



STATE OF TEXAS

TWDB Contract No. 1600012011

COUNTY OF TRAVIS

General Revenue

Kennedy Resource Company

This Contract, (hereinafter "CONTRACT"), between the Texas Water Development Board (hereinafter "TWDB") and Kennedy Resource Company (hereinafter "CONTRACTOR"), is composed of two parts, SECTION I. SPECIFIC CONDITIONS AND EXCEPTIONS TO THE STANDARD AGREEMENT and SECTION II. STANDARD AGREEMENT. The terms and conditions set forth in SECTION I will take precedence over terms and conditions in SECTION II.

SECTION I. SPECIFIC CONDITIONS AND EXCEPTIONS TO STANDARD AGREEMENT

ARTICLE I. DEFINITIONS

For the purposes of this CONTRACT, the following terms or phrases shall have the meaning ascribed therewith:

1. TWDB – The Texas Water Development Board, or its designated representative
2. CONTRACTOR – Kennedy Resource Company
3. EXECUTIVE ADMINISTRATOR – The Executive Administrator of the TWDB or a designated representative
4. PARTICIPANT(S) – N/A
5. REQUIRED INTERLOCAL AGREEMENT(S) – N/A
6. RESEARCH PROJECT – Evaluation of Rainfall-Runoff Trends in the Upper Colorado River Basin
7. TWDB APPROVAL DATE – July 21, 2016
8. DEADLINE FOR CONTRACT EXECUTION – November 18, 2016
9. CONTRACT INITIATION DATE – July 21, 2016
10. STUDY COMPLETION DATE (Draft Report Due) – June 30, 2017

11. CONTRACT EXPIRATION DATE (Final Report Due) – August 31, 2017
12. TOTAL STUDY COSTS – \$20,000.00
13. TWDB SHARE OF THE TOTAL STUDY COSTS – the lesser of \$20,000.00 or 100 percent of the total study costs or individual payment submission
14. LOCAL SHARE OF THE TOTAL STUDY COSTS – 0 in cash or 0 percent of the total study costs or individual payment submission
15. PAYMENT SUBMISSION SCHEDULE – Monthly
16. OTHER SPECIAL CONDITIONS AND EXCEPTIONS TO STANDARD AGREEMENT OF THIS CONTRACT –
 1. Section II. Article III, Item No. 7 is deleted in its entirety.

SECTION II. STANDARD AGREEMENT

ARTICLE I. RECITALS

Whereas, on TWDB APPROVAL DATE, the TWDB considered providing the CONTRACTOR a grant to conduct a RESEARCH PROJECT;

Whereas, the CONTRACTOR and PARTICIPANT will commit the LOCAL SHARE OF THE TOTAL STUDY COSTS, if applicable, in cash and/or in-kind services to pay for the LOCAL SHARE OF THE TOTAL STUDY COSTS of this RESEARCH PROJECT;

Whereas, the CONTRACTOR is the entity who will act as administrator of the TWDB's research grant and will be responsible for the execution of this contract;

Whereas, on the TWDB APPROVAL DATE, the TWDB approved a research grant to CONTRACTOR;

Now, therefore, the TWDB and the CONTRACTOR, agree as follows:

ARTICLE II. PROJECT DESCRIPTION AND SERVICES TO BE PERFORMED

1. The TWDB enters into this CONTRACT pursuant to Water Code §§16.012 as appropriate; Exhibit A, the original grant application, which is incorporated herein and made a permanent part of this CONTRACT; and this CONTRACT.
2. The CONTRACTOR will conduct a RESEARCH PROJECT, as delineated and described in Exhibit A, according to the Scope of Work contained in Exhibit B.
3. A progress report, including results to date, will be provided to the EXECUTIVE ADMINISTRATOR monthly, throughout the project. Special interim reports on special topics and/or results will be provided as appropriate. Instructions for the progress report are shown in Exhibit E, TWDB Guidelines for a Progress Report.
4. Within the first 60 days of the commencement of this CONTRACT, CONTRACTOR will consult with TWDB staff to prepare a list of entities that potentially may be affected by the results of this RESEARCH PROJECT. On the STUDY COMPLETION DATE, this list will be reviewed and updated by the CONTRACTOR and submitted to the TWDB with the draft final report.

ARTICLE III. CONTRACT TERM, SCHEDULE, REPORTS, AND OTHER PRODUCTS

1. The CONTRACTOR has until the DEADLINE FOR CONTRACT EXECUTION to execute this CONTRACT and to provide acceptable evidence of any REQUIRED INTERLOCAL AGREEMENT(S) and the Contractors' ability to provide the LOCAL SHARE OF THE TOTAL STUDY COSTS, if applicable, to

the EXECUTIVE ADMINISTRATOR for approval or the TWDB's SHARE OF THE TOTAL STUDY COSTS will be rescinded.

2. The term of this CONTRACT shall begin and the CONTRACTOR shall begin performing its obligations hereunder on the CONTRACT INITIATION DATE and shall expire on the CONTRACT EXPIRATION DATE. Delivery of an acceptable final report prior to the CONTRACT EXPIRATION DATE shall constitute completion of the terms of this CONTRACT.
3. The CONTRACTOR will complete the Scope of Work and will deliver four (4) double- sided copies of a draft final report to the EXECUTIVE ADMINISTRATOR no later than the STUDY COMPLETION DATE. The draft final report will include the scope of work; a description of the research performed; the methodology and materials used; any diagrams or graphics used to explain the procedures related to the study; any data collected; an electronic copy of any computer programs, maps, or models along with an operations manual and any sample data set(s) developed under the terms of this CONTRACT; analysis of the research results; conclusions and recommendations; a list of references, a Table of Contents, List of Figures, List of Tables, an Executive Summary, and any other pertinent information. All final reports should be prepared according to Exhibit D, Guidelines for Authors Submitting Contract Reports to the Texas Water Development Board. After a 30-day review period, the EXECUTIVE ADMINISTRATOR will return review comments to the CONTRACTOR.
4. The CONTRACTOR will consider incorporating comments from the EXECUTIVE ADMINISTRATOR and other commentors on the draft final report into a final report. The CONTRACTOR will include a copy of the EXECUTIVE ADMINISTRATOR 's comments in the final report. The CONTRACTOR will submit one (1) electronic copy of the entire final report in Portable Document Format (PDF) and five (5) bound double- sided copies of the final report to the EXECUTIVE ADMINISTRATOR no later than the sixty days (60) after the STUDY COMPLETION DATE.
5. The CONTRACTOR will submit one (1) electronic copy of any computer programs or models and an operations manual developed under the terms of this CONTRACT. In compliance with Texas Administrative Code Chapters 206 and 213 (related to Accessibility and Usability of State Web Sites), the digital copy of the final report will comply with the requirements and standards specified in statute. After a 30-day review period, the EXECUTIVE ADMINISTRATOR will either accept or reject the final report. If the final report is rejected, the rejection letter sent to the CONTRACTOR shall state the reasons for rejection and the steps the CONTRACTOR needs to take to have the final report accepted and the retainage released.
6. The CONTRACTOR will submit the most recent progress report with submittal of payments according to the PAYMENT SUBMISSION SCHEDULE. Progress reports shall be in written form and shall include a brief statement of the overall progress made since the last status report; a brief description of any problems that have been encountered during the previous reporting period that will affect the study, delay the timely completion of any portion of this CONTRACT, inhibit the completion of or

cause a change in any of the study's products or objectives; and a description of any action the CONTRACTOR plans to take to correct any problems that have been encountered.

7. The EXECUTIVE ADMINISTRATOR can extend the STUDY COMPLETION DATE and the CONTRACT EXPIRATION DATE upon written approval. The CONTRACTOR should notify the EXECUTIVE ADMINISTRATOR in writing within ten (10) working days prior to the STUDY COMPLETION DATE or thirty (30) days prior to the CONTRACT EXPIRATION DATE that the CONTRACTOR is requesting an extension to the respective dates.

ARTICLE IV. COMPENSATION AND REIMBURSEMENT

1. The TWDB agrees to compensate and reimburse the CONTRACTOR in a total amount not to exceed the TWDB's SHARE OF THE TOTAL STUDY COSTS for costs incurred and paid by the CONTRACTOR pursuant to performance of this CONTRACT. The CONTRACTOR will contribute local matching funds, if applicable, in sources and amounts defined as the LOCAL SHARE OF THE TOTAL STUDY COSTS. The TWDB shall reimburse the CONTRACTOR for one hundred percent (100%) of the TWDB's share of each invoice pending the CONTRACTOR's performance up to ninety percent (90%) of the total funding costs. Upon completion of a Final Report, and written acceptance of said Final Report by the EXECUTIVE ADMINISTRATOR, the TWDB shall pay the remaining ten percent (10%) to the CONTRACTOR upon submission of a final invoice.
2. The CONTRACTOR shall submit payments and documentation for reimbursement billing according to the PAYMENT SUBMISSION SCHEDULE and in accordance with the approved task and expense budgets contained in Exhibit C to this CONTRACT. The CONTRACTOR has budget flexibility within task and expense budget categories to the extent that the resulting change in amount in any one task or expense category does not exceed 35% of the total authorized amount by this CONTRACT for the task or category. Larger deviations shall require approval by EXECUTIVE ADMINISTRATOR or designee which will be documented through an Approved Budget Memorandum to the TWDB contract file. The CONTRACTOR will be required to provide written explanation for the overage and reallocation of the task and expense amount.
For all reimbursement billings including any subcontractor's expenses, the EXECUTIVE ADMINISTRATOR must have determined that the REQUIRED INTERLOCAL AGREEMENT(S) and contracts or agreements between the CONTRACTOR and the subcontractor are consistent with the terms of this CONTRACT. The CONTRACTOR is fully responsible for paying all charges by subcontractors prior to reimbursement by the TWDB.
3. The CONTRACTOR and its subcontractors shall maintain satisfactory financial accounting documents and records, including copies of invoices and receipts, and shall make them available for examination and audit by the EXECUTIVE ADMINISTRATOR. Accounting by the CONTRACTOR and its subcontractors shall

be in a manner consistent with Generally Accepted Accounting Principles.

4. By executing this CONTRACT, the CONTRACTOR accepts the authority of the State Auditor's Office, under direction of the legislative audit committee, to conduct audits and investigations in connection with any and all state funds received pursuant to this contract. The CONTRACTOR shall comply with and cooperate in any such investigation or audit. The CONTRACTOR agrees to provide the State Auditor with access to any information the State Auditor considers relevant to the investigation or audit. The CONTRACTOR also agrees to include a provision in any subcontract related to this CONTRACT that requires the subcontractor to submit to audits and investigation by the State Auditor's Office in connection with any and all state funds received pursuant to the subcontract.

5. The CONTRACTOR shall submit a monthly progress report as described in Article II, Item 3 which documents the TOTAL STUDY COSTS for the reporting period, even if the TOTAL STUDY COSTS for the period is zero. The monthly progress report shall be in the format described in Exhibit E and should also contain the following documentation:
 - A. Completed and Signed Payment Request Checklist which includes the following:
 - (1) TWDB CONTRACT Number;
 - (2) Billing period; beginning (date) to ending date;
 - (3) Total Expenses for this period;
 - (4) Total In-kind services, if applicable;
 - (5) Less LOCAL SHARE OF THE TOTAL STUDY COSTS for the billing period, if applicable;
 - (6) Total TWDB's SHARE OF THE TOTAL STUDY COSTS for the billing period;
 - (7) Amount of retainage to be withheld for the billing period;
 - (8) Total costs to be reimbursed by the TWDB for the billing period; and
 - (9) Certification, signed by the CONTRACTOR's authorized representative, that the expenses submitted for the billing period are a true and correct representation of amounts paid for work performed directly related to this contract.

 - B. For direct expenses incurred by the CONTRACTOR other than subcontracted work:
 - (1) A spreadsheet showing the tasks that were performed; the percent and cost of each task completed; a total cost figure for each direct expense category including labor, fringe, overhead, travel, and other expenses such as communication and postage, technical and computer services, expendable supplies, printing and reproduction; and
 - (2) Copies of detailed, itemized invoices/receipts for other expenses (credit card summary receipts or statements are not acceptable).

 - C. For direct expenses incurred by the CONTRACTOR for

subcontracted work:

- (1) Copies of invoices from the subcontractors to the CONTRACTOR;
- (2) A spreadsheet showing the tasks that were performed; the percent and cost of each task completed; a total cost figure for each direct expense category including labor, fringe, overhead, travel, and other expenses such as communication and postage, technical and computer services, expendable supplies, printing and reproduction; and the total dollar amount due to the consultant; and
- (3) Copies of detailed, itemized invoices/receipts for other expenses (credit card summary receipts or statements are not acceptable).

- D. For travel expenses for the CONTRACTOR and/or subcontractor(s) –
- (1) Names, dates, work locations, time periods at work locations, itemization of subsistence expenses of each employee, limited, however, to travel expenses authorized for state employees by the General Appropriations Act, Tex. Leg. Regular Session, 2015, Article IX, Part 5, as amended or superceded. Receipts required for lodging;
 - (2) Copies of invoices or tickets for transportation costs or, if not available, names, dates, and points of travel of individuals; and
 - (3) All other reimbursable travel expenses -- invoices or purchase vouchers showing reason for expense with receipts to evidence the amount incurred.

6. Incomplete requests will be returned to the CONTRACTOR if deficiencies are not resolved within ten (10) business days.
7. If for some reason the reimbursement request cannot be processed due to the need for an amendment to the CONTRACT, the CONTRACTOR will be required to resubmit the Payment Request Checklist dated after the execution of the amendment.
8. The CONTRACTOR is responsible for any food or entertainment expenses incurred by its own organization or that of its subcontractors, outside that of the travel expenses authorized and approved by the State of Texas under this CONTRACT.
9. A compliance report in accordance with Texas Administrative Code (TAC) Title 1, Part 5, Chapter 111, Subchapter B, Rule §111.14:, The CONTRACTOR shall maintain business records documenting its compliance with the approved Historically Underutilized Business subcontracting plan in the format prescribed by the Texas Procurement and Support Services (Exhibit F). The compliance reports must include payment information on all HUB and non-HUB subcontractors. Submittal of these monthly compliance reports is required as a condition of payment.

The TWDB will monitor the HUB subcontracting plan monthly to ensure the value of the subcontracts meets or exceeds the HUB subcontracting provisions specified in the contract. CONTRACTOR who fails to implement the HUB subcontracting plan in good faith will be reported to Texas Procurement and Support Services. The TWDB may revoke the contract for breach of contract and make a claim against the contractor.

ARTICLE V. INTELLECTUAL PROPERTY: OWNERSHIP, PUBLICATION, AND ACKNOWLEDGMENT

1. “Use” of a work product, whether a CONTRACTOR Works, a Subcontractor Works or otherwise, shall mean and include, without limitation hereby, any lawful use, copying or dissemination of the work product, or any lawful development, use, copying or dissemination of derivative works of the work product, in any media or forms, whether now known or later existing.
2. “No Compensation Obligation” shall mean there is no obligation on the part of one co-owner or licensee of a work, whether a CONTRACTOR Works, a Subcontractor Works or otherwise, to compensate other co-owners, licensees or licensors of the work for any use of the work by the using co-owner or licensee, including but not limited to compensation for or in the form of: royalties; co-owner or licensee accounting; sharing of revenues or profits among co-owners, licensees or licensors; or any other form of compensation to the other co-owners, licensees or licensors on account of any use of the work.
3. “Dissemination” shall include, without limitation hereby, any and all manner of: physical distribution; publication; broadcast; electronic transmission; internet streaming; posting on the Internet or world wide web; or any other form of communication, transmission, distribution, sending or providing, in any forms or formats, and in or using any media, whether now known or later existing.
4. The TWDB shall have an unlimited, unrestricted, perpetual, irrevocable, non-exclusive royalty-free right to access and receive in usable form and format, and to use all technical or other data or information developed by CONTRACTOR and Subcontractor in, or otherwise resulting from, the performance of services under this CONTRACT.
5. For purposes of this Article, “CONTRACTOR Works” are work products developed by CONTRACTOR and Subcontractor using funds provided under this CONTRACT or otherwise rendered in or related to the performance in whole or part of this CONTRACT, including but not limited to reports, drafts of reports, or other material, data, drawings, studies, analyses, notes, plans, computer programs and codes, or other work products, whether final or intermediate.
 - a. It is agreed that all CONTRACTOR Works shall be the joint property of the TWDB and CONTRACTOR.
 - b. The parties hereby agree that, if recognized as such by applicable law, the CONTRACTOR Works are intended to and shall be works-made-for-hire with joint ownership between the TWDB and CONTRACTOR as such works are created in whole or part.
 - c. If the CONTRACTOR Works do not qualify as works-made-for-hire under

applicable law, CONTRACTOR hereby conveys co-ownership of such works to the TWDB as they are created in whole or part. If present conveyance is ineffective under applicable law, CONTRACTOR agree to convey a co-ownership interest of the CONTRACTOR Works to the TWDB after creation in whole or part of such works, and to provide written documentation of such conveyance upon request by the TWDB.

