

ATTACHMENT B

AGREEMENT BETWEEN  
GREAT BASIN UNIFIED AIR POLLUTION CONTROL DISTRICT  
AND STATE OF CALIFORNIA, STATE LANDS COMMISSION  
FOR THE PROVISION OF  
VEGETATION RESEARCH AND DEVELOPMENT SERVICES

TERM: From: July 1, 1992 To: June 30, 1993

SCHEDULE OF FEES, TRAVEL AND PER DIEM

Billing and Payment:

State shall submit to the District, no more than once a month, an itemized statement of all hours spent by State and its subcontractors in performing services and work described in Attachment A. This statement will identify the date on which the hours were worked and an itemization of any materials, travel or per diem expenses. Upon timely receipt of the statement by the fifth day of the month, District shall make payment to the State by the last day of the month. Payments shall be made according to the following schedule:

PROJECT I - SALT AND NUTRIENT DYNAMICS IN VEGETATION, SOIL AND  
GROUNDWATER OF THE OWENS PLAYA SYSTEM

Personnel

Post-graduate research associate - <u>2081</u> hrs. @ \$ <u>15.00</u> /hr.	\$31,215
Benefits (30%)	9,365
Undergraduate laboratory assistant - <u>545</u> hrs. @ \$ <u>5.50</u> /hr.	<u>2998</u>
Subtotal Personnel	\$43,578

Supplies and Services

Miscellaneous field equipment	250
Excavation (backhoe time) 20 hrs. @ \$50/hr.	1,000
Reagents and laboratory supplies	2,500
Filters	1,775
Chemical analyses	
Ion chromatography	2,500
ICP-MS	4,000
AA-graphite furnace	2,000
Plant digestions	<u>2,500</u>
Subtotal Supplies and Services	\$16,525

Travel (mileage and per diem)

Vehicle rental - <u>16</u> days @ \$45/day	\$720.00
Per diem - <u>37</u> days @ <u>\$75/day</u>	<u>2,775</u>
Subtotal Travel	\$3495
<u>Overhead (10%)</u>	<u>\$6,360</u>
<u>Total for Project I</u>	<u>\$69,958</u>

**PROJECT II - PHYSIOLOGICAL LIMITS OF PLANTS IN DESER. PLAYA ENVIRONMENTS**

Personnel

Post-graduate research associate - <u>2081</u> hrs. @ \$15.00/hr.	\$31,215
Benefits (30%)	9,365
Undergraduate laboratory assistant - <u>1181</u> hrs. @ <u>\$5.50/hr.</u>	<u>6,496</u>
Subtotal Personnel	\$47,076

Supplies and Services

Refurbish sand culture system	\$6,000
Chemicals for solutions	2,500
Sampling supplies, greenhouse supplies, plant propagation, and sample extraction	2,300
Chemical analyses (digests, ICP-MS, AA, )	6,000
Secretarial, publication charges, computing charges	<u>3,000</u>
Subtotal Supplies and Services	\$19,800

Travel (mileage, per-diem)

Vehicle rental - <u>15</u> days @ \$45/day	<u>\$675</u>
Per diem - <u>15</u> days @ \$75/day	<u>1,125</u>
Subtotal Travel	\$1,800

<u>Overhead (10% of Personnel, Supplies, Services &amp; Travel)</u>	<u>\$6,868</u>
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Equipment

CR-10 data logger, storage module, power supply and sensors to monitor sand culture greenhouse \$3,985\*

Pressure chamber for plant water extraction (for ionic analyses and water potential measurements) 1,250\*\*

Subtotal Equipment \$5,235

\*Note: Data logger will be purchased for use in this contract but will be turned over to Great Basin for use on future Owens Lake projects upon completion of this contract.

\*\*Note: This figure represents 50% of the cost of the chamber. The Contractor will be responsible for funding the remaining 50% as this equipment will remain with the Contractor upon completion of the work.

Total for Project II \$80,779

GRAND TOTAL FOR PROJECTS I and II \$150,737

## INTERAGENCY AGREEMENT

STD. 13 (REV. 9-89)

NUMBER

C 9176

## EXHIBIT "E"

THIS AGREEMENT is entered into this \_\_\_\_\_ day of \_\_\_\_\_, 19\_\_\_\_,  
by and between the undersigned State Agencies:

Set forth services, materials, or equipment to be furnished, or work to be performed, and by whom,  
time for performance including the terms, date of commencement and date of completion, and provision  
for payment per (1225 and 8752-8752.1 SAM.)

