Document Type:	Supplemental EA-Administrative Record
Index Field:	Finding of No Significant Impact (FONSI)
Project Name:	Allen Fossil Plant Emission Control Project – Groundwater Wells
Project Number:	2015-28

FINDING OF NO SIGNIFICANT IMPACT

TENNESSEE VALLEY AUTHORITY

ALLEN FOSSIL PLANT EMISSION CONTROL PROJECT – GROUNDWATER WELLS
SHELBY COUNTY, TENNESSEE

The August 2014 EA, entitled Allen Fossil Plant Emission Control Project (herein referred to as the ALF Emission Control EA), explored two alternatives: Alternative A - No Action, and Alternative B - Retire ALF and construct a Natural Gas-Fired Facility. Based on analysis in the EA, the Tennessee Valley Authority (TVA) concluded that implementing Alternative B would not be a major federal action significantly affecting the environment, and it was determined that an Environmental Impact Statement was not required. Subsequent to the issuance of the FONSI, TVA decided to construct the Allen Combined Cycle (ACC) facility. As proposed, the ACC would use approximately 2,400 gallons per minute (gpm) or 3.5 million gallons per day (MGD) of gray water supplied by the City of Memphis Public Works Maxson wastewater treatment plant to provide a make-up water for the cooling water system at the ACC plant.

During the detailed engineering phase of that project, TVA evaluated several gray water treatment technologies required to remove constituents that would significantly reduce the effectiveness and reliability of the cooling water system equipment. Substantial equipment and annual routine maintenance would be required to treat and prepare gray water from the Maxson WWTP to be suitable for cooling the ACC plant. Therefore, TVA is proposing alternate water sources to provide an adequate and more reliable water supply to the ACC facility to replace cooling water system losses that occur as part of the evaporative cooling process to maintain the volume needed to adequately cool the combine cycle equipment.

Alternatives

TVA evaluated three alternatives in Supplemental Environmental Assessment (SEA): Alternative A - No Action; Alternative B – Installation of Groundwater Wells; and Alternative C – Purchasing Water from MLGW. Capital costs of each alternative are similar, ranging from $8.3 to $8.9M.

Under the No Action Alternative, TVA would obtain gray water from, and discharge wastewater to, the Maxson WWTP as it is described in the ALF Emission Control EA.

Under Alternative B, TVA would install five wells to provide groundwater for circulating cooling water system make-up water at the ACC plant. Groundwater would be obtained from the Memphis Sands aquifer. Each well would be capable of producing 1,250 gpm. Only two wells would be needed to supply 2,400 gpm, which is an adequate quantity of cooling water system make-up for normal operation of the ACC plant. Up to two additional wells would be operated to obtain up to 5,000 gpm to supply sufficient cooling water system make-up for peak generation periods. The fifth well would be available as a back-up. The five wells would be drilled within the property boundaries of the ACC plant. Annual operation and maintenance costs of this alternative are estimated to be $0.7 Million per year.

Under Alternative C, TVA would purchase potable water from Memphis Light, Gas and Water Division (MLGW) for use as cooling system make-up water. MLGW's potable water system draws from the Fort Pillows and Memphis Sands aquifers. Based on information from MLGW,

the peak cooling system needs of 5,000 gpm could not be met due to existing infrastructure limitations. However, the annual average amount (approximately 2,400 gpm) could be supplied to TVA for the operation of the ACC plant. To meet peak demand, TVA would have to store potable water in three, four-million gallon tanks constructed within the ACC plant boundaries. These tanks would store enough make-up water to support approximately three days of peak CC operation. Although viable, this alternative would limit the operational capacity of the plant. The potable water contains calcium, magnesium, silica, and other elements that would result in higher rate of corrosion in the cooling system equipment. Therefore, this alternative would involve chemical treatment processes to reduce the hardness of the potable water. Annual operation and maintenance costs of this alternative are estimated to be $1.7 Million per year.

Impacts Assessment

Based on the analyses in the SEA, TVA determined that the potential impacts of the alternatives under consideration on the following environmental resources are bounded by assessment of the ALF Emissions Control EA: air quality, climate change, land use, prime farmland, vegetation, wildlife, aquatic ecology, threatened and endangered species, geology, wetlands, floodplains, surface water, natural areas, parks, public recreation, cultural and historic resources, visual resources, hazardous materials and hazardous waste, solid waste, noise, transportation, socioeconomics, environmental justice, and public health and safety. Therefore, because the proposed action is primarily associated with the withdrawal of groundwater for ACC use, the only resource retained for detailed analysis in the SEA was groundwater.

