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Mr. Harold Reheis
c/o Joe Tanner and Associates
Suite: 930
50 Hurt Plaza
Atlanta, GA 30303

Dear Harold:

This letter summarizes previous hydrogeologic studies that were preformed wholly or partly in Carroll County, Georgia to support an assessment of alternative water resources required as part of the §404 permitting process. The previous studies include:

- **Assessment #1:** January 23, 1989: A technical memorandum prepared by the Geologic Survey Branch of Georgia EPD entitled: Ground-water availability in the West Georgia Reservoir Area.
- **Assessment #2:** April, 1992: A preliminary study prepared by Lisa Joyce Hollingsworth entitled: Groundwater Availability in Carroll County, Georgia.
- **Assessment #3:** October, 1992: An report prepared by Southern Engineering entitled: Addendum to Water Supply Alternative Analysis for Carroll County Water Authority Carroll County, Georgia.
- **Assessment #4:** September 8, 1993: A project report prepared by the Geologic Survey Branch of EPD entitled: Estimated Ground-Water Availability in Carroll, Douglas, Haralson, Paulding, and Polk Counties, Georgia.
- **Assessment #5:** September 9, 1993: A technical memorandum prepared by CH2MHill entitled: Groundwater Analysis.
- **Assessment #6:** January 3, 1995: A technical memorandum prepared by CH2MHill entitled: Overview of the Development of Water Supply Alternative Packages.
- **Assessment #7:** In 2002 the offices of Tommy Craig submitted a revised Section 404 permit application. This application does not include a separate analysis of groundwater..

The hydrogeological significance of the first six of these assessments is discussed in following paragraphs:

Assessment #1: For this assessment the Geologic Survey Branch performed a two month evaluation of the ground-water potential in the area of the proposed West Georgia Water Supply Reservoir. The assessment involved identifying geologic features that correlate with higher well yields, and included the Piedmont portions of the five counties of Carroll, Douglas, Haralson, Paulding and Polk. The study concluded that approximately 1 million gallons of water per day (mgd) from could be obtained from 14-42 wells per USGS 7.5-minute quadrangle; this is approximately 16,340 gallons per day per square mile. The assessment also notes (italicized phrases added for the purposes of clarity):

- That, as of 1980, only 55% of the 5-county area is within 0.5 miles of a paved road and only 77% of the area is within one mile of a paved road. The Survey deemed areas more than one mile to be unfeasible for public water supply wells as pipeline access and construction costs would be very high.

- In general, some of the areas favorable from a hydrogeologic point of view for high yielding wells may tend to be in low-lying topographic areas and may coincide with wetlands. Since Piedmont aquifer systems are predominantly unconfined, the cone of depression around a pumping well could possibly dewater (or dry up) such a wetland. From the point of view of protection of wetlands, development of the favorable well sites may offer no advantage over a surface water reservoir.

- It has been the Survey's experience that local governments often cannot obtain access to geologically favorable drills sites. This occurs when there are small parcels of land or where the land owners are unwilling to grant access. This means that the water supply authority may have to condemn land, obtain easements, purchase water rights, and so forth *(even when the ground-water potential of the land parcels is unknown).*

- In order for a well to be a long term source of groundwater, it will need to be protected from existing and potential sources of pollutants. Therefore, local governments will have to establish a *number of* well-head protection ordinances.

Assessment #2: This preliminary study was performed to support permit approval from the Corps of Engineers for a water supply reservoir on Snake Creek in Carroll County. This assessment involved no independent measurements of analysis; rather it was limited to review of published and unpublished data. The study points out a "rule of thumb" that about 150,000 gallons per day can be obtained per square mile and if Carroll County wanted a well yield of 200 gallons per minute, then only those sites having a drainage area of two square miles should be investigated further. Ms Hollingsworth also points out (italicized phrases added for the purposes of clarity):

- Geologists have been successful in locating high-yielding wells (*greater than 50 gallons per minute)* in Carroll County.

- It is not possible at this time *(April, 1992)* to accurately estimate the quantities of water or the well yields that could be developed in Carroll County; but that it is reasonable to expect that several million gallons per day of water could be developed in the County.

