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# ALASKA POWER AUTHORITY

## SUSITNA HYDROELECTRIC PROJECT PROPOSAL

APA-R-82-002

**HARZA-EBASCO**

JOINT VENTURE

AUGUST 16, 1982

VOLUME 1

TECHNICAL PROPOSAL

BINDER 1

ALASKA POWER AUTHORITY

HARZA-EBASCO

Susitna Joint Venture  
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# SUSITNA HYDROELECTRIC PROJECT PROPOSAL

APA-R-82-002

HARZA-EBASCO

JOINT VENTURE

AUGUST 16, 1982

VOLUME 1

TECHNICAL PROPOSAL

BINDER 1



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RESUMES

RESUMES

HARZA-EBASCO

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RESUMES

RESUMES

HARZA-EBASCO

# HARZA-EBASCO

August 12, 1982

Alaska Power Authority  
334 West Fifth Avenue  
Anchorage, Alaska 99501

Attention: Mr. David D. Wozniak, Executive Secretary  
Selection Committee

Subject: APA-R-82-002  
Susitna Hydroelectric Project Proposal

Gentlemen:

Harza-Ebasco is pleased to have the opportunity to submit this Proposal for the Susitna Hydroelectric Project. The Proposal, which is attached, is to remain in effect in its entirety (work scope and cost) for a period of 180 days following the due date of August 16, 1982.

Harza and Ebasco are both authorized to practice professional engineering in Alaska in compliance with AS 08.48.281 and other applicable statutes. Harza holds Corporate License No. C-0251, and Ebasco holds Corporate License No. C-0278. The Harza Business License is No. 008004; SIC Code 8910, and the Ebasco Business License is No. 067100; SIC Code 7392.

The organizational unit submitting this Proposal is identified as follows:

Harza-Ebasco, A Joint Venture  
400 - 112th Avenue, NE  
Bellevue, Washington 98004  
(206-451-4500)

Harza-Ebasco acknowledges receipt of the following four amendments to the Proposal in accordance with your instructions:

<u>Amendment Number</u>	<u>Date</u>
1	June 25, 1982
2	July 2, 1982
3	July 15, 1982
4	July 30, 1982

We would like you to direct Alaska Power Authority inquiries during the evaluation of the Proposal to:

Stephen O. Simmons  
Harza-Ebasco  
400 - 112th Avenue, NE  
Bellevue, Washington 98004  
(206-451-4500)

# HARZA-EBASCO

Alaska Power Authority  
Attention: David D. Wozniak  
Susitna Hydroelectric Project Proposal

August 12, 1982  
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Mr. Simmons will be in a position to respond to inquiries and route them to the proper individuals within the Joint Venture.

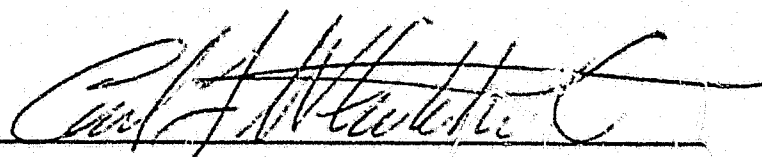
It is our pleasure to have the opportunity to provide this Proposal document to the Alaska Power Authority. We would be pleased to respond to questions as they arise.

Very truly yours,

HARZA/EBASCO, A JOINT VENTURE



Dwight L. Glasscock



Carl F. Whitehead

DLG:CFW:rz

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# CORPORATE COMMITMENT

RESUMES

RESUMES

HARZA-EBASCO



# HARZA-EBASCO

August 11, 1982

Alaska Power Authority  
334 West Fifth Avenue  
Anchorage, Alaska 99501

Subject: Corporate Commitment to the  
Susitna Hydroelectric Project

Gentlemen:

Harza Engineering Company and Ebasco Services Incorporated have formed a Joint Venture to provide the Alaska Power Authority the necessary services for engineering, project control, and regulatory and environmental studies for the Susitna Hydroelectric Project. As the Chief Executive Officers of the firms comprising the Joint Venture, it is our mutual objective to assure you of the Corporate Commitment of our respective companies to meet the the goals and objectives of the Power Authority for the Susitna Project.

Both Harza and Ebasco have already committed substantial personnel and financial resources to work in Alaska. Each firm recognizes the need to have a base of operation in Alaska in order to provide effective professional services. To assure that the Power Authority's goals and objectives are met on the Susitna Project, we have:

1. Entered into a carefully thought-out Joint Venture Agreement to form a partnership of complementary skills utilizing the staffs of both organizations;
2. Committed to staffing the Joint Venture with experienced individuals dedicated solely to meeting the work objectives of the Power Authority.
3. Committed our organizations to the establishment of a Joint Venture project management office in Anchorage and a production design office in Bellevue, Washington. We have made the commitment to provide an engineering and environmental staff in Bellevue, Washington that can produce most of the work required. This commitment is made because we believe it is the most economical

# HARZA-EBASCO

Alaska Power Authority  
August 11, 1982  
Page 2

location for performance of the production work, while at the same time permitting convenient communication between the project management office in Anchorage and the production design office in Bellevue;

4. Committed to use the services of Alaska based sub-consultants that possess specialized knowledge of the physical, natural and human resources which may affect, or be affected by, development of the Susitna Project; and
5. Added subconsultants to strengthen the Project Team in areas requiring specialized services in the subarctic environment.

Harza and Ebasco have formed a Joint Venture to make available an excellent combination of capabilities to design Susitna. In addition to our extensive design experience on major hydro-electric projects, Ebasco has developed the sophisticated management and project control techniques required to satisfy the Power Authority's needs. Both firms have experienced staffs for environmental studies management and have demonstrated success in difficult licensing processes.

Because of the complexity and extent of the Susitna Project, a coordinated Project effort is necessary. The two firms have joined to make those capabilities available to the Project; hence, the Project can be served from a single organization in which both firms contribute expertise and know-how. The Project organization will function independently of the two corporate organizations and be responsible directly to the Power Authority.

To assure that the Project organization can function independently and with the full confidence of both firms, we have made the commitment to assign an individual from the highest level of Harza to serve as Susitna Project Manager. Dr. Ramon LaRusso, a member of the Harza Board of Directors, will leave his current assignment as Vice President of Corporate Coordination Management to assume full time responsibility in Anchorage for the Susitna Project. To support Ray LaRusso, we have further committed four additional senior-level project

# HARZA-EBASCO

Alaska Power Authority  
August 11, 1982  
Page 3

personnel: (1) Arvids Zagars, Harza Vice President, will be assigned to Anchorage as Engineering Operations Manager; (2) Gary Lawley, Ebasco Manager of Life Sciences and presently Program Manager of the North Slope Waterflood Project, will be assigned in Anchorage as Environmental and Regulatory Programs Manager; (3) Marty Soniker, Project Control Manager in Ebasco's Bellevue office, will be assigned to Anchorage as Project Control Manager; and (4) Donn Ruotolo, Ebasco Manager of Projects, will leave his present assignment in Placerville, California and will be assigned as Bellevue Office Engineering Manager.

Our commitment to work in Alaska has given us the opportunity to familiarize many of our personnel with the local requirements for engineering, public perception, and environmental and regulatory agency needs, so important in the planning, design, and construction of complex generating and transmission facilities. The diverse assignments we have performed have contributed to the development of an understanding of the widely varying conditions that may be found in the nation's largest state. At the same time, the Power Authority has had the opportunity to evaluate our performance on a number of assignments.

For the past year, Harza and Ebasco have held meetings at all levels to discuss each firm's philosophy and approach to the Susitna Project and to evaluate the potential for a joint venture. During these discussions, it became apparent that the mutual capabilities and professional respect demonstrated by both firms would result in a dynamic and long-lasting relationship. We believe the Susitna Project is the most challenging and prestigious hydropower project in the country. We personally commit to the Joint Venture and the Power Authority the resources necessary to perform the proposed services and we are confident in our capabilities as a joint venture to bring the Susitna Project to a successful completion.

Sincerely yours,

Sincerely yours,

Richard D. Harza  
President  
Harza Engineering Company

William Wallace III  
President  
Ebasco Services Incorporated

000153

# JOINT VENTURE AGREEMENT

RESUMES

RESUMES

HARZA-EBASCO

AMENDMENT NO. 1

to the

JOINT VENTURE AGREEMENT

between

HARZA ENGINEERING COMPANY

and

EBASCO SERVICES INCORPORATED

THIS AMENDMENT NO. 1 to the Joint Venture Agreement dated as of August 6, 1982 between Harza Engineering Company and Ebasco Services Incorporated is made as of the 22nd day of November, 1982.

The parties agree as follows:

1. FORMATION. Add the following paragraph at the end of Section 1:

Pursuant to Subsection 18.2 of this Agreement, the parties agree to include within the scope of this Agreement the negotiation, execution, carrying out and performance of the planning and design services for the EHV Transmission and Control Systems for the Susitna Hydroelectric Project. If performance of the aforesaid services is awarded to the Joint Venture, the parties contemplate that the said services will be added to the scope of the Contract for preliminary and final design and related services.

2. NAME. Revise Section 4 to read as follows:

4. NAME. The name of the Joint Venture shall be "Harza-Ebasco Susitna Joint Venture", and the principal place of business of the Joint Venture shall be 400-112th Avenue NE, Bellevue, Washington 98004.

3. Except as specifically provided in this Amendment No. 1, all terms and conditions of the Joint Venture Agreement shall continue in full force and effect.



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3. Except as specifically provided in this Amendment No. 1, all terms and conditions of the Joint Venture Agreement shall continue in full force and effect.




IN WITNESS WHEREOF, Harza and Ebasco have caused this Amendment No. 1 to be executed by their duly authorized officers as of the day and year first above written.

Harza Engineering Company

Attest:

  
Sean Hastings  
Secretary

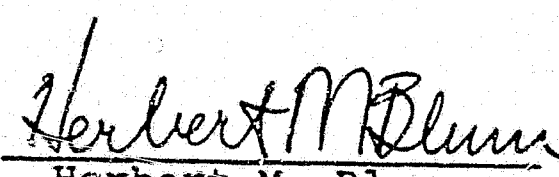
By:

  
Richard D. Harza  
President

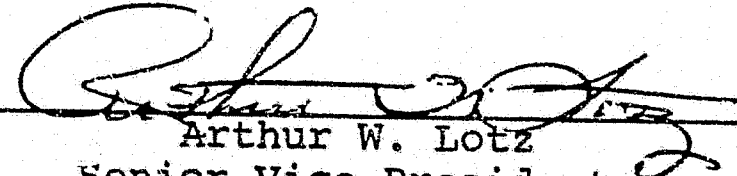
Date: November 22, 1982

Ebasco Services Incorporated

Attest:

  
Herbert M. Blum  
Assistant Secretary

By:

  
Arthur W. Lotz  
Senior Vice President

Date:

11/24/82

51000

JOINT VENTURE AGREEMENT  
between  
HARZA ENGINEERING COMPANY  
and  
EBASCO SERVICES INCORPORATED

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THIS JOINT VENTURE AGREEMENT ("Agreement") is made as of the 6th day of August, 1982, between Harza Engineering Company, a Delaware corporation having its principal place of business at 150 South Wacker Drive, Chicago, Illinois 60606 ("Harza"), and Ebasco Services Incorporated, a New York corporation having its principal place of business at Two World Trade Center, New York, New York 10048 ("Ebasco"), collectively referred to herein as the "Joint Venturers."

WHEREAS the Joint Venturers are being considered for the performance of preliminary and final design and related services (the "Services") for the Susitna Hydroelectric Project (the "Project"), being undertaken by the Alaska Power Authority (the "Power Authority"), a public corporation of the State of Alaska in the Department of Commerce and Economic Development but with separate and independent legal existence.

WHEREAS the Joint Venturers desire to associate themselves with each other in a joint venture for the purposes of performing the Services as more fully described in the proposal to be prepared by the Joint Venturers for submittal to the Power Authority.

WHEREAS it is the intention of the parties to enter into a contract (the "Contract") with the Power Authority for the performance of the Services for the Project.

In order to set forth the respective rights, interests, duties and obligations to each other in connection with the Contract for Services, the parties agree as follows:

1. FORMATION. The parties hereby form a Joint Venture ("Joint Venture") for the sole purpose of negotiating, executing, carrying out and performing the Contract to be entered into with the Power Authority. Harza is designated as the sponsoring firm. This Joint Venture is limited to the Contract with the Power Authority. Otherwise, each of the Joint Venturers may carry on its separate business for its sole benefit.

2. RELATIONSHIP OF THE JOINT VENTURERS. Nothing contained in this Agreement shall be construed to create a partnership between the parties or give rise to any agency relationship except as specifically necessary and set forth in this Agreement for performance of the Contract. The Joint Venturers shall be joint venturers only with respect to performance of the Contract, and nothing contained in this Agreement shall render any Joint Venturer liable for any debts or obligations unrelated to the Joint Venture.

3. BEST EFFORTS. Each Joint Venturer shall use its best efforts to carry out the purposes of this Agreement, to cooperate with the other Joint Venturer fully, and to attend all meetings of the Management Committee to the end that the business affairs of the Joint Venture shall be conducted in an orderly and businesslike manner.

4. NAME. The name of the Joint Venture shall be "Harza/Ebasco, a Joint Venture," and the principal place of business of the Joint Venture shall be 400-112th Avenue NE, Bellevue, Washington 98004.

5. CONTRACT PERFORMANCE

5.1 The Contract shall be carried out and be performed by the Joint Venture under the direction of the Management Committee as described in Section 6 (Management Committee). Harza and Ebasco agree that Harza will be responsible for and benefit from approximately sixty-five percent (65%) and that Ebasco will be responsible for and benefit from approximately thirty-five percent (35%) of the obligation to perform the Services pursuant to the Contract, the percentages to be calculated in accordance with Subsection 5.4. The Joint Venturers shall cooperate with each other to the end that the Services will be performed in an efficient and cost-effective manner. The Services of each Joint Venturer shall be undertaken in the spirit of technical cooperation, with each Joint Venturer making the contribution which is most appropriate to its corporate experience, capabilities and personnel, consistent with the overall objective of providing Services of maximum quality.

5.2 Each Joint Venturer shall make available to the Joint Venture for the performance of Services for the Project such of its technical and administrative personnel, facilities and equipment as are, in the judgment of the Management Committee, necessary and appropriate for the orderly and efficient execution of the Project and as are acceptable to the Project Manager.

5.3 The Joint Venturers will reevaluate the allocation of responsibility and of performance in the furnishing of the Services hereunder if (a) such reallocation is necessary for efficient and effective performance of the Services, (b) major changes occur in the scope of work under the Contract, or (c) additional phases or portions are added to the Project. In any of such events, the participation of the Joint Venturers shall be determined on the basis of the Joint Venturer best suited to provide the services required. Any reallocation herein shall be made in increments of not less than five percent (5%).

5.4 At the conclusion of the Services, each Joint Venturer's actual participation in the Joint Venture shall be finally determined on the basis of the proportion that each Joint Venturer's billings for costs of Services actually provided (which shall be defined as salaries, fringes and overhead costs, but excluding all other costs) bears to the total cost of Services billed by both Joint Venturers to the Joint Venture.

6. MANAGEMENT COMMITTEE

6.1 The management of the business and affairs of the Joint Venture shall be vested in a Management Committee which will be composed of two (2) principal representatives, each having one vote. Each Joint Venturer shall designate one (1) principal representative and one (1) alternate

representative on the Management Committee. The alternate representative shall serve on the Management Committee in the event his respective principal representative is absent, incapacitated, or otherwise unable to serve. The principal and alternate representatives appointed by each Joint Venturer shall be officers or senior employees of his respective Joint Venturer. The Harza principal representative shall be the Chairman of the Management Committee, and in his absence he shall designate one of the other representatives as acting Chairman. Until written notice of any change is given as hereinafter provided, the representatives are as follows:

Harza:	Dwight L. Glasscock	Principal
	Earl J. Beck	Alternate
Ebasco:	Carl F. Whitehead	Principal
	Arthur W. Lotz	Alternate

6.2 Each alternate representative on the Management Committee shall be notified in advance of, and may be present at, all meetings of the Management Committee but shall have the right to vote at such meetings only when the alternate is serving in place of a principal representative and such principal representative is absent. Any decision, approval, consent or other action on behalf of any Joint Venturer shall be equally binding on such Joint Venturer, whether made, given or taken by a principal representative or by an alternate representative.

6.3 Either Joint Venturer may change its principal or alternate representatives on the Management Committee at any time by giving written notice to that effect to the other Joint Venturer.

6.4 Regular meetings of the Management Committee will be held no less frequently than quarterly. In addition, either principal representative or the alternate representative acting in his place or the Project Manager may call a special meeting of the Management Committee at any time by giving written or telephonic notice at least five (5) days prior to the meeting. Notice of all meetings shall be given to the principal and alternate representatives and to the Project Manager. Unless the Management Committee shall otherwise agree with respect to a particular meeting, regular quarterly meetings shall be held on an alternating basis at the Joint Venture offices in Anchorage and Bellevue. The first meeting shall be held in the Anchorage office.

6.5 A meeting may be conducted by telephone without prior notice, in an emergency or at any time convenient to the representatives on the Management Committee and the Project Manager.

6.6 All action taken at any meeting shall be recorded in the minutes of the Management Committee, which shall be maintained by the Chairman of the Management Committee. In addition, the Management Committee may act without a meeting provided that such action is set forth in a written consent signed by the Management Committee representatives, which document shall be maintained with the minutes. The Chairman of the Management Committee will provide copies of all minutes and consents to the principal and alternate representatives and the Project Manager.



6.7 The Project Manager shall be entitled to be present in person or by conference telephone at all meetings of the Management Committee.

6.8 For any meeting of the Management Committee, a quorum shall be comprised of both principal representatives, or in the absence of either or both principal representatives, their respective alternate representative(s). No decision, determination, approval, consent or other action by the Management Committee shall be valid or binding on the Joint Venturers unless adopted and approved by both principal representatives or their respective alternate representative(s); provided, however, that in the event of a tie vote of the Management Committee, the matter at issue shall be referred to the Chief Executive Officers of the Joint Venturers for resolution. If the Chief Executive Officers cannot resolve the matter, it shall be resubmitted to the Management Committee for reconsideration, at which time the Project Manager shall be entitled to have one vote, and a majority vote shall decide the matter.

#### 7. MANAGEMENT COMMITTEE AUTHORITY

7.1 The Management Committee shall have full authority in any matter in connection with or relating to the Contract and the Joint Venture, including without limitation the following:

- (a) To negotiate the Contract.
- (b) To call for capital contributions.
- (c) To negotiate, prosecute and settle any claim or lawsuit by the Joint Venture against a third party arising out of performance of this Agreement or the Contract.
- (d) To withdraw and disburse funds from the Joint Venture.
- (e) To adopt procedures to execute and terminate subcontracts, purchase orders and directives with respect to the Contract, or any change order to a subcontract or purchase order.
- (f) To assign key personnel.
- (g) To provide for handling and controlling the funds of the Joint Venture.

7.2 The Management Committee may establish rules and regulations for the conduct of its proceedings and for the administration of the affairs of the Joint Venture, which shall be consistent with the terms and provisions of this Agreement.

8. KEY PROJECT PERSONNEL

8.1 Each Joint Venturer shall make available to the Joint Venture key Project personnel for the performance of the Services for the Project as indicated in the Project Organization Chart made a part of the Proposal. Neither Joint Venturer shall withdraw key personnel from the Services in progress without reasonable prior notice of such withdrawal to the Project Manager and to the other Joint Venturer. Each Joint Venturer will exercise its best efforts to replace personnel so withdrawn with personnel having experience and qualifications commensurate with the assignment.

8.2 Project Manager. The Joint Venturers agree that R. S. LaRusso shall be the Project Manager. The Project Manager shall have general charge of the Joint Venture's performance of the Services under the Contract, in accordance with project management procedures established by the Management Committee as being best suited to the performance of the Services for the Project. The Project Manager shall be responsible to the Management Committee for the Joint Venture's performance of the Services for the Project. The Project Manager shall be the representative of the Joint Venture, and the Joint Venturers shall share responsibility to third parties (including, but not limited to the Power Authority) for the Project Manager's acts in proportion to each Joint Venturer's respective final participation in the Joint Venture as determined in accordance with Subsection 5.4. The Project Manager's responsibility and authority shall include but not be limited to the following:

- (a) To oversee, coordinate and direct the efforts of all personnel assigned by the Joint Venture for the performance of Services for the Project, whether on the premises of the Joint Venture, on the premises of either Joint Venturer, at the Project site or elsewhere;
- (b) To represent the Joint Venture in its relationship with the Power Authority and to execute any and all other contracts and other agreements on behalf of the Joint Venture as and to the extent specifically directed and authorized by the Management Committee;
- (c) (i) To monitor the overall effort of the Joint Venture on the Project in relation to the Contract, the Project Schedule and the Project budget as established from time to time, and  
(ii) to ensure that all charges made to the Project have been authorized for a specific task within a previously agreed budget;
- (d) To evaluate the activities of personnel assigned to the Project, to identify potential problems and their causes and, subject to the general direction and control of the Management Committee, to initiate appropriate remedial measures as and to the extent necessary;

- (e) To ensure that changes and additional Services beyond the scope of the Contract are estimated in advance of performance and that the Power Authority and the Management Committee are made aware of, and approve, the number of man-hours to be consumed and the effect thereof on the original man-hour estimate, budget, Project Schedule and Project cost;
- (f) To prepare and submit to the Management Committee for approval, appropriate written procedures for performing all engineering, design, procurement and related technical portions of the Services; and
- (g) To report directly to the Management Committee regarding all aspects of the Project.

8.3 Engineering Operations Manager. The Joint Venturers agree that A. Zagars will be the Engineering Operations Manager. During performance of engineering, design and procurement services and thereafter as determined by the Management Committee, the Engineering Operations Manager shall direct the engineering and design aspects of the Project and the Services and will supervise the resolution of major engineering and design alternatives and conflicts in the technical effort of the Joint Venture. He will report to the Project Manager.

8.4 Regulatory and Environmental Programs Manager. The Joint Venturers agree that G. Lawley will be the Regulatory and Environmental Programs Manager. He will be responsible for the technical management and overall direction of the environmental programs. He will report to the Project Manager.

8.5 Project Control Operations Manager. The Joint Venturers agree that M. Soniker will be the Project Control Operations Manager. He will be responsible for Project cost and schedule control, contract administration, Project accounting, estimating and administration of the Anchorage office. He will report to the Project Manager.

8.6 Principal Design Office Manager. The Joint Venturers agree that D. Ruotolo will be the Principal Design Office Manager. He will be responsible for all Project engineering and design activities in the Bellevue office. He will report to the Engineering Operations Manager.

8.7 Transition Program Staff. The Joint Venturers agree that J. Ehasz, S. O. Simmons and R. L. Meagher will be assigned as Transition Program Staff Members. They will be available to the Project Manager to assist in the orderly start of the Project for a period of time deemed appropriate by the Project Manager.

8.8 The employees assigned by the Joint Venturers to the performance of Services to be provided by the Joint Venture shall be and remain the employees of each Joint Venturer. Except as otherwise provided in this Agreement, each Joint Venturer will pay all costs and expenses incident to the performance of its own personnel, including, without limitation, direct salaries, overtime pay, if any, fringe benefits, other employee contributions, payments and applicable overhead expenses. Any assignment of personnel to the Project by the Joint Venturers shall be done subject to and in accordance with the applicable terms of the Contract.

9. BASIS OF COMPENSATION AND PAYMENT BY THE POWER AUTHORITY

9.1 The Joint Venturers have set forth in this Section 9 their anticipated basis of compensation and payment to them by the Power Authority for the Services; however, the final effective basis of compensation and payment by the Power Authority to the Joint Venture for the Services shall be as set forth in the Contract. Upon execution of the Contract and any amendments thereto by the Power Authority and the Joint Venture, the basis of payment by the Power Authority, as set forth in the Contract, shall be deemed to be incorporated by reference into this Agreement.

9.2 The Joint Venturers shall invoice to the Joint Venture, and the Joint Venture shall consolidate, all Project charges, accounting records and reports. The Joint Venture shall thereafter invoice the Power Authority for payment and reimbursement in accordance with the terms of the Contract.

9.3 The Joint Venturers shall establish a budget for the Project, which shall be revised periodically to take into account any change in the scope of the Services. Any such change shall be subject to approval in advance by the Project Manager before it is reflected in a revision of the Project budget. Each Joint Venturer shall so regulate its performance as to limit its charges in both man-hours and dollars to the amount established in the Project budget then in effect.

9.4 Subject to the provisions of the Contract as finally negotiated and executed by the Joint Venture and the Power Authority, the Joint Venturers anticipate that each of the Joint Venturers shall bill the Joint Venture for its salary, fringes, overhead and direct (out-of-pocket) costs on a monthly basis. The multipliers used for fringes and overhead will be either (a) provisional based on the most recent audit and forecast, subject to annual adjustment in accordance with approved audits, or (b) stipulated for the duration of the Contract, such stipulated rates to be established in conjunction with the negotiation of the Contract. The Joint Venture shall combine the actual salaries so billed, include the appropriate composite multiplier for fringes and overheads, add the direct costs and a fee portion and prepare and submit an invoice to the Power Authority for payment on a monthly basis.

9.5 Within fifteen (15) days following receipt by the Joint Venture of a payment from the Power Authority during the performance of Services under the Contract, the Joint Venture shall distribute to each Joint Venturer the amount of such payment to which such Joint Venturer shall be entitled as reimbursement for its allowable costs. The fee portions shall be retained by the Joint Venture if necessary to cover working capital requirements and shall otherwise be distributed to the Joint Venturers as the Management Committee may in its discretion direct from time to time, which distributions shall be made to each of the Joint Venturers on a provisional basis in the same proportion as its then current respective participation in the Joint Venture, subject to adjustment to reflect each Joint Venturer's respective final participation as determined in accordance with Subsection 5.4.

#### 10. FUNDS OF THE JOINT VENTURE

10.1 The Management Committee shall establish one or more bank accounts in the name of the Joint Venture in such bank or banks as the Management Committee shall deem appropriate. All capital, including capital contributions, of the Joint Venture and all funds received by the Joint Venture from any source (including, but not limited to, payments from the Power Authority) shall be deposited in such bank account or accounts, and such accounts shall be subject to the control of the Management Committee. All invoices received by the Joint Venture and approved for payment by the Management Committee, or by such person or persons as the Management Committee may authorize to act on their behalf in that regard, shall be paid by checks drawn on said bank account or accounts and signed by persons so authorized by the Management Committee. The Management Committee may require the bonding of any person or persons authorized to draw upon the funds of the Joint Venture.

10.2 The Management Committee may cause funds of the Joint Venture to be invested at interest on a short-term basis, in US Government securities, bank certificates of deposit or savings accounts.

10.3 Not later than thirty (30) days after issuance of the Power Authority's notice of intent to negotiate a Contract with the Joint Venture, Harza shall make a capital contribution of Sixty-Five Thousand Dollars (\$65,000.00) to the Joint Venture, and Ebasco shall make a capital contribution of Thirty-Five Thousand Dollars (\$35,000.00) to the Joint Venture. The Management Committee may direct each Joint Venturer to make further capital contributions in proportion to its respective participation in the Joint Venture, if deemed by the Management Committee to be in the best interests of the Joint Venture. The Joint Venturers' capital contributions shall be used to pay in part the expenses of the Joint Venture, as authorized by the Management Committee. The Management Committee may direct the return of the unexpended portions of the Joint Venturers' capital contributions, in whole or in part, at such times and under such circumstances as the Management Committee may determine to be appropriate.

10.4 Each of the Joint Venturers will be responsible for and pay all of its own costs, expenses, and other fees incurred prior to formation of the Joint Venture and signing of the Contract with the Power Authority.



11. BOOKS OF ACCOUNT AND RELATED MATTERS

11.1 Separate books of account for the performance of the Contract and all matters pertaining thereto and for the Joint Venture shall be maintained under the supervision of the Management Committee on behalf of the Joint Venturers in accordance with detailed accounting procedures approved by the Management Committee. The Project Manager shall be responsible for maintaining such books of account until such time, if any, as the Management Committee shall appoint a financial manager to perform this function. The prescribed methods of accounting in all matters relating to the affairs of the Joint Venture and the performance of the Contract shall be those known as generally accepted accounting principles applicable under the circumstances and applied on a consistent basis. All books, records, vouchers, contracts, inventory, supplies, equipment, property and other data of the Joint Venture shall be available for examination and audit by each Joint Venturer at all reasonable times at the principal office of the Joint Venture. In addition, if required by the Management Committee, certified audits shall be prepared by Arthur Andersen & Co. or such other accountants as may be designated by the Management Committee, covering the period through December 31 of each year. The audits will be distributed to the Joint Venturers within sixty (60) days after December 31. A final certified audit shall be prepared and distributed to each of the Joint Venturers at the completion of the Contract, if requested by either Joint Venturer.

11.2 Harza and Ebasco shall be responsible for maintaining, at their cost, respectively, their respective books of account pertinent to their respective operations in connection with the Project. Such books of account relating to salary, the number of hours individuals performed services, and out-of-pocket expenses which are reimbursable by the Power Authority or the Joint Venture shall be subject to audit at any time by the Joint Venture or either Joint Venturer.

11.3 All financial, technical and other records of the Joint Venture shall be kept and preserved for no less than three (3) years subsequent to the completion of the Services to be rendered under the Contract, at such place or places as the Management Committee may from time to time designate.

11.4 Provisions for insurance shall be agreed upon as required to conform with the terms and conditions of the Contract.

12. EXPENSES OF THE JOINT VENTURE; REMAINING PROFITS

12.1 Except as otherwise provided in Subsections 9.5 and 10.3 of this Agreement, the capital contributions of the Joint Venturers and the fee portions of payments made by the Power Authority shall be retained by the Joint Venture and may be used to pay any expenses incurred by the Joint Venture as authorized by the Management Committee, which are not recoverable from the Power Authority as an allowable cost.

12.2 Fixed asset items purchased jointly will be disposed of on completion of the Project and the values obtained shared in proportions equivalent to those used for allocating the costing of such assets.



12.3 In proportion to each Joint Venturer's respective final participation in the Joint Venture as determined in accordance with Subsection 5.4, the Joint Venturers shall share all costs incurred by the Joint Venture for any agreed expenses which are not reimbursable by the Power Authority, if any.

12.4 The Management Committee shall review the allocation of unreimbursed Joint Venture expenses, if any, from time to time to ensure its continuing equitability. The actual method of payment and reimbursement for Joint Venture expenses shall be reviewed from time to time by the accountants of each Joint Venturer and, if necessary, changed after approval by the Management Committee.

12.5 As soon as reasonably practicable after the completion of the performance of the Services under the Contract, the portions of the fee, which have theretofore been retained by the Joint Venture, shall be used to pay all outstanding obligations and other indebtedness of the Joint Venture; and sufficient reserves, as determined by the Management Committee, shall be established for known or reasonably anticipated contingencies not theretofore discharged. Thereafter, any funds remaining in the bank account or accounts of the Joint Venture, or which shall be received by or for the account of the Joint Venture or which shall become available in any manner for distribution, shall be distributed to the Joint Venturers in proportion to their respective final participation in the Joint Venture as determined in accordance with Subsection 5.4. When funds set aside as reserves are no longer required for such purpose, then such funds shall be similarly distributed.

### 13. PLACE OF PERFORMANCE OF SERVICES

13.1 It is the intention of the Joint Venturers that the Services will be managed and directed from the Project office located in Anchorage, Alaska and that the principal design office be located in Bellevue, Washington.

13.2 Where Services are performed at a Joint Venturer's established office:

(a) Harza shall reimburse Ebasco for all actual costs incurred by Ebasco as a result of the presence of Harza personnel in Ebasco's offices, to the extent that such costs are not directly reimbursed by the Power Authority. Likewise, Ebasco shall reimburse Harza for all actual costs incurred by Harza as a result of the presence of Ebasco personnel in Harza's offices to the extent that such costs are not directly reimbursed by the Power Authority. Such costs will be recorded, allocated and documented in accordance with generally accepted accounting principles. Examples of such costs are:

(i) Rent of office space, including appropriate allowances for maintenance, alterations, repairs, leasehold improvements and common space.

- (ii) Furniture.
- (iii) Office Supplies.
- (iv) Non-Project specific charges such as:

Nonreimbursable telephone charges.

Nonreimbursable photocopying and printing.

Nonreimbursable computer charges.

Nonreimbursable word processing.

Nonreimbursable postage.

- (b) The initial determination of the above cost allocations shall be made and documented in accordance with the respective Joint Venturer's judgment as to purpose and benefit of the expenditures.

#### 14. LIMITATION OF LIABILITY

14.1 In no event shall either Joint Venturer be liable to the other Joint Venturer or the Joint Venture for the acts or omissions of any officer, employee or agent of either Joint Venturer, nor shall any duly authorized principal or alternative representative on the Management Committee be liable to either Joint Venturer or the Joint Venture, except for direct (but not consequential) damages resulting from actual fraudulent or dishonest conduct.

14.2 If any third party (including but not limited to the Power Authority) should assert any claim or commence any legal action against one or both of the Joint Venturers or against the Joint Venture in connection with any matter arising under the Contract or associated with the Project, then Harza and Ebasco shall share all costs thereof, including, but not limited to, all damages, judgments, fees and expenses, in proportion to their respective final participation in the Joint Venture as determined in accordance with Subsection 5.4.

14.3 In the event that performance or reperformance of any of the Services by the Joint Venture or by either Harza or Ebasco is authorized by the Management Committee because such Services were not performed in accordance with customarily accepted good engineering and technical practices and procedures and such performance or reperformance is not reimbursed by the Power Authority, the costs of such performance or reperformance shall be borne entirely by the Joint Venturer which failed to perform in accordance with such standards. Where such individual Joint Venturer liability is not evident from work package allocations, the costs shall be shared by Harza and Ebasco in the same proportions as set forth in the preceding Subsection. Prior to the start of any such reperformance, the Management Committee shall determine the scope, costs and responsibility of such reperformance.

15. SUBCONTRACTING AND ASSIGNMENT

15.1 The Joint Venturers contemplate that, unless otherwise determined by the Management Committee, all subcontracts and other agreements with respect to the Services to be performed under the Contract shall be executed in the name of the Joint Venture.

15.2 Neither this Agreement nor any interest or obligation of either Joint Venturer herein, including any interest in funds belonging to or which may accrue to the Joint Venture, or any interest in any bank account of the Joint Venture, or in any property of any kind employed or used in connection with the Contract, may be assigned, pledged, transferred, subcontracted or hypothecated by either Joint Venturer without the prior written consent of the other Joint Venturer, which consent shall not be unreasonably withheld.

16. INSOLVENCY

16.1 The filing of a voluntary petition of bankruptcy, adjudication as bankrupt or insolvent, appointment of a receiver for all or substantially all of the assets, assignment for benefit of creditors, any other proceeding for relief under the bankruptcy laws of the United States, or failure to discharge any judgment against a Joint Venturer or levy or seizure of the property of a Joint Venturer within ten (10) days, shall be a default by the party committing such act. Upon such default, the interest of the defaulting party ("Defaulting Party") in this Joint Venture shall terminate and be limited to the rights under this Joint Venture specifically set forth herein. However, the business of this Joint Venture shall continue to be conducted under the same name by the remaining Joint Venturer and such Joint Venturer shall carry on and perform the remainder of the Services to be completed on the Contract. Neither the Trustee, Receiver, nor Custodian of the Defaulting Party, nor such Defaulting Party itself, shall have any interest in any profits resulting from the completion of the Services on the Contract, after the date of default. The Joint Venture and the remaining Joint Venturer shall have title to and the right to possession of all the remaining assets of the Joint Venture.

16.2 Notwithstanding the provisions of Subsection 16.1, the Defaulting Party shall remain liable for its share of any losses sustained by the Joint Venture with respect to the performance of the Contract as a whole (as determined pursuant to the terms and conditions of this Agreement). However, the Defaulting Party shall be entitled to receive that proportion of the profits of the Joint Venture, if any, to which it would otherwise be entitled as the monetary value of the Services completed at the time of the happening of any of the events described in this Section bears to the monetary value of all Services to be performed under the Contract. Such share of the profits shall be determined by the Management Committee without the participation of the principal or alternate representative of the Defaulting Party. The payment of any such share of the profits to the Defaulting Party shall be paid at the times and in the manner provided in this Agreement. If such

insolvency, bankruptcy or other proceedings of the type described in this Section should cause damage or additional costs to the remaining Joint Venturer, then such damages or additional costs shall be charged against the interest of the Defaulting Party and against any amounts to which the Defaulting Party would otherwise be entitled pursuant to the terms and provisions of this Agreement.

17. NOTICES

Any notice which is required or permitted to be given under any provision of this Agreement, except notices of special meetings of the Management Committee as provided in Section 6 (Management Committee), shall be given in writing and shall be delivered either in person or by registered or certified mail, by telegram or cable, and shall be deemed effective if and when received by the party to be notified at such party's address as set forth below. Either Joint Venturer may, by written notice to the other Joint Venturer as provided in this Section, change its address for receiving such notices.

- (a) Harza Engineering Company  
150 South Wacker Drive  
Chicago, Illinois 60606  
Attention: Dwight L. Glasscock,  
Vice President
- (b) Ebasco Services Incorporated  
Two World Trade Center  
New York, New York 10048  
Attention: Carl F. Whitehead,  
Senior Vice President

18. TERM OF THE JOINT VENTURE; SUBSEQUENT PHASES

18.1 This Agreement, and the Joint Venture hereby created, shall remain in effect only for such period of time as necessary to carry out the Services to be performed for the Project, to receive full and final payment of all amounts owed to the Joint Venture, to make appropriate provision for all actual and contingent liabilities of the Joint Venture and otherwise to carry out the terms and provisions of this Agreement; provided, however, that if the Power Authority should either (a) terminate the Contract, (b) abandon the Project, (c) in the judgment of the Management Committee, unduly delay the Project, or (d) proceed with the Project in a manner not involving both of the Joint Venturers, then, in any of such events, this Agreement and the Joint Venture hereby created shall continue in effect only for such period of time as may be necessary for the Joint Venture to receive full and final payment of all amounts owed to the Joint Venture, to make appropriate provision for all actual and contingent liabilities of the Joint Venture and otherwise to carry out the terms and provisions of this Agreement.



18.2 Each Joint Venturer hereby covenants and agrees with the other Joint Venturer that it will pursue a contract for Services for any additional phases or portions of the Project only as a participant in this Joint Venture, unless the Power Authority requests otherwise.

19. ARBITRATION

19.1 In the event that a dispute arises between the Joint Venturers which is not resolved by the Management Committee, then, at the request of either Joint Venturer, such dispute shall be submitted to arbitration before a panel of three (3) arbitrators acceptable to both Joint Venturers, in accordance with the then existing Rules of the American Arbitration Association as in effect at the time of such arbitration. In the event that the Joint Venturers cannot agree as to such arbitrators, they, or so many as cannot be agreed to, shall be finally chosen in accordance with such Rules. The place of such arbitration shall be Chicago, Illinois. The Joint Venturers agree that the decision and award of the arbitration shall be final and binding upon them, may be entered as a judgment in any court of competent jurisdiction and shall not be subject to appeal. Notwithstanding such Rules to the contrary: (a) either party to the arbitration may avail itself of discovery procedures, including depositions, interrogatories, requests for production and inspection of documents and reports as provided for in the Federal Rules of Civil Procedure; and (b) the arbitrators shall be required to issue written findings, conclusions and award.

19.2 In the event of any arbitration between the parties arising under this Agreement, the prevailing party shall be entitled to its costs, expenses, and reasonable attorneys' fees. The determination of which party is the "prevailing party" shall be made by the arbitrators.

20. GOVERNING LAW

This Agreement shall be governed by and shall be construed and interpreted in accordance with the laws of the State of Illinois.

21. LIMITATION ON THE RIGHTS OF OTHERS

Nothing in this Agreement, whether express or implied, shall be construed to give any person other than the Joint Venturers any legal or equitable right, remedy or claim under or in respect of this Agreement. As used in this Section, the term "person" includes the Power Authority.

22. EMPLOYMENT OF JOINT VENTURER'S PERSONNEL

During the term of this Agreement and for a period of six (6) months thereafter, each Joint Venturer shall refrain from employing or offering employment to any present or former personnel of the other Joint Venturer associated with the Project unless (a) the other Joint Venturer shall have first given its written consent to such employment or offer of employment, or (b) six (6) months shall have elapsed since the person in question was last employed by the other Joint Venturer.

23. MISCELLANEOUS

23.1 No Waiver. Neither the failure of either party to exercise any power given to such party under this Agreement or to insist upon strict compliance by the other party with such party's obligations under this Agreement, nor any custom or practice of the parties at variance with the terms hereof, shall constitute a waiver of either party's right to demand exact, full and complete compliance by the other party with the terms and provisions of this Agreement.

23.2 Entire Agreement. This Agreement contains and constitutes the entire agreement of Harza and Ebasco with respect to the performance of preliminary and final design of technical Project facilities and associated Project features.

23.3 Severability of Invalid Provision. If any provision of this Agreement shall for any reason be held to be invalid, illegal or unenforceable in any respect under the laws of the State of Illinois, any such invalidity, illegality, or unenforceability shall not affect any other provision of this Agreement, and this Agreement shall be construed as if such invalid, illegal, or unenforceable provision had never been incorporated herein and the rights of the parties hereto shall be construed and enforced accordingly.

23.4 Successors. Neither the interest of a Joint Venturer in the Joint Venture or its right to share in the profits, nor any right of a Joint Venturer hereunder, may be assigned or transferred to any third party nor may any security interest therein be created, without the prior written consent of the other Joint Venturer. No assignment, with or without such consents, nor any assumption of obligations hereunder by a third party shall relieve any Joint Venturer of its obligations hereunder unless such Joint Venturer is expressly so relieved in writing by the other Joint Venturer.

23.5 Amendments. This Agreement shall not be changed, amended, modified, or waived otherwise than by a written instrument signed by duly authorized officers of Harza and Ebasco.



23.6 Counterparts. This Agreement may be executed in multiple counterparts, each of which shall be deemed to be an original and all of which, together, shall constitute one and the same instrument.

IN WITNESS WHEREOF, Harza and Ebasco have caused this Agreement to be executed by their duly authorized officers as of the day and year first above written.

Harza Engineering Company

Attest:

Sean Hastings  
Secretary

By:

Richard D. Harza  
President

Date: August 12, 1982

Ebasco Services Incorporated

Attest:

Herbert M. Blum  
Assistant Secretary

By:

Roger J. Sherman  
Chairman of the Board

Date: August 11, 1982

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# COMMENTS ON DRAFT CONTRACT

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## COMMENTS ON DRAFT CONTRACT

Harza-Ebasco has reviewed the Draft Contract accompanying the Power Authority's RFP. The majority of the Draft Contract provisions are acceptable in their present form, although we have noted a number of inconsistencies, which will require clarification. In addition, the Power Authority has left several areas open for later finalization.

The following are examples of particular provisions which would require discussion and clarification:

1. Article I(a)(1) Scope: The scope description in this paragraph is more suggestive of a contract for performance of construction work rather than engineering services.
2. Article III(f): This paragraph, covering physical responsibility for project property, also appears to be more appropriate for a construction, rather than an engineering services, contract.
3. Article V(b)(2) Award Fee: Alternate approaches to incentive fee arrangements are discussed elsewhere in this Proposal.
4. Article V(d)(1) Bonds and Insurance: We read this provision to include as an allowable cost the costs of bonds and insurance required under the Contract; however, clarification is required regarding the reference to exclude State property in this paragraph and excluded Power Authority property in paragraph V(e)(13).
5. Article V(e)(13) Insurance, Article V(e)(16) Losses (i) and Article VI(c) Financial Settlement (i\*)(D) refer to Article XVII as an insurance article. Article XVII covers only termination by the Power Authority.
6. Article X Insurance: Paragraphs 1 and 2 require the Contractor to maintain insurance covering both the Contractor and its subcontractors. It is our understanding that the subcontractor requirement has been deleted in several recent Power Authority contracts. Moreover, insurance requirements have been substan-

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Both Harza and Ebasco have successfully negotiated recent contracts with the Power Authority and, based on that experience, are confident that a mutually acceptable contract can quickly be agreed to with the Power Authority. As we are in agreement with the principles embodied in the Draft Contract, the items for discussion can be resolved without difficulty.

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## B. STATEMENT OF WORK

### EXECUTIVE SUMMARY

#### Introduction

The Susitna Hydroelectric Project is an extremely important future source of reliable power and energy for the State of Alaska. The Project also constitutes a major challenge to the engineering profession and the construction industry. Project issues that must be effectively dealt with include the following:

- Project dimensions are large and it must be constructed under subarctic climatic conditions in a location with limited access.
- Major investigations are required with respect to foundation conditions and embankment dam construction.
- Special factors, including seismicity of the region, existence of permafrost zones and buried rivers, and unique environmental conditions, must be considered in the design.
- Licensing and permitting processes are complex and the entire project development process will be undertaken in an environment of intense public scrutiny.

These special issues, combined with the others that are more commonly encountered in dam design and construction, make the Susitna Hydroelectric Project one of the most unusual engineering endeavors on the North American continent.

We believe the Harza-Ebasco Joint Venture is the best qualified to provide the required engineering services, for the following reasons:

- Design Competence - The respective staffs of the Joint Venture have successfully completed the engineering design of several world-class hydroelectric projects on, or ahead of, schedule and within budget. These projects include Ludington and Bath County - the two largest pumped storage projects in the world, and the Tunnel and Reservoir Project in Chicago (TARP) which is one of the largest underground water resource projects ever undertaken.

The ultimate measure of a firm's design competence is the successful operation of a project when completed. Harza and Ebasco projects have consistently performed at the highest levels. Both Harza and Ebasco have received numerous awards for their achievements in the hydroelectric design field.

- FERC Licensing Support - Key personnel of the Joint Venture Project Team have worked together to develop the supporting documentation to ensure the timely licensing of the Bath County Pumped-Storage Project and have prepared the accepted License Application for the Kootenai River Hydroelectric Project in Montana.
- Personnel Commitments - The Joint Venture has committed senior level management and technical personnel to the Project Team, to a great extent from the projects mentioned above. The superior management and technical skills possessed by these key people is necessary to effectively manage, license, and design the Watana phase of the Susitna Project.
- Professional Resources - The combined hydroelectric-technical design staff of the Joint Venture numbers approximately a thousand. This large work force, with current and recent experience on hydropower design, is unique among U.S. organizations. It provides the Joint Venture the ability to respond quickly to any unforeseen circumstances, thereby minimizing impact on project cost and schedule.
- Cost/Schedule Control - The Joint Venture brings to the Susitna Project the Ebasco Project Information and Control System (EPICS) which is a proven system for defining, monitoring, and reporting project cost and schedule performance on large, multi-billion dollar projects. The first generation of EPICS was used to control cost and schedule at Ludington (which was completed ahead of schedule).
- Office Locations - The Joint Venture has committed to assigning the Project Management Team to a Susitna Project Office in Anchorage where the many Alaskan activities can be controlled effectively, and day-to-day communication with

the Power Authority will facilitate the flow of information and the decision-making process.

Detailed design will be performed in the Joint Venture office in Bellevue, Washington. This location is ideally suited to supporting the Anchorage operations because the travel to and communication with Anchorage is rapid, convenient, and cost effective.

- Sensitivity to Alaska Issues - The Joint Venture firms have gained experience from ten different assignments in Alaska during the last three years which have contributed substantially to our understanding of local technical, socioeconomic and environmental issues. Through this familiarity, we have also gained knowledge of several Alaskan firms and individuals with outstanding capability in cold region engineering, and we have made them an integral part of our project team.

The Joint Venture can provide the needed personnel, organization framework, and control systems that will ensure on-schedule, within-budget delivery of power from Watana Dam. Our plan for accomplishing this is summarized below.

### Management and Organization

#### Management Team

On-time completion of the Susitna Project under the identified constraints presents a major management challenge. To ensure effective management and timely execution of the design work, the Joint Venture will staff management positions with individuals whose proven records of accomplishment in similar assignments have led to high levels of responsibility within Harza and Ebasco. Management positions will be filled as follows:

- |   |   |
|---|---|
| • Project Manager                               | Dr. Ramon S. LaRusso<br>Vice President (Harza)        |
| • Engineering Operations Manager                | Mr. Arvids Zagars<br>Vice President (Harza)           |
| • Environmental and Regulatory Programs Manager | Dr. Gary G. Lawley<br>Manager, Life Sciences (Ebasco) |

- Project Control Manager Mr. Martin Soniker  
Manager, Project  
Control (Ebasco)

As demonstrated by the brief resumes provided below and the detailed resumes in Section C(A) of this proposal, each of these individuals have proven abilities in managing large projects.

**Ramon S. LaRusso**  
Project Manager

Ph.D - Engineering, University  
of Notre Dame (1967)

Ray LaRusso is a Vice President and Member of the Board of Directors at Harza. He brings to the Project Manager's position over 29 years of experience in the planning, design, and construction of dams, underground structures, and environmental projects. He has extensive experience in fill dam design and foundation engineering. As Project Manager for the \$2 billion Tunnel and Reservoir Project (TARP) in Metropolitan Chicago, Ray has supervised the initial planning of the TARP system, the detailed design of its project features, and the construction management services provided by Harza. TARP includes 30 miles of rock tunnels at depths to 350 feet, and associated underground storm water storage and pumping facilities. His management expertise is demonstrated by the fact that TARP has been constructed by multiple contractors ahead of schedule and within target cost.

**Arvids Zagars**  
Engineering Operations Manager

CE, State Technicum-Latvia

Arv Zagars is a Vice President of Harza with 40 years of experience in hydroelectric projects. Currently he is a member of Harza's Senior Professional Staff as Principal Hydroelectric Engineer. He has held key management or technical positions on 16 hydroelectric projects, ranging in capacity from the 40-MW Rio Lindo Project in Honduras to the 2100-MW Bath County Pumped Storage Project in Virginia. Recent assignments have included Project Manager for the Bath County Project and Project Engineer on the Reza Shah Kabir Project (1000 MW).

**Gary G. Lawley**  
Environmental and  
Regulatory Programs Manager

Ph.D - Limnology, North Texas  
State

Gary Lawley is Manager of Life Sciences at Ebasco. He has developed and managed the environmental programs for several hydroelectric developments, including the Grant Lake Project in Alaska, as well as for several steam-electric generating stations. Gary currently is assigned to Ebasco's Anchorage office where he is Program Manager for ARCO-Alaska's and the Alaska



District Corps of Engineers' Waterflood Environmental Monitoring Program at Prudhoe Bay.

Martin Soniker  
Project Control Manager

MBA, Baruch College

Marty Soniker currently is Project Control Manager in Ebasco's Bellevue office. He has 17 years of experience in the area of project accounting and cost control. His most recent project assignments have been as Project Control Manager for two multi-billion dollar steam-electric stations. Prior to those two assignments he was responsible for establishing the computer-based project control system for the Ludington Pumped Storage Project which at 1875 MW is the largest operating pumped storage project in the world.

Joint Venture Organization

The Joint Venture has been organized to provide efficient and effective services to the Power Authority, in accordance with the Organization Chart on the following page. Key positions are structured to interface directly with the Power Authority to permit interchange of ideas and to involve the Power Authority directly in project formulation. The project management office will be established in Anchorage and the office in Bellevue, Washington will be used as the design office for execution of the tasks identified in the detailed work plan. Assigning the design office in Bellevue has significant advantages:

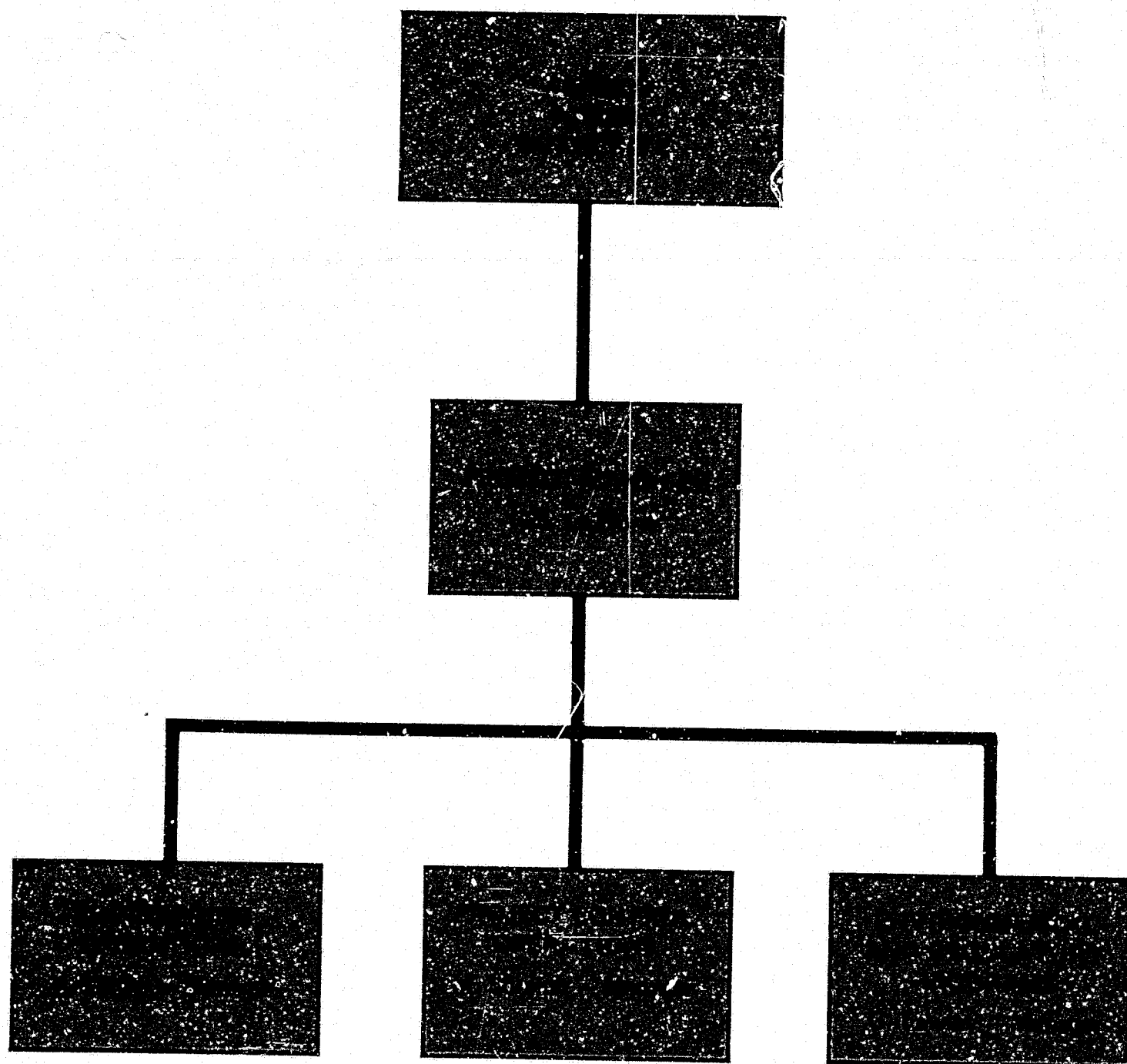
- Cost savings over the alternative of relocating all project personnel to Anchorage.
- Better communication with the Power Authority than could be maintained if design work were performed further east, because the time difference between Chicago or New York and Anchorage would limit the effective hours of communications each day.
- Reduction in travel time and cost.

The Anchorage office will be headed by the Project Manager. He will be supported by the three additional members of the Management Team who also will be based in Anchorage. The Bellevue office will be headed by Mr. Donn Ruotolo, currently is Manager of Projects in Ebasco's Placerville, California office. He will be assigned as Bellevue Office Engineering Manager.

The two centers will be supported by the home office resources of both firms. However, all key personnel involved with

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the project over a long term will be located either in the Anchorage or the Bellevue office. This deployment will facilitate the close involvement of Power Authority staff in project management activities, project formulation, and decision making. It also will enable the Joint Venture to more efficiently use the special skills and outstanding cold region engineering experience of the several Alaska-based firms and individuals that are identified in this proposal. Lastly, the management of geotechnical exploration, environmental and regulatory permitting, and public participation programs must be based in Anchorage.

### General Operating Plan

The operating plan developed by the Joint Venture recognizes the need for a rapid start-up in providing engineering services and the need to carry out design investigations intensively during the early years of the implementation period.

The Anchorage office will have overall responsibility and authority for all project design activities undertaken by the Joint Venture and its subcontractors as well as for all support operations. As stated earlier, both the Joint Venture firms have committed principals and senior management personnel to the Project Management Team. Additional key individuals will be assigned to the Anchorage office in specific Task Leader positions as described in Section C(B) of this proposal.

During the initial phase of the program, Anchorage-based personnel will prepare optimization studies, preliminary engineering studies, and layouts of major project features. These individuals also will formulate guidelines for design memorandum preparation and conduct other work tasks scheduled for early execution. Management personnel in the Anchorage office then will identify and define discrete work packages in terms of scope, interrelationships, schedules for completion, and budget. This effort will require approximately three months of intensive planning in Anchorage by the Project Management Team. Two principle benefits will accrue from performing the activity in Anchorage at the start of the design effort:

- Power Authority staff can participate easily in the development of the work plan.
- The Project Control Manager will be able to input the work plan into the computerized project control system almost immediately.

A Transition Program Team will be assigned to assist the Management Team during the initial intensive planning effort.

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Three individuals within our firms have gained appreciable experience in the past on studies contributing to the development of Alaska's energy resources, with some of this experience consisting of direct work on the Susitna Project. They have worked directly with Power Authority staff on prior assignments and, therefore, are knowledgeable about the requirements and procedures of the Power Authority. These individuals, and their specific Alaskan expertise is presented below:

- **Mr. J. L. Ehasz**, Chief Civil and Geotechnical Engineer for Ebasco has been heavily involved in the hydroelectric feasibility and design work performed in Alaska. He also was involved in the development of an independent cost estimate for the Susitna Hydroelectric project in early 1982 during which he gained thorough familiarity with project concepts and potential problems.
- **Mr. R. L. Meagher**, Vice President, currently is Manager of Alaskan Operations for Harza. In this capacity he has supervised the planning, preliminary design, and license applications for hydroelectric projects in Alaska, as well as numerous other feasibility and licensing studies.
- **Mr. S. O. Simmons**, Manager of Energy and Resources Planning at Ebasco, has participated in several studies involving assessment of energy development potentials in Alaska. Projects include the Railbelt Electric Power Alternatives studies, the Grant Lake Hydroelectric Project, and statewide inventories of hydroelectric project sites.

Project start-up and the transfer of existing data and information from Acres to the Project Team must be handled as expeditiously as possible. A smooth, quick start-up and transfer will be beneficial to the entire project. Immediately following notice-to-proceed, the Transition Program Team, functioning as special staff-level advisors to the Project Manager, will commence the transfer operation. We believe the special background of the Transition Team members to be very valuable since the Transition Program is the operations vehicle used to ensure full and timely infusion into the work plan of their background and special knowledge of Power Authority requirements.

Execution of the work packages will be the responsibility of several principal project team members, located in Bellevue, and reporting to the Bellevue office Engineering Manager. The specific individuals proposed for these lead positions are indi-

cated on the organization charts of Section C(B). Their resumes are furnished in Section C(A).

It is anticipated that approximately 45 project personnel will be assigned to the Anchorage office during the period of peak engineering activity, including all technical field personnel involved in the environmental and geotechnical programs. The Bellevue office will have a peak staff of sixty.

Both offices will be fully supported by the home offices of the Joint Venture firms. This support will be in two forms: short-term assignment of specialists to Bellevue for work there, and execution of certain work packages in the home office when it is clearly more efficient to conduct such work there. Approximately 85 percent of the project activities will be accomplished in the Anchorage and Bellevue offices, with the remainder allocated to the Chicago and New York City offices.

All principal tasks of the proposed work program are scheduled for direct handling by the Project Management Office in Anchorage, except for the design of project components, which will be shared between offices as explained above. These principal activities are:

- Environmental and Regulatory Programs, including FERC License Application Support and Liaison with Alaska Agencies
- Geotechnical Exploration Program Management
- Non-technical Facilities and Logistic Support
- Public Participation Programs

Our candidate staff for conducting of this work is fully identified in Sections C(A) and C(B). Several firms and individuals bring special Alaskan experience to our project team and they are noted here because of their important contribution to our program.

- Mr. Bill Wilson of the AEIDC will conduct a liaison program with Alaska agencies because of his unique knowledge and respected position as an independent authority on Susitna environmental issues.
- The Anchorage firm of Harding Lawson Associates will be responsible for executing selected activities in the geotechnical exploration program, a function they have successfully handled on several other major Alaska projects.

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- The Anchorage firm of Frank Moolin and Associates will manage subcontracts involving construction support facilities such as the access road and field camp. Their knowledge of special permit requirements and familiarity with local climatic conditions have been demonstrated on past assignments.
- R.A. Kreig Associates, Inc., an Anchorage consulting firm highly experienced in airphoto interpretation and terrain analysis, will support the geologic mapping activities.
- EBA, a specialty Alaska firm, will provide computer-assisted studies of permafrost thaw induced by reservoir filling.
- R & M Consultants Inc. have agreed to provide continuing services for the hydrologic and climatologic data collection program that they are now doing. We believe the continuity of data collection provided by this firm and the other local organizations that are involved in the environmental data collection program will be an important factor in obtaining a satisfactory evaluation of the environmental impacts.
- Dr. W.G. Nelson, of the University of Alaska, will provide expert assistance to the project team in design and construction under arctic conditions.
- Mr. R.W. (Tink) Martin, with recent construction engineering experience on Section II of the Trans Alaska Pipeline, will assist in constructibility analysis and review.
- Mr. E.F. Lobacz, former Research Branch Chief, Cold Regions Research and Engineering Laboratory of the Corps of Engineers, has agreed to assist our project team through review of designs for construction support facilities.
- Dr. R.B. Peck, noted authority on fill dam design and construction, who participated in the Susitna feasibility studies, will provide special consulting service to the Joint Venture project team.



### Engineering Work Plan

Engineers of the Joint Venture staff have examined the project layout for Watana Dam and Powerhouse and have developed a preliminary construction program involving eleven construction/installation contracts and fifteen equipment supply contracts, excluding construction support facilities. This program was developed to aid our formulation of the design program presented in the main proposal.

The program takes into account the following factors:

- Early procurement contracts for long lead-time items.
- Fixed price arrangement for purchase and construction contracts.
- Coordination of procurement and construction work.
- Anticipation of early availability of field data on an accelerated schedule.
- Optimization of Alaskan contractor participation in construction.

The construction of the embankment dam is the controlling element of the implementation program. At least six construction seasons will be required for placement of the approximately 60 million cubic yards of fill material that will comprise this project component. This period provides ample time for purchase, manufacture, and delivery of the mechanical and electrical equipment and adequate time for integrating and coordinating the detailed equipment design with the structural features of the powerhouse. As a result, fixed price contracts are planned for the installation of equipment and the final stage concrete work.

The critical part of the construction schedule is commencement of the Diversion Tunnels contract in early 1985. A very nearly complete project layout will be required before a final diversion tunnel alignment can be selected. Accordingly, our design program envisions completion of a major design report, the Detailed Conceptual Design Report by December, 1983. Investigations, studies, and preliminary engineering work are arranged through an accelerated 1983 program in order to produce this report in time to award construction contracts in 1985.

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The length of time required to construct the embankment dam raises concerns with respect to contracting procedures and potentials for price growth during the construction period. Joint Venture engineers deliberated at considerable length over whether embankment dam construction should be handled in a single contract or whether multiple contracts may be more attractive. As described in Section D(b) of our proposal, there are advantages and disadvantages associated with each scheme. Final resolution of the matter is expected to involve thorough discussions between the Power Authority, the Construction Manager, and the design team.

Whether a single contract or multiple contracts are used will not affect embankment dam design and, in either case, construction contracts will be very large. To minimize the potential for cost growth associated with a long-term construction contract or contracts for placing the embankment, we consider it imperative that separate contracts with very well-defined limits be awarded for this fill work. This condition then requires other separate contracts for work beneath and around the embankment fill. The latter category will include foundation excavation and preparation, grouting and drainage curtain construction beneath the embankment, and initial embankment fill lifts from the foundation floor. Under this arrangement, the main embankment contracts will contain completely determined quantities of the various types of fill material which will substantially reduce the potential for cost increases.

A complicating factor with regard to the embankment construction contract(s) and potential for cost increases concerns fill material handling. The properties of core material and their influence on the placing/compaction operation must be rigorously investigated. The available material is reportedly wet-of-optimum. Therefore, it is imperative to determine in advance of contract award what degree of drying, if any, will be required. Identified borrow areas also are reported to contain zones of permafrost. Investigation and detailed studies of this condition are required. To account for these potential complicating factors, the Joint Venture work plan includes an intensive and comprehensive field investigation of all potential fill materials in place, as well as construction of a test fill as part of the Diversion Tunnels Contract. Achievable rates of fill material excavation and placement will be established well in advance of advertising for bids to construct the main embankment dam.

Work flow diagrams and detailed discussion of work elements for portions of the overall project have been developed by the Joint Venture and are presented in Section D(b) of this proposal. Among the diagrams selected for display in that section



are those for the following proposed construction contracts which we have classified as major tasks:

Contract C-1: Diversion Works  
Contract C-6: Power Facilities  
Contract C-7: Main Dam  
Contract C-10: Completion Works

Similar work flow diagrams will be prepared for all other procurement and construction contracts. The overall work plan consists of the 38 major tasks shown on Exhibits D(b)-1, D(b)-2, and D(b)-3 in Section D(b). The scope of work involved in each major work task also is described in that section and forms the basis for our estimate of man-hour budgets for project management, field investigations, designs, environmental assessments, and other features of our total effort on the Susitna Project.

#### Cost/Schedule Control

The Joint Venture recognizes that control of cost and schedule is of special importance to the Power Authority, second only to the quality of project construction. In order to maintain the level of control that is necessary to assure timely and cost-effective implementation of the Susitna Project, we will implement a comprehensive cost/schedule control program based on established procedures, methods, and systems. The cost/schedule control program that will be used is the Ebasco Project Information and Control System (EPICS), as explained in detail in Section D(1). This program will provide project management personnel from the Power Authority, as well as the Joint Venture, with the detailed information needed to make important decisions regarding project goals and directions and to provide assurance that activities and costs are within established budgets and schedules.

It should be emphasized that the responsibility for control of cost and schedule will rest with each member of the project team. Although specific individuals are assigned the responsibility for management of the work program's various elements, actual control requires a high degree of responsiveness on the part of all project participants. The engineers and scientists that we have assigned to the Project have been selected in large part because of their abilities to accomplish tasks within established schedules.

The Project Control Manager will be located in the Anchorage office and will be responsible for inputting, updating, and managing the control system (EPICS), and preparing status reports. His proximity to Power Authority management personnel will enable discussions of cost and schedule control issues and

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provide for timely resolution of problems or concerns. Reporting to the Project Control Manager will be two separate cost/schedule control groups; one in Anchorage and one in Bellevue. The primary focus of the Anchorage group will be the control of activities performed in Alaska (primarily environmental studies, geotechnical investigations, and licensing activities). The Bellevue cost/schedule control staff will concentrate on the monitoring of design and construction activities and the capital cost of the project.

Cost/schedule control functions are planned in two separate areas. These are control of cost and schedule for technical services and control of project capital cost.

The cost and schedule program for technical services provides a series of activities designed to objectively measure project performance and identify areas requiring management attention. The key components of this program are:

- Identifying project work elements and tasks.
- Assigning man-hour budgets to each task.
- Developing a Critical Path Method Schedule which encompasses all project tasks.
- Making effective use of manpower resources through correlation of task budgets and schedules.
- Measuring performance in cost and schedule for each task through calculation of performance factors.
- Assessing performance through comparison of performance factors to established budgets.
- Developing corrective action plans for deficient areas.
- Controlling project changes.

The output of the EPICS program will consist of specific numerical performance factors that can be used by project management to assess performance and identify corrective actions. Project status will be described in monthly progress reports that will highlight actual performance on each task.

Control of the project capital cost also will involve a series of specific activities, each of which will support the

overall cost control program. The Project Estimator, located in the Bellevue office, will be responsible for these activities, with assistance provided by certain technical personnel and cost estimators. A key component of the capital cost control program is developing estimates of total project capital cost, with increasing levels of accuracy, as design progresses. These estimates will include:

- A Baseline Budget Estimate at the start of the design effort.
- A Preliminary Estimate midway through project design.
- A Definite Estimate when project design is near completion.
- Engineer's estimates of major equipment costs for bid evaluations.

Assessments will be made the effects of alternative project design concepts on the capital cost and of the impacts of proposed design changes will have on the capital cost. These assessments will be reported to the Power Authority on a regular basis. The estimates and assessments will provide the Power Authority with ample information for decision making.

#### Environmental Compliance

A large number of both public and private sector entities, as well as individual specialists, are and will continue to be involved in subcontract assignments to collect baseline environmental data, monitor field activities, prepare impact assessments and identify mitigation measures. These Alaskan entities bring to the project the best available expertise and understanding of local conditions, values, and issues. However, the diversity of participants makes it imperative to effectively manage their activities and control the quality of work performed.

The combination of the size and complexity of the Susitna Project, coupled with the unique Alaskan social and ecological conditions, makes environmental management and control an especially critical aspect of the overall project development.

To provide the Power Authority with the necessary assistance to accomplish this process of response to and resolution of issues, we have assembled the requisite management capabilities and established a study plan which allows for:

- Rapid review of the issues as they are identified to determine their merit and implications on the project.
- Immediate development of a plan or plans of action to satisfactorily address the issues.
- Providing experienced personnel to implement the selected plan of action, following approval by the Power Authority.

Effective resolution of issues is required to deter intervention in the licensing process. The schedule for completion of the License Application process does not allow for slippage. Extended legal hearings on the Project would seriously impair the Power Authority's ability to maintain this schedule.

A complete environmental and licensing support team will be placed in Anchorage to provide the immediate response capability required. This team will include a Environmental and Regulatory Programs Manager, reporting directly to the Joint Venture's Project Manager and providing both the Power Authority and others with a single, responsible point of contact and control. A resident support team of experienced specialists in aquatic and terrestrial ecology, socioeconomics, and permitting will be assigned (refer to Sections C(A), C(B), D(c), and D(d)). An

FERC License Support Coordinator will be assigned full time to the Susitna Project in Anchorage, reporting to the Program Manager. The License Coordinator will be responsible for the day-to-day production effort required to produce the analyses and documents needed to address all licensing issues as they arise.

Because it is always better to anticipate issues than to react after the fact, the Joint Venture will utilize the services of Mr. Bill Wilson, a respected and independent authority on Susitna, to provide agency liaison. His services will ensure that the Joint Venture is able to keep open and productive lines of communication with the local, state, and federal agency personnel having interest in or review responsibilities for Susitna.

The Joint Venture will have available, in its Bellevue office, a full-time, experienced staff of engineering, environmental, geotechnical, socioeconomic, and other specialists to provide complete support to the FERC License Application process. Both the resident Anchorage team and the Bellevue support team in the environmental program will consist almost entirely of full-time employees of the two Joint Venture firms. They



have previous Alaskan FERC License experience. As such, they can work effectively within the Susitna Project organization. They are, by experience, environmental planners and managers.

The technical approach to the Susitna Environmental Program is described in Section D(c) of the proposal and includes the following combination of proven and innovative techniques:

- Development of a Data Management and Information Retrieval System for the Project to facilitate program development, analysis, and document production.
- Establishment of clearly defined lines of communication and priority routing of information among all project participants.
- Implementation of "issue management" techniques including the use of issue-oriented licensing topical reports (LTR's) that have been used successfully on major thermal electric licensing studies.
- Implementation of proven Quality Control/Quality Assurance procedures.
- Cross-participation of engineering and environmental specialists in the development of engineering design criteria, design memoranda, and mitigation plans.
- Designation of a specific Lead Environmental Scientist to manage each of the ongoing environmental subcontracts.
- Designation of a License Support Team, under the supervision of the FERC License Coordinator, to assume full responsibility for the license support activities.

#### Concluding Statement

The Harza-Ebasco Joint Venture has the capability and is fully equipped to undertake design of the Susitna Hydroelectric Project. We have a combined staff with extensive experience in hydroelectric design and we have required support services. This staff is several times the size needed to meet planned requirements for the Susitna Project. We have the capability to provide:



- A fast start-up for design and other services.
- Appropriate accommodation to unexpected conditions as project implementation proceeds.
- Rapid and effective response to technical issues using our in-house capabilities.

We will assure fast start-up by assigning a Transition Program Team during the initial months of the design effort.

The Joint Venture has committed company officers and senior level individuals to the Susitna Project in recognition of the Project's importance. The Project Team provided by the Joint Venture is of the highest caliber in management and technical expertise, and is experienced in Alaska. Other organizations and consultants, many Alaska-based, have been integrated into the Project Team to bring additional knowledge of local conditions, together with their technical expertise.

A project office will be established in Anchorage to work jointly with the Joint Venture office in the same building as the Ebasco office in Bellevue, Washington. Many factors were considered when projecting the work assignments in these two offices, including the need to maximize communications with the Power Authority and the field activities and to be cost effective by recognizing the additional expense of relocating people to Alaska. The interface between Anchorage and Bellevue will be an effective one because of the relatively close proximity of Bellevue to Anchorage. It will enable the Power Authority to become actively involved in all project activities, thereby integrating the Power Authority and the Joint Venture into a cohesive unit. We consider this unity to be important for success of the Project, because it enables the Power Authority to make the informed and timely decisions necessary to support the project work plan.

The Joint Venture approach to the project is based on our knowledge and experience of what is necessary to bring a project of this magnitude to successful completion, combined with our knowledge of the special needs of Alaska. People within the Joint Venture who have worked extensively with the Power Authority and who will participate in the transition, start-up, and continuing review of the project have formulated our approach to the work to ensure that it is responsive to the Power Authority's needs. Our commitment to placing the Project Management Team in Anchorage is indicative of our intent to be fully responsive to the Power Authority.

We are confident that our approach to the Project, and the subsequent work plan developed, will lead the Susitna Project to successful completion.

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## C(A) PERSONNEL

One of the benefits of the Harza-Ebasco Joint Venture is the substantial personnel resources available to the Project Manager. Harza-Ebasco jointly employs approximately 5,500 technical personnel; the requested break-out of the people is provided later in this section. An indication of our resources is that, in addition to identifying the specific individuals proposed for all key project positions, one or more candidates for every anticipated project team assignment has been identified. Resumes for all project personnel are provided at the end of this section categorized as follows:

- Project Management Staff

Project Manager  
Engineering Operations Manager  
Principal Design Office Manager  
Project Control Manager  
Environmental and Regulatory Programs Manager

- Engineering Operations

Anchorage Office Engineering  
Anchorage Office Geotechnical Programs  
Non-Technical Project Features  
Bellevue Office Engineering

- Project Control Operations

Anchorage Office Staff  
Bellevue Office Staff

- Regulatory and Environmental Programs

FERC Licensing  
Permits  
Lead Scientists  
Bellevue Office Support

1. Senior level project positions committed to the project by Harza-Ebasco include:

- (a) Alaska representative responsible for the project:

Ramon S. LaRusso  
Project Manager

- (b) Home office representatives responsible for the project:

Dwight L. Glasscock	Carl F. Whitehead
Vice President and Member,	Senior Vice President
Board of Directors	Ebasco Services Inc.
Harza Engineering Company	2 World Trade Center
150 S. Wacker Drive	New York, N.Y. 10048
Chicago, Illinois 60606	(212) 839-2400
(312) 855-7000	

- (c) Other key personnel:

i. In Alaska:

Engineering Operations Manager - Arvids Zagars

Project Control Manager - Marty Soniker

Regulatory & Environ. Programs Mgr. - Gary Lawley

ii. In Bellevue, Washington:

Principal Design Office Manager - Donn Ruotolo

- (d) Specific experience and qualification with respect to similar work on a comparable project:

Table CA-1 provides the requested matrix of key personnel and work experience on similar projects.

- (e) Listing of engineers registered in Alaska as well as a plan for requesting key personnel not currently registered in Alaska:

Table CA-2 provides a list of engineers proposed for assignment to the project who are registered in Alaska. The following key personnel, not currently registered in Alaska, are registered for the University of Washington Cold Regions



Engineering Short Course, fall session, which will provide them with an Alaska PE License at the start of contract work.

Ramon LaRusso  
Donn Ruotolo

Nick Hernandez  
Arvids Zagars

In addition, Harza-Ebasco has tentatively arranged for the above course to be given in the Joint Venture office to the to the project technical staff. This represents a four day course, with examination on the fifth day, given by staff members from the University of Alaska, the University of Washington, and the State University of New York. Harza-Ebasco intends to execute this training program as soon as is practicable after notice of the Power Authority's intent to negotiate a contract with Harza-Ebasco.

2. Availability and capability of additional competent regular employees of the firm.

Tables CA-3 thru CA-5 provide the requested break-outs of professional engineers by engineering discipline, experience category, and location for each company and for the Joint Venture Project Team. The experience categories shown are compatible with those presently in use and are in accordance with the Survey of Engineering Salaries, D. Dietrich & Associates.

As stated earlier, a significant benefit offered by Harza-Ebasco is the large pool of professional talent available to the Project Manager to satisfy short term project personnel needs. The Project Manager reports directly to the Joint Venture Management Committee (as described in the Joint Venture Agreement) which is made up of one representative from the executive management staff of each parent company. Therefore, the Project Manager has direct access to the highest management levels of each company, if necessary, to receive additional project support. Both companies have demonstrated their abilities to assign significant additional manpower to a project on a short term basis in an effective manner. Furthermore, the forecasted peak project staff in Bellevue provided in Organization (B), when compared with the staff already in Bellevue, will represent only 30% of the total office staff. This means that, for every one person working directly on Susitna in Bellevue, there will exist two other people in Bellevue that could be made available to the project on a short term basis.

Table C(A) - 1 Experience Matrix

PROJECT \ PERSONNEL														
	GURI	TARP	BATH COUNTY	KEBAN	LUDINGTON	SUSITNA	RAILBELT	GRANT LAKE	TERROR LAKE	BLACK BEAR LAKE	YACYRETA	SANDY CREEK	KOOTENAI	KARUN RIVER
<b>PROJECT MANAGEMENT</b>														
<b>MANAGEMENT TEAM</b>														
R. S. LA RUSSO														
A. ZAGARS														
M. SONIKER														
G. G. LAWLEY														
<b>PUBLIC PARTICIPATION</b>														
W. D. KITTO														
<b>TRANSITION TEAM</b>														
R. L. MEAGHER														
J. EHASZ														
S. O. SIMMONS														
<b>ENGINEERING OPERATIONS</b>														
<b>PROJECT STUDIES AND DESIGN</b>														
N. M. HERNANDEZ														
<b>GEOTECHNICAL EXPLORATION</b>														
N. R. TILFORD														
M. S. TEMCHIN														
P. S. FORD														
R. E. HEDGECOCK														
G. D. JOHNSON														
R. A. PAIGE														
<b>BELLEVUE OFFICE ENGINEERING</b>														
D. RUOTOLO														
R. C. ACKER														
C. D. CRADDOCK														
J. STRAUBERGS														
H. W. COLEMAN														
R. S. BURKHART														
J. J. QUINN														
R. VINE														
<b>NON-TECHNICAL PROJECT FEATURES</b>														
W. R. TURNER														
M. P. FINNEGAN														
J. A. COOK														
R. K. CARTER														
D. M. JEZEK														
<b>PROJECT CONTROL</b>														
J. E. CANEPARI														
A. O. MCDERMOTT														
J. L. BECKMAN														
<b>ENVIRONMENTAL AND REGULATORY</b>														
<b>ENVIRONMENTAL STUDIES</b>														
J. P. ROBINSON														
W. J. WILSON														
J. A. MARX														
J. R. BIZER														
<b>BELLEVUE ENVIRONMENTAL SUPPORT</b>														
R. V. JENSMORE														
J. A. RICHARDSON														
D. L. BEYER														
R. L. FAIRBANKS														
R. K. SUTTLE														
C. E. LAWSON														
E. S. CUNNINGHAM														
B. K. LEE														
W. HUTCHINSON														

Table CA-2

ALASKA REGISTRATION

<u>Name</u>	<u>Project Position</u>
R.S. Burkhart	Lead Mechanical Engineer
J.L. Ehasz	Internal Review Board
D.K. Smith	Hydraulic Machinery Specialist
J. Straubergs	Lead Civil/Structural Engineer
N.R. Tildford	Manager, Geotechnical Exploration Program
J.M. England (Harding-Lawson)	Program Director for Harding-Lawson
D.C. Miller (Harding-Lawson)	Cold Regions Specialist
A. Mahmood (EBA)	Alaska Manager for EBA
R.A. Kreig (Kreig & Assoc.)	Photointerpretation Manager
W.R. Turner (FMAA)	Manager, Non-Technical Project Features
M.P. Finnegan (FMAA)	Project Control Specialist

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Table CA-3

## HARZA-EBASCO PROFESSIONAL STAFF

## BY DISCIPLINES

Discipline	Harza	Ebasco	Total	Joint Venture Project Team (At Peak)
Architects, Landscape Architects	7	2	9	1
Civil Engineers	45	163	208	3
Communications, Computer Control, Instrumentation	5	174	179	2
Computer Specialists & Technicians	13	-	13	2
Construction	54	788	842	6
Cost Control & Financial Analysis	7	269	276	6
Designers/Draftsmen	114	1051	1165	7
Ecologists/Environmental Scientists	17	155	172	8
Economists/Socioeconomists	5	10	15	2
Electrical Engineers	19	161	180	7
Estimators	4	86	90	2
Expediting	-	60	60	1
Geologists	22	26	48	3
Hydraulic Engineers	18	15	33	3
Hydroelectric Engineers	103	40	143	2
Hydrogeologists	3	6	9	Part Time
Hydrologists	21	4	25	1
Mechanical Engineers	34	450	484	8
Modeling	-	34	34	1
Planners, Urban/Regional	22	15	37	2
Purchasing Specialists	2	151	153	+
Rock Mechanics & Tunnel Technicians	5	-	5	5
Sanitary Engineers	18	5	23	Short Term
Soils Engineers	32	15	47	8
Specifications Writers/Vendor Quality Assurance	4	305	309	5
Structural Engineers	33	255	288	7
Surveyors	1	-	1	Short Term
Transmission, Substation & Distri- bution Engineers	26	25	51	2
Miscellaneous Technical Staff	9	555	564	5
TOTALS	643	4820	5463	103

Table CA-4

HARZA-EBASCO PROFESSIONAL STAFF  
BY EXPERIENCE CATEGORY

<u>Position</u>	<u>Harza</u>	<u>Ebasco</u>	<u>Total</u>
Engineering I	14	256	270
Engineering II	30	420	450
Engineering III	54	492	546
Engineering IV	60	641	701
Engineering V	94	781	875
Engineering VI	131	588	719
Engineering VII	116	492	608
Engineering VIII	22	155	177
Senior Designer	-	208	208
Designer	-	256	256
Drafting Level I	3	-	3
Drafting Level II	13	107	120
Drafting Level III	48	120	168
Drafting Level IV	13	304	317
Miscellaneous Technical Staff	<u>45</u>	<u>      </u>	<u>45</u>
	643	4820	5463

1/ Categories described in Survey of Engineering Salaries, D. Dietrich Associates, inc.



Table CA-5

HARZA-EBASCO PROFESSIONAL STAFF  
BY LOCATION

<u>Location</u>	<u>Harza</u>	<u>Ebasco</u>	<u>Joint Venture Project Team</u>
New York	-	3400	3400
Chicago	480	5	485
Bellevue	-	112	112
Atlanta	-	320	320
Houston	-	82	82
Newport Beach	-	113	113
Field**	<u>163</u>	<u>788</u>	<u>951</u>
TOTAL	643	4820	5463

\* Projected.

\*\* Includes project offices, construction sites, and minor offices.

