M E M O R A N D U M

To: Northern Pueblo Tributary Water Rights Association (NPTWRA)
Through Peter Chestnut
From: Rich Schilf, Project Manager
Date: December 21, 2009
RE: Comments on Design, Estimating and Construction (DEC) Review Draft Report

Introduction

The Draft report from Design, Estimating and Construction (DEC) review of the Pojoaque *Basin* Regional Water system (PRWS) was reviewed by DOWL HKM during the week of November 30. Comments on the DEC team's verbal presentation of November 6 were previously provided to the NPTWRA by DOWL HKM on November 16. The comments provided on November 16 are still generally applicable and with minor revisions have been included in this memorandum. This memorandum provides 1) a general overview of the DEC process and Reclamation project planning approach compared to the approach envisioned in the Engineering Report (HKM 2008) and 2) specific comments on some items of the report or clarification of earlier comments.

General Overview

The DEC team members included three current and one retired Bureau of Reclamation (Reclamation) employees. Their technical competence is not questioned; however, their approach to project formulation, planning, authorization and implementation is a product of their working environment. In several instances the DEC review mentions bringing the design up to "feasibility level" and states that "A feasibility study provides the basis for making recommendations to Congress about whether a proposed project should be authorized for construction." (Page 2)

Portions of the project have been studied at feasibility level. The Energy and Water and Water Development Appropriations Act of 202 (P.L. 107-66) *"…Provided further, That of such funds, not more than $1,500,000 shall be available to the Secretary for completion of a* ***feasibility study*** *for the Santa Fe-Pojoaque Regional Water System, New Mexico: Provided further, That the study shall be completed by September 30, 2002."* These appropriations were used to prepare the Aamodt Settlement Study Report (Reclamation 2004).

The Engineering Report prepared by HKM Engineering Inc. (now DOWL HKM) utilized and updated materials from the Settlement Study and developed new information to correspond to the Settlement Agreement. The Engineering Report also envisioned a different path to project implementation. The remarkable consistency between the three project cost estimates (a variance of about $600,000, or less than 0.4% on a $157,000,000 project) from the Settlement Study, CH2M Hill and the Engineering Report provides strong evidence of the cost of a project to provide a reliable firm supply of water to the project area.

The Engineering Report acknowledges that a Final Engineering Report, National Environmental Policy Act (NEPA) compliance, and geotechnical investigations are needed and costs for these efforts are included in the non-contract multipliers used to arrive at the project cost estimate. The Engineering Report also addresses the constructability issues and the uncertainty of the hybrid wells but it is believed that the investigations phase and adaptive management by the project team provide an acceptable, efficient and cost effective means to address contingencies encountered during the preliminary and final design of project facilities.

Specific Comments

Distribution System Page 4. As stated in the Engineering Report, PRV is an acronym for pressure reducing valve not pressure relief valve. Pressure relief valves are not currently included in the distribution system.

Pipelines Page 7. Section 4.3 of the Engineering Report acknowledged the constructability issues discussed on page 7. Developing final alignments for the 164 miles of pipelines in the PRWS was beyond the scope of the Engineering Report. Final alignments for projects such as this are developed in the design phase when the number and location of users is known.

There are relatively few sewer lines in the project area and believe that other utility crossings will be more problematic.

DOWL HKM also believe that using a higher multiplier for unlisted items (25% instead of the 15% more frequently used in the Engineering Report) and listing of minor items (i.e., hydrants, isolation valves and road crossings) provides a sufficient level of a confidence for estimating pipeline costs prior to final design. For water distribution networks it is not possible to determine the precise alignment until all of the service connections are identified. To go through a process of defining the final alignment until all of the service connections are identified would be nebulous and not cost effective.

Hybrid Wells Pages 7 – 10. The material in quotes from the Settlement Study appendix is still generally applicable and investigations which include drilling at potential well field locations are needed to address water quality and compatibility issues. The Engineering Report envisioned that as part of the Final Engineering Report or design phase test drilling would be undertaken at proposed well field number three. The test drilling would provide definitive data regarding water quality and quantity that can then be analyzed and informed decisions regarding development. If the quality of waters are incompatible (which is by no means a certainty), it may be practical to treat either produced or injected waters.

The hybrid wells are planned as a supplemental supply and not intended as a primary source of supply. If the test drilling and analysis shows the wells infeasible, alternative supplemental supplies can be

pursued. One such example could be purchasing water from the horizontal collection well on the Pueblo of San Ildefonso.

Water Treatment Pages 10 – 11. The DEC team "echoed" the Engineering Report recommendation that multiple manufactures participate in a pilot study.

In regard to calcium and magnesium water quality data for the Otowi bridge location, 927 samples have been collected and analyzed between 1959 and 2005 when HKM accessed those data. It was our assumption that Reclamation would have also used those data when selecting the treatment process identified in the Settlement Study. The treatment process identified in the Settlement Study was further refined in the Engineering Report.

In the Engineering Report chlorine was planned to be added at the head of a contact basin to provide suitable concentration time to achieve to achieve the 0.5 log Giardia inactivation. Disinfection would be further analyzed in the Final Engineering Report.