- d. The TWDB and CONTRACTOR acknowledge that the copyright in and to a copyrightable CONTRACTOR Work subsists upon creation of the CONTRACTOR Work and its fixing in any tangible medium. CONTRACTOR or the TWDB may register the copyrights to such Works jointly in the names of the CONTRACTOR and the TWDB.
- e. The TWDB and CONTRACTOR each shall have full and unrestricted rights to use a CONTRACTOR Work with No Compensation Obligation.

6. For purposes of this Article, “Subcontractor Works” include all work product developed in whole or part by or on behalf of Subcontractors engaged by CONTRACTOR to perform work for or on behalf of any CONTRACTOR under this CONTRACT (or by the Subcontractors’ Subcontractors hereunder, and so on). CONTRACTOR shall secure in writing from any Subcontractors so engaged:

- a. unlimited, unrestricted, perpetual, irrevocable, royalty-free rights of the TWDB (and, if desired, of CONTRACTOR) to access and receive, and to use, any and all technical or other data or information developed in or resulting from the performance of services under such engagement, with No Compensation Obligation; and either
- b. assignment by the Subcontractor to the TWDB (and, if desired by them, jointly to the CONTRACTOR) of ownership (or joint ownership with the Subcontractor) of all Subcontractor Works, with No Compensation Obligation; or
- c. grant by Subcontractor of a non-exclusive, unrestricted, unlimited, perpetual, irrevocable, world-wide, royalty-free license to the TWDB (and, if desired by them, the CONTRACTOR) to use any and all Subcontractor Works, including the right to sublicense use to third parties, with No Compensation Obligation.

7. No unauthorized patents. CONTRACTOR Works and Subcontractor Works or other work product developed or created in the performance of this CONTRACT or otherwise using funds provided hereunder shall not be patented by CONTRACTOR or their Subcontractor unless the EXECUTIVE ADMINISTRATOR consents in writing to submission of an application for patent on such works; and provided that, unless otherwise agreed in writing, any application made for patent shall include and name the TWDB (and, as applicable and desired by them, CONTRACTOR) as co-owners of the patented work:

- a. no patent granted shall in any way limit, or be used by CONTRACTOR or Subcontractor to limit or bar the TWDB's rights hereunder to access and receive in useable form and format, and right to use, any and all technical or other data or information developed in or resulting from performance pursuant to this CONTRACT or the use of funds provided hereunder; and
 - b. the TWDB (and, if applicable, the CONTRACTOR) shall have No Compensation Obligation to any other co-owners or licensees of any such patented work, unless otherwise expressly agreed in writing.
8. CONTRACTOR shall include terms and conditions in all contracts or other engagement agreements with any Subcontractors as are necessary to secure these rights and protections for the TWDB; and shall require that their Subcontractors include similar such terms and conditions in any contracts or other engagements with their Subcontractors. For the purposes of this section, "Subcontractors" includes independent contractors (including consultants) and also employees working outside the course and scope of employment.
9. Any work products subject to a TWDB copyright or joint copyright and produced or developed by the CONTRACTOR or their Subcontractor pursuant to this CONTRACT or using any funding provided by the TWDB may be reproduced in any media, forms or formats by the TWDB or CONTRACTOR at their own cost, and be disseminated in any medium, format or form by any party at its sole cost and in its sole discretion. CONTRACTOR may utilize such work products as they may deem appropriate, including Dissemination of such work products or parts thereof under their own name, provided that any TWDB copyright is noted on the materials.
10. The CONTRACTOR agrees to acknowledge the TWDB in any news releases or other publications relating to the work performed under this CONTRACT.

ARTICLE VI. AMENDMENT, TERMINATION, AND STOP ORDERS

1. This CONTRACT may be altered or amended by mutual written consent or terminated by the EXECUTIVE ADMINISTRATOR at any time by written notice to the CONTRACTOR. Upon receipt of such termination notice, the CONTRACTOR shall, unless the notice directs otherwise, immediately discontinue all work in connection with the performance of this CONTRACT and shall proceed to cancel promptly all existing orders insofar as such orders are chargeable to this CONTRACT. The CONTRACTOR shall submit a statement showing in detail the work performed under this CONTRACT to the date of termination. The TWDB shall then pay the CONTRACTOR promptly that proportion of the prescribed fee, which applies to the work, actually performed under this CONTRACT, less all payments that have been previously made. Thereupon, copies of all work accomplished under this CONTRACT shall be delivered to the TWDB.
2. The EXECUTIVE ADMINISTRATOR may issue a Stop Work Order to the

CONTRACTOR at any time. Upon receipt of such order, the CONTRACTOR shall discontinue all work under this CONTRACT and cancel all orders pursuant to this CONTRACT, unless the order directs otherwise. If the EXECUTIVE ADMINISTRATOR does not issue a Restart Order within 60 days after receipt by the CONTRACTOR of the Stop Work Order, the CONTRACTOR shall regard this CONTRACT terminated in accordance with the foregoing provisions.

ARTICLE VII. SUBCONTRACTS

Each Subcontract entered into to perform required work under this CONTRACT shall contain the following provisions:

- a. a detailed budget estimate with specific cost details for each task or specific item of work to be performed by the Subcontractor and for each category of reimbursable expenses;
- b. a clause stating that the Subcontract is subject to audit by the Texas State Auditor's Office and requiring the Subcontractor to cooperate with any request for information from the Texas State Auditor, as further described in Article X, Section 1, Paragraph D hereof;
- c. a clause stating that payments under the Subcontract are contingent upon the appropriation of funds by the Texas Legislature, as further described in Article X, Section 1, Paragraph A hereof;
- d. a clause stating that ownership of data, materials and work papers, in any media, that is gathered, compiled, adapted for use, or generated by the Subcontractor or the CONTRACTOR shall become data, materials and work owned by the TWDB and that Subcontractor shall have no proprietary rights in such data, materials and work papers, except as further described in Article V hereof;
- e. a clause stating that Subcontractor shall keep timely and accurate books and records of accounts according to Generally Accepted Accounting Principles as further described in Article X, Section 2, Paragraph H;
- f. a clause stating that Subcontractor is solely responsible for securing all required licenses and permits from local, state and federal governmental entities and that Subcontractor is solely responsible for obtaining sufficient insurance in accordance with the general standards and practices of the industry or governmental entity; and
- g. a clause stating that Subcontractor is an independent contractor and that the TWDB shall have no liability resulting from any failure of Subcontractor that results in breach of CONTRACT, property damage, personal injury or death.

ARTICLE VIII. LICENSES, PERMIT, AND INSURANCE

1. For the purpose of this CONTRACT, the CONTRACTOR will be considered an independent contractor and therefore solely responsible for liability resulting from negligent acts or omissions. The CONTRACTOR shall obtain all necessary insurance, in the judgment of the CONTRACTOR, to protect themselves, the TWDB, and employees and officials of the TWDB from liability arising out of this CONTRACT.
2. The CONTRACTOR shall be solely and entirely responsible for procuring all appropriate licenses and permits, which may be required by any competent authority for the CONTRACTOR to perform the subject work.
3. Indemnification. The CONTRACTOR shall indemnify and hold the TWDB and the State of Texas harmless, to the extent the CONTRACTOR may do so in accordance with state law, from any and all losses, damages, liability, or claims therefore, on account of personal injury, death, or property damage of any nature whatsoever caused by the CONTRACTOR, arising out of the activities and work conducted pursuant to this CONTRACT. The CONTRACTOR is solely responsible for liability arising out of its negligent acts or omissions during the performance of this CONTRACT.

ARTICLE IX. SEVERANCE PROVISIONS

Should any one or more provisions of this CONTRACT be held to be null, void, voidable, or for any reason whatsoever, of no force and effect, such provision(s) shall be construed as severable from the remainder of this CONTRACT and shall not affect the validity of all other provisions of this CONTRACT which shall remain of full force and effect.

ARTICLE X. GENERAL TERMS AND CONDITIONS

1. GENERAL TERMS.
 - a. No Debt Against the State. This CONTRACT does not create any debt by or on behalf of the State of Texas and the TWDB. The TWDB's obligations under this CONTRACT are contingent upon the availability of appropriated funds and the continued legal authority of the TWDB to enter into this CONTRACT.
 - b. Independent Contractor. Both parties hereto, in the performance of this contract, shall act in an individual capacity and not as agents, employees, partners, joint ventures or associates of one another. The employees or agents of one party shall not be deemed or construed to be the employees or agents of the other party for any purposes whatsoever.
 - c. Procurement Laws. The CONTRACTOR shall comply with applicable State of Texas procurement laws, rules and policies, including but not limited to competitive bidding and the Professional Services Procurement Act, Government Code, Chapter 2254, relating to contracting with persons whose services are within the scope of practice of: accountants, architects, landscape architects, land surveyors, medical doctors, optometrists, professional

engineers, real estate appraisers, professional nurses, and certified public accountants.

- d. Right to Audit. The CONTRACTOR and its Subcontractors shall maintain all financial accounting documents and records, including copies of all invoices and receipts for expenditures, relating to the work under this CONTRACT. CONTRACTOR shall make such documents and records available for examination and audit by the EXECUTIVE ADMINISTRATOR or any other authorized entity of the State of Texas. CONTRACTOR'S financial accounting documents and records shall be kept and maintained in accordance with Generally Accepted Accounting Principles. By executing this CONTRACT, the CONTRACTOR accepts the authority of the Texas State Auditor's Office to conduct audits and investigations in connection with all state funds received pursuant to this CONTRACT. The CONTRACTOR shall comply with directives from the Texas State Auditor and shall cooperate in any such investigation or audit. The CONTRACTOR agrees to provide the Texas State Auditor with access to any information the Texas State Auditor considers relevant to the investigation or audit. The CONTRACTOR also agrees to include a provision in any Subcontract related to this CONTRACT that requires the Subcontractor to submit to audits and investigation by the State Auditor's Office in connection with all state funds received pursuant to the Subcontract.

- e. Force Majeure. Unless otherwise provided, neither CONTRACTOR nor the TWDB nor any agency of the State of Texas, shall be liable to the other for any delay in, or failure of performance, of a requirement contained in this CONTRACT caused by force majeure. The existence of such causes of delay or failure shall extend the period of performance until after the causes of delay or failure have been removed provided the non-performing party exercises all reasonable due diligence to perform. Force majeure is defined as acts of God, war, strike, fires, explosions, or other causes that are beyond the reasonable control of either party and that by exercise of due foresight such party could not reasonably have been expected to avoid, and which, by the exercise of all reasonable due diligence, such party is unable to overcome. Each party must inform the other in writing with proof of receipt within two (2) business days of the existence of such force majeure or otherwise waive this right as a defense.

2. STANDARDS OF PERFORMANCE.

- a. Personnel. CONTRACTOR shall assign only qualified personnel to perform the services required under this CONTRACT. CONTRACTOR shall be responsible for ensuring that any Subcontractor utilized shall also assign only qualified personnel. Qualified personnel are persons who are properly licensed to perform the work and who have sufficient knowledge, skills and ability to perform the tasks and services required herein according to the standards of performance and care for their trade or profession.

- b. Professional Standards. CONTRACTOR shall provide the services and deliverables in accordance with applicable professional standards. CONTRACTOR represents and warrants that he is authorized to acquire Subcontractors with the requisite qualifications, experience, personnel and other resources to perform in the manner required by this CONTRACT.
- c. Antitrust. CONTRACTOR represents and warrants that neither CONTRACTOR nor any firm, corporation, partnership, or institution represented by CONTRACTOR, or anyone acting for such firm, corporation, partnership, or institution has (1) violated the antitrust laws of the State of Texas under the Texas Business & Commerce Code, Chapter 15, of the federal antitrust laws; or (2) communicated directly or indirectly the proposal resulting in this CONTRACT to any competitor or other person engaged in such line of business during the procurement process for this CONTRACT.
- d. Conflict of Interest. CONTRACTOR represents and warrants that CONTRACTOR has no actual or potential conflicts of interest in providing the deliverables required by this CONTRACT to the State of Texas and the TWDB. CONTRACTOR represents that the provision of services under this CONTRACT will not create an appearance of impropriety. CONTRACTOR also represents and warrants that, during the term of this CONTRACT, CONTRACTOR will immediately notify the TWDB, in writing, of any potential conflict of interest that could adversely affect the TWDB by creating the appearance of a conflict of interest. CONTRACTOR represents and warrants that neither CONTRACTOR nor any person or entity that will participate financially in this CONTRACT has received compensation from the TWDB or any agency of the State of Texas for participation in the preparation of specifications for this CONTRACT. CONTRACTOR represents and warrants that he has not given, offered to give, and does not intend to give at any time hereafter, any economic opportunity, future employment, gift, loan, gratuity, special discount, trip, favor or service to any public servant in connection with this CONTRACT.
- e. Interested Parties. All non-governmental CONTRACTORS are required to submit a Certificate of Interested Parties at the time the signed contract is submitted to the TWDB. The Certificate of Interested Parties (Form 1295) is a sworn statement by the contracting business entity and must be submitted even if there is no interested party in the transaction. The Form 1295 and instructions for completing and submitting the form are available at: <https://www.ethics.state.tx.us/tec/1295-Info.htm>. The TWDB is prohibited from executing a contract unless the contracting business entity submits a completed Form 1295.
- f. Proprietary and Confidential Information. CONTRACTOR warrants and represents that any information that is proprietary or confidential, and is received by CONTRACTOR from the TWDB or any governmental entity, shall not be disclosed to third parties without the written consent of the TWDB or

applicable governmental entity, whose consent shall not be unreasonably withheld.

- g. Public Information Act. CONTRACTOR acknowledges and agrees that all documents, in any media, generated in the performance of work conducted under this CONTRACT are subject to public disclosure under the Public Information Act, Government Code, Chapter 552. CONTRACTOR shall produce all documents upon request of the TWDB within two (2) business days when the documents are required to comply with a request for information under the Public Information Act.
- h. Accurate and Timely Record Keeping. CONTRACTOR warrants and represents that he will keep timely, accurate and honest books and records relating to the work performed and the payments received under this CONTRACT according to Generally Accepted Accounting Principles. Further, CONTRACTOR agrees that he will create such books and records at or about the time the transaction reflected in the books and records occurs.
- i. Dispute Resolution. The CONTRACTOR and the TWDB agree to make a good faith effort to resolve any dispute relating to the work required under this CONTRACT through negotiation and mediation as provided by Government Code, Chapter 2260 relating to resolution of certain contract claims against the state. The CONTRACTOR and the TWDB further agree that they shall attempt to use any method of alternative dispute resolution mutually agreed upon to resolve any dispute arising under this CONTRACT if this CONTRACT is not subject to Chapter 2260.
- j. Contract Administration. The TWDB shall designate a project manager for this CONTRACT. The project manager will serve as the point of contact between the TWDB and CONTRACTOR. The TWDB's project manager shall supervise the TWDB's review of CONTRACTOR's technical work, deliverables, draft reports, the final report, payment requests, schedules, financial and budget administration, and similar matters. The project manager does not have any express or implied authority to vary the terms of the CONTRACT, amend the CONTRACT in any way or waive strict performance of the terms or conditions of the CONTRACT.

ARTICLE XI. CORRESPONDENCE

All correspondence between the parties shall be made to the following addresses:

For the **TWDB:**

Contract Issues:

Texas Water Development Board
Attention: Contract Administration
P.O. Box 13231
Austin, Texas 78711-3231
Email: contracts@twdb.texas.gov

Payment Request Submission: Texas Water
Development Board Attention: Accounts
Payable
P.O. Box 13231
Austin, Texas 78711-3231
Email: invoice@twdb.texas.gov

Physical Address:

Stephen F. Austin State Office Building
1700 N. Congress Avenue
Austin, Texas 78701

For the **CONTRACTOR:**

Contract Issues:

Kennedy Resource Company
Kirk Kennedy
1443 CR 204
Burnet, Texas 78611
Email: kkennedy@kennedyresource.com

Payment Request Submission:

Kennedy Resource Company
Kirk Kennedy
1443 CR 204
Burnet, Texas 78611
Email: kkennedy@kennedyresource.com

Physical Address:

1443 CR 204
Burnet, Texas 78611

IN WITNESS WHEREOF, the parties have caused this CONTRACT to be duly executed in multiple originals.

TEXAS WATER DEVELOPMENT BOARD

KENNEDY RESOURCE COMPANY

Carla G. Mace for
Robert E. Mace, Ph.D. P.G.
Deputy Executive Administrator

Kirk Kennedy
Kirk Kennedy
Owner

Date: 16 Sept 2016

Date: 9/16/16

EXHIBIT A

ORIGINAL GRANT APPLICATION

Texas Water Development Board



P.O. Box 13231, 1700 N. Congress Ave.
Austin, TX 78711-3231, www.twdb.texas.gov
Phone (512) 463-7847, Fax (512) 475-2053

Addendum to RFQ No. 580-16-RFQ0013 EVALUATION OF RAINFALL-RUNOFF TRENDS IN THE UPPER COLORADO RIVER BASIN

RFP NO:	580-16-RFQ0013	ADDENDUM NO. :	1
Deadline for Submission for RFQ:	3:00 PM, Monday, April 4, 2016		
Contact: Tina Newstrom	Phone: 512-463-7979 Email: angela.wallace@twdb.texas.gov		

PURPOSE OF ADDENDUM

Please change the following:

On cover page listed as **RESPONSES DUE** and also under **SECTION IV, 4.4 SCHEDULE OF EVENTS, EVENT DATE: Deadline for Submission:** Change due date from April 4, 2016, to **Tuesday, April 12, 2016.**

End of Addendum No. 1

IN THE SUBMISSION OF RFQ, RESPONDENT SHOULD ACKNOWLEDGE RECEIPT OF THIS ADDENDUM; OTHERWISE THE SUBMISSION MAY NOT BE GIVEN CONSIDERATION. RESPONDENT MAY ACKNOWLEDGE RECEIPT BY RETURNING A SIGNED COPY WITH THEIR SUBMISSION.

