DF-55 4-74 0009

BID RESULTS AVAILABLE
THURSDAYS 1:00 P.M. TO 4:30 P.M
533-4615

STATE OF UTAH
BID PROPOSAL FORM

DEPARTMENT OF FINANCE

DIVISION OF PURCHASING

Date March 7, 1983

Req. No. 584202

Dept. NATURAL RESOURCES AND ENERGY

All inquiries and correspondence to be addressed to the attention of:

Finance Department
Division of Purchasing
147 State Capitol Building
Salt Lake City, Utah 84114

Bids must be submitted on this proposal form.

Proposal to be returned in enclosed self-addressed envelope, not later than 10:30 a.m. March 22, 1983 at which time all proposals will be publicly opened and read.

Quote Prices F.O.B. 4241 State Office Building, Salt Lake City UT 84114

ITEM NO.	QUANTITY	DESCRIPTION	UNIT PRICE	TOTAL
		Brand names and model numbers must be furnished with bid.		
		Technical assistance in permit review related to Coal Mining and Reclamation Permanent Program.		$19980.00
		See attached Statement of Work		

IT IS THE RESPONSIBILITY OF THE VENDOR TO IDENTIFY ANY PROPRIETARY INFORMATION REGISTERED UNDER THIS SOLICITATION.

PLEASE NOTE: ANY VENDOR THAT DOES NOT REPLY WITH A POSITIVE BID REPLY RECEIVED BY THE DATE AND TIME SHOWN ABOVE OR A NO BID REPLY RECEIVED NO LATER THAN THE FRIDAY FOLLOWING, SIGNED BY THE REPRESENTATIVE AND GIVING THE COMPANY NAME, WILL BE DELETED FROM THE FILE.

Cash discounts of less than 30 days will not be considered in awarding.

IMPORTANT: PLEASE READ
FAILURE TO SIGN THIS PROPOSAL IN INK WILL RESULT IN THIS BID BEING REJECTED.

Cash discount terms _____

quested Delivery Date See Attached

quote number of calendar days required _____
ery after receipt of purchase order.

_____ days.

Company Native Plants, Inc.

Address 360 Wakara Way

Salt Lake City, UT 84108
Zip Code

Signature Peter D. Meldrum

Title Peter D. Meldrum, C.E.O.

Apparent Completeness Review, Determination of Completeness, and Technical Analysis for the Emery Deep Mine, ACT/015/015

Requisition No. 584202

Cost Proposal

Submitted To:

State of Utah
Division of Oil, Gas, and Mining
4241 State Office Building
Salt Lake City, Utah 84114

Submitted By:

Native Plants, Inc.
360 Wakara Way
University Research Park
Salt Lake City, Utah 84108

and

J.F. Sato & Associates, Inc.
5898 So. Rapp St.
Littleton, Colorado 80120

Native Plants, Inc. in conjunction with J.F. Sato & Associates, Inc. has developed this proposal for the formulation and completion of a detailed Apparent Completeness Review (ACR), a Determination of Completeness (DOC), and Technical Analysis (TA) of the following mining and reclamation plan: Emery Deep Mine, Consolidation Coal Company, ACT/015/015, Emery County, Utah. We agree to follow the "General Outline for Technical and Environmental Analyses for Mine Plans" attached to the Statement of Work with the following exception: all references to the 816 (surface operations) regulations have been changed to the 817 (underground operations) regulations. Otherwise, all terms and conditions of the contract, as specified in the Statement of Work (Requisition No. 584202), are incorporated into this task order proposal, including the time schedule (page 6) and special instructions (pages 3-5).

To provide the expertise necessary to carry out this task order, a team consisting of a plant ecologist, a range scientist, a soil scientist, and a wildlife biologist from Native Plants and a hydrologist, a geologist, and a civil engineer from Sato will be provided.

DELIVERABLES

Our cost estimate is based on providing the following deliverables:

Phase I 1) A Draft and Final ACR of the Emery Deep Mine's mining and reclamation plan for:

a) vegetation

b) soils

c) fish and wildlife

d) prime farmland

e) land use

f) reclamation

g) surface water hydrology

h) ground water hydrology

i) alluvial valley floors

j) cumulative hydrologic impact (no modelling)

k) geology

l) drainage structures and sedimentation ponds

m) disposal of underground development waste

n) backfilling and grading

o) roads/transportation

p) bonding

q) subsidence

r) blasting

s) miscellaneous compliance

2) One professional from Native Plants to attend a briefing session and on-site inspection with DOGM personnel.

Phase II

3) Two professionals, one from Native Plants, one from Sato, to attend a meeting with DOGM personnel and the applicant.

4) A Draft and Final Determination of Completeness for the disciplines covered in item (1) above.

Phase III

5) A Draft Technical Analysis for the disciplines outlined in item (1) above.

6) Two professionals, one from Native Plants, one from Sato, to attend a meeting with DOGM.

7) A Final Technical Analysis for the disciplines outlined in item (1) above.

TECHNICAL APPROACH

Vegetation/Reclamation/Land Use

Methodology and sample adequacy of the baseline survey will be specifically examined for acceptability and accuracy in light of DOGM guidelines and requirements. The feasibility of the reclamation plan and the choice of revegetation procedures and materials will be assessed in light of the environmental conditions found at the Emery Deep Mine, the past land uses of the mine site, and the proposed post-mining land use objectives.

Soils/Prime Farmland

Data collection procedures used during the soil survey, topsoil availability and quality, and potential soil-related reclamation problems will be evaluated. Special attention will be given to the prime farmlands issue in light of the extensive use of flood irrigation in the vicinity of the mine site.

Fish and Wildlife

Information collected during the baseline survey will be assessed for its accuracy and used to identify the extent of critical wildlife habitat and the existence of threatened and endangered plant or wildlife species on the permit area. Mitigation measures taken during and after mining will also be evaluated for adequacy.

Surface and Ground Water Hydrology

The existing surface water monitoring program and the resulting data will be analyzed with the mining plan to determine impacts to the hydrologic balance. A powerful ground-water model is already being used in the mining and reclamation plan. This model was developed by the U.S. Geological

Survey specifically for the Emery Deep Mine. We will check the results of the model.

Alluvial Valley Floors

Quitchupah Creek is associated with a possible alluvial valley floor; a final determination will be required. Determination of an alluvial valley floor will be made based on an analysis of the data and in conjunction with the DOGM staff.

Cumulative Hydrologic Impact Assessment

This assessment will be based largely on the determination of probable hydrologic consequences for the Emery Deep Mine. In addition, impacts from the Emery Surface Mine and Hidden Valley Mine will be included.

Drainage Structures and Sedimentation Ponds

All analytical procedures used by the applicant will be checked and compliance with the regulation will be checked.

Disposal of Underground Development Waste

If applicable, all analytical procedures used by the applicant will be checked for accuracy and for compliance with the regulations.

Backfilling and Grading

The postmining topography will be checked against the premining topography and for compliance with the approximate original contour regulations.

Road/Transportation

All access and haul roads will be evaluated for accuracy of the procedures for road and drainage design. The prep plant will also be looked at as it relates to this section.

Bonding

All analytical procedures used by the applicant will be checked for accuracy and for compliance with the regulations.

Blasting

The procedures used by the applicant will be checked for compliance with the regulations.

Subsidence

The potential for and probable extent of subsidence as related to the determination of material damage will be evaluated, along with the applicant's proposed monitoring plan. Proposed mitigation measures will also be examined.

Miscellaneous Compliance

The applicant's compliance with other pertinent regulatory areas not covered by the above will also be assessed.

