TUDOR QUARTERLY

SPRING 1982

IDAHO FLOOD STUDIES

Salmon River, Idaho, February 1982, showing flooding created by ice jams.

Tudor is conducting Flood Insurance Studies for four small cities under a contract with the Federal Emergency Management Agency. Included in the project are Salmon, Horseshoe Bend, Kamiah and Kooskia, Idaho

Cross sections have been completed on 11.2 miles of river including the Lemhi River at Salmon; the Payette River and Shafer Creek near Horseshoe Bend; and the Middle Fork of the Clearwater River at Kooskia. Don Payne headed up the survey crews in the late fall of 1981.

Research and study of flooding created by ice jams is included in the scope of work. During February 1982 the Salmon River, near the confluence of the Lemhi at the City of Salmon, cooperated by providing ice jams resulting in flooding. Paul Kunz, Project Engineer, and Jim Spofford made an inspection trip. Fortunately the flooding was not severe enough to cause extensive property damage.

The hydrology work for all four areas is nearly complete. Preliminary computer runs of backwater profiles have been performed on all the river reaches. First draft of the reports should be ready by fall.

STARVED ROCK LOCK AND DAM

Tudor was selected in association with Beling Consultants of Moline, Illinois to prepare a preliminary feasibility study for the Starved Rock Lock and Dam Hydroelectric Project. The City of Peru, Illinois, holds the preliminary permit which grants to the city the right to study the hydroelectric potential at the Corps of Engineers owned facility. Preliminary estimates at the site indicate an installed capacity of 15 megawatts at a head of 16 feet.

The Starved Rock Lock and Dam is located on the Illinois River near Ottawa, Illinois. A series of eight lock and dam structures has been constructed on the Illinois River to maintain a navigation waterway between Lake Michigan and the Mississippi River. In addition to the Starved Rock Lock and Dam project, Tudor is currently negotiating similar studies on two of the other lock and dam structures on the Illinois River.

A First of July 1982 completion date is scheduled for the first stage of the Starved Rock Study which will be managed from the Denver office by John Williams and Jerry Cross.

Starved Rock Lock and Dam.

TUDOR TO DESIGN NAVY HANGAR

In April, the Western Division of the Navy Facilities Engineering Command selected Tudor to design an Aircraft Corrosion Control Facility which will be constructed at the Naval Air Station, Alameda. The main element of the facility is a 60,000 square foot hangar with a controlled environment to be used for chemical paint stripping and corrosion blast cleaning of aircraft prior to repainting at the Naval Air Rework Facility. Included also are a myriad of utilities and surrounding parking aprons. Estimated construction cost is $18 million.

Tudor will be assisted on the project by several well known subconsultants: Keller and Gannon (Architectural, Mechanical and Electrical); Harding & Lawson (Soils); and Harris and Associates (Surveying).

The Tudor team includes Mike Harrington (Principal in Charge), Lou Salaber (Project Engineer), Heinz Mueller (Structures) and Don Moore (Civil). Negotiations are scheduled for May with an anticipated start of design in late June.

SANDY CREEK POWER PROJECT

Puget Sound Power and Light added additional work to the Seattle job log in early February with the Sandy Creek Power Project. The utility, faced with a rapidly approaching license application submittal date and in the process of changing consultants, decided to award the project to Tudor, but only if Tudor could guarantee to meet stringent target dates. After an evaluation of staffing needs and hiring an additional engineer, Tudor accepted the challenge. The project is proceeding expeditiously, with Tudor responsible for all aspects of the license application except the environmental exhibit.

The project entails an intensive development of four streams in the western drainage of the Baker River in northwestern Washington. It will include four diversion dams, two powerhouses and many miles of pipeline, penstock, transmission line and access road. One of the powerhouses will enclose the generation equipment for two diversion dam-penstock systems at substantially different heads and thus will require an unusual layout. The total installed capacity of the project will be 17.4 megawatts.

The work is posing some interesting problems for the engineering staff. The license application is due June 1, but some data required for the application, such as surveying and geotechnical, was not developed by the previous consultant and is not currently available because of snow conditions. Thus, Pete Paterson and Ron Wright have, in addition to regular engineering duties, begun a regular monitoring of snow conditions in hopes of planning a field trip for the near future. Late season snow storms, however, continue to frustrate their attempts.

OGELTHORPE

An interesting study of a potential project encompassing compressed air, underground and conventional hydroelectric pumped storage energy alternatives has been awarded by the Ogelthorpe Power Corporation of Georgia to Reynolds, Smith and Hills of Jacksonville, Florida. Law Engineering and Testing Company and Tudor Engineering Company will be subcontractors to RS&H with Tudor responsible for conventional pumped hydro aspects of the project.

62nd ANNUAL SAME MEETING

Louis and Pat Riggs were honored at the 62nd Annual Meeting of the Society of American Military Engineers held in San Antonio, Texas on April 21, 22 and 23. The occasion was attended by over 500 participants and marked the end of a very successful year for the SAME during which Mr. Riggs was the National President of the Society and its 23,000 members. Jack and Edna Biederman also attended. Mr. and Mrs. Riggs were presented with Texas "passports" and Mr. Riggs was designated Honorary Mayor of La Villita, the city within the city of San Antonio where the spirit of Old San Antonio has been captured and preserved by the local historical society.

President Louis Riggs presents the gavel to incoming president, Lt. Gen. Joseph Bratton, as incoming vice president, Rear Adm. William Zobel (left), and Executive Director, Brig. Gen. Walter Bachus (right), look on.

STOCKHOLDERS MEETING

The annual stockholders meeting of Tudor Engineering Company was held on May 15, 1982, in San Francisco. Thirty people attended the meeting at which time the stockholders reelected the current Board of Directors consisting of Louis W. Riggs, Robert N. Janopaul, Paul E. Potter, Keith D. Bull and Douglas J. Mansfield. At the conclusion of the meeting it was announced that the Board of Directors was appointing Robert W. Myrdal as an Officer and Vice President of Tudor Engineering Company. Other officers will continue in the same capacity as they have served the company during the past twelve months.

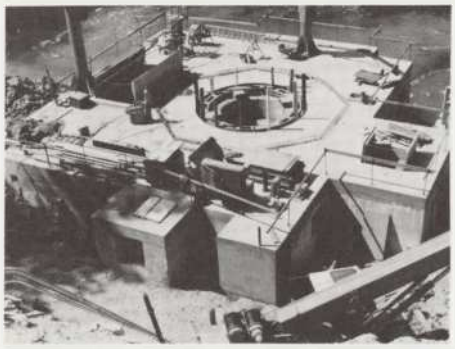
Robert W. Myrdal

CACHE LA POUDRE PROJECT

The Cache la Poudre Project, a major activity in the Tudor Denver office, has been a team effort with Nelson Jacobs planning the tasks. Hydrology consultant, Al Stevens, has completed the basin water supply hydrology studies with the help of Tom Rawlings. Ed Barbour has developed the population projections and mining and industrial water-use projections along with the rates of conversion of agricultural land to urban use. Joe Bergquist, is working on the projected future agricultural use with the help of Al Stevens. Eleven preliminary schemes have been developed, each with several major dams, tunnels and power plants. Jerry Cross has developed preliminary cost estimates for all the facilities with help from Sal Todaro, Jeff Stevens and Chuck Spinks. John Magnuson provided input on tunnelling costs. John Williams has organized some operations studies for the eleven alternatives with Dale Bowers doing the calculations. Dale, Karl Huttner, and Debbie Harris have been drafting for the many studies going on simultaneously. The Denver office has received excellent support from San Francisco as Dave Church has made several trips to analyze the water rights situation. Don Rose and Jon Kaneshiro have made a preliminary evaluation of the geology and geotechnical considerations for the various damsites and tunnel locations with the help of Frank Techar in Denver. Lemma Wendim-Agegnehu has spent time in Denver setting up the basin simulation modelling with the help of Tom Rawlings. Liz Fountain spent a week in Denver helping Pam Stimpson with the typing for preliminary reports submitted to the State on each facet of the study.

All of this activity pointed toward the Advisory Committee meeting in Fort Collins, on April 29th, when Tudor presented the hydrology studies, water use studies, water rights studies, and the best alternative schemes for development. An interim report will be prepared by mid-July which will present the evaluation of the best schemes from which the Colorado Water Conservation Board will select one scheme for continued study.

SLY CREEK POWER PLANT



Sly Creek Power Plant

The progress photo shows the 13 megawatt Sly Creek power plant construction with draft tube in place. The project is nearing 65 percent completion with on-line service scheduled for October 1982.

Tudor has been the engineer on this project for the Oroville-Wyandotte Irrigation District from feasibility studies through final design, and is currently providing field engineering services during construction.

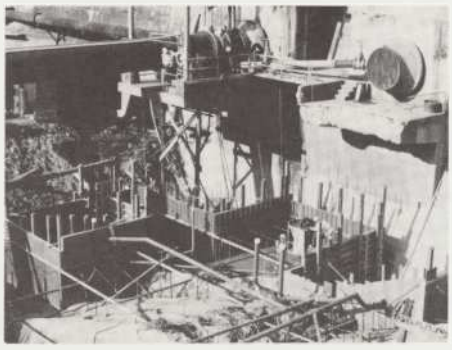
This power plant will supplement the District's South Fork Feather River Project that was completed in the 1960's, a time when the low value of energy did not warrant a plant at this site.

Sly Creek power plant will utilize a rehabilitated turbine and generator from the decommissioned Melones Power Plant, the same as Rollins power plant designed by Tudor. Hugh Brown was project manager for final design and Fred Estep, with the assistance of Joe Culpepper, is handling field engineering services during construction.

MONTICELLO POWER PLANT

The photograph shows the first concrete being placed for the three unit, 11.5 megawatt Monticello Power Plant on April 8, 1982. The plant is located at the toe of Monticello Dam that forms Lake Berryessa near Vacaville, California. The general layout of the plant is evident with draft tube and floor drainage piping in place. Construction started in early November 1981 with completion scheduled for spring 1983.

Tudor has provided engineering services for the Solano Irrigation District on this project from preliminary studies through final design. Kurt Scholz was Project Engineer during design and Paul Kneitz is Project Engineer for design services during construction phase. Fred Estep serves as the Resident Engineer on this project, assisted in the field by Brian McDermott.