## Distribution:

- Agency providing services  
 Agency receiving services  
 Department of General Services  
 (unless exempt from DGS approval)  
 Controller

- I. The University agrees to provide all personnel, labor, materials and equipment necessary to perform the work described in a document entitled "Provision For Vegetation Research And Development Services" which is attached hereto and incorporated herein as Exhibit B to this Agreement.
- II. The State agrees to compensate the University a total amount not to exceed \$150,737.00 as consideration for the work performed and in accordance with the cost estimates contained in Exhibit C - Cost Proposal For Provision of Vegetation Research And Development Services hereto.
- III. For purposes of this Agreement the direct and indirect costs (with the indirect cost expressed as a percentage of direct costs) allowable for payment shall be as identified in this Agreement.
- IV. The following documents are hereby incorporated and made a part of this Agreement by reference:
- a. Exhibit A - Special Provisions.
- b. Exhibit B - Provision For Vegetation Research And Development Services.

(Continued on \_\_\_\_\_ sheets which are hereby attached and made a part hereof)

NAME OF STATE AGENCY RECEIVING SERVICES State Lands Commission CALLED ABOVE (SHORT NAME)	NAME OF STATE AGENCY PROVIDING SERVICES University of California, Davis CALLED ABOVE (SHORT NAME)
AUTHORIZED SIGNATURE ▷	AUTHORIZED SIGNATURE ▷
PRINTED NAME AND TITLE OF PERSON SIGNING	PRINTED NAME AND TITLE OF PERSON SIGNING
FUND NUMBER AND NAME	FUND NUMBER AND NAME

AMOUNT ENCUMBERED BY THIS DOCUMENT \$	PROGRAM/CATEGORY (CODE AND TITLE)	FUND TITLE	Department of General Services Use Only
PRIOR AMOUNT ENCUMBERED FOR THIS CONTRACT \$	(OPTIONAL USE)		
TOTAL AMOUNT ENCUMBERED TO DATE \$	ITEM	CHAPTER    STATUTE    FISCAL YEAR	
	OBJECT OF EXPENDITURE (CODE AND TITLE)		

I hereby certify upon my own personal knowledge that budgeted funds available for the period and purpose of the expenditure stated above.

T.B.A. NO. \_\_\_\_\_ B.R. NO. \_\_\_\_\_

SIGNATURE OF ACCOUNTING OFFICER \_\_\_\_\_ DATE \_\_\_\_\_

X

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- c. Exhibit C - Cost Proposal For Provision of Vegetation Research And Development Services
- V. In the event of an inconsistency in this Agreement, the inconsistency shall be resolved by giving precedence in the following order:
- a. Interagency Agreement/Form 13.
  - b. Exhibit A.
  - c. Exhibit B.
  - d. Exhibit C.

Exhibit A

Special Provisions  
State Lands Commission - University Of California  
Interagency Agreement

1. **Cost:** Upon completion of the work described in Exhibit B the SLC shall pay the University an amount equal to the University's cost of performance as computed in accordance with Section 8752 of the State Administrative Manual and in accordance with cost estimates as presented in Exhibit C, and in an amount not to exceed \$157,737.00.
  
2. **Payments & Invoices:**
  - a. Payment shall be made monthly upon receipt of an invoice and progress report in triplicate. With respect to the payment period completed, the invoice shall set forth in detail, in accordance with the contract budget, charges for direct costs and overhead costs, including employee fringe benefits; and an itemization of time expended, the classification of personnel involved in such time expenditure, and the salaries and wages for such personnel by monthly, weekly or hourly rates, as appropriate. The invoice shall also contain an itemization of all travel and all equipment purchased from any source with SLC funds, or procured from the State, including the type of equipment, serial number and cost. Any reimbursement for travel expenses incurred under this agreement shall not exceed the rates established by the State Department of Personnel Administration regulations for civil service employees. Nothing herein contained shall preclude advance payments pursuant to Article 1, Chapter 3, Part 1, Division 3, Title 2 of the Government Code.
  
