AN INTERN EXPERIENCE

at

TEXAS A&M UNIVERSITY

and

TEXAS A&M RESEARCH FOUNDATION

AN INTERNSHIP REPORT

by

Joseph Urlan Le Blanc

Submitted to the College of Engineering
of Texas A&M University
in partial fulfillment of the requirement for the degree of

DOCTOR OF ENGINEERING

January 1981

Major Subject: **Industrial Engineering**

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An Internship Report

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January 1981

Obligation of an Engineer

I am an Engineer. In my profession I take deep pride.
To it I owe solemn obligations.

Since the Stone Age, human progress has been spurred by the engineering genius.
Engineers have made usable Nature's vast resources of material and energy for Mankind's benefit.
Engineers have vitalized and turned to practical use
the principles of science and the means of technology.
Were it not for this heritage of accumulated experience, my efforts would be feeble.

As an Engineer, I pledge to
practice integrity and fair dealing, tolerance and respect; and to
uphold devotion to the standards and the dignity of my profession,
conscious always that my skill carries with it the obligation to serve
humanity by making the best use of Earth's precious wealth.

As an Engineer, in humility and with the need for Divine Guidance,
I shall participate in none but honest enterprises. When needed,
my skill and knowledge shall be given without reservation for the
public good. In the performance of duty
and in fidelity to my profession, I shall give the utmost.

Order of the Engineer

Joseph U. Le Blanc, P.E.
College Station, TX 77840
January 1981

ABSTRACT

Engineering Internship Report at Texas A&M University and Texas A&M Research Foundation (January 1981).

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Dr. Milden J. Fox, Jr., P.E., Chairman, Advisory Committee

The results of an Internship in a matrix management environment during the period January 1980 to December 1980 at Texas A&M University and the Texas A&M Research Foundation are presented to partially satisfy requirements of the Doctor of Engineering Degree at Texas A&M University. The job was to manage the administrative, logistical, fiscal, and scientific work efforts of several oceanographic contracts, to manage resources (i.e., manpower or personnel, materials or supplies, machinery or equipment, methods or techniques, monies or funds, subcontractors or services, space or facilities, data or information, and time) and to insure accomplishment of timely, efficient, and competent contractual results. The contracts were with the U.S. Department of Interior, Bureau of Land Management, and required the collection of geological, biological, chemical, physical, and geophysical oceanographic data and samples, the reduction, analysis, and integration of data, and the synthesis and reporting of timely information for oil and gas offshore leasing decisions. Internship objectives were satisfied by completing industrial engineering, project management, and other professional tasks.

Key words: project management, industrial engineering, cost engineering, geological oceanography, matrix, matrix management, contracts administration, estimating, planning, resource management, logistics, internship, Doctor of Engineering, oceanography, oil and gas leasing.

"What we obtain too cheap,
we esteem too lightly;
it is dearness only that
gives everything its value."

Thomas Paine

ACKNOWLEDGMENTS

In the summer of 1978 while visiting friends at Texas A&M University, I was made aware of a potential job opportunity which became the first step towards the accomplishment of a Doctor of Engineering Degree. I pursued the job opportunity and was tendered an offer in the College of Geosciences. At about the same time I applied and was granted admission to both the Graduate College and Doctor of Engineering Program in the Engineering College. I subsequently completed graduate level courses and pursued the possibility of an Internship within Texas A&M University and the Texas A&M Research Foundation. My goal directiveness culminated with the acceptance of my proposed Internship and Degree Plan in late 1979 by my Graduate Advisory Committee and both the Graduate and Engineering Colleges. For these actions I am especially indebted to my Committee consisting of Drs. M.J. "Bob" Fox, Jr., R.B. "Dick" Konzen, D.L. "Don" Woods, R. "Dick" Rezak, Biman Das, D.A. "Dave" Brooks, and Lee Stavenhagen, and to Drs. C. Rodenberger and R. Steward of the Engineering College. I am also grateful for the encouragement given by Dr. M. J. Fox, Jr., and for the support of my Manager, Dr. R. Rezak. During the Internship I also offer special thanks to my two able assistants, Mrs. J. Pate and Mrs. S. Herrig, for word processing services and other administrative functions. Many thanks of appreciation are also in order for my wife, Betty, our son, Mark, and daughter, Kathy, for the time from the family I spent pursuing the Doctor of Engineering Degree; their love and understanding will be forever cherished.

Joseph U. Le Blanc
January 1981

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"Whatever you vividly imagine,

ardently desire,

sincerely believe, and

enthusiastically act upon . . .

must inevitably come to pass!"

Paul J. Meyer

CHAPTER I

PLANNED INTERNSHIP

INTRODUCTION

The purpose of this report is to present the results of my Doctor of Engineering Internship (hereinafter, Internship) at Texas A&M University (hereinafter, TAMU) and the Texas A&M Research Foundation (hereinafter, TAMRF) during the 12-month period of January 80 to December 80. The Internship dealt with the management of oceanographic research, and the report satisfies partial requirements for the Doctor of Engineering Degree (hereinafter, D. Eng.). The Doctor of Engineering Program (hereinafter, Program) is described in Appendix A.

The first section of this chapter introduces the contents of this report and provides an introduction of interests. Growth models and a brief background are included in the second section, and the Internship objectives are described in the third section. The report is also organized into several chapters. Chapter I presents the proposed and approved Internship; Chapter II presents an overview of the Internship and reports the results; and Chapter III covers conclusions and specific recommendations relating to the organizations and the Internship.

Since interests are in areas related to project management or management engineering, definitions and training requirements

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The general guide in Industrial Engineering (1) was used as a pattern for format and style.

were researched for the most appropriate definition. On numerous occasions industrial engineering is defined in Industrial Engineering as: "the design, improvement, and installation of integrated systems of men, materials, and equipment. It draws upon specialized knowledge and skill in the mathematical, physical, and social sciences together with the principles and methods of engineering analysis and design, to specify, predict, and evaluate the results to be obtained from such systems" (1). In decreasing order of importance, the training of an industrial engineer (IE) as defined in the Industrial Engineer Handbook by Maynard (9) includes:

1. Human relations
2. Supervision and management
3. Methods improvement programs
4. Systems design
5. Statistical techniques
6. Operations research
7. Mathematical decision tools
8. Work measurement techniques.

Maynard also cites training requirements which have been expanded in Figure 1. An analysis of these data and an understanding of the functional responsibilities of an IE clearly exhibits why the IE has been labeled in recent years as a "productivity" engineer.

The IE is trained to ask questions and seek alternatives and solutions to management/engineering problems in a manner that

An industrial engineer is most effective when he is:	Which requires training in:
1. First and foremost skilled in IE techniques	Latest IE techniques
2. Knowledgeable of group dynamics: a. Motivation b. Impact of change c. Organizational behavior	Group dynamics Leadership skills Managerial skills Labor-relations skills
3. A good listener	Active listening Communication skills Negotiating skills
4. A catalyst in developing an understanding of needs	Consulting skills Communication skills
5. A change agent	Consulting skills Group dynamics
6. An interpreter of results	Industrial engineering skills Consulting skills Communication skills
7. Supportive of IE group objectives: a. Philosophy b. Policy c. Professional	Sensitivity training Group problem solving Group decision making
8. An identifier/worker of peripheral/related problems	Understanding that the IE does not solve all problems Group dynamics and motivation
9. Open with clients and others	Sensitivity training Active listening Relationship improvement program
10. A user of available resources	Knowledge of what resources are available and how to use them
11. Knowledgeable of company goals and plans, administration, and engineering systems	General business subjects Financial management O D and H R D programs

Figure 1. Training for the Industrial Engineer

will increase performance, productivity, and profits within an organization. The IE seeks alternatives to eliminate, combine, improve, or change a sequence, place, or person. While seeking alternatives, the functional questions normally asked are: (1) What is the process? (Purpose?); (2) Where should this be done? (Place?); (3) When should this be done? (Sequence?); (4) Who should do this? (Person?); (5) How should this be done? (Means?); and, (6) every question is followed with why? (Results?). What, where, when, who, how, and why are what Rudyard Kipling called his "six honest serving men (They taught me all I knew.)." And "with these serving men," the IE can be intimately involved with the management process of planning, organizing, directing, controlling, evaluating, budgeting, etc., and apply practical methods and techniques in solving the problems.

BACKGROUND

My original understanding of industrial engineering can be correlated to experiences in systems engineering and systems management in the early to mid '60s. In August 1964 while employed in a System Program Office as a Test and Evaluation Specialist, a management engineering conceptual growth model (Figure 2) was developed; and in September 1976, a general project management conceptual model (Figure 3) was developed. These two models are described herein.

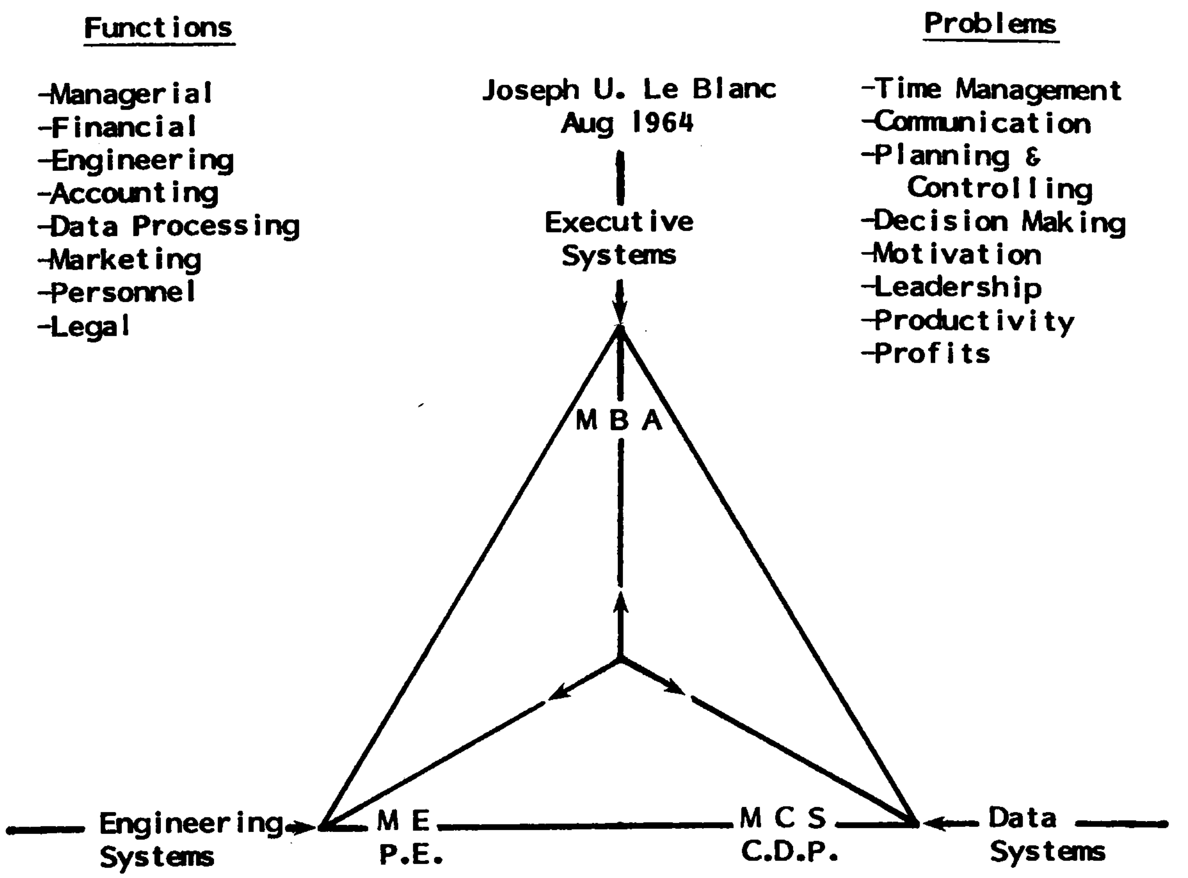

Figure 2. Conceptual Model, Management Engineering

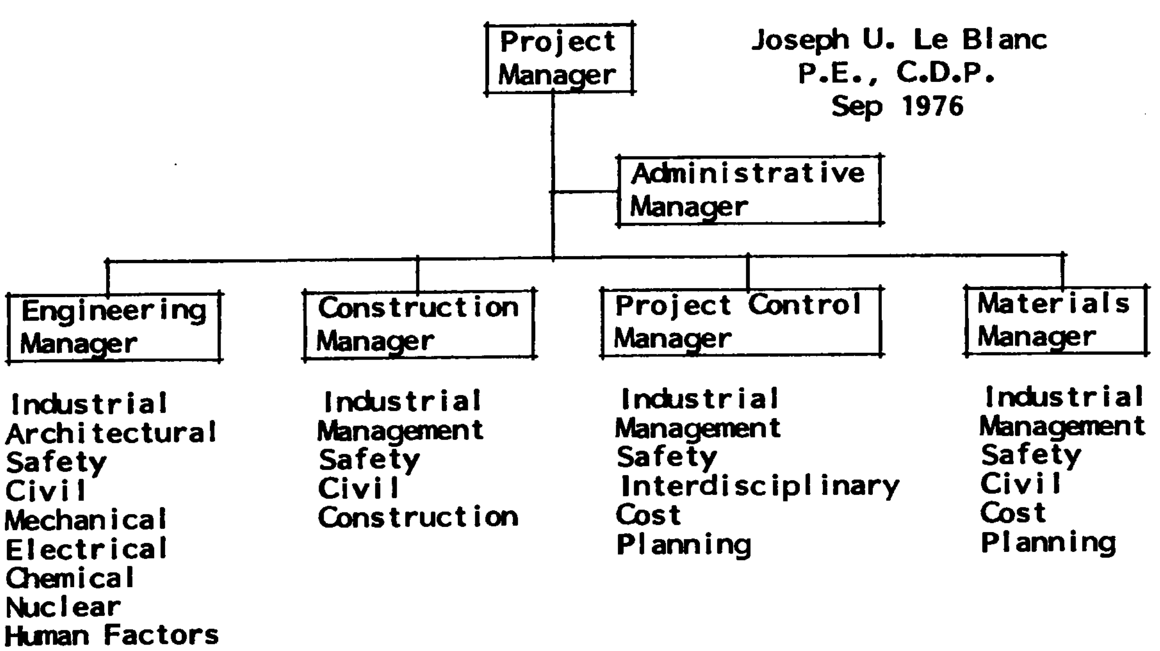

Figure 3. Conceptual Model, General Project Management

The triangular growth model depicts many organizational facets and was a personal growth model. In the model the professional components include being a Registered Professional Engineer and a Certified Data Processor which complements the educational components of the Master of Engineering (8), Master of Computing Science (7), and Master of Business Administration (6) study programs (see Table 1). The objectives were to be able to solve functional problems in an effective and efficient manner and to be able to interface with a Chief Executive Officer, professionals, managers, or laborers. Similar objectives were also documented for the Program and offered the challenge and opportunity to strive for perfection and be rewarded in the process with the Doctor of Engineering Degree.

Another model was developed in 1976 as a means to understand more thoroughly the requirements of a project, the qualifications of a project manager, and how to best satisfy these requirements and qualifications (Figure 3). The functional aspects of this general project management model can be modified into a matrix management model when required by a project.

In this model, several engineering disciplines are identified in an attempt to define common threads across functional areas. The disciplines in the model could be expanded and distributed differently, but two common threads are the industrial and management engineering disciplines. Inherent qualifications and talents of industrial or management engineers are the

Table 1. Completed Graduate Studies with Results

COURSE	HOURS	GRADE	COURSE TITLE
MASTER OF ENGINEERING (May 1972, Texas A&M University)			
I En 615	4	B	Production & Inventory Control Systems
I En 660	3	A	Design & Control of Engineering Mgmt. Systems
I En 661	3	A	Network-Based Planning & Scheduling Systems
I En 662	3	A	Planning Technology
I En 663	3	B	Engineering Management Control Systems
I En 664	3	A	Principles of Scheduling
I En 685	5	A	Problem (Inventory Control Systems)
I En 685	2	B	Problem (Procedural Languages)
Itd E 681	1	S	Interdisciplinary Engineering Seminar
Mgmt 655	3	A	Survey of Management
Fin 652	3	B	Financial Management
Acct 640	3	B	Accounting Concepts & Procedures
MASTER OF BUSINESS ADMINISTRATION (December 1972, Texas A&M University)			
Fin 630	3	B	Problems of Corporate Finance
Fin 638	3	A	Management of Financial Intermediaries
Fin 670	3	A	Planning, Programming, Budgeting Systems
Fin 685	3	A	Problem (Financial Management)
Acct 649	3	B	Management Accounting
B Ana 666	3	B	Quantitative Analysis for Business Decisions
B Ana 680	3	B	Business Policy
B Ana 685	3	A	Problem (Financial Analysis)
Mgmt 609	3	B	Management Seminar (Organization & Leadership)
Mgmt 610	3	A	Business and Society
Mgmt 672	3	A	Management Information Systems
Mktg 675	3	B	Marketing Management
MASTER OF COMPUTING SCIENCES (January 1969, Texas A&M University)			
CS 641	4	B	Computer Languages
CS 643	4	B	Logic of Information Processing
CS 645	3	A	Data Processing Management
CS 648	3	A	Computer Software Systems
CS 649	3	A	Time Sharing Computer Systems
CS 681	2	S	Computing Sciences Seminar
CS 685	3	A	Problem (Computer Graphics)
Math 480	3	A	Advanced Digital Computer Programming
Math 411	3	B	Advanced Calculus
I En 614	4	B	Advanced Quality Control
I En 620	4	B	Principles of Operation Analysis

project management requirements associated with planning and controlling costs, time, materials, subcontracts, and other resources, and those requirements associated with evaluating performance, productivity, and profits.

As described herein, general and industrial engineering experience, education, and training should satisfy some of the functions in the model. Interpersonal, managerial, financial, and information processing experience, education, and training should especially satisfy the project control and administrative functions. The additional selective training in labor-relations, ethics, economics, law, negotiation, and safety increased the management engineering abilities, expanded professional growth to accommodate the scope of responsibility and authority, and increased the potential for becoming an effective and efficient business executive, consultant, or manager of engineering, projects, project control, resources, etc. Furthermore, the ability to converse in the French language fluently should increase potential contributions in a multi-national environment.

The Doctor of Engineering Degree will be the culmination of another personal goal. The plan was to satisfy the schedule and to complete the courses set forth in Tables 2 and 3, with the understanding that target dates could be modified or courses could be changed to satisfy higher priority personal goals. The goal for the D. Eng. was realistic and will be achieved on schedule.

Table 2. Doctor of Engineering Schedule (Dec 80)

DATE	ACTION
Aug 59	Completed, Bachelor of Science
Jan 69	Completed, Master of Computing Sciences
May 72	Completed, Master of Engineering
Dec 72	Completed, Master of Business Administration
Aug 78	Submitted, D. Eng. Application
Aug 78	Admitted, Graduate College
Aug 78	Admitted, D. Eng. Program
Jan 79	Enrolled, 1st Course
Dec 79	Approved, D. Eng. Degree Plan
Dec 79	Completed, 12 SHs (sum-to-date)
Jan 80	Started, Internship
May 80	Completed, 25 SHs (sum-to-date)
Dec 80	Completed, Internship
Dec 80	Completed, 51 SHs (sum-to-date)
Jan 81	Complete, Oral Examination
May 81	Complete, 57 SHs (sum-to-date)
May 81	Complete, Doctor of Engineering

Table 3. Doctor of Engineering Studies with Results (Dec 80)

COURSE	HOURS	GRADE	COURSE TITLE
I En 603	4	B	Human Relations in Industry
I En 604	3	*	Advanced Methods Engineering & Work Measurements
I En 606	3	A	Collective Bargaining in the Public Sector
I En 611	3	A	Arbitration Procedures in Work Practices
I En 666	3	*	Engineering Economy
I En 685	3	*	Problem (Matrix Management)
I En 689	3	A	Industrial Job Analysis
Engr 681	3	S	Professional Development Seminars
Engr 684	16	*	Professional Internship (Project Management)
Mgmt 643	3	*	Legal Relationships
Ocn 606	2	A	Geological Oceanography Cruise
S Eng 670	3	B	Industrial Safety Engineering
Itd E 671	2	A	Professional Engineering Ethics & Practice

* To be completed during Spring 81 Semester.

OBJECTIVES

As specified in the Program (Appendix A), there is a minimum set of semester and internship hours. These hours were specified on the Degree Plan and approved by the Engineering and Graduate Colleges (Table 3, p. 11). The Internship was scheduled for the period of January 80 to December 80 at Texas A&M University and the Texas A&M Research Foundation.

A position was negotiated as the Program Manager of an interdisciplinary oceanographic program under a contract with the U.S. Department of Interior, Bureau of Land Management. During the Internship, the Program Manager was to be "responsible for the administrative, logistical, financial, and scientific coordination of the work efforts" and was to be "vested with sufficient authority to insure timely, efficient and competent accomplishment of all work required under the contract" (2; 10; 11; 12; 13). Dr. Richard Rezak, Deputy Department Head and a geological oceanographer, was the manager and delegated responsibilities and authority for managing the contract. Dr. Rezak expected the effective application of expertise in project management, industrial engineering, information processing, and human relations to the job.

The intern advisor, Dr. David A. Brooks, is an engineering graduate with a Bachelor of Science in Electrical Engineering, a Master of Science in Ocean Engineering, and a Doctor of Philosophy in Oceanography. He is an educator, researcher, engineer, and also Manager of Technical Services in the Department of Oceanography at TAMU. These credentials satisfied the intern advisor requirements of the Engineering and Graduate Colleges.

Another requirement of the Internship experience was that it should apply toward registration as a Professional Engineer in the State of Texas. As a Registered Professional Engineer in Texas, this professional requirement (3) had already been satisfied.

During the Internship, technical, managerial, and leadership abilities were to be demonstrated and applied in the innovative and creative solution of technical, organizational, and oceanographic problems. Therefore, specific project management, industrial engineering, and other objectives were pursued.

Project Management Objectives

Some of the project management objectives were:

1. Prepare plans, execute programs, and manage operating budgets. (I wanted to apply management, cost, and planning engineering principles.)

2. Prepare Statements of Work and unsolicited proposals, or technical proposals in response to Request for Proposals. (I wanted to prepare or assist in preparing at least one technical proposal for research funding.)

3. Estimate costs and prepare, negotiate, modify, or execute subcontracts or service agreements. (I wanted to complete the

Art of Negotiating Seminar by the Negotiating Institute, Inc., and to improve estimating and negotiating skills.)

4. Coordinate the reduction, analysis, and reporting of data and the synthesis and reporting of quality information. (I wanted to coordinate the design and method for reporting research results and to co-author technical reports and articles arising from the contract.)

5. Select, hire, and assign personnel, evaluate performance, and recommend promotions and merit increases. (As the personnel coordinator, I wanted to apply acceptable interview and evaluation techniques while hiring and supervising employees.)

6. Prepare and coordinate news releases and make technical evaluations of environmental impact statements (EIS). (I wanted to understand the interfaces between selected federal agencies such as Bureau of Land Management [BLM], U.S. Geological Survey [USGS], Environmental Protection Agency [EPA], National Oceanic and Atmospheric Agency [NOAA], National Marine Fishery Service [NMFS], and become familiar with applicable statutes to facilitate news releases and evaluations of environmental impact statements.)

Industrial Engineering Objectives

In addition to the above specific project management objectives, industrial engineering objectives were:

1. Manage a multi-disciplinary research team. (I wanted to seek solutions to management problems that occur in a matrix management environment.)

2. Learn the skills of a cost engineer. (I wanted to attend the Cost Engineer Skills Course sponsored by the American Association of Cost Engineers, and to improve estimating and cost engineering skills.)

3. Learn and apply job analysis techniques. (I wanted to analyze certain tasks and write job descriptions.)

4. Learn and apply work measurement and methods engineering techniques and procedures. (I wanted to analyze and document several analytical processes used in sedimentology, cartography, geology, and/or oceanography as a step in the development of a realistic cost model.)

5. Make or supervise engineering changes to existing systems or components. (I wanted to prepare engineering drawings of data collection systems.)

6. Design and implement information processing or management solutions to data problems. (I wanted to demonstrate the use of computers as a tool to analyze research data.)

7. Learn and understand human relations principles. (I planned to volunteer as a Commercial Arbitrator for the American Arbitration Association and the Brazos Valley Better Business Bureau. I also wanted to serve as a resource person on the

project in labor-relation procedures and Equal Employment Opportunity requirements.)

Other Objectives

In addition to these industrial engineering objectives, I also wanted to accomplish personal, professional, civic, and community objectives as a means to support my total professional growth. These included:

1. Speak at civic or professional functions on such subjects as planning and goal setting, motivation, employee selectivity, project management, etc. (I wanted to lead or participate in workshops, lectures, or seminars.)

2. Participate actively in professional activities (i.e., Texas and National Society of Professional Engineers, American Institute of Industrial Engineers, American Association of Cost Engineers, Society of Certified Data Processors and Reserve Officers Association) and in civic and community activities (i.e., Lions International, St. Mary's Catholic Church, A&M Consolidated Independent School District Communication Council, Chamber of Commerce).

3. Perform USAF Ready Reserve duties as a Plans and Requirements Officer and a USAF Academy Liaison Officer.

These objectives were to be pursued during the Internship. The results, exceptions, and/or problems caused by on-going management decisions were to be documented, along with methods of solutions, in an Internship Report. These results are documented herein.

REFERENCES

1. Industrial Engineering; American Institute of Industrial Engineers, Inc., Atlanta, GA.

2. "Job Description (Program Manager)"; Texas A&M University, Department of Oceanography, College Station, TX 1978.

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11. Texas A&M Research Foundation--Bureau of Land Management Contract AA851-CT0-25, College Station, TX 1980.

12. Texas A&M Research Foundation--Texas A&M University Agreement (Subcontract) No. 3839, College Station, TX 1978.

13. Texas A&M Research Foundation--Texas A&M University Agreement (Subcontract) No. 4260, College Station, TX 1980.

CHAPTER II

"Lord,

grant that I

may always desire

more than I can accomplish."

Michelangelo

CHAPTER II

INTERNSHIP RESULTS

INTRODUCTION

The objectives of the Program are to educate engineers who: (1) are technically competent; (2) understand the social, political, environmental, and other factors which shape modern technology; and, (3) can operate in the interface between society and technology, articulating technological alternatives to non-engineers. The goal is to develop engineers with technical, managerial, and personal know-how, skills, and attributes who can lead an organization or projects and achieve predetermined goals in performance, productivity, and profits. To satisfy these objectives and goals, Internship objectives and graduate courses, as presented in Chapter I, were tailored to broaden the horizon in project or executive management. During the Internship, stated objectives were satisfied, but the dynamics of the organization did not provide the time and opportunity to accomplish all objectives in the detail originally anticipated.

An overview of accomplishments during the Internship with a brief performance evaluation by Dr. R. Rezak, the intern manager, are included in the next two sections. In subsequent sections of this chapter, the Internship environment and organization, actions, and results are documented. Conclusions and recommendations are set forth in Chapter III.

OVERVIEW

In the job (Internship) as the Program Manager of the BLM Program Office with the Department of Oceanography, a balance between performance, schedules, and cost was maintained, despite obstacles within the rather rigid framework of TAMU and TAMRF. In this research, it was necessary to balance technological performance with the needs of cost and schedules. Managing the resources, especially the 14 PIs/Co-PIs, was challenging since some PIs were unaccustomed to working within a planning and controlling environment. They were more attuned to their respective science rather than a teamwork approach for the integration and synthesization of data from multi-disciplinary areas (e.g., geology, biology, oceanography, chemistry, geophysics, computer sciences, engineering, etc.). The data was synthesized and documented into cohesive and organized reports over an extended planning horizon (Aug 78–Mar 81).

As listed in Table 4, management and logistical plans were prepared, as were cruise and periodic performance reports citing accomplishments, recommendations, and cost or schedule deviations. Significant findings and forecasts were documented. This information was used by the New Orleans Louisiana BLM Office for preparing environmental impact statements (11; 12) and in making management decisions (13; 34) related to oil and gas activities in the Gulf of Mexico. A lease block map of areas in the Gulf of Mexico made available by BLM for leasing during Lease Sales A62

Table 4. Plans, Reports, and Proposals Prepared

	PLANS	REPORTS
CONTRACT #AA550-CT6-18		
FINAL REPORT (772 pp.)		Sep 78
CONTRACT #AA550-CT7-15		
FINAL REPORT (699 pp.)		Dec 78
EXECUTIVE SUMMARY (89 pp.)		Apr 79
CONTRACT #AA551-CT8-35		
MANAGEMENT PLAN	Sep 78	-
LOGISTICAL PLAN	Sep 78	-
QUARTERLY SUMMARY REPORTS	-	
PERIODIC PERFORMANCE REPORTS	-	
SPECIAL REPORTS		
Coffee Lump Bank	-	Jan 79
Proceedings: Gulf of Mexico Information Transfer Meeting (12-13 May 80)	-	Oct 80
CRUISE PLANS AND REPORTS		
1st Mapping (54 days)	Sep 78	Nov 78
2nd Mapping (7 days)	Jul 79	Aug 79
1st Submersible (36 days)	Sep 78	Dec 78
2nd Submersible (61 days)	Aug 79	Nov 79
1st SCUBA Diving (8 days)	Sep 78	Oct 78
2nd SCUBA Diving (8 days)	Dec 78	Mar 79
3rd SCUBA Diving (8 days)	Mar 79	Jun 79
4th SCUBA Diving (4 days)	Jul 79	Aug 79
5th SCUBA Diving (8 days)	Aug 79	Dec 79
6th SCUBA Diving (9 days)	Jan 80	May 80
1st FMG Monitoring (23 days)	Sep 78	Feb 79
2nd FMG Monitoring (21 days)	Dec 78	Mar 79
3rd FMG Monitoring (5 days)	Feb 79	Apr 79
4th FMG Monitoring (23 days)	May 79	Jul 79
5th FMG Monitoring (7 days)	Jan 80	Jan 80
1st Seasonal (8 days)	Dec 78	Feb 79
2nd Seasonal (13 days)	Mar 79	May 79
3rd Seasonal (10 days)	May 79	Sep 79
Summer Sampling (10 days)	May 79	Sep 79
1st Recovery (4 days)	-	Jun 79
2nd Recovery (2 days)	Oct 79	May 80
3rd Recovery (2 days)	Oct 79	May 80
4th Recovery (2 days)	Oct 79	May 80
1st Deployment (6 days)	Oct 79	May 80
2nd Deployment (4 days)	Feb 80	May 80

Table 4 (Continued)

	PLANS	REPORTS
FINAL REPORT (approximately 950 pp.)	Sep 78	Mar 81
EXECUTIVE SUMMARY (approximately 75 pp.)	Sep 78	Apr 81

PROPOSALS SUBMITTED

Proposal Numbers	Dollars Proposed	Dollars Awarded	Contract Date
TAMRF 78-603	$1,985,213	$1,919,563††	Aug 78
TAMRF 79-510	11,290	11,290	Mar 79
TAMRF 79-549	139,198	139,198	Jun 79
TAMRF 79-736	605,298	397,558	Jul 79
TAMRF 79-838	50,330	25,340	Aug 79
TAMRF 80-043	86,496	108,444	Sep 79
TAMRF 80-087	1,399,166	*	- *
TAMRF 80-297	6,300	**	**
TAMRF 80-301	96,880	**	**
TAMRF 80-310	49,657	127,157	Jan 80
TAMRF 80-334	38,138	38,138	Jan 80
TAMRF 80-525	90,121	73,958	Jul 80
TAMRF 80-543	20,808	20,808	Apr 80
TAMRF 81-132	4,122	4,900	Dec 80
TAMRF 81-162	5,018	***	***

*RFP canceled; **Funded partially in TAMRF Proposal 80-310; ***Pending; ††Prior to employment.