Kirk Kennedy

RESPONDENT NAME

Kirk Kennedy

AUTHORIZED SIGNATURE

<p>Our Mission</p> <p>To provide leadership, information, education, and support for planning, financial assistance, and outreach for the conservation and responsible development of water for Texas</p>	<p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p>	<p>Board Members</p> <p>Bech Bruun, Chairman Kathleen Jackson, Board Member Peter Lake, Board Member</p> <p>Kevin Patteson, Executive Administrator</p>
--	---	--



Kennedy Resource Company
Consulting in Water Resources

1443 CR 204
Burnet, TX 78611
(512) 589-5109
kkennedy@kennedyresource.com

Texas Water Development Board
Contracting and Purchasing
P.O. Box 13231
Austin, TX 78711-3231

April 11, 2016

SUBJECT:

Response to RFQ 580-16-RFQ0013
Evaluation of Rainfall-Runoff Trends in the Upper Colorado River Basin

Dear Sirs,

Attached is Kennedy Resource Company's (KRC) response to the Texas Water Development Board's RFQ 580-16-RFQ0013 Evaluation of Rainfall-Runoff Trends in the Upper Colorado River Basin. KRC is confident that we have assembled a small team of uniquely qualified individuals that have the specific expertise, as well as many years of experience, performing the type of services the RFQ is seeking.

Please feel free to call or contact me if you have any questions.

Sincerely

Kirk Kennedy
Kennedy Resource Company
1443 C.R. 204
Burnet, TX 78611
(512) 589-5109



Kennedy Resource Company
Consulting in Water Resources

1443 CR 204
Burnet, TX 78611
(512) 589-5109
kkennedy@kennedyresource.com

STATEMENT OF QUALIFICATIONS

IN RESPONSE TO TEXAS WATER DEVELOPMENT BOARD

REQUEST FOR QUALIFICATIONS NO. 580-16-RFQ0013

EVALUATION OF RAINFALL-RUNOFF TRENDS IN THE UPPER COLORADO RIVER BASIN

00004273
RFQ 580-16-RFQ0013

2016 APR 11 PM 2:15

Kennedy Resource Company
April 11, 2016

**KRC RESPONSE TO REQUEST FOR QUALIFICATIONS NO. 580-16-RFQ0013
EVALUATION OF RAINFALL-RUNOFF TRENDS IN THE UPPER COLORADO RIVER BASIN**

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**KRC RESPONSE TO REQUEST FOR QUALIFICATIONS NO. 580-16-RFQ0013
EVALUATION OF RAINFALL-RUNOFF TRENDS IN THE UPPER COLORADO RIVER BASIN**

SUMMARY

Overview of KRC and Team Member Participation

Kennedy Resource Company is a small independent firm, solely owned and operated by Kirk Kennedy that specializes in surface water right analysis. Mr. Kennedy has been involved in Texas' surface water rights for 27 years, with experience ranging from Team Leader of the TCEQ's (formerly known as TNRCC) Surface Water Rights Availability Team to Senior Scientist for R. J. Brandes Company. While with the TCEQ, Mr. Kennedy determined water availability for water right applications, represented Texas in River Compact issues with other states, testified as an expert witness for the TCEQ, determined impacts of environmental flow recommendations on proposed water right applications, and developed much of the process and guidance used by the TCEQ to bring about the construction of most of the water availability models (WAMs) under Senate Bill 1 (75th Legislature). After leaving the TCEQ, Mr. Kennedy has analyzed water projects using every WAM model in the state and was deeply involved with the construction of the Colorado, Rio Grande, and Nueces/Rio Grande Coastal WAM models as well as in the development of the naturalized flows that are used as inputs to these models and other WAM models. Over the past several years, Mr. Kennedy has been involved in the formulation and application of the state's Senate Bill 3 process (80th Legislature) in roles ranging from assisting the Science Advisory Committee's (SAC) efforts to provide guidance on the interpretation and model representation of many aspects of SB3, participating as a member of the Colorado Lavaca Basin Bay Expert Science Team (BBEST), and determining impacts of future eflow recommendations on possible new water supply projects for the Guadalupe and Colorado Basin Bay and Stakeholder Committees (BBASC). Mr. Kennedy has many years of experience working with USGS streamflow data, precipitation data from numerous sources, and the naturalized flows used as inflows to the TCEQ's WAM models all of which provide a solid background to assemble and analyze the information necessary to understand the issues the RFQ raises.

Dr. Robert J. Brandes has been a consultant in the field of Texas surface water rights for over 40 years. Since 1984, he has owned and operated a consulting firm specializing in surface water analyses and modeling throughout the State of Texas, and he has worked for many of the state agencies, as well for numerous river authorities, water districts, municipalities and industries. One of his company's primary accomplishments was the development of the water availability models for several of the large river basins in Texas, one of which was the Colorado. As part of this effort, Dr. Brandes supervised a team of experts that assembled an extensive set of observed historical data pertaining to hydrology, climate, reservoir storage, surface water use and return flows, and then used these data to calculate naturalized flows for all of the streamflow gaging locations used in the TCEQ's Colorado WAM. In addition, Dr. Brandes interpreted many of the complicated water right and contractual relationships authorized in the Colorado River Basin and was instrumental in the creation of the WRAP input files that simulate all water rights' authorized parameters in the TCEQ's current and past WAMs. Both of these efforts involved a deep understanding of the streamflow, springflow, reservoir operations, and water rights in the Upper Colorado River Basin, the subject area of the RFQ.

**KRC RESPONSE TO REQUEST FOR QUALIFICATIONS NO. 580-16-RFQ0013
EVALUATION OF RAINFALL-RUNOFF TRENDS IN THE UPPER COLORADO RIVER BASIN**

Mr. Steve Stecher is the owner and operator of Crespo Consulting, a small firm specializing in hydrology related issues affecting municipalities, river authorities and industries. In the early 2000's, Mr Stecher and his firm were part of the team that developed the naturalized flows in the Colorado River Basin, and were specifically assigned the Concho River watershed, a watershed that encompasses much of the area of interest in the subject RFQ. Mr. Stecher and his firm's participation in the naturalized flow efforts involved assembling observed gaged flow data from USGS records, precipitation records from numerous sources, and reported surface water use from the TCEQ. In many areas in the RFQ's subject area, Mr. Stecher used this historical information to quantify the effects of water rights and major reservoirs so that naturalized streamflows could be estimated for many sites in the upper Colorado watershed that had limited or questionable observed data.

Kevin Bone has been employed by Crespo Consulting for 2 years and has in depth knowledge of all of the latest ESRI GIS software available and has used these tools to provide assistance in understanding the interrelationship of hydrologic factors with changes due to man's activities. Recently, Mr. Bone used ArcInfo to create depth contours based on GPS derived depth soundings for a small reservoir in the Brazos Basin, with the process culminating in a practical elevation, area, and capacity table the reservoir owner can use to determine the amount water in storage based on observed elevation.

KRC plans to use the above described team members in the following capacities to accomplish the study of the Evaluation of Rainfall/Runoff Trends in the Upper Colorado River Basin and can accomplish the goals of the study within the specified deadlines:

KRC TEAM MEMBER FUNCTION, EXPERIENCE, AND CAPABILITY MATRIX						
TEAM MEMBER	FUNCTION IN PROJECT	# YEARS EXPERIENCE WITH TEXAS WATER HYDROLOGY, MODELS, DATA, ANALYSIS	EXPERIENCE COMMUNICATING AND PRESENTING COMPLEX RESULTS	DEVELOPED TCEQ NATURALIZED FLOWS FOR AREA OF INTEREST	EXPERIENCE WITH STATISTICAL AND TREND ANALYSIS	GIS CAPABILITY
Kirk Kennedy	Principal Investigator	27	✓	✓	✓	✓
Bob Brandes	Senior advisor	40	✓	✓	✓	✓
Steve Stecher	Senior advisor	30	✓	✓	✓	✓
Kevin Bone	GIS Expert	2				✓

KRC RESPONSE TO REQUEST FOR QUALIFICATIONS NO. 580-16-RFQ0013
EVALUATION OF RAINFALL-RUNOFF TRENDS IN THE UPPER COLORADO RIVER BASIN

CONTENT 1
Signed and Dated Statement of Qualifications

Company Name: Kennedy Resource Company

Address: 1443 CR 204
Burnet, TX 78611

Phone Number: (512) 589-5109

E-Mail: kkennedy@kennedyresource.com

I, Kirk Kennedy, am the above-referenced company's representative and I am authorized to submit this response and sign future contract documents. By signing below, the representative certifies that if a Texas address is shown as the address, the respondent qualifies as a Texas Bidder as defined in 34 TAC Rule 20.32(68).


Authorized Signature

4/11/2016
Date

OWNER
Title:

CONTENT 2
Company Profile Summary and History

- (a) Name, address, phone number, legal status

Kennedy Resource Company
1443 CR 204
Burnet, Texas 78611
(512) 589-5109
Sole Proprietor

- (b) Name of Person Submitting Proposal and Authority to Bind Company

Kirk Kennedy
Owner of Kennedy Resource Company

- (c) Name, phone number, and email address of contact person for any questions on the proposal.

Kirk Kennedy
(512) 589-5109
kkennedy@kennedyresource.com

- (d) General nature of previous work, number of years in business, size and scope of operation

Kirk Kennedy is the owner of Kennedy Resource Company and has been independently operating the business for 8 years. Mr. Kennedy has been involved with Texas surface water issues for 27 years, beginning his career performing surface water analysis and modeling for predecessor agencies of the TCEQ (Texas Water Commission and Texas Natural Resource Conservation Commission) and later as a consultant working for R.J. Brandes Company, TRC, and Atkins Global analyzing surface water related issues related to WAM modeling, water rights permit applications and amendments, streamflow analysis, firm yield analysis, and water management plan development for river authorities, water districts, state agencies, municipalities, industries, and other organizations.

**KRC RESPONSE TO REQUEST FOR QUALIFICATIONS NO. 580-16-RFQ0013
EVALUATION OF RAINFALL-RUNOFF TRENDS IN THE UPPER COLORADO RIVER BASIN**

**CONTENT 3
Resumes of Team Members**

For Resumes of the KRC team members (Kirk Kennedy, Robert Brandes, Steve Stecher and Kevin Bone), see Attachment 1 at the end of this submittal.

**KRC RESPONSE TO REQUEST FOR QUALIFICATIONS NO. 580-16-RFQ0013
EVALUATION OF RAINFALL-RUNOFF TRENDS IN THE UPPER COLORADO RIVER BASIN**

CONTENT 4

Historically Underutilized Business Subcontracting Plan

Pursuant to Texas Gov't Code §2161.252 and Texas Administrative Code §20.14, KRC understands that a Historically Underutilized Business Subcontracting Plan is not required for contracts that envision an expenditure of less than \$100,000.00. Since the cost of the services for this RFQ has been estimated to be \$20,000.00, KRC believes this requirement is not applicable.



HUB Subcontracting Plan (HSP)

QUICK CHECKLIST

While this HSP Quick Checklist is being provided to merely assist you in readily identifying the sections of the HSP form that you will need to complete, it is very important that you adhere to the instructions in the HSP form and instructions provided by the contracting agency.

- If you will be awarding **all** of the subcontracting work you have to offer under the contract to **only** Texas certified HUB vendors, complete:
 - Section 1 - Respondent and Requisition Information
 - Section 2 a. - Yes, I will be subcontracting portions of the contract.
 - Section 2 b. - List all the portions of work you will subcontract, and indicate the percentage of the contract you expect to award to Texas certified HUB vendors.
 - Section 2 c. - Yes
 - Section 4 - Affirmation
 - GFE Method A (Attachment A) - Complete an Attachment A for each of the subcontracting opportunities you listed in Section 2 b.
- If you will be subcontracting any portion of the contract to Texas certified HUB vendors and Non-HUB vendors, and the aggregate percentage of all the subcontracting work you will be awarding to the Texas certified HUB vendors with which you **do not** have a **continuous contract** in place for more than five (5) years **meets or exceeds** the HUB Goal the contracting agency identified in the "Agency Special Instructions/Additional Requirements", complete:
 - Section 1 - Respondent and Requisition Information
 - Section 2 a. - Yes, I will be subcontracting portions of the contract.
 - Section 2 b. - List all the portions of work you will subcontract, and indicate the percentage of the contract you expect to award to Texas certified HUB vendors and Non-HUB vendors.
 - Section 2 c. - No
 - Section 2 d. - Yes
 - Section 4 - Affirmation
 - GFE Method A (Attachment A) - Complete an Attachment A for each of the subcontracting opportunities you listed in Section 2 b.
- If you will be subcontracting any portion of the contract to Texas certified HUB vendors and Non-HUB vendors or only to Non-HUB vendors, and the aggregate percentage of all the subcontracting work you will be awarding to the Texas certified HUB vendors with which you **do not** have a **continuous contract** in place for more than five (5) years **does not meet or exceed** the HUB Goal the contracting agency identified in the "Agency Special Instructions/Additional Requirements", complete:
 - Section 1 - Respondent and Requisition Information
 - Section 2 a. - Yes, I will be subcontracting portions of the contract.
 - Section 2 b. - List all the portions of work you will subcontract, and indicate the percentage of the contract you expect to award to Texas certified HUB vendors and Non-HUB vendors.
 - Section 2 c. - No
 - Section 2 d. - No
 - Section 4 - Affirmation
 - GFE Method B (Attachment B) - Complete an Attachment B for each of the subcontracting opportunities you listed in Section 2 b.
- If you will not be subcontracting any portion of the contract and will be fulfilling the entire contract with your own resources (i.e., employees, supplies, materials and/or equipment, including transportation and delivery), complete:
 - Section 1 - Respondent and Requisition Information
 - Section 2 a. - No, I will not be subcontracting any portion of the contract, and I will be fulfilling the entire contract with my own resources.
 - Section 3 - Self Performing Justification
 - Section 4 - Affirmation

***Continuous Contract:** Any existing written agreement (including any renewals that are exercised) between a prime contractor and a HUB vendor, where the HUB vendor provides the prime contractor with goods or service, to include transportation and delivery under the same contract for a specified period of time. The frequency the HUB vendor is utilized or paid during the term of the contract is not relevant to whether the contract is considered continuous. Two or more contracts that run concurrently or overlap one another for different periods of time are considered by CPA to be individual contracts rather than renewals or extensions to the original contract. In such situations the prime contractor and HUB vendor are entering (have entered) into "new" contracts.

Enter your company's name here: Kirk Kennedy Requisition #: 580-16-RFQ0013

SECTION-2: RESPONDENT'S SUBCONTRACTING INTENTIONS

After dividing the contract work into reasonable lots or portions to the extent consistent with prudent industry practices, and taking into consideration the scope of work to be performed under the proposed contract, including all potential subcontracting opportunities, the respondent must determine what portions of work, **including contracted staffing, goods, services, transportation and delivery will be subcontracted**. Note: In accordance with 34 TAC §20.11, a "Subcontractor" means a person who contracts with a prime contractor to work, to supply commodities, or to contribute toward completing work for a governmental entity.

a. Check the appropriate box (Yes or No) that identifies your subcontracting intentions:

- *Yes*, I will be subcontracting portions of the contract. (If *Yes*, complete Item b of this SECTION and continue to Item c of this SECTION.)
- *No*, I will not be subcontracting any portion of the contract, and I will be fulfilling the entire contract with my own resources, including employees, goods, services, transportation and delivery. (If *No*, continue to SECTION 3 and SECTION 4.)

b. List all the portions of work (subcontracting opportunities) you will subcontract. Also, based on the total value of the contract, identify the percentages of the contract you expect to award to Texas certified HUBs, and the percentage of the contract you expect to award to vendors that are not a Texas certified HUB (i.e., Non-HUB).

Item #	Description of Subcontracting Opportunity	Percentage of the contract		Percentage of the contract
		expected to be subcontracted to HUBs with which you <u>do not</u> have a <u>continuous contract</u> * in place for <u>more than five (5) years</u> .	expected to be subcontracted to HUBs with which you have a <u>continuous contract</u> * in place for <u>more than five (5) years</u> .	
1	GIS work	5 %	%	%
2		%	%	%
3		%	%	%
4		%	%	%
5		%	%	%
6		%	%	%
7		%	%	%
8		%	%	%
9		%	%	%
10		%	%	%
11		%	%	%
12		%	%	%
13		%	%	%
14		%	%	%
15		%	%	%
		%	%	%

(Note: If you have more than fifteen subcontracting opportunities, a continuation sheet is available online at <http://window.state.tx.us/procurement/prog/hub/hub-subcontracting-plan/>.)

c. Check the appropriate box (Yes or No) that indicates whether you will be using **only** Texas certified HUBs to perform **all** of the subcontracting opportunities you listed in SECTION 2, Item b.

