Administrative Record Document No. 9
Docket # RCRA -06-2008-0903

TNRCC

Protecting Texas by Reducing and Preventing Pollution

* Groundwater Contamination Report *

Screening Site Inspection Report

Longview Refining Associates, Inc.
Longview, Gregg County, Texas
TXD 045 586 187
Volume I of II

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VI

Prepared in cooperation with the U.S. Environmental Protection Agency

February 2001

* Excerts From *

3.1 LIKELIHOOD OF RELEASE

3.1.1 OBSERVED RELEASE

An observed release to a qualifying aquifer can be documented in the HRS system by chemical analysis. We will present and document the observed release by chemical analysis and the assignment of the HRS observed release factor value.

Aquifer Being Evaluated: Queen City Sand Aquifer

The Queen City Aquifer is the aquifer being evaluated. No drinking water samples were collected from the Queen City aquifer since there were no drinking water wells screened in the Queen City aquifer (Ref. 36; Ref 37). However, groundwater samples collected from monitoring wells located on and near the facility have documented an observed release to the Queen City Sand aquifer (Ref. 31, pp. 79-83; Ref. 39, pp. 1-9).

Chemical Analysis:
An observed release has been documented to the ground water pathway for the Longview Refining Associates, Inc. site by chemical analysis. Establishing an observed release by chemical analysis requires determining background, demonstrating that the concentration of the hazardous substance(s) in a release sample is significantly increased above background , and attributing some portion of the significant increase to the site. In order to document a significant increase above background, it is necessary to establish the presence of hazardous substance(s) at concentrations three times above a designated background level when the hazardous substance(s) have been detected in background sample or at concentrations above the release samples' and the background samples' SQLs when a hazardous substance(s) has been reported as not detected in background samples (Ref.1, Section 2.3)

As described in the HRS Guidance Manual a background level of 0 can be assumed for substances that are neither naturally occurring, ubiquitous, nor attributable to other sources in the area (Ref.1,p.154).

Background Sample

The following tables provide a summary of the designated ground water background levels for the organic and inorganic hazardous substances of concern for this site.

One (1) background monitor well sample, MW-01 (FGX17,MFHX37) was collected to characterize local ground water conditions of the Queen City aquifer and establish attribution of contaminants to the subject site (Ref. 39, pp. 78,79). MW-01 was collected from one of the existing monitor wells on the LRA property. MW-01 was the farthest from potential sources areas and was designated as a background well. This background groundwater sample may not reflect naturally occurring conditions.

TABLE 5
BACKGROUND
GROUND WATER SAMPLE LOCATIONS (Queen City Sand aquifer)

Sample Designation	Well ID	Screened Interval (feet)	Date Sampled	Aquifer/ Well Type	Reference: Page(s)
FGX17,MFHX38 (See Figure 4)	MW-01	TD 17'	04/27/00	Queen City Sand	Ref. 39, pp. 78,79; Ref. 42, p. 21, Photos #041,042

TD = Total Depth.

TABLE 6
BACKGROUND GROUND WATER SAMPLE RESULTS
FROM QUEEN CITY SAND AQUIFER MONITOR WELLS

Sample ID	Constituent	Concentration (ug/L)	SQL (or equivalent) (ug/L)	3 x Highest Background [SQL]	References
MW-01 (FGX17, MFHX37)	Acetone	ND	10	NA	Ref. 39, pp. 78,79; Ref. 42, p. 21, Photos #041,042; Ref. 47, pp. 18,28,29.
	Methyl tert-Butyl Ether	ND	10	NA	
	2-Butanone	ND	10	NA	
	Cyclohexane	210	20	630	
	Benzene	16	10	48	
	Toluene	ND	10	NA	
	Ethylbenzene	140	10	420	
	Xylenes	25	10	75	
	Isopropylbenzene	29	10	87	
	Napthalene	390J^	50	1170	
	2-Methylnapthalene	270J^	50	810	
	Aluminum	6590J^	200	19770	
	Arsenic	15.7	10	47.1	
	Barium	173L	200	519	
	Chromium	15.3	10	45.9	
	Copper	24.0L	25	72	
	Iron	57000	100	171000	
	Lead	5.4Jv	3	16.2	
	Manganese	11.1L	15	33.3	
	Thallium	3.7L	10	11.1	
	Zinc	74.4J	20	223.2	

SQL Sample quantitation limit.
J J^ Jv = sample results are estimated and biased high/ low due to a quality control problem.
L = Reported concentration is between the IDL and CRDL
IDL = Instrument Detection Limit
CRDL = Contract Required Detection Limit

All samples were collected according to the EPA approved Quality Assurance Project Plan and sample locations were approved by EPA prior to sample collection (Ref. 33).