There would be no impacts to groundwater resources under the No Action Alternative. Additionally, because gray water from the Maxson POTW would require additional equipment and operational support to provide water of sufficient quality for cooling, this alternative has the potential to reduce operational efficiency and reliability.

Under Alternative B the primary environmental consequence of obtaining the groundwater required from production wells at the ACC site is the potential for drawdown impacts to the surrounding community from the operation and recovery of between 2,400 and 5,000 gpm from the proposed well system.

The U.S. Geological Survey (USGS) modeled the effects of the ACC operation on the aquifer system by comparing simulated water levels in area aquifers with and without the combined-cycle-plant withdrawals over a 30-year period.

Under most conditions, simulated water level changes in the Memphis Sands aquifer from the proposed groundwater withdrawal create an anticipated cone of depression result in a reduction in the potentiometric surface of 7 ft at the plant site and 4 ft within approximately 1 mi (2,590 ac area) from the proposed groundwater wells. Under more extreme and less likely conditions, the reduction in the potentiometric surface at the plant was expected to be 11 ft. Simulated declines at the conclusion of the 30 year simulated withdrawal event in the underlying Fort Pillow aquifer and overlying alluvial aquifer were both less than 1 foot.

The nearest existing groundwater wells within 1-mi of the point of withdrawal are established within the alluvial aquifer. According to the USGS model, the upper alluvial aquifer at this site is not expected to be impacted in excess of 1 ft additional drawdown (USGS 2016).

Other groundwater users that withdraw water from the Memphis sands aquifer are located more than one mile northeast and southwest of the ACC site. Based upon the USGS analysis, some drawdown (2 to 4 ft) may be expected beyond the 1-mile radius (see Figure 3-2). However, it is

expected that water supply wells of these facilities are established with extensive screening intervals similar to those used in the Davis well field (80-ft long screens with the tops of screens ranging from 332 to 526 ft below ground surface). While some drawdown to the Memphis Sands aquifer may be evident at other wells in the vicinity, the presence of an extensive screening interval would allow for continuous water supply. Therefore, no impacts to these water users is expected with this alternative.

With a combined system that has greater pumping capacity and the availability of backup systems, this alternative would provide for greater reliability of cooling water for plant operations.

Under Alternative C, TVA would purchase water from MLGW, which supplies potable water obtained from the Memphis sands and Fort Pillow aquifers for 257,000 customers in the Shelby County area. Because use of potable water from MLGW would consist of groundwater use that is within the capacity of MLGW, no significant effects on groundwater or groundwater supply would occur under normal circumstances. However, increased demand for potable water by ACC would exert a similar effect on groundwater levels of the Memphis Sands and Fort Pillow aquifers as was described for Alternative B, albeit from different production wells. Therefore, significant impacts to the Memphis Sands aquifer and its groundwater users are not expected with this alternative. However, the inability to provide continuous water supply under certain peak generation periods could potentially constrain plant operations.

Annual operating and maintenance expenses associated with this alternative are greater than Alternative B, but less than the No Action Alternative.

TVA continues to refine estimates and plans associated with each alternative. TVA may select one of the options or a combination of portions of the two options as the most feasible and reasonable action. If TVA decides to implement an action that combines portions of the two options, the resulting environmental effects are expected to be no greater than the impacts described herein.

Mitigation

TVA would implement routine best management practices listed in the SEA for avoiding or reducing minor adverse environmental effects from the construction, operation, and maintenance of the proposed production wells.

Conclusion and Findings

Based on the findings in the SEA, TVA concludes that implementing either Alternative B – Installation of Groundwater Wells, Alternative C – Purchasing Water from MLGW, or implementing a combination of portions of the two alternatives (where the combination of impacts would not be greater than impacts from A or B alone) would not be a major federal action significantly affecting the environment. Accordingly, an environmental impact statement is not required.

Amy B. Henry, Manager
NEPA Program & Valley Projects
Environmental
Tennessee Valley Authority

4/29/10
Date Signed