- *No* (If *No*, continue to SECTION 4 and complete an "HSP Good Faith Effort - Method A (Attachment A)" for **each** of the subcontracting opportunities you listed.)
- *Yes* (If *Yes*, continue to Item d, of this SECTION.)

d. Check the appropriate box (Yes or No) that indicates whether the aggregate expected percentage of the contract you will subcontract **with Texas certified HUBs** with which you **do not** have a **continuous contract*** in place with for **more than five (5) years**, **meets or exceeds** the HUB goal the contracting agency identified on page 1 in the "Agency Special Instructions/Additional Requirements."

- *No* (If *No*, continue to SECTION 4 and complete an "HSP Good Faith Effort - Method A (Attachment A)" for **each** of the subcontracting opportunities you listed.)
- *Yes* (If *Yes*, continue to SECTION 4 and complete an "HSP Good Faith Effort - Method B (Attachment B)" for **each** of the subcontracting opportunities you listed.)

***Continuous Contract:** Any existing written agreement (including any renewals that are exercised) between a prime contractor and a HUB vendor, where the HUB vendor provides the prime contractor with goods or service, to include transportation and delivery under the same contract for a specified period of time. The frequency the HUB vendor is utilized or paid during the term of the contract is not relevant to whether the contract is considered continuous. Two or more contracts that run concurrently or overlap one another for different periods of time are considered by CPA to be individual contracts rather than renewals or extensions to the original contract. In such situations the prime contractor and HUB vendor are entering (have entered) into "new" contracts.

Enter your company's name here: Kirk Kennedy Requisition #: 580-16-RFQ0013

RESPONDENT'S SUBCONTRACTING INTENTIONS

This page can be used as a continuation sheet to the HSP Form's page 2, Section 2, Item b. Continue listing the portions of work (subcontracting opportunities) you will subcontract. Also, based on the total value of the contract, identify the percentages of the contract you expect to award to Texas certified HUBs, and the percentage of the contract you expect to award to vendors that are not a Texas certified HUB (i.e., Non-HUB).

Line Item	Description of Work	Percentage of the contract		Percentage of the contract
		expected to be subcontracted to HUBs with which you do not have a continuous contract* in place for more than five (5) years.	expected to be subcontracted to HUBs with which you have a continuous contract* in place for more than five (5) years.	expected to be subcontracted to non-HUBs.
16		%	%	%
17		%	%	%
18		%	%	%
19		%	%	%
20		%	%	%
21		%	%	%
22		%	%	%
23		%	%	%
24		%	%	%
25		%	%	%
26		%	%	%
27		%	%	%
28		%	%	%
29		%	%	%
30		%	%	%
31		%	%	%
32		%	%	%
33		%	%	%
34		%	%	%
35		%	%	%
36		%	%	%
37		%	%	%
38		%	%	%
39		%	%	%
40		%	%	%
41		%	%	%
42		%	%	%
43		%	%	%
Total		%	%	%

***Continuous Contract:** Any existing written agreement (including any renewals that are exercised) between a prime contractor and a HUB vendor, where the HUB vendor provides the prime contractor with goods or service, to include transportation and delivery under the same contract for a specified period of time. The frequency the HUB vendor is utilized or paid during the term of the contract is not relevant to whether the contract is considered continuous. Two or more contracts that run concurrently or overlap one another for different periods of time are considered by CPA to be individual contracts rather than renewals or extensions to the original contract. In such situations the prime contractor and HUB vendor are entering (have entered) into "new" contracts.

Enter your company's name here: Kirk Kennedy Requisition #: 580-16-RFQ0013

SELF PERFORMING JUSTIFICATION (If you responded "No" to SECTION 2, Item a, you must complete this SECTION and continue to SECTION 4.)

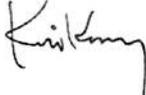
If you responded "No" to SECTION 2, Item a, in the space provided below explain how your company will perform the entire contract with its own employees, supplies, materials and/or equipment, to include transportation and delivery.

[Empty space for justification text]

AFFIRMATION

As evidenced by my signature below, I affirm that I am an authorized representative of the respondent listed in SECTION 1, and that the information and supporting documentation submitted with the HSP is true and correct. Respondent understands and agrees that, if awarded any portion of the requisition:

- The respondent will provide notice as soon as practical to all the subcontractors (HUBs and Non-HUBs) of their selection as a subcontractor for the awarded contract. The notice must specify at a minimum the contracting agency's name and its point of contact for the contract, the contract award number, the subcontracting opportunity they (the subcontractor) will perform, the approximate dollar value of the subcontracting opportunity and the expected percentage of the total contract that the subcontracting opportunity represents. A copy of the notice required by this section must also be provided to the contracting agency's point of contact for the contract no later than ten (10) working days after the contract is awarded.
- The respondent must submit monthly compliance reports (Prime Contractor Progress Assessment Report – PAR) to the contracting agency, verifying its compliance with the HSP, including the use of and expenditures made to its subcontractors (HUBs and Non-HUBs). (The PAR is available at <http://www.window.state.tx.us/procurement/prog/hub/hub-forms/progressassessmentrpt.xls>).
- The respondent must seek approval from the contracting agency prior to making any modifications to its HSP, including the hiring of additional or different subcontractors and the termination of a subcontractor the respondent identified in its HSP. If the HSP is modified without the contracting agency's prior approval, respondent may be subject to any and all enforcement remedies available under the contract or otherwise available by law, up to and including debarment from all state contracting.
- The respondent must, upon request, allow the contracting agency to perform on-site reviews of the company's headquarters and/or work-site where services are being performed and must provide documentation regarding staffing and other resources.


Kirk Kennedy Owner 05/05/2016
 Printed Name Title Date

Reminaer:

- If you responded "Yes" to SECTION 2, Items c or d, you must complete an "HSP Good Faith Effort - Method A (Attachment A)" for each of the subcontracting opportunities you listed in SECTION 2, Item b.
- If you responded "No" to SECTION 2, Item a, you must complete an "HSP Good Faith Effort - Method B (Attachment B)" for each of the subcontracting opportunities you listed in SECTION 2, Item b.



Enter your company's name here: <u>Kirk Kennedy</u>	Requisition #: <u>580-16-RFQ0013</u>
---	--------------------------------------

IMPORTANT: If you responded "No" to SECTION 2, Items c and d of the completed HSP form, you must submit a completed "HSP Good Faith Effort - Method B (Attachment B)" for each of the subcontracting opportunities you listed in SECTION 2, Item b of the completed HSP form. You may photo-copy this page or download the form at <http://window.state.tx.us/procurement/prog/hub/hub-forms/hub-sbcont-plan-gfe-achm-b.pdf>.

SUBCONTRACTING OPPORTUNITY

Enter the item number and description of the subcontracting opportunity you listed in SECTION 2, Item b, of the completed HSP form for which you are completing the attachment.

Item #: _____ Description: _____

MENTOR PROTÉGÉ PROGRAM

If respondent is participating as a Mentor in a State of Texas Mentor Protégé Program, submitting its Protégé (Protégé must be a State of Texas certified HUB) as a subcontractor to perform the subcontracting opportunity listed in SECTION B-1, constitutes a good faith effort to subcontract with a Texas certified HUB towards that specific portion of work.

Check the appropriate box (Yes or No) that indicates whether you will be subcontracting the portion of work you listed in SECTION B-1 to your Protégé.

- Yes (If Yes, continue to SECTION B-4.)

- No (If No, continue to SECTION B-3 and SECTION B-4.)

NOTIFICATION OF SUBCONTRACTING OPPORTUNITY

When completing this section you **MUST** comply with items 1, 2 and 3, thereby demonstrating your Good Faith Effort of having notified Texas certified HUBs and trade organizations or development centers about the subcontracting opportunity you listed in SECTION B-1. Your notice should include the scope of work, information regarding the location to review plans and specifications, bonding and insurance requirements, required qualifications, and identify a contact person. When sending notice of your subcontracting opportunity, you are encouraged to use the attached HUB Subcontracting Opportunity Notice form, which is also available online at <http://www.window.state.tx.us/procurement/prog/hub/hub-subcontracting-plan>.

Retain supporting documentation (i.e., certified letter, fax, e-mail) demonstrating evidence of your good faith effort to notify the Texas certified HUBs and trade organizations or development centers. Also, be mindful that a working day is considered a normal business day of a state agency, not including weekends, federal or state holidays, or days the agency is declared closed by its executive officer. The initial day the subcontracting opportunity notice is sent/provided to the HUBs and to the trade organizations or development centers is considered to be "day zero" and does not count as one of the seven (7) working days.

a. Provide written notification of the subcontracting opportunity you listed in SECTION B-1, to three (3) or more Texas certified HUBs. Unless the contracting agency specified a different time period, you must allow the HUBs at least seven (7) working days to respond to the notice prior to you submitting your bid response to the contracting agency. When searching for Texas certified HUBs and verifying their HUB status, ensure that you use the State of Texas' Centralized Master Bidders List (CMBL) - Historically Underutilized Business (HUB) Directory Search located at <http://mycpa.cpa.state.tx.us/tpasscmbsearch/index.jsp>. HUB status code "A" signifies that the company is a Texas certified HUB.

b. List the three (3) Texas certified HUBs you notified regarding the subcontracting opportunity you listed in SECTION B-1. Include the company's Texas Vendor Identification (VID) Number, the date you sent notice to that company, and indicate whether it was responsive or non-responsive to your subcontracting opportunity notice.

Company Name	Texas VID <small>(Do not enter Social Security Numbers.)</small>	Date Notice Sent <small>(mm/dd/yyyy)</small>	Did the HUB Respond?
			<input type="checkbox"/> - Yes <input type="checkbox"/> - No
			<input type="checkbox"/> - Yes <input type="checkbox"/> - No
			<input type="checkbox"/> - Yes <input type="checkbox"/> - No

c. Provide written notification of the subcontracting opportunity you listed in SECTION B-1 to two (2) or more trade organizations or development centers in Texas to assist in identifying potential HUBs by disseminating the subcontracting opportunity to their members/participants. Unless the contracting agency specified a different time period, you must provide your subcontracting opportunity notice to trade organizations or development centers at least seven (7) working days prior to submitting your bid response to the contracting agency. A list of trade organizations and development centers that have expressed an interest in receiving notices of subcontracting opportunities is available on the Statewide HUB Program's webpage at <http://www.window.state.tx.us/procurement/prog/hub/mwb-links-1/>.

d. List two (2) trade organizations or development centers you notified regarding the subcontracting opportunity you listed in SECTION B-1. Include the date when you sent notice to it and indicate if it accepted or rejected your notice.

Trade Organizations or Development Centers	Date Notice Sent <small>(mm/dd/yyyy)</small>	Was the Notice Accepted?
		<input type="checkbox"/> - Yes <input type="checkbox"/> - No
		<input type="checkbox"/> - Yes <input type="checkbox"/> - No

HSP Good Faith Effort - Method B (Attachment B) Cont.

Rev 09/15

Enter your company's name here: Kirk Kennedy

Requisition #: 580-16-RFQ0013

SECTION B-4: SUBCONTRACTOR SELECTION

Enter the item number and description of the subcontracting opportunity you listed in SECTION 2, Item b, of the completed HSP form for which you are completing the attachment.

a. Enter the item number and description of the subcontracting opportunity for which you are completing this Attachment B continuation page.

Item Number: 1 Description: GIS work.

b. List the subcontractor(s) you selected to perform the subcontracting opportunity you listed in SECTION B-1. Also identify whether they are a Texas certified HUB and their Texas Vendor Identification (VID) Number or federal Employer Identification Number (EIN), the approximate dollar value of the work to be subcontracted, and the expected percentage of work to be subcontracted. When searching for Texas certified HUBs and verifying their HUB status, ensure that you use the State of Texas' Centralized Master Bidders List (CMBL) - Historically Underutilized Business (HUB) Directory Search located at <http://mycpa.cpa.state.tx.us/toasscmbsearch/index.jsp>. HUB status code "A" signifies that the company is a Texas certified HUB.

Company Name	Texas certified HUB	Texas VID or federal EIN <small>Do not enter Social Security Numbers If you do not know the VID / EIN, leave this VID / EIN field blank.</small>	Approximate Dollar Amount	Expected Percentage of Contract
Crespo Consulting Services Inc	<input checked="" type="checkbox"/> - Yes <input type="checkbox"/> - No	019787	\$ 2000	1 %
	<input type="checkbox"/> - Yes <input type="checkbox"/> - No		\$	%
	<input type="checkbox"/> - Yes <input type="checkbox"/> - No		\$	%
	<input type="checkbox"/> - Yes <input type="checkbox"/> - No		\$	%
	<input type="checkbox"/> - Yes <input type="checkbox"/> - No		\$	%
	<input type="checkbox"/> - Yes <input type="checkbox"/> - No		\$	%
	<input type="checkbox"/> - Yes <input type="checkbox"/> - No		\$	%
	<input type="checkbox"/> - Yes <input type="checkbox"/> - No		\$	%
	<input type="checkbox"/> - Yes <input type="checkbox"/> - No		\$	%
	<input type="checkbox"/> - Yes <input type="checkbox"/> - No		\$	%

c. If any of the subcontractors you have selected to perform the subcontracting opportunity you listed in SECTION B-1 is **not** a Texas certified HUB, provide written justification for your selection process (attach additional page if necessary):

REMINDER: As specified in SECTION 4 of the completed HSP form, if you (respondent) are awarded any portion of the requisition, you are required to provide notice as soon as practical to all the subcontractors (HUBs and Non-HUBs) of their selection as a subcontractor. The notice must specify at a minimum the contracting agency's name and its point of contact for the contract, the contract award number, the subcontracting opportunity it (the subcontractor) will perform, the approximate dollar value of the subcontracting opportunity and the expected percentage of the total contract that the subcontracting opportunity represents. A copy of the notice required by this section must also be provided to the contracting agency's point of contact for the contract no later than ten (10) working days after the contract is awarded.

**KRC RESPONSE TO REQUEST FOR QUALIFICATIONS NO. 580-16-RFQ0013
EVALUATION OF RAINFALL-RUNOFF TRENDS IN THE UPPER COLORADO RIVER BASIN**

CONTENT 5

Name and Social Security Number of Owner

SSN# will be provided upon request.

**KRC RESPONSE TO REQUEST FOR QUALIFICATIONS NO. 580-16-RFQ0013
EVALUATION OF RAINFALL-RUNOFF TRENDS IN THE UPPER COLORADO RIVER BASIN**

**CONTENT 6
Proposed Technical Approach**

KRC proposes the following approach, divided into six tasks, to address the issues the RFQ seeks to understand.

TASK 1: Prepare Data Inventory of all Observed Hydrologic Information Available in the Study Area.

This work will include preparation of the following:

- (1) A list of all USGS gaging stations in the Colorado River Basin upstream of Lakes Buchanan and Travis with exact location, contributing drainage area, and available period of record noted.
- (2) A list of daily precipitation recording stations within and in the vicinity of the Colorado River Basin upstream of Lakes Buchanan and Travis, possibly including locations in the Brazos, Guadalupe, and Rio Grande Basins near the Colorado River Basin watershed boundary, with exact location and available period of record noted.
- (3) A timeline of major reservoir construction with the size of impoundment and date of first impoundment noted.
- (4) TCEQ naturalized flows for each of the locations identified in Item 1, as available.
- (5) A list of long term groundwater monitoring wells in the Colorado River Basin upstream of Lakes Buchanan and Travis with exact location and period of record noted.
- (6) A list of all major springs in the Colorado River Basin upstream of Lakes Buchanan and Travis with exact location of the spring head, receiving waters, period of record, and any available flow data noted.

Monthly observed streamflow, monthly naturalized flow, and monthly precipitation quantities will be tabulated for all locations that have reasonably long periods of available data. The unit area runoff (acre-feet per square mile per year) for monthly gaged streamflow and monthly naturalized flow will be calculated by decade for these locations, and a matrix will be prepared summarizing these results. A map also will be generated showing the locations of each of these observation sites that have useful available information. The results presented in the matrix will define the extent of the available observed data for purposes of the assessment described in Task 3 below.

TASK 2: Review Previous and Ongoing Relevant Investigations in the Study Area

Research will be conducted and an inventory will be prepared describing all documented previous and present efforts that address rainfall/streamflow relationships in the area of interest. In addition, an attempt will be made to research issues and information such as well records from TWDB and/or Groundwater Districts, phreatophyte infestation, NRCS and other reservoir construction, livestock and farm pond construction, rural electric meter installation specifically designated for wells, land use changes and land development data to the extent such information is available and can be reasonably obtained, and any other available data and information that is considered useful for the investigation. Representatives of large municipalities, river authorities, and water districts in the region will be contacted to get input on possible reasons for changes in

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rainfall verses streamflow relationships. Any pertinent information, such as ongoing soil moisture monitoring by NASA and LCRA, made available by such entities will be added to the data inventory list.