Contaminated Wells

The following wells listed in Table 7 have been documented to be contaminated with hazardous substances associated with Longview Refining Associates, Inc. The well locations can be seen in Figure 4.

Groundwater samples collected from monitoring well MW-02, MW-03, and MW-04 in April 2000 during the SSI, indicated elevated levels of hazardous constituents not naturally occurring in the environment.

Table 7 CONTAMINATED GROUNDWATER WELLS

Sample ID / Well ID	Date	Total Depth (ft.)	Reference
FGX18,MFHX38/MW-02	April 2000	17'8	Ref. 31, pp. 80-81; Ref. 42, p. 22, Photo #043.
FGX19,MFHX39/MW-03	April 2000	15'	Ref. 39, pp. 2,4,5; Ref. 42, p. 14, Photo #027.
FGX20,MFHX40/MW-04 FGX21,MFHX41/MW-05 (Dup. of MW-04)	April 2000	15'6	Ref. 39, pp. 1,6,7,9; Ref. 42, p. 13, Photo #026.

According to the HRS Final Rule, if an observed release to the aquifer has been established, identify each hazardous substances that establishes an observed release, their concentrations, and the associated SQLs.

TABLE 8A - Volatiles HAZARDOUS SUBSTANCES IN QUEEN CITY SAND AQUIFER MONITOR WELLS				
Constituent (µg/L)	MW-02 FGX18 [SQL]	MW-03 FGX19 [SQL]	MW-04 FGX20 [SQL]	MW-05 FGX21 [SQL] (Dup. of MW-04)
Acetone	ND [200]	29J [10]	ND [10]	20J [10]
Methyl tert-Butyl Ether	ND [200]	ND [10]	110 [10]	110 [50]
2-Butanone	ND [200]	14J [10]	ND [10]	ND [10]
Benzene	9100 [500]	570 [40]	81 [10]	80 [50]
Toluene	ND [200]	68 [10]	ND [10]	ND [10]
Ethylbenzene	230 [200]	360 [40]	940 [50]	1000 [50]
Xylenes (total)	219 [200]	390 [10]	34 [10]	37 [10]
References	Ref. 31, pp. 80-81; Ref. 42, p. 22, Photo #043.; Ref. 47, p. 18	Ref. 39, pp. 2,4,5; Ref. 42, p. 14, Photo #027.; Ref. 47, p. 18	Ref. 39, pp. 1,6,7,9; Ref. 42, p. 13, Photo #026.; Ref. 47, p. 18	Ref. 39, p. 9; Ref. 42, p. 13, Photo #026.; Ref. 47, p. 19

ND = Not detected. Concentrations for these constituents were not detected at the reported quantitation limit in sediment samples.
[SQL] = The sample quantitation limit. SQL for metals is mg/Kg. SQL = (CRQL/CRDL) x (df) / % solids, where % solids = [100 - % moisture] / 100
J, J^, Jv = The value is an estimated concentration because one or more of the quality control criteria have not been met. It is included to show that the substance identified as present in this sample. J^ indicates a high bias and Jv indicates a low bias.
IDL = Instrument Detection Limit
L = Reported concentration is between the IDL and CRDL
CRDL = Contract Required Detection Limit.
M= Reported concentration should be used as a raised quantitation limit because of interferences and/or laboratory contamination.
N = Identification is tentative
T = Identification is questionable because of absence of other commonly coexisting pesticides.
Shaded samples = The sample met observed release criteria for that hazardous substance.

TABLE 8B - Inorganics HAZARDOUS SUBSTANCES IN QUEEN CITY SAND AQUIFER MONITOR WELLS				
Constituent (ug/L)	MW-02 MFHX38 [SQL]	MW-03 MFHX39 [SQL]	MW-04 MFHX40 [SQL]	MW-05 MFHX41 [SQL] (Dup. of MW-04)
Aluminum	577J^ [200]	3210J^ [200]	19400J^	21700J^ [200]
Barium	123L [200]	716 [200]	360 [200]	369 [200]
Iron	126000 [100]	280000 [100]	274000 [100]	281000 [100]
Manganese	229 [15]	538 [15]	559 [15]	545 [15]
Thallium	15.9Jv [10]	23.9 [10]	28.8 [10]	29.4 [10]
References	Ref. 31, pp. 80-81; Ref. 42, p. 22, Photo #043.; Ref. 45, p. 9	Ref. 39, pp. 2,4,5; Ref. 42, p. 14, Photo #027.; Ref. 45, p. 9	Ref. 39, pp. 1,6,7,9; Ref. 42, p. 13, Photo #026.; Ref. 45, p. 9	Ref. 39, p. 9; Ref. 42, p. 13, Photo #026.; Ref. 45, p. 9