# Section C - Personnel (A)

## ASSIGNMENT OF HARZA-EBASCO JOINT VENTURE PERSONNEL TO THE SUSITNA HYDROELECTRIC PROJECT

<u>Project Position</u>	<u>Individual Assigned</u>	<u>Work Location</u>	<u>Parent Company</u>	<u>Assignment</u>
<u>I. Joint Venture Technical Operations</u>				
<u>Project Management Staff</u>				
Project Manager	R.S. La Russo	Anchorage	Harza	1/83 - 7/94
Engineering Operations Manager	A. Zagars	Anchorage	Harza	1/83 - 1/88
Project Control Manager	M. Soniker	Anchorage	Ebasco	1/83 - 7/94
Environmental & Regulatory Programs Manager	G.G. Lawley	Anchorage	Ebasco	4/83 - 7/92
Public Information Program Manager	W.D. Kitto	Anchorage	Ebasco	1/83 - 1/86
<u>Engineering Operations</u>				
Project Studies & Design Manager	N.M. Hernandez	Anchorage	Harza	1/83 - 1/84
Geotechnical Exploration Program	N.R. Tilford, Manager	Anchorage	Ebasco	1/83 - 1/85
Instrumentation & Testing	M.S. Temchin, Lead R.K. Dodds	Anchorage Anchorage	Ebasco Foundation Sciences Inc.	1/83 - 1/85 1/83 - 1/85

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(cont'd)

<u>Project Position</u>	<u>Individual Assigned</u>	<u>Work Location</u>	<u>Parent Company</u>	<u>Assignment</u>
Cold Regions Specialist	D.L. Miller	Anchorage	Harding-Lawson	1/83 - 1/85
Soils Exploration and Testing	P.S. Ford, Lead	Anchorage	Harza	1/83 - 7/85
Field Geotechnical Engineer	L.G. Emerson A.P. Wulff	Anchorage Anchorage	Harza Harza	1/83 - 1/85 1/83 - 1/85
Program Director	J.M. Enqland	Anchorage	Harding-Lawson	1/83 - 1/85
Program Manager	R.W. Christensen	Anchorage	Harding-Lawson	1/83 - 1/85
Field Manager	S.A. Johnson	Anchorage	Harding-Lawson	1/83 - 1/85
Drilling Superintendent	D.N. Spansgle	Anchorage	Harding-Lawson	1/83 - 1/85
Laboratory Director	L.E. Lewis	Novato, Ca.	Harding-Lawson	2/83 - 1/85
Anchorage Laboratory	J.D. Hobbs	Anchorage	Harding-Lawson	2/83 - 1/85
Rock In-Situ Tests	R.E. Hedgecock, Lead	Anchorage	Ebasco	1/83 - 1/85
	R.K. Dodds	Anchorage	Foundation Sciences Inc.	1/83 - 1/85
	H.S. Kelsay	Anchorage	Foundation Sciences Inc.	1/83 - 1/85
Senior Rock Mechanics Specialist	F.S. Shuri	Anchorage	Foundation Sciences Inc.	1/83 - 1/85
Field Geologist	A.H. Stukey	Anchorage	Harza	1/83 - 1/85
Rock Drilling & Test Grouting	G.D. Johnson, Lead	Anchorage	Ebasco	1/83 - 1/85
Field Geologist	D.A. Frey	Anchorage	Harza	1/83 - 1/85
Supporting Exploration Services	R.A. Paige	Anchorage	Harza	1/83 - 1/85
Geologic Mapping	F.G. Snider	Anchorage	Ebasco	1/83 - 1/85
Senior Field Geologist	A.H. Stukey	Anchorage	Harza	1/83 - 1/85
Field Geologist	N.B. Holst	Anchorage	Harza	1/83 - 1/85

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<u>Project Position</u>	<u>Individual Assigned</u>	<u>Work Location</u>	<u>Parent Company</u>	<u>Assignment</u>
(cont'd)				
Surface Geophysical and Down-hole Surveys	E.W. Scarlett J.S. Nelson	Anchorage Anchorage	Ebasco Harding-Lawson	1/83 - 1/85
Groundwater	Z.A. Saleem R.P. Kewer	Anchorage Anchorage	Ebasco Harza	1/83 - 1/85 1/83 - 1/85
Non-Technical Project Features Management	W.R. Turner, Manager	Anchorage	Moolin	1/83 - 1/88
Project Control	M.P. Finnegan	Anchorage	Moolin	1/83 - 1/88
Costs	J.A. Cook	Anchorage	Moolin	1/83 - 1/88
Project Planning	R.K. Carter	Anchorage	Moolin	1/83 - 1/84
Logistics	D.M. Jezek	Anchorage	Moolin	1/83 - 1/85
Bellevue Office Engineering	D. Ruotolo, Manager	Bellevue	Ebasco	1/83 - 6/89
Geologist	R.A. Acker, Lead	Bellevue	Harza	
Senior Geologist	R.P. Kewer	Bellevue	Harza	1/83 - 6/85
Geotechnical Engineer	C.D. Craddock, Lead	Bellevue	Harza	3/83 - 6/87
Senior Geotechnical Engineer	K.L. Wong	Bellevue	Harza	6/83 - 6/87
Senior Rock Mechanics Engineer	H.H. Mac Pherson	Bellevue	Harza	9/83 - 1/87
Senior Engineer - Dam Design	M. Pavone	Bellevue	Ebasco	6/83 - 6/87
Senior Engineer - Geotechnical Engineer	P.K. Liu A. Custin	Bellevue Bellevue	Ebasco Ebasco	9/83 - 1/87 3/83 - 1/85
Civil/Structural Engineer	J. Straubergs, Lead	Bellevue	Ebasco	1/83 - 1/89
Senior Engineer - Design Analysis	G.C. Antonopoulos	Bellevue	Harza	6/83 - 3/89
Senior Engineer - Structural Steel	M. Akagi	Bellevue	Harza	1/84 - 1/87
Principal Engineer - Analysis/Design	S.N. Goyal	Bellevue	Ebasco	1/84 - 1/89

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<u>Project Position</u> (cont'd)	<u>Individual Assigned</u>	<u>Work Location</u>	<u>Parent Company</u>	<u>Assignment</u>
Principal Engineer - Analysis/Design	G.E. Ellis	Bellevue	Harza	1/84 - 3/89
Hydraulic Engineer	H.W. Coleman, Lead	Bellevue	Harza	3/83 - 1/86
Senior Engineer - Hydraulics	G.J. Gemperline	Bellevue	Harza	6/83 - 1/86
Mechanical Engineer	R.S. Burkhart, Lead	Bellevue	Harza	6/83 - 1/89
Gates and Hoists Specialist	U. Vitols	Bellevue	Harza	1/84 - 1/85
Hydraulic Machinery	D.K. Smith	Bellevue	Harza	6/83 - 6/85
Electrical Engineer	J.J. Quinn, Lead	Bellevue	Harza	9/83 - 1/89
Senior Engineer	D.W. Undevia	Bellevue	Harza	1/84 - 6/86
	G. Scheel	Bellevue	Harza	9/83 - 1/87
Systems Engineer	E.C. Foszcz	Bellevue	Harza	1/84 - 6/86
Power Systems Engineer	J.F. Szablya	Bellevue	Ebasco	3/83 - 1/85
Support Services Engineer	R. Vine, Lead	Bellevue	Ebasco	6/83 - 1/89
Specifications Specialist	R.B. Styles	Bellevue	Harza	1/84 - 6/89
<u>Project Control</u>				
Lead Cost/Schedule Control Engineer	J.E. Canepari	Bellevue	Ebasco	1/83 - 1/90
Project Estimator	A.O. McDermott	Bellevue	Harza	1/83 - 1/92
Services Cost Engineer	-	Bellevue	-	1/83 - 1/93
Cost/Schedule Control Engineer	-	Bellevue	-	1/83 - 1/87
				7/83 - 1/90
Accountant	(Local Hire)	Anchorage	-	1/83 - 3/92
Lead Cost/Schedule Control Engineer for Field and Non-Technical Services	J.L. Beckman	Anchorage	Ebasco	1/83 - 1/91



<u>Project Position</u>	<u>Individual Assigned</u>	<u>Work Location</u>	<u>Parent Company</u>	<u>Assignment</u>
(cont'd)				
Non-Technical Services				
Cost/Schedule Control Engineer	(Local Hire)	Anchorage	-	1/83 - 1/86
Lead Contract Administrator	(Local Hire)	Anchorage	-	1/83 - 1/89
Contract Administrator	(Local Hire)	Anchorage	-	1/83 - 1/86
Project Coordinator	(Local Hire)	Anchorage	-	1/83 - 1/89
<u>Environmental and Regulatory Programs</u>				
FERC License Support Manager	J.P. Robinson	Anchorage	Harza	4/83 - 1/85
Agency Liaison Manager	W.J. Wilson	Anchorage	AEIDC	4/83 - 1/85
Permits Coordinator	J.A. Marx	Anchorage	Moolin	4/83 - 1/85
Aquatic Ecology	J.R. Bizer	Anchorage	Harza	4/83 - 1/92
Terrestrial Ecology	R.V. Densmore	Anchorage	Ebasco	4/83 - 1/85
Resources Planning	J.A. Richardson	Anchorage	Orth	4/83 - 1/92
<u>Bellevue Environmental Support</u>				
Fisheries	D.L. Beyer	Bellevue	Ebasco	4/83 - 1/85
Wildlife	R.L. Fairbanks	Bellevue	Ebasco	4/83 - 1/85
Recreation, Aesthetic, & Cultural Resources	R.K. Suttle	Bellevue	Harza	4/83 - 1/85
Land Use	C.E. Lawson	Bellevue	Ebasco	4/83 - 1/85
Socioeconomics	E.S. Cunningham	Bellevue	Ebasco	4/83 - 1/85
Water Resources	B.K. Lee	Bellevue	Harza	4/83 - 1/92
Soils & Geology	R.C. Acker	Bellevue	Harza	4/83 - 1/85
Project Economics & Alternatives	W. Hutchinson	Bellevue	Ebasco	4/83 - 1/85

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<u>Project Position</u>	<u>Individual Assigned</u>	<u>Work Location</u>	<u>Parent Company</u>	<u>Assignment</u>
(cont'd)				
<b>II Corporate Executive Support and Senior Level Review</b>				
Joint Venture Management Committee	D.L. Glasscock (Chairman)	Chicago	Harza	
	C.F. Whitehead	New York	Ebasco	
Internal Review Board				
Geology	E.E. Komie	Chicago	Harza	
Geotechnical	J.L. Ehasz	New York	Ebasco	
Civil	G.A. Kanakaris	New York	Ebasco	
Electrical	L. Eilau	Chicago	Harza	
Mechanical	J.M. Horn	New York	Ebasco	
Hydraulics	D.S. Louie	Chicago	Harza	
Constructability	D.J. Duck	Chicago	Harza	
Environmental	J.H. Thrall	Chicago	Harza	
Licensing - Engineering	R.L. Meagher	Chicago	Harza	
Licensing - Environmental	S.O. Simmons	Bellevue	Ebasco	
Transition Team				
Planning Engineering	R.L. Meagher	Anchorage	Harza	1/83 - 1/84
Civil and Geotechnical	J.L. Ehasz	Anchorage	Ebasco	1/83 - 1/84
Licensing and Environmental	S.O. Simmons	Anchorage	Ebasco	1/83 - 1/84
Value Engineering				
Hydroelectric Projects	W.T. Bristow		Harza	
Electrical Design	M.E. Schuchard		Harza	
Mechanical Design	G.H. Post		Harza	
Architecture	E.R. Paul		Harza	
Civil Design	J.R. Fotheringham		Ebasco	

<u>Project Position</u>	<u>Individual Position</u>	<u>Work Location</u>
(cont'd)		
<u>III Sub-Contractors and Consultants</u>		
<u>EBA Engineering Consultants, Ltd.</u>		
Principal Consultant	D.W. Hayley	Edmonton, Alberta
Senior Project Engineer	W.D. Roggensack	Edmonton, Alberta
Principal Consultant	C.T. Hwang	Edmonton, Alberta
Engineering Geologist	K.O. Stangl	Edmonton, Alberta
Manager, Alaska	A. Mahmood	Anchorage
<u>R. A. Kreig &amp; Associates, Inc.</u>		
Photointerpretation	R.A. Kreig	Anchorage
<u>CIRI-/H&amp;N</u>		
<u>Consultants</u>		
General Dam Design	R.B. Peck	
Rock Mechanics	A.J. Hendron	
Cold Regions		
Constructability	R.W. Martin	
Cold Regions		
Geotechnical Engineering	E. Lobacz	
Arctic Engineering	W.G. Nelson	
Dynamic Analysis	M.L. Silver	

<u>Project Position</u>	<u>Individual Position</u>	<u>Work Location</u>	<u>Parent Company</u>
(cont'd)			
Instrumentation	J. Dannicliff		
Seismic Review	C. Allen		
Aesthetic Resources	R.F. Scheele		

IV Home Office Support

Coordinator of Geotechnical Analyses	D.E. Kleiner	Chicago	Harza
Static and Dynamic Specialist	P.P. Martin	Chicago	Harza
Analysis of Dam	R.D. Huang	Chicago	Harza
Seepage Analysis	C.Y. Wei	Chicago	Harza
Finite Element Analysis	C.H. Yeh	Chicago	Harza
Coordinator of Hydraulic Analyses	F.G. De Fazio	Chicago	Harza
Spillways	C.Y. Lin	Chicago	Harza
Power Tunnel	T.H. Hsu	Chicago	Harza
River Studies	J.E. Lindell	Chicago	Harza
Communications	R.L. Kuntzendorf	Chicago	Harza
Turbines	R.W. Fazalare	Chicago	Harza
Systems Studies	P.J. Donalek	Chicago	Harza
Seismology	U. Chandra	Greensburg, NC	Ebasco
Seismology	J.J. Healey	New York	Ebasco
Power Systems	R.S. Meredith	New York	Ebasco

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PROJECT  
MANAGEMENT  
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**HARZA-EBASCO**



ASSIGNMENT OF HARZA-EBASCO JOINT  
VENTURE PERSONNEL TO THE  
SUSITNA HYDROELECTRIC PROJECT

RESUMES

Project Management Staff

<u>Project Position</u>	<u>Individual Assigned</u>	<u>Work Location</u>
Project Manager	R.S. La Russo	Anchorage
Engineering Operations Manager	A. Zagars	Anchorage
Project Control Manager	M. Soniker	Anchorage
Environmental & Regulatory Programs Manager	G.G. Lawley	Anchorage
Public Information Program Manager	W.D. Kitto	Anchorage
<u>Joint Venture Management Committee</u>	D.L. Glasscock (Chairman)	Chicago
	C.F. Whitehead	New York

Internal Review Board<sup>1/</sup>

Geology	E.E. Komie	Chicago
Geotechnical	J.L. Ehasz	New York
Civil	G.A. Kanakaris	New York
Electrical	L. Eilau	Chicago
Mechanical	J.M. Horn	New York
Hydraulics	D.S. Louie	Chicago
Constructability	D.J. Duck	Chicago
Environmental	J.H. Thrall	Chicago
Licensing - Engineering	R.L. Meagher	Chicago
Licensing - Environmental	S.O. Simmons	Bellevue

Transition Team<sup>1/</sup>

Planning Engineering	R.L. Meagher	Anchorage
Civil and Geotechnical	J.L. Ehasz	Anchorage
Licensing and Environmental	S.O. Simmons	Anchorage

<sup>1/</sup> Resumes are presented in alphabetical order.

# PROJECT MANAGEMENT STAFF

OPERATIONS  
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HARZA-EBASCO

# HARZA-EBASCO

RAMON S. LA RUSSO

Job Title: Project Manager

Work Location: Anchorage

Education: Doctor of Philosophy in Civil Engineering  
1967, University of Notre Dame, Indiana  
Master of Science in Civil Engineering  
1965, University of Notre Dame, Indiana  
Bachelor of Science in Civil Engineering  
1953, University of Illinois, Urbana,  
Illinois

Professional Registrations: Illinois, Indiana, Ohio and Wisconsin

Parent Company: Harza Engineering Company

Experience and Qualifications Relevant to the Susitna Project:

April 1979: Elected to Board of Directors, Harza Engineering Company

February 1976: Vice President, Harza Engineering Company

July 1972: Associate, Harza Engineering Company

September 1980 to Present: Chief, Coordination Management Group  
Shares responsibility for corporate business development and project management programs; corporate representative on selected projects. Principal current projects include the following:

- Rochester, New York; Combined Sewer Overflow Abatement (1981-present). Principal Engineer for final planning, design, estimates, schedules, documents, and resident services during construction of 25,000 feet of 12 and 14 foot diameter sewer tunnel; 30 shaft structures 6 to 14 foot depth in overburden, sandstones, and shales; gateworks, ancillary structures. Estimated construction cost, \$100 million.
- Tunnel and Reservoir Plan (TARP) Chicago, Ill. (1971 to present). Principal Engineer for Planning Environmental Reports and testimony, Financing Reports, design, estimates, schedule, documents, resident services during construction, start-up and O & M Manual for 40 miles of sewer tunnel, 15 to 35 foot diameter; 75 shaft structures

RAMON S. LA RUSSO  
Project Manager

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5-30 foot diameter to 300 foot depth thru overburden and limestone; underground 8-unit pumping station, 380 ft. head, 2030 cfs, gate and valve walls, ancillary structures. Construction cost \$750 million.

- Commonwealth Edison Company Wastewater Treatment Plants, Illinois (1973-1978). Principal Engineer for Environmental Report, regulations interpretation, permits, design, estimates, schedules, documents, assistance during construction, start-up, O & M Manuals for treatment process facilities for three fossil fuel and two nuclear electric power generating stations. Tanks, ponds, pumps, piping, and ancillary facilities. Construction cost \$80 million.

March 1975 to September 1980: Head, Urban and Environmental Engineering Branch. Administratively and technically responsible for the conduct of all the planning, design and construction surveillance activities of the firm related to Environmental Engineering. Projects involved municipal and industrial water and wastewater conveyance and treatment, transportation and underground structures, air pollution control, solid waste disposal and resource recovery. Provided direction of projects through Division and Department Heads and Project Engineers.

Project Director or Branch Head for the following assignments:

- Ohio-Kentucky-Indiana Water Quality Management ("208") Plan.
- Design of a Wastewater Treatment Plant and Solid Waste Incinerator for Saudi Arabia's Jeddah International Airport.
- Process and final design and construction surveillance of 6 wastewater treatment plants for Commonwealth Edison Company's power stations.
- Final planning of Chicago's Tunnel and Reservoir Plan (total system). Design and construction supervisor for the Mainstream System part of the project.
- Planning and final design of a joint municipal-industrial treatment plant for the city of Oconto Falls, Wisconsin, and Scott Paper Company.

RAMON S. LA RUSSO  
Project Manager

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- Design and review of shop drawings for Chicago's Nashville Avenue Sewer Tunnel.
- Downers Grove sludge disposal study.
- Tilden mine tailings wastewater treatment plant for Cleveland-Cliffs Mining Company.
- Sludge disposal study for Rockford Sanitary District.
- Study of diversion of Lake Michigan water for the Illinois Department of Water Resources, including provision of expert testimony.

June 1973 to March 1975: Head, Urban Drainage Projects Division. Principal duties included administration and technical direction of engineers and draftsmen engaged in design of a variety of projects associated with the control of urban storm runoff. Project aspects involved conventional and tunnel sewers, reservoirs, pumping stations, and sewage treatment facilities.

August 1971 to June 1973: Head, Sanitary Engineering Division. Principal responsibilities in this position included the administration and technical direction of engineers of the Division engaged in a variety of sanitary engineering projects. Examples of projects are: Preparation of a regional sewerage system master plan for seven counties in Southeastern Wisconsin including the cities of Milwaukee, Kenosha, and Racine; design and preparation of plans and specifications for construction of phosphorus removal facilities and trickling filter plant expansion for Oconto Falls, Wisconsin; treatability study and preliminary engineering report for joint municipal-industrial treatment facility for Scott Paper Company and City of Oconto Falls; preparation of the feasibility report and preliminary plan for a 150 mgd water treatment plant for Kingston, Jamaica; preliminary design of a sanitary landfill for the City of Rockford, Illinois; determination of the effect of effluent discharge from the City of Madison, Wisconsin's Sewage Treatment Plant on the water quality of Badfish Creek; investigation of the feasibility of blending industrial liquid waste streams of the Campbell Soup Company, Chicago, to control temperature, pH, and hexane soluble concentrations.

March 1971 to August 1971: Assistant Project Director and then Project Director. Two major assignments were the Chicagoland Flood and Pollution Control Program and the Tunnel and Reservoir



RAMON S. LA RUSSO  
Project Manager

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Plan. Clients were the Metropolitan Sanitary District of Greater Chicago and the Department of Public Works, City of Chicago. Work involved participation with a team of consultants and public agency engineering staffs engaged in plan preparation of a tunnel and underground storage network to capture and treat combined sewer wet-weather discharges. Participated in public information meetings. Project construction costs were estimated to total \$1,300,000 (1972 base). Also, Project Director for a variety of municipal and industrial wastewater treatment projects.

October 1970 to March 1971: Harza Engineering Company, Chicago, Illinois. Assistant to Richard D. Harza, Vice-President. Rejoined the firm.

August 1968 to October 1970: Clyde E. Williams and Associates, Inc., South Bend, Indiana. Director of Engineering and Member, Board of Directors. Responsibilities in this position were management and technical supervision of all field and office forces engaged in a wide variety of projects in the disciplines of water resources, environmental, sanitary, and municipal engineering. Professional engineers involved in these activities numbered approximately thirty, with additional complements of inspectors, construction supervisors, draftsmen, and technicians. Typical projects were water and wastewater systems, urban drainage systems, dams and reservoirs, special foundations, airfields, airborne lake and stream pollution monitoring, and urban renewal. Principal projects included preparation of the survey report on Flood Control and Recreational Development of the Little Calumet River, Northern Illinois and Indiana, for the U.S. Corps of Engineers, Chicago District; design of deep foundations subject to impact loading for the C-5A Aircraft Landing Gear Drop Test Facility, for Bendix Corporation; preparation of the Master Plan for Storm Water Drainage for St. Elmwood, Paoli, Butler, Bourbon and Borden, Indiana; preparation of reports and design of a series of water supply and recreational dam and reservoir projects for the Soil Conservation Service, U.S. Department of Agriculture; preparation of sewerage plan for LaPorte, Indiana; design of phosphorus removal facilities utilizing alum, ferric chloride, and lime treatment for several municipal sewage treatment plants in the Lake Michigan watershed; design of several activated sludge sewage treatment plants for Lawrence, Indiana and New Buffalo, Buchanan and Sturgis, Michigan; water and wastewater projects for Carmel, Corydon, Lakeville, North Liberty and Argos in Indiana and Constantine and Three Oaks in Michigan; provision of expert testimony to the Indiana Public Service Commission concerning municipal water utility rate cases.

RAMON S. LA RUSSO  
Project Manager

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September 1963 to August 1968: University of Notre Dame, Notre Dame, Indiana. Instruction (1964-1966) and Assistant Professor (1967-1968), Department of Civil Engineering (held full time faculty position while working toward advanced degrees). Responsibilities in this position included the teaching of senior and graduate courses in Soil Mechanics and Foundation Engineering, Water Resources Engineering, Advanced Engineering Mathematics, and Computer Technology. Served as principal adviser on four research theses involving soil dynamics, groundwater seepage through rock, reservoir systems, computer analysis, and footing behavior. Participated as a member of the review panel for theses in Sanitary Engineering involving physical-chemical aspects of treatment.

September 1960 to September 1963: Harza Engineering Company, Chicago, Illinois. Assistant Head, Soil Mechanics and Foundation Engineering Department. Responsibilities in this position involved supervision of the activities of personnel engaged in numerous soils, foundations, and geology projects. Department personnel numbered between 20 and 40, depending on work load. Principal projects which were developed in this capacity were Guri Dam, Venezuela; Angat Dam, Philippine Islands; Mossyrock Dam, State of Washington; Mangla Dam, Pakistan; and Mayfield Dam, Washington. These projects involved all phases of development from planning, testing, and exploration to completion of construction.

June 1958 to September 1960: Griffin Wellpoint Corporation, New York, New York. Engineer for construction site dewatering subcontractor assignments. Activities involved initial field testing and analysis, bid preparation, system installation in the field, and field supervision. Principal projects were the Syracuse, New York, wastewater treatment plant and the Campbell Steam Generation Plant, Muskegon, Michigan. The latter project involved the first installation of deep eductor well points at a major construction site.

December 1955 to June 1958: Harza Engineering Company, Chicago, Illinois. Engineer. Soil Mechanics and Foundation Engineering Department. Responsibilities included both field and office work at the following projects:

- Derbendi Khan Dam, Iraq (1956, 1957), (440 foot high rockfill with central clay core); layout, excavation design, foundation surface treatment, grouting program, embankment design, earthwork and grouting estimates and specifications, tunnel specifications.

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RAMON S. LA RUSSO  
Project Manager

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- Priest Rapids, Columbia River, Washington (1956-1967), (110 foot high central impervious core with granular shells); layout, excavation design, embankment design, abutment seepage analysis, earthwork estimates and specifications; followed by resident field assignment during construction as Principal Earthwork Engineer, in-charge of embankment construction inspection force of ten to fifteen and also in-charge of detailed design phase exploration drilling program with additional 6 man field logging crew.
- Fellows Lake Dam, Springfield, Missouri (1957-58), Field Grouting Program Supervisor - (130 foot high homogeneous earth dam, water supply, designed by others than Harza); In charge of emergency grouting program to stop excessive leakage through creviced limestone foundation which threatened integrity of the structure. Grouting contractor was engaged by Owner on a "time-and-materials" basis, reported to the Grouting Program Supervisor. Directed field program (two 12 hr. shifts/day. 7 days/week) involving up to 80 contractor's men, monitored and approved invoices involving time of personnel, materials, equipment.
- Wanapum Dam (Columbia River), Washington (1957-58); (100 foot high central impervious core with granular shells); in charge of field testing program for grouting of gravel foundation and construction of first slurry trench underground cutoff on a major project anywhere in world. Returned to office and completed embankment design, plans and specifications.

December 1953 to December 1955: U.S. Army, Engineer Corps Military Service with Combat Engineer Division. Placed in technical charge of a 20 man team formed as a special detachment to 20th Air Force Base headquartered in Okinawa. Toured Korea and Ryukyu Islands developing basic plans at existing sites for rehabilitation and extension of military air strips to accommodate medium range SAC bombers. Program was classified as secret. Received special commendation from commanding officers at conclusion of tour.

June 1953 to December 1953: Junior Engineer, Ambuklao Dam (Philippines) Project Team; made stability analyses, layouts, and quantity take-offs for what was then the highest-in-the-world (425 feet) central core rockfill dam.

RAMON S. LA RUSSO  
Project Manager

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Technical Papers:

"A Study of One-Dimensional Consolidation of Cohesive Soil by Use of Electric Double Layer and Rate Process Theories (Physico-Chemistry of Colloids)," unpublished M.S. Thesis.

"Analysis of Seepage and Groundwater Flow by Monte Carlo Methods," unpublished Doctoral Dissertation.

"Fill Dam Design and Construction Practice in the United States," contribution to the USCOLD General Paper of the 8th Int. Conf. on Large Dams, Edinburgh, 1964.

"Wanapum Dam Project-Slurry Trench and Grouted Cut-offs," Symposium on Grouts and Drilling Muds, International Society of Soil Mechanics and Foundation Engineering, London, 1962.

"Geologic Aspects of the Chicagoland Flood Control and Pollution Abatement Program," N. Amer. Rapid Excavation and Tunneling Conference, co-author with Frank Wheby and Richard Acker, June 1972, Chicago.

"Deep Tunnel Technology," Amer. Pub. Works Association Reporter, September 1973.

"Giant Mole to Dig Sanitary District Tunnels." MIDWEST ENGINEER, Mar. 1976.

"A Bicentennial Look at Engineering in the Midwest." MIDWEST ENGINEER, Oct. 1976. (Co-authored with William M. Parker III, John R. Moore, and C.A. King).

"TARP Construction Takes In-depth Look at Correcting an Age-old Problem," MIDWEST ENGINEER, Jan. 1977. Co-authored with Forrest C. Neil.

RAMON S. LA RUSSO  
Project Manager

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Client References:

Project Name: Tunnel and Reservoir Plan  
The Metropolitan Sanitary District  
of Greater Chicago  
100 E. Erie Street  
Chicago, Illinois 60611  
Joseph H. Irons, Project Manager  
Frank E. Dalton, Assistant Chief Engineer  
Forrest Neil, Chief Engineer

Project Name: Rochester, New York CSOAP  
(Combined Sewer Overflow Abatement  
Program)  
County of Monroe  
Department of Engineering  
100 Terminal Building  
Rochester, N.Y. 14614  
Mr. Irwin Brodell, Program Coordinator

Project Name: Commonwealth Edison Company  
Wastewater Treatment Plants  
One First National Plaza  
Chicago, Illinois 60690  
Mr. Harold Koenig,  
Project Manager

Project Name: Detroit Water System Master Plan  
c/o Water and Sewerage Department  
Water Board Building  
Detroit, Michigan 48226  
Mr. A.C. Davanzo, Assistant  
Director Water Department  
Mr. H. Bierig, Director of  
Engineering



# HARZA-ERASCO

ARVIDS ZAGARS

Job Title: Engineering Operations Manager

Work Location: Anchorage

Education: Diploma, Civil Engineering  
1940, State Technicum, Riga, Latvia

Professional Studies: Member (representing ASCE) of a four-man team sponsored by the National Science Foundation for a study tour of European Pumped-Storage Development (July/August, 1974). Prepared report on the civil engineering aspects of a summary report published by USBR.

Special Qualifications: Project Manager and Project Engineer -  
2100 MW Bath County Pumped-Storage Project

Professional Registration: Structural Engineer - Illinois  
Professional Engineer - Virginia

Parent Company: Harza Engineering Company

## Experience and Qualifications Relevant to the Susitna Project:

February 1977 to Date: Vice President.

March 1976 to February 1977: Senior Associate and Head of Civil Design Branch.

- Project Manager for the Bath County Pumped-Storage Project.

January 1968 to March 1976: Associate of the Company (since January 1968). Head of Power Projects Division, November 1967 to December 1973; Head of Pumped-Storage Civil Division, January 1974 to March 1976.

- Project Engineer, Bath County Pumped-Storage Project (2100 MW) in Virginia: directed work in connection with field exploration, project conceptual studies, preparation of FPC license application exhibits, design studies and preparation of final designs, construction drawings and specifications.

OPERATIONS  
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ARVIDS ZAGARS  
Engineering Operations Manager

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- Assistant Project Director and Project Engineer, Reza Shah Kabir Hydroelectric Project (1,000 MW powerhouse, 200 meter high arch dam, 15,000 cms spillway in Iran); responsible for preparation of final design and construction drawings.
- Assistant Project Director, Rio Lindo Hydroelectric Project (40 MW, 6.5 km penstock) in Honduras. Responsible for management of the above projects, supervision of preparation of contract documents, final designs and construction drawings for Reza Shah Kabir, Rio Lindo, and Finchaa Project (100 MW) in Ethiopia.

August 1964 to January 1968: Head, Civil Engineering Department. In charge of design for the following projects:

- Chief Civil Engineer, Rio Lindo 40 MW Hydroelectric Project, Honduras. Supervision of layouts and preparation of contract documents for water conduits, penstocks and powerhouse.
- Chief Civil Engineer, Montezuma 500 MW Pumped-Storage Project in Arizona preparation of studies and FPC license application.
- Chief Civil Engineer, Finchaa, 100 MW Hydroelectric Project, Ethiopia. Supervision of layouts and preparation of contract documents for water conduits, penstocks and powerhouse.
- Kinzua, Pennsylvania, 429 MVA Pumped-Storage Plant. Supervision of layout, design, contract drawings and specifications for the intake structures, pressure conduits and powerstation (two 200 MVA generator/motors, one 29 MVA generator).
- Chief Civil Engineer, Mossyrock, 450 MW Hydroelectric Project, Washington. Supervision of design and preparation of construction drawings for the diversion tunnels, penstocks and powerhouse.
- Chief Civil Engineer, Angat, 218 MW Hydroelectric Project, Philippines. Design and preparation of construction drawings for the power tunnel, penstocks, main pit-powerhouse and auxiliary powerhouse. Review of design work prepared by the client and associate engineering company for the power intake, outlet works and spillway.

ARVIDS ZAGARS

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Engineering Operations Manager

June 1959 to August 1964: Section Head, Civil Engineering Department. In charge of initial layout work and preparation of contract documents for the Mossyrock and Angat projects listed above.

- Sam Rayburn Hydroelectric Project (formerly McGee Bend project) Supervision of layout scheme for the powerhouse and the associated inlet and outlet channels, stilling basin and the appurtenant structures; preparation of final designs and construction drawings for the above structures. (Distinguished first prize Engineering Award Winner 1967, Corps of Engineers).

November 1952 to June 1959: Group Leader, Civil Department.

- Bruces Eddy 600 MW Hydroelectric Project. Supervision and production of preliminary layout studies for a 600-foot high gravity dam, powerhouse, spillway and outlet works.
- Summersville, W. Va. Design and preparation of construction drawings for the diversion and (29-foot diameter, concrete and steel lined) outlet tunnel.
- Karadj, Iran. Layout and preparation of contract drawings for powerhouse (120 MW) and outlet works.
- Derbendi Khan, Iraq. Initial layouts, contract drawings, final design and construction drawings for diversion and pressure tunnels, outlet works and the initial stage of the powerhouse (114 MW ultimately).
- Mayfield 40.5 MW Project, Washington. Design and construction drawings for gravity dam portion and arch dam thrust blocks.
- Box Canyon 75 MW Hydroelectric Project, Washington. Design and construction drawings for the powerhouse.

August 1950 to November 1952: Civil Engineer Johnson Machine Works, Iowa. Responsible for design and detailing of structural steel framing.

May 1945 to July 1950: Siemens - Schuckertwerke AG, Vienna, Austria. Hydroelectric Branch, Linz-Danube, Austria.

October 1941 to May 1945: Siemens-Schuckertwerke AG, Berlin, Germany. Assistant to Resident Engineer.

ARVIDS ZAGARS  
Engineering Operations Manager

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Technical Papers: "Bath County, a 2100 MW Development in the U.S.A.," principal author, Water Power & Dam Construction, October 1977.

Client References:

Project Name: Bath County Pumped-Storage Project  
Virginia Electric and Power Company  
Powerstation Engineering and Construction  
P.O. Box 564  
Richmond, Virginia 23204  
Mr. J.M. Hagood, Jr.  
(804) 771-6103

# HARZA-EBASCO

MARTIN SONIKER

Job Title: Project Control Manager

Location: Anchorage

Education: Baruch College - MBA, 1972  
City College of New York (CCNY) - BBA, 1965

Special Qualifications: Over sixteen years experience in all aspects of Planning, Scheduling and Cost Engineering for all phases of major projects. Types of projects include hydroelectric, nuclear power, fossil fuel and industrial facilities.

Professional Registration: None

Parent Company: Ebasco Services Incorporated

## Experience and Qualifications Relevant to the Susitna Project:

1977 to Present: Currently assigned to the Seattle Regional Office as Project Control Manager. Assists in project management, proposal development, as well as schedule input and bid evaluation for current projects, including Terror Lake. Supports the Engineering Manager in determining design and engineering staffing requirements and procedures necessary to achieve project milestones. Previous experiences include Project Control manager at WPPSS Unit Nos. 3 and 5 and Project Control Superintendent at Waterford 3 Steam Electric Station. At Washington Public Power Supply System, managed staff of over 100 professional, technical and clerical personnel whose responsibilities covered all aspects of planning including engineering and design, required at site dates for major equipment and material purchase orders, and construction. Reviewed and approved contractor schedules. Other department responsibilities included engineer's verification of all contractors' monthly progress billings; developing and maintaining the project estimate of quantities, manhours and dollars, cost benefit studies, analysis of design changes for cost and schedule impact, contract claims assessment and cash flows. Prepared Monthly Progress Reports and presented project status at Monthly Project Status meetings.

1970 to 1977: Supervised the design, maintenance and implementation of Ebasco's computerized site cost control system for the Ludington Pumped Storage Station. Established the project's



MARTIN SONIKER  
Project Control Manager

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work breakdown structure and account codes for both control and FPC (now FERC) requirements. The system is credited with providing client and Ebasco management the necessary control of the contractor's performance. The system also enabled the control staff to generate timely cost reports and cash flows.

Initiated and improved methods and procedures with emphasis on material control, electrical cable pulling and start-up/construction of an Electrical Management System (EMS) now utilized on all major projects. Developed corporate "Construction Control Plan" and performed pre-construction activities. Implemented and utilized the computerized Civil Control System (CCS), Piping Management System (PMS), Electrical Management System (EMS), I & C Management System (ICMS), HVAC Management System (HVMS), Equipment Component Report (ECR), and Ebasco Scheduling System (ESS).

Client References

Project Name: Satsop 3  
Coy Love - Manager of Construction  
Washington Public Power Supply System  
P.O. Box 1189  
Elma, Washington 98541  
(206) 482-4428

Project Name: Waterford No. 3  
Lee V. Maurin - Vice President  
Louisiana Power and Light Company  
142 Delaronde Street  
New Orleans, Louisiana 70174  
(504) 366-2345

# HARZA-EBASCO

GARY G. LAWLEY

Job Title: Environmental and Regulatory Programs Manager

Work Location: Anchorage

Education: East Central State University, B.S.  
Biology: 1959  
University of Oklahoma, M.S.  
Ecology: 1965  
North Texas State University, Ph.D  
Limnology: 1973

Special Qualifications: Testimony as an expert witness has been given on nine occasions in respect to aquatic ecology, water quality, and terrestrial ecology

Professional Affiliations: Estuarine Research Federation  
American Society of Limnology and Oceanography  
Water Pollution Control Federation  
International Association for Great Lakes Research  
American Fisheries Society

Parent Company: Ebasco Services Incorporated

## Experience and Qualifications Relevant to the Susitna Project

1978 to Present: Dr. Lawley is a Consulting Scientist and Manager of the Life Sciences of EnviroSphere Company, a Division of Ebasco Services Incorporated. His duties as life sciences manager include planning and coordination of multidisciplinary hydroelectric and other environmental studies.

- Currently Program Manager in Anchorage, Alaska for ARCO Alaska's and the Alaska District, Corps of Engineers' Waterflood Environmental Monitoring Program at Prudhoe Bay, Alaska. Project responsibilities include management and administration of all aspects of a long-term multidisciplinary environmental monitoring study at the site. Elements being investigated include meteorology, oceanography, fisheries, invertebrates, coastal processes, tundra vegetation, and birds. Dr. Lawley serves as the interface between the Prudhoe Bay unit owners and eight federal, state, and local regulatory agencies.

GARY G. LAWLEY  
Environmental and Regulatory  
Programs Manager

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- Served as Program Manager for a fish and wildlife study plan involving the White Salmon River Hydroelectric Project in southwest Washington State and technical manager of a feasibility study for hydroelectric development of Grant Lake, near Moose Pass, Alaska. The latter study included all areas of environmental work and involved working with the U.S. Corps of Engineers, Fish and Wildlife Service, National Marine Fisheries Services, and the Alaska Department of Fish and Game.
- Management Coordinator for a 5-year multidisciplinary research project for the Columbia River Estuary. This study was funded for 6.5 million dollars and included all the associated disciplines comprising water quality, aquatic ecology, marine biology, and terrestrial ecology. He was also Principal Investigator and Manager of the Generic Environmental Impact Assessment of the effects of experimental borehole drilling for the Department of Energy's Nuclear Waste Terminal Storage Project. Earlier he served as Technical Leader for the terrestrial and aquatic portions of a pumped-storage hydro project in the Republic of the Philippines. In his current capacity, Dr. Lawley serves as Quality Assurance officer and technical reviewer for the Western regional offices of EnviroSphere.

1973 to 1978: Dr. Lawley was Manager for Environmental Programs at Texas Instruments Incorporated. In this position he was responsible for all aspects of a variety of environmental programs, including marketing, financial, technical, personnel, and testimony support.

- Representative programs included aquatic, terrestrial, water quality siting and monitoring work for the Niagara Mohawk Power Corporation (NMPC); the New York State Electric and Gas Corporation; the Power Authority, State of New York (PASNY); and the U.S. Army Corps of Engineers.
- The NMPC and PASNY programs addressed environmental aspects, including intakes and discharges, for both nuclear and fossil-fuel facilities at the Nine Mile Point, James A. Fitzpatrick plants, and Greene County Nuclear Plants. Experience on environmental studies regarding fossil generation includes the Lake Erie Generating Station, Pomfret/-Sheridan Sites, the Quarry Site on the Hudson River, and

GARY G. LAWLEY  
Environmental and Regulatory  
Programs Manager

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the Dunkirk Steam Station on Lake Erie, near Dunkirk, New York. Additional studies for fossil-fueled plants included monitoring studies on Lakes Cayuga and Ontario for New York State Electric and Gas; harbor studies near Dunkirk, Lake Erie, for the Corps of Engineers; and a 14-month ecological assessment for the New York Power Authority regarding siting studies at Athens and Quarry on the Hudson River near Poughkeepsie.

- Testimony as an expert witness has been given on nine occasions concerning aquatic ecology, water quality, and terrestrial ecology for hearings for the New York Public Service Commission and Nuclear Regulatory Commission on the following nuclear and fossil-fuel power stations; Greene County, Cementon on the Hudson; the proposed New York Power Authority Quarry facility near Poughkeepsie and in New York City; and the proposed Niagara Mohawk Lake Erie Generating Station, Pomfret/Sheridan Sites.

1972 to 1973: At the University of California at Berkeley, Dr. Lawley performed postdoctoral studies on several projects including control of algae blooms with the low levels of chemicals affecting nitrogen fixation; use of remote sensing (in conjunction with NASA, Ames) for evaluating artificial aeration to control algae blooms; and development of a continuous monitoring system for determining density of blue-green algae using fluorimetric techniques.

Client References:

Project Name: Waterflood Environmental Monitoring Project  
Jean Elder  
U.S. Army Corps of Engineers  
Anchorage, Alaska 99510  
(907) 552-2572

Project Name: White Salmon River Fish and Wildlife Study Plan  
Norm Bargabus (project was formerly administered  
by John Budd [deceased])  
PUD No. 1 of Klickitat County  
1313 S. Columbus  
Goldendale, Washington 98620  
(509) 773-5891

GARY G. LAWLEY  
Environmental and Regulatory  
Programs Manager

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Project Name: Columbia River Estuary Data Development Program  
Robert Moulton  
Bonneville Power Administration  
825 N.E. Multnomah  
Portland, Oregon 97208  
(503) 234-3361

Project Name: Grant Lake Hydroelectric Project  
Eric Marchegiani  
Alaska Power Authority  
334 West Fifth Avenue  
Anchorage, Alaska 99501  
(907) 276-0001



# HARZA-EBASCO

WILLIAM D. KITTO

Job Title: Public Information Program Manager

Work Location: Anchorage

Education: University of Washington, PhD Coursework-  
Forest Resources  
University of Washington, M.S. - Forest  
Resources: 1978  
Princeton University, B.S. - Civil and  
Geological Engineering: 1973

Special  
Qualifications: Oregon Energy Facility Siting Council  
Expert Witness Testimony - 1982

Professional  
Registration: None

Parent Company: Ebasco Services Incorporated

## Experience and Qualifications Relevant to the Susitna Project

October 1978 to Present: Mr. Kitto is presently a Principal Environmental Planner in the Bellevue, Washington office of Envirosphere Company, a Division of Ebasco Services Incorporated. Mr. Kitto is a manager of the energy systems planning group of Envirosphere and has eight years of experience in managing and participating in planning studies related to the development of energy facilities and natural resources.

- Currently a project manager on a feasibility study of the Kake-Petersburg transmission line intertie in southeast Alaska. This study requires coordination of the engineering, economic, and environmental studies. To date, Mr. Kitto has been responsible for conducting public and agency meeting in Kake to explain the scope of study and solicit local concerns regarding the project.
- Currently managing Envirosphere's work on the Eugene-Medford 500 kV transmission line EIS project. As project manager, Mr. Kitto has had the responsibility of coordinating the technical studies as well as ensuring compliance with federal and state regulations and guidelines. The proposed transmission line, if constructed, would pass through three counties in Oregon and cross a wide spectrum of land uses, ranging from urbanized to forested lands. Since the project has been controversial and would affect a diverse group of people, the public participation program has been a key element of this project. Mr. Kitto has been

responsible for conducting public workshops, holding meetings with county planning agencies, and providing technical support at public hearings. In addition, Mr. Kitto provided testimony to support the draft Environmental Impact Statement before the Oregon Energy Facility Siting Council.

- Currently serving as project manager of another proposed transmission line in Flathead Valley, Montana. The public participation program to date has involved conducting public workshops in three communities. Mr. Kitto was responsible for making a formal presentation of the project as well as preliminary findings. The presentation involved a slide show that illustrated the various transmission line routes and design options. The presentation succeeded in communicating a complex project to a diverse group of people in a short time span. Local concerns were solicited during the informal workshop and through written instruments. The outcome of these workshops was a report that documented findings and comments which was distributed to all interested participants.

1972 to September 1978: Mr. Kitto held three positions during this period. For three years, Mr. Kitto was a Reconnaissance Engineer/Environmental Planner with the Bonneville Power Administration. He coordinated preliminary engineering and environmental analysis work and EIS preparation for transmission line projects in the Bonneville Power Administration service area. Mr. Kitto also participated in long range planning studies concerned with development of western Great Plains coal. Mr. Kitto was on the staff of the U.S. Department of the Interior for one year. There he participated in engineering and environmental studies for a proposed hydroelectric project in northern New England. His responsibilities included working with contractors and federal, state, and local officials to determine the location and environmental impact of proposed transmission facilities. Mr. Kitto worked with the U.S. Forest Service for two years, including summers, where he assisted engineers and other specialists in transportation planning and recreation, timber, and fire management.

WILLIAM D. KITTO  
Public Information Program Manager

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Client References:

Project Name: Kake-Petersburg Intertie  
Remy Williams  
Alaska Power Authority  
334 West Fifth Avenue  
Anchorage, Alaska 99501  
(907) 276-0001

Project Name: Flathead Valley Reinforcement Project  
Judith Woodward  
Bonneville Power Administration  
P.O. Box 3621  
Portland, Oregon 97208  
(503) 234-3361 ext. 5756

Project Name: Eugene-Medford 500 kV Transmission Line  
Ron Smith  
Bureau of Land Management  
P.O. Box 2965  
Portland, Oregon 97208  
(503) 231-6950

OPERATIONS  
RESUMES

JOINT VENTURE  
MANAGEMENT  
COMMITTEE

RESUMES

HARZA-EBASCO

# HARZA-EBASCO

DWIGHT L. GLASSCOCK

Job Title: Chairman, Joint Venture Management Committee

Work Location: Chicago

Education: Master of Science  
1947, University of Illinois  
Bachelor of Science in Civil Engineering  
1944, University of Illinois

Special Qualifications: Thirty-five years of hydroelectric experience

Professional Registrations: California, Connecticut, Illinois, Maine, Maryland, Massachusetts, Michigan, Nebraska, New Hampshire, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, South Carolina, Virginia, Wisconsin and Nova Scotia.

Parent Company: Harza Engineering Company

Experience and Qualifications Relevant to the Susitna Project:

January 1978 to Date: Vice President and Head of Business Development and Project Management, U.S. and Canada. Responsible for all project management activities in U.S. and Canada including project staffing and performance of all project teams. Prior to current assignment, Head of Hydroelectric Design Branch at Harza.

1952 to 1977: Vice President, General Manager, Hydroelectric Power and Water Resources Division. Chas. T. Main, Inc., Boston Massachusetts. Responsible for technical design activities, and performance of the project staffing, work scheduling, and performance of the project teams. The scope of engineering services covered reconnaissance, feasibility, detailed design, construction management, and start-up operation. Operations included both domestic and international projects with work undertaken concurrently in the U.S., South America, Africa and Asia.

- Project Manager, 1,000-MW Blenheim-Gilboa Pumped-Storage Development, New York State. Responsible for the direction, coordination, and execution of design.



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- Directed feasibility study for the trans-basin diversion of the Capivari River for augmentation of the Sao Paulo, Brazil, water supply. Responsible for liaison and administration of Rio de Janeiro and Sao Paulo, Brazil, offices of the company for the design of the 1,400-MW Marimbondo and 1,380-MW Agua Vermelha Hydroelectric Projects.
- As Project Engineer, supervised a study for the regulation of the outflow of Lake Ontario which reviewed the existing regulating scheme and investigated alternative regulation plans, to determine the economic effect on the power generating facilities of the St. Lawrence Power Project, U.S. and Canada.
- Responsible for the economic studies and analyses in conjunction with the comprehensive review and preparation of the engineering feasibility report for the California Water Plan. This plan provided for the conservation of northern California water and its transportation to the Central Valley and southern portion of the state.
- Directed a power study for the Province of Nova Scotia, Canada, that included a forecast of load growth, power transmission and interconnections for studies, rate studies, and recommendations for additional generating and transmission facilities.
- As Design Engineer, prepared flow analyses and equipment specifications, and supervised preparation of construction drawings and installation of filter plant, pumping plant, and sewer system.

1949 to 1952: Assistant Professor of Hydraulic Engineering,  
Louisiana State University, Baton Rouge, Louisiana.

1947 to 1949: Hydraulic Design Engineer, Aluminum Company of America, Pittsburgh, Pennsylvania. Worked on structural and hydraulic design of dams, penstocks, hydroelectric power plants, and appurtenances.

# HARZA-EBASCO

CARL F. WHITEHEAD

Job Title: Joint Venture Management Committee

Work Location: New York

Education: BSCE Rensselaer Polytechnic Institute, 1951

Special Qualifications: More than thirty years experience in design engineering, project management and administration covering power generation projects.

Professional Registration: Registered Professional Engineer in the States of Arizona, California, Florida, Georgia, Iowa, Louisiana, Michigan, New York, New Jersey, North Carolina, Minnesota, Ohio, Oregon, Pennsylvania, Rhode Island, South Dakota, Texas and Washington.

Parent Company: Ebasco

## Experience and Qualifications Relevant to the Susitna Project:

January 1978 to Present: Senior Vice President, Projects/ Procurement - In charge of the Project Management Department, consisting of Managers of Projects and Project Managers; and the Procurement Department consisting of Purchasing, Expediting and Traffic.

April 1976 to January 1978: Vice President Engineering - Directed the activities of the corporate Chief Engineers of the Mechanical, Electrical, Civil, Instrumentation & Control, Project Engineering Departments and the Manager of Design. Provided leadership and guidance for the overall execution of the Engineering and Design work performed in the offices of Ebasco Services Incorporated.

June 1972 to April 1976: Manager of Projects New York office on nuclear, conventional thermal and hydroelectric power projects. Supervised and directed the activity of the Project Manager assigned to these projects.

August 1968 to June 1972: Project Manager on the three hundred and fifty million dollar Ludington Pumped Storage Project at

Ludington, Michigan. This project consists of the six largest pump-turbines/generator-motors manufactured to date producing 1872 MW of peaking power. Upper reservoir is a complete man-made, asphalt/clay lined basin of 83,000 AF, containing over 50 million cubic yards of fill and 530,000 tons of asphalt. Lower reservoir is Lake Michigan. Directed Ebasco contributions for Client presentation to various regulatory agencies including FPC and Michigan Department of Natural Resources. Attended Agency Hearings and made appropriate presentations. Project was awarded the American Society of Civil Engineers' "Outstanding Civil Engineering Achievement Award" for 1973.

June 1966 to August 1968: Supervising Civil Engineer on the following nuclear, steam electric and hydroelectric power projects: nuclear installation totalling 1,500,000 kW; H.B. Robinson, Vermont Yankee and Nuclenor (Spain). Conventional thermal installations totalling 3,500,000 kW; Cedar Bayou, P.H. Robinson, Graham, Dave Johnston, Morgan Creek, Hawthorn and W.A. Parish. Hydroelectric projects totaling 1,250,000 kW; Kastraki (Greece), Keban and Gokcekaya (Turkey). Estimated value of these plants was over one billion dollars.

June 1955 to June 1966: Engineer in the Concrete-Hydraulic Engineering Department - Designed and engineered the foundations, structural and hydraulic components of over ten steam and power plants. Dollar value of my work exceeded two million dollars.

- Project Engineer New York office and site for the forty million dollar Nevada Irrigation District's Hydro-Irrigation development in Grass Valley, California. Developed plans and designs leading to a successfully integrated power-irrigation system; involved were various hydrological and hydraulic studies and the designs of seven dams, ten miles of canals, two powerhouses and other related structures. Studied different methods of routing water and controls of outflows by computer analysis. Developed the technical portions of a comprehensive contract for the sale, purchase and exchange of water between the District and the Pacific Gas & Electric Co. Studied alternate dam layouts including arch, gravity and fill dams. Field assignment during Construction phase, I analyzed and evaluated all engineering and design performed in the field and coordinated with many State and Federal Agencies.

CARL F. WHITEHEAD

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Joint Venture Management Committee

- Project Engineer at the twenty-five million dollar Kastraki Hydroelectric project in Greece for the Public Power Corporation, consisting of a 300 feet high earth-fill dam, three 80 MW-unit powerhouse and diversion tunnel. Coordinated contract negotiations with various contractors. Established design criteria and supervised all detailed design which was produced in Athens, Greece.

OPERATIONS  
REQUIREMENTS

**INTERNAL REVIEW  
BOARD**

OPERATIONS  
RESUMES

**HARZA-EBASCO**



# HARZA-EBASCO

DONALD J. DUCK

Job Title: Internal Review Board - Constructability  
Work Location: Chicago  
Education: Bachelor of Science in Civil Engineering  
1959, Rose Hulman Instit. of Technology  
Special Qualification: Responsible for constructability review -  
Guri, Uribante, Bath County and TARP.  
Professional Registration: Wisconsin  
Parent Company: Harza Engineering Company

## Experience and Qualifications Relevant to the Susitna Project:

1980 to Date: Vice President and Head, Construction Management Department. Responsible for field construction engineering activities. Supervises Resident Engineers assigned to projects in the construction phase. Ultimate responsibility for quality control, quality assurance, cost and schedule monitoring, quantity computation, progress payment and reporting, design change implementation and contract change negotiations. Technically and administratively responsible for central office scheduling, estimating, constructability review of designs, the review and issuance of contract documents, procurement services, contract administration and claims evaluation, and for maintaining a central staff of construction technical specialists. Present major projects in the construction phase include: Guri, Venezuela; Uribante Doradas, Venezuela; Foothills, Denver; Bath County, Virginia; Summer Falls, Washington; San Lorenzo, El Salvador; El Nispero, Honduras; Tunnel and Reservoir Plan, Chicago.

1972 to 1980: Deputy Assistant Commissioner - Engineering and Research. U. S. Bureau of Reclamation.

Shared responsibility for coordinating and directing the design and construction activities for the \$600 million per year USBR water resources program. Program included up to ten dams in the construction phase as well as canals, tunnels, pipelines, powerplants, pumping plants, and power transmission facilities.

OPERATIONS  
RESUMES

- Responsible for resolving major construction problems and negotiating major contract disputes.
- Contracting Officer for 125 construction contracts and 62 major equipment supply contracts, totaling \$906 million; led team in continuing effort to improve constructability of designs.
- Led and coordinated activities related to the re-evaluation of the seismicity of the Auburn damsite following the Oroville, California earthquake in 1975. Work included contracting for engineering services. Provided briefings for subcommittees of Congress. Participated in selection of structure type for the Auburn damsite following the re-evaluation of seismicity of the area.
- Other major projects with significant involvement include: Crystal Dam, CO; Nambe Falls Dam, NM; Current Creek Dam, UT; Mountain Park Dam, OK; Palmetto Bend Dam, TX; Choke Canyon Dam, TX; Tyzak Dam, UT; Sugarpine Dam, CA; Tiber Dam, MT; Buckskin Mountain Tunnel, AZ; Pacheco Tunnel, CA; Vat and Stillwater Tunnels, UT; Bacon Tunnel, WA.

1967 to 1972: Chief, Field Engineering Division, Grand Coulee Third Powerplant, Grand Coulee, WA. USBR. Responsible for all field construction activities; directed the engineering, inspection, and field control of the contractors' operations including construction safety. Project included modification and relocation of major electrical facilities, one of the most comprehensive controlled-blasting programs associated with a hydro project, tunnel excavation in existing concrete dam by both blasting and non-blasting methods, construction of cellular cofferdams, large concrete gravity dam, and powerplant (3900 MW in six units).

1963 to 1967: Chief, Civil Engineering Division, Yellowtail Dam, Fort Smith, MT., USBR. Responsible for the engineering and inspection of the civil activities of the contractors' operations including safety. Project included diversion tunnel; inclined spillway tunnel; large concrete arch dam; powerplant and four turbine-generating units; and composite embankment and concrete afterbay dam.

1959 to 1963: Supervisory Construction Engineer, Flaming Gorge Dam, Dutch John, UT. USBR responsible for supervising inspection of contractors operations including safety on an assigned shift. Project included a diversion tunnel; inclined spillway

DONALD J. DUCK

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Internal Review Board - Constructability

tunnel; large concrete arch dam; and powerplant housing three turbine generating units.

1951 to 1954: Chief of Surveys, Air Installations. USBR. USAF Elmendorf AFB, Alaska. Field surveys for design and construction of both new and rehabilitation roads, railroads, airfields, water, sewer, utilities, and remote radar installations.

Technical Papers:

"Tunnel Excavation-Grand Coulee Third Powerplant," Rapid Excav. and Tunnel. Conf., 1972.

"Safety Requirements Point Way to Versatile Nonelectric Rock Blasting Methods Used at Grand Coulee's Third Powerplant," Reclamation Safety News, 2nd Qtr, 1971.

"Blasting-Mass Concrete Removal-Third Powerplant Forebay," Construction Report, Grand Coulee Third Powerplant.

"Construction of Grand Coulee Third Powerplant," Journal of the Construction Division, ASCE 1975.

"Reclamation and Western Development," Symposium on Inland Waterways for Navigation, Flood Control and Water Diversions, 3rd Ann. Symp. Waterways, Harbors and Coastal Eng. Div. ASCE, Aug. 10-12, 1976.

"Better Contracting for Underground Construction". Participated on Subcommittee No. 4 - Contracting Practices, National Academy of Sciences, U. S. Committee on Tunneling Technology.

Client References:

Project Name:

TARP  
The Metropolitan Sanitary  
District of Chicago  
100 E. Erie Street  
Chicago, Illinois 60611  
Jospeh H. Irons  
Ronald A. Newbauer

OPERATIONS  
RESUMES

DONALD J. DUCK  
Internal Review Board - Constructability

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Frank E. Dalton  
(312) 751-5600

Project Name:

Bath County Pumped Storage Project  
Virginia Electric and Power Company  
Powerstation Engineering and Construction  
P.O. Box 564  
Richmond, Virginia 23204  
Mr. J. M. Hagood, Jr.  
(804) 771-6103

Project Name:

CVG - Electrificacion Del Caroni, C.A.  
Direccion Obras de Guri  
Apartado No. 62413  
Caracas, Venezuela  
Dr. Luis Del Rio  
Tel 011-582-921155

# HARZA-EBASCO

JOSEPH L. EHASZ

Job Title: Internal Review Board and Transition Team -  
Geotechnical and Civil

Work Location: New York /Anchorage

Education: B.S. Civil Engineering  
1963, Rutgers University  
M.S. Foundation Engineering  
1965, Rutgers University

Special  
Qualifications: FERC Expert Witness Testimony on various  
hydroelectric license applications. Expert  
Witness and Testimony on various Nuclear  
Power Plant Applications and licenses before  
the USNRC and at ACRS hearings. Numerous  
publications on Civil and Geotechnical Engi-  
neering.

Professional  
Registrations: Alaska, Arizona, California, Florida,  
Georgia, Louisiana, Michigan, Minnesota, New  
Jersey, New York, North Carolina,  
Pennsylvania, Texas, Virginia, Washington  
and West Virginia.

Parent Company: Ebasco Services Incorporated

## Experience and Qualifications Relevant to the Susitna Project:

June 1980 to Present: Presently Chief Consulting Civil Engineer  
in the Corporate Offices of Ebasco in New York City. Mr. Ehasz  
is responsible for both the technical and administrative direc-  
tion of approximately fifty experienced Professional Engineers  
and Registered Geologists. He is responsible to the Vice Presi-  
dent for all feasibility and siting studies, advanced engineer-  
ing and special problems associated with hydroelectric projects  
and civil features of all power projects.

In late 1980 Mr. Ehasz led a technical review effort of the Bath  
County PSP for Allegheny Power Corporation. This review was to  
assess the project design and construction, as well as a review  
of the cost to complete. During the past eighteen months, Mr.  
Ehasz has been responsible for technical input and review of  
various small hydroelectric studies and projects in Alaska. In



JOSEPH L. EHASZ

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Internal Review Board and Transition Team -  
Geotechnical and Civil

particular, the Grant Lake Feasibility & Licensing Project and the review of the technical requirements and construction of the Terror Lake Project.

May 1979 to June 1980: Chief Design Engineer in the Corporate Offices of Ebasco in New York. Mr. Ehasz was responsible for both the technical and administrative direction of approximately five hundred engineers and designers. He was responsible to the Vice President of Engineering for all civil engineering and design associated with hydroelectric, fossil and nuclear power projects.

May 1977 to May 1979: Assistant Chief Civil Engineer, responsible for all geotechnical engineering within Ebasco as well as civil engineering on hydroelectric projects. As head of the geotechnical engineering Mr. Ehasz was responsible for the evaluation of soils and geologic conditions on all power projects and established the final design parameters for various soils and rock foundations, rock tunnels and powerhouse construction.

June 1973 to May 1977: Supervising Civil Engineer, responsible for the supervision of fifteen to twenty soils engineers and lead civil engineers on various power projects. Mr. Ehasz personally was responsible for a unique foundation for a nuclear power plant in Louisiana. This plant is a 1100 MW nuclear power plant located about 20 miles upstream from New Orleans. He evaluated the foundation conditions and was responsible for the final foundation design concept, namely, a "floating foundation". This concept was necessary to minimize settlements and essentially involves balancing the total structure weight with the weight of the soil removed.

During this period Mr. Ehasz also directed the geotechnical investigations and supervised the civil design of the Davis Pumped Storage Project, a 1000 MW Project in West Virginia. He led an intensive rock mechanics program and evaluation to evaluate the potential for utilizing an underground powerhouse at the site. He also had given expert testimony in the FERC Licensing hearings for the Project.

June 1965 to June 1973: Civil Engineer responsible for various hydroelectric project features. Of particular mention with respect to large hydroelectric projects is the foundation related work on two large hydroelectric projects in Turkey. The first project was the Gokcekaya Hydroelectric Project which involved a 500 ft high thin arch dam and 360 MW powerhouse. The

JOSEPH L. EHASZ

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Internal Review Board and Transition Team -  
Geotechnical and Civil

stress conditions were analyzed and the stability analysis was performed which dictated the various fault excavation and treatment beneath the arch dam and thrust blocks. An instrumentation program to monitor the dam and foundation program to monitor the dam and foundation performance was also developed.

The other project was the Keban Dam and Hydroelectric Development in eastern Turkey. The Project involved a 680 ft high earth and rockfill dam, a 350 foot high concrete gravity dam at the intake area and a large spillway. The major problem at the Project was the Karstic limestone foundation. He evaluated the foundation conditions along and beneath the dam and cutoff. Mr. Ehasz performed various stability analyses for the rockfill dam as well as the large gravity dam and spillway. He designed the instrumentation system to monitor the performance of the rockfill dam and the seepage and groundwater conditions throughout the damsite area. During the five years of his association with these two Projects he made 18 trips to Turkey to establish the actual field conditions and adapt the design to the actual foundations. Mr. Ehasz worked with our Resident Engineers and Geologists on the site to complete the Project. Both Projects have been operating successfully since 1975.

During this period Mr. Ehasz also was the responsible geotechnical engineer on the construction of the Ludington Pumped Storage Project. He was instrumental during construction in solving difficult geotechnical construction problems and has led the efforts in monitoring the upper reservoir during first filling. The instrumentation of this Project is unique in that it is one of the few, if not the only, large reservoir where the actual seepage can be measured and related to the design conditions.

Client References:

Project Name:	Bath County Project Review
	Mr. Ralph Haffner
	Director, Power Engineering
	Allegheny Power System/Bulk Power Supply
	800 Cabin Hill Drive
	Greensburg, Pennsylvania 15601
	412/838-6761

RESUMES

JOSEPH L. EHASZ

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Internal Review Board and Transition Team -  
Geotechnical and Civil

Mr. Richard Sequin  
Plant Manager  
Ludington Pumped Storage Plant  
RR #1, South Lake Shore Drive  
Ludington, Michigan 49431  
616/845-6264

Keban & Gokcekaya Hydroelectric Projects  
Mr. Refik Akarun  
Devlet Su Isleri  
Bakanlikar, Ankara, Turkey  
Ankara - 90-41-18-1100

Davis Pumped Storage Project  
Mr. Ralph Haffner  
Director, Power Engineering  
Allegheny Power System/Bulk Power Supply  
800 Cabin Hill Drive  
Greensburg, Pennsylvania 15601  
412/838-6761

Waterford Nuclear Power Station  
Mr. David Lester, Plant Superintendent  
Louisiana Power & Light Company  
P. O. Box "B"  
Killona, Louisiana 70066  
504/467-8211

# HARZA-EBASCO

LEMBIT EILAU

Job Title: Internal Review Board - Electrical

Work Location: Chicago

Education: Master's Degree in Business Administration  
1972, Loyola University  
Electrical Engineer 1944, Technical School  
of Dorpat, Estonia

Special  
Qualifications: Supervisor - Bath County, Guri

Professional  
Registration: California, Colorado, District of Columbia,  
Florida, Illinois, Nebraska, New Jersey,  
Virginia, and Wisconsin

Parent Company: Harza Engineering Company

## Experience and Qualifications Relevant to the Susitna Project:

November 1960 to Date: Electrical Engineer, Section Head, and Head of the Electrical Design Department with Pumped Storage, Hydroelectric Design and Computer Control & Communications Sections. Appointed Associate in June 1970; Senior Associate July 1978; Vice President 1981. Duties include administration, supervising the preparation of design criteria, specifications, and drawings for electrical equipment, cost estimates, evaluation of bids, contact with clients, and visits to project sites.

- Bath County 2100 MW Pumped-Storage Project, Virginia supervised preparation of electrical design memoranda, specifications, and construction drawings.
- Supervised preparation of electrical specifications and drawings for Cornell Hydroelectric Project in Wisconsin.
- Supervised alternative feasibility studies and cost estimates for electrical equipment for Mount Hope Project in New Jersey, utilizing either underground pumped-storage or underground compressed air storage systems.
- Supervised the preparation of exhibits and cost estimates for electrical work for the FPC (FERC) License Application for Bath County Pumped-Storage project, Stony Creek Pumped-



Storage project, Pennsylvania, and Cornell Hydroelectric project, Wisconsin.

- Washington Metropolitan Area Transit Authority. Supervised preparation of electrical construction documents for a two-mile section of rapid transit subway in Washington, D.C.
- Nebraska Public Power and Irrigation District. Supervised preparation of design and construction drawings for rehabilitating controls and protective relays for three existing hydroelectric plants and one steam power plant.
- Guri Hydroelectric Project, Venezuela. Supervised electrical design and preparation of construction drawings and specifications for extending the partially completed powerhouse and adding a second powerhouse with associated 400-kV and 765-kV switchyards for a total generating capacity of 10,000 MW.
- Kinzua Pumped-Storage Project, Pennsylvania. Prepared design criteria and supervised preparation of specifications and construction drawings for electrical equipment for pumped-storage plant and associated 230-kV switchyard.
- Guatape Hydroelectric Project, Colombia. Prepared electrical design criteria and specifications for an underground powerplant and outdoor 230-kV switchyard.
- Markland Hydroelectric Project, Indiana. Prepared specifications and supervised preparation of electrical construction drawings for the powerhouse.
- Brokopondo Hydroelectric Project, Surinam. Checked design of electrical construction drawings and specifications for the powerhouse and 161-kV substation.
- Wanapum Hydroelectric Project, Washington. Prepared specifications for the automatic control of fish facilities.
- City of Kandahar, Afghanistan. Prepared project planning report and cost estimates for the City's distribution system and distribution substations.

January 1959 to November 1960: Electrical Engineer, Robert E. Hattis, Engineers, Inc., Chicago, Illinois. Duties included designing electrical facilities and preparing specifications for commercial and industrial buildings.



LEMBIT EILAU  
Internal Review Board - Electrical

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April 1957 to January 1959: Squad Leader, Vern E. Alden Engineers, Chicago, Illinois. Supervised the preparation of design drawings for steam power plants.

August 1951 to April 1957: Electrical Designer, Pioneer Service and Engineering Company, Chicago, Illinois. Designed and drafted electrical facilities for steam and hydro plants and substations.

Jan 1950 to July 1951: Automatic Electric Company, Northlake, Illinois. Electrical Draftsman.

Client References:

Project Name: Bath County Pumped Storage Project  
Virginia Electric and Power Company  
Powerstation Engineering and Construction  
P.O. Box 564  
Richmond, Virginia 23204  
Mr. J.M. Hagood, Jr.  
(804) 771-6103

Project Name: Guri CVG-Electrificacion Del Caroni, C.A.  
Direccion Obras de Guri  
Apartado No. 62413  
Caracas, Venezuela  
Ing. Hector Beltran  
Tel. 011 + 582 + 921155

OPERATIONS  
RESUMES

# HARZA-EBASCO

JOHN M. HORN

Job Title: Internal Review Board - Mechanical.

Work Location: New York

Education: Colorado School of Mines, 1937-1938  
Purdue University - BSME, 1941

Special  
Qualifications: Extensive experience in the solution of field problems in the field of hydroelectric generation, e.g. Carmen Smith Plant, Packwood Ice Harbor, Smith Mountain, Ludington, Keban, Guri, et. al.,

Professional  
Registration: None

Parent Company: Ebasco Services Incorporated

## Experience and Qualifications Relevant to the Susitna Project:

May 1971 to Present: Consulting Hydromechanical Engineer providing services on hydromachinery to Ebasco and its clients. This service included site studies, guidance in the preparation of specifications, and the selection of equipment, trouble shooting at existing plants, equipment evaluations and quality.

1964 to 1971: Chief Engineer and Manager of Product Engineering and Development for Allis Chalmers Hydro Turbine Division, York, Pa. This position carried overall responsibility for the development and design of the entire product line of the division, as well as, the management of all license agreements with foreign manufacturers.

1959 to 1964: Chief Mechanical Engineer for Allis Chalmers Hydro Turbine Division with responsibility for all of the mechanical aspects of the entire product line including design.

1957 to 1959: Chief Mechanical Engineer for The S. Morgan Smith Company, York, Pa. with same responsibilities as those from 1959 to 1964. The S. Morgan Smith Company was purchased by Allis Chalmers in 1959.

1955 to 1959: Chief Design Engineer for The S. Morgan Smith Company responsible for all machine design of the product line including turbines of all types, gates, hoists, valves, trash

OPERATIONS  
RESUMES

JOHN M. HORN

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Internal Review Board - Mechanical

rakes and special products which included, high temperature valves, air flow control valves for NASA, the Navy and General Electric.

1948 to 1959: Design Engineer for The S. Morgan Smith Company assigned to a variety of products including Francis Turbines, Impulse Turbines, Kaplan and Propeller Turbines, as well as, all types of valves such as butterfly, spherical, free discharge and pressure regulators. Included in the assignments were several special projects such as; characterized air flow control valves for the U.S. Navy, Large air compressors for NASA (100,000 HP and 150,000 HP) and an acceleration wheel for the U.S. Navy.

1945 to 1948: Designer for The S. Morgan Smith Company, assignments included Impulse Turbines, Francis Turbines, Kaplan Turbines, Bascute Gates, Trash Rakes, etc.

# HARZA-EBASCO

GEORGE A. KANAKARIS

Job Title: Internal Review Board - Civil

Work Location: New York

Education: Columbia, University - MSCE - 1964  
City College of New York - BSCE - 1951

Special Qualifications: Expert witness NRC testimony and review of Nuclear Power Plant designs. Chairman, Nuclear Power Plant Committee, ASCE Energy Division (previously called Power Division)

Professional Registration: Professional Engineer - Arizona, California, Florida, Georgia, Louisiana, Maryland, New Jersey, New York, North Carolina, Pennsylvania, Texas, Virginia, West Virginia and Washington

Parent Company: Ebasco Services Incorporated

## Experience and Qualifications Relevant to the Susitna Project:

July 1980 to Present: Chief Civil Engineer responsible for corporate direction of all civil engineering and design of nuclear, fossil-fueled and hydroelectric generating stations.

October 1976 to June 1980: Assistant Chief Civil Engineer responsible for the technical direction and management of the Civil Engineering staff and activities of Ebasco's Jericho and Lyndhurst branch offices, engaged in the design of nuclear and fossil-fueled power projects.

June 1968 to October 1976: Supervising Concrete-Hydraulic Engineer responsible for the technical direction of engineering and design for both nuclear (BWR AND PWR) and fossil fueled power plants and for conventional hydro and pumped storage hydroelectric projects totalling over 20,000-MW installed capacity.

- Technical direction of staffs approaching 40 to 50 engineers, included the design for hydraulic structures, embankments, concrete dams, spillways, power conduits and hydroelectric powerhouses for both run-of-river and pumped storage hydroelectric plants.

OPERATIONS  
RESUMES

GEORGE A. KANAKARIS  
Internal Review Board - Civil

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- For fossil fueled and nuclear power plants, directed the design of reinforced concrete buildings and structures, containments, turbine and boiler area foundations, circulating water pump intake and discharge structures, coal handling foundations and sub-structures.
- Also directed analyses of structures for earthquake loading and responses, and the development and implementation of computer programs for waterhammer analysis of circulating water systems for steam power plants and power conduit systems for hydroelectric projects.

June 1965 to May 1968: Project Engineer for the Peixoto Hydroelectric Extension in Brazil, directed the design and engineering of the powerhouse, related structures and auxiliary mechanical systems for domestic and European designed Francis units. Reviewed hydraulic model tests for optimization of units into existing powerhouse cavity and facilities.

February 1957 to June 1964: As a Designer, up to a Lead Discipline Engineer, Civil Engineering and Design responsibilities for nuclear, fossil and hydroelectric power projects varied from performing designs, checking designs, to directing the design of other engineers and designers.

Client References:

Project Name: Ludington Pumped Storage - 1875 MW  
Richard Sequin  
Consumers Power Company  
RR #1  
South Lake Shore Drive  
Ludington, Michigan 49431

Project Name: Peixoto HED - 402 MW extension  
CIA Paulista de Forca e Luz  
Brazil

Project Name: Yuba-Bear River Development  
Edward Koster  
Nevada Irrigation District  
Grass Valley, California

Project Name: Allens Creek Nuclear Power Plant  
Limestone Lignite Power Plant  
Carl Howell  
Houston Lighting and Power Company  
Houston, Texas



GEORGE A. KANAKARIS

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Internal Review Board - Civil

Project Name:

St. Lucie Nuclear Generating Station 1 & 2  
Cliff Kent  
Florida Power & Light Company  
Miami, Florida

OPERATIONS  
RESUMES

# HARZA-EBASCO

EARL E. KOMIE

Job Title: Internal Review Board - Geology

Work Location: Chicago

Education: Master of Science in Geology  
1952, University of Texas

Bachelor of Science in Geology  
1950, University of Arizona

Special Qualifications: Principal Geologist, on the Guri, Bath County, TARP, and Hrauneyjafoss, (Iceland) Hydroelectric Projects

Parent Company: Harza Engineering Company

## Experience and Qualifications Relevant to the Susitna Project:

1979 to Date: Principal Geologist and Senior Associate. Responsible for the safety, economy and quality of the Company's geologic work and application of geologic work to siting, design and safety of civil structures.

Major participant in the design and/or construction phases of the following hydroelectric projects.

- 2700 MW Yacyreta Project, Argentina/Paraguay
- 320 MW Hrauneyjafoss Project, Iceland
- Raising of King Talal Dam, Jordan
- Pehuenche Rockfill Dam, Chile
- 80 MW Summer Falls Project, Washington
- 4300 MW Corpus Project, Argentina/Paraguay.

March 1974 to January 1979: Head, Geology Division (Associate, March 1976). Responsible for the technical direction, administration and supervision of ten geologists. Assignments comprised appraisals through construction-phase, on a diversity of projects including conventional and pumped-storage hydroelectric projects; underground structures for transportation and flood control; storage; solid waste disposal reservoirs; flood control and river navigation projects; groundwater pollution control projects; municipal and industrial sewage and urban-runoff control projects; and mining projects.

- Major participant in the design construction phases of the Cerron Grande Project, El Salvador; Guri Dam Project,

Venezuela; Yure and Varsovia Dams, Honduras; Bath County County Pumped-Storage Project, Virginia; and the Deep Tunnel (TARP) Project, Illinois.

- Supervised geologic investigations for overseas hydroelectric projects in Argentina, Paraguay, Venezuela, Peru, Iceland, Ecuador, Honduras, El Salvador and the Philippines, and domestic ones in Wyoming, Illinois, Montana, Wisconsin, and Minnesota.
  - Supervised hydrogeologic investigations for solid-waste disposal sites, sewage disposal sites, groundwater pollution control projects, mining sites, groundwater supply projects in Arizona, Wyoming, South Dakota, California, Wisconsin, Kentucky, Illinois, Oklahoma, Honduras and Chile.
  - Supervised geologic studies for underground energy storage within the continental United States.
- July 1961 to February 1974: U.S. Bureau of Reclamation, Phoenix, Arizona. Chief, Geology Branch. Specific responsibilities included geological and geotechnical supervision for a wide variety of reclamation projects, including the large Central Arizona Project.
- Participated in dam safety inspections for Salt River Project, Arizona; Bureau of Indian Affairs, Arizona, California and New Mexico; and for the Arizona Game and Fish Department.

January 1956 to July 1961: Engineering Geologist, U. S. Bureau of Reclamation, Sacramento, California

January 1954 to January 1956: Geologist, Crane Company, Chicago, Illinois.

June 1952 to January 1954: Research Geologist, Dan Kralis & Associates, Consulting Petroleum Geologists, Abilene, Texas.

September 1950 to May 1952: University of Texas. Graduate Teaching Assistant.

Technical Papers: "Geology of Red Bluff Lake Area, Texas,"  
Unpublished Thesis.

EARL E. KOMIE  
Internal Review Board - Geology

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"The Changing Role of the Groundwater Reservoir in Arid Lands," presented at the 1969 AAAS, Meeting Tucson, Az.

"Regional Studies for Underground Energy Storage Development," presented at the 1978 ASCE Meeting, Chicago.

Client Reference:

Project Name:

TARP  
The Metropolitan Sanitary  
District of Chicago  
100 E. Erie Street  
Chicago, Illinois 60611  
Joseph H. Irons  
Ronald A. Neubauer  
Frank E. Dalton  
(312) 751-5600

Project Name:

Bath County Pumped Storage Project  
Virginia Electric and Power Company  
Powerstation Engineering and Construction  
P.O. Box 564  
Richmond, Virginia 23204  
Mr. J. M. Hagood, Jr.  
(804) 771-6103

Project Name:

CVG - Electrificacion Del Caroni, C.A.  
Direccion Obras de Curi  
Apartado No. 62413  
Caracas, Venezuela  
Dr. Luis Del Rio  
Tel. 011-582-921155

OPERATIONS  
RESUMES

# HARZA-EBASCO

DAVID S. LOUIE

Job Title: Internal Review Board - Hydraulics

Work Location: Chicago

Education: Doctor of Science, Hydraulic Engineering  
1945, Mass. Institute of Technology  
Master of Science, Hydraulic Engineering  
1943, Mass. Institute of Technology  
Bachelor of Science in Civil Engineering  
1942, University of Washington

Special Qualifications: Ice Management Specialist  
Dr. David S. Louie, Principal Hydraulic Engineer, Harza Engineering Company, is Consultant to the Great Lakes - St. Lawrence Seaway Winter Navigation Board on ice management for extension of navigation season, shoreline protection, ice affects on power generation, etc. This involves ice formation control to keep the shipping lanes open and the economic balance on the infringement on hydropower generation.

Dr. Louie is a past member of the Ice Task Committee, International Association for Hydraulic Research.

Dr. Louie has had broad experience in the design of a variety hydraulic structures for ice management. Some of his project experiences are listed below:

1. Great Lakes Power Company Limited, Ontario, Canada. Five dams on two rivers. Studies and designs were:
  - Inhibit the formation of ice on gates.
  - Determine the minimum flow velocities in power conduits to prevent ice build-up in penstocks and surge tanks, otherwise thermal protection would be required.



DAVID S. LOUIE  
Internal Review Board - Hydraulics

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- Develop method of log movement over log chute during early ice season when ice floes are light.
  - Encourage the formation of ice cover thus preventing the formation of frazil ice and frazil slush. Frazil will clog up trashracks and intakes.
  - Break up of ice bridges and ice jams when required.
2. Burfell Project, Iceland. Studies and designs were:
- Physical hydraulic model studies of ice management at Trondheim University, Norway.
  - Physical hydraulic model studies of special gates for passage of ice at Darmstadt University, Germany.
  - Design to inhibit the formation of ice on gates, valves and intake structures to an extent that these structures are operative when required.
  - Means of minimizing ice jam formation and ice jam breaking.
  - Electronic monitoring and management of ice formation and movement.
  - Spring thaw and ice-break problems.
3. Hrauneyjafoss Project, Iceland. Studies and design were:

DAVID S. LOUIE  
Internal Review Board - Hydraulics

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- Hydraulic model studies of ice management at Trondheim University, Norway for diversion of ice from power intake and canal.
  - Design to divert ice over power canal.
  - Other studies similar to Burfell.
4. Ice studies in Lake Michigan on ice formation near and around condenser cooling water intake structures and on the prevention of the ice clogging of trashracks for:
- J. H. Campbell Plant - Michigan
  - Zion Nuclear Plant - Illinois
  - Point Beach Nuclear Plant - Wisconsin.
5. Review design of deicing system for Eisenhower Lock - St. Lawrence Seaway Development Corporation.

Professional  
Registration:

Colorado, Maryland, Massachusetts,  
New York, Oklahoma, Virginia, Wisconsin,  
Illinois

Parent Company:

Harza Engineering Company

Experience and Qualifications Relevant to the Susitna Project:  
September 1950 to Date: Senior Associate and Principal  
Hydraulic Engineer, 1979; Consultant to Great Lakes-St.  
Lawrence Seaway Winter Navigation Board.

1974 - 1979: Since 1967, Senior Professional Staff number level review and quality control for hydromechanics, hydraulic transients, hydraulic model experimentations, and prototype investigations. Duties included establishment of basic concepts for various hydraulic research, development, and design. Principal consultant on all major hydraulic problems.

OPERATIONS  
RESUMES

- River Hydraulics Backwater, water waves and surges, channel improvements, revetments, flow and erosion control, sediment transport processes, energy dissipation and dispersion, boundary and form losses, ice movements and management, fish channeling, inland navigation.
  - Open Channel Flows in Chutes and Canals Surges and waves, boundary layer (due to aging), air entrainment, velocity distributions, curvilinear flow, channel stability, cavitation. Design of large capacity canals, navigation locks, fish ladders.
  - Pressurized Flow in Conduits such as Sluices, Penstocks, and Tunnels: Waterhammer, surge tanks, boundary roughness (due to aging), transitions, pressure distribution, turbulent diffusion, hydroelectric vibrations, flow aeration, cavitation.
  - Water Pollution Control Non-Newtonian flows, waste and temperature pollution, stratified flows, selective withdrawal for quality control, waste disposal. Design of multiport diffuser system.
  - Estuary and Coastal Hydraulics Salt wedge intrusions, salt water barriers, tidal flushing of detention basins, littoral processes, breakwaters, groins, seawalls, shore erosion, marina, harbors.
  - Project Manager, 120-MW thin arch Karadj Dam gravity arch reregulating dam.
  - Design responsibilities included the Upper Falls Dam (42,000 kW), Upper Falls 3rd Unit Addition (25,000 kW), Gartshore Falls (20,000 kW), Hollingsworth Falls (20,000 kW), and Hogg Generating Station and Dam (15,000 kW) for the Great Lakes Power Company on the river basin development of the Montreal River and the Michipicoten River in Ontario, Canada; and on Scott Falls and McPhail Falls (1951-53); Bekhme Dam (1953-54); and the Derbendi Khan Dam (1954-55).
- 1947 to 1950: International Engineering Company, Inc., Denver, Colorado. Senior Engineer, hydraulic design and model studies.

DAVID S. LOUIE  
Internal Review Board - Hydraulics

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1946 to 1947: Bureau of Reclamation, Denver, Colorado. Engineer. Hydraulic studies and design of dams.

1945 to 1946: Tennessee Valley Authority, Knoxville, Tennessee. Engineer.

Technical Papers:

"Cavitation and Its Mitigation on Concrete," ASCE Ann. Conf., Portland, Oregon, Apr. . F. 1980.

"High Velocity Flows on Concrete Structures," Alvin G. Anderson Award Lecturer, n, St. Anthony Falls Hydraulic Lab., Univ. of Minn., Apr. 1980.

"Mossyrock Project - Flow Control During and After Construction," ASCE Water Res. mp. Conf., Wash., D.C., Feb. 1973.

"The Seneca Pumped-Storage Station" 6th Symp. Int. Ass. Hydraulic Res., Rome, Sept. 1972.