TASK 3 - Methodology for Identifying/Assessing Trends and Quantifying Relationship between Rainfall and Runoff

For all gaged streamflow sites identified above, a companion precipitation record will be selected or developed by weighting several nearby long term precipitation sites using standard procedures. Standard deviation between streamflow and precipitation quantities for common historical periods will be computed, and time series and cumulative graphs will be created by decade and for the entire period of record. Similar results will be developed for the naturalized flows for each subject site. Locations showing substantial deviations between streamflow and precipitation or obvious changes in historical rainfall patterns and trends will be analyzed further to see if such deviations can be understood and explained. For these sites, the date of first impoundment of each major reservoir(s) constructed in the watershed upstream of the site will be examined and adjustments for these impacts on the observed historical streamflows will be considered. Any other major water right activity that is known to have been operating in the watershed during the period of record will also be considered and possibly quantified using information from TCEQ's naturalized flows workbooks. Locations showing substantial changes in rainfall/streamflow trends over long time periods that are still unexplained will be identified as sites with valuable potential for further analysis. Such further analysis may include:

- (a) Daily analysis of resulting streamflow from specific rainfall events. Soil moisture and overall antecedent conditions will be considered when comparing daily runoff between selected rainfall events by calculating and maintaining a long term average of rainfall total encompassing some period prior to and during each comparison period.
- (b) Daily variability of rainfall within calculated monthly and annual rainfall totals will be examined to ensure that the daily variability of rainfall is not biasing the information and preliminary conclusions.
- (c) For the sites that show the largest deviations in rainfall/streamflow relationships, a large portion of the watershed will be reviewed using GIS procedures and aerial photography, and the quantity and approximate area of existing exempt reservoirs will be estimated and converted into approximate water storage capacity and surface area. Other obvious land use features such as acreage of brush land will also be approximated and the associated water consumption will be approximated based on published evapotranspiration information for the predominate brush species. The extent such changes exist in the watershed will be quantified and compared to the same information developed for another nearby site that does not show large deviations in rainfall/streamflow relationships.
- (d) Also for these sites with the largest deviations in rainfall/streamflow relationships, groundwater development and groundwater usage in the subject watersheds will be investigated. To the extent available, information pertaining to the number of wells, date of well completion, total depth, and well yield will be tabulated.

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The extent the analysis described in items (a) through (d) will be accomplished is subject to the availability of observed data and the project's budget.

TASK 4: Share Findings with Regional Experts

The findings in Task 3 will be made available to several large municipalities, river authorities, and water districts in the region. Conference calls will be scheduled to receive their input on the initial findings and all comments will be summarized.

TASK 5: Meeting with TWDB and BBASC to Discuss Recommendations/Methodology

The final list and supporting information for locations identified in Task 3 and possibly as a result of Task 4 will be presented to TWDB and/or the BBASC for further discussion. Upon concurrence of the selected sites as being the most impacted locations, a final research plan and timeline for additional analysis and/or data needs will be developed. The final research plan will identify/suggest additional analysis and or monitoring necessary to better understand the hydrologic factors that are thought to contribute to the noted deviations. Types of recommendations in the final research plan may include recommendations such as:

- (1) Establish locations where additional streamflow gages, monitoring wells, or precipitation stations would provide meaningful future information to address concerns.
- (2) Explore techniques to monitor soil moisture and overall antecedent conditions. Develop additional sites that could be added to existing soil moisture monitoring network to better understand how these factors influence rainfall/runoff relationships.
- (3) Explore linkages between soil moisture and past and current land use practices.
- (4) Determine location and water surface area of all exempt reservoirs (domestic and livestock and sediment/flood control) in the watershed upstream of the most impacted sites using GIS and aerial photography. Estimate water storage capacity of each exempt reservoir based on observed water surface area and create special version of the TCEQ WAM model that incorporates all existing exempt reservoirs. Using natural priority option in WRAP, execute special WAM model without and with exempt reservoirs in place and compare simulated flows for the site between models.
- (5) Quantify current phreatophyte acreages using GIS and aerial photography. Explore availability of historical aerial photography to gain understanding of how phreatophyte acreages have changed over time. Apply water consumption rates to acreage estimates to estimate magnitude of water losses possible due to phreatophyte infestation for current and past periods. Possibly include some portion of these estimated water uses in the alternative version of WAM model described in item #5 above.
- (6) More investigation and monitoring of groundwater use in impacted areas.

TASK 6: Prepare Report and Finalize Results and Recommendations.

**KRC RESPONSE TO REQUEST FOR QUALIFICATIONS NO. 580-16-RFQ0013
EVALUATION OF RAINFALL-RUNOFF TRENDS IN THE UPPER COLORADO RIVER BASIN**

Attachment 1
Resumes of KRC Team Members

PROFESSIONAL RESUME - KIRK KENNEDY

Email: kkennedy@kennedyresource.com

Address: 1443 CR 204; Burnet, TX 78611
Telephone: 512 / 589-5109 [office and cell]

EDUCATION

B.S Geology, Tarleton State University, Stephenville, Texas 1984

REGISTRATION

Professional Geoscientist, State of Texas, No. 3130

EXPERIENCE SUMMARY

Mr. Kennedy has been involved in Texas surface water right analysis for 26 years. His work has been in the fields of water rights modeling, interstate compacts, water rights permit analysis, drought water management/allocation, WAM model design and construction, and water supply determination such as firm yield analysis. Mr. Kennedy has a broad background in Texas water resources, particularly with respect to the TCEQ's regulatory activities, and those of its predecessor agencies. This experience includes the construction of the pre-SB1 water availability models, as well as the SB1 WAM models and their subsequent use for system operations to long term water planning. Mr. Kennedy was the team leader for the Surface Water Availability Team at the TNRCC (now TCEQ) and trained numerous other hydrologists in the concept of prior appropriation and its affect on reservoir operations, streamflow studies, environmental flows, and water rights permitting criteria. Mr. Kennedy is familiar with TCEQ's WAM models for every basin in Texas with typical uses of these models for determining feasibility of new projects, reliability and yield of specific water rights and reservoirs, quantifying impacts on downstream water rights due to changes proposed by upstream users, and impacts of special conditions being proposed by TCEQ or environmental groups on amendments to existing water rights. Mr. Kennedy has also participated in the development of daily and monthly timestep RiverWare models in the Trinity and Colorado River basins in Texas and has used these models to evaluate complex system operation behavior under various demands and operational policies. Mr. Kennedy was also a member of the Colorado BBEST team and participated in the process to develop environmental flow recommendations for the Colorado and Lavaca River Basins.

EMPLOYMENT HISTORY

<u>2008 to Present</u>	Owner/Hydrologist; Kennedy Resource Company; Burnet, Texas. Sub-consultant: Atkins North America; Austin, Texas.
<u>2000 to 2008</u>	Senior Scientist; R.J. Brandes Company / TRC Brandes, Austin, Texas.
<u>1989 to 2000</u>	Senior Hydrologist; Texas Natural Resource Conservation Commission, Austin, Texas

PROFESSIONAL HISTORY

LOWER COLORADO RIVER AUTHORITY, Austin Texas: WAM Modeling

- Used TCEQ naturalized flow approach to extend the Colorado WAM naturalized flow dataset for the middle and lower Colorado River Basin to include 14 additional years of hydrology. Project involved the manipulation of hundreds of excel worksheets involving observed streamflow from USGS, reported water use information from LCRA and TCEQ, evaporation and precipitation information from the TWDB, and numerous other hydrologic information from the USGS and LCRA.

TEXAS WATER DEVELOPMENT BOARD, Austin Texas: GSA BBEST / SB3 Modeling

- Applied the Guadalupe / San Antonio BBEST's proposed environmental recommendations to two large conceptual water supply projects in the Guadalupe/San Antonio River Basin to assess impacts of projects' depletions on river flows. Analysis included the refinement of TCEQ's WAM model to make more consistent with Region L modeling assumptions and the development of numerous basin wide model conditions such as natural and present conditions. Project involved use of the various WAM model's monthly flows, disaggregated to daily flows, for use in FRAT spreadsheet model to represent specific parameters of water supply projects and environmental flow requirements on a daily basis. Prepared numerous graphs and tables depicting flows before and after projects for use by GSA BBEST to evaluate effectiveness of their recommendations with regard to protecting flows in the various water courses. Presented findings of analysis to GSA BBEST team.

TEXAS WATER DEVELOPMENT BOARD, Austin Texas: WAM / RiverWare Modeling

- Determined the increase in the Firm Annual Yield of Lake Kemp attributable to raising the conservation pool for various existing and future sedimentation conditions using TCEQ's monthly WAM and COE's daily RiverWare models. Made numerous modifications to TCEQ's WAM model to more closely reflect operational parameters in the COE's daily model and reviewed inflow development approach for both models. Noted yield differences between model results and explored/quantified differences for each inflow and outflow component. Wrote report detailing differences and furnished to TWDB staff.

LOWER COLORADO RIVER AUTHORITY, Austin Texas: WAM / RiverWare Modeling

- Used TCEQ's Colorado WAM model to create a monthly operational model to assess impacts of LCRA's Water Management Plan update process. This operational WAM model utilizes a priority assumption which more closely reflects actual operations and also uses accounting procedures within WAM to better represent actual release operations with regard to travel time and future inflows downstream of LCRA's Highland Lakes. Created the WAM code that simulates complex interactions in the LCRA's proposed 2014 Water Management including the drought definitions proposed by TCEQ. Made numerous



advanced WAM model logic refinements in response to stakeholders, LCRA management, and TCEQ staff.

- Created the WAM model used to represent the LCRA's lower basin off-channel project and determined the increase in LCRA System yield using a modified version of the Colorado WAM model. This modified version of the WAM model uses accounting processes to keep track of the numerous run-or-river components of the LCRA's lower basin water rights to ensure that the full use of these water rights is made while limiting the sum of all diversions to the limits in the water authorized water rights.
- Used TCEQ's Colorado Basin WAM model to represent the LSWP (LCRA-SAWS Water Project). Calculated instream flow requirements for the proposed new diversion point using the Lyons Method, Consensus Planning Criteria, as well as new storage trigger based environmental standards that were derived from the basin specific detailed instream flow and bay and estuary inflow studies. Developed daily spreadsheet model that used WAM output as input to better understand pump rate requirements and other project operations dependant on daily timestep detail. Manipulated WAM operating rule features to determine sensitivity of system yield by changing the release requirements between Lakes Buchanan and Travis. Developed WAM logic to represent freshet based Matagorda Bay inflow requirements and determined impacts of various Bay compliance requirements on the LSWP, Highland Lakes, and irrigation users in the lower basin.
- Participated in the Texas Water Development Board's Regional Water Planning Process for Region K. Implemented changes to the Colorado WAM model input files to represent reasonable planning conditions for determining supply estimates and coded/developed many of the code changes to represent the various strategies modeled by Region K.
- Performed numerous water availability and Highland Lakes firm yield impact analyses to assess changes in water right reliability and yield as a result many likely future conditions. The changes implemented in the model included the change in location water rights upstream of the Highland Lakes, the additional subordination of Highland Lakes priority to upstream juniors, the change of use type from irrigation to municipal by downstream senior water rights, the effect of future sedimentation occurring in the Highland Lakes.
- Participated in LCRA's efforts developing a Water Supply Resource Plan which enabled LCRA staff to compare the water supply value of numerous complex water supply strategies for decades 2010 to 2100. This activity required numerous modifications of the TCEQ's WAM model to simulate LCRA's existing surface water supplies/system along with the development of new water supplies from numerous strategies which included the amendment of large senior irrigation water rights located in the lower basin to municipal use in the Austin area of the basin, conjunctive use of groundwater, aquifer storage and recovery; desalination of sea water; the construction of large off-channel reservoirs located in the lower basin, and various levels municipal, industrial, and irrigation conservation.



Robert J. Brandes Consulting

Professional Resume

ROBERT J. BRANDES

PERSONAL DATA

Birthplace: East Bernard, Texas
 Home Address: 6000 Maurys Trail
 Austin, Texas 78730
 Home Telephone: 512 / 795-0195

EDUCATION

Pre-Engineering Curriculum, Southwestern University, 1962-1964
 B. S., Civil Engineering, The University of Texas at Austin, 1967
 M. S., Civil Engineering, The University of Texas at Austin, 1968
 Ph.D., Water Resources, The University of Texas at Austin, 1972

HONORS

Tau Beta Pi, Chi Epsilon, Sigma Xi

REGISTRATION

Professional Engineer, State of Texas, No. 39120

EXPERIENCE

Dr. Brandes has been engaged in consulting engineering practice in Texas for over forty years, specializing in water resources and related engineering and environmental disciplines. He has represented numerous private, commercial, and governmental entities, providing various planning, analysis, permitting, design, and operational services for a wide range of water projects. He has directed and conducted numerous studies and investigations dealing with surface and ground water hydrology and hydraulics; water resources planning and development; water availability modeling (WAMs), water rights permitting and related issues; municipal, industrial and agricultural water supply; reservoir system operations; rural and urban flooding and stormwater management; water quality; irrigation system analyses; project site development engineering; and environmental impact assessments. His experience encompasses a wide variety of problems involving rivers and streams, lakes and reservoirs, ground water aquifers, wetlands, and bays and estuaries, and he is especially familiar with the development and application of computerized simulation techniques for analyzing water-related phenomena in these systems. Dr. Brandes has prepared and presented testimony and served as an expert witness in various judicial proceedings in state and federal courts and in administrative and regulatory hearings conducted by SOAH and natural resources agencies in Texas, as well as the Texas Legislature.

PUBLICATIONS

Dr. Brandes has authored or co-authored numerous technical documents and project reports, and he has presented many technical papers and lectures pertaining to water resources and water rights at professional society meetings, water conferences and short courses.

COMMITTEES

Dr. Brandes has served on several committees appointed by state agencies and professional associations dealing with water rights, wastewater reuse, water supply planning, and environmental flow issues. He was chairman of the Science Advisory Committee for the Legislative-appointed Study Commission on Water for Environmental Flows and the Science Advisory Committee for the Governor-appointed Environmental Flows Advisory Committee, and he is currently vice-chair for the Senate Bill 3 Texas Environmental Flows Science Advisory Committee. He currently is a director, policy committee chairman, surface water committee co-chair, and past-president of the Texas Water Conservation Association.

PROFESSIONAL AFFILIATIONS

American Society of Civil Engineers
 Texas Water Conservation Association
 American Water Resources Association
 American Academy Water Resources Engineers
 Water Environment Federation
 Texas Society of Professional Engineers
 National Society of Professional Engineers

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ROBERT J. BRANDES
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PROFESSIONAL
HISTORY

2008 to Present Principal and Owner; Robert J. Brandes Consulting; Austin, Texas.
2008 to Present Senior Consultant; Atkins (formerly PBS&J); Austin, Texas.
2005 to 2008 Principal; TRC/R. J. Brandes Company, Consulting in Water Resources; Austin, Texas.
1994 to Present Principal and Director; Crespo Consulting Services, Inc.; Austin, Texas.
1992 to 2005 Principal and Director; Terra Dynamics, Inc.; Austin, Texas.
1984 to 2005 Principal and Owner; R. J. Brandes Company, Consulting in Water Resources; Austin, Texas.
1975 to 1984 Associate and Vice President; Camp Dresser & McKee Inc.; Austin, Texas.
1971 to 1980 Associate, Senior and Principal Engineers and VP; Water Resources Engineers; Austin, Texas.
1970 to 1971 Special Consultant; F. Barry Haskett Investments/Aquarius, Inc.; New York, NY and Zurich, SUI
1968 to 1971 Associate; Frank D. Masch & Associates; Austin, Texas.
1967 to 1970 Research Engineer/Scientist; The Univ. of Texas at Austin, Depart. of Civil Engr.; Austin, Texas.

REPRESENTATIVE PROJECT
ASSIGNMENTS

- Represent the State of Texas in a lawsuit filed with the U.S. Supreme Court against New Mexico regarding violations of the Rio Grande Compact.
- Directed and performed water availability and project operation studies for the Unappropriated Flows Permit sponsored by the Lower Colorado River Authority, including development and evaluation of alternative project configurations and components, applying water availability models, investigating numerous environmental flow scenarios, working with state regulatory and resource agencies as part of water rights permitting, and coordinating work with client, other project team members, and various environmental groups.
- Directed and performed reservoir water availability and firm yield studies, conceptual dam and spillway design, and project mitigation planning and analyses for the proposed Lake Ralph Hall on the North Sulphur River in Fannin County, Texas, for the Upper Trinity Regional Water District, including preparation of supporting documents for the water rights permit application, coordination of permitting activities with the TCEQ, and presentation of expert testimony in the SOAH permit hearing.
- Served as a special consultant to the State of Texas and the International Boundary and Water Commission through the Texas Water Development Board and the Texas Natural Resource Conservation Commission regarding water deficits incurred by Mexico under the 1944 Treaty between the United States and Mexico and participated in negotiations between the two countries.
- Directed and performed long-range water supply planning for the Lower Colorado River Authority, including analysis of future municipal, industrial and power water demands, identification and evaluation of numerous supply alternatives, and consideration of alternative means for satisfying environmental flow requirements.
- Performed water supply studies for Dow Chemical Company in Brazoria County, Texas, including analysis of DOW's historical and projected water demands and supplies, modification and application of the TCEQ's Brazos Basin water availability model for evaluations of DOW's existing and proposed water supply system, investigated reservoir storage and river pumping requirements to meet specific levels of water demands considering river salinity effects, and provided expert testimony in SOAH permit hearings.
- Developed naturalized streamflows for the Sulphur, Sabine, Colorado, San Bernard, and Rio Grande River Basins and for the Brazos-Colorado and Nueces-Rio Grande Coastal Basins for the Texas Commission on Environmental Quality as part of the Senate Bill 1 water availability modeling program and direction application of the Texas A&M Water Rights Analysis Package to develop water availability models (WAMs) and simulate water availability for existing water rights under different flow conditions, assumed water rights cancellation, and various levels of wastewater reuse.