Monticello Power Plant

GARLAND CANAL POWER PROJECT

The Garland Canal Power Project is now in the final design stage. The client is Shoshone Irrigation District of Powell, Wyoming. This project utilizes the existing irrigation flows in the half mile long Ralston Chute, together with its 50 foot drop, to generate 2.4 megawatts of power. The proposed design will serve as a small hydroelectric power demonstration project for the Department of Energy.

Project Manager is John Williams of the Denver office. Power plant design is being handled in the San Francisco office under Andy Yeung, project engineer. The design of the intake structure, penstock, bypass gate and weirs will be made in the Denver office under the direction of Sal Todaro. The turbine/ generator/ equipment bids were opened on June 1, with completion of all Tudor design by December.

PORT OF SEATTLE TRAFFIC STUDY AND ROAD DESIGN PROJECTS

The Port of Seattle has selected Tudor to prepare a traffic study, preliminary and final design, and contract documents for a road relocation project at Terminal 5. The project involves vacating approximately one third mile of 26th Avenue SW, a 5-lane street, and replacing it with a new section of West Marginal Way on new alignment. The design will include the roadway, a traffic signal, drainage, and illumination relocation. Extensive coordination with the City of Seattle is required.

Tudor's work is part of the Port's effort to renovate Terminal 5, a major container cargo facility serving SeaLand, Inc., and located immediately adjacent to the west end of the West Seattle Bridge Project. Currently, 26th Avenue SW divides the property in half, creating an awkward cargo circulation pattern and greatly reducing the usefulness of the site. The Port proposes to construct a new road, West Marginal Way Extension, on the west side of the Terminal 5 site away from the West Channel of the Duwamish Waterway. One end of the new road overlaps a Tudor designed signalized detour for the West Seattle Bridge.

The Port is currently negotiating a new lease with SeaLand and is planning to complete improvements to the terminal as soon as possible. Consequently, all phases of Tudor's work have tight schedules. Contract documents are due for completion by the end of May.

Tudor is prime consultant for this project and will perform all the work except the illumination design, which is the responsibility of ELCON, who provided the same service on the West Seattle Bridge. Einer Handeland is project manager for all phases of the project, Jim Schroeder is project engineer for the roadway and Darrel Chambers is project engineer for the traffic study and signal design.

SMUD JONES FORK PROJECT

Tudor's final design of the Jones Fork Hydroelectric Project has been completed and the construction contract documents are being reviewed by the owner, the Sacramento Municipal Utility District. The project was advertised for construction bids early in May and bid opening is set for June 22, 1982.

This project is located in the Crystal Basin area of the Sierras range at about 5,000 feet elevation between Placerville and Tahoe South Shore.

The project consists of a 1,600 foot-long tunnel and a 1–1/2 mile long, five-foot diameter penstock which will convey water from SMUD's existing Ice House Reservoir to a new powerhouse to be built near the inlet of the Jones Fork to SMUD's Union Valley Reservoir. The plant will house a 10 megawatt generating unit which will be unattended and remotely controlled from SMUD's central control facility in Sacramento. The project includes a new 3–1/2 mile long power transmission line to connect the plant to SMUD's system. The construction for this transmission line will be by a separate contract which will be bid late Summer of this year.

There is no powerhouse at the Ice House dam but SMUD has an existing powerhouse at Union Valley. Therefore, the water that this project diverts through the new plant does "double duty", generating power at the new plant and then generating more as it passes through the Union Valley plant.

The project is an interesting "small hydro" development with several challenging design and construction restraints. Because of SMUD's commitment to recreation, fish and game, as well as its own power demands, the times for construction work at the two SMUD reservoirs are severely restricted. Both the intake structure and the initial powerhouse construction can only be done while reservoir levels are low. The most critical construction task is the intake, where the lake can only be drawn down after Labor Day and must be refilled beginning New Years Day to ensure it will be filled by the following summer. All construction at the intake must be completed during this short period which includes months of normally inclement weather.

The procurement documents for the turbine-generator and associated equipment were prepared by Tudor and were advertised for bid by SMUD. Bids were opened in February with four firms submitting bids. The apparent lowest qualifying bid was comfortably below Tudor's estimated cost. Although SMUD has not awarded the contract yet, an award is expected as soon as FERC approves SMUD's application for an amendment to its license. The amendment was received on April 23, 1982, which should clear the way for construction to proceed.

Tudor is also performing other hydro work and studies for SMUD. An application to FERC is being prepared for a small diversion project being planned at Loon Lake, in the same general area as the Jones Fork project. Work is also beginning on a new series of studies of other potential small hydro development sites for SMUD.

Jones Fork Power Plant on Union Valley Reservoir.

Tony Lea and Kurt Scholz on a field trip to check Jones Fork penstock alignment.

KUNA SEWER PROJECT

Installation of 24" steel casing under railroad tracks through solid rock. A circular bit is welded to the end of the casing and the rock is removed in the form of a core.

The City of Kuna is some 20 miles southwest of Boise. As early as 1972 Tudor began work on the development of a sewage collection, treatment and disposal system. Tudor's scope of services included planning, design and construction management. Between 1976 and 1978 the Facility Plan was prepared. Various alternative systems were evaluated and recommendations made for the most cost-effective solution.

Funding for the project was obtained during 1978 and 1979. A complicated funding program was established with the State of Idaho, EPA, EDA, HUD and FMHA all participating. Total project cost will be approximately $4 million.

The project has been separated into two phases: Phase I is the Collection System; Phase II is Treatment and Disposal Facilities. Final design began in 1980 and was completed in 1982.

A low bid of $1,573,000 was obtained in January 1982 for Phase I of the project. Construction is now under way by H-K Contractors, Inc. Phase II bids were opened on May 12. Estimated cost was $2.1 million and the low bid was $1.84 million.

Unique features of the project include the complex funding arrangements and the disposal system. This will be the first use of a sprinkler system for land disposal of treated wastewater in the area.

Tudor staff on the project include Rick Orton, Project Manager; Bob Stannard (now in Wyoming), facility planning; Bob Mayers, Tim Burgess and Don Payne, design plans and specifications; Jim Spofford, rock location studies; Paul Kunz and Neal Eagar are handling construction inspection.

WEST SEATTLE LOW LEVEL BRIDGE PHASE 2

The City of Seattle has selected the joint-venture of Tudor, Andersen-Bjornstad-Kane-Jacobs, and Parsons Brinckerhoff to prepare conceptual studies, preliminary and final designs, and contract documents for the $40 million Phase 2 of the West Seattle Freeway Bridge Replacement Project. This phase involves a new, movable span bridge over the West Channel of the Duwamish Waterway. The first portion of the project will be a conceptual location study; this will be followed by a complete type, size and location study; then preliminary and final design. Tudor will be the lead civil firm and will direct location studies, and the design of roadway geometry, traffic engineering improvements, utilities and other civil features.

Phase 2 is related to Tudor's work on Phase 1 in many ways besides name and location. The new high level bridge (Phase 1) does not provide access to Harbor Island. The City needs to replace the existing bascule structure in order to accommodate widening of the shipping channel. The City is able to afford the Phase 2 bridge because the construction bids for Phase 1 are tens of millions of dollars less than originally budgeted. Tudor conducted studies of movable bridge options during Phase 1.

The Tudor-ABKJ-PBQ&D joint venture, also known as "The WSB-2 Design Team", exceeds the City's requirements for Minority and Woman's Business Enterprise Participation. Bela Vadasz will be lead Civil Engineer for the joint venture, assisted by Einer Handeland.

MARTA OPENS NORTH/SOUTH LINE SEGMENT

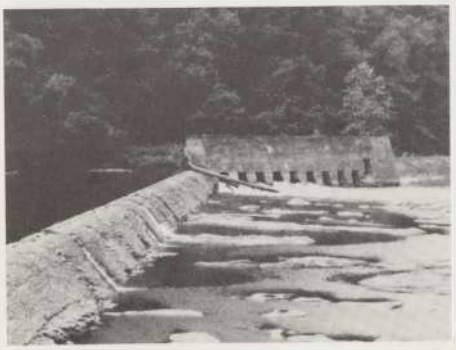
On December 4, 1981, a segment of the North/South Line from Garnett Station to North Avenue Station was opened for revenue service. The new service is a single track shuttle service operating during the week days from 6:00 a.m. to 8:00 p.m. Service is not provided during the weekends to allow the contractors to complete the Peachtree Center Station.

This segment of the MARTA system is 2.7 miles long including Garnett, North/South level of Five Points, Civic Center and North Avenue Stations. The predominant feature provides a connecting link at Five Points Station for patrons wishing to go to the Summit Building (which has direct access to Civic Center Station) or to the new Southern Bell Building (which has direct access to North Avenue Station). MARTA now has 13.7 miles of line and 16 stations in revenue service. In September 1982 the line south will open to West End Station and place Peachtree Station in operation. In December 1982, Midtown Station and Arts Center Station will be open for revenue service.

Personnel from left to right: Clyde Earnest, Manager of Construction Division, PB/T; Miguel Cornejo, Resident Engineer, PB/T; Ken Tolland, Resident Engineer for Elevators and Escalators, PB/T; Louis Riggs, President, Tudor; John Orrison, Resident Engineer, PB/T; Kirk Ehlers, Resident Engineer, PB/T; and Paul Potter, Senior Vice President, Tudor.

Doug Mansfield receives congratulations from Mr. Kiepper.

CAPITOLA HYDROELECTRIC PROJECT



Capitola Dam and Sluiceway.

Final design is proceeding on the Capitola Hydroelectric Project. This project will be a three megawatt facility installed at an existing dam on the French Broad River in Marshall, North Carolina. The project, which has a rated head of approximately fifteen feet, is being developed by the French Broad Electric Membership Corporation, a distribution cooperative serving a portion of western North Carolina near the Great Smokey Mountains. The project is unique in several ways: It involves the rehabilitation of a dam built approximately 100 years ago; financing is being provided through a Rural Electrification Administration loan guarantee. Tudor will be working in association with Law Engineering Testing Company through the design and construction phases of the project. The specifications for procurement and installation of generating equipment have been finalized and bids are expected to be opened early in the summer. Design of the civil works should be completed later in the year. The bulk of the work on the project is being performed by the hydroelectric design group in San Francisco with Andy Yeung as project engineer.

