURE VOLUMES AT CLINTON DOME

	Frio E&F Sand	Frio A&B Sand	Frio C Sand
High Side Area (MMgals)	9,315	7,958	10,302
Low Side A-Segment Area (MMgals)	3,043	2,325	3,346
Low Side-B Segment Area (MMgals)	2,236	2,200	2,579
Cumulative Volume (MMgal	**14,594**	**12,484**	**16,226**

TABLE 3-22
AVAILABLE CLOSURE VOLUMES AT CLINTON DOME – SENSITIVITY CASE

	Calculated Closure Volume (MMgals)
High Side Area – Frio D Sand*	10,506
High Side Area – Frio E&F Sand*	2,737
Cumulative Volume (MMgals)	**13,243**

* Common contact at –5,700-feet in both sands