  - b. Copies of all invoices shall be sent to Great Basin Unified Air Pollution Control District as follows:

Mr. Ted Schade  
Great Basin APCD  
157 Short St., Suite 6  
Bishop, CA 93514

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3. Audits:

a. The University shall maintain books, records, documents, and other evidence pertaining to the reimbursable costs, and any matching costs and expenses, and hold them available for audit and inspection by the Auditor General for a minimum of four (4) years from the termination or completion of this Agreement.

b. The University grants the SLC, upon reasonable prior notice and identification of materials to be examined, permission to examine University records pertinent to direct costs payable under this Agreement solely for the purpose of determining that the direct costs are consistent with those identified in this Agreement.

4. Retentions: The SLC may withhold final payment of an amount not to exceed ten (10) percent of the total agreement cost until completion of all work and submission to the SLC of all reports required by the Agreement.

5. Term & Time Of Performance: Performance shall not commence until final approval of this Agreement by all necessary State agencies. This Agreement shall be effective from the last of the approval dates and shall remain in effect until June 30, 1993 unless it is terminated sooner under the provisions of this Agreement.

6. Termination: Each party shall have the right to terminate this Agreement at its sole discretion upon thirty (30) days written notice to the other party. In case of early termination by the SLC, a final payment shall be made to the University upon receipt of an invoice in triplicate and report in triplicate covering services to the termination date. Such payment shall be for all incurred costs including time expended, equipment purchased or utilized to termination at the actual rates incurred including proration of indirect costs. However, the total amount shall not exceed the total contract amount.

7. Information & Research Data:

a. The University prepare and submit to the SLC the reports described in Attachment A to the Joint Powers Agreement at the times designated in said Attachment A. Copies of such reports

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shall be submitted to the Great Basin Unified Air Pollution Control District at the same time as those to the SLC.

b. The SLC shall have the right at reasonable times during the term of this Agreement to inspect and reproduce any written or printed matter developed under this Agreement by the University.

c. Any information or research data generated under this Agreement shall become the joint property of the University and the SLC.

d. The University shall be entitled to release or make available reports, information or other data prepared or assembled by it pursuant to this Agreement in scientific journals and other publications and at scientific meetings, provided however, that a copy of the publication shall be submitted to the SLC for review and comment forth-five (45) days prior to such publication. Further, the University shall place a disclaimer statement in a conspicuous place in all such reports or publications. Nothing in this provision shall be construed to limit the right of the SLC to release information obtained from the University or to publish reports, information or data in SLC publications.

8. Designation of Representatives: The SLC and the University each hereby name a representative who shall represent it during the term of this Agreement. The SLC or the University may change its representative by notifying the other as provided for in Paragraph 10.

The SLC's representative for technical matters shall be:

Mr. Steve Sekelsky.  
State Lands Commission  
1807 13th Street  
Sacramento, CA 95814

The SLC's representative for contractual matters shall be:

Mr. David Brown.  
State Lands Commission  
1807 13th Street  
Sacramento, CA 95814

The University's representative for technical matters shall be:

Mr. Randy Dahlgren  
University of California, Davis  
Department of Land Air Water Resources  
Davis, CA 95616

The University's representative for contractual matters shall be:

Ms. Louise Ivey.  
Office of Research  
410 Mrak Hall  
University of California, Davis  
Davis, CA 95616

9. **Notice:** Any notice, communication, amendments, additions, or deletions to this Agreement, including change of address of either party during the term of this Agreement, which the SLC or the University shall be required or may desire to make shall be in writing and may be personally served or sent by prepaid first class mail to the respective parties as follows:

SLC: Owens Lake Project Coordinator  
State Lands Commission  
1807 13th Street  
Sacramento, CA 95814

University: University of California, Davis  
Department of Land Air Water Resources  
Davis, CA 95616

11. **Disputes:** Except as otherwise provided in this Agreement, any dispute concerning a question of fact arising under or relating to the performance of this Agreement which is not disposed of by agreement shall be decided by the SLC's representative, who shall reduce his decision to writing and shall transmit a copy thereof to the University. The decision of the SLC's representative shall be deemed final and conclusive unless, within thirty (30) days from the date of receipt of such copy, the University transmits to the SLC a written appeal. Said appeal shall be supported with specificity. In connection with any appeal proceeding under this clause, the University shall be afforded an opportunity to be heard before the State Lands Commission and to offer evidence in support of its appeal. Pending the final resolution of any such dispute, the University shall proceed diligently with the performance of this Agreement and in accordance with the written decision of the SLC's

representative which is the subject of the University's appeal.