STANFORD LINEAR COLLIDER (SLC)

Approximately one year has passed since Tudor was selected to provide architectural/engineering services for this $30 million high-energy physics project at Stanford. During that period the design team has been actively studying alternative concepts for the facilities. This "evolution" process has entailed extensive coordination with the scientists since the facilities are to support a pioneering effort in physics experiments.

By March of 1982 the elements had taken sufficient form to permit transition into the preliminary design phase, which is scheduled for completion in September. Main project elements include two 4500 foot-long half-arc tunnels which connect to the existing linear accelerator on one end and the experimental hall on the other, plus the experimental hall which will have three substantially underground interaction and assembly vaults and an above grade building housing laboratories, office space, receiving areas, counting houses, and other facilities. The project has been expanded to include a secondary tunnel adjacent to the primary tunnel in the vicinity of the experimental hall which will provide a second collision point. This secondary tunnel necessitates underground wye structures.

Emphasis is being placed on completion of the final design for the complicated LINAC junction connection to the existing accelerator by September 1982. Construction of this "tap" requires a shutdown of the main accelerator which is a rather delicate scheduling problem.

Don Rose (Project Manager), Heinz Mueller (Project Engineer), and Glenn Hough are the key engineers assigned to the project. Robert Janopaul is principal in charge. Keller and Gannon (Architectural/Mechanical/Electrical), Jacobs Associates (Estimator), and Earth Sciences Associates (Soils and Geology) are the main consultants on the Tudor team.

Stanford Linear Collider

TURIMIQUIRI WATER SUPPLY PROJECT – VENEZUELA

Turimiquiri Intake Structure.

This is a major water supply project being built by Guy F. Atkinson Construction Company for the government of Venezuela to provide water to the cities of Barcelona and Cumana in the northern part of the country. During construction of the project, major design changes were required on the intake and spillway. As a result of this, Tudor was retained by Guy F. Atkinson to prepare new designs for these structures.

Since 1977, Tudor Engineering Company has been involved on the redesign of the mechanical and electrical equipment and controls for the intake tower and the structural design of the spillway walls and impact slab just downstream of the flip bucket. The intake structure is a free standing tower, 300 feet high, provided with six 84-inch hydraulically operated butterfly valves at six different elevations in the tower. The spillway is a concrete lined chute type structure capable of discharging 11,000 cubic feet per second of water.

Tudor's responsibilities included the preparation of drawings and specifications for the procurement of the valves, operating equipment and both electrical and mechanical controls; preparation of drawings and specifications for the fabrication and installation of all metalwork related to the intake; and the preparation of construction drawings for the spillway walls and flip bucket impact slab.

Robert Janopaul is the principal in charge. All this work was accomplished under the direction of Roberto Iniguez, Project Manager, assisted by Mike Goldberg, Don Guild and Tom MacLennan.

PEOPLE AND PLACES

The first quarterly marketing meeting was held April 14 at the Sheraton Airport Inn in San Francisco with key marketing managers present to review marketing plans and progress to date. This involved Bob Janopaul, Paul Potter, Dave Willer, Keith Bull, Ted Purcell, John Williams and Jack Biederman. Gerry Gibney was in Chicago preparing a proposal for the Navy.

Roberto Iniguez made a final trip to Kuala Lumpur, Malaysia, in connection with the mini-hydro project in that country. On the way to Malaysia he stopped in Manila, Philippines, Bangkok, Thailand, and Jakarta, Indonesia, to investigate the possibilities of work for Tudor in southeast Asia. He was absent from the San Francisco office from April 2 through April 25, 1982.

Jack Biederman and Gerry Gibney attended the annual Committee on Federal Procurement of A/E Services (COFPAES) in New York City at the end of March. Large appropriations in the coming year will go to the Armed Forces with current levels of Civil Works, Energy and Transportation programs being greatly reduced.

ASCE 1982 National Spring Convention in Las Vegas, Nevada, during April was attended by Walter Anton, Don Rose and Rainer Rungaldier. Walt was Chairman of the Executive Committee of the Technical Council on Lifeline Earthquake Engineering. Lifelines include transportation, electric power and communication, gas and liquid fuel, water and sewer facilities. TCLEE sponsored three technical sessions during the conference. Don participated in Geotechnical Design and Construction Conference in a debate "Are Rock Mechanics Investigations Always Warranted for Civil Engineering Projects?" Rainer, substituting for Paul Potter, presented to the session on Analysis and Design of Transit Structure, a paper and slide show on the MARTA Aerial Structure Standardized Plan and Construction Options.

At the Construction Specifications Institute 26th Annual Convention opening ceremonies, June 18, in Atlanta, Grant Larsen, FCSI, was presented two Honorable Mention awards in the Institute's Annual Specification Competition. These awards are the second highest offered by the Institute and signify notable achievement in the field of specification writing. Awards were in two categories: Civil Engineering, for the Construction of the Monticello Power Plant; and Procurement, for the Procurement of Turbine-Generators for the Monticello Power Plant.

Paula Dierkop has been notified by the Construction Specifications Institute that she has passed the examinations and is now classified as a Certified Construction Specifier.

Gary Waddoups, formerly in Tudor's Kennewick office, has been assigned as a Design Engineer on Design Contract CS520.

Jim Lammie, PB/T's Project Director for the past 6 years, was reassigned to Parsons Brinckerhoff's New York office as Regional Manager, North Atlantic Region. Recently, word was received in Atlanta that Jim was elected President of Parsons Brinckerhoff Quade and Douglas, Inc. He will assume his new duties later this year. Jim did an outstanding job on the MARTA Project and received many commendations for his tireless efforts.

Alan F. Kiepper, MARTA General Manager for the past 10 years, will become General Manager for the Houston Texas Transit System. Mr. Kiepper has done an outstanding job during his tenure with MARTA and will certainly be missed by all at PB/T.

Miguel Cornejo has been appointed Resident Engineer of Project CS380. This project is predominantly an at-grade project with MARTA and a highway bridge over the Lakewood Freeway.

Tudor provided a judge, Bob Moorhead, for the annual Lewiston Regional Science and Engineering Fair. Projects from area schools within a 75-mile radius were on display at the Nez Perce County Fair Building. This is the second year Tudor has assisted in this activity.

Jeannie Beal, wife of Bob, graduated from Lewis-Clark State College at Lewiston with an A.A.S. degree in engineering technology (drafting) on May 14, 1982.

Tudor's Chief Economist, Ed Barbour, has a new nickname – "Ace" Barbour. This is a result of Ed's exploits on the golf course. He recently scored a hole-in-one with a seven iron on the par 3, 157 yard, seventh hole at the Willow Springs Golf Course near Morrison, Colorado.

Aurora Salcedo and Campton Mock were married April 3, 1982 at St. Philomena Church in Honolulu, Hawaii. The couple now live in San Francisco. They were honored at a reception in San Francisco on April 18, 1982.

NEW FACES . . .

Tudor welcomes new employees.

. . . for san francisco

Amelio Bulseco
Designer

Jessica Larson
Secretary

Susan Lee
Senior Drafter

Susan Mara
Hydrogeologist

Celia Politeo
Receptionist

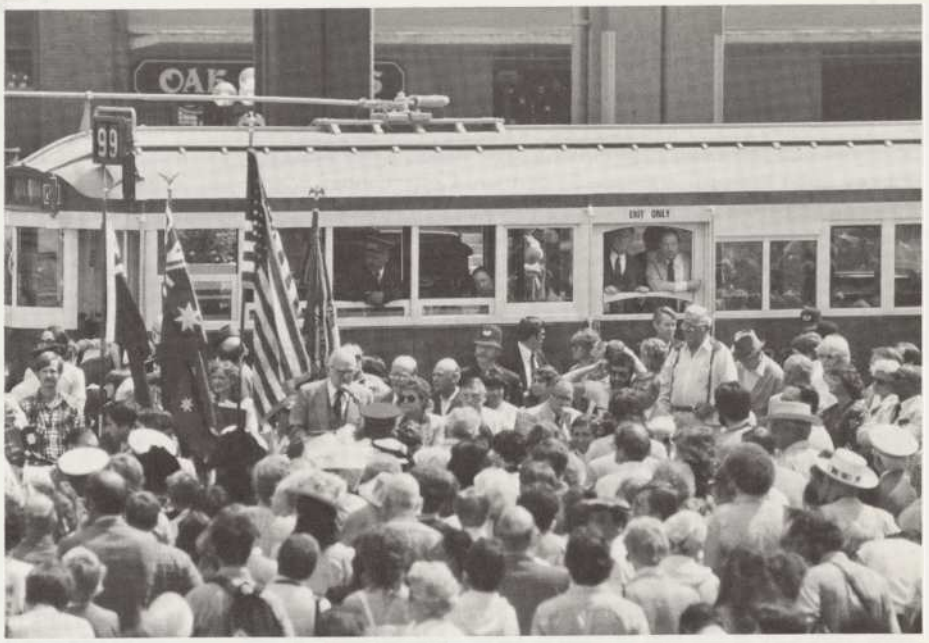
Lesly Sacripanti
Marketing Assistant

David Silveira
Drafting Trainee

. . . for denver

Joe Bergquist
Civil Engineer

NEW SEATTLE STREETCAR LINE DEDICATED



Crowd of local residents celebrate dedication of the Seattle Waterfront Streetcar System, a 1.3-mile line along the City's historic waterfront.

The Seattle Waterfront Streetcar line, a nostalgic reminder of an era when electric streetcars were the principal means of transportation in American cities, was dedicated in May.

The 1.3-mile line was installed along Seattle's historic waterfront, now a popular tourist attraction. It features two vintage streetcars riding on a reconstructed section of railroad leased from the Burlington Northern Railroad.

Tudor Engineering Company of San Francisco and Seattle performed planning and engineering of the project. Although only a limited operation, it required almost all of the components of a full-scale transit system, including route location study, trackwork design, station stops, traction power system and maintenance shop.