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- For Lake Chapman water users, performed firm yield analyses of the reservoir and developed an accounting plan to provide an equitable distribution and use of inflows to and storage in the reservoir and to allow equal access to the available water supply from the reservoir among water rights holders and users.
- Directed and performed surface water availability studies for the Lower Colorado River Authority/San Antonio Water System joint Water Supply Project, including development and evaluation of alternative project configurations and components, developing and applying various water availability models to test alternatives, and coordinating work with LCRA/SAWS and project team members and making public presentations.
- Directed and performed water availability and project operation studies for the Excess Flow Optimization Project sponsored by the Tarrant Regional Water District, including development and evaluation of alternative project configurations and components, applying water availability models, investigating numerous environmental flow scenarios, preparation of water rights permit application, working with TCEQ as part of water rights permitting, and coordinating work with client and other project team members.
- For the City of Irving, performed assessment of existing water rights and applications for water supplies from Lake Hugo and Kiamichi Creek in Oklahoma, developed and applied water availability model for Kiamichi Basin to assess Lake Hugo firm yield and reliability of water supplies from reservoir under different operating plans, and prepared documentation of findings and study results.
- Performed hydrology, water quality and water supply system operations studies for the Texas Attorney General's Office to support potential Federal litigation regarding the use and ownership of water from the Rio Grande Project in Texas and New Mexico, including the development of a quantity and quality routing models of Project operations.
- For a public power company, evaluated availability and reliability of cooling water supplies for potential power plant projects in the Colorado and Guadalupe River Basins, including application of basin water availability models and simulation of off-channel reservoir operations under different water demand conditions.
- For the Lavaca-Navidad River Authority, examined increased water supplies for industrial users through joint operation of Lake Texana in the Lavaca River Basin with other surface water rights in adjacent basins, including conceptual design and analysis of an off-channel reservoir and development of operating procedures.
- Served as special consultant to the Lower Colorado River Authority with negotiations with the City of Austin to develop a joint settlement agreement regarding future use of water rights and available water supplies, including return flows, from the Colorado River for the next 100 years.
- Served as special consultant to the Lower Colorado River Authority with negotiations with the South Texas Nuclear Project to develop a joint settlement agreement regarding future use of water rights and a dependable supply of water from the Colorado River for the life of the project.
- Served as a special consultant to the International Boundary and Water Commission to provide assistance with review of water conservation plans and other strategies proposed by Mexico to alleviate its water deficit under the 1944 Treaty between the United States and Mexico.
- For the Lower Colorado River Authority, performed water availability analyses and modeling to assess water supplies and strategies in support of regional water supply planning undertaken pursuant to Senate Bill 1 of the 75th Texas Legislature for the Lower Colorado Regional Planning Study (Region K).
- Performed water supply systems operations analyses and water rights/environmental permitting for the proposed Brownsville Weir and Reservoir Project on the Lower Rio Grande, including computer simulations of the hydrologic behavior and performance of the proposed project considering daily historical sequences of streamflows; preparation of an environmental assessment; state water rights and federal 404 permitting support; and meetings and negotiations with regulatory agencies, protestants, and Mexican representatives.

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- Directed and performed water availability studies as part of a multidisciplinary team of consultants for the Lower Guadalupe Water Supply Study that was jointly sponsored by the San Antonio River Authority, San Antonio Water System and Guadalupe-Blanco River Authority, including evaluation of alternative project scenarios, applying water availability models, coordinating work project team, and making public presentations.
- Investigated existing and projected surface water supplies and demands for municipal, industrial and irrigation users in the lower and middle Rio Grande Basin, including reservoir simulations and yield analyses under alternative reservoir operating plans and storage allocations, and evaluated Mexican Rio Grande water deficits under the 1944 Treaty, as part of the eight-county Rio Grande Regional Water Planning Study (Region M).
- Represented the State of Texas as a consultant and expert for the State Attorney General's Office regarding State ownership of land in the Texas Panhandle along the Canadian River in a dispute over oil and gas royalties.
- For the City of San Antonio, evaluated alternative scenarios for maintaining springflow conditions required for preservation of endangered species at Comal and San Marcos Springs, analyzed stream channel and springrun hydraulics at Comal Springs, and presented expert witness testimony in Federal District Court.
- Provided consulting assistance to a private water right holder with determining losses and operating procedures associated with adding new diversion points on the Rio Grande in Maverick and Webb Counties for diverting approximately 8,000 acre-feet/year of water for municipal use that was previously authorized for irrigation use near Presidio, Texas upstream of Lake Amistad and assisted with TCEQ permitting activities.
- Inventoried surface and ground water supply sources and facilities on the 21,000-acre Indio-Faith Ranch on the Rio Grande in Maverick and Dimmitt counties in South Texas and developed recommendations and a plan for joint use of the available water supplies and water facilities by two entities owning different parts of the ranch.
- Investigated flooding in Big Fossil Creek watershed caused by upstream development in city of Saganaw and provided expert witness support and testimony for plaintiffs in Tarrant County, Texas law suit.
- Analyzed domestic and agricultural water demands for 112,000-acre Comanche Ranch in Maverick County, Texas, developed water supply plans and facility designs for providing Rio Grande water to meet ranch water demands, and assisted with implementation of various water supply strategies and facilities.
- Analyzed potential downstream flooding caused by warehouse and drainage projects implemented by City of Fredericksburg, represented City in law suits, and developed mitigation measures used in settlement proceeding.
- Evaluated the impacts of upstream artificial recharge projects in the Edwards Aquifer recharge zone on the yield and operations of City of Corpus Christi's reservoirs in the Nueces River Basin, including examination of bay and estuary inflows and system operation with other sources of water supply.
- Provided hydrologic and water rights permitting support for amendment of Tarrant Regional Water District's permits for diversion of upper Trinity Basin return flows from the Trinity River into Richland-Chambers Reservoir and Cedar Creek Reservoir in order to develop additional firm supply for TRWD customers.
- Analyzed future water supply availability for the Lower Neches Valley Authority considering existing municipal, industrial and irrigation water rights in the Neches River Basin and Federal hydropower water requirements at Sam Rayburn Reservoir, including application of the Neches water availability model.
- Served as special consultant to the Texas Natural Resource Conservation Commission for the evaluation and analyses of various water rights and water resources management models as part of technical advisory team to select a general modeling approach pursuant to the requirements of Senate Bill 1 of the 75th Texas Legislature.

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- Analyzed the feasibility (yield and cost) of constructing and operating off-channel reservoir projects for developing new municipal water supplies at various locations throughout the San Antonio and Guadalupe River Basins as part of the South Central Texas Regional Water Planning Study (Region L).
- Investigated causes of flooding of Republic Bank Towers in Dallas, Texas during severe rainfall event for plaintiffs in law suit in Dallas County District Court, including definition of contributing drainage areas, analysis of street inflows to lower level parking areas, and presentation of expert deposition testimony.
- Performed hydrology, hydraulics, drainage and flood control studies and investigations for the City of Fredericksburg as part of a TWDB-sponsored regional flood prevention plan for the City and surrounding area, including drafting of stormwater ordinances, preparation of a drainage criteria manual, and facilities design.
- Performed hydrologic and water rights investigations for the Dallas County Park Cities Municipal Utility District to evaluate the ability of Lake Grapevine in the upper Trinity River Basin to provide a firm water supply under various operating rules and demand scenarios involving other existing water right holders.
- Analyzed surface water issues related to a Medina Lake water rights amendment for the Bexar-Medina-Atascosa Counties Water Control and Improvement District, including analysis of release requirements for instream uses below the lake, evaluation of reservoir yield and operations, and examination of reservoir water quality impacts.
- Analyzed stream flooding and erosion using HEC-2 backwater program and sediment transport methods for the City of Austin on lower Walnut Creek to evaluate the potential erosion impacts of the City's treated wastewater effluent on an adjacent property owner and presentation of expert witness testimony for defendant in Travis County District Court.
- Performed hydrologic and hydraulic investigations involving floodplain reclamation, hydraulic design of flood control facilities, and runoff and flooding simulations for a 2,000-acre residential and commercial development on the West Fork of the Trinity River in Tarrant County, Texas, including Section 404 permitting support.
- Performed hydrology and hydraulic studies of the potential impacts of sand and gravel dredging operations proposed by Sand Supply, Inc. on or near the Brazos River in Fort Bend County, Texas, and the Colorado River in Fayette County, Texas, including assistance with acquisition of permits from the Texas Parks and Wildlife Department, the Texas Natural Resource Conservation Commission and the U. S. Army Corps of Engineers.
- Performed hydrologic and hydraulic studies of runoff control and wastewater retention facilities for confined animal feeding operations (feedlots and dairies) and simulation of combined runoff storage and irrigation operations for effective disposal of contaminated waters under state and federal laws and rules, including analyses for facilities in Erath and Maverick Counties, Texas.
- Provided technical assistance and support involving river basin hydrology, water rights, water supply development and water availability in the Brazos River Basin for Dow Chemical Company in a wholesale water rate case before the Texas Water Commission.
- Performed water quality impact analyses and nonpoint source pollution studies for the Brownsville Public Utilities Board pertaining to a proposed raw water pipeline diversion from a series of existing storage lakes and resacas, including field data collection and water quality sampling, runoff and pollutant transport modeling for a 50-year historical period, and projections of water quality conditions with and without the project.
- Provided technical assistance, engineering support and expert witness testimony for the United Irrigation District in Hidalgo County, Texas, with regard to a wholesale water rate case decided before the Texas Water Commission, including studies of irrigation water demands, historical Rio Grande diversions, domestic and municipal water usage, water delivery system losses, water rights and water supply commitments, and canal system rehabilitation requirements.

Professional Resume
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- Developed and applied two-dimensional tidal hydrodynamics and salinity transport models for Sabine Lake, Matagorda, San Antonio, Aransas-Copano, and Corpus Christi bays and estuaries as part of the Texas Water Development Board's studies of freshwater inflow requirements for maintenance of marine aquatic habitat and productivity.
- Served as officer-in-charge for an investigation of a groundwater mound beneath Texas Tech University and the City of Lubbock, Texas, including computer modeling of the mound's hydraulic behavior, the development of remedial measures to reduce the mound, water quality analyses, and the formulation of a comprehensive water management program for the University.
- Worked as a consultant investigating the theory and application of the Fiscalin hydraulic mixing process, including reviewing previous applications of the process in Switzerland and designing/testing several units for application to municipal wastewater treatment and various industrial problems in the United States.



Areas of Expertise:

Environmental Site Evaluation
Hydrologic Modeling
Hydraulic Modeling
Erosion Control
Water Quality Management
Civil Engineering
Environmental Assessments

Registration:

Texas Professional Engineer,
No. 55645

Education:

M.S. Civil Engineering, University of Texas
at Austin (1985)
B.S. Civil Engineering with Highest Honors,
University of Texas at Austin (1978)

Continuing Education/Training:

Floodplain Management Training
Streambank Stabilization
Sedimentation/Erosion Control
SWMM Short-Course
EPA Watershed Management
Storm Water Management/Stream
Restoration

Professional Affiliations:

American Society of Civil Engineers (ASCE)
Society of Hispanic Professional Engineers
Water Environment Federation/ Water
Environment Assoc. of Texas

Employment History:

1994-present: Crespo Consulting Services, Inc
1989-1994: COA – Environmental &
Conservation Services Department
1985-1989: R.J. Brandes Company
1977-1985: Camp Dresser & McKee Inc.
1976: Radian Corporation

Mr. L. Stephen Stecher, P.E., President of Crespo Consulting Services, directs a locally-owned and operated civil and environmental engineering firm in Austin. He has over twenty-nine years of project management and 35 years of engineering experience in civil engineering related to hydrologic, hydraulic and water quality studies and design. He has direct project experience involving drainage, flooding, water quality and erosion control in the Austin area. Mr. Stecher has performed or directed numerous engineering projects including street, drainage and utility design; Storm Water Pollution Protection Plans (SW3P); channel improvements for flood and erosion control; design and permitting of innovative water quality facilities and flood management projects; design of regional detention facilities and park improvements; preparation and updating of watershed master plans; hydrologic and hydraulic modeling; water availability modeling; revising and updating of FEMA maps; and use and analysis of GIS for watershed planning and engineering. Mr. Stecher has been involved in and managed many environmental engineering and consulting projects including: environmental site assessments; environmental constraints evaluations; pollution control and BMP designs; landfill studies and permitting compliance reviews; and environmental commissioning for the City of Austin.

Specific Relevant Experience:

- ◆ **Texas River Basins Water Availability Modeling: Throughout Texas.** *Project Manager.* Performed subconsultant work for a number of TCEQ Water Availability Modeling (WAM) projects for the following river basins: Trinity, Sabine, Neches, Colorado, Canadian, Red, Sulphur, Brazos, Guadalupe, San Antonio, Nueces and Rio Grande. The watershed modeling work included utilization of GIS to develop watershed runoff parameters, locations of wastewater discharges, water rights and reservoirs. Estimated future water usage and wastewater flows based on population projections. Performed reservoir volume analyses for existing and future conditions, including estimation of current and historical watershed sediment load. Developed rainfall, runoff and evaporation characteristics throughout the basins and simulated reservoir inflow, discharge and content.
- ◆ **City of Austin Water Resource Planning Study: Austin, Texas.** *Project Manager.* Provided engineering services to identify and evaluate surface water supply alternatives for inclusion into the Integrated Water Resources Plan for the City of Austin. Performed a water availability modeling (WAM) analysis using the WRAP model and a water rights permitting analysis to develop technically sound and environmentally feasible surface water

alternatives for the City. Analysis included the use of existing and future surface water reservoirs and modeling of potential impacts. Hydrologic data and WAM models for the appropriate tributaries of the Colorado River and adjacent River Basins were gathered along with information on State water supply planning for Region K in order to evaluate further alternatives. Groundwater, water re-use and aquifer storage and retrieval were also evaluated.

- ◆ **Texas Coastal Basin Water Availability Modeling Study: Various, Texas.** *Project Manager.* Performed subconsultant work on the TCEQ WAM project for the all the Texas coastal basins. The watershed modeling work included utilization of ArcView GIS to develop watershed runoff parameters and stream characteristics. Implemented SWAT and other NRCS models using GIS. The models were calibrated to nearby gages with similar soils and geologic conditions. Runoff modeling techniques were adapted for the sandy, dry soils of the area. With GIS input, used the model to simulate naturalized flows for the ungaged watersheds and verified the locations of diversions and wastewater treatment plants, and determined the upstream intervening drainage area to each control point. Developed runoff and evaporation characteristics for reservoirs and estimated reservoir content for small in-channel reservoirs.
- ◆ **Water Treatment Plant 4 Environmental Commissioning: Austin, Texas.** *Water Quality Task Leader.* Performing independent research on facility component designs and providing evaluations of water quality detention and environmental facilities and controls. Work will include review of environmental mitigation measures, Best Management Practices, and adaptive strategies proposed by the WTP4 design team, as well as analyses to establish a threshold concentration of potential contaminants and perform environmental impact analyses to identify contaminant discharges.
- ◆ **Austin Bergstrom International Airport Stormwater Master Plan Update: Austin, Texas.** *Task Manager.* Currently engineering services and technical evaluation of water quality condition at the airport as part of the Stormwater Master Plan Update. Reviewed existing ABIA Water Quality TPDES Data and current City of Austin Water Quality Ordinances applicable to the airport.
- ◆ **Barton Hills Retrofit: Austin, Texas.** *Project Manager.* For the City of Austin Watershed Protection Department Rotation List, designed water quality controls in COA parkland to reduce pollutants reaching Barton Creek and Barton Springs including ponds, trails and sidewalks, channel stabilization, inlets, and pipes. Directed the development of a WPAP and corresponding geologic assessment to comply with TCEQ requirements. Directed and performed the final project design which included erosion control measures, a sedimentation/infiltration pond, storm sewers and inlets, channel revegetation, tree mitigation and planting plan, and parkland aesthetics.
- ◆ **Ben White/IH-35 Bioretention Pond Design: Austin, Texas.** *Project Manager.* Provided preliminary and final engineering services for a bioretention/extended detention pond to treat storm water runoff from the IH-35/Hwy 71 interchange. Designed an innovative water quality pond that was effective at removing pollutants, cost efficient, with minimal environmental disturbance. This complex project involved not only hydrologic, hydraulic, and storm water modeling, but also numerous coordination efforts with Federal and State agencies and City departments, including: TxDOT, USFWS, USACE, TPWD, Texas Historical Commission and WPDRD. Permits obtained for final construction include: TxDOT driveway permit; TxDOT construction in the right-of-way permit and US Army Corps of Engineers nationwide permit. City variances were also obtained during site plan review. Supervised the production of the construction documents for the project and provided value engineering services to determine the most cost-effective design.
- ◆ **US 183A Water Pollution Abatement Plan (WPAP): Williamson County, Texas.** *Project Manager.* Prepared the Water Pollution Abatement Plan (WPAP) for this highway project located over the recharge and contributing zones of the Edwards Aquifer related to the schematic design of 183A. Prepared water quality portions of the WPAP and water quality BMP design drawings. Work involved pollutant loading determination and design of temporary and permanent water quality structures measures in accordance with the Edwards Rules and TPDES Stormwater Permitting compliance. Responsible for an environmental assessment including an evaluation and review of endangered species, FEMA floodplain issues and Corps 404 permits for the creek crossing. Also developed detention pond designs using SWMM.
- ◆ **Main to Montopolis Reclaimed Water Line Environmental Assessment: Austin, Texas.** *Project Manager.* Supervised the preparation of an environmental constraints evaluation for 3 alternatives. For the final alignment, Crespo performed velocity and scour analyses at four (4) creek crossings, delineated floodplains and took bank soil samples in order to recommend countermeasures and assist with streambank stabilization plans. Supervised the production of the City of Austin Environmental Assessment for the project.
- ◆ **Water Supply Master Plan, City of San Marcos.** *Project Manager.* Reviewed water supply alternatives, including regulatory options, current supply and new supplies. Reviewed modeling results for the Edwards Aquifer and Carrizo-Wilcox Aquifer, evaluated surface water rights using the WRAP model, and evaluated San Marcos springflow and return flows.