12. Defense And Indemnification: University shall defend, indemnify and hold the SLC, its officers, employees and agents harmless from and against any and all liability, loss, expense (including reasonable attorneys' fees), or claims for injury or damages arising out of the performance of this Agreement but only in proportion to and to the extent such liability, loss, expense, attorneys' or claims for injury or damages are caused by or result from the negligent or intentional acts or omissions of University, its officers, agents, or employees.

SLC shall defend, indemnify and hold University, its officers, employees and agents harmless from and against any and liability, loss, expense (including reasonable attorney's fees), or claims for injury or damages arising out of the performance of this Agreement but only in proportion to and to the extent such liability, loss, expense, attorneys' fees, or claims for injury or damages are caused by or result from the negligent or intentional acts or omissions of SLC, its officers, agents, or employees.

EXHIBIT B

PROVISION OF VEGETATION  
RESEARCH AND DEVELOPMENT SERVICES

SCOPE OF WORK

PROJECT I - SALT AND NUTRIENT DYNAMICS IN VEGETATION, SOIL AND  
GROUNDWATER OF THE OWENS PLAYA SYSTEM

The state shall perform the following tasks relating to an investigation of the salt and nutrient dynamics of the vegetation, soil and groundwater found on and around the Owens Dry Lake in Inyo County, California.

OBJECTIVES

1. Characterize i) salt composition and distribution and ii) nutrient pools on the bare playa and in natural and man-made dunes with and without vegetation.
2. Relate salt concentrations and composition to root and foliage elemental concentrations. Evaluate potential toxicities and deficiencies in conjunction with Project II.
3. Determine elemental concentrations in shallow groundwater and evaluate this water as a potential source of irrigation water.

TASKS

The following tasks set forth the basic work effort necessary to complete the project. Prior to the actual start of any field or laboratory work, task protocols shall be developed that describe in detail the data collection and data analysis to be performed.

1. Perform a Literature Search

A literature search to collect existing data on soil, vegetation and groundwater chemistry/hydrology of Owens Lake and other similar sites will be conducted prior to the experiments. This effort will take place in conjunction with the literature search performed in Project II.

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2. Identify Intensive Study Sites

Working with Great Basin staff and consultants, and with the Project II vegetation investigators, a series of sites will be selected as intensive study locations. These locations will include stable dunes, both man-made and naturally occurring, bare playa, and transitional gradients from vegetated to non-vegetated surfaces. Preliminary selections for the study locations include the Phase II Keeler/Swansea dune, the old pipeline dune, the Dirty Socks dunes, the vegetated dunes north of Keeler and representative bare playa sites in sand, clay and mixed soils.

3. Survey Soil Salt Distribution

An electromagnetic detection device capable of measuring salinity profiles down to 4 to 5 feet deep (EM Model 38 electromagnetic detector) will be used to survey salt distribution in the upper 4 to 5 feet at each location. This preliminary study will be used to develop a salinity map showing spatial variability at each location.

4. Trench Study Sites

Based on the preliminary study of salt spatial variability, representative sites will be trenched and samples collected as a function of depth and horizontal distance along the trench. Where possible, this trenching will be performed to characterize gradients from vegetated to non-vegetated, or from wet to dry sites. Trenching will be performed with a backhoe and will generally be perpendicular to and as deep as the dunes. No backhoe trenching will be performed in areas designated by the project negative declaration as sensitive. All trenches will be backfilled and restored to their original condition.

5. Analyze Water Chemistry

Water extracts will be made for each sample and the following chemical parameters measured: pH, EC (electrical conductivity), Li, Sr, Ca, Mg, Na, K, NH<sub>4</sub>, F, Cl, Br, NO<sub>3</sub>, PO<sub>4</sub>, SO<sub>4</sub>, B, Se, As, and Mo. Representative samples will also be screened using an inductively coupled plasma mass spectrometer (ICP-MS) to determine if other elements are present in detectable quantities. Only those elements that exceed detection limits and are important from a plant or toxicological perspective will be analyzed on all the samples. laboratory quality assurance/quality control

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protocols will follow EPA approved methods including spikes, blind samples, reference materials, setting of control limits, criteria for rejection, and data validation methods.