"Mossyrock Arch Spillway," Journal, Power Division, ASCE, Jan. 1971.

"Design and Model Studies of the Mangla Headworks," ASCE Conf., Chicago, 1969 (with A. Eberhardt).

"Discussion of the Flow of Water in Unlined, Lined and Partially Lined Tunnels," by C. F. Colebrook, Instit. of Civil Eng. Proc. , London, Apr.

RESUMES

# HARZA-EBASCO

RICHARD L. MEAGHER

Job Title: Internal Review Board and Transition Team - Planning Engineer, Licensing

Work Location: Anchorage/Chicago

Education: Bachelor of Science in Civil Engineering  
1956, University of Notre Dame

Special Qualifications: Twenty-six years of intensive and extensive hydroelectric experience

Professional Registration: Illinois and Virginia

Parent Company: Harza Engineering Company

## Experience and Qualifications Relevant to the Susitna Project:

October 1981 to Present: Manager, Alaska Operations: Responsibilities include management of Harza assignments and business development in Alaska. Project Managers report to Mr. Meagher to demonstrate that projects are being performed on schedule, within budget, and in a manner that is satisfactory to clients. Projects include:

- Black Bear Lake - a 6.0 MW hydroelectric project for which Harza has prepared the FERC License Application and Feasibility Report and is now engaged in the project design phase;
- Chester Lake - a 2.5 MW hydroelectric project for which Harza has prepared the Feasibility Report and;
- Bethel Area Power Plan which is a prefeasibility study of the most favorable power supply system for Bethel and the surrounding villages.
- Responsibilities also include completion of Project Manager's assignment of the 22.5 MW El Nispero Hydroelectric Project in Honduras, under construction, and scheduled for operation in August, 1982.

November 1977 to October 1981: Head of the Water & Energy Planning & Design Department: Directed the work of engineers, resource specialists, and drafters in planning water and power



RICHARD L. MEAGHER  
Internal Review Board and  
Transition Team - Planning  
Engineer, Licensing

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resources. Studies include master plans as well as prefeasibility, feasibility and FERC License Application of projects. Evaluations are based on engineering, environmental, economic, and financial considerations. Also directed two civil design sections involved in the design of small hydroelectric and water resource projects, and one section responsible for the detailed hydraulic design for all Harza projects. Major project assignments within the department include:

- Hydraulic Design

Guri Hydroelectric Project	10,000 MW in Venezuela Hydraulic Design
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Yacyreta Hydroelectric Project	4,000 MW in Argentina Hydraulic Design
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- Feasibility & Design

Maqarin Water Supply 2nd Irrigation Project in Jordan Feasibility and Design

- Prefeasibility

Lower Caroni Hydroelectric Development	7,000 MW in Venezuela Prefeasibility
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- FERC License Applications were completed for the following projects:

Raystown	20 MW in Pennsylvania
Kootenai	144 MW in Montana
Boundary	392 MW in Washington (License Amendment)
Black Bear Lake	6 MW in Alaska

January 1977 to October 1978: Assistant Head of the Resources Development Department: Provided direction and review for planning studies on river development and pumped-storage projects. Project Manager for prefeasibility and feasibility studies of the Remolino and El Nispero Hydroelectric Projects, the Quimistan Irrigation Project, and the Sula Valley Flood Control Master Plan, all in Honduras.

RICHARD L. MEAGHER  
Internal Review Board and  
Transition Team - Planning  
Engineer, Licensing

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- Project Manager for the Feasibility study and FERC License Application for Brumley Gap Pumped-Storage Project in Virginia. The project can provide more than 3,000 MW generating capacity, which is currently inactive because of legal action concerning land access.

October 1972 to December 1976: Section Head for Power Resource Planning: Provided direction for power project planning studies and reports. These studies included preliminary planning, feasibility and FPC License Applications. The projects included conventional hydroelectric and pumped-storage projects and the expansion of conventional hydroelectric projects. Project Manager assignments include:

- Prefeasibility study to determine hydroelectric potential in eastern Honduras. The inventory involved 14 sites with a total installation of about 1700 MW. Also Project Manager for the planning of a 450 MW development on the Rio Chimbo in Ecuador.
- The 1500 MW Rio Patia Project and the Betania Project with 500 MW power installation and 20,000 ha. of irrigation, both in Colombia.

October 1967 to October 1972: Project Engineer for power planning. Responsible for supervision of a group preparing appraisal and feasibility studies and reports on hydroelectric power projects. Project Engineer for a prefeasibility study of the Patia River Basin in southwest Columbia to determine the most favorable hydroelectric power development. The potential development would be about 3,000 MW.

- Project Engineer for three other planning studies. The first study recommended a plan of development for a reach of the Rio Grande in Bolivia about 350 km long with a fall of about 1,000 km. The study identified nine potential hydroelectric project sites with a total installed capacity of 3,000 MW. The second study was for a prefeasibility report to evaluate two small hydroelectric projects in southern Bolivia which could serve a community with a population of about 30,000. The third study was a feasibility report for the Hrauneyjafoss Project in Iceland which can serve expected growth in industrial load. The project will have an installed capacity of 210 MW.

RICHARD L. MEAGHER  
Internal Review Board and  
Transition Team - Planning  
Engineer, Licensing

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- Project Engineer during the planning phase of the Rio Caroni hydroelectric development in Venezuela involving four sites with an initial potential of about 15,000 MW. Supervised planning studies aimed at: appraising the overall development, and determining the technical and economic feasibility of a program for staged expansion at the Guri and Macagua sites which have been partially developed.

October 1967 to October 1972: Project Engineer: During the feasibility phase of two major river projects in Iran: the Gotvand Project which provides 40,000 ha. of agricultural land with an irrigation and drainage system and the Reza Shah Kabir Project which has a 200 m arch dam and 1,000 MW power plant.

- Lead Engineer during the design phase of the Reza Shah Kabir Project and supervised the design of the spillway structure and the river diversion and access facilities. Also provided liaison between the owner and the architectural firm that prepared contract drawings for the operators village.

October 1962 to October 1967: Senior Engineer: Duties included supervision of planning studies and writing reports for river development projects. These included the feasibility study of a 90 MW Finchaa Project in Ethiopia and an appraisal study of the Karun River multipurpose development in Iran to determine the overall plan of development and the most favorable projects for initial construction. Full development will include over 5,000 MW of power, 140,000 ha. of irrigated agriculture and flood control.

- Also performed and supervised design work and preparation of construction drawings for the initial Guri powerhouse and other major structures for hydroelectric projects.

November 1958 to October 1962: Design Engineer: Duties included: Making designs and drawings for various components of hydroelectric and water control projects. The work involved powerhouses, outlet works, tunnels, spillways, and retaining walls. Projects included Canaveral (28 MW) in Honduras, Markland (81 MW) on Ohio River; and Summersville Flood Control in West Virginia.

June 1956 to November 1958: Planning Engineer: Duties included: Preliminary design studies, project layouts, power production, hydraulic and hydrologic studies, and economic analyses.

RICHARD L. MEAGHER  
Internal Review Board and  
Transition Team - Planning  
Engineer, Licensing

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Client References:

Project Name:

Guri  
CVG-Electrificacion Del Caroni, C.A.  
Direccion Obras de Guri  
Apartado No. 62413  
Caracas, Venezuela  
Dr. Luis Del Rio  
Tel. 011 + 582 + 921155

Project Name:

Black Bear Lake  
Alaska Power Authority  
334 West Fifth Ave.  
Anchorage, Alaska 99501  
Mr. Brent Petrie  
907/276-0001

OPERATIONS  
RECORDS

# HARZA-EBASCO

JAMES H. THRALL

Job Title: Internal Review Board - Environmental

Work Location: Chicago

Education: Doctor of Philosophy in Biological Sciences  
1972, Illinois State University  
Master of Science in Biological Sciences  
1967, St. Mary's College  
Bachelor of Science in Biology  
1964, St. Mary's College

Special Qualifications: FERC License Applications final technical review

Professional Registration: Not applicable

Parent Company: Harza Engineering Company

Experience and Qualifications Relevant to the Susitna Project:  
1974 to Date: Senior Aquatic Ecologist and Head, Environmental Sciences Section. Duties are personnel management, new business development, and budget management and final technical review of all environmental assignments carried out by the Company. Responsible for or participated in environmental assessment and impact studies for nine domestic and six foreign hydropower development projects.

- FERC License Studies for the Stony Creek Pennsylvania Pumped Storage Project; evaluated the impacts of reservoir development on trout populations.
- Lead Environmental Scientist, Summersville, West Virginia. Hydropower Development Study COE. Responsible for impact assessment of reservoir water quality and fisheries; downstream flow rates and water temperature effects on fisheries and impacts on white water boating on the lower Gaulty River, (a premier white water river). Prepared the Draft Environmental Impact Statement for the Project.
- Lead Scientist, Boundary Dam Hydropower Modification Study (Seattle City Light, Pend Orielle River, Washington). Prepared the FERC Exhibit E. Assisted the client at agency and public meetings to explain project's environmental and socioeconomic impacts.

OPERATIONS  
RESUMES



- Managed and provided final technical review for FERC License projects such as Kootenai Falls (Montana), Raystown (Pennsylvania), and Black Bear Lake (Alaska). Responsible for management of the St. Joseph's River Project (Michigan, Indiana), Bethel (Alaska) Energy Development Study and Strontia Springs (Colorado) Hydropower Project.
- Carried out fisheries and aquatic impact assessment studies including experimental fishing and water quality analysis programs for the Sogomoso Project (Colombia), Uribante-Caparo Project (Venezuela), Lower Caroni Project (Venezuela), San Lorenzo Project (El Salvador), Yacyreta and Corpus projects (Argentina and Paraguay).
- Participated in design of fish passage facilities and laboratory facilities to be included in both the Yacyreta and Corpus projects.
- Lead Environmental Scientist for the South Park, Colorado Reservoir Project (Colorado). Directed water quality, fisheries, benthos and in-stream flow studies on Tarryall Creek, site of a proposed 60,000 acre foot storage reservoir to supply the City of Thornton's future water needs. Assisted client at agency and public meetings.
- Supervised preparation of an environmental report for the Bureau of Reclamation on the riverine ecosystems affected by the Garrison Diversion Unit Irrigation Project, North Dakota. Studies focused on impacts of diversion water on terrestrial and aquatic biota, and environmental quality of the receiving streams.
- Supervised the preparation of an environmental assessment report for the 80,000-acre Lake Andes-Wagner Irrigation Development, South Dakota. Evaluated project impacts on terrestrial, aquatic and recreation resources and made recommendations for mitigating.
- Project Manager for the preparation of a technical review of the U.S. Fish and Wildlife Service's impact and mitigation studies for the Garrison Diversion Project. Review comprised assessment of the project's impacts on wetlands, waterfowl and native and introduced fish species.

JAMES H. THRALL

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Internal Review Board - Environmental

- Project Manager for the preparation of a technical review of the International Joint Commission's report on the Garrison Diversion Unit. Supervised the technical review report for the Garrison Conservancy District and presented testimony at public hearings held by the International Joint Commission in North Dakota.
- Helped prepare a special report for the Ohio-Kentucky-Indiana Regional Planning Commission (Section 208 of the Federal Water Pollution Control Act) on the areawide wastewater management planning and aquatic resources.

1972 to 1974: Fisheries Biologist, Peace Corps, Smithsonian Institute Environmental Program. Worked with the "Instituto de Desarrollo de los Recursos Naturales Renovables" (Colombia), to develop a fish culture program. Engaged in studies of a fresh-water fish, the Sabaleta/(Brycon henni), doing research on its life history and basic ecology. Made limnological studies of El Penal reservoir and on the Porre River, Colombia. Advisor to the staff of INDERENA (a Colombian conservation agency) in the planning of fish culture stations and future fisheries research projects.

1964 to 1966: Assistant Professor and Lecturer, Institute of Medical Technology in Minneapolis, Minnesota.

Client References:

Project Name:           Boundary Hydroelectric Project  
                          Seattle Department of Lighting  
                          1015 Third Avenue  
                          Seattle, WA 98104  
                          Mr. Dean Sunquist  
                          (206) 625-3056

OPERATIONS  
RESUMES

# HARZA-EBASCO

STEPHEN O. SIMMONS

Job Title: Internal Review Board and Transition Team -  
FERC Licensing - Environmental

Work Location: Bellevue /Anchorage

Education: University of Michigan B.S.- Natural  
Resources: 1967  
University of Michigan B.S. -  
Forestry: 1967  
University of Alaska - Field Studies In  
Alaska Ecological Systems: 1977 (credit)

Special  
Qualifications: FERC Expert Witness Testimony - 2100 MW  
Bath County Project

Professional  
Registration: None

Parent Company: Ebasco Services Incorporated

## Experience and Qualifications Relevant to the Susitna Project

January 1979 to Present: Presently Manager of Energy and Resources Planning in the Bellevue, Washington office of Enviro-sphere Company, a Division of Ebasco Services Incorporated. Mr. Simmons has overall responsibility for consulting services offered in the fields of water resources, energy systems planning, air quality/meteorology, economics and resource planning. Studies in support of the regulatory and licensing objectives of Ebasco clients are accomplished under the direct supervision of Mr. Simmons.

- Project Manager for execution of studies which were necessary to identify Railbelt Electric Power Alternatives in support of the Battelle-Northwest studies leading to the development of energy plans to serve the Railbelt region of Alaska. Detailed evaluations were made of the engineering, economic and environmental feasibility of delivering power to Railbelt region utilities utilizing six major power supply options: hydroelectric (Chakachamna, Browne), wind (Delta Junction), combined-cycle, combustion turbines (Beluga), coal-fired (Healy, Beluga), and biomass.
- Previously served as Project Manager on a study of small-scale hydroelectric resources in the Aleutian Islands,

STEPHEN O. SIMMONS

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Internal Review Board and Transition Team -  
FERC Licensing - Environmental

Alaska Peninsula, and Kodiak Island conducted for the Alaska District Corps of Engineers. Project responsibilities involved the development of load and energy forecasts and environmental analysis necessary to identify project impacts at the reconnaissance level.

- Manager of Energy and Resources Planning, has had overall production responsibility for the development of an Exhibit E for the Sandy Creek Project of Puget Sound Power & Light. Mr. Simmons was responsible for providing production staff and technical review of the documents used by the client in support of their license application.
- Presently serves as a member of the technical review board for environmental studies on the Grant Lake Hydroelectric Project and the Kake-Petersburg Transmission Line feasibility studies being conducted for the Alaska Power Authority. He is responsible in this position for the review of environmental study design, evaluation of work products, and study quality assurance for work being accomplished in the environmental disciplines.

January 1968 to January 1979: Mr. Simmons served on the staff of Harza Engineering Company for eleven years, specializing in the development of FERC license applications, water resources projects, environmental evaluations, and land use and recreation studies. He served as Acting Project Manager for the development of an FERC license application for the 150-MW Kootenai River Hydroelectric Project. He was responsible for preparation of the License Application documents as well as the conduct of meetings involving state and federal resource management agencies, public coordination and responses to public inquiries.

- Presented expert witness testimony before the Federal Power Commission (1975) on Exhibit R leading to the successful licensing of the 2100 MW Bath County Hydroelectric Project. Testimony included expert opinion on land use, recreation facilities proposed by the applicant, potential use of such facilities, and the impact of the project on state and federal facilities surrounding the project.
- Participated in the design and construction phase where detailed design included preparation of plans and specifications for all public use facilities.

STEPHEN O. SIMMONS  
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Internal Review Board and Transition Team -  
FERC Licensing - Environmental

Client References:

Project Name: Railbelt Electric Power Alternatives Study  
Jeff King  
Battelle Northwest  
P.O. Box 999  
Richland, Washington 99352  
(206) 376-4741

Project Name: Small Hydropower Reconnaissance Survey - Aleutian  
Islands, Alaska Peninsula, Kodiak Island  
Loran Baxter  
Department of the Army  
Alaska District, Corps of Engineers  
P.O. Box 7002  
Anchorage, Alaska 99510  
(907) 552-3461

Project Name: Sandy Creek Project  
Virginia (Howell) Pistorese  
Puget Sound Power & Light Company  
Puget Power Building  
Bellevue, Washington 98009  
(206) 454-6363

Project Name: Kake-Petersburg Intertie  
Grant Lake Hydroelectric Project  
Remy Williams  
Mike Yerkes  
Eric Marchegiani  
Alaska Power Authority  
334 West Fifth Avenue  
Anchorage, Alaska 99501  
(907) 276-0001

Project Name: Kootenai River Hydroelectric Project  
James Nordeen  
Northern Lights, Inc.  
P.O. Box 310  
Sandpoint, Idaho 83864  
(208) 263-5141

Project Name: Bath County Pumped-Storage Project  
James Hagood  
Virginia Electric & Power Company  
Richmond, Virginia  
(804) 771-6103

OPERATIONS  
RESUMES



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# TRANSITION TEAM

OPERATIONS  
RESUMES

HARZA-EBASCO

# HARZA-EBASCO

JOSEPH L. EHASZ

Job Title: Internal Review Board and Transition Team -  
Geotechnical and Civil

Work Location: New York /Anchorage

Education: B.S. Civil Engineering  
1963, Rutgers University  
M.S. Foundation Engineering  
1965, Rutgers University

Special  
Qualifications: FERC Expert Witness Testimony on various  
hydroelectric license applications. Expert  
Witness and Testimony on various Nuclear  
Power Plant Applications and licenses before  
the USNRC and at ACRS hearings. Numerous  
publications on Civil and Geotechnical Engi-  
neering.

Professional  
Registrations: Alaska, Arizona, California, Florida,  
Georgia, Louisiana, Michigan, Minnesota, New  
Jersey, New York, North Carolina,  
Pennsylvania, Texas; Virginia, Washington  
and West Virginia.

Parent Company: Ebasco Services Incorporated

## Experience and Qualifications Relevant to the Susitna Project:

June 1980 to Present: Presently Chief Consulting Civil Engineer in the Corporate Offices of Ebasco in New York City. Mr. Ehasz is responsible for both the technical and administrative direction of approximately fifty experienced Professional Engineers and Registered Geologists. He is responsible to the Vice President for all feasibility and siting studies, advanced engineering and special problems associated with hydroelectric projects and civil features of all power projects.

In late 1980 Mr. Ehasz led a technical review effort of the Bath County PSP for Allegheny Power Corporation. This review was to assess the project design and construction, as well as a review of the cost to complete. During the past eighteen months, Mr. Ehasz has been responsible for technical input and review of various small hydroelectric studies and projects in Alaska. In

JOSEPH L. EHASZ

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Internal Review Board and Transition Team -  
Geotechnical and Civil

particular, the Grant Lake Feasibility & Licensing Project and the review of the technical requirements and construction of the Terror Lake Project.

May 1979 to June 1980: Chief Design Engineer in the Corporate Offices of Ebasco in New York. Mr. Ehasz was responsible for both the technical and administrative direction of approximately five hundred engineers and designers. He was responsible to the Vice President of Engineering for all civil engineering and design associated with hydroelectric, fossil and nuclear power projects.

May 1977 to May 1979: Assistant Chief Civil Engineer, responsible for all geotechnical engineering within Ebasco as well as civil engineering on hydroelectric projects. As head of the geotechnical engineering Mr. Ehasz was responsible for the evaluation of soils and geologic conditions on all power projects and established the final design parameters for various soils and rock foundations, rock tunnels and powerhouse construction.

June 1973 to May 1977: Supervising Civil Engineer, responsible for the supervision of fifteen to twenty soils engineers and lead civil engineers on various power projects. Mr. Ehasz personally was responsible for a unique foundation for a nuclear power plant in Louisiana. This plant is a 1100 MW nuclear power plant located about 20 miles upstream from New Orleans. He evaluated the foundation conditions and was responsible for the final foundation design concept, namely, a "floating foundation". This concept was necessary to minimize settlements and essentially involves balancing the total structure weight with the weight of the soil removed.

During this period Mr. Ehasz also directed the geotechnical investigations and supervised the civil design of the Davis Pumped Storage Project, a 1000 MW Project in West Virginia. He led an intensive rock mechanics program and evaluation to evaluate the potential for utilizing an underground powerhouse at the site. He also had given expert testimony in the FERC Licensing hearings for the Project.

June 1965 to June 1973: Civil Engineer responsible for various hydroelectric project features. Of particular mention with respect to large hydroelectric projects is the foundation related work on two large hydroelectric projects in Turkey. The first project was the Gokcekaya Hydroelectric Project which involved a 500 ft high thin arch dam and 360 MW powerhouse. The

JOSEPH L. EHASZ

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Internal Review Board and Transition Team -  
Geotechnical and Civil

stress conditions were analyzed and the stability analysis was performed which dictated the various fault excavation and treatment beneath the arch dam and thrust blocks. An instrumentation program to monitor the dam and foundation program to monitor the dam and foundation performance was also developed.

The other project was the Keban Dam and Hydroelectric Development in eastern Turkey. The Project involved a 680 ft high earth and rockfill dam, a 350 foot high concrete gravity dam at the intake area and a large spillway. The major problem at the Project was the Karstic limestone foundation. He evaluated the foundation conditions along and beneath the dam and cutoff. Mr. Ehasz performed various stability analyses for the rockfill dam as well as the large gravity dam and spillway. He designed the instrumentation system to monitor the performance of the rockfill dam and the seepage and groundwater conditions throughout the damsite area. During the five years of his association with these two Projects he made 18 trips to Turkey to establish the actual field conditions and adapt the design to the actual foundations. Mr. Ehasz worked with our Resident Engineers and Geologists on the site to complete the Project. Both Projects have been operating successfully since 1975.

During this period Mr. Ehasz also was the responsible geotechnical engineer on the construction of the Ludington Pumped Storage Project. He was instrumental during construction in solving difficult geotechnical construction problems and has led the efforts in monitoring the upper reservoir during first filling. The instrumentation of this Project is unique in that it is one of the few, if not the only, large reservoir where the actual seepage can be measured and related to the design conditions.

Client References:

Project Name:	Bath County Project Review
	Mr. Ralph Haffner
	Director, Power Engineering
	Allegheny Power System/Bulk Power Supply
	800 Cabin Hill Drive
	Greensburg, Pennsylvania 15601
	412/838-6761

OPERATIONS  
RESUMES

JOSEPH L. EHASZ  
Internal Review Board and Transition Team -  
Geotechnical and Civil

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Mr. Richard Sequin  
Plant Manager  
Ludington Pumped Storage Plant  
RR #1, South Lake Shore Drive  
Ludington, Michigan 49431  
616/845-6264

Keban & Gokcekaya Hydroelectric Projects  
Mr. Refik Akarun  
Devlet Su Isleri  
Bakanlikar, Ankara, Turkey  
Ankara - 90-41-18-1100

Davis Pumped Storage Project  
Mr. Ralph Haffner  
Director, Power Engineering  
Allegheny Power System/Bulk Power Supply  
800 Cabin Hill Drive  
Greensburg, Pennsylvania 15601  
412/838-6761

Waterford Nuclear Power Station  
Mr. David Lester, Plant Superintendent  
Louisiana Power & Light Company  
P. O. Box "B"  
Killona, Louisiana 70066  
504/467-8211



# HARZA-EBASCO

RICHARD L. MEAGHER

Job Title: Internal Review Board and Transition Team - Planning Engineer, Licensing

Work Location: Anchorage/Chicago

Education: Bachelor of Science in Civil Engineering  
1956, University of Notre Dame

Special Qualifications: Twenty-six years of intensive and extensive hydroelectric experience

Professional Registration: Illinois and Virginia

Parent Company: Harza Engineering Company

## Experience and Qualifications Relevant to the Susitna Project:

October 1981 to Present: Manager, Alaska Operations: Responsibilities include management of Harza assignments and business development in Alaska. Project Managers report to Mr. Meagher to demonstrate that projects are being performed on schedule, within budget, and in a manner that is satisfactory to clients. Projects include:

- Black Bear Lake - a 6.0 MW hydroelectric project for which Harza has prepared the FERC License Application and Feasibility Report and is now engaged in the project design phase;
- Chester Lake - a 2.5 MW hydroelectric project for which Harza has prepared the Feasibility Report and;
- Bethel Area Power Plan which is a prefeasibility study of the most favorable power supply system for Bethel and the surrounding villages.
- Responsibilities also include completion of Project Manager's assignment of the 22.5 MW El Nispero Hydroelectric Project in Honduras, under construction, and scheduled for operation in August, 1982.

November 1977 to October 1981: Head of the Water & Energy Planning & Design Department: Directed the work of engineers, resource specialists, and drafters in planning water and power

RICHARD L. MEAGHER  
Internal Review Board and  
Transition Team - Planning  
Engineer, Licensing

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resources. Studies include master plans as well as prefeasibility, feasibility and FERC License Application of projects. Evaluations are based on engineering, environmental, economic, and financial considerations. Also directed two civil design sections involved in the design of small hydroelectric and water resource projects, and one section responsible for the detailed hydraulic design for all Harza projects. Major project assignments within the department include:

- Hydraulic Design

Guri Hydroelectric Project	10,000 MW in Venezuela Hydraulic Design
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Yacyreta Hydroelectric Project	4,000 MW in Argentina Hydraulic Design
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- Feasibility & Design

Maqarin Water Supply 2nd Irrigation Project in Jordan Feasibility and Design

- Prefeasibility

Lower Caroni Hydroelectric Development	7,000 MW in Venezuela Prefeasibility
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- FERC License Applications were completed for the following projects:

Raystown	20 MW in Pennsylvania
Kootenai	144 MW in Montana
Boundary	392 MW in Washington (License Amendment)
Black Bear Lake	6 MW in Alaska

January 1977 to October 1978: Assistant Head of the Resources Development Department: Provided direction and review for planning studies on river development and pumped-storage projects. Project Manager for prefeasibility and feasibility studies of the Remolino and El Nispero Hydroelectric Projects, the Quimistan Irrigation Project, and the Sula Valley Flood Control Master Plan, all in Honduras.

RICHARD L. MEAGHER  
Internal Review Board and  
Transition Team - Planning  
Engineer, Licensing

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- Project Manager for the Feasibility study and FERC License Application for Brumley Gap Pumped-Storage Project in Virginia. The project can provide more than 3,000 MW generating capacity, which is currently inactive because of legal action concerning land access.

October 1972 to December 1976: Section Head for Power Resource Planning: Provided direction for power project planning studies and reports. These studies included preliminary planning, feasibility and FPC License Applications. The projects included conventional hydroelectric and pumped-storage projects and the expansion of conventional hydroelectric projects. Project Manager assignments include:

- Prefeasibility study to determine hydroelectric potential in eastern Honduras. The inventory involved 14 sites with a total installation of about 1700 MW. Also Project Manager for the planning of a 450 MW development on the Rio Chimbo in Ecuador.
- The 1500 MW Rio Patia Project and the Betania Project with 500 MW power installation and 20,000 ha. of irrigation, both in Colombia.

October 1967 to October 1972: Project Engineer for power planning. Responsible for supervision of a group preparing appraisal and feasibility studies and reports on hydroelectric power projects. Project Engineer for a prefeasibility study of the Patia River Basin in southwest Columbia to determine the most favorable hydroelectric power development. The potential development would be about 3,000 MW.

- Project Engineer for three other planning studies. The first study recommended a plan of development for a reach of the Rio Grande in Bolivia about 350 km long with a fall of about 1,000 km. The study identified nine potential hydroelectric project sites with a total installed capacity of 3,000 MW. The second study was for a prefeasibility report to evaluate two small hydroelectric projects in southern Bolivia which could serve a community with a population of about 30,000. The third study was a feasibility report for the Hrauneyjafoss Project in Iceland which can serve expected growth in industrial load. The project will have an installed capacity of 210 MW.

ENGINEERING  
OPERATIONS  
DESIGN

RICHARD L. MEAGHER  
Internal Review Board and  
Transition Team - Planning  
Engineer, Licensing

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- Project Engineer during the planning phase of the Rio Caroni hydroelectric development in Venezuela involving four sites with an initial potential of about 15,000 MW. Supervised planning studies aimed at: appraising the overall development, and determining the technical and economic feasibility of a program for staged expansion at the Guri and Macagua sites which have been partially developed.

October 1967 to October 1972: Project Engineer: During the feasibility phase of two major river projects in Iran: the Gotvand Project which provides 40,000 ha. of agricultural land with an irrigation and drainage system and the Reza Shah Kabir Project which has a 200 m arch dam and 1,000 MW power plant.

- Lead Engineer during the design phase of the Reza Shah Kabir Project and supervised the design of the spillway structure and the river diversion and access facilities. Also provided liaison between the owner and the architectural firm that prepared contract drawings for the operators village.

October 1962 to October 1967: Senior Engineer: Duties included supervision of planning studies and writing reports for river development projects. These included the feasibility study of a 90 MW Finchaa Project in Ethiopia and an appraisal study of the Karun River multipurpose development in Iran to determine the overall plan of development and the most favorable projects for initial construction. Full development will include over 5,000 MW of power, 140,000 ha. of irrigated agriculture and flood control.

- Also performed and supervised design work and preparation of construction drawings for the initial Guri powerhouse and other major structures for hydroelectric projects.

November 1958 to October 1962: Design Engineer: Duties included: Making designs and drawings for various components of hydroelectric and water control projects. The work involved powerhouses, outlet works, tunnels, spillways, and retaining walls. Projects included Canaveral (28 MW) in Honduras, Markland (81 MW) on Ohio River; and Summersville Flood Control in West Virginia.

June 1956 to November 1958: Planning Engineer: Duties included: Preliminary design studies, project layouts, power production, hydraulic and hydrologic studies, and economic analyses.

RICHARD L. MEAGHER  
Internal Review Board and  
Transition Team - Planning  
Engineer, Licensing

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Client References:

Project Name:

Guri  
CVG-Electrificacion Del Caroni, C.A.  
Direccion Obras de Guri  
Apartado No. 62413  
Caracas, Venezuela  
Dr. Luis Del Rio  
Tel. 011 + 582 + 921155

Project Name:

Black Bear Lake  
Alaska Power Authority  
334 West Fifth Ave.  
Anchorage, Alaska 99501  
Mr. Brent Petrie  
907/276-0001



# HARZA-EBASCO

STEPHEN O. SIMMONS

Job Title: Internal Review Board and Transition Team -  
FERC Licensing - Environmental

Work Location: Bellevue/Anchorage

Education: University of Michigan B.S.- Natural  
Resources: 1967  
University of Michigan B.S. -  
Forestry: 1967  
University of Alaska - Field Studies In  
Alaska Ecological Systems: 1977 (credit)

Special  
Qualifications: FERC Expert Witness Testimony - 2100 MW  
Bath County Project

Professional  
Registration: None

Parent Company: Ebasco Services Incorporated

## Experience and Qualifications Relevant to the Susitna Project

January 1979 to Present: Presently Manager of Energy and Resources Planning in the Bellevue, Washington office of Enviro-sphere Company, a Division of Ebasco Services Incorporated. Mr. Simmons has overall responsibility for consulting services offered in the fields of water resources, energy systems planning, air quality/meteorology, economics and resource planning. Studies in support of the regulatory and licensing objectives of Ebasco clients are accomplished under the direct supervision of Mr. Simmons.

- Project Manager for execution of studies which were necessary to identify Railbelt Electric Power Alternatives in support of the Battelle-Northwest studies leading to the development of energy plans to serve the Railbelt region of Alaska. Detailed evaluations were made of the engineering, economic and environmental feasibility of delivering power to Railbelt region utilities utilizing six major power supply options: hydroelectric (Chakachamna, Browne), wind (Delta Junction), combined-cycle, combustion turbines (Beluga), coal-fired (Healy, Beluga), and biomass.
- Previously served as Project Manager on a study of small-scale hydroelectric resources in the Aleutian Islands,

STEPHEN O. SIMMONS

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Internal Review Board and Transition Team -  
FERC Licensing - Environmental

Alaska Peninsula, and Kodiak Island conducted for the Alaska District Corps of Engineers. Project responsibilities involved the development of load and energy forecasts and environmental analysis necessary to identify project impacts at the reconnaissance level.

- Manager of Energy and Resources Planning, has had overall production responsibility for the development of an Exhibit E for the Sandy Creek Project of Puget Sound Power & Light. Mr. Simmons was responsible for providing production staff and technical review of the documents used by the client in support of their license application.
- Presently serves as a member of the technical review board for environmental studies on the Grant Lake Hydroelectric Project and the Kake-Petersburg Transmission Line feasibility studies being conducted for the Alaska Power Authority. He is responsible in this position for the review of environmental study design, evaluation of work products, and study quality assurance for work being accomplished in the environmental disciplines.

January 1968 to January 1979: Mr. Simmons served on the staff of Harza Engineering Company for eleven years, specializing in the development of FERC license applications, water resources projects, environmental evaluations, and land use and recreation studies. He served as Acting Project Manager for the development of an FERC license application for the 150-MW Kootenai River Hydroelectric Project. He was responsible for preparation of the License Application documents as well as the conduct of meetings involving state and federal resource management agencies, public coordination and responses to public inquiries.

- Presented expert witness testimony before the Federal Power Commission (1975) on Exhibit R leading to the successful licensing of the 2100 MW Bath County Hydroelectric Project. Testimony included expert opinion on land use, recreation facilities proposed by the applicant, potential use of such facilities, and the impact of the project on state and federal facilities surrounding the project.
- Participated in the design and construction phase where detailed design included preparation of plans and specifications for all public use facilities.

STEPHEN O. SIMMONS

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Internal Review Board and Transition Team -  
FERC Licensing - Environmental

Client References:

Project Name: Railbelt Electric Power Alternatives Study  
Jeff King  
Battelle Northwest  
P.O. Box 999  
Richland, Washington 99352  
(206) 376-4741

Project Name: Small Hydropower Reconnaissance Survey - Aleutian  
Islands, Alaska Peninsula, Kodiak Island  
Loran Baxter  
Department of the Army  
Alaska District, Corps of Engineers  
P.O. Box 7002  
Anchorage, Alaska 99510  
(907) 552-3461

Project Name: Sandy Creek Project  
Virginia (Howell) Pistorese  
Puget Sound Power & Light Company  
Puget Power Building  
Bellevue, Washington 98009  
(206) 454-6363

Project Name: Kake-Petersburg Intertie  
Grant Lake Hydroelectric Project  
Remy Williams  
Mike Yerkes  
Eric Marchegiani  
Alaska Power Authority  
334 West Fifth Avenue  
Anchorage, Alaska 99501  
(907) 276-0001

Project Name: Kootenai River Hydroelectric Project  
James Nordeen  
Northern Lights, Inc.  
P.O. Box 310  
Sandpoint, Idaho 83864  
(208) 263-5141

Project Name: Bath County Pumped-Storage Project  
James Hagood  
Virginia Electric & Power Company  
Richmond, Virginia  
(804) 771-6103

ENGINEERING  
OPERATIONS

ENGINEERING  
OPERATIONS  
RESUMES

**HARZA-EBASCO**

ASSIGNMENT OF HARZA-EBASCO JOINT  
VENTURE PERSONNEL TO THE  
SUSITNA HYDROELECTRIC PROJECT

RESUMES<sup>1/</sup>

<u>Project Position</u>	<u>Individual Assigned</u>	<u>Location</u>
<u>Engineering Operations</u>		
Project Studies & Design Manager	N.M. Hernandez	Anchorage
Geotechnical Exploration Program	N.R. Tilford, Manager	Anchorage
Instrumentation & Testing	M.S. Temchin, Lead R.K. Dodds	Anchorage Anchorage
Cold Regions Specialist	D.L. Miller	Anchorage
Soils Exploration and Testing	P.S. Ford, Lead	Anchorage
Field Geotechnical Engineer	L.G. Emerson A.P. Wulff	Anchorage Anchorage
Program Director	J.M. England	Anchorage
Program Manager	R.W. Christensen	Anchorage
Field Manager	S.A. Johnson	Anchorage
Drilling Superintendent	D.N. Spansgle	Anchorage
Laboratory Director	L.E. Lewis	Novato, Ca
Anchorage Laboratory	J.D. Hobbs	Anchorage
Rock In-Situ Tests	R.E. Hedgecock, Lead R.K. Dodds	Anchorage Anchorage
Senior Rock Mechanics Specialist	H.S. Kelsay	Anchorage
Field Geologist	F.S. Shuri	Anchorage
	A.H. Stukey	Anchorage
Rock Drilling & Test Grouting	G.D. Johnson, Lead	Anchorage
Field Geologist	D.A. Frey	Anchorage

<sup>1/</sup> Resumes are presented in alphabetical order.



<u>Project Position</u>	<u>Individual Assigned</u>	<u>Location</u>
(cont'd)		
Supporting Exploration Services	R.A. Paige	Anchorage
Geologic Mapping	F.G. Snider	Anchorage
Senior Field Geologist	A.H. Stukey	Anchorage
Field Geologist	N.B. Holst	Anchorage
Surface Geophysical and	E.W. Scarlett	Anchorage
Down-hole Surveys	J.S. Nelson	Anchorage
Groundwater	Z.A. Saleem	Anchorage
	R.P. Kewer	Anchorage
Non-Technical Project Features Management	W.R. Turner, Manager	Anchorage
Project Control	M.P. Finnegan	Anchorage
Costs	J.A. Cook	Anchorage
Project Planning	R.K. Carter	Anchorage
Logistics	D.M. Jezek	Anchorage
Bellevue Office Engineering	D. Ruotolo, Manager	Bellevue
Geologist	R.A. Acker, Lead	Bellevue
Senior Geologist	R.P. Kewer	Bellevue
Geotechnical Engineer	C.D. Craddock, Lead	Bellevue
Senior Geotechnical Engineer	K.L. Wong	Bellevue
Senior Rock Mechanics Engineer	H.H. Mac Pherson	Bellevue
Senior Engineer - Dam Design	M. Pavone	Bellevue
Senior Engineer - Geotechnical Engineer	P.K. Liu	Bellevue
	A. Custin	Bellevue
Civil/Structural Engineer	J. Straubergs, Lead	Bellevue
Senior Engineer - Design Analysis	G.C. Antonopoulos	Bellevue
Senior Engineer - Structural Steel	M. Akagi	Bellevue
Principal Engineer - Analysis/Design	S.N. Goyal	Bellevue

<u>Project Position</u>	<u>Individual Assigned</u>	<u>Location</u>
(cont'd)		
Principal Engineer - Analysis/Design	G.E. Ellis	Bellevue
Hydraulic Engineer	H.W. Coleman, Lead	Bellevue
Senior Engineer -	S. Khondker, Lead	Bellevue
Senior Engineer - Hydraulics	G.J. Gemperline	Bellevue
Mechanical Engineer	R.S. Burkhart, Lead	Bellevue
Gates and Hoists Specialist	U. Vitols	Bellevue
Hydraulic Machinery	D.K. Smith	Bellevue
Electrical Engineer	J.J. Quinn, Lead	Bellevue
Senior Engineer	D.V. Undevia	Bellevue
	G. Scheel	Bellevue
Systems Engineer	E.C. Foszcz	Bellevue
Power Systems Engineer	J.F. Szablya	Bellevue
Support Services Engineer	R. Vine, Lead	Bellevue
Specifications Specialist	R.B. Styles	Bellevue

#### Value Engineering

Hydroelectric Projects	W.T. Bristow
Electrical Design	M.E. Schuchard
Mechanical Design	G.H. Post
Architecture	E.R. Paul
Civil Design	J.R. Fotheringham

#### Sub-Contractors and Consultants

##### EBA Engineering Consultants, Ltd.

Principal Consultant	D.W. Hayley	Edmonton, Alberta
Senior Project Engineer	W.D. Roggensack	Edmonton, Alberta
Principal Consultant	C.T. Hwang	Edmonton, Alberta

<u>Project Position</u>	<u>Individual Assigned</u>	<u>Location</u>
(cont'd.)		
Engineering Geologist	K.O. Stangl	Edmonton,
Manager, Alaska	A. Mahmood	Alberta Anchorage

CIRI-/H&N

Consultants

Photointerpretation	R.A. Kreig
General Dam Design	R.B. Peck
Rock Mechanics	A.S. Hendron
Cold Regions Constructability	R.W. Martin
Cold Regions Geotechnical Engineering	E. Lobacz
Arctic Engineering	W.G. Nelson
Dynamic Analysis	M.L. Silver
Instrumentation	J. Dunnicliff
Seismic Review	C. Allen
Aesthetic Resources	R.F. Scheele

IV. Home Office Support

Coordinator of Geotechnical Analyses	D.E. Kleiner	Chicago
Static and Dynamic Specialist	P.P. Martin	Chicago
Analysis of Dam	R.D. Huang	Chicago
Seepage Analysis	C.Y. Wei	Chicago
Finite Element Analysis	C.H. Yeh	Chicago
Coordinator of Hydraulic Analyses	F.G. De Fazio	Chicago
Spillways	C.Y. Lin	Chicago
Power Tunnel	T.H. Hsu	Chicago
River Study	J.E. Lindell	Chicago
Communications	R.L. Kuntzendorf	Chicago
Turbines	R.W. Fazalare	Chicago
Systems Studies	P.J. Donalek	Chicago
Seismology	U. Chandra	Greensburg, NC
Seismology	J.J. Healey	New York
Power Systems	R.S. Meredith	New York

# ENGINEERING OPERATIONS

HARZA-EBASCO

# HARZA-EBASCO

RICHARD C. ACKER

Job Title: Lead Geologist

Location: Bellevue

Education: Master of Science in Geology  
1950, Brown University  
Bachelor of Arts in Geology  
1947, Williams College

Special Qualification: Major participant - TARP  
Corps of Engineers special studies of  
foundations in permafrost

Professional Registration: Registered Professional Geologist -  
California  
Registered Engineering Geologist -  
California

Parent Company: Harza Engineering Company

## Experience and Qualifications Relevant to the Susitna Project:

November 1973 to Date: Head, Geology Section, Geotechnical Department. Directs geologic investigations which comprise core borings; in-hole permeability testing; down-hole geophysical surveys; surface geophysical surveys; exploratory adits; in-situ tests in adits, chambers, and boreholes; hydrogeologic exploration; and seismic test evaluation for many of the Company's major projects.

- Rockfill Dams. Patia site 405, Colombia; feasibility investigations for 840 ft. high rockfill dam. Nader Shah Dam, Iran; feasibility and design investigations, for 480 ft. high rockfill dam and preparation of contract documents. Sogamoso Project, Colombia; feasibility investigations for 945 ft. high rockfill dam. Maqarin Project, Jordan; feasibility and design investigations for 495 ft. high rockfill dam and preparation of contract documents. La Honda Dam, Venezuela; feasibility and design investigations for 390 ft. high rockfill dam and preparation of contract documents. Project under construction.
- Arch Dams. Reza Shah Kabir Arch Dam, Iran; feasibility and design investigations for 600 ft. high dam, preparation of



RICHARD C. ACKER  
Lead Geologist

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water development projects; report writing; and technical assistance to Pakistan field staff.

February 1962 to August 1966: Principal Geologist and Chief, Geology and Materials Branch, Harza Engineering Company International, Lahore, Pakistan. Projects included Karachi Irrigation Project, Hub Dam (Earth); Khanpur Irrigation Project, Khanpur Dam (Earth); Gomai Irrigation and Hydro Project, Khajure Kach Dam (Gravity); Kachhi Plains (Sibi-Jhatpat) Projects; Kabul-Swat-Chitral Basin Reconnaissance Report; Tarbela Dam Project (Rockfill); Central Aggregate Contract, IBP Geological Investigation (mapping and report of Bulland Hill Quarry); Chasma Barrage Project; and Mangla Dam Project (Earth).

November 1956 to February 1962: District Geologist and Assistant to Chief. U.S. Corps of Engineers, New York, New York, Paving, Foundations and Materials Branch. Responsibilities included all geologic work relative to siting, foundation and materials investigations, design, construction and maintenance of structures, paving and water supply for nine military airfields and a widespread radar/communications network. Preparation and review of geologic reports, foundation designs and contract documents. Special studies of foundations in permafrost. Surveillance of foundation work, aggregate and quarry control during construction. Projects included DEW line, Southeast Extension; DEW line, Eastward Extension; NIKE sites,

Thule, Greenland; Ballistic Missile Early Warning Site (BMEWS), Thule; Ballistic Missile Early Warning Site (BMEWS), Alaska.

November 1950 to November 1956: District Geologist, U. S. Corps of Engineers, Baltimore, Maryland.

September 1947 to February 1950: Graduate Teaching Assistant. Brown University, Providence, Rhode Island.

June to September 1948: Geological Assistant to Mine Superintendent, R. T. Vanderbilt, Inc., Ralmat, New York.

August 1945 to November 1946: Geologist, U.S. Corps of Engineers, Ft. Belvoir, Virginia.

Technical Papers: "Rock Mechanics Studies for Mossyrock Arch Dam," with D. E. Kleiner, ASCE, Power Journal, January 1971.

"Foundation and Abutment Treatment for High Rockfill Dams," with Jack C. Jones, ASCE Journal Soil Mechanics and Foundations Division, October 1972.

RICHARD C. ACKER  
Lead Geologist

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contract documents and construction surveillance. Project operating. Strontia Springs Arch Dam, Colorado; feasibility and design investigations for 300 ft. high dam, preparation of contract documents and surveillance during construction. Project complete October, 1982. Southpark Reservoir Project, Colorado; prefeasibility and feasibility investigations for 270 ft. high arch dam.

- Underground Projects. TARP Project, Chicago; feasibility investigations for 120 mile long tunnel and reservoir complex. Geologic monitoring during construction nearly completed of initial 21.5 mile mainstream segment. Includes tunnels 20 to 35 ft. in diameter and underground pumping chambers 63 ft. wide, 213 ft. long and 105 ft. high. Blue Mountain Water Supply Project, Jamaica; prefeasibility investigations for 29 mile long tunnel and reservoir complex. Feasibility investigations for initial 10 mile tunnel reach. Mt. Hope Project, New Jersey; geologic studies for planning development of an underground hydro or compressed air energy storage facility utilizing existing deep mine openings. Northwestern Illinois Project; prefeasibility investigations including three deep core borings (to 5500 ft.) and extensive bore-hole in-situ tests for potential 2000 MW - 3000 MW underground hydro development.

June 1967 to November 1973: Head, Geology Department, Geo-technical Division.

Major projects completed by the department included Reza Shah Kabir Dam, Iran (feasibility and design investigation and studies of 650-foot high arch dam); St. Lawrence Basin Appraisal Studies (18 damsites); Rio Grande River Basin, Bolivia (damsite appraisal studies); Blue Mountains Water Supply Project, Jamaica (appraisal and feasibility studies for diversion dams and 29 mile tunnel complex); Chicago North Side Rock Tunnel (feasibility investigations 120 mile rock tunnel complex); Patia River Basin, Colombia (appraisal of 28 damsites, prefeasibility investigation of five damsites, and feasibility study of 850-foot high rockfill dam); Nader Shah Dam, Iran (design investigations for 480-foot high rockfill dam); Gavin Fly Ash Dam and Reservoir (site selection and design studies); and Foothills Project, Site No. 3, Colorado (feasibility studies of 265-foot high arch dam).

August 1966 to June 1967: Geologist, Indus Basin Division. Responsibilities included review of geologic investigations and reports, design drawings and specifications for West Pakistan

RICHARD C. ACKER  
Lead Geologist

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"Geohydrologic Monitoring, Karun River Dam, Iran," with J. A. Scoville and M. Saines, Proceedings of the Tenth International Conference on Soil Mechanics and Foundation Engineering.

Client References:

Project Name:

TARP  
The Metropolitan Sanitary  
District of Chicago  
100 E. Erie Street  
Chicago, Illinois 60611  
Joseph H. Irons  
Ronald A. Neubauer  
Frank E. Dalton  
(312) 751-5600

# HARZA-EBASCO

MIKIO AKAGI

Job Title: Senior Engineer - Structural Steel

Work Location: Bellevue

Education: Bachelor of Science in Architectural Engineering  
1963, University of Illinois

Special Qualifications: Resident Consultant - Guri

Professional Registration: Structural Engineer - Illinois

Parent Company: Harza Engineering Company

## Experience and Qualifications Relevant to the Susitna Project:

May 1978 to Date: Harza Engineering Company, Chicago, Illinois. Structural Engineer. Civil Branch. Coordinates engineering and production work for the power house on the San Lorenzo Project.

October 1974 to May 1978: Harza Engineering Company, Venezuela. Resident Consultant for Guri Final Stage Expansion work. Assisted in establishing an office in Caracas, Venezuela, and worked in conjunction with EDELCA personnel to produce contract and construction drawings. Extensively involved with all aspects of the Guri trestle; worked with Venezuelan engineering, fabricating, and construction firms including shop and on-site inspections.

January 1974 to October 1974: Harza Engineering Company, Chicago, Illinois. Civil Division. Senior Engineer designing miscellaneous projects, including the Guri Project.

July 1971 to January 1974: Consoer, Townsend, and Associates. Engineer. Structural Division. Senior Engineer designing structures for wastewater treatment plants. Responsibilities included preparing and checking design calculations (in structural steel and concrete), supervision of drafting personnel, and application of computer programs as a design aid.

September 1965 to July 1971: The Engineers Collaborative Ltd. Engineer. Structural Division. Senior Engineer designing structures for commercial, institutional, and industrial pro-

MIKIO AKAGI  
Senior Engineer - Structural Steel

-2-

jects. Responsibilities included preparing design calculations, supervision of drafting personnel, checking shop drawings, preparation of field reports, and applying computer programs as a design aid.

February 1963 to September 1965: Skidmore, Owings and Merrill. Engineer. Structural Division. Design Engineer for commercial, institutional, and industrial buildings. Responsibilities included preparing design calculations (in structural steel and concrete), supervision of drafting personnel, checking shop drawings, preparation of field reports, and applying computer programs as a design aid.

Client References:

Project Name: Guri  
CVG-Electrificacion Del Caroni, C.A.  
Direccion Obras de Guri  
Apartado No. 62413  
Caracas, Venezuela  
Dr. Luis Del Rio  
Tel. 011+582+921155



# HARZA-EBASCO

GEORGE C. ANTONOPOULOS

Job Title: Senior Engineer - Design Analysis

Work Location: Bellevue

Education: Master of Science in Civil Engineering  
(Structures)  
1975, University of Illinois  
Bachelor of Science in Civil Engineering  
1974, University of Illinois

Special  
Qualifications: Major participant - Bath County, Guri, TARP

Professional  
Registration: Structural Engineer - Illinois  
Professional Engineer - Illinois and Alabama

Parent Company: Harza Engineering Company

## Experience and Qualifications Relevant to the Susitna Project:

October 1979 to Date: Harza Engineering Company, Chicago, Illinois. Lead Structural Engineer, Hydroelectric III Section. Assist in supervision of the preparation of detailed studies, design criteria, specifications, reports and drawings for the civil/structural design of dams, spillways, powerhouses, penstocks and other hydraulic structures. Prepares work plans, budgets, estimates, schedules and progress reports.

## Experience Highlights:

### Five Dam Projects

- Uribante-Doradas Venezuela: Assisted in the preparation of the final civil/structural designs and drawing preparation of the following:

Spillway and evacuation outlet including; approach walls, crest structure, emergency generating house, spillway bridge, chute, flip bucket, gate shaft, outlet intake, portals, outlet tunnel lining and tailrace.

Cutoff wall at the abutment of the dam and foundation gallery under the dam and instrumentation for the wall and gallery. Performed studies and alternative designs for the powertunnel concrete and steel liners (1980 to present)

GEORGE C. ANTONOPOULOS                      -2-  
Senior Engineer - Design Analysis

- Bath County, Pumped Storage Project, Virginia: Design and drawing preparation of instrumentation for the powerhouse and drainage tunnels. Drawing preparation for the powerhouse equipment arrangement (1980).
- El Nispero, Honduras: Design of three access bridges. Assisted Honduran firm in drawing preparation for powerhouse access bridge. Parametric studies and final design of the powertunnel concrete liner (1981-1982).
- Maqarin, Jordan: Final civil/structural design, drawing preparation and design criteria of the double chute spillway including; approach walls, crest structures, underground chute tunnels, buckets and access roads (1981-1982).
- King Talal, Jordan: Final design, drawing preparation, design criteria and specifications of all structures related to spillway, powertunnel and powerhouse (1981-1982)

June 1975 to October 1979: Harza Engineering Company, Chicago, Illinois. Structural Design Engineer. Structural Analysis and Design Section. Analysis and design of advanced structural problems related to dams, spillways, penstocks, tunnels, transmission towers, substation structures, microwave towers and other hydraulic related structures using conventional and computer methods. Developed new computer programs and coordinated work for drawing production.

#### Experience Highlights:

##### Five Dam Projects

- Guri, Venezuela: Stability and Finite Element Method analysis of the existing concrete dam, the new dam, and raising of the existing dam. Concrete design of power intakes, trunnion block and spillway walls. Design and detail plumb lines instrumentation system (1975-1979).
- Foothills, Colorado: Trial Load and Finite Element Method analysis of the double curvature concrete arch dam (1975-1976).
- Big Dalton, California: Static and Dynamic computer reanalysis and evaluation of the 50 year old multiple concrete arch-hollow buttress dam. Assisted in preparation of the reanalysis report (1976-1977).
- Smith Mountain, Virginia: Finite Element Method analysis of the steel penstock (1978).

GEORGE C. ANTONOPOULOS -3-  
Senior Engineer - Design Analysis

- San Lorenzo, El Salvador: Design a continuous reinforced concrete slab over the entire downstream face of the rockfill dam (1978).

Two Miscellaneous Projects

- Deep Tunnel, Chicago, Illinois: Finite Element Methods analysis and reinforcement design of several tunnel sections. Maximum tunnel diameter 40 feet (1977).
- Washington, D.C. Metro, Washington, D.C.: Designed the concrete arch roof for Van-Ness subway station (1978).

Six Transmission Towers, Substations and Microwave Antenna Projects

- Cerron Grande, El Salvador: Design and drawing preparation of transmission towers converted from 69-kV to 115-kV. Analysis-evaluation and review manufacturer's drawings of a new 115-kV line transmission towers and substation structures (1977-1978).
- Mayfield, Washington: Design and drawing preparation of the 230-kV line transmission towers, aluminum substation structures and footings (1978).
- Tarbela, Pakistan: Analysis-evaluation and review of manufacturer's drawings of the 500-kV line transmission towers. Design of tower footings (1978-1979).
- Columbia-Wyocena 345-kV Line, Wisconsin: Reanalysis-evaluation of the double circuit steel poles collapsed in November 1977. Assisted on failure investigation report (1978).
- Guri, Venezuela: Design and drawing preparation of fifteen 765-kV double and single circuit transmission towers and footings for the dam area. Maximum double circuit tower height is 320 feet. Preliminary design of the 800-kV substation structures for proposal purposes. Analysis-evaluation and review of manufacturer's drawings of the microwave antenna towers system (1977-1979).
- Antelope Valley, North Dakota: Analysis-evaluation and review of manufacturer's drawings of one 230-kV line, two 345-kV lines and one 500-kV line transmission towers. Design of tower footings (1978-1979).

GEORGE C. ANTONOPOULOS                      -4-  
Senior Engineer - Design Analysis

September 1974 to June 1975: Attended graduate school at the University of Illinois. Thesis-research: Optimum Cost Design of Prestressed Concrete Beams and Slabs (1975).

Client References:

Project Name:                      TARP  
The Metropolitan Sanitary District of  
Chicago  
100 E. Erie Street  
Chicago, Illinois 60611  
Joseph H. Irons  
Ronald A. Neubauer  
Frank E. Dalton  
312/751-5600

Project Name:                      Bath County Pumped Storage Project  
Virginia Electric and Power Company  
Powerstation Engineering and Construction  
P.O. Box 564  
Richmond, Virginia 23204  
Mr. J.M. Hagood, Jr.  
804/771-6103

Project Name:                      Guri  
CVG-Electrificacion Del Caroni, C.A.  
Direccion Obras de Guri  
Apartado No. 62413  
Caracas, Venezuela  
Dr. Luis Del Rio  
Tel. 011+582+921155

# HARZA-EBASCO

RICHARD S. BURKHART

Job Title: Lead Mechanical Engineer

Work Location: Bellevue

Education: Bachelor of Science in Engineering Science  
1959, North Central College

Special Qualification: Lead Mechanical Engineer Bath County  
Participated in turbine model tests - Guri

Professional Registration: Professional Engineer - Alaska, Texas,  
and Virginia

Parent Company: Harza Engineering Company

## Experience and Qualifications Relevant to the Susitna Project:

April 1977 to Date: Harza Engineering Company, Chicago, Illinois. As Section Head, directs the work of a section responsible for all general mechanical engineering work on hydroelectric powerstations, diesel and gas turbine installations, pumping plants, and related projects. Major tasks include preparation of preliminary and final designs, contract documents and drawings, construction drawings and assistance to the field during construction.

- Lead Mechanical Engineer for preparation of final designs, contract documents and contract drawings for the 5100 MW Corpus Project, Argentina/Paraguay.
- Lead Mechanical Engineer for preparation of final designs, procurement specifications and construction drawings for the 2100-MW Bath County Project, Virginia.

June 1973 to April 1977: Brown & Root, Inc., Houston, Texas. Department Senior Staff Engineer. In responsible charge of all mechanical work for the Water Supply and Heavy Civil Engineering Department. Directed mechanical design for a 160 cfs pumping station for the Manatee powerplant and reservoir, Florida; an 800 cfs pumping station for the Martin powerplant and reservoir, Florida; a 200 cfs pumping station for the Sooner powerplant and reservoir, Oklahoma; a 160 cfs irrigation pumping station on the Brazos River, Texas; and a 1200 cfs pumping station for the South Texas Nuclear Project, Texas. Served for two years as Project Manager for the \$30,000,000 reservoir and pumping station for the Martin powerplant, Florida.



RICHARD S. BURKHART  
Lead Mechanical Engineer

-2-

December 1972 to June 1973: Harza Engineering Company, Chicago, Illinois. Mechanical Department. Assistant Project Manager for the Mount Hope Underground Hydroelectric Pumped-Storage project feasibility studies. Also responsible for all mechanical work related to studies of compressed air energy storage for the Mount Hope project.

August 1971 to December 1972: Harza Engineering Company, Chicago, Illinois. Head of Systems Analysis Section. In charge of all electronic computer operations of Harza using in-house equipment and a variety of leased computer equipment.

May 1970 to August 1971: Harza Engineering Company, Chicago, Illinois. Mechanical Department. Assigned to Hydraulic Machinery Section and specialized in all aspects of work relating to hydraulic turbines, governors, and valves. Supervised the field vibration testing of arch dam and penstocks at Smith Mountain Pumped-Storage project, Virginia in July and August 1970. Participated as measurements engineer for turbine model tests of 303,000 mhp Francis turbines for Guri project, Venezuela in January 1971. Participated in field testing of electric-hydraulic governors at Rio Lindo project, Honduras in March 1971. Functioned as assistant project manager for feasibility study performed for the National Aeronautics and Space Administration concerning the application of hydraulic turbine drives to a transonic wind tunnel.

February 1970 to May 1970: Harza Engineering Company, Chicago, Illinois. Production Manager, Computer Section.

August 1968 to February 1970: Harza Engineering Company, Chicago, Illinois. Mechanical Department. Duties included preparation of engineering studies, design memoranda, specifications, bid evaluations and review of manufacturers drawings for and shop inspection of hydraulic turbines, governors, and valves. Participated as mechanical and hydraulics measurements engineer for turbine and generator acceptance tests and load rejection tests at Malpaso Powerhouse in Mexico.

February 1968 to August 1968: Harza Engineering Company, Chicago, Illinois. Computer Division. Work included writing of technical computer programs in Fortran Language.

March 1967 to February 1968: Harza Engineering Company, Chicago, Illinois. Mechanical Department. Duties included preparation of engineering studies, design memoranda, contract drawings, and contract documents for the Finchaa and Rio Lindo projects, Ethiopia and Honduras, respectively. Work covered all

RICHARD S. BURKHART  
Lead Mechanical Engineer

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mechanical piping systems and auxiliary equipment and portions of the work relating to hydraulic turbines, governors, valves, cranes and hoists.

August 1962 to March 1967: Harza Engineering Company, Chicago, Illinois. Duties included preparation of engineering studies, design memoranda, specifications, bid evaluations, and review of manufacturers drawings for hydraulic turbines, governors, valves, and cranes and hoists.

July 1960 to August 1962: U.S. Army. Project Engineer. Performed research and development work in dynamic testing of diesel and gasoline powered military track and wheeled vehicles and vehicle transported weapons systems.

June 1959 to July 1960: Harza Engineering Company, Chicago, Illinois. Layout of powerhouse mechanical piping systems.

Client References:

Project Name: Bath County Pumped Storage Project  
Virginia Electric and Power Company  
Powerstation Engineering and Construction  
P. O. Box 564  
Richmond, Virginia 23204  
Mr. J. M. Hagood, Jr.  
(804) 771-6103

Project Name: CVG - Electrificación Del Caroni, C.A.  
Dirección Obras de Guri  
Apartado No. 62413  
Caracas, Venezuela  
Ing. Hector Beltran  
Tel. 011-582-921155

# HARZA-EBASCO

RANDAL K. CARTER

Job Title: Project Planner

Work Location: Anchorage

Education: Arizona State University, B.S. Business Administration, 1970 University of San Diego, J.D. Law, 1974

Special Qualifications: Law Degree, General Building Contractor, State of California, 1977

Professional Registration: None

Parent Company: Frank Moolin & Associates, Inc.

## Experience and Qualifications Relevant to the Susitna Project:

March 1982 to Present: As Senior Planner for Frank Moolin & Associates in Anchorage, Alaska, Mr. Carter provides overall project planning and scheduling support for the Barrow Utilities System Project for the North Slope Borough. In this capacity, Mr. Carter performs overall design and construction scheduling, logistics coordination, manpower loading analyses and forecasts, and the preparation of the project planning guide and monthly client review reports.

- Developed and implemented a computerized CPM network for total project scheduling and integration, incorporating individual design contracts, bid advertisement and analysis and construction contracts.
- Has developed and implemented a computerized CPM network for total project scheduling and integration, incorporating individual design contracts, bid advertisement and analysis, construction contracts, procurement requirements, and material delivery control. This system is used to perform "what if" alternative analyses including schedule and cost impact to the project. Mr. Carter presents his findings and remedial action recommendations to the Senior Project Manager for action.
- As the Senior Planner, coordinates the efforts of the home and field office project staffs to ensure integrated design and construction activities. Analyses of design progress, contractor progress, change orders, progress payments, and contractual requirements are also part of Mr. Carter's responsibilities.

RANDALL K. CARTER  
Project Planner

-2-

June 1973 to March 1982: Mr. Carter was employed by Bernardo Builders, Inc., San Diego, California as a Scheduling/Planning Engineer and as a Contracts Analyst. As a scheduling engineer, Mr. Carter provided construction management support, including cost reporting, scheduling, project planning, and progress reporting as part of the support effort to the Government of Mexico by the Ebanal Consortium (which Bernardo Builders was a member). Project activities included monitoring and reporting construction progress of petroleum pipelines, storage facilities and ballast treatment plant, preparation of project control reports, productivity analysis, tracking and forecasting by CPM were integral to the support effort. Contracts administration and field support liaison were the primary initial activities provided to the consortium for their hydro plant near Vera Cruz.

The scope evolved into related project management construction support of the dam and power plant. The construction scheduling, manpower allocation and materials coordination became the primary area of emphasis.

Client References:

Project Name:

Barrow Utilities System  
Irving Igtanloc, Director  
Director of Public Works  
North Slope Borough  
P.O. Box 69  
Barrow, Alaska 99723  
(907) 852-2611

Project Name:

Ebanal de Vera Cruz  
Sr. Bernardo Quintana Arrioja  
ICA Group  
Numero 43 Col. Del Valle Delg. Venito Juarez  
Mexico City, Mexico

Bernardo Builders, Inc. (Ebanal)  
1261 Simpson Way  
Escondido, CA 92025  
c/o Ebanal - ICA Group  
43-1 Er Piso  
Col. Del Valle Delg. Benito Juarez  
(905) 595-5058  
Mr. Bernardo Quintana Arrioja



# HARZA-EBASCO

RICHARD W. CHRISTENSEN

Job Title: Geotechnical Project Manager

Work Location: Anchorage

Education: Ph.D., Civil Engineering, Michigan State University - 1964  
M.S., Civil Engineering, Michigan State University - 1960  
B.S., Civil Engineering, San Diego State College - 1958

Special Qualifications: Dr. Christensen has over 20 years of experience as a geotechnical engineer in the United States and abroad. He has performed and directed geotechnical investigations for commercial/industrial facilities and power plants. In addition, he has served as a technical expert on a variety of special problems including vibrating machine foundations, liquefaction analyses and investigation of failures.

Professional Registration: Professional Engineer - Illinois, Minnesota, North Dakota, and Wisconsin

Parent Company: Harding Lawson Associates

## Experience and Qualifications Relevant to the Susitna Project:

1979 to Present: Underground Utilidor System, Barrow - Arctic soils investigation of problems installing steam, water, and sewer lines in permafrost for the North Slope Borough c/o Frank Moolin & Associates.

- Rehabilitation of Matanuska Levee, Palmer, 1981 - Project manager providing consultation and engineering analysis including flow nets, estimation of permeability coefficients and expected seepage quantities.
- Petrochemical Plant Sites, Missouri, 1975 - Provided engineering analysis of dynamic response and liquefaction studies.
- Excavation Project, Illinois, 1978 - Design and construction monitoring of excavation using an innovative shoring technique consisting of shotcrete facing and grouted tendons; design of grouted anchors in soil and rock; speci-



RICHARD W. CHRISTENSEN  
Geotechnical Project Manager

-2-

cations for foundation grouting; design of foundations on swelling soils.

- Studies for Nuclear Power Plants, Iran, Illinois, and Michigan, 1974-1975 - Project manager and/or technical consultant on nine power stations. Responsible for deep foundation analyses dynamic evaluation of soil parameters; liquefaction analysis; and site feasibility studies.
- Several Large Scale Steel Facilities, Indiana, 1974-1978 - Foundation analysis for multi-story blast furnace and bag house structures for U.S. Steel.
- Hydro Investigation, Akutan, 1980 - Investigations for dam sites, penstock, and power plant.

Client References:

Project Name: Mr. Winston Zirjacks  
Frank Moolin & Associates.  
3300 "C" Street  
Anchorage, Alaska 99503  
(907) 276-7484.

Project Name: Mr. David Black  
Ott Water Engineers  
4790 Business Park Boulevard  
Anchorage, Alaska 99503  
(907) 277-8255.

# HARZA-EBASCO

H. WAYNE COLEMAN

Job Title: Lead Hydraulics Engineer

Work Location: Anchorage

Education: Master of Science in Civil Engineering,  
Hydromechanics  
1964, University of Minnesota  
Bachelor of Science in Civil Engineering  
1961, West Virginia University

Special Qualifications: Supervised hydraulic studies for Guri and Bath County. Participated in ice studies for Burfell in Iceland and for Safe Harbor.

Professional Registration: Illinois

Parent Company: Harza Engineering Company

## Experience and Qualifications Relevant to the Susitna Project:

January 1968 to Date: Harza Engineering Company, Chicago, Illinois. Assistant Section Head. Hydraulics Section. Water and Energy Design Department. Responsibilities include writing design memoranda, preparing design computations, supervision of drafting, analyses, and design work performed by members of the section, and field tests of hydraulic systems. The following projects were included in the above designs and analyses: Guri Project, Venezuela. Project includes spillway design and model test with capacity of 1,000,000 cfs, and penstocks for power plant with 10,000 MW capacity. Designs and model tests were made for aeration ramps for spillway.

- Reza Shah Kabir project, Iran. Project includes spillway design and model test with capacity of 560,000 cfs, and two diversion tunnels, 46 feet in diameter, with 170,000 cfs.
- Bath County Pumped-Storage project, Virginia, includes a spillway design and model test with capacity of 60,000 cfs; low level outlet conduits with capacity of 5000 cfs; and power tunnel - penstock transient studies, for six 350-MW turbines.
- Tarbela Project, Pakistan. Analytical and hydraulic model studies to determine hydrodynamic loads for service gates in a 45 ft. diameter irrigation tunnel with a discharge capacity of 100,000 cfs.

H. WAYNE COLEMAN  
Lead Hydraulics Engineer

-2-

- Mayfield Project, Washington. Analytical studies, hydraulic model studies, and field tests were performed for hydraulic conditions in a 37 ft. diameter power tunnel and forebay for a power plant with discharge of 11,000 cfs.
- Uribante Project, Venezuela. Project includes a 350 feet high earthfill dam with chute spillway with 35,000 cfs capacity. Also includes a 13 foot diameter low-level outlet works tunnel and a 16 foot diameter diversion tunnel. Model studies were made for above features. Designs and model tests were included for aeration for cavitation protection on spillway and outlet works. Transient studies were made for a 4 mile long power tunnel with surge tank, with 2 impulse units with head of 1200 feet.
- Safe Harbor Dam, Pennsylvania. Ice jam study for existing dam with 80 feet of head. Spillway and ice sluice capacity 1,000,000 cfs.

January 1964 to January 1968: Harza Engineering Company, Chicago, Illinois. Hydraulic Engineer. Civil Division. Group Leader in Hydraulics Department. Responsibilities included hydraulic analyses, design, and supervision of drafting and design work performed by members of the group. Projects included in the above studies are as follows:

- Guatape Hydroelectric project, Colombia. Hydraulic transient studies of the four mile long power tunnel, surge tank, penstock system with about 2500 feet of head. Open tunnel surge analysis of the tail-tunnel which is about two miles long.
- Burfell Project, Iceland. Project included ice sluices and sediment sluices for low head diversion dam. Spillway designed for 150,000 cfs. Power tunnel, surge tanks, penstocks for power plant with 400 feet head. Model studies were made for spillway and sluices.

September 1961 to January 1964: University of Minnesota, St. Anthony Falls Hydraulics Laboratory. Design and operation of hydraulic models of spillways, diversion works and other facilities associated with hydroelectric developments.

H. WAYNE COLEMAN  
Lead Hydraulics Engineer

-3-

Client References:

Project Name:

Bath County Pumped Storage Project  
Virginia Electric and Power Company  
Powerstation Engineering and Construction  
P.O. Box 564  
Richmond, Virginia 23204  
Mr. J. M. Hagood, Jr.  
(804) 771-6103

Guri  
CVG-Electrificacion Del Caroni, C.A.  
Apartado No. 62413  
Caracas, Venezuela  
Tel. 001+582+921155

# HARZA-EBASCO

JEFFREY A. COOK

Job Title: Cost Estimator, Non-Technical Features  
Work Location: Anchorage  
Education: Arizona State University, B.S. Construction Management  
Special Qualifications: Member, Project Management Institute  
Professional Registration: None  
Parent Company: Frank Moolin & Associates, Inc.

## Experience and Qualifications Relevant to the Susitna Project:

May 1982 to Present: As Senior Cost Engineer for Frank Moolin & Associates in Anchorage, Alaska, Mr. Cook performs home office cost engineering duties for several FMAA design and construction management projects. Mr. Cook's duties include cost collection and monitoring, forecasts at completion, change order estimates, budget development, design and construction contract bid evaluations, cash flow requirements, value engineering, invoice review and payment authorization, and escalation studies. Mr. Cook also performs cost/benefit analysis on project implementation alternatives.

October 1981 to May 1982: Mr. Cook was employed by the Bechtel Power Corporation, Hanford, Washington, as a Senior Construction System Engineer on the Washington Public Power Supply System (WPPSS) Nuclear Power Plant No. 2 project. In this capacity, Mr. Cook provided all engineering design review and field charges for seismic pipe supports on all Class I, II, and III nuclear piping in conformance with power piping codes as identified by the Nuclear Regulatory Commission (NRC).

- Performed material take-off and confirmation of drawing requirements and final as-built drawings, as well as verification of quantities installed and final engineering paperwork review for turnover to the hydro test engineer for hydro testing of the piping prior to start-up.

June 1977 to July 1981: Mr. Cook was employed by the Pittsburgh-Des Moines Steel Company (PDM) in several capacities on various projects. Mr. Cook's last assignment with PDM was a



JEFFREY A. COOK

-2-

Cost Estimator, Non-Technical Features

Boilermaker on two water storage tanks in Craig, Colorado, and also as a site Project Manager for the Chevron Carter Creek Project No. 9 API storage tank in Evanston, Wyoming.

- Prior to that assignment, Mr. Cook worked from January 1979 to March 1981 as the Project Control Manager for PDM's construction of the wet-well, down comers, associated piping, quenching towers, main steam relief valves, and all well pods within the containment shell for the WPPSS Nuclear Power Plant No. 2 project. In this capacity, Mr. Cook performed all scheduling, planning and estimating and developed work package systems, material control, field engineering, and the computer data processing systems. Mr. Cook also developed a design charge control system, presented project schedule status to the owner, conducted and supervised all superintendent/field engineer contract planning sessions, and provided project status for system completion and document review.
- From June 1977 to January 1979, Mr. Cook was assigned to PDM's Provo, Utah office and participated in the company's Engineering/Management Training Program. As a Project Coordinator, Mr. Cook was involved in the construction and testing of personnel and emergency airlocks for the WPPSS Hanford No. 1 and No. 4 Nuclear Power Plant. He generated and reported on all schedules and progress status reports, and coordinated project engineering, drafting, purchasing, planning, and shop work for all phases of fabrication.
- As a Shop Production Coordinator, Mr. Cook developed schedules and status reports, provided customer interface for all shop problems, and negotiated shop changes with the sales department on an a one-half mile long, 12 foot diameter tube coal conveyor for the Boardman, Oregon coal-fired power plant.

Client References:

Project Name:

Washington Public Power Supply System  
WPPSS) Nuclear Power Plant No. 2  
Bill Dykema  
Burns and Roe Engineers (WPPSS Construction  
Managers)  
Rt. No. 2, Box 2582  
Benton City, Washington 99320

JEFFREY A. COOK  
Cost Estimator, Non-Technical Features

-3-

Project Name: Dave Voorhies, Area Manager  
Washington Public Power Supply System  
(currently with Johnson Controls)  
2161 Newcomer  
Richland, Washington 99352  
(509) 377-2131

# HARZA-EBASCO

C. D. CRADDOCK

Job Title: Lead Geotechnical Engineer

Work Location: Bellevue

Education: Contract Administration  
1978, College of William and Mary  
Civil Engineer Refresher  
1969, University of Kansas  
Geotechnical Engineering  
1963, University of California Graduate School  
Electrical Engineering  
1943, Columbia University

Special Qualifications: Consultant, Geotechnical Engineering

Professional Registration: District of Columbia

Parent Company: Harza Engineering Company

## Experience and Qualifications Relevant to the Susitna Project:

1980 to Date: Consultant, Geotechnical Engineering. Individual consultant specializing in design and construction of earth and rock fills, foundations, instrumentation, diversions, cofferdams, dam safety, etc.

1945 to 1980: U.S. Army Corps of Engineers, Kansas City District. Chief, Operations Division (Supervisory Civil Engineer). Overall responsibility for monitoring, maintaining, and operating 16 major multipurpose dam and reservoir projects, (flood control, water supply, hydropower, etc.). Mission responsibility included a detailed program for dam safety; i.e., inspections, observation device monitoring, contingency plans for emergencies, project status report, training of project personnel, etc. Also included in the overall responsibility were construction supervision and inspection of water-retaining structures on the lower 500 miles of the Missouri River.

1974 to 1975: U.S. Army Corps of Engineers, Kansas City District. Assistant Chief, Construction Division, and Chief, Supervision and Inspection Branch (Supervisory Civil Engineer). Responsible for supervision of construction projects located over a 5-state area. Mission included a yearly construction

C. D. CRADDOCK  
Lead Geotechnical Engineer

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program in excess of \$100 million involving dams, hydropower facilities, local protection systems, bridges, buildings, etc.

1971 to 1974: U.S. Army Corps of Engineers, Kansas City District. Assistant Chief, Engineering Division (Supervisory Civil Engineer). Responsible for management and technical direction of the district's engineering staff (350 engineers of various disciplines) engaged in design of multipurpose dams and reservoirs levees, roads, bridges, etc.

1969 to 1971: U.S. Army Corps of Engineers, Kansas City District. Chief, Geotechnical Branch (Supervisory Civil Engineer). Responsible for supervision and direction of approximately 85 engineers and geologists engaged in designing facilities such as earth and rock fill dams, spillways, outlet works, levees, hydropower structures, tunnels, etc. Mission also included a comprehensive district soils and materials laboratory.

1966 to 1969: U.S. Army Corps of Engineers, Kansas City District. Chief, Dams Design Section (Supervisory Civil Engineer). Responsible for detailed embankment and foundation design of multipurpose dams within a 5-state area.

1958 to 1966: U.S. Army Corps of Engineers, Omaha and Kansas City Districts. Senior Design Engineer (Civil Engineer). Responsible for overall execution of soil mechanic and foundation design activities for four major multipurpose dam and reservoir projects, i.e., Oahe, Wilson, H.S. Truman and Perry.

1956 to 1958: U.S. Army Corps of Engineers, Garrison District, North Dakota. Chief Soil Mechanic Design Section (Civil Engineer). Responsible for supervision and direction of approximately 10 engineers engaged in designing features of Garrison Dam and Reservoir.

Mission included detailed development of design memoranda and final plans and specifications for those features yet to be incorporated into the overall project plan. The mission also included monitoring of existing project features to insure their satisfactory performance.



# HARZA-EBASCO

ALEXANDER CUSTIN

Job Title: Geotechnical Engineer

Work Location: Bellevue

Education: MSCE (Geotechnical)  
1978, Purdue University  
University of Wisconsin Extension,  
Certificates  
Ice Engineering for Rivers and Lakes, and  
Geotechnical Aspects of Cold Regions  
Foundation Design

Special  
Qualifications: Geotechnical Site Experience

Professional  
Registration: None

Parent Company: Ebasco Services Incorporated

## Experience and Qualifications Relevant to the Susitna Project:

July 1981 to Present: Civil (Geotechnical) Engineer in the Bellevue, Washington office. Involved in dam inspections, prefeasibility studies and FERC preliminary permit applications for small hydro projects, and provide geotechnical input as needed to help resolve construction problems on the WPPS Unit 3 nuclear projects under construction. Also was involved in alternative foundation study for fuel oil storage which included oil reservoirs and tanks on soft ground.

August 1980 to July 1981: Site Geotechnical Engineer during construction of the WPSS Unit 3 nuclear project. Provided geotechnical expertise for construction of heavy haul road over soft ground. This included supervision of soils drilling, sampling, assigning laboratory tests and performing analyses. Also involved in pile driving, testing, and analysis; slope and river bank stabilization, resolution of construction problems, installation and data interpretation of piezometers and inclinometers.

August 1979 to August 1980: Geotechnical Engineer in the New York office. General geotechnical analyses including assignment and supervision of field and laboratory tests, stability and seepage analyses of embankments, piling analysis, preparation of



ALEXANDER CUSTIN  
Geotechnical Engineer

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excavation and backfill specifications for embankment and power plant construction. Responsible for excavation and backfill scheme to place expansive soil fill during construction of a power plant in Texas. Field assignments included supervision of subsurface investigation programs, and sampling, and installation of instrumentation.

August 1978 to August 1979: Site Geotechnical Engineer during construction of the St. Lucie Unit 2 nuclear project. Provided geotechnical expertise during excavation and backfill operations, canal construction and erosion protection installation, and canal spillway construction.

1976 to 1978: Graduate Teaching Assistant, Purdue University. Taught soil mechanics laboratory and assisted in foundation engineering course.

1974 to 1976: Assistant and Associate Soils Engineer in New York office. Seepage and stability analysis of dams and embankments, preparation of earthwork and piling specifications, etc. Field assignments included supervision of soils drilling and sampling, installation of piezometers, in-situ permeability testing of soil and rock, foundation soils mapping, pile load testing.

# HARZA-EBASCO

R. KENNETH DODDS

Job Title: Instrumentation and Testing

Work Location: Anchorage

Education: B.S., Geology, University of Oregon  
M.S., Geology, University of Oregon

Special Qualifications: Mr. Dodds has been in responsible charge of rock mechanics projects for 22 years. These projects are located on 4 continents and in a wide variety of rock types. His experience includes: underground powerhouses for the Dez Project, Mica Project, and Bear Swamp Project. Over 80% of his experience is on projects that are built or are now under construction, providing a broad experience in applied rock mechanics. He has lived and worked in Alaska and is a registered geologist there.

Professional Registration: Registered Geologist:  
California  
Georgia  
Oregon  
Alaska

Certified Professional Geologist:  
AIPG

Certified Engineering Geologist:  
California  
Oregon

Parent Company: Foundation Sciences, Inc.

## Experience and Qualifications Relevant to the Susitna Project

1965 to Present: President, Foundation Sciences, Inc. Mr. Dodds has directed engineering geology and rock mechanics phases of 38 major tunnel projects, 49 dam projects, 23 large underground chambers, 36 deep rock shafts, 12 grouting and groundwater control projects, and geophysical analyses of six nuclear power projects.

1970 to Present: Adjunct Professor of Geology, Portland State University.

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R. KENNETH DODDS  
Instrumentation and Testing

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1964 to 1965: Chief Geologist, Tarbela Dam. Mr. Dodds was responsible for the exploration, testing and interpretation of geologic conditions for the \$800 million Tarbela Dam project. His work included directing operation of a professional crew of 25 and a support staff of approximately 100. The project exploration program included excavation of more than 30,000 linear feet of exploratory adit, drilling more than 125,000 linear feet of borings, rock mechanics studies, construction materials source studies, seismic studies and groundwater studies. Excavation, grouting, design and specifications for the project tunnels were also reviewed.

1963 to 1964: Consulting Geologist, Electric Planning Commission of Turkey. Mr. Dodds was responsible for the exploration, testing and interpretation of the geologic conditions on projects with a total construction cost of over \$1 billion. He instructed staff engineers and geologists in the application of engineering geology and rock mechanics to design and construction problems. He conducted rock mechanics studies at Ciceroz, Homa and Kadincek dam sites.

1960 to 1963: Chief Geologist and Head of Foundations and Grouting Section, Dez Dam, Iran. Mr. Dodds supervised a staff of approximately 75 geologists, engineers, construction inspectors and support staff for the 666-foot-high, double-curvature, thin-arch dam and underground powerhouse. He was responsible for extensive in situ and laboratory rock mechanics studies; development and interpretation of dam abutment instrumentation; design of rock supports, excavation, grouting and drainage; and administration of construction contracts for all foundation and grouting work items. He also prepared geologic reconnaissance reports of future dam projects in the area.

1965 to 1960: Geologist, U.S. Army Corps of Engineers, Portland District. Mr. Dodds' work included geologic investigations of dam sites, road locations, and construction materials sources for Hills Creek, Cougar, Blue River, Green Peter and Holley Dam projects; he conducted materials surveys for revetment and jetty projects and sediment source surveys for the Columbia River to reduce maintenance dredging.

Publications:

"Geology Applied to Road Relocations on Dam Projects in the Western Cascade Mountains of

Oregon"; Geological Society of the Oregon Country Newsletter, 1959.

"Rock Movement Along Fractures During Failure"; Proc. First Congress of the International Society on Rock Mechanics, 11, 1966.

"Criteria for Optimum Utilization of Boring Exploration in Rock"; Association of Engineering Geologists, National Meeting, 1968. (Abstract)

"Determination of Rock Dynamic Elastic Constants by Seismic Waves"; Association of Engineering Geologists, National Meeting, 1968. (Abstract)

"The Age of the 'Columbia River Basalts' near Astoria, Oregon"; Proc. Second Columbia River Symposium, 1970.

"Rock Mechanics Applied to Structural Design"; American Society of Civil Engineers, Portland National Conference, 1970. (Abstract)

Rock Mechanics Field Testing - Mica Dam Project, B.C."; American Society of Civil Engineers, Phoenix National Conference, 1971.

"Tocks Island Project Spillway Rock Mechanics Studies"; 13th Symposium on Rock Mechanics, 1971.

"Preliminary Investigations"; Handbook on Tunnel Engineering, T.R. Kuesel and J.O. Bickel, eds; Van Nostrand Reinhold Company.

References:

Tunnels and Rock Chambers:  
Elwyn King, Senior Associate  
Parsons, Brinckerhoff, Quade and Douglas  
1625 Van Ness Avenue  
San Francisco, CA 94109  
(415) 474-4500

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R. KENNETH DODDS  
Instrumentation and Testing

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TARP - Tunnel and Reservoir Plan, Chicago

Frank Dalton, Assistant Chief Engineer  
Metropolitan Sanitary District of Greater  
Chicago  
100 East Erie Street  
Chicago, IL 60611  
(312) 751-5600

or

Gene Randich, Vice President  
DeLeuw Cather Co.  
165 West Wacker Drive  
Chicago, IL 60601  
(312) 356-0424



# HARZA-EBASCO

GLENN E. ELLIS

Job Title: Principal Engineer - Analysis/Design

Work Location: Bellevue

Education: Purdue University, BS - Civil Engineering,  
1972, New York University, MBA -  
Management, 1977

Professional Registration: Engineer-in-Training, Indiana, 1972

Parent Company: Ebasco Services Incorporated

## Experience and Qualifications Relevant to the Susitna Project:

April 1982 to Present: Principal Civil Engineer in the Bellevue, Washington office of Ebasco Services Incorporated. As the Lead Civil Engineer is responsible for the civil design and drafting activities of the Terror Lake Hydroelectric Project in Kodiak, Alaska. Areas of responsibility include soils, foundations, powerhouse substructure and superstructure, and tailrace design staff is approximately eight engineers, designers, and drafters.