More and more urban transportation planners are considering light rail systems as the most affordable transit option. In the Seattle case, the City took over an existing railroad line, rebuilt the trackways, purchased used streetcars and installed a new electric power system. The cost was $3.3 million. A completely new system would have cost at least twice that amount.

Seattle officials are hoping the streetcars will become as popular as San Francisco's cable cars.

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THE TUDOR QUARTERLY is published by Tudor Engineering Company for the information and enjoyment of its employees, their families, and friends.

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TUDOR QUARTERLY

SUMMER 1982

SOUTHEASTERN HYDROPOWER

Tudor's major focus of operation in the Southeastern United States for years has been the MARTA Project. Recently, however, the company has expanded its scope of services in the Southeast. The new activity is in the field of hydroelectric projects. One of the first southeastern hydro jobs was performed for the Department of Energy's Savannah River Plant in Aiken, South Carolina. Tudor's Denver Office prepared a report on the hydroelectric potential of two cooling water effluent channels at this nuclear manufacturing facility.

A southeastern hydroelectric project which has particular significance is the Capitola project in Marshall, North Carolina. Tudor, in association with Law Engineering Testing Company, is performing final design for this three megawatt project. A contract has been awarded for the plant equipment; on-site construction should start in the spring. Tom O'Neill is the Project Manager and Andy Yeung is the Project Engineer.

More recently the Tudor/Law team was selected to perform several hydroelectric studies in Kentucky. The Frankfort Electric and Water Plant Board has commissioned a study on the hydroelectric potential of Lock and Dam Number 4 on the Kentucky River. This federally-owned facility was constructed in 1836 and once powered a hemp mill. The age of the dam, combined with low head (13 feet) and the topographic setting, presents an interesting technical challenge. The Louisville District Corps of Engineers has selected Tudor/Law to perform other hydroelectric studies at several reservoirs within its jurisdiction. This work is just beginning with the first study being the Buckhorn Reservoir located in the center of the southeastern Kentucky coal mining area.

SEATTLE OFFICE REACHES ACROSS THE BORDER

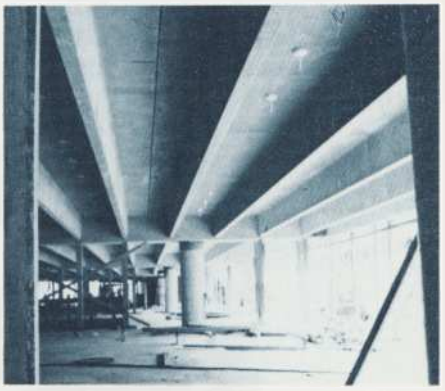
Acres Consulting Services Limited, a large and prestigious Canadian consulting engineering firm, has been selected by British Columbia Transit as staff consultants for the development of the Vancouver Advanced Light Rapid Transit system. Tudor is Acres's subconsultant on transit engineering.

British Columbia Transit is a provincial authority managing the design and construction of the 21-kilometre rail transit system serving Greater Vancouver. Three future extensions of the initial line are also being considered. "ALRT" will run on regular-weight, standard gage tracks in a fully dedicated right-of-way. The cars will be propelled by linear induction motors, a first in transit history. The LIM works on the same principle as a conventional electric motor, except that the rotor is developed into a flat surface on the underside of the car, and the stator — the stationary part of conventional electric motors — is strung out continuously between the running rails. The car then runs along this linear motor.

ALRT will run on aerial structures and at grade mostly in existing railroad rights-of-way, and underground in an existing 2 km-long railroad tunnel. Construction of an early aerial section has already begun. Revenue service will start in 1986, ready for Expo 86, Vancouver's big trade fair.

Paul Potter is Principal-in-Charge and with assistance from Rainer Rungaldier and Mike Goldberg, is the key reviewer of the aerial structure concepts and design. Bela Vadasz, assisted by Roger Brassfield, carries on the day-to-day activities in Canada. They spend a day or two in Vancouver every week coordinating consulting and reviewing efforts that involve the San Francisco and Seattle offices, PB/T in Atlanta, and special consultants. Louis Riggs and Paul Potter recently visited Vancouver to observe the operations and to visit with top BCT and Acres managers.

PERFORMING ARTS GARAGE



Performing Arts Garage construction shows progress.

No sooner had excavation been completed for the 620-space performing arts garage than construction was halted for three months while the City of San Francisco considered the use of air rights over the structure for housing. The housing proved economically unfeasible and construction resumed on the garage. Completion is expected in April 1983.

Dense sand in the area permitted the use of spread footings rather than piles for the foundations and the basic structure is comprised of cast-in-place columns and girders and precast double Tees. Three separate exits are provided to permit the garage to be emptied quickly after a performance at one or more of the nearby performing arts facilities. Don Croft is project manager.

BOWMAN PROJECT

For Nevada Irrigation District, Tudor will be preparing the final design and providing construction services for the Bowman Power Plant located high in the Sierra. The 3 megawatt power plant will operate under a head of 140 feet and with flows to 322 cubic feet per second producing an average of 16 million kilowatt hours of electricity annually. The Plant has an estimated construction cost of $3.5 million and is expected to be on-line by the end of 1985.

TUDOR SUMMER GATHERINGS

SAN FRANCISCO PICNIC

Once again Del Valle Regional Park in Livermore proved an excellent location for the San Francisco office picnic on July 17. Clear skies and 80 degree temperatures promoted participation in the many activities offered in the park including volleyball, boating, swimming, hiking and primarily eating and drinking.

The luau style picnic was directed by Elise and Ulrich Lemcke assisted by Debbie and Brian McDermott. Matters were greatly simplified when a local farmer and restaurant owner agreed to prepare and serve the roast pig. Delicious casseroles, salads and desserts were prepared by all in attendance. The picnic was regarded as a success, particularly by Ulrich Lemcke, who learned how not to tap full beer kegs with a pressurized tap.

As it did last year, Del Valle Regional Park provided ideal surroundings and beautiful weather for the picnic.

Brian McDermott and Ulrich Lemcke discuss the adequacy of this year's main course, a 176-pound roast pig.

Irene and Gordon Marsh and Bob Janopaul serve themselves a luau lunch.

Greg Reichert, Mike Goldberg, Stewart Iniguez, and especially Gordon Marsh found the volleyball matches exhilarating.

Enjoying the shade and some friendly conversation are Pat and Louis Riggs and Karen and Bill Untiedt.

Gerald Gibney's kids, Adam and Michele, check the arrangement of the fruit salad to be sure everything is in order.

Afternoon dock scene.

BOISE PICNIC

This year the Boise staff, family and friends held their annual summer picnic at Lucky Peak Reservoir. Activities included volleyball, water skiing, swimming, horseshoes and relaxing. Ted and Pat Purcell made the arrangements for an excellent picnic. Mike Moore assisted with barbeque chores. Tim Burgess, Jim Spofford, Gary Ames and Rick Orton furnished boats for skiing and transportation.

"The Chefs", Ted Purcell and Mike Moore

Neal Eagar relaxing after lunch.

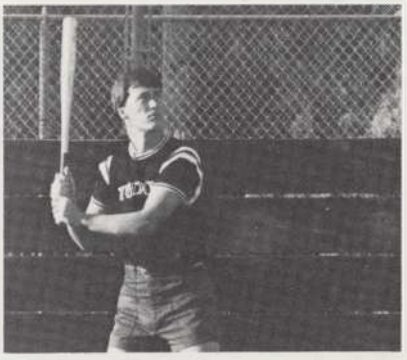
SAN FRANCISCO SOFTBALL — CLOSE, BUT NO CIGAR

The 1982 season was the most successful ever for the S.F. softball team, winning 12, losing 3 and finishing third in league play. A 6-team playoff was scheduled at the end of the season, and Tudor was eliminated in the first round. Twenty-eight different players participated this year, including Tom O'Neill from Atlanta and Harry Jasper from Seattle. The accompanying pictures show some of our heroes in action.

Brian McDermott, shortstop.
First you put your left foot way out here...

Don Yamagishi, catcher.
Now we're going to play some "Yama-ball."

Steve Van Til, left field.
The new home run king, "just showin' off."



Ulrich Lemke, first base.
How do you like my Sealy Posturepedic batting stance?

SEATTLE PICNIC

The Seattle Office returned to St. Edward's State Park on the NE shore of Lake Washington for its 1982 picnic, held July 24th. (It was the scene of the 1979 picnic.) Picnic tables and Keith Bull's premier salmon barbeque were set up in the shade at the edge of the lawn near the old seminary building. Volleyball drew many participants (most notably, Polly Rae, who earned recognition for the "Best Volleyball Performance by a Visibly Pregnant Woman"). Many Tudorites were lured to the lakeshore by a short hiking trail (1/4 mile) near the picnic area, which proved remarkably steep on return. There was a consensus that the food was up to Tudor standards on all criteria: Quality, quantity and variety.

Relaxing before lunch are Dave Alden, Jeri Alden, Don Hoel, Jack Bjork, Harry Jasper, Bethany Wright, Brian Rae, Dewitt Jensen, Ron Wright, and Jeremy Paterson.

Having a good time are Dick Rudolph, Phyllis Rudolph, Mary Bickerdike, Debbie Hirschel, Don Hoel, Donna Wright, and Bethany Wright.

The volleyball players are Harry Jasper, Brian Rae, Mujib Ahmed, Dave Alden, Jack Bjork, Ron Wright, and Pete Paterson.

Alia Ahmed, James Wright and Bethany Wright giving the dog a walk.

Keith and Diane Bull with today's catch.

The homemade spread.

Nels Jacobs and Ed Barbour cooking under Pam Stimpson's direction while Dawn Jacobs, Jeanne Barbour and John Williams await the results.

Dale Bowers and Karl Huttner after the meal. Is that Alka-Seltzer, Karl?

John Williams says, "It's my ball and I'll make the rules."

Jeff Stevens and Cliff Bjorgum — which is the bride?

Sal Todaro and son enjoy the mountain air while Karl Huttner enjoys his Coors.