6. Correlate Soil and Water Chemistry to Plant Uptake

In collaboration with the Project II vegetation subgroup, foliage and roots will be collected along the trench in vegetated dunes to determine chemical concentrations. The vegetation subgroup will map root distribution and the relationship between soil chemistry and plant nutrient/toxic element distribution will be evaluated (see Project II Tasks). Plant samples will be digested using nitric acid. Both nutrient and potentially toxic element concentrations will be measured. The elemental concentrations in the plant materials will be correlated with the nutrient and salt concentrations in the soil solution to determine plant uptake mechanisms and toxicity avoidance mechanisms.

7. Monitor Shallow Groundwater Chemistry

At each study location, shallow groundwater monitoring stations will be installed in conjunction with the network being installed by Great Basin. Shallow groundwater will be collected and chemically analyzed to permit comparison of the chemistry of the plant and soil material to the water that supplies it. This work will be coordinated with hydrologic experts working with the Great Basin APCD in order to derive estimates of groundwater discharge and an estimation of the degree of concentration of salts and toxic ions that occur through evaporation and transpiration. The relationship of shallow groundwater to interstitial pore water in the unsaturated zone will be developed to determine the influence of shallow ground water on dune salt composition. Shallow groundwater samples will be collected throughout the year in order to observe seasonal changes that may occur. Sufficient data will be collected to evaluate the feasibility of a regression model for predicting water chemistry as a function of electrical conductivity values for a given source area. Water chemistry analysis will be performed for those parameters indicated under #5 above (pH, EC, Li, Sr, Ca, Mg, Na, K, NH<sub>4</sub>, F, Cl, Br, NO<sub>3</sub>, PO<sub>4</sub>, SO<sub>4</sub>, B, Se, As, and Mo).

8. Evaluation of Results for Study Sites

The state will synthesize and interpret results of vegetation, soil and groundwater analyses in an effort to identify the microsite environmental conditions associated

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with bare playa and man-made, natural, vegetated and non-vegetated dunes. Results and their interpretation will be given to Great Basin for review and comment. A final project report will be prepared and submitted to Great Basin no later than June 30, 1993.

<u>SCHEDULE</u>	<u>Start</u>	<u>Finish</u>
1. Perform a Literature Search	7/92	9/92
2. Identify Intensive Study Sites	7/92	8/92
3. Survey Soil Salt Distribution	7/92	10/92
4. Trench Study Sites	7/92	10/92
5. Analyze Water Chemistry	10/92	3/93
6. Correlate Chemistry to Plant Uptake	3/93	6/93
7. Monitor Shallow Groundwater Chemistry	7/92	6/93
8. Evaluation of Results For Study Sites	10/92	6/93

PROJECT II - PHYSIOLOGICAL LIMITS OF PLANTS IN DESERT PLAYA ENVIRONMENTS

The state shall perform the following tasks relating to an investigation of the physiological limits of plants found on and around the Owens Dry Lake in Inyo County, California.

OBJECTIVES

1. To determine the tolerance limits to NaCl, NaSO<sub>4</sub>, and borate individually for a suite of species that occur naturally on dune or playa habitats at Owens Lake.
2. To determine how much the levels of tolerance of the most tolerant Owens Lake species, selected based on the results of objective 1, above, and field observations, are reduced when sodium, chloride, sulfate and borate are provided in combination.
3. To determine the influence of increased Ca/Na activity ratio on the levels of tolerance to sodium, chloride, sulfate, and borate.
4. To relate the results of the greenhouse studies of objectives 1, 2 and 3 to the actual chemical environment of roots of plants

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growing naturally in playa and dune habitats at Owens Lake.

## TASKS

The following tasks set forth the basic work effort necessary to complete the project. Prior to the actual start of any field or laboratory work, task protocols shall be developed that describe in detail the data collection or data analysis to be performed.

### 1. Perform a Literature Search

A literature search regarding the tolerances of species native to Owens Lake will be conducted prior to the experiments, which may result in modification of the solution concentration ranges selected.