August 1978 to April 1982: Served as the Lead Civil ESSE Engineer on the Washington Public Power Supply Systems Nuclear Projects 3 and 5. Was responsible for supervising all of the civil design activities performed on-site, resolving construction problems, evaluating non-conforming conditions, and providing engineering interpretations of drawings and specifications. Subordinate civil engineering and design staff exceeded ten engineers, designers, and drafters.

1973 to 1976: Civil Engineer in the New York office working with a team of civil engineers on the Washington Public Power Supply Nuclear System Nuclear Projects 3 and 5. Responsibilities included preparation of the PSAR, preparation of purchase specifications for reinforced concrete pipe, circulating water pumps, and natural draft cooling towers. Also prepared design specifications for the circulating, make-up and blowdown water systems, turbine building and T-G pedestal, and performed the waterhammer analysis for the circulating and make up water system.

1972 to 1973: Assistant Engineer in the New York office working on the Waterford Unit No. 3 Project in Louisiana. Prepared

GLENN E. ELLIS  
Principal Engineer -  
Analysis/Design

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specifications for dike construction, concrete and steel bulkheads, in addition to designing the secondary shield wall.

Client References:

Project Name:       Terror Lake Hydroelectric Project  
                      Mr. John Longacre  
                      Alaska Power Authority  
                      334 West 5th Avenue  
                      Anchorage, Alaska 99501  
                      (907) 276-0001

Project Name:       WPPSS Nucler Projects 3 and 5  
                      Mr. Dave Koski  
                      P.O. Box 1223  
                      Elma, Washington 98541  
                      (206) 482-4428

# HARZA-EBASCO

LARRY G. EMERSON

Job Title: Field Geotechnical Engineer

Work Location: Anchorage

Education: Master of Science in Materials Engineering  
1978, University of Illinois  
Bachelor of Science in Materials Engineering  
1977, University of Illinois  
Bachelor of Science in Geology  
1974, University of Illinois

Special Qualifications: Designer - TARP  
Field Engineer - TARP

Professional Registration: None

Parent Company: Harza Engineering Company

Experience and Qualifications Relevant to the Susitna Project:  
June 1981 to Date: Harza Engineering Company, Chicago, Illinois. Engineer. Geotechnical Department. Three month field assignment to New Guinea, Indonesia for feasibility report for the Tembagapura Hydroelectric project. Field responsibilities included supervision of a 30 man survey and labor crew; test pit logging; drilling logistics; assessing and writing reports concerning the foundation conditions and construction materials for the proposed diversion dam, power station and 8 Km pipeline; geological tunnel mapping; recommending locations for rock bolt installation and drilling and grouting operations; piezometer readings; and water flow measurements within the tunnel. Office responsibilities included structural engineering design of reinforced concrete structures (footings and mat foundations); lateral earth pressure and seismic load studies; writing proposals and soil testing programs; maintaining correspondence with the Metropolitan Sanitary District (TARP).

June 1980 to January 1981: Harza Engineering Company, Chicago, Illinois. Field Engineer on Chicago's Tunnel and Reservoir (TARP) Project. Responsibilities included engineering and inspection of the drilling and grouting operations within the 36' diameter mainstream tunnel; rebar and concrete placement inspections; rock bolt installation inspection.

LARRY G. EMERSON  
Field Geotechnical Engineer

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January 1979 to June 1980: Harza Engineering Company, Chicago, Illinois. Geotechnical Department. Designed portions of the Magarin Dam, Jordan, a 500 foot high earth and rock fill dam. Portions included excavation and cutoff wall drawings; drainage galleries, grout curtain, and instrumentation drawings. Design studies include testing and analysis of residual shear strength of clays and rock; geophysical evaluation of foundation strength parameters; use of synthetic filter fabric.

January 1978 to December 1978: University of Illinois, Chicago, Illinois. Teaching Assistant. Duties included instructing materials testing laboratory, preparing and grading lab reports and exams, full teaching responsibilities for summer semester.

February 1977 to December 1977: University of Illinois, Chicago, Illinois. Technical Assistant. Materials Engineering Department. Duties included preparation of geologic profiles, charts, graphs, and computer analyses for a Research Grant on Costs of Deep vs. Shallow Tunnelling.

Client References:

Project Name:

TARP  
The Metropolitan Sanitary  
District of Chicago  
100 E. Erie Street  
Chicago, Illinois 60611

Joseph H. Irons  
Ronald A. Newbauer  
Frank E. Dalton  
(312) 751-5600



# HARZA-EBASCO

JAY M. ENGLAND

Job Title: Program Director

Work Location: Anchorage

Education: Graduate Study, Engineering Management,  
University of Alaska  
B.S., Civil Engineering, Pennsylvania State  
University - 1959  
B.A., Business Administration, Pennsylvania  
State University - 1953

Special  
Qualifications: As a Principal Engineer for HLA, Mr. England  
has been responsible for senior project  
management and has authored or co-authored  
comprehensive geotechnical reports for hun-  
dreds of Alaska projects ranging from com-  
plex industrial facilities to remote village  
schools. During the Watana Dam project, Mr.  
England will serve as Project Director,  
responsible for contract review, budgetary  
control, and public hearings. Mr. England  
has 20 years of experience as a supervisor  
and manager of engineering projects, plan-  
ning studies and construction projects. He  
established the Anchorage office of HLA in  
1969, is a Vice President of the firm and  
serves as a director of the corporation.

Professional  
Registration: Civil Engineer - Alaska, Oregon  
Land Surveyor - Alaska, Oregon

Parent Company: Harding Lawson Associates

## Experience and Qualifications Relevant to the Susitna Project:

1975 to Present: Mr. England provides technical review and  
direction on most of the projects conducted by the Anchorage  
office and laboratory. Representative projects include:

- Upper Mahoney Lake Hydroelectric Project, near Ketchikan,  
1981 - Soil and geologic reconnaissance for lake tap,  
tunnel and power plant for U.S. Army Corps of Engineers,  
Alaska District.
- Oil and Gas Exploration Drilling Sites, 1977-Present,  
Various permafrost and non-permafrost locations in central  
and western Alaska, Brooks Range, Alaska Peninsula, Bering



JAY M. ENGLAND  
Program Director

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Sea and Beaufort Sea islands - Soil investigations, material site exploration, earthwork and foundation designs for well pads, Hercules airstrips, docks, water supply, camp sites, access roads for Chevron, Union, Amoco, Sohio and Exxon.

- Near Island Bridge and Connecting Roadways, Kodiak, 1982 - Feasibility study, geologic reconnaissance, investigation and foundation design for piers and abutments for a 1200-foot-long bridge for the State of Alaska, Department of Transportation and Public Facilities.
- Natural Gas Conditioning Facility, Prudhoe Bay, 1981 - Soil and foundation investigation and design for a major industrial complex including a plant site, flare area, camp, reservoir and water intake for Ralph M. Parsons Company.
- Material Site Investigations, North Slope Area between the Colville and Canning Rivers, 1977-Present - Airphoto interpretation, geologic reconnaissance, delineation drilling and sampling, laboratory testing, mining plan preparation for ARCO, Sohio, Exxon, Conoco and the North Slope Borough.
- Monashka Creek Dam and Reservoir, Kodiak, Alaska, 1975 - Soil and geophysical investigation for proposed earthdam and borrow area for the City of Kodiak.

Client References:

Project Name: Upper Mahoney Lake  
Mr. Harlan E. Moore  
U.S. Army Corps of Engineers Alaska District  
P.O. Box 7002  
Anchorage, Alaska 99510  
(907) 276-4817.

Project Name: Various Oil and Gas Explorations  
Mr. Robert Potter  
Sohio Construction Company  
100 Pine Street  
San Francisco, California 94111  
(415) 433-7971.

JAY M. ENGLAND  
Program Director

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Project Name: Near Island Bridge  
c/o Mr. Steven Kautz  
EMPS-Sverdrup  
4111 Minnesota, Suite 3  
Anchorage, Alaska 99503  
(907) 274-4541.

Project Name: Natural Gas Conditioning Facility  
Mr. Maurice S. Greenberg  
The Ralph M. Parsons Company  
100 West Walnut  
Pasadena, California 91124  
(213) 440-3474.

Project Name: Monashka Creek Dam  
c/o Mr. Pablo Chavez  
International Engineering Company  
220 Montgomery Street  
San Francisco, California 94105  
(415) 544-1200.

# HARZA-EBASCO

MICHAEL P. FINNEGAN

Job Title: Project Control Specialist

Work Location: Anchorage

Education: California Polytechnic State University, San Luis Obispo, B.S. Aeronautical Engineering, 1971

University of California at Berkeley, M.S. Transportation Engineering, 1972

Special Qualifications: Member, Project Management Institute

Professional Registration: Professional Mechanical Engineer: California, Alaska

Parent Company: Frank Moolin & Associates, Inc.

## Experience and Qualifications Relevant to the Susitna Project

March 1981 to Present: As Project Control Manager for Frank Moolin & Associates in Anchorage, Alaska, Mr. Finnegan directs the overall corporate project control departmental activities including cost engineering, planning and scheduling, and construction cost estimating. Mr. Finnegan is responsible for developing and implementing the corporate project control system including policies and procedures which define the parameter of the reporting and operating functions and which provide guidance to the individual project control engineer.

- Provides technical expertise to the chiefs of each discipline within project control and to the Project Control Supervisors assigned to field positions. He is responsible for the technical performance of all department staff activities and routinely reviews all project control reports for information and technical accuracy.
- Represents the project control organization as the prime corporate contact on client contracts and projects. he interacts with senior and executive level client and consultant/contractor personnel on significant technical matters often requiring coordinative activity across organizational lines.

September 1973 to March 1981: Mr. Finnegan was employed by Kaiser Engineers, Oakland, California, serving in various capacities on several projects.

June 1978 to February 1981, (Oakland, California), Mr. Finnegan served as Project Engineer for the final design and preparation of construction contract documents for the transit vehicle maintenance shop, the vehicle storage yard, and the test rack for the 20-mile Stage I Miami Rapid Transit System. His responsibilities included project control of the design as well as the construction scope and cost including developing and controlling the design budget and engineering costs, design schedule, project scope, and construction cost estimates for conformance to the design and construction budget. In addition, Mr. Finnegan was responsible for evaluating scope changes and determining resulting impact on costs and schedule.

- Other responsibilities included determining criteria for design, preparation of initial engineering standards and specifications, reviewing design drawings, engineering studies and economic evaluations of design alternatives, preparation of technical reports and studies as well as the review of reports by others. He also performed overall coordination between the client and design staff to discuss progress, significant problems, and solution, conducted weekly staff meetings to discuss progress, problem areas, and recommended solution, and provided direction to the design supervisor.

August 1976 to June 1978 (Miami, Florida), Mr. Finnegan served as the Senior (or lead) Cost and Scheduling Engineer for the 20-mile Stage I Miami Rapid Transit Project, responsible for cost monitoring and control, project budget development and analysis, project cash flow requirements, cost versus scheduling evaluations, manpower projections, preparation of cost and progress reports to the client and UMTA, and other pertinent cost and scheduling technical support. He also reviewed and evaluated design subcontracts for cost and progress performance requirements.

March 1975 to August 1976 (Baltimore, Maryland), Mr. Finnegan served as Scheduling Engineer on the 7.5 Mile Phase I Baltimore Regional Rapid Transit System Project. Mr. Finnegan provided the development and evaluation of the master design and con-



struction schedules, program budgets, cost control, and fiscal cash flow analyses for the project. He was responsible for the progress and cost monitoring of several in-house and subcontracted final design contracts having a combined construction value of \$159 million. Mr. Finnegan also participated in the preparation of monthly management "by exception" report which delineated significant problem areas and recommended solutions..

September 1974 to January 1975 (Dalhousie, New Brunswick, Canada). Mr. Finnegan served as an Assistant Project Engineer for construction management of a wharf and warehouse construction project funded by the Department of Public Works in Dalhousie. His responsibilities included contractor claims monitoring and evaluation, quantity calculations, office engineering, field engineering, and inspection.

September 1973 to March 1975 (Pittsburgh, Pennsylvania),. Mr. Finnegan served as a Scheduling Engineer assigned to the final design phase of the Transit Expressway Revenue Line (TERL) project for the Pittsburgh Mass Transit System. Mr. Finnegan was responsible for the preparation and evaluation of the overall design and construction master schedule. His other duties included preparation of monthly progress reports to the client, assisting in technical studies, and field engineering assignments.

January 1973 to September 1973: As an Airport Planner for the Metropolitan Transportation Commission in Berkeley, California, Mr. Finnegan was responsible for the preparation of the National Airport System Plan Reports for the airports designated as elements of the Regional Airport Systems Study (RASS). Mr. Finnegan's other responsibilities included technical evaluation of regional airports, master plans and development of special access/egress technical reports.

Client References:

Project Name: Barrow Utilities System  
Irving Igtanloc, Director  
Department of Public Works  
North Slope Borough  
P.O. Box 69  
Barrow, Alaska 99723  
(907) 852-2611



MICHAEL P. FINNEGAN

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Project Name: Miami Rapid Transit System  
Walter Higgins, Director  
Carlos Bonzon, Engineering Manager  
Metropolitan Dade County  
44 West Hagler Street  
Miami, Florida 33130  
(305) 579-5323

Project Name: Baltimore Rapid Transit System  
Frank Hoppe, Director of Engineering  
Robert Murry, Project Manager  
Mass Transit Administration  
Maryland Department of Transportation  
109 East Redwood Street  
Baltimore, Maryland 21202  
(301) 383-3434

Project Name: Transit Elevated Railway Line  
J.R. Maloney, Director  
T.C. Hardy, Project Manager  
Port Authority of Allegheny County  
2235 Beaver Avenue  
Pittsburgh, Pennsylvania 15233  
(412) 237-7000

# HARZA-EBASCO

PAUL S. FORD

Job Title: Lead Soils Exploration and Testing

Work Location: Anchorage

Education: Master of Science in Civil Engineering  
1963, University of Illinois  
Bachelor of Arts in Physics and Mathematics  
1961, Monmouth College

Special Qualification: Major Participant - EIS, Prudhoe Bay  
Foundation Consultant - Valdez, Sitka

Professional Registration: Idaho, Illinois, Oregon, Washington

Parent Company: Harza Engineering Company

Experience and Qualifications Relevant to the Susitna Project:

July 1981 to Date: Senior Geotechnical Engineer. Responsible for resident client and project liaison and business development in Alaska and the Pacific Northwest.

- Lead Geotechnical Engineer for design phase geotechnical investigation of 75-MW Summer Falls Project in eastern Washington.

January 1976 to July 1981: Partner, Dames & Moore, Seattle, Washington.

- Project Manager for reconnaissance feasibility study of a 50-MW Hydroelectric Project in eastern Washington.
- Project Manager for geotechnical feasibility study of the 10-MW Sandy Creek Hydroelectric Project in western Washington for Puget Sound Power & Light Company.
- Project Manager for geohydrologic studies of alternative methods of flood protection for the Regional Water Treatment Plant, City of Anacortes, Washington.
- Project Manager for geotechnical and hydraulic engineering and slope protection design of waterfront development from Mt. St. Helens dredge spoils in the Columbia River for Weyerhaeuser Company.

PAUL S. FORD  
Lead Soils Exploration and Testing

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- Senior Engineer for EIS on water flood project at Prudhoe Bay, Alaska for the Corps of Engineers Alaska District.
- Project Manager for marine biology, water quality, flood retention, marine land fill, docking facilities and dredging studies in Puget Sound and on the Columbia River, Washington.
- Project Manager for site selection and alternate site comparison for major wood projects plant in Minnesota and Michigan for Weyerhaeuser Company.
- Project Manager for land status, EIS permitting and planning of geologic exploration program for potential geothermal resources in Washington, Idaho, Oregon and California.
- Project Manager for planning and design of stabilization of four major landslides in Washington and Idaho.
- Consultant on marine landfill and foundation problems in Valdez and Sitka, Alaska.
- Client and Technical Advisor for environmental monitoring and licensing studies of 2200-MW Skagit Nuclear Power Plant site in Washington.

January 1968 to December 1975: Staff Engineer to Partner, Dames & Moore, Chicago, Illinois.

- Staff Engineer to Partner. Project Manager for planning and design of Lake Mashkenode Dam, canal and control works for water supply at the U.S. Steel tactonite plant in Minnesota.
- Project Manager for Environmental Report, for 1100-MW Wolf Creek Nuclear Plant in Kansas. Duties involved siting portion of Safety Analysis Report, licensing support and geotechnical design investigations and recommendations concerning the 5,000-acre off channel cooling reservoir and major earthworks for development of a 12,500-acre site.
- Project Manager for geohydrologic, foundation engineering and wave protection designs at Unit 2 of Enrico Fermi Nuclear Plant in Michigan.
- Project Manager for alternate site studies, site safety analysis report, environmental report and geotechnical

PAUL S. FORD

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Lead Soils Exploration and Testing

- Design recommendations for 2200-MW La Salle Nuclear Plant in Illinois.
- Project Manager for planning through construction management of 25-acre land reclamation project in Hudson River, New York.
- Project Manager for numerous foundation engineering studies for many types of facilities in 15 states.

January 1967 to December 1968: Shift Engineer, Harza Engineering Company, Chicago, Illinois. In charge at Upper Reservoir, Kinzua Pumped-Storage Project, Pennsylvania. Supervised engineering staff monitoring of upper reservoir and shaft construction.

January 1963 to December 1967: Civil Design Engineer, Harza Engineering Company, Chicago, Illinois. Performed design and construction phase geotechnical studies of the following water supply and hydroelectric dam projects.

- The 1,200,000 cfs Mangla Spillway in West Pakistan.
- The Angat Dam and Dike in the Philippines.
- The Mossyrock and Mayfield hydroelectric projects in Washington.
- The Brokopondo project in Suriname.

# HARZA-EBASCO

EUGENE C. FOSZCZ

Job Title: Systems Engineer

Work Location: Bellevue

Education: Attended Chicago Technical College  
(Electrical Engineering, 1951 thru 1953)

Special Qualifications: Major participant - Guri

Parent Company: Harza Engineering Company

## Experience and Qualifications Relevant to the Susitna Project:

January 1964 to Date: Harza Engineering Company, Chicago, Illinois. Section Head, Electrical Branch. Responsibilities include planning, design and checking of electrical equipment installations for hydroelectric river projects and high voltage substations; preparation of electrical specifications and drawings; review of manufacturer's designs and drawings for all electrical equipment; factory inspection of electrical equipment, review and coordinating civil and mechanical drawings; supervising engineers, designers and draftsmen, and assistance during construction.

## Assignments include:

- Cerron Grande project, El Salvador. 150,000 kVA hydroelectric plant and four 115 kV substations. Field assignment consisting of assistance during construction and final inspection and testing of electrical installations, and assistance during initial operation of units.
- Guri project, Venezuela. Field assignments consisting of final inspection and testing of electrical installation for a 855,000 kVA hydroelectric plant and switchyard.
- Electric Lake Dam, Spillway and Outlet Works, Utah. Field assignment consisting of final inspection and testing of electrical installations.
- Round Butte Fish Hatchery project, Oregon.
- Oriente Expansion, El Salvador. Four 115 kV substations.



EUGENE C. FOSZCZ  
Systems Engineer

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- Guatape project, Colombia. 309,600 kVA hydroelectric plant.
- Wastewater Pumping Stations, Muskegon, Michigan. Six pumping stations used for drainage and irrigation.
- Burfell project, Iceland. Field assignment consisting of final inspection of electrical installations and assistance during initial operation of the units and substations. 116,667 kVA hydroelectric plant and three 230 kV substations.
- Mossyrock Fish Facilities, Washington.
- Brokopondo project, Surinam. A ten unit hydroelectric plant for the Aluminum Company of America.

January 1963 to January 1964: Pioneer Service and Engineering, Chicago, Illinois. Electrical Design Engineer. Responsibilities included design and checking of electrical construction drawings for steam powerplants, high voltage substations, and water filtration plant. Also reviewed manufacturer's drawings for such projects.

July 1962 to January 1963: Vern E. Alden Company, Chicago, Illinois. Design Engineer. Duties included planning and electrical design of industrial plants.

July 1961 to July 1963: Harza Engineering Company, Chicago, Illinois. Electrical Design Engineer. Performed design and checking of electrical construction drawings for the Sam Rayburn hydroelectric plant for the Corps of Engineers.

December 1960 to July 1961: Sturm and Brett Engineers, Chicago, Illinois. Electrical Design Engineer. Responsibilities included design and checking of electrical construction drawings for industrial plants; also coordinating and trouble shooting in field for such plants.

March 1956 to December 1960: Vern E. Alden Company, Chicago, Illinois. Electrical Design. Responsibilities included design and checking of electrical construction drawings for steam power plants, high voltage substations and industrial plants; review of manufacturer's drawings and field assignments for industrial projects.

EUGENE C. FOSZCZ  
Systems Engineer

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Client References:

Project Name:

Guri  
CVG-Electrificacion Del Caroni, C.A.  
Direccion Obras de Guri  
Apartado No. 62413  
Caracas, Venezuela  
Ing. Hector Beltran  
Tel. 011+582+921155

# HARZA-EBASCO

DAVID ALAN FREY

Job Title: Field Geologist

Work Location: Anchorage

Education: Master of Science in Geology 1977, Ohio University  
Bachelor of Science in Geology 1979, Ohio University

Special Qualifications: Resident geologist - Black Bear Lake and Chester Lake, Alaska. Participant - TARP, Bath County

Professional Registration: Geologist - Oregon, Engineering Geologist - Oregon

Parent Company: Harza Engineering Company

## Experience and Qualifications Relevant to the Susitna Project:

July 1982 to Date: Harza Engineering Company, Alaska. Resident Geologist, Black Bear Lake Hydroelectric Project during design exploration studies.

January 1982 to June 1982: Harza Engineering Company, Chicago, Illinois. Various geotechnical office activities included preparation of exploratory drilling and camp facilities contracts for Black Bear Lake Hydroelectric Project, Alaska for design exploration phase and preparation of a detailed proposal to the DOD requiring intensive investigation of state-of-the-art exploratory, geophysical, instrumentation and mechanical tunneling techniques.

November 1981 to December 1981: Harza Engineering Company, Metlakatla, Alaska. Resident Geologist on the Chester Lake Hydroelectric Project during feasibility exploration studies for an 80 ft. high concrete arch-gravity dam, 2,800 ft. penstock, developing 800 ft. head and 2.5 MW power plant. Duties included field mapping, exploratory drilling and testing, field contract management and supervision and report preparation.

January 1981 to April 1981: Harza Overseas Engineering Company, St. Lucia, W.I. Resident Geologist on the St. Lucia Water Supply Project during feasibility exploration studies for a 180 foot high fill dam on deep alluvium, a 5 mile long pipeline and 1 mile long tunnel. Responsibilities included field mapping, core logging, pressure testing, field contract management and

DAVID ALAN FREY  
Field Geologist

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supervision, on-site client relations and report preparation.

September 1980 to December 1980: Harza Engineering Company, Chicago, Illinois.

- Lead Geologist on the Coal Creek Project, Colorado for the feasibility design review.
- Preparation of geotechnical data volumes, geological and design studies for spillway modification, Maqarin Project, Jordan.

July 1980 to August 1980: Harza Engineering Company, Alaska. Resident Geologist on the Black Bear Lake Hydroelectric Project during feasibility exploration studies for a 50 ft. high concrete gravity dam, 1400 ft. head penstock and 6 MW powerplant. Responsibilities included field mapping, core logging and pressure testing, contract supervision and writing of draft report.

January 1979 to August 1979: Harza Overseas Engineering Company, Jordan. Acting Resident Project Manager, Jordan Valley Irrigation Project, Amman, Jordan. Company representative in Jordan. Responsibilities included client relations, correspondence, contract negotiations and payment authorization claims settlement, and company and contract administration for 8 contracts for all phases of the project. Major components of the project include the Maqarin Storage Dam and powerplant, downstream diversion, and conversion and development of irrigation lands.

August 1977 to May 1978: Harza Overseas Engineering Company, Jordan. Field Geologist on the Maqarin Dam Project during feasibility/design exploration studies for a 150 m high fill dam. Duties included core logging, pressure testing, field mapping and office studies as well as contract supervision, administration and payment authorization.

February 1973 to October 1976: Harza Engineering Company International, to Iran. Progressively assigned as Geologist, Foundations Engineer and Foundations Office Engineer for the Reza Shah Kabir Project, Iran, consisting of a 200-meter, double curvature arch dam and one thousand MW powerplant. Duties encompassed all phases of drilling and grouting works and extensive geological exploration, including adit and foundation excavation, geologic mapping, contract inspection and supervision, field design,



DAVID ALAN FREY  
Field Geologist

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payment authorization, and administration. Cost of drilling and grouting works and geological exploration was approximately \$12 million.

December 1972 to February 1973: Harza Engineering Company, Chicago, Illinois. Geologist. Geotechnical Division.

- Evaluation of geophysical survey methods, Mount Hope Underground Pumped-Storage Project
- Geologic field mapping of Mount Hope project site area.
- Compilation and analysis of rock test data, Chicago North-side Rock Tunnel Project.

September 1972 to October 1972: Harza Engineering Company, Chicago, Illinois. Geologist. Duties included field inspection of water pressure testing of core holes and recording of test data for the Bath County Pumped-Storage Project, Virginia.

August 1972: Harza Engineering Company, Chicago, Illinois. Geologist. Duties included geologic logging of core and soil samples and contract field inspection of drill crews for the Raccoon Creek Conveyor project, Ohio.

Client References:

Project Name: TARP  
The Metropolitan Sanitary  
District of Chicago  
100 E. Erie Street  
Chicago, Illinois 60611  
Joseph H. Irons  
Ronald A. Newbauer  
Frank E. Dalton  
(312) 751-5600

Project Name: Bath County Pumped Storage Project  
Virginia Electric and Power Company  
Powerstation Engineering and Construction  
P.O. Box 564  
Richmond, Virginia 23204  
Mr. J.M. Hagood, Jr.  
(804) 771-6103



# HARZA-EBASCO

EUGENE J. GEMPERLINE

Job Title: Senior Engineer - Hydraulics

Work Location: Bellevue

Education: Master of Science in Environmental Engineering 1974, University of North Carolina  
Bachelor of Sciences in Civil Engineering 1973, University of Notre dame

Special Qualifications: Hydraulic designer - TARP

Professional Registration: Illinois

Parent Company: Harza Engineering Company

## Experience and Qualifications Relevant to the Susitna Project:

June 1978 to Date: Harza Engineering Company, Chicago, Illinois. Engineer. Hydraulic Design Division. Responsibilities include preparation of conceptual and final hydraulic designs.

- Lead Hydraulic Engineer on Yacyreta Project, Argentina and Paraguay. Provided review and design studies for 55,000 m<sup>3</sup>/s, 44 m head and 40,000 m<sup>3</sup>/s, 34 m head spillways and stilling basins. Simulation of river diversion and closure schemes proposed by bid tenderers with mathematical model to assist in the evaluation of offers. Analytical analysis and design of fish facilities.
- Prepared hydraulic design studies for 4600 m<sup>3</sup>/s, 950 m long tunnel spillway, 800 m<sup>3</sup>/s, 1100 m long diversion tunnel, 90 m<sup>3</sup>/s irrigation conduit, 90 m<sup>3</sup>/s powerhouse conduit, including intakes and energy dissipators for Maqarin Project, Jordan. Hydraulic design of the powerhouse tailrace. Evaluated hydraulic transient response of penstocks for 20 MW 150 m head units.
- Hydraulic transient and head loss analyses for addition of 3000 MW powerhouse to Tarbela Project, Pakistan by converting three 3.5 km, 550-700 m<sup>3</sup>/s diversion tunnels to power conduits.

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EUGENE J. GEMPERLINE  
Senior Engineer - Hydraulics

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- Hydraulic analyses for upgrading of existing Warrior Ridge, Pennsylvania small-hydro project including computations of tailwater rating curve and spillway capacity.
- Hydraulic analyses for expansion of existing Hadley Falls Hydroelectric Project Massachusetts, including tailwater rating curve and hydraulic analysis of new fish facilities.
- Lead Hydraulic Engineer for discharge capacity study for an existing 3.5 km long 100 m<sup>3</sup>/s diversion tunnel for mine tailings in Chile. Developed recommendations to improve hydraulic capacity by eliminating hydraulic jumps, locating points of interior wall overtopping and determining transition discharges from open channel pressurized flow.
- Conducted preliminary hydraulic analyses of head loss and stability in penstocks, intakes and draft tubes to optimize design of 2000-3000 MW underground pumped-storage project in northern Illinois. Developed a computer program in northern Illinois. Developed a computer program to compute hydraulic properties for systems ranging from 2250 to 6600 ft head, and with from 3000 to 13,000 cfs in discharge and 8 to 12 pump/turbine units.
- Prepared hydraulic design studies to determine surge levels following power failure to an 1150 cfs 150-330 head pumping station while dewatering over 100 miles of 20-33 feet diameter tunnels. Also, performed hydraulic analyses for the preliminary design of components of an 80,000 acre-feet reservoir, including the 80,000 cfs outlet manifold, a 1000 cfs pumping intake/outlet, a distribution chamber, and a surge gateshaft for the Chicago Tunnel and Reservoir Plan, Illinois.
- Modified a water surface profile computation program to accept more cross section geometries including transitions and to improve computational techniques. Program is used in both closed conduits and open channels, for tranquil and rapid flow and determines locations of hydraulic jumps.
- Prepared final design of a 39 meter long stilling basin for El Nispero Dam Spillway. Basin was designed for a hydraulic jump on sloping apron downstream of gates for design flow of 1150 cms, resulting in safe design and economy.
- Used results of model studies of San Lorenzo Dam spillway and stilling basin to develop upper and lower nappe profiles for 25,000 cms design flow.

EUGENE J. GEMPERLINE  
Senior Engineer - Hydraulics

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January 1978 to June 1978: Harza Engineering Company, Chicago, Illinois. Assigned to Hydraulic Design Division. Prepared hydraulic design of components of the Burlington Dam Flood Control Project in North Dakota including a 60,000 cfs diversion works including a mile long 22 ft tunnel and a spillway, and a 500 cfs three-level water quality intake. Also designed two smaller outlet works for an upstream flood control dam and a diversion dam and analyzed effects of the diversion dam on flood levels upstream through backwater modeling.

September 1974 to January 1978: Harza Engineering Company, Chicago, Illinois. Engineer. Water Resources Division. Developed alternative plans and cost estimates for the control of storm runoff to meet state and federal standards for new strip coal mines in Wyoming. Prepared drawings of the accepted plan for presentation to the regulatory authorities including the State Engineer and Department of Environmental Quality and the Mine Enforcement Safety Administration. Plans included side channel spillways, sedimentation ponds, diversion channels and dikes, conduits and small flow-regulating reservoirs. Both short-range and long-range plans for the 50-year life of the mine were made.

- Analyzed potential flood damages for a community in northern Indiana for a U.S. Army Corps of Engineers flood control study. Flood losses were computed for commercial, public, and semi-public establishments, and utilities. The value of lost recreational opportunities for a heavily used park was analyzed based on the duration, frequency and seasonal distribution of flooding. The cost of transportation delays was estimated on the basis of detour routes.
- Project Manager of a project to alleviate open-water and ice-related flood damage on the Rock River in western Illinois. Duties included definition of the flood problem through hydrology, hydraulics and back-water modeling, flood damage estimation, and formulation and evaluation of structural and non-structural flood control plans. Layouts and cost estimates were made and benefits were estimated based on average annual damages eliminated. Environmental analyses were carried out. A computer model was developed which would estimate average annual damages with and without plans in place enabling optimization of alternative plans. This model estimated over \$1,000,000 damage to over 1,000 structures for the flood of record within 5% of the actual damage. Developed computer backwater models of 15 miles of the Rock River for flows from 5,000 to 75,000 cfs. The recommended plan of selective flood proofing and levees

EUGENE J. GEMPERLINE  
Senior Engineer - Hydraulics

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has a benefit-cost ratio of 1.6 and is to be included in a survey report by the U.S. Army Corps of Engineers.

- Participated in Flood Insurance Studies for communities in Illinois. Duties included hydrologic and hydraulic analyses, community contact and definition of flood hazard areas. Developed computer backwater models for over 100 miles of streams for flows from 100 to 65,000 cfs.

September 1973 to September 1974: University of North Carolina, Chapel Hill, North Carolina. School of Public Health. Graduate work on a Master of Science in Environmental Engineering included several courses in System Analysis and Water Resources Planning.

- Developed a computer model for a stream reservoir system which defines the probability with which stream and reservoir will not meet water supply demands.

January 1973 to May 1973: University of Notre Dame. Senior Project. Developed a physical model of a proposed cable anchored underwater dredging device, in order to determine expected forces in the cables from waves. Worked included instrumentation with resistive type strain gages, design and construction of the model and electrical circuitry including hook-up to an oscilloscope.

Technical Papers and Articles: "Development of the Hedging Horizon for Use in the Allocation of Stream Resources for Water Supply". Master's Thesis, 1974. The paper shows how a computer model can be used in the operation of a stream-reservoir system.

Client References:

Project Name:

TARP  
The Metropolitan Sanitary  
District of Chicago  
100 E Erie Street  
Chicago, Illinois 60611  
Joseph H. Hines  
Ronald A. Newbauer  
Frank E. Dalton  
(312) 751-5600



# HARZA-EBASCO

SHIAM N. GOYAL

Job Title: Principal Engineer - Analysis/Design

Work Location: Bellevue

Education: Agra University, India - BSc 1949  
Roorkee University, India - BP, Civil Engineering (with honors) 1952  
Iowa University, Iowa - MS, Mechanics and Hydraulics 1970

Professional Registration: New York

Parent Company: Ebasco Services Incorporated

## Experience and Qualifications Relevant to the Susitna Project:

December 1980 to Present: Principal and Lead Discipline Engineer at New York Office of Ebasco for 2-960 MW Shearon Harris Nuclear Power Plant. Administratively responsible for forecast of manpower and workday forecast for design and engineering, job control by monitoring schedules and workdays. Technical responsibilities include technical correspondence with the client, Civil Engineering input to the Final Safety Analysis Report and responses to Nuclear Regulatory Commission's questions on that. Also responsible for Engineering Support to construction.

April 1977 to December 1980: Principal Civil Engineer. Responsible for development of design criteria and material specifications.

- The structures included ultimate heat sink cooling reservoirs main and auxiliary; main and auxiliary dams and their spillways; stream diversion works; make-up water and circulating water system; cooling tower blowdown system; seismic Category 1 fuel handling building, diesel fuel oil storage tank building, reactor make-up and refuel water storage tank and condensate storage tank building, and other miscellaneous structures; and foundations for all buildings for the Shearon Harris Nuclear Power Plant.
- The dams were designed as seismic Category 1 structures. Dynamic analysis by finite element model was performed.



SHIAM N GOYAL

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Principal Engineer - Analysis/Design

September 1973 to April 1977: Senior Civil Engineer. Responsible for engineering and hydraulic studies for ultimate head sink cooling reservoirs, stream diversion works, main and auxiliary reservoir, stream diversion works, main and auxiliary reservoir spillways, low level release system, reservoir make-up water system, and circulating water system; engineering studies for river and reservoir intake structures, seismic Category 1 plant buildings; and input to construction bid specifications.

February 1973 to September 1973: Design Supervisor, Shearon Harris Nuclear Power Plant. Responsible for supervision of design and drafting of drawings for construction bid package for the ultimate heat sink cooling reservoirs, dams and spillways, stream diversion works and make-up water system; and final construction drawings for turbine building and fuel handling building.

February 1970 to February 1973: Lead Engineer, Shearon Harris Nuclear Power Plant for cooling reservoirs, dams and spillways.

- Lead Engineer, Monroe Street Hydroelectric Modifications, Washington. Responsible for layout and design of concrete dam, intake structure and concrete penstock.
- Lead Engineer, Ludington Pumped Storage Project 1,872,000 kw installation. Power plant building, including coordination, review of manufacturer's drawings; storm water drainage; layout and design of emergency overflow system; penstock encasement and penstock retaining walls.
- Studies for river diversion works for Davis Pumped Storage Project.

September 1969 to February 1970: Back to Iowa University, Iowa for completing graduate studies leading to MS in Mechanics and Hydraulics.

June 1969 to September 1969: Civil Engineer, Ludington Pumped Storage Project; Stability analysis of power plant.

September 1968 to June 1969: Research Assistant in the Department of Mechanics and Hydraulics of the University of Iowa, Iowa. Pursued course of study for MS in Mechanics and Hydraulics.

SHIAM N GOYAL  
Principal Engineer - Analysis/Design

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STATE IRRIGATION DEPARTMENT UTTAR PRADESH, INDIA

July 1962 to August 1968: Executive Engineer, Central Design Directorate, Lucknow; Engineering of 90 feet high earth and rockfill Obra Dam, 390,000 cfs concrete spillway, power plant having 3 units of 33,000 kw each; 400 feet high earth and rockfill Ramgange Dam, 31 feet diameter diversion tunnels, 280,000 cfs, 400 feet head service spillway, 80,000 cfs auxiliary spillway, 5,000 cfs irrigation outlets, and power plant having 3 units of 66,000 kw each.

- Development of hydraulic and structural design criteria and material specifications, economic studies for the height of dam vs spillway capacity. Spillway stilling basin was located in soft sand rocks. The stilling basin had 95 feet high retaining walls.

February 1960 to July 1962: Subdivisional Officer, irrigation Division Remodelling bridges and weirs on 2000 cfs channel to increase capacity to 4000 cfs. Maintenance and construction of flood protection works.

May 1954 to February 1960: Engineer, Design and Planning Directorate, Eihand Dam; Design of prestressed and reinforced concrete bridges, 296 feet high concrete gravity dam, penstock intake and trashrack structure, power plant having six units of 55,000 kw each. Development of contract specifications and other documents.

- Visited English Electric Company, England to finalize power plant layout; visited Electricity de France Hydraulic Research Laboratories.

November 1953 to May 1954: Subdivisional Officer, Irrigation Division. Maintenance of 2000 cfs irrigation channel system, planning and design of flood drainage schemes.

September 1952 to August 1953: Apprentice Engineer, Soils and Construction Division. Design and construction supervision of official building, design of single span foot bridge over 300' wide irrigation channel.

Client References:

Project Name:	Shearon Harris Nuclear Power Plant
	Mr. Ashleight Lucas
	Site Manager
	New Hill, NC 27562
	(919) 362-2290

SHIAM N GOYAL  
Principal Engineer - Analysis/Design

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Project Name:

State Irrigation Department Uttar  
Pradesh, India  
Mr. Jagdish Narayan  
Now at World Bank Washington, D.C.  
(202) 477-6881

# HARZA-EBASCO

R. EDWARD HEDGECOCK

Job Title: Lead - Rock In-Situ Tests

Work Location: Anchorage

Education: Duke University - BS - Geology - 1971  
Duke University - MSCE - Soil/Rock Mechanics  
- 1973

Special Qualifications: Rock excavation, Blast Vibration Monitoring, Rockbolting, Rock Stability, and Geotechnical Instrumentation

Professional Registration: Professional Engineer Colorado, North Carolina  
Professional Geologist, Oregon

Parent Company: Ebasco Services Incorporated

## Experience and Qualifications Relevant to the Susitna Project:

May 1978 to Present: Mr. Hedgecock is presently Senior Geotechnical Engineer in the Earth Sciences group of Ebasco Services Incorporated. He was Ebasco's field representative during 1981 field studies to evaluate the feasibility of constructing the Grant Lake Hydroelectric Project for the Alaska Power Authority and was responsible for geotechnical field investigations including technical review and liaison with subcontract professional staff. Site development options considered included a 75 ft high rockfill embankment, saddle dam, surface penstock, above ground powerhouse, along with various tunnel alignments.

- Participated as project team member during technical and cost review of the Bath County Pumped Storage Project for Allegheny Power Service Corporation and was responsible for technical review of all quality control records for the partially completed construction of the 460 ft high Upper Dam and the 140 ft high Lower Dam. Both dams are zoned earth and rockfill embankments. Also responsible for technical review of remedial work performed to a) monitor and ensure stability of the high rock slope comprising the powerhouse back slope and b) define and grout a series of fractures intersecting the Upper Dam right abutment at depth.
- Served in a geotechnical advisory capacity during construction of Main Dam at Carolina Power and Light's Shearon

Harris Nuclear Power Plant Site. The structure is a 100 ft high earth and rockfill dam with central impervious core. Principal areas of involvement have included: Assisted CP&L in preparation and implementation of embankment quality control test procedures. Advised on construction of and prepared report documenting rockfill test sections. Estimated available spillway rockfill quantities based on rockfill gradation requirements and anticipated spillway weathering profile. Evaluated spillway rock slope stability rockbolting requirements, and associated costs. Directed field and laboratory investigations for impervious borrow area. Monitored and advised on borrow area development and expansion. Supervised and evaluated laboratory and field test section comparisons of filter maximum and minimum densities for relative density control. Advised on Main Dam rockfill quarry investigation, layout, and slope stability. Monitored quarry excavation procedures as they affected rockfill quality. Reviewed Wake Stone quarry processing and stockpiling procedures due to coarse filter gradation difficulties. Recommended improved techniques and provided full-time inspection of coarse filter production at the Knightdale quarry. Assisted CP&L in supervision of laboratory and field inspection personnel. Reviewed and evaluated embankment Quality Control test results. Prepared Interim Embankment Report summarizing all aspects of embankment quality control for the 1979 construction season. Prepared Final Embankment Report summarizing all aspects of embankment quality control for the 1979-1980 construction seasons.

- Planned laboratory soils investigations for Phase I feasibility studies of upper reservoir of Utah Power and Light's Bear Lake Pumped Storage Project. Evaluated and documented results of lab investigations as input to feasibility report.
- Edited and prepared geologic sections of Environmental Report for the U.S. Department of Energy, W. R. Grace Company, Synthesis Gas Demonstration Plant.

January 1973 to April 1978: Mr. Hedgecock served as soils engineer for Stone and Webster Engineering Corporation gaining extensive experience in geotechnical related investigation, design, and construction of power plants on soil and rock sites. Representative responsibilities included involvement with the



following projects: Lead Geotechnical Engineer during construction phases of Tampa Electric Company's Gannon, Hooker's Point and Big Bend 3 and 4 fossil power stations. Lead Geotechnical Engineer during initial phases of geologic and seismologic feasibility studies for nuclear power station sites planned by Tampa Electric Company. Lead Field Geotechnical Engineer during foundation rock excavations for Virginia Electric and Power Company's North Anna Units 3 and 4 Nuclear Power Stations. Responsible for geologic mapping, blast monitoring, and review of rock support installation procedures. As Support Soils Engineer, reanalyzed seismic stability of the service water reservoir embankment for Units 1 and 2 at the North Anna Site and prepared response to the NRC. Lead Field Geotechnical Engineer during cofferdam dewatering, foundation excavation, and structure demolition for the Rock Island 2nd Powerhouse constructed for the Public Utility District No. 1 of Chelan County, Washington. Lead Geotechnical Engineer during installation of the grout curtain and foundation relief drain systems and during rewatering and removal of the cofferdams for the Rock Island 2nd Powerhouse. The Rock Island Project, an eight-unit bulb turbine installation, is located on the Columbia River south of Wenatchee, Washington. Major geotechnical involvement included dewatering and cofferdam sealing of a 100 ft high earthen cofferdam upstream of the existing structure and a 70 ft. high cellular cofferdam downstream of the structure, demolition of a portion of the existing concrete gravity structure., 1/2 million cubic yards of rock excavation, rock bolt support of a 90 ft high vertical cut in basalts, foundation grouting and drain installation, and rewatering and removal of cofferdams.

Client Reference:

Project Name:	Grant Lake, Alaska Alaska Power Authority 334 West Fifth Avenue Anchorage, Alaska 99501 Mr. Eric A. Marchegiani
Project Name:	Shearon Harris Dams, North Carolina Carolina Power & Light Company 336 Layetteville Street P.O. Box 1551 Raleigh, North Carolina 27602 Mr. T. H. Wyllie, Manager Construction (919) 836-6111

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R. EDWARD HEDGECOCK  
Lead - Rock In-Situ Tests

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Project Name:

Rock Island, Washington  
Public Utility District #1  
Chalane County, Washington  
Mr. Ralph Kurtz  
(206) 682-2581

# HARZA-EBASCO

NICHOLAS M. HERNANDEZ

Job Title: Project Studies and Design Manager

Work Location: Anchorage

Education: Master in Business Administration 1973,  
University of Chicago  
Graduate Studies in Structural Engineering  
Illinois Institute of Technology  
Bachelor of Science in Civil Engineering  
1952, Illinois Institute of Technology

Special  
Qualifications: Project Manager-Bath County Planning Stage

Professional  
Registration: Professional Engineer - Illinois  
Structural Engineer - Illinois

Parent Company: Harza Engineering Company

## Experience and Qualifications Relevant to the Susitna Project:

September 1979 to Date: Harza Engineering Company, Chicago and Argentina. Project Engineer in Chicago for three months during the initiation of the design and construction drawing preparation phase for the 26 MW Maqarin Hydroelectric Project in Jordan. In Argentina as Engineering Coordinator and Civil Department Head for the design and construction drawing preparation for the Yacyreta Hydroelectric Project on the Parana River.

May 1976 to September 1979: Harza Engineering Company, Honduras and Venezuela. Resident Manager in Honduras of an integrated group for the preparation of a Master Plan at prefeasibility level, a feasibility study and the preparation of contract documents for the flood control in a valley with an area of 1,800 sq. kilometers below a watershed of 24,000 sq. kilometers. Also included was the investigation at feasibility level, the irrigation of a valley with a gross area of 12,000 hectares and preparation of Contract Documents for an irrigation system in a selected zone. Five months were spent in Caracas preparing feasibility designs for a complex of three hydroelectric developments in western Venezuela. Emphasis was on the design of the spillways, water conductors and powerhouses.

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- Chief Engineer in Argentina for the initiation of feasibility studies for hydroelectric development of the 150 kilometers reach of the Parana River below the proposed Itaipu site.

November 1970 to May 1973: Harza Engineering Company, Chicago, Illinois. Department Head, Civil Design Branch. Project Manager for Reza Shah Kabir Project in Iran with 1,000 MW power station, arch dam 200 m high and 16,000 cumecs chute spillway. Responsible for preparation and scheduling civil power station drawings for hurricane barrier in the New Orleans area for the U.S. Army Corps of Engineers. Responsible for the feasibility design layout and estimating of the 2,000 MW Savage River Pumped-Storage Project. Conceptual design layout and scheduling the Stony Creek Pumped-Storage Project (1,500 MW). Conceptual planning for development of a proposal for 600 MW underground hydro-project in Guatemala including client contact. Project Manager during initial planning stage of the 2,100 MW Bath County Pumped-Storage Project, Virginia.

February 1969 to October 1970: Harza Engineering Company, Chicago, Illinois. Department Head, Civil Design Branch. Reviewed project areas and prepared engineering proposals for irrigation and power projects in Guatemala, Argentina and South Korea. Responsible for preparation of feasibility designs and reports for six flood control projects including one power station for the U.S. Bureau of Conservation.

December 1966 to January 1969: Harza Engineering Company, Chicago, Illinois. Department Head, Civil Design Branch. Prepared preliminary design and layout of Havasu Pumped-Storage



NICHOLAS M. HERANDEZ  
Project Studies and Design Manager

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Project and Central Arizona Project, Link Power Station. Prepared civil contract documents for completion of power station and yard for Rio Hondo Project, Argentina. Supervision of design and preparation of construction drawings for Seneca Pumped-Storage Project power station and water power conductors.

- Layout of pumped-storage power station and water conductors in Arizona for an FPC license. Layout of Chicago underground pumped-storage power station and water conductors for feasibility studies. Review of proposed 38,000 hectares irrigation project in Iran.

November 1961 to November 1966: Harza Engineering Company, Chicago, Illinois. Section Head in the Civil Division. Duties included design of 75-foot gravity retaining wall to stabilize the hillside adjoining the tailrace of Mayfield Hydroelectric Project, Washington. Supervision of contract document preparation for the Seneca Pumped-Storage Project and design of power tunnel, conduits and penstocks.

September 1959 to October 1961: Harza Engineering Company, Amman, Jordan. Chief of Design Section in charge of design of the irrigation distribution system for 12,000 hectares in the Jordan Valley.

February 1958 to August 1959: Harza Engineering Company, Chicago, Illinois. Supervision, design, and preparation of design drawings for the Karadj Hydroelectric Development powerhouse. Harza Engineering Company, Amman, Jordan. Chief of Design Section, East Ghor Technical Team, Jordan.

November 1955 to February 1958: Harza Engineering Company, Chicago, Illinois. Design of the generating monoliths, gravity dam monoliths and fish ladders on the Priest Rapids Hydroelectric Project, Washington. Inspection of construction on the Boulder Creek Hydroelectric Project in Utah. Design of 300-foot reinforced concrete intake tower and 6 and 9 meter diameter reinforced concrete power tunnels for Derbendi Khan Hydroelectric Project, Iraq. Preliminary design for the Priest Rapids Hydroelectric Project contract documents. Design of elements of the service bay on the Panchet Hill Hydroelectric Project, India.



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NICHOLAS M. HERANDEZ -4-  
Project Studies and Design Manager

Client References:

Project Name: Bath County Pumped Storage Project  
Virginia Electric and Power Company  
Powerstation Engineering and Construction  
P.O. Box 564  
Richmond, Virginia 23204  
Mr. J.M. Hagood, Jr.  
(804) 771-6103

# HARZA-EBASCO

J. DAVID HOBBS

Job Title: Anchorage Laboratory

Work Location: Anchorage

Education: University of Florida, 1977 - 1980

Special Qualifications: Mr. Hobbs has eight years of laboratory testing experience and is responsible for the day-to-day management of testing activities in Harding Larson Associates' Anchorage laboratory. Under the direction of senior engineers at HLA, Mr. Hobbs supervises the laboratory technicians performing classification testing (moisture, density, compaction, grain size analysis, Atterberg limits), and performs triaxial shear strength and consolidation tests on frozen and unfrozen soils. He performs quality control review of data obtained from the technicians under his supervision and coordinates testing programs with staff engineers and geologists.

Professional Registration: None

Parent Company: Harding Lawson Associates

## Experience and Qualifications Relevant to the Susitna Project:

Mr. Hobbs has provided laboratory support for most of HLA's projects since he joined the firm, with particular emphasis on frozen soil testing of onshore and offshore samples.

- Duck Island Development Unit, Beaufort Sea, Alaska, 1981 - Testing of frozen soil samples for triaxial compression, strength testing, and classification testing. Data were used to establish preliminary design criteria for offshore gravel island, pipelines and causeways for Exxon Company, U.S.A.
- Gas Conditioning Facility, Prudhoe Bay, 1981 - Laboratory testing included shear strength in triaxial compression for

J. DAVID HOBBS  
Anchorage Laboratory

-2-

both quick and long-term creep for design of facility which will condition gas for shipment through the proposed gas pipeline for Northwest Alaskan Pipeline Company and four major petroleum companies.

- Waterflood Project, Prudhoe Bay, 1980 - Extension laboratory program included frozen strength, thaw consolidation, thermal conductivity, triaxial compression and classification testing for major water injection development. Performed for Prudhoe Bay Joint Operating Unit.

Client Reference:

Mr. R.R. Bowen Exxon Company, U.S.A., Western Division 1800  
Avenue of the Stars Los Angeles, California 90067, (213)  
552-5685.

Mr. Maurice S. Greenberg c/o The Ralph M. Parsons Company 100  
West Walnut Street Pasadena, California 91124, (213)  
440-3774.

Mr. John K. Deavenport Arco Oil and Gas Company Prudhoe Water-  
flood Project P.O. Box 7232 San Francisco, California 94120  
(415) 768-5194.

# HARZA-EBASCO

NORMAN B. HOLST, JR.

Job Title: Field Geologist

Work Location: Anchorage

Education: Master of Science 1978, University of Illinois at Chicago Circle  
Bachelor of Science 1974, Wayne State University

Special Qualifications: Major Participator - Bath County

Parent Company: Harza Engineering Company

Experience and Qualifications Relevant to the Susitna Project June 1980 to Date: Various assignments in U.S. and Latin America. These included geologic mapping and interpretation of widely varying terrains: complexly faulted sediments in Venezuelan Andes, volcanics and volcano-clastics in El Salvador, faulted and karstic limestones in Honduras, and basalt flows in Washington State. Also participated in geotechnical evaluation of project sites in Washington and Colorado.

Work in Washington included extensive drilling and geophysical program with exploration and evaluation of existing earth/rock fill dikes. Also assisted geotechnical personnel in grouting program for dams, tunnels, and powerhouse during several recent short term assignments at Bath County Project, Warm Springs, Virginia.

August 1978 to June 1980: Harza Associates of Virginia, Warm Springs, Virginia. Field Geologist. Responsibilities included mapping of geology uncovered in tunneling and excavation of foundations, identification of areas in tunnels and foundations requiring special treatment or reinforcement, and solution of various field problems such as locating suitable construction materials.

June 1978 to September 1978: University of Illinois at Chicago Circle, Chicago, Illinois. Lecturer in Geology. Developed and taught introductory level college geology course and coordinated laboratory instruction for same.

Technical Papers and Articles: The Use of Thermodynamic Excess Functions in the Nernst Distribution Law," The American Mineralogist, Vol. 63, pp. 83-86, January-February 1978.

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NORMAN B. HOLST, JR.  
Field Geologist

-2-

"The Join Diopside - Ilmenite and Its Bearing on the Corporation of Titanium into Clinopyroxenes." Master's Thesis, University of Illinois at Chicago Circle, March 1978.

Client References:

Project Name: Bath County Pumped Storage Project  
Virginia Electric and Power Company  
Powerstation Engineering and Construction  
P.O. Box 564  
Richmond, Virginia 23204  
Mr. J.M. Hagood, Jr.  
(804) 771-6103



# HARZA-EBASCO

DAVID M. JEZEK

Job Title: Logistics  
Location: Anchorage  
Education: High College, Seattle, Washington, Studies  
Special Qualifications: Relevant Experience in Alaska  
Professional Registration: None  
Parent Company: Frank Moolin & Associates, Inc.

## Experience and Qualifications Relevant to the Susitna Project:

April 1981 to Present: As Manager of Logistics for Frank Moolin & Associates, Inc., Mr. Jezek directs the logistical operations for all home office and field projects, including developing and implementing comprehensive logistical plans for remote Alaska, arctic and subarctic environments. Coordinates and monitors subcontractor logistical efforts. Additionally, he develops camp operation and maintenance criteria and provides conceptual design and procurement assistance for camp facilities. The logistics operations includes logistical planning, procurement, traffic, inspection, expediting, material take-off/control, warehousing, and related activities. Mr. Jezek provides logistical planning and operations support for the North Slope Borough Barrow Utilities System, City of Valdez container terminal and grain terminal, Alaska Power Authority Terror Lake Hydro-electric power project, and Alaska International Air, Inc.'s air cargo handling facilities at Bethel, Alaska.

April 1980 to March 1981: Mr. Jezek served as Material Control Supervisor for Parsons Constructors, Inc., directing field operations including logistics, purchasing, traffic and warehousing for new construction and rehabilitation of existing facilities at the Shell Oil petrochemical manufacturing complex at Martinez, California.

March 1978 to April 1980: For Saudi Arabian Parson, Ltd., as Material Control Supervisor, he supervised personnel involved in monitoring the construction contractor to ensure compliance with project procedures and approved construction documents in the areas of purchasing, warehousing, material control, and traffic. Projects included grass-roots construction of Arabian American Oil Company sulfur recovery and oil-fired utility plants at

DAVID M. JEZEK  
Logistics

-2-

Berri and Ju'Aymah, Saudi Arabia.

March 1977 to March 1978: As Logistics Supervisor for Parsons International, Ltd., Mr. Jezek provided supervision of logistics, material control, and computer data input personnel engaged in the generation, maintenance, management, and processing of logistical data.

October 1973 to March 1977: Mr. Jezek was the Material Control Supervisor for RSR Corporation, where he supervised material control activities, including inventory audits of raw materials for smelter and manufacturing operations, warehousing, traffic, and maintenance contract preparation and negotiations.

December 1970 to October 1973: For DBM Corporation, Mr. Jezek served as Maintenance Supervisor, responsible for maintenance, scheduling, and material procurement for industrial facilities and multi-story office complexes.

# HARZA-EBASCO

GEORGE D. (DAN) JOHNSON

Job Title: Lead - Rock Drilling and Test Grouting

Work Location: Anchorage

Education: Oregon State University - Geology B.S. -  
1955; M.S. 1959

Special Qualifications: Extensive experience in leading exploration and grouting for hydroelectric projects.

Professional Registration: Registered Geologist and Certified Engineering Geologist in State of California.

Parent Company: Ebasco Services Incorporated

## Experience and Qualifications Relevant to the Susitna Project:

June 1971 to Present: Mr. Johnson is presently Consulting Geologist in the Earth Sciences Group of Ebasco Services. His 11 years of Ebasco project experience includes the South Fork American River Project in California, the Keban Hydroelectric Project in Turkey, review of the Bath County Pumped Storage Project in Virginia, a proposed pumped storage project at Bear Lake in Utah and the Shearon Harris dams which are nearing completion in North Carolina.

- While on a 3-year assignment for Ebasco in Turkey, he supervised a large staff of engineers and geologists for underground construction of an extensive groundwater barrier beneath a dam using grouting and drainage methods. Work also included exploration and treatment to exclude groundwater while driving the adit network below river level.
- For California's South Fork American River Project, he led geotechnical design exploration for three dams, tunnels, powerhouses, pipelines, and related structures. Exploration included geologic mapping, seismic refraction surveys, and core borings for tunnel alignments/portals, and dam construction materials. As a result of the explorations, recommendations have been made to adjust structure locations to better adapt to the known geologic conditions.
- Allegheny Power Service Corporation requested Ebasco to review certain aspects of the design and ongoing construction of the Bath County Pumped Storage Project. Mr. Johnson, responsible for review of grouting and underground

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GEORGE D. (DAN) JOHNSON                    -2-  
Lead - Rock Drilling and Test Grouting

structures, found that state-of-the-art methods were being utilized.

- Supervised Ebasco's feasibility explorations for siting a 400 MW powerhouse and dam for Utah Power & Light Company at Bear Lake, Utah. Explorations, including geologic mapping, core drilling, trenching and soil and permeability testing, identified complex geologic conditions in this highly seismic area.
- Carolina Power & Light Company is constructing the Shearon Harris Nuclear Power Plant which includes two embankment dams for cooling reservoirs. Mr. Johnson lead the Ebasco staff for field construction geology which has included treatment and mapping of foundations, fault investigations, preparation/implementation of grouting procedures and preparation of as-built reports on the foundations and grouting.

1962 to June 1972: Mr. Johnson served as Engineering Geologist to the State of California Department of Water Resources. His nine years with the California Department of Water Resources provided Mr. Johnson varied hydroelectric experience in which he participated in geotechnical investigations and grouting programs at various dams and related structures throughout California. He was resident geologist during construction of Grizzly Valley Dam, Thermalito power plant, forebay and afterbay, power canal and power canal bridges at Oroville, California. He also participated in explorations for the Oroville Dam underground powerhouse. At the Techachapi Crossing of the California aqueduct he led the staffs in contact and consolidation grouting of five tunnels.

1960 to 1961: Dames & Moore, Seattle-Portland-New York City; Engineering Geologist. Logged borings and conducted soil tests.

1960: Oregon Portland Cement Company, Portland, Oregon; Economic Geologist.

1955 to 1957: United States Army, Signal Corps; 1st Lieutenant, Site Platoon Leader.

Summer 1953: Corps of Engineers, Anchorage, Alaska. Conducted tests in materials lab.

GEORGE D. (DAN) JOHNSON      -3-  
Lead - Rock Drilling and Test Grouting

Client References:

Project Name:      Keban Dam, Turkey  
                         Devlet Su Isleri  
                         Mr. Refik Akarun  
                         Head of Dam Division, DSI  
                         Ankara, Turkey  
                         Tel 90-41-181100

Project Name:      SOFAR Project, California  
                         El Dorado Irrigation District  
                         Mr. Frederick C. McKain  
                         Project Administrator SOFAR  
                         2890 Mosquito Road  
                         Placerville, CA 95667  
                         (916) 622-8620

Project Name:      Shearon Harris Dams, North Carolina  
                         Carolina Power & Light Company  
                         336 Fayetteville Street  
                         P.O. Box 1551  
                         Raleigh, North Carolina 27602  
                         Mr. T. H. Wyllie, Manager Construction  
                         (919) 836-6111



# HARZA-EBASCO

STEVEN A. JOHNSON

Job Title: Field Manager

Work Location: Anchorage

Education: M.S., Engineering Geology, Purdue University - 1974  
B.S., Geological Engineering, University of Alaska - 1973

Special Qualifications: Mr. Johnson brings eight years of Alaskan field experience to the Watana Dam project. For the past three years he has managed field operations for major on-ice, onland and overwater geotechnical and geophysical investigations. He has developed particular expertise in coordinating logistics for remote site locations, including surveyors, barge operators, helicopter and fixed wing support. Mr. Johnson is skilled at conducting complex investigations under extreme conditions using large crews.

Professional Registration: None

Parent Company: Harding Lawson Associates

## Experience and Qualifications Relevant to the Susitna Project:

1981 to present: Over-Ice Drilling Investigations, Lease Sale Area 71, Harrison Bay, Alaska, 1982 - Field project manager during pre-lease sale studies responsible for coordinating, planning and logistics for two concurrent operations including 36-man crew and two Rolligon-mounted, enclosed drill rigs that collected over 90 core samples to depths of 150 feet below mud line, using the ice as a drill platform. Responsible for ice safety reconnaissance. One investigation performed for a major oil company and one for Members of Alaska Oil and Gas Association.

- Duck Island Development Area, Beaufort Sea, Alaska, 1981 - Field project manager of drilling operations onshore and offshore. Responsible for complete rigging of drill barge. Supervised 15-man crew during investigation for first major offshore production wells in Beaufort Sea. Data used to develop preliminary foundation design criteria for offshore islands, buried pipelines, causeway and onshore facilities for Exxon.

STEVEN A. JOHNSON  
Field Manager

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- Port of Nome Over-Ice Investigation, Nome, Alaska, 1981 - Field project manager supervising helicopter-supported, over-ice drilling operations. Drilled over 20 test holes on and offshore to bedrock and conducted rock core sampling for the City of Nome.
- Bethel Area Feasibility Study, Alaska, 1982 - As a geologic consultant, provided field reconnaissance support during field review of five potential hydroelectric sites on the Kisaralik and Kipchuck rivers for Alaska Power Authority.
- Waterflood Project, Prudhoe Bay, Alaska, 1981 - Field project manager during offshore soil investigation to provide data for construction of offshore island, pipelines and dredged channels for Prudhoe Bay Joint Operating Group.
- Bethel to Mapakiak Road, Bethel, 1981 - Project manager responsible for library search, air photo interpretation and field analysis for preliminary design of west terminus of road for State of Alaska Department of Transportation and Public Facilities.

1974 to 1981: Soil Boring Programs, Trans-Alaskan Pipeline Route, 1976 - Supervised numerous construction mode confirmation soil boring programs. Responsibilities included coordinating field phases of programs and insuring proper sampling techniques were observed in a wide range of frozen and thawed soils for Alyeska Pipeline Service Company.

- Coal Exploration Study, Beluga Basin, Alaska, 1975 - Performed preliminary field survey (coordinating helicopter support) for large scale exploratory program. Wrote geological hydrology sections of environmental impact statement for Shell Oil Company.
- Offshore Drilling, Beaufort Sea, Alaska, 1974 - Participated in conception and design of artificial ice island for offshore drilling program. Duties included obtaining and analyzing subsea soil strength data and working with project engineer to develop design parameters for Mobil Oil Corporation.

STEVEN A. JOHNSON  
Field Manager

-3-

- Generating Facility, Beluga Area, Alaska, 1974 - Geotechnical investigation and design of foundation for new generating facility in Beluga area. Supervised analysis of soil borings and final report preparation for Chugach Electric.

Client References:

Project Name: Mr. Grant Thompson  
Mobil Oil Corporation, Research and Development  
P.O. Box 900 (FRL)  
Dallas, Texas 75221  
(214) 333-6335.

Project Name: Mr. R. R. Bowen  
Exxon Company, U.S.A., Western Division  
1800 Avenue of the Stars  
Los Angeles, California 90067  
(213) 552-5685.

Project Name: City of Nome  
c/o Mr. Michael G. Horton  
TAMS Engineers  
1305 Fifth Avenue, Suite 3320  
Seattle, Washington 98101  
(206) 624-3532.

Project Name: Alaska Power Authority  
c/o Mr. Paul Ford  
Harza Engineering Company  
203 West 15th Avenue, Suite 204  
Anchorage, Alaska 99501  
(907) 278-4415.

# HARZA-EBASCO

H. STANLEY KELSAY

Job Title: Rock In-Situ Tests

Work Location: Anchorage

Education: B.S., Civil Engineering, New Mexico State University  
M.S., Civil Engineering, Oregon State University

Special Qualifications: Mr. Kelsay has worked in Alaska for 18 months while with the Corps of Engineers. He is presently project manager for a satellite communication project in the Nome area and has just completed an assignment as project manager for the rock mechanics, geotechnical, and groundwater elements of two large rock chambers for a pumping station.

Professional Registration: Oregon, Washington

Parent Company: Foundation Sciences, Inc.

## Experience and Qualifications Relevant to the Susitna Project

1978 to Present: Senior Engineer and Associate, Foundation Sciences, Inc. Mr. Kelsay is presently project manager for the design and installation of the foundations for a satellite communication system in the Nome, Alaska area.

- Project Engineer for the 3.7-mile Southeast Relieving Interceptor in Portland, and was responsible for the geotechnical investigation, design and specifications for the soft ground tunnel. He also served as project engineer for feasibility studies of three proposed light rail transit (LRT) tunnels through the West Hills of Portland, Oregon. He supervised grouting and tunnel-support construction in the Upper Des Plaines Tunnel, for the Chicago Deep Tunnel project. Mr. Kelsay also served as project manager for the Calumet Pumping Station in Chicago, responsible for the installation of long-term rock instrumentation and in situ testing for this major (over 50,000 cubic yards) underground cavern excavation.
- Project Manager for the geotechnical investigation and repair of Franzen Reservoir for the City of Salem. This project included the complete removal and reconstruction of



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H. STANLEY KELSAY  
Rock In-Situ Tests

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a portion of the asphalt-lined embankment dam, repair of the inlet and drainage conduits, and pressure injection grouting of the intake conduit and overflow structure. Mr. Kelsay was responsible for the investigation, engineering analyses, preparation of contract drawing and specifications, and construction supervision.

1974 to 1977: Staff/Project Engineer, L.R. Squier, Inc. Mr. Kelsay was responsible for all stages of work from initial planning through technical report writing and construction inspection for a variety of geotechnical projects including large commercial buildings, industrial plants, ports, airfields, highways, landslides and wastewater treatment facilities.

1972 to 1974: Graduate Research Assistant, Oregon State University Civil Engineering Department.

1971 to 1972: Construction Engineer, Oregon State Highway Division. Mr. Kelsay was responsible for field control and inspection on highway and bridge construction projects. Included was construction supervision of pile-founded bridge structures, dewatering of deep excavations and braced sheet-pile cofferdams.

1969 to 1970: Assistant Bridge Engineer, State of California, Division of Bay Toll Crossings. Mr. Kelsay worked on a new toll bridge crossing in San Francisco Bay. Work included structural analysis of environmental impact reports; and planning, designing, and preparation of specifications for a pile loading test program. He also participated in planning and implementation of subsurface investigations for several major bridge structures around and across San Francisco Bay.

1967 to 1968: U.S. Army. While enlisted in the U.S. Army, Mr. Kelsay worked for the Corps of Engineers in Alaska for 18 months. He worked on projects involving highways, airfields, and public buildings.

1966: Construction Engineer, State of California, Division of Bay Toll Crossings, San Francisco. Mr. Kelsay was responsible for field control and inspection during the construction of the substructure of a highway viaduct project.

Publications:

"Composite Pile Solves Installation and Uplift Problems for New Wharf", presented at Pile Talk Seminar, Miami, Florida, 1978.



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H. STANLEY KELSAY  
Rock In-Situ Tests

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References:

Satellite Communication Project

Mr. George Ekberg, Project Manager  
Pacific Telecom, Inc.  
100 West 11th Avenue  
Plaza Suite  
Vancouver, WA 98660  
(206) 696-6835

TARP - Calumet Pumping Plant

Mr. Ed McGuire, Project Manager  
DeLeuw Cather Company  
165 West Wacker Drive  
Chicago, IL 60601  
(312) 346-0424

Franzen Reservoir Reconstruction

Mr. B.T. VanWormer, Asst. Director  
Public Works  
City of Salem  
325 Civic Center  
Salem, OR 97301  
(503) 588-6063

# HARZA-EBASCO

ROBERT P. KEWER

Job Title: Senior Geologist

Work Location: Bellevue

Education: Master of Science in Geology 1973, Rutgers University  
Bachelor of Science in Geology 1970, Tufts University

Special Qualifications: Major participant - Uribante, TARP,  
Participant - Bath County, Guri

Professional Registration: Professional Geologist - Oregon, Engineering Geologist - Oregon

Parent Company: Harza Engineering Company

Experience and Qualifications Relevant to the Susitna Project:  
February 1981 to March 1982: Harza Engineering Company International. Pehuenche Hydroelectric Project, Chile, S.A. Resident geologist during feasibility and design exploration for a 90 m. high rockfill dam, chute spillway and diversion tunnels on jointed andesites and thick alluvium. Responsible for supervising and performing all aspects of the geologic site evaluation which included mapping, structural surveys, seismic risk studies, drilling, aditing, gravity surveys, seismic profiling, test trenching and groundwater testing. Provided geologic input and review to engineering design studies and criteria as part of Harza's resident staff.

January 1980 to February 1981: Harza Engineering Company, Chicago, to Illinois. Conducted a variety of field assignments, including construction excavation mapping at the Uribante Hydroelectric site in Venezuela, groundwater studies in northern Haiti, subsurface studies at the Strontia Springs thin arch dam, Colorado, and prefeasibility geologic evaluation of a water supply dam and reservoir in eastern Montana.

January 1979 to January 1980: Harza Engineering Company, Chicago, Illinois. Copper Mountain Project, Fremont County, Wyoming. Responsible for hydrogeologic and geologic investigations in a multidisciplinary study of a proposed uranium mine and related tailings disposal and mill facilities. Developed geologic criteria for design of alternative tailings disposal schemes, including 90 foot high zoned and/or homogeneous tailings dams, founded on bentonitic claystones. Evaluated ground-

ROBERT P. KEWER  
Senior Geologist

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water conditions and occurrence in the rocks underlying the tailings site, characterized the hydrogeologic framework for use in monitoring and modeling studies and evaluating deep limestone aquifers as possible project water supply sources.

January 1978 to January 1979: Harza Engineering Company, Chicago, Illinois. Gratiot County Landfill, Michigan. Conducted a comprehensive evaluation of hydrogeologic and geologic data to determine potential PBB contamination of shallow and deep aquifers.

Itapeuara Hydroelectric Project, Brazil: prepared a preliminary geologic report and drilling specifications and developed a design level drilling program for the 60 meter high gravity dam and related structures founded on interbedded basalts and sandstones. Initiated and had field responsibility for the initial part of the field program. Provided geologic input to the design engineers.

January 1977 to January 1978: Harza Engineering Company, Chicago, to Illinois. Resident Geologist at the Nispero and Remolino Hydroelectric Projects, Honduras, located in cavernous limestone and red bed terrain. Responsible for the geologic exploration, including geologic mapping, development of a subsurface exploration program, core drilling and preparing technical reports.

- Conducted field mapping of tunnels and excavations in folded siltstones at the Bath County Pumped-Storage Project, Virginia.
- Resident Geologist on the Kootenai Falls Hydroelectric Project, Montana, where responsibilities included geologic mapping of pre-Cambrian belt metasediments, development of a subsurface exploration program, preparation of drilling specifications, and supervision of the drilling program.

January 1976 to January 1977: Harza Engineering Company, Chicago, Illinois.

- Project Manager on a hydrogeologic study of a fly ash disposal site in Joliet, Illinois. Responsibilities included groundwater evaluation and report preparation leading to licensing.

ROBERT P. KEWER  
Senior Geologist

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- Geologist on the Argonne National Laboratory survey of potential underground pumped-storage sites. Performed a comprehensive office study of regional geologic conditions relevant to siting, and summarized potentially feasible areas in the eastern United States.
- Participated in the office studies for the Guri Hydroelectric Project, Venezuela and San Lorenzo Hydroelectric Project, El Salvador, both in construction.

January 1975 to January 1976: Harza Engineering Company, Chicago, Illinois.

- Geologist at the Montezuma Pumped-Storage Hydroelectric Project, Arizona, where responsibilities included drilling supervision, core logging and geologic mapping in Precambrian granites and gneisses.
- Conducted subsurface field studies for the existing CCI Hoist Dam, built on slates, in Marquette, Michigan, and for a proposed underground pumped storage project in northern Illinois.

January 1974 to January 1975: Harza Engineering Company, Chicago, Illinois.

- Resident Geologist. Lock and Dam No. 1 Rehabilitation Study, St. Paul, Minnesota. Responsibilities included field geology, drilling supervision, preparation of drawings and writing of the geologic report for the concrete structure founded on the St. Peter Sandstone.

Client References:

Project Name: TARP  
The Metropolitan Sanitary  
100 E. Erie Street  
Chicago, Illinois 60611  
Joseph H. Irons  
Ronald A. Newbauer  
Frank E. Dalton  
(312) 751-5600

Project Name: Uribante-Doradas Project  
CADAPE  
Ave. Sanz, El Marques  
Caracas, Venezuela  
Ing. Herman Boulton

# HARZA-EBASCO

LYLE E. LEWIS

Job Title: Laboratory Director

Work Location: Novato, California

M.S., Civil Engineering, University of  
California, Berkeley - 1971

B.S., Agricultural Engineering,  
California State Polytechnic  
College - 1962

Special  
Qualifications:

Mr. Lewis is the director of Harding Lawson Associates' headquarters laboratory in Novato, California and has managed numerous geotechnical engineering projects. Mr. Lewis will supervise advanced testing including triaxial shear strength, resonant column, and cyclic shear testing, and will review test data performed in the Anchorage laboratory. He has supervised soil mechanics studies, instrumentation, and laboratory testing for dams and tailings piles.

Professional  
Registration: California

Parent Company: Harding Lawson Associates

## Experience and Qualifications Relevant to the Susitna Project:

- Fourteen-Mile Reservoir, Colorado, 1982 - Project manager for large scale laboratory testing requiring large diameter triaxial testing for Bechtel Civil and Minerals.
- 200-Foot-High Tailings Dam and 700-Foot-High Waste Fill for Vermiculite Mine Tailings Disposal, 1975-Present - Project manager, soil investigations, design and construction management for W. R. Grace and Company, Construction Projects Division.
- San Quentin Disposal Site, Marin County, California, 1975-Present - Project manager for continuing geotechnical studies and instrumentation for San Quentin Disposal Company.
- Berkeley Sanitary Landfill, Berkeley, California, 1978 - Consultant on leachate seepage through perimeter dikes for City of Berkeley.



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LYLE E. LEWIS  
Laboratory Director

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- Solid Waste Master Planning Studies, Santa Cruz and Marine Counties, 1978 - Project manager, soils and geology portions for Garretson, Elmendorf, Zinov & Reibin.
- Alameda Naval Air Station Sanitary Landfill Site Study, Alameda, California, 1976 - Directed investigation of existing operation, including closure plans and a perimeter sea wall seepage study for U.S. Navy.
- Bell Canyon Dam, 1975 - Instrumentation corrective grouting of dam embankment and abutment, St. Helena, California for City of St. Helena.
- Trampas Canyon Tailings Retention Dam, Orange County, California, 1975 - Project manager for dynamic testing and analysis: project engineer for construction management for Owen-Illinois, Inc.
- Dredge Disposal Feasibility Study for Three Possible Sites, San Francisco Bay and Estuary, 1975 - Project manager for U.S. Army Corps of Engineers, San Francisco District.

Client References:

Project Name: Mr. William McCraig  
W.R. Grace and Company  
Construction Products Division  
P.O. Box 609  
Libby, Montana 55923  
(406) 293-3746.

Project Name: Mr. Walter Ferris  
Bechtel Civil and Minerals, Inc.  
P.O. Box 3965  
San Francisco 94119  
(415) 768-7834.

Project Name: Mr. D. G. Hendrickson  
Owens-Illinois, Inc.  
Mission Viejo Plant  
San Juan Capistrano, California, 92675  
(714) 493-4571

# HARZA-EBASCO

PATRICK K. H. LIU

Job Title: Senior Engineer

Work Location: Bellevue

Education: BS - Civil Engineering  
1969, National Taiwan University  
MS - Geotechnical Engineering  
1970, Georgia Institute of Technology

Special Qualifications: Expert testimony preparation on various nuclear power plant applications and licenses before the USNRC and at ACRS hearings. Publications on Civil and Geotechnical Engineering.

Parent Company: Ebasco Services Incorporated

## Experience and Qualifications Relevant to the Susitna Project:

February 1982 to Present: Presently Senior Civil Engineer in the Corporate Office of Ebasco in New York City. The responsibilities of Mr. Liu include the review of feasibility study and preparation of technical proposal for hydroelectric projects, and study of special foundation problems.

June 1978 to February 1982: Lead Engineer of Allens Creek NPP for Houston Lighting and Power Company. Responsibilities included all geotechnical and hydraulic aspects of the plant engineering and design, the preparation of design criteria, providing technical direction for preparation of construction drawings, performing static and seismic stability analysis of embankment dams, seepage study and settlement analysis of earthen dams, earthwork site management and control; performing circulating water system layout studies and detailed design, formulating hydraulic model test and optimizing the hydraulic characteristics for pump bay design; design of storm drainage and erosion control; design of spillways, drainage channel and canal; preparing procurement specifications, performing contract negotiations, bid evaluation and recommendation.

September 1976 to June 1978: Senior Civil Engineer, Mr. Liu's responsibilities included the study and analysis of special foundation and geotechnical problems of power plant structure design. One particular feature was the evaluation of seismically induced settlement problem under a major plant structure

PATRICK K. H. LIU  
Senior Engineer

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structure. The effort of evaluation comprised of formulating special field investigation and laboratory testing program to appraise the dynamic characteristics of the foundation materials.

November 1975 to September 1976: Civil Engineer, the responsibilities included all phases of geotechnical and foundation works on various power projects. Mr. Liu led a geotechnical investigation effort for the Philippine NPP. He personally resided at site for eight months to direct the field exploratory works for field testing and for soils and rock mechanics. This plant situated in a semi-active seismic region and the foundation rock conditions were complicated by the high chemical-weathering process. The degree of weathering and the dynamic strength of the foundation rocks have a direct impact on the major plant structure design. Mr. Liu formulated an extensive weathered rock investigation program to evaluate the relationship of the in-situ rock strength and strength derived from laboratory dynamic testings, which led to realistic and conservative design parameters for the plant structure systems. Mr. Liu was also directly responsible for the preparation of the Preliminary Safety Analysis Report on the geotechnical aspects of the plant design.

April 1974 to November 1975: Civil Engineer, the responsibilities included siting study, formulating field and laboratory soils and rock investigation programs, preparation of technical specifications, design of shallow and deep foundation systems, design of large oil tank farm on soft soils using surcharge and preconsolidation methods, design of reservoir embankments, performing slope stability analyses using finite element techniques.

July 1970 to April 1974: Staff Engineer and Lead Engineer, when Mr. Liu was with Board of Water Supply, City of New York and Rammot Associates P.C. The responsibilities of his early career included the technical review of City Water Tunnel design, implementation of the quality control program. When he was associated with Rammot, P.C., Mr. Liu's main responsibilities included all phases of Civil Engineering Projects of embankment design and construction, LNG tank farm on soft soils, sewage system plant foundation design, marine structures and seawall design and construction.

#### Client References

Project Name:	Allens Creek Nuclear Power Plant
	Houston Lighting and Power Company
	Mr. Richard Raymond
	Civil Project Supervisor

# HARZA-EBASCO

HOBART H. MAC PHERSON

Job Title: Senior Rock Mechanics Engineer

Work Location: Bellevue

Education: Master of Science in Civil Engineering  
1975, University of Illinois  
Bachelor of Science in Civil Engineering  
1966, Massachusetts Institute of Technology

Professional Registration: Engineer-in-Training - Massachusetts

Parent Company: Harza Engineering Company

## Experience and Qualifications Relevant to the Susitna Project:

August 1981 to Date: Harza Engineering Company, Chicago, Illinois. Civil Engineer. Geotechnical Department. Works on rock mechanics problems related to tunneling and dams including tunnel support design, and estimation of rock modulus for tunnels, dam abutments and foundations.

1973 - August 1981: Consultant on problems of instrumentation and field observations, and design of soil and rock tunnels, caverns and excavations.

- Pre-bid study and recommendations for instrumentation and support of deep rock excavations, East 63rd Street subway, New York City.
- Recommendations for design loadings and geotechnical report for Wheaton Plaza Station (rock excavation) and Section B-10 rock tunnels, Washington Metro System.
- Design and supervision of field instrumentation installations for the North Avenue Station soil and rock excavation, Baltimore Metro System.

1973 - 1981: University of Illinois at Urbana-Champaign, Department of Civil Engineering, Graduate Student and Research Assistant (1973-79).



HOBART H. MAC PHERSON                      -2-  
Senior Rock Mechanics Engineer

- Co-authored and edited manual of methods for geotechnical observations and instrumentation in soil and rock tunneling.
- Subsequently assigned to research program and field studies on ground movements associated with excavations and tunnels in soil and the effect of such movements on adjacent buildings and structures. Responsible for preparing research proposals and budgets, selecting field research sites, planning and directing field observation and monitoring programs including supervision and writing reports on the results of the research.

1968 - 1973: DeLeuw, Cather and Co., Washington, D.C. Soils Engineer (1968-72), Senior Soils Engineer (1973).

- Reviewed, analyzed, and approved design loadings and schemes for subway construction for the Washington Metro System, including cut and cover construction, earth and rock tunnels, rock station caverns, and underpinning. Developed standard specifications and designs for underpinning, excavations and excavation bracing, piling, earth and rock tunneling, rock station caverns, tunnel linings, and geotechnical instrumentation programs for construction control. Provided review and advice on geotechnical problems during Metro construction.
- Technical monitor for a major research program on behavior of braced excavations and soil and rock tunnels carried out by the University of Illinois on the Washington Metro System. Directed technical support group assisting in the research program.
- Directed program for monitoring and controlling construction blasting vibrations.

1966 - 1968: Massachusetts Institute of Technology, Department of Civil Engineering, Graduate Student and Research Assistant. Assigned to research project of field observations of the behavior of a deep braced excavation in soft silt in Boston.

Technical Papers  
and Articles:

Methods for Geotechnical Observations and Instrumentation in Tunneling, E. J. Cording, A. J. Hendron, Jr., H. H. MacPherson, W. H. Hansmire, R. A. Jones, J. W. Mahar, and



HOBART H. MAC PHERSON  
Senior Rock Mechanics Engineer

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T. D. O'Rourke, University of Illinois at  
Urbana-Champaign, UILU-ENG 75 2022, 2 vols,  
566 pp., 1975.

# HARZA-EBASCO

DUANE L. MILLER

Job Title: Cold Regions Consultant

Work Location: Anchorage

Education: Graduate Study, Engineering Management,  
University of Alaska  
M.S., Geological Engineering, University of  
California, Berkeley - 1968  
B.S., Civil Engineering, University of  
California, Berkeley - 1967

Special Qualifications: Mr. Miller has gained the majority of his professional experience as a project geotechnical engineer in Alaska. He has special training and experience in arctic and marine engineering, seismology and soil-structure interaction under earthquake loading. Mr. Miller has several years' experience as a geotechnical engineer during design of high-rise structures in seismically active areas.