Areas of Expertise:

Water Resources
Geographic Information Systems (GIS)

Professional Affiliations:

American Academy of Environmental
Engineers and Scientists

Education:

B. S. Environmental Science – University of
Texas at Austin (2014)

Employment History:

5/2014-Present – Crespo Consulting
Services, Inc.

6/2013-8/2013 – City of Austin Water &
Wastewater Utility. *Environmental
Management Intern*

5/2012-8/2012 – City of Austin
Transportation Department. *Air Quality
Intern*

Mr. Kevin Bone earned a bachelor's degree in environmental science with a focus in geological sciences from the University of Texas at Austin. His related coursework in hydrology, environmental field methods, and GIS provide a wide range of skills applicable to his work at Crespo Consulting Services, Inc.

Specific Relevant Experience:

◆ **Onion Creek Floodplain Study & Mapping Project: Austin, Texas.** *Water Resources Scientist.* Performed hydrologic (HEC-HMS) and hydraulic (HEC-RAS) modeling to update the Rinard Creek tributary of Onion Creek floodplain mapping. Used GIS to delineate drainage areas and conduct basic hydrologic elements of the site area, such as longest flow path, soils, and landuse types for calculation of Snyder's lag times and curve numbers. Work required extensive use of ArcGIS and GeoRAS processing tools, such as ArcGIS Spatial Analyst and 3D Analyst extensions.

◆ **ABIA Stormwater Drainage Improvement: Austin, Texas.** *Project Coordinator.* Developed the Site Plan and Erosion and Sedimentation Control Plan in AutoCAD for the repair of a water quality pond and for the repair of rutting along the fence line of the Austin-Bergstrom International Airport. Also aided in writing the technical memorandum for the proposed repairs.

◆ **Hornsby Bend Groundwater Sampling: Austin, Texas.** *Project Coordinator.* Assisted in the quarterly groundwater sampling of 30 monitoring wells at Hornsby Bend Bio-Solids Management Facility. Groundwater sampling was done by TCEQ low flow purging and sampling procedures.

◆ **Continental Cream Quarries: Liberty Hill, Texas.** *Project Coordinator.* Developed a Storm Water Pollution Prevention Plan and Edwards Aquifer Contributing Zone Plan to implement at the quarry. This involved a site visit and coordination with TCEQ for the plan submittal.

◆ **Austin Energy Vault Inspections: Austin, Texas.** *Project Coordinator.* Performed site inspections of 11 transformer vaults for Austin Energy. Information from the inspections was used to update the Austin Energy Spill Prevention Control and Countermeasure Plan.

- ◆ **US 183 North: Austin, Texas.** *Water Resources Scientist.* Researched and organized information from existing Water Pollution Abatement Plans to aid in the analysis of potential water quality controls along the project corridor. This involved calculating the load removal capabilities of various water quality control configurations.
- ◆ **ABIA Integrated Pest Management: Austin, Texas.** *Water Resources Scientist.* Developed an Integrated Pest Management Plan for the Austin-Bergstrom International Airport. This involved a site visit and researching and summarizing similar plans from other facilities.
- ◆ **Dam Hazard Assessment: Austin, Texas.** *Water Resources Scientist.* Reviewed the procedure used to create a Simplified Breach Analysis for potentially hazardous dams. The analysis was then performed on seven sets of dams to evaluate whether the correct methodology was used to determine relevant breach parameters.

- ◆ **Bitter Creek Tributary Stream Restoration: Austin, Texas.** *Water Resources Scientist.* Developed the Erosion and Sedimentation Control Plan in AutoCAD as well as the Storm Water Pollution Prevention Plan for the stream restoration project.
- ◆ **Reznicek Field Water Quality Retrofit: Austin, Texas.** *Water Resources Scientist.* Developed the Erosion and Sedimentation Control Plan in AutoCAD as well as the Storm Water Pollution Prevention Plan for the water quality pond retrofit. Also aided in the hydraulic modeling (HEC-RAS) of the proposed pond and channel.
- ◆ **YBC Urban Trail Route: Austin, Texas.** *Water Resources Scientist.* Performed field walks and aided in information collection to provide input regarding drainage and water quality issues of different alignment alternatives of the urban trail. Also aided in writing the drainage section of the PER and prepared maps and figures in ArcGIS.
- ◆ **Pleasant Valley/Elmont Stormwater Conveyance: Austin, Texas.** *Water Resources Scientist.* Developed maps and figures in ArcGIS for inclusion in the environmental assessment report for the three alternative alignments for the proposed street, storm drain, and open drainage channel improvements.
- ◆ **5505 Jim Hogg Ave. Floodplain Regulations: Austin, Texas.** *Water Resources Scientist.* Revised hydraulic (HEC-RAS) model based on new pier and structure locations at the property. Also revised technical memorandum of floodplain information based on the model updates.
- ◆ **2502 Thornton Rd. Floodplain and Critical Water Quality Zone Evaluation: Austin, Texas.** *Water Resources Scientist.* Created and revised maps and figures in ArcGIS for inclusion in the floodplain analysis for the proposed apartment developments. Revised forms for submission of FEMA LOMR application.
- ◆ **City of Austin Group 12 Street Reconstruction – Justin Lane: Austin, Texas.** *Water Resources Scientist.* Revised the Erosion and Sedimentation Control and Tree Protection Plan sheets in MicroStation for inclusion in the construction plan set.
- ◆ **Lake Pat Cleburne Modeling: Cleburne, Texas.** *Water Resources Scientist.* Calculated the total volume of each section of the lake using ArcGIS analysis for use in the lake modeling analysis. This also included summary calculations of water quality parameters from three sampling events.
- ◆ **Lake Worth Water Quality Modeling: Lake Worth, Texas.** *Water Resources Scientist.* Calculated the total volume of each section of the lake using ArcGIS analysis for use in the lake modeling analysis.
- ◆ **Kimberlin Lake Volume Analysis: Graford, Texas.** *Project Coordinator.* Used given lake sounding depths to generate a set of contours in ArcGIS that were used to calculate the total volume of the lake. Also developed an elevation-capacity table to interpolate the lake volume in tenths of feet increments.

EXHIBIT B

SCOPE OF WORK

OVERVIEW

The Colorado/Lavaca Basin and Bay Area Stakeholder Committee has noted that the relationship between rainfall and river flows may have changed over time in some areas of the upper Colorado River Basin in Texas (Appendix 1). Although this area is known to have recently been in a substantial drought cycle, it is not clear that the reasons for low streamflows in recent decades are completely explained by drought. Specifically, the Colorado Basin and Bay Area Stakeholder Committee and TWDB are seeking to identify potential reasons for the apparent decline in flows in the upper Colorado Basin and to gain a better understanding of the apparent change in the relationship between rainfall and streamflow. The primary objective of this Scope of Work is to review relevant and available long term observed hydrologic data: (1) to determine if in fact there has been a change in the relationship between streamflow and precipitation, and if so, (2) to develop an explanation/understanding of the reasons for this change.

SUMMARY OF APPROACH

Kennedy Resource Company (KRC) plans to undertake the analysis beginning with the development of an inventory of all appropriate and available long term observed hydrology information (streamflow, precipitation, groundwater levels) in the Colorado River Basin upstream of Lakes Buchanan and Travis (study area). In addition, the Texas Commission on Environmental Quality (TCEQ) Water Availability Modeling (WAM) naturalized flows as well as WAM simulated flows from a natural priority current conditions WAM run will be obtained for all of the streamflow gage locations in the study area. Historical streamflows for the 10 upper Colorado River Basin sites where the Basin and Bay Area Stakeholder Committee made environmental flow recommendations will be obtained along with historical streamflow data from other nearby locations that have observed data for a period of record of at least 40 years. Various monthly statistics will be developed for observed streamflow, naturalized flow, WAM simulated flow, and observed precipitation for the entire period of record (1940-2015, to the extent possible) and separately for an early and late period of record (early and late periods to be determined once data is assembled).

This information will be reviewed, and areas of the basin that show substantial differences between the early and late periods of record will be selected for in-depth analysis. Such in-depth analysis will involve review of naturalized flow information from TCEQ's WAM for the Colorado River Basin, simulated flows from the WAM current conditions simulation (Run 8), historical diversions/depletions by existing water rights in the watershed, and groundwater levels in the region. For sites that show substantial statistical differences between early and late periods that are not explained by the above, the appropriate precipitation stations will be associated with streamflow gaging stations and analyses of daily streamflow volumes versus daily rainfall

quantities will be conducted. Information relating to streamflow and precipitation distribution, magnitude, and timing will be analyzed for each site and compared over the entire period of record to determine if the relationships have significantly changed over time. Where necessary and possible, incremental watershed areas between streamflow gages will be isolated and analyzed separately. Areas of the basin, or portions of watersheds between streamflow gages, that show clear deviations in the precipitation to streamflow relationship will be further examined by reviewing and analyzing current land use coverage information in the subject watersheds such as (a) the occurrence and density of phreatophytes and/or other water consuming brush varieties and (b) an assessment of the number of small stock ponds and reservoirs (those exempt from water rights permitting requirements) present in the watershed. The Basin and Bay Area Stakeholder Committee and TWDB will be updated as the analysis progresses and findings will be shared with regional experts. A final report will be written detailing the results of the investigation.

Following is a list of tasks and subtasks anticipated to be undertaken pursuant to completion of the work, with the expected level of effort for each of the tasks expressed as a percentage of the overall project effort.

TASKS

Task 1: Create Data Inventory of Information Available in the Study Area (4%)

- (1) Create a list of the following observed hydrology information:
 - (a) USGS gaging stations for the 10 sites the Basin and Bay Area Stakeholder Committee made environmental flow recommendations for.
 - (b) Up to 3 other gaging station sites (United States Geological Survey, Lower Colorado River Authority, other) in the study area that have at least 40 years of observed data available.
 - (c) Long term precipitation recording stations in or near the study area.
 - (d) Groundwater monitoring wells in the study area.
 - (e) Major springs located in or near the study area.
- (2) Create a timeline of major reservoir construction in the study area with the size of impoundment and date of first impoundment noted.

Task 2: Review Past and Ongoing Efforts in the Study Area (6%)

- (1) Research previous studies describing all documented past and present efforts that address rainfall/streamflow relationships in the area of interest.
- (2) Research previous studies dealing specifically with phreatophyte infestation and/or other water consuming brush varieties, Natural Resources Conservation Service reservoir construction, livestock pond construction, rural electric meter installation specifically designated for wells, and land use changes to the extent such information is available and can be reasonably obtained.

- (3) Contact (via telephone) representatives of large municipalities, river authorities, and water districts in the region to get their input on possible reasons for changes in rainfall versus streamflow.

Task 3 – Analyze Hydrology Information (60%)

- (1) Associate representative precipitation stations with the streamflow gages identified in Task 1 and identify precipitation trends over time.
- (2) Extract naturalized flows from TCEQ’s WAM for all primary control point locations (gages) in the study area.
- (3) Extract regulated flow from TCEQ’s current conditions WAM (executed with natural priority option) for all primary control points in the study area.
- (4) Analyze historical flows and naturalized flows for each of the streamflow gages identified in Task 1 and identify all sites that show declining historical streamflows over time using cumulative mass curves.
- (5) Review historical water right diversion information and major reservoir construction dates for the watersheds upstream of stations identified in Task 3(4).
- (6) Review available groundwater level information in the vicinity of the stations identified in Task 3(4).
- (7) Identify sites that show the most deviation in streamflow/precipitation relationships between the early and late time periods that is not explained by findings from Tasks 3(5) and 3(6).
- (8) Select and/or develop companion precipitation stations for the gaging stations identified in Task 3(7).
- (9) Using daily records, develop streamflow and precipitation statistics for common periods of time (entire period, early period, late period) for the sites identified in Task 3(7) and compare results between the various periods of time.
- 10) Identify single site from Task 3(9) that shows the most deviation in streamflow/precipitation relationships between early and late time periods and use available investigations and reports, GIS information and aerial photography to review:
 - (a) The approximate watershed areas infested with phreatophytes and/or other water consuming brush varieties.
 - (b) The approximate drainage area controlled by exempt reservoirs.

Task 4: Share Findings with Regional Experts (4%)

- (1) The findings determined for the locations identified in Task 3 will be made available to representatives from large municipalities, river authorities, and water districts in the region. Conference calls will be scheduled with these individuals to discuss their findings, and all comments will be considered in finalizing study results.

Task 5: Meet with TWDB and Basin and Bay Area Stakeholder Committee to Discuss Study Results (9%)

- (1) Meet with TWDB and Basin and Bay Area Stakeholder Committee to discuss findings (up to 2 meetings in Austin).

- (2) Discuss additional analysis needed to investigate the causes of changes in precipitation/streamflow relationships.
- (3) Discuss locations where additional streamflow gages, monitoring wells, or precipitation stations would provide meaningful future information to address the precipitation/streamflow issue.

Task 6: Prepare Report and Finalize Results and Recommendations (17%)

- (1) Prepare and submit draft report to TWDB summarizing all findings and conclusions.
- (2) Respond to and address TWDB comments on draft report.
- (3) Prepare and submit to TWDB final report to TWDB summarizing all findings and conclusions and include electronic copies of models and data.

EXHIBIT C

TASK AND EXPENSE BUDGETS AND PROJECT TIMELINE

TASK BUDGET

TASK	DESCRIPTION	TWDB AMOUNT
Task 1	Create Data Inventory of Information Available in the Study Area	\$865.00
Task 2	Review Previous and Ongoing Efforts in the Study Area	1,155.00
Task 3	Analyze Hydrology Information	12,085.00
Task 4	Share Findings with Regional Experts	825.00
Task 5	Meeting with TWDB and BBASC to Discuss Study Results	1,750.00
Task 6	Prepare Report and Finalize Results and Recommendations	3,320.00
Total		\$20,000.00

EXPENSE BUDGET

CATEGORY	TWDB AMOUNT
Salaries and Wages ¹	\$15,510.00
Fringe ²	0.00
Travel ³	100.00
Other Expenses ⁴	90.00
Subcontract Expenses	4,300.00
Overhead ⁵	0.00
Profit	0.00
TOTAL	\$20,000.00

¹ Salaries and Wages is defined as the cost of salaries of engineers, draftsmen, stenographers, surveymen, clerks, laborers, etc., for time directly chargeable to this CONTRACT.

² Fringe is defined as the cost of social security contributions, unemployment, excise, and payroll taxes, workers' compensation insurance, retirement benefits, medical and insurance benefits, sick leave, vacation, and holiday pay applicable thereto.

³ Travel is limited to the maximum amounts authorized for state employees by the General Appropriations Act, Tex. Leg. Regular Session, 2015, Article IX, Part 5, as amended or superseded

⁴ Other Expenses is defined to include expendable supplies, communications, reproduction, postage, and costs of public meetings directly chargeable to this CONTRACT.

⁵ Overhead is defined as the costs incurred in maintaining a place of business and performing professional services similar to those specified in this CONTRACT.

EXHIBIT D

GUIDELINES FOR AUTHORS SUBMITTING CONTRACT REPORTS TO THE TEXAS WATER DEVELOPMENT BOARD

1.0 Introduction

The purpose of this document is to describe the required format of contract reports submitted to the Texas Water Development Board (TWDB). Our reason for standardizing the format of contract reports is to provide our customers a consistent, and therefore familiar, format for contract reports (which we post online for public access). Another reason for standardizing the format is so that we can more easily turn a contract report into a TWDB numbered report if we so choose. Remember that your report will not only be seen by TWDB staff, but also by any person interested in the results of your study. A professional and high quality report will reflect well on you, your employer, and the TWDB.