PROJECT MANAGEMENT

Thomas Guobis will be the project manager for the Native Plants/Sato project team. As such, he will be responsible for insuring the technical acceptability of the deliverables, maintaining report delivery schedules, and coordinating activities and communication among Native Plants, Sato, and DOGM. He will be assisted by Kevin Allred, the Native Plants group manager, and John Nadolski, the Sato group manager.

LABOR

An itemization of the projected labor, along with a breakdown of the tasks performed by each discipline, is presented in Table 1. Native Plants will provide technical expertise in vegetation, soils, wildlife, land use,

Table 1. Estimated Labor by Task

Task	Hours				
	ACR	DOC	DTA	FTA	TOTAL
Native Plants, Inc.					
1. Vegetation/Reclamation/Land Use					
A. Vegetation Information	4	2	10	4	20
B. Revegetation Plan	4	2	10	4	20
C. Pre- and Post-mine Land Use	2	2	8	2	14
2. Soils/Prime Farmland					
A. Soils Information	4	2	8	4	18
B. Topsoil Salvage/Protection/ Redistribution	4	2	8	4	18
C. Prime Farmland Determination	4	2	6	2	14
3. Fish and Wildlife Resources	10	2	16	4	32
4. Miscellaneous Compliance	4	2	6	2	14
5. Project Management Liaison w/DOGM, Native Plants, and Sato	20	16	28	16	80
6. Technical Advisor	4	2	6	2	14
TOTAL	60	34	106	44	244
J.F. Sato & Associates, Inc.					
1. Hydrology/Geology					
A. Protection of the Hydrologic Balance					
1. Surface Water	4	2	16	4	26
2. Ground Water	4	2	16	4	26
B. AVF	6	2	32	4	44
C. CHIA	2	2	12	4	20
D. Subsidence	2	1	4	1	8
2. Civil Engineering					
A. Surface Water Drainage	4	2	16	2	24
B. Sedimentation Ponds	4	2	16	2	24
C. Disposal of Excess Spoil	6	2	16	4	28
D. Backfilling & Grading	6	2	8	4	20
F. Roads	4	2	8	4	18
G. Subsidence	4	2	8	4	18
H. Blasting	2	1	3	1	7
3. Project Management Liaison w/DOGM and Native Plants	12	8	20	12	52
TOTAL	60	30	175	50	315
GRAND TOTAL	120	64	281	94	559

ACR: Apparent Completeness Review
DOC: Determination of Completeness
DTA: Draft Technical Analysis
FTA: Final Technical Analysis

and reclamation, while Sato will cover hydrology, ecology, and civil and mining engineering. Resumes for the key people involved in this project are attached. The technical staff assignments are listed below:

Assigned Discipline	Staff Member
Vegetation/Reclamation/Land Use	Kevin Allred/Tom Guobis, NPI
Soils/Prime Farmland	Don Wagenet, NPI
Wildlife	Susan White, NPI
Geology/Subsidence	Tsegaye Hailu, JFSA
Hydrology (Surface, Ground, AVF, CHIA)	John Nadolski, JFSA
Civil/Mining Engineering (including Backfilling & Grading, Roads, Subsidence & Blasting)	Steve Lowry, JFSA
Miscellaneous Compliance	Tom Guobis, NPI

COSTS

An itemized cost proposal is presented in Table 2.

CONFLICT OF INTEREST

Neither Native Plants nor Sato has worked for Consolidated Coal Company on the Emery Deep Mine within the last 3 years, nor do we presently anticipate any employment from these organizations.

Table 2. Estimated Cost

A. Native Plants, Inc.

Labor	Hours	Cost	
Plant Ecologist/Range Scientist	54	1586.00	
Soil Scientist	50	1469.00	
Wildlife Biologist	32	940.00	
Project Manager	94	2761.00	
Technical Advisor (senior scientist)	14	499.00	
		TOTAL LABOR	7255.00
Direct Expenses			
Travel		80.00	
Reproduction		200.00	
		TOTAL DIRECT EXPENSES	280.00
General & Administrative & Fixed Fee @ 25%		70.00	
		TOTAL ESTIMATED COST	7605.00

B. J.F. Sato & Associates, Inc.

Labor	Hours	Cost	
Hydrologist	124	3971.00	
Civil Engineer	139	4609.00	
Project Manager	52	1667.00	
		TOTAL LABOR	10247.00
Direct Expenses			
Long Distance Phone		165.00	
Travel		253.00	
Per Diem		28.00	
Reproduction		307.00	
		TOTAL DIRECT EXPENSES	753.00
General & Administrative @ 12.5%		1375.00	
		TOTAL ESTIMATED COST	12375.00

GRAND TOTAL ESTIMATED COST $19980.00

RELEVANT CORPORATE EXPERIENCE

RELEVANT EXPERIENCE

Native Plants, Inc.

Native Plants, Inc. has substantial experience in designing, as well as implementing, reclamation and land use plans for coal and non-coal mining operations in a variety of environmental settings in the West. The information derived from its pre- and post-mine soil and vegetation survey and monitoring programs has enabled Native Plants to refine its revegetation practices and to enhance its already extensive field expertise in plant and wildlife ecology, plant taxonomy, forest and range ecology and management, desert and tropical ecology, arctic and alpine ecology, and agroecology. This field expertise has also provided Native Plants with the ability to conduct and draft environmental assessments and environmental impact statements and to serve as expert witnesses in litigation. The company now has over 100 scientists and technical support staff, as well as extensive laboratory, greenhouse, and nursery facilities, giving it the ability to address all aspects of a reclamation program.

Our reclamation staff is nationally recognized and has contributed to advancing the state-of-the-art of disturbed land reclamation. Each year Native Plants sponsors an annual international workshop which focuses on such aspects of reclamation as "Plant Establishment on Harsh Sites", "Reclamation Techniques to Enhance Land Uses", "Reestablishing Wildlife Habitats", and "The Use of Native Plants in Landscape Design". Native Plants has compiled a "Reclamation Planting of Disturbed Sites" manual. Several staff members are active on a number of scientific panels and national committees (e.g., National Academy of Science, Dry Lands Research Institute, Institute for Land Rehabilitation, and the Society for Range Management).

Those projects that most clearly demonstrate Native Plants' ability to successfully complete this task order are attached.

In addition to Native Plant's direct experience, Tom Guobis, the proposed project manager, was the principal Plant Ecologist for OSM's Western Technical Center and project manager in the review of a number of MRP's. As an ecologist, Mr. Guobis worked closely with DOGM's vegetation staff in developing and implementing vegetation guidelines applicable to Utah mining conditions. Mr. Guobis has reviewed the vegetation/reclamation/land use sections of the MRP's on numerous underground coal mines in Utah. In so doing, he has become familar with the applicable Utah regulations and DOGM's approach to the preparation of an ACR and a TA. He is, therefore, well-grounded in the reclamation practices and concerns encountered in Utah coal mining operations.

Similarly, Kevin Allred, the proposed Native Plants' staff manager, has served as a range ecologist for OSM's Western Technical Center and is familar with the Utah regulatory and mining environment. He also has reviewed the revegetation/reclamation/land use sections of a number of Utah MRP's.

PROJECT NAME: Monitoring of Vegetation to Assess Impacts of the White River Shale Project

LOCATION: Bonanza, Utah

REFERENCE: White River Shale Co.

DESCRIPTION: Developed and implemented a monitoring program to assess impacts from oil shale processing and retorting. This program was approved by the Oil Shale Office and will be undertaken during the life of the White River Shale Project.

PROJECT NAME: Environmental Analysis of Natural Gas Pipeline

LOCATION: Coalville to Bountiful, Utah

REFERENCE: Mountain Fuel Supply Co.

DESCRIPTION: Prepared assessment of impact of pipeline on mountain vegetation and advised in selecting alternate alignment of reduced impact.