CONTRACT AA881-CT0-25	PLANS	REPORTS
MANAGEMENT PLAN	Jun 80	-
LOGISTICAL PLAN	Jun 80	-
SAMPLING PLAN	Jun 80	-
QUARTERLY SUMMARY REPORTS	-	
PERIODIC PERFORMANCE REPORTS	-	
SPECIAL REPORTS	-	
FINAL REPORT (Draft)		Jun 81
EXECUTIVE SUMMARY (Draft)		Jun 81

Table 4 (Continued)

	PLANS	REPORTS
CRUISE PLANS AND REPORTS		
1st Mapping (12 days)	Jun 80	
1st Submersible (24 days)	Jul 80	
1st SCUBA Diving (9 days)	May 80	Jul 80
2nd SCUBA Diving (8 days)	Aug 80	Oct 80
3rd SCUBA Diving (4 days)	Dec 80	Mar 81
1st Recovery (4 days)	Jul 80	
2nd Recovery (3 days)	Oct 80	
3rd Recovery	May 81	
4th Recovery	Aug 81	
5th Recovery	Dec 81	
1st Deployment (8 days)	Aug 80	
2nd Deployment (5 days)	Dec 80	
3rd Deployment	Jun 81	
4th Deployment	Sep 81	

PROPOSALS SUBMITTED

Proposal Numbers	Dollars Proposed	Dollars Awarded	Contract Date
TAMRF 80-423	836,305	†	-
TAMRF 80-424	824,680	795,000	Jun 80
TAMRF 80-687	4,700	4,700	Jun 80
TAMRF 81-047	200,106	200,106	Dec 80
TAMRF 81-253	292,807	†	
	278,172	278,172	Feb 81

†Alternative (i.e., Proposal 80-424) selected.

and 62 is shown as Figure 4. Contributions were used to prepare this map and the one prepared for Lease Sales A66 and 66 (12). PIs presented information in Boston, MA, to the Interagency Committee on Ocean Pollution Research, Development, and Monitoring (COPRDM) as an adjunct of the Federal Petroleum Program Review. The COPRDM is a standing committee of the Federal Coordinating Council for Science, Engineering, and Technology. Evidentiary hearings for considering National Pollutant Elimination System (NPDES) permits on oil and gas activities in the Gulf of Mexico are also scheduled for July 1981 in Houston, TX. Testimony is being prepared by Dr. R. Rezak and Dr. D. McGrail using findings and forecasts. The NPDES permits are issued by EPA to firms allowing them to discharge effluents in the marine environment.

Maritime, environmental, administrative, and other public laws were researched. Private law encompassing the subjects of contracts, torts, and property was also researched for principles and information necessary for the proper execution of contracts. The law of agency contains a body of law to resolve tort liability of the employer and employee. The principles therein were used in managing the subcontracts.

The data and samples collected during the Internship had to be inventoried, analyzed, integrated, and synthesized into meaningful information. Computer and word processing resources were obtained to process the data and prepare quantitative reports, geological and bathymetric maps, and physical oceanography

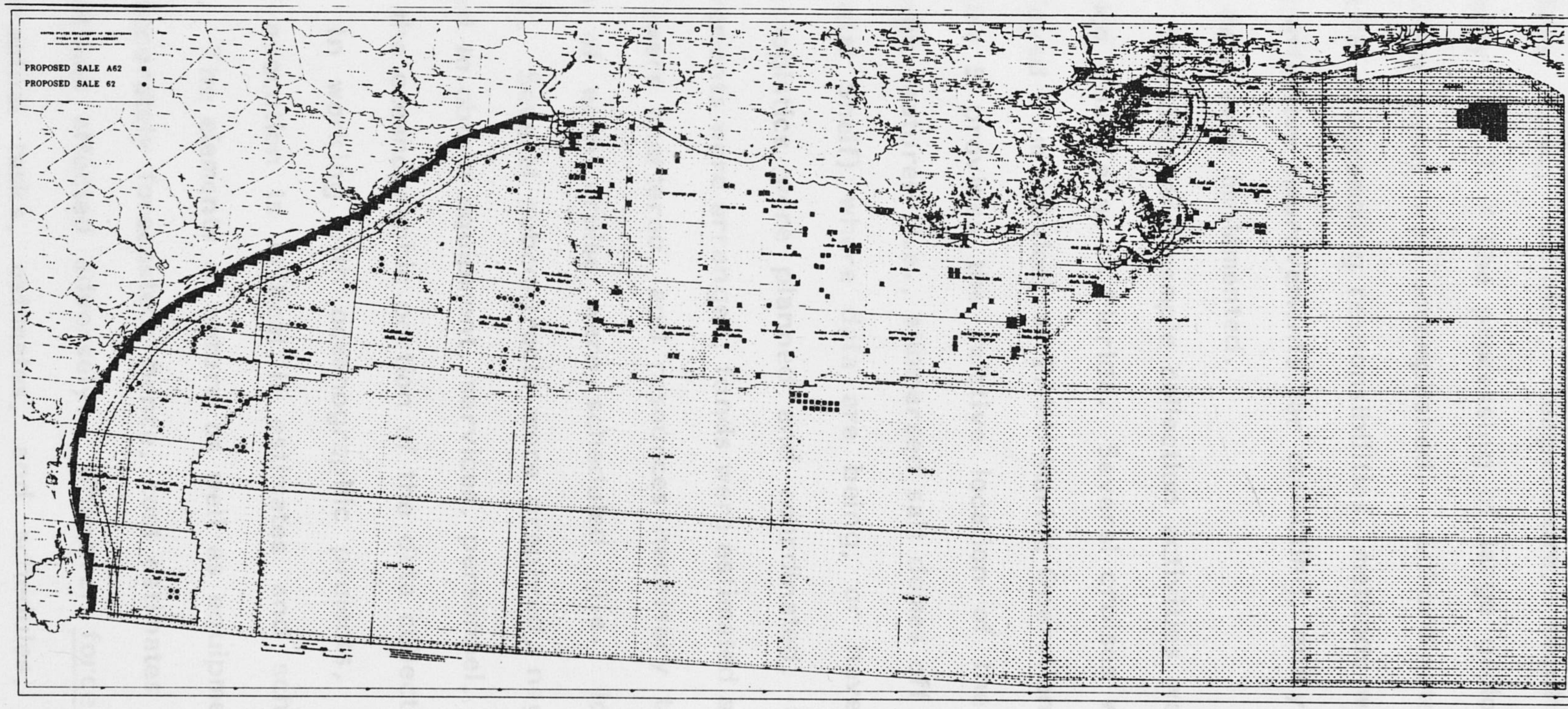


Figure 4. Map of Proposed Tracts on Lease Sales A62 and 62 (Source: BLM, New Orleans, LA)

profiles (i.e., salinity, temperature, depth, transmissivity, velocity, etc.). The processing of large geological and biological data bases was accomplished. Subordinates were delegated specific programming responsibilities, methods were analyzed, and cost-effective improvements for collecting, analyzing, and reporting data were implemented.

The data and sample collection activities were in the Gulf of Mexico from Texas to Florida. Several cruises were mobilized and deployed from the dock at TAMU Marine Operations, Galveston, TX. Figure 5 provides the relative location of the submersed topographic features (i.e., submersed salt domes off of the Outer Continental Shelf) where data are being, or have been, collected. The logistics were planned and coordinated, transportation requirements were arranged, funds were estimated and budgeted, vessels were chartered, and resources necessary to satisfy the mission of each cruise were scheduled (i.e., logistical coordination). Several subcontracts were prepared, negotiated, and executed to obtain equipment, services, personnel, etc., for supporting the oceanographic portion of the data collection efforts.

In working with oceanographic projects, logistical planning and execution is critical if estimates and schedules are to be met. The elements of nature as well as equipment failures cannot be accurately forecasted; hence, cost estimates and schedules are sometimes affected adversely. Whenever force majeure impacted contractual tasks, estimates, and schedules, alternatives were

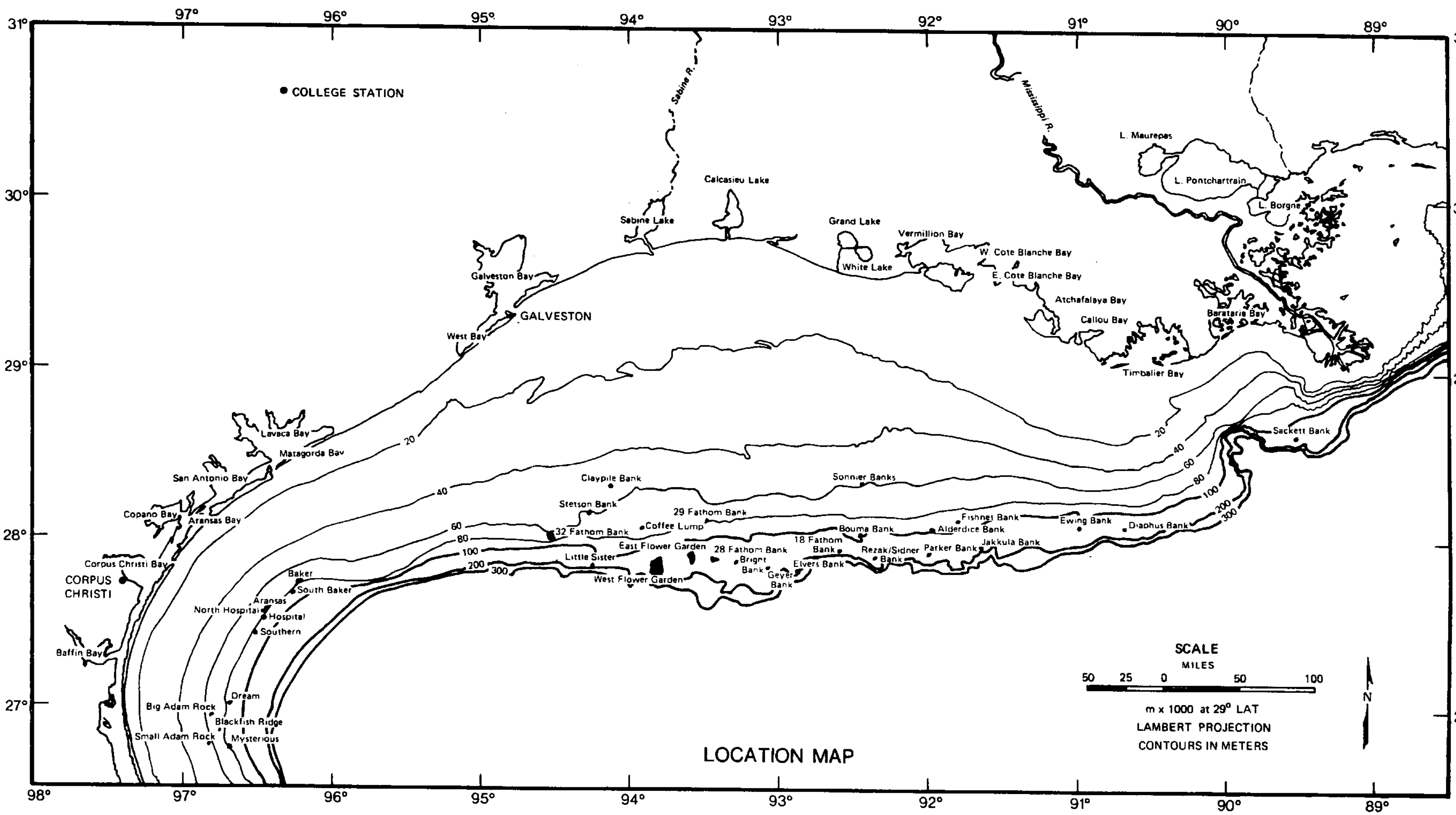


Figure 5. Major Topographic Features on Texas-Louisiana Outer Continental Shelf

prepared and submitted with recommendations to the BLM Contracting Officer Authorized Representative (COAR). The recommendations frequently resulted in a request for a proposal (RFP) from BLM; costs were estimated, tasks were rescheduled, requirements were collaborated with PIs, and proposals were prepared and submitted. During the period Aug 78 to Dec 80, the production, submission, and negotiation of 20 proposals totaling over $7 million was managed. From this work, contracts were received which exceeded $4 million.

The costs of the chartered vessels, navigation services, and other requirements such as the DRV DIAPHUS, the TAMU submersible vessel, were negotiated and renegotiated. The estimated cost for the R/V GYRE, the TAMU research vessel, is $6000/day; a navigator and LORAC equipment is $1000/day; and the DRV DIAPHUS is $1700/day. These costs, when combined with manpower, resulted in minimal costs which exceeded $10,000/day. During periods when delays were caused by weather, additional costs were proposed to, and approved by, BLM as contract modifications.

Industrial engineering knowledge and skills were used in maximizing results from the integrated systems of men, materials, and equipment. Human relations skills and knowledge of industrial psychology and labor relations also helped with the personnel management functions. Key associates were recruited and hired, several employees were terminated, and merit increases and/or promotions were recommended. These functions were properly documented.

Fiscal funds were managed, and cost-reductions were negotiated for contractual tasks. Savings from these negotiations were used to support tasks extending the technology and state-of-the-art in oceanography or tasks necessary to enhance contractual results. The title of capital equipment on the project was also negotiated so that ownership was transferred from BLM to TAMRF/TAMU. As a result of this equipment acquisition, researchers were placed in a more competitive position to obtain new research contracts.

This Internship as a Program Manager could be summarized as the management of functions necessary to achieve the predetermined goals on 12 projects through people--the PIs/Co-PIs, supporting staff and services, and subcontractors. The stewardship included not only the custody of and legal responsibility for the physical and financial assets but also the moral and ethical responsbility to use funds efficiently and with integrity. This fiduciary relationship as well as moral and ethical responsibility required decisions on what was "best" for the Internship organizations (i.e., TAMU, TAMRF) and the sponsor (i.e., BLM). Even with major obstacles, timely and quality results were accomplished through the professional efforts of key associates. Appendix B has Chapters I, II, and XVIII of the final report which were submitted to BLM (38). The information therein illustrates some of the project and data management tasks, plus biological, physical, chemical, and geological oceanographic tasks.

In view of the many and varied accomplishments realized during this project management Internship, and because self-improvement is best accomplished through frequent feedback and evaluation, Dr. R. Rezak, the immediate manager, was asked to include an evaluation in the next section. The Internship organizational environments and Internship results follow this evaluation.

INTERNSHIP EVALUATION
by Dr. R. Rezak

The purpose of this section is to present an evaluation of Mr. Joseph U. Le Blanc's engineering Internship during the period Jan 80 to Dec 80. This is an addition to the monthly endorsement I had on the intern reports submitted by Mr. Le Blanc.

During the Internship Mr. Le Blanc conducted himself in an exemplary manner. His initiative, self confidence, desire, and perseverance enabled him to accomplish objectives with very limited supervision and direction. He demonstrated fiscal, managerial, technical, human relations, and leadership skills that clearly satisfy the Doctor of Engineering Internship requirements. His project management, fiscal, industrial engineering and data processing background helped us tremendously while he satisfied the objectives of the Internship and Doctor of Engineering Program.

One of the Program objectives is to train engineers who can interface technology with non-engineers. During the Internship Mr. Le Blanc successfully worked with geologists, oceanographers (chemical, physical, geological, biological), technicians (marine, electronic), surveyors, engineers, contract administrators, or executives dealing with oceanographic work tasks. His concern for the "health, safety, and welfare" of project personnel was foremost whenever he planned and managed the logistics of our sea-going cruises--12 during 1980 and 34 during the period of

Aug 78 to Feb 81. I am also most pleased with his complete awareness of the need for adequate working conditions, wages, and hours of employment. He has mastered and demonstrated result-oriented skills necessary for executive actions.

I will not discuss the Internship objectives; they are adequately covered herein. However, I commend the results of business development and project management demonstrated by Mr. Le Blanc. During 1980 Mr. Le Blanc estimated, scheduled, proposed (with other PIs), and negotiated funds in excess of $2 million on 19 proposals. He managed the successful performance of 14 PIs and 7 subcontractors while working in the rather rigid matrix management framework of Texas A&M University and Texas A&M Research Foundation. I commend his efforts in delivering quality contractual results at or ahead of schedule in a cost-effective manner. Some of his cost-reduction actions enabled us to fund tasks that had been underestimated on an original proposal and to also fund tasks extending oceanographic technology and state-of-the-art equipment. In the past we had been naive in estimating and submitting costs for proposals; however, the project management, cost, and planning engineering techniques demonstrated by Mr. Le Blanc enabled us during 1980 to estimate, submit, and negotiate work tasks based on "available" monies only. We submitted reasonable proposals to satisfy RFPs, but also submitted recommended alternatives that were fully funded in lieu of original RFPs.

Management is the judicious use of means to accomplish an end and industrial engineering is the process of designing, improving, installing, etc., integrated systems of people, materials, equipment and of planning, estimating, scheduling, forecasting, and evaluating costs and results from such system. Mr. Le Blanc's judicious use of "what, when, where, why, who and how" has been invaluable when applied to his resource management definition of "those resources necessary to accomplish a predetermined goal: men or personnel, materials or supplies, methods or techniques, monies or funds, machinery or equipment, subcontracts or services, space or facilities, data, information, time."

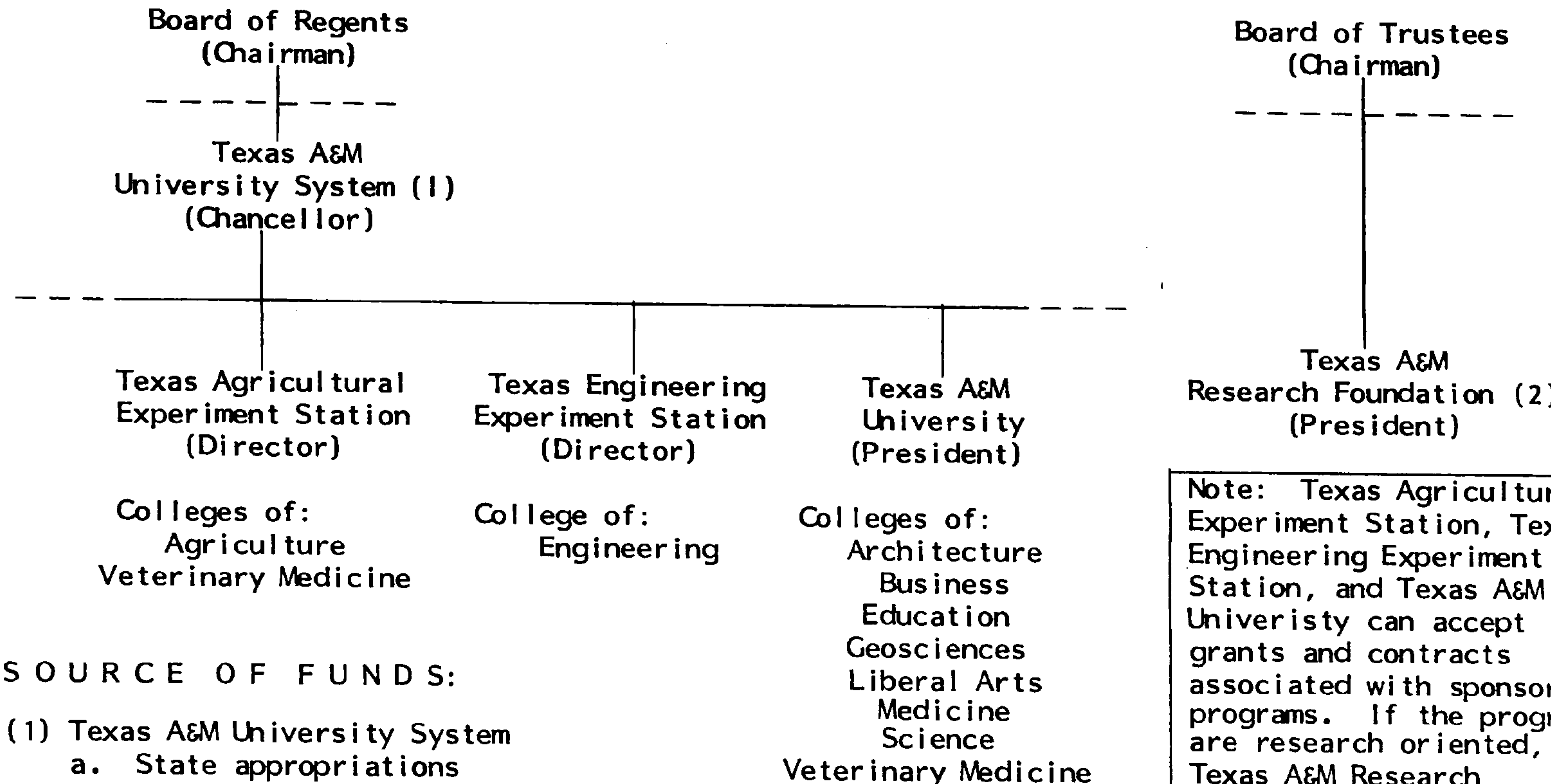
I believe Mr. Le Blanc's achievement during this Internship stems from the successful use of fiscal, managerial, and engineering principles. "To strive for excellence" is an illusive goal, but one that motivates an individual to perform outstandingly. Mr. Le Blanc is result-oriented and fits this goal.

I respectfully recommend Mr. Le Blanc's Internship experience be accepted by his Advisory Committee as satisfying the Doctor of Engineering Program Requirements. I have also reviewed Mr. Le Blanc's Internship Report and concur with its contents. This report adequately demonstrates project management expertise.

INTERNSHIP ORGANIZATIONS

The Internship in the matrix management environments at TAMU and TAMRF was unique. The wiring diagrams of Figures 6 and 7 depict these organizations, and Figure 8 suggests the ideal flow of authority, responsibility, and accountability for any organization. The most effective and efficient managers in an organization delegate authority and responsibility to the lowest level for accountability of results. Management is an executive skill; it is defined in Webster's New Collegiate Dictionary as "the act or art of managing, conducting, or supervising something (as a business); judicious use of means to accomplish an end." Authority is the power to assign resources and make decisions for others to follow; responsibility is the obligation for performing and being responsible for assigned tasks in a productive manner; and accountability is the satisfactory and timely completion of assigned tasks. The Internship covered all these facets and principles; the job specification is included herein as Appendix C.

During the Internship, non-traditional situations related to responsibility and authority were encountered in the organizations. Matrix management problems were experienced and solved totally when controlled by the Program Manager, and partially when controlled by others. A bibliography on project and matrix management (see Appendix D) was prepared, selected articles were reviewed, and a research paper on matrix management was prepared



SOURCE OF FUNDS:

(1) Texas A&M University System
  a. State appropriations
  b. State agencies
  c. Contracts/grants

(2) Texas A&M Research Foundation
  a. Private profit & non-profit entities
  b. Local, regional, and other public entities
  c. Federal appropriations
  d. Federal agencies
  e. International agencies

Note: Texas Agricultural Experiment Station, Texas Engineering Experiment Station, and Texas A&M Univeristy can accept grants and contracts associated with sponsored programs. If the programs are research oriented, Texas A&M Research Foundation will execute contracts or accept grants for Texas Agricultural Experiment Station, Texas Engineering Experiment Station and Texas A&M University and immediately subcontract the work to the Texas A&M University System through a standard agreement.

Figure 6. TAMUS, TAMRF, and Source of Funding

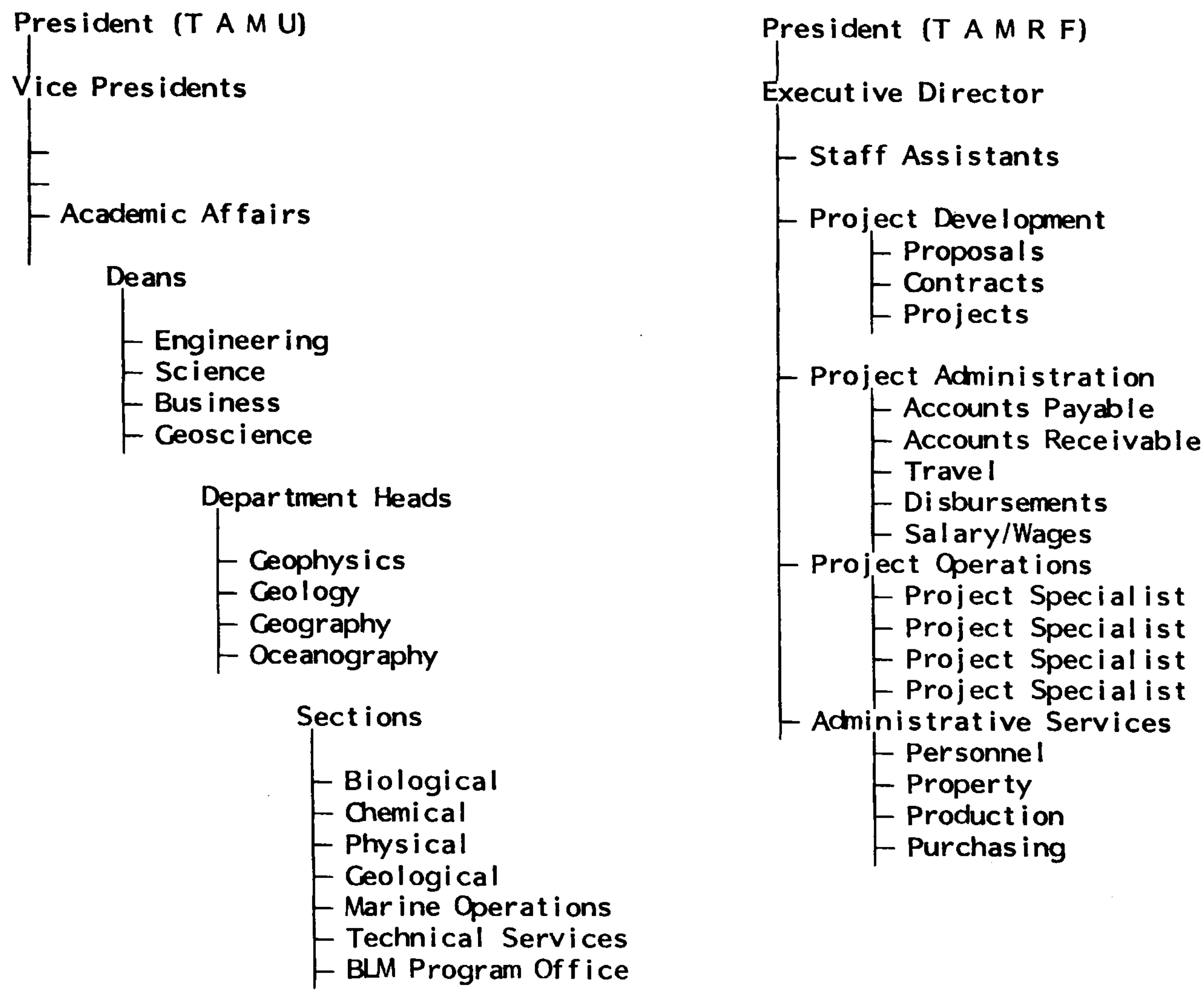


Figure 7. Organizational Setting, T A M U & T A M R F

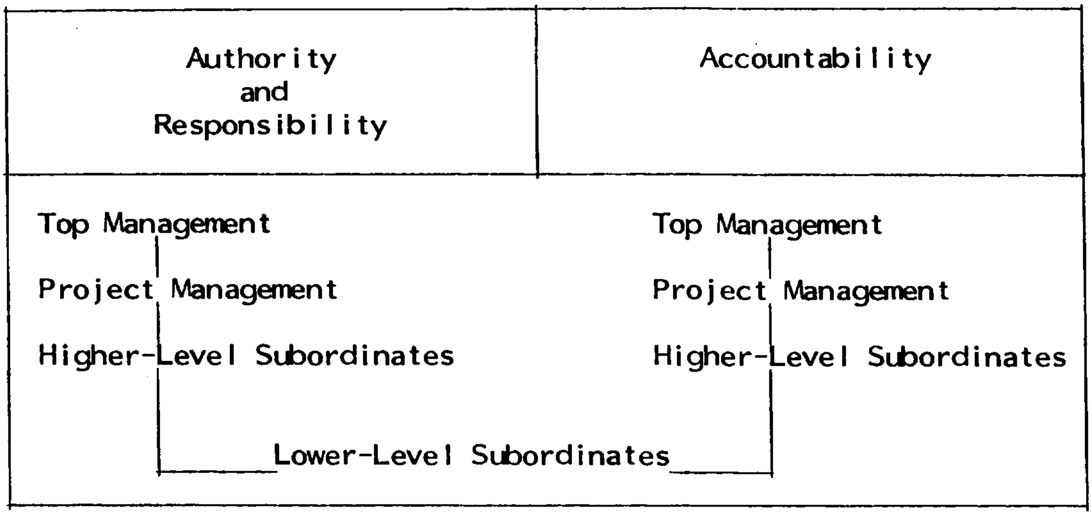


Figure 8. Ideal Organizational Flow.

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for publication. During the Internship many of the documented industrial problems in the literature were encountered; unfortunately, solutions were not always apparent in the working environment.

Because of the organizational environments, the experiences are applicable to both private and public sector settings. Some of the unique experiences included:

1. The Intern was the 1st manager at TAMU and TAMRF named in a TAMRF contract as the "Program Manager."

2. The Intern was delegated responsibility "for the administrative, logistical, financial, and scientific coordination of the work efforts" and was "vested with sufficient authority to insure timely, efficient, and competent accomplishment of all work under the contract," a first.

3. The Intern was the focal point between TAMU and TAMRF for program activities.

4. The Intern prepared proposals for additional work and funding, negotiated contract modifications, and negotiated and executed subcontracts.

Another experience was being exposed to the fiscal arrangements at TAMRF and TAMU. TAMRF is a non-profit corporation; and, TAMU is a component of the Texas A&M University System (TAMUS), a State of Texas creation governed by a Board of Regents. The TAMUS Board sets policy and gives direction to the Chancellor of TAMUS and the President of TAMU. The Directors of the Texas Agricultural Experiment Station (TAES), Texas Engineering Experiment Station (TEES), and other TAMUS components are also provided guidance indirectly by the Board through the Office of the Chancellor. Funds to operate these entities are obtained from State of Texas appropriations, other state agencies, contracts or grants.

The TAMRF Board of Trustees also sets policy and provides guidance to its Chief Executive Officer. The Presidents of TAMU and TAMRF are normally the same, but a recent policy decision changed this arrangement.* The internal TAMRF functions and associated organizational components should improve.

*I believe the change will enhance the operation of TAMRF by assigning to it a full-time Chief Executive Officer and by placing more emphasis on effective and efficient operations independent of the TAMUS bureaucratic processes and potential conflicts of interest.

Since TAMRF accepts work contracts and research grants for TAMUS, the source of TAMRF operating funds varies and may include entities from both the public and private sectors. TAMRF subcontracts work to TAMUS under a standard binding agreement between two corporative entities. Normally, the Chief Executive Officers sign the agreement and the responsibility and authority is delegated to the TAMU Department Heads for accountability of results. In the Internship as Program Manager of the BLM Program Office, the responsibilities and authority were assigned by name in the TAMRF-TAMU agreement. This was the first contract awarded whereby a Program Manager was designated to manage the contract within the TAMRF-TAMU matrix management environments. The contract was also the 2nd largest contract ever awarded to TAMRF and TAMU.

As the Program Manager of the BLM Program Office, the Intern was functionally responsible to Capt. T.K. Treadwell, Jr., USN (Retired), then Head, Department of Oceanography; but, the manager was Dr. Richard Rezak, Lt. Cmdr USNR (Retired) and Leader, Geological Oceanography Section. Dr. Rezak is a tenured Full Professor and geologist and was the Technical Director and one of the 14 Principal Investigators (PI) on the contract. As stated in the job description (see Appendix C), the Intern had the overall responsibility and authority, but PIs were responsible and accountable for individual projects. The Intern also managed seven subcontracts to support the work efforts of the PIs and was responsible for the engineering aspects on the contract. The intern advisor was Dr. David A. Brooks, Manager of Technical Services. All three of these persons are in the Department of Oceanography.

The matrix organization included personnel from TAMU and TAMRF, and, through service and subcontract agreements, personnel from the following organizations: LGL, Inc., Bryan, TX; Oceanonics, Inc., Houston, TX; University of Texas Marine Institute, Port Aransas, TX; University of Alabama at Birmingham Sea Laboratory, Dolphin Island, AL; LORAC Services, Inc., Houston, TX; University of South Florida Marine Science Dept., Tampa, FL; Sealfleet, Inc., Galveston, TX; and others.

Within TAMU the contract was supported by: fiscal and personnel specialists; geological, physical, geophysical, chemical, and biological oceanographers; marine and electronics technicians; engineers; plus scientists and/or technicians from the following facilities.

