GROUNDWATER SUPPLY ASSESSMENT AND SECTION 404 PERMITTING FOR WATER SUPPLY RESERVOIRS

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INTRODUCTION

Upon review of permit applications submitted to the Savannah District of the U.S. Army Corps of Engineers for construction of water supply reservoirs, it appears that groundwater supply has been assessed inadequately. The Environmental Protection Agency is directed to recommend denial of a Section 404 permit application if the proposed activity is not the least environmentally damaging practicable alternative. In consideration of a water supply reservoir permit application, the typical water supply alternatives include: 1) no action; 2) conservation; 3) groundwater; 4) increased withdrawal from streams; 5) various alternative reservoir sites; 6) upland storage lagoons; and 7) various redistribution schemes. Generally, installation of groundwater wells is a non-water dependent activity with minimal direct impact to the aquatic environment. Therefore, unless the applicant shows that groundwater is not a practicable water supply alternative, a reservoir permit application may be denied on the basis that groundwater wells are less environmentally damaging.

There are two steps involved in assessing the practicability of any water supply alternative (and they must be performed in order):

1) Determining the potential availability; and
2) Identifying economic and logistical factors pertinent to utilization of the resource.

This paper describes errors in methodology and interpretation in the groundwater availability assessments prepared for eight reservoir permit applications. Steps necessary for adequately evaluating groundwater availability are then discussed.

BACKGROUND

As of November 1990, 26 water supply reservoirs had begun the permitting process in the Savannah District of the Army Corps of Engineers: 9 permit applications are currently under review, and 9 permits have been issued. In order to determine the adequacy of the groundwater supply practicability assessments, the Corps of Engineers permit application files were examined for 8 of the 9 reservoirs under review (Table 1). Applications for 3 of the 9 permitted reservoirs were reviewed, also, but no technical groundwater assessments could be found.

Table 1. Summary Of Proposed Water Supply Reservoirs For Which Section 404 Permit Applications Are Currently In Review.

County	Stream	Surface Area (acres)	Withdrawal (MGD)
Henry	Towaliga River *(Revised Strickland Plan)*	1102	14
Gilmer	Owltown Creek	364	2.5–25
Fayette	Whitewater Creek	270	3
Haralson	Tallapoosa River *(West GA Regional Reservoir)*	4200	100
Bibb/Jones	Town Creek	626	15.4
Cherokee	Yellow Creek	334	22
Habersham	Hazel Creek	419	6
Lumpkin	Yahoola Creek	132	4.4
Banks	Hudson River *(Not reviewed for this paper)*	344	9.2

RESULTS

All of the proposed reservoir sites are in the Piedmont/Blue Ridge geologic province. In every reservoir permit application reviewed, the site-specific availability of groundwater was not identified. No technical report included results of any actual exploration work. Only existing information was reviewed, despite the fact that the Corps of Engineers (1989) stated that "...with existing information, the actual potential for ground water development in the study area cannot be determined." The typical permit application makes vague statements about the geology of the Piedmont; describes groundwater as occurring in bedrock fractures or overlying soil; lists USGS well data that are old, incomplete, and relevant to household wells sited for convenience only; and finally claims that large dependable aquifers do not exist. No permit application included a geologic map or described local geology. Only two reports even named a local rock unit; only one pump test was performed; no test

wells were drilled; only three reports describe areas generally suitable for high yield wells; and no report named a specific location for siting a well. As an example, one applicant failed to mention that the county occupies a major fault zone, and the reservoir site itself is in a narrow, linear valley with carbonate rocks along strike. Even to someone only vaguely familiar with groundwater exploration, this combination of features (faulting, possible large solution cavities, sharp contacts between permeable and impermeable rocks) should have strongly suggested a potential for significant groundwater resources and the need for greater investigation.

DISCUSSION AND CONCLUSION

Steps for conducting a reasonable determination of groundwater availability include:

1) Identification of all groundwater exploration and development in the area, from dry holes to high yield wells, with recording of precise location, well construction, and production data;

2) Investigation of local, site-specific geology through review of existing information and field mapping. This investigation should focus on geologic features that affect the water bearing properties of the rocks, including:

- rock types and structures;
- discontinuities due to compositional or textural differences, joints, faults, etc.;
- topography;
- depth of weathering;
- recharge area; and
- the spatial relations of all of these features.

Information on existing wells can provide important clues to groundwater occurrence, and the records of local drillers and state agencies should be reviewed. There is little need to investigate the regional geology, as this will rarely have any bearing on local water availability. Understanding the local geology is of utmost importance, and on-site mapping, data collection, and interpretation of the factors listed above is required. This work must be performed by an experienced field geologist, familiar with the hydrogeology of igneous and metamorphic rocks. As with any geological investigation, a map must be prepared that illustrates all pertinent features. The well data gathered in Step 1 can be overlaid on the geologic map to identify any patterns. It may be desirable to drill one or more test wells and perform pumping tests in order to confirm positive or negative conclusions drawn from the geologic and well data. Once all the site specific information is correlated, existing groundwater use and important hydrologic features should be discussed, and conclusions regarding availability can be made. The report should then describe areas of high or low groundwater potential in specific terms.

It is noteworthy that appropriate methodology for conducting a groundwater supply investigation was briefly described in the West Georgia Regional Reservoir report. "...it must be pointed out that actual quantification of the area's ground-water resource will require the installation of wells at geologically favorable sites and the conducting of pumping tests. Therefore, the estimated availability of groundwater presented in this survey is conjectural." (Georgia Geologic Survey, 1990). The concluding remark is correct, but unfortunately, all of the permit applications for reservoir construction relied on conjecture for their long term water supply plans. None of the permit applications discussed groundwater availability with regard to the steps described above, apparently for two reasons: water authorities were not interested in alternatives to reservoir construction; and consulting firms do not have personnel qualified to conduct groundwater exploration in the Piedmont/Blue Ridge (i.e., experienced geologists). Both the lack of interest in water supply alternatives and the failure to utilize adequately trained personnel are flaws that can result in denial or long delays of a Section 404 permit application.

Once the availability of groundwater has been defined, the second step in determining practicability can be performed: the economics and logistics of utilization can be accurately estimated. Only then can groundwater be compared realistically to other water supply alternatives. This comparison can serve the water authority as a valuable planning tool, and the permit application can satisfy Section 404(b)(1) guidelines for alternatives analysis. Therefore, it is critical that the consultant provide site specific groundwater data rather than hearsay.

LITERATURE CITED

Georgia Geologic Survey. 1990. West Georgia Regional Reservoir. Ground Water Availability In the West Georgia Reservoir Area. Technical Memorandum. *In*: Phase 1 Site Selection Study Final Report Technical Appendices West Georgia Regional Reservoir. Dames & Moore.

U.S. Army Corps of Engineers. 1989. Water Resources Management Study. South Metropolitan Atlanta Region. Documentation Report.