DENVER PICNIC

The Denver office summer picnic was held on June 5th at the Denver City Parks facility in the mountains near Conifer. Over 30 people enjoyed a gorgeous Colorado mountain day. Ed Barbour and Nels Jacobs cooked the hamburgers and hotdogs, which along with homemade goodies, beer and pop satisfied appetites. After the meal everyone participated in competitive games of softball, volleyball and horseshoes. Everyone had a thoroughly enjoyable day before heading down the mountain at sunset.

Tom Rawlings and Jessica enjoying the meal with Ed Barbour and Dawn Jacobs.

DENVER UPDATE

The Interim Report on the Cache la Poudre Project was completed by the Denver office staff in July. This report presented the preliminary evaluation of six alternative water resources projects in the Cache la Poudre River Basin in Colorado. The alternatives range from a basic scheme with one major storage dam with a 12,500 kilowatt run-of-the-river power plant to a power intensive scheme consisting of four major dams, two diversion dams, two forebay dams, three peaking power plants with a total capacity of 166,000 kilowatts and two run-of-the river power plants with a total capacity of 12,700 kilowatts. The Interim Report will be the basis for selection of one or two alternatives by the Colorado Water Conservation Board. The selected alternatives will be studied at reconnaissance level by the Denver staff during the remainder of the year. The report was prepared by Nels Jacobs, Ed Barbour, Joe Bergquist and Tom Rawlings.

The Denver staff has started two small hydro projects, reconnaissance studies of the Hubbart Dam Power Project in Montana, and the El Vado Dam Power Project in New Mexico.

John Williams and Jerry Cross have completed studies of small hydro potential at Starved Rock Lock and Dam and Dresden Island Lock and Dam in Illinois, and Locks & Dams 11 and 14 on the Mississippi River.

IDAHO FLOOD STUDIES

Tudor is continuing the hydraulic analysis and report writing on the Flood Insurance Studies for four small cities in Idaho. With the hydrology completed, the next step is to make numerous computer runs to determine flood profiles and calibrate the models. Jim Spofford is making the runs with Paul Kunz, Project Engineer, reviewing the output and coordinating the activities.

KUNA SEWER PROJECT

Phase II of the sewer project for treatment and disposal was awarded in June for $1.84 million to H-K Contractors, Inc., the same contractor for Phase I. Construction under Phase I is proceeding without any major problems. Phase II construction has started at the lagoon site where approximately 110,000 cubic yards of embankment are needed to build the lagoons. The major items included in Phase II are: A $0.2 million lift station, 3.9 miles of force main, $0.8 million PVC-lined lagoons with aeration equipment, sprinkler system for disposal of treated wastewater, and a new well to supplement water for the disposal site.

Rick Orton, Project Manager, is coordinating efforts with the City; and Paul Kunz, Project Engineer, along with Neal Eagar and Tim Burgess, are handling the construction inspection and funding participation with the State of Idaho, EPA, EDA, HUD, and FmHA.

GARDEN CITY

Phase I of the sewer sealing project in Garden City, Idaho, is now complete. Rough estimates show that in excess of 775,000 gallons per day of groundwater infiltration was stopped. Unfortunately, most of this infiltration has migrated to other parts of the sewer system and considerable work remains in Phase II to eliminate the problem. Phase I consisted of grouting the sewer line joints and manholes, and Phase II covers repair of leaking sewer line services.

SLY CREEK POWER PLANT

On Friday, October 8, Paul Williams and Eddie Ferreira, Directors of NID, accompanied Bob Janopaul and Dave Willer to the construction site of the Sly Creek Power Plant. They were met by Fritz Steppat, General Manager of OWID, and Steve Onkun, Power Superintendent. The Sly Creek Power Plant is about 95 percent complete. It is anticipated that the plant will be ready for testing by mid-November.

From left to right: Steve Onkun, OWID, Power Superintendent; Bob Janopaul, Tudor; Fritz Steppat, OWID, Manager; Paul Williams, Nevada I.D., Director; Eddie Ferreira, Nevada I.D., Director; Dave Willer, Tudor.

NEW FACES . . . . . .

Tudor welcomes new employees:

. . . . . for seattle

J. Ron Wright
Civil Engineer

Polly Rae
Drafter

J. Ross Jackson
Drafter

CONGRATULATIONS . . . . .

Dave Alden and Jeri Barrow were married July 12, 1982 at Faculty Club, University of California at Berkeley, California.

Gordon Little and Candence Julie Kurtin, a social worker, were married July 31, 1982 in Sacramento, California.

Steve Alters, Craig Giordano, Don Scapuzzi, George Schneider, and S.T. Su received their Civil Engineering registration from the State of California.

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THE TUDOR QUARTERLY is published by Tudor Engineering Company for the information and enjoyment of its employees, their families, and friends.

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TUDOR QUARTERLY

FALL 1982

HOUSTON RAPID TRANSIT

During November Tudor was selected to perform conceptual design studies for the aerial guideway structures of the Houston Rapid Transit System. It is intended to develop a system-wide standard structure, similar to the approach taken for BART, MARTA, the Miami METRO and other modern systems. The objective of the conceptual study is to determine the basic configuration of the standard structure, select a basic span length, girder type, girder material (steel, concrete), and pier types. The study will also define the procedures for use of the standards, including the scope of a structure geometry computer program.

It was gratifying to see Tudor selected as special consultant for this prestigious job on a "sole source" basis. We believe this was a consequence not only of Tudor's national reputation as leading designers of transit structures, but also the result of meticulous attention to the development of this project, primarily by Paul Potter, over the last few years.

The work will be performed in San Francisco, involving Rainer Rungaldier, Mike Goldberg, Walter Zien, Wu-Chieh Chen and Eva Spatenka, with Principal-in-Charge Paul Potter. We hope that this project will lead eventually to Tudor's selection for the considerably bigger job of the actual detail design of the standard structures, following the completion of the present study in mid-March of 1983.

TUDOR SELECTED FOR EBMUD HYDRO PROJECTS

The East Bay Municipal Utility District has selected Tudor to perform comprehensive feasibility studies, geotechnical investigations, conceptual designs and FERC license applications for hydroelectric developments at the Middle Bar and Railroad Flat dam sites on the Mokelumne River.

Tudor performed the previous "Feasibility Study for Mokelumne River Project Potential Power Development" for the District in the mid-1970's.

FERC has issued Preliminary Permits to the District for these two major projects. Exhibits for separate FERC License Applications will be prepared by Tudor and the District's environmental consultant EDAW, Inc. for submittal to FERC in late 1984. The major portion of Tudor's effort will be performed during 1983.

Various types of concrete and rockfill dams will be considered for each site ranging in height from 345 feet at the Railroad Flat dam site to 420 feet at the Middle Bar dam site. The power plant capacities range from 23 MW for the Railroad Flat Project to 54 MW for the Middle Bar Project.

Tudor's principal subconsultant, Woodward-Clyde Consultants, will be responsible for the extensive geotechnical investigations that will be required. Gordon Marsh is the Project Manager, and Walter Anton is the Principal-in-Charge.

From left to right:

Middle Bar dam site looking upstream.

Railroad Flat dam site looking upstream.

DECEMBER BOARD ACTION

Louis Riggs steps up to Chairman, and names Robert Janopaul President, effective January 1, 1983. The Board of Directors approved the nomination and also adopted an Employee Stock Bonus Plan. Stories in the next newsletter.

NEW APPOINTMENTS

The Board of Directors has elected Robert Myrdal as Treasurer and Assistant Secretary and Barbara Cooper as Assistant Secretary of Tudor Engineering Company, effective October 15, 1982. Bob joined Tudor in 1965 working on the BART project, then moved to Seattle with the opening of that office in 1969. Bob returned to the San Francisco office in 1976 where he has been serving as office manager for the past four years. In his new capacity as Vice President-Treasurer in the corporate office, Bob has responsibility for personnel, administration, accounting and finance under the direction of the Executive Committee. Barbara joined Tudor in 1975 as an executive secretary. In her present position as Assistant to the Chairman and Assistant Secretary of the Corporation, Barbara works closely with Louis Riggs and the Board in executing the official business of the Company. Barbara also continues to serve as Administrator for the Tudor Retirement Plan.

BONNEVILLE POWER CONFERENCE

The Bonneville Power Administration (BPA) held a conference in Boise recently. The theme centered upon renewable resources and conservation. Dave Willer participated in the program. Tudor was represented in the exhibit hall by Ted Purcell and Dave Alden. Tudor's hydro display board, prepared by Frank Chiappella, and the slide show prepared by Duane Cronk & Associates, were proudly displayed.

From left to right shows visitors to the Tudor booth plus David Alden and Ted Purcell.

MARTA NEWS

Another PB/T milestone was achieved with the opening of the Midtown and Arts Center Stations for revenue service on December 18, 1982. This is a very important milestone for the MARTA rail/bus system in that the majority of the buses arriving from the north and currently going through downtown Atlanta terminating at Five Points Station, will now terminate at Arts Center Station. This transition will alleviate the heavy traffic congestion on Peachtree Street in downtown Atlanta which has existed for many years.

The opening of these two stations provides MARTA with a total of 20 stations and approximately 16 miles of rail line and the Avondale maintenance yards and shops. That's quite an achievement for PB/T especially when the first portion of the East line was open for revenue service in July 1979.

Again Louis Riggs was on hand to witness this opening which marks the 5th gala affair.

Currently, construction continues from Lakewood Station in the South to Brookhaven Station in the North. Revenue service from Lakewood to Brookhaven is scheduled to open in December 1984.

JONES FORK PROJECT

The San Francisco office is providing construction contract administration and design office services for Sacramento Municipal Utility District (SMUD)'s Jones Fork Hydroelectric Project. Tudor had earlier provided engineering services for the planning and design phases. This construction phase is scheduled to be completed in early 1985.

The $19 million Jones Fork Project is located in the Sierras east of Placerville, California. When completed the 10 megawatt power plant will produce about 24 million kilowatt hours of electrical energy annually. SMUD provides electricity to residents and businesses in the Sacramento area. The key elements of the project consist of an 1800-foot long, 8-foot diameter tunnel and an 8400-foot long, 5½-foot diameter steel penstock that will divert a portion of the flow of the South Fork Silver Creek to Union Valley Reservoir located on the main branch of Silver Creek. The vertical Francis type hydraulic turbine and other related equipment is being furnished by Fuji Electric Company of Tokyo, Japan. Fred Estep is Tudor's Resident Engineer for the Project and is assisted by John Wurschmidt and George Schneider in the field and John Richardson in the San Francisco office. In these initial months Tudor's involvement in the design services area is extensive with key mechanical, electrical and civil staff members contributing.