Centers

Data Processing

Geodynamics

Sedimentology

Trace Metal Characterization

Marine Operations

Nuclear Science

Media & Visual Aids

Institutes

Statistics

Laboratories

X-Ray Diffraction	Neutron Activation
Electron Microscopy	Atomic Absorption
Geophysical	Gas Chromatography
Hydrology	Mass Spectronomy
Photographic	Sedimentology
Hydrocarbon Chemical Analysis	

TAMRF also submits proposals, assists with negotiations, executes contracts with most contractors or grantors, and executes the subcontract agreement with TAMUS or its components (i.e., TAMU, TAES, TEES). TAMRF retains accounting responsibilities for all contracts and grants. The matrix team was supported by a TAMRF contract administrator, and the following specialists: proposals, project, budget, travel, salary, accounts payable/ receivable, property, personnel, and purchasing. Since TAMRF is a non-profit entity, contract overhead dollars supported these resources.

In this matrix management environment, the Intern was able to apply and enhance many management and engineering skills. The planning, controlling, human relations, and negotiating skills were most helpful and have improved because of these unique experiences. Furthermore, work in research and technology normally reserved for non-engineers was experienced.

In the next three sections information on how the planned objectives were satisfied is included. The Internship Report required the details of only a specific assignment, but the Intern elected to cover several assignments within each objective area: project management, industrial engineering, and others.

1ST OBJECTIVE: PROJECT MANAGEMENT

The first objective was to identify areas where engineering principles and concepts could be applied within a project management environment and to select practical approaches and solutions to problems. The responsibilities and authority as a Program Manager at TAMU helped in satisfying these objectives. This first objective was also interwoven with the second objective: industrial engineering.

The success of these objectives was a direct outcome of the desire to become a more effective engineer and manager. Dr. R. Rezak, the immediate manager, and Dr. M.J. Fox, Jr., the D. Eng. Committee Chairman, also provided valuable consulting. The Intern was placed in an environment and evaluated from several bases--professionally and academically. This evaluation lead to the Internship, and to the nomination for the 1980 Engineer of the Year Award. The evaluation and the recommendations should lead to opportunities for other internships at TAMUS and TAMRF.

In a 1974 presentation at the II Interamerican Conference on Systems and Informatics, Mexico City, D.F., the Intern stated that a manager is "anyone whose job is to reach predetermined goals through people." The "successful manager is willing to visualize and learn how winners think and act, is willing to act, and is willing to develop necessary traits" to become effective and efficient. Traits of successful managers and leaders were summarized (23):

1. Self-identity - the ability to understand self, needs, desires, and wants. Personal decisions can be made to deal with any resources effectively and efficiently.
2. Stability - the ability to recognize strengths and weaknesses and to capitalize on strengths. The tendency is to continually extend self limits in performing new tasks.
3. Striver - the ability to be rewarded by the process of achieving. High achievers or strivers learn to enjoy solving problems, making decisions, setting and reaching goals, producing quality results, etc., because responsibilities bring intrinsic value and satisfaction to boost upward mobility drives.
4. Practical Judgment - the ability to apply common sense to any situation. This trait stresses the need to be concerned with practical solutions rather than theories (i.e., what will work). Daily observations of activities are channeled towards "why" and "how."
5. Independence - the ability to take initiative without fear. Cooperation is there, yet a stand is taken to be counted regardless of the situation.
6. Decisiveness - the ability to gather the right facts and make the right decision at the right time. The choice to say "yes" and "no" lies with the manager. A high

degree of objectivity and freedom from bias must be maintained.

7. Self-Confidence - the ability to perform tasks involving risk. Actions are forceful, deliberate, and with minimum procrastination. A high degree of self-confidence reflects a positive attitude.

8. Organizer - the ability to structure chaotic situations. This is the quickness for getting things organized and running smoothly or for living with demands of indefiniteness.

9. Time-Manager - the ability to plan, organize, and control this most important asset. Delegation to and motivation of subordinates comes about through effective time management. The efficient manager of time, whether he is a superior, subordinate, or peer, is most productive.

10. Creativeness - the ability to foresee an event and take appropriate action. This is one of the most valued traits of executives today.

11. Human-Relations - the ability to deal fairly and squarely. Positive leadership, integrity, fairness, and managerial expertise are exhibited.

12. Goal-Directiveness - the ability to visualize clearly the desired results and to move in a direction with intensity of purpose to satisfy needs. A goals program

has been implemented that covers both personal and professional roles.

13. Varied-Experiences - the ability to gain new knowledge which can provide a "slight edge." A well-read manager with experiences in a variety of situations reacts favorably to difficult situations.
14. Organizational-Broadness - the ability to view the needs of the whole organization. Awareness of total needs rather than only departmental or personal needs contributes to better human relations among superiors, subordinates, and peers.
15. Self-Improvement - the ability to understand the perpetual process necessary for continual growth. Education is a never-ending process that continues past elementary, secondary, undergraduate, or graduate training. One must commit and motivate himself to adapt, learn, and change or one will never reach his true potential.

Wright also defined desirable traits of a project manager which have been expanded (50); these traits or abilities are:

1. Technical - the ability to understand and decide on trade-offs between technical issues, cost, and schedule.
2. Managerial - the ability to understand and use the skills of planning, staffing, directing, and controlling.
3. Delegation - the ability and know-how to use properly.

4. Interpersonal relations - the ability to cope with large numbers of relationships.
5. Synthesizer - the ability to extract data from multiple sources, to integrate the data, and to synthesize for viable project decisions.
6. Stamina - the ability to withstand the pressures for co-ordinating large sets of personnel.
7. Motivator - the ability to motivate personnel working under stresses.
8. Theories "X" or "Y" - the ability to demonstrate the proper traits defined by Douglas McGregor (15:54).
9. Organizational Development - the ability to understand procedures and systems, to apply know-how to operating systems, and to understand all major organizational functions.
10. Executive-support - the ability to understand when and how to obtain executive or top management support.
11. Ethical - the ability to operate under moral and ethical personal and business standards.

The project manager must also be a superb planner, problem solver, and understand the planning process necessary to achieve predetermined goals. The manager must have a goals program and practice the planning process. This includes:

1. Determining the goal to be achieved.
2. Determining the expected benefits or rewards.

3. Determining the roadblocks or obstacles between a goal and expected benefits.
4. Determining solutions or alternatives to obstacles.
5. Establishing target dates for each solution.
6. Committing to "pay the price" for getting results or benefits.
7. Committing to evaluate and report performance and feedback.

There are many reasons for having and managing a goals program. Odiorne cites the following (32):

1. The human being is a purposive being and lives to attain goals.
2. Organizations have a tendency to disperse this purposiveness, and people become caught in activity traps.
3. Managers and bosses lose sight of subordinate goals.
4. People shrink instead of grow as human beings when caught in activity traps.
5. Agreement and understanding of expectations is a characteristic of the "best" run organization.
6. Failure results from not achieving goals or from not knowing the goals.
7. Performance improves with knowledge of personal and organizational goals.
8. Ethical behaviors can be correlated to goal attainment.
9. Most management subsystems succeed or fail according to the clarity of the organizational goals.

10. Goal setting is a vital and necessary condition for successful management.

As a proponent of positive planning or goal setting, the benefits are neither mystical or nebulous. There are many real and significant benefits to be gained by practicing written goal-setting, including:

1. Improving one's self-image and valuable abilities. It improves you today and makes you better for tomorrow.
2. Making one aware of strengths to overcome obstacles and find solutions to opportunities.
3. Making one aware of weaknesses so new goals can be established to overcome the weaknesses.
4. Giving one a sense of past victories to provide the impetus for more successes.
5. Helping one visualize, actionize, prioritize, and actualize--"what thou see-est, so thou be-est."
6. Giving one a track to run on and a way to keep score--a sound business/personal practice.
7. Forcing priorities to establish proper direction. It forces one to be specific in order to give a better perspective.
8. Defining reality, not wistful thinking, not daydreaming. It properly separates and defines the roles one must play.

9. Making one responsible and accountable for results. It forces one to define and establish a system of values as a basis for success in life.

The project manager who understands this planning process and has a written personal and organizational goals program will be motivated. He will be the committed manager who wants to be accountable for results, who knows that lasting motivation must come from an internal source, not from external or temporary sources, and who strives for perfection. The best motivator is knowing what is expected in specific terms of outputs for a specific time horizon.

In any organization associates, peers, subordinates, or superiors must be motivated to achieve common goals; or the project and organization will become unbalanced, problems will occur, schedules will be missed, and costs will increase. These economical, technical, and human considerations were recognized; and during the Internship, problems were minimized, all schedules were met, costs were reduced, and savings were invested in technological advances.

Task No. 1

One of the first tasks as Program Manager was to prepare an operations or management plan for satisfying contractual requirements. An attempt was made to satisfy the planning process and to provide a mechanism for identifying and acting on alternatives. A logistics plan was developed which could be updated to accommodate changes in the scope of the contract or field requirements. Whenever additional requirements could be identified, project personnel prepared and submitted technical proposals to the sponsor (i.e., Bureau of Land Management). Cost estimates were prepared, the schedule was updated, segments of the technical proposals were written, and the total proposals were coordinated within TAMU and TAMRF. The significance of these submissions is illustrated in Table 5, and a perusal of the facts illustrates what successful teamwork and planning can accomplish.

The contract also required that Program Evaluation and Review Technique (PERT) charts using an arrow diagramming method (ADM) be prepared, submitted, and maintained. As the planner and estimator in the BLM Program Office, an alternative for planning and controlling was researched and proposed to the COAR, Contract Technical Inspector (CTI), and Contracting Officer (CO). The proposal was for using PERT charts and a precedence diagramming method (PDM)(4; 26) which was acceptable to BLM. A modified Gantt Chart was also prepared as a control tool, used by the COAR and CTI, and included in the reports (37; 38).

The controlling function covered a process of planning operational tasks, of reviewing and updating the management plan, and of taking actions on alternatives whenever a deviation to the plan and schedule occurred. The planning function, however, determined the success or failure of the project. Every sequence

Table 5. Business Development History (Aug 78-Dec 80)

Proposal Numbers		Dollars Proposed	Dollars Awarded	Contract Date	Key Personnel*
TAMRF	TAMU				
78-603	78-381	$1,985,213	$1,919,563	Aug 78	6
79-510	N/A	11,290	11,290	Mar 79	3,2
79-549	N/A	139,198	139,198	Jun 79	3,1,4,5
79-736	N/A	605,298	397,558	Jul 79	3,1,4,5
79-838	79-492	50,330	25,340	Aug 79	3,4,5
80-043	80-020	86,496	108,444	Sep 79	3,1,4,5
80-087	80-043	1,399,166	0	-	3,1,4,5
80-297	80-126	6,300	**		3,4
80-301	80-140	96,880	**		3,4
80-310	80-129	49,657	127,157	Jan 80	3,1,4,5
80-334	N/A	38,138	38,138	Jan 80	3,2,4
80-423	80-226	836,305	0	-	3,1,4,5
80-424	80-227	824,680	795,000	Jun 80	3,1,4,5
80-525	80-266	90,121	73,958	Jul 80	3
80-543	80-274	20,808	20,808	Apr 80	3
80-687	N/A	4,700	4,700	Jun 80	3,4
81-047	81-92	200,106	200,106	Dec 80	3,1,4,5
81-132	81-91	4,122	4,900	Dec 80	3,7
81-162	N/A	5,018	***	***	3,1
81-253		292,807	***	***	3,1,4,5
		278,172	***	***	3,1,4,5

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*1: Bright, T.; 2: Hopkins, T.; 3: Le Blanc, J.; 4: McGrail, D.; 5: Rezak, R.; 6: Rezak *et al.*; 7: Wormuth, J.

**Funded partially in 80-310.

***Pending.

of activities was programmed, scheduled with specific standards of performance, and budgeted with the right resources. This involved decision-making in addition to the planning and controlling functions.

Decision-making as applied to project manasgement entails forecasting needs and requirements. Specific objectives and goals were established for satisfying the requirements. Requirements were detailed, and resources were allocated and managed for competing activities on the project. Policies and procedures were also defined for assisting in the management process and became the guides for effective delegation and accountability.

Task No. 2

Normally firms have three fundamental types of economic exchanges: financing, investing, and producing functions. The financing function consists of activities to secure funds or capital; the investing function consists of activities to invest funds; and the producing function consists of activities to generate returns on the investments. These functions must be managed and integrated as a means of survival.

The survival of the BLM Program Office was contingent on the availability of funds from contractual tasks. A goal was set to prepare or assist in preparing at least one successful technical proposal. As depicted in Table 5, the opportunities to prepare several proposals and to negotiate successfully with other team members were plentiful. Contract dollars were increased by over

100%. These funds came from modifications on the original contract (TAMRF Proposal 78-603), a 2nd contract (TAMRF Proposal 80-424), plus (as of Dec 80) an increase on the 2nd contract (TAMRF Proposal 81-047). A major portion of the technical proposal (TAMRF Proposal 80-424) that was negotiated and awarded as TAMRF-BLM Contract AA851-CT0-25 was prepared.

Prior to preparing the above proposals, discussions and phone conversations were made with the COAR and CTI. Requirements had to be definitized for accomplishing specific goals. Specific goals should provide specific results; vague goals often do not provide satisfactory, if any, results. Pre-negotiating discussions were used to ascertain the requirements and arrive at gross estimates. When funds became limited, requirements were prioritized, benefits-costs were defined, alternatives were developed, and recommendations were documented in the proposals. The recommended and prioritized alternatives were subsequently funded by BLM as contract modifications. From the point of view of economic exchanges, BLM made investments in the BLM Program Office at TAMU in return for producing quality and timely decision-making information. A review of TAMRF project expenditures indicates the relative level of investment.

During Fiscal Year 1980 TAMRF project expenditures were approximately $25 million (51; 52). The TAMU College of Geosciences had approximately 22% of these research expenditures. The Department of Oceanography had approximately 84% of the 22%

or 18.5% of the TAMRF research expenditures; and, the BLM Program Office had approximately 15.5% of the TAMRF research funds.

Task No. 3

By preparing or assisting with these technical and cost proposals, the estimating, planning, scheduling, and negotiating skills were improved. The Negotiating Institute's Art of Negotiating Seminar which was completed in February 1980 and the research of negotiating techniques (3; 6; 14; 17; 28; 29; 30; 31; 39; 45; 47) provided valuable insight and information on negotiation processes in general. The graduate courses in labor relations taught by Dr. M.J. Fox, Jr., provided additional insight of the labor-management processes (i.e., I. Eng. 603, I. Eng. 606, and I. Eng. 611).

The purpose of the Art of Negotiating Seminar was to cover negotiating techniques that have been applied worldwide. The goal was to present methods and ways to arrive at win-win situations. The Seminar was divided into a set of 12 interrelated modules with each building on preceding modules. The modules were: 1) Negotiating Conceptual Framework; 2) Preparing for Negotiating; 3) Motivation: Nierenberg's Need Theory of Negotiation; 4) Strategies, Tactics, and Counters; 5) Use of Questions to Structure Negotiation; 6) Climates of Negotiations; 7) Overcoming Barriers in Negotiations; 8) Reading Non-Verbal Communications; 9) Applying Non-Verbal Communication; 10) Understanding

Hidden Meanings in Conversation; 11) Evaluating and Improving Negotiating Skills; and, 12) Negotiating Philosophies (28; 29).

Attendees at the seminar were executives, project managers, contract administrators, and other senior executives of major private and public sector organizations. The attendees were divided into negotiating teams and each had the opportunity to apply, role play, and critique some of the aspects of the seminar on an environmental problem involving the public and private sectors. This exchange provided insights into the applicability of negotiating approaches. The business executives in the seminar also shared problems, and the attendees applied negotiating principles in determining the alternatives.

The president of the Negotiation Institute, Gerard J. Nierenberg, stated that "whenever people exchange ideas with the intention of changing relationships, whenever they confer for agreement, they are negotiating." Dr. Israel Unterman, Professor of Management at San Diego State University, amplifies and elaborates on Nierenberg's definition (45): "... rather than occurring in a framework of conflict, negotiation is perceived as taking place in a positive setting of intended cooperation. It is exchanging ideas with the expressed intention of changing relationships. The action is taken neither to widen nor to breach the relationships, but to form a new or different configuration. True, there will be differences of opinions, but this does not automatically imply conflict. On the contrary, when executives involved are skilled at negotiation, one main objective is to create a better, on-going relationship." In short, negotiation is a way of structuring the communication process; it is a positive skill, <u>not</u> the limited, tough-guys-finish-first or win-lose position to which most people relate when negotiation is mentioned. The successful negotiating over the past year is partly due to using the information from the seminar and to the conviction that a "win-win" relationship must exist if quality and timely results or services are to be expected. According to members of the negotiating team, fewer objections were encountered while negotiating TAMRF Proposal 80-424 than any one of the previous BLM contract negotiations.

Before negotiating TAMRF Proposal 80-424, which led to the award of TAMRF-BLM Contract AA881-CT0-25, responsibilities and authority of the negotiator were defined. Expectations, strategies, and decision points were also defined. The negotiator was accountable to the leader for results and performance was measured successfully against the predetermined expected criteria. The negotiator was, in fact, several people, one of whom was the Intern.

The negotiating team also had a decisive leader and spokesman; it was his responsibility to decide roles and strategies for negotiations. The principles, methods, and techniques of negotiating that were applied are common whether one is negotiating a contract for research funds or a contract for labor benefits.

Task No. 4

Another goal was to coordinate the design and method of reporting quality information and results, and to co-author technical reports or articles arising from the contract. By working closely with PIs and managing the tasks necessary to analyze and synthesize data, timely cruise plans, cruise reports, performance reports, and other contract items were delivered (see Table 4, p. 23). We were complimented by BLM for meeting all contractual delivery dates at or below cost. The quality of the results from the efforts of all PIs has also been well received; in fact, three TAMU PIs (Dr. R. Rezak, Dr. T. Bright, and Dr. D. McGrail) have presented expert testimony at several public hearings and are presently preparing for an evidentiary hearing in Houston, TX.

The major contributions in satisfying this task were in organizing, coordinating, and managing the reporting efforts of 14 PIs/Co-PIs. Two of twenty-one chapters in the final report were written by the Intern; the total report was also critiqued and updated. Appendix B has some of the written contributions plus another written segment of the final report (38). A perusal of these references, especially the latter reference, indicates the complexities leading to the accomplishment of the reporting task.

Several subcontracts to support PI efforts were prepared and negotiated. A subcontract to collect bathymetric, geological, and geophysical data was executed for accomplishing some of the geological tasks on the contract. This data was reviewed by PIs, accepted by the Program Manager for TAMRF and BLM, and used to prepare a series of maps. A second subcontract was executed for collecting biological data at the East and West Flower Garden Banks. Other subcontracts were executed for precise navigational services (i.e., LORAC Services Company, Inc., plus navigators) on the chartered vessels. One subcontractor was cited for non-compliance.

The chartered vessels were also subcontracted, scheduled, and mobilized. Unanticipated force majeure such as hurricanes (i.e., Bob, Claudette, David, Elena, Frederic, Henri) and equipment failure were not allowable contingencies on the contracts and amendments had to be proposed and negotiated with BLM upon occurrence. Performance reports cited problems created by force majeure; and, recommendations were implemented by BLM.

Since the goal also included making technical presentations or writing technical articles, the Texas Society of Professional Engineers, Brazos Valley Chapter, was addressed and a paper entitled, "The Role of Industrial Engineering in Oceanography" was presented. Solutions to several engineering problems (e.g., geological surveying, safety, resource management, etc.) were discussed (24).

Task No. 5

The Program Manager was also responsible for the personnel function. A policy of encumbering sufficient funds to cover all personnel costs was developed and enforced. Promotions and/or merit increases were recommended in a timely manner and project funds were always available to satisfy work requirements. While selecting personnel for satisfying job requirements, a set of interviewing questions found to be very effective were developed by the Program Manager. These questions are listed in Table 6. Answers from this structured interview could be supplemented with selected tests such as the Wonderlic Personality test or the Manpower Evaluation Booklet (MEB). Other types of tests could also be administered (i.e., intelligence, physical skills, achievement, aptitude, interest, personality). But the MEB is the only known test providing a scale to identify what motivates the workers.

The MEB has been used successfully in industry to define 18 dimensions of an individual and to identify personality traits that can be used to predict successful results in an organization. For example, one of the personality traits from the MEB, Dominance (D6), is largely determined by heredity; and any permanent personality change would most likely be small. This means an individual must learn to control, not change, his behaviors. A very assertive individual (i.e., Stanine 7-9) will want to control and be in charge automatically; this is a very strong leadership trait. However, there are also negative applications of high assertiveness--a trainee without knowledge or skill wanting to run the show, two employees arguing over a minor

Table 6. Interviewing Guidelines

A. PRE-INTERVIEW

1. Review resume, application, test results (if administered), and references.
2. Evalute technical, managerial, and creative abilities.
3. Establish questions and desired information for proper job-match.

B. INTERVIEW

1. Introduce self and organizations and put applicant at ease.
2. Take notes and communicate questions and answers with understanding.
3. Cover all questions and provide opportunity for dialogue.
4. Evaluate "can do" factors: education, skills, knowledge, intelligence, experience, physical stamina, reliability, sociability, availability, adaptability.
5. Evaluate "will do" factors: stability, loyalty, reliance, perseverance, industry, leadership, initiative, dependability, cooperativeness.
6. Evaluate "motivational" factors: goals, values, attitudes, interests, needs, desires, wants, confidence, accomplishments.

Table 6 (Continued)

7. Evaluate "leadership" factors: self improvement, planning, decision-making, creativity, communication, human relations.

8. Evaluate "managerial" potential: fiscal, personnel, logistics, legal, safety, labor relations, productivity, family, organizational (OD) and human resource (HRD) development.

9. Evaluate emotional maturity: expressiveness, judgement, honesty, decisiveness, stamina, character.

10. Ask key questions:

    a. Tell me about yourself.

    b. Why are you interested in working for us?

    c. Why do you want to leave your job?

    d. Why have you chosen this field?

    e. Why should we hire you?

    f. What are your long range goals?

    g. What is your greatest strength?

    h. What is your greatest weakness?

    i. What is your current salary?

    j. What is important to you in a job?

    k. What do you do in your spare time?

    l. Which feature of the job interests you least?

    m. Which feature of the job interests you most?

    n. How do others describe you?

Table 6 (Continued)

o. What are your plans for professional development?

p. Tell me about your schooling.

C. <u>POST-INTERVIEW</u>

1. Review findings and rate candidate.
2. Confirm findings with references.
3. Evaluate results with associates.
4. Offer opportunity or arrange for more data.
5. Confirm acceptance or denial.

issue, or a subordinate always challenging a superior. As a manager, the goal must be to make these negative situations more positive.

To effectively manage an assertive employee, it is best to delegate an area of responsibility where the individual is in complete control. The individual must understand the results desired and the planning horizon. He should have the flexibility in determining the plan of action for accomplishing the task without being told how and what to do. The manager will become more effective by getting the employee to use his assertiveness with and for the manager, not against.

A highly assertive manager must also be aware of breakdowns in communications. Such a manager can recognize other highly assertive employees rather quickly by recognizing their direct and forceful manners. The manager must then concentrate on the desired results instead of the automatic reaction to their own assertiveness. The manager will not allow an assertive employee to constantly upset him; instead, the manager accomplishes predetermined goals by learning and applying whatever is necessary to motivate the employee. During the Internship, these principles were useful for working with assertive and sometimes uncooperative PIs. Tasks that had not been realized on past contracts were accomplished. The knowledge of personality traits and the subsequent effects on performance helped in persuading PIs to accomplish the timely tasks. Furthermore, the personnel recruited and hired performed in a superior manner. The information gained from the interviews while using the interviewing guidelines (Table 6, p. 63) proved to be reliable.

The specific requirements of the Equal Employment Opportunity Commission were reviewed. The MEB meets empirical, content, and construct validity which are requirements of the Equal Employment Opportunity Commission. Empirical validity refers to the accuracy with which a test score predicts some criterion; content validity refers to the extent to which items in a test seem to represent the behaviors to be measured; and construct validity refers to the extent to which the tests measure psychological qualitities.

The validity of a test is extremely important since it must measure specific parameters; and, it must provide consistent and reliable results. Some test results can be effectively used in the selection process or management of the human resources. However, a user must understand the utility of such results and must understand human resource limitations.

Testing instruments were not used on the project but the MEB was validated with a group of 28 engineers in a professional engineering seminar, i.e., Eng. 681. The composite results are given in Figure 9 and a sample profile is included in Appendix E, along with descriptions of the personality traits. Similar results could be obtained by a manager to help identify strengths and shortcomings within an organization and to assist in the

MANPOWER EVALUATOR SUMMARY

Positions: D. Eng.   DATE: 17 Mar 80

	Aptitude						Personality											
Dimensions / Names*	A1	A2	A3	A4	A5	A6	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	V1	V2
1. 90	7	5	6	6	9	7	3	5	7	5	5	4	3	2	5	4	2	8
2. 75	5	3	4	1	9	7	5	3	7	7	3	8	5	5	5	5	7	7
3. 75	7	5	7	7	8	7	5	5	5	3	7	5	5	2	4	6	7	9
4. 85	5	8	7	5	6	7	2	9	8	1	5	4	1	1	7	2	5	5
5. 95	9	6	6	9	9	6	4	3	2	5	4	7	1	4	6	5	1	6
6. 95	6	2	6	6	9	9	7	5	8	8	3	4	5	8	7	9	1	5
7. 95	8	7	8	9	8	9	1	4	4	1	4	8	6	2	6	5	1	5
8. 85	6	4	7	7	9	7	6	3	4	6	6	5	2	2	1	9	5	6
9. 85	8	6	7	9	7	9	9	3	6	3	6	7	1	4	3	9	5	8
10. 95	7	7	6	9	8	6	4	6	5	3	6	5	3	4	7	5	1	5
11. 85	5	3	7	4	8	9	5	4	4	5	8	5	3	4	5	6	4	7
12. 80	7	4	7	3	5	8	3	5	2	7	5	5	7	3	8	9	6	6
13. 85	5	5	8	5	7	6	3	3	4	5	3	3	5	1	7	6	4	6
14. 90	9	6	6	6	9	9	6	6	4	3	6	5	5	6	8	8	6	9
15. 80	8	5	8	7	9	5	5	1	1	3	1	9	6	1	9	7	8	1
16. 60	8	5	8	7	9	5	2	1	1	3	1	9	6	1	9	7	8	1
17. 95	9	4	7	9	9	8	6	5	4	1	5	6	5	6	5	7	1	6
18. 85	5	4	4	3	8	9	5	3	4	3	5	1	6	6	6	5	5	6
19. 95	7	5	8	7	8	7	4	5	5	1	3	5	4	5	4	5	1	5
20. 90	7	8	8	8	8	7	5	4	4	4	5	7	3	5	5	9	3	7
21. 95	9	6	8	8	9	9	7	4	8	1	4	8	6	8	5	4	1	6
22. 95	8	6	7	7	7	9	2	2	3	3	4	7	5	1	7	6	1	7
23. 85	7	8	7	9	5	8	7	4	1	7	4	9	1	2	5	9	4	6
24. 85	6	5	7	6	7	7	4	6	6	4	6	8	7	2	6	9	5	8
25. 75	7	4	7	2	8	9	4	3	3	1	6	5	7	3	7	5	7	8
26. 85	8	7	8	8	9	9	3	1	4	5	7	8	1	1	7	9	5	3
27. 90	8	3	6	6	6	6	5	8	5	2	7	4	4	6	5	3	2	7
28. 85	4	9	8	5	9	8	7	6	4	2	4	2	5	6	6	5	5	9

* An integer is used to protect the confidentiality of the individuals; the indicated number is the % accuracy of each profile.

Figure 9. MEB Composite Summary for 28 Engineers

planning and executing of human resources and organizational development actions. Results could also be used to establish a baseline for selecting new employees, thus reducing turnover costs. The evaluation did provide an awareness of the personality dimensions of another sample of engineers as an aid in personnel evaluation. The results depicted would be extremely useful to a recruiter who wanted to find the "best" man-job match. With known job requirements and managerial philosophies, the statistical potential for each of the engineers listed could be forecasted. Employee patterns (i.e., Figures E-1 to E-13) that may or may not benefit an individual or company could also be predicted.

The requirements of several statutes relating to maritime employees were also researched. This was necessary because vessels were chartered for at-sea data collection; and, employees from TAMU, TAMRF, University of South Florida (USF), University of Alabama at Birmingham (UAB), and others were on-board the chartered vessels.

As the Program Manager, the "health, safety, and welfare" of all employees was a major concern. We were interested in doing whatever was necessary to prevent injuries and to also minimize liabilities if a maritime employee was injured. Also researched were some of the remedies a maritime employee has against an employer for personal injuries. Briefly, these are:

1. State of Texas Workmen's Compensation Act (TX Rev. Civ. Stat. Ann. Art-8306, ¶8 [1967]) -- Maritime employees covered by the Compensation Act receive the same benefits as non-maritime employees, including possible recovery of exemplary damages based on gross negligence.

2. Longshoremen's and Harbor Workers' Compensation Act (33 USC ¶901-ff) -- Maritime employees all receive the same and, in general, more liberal benefits regardless of the individual state compensation benefits. For example, there is no statutory maximum for permanent disability nor death while most state workmen compensation laws have limits.

3. Outer Continental Shelf Lands Act (43 USC ¶1331-ff) -- This Act states that offshore boundaries for maritime jurisdiction are 3 miles offshore for Louisiana, Mississippi, Alabama, and the East coast of Florida; and, the boundaries for Texas and the west coast of Florida are 10.5 miles (i.e., 3 leagues). Hence, an injury occurring seaward in the Gulf or Atlantic would be covered by this Act.

4. Jones Act (46 USC ¶688) -- This Act allows a seaman (i.e., masters and members of the crew of a vessel) to recover damages for injuries by virtue of the negligence of their employer or someone for whom the employer is responsible. In essence, Congress gave seamen the same rights accorded railroad employees under the Federal Employers Liability Act (45 USC, ¶51-ff) -- In fact, the only way a seaman's claim can be defeated

is to find that the employee was the sole proximate cause of the accident.

To recover for injuries, the seaman must show or certify that:

a. He was a seaman.

b. An employer-employee relationship existed between the seaman and the operator or owner of the vessel.

c. The "negligence of the employer played any part, however small, in the injury or death" as determined by the U.S. Supreme Court in Rogers v. Missouri Pacific Railroad Co., 352 U.S. 500 (1957).

d. The actual and other damages sustained.

5. Doctrine of Unseaworthiness -- Under general maritime law, the doctrine of liability without fault is applicable when seamen can demonstrate injury due to the unseaworthiness of a vessel [T.K. Treadwell, Jr., Capt., USN (Retired), personal communication]. A seaman is entitled to recover damages under the Jones Act even without negligence on the part of the employer. About the only defense an employer has under this doctrine is to show that the seaman personally caused a break to occur resulting, in essence, in a self-inflicting injury.

6. Transportation, Wages, Maintenance, and Cure -- Again general maritime law provides that an injured seaman must be provided first-class transportation from the port of injury to his home base. An employer is also required to provide wages to

the end of a voyage or to the date the seaman is fit for duty, whichever occurs first. An absolute employer liability is the maintenance and cure of a disabled seaman when aboard a vessel. This coverage is relinquished when the seaman is placed in a state-side hospital which comes under the unlimited medical coverage of the Longshoremen's and Harbor Workers' Compensation Act.

7. Indemnity Action by Third Party -- This is an indirect remedy for a seaman; the seaman recovers from his employer and his employer recovers from a third party. An indemnity agreement implies, by law, the contractual relationship between an owner and a stevedoring company hired to load or unload a vessel. This is a contractual right not grounded in tort nor based on tort concepts of negligence. The net result is that the employer pays damages only where an employee could recover compensation benefits directly from his employer. Some of the cases on indirect remedy include:

a. Ryan Stevedoring Co. v. Pan American S.S. Corp. [350 U.S. 124 (1955)];

b. Weyerhaeuser S.S. Co. v. Nacirema Operating Co. [355 U.S. 563 (1958)];

c. Grumady v. Jachim Hendrik Fisser. [358 U.S. 423 (1959)].

The above possible remedies for injuries sustained by a maritime employer or seaman is not inclusive. A seaman may also be able to recover in other ways when his rights have been violated by a third party.