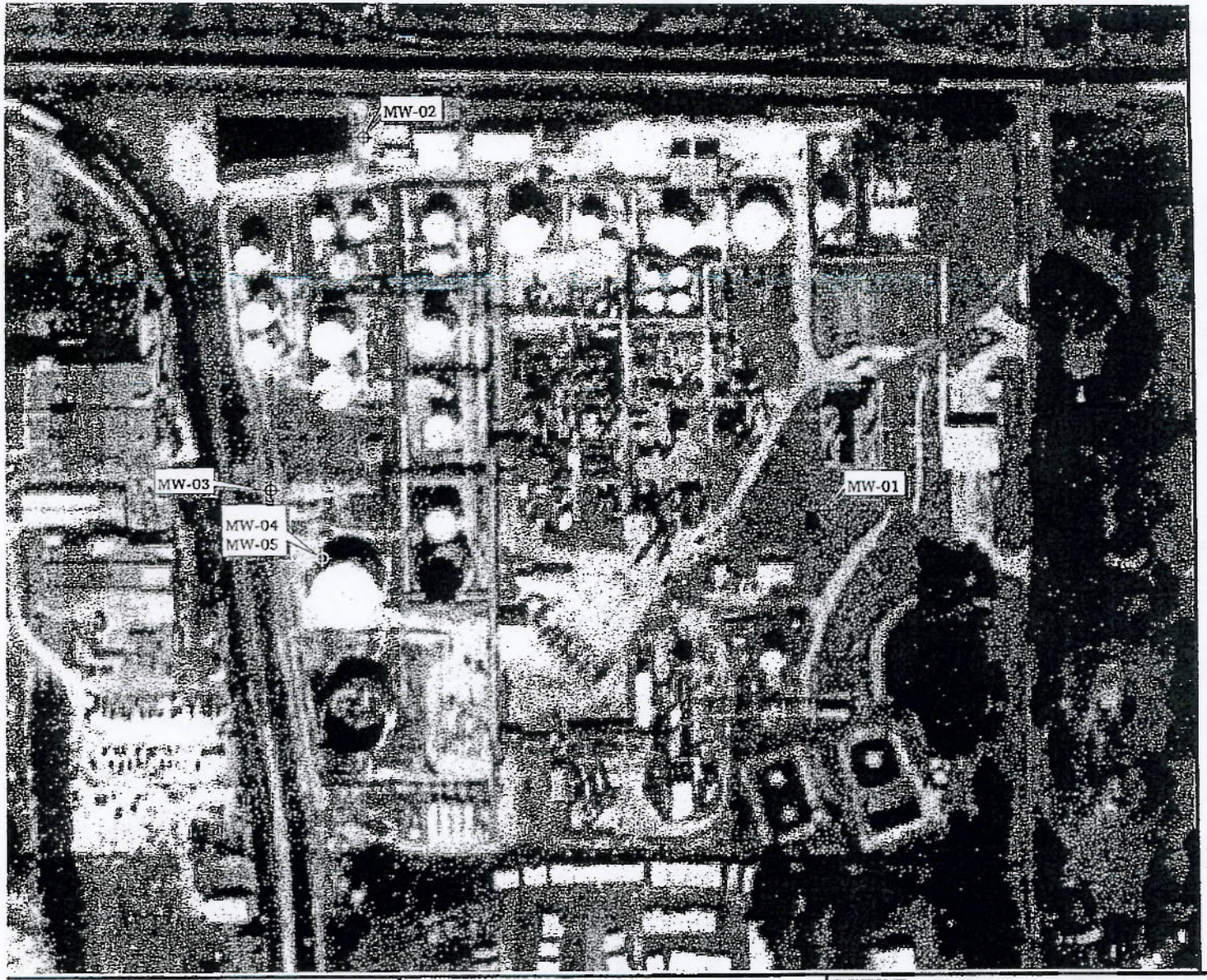
ND = Not detected. Concentrations for these constituents were not detected at the reported quantitation limit in sediment samples.
[SQL] = The sample quantitation limit. SQL for metals is mg/Kg. SQL = (CRQL/CRDL) x (df) / % solids, where % solids = [100 - % moisture] / 100
J, J^, Jv = The value is an estimated concentration because one or more of the quality control criteria have not been met. It is included to show that the substance identified as present in this sample. J^ indicates a high bias and Jv indicates a low bias.