PROJECT NAME: Reclamation Plan for Proposed Drill Sites in the Henry Mountains, Utah

LOCATION: Henry Mountains, Utah

REFERENCE: Exxon Corporation

DESCRIPTION: Prepared a reclamation plan for revegetating several drill pads and access roads. The area is adjacent to a proposed wilderness area so aesthetic and visual concerns were important. The area is also in a very low rainfall area making revegetation using normal practices nearly impossible.

PROJECT NAME: Revegetation Design and Implementation for a Mobile Oil Drill Site

LOCATION: Las Vegas, Nevada

REFERENCE: Mobile Oil Corp.

DESCRIPTION: A revegetation plan was proposed to establish vegetation on a drill site in southern Nevada. Species were selected that could tolerate the extreme heat and drought conditions associated with the site. The plan was implemented and plants were installed. Irrigation was applied in small volumes to aid in establishment.

PROJECT NAME: Land Use and Reclamation Planning for Chevron Chemical, Vernal Operations

LOCATION: Vernal, Utah

REFERENCE: Chevron Resources

DESCRIPTION: Developed a reclamation plan and the land use objectives for Chevron Resources for their phosphate plant near Vernal. Detailed analyses of soils, vegetation, wildlife were performed and a reclamation plan developed to mitigate the effects of disturbance from both a biological and aesthetic viewpoint.

PROJECT NAME: Intermountain Power Project; Reclamation Design

LOCATION: Delta, Utah

REFERENCE: Intermountain Power Project

DESCRIPTION: Developed revegetation plans for a 10-mile railroad spur to keep windblown sand from tracks. Developed test plots to determine appropriate species and cultural practices necessary for plant establishment on disturbed sites.

PROJECT NAME: Revegetation Studies on Inactive Uranium Mill Tailing Sites

LOCATION: Western States and Pennsylvania

REFERENCE: Battelle Pacific NW Laboratories / DOE

DESCRIPTION: The projects involve consultation on vegetation and soil sampling at 25 inactive uranium mill tailings sites in the U.S. including design of the sampling program, data interpretation, species identification and selection of revegetation species. Additionally, the study will include test plot site selection, design, construction, and evaluation.

PROJECT NAME: Location and Environmental Impact of High Voltage Electric Power Line

LOCATION: N. Ogden to Kemmerer, Wyoming

REFERENCE: Utah Power and Light Co.

DESCRIPTION: Developed vegetation impact of powerline and alternate routes.

PROJECT NAME: Revegetation Plan for the Sheep Mountain Unit of the Carbon Dioxide Project

LOCATION: Southcentral Colorado

REFERENCE: ARCO Oil and Gas Company

DESCRIPTION: This project involves the development of a revegetation plan for 19 drill sites and associated pipelines, roads, transmission lines and soil disposal areas that will be used to transport CO_2 gas from subterranean deposits in Colorado to the oil fields in Texas. After the revegetation plan is developed, specifications will be prepared and constructors evaluated to implement the plan. During the four-year duration of the project, NPI will provide site inspections to ensure that the revegetation plan is properly implemented.

PROJECT NAME: A Revegetation Plan for the Proposed Pipeline through the San Juan National Forest

LOCATION: Near Mancos, Colorado

REFERENCE: Mid-America Pipeline Co.

DESCRIPTION: The project involved a site visit and development of a revegetation plan for areas to be disturbed by a proposed pipeline through the San Juan National Forest.

PROJECT NAME: Stabilization of Disturbed Sand Dune Areas in BLM Proposed Wilderness Areas

LOCATION: Northwest of Rock Springs, Wyoming

REFERENCE: Chevron, U.S., Inc., Western Geophysical and the BLM

DESCRIPTION: Approximately seven miles of sand dune vegetation was disturbed due to reconnaissance drilling and seismic work for gas and oil exploration in BLM proposed wilderness designed and implemented using selected seed mixes and containerized plants of adapted species for dune stabilization and to reduce visual impacts.

PROJECT NAME: An Evaluation of Revegetation Techniques for Reclaiming Oil Shale Lands

LOCATION: Colorado, Utah, and Wyoming

REFERENCE: Office of Technology Assessment, Washington, D.C.

DESCRIPTION: Project involved an evaluation of state-of-the-art techniques for reclaiming retorted and unretorted oil shales. Spent shale from various processes were chemically and physically characterized and their influence on plant growth was discussed. Potential problems in reclamation of oil shale lands under several scenarios were identified.

PROJECT NAME: Revegetation Study Plots for Steep Slopes and Coal Refuse Piles

LOCATION: Wattis, Utah

REFERENCE: Plateau Mining Co.

DESCRIPTION: Study plots were established at three locations to evaluate plant germination, growth, and establishment on steep slope areas, borrow areas, and coal refuse piles. Treatments included variations in species, density, fertilizer, mulch, and container grown plants. Plots will be monitored during the next few years to assess plant performance.

PROJECT NAME: Design and Implementation of Revegetation Plan for the Valley Camp Mine

LOCATION: Scofield, Utah

REFERENCE: Valley Camp of Utah, Inc.

DESCRIPTION: Cut slopes and recontoured areas were reseeded and container-grown plants were planted to control erosion and stabilize areas disturbed by activities associated with their underground mine. The revegetation plan was designed and implemented by NPI.

PROJECT NAME: Revegetation Plan - Alunite Properties

LOCATION: Beaver County, Utah

REFERENCE: Alumet, Cedar City, Utah

DESCRIPTION: Provided preliminary and final draft revegetation plans that were incorporated in the mine plan. The unique problems of this project led to a followup study and proposed joint venture between NPI and Alumet to create a desert nursery for seedlings and seed production.

PROJECT NAME: Environmental Impact Assessments for Bloomington and Soda Springs Phosphate Planning Units, Idaho

LOCATION: Caribou National Forest

REFERENCE: VTN Colorado

DESCRIPTION: Project involved determination of environmental inputs to the existing landscape from proposed phosphate developments in four areas of the Caribou National Forest. Specific responsibility included surveys of the vegetation and wildlife resources of the affected areas. Alternatives were suggested and the assessments were submitted to the Forest Service Energy Team responsible for the future planning within the Caribou National Forest.

PROJECT NAME: Expert Testimony in Litigation

LOCATION: Santa Fe, New Mexico

REFERENCE: Sunbelt Mining Co.

DESCRIPTION: Presented expert testimony in relation to reclamation feasibility for surface mine.

PROJECT NAME: Expert Testimony in Litigation

LOCATION: Santa Fe, New Mexico

REFERENCE: Consolidation Coal Co.

DESCRIPTION: Presented expert testimony in relation to reclamation feasibility for surface mining of Burnham Mine.

RELEVANT EXPERIENCE

J.F. Sato & Associates, Inc.

J.F. Sato & Associates has substantial experience that can be put to the direct benefit of the Utah Division of Oil, Gas, and Mining for the review of the Emery Deep Mining and Reclamation plan. The company has previously developed two state-of-the-art manuals for the Office of Surface Mining related to hydrology and sediment control. Further, Sato has provided assistance under the Small Operator Assistance Program in Colorado and New Mexico. As the attached letters of recommendations indicate, the OSM and the Colorado Mined Land Reclamation Division were satisfied with Sato's professional capabilities.

The firm has also worked on the hydrology and geomorphology study for the Castle Valley Rail Spur. This study covered the area from Price to near the Emery mine. Through this study, the firm developed an in-depth understanding of the area. A more detailed description of these projects and others are attached.