JONES FORK TRANSMISSION LINE

With direction from Jones Fork Project Manager Bob Ganse and Tom MacLennan, Tudor completed the Jones Fork 69kV Transmission Line design in October. SMUD crews will construct the line, which will be carried on wood pole "H" structures. The line will connect the new Jones Fork Powerhouse switchyard and the existing Union Valley powerhouse switchyard.

The three and one-half mile line, using high strength cable, is designed for extreme ice loads, and follows a route planned with careful attention to environmental concerns. Using balloons tethered to the height of the proposed transmission structures, sightings were made from nearby public thoroughfares and recreation areas during route location to assure low visibility. The transmission line right-of-way clearing will be kept to a minimum and color-coated, non-reflective conductors and shield wires will be installed. The transmission line is due to be completed by December 1983.

JONES FORK SWITCHBOARD PROCUREMENT

The fourth separate contract document for the Jones Fork project was completed for the procurement of the main control switchboard and auxiliary equipment. With engineering design information for the turbine-generator available from the manufacturer, the final design, drawings and specifications were completed and the procurement contract was scheduled to be advertised in late December.

HYDROPOWER WORKSHOP

Tudor personnel, from the Denver and San Francisco offices, were recently involved in a small hydropower seminar sponsored by the Denver Research Institute, University of Denver, Colorado, during October. The primary goal of the workshop was to present to attendees from various developing countries the investigations, analyses and guidelines involved in hydropower development. International participants included middle and high level government planners, policy makers, and energy resource development program and project managers from about a dozen nations.

Tudor's representatives covered several study and design topics in two separate sessions. The first session, held on October 14–15, was led by Gordon Little (S.F.), Ed Barbour (D), and Nelson Jacobs (D). They discussed the methods, and presented project case studies, pertaining to reconnaissance and feasibility level investigations. The second session, October 19–20, was led by Hugh Brown (S.F.), John Williams (D) and Sal Todaro (D). Their presentations and discussions detailed various components of project design from field investigation to preparation of contract documents for construction. Engineering services during construction were included in the presentation.

The seminar was viewed generally as a success, and Tudor was well represented at this international workshop.

OGLETHORPE TOUR

Visiting the McSwain Power Plant are, from left to right: Clarence Mitchell, Ernest Jones, Don Martin, Tom O'Neill, and Plant Operator James Hardee.

On December 6, five representatives from Oglethorpe Power Corporation arrived in San Francisco for meetings with Tudor personnel and a tour of several hydro projects which Tudor has designed. Oglethorpe is the Generation and Transmission cooperative for the State of Georgia, serving all 39 distribution cooperatives within the State under the guidelines of the Rural Electrification Administration. Currently, Oglethorpe is participating as a joint owner in the construction of several very large nuclear plants. However, they are actively pursuing small hydro as a next source of generation within their system. Making the trip for Oglethorpe were Don Martin and Clarence Mitchell from design, Mike Norman from construction, and Ernie Jones and Don Regan from operations. Tom O'Neill from Tudor's Atlanta office accompanied the group throughout their tour.

On Monday initial discussions were held concerning Tudor's background and experience in small hydro. Walt Anton and Hugh Brown gave presentations on Tudor's design practices and methods of project control.

Tuesday morning, the group departed San Francisco for the San Joaquin Valley. The weather, which had been very poor, cleared prior to departure and provided a beautiful day. Initial stops were made at Turlock Irrigation District's power plants at Drop 1 and Drop 9 on their main canal. Both plants, designed by Tudor in the late 1970's, were operating, which is uncommon during the winter non-irrigation season. After lunch in Turlock, the group toured Merced Irrigation District's McSwain and Exchecquer projects. Both of these plants, on which Tudor provided all engineering services, were operating at full capacity. Additionally, due to the recent heavy rains, both facilities were bypassing water over and above the maximum turbine flow, an event which occurs approximately every five years. The group then travelled to Sacramento where they spent the evening.

On Wednesday morning, an early visit was made to the Rollins power project where a tour was conducted by Bob Carr of Nevada Irrigation District. Rollins was also running at full capacity and water was being passed over the spillway. From Rollins, the group moved on to the Sly Creek project where Fred Estep, Tudor's Resident Engineer at the site, conducted an informative tour. Sly Creek is nearing completion of construction and was at a most interesting stage. The visitors were even able to climb down inside the draft tube and look up at the turbine runner. From Sly Creek the tour moved on to make a late afternoon visit to the Monticello power project where the group was met by Tudor's Brian McDermott. Brian led the way through the nearly completed power plant which has been under construction for nearly one year. The layout of the three horizontal Francis turbines was an especially interesting feature. The tour then returned to San Francisco where it concluded with a visit to the North Beach area of the City. Everyone returned to Atlanta the following day, tired, but impressed with the sights they had seen.

SLY CREEK NEARING COMPLETION

The Sly Creek power plant construction which started in April 1981 is nearing completion. Its single unit is the second to be removed from PG&E's decommissioned Melones powerhouse for refurbishing and reuse. The first unit, reinstalled at Rollins Powerhouse, has been churning out the kilowatts for Nevada Irrigation District for some time. By now the equipment has been mostly installed at the completed Sly Creek powerhouse. Fred Estep and Joe Culpepper are seeing the construction through the final installation, checking and testing stages in preparation for startup in January.

Frequent visitors to the site for field work are Don Guild, Gary Durham, Bill Untiedt, and Paul Kneitz, who have followed the project from the start in the San Francisco office. The project has successfully met some rather restrictive scheduling requirements, but Hugh Brown, Project Manager, is still giving odds that the Contractor will meet the scheduled completion date. Fritz Steppat, Oroville-Wyandotte Irrigation District Manager, had the unenviable task of coming aboard midway in the project. Steve Onken, OWID Power Superintendent and Dale Turman, his assistant who will operate the plant, have been on the job since construction started. The 1100 foot steel penstock and 48-inch bypass valve have been discharging water, as planned, since last spring. When funnelled through the turbine, the water will generate 13,500 kW of power and produce 48,500,000 kWh annually.

Sly Creek power plant shows final stage in the construction.

The Great Wall of China. Much of it requires repair.

Terra cotta soldiers buried with the Emperor in Xian.

We flew to Xian, where we saw the 8000 full-size terra-cotta soldiers originally buried with the Emperor and recently excavated at the Museum of the Qin Dynasty. We had an outstanding technical exchange in Xian which ended at 9:00 p.m., after 12 hours. Our next stop was Guilin, where we saw the limestone caves and strange, steep and misty topography so often seen in Chinese paintings. Guilin is openly working to attract tourists, and there was a hustle and bustle and variety not often seen in China. Finally, we returned via Canton to Hong Kong, where that British colony has erected spectacular high-rise low-cost public apartment housing which completely dominates the harbor shores. The tour group then left for home. Victoria and I made our return via Macao, Bangkok, Singapore, Manila and Tokyo (where I toured the undersea Seiken Tunnel).

It is difficult to sum up my feelings about the enigma that is China, but several things are quite clear. The people are friendly and clearly well-fed, and extremes of wealth and poverty do not seem to exist now. The government was extraordinarily friendly, with repeated expensive banquets and elaborate attention paid us from the moment of our arrival in a city to our departure. It is obvious that China wants to modernize and wants to open its doors to western skills. The physical and historical sights are marvelous and live up to dreams and expectations. I would suggest that all of you who would like to visit China some day, don't hesitate. It is safe, friendly and a wonderful trip!

Limestone topography at Guilin.

REGIONAL ASSESSMENTS OF SMALL SCALE HYDROPOWER

Tudor is currently working on an assignment for the World Bank from Washington D.C. to develop a methodology for regional assessments of small scale hydropower. In this case "small scale" is defined as projects less than 3000 kW in size. The methodology is intended primarily for application in developing countries covering areas greater than several thousand square miles.

The intent of the study is to develop a technique whereby reasonably accurate estimates can be made in a fairly short period of time (2 to 3 months) of the number, size, and cost of the economically justified small scale hydroelectric projects that could be found in a particular region. A long term program would then be set up in the country to develop a certain number of sites annually.

The basic approach of the methodology is to identify the zones where the sites would be found, analyze representative areas from this zone in some detail and then extrapolate the results in the entire area. Probably not more than 20 to 25 percent of the total number of sites would actually need to be analyzed in detail.

The methodology is based on the experience gained by Tudor on the Malaysian Mini-Hydro project and the Alaskan Small Hydro project. Gordon Little of the San Francisco office is the principal author and Ed Barbour from Denver is supplying advice on economic analysis techniques.

KUNA SEWER PROJECT

The Kuna sewer project moves toward completion. Construction of the two phase project is nearing completion ahead of schedule and under budget. Phase I, the collection system, is completed with the exception of cleanup and installation of some pumping facilities. Phase II, the treatment facilities, is approximately 60 percent complete. We expect that weather will slow progress some this winter. Sabin Landaluce, Neal Eagar, Paul Kunz and Tim Burgess are the construction management team.

Lifted road surface after blasting.

CHINA IN 16 DAYS
中國十六天

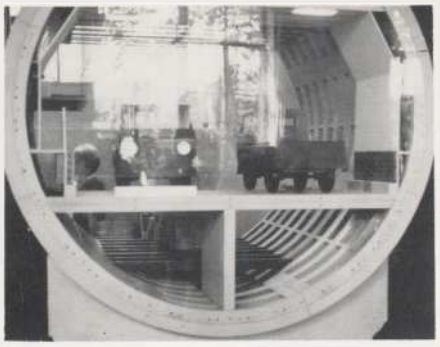
by Don Rose

My 17-year-old daughter Victoria and I were part of a 17-person official delegation that visited China in October-November for 16 days. Our tour was sponsored by the Chinese Ministry of Rail, one of the largest, oldest and most powerful of China's Ministries. I was the leader of the delegation of engineers specializing in underground structures and dam foundations. The tour was organized by the Sino-American Technology Exchange Council.