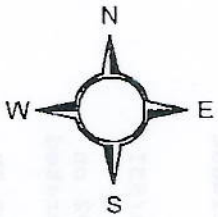
Observed Release:

An observed release has been documented to the ground water pathway from the monitoring wells identified in Table 34 above by chemical analysis as defined by the HRS Rule (Ref. 1, Section 2.3, Table 2-3).

Attribution:

The hazardous substances reported in Table 8A and 8B have been documented in samples collected from on-site monitoring wells. Those constituents are documented in Sources 1 and 2 of the Longview Refining property. These contaminants document migration from on-site sources (Sources 1 and 2) to the ground water. The contaminants were identified in sediments from onsite surface impoundments and surface soils near source areas, and in ground water samples.





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MW-02 Monitoring Well Designation

Scale 1:2,567

70 0 70 140 Feet

Figure 4

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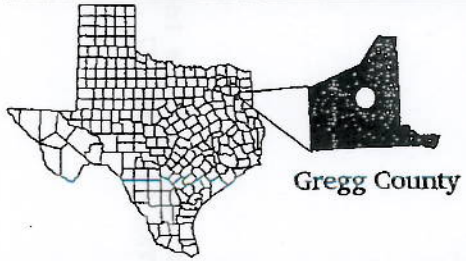

Monitoring Well Location Map

Longview Refining Associates, Inc
601 Premier Road
Longview, Gregg County, TX

TNRCC

Texas Natural Resource Conservation Commission

Protecting Texas by Reducing and Preventing Pollution

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Prepared in cooperation with the U.S. Environmental Protection Agency

Site reconnaissance and file reviews conducted by the TNRCC during the PA/SSI investigation did identify potential alternate sources within the 1/4 -, ½- and 1- mile radii. There was a pipeline leak discovered in November 1992 on the western property boundary of Longview Refinery. The pipeline was operated by Schurlock-Permian and transferred crude oil. The pipeline leak was discovered by an investigation of an explosion at ACF Industries, which is on the west side of Longview Refining Associates. Hydrocarbon contamination in the groundwater was the cause of the explosion (Ref. 34, p. iii). The investigation was intended to find the source of hydrocarbons. High levels of benzene and Total Petroleum Hydrocarbon were reported near the pipeline leak (Ref. 34, Table 3). The pipeline leak occurred in the Missouri-Pacific Right-of-Way between the LRA and ACF Industries properties (Ref 34, p. iii). The investigations were part of a lawsuit initiated by ACF Industries, Inc. Investigation reports revealed that groundwater gradient was toward southeast and southwest. There were several different conclusions on groundwater movement in the vicinity of the pipeline leak (Ref. 34; Ref. 35).

Additionally, during site reconnaissance in April 2000, ACF Industries was observed to be adjacent to the LRA property. ACF industries provides tank cleaning services. Due to the nature of the business, there is a potential for hazardous substances from this entity to groundwater in the surrounding area.

Hazardous Substances Released:

- Acetone
- 2-Butanone
- Cyclohexane
- Methylcyclohexane
- Toluene
- Ethylbenzene
- Xylenes
- Isopropylbenzene
- 2-Methylnapthalene
- Aluminum
- Barium
- Chromium
- Copper
- Lead
- Zinc

3.1.2 POTENTIAL TO RELEASE

Potential to release is not applicable since an observed release has been established and evaluated (Ref.1, Sec.3.1.2).

3.1.3 LIKELIHOOD OF RELEASE FACTOR CATEGORY VALUE

An observed release is established for the Queen City Sand aquifer.

3.2 WASTE CHARACTERISTICS

3.2.1 Toxicity/Mobility

A Toxicity, Mobility and combined Toxicity/Mobility Factor Value is assigned as follows (Ref.1, Sec.3.2.1).