The above enumerated statutes and cases were researched and the requirements were introduced as a potential problem for TAMRF and TAMUS. The TAMRF attorney is researching the facts, and an interim response from the TAMUS attorney indicates that a Texas employer is covered by the State Workman's Compensation Act and not by the other Acts. With personnel from TAMRF and TAMUS on the payroll and on chartered vessels, plus academic subcontractors from UAB, USF, and others who are also on-board the vessels, the interim response is not convincing nor is insurance coverage from the State of Texas adequate. This is an area for further research and should be pursued in depth.

Task No. 6

The reviews of two Environmental Impact Statements (11; 12) for the Office of the Governor, State of Texas, were accomplished and documented. Several federal statutes or Acts (38) were reviewed to obtain an understanding of the responsibilities of selected federal agencies and to provide acceptable critiques. Our critiques and other contractual findings are being included in documents to a federal evidentiary hearing scheduled for July 1981 in the United States District Court, Houston, TX. We have also been asked by several private sources for additional and background information which originated from contractual tasks. Our position has been, and will continue to be, to provide scientific evidence based on factual data which have been collected, reduced, and analyzed by PIs on the project. Scientific opinions and legal questions raised by oceanographers and industrial concerns provided some insights into some of the legal problems faced by the private sector due to environmental laws and other statutes. Insights of the maritime statutes and other laws, although limited, met the D. Eng. criteria.

In summary, law comes from written laws such as constitutions, statutes, ordinances, and treaties; from case law which is based on judicial reviews; and from rules, procedures, and regulations of administrative agencies (7:9). From the point of view of the Program Office, the information and principles from both public and private laws were applied during the Internship.

2ND OBJECTIVE: INDUSTRIAL ENGINEERING

In the previous section, results from the "Project Management" objectives are described. Those results are closely related and integrated with the results from the "Industrial Engineering" objectives described in this section. Some of the information from the engineering graduate courses on the D. Eng. Plan (Table 3, p. 11) also proved to be useful in satisfying these objectives. Especially useful were the contents of the courses on labor relations, engineering economy, ethics, safety, and management. This information was supplemented by the Cost Engineer Skills Course (American Association of Cost Engineers), Art of Negotiating Seminar (Negotiating Institute), and the Joint Operations Planning Course (Armed Forces Staff College).

As a manager and engineer, the program goals were to have productive and cost-effective results and to manage effectively and efficiently all resources. Engineering is defined in Webster's New Collegiate Dictionary as "the application of science and mathematics by which properties of matter and the sources of energy in nature are made useful to man in structures, machines, products, systems, and processes." As stated earlier, industrial engineering is defined as "the design, improvement, and installation of integrated systems of men, materials, and equipment. It draws upon specialized knowledge and skills in the mathematical, physical, and social sciences together with the principles and methods of engineering analysis and design to specify, predict, and evaluate the results to be obtained from such systems." The industrial engineer is responsible logistically for moving and maintaining material, personnel, facilities and services. This latter point helped the Program Manager define resources as "those components necessary to accomplish a specific goal and may include: manpower or personnel, methods or techniques, monies or funds, machinery or equipment, subcontracts or services, space or facilities, data or information, and time." To fail to plan and control these resources on a project will decrease productivity and will lead to cost and time overruns. And, to underestimate costs or to negotiate costs that place constraints on facilities, space, and resources is a much greater failure. These engineering criteria were kept in focus throughout the Internship and used in satisfying contractual requirements. Solutions to any condition that affected the "health, welfare, and safety" or "hours, wages, and working conditions" of project personnel were also pursued. As stated above, a problem presently being researched by organizational attorneys is employee liability for both TAMUS and TAMRF personnel on oceanographic cruises.

Task No. 1

Another goal was to manage effectively a multi-disciplinary research project team and to seek solutions to problems in a matrix or project management environment. This very difficult task was complicated by the lack of understanding or acceptance of matrix management principles by some PIs. For example, contractual responsibility and authority was delegated but the Program Manager was criticized for expecting accountability of timely results and evaluating performance. Some PIs were not accustomed to advanced planning and preparing contractual deliverables in a timely manner on or ahead of schedule. Nor were some willing to accept an evaluation by a non-faculty member. Even so, performance evaluations and merit recommendations from the Program Manager were sources of information for the Department Head to consider.

Another goal was to work cooperatively with all project personnel in a problem-solving attitude. Expected results were documented. Whenever problems were encountered, alternative solutions were presented with recommendations for actions within TAMU, TAMRF, and BLM.

Obstacles within TAMU on hiring and remunerating the most qualified personnel were experienced. Responsibilities were delegated, but authority to hire and promote was vested at the President's level within TAMU. This process could be enhanced by delegating responsibilities and authority at the lowest level in the organization for accountability of results. It is not a sound business practice to expect accountability for results without an equal amount of authority and responsibility--both of which must be written and understood.

The logistics and fiscal requirements of the contract were planned. Alternate approaches to process and reduce data were designed. For example, the PIs were persuaded to consolidate all payroll funds into one account, thus combining 7 sets of data and reducing the paper work by a factor of 6. This provided a more reasonable approach to resource allocations, controls, and personnel funding. In past years some tasks were completed on "company" or "personal" time because of inadequate planning, estimating, or funding. But during the Internship, arrangements were made for every PI to have sufficient funds, personnel, and other resources to accomplish contractual tasks.

Impacts caused by force majeure or by scope changes were properly documented. The costs of the impacts were estimated and funds were obtained. The results depicted in Table 5 (p. 54) illustrate the success pattern of the Program Office.

In addition to the above, a considerable amount of time was used in planning and executing the logistics of sea-going cruises. During the period of Aug 78 to Dec 80, the Program Manager was directly and indirectly responsible for the planning of 34 cruises, the execution of the plans, and the performance reporting for each cruise (37). The logistical management and planning of a cruise required the scheduling of a dock and chartered vessel for mobilization or demobilization, the support equipment (e.g., cranes, etc.) and personnel (e.g., electricians, welders, plumbers, etc.) necessary to mobilize and demobilize equipment on deck of the chartered vessel, the transportation and maintenance of the on-board survey or scientific parties, the work plan coordination, fiscal and contractual administration, safety and other TAMUS or TAMRF requirements, etc. The pre-cruise plans defined the mission of the cruise, the specific data collection requirements and expected results, the schedule and resource allocations, the survey or scientific parties with key personal information, and the delegated tasks for accountability purposes. Needless to say, the mission of a cruise could not be satisfied until all necessary resources had been planned, programmed, scheduled, budgeted, purchased, contracted, and placed on board the chartered vessel.

In 1978, the Program Manager became totally aware of these complexities when some items were inadvertently left ashore and additional transit time (and funds) became necessary for obtaining the items for completing the missions. As stated above, potential problems were resolved with check lists and defined responsibilities. The dual base of operations (i.e., TAMU Campus, College Station, TX; TAMU Marine Operations, Galveston, TX) created logistical problems, but the problems were resolved prior to the scheduled departure date of a cruise. The last departure from College Station did not occur until the requirement list had been verified in Galveston, TX and communicated to the Program Office.

Task No. 2

The Cost Engineer Skills Course was completed in February 1980 in Houston, TX. The course was sponsored by the American Association of Cost Engineers and covered the topics in Table 7. The information from the course provided a refresher on cost engineering principles and methods normally covered in an industrial or management engineering curriculum. It was gratifying to verify the breadth of professional skills and know-how. Furthermore, it was also satisfying to see how industry personnel are attempting to obtain information and knowledge that is provided by the D. Eng. Program at TAMU.

The American Association of Cost Engineers has a Certification Program that covers planning, scheduling, estimating, and controlling functions. An engineer must be experienced, be recommended, pay a test fee, and pass a comprehensive examination to become a Certified Cost Engineer (C.C.E.). An industrial engineer should qualify by training and experience for this Certification Program.

As a personal aid, several texts on cost engineering principles (5; 8; 18; 27; 40; 41; 44; 49) were reviewed. These principles are included in Table 8. This table and references can provide a quick access to cost engineering principles and concepts for evaluating alternatives using one of the economic criteria (5:199): 1) present worth or net present value; 2) equivalent annual worth; 3) benefit-cost ratio or profitability

Table 7. Cost Engineer Skills Course Topics

1. General Knowledge
   a. Time value
   b. Period and costs
   c. Depreciation
   d. Capitalization
   e. Interest
   f. Inflation
   g. Learning curves
   h. Profitability

2. Costs and Controls
   a. Costs
      (1) Construction
      (2) Manufacturing
      (3) Other
   b. Estimating
   c. Planning
   d. Scheduling
   e. Controlling
   f. Working Capital
   g. Elements

3. Cost Topics
   a. Accounting
   b. Economics
   c. Forecasting
   d. Productivity
   e. Indices
   f. Value analysis
   g. Inventory Control
   h. Proposals
   i. Reporting

4. Management Topics*
   a. Project Management
   b. Contract Management
   c. Finanacial Management
   d. Materials Management
   e. Data Management
   f. Society
   g. Techniques
      (1) Optimization
      (2) Inventory Control
      (3) Linear Programming
      (4) Queuing
      (5) Dynamics Programming
      (6) Monte Carlo
      (7) Break-even analysis
      (8) Risk Analysis
      (9) Cost-Benefit Analysis

*Topics on labor relations, quality assurance, and safety engineering should also be included but were not.

TABLE 8. SUMMARY OF COMPOUNDING FACTORS AND DESIGNATIONS

Factor	Find	Given	Discrete Payments Discrete Compounding	Discrete Payments Continuous Compounding	Continuous Payments Continuous Compounding	Figure
Compound-Amount	F	P	$F = P(F/P,i\%,n) = P\,(1+i)^n$	$F = P(F/P,r\%,n) = Pe^{rn}$	$F = P(F/P,r\%,n) = Pe^{rn}$	10a
Present-Worth	P	F	$P = F(P/F,i\%,n) = F/(1+i)^n$	$P = F(P/F,r\%,n) = F/e^{rn}$	$P = F(P/F,r\%,n) = F/e^{rn}$	10a
Present-Worth	P	A	$P = A(P/A,i\%,n) = A\left[\dfrac{(1+i)^n - 1}{i\,(1+i)^n}\right]$	$P = A(P/A,r\%,n) = A\left[\dfrac{e^{rn} - 1}{e^{rn}\,(e^r - 1)}\right]$	$P = A'(P/A',r\%,n) = A'\left[\dfrac{e^{rn} - 1}{re^{rn}}\right]$	10c
Capital-Recovery	A	P	$A = P(A/P,i\%,n) = P\left[\dfrac{i\,(1+i)^n}{(1+i)^n - 1}\right]$	$A = P(A/P,r\%,n) = P\left[\dfrac{e^{rn}\,(e^r - 1)}{e^{rn} - 1}\right]$	$A' = P(A'/P,r\%,n) = P\left[\dfrac{re^{rn}}{e^{rn} - 1}\right]$	10c
Compound-Amount	F	A	$F = A(F/A,i\%,n) = A\left[\dfrac{(1+i)^n - 1}{i}\right]$	$F = A(F/A,r\%,n) = A\left[\dfrac{e^{rn} - 1}{e^r - 1}\right]$	$F = A'(F/A',r\%,n) = A'\left[\dfrac{e^{rn} - 1}{r}\right]$	10b
Sinking-Fund	A	F	$A = F(A/F,i\%,n) = F\left[\dfrac{i}{(1+i)^n - 1}\right]$	$A = F(A/F,r\%,n) = F\left[\dfrac{e^r - 1}{e^{rn} - 1}\right]$	$A' = F(A'/F,r\%,n) = F\left[\dfrac{r}{e^{rn} - 1}\right]$	10b
Uniform-Gradient-Series	A	G	$A = G(A/G,i\%,n) = G\left[\dfrac{1}{i} - \dfrac{n}{(1+i)^n - 1}\right]$	$A = G(A/G,r\%,n) = G\left[\dfrac{(e^{rn} - 1) - n\,(e^r - 1)}{(e^r - 1)\,(e^{rn} - 1)}\right]$		10d
Gradient-Present-Worth	P	G	$P = G(P/G,i\%,n) = \dfrac{G}{i}\left[\dfrac{(1+i)^n - 1}{i} - n\right]\left[\dfrac{1}{(1+i)^n}\right]$			10e

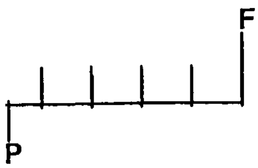

Figure 10a

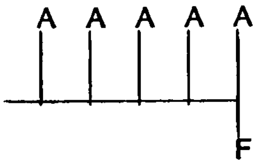

Figure 10b

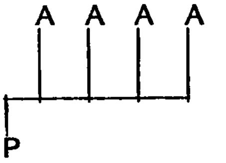

Figure 10c

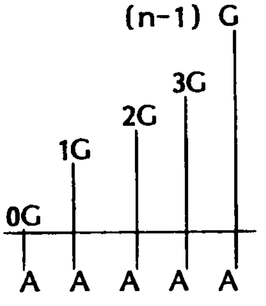

Figure 10d

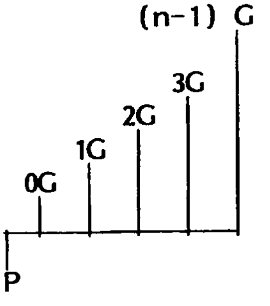

Figure 10e

Figure 10. Cash Flow Diagrams

index; 4) net benefit-cost ratio; 5) Solomon's average rate of return; 6) internal rate of return; 7) MAPI urgency rating; (8) Eckstein benefit-cost ratio. The present worth, benefit-cost ratio, and internal rate of return are essentially the only rational criteria to use since they account for the entire planning horizon of a cash flow and the time value of money. Another criterion, payback, is not acceptable because it ignores the time value of money and future cash flows beyond a payback period.

In 1963, Weingartner (48) published a dissertation showing that the optimal solution to a capital budgeting problem could be obtained by maximizing the objective function of a linear programming formulation for the net present value criterion. In 1958, Hirshleifer (16) had provided a fundamental explanation and had justified the use of net present value as a selection criterion. In 1965, Teichroew et al. (42; 43) analyzed rigorously the internal rate of return and provided the conditions for usage. In 1971, Bernhard (2) compared and critiqued the above eight criteria. Bernhard showed that [2] was a variation of [1], [4] and [5] were equivalent to [3], and [7] reduced to [6]. In 1980, Phung (33) categorized thirty-two methods frequently encountered in economic and engineering analysis of alternatives. Phung showed that 30 methods were variations or derivatives of the discounted cost flow or revenue requirement methods . . . methods based on a discount rate for a given cash flow or on a known discount rate.

In making comparisons of investment alternatives, Dr. D.R. Smith (I. Eng. 666) suggested the following procedure:

1. Define set of feasible mutually exclusive alternatives;
2. Define planning horizon;
3. Develop cash flow profiles;
4. Specify the time value of money;
5. Specify measure of effectiveness;
6. Compare alternatives;
7. Perform supplementary and/or incremental analysis;
8. Select and implement preferred alternative.

During the Internship, alternatives were prepared and submitted with facts to justify proposals. Estimates and cash flows over the planning horizon were prepared as a means of arriving at acceptable cost proposals for satisfying the project RFPs. Gross estimates and project alternatives were discussed with the COAR and Contractor Technical Inspector as a means of determining the availability of funds and the selectability of alternatives. By obtaining pre-proposal data, valuable time and talents were expended on high value requirements and negotiable proposals were formulated. As indicated in Table 5 (p. 54), deliberations and negotiations were most successful.

Cost engineering or engineering economic analysis evaluates choices between executable alternatives. Techniques and strategies normally applied when comparing alternatives on projects were not applied. However, TAMRF could benefit by evaluating the applicability of depreciating techniques and strategies on the purchase of capital equipment. With depreciation, the book value of an asset may become such that cost-sharing proposals would be practical and cost-effective. Switching strategies and investment credits may also be applicable; if so, they should be applied.

Task No. 3

During the Internship, several job analysis methods and techniques (25) were researched. Job specifications and descriptions were prepared; but the methods were not applied in the anticipated detail during the Internship.

Task No. 4

Methods engineering and work measurement principles were applied to assist in estimating and minimizing the logistical costs of oceanographic cruises and other resources. Methods engineering is the systematic recording and critical examination of existing and proposed ways of doing work as a means of developing and applying more efficient and effective methods. Work measurement is the application of techniques designed to establish the time for a qualified employee to accomplish a specified job or tasks at a defined level of performance.

Skills, efforts, consistency, and environmental work conditions were considered during logistical coordination and at-sea operations. Environmental conditions were of utmost concern, especially during winter cruises when oceanographic and atmospheric conditions were abnormal (e.g., 25 foot seas). During one cruise when such conditions created hazardous and safety problems, the mission was aborted. The vessel's Captain, with over 20 years of operations in the Gulf of Mexico, had never witnessed such severity. The electronics in some of the data collection equipment were heavily damaged and had to be completely restructured.

The methods used in analyzing samples and data were documented. Technicians were interviewed and time estimates were obtained for some work tasks (These are on-going efforts.). Time for researchers is also hard to quantify; and the time spent on writing proposals, estimating costs, negotiating funds, and managing project funds and schedules precluded completing this task (i.e., systematically recording and examining research methods and procedures) during the Internship.

<u>Task No. 5</u>

Engineering tasks were directed by the Program Manager who was also the project engineer. PIs, Research Associates, and electronic technicians were encouraged to analyze systems and components and find better methods or procedures. The Profiling-Hardwired Instrumented Sensor for Hydrographic (PHISH) Integrated Data System was conceived when project personnel began to investigate methods to reduce time and cost and to increase productivity both at sea and in the laboratories. The state-of-the-art instrumentation system provided at least a 10-fold increase in data collection with a 4-fold decrease in time, and replaced the previous profiling current meter and several individual data collection systems. Decreases in time were significant when at-sea cost for a fully-founded vessel exceeded $8000 per day.

The system provided the opportunity for a scientist or physical oceanographer to collect and record on a single cast simultaneous data and profiles at 1/6 meter intervals from a temperature probe, a conductivity probe, a depth sensor, a light emitting diode transmissometer, and a profiling current meter. In addition, water samples and temperatures were obtained with a 5 litre Niskin bottle and an ANSI calibrated thermistor. The temperatures and the water samples were used for calibrating temperature and salinity; the water samples were also used to determine the suspended sediments in the bottom boundary layer.

The data from the conductivity and temperature probes were used to determine salinity. The profiling current meter data consisted of the (x, y) component of the velocity vector; the z component was rejected. The depth sensor measured pressure in contrast to a fathometer which measures the time delays of a signal; both instruments are used to measure the depth of water.

A microprocessor recorded the data; in addition, navigational references (fixes) were recorded and integrated with the physical oceanography data allowing for more precise station locations after vessel drift and other factors affecting ship movement were computed. This process, even though it increased the volume of data, significantly reduced the time for collection, reduction, and processing the data. Furthermore, the total integrated system provided first-class facilities both at sea and in the laboratory. Dr. D. McGrail and our associates were complimented for their creative efforts. For their accomplishments with PHISH, members of the project team were also recognized with merit promotions. Many long hours were expended by the electronics technician, J. Stasny, and an associate, D. Horne, to design, integrate, and test the components to produce a total system. Without their efforts and assistance, the PHISH System would still be on the drawing board.

Engineering drawings of the system are contractually required by BLM. A preliminary sketch and schematic have been prepared (Figures 11 and 12) and are being updated. System integration, engineering designs, procurement, and economic analysis/cost reductions were areas of participation; and, it was indeed gratifying to be a contributing member.

Task No. 6

The major contribution in the data management efforts was in convincing some PIs of the utility of data and word processing facilities. A multitude of plans and reports were prepared in a professional and timely manner (38). A threefold cost reduction in secretarial services was experienced by using word processing equipment. Several analytical processes were modified and integrated into computer processes to eliminate or minimize manual

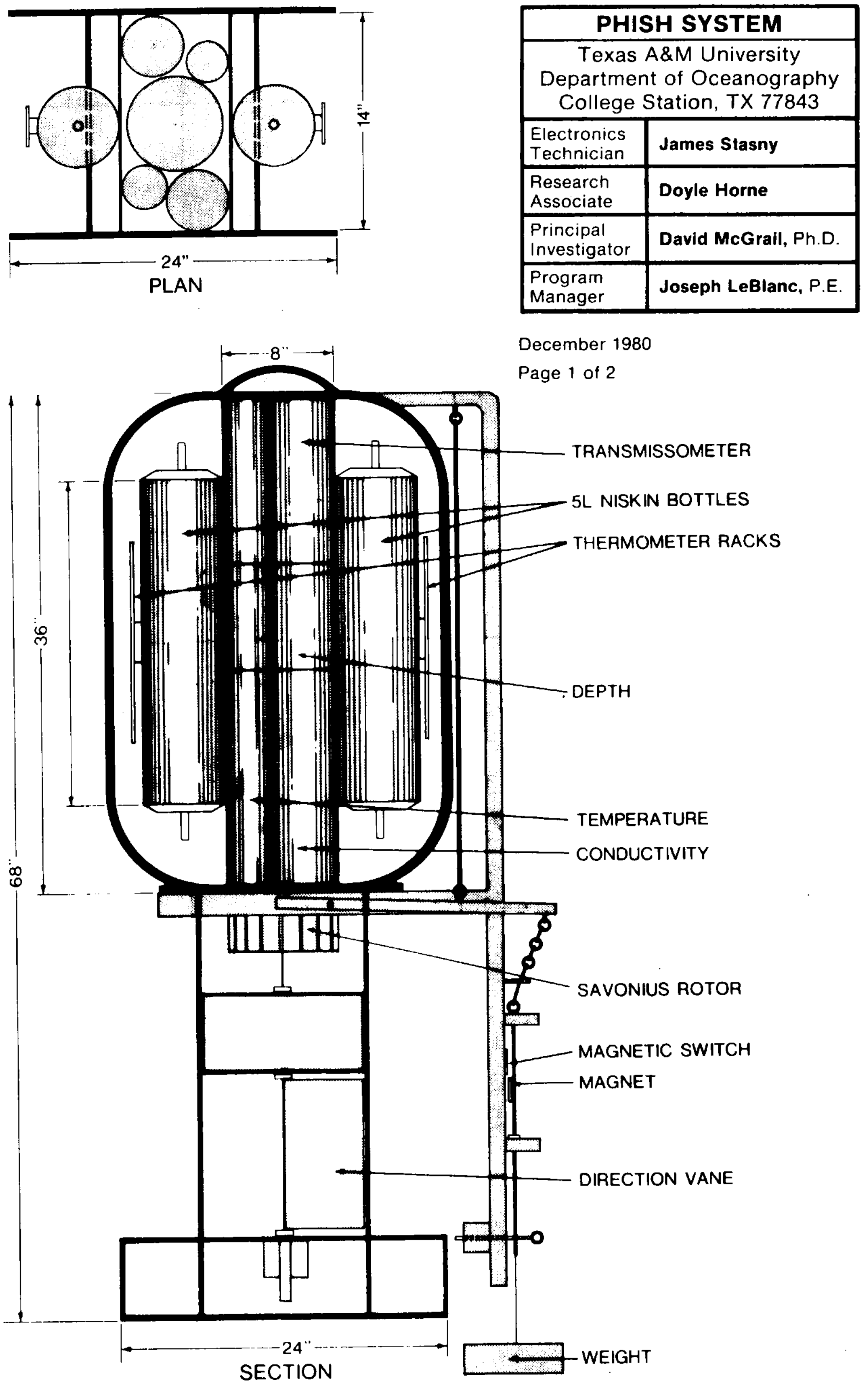

Figure 11. Preliminary Sketch, PHISH System

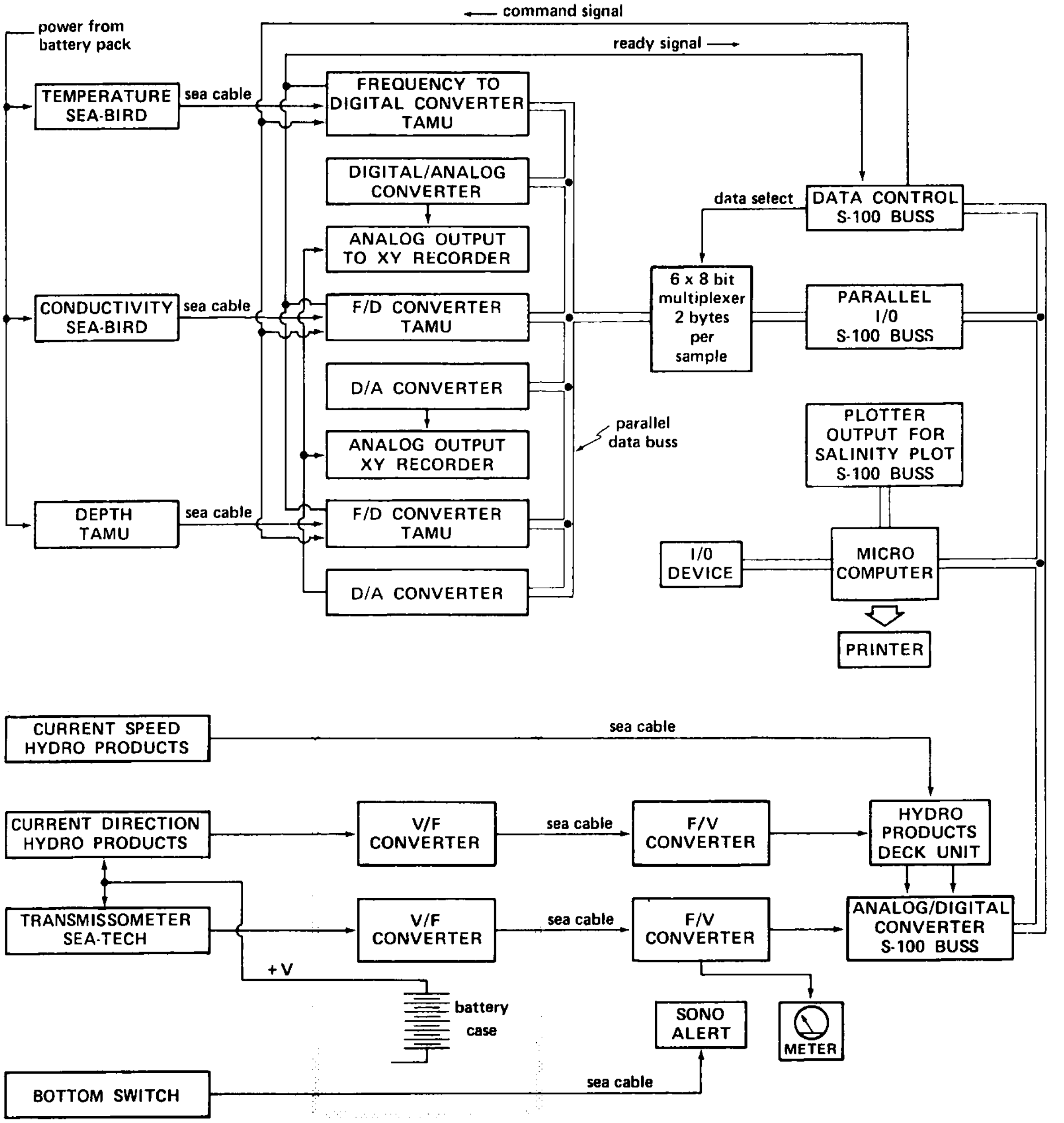

Figure 12. Preliminary Schematic, PHISH System

handling of data and to expedite processing for synthesis efforts. Data products were computer generated to satisfy some PI and contractual requirements. The methods and procedures were documented and all are set forth in the reports (37; 38).

More in-depth analysis will be required to synthesize the data collected. This will require the use of computers and the manipulation of large biological/geological data bases.

Task No. 7

Another goal was to volunteer as a Commercial Arbitrator to the Brazos Valley Better Business Bureau. To accept this challenge, the graduate labor relations courses taught by Dr. M.J. Fox, Jr., and the Art of Negotiating Seminar were completed. Applicable laws and statutes, labor relations data, and information from the American Arbitration Association (e.g., "Voluntary Labor Arbitration Rules" [46], etc.) were also reviewed. An appointment to arbitrate one dispute during the Internship was received, but project priorities precluded acceptance.

According to Dr. M.J. Fox, Jr., disputes or grievances occur whenever individuals are unfairly treated or agreements are violated and a resolution by the parties cannot be reached. Labor laws (i.e., Wagner Act of 1935, Taft-Hartley Act of 1947, Landrum-Griffin Act of 1959) provide the foundation for a very complex system of rules, procedures, regulations and decisions that protects against unfair wages, hours, and conditions of employment (9; 35). Other laws have also been implemented to cover the health, safety, and welfare of the public (1). Canon I of the Code of Responsibility for Professional Engineers in the State of Texas states that "the engineer's paramount professional responsibility should be the safety, health, and welfare of the general public" (22). The professional arbitrator understands these principles and laws and applies procedures accordingly.

In a labor dispute over a discharge case, an arbitrator may be asked to rule on "proper" discharge and "just" remuneration. The normal criteria for discharge include (I. Eng. 611 handout): (1) Was the employee forewarned? (2) Was the employer's position reasonable with respect to the employee's conduct? (3) Did the employer investigate the incidents prior to the discharge actions? (4) Was the investigation fair? (5) Does substantial evidence support the charges? (6) Was there no discrimination? and, (7) Was the degree of discipline reasonable for the offense and for the past record of the employee? An affirmative answer to these questions would normally sustain a discharge.

During the Internship, several employees were terminated; and, the above guidelines were followed. For example, job descriptions were prepared. The specific tasks, responsibilities, resources, and limits of authority were documented and discussed with the employees. The expectations and consequences were also documented and accepted (signed) by the employees and the supervisors. One employee made a careless error that was hazardous and caused damages in excess of $8000. This was after repeatedly being warned verbally and in writing; hence, the employment termination was justified.

While conducting an arbitration, the following checklist is suggested (I. Eng. 611 handout).

1. Document attendance at arbitration.

2. Open hearing, specify the rules, and obtain concurrence.

3. Specify method of recording and payment, and request permission for taping.

4. Request permission to publish award and/or use the case for educational purposes.

5. Obtain acceptable sequestering of witnesses.

6. Swear in witnesses.

7. Define joint exhibits.

8. Define stipulations such as "grievance is properly before the arbitrator" and parties "waive an arbitration panel."

9. Obtain a statement of the issue.

10. Obtain opening statements.

11. Have parties present the case with witnesses and exhibits.

12. Summarize the case orally at the hearing or written with or without post hearing briefs (if briefs, define due date and handling procedure).

13. Define due date for trail transcript.

14. Request from parties the number of copies of the award.

15. Verify billing source(s) and procedure.

16. Ask if anyone has anything else to add to the case.

17. Adjourn the hearing.

The above is a reminder of the arbitration process and a reference to questions associated with labor relations. Other references can be derived from the Labor Law Reports (21), Public Employee Bargaining (36), Employment Practice Guide (10), Labor Arbitration Awards (19), or Labor Arbitration Reports (20). Elkouri and Elkouri (9:652-666) also provided a table of offenses for some relevant and useful cases.

3RD OBJECTIVE: OTHER

As stated in Chapter I, personal, professional, civic, and community objectives to enhance total professional growth were also planned. The goal was to actively participate in civic or professional functions as a participant, leader, or speaker. This was accomplished by participating in ancillary activities which are briefly describe below. The results include, but are not limited to, the following:

1. Presented a talk to the Texas Society of Professional Engineers, Brazos Valley Chapter, entitled "The Role of Industrial Engineering in Oceanography."

2. Managed the publicity and profitable fund raising for the American Institute of Industrial Engineers Region IX Fall Conference in College Station, TX.

3. Completed the Art of Negotiation Seminar, Cost Engineer Skills Course, Joint Operations Planning Course, National Military Strategy Course, Personal Stress Management Seminar, Hersey-Blanchard Tri-Dimensional Leadership Seminar, and courses on my D. Eng. Degree Plan.

4. Accepted the appointment as the state coordinator for requests related to the certification programs sponsored by the Institute for Certification of Computer Professionals; answers to questions related to professional requirements, testing, etc., were provided.

5. Participated in community service projects through the Lions International; arranged presentations by J. Lawrence, III, Esq., ("Medical Liabilities") and by L. Kitzmiller ("What can an EMT do for you?") for the College Station Noon Lions Club.

6. Represented citizens on the College Station Consolidated Independent School District Communication Council and also represented parents and students on the A&M Consolidated High School Communication Council, College Station, TX.