We flew to Shanghai non-stop from San Francisco in about 14 hours, starting at 2 p.m., crossing the International Date Line and arriving one calendar day later at about 8 p.m. We were housed in the old, large western-style Shanghai Mansions Hotel and immediately several of us went walking a few hundred yards across the river bridges to see the city. Streets were dusty, but unlittered. We saw no old fashioned hand-pulled rickshaws and almost no automobiles, but a few buses and numerous bicycles. The town was closing down and by ten o'clock the streets were essentially empty: we found that China is now a Puritan society with no night life, even in cosmopolitan Shanghai.

In the early morning, between 5 and 6 a.m., we could look out our 15th-story hotel windows and see the long trains of barges on the river below, and on both sides of the river a few hundred people both old and young exercising in the traditional Chinese fashion, which roughly speaking resembles martial arts stances and movements. Several of the younger men leaped and kicked spectactularly, but most people exercised very patiently, almost in slow motion.

After breakfast, we attended our first technical meeting in China, which was in some ways to prove typical. Mr. Wang Zhenxin presented a lecture in excellent English on the design and construction of China's first subaqueous vehicular tunnel, built from 1965–1971 beneath the Huangpu River. Construction was interrupted for a year by the Cultural Revolution (1966–1976), a period of chaos openly criticized by almost all of the Chinese engineers we met. A very large (10′ high) working model of the soft ground blind-shove tunnel shield, and a large model of the tunnel profile were on display. Every single item on the job, from strain gages to precast concrete liner segments, was built in China. Thus we saw the first of several examples of Chinese engineering excellence. Later, however, we learned from the Chinese that in some respects China is short of good experienced engineers, and that although their top talent is world-class, they need to open China to outside help in order to rapidly modernize the country.



Working model of the full-face TBM and shield used to tunnel below the Huangpu River.

From Shanghai we went to Wuhan and on to Yi Chang, where we visited the 2715 MW Gezhouba Dam, the first dam across the Yangtse River. Immediately upstream in the Three Gorges, the Chinese are exploring the abutments for a 25,000 MW dam which would be by far the world's largest. Here again the Chief Engineer, Rushu Wang, gave an excellent presentation in English (as he had done recently for Kissinger, Nixon and others), and we saw a movie and later a huge working model of the Gezhouba Dam and the Yangtse River, with moving ships and ship locks, trains, city lights and so on. About one third of the Gezhouba dam remains to be completed, but two Chinese-built 170 MW and two 125 MW units have been commissioned. However, the concrete construction work and some safety practices were not up to Western standards.

The Yangtse River is fully closed off, but 1/3 of the Gezhouba Dam is still under construction.

We travelled by train on an excellent sleeping car in returning to Wuhan. After another technical visit we were hosted at dinner with many toasts ending "Gum Bai" ("bottoms up"), followed by an evening walk over the Yangtse on the Wuhan Bridge, with songs ranging from opera to "Jingle Bells" sung by our hosts. The Chinese dinners are justifiably legendary for the quality and variety of local food and the quantity (not quality) of the Maotai, the 106-proof traditional dinner drink.

In Beijing we saw the Forbidden City, the enormous yet amazingly serene and harmonious home of the Emperors now open to the public, and the Great Wall of China some 40 miles from the city. China's streets are full of bicycle traffic (which often has its own divided lanes). A few salmon-pink jacket and pants outfits were seen on some of the local belles, in contrast to the almost universal blue Mao jackets and loose trousers usually worn by both sexes. Beijing air is dusty and polluted by the high-sulfur coal used for heating. The lovely white limestone carvings at the Forbidden City are becoming discolored. In Beijing several of us caught the famous Chinese Cough; mild respiratory problems are common. An excellent technical session was held at the Ministry of Rail Facilities, and another at the Institute of High-Energy Physics where a facility very similar to Stanford's SLC Tunnel is under study.

Working model of the Gezhouba Dam. The ships move up into the ship locks in this model.

SHOSHONE-PAIUTE TRIBES

The Shoshone-Paiute Tribes of southwestern Idaho and north central Nevada have retained Tudor to oversee the advertising, bidding and construction of Phase II of their Agriculture Development Project. The work consists of constructing approximately 11,000 feet of 12 inch to 26 inch PVC and welded steel water line and two quarter-mile radius, center pivot irrigation circles. Construction should begin in March or April 1983 and be completed before July. This will increase the Tribe's irrigable farmland by 50 percent.

ASSIGNMENT SMUD

In October, Steve Alters began a nine to twelve month special assignment with SMUD at their main office in Sacramento. Under SMUD's project manager, George Rummel, Steve will be performing a variety of duties for the Generation Engineering Department, including project planning, project review, cost estimating and economic planning, and construction contract administration.

One of the more interesting projects is the contract administration assistance on the Jones Fork Project. Steve is working closely with Deputy Project Manager John Richardson and Resident Engineer Fred Estep on this Tudor designed hydroelectric project which began construction in July of 1982.

In addition to gaining valuable experience working with a municipal utility and providing needed service to an important client, there are fringe benefits. SMUD's hydroelectric generating facility, known as the Upper American River Project, is located in the Sierra Nevada, northwest of Sacramento near the Lake Tahoe area. Preliminary scheduling of field trips to the site involve fighting snow during the area's prime skiing season, and coping with mosquitoes in the adjacent Desolation Valley Wilderness Area during the fishing season.

TUDOR GOES INTO MOVIE MAKING!!

Say cheese and get your lines straight; the camera is going. For those of you who are wondering, we're referring to Tudor's new video equipment, and the marketing group's new toy.

The system consists of a color video camera, a video recorder, and a TV monitor. The camera and recorder can be operated on internal batteries as a portable unit, and carrying cases have been purchased. The commercial quality system simultaneously records both the picture (video) and sound (audio).

We want to encourage use of the system; however, watch it — because when you least expect it, someone might say to you..."Smile, you're in an interview."

David Silveira, Cameraman.

BOISE BOWLING

The Boise office organized a bowling team this year. The team is made up of five Tudor employees, Tim Burgess, Jim Spofford, Gary Ames, Don Payne and Stan McHutchison, and two non-Tudor people. The bowling season lasts from September to April, which should give us plenty of time to raise our team average above 140, maybe. Special mention should be given to Jim Spofford who won a 12-pound turkey for rolling high series during the Thanksgiving week turkey shoot.

BARBOUR BAGS FISH IN JACKSON HOLE

A five pound, two foot long Cutthroat Trout in the Snake River succumbed to Ed's fly fishing prowess. Caught just inside Teton National Park on a home-tied #12 dry fly (Joe's Hopper) with a 10 foot tapered 5X leader. Battle took 15 minutes, witnessed by river rafters from Jackson Lake Lodge, so it's not a fish story.

NEW FACES...

Tudor welcomes new employees:

...for san francisco

Noel P. Gaerttner
Chief Accountant

...for seattle

Laurijae Sweetland Smith
Receptionist

WIL PACHECO RETIRES

Wil Pacheco retired October 1, 1982 after 34 plus years in the engineering field.

Wil joined Tudor Engineering Company on May 1, 1964 when he was assigned to the Bay Area Rapid Transit (BART) project as Project Engineer responsible for the route location and detailed design of an 8-1/2 mile segment including three stations. In 1973 he was transferred to PB-T-B (now PB/T) where he held various positions on the MARTA project.

During Wil's engineering career he worked on assignments in Guam, Midway, Hawaii and Santiago, Chile in addition to his assignments in California, Nevada, Washington and Atlanta. Wil claims that his move back to California will be his 27th since taking up engineering.

Wil has been a long standing member of the American Society of Civil Engineers, Society of American Military Engineers, American Public Works Association and the Public Works Historical Society.

Although Wil is officially retired, he can be observed from time to time in the San Francisco office in his new role as an Associated Consultant for Tudor Engineering Company.

Wil Pacheco

CONGRATULATIONS

Bambi Pineda and Mehrdad Goosheh were married in a small family ceremony at the bride's home on December 26, 1982.

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TUDOR QUARTERLY

WINTER 1982

PROGRESS ON WEST SEATTLE BRIDGE

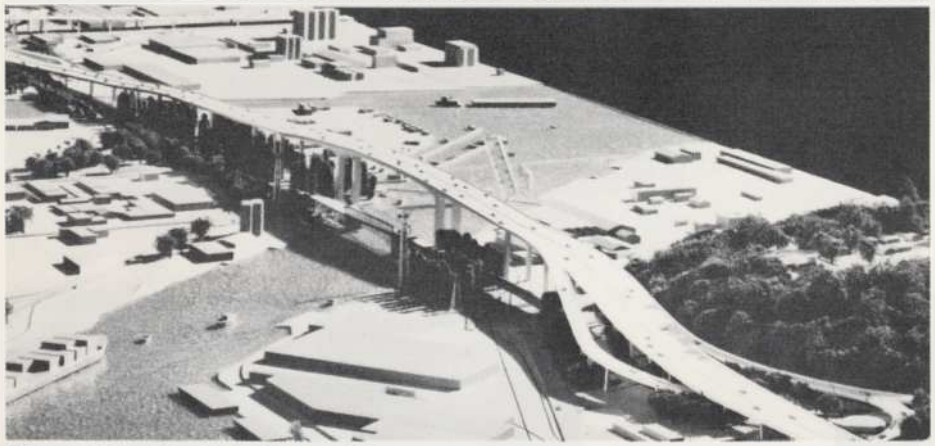


Photo of West Seattle Bridge model.

The accompanying photo, taken this winter, shows some of the progress on the West Seattle Bridge Project. Tudor is the lead civil firm on the job, in a joint venture with Andersen·Bjornstad·Kane·Jacobs, Inc., Parsons, Brinckerhoff and Kramer, Chin & Mayo, Inc. The construction schedule calls for completion in 1984.