In addition to the firm's direct experience, John Nadolski, of Sato's staff, was the OSM coordinator to the Utah Division of Oil, Gas, and Mining. During this time, Mr. Nadolski developed an intimate understanding of the needs of the DOGM including their regulations and their approach to the preparation of their technical analysis. Mr. Nadolski also served as the Technical Project Officer for the OSM's ACR of the Emery Deep Mine. He, therefore, is already well acquainted with the specifics of that mining and reclamation plan, and therefore, Sato can pass on these savings in labor directly to the DOGM.

Hydrologic Study and Erosion Control Study for Castle Valley Branch Line

Under subcontract to Parsons Brinckerhoff, Quade and Douglas, J.F. Sato and Associates developed runoff estimates for drainage crossing associated with the 60 mile long branch line located near Price, Utah. The firm was also responsible for developing erosion control guidelines for the drainage crossing. Drainage problems varied from realignment of a stable channel, preventing filling in a culvert in an aggrading channel, and controlling excessive headcutting in a degrading channel. In some cases, gullies were over 50 feet in depth.

JFSA Staffing: G. Steve Lowry, Civil Engineering/Project Manager
Dr. Russ Sheperd, Geomorphology
John Nadolski, Hydrology

Clients: Parsons Brinkerhoff, Quade and Douglas

Study to Review and Analyze Approaches for Conducting Probable Hydrologic Consequences (PHCs) and Cumulative Hydrologic Impact Assessments (CHIAs) Associated with Surface Coal Mining Operations

This study for the Office of Surface Mining is in progress. Over 90 CHIAs and 100 PHCs for the coal producing states west of the Mississippi River have already been reviewed and an expansion of the scope of work to include the eastern states has been agreed upon in principle by the OSM. The final outcome will be a documentation, identification and analysis of methodologies used in CHIAs and PHCs nation wide. Data management and analysis are handled using an in-house computer.

Staffing: James Sato, Principal in Charge, P.E.
John Nadolski, Principal Investigator & Hydrologist
Tsegaye Hailu, Geology
Russell Shepherd, Geohydrology
Steve Lowry, Hydrology
Ginger Evans, Hydrology
Helen Weagraff, Environmental

Client: Office of Surface Mining

Environmental Assessment of Coal Mining in Northwest Georgia

This EIA was prepared for Region II of OSM under a stringent time constraint. The purpose of the EIA was to evaluate the environmental impacts, if any, of the Federal regulatory program that was to be implemented in Georgia. The study covered three counties in which contour, limited strip, and underground mining was practiced. Impacts on the hydrology, geology, soils, wildlife, socioeconomic structure, transportation system, air quality, recreation resources and archeological resources were evaluated.

Staffing: James F. Sato, Project Manager
G. Steve Lowry, Technical Team Leader, Hydrologist
Dr. Russ Shepherd, Geologist
Paul C. Deutsch, Soils
E.J. Smith, Socioeconomics

Client: Office of Surface Mining Region II

Determination of the Impact of Longwall Mining on the Hydrologic Balance

J.F. Sato & Associates was contracted by the Bureau of Mines to carry out this study. The purpose of the project was to describe and monitor the baseline hydrologic conditions for an area that will be mined by longwall techniques. To accomplish this, several monitor wells were drilled and completed, groundwater pump tests were used to determine the aquifer characteristics, detailed geologic logging and coring were used to determine overburden characteristics, and a three-dimensional, finite-difference groundwater model was used to simulate the pre-mining aquifer system. A regular monitoring program was also implemented. Other components of the study included surface

water investigations, on-site soil testing, water quality sampling, and establishing a weather station.

Staffing: Ginger Sunday Evans, Project Manager & Hydrology
G. Steve Lowry, Hydrology
Dr. Russell Shepherd, Geohydrology
Dr. James Warner, Computer Simulation
Tsegaye Hailu, Geology
Helen Weagraff, Soils and Vegetation

Client: U.S. Bureau of Mines

Ground Water Investigation for Pryor Mine

The primary goal of this investigation was to locate and characterize aquifer systems to be affected by proposed mining activities at Pryor Mine near Walsenburg, CO. Local and regional faults were mapped using aerial photos and field reconnaissance. The study also identified the geohydrologic connection between abandoned mine workings that are flooded and the new mining area. Overburden samples were analyzed for toxic and acid-forming materials and water samples were taken from the flooded workings. The undisturbed stream channel was studied for use in designing a stable reclaimed channel section.

Staffing: Ginger Sunday Evans, Project Manager/Engineering
Surface Water Hydrology
Tsegaye Hailu, Geology/Ground Water
Helen Weagraff, Permits/Sampling

Client: Colorado Mined Land Reclamation

Small Operator Assistance Program (SOAP)

J.F. Sato and Associates has been the contractor to OSM Region V to carry out the SOAP. This program provided assistance to several operators to evaluate the impacts of mining in the areas of hydrology and overburden effects. Specifically, J.F. Sato & Associates has prepared the "Determination of Probable Hydrologic Consequences: and "Statement of the Results of Test Borings or Core Samplings" as well as other environmental requirements of Colorado Mined Land Reclamation Board. Studies

of four mines in Colorado and New Mexico involved extensive field assessment of the hydrologic regime and geologic conditions. Heavy consideration was given to prediction of impacts on the hydrologic balance. All studies included Alluvial Valley Floor investigations.

Staffing: Ginger Sunday Evans, Project Manager & Hydrology
G. Steve Lowry, Hydrology
Dr. Russell Shepherd, Geology
Tsegaye Hailu, Geology
Helen Weagraff, Environmental Sciences

Client: Office of Surface Mining, Region V

Surface Water Hydrology and Sedimentology Manual

This manual was prepared for OSM Region V. The initial task of the project was to review 30 mine permit applications to assess the predictive and analytical methods used by mine operators. Another segment of the project involved preparation of a Hydrology and Sediment Yield Work Manual, designed to facilitate some of the most frequently used procedures in mine plan submittals. The main document of the project, the Hydrology Manual, discusses in detail the technical merits of surface water hydrologic models, sediment yield models, and hydraulic structures applied to mitigate adverse impacts of coal mining. The manual was well received by OSM as expressed in their letter of recommendation, Exhibit 5.

Staffing: Ginger S. Evans, Project Manager
Dr. Russ Shepherd, Geomorphology
G. Steve Lowry, Hydrology
Tsegaye Hailu, Geology
Helen M. Weagraff, Environmental Sciences

Client: Office of Surface Mining

Mine Site Investigations for William Lackey Assoc.

Studies included a subsidence survey and monitoring program,

detailed vegetation study, soil mapping, and drainage control plan. A coal resources estimation was also prepared for the site.

Staffing: Tsegaye Hailu, Geology
Helen Weagraff, Soils and Vegetation
Ginger Sunday Evans, Hydraulic Structures and Erosion Estimates.

Client: Private Mining Company

"K" Factor Determination

J.F. Sato & Associates was a subcontractor to Simons, Li Associates on this project for OSM, Region V. The project evaluated the contributing factors to erosion on four soil types found in western mining operations. The study uses a rainfall simulator to produce the required data which will then be analyzed. J.F. Sato & Associates was involved in both data collection and data analysis.

Staffing: Ginger S. Evans, Project Manager

Client: Simons, Li Associates

Review of Soil Stabilization Methods for Four Mining and Reclamation Plans

J.F. Sato & Associates was a subcontractor on this study and provided input on erosion and runoff controls. The study also provided an assessment of methods used with recommendations of appropriate applications.

Staffing: Ginger S. Evans, Erosion and Runoff Control

Client: Willard Owens Associates, Inc.

Technical Assistance to DOE Region X for Small Hydropower Projects

JFSA was awarded this contract to assist potential developers evaluate their hydroelectric sites. To date the firm has analyzed 35 sites. Each appraisal level report contains information on potential technical, environmental, economic and social constraints. An estimate of the project cost is developed and compared to expected project revenues by means of a present value

of net revenue analysis. A benefit/cost ratio is used to determine if the site warrants further study.

