APPENDIX B
QUALITY ASSURANCE

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1.0 QUALITY ASSURANCE

1.1 INFORMATION

Project Title: Upper Rio Grande Basin Water Operations Review & EIS

Location of Project: Upper Rio Grande Basin (Basin), Headwaters in Colorado through all of New Mexico to Fort Quitman, Texas

Joint Lead Agencies: U.S. Army Corps of Engineers (COE), Albuquerque District, NM

Bureau of Reclamation (BOR), Albuquerque Area Office, NM

New Mexico Interstate Stream Commission (NMISC), Santa Fe

Project Description: The Joint Lead Agencies (JLA) are considering the modification of river and reservoir operations within the Upper Rio Grande Basin. The Basin includes the Rio Grande COE and BOR facilities above Fort Quitman, Texas. The JLA are initiating an Upper Rio Grande Basin Water Operations Review (Review), which will result in the development of an integrated plan for the federal and state operations that affect rivers and reservoirs in the Basin. The Upper Rio Grande Water Operations Model (URGWOM) will be used as a primary tool for developing alternative water operations and evaluating their impacts. To ensure compliance with applicable federal and state legislation affecting the Basin, the JLA will prepare the Programmatic Water Operations Environmental Impact Statement (Water Operations EIS) that comprehensively addresses the proposed action and all reasonable alternatives.

Project Organization Chart and Roster: The Organization Chart for the Review and related Water Operations EIS is shown in **Figure 3-1** of this Work Plan and in Figure 1 of the Memorandum of Agreement (MOA) between the JLA. It shows the decision-makers and the Executive Committee makeup. The Management Team is indicated in the figure, as well as the other working parts of the organization. The rosters of most of the parts of the organization are provided in **Table 6.1**. This table also provides the list of the contractors used in this project. Appendix C of this Work Plan provides the vita of all individuals listed in **Table 6.1**.

1.2 REFERENCES

Memorandum of Agreement: Upper Rio Grande Basin Water Operations, January 26, 2000.

Work Plan for the Rio Grande Basin Water Operations Review: U.S. Army Corps of Engineers, Albuquerque District, Contract # DACA47-97-D-0009, Delivery Order #2, January 26, 2000.

Quality Control Plans: CESPD R 1110-1-8, APP C, 14 December 1998. Pages C-8 and C-9 provide the minimum requirements for quality assurance. The following subsections of this Section provide the details developed at the technical review strategy sessions and during the complex planning process for the Review and Water Operations EIS.

JLA References: APPENDIX A to this Work Plan, “Environmental Laws and Regulations”, provides the list of the required references for the Review and Water Operations EIS. Appendix A of the MOA provides the water operations authorities.

Hydrologic Modeling Quality Control Plan: CADSWES has provided the hydrologic modeling quality assurance plan for the standard operating procedure for use of RiverWare. This modeling quality assurance provides a synopsis of the philosophy of computer modeling, a brief overview of staff responsibilities and hardware and software requirements, and the applicable educational and training needs for the modeling effort.

Other Modeling Software (Current Versions): FLO-2D, (Users Manual, Model Verification Document), is a finite element, 2-dimensional flood routing model. The Water Operations Review and EIS version of this program translates flows into depths and velocities for use in riparian and cultural resource evaluations in the Basin. The version of the FLO-2D model for the Water Operations Review and EIS was developed by Jim O'Brien of Tetra Tech.

RMA-2, (SMS Reference Manual) is a 2-dimensional module of the Surface Modeling System (SMS) developed by Brigham Young University in cooperation with the U.S. Army Corps of Engineers Waterways Experiment Station (WES). The Water Operations Review and EIS version of RMA-2 with inputs of appropriate data for specific reaches of the Rio Grande, supports sub-critical flow analysis, including wetting and drying for use in riverine aquatic evaluation.

HEC-RAS, (Users Manual), is a 1-dimensional, step backwater, hydraulic program used mostly for floodplain and flood depth determination. HEC-2 (Hydraulic Reference Manual, Users Manual and Applications Guide) is a surface water profile model. The U.S. Army Corps of Engineers Hydrologic Engineering Center (HEC) developed both HEC-RAS and HEC-2. These canned programs will be customized to use Rio Grande cross-section, roughness, and other applicable data from specific reaches of the Rio Grande for evaluation of peak instantaneous discharge effects.

Hydraulic Design Package for Channels (SAM Users Manual), the basic model provides the computational capability to include processes of erosion, entrainment, transportation and deposition of sediments in the design of stable channels and was developed at WES. Using sediment samples and other data pertinent to specific sites along the Rio Grande, the Water Operations review and EIS version of SAM will aid in identifying erosion and other sediment effects of flow changes.

Data: U.S. Geological Survey National handbook of recommended methods for water data acquisition. EPA Environmental Investigations Standard Operating Procedures and Quality Assurance Manual.