S.A.M.E. SPONSORS MOBILIZATION CONFERENCE

A two-day Construction Mobilization Conference, jointly sponsored by S.A.M.E. and the Department of Defense, was held on November 23 and 24, 1981, at the National Defense University, Ft. McNair, Washington, D.C. As National President of the Society, Louis Riggs was called upon to participate in the planning and in the conference itself, addressing the architect-engineers' role. Louis sees S.A.M.E.'s role as being key to collaboration between the military services and civilian engineers and contractors in readying the nation for national defense. Presidential Counsellor Ed Meese welcomed S.A.M.E.'s support when he addressed the 300 senior representatives from the government, military, industrial, construction, labor, legal and financial communities.

Louis Riggs is shown with Admiral William Zobel (left) and General Joseph Bratton at the Conference

FAIRFIELD

December marked the completion date for the preliminary design of a vehicle fleet maintenance facility for the City of Fairfield, California. The published report contained recommendations for maintenance and repair procedures for all City-owned vehicles and included plans of both a base and expanded shop to be located in an improved version of the existing Public Works yard. Estimated construction costs are approximately 3 million dollars. Lou Salaber was project manager working with Don Croft, Ken Heilig, Thompson & Wright (architect), Keller & Gannon (electrical & mechanical), J. Warren & Associates (site improvements) and Haygood & Zebroski (landscaping). Final design of the facility could begin in the spring of 1982.

Fairfield Rendering

BOISE CHRISTMAS PARTY

On Saturday, December 19, the Boise office held their annual Christmas party at the Crystal Ballroom. Out-of-town Tudorites in attendance included Pat and Louis Riggs from San Francisco; Linda and Don Armstrong from Riverton; Jeanette and Bob Beal and Bob Moorhead from Lewiston.

Dave Toothman was presented with a Certificate of Merit from the Tudor Board of Directors, commemorating his retirement after 14 years of service. Both Dave and Loreen received gifts of appreciation in honor of the occasion. Gifts included a new fishing rod for Dave and a gold pendant for Loreen from the Boise employees. A pair of crystal decanters was presented from Tudor Engineering Company.

Dave Toothman receiving Certificate of Merit from Louis Riggs.

Paul Kunz receiving 10 year Tudor Service Award.

Dave and Loreen Toothman receiving retirement gifts.

The women's cocktail hour.

Deep in conversation are Sabine Landaluce, Rhonda and Paul Kunz, and Mike Moore.

Dave Toothman receiving gift (fly rod) from Boise employees.

Guests include Linda Armstrong (Riverton), Jeannette and Bob Beal (Lewiston).

THE HOLIDAYS

Aerial views of the cocktail scene.

SAN FRANCISCO CHRISTMAS PARTY

The San Francisco office held its annual Christmas Party at The Engineers Club on December 5th. Two hundred people, including 1 month old Benny Hough, attended the dinner dance, and were thoroughly entertained by a slide show presented by Master of Ceremonies, Tom O'Neill. Tom, recently relocated to Atlanta, enlightened the group on the differences between life in "big city" San Francisco and "down home" Atlanta.

Louis Riggs had the honor of presenting Tudor Awards to Lou Salaber and Dave Willer for 15 years of service and to Joe Carson for 10 years of service with the Company. The highlight of the evening was the presentation of Tudor's first 30-year awards to Louis Riggs and Stanley Froid. Louis also presented Stan with a Certificate of Merit commemorating Stan's retirement and thirty years of loyal service to Tudor Engineering Company.

Tom O'Neill, our Atlanta connection, 1981 Christmas Party Master of Ceremonies.

Louis Riggs, Harriette and Stan Froid congratulating each other on thirty years of service to Tudor.

Barbara and Jack Cooper caught by the roving camera as they arrive.

Standing at attention are Cheryl Durham, wife of photographer Gary Durham, Irene and Dave Willer.

Patricia Scapuzzi, Louis and Pat Riggs, and Don Scapuzzi interrupt their conversation for a group photo.

Dave Alden and Jeri Barrow contemplating marriage and relocation plans for 1982.

SEATTLE CHRISTMAS PARTY

As a full moon shone through an unseasonably clear sky on the waters of Lake Washington, the staff, spouses and friends of the Seattle Tudor office met for the 1981 Christmas Party. The place was the Mercer Island Beach Club, where Diane Bull had again organized an excellent party, topped by a prime rib dinner and after-dinner dancing. During a brief presentation directed by Keith Bull, Bob Janopaul gave 10 year Service Awards to Don Hoel and Dick Rudolph. Out-of-town guests for the party were Bob and Beth Janopaul of San Francisco; Gerry and Carol Gibney, formerly of Seattle, now of San Francisco; and Dave Alden and his fiancee, Jeri Barrow, at that time of San Francisco, but now of Seattle.

Before dinner social hour.

Don Hoel earns his 10 year Service Award from Bob Janopaul by reciting the entire FHWA specification for breakaway Xmas tree ornaments.

Keith Bull and Beth Janopaul compare notes.

RIVERTON CHRISTMAS PARTY

The Riverton office Christmas party was held December 12 1981 at Riverton Elks club. We were very pleased to have Ted and Pat Purcell join us for this year's party. Everyone had a GREAT time.

Pat Parcell, Don Armstrong and Shirley Walton reading a poem written for Don.

Passing out surprise presents (Shirley and Chuck Walton and Dick and Millie Shelton).

Kevin Brown and Jerry Weast "enjoying".

CELEBRATES

Jerry and Lynn Cross enjoy the party with Karl and Frieda Huttner.

Bob Janopaul leads Pam Stimpson, Pam Griffen, and Tonda Gussman in Christmas carols, with Dawn Jacobs on accordion.

Lucy and Jeff Stevens in serious conversation with Bob and Beth Janopaul.

The latest in gold panning equipment for John Magnuson.

John Williams receives high quality plastering tools for completing his turn-of-the-century house.

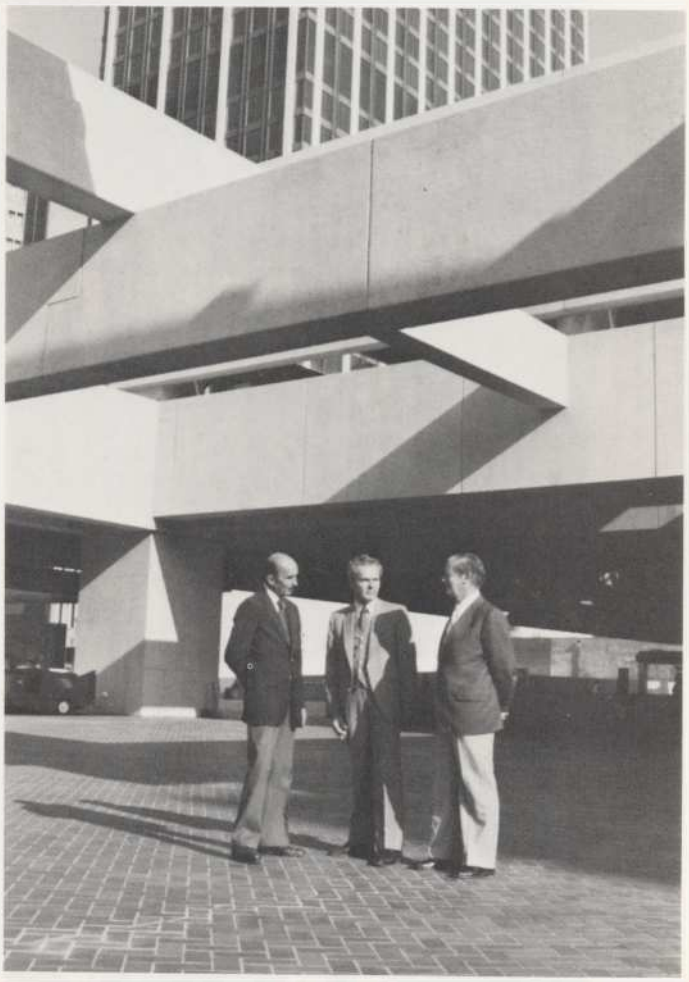
Jim Sato, John Magnuson and Chuck Spinks.

DENVER CHRISTMAS PARTY

The Denver office held its Christmas party on December 19 in the Luau room at Trader Vic's in the Denver Hilton. More than 30 employees and guests were treated to Polynesian specialties, while entertainment was provided by Nelson Jacobs as Master of Ceremonies for the evening. Special guests for the evening were Bob and Beth Janopaul from San Francisco and Jim and Jessie Sato of Denver. Jim Sato's firm has worked with the Denver office on several projects, including the USBR Western States Inventory of Hydro Sites.

The Tudor Denver Chorus Line with Dawn and Nelson Jacob, Pam Griffen, Bob Janopaul, Janet Williams and Tom Rawlings.

FIVE POINTS STATION IN ATLANTA



Shown at completed MARTA Five Points Station are PB/T (TUDOR) employees left to right Will Pacheco, Doug Mansfield and Frits Fenger.

NEW FACES . . .

. . . for san francisco

Antonio Rodrigues moved from Seattle to San Francisco so that he could get out of the rain and stay dry for a while.

Tudor welcomes new employee:

. . . for denver

Tom Rawlings Civil Engineer

ROTATION PROGRAM

In January of 1982 the Tudor Engineering Rotation Program was reactivated: Mike Harrington moved from the Seattle office to the San Francisco office to become the Manager of Engineering for Civil Engineering Projects while Dave Alden moved from the San Francisco office to the Seattle office to become the Project Manager for Water Resources Projects in Seattle. Dave Alden has managed to find a house in the Washington Park area of Seattle while Mike Harrington has acquired an apartment in Walnut Creek. Come this Summer, matters will become fully resolved when Judy and Brad, Susan and Jennifer join Mike in a house yet to be identified in the Walnut Creek area and Dave and Jeri Barrow get married and occupy the "fully renovated" house in the Washington Park area of Seattle.

TOOTHMANS IN EGYPT

Dave and Loreen Toothman toured Egypt during late October and early November. They spent five days cruising the Nile River from Luxor to Aswan Dam.

On camel ride to visit the pyramids at Giza.

CONGRATULATIONS

Glen and Karen Hough on the birth of their son Benjamin on November 1 1981 in San Francisco, California.

Steve and Gale Alters on the birth of their son Nathaniel on December 29 1981 in Concord, California.

Craig Giordano and Kim Peacock were married February 13 1982 at Willow Glen Baptist Church in San Jose, California.

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