Appendix 9G

Longhorn Contingency Plan for Public Ground Water Supply Systems along the Pipeline Route

CONTINGENCY PLAN FOR PUBLIC GROUND-WATER SUPPLY SYSTEMS ALONG THE LONGHORN PIPELINE

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Radian International has identified several municipalities and other public water-Supply systems that it considered as sensitive to a potential spill of refined product from the Longhorn Pipeline. Eleven of these are dependent upon ground water and are listed below:

Bastrop (Wells in Colorado River Alluvium)
Aqua Water Supply Corporation
Travis County M.U.D. #2 (Wells in Colorado River Alluvium)
Manor (Wells in Colorado River Alluvium)
Garfield (Wells in Colorado River Alluvium)
Manville W.S.C. (Wells in Colorado River Alluvium)
The Colony (Austin) (Wells in Colorado River Alluvium)
River Timbers Development (Wells in Colorado River Alluvium)
Sunset Valley (Edwards Aquifer/Balcones Fault Zone)
Eldorado (Edwards-Trinity Aquifer)
Big Lake (Edwards-Trinity Aquifer)
Upton County Water Supply Corporation
City of Grandfalls.

Seven of these systems have wells located in Colorado River alluvium or in the Carrizo/Wilcox aquifer east of Austin, four have wells in Cretaceous limestones, and one used to be located in the Cenozoic Pecos Alluvium. Upon review of available geologic data and well data for each municipality from the Public Water Supply Section of the Texas Natural Resource Conservation Commission (TNRCC), only three well fields are considered as truly sensitive. These are the well fields for the City of Eldorado and Sunset Valley. The well field for the Upton County Water Supply may be sensitive but further evaluation is needed. The sensitivity of each ground-water supply is considered below.

Well Fields in Colorado River Alluvium or Carrizo/ Wilcox Aquifer East of Austin

The communities of Bastrop, Travis County M.U.D. #2, Manor, and Manville have wells located in Colorado River alluvium north of the Colorado River. The community of Garfield has wells in the Colorado River alluvium south of the Colorado River. (The municipal well field for River Timbers no longer exists; it appears to be part of the Garfield

system. The database for the TNRCC's public water supplies has no listing for the Colony: on that basis it will not be addressed.

The following scenario has to occur for potential petroleum contamination of a water well screened in the Colorado River alluvium. A pipeline break results in a product release into Onion Creek, the product flows a minimum of 2 miles to the Colorado River and then a minimum of 1 mile downstream before it reaches the general area of any of these wells. The wells in the alluvium along the river have to be producing directly from the river such that the surface layer of water in the river is actively and instantaneously pumped into the well and into the distribution system. All of the public water supply systems producing from the Colorado River alluvium either (1) have more than one well such that a sensitive well could be turned off and other nonsusceptible wells could be used to provide required water or (2) have wells in the Colorado River alluvium, but are not located near the river. These "away from the river" wells would not be susceptible to contamination from a product spill flowing down the Colorado River. Any well fields close to the river should be treated similarly to any surface-water supply on the Colorado River that is downstream from a potential spill. This would include notifying water systems of the spill so that water can be stored in storage tanks, production can be switched to other wells and the downstream movement of any spilled product can be monitored.

Overland flow of product from a pipeline spill to one of these well fields in the Colorado River alluvium is not considered a viable scenario. All well fields in the alluvium are far enough away from the pipeline that they could not be affected by overland flow from a potential pipeline break.

Potential contamination of Carrizo/Wilcox wells is not considered possible either. Carrizo/Wilcox wells produce from deep strata that are confined and contain waters that are thousands of years old.

Specifics on each public ground-water supply identified by Radian in Colorado River alluvium or Carrizo/Wilcox are listed below.

Bastrop. The City of Bastrop has seven water wells located in the Colorado River alluvium. In 1989 the Texas Health Department did not believe that these wells were under the influence of surface water, and therefore were not directly producing river water. In addition, the City of Bastrop has at least nine wells in the Wilcox Aquifer. This network of wells should not be considered as sensitive.

Aqua Water Supply Corporation. Aqua Water Supply Corporation (WSC) has 14 wells in Bastrop County that produce from various strata within the Wilcox Formation including the general Wilcox, the Simsboro Member and the Hooper Member. Aqua WSC has no production from Colorado River alluvium. TNRCC and Texas Water Development Board (TWDB) files indicate total well depths range from about 500 feet to 1,500 feet below

land surface. Previous work by Kreitler and Senger (1991) indicated that the C14 age of the water is about 4,000 years old or greater. These deep Aqua WSC wells are confined and should not be susceptible to surface processes. Only wells 5862409 and 5864406 are located near the pipeline. They are screened from 441 to 557 feet and 1,200 to 1,330 feet, respectively. Well 5862409 has surface cement to 430 feet. Well 5864406 has surface cement to 1,200 feet. These wells do not appear to be susceptible to surface contamination.