Metadata: Federal Geographic Data Committee (FGDC) "content Standards for Spatial Metadata" (FGDC-STD-001-1998), Administrative Records Manual developed for the Review and Water Operations EIS.

1.3 APPLICABILITY AND OBJECTIVE

1.3.1 Quality Assurance Plan

This Quality Assurance Plan applies to all activities involved with this project. The objective of this Quality Assurance Plan is to provide the JLA with a management tool that will help achieve the maximum in high quality products and services from the Management Team, the Interdisciplinary (ID) NEPA Team, the Resource Teams, the Support Teams, and the contractors.

1.3.2 Quality Assurance Tools

Project quality and performance will be enhanced by the use of quality tools available for the project. These are summarized below:

GIS Mapping Systems Software: GIS analysts, in order to construct geographic data based maps and figures will use ARC/INFO Export Files, Arc View Shape Files, AutoCAD Drawing Exchange Files and associated software. Basic guidelines have been developed for the Technical Teams when assessing potential date types and sources. Databases will be developed or linked to store a vast amount of data necessary to develop and maintain URGWOM and other required models that analyze various parameters of the Basin.

Modeling Software: URGWOM (Upper Rio Grande Water Operations Model) is a unified water operations model for the Basin. This model is a cooperative effort of six federal agencies and others for simulating water storage and delivery operations in the Rio Grande from its headwaters in Colorado to Fort Quitman, Texas. The model will be used in flood control operations and water accounting. A planning version will be used in evaluating water operations alternatives. Software that is used for other resource parameters will be used as appropriate.

Cost/Schedule Tracking Software: Open Plan project management software is utilized to track costs and monitor schedules.

Lessons Learned: Lessons learned from similar projects will be incorporated throughout the completion of the Review and Water Operations EIS. In particular, similar water operation studies, metadata bases, and database presentational tools were evaluated during the preparation of this Work Plan. Also, other environmental resource information will be used to prepare the Draft EIS (DEIS) associated with the combined proposed water operations for the future.

1.3.3 Quality Review Procedures

The comprehensive review process for the Review and Water Operations EIS will include the following:

- Quality Control Check: Each task product will be subject to one or more quality control checks prior to submittal. Each Team Leader or other competent project team member designated by the Management Team shown in Figure 3.1 of this Work Plan typically will perform the quality control checks. The quality control checks will be performed to ensure that the performance of the work conforms to appropriate technical criteria, and meets the MOA between the COE, BOR, and the NMISC.
- Peer Review: A competent in-house scientist or engineer, prior to formal submittal for independent technical review, will review each task product. Typically, the ID NEPA Team or a Technical Advisor will be assigned this review by the Management Team. It will be conducted prior to review by the Independent Technical Review Team or by the Steering Committee.
- Independent Technical Review: Formal independent technical reviews will be conducted prior to the Executive Committee's submittal of the Task products during the public review process. Reviewers will include those agencies or individuals listed in Table 5-1 of this Work Plan. Communication between the Independent Technical Review Team and the Project Steering Committee will be ongoing throughout the task product preparation process; however, members of the Independent Technical Review Team will not perform the work associated with each task's product.
- Documents Scheduled for Review: The following documents are anticipated for quality control checks, peer review, and independent technical review during the course of the project.

- Support Team Products: The URGWOM Integration/Water Operations, GIS, and Hydrology & Hydraulics support teams will produce a technical document for use with the Review and Water Operations EIS process. These documents will be completely reviewed before they are distributed with the DEIS to the public.
- Resource Team Products: Each of the six resource teams (river morphology, sedimentation, & mechanics; riparian & wetland ecosystems; cultural resources; aquatic systems; water quality; recreation, land use, socio-economics, & environmental justice—these titles of the teams might have been changed?) will produce a technical document for use in the Review and Water Operations EIS. These documents will be completely reviewed before they are distributed with the DEIS to the public.
- The DEIS will be developed by the Interdisciplinary NEPA Team and it will be reviewed internally by the Management Team advisors and externally by the Independent Technical Review Team. The document will be distributed to the public for review.

1.3.4 Project Coordination

Coordination is essential for the successful completion of the Review and Water Operations EIS. Key team members will be involved with coordination activities to ensure effective communications, maintenance of interdisciplinary structure, resolution of potential conflicts, and adherence to schedule and cost requirements as required in the MOA. Specific responsibilities are outlined in the following subsections of this Section, in the MOA, and throughout the rest of this Work Plan.

1.3.5 Implementation of Work Plan

The Executive Committee and its Management Team are responsible for the Review and Water Operations EIS schedule and costs, and shall serve as the liaison with the "Decision Makers" of the COE, BOR, and the NMISC. The Management Team shall be responsible for implementation of this Quality Assurance as shown in **Figure 3.1** of this Work Plan and in Figure 1 of the MOA. The Executive Committee must approve deviations from this Quality Assurance Plan as indicated in the MOA.