Table 9 Toxicity/Mobility Factor Values					
Hazardous Substance	Source No. Documented	Toxicity Factor Value	*Mobility Factor Value	Toxicity / Mobility	Reference
Acetone	1,2	10	1	10	Ref.2
2-Butanone	1,2	10	1	10	Ref.2
Cyclohexane	1,2	1	1	1	Ref.2
Toluene	1,2	10	1	10	Ref.2
Ethylbenzene	1,2	10	1	10	Ref.2
Xylenes (total)	2	10	1	10	Ref.2
2-Methylnapthalene	2	NA	NA	NA	Ref.2
Aluminum	1	0	0.0001	0	Ref.2
Barium	1,2	10000	0.01	100	Ref.2
Copper	1,2	0	0.01	0	Ref.2
Zinc	1,2	10	0.01	0.1	Ref.2

NA = Not Available
* = Ref.1,Sec.3.2.1.2. A value of 1 is assigned for any hazardous substance that meets an observed release to the aquifer underlying the sources at the site.

Documentation for Toxicity/Mobility Values:

*The Mobility Factor Value for all hazardous substances in an observed release by chemical analysis to one or more aquifers underlying the source(s) at the site, regardless of the aquifer being evaluated, are assigned a mobility factor value of 1 (Ref. 1, Section 3.2.1.2).

Contaminant characteristic values for hazardous substances found in an observed release to the Queen City Sand aquifer were derived from SCDM (Ref. 2). The hazardous substance with the highest toxicity/mobility factor value available to the ground water migration pathway for the Queen City Sand aquifer is barium (100).

3.2.2 Hazardous Waste Quantity

Source Hazardous Waste Quantity Values		
SOURCE NUMBER	SOURCE HAZARDOUS WASTE QUANTITY VALUE	HAZARDOUS CONSTITUENT QUANTITY DATA COMPLETE?
1	6156.5	NO
2	12.25	NO
TOTAL	6168.75	

3.2.3 Waste Characteristics Factor Category Value

The hazardous substance with the highest toxicity/mobility factor value is Barium (100). The Hazardous Waste Quantity Factor Value is 100, due to the source hazardous waste quantity value sum of 6168.75 (Ref. 1, 2.4.2.2, Table 2-6)

3.3 TARGETS (Queen City Sand aquifer)

3.3.1 Nearest Well

At the time of this SSI the drinking water source for the City of Longview is surface water from the Sabine River and Lake Cherokee. However, there are domestic wells within the TDL (Ref. 36). It is unknown whether these wells are used for drinking water purposes.

Although public drinking water wells were found within the 4-mile target distance limit (TDL), they were all completed in the Carrizo-Wilcox aquifer (Ref. 37, Ref. 38). The nearest well factor for the Queen City Sand aquifer was therefore assigned a value of 0 (Ref. 1, Sec. 3.3.1).

3.3.2 Population

3.3.2.1 Level of Contamination

3.3.2.2 Level I Concentrations

No drinking water wells subject to Level I Concentrations have been identified.

3.3.2.3 Level II Concentrations

No drinking water wells subject to Level II Concentrations have been identified.

3.3.2.4 Potential Contamination

At the time of this SSI the drinking water source for the City of Longview is surface from the Sabine River and Lake Cherokee. There were no drinking water wells identified within the TDL (Ref. 36). There were no domestic water wells used for drinking water purposes identified within the TDL (Ref. 36, Ref. 37).

3.3.3 Resources

There is no documentation to indicate that the water drawn from wells completed in the Queen City Sand aquifer within the target distance limit are used for any purposes listed in Section 3.3.3 of the HRS.

3.3.4 Wellhead Protection Area

No wellhead protection areas (WHPA) were identified within the 4-mile TDL for wells completed in the shallow alluvial aquifer (Ref. 31, p. 1)

3.1 LIKELIHOOD OF RELEASE

3.1.1 Observed Release

Aquifer Evaluated: Carrizo-Wilcox aquifer

A ground water sample was collected from two interconnected public drinking water wells (State Well #35-34-207 and #35-34-208) completed in the Carrizo-Wilcox aquifer present at a depth of approximately 345' and 360' feet beneath the subject site and surrounding area.