7. Advised as Co-Director to the Catholic Youth Organization at St. Mary's Catholic Church, College Station, TX.

8. Represented citizens on the University Relations Committee, Chamber of Commerce, Bryan-College Station, TX.

9. Performed USAF Ready Reserve duties in a unit recognized with the Outstanding Unit Award.

10. Selected by the Engineers Joint Council to appear in Who's Who in Engineering, 1980.

11. Completed the D. Eng. degree plan courses.

As stated in the Internship plans, objectives were to have been pursued and results documented. This chapter has documented the results and, in the next and final chapter, conclusions and recommendations are set forth.

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CHAPTER III

The Guy in the Glass

"When you get what you want in your struggle for self
And the world makes you "King" for a day
Then go to the mirror and look at yourself
And see what that guy has to say

For it isn't your father, or mother, or wife
Whose judgement upon you must pass
The fellow whose verdict counts most in your life
Is the Guy staring back from the glass

He's the fellow to please - never mind all the rest
For he's with you clear to the end
And you've passed your most dangerous, difficult task
If the guy in the glass is your friend

You may be like Jack Horner and "Chisel" a plum
And think you're a wonderful guy
But the man in the glass says you're only a bum
If you can't look, him straight in the eye

You can fool the whole world down the pathway of years
And get pats on the back as you pass,
But your final reward will be heartaches and tears
If you've cheated the guy in the glass."

Dale Wimbro

CHAPTER III

CONCLUSIONS AND RECOMMENDATIONS

INTRODUCTION

The objectives and goal of the Program are documented in Appendix A; D. Eng. goals and Internship objectives are documented in Chapter I; and, Internship results are documented in Chapter II. In this Chapter III, conclusions and recommendations are set forth. These conclusions and recommendations could lead to more Internships within TAMUS or TAMRF and could increase productivity within these matrix or project management environments.

CONCLUSIONS

A broad-based background proved to be invaluable in dealing with the opportunities presented during the Internship. Resources were organized, planned, and directed to assure the timely delivery of highest quality reports to the Bureau of Land Management. Diligent efforts were required to maintain fiscal and administrative flexibility required for oceanographic research, logistical management, and data/sample collection within the rather rigid framework of TAMU and TAMRF. The production, submission, and/or negotiation of 20 proposals totaling over $7 million were managed. Creative talents for improving or modifying existing processes and systems were supported as means of enhancing research and protecting the "health, safety, and welfare" of the personnel. "What are the alternatives?" and "What are the ranges of cost?" were repeatedly used as a successful means to instill creativity. All feasible and cost-effective efforts were endorsed.

Upon reviewing results and accomplishments during the Internship, one can conclude that the objectives of the Program were satisfied. As stated in Chapter I, the objective of the D. Eng. Program is to educate engineers who: (1) are technically competent; (2) understand the social, political, environmental, and other factors which shape modern technology; and, (3) can operate in the interface between society and technology, articulating technological alternatives to non-engineers. A graduate engineer must have expertise in finance, management, ethics, law, and related subjects and must have technical, managerial, and personal know-how, skills, and attributes to lead an organization and achieve predetermined performance, productivity, and profit goals. One can also conclude that the overall Internship objectives were satisfied by: (1) demonstrating managerial and engineering abilities; (2) solving industrial and matrix management problems; (3) participating in executive decision-making with non-engineers; and, (4) applying traditional and non-traditional engineering analysis and design (e.g., planning and cost engineering, logistics and safety engineering, estimating and business development, negotiating and contracts administration, methods engineering and work measurements, etc.).

These conclusions are based on the results of the Internship documented in Chapter II. However, the Internship also provided the opportunity to identify organizational problems that must be legally and politically resolved. Some of these problems include:

1. What is the most effective matrix or project management organization for TAMUS and TAMRF?

2. What organization (i.e., TAMUS, TAMRF) is legally liable for business development?

3. What is the appropriate fiscal support and overhead distribution for projects? Why is there "fiscal" discrimination among TAMUS components?

4. What standard performance rating system can be used to measure and evaluate results from professional and administrative personnel?

5. What standard performance rating system can be used to measure and evaluate results from faculty members and to integrate timely and quality results with teaching excellence?

6. What is the most effective and efficient use of automation for project support?

7. What is the most reasonable remuneration system for supporting personnel on research funding?

8. What legal precedence can be used to delegate responsibility and authority at the lowest level in an organization for accountability of results?

9. What organizational entities could provide opportunities for internships?

10. What is the proper procedure for handling grievances from administrative and professional personnel and/or faculty members? What actual and fiscal recourse can a grievant follow when TAMUS is backed by state appropriations and resources?

The above cited problems must be solved within the organizations and should provide opportunities for other internships within the TAMUS and TAMRF environments. Where else could an intern learn about professional engineering, fiscal accountability, business development (i.e., RFPs, proposals, negotiations, contracts), basic and applied research, and the multitude of personalities in the educational-research environments. Therefore, this report is concluded with a set of recommendations.

RECOMMENDATIONS

Recommendation No. 1 -- I recommend TAMUS and TAMRF formally recognize the existence of the matrix management structure and implement actions accordingly.

By implementing this recommendation, solutions to matrix or project management problems would become apparent. The matrix structure needs to be defined in such a manner that leadership does not have a division of responsibility and authority. Functional and project managers must be responsible to top administration and jointly direct personnel beneath them. The personnel in this environment must clearly understand procedures for integrating goals, plans, budgets, and resource allocations. Functional managers and joint managers each must monitor and evaluate their resources according to some predetermined criteria. Both have obligations to satisfy personal and organizational goals; it behooves top administration to formally delegate responsibility and authority for accountability of results. Managers must also understand and agree to the cooperative behavior necessary in a matrix.

Employees must learn more about teamwork, group dynamics, and cooperation. The beliefs, values, standards, and attitudes of employees must be integrated with a reasonable and acceptable reward system or the matrix will fail. Top administration must also ensure a balance between performance, schedules, and cost. They must be careful not to sacrifice technological performance to the needs of cost and schedules. Top administration must also deal with power struggles and not let employees play one boss against another. They must allocate necessary resources and hold project managers liable for the success and timeliness of projects.

The goals of the organization must be evaluated with its assets and liabilities. Personnel resources can be an asset or a liability depending on the willingness and ability of the personnel to adjust in a "two-boss" matrix environment.

How should the matrix system be implemented in the TAMUS and TAMRF environments? This is indeed a complicated problem cutting across project and functional lines within both TAMUS and TAMRF. A cadre of professional project managers need to be hired to manage performance, time and cost of projects. These managers must be technically competent and have fiscal and managerial expertise--managers with training similar to the Doctor of Engineering Program. In fact, once the matrix system is acknowledged, internships in a multitude of disciplines could and should be developed.

The matrix management system with its team of project managers would satisfy dual roles. The functional manager and subordinates would be TAMUS employees; the project managers would be employed by both TAMUS and TAMRF. Dual employment would protect an employee against being terminated by TAMU between contracts or grants and would protect TAMUS and the employee against legal liability for business development. For example, some TAMUS employees are being illegally paid when funded full-time on a grant or contract at which time they are also developing proposals for additional work. Any reasonable amount of dual support from TAMUS and TAMRF would eliminate this problem in fiduciary responsibility.

Recommendation No. 2 -- I recommend full-time TAMUS personnel on 100% research funds be placed on both TAMUS and TAMRF payrolls.

An alternative to the dual payroll is to have project managers funded totally or partially by TAMUS. This would open avenues for eliminating the money problem cited above.

Recommendation No. 3 -- I recommend a portion of overhead funding be distributed to projects in an equitable manner.

It is frustrating when fund distributions are made to components of TAES, TEES, TTI, etc., and not to components of TAMU. Researchers will migrate to the source of funds and TAMU stands to lose valuable personnel and incur expensive turnover costs.

Recommendation No. 4 -- I recommend a reasonable system of criteria and performance standards for non-faculty members be developed, published, and enforced within TAMUS and TAMRF.

The TAMU performance rating discriminates or ignores the performance of administrative and professional personnel. Performance rating and merit increase guidelines do not exist, or are limited, at best. Both the project manager or functional manager in a matrix management environment must be evaluated against predetermined criteria. The performance and productivity of all matrix members must also be evaluated justly. Results are measurable! Were they cost-effective? Was the product quality outstanding and timely? Were results performed voluntarily or with persuasion? Was the sponsor's acceptance outstanding? With reservations?

If the present arrangement of having project managers perform tasks for both TAMU and TAMRF continues, a performance evaluation needs to consider inputs from both organizations. A manager that does not consider and evaluate all inputs on a continuous basis would not be properly performing his duties.

Recommendation No. 5 -- I recommend Department Heads and Deans at TAMU formally include performance evaluations from non-faculty members in the rating process.

A faculty member may be an excellent educator, an outstanding and prolific writer, but a complete failure in delivering timely results on a contract. Specific performance on a contract is a major cause of legal recourse. The ideal educator may be an outstanding teacher and motivator of students. Or he may be an outstanding teacher, researcher, or writer. Or he may be all the above and also a manager. Regardless, if results are not timely and of acceptable quality, then the individual and organization (i.e., TAMU, TAMRF) both have not performed according to expectations. Standards of performance and procedures are needed and should be administered throughout the organizations.

Recommendation No. 6 -- I recommend the project or matrix management organization be supported with appropriate management tools.

The present practice is to develop individual accounts for each project on a contract. This is an acceptable practice; however, project managers need composite management summaries. PIs can control research funds, but administrative funds should be controlled from a single account on a contract.

A centralized word processing center independent of the TAMU Data Processing Center needs to be established to process proposals, reports, contracts, etc. State-of-the-art systems using optical scan readers and remote entry devices are cost-effective in the TAMUS and TAMRF environments and need to be implemented. Word-processing units should also be installed at the operating levels.

Recommendation No. 7 -- I recommend all support personnel on research funds be allocated a minimum 10% risk factor.

Personnel working at TAMUS and TAMRF who are not identified as "line" enjoy the risk of not having a job when research funds are depleted. This group of personnel are highly talented and a valuable asset. The "risk" factor would be paid as an incentive for this set of valuable personnel to stay at TAMUS and minimize turnover costs.

Recommendation No. 8 -- I recommend that the delegation of responsibility and authority be established at the lowest level in the organization.

A legal precedence needs to be established for project managers to hire qualified talents at prevailing salaries without having to obtain the permission of the TAMU President or Vice President. An effective manager knows what is expected and controls his resources accordingly. His expectations are communicated to subordinates, problems are solved at the working levels, and alternatives are presented on problems requiring executive decisions. It is not cost-effective nor proper management to involve high-level administrators and executives in local decisions.

Recommendation No. 9 -- I recommend internship opportunities be made available within TAMUS and TAMRF.

The Texas A&M University System and Research Foundation environments have untold opportunities for energetic young scholars and engineers to learn and apply their skills and abilities. The realm of federal procurement regulations, contract and agency laws, business development (RFPs, proposals, etc.) and negotiation, inter- and multi-discipline projects, planning and controlling, labor and human relations, budgeting and fiscal accountability, marine operations, etc., are just a few of the many avenues available for internships. The TAMU Advisor could be available locally and the intern would be contributing and obtaining valuable experience. This arrangement would be cost-effective for both the intern and organization.

Recommendation No. 10 -- I recommend an enhancement to the TAMU or TAMUS arbitration system.

Presently the arbitration procedure at TAMUS is advisory in nature and not necessarily binding on the administration. Furthermore, all University resources are available to oppose the grievant. TAMUS employees should be defended against unjust administrative actions; an equal amount of funds should be provided the employee and administrator(s) in a dispute. A standard for arbitral review, such as the U.S. Arbitration Act [Title 9, USC ¶1-14 (43 Stat. 883); codified 30 Jul 47 (61 Stat. 669); amended 3 Sep 54 (68 Stat. 1233; amended 31 Jul 70 (84 Stat. 692)], should be developed and implemented.

TAMUS could also benefit tremendously with an effective "suggestion" system. Overhead or "line" funds could be used to reward suggestions that implement new ideas, reduce costs, etc. Such a system could be controlled by the employees under policy direction of the TAMUS Chancellor or TAMU President.

Recommendation No. 11 -- I recommend a course in the Art and Fundamentals of Negotiating be approved as a required D. Eng. Course at TAMU.

The D. Eng. Program has an effective curriculum for developing fiscal, managerial, and other skills necessary for an engineer to become more productive. However, there is a need to present the contents of a course solely in the Art and Fundamentals of Negotiating. This course must not only cover negotiating skills but the elements of verbal and non-verbal communication, personal leadership, and motivation.

A graduate engineer in the D. Eng. Program will have to negotiate an internship and a salary; he will also have to negotiate a vocational opportunity that will be rewarding and fulfilling. The contents of the recommended course would be most helpful in providing short- and long-term benefits. TAMU is a leading academic and research institution; if Harvard University, the University of Michigan, and San Diego State University can offer courses in "The Art and Fundamentals of Negotiating," then a similar course should be available at TAMU.

CONCLUDING REMARKS

This report is summarized by thanking the Advisory Committee, matrix management colleagues and associates, and all who made this Internship possible. Furthermore, the experiences and knowledge gained will have untold benefits in future endeavors and I am grateful.

The conclusions and recommendations cited above will enhance the organizations. I strongly endorse the recommendations especially formally recognizing the matrix management structure and implementing positive actions accordingly. The question of unfair wage practices and procedures also needs to be addressed at an early date. Failure to address these problems will cause personnel turnovers, reduce productivity, and increase cost. In this period of inflation, taxpayers are looking for cost reductions in government; and it is our professional responsibility to help in this endeavor.

APPENDICES

"When there is a will
there is a way . . .
Striving for perfection
is the ultimate goal."

Joseph U. Le Blanc

LIST OF APPENDICES

APPENDIX A

"The extent of the extra effort you exert can directly affect your advancement. The future is full of promise for one who shows initiative."

Author Unknown

APPENDIX A

DOCTOR OF ENGINEERING PROGRAM

INTRODUCTION

The Program was approved at TAMU in 1974 through the cooperative efforts of educational, governmental, and industrial representatives. Succinctly, the objective of the Program is to educate engineers who: (1) are technically competent; (2) understand the social, political, environmental, and other factors which shape modern technology; and, (3) can operate in the interface between society and technology, articulating technological alternatives to non-engineers. Industry, government, and society demand that a graduate engineer also have expertise in finance, management, ethics, law, and related subjects to function effectively in the business world. The goal is an engineer with technical, managerial, and personal know-how, skills, and attributes who can lead an organization or projects and achieve predetermined goals in performance, productivity, and profits.

Entry into the Program may occur at the undergraduate or graduate level. Applicants may be admitted as: (1) a junior or senior with a 2.5/4.0 grade point ratio (GPR) while at TAMU; (2) a graduate with a 3.0/4.0 GPR and an engineering degree accredited by the Engineers Council for Professional Development; or, (3) a graduate with a Master of Engineering Degree and a 3.25/4.0 GPR. The applicant must complete: (1) the Nelson-Denny Reading Test; (2) the Minnesota Engineering Analogies Test; (3) the

Graduate Record Examination; (4) the University, College and/or departmental applications; and, (5) a 300 word essay on career objectives. The application and supporting documents are processed through and by a program coordinator in one of the engineering departments. An interview for the applicant is subsequently arranged by the coordinator before an Admissions Committee who can accept the application or recommend other actions.

Once admitted the candidate must maintain a 3.25/4.0 GPR and be enrolled each semester in a professional engineering seminar (Eng. 681). The candidate must complete: (1) at least 96 semester hours above a bachelor's degree; (2) a 170-hour written and oral examination (i.e., qualifying examination), which is normally administered when the Master of Engineering Degree is completed; (3) an 8- to 12-month Internship that can be tailored especially for an employer and the intern engineer; and, (4) an oral examination prior to completing the Doctor of Engineering requirements. This education plan normally requires 3 years to complete (i.e., 4 regular semesters at 16 hours, 2 summer semesters at 8 hours, and the Internship with 16 hours credit [Eng. 684]). The Internship requirements are described in the next section.

INTERNSHIP

Objectives

The objectives of the Internship are to enable the engineer, in an organizational environment, to (1) demonstrate abilities, (2) apply know-how and technical training, (3) contribute in solving industrial or organizational problems, (4) function in the environment and become aware of problem-solving approaches, and (5) apply traditional engineering analysis and design to organizational problems. The approaches may include, but are not limited to, problems in management, labor relations, public relations, environmental protection, economics, etc; and, the Internship experience should be such that it would satisfy some of the requirements for a Registered Professional Engineer in the State of Texas.

Intern Supervisor

During the Internship a person with management level status should make work assignments. The supervisor could be the immediate manager, or, in the event several work tasks are assigned, could be someone at a higher level of management who supervises various areas. The intern advisor should also be a practicing professional engineer.

Confirmation Procedure

University policies require that the person recommended as intern supervisor or advisor submit a resume to the attention of the Chairman of the Advisory Committee of the student engineer.

This Committee reviews the resume and a letter recommending appropriate actions is submitted by the Chairman to the Deans of the College of Engineering and Graduate College. The College of Engineering considers the intern advisor as a full member of the Advisory Committee and the Graduate College considers the advisor as a non-voting member of the Graduate Committee. (Note: The Advisory and Graduate Committees are requirements of the Engineering and Graduate Colleges, respectively; and members can serve both requirements.)

Internship Procedure

The Office of the Dean of Engineering maintains a file of organizations with internship opportunities. The student engineer selects potential employers and negotiates an internship. The Advisory Committee provides advice but the engineer and employer negotiate the job description and salary. Normally, prior to employment, a set of Internship objectives is prepared by the intern engineer and submitted for approval by the employer and Advisory Committee. These objectives are updated during the second month of the Internship and submitted for approval to the Chairman of the Advisory Committee. At the end of the Internship, the engineer prepares an Internship Report to document the extent that each objective was met.

Reporting Procedure

Intern's Interim Reports The intern engineer summarizes work tasks and reports monthly to the Chairman of the Advisory

Committee. During the second month the approved objectives are reported.

Intern Supervisor's Reports The intern supervisor evaluates the intern engineer and reports to the Chairman during and at the end of the Internship. The reports comment on the performance of the intern as a practicing engineer and evaluate the extent to which each of the objectives were satisfied. These reports are submitted at three-month intervals or as agreed by the Chairman, intern, and supervisor.

Internship Report The intern completes and submits three (3) copies to the College of Engineering. Guidelines for this report have been specified, and the topics that should be addressed are:

a. Internship objectives

b. Intern's position, technical, and administrative duties

c. Intern supervisor and the organization

d. Details of a specific assignment including:

1. Objective
2. Task description
3. Administrative assignment
4. Non-technical problems
5. Method or approach
6. Information sources and discussion
7. Consequences of assignment
8. Contributions to related assignments.

REFERENCES

1. "Guidelines for Industry Participation in the Doctor of Engineering Internship"; Texas A&M University, College of Engineering, College Station, TX (Revised, June, 1979).

2. "Guidelines for Doctor of Engineering Report"; Texas A&M University, College of Engineering, College Station, TX (Undated).

3. "Information for the Prospective Student"; Texas A&M University, College of Engineering, College Station, TX, July, 1978.

4. "Instructions Concerning the Preparation of Proposals, Thesis Dissertation, and Records of Study"; Texas A&M University, Graduate College, College Station, TX (Revised, September, 1979).

5. "Instruction for the Preparation of Doctor of Engineering Internship Reports"; Texas A&M University, College of Engineering, College Station, TX (Undated).

6. Rodenberger, C.A.; "Education for the Engineers of the 1980's and Beyond--The Doctor of Engineering Degree"; Frontiers in Education Conference Proceedings, pp. 41-45, 1980.

APPENDIX B

"My Creed"

"I do not choose to be a common man.

It is my right to be uncommon--if I can. I seek opportunity--not security. I do not wish to be a kept citizen, humbled and dulled by having the state look after me.

I want to take the calculated risk; to dream and to build, to fail and to succeed.

I refuse to barter incentive for a dole. I prefer the challenges of life to the guaranteed existence; the thrill of fulfillment to the stale calm of utopia.

I will not trade freedom for beneficence nor my dignity for a handout. I will never cover before any master nor bend to any threat.

It is my heritage to stand erect, proud and unafraid; to think and act for myself, enjoy the benefit of my creations and to face the world boldly and say, this I have done.

All this Is what it means to be an American."

Dean Alfange

NORTHERN GULF OF MEXICO TOPOGRAPHIC FEATURES STUDY

FINAL REPORT

VOLUME ONE

Submitted to the
U.S. Department of the Interior
Bureau of Land Management
Outer Continental Shelf Office
New Orleans, Louisiana

Contract No. AA551-CT8-35

Department of Oceanography
Texas A&M University
College Station, Texas

Technical Report No. 81-2-T

Research Conducted Through
the Texas A&M Research Foundation

MARCH 1981

VOLUME ONE
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CHAPTER I

INTRODUCTION

J. Le Blanc

STUDIES

This report was prepared to satisfy the tasks specified in the U.S. Department of the Interior (DOI), Bureau of Land Management (BLM) Contract #AA551-CT8-35. The contract was awarded in August 1978 to Texas A&M University (TAMU) through the Texas A&M Research Foundation (TAMRF). Subcontracts were subsequently awarded to the University of Alabama at Birmingham (UAB), Dauphin Island Marine Laboratory; the University of Texas at Austin (UTA), U.T. Marine Science Institute (UTMSI); the University of South Florida (USF) at Tampa; and several private service organizations including LGL, Inc., Oceanonics, Inc., Sealfleet Operations, Inc., and Lorac Service Corp.

The main purpose of the study was to gather data from selected areas and topographic features in the Gulf of Mexico, and then reduce, map, analyze, synthesize, integrate, and report findings and conclusions. Geological, chemical, physical, geophysical, and biological oceanographic data were collected from the Florida Middle Ground (off the west Florida coast) and from twelve topographic features off the Louisiana-Texas coast: Alderdice, Applebaum, Coffee Lump, Diaphus, Elvers, East Flower Garden, Fishnet, Geyer, Jakkula, Rezak-Sidner, West Flower Garden, and 32 Fathom Banks.

This report presents the findings of the work performed during the period August 1978 to November 1980 and extends the efforts begun in 1961 by researchers from TAMU on a cruise to the West Flower Garden Bank conducted by R. Rezak on the R/V HIDALGO.

In previous BLM-funded studies, beginning in 1974, TAMU oceanographers characterized the geology and biology of 28 banks in the northwestern Gulf of Mexico. The present study adds eight banks to this list and provides additional information on four banks previously studied: Applebaum (previously called Little Sister), 32 Fathom, and the East and West Flower Garden Banks.

Descriptive reconnaissance studies were completed in 1978 for the Florida Middle Ground and Alderdice, Applebaum, Coffee Lump, Diaphus, Elvers, East Flower Garden, Fishnet, Geyer, Jakkula, Rezak-Sidner, West Flower Garden, and 32 Fathom Banks. These studies assessed the geology and biology of the banks as observed from the submersible DRV DIAPHUS. In addition, a variety of special studies were conducted at Alderdice, Coffee Lump, Diaphus, East and West Flower Garden, Fishnet, and Jakkula Banks. Chemical analysis of sediments for trace metals, high molecular weight hydrocarbons, Delta C-13, and total organic carbon was conducted for Coffee Lump and the East and West Flower Garden Banks. At the East and West Flower Garden Banks, chemical analysis of <u>Spondylus</u> and certain fish species for trace metals and high molecular weight hydrocarbons was also undertaken. Study of the size distribution and mineralogy of the surrounding sediments was done at Alderdice, Applebaum, Coffee Lump, Diaphus, East Flower Garden, Fishnet, Jakkula, and 32 Fathom Banks. Chemical analyses of the water column for nutrients, dissolved oxygen, and low molecular weight hydrocarbons were done at the East and West Flower Garden Banks. The study of the distribution of reworked fossil coccoliths on the South Texas Outer Continental Shelf, initiated during 1976 under BLM Contract #AA550-CT6-18, was continued.

The East Flower Garden Monitoring study was continued and resulted in data in the following areas: coral and coralline algae population estimates; growth and mortality of hermatypic corals; recruitment and early growth of corals; coelenterate larvae and other zooplankton; leafy algae populations; and the brine seep.

Studies at the West Flower Garden Bank included mapping, hydrocarbon analysis, and monitoring. The new maps (generated through more sophisticated techniques than were previously available) and the results of hydrocarbon analysis are reported herein. The monitoring study, identical to that at the East Flower Garden Bank, was initiated under the present contract, but reports on these studies were earmarked for BLM Contract #AA851-CT0-25.

This report is organized in six volumes. Volume One includes a chapter on program management, special chapters on geological, biological, and hydrographic studies, and a summary and recommendations chapter. Volume Two contains a general methods chapter and chapters on chemical analyses and the fossil coccolith study. Volume Three is devoted entirely to the East and West Flower Garden Banks, and Volume Four reports the geological and biological characterization of ten other banks in the northern Gulf of Mexico, each one comprising a separate chapter. Volume Five includes all data from the Florida Middle Ground study, including methods, mapping, physical and chemical oceanography, geology, and biology. The last volume is an Executive Summary Report.

BACKGROUND

The U.S. Department of the Interior has been mandated by federal statutes to conduct critical or information gathering studies in waters adjacent to the continent. The information from such studies is used to make policy and management decisions on oil and gas related activities in the open waters. The Office of Management and Budget (OMB) has a priority system to rank all mandated and/or critical studies, and the Government Accounting Office (GAO) oversees the expenditure of funds approved by the United States Congress. The Bureau of Land Management, U.S. Geological Survey (USGS), and others are responsible for the DOI studies.

The Department of Transportation (DOT) has been mandated other sea-related responsibilities handled by the U.S. Coast Guard (USCG). The Environmental Protection Agency (EPA), Department of Commerce

(DOC), Department of Defense (DOD), and others have also been mandated responsibilities related to pollution, marine environments, and marine resources. These mandated responsibilities are sometimes overlapping and have affected progress in some marine studies.

The relevant public laws, acts, or orders include:

Clean Air Act of 1963, 42 USC 1857 et seq., PL 88-206 (Agency: EPA); amended: 1966, 42 USC 1857c, 1857l, PL 89-675; 1970, 42 USC 1857b et seq., PL 91-604; 1977, 42 USC 7401 et seq., PL 95-95.

Clean Water Act of 1977, 33 USC 1251 et seq., PL 94-217 (Agency: EPA).

Coastal Zone Management Act of 1972, 16 USC 1451 et seq., PL 92-583 (Agency: DOC, National Oceanographic and Atmospheric Agency [NOAA], and Office of Coastal Zone Management [OCZM]); amended: 1976, 16 USC 1451,1453 et seq., PL 94-370.

Deepwater Port Act of 1974, 33 USC 1501, PL 93-627 (Agency: DOC, NOAA).

Endangered Species Act of 1973, 16 USC 1531-43, PL 93-205 (Agency: DOI, Fish and Wildlife Service [FWS]; and DOC, National Marine Fisheries Service [NMFS]).

Environmental Quality Improvement Act of 1970, 42 USC 4371 et seq., PL 91-224 (Agency: EPA).

Federal Water Pollution Control Act of 1960, 33 USC 1251 et seq., PL 92-500 (Agency: EPA); amended: 1961, 33 USC 466 et seq., PL 87-88; 1972, 33 USC 1251 et seq., PL 92-500.

Fishery Conservation and Management Act of 1976, 16 USC 1801-1883, PL 94-265 (Agency: DOC, Regional Fishery Management Councils; DOT, USCG).

Land and Water Conservation Fund Act of 1965, PL88-578, 16 USC 460d, 4601-4 et seq. (Agency: DOI, FWS).

Marine Mammal Protection Act of 1972, 16 USC 1361 et seq., PL 92-522 (Agency: Marine Mammal Commission; DOI, FWS; DOC, NMFS).

Marine Protection, Research, and Sanctuaries Act of 1972, 33 USC 1401 et seq., PL 92-532 (Agency: EPA).

Marine Resources and Engineering Development Act of 1966, 33 USC 1101 et seq., PL 89-454 (Agency: National Council on Marine Resources & Engineering Development; Commission on Marine Science, Engineering & Resources).

National Environmental Policy Act of 1969, 42 USC 4321 et seq., PL 91-190 (Agency: Council on Environmental Quality [CEQ]).

Natural Gas Act (Emergency), PL 95-2, 91 stat. 4 (Agency: Federal Energy Regulatory Commission [FERC]).

Natural Gas Act (Hinshaw), 15 USC 717, 68 stat. 36 (Agency: FERC).

Natural Gas Policy Act of 1978, 92 stat. 3350, PL 95-621 (Agency: FERC).

National Historic Preservation Act of 1966, 80 stat. 915 (Agency: Advisory Council on Historic Preservation; USGS); amended: 16 USC 470 et seq., PL 89-665.

Natural Gas Pipeline Safety Act of 1968, 49 USC 1671 et seq., PL 90-481 (Agency: DOT, Technical Pipeline Safety Standards Committee); amended: 1976, 49 USC 1671, 1674, 1680, 1683 et seq., PL 94-477; 1974, 49 USC 1674, 1684, PL 93-403.

Oil Pollution Act of 1961, 33 USC 1001 et seq., PL 87-167 (Agency: Bureau of Customs; DOT, USCG); amended: 1973, 33 USC 1001 et seq., PL 93-119.

Outer Continental Lands Act of 1953, 67 stat. 462 (Agency: DOI, BLM).

Outer Continental Oil Shelf Lands Act of 1978, 43 USC 1331 et seq., PL 95-372 (Agency: DOI, BLM).

Ports and Waterways Safety Act of 1972, 33 USC 1221, PL 92-340 (Agency: USCG).

In addition to the above cited acts, international agreements have also been executed as a result of the 1954 International Convention for the Prevention of Pollution of the Sea by Oil, the 1958 Geneva Convention on the Continental Shelf, and others. These agreements and acts illustrate the complexities of actions and/or studies and the requirements for executive level decisions on matters related to the oil and gas development process.

With few exceptions, the process includes: 1) exploration by private or public enterprises; 2) leasing by the BLM Outer Continental Shelf (OCS) Office; 3) exploratory and development drilling by the lease owner; 4) completion of units, and production and distribution of hydrocarbons by lease owner; and 5) distribution of funds as per lease agreement.

During the exploration phase, survey cruises are deployed to the proposed OCS leased areas for gathering seismic and geological data. These data are reduced, processed, analyzed, and synthesized by potential lease owners to determine the potential and economics of oil and gas production. To exploit these resources, potential lease owners must bid for the proposed areas through BLM. Bidding is required before exploratory drilling can commence on the federally owned OCS lands.

Other requirements must also be met, including those of BLM, USGS, EPA, DOT, and NOAA.

Once these requirements are met, exploratory drilling can commence, with an average of four exploratory wells per tract being drilled. This exploratory process will confirm the quantity and quality of hydrocarbons to determine the range and extent of the oil and gas reservoirs and also to determine optimal locations for production platforms. Then the lease owner prepares and submits development plans to the USGS and other agencies to determine compliance with safety and environmental specifications. These plans are approved, production platforms are emplaced, and production drilling commences, with the number of platforms and wells per tract dependent on the reservoirs. Normally, the lease owner will build two platforms and drill up to forty wells per tract (personal communication).

BLM is responsible for obtaining biological, geological, ecological, and other data for preparing an Environmental Impact Statement (EIS) prior to awarding a lease. The specific requirements of the aforementioned acts are considered in determining the type, quality, and quantity of data and information necessary. All required data that are not readily available must be collected, reduced, analyzed, and synthesized into meaningful information. This information is subsequently used to make policy and management decisions on OCS matters.

CHAPTER II

PROGRAM MANAGEMENT

J. Le Blanc

INTRODUCTION

Project and data management on this contract have been directly supervised by the Program Manager, who is, in the words of the contract, "responsible for the administrative, logistical, financial, and scientific" work efforts and who holds "sufficient authority to insure the timely, efficient, and competent accomplishment of all work." The Program Manager has worked directly with the two Technical Directors, one geological and one biological, as well as with all Principal Investigators (PIs) in satisfying the tasks or items specified in the Statement of Work.

The requirements in the Statement of Work were specified in order to obtain information that could be used by BLM and others in making policy and management decisions, in developing Environmental Impact Statements, lease stipulations, etc., and in supporting other mandated requirements. For example, information in this report was used in February 1980 at a public hearing on the Flower Gardens Marine Sanctuary, in the EIS for lease sales 58A, 62A, and 62 (BLM, 1979a,b), in the draft EIS on the Flower Gardens Marine Sanctuary (NOAA, 1979), in the BLM Fiscal Year Regional Studies Plan (BLM, 1978), in the development of EPA and NOAA monitoring efforts, etc. Several PIs have also discussed and shared findings and implications at professional and technical conferences and meetings.