Land and Land Rights Page 11. Utility occupancy or encroachment permits are also frequently used for locating pipelines within road rights-of-way. Rights-of-way across lands held or controlled by the Pueblos, county and state have been addressed by the Settlement Agreement and the proposed legislation and will be provided at no cost to the Secretary of the Interior. The Pueblos' grants are in exchange for exchange for funds for operation, maintenance and replacement. These provisions for lands owned or controlled by the Pueblos, county and state resolve right-of-way acquisition issues for the majority of the project.

Estimating Page 12 -14. DOWL HKM concurs that the estimate is closer to appraisal rather than feasibility level.

Costs for providing and upgrading electrical facilities were provided by Jemez Mountain Electric Cooperative and were included in the project cost estimate.

Detail estimating for items such as pipelines is not likely to be any more accurate than using recent bid tabs for work in the same area at the same time as the cost estimate was made. Obtaining material quotes, developing crews, estimating production, inserts more variables into the estimating process and assumptions on a contractor's methods that do not necessarily result in a more precise estimate.

Tribal administrative costs and fees and state taxes were accounted for in the cost estimate and are discussed in the Engineering Report.

The current cost estimate envisions multiple contracts per the construction schedule in the Engineering Report.

Construction delays and associated project cost increases resulting from funding limitations would be mitigated to a large extent by the application of construction cost indexing as provided for in the proposed legislation which would authorize the project.

The time requirements for right-of-way acquisitions have previously been addressed.

Most of the other comments in this section would be addressed in the Final Engineering Report.

The DEC team has misunderstood the application on unlisted items and confused unlisted items with contingencies.

Operation, Maintenance and Replacement (OM&R) Pages 14-15.
DOWL HKM agrees that OM&R costs and calculations should be further refined in the Final Engineering Report.

Alternative demand ramping was analyzed during the preparation of the Engineering Report. To develop a more accurate analysis will require additional data that were not available (and may still not be) at that time.

Power costs from Jemez Mountain and PNM were used in estimating pumping costs.

Construction Pages 15-16.
The intake construction costs in the Engineering Report include a coffer dam and dewatering. Shoring for the excavation of the raw water pump station near the New Mexico 502 is included for the excavation cost estimate for the raw water pump station.

The need for permits from the NMDOT was noted in the Engineering Report and the NMDOT has been contacted regarding construction conditions encountered during the construction of the Highway 502 Bridge across the Rio Grande.

These and other items would be resolved through the investigations and Final Engineering Report proposed in the Engineering Report.

Conclusions and Recommendations Pages 16-18.
DOWL HKM agrees that there is some risk of project costs increasing because of unknown conditions. A substantial portion of this risk is mitigated by the contingency factor included in the project cost estimate. A feasibility level study may lower but will not eliminate the risk of project cost increases. A feasibility level study cannot answer all uncertainties and cannot take into account economic factors, including market conditions and level of completion that will be encountered during project bidding and construction.

The draft report goes on to state that "…the issues identified by the Team herein make it clear that in the absence of a Feasibility level study, the risks of significance increases in the total estimated cost of the project are substantial." DOWL HKM respectfully disagrees for the reasons cited in the preceding paragraph and that the Settlement Study previously completed by Reclamation analyzed some items at feasibility level and the estimated costs from that study, the Engineering Report and the CH2MHill effort are all very similar.

What is certain is that if a new feasibility study is undertaken prior to authorization by Congress, the project cost will definitely increase as a result of both the funds expended on the study and, more significantly, the delay in construction that will result from the time taken to complete the study. If the feasibility study costs $5 million and the project is delayed by two years, the total cost of the project could increase by about $15 million.

Each of the draft DEC recommendations are restated below and a response then provided.

1. ***Consideration should be given to legislated federal and state environmental and cultural resource requirements and their impacts on the project's scope, schedule, and costs. Studies (such as environmental impact statements and other NEPA compliance studies, Section 106 of the National Historic Preservation Act compliance studies, and Air Quality and Stormwater requirements) required on projects of this nature can be very time consuming – and as such, should be identified and planned for.***

This recommendation is logical; however, NEPA compliance is a federal responsibility and a lead federal agency needs to be designated for NEPA compliance and documentation. The lead agency would logically be the Bureau of Reclamation. Although not one of the eight enumerated recommendations, the DEC Team also recommended forming a Project Management Team (PMT) to coordinate and schedule future activities. The recommendation for the PMT seems particularly relevant to Recommendations 1 and 2.

It should also be noted that Table 4.1 (page 43) of the Engineering Report scheduled two years for completion of the NEPA process. As with most of the other recommendations, funding is required to implement this recommendation.

2. ***Consult with State and Federal Fish and Wildlife Services to better understand the requirements placed on the intake structure with respect to the need for a fish bypass and the type of screen that is acceptable to prevent fish from getting into the suction line or impacted on the screen.***

The Buckman Direct Diversion (BDD) (approximately 3 miles downstream) is currently under construction and was subject to the same environmental review and fish and wildlife coordination processes as the PRWS diversion will be subjected to. The design of the two intakes is very similar. The maximum through the slot velocity for the BDD is 0.5 feet per second. This velocity is also what was

used for the PRWS intake and on two river intakes the design engineer designed and constructed prior to his work on the PRWS Engineering Report. This velocity has been required by the U.S. Fish and Wildlife Service on most river intakes and should not be a problem on the PRWS intake.