Professional Registration: Civil Engineer - Alaska, California,  
Hawaii, Guam

Parent Company: Harding Lawson Associates

## Experience and Qualifications Relevant to the Susitna Project:

1977 to Present: Duck Island Development Unit, Beaufort Sea, Alaska, 1981 - Technical project manager responsible for direction of 40-man team conducting on and offshore geotechnical investigation and geophysical surveys. Data used to develop design criteria for offshore and onshore pipeline corridors, island and causeway construction and marine permafrost foundations for Exxon.

- Trans-Alaska Oil Pipeline, 1977 - Provided consultation during field design changes and review of design criteria for vertical support members for Department of Interior.
- West Dock, Prudhoe Bay, 1979 - Project manager during investigation for 5000-foot-long causeway. First major causeway and dock in the Alaskan Beaufort Sea for ARCO.

DUANE L. MILLER  
Colds Regions Consultant

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- Kandik Basin Oil Exploration, Alaska, 1977 - Project manager responsible for remote site investigations and foundation design and construction for well pads on warm permafrost for Louisiana Land and Exploration Company.
- On-ice Drilling Program, Beaufort Sea, Alaska, 1979 - Project manager supervising 32-man crew gathering geotechnical data used to evaluate oil lease sale areas previous to the 1979 sale for U.S. Geological Survey.
- Modules and Flare Pad of Flow Station III, Prudhoe Bay, 1977 - Project manager for investigation and analysis for heavily loaded adfreeze pile design and thermal study for ARCO.
- Federal Office Building, Anchorage, 1979 - Project manager conducting foundation investigation, seismicity evaluation and dynamic response analysis for the General Services Administration.
- Public Health Service Hospital, Bethel, 1976 - Project engineer, supervision and analysis of sustained load tests of driven H piles in warm permafrost for U.S. Public Health Service.

Client References:

Project Name: Mr. R. R. Bowen  
Exxon Company, U.S.A., Western Division  
1800 Avenue of the Stars  
Los Angeles, California 90067  
(213) 552-5400.

Project Name: Mr. Ralph Isacss  
Northwest Alaska Pipeline Company, c/o Fluor  
3333 Michelson Drive  
Irvine, California  
(213) 975-3553.

Project Name: Mr. Lawrence Davis  
Louisiana Land and Exploration Company  
1500 Denver Club  
Denver, Colorado 80202  
(303) 623-5759.

DUANE L. MILLER  
Colds Regions Consultant

-3-

Project Name: Mr. Jerry Shearer  
U.S. Geological Survey, Mineral Management  
Services  
800 "A" Street  
Anchorage, Alaska 99501  
(907) 271-4582.

# HARZA-EBASCO

JEROME S. NELSON

Job Title: Surface Geophysical and Down-Hole Surveyor

Work Location: Anchorage

Education: B.S., Geological and Geophysical Engineering, University of Minnesota, 1952

Special Qualifications: Mr. Nelson is a specialist in engineering geophysics, and he directs all of HLA's geophysical investigations. He coordinates and acts as consultant for all Alaska geophysical investigations. He is particularly qualified in the investigation of compressional and shear wave propagation in soil and rock, resistivity surveys and acoustical subbottom profiling. He has extensive experience in performing geophysical studies for dams, nuclear power plants, tunnels, airports, and coastal and offshore installations. In addition, he has demonstrated the application of geophysical methods, especially electrical resistivity and streaming potential, to seepage problems.

Professional Registration: Geologist, Engineering Geologist and Geophysicist - California

Parent Company: Harding Lawson Associates

## Experience and Qualifications Relevant to the Susitna Project:

Client: Bechtel, Inc.

- Seismic refraction survey for Rio Grande Rositas Dam site, Bolivia.
- Electrical resistivity and streaming potential surveys for seepage studies, Colstrip Dam, Montana, Ludington Reservoir, Michigan, and Churchill Falls (Labrador), Newfoundland.
- Marine seismic refraction and acoustic profiling for nuclear power plant site, Republic of China.
- Seismic refraction surveys and gravity profile, Duane Arnold power plant, Cedar Rapids, Iowa.



JEROME S. NELSON

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Surface Geophysical and Down-Hole Surveyor

- Magnetometer survey for nuclear power plant site, Columbus, Georgia.
- Magnetic profiles for nuclear power plant site, Pensacola, Florida.
- Seismic refraction survey for uranium enrichment plant, Dothan, Alabama.
- Cross-hole seismic surveys for P- and S-wave velocities and elastic moduli, Blue Hills nuclear power plant, Texas.
- Seismic refraction and cross-hole surveys for P- and S-wave velocities and elastic moduli, crusher plant, South Africa.
- Cross-hole and downhole surveys for Waste Isolation Pilot Plant, Carlsbad, New Mexico.
- Client: U.S. Corps of Engineers,<sup>2</sup>
- Geophysical surveys in test fills, Butler Valley Dam and Blue Lake Project, Humboldt County, California (San Francisco District).
- Seismic refraction survey, Warm Springs Dam, Sonoma County, California (San Francisco District).
- Seismic refraction surveys for depth, Parks Bar and Dry Creek Dam sites, Sacramento County (Sacramento District).
- Seismic waterfront survey to define geology and excavation characteristics of spillway site, Adobe Dam, near Phoenix, Arizona (Los Angeles District).

Other Clients:

- Seismic refraction survey for Monashka Dam and Reservoir, Kodiak Island, Alaska. Client: International Engineering Company.<sup>3</sup>
- Seismic refraction surveys for Oroville Dam, California (while with the State of California Department of Water Resources).

JEROME S. NELSON

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Surface Geophysical and Down-Hole Surveyor

- Electrical resistivity application to geothermal exploration, Imperial Valley, California. Client: U.S. Bureau of Reclamation.
- Cross-hole and downhole seismic surveys for P- and S-wave velocities, Diablo Canyon nuclear power plant near San Luis Obispo, California. Client: Pacific Gas & Electric Company.
- Cross-hole seismic survey and wavefront analysis to detect coal mine cavities, school site, Kingston, Pennsylvania. Client: Wyoming Valley West School District.
- Downhole seismic survey for P- and S-wave velocities and elastic moduli for dynamic analysis, Trampas Canyon Dam site, Orange County, California. Client: Owens-Illinois, Inc.

Client References:

Project Name: Various Refraction Surveys  
Mr. Cole McClure, Bechtel, Inc.  
50 Beale Street  
San Francisco, California 94105  
(415) 768-8214.

Project Name: Geophysical and Refraction Surveys  
Mr. Lee Knupple  
Los Angeles District  
U.S. Army Corps of Engineers  
300 North Los Angeles Street  
Los Angeles, California 90053  
(213) 688-5469.

Project Name: Manashka Dam  
Mr. Pablos Chavez  
International Engineering Company  
220 Montgomery Street  
San Francisco, California 04105  
(415) 544-1200.

# HARZA-EBASCO

RUSSELL A. PAIGE

Job Title: Supporting Exploration Services

Work Location: Anchorage

Education: Master of Science in Geology  
1959; University of Washington  
Bachelor of Science in Geology  
1955, University of Alaska

Special Qualifications: Resident Geologist - Uribante and Bath  
County Hydroelectric Development Projects  
Naval Geologist - Polar regions  
Road Geologist - Alaska  
Geological Survey - Alaska

Professional Registration: Registered Geologist - California  
Certified Engineering Geologist - California

Parent Company: Harza Engineering Company

## Experience and Qualifications Relevant to the Susitna Project:

July 1979 to Present: Senior Geologist, Department Head. Responsible for supervision and review of field investigations for major hydroelectric projects for the company. Technical Expertise in planning and supervision of core drilling, geologic mapping, damsite evaluation, seismic hazard evaluation and miscellaneous exploration programs. Other duties include preparation and review of reports, liaison with design engineers, cost estimating, preparation of proposals, contract documents, specifications, and contract administration.

- As project geologist during construction of the Strontia Springs Dam, a 300-ft.-high thin-arch concrete dam near Denver, Colorado, was responsible for detailed geologic mapping rock slope stability, foundation integrity of the dam and all related structures. Duties involved preparation of miscellaneous technical reports, and preparation of the final project geology report.
- For the proposed concrete arch dam in the Tarryall Mountains for the City of Thornton, Colorado, carried out dam site evaluation, geologic mapping, core drilling, and seismic hazard evaluation.

RUSSELL A. PAIGE  
Supporting Exploration Services

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- Conducted a five week feasibility study for a dam on the Jari River, Amazon Basin of NE Brazil.
- Responsible for supervision and review of field geology and design drilling for the San Lorenzo Hydroelectric Project, El Salvador. Feasibility studies for the El Nispero and Remolino Hydroelectric Projects, in Honduras.
- Evaluated five damsites for the Sula Valley Flood Control Project, Honduras. Participated in studies of dam construction material for the Dominican Republic and the United States.

February 1976 to December 1976: Resident Geologist on the Uribante-Caparo Hydroelectric project Venezuela; Harza Engineering Company International. Responsible for detailed geologic mapping at dam sites and tunnel alignments, assistance to design, supervision of core drilling, evaluation of construction material, and preparation of reports.

April 1975 to January 1976: Resident Geologist on the Chimbo River Hydroelectric Project Harza Engineering Company, Ecuador. Responsible for prefeasibility geologic mapping, detailed geologic studies of numerous development schemes, assistance to design, preparation of the prefeasibility geologic report, estimating and planning core drilling and adit exploration for feasibility-stage studies.

February 1974 to March 1975: Resident Geologist at the Foot-hills Project, a 300 foot high concrete arch dam in Denver, Colorado. Duties included planning and estimating core drilling programs, contract administration, assistance to design, preparation of the geologic report, supervision of geologic mapping, core drilling, core logging, and water pressure testing.

February 1973 to December 1973: Resident Geologist at Patia 405, a 825-foot high rockfill dam in Columbia. Responsible for geologic mapping, core drilling and logging, water pressure testing, mapping exploration adits, and preparation of the feasibility report.

June 1972 to February 1973: Geologist, Geotechnical Division, Harza Engineering Company, Chicago. Responsibilities included planning and supervision of field investigations; preparation of geologic reports; assistance during design.

- Resident Geologist at Stony Creek Pumped-Storage Project Pennsylvania. Duties consisted of core logging, geologic



RUSSELL A. PAIGE  
Supporting Exploration Services

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mapping, detailed studies of joint patterns, and preparation of reports.

- Resident Geologist at VEPCO's 2100 MW Pumped-Storage Project in Bath County, Virginia. Duties included core logging, reconnaissance and detail geologic mapping, supervision of core drilling, and special subsurface structural studies involving oriented core techniques.

November 1963 to June 1972: Engineering Geologist, Naval Civil Engineering Laboratory, Polar Division, Port Hueneme, California. Specialized in engineering geology problems of snow, ice, and frozen ground as related to the location of camps, roads, airfields, and other Naval facilities in the polar regions. Applied research included studies to determine seasonal changes in the strength properties and bearing capacity of sea ice for heavy cargo aircraft, docking areas, floating platforms, and other sea ice structures. Was advisor to the U.S. Naval Civil Engineering Corp., Task Force 43, Antarctica.

November 1962 to November 1963: Engineering Geologist, Haner, Ross, and Sporseen, Consulting Engineers, Portland, Oregon. Responsible for geologic mapping of three dam sites, foundation and geologic studies for pipeline, canal, and irrigation projects. This work involved shallow-zone seismology, surveying, and supervision of core drilling programs.

April 1962 to September 1962: Mining Geologist, Self-Employed. Engaged in mineral exploration for a private organization. Evaluated numerous mines and mineral deposits in Nevada, Oregon, Washington, British Columbia, and Alaska.

July 1959 to April 1962: Engineering Geologist, Kiewit Sons Co., Vancouver, Washington. Classified material from excavation projects, did cost estimations. Knowledge of shallow zone seismology important in this work.

September 1957 to June 1959: Graduate Student and Assistant Engineer, Bureau of Public Roads, Fairbanks, Alaska. Carried out a variety of geological tasks in remote road routing and construction projects and simultaneously carried out field research for M. Sc. thesis, University of Washington.

May 1955 to May 1957: Geologist, U.S. Geological Survey, Engineering Geology Branch, College, Alaska. Duties consisted of geologic mapping, reports, and research on frost action and permafrost.



RUSSELL A. PAIGE  
Supporting Exploration Services

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Technical Papers  
and Articles:

- "Floor Foundation Stabilization in Permafrost at Barrow Alaska," Proceedings, Tenth Annual Symposium on Engineering Geology and Soils Engineering, University of Idaho, Moscow, Idaho, April 1972.
- "Engineering Geology in the McMurdo Sound Region, Antarctica," Proceedings of the 1966 Annual Meeting, Association of Engineering Geologists, October, 1966, also the Bulletin of the A.E.G., Vol. 4, No. 1, January 1967.
- "Petrographic Studies of Sea Ice in McMurdo Sound, Antarctica," Transactions, Sixth Western National Meeting, American Geophysical Union, Vol. 47, No. 3, September 1966.
- "Advance of the Walsh Glacier," Journal of Glaciology, Vol. 5, No. 42, October 1965.
- "Two Examples of Applied Engineering Geology: Mosier, Oregon, and Petersburg, Alaska," Proceedings of the 15th Alaskan Science Conference, University of Alaska, 1964.
- "Frost Heaving of Piles with an Example from Fairbanks, Alaska," U.S. Geological Survey Bulletin 1111-1, 1963 (co-author).
- "Geology of the Fairbanks D-1 Quadrangle, Alaska," Geologic Quad. Map Series, U.S. Geological Survey. Map GQ 124.
- "Geology of the Mt. Hayes D-4, Quadrangle, Alaska," Geologic Quad. Map Series, U.S. Geological Survey. Map 1-394.
- "Subglacial Stoping, or Block Caving; a Type of Glacial Ablation," Journal of Glaciology, Vol. 2, No. 20, October 1956.
- "Tertiary Geology of the Cheyenne Creek Area, Alaska," Unpublished M.Sc. Degree Thesis, University of Washington, 1959.

RUSSELL A. PAIGE  
Supporting Exploration Services

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Client References:

Project Name: Bath County Pumped Storage Project  
Virginia Electric and Power Company  
Powerstation Engineering and Construction  
P.O. Box 564  
Richmond, Virginia 23204  
Mr. J. M. Hagood, Jr.  
(804) 771-6103

Project Name: Uribante-Doradas Project  
CADAPE  
Ave. Sanz, El Marques  
Caracas, Venezuela  
Ing. Hernan Boulton

# HARZA-EBASCO

MICHAEL PAVONE

Job Title: Senior Engineer - Dam Design

Work Location: Bellevue

Education: BCE-Civil Engineering  
1973, Manhattan College  
MCE-Geotechnical Engineering  
1978, Polytechnic Institute of New York  
Special Course on Embankment Dams  
1980, University of Missouri

Special Qualifications: Pre-feasibility & feasibility-level studies in Alaska. Reviewed design of Bath County

Professional Registrations: Professional Engineer, State of New York, 1978  
Member - International Society for Soil Mechanics and Foundation Engineering

Parent Company: Ebasco Services Incorporated

## Experience and Qualifications Relevant to the Susitna Project:

January 1982 to Present: Senior Engineer in the Seattle office's consulting Engineering Department. Performed pre-feasibility assessments for two hydroelectric power plants in Alaska, as part of the Railbelt Alternatives Study.

- Performed feasibility-level studies for the Grant Lake hydroelectric project in Alaska which culminated in the Interim Report.
- Performed a feasibility study for Taiwan Power Company assessing the potential for storing No. 6 fuel oil in pond in lieu of conventional tanks. The study culminated in the preparation of preliminary designs and cost estimates.

July 1980 to January 1982: Senior Engineer in the New York office's Consulting Engineering Department.

- Performed complete design review of two zoned earth and rockfill dams at the Bath County Pumped Storage project. Responsibilities included review of all analyses, technical

MICHAEL PAVONE  
Senior Engineer - Dam Design

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reports, field specifications, laboratory and field tests and all field subsurface exploration. This work culminated in the preparation of a report to Allegheny Power System that presented review findings and recommendations.

- Performed hydropower potential assessment of five dams along the Lower Arkansas River for the Army Corps of Engineers, Little Rock District. The study included an assessment of the affects of operating hydro machinery on the powerhouse soil/pile foundation as well as on the adjacent pile supported dams.

May 1978 to July 1980: Engineer in the New York office responsible for all engineering and design activities for three Seismic Category I zoned earth and rockfill dams at the Shearon Harris nuclear power plant. Responsibility included: performing various stability analyses; design of embankment features and instrumentation; development of design specifications; development and coordination of laboratory testing as well as field test fills to satisfy static and dynamic state-of-art finite element analyses; provided liaison with field activities and was responsible for initiation of office design changes and review of field design change requests. (Note: This work activity responsibility continued through September, 1981.)

May 1977 to May 1978: Associate Engineer in the New York office responsible for geotechnical engineering at the Waterford Nuclear Power Plant. Responsibilities included numerous slope stability studies; plant settlement and earth pressure analyses; design of sheet pile - supported excavations; and review of an extensive subsurface instrumentation program. Responsibility also included preparation and coordination of all geology, seismology and foundation engineering sections of the Final Safety Analysis Report (FSAR) for submittal to the U.S. Nuclear Regulatory Commission. Part of this activity included providing expert testimony to the Advisory Committee on Reactor Safety (ACRS).

- Field assignments at Waterford included performing geologic mapping of the plant foundations.
- Geotechnical Engineer for the tailings dams at the Erie Mining Company taconite mines in Minnesota. Responsibilities included developing a laboratory testing program, and performing numerous stability analyses for their proposed 300-foot-high dams.



MICHAEL PAVONE  
Senior Engineer - Dam Design

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Engineer in charge of all geotechnical engineering activities for two fossil-fuel power plants including field exploration, laboratory testing, foundation selection and ash pond embankment dam design.

May 1973 to May 1977: Assistant Engineer in the New York office responsible for geotechnical engineering studies at the St. Lucie Nuclear Generating Station. Work activities included liquefaction analyses of foundation materials, slope stability analyses of Seismic Category I earth embankment structures and stability analyses of the various plant structures.

- Field assignments at St. Lucie included coordination of subsurface boring investigations, quality control supervision of seismic refraction surveys and inspection of pile driving activities.
- Geotechnical engineer for the Allens Creek Nuclear Generating Station. Work activities included; performing slope stability analyses for all Seismic Category I embankment dams; developed nonlinear static material properties for use in state-of-art finite element dam stability analyses; performed complete settlement analysis for all plant structures.
- Performed detailed foundation studies into settlement characteristics of large diameter floating roof fuel oil tanks at four oil-fired generating stations.
- Designed several deep braced excavations for the Neal 4 and Pawnee 1 and 2 coal-fired generating stations. One project involved a large open circular 90-foot-diameter and 50-foot-deep ring beam-supported excavation along a river front which also incorporated sheetpile cells for support.
- Geotechnical Engineer for the Philippine Nuclear Power plant. Responsibilities included coordination and supervision of all laboratory tests performed on foundation soils and rock; developed nonlinear static and dynamic properties for soil and rock materials for use in state-of-art finite element analyses.

#### OTHER EXPERIENCE

1972: Field geotechnical technician for the Port of New York Authority.



MICHAEL PAVONE  
Senior Engineer - Dam Design

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Client References:

Project Name: Army Corps of Engineers, Little Rock  
District  
Mr. Carroll D. Winter  
P.O. Box 867  
Little Rock, Arkansas 72203  
501/378-5664

# HARZA-EBASCO

JOHN J. QUINN

Job Title: Electrical Engineering

Work Location: Bellevue

Education: Bachelor of Science in Electrical Engineering  
1968, Illinois Institute of Technology  
Bachelor of Arts in Math-Physics  
1960, St. Joseph's College, Rensselaer, Indiana

Professional Registration: Illinois

Parent Company: Harza Engineering Company

Experience and Qualifications Relevant to the Susitna Project:  
January 1968 to Date: Harza Engineering Company, Chicago, Illinois.

- Boundary Project - Underground powerhouse located in the State of Washington. Lead Electrical Engineer. Preparation of equipment design memos, procurement specifications for two 210 MVA, 128.6 rpm generators and bid analysis; initiated design of controls, protective relaying and instrumentation; and initiated preparation of construction drawings.
- Yacyreta Project - twenty 172 MVA Unit powerhouse, 220-kV SF<sub>6</sub> switchyard and navigation locks located in Argentina. Electrical Lead Engineer responsible for project coordination; preparation of design studies, electrical equipment technical specifications and review of design; feasibility study of 220-kV transmission line utilizing oil-filled cable and SF<sub>6</sub> bus.
- San Lorenzo generating station with two 87 MVA units and 115 kV switchyard in El Salvador. Lead Electrical Engineer in preparation of generator procurement specifications, design criteria and electrical construction drawings, and review of manufacturers' drawings.
- 138-kV Transmission Line System relay study. Project Engineer on the relay coordination study for the complete transmission in Honduras.

- Mayfield Powerhouse Expansion, Tacoma, Washington, U.S.A. Senior Design Engineer responsible for preparation of powerhouse and substation electrical equipment specifications and designs for the addition of a 45 MVA generator.
- Rio Lindo Project, Honduras, C.A. Senior Design Engineer for expansion of the present Rio Lindo powerhouse and switchyard to accommodate two additional generating units of 21 MVA each. Supervision, coordination and review of all electrical design facets, including preparation of contract documents, engineer's estimates, evaluation of bid proposals, construction drawings, review of equipment manufacturers' drawings and assistance to field during construction stage.
- Karun EHV Transmission System, Tehran, Iran. Design Engineer. Preparation of preliminary and review of final substation control design; review manufacturer's design of 230 kV and 400 kV power circuit breakers and current transformers, 15 kV metalclad switchgear, 230 and 400 kV coupling capacitor potential devices and lightning arresters, 230 and 400 kV disconnecting switches, control switchboards; and preparation of electrical equipment and cost estimates for four 230/400 kV substations.
- Sucre Power Plant, Sucre, Bolivia. Design Engineer. Start-up and inspection of three unit, 10 MVA, 10 kV diesel-generator powerhouse and switchyard.
- Cornell Hydroelectric Plant, Wisconsin, U.S.A. Design Engineer. Responsibilities included preparation of specifications, design of controls and protective relaying for automatic operation of a four unit hydroelectric powerhouse.
- Medan Electric Power System, Sumatra, Indonesia. Design Engineer. Responsibilities included preparation of specifications, design, estimates, equipment selection for a 30 MVA, six unit diesel powerplant and 20 kV switchyard.
- South Carolina Public Service Authority, Santee Cooper Hydroelectric Plant, U.S.A. Design Engineer, responsible for preparation of design and specifications for the generating station and 115 kV switchyard including supervisory control.

JOHN J. QUINN  
Electrical Engineering

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- Central Nebraska Public Power District Hydroelectric Plants and Irrigation System, U.S.A. Preparation of specifications for the supervisory control equipment to control three unattended hydro plants and thirteen irrigation structures from the central office.

June 1960 to January 1968: Rauland Corporation, Chicago, Illinois. Electrical Engineer. Design engineering, procurement, installation, testing, and operation of electrical facilities for a three plant 25,000 kVA industrial system in Chicago.

Client References:

Project Name: Boundary Hydroelectric Project  
Seattle Department of Lighting  
1015 Third Avenue  
Mr. Dean Sunquist  
(206) 625-3056

# HARZA-EBASCO

DONN RUOTOLO

Job Title: Bellevue Office Engineering Manager

Location: Bellevue

Education: Bachelor of Engineering in Civil Engineering  
1947, Yale University  
AMA Management Courses

Special  
Qualifications: More than thirty-four years of experience in management, planning, consulting, estimating, engineering, design and construction of hydroelectric, fossil fueled power, nuclear power and industrial projects.

Professional  
Registration: Registered Professional Engineer in the states of California, Michigan and New York.

Parent Company: Ebasco Services Incorporated

## Experience and Qualifications Relevant to the Susitna Project:

1980 to Present: Presently Manager of Projects, Placerville, California office, responsible for overall management on several hydroelectric developments. Has served on Ebasco's Technical Review Board in reviewing feasibility studies and estimates performed for the Alaska Power Authority on Tyee Lake, Terror Lake, Grant Lake and the Susitna Hydroelectric Project. In 1981, identified the potential use of tunnel boring machines on the Terror Lake Project, and presented findings to the Kodiak Electric Association and APA. Has participated in reconnaissance of the Watana and Devil's Canyon Sites, and in detailed reviews of estimates, which has already familiarized him with the Susitna Project.

- Auburn Dam - Engaged as a consultant to the Amerian River Authority to analyze their participation with the Bureau of Reclamation in constructing the Auburn Dam, and to represent them in negotiations with the Bureau and potential power purchasers for the 300 MW power generation.
- Upper Mountain Project, South Fork American River. A multi-purpose water and hydroelectric project for the El



DONN RUOTOLO  
Bellevue Office Engineering Manager

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Dorado Irrigation District and the El Dorado City Water Agency. Responsibilities include managing and planning, site exploration and supplementing FERC Licensing activities and State Water Rights Application

- Other active work includes a feasibility study for a Hydroelectric Development on the Mokelumne River for Amador County, California and several small hydroelectric units for the El Dorado Irrigation District.

1977 to 1980: Director of Project Planning Department. Directed Planning Department which is responsible for preliminary planning and scheduling of hydroelectric, fossil, nuclear, and special projects. Maintained surveillance, troubleshooting and auditing of ongoing projects. Established policies and procedures to insure compatibility of budgets and schedules at all phases of engineering and construction. Analyzed productivity and control systems to improve planning, scheduling and cost/schedule control functions.

1970 to 1977: Project Manager. Responsible for planning, directing, coordinating, controlling and evaluating the Company's activities on the 1872 MW Ludington Pumped Storage Project in Michigan, the largest of its kind in the world. Previously occupied a similar position on a 1000 MW pumped storage project in West Virginia. Preliminary activities included feasibility studies of underground vs. surface powerhouse, tunnel layouts and preparation of FPC exhibits, extensive site exploration, design of storage facilities, studies of start-up methods, optimization of hydraulic equipment and preparation of specifications for major equipment. Conducted prequalification investigations of foreign sources of hydroelectric equipment including site investigations of manufacturing and laboratory facilities in Japan and Europe. Evaluated proposals for pump-turbines before suspension of activities pending affirmative action on the FPC application. Supervised preparation of estimates, economic studies and cash flows. Testified before FPC in support of license application.

1969 to 1970: Manager Construction Planning, Construction Department. Responsible for planning field organization, construction schedules, construction equipment and facilities for hydro, fossil-fueled and nuclear generating units in preliminary phases. Assisted in special problems associated with scheduling and construction. Responsible for coordinating between Construction and Estimating Departments on all types of estimates and Business Development Department on new business proposals.

DONN RUOTOLO  
Bellevue Office Engineering Manager

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1965 to 1969: Civil Engineer - Consulting Department. Responsible for preparation of feasibility study of the South Fork American River Basin in El Dorado County, California, involving 12 dams, 6 power plants, 2 pumping stations, 19 miles of tunnels and 18 miles of pipe conduits over 8 feet in diameter. Field work on reconnaissance of sites, collection of pertinent data, and discussions with many Federal, State and local agencies involved in hydroelectric developments.

- On six dams on Madison and Missouri Rivers in Montana made inspection and prepared report to meet requirements of FPC Safety Regulations; two concrete gravity, one concrete arch, one earthfill and two timber crib dams in severe earthquake zones. Recommendations for remedial work were implemented, including post tensioning to improve stability of one dam.
- Made site reconnaissance and engineering feasibility study of a port and highway development in Ecuador, S.A.

1955 to 1965: Supervising Engineer. In charge of estimating costs of civil engineering features of hydro and steam electric stations and industrial plants.

- In preparation of competitive bids for turnkey projects, performed site reconnaissance and assisted in selection of most attractive layouts and designs. Assisted Construction and Engineering Departments in negotiations with contractors. Priced contract proposals for use in evaluation of bids. Recommended potential hydroelectric sites on the Euphrates River in Turkey from its headwaters to the Syrian border, and one site on the Sariyar River. Investigated for facilities at Istanbul and Iskenderun and performed detailed route reconnaissance to the site. Collected data on Turkish industrial capabilities, labor conditions, import restrictions, and construction costs, to select the most economical type and size of the dams for the Keban HED (680 foot high rockfill) with two 50 feet x 2300 feet long concrete-lined tunnels and Gokcekaya HED (500 foot high arch) with a 32 foot x 1400 foot long concrete-line tunnels diversion tunnel. Analyzed construction plant and prepared list and specifications for construction equipment. Assisted successful negotiations with AID and World Bank officials for loans to finance those projects.
- Made reconnaissance and site studies of potential thermal electric station sites in the Istanbul area of Turkey.

DONN RUOTOLO  
Bellevue Office Engineering Manager

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- Supervised estimates and/or cost control for the following hydroelectric projects:

Yuba Bear River Development - five dams up to 270 feet high, two power plants 61 MW, 10-foot horseshoe tunnels 1,100 feet long.

Upper Smith Mountain Pumped Storage Project 170 MW;  
Yards Creek Pumped Storage Project - 330 MW - 780 foot head, power tunnel, 20 feet x 1500 feet in New Jersey.

Noxon Rapids HED - 400 MW concrete gravity dam 270 feet high, earthfill dikes in Montana.

- Made reconnaissance of site, port facilities and access routes in Northern Spain. Collected cost data and negotiated with contractors which contributed to preparation of successful competitive bid for the BWR nuclear station. Evaluated economics of transporting 330 ton reactor vessel from port to site for comparison with cost of field fabrication.

1947 to 1954: Engineer. (Design Office and Site Offices)

Client References:

Project Name: Upper Mountain Project, South Park American River  
Mr. Frederick C. Mikain  
El Dorado Irrigation District  
P.O. Box 1608  
Placerville, California 95667  
916/622-4513

Project Name: Auburn Dam  
Mr. Edwin Koster  
Chairman American River Authority  
P.O. Box 3218  
Auburn, California 95604  
916/885-2411

# HARZA-EBASCO

ZUBAIR A. SALEEM

Job Title: Hydrogeologist

Work Location: Anchorage

Education: New Mexico Institute of Mining Technology  
Ph.D. - Hydrology - 1969  
Panjab University, Lahore - BS and MS  
1959, 1961  
University of California, Los Angeles  
Short Course - Systems Analysis of  
Large Scale Water-Resources Systems  
1968  
Society of Professional Engineers, Chicago  
Short Course - Liability for Profes-  
sional Engineers - 1977

Special  
Qualifications: Dr. Saleem has over twenty years experience in hydrologic, geologic and geophysical studies including field studies, computer modeling, groundwater quality investigations and regional groundwater resource evaluations. Responsibilities include planning, management, and execution of groundwater studies, Safety Analysis Reports and Environmental Reports; proposal preparation and presentations to clients. The hydroelectric projects experience include the monitoring program for the Karun Dam (formerly Reza Shah Kabir Dam) in Iran, for the prediction and control of seepage; a study of the optimum operating policies for the operations for the Guri reservoir system Venezuela, for hydroelectric generation and for other water uses; Seismic refraction survey of the Tarbela dam-site in Pakistan; and electrical resistivity surveys for the determination of depth to the bedrock at Babar Kachh Dam Sites, Pakistan.

Professional  
Registration: Professional Geologist - Delaware  
Certified Professional Geologist - Indiana

Parent Company: Ebasco Services, Incorporated



ZUBAIR A. SALEEM  
Hydrogeologist

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Experience and Qualifications Relevant to the Susitna Project:

1979 to Present: Dr. Saleem is currently Senior Principal Hydrogeologist in the Earth Sciences Group of Ebasco Services and is geosciences-geotechnical manager for the Licensing Project Manager Project of the Office of Nuclear Waste Isolation, Battelle Project Management Division.



ZUBAIR A. SALEEM  
Hydrogeologist

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REPRESENTATIVE EBASCO EXPERIENCE

<u>Client</u>	<u>Project</u>	<u>Position</u>
Carolina Power and Light Co.	Shearon Harris Units 1-4, 3600 MW	Lead Geophydrologist
National Power Corporation of Philippines	Philippine Nuclear Plant Unit No. 1	Groundwater Modeler
Florida Power & Light Co.	St. Lucie Nuclear Power Plant	Review
Washington Public Power Supply System	WPPSS Units 3 & 5	Groundwater Supply and Review
W.R. Grace Co./U.S. Department of Energy	Coal Gasification Demonstration Plant	Siting Investigations
U.S. Department of Energy	Eastern Geothermal Drilling Project	Lead
U.S. Department of Housing of Urban Development	District Heating and Cooling Using Geothermal Resources, Berline, Maryland	Lead
Office of Nuclear Waste Isolation, Battelle Project Management Division	Definition of Instrumentation Technology Development needs for a mined geologic repository	Support
Office of Nuclear Isolation, Battelle Project Management Division	Licensing Project Manager	Geosciences-Geotechnical Manager

1976 to 1977: Dr. Saleem served as hydrologist in the Hydrology and Environmental Division of Harza Engineering Company and was responsible for the supervision of groundwater hydrology aspects of projects.

Groundwater contamination potential from a disposal pond site; evaluation and control of seepage from a large dam on a hydro-

ZUBAIR A. SALEEM  
Hydrogeologist

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electric project; potential of artificial recharge of groundwater in the Great Salt Lake basin; urban storm water quality model; review and writing of technical proposals.

1970 to 1979: Dr. Saleem was Associate Professor, at the University of Illinois, Chicago, in charge of their hydrology program. He was responsible for teaching and research in hydrology. Taught undergraduate management, engineering geology, computer applications in geology, hydrology, hydrogeochemistry, environmental geology, an introductory geology. Advised and supervised M.S. and Ph.D. students. Developed, managed and supervised several hydrologic projects.

- A study for the optimal utilization of water resources of Northeastern Illinois; analysis of aquifer characteristics of Long Island for the Suffolk County, New York; drawdown distribution due to well fields in coupled leaky aquifers; investigation of the clogging and contamination of aquifers due to artificial recharge; development of a computer model for the simulation of transport of contaminants in aquifer systems; setup of a modern water-quality laboratory for analyses of major and trace elements in water; investigation of effects of road salts on quality of waters of an urban basin; study of the hydrogeochemistry of groundwaters of the Chicago Metropolitan area; evaluation of underground compressed air energy storage - underground pumped hydro storage development cost and potential. Funded by the U.S. Dept. of Energy through the Argonne National Laboratory (ANL), Argonne; evaluation of candidates for senior-level hydrogeology positions for Agency for International Development; heat pump centered integrated community energy systems using aquifers. and; review of mathematical, experimental, and computer models for the simulation of seepage from uranium tailings for the U.S. Department of Energy through ANL.

1965 to 1970: Dr. Saleem was Research Assistant, Assistant Hydrologist and Visiting Hydrologist at the New Mexico Institute of Mining & Technology.

He acted as Co-Principal Investigator of the Pecos River Basin Interdisciplinary Project involving quantitative analysis of a complex overdrawn irrigated basin in a semiarid climate. Supervised other assistants and taught the course on "Theory of Groundwater Motion". Funded by the Office of Water Resources Research (OWRR). Principal Investigator, "simulation of coupled leaky aquifer systems", funded by OWRR.

ZUBAIR A. SALEEM  
Hydrogeologist

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Research included: development of a stochastic dynamic programming model; a method for the simulation flow in multiaquifer systems; computer method for the pumping test analysis; salt-water encroachment in leaky aquifers and times of travel for an impulse in multiaquifer systems.

Client References:

Project Name: Battelle Memorial Institute  
505 King Avenue  
Columbus, Ohio 43201  
Dr. R.W. Klingensmith  
414/424-7478

Project Name: Shearon Harris Dams, North Carolina  
Carolina Power & Light Company  
336 Fayetteville Street  
P.O. Box 1551  
Raleigh, North Carolina 27602  
Mr. Steve Whatley  
919/836-6111

Project Name: Philippine Nuclear Plant Unit #1  
National Power Corporation  
Nuclear Power Department  
Port Area, Manila, Philippines  
Mr. Jose Torres  
Tel. 011-63-47-21-41

Publications  
and Reports:

Electrical resistivity investigations of the Baber Kachh dam sites, Sibi District, Pakistan: Geol. Bull. Pan. Univ., no. 4, 17-22, Dec., 1964.

Tables of drainage function, special publication of N. M. Institute of Mining and Technology, pp. 7, 1966.

A computer method for pumping-test analysis: Journal of Groundwater, v. 8, no. 5, 21-24, 1970.

Dynamic programming model and quantitative analysis, Roswell Basin, New Mexico: N. M. Water Resources Research Institute Report No. 10, pp. 180, (with C.E. Jacob), April, 1971.

Optimal use of coupled leaky aquifers, Water Resources Research, vol. 7, no. 2, 382-393, (with C.E. Jacob), April, 1971.

Time of travel of an impulse in leaky and nonleaky aquifers, presented at the annual meeting of the Amer. Geophysical Union, April, 1971. Abs. in EOS, v. 52, no. 4, April, 1971.

Lead content of soils along Chicago's Eisenhower and Loop-Terminal Expressways, Arc. of Environmental Contamination and Toxicology, v. 1, no. 3, 209-233, (with W.C. Coello and M.A.Q. Khan), 1973.

Simulation of Coupled Leaky Aquifers and Surface Water Systems: New Mexico Water Resources Research Inst., Rep. No. 17, 70 pp., 1973.

Clogging in simulated glacial aquifers due to artificial recharge: Water Resources Research, v. 9, no. 4, 1047-57, August, (with David P. PIPLEY), 1973.

Method for numerical simulation of flow in multiaquifer systems: Water Resources Research, v. 9, no. 5, October, 1973.

Drawdown distribution due to well fields in coupled leaky aquifers:

1. Infinite aquifer system: Water Resources Research, v. 9, no. 6, December, (with C.E. Jacob), 1973.

Drawdown distribution due to well fields in coupled leaky aquifers:

2. Finite aquifer system: Water Resources Research, v. 10, no. 2, April, 1974.

Ecological effects of lead in auto exhaust, in Survival in Toxic Environments, edited by M.A.Q. Khan and J.P. Bederka, Jr., Academic Press, (with W.F. Coello and M.A.Q. Khan), 1974.

ZUBAIR A. SALEEM  
Hydrogeologist

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Opening and Welcoming Addresses, Decade of  
Progress in Water Resources, presented at  
the Tenth Amer. Water Resources Conf.,  
Puerto Rico, (with S.C. Csallany), 1974.



# HARZA-EBASCO

ERVIN W. SCARLETT, JR.

Job Title: Surface Geophysical and Down-Hole Surveyor  
Work Location: Anchorage  
Education: University of South Carolina - BS - Geology  
1970  
Duke University - MS - Geology/Geophysics -  
1979  
Special  
Qualifications: 1) Commerical Pilot  
2) Experienced in conducting geophysical  
exploration projects  
Professional  
Registration: None  
Parent Company: Ebasco Services, Incorporated

## Experience and Qualifications Relevant to the Susitna Project:

1979 to Present: Mr. Scarlett is presently geophysicist in the Earth Sciences Group of Ebasco Services Incorporated. He has recently conducted a seismic refraction survey for the Alaska Power Authority's Grant Lake Project, performed a feasibility study assessing geothermal potential for a deep well in eastern Maryland and provided geotechnical input for review and revision of the proposed SAR for siting a nuclear waste repository for the office of NWTS Integration, Battelle Project Management Division.

- Designed and carried out numerous seismic refraction investigations including a seismic refraction exploration program for the Upper Mountain of the El Dorado Irrigation District project on the South Fork of the American River in California.
- Planned and conducted search for a borrow source for the main reservoir dam at the Shearon Harris Nuclear Power Plant in North Carolina, planned and conducted field investigations to lay out borrow area boundaries and assisted in development of borrow area. He also planned and conducted quarry investigation and laid out quarry boundaries, configurations, and development sequences and carried out investigations including coring and seismic refraction. Participated in the preparation of the geology/seismology

ERVIN W. SCARLETT, JR.                      -2-  
Surface Geophysical and Down-Hole Surveyor

section of the Final Safety Analysis Report for this project.

- Participated in seismic risk analysis for a nuclear power plant site in the Philippines and was involved in evaluation of a volcanic-seismic surveillance network proposed for the same site. He also prepared portions of the Final Safety Analysis Report for this project.
- Conducted geophysical investigations for water well siting at recreation areas of the U.S. Corps of Engineers Wilmington District's B. Everett Jordon Lake Project.
- Also reviewed field test instrumentation for a study of instrument technology research and development needs for a mined geologic repository for Battelle Memorial Institute's Office of Nuclear Waste Isolation.

1976 to 1979: Duke University, Durham, North Carolina; Engaged in studies leading to Master of Science degree, served as a Research Assistant to Dr. B. R. Rosendahl, and participated in a geophysical research cruise aboard Research Vessel Wecoma with scientific personnel from Scripps Institution of Oceanography and Oregon State University. M.S. Thesis Title - "A Cross-Ridge Seismic Refraction Survey of the East Pacific Rise at 10° South".

1979 to 1976: United States Marine Corps; Regular Officer. Designated Naval Aviator, Squadron Pilot (F-4J).. At various times served as Officer in Charge (OIC of Power Plants, OIC of Hydraulic Shop, OIC of Metal Shop, and Airframes Division Officer; Beaufort, South Carolina. As Airframes Division Officer was in charge of and responsible for approximately 150 men. Served as a Flight Instructor, Naval Training Command, Pensacola, Florida.

Client References:

Project Name:                      SOFAR Project, California  
El Dorado Irrigation District  
Mr. Frederick C. McKain  
Project Administrator SOFAR  
2890 Mosquito Road  
Placerville, CA 95667  
916/622-8620

Project Name:                      Shearon Harris Dams, North Carolina  
Carolina Power & Light Company

ERVIN W. SCARLETT, JR. -3-  
Surface Geophysical and Down-Hole Surveyor

336 Fayetteville Street  
P.O. Box 1551  
Raleigh, North Carolina 27602  
Mr. Alex Custin  
919/836-6111

Project Name: Nuclear Waste Repository Siting  
Battelle Columbus Lab.  
505 King Avenue  
Columbus, Ohio 43201  
Mr. Norman C. Henderson  
614/424-6424

# HARZA-EBASCO

GUENTHER SCHEEL

Job Title: Substation Engineer

Work Location: Bellevue

Education: Bachelor of Science in Electrical Engineering 1950, Polytechnicum Giessen, Germany

Special Qualifications: Senior Engineer - Hrauneyfoss (Iceland)

Professional Registration: Wisconsin

Parent Company: Harza Engineering Company

## Experience and Qualifications Relevant to the Susitna Project:

July 1969 to Date: Harza Engineering Company, Chicago, Illinois. Senior Electrical Engineer, Electrical Department I. Duties and responsibilities include supervision, coordination and review of electrical design, including preparation of contract documents, engineer's estimates, evaluation of bid proposals, construction drawings, witnessing factory tests of electrical equipment, and assistance to field during construction stage. Worked on the following projects:

- Hrauneyjafoss Project, Iceland. Three-unit, 244.5 MVA powerhouse and 220 kV SF-6 gas insulated substation.
- El Nispero Project, Honduras, C.A. One-unit 23 MW powerhouse and 34.5/69 kV switchyard.
- Yacyreta-Apipe project, Argentina, S.A. Twenty units, 3,450 MVA powerhouse and 220 kV SF-6 gas insulated substation.
- Karun River project, Iran. Four units, 1,000 MVA powerhouse, dam and 400 kV switchyard. Karun EHV Transmission System, Iran. Four 400 kV substations. Gotvand Irrigation project, Iran.
- Finchaa project, Ethiopia. Three units, 105 MVA powerhouse and 230 kV switchyard.
- Rio Lindo project, Honduras, C.A. Two units, 42 MVA powerhouse and 138 kV switchyard. La Puerta Substation, Honduras, C.A. Expansion of 138 kV switchyard including modification of control switchboard (field assignment).

GUENTHER SCHEEL  
Substation Engineer

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November 1962 to July 1969: Erik Floor & Associates, Chicago, Illinois. Electrical Design Engineer. In charge of all electrical design and drafting of the following hydroelectric generating stations:

- Miller Ferry project, Alabama. Three units, 79 MVA powerhouse and 115 kV switchyard.
- Sarijar project, Turkey. Expansion of existing powerhouse and switchyard to accomodate two additional generating units of 44.5 MVA each.
- West Point project, Georgia. Three units, 110.5 MVA powerhouse and 115 kV switchyard.

November 1959 to October 1962: A. J. Boynton & Company, Chicago, Illinois. Electrical Design Engineer. Work consisted of preparing cost estimates, calculations, equipment selection and requisitioning, physical layouts, wiring diagrams, modernization of existing steel plant (field assignment).

January 1957 to October 1959: Laramore, Douglas and Popham, Chicago, to October 1959: Illinois. Electrical Engineer. Work included electrical engineering design work of steam-electric generating stations and switchyards.

October 1950 to December 1956: Siemens & Schuckert, Germany. Electrical Field Engineer. Supervised field erection and testing of switchgear and transformers, industrial control, and machine tool control for industrial customers of apparatus division.



# HARZA-EBASCO

FRANK S. SHURI

Job Title: Senior Rock Mechanics Specialist

Work Location: Anchorage

Education: B.S., California Institute of Technology  
Graduate Courses, Portland State University

Special Qualifications: Mr. Shuri is just completing an assignment as project engineer for rock mechanics studies for a dam at Site C on the Peace River in British Columbia. The work included large plate loading tests and large block direct shear tests and was conducted through the winter months. FSI was nominated for the Small Business Administration Subcontractor of the Year Award due to his work on the rock testing for the BWIP Project, Hanford, Washington.

Professional Registration: Geologist, State of Oregon, No. E826  
Engineering Geologist, State of Oregon, No. 826

Parent Company: Foundation Sciences, Inc.

## Experience and Qualifications Relevant to the Susitna Project:

1974 to Present: Senior Geologist and Project Manager, Foundation Sciences, Inc. Mr. Shuri has managed many projects for FSI. He directs field and laboratory studies, develops rock and soil instrumentation programs, and conducts the computer data reduction and analysis.

- Directed in-situ rock mechanics testing at Dam Site C on the Peace River in British Columbia. The work included in-situ plate loading and shear strength testing, and seismic measurements of dynamic elastic properties of rock.
- Project Manager for a program of in-situ overcoring and rock mass permeability tests at the Nevada Test Site (NTS). He was also the principal author of two manuals for the Office of Nuclear Waste Isolation, which contain state-of-the-art procedures for field and laboratory rock mechanics testing.

FRANK S. SHURI  
Senior Rock Mechanics Specialist

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- Directed an extensive series of rock mechanics tests at the Calumet Pumping Station near Chicago. He also worked on several phases of the Rock Instrumentation System to monitor the effects of heating rock in an experimental cavern at the Hanford Site, Washington, including instrument design modifications, instrument installation, test procedures, computer processing of test data, and analysis of results. The instruments include extensometers, USBM gages, vibrating wire stressmeters and thermocouples. In another phase of the project, he conducted overcoring and borehole jacking tests at the site to determine in-situ stresses.
- Field Engineer for rock instrumentation at the Forest Glen Metro Station in Washington, D.C. where he directed the use of the Goodman jack and analyzed test results. He assisted in developing cross-hole seismic equipment for use at the Ferrel Nuclear Power Plant site in Portugal, and participated in a comprehensive seismic analysis of the site which included probabilistic and deterministic earthquake potential, attenuation studies, dynamic response of various geologic units, and spectrum analysis. He conducted tests on inclined roof bolts in a study for the U.S. Bureau of Mines and determined rock properties and in-situ stresses in the Cain Street Station for the Metropolitan Atlanta Rapid Transit Authority. He has extensive experience in computer programming, data acquisition, and digital processing of geologic data. Mr. Shuri set up and managed an in-house data management program for 10,000 pieces of data weekly from Satsop Nuclear Power Plant and implemented in-house finite element analysis capability to investigate geologic problems.

1973 to 1974: Geologist, McClelland Engineers, Houston, Texas. Mr. Shuri was field supervisor of soil sampling for the South Texas Nuclear project and several other soil mechanics studies. He was soils technician for off-shore sampling in the North Sea; he also did extensive laboratory soils testing and geophysical field work.

1969 to 1973: Research Assistant, Ice Mechanics Program, California Institute of Technology. Mr. Shuri was responsible for borehole and crystal fabric photography on the Blue Glacier Project, Washington. Its objectives were to measure directly the basal sliding rate and to examine the internal structure of the glacier. He also worked on an experiment in which large single crystals of ice were subjected to torsional deformation. His duties included growing suitable crystals, manufacturing mechanical and electronic control apparatus, and monitoring preliminary testing.

FRANK S. SHURI  
Senior Rock Mechanics Specialist

-3-

Publications:

Shuri, F.S., 1975, "Pre-Construction Flow Estimate for Tunnels", Foundation Sciences' Newsletter, Vol. 9, No. 1.

Shuri, F.S., 1976, "Measurements of Earthquake Size", Foundation Sciences' Newsletter, Vol. 10, No. 1.

Shuri, F.S., Dodds, D.J., and Kim, K. (1980), Measurement of Rock Mass Deformation Properties by the Borehole Jacking Method at the Near-Surface Test Facility, RSD-BWI-TI-018, Rockwell Hanford Operations, Richland, Washington.

Shuri, F.S., 1981 "Borehole Diameter as a Factor in Borehole Jack Results", Proceeding of the 22nd U.S. Rock Mech. Symp., MIT, Cambridge, Mass.

Client References

Peace River, Site C  
Mr. Tim E. Little  
British Columbia Hydro and Power Authority  
555 W. Hastings Street  
Vancouver, BC V6B4T6  
604/663-3727

Nevada Test Site  
Mr. Rober Zimmerman  
Sandia National Laboratories  
Albuquerque, NM 87185  
505/845-0187

Near-Surface Test Facility Project:  
Mr. James L. Cheshire  
Rockwell Hanford Operations  
P.O. Box 800  
1106 Bldg., Area 1100  
Richland, WA 99352  
509/376-7988

# HARZA-EBASCO

DON K. SMITH

Job Title: Hydraulic Machinery Engineer

Work Location: Bellevue

Education: BS, Mechanical Engineering  
1949, Colorado University  
Graduate Courses - Mechanical Engineering  
1950-1953

Special Qualifications: Chief mechanical engineer for Alaskan Projects

Professional Registration: Alaska, Colorado, Washington, Virginia, Maine

Parent Company: Ebasco Services Incorporated

## Experience and Qualifications Relevant to the Susitna Project:

September 1981 to Present: Consulting Engineer in the Bellevue, Washington office serving as consultant and Project Manager and Feasibility Studies, FERC Licensing, and Final Design of Hydroelectric Projects.

September 1971 to September 1981: Executive Mechanical Engineer with R.W. Beck and Associates of Seattle, Washington where he was responsible for conducting reconnaissance, feasibility, licensing, and design phases of development for numerous hydroelectric and water resources projects. Served as project manager for feasibility level studies for the Kennebec River Project (68 MW) in Maine and feasibility and FERC licensing studies for the Black River Hydroelectric Project (30 MW) in Vermont. Responsibilities included supervision of preparation of predesign layouts, hydrological analysis, power output studies, assessment of environmental impact, preparation of cost estimates and determination of economic feasibility. Served as project manager during the permitting and design phases of the Spinney Mountain Dam and Reservoir Project in Colorado (constructed 1981) which included a 2,100,000 cubic yard embankment dam.

- As chief mechanical engineer, he had overall responsibility for designing and specifying all hydromechanical equipment including emergency and service gates, outlet valves, tur-



DON K. SMITH  
Hydraulic Machinery Engineer

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bines, governors, and turbine shutoff valves. Representative projects include the Green Lake Hydroelectric projects, Alaska (16.5 MW), Swan Lake Hydroelectric Project, Alaska (22 MW), Lake Silvis Hydroelectric Project Rehabilitation, Alaska (2.1 MW), Snowden Hydroelectric Project, Virginia (7 MW), James River Hydroelectric Project, Virginia (26 MW), Antilon Lake Pumped Storage Project, Washington (2,000 MW), and other major projects. Also performed FERC safety inspections for large hydro generating plants in the Northwest. Other experience includes serving as project engineer on Methow River Flood Plain Information Study, Washington, the Lake Washington Ship Canal Fish Ladder (design and specifications), and siting studies for nuclear and hydroelectric projects in the northwest and eastern states.

1957 to 1971: During this period Mr. Smith was employed by Tipton and Kalmbach, Inc., Denver, Colorado, where he designed and prepared specifications for much of the hydromachinery for Williams Fork Dam and Powerplant, Roberts Tunnel, and Dillon Dam; which were designed and constructed for the Denver Water Board. Other experience on these projects included bid evaluation, procurement recommendations and administration, and approval of manufacturer's drawings. Inspection of the equipment for conformity to the specifications, and consultation with the contractors and client concerning installation and operation was also a responsibility.

- On the Cumbaya Project in Ecuador, was responsible for the design of the gates and hoists, preparation of specifications for the gates, bid evaluation, approval of manufacturer's drawings, and supervision of the procurement and delivery of the gates. Also prepared the specifications for the turbines, governors, pumps, air compressors, and other equipment required in this hydroelectric plant, evaluated bids, approved manufacturer's drawings and supervised its procurement. Responsible for similar items on the Bocono Project in Venezuela and the Link Canals project in West Pakistan.
- Was project engineer on the Groundwater and Reclamation Program in West Pakistan, which involved the construction of several thousand irrigation wells to drain and reclaim waterlogged land. This included supervision of design, writing specifications, and procurement of the materials and equipment required for the project.



DON K. SMITH  
Hydraulic Machinery Engineer

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1955 to 1957: Mr. Smith was mechanical engineer in charge of all plant utilities and services of a major manufacturing plant at Rocky Mountain Arsenal.

1949 to 1952: Mr. Smith started his professional work as a product application engineer with Gates Rubber Co. in Denver.

Client References:

Project Name:

Grant Lake Feasibility Study  
Mr. Eric A. Marchegiani  
Alaska Power Authority  
334 West Fifth Avenue  
Anchorage, Alaska 99501  
907/276-0001

Spinney Mountain Project  
Mr. Chuck Wemlinger  
City of Aurora  
1470 So. Havana St.  
Duraray, Colorado  
303/694-7000

Black River Hydroelectric Project  
Mr. Michael J. Valuk  
Town Manager  
96 Main St.  
Springfield, Vermont 05156  
802/855-2104

# HARZA-EBASCO

FREDERIC G. SNIDER

Job Title: Geologic Mapping

Work Location: Anchorage

Education: Wesleyan University - M.Sc. Geology - 1975  
Amherst College - B.A. Physics - 1972

Special Qualifications: Mr. Snider specializes in the design and supervision of field geologic investigations for major power generating projects. His experience both in the United States and abroad has provided a wealth of practical geological knowledge specifically applicable to the siting and construction of major engineering structures.

Professional Registration: None

Parent Company: Ebasco Services, Incorporated

## Experience and Qualifications Relevant to the Susitna Project

1975 - Present: Mr. Snider is currently Senior Geologist in the Earth Science Group of Ebasco Services. Since joining Ebasco, Mr. Snider has participated in geological and geophysical investigations for site selection, site confirmation, and SAR preparation for nuclear generating facilities. He was involved in studies of regional and local geologic structures, surface and subsurface mapping, geotectonics, volcanic stratigraphy, and acquisition and interpretation of geophysical data. He has also been involved in mineral exploration and resource assessment programs, and development of computer-based analysis systems and techniques to enhance geologic, geophysical, and hydrologic field investigations.

- At the Bear Lake Hydroelectric Project, Utah, Mr. Snider led the geologic field investigations aimed at determining the feasibility and cost of a proposed pumped storage facility. His responsibilities ranged from analysis of dam foundation conditions, evaluation of reservoir suitability, location of sources of construction materials, and planning of subsurface exploration programs.

FREDERIC G. SNIDER  
Geologic Mapping

-2-

- At the Grant Lake project, Moose Pass, Alaska, Mr. Snider acted as field representative and supervisor for the feasibility studies at this hydro-power site.
- Mr. Snider also has extensive experience in the detailed geologic analyses required for siting, site confirmation, and licensing of nuclear power sites, both in the U.S. and abroad. He has been involved in studies of regional and local geologic structures, surface and subsurface mapping, geotectonics, stratigraphy, and the acquisition and interpretation of geophysical data. His experience in fossil-fueled projects include geologic hydrologic studies for ash pond siting and plant foundation analyses.

Client References:

Project Name: Grant Lake, Alaska  
Alaska Power Authority  
334 West Fifth Avenue  
Anchorage, Alaska 99501  
Mr. Eric A. Marchegiani

Project Name: Bear Lake Hydroelectric Project  
Utah Power & Light Company  
P. O. Box 899  
Salt Lake City, Utah 84110  
Mr. John Kunz  
(805) 535-2323

Project Name: Philippine Nuclear Plant Unit #1  
National Power Corporation  
Nuclear Power Department  
Port Area, Manila, Philippines  
Mr. Jose Torres  
Tel. 011-63-47-21-41

# HARZA-EBASCO

DALE N. SPANOGLE

Job Title: Drilling Superintendent

Work Location: Anchorage

Special Qualifications: Mr. Spanogle has nearly 30 years of experience as a driller and superintendent in Alaska. He is responsible for the supervision of drilling crews and maintenance of drilling equipment for Harding Lawson Associates' Alaskan operations. Mr. Spanogle is experienced with permafrost drilling, refrigerated coring, soil sampling, hard rock mineral exploration, dam foundation drilling and testing, offshore operations and helicopter drilling operations at remote sites. Mr. Spanogle first performed coring on the Susitna River project in 1957 for the U.S. Bureau of Reclamation. Between 1962-1969 Mr. Spanogle was employed by the State of Alaska, Department of Highways and performed drilling operations throughout the State.

Professional Registration: None

Parent Company: Harding Lawson Associates

## Experience and Qualifications Relevant to the Susitna Project:

- Drilling Operations for Hydroelectric Development, Susitna River, Alaska, 1957-1960 - Performed core drilling, soil sampling and water testing in overburden to bedrock at the Devil's Canyon and Denali Dam sites in the summer months and at Vee Canyon over-ice in the winter while employed by the U.S. Bureau of Reclamation.
- Duck Island Development, Beaufort Sea, Alaska, 1981 - Superintendent of barge-mounted drilling operations. Drilling program lasted 30 days over water; supervised two crews on 24-hour basis. Duties included trouble-shooting drill problems and maintaining equipment. Equipment reliability was 100 percent throughout drilling operations for Exxon Company, U.S.A.

DALE N. SPANOGLE  
Drilling Superintendent

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- Kandik Basin Exploration, Brooks Range, Alaska, 1979 - Geologic coring investigations for mineral and oil exploration for Louisiana Land Exploration.
- Kenai Products Dock, 1977 - Used a Failing 1500 to drill five holes to over 100 feet below mudline in 80 to 100 feet of water with severe tidal conditions for Phillips Petroleum.
- Port of Anchorage, 1975-1977 - Used B-61 equipment under severe tidal conditions (32 feet). In 1975 drilled four holes and in 1977 drilled three holes, some of which were 250 feet deep. The 250-foot boring was completed in 18-1/2 hours drilling time for Municipality of Anchorage.

Client References:

Project Name: Mr. R. R. Bowen  
Exxon Company, U.S.A., Western Division  
1800 Avenue of the Stars  
Los Angeles, California 90067  
(213) 552-5685.

Project Name: Mr. Lawrence Davis  
Louisiana Land and Exploration  
1675 Broadway, Suite 2100  
Denver, Colorado 80202  
(303) 623-5759.



# HARZA-EBASCO

JANIS STRAUBERGS

Job Title: Lead Civil/Structural Engineer

Work Location: Bellevue

Education: Bachelor of Civil Engineering  
1956, Melbourne University, Australia  
BA (Economics and Geography)  
1959, University of New England,  
Australia

Special  
Qualifications: Project Engineer - Alaska Projects,  
Reviewed design of Bath County

Professional  
Registration: Idaho, Montana, Oregon, Washington, and  
Wyoming

Parent Company: Ebasco Services Incorporated

## Experience and Qualifications Relevant to the Susitna Project:

### Ebasco Experience (since 1967):

May 1981 to Present: Acting Chief Consulting Engineer in the Seattle, Washington office responsible for all reconnaissance and feasibility stage work. At present also supervising all civil work on the final design of 20 MW Terror Lake powerhouse and transmission line. Mr. Straubergs has repeatedly acted in various project management, engineering or review functions on numerous studies for the Puget Sound Power and Light Company involving evaluation of the potential development of small hydroelectric resources, and assistance applying for FERC licensing documents.

- Project Engineer on a 1980 study for the Alaska District Corps of Engineers to evaluate small hydroelectric development potential in the Aleutian Islands. Alaska Peninsula and Kodiak Island, and on a similar study in 1981 for the southcentral and northeast regions of Alaska. During this time he travelled to the region to evaluate the region's hydroelectric resources, developed layouts for project features and supervised the preparation of cost estimates. He also supervised the hydro-related studies forming part of Batelle's 1981 Alaska Railbelt Study.

JANIS STRAUBERGS  
Lead Civil/Structural Engineer

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- Mr. Straubergs is regularly carrying out numerous FERC dam safety investigations in the Pacific Northwest for Pacific Gas and Electric, Pacific Power and Light and Montana Power.

November 1979 to April 1981: Senior Principal Engineer in the New York Civil Consulting Department. Project Engineer and Assistant Project Manager on review of main civil, mechanical, electrical aspects and project costs for the 2100 MW Bath County Pumped-Storage Project. Responsible for the hydroelectric engineering input on a 400 MW pumped storage feasibility study for the Utah Power and Light Company and for a prefeasibility study of the 240 MW Katka hydro project for the Washington Water Power Company.

August 1975 to October 1979: Principal Engineer in New York Civil Engineering Department. Responsible for engineering of powerhouse, including specifications and bid evaluation of the pump-turbines and spherical valves on a 1000 MW Davis pumped-storage project for Allegheny Power and Light Company. Project Engineer and Lead Civil Engineer, responsible for all technical aspects and also for engineering of civil and mechanical items on the 120 MW Noxon Rapids No. 5 hydro extension for the Washington Water Power.

- Lead Civil Engineer on the La Oroya-Pachachaca Transmission Line for Centronin, Peru.

July 1971 to July 1975: Senior Engineer in New York Civil Engineering Department. Lead civil engineer on various hydro-electric, fossil and transmission projects. Responsible for all civil aspects for the 480 MW pumped-storage and 400 MW hydro addition feasibility study of the Yale project for the Pacific Power and Light Company. Lead Civil Engineer, responsible for civil aspects on five fuel oil conversion and fuel oil storage tank projects for the Houston Light and Power and for Portland General Electric companies; on various gas turbine projects, including a barge-based project involving piers and mooring facilities for Electrobras in Salvador, Brazil, and on various transmission line projects. Responsible for civil aspects of preparation of bid documents, evaluation of bids, and subsequently continuous review of design during construction of the 120 MW turnkey fossil Manaus 3 and 4 project in Brazil. Responsible for shielding concrete selection on the Tokamak fusion test reactor project for Princeton University.

- Lead Civil Engineer, mainly involved with design of dams, tunnel and spillways on the 1000 MW Dam's Pumped Storage

JANIS STRAUBERGS  
Lead Civil/Structural Engineer

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project for the Allegheny Power and Light Company. Geotechnical assignments ranged from field supervision and borehole logging, to office studies of deep foundation cutoffs, dam stability and lead position of various projects including large tank foundations on soft ground.

February 1967 to June 1971: Senior Engineer in New York and Turkey Civil Engineering Departments. Responsible for: the containment of the 700 MW PWR HB Robinson No. 2 nuclear plant for the Carolina Power and Light Company; for concrete and foundations of the 350 MW Dave Johnston No. 4 project for the Pacific Power and Light Company. Responsible for design during construction; as lead on the 300 MW Gokcekaya hydro project including a 500' arch dam: and as Assistant Lead on the 640 MW Keban hydro that included a 700' rockfill dam - the last two projects being for Devlet Su Isleri in Antkaya, Turkey.

February 1961 to May 1966: Civil Engineer with the Snowy Mountains HE Authority, Cooma, Australia, responsible for final design and layout and stress analysis on a 200 foot high arch dam, and of in situ stress in foundations; preparation of computer program for earth dam stability analysis; cut-off in deep gravel foundations. Hydraulic model testing of movable bed erosion for super elevated spillways; earthquake design of gravity dams. Project Engineer, responsible for preparation of construction drawings, design report and for coordination with construction personnel on the 220 foot high Jindabyne earth and rockfill dam project. Lead Civil Engineer, responsible for selection of type of dam and for a 120 foot high penstock intake structure with six 18 foot diameter penstock intakes and adjacent service spillway on the 1,500 MW Tumut 3 Pumped Storage project.

April 1960 to February 1961: In-service training with the U.S. Bureau of Reclamation, Denver on design and construction of earth, concrete gravity and hydraulic model testing. Construction of the 700 foot high Glen Canyon arch dam and a 400 30 million cubic yard earthfill Navajo dam.

January 1957 to March 1960: Civil Engineer with the Snowy Mountains HE Authority on design of buildings, bridges, towers and footings and water supply and sanitary works; various civil aspects of the 900 foot head, 320 MW Tumut I underground power station.

JANIS STRAUBERGS  
Lead Civil/Structural Engineer

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Client References:

Project Name:

River Basin Reconnaissance Studies  
Ms. Virginia Pisforesi  
Puget Sound Power and Light  
Puget Power Building  
Bellevue, WA 98009  
206/451-3058

Small Hydroelectric Reconnaissance Studies  
Mr. Loran Baxter  
Alaska District, Corps of Engineers  
P.O. Box 7002  
Anchorage, Alaska 99501  
907/752-3461

Bath County Pumped Storage Project Review  
and Davis Pumped Storage Project  
Mr. John H. Bail, Director - Power  
Engineering  
Allegheny Power Service Corporation  
900 Cabin Hill Drive  
Greensburg, Pennsylvania 15601  
412/837-3000

Noxon Rapids No. 5 Extension and Katka  
Project Prefeasibility Studies  
Mr. Donald L. Olson, Senior Vice President,  
Resources  
The Washington Water Power Company  
P.O. Box 3727  
Spokane, Washington 99220  
509/489-0500

Yale Feasibility Study  
Mr. G. Eldon Drennan, President  
Pacific Power and Light Company  
Public Service Building  
Portland, Oregon 97204  
503/243-1122

Australian Projects  
Stan Howard  
Snowy Mountains Engineering Co.  
Cooma, NSW, Australia



# HARZA-EBASCO

ARTHUR H. STUKEY

Job Title: Senior Field Geologist

Work Location: Anchorage

Education: Master of Science in Geology 1968,  
University of New Mexico  
Bachelor of Science in Geology 1964,  
Tufts University

Special Qualifications: Major participant - Uribante Project,

Professional Registration: Certified Geological Scientist, (APGS),  
Registered Engineering Geologist, Oregon

Parent Company: Harza Engineering Company

Experience and Qualifications Relevant to the Susitna Project  
January 1980 to Date: Harza Engineering Company, Chicago, Illinois. Senior Engineering Geologist. Responsible for technical and administrative aspects of geologic exploration, feasibility, design and construction programs for domestic and international hydroelectric projects. Work involves coordinated field and office activities; planning; site reviews; and evaluation reports.

- South Columbia Basin Irrigation Project, Lead Geologist, developing and coordinating investigations and foundation design for Summer Falls dam, dikes, shafts tunnels and powerhouse; Main Canal powerhouse, and P.E.C. powerhouse.
- Twin Falls Project, Idaho. Lead geologist to develop foundation criteria for expansion of existing facilities, evaluating new power shafts/tunnels and powerhouse in Snake River Basalt sequence.
- Glendive Project, Lead Geologist for water storage site appraisals for major synfuels projects in eastern Montana and Wyoming.
- Uribante-Caparo Project, Venezuela, 160 meter earth dam. Site evaluation of test grouting and consolidation grouting programs, friable Cretaceous sandstones. Report preparation and Review Board presentations.
- Rim Basin Project, Gunnison, Colorado. Geologic review and report for preliminary design of pump-storage plant, Juras-



sic-Cretaceous clastics.

- Electric Lake Dam, Huntington, Utah. Field Supervisor of remedial grouting program to stop major abutment leakage at 100 ft high embankment dam in Cretaceous clastics. Directed all drilling and grouting; maintained all records; and authored completion report.

January 1979 to December 1979: Harza Engineering Company, Chicago Illinois. Engineering Geologist.

- Tavera Bao Project, Dominican Republic. Site geologic mapping during construction phase of 100 m high earthfill dam, auxiliary dikes, diversion tunnel and drainage galleries. Revision of drain curtain; coordination with grouting program; and seismic review of Maximum Credible Earthquake (MCE) terrain.
- San Lorenzo Hydroelectric Project, El Salvador. Field mapping of foundations, short-term supervision of alluvial grouting program, consolidation layouts for gravity wall training structure. Tertiary volcanics and alluvium.
- Summersville Long Tunnel Project, West Virginia, U.S.A. Field and office review of Corps of Engineers exploration program for 1.5 mile long power tunnel, and powerhouse, Summersville, West Virginia. Pennsylvanian clastic terrain.
- Sullivan Creek Project, Metalline Falls, Washington. Geologic field evaluation and report concerning dam siting, power-tunnel routing and surface powerhouse location, glaciated metamorphic terrain, eastern Washington.

January 1978 to December 1978: Harza Engineering Company, Chicago, Illinois. Engineering Geologist. Conducted site and office evaluations of hydrogeologic monitoring; drainage; grouting; prepared final geologic foundation report for Reza Shah Kabir Dam, Iran.

- Karun River Dam, Iran. Resident Geologist during construction and reservoir filling. Field mapping of cutoff wall excavation in abutment of 200 m high thin arch dam; drainage review; grouting review; supervision of hydrologic monitoring; slope stabilization; adit

ARTHUR H. STUKEY  
Senior Field Geologist

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and tunnel mapping; subsurface investigations. Eocene limestone terrain, Zagros Mountains.

- Northern Indiana Power. Field survey and report on five proposed cooling ponds; glacial terrain, northern Indiana.
- Cornell Hydro Plant, Cornell, Wisconsin. Field geologist for foundation mapping of hydro-expansion project. Metamorphic terrain, northern Wisconsin.

September 1970 to January 1975: Rutgers University, New Brunswick, New Jersey, Graduate Student. Department of Geology with supporting full- and part-time work as follows:

- Rutgers Institute for Environmental Studies, Consultant. Geologist on multi-disciplinary team reviewing, evaluating and summarizing technical literature for local, urban planning agencies throughout New Jersey. Also conducted geologic and groundwater study in glaciated carbonate terrain, northern New Jersey.
- Madison Township Environmental Commission, Consultant. Conducted hydrogeologic studies relating to urban development south of New York City. Responsibilities also included presentations in public hearings and representing Commission in legal deposition.
- Dames and Moore, Consulting Engineers, Cranford, New Jersey, Staff Geologist. Performed regional structural geology and seismic studies for nuclear plant sites; directed and participated in field and office programs, primarily in Mid Atlantic States of New Jersey, Maryland, Delaware and Pennsylvania.
- Harza Engineering Company, Chicago, Illinois. (June-December, 1971). Field Geologist. Primary responsibilities included core logging, borehole pressure testing, and establishing stratigraphic correlations at Stony Creek Pumped-Storage Project, near Harrisburg, Pennsylvania. Additional duties include piezometer installation, test pit mapping and field coordination of drill hole locations.
- Rutgers University, New Brunswick, New Jersey. Graduate Teaching Assistant. Geology Department. Teaching fundamental geologic principles in survey course; and

ARTHUR H. STUKEY  
Senior Field Geologist

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developing laboratory and field exercises for undergraduate structural geology course.

September 1966 to August 1970: New Mexico. Texaco, Inc., Midland, Texas. Exploration Geologist in Permian Basin of West Texas and Field responsibilities at deep (18,000 ft) exploration holes included sample logging, drillstem testing, selecting casing points, and overseeing geophysical logging. Office responsibilities included prospect evaluation and generation, regional and local subsurface mapping, log analysis, and seismic interpretation.

Client References:

Project Name: Uribante Doradas Project  
CADAPE  
Ave. Sanz, El Marques  
Caracas, Verezuela  
Ing. Hernan Boulton

# HARZA-EBASCO

ROBERT B. STYLES

Job Title: Specifications Specialist

Work Location: Bellevue

Education: Bachelor of Science in Mathematics 1965,  
Illinois Institute of Technology

Special Qualifications: Major Participant - Guri, Uribante,  
Participant - Bath County

Parent Company: Harza Engineering Company

Experience and Qualifications Relevant to the Susitna Project  
December 1974 to Date: Harza Engineering Company, Chicago,  
Illinois. Assistant Head. Contract Document Preparation De-  
partment. Responsible for writing contractual provisions for  
contract documents and review and coordination of technical  
specifications; overseeing the final typing, proofreading,  
printing, binding, and issuing to bidders of contract documents;  
preparing lists of bidders for various construction and equip-  
ment contracts; writing advertisements for bids for publication  
in newspapers and engineering magazines.

April 1970 to December 1974: Cook County Department of Pur-  
chases, Chicago, Illinois. Specification Engineer II. Head of  
Contract Division. Responsible for handling all contracts for  
supplies, work, and professional services for all offices, de-  
partments, and agencies of Cook County, except the Forest Pre-  
serve District. Contracts were required on any expenditure in  
excess of \$5,000.00. This averaged approximately 250 contracts  
per year with an annual volume of approximately 20 million dol-  
lars. Typical duties included: receive and review requi-  
sitions; prepare specifications and contract documents; select  
prospective bidders; advertise for bids; receive, open, and  
tabulate bids; prepare recommendations of award of contracts  
and present it to County Board of Commissioners for approval;  
prepare and process contracts, performance bonds, and change  
orders; review and approve payment requests; review and evalu-  
ate Contractor's claims and present recommendation to State's  
Attorney and County Board. Typical contracts handled were:  
Highway Construction, Maintenance Equipment, and Maintenance  
Materials; Sheriff's Police Vehicles, Ammunition, and Communi-  
cations Equipment, Building Construction, Remodeling, and Demo-  
lition; Professional Services Contracts with Architects, Con-  
struction Manager, Testing Laboratories, Management Consultants,  
Accounting Firms, etc.; Annual or Semi-Annual Contracts for  
Printing, Office Supplies, Food, Janitorial Supplies, Newspaper  
Advertising, Scavenger Service, etc.



ROBERT B. STYLES  
Specifications Specialist

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October 1965 to April 1970: Harza Engineering Company, Chicago, Illinois. Assistant Head. Specification Department. Responsible for writing contractual provisions for contract documents and review and coordination of technical specifications; overseeing the final typing, proofreading, printing, binding, and issuing to bidders of contract documents; preparing lists of bidders for various construction and equipment contracts; writing advertisements for bids for publication in newspapers and engineering magazines.

March 1960 to October 1965: Harza Engineering Company, Chicago, Illinois. Clerk-Proofreader. Specifications Department. Duties included preparing copies of contract documents for review of engineering staff and clients; proofreading contract documents after final typing, keeping bidders list up-to-date; keeping files of specification material; writing routine letters for transmitting contract documents to clients and bidders.



# HARZA-EBASCO

JOHN F. SZABLYA

Job Title: Power Systems Engineer

Work Location: Bellevue

Education: Technical University of Budapest, Diploma  
(equivalent to M.S.),  
Mechanical Engineering, Electrical Option:  
1947,  
Technical University of Budapest, Ph.D.  
Economics: 1948

Special  
Qualifications: State Regulatory Commission Expert Witness  
Testimony - 1976 and 1981.

Professional  
Registration: State of Washington-Province of British  
Columbia Great Britain

Parent Company: Ebasco Services, Incorporated

## Experience and Qualifications Relevant to the Susitna Project:

November 1981 to Present: Presently Electrical Consulting Engineer at the Bellevue, Washington office of Ebasco Services Incorporated. Dr. Szablya has overall responsibility for consulting services offered in the areas of electric energy generation, transmission, distribution, control, management and industrial applications. Feasibility and design studies are made also under the direct supervision of Dr. Szablya.

- Overall responsibility as lead engineer for the design of the Kake-Petersburg Intertie in Alaska. The line will cross some environmentally sensitive areas, therefore will require careful technical design. Detailed evaluations were necessary to the economic feasibility and environmental compatibility of the intertie.
- Lead engineer for the Tyee Lake System Studies, an independent study within the framework of the Kake-Petersburg Intertie contract. Detailed studies were made on the Tyee Lake-Wrangell-Petersburg line under construction to assure that the line, which has four undersea cable crossing sec-

JOHN F. SZABLYA  
Power Systems Engineer

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tions, will perform satisfactorily under all anticipated operational conditions.

- Participated in the Flathead Valley Alternate Transmission Study which investigated several alternatives, including non-electric-transmission versions. Project responsibilities involved the assessing of the loading and overloading capability of the entire area transmission system and to help establish load/generation schedule alternatives.

September 1963 to November 1981: Dr. Szablya authored a report, as an independent consultant, for the Trinidad and Tobago Electricity Commission. The report gave concrete recommendations regarding the development plans of the system which is planned to have a capacity close to 1,500 MW in the near future to serve the 1.3 million people of the two islands. The analysis addressed itself to the spectacular load growth (over 10% per annum), the effects of population drifts and heavy industrial developments which take place.

- Did studies in conjunction with the licensing process of the Colstrip 2 generation unit, in Colstrip, Montana. The studies involved assessment of different transmission line routings between Colstrip, Montana and Spokane, Washington, consideration of alternate sites for the power plant and comparing the costs and feasibilities of high voltage transmission and shipping the coal between the two places mentioned above. Dr. Szablya's report was submitted to the Montana PUC and he testified as an expert witness before the Commission.
- Made a detailed study of the performance and operation of the Malin Substation of the 500 kV Pacific Northwest Intertie on the Orgeon-California border, following an accident that seriously damaged the 300 MVA transformer, phase shifter and other equipment. The study involved not only the substation itself, but some 500 circuit miles of transmission lines and their protection and communication system. The analysis came up with definite conclusions regarding the origins of the problems involved.
- Project Manager for the testing and evaluation of the two 26,000 MVA, 230 kV circuit breakers tested on the 230 kV Pacific Northwest system. As a result, the manufacturer could, and did, increase the ratings of its circuit breakers. The testing affected EHV lines owned by several area

JOHN F. SZABLYA  
Power Systems Engineer

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utilities and required extensive advanced coordination for each of the test series lasting for several days.

Client References:

Project Name: Kake-Petersburg Interties  
Tyee Lake System Studies  
Miles C. Yerkes  
Remy Williams  
Alaska Power Authority  
334 West Fifth Avenue  
Anchorage, Alaska 99501  
(907) 276-0001

Project Name: System Reliability and Development  
Grounding & Lighting & Surge Protection  
Design  
Leo Martin  
Trinidad & Tabago Electricity Commission  
63 Frederick Street  
Port of Spain - Trinidad W.I.  
(809) 62-32684

Project Name: Flathead Valley Alternate Transission Study  
Judy Woodward  
Bonneville Power Administration  
825 N.E. Mulnomah, Lloyd Tower, 18th Fl.  
Portland, Oregon 97232  
(503) 230-5756

Project Name: Colstrip 2, License Application  
Donald Olson  
Washington Water Power Company  
P.O. Box 3727  
Sponkane, Washington 99220  
(509) 489-0500

Project Name: Pacific Northwest-Southwest Intertie Malin  
Substation  
Henry K. Elliot  
Engineering Department- Travelers  
1 Tower Square  
Hartford, Connecticut 06115  
(203) 277-3283

JOHN F. SZABLYA  
Power Systems Engineer

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Project Name:

230 kV Circuit Breaker Evaluation  
Gustave E. Heberlein (ret.)  
(ITE, presently Brown Boveri Co.)  
621 Mawr, Pennsylvania 19010  
(215) 525-0417

JOHN F. SZABLYA  
Power Systems Engineer

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Project Name: 230 kV Circuit Breaker Evaluation  
Gustave E. Heberlein (ret.)  
(ITE, presently Brown Boveri Co.)  
621 Mawr, Pennsylvania 19010  
(215) 525-0417



# HARZA-EBASCO

MYRON S. TEMCHIN

Job Title: Lead-Instrumentation & Testing

Work Location: Anchorage

Education: City College of New York - BSCE - 1968  
Numerous Advanced Courses - 1968 - Present

Special Qualifications: Registered Professional Engineer in four states with over fourteen years experience in the civil engineering management, design and construction of hydroelectric, fossil, and nuclear generating stations and their related structures. Responsibilities included management and coordination of both design stage and construction stage activities.

Professional Registration: Professional Engineer, New York, Florida, Arizona and Louisiana

Parent Company: Ebasco Services Incorporated

## Experience and Qualifications Relevant to the Susitna Project

1968 to Present: Mr. Temchin is currently Consulting Civil Engineer in the Houston Office of Ebasco Services. In fourteen years with Ebasco, Mr. Temchin has been involved in all phases of the design and construction of power generating facilities.

- Design responsibilities included: 1) design of instrumentation and monitoring programs, 2) static and dynamic geotechnical site design and analysis, 3) selection of design parameters from field and laboratory testing, the concrete and hydraulic design of structures, feasibility site selection studies, economic analysis of engineering alternates, preparation of regulatory reports, specifications, contracts, bid documents, and design engineering support of field forces.
- Construction responsibilities included on-site responsibility for the implementation, construction and technical supervision of civil engineering activities in the areas of earthwork, roadwork, asphalt lining, concrete, reinforcing, grading, drainage and large embankment construction.
- As geotechnical engineer during construction and early operation of the Ludington Pumped Storage Project in Michigan, Mr. Temchin was involved in quality control of

MYRON S. TEMCHIN  
Lead-Instrumentation & Testing

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43,000,000 cubic yards of earthwork. Duties included development and direction of an extensive instrumentation program for detection and monitoring of reservoir seepage, embankment and structure settlement and penstock creep during early plant operation, coordination of a 30-man laboratory and inspection staff, planning and directing drilling, sampling and testing programs, analyzing borrow pits, determining foundation treatment, conducting studies of bluff recession and Lake Michigan turbidity.

Client References:

Project Name: Ludington Pump Storage Facility  
Consumer Power Corporation  
Ludington Pump Storage Project  
Rural Rt. 1 on Lakeshore Drive  
Ludington, Michigan 49431  
Mr. Richard Sequin (Plant Manager)  
(616) 845-6264

Project Name: Cholla Steam Project  
Arizona Public Service  
P.O. Box 2907  
Phoenix, Arizona 85062  
Mr. George Stringham (Project Supervisor)  
(602) 271-7788

Project Name: Washington Nuclear Project #3  
Washington Public Power Supply System  
Construction Office Building  
Satsop, Washington 98563  
Mr. Koy Love (Construction Manager)  
(206) 482-4428 Ext. 5511

# HARZA-EBASCO

NORMAN R. TILFORD

Job Title: Manager - Geotechnical  
Exploration Program

Work Location: Anchorage

Education: Arizona State University M.S. - Geology:  
1966  
Arizona State University B.S. - Geology:  
1958

Special Qualifications: Mr. Tilford has work on significant projects as an employee of Harza in the 1960's and Ebasco in the 1970's. This background will be a special asset to the Harza-Ebasco geotechnical team since he is familiar with the policies, procedures and senior staff of both organizations. Mr. Tilford holds joint appointments as Chief Geologist of Ebasco Services and Associate Professor of Engineering Geology in the graduate faculty of Texas A & M University. He has twenty-two years experience in civil engineering projects, geological studies, and research for hydroelectric, irrigation and nuclear projects including expert testimony before judicial and regulatory bodies.

Professional Registration: Registered Professional Geologist in the States of Arizona (by examination), Georgia, Oregon and Delaware.  
Registered Engineering Geologist in the States of California, Idaho and Oregon.

Parent Company: Ebasco Services, Incorporated

## Experience and Qualifications Relevant to the Susitna Project:

1974 to Present: Consulting Geologist and Chief Geologist for Ebasco Services, Inc. In responsible charge of Earth Science aspects of Ebasco projects. On a part time basis, teaches aspects of level courses at Texas A & M University. Provides expert testimony before regulatory and judicial bodies as needed to support and defend the findings of corporate scientific investigations in the earth sciences. Reviewed foundation prepa-

NORMAN R. TILFORD

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Manager - Geotechnical Exploration Program

ration and treatment for the 100' high rock fill dam at the Shearon Harris Nuclear Plant in 1980-81. Participated in review and licensing hearings for the Davis Pumped Storage Project in West Virginia.

1969 to 1974: Consulting geologist on dam inspection at the Peti Hydroelectric Project (Brazil) for Centrais Electricas Brasileiras, S.A. Resident Chief Foundation Engineer on Keban Hydroelectric Development (Turkey), Units 1-4, 620,000 kw, including 680 ft. high rockfill dam, twin 51 ft. diversion tunnels, 278 ft. high concrete gravity intake section, and 525,000 cfs concrete ogee and chute spillway and more than 15 km of hard rock tunnels and adits. Responsible for the undertaking of geotechnical studies for inspection of hydroelectric projects, as required by Federal Energy Regulatory Commission regulation, performed for Carolina Power and Light Company and geotechnical studies for Pacific Power and Light Company (Yale Pumped Storage) and Public Power Corporation, Athens, Greece (Kastraki Reservoir Study).