During this project, the firm has gained valuable experience in identifying the potential environmental and social impacts of such a project on the local area. Topics that have been addressed in some detail are fishery resources (both anadromous and resident), water rights, availability of water, competing land use (including USFS land), selection of equipment, and site layout.

This project operates under strict time and budgetary limits. JFSA has been able to produce high quality reports within these limits, as evidenced by the letter of recommendation from the US Fish & Wildlife which is included as Exhibit 6.

Staffing: G. Steve Lowry, Water Resources

Client: Department of Energy

Low-Head Hydroelectric Evaluation and Inventory

J.F. Sato and Associates was a subcontractor to Tudor Engineering, San Francisco, for this Bureau of Reclamation study. The firm was given the primary responsibility for the comprehensive evaluation of developed and undeveloped low-head dam sites in seven of the seventeen western states under study. The last phase of the project, October 1980 to October 1981, included detailed appraisal studies for approximately 40 sites in a seven-state area. Flow exceedance values used to size the embankment, spillway, and turbine for each site were obtained using the SMHYDRO computer program developed by the Bureau of Reclamation and modified by Tudor/JFSA. Probable Maximum Flood (PMF) estimates were made using the Bureau of Reclamation-approved Creager formula.

Prior to the initial design, each site had been selected based on U.S.G.S. flow data, local topography, geology and both social and environmental constraints. The environmental considerations included fishery resources, visual impacts, water quality, recreation uses, protected species, cultural resources, wetlands and natural areas. The social impacts considered were those due primarily to the effects of the in-migration of workers to the local area during the construction period.

Site reconnaissance provided basic data required for the initial design. Profiles and sections of the affected reach of river were then completed. Structures that would be impacted were identified. Site specific data on the nature of the river was collected. As a result of this study and other projects, our staff has a deep appreciation for environmental issues associated with, and has data for, many river systems in the western U.S. Our staff has used both the USGS Water Resources Data Publications and computer listings of USGS WATSTORE data. For the Bureau of Reclamation study, we covered Colorado, Nebraska, Kansas, New Mexico, Texas, Oklamhoma, and Utah.

JFSA Staffing: Steve Lowry, Water Resources
Ginger Evans, Water Resources
Julie McHenry, Draftsperson
Tsegaye Hailu, Geology

Client: Tudor engineering

Safety Evaluation of Existing Dams (SEED)

Under two separate contracts with the Bureau of Reclamation, J.F. Sato and Associates performed professional services within the context of SEED. 8 dams under the National Park Service and U.S. Fish and Wildlife Service were studied, safety evaluations made, and written reports furnished for each covering geologic conditions and/or mechanical features of the dams, appurtenant structures and reservoir rims.

Staffing: James Sato
Howard Simpson
Dale Weskamp
Ernest Dobrovolny
Norbert Noonan

Client: Bureau of Reclamation

Besides the experience represented by these contracts, Jim Sato has considerable experience in dam design and construction.

Description of Firm's Facilities

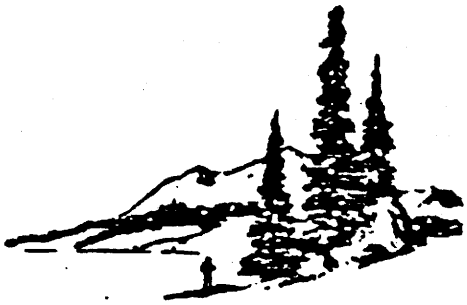
J.F. Sato and Associates owns and occupies 2000 sq. ft. of office space in Littleton, CO. The firm has computer equipment that includes: a DEC LA 120 terminal that allows time-sharing with major commercial and government computer systems in the Denver area; a WANG 2200 LVP with two DP workstations, matrix printer, and software which includes accounting, engineering, and project management programs; and a DEC-mate word processing system with letter quality printer.

The firm has an extensive collection of survey equipment and three 4WD vehicles. For drafting services, we have three well-equipped work stations and blueprint machine.

For collecting water quality samples, the firm owns an air pump operated 0.5 micron filter apparatus, an electroconductivity meter, and a portable Hach Water quality kit for field measurements of pH, alkalinity, and other parameters. Water level measurements in wells are taken using a 500-foot M-scope and a 300-foot "popper" designed according to U.S. Bur. of Rec. standards. J.F. Sato and Associates also has an air-lift pump apparatus used to clean or purge wells. We also own custom-fabricated pipe clamps of various sizes for setting well casing without risk of losing the casing down the hole.

LETTERS OF
RECOMMENDATION

Letter of Recommendation from Colorado Mined Land Reclamation Division



STATE OF COLORADO RICHARD D. LAMM, Governor
DEPARTMENT OF NATURAL RESOURCES
D. Monte Pascoe, Executive Director

MINED LAND RECLAMATION

423 Centennial Building, 1313 Sherman Street
Denver, Colorado 80203 Tel. (303) 839-3567

David C. Shelton
Director

August 5, 1981

To whom it may concern:

J. F. Sato and Associates have worked on two small operators assistance program (SOAP) projects I have dealt with in the last year; the Sulphur Creek and Sunlight coal mines. The SOAP program involves collection of baseline geologic and hydrologic information for small coal mines to use in obtaining a permit under the Colorado Permanent Regulatory Program.

To date, we have received a final report on the Sunlight Mine, which covers all the information needs presented by the Mined Land Reclamation Divions. During our many meetings, I was particularly impressed by how well they worked with MLRD and the mine operator in reaching solutions to the various hydrologic and geologic issues presented. Therefore, based on my knowledge of their work, I would give this organization a good recommendation.

Sincerely,

Jim Herron

Jim Herron, Reclamation Specialist

United States Department of the Interior
OFFICE OF SURFACE MINING
Reclamation and Enforcement
BROOKS TOWERS
1020 15TH STREET
DENVER, COLORADO 80202

August 10, 1981

To Whom It May Concern:

Subject: Letter of Recommendation

J.F. Sato and Associates have been doing consulting work for the Office of Surface Mining, Small Operator Assistance Program, for over one and a half years. The work has consisted of geologic, hydrologic and engineering analysis of existing and proposed coal mines in Colorado and New Mexico. The work products have been very professional and within time and budget constraints.

Murray Smith
Assistant Regional Director
State Programs Branch

Letter of Recommendation from U.S. Fish and Wildlife Service.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
LLOYD 500 BUILDING, SUITE 1692
500 N.E. MULTNOMAH STREET
PORTLAND, OREGON 97232

August 14, 1981

Mr. Larry Mann
U.S. Department of Energy
915 Second Ave.
Seattle, Washington 98174

Dear Mr. Mann,

I would like to take this opportunity to thank your for the services of your contractor, J.F. Sato and Associates in conducting feasibility studies for hydroelectric potential at U.S. Fish and Wildlife Service facilities. Your cooperation in effecting the study is greatly appreciated. The study reports are already proving to be very useful in our energy conservation program.

Mr. Steve Lowry of J.F. Sato and Associates conducted the field studies and prepared the reports. He is to be commended for the exceptional quality of his work.

Jerry R. Van Meter
Regional Director

RESUMES

NATIVE PLANTS, INC.

KEVIN L. ALLRED, ASSISTANT MANAGER/RECLAMATION SERVICES

EDUCATION

M.S. in Range Ecology with additional emphasis in Wildlife Ecology, Texas A & M University, 1980; B.S. in Range Science, Summa Cum Laude, Brigham Young University, 1976.