### 2. Collect Plants

Plant materials to be used will be collected at Owens Lake. When possible, both seedlings and more mature plants derived from transplants, cuttings or rhizome segments, as appropriate, would be utilized and evaluated. Potential species to be evaluated include *Distichlis spicata*, *Sarcobatus vermiculites*, and *Atriplex parryii*. Final decisions on the species to be tested will be based on field observations of species abundance and distribution in the most stressful habitats, literature review, and suitability of species for use in ecosystem development efforts. The number of species that can be evaluated is constrained by the number of test containers in the greenhouse sand-culture system. Five replicates, the minimum number acceptable, of each species in each treatment will limit the list to six species.

### 3. Collect and Map Soil, Roots and Shoots

Soil samples, root and shoot materials will be collected at Owens Lake and will be coordinated with the work to be performed in Project I. Root profiles will be mapped and correlated with vegetation at the soil/vegetation sampling sites. Roots will be mapped along the trench profile walls excavated for the soil chemistry study. Mapping will include counting fine roots crossing the plane of the profile wall in 5-10 10x10-cm quadrats in each 10-cm soil layer to obtain a semi-quantitative measure of the vertical distribution of fine root density. Root and soil samples will be taken at representative depths through the rooted zone. This work will be coordinated with the work to be performed in Project I.

### 4. Analyze Soil and Plant Tissue

Chemically analyze field-collected soil and plant tissue samples. Coordinate with work performed in Project I.

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5. Compile and Analyze Root Profile Wall Maps

6. Set-up Greenhouse Experiments

The plants for all experiments will be propagated in a greenhouse adjacent to the sand-culture greenhouse. Plants will be adequately supplied with water and nutrients, both during propagation and experimental periods. If possible, seed germination and initial growth (3-4 weeks) will be evaluated simultaneously with longer treatment of more mature plants planted in the same container. The containers' size (30 cm diameter) will be large enough for these evaluations to be done simultaneously without plant-plant interference. The greenhouse experiments will utilize a sand-culture system with programmable control of the root solution composition. This system is currently available in a greenhouse in the Orchard Park facility at the UC Davis campus but will require some refurbishment before it can be used for the Owens Lake experiments. Refurbishment will consist of valve replacements, replumbing and replacing pots. After refurbishment, the system will consist of 180 35-liter pots and a nutrient solution supply system that can be programmed to provide 6 different treatments (nutrient/salt solutions). Environmental conditions and operation of the solution supply system will be monitored with a CR-10 data logger system (Campbell Scientific, Inc. Logan, UT) that is included in the budget.

7. Test Tolerance Limits of Plants

Greenhouse experiments with species and solution concentration as main factors will be conducted to determine the tolerance limits to NaCl, NaSO<sub>4</sub>, and borate individually for the selected species. Include six NaCl levels ranging from 0.5 mM (milli Moles) to 1000 mM and six boron levels ranging from 0.05 mM to 10 mM. Higher maximum concentrations of both salt and boron may be necessary to define the upper limits of tolerance of the most tolerant species at Owens Lake. Concentrations to be used in these experiments, and for the sulfate experiment, will be adjusted as necessary to span the range of soil solution concentrations found in the substrates adjacent to the roots of plants growing in playa and dune habitats at Owens Lake.

Based on the results of the individual concentration tests, a factorial set of treatments including salt and borate in combination will be conducted to address how much the levels of tolerance of the most tolerant species are reduced. The concentrations to be used will depend on the results of the first two experiments and the soil solution concentrations in Owens Lake habitats. Additional interactions will be studied as time permits.

To determine the influence of increased Ca/Na activity ratio on the levels of tolerance to sodium, chloride, sulfate and borate, interactions of the toxic elements with calcium activity will then be investigated. A factorial set of treatments with stressful levels of salt or borate combined with three Ca/Na activity ratios will be conducted. The Ca/Na

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activity ratios used will range upward from the very low values in the soil solutions at Owens Lake. An appropriate computer model will be used to develop the specific nutrient/salt solution concentrations for this factorial experiment.