The Engineering Report did not include the cross sections of the intake that were provided to the DEC team. Subsequent markups of the intake drawings included an outlet on the downstream side of the diversion box that would function as a fish passage. The cost of including the outlet would be insignificant.

3. Confirm the elevations of the intake structure required to assure operation at very low river flows and confirmation of the stability of the stream bed with respect to aggradations or degradations. The Team feels it would be beneficial to consult with NMDOT to see what subsurface conditions they encountered when constructing the Highway 502 Bridge and if they have experienced any scour problems at the center pier.

The New Mexico Department of Transportation Bridge Engineer for this district has been contacted and geotechnical data and any scour analyses have been requested. Geological Survey gage data were used to establish the conceptual low water level stage.

4. ***Perform subsurface explorations for the river diversion intake structure and the raw water pump station in order to design the foundations, shoring system for the excavation of the raw water pump station and to determine groundwater conditions and dewatering/unwatering requirements. Adjustments to quantity and cost estimates should be made as required.***

Geotechnical investigations would be conducted as part of the preliminary design phase for the intake. The cost of geotechnical investigations is estimated at 1.5% of the field cost of the project and is specifically included in the non-contract multiplier that was used to estimate the total project cost. The cost estimate did include the cost of shoring for the raw water pump station clear well in the major item cost for the intake and raw water pump station near State Road 502.

This recommendation, like several others, goes to the timing of activities. The DEC Team frequently mentioned their experience in completing a feasibility level study prior to project authorization. The cost of feasibility studies (estimated at between $2 and $10M for this project) can delay project implementation further increasing the cost of the project. The cost savings from conducting feasibility studies on project such as the PRWS are not quantified. Similar projects have been authorized based on appraisal level studies and a cost containment strategy included in the implementation of the project.

5. Right-of-Way through the Pueblo lands and private lands will require entering into agreements, which will be costly in terms of time and money to draw up the agreements

and acquire the land interests. Estimate of lands and Right-of-Way costs should be made as accurately as possible and included in a Feasibility level cost estimate.

The majority of the rights-of-ways would be located within the Pueblo boundaries (560 acres out of 645 acres) and the Pueblos have agreed in principal to the grant of rights-of-way for the project. It is also the understanding of DOWL HKM that as a party to the agreement, Santa Fe County has also agreed in principal to the use of their lands and road right-of-ways for project facilities. Obtaining easements from individual landowners, prior to authorization and final design, is premature.

6. ***Update the design team study to a Feasibility level by re-pricing the cost estimate (versus indexing the historical prices) such that site specific costs unique for this project may be captured. In addition, the Team identified a number of cost elements that were excluded from the cost estimate, some of which may be significant cost drivers and should be considered and captured.***

This suggestion goes to the root issue of wanting feasibility level cost estimates prior to project authorization. Reclamation staff have stated that the feasibility level activities could cost between $2 and $10M. It is also uncertain how much more accurate the feasibility level cost estimates will be. If the contracts are competitively bid it will be contractors submitting the bids and not Reclamation estimators. Competitively bid contracts can have a high variability in the bid price because of factors that would not necessarily be addressed well in a feasibility level cost estimate.
Project delivery methods should be considered as a means of controlling contract and non-contract costs. Perhaps this could be an extension of the PMT suggested by the DEC.

It should also be noted that the Engineering Report did include itemized costs for road crossings.

7. ***The pilot testing of the proposed water treatment system should be performed as part of a Feasibility study. The pilot system should use an intake similar to that planned to be installed to ensure that the full scale plant will be accurately simulated for both intake conditions and water quality. The focus of the pilot testing should be simplicity of operation and high reliability of equipment.***

This is by no means a new recommendation, both the Settlement Study Report and the Engineering Report recommended a 12-month pilot test.

8. ***Until further investigation verifying ASR as a viable supplemental source of water for this project is available, the ASR not be considered in a Feasibility design, and that another verifiable storage alternative be provided for in the cost estimate at this time.***

The essence of this recommendation was addressed on page two of the memorandum. During the preparation of the Final Engineering Report or in the design phase test drilling would be conducted, data obtained then analyzed and informed decisions then made regarding the use of hybrid wells.

Alternative sources of supplemental supply could be analyzed if the results of the investigations and analyses show that hybrid wells are not feasible.

Conclusion

The DEC team has made many accurate observations regarding the Engineering Report. The DEC team believes that without a feasibility level study there is significant potential for significant increases in project costs. DOWL HKM believes: 1) that the contingency factor used in the current cost estimate reduces this risk; 2) that a complete feasibility level study prior to authorization may reduce risk but increase project costs because of delays in implementation; 3) the development of a cost containment plan and consideration of alternative means of project delivery will significantly reduce the potential for cost overruns and 4) most, if not all, of the items identified by DEC team would be addressed in the Final Engineering Report and investigations undertaken during the design phase.