RESEARCH/EMPLOYMENT

Since joining Native Plants, Inc. (September, 1981), collected and analyzed data to be used in the development of a revegetation plan along the Alaskan Natural Gas Pipelines. Managed the revegetation of drill pads and the establishment of study plots in northwestern Colorado, developed revegetation plans and supervised revegetation efforts in southern Colorado, developed land use and reclamation on plans and established study plots in Utah.

Served as a teaching and research assistant, Brigham Young University. Organized and taught a lab on range forage identification utilization. Coached and instructed the BYU range plant identification team. Conducted seed germination and seedling establishment trials. Conducted small mammal feeding trials. Conducted studies for an EIS as a range technician, Bureau of Land Management, Salmon, Idaho. Conducted plant composition and distribution studies on mule deer winter ranges for several herd units as a trainee for the Utah Division of Wildlife Resources.

Served as a research assistant, Texas A & M University. Developed and conducted a research project studying deer and cattle distribution patterns on a short duration grazing system. Required statistical design and analysis, census techniques and vegetation data collection. Taught undergraduate ecology labs.

Served as a range conservationist/plant ecologist with the Bureau of Land Management for a rainfall simulation project. Collected and analyzed data on hydrologic responses under different grazing systems, soils and ecological regimes throughout the western United States. Developed sampling designs, data collection techniques, and participated in and supervised data collection. Assisted in the operation of the rainfall simulator and hydrologic sampling devices. Assisted in all phases of data reduction, analyses and report writing. Developed software programs (Fortran and Basic) on an HP minicomputer system and a Honeywell 6800 computer. Conducted statistical analyses.

Served as regional revegetation specialist, Office of Surface Mining. Provided technical expertise in developing revegetation programs and analyzing specific revegetation problems with coal mines throughout the western United States. Reviewed monitoring data and provided feedback for improvement of revegetation programs. Provided technical advice regarding impacts of coal mining and revegetation potential. Statistically analyzed baseline data to be used as success criteria for revegetation. Reviewed reclamation plans for compliance with the Surface Mining Control and Reclamation Act. Participated in team review and developed documents from environmental, technical, and legal aspects. Participated in the development of state guidelines. Took the lead in developing a comprehensive data base to include data from mine plans, monitoring programs and bond release tests interfacing with other software for analysis and data representation. Developed software programs (Fortran, Basic) using IBM and CDC computer systems, Tektronics graphics systems, and peripheral hardware.

Provided technical support in research projects from design, analytical, and data collection standpoints.

PUBLICATIONS

Authored revegetation sections of technical and environmental assessments for the following coal mines: Skyline, Rawhide, West Decker, Marr Strip, Canadian Strip, and Gillette.

AWARDS AND RECOGNITION

Member of Phi Kappa Phi Honorary Academic Society, Gamma Sigma Delta Honorary Society, Phi Sigma Honorary Biological Society. Was listed as the Outstanding Senior in Botany and Range Science at Brigham Young University, 1976; Who's Who in American Colleges and Universities, 1976. Recipient of L.A. Stoddart Scholarship (Utah Section, Society for Range Management), 1976; Presidential Scholarship, Brigham Young University, 1974-1976. President (1976) and Vice-President (1975) BYU Chapter, Utah Section, Society for Range Management; Agricultural Council Representative, Brigham Young University, 1976.

PROFESSIONAL ORGANIZATIONS

Member of the Society for Range Management.

THOMAS J. GUOBIS, RECLAMATION ECOLOGIST

EDUCATION

M.S., SUNY College of Environmental Science and Forestry, 1980
B.S., Brooklyn College, 1972

RESEARCH EMPLOYMENT

Since joining Native Plants in 1982 as a Reclamation Ecologist, has served as technical advisor and supervised revegetation efforts on steep slope oil shale lands in western Colorado. Supervision entailed on-site coordination of Native Plants and subcontractor crews and quality assurance for work involving drill, broadcast, and hydroseed techniques. Also developed revegetation plans for coal mines and waste disposal sites in Colorado, Utah, and Wyoming, and designed test plot and field research studies for use in a number of the western states. Assisted in Native Plants' development of the Amoco Rose Park (Salt Lake City) sludge pit reclamation plan.

Ecologist, U.S. Dept. of the Interior, Office of Surface Mining, from 1980-1982. Served as principal vegetation ecologist and statistician for the Western Technical Center, OSM, Denver, Colorado. Acted as project coordinator in mine plan review and permit decision document preparation, and vegetation research. From 1979 to 1980 served as Surface Mining Reclamation Specialist for the OSM in Kentucky. Was responsible for inspection of surface and deep mines and preparation plans for the purpose of enforcing the provisions of the Surface Mining Control and Reclamation Act of 1977 during the Initial Regulatory Program.

Thesis research was conducted on the evaluation of the environmental constraints on population growth of one of the species naturally colonizing an abandoned limestone quarry site in central New York. This work involved field and lab assessment of herbaceous plant populations and communities (including seedling identification and germination tests) and of micro-meteorological and soil characteristics and computer-assisted statistical analyses.

AWARDS AND RECOGNITION

Regents Scholarship and Incentive Award, 1967-1972
Anna E. Schoen-Rene Graduate Forestry Scholarship, 1976

PROFESSIONAL ORGANIZATIONS

Ecological Society of America

PUBLICATIONS

Guobis, T.J. 1980. Immigration and establishment of Centaurea maculosa Lam. on two limestone quarry substrates. Master thesis. SUNY College of Environmental Science and Forestry, Syracuse, NY.

Guobis, T.J. and D.J. Raynal. 1977. Differential population response of Centaurea maculosa Lam. on two limestone quarry substrates. Bulletin of Ecol. Soc. of Amer. 58(2): 47 (Abstract).

DENNIS J. HANSEN, MANAGER/RECLAMATION SERVICES

EDUCATION

Ph.D. in Botany, University of Michigan, 1977; M.S. in Botany, Brigham Young University, 1973; B.S. in Botany, Brigham Young University, 1971

RESEARCH/EMPLOYMENT

Joined Native Plants, Inc., in 1979 as the Manager of Reclamation Services. Activities at Native Plants have included program management for the evaluation of the revegetation on the Trans-Alaskan Pipeline System and reclamation plan for the Alaskan Natural Gas Transportation System, as well as being responsible for field design, site selections, report writing, and assuring the smooth and timely completion of all phases of the project. Program Manager for revegetation plans for ARCO Oil and Gas CO2 Project in Colorado, Battelle Pacific Northwest Laboratories, 25 inactive uranium mill tailings sites in the western U.S., Chevron Resources Company's phosphate mine in Utah, and several revegetation test plot studies in New Mexico, Colorado, and Utah for coal, precious metals, oil shale, and energy exploration projects.

Conducted range inventories for the Division of Wildlife Resources for the State of Utah in 1970. While at Brigham Young University and the University of Michigan served as a lecturer, research assistant, and teaching assistant. At this time, research focused on physiological aspects of salt and drought tolerance and plant stress physiology. These involved the application of quantitative ecological and statistical approaches to plant establishment and distribution problems. Joined Texas Instruments, Inc., in 1977 in Dallas, Texas as a range manager and environmental engineer. Research at TI included monitoring for vegetation stress from cooling tower salts for nuclear generating stations in Indiana, Kentucky, Michigan, and Arkansas. Lead biologist for the National Uranium Resource Evaluation; Program Manager for mine-permit baseline studies in Colorado, Texas, and Wyoming; botanist for environmental impact assessment of the Colstrip project in Montana.

PUBLICATIONS

Publications include 9 journal papers and over 15 technical reports. Topics include physiology of stress and salt tolerance, plant establishment and growth on disturbed land, baseline monitoring, technology assessments, and revegetation test plot studies.