An observed release to an aquifer can be documented in the HRS system by two methods: a) direct observation and b) chemical analysis. No observed release was documented from the LRA site to the Carrizo-Wilcox aquifer

Chemical Analysis:
No observed release has been documented to the ground water pathway for the Longview Refining Associates, Inc. site by chemical analysis. Establishing an observed release by chemical analysis requires determining background, demonstrating that the concentration of the hazardous substance(s) in a release sample is significantly increased above background , and attributing some portion of the significant increase to the site. In order to document a significant increase above background, it is necessary to establish the presence of hazardous substance(s) at concentrations three times above a designated background level when the hazardous substance(s) have been detected in background sample or at concentrations above the release samples' and the background samples' SQLs when a hazardous substance(s) has been reported as not detected in background samples (Ref.1, Section 2.3)

As described in the HRS Guidance Manual a background level of 0 can be assumed for substances that are neither naturally occurring, ubiquitous, nor attributable to other sources in the area (Ref.1,p.154).

Background Sample

The following tables provide a summary of the designated ground water background levels for the organic and inorganic hazardous substances of concern for this site.

One (1) background ground water sample, GW-01 (FGX13,MFHX33) was collected to characterize local ground water conditions of the Carrizo-Wilcox aquifer and establish attribution of contaminants to the subject site (Ref. 31, pp. 84,85, See Figure 5)). GW-01 was collected from PWS #2300008 well, which supplies water to the Union Grove community (Ref. 37; Ref. 38).

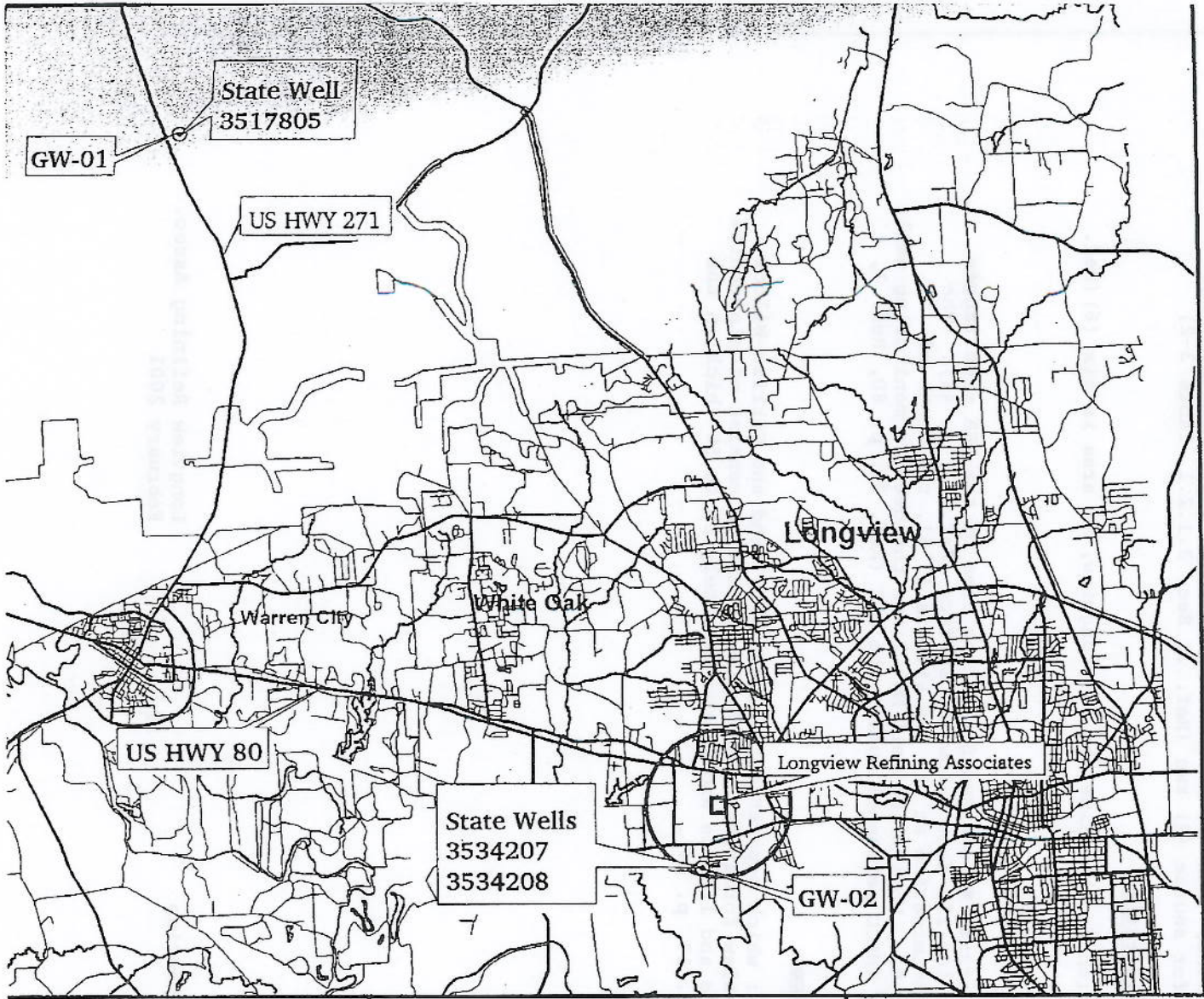
TABLE 10 BACKGROUND GROUND WATER SAMPLE LOCATION (Carrizo-Wilcox aquifer)					
Sample Designation	Well ID	Screened Interval (feet)	Date Sampled	Aquifer/ Well Type	Reference: Page(s)
FGX13,MFHX33 (Union Grove Water Supply) (See Figure 4)	GW-01	TD 345' 360'	04/27/00	Carrizo-Wilcox	Ref. 31, pp. 84,85; Ref. 42, p. 12, Photo #024