Travis County M.U.D. #2. Travis County M.U.D. #2 has three wells located in the terrace deposits associated with the Colorado River. These wells are located about 2.5 miles from the river. These wells should not be considered as sensitive.

Manville Water Supply Corporation. Manville Water Supply Corporation encompasses a vast water distribution network in eastern Travis County. Within its network are 13 wells, nine producing from the Edwards aquifer and four from the Colorado River alluvium. The alluvium wells are about 1.5 miles from the Colorado River. The alluvium wells are interconnected to the Pflugerville part of the system. The Edwards wells are generally in the northern part of Travis County, are north of the Colorado River and not near the pipeline. This network of wells should not be considered as sensitive.

Garfield Water Supply Corporation. Garfield Water Supply Corporation is located on the southern side of the Colorado River. The system currently has two wells; one located approximately 200 feet from the river and a second well located, at a minimum, 1 mile from the river. The Garfield Water Supply Corporation has received a permit for a third well. The new well will be located relatively close to the Colorado River. Because of the closeness of these two wells to the Colorado River, the Texas Health Department is requiring them to install additional treatment capability to insure that potential contamination associated with the Colorado River will be treated. With the new well located at a distance of 125 feet from the river and the requirement for surface-water treatment capability, the Garfield Water Supply Corporation is not considered "at risk." In the case of a spill into Onion Creek and subsequent flow down the Colorado River, however, Garfield will be informed that a product plume will flow past its wells and it should use its "inland" well and store water in its elevated tank until the plume has passed. This will avoid any possible movement of product into the alluvium toward these wells.

River Timber. River Timber is now part of the community of Garfield. They had a well in the 1970's but currently there is no listing for this public water supply because they are now part of the Garfield community. (See the discussion of the Garfield Water Supply Corporation above for additional information.)

The Colony. The Colony has no listing with the Public Water Supply Section of TNRCC.

Manor. The City of Manor currently buys water from Travis County M.U.D. #2, which is described above. Manor also has a well completed in the Carrizo-Wilcox aquifer, and not the Colorado River alluvium, that was reported active as of October 1997.

Public Ground-Water Supply Systems in Cretaceous Edwards Limestone and Associated Strata

Radian has identified four public ground-water supplies located in Cretaceous-aged Edwards Limestone and associated aquifers. These include Sunset Valley (Travis County), the City of Eldorado (Schleicher County), Upton County Water Supply Corporation (Upton County) and the City of Big Lake (Reagan County). After review of the available data from the Public Water Supply Section of TNRCC, LBG-Guyton Associates believes that the public ground-water supply for Sunset Valley, for the City of Eldorado and possibly the Upton Water Supply Corporation are potentially at risk and remediation strategies or contingency approaches for developing alternate water supplies should be applied.

The City of Sunset Valley. The City of Sunset Valley in Travis County has three wells that produce from the Edwards aquifer in the Balcones Fault Zone. These wells are approximately 3 miles down the hydraulic gradient from the trace of the pipeline as it crosses the Edwards aquifer recharge zone. These wells should be considered as sensitive to a potential spill from the pipeline as it crosses the Edwards aquifer. The City of Sunset Valley, however, has a connection to the City of Austin water supply. In case of a spill into the Edwards, Sunset Valley will be notified so it can shift to Austin water.

The City of Eldorado. The City of Eldorado has six municipal water wells located approximately 1 to 2 miles north of the pipeline. The wells are about 400 feet deep and may be open to the Edwards aquifer in the Edwards Plateau Region. In the area of the pipeline, there are surface depressions which may indicate surface karst features. Three of these wells are cased to a minimum of 300 feet. These wells could be considered as sensitive to a potential spill from the pipeline as it crosses the Plateau section of the Edwards aquifer. Longhorn Pipeline, LLP recognizes the potential for contamination of the public water supply if the pipeline leaked in this area. This section of the pipeline has been designated as Tier 3 and therefore undergoes a higher level of testing. Longhorn makes the commitment to remediate any spill at this location. An alternate temporary water supply will be provided immediately. Longhorn will request that production from those wells closest to the spill be shut in and used as monitoring wells until the extent of the subsurface migration of the spill can be determined. Additional monitoring wells may need to be drilled. If a water well does become contaminated by the Longhorn pipeline, Longhorn will provide treatment technology to clean up the water in the well. This alternate water supply may be accomplished by the drilling of another water well in a nonimpacted part of the aquifer. Longhorn Pipeline will be responsible for the costs of remediation.