#### 8. Evaluation of Experimental Treatments and Field Data

All experiments will utilize a randomized block design to account for gradients in the environmental conditions in the greenhouse. In all experiments the concentrations of toxic ions will be increased slowly over several weeks to the target levels to prevent osmotic shock and allow time for acclimation to the stress. Plant performance in all experiments will be measured both during the growth period and with a final harvest of the experimental plants. The measurements proposed will be used to make preliminary assessments of some of the key mechanisms of salinity tolerance. Measurements will include: survival; rate of leaf production and growth; biweekly predawn and midday plant water potentials; sodium, chloride and borate content of the xylem sap at biweekly midday and predawn measurements; total shoot and root production; total root length produced; nutrient, salt and boron content of leaves and roots. During the growth period and at the end of the experiments evidence of salt excretion (e.g. by *Distichlis spicata*) or accumulation in epidermal trichomes will also be determined. The nutrient, salt and boron content measurements taken for the greenhouse plants will be compared with the same measurements taken for the field collected plants. The growth period of each experiment will be limited to approximately two months.

An analysis and synthesis of field and lab results will be performed. Analysis of the results of the greenhouse experiments will be conducted using the SAS statistical analysis computer program (Statistical Analysis Systems) and all data will be transformed as necessary to obtain homogeneity of variances and adequate approximation to normality. Field results will be summarized with descriptive statistics for comparison to the treatment solutions used in the greenhouse.

Results and their interpretation will be given to Great Basin for review and comment. A final project report will be prepared and submitted to Great Basin no later than June 30, 1993.

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MINUTE PAGE	1032

SCHEDULE

	<u>Start</u>	<u>Finish</u>
1. Perform a Literature Search	7/92	9/92
2. Collect Plants	7/92	8/92
3. Collect and Map Soil, Roots and Shoots	7/92	10/92
4. Analyze Soil and Plant Tissue	9/92	1/93
5. Compile and Analyze Root Profile Wall Maps	9/92	1/93
6. Set-up Greenhouse Experiments	7/92	4/93
7. Test Tolerance Limits of Plants	8/92	5/93
8. Evaluation of Treatments and Field Data	1/93	6/93

EXHIBIT C

COST PROPOSAL FOR THE PROVISION OF  
VEGETATION RESEARCH AND DEVELOPMENT SERVICES

SCHEDULE OF FEES, TRAVEL AND PER DIEM

PROJECT I - SALT AND NUTRIENT DYNAMICS IN VEGETATION, SOIL AND  
GROUNDWATER OF THE OWENS PLAYA SYSTEM

Personnel

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Subtotal Personnel \$43,578

Supplies and Services

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Reagents and laboratory supplies	2,500
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Ion chromatography	2,500
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AA-graphite furnace	2,000
Plant digestions	<u>2,500</u>

Subtotal Supplies and Services \$16,525

Travel (mileage and per diem)

Vehicle rental - <u>16</u> days @ \$45/day	\$720.00
Per diem - <u>37</u> days @ <u>\$75</u> /day	<u>2,775</u>

Subtotal Travel \$3495

COVER PAGE 163.15  
10/27

<u>Overhead (10%)</u>	<u>\$6,360</u>
<u>Total for Project I</u>	<u>\$69,958</u>

**PROJECT II - PHYSIOLOGICAL LIMITS OF PLANTS IN DESERT PLAYA ENVIRONMENTS**

Personnel

Post-graduate research associate - <u>2081</u> hrs. @ \$ <u>15.00</u> /hr.	\$31,215
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Subtotal Personnel	\$47,076

Supplies and Services

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Chemicals for solutions	2,500
Sampling supplies, greenhouse supplies, plant propagation, and sample extraction	2,300
Chemical analyses (digests, ICP-MS, AA, )	6,000
Secretarial, publication charges, computing charges	<u>3,000</u>
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Subtotal Travel	\$1,800

<u>Overhead (10% of Personnel, Supplies, Services &amp; Travel)</u>	<u>\$6,868</u>
---------------------------------------------------------------------	----------------

SLC-UC VEGETATION CONTRACT - 9176  
10-7

Equipment

CR-10 data logger, storage module, power supply and sensors to monitor sand culture greenhouse	\$3,985*
Pressure chamber for plant water extraction (for ionic analyses and water potential measurements)	<u>1,250**</u>
Subtotal Equipment	\$5,235

\*Note: Data logger will be purchased for use in this contract but will be turned over to Great Basin for use on future Owens Lake projects upon completion of this contract.

\*\*Note: This figure represents 50% of the cost of the chamber. The Subcontractor will be responsible for funding the remaining 50% as this equipment will remain with the subcontractor upon completion of the work.

Total for Project II \$80,779

GRAND TOTAL FOR PROJECTS I and II \$150,737

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