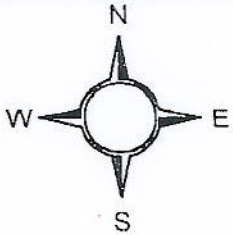
TD = Total Depth.

Contaminated Wells

There were hazardous constituents reported in the samples collected from GW-02 and GW-03 (Dup of GW-02), which were target wells (PWS 0920037)(Ref. 49, pp. 11-26, See Figure 5). There were two wells (State well ID#3524207 & 3524208) connected at the PWS 0920037, Garden Acre Subdivision (Ref. 36; Ref 37; Ref. 38).

TABLE 11 TARGETS WELLS GROUND WATER SAMPLE LOCATION (Carrizo-Wilcox aquifer)					
Sample Designation	Well ID	Screened Interval (feet)	Date Sampled	Aquifer/ Well Type	Reference: Page(s)
FGX14,MFHX3 (Union Grove Water Supply) (See Figure 4)	GW-02	TD 540'	04/27/00	Carrizo-Wilcox	Ref. 31, pp. 86,87; Ref. 42, p. 11, Photo #022





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GW-01 Ground Water Sample Location

Scale 1:120,624

1 0 1 Miles

Figure 5

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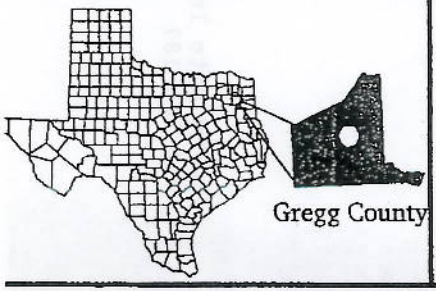

Drinking Water Well Location Map

Longview Refining Associates, Inc.
601 Premier Road
Longview, Gregg County, TX

Texas Natural Resources Conservation Commission

Protecting Texas by Reducing and Preventing Pollution

TNRCC

February 2001

Prepared in cooperation with the US Environmental Protection Agency

3.1.2 Potential to Release

Potential to release is applicable since an observed release has not been documented (Ref. 1, p. 51595).

3.1.2.1 Containment

There is no evidence of hazardous substance migration from the source 1)one area, a liner, and none of the following is present: maintained engineered cover, or functioning and maintained run-on control system and runoff management system or functioning leachate collection and removal system immediately above liner (Ref. 1, Sec. 3.1.2.1., Table 3-2) Additionally, there is no liner for source (2) two (Ref. 1, Sec. 3.1.2.1, Table 3-2)

3.1.2.2 Net Precipitation

The net precipitation factor value for the Longview, TX area is six (6)(Ref. 1, Figure 3-2).

3.1.2.3 Depth to Aquifer

The depth to the Carrizo-Wilcox Aquifer in the area of the LRA site ranges from approximately 100-150 feet below the surface (Ref. 17, p. 44). The lowest point of contamination at the LRA site is 17'8', the depth of monitoring well MW-02. Monitoring well MW-02 was the deepest monitoring well that was sample by TNRCC personnel during the SSI (Ref. 31, p. 80, Ref. 1, Sec. 3.1.2.3).

3.1.2.4 Travel Time

The confining layer which separates the Queen City Sand and Carrizo-Wilcox Aquifers is the Reklaw formation. The Reklaw formation consist of glauconite clay with some sand and lignite and is approximately 25 to 50 thick in the Longview area (Ref. 17, p. 44).