Available upon request, we will provide a Microsoft Word template (used to write these instructions) that gives the fonts, spacing, and other specifications for the headings and text of the report. Please follow this template as closely as possible.

2.0 Formatting your report

The TWDB format is designed for simplicity. For example, we use Times New Roman for all text. We use 12 point, single-spaced text, left justification for paragraph text, 18 point bold for first-level headings, and 14 point bold for second-level headings. Page numbers are centered at the bottom of the page. Other than page numbers, please refrain from adding content to the document header or footer. Page setup should use one-inch margins on all four sides.

2.1 Text

The best way to format your document is to use the styles described and embedded in the template document (Authors_Template.dot) that is available on request from the TWDB. To use the Authors_Template.dot file, open it in Word (make sure *.dot is listed under Files of type) and save it as a .doc file. Advanced users can add the .dot file to their computers as a template. Make sure the formatting bar is on the desktop (to open, go to View→Toolbars→Formatting) or, to view all of the formatting at once, go to Format→Styles and Formatting and select Available Styles from the dropdown box at the bottom of the window. The formatting in the template document provides styles (such as font type, spacing, and indents) for each piece of your report. Each style is named to describe what it should be used for (for example, style names include Chapter Title, Body Text, Heading 1, References, and Figure or Table Caption). As you add to your report, use the dropdown list on the Formatting Toolbar or the list in the Styles and Formatting window to adjust the text to the correct style. The Authors_Template.dot file shows and lists the specifications for each style.

2.1.1 Title

Give your report a title that gives the reader an idea of the topic of your report but is not terribly long. In addition to the general subject (for example, “Droughts”), you may include a few additional words to describe a place, methodology, or other detail focused on throughout the paper (for example, “Droughts in the High Plains of Texas” or “Evaluating the effects of drought using groundwater flow modeling”). Please capitalize only the first letter of each word except ‘minor’ words such as ‘and’ and ‘of’. Never use all caps.

Use headings to help the reader follow you through the main sections of your report and to make it easier for readers to skim through your report to find sections that might be the most interesting or useful to them. The text of the report should include an executive summary and sections outlined in 4.4 of Attachment 1. Headings for up to five levels of subdivision are provided in the template; however, we suggest not using more than three or four levels of subdivision except where absolutely necessary. Please avoid stacked headings (for example, a Heading 1 followed immediately by a Heading 2), and capitalize only the first letter of headings or words where appropriate—never use all caps.

2.2 Figures and photographs

To publish professional-looking graphics, **we need all originals to be saved at 300 dots-per-inch (dpi)** and in grayscale, if possible, or in the CMYK color format if color is necessary. Excessive use of color, especially color graphics that do not also work in grayscale, will prevent us from publishing your report as a TWDB numbered report (color reproduction costs can be prohibitive). Preferred file formats for your original graphics are Adobe Illustrator (.ai), Photoshop (.psd), EPS with .tiff preview, .jpg, .png, or .tiff files. Refrain from using low resolution .jpg or .gif files. Internet images at 72 dpi are unacceptable for use in reports.

All graphics shall be submitted in two forms:

1. Inserted into the Microsoft Word document before you submit your report. Ideally, inserted graphics should be centered on the page. Format the picture to downsize to 6 inches wide if necessary. Please do not upsize a graphic in Word.
2. Saved in one of the formats listed above.

2.2.1 Other graphics specifications

It is easiest to design your figures separately and add them in after the text of your report is more or less complete. Graphics should remain within the 1-inch page margins of the template (6.5 inches maximum graphic width). Be sure that the graphics (as well as tables) are numbered in the same order that they are mentioned in the text. Figures should appear embedded in the report after being called out in the text. Also, remember to include a caption for each graphic in Word, not as part of the graphic. We are not able to edit or format figure captions that are part of the figure. For figures and photographs, the caption should appear below the graphic. For tables, the caption should appear above.

2.2.2 Creating publication-quality graphics

When designing a graphic, make sure that the graphic (1) emphasizes the important information and does not show unnecessary data, lines, or labels; (2) includes the needed support material for the reader to understand what you are showing; and (3) is readable (see Figures 1 and 2 for examples). Edward R. Tufte's books on presenting information (Tufte, 1983; 1990; 1997) are great references on good graphic design. Figures 1 through 3 are examples of properly formatted, easy to understand graphics. Do not include fonts that are less than 6 points.

For good-looking graphics, the resolution needs to be high enough to provide a clear image at the size you make them within the report. In general, 300 dpi will make a clear image—200 dpi is a minimum. Try to create your figures at the same size they will be in the report, as resizing them in Word greatly reduces image quality. Photographs taken with at least a two-megapixel camera (if using digital) and with good contrast will make the best images. Save the original, and then adjust color levels and size in a renamed image copy. Print a draft copy of your report to double-check that your figures and photographs have clear lines and show all the features that you want them to have.

Figures and photographs should be in grayscale. Color greatly adds to the cost of printing, so we are trying to keep it to a minimum. Also remember that your report may be photocopied, scanned, or downloaded and printed in black and white. For this reason, you should use symbols or patterns, or make sure that colors print as different shades in black and white. All interval or ratio data (data measuring continuous phenomena, with each color representing an equal interval) need to be displayed in a graded scale of a single color (Figure 3). This way your figures will be useful even as a photocopy.

If you need help with your graphics or have questions, please contact the TWDB graphics department at (512) 936-0129.

2.2.3 Using other people’s graphics

Figures and photographs (and tables) need to be your own unless you have written permission from the publisher that allows us to reprint them (we will need a copy of this permission for our records). Avoid using any figures or photographs taken off the Internet or from newspapers or magazines—these sources are difficult to cite, and it is often time-consuming and expensive to gain permission to reproduce them.

2.3 Tables

Tables should be created in Microsoft Word (see Table 1). Tables should include a minimal amount of outlining or bold font to emphasize headings, totals, or other important points. Tables should be numbered separately from figures, and captions should appear above the text of the table.

Table 1: A sample table. Note caption above table.

Table text heading*

Table text	1940	1950	1960	1970	1980	1990	2000	%GW
Table text	15	441	340	926	196	522	83	97.4
Table text	64	944	626	173	356	171	516	99.9
Total	79	1385	966	1099	552	693	599	

* A footnote should look like this using 10 point Times New Roman.

%GW = percent groundwater

Be sure to describe any abbreviations or symbols, and, unlike in this table, be sure to note the units!

3.0 Units

Measurements should be in English units. Metric units may be included in parentheses after the English units.

All units of geologic time should conform to the most recent geologic timescale (Gradstein and others, 2004). A summary of this timescale is available from the International Commission on Stratigraphy’s website at <http://stratigraphy.org/chus.pdf>.

4.0 Citations and references

It is important to give credit where credit is due. Therefore, be sure to use the appropriate citations and include references in your paper.

4.1 In-text citations

Each piece of information you use in your report that comes from an outside source must be cited within the text using the author’s last name and the year of publication. If there are two authors, list the last

name of each followed by the year, and if there are more than two authors, list the last name of the first author followed by “and others” and the year. For example: the end of the Jurassic Period occurred approximately 145.5 million years ago (Gradstein and others, 2004).

4.2 References

All sources that are cited within the report should be listed at the end of the paper under the heading References. The references should follow the guidelines in “Suggestions to Authors of the Reports of the United States Geological Survey” (Hansen, 1991). These are available online at http://www.nwrc.usgs.gov/lib/lib_sta.html (a link to the chapter “Preparing references for Survey reports,” p. 234-241, is found here). Several examples of complete reference citations are listed at the end of these guidelines. Be sure that any citations that appear in tables or figures are included in the reference list. Also, before submitting the report, please check that all the citations in the report are included in the reference list and all references in the reference list are cited in the report. If at all possible, avoid web-based citations. These materials are often transient and therefore useless to future readers.

5.0 Submitting your report

Before you submit your report, proofread it. Look for spelling and grammatical errors. Also, check to see that you have structured the headings, paragraphs, and sentences in your paper so that it is easy to follow and understand (imagine you are a reader who does not already know the information you are presenting!).

6.0 Conclusions

Following the instructions above and providing accurate and readable text, tables, figures, and citations will help to make your report useful to readers. Scientists may read your report, as well as water planners, utility providers, and interested citizens. If your report successfully conveys accurate scientific information and explanations to these readers, we can help to create more informed decisions about the use, development, and management of water in the state.

7.0 Acknowledgments

Be sure to acknowledge the people and entities that assisted you in your study and report. For example: We would like to thank the Keck Geology Consortium, the American Society of Civil Engineers, and the Texas Bar CLE for providing examples to use in developing these guidelines. In addition, we appreciate Mike Parcher for providing information on how to create publication-quality graphics, Shirley Wade for creating the data used in sample Figure 1, and Ian Jones for providing sample Figure 3.

8.0 References

Gradstein, F.M., J.G. Ogg, and A.G. Smith, eds., 2005, A geologic time scale 2004: Cambridge, Cambridge University Press, 610 p.
Hansen, W.R., ed., 1991, Suggestions to authors of the reports of the United States Geological Survey (7th ed.): Washington, D.C., U.S. Government Printing Office, 289 p.
Tufte, E. R., 1983, The visual display of quantitative information: Cheshire, C.T., Graphics Press, 197 p.
Tufte, E. R., 1990, Envisioning information: Cheshire, C.T., Graphics Press, 126 p.
Tufte, E. R., 1997, Visual explanations: Cheshire, C.T., Graphics Press, 156 p.

9.0 Examples of references

- Arroyo, J. A., and Mullican, III, W. F., 2004, Desalination: *in* Mace, R. E., Angle, E. S., and Mullican, W. F., III, editors, *Aquifers of the Edwards Plateau: Texas Water Development Board Report 360*, p. 293-302.
- Bates, R. L., and Jackson, J. A., 1984, *Dictionary of geological terms*: Anchor Press/Doubleday, Garden City, New York, 571 p.
- Blandford, T. N., Blazer, D. J., Calhoun, K. C., Dutton, A. R., Naing, T., Reedy, R. C., and Scanlon, B. R., 2003, *Groundwater availability of the southern Ogallala aquifer in Texas and New Mexico—Numerical simulations through 2050: contract report by Daniel B. Stephens and Associates, Inc., and the Bureau of Economic Geology, The University of Texas at Austin to the Texas Water Development Board*, variably paginated.
- Fenneman, N. M., 1931, *Physiography of Western United States* (1st edition): New York, McGraw-Hill, 534 p.
- Hubert, M., 1999, Senate Bill 1—The first big bold step toward meeting Texas's future water needs: *Texas Tech Law Review*, v. 30, no. 1, p. 53-70.
- Kunianski, E. L., 1989, *Precipitation, streamflow, and baseflow in West-Central Texas, December 1974 through March 1977*: U. S. Geological Survey Water-Resources Investigations Report 89-4208, 2 sheets.
- Mace, R. E., Chowdhury, A. H., Anaya, R., and Way, S.-C., 2000, *A numerical groundwater flow model of the Upper and Middle Trinity aquifer, Hill Country area*: Texas Water Development Board Open File Report 00-02, 62 p.
- Maclay, R. W., and Land, L. F., 1988, *Simulation of flow in the Edwards aquifer, San Antonio Region, Texas, and refinements of storage and flow concepts*: U. S. Geological Survey Water-Supply Paper 2336, 48 p.
- For more examples of references, see p. 239-241 of “Suggestions to Authors of the Reports of the United States Geological Survey” at http://www.nwrc.usgs.gov/lib/lib_sta.html.

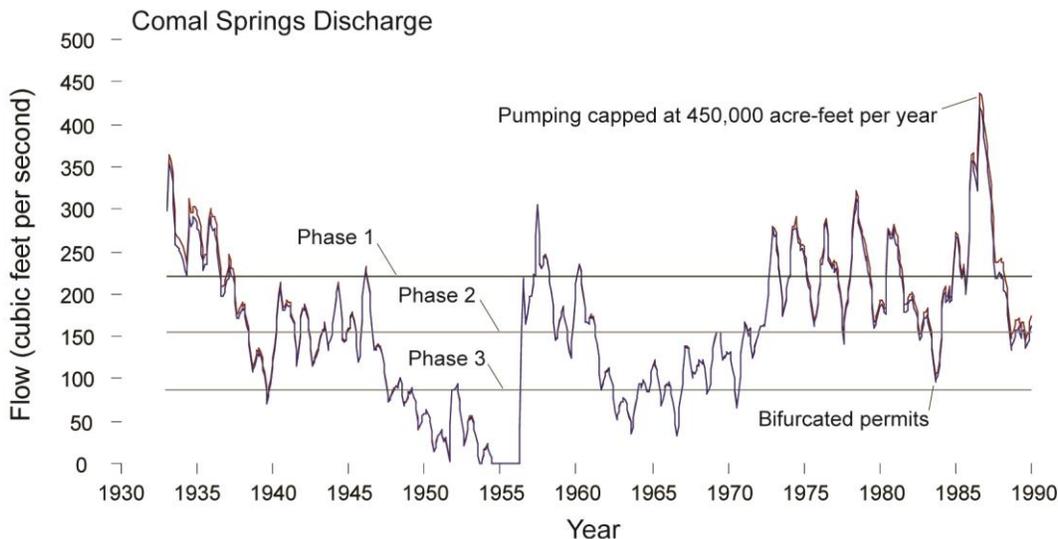


Figure 1. A sample figure showing only the information needed to help the reader understand the data. Font size for figure callouts or labels should never be less than 6 point.

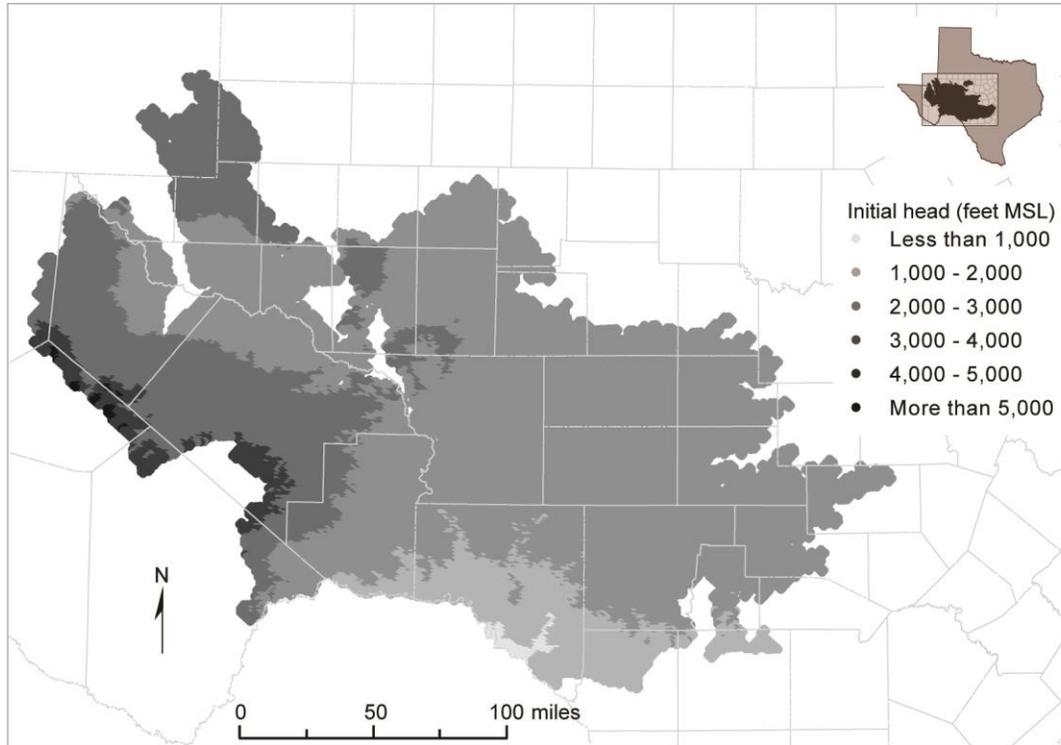


Figure 3. Initial hydraulic heads used in model simulations for layer 1. Note the use of grayscale shading to show differences.

EXHIBIT E
TWDB Guidelines for a Progress Report

Texas Water Development Board Contractors are required by their contracts to provide Progress Reports usually with the submission of an invoice/payment request.

The progress report should contain the following standard elements:

- Date: Date the memo is sent
- To: Name and position of the reader
- From: Name and position of the writer

Subject: TWDB Contract Number and a clear phrase that focuses the reader's attention on the subject of the memo

Work Completed: (The next section of a progress report explains what work has been done during the reporting period. Specify the dates of the reporting period and use active voice verbs to give the impression that you or you and your team have been busy) For Example:

- Task 1: Completed 3 draft chapters and all appendices. Met with sub consultants on their chapters.
- Task 2: Completed sample collection throughout river reach.
- Task 3: No work completed in reporting period.

Problems:

If the reader is likely to be interested in the glitches you have encountered along the way, mention the problems you have encountered and explain how you have solved them. If there are problems you have not yet been able to solve, explain your strategy for solving them and give tell the reader when you think you will have them solved.

EXHIBIT F
HUB SUBCONTRACTING PLAN PROGRESS ASSESSMENT REPORT

Use current form located at:

<http://www.window.state.tx.us/procurement/prog/hub/hub-forms/>