AWARDS, RECOGNITION AND SERVICE

Recipient of Botany and Range Science award at BYU, 1970; Scott Turner Award in Earth Science at the University of Michigan, Secretary of the BYU Chapter of the Society of Range Management, 1972-1973; Associate Member of the Society of Sigma Xi and member Beta Beta Beta Biological Honor Society. Also served as a consultant for the Office of Technology Assessment in Washington, D.C. where two reports were prepared, one on the state-of-the-art of revegetation of oil shale, and the other an evaluation of applied genetics to reforestation and forest products. Has also served

on the OTA panel for the selection of authors working on water-use technologies for agriculture in arid and semi-arid areas of the U.S. Was co-chairman for a workshop on Reclamation Planting of Disturbed sites in 1981 and presented papers at three other workshops or symposia. Serves as a manuscipt reviewer for the American Journal of Botany.

CONSULTING

Consulting assignments include service with: Fluor Northwest, Northwest Pipeline Company, California Nickel Co, Chevron, U.S. Forest Service, Bureau of Land Management, Bureau of Reclamation, Pittsburg and Midway Coal Co, North American Coal Co., Western Tar Sands, Rio Blanco Oil Shale Co., White River Oil Shale Co., Battelle Pacific Northwest Laboratories, Peabody Coal Company, ARCO Oil and Gas, Kentucky Utilities, Arkansas Power and Light Company, Detroit Edison Co., OTA, Plateau Resources, Inc./Getty, Valley Camp of Utah, and others.

PROFESSIONAL AFFILIATIONS

Membership in professional societies include: Society for Range Management and Sigma XI.

DONALD W. WAGENET, SOILS SPECIALIST

EDUCATION

M.S. in Soil Science, Utah State University, 1981; B.S. in Soil and Water Science, University of California, Davis, 1978

EMPLOYMENT/RESEARCH

Joined Native Plants, Inc., in 1981 at Soil Specialist. Since joining the company his projects have included:

Project Manager - Minerals Exporation Company (Union Oil-Sweet Water Uranium Project, Rawlins, Wyoming). Conducting ongoing field research to develop a reclamation strategy for lands to be inundated for 15 years with uranium tailings waters. Project Manager - Stauffer Chemical Company, Green River, Wyoming. Completed a detailed soil survey for critical areas adjacent to sodium carbonate tailings ponds. Included field investigations, cartography, laboratory analysis, and all report writing. Senior Scientist - ARCO Oil and Gas Company, Dallas, Texas. Developed and conducted on-site supervision of topsoil stripping, stockpiling, and redistribution plans for ARCO's drillsites in Southwest Colorado. Senior Scientist - Battelle Pacific Northwest Laboratories, Richland, Washington, Identified soils in Colorado, New Mexico, South Dakota, Utah, and Wyoming as potential sources of topsoil for reclaiming uranium tailings piles. Assisted in field sampling and analysis recommendations. Senior Scientist - Chevron Resources, Vernal, Utah. Field assessment of soil productivity and potential sources of topsoil for future reclamation on Chevron's phosphate operations near Vernal, Utah. Senior Scientist - Fluor/Northwest Pipeline Company, Irvine, California. Supervised laboratory analysis of 675 soil samples for soils-plant community correlations. Senior Scientist - Western Tar Sands, Bonanza, Utah. Developed and conducted on-site supervision of a topsoil stripping and stockpiling plan for Western Tar Sands' operations near Bonanza, Utah. Senior Scientist - Soil Testing; Mr. Wagenet is also currently overseeing the development of a reclamation-soils testing laboratory at Native Plants' Salt Lake City facilities.

From 1978 until 1980 served as Soil Scientist, USDA Soil Conservation Service, Lakeport California. Duties included soil mapping at the detailed and reconnaissance levels, engineering interpretations, report preparation, and responsibility for all laboratory analyses. Supervised training of soil scientists in Soil Conservation Service mapping procedures. Received training in management (USDA "Management Level II", 5-day short course) and reconnaissance soil mapping (3-day short course). From 1977 until 1978 Mr. Wagenet served as Biological Aide for the USDA Soil Conservation Service State Office in Davis California. His responsibilities included the completion, organization, and editing of computer worksheets for state-wide projects on soil temperature and erosion control (Land Inventory and Monitoring - LIM I). He also assisted the State Office technical staff in the editing of completed soil survey manuscripts.

In 1977, Mr. Wagenet was Laboratory Assistant for the Department of Land, Air, and Water Resources at the University of California, Davis. He was responsible for the operation of a variable-intensity rainfall simulator and analysis of data for experiments assessing the effects of ground cover amount, shape, and thickness on soil erosion.

ORGANIZATIONS/HONORS

American Society of Agronomy
International Soil Science Society
Soil Science Society of America
Soil Conservation Society of America
Member - Council on Soil Testing and Plant Analysis

PUBLICATIONS AND TECHNICAL REPORTS

Spatial Correlation of Infiltration Rate and Related Soil Physical Properties. Co-Author (Submitted for publication to the Soil Science Society of America Proceedings).

Topsoil suitability analysis for drillsites 1-3 on the Sheep Mountain Unit ARCO Carbon Dioxide Project. May, 1981.

Rehabilitation studies for Battle Springs Flat. Annual Report, January 1 to December 31, 1981.

Stauffer Chemical Company. Order 1 Soil Survey, 1981.

Reconnaissance soils report on topsoil availability at the Western Tar Sands outcrop and plant site. 1981.

SUSAN M. WHITE, BOTANIST/RANGE ECOLOGIST

EDUCATION

M.S., Range and Wildlife Management, Brigham Young University, 1980;
B.S., Zoology with minor in Botany, Brigham Young University, 1977

RESEARCH/EMPLOYMENT

Since joining the staff at Native Plants, work has included being the primary field investigator in a study involving rubber rabbitbrush and being a field technician in the evaluation of revegetation efforts on the Trans-Alaskan pipeline. The second year of study on the proposed Alaskan pipeline involved the assignment as project field coordinator, being responsible for field crews, equipment, completeness of data collection, root and nodule collection for mycorrhizal studies, and computer analysis. Assisted project scientists at Native Plants in report preparation, statistical analysis, mycorrhizal occurance and isolation, and proposal writing. Has overseen and carried out several of the experimental designs initiated by Native Plants, including germination and growth experiments on processed oil shale and nickel tailings. Has written several erosion control and revegetation plans for urban developments. Analyzed and reported on seed and tubeling experimental plots for coal land reclamation. Served as field coordinator on establishment of uranium irrigation and vegetation experimental plots in Farmington, New Mexico.

Assisted in numerous vegetation and endangered plant studies and several vegetation reports for coal mines while employed by Endangered Plant Studies, Inc. Work with the USDA Shrub Sciences Laboratory investigations included research in range shrub nutrition. Assisted the project scientist in digestion trials, chemical analysis, experimental field plot design and maintenance, shrub utilization measurements, and growth evaluation.

PUBLICATIONS

Ms. White has authored or co-authored over eight research publications and technical reports.

PROFESSIONAL AFFILIATIONS

Membership in professional societies include: Sigma XI.

J.F. SATO & ASSOCIATES, INC.

TSEGAYE HAILU

Geologist/Hydrogeologist

Education

Diploma, Hydrogeology, Hebrew University, Jerusalem, 1970
B.S., Geosciences, University of Hawaii, 1967

Professional Affiliations

Fellow, Geological Society of Africa
Nigerian Mining, Geological and Metallurgical Society
Association of Geoscientists for International Development

Experience

Since joining J. F. Sato and Associates early in February, 1981, Mr. Hailu has been involved in the geologic, engineering geology and hydrogeologic studies in a number of projects including: The Determination of the Probable Hydrologic Consequences and the Statement of the Results of Test Borings or Core Samplings for the Office of Surface Mining and Low Head Hydroelectric Power Evaluation study for the Bureau of Reclamation under a subcontract to Tudor Engineering.