1966 to 1969: Philadelphia Port Corporation, Resident Engineer for planning and construction of a seven berth marginal marine terminal. Site selection studies encompassed environmental impact, foundation conditions and engineering economic considerations. The terminal consisted of a permanent steel sheet cellular bulkhead, dredged land filling, pile supported relieving platform and above grade elements including cranes, paving, rail facilities and transit sheds.

1965 to 1966: Arizona State University; holder of Inspiration Cooper Company Graduate Scholarship. Completed studies for MSc.

1960 to 1965: Harza Engineering Company. Participated in overseas projects in West Pakistan and Ethiopia as Engineering Geologist, Resident Engineer, and Contracts Engineer, involving ground water development, hydroelectric and irrigation planning and construction and construction materials processing. Projects included Magla Dam, Tarbela Dam Investigation, West Bank Indus Groundwater Project, Tanda Dam, Dhok Pathan Dam, Gomai River Scheme, Finchaa Hydroelectric Project and the Central Quarrying Contract for the Indus Basin Scheme. In the U.S., acted as Resident Representative for the excavation and grouting of the Markland Powerhouse Foundation.

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NORMAN R. TILFORD  
Manager - Geotechnical Exploration Program

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1958 to 1960: U.S. Army Corps of Engineers, Los Angeles District; Engineering Geologist. Inspected foundation preparation and grouting treatment for Corps flood control projects and explored for missile sites.

Client References:

Project Name: Keban Dam, Turkey  
Devlet Su Isleri  
Mr. Refik Akarun  
Head of Dam Division, DSI  
Ankara, Turkey  
Tel 90-41-181100

Project Name: Portland General Electric Company  
Service Bldg. Bridge  
121 SW Salmon Street  
Portland, Oregon 92704  
Mr. Raymond Halicki, Jr.  
Generation and Facility Engineering  
(503) 226-8060

Project Name: Shearon Harris Dams, North Carolina  
Carolina Power & Light Co.  
336 Fayetteville St.  
P.O. Box 1551  
Raleigh, North Carolina 27602  
Mr. T. H. Wyllie, Manager Construction  
(919) 836-6111



# HARZA-EBASCO

WILLIAM R. TURNER

Job Title: Non-Technical Project Features Manager

Location: Anchorage

Education: Grays Harbor College, Associate Engineering, 1956  
Seattle University, Civil Engineering, 1958  
University of Alaska, Arctic Studies, 1976

Special Qualifications: Extensive Project Manager experience in Alaska

Professional Registration: State of Washington, No. 10444; State of Montana No. 3960E; State of Alaska, No. CE 4443

Parent Company: Frank Moolin & Associates

## Experience and Qualifications Relevant to the Susitna Project:

August 1980 to Present: Presently Resident Engineer responsible for the field staff which is providing construction management for the design and construction of the Valdez Container Terminal, a major port and harbor development project in Valdez, Alaska. Mr. Turner is responsible for design review, contract administration, quality control, and cost and schedule reporting for the project which includes a causeway, 1500-ft. trestle, 21-acre marshalling yard, and a 700- by 100-ft. prestressed concrete floating dock with two 200-ft. span steel access ramps.

Mr. Turner is also presently Project Manager in charge of a field staff which is providing construction management for the design and construction of the Valdez Grain Terminal, a facility to receive, store, and ship grain in Valdez, Alaska. He is responsible for the review and approval of the turnkey contractors design drawings and work plan, for the field quality control during the slipform construction of the facility, the progress estimate preparation, the contract administration and the cost and schedule reporting to the owner.

April 1979 to August 1980: Mr. Turner provided consulting services to the law firm of O'Melveny & Meyers in connection with their representation of Alaska Pipeline Service Company in litigation concerning pipeline tariffs pending before the Federal Energy Regulatory Commission and the Alaska Pipeline Commission. He provided construction cost analysis versus pre-construction estimates and assisted with the preparation of exhibits and testimony substantiating as-built costs.

WILLIAM R. TURNER

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Non-Technical Project Features Manager

April 1978 to April 1979: Mr. Turner provided field construction management for two intricate and unique Alaskan construction projects for Alaska International Construction, Inc. He served as Project Superintendent in charge of field construction of the Frost Heave Test Facility for the Alaska Northwest Gas Transportation System. He directed staff and craft labor during the installation of machinery, piping, instrumentation and electrical equipment to simulate low temperature pipeline burial in permafrost conditions to gather data necessary to provide criteria for the final design.

He also served as Project Manager for the construction of the Water Injectivity Test Facility for ARCO at Prudhoe Bay, Alaska. He was responsible for the direct of staff and craft labor involved with the installation of piping, pumps, electrical equipment and instrumentation at two source wells and one injection well to gather data required for the design of the Prudhoe Bay Field, Water Flood Project.

June 1973 to February 1978: Mr. Turner served on the staff of Alyeska Pipeline Service Company during the planning, construction and start-up of the TransAlaska pipeline. As Manager of Support Activities, he provided coordination and staff assistance to the Senior Project Manager of the Terminal, Pump Stations and Communications Department to ensure completion of all designated project elements to specifications, on schedule, within budget, to established criteria and within environmental requirements. He monitored the Contractor's staff during their cost and schedule reporting, procurement, transportation, quality control and subcontracting to ensure conformance with project goals and objective. He provided liaison with Federal and State agencies monitoring design and construction activities.

As Senior Project Engineer assigned to the Pipeline and Roads Department, Mr. Turner reviewed and approved the work of numerous engineering firms engaged in the design of camps, life support systems, access roads, material sites, airfields, staging areas and work pads. He assured that the work products were functional and cost-effective while complying with the stringent environmental restraints imposed by Federal and State monitoring agencies. He provided follow-up on field activities as the Owner's Representative during construction, operation and maintenance of these facilities. He also monitored the construction management and execution of Contractors on a 125-mile section of road and pipeline construction.

WILLIAM R. TURNER  
Non-Technical Project Features Manager

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Client References:

Project Name: Valdez Container Terminal  
Jerry Zoet  
Port Director, City of Valdez  
P.O. Box 307  
Valdez, Alaska 99686  
(907) 835-4313

Project Name: Valdez Grain Terminal  
Fred Hanson  
City Engineer, City of Valdez  
P.O. Box 307  
Valdez, Alaska 99686  
(907) 835-4313

Project Name: O'Melveny & Meyers  
Charles Bender  
O'Melveny & Meyers  
611 W. 6th Street  
Los Angeles, California 90017  
(213) 620-1120

Project Name: ARCO Water Injectivity Test  
William D. Fowler  
Alaska International Construction, Inc.  
P.O. Box 1410  
Fairbanks, Alaska 99701  
(907) 452-5171

Project Name: Frost Heave Test Facility  
William D. Fowler  
Alaska International Construction, Inc.  
P.O. Box 1410  
Fairbanks, Alaska 99701  
(907) 452-5171

Project Name: TransAlaska Pipeline  
Jerry Ogle  
Alyeska Pipeline Service Company  
1835 South Bragaw  
Anchorage, Alaska 99504  
(907) 265-8547

# HARZA-EBASCO

DINESH V. UNDEVIA

Job Title: Senior Engineer

Work Location: Bellevue

Education: Master of Science in Electrical Engineering  
1966, Illinois Institute of Technology  
Bachelor of Science in Electrical Engineering  
1963, S.V.V. University, Gujarat, India

Special  
Qualifications: Lead Electrical Engineer-TARP; Designer-Guri,  
Bath County

Professional  
Registration: Illinois

Parent Company: Harza Engineering Company

## Experience and Qualifications Relevant to the Susitna Project:

March 1968 to Date: Harza Engineering Company, Chicago,  
Illinois. Electrical Engineer. Experience highlights:

- Lead electrical engineer for electrical design features for 100 MW, underground, main stream pumping station for Tunnel and Reservoir Project (TARP), Metropolitan Sanitary District of Greater Chicago.
- Lead electrical engineer for 24 MW additions to station auxiliary power and 345-kV switchyard modifications for Kincaid generating station wastewater facilities.
- Lead electrical engineer for Maqarin hydroelectric generating station, Jordan. Two units, each 12.5 MVA.
- Yacyreta-Apipe Hydroelectric Project, Argentina, S.A. Work includes supervision and preparation of contract drawings and specifications for electrical systems and equipment.
- Other work assignments included preparation of specifications, design studies, contract and construction drawings, bid analysis, cost estimates, etc. for Bath County Pump Storage Power Plant, Virginia; Cerron Grande hydroelectric generating station, El Salvador, C.A; Oriente Expansion Project consisting of 115-kV substations for CEL, El Salva-

DINESH UNDEVIA  
Senior Engineer

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dor, C.A.; Karun River Project, Iran; rehabilitation of hydroelectric generating stations Johnson I, Johnson, and Jeffrey for Central Nebraska District Power; rehabilitation of Falcon Hydro Power Station, Texas; Guri Powerhouse I, Venezuela; and Pump-Storage Power Plant, Seneca, Pennsylvania.

July 1966 to September 1967: Leonard Construction Company, Chicago,

July 1965 to July 1966: Kaiser Engineers, Inc., Chicago, Illinois.

September 1963 to August 1964: Mahindra & Mahindra Ltd., Bombay, India. Plant engineer in jeep automobile manufacturing plant.

Client References:

Project Name: TARP  
The Metropolitan Sanitary  
District of Chicago  
100 E. Erie Street  
Chicago, Illinois 60611  
Joseph H. Irons  
Ronald A. Newbauer  
Frank E. Dalton  
(312) 751-5600

Project Name: Bath County Pumped Storage Project  
Virginia Electric and Power Company  
Powerstation Engineering and Construction  
P.O. Box 564  
Richmond, Virginia 23204  
Mr. J.M. Hagood, Jr.  
(804) 771-6103



# HARZA-EBASCO

ROBERT F. VINE

Job Title: Lead Support Services Engineer

Work Location: Bellevue

Education: Bacheolor of Science in Civil Engineering  
1953, Clarkson College of Technology

Special  
Qualifications: Over twenty-five years construction  
experience

Parent Company: Ebasco Services Incorporated

## Experience and Qualifications Relevant to the Susitna Project:

Specializes in hydroelectric and nuclear power plant construction. Assignments have ranged from office and field engineering to overall responsibility for all on-site engineering. Responsibilities on hydroelectric and pump storage projects included interpretation of drawings and specifications, preparation of detail drawings and supervision of craft personnel. Currently assigned as Construction Superintendent at the Sultan Hydro Project as the client's Construction Manager.

Recently assigned as Senior Resident Engineer on a large nuclear construction project. Responsibilities included preparation of field organization charts and assignment of staff, procurement of replacement parts; development of a program for review of mechanical equipment specifications and vendor documents, and organization and supervision of conduit-problem solving task forces at the site. Other assignments include a marine terminal, a hospital and a steel girder bridge.

## REPRESENTATIVE EXPERIENCE

Client	Project	Fuel
Snohomish County Utility, Snohomish, Washington	Sultan Hydro Project	Hydroelectric
Consumers Power Co.	Ludington Pumped Storage	Hydroelectric
Philadelphia Electric Co.	Muddy Run Pumped Storage	Hydroelectric

ROBERT F. VINE  
Lead Support Services Engineer

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Merritt-Chapman & Scott  
Corporation

Robert Moses  
(Niagara)  
Power Plant

Hydroelectric

St. Lawrence Seaway Authority

Robinson Bay  
(Eisenhower)  
Locks

Waterway

Louisiana Power & Light  
Company

Waterford, Unit  
No. 3

Nuclear

Employment History

Ebasco Services Incorporated, New York, New York; 1970-Present

- Construction Superintendent; 1981-Present
- Senior Resident Engineer; 1977-1981
- Resident Engineer; 1974-1977
- Construction Engineer; 1971-1974
- Office Engineer; 1970-1971

The Arunoel Corporation, Baltimore, Maryland; 1966-1970

- Construction Project Engineer; 1968-1970
- Change Order Engineer; 1966-1968

Merritt-Chapman & Scott Corporation, New York, New York; 1958-1966

- Change Order Engineer; 1963-1966
- Quantity Engineer; 1958-1963

Morrison-Knudson Company, Boise, Idaho; 1956-1958

- Field Survey Party Chief

D.W. Winklemen Company, Syracuse, New York; 1955-1956

- Assistant Field Engineer

# HARZA-EBASCO

ULDIS VITOLS

Job Title: Gates & Hoists Specialist

Work Location: Bellevue

Education: Bachelor of Science in Civil Engineering 1959,  
Chicago Technical College

Special  
Qualifications: Section Head-Bath County, Guri, TARP

Professional  
Registration: Professional Engineer - Wisconsin

Parent Company: Harza Engineering Company

Experience and Qualifications Relevant to the Susitna Project:

August 1977 to Date: Harza Engineering Company, Chicago, Illinois. Section Head. Gates, Cranes and Hoists Section. Responsible for planning, supervising, and coordinating preparation of designs, layouts, and specification writing, and reviewing manufacturers' drawings for gate, hoist, and crane equipment for all of the company projects. Presently engaged on the following major projects: Bath County Pumped-Storage, Virginia; Uribante-Doradas and Guri, Venezuela; San Lorenzo, El Salvador; Yacyreta-Apipe, Argentina-Paraguay; Tunnel and Reservoir Plan, Chicago, Illinois; El Nispero, Honduras; Foothills, Colorado; Rochester Sewer Overflow, New York; Pehuenche, Chile; King Talal, Jordan; and Corpus, Argentina-Paraguay.

June 1977 to August 1977: Harza Engineering Company, Chicago, Illinois. Acting Section Head. Gates, Cranes and Hoists Division. Responsible for layout and design preparation for various gates and hydraulic equipment for Uribante-Doradas Project, Venezuela.

October 1970 to June 1977: Harza Engineering Company, Chicago, Illinois. Senior Engineer. Responsible for design, layout, and computations; review of manufacturers' computations and design; and inspection reports of hydraulic gates, bulkheads, stoplogs, trashracks and similar equipment.

- Reza Shah Kabir Project, Iran. Responsible for the review of manufacturers' computations, and final design and drawings of gates, stoplogs, and trashracks.

- Guri Powerhouse Extension Project, Venezuela. Responsible for the review of manufacturers' computations, designs, and drawings of intake gates (5.20 x 9.60 meters; design water head: 81.70 meters), and detailed design of spillway gate extension of 1.50 meters for existing radial gates (20.80 x 15.24 meters).
- Prepared layouts and design of gates, stoplogs, and trash-racks for the Ullum Project (Argentina), Conowingo Fish Collection Facilities, Lawrence Avenue Sewer System, Geddes Dam Project, and Prairie Island and Kewaunee Nuclear Generating Plant. Prepared layouts and specifications of gates for Gotvand Project, Iran; Cerron Grande Project, El Salvador; Yacyreta-Apipe Project, Argentina-Paraguay; Tavera-Bao Project, Dominican Republic; and Tunnel and Reservoir Plan Tunnel Gates, Chicago, Illinois.

December 1967 to October 1970: Harza Engineering Company, Chicago, Illinois. Gate Design Engineer. Reza Shah Kabir Project, Iran. Prepared layouts, computations, and designs for spillway radial gates, intake radial gates, stoplogs, trash-racks, and other hydraulic equipment. Prepared layouts and design for various gates and hydraulic equipment and reviewed manufacturers' drawings for the following projects: Finchaa, Ethiopia; Rio Lindo, Honduras; Burfell, Iceland; and Cowlitz River Fish Facilities, Washington.

April 1964 to December 1967: Harza Engineering Company, Chicago, Illinois. Gate Design Engineer. Guri Project. Designed spillway floating bulkhead (26.70 x 20.00 meters), and assisted in preparation of operating and handling instructions. Designed gates and other hydraulic equipment for Robert S. Kerr and Kinzua projects.

February 1962 to April 1964: Harza Engineering Company, Chicago, Illinois Engineer. Work included design, quantity estimates, engineering studies, etc.

July 1959 to February 1962: Harza Engineering Company, Chicago, Illinois. Junior Engineer. Work included miscellaneous design work and drafting.

ULDIS VITOLS  
Gates & Hoists Specialist

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Project Name: TARP  
The Metropolitan Sanitary  
District of Chicago  
100 E. Erie Street  
Chicago, Illinois 60611  
Joseph H. Irons  
Ronald A. Newbauer  
Frank E. Dalton  
(312) 751-5600

Project Name: Bath County Pumped Storage Project  
Virginia Electric and Power Company  
Powerstation Engineering and Construction  
P.O. Box 564  
Richmond, Virginia 23204  
Mr. J.M. Hagood, Jr.  
(804) 771-6103

Project Name: Guri CVG-Electrificacion Del Caroni, C.A.  
Direccion Obras de Guri  
Apartado No. 62413  
Caracas, Venezuela  
Ing. Hector Beltran  
Tel. 011 + 582 + 921155



# HARZA-EBASCO

KEA-LING WONG

Job Title: Senior Geotechnical Engineer

Work Location: Bellevue

Education: Master of Science in Civil Engineering 1965,  
Colorado State University  
Bachelor of Science in Civil Engineering  
1963, Chu Hai College, Hong Kong, China

Special Qualifications: Resident Consultant-Uribante, Supervisor-  
Bath County, Designer-Guri

Professional Registration: Professional Engineer - Illinois, Structural  
Engineer - Illinois

Parent Company: Harza Engineering Company

Experience and Qualifications Relevant to the Susitna Project:

September 1979 to Date: Harza Engineering International, Caracas, Venezuela. Resident Geotechnical Consultant to our client company, CEH, on design and construction of the 460 ft. high La Honda embankment dam for the Uribante Hydroelectric Project.

- Provide assistance and advice to client engineers relating to geotechnical design and analysis and to the preparation of construction drawings, specifications and instrumentation programs; review construction activities; coordinate design activities performed in Chicago; coordinate geotechnical presentations required for project owner's Consultant Board Meetings.

June 1975 to August 1979: Harza Engineering Company, Chicago, Illinois. Senior Geotechnical Engineer. Supervised 3 to 4 engineers in the preparation of geotechnical engineering and design studies, construction drawings, and construction inspection procedures for two earth dams (460 ft. and 165 ft. high) for the Bath County Pumped-Storage Project, Virginia. Engineering studies and analyses included evaluation of material usage for the dams; stability of excavations and embankment slopes; foundation treatment including grouting and drainage adits and shallow and deep grout curtains; and instrumentation systems for the dams and foundations.

KEA-LING WONG  
Senior Geotechnical Engineer

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March 1974 to May 1975: Harza Engineering Company, Chicago, Illinois. Resident Engineer for Longwall Study at Federal No. 2 Mine. Supervised 3 to 4 engineers and technicians in the use, interpretation and evaluation of geotechnical instruments for the study of state of stress changes and deformation of underground excavations and surface settlement.

October 1973 to March 1974: Harza Engineering Company, Chicago, Illinois. Geotechnical Engineer. Developed a comprehensive computer program to estimate costs of tunneling (COSTUN) for U.S. Department of Transportation. Installed geotechnical instruments for Longwall Mining Project.

April 1966 to October 1973: Harza Engineering Company, Chicago, Illinois. Geotechnical Engineer. Duties included: design of earth and earth-rock dams, slope stability, settlement and underseepage analyses; preparation of contract and construction drawings; computer programming for earthwork quantity estimate; construction supervision; batter pile foundation design; tunnel and cavern support design; instrumentation study for embankment dams and tunnels; and retaining structure design.

Client References:

Project Name:           Uribante-Doradas Project  
                          CADAPE  
                          Ave. Sanz, El Marques  
                          Caracas, Venezuela  
                          Ing. Hernan Boulton

Project Name:           Bath County Pumped Storage Project  
                          Virginia Electric and Power Company  
                          Powerstation Engineering and Construction  
                          P.O. Box 564  
                          Richmond, Virginia 23204  
                          Mr. J.M. Hagood, Jr.  
                          (804) 771-6103

# HARZA-EBASCO

ALLAN P. WULFF

Job Title: Field Geotechnical Engineer

Work Location: Anchorage

Education: Bachelor of Geological Engineering  
1975, University of Minnesota

University of Alabama  
1977, Birmingham, Alabama  
Non-Destructive Testing and Evaluation of  
Materials Course - 4 CE Credits  
Advanced Soils Mechanics Course - 4 CE  
Credits

Quality Control School Program  
1979, Daniel Construction Company, Warm  
Springs, Virginia  
Drilling and Grouting School (20 Hours)  
Concrete Inspection School (30 Hours)  
Soils Technician School (20 Hours)

Special  
Qualifications: Participant - TARP, Bath County

Professional  
Registration: None

Parent Company: Harza Engineering Company

Experience and Qualifications Relevant to the Susitna Project:  
June 1980 to Date: Harza Engineering Company, Chicago,  
Illinois. Performs geologic mapping of mechanically bored tun-  
nels and shafts for TARP Mainstream Tunnel Project, Chicago.  
Includes strike and dip calculations for joints, plotting, and  
summarization of joint data and preparation of all geologic  
information for final reports.

January 1979 to June 1980: Daniel Construction Company, Warm  
Springs, Virginia, Bath County Project. Quality Control Drill-  
ing and Grouting Inspector. Duties included responsibility for  
inspection of dam foundation drilling and grouting operations,  
quantities, and contractor's compliance with specifications.  
Also included core logging of recovery and physical and litho-  
logic conditions of rock. Worked with Harza Engineering Company  
geologists on mapping and subsurface exploration projects.

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RESUMES

ALLAN P. WULFF  
Field Geotechnical Engineer

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November 1978 to January 1979: Daniel Construction Company, Warm Springs, Virginia, Bath County Project. Quality Control Soils Lab, Shift Supervisor. Supervised foreman and four man crew in soils laboratory testing earth dam core zones stockpile to assure compliance with specifications.

January 1978 to April 1978: Law engineering Testing Company, Birmingham, Alabama. Project Soils Engineer. Duties included planning and supervising all phases of site and subsurface investigations, testing, and laboratory analysis, writing engineering reports with recommendations mainly for commercial type buildings. Also performed mapping of structural geology for a nuclear power plant foundation in the King's Mountain belt in the Carolinas.

November 1976 to December 1977: Federer-Bhate and Associates, Inc., Birmingham, Alabama. Soils Technical/Engineer. Performed standard ASTM field and laboratory soils tests for subsurface investigations and construction testing and performed inspection of earth footings. Also performed a subsurface investigation and soil gradation and slope stability analysis for an earth dam.

September 1975 to June 1976: Al Johnson Construction Company, Brookwood, Alabama. Site Engineer. Mine Shaft Construction. Office engineering duties included making production graphs and records and daily and weekly job summaries. Filing blueprints and some billing. Site Engineering duties included aligning forms for vertical shaft concrete, some pipelaying, minor surveying work and rockbolt pullout tests.

January 1975 to July 1975: University of Minnesota, Minneapolis, Minnesota. Research Assistant Technician, Underground Studies. Department of Civil and Mineral Engineering. Part-time while attending college. Worked with graduates and undergraduates setting up rock strength, stress and strain tests and equipment such as core cylinder crushing tests, block crushing "insitu" tests in sandstone tunnel excavations, and extensometer strain tests for a major underground test excavation. Also helped develop and test spray grouting equipment, performed rockbolt pullout tests, and shotcrete strength tests.

# VALUE ENGINEERING

HARZA-EBASCO

RESUMES

RESUMES

000153



# HARZA-EBASCO

WILLIAM T. BRISTOW  
Vice President and Assistant Chief Engineer

Date of Birth: July 11, 1926

Citizenship: U. S. A.

Degree: Bachelor of Science in Civil Engineering  
(Structural Option)  
1950, University of Illinois

Languages: English and working knowledge of Spanish

Professional Registrations: Professional Engineer - Arkansas, California, Illinois, Washington, D.C., and Wisconsin

Professional Society: American Society of Civil Engineers

February 1977 to Date: Harza Engineering Company, Chicago, Illinois. Vice President and Assistant Chief Engineer. Project Director - Hrauneyjafoss Hydroelectric Project, Iceland. Client contact is involved for a project that will ultimately have an installed capacity of 210 MW. As Assistant Chief Engineer, responsible for technical direction and coordination of the Technical Design Branches in absence of Chief Engineer. Project Director for Calion Lock and Dam and Burlington Dam Projects.

July 1976 to January 1977: Harza Engineering Company, Chicago, Illinois. Project Director. Bonneville Second Powerhouse Schedule Review. Client contact involved. Harza Engineering Company prepared an independent review of the construction schedule to ascertain if the scheduled "on-line date" was feasible. Project Director for Calion Lock and Dam and Burlington Dam Projects.

September 1974 to July 1976: Harza Engineering Company, Chicago, Illinois. Head, Hydroelectric Division and Project Director. Burlington Dam project for the St. Paul District of the Corps of Engineers. Client contact was involved. Harza Engineering Company was to prepare the General Design Memoranda for the Burlington Dam project which is to serve as flood control for the City of Minot, North Dakota.

Project Director. Chief Joseph Dam Raising project for the Seattle District of the Corps of Engineers. The assignment on this project was to review the Corps' prepared contract documents for constructibility and to point out changes to the contract documents where significant savings could be made as well as changes or corrections to minimize claims by the contractor. Client contact was involved in the work.

WILLIAM T. BRISTOW  
Vice President and Assistant Chief Engineer

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September 1974  
to July 1976:  
(continued)

Project Director - Calion Lock & Dam for the Vicksburg District Corps of Engineers. Client contact for an assignment to prepare Feature Design Memoranda, designs and contract documents for a lock and dam on the Ouachita River in Arkansas.

Project Manager. Sultartangi Hydroelectric project feasibility studies. This project is located on the Thjorsa River in Iceland.

Project Director. Feasibility study for the development of hydroelectric power on the Magpie River in Ontario, Canada, for Great Lakes Power Corporation. Client contact was involved in the work for Great Lakes Power Corporation.

March 1974  
to November 1974:

Harza Engineering Company, Chicago, Illinois.  
Hydroelectric Division Head and Project Manager.  
Lock and Dam #26 (Replacement) for the St. Louis District Corps of Engineers. This project involved the preparation of designs, specifications for 6-1/2 bays of the dam, 110-feet wide by 43-feet high tainter gates, bulkhead gates, and emergency bulkhead gate gantry crane.

November 1973  
to May 1975:

Harza Engineering Company, Chicago, Illinois.  
Associate and Hydroelectric Division Head. Project Director Andrews Generating Station Third Unit Addition for the Great Lakes Power Corporation of Sault Ste. Marie, Ontario, Canada. Responsible for the preparation of contract documents for the powerhouse, power tunnel, and intake for 25-MW unit under 178-feet net head.

Project Director. Feasibility study for additional generation at the existing Soo Plant for the Great Lakes Power Corporation of Sault Ste. Marie, Ontario, Canada.

February 1972  
to June 1974:

Harza Engineering Company, Chicago, Illinois.  
Associate and Head, Transportation Division.

Project Manager. Washington, D. C. METRO project A6 Section-Rockville Route. Responsible for preparation, coordination, and supervision of structural designs that included 10,000 feet of double and single track tunnels, three passenger stations and a 500-foot long double track cut-and-cover double box structure, two chilled water plants for air conditioning, 12 vent shafts, three fan shafts, two traction power substations, and one drainage station. Client contact and coordination with General Engineering, General Architectural, and General Construction Consultants were involved.

November 1967 to February 1972: Harza Engineering Company, Chicago, Illinois.  
Associate and Head, Power Resources Planning Division.  
  
Project Director. Sucre-Potosi Transmission Line, Sucre Thermal Plant and Rio Grande, San Jacinto-Sola Prefeasibility studies in Bolivia; and Rio Patia watershed studies in Colombia.  
  
Project Manager - Lawrence Avenue Sewer System, Chicago, Illinois. Project consisted of design, plans and specifications for a 5-mile sewer tunnel up to 250-ft. deep; shafts and pumping plant.

September 1966 to November 1967: Harza Engineering Company, Chicago, Illinois.  
Assistant Head, Civil Division.

August 1964 to September 1966: Harza Engineering Company International, Medellin, Colombia.  
Resident Representative. Duties included coordination between our associate, INTEGRAL LTDA., and our office in Chicago, as well as the review of civil designs and drawings, and equipment bid analyses prepared by INTEGRAL LTDA. In addition, assisted INTEGRAL LTDA. in the preparation of structural designs and contract documents.

July 1963 to August 1964: Harza Engineering Company, Chicago, Illinois.  
Assistant to the Project Manager. Mangla Dam project, Spillway Section. Responsible for the preparation of the design criteria and the analysis of design for the spillway designs.

March 1962 to July 1963: Harza Engineering Company, Chicago, Illinois.  
Head, Mangla Dam project, Review Section. Responsible for the review of designs and drawings of Binnie & Partners, London, England, for the powerhouse, intake and dam.

October 1961 to March 1962: Harza Engineering Company, Chicago, Illinois.  
Group Leader. Supervised design and construction drawings for the Canaveral and Guajoyo projects in Central America (powerhouse and intake).

March 1960 to October 1961: Harza Engineering Company International, Tehran, Iran.  
Engineer. Karadj Arch Dam project. Responsible for construction surveillance and training Iranian engineers in inspection techniques.

April 1959 to February 1960: Graver Tank & Manufacturing Company.  
Field Erection Design Engineer. Responsible for the design of field erection equipment for elevated water tanks, reactor housings, stand pipes, tankage, etc.

WILLIAM T. BRISTOW

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Vice President and Assistant Chief Engineer

October 1958 to April 1959:	Harza Engineering Company, Chicago, Illinois. Group Leader. Karadj project. Responsible for the design and preparation of construction drawings for the powerhouse.
April 1957 to October 1958:	Public Utility District #1 of Grant County, Washington. (Leave of absence from Harza Engineering Company.) Six months were spent training personnel to check the contractor's detailed reinforcing drawings for the Priest Rapids project. Twelve months were spent in construction surveillance and inspection of powerhouse intake, spillway, and fish facilities.
October 1955 to April 1957:	Harza Engineering Company, Chicago, Illinois. Squad Leader and Group Leader. Supervised design and construction drawings for the Panchet Hill Powerhouse and the Priest Rapids Powerhouse Erection Bay.
April 1955 to October 1955:	Harza Engineering Company, Chicago, Illinois. Leave of absence.
January 1951 to April 1955:	Harza Engineering Company, Chicago, Illinois. Squad Leader and Assistant Project Manager. Ambuklao project, Philippine Islands. Responsible for design and preparation of construction drawings for underground powerhouse, spillway, and outlet works.  Assistant to the Project Manager. Brokopondo project, Suriname, South America. Duties included the preparation of the Planning Report.  Designer and Squad Leader. McPhail Falls project, Canada. Responsible for the designs and preparation of construction drawings.  Designer and Detailer. Blakely Mountain project, Arkansas. Responsible for the powerhouse erection bay.  Designer and Detailer. Scott Falls project, Canada. Responsible for the intake and powerhouse.
June 1950 to January 1951:	City of Milwaukee, Bureau of Street Construction, Wisconsin. Responsible for the inspection of street construction.

# HARZA-EBASCO

JOHN R. FOTHERINGHAM

Job Title:

Location:

Education:

Lehigh University, BS - Civil Engineering, 1964  
Lehigh University, BA - Applied Science, 1963  
United States Navy, Diploma, Officer Candidate School, 1965  
United States Navy, Diploma, Civil Engineer Corp Officers' School, 1965  
University of Wisconsin, Certificate, Value Engineering, 1981  
University of Washington, Certificate, Cold Regions Engineering, 1982

Professional  
Registration:

Professional Engineer, State of New Jersey, 1975  
Professional Engineer, Province of British Columbia, 1982  
Engineer-in-Training, Commonwealth of Pennsylvania, 1964  
Member - American Society of Civil Engineers, 1981  
Member - American Concrete Institute

Parent Company:

Ebasco Services Incorporated

July, 1982 -  
Present:

Chief Civil Design Engineer in the Bellevue, Washington office responsible for the civil design engineering and design drafting divisions.

April, 1981 -  
June, 1982:

Supervising Civil Engineer assigned to Integ-Ebasco joint venture office in Vancouver, B.C., Canada. Responsible for the technical direction and acceptability of the civil engineering features of a four unit (500 MW each) coal fired electric generating facility being designed for B.C. Hydro.

Project involved make-up water system involving reservoir, pump structure, pipeline (3½ miles), closed cooling water system with natural draft cooling towers, erosion and sedimentation control facilities and 1200 foot high chimney.

1971 - 1981:

Principal Civil Engineer (1973 - 1981) in the New York office responsible for the civil engineering features of St. Lucie Nuclear Generating Station, Unit 1 as the Lead Civil Engineer. Areas of responsibility included all principal structures, foundations, soils, and circulating water system design including off-shore ocean intake and discharge system. Designed facilities included most Class 1 structural facilities and Ultimate Heat Sink. Work included preparation and presentation of testimony for both state and federal environmental and licensing hearings - subordinate civil engineering and design staff exceeded 20 engineers, designers, and draftsmen.



Performed extensive studies and investigations into ocean intake and discharge system performance and control of marine growth.

Studied water hammer problems in service cooling water system. Provided operating procedure for 2300 cfs circulating water system.

1970 - 1971:

Senior Civil Engineer in New York office responsible for the civil engineering features of Waterford SES Units 1 and 2 (430 MW each) as the Lead Discipline Engineer. Project participation was from inception to 25 percent completion at which time project was transferred to branch office for completion. Included design and layout of circulating water system.

1969 - 1972:

Civil Engineer in New York office responsible for the civil engineering features (excluding structural steel) of the Montour SES (2 - 790 MW coal fired units) as the Lead Discipline Engineer: Montour I from approximately 60 percent design completion to conclusion, Montour II from beginning to end.

Project civil engineering features included rock excavation, spread footings and mats, makeup water system including 1500 acre-foot reservoir, 15 mile pipeline and river intake system, closed circulating water system, coal handling system, ash disposal dike and waste water disposal system.

1968 - 1969:

Assistant Engineer

Design and drafting responsibilities for Ninemile Point Units 4 and 5 (750 MW each) including layout of circulating water system, structural concrete design, drawing preparation, and review.

1964:

Cadet Engineer

Performed various civil engineering assignments including feasibility study for power plant in southwest, chimney design, spillway model study for 350 ft. high concrete arch dam, and miscellaneous foundation designs.

OTHER  
EXPERIENCE:

1966 - 1968:

Transportation Office, U.S. Navy

U.S. Naval Station, Keflavik, Iceland. In charge of Transportation, Public Works Department, involving vehicle and equipment operation and maintenance, snow removal and construction equipment operations. Department involved 100+ Icelandic nationals and 25 enlisted personnel. Resigned as LT(jg) in March, 1968. Honorable Discharge.

- 1965 - 1966: Shops' Engineer and Assistant Public Works Officer  
U.S. Navy, Earle Ammunition Depot, Colts Neck, N.J.  
Performed management functions in Public Works Department involving 200+ civilian employees.
- 1964 - 1965: Officer Candidate, U.S. Navy
- a) Officer Candidate School, Newport, R.I. four months training, commissioned Ensign, U.S. Navy
  - b) Civil Engineer Corp. Officers' School, Port Hueneme, Cal., 2½ months additional training - Ensign, U.S. Navy

CLIENT  
REFERENCES:

- Project Name: Hat Creek Project  
Mr. S.A. Ridley  
B.C. Hydro and Power Authority  
Box 12121  
555 West Hastings Street  
6th Floor - Mailroom  
Spencer Building  
Vancouver, B.C. V6B 4T6  
(604) 663-4480
- Project Name: St. Lucie Nuclear Power Plant  
Mr. C.S. Kent  
Florida Power and Light Company  
P. O. Box 529100  
Miami, Florida  
(305) 863-3330
- Project Name: Montour Steam Electric Station  
Mr. W. Strobel  
Pennsylvania Power and Light Company  
Two North Ninth Street  
Allentown, Pennsylvania  
(215) 770-5151

# HARZA-EBASCO

EUGENE PAUL

Architect

Date of Birth: May 17, 1937

Citizenship: U. S. A.

Degree: Bachelor of Architecture  
1965, University of Illinois

Language: English, Lithuanian

Professional Registrations: National Council of Architectural  
Registration Boards Certificate  
Architect - Illinois, Nebraska, North Dakota, Wisconsin,  
Virginia and Minnesota

Certificates: A.C.E.C., A.I.A. Value Analysis Workshop Certificate

Awards: James White Memorial Prize for Structural Courses

November 1974 to Date: Harza Engineering Company, Chicago, Illinois.  
Lead Engineer. Responsibilities include the production and supervision of production of architectural design, design drawings, design memos, contract drawings, specifications, cost estimates, construction drawings, and presentations. Also included is client liaison, interdepartmental liaison, selection and evaluation of materials and scheduling of project budgets. Project types include hydroelectric, environmental, sanitary, river locks, control facilities, warehousing, workers' camps, pumped-storage projects, and recreational facilities.

June 1965 to November 1974: Robert F. Brown & Associates, Architects/Engineers,  
& the Rowmen Co. General Contractors, Northfield, Illinois.  
Associate Architect. Responsibilities included client contact, project planning, preliminary design, preparation and supervision of working drawings, field supervision, structural engineering, sanitary engineering, specifications writing, flood retention, work on commercial and industrial buildings up to 750,000 sq. ft. in size.

September 1958 to June 1965: University of Illinois.  
Undergraduate Student.

EUGENE PAUL  
Architect

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October 1959  
to June 1965:

U.S.A.R.  
Six months active service.

June 1957  
to September 1963:

Harza Engineering Company, Chicago, Illinois.  
Draftsman. Civil Division.  
Worked intermittently in architectural, civil and  
soils sections for a total accumulated time of three  
years.

February 1981

61202

# HARZA-EBASCO

GILBERT H. POST  
Associate and Head, Thermal Systems Section

Date of Birth: August 13, 1920

Citizenship: U. S. A.

Education: Illinois Institute of Technology  
Mechanical Engineering

Language: English

Professional  
Registration: Wisconsin

Professional  
Societies: American Society of Mechanical Engineers  
Illinois Society of Professional Engineers  
National Society of Professional Engineers  
Western Society of Engineers  
Wisconsin Society of Professional Engineers

October 1961  
to Date:

Harza Engineering Company, Chicago, Illinois.  
Positions Held: Head, Thermal Systems Section.  
Head, Equipment Piping Division. Responsible for  
all mechanical design and engineering services  
related to water and wastewater treatment plants,  
and solid waste processing facilities.

## Relevant Experience:

Commonwealth Edison - wastewater treatment plants  
for Will County, Kincaid, Ridgeland, Dresden, Quad  
Cities and Zion generating stations.

Cleveland Cliffs Mining Company, Tilden Tailings -  
Wastewater Treatment Plant.

Jeddah Airport, Saudi Arabia, 15 MGD Wastewater  
Treatment Plant. 100 ton per day solid waste incinerator  
plant.

Mayfair Pumping Station, City of Chicago, design and  
specifications for extension of potable water distribution  
facilities including complete flow metering devices.

Muskegon County Sewage Lift Stations, Muskegon,  
Michigan. Determination of sewage flows, present  
and future, selection of pumps and associated



GILBERT H. POST  
Associate and Head, Thermal Systems Section

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October 1961  
to Date:  
(Continued)

equipment including arrangement of plant and facilities. Design and specifications for five underground and one aboveground stations ranging in size from 1 MGD to 90 MGD.

Soyapango Gas Turbine Plant, San Salvador, El Salvador. Specifications, bid evaluation and recommendation for award of contract for 2-16.5 MW industrial type gas turbines, including negotiations with World Bank for financing the project.

Sucre Diesel Plant, Sucre, Bolivia. Review of specifications, site evaluation, review of bids and recommendation for award of contract for a three unit 10 MW dual fuel diesel plant including final acceptance testing on site.

Medan, Sumatra feasibility study. Upgrading, rehabilitation and recommendation of additional generating units, including gas turbine and diesel power plants.

Medan, Sumatra, New Diesel Electric Plant of 24 MW capacity and rehabilitation of existing diesel and gas turbine plants with a total capacity of 30 MW.

Tegucigalpa Diesel Plant, Honduras. Project Manager for the design, specification, site selection, and field testing of a 10 MW automatic diesel plant for base load and peaking operations.

Kandahar Project, Afghanistan. Project Manager for the rehabilitation of the City of Kandahar Diesel Plant, including field investigations to determine the extent of the project and determine the financial scope. Procurement of all materials required for the rehabilitation.

Karun Project, Iran, four 250,000 kVA unit hydroelectric project.

Cerron Grande Project, El Salvador, two 69,300 kW unit hydroelectric project.

Guri Project, Venezuela, Powerhouse No. 1, ten 400,000 kW unit hydroelectric project.

Guri Project, Venezuela, Powerhouse No. 2, ten 610,000 kW unit hydroelectric project.

GILBERT H. POST  
Associate and Head, Thermal Systems Section

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October 1961  
to Date:  
(Continued)

Mossyrock Project, City of Tacoma, Washington, three 167,000 kVA unit hydroelectric project.

Cowlitz Salmon Hatchery, City of Tacoma, Washington, complete facilities, including a 150 cfs pump house, process and sanitary sewers, water distribution mains and related screens and filtration. Also, the salmon hatchery at the Priest Rapids Project.

Kinzua Project, Pennsylvania, two pump turbines of 207,500 hp and one conventional turbine generating unit of 29,000 kVA.

CEMAT Project, Brazil. Project Manager for the expansion of the power system in the State of Mato Grosso, Brazil, including hydro and diesel generation, transmission and distribution facilities, personnel training in operations and maintenance, electrical testing laboratories and maintenance equipment.

Ann Arbor Emergency Diesel Electric Power, Michigan. Project Manager for feasibility study including determination of power requirements, cost analysis and location of plant. Project Manager for control and construction phase to implement study.

METRO Subway, Washington Metropolitan Area Transit Authority. Complete mechanical design, drawings, specifications and cost estimates for one section of the Metro System including 350-ton Chiller Plants and related piping and ventilating systems for three passenger stations.

March 1956  
to October 1961:

Maccabee and Associates, Chicago, Illinois. Assistant Head of Industrial Division. Supervised design, prepared drawings, field investigation, inspected construction, and coordinated mechanical design and field installations for all phases of work related to steel mill construction and expansion, including steam process piping, steam power piping, natural and coke-oven gas distributing piping, storm and sanitary sewers, clarification of mill water and waste by means of thickeners, clarifiers and grit chambers.

March 1953  
to March 1956:

Harza Engineering Company, Chicago, Illinois. Group Leader. Mechanical Department. Responsibilities included studies, engineering design, specifications, and preparation of drawings for mechanical features of hydroelectric plants.

RESUMES

RESUMES

GILBERT H. POST  
Associate and Head, Thermal Systems Section

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March 1953  
to March 1956:  
(Continued)

Typical Projects and Assignments:

Gavins Point Project, supervised design and prepared construction drawings for a three-unit hydroelectric power plant.

Derbendi Khan Project, supervised design memoranda and drawings for a two-unit hydroelectric power plant.

December 1950  
to March 1953:

Frey Engineering Company, Chicago, Illinois.  
Squad Leader. Mechanical Department. Responsible for the design and drawings in mechanical phases of steel mills and steam generation stations, steam power piping and steam driven auxiliaries, water treatment plants, sewage treatment and collector mains and process water reclamation plants including clarification, grit removal and acid neutralization.

April 1947  
to December 1950:

Sargent and Lundy, Chicago, Illinois.  
Designer. Mechanical Department. Responsible for layout and design of piping systems related to steam power plants.

September 1943  
to December 1945:

U. S. Navy.  
Metalsmith 2/c. Pipefitter and welder, and diesel engine operation.

September 1939:

Crane Company, Chicago, Illinois.  
Laboratory Assistant. Materials Testing Laboratory. Performed product testing of valves and welding procedures.

Crane Company, Draftsman. Product Design Division.

January 1982  
63012

# HARZA-EBASCO

MARVIN E. SCHUCHARD  
Department Head, Electrical Design Branch

Date of Birth: May 26, 1929

Citizenship: U. S. A.

Degree: Bachelor of Science in Electrical Engineering  
1951, North Dakota State University

Language: English

Professional Society: Institute of Electrical and Electronics Engineers

Experience Record: Professional Experience - 27 years.  
Design engineering and construction management of hydroelectric power plants, substations and switchyards.

September 1969 to Date: Harza Engineering Company, Chicago, Illinois.  
Department Head. Electrical Design Branch. Duties include: Design studies; feasibility studies; preparation of designs, specifications and estimates; equipment selection and application; bid evaluation; control and protection; review of design drawings; review of manufacturers' drawings and technical information; factory inspections of manufactured equipment; field assignments for project start-ups which include responsibilities for overall coordination, final checkouts, testing, energization, generating unit start-up and initial operation; as all this work relates to hydroelectric projects. Project Manager for Permanent Restoration and Automation of Santee Cooper Hydroelectric Power Plant. Project Electrical Engineer for the Cornell Hydro Power Plant, the Uribante-Doradas Project and the Foothills Project.

April 1967 to August 1969: Harza Engineering Company, Chicago, Illinois.  
Construction Division. Chief Field Electrical-Mechanical Engineer on the Kinzua (Seneca) Pumped-Storage Power Plant. Worked on Resident Construction Staff and was responsible for all electrical and mechanical construction work on the power plant. Supervised all final checkouts, start-ups, testing and energization, and was the project start-up coordinator.

RESUMES

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# HARZA-EBASCO

DONALD W. HAYLEY

Job Title: Geotechnical Consultant

Work Location: Edmonton, Alberta

Education: B.Eng., Civil Engineering,  
Carleton University, Ottawa, Canada  
1966

M.Sc., Civil Engineering (Soil Mechanics)  
University of Alberta, Edmonton, Canada  
1968

Special Qualifications: Geotechnical specialist on permafrost engineering

Professional Registration: Alberta  
Yukon Territory

Parent Company: EBA Engineering Consultants Ltd.

## Experience and Qualifications Relevant to the Susitna Project:

1970 to Present: Has directed EBA's Arctic Group that has been dedicated to evaluating and solving geotechnical problems in Canada's north. He has particular experience at formulating site development recommendations in arctic and sub-arctic regions. He contributed to various feasibility studies including Arctic gas pipelines, transportation corridors in the Mackenzie Valley, drilling platforms in the Beaufort Sea, and preliminary studies for gas plant sites in the Mackenzie Delta. Mr. Hayley has also pioneered EBA's involvement in the application of finite element techniques to geotechnical and geothermal problems.

- Geotechnical Design Study - Normal Wells Pipeline Gathering System, ESSO Resources Canada Ltd. This project involved evaluation of geothermal and geotechnical behaviour of warm oil gathering system pipelines buried in permafrost. Also included was a major crossing of the Mackenzie River. Evaluation of differential thaw settlement and soil parameters appropriate for pipe stress analyses were a key element in assessing the acceptability of a fully buried system.

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MARVIN E. SCHUCHARD  
Department Head,  
Electrical Design Branch

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April 1966  
to April 1967:

Harza Engineering Company, Chicago, Illinois.  
Resident Construction Engineer. Construction Division.  
Assumed and completed the responsibilities of Resident  
Construction Engineer's office for all construction  
work on Wanapum Hydroelectric Development. This  
development consisted of a dam, spillway and powerhouse  
with ten 87,500 kVA generating units, fish passage  
facilities, 230 kV transmission lines, and a 230 kV  
switchyard.

May 1962  
to April 1966:

Grant County Public Utility District, Ephrata, Washington.  
Senior Electrical Engineer. Worked on Resident Con-  
struction Engineer's staff and was responsible for all  
electrical construction work on the Wanapum Hydroelectric  
Development. This included all construction work of  
the 230 kV Wanapum switchyard and transmission lines  
and the electrical features of the Wanapum Dam, Spillway  
and Powerhouse. Supervised the final checkout of  
controls, metering and relaying, the start-ups, testing  
and energization of all electrical features of the  
Wanapum Development. Responsible for contract adminis-  
tration of all electrical work.

February 1959  
to May 1962:

Grant County Public Utility District, Ephrata, Washington.  
Electrical Engineer. Priest Rapids Hydroelectric  
Development. Worked on installation of the electrical  
facilities, the final checkouts, start-ups, testing and  
energization. Assigned to the position of Electrical  
Maintenance Engineer and was responsible for the initial  
electrical maintenance program established at Priest  
Rapids.

September 1958  
to January 1959:

Anderson-Burke Corporation, Bellevue, Washington.  
Electrical Engineer. Field engineering for contractor  
on installation of electrical equipment and completion  
phases of the SAGE Project at Moses Lake, Washington.

May 1955  
to August 1958:

U. S. Navy, Bureau of Ships - Engineering Duty Officer,  
LTJG. Worked on conversions, alterations and repairs  
of naval vessels.

October 1954  
to April 1955:

Sewell & Sewell, Consulting Engineers, Newport, Washington.  
Electrical Engineer. Responsible to the Assistant  
Resident Construction Engineer for all electrical  
construction work at the Box Canyon Hydroelectric  
Project.

MARVIN E. SCHUCHARD  
Department Head, Electrical Design Branch

-3-

July 1951  
to September 1954:

Bonneville Power Administration, Federal Power Utility,  
Portland, Oregon.

Electrical Engineer. Worked up progressively from  
Office Engineer, to Field Engineer, to Project Engineer  
in the substation and switchyard construction program  
of the Administration. As Project Engineer, was responsi-  
ble for all phases of the construction (both contract  
and force account) of each substation or switchyard to  
which assigned.

October 1978  
71577

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CONSULTANTS, LTD.**

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DONALD W. HAYLEY  
Geotechnical Consultant

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- Geotechnical Evaluation of an Offshore Pipeline from the Saganavirktok Delta, Beaufort Sea, Alaska, Sohio Construction Company. This project encompassed identification of geotechnical problems associated with an offshore pipeline. The scope of work was expanded to include review of preliminary engineering conducted by others and definitive geothermal analyses to predict thaw of seabed permafrost.
- The Arctic Pilot Project has involved planning and design of a 100 mile natural gas pipeline across Melville Island, N.W.T. The line is fully buried within continuous permafrost. EBA has been sole geotechnical consultant for this phase of the project. Assignments included route location, borrow evaluation, and right-of-way protection measures. Two major test ditching programs have been carried out. As Project Manager, Mr. Hayley directed all phases of the work and participated in both environmental and Energy Board regulatory hearings. Construction of the pipeline is scheduled to commence in 1984.
- Drake Point Gas Plant, Panarctic Oils Limited. This preliminary design study for the first Canadian high arctic gas production facilities included site selection in a region of thaw-sensitive terrain, foundation design, quarry site development, dock design, and contribution to logistics planning for overland haul routes.
- Polar Gas Project Pipeline. As sole geotechnical consultants for the Polar Gas projects, EBA provided geotechnical engineering for a 3000 km pipeline project from the high arctic to southern Canada. As Project Manager for all phases, Mr. Hayley conducted extensive route reconnaissance and coordinated numerous field data collection programs. Analytical studies included geothermal analyses and thaw settlement analyses where warm gas could thaw discontinuous permafrost. Stresses in the buried pipeline imposed by freezing and thawing of soils were evaluated by sophisticated soil-structure interaction analyses.
- Remedial Measures for Stabilization of a Thawing Subgrade, Canadian National Railways. Applied research into settlement sink holes in a railway subgrade has been ongoing at EBA for several years. The sink holes can be attributed to localized thaw of permafrost within



DONALD W. HAYLEY  
Geotechnical Consultant

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discontinuous permafrost-peatland terrain. A thaw-settlement model was developed as an aid for evaluating remedial measures. Numerous alternative configurations were assessed numerically using two-dimensional geothermal analyses. A combination of heat pipes and insulation was selected and five prototype test sites installed. A two-year intensive monitoring program has confirmed the validity of the approach. This project was a joint effort with W.D. Roggensack of EBA.

- Various Low Dams on Permafrost Foundations. Several projects have been undertaken involving design or evaluation of existing low earth fill dams on permafrost foundations in the Canadian North. These have included:

- a) Evaluation of leakage through thawed permafrost rock foundation of the water supply dam at Rankin Inlet, N.W.T.
- b) Feasibility Assessment of an earth fill or rock fill dam on continuous permafrost at Arctic Bay, N.W.T.
- c) Stability and settlement evaluation of an existing tailings dam on thawing permafrost at Mayo, Yukon. The project included recommending remedial measures for minimizing the risk of failure where larger settlements have occurred.

Client References:

Mr. R.B. Potter  
Sohio Petroleum Company  
100 Pine Street  
San Francisco, California  
U.S.A. 94111

Mr. D.V. Inman  
Algas Engineering Services  
P.O. Box 2535  
205 - 5 Avenue S.W.  
Calgary, Alberta T2P 2N6

Mr. O.M. Kaustien  
Polar Gas Project  
P.O. Box 90  
Commerce Court West  
Toronto, Ontario M5L 1H3

DONALD W. HAYLEY  
Geotechnical Consultant

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Mr. W.E. Jubien  
Canadian National Railways  
16th Floor, 10004 - 104 Avenue  
Edmonton, Alberta

# HARZA-EBASCO

C.T. HWANG

Job Title: Principal Consultant

Work Location: Edmonton, Alberta

Education: B.Sc., Civil Engineering, National Taiwan University, Taipei, Taiwan  
1962  
M.Eng., Civil Engineering, McMaster University, Hamilton, Canada  
1968  
Ph.D., Civil Engineering (Geotechnical), McMaster University, Hamilton, Canada  
1969

Special Qualifications: Development of a finite element model for prediction of ground thermal regime in permafrost regions.

Professional Registration: Professional Engineer - Alberta

Parent Company: EBA Engineering Consultants Ltd.

## Experience and Qualifications Relevant to the Susitna Project:

Dr. Hwang has had extensive experience in the field of Civil Engineering, including the design of earthworks, vibration analysis, research on the consolidation and deformation characteristics of soils, development of computer programs for geotechnical applications, frost heave studies, and analysis of ground thermal regime affecting permafrost conditions.

- Supervised thermal design of the Barrow Utilities System (Barrow, Alaska). Thermal analyses were undertaken to ensure preservation of ice rich permafrost around the heated utilidors and pump stations of this buried utilities system. Design considerations addressed in this study included the possible effects of frost heave, thaw settlement, buoyancy problems resulting from seasonal freeze-thaw cycles, the convective thermal effect of groundwater seepage, and possible freezing of the utility pipes within system components.

C.T. HWANG  
Principal Consultant

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- Conducted geotechnical and geothermal studies for the proposed Alaska Highway Chilled Gas Pipeline project for Northwest Alaskan Pipeline Co. and Foothills Pipe Lines Ltd. The specific requirements of this project have led to his development of a frost heave model for use in the design of chilled gas pipelines. The semi-empirical frost heave model requires laboratory determination of the heave strain of undisturbed soil samples. C.T. Hwang has been instrumental in developing laboratory testing procedures and in data analysis and interpretation.
- Using finite element techniques, developed a mathematical model for Canadian Arctic Gas Study Ltd. that made it possible to conduct two-dimensional geothermal analyses of ground temperature regime in permafrost regions. The EBA geothermal model has been the basis of analytical studies for feasibility of several arctic pipelines; of thermal review work for the Alaska Oil Pipeline project, especially for design of thermal VSM system; and of thermal design for the Syncrude oil storage tank at Fort McMurray, Alberta.

Client References:

Mr. W. Zirjacks, P.E.  
Frank Moolin & Associates, Inc.  
3300 'C' Street  
Anchorage, Alaska 99503  
(907) 276-7484

Dr. R.M. Isaacs  
Northwest Alaskan Pipeline Co.  
3333 Michelson Drive  
Irvine, California 92730  
(714) 975-4058

Mr. J.R. Ellwood, P.Eng.  
Foothills Pipe Lines (Yukon) Ltd.  
425 - 1 Street S.W.  
12 Floor, ESSO Plaza East Tower  
Calgary, Alberta T2P 3L8  
(403) 294-4148

# HARZA-EBASCO

ARSHUD MAHMOOD

Job Title: EBA Team Leader

Work Location: Anchorage

Education: B.Sc. Physics, Government College, Lahore,  
University of Punjab, Pakistan 1961  
B.E. Civil Engineering (Soil Engineering)  
Asian Institute Technology,  
Bangkok, Thailand 1965  
M.S., Soil Mechanics,  
University of California, Berkeley  
1968  
Ph.D., Geotechnical Engineering,  
University of California, Berkeley  
1972

Special  
Qualifications: Arctic Field Experience

Professional  
Registrations: California, Texas,  
Alaska (Pending)

Parent Company: EBA Engineering Consultants, Ltd.

## Experience and Qualifications Relevant to the Susitna Project

1976 to Present: EBA Engineering Consultants, Ltd. Projects include:

- Project Manager Geotechnical Site Investigation, Navarian Basin, Bering Sea, Alaska, for Arco Alaska, Inc. Conductor design and evaluation of shallow bearing capacity.
- Geotechnical Manager, Strudel Scour Investigation and Ground Temperature Measurements, Duck Island, Beaufort Sea, Alaska Exxon Company, U.S.A.
- Geotechnical Consultant, Gravel Resource Study, including over-ice in situ testing, Harrison Bay, Beaufort Sea, Alaska for Sohio Petroleum Company.
- Project Manager, Site Investigation and Foundation Design for facilities pads, piles and oil pipeline burial sites, Milne Point, North Slope, Alaska Conoco, Inc.
- Project Manager, Site Investigations, including in situ testing, and foundation design, for offshore platforms and pipelines, Gabon, W. Africa, for Amoco Production Co.



ARSHUD MAHMOOD  
EBA Team Leader

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- Project Manager, Slope Stability Investigations, Mississippi Delta, for Transco Exploration Company.
- Senior Engineer & Project Manager, Site investigations and foundation design for more than 100 sites in Gulf of Mexico, Arabian Gulf, Straits of Magellan, and Gulf of Alaska.
- Senior Engineer, Slope stability evaluation of the Kodiak Shelf, Western Gulf of Alaska, Mobil Oil et al.
- Senior Engineer, Cooling Pond Dike Design, South Texas nuclear project, Bay City, Texas, for Houston Light and Power
- Senior Engineer, Sand Canyon Dam Evaluation and Monitoring, Irvine, California, for Irvine Water District
- Senior Engineer, Bluff Erosion Evaluation, San Onofre Nuclear Generating Station, for Southern California Edison Co.

Client References:

Mr. Barry Kathrens  
ARCO Alaska, Inc.  
P.O. Box 360  
Anchorage, Alaska 99510

Mr. Vernon Lockett  
EXXON Co. USA  
P.O. Box 2180  
Houston, Texas 77001

Mr. Harry Berkey  
CONOCO, Inc.  
P.O. Box 2197  
Houston, Texas 77001

Mr. David Hayes  
SOHIO Construction Co.  
100 Pine Street  
San Francisco, California 94111

# HARZA-EBASCO

W.D. (BILL) ROGGENSACK

Job Title: Senior Project Engineer

Work Location: Edmonton, Alberta

Education: B.Sc., Civil Engineering,  
University of Alberta, Edmonton, Canada  
1970

Ph.D., Geotechnical Engineering,  
University of Alberta  
1977

Special Qualifications: Research and experience background exclusively in permafrost and Arctic engineering. Special expertise includes strength and deformation properties of frozen ground, stability analysis of thawing soils, and design of ground freezing/thawing systems.

Professional Registration: P.Eng., Alberta  
P.Eng., Yukon Territory

Parent Company: EBA Engineering Consultants Ltd.

## Experience and Qualifications Relevant to the Susitna Project:

1976 to Present: Senior technical consultant in EBA's Arctic Group. While providing engineering input for projects located in the Canadian Arctic and Alaska, he has developed field investigation techniques and geotechnical analyses for structures to be founded on permafrost. He has also gained considerable experience in the design and execution of specialized sampling and laboratory testing programs involving both permafrost and marine sediments. He has worked extensively throughout the MacKenzie Valley, District of Keewatin, Arctic Islands and Beaufort Sea. Experience gained in analysis and design, applied permafrost research, field investigations, laboratory testing, and instrumentation has equipped him with a broad consulting background for Arctic regions.

- Directed geotechnical design, analysis, instrumentation and certification of a caisson-retained, artificial drilling island in the Canadian Beaufort Sea (Tarsiut N-44).

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W. D. ROGGENSACK  
Senior Project Engineer

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- Evaluation of thermal aspects of operating and backfilling a mine in permafrost (Polaris Mine, Little Cornwallis Island, N.W.T.)
- Analysis of thaw settlement and soil-pipe interaction for an oil pipeline gathering system (Norman Wells, N.W.T.)
- Geotechnical design and instrumentation of a cellular dock with an artificially frozen core to resist large ice forces (Polaris Mine, Little Cornwallis Island, N.W.T.)
- Research program to evaluate techniques for stabilizing thaw subsidence of railway line in discontinuous permafrost. Study included five instrumented test sites, some with heat pipes. (Hudson Bay Railway, Manitoba)
- Geotechnical analysis of hydraulically-placed artificial islands in the Canadian Beaufort Sea. Studies have included construction pore pressures, fill properties, liquefaction potential, and interaction with ice sheets and grounded rubble (Illungnak 0-61)
- Geotechnical and groundwater investigations and subsequent design of earthfill dams to retain toxic tailings produced by a gold mine. Foundations for two dams included ice-rich permafrost. (Con Mine, Yellowknife, N.W.T.)

Client References:

Mr. D.E. Mitchell, P.Eng.  
Dome Petroleum Ltd.  
5th Floor, Roslyn Building  
400 - 5th Avenue S.W.  
CALGARY, Alberta T2P 3G3

Mr. H.M. Giegerich, P.Eng.  
5660 B Street  
Cominco Alaska, Inc.  
ANCHORAGE, Alaska 99502

Mr. J.C. Bruce, P.Eng.  
Swan Wooster Engineering Co. Ltd.  
1525 Robson Street  
VANCOUVER, B.C. B6G 1C5

# HARZA-EBASCO

KURT O. STANGL

Job Title: Engineering Geologist

Work Location: Edmonton, Alberta

Education: B.Sc., Engineering Geology,  
Queen's University, Kingston, Canada  
1972

Special Qualifications: Specialist in arctic terrain analysis,  
route location, and geotechnical field  
programs.

Professional Registration: Alberta  
Northwest Territories

Parent Company: EBA Engineering Consultants, Ltd.

## Experience and Qualifications Relevant to the Susitna Project:

1974 to Present: EBA's Arctic Group. Kurt Stangl has a diverse professional background in surface and subsurface geological mapping. He has also been involved in numerous site investigations, land and marine pipeline route studies, and studies of borrow materials requiring geological and geotechnical skills. He has managed major field programs in both winter and summer throughout western Canada and the Arctic.

- Geotechnical Investigation of Seabed Soils, Harrison Bay, Alaska, Sohio Petroleum Company. EBA Engineering and McClelland Engineers carried out a geotechnical sampling and in situ strength testing program of seabed sediments in the Harrison Bay area. The drilling program was helicopter-supported and was carried out from the sea-ice surface during March and April, 1982. Mr. Stangl was responsible for the management of the field program and office studies.
- Route Evaluation and Borrow Investigation, Algas Engineering Services Arctic Pilot project. Conducted major geotechnical drilling and reconnaissance programs along a proposed pipeline corridor on Melville Island, N.W.T. These programs were carried out to determine permafrost soil conditions and to evaluate potential sources of borrow materials along the route. The work included extensive engineering studies related to pipeline design and construction. Recently, he was involved in full-scale bucket-wheel ditching trials on Melville Island.

RESUMES

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KURT O. STANGL  
Engineering Geologist

-2-

- Route Evaluation and Borrow Investigation, Polar Gas Project. Several major geotechnical field programs and engineering studies have been under Mr. Stangl's direction. The field work encompassed geotechnical drilling and reconnaissance along several thousand kilometers of proposed pipeline route in the Canadian Arctic. Location and evaluation of potential borrow sites in permafrost terrain constituted a major portion of the work.
- Geotechnical Investigation of Proposed Quarry Sites, Panarctic Oils Limited. Mr. Stangl has directed rock quarry evaluation programs on northern Melville Island, N.W.T. The field programs included diamond coring and test pitting with explosives in frozen bedrock. Geotechnical recommendations for development of a quarry were addressed.
- Borrow Investigations, Mackenzie Delta, N.W.T, Arctic Petroleum Operators Association and Department of Indian and Northern Affairs. Supervised several geotechnical and borrow investigations in the Mackenzie Delta area. The borrow studies have included a detailed evaluation of the granular resources at Ya Ya Lake and examination of several other regional borrow prospects. As part of these studies, he undertook terrain analyses from airphotos, intensive exploratory drilling programs, and petrographic analyses. These borrow prospects are within the region of continuous permafrost and thus special development recommendations were required.

Client References:

Mr. A. Jenkins, P.Eng.  
Polar Gas Project  
P.O. box 90  
Commerce Court West  
Toronto, Ontario M5L 1H3

Mr. D.V. Inman, P.Eng.  
Algas Engineering Services  
P.O. Box 2535  
205 - 5 Avenue S.W.  
Calgary, Alberta T2P 2N6





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# HARZA-EBASCO

CLARENCE R. ALLEN

Job Title: Seismic Review Consultant

Work Location: Pasadena, California

Education: BA, Physics 1949, Reed College  
MS, Geophysics, 1951, Cal. Inst. Tech.  
PhD, Structural Geology and Geophysics,  
1954, Cal. Inst. Tech.

Special  
Qualifications: Seismic Consultant for nineteen years

Professional  
Registration: Geologist, Engineering Geologist and Geo-  
physicist in California

## Experience and Qualifications Relevant to the Susitna Project:

Agbabian Associates, El Segundo, California. Consultant re  
Bonneville Power Administration project, 1973

C.V.G. Electrificacion de Caroni, C.A., Caracas, Venezuela Con-  
sultant re Guri Dam Project, Stage III, Venezuela, 1976

California Department of Water Resources, Sacramento Consulting  
Board for Earthquake Analysis, 1963; (Chmn., 1965-74), Dam  
Safety Advisory Board, 1975. Special Consulting Board for  
the Oroville (Calif) Earthquake, 1975-Panel of Consultants  
for Littlerock Dam and Reservoir, 1979-81

California Public Utilities Commission, San Francisco. LNG  
Seismic Review Panel, Point Conception LNG Facility, 1980

Engineering Consultants, Inc., Denver, Colorado. Consultant re  
Magat Dam, Philippines, 1977-78

FRAMATOME, S.A., Paris, France. Consultant re Rud-E-Karun nu-  
clear power plant, Iran, 1976-79. Consultant re Samarra  
Nuclear Power Project, Iraq, 1979

Fundacion Venezolana de Investigaciones Sismologicas (FUNVISIS),  
Caracas Consultant re Uribante-Caparo Hydroelectric  
Project, Venezuela (La Honda, Las Cuevas, Borde Seco, La  
Vueltoza Dams), 1981

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CLARENCE R. ALLEN  
Seismic Review Consultant

-2-

Harza Engineering Company, Chicago Illinois. Consultant re Guri Dam Project Stage III, Venezuela, 1977

Holmes & Narver, Las Vegas, Nevada. Consultant to AEC on various seismic problems of Nevada Test Site and Amchitka, Alaska, 1969-71

International Engineering Company, San Francisco, California.  
Consultant re Las Tortolas tailings dam, Chile, 1980.  
Consultant re Cooper Creek Dam, Washington, 1980

IECO-ELC, Rio de Janeiro, Brazil. Consulant re Itaipu Hydroelectric Project, Brazil-Paraguay, 1978

Lahmeyer International GmbH, Frankfurt, Germany. Consultant re Chico IV Hydroelectric Project, Philippines, 1979

LeRoy Cradall and Associates, Los Angeles, California. Consultant re proposed Veterans Hospital sites, California, 1971-72

Pakistan Atomic Energy Commission, Islamabad, Pakistan. Consultant re Chashma Nuclear Power Plant Project, Pakistan, 1976

Ralph M. Parsons Company, Pasadena, California. Consultant re Los Bronces Expansion Project, Chile, 1981

Security Pacific National Bank, Los Angeles, California. Consultant re new headquarters building site, Los Angeles, 1971

H. Bolton Seed, Berkeley, California. Consultant re High Speed Ground Transportation Route, Los Angeles, 1971. Consultant re Rio Limay Project, Argentina, 1979

Tippetts-Abbett-McCarthy-Stratton, New York. Consultant re Tarbela Dam, Pakistan, 1974. Consultant re Sawpit Dam, California, 1976. Consultant re Bureau of Reclamation Technology Assessment and Safety Evaluation, 1977-78. Consultant re Pond Hill Reservoir Project, Pennsylvania, 1979-80. Consultant re Peligre Dam, Haiti, 1980. Consultant re Casa de Piedra Dam, Argentina, 1981

UNESCO, Paris. Consultant re Balkan Seismicity Project, Skopje, Yugoslavia, 1972-73

U.S. Army Corps of Engineers. Consultant re Butler Valley Dam Project, California, 1973. Consultant to Waterways Experiment Station, Vicksburg, Miss., 1971-74. Board of Consul-

CLARENCE R. ALLEN  
Seismic Review Consultant

-3-

tants, Mentone and Prado Dams, Santa Ana River Basin Project, California, 1975

U.S. Atomic Energy Commission, Washington. Consultant to Advisory Committee for Reactor Safeguards, 1971-73

U.S. Bureau of Reclamation, Denver. Auburn Dam Board of Consultants, 1976

U.S. Navy, Washington. ONR National Hazards Review Panel for Navel Facilities, 1973-74

Williams Brothers Engineering Company, Tulsa, Oklahoma. Seismicity Panel, SOHIO West Cost/Mid-Continent Pipeline Project, 1975-79

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# HARZA-EBASCO

JOHN DUNNICLIFF

Job Title: Instrumentation Consultant

Work Location: Lexington, Mass.

Education: Oxford University  
B.A. in Engineering, 1955  
M.A. in Engineering, 1960  
Harvard University  
S.M. in Civil Engineering  
(Soil Mechanics and Foundation  
Engineering), 1968  
Massachusetts Institute of Technology  
Graduate Studies in Rock Mechanics, 1969

Special  
Qualifications: Twenty-five years of relevant experience

Professional  
Registration: Massachusetts

## Experience and Qualifications Relevant to the Susitna Project:

### Tunnels

- Performance monitoring of tunnel linings and surrounding ground during construction of five tunnels: Port Richmond Tunnel, Staten Island, N.Y.; precast concrete lined portion of Lexington Market Line, Baltimore Region Rapid Transit System; 63rd Street Subway, New York City; Tenley Circle and Friendship Heights Stations, Washington, D.C.
- Co-principal investigator for two Department of Transportation research projects on soft-ground tunneling for urban rapid transit tunnels: a state-of-the-art evaluation of subsurface exploration techniques and a state-of-the-art evaluation of geotechnical instrumentation for monitoring tunnel performance during construction.
- Long-Term Groundwater Monitoring Program, Milwaukee Water Pollution Abatement Program.
- Pilot Tunnel Instrumentation Program, Cumberland Gap Tunnel, Kentucky and Tennessee

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- Investigation for relief of structure distress, Allegheny and Tuscarora Tunnels No. 2, Pennsylvania.

#### Pile Foundations

- Large-scale field test to monitor performance of 230-foot-long precast concrete piles for Keehi Interchange, Honolulu, Hawaii.
- Instrumentation of 250-foot-long precast concrete piles during load testing for Metropolitan Syracuse Sewage Treatment Plant, Syracuse, N.Y.

#### Power Projects

- Instrumentation to monitor performance and safety of four nuclear power projects: Nine Mile Point Nuclear Station, N.Y.; Alvin W. Vogtle Nuclear Plant, Ga.; Summit Power Station, Del.; and Atlantic Generating Station, offshore N.J.
- Instrumentation to monitor progress of corrective measures for building undergoing settlement, Midland Nuclear Units 1 & 2, Midland, Michigan.
- Measurement of in-situ stress using Bureau of Mines overcoring procedure and C.S.I.R. doorstopper procedure. Measurement of rock mass modulus using plate jacking test procedure. Design and installation of sonic extensometer system for monitoring performance of underground powerhouse, San Carlos Hydroelectric Project, Colombia, S. America.

#### Dams

- Instrumentation to monitor performance and safety of 5 mile long earth dam at Ludington, Mich.
- Lecturer on dam instrumentation at courses "Earth and Rockfill Dams" by Corps of Engineers at Waterways Experiment Station, Vicksburg, Miss., and at Northeast and South Planning, Design and Construction Engineers Workshops, U.S.D.A. Soil Conservation Service.
- Development of instrumentation program for monitoring performance of U.S.D.A. Soil Conservation Service dam; Brandywine Creek Dam, Pennsylvania.
- Design, installation, monitoring and data reduction for 500 piezometers, 60 remote settlement gages and 2000 feet of inclinometer casing for earth dam con-

JOHN DUNNICLIFF  
Instrumentation Consultant

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structed beneath ocean surface, during construction of Plover Cove Main Dam, Hong Kong.

- Site engineer on Dokan Dam, Iraq. Planning, installation, and evaluation of vibrating wire strain gages measuring system in concrete arch dam.
- Design of three earth dams for Batang Padang Hydro-Electric Scheme, Malaya. Sole charge of survey and site investigation. Soil testing. Selection of design parameters. Design of instrumentation. Preparation of specifications for the entire project.

#### Nuclear Waste Disposal Facilities

- Preparation of specifications for supply and installation of underground instrumentation, Waste Isolation Pilot Plant, New Mexico.
- Instrumentation program to monitor performance of Near-Surface Test Facility, Rockwell Hanford Operations, Washington.

#### Retaining Walls

- Planning and execution of instrumentation program to monitor long-term performance of permanent tieback wall, Fulton County, Atlanta, Ga.
- Design of instrumentation program to monitor performance of Retained Earth wall, Hayward, California.

#### Large-Scale Preconsolidation of Soft Foundations

- Design and installation of instruments to monitor marine test embankment, Chek Lap Kok Replacement Airport, Hong Kong.
- Instrumentation program for Reserve Limestone Storage Area, Ideal Cement Plant, Theodore, Alabama
- Field test to monitor performance of various 140 feet long vertical drains for Keehi Interchange, Honolulu, Hawaii.

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# HARZA-EBASCO

ALFRED J. HENDRON

Job Title: Rock Mechanics Consultant

Work Location: Mahomet, Illinois

Education: Ph.D. Soil Mechanics Foundations  
Geology Theoretical and Applied  
Mechanics  
1963, University of Illinois  
Urbana, Illinois  
M.S. Civil Engineering  
1960 University of Illinois  
Urbana, Illinois  
B.S. Civil Engineering (Bronze Tablet)  
1959, University of Illinois  
Urbana, Illinois

Special  
Qualifications: Extensive rock engineering teaching,  
research and consulting experience

## Experience and Qualifications Relevant to the Susitna Project:

### Examples of Rock Engineering Experience

- Consultant to the American River Constructors on the stability of 300 ft. high rock slopes for the spillway cut at Hell Hole Dam, American River Project.
- Consulted, as associate of Dr. D.U. Deere, on rock mechanics problems related to the foundations of the World Trade Center Building, New York City (110 story office building).
- Consultant to New York Port Authority on Controlled Blasting Techniques to reduce damage to adjacent structures for Journal Square Subway Terminal.
- Consultant to Western Contracting Company on stability of 150 ft high vertical spillway cut, Stocton, Dam, Stocton, Mo.
- Consultant to British Columbia Hydro Authority, Canada, on assessing stability of Portage Mountain Underground Powerhouse.

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ALFRED J. HENDRON  
Rock Mechanics Consultant

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- Consultant to Fenix and Scisson on the design of a rock cavity and steel casing at a depth of 6,000 ft. in weak rock on Amchitka Island.
- Slope stability problems along the Transandean Pipeline, Colombia, S.A., for Williams Brothers Construction Co.
- Consultant to Joseph S. Ward, Foundation Engineers on the design of a school to resist blasting vibrations, Manchester, New Jersey.
- Consultant to Architect's Collaborative, Cambridge, Mass., on controlled blasting techniques and blasting vibrations on IBM building complex, Fishkill, N.Y.
- Stability of soil and rock slopes for Transalaskan Pipeline.
- Consultant to Deleuw Cather & Co. on Blasting Specifications for Washington D.C. Subway.
- Stability of open pit mine slope - Climax Molybdenum Co., - Climax, Co.
- Consultant to British Columbia Hydro on the effects of a new reservoir on the stability of Downie Slide (1 billion cubic meter slide).
- Consultant to Gibbs & Hill on a slope adjacent to the Ohio River near Pittsburgh for sludge pipeline construction, slope 500 ft high.
- Consultant on effect of blasting on stability of slopes of Caue Mine, Itibira, Brazil, slope 800 ft high.



# HARZA-EBASCO

RAYMOND A. KREIG

Job Title: Photointerpretation Consultant

Work Location: Anchorage

Education: M.S., Geotechnical Engineering/Aerial  
Photographic Studies,  
Cornell University  
B.S., Civil Engineering  
Cornell University

Special  
Qualifications:

Mr. Kreig is a specialist in terrain and natural resource evaluation. He has extensive field experience on the North Slope, in the Brooks Range, Interior Alaska, and in South Central Alaska. Since establishing his own consulting firm he has completed numerous soils, permafrost, and terrain analysis studies for industry and government in Alaska. In the majority of these projects, the evaluation of physical and environmental conditions were based upon Mr. Kreig's experience and skill in airphoto interpretation. These skills are especially applicable to large areas where little or no existing data is available and the collection of field data by conventional means is expensive and logistics difficult.

Professional  
Registration: Alaska

Parent Company: R.A. Kreig and Associates, Inc.

Experience and Qualifications Relevant to the Susitna Project:

- Project Manager for terrain unit mapping of 1.3 million acres of 1980 Alaska Department of Natural Resources Land Disposal Areas, Alaska.
- Detailed terrain unit mapping of 800-mile Alaskan Northwest Natural Gas Pipeline route.

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RAYMOND A. KREIG  
Photointerpretation Consultant

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- Primary responsibility for borehole selection for Alaskan Northwest Natural Gas Pipeline terrain and permafrost investigations.
- Soil and permafrost centerline profile to the depth of 50 feet for the 800-mile length of the Alaskan Northwest Natural Gas Pipeline route.
- Terrain unit mapping for the Anchorage Bowl and Eagle River Coastal Zone Management Atlas for the Municipality of Anchorage Planning Department.
- Terrain unit mapping and centerline landform profile for the Alaska pipeline from Valdez to Prudhoe Bay.
- Terrain unit mapping, field route reconnaissance and soil borehole logging for the Alaska Railroad extension from Nenana to Prudhoe Bay, Kobuk area.
- Numerous geotechnical consulting tasks for the Alaskan Northwest Natural Gas Pipeline, including: 1) participation in the site selection for \$7 million Chena Hot Springs Road Frost Heave Test Site which required very specific, difficult to identify soil conditions; 2) alignment location and facility site analysis; 3) responsible for identifying initial ground temperature conditions and thermistor analysis.
- Land status determination, detailed land ownership tract map preparation and entry permission negotiation with owners for 800-mile corridor of the Alaskan Northwest Natural Gas Pipeline.
- Project Manager for design of nationwide comprehensive Land Use and Natural Resources Inventory for Ministry of Agriculture in Caracas, Venezuela.
- Developed databank of geotechnical information collected on the Alaska pipeline project to aid in analysis of natural variation of soil properties and landforms along the route.
- Route location, terrain analysis, material site identification for proposed Yukon-Kuskokwim Highway from Kalskag to Paimiut.
- Route location and terrain analysis for proposed Bethel-Napakiak Road.

RAYMOND A. KREIG  
Photointerpretation Consultant

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- Project Manager for bedrock and structural mapping, detailed soil profile and data compilation for Sagwon Stabilization Project, Alaska Pipeline.
- Terrain analysis for gravel location studies, Kuparuk and Flaxman Island vicinity, Alaska.
- Extensive field geology (including drilling) and vegetation analysis in the following regions: Trans Alaska Pipeline - entire length; Alaska Gas Pipeline - entire length; Bethel-Kalskag; Railroad extension - Nenana to Kobuk in Northwestern Alaska.

Publications:

Kreig, R.A., 1977, Terrain Analysis for the Trans-Alaska Pipeline. Civil Engineering, 47(7):61-65.

Kreig, R.A. and Reger, R.D., 1976, Preconstruction Terrain Evaluation for the Trans-Alaska Pipeline Project. Comprises pages 55-76, Chapter 4 of Geomorphology and Engineering, Coates, Donald ed., Dowden, Hutchinson & Ross.

Kreig, R.A., and Reger, R.D. (in press) Airphoto Analysis and Summary of Landform Soil Properties along the Trans-Alaska Pipeline Route. Geologic Report 66, Alaska Division of Geological and Geophysical Survey.

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# HARZA-EBASCO

EDWARD F. LOBACZ

Job Title: Cold Regions Geotechnical Engineering  
Consultant

Work Location: Hanover, New Hampshire

Education: BOSCE, 1943, Northeastern University  
MSCE, 1948, Harvard University  
MS in Engineering Management, 1970,  
Vanderbilt University

Special  
Qualifications: During 1975-1980, he was a member of the US-  
USSR Joint Working Group in Building for  
Extreme Climates and Unusual Geological  
Conditions under the US-USSR Agreement on  
Cooperation in the Field of Housing and  
Other Construction

Professional  
Registration: Massachusetts

## Experience and Qualifications Relevant to the Susitna Project:

Prior to retirement from the Corps of Engineers in February 1980, his experience background included Foundations, Dams, Pavements, Materials, Soil Mechanics, Frost Effects, Arctic and Subarctic Research and Engineering Practice, Major Civil and Military Construction, and Technical and Research Management.

Mr. Lobacz is past Assistant Chief, Arctic Construction and Frost Effects Laboratory, US Army Engineer Division, New England, and past Chief, Civil Engineering Research Branch, Cold Regions Research and Engineering Laboratory (CRREL). He worked and traveled extensively in the cold regions of the North American Hemisphere and Eurasia. Currently he is a private consultant specializing in cold regions engineering for several international firms and revised Cold Regions Technical Manuals for the Department of the Army.

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# HARZA-EBASCO

ROBERT W. (TINK) MARTIN

Job Title: Cold Regions Constructability Consultant

Work Location: Fairbanks, Alaska

Experience and Qualifications Relevant to the Susitna Project:

R.W. MARTIN ASSOCIATES, Fairbanks, Alaska, (1981 to Present):

Constructability Consultant. Perform constructability reviews, develops and analyzes construction cost estimates, and audits construction and maintenance operations for civil projects including hydroelectric power facilities, construction camps, roads and highways, marine structures, and airstrips.

ALASKA INTERNATIONAL CONSTRUCTORS, INC., Fairbanks, Alaska, (1980 to 1981):

Vice President, Manager of Construction. Responsible for the overall management and direction of all construction projects for Alaska International Constructors, Inc., the parent organization of Frank Moolin & Associates, Inc.

CONSTRUCTION ADVISORY GROUP, Toronto, Canada (1979):

Member. As a member of the Construction Advisory Group for the Polar Gas Project, was responsible for civil construction estimates for the Longlac Alternatives.

McKINNEY-FRANCO ENGINEERING & CONSTRUCTION CO., Fairbanks, Alaska, (1977 to 1979):

President. Directed all engineering and construction activities of the company, a division of McKinney Drilling Company. Responsible for the completion of the reconstruction and enlargement of the Nenana Airport at Nenana, Alaska, and the Auto Parking Expansion at Anchorage International Airport, Anchorage, Alaska.

MAJESTIC WILEY CONTRACTORS, LIMITED, Fairbanks, Alaska, (1977):

General Superintendent and Construction Manager.  
Responsible for all construction activities.

PERINI ARCTIC ASSOCIATES, Fairbanks, Alaska, (1974 to 1977):  
Assistant Project Manager and General Superintendent-Civil Construction. Responsible for the scheduling and performance of all civil-related construction activities in Section II of the Trans-Alaska Pipeline project.

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ROBERT W. MARTIN  
Cold Regions Constructability Consultant

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GENERAL-RIVERS-STEWART, Fairbanks, Alaska (1973 to 1974):

Superintendent of Operations. Responsible for winter mobilization north of the Brooks Range for the Haul Road construction which included establishing the Franklin Bluff Camp and the Atigun Pass Camp; reconstructing the Toolik Camp; construction of the Franklin Bluff, Happy Valley, and Galbraith airfields; and constructing a pioneer road from Toolik Camp to Galbraith Lake, the Atigun River Bridge, and the winter road between Atigun and Deadhorse.

GENERAL CONSTRUCTION COMPANY, Portland, Oregon (1964 to 1973):

Marine Superintendent. Initially served as an estimator and a dredging superintendent for the Portland, Oregon, Division. Later supervised all marine efforts and was responsible for the maintenance and operation of all floating equipment. Principal work involved pile driving and dock construction, underwater drilling and blasting, clamshell and dipper dredging, outfalls, pipeline and utility river crossings, riprap bank protection, land fills using materials excavated from underwater and placed in embankments on the shore, salvage work, and heavy lifts.