The City of Big Lake. The City of Big Lake does not produce any ground water in the vicinity of Big Lake but buys its water from the Reagan County Fresh Water Supply District (FWSD). Reagan County FWSD has a well field of 19 wells located in the Antlers aquifer about 20 miles north of Big Lake. The Longhorn pipeline is approximately 1 mile south of Big Lake. Based on the topography, overland flow from a pipeline leak in this region would be expected to go to Big Lake, an ephemeral playa. There are numerous oil fields between the pipeline and the well field. There are several oil wells within the well field itself. Since ground-water production is from the Antlers aquifer and not the overlying Edwards, subsurface flow and contamination should not occur. All wells appear to be cased to the top of the Antlers and have at least 50 feet of cement in the annular space. Surface and subsurface contamination of this well field from a pipeline break 20 miles away is not considered likely to occur. Spills associated with the oil fields closer to the well field are considered to have a higher probability of affecting this water well field than a potential spill associated with Longhorn pipeline.

Upton County Water Supply Corporation. The Upton County Water Supply Corporation is located in eastern Upton County a few miles south of the Longhorn pipeline. The well field is composed of 15 active wells (as of January 1999) that produce from the Antlers aquifer. Total well depths are up to 400 feet with casings set to depths from 200 to 300 feet. There is evidence of some karst features at land surface, but karst appears less prevalent than was observed near the City of Eldorado. Currently we have only a limited understanding of the hydrogeology of the well field and its potential for contamination if a Longhorn pipeline spill occurred. On that basis, the Upton County Water Supply Corporation is considered as a potentially sensitive ground-water supply. This section of the pipeline has been designated as Tier 3 and therefore undergoes a higher level of testing. Longhorn makes the commitment to remediate any spill at this location. An alternate temporary water supply will be provided immediately. Longhorn will request that production from those wells closest to the spill be shut in and used as monitoring wells until the extent of the sub-surface migration of the spill can be determined. Additional monitoring wells may need to be drifted. If a water well does become contaminated by the Longhorn pipeline, Longhorn will provide treatment technology to clean up the water in the well. This alternate water supply may be by the drilling of another water well in a nonimpacted part of the aquifer. Longhorn Pipeline will be responsible for the costs of remediation.

Well Field in Cenozoic Pecos Alluvium

City of Grandfalls (Pecos County). Radian has included the City of Grandfalls, located in Pecos County, as a sensitive municipal ground-water supply, presumably because of its proximity to the Pecos River. A review of the database of the Public Water Supply Section of TNRCC indicates that the three wells have been operated by Grandfalls and produce ground water from the Cenozoic Pecos Alluvium aquifer and the Pecos Alluvium aquifer/Dockum aquifer. The depths of the three wells range from 225 to 260 feet. The wells are cemented from land surface to the depth of approximately 100 feet. Only one well was

active as of January 1994. As of October 1996, this well field has been abandoned. All wells have been plugged. Grandfalls now acquires its water from the Colorado River Municipal Water District.

Mitigation Plan

In the case of pipeline leak the following mitigation actions would occur.

(1) With the occurrence of a leak there will be a shutdown of the pipeline and deployment of the Emergency Response Team (ERT) to contain the spill. The first responsibility of the ERT is to contain the surface spill and limit the health and safety and environmental hazards. The next responsibility of the ERT is to contain any leak in the subsurface and prevent water-well contamination.

(2) The spill is assumed to have reached land surface, and product potentially flows away from the pipe downslope either as overland sheet flow or down drainages. Direction and distance of flow can be predicted from topographic maps. Operators of public water supply well fields located in the direction of surface flow will be warned of the potential for their water wells to be impacted.

(3) Cleanup of product plus contaminated soils will be initiated at the pipeline as quickly as possible. Cleanup procedures would follow TNRCC guidelines.

(4) Potential for water-well contamination would be evaluated by reviewing distance to water wells, any information on well construction and local hydrogeologic conditions. Water wells in close proximity will be monitored for the chemical constituents of the spill. A monitoring well(s) may need to be installed to assess the extent of subsurface contamination and cleanup approaches.

(5) If a public water supply well becomes contaminated, Longhorn Pipeline will provide at that time either treatment technology to clean up the water in the well or provide an alternate water supply. Treatment technology will be based on site-specific conditions and on technological solutions available at the time for the particular circumstances. The alternate water source may be provided by another established water supply or by the drilling of another water well in a nonimpacted part of the aquifer. A temporary water supply will be provided until a permanent solution is in place.

(6) Longhorn Pipeline will be responsible for the costs of cleanup.

Summary

Radian International identified 11 public ground-water supplies as being sensitive to potential contamination from a Longhorn pipeline spill. Upon more detailed evaluation,

eight of these systems do not appear sensitive to a potential spill. Three systems, the City of Sunset Valley, the City of Eldorado and the Upton Water Supply Corporation appear sensitive and need further evaluation toward developing contingency plans.

Appendices

Available upon request are the TNRCC Public Water Supply Program files collected from the TNRCC between July 1999 and February 2000 for these public water supply systems.