Just before joining our firm, Mr. Hailu participated in the Correlation of Stratigraphic Units for North America (COSUNA) Project of the American Association of Petroleum Geologists. He compiled stratigraphic data for basins and ranges in Colorado, Arizona and New Mexico under the supervision of Dr. Harry C. Kent of the Colorado School of Mines.

From 1978 to 1980, Mr. Hailu served as Senior Geologist in the Geological and Mineral Resources Department of the Sudan. He supervised field parties and conducted mineral exploration and geologic mapping of the southeastern parts of the country. He was also one of the principal compilers of a new Geologic Map of the Sudan (1:2,000,000) to be published soon. Mr. Hailu participated in drawing up the Second Strategic Plan for the Department outlining its present and future activities and areas of interest to foreign investment.

As Senior Geological Consultant with Metals and Minerals Nigeria Limited, in 1976 to 1977, Mr. Hailu undertook mineral prospection for gold and industrial minerals in southwestern Nigeria, carried out a market survey for lime products throughout Nigeria and valuated some of the cassiterite and molybdenum mines in the country. He also undertook geologic studies of proposed damsites.

Prior to his work in Nigeria, Mr. Hailu was with the Geological Survey of Ethiopia from 1968 to 1976. He worked first, as regional mapping and mineral survey geologist, and later as head and co-project manager of the Survey and the United Nations Development Program's Strengthening Project. He has co-authored 1/4 million maps of northern Ethiopia and contributed to the Geological Map of Ethiopia (1:2,000,000), 1973 Edition. He has published papers on Palaeozoic glacial rocks, in Ethiopia and early structures in the Great Rift Valley in the Geological Magazine and Nature, respectively.

After completing university in 1967 Mr. Hailu was a Research Assistant for a year at the Water Resources Research Center, University of Hawaii. He was responsible for establishing laboratory instrumentation for the concentration of tritium in natural Hawaiian waters for detection by scintillation counting as the first-phase in the study of groundwater flow direction and layering under the supervision of Professor Stephen Lau. The research work was published as one of the Center's Technical Reports.

G. STEVE LOWRY

Water Resources Engineer

Education

M.S., Civil Engineering, University of Hawaii, 1980
B.S., Science Engineering, Univeristy of Michigan, 1971

Professional Engineer Registration

Montana 1979
Colorado 1980
Washington 1982

Experience

Mr. Lowry is the head of the firm's Water Resources Department. Since joining the firm in June 1980, Mr. Lowry has participated in several water resource and environmental projects. As part of the National Hydropower Study, he conducted appraisal level studies of hydroelectric power sites for the Water and Power Resource Service. He is currently Project Manager of a contract which provides technical assistance to the Department of Energy for evaluating the potential of hydroelectric projects in the Pacific Northwest.

Mr. Lowry has completed reports for the Office of Surface Mining determining the probable hydrologic consequences of small mining operations. He was the Technical Team leader for an environmental assessment of coal mining in northwest Georgia. Mr. Lowry participated in a groundwater study with the Bureau of Mines which included construction of multiple completion groundwater monitor wells and the use of a digital groundwater model. He also has completed utility definition projects for the preliminary engineering phase of 15 miles of the Denver Regional Transportation District Light Rail system.

Before joining the firm, Mr. Lowry had worked in various areas of the water resources field. Most recently he had worked on the application of a water quality model (WQRRS) to an eutrophic reservoir on the island of Oahu, Hawaii. With results from the model, management techniques to improve the reservoir condition could be evaluated. At the same time, Mr. Lowry was working on a project to determine the feasibility of disposing of effluent from the Ocean Thermal Energy Conversion (OTEC) project by means of artificial recharge into a basalt aquifer.

Mr. Lowry has been a Senior Assistant Sanitary Engineer with the U.S. Public Health Service in Montana. His responsibilities included providing sanitation facilities for the Native American population on Rocky Boy's Reservation. This included the design of water and sewer facilities, supervision of construction and contracts, preparing specifications, and management of a work force.

Prior to this, he had been a Resident Engineer with a consulting firm designing and constructing hydroelectric installations in Zambia. These installations included both concrete and earth dams, powerhouse facilities, diversion structures and canals. He worked on feasibility studies for new sites as well as ensuring that construction on current projects was to specifications. He also participated in a regular inspection program of dam embankments, outlet works, and drainage facilities at existing hydroelectric installations.

Before this, he had worked for a contractor in Zambia as an Assistant Site agent. This job involved direct supervision and management of a medium size earth and concrete dam used for irrigation.

Mr. Lowry was a Peace Corps Volunteer in Botswana where he assisted the local government in the provision of water supplies to villages. He worked with all aspects of the project, from obtaining financing to design and construction and finally, operation and maintenance.

JOHN A. NADOLSKI
Hydrologist

Education

M.S., Hydrology/Hydrogeology, University of Nevada, Reno, 1979.
B.S., Forest Science, University of Illinois, Champaign-Urbana, 1977.

Experience

Mr. Nadolski has been extensively involved with the assessment of impacts on the hydrologic balance due to the land-use changes. Currently, he is principal investigator for an U.S. Office of Surface Mining study to define the approaches and methodologies useful in probable hydrologic consequence studies and cumulative hydrologic impact assessments. He has written the inlet and outlet section for a design manual for sediment control through the use of sedimentation ponds and other physical/chemical treatment. He was one of the project engineers for the preliminary design of the sanitary, storm, industrial wastewater, and potable-water/fire-protection systems for a proposed expansion of the Stapleton International Airport.

Prior to joining this firm, Mr. Nadolski worked for the Office of Surface Mining (Department of the Interior). His responsibilities included the review, research, and application of physical and mathematical modeling in groundwater and surface-water hydrology, hydraulic structures, alluvial geomorphology, and sediment yield. He was also responsible for set-up and implementation for several groundwater and surface-water monitoring programs.

Previously, Mr. Nadolski has been involved in projects which have included modeling of sediment delivery on undisturbed mountain watersheds, impacts of urban development on the ground-water system, water quality analyses of improvements at the sewage treatment plant for the cities of Reno and Sparks, and water quality analyses on four river systems in California and Nevada. He has also worked on small-mammal population studies in Illinois.

Mr. Nadolski is very familiar with existing and proposed energy developments in the western United States. He is also knowledgeable in regard to the requirements of the National Environmental Policy Act (NEPA). He has prepared and has managed the preparation of several Environmental Assessments (EA), and he has also aided in the preparation of several Environmental Impact Statements (EIS).

Professional Associations

American Society of Civil Engineers - Task Committee on Quantifying Land Use Change Effects
Denver Water Board - Task Committee on Long Range Water Supply

Publications

A Study of Bedload and Total Sediment from the East Side of the Sierra Nevada; Nadolski, John A., Master's thesis; University of Nevada, 1979.

Sediment Load from the Headwaters of the East-Central Sierra Nevada; Nadolski, John A., C.M. Skau, and John C. Brown; Desert Research Institute, Publication No. DRI-43009; Reno, Nevada; July, 1980.

Snowmelt Sediment from Sierra Nevada Watersheds; Skau, C.M., John C. Brown, and John A. Nadolski; Proceedings of Symposium on Watershed Management; American Society of Civil Engineers; Boise, Idaho, July, 1980.

Forested Watersheds of the East Central Sierra Nevada: Studies of the Quality of Natural Waters; Skau, C.M., John C. Brown, and John A. Nadolski (in press).