GENERAL-RIVERS-STEWART, Portland, Oregon, (1970):

Administrative Manager and Project Manager. Assigned to the equipment and camp mobilization effort for Section 6N of the Trans Alaska Pipeline System road. Later served as Plant and Equipment Manager in addition to duties as Marine Superintendent at Portland. In 1971, was appointed Manager of a newly formed, company-wide equipment division, responsible for establishing a computerized equipment cost accounting system, the purchasing of new equipment, the disposal of surplus equipment, and maintenance of all Company equipment.

# HARZA-EBASCO

WILLIAM GEORGE NELSON

Job Title: Arctic Engineering Consultant

Work Location: East Stroudsburg, Pennsylvania

Education: Michigan Technological University  
Oregon State University, Bachelor of  
Science, Mechanical Engineering

Oregon State University, Master of Science,  
Mechanical Engineering, Minor: Physical  
Oceanography

Oregon State University, Doctor of Phil-  
osophy, Mechanical Engineering, Minor:  
Atmospheric Sciences

Arctic Engineering, UAA, 3 credits  
Advanced Arctic Engineering, UAA, 3 credits  
Engineering Glaciology, UAA, 3 credits

Glulam Design Short Course, Anchorage,  
Alaska, sponsored by the Timber Institute of  
America, 8 hours of lecture.

Ice and Snow Engineering Short Course, Uni-  
versity of Alaska, Fairbanks, April 10 and  
11, 1979.

## Experience and Qualifications Relevant to the Susitna Project:

1974-present: Nine month employment per year at UAA. Duties include undergraduate and graduate course instruction, lab development, and program director for masters program in Arctic engineering.

- Areas of private consultation during this period have included Arctic Engineering, Mechanical Engineering, Air Pollution Control Engineering and Energy Conservation consultation.
- From June 1976 to September 1976 Dr. Nelson was employed full-time as a permafrost engineer by the State of Alaska, Pipeline Coordinator's Office.

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WILLIAM GEORGE NELSON  
Arctic Engineering Consultant

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- From June 1977 until September 1977, Dr. Nelson was retained as a full-time consultant (40 hours per week) in Arctic Engineering by the State of Alaska Pipeline Coordinator's Office.
- During winters of 1979-80 and 1980-81 Dr. Nelson served as Technical Director for the ABSORB Oil - Ice Research Program conducted on the Beaufort Sea ice cover.

# HARZA-EBASCO

RALPH B. PECK

Job Title: General Dam Design Consultant

Work Location: Albuquerque, N.M.

Education: C.E., Rensselaer Polytechnic Institute, 1934  
D.C.E., Rensselaer Polytechnic Institute, 1937  
Harvard University, Graduate School of Engineering, April 1938 to January 1939

Special Qualifications: 1974 National Medal of Science, awarded by President Ford, September 18, 1975  
Selected as One of Top Ten U.S. Construction Men of the past 50 years, Constr. Div., American Society of Civil Engineers, 1975  
Washington Award, 1976

Professional Registration: Structural Engineer, State of Illinois  
Professional Engineer, Illinois, Hawaii  
Civil Engineer, California

## Experience and Qualifications Relevant to the Susitna Project:

Member, Board of Consultants: Bonneville Dam Second Powerhouse and Applegate Dam, Portland District, Corps of Engineers; Miami Conservancy District, Ohio; Boruca Dam, Costa Rica; Lower Churchill Development Corporation on Muskrat Falls and Gull Island sites; Arkansas River Salt Control Project, Oklahoma, Tulsa District Corps of Engineers

Consultant, USBR and WPRS, Stability of Slopes Downstream from Grand Coulee Dam; Earth and Rockfill Alternates for Auburn Dam

Member, Independent Panel to Determine Cause of Teton Dam Failure.

## Other Professional Experience:

5/74 to date Professor of Foundation Engineering, Emeritus, University of Illinois

12/42 to 5/74 Successively Research Assistant Professor, Associate Professor and Professor of Foundation Engineering, University of Illinois, Urbana

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RALPH B. PECK

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General Dam Design Consultant

5/42 to 12/42	Chief Engineer - Testing, Holabird & Root, Marion, Ohio
1/39 to 5/42	Assistant Subway Engineer, City of Chicago
4/38 to 1/39	Laboratory Assistant, Arthur Casagrande, Cambridge, Massachusetts
6/37 to 4/38	Structural Detailer, American Bridge Co., Ambridge, Pennsylvania



# HARZA-EBASCO

ROBERT F. SCHEELE

Job Title: Consultant - Aesthetic Resources

Education: Master of Landscape Architecture  
1970, Harvard University  
Bachelor of Science  
1967, University of Wisconsin

Professional  
Registration: None

Parent Company: Private Consultant

## Experience and Qualifications Relevant to the Susitna Project:

Academic Practice: The University of Michigan, School of Natural Resources, Graduate Program in Landscape Architecture and Regional Planning, Associate Professor of Landscape Architecture 1973 to present.

- Teaching responsibilities have ranged across large undergraduate lecture courses, graduate design and construction studios, issues seminars, and Master's and Ph.D. committees. Current portfolio includes introductory and terminal studios for Regional and Landscape Planning concentrators, a mid-level studio in the construction engineering sequence, an alternative futures discussion group, and participation on five thesis and candidacy committees.
- Recent research and practice is in the general area of visual resource analysis. This work has a special emphasis on developing objective measures and methods in the conduct of scenery inventories and descriptions. Current efforts are directed to development and application of photosimulation technology in environmental assessments and land use decision forums.
- Recent work as a member of the I.U.C.N.-Environmental Planning Commission has led to a formal agreement for conservation planning and design services with the Direccion Nacional de Parques in the Dominican Republic. This is a collaborative effort between Architecture students and faculty at Universidad Centrale del Este and Landscape Architecture students at the University of Michigan. Additional recent work resulted in the development of Environmental Planning Guidelines in response to I.U.C.N.'s World Conservation Strategy.

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ROBERT F. SCHEELE  
Consultant - Aesthetic Resources

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The University of Washington, Dept. of Landscape Architecture, College of Architecture and Urban Planning. Visiting Assistant Professor, summer 1975. Organized and managed an intensive pre-design summer program for beginning landscape architecture concentrators. Four faculty members shared teaching responsibilities both on campus in Seattle and on Shaw Island in the San Juans.

Washington State University, Dept. of Horticulture, College of Agriculture.

Assistant Professor of Landscape Architecture 1970 - 73

Private Consulting:

1981 to Present: USDI-Bureau of Land Management. Development of methods in Alaska to produce visual simulations and objective landscape descriptions. Work in Berkeley included developing computer graphic instructional packages and critical evaluation of the Bureau's Visual Resource Management process.

1977 to 1979: USDI-National Park Service. Participated as a study team member for a new area of North Carolina. Responsibilities involved the design and implementation of a landscape assessment process for the 245,000 acre Mt. Mitchell new area proposal.

1967 to 1970: Susaki, Dawson, DeMay Assoc., Boston, MA. Worked as a project landscape architect on a full spectrum of design and construction projects. Was project manager for a large recreational development plan in New Hampshire, and a sculpture plaza in Central Park, NY.

Publications:

"The Mt. Mitchell Scenery Assessment," Proceedings: Our National Landscape: Applied Techniques for Analysis and Management of the Visual Resources, U.S. Forest Service Genl. Technical Report PSW-35, 1979.

"The ABC's of Cooking with the Visual Simulator in Alaska", Resources Division Technical Report BLM, Anchorage, 1979.

"The VIEWIT Instructional Package," Computer Graphics 79, BLM, Denver, 1979.

ROBERT F. SCHEELE  
Consultant - Aesthetic Resources

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"Simulating the Visual Effects of Land Use Change," The LAND, Winter, 1980, Anchorage, AK.

"Landscape Visual Resource Description", The Yukon-Kuskokwim Regional Plan, BLM, Anchorage, Ak, 1980

"Landscape Architects and the BLM: A Frontier Agenda," Proceedings 19th Congress of the International Federation of Landscape Architects, Vancouver, British Columbia, Canada, August, 1981.

"Petroleum Exploration Simulations and Findings" in Draft, Environmental Assessment of the Federal Oil and Gas Lease Sale - National Petroleum Reserve - Alaska, BLM, Anchorage, August, 1981.

"Visual Simulations of the Anchorage - Fairbanks Electrical Intertie Alaska Power Authority," Technical Report, Ann Arbor, Michigan, Oct. 1981.

"Toward Objective Visual Impact Assessment: Photosimulation and an Alaskan Case Study", Proceedings Third Symposium on Environmental Concerns in Rights-of-Way Management, San Diego, CA., 1982.

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# HARZA-EBASCO

MARSHALL L. SILVER

Job Title: Dynamic Analysis Consultant

Work Location: Highland Park, Illinois

Education: University of California at Berkeley;  
Ph.D. Civil Engineering  
University of California at Berkeley;  
M.S. Civil Engineering  
University of Colorado;  
B.S. Civil Engineering

Special Qualifications: Consultant to many universities, governmental agencies and consulting firms on experimental soil mechanics and has provided them with specialized test equipment, 1969 - date.

Professional Registration: Illinois

## Experience and Qualifications Relevant to the Susitna Project:

Dr. Silver is engaged in undergraduate and graduate teaching in the Soil Mechanics Curriculum and in the development of the undergraduate, graduate and research Soil Mechanic Laboratories at the University of Illinois at Chicago Circle. In addition to research on transportation noise and vibration measurement and abatement, he is engaged in funded research on geotechnical testing methods, dynamic stress-strain properties of soils and dynamic strength of soils.

Dr. Silver has been a consultant on experimental soil mechanics to many consulting firms, governmental agencies and universities, both in the USA and abroad. He has also designed and provided dynamic soil test equipment to such organizations.

Dr. Silver has been involved in dynamic testing programs associated with many nuclear power plants. Some of these nuclear power plants being Enrico Fermi (Michigan); Clinton (Illinois); Quanicassee (Michigan); Marble Hill (Indiana); Byron Station (Illinois) and Braidwood (Illinois).

He has also been involved in dynamic soil testing programs for dams such as Cerron Grande (El Salvador); Guri (Venezuela); and Ascot (California).

Dr. Silver is involved in tunneling research both for soft ground and for rock.

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# HOME OFFICE SUPPORT

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# HARZA-EBASCO

UMESH CHANDRA

Job Title: Lead Seismologist  
Work Location: Anchorage/Greensboro, North Carolina  
Education: St. Louis University - Ph.D. Geophysics -  
1969

(A Fulbright student under a program sponsored by the U.S. Department of State through the U.S. Educational Foundation in India)

Dissertation: Analysis of body wave spectra for earthquake energy determination

Banaras Hindu University - M.Sc. Geophysic -  
1963  
P.G.D. Spectro-  
scopy - 1962  
B.Sc. Mathe-  
matics - 1961

Special Qualifications: Dr. Chandra has over eighteen years experience in seismology, tectonics, and the development of seismic design criteria for critical structures.

Professional Registration: None

Parent Company: Ebasco Services, Incorporated

## Experience and Qualifications Relevant to the Susitna Project

1978 - Present: Dr. Chandra is currently Senior Principal Seismologist within the Earth Sciences Group of Ebasco Services. In this capacity he has served as principal investigator in charge of seismic and earthquake engineering investigations for the selection of the first nuclear power plant site in Greece, seismotectonic investigation for the siting of Philippine nuclear power plant at Napot Point, Bataan Peninsula; preparation of Final Safety Analysis Report for the Shearon Harris Nuclear Power Plant; geotechnical investigation for the Nuclear Energy Center Study - Phase III for the Southern States Energy Board; seismic design for a synthesis gas demonstration

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UMESH CHANDRA  
Lead Seismologist

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\* plant, W.R. Grace/DOE, and for an energy industrial complex for the Arkansas Power and Light Company.

1974 - 1978: As project seismologist for Dames & Moore, Dr. Chandra conducted seismic risk analysis for the construction of critical facilities such as nuclear power plants, dams, bridges, and hospitals. Representative projects included siting study for a nuclear power plant in central and southern Iraq; expert testimony before the Atomic Safety and Licensing Appeal Board in a seismic show cause issue on the "Capability of the Ramapo Fault"; monitoring of a microearthquake network in North Anna, Virginia; seismic risk evaluation for a coal gasification plant at Ownesboro, Kentucky, and for a Veterans Administration hospital in Richmond, Virginia.

1971 - 1974: University of Western Ontario, London, Ontario, Canada Visiting Assistant Professor/Post Doctoral Fellow involved in research and teaching in geophysics. The courses taught included: 2nd year seismology, Fortran IV programming, 4th year communications theory, geophysics seminars.

1970 - 1971: University of British Columbia, Vancouver, B.C., Canada Visiting Assistant Professor involved in research and teaching in geophysics. The courses taught included a graduate course in seismology, and some undergraduate tutorials involving problems in 2nd year physics, 3rd year waves and seismology, and 3rd year physics of the earth.

1969 - 1970: University of California, Berkeley, California Research Seismologist charged with supervision of the station staff and students in the interpretation of seismograms, supervision of the production of Berkeley Station Bulletins, development of new methods of interpretation and data processing, and interfaces with the press and local agencies on the recording of earthquakes and local seismicity.

1966 - 1969: Saint Louis University, St. Louis, Missouri Research Assistant; Graduate studies leading to a Ph.D. degree in geophysics.

1963 - 1966: University of Roorkee, Roorkee, U.P., India Research Fellow/Lecturer; Research and teaching in seismology.

Client References:

Project Name: Grant Lake, Alaska  
Alaska Power Authority  
334 West Fifth Avenue

UMESH CHANDRA  
Lead Seismologist

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Anchorage, Alaska 99501  
Mr. Eric A. Marchegiani

Project Name: Shearon Harris Dams, North Carolina  
Carolina Power & Light Company  
336 Fayetteville Street  
P. O. Box 1551  
Raleigh, North Carolina 27602  
Mr. T. H. Wyllie, Manager Construction  
(919) 836-6111

Project Name: Battelle Memorial Institute  
505 King Avenue  
Columbus, Ohio 43201  
Dr. R. W. Klingensmith  
(414) 424-7478

#### Publications

Chandra, U. (1969) Analysis of body wave spectra for earthquake energy determination, Ph.D. Thesis, Saint Louis University

Chandra, U. (1970) Analysis of body wave spectra for earthquake energy determination, Bull. Seism. Soc. Am., 60, 539-563.

Chandra, U. (1970) The Peru-Bolivia border earthquake of August 15, 1963, Bull. Seism. Soc. Am. 60, 639-646.

Chandra, U. and A. Qamar (1970) Earthquake and the registration of earthquakes from January 1, 1969 to June 30, 1969, Bulletin of the Seismographic Stations, University of California, Berkeley, 39, 1-89.

Chandra, U. (1979) Attenuation of intensities in the United States, Bull. Seism. Soc. Am., 69, 2003-2024.

Chandra, U. (1981) Different magnitude-epicentral intensity relations and estimation of maximum ground acceleration, Proceedings of the International Conference on Recent Advances in Geotechnical Earthquake Engineering and Soil Dynamics, St. Louis, Missouri, U.S.A., April 26 - May 3, 1981, vol. I, 545-550.

Chandra, U. (1981) Moderator's Report on "Numerical Methods in Geotechnical Earthquake Engineering", Proceedings of the International Conference on Recent Advances in Geotechnical Earthquake Engineering and Soil Dynamics, St. Louis, Missouri, U.S.A., April 26 - May 3, 1981, vol. III, 1267-1269.

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UMESH CHANDRA  
Lead Seismologist

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Chandra, U. (1981) Discussion on i) "On Surface Waves in a Gibson Half-space" by I. Vardoulakis and V. Dugalis, ii) "Analysis of Stresses in Seismically Induced Shallow Slope Failures" by L. E. Vallejo and L. M. Peszek, and iii) "Seismic Response of Subsurface Ground with use of Measured Underground Acceleration", Proceedings of the International Conference on Recent Advances in Geotechnical Earthquake Engineering and Soil Dynamics, St. Louis, Missouri, U.S.A., April 26 - May 3, 1981, vol. III, p. 1271.

# HARZA-EBASCO

FRANKLIN G. DE FAZIO  
Head, Hydraulic Design Section

Date of Birth: August 6, 1939

Citizenship: U.S.A.

Degrees: Master of Science in Hydraulic Engineering  
(Minor: Applied Mathematics)  
1965, University of Colorado  
Bachelor of Science in Civil Engineering  
1961, Ohio University

Professional Registration: Professional Engineer - Illinois

Professional Societies: American Society of Mechanical Engineers  
Ex-Chairman: Fluid Transients Committee of the  
Fluids Engineering Division of ASME  
International Association of Hydraulic Research  
Tau Beta Pi  
United States Committee on Large Dams

Professional Experience: Harza Engineering Company, Chicago, Illinois - Associate  
1978.

February 1968 to Date: Harza Engineering Company, Chicago, Illinois.  
Head, Hydraulic Design Section. Responsibilities include supervision of engineers preparing conceptual and final hydraulic designs of structures and equipment used for flood control (15 projects); river diversion (12 projects); fish transport (3 projects); hydropower and steam power generation (40 projects); pollution abatement (11 projects); municipal and industrial water supply (13 projects); irrigation supply and irrigation drainage (11 projects) and river navigation (2 projects). Additional responsibilities include instrumentation of existing structures and equipment to evaluate their hydraulic, structural and mechanical performance.

Yacyreta Project, Argentina and Paraguay. Supervised review, analysis and design of hydraulic structures including: two dimensional and comprehensive models of 55,000 m<sup>3</sup>/s main and 40,000 m<sup>3</sup>/s auxiliary spillways, fish facilities, navigation locks (27 m x 280 m, 18 m lift), and river diversion and closure schemes.



FRANKLIN G. DE FAZIO  
Head, Hydraulic Design Section

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February 1968  
to Date:  
(Cont'd.)

Guri Project, Venezuela. Supervised design and model studies for 50 meter raising of 30,000 m<sup>3</sup>/sec. spillway in 9 stages. Supervised development of design criteria for spillway aeration ramps using physical and mathematical model studies.

Project Manager, Montezuma Pumped-Storage project, Arizona: 500-MW underground power/pumping station; 1700 feet rated head; 4800 feet of tunnels; 2,800,000 cubic yards of dikes. Preliminary design studies, project cost studies and project scheduling.

Project Manager, Monroe County Pollution Abatement project, New York: Special consulting services to provide hydraulic design of drop shafts to tunnels with 60 cfs to 1000 cfs capacity. Provide hydraulic transient analyses for design and operation of 10 miles of tunnels. Preparation of contract drawings for drop shafts.

Project Manager, Smith Mountain Pumped-Storage Expansion, Virginia: 100-MW additional pump-turbine unit. Supervised instrumentation of 200 feet existing arch dam to obtain structural dynamic response to transient hydraulic loads. Preparation of exhibits for the Federal Power Commission license amendment, preparation of pump-turbine and generator specifications, and feasibility study to remove and replace existing fixed in place trashrack with a movable trashrack. Prepare data collection program on 4.5 miles of river downstream of project subject to flow reversal and analysis of data to determine effect of plant expansion on river levels.

Project Manager, Smith Mountain project, 1974, trashrack modification program. Supervised preparation of trashrack design to modify existing 60 feet high pump-turbine trashrack structures 180 feet below reservoir surface. Supervised hydraulic vibration analyses, preparation of contract drawings, and review of fabrication drawings.

November 1965  
to February 1968:

Harza Engineering Company, Chicago, Illinois.  
Hydraulic Engineer and Engineering Systems Analyst.  
Developed and implemented computer programs for design analyses and simulation of hydraulic conveyances. Prepared hydraulic design memorandum and hydraulic design of penstocks,

FRANKLIN G. DE FAZIO  
Head, Hydraulic Design Section

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November 1965  
to February 1968:  
(Cont'd.)

tunnels, gate control structures and spillways. Also served as a computer systems advisor for selection of Harza computer facilities and for implementation of civil, electrical and mechanical engineering computer programs.

June 1961  
to November 1965:

Department of Interior, Office of Chief Engineer, Bureau of Reclamation, Denver, Colorado. General Engineer. Technical Analysis Branch of the Design Division. Developed a proficiency in the analysis of hydraulic transients for design of penstocks, tunnels, hydraulic machinery, pressure and open channel irrigation systems, and water distribution systems. Developed earthquake loadings for dams and towers. Pioneered and developed Bureau's computer programs for waterhammer and surge analysis.

Civil Engineer. Participated in the Chief Engineer's training program which included working in the Design, Planning, Computer and Hydraulic Laboratory Divisions. Duties included operation of hydraulic models, developing design floods for rivers, analysis of sediment transport in Colorado River, writing computer programs for stress analyses of hydraulic turbine parts. Duties also included operation of structural models for obtaining stress or strain measurements.

"Electrical and Hydraulic Characteristics of Pumped Storage Plants," American Power Conference, April 1978.

Technical Papers  
and Articles:

"Analytical and Field Studies of the Intake Gates of Mossyrock Dam," presented at the Annual Hydraulic Division Conference of ASCE, August, 1971.

"Open-Channel Surge Simulation by Digital Computer," Journal of Hydraulics Division, ASCE, November, 1969.

"Transient Analysis of Variable-Pitch Turbines," ASME Winter Annual Meeting, November, 1966. Paper No. 66-WA/FE-19.

"Design Analysis of Waterhammer at the San Luis Pumping-Generating Plant," ASME International Symposium on Waterhammer in Pumped-Storage Projects, November, 1965.

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# HARZA-EBASCO

PEL ER J. DONALEK

Senior Electrical Engineer

Date of Birth: April 9, 1939

Citizenship: U. S. A.

Degrees: Master of Arts in Mathematics  
1973, University of Toledo, Ohio  
Master of Science in Electrical Engineering  
1970, University of Pennsylvania, Moore  
School of Electrical Engineering, Philadelphia  
Bachelor of Science in Electrical Engineering  
1961, University of Illinois, Urbana

Languages: English, Portuguese (speaking and reading knowledge),  
Spanish, and French (reading knowledge)

Professional Registration: Professional Engineer - Illinois

Professional Societies: Institute of Electrical and Electronics Engineers  
The Mathematical Association of America  
Society for Industrial and Applied Mathematics  
Western Society of Engineers

Professional Activities: Chairman, IEEE Task Force on Discrete Supplementary Controls for Stability (DISCOS). Task Force is studying a class of discrete power system controls that enhance system dynamic performance during periods of major system disturbance.

September 1973 to Date: Harza Engineering Company, Chicago, Illinois.  
Senior Electrical Engineer. Utilities Division, Transmission and Distribution Systems Planning Department. Responsible for development of short and long range system expansion plans and determination of design parameters for transmission lines and substations. Analytical techniques include load flow, stability, short circuit, economic conductor selection, and transient network computer programs. Computer programs are developed for special problems.

Project Manager for study of the application of the principle of Coal by Wire to coal fields of the United States. The study included the planning of an extensive 765-kV transmission network.

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PETER J. DONALEK  
Senior Electrical Engineer

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September 1973  
to Date:  
(Continued)

Project Manager on study of Electric Utility interface requirements of the Solar Power Satellite. The work required analysis of transmission system requirements associated with 5,000-MW capacity sources. Client was Argonne National Laboratories.

Lecturer on transmission system planning and related topics for the International Atomic Energy Agency Nuclear Power Training Program at Argonne National Laboratory, 1977, 1978, and 1979.

Prepared system planning report for 500 kV transmission line initially operated at 220 kV for the Water and Power Development Authority of Pakistan. This work included analysis of local flow and stability calculations. Carried out Transient Network Analyses studies for the Gatti-Multan and Multan-Guddu transmission lines.

Responsible for evaluation of transmission system expansion plans of an electric utility system involving voltages through 500 kV.

Developed under frequency load shedding system for El Salvador bulk power transmission system.

Prepared transmission and substation expansion plans for nationwide systems in South and Central America. The system includes hydro, gas turbine, and geothermal generation.

Developed a twenty-five year expansion plan for the 345 kV transmission system of the Republic of South Korea. The recommended expansion plan inter-connected present and future generating plants, both conventional and nuclear steam plants as well as conventional and pumped-storage hydro. This required the use of load flow, short circuit and stability analysis.

Electrical Design Division. Prepared evaluation of battery system alternative to underground pumped-storage hydro for use in a Federal Power Commission license application.



PETER J. DONALEK  
Senior Electrical Engineer

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September 1973  
to Date:  
(Continued)

Prepared detailed technical specifications for 230 kV oil minimum circuit breakers.

Prepared preliminary design and cost estimates for electrical portion of various pumped-storage and hydroelectric generating stations up to 9,600-MW capacity.

Prepared and evaluated alternative arrangements, including cost estimates, for LHV substations at voltages through 765 kV.

Formulated and analyzed alternative electric systems, motor starting methods, and auxiliary electrical equipment requirements for pumping stations, up to 200-MW, for the Chicago Tunnel and Reservoir Project.

June 1971  
to September 1973:

University of Toledo, Toledo, Ohio.  
Graduate Teaching Assistant. Taught undergraduate mathematics courses while working on Masters Degree.

March 1969  
to June 1971:

Spring Garden College, Philadelphia, Pennsylvania.  
Assistant Professor. Taught introductory courses in electro-mechanics and electrical power systems, and utilized the AC Network Analyzer as a teaching aid. Many students were from electric utilities and electrical manufacturing companies.

September 1965  
to August 1968:

Sargent & Lundy Engineers, Chicago, Illinois.  
Electrical Engineer. Electrical Analytical Section. Performed electric power system design studies including analysis of substation short circuit and relay problems.

March 1963  
to June 1965:

United States Peace Corps Project, Brazil.  
Electrical Engineer and Designer for rural electrification projects in the San Francisco River Valley. The work was done in conjunction with the Brazilian government agency Comissao do Vale do Sao Francisco, similar to the U.S. Bureau of Reclamation.

June 1961  
to March 1963:

Westinghouse Electric Corporation, Baltimore, Maryland.  
Field Service Engineer.



PETER J. DONALEK  
Senior Electrical Engineer

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Technical Papers  
and Articles:

"A Description of Discrete Supplementary Controls  
for Stability," Co-author IEEE paper F 76 626-2,  
1976.

"Use of The AC Network Calculator as a Pedagogical  
Aid," Masters Degree Thesis, 1970.

Publication:

"Preliminary estimates of characteristics and costs  
for Electrical Equipment in Hydroelectric Powerplants,"  
co author, paper presented at 1982 American Power  
Conference, Chicago, Illinois."

# HARZA-EBASCO

RICHARD W. FAZALARE  
Division Head - Mechanical Branch

Date of Birth: November 15, 1925

Citizenship: U. S. A.

Degree: Bachelor of Science in Mechanical Engineering  
1957, Chicago Technical College

Language: English

Professional Registration: Professional Engineer - Wisconsin

Professional Society: American Society of Mechanical Engineers

October 1975 to Date: Harza Engineering Company, Chicago, Illinois.  
Head, Hydraulic Machinery Division. Responsible for all aspects of hydraulic machinery relative to selection, specifying, procurement, review of designs, shop inspections, commissioning and testing, for all Harza projects.

July 1969 to October 1975: Harza Engineering Company, Chicago, Illinois.  
Head, Hydraulic Machinery Department. Responsible for selection of hydraulic machinery, preparation of technical specifications, cost estimates, bid analyses, review of manufacturers' designs, shop inspections, witness of model test, and commissioning of the hydraulic machinery.

October 1957 to July 1969: Harza Engineering Company, Chicago, Illinois.  
Specialist, Hydraulic Turbines. Responsible for preliminary selection of hydraulic turbines, including cost estimates; establishing outline dimensions and other parameters required for technical specifications, and powerhouse layout. Drafted technical specifications for hydraulic turbines, governors, and valves. Analyzed bids and prepared recommendation for contract award. Reviewed manufacturers' designs and performed shop and field inspections including model testing and investigation of field operating problems. Participated in the start-up and testing programs of hydroelectric plants.

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RICHARD W. FAZALARE  
Division Head - Mechanical Branch

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October 1957  
to July 1969:  
(Continued)

The preceding functions involved 30 major projects which were either in operation or under construction. These projects included 39 Kaplan turbines, 44 Francis turbines, 9 Pelton turbines, and 8 pump-turbines of the reversible Francis type. These units provided a total plant rated capacity in excess of 16,550 MW. Some of the most recent and noteworthy include the equipment for the Bath County, Cerron Grande, Guri-II, Mossyrock, Reza Shah Kabir, Finchaa, Wanapum, Markland, Seneca, Yacyreta, San Lorenzo, San Agaton (Uribanta Capara), Nispero and Mayfield Projects.

In conjunction with shop inspections and model tests of hydraulic machinery, the facilities of the world's major hydraulic machinery manufacturers' shops, hydraulic laboratories and foundries were visited; namely: Allis-Chalmers, Baldwin-Lima-Hamilton, Newport News, Erie Forge, Willamette Iron and Steel, Dominion Engineering, Canadian Allis-Chalmers, Hitachi, Toshiba, Mitsubishi, Neyrpic, Bell and Escher Wyss, George Fischer, and Kobe Steel foundries.

April 1956  
to October 1957:

Harza Engineering Company, Chicago, Illinois. Layout of powerhouse piping systems. Responsibilities included preparation of mechanical auxiliary equipment technical specifications, review of manufacturers' designs of powerhouse auxiliary equipment, preparation of design and construction drawings for turbine draft tube gates, and preparation of design and construction drawings of highway bridges and railroad bridge for the Illinois Tri-State Toll Road.

May 1954  
to April 1956:

Bertman Electric Company, Chicago, Illinois. Engineer. Development Department, Test Laboratory. Duties included design and testing of universal electric motors for domestic appliances. Tested domestic appliances for useful life, capacity, efficiency, noise, safety features, finish wear test and physical effort tests. Responsible for the design and fabrication of required test apparatus, and analysis of design and testing of competitive products.

May 1952  
to May 1954:

Union Special Machine Company, Chicago, Illinois. Engineering Branch, Development Division. Duties included detail and design of industrial textile machine parts. Redesigned existing machine elements.

RICHARD W. FAZALARE  
Division Head - Mechanical Branch

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March 1948  
to May 1952:

Union Special Machine Company, Chicago, Illinois.  
Responsibilities included centrifugal casting  
of intricate machine elements by investment casting  
process; general machine shop work, preparation of  
pattern molding dies, and setting up dies on production  
machines.

January 1943  
to March 1945:

Bethlehem Steel Shipyards, Baltimore, Maryland.  
Apprentice Marine Electrician. U.S. Navy, Small  
Boats Coxswain, Amphibious Forces, Atlantic Fleet.

Technical  
Papers and  
Articles:

Seneca Pumped-Storage Power Plant:  
"Description of Hydraulic Machinery."

August 1978  
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# HARZA-EBASCO

JOHN J. HEALEY

Job Title: Lead Seismic Engineer

Work Location: Anchorage/New York

Education: Manhattan College: BCE, Civil Engineering - 1962  
University of Illinois; MS, Theoretical and Applied Mechanics - 1963

Special Qualifications: Over nineteen years of experience in Civil Engineering with emphasis in the area of earthquake engineering.

Professional Registration: Professional Engineer - New York

Parent Company: Ebasco Services Incorporated

## Experience and Qualifications Relevant to the Susitna Project

1978 - Present: Dr. Healey is currently Consulting Civil Engineer in the Civil Consulting Department of Ebasco Services. Responsibilities have included design and analysis studies for a wide variety of buildings, special structures, power plants, industrial and military facilities; project review, failure investigations and development of remedial measures for structures subject to seismic, wind, blast, thermal, vibratory and missile impact loads; development of design criteria for structures subjected to conventional and extreme dynamic loads; and siting and site evaluation studies and reports for power plant facilities.

- Project Consulting Engineer for the following projects: Philippine Nuclear Power Plant with overall responsibility for the hydrological, seismological, geological and geotechnical aspects of site investigation, safety analysis report preparation and defense; the Seismic Building Response Study for the USNRC-sponsored Seismic Safety Margins Research Program at the Lawrence Livermore Laboratory; Analysis of reactor structures and components for LOCA-related loads at various nuclear plants; Seismic review (seismology, geotechnical and structural) on a major stadium project in Greece.

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JOHN J. HEALEY  
Lead Seismic Engineer

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- Other consulting assignments on a wide range of topics have included a liner study for a circulating water system; the development of a site quality control testing program; stress, stability and seismic analyses of dams; civil engineering input to waste management projects; analysis of a cable-supported radio telescope structure; study of structural criteria, alternative design concepts and design review for turbine-generator pedestals.
- Prior to joining Ebasco, served as Project Engineer for an extensive program of analytical and experimental studies for the U.S. Army (Picatinny Arsenal) and U.S. Navy to develop loading data, design criteria and computational procedures for containment, protective and conventional buildings subjected to explosive blast and missile impact effects. Conducted dynamic soil-structure interaction analyses on Safeguard ABM structures to determine overall response and interior shock environment for combined airblast and ground motion.

As a Consultant to the World Bank and the Government of Bangladesh, responsible for a comprehensive program of inspection, construction supervision, soil investigation, design review and remedial construction for a series of cyclone shelters in the coastal areas of Bangladesh. Project Structural Engineer for design and construction of sixty warehouse structures throughout Bangladesh (USAID).

Monitored research projects sponsored by the steel industry, provided staff support and liaison with industry research committees, developed results into design criteria and analytical methods, prepared technical reports and industry-wide steel standards and design aids.

Client References:

Project Name: Philippine Nuclear Plant Unit #1  
National Power Corporation  
Nuclear Power Department  
Port Area, Manila, Philippines  
Mr. Jose Torres  
Tel. 011-63-47-21-41

Project Name: Seismic Safety Margins Research Program-  
Seismic Building Response Review  
Lawrence Livermore Laboratory  
P. O. Box 808  
Livermore, CA 94550

JOHN J. HEALEY  
Lead Seismic Engineer

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Dr. Ting Lo  
(415) 427-1100

Project Name: Manufacturing Plant and Offices  
Oak Ville, Ontario  
Wella Corporation  
524 Grant Avenue  
Englewood, NJ 07631  
Dr. George Megerle  
(201) 569-1020

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# HARZA-EBASCO

TEH-HONG HSU  
Hydraulic Engineer

Date of Birth: September 3, 1934

Citizenship: U. S. A.

Degrees: Master of Science in Civil Engineering  
1967, Utah State University  
Bachelor of Science in Hydraulic Engineering  
1958, National Taiwan University

Languages: English, Chinese, knowledge of German

Professional Registration: Professional Engineer - Illinois

May 1972  
to Date:

Harza Engineering Company, Chicago, Illinois.  
Hydraulic Analysis and Design Division. Advanced  
Structures and Hydraulics Branch. Duties include  
development of dimensionless-homologous turbomachinery  
characteristics, studies of hydraulic transient from  
unit operations and valve stroking, design of surge  
tank and preparation of design memoranda. Responsibilities  
include waterhammer analyses of: 1700 MW, 1030 ft.  
head units of Stony Creek Pumped-Storage Project;  
2100 MW, 1260 ft. head units of Bath County Pumped-  
Storage Project; 6100 MW, 140 m head units of final  
stage expansion of Guri Hydroelectric Project; 400  
hp pumps of Behbahan Irrigation Project; 270 MW, 90  
m head unit of Hrauneyjafoss Hydroelectric Project;  
110 MW, 200 ft. head unit of Smith Mountain Pumped-  
Storage Project; 27,000 ft. long tunnel, 18 pumps of  
Chicago Tunnel and Reservoir Plan sewage project;  
460 MW, 350 m head and 7500 m long tunnel of Uribante  
Hydroelectric Project; 180 MW, 425 ft. head unit of  
Tarbela Hydroelectric Project; 80 MW, 90 ft. head  
units of Kootenai Hydroelectric Project; 1500 MW,  
1800 ft. head units of Brumley Gap Pumped-Storage  
Project; 1500 MW, 1000 m head units of Northern  
Illinois underground pumped-storage project; 300 MW,  
30 m head units of San Lorenzo Hydroelectric Project.

Duties also include design of various types of  
spillway; design of retaining wall; computation of  
pressure profiles; and hydraulic design of sediment  
dam and two-way riser spillway of Bath County,  
principal drop inlet spillway and emergency unlined  
earth spillway of Meigs Mine, Ohio, 50 cfs, two-way

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TEH-HONG HSU  
Hydraulic Engineer

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May 1972  
to Date:  
(Continued)

riser spillway of Fly Ash Dam, Ohio and Guri spillway pressure profiles and retaining wall.

Performed hydraulic design of powerhouse tailrace channel, and urban sewer and flood control systems. Responsibilities include design of 37,000 m<sup>3</sup>/s Guri Powerhouse II tailrace channel, hydraulic design of 38,000 cfs Bath County Lower Reservoir tailrace and stilling basin, design of 1250 cfs retention basin Ogee Spillway and 15000 ft sewage conduit and flood channel of West Branch Upper DuPage River.

Responsible for designing and developing computer programs for engineering application, implementation and documentation of data and program files, and application of computer graphic techniques. Duties include problem definition, engineering analysis and program development, input/output devices allocation, file creation, storage process and retrieval, and system control language execution (UNIVAC 1100 Series Executive Systems 2 and 8).

August 1971  
to May 1972:

Harza Engineering Company, Chicago, Illinois. Foundation, Soil Mechanics, and Geology Division. Duties included hydrological studies and design studies of the drainage system for an overland conveyor. Preliminary designs and layouts of earth dams and dikes. Design of drainage channel to relieve existing suburban storm drainage system.

April 1964  
to May 1971:

Agricultural Research Service, Soil and Water Conservation Division, United States Department of Agriculture. In charge of a research project for studying the uplift action of a flexible impervious membrane anchored along the edges. Responsibilities included review of literature, design of the experimental layout, and supervision of the construction of a 20 ft. high wind tunnel model. Conducted the experiment and analyzed the data by using the computer Fortran program. During the same period, pursued graduate study leading to the Ph.D. program at Utah State University on a part-time basis. Courses included advanced fluid mechanics and advanced applied mathematics.

Study of a program to evaluate the effectiveness of permeabilities for sixteen types of earth lining canals. Duties involved data collection and statistical analysis, and preparation and writing of final report.

TEH-HONG HSU  
Hydraulic Engineer

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June 1963 to September 1963:	Graduate Research Assistant to Professor Jerald E. Christiansen of Civil Engineering Department, Utah State University. Performed evaporation study for plants in Great Salt Lake Basin, Utah.
January 1963 to June 1963:	Attended Utah State University for graduate study.
October 1958 to November 1962:	Water Resources Planning Commission, Ministry of Economic Affairs, Taipei, Taiwan, China. Junior Engineer. Participated in the planning of multi-purpose development for Choi-Shui River Basin Project. Duties included determination of water requirements of rice, sugar cane and miscellaneous crops, planning optimum water use by the application of rotational irrigation technique and by scheduling regional and seasonal crop patterns. Redesigned the water conveyance system by lined concrete on the existing earth canals to reduce seepage loss.
June 1957 to September 1957:	Taiwan Provincial Water Conservancy Bureau, Taipei, Taiwan. Engineer-in-Training. Worked on analysis of rainfall hydrology.
June 1956 to September 1956:	Surveying of arable land areas along Taiwan's west coast.
Technical Papers and Articles:	Unpublished thesis "Evaluation of Earth Linings for Seepage Control," Utah State University Library.

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# HARZA-EBASCO

RODNEY J. HUANG  
Geotechnical Engineer

Date of Birth: February 20, 1941

Citizenship: U. S. A.

Degrees: Doctor of Philosophy in Soil Engineering  
1971, Iowa State University  
Master of Science in Soil Mechanics  
1968, University of Rhode Island  
Bachelor of Science in Civil Engineering  
1963, National Taiwan University

Languages: English, Chinese, Taiwanese, and knowledge of  
Japanese

Professional Societies: American Ceramic Society  
American Society of Civil Engineers  
Society of Applied Spectroscopy

Professional Registrations: Professional Engineer - Taiwan and Wisconsin

August 1977  
to Date: Harza Engineering Company, Chicago, Illinois.  
Senior Geotechnical Engineer. Responsible for planning,  
coordinating, supervising, and directing the work of  
engineers and technicians on the analysis of embankment  
dams for Guri and Bath County Projects. Duties also  
include development of new or improved techniques  
and procedures utilizing advanced numerical methods.

The studies have included the following:

For the Guri Hydroelectric Project: responses and  
stability of embankment dam under static and seismic  
loadings, and internal seepage and stability.

For the Bath County Pumped-Storage Project: static  
and dynamic analyses of upper and lower dams, and  
stress and strain analyses of upper dams.

For the Tavera Bao Hydroelectric Project: core  
cracking.

November 1974  
to July 1977: Harza Engineering Company, Chicago, Illinois.  
Soils Engineer. Soils and Foundations Division.  
Group Leader. Duties included the use of highly  
technical analyses for various aspects of Guri  
Project, Venezuela, S.A. Responsibilities included  
supervision of design, computation, and drafting  
work.

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RODNEY J. HUANG  
Geotechnical Engineer

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- November 1974  
to July 1977:  
(Continued) Duties also included use and supervision of the most modern analytical techniques that include blasting vibrations, soil structures interaction, core cracking, settlement, slope stability, and internal seepage studies by conventional and finite element methods.
- November 1973  
to October 1974: Dames and Moore, Park Ridge, Illinois.  
Staff Engineer. Assignment on various fossil and nuclear power plant projects included Clinton Project, Illinois; Pittsburgh Project, California; La Salle Project, Illinois; and Offshore Generating Stations, New Jersey. Duties included analysis and report write-up on slope stability, settlement (including secondary consolidation), pile foundation design and liquefaction potential studies due to earthquake and storm-wave actions, and field exploration supervision.
- October 1972  
to October 1973: University of California, Berkeley, California.  
Assistant Research Engineer. Research contracted on lunar soil mechanics and shale slaking investigations. Experience also included studies in astronomy and landslide phenomena.
- May 1971  
to October 1972: Iowa State University, Ames, Iowa.  
Research Associate. Research conducted on composite material studies. Experiences included soil/solid strength structure relations, material surface energy, etc.
- 1965  
to 1966: National Taiwan University, Taipei, Taiwan.  
Teaching Assistant (full-time). Taught soil mechanics lab, and assisted in teaching soil mechanics, foundation engineering, architecture, and construction methods.
- Technical Papers  
and Articles: Authored and/or co-authored more than twenty-five papers and reports. Listed below are only a few of the most recent articles.

Articles in Journals:

"New Rheological Model for Soil Behavior," (with F. Komamura) Proceedings of American Society of Civil Engineers, Journal of the Geotechnical Engineering Division, Vol. 100, GT. 7, pp. 807-824, 1974.

"Weathering of Asphalts as Characterized by FMIR Technique," (with D. Y. Lee) Journal of Applied Spectroscopy, 27(6), pp. 435-440, 1973.

RODNEY J. HUANG  
Geotechnical Engineer

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Technical Papers  
and Articles:  
(Continued)

"Micro Pore Size Analysis of a Friable Iowa Loess,"  
(with T. Demirel) Highway Research Record No. 429,  
pp. 1-13, 1973.

"Calculation and Interpretation of Free Energy of  
Wetting of E-glass by Vapors," (with T. Demirel and  
T. D. McGee) Journal of the American Ceramic Society,  
56(2), pp. 87-91, 1973.

"Evaluation of Embankment Dams by Finite Element  
Method," (with W. Y. Shieh) to be published in the  
ASCE Specialty Conference Proceedings, Seventh  
Conference on Electronic Computation, St. Louis,  
1979.

"Investigations of the Guri Embankment Dams under  
Seismic Loading," with E. Carrera, W. Y. Shieh, and  
D. E. Kleiner, to be published in the Proceedings  
of the 13th Congress of Corpses Dams, New Delhi, 1979.

"Stability Evaluation of Earth Dams Under Earthquakes,"  
with W. Y. Shieh and D. E. Kleiner, submitted to the  
International Symposium on Soil Under Cyclic and  
Transient Loading for consideration of publication  
in the conference proceedings, Swansea, 1980.

Papers presented at Conferences:

"Micro Pore Size Analysis of a Friable Iowa Loess,"  
presented at 48th Highway Research Board Annual  
Convention, Washington, D.C., 1973.

"Weathering of Asphalts as Characterized by FMIR  
Technique," presented at Society of Applied Spectroscopy,  
8th Annual Convention, Dallas, 1973.

"Evaluation of Embankment Dams by Finite Element  
Methods," presented at 7th Conference on Electronic  
Computation, St. Louis, 1979.

July 1979

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# HARZA-EBASCO

DAVID E. KLEINER  
Senior Associate

Date of Birth:

June 12, 1935

Citizenship:

U. S. A.

Degrees:

Master of Science in Civil Engineering  
1959, Northwestern University  
Bachelor of Science in Civil Engineering  
1958, Valparaiso University

Professional  
Registrations:

Professional Engineer - Arkansas, Illinois, Texas  
and Virginia  
Structural Engineer - Illinois

Professional  
Societies:

American Society of Civil Engineers  
Illinois Society of Professional Engineers  
National Society of Professional Engineers  
U.S. Committee on Large Dams  
International Society of Soil Mechanics and  
Foundation Engineering  
Society of American Military Engineers

Honors:

Selected as "Young Engineer of the Year" in 1969  
by the Chicago Chapter, Illinois Society of  
Professional Engineers.

Member of ASCE Soil Dynamics Delegation to  
the People's Republic of China, August, 1979.

1979 to Date:

Harza Engineering Company, Chicago, Illinois.  
Head, Geotechnical Department.

Supervises and administers work assigned to  
department of approximately 50 engineers,  
geologists, technicians and draftsmen. Present  
work assignments include feasibility, design,  
and advice during construction on a wide range  
of projects. These assignments involve:

1. Geologic mapping and reconnaissance
2. Surveillance of field exploration at pro-  
ject sites and for construction materials
3. Sampling and laboratory testing.

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David E. Kleiner  
Senior Associate

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4. Soil and rock mechanics analysis.
5. Finite element analyses of dams and foundations under static and dynamic loading conditions.
6. Foundation evaluation design of earth and rockfill dams and dikes, tailings dams and waste holding reservoirs, tunnels and underground caverns, foundation for dams, spillways and powerplants.
7. Preparation of design and construction drawings.
8. Preparation of construction specifications
9. Assistance and advice during construction.

Current major projects include:

1. Guri expansion and Uribante-Doradas hydroelectric projects in Venezuela.
2. Yacyreta and Corpus hydroelectric projects on the Parana River, Argentina and Paraguay.
3. The Maqarin Irrigation Project and the King Talal expansion in Jordan.
4. Pehuenche hydroelectric development in Chile.
5. San Lorenzo hydroelectric project in El Salvador.
6. Bath County pumped storage project in Virginia.
7. Tembagapura project in Indonesia.
8. Numerous water supply and tailings dams studies in the United States and in the Caribbean.



David E. Kleiner  
Senior Associate

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1973 to 1979:

Harza Engineering Company, Chicago, Illinois. Senior Associate, 1978. Associate, 1974. Head, Foundations and Soil Mechanics Section 1973. Supervised and administered work assigned to the section. Work assignments included embankment dam design, soil mechanics, field and laboratory investigations, foundation analysis and design at levels of effort from feasibility studies to detail design including construction drawings and specifications. Projects included the Magarin Irrigation Project, Jordan; the Bao Hydroelectric Project, Dominican Republic; the Brumley Gap and Powell Mountain Pumped-Storage Projects, Virginia; the Bath County Pumped-Storage Project, Virginia; Tilden Tailings Dam, Michigan; Reza Shah Kabir and Nader Shah Projects, Iran; Cerron Grande and San Lorenzo Projects, El Salvador; Guri and Uribante Projects, Venezuela; and the Yacyreta-Apipe Project, Argentina. Also served as Project Manager on several projects for Commonwealth Edison Company and Sargent and Lundy, and has served as Project Manager for many Olin Corporation Projects, and for the Tilden Tailings study for The Cleveland Cliffs Iron Company.

November 1967  
to April 1973:

Harza Engineering Company, Chicago, Illinois Senior Geotechnical Engineer and Assistant Head, 1972-1973, Foundations and Soil Mechanics Section. Supervised and administered work of 5 to 8 engineers and technicians. Work assignments included foundation and embankment design and preparation of portions of the contract documents for the Rio Lindo Project, Honduras and the Reza Shah Kabir Project, a 650-foot high arch dam, Iran; foundation evaluation of the Pedro Miguel Locks, Panama Canal; and preliminary design of earth and rockfill dams and dikes for the proposed raising of the Guri Dam, the Stony Creek Pumped-Storage Project, Pennsylvania, the Bath County Pumped-Storage Project, Virginia, the Sandridge Project, New York, the Thorisvatn and Hrauneyjafoss Project, Iceland and the NASA Wind Tunnel Project, Virginia. Also served as Project Manager for coordinating investigations and design for impounding reservoirs at several chemical plants; for several projects for Commonwealth Edison including cooling water lakes, fly ash disposal, canal sealing, and site appraisal; for design of flood control structures of the

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Senior Associate

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Village of Wheeling; for exploration and design of three dams for the Soil Conservation Service; and for design of barge dock repairs for Olin Corporation. Assistant Project Manager for the Kinzua Project, a 380-MW pumped-storage plant, Pennsylvania.

March 1965  
to November 1967:

Harza Engineering Company, Chicago, Illinois. Senior Geotechnical Engineer. Foundations and Soil Mechanics Section. Supervised work assigned to the section for Mossyrock Project, Washington, a 600-foot high arch dam; the Burfell Project, Iceland; the San Buenaventura and Rio Lindo Projects, Honduras; the Kinzua Project; and the spillway for the Mangla Project, West Pakistan. Served as Project Manager for consultation to Olin Mathieson Chemical Corporation in Virginia, Illinois, Indiana and Texas and to PPG Industries in Ohio concerning development of their waste impounding reservoirs; for design of river bank stabilization works and pipeline suspension bridge for the Mayfield Project and as Assistant Project Manager for the Kinzua Project.

August, 1959  
to March 1965:

Harza Engineering Company, Chicago, Illinois Geotechnical Engineer. Foundations and Soil Mechanics Section. Supervised planning of field investigations, analysis, and design of earth-works and foundations; preparation of reports, contract and construction drawings, and specifications. Supervised design studies for the Mossyrock Project, the Mangla Spillway; and the San Buenaventura Project, Honduras. Supervised stability studies and preparation of a series of exhibits for consulting board meeting for Mangla Spillway. Presented studies and analyses to consulting board, to Binnie and Partners, Consulting Engineers, and to World Bank and West Pakistan officials. Served as Project Manager for design studies of disposal of mine tailings at the White Pine Copper Company and for design studies of an impervious lining for a waste impounding reservoir at an Olin Corporation plant. Analyzed underseepage and potential of foundation liquefaction for the Pearl River Dam.

Technical Papers  
and Articles:

"An Analysis of Consolidation Data of a Swedish Clay and a Method for Estimating Sample Disturbance," Unpublished thesis, August 1959.

David E. Kleiner  
Senior Associate

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"Making Waste Ponds and Piles Safe and Efficient,"  
Water and Sewage Works, May 1965.

Presented series of lectures on design of small  
dams to Peace Corps volunteers, March and  
October, 1966.

"The Upper Reservoir for the Seneca Pumped-Storage  
Plant," co-author with J. C. Jones, paper pre-  
sented at the University of California, March  
1968.

"Rock Mechanics Studies for the Mossyrock Arch  
Dam," ASCE Power Journal, January 1971.

"Environmentally Attractive Methods to Store or  
Use Fly Ash," ASCE Annual Meeting, St. Louis,  
October 1971.

"Design and Construction of an Embankment Dam to  
Impound Gypsum Wastes," Report No. 12, Question  
44, 12th International Congress on Large Dams,  
Mexico City, April 1976.

"Some Practical Considerations for the Static  
and Dynamic Safety of Embankment Dams," paper  
presented in Peking, China, August, 1979.

April 1981

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# HARZA-EBASCO

RAYMOND L. KUNTZENDORF

Electrical Engineer

Date of Birth: March 23, 1936

Citizenship: U. S. A.

Degrees: Master of Science in Power Systems Engineering  
1959, Illinois Institute of Technology  
Bachelor of Science in Electrical Engineering  
1958, University of Notre Dame

Language: English

Professional Societies: Institute of Electrical and Electronics Engineers  
Instrument Society of America

Professional Activities: Member, IEEE Power System Communications, Microwave  
and Radio Subcommittee.  
Member, IEEE Power Generation Working Group on  
Computer Application for Plant Automation.

Professional Registration: Professional Engineer - Illinois

May 1975  
to Date: Harza Engineering Company, Chicago, Illinois.  
Head, Communications and Supervisory Control Systems  
Division. Responsible for design guides, standards,  
project design memoranda and specifications related  
to microwave, power line carrier, radio and telephone  
voice and data communications; supervisory control  
including computer applications related to energy  
management centers, generating stations and individual  
unit control, high-voltage substation control, and  
industrial project control.

June 1973  
to May 1975: LFE Corporation, Boston, Massachusetts.  
Regional Manager. Responsibilities included sale,  
installation and acceptance of computer based supervisory  
control systems. Developed design criteria for  
plant computer multiplex and variable energy charge  
based on system demand.

February 1970  
to June 1973: KAY Sales, Inc., Chicago, Illinois.  
General Manager. Prepared system estimates, reports  
and specifications for communication and control  
subsystems involving microwave, radio, power line  
carrier and transfer trip. Developed design criteria

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RAYMOND L. KUNTZENDORF  
Electrical Engineer

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February 1970  
to June 1973:  
(Continued)

for utility radio controlled switching, automatic subscriber monitoring, IMTS base station monitoring, computer control of microwave alarm and computer telemetering data handling.

April 1966  
to February 1970:

Analog Digital System, Inc., Chicago, Illinois. Division Manager. Specified design criteria for all products. Duties included marketing and development of substation integrated circuit remote data loggers, and sequential event recorders. Designed numerous special purpose computer system interfaces for the scientific community.

September 1963  
to April 1966:

Lundell Controls, Inc., Chicago, Illinois. General Manager. Supervised the design and manufacture of power plant annunciators, sequential event recorders and temperature scanners. Instrumental in developing prewired terminal cabinets for bench board annunciators and systems. Project Manager for the development of first application of digital logic to supervisory control.

June 1959  
to September 1963:

Commonwealth Edison Company, Chicago, Illinois. Project Engineer. Assignments in system planning and station electrical engineering. Developed design guides, specified equipment and designed numerous substations. Specified and installed first all digital supervisory control equipment.

Technical Papers  
and Articles:

"Computer Control Design Highlights of a Modern Hydroelectric Power Plant," presented at the IEEE Power Engineering Society winter meeting, New York, paper A78-103-4, January 1978.

"Control and Monitoring of a Unique Wastewater System," presented at the International Workshop on Instrumentation and Control for Water and Wastewater Treatment and Transport Systems, London, May 1977.

"Current Asymmetry in Resistance-Reactance Circuits," Power Apparatus and Systems, paper 60-825, December 1960.

"Evaluation of RMS Asymmetrical Current for Varying X/R Ratios," Published thesis, Illinois Institute of Technology Library, June 1959.

June 1978

46769



# HARZA-EBASCO

JERRY HSIN-CHI LIN  
Hydrologist/Hydraulic Engineer

Date of Birth: November 9, 1942  
Citizenship: U. S. A.  
Degrees: Doctor of Philosophy in Civil Engineering -  
Hydraulics  
1976, University of Pittsburgh  
Master of Science in Civil Engineering  
1972, University of Pittsburgh  
Bachelor of Science in Civil Engineering  
1967, National Chung-Hsiung University

Languages: English and Chinese

Professional Registration: Professional Engineer - Pennsylvania

August 1978  
to Date: Harza Engineering Company, Chicago, Illinois.  
Hydraulic Engineer. Adapted and applied HEC-1  
computer model with dam-break version and the Dam-  
Break Flood Forecasting Model developed by National  
Weather Service to compute dam-failure hydrograph  
and estimate flood stage downstream. The dams  
studied include Norway and Oakdale Dams, Indiana;  
Lake Vermilion Dam, Illinois; Lake Zumbro Dam,  
Minnesota; Oneida Dam, Idaho; Lake Marion and Lake  
Moultrie, South Carolina.

Adapted and applied HEC-5 computer model to determine  
reservoir operation rules for water supply and flood  
protection for Ross Barnett Reservoir, Mississippi,  
and for flood control for Guri, Tocoma, Caruachi and  
Macagua reservoir in Venezuela. Also applied HEC-3  
computer model to develop power generation rule  
curve for Guri and the downstream reservoirs in  
Venezuela.

Adapted and operated the river-forecasting system  
computer model of National Weather Service (NWSRFS)  
to analyze and simulate flood flow in the Caroni and  
La Paragua Rivers for Guri River Forecasting,  
Venezuela. Calibrated NWSRFS model parameters and  
trained EDELCA engineers to operate and calibrate  
NWSRFS models.

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JERRY HSIN-CHI LIN  
Hydrologist/Hydraulic Engineer

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August 1978  
to Date:  
(Continued)

Adapted and operated a computer model to study the fluctuation of water surface on downstream reservoirs as affected by the operation of Guri Reservoir for Lower Caroni Master Plan Study, (Venezuela).

Adapted and operated computer models for water-quality simulation of a river-reservoir system to predict water temperature and dissolved oxygen in the system for the Brumley Gap Pumped-Storage Project, (Virginia).

Analyzed flood frequency for Tavera-Bao Project, Dominican Republic and Guri Project, (Venezuela).

Estimated the seasonal PMF for Guri Expansion Construction schedule, Venezuela.

Computed the backwater effects of Occoquan Reservoir on Bull Run for Fairfax County Water Authority, (Virginia).

February 1977  
to August 1978:

Bernard Johnson Incorporated, Washington, D.C. Hydraulic Engineer and Hydrologist. Reviewed the technical soundness of flood insurance studies for the Federal Insurance Administration and trained the entry-level engineers.

Adapted and operated computer models to study flood frequency flow of ungaged streams for Water Resources Council.

Estimated the flood flow of Buffalo Bayou and its tributaries by computer model (HEC-1) for the Hydraulic Studies of Buffalo Bayou and Tributaries (Texas).

June 1976  
to January 1977:

Michael Baker, Jr., Incorporated, Beaver, Pennsylvania. Hydraulic Engineer. Worked as a technical consultant and reviewed the hydraulic and hydrologic analyses of flood insurance studies.

January 1970  
to April 1976:

University of Pittsburgh, Pittsburgh, Pennsylvania. Teaching Fellow and Research Assistant. Taught in the hydraulic laboratory and performed research in hydraulics and hydrology. Major projects related to mathematical and stochastic simulation models of hydraulic and hydrologic processes.

May 1974  
to August 1974:

DRAVO Corporation, Pittsburgh, Pennsylvania. Civil Engineer. Participated in a project called

JERRY HSIN-CHI LIN  
Hydrologist/Hydraulic Engineer

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May 1974  
to August 1974  
(Continued)

"Feasibility Study of Extending Philips and Elrama Power Plants," for Duquesne Light Company. Specific work tasks included selection of potential sites with the capacity to handle 30 years' sludge; hydrologic and hydraulic analyses for potential sites; evaluation of methods of transporting sludge; and estimation of costs.

September 1968  
to December 1969:

Chinese Petroleum Corporation, Taiwan, Republic of China. Civil Engineer. Participated in the design of 4- to 12-inch natural gas pipelines including layout of pipelines and structures for river crossing. Worked for the special project, "Feasibility Study of Constructing an Oil Harbour North of Taiwan." Subsequently was assigned to Bureau of Kee Lung Harbour, Taiwan; trained as a field engineer.

July 1967  
to September 1968:

Chinese Military Academy, Fonshan, Taiwan. Teaching Assistant in the Department of Civil and Military Engineering.

Technical Papers  
and Articles:

"Three-Dimensional Open Channel Flow," with Chao-Lin Chin and David E. Hsiung. Journal of the Hydraulics Division, ASCE, HY8, 1978.

"Simulation of Hydraulic Processes in Open Channel," with Chao-Lin Chiu and Kazumasa Mizumura. Journal of the Hydraulics Division, ASCE, HY2, 1976.

"Study of Secondary Flow in Natural Streams," Ph.D. Dissertation, University of Pittsburgh, Pennsylvania, April 1976.

"Multiple Input-Output System of Rainfall-Runoff Relationship," M.S. Thesis. Paper presented at the Conference of American Geophysical Union, Washington, D.C., 1972.

April 1982  
48604

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# HARZA-EBASCO

JAMES E. LINDELL  
Senior Hydraulic Engineer

Date of Birth: April 29, 1943

Citizenship: U. S. A.

Degrees: Doctor of Philosophy in Hydraulic Engineering  
1969, Northwestern University  
Master of Science in Hydraulic Engineering  
1967, Northwestern University  
Bachelor of Science in Civil Engineering  
1965, Michigan Technological University

Languages: English, some Spanish

Professional Registration: Professional Engineer - Illinois

Professional Societies: American Society of Civil Engineers  
Illinois Society of Professional Engineers  
Western Society of Engineers

Honors: Elected to Chi Epsilon Honor Fraternity  
Phi Kappa Phi Honor Society  
Society of the Sigma Xi Research Society  
1979 Recipient of Western Society of Engineer's  
Charles Elliot Award for Outstanding  
Professional Development

June 1977 to Date: Harza Engineering Company, Chicago, Illinois.  
Department Head.\* Advanced Structures and Hydraulics  
Branch, Hydraulic Analysis and Design Division.  
Duties include preparation of design memos, hydraulic  
analysis and design, and supervision of hydraulic  
analysis and design studies by junior engineers.  
Projects include:

Lead Hydraulic Engineer, Yacyreta Project, Argentina  
and Paraguay. Reviewed hydraulic model testing  
program and the physical layouts of two dimensional  
and comprehensive models of the main and auxiliary  
spillways of a 6,000-MW Yacyreta Hydroelectric  
Project.

Project Manager: James H. Campbell Plant Unit No.  
3. Responsible for project administration, cost,  
scheduling and executing a review of the circulating  
water system for the expansion of a steam electric

\* Titles changed with company reorganization in 1979 - Current title  
is Lead Engineer, responsibilities and duties unchanged.

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JAMES E. LINDELL  
Senior Hydraulic Engineer

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June 1977

to Date:

(Continued)

generating station.

Prepared preliminary hydraulic design criteria for a proposed 2,000-3,000-MW underground pumped-storage project, Commonwealth Edison Company, Illinois.

Supervised formulation level hydraulic design of spillways, stilling basins, low level outlet works and an inter basin diversion tunnel for two flood control dams in the Burlington Project, North Dakota.

Project Director and Project Manager of the Findley Run flood wave analysis project in Pennsylvania. Supervised analysis of flood wave propagation resulting from the failure of a small water supply dam on a steep stream.

Developed a computer program for dynamic flood routing through two reservoirs linked by a 1,500-m long and 10-m wide interconnecting channel for the Tavera Bao project, Dominican Republic. Supervised program application for flood routing studies to determine the relationship between interconnecting channel size and alternative auxiliary spillway capacity. Also supervised engineering studies in conjunction with tailwater rating, hydraulic design of a 7-m diameter, 390-m long diversion tunnel, and power intake design and reservoir freeboard studies.

Supervised engineering studies including reservoir flood routing, tailwater rating, and hydraulic model studies to determine the hydraulic design of the spillway and stilling basin for a 25,000 m<sup>3</sup>/sec project design flood with a 30-m head for the San Lorenzo Project, El Salvador.

Supervised the hydraulic design of the 1,200-mgd mainstream pumping station with a lift of 300 ft. for the Tunnel and Reservoir Plan (TARP), Chicago, Illinois.

January 1978  
to March 1978:

Northwestern University, Evanston, Illinois. Visiting Lecturer. Taught a course in the hydraulic design of civil engineering structures, dealing with the analysis and design of canals, tunnels, transitions, spillways and energy dissipators.

July 1974  
to June 1977:

Harza Engineering Company, Chicago, Illinois. Hydraulic Engineer. Hydraulics Department, Civil Design Branch. Duties included preparation of design memos, hydraulic analysis and design, and supervision of draftsmen. Projects included:



JAMES E. LINDELL  
Senior Hydraulic Engineer

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July 1974  
to June 1977:  
(Continued)

The Cerron Grande Project, El Salvador. Work included backwater studies of 15 kilometers of River Channel in conjunction with tail water rating and development of a computer program to model transient channel degradation downstream from the project using a dynamic flood routing technique.

The Guri Project, Venezuela. Work included dynamic flood routing of a 55,000 m<sup>3</sup>/sec probable maximum flood in an 80-kilometer reservoir; computer simulation of the operation of 10 x 5 meter power intake gates for design field tests; test engineer for field tests of power intake gates; and hydraulic design of 500-cms capacity power intakes for 625-MW units.

The Reza Shah Kabir Project, Iran. Work included hydraulic analysis for design of low-level outlet works with a capacity of 600 cms at 120 meters of head; diversion flood routing for various stages of low-level outlet construction.

The Corpus Project, Argentina and Paraguay. A coordinator of an international study team in Buenos Aires, Argentina, assigned to perform operation studies for a system of 3 powerplants on a 350-km reach of the Parana River to assist in the determination of the feasibility of a 10,500-MW capacity project. Also a coordinator of an international study team assigned to perform mathematical hydrodynamic model studies of a 350-km reach of the Parana River. Studies were conducted in Buenos Aires, Argentina, and Grenoble, France, to determine the effects of operational releases of a powerplant on navigation, flood stages, and operation of downstream plants.

January 1974  
to July 1974:

Harza Engineering Company, Chicago, Illinois. Hydraulic Engineer. Urban Drainage Projects Division. Duties included special assignments in urban hydrology and hydraulics and supervision of junior engineers and draftsmen.

Performed hydraulic analyses of over 50 miles of 20- to 45-ft. diameter hard rock tunnels for the storage and conveyance of combined storm and sanitary overflows, including the preparation of the Report on Hydraulic Analysis, Tunnel and Reservoir Plan, Metropolitan Sanitary District of Greater Chicago, Illinois.

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JAMES E. LINDELL  
Senior Hydraulic Engineer

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September 1969  
to January 1974:

University of Notre Dame, Indiana.  
Assistant Professor of Civil Engineering. Taught  
courses, directed graduate student theses, and  
conducted research in hydraulic engineering and  
hydrology. Principal investigator on a research  
project sponsored by the Office of Water Resources  
Research, U.S. Department of the Interior, entitled  
"Hydrogeologic Factors Involved in Predicting the  
Effect of Sanitary Landfill Operations on Ground  
Water Quality."

September 1965  
to September 1969:

Attended graduate school as a National Science  
Foundation Trainee. Conducted research in hydrodynamics.

Technical Papers  
and Articles:

"Measured Accelerations and Added Mass Coefficients  
for Spheres Released in Water," Ph.D. Dissertation,  
Northwestern University, 1969.

"Fluid Force Analysis and Accelerating Spheres  
Tests," Hamilton, W.S., and J.E. Lindell, J. Hydraulics  
Division, Proceedings, ASCE, June 1971.

"Hydrogeologic Aspects of Ground Pollution from  
Sanitary Landfills in St. Joseph County, Indiana,"  
Lindell, J.E., P.C. Singer, E.M. Winkler and J.J.  
Marley, presented at the Eighth AWRA Conference at  
St. Louis, Missouri, October 30 - November 2, 1972.

"Mathematical Modeling of Ground Water Contaminant  
Decay," Aquirre, G., and J.E. Lindell, presented at  
the meeting of the Indiana Academy of Science, 1973.

"Planning and Design of Storage in Combined Sewer  
Systems," R. S. La Russo, J. E. Lindell and J. E.  
Priest, to be presented at the ASCE Symposium on  
Surface-Water Impoundments, Minneapolis, Minnesota,  
June 2-5, 1980.

April 1980  
48608

# HARZA-EBASCO

PHILIPPE PIERRE MARTIN

Date of Birth: June 5, 1947

Citizenship: French, Permanent Resident in U.S. since 1978

Degrees: Doctor of Philosophy in Soil Mechanics  
1975, University of California, Berkeley  
Master of Science in Soil Mechanics  
1972, Massachusetts Institute of Technology  
Diplome d'Ingenieur Civil in Hydraulic Works  
and Soil Mechanics  
1970, Ponts et Chaussees, Paris, France

Languages: French and English

Professional Societies: American Society of Civil Engineers, Associate Member  
- Committee on Soil Dynamics  
- Committee on Computers and Numerical Methods  
Comite Francais de la Mecanique des Sols  
International Society for Soil Mechanics and  
Foundation Engineering  
Sigma Xi, member of University of Illinois Chapter

1979  
to Date: Martin & Raad Company, Consulting Engineers,  
Urbana, Illinois. Co-Founder and President.  
Consulting Projects included:

Stability of intake conduits in potentially  
liquefiable foundation soil.

Seepage analysis of the dike failure at Martin  
Reservoir, Florida.

Liquefaction potential analysis of structural  
backfill for South Texas Project Electric Generating  
Station.

Bearing capacity analysis of footing foundation under  
earthquake load for Midland Nuclear Station, Michigan.

1978  
to 1979: University of Illinois, Urbana, Illinois.  
Assistant Professor of Civil Engineering.  
Teaching duties included teaching undergraduate  
courses in soil mechanics, and geotechnical  
engineering. Teachings in graduate courses included  
earth dams and soil dynamics.

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1975  
to 1978:

"Engineering et Ouvrages d'Art," Design Office  
of Bouygues, S.A., France. In-House Geotechnical  
Consultant. Consulting assignments included:

Foundation design and seismic design of Osirak nuclear  
research reactor, Baghdad, Iraq.

Site investigation and design of port facilities on  
Benin River at Sapele, Nigeria.

Invalides-Orsay underground railroad link, Paris,  
France.

1973  
to 1975:

University of California, Berkeley.  
Research Assistant. Duties included research on  
influence of soil conditions on earthquake ground  
motions.

1971  
to 1972:

Stone & Webster Engineering Corporation, Boston,  
Massachusetts. Engineering Aide, Geotechnical  
Division.

Technical Papers  
and Articles:

Christian, J. T., Boehmer, J. W., and Martin, P. P.,  
"Consolidation of a Layer Under a Strip Load." Journal  
Soil Mech. Foundation Division, Proceedings ASCE 98 SM7  
(July 1972): 698-707.

Seed, H. B., Martin, P. P., Lysmer, J., "Pore-Water  
Pressure Changes During Soil Liquefaction."  
J. Geotechnical Engr. Division., Proceedings, ASCE  
102, GT4 (April 1976): 323-346.

Martin, P. P., and Seed, H. B., "A Simplified Procedure  
for Effective Stress Analysis of Ground Response."  
J. Geotechnical Engr. Div., Proc. ASCE 105, GT6  
(June 1979): 739-758.

Martin, P. P. and Seed, H. B., APOLLO: A Computer  
Program for the Analysis of Pressure and Dissipation  
in Horizontal Sand Layers During Cyclic or Earthquake  
Loading. Report UCB/EERC 78-21, October 1978.

Martin, P. P. and Seed, H. B., MASH: A Computer  
Program for the Non-Linear Analysis of Vertically  
Propagating Shear Waves in Horizontally Layered Deposits.  
Report UCB/EERC 78-23, October 1978.

Martin, P. P. and Seed, H. B., "One Dimensional Dynamic  
Ground Response Analyses." Accepted for publication in  
J. Geotechn. Engr. Div., Proc. ASCE.

Technical Papers  
and Articles:  
(Continued)

Martin, P. P., "The Flow Net: Solution of the Seepage Problem." Submitted to J. Geotechn. Engr. Div., Proceedings, ASCE.

Martin, P. P., "Boundary Effects on Pore Pressure Build-Up in Loose Sands." Invited paper to the International Conference on Soil Dynamics and Earthquake Engineering, Southampton, England, July 1982.

Martin, P. P., "ELF: A Computer Program for the Analysis of Two-Dimensional Steady-State Seepage Through Porous Media," Geotechnical Engineering Report, University of Illinois, 1982.

August 1982

PROJECT  
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# HARZA-EBASCO

ROBERT J. MEREDITH

Job Title: Electrical - Power System Studies  
Work Location: New York  
Education: Rensselaer Polytechnic Institute - BSCE 1967  
Rensselaer Polytechnic Institute  
MEE, Electric Power Engineering, 1968  
AEP System Management Program at the  
University of Michigan, 1979

Professional Registration: None

Parent Company: Ebasoc Service Incorporated

## Experience and Qualifications Relevant to the Susitna Project:

April 1980 to Present: Presently Consulting Electrical Engineer in New York City, NY office of Ebasco. Responsibilities include analysis of problems involving operating and planning of electric power generations and transmission systems.

Principal author of an HVDC transmission planning reference manual being prepared for the Electric Power Research Institute. The manual will provide a source of information on the comparative evaluation of ac and dc transmission systems. It will also provide guidance as to how dc systems and their controls perform and should be modeled in the various steady state and transient studies required for planning HVDC systems.

Assisting in the evaluation of transmission requirements to serve the towns of Wrangell and Petersburg, Alaska from the Tyee Lake hydro power plant, now under construction by the Alaska Power Authority. The study has been concerned with selection of operating voltage, shunt compensation and system steady state and transient voltage control.

Project Manager on a study for Nevada Power Company. The study included evaluating generation planning practices, determining the availability of emergency power from interconnections and recommending desirable generation reserve margins.

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Assisted in a generation planning study for Kansas City Power & Light Company. That study provided a reliability assessment of KCPL's generation system as a function of its own forced outag rates and those of the surrounding MOKAN power pool. It also made recommendations regarding desirable generation reserve levels.

June 1968 to December 1979: Served in the Transmission Planning Section of American Electric Power Service Corp. For the last two years he headed the Section, supervising a staff of approximately fifteen engineers and technicians. The Section's responsibilities included carrying out all planning and operating studies for AEP's seven-state 138-kV transmission system and its 765-kV and 345-kV sources. Representative transmission reinforcement project included EHV/138-kV stations of 400 to 1500 MVA with their associated EHV and 138-kV circuitry; reactive correction programs including static capacitors, synchronous condensers, and a static var systems; and development of operating procedures to avoid such large investments.

Client References:

Project Name: RP 1964-1 " Methodology for Integration of  
HVDC Links in Large Ac Systems - Phase I"  
Dr. Real Balu  
Project Manager  
Electric Power Research Institute  
P. O. Box 10412  
Palo Alto, California 94303  
(415) 855-2834

Project Name: Tyee Lake - Wrangell - Petersburg Power  
System Study  
Mr. Mike Yerkes  
Alaska Power Authority  
334 West Fifth Avenue  
Anchorage, Alaska 99501  
(907) 276-0001

Project Name: Examination of Conditions and Management of  
Nevada Power Company  
Mr. Connel Maraden  
Manager, Regulatory Affairs  
Nevada Power Company  
4th Street & Stewart Avenue

ROBERT J. MEREDITH  
Electrical - Power System Studies

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Las Vegas, Nevada  
(702) 385-5639

Project Name:

Kansas City Power & Light Company  
Generator Planning Study  
Mr. J. Michael Evans  
Director, System Planning  
Kansas City Power & Light Co.  
1330 Baltimore Avenue  
Kansas City, Missouri 64141  
(816) 556-2941

PROJECT  
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REQUIREMENTS

# HARZA-EBASCO

CHI-YUAN WEI

Hydraulic Engineer

Date of Birth: December 17, 1940

Citizenship: U.S.A.

Degrees: Doctor of Philosophy in Civil Engineering  
1971, Utah State University  
Master of Science in Civil Engineering  
1968, Utah State University  
Bachelor of Science in Hydraulic Engineering  
1963, Chung-Yuan College of Science and Engineering

Languages: English, Chinese and some Japanese

Professional Societies: American Geophysical Union  
National Water Well Association

Professional Registration: Professional Engineer - Illinois  
Engineer-in-Training - Utah

September 1971 to Date: Harza Engineering Company, Chicago, Illinois.  
Hydraulic Engineer. Hydraulics Division. Duties include analysis and design of hydraulic structures. Examples of work include:

Participated in the development of a finite element transient hydrothermal model for simulating the thermal diffusion characteristics of the Cedar and Lyndale cooling ponds of the Black Dog electric generation station (Northern States Power). The Galerkin finite element procedure and linear triangular elements were used to solve the governing partial differential equations. The method was extended to permit division of a region into quadrilateral elements composed of four basic triangular elements. The plant discharges, the velocity distributions, the wind speed, and the solar radiation were also incorporated.

Carried out a study to simulate the adequacy of the proposed drainage improvements for the Guayana Black Bush frontlands (11,000 acres), from Bloomfield to Hogstyle. A transient open channel (drainage) computer model developed by Harza for the Black Bush and Tapakuma projects was used to

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CHI-YUAN WEI  
Hydraulic Engineer

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September 1971  
to Date:  
(Continued)

simulate the drainage characteristics of the system under the given storm and tidal conditions.

Conducted a two-dimensional steady state finite element seepage analysis for the foundation of the San Lorenzo rockfill dam, El Salvador. The foundation consists of alluvium with highly stratified zones. The effects of cutoff length, relief wells, and possible geological variations in the foundation on the uplift pressures and seepage discharges were investigated. The results provided valuable information for the final design of the foundation.

Developed a two-dimensional finite element ideal fluid flow model to simulate a jet of high velocity water (up to 150 feet per second and 450 feet maximum head) passing a proposed ramp (3-6 inches high and 2-4 feet long). The ramp was located upstream of an airtrough proposed to introduce air into the jet downstream of a steel liner. The trajectory and the upper and lower nappes were calculated. The effects of negative pressures along the lower nappe on the trajectory were simulated. The study conducted was part of the Tarbela project stilling basins 3 and 4 restoration work (1976) for Water and Power Development Authority of Pakistan. Each basin was designed to pass a maximum flow of approximately 100,000 cfs.

Responsible for conducting a pioneering study on the saturation of earthfill and foundation of the 110-meter high (maximum) Guri Left Auxiliary Fill Dam (Guri Raising Project) following the filling of the reservoir. Saturated-unsaturated porous media flow theory and finite element techniques were applied. The movements of the saturation (wetting) fronts and the pore pressure distributions in the earthfill and the foundations were simulated using the proposed reservoir filling schedule in order to predict the possible differential settlements throughout the entire cross-sections. The high porosity (0.5) and the lower natural water content (13 per cent saturated by volume) of the collapsible foundation soils amplified the critical nature of the study.



CHI-YUAN WEI  
Hydraulic Engineer

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September 1971  
to Date:  
(Continued)

Carried out transient seepage study for the lower earthfill dam (185 feet maximum height) of the Bath County Pumped-Storage project in conjunction with reservoir rapid drawdown (60 feet in 13.5 hours). A powerful finite element saturated-unsaturated porous media flow model was constructed to simulate the transient seepage flows. The optimal location and material of the horizontal drain were determined. The free surfaces and the pore pressure distributions were calculated. These results were used to assist in designing a stable upstream slope of the dam.

Carried out finite element analyses on temperature distributions of heated water effluent discharged into Lake Michigan from an electric generation plant of Northern Indiana Public Service Company. The extent of the thermal plume into the lake and its pattern were simulated. The effects of wind speed and lake currents were included.

Development and application of a computer program to perform calculations of hydraulic jumps in a stilling basin with sloping apron (15 meters maximum head) as a part of the hydraulic design analysis for Gotvand project, Iran.

Development and application of geohydrodynamic simulation models using saturated-unsaturated flow theory and finite element technique for Guri Auxiliary Dams to predict transient pore pressures and the phreatic surfaces due to reservoir rapid drawdown.

Development and applications of an irrotational flow model using the finite element technique to predict cavitation potentials and pressures along the spillway crest under cracked-gate operation for the Guri project, Venezuela.

Carried out hydraulic design analyses, and layout of spillways (620 cms maximum design flow), stilling basins (62-meter maximum head), diversion tunnels (170 cms maximum flow), and canals for Rio Lindo Hydroelectric Expansion project, Honduras. Development and application of a two-dimensional, transient, unconfined seepage program for design analyses of an earth dam with fluctuating reservoir levels and for a reservoir rim with drains for the Bath County Pumped-Storage project, Virginia.

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DESIGN

CHI-YUAN WEI  
Hydraulic Engineer

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September 1971  
to Date:  
(Continued)

Development of a three-dimensional steady state model with 4000 finite elements to simulate seepage of a two square mile area upstream from and under Tarbela Dam to study the effects of the upstream blanket, bedrock contours, and open-work gravel zones on the Tarbela Dam foundation.

Responsible for the analyses of transient groundwater flow and groundwater dispersion problems using finite difference and finite element techniques. The study was carried out for Byron and Braidwood Nuclear Power Stations Preliminary Safety Analysis Report.

Carried out numerical simulation of hydrodynamic flow through control gates of irrigation tunnels (350 feet maximum head), Tarbela Dam project, Pakistan. Each tunnel was designed to pass approximately 100,000 cfs (maximum). A Marker-and-Cell computational technique was applied and the Navier-Stokes viscous flow equations were solved. The free surfaces, and the transient velocity and pressure fields were calculated. The results were presented in a movie film showing movements of water particles.

Performed hydraulic design analysis for an outfall diffuser pipe, Pond 4, Tomahawk Mill, Wisconsin, Owens-Illinois, Inc. A computer program was developed to analyze the flow distributions.

Performed analysis of general hydraulic design problems.

June 1966  
to August 1971:

Utah Water Research Laboratory, Utah State University. Logan, Utah.  
Research Assistant. Laboratory investigation and hydraulic analysis of a Parshall flume connected by sewage pipelines for the City of Detroit, Michigan.

Preparation and processing of cost and hydrology data on the report "Optimum Operation of Desalting Plants as a Supplemental Source of Safe Yield" to the Office of Saline Water.

Carried out numerical analysis of a transient groundwater flow in conjunction with an irrigation pipeline.

CHI-YUAN WEI  
Hydraulic Engineer

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June 1966  
to August 1971:  
(continued)

Responsible for the analysis of "Finite Difference Solutions to Steady-State Axisymmetric Infiltration through Partially Saturated Porous Media" for the Northwest Watershed Research Center and for partial fulfillment of the requirements for Doctor of Philosophy.

Laboratory investigations on the feasibility of rating current meters in a submerged uniform velocity field for a project granted by U.S.G.S.

Performed model study for the project - "Design Criteria for USU Stilling Basin Pipe Flow to Open Channels" - to find criteria for designing a stilling basin to serve as transition from pipe flow to open channel flow.

Carried out field investigation of land use study for the water budget analysis as a part of the project "Hydrologic Inventory of the Utah Lake Drainage Area."

June 1964  
to January 1965:

Taiwan Power Company.  
Research Assistant. Responsibilities included analyses of hydraulic and hydrologic problems.

Technical Papers  
and Articles:

"Feasibility of Rating Current Meter in a Velocity Field," Co-author with Gaylord V. Skogerboe, Lloyd H. Austin and Roland W. Jeppson, Utah Water Research Laboratory Report PR-WG51-1, Utah State University, Logan, Utah, January, 1968.

"Closed Conduit to Open Channel Stilling Basin," Co-author with Gordon H. Flammer, Gaylord V. Skogerboe and Hameed Rasheed. Journal of the Irrigation and Drainage Division, ASCE, Vol. 96, No. IR 1, Proc. Paper 7124, March 1970.

"Finite Difference Solutions to Steady-Static Axisymmetric Infiltration Through Partially Saturated Porous Media," Co-author with Roland W. Jeppson, Utah Water Research Laboratory Report, PRWG 59c - 6, Utah State University, Logan, Utah, April 1971.

"Calibration of Parshall Flumes with Non-standard Entrance Transitions," Co-author with Cheng-lung Chenn, Calvin G. Clude, Min-shoung Chu, Utah Water Research Laboratory Report, PR-WG102-1, Utah State University, Logan, Utah, March 1972.

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CHI-YUAN WEI  
Hydraulic Engineer

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**Presentations:**

Some experiences at Harza with the "Applications of Finite Elements to Seepage Analyses."  
Presented at the workshop on seepage and stability, specialty conference on analysis and design in Geotechnical Engineering, ASCE, Austin, June 9-12 1974.

July 1980  
85461

# HARZA-EBASCO

C. H. YEH  
Head, Structural Department

Date of Birth: June 3, 1943

Citizenship: U.S.A.

Degrees: Doctor of Philosophy in Structural Engineering and  
Structural Mechanics  
1970, University of California, Berkeley  
Master of Science in Structural Engineering and  
Structural Mechanics  
1967, University of California, Berkeley  
Bachelor of Science in Civil Engineering  
1965, National Taiwan University

Languages: English and Chinese

Professional Registrations: Structural Engineer - Illinois  
Professional Engineer - Illinois, Florida

June 1976 to Date: Harza Engineering Company, Chicago, Illinois.  
Head, Structural Department.