Assessment #3: This study relied on previous work of the USGS as well as unpublished data. The study concludes (italicized phrases added for the purposes of clarity):

- It is clear that groundwater is not going to provide amount of water to take of *Carroll* County's requirements very far into the future.

- The *150,000 gallons per day per square mile "Rule of Thumb" cited in Assessment #2 above* is optimistic.

- *It* is important to note that that there is no certainty of success for the economical discovery and production of a sustained large quantity of water from the ground.

- It is reasonable to assume that some reliable quantity of water can be reasonably extracted from the ground and that it is reasonable to assume that even with the latest techniques for discovery and development and drilling effort, a wide range of yields can be expected from the results of a concerted exploration analysis and drilling effort.

- 0.825 mgd *of groundwater* can be extracted to supplement Carroll County Water Authority requirements.

Assessment #4: This study unlike the others was not directed specifically as an alternative analysis to §404 permitting; rather it was directed at defining the total ground water resource within the 5-county area that could be obtained for high-yielding wells *(50-150 gallons per minute)*. This study assessed the hydrogeology of the 5-county area, potential sources of pollution, and 16 case studies of hydrogeological well siting studies. The Survey concluded that approximately 40 million gallons of groundwater could be obtained from about 280 wells *(sited by a geologist)* at widely scattered locations. This amounts to about 29,476 gallons per day per square mile. The assessment also notes (italicized phrases added for the purposes of clarity):

- For the Piedmont, ground-water is mainly under unconfined or water table conditions; and ground and surface water are hydraulically connected and in can be considered as a single system. Excessive ground-water withdrawals from unconfined aquifers can dewater surface water bodies such as streams, ponds, and wetlands.

- Naturally occurring metallic deposits have the potential to pollute Piedmont wells with heavy metals. The Piedmont portion of the 5-county area contains more heavy mineral mines and prospects compared to other comparatively-sized areas in the Piedmont of Georgia.

- Although ground-water quality is generally good in the Piedmont, local problems such as radon or high iron, manganese, and sulfate contents have been observed. Therefore, some level of treatment should be anticipated.

- *The map of areas favorable for high-yielding wells in Carroll County shows that most of these areas are concentrated along or adjacent to rivers and streams.*

- *Wellhead protection areas for 50-150 gpm wells will be circular in area diameters of 2000-3400 feet. Within these areas, the County will need to promulgate protective wellhead protection ordinances,*

Assessment #5: This memorandum is based on the aforementioned Geologic Survey Project Report (i.e., assessment #4) as well as a Lineament Analysis. CH2MHill points out that no additional hydrogeological explorations should be initiated before the water supply plan is finalized.

Assessment #6: This memorandum addresses six water supply alternatives being considered for West Georgia Regional Water Authority. High ground-water availability was screened from further consideration because: (a) yield unproven at desired levels in Piedmont geologic province, and (b) questionable reliability during a drought. Moderate to low ground-water availability was considered reasonable; however, even though there was some potential for groundwater, yield was not proven and reliability was a concern. Estimated total low to moderate groundwater yields for Chattahoochee River Basin and Tallapoosa River portions of Carroll County are 0.6-1.2 mgd and 1.4-2.8 mgd respectively.

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There have been six previous attempts to assess the ground-water availability or as a water supply alternative to a reservoir in Carroll County, Georgia, with the last being in 1993, some fifteen years ago. None of the previous studies indicate that large ground-water yields are likely, albeit an occasional high-yielding well (> 100gpm) perhaps is possible. Of the six previous attempts to assess Carroll County ground-water availability, **Assessment #4**, performed by the Geologic Survey Branch of EPD in 1993, is deemed the most comprehensive. This assessment indicates that County's ground-water resources are diffuse and inter-connected to the surface water regime. Based on my review of the previous assessments, it is my profession opinion that groundwater is not cable of supplying much more than 10% of the County's estimated 2050 needs of an additional 18 mgd.

Sincerely:

William H. McLemore

Cc: David Word, Andrea Gray