3.2 WASTE CHARACTERISTICS

3.2.1 Toxicity/Mobility

A Toxicity, Mobility and combined Toxicity/Mobility Factor Value is assigned as follows (Ref.1, Sec.3.2.1,p.51601).

Table 12 Toxicity/Mobility Factor Values

Hazardous Substance	Source No. Documented	Toxicity Factor Value	*Mobility Factor Value	Toxicity / Mobility	Reference
Acetone	1,2	10	1	10	Ref. 1; Ref. 2
2-Butanone	1,2	10	1	10	Ref. 1; Ref. 2
Cyclohexane	1,2	1	1	1	Ref. 1; Ref. 2
Toluene	1,2	10	1	10	Ref. 1; Ref. 2
Ethylbenzene	1,2	10	1	10	Ref. 1; Ref. 2
Xylenes (total)	2	10	1	10	Ref. 1; Ref. 2
2-Methylnapthalene	2	NA	NA	NA	Ref. 1; Ref. 2
Aluminum	1	0	0.0001	0	Ref. 1; Ref. 2
Barium	1,2	10000	0.01	100	Ref. 1; Ref. 2
Copper	1,2	0	0.01	0	Ref. 1; Ref. 2
Zinc	1,2	10	0.01	0.1	Ref. 1; Ref. 2

NA = Not Available
* = Ref.1,Sec.3.2.1.2. A value of 1 is assigned for any hazardous substance that meets an observed release to the aquifer underlying the sources at the site.

Documentation for Toxicity/Mobility Values:

*The Mobility Factor Value for all hazardous substances in an observed release by chemical analysis to one or more aquifers underlying the source(s) at the site, regardless of the aquifer being evaluated, are assigned a mobility factor value of 1 (Ref. 1, Section 3.2.1.2).

Contaminant characteristic values for hazardous substances found in an observed release to the Queen City aquifer were derived from SCDM (Ref. 2). The hazardous substance with the highest toxicity/mobility factor value available to the ground water migration pathway for the Queen City Sand aquifer is barium (100).

3.2.2 Hazardous Waste Quantity

Source Hazardous Waste Quantity Values		
SOURCE NUMBER	SOURCE HAZARDOUS WASTE QUANTITY VALUE	HAZARDOUS CONSTITUENT QUANTITY DATA COMPLETE?
1	6156.5	NO
2	12.25	NO
TOTAL	6168.75	

3.2.3 Waste Characteristics Factor Category Value

The hazardous substance with the highest toxicity/mobility factor value is Barium. The Hazardous Waste Quantity Factor Value is 100, due to the source hazardous waste quantity value sum of 6168.75 (Ref. 1, 2.4.2.2, Table 2-6)

3.3 TARGETS (Carrizo-Wilcox aquifer)

3.3.1 Nearest Well

At the time of this SSI the drinking water source for the City of Longview is surface from the Sabine River and Lake Cherokee. There are two public supply water wells, State well ID#3524207 &3524208, which supply drinking water to approximately 150 residents. The two water wells are within 1 mile of the LRA site (Ref. 36; Ref. 37; Ref. 38).

Due to the fact the nearest drinking water was within one mile of the LRA site, the nearest well factor for the Carrizo Wilcox aquifer was therefore assigned a value of 9 (Ref. 1, Sec. 3.3.1).

3.3.2 Population

3.3.2.1 Level of Contamination

3.3.2.2 Level I Concentrations

No drinking water wells subject to Level I Concentrations have been identified.

3.3.2.3 Level II Concentrations

No drinking water wells subject to Level II Concentrations have been identified.

3.3.2.4 Potential Contamination

There are two public water supply wells located within a 1-mile radius of the site. The two public water supply wells supply 150 residents of the Garden Acres Subdivision.

Additionally there were domestics wells within the 4-mile TDL, however the potential contamination score was not significant to raise the ground water pathway by an integer (Ref. 36; Ref. 37; Ref. 38). Therefore, the domestics wells within the TDL will not be scored in the ground water pathway.

3.3.3 Resources

There is one water well used to water livestock completed in the Carrizo-Wilcox aquifer within the target distance limit (Ref. 37; Ref. 38).

3.3.4 Wellhead Protection Area

No wellhead protection areas (WHPA) were identified within the 4-mile TDL for wells completed in the Carrizo-Wilcox aquifer (Ref. 31, p. 1)