September 1970 to June 1976: Harza Engineering Company, Chicago, Illinois.  
Senior Structural Engineer. Advanced Hydraulic and  
Structural Design Division.

Responsibilities as Head of Structural Department and as Senior Structural Engineer include analysis and design of hydro-structures using the finite element method. Major projects have included static analysis and dynamic response to earthquakes of the 200-meter high Reza Shah Kabir arch dam, Iran; the 300-ft. high Strontia Springs (Foothills) arch dam, Colorado; the 250-ft. high Cerron Grande rockfill dam, El Salvador; the 130-ft. high San Dimas arch gravity dam, California; the 160-meter high Guri gravity dam, Venezuela; and the 170-ft. high Big Dalton multiple-arch dam, California.

Studies on special problems included influence on settlement due to clay joint in the arch dam foundation, stability evaluation of thrust block subject to both thrust and torsional load, stress distribution in the generator barrel and monitoring structural behavior during reservoir filling for the Reza Shah Kabir project; stress evaluation of penstock due to settlements on the 100-MW Finchaa project, Ethiopia; optimization of excavation shape for the 2100-MW underground Bath County powerhouse, Virginia; analysis of reactor building and shield wall for the Prairie

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C. H. YEH  
Head, Structural Department

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September 1970  
to June 1976:  
(Continued)

Island nuclear power plant, Minnesota; dynamic response of intake tower to earthquake excitation for the Tarbela dam project, Pakistan; vibration study of arch dam, penstocks and trashrack support and design of reinforcing scheme to reduce vibration for the Smith Mountain project, Virginia; creep, bond and crack control associated with the two-stage construction of Guri gravity dam; prestressed gate trunnion anchor for Reza Shah Kabir and Guri; two- and three-dimensional seepage studies for Guri, Cerron Grande, Tarbela and Chicago Deep Tunnel projects; heat loss study for pumped-storage reservoir for Bath County; rehabilitation of Lock and Dam No. 1 for Mississippi River; and stress analysis of tunnel intersection for Chicago Deep Tunnel.

Responsibilities also include the analysis and design of transmission towers, substations, bulkheads, penstock bifurcations, prestressed gate trunnion anchor, and instrumentations; instrumentation for measuring strain, deflection, joint opening, foundation settlement, and temperature, for Reza Shah Kabir, Guri, and Smith Mountain projects; and temperature and crack control of mass concrete for Reza Shah Kabir, Guri, Strontia Springs and Tarbela projects.

Responsible for the development of the following computer programs: CONCO, a program to compute the effects of pre- and post-cooling of mass concrete; ARDE, a program to find optimal shape of arch dams; NL2D, bilinear analysis of two-dimensional structures; and VOGT, stress analysis for arch dam foundations interaction using VOGT coefficients.

February 1970  
to September 1970:

Agbabian Jacobsen Associates, Los Angeles, California. Associate Consultant. Part-time. Main duty was computer analysis in the field of dynamic plate bending problems.

Technical Papers  
and Articles:

"Large Deflection Dynamic Analysis of Thin Shells Using the Finite Element Method," SEL Report No. UCSESM 70-18, University of California, Berkeley, October 1970.

"A Nonlinear Dynamic Analysis of Cooling Tower," ASCE Power Division Journal, June 1972.

"Stability and Dynamic Analyses of Cooling Tower," presented at the Joint Power Generation Conference, Boston, Massachusetts, September 1972.

"Stability and Dynamic Analyses of Cooling Tower," ASCE Power Division Journal, November 1973.

C. H. YEH  
Head, Structural Department

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Technical Papers  
and Articles:  
(Continued)

"Safety Analysis of Concrete Dams Under Earthquake,"  
International Symposium on Criteria and Assumptions  
for Numerical Analysis of Dams, Swansea, United  
Kingdom, September 1975.

"Flow-Induced Trashrack Vibration," ASME Pump/Turbine  
Symposium, Niagara Falls, New York, June 1979.

"Raising Guri Gravity Dam: Stability and Stress  
Investigations," 13th International Congress on  
Large Dams, New Delhi, India, October 1979.

December 1978

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**HARZA-EBASCO**

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REGULATORY AND  
ENVIRONMENTAL  
RESUMES

ASSIGNMENT OF HARZA-EBASCO JOINT  
VENTURE PERSONNEL TO THE  
SUSITNA HYDROELECTRIC PROJECT

RESUMES

Project Control

<u>Project Position</u>	<u>Individual Assigned</u>	<u>Work Location</u>
Lead Cost/Schedule Control Engineer	J.E. Canepari	Bellevue
Project Estimator	A.O. McDermott	Bellevue
Services Cost Engineer	-	Bellevue
Cost/Schedule Control Engineer	-	Bellevue
Accountant	(Local Hire)	Anchorage
Lead Cost/Schedule Control Engineer for Field and Non-Technical Services	J.L. Beckman	Anchorage
Cost/Schedule Control Engineer	(Local Hire)	Anchorage
Lead Contract Administrator	(Local Hire)	Anchorage
Contract Administrator	(Local Hire)	Anchorage
Project Coordinator	(Local Hire)	Anchorage

# PROJECT CONTROL

HARZA-EBASCO

ENVIRONMENTAL  
RESUMES



# HARZA-EBASCO

JOHN E. CANEPARI

Job Title: Lead Cost/Schedule Control Engineer

Work Location: Bellevue

Education: AAS 1963, State University of New York  
BCE 1968, Manhattan College  
MBA 1979, Rider College

Special Qualifications: Fourteen years relevant experience

Professional Registration: None

Parent Company: Ebasco Services Incorporated

## Experience and Qualifications Relevant to the Susitna Project:

- Fourteen years experience in the design, engineering, and construction phases of both utility and non-utility projects.
- Responsibilities have included overall project cost engineering functions, including developing and implementing a cost control system for monitoring and analyzing cost and schedule performance during the engineering and pre-construction stages, site office administration, internal cost reporting, and monthly statusing giving an analysis and forecast of progress and project costs.
- Duties included establishing both workday and dollar budget estimates, determining physical accomplishment utilizing "earned value" indicators, developing project milestone schedules, preparing monthly progress reports, establishing and monitoring internal budget estimates and providing management update reports.
- Also responsible for providing scope, criteria, and coordination of company efforts in developing project capital cost estimates, preparing and reviewing reports covering project procurement commitments and forecasting future capital expenditures.

JOHN E. CANEPARI  
Lead Cost/Schedule Control Engineer

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<u>Client</u>	<u>Project</u>	<u>Fuel</u>	<u>Position</u>
Allegheny Power Services Company	Davis Pumped Storage Unit Nos. 1-4	Hydro	Cost/Schedule Engineer
W.R. Grace/Department of Energy	Synthesis Gas Demonstration Plant	-	Project Controls Engineer
Washington Public Power Supply System	WPPSS Unit Nos. 3 and 5	Nuclear	Cost/Schedule Control
Houston Lighting & Power Company	Limestone Electric Generating Station Units Nos. 1 & 2	Lignite	Cost Engineer
El Dorado Irrigation District	SOFAR-Upper Mountain Project	Hydro	Manager, Project Services

Employment History:

Ebasco Services Incorporated: 1978 - Present

- Principal Engineer, 1979 - Present
- Senior Engineer, 1978 - 1979
- American Electric Power Service Corporation, New York, NY: 1973 - 1978
- Engineer, 1976 - 1978
- Associate Engineer, 1973 - 1976

U.S. Department of Transportation, Third Coast Guard District, New York, NY: 1968 - 1973

- Associate Civil Engineer, 1969 - 1973
- Assistant Structural Engineer, 1968 - 1969

# HARZA-EBASCO

ANDREW O. MCDERMOTT

Job Title: Project Estimator

Work Location: Bellevue

Education: Louisiana State University

Special Qualifications: Major participant in Chicago Deep Tunnel Project

Professional Registration: None

Parent Company: Harza Engineering Company

## Experience and Qualifications Relevant to the Susitna Project:

August 1982 to Date: Harza Engineering Company, Chicago, Illinois. Senior Estimator, Construction Management Department. Prepared cost estimates for dams, powerplants and underground construction.

December 1969 to July 1982: J.F. Shea Co., Incorporated.

- Project Engineer, Chicago, Deep Tunnel, 3/79-7/82. Coordinated design and field assembly with manufacturers of tunnelling equipment including one 32-foot and one 15-foot tunnel boring machine, one head frame, and one 30-foot concrete forming system. Designed and supervised fabrication of all ancillary equipment: tunnel jumbo, grout set-up, bridges, railroad structures, concrete batch plant, and underground trailing gear for mining and concrete. Supervised all special and typical job engineering. Negotiated real estate leases for additional property at various shaft sites.
- Assistant Project Manager, A-11-a Project Metro, Washington, D.C. 1/78-3/79. Assisted project manager on 10,000 L.F. tunnels, 6 shafts, 3 enlargements, and 2 structures. Realigned various reaches of tunnel to avoid bad ground areas. Supervised all jobsite engineering. Estimated job budget and monitored cost control. Negotiated and supervised major subcontracts.
- Lead Estimator, Bethesda Maryland Office, 7/76-1/78. Supervised estimates on five major metro contracts including conventional mining, T.B.M. mining, open cut, cut and cover,

ANDREW O. MCDERMOTT  
Project Estimator

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station enlargements (heading and bench plus mult-drift), and shafts. Included was successful bid on a-11-a above.

- Project Engineer, Contract C-5, Metro, Arlington Station. 12/72-7/76. Designed procedures and equipment to excavate first underground station (hard rock) in D.C. area: four vertical shafts, one underground shaft, and 720 L.F. of 50-foot high and 60-foot wide station. Worked very closely with tunnel superintendent in connection with excavation procedure, depth of round, and support of excavation (steel ribs and shotcrete). Supervised erection of first coffered station of same.
- Chief Estimator, Walnut, California, 12/69-12/72. Supervised estimates on many projects including the following:
  - Gillboa-Blenheim, California
  - New York Water Tunnel
  - Pyramid Dam, California (Low Bidder)
  - Bernesconi Tunnel #2, California (Low Bidder)
  - Red Hill Tunnel, Hawaii
  - Thompson Yarra Tunnel, Australia
  - G-4 Tunnel, Washington, D.C. (Low Bidder)
  - Snettisham Power Company, Alaska

July 1966 to July 1969: S. S. Mullen, Seattle, Washington. Area Manager for work in Washington and Oregon. Work included railroad relocation in Central Ferry, Washington; levee rehabilitation in Milton Freewater, Oregon; bridge repair, two freeways, and negotiated excavation for Boeing Company for Paine Field in Everett, Washington.

August 1964 to December 1969: McNamarra Corporation of California. Estimator for freeways, dams and powerhouse. Project Manager for Pacifica Freeway California. Area Manager on four freeway projects (Pacifica, Tracy, Camp Roberts and Chico, California).

1952 to 1964: Kaiser Engineers, Oakland, California. Field Engineer, Lompoc, California, Process Plant. Area Engineer, Baton Rouge, Louisiana, Aluminum Plant. Office Engineer, Garrison Powerhouse, North Dakota. Area Engineer, Grammercy, Louisiana, Aluminum Plant. Project Engineer, Howard Hanson Dam, Green River, Washington.

ANDREW O. MCDERMOTT  
Project Estimator

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Client References:

Project Name:

TARP  
The Metropolitan Sanitary  
District of Chicago  
100 E. Erie Street  
Chicago, Illinois 60611  
Joseph H. Irons  
Ronald A. Newbauer  
Frank E. Dalton  
(312) 751-5600



# HARZA-EBASCO

JAMES L. BECKMAN

Job Title: Lead Cost/Schedule Control Engineer  
Field and Non-Technical Services

Work Location: Anchorage

Education: Bachelor of Science in Civil Engineering  
1970, University of Notre Dame  
MBA, Marketing  
1976, New York University

Special  
Qualifications: Eleven years relevant experience

Professional:  
Registration: Engineer-In-Training, Indiana

Parent Company: Ebasco Services Incorporated

## Experience and Qualifications Relevant to the Susitna Project:

Principal Engineer with eleven years of home office and field experience in estimating, cost/schedule control, finance and marketing of fossil, hydro and nuclear electric generating stations. Responsibilities include assessing and monitoring all costs and schedules associated with the engineering, procurement and construction phases of the projects; development of cash flows, integrated CPM logic networks and associated resource loaded schedules; and implementation of earned value systems.

- Administrative responsibilities include supervision of the cost/schedule staff, periodic reviews and training of personnel, development of departmental manpower forecasts and hiring of staff as required.
- Previously responsible for coordinating and writing portions of the Company's marketing plan and five and ten year Corporate Plans, preparing market research and sales and marketing data, editing of public relations material, and administering the executive's eight reporting departments.
- Previously responsible for managing an international client's account with domestic vendors, including interfacing the Traffic, Expediting, Purchasing, Accounting and Treasury Departments.

JAMES L. BECKMAN -2-  
Lead Cost/Schedule Control Engineer  
Field and Non-Technical Services

Representative Experience:

<u>Client</u>	<u>Project</u>	<u>Size</u>	<u>Fuel</u>	<u>Position</u>
Houston Lighting & Power Co.	Allens Creek Unit No. 1	1200 MW	Nuclear	Project Cost/Schedule Engineer
Washington Water Power Co.	Noxon Rapids Unit No. 5	125 MW	Hydro	Project Cost Engineer
Louisiana Power & Light Co.	Waterford Unit No. 3	1165 MW	Nuclear	Project Estimate
Niagara Mohawk Power Corp.	Lake Erie Unit Nos. 1 & 2	850 MW ea.	Coal	Project Estimate
New York State Electric & Gas Corp.	Homer City Unit No. 3	600 MW		Lead Civil Estimate
Consumers Power Co.	Ludington Pumped Storage	825 MW	Hydro	Construction Cost Engineer

Employment History:

Ebasco Services Incorporated, New York, NY; 1970-Present

- Principal Engineer, 1979-Present
- Senior Engineer, 1976-1979
- Engineer, 1974-1976
- Associate Engineer, 1973-1974
- Assistant Engineer, 1970-1973 (Includes Military Leave of Absence)

U.S. Army - Corp. of Engineers, Washington, D.C.; 1970-1972

- Civil Engineering Aide

Tweed & Erikson, Highway Consultants, Columbus, Ohio; Summers, 1968 & 1969.

- Engineering and Design Technician

**HARZA-EBASCO**

REGULATORY AND  
ENVIRONMENTAL  
RESUMES

ASSIGNMENT OF HARZA-EBASCO JOINT  
VENTURE PERSONNEL TO THE  
SUSITNA HYDROELECTRIC PROJECT

RESUMES<sup>1/</sup>

Environmental and Regulatory Programs

<u>Project Position</u>	<u>Individual Assigned</u>	<u>Work Location</u>
FERC License Support Manager	J.P. Robinson	Anchorage
Agency Liaison Manager	W.J. Wilson	Anchorage
Permits Coordinator	J.A. Marx	Anchorage
Aquatic Ecology	J.R. Bizer	Anchorage
Terrestrial Ecology	R.V. Densmore	Anchorage
Resources Planning	J.A. Richardson	Anchorage
Bellevue Environmental Support		
Fisheries	D.L. Beyer	Bellevue
Wildlife	R.L. Fairbanks	Bellevue
Recreation, Aesthetic, & Cultural Resources	R.K. Suttle	Bellevue
Land Use	C.E. Lawson	Bellevue
Socioeconomics	E.S. Cunningham	Bellevue
Water Resources	B.K. Lee	Bellevue
Soils & Geology	R.C. Acker	Bellevue
Project Economics & Alternatives	W. Hutchinson	Bellevue

<sup>1/</sup> Resumes are presented in alphabetical order.

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ENVIRONMENTAL AND  
REGULATORY PROGRAMS

HARZA-EBASCO



# HARZA-EBASCO

RICHARD C. ACKER

Job Title: Lead Geologist

Location: Bellevue

Education: Master of Science in Geology  
1950, Brown University  
Bachelor of Arts in Geology  
1947, Williams College

Special Qualification: Major participant - TARP  
Corps of Engineers special studies of  
foundations in permafrost

Professional Registration: Registered Professional Geologist -  
California  
Registered Engineering Geologist -  
California

Parent Company: Harza Engineering Company

## Experience and Qualifications Relevant to the Susitna Project:

November 1973 to Date: Head, Geology Section, Geotechnical Department. Directs geologic investigations which comprise core borings; in-hole permeability testing; down-hole geophysical surveys; surface geophysical surveys; exploratory adits; in-situ tests in adits, chambers, and boreholes; hydrogeologic exploration; and seismic test evaluation for many of the Company's major projects.

- Rockfill Dams. Patia site 405, Colombia; feasibility investigations for 840 ft. high rockfill dam. Nader Shah Dam, Iran; feasibility and design investigations, for 480 ft. high rockfill dam and preparation of contract documents. Sogamoso Project, Colombia; feasibility investigations for 945 ft. high rockfill dam. Maqarin Project, Jordan; feasibility and design investigations for 495 ft. high rockfill dam and preparation of contract documents. La Honda Dam, Venezuela; feasibility and design investigations for 390 ft. high rockfill dam and preparation of contract documents. Project under construction.
- Arch Dams. Reza Shah Kabir Arch Dam, Iran; feasibility and design investigations for 600 ft. high dam, preparation of

RICHARD C. ACKER  
Lead Geologist

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contract documents and construction surveillance. Project operating. Strontia Springs Arch Dam, Colorado; feasibility and design investigations for 300 ft. high dam, preparation of contract documents and surveillance during construction. Project complete October, 1982. Southpark Reservoir Project, Colorado; prefeasibility and feasibility investigations for 270 ft. high arch dam.

- Underground Projects. TARP Project, Chicago; feasibility investigations for 120 mile long tunnel and reservoir complex. Geologic monitoring during construction nearly completed of initial 21.5 mile mainstream segment. Includes tunnels 20 to 35 ft. in diameter and underground pumping chambers 63 ft. wide, 213 ft. long and 105 ft. high. Blue Mountain Water Supply Project, Jamaica; prefeasibility investigations for 29 mile long tunnel and reservoir complex. Feasibility investigations for initial 10 mile tunnel reach. Mt. Hope Project, New Jersey; geologic studies for planning development of an underground hydro or compressed air energy storage facility utilizing existing deep mine openings. Northwestern Illinois Project; prefeasibility investigations including three deep core borings (to 5500 ft.) and extensive borehole in-situ tests for potential 2000 MW - 3000 MW underground hydro development.

June 1967 to November 1973: Head, Geology Department, Geotechnical Division.

Major projects completed by the department included Reza Shah Kabir Dam, Iran (feasibility and design investigation and studies of 650-foot high arch dam); St. Lawrence Basin Appraisal Studies (18 damsites); Rio Grande River Basin, Bolivia (damsite appraisal studies); Blue Mountains Water Supply Project, Jamaica (appraisal and feasibility studies for diversion dams and 29 mile tunnel complex); Chicago North Side Rock Tunnel (feasibility investigations 120 mile rock tunnel complex); Patia River Basin, Colombia (appraisal of 28 damsites, prefeasibility investigation of five damsites, and feasibility study of 850-foot high rockfill dam); Nader Shah Dam, Iran (design investigations for 480-foot high rockfill dam); Gavin Fly Ash Dam and Reservoir (site selection and design studies); and Foothills Project, Site No. 3, Colorado (feasibility studies of 265-foot high arch dam).

August 1966 to June 1967: Geologist, Indus Basin Division. Responsibilities included review of geologic investigations and reports, design drawings and specifications for West Pakistan

RICHARD C. ACKER  
Lead Geologist

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water development projects; report writing; and technical assistance to Pakistan field staff.

February 1962 to August 1966: Principal Geologist and Chief, Geology and Materials Branch, Harza Engineering Company International, Lahore, Pakistan. Projects included Karachi Irrigation Project, Hub Dam (Earth); Khanpur Irrigation Project, Khanpur Dam (Earth); Gomal Irrigation and Hydro Project, Khajure Kach Dam (Gravity); Kachhi Plains (Sibi-Jhatpat) Projects; Kabul-Swat-Chitral Basin Reconnaissance Report; Tarbela Dam Project (Rockfill); Central Aggregate Contract, IBP Geological Investigation (mapping and report of Bulland Hill Quarry); Chasma Barrage Project; and Mangla Dam Project (Earth).

November 1956 to February 1962: District Geologist and Assistant to Chief. U.S. Corps of Engineers, New York, New York, Paving, Foundations and Materials Branch. Responsibilities included all geologic work relative to siting, foundation and materials investigations, design, construction and maintenance of structures, paving and water supply for nine military airfields and a widespread radar/communications network. Preparation and review of geologic reports, foundation designs and contract documents. Special studies of foundations in permafrost. Surveillance of foundation work, aggregate and quarry control during construction. Projects included DEW line, Southeast Extension; DEW line, Eastward Extension; NIKE sites,

Thule, Greenland; Ballistic Missile Early Warning Site (BMEWS), Thule; Ballistic Missile Early Warning Site (BMEWS), Alaska.

November 1950 to November 1956: District Geologist, U. S. Corps of Engineers, Baltimore, Maryland.

September 1947 to February 1950: Graduate Teaching Assistant. Brown University, Providence, Rhode Island.

June to September 1948: Geological Assistant to Mine Superintendent, R. T. Vanderbilt, Inc., Ralmat, New York.

August 1945 to November 1946: Geologist, U.S. Corps of Engineers, Ft. Belvoir, Virginia.

Technical Papers: "Rock Mechanics Studies for Mossyrock Arch Dam," with D. E. Kleiner, ASCE, Power Journal, January 1971.

"Foundation and Abutment Treatment for High Rockfill Dams," with Jack C. Jones, ASCE Journal Soil Mechanics and Foundations Division, October 1972.

RICHARD C. ACKER  
Lead Geologist

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"Geohydrologic Monitoring, Karun River Dam, Iran," with J. A. Scoville and M. Saines, Proceedings of the Tenth International Conference on Soil Mechanics and Foundation Engineering.

Client References:

Project Name:

TARP  
The Metropolitan Sanitary  
District of Chicago  
100 E. Erie Street  
Chicago, Illinois 60611  
Joseph H. Irons  
Ronald A. Neubauer  
Frank E. Dalton  
(312) 751-5600



# HARZA-EBASCO

DONALD L. BEYER

Job Title: Fisheries Resource Specialist

Work Location: Bellevue

Education: Oregon State University, B.S.  
Fisheries Science: 1970  
University of Washington, M.S.  
Fisheries Science: 1973  
University of Washington, Ph.D.  
Fisheries Science: 1977

Special Qualifications: Washington State Energy Facility Site  
Evaluation Council Expert Witness  
Testimony, 1978

Professional Registration: None

Parent Company: Ebasco Services Incorporated

## Experience and Qualifications Relevant to the Susitna Project:

January 1978 to Present: Presently a Senior Fisheries Scientist in the Bellevue, Washington office of Envirosphere Company, a Division of Ebasco Services Incorporated. Dr. Beyer is responsible for the design, coordination and involvement in numerous environmental programs and licensing efforts including: license applications for hydroelectric facilities in the Pacific Northwest and Alaska; National Pollutant Discharge Elimination System permits; environmental impact statements for transmission line routing and railroad corridor siting; and impact analysis of energy-related projects on ecosystems.

- Presently involved in fisheries studies for the Grant Lake Hydroelectric Project for the Alaska Power Authority. Key issues that are being investigated with respect to fisheries are instream flows, mitigation plans, and passage of salmonid smolts around project facilities.
- Recently served as Project Manager for FERC license applications on Puget Sound Power and Light Company's Nooksack Falls and Sandy Creek Projects. Responsibilities on both projects were to coordinate, review and finalize the pre-



DONALD L. BEYER  
Fisheries Resource  
Specialist

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paration of the entire Exhibit E sections of the license documents.

- Has provided impact predictions on fisheries resources related to transmission line routing and development. These studies were on the Eugene-Medford, Flathead Valley, and Kake-Petersburg transmission lines.
- Provided expert testimony to the Washington State Energy Facility Site Evaluation Council on fisheries studies related to the Washington Public Power Supply System's NPDES hearings for its Nuclear Projects 3 and 5. Testimony included defense of the fisheries monitoring program and impact prediction for thermal discharges from the plant's discharge.
- Has completed the field techniques, computer techniques, and negotiations courses involving the U.S Fish and Wildlife Service's Instream Flow Incremental Methodology. He has applied this methodology (IFG) to several streams in the Pacific Northwest to assess instream flow requirements.

September 1970 to January 1978: Dr. Beyer served on the staff at Fisheries Research Institute of the College of Fisheries, University of Washington as either a research assistant, research associate, and fisheries biologist on numerous projects involving the design and coordination environmental investigations.

Client References:

Project Name: Sandy Creek Project/Nooksack Falls project  
Virginia (Howell) Pistorese  
Puget Sound Power and Light Company  
Puget Power Building  
Bellevue, Washington 98009  
(206) 454-6363

Project Name: NPDES Hearings for WNP 3 and 5  
Ken Wise  
Washington Public Power Supply System  
3000 George Washington Way  
P.O. Box 968  
Richland, Washington 99352  
(509) 375-5371

DONALD L. BEYER  
Fisheries Resource  
Specialist

-3-

Project Name: Kake-Petersburg Intertie  
Grant Lake Hydroelectric Project  
Remy Williams  
Eric Marchegiani  
Alaska Power Authority  
334 West Fifth Avenue  
Anchorage, Alaska 99501  
(907) 276-0001

Project Name: Flathead Valley Transmission Study  
Judy Woodward  
Bonneville Power Administration - EVHC  
825 N.E. Multnomah  
Portland, Oregon 97208  
(503) 234-3361

Project Name: Eugene-Medford Transmission Line Study  
Ron Smith  
Bureau of Land Management  
P.O. Box 2965  
Portland, Oregon 97208  
(503) 231-6950

# HARZA-ERASCO

JOHN R. BIZER

Job Title: Aquatic Ecologist

Work Location: Anchorage

Education: Doctor of Philosophy in Biology  
1977, Washington University, St. Louis,  
Missouri  
Bachelor of Arts in Biology  
1969, Elmhurst College, Elmhurst,  
Illinois

Special Qualifications: Prepared portions of Exhibits S and W of  
FERC license application for Black Bear Lake  
Project, Alaska. Expert witness testimony  
for Kootenai Project.

Professional Registration: None

Parent Company: Harza Engineering Company

## Experience and Qualifications Relevant to the Susitna Project:

June 1978 to Present: Aquatic Ecologist, Land Resources and Environmental Sciences Department. Responsible for preparing environmental reports on the effects of proposed water resources development. As part of this responsibility, designs investigation methods for on-site evaluation of actual or potential impacts on aquatic habitats and recommends methods for environmental protection or impact mitigation to be incorporated in project development.

- Project Scientist for the Black Bear Lake Hydroelectric Project in Alaska. Assisted in the preparation of Exhibits S and W of the FERC application for license. He assisted in preparing recommendations for minimizing potential disruption of salmon spawning areas downstream of the project and other aspects of the study aimed at minimizing the potential for adverse water quality effects.
- Lead Scientist for the Raystown Hydroelectric Project in Pennsylvania. Directed efforts of six investigators for baseline studies, impact analysis, and preparation of Exhibit E of the FERC license application. Participated in exploratory and informational meetings with public agencies during the planning studies. Participated in planning

JOHN R. BIZER  
Aquatic Ecologist

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features of the proposed project to protect fish resources. To support the application for license, developed, implemented, and analyzed a study of the fish populations in the vicinity of the proposed intake structure to evaluate the potential for fish entrainment or impingement.

- Project Scientist for environmental evaluation of proposed hydroelectric installation at the U.S. Army Corps of Engineers Summersville Project in West Virginia. Evaluated the effects of flow fluctuation in the Gauley River downstream of the project and provided recommendations for minimum flows and methods of operation to protect fisheries and recreational resources in the river.
- Project Manager for a Baseline Water Quality and Biological Survey of the Rocky River in southwest Michigan. The purpose of the study was to determine the possible effects of a stormwater drainage system which discharges surface runoff from an industrial site into the river.
- Designed methodologies for the estimation of phytoplankton densities and benthic fauna densities as part of a water quality monitoring program for the Yacyreta Project on the Parana River in Argentina and Paraguay.
- Reconnaissance level assessment of potential impacts on the aquatic habitats for the Cuff's Run Pumped-Storage Facility in southeastern Pennsylvania. Participated in the environmental screening of 12 potential sites for an offstream reservoir to augment the flow of the Susquehanna River for power plant cooling.
- Lead Scientist for the preparation of FERC Exhibit E for the expansion of the Boundary Dam Hydroelectric Project in Washington. Utilized existing data from the project area and agency contacts for evaluation of potential impacts and preparation of the environmental report. Assisted the client, Seattle City Light, at agency and local community meetings and the incorporation of review comments into the FERC application.
- Aquatic Biologist for Kootenai River Hydroelectric Project, Montana. Prepared expert witness testimony regarding project impacts on water quality and macro-invertebrate populations. Also assisted in preparation of fisheries testimony to be presented in support of the project at FERC hearings.

January to June 1978: Assistant Professor of Ecology, Department of Biological Sciences, Illinois State University, Normal,



JOHN R. BIZER  
Aquatic Ecologist

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Illinois. Taught lecture and laboratory course in General Ecology; presented seminars in Ecology; conducted aquatic research and prepared articles for publication in professional journals.

March to June 1977: Acting Assistant Professor, Department of Biological Sciences, Stanford University, Stanford, California. Taught course in Introductory Biology, supervised the activities of 15 teaching assistants assigned to the course.

Client References:

Black Bear Lake

Mr. Brent Petrie, Project Manager  
Alaska Power Authority  
334 West Fifth Ave.  
Anchorage, Alaska 99501  
907/276-0001

Kootenai

Mr. William T. Nordeen, General Manager  
Northern Lights, Inc.  
Sandpoint, Idaho 83864  
208/263-2163

Raystown

Mr. Robert C. Richert  
Water Resources Manager  
GPU Service Corporation  
P.O. Box 1018  
Reading, Pennsylvania 19603  
215/921-6545

Summersville

Mr. Gerry Baumgardner  
U.S. Army Corps of Engineers,  
Huntington District  
Huntington, West Virginia  
304/529-5639

Boundary

Mr. G. Wayne Bishop  
Director of Civil Engineering  
City of Seattle - City Light Dept.  
1015 Third Avenue  
Seattle, Washington 98104  
206/625-3000

Rocky River

Ms. Sandy Shelton  
Hydra-matic Division  
General Motors Corporation  
One Hydra-matic Drive  
Three Rivers, Michigan 49093  
616/278-0307



# HARZA-EBASCO

ELLEN S. CUNNINGHAM

Job Title: Socioeconomic Planner

Work Location: Bellevue

Education: University of North Carolina, M.R.P. -  
Regional Planning, 1979  
Trinity College, B.A. - Philosophy, 1975

Special Qualifications: Surveyed community only energy needs in 100 communities in Northeast, South Central, Alaska, Peninsula, Kodiak Island and Aleutian communities

Professional Registration: None

Parent Company: Ebasco Services Incorporated

## Experience and Qualifications Relevant to the Susitna Project

February 1980 to Present: Ms. Cunningham is presently a Senior Associate Regional Planner in the Bellevue, Washington office of Envirosphere Company, a division of Ebasco Services Incorporated and has over four years of experience involving regional land use, energy resources, and environmental impact assessment.

- Performed socioeconomic assessments for projects based in rural areas. She prepared the socioeconomic and land use sections of an EIS of a proposed railroad that would transport coal across the Navajo Indian Reservation in New Mexico. This project involved a description of baseline conditions and an impact assessment with particular attention given to the effects on the Navajo Nation. The scope of work included an examination of the following potential impacts: population characteristics; direct and indirect economic effects; fiscal; public services and community infrastructure; recreational opportunities; residential and commercial land use; transportation; grazing land; and agricultural cropland. As part of the socioeconomic assessment, Ms. Cunningham coordinated with Navajo tribal leaders and BIA officials to obtain data sources and provide input on their areas of concern.
- Has significant experience working with isolated communities in Alaska. She forecasted electric load growth for over 100 communities as part of a small scale hydroelectric studies for the Alaska District Corps of Engineers. This

ELLEN S. CUNNINGHAM  
Socioeconomic Planner

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task involved an analysis of existing power requirements and socioeconomic characteristics. She was responsible for surveying community leaders about local attitudes toward the development of small scale hydropower and the effect it would have on the community lifestyle. As part of this study, Ms. Cunningham performed an economic analysis of the cost of alternative power, e.g., diesel, combustion turbines. As an outcome of this project, Ms. Cunningham presented a paper at the American Society of Civil Engineers conference on the northern community held in April 1981 on the small hydropower potential in remote Alaska.

- Currently serving as assistant project manager on a study of a proposed transmission line in the Flathead Valley, Montana. This has required coordinating the preparation of an EIS and study documentation report, involving numerous disciplines, as well as preparing the floodplains assessment. She participated in public workshops and prepared public workshop reports. Project responsibilities also included an analysis of the effects of energy conservation measures on the need for the project.
- Presently coordinating the environmental studies on a feasibility study of the Kake-Petersburg Intertie proposed transmission line in southeast Alaska for the Alaska Power Authority. As part of the overall study, she is preparing the assessment of recreation, land use, cultural resources, and socioeconomics.
- Has experience with the siting and impact assessment of large-scale energy projects. Specifically, she prepared and reviewed several environmental and planning documents on nuclear waste management and repository siting decisions as part of the National Waste Terminal Storage program. She was responsible for reviewing the demographic and socioeconomic sections of the Final Safety Analysis Report and the Operating License Environmental Report for WPPSS Unit 3. The review was performed to ensure compliance with Nuclear Regulatory Commission guidelines, technical accuracy, and completeness.
- Experience related to the impact assessment of energy facilities extends to work performed for the Railbelt Electric Power Alternatives Study. Ms. Cunningham prepared

ELLEN S. CUNNINGHAM  
Socioeconomic Planner

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- a generic socioeconomic and aesthetic assessment for the overview phase of the study.
- Prepared several planning reports for Pacific Power and Light on the consistency of a proposed 500 kV transmission line with county and statewide planning goals. This project was conducted as partial fulfillment of NEPA and Oregon State energy facility siting requirements.

January 1976 to September 1979: Ms. Cunningham held three positions during this period as well as attending graduate school. She was an assistant planner for housing and land use with a regional planning agency in Massachusetts and conducted studies on growth management, land use/water quality issues, regional housing needs, and subdivision and zoning regulations. Ms. Cunningham was a student intern at the U.S. Environmental Protection Agency where she conducted a study on opportunities for 208 water quality and coastal zone management program coordination at the state level. As a graduate student at the University of North Carolina, Ms. Cunningham held a research assistant position for an NSF grant on evaluating the effectiveness of floodplain land use management.

Client References:

Project Name: Flathead Valley Reinforcement Project  
Judith Woodward  
Bonneville Power Administration  
P.O. Box 3621  
Portland, Oregon 97208  
(503, 234-3361 ext. 4995)

Project Name: Kake-Petersburg Intertie  
Remy Williams  
Alaska Power Authority  
334 West Fifth Avenue  
Anchorage, Alaska 99501  
(907) 276-0001

Project Name: Navajo Railroad Environmental Impact Statement  
James Murray  
Consolidation Coal Company  
2 Inverness Drive East  
Englewood, Colorado 80112  
(303) 770-1600

ELLEN S. CUNNINGHAM  
Socioeconomic Planner

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Project Name: Study on Consistency of Transmission Line with  
County and Statewide Planning Goals  
Paul Higgins  
Pacific Power and Light Company  
920 SW Sixth Avenue  
Portland, Oregon 97204  
(503) 243-1122

Project Name: Small Hydropower Reconnaissance Study  
Southcentral and Northeast Regions  
Harlan Legare  
Department of Army  
Alaska District  
Corps of Engineers  
P.O. Box 7002  
Anchorage, Alaska 99510  
(907) 552-3861

Project Name: Basic Ordering Agreement  
Robert McPherson  
Office of Nuclear Waste Isolation  
Battelle Memorial Institute  
505 King Avenue  
Columbus, Ohio 43201  
(614) 424-6424



# HARZA-EBASCO

ROSEANN VAN ESSEN DENSMORE

Job Title: Terrestrial Ecologist

Work Location: Anchorage

Education: University of Iowa, B.S.  
General Science: 1970  
University of Alaska, M.S.  
Botany: 1974  
Duke University, Ph.D - Plant Ecology,  
Minor Forestry: 1979

Special Qualifications: 10 years experience in Arctic and Subarctic  
terrestrial ecosystems

Professional Registrations: None

Parent Company: Ebasco Services Incorporated

## Experience and Qualifications Relevant to the Susitna Project

June 1982 to Present: Presently a Senior Terrestrial Ecologist in the Anchorage, Alaska office of Envirosphere Company, a Division of Ebasco Services Incorporated. Dr. Densmore has reviewed selected technical aspects of the Waterflood project and other large-scale projects, and has established communications with regulatory agencies and principal investigators.

October 1980 to June 1980: Before joining Envirosphere, Dr. Densmore worked for the Alaska State Pipeline Coordinator's Office, providing expertise on restoration for the Alaska Northwest Natural Gas Transportation System. Her duties included review of design criteria, permit applications, and policy statements; and development of guidelines for mitigation criteria and methods during and after construction that would minimize disturbance and facilitate surface stabilization and rapid restoration of native plant communities. Responsibilities required coordinating with all involved state and federal agencies, and working closely with civil engineers to ensure that mitigation methods were feasible and cost effective.

May 1978 to October 1980: Dr. Densmore was a Research Associate at the University of Alaska, with duties as director of a research program on moose habitat within and north of the Trans-Alaska Pipeline system. The study included baseline environmental analyses; identification, description, and mapping of habitat; quantitative measures of utilization; quantitative assessment of impacts; and development of mitigation strategies.



ROSEANN VAN ESSEN DENSMORE  
Terrestrial Ecologist

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January 1972 to May 1978: Research from 1972 to 1978 was conducted under contract to the Institute of Northern Forestry (U.S. Forest Service) in Fairbanks, Alaska, and for a Ph.D in Botany from Duke University. Studies during this time emphasized reproduction ecology of the dominant plants of the Alaskan forest and tundra and regeneration of plant habitat communities following disturbance. Investigations included habitat regeneration following wildfire and varying prescribed burning regimes and forest regeneration following logging.

Client References:

Project Name: Dr. Charles Behlke  
Alaska State Pipeline Coordinator's Office  
1001 Noble Street  
Fairbanks, Alaska  
(907) 456-4835

# HARZA-EBASCO

RANDAL L. FAIRBANKS

Job Title: Wildlife Resources Specialist

Work Location: Bellevue

Education: University of Washington, B.S.  
Wildlife Sciences, 1972  
University of Washington, M.S.  
Wildlife Ecology and Biostatistics, 1979

Special Qualifications: Oregon State Energy Facility Siting Council  
Expert Witness Testimony - 1982

Professional Registration: Certified Wildlife Biologist - The Wildlife Society

Parent Company: Ebasco Services Incorporated

## Experience and Qualifications Relevant to the Susitna Project

1976 to Present: Presently a Principal Wildlife Scientist in the Bellevue, Washington office of Envirosphere Company, a Division of Ebasco Services Incorporated. Mr. Fairbanks is or has been responsible for a variety of projects that include:

- Vegetation and wildlife field studies and the preparation of those respective sections of Exhibit E of the FERC license application for the Grant Lake Hydroelectric Project, Alaska, for the Alaska Power Authority.
- All biological studies and the preparation of the biological sections of an Environmental Assessment for the Kake-Petersburg transmission line intertie in southeast Alaska. This work is being conducted for the Alaska Power Authority.
- All biological studies and the preparation of the biological sections of a Study Documentation Report, including a Wetlands Assessment, and Environmental Impact Statement for the Flathead Valley 230 kV transmission line project in northwestern Montana for Bonneville Power Administration.
- All biological studies and the preparation of the biological sections of a Technical Investigations Report and

RANDAL L. FAIRBANKS  
Wildlife Resource  
Specialist

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Environmental Impact Statement for a 500 kV transmission line project in southwestern Oregon for the Bureau of Land Management. This was a third party EIS sponsored by Pacific Power and Light Company.

- Preparation of terrestrial ecology impact assessments for a wide variety of electrical power generation alternatives throughout the Railbelt region of Alaska for Battelle Northwest as part of the Railbelt Electrical Power Alternatives Study.
- An extensive environmental monitoring program associated with Washington Public Power Supply Nuclear Projects 3 and 5 in southwestern Washington for 2 years. Program involved field and laboratory studies of water quality, aquatic ecology, terrestrial ecology, and air quality and required a full-time staff of approximately five scientists and technicians.
- An evaluation of the effects on wildlife of wilderness versus multiple-use management of a forested watershed in western Oregon, for review of wildlife-forestry conflicts associated with a Bureau of Land Management Plan in southwestern Oregon, and for the preparation of an annotated bibliography on Roosevelt Elk.

1975 to 1976: Mr. Fairbanks was a biostatistician for the Department of Army at the Rocky Mountain Arsenal. In this position, he was responsible for: design and implementation of an ecological sampling program to determine population sizes, habitat preferences and reproductive success of terrestrial and aquatic vertebrates and some invertebrates, and the distribution of vegetation on the Rocky Mountain Arsenal; design of the sampling program for pesticides, heavy metals and other contaminants in soil and plant and animal tissue.

1974 to 1975: Mr. Fairbanks was a terrestrial ecologist for John Graham and Company. In this position his responsibilities included studies for a variety of environmental impact assessments and natural resources inventories.

Client References:

Project Name: Kake-Petersburg Intertie  
Grant Lake Hydroelectric Project  
Remy Williams  
Eric Marchegiani

RANDAL L. FAIRBANKS  
Wildlife Resource  
Specialist

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Alaska Power Authority  
334 West Fifth Avenue  
Anchorage, Alaska 99501  
(907) 276-0001

Project Name: Flathead Valley Transmission Study  
Judy Woodward  
Bonneville Power Administration  
825 N.E. Multnomah  
Portland, Oregon 97208  
(503) 234-3361

Project Name: Eugene-Medford Transmission Line Study  
Ron Smith  
Bureau of Land Management  
P.O. Box 2965  
Portland, Oregon 97208  
(503) 231-6950

Project Name: Environmental Monitoring Program for WNP 3 and 5  
Ken Wise  
Washington Public Power Supply System  
3000 George Washington Way  
P.O. Box 968  
Richland, Washington 99352  
(509) 375-5371

Project Name: Boulder Creek Watershed Wildlife Evaluation -  
Southwest Oregon  
Douglas Timber Operators, Inc.  
Suite 222, Pacific Bldg.  
727 Southeast Cass Avenue  
Roseburg, Oregon 97470  
(503) 672-0757

Project Name: Railbelt Electric Power Alternatives Study  
Jeff King  
Battelle Northwest  
P.O. Box 999  
Richland, Washington 99352  
(206) 376-4741

# HARZA-EBASCO

WILLIAM HUTCHINSON

Job Title: Project Economics and Alternatives Specialist

Work Location: Bellevue

Education: University of Texas at Austin, M.A.  
Economics: 1967  
Washington and Lee University, B.A.  
Economics and French: 1965

Special Qualifications: Fifteen years of Water Resources Economics Experience

Professional Registration: None

Parent Company: Ebasco Services Incorporated

## Experience and Qualifications Relevant to the Susitna Project

November 1979 to Present: Presently Senior Economist in the Bellevue, Washington, office of Envirosphere Company, a division of Ebasco Services Incorporated, Mr. Hutchinson is responsible for project economic studies and socioeconomic analyses for Envirosphere energy and natural resources projects.

- Current work includes preparation of the human resources sections of a Federal Energy Regulatory Commission license application Exhibit E for the Grant Lake Hydroelectric project, Kenai Peninsula Borough, Alaska. This project includes assessment of historic and archaeological impacts as well as socioeconomic, recreation, aesthetic, and land use effects of project construction and operation.
- Previously conducted an assessment of human resources impacts of the Sandy Creek Hydroelectric Project, Whatcom County, Washington. This work involved analysis of the project's impacts on the local economy, preparation of a recreation plan, analysis of land use changes, and assessment of aesthetic impacts of a 17 megawatt hydroelectric plant. The results of these analyses constituted a part of the project's Federal Regulatory Commission license application Exhibit E.



WILLIAM HUTCHINSON  
Project Economics and  
Alternatives Specialist

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- Conducted a technical review of Final Safety Analysis Report sections on geography, demography, and industrial transportation, and military facilities for Washington Public Power Supply System units 3 and 5. This review involved analysis of the report to ensure compliance with Nuclear Regulatory Commission rules as well as to ensure technical accuracy and completeness.

January 1980 to November 1981: Mr. Hutchinson served as Director of Planning for the Pacific Northwest River Basins Commission in Vancouver, Washington. Responsibilities involved analysis of economic and environmental characteristics of hydroelectric power, navigation, irrigation, and fisheries in the Columbia River Basin; assessment of potential development of large scale hydroelectric power, low-head hydro, geothermal water, cogeneration, and biomass in the Pacific Northwest; biological and physical data collection and research, and analysis of estuarine environmental processes; coordination of state, federal and private natural resources planning in the Columbia River Basin; review and analysis of state and federal natural resources policies; and administrative responsibilities including budget preparation, management of planning activities, and staff supervision.

December 1974 to December 1979: Mr. Hutchinson served as Director of Comprehensive Planning for the Missouri River Basin Commission in Omaha, Nebraska. Mr. Hutchinson conducted analyses of projected economic, social, and demographic characteristics, and forecasted water requirements in 10-state Missouri River Basin; designed and directed computer-based natural resources information management system; served as economic advisor to Nebraska governor's economic evaluation of North Loup Irrigation Project and conducted analysis of economic benefits of the project to agricultural production; prepared a water resources plan for James River Basin in North and South Dakota, and prepared water resources management plan for Missouri River Basin.

December 1967 to November 1974: Mr. Hutchinson served as Branch Chief and Staff Economist for the Texas Water Development Board in Austin, Texas. His responsibilities included forecasting municipal, industrial, and electric power water use and demand. He forecasted electric power costs and availability for operating water resources conveyance facilities, and assessed alternative energy sources; developed computer models of thermal electric power plant condenser cooling systems; projected state

WILLIAM HUTCHINSON  
Project Economics and  
Alternatives Specialist

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petroleum production from secondary recovery; conducted surveys of economic, social, and demographic characteristics and water use of major municipalities and industrial installations; evaluated load applications from municipalities to water development fund to determine water system requirements and financial expectations.

Client References:

- Project Name: Sandy Creek Hydroelectric Project  
Larry Tornberg  
Puget Sound Power and Light Company  
Puget Power Building  
Bellevue, Washington 98009  
(206) 454-6363
- Project Name: Columbia River Basin Planning Studies  
George Proctor  
Proctor, Puckett and Fairclo  
280 Main Street  
Klamath Falls, Oregon 97601
- Project Name: Missouri River Basin Studies  
Carroll Hamen  
Missouri Basin States Association  
10050 Regency Circle  
Omaha, NE 68114  
(402) 397-5714
- Project Name: Texas Water Resources Planning  
Charles Nemir  
Texas Dept. of Water Resources  
P.O. Box 13087, Capitol Station  
Austin, Texas 78711  
(512) 475-3187

# HARZA-EBASCO

CHRIS E. LAWSON

Job Title: Land Use Planner

Work Location: Bellevue

Education: Western Illinois University, B.S.  
Geography, 1976  
University of Washington, M.A.  
Geography, 1979

Special Qualifications: Oregon Energy Facility Siting Council  
Expert Witness Testimony - 1982

Professional Registration: None

Parent Company: Ebasco Services Incorporated

## Experience and Qualifications Relevant to the Susitna Project

November 1979 to Present: Presently Senior Associate Resource Planner in the Bellevue, Washington office of Envirosphere Company, a division of Ebasco Services Incorporated. Mr. Lawson has been responsible for performing economic, social, land use, and recreation studies for various environmental projects conducted by Envirosphere.

- Has worked on several water resources projects, including the preparation of the FERC license application Exhibit E for two Puget Sound Power and Light Company hydroelectric projects in Washington. For the Nooksack Falls Project, Mr. Lawson prepared the socioeconomic report and portions of the recreation report, and assisted on the land use and aesthetics reports. Responsibilities for the Sandy Creek Project Exhibit E involved review of the four social science reports. Mr. Lawson also developed the socioeconomic and land use studies for the environmental impact statement on the Ak Chin Water Supply Project in Arizona, undertaken for the U.S. Bureau of Indian Affairs.
- Extensive experience with environmental studies of transmission lines. Mr. Lawson performed several land use and socioeconomic tasks in the preparation of the environmental impact statement for a proposed Pacific Power and Light Company 500 kV transmission line from Eugene to Medford,

CHRIS E. LAWSON  
Land Use Planner

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Oregon. The EIS was prepared in a third-party role for the U.S. Bureau of Land Management, with the Bonneville Power Administration and Oregon Department of Energy also involved as cooperating parties. Specific project responsibilities included participation in routing studies, technical investigations of agricultural, forestry, floodplain and socioeconomic (including human health) impacts, preparation of EIS sections for these elements, and expert witness testimony before the state siting council. Mr. Lawson also conducted socioeconomic studies and assisted on the forestry and agriculture studies for an EIS on a proposed Bonneville Power Administration 230 kV power line in the Flathead Valley area of Montana, and had a major role in a study of non-transmission line alternatives to this project.

- Assigned primary responsibility for several major components of a socioeconomic study performed for a client seeking to relocate a large work force in Montana (client confidential). The project required Envirosearch to recommend a course of action on the basis of analyses of baseline economic, social, demographic, political, public service and related conditions; the potential socioeconomic impacts resulting from relocating several hundred workers, and hiring more in the local community; and location-sensitive business cost factors.
- Much of Mr. Lawson's experience has concerned public land management and planning efforts. He was responsible for the economic, demographic and forest use components of socioeconomic overviews of the Mt. Baker-Snoqualmie and Colville National Forests in Washington, prepared for the U.S. Forest Service. Similar project work involved participation on a socioeconomic overview of the Wenatchee National Forest in Washington, baseline socioeconomic characterization for a Bureau of Indian Affairs forest management plan for the Hoopa Indian Reservation in northern California, and studies of the economic effects of proposed timber management changes for Bureau of Land Management lands in western Oregon.

August 1979 to November 1979: Mr. Lawson served in the research division of the Washington Department of Commerce and Economic Development, performing a variety of research and public contact tasks. He assisted the division's economists in revision of the Washington Projection and Simulation Model, including research on major construction projects in the state and future trends in



CHRIS E. LAWSON  
Land Use Planner

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the agriculture and forest products sectors. Mr. Lawson also prepared briefing papers on socioeconomic conditions of various areas of the state for the governor and department officials, and responded to agency, business and citizen requests for economic information on Washington State.

June 1978 to September 1978: Mr. Lawson was an administrative intern with the research division of the Washington Department of Commerce and Economic Department. His major responsibility was to prepare a review of local economic development plans and economic assessments for regional subdivisions of the state.

September 1976 to August 1977: Mr. Lawson served as a planner on the staff of the Western Illinois Regional Council. This experience involved providing technical assistance to local governments; developing grant applications; preparing regional land use, housing and manpower reports; conducting a water rate study for a municipal system; and performing A-95 reviews.

Client References:

Project Name: Nooksack Falls Project, Sandy Creek Project  
Terry Oxley  
Puget Sound Power and Light Company  
10608 N.E. Fourth Street  
Bellevue, Washington 98004  
(206) 454-6363

Project Name: Ak Chin Water Supply Project  
James R. Crowther  
U.S. Bureau of Indian Affairs  
3030 North Central Avenue  
Phoenix, Arizona 85012  
(602) 241-2275

Project Name: Eugene-Medford 500 kV Transmission Line  
Ron Smith  
U.S. Bureau of Land Management  
P.O. Box 2965  
Portland, Oregon 97208  
(503) 231-6951

Project Name: Flathead Valley Reinforcement Project  
Judy Woodward  
Bonneville Power Administration  
825 N.E. Multnomah Street



CHRIS E. LAWSON  
Land Use Planner

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Portland, Oregon 97208  
(503) 230-4997

Project Name: Mt. Baker-Snoqualmie, Colville, Wenatchee  
National Forest  
Forest Socioeconomic Overviews  
Arnold Holden  
U.S. Forest Service, Region 6  
319 S.W. Pine Street  
Portland, Oregon 97201  
(503) 221-2877

Project Name: BLM Timber Management Study  
Robert Vincent (representing the Association of  
Oregon and California Counties)  
176 Evergreen Road  
Philomath, Oregon 97370  
(503) 929-5635

# HARZA-EBASCO

BAUM K. LEE

Job Title: Water Resources

Work Location: Bellevue

Education: Doctor of Philosophy in Civil Engineering -  
Hydraulics, 1973, Colorado State  
University  
Master of Science in Civil Engineering -  
Hydraulics, 1969, Colorado State  
University  
Bachelor of Science in Civil Engineering  
1963, Seoul National University, Seoul,  
Korea

Special  
Qualifications: Major Participant - Guri, Bath County

Parent Company: Harza Engineering Company

## Experience and Qualifications Relevant to the Susitna Project:

January 1980 to Date: Assistant Section Head Hydrology, and Senior Hydrologist Harza Engineering Company, Chicago,  
Supervises, coordinates and performs surface-water hydrologic assignments of all types.

- Study Manager for sedimentation investigation for 14 locks and dams in Europe. The results of studies are to be used to predict sediment impact on the New Lock and Dam No. 26, Mississippi River.
- Federal Energy Regulatory Commission expert court witness for Kootenai River Hydroelectric Project, Montana. Prepared direct testimony on river-reservoir sedimentation and hydraulics.
- Housatonic River Project, Massachusetts. Supervised, reviewed, and prepared work program for PCB-sediment transport studies.
- Supervised and coordinated comprehensive PMP/PMF studies for the watersheds above Cheesman dam near 105° meridian in Colorado. The studies were made in coordination with various government agencies including National Weather Services.

BAUM K. LEE  
Water Resources

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- Field assignments in Senegal, Africa for Lower Casamance River Irrigation Master Plan.
- Studies, in Thailand for Nam Mun Irrigation Project, and in Chile for Pehuenche Hydroelectric Project. For each of these projects, performed field investigation, prepared hydrology work program, supervised analyses and coordinated the studies.
- Supervised spillway adequacy and dam-break studies for over 25 dams in the United States. The studies provided input to Dam Safety Inspection Report and Emergency Action Plan preparation. National Weather Service DAMBRK and U.S. Army Corps HEC-I computer models were used.

August 1977 to December 1979: Senior Hydrologist, Land Resources and Environmental Sciences Department. Supervised, coordinated, and performed flood and storm analyses, sedimentation and erosion studies, stochastic hydrology, mathematical modeling, and determination of water availability for domestic and overseas projects.

- Three-week assignment in Brazil for Cipo and Primavera Pumped Storage Project. Prepared hydrology work program and subsequent reports. Performed field investigation. Trained local hydrologists.
- Puyango-Tumbes Multi-Purpose Project, Ecuador and Peru. Prepared hydrology report, coordinated hydrologic studies being conducted by associated firms in the two countries, and trained local hydrologists.

March 1973 to June 1977: Hydrologist. Established a sedimentation laboratory and a streamflow and sediment measurement program, and trained local hydrologists for El Nispero Project, Honduras.

- Floods. Determined probable maximum floods for spillway design of Strontia Springs Dam, Colorado; Guri Dam, Venezuela; Betania and Sogamoso Projects, Colombia; Maqarin Dam, Jordan; and San Lorenzo Dam, El Salvador; applied storm-transposition techniques and a hurricane model. Analyzed monthly variation of flood potential for construction scheduling and investigated streamflow and flood forecasting models for Guri Reservoir, Venezuela. Determined design flood for Gotvand Irrigation Diversion Project, Iran.

- Sedimentation and Erosion. Determined sediment inflow to reservoirs; predicted delta formation in reservoirs and downstream degradation below dams; planned sediment-control structures for Powder River Project, Wyoming, and San Lorenzo Reservoir, El Salvador. Predicted sediment concentration from construction areas and recommended erosion-control methods for Bath County Project, Virginia. Determined sediment yields from surface-mine areas for Copper Mountain Uranium Mine, Wyoming.
- Water Availability. Performed computer simulation for heat and mass-budget analysis for a cooling reservoir of a power station in central Illinois, and hydrologic analyses for cooling tower sites for nuclear power plants in Midwestern U.S.
- Hydrologic and Meteorological Data Monitoring. Evaluated existing streamflow and water quality monitoring programs and recommended improved monitoring program for surface-mining projects, Wyoming. Designed hydrologic and meteorological data collection programs for Brumley Gap and Powell Mountain Pumped-Storage Projects, Virginia.
- Mathematical Modeling. Supervised dam-failure simulation studies for Bath County Project, Virginia, and simulation of reservoir-stream temperature and dissolved oxygen for Brumley Gap Pumped-Storage Project, Virginia. Applied computer models, HEC-1, HEC-2, HEC-4, HEC-5, and WQRRS developed by U.S. Army Corps of Engineers. Reviewed and evaluated PCB laden sediment sampling program for Housatonic River, Massachusetts. Recommended the most suitable mathematical model to determine PCB transport rates under various hydrologic conditions.
- Project Manager Intake-sedimentation study, W. H. Zimmer Nuclear Power Station, Ohio. Analyzed causes of sedimentation and future sedimentation and recommended sediment-control methods and monitoring program.
- Project Manager for research studies on sediment-yield standards for thermal-power projects in the Midwestern region, United States.
- Project Manager Garrison Diversion Unit, Water Supply Project North Dakota. Studied effects of return flows on 22 water-quality parameters in 1,400 miles of receiving streams by using mathematical simulation models.



BAUM K. LEE  
Water Resources

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September 1967 to March 1973: Graduate Research Assistant, Colorado State University. Worked for the U.S. Geological Survey.

July 1966 to July 1967: Group Leader, Hydrology, Water Resources Division, Korean Engineering Consultant Corporation in Seoul, Korea.

March 1963 to April 1964: Junior Civil Engineer, Hydrology Group, Water Resources Division, Korean Engineering Consultant Corporation.

Technical Papers  
and Articles:

"Laboratory Study of an Alluvial Stream at One-Foot Depth," M.S. thesis, Civil Engineering Department, Colorado State

"A Review of Some Stochastic Models for Sediment Transport," unpublished, Civil Engineering Department, Colorado State University, Fort Collins, 80 p., 1972.

"Stochastic Characteristics of Particle Movement Over a Dune Bed," with H.E. Jobson, International Symposium on River Mechanics, Bangkok, Thailand, Proc., Vol. 1, 15 p., 1973.

"Stochastic Analysis of Particle Movement over a Dune Bed," Ph.D. dissertation, Colorado State University, Fort Collins, 216 p., 1973.

"Stochastic Analysis of Dune Bed Profiles," with H.E. Jobson, Journal of Hydraulics Division, American Society of Civil Engineers, Vol. 100, No. HY. 7, pp. 849-867, 1974.

"Stochastic Analysis of Dune Bed Profiles (Closure)," with H. E. Jobson, Journal of Hydraulics Division, American Society of Civil Engineer, Vol. 101, No. HY. 11, pp. 1445-1447, 1975.

"Stochastic Analysis of Particle Movement Over a Dune Bed," with H.E. Jobson, U.S.



BAUM K. LEE  
Water Resources

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Geological Survey Open File Report, Bay St.  
Louis, Mississippi, 221 p., 1975.

"Stochastic Analysis of Particle Movement  
Over a Dune Bed," with H. E. Jobson, U.S.  
Geological Survey Professional Paper 1040,  
Washington, D.C., 72 p., 1977.

Client References:

Project Name: CVG - Guri Electrification Del Caroni, C.A.  
Direccion Obras de Guri  
Apartado No. 62413  
Caracas, Venezuela  
Dr. Luis Del Rio  
Tel. 011-582-921155

Project Name: Bath County Pumped Storage Project  
Virginia Electric and Power Company  
Powerstation Engineering and Construction  
P.O. Box 564  
Richmond, Virginia 23204  
Mr. J.M. Hagood, Jr.  
(804) 771-6103

# HARZA-EBASCO

JEAN A. MARX

Job Title: Permits Coordinator

Work Location: Anchorage

Education: University of Wisconsin, B.S. -  
Biological Sciences, 1966  
University of Wisconsin, M.S. -  
Biological Sciences, 1969

Special Qualifications: Permitting responsibility for the Terror Lake Hydroelectric Project

Professional Registration: None

Parent Company: Frank Moolin & Associates, Inc.

## Experience and Qualifications Relevant to the Susitna Project:

June 1981 to Present: As the Senior Environmental/Permits Specialist for Frank Moolin & Associates in Anchorage, Alaska, Mrs. Marx reviews environmental and permit data for company projects and identifies environmentally sensitive issues, existing environmental data, land use/ownership status, permit application requirements, etc., which must be addressed, mitigated or cleared to ensure that planning during design, construction and operational phases is consistent with codes, regulations and environmentally acceptable practices.

- The environmental/permits/safety field monitor for the Terror Lake Hydroelectric Project, Kodiak, Alaska. She identified all permits and land use authorizations for that project for Kodiak Electric Association and the Alaska Power Authority. License applications which had not been submitted were drafted and forwarded to appropriate agencies.
- Submits permit status reports for the project to the Alaska Power Authority and their contractors on a weekly schedule. Field monitoring for conformance with regulatory and environmental stipulations during the construction phase of the project is an additional responsibility as a member of the construction management team of Ebasco/FMAA.

May 1978 to June 1981: Mrs. Marx was employed by Northwest Alaskan Pipeline Company, Fairbanks, Alaska, for three years engaged in the planning of the gas pipeline proposed for

JEAN A. MARX  
Permits Coordinator

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construction from Prudhoe, Alaska through Canada along the Alcan Highway to the Lower 48 states. Mrs. Marx specialized in planning stage technical and regulatory permit requirements for preconstruction activities. She was an Authorized Field Representative for Northwest during field exploration program activities to supervise contractors' operations for conformance with permit stipulations, environmental constraints and project policies. Mrs. Marx provided the liaison between government agency personnel and field contractors.

- Served as a Construction Engineer and provided recommendations to the Vice President of Construction with regard to conceptual and detailed design of camps and life support system to support the proposed gasline construction. She provided the planning, coordination and construction supervision of four 78-man fly camps and five fuel and maintenance stations north of the Yukon River.

July 1977 to May 1978: Mrs. Marx represented the State of Alaska as a Senior Planner for the Department of Environmental Conservation on the comprehensive water resources planning study management team for the southcentral Alaska area. In that position, she coordinated planning with federal, state, local and private entities in analyzing water and land use and/or preservation of those resources.

June 1975 to July 1977: Mrs. Marx was the coordinator of Sanitary Engineering (life support facilities) for 18 construction camp operations for Alyeska Pipeline Service Company, Fairbanks, Alaska. The camps supported the workers responsible for construction of 800 miles of the TransAlaska oil pipeline. She administered operator training management reports, emergency spill notifications, laboratory data and permit reporting. She supervised four to eight sanitary engineers and technicians who provided technical assistance to contractors.

April 1974 to June 1975: Bechtel, Inc., San Francisco, California, employed Mrs. Marx initially as an Environmental Engineer to plan and implement the environmental compliance program for the construction of the TransAlaska oil pipeline. Contractor's conformance with applicable regulations was evaluated and recommendations for conformance noted.

- A Field Superintendent for the project and managed the sanitary engineering services for 18 camps which included

JEAN A. MARX  
Permits Coordinator

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24 wastewater treatment systems (biological and physical/-chemical) sludge and solid waste incineration systems, potable water treatment plants, storage and distribution, etc. Camps supervised ranged from 300 to 1500 personnel, with approximately 70 life support systems operating personnel.

September 1969 to April 1974: Mrs. Marx came to Alaska following this time frame as an employee of the Wisconsin Department of Natural Resources where she was employed as a Natural Resources Specialist IV with Environmental Standards. She was responsible for planning, organizing and implementing the State solid waste disposal licensing program in 26 counties. She supervised three field inspectors who documented conformance by municipal and private waste and salvage site operators. Mrs. Marx was one of the six water pollution biologists with the State. She served on numerous advisory boards, (e.g. lake advisory boards) and provided witness evidence of violations of water quality standards for State waters. Mrs. Marx participated in on-site investigations and data compilation including gathering environmental information to support State engineers review decisions and/or enforcement of environmental codes and concerns for existing point or non-point source activities (e.g. atomic energy power facility location study - Chippewa River, Wisconsin).

Client References

- Project Name: Terror Lake Hydroelectric Project  
Frank Bostwick, KEA, Project Coordinator  
Kodiak, Alaska  
(907) 486-3261
- Project Name: Northwest Alaska Pipeline Company  
Robert N. Hauser, Vice President of Construction  
3333 Mickelson Drive  
Irvine, California 92730  
(714) 975-3050
- Project Name: Southcentral Alaska "Land B" Study  
Glenn Akins, Deputy Commissioner  
Alaska Department of Environmental Conservation  
Pouch O  
Juneau, Alaska 99801  
(907) 465-2601



# HARZA-EBASCO

JAMES A. RICHARDSON

Job Title: Resources Planner

Work Location: Anchorage

Education: Oregon State University M.S. - Agricultural  
and Resource Economics: 1980  
University of Calgary B.A. - Economics 1974

Special  
Qualifications: Experience on Susitna Projects & other  
Alaskan Projects

Professional  
Registration: None

Parent Company: Frank Orth & Associates, Inc.

## Experience and Qualifications Relevant to the Susitna Project:

1981 to Present: Jim Richardson is a Senior Associates with Frank Orth & Associates, Inc. and is Manager of the Company's Anchorage Office. In addition to responsibility for the operation of the office, his responsibilities include project management, business development and providing research and analysis on projects for a wide variety of private and public clients. Mr. Richardson has been with FO&A, Inc. since March 1982. Since joining the Company, he has been involved in several completed and ongoing projects. Specific project descriptions and responsibilities are discussed below.

- Project Leader for "Socioeconomic Impacts of Relocation Effects on the State, Juneau and Matanuska-Susitna Borough", a study prepared for the New Capital Site Planning Commission, State of Alaska. Completion of this study required coordination among several subconsultants and study team members within FO&A, Inc. to be able to complete a large amount of research tasks in a short period of time. Mr. Richardson was also responsible for the analysis of impacts for the Statewide section of the study, presentations to the client and for day-to-day contact with the client during the project.
- Project Leader, "Alaska Salmon Projected 1982 Market Conditions" for the Office of Commerical Fisheries Development; State of Associates, Inc. This study has presented, in an



JAMES A. RICHARDSON  
Resources Planner

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initial report, some of the characteristics of demand for Alaskan produced salmon and also provided information on some of the determinants of that demand. Phase II, which is currently in progress, will develop price forecasting and demand models which will be placed on computer files for the State of Alaska and maintained for future use. Mr. Richardson's responsibilities for the project are to coordinate the participation of FO&A, Inc. with other members of the study team and to provide research and analysis for sections of the study.

- Project Leader for a study to place a valuation on some of the fish and game resources which would be impacted as a result of the Susitna dam. This study, which is currently in progress, will provide analysis of factors of valuation for the commercial, recreational and subsistence fish and game users. Characteristics of user groups and impacts of dam construction impacts on the different user groups will also be estimated. The role of Mr. Richardson in this study is in study design, project management, coordination of input from individuals to the study in completion of several sections of the study.
- Project Leader for "Longline Demonstration Project", a study which is being prepared for the Alaska Fisheries Development Foundation. This study is in the final stages of completion of the second phase. Project responsibilities include study design, organization of study team research tasks, and client meetings and presentations. The objective of the study is to obtain information on financial feasibility for a 124 foot longline processor.

Previous to 1981: Mr. Richardson was the economist for the North Pacific Fishery Management Council in Anchorage. The responsibilities of this position were to provide economic information and analysis to the Council members on any fishery matter, particularly those relating to Fishery Management Plans. Some major duties included development and completion of research projects; either along or in cooperation with other individual or groups; presentation of analysis along or in cooperation with other individuals or groups; presentation of analysis to members at Council meetings; representing the Council to research agencies and other scientific groups on matters pertaining to economics; and participating in the Fishery Management Plan process where specific analysis was necessary.

# HARZA-EBASCO

JOHN P. ROBINSON

Job Title: FERC License Support Manager

Work Location: Anchorage

Education: Master of Science in Zoology  
1973, University of Wisconsin  
Bachelor of Science in Biochemistry  
1969, Michigan State University

Special Qualifications: Lead Environmental Scientist for Black Bear Lake Project, Alaska  
Expert witness testimony for Kootenai River Hydroelectric Project, Montana

Professional Registration: None

Parent Company: Harza Engineering Company

## Experience and Qualifications Relevant to the Susitna Project:

February 1976 to Present: Senior Aquatic Ecologist, Land Resources and Environmental Sciences Department. Duties cover all aspects of preparation or supervising the preparation of assessments of potential aquatic impacts and formulation of mitigation/enhancement measures. Coordinates impact evaluation and design of mitigation measures with project engineering staff.

- As Lead Scientist for the Black Bear Lake Hydroelectric Project, Southeast Alaska, supervised project environmental analyses and the preparation of Exhibits R, S, V, and W of Federal Energy Regulatory Commission (FERC) license application. Other duties included coordination and meetings with agencies and the public, design and monitoring of field programs, and design of fisheries and water quality mitigation/enhancement programs. Principal aquatic mitigation/enhancement measures developed include a multi-level power intake to minimize fish entrainment and to minimize changes in the downstream water temperature regime, as well as modified discharge regime to minimize adverse effects on the downstream salmon fishery.
- Performed field studies of five potential hydroelectric sites in Southeast Alaska for the Tlingit-Haida Hydroelectric Project. Identified potential impacts, with major emphasis on salmon fisheries resources and water quality.

Provided coordination with federal and State of Alaska resource agencies and developed a permitting outline for the potential projects.

- Fisheries Scientist for the Kootenai River Hydroelectric Project, Montana. Monitored field studies and prepared aquatic ecology sections of Exhibits S (impacts on fish and wildlife resources) and W (environmental report) required by the Federal Energy Regulatory Commission as part of the license application for this 144-MW project. Prepared responses to resource agency and public comments during the Environmental Impact Statement review process. Developed expert witness testimony on fisheries issues for presentation at FERC license hearings in Washington, D.C.
- Prepared aquatic resources sections of Exhibit E of FERC license application for the Raystown Hydroelectric Project, Pennsylvania. Issues addressed included fish impingement and entrainment, turbine mortality, multilevel intake control of the downstream water temperature regime, and downstream dissolved gas supersaturation.
- Analyzed aquatic resource costs and benefits of hydropower installation at Corps of Engineers Summersville Dam, West Virginia. Contributions included assessment of instream flow requirements and effects of tailrace water temperature regime on maintenance of trout populations.
- St. Joseph River Hydroelectric Project, Michigan and Indiana. Identified and evaluated environmental, institutional, and regulatory factors influencing provision of additional generating capacity at five existing low-head hydroelectric dams for a report to the U.S. Department of Energy. Factors evaluated included future expansion of the salmonid river fishery and constraints on minimum and peaking discharges. Assessed potential impacts of construction (rehabilitation vs. new units) and operation (run-of-river or peaking) alternatives on the aquatic environment, and recommended mitigating measures for adverse impacts identified.
- Fisheries Biologist for Yacyreta Hydroelectric Project, Rio Parana, Argentina and Paraguay. Prepared detailed specifications for a two-year fisheries investigation program consisting of an experimental fishing study to gather baseline ecological and life history data on major fish species in the river, a fishing industry catch survey to obtain estimates of present total yield and fishing effort, and a socioeconomic analysis to describe the present role and

JOHN P. ROBINSON  
FERC License Support Manager

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importance of the fishery. Prepared preliminary technical specifications and capacity requirements for installation of fish hatchery and laboratory facilities in the project powerhouse. Prepared a report to the client describing the fisheries resources of the Parana River and detailing the rationale for and design and operation of fish passage facilities.

February 1974 to January 1976: Aquatic biologist with the Smithsonian Institution/U.S. Peace Corps Environmental Program; Servicio de Recursos Naturales, Ministerio de Agricultura y Ganaderia, El Salvador, C.A. Duties included planning and execution of fisheries and general biological surveys of major river systems. Made recommendations on resource use and on future investigative programs, with special emphasis on hydro-electric impoundments on the Lempa River.

June 1970 to August 1973: University of Wisconsin, Madison, Wisconsin, Graduate research. Responsible for all phases of coho salmon ultrasonic tracking program in Lake Michigan near Point Beach Nuclear Plant, Wisconsin. Member of team investigating migratory movements of sockeye salmon near Prince Rupert, B.C., Canada. Studied nearshore spawning movements of white bass in Lake Mendota, Madison, Wisconsin. Attended special course on miniaturized radio telemetry systems for monitoring fish movements; marine research cruise off Cap Hatteras, North Carolina.

Client References: (Names, current addresses & telephone numbers).

Black Bear Lake

Mr. Brent Petrie, Project Manager  
Alaska Power Authority  
334 West Fifth Ave  
Anchorage, Alaska 99501  
907/276-0001

Kootenai

Mr. William T. Nordeen, General Manager  
Northern Lights, Inc.  
Sandpoint, Idaho 83864  
208/263-2163

Raystown

Mr. Robert C. Richert  
Water Resources Manager  
GPU Service Corporation  
P.O. Box 1018  
Reading, Pennsylvania 19603  
215/921-6545



JOHN P. ROBINSON  
FERC License Support Manager

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Summersville

Mr. Gerry Baumgardner  
U.S. Army Corps of Engineers,  
Huntington District  
Huntington, West Virginia  
304/529-5639

St. Joseph River

Mr. William Stelle  
Chief Civil Engineer  
American Electric Power  
Service Corporation  
2 Broadway  
New York, New York, 10004  
212/440-9000



# HARZA-EBASCO

RICK K. SUTTLE

Job Title: Recreation, Aesthetic, and Cultural Resources

Work Location: Bellevue

Education: Master of Landscape Architecture  
1978, University of Michigan  
Bachelor of Science in Natural Resources  
1975, University of Michigan

Special Qualifications: Expert witness testimony and FERC license applications.

Professional Registration: Landscape Architect-in-Training -- Illinois

Parent Company: Harza Engineering Company

## Experience and Qualifications Relevant to the Susitna Project:

May 1978 to Present: Landscape Architect, Land Resources and Environmental Sciences Department. Responsibilities include recreation planning and design, environmental planning and impact analysis, facility siting studies, visual impact assessment, and mine reclamation.

- Black Bear Lake Hydroelectric Project, Alaska. Conducted a visual impact assessment study and developed a recreation plan for Exhibits V and R of the Black Bear Lake FERC License Application. Also conducted a transmission corridor alternative evaluation study as part of Exhibit W. Developed mitigation measures for identified adverse impacts and land management measures for transmission line routing and construction.
- 12th Street Hydroelectric Project, Virginia. Provided an evaluation of the impacts on existing recreation resources and potential for additional recreation associated with the restoration of an existing small hydroelectric site in Richmond, Virginia.
- Summersville Modification Study, West Virginia. Identified and evaluated recreation and aesthetic resources associated with feasibility of adding hydroelectric power to an existing flood control and recreation reservoir. Study included an on-site survey of whitewater boaters to aid in evaluating the potential impacts that alternative flow release

patterns might have on whitewater boating. Evaluated potential effects on downstream fishing and developed a conceptual recreation plan. Also probed the effects different reservoir levels would have on reservoir-based recreation activities and resources. Aesthetic study included the evaluation of a river stretch recommended for inclusion into the National Wild and Scenic River System.

- Raystown Hydroelectric Project, Pennsylvania. Developed a recreation plan and cost estimate for Exhibit E of the FERC License Application. Devised mitigation measures to reduce project impacts on existing resources.
- Boundary Dam Hydroelectric Project Expansion, Washington. Developed reports on land use, recreation and aesthetic resources for Exhibit E of the FERC License Application. Studies included descriptions of existing recreational opportunities and use, land use and visual resources, development of a recreation plan, assessment of net effects on visual and recreation resources, and development of land management and resources protection measures.
- Bath County Pumped Storage Project, Virginia. Developed a recreation master plan for the borrow area. Report included an area design concept, area master plan, design details and estimated development costs. Additional studies involved evaluations of recreation demand, need, and national trends and their effect on projected recreation use and development of proposed recreation facilities. Additional studies also involved coordination with FERC itself.
- Kootenai River Hydroelectric Project, Montana. Developed a recreation plan and conducted a visual impact assessment study using the U.S. Forest Service's computerized VIEWIT program for Exhibits R and V of a FERC license application. Developed mitigation measures for identified adverse impacts which included shoreline modification and development of flow distribution structures. Also prepared expert witness testimony on recreation and visual resources in support of the client's application for license.
- St. Joseph River Hydroelectric Project, Indiana & Michigan. Performed the analysis of benefits and adverse impacts of hydroelectric development along the St. Joseph River, upon recreation, scenic and historic resources. Studied potential impacts of construction and operation alternatives

RICK K. SUTTLE

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Recreation, Aesthetic, and Cultural Resources

associated with developing additional generating capacity at five low-head hydroelectric dams for a report to the U.S. Department of Energy. Recommended mitigating measures for identified adverse impacts.

Client References:

Bath County

Mr. Jim Hagood, Jr.  
Director of Hydroelectric Engineering  
Virginia Electric and Power Company  
P.O. Box 564  
Richmond, Virginia 23204  
804/771-6103

Black Bear Lake

Mr. Brent Petrie, Project Manager  
Alaska Power Authority  
334 West Fifth Ave.  
Anchorage, Alaska 99501  
907/276-0001

Kootenai

Mr. William T. Nordeen, General Manager  
Northern Lights, Inc.  
Sandpoint, Idaho 83864  
208/263-2163

Raystown

Mr. Robert C. Richert  
Water Resources Manager  
GPU Service Corporation  
P.O. Box 1018  
Reading, Pennsylvania 19603  
215/921-6545

Summersville

Mr. Gerry Baumgardner  
U.S. Army Corps of Engineers,  
Huntington District  
Huntington, West Virginia  
304/529-5639

St. Joseph River

Mr. Willaim Stelle  
Chief Civil Engineer  
American Electric Power  
Service Corporation  
2 Broadway  
New York, New York, 10004  
212/440-9000

RICK K. SUTTLE

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Recreation, Aesthetic, and Cultural Resources

Boundary Dam

Mr. G. Wayne Bishop  
Director of Civil Engineering  
City of Seattle - City Light Dept.  
1015 Third Avenue  
Seattle, Washington 98104  
206/625-3000



# HARZA-EBASCO

WILLIAM J. WILSON

Job Title: Agency Liaison Manager

Work Location: Anchorage

Education: Gonzaga University, Spokane, Washington,  
B.S., Biology, 1969  
Oregon State University, Corvallis, M.S.,  
Fisheries and Wildlife, 1973

Special  
Qualifications: Alaskan expertise since 1974 has been  
concentrated in marine and freshwater fish-  
ery biology, aquatic habitats and impact  
assessment, oceanography, limnology, and  
instream flow assessment

Professional  
Registration: None

Parent Company: Fisheries Arctic Environmental Information  
and Data Center, University of Alaska

## Experience and Qualifications Relevant to the Susitna Project:

1974 to Present: Senior Fisheries Biologist at AEIDC, is also supervisor of the Resource Science and Cultural Services Division. Mr. Wilson is an experienced marine and freshwater fisheries scientist and has worked in this capacity in Alaska since 1974. Prior to that his experience was in marine and estuarine fisheries habitat investigations, pesticide toxicity assaying, and assessment of marine fish and shellfish response mechanisms to water pollutants. He has directed many fishery and aquatic habitat investigations while at AEIDC. Mr. Wilson conducted preliminary fishery and aquatic habitat investigations of the Beluga Coal region of upper Cook Inlet in the fall of 1980. This work provided a basis from which the study plan for future environmental studies was developed.

- Mr. Wilson conducted ecological modeling of the Naknek River system of Bristol Bay in 1977-78, investigations of oil exploration in the Arctic and, recently, studies of environmental consequences of hydroelectric developments. Mr. Wilson has been project leader on the environmental studies of the proposed Terror Lake hydroelectric project from 1979 through 1981 and he directed the instream flow



WILLIAM J. WILSON  
Agency Liaison Manager

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assessment of the Terror and Kizhuyak rivers. He is knowledgeable of state and federal permitting requirement in Alaska associated with coal developments. Mr. Wilson is presently conducting water quality, fishery habitat, and preliminary instream flow assessments for the Grant Lake and Kisaralik River hydroelectric project feasibility studies.

- Collaborator, U.S. National Park Services, Alaska Area Office, Anchorage, AK. 1979.
- Research Analyst in Fisheries and Wildlife Biology, Arctic Environmental Information and Data Center, University of Alaska, Anchorage, AK. 1975-1978.
- Research Assistant in Biology, Arctic Environmental Information and Data Center, University of Alaska, Anchorage, AK. 1974-1975.
- Independent Consultant, Water Quality Biologist, Puget Sound Oil Baseline Studies, Daniel, Mann, Johnson Mendenhall/Hilton, Portland, OR. 1974.
- General Science Instructor, Lincoln County School District, Newport, OR. 1974.
- Aquatic Biologist and Research Assistant, Pesticide Toxicity to Dungeness Crab and Thermal Tolerance of Estuarine Organisms Studies, Marine Science Center, Oregon State University, Newport, OR. 1973-1974.
- Environmental Protection Agency Trainee in Water Quality, Suspended Sediments Study, Marine Science Center, Oregon State University, Newport, OR 1970-1973.
- Fisheries Laboratory Assistant, Freshwater Stream Productivity Studies, Oak Creek Fisheries Research Laboratory, Oregon State University, Corvallis, OR 1970.

Publications:

Wilson, W.J., et al. 1980. Environmental studies of the proposed Terror Lake hydroelectric project, Kodiak Island, Alaska. Raptor studies/intragravel water temperature studies. Arctic Environmental Information and Data Center, University of Alaska, Anchorage, AK. Report for Kodiak Electric Association. 57 pp.

\_\_\_\_\_. 1980. Environmental studies of the proposed Terror Lake hydroelectric project, Kodiak Island, Alaska. In-

WILLIAM J. WILSON  
Agency Liaison Manager

-3-

stream flow studies. Arctic Environmental Information and Data Center, University of Alaska, Anchorage, AK. Report for Kodiak Electric Association. 197 pp.

1981. An assessment of environmental effects of construction and operation of the proposed Terror Lake hydroelectric facility, Kodiak Island, Alaska. Instream flow studies. Final report. Arctic Environmental Information and Data Center, University of Alaska, Anchorage, AK. Report for Kodiak Electric Association. 419 pp.

Wilson, W.J., J.C. LaBelle, and M.D. Kelly. 1981. An investigation of the feasibility of constructing a spawning channel at the Tyee Lake hydroelectric project. Arctic Environmental Information and Data Center, University of Alaska, Anchorage, AK. Report for the Alaska Power Authority. 32 pp.

Trudgen, D.E., et al. 1982. Preliminary summary of environmental knowledge of the proposed Grant Lake hydroelectric project area. Report for Ebasco Service, Inc. 150 pp.

Wilson, W.J., et al. 1982. Tyee Lake hydroelectric project fisheries mitigation plan. Arctic Environmental Information and Data Center, University of Alaska, Anchorage, AK. Report for Alaska Power Authority. 19 pp.

Wilson, W.J. In press. Instream flow decision-making for a proposed Alaskan hydroelectric project. Proceedings of the symposium on the acquisition and utilization of aquatic habitat inventory information. October 28-30, 1981, Portland, OR.

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unknown,start scan,11/27/2012 1:46:41 PM,FFF,DDCHGRL1  
unknown,info,11/27/2012 1:46:41 PM,FFF,DDCHGRL1,none,none,09100420121127133446,H:\Susitna Hydro\153\index.txt  
unknown,stop scan,11/27/2012 1:47:22 PM,FFF,DDCHGRL1  
unknown,stop scan,11/27/2012 1:47:31 PM,FFF,DDCHGRL1  
unknown,start scan,11/27/2012 1:54:30 PM,FFF,DDCHGRL1  
unknown,info,11/27/2012 1:54:30 PM,FFF,DDCHGRL1,none,none,09100420121127133446,H:\Susitna Hydro\153\index.txt  
unknown,stop scan,11/27/2012 1:55:12 PM,FFF,DDCHGRL1  
unknown,stop scan,11/27/2012 1:55:20 PM,FFF,DDCHGRL1  
unknown,start scan,11/27/2012 2:01:06 PM,FFF,DDCHGRL1  
unknown,info,11/27/2012 2:01:06 PM,FFF,DDCHGRL1,none,none,09100420121127133446,H:\Susitna Hydro\153\index.txt  
unknown,stop scan,11/27/2012 2:01:33 PM,FFF,DDCHGRL1  
unknown,stop scan,11/27/2012 2:01:41 PM,FFF,DDCHGRL1  
unknown,reset,11/27/2012 2:02:51 PM,FFF,DDCHGRL1