The Contractor was obligated to provide all necessary labor, material, supplies, equipment, facilities, and services to accomplish the specified work items. These work items were as follows:

1. Develop and operate from a program management plan.
2. Plan and conduct a field sampling program in the northern Gulf of Mexico and the Florida Middle Ground.
3. Plan and conduct submersible studies and mapping.
4. Reduce, analyze, and synthesize data for the above tasks.
5. Manage and archive scientific data.
6. Prepare and submit plans, maps, and reports.

The Program Manager was also responsible for planning the work tasks and assessing and reporting to BLM the status in terms of accomplishments, cost, and time. Table II-1 provides a list of the plans and reports prepared, and this final report provides the integrated efforts of all contributors. The Management Plan provided the framework for planning and assessing performance in terms of accomplishments, time, and costs. The Logistics Plan provided a similar framework for planning and assessing the field sampling program, submersible studies, mapping, and logistics. The fiscal and personnel resources, materials, facilities, and services were planned and coordinated so as to maximize results. Each Pre-Cruise Plan stated the objectives, expected results, and resources necessary to accomplish the stated objectives. Within thirty days after each cruise, cruise reports were prepared and submitted to BLM. In each cruise report, the planned activities were described and all deviations from the Pre- Cruise Plan were documented and reported, with appropriate recommendations. Some recommendations were approved by BLM and incorporated as contract modifications and scope changes. Scope changes were also initiated by BLM. Table II-2 provides a breakdown of all contract modifications; all requirements have been addressed in this report.

PROJECT MANAGEMENT

Introduction

To satisfy the requirements of the contract, the Contractor established the BLM Program Office at TAMU and assigned the necessary resources. The Program Manager was delegated the responsibilities and authority for logistical, financial, administrative, and contractual functions, as well as the responsibility for coordinating the scientific work of the PIs accountable for specific tasks.

The Program Manager and TAMRF developed and executed subcontracts and agreements for services, equipment, and materials. The Program Manager and the Technical Directors, in addition to having PI responsibilities, were tasked with the technical review and acceptance of deliverables from PIs and subcontractors.

Personnel, Contracts, and Logistics

Table II-3 provides a list of Pis as well as their associates and subcontractors. Table II-4 tabulates contract modifications and the associated period of performance for each PI. An analysis of these two tables tends to identify the management and logistics complexities of the contract, as amended. The original Statement of Work was altered with ten contract modifications. Briefly, the requirements in these modifications were as follows.

Modification #1

The Contractor and the The University of Alabama (UAB) subcontractor were provided overrun funding to complete the recovery of data and samples from the Florida Middle Ground. Their scheduled cruise had first been delayed by subcontract negotiations, and when the cruise did get underway, bad weather prevented accomplishment of two-thirds of the planned work.

Modification #2

The Contractor and TAMU were provided overrun funding to complete the recovery of data and samples from the East Flower Garden Bank and other banks. Work had been delayed by bad weather.

Modification #3

BLM extended the scope of the contract to include additional work at the East and West Flower Garden Banks. TAMU was required to conduct a submersible and SCUBA diving cruise, collect seasonal data and samples from the two banks, and map the West Flower Garden Bank. Only East Flower Garden data were to be interpreted and included in the present final report. West Flower Garden data were to be interpreted and reported on the succeeding contract (i.e., #AA851-CT0-25).

Modification #4

BLM extended the scope of work to include collection and analysis of post-IXTOC sediment samples at the East and West Flower Garden Banks.

Modification #5

The Contractor and TAMU were provided overrun funding to complete the tasks added under Modifications 3 and 4. This work had been delayed by hazardous atmospheric and oceanographic conditions.

Modification #6

The Contractor and UAB were provided overrun funding to complete the recovery of data and samples from the Florida Middle Ground. The cruise was shortened due to Hurricane Bob, and deployed instruments had to be recovered.

Modification #7

BLM extended the scope of work to include several sampling, equipment recovery, and SCUBA diving cruises for the collection of seasonal data and samples from the East and West Flower Garden Banks.

Modification #8

BLM extended the scope of work to include organizing and conducting a technical workshop in New Orleans, LA, and publishing the proceedings of this workshop.

Modification #9

BLM extended the scope of work to compensate requirements not properly covered in the original contract nor in subsequent modifications.

TABLE II-1
REPORTS AND PLANS PREPARED FOR TAMRF & BLM
(Contract #AA551-CT8-35)

REPORT	DATE
MANAGEMENT PLAN	Sep 78
LOGISTICS PLAN	Sep 78
QUARTERLY SUMMARY REPORTS	
(1) Aug 78 - Nov 78	Jan 79
(2) Dec 78 - Feb 79	Mar 79
(3) Mar 79 - Jun 79	Aug 79
(4) Jul 79 - Oct 79	Dec 79
PERFORMANCE REPORT	
Nov 79 - Jun 80	Jun 80
SPECIAL REPORT (COFFEE LUMP)	Jan 79
PRECRUISE PLANS	
1st Mapping	Sep 78
2nd Mapping	Jul 79
1st Submersible	Sep 78
2nd Submersible	Aug 79
1st Diving	Sep 78
2nd Diving	Dec 78
3rd Diving	Mar 79
4th Diving	May 79
5th Diving	Dec 79
1st Monitoring	Sep 78
2nd Monitoring	Jan 79
3rd Monitoring	Apr 79
4th Monitoring	Jul 79
1st Seasonal	Dec 78
2nd Seasonal	Mar 79
3rd Seasonal	May 79
Summer Sampling	May 79

REPORT	DATE
CRUISE REPORTS	
Mapping Cruise	
(1) 12 Aug - 4 Oct 78	2 Nov 78
(2) 29 Jul - 4 Aug 79	5 Sep 79
Submersible Cruises	
(1) 26 Sep - 15 Nov 78	20 Feb 79
(2) 27 Aug - 26 Oct 79	21 Nov 79
Diving Cruises	
(1) 28 Sep - 20 Oct 78	15 Feb 79
(2) 15 Jan - 4 Feb 79	9 Mar 79
(3) 26 Mar - 30 Mar 79	25 Apr 79
(4) 18 Jun - 11 Jul 79	15 Aug 79
(5) 15 Jan - 21 Jan 80	Jan 80
Monitoring Cruises	
(1) 25 Sep - 2 Oct 78	31 Oct 78
(2) 7 Feb - 14 Feb 79	9 Mar 79
(3) 28 May - 4 Jun 79	29 Jun 79
(4) 27 Aug - 31 Aug 79	28 Sep 79
Seasonal Cruises	
(1) 11 - 18 Jan 79	13 Feb 79
(2) 18 - 30 Apr 79	28 May 79
(3) 9 - 19 Jul 79	5 Sep 79
Retrieval Cruise	
(1) 31 May - 3 Jun 79	13 Jun 79
Summer Cruise	
(1) 18 Jun - 28 Jun 79	5 Sep 79
PROCEEDINGS: GULF OF MEXICO INFORMATION TRANSFER MEETING (12-13 May 80)	Oct 80

TABLE 11-2
BREAKDOWN OF CONTRACT MODIFICATION (COSTS/DESCRIPTION)
(BLM-TAMRF Contract #AA551-CT8-35)

Document	Initiator	Description	Effective Date	Amount	Subtotals
Contract #AA551-CT8-35		Contract let 26 Aug 78	5 Aug 78	$1,919,563	$1,919,563
Mod. 1.	UAB*	(a) Overrun funding (weather) (b) Extend period of performance to Feb 80	17 Mar 79	11,290	1,930,853
Mod. 2.	TAMU	Overrun funding (weather)	28 Jun 79	139,198	2,070,051
Mod. 3.	BLM	(a) Add a 79 summer monitoring cruise to EFG/WFG (b) Extend period of performance to May 80	13 Jul 79	397,558	2,467,609
Mod. 4.	BLM	(a) Add sample collection for HMWH analysis	30 Aug 79	50,330	2,517,939
		(b) Redirect funds from Mod 2		-24,990	2,492,949
Mod. 5.	TAMU	Overrun funding (weather)	28 Sep 79	108,444	2,601,393
Mod. 6.	UAB*	Overrun funding (weather and equipment recovery)	2 Feb 80	38,138	2,639,531
Mod. 7.	BLM TAMU	(a) Add funds to continue monitoring (b) Replace current meters (c) Extend period of performance to Dec 80	1 Dec 79	127,157	2,766,688
Mod. 8.	BLM	Conduct workshop	1 May 80	20,808	2,787,496
Mod. 9.	TAMU	Corrections to original contract and Mod. 3	28 Sep 80	73,958	2,861,454
Mod. 10.	TAMU	Transmission of STOCS data to Smithsonian Institute	1 Dec 80	4,900	2,866,354

*University of Alabama at Birmingham Subcontract #L800166

Table II-3
PI'S, ASSOCIATES, AND SUBCONTRACTORS

1. Texas A&M University (TAMU), College Station, TX
    a. Joseph U. LeBlanc, P.E., C.D.P., Program Manager
       (Rose Norman, Ph.D., Associate)
    b. Richard Rezak, Ph.D., PI and Co-Technical Director
    c. Thomas J. Bright, Ph.D., PI and Co-Technical Director
    d. C.S. Giam, Ph.D., PI (Subcontractor)
       (Grace Neff, Ph.D., Associate)
    e. Stefan Gartner, Ph.D., PI
    f. Thomas Hilde, Ph.D., PI
       (George Sharman, Ph.D., Associate)
    g. David W. McGrail, Ph.D., PI
       (Doyle Horne, Associate)
    h. Bobby J. Presley, Ph.D., PI
       (Paul Boothe, Ph.D., Associate)

2. University of Texas Marine Science Institute (UTMSI), Port Aransas, TX, Subcontract #L800167
    a. Patrick Parker, Ph.D., PI
       (Dan Boatwright, Associate)
    b. Richard Scalan, Ph.D., PI
    c. Kenneth Winters, Ph.D., PI

3. University of Alabama at Birmingham (UAB), Dauphin Island Sea Laboratory (DISL), Mobile, AL, Subcontract #L800166
    a. Thomas Hopkins, Ph.D., PI
    b. W.W. Schroeder, Ph.D., PI

4. University of South Florida (USF), Dept. of Marine Science, Tampa, FL, Subcontract #L800165
    a. Larry Doyle, Ph.D., PI
    b. John Steinmetz, Ph.D., PI

5. LGL Ecological Research Associates, Bryan, TX, Subcontract #L800137
    a. Benny Gallaway, Ph.D., President
    b. Greg Boland, Diving Scientist
    c. Larry R. Martin, Diving Scientist

6. Oceanonics, Inc. (OI), Houston, TX, P.O. #P36189
    a. Jack O. Hill, President
    b. Lou Andrus, Marine Operations
    c. Thomas Sellers, Hydrologist

7. Sealfleet Operators, Inc. (SOI), Galveston, TX, Subcontract #L800164
    a. John Bissell, President

8. Lorac Service Corp., (LORAC), Houston, TX, P.O. #P36846
    a. Max Huff, President

TABLE II-4
CHANGES IN PERIOD OF PERFORMANCE
(TAMRF-BLM CONTRACT AA551-CT8-35)

PIs/Co-PIs	Contract Modifications Changing Scope										Final Period of Performance,
	1	2	3	4	5	6	7	8	9	10	Aug 78 to
Bright, T.J.			X	X	X			X	X	X	Mar 81
Doyle, L.									X	X	Mar 81
Gartner, S.									X		Aug 80
Giam, C.S.			X								Feb 80
Hopkins, T.	X					X			X	X	Mar 81
Hilde, T.									X	X	Mar 81
LeBlanc, J.U.	X	X	X	X	X	X	X	X	X	X	Mar 81
McGrail, D.W.		X	X	X	X		X	X	X	X	Mar 81
Parker, P.			X						X		Aug 80
Presley, B.J.			X						X		Aug 80
Rezak, R.		X	X	X	X			X	X	X	Mar 81
Scalan, R.			X						X		Aug 80
Schroeder, W.	X					X			X	X	Mar 81
Steinmetz, J.									X	X	Mar 81
Winters, K.			X						X		Aug 80

Modification #10

The Contractor was provided funding for transmission of STOCS data to the Smithsonian Institute.

Services Provided by Subcontractors
(Table II-3)

Chemistry

The researchers from the University of Texas performed the analysis of sediments for high molecular weight hydrocarbons, Delta C-13, and total organic carbon. The Environmental Service Section of the TAMU Department of Chemistry performed analysis of Spondylus and macronekton samples for high molecular weight hydrocarbons. (Trace metals analysis of Spondylus and sediments was not subcontracted, but handled through a PI in the Chemical Oceanography Section of the TAMU Department of Oceanography.)

Biology

LGL, Inc., Bryan, TX, conducted all four biological monitoring cruises to the East and West Flower Garden Banks and assisted in the experimental design of the monitoring studies.

Mapping

Oceanonics, Inc., Houston, TX, collected bathymetric, seismic, and other geophysical data, and delivered the bathymetric maps of the Northern Middle Ground and the nine northern Gulf of Mexico banks. PIs at TAMU prepared the seafloor roughness, structure, and other pertinent geological maps.

Florida Middle Ground

Biological and geological studies at the Florida Middle Ground were handled through two subcontractors. Scientists at the University of Alabama at Birmingham, Dauphin Island Sea Laboratory, were tasked with biological reconnaissance and sampling, and conducted all cruises to the Florida Middle Ground. Analysis of geological samples was handled by scientists in the Marine Science Department, University of South Florida. These two subcontractors collaborated in the synthesis of findings. TAMU supported the characterization efforts by mobilizing the M/V RED SEAL and the DRV DIAPHUS for deep submersible operations. TAMU also prepared the geological maps. UAB took responsibility for reporting the integrated work efforts at the Florida Middle Ground.

Cruises

To support the acquisition of geological and biological data, fourteen vessels were leased in connection with eighteen cruises (see

Table II-5). For TAMU cruises, the mobilization of each vessel was accomplished at the docks at TAMU Marine Operations, TAMU/Galveston, Pelican Island, TX. Local welders, plumbers, and electricians, together with TAMU technicians, provided the necessary services. Other facilities in Galveston were used when necessary to satisfy mobilization and logistical requirements. Florida Middle Ground cruises were mobilized by the University of Alabama subcontractor.

Special Equipment

In the course of the contract, special equipment was obtained from a variety of vendors. Nine current meters, Model 550, were obtained from Hydro Products, Inc., San Diego, CA. Six LED transmissometers were obtained from Sea Tech, Corvallis, OR, to be integrated with the current meters (see Volume Two, Chapter VII).

Time, Funds, Space

The period of performance for all work tasks was originally negotiated at eighteen months, ending in February 1980. Force majeure, changes in the scope of work, and other proposed changes extended the period of performance for some of the work tasks to March 1981 (Table II-4, above). These changes increased the funding by approximately 49%.

The BLM Program Office was established in the Oceanography and Meteorology building at TAMU. Space was allocated for professional, technical, administrative, and support personnel. Data, records, and samples were stored and processed in the various laboratories on the TAMU campus. The analytical processes leading to the integration and synthesis of data into meaningful information were also performed in these laboratories. The facilities include the following:

Atomic Absorption Laboratory
Cartographic Services Unit
Center for Geodynamics
Center for Sedimentology
Center for Trace Characterization
Data Processing Center with Amdahl 470V-6 System
DRV DIAPHUS
Electron Microscopy Laboratory
Electronic Technician Shop
Gas Chromatography-Mass Spectronomy Laboratory
Geophysical Laboratory
Hydrocarbon Chemical Analytical Laboratories
Hydrology Laboratory
M/V GYRE
Machine Shop
Marine Operations Center
Nuclear Science Center
Photographic Laboratory
Rudder Meeting Center
Sedimentology Laboratory
X-Ray Diffraction Laboratory

DATA MANAGEMENT

Introduction

The management and processing of information and data are critical to overall performance in a contract. The data on this contract have

TABLE 11-5
SUMMARY OF CRUISES

CRUISE		DATES AT SEA	SHIP	SITE	CHIEF SCIENTIST	REPORT DATE
1st Mapping	Leg 1	12 Aug-29 Aug 78	JOYRO	FMG	Rezak	
	Leg 2	30 Aug-16 Sep 78	JOYRO	FMG	Hilde	2 Nov 78
	Leg 3	17 Sep- 4 Oct 78	JOYRO	NW Gulf	Rezak	
2nd Mapping		29 Jul- 4 Aug 79	PROTON	WFG	Rezak	5 Sep 79
1st Submersible	Leg 1	26 Sep-20 Oct 78	GYRE	COF/EFG	Bright	
	Leg 2	4 Oct- 8 Oct 78	GYRE	EFG	McGrail	20 Feb 79
	Leg 3	9 Oct-25 Oct 78	GYRE	11 banks	Rezak, Bright	
	Leg 4	4 Nov-13 Nov 78	RED SEAL	FMG	Hopkins	
2nd Submersible	Leg 1	5 Sep-18 Sep 79	BLACK SEAL	EFG/WFG	Rezak, McGrail	
& Boundary Layer	Leg 2	21 Sep-28 Sep 79	BLACK SEAL	EFG/WFG	Bright	21 Nov 79
	Leg 3	12 Oct-21 Oct 79	ROSS SEAL	EFG/WFG	Rezak, Horne	
1st Monitoring		25 Sep- 2 Oct 78	TONYA & JOE	EFG	Martin (LGL)	31 Oct 78
2nd Monitoring		7 Feb-14 Feb 79	TONYA & JOE	EFG	Martin (LGL)	9 Mar 79
3rd Monitoring		28 May- 4 Jun 79	TONYA & JOE	EFG	Martin (LGL)	29 Jun 79
4th Monitoring		27 Aug-31 Aug 79	TONYA & JOE	EFG	Martin (LGL)	28 Sep 79
1st Diving		28 Sep-20 Oct 78	BELLOWS	FMG	Hopkins	15 Feb 79
2nd Diving		15 Jan- 4 Feb 79	BELLOWS	FMG	Hopkins	9 Mar 79
3rd Diving		26 Mar-30 Mar 79	ROUNSEFELL	FMG	Hopkins	25 Apr 79
4th Diving		19 Jun-11 Jul 79	BELLOWS	FMG	Hopkins	15 Aug 79
5th Diving		15 Jan-21 Jan 80	ROUNSEFELL	FMG	Lutz 3	Jan 80
1st Seasonal		11 Jan-18 Jan 79	BERING SEAL	EFG	Horne	13 Feb 79
2nd Seasonal		18 Apr-30 Apr 79	MEDITERRANEAN SEAL	EFG	McGrail	28 May 79
3rd Seasonal		6 Jul-19 Jul 79	BERING SEAL	EFG	Horne	
Summer Sampling		18 Jun-28 Jun 79	BERING SEAL	6 banks	Rezak	5 Sep 79
Current Meter Retrieval		31 May- 3 Jun 79	PETE & SUE	EFG	Barrow	13 Jun 79
Recovery/Deployment/ Monitoring	Leg 1	7 Dec 79	GYRE	EFG/WFG	Barrow	
	Leg 2	16 Dec 79	INVADER	EFG/WFG	McGrail	
	Leg 3	15 Feb-23 Feb 80	BERING SEAHORSE	EFG/WFG	Vlada	May 80
	Leg 4	17 Apr-18 Apr 80	COLD HARBOR	aborted	Horne	
	Leg 5	22 Apr-25 Apr 80	GYRE	EFG/WFG	Horne	

been voluminous and technical (e.g., integrated current meter and transmissometer time series data), complicated (e.g., biological data), and crucial (e.g., bathymetric data). The functions associated with the management of data have included: total system planning, data and sample collection, data reduction, data and sample analysis, data integration and synthesis, data evaluation and reporting, and data base generation and archiving. Once the data and samples were processed by the PIs, scientific techniques were applied, and, in a cognitive manner, data were integrated and synthesized into meaningful information for this report.

Data Manager

The functions and responsibilities of the data manager were manyfold, including the following:

1. Assisting PIs with data and information requirements.

2. Defining requirements associated with collection, reduction, analysis, reporting, quality and inventory control, man-machine interfaces, data integration and synthesis, and data base structures for processing and achiving data.

3. Managing the digitizing of data and preparing acceptable tabular and graphical representations of analytical data.

4. Integrating data bases and preparing support computer programs and other software.

5. Assisting the Program Manager and PIs in selecting hardware, software, and firmware.*

6. Verifying the data bases and archiving them in the NOAA Environmental Data Information System (e.g., NODC and NGSTDC formats).

These functions illustrate the need for total information system planning so that components can be monitored and evaluated. The system components started with the field sampling efforts and culminated with reports and correct data bases.

Data/Sample Collection

To satisfy the field sampling program, vessels were mobilized and deployed to collect samples and data. There were five types of data collection cruises: mapping, submersible, monitoring, seasonal sampling, and diving.

*"Firmware" refers to hardware computer programs.

Field Mapping Tasks

The field mapping effort consisted of collecting seismic, geophysical, and bathymetric data to prepare maps of nine banks and the Northern Middle Ground area. Lorac Service Corp. provided precision navigation, and Oceanonics, Inc. provided the vessel and survey equipment under fixed price subcontracts. While performing the work tasks, several problems were encountered and were reported in cruise reports.

Submersible Tasks

The submersible tasks consisted of collecting data and samples in deep waters. The TAMU submersible DRV DIAPHUS was used to collect photographic and audio-video data and geological and biological samples (i.e., Spondylus, rocks, sediments, etc.). Water column data were also collected to help characterize the banks.

Scientists from TAMU collected geological and biological data and samples from eight northern Gulf of Mexico banks, and scientists from UAB and USF collected data and samples from the Florida Middle Ground.

Monitoring Tasks

The monitoring tasks consisted of seasonal SCUBA cruises to the Florida Middle Ground and the East and West Flower Garden Banks to collect biological samples and photographic data and to service station instruments and arrays. These tasks are described fully with the data and/or sample inventories in later chapters.

Seasonal Sampling

Sampling for geological, biological, chemical, and hydrographic oceanographic data was accomplished on cruises to the East Flower Garden Bank, during three seasons: fall, winter, and spring/summer. To conduct required water column and bottom sediment sampling at Coffee Lump, Fishnet, Diaphus, Jakkula, and Alderdice Banks, a summer sampling cruise was combined with the third seasonal cruise.

Diving at the Florida Middle Ground

Intensive sampling and observational activities were conducted on four SCUBA diving cruises to the Florida Middle Ground. Diving activities involved collection of biological samples and photographic data, as well as installation and servicing of instruments.

Sample Analysis

Samples were transferred to appropriate laboratories for analysis. The Spondylus were delivered to the TAMU Trace Metal Analytical Laboratory for analysis by Drs. Bobby Presley and Paul Boothe and to the TAMU HMWH Analytical Laboratories for analysis by Drs. C.S. Giam and Grace Neff. Sediments were delivered to the TAMU laboratory for textural and mineralogy analysis by Dr. Richard Rezak and to the University of Texas Marine Science Institute for HMWH, Delta-C-13, and total organic carbon analysis by Drs. Partick Parker, Kenneth Winters, R. Scalan, and Dan Boatright. Water samples were analyzed at TAMU by Dr. James Brooks.

The analytical data were documented and delivered to the Program Office for inclusion in this report.

Data Analysis

PIs were individually responsible for the analysis of data in their field of specialization. Techniques were applied and computerized where applicable so as to process the volume of data and arrive at meaningful graphic or tabular data. Some of the computerized techniques include:

- Cartographic Projection/Grid Programs
- Current Meter Data Analysis
- Gausian-Cascading Butterworth Filter Analysis
- Grain Size Analysis
- Graphics and Plotting Programs
- Report Generator Program
- Rotary Spectral Analysis
- Spectral Analysis
- Standard Fourier Fast Tranform
- Standard Statistical Analysis
- Time Series Analysis
- Variance Tensor Analysis

The TAMU Data Processing Center and other computer facilities were used in the reduction, analysis, and reporting processes. These procedures are described in the appropriate chapters of this report.

Data Synthesis and Integration

PIs analyzed the data in their respective areas, synthesized, and integrated the results, and then prepared PI Reports. This information was collected and interpreted by the Technical Directors to characterize the areas and banks.

The Florida Middle Ground characterization was directed by UAB, and the characterization of banks in the northern Gulf of Mexico was performed by TAMU.

Data Archiving

Once digitized and analyzed, the data were placed on magnetic tapes and/or microfilmed and mailed to the NOAA EDIS in an appropriate format. Analog records were microfilmed to enhance the life of the data.

Data and Information Reporting

Table II-1 (above) provides a complete list of documents prepared in this contract. Management plans provided the framework for reporting. Progress reports provided data and information for the COAR and Contract Inspector to monitor the work efforts and provide feedback to the Program Manager and PIs. The progress reviews were held on schedule with positive information exchanges. Cruise reports provided up-to-the-minute status of the data/sample collection efforts with recommendations as appropriate.

DISCUSSION

Introduction

Management of this multi-million dollar contract required surmounting factors and variables affecting the Period of Performance and the associated costs and PI performance. The chief force majeure was weather and its impact on the data collection efforts. Another force majeure was the IXTOC-1 oil and gas spill and its potential effect on the Flower Garden Banks. Part of the FY 1980 monitoring efforts also had to be included as an amendment to satisfy urgent 1980 requirements, underestimated costs, and delays both in releasing the Request for Proposals (RFP) and in evaluating proposals.

Contracts Administration

Service agreements and subcontracts were executed during the contract period, but several tasks had to be initiated prior to obtaining fully executed subcontracts or service agreements. Such delays could be prevented with more advance planning and sufficient lead time to plan and execute these documents and actions.

Federal agencies often have time, fiscal, and other constraints imposed on them which delay the timely award of contracts. It would be highly desirable to have RFPs and realistic estimates on-the-street prior to the start of a fiscal year so as to evaluate proposals, negotiate agreements, and award contracts within a reasonable time after the start of the fiscal year. Each management plan, master schedule, sampling plan, and logistics plan must be prepared, coordinated, and accepted in a minimum amount of time after a contract is awarded. The time is dependent on the size of the contract, and the initial 60 days of a contract are crucial to the efficient scheduling needed to ensure a smooth-running project. For example, some of the reported problems with the mapping tasks were traced to inadequate lead time for performing the tasks and for evaluating and certifying results. Some of the reported problems with the submersible tasks are attributable to inadequate lead time before the cruise. Complaints were also expressed regarding the slow turnaround in obtaining approvals or subcontracts. These problems could be reduced with adequate planning time and sufficient lead time to order, test, and install equipment, to mobilize and deploy data collection efforts, to analyze samples, and to reduce, analyze, integrate, and synthesize data. Results would also be greatly enhanced.

Quality Control and Assurance

All samples and data were labeled, inventoried, and processed as per contractual requirements. Several check points were planned to evaluate performance of PIs and subcontractors and the quality of the intermediate products.

The bathymetric products were prepared by Oceanonics, Inc., and control points were verified by TAMU geophysicists and cartographers. Several errors were discovered and corrected.

Intermediate results from PIs were discussed at progress meetings and reported in the Quarterly Summary Reports. Corrective actions were taken and reported in PI status reports whenever problems were identified.

Analytical results prepared and reported by PIs were reviewed and critiqued by the Technical Directors. Corrections were made to the reports before submittal to BLM.

In the laboratories and in the field, equipment was calibrated according to the specifications. Tasks were performed, checks made, and appropriate corrections incorporated. As a result, the margin for error of the data was minimized and the quality of the information was greatly enhanced. Planning and accomplishing quality control did, however, require additional time and effort.

Planning, Scheduling, and Coordinating

The planning and controlling functions are critical to all projects, especially one with limited resources and with seven subcontractors and fourteen PIs located from Texas to Florida. Requirements were defined and delegated, tasks were planned with successor-predecessor relationships, expected time to complete the tasks was estimated, and a schedule was prepared. Products were subsequently prepared throughout the contract and delivered on time.

The incremental scheduling of tasks along the critical path proved to be very successful except for unanticipated problems encountered with several PI reports. Some PIs performed below expectation, their work efforts were not properly coordinated, and the shortcomings impacted the time and efforts of other PIs, the Technical Directors, and the Program Manager. Other impacts to the period of performance were caused by changes in the scope and by *force majeure*.

Amendments to the scope of the contract and *force majeure* resulted in ten modifications to the contract. Not all PIs were affected by these modifications (Table II-4, above). The major *force majeure* was weather, especially during the winter and fall of 1979, when several tropical storms and hurricanes (i.e., Bob, Claudette, David, Elena, Frederic, Henri) caused delays in the data collection efforts. Other *force majeure* included the failure of components in some of the deployed instruments, the loss of deployed instruments and data, the loss of navigation and bathymetric data from the submersible cruise, etc. These created needs for additional time, efforts, and costs, especially to handle the logistics.

Logistics Administration

The Logistics Plan established the framework for the field logistics. Several vendors were contacted for chartered vessels and navigational services, etc., and the most cost-effective alternatives were selected. Effective negotiating was also used so as to obtain the least cost for the "best" equipment and services. PIs were successful in all deliberations.

RECOMMENDATIONS

To maximize the future work efforts, minimize costs and time, and obtain qualitative and quantitative results, several recommendations are in order. These include:

1. Assign a Program Manager with technical and managerial abilities and with sufficient authority over the resources for accomplishing timely tasks.
2. Authorize the Program Manager to commit negotiated funds and resources for accomplishing all contractual tasks without additional approval of the Contracting Officer.
3. Minimize or eliminate duplicate efforts of federal agencies, and allocate appropriated funds to maximize results.
4. Provide realistic estimates of time and costs for scope changes.
5. Use acceptable industrial engineering planning and controlling techniques in lieu of PERT.
6. Allow a 60-day project establishment and planning period after letting a contract.
7. Provide archived data in a timely manner so as not to delay the efforts of PIs.
8. Place more emphasis on data management by allocating necessary resources for programming, analysis, archiving, etc.
9. Allow a 90 day period for analyzing data after the data have been processed and reduced to a form usable by PIs.
10. Specify for completing all data analysis "a period of at least 60 days before the draft final report is due."

11. Provide timely critiques and courses of action of all plans and reports.

12. Schedule the draft Executive Summary "30 days after the draft Final Report."

13. Prepare and schedule intermediate segments of the draft reports so as to level resource requirements.

14. Conduct bathymetric mapping tasks at least six months before the products are required.

15. Submit draft report for peer review when draft is submitted to BLM; allow sufficient review time, and provide stipends for reviewers.

NORTHERN GULF OF MEXICO

TOPOGRAPHIC FEATURES

STUDY

FINAL REPORT

VOLUME FOUR

Submitted to the
U.S. Department of the Interior
Bureau of Land Management
Outer Continental Shelf Office
New Orleans, Louisiana

Contract No. AA551-CT8-35

Department of Oceanography
Texas A&M University
College Station, Texas

Technical Report No. 81-2-T

Research Conducted Through
the Texas A&M Research Foundation

MARCH 1981

VOLUME FOUR
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CHAPTER XVIII

ALDERDICE BANK

R. Rezak, T. Bright, D. McGrail, T. Hilde,
G. Sharman, L. Pequegnat, D. Horne, S. Jenkins, F. Halper

INTRODUCTION

In addition to geological and biological reconnaissance and sampling from the submersible, studies at Alderdice Bank included mapping and sub-bottom profiling, sedimentological analyses, and hydrographic sampling. Results of these studies are presented under the headings Structure and Physiography, Hazards, Sedimentology, Water and Sediment Dynamics, and Biology.

GENERAL DESCRIPTION

Alderdice Bank is located at 28°04'40"N latitude and 91°59'36"W longitude (Volume One, Figure III-1) in Blocks 170, 171, 178, and 179 of the South Marsh Island Area (Figure XVIII-1). The bank is an oval, elongate in an east-west direction, and covers an area of about 16 km^2. The top of the bank is relatively flat, with depths ranging from 78 to 82 m. Superimposed upon this broad surface is a smaller scale relief formed by ridges and peaks. The shallowest bank depths (59 m) are two of these peaks. Depth of the seafloor surrounding the bank on the south, west, and northwest sides is about 92-94 m, while on the northeast and east sides it is about 84 m. Although the relief is not great along the margins of the bank (generally less than 10 m), the margins are rather steep around the western half of the bank. Although the features on top of the western part of the bank have a rather random distribution, the eastern part of the bank displays a dominant north-south ridge. There is also a gentle north-south oriented swell on the seafloor extending northward from the eastern part of the bank (Figure XVIII-1). The gentle depression on the northwest margin of the bank is the head of a north-south oriented valley that curves around the western margin of the bank. This valley was probably eroded during a lower stand of sea level during Late Pleistocene or Early Holocene time.

STRUCTURE AND PHYSIOGRAPHY
(PI's: R. Rezak and T. Hilde)

Structurally, Alderdice Bank is a uniformly uplifted salt dome with a non-reflective core or acoustic basement and surrounded by onlapping sediments that are tilted upward along the margins of the bank and are progressively more steeply tilted with depth (Figures XVIII-5 and 6).* The main body of the bank has been mapped (Figure XVIII-4)

*For the sections of seismic reflection profiles shown in Figures XVIII-5 through 8, the vertical scale is two-way travel time in milliseconds (msec); the horizontal scale equals 500 ft between shot points (vertical lines on the records).

as exposed acoustic basement (the non-reflective core, which may be cap rock and salt). Extensive areas of carbonate reef occur on this surface. These patches include the peaks referred to above.

There is a single prominent reflector at about 5 to 10 m depth beneath most of the bank (Figures XVIII-5 and 7). This reflector is very flat and may be an artifact or may represent the upper surface of the cap rock. On Figures XVIII-5 and 7 it is seen only under the lows on both sides of prominences on the upper surface of the bank.

The sequences mapped in Figure XVIII-4 are: 1) acoustic basement; 2) an intermediate sedimentary sequence on the east end of the bank, which has been uplifted with the non-reflective core of the bank; and 3) the onlapping, more recent sediment around the rest of the bank. Contours in Figure XVIII-4 represent thickness of the sedimentary sequences down to the deepest reflector that can be interpreted as a sequence boundary. The lower boundaries are marked at the margins of the boomer profiles shown in Figures XVIII-5, 6, and 7.

The surrounding sedimentary sequences, mapped in Figure XVIII-4, contain two prominent erosional unconformities with clear truncation of bedding reflectors upon which the overlying sediments onlap towards the bank. The base of the mapped sequence is also an unconformity. Below this surface is another well stratified sequence, but no additional unconformities are displayed in the deeper section (Figure XVIII-5). The presence of the angular unconformities, together with the increasing dips with depth, indicate that the bank has been in the process of uplift over a long period of time including several periods of erosion and subsequent deposition.

Two patterns of faults are present on the bank: 1) the annular fault that encircles the bank; and 2) the radial faults. All show evidence of Recent activity as seen by displacement, such as in Figure XVIII-6b and c. However, the surficial sediments in some cases are not offset (Figure XVIII-7b). Along the eastern margin of the bank (Figure XVIII-6c), it appears that the seafloor and sub-bottom structure have opposite displacements along the same faults--and that is actually the case. The central block is a radial graben that was formed during the last regression of sea level. With renewed sedimentation following the subsequent transgression, the surface relief on this part of the bank was buried. In very recent time, upward movement of salt has reversed the relative movement along these faults and the Recent sediments have been bowed upward over the graben. The directional sense of this movement can be seen where each of the faults intersects the seafloor.

An example of the 3.5 kHz profiles (Figure XVIII-8) shows peaks that are suspected of being outcrops of bedrock covered by carbonate reef growth. One such ridge on the southwestern peak of the bank was examined during dives 122 and 123 (Figure XVIII-2). The ridge is about 200 m long, 24 m high, 5 m wide at the base, and at a depth of 55 m. It is a massive ledge of nearly bare basalt that strikes 055° and dips about 80° to the SSE. A magnetic profile reveals a local anomaly of about +25 gammas directly over the outcrop. Petrographic analysis of the rock indicates that it is a basalt. Neutron activation analysis shows an enrichment in the light rare earth elements, indicating that the rock is an alkalic basalt. K-Ar age determination yields an age of 76.8 $\pm$ 3.3 m.y. (Late Cretaceous). This is the oldest known rock exposed on the continental shelf off Louisiana and Texas.

The feature is interpreted as a dike or sill that has been rafted to the surface by the salt diapir. It has been exposed at the seafloor due to dissolution of the surrounding salt and the subsequent collapse of the adjacent cap rock on either side of the feature. This implies a sizeable root zone still embedded in the salt. Similar features have been observed on Red Sea salt domes in East Africa and in the Zechstein region of Germany. Mounting evidence of Late Mesozoic igneous activity, together with published multi-channel seismic data (Martin, 1978; Humphris, 1978), strongly indicate a rifted origin for the Gulf of Mexico.

HAZARDS
(PI: R. Rezak)

Faulting occurs over the entire bank and surrounding seafloor, as evidenced by the discontinuous outcrop patterns on the side-scan sonar record (Figure XVIII-2) and by displacement of reflectors in the boomer records (Figures XVIII-6 and 7). Evidence for Recent movement along faults may be found in the outcrop of basalt and on boomer records (Figure XVIII-6c). The basalt outcrop is covered by a millimetre thick crust of coralline algae, sponges, and bryozoans. If this rock had been exposed at the seafloor since Late Pleistocene time, one would expect more massive encrustations over the bedrock outcrops, such as those on the peak just to the east, and on other banks such as the Flower Gardens. The presence of such thin crusts suggests a brief time span for colonization by encrusting organisms, probably a year or two at the most.

A diffuse pattern of reflections in the water column over most of the bank, particularly the western half, is probably due to general gas seepage from nearly vertical beds seen on the side-scan records. Specific vents are also evident over the western part of the bank (Figure XVII-5b).

SEDIMENTOLOGY
(PI: R. Rezak)

Four grab samples were taken at Alderdice Bank (Figure XVIII-1). The sediment types at these stations are as follows:

Station 1 - gravelly sand
Station 2 - gravelly, muddy sand
Station 3 - muddy, sandy gravel
Station 4 - gravelly sand.

Submersible observations indicate that below 82 m the sediment is primarily fine mud. At station 1 the sediment is a coralline algal nodule gravel and sand.

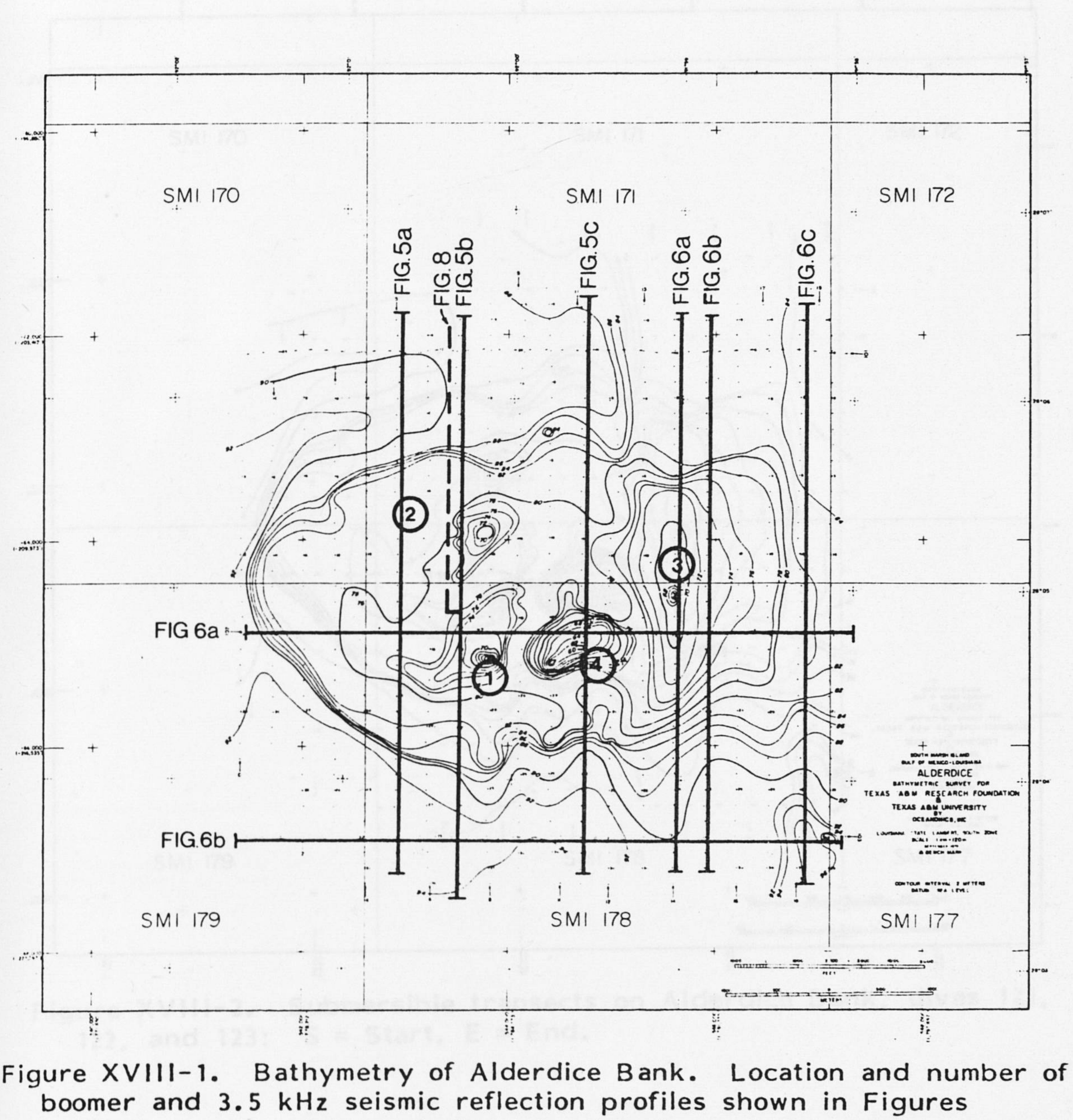

Figure XVIII-1. Bathymetry of Alderdice Bank. Location and number of boomer and 3.5 kHz seismic reflection profiles shown in Figures XVIII-4, 5, 6, and 7 are indicated. Sample stations: 1-4.

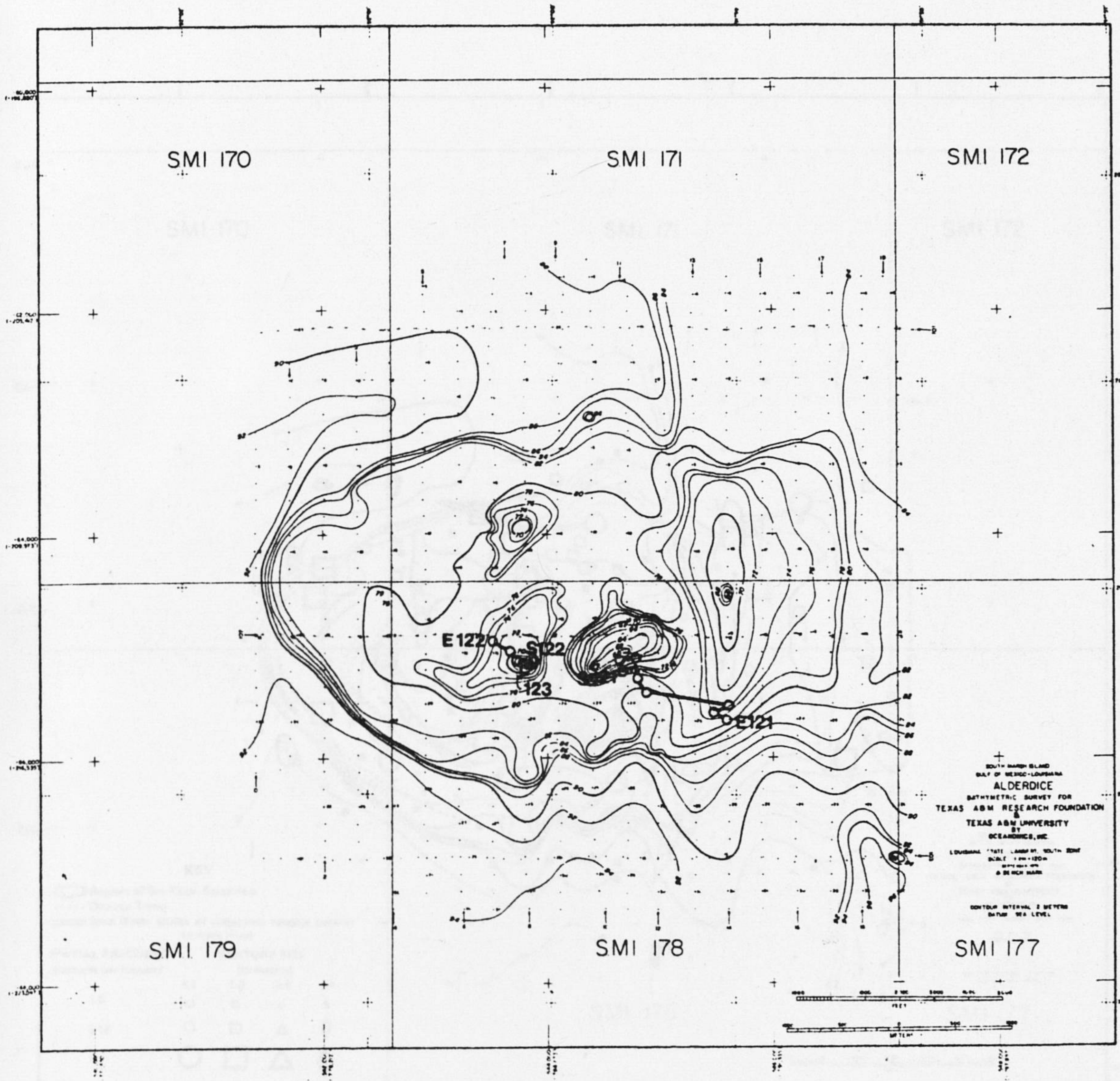

Figure XVIII-2. Submersible transects on Alderdice Bank, dives 121, 122, and 123: S = Start, E = End.

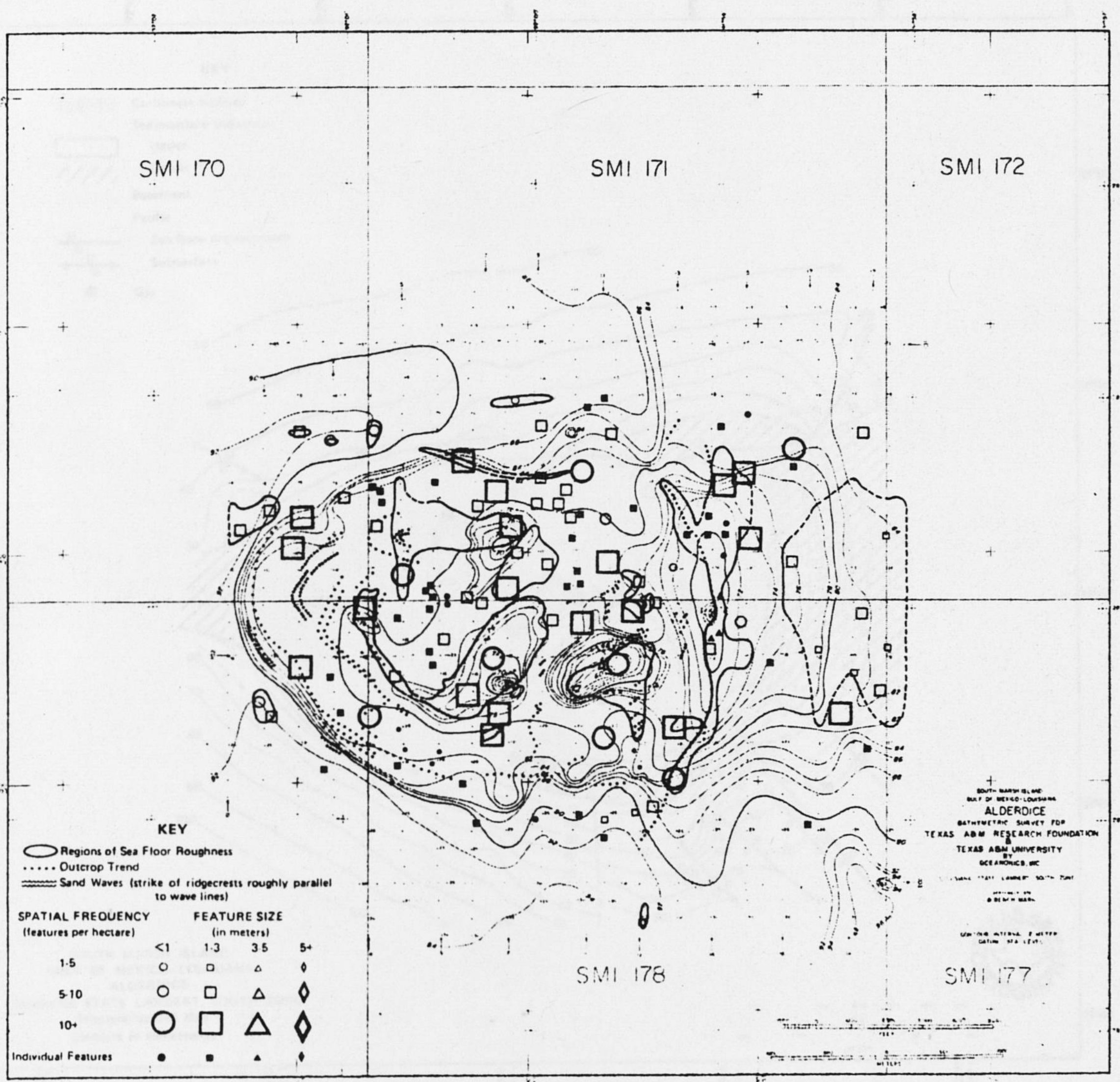

Figure XVIII-3. Seafloor roughness, interpreted from side-scan sonar records.

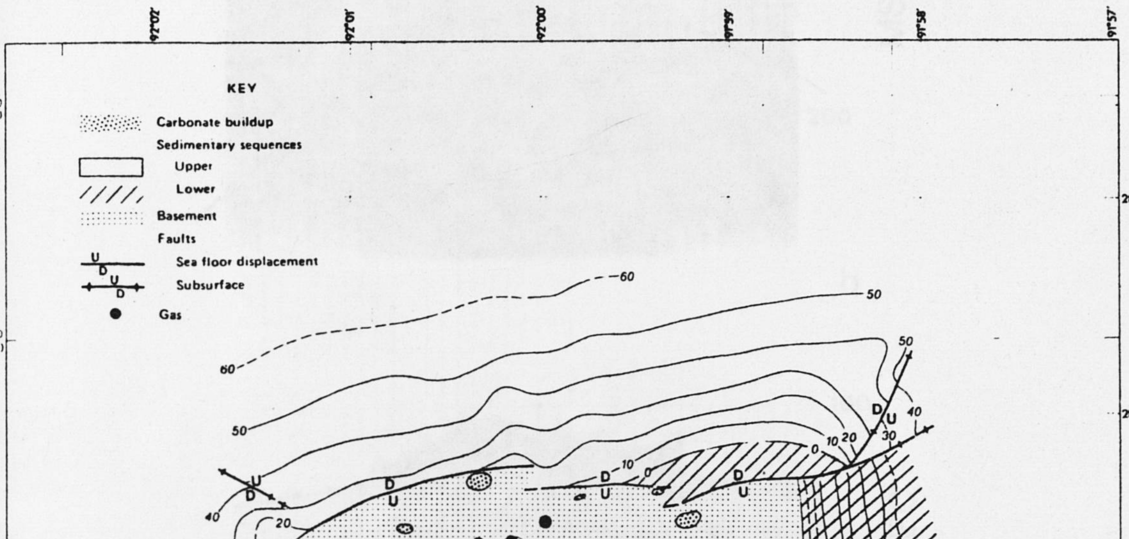

Figure XVIII-4. Structure/isopach map of Alderdice Bank. Contours indicate thickness of the surrounding sedimentary sequences.

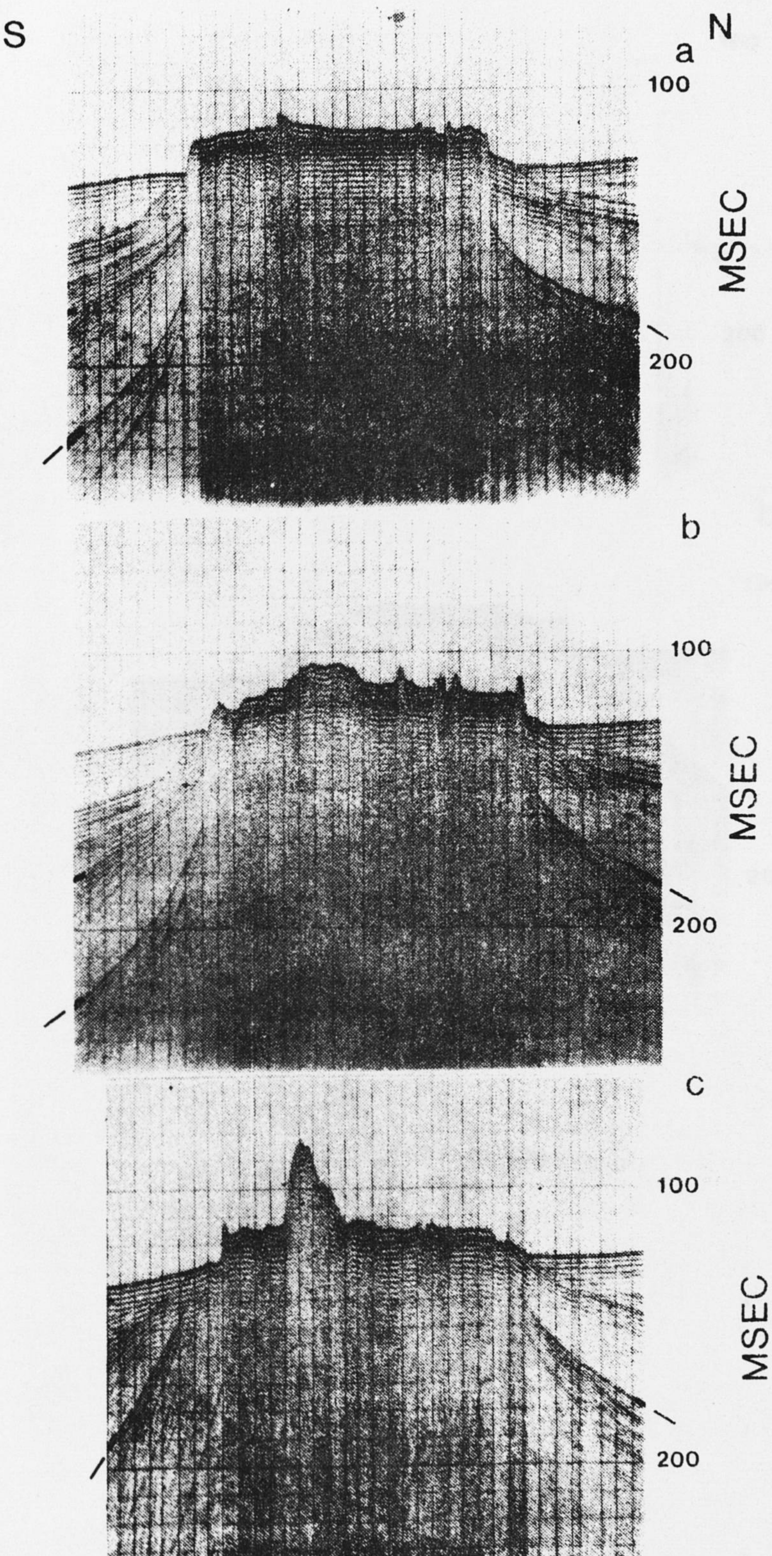

Figure XVIII-5. N-S boomer seismic reflection profiles across western part of the bank are indexed on Figure XVIII-1. The base of the contoured sequence in Figure XVIII-3 is indicated along the record margins.

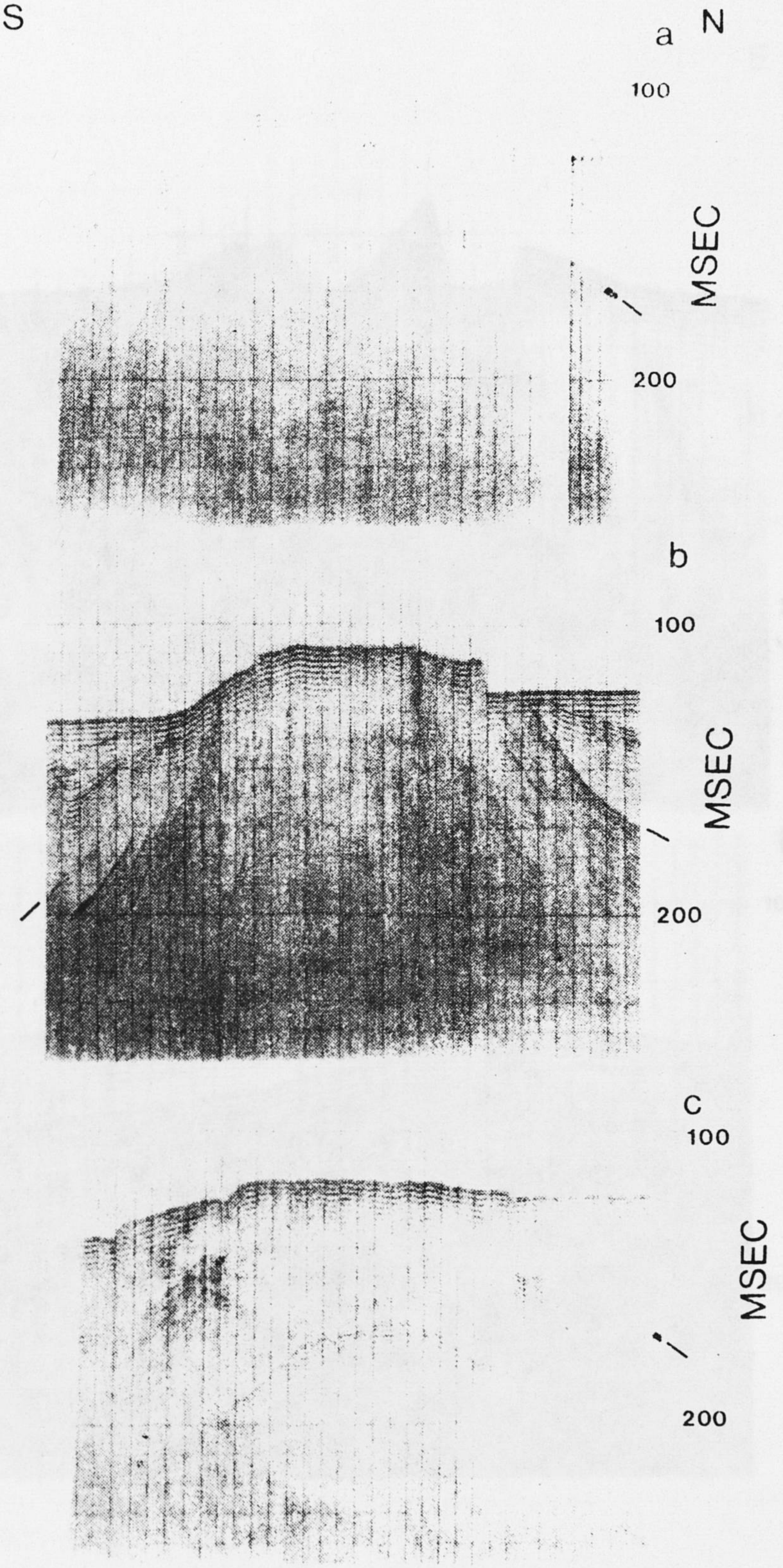

Figure XVIII-6. N-S boomer seismic reflection profiles across eastern part of the bank. Locations are indexed on Figure XVIII-1. The base of the contoured sequence in Figure XVIII-3 is indicated along the record margins.

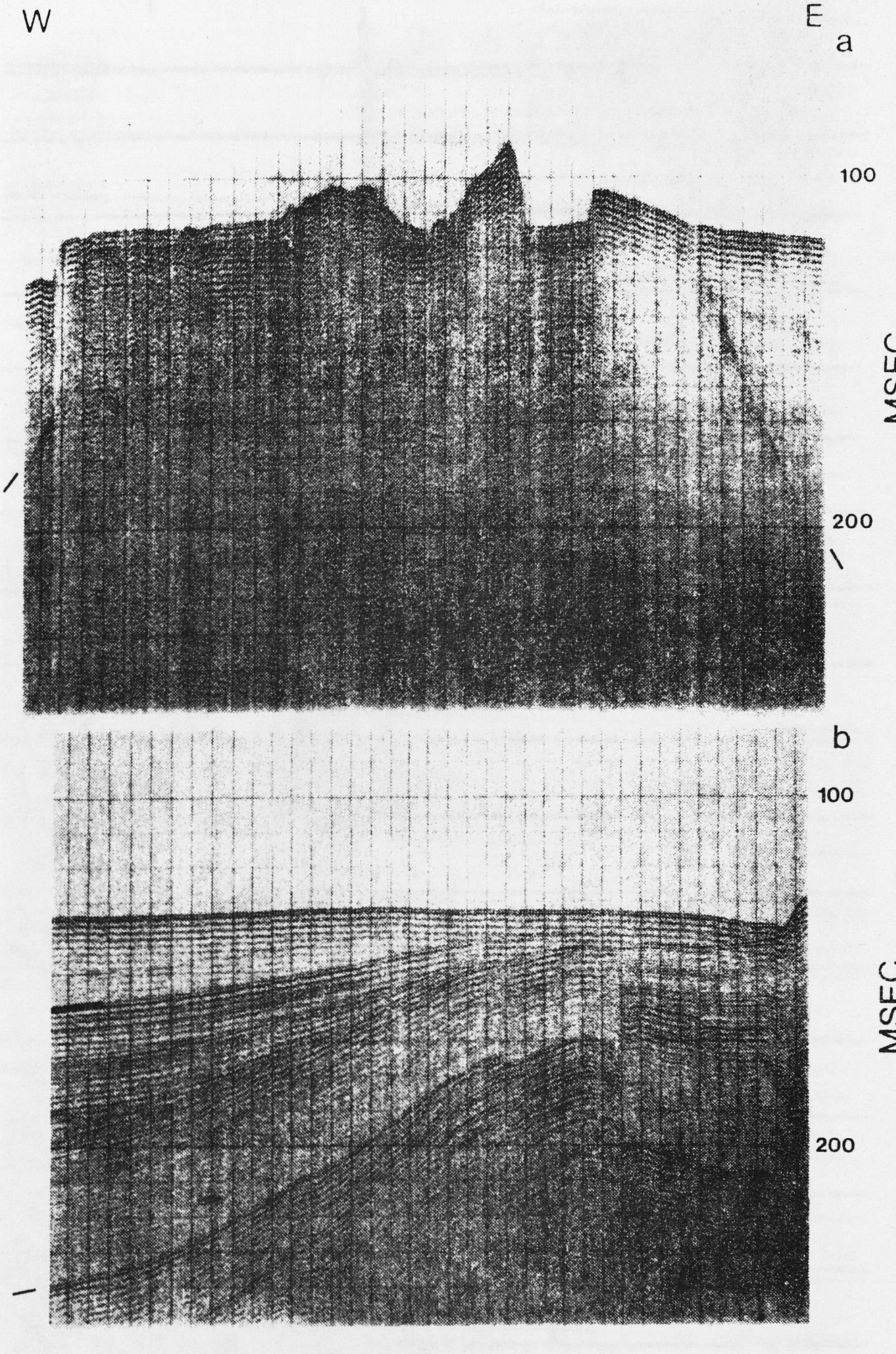

Figure XVIII-7. E-W boomer profiles across Alderdice Bank. See Figure XVIII-1 for locations. The base of the mapped unit is indicated on the sides of profiles.

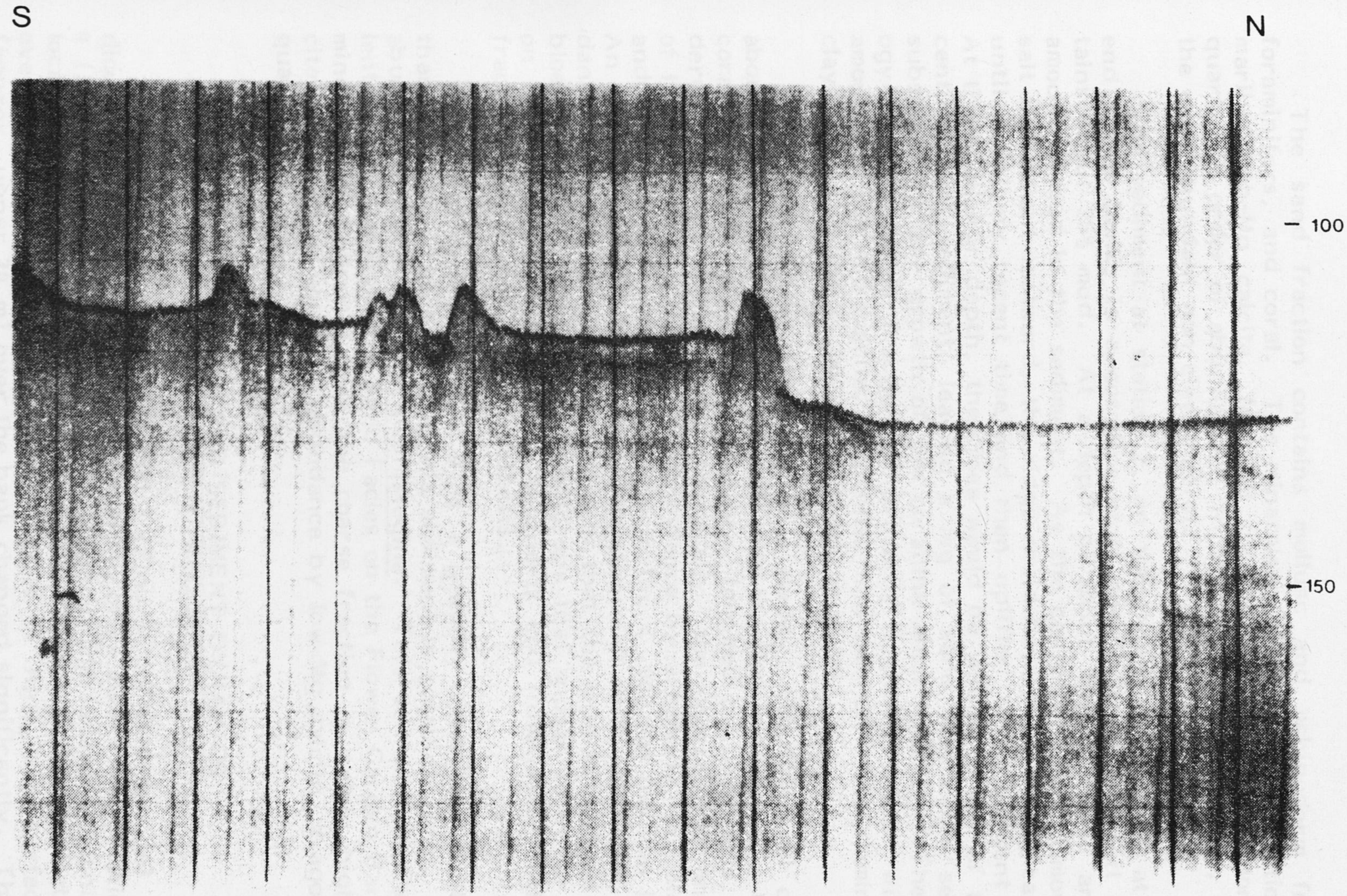

Figure XVIII-8. N-S 3.5 kHz profile of the northern portion of Figure XVIII-5b.

The sand fraction contains mollusc and echinoderm fragments, foraminifers, and coral. The mineralogy of the coarse fraction is primarily high-Mg calcite, followed by low-Mg calcite, aragonite, and quartz, in order of abundance. In the < .002 mm fraction, quartz is the most abundant non-clay mineral.

The sediment at station 2, on the north-south ridge at the east end of the bank, is a coralline algal nodule gravel, but it also contains about 25% mud. At a depth of about 70 m, this is an unusual amount of mud in the sediment. As the center of upward movement of salt has moved eastward, the ridge could have been at a greater depth until relatively recent time and then uplifted to its present position. At the shallower depth, the fines would be winnowed out of the upper centimetre of sediment, leaving a lag of sand that could serve as a substrate for the growth of the coralline algal nodules. The mineralogy of the coarse fraction is primarily high-Mg calcite with lesser amounts of low MG-calcite, aragonite, and quartz. The dominant non-clay mineral in the < .002 mm fraction is quartz.

The sediment at station 3 is a muddy, sandy gravel containing about 19% mud. Mollusc fragments are the dominant particle type, but coralline algae are next in abundance, followed by bryozoans, enchinoderms, and lithoclasts. Mineralogically, the coarse fraction consists of high-Mg calcite followed in abundance by aragonite, low Mg calcite, and quartz. The dominant mineral in the < .002 mm fraction is quartz. An alternative hypothesis for the presence of mud containing an abundance of quartz at shallow depths is that the mud is derived from the bioerosion of Tertiary bedrock outcrops that appear to be so abundant on the bank. The abundance of quartz and lithoclasts in the coarse fraction also support this hypothesis.

The sediment at station 4 is a gravelly sand that contains less than 1% mud. The gravel in this sediment is coralline algae. The most abundant particle type is *Amphistegina*. This sediment is the equivalent of the *Amphistegina* Sand Facies on the Flower Garden Banks. The mineralogical composition of the coarse fraction is mainly high-Mg calcite, followed in order of abundance by low-Mg calcite, aragonite, and quartz.

WATER AND SEDIMENT DYNAMICS
(PI: D. McGrail)

Hydrographic stations 1 and 2 (Figures XVIII-9 and 10) at Alderdice Bank were occupied on the evening of 23 June 1979. Stations 3 and 4 (Figures XVIII-11 and 12) were occupied the following morning. The locations of the stations are shown in Figure XVIII-1. Between the evening of 23 June and the morning of 24 June, the surface waters (approx. upper 24 m) over the bank changed significantly. This change is apparent in both the plots of the Brunt-Vaisala frequency (Figure XVIII-13) and the T-S diagram (Figure XVIII-14). In the evening, the surface waters possessed salinities of approximately 33.7 o/oo and temperatures of approximately 26.5°C. By morning the salinities were of the order of 34.5 °/oo and temperatures were approximately 25.8°C.

Judging from the current meter profiles, it would appear that the southerly and easterly surface flow observed in the evening brought warm low salinity from the shelf out over the bank. This is somewhat surprising since the wind was blowing gently (< 2.5 m/sec) out of the southeast. By the morning of 24 June the surface flow was from the south and west. The cooler, more saline waters appear, therefore, to have been advected in from offshore as the fresher water was displaced back over the continental shelf.

The very thin mixed layer in the surface waters and opposition of wind and current during the evening of 23 June illustrate how little effect the gentle southeasterly breezes have on the circulation of the Outer Continental Shelf in the spring.

As with all of the reconnaissance stations occupied during the June 1979 cruise, the flow observed at Alderdice Bank stations was strongly depth and time dependent and topographically steered. The depth dependence means that the pressure gradients driving the flow were induced by inclinations of the isopycnals against geopotential surfaces rather than inclination of the sea surface. The time dependence was on a sufficiently short time scale to be observed over the approximately 18-hour sampling period. It seems likely, therefore, that those fluctuations in speed and direction among the stations not accounted for by topography were due to the baroclinic tide or inertial oscillations.

Since all of the stations at Alderdice Bank were located on the bank itself, no observations were made regarding the suspended sediment distribution around the base of the bank. However, because the substrate surrounding the bank is reported to be silt and clay (BLM, 1979a, visual #3), it is anticipated that a well developed nepheloid layer should exist there much of the time. At the time of the June sampling, really turbid bottom water was observed on the bank only at station 3, although there were minor amounts of suspended sediment below about 60 m at station 2. The near-bottom deflections in the transmissivity profiles from the other two stations were caused by the instrument hitting bottom. Bottom sediment samples from both stations 2 and 3 contained significant quantities of silt and clay, whereas samples from stations 1 and 4 did not. It would appear, therefore, that the suspended sediment observed at stations 2 and 3 was locally derived and not advected across the bank from sources off the bank.

From the data available it is not possible to determine whether sediment resuspended from the adjacent seafloor is ever advected over the broad platform of Alderdice Bank. It is reasonable to expect so because of the low relief of the bank and observations on the vertical extent of the nepheloid layer around other banks, such as the East Flower Garden. It seems highly unlikely, however, that sediment resuspended from the substrate adjacent to the bank reaches the crests of the peaks that rise from the surface of Alderdice Bank.

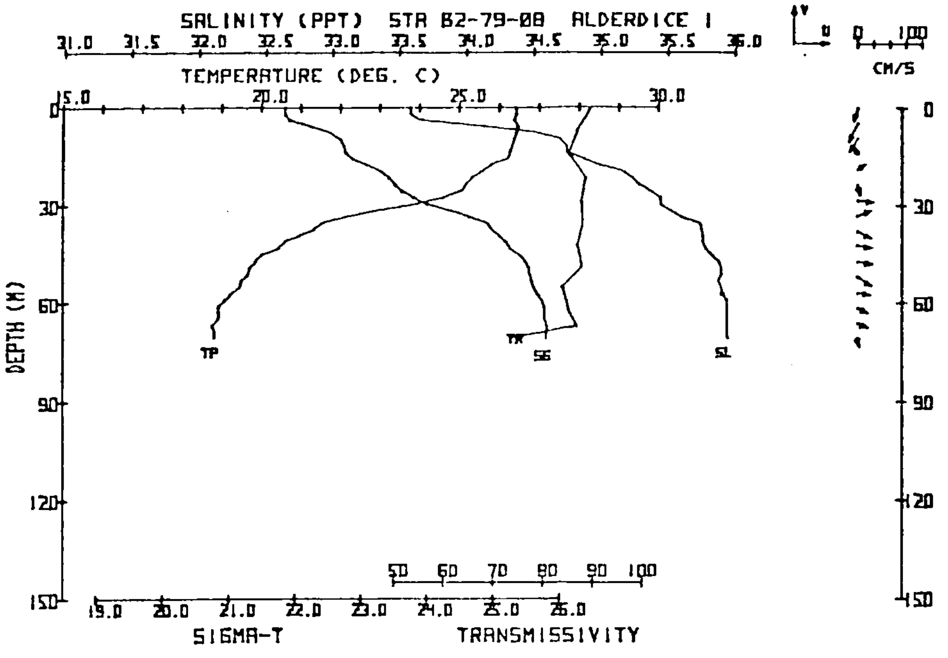

Figure XVIII-9. Plot of salinity (SL), temperature (TP), transmissivity (TR), and sigma-t (SG) from Alderdice 1.

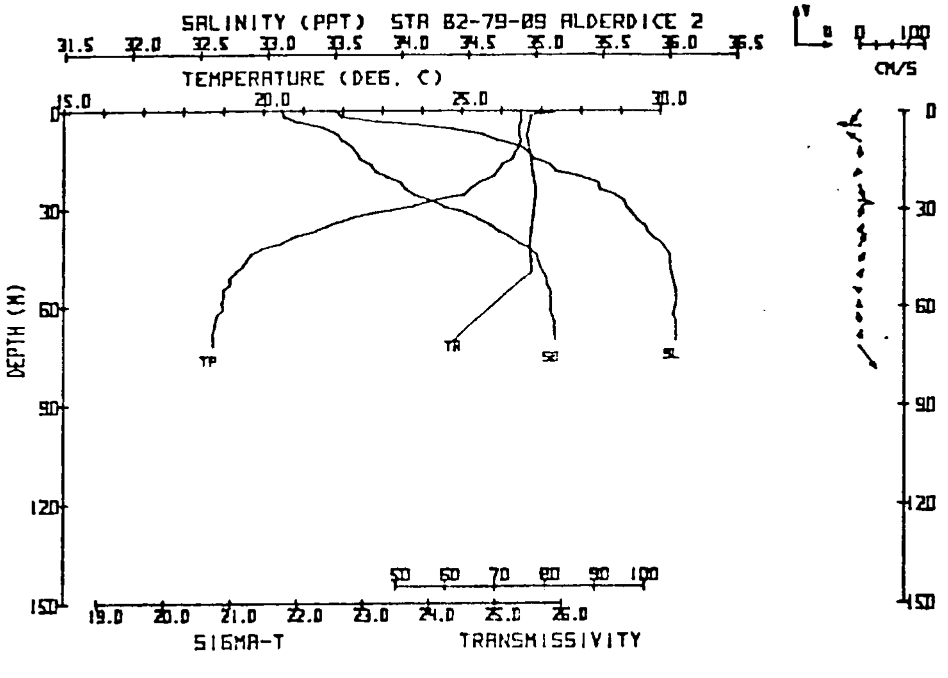

Figure XVIII-10. Plot of salinity (SL), temperature (TP), transmissivity (TR), and sigma-t (SG) from Alderdice 2.

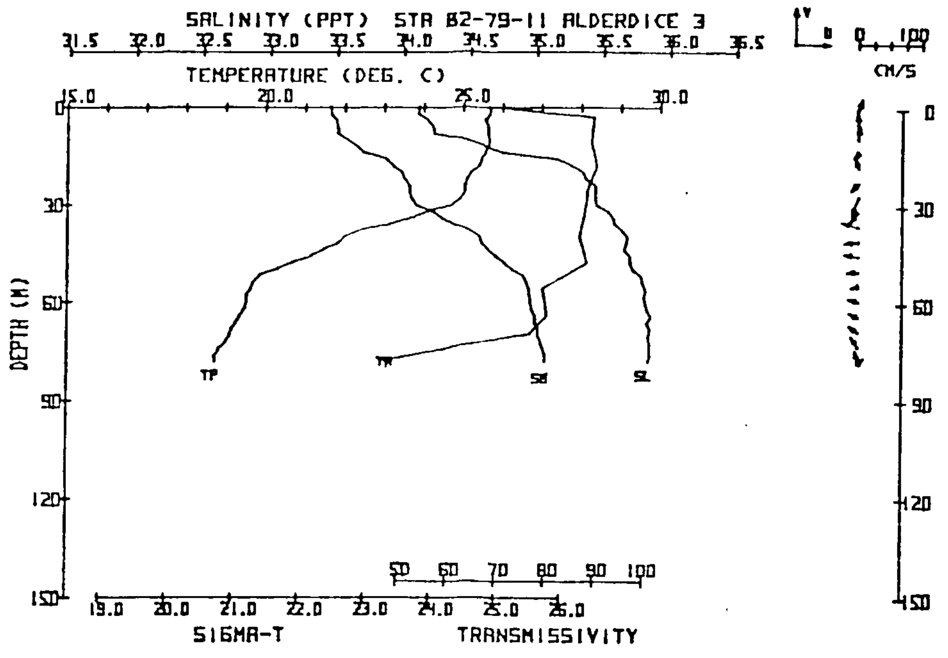

Figure XVIII-11. Plot of salinity (SL), temperature (TP), transmissivity (TR), and sigma-t (SG) from Alderdice 3.

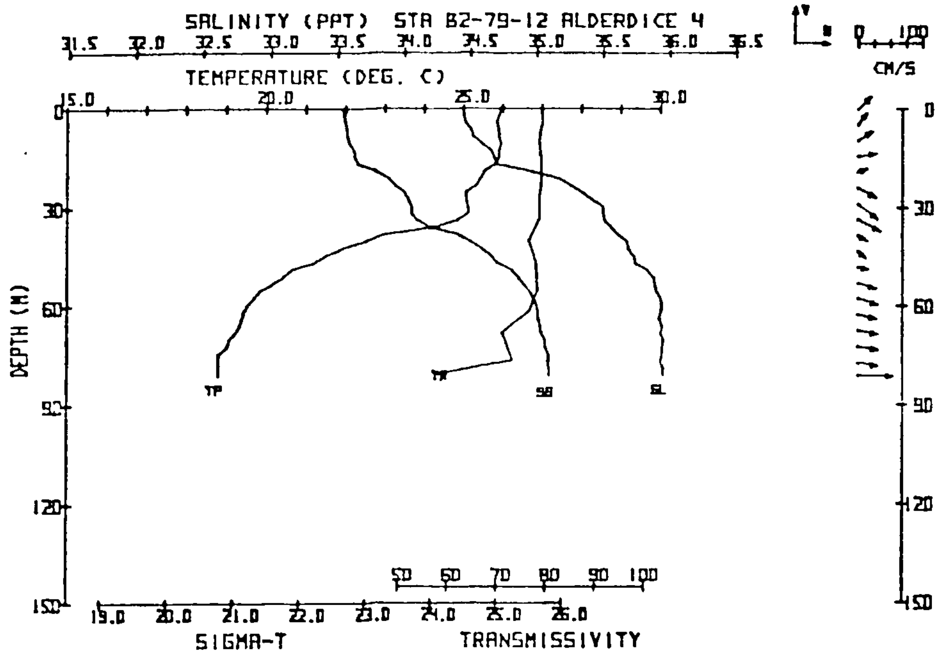

Figure XVIII-12. Plot of salinity (SL), temperature (TP), transmissivity (TR), and sigma-t (SG) from Alderdice 4.

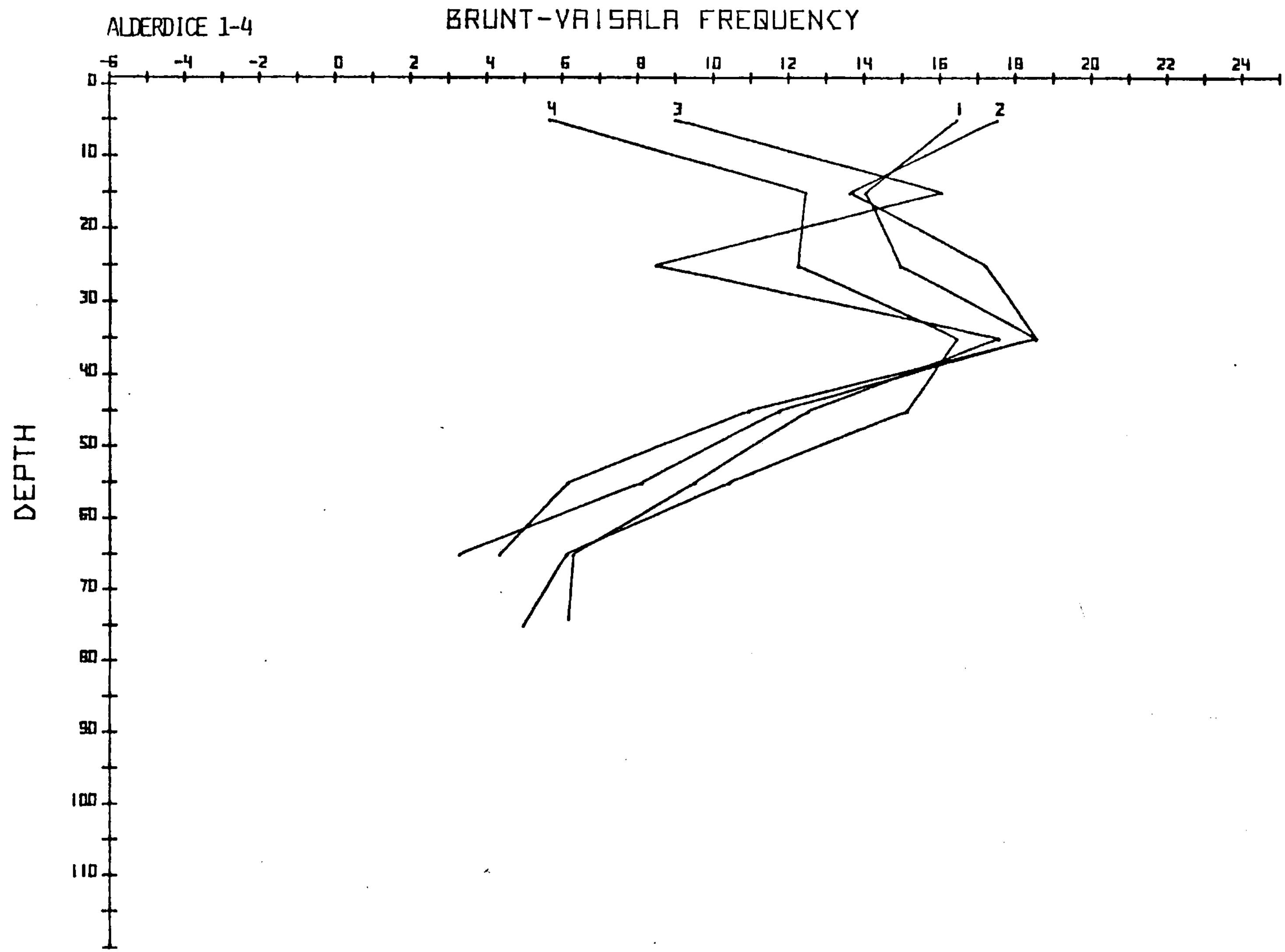

Figure XVIII-13. Plot of Brunt-Vaisala frequency (N) against depth for the four stations at Alderdice Bank.

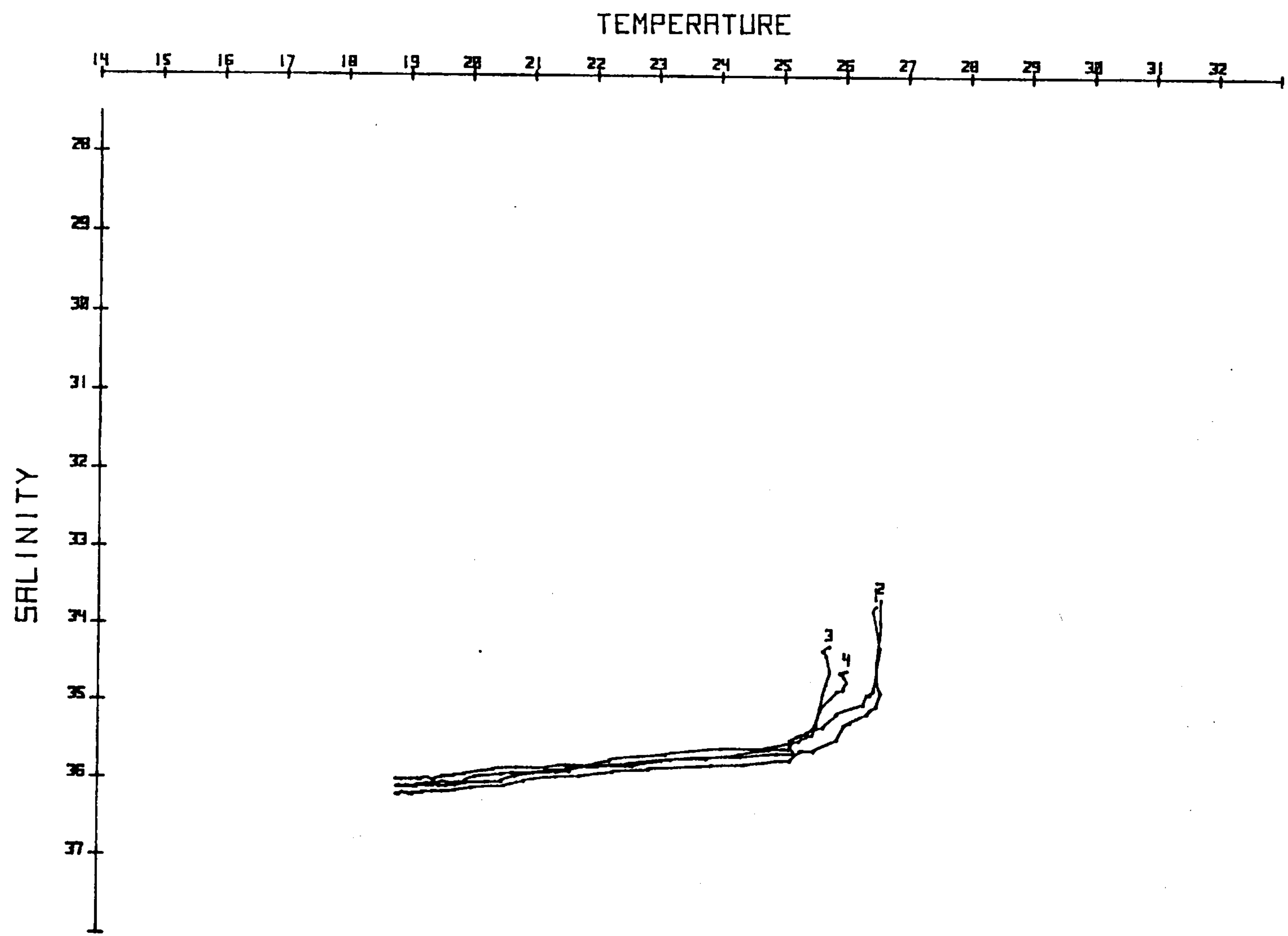

Figure XVIII-14. Temperature vs. salinity plot for Alderdice Bank.

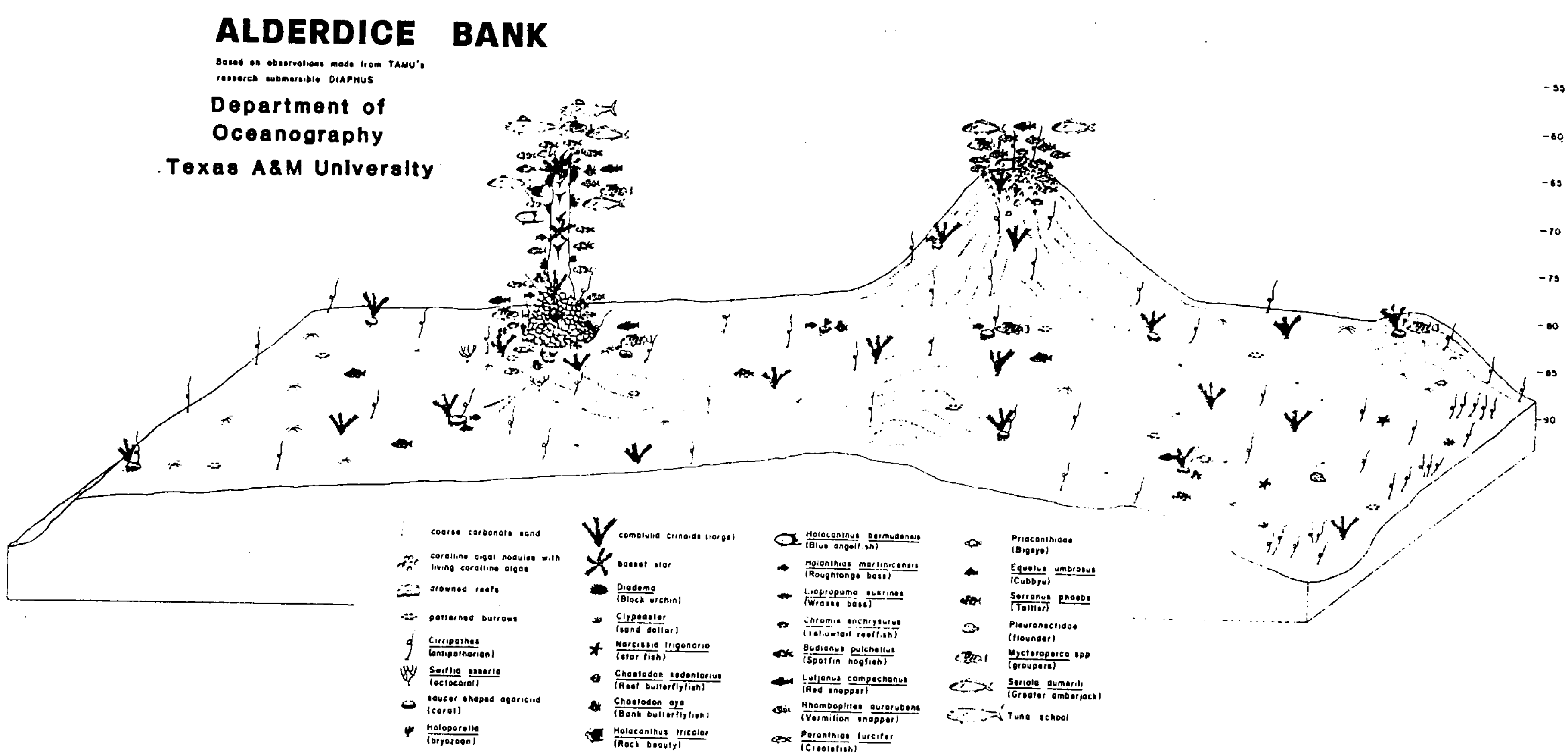

Figure XVIII-15. Diagrammatic representation of biota at Alderdice Bank.

BIOLOGY
(PI: T. Bright)
(Figures XVIII-15 through 18, and Appendix D, Table XVIII-1)

Alderdice Bank is composed of four major topographical peaks on a flattish platform of about 80 m depth. In addition, a spectacular basalt outcrop juts vertically out of the bottom at 76 m, cresting at 55 m (Figures XVIII-16, 17, and 18). Reconnaissance of one of the major peaks, the basalt outcrop, and a good part of the 80 m platform, revealed basic differences in biotic communities occupying the three structural zones.

Healthy, growing coralline algal nodules underlain by carbonate sand occur at the crest of the large southeastern peak (58 to 67 m depth). The nodules are accompanied here and there by very small reefal structures and carbonate blocks covered with the dominant coralline algae. The extreme variability in size of nodules, blocks, and firmly affixed reef rock gives the substratum an irregular appearance not typical of other algal nodule zones. Contributing to the irregularity is the "lumpy" nature of the highly bioturbated sand, where it is exposed.

The most conspicuous invertebrates on the peak are Cirripathes, massive sponges of several species, and large branching bryozoan colonies (Holoporella). An exceptionally large number of Yellowtail reeffish, Chromis enchrysurus, was encountered above 67 m; the peak was literally swarming with them. Creolefish, Paranthias furcifer, were numerous; groupers, Mycteroperca sp., congregated on top; schools of snappers (Lutjanus spp. and Rhomboplites aurorubens) and Greater amberjack (Seriola dumerili) were seen.

The Algal-Sponge Zone described above is probably restricted to the crests of the several peaks at Alderdice Bank and, therefore, is of limited areal extent. It nevertheless is a zone of active reef-building and carbonate substratum production deserving special consideration from the standpoint of environmental protection.

Small "drowned" reefal structures occur on the bank down to at least 85 m depth, surrounded by the large expanse of unconsolidated sediment which comprises most of the bank. The sediment grades from carbonate sand, gravel, and nodular material (75 m), to mixtures of sand, silt, clay, and gravel (79 m), to soft, primarily fine sediment (82 m). Reefal structures below the Algal-Sponge Zone are typically laden with veneers of sediment which is entrapped by mats of low epifaunal growth (Figure XVIII-17). Below 82 m the drowned reefs are almost totally covered with thin layers of fine sediment. Small amounts of coralline algae, nevertheless, occur on the drowned reefs down to at least 79 m (5% cover at 76 m). No algae were seen below 79 m.

Cirripathes is generally the most conspicuous invertebrate at all depths and is particularly abundant locally below 84 m. Between 76 and 85 m enormous populations of small comatulid crinoids occur on the unconsolidated bottom, clinging to rocks and rubble. Larger crinoids are numerous on rocks and drowned reefs between 76 and 85 m, and were seen to 88 m. Branching colonies of Holoporella are abundant above 76 m. Various alcyonarians occur on the rocks between 76 and 79 m, the largest being white muriceid fans and the orange and white branching form Swiftia exserta.

The deeper, muddy bottoms below 82 m are comparatively barren but are abundantly etched with tracks, trails, and burrows, indicating an active population of mobile benthic invertebrates. The sand dollar, Clypeaster ravenelii is fairly numerous below 85 m, and the starfish, Narcissia trigonaria, was seen between 82 and 85 m.

Two species of hermatypic corals were encountered at 76 m, saucer-shaped agariciids and a small head of what appeared to be Stephanocoenia sp. Neither was abundant, and both occurred on drowned reefs.

Holanthias martinicensis was the most frequently seen fish around the drowned reefal structures below 76 m. Others included Yellowtail reeffish, Chromis enchrysurus; Spotfin hogfish, Bodianus pulchellus; Blue angelfish, Holacanthus bermudensis; Reef butterflyfish, Chaetodon sedentarius; Cubbyu, Equetus umbrosus; Spanish flag, Gonioplectrus hispanus; and Bigeye, Priacanthus sp. A school of snappers, Lutjanus sp., and several groupers, Mycteroperca sp., were also seen. Tattlers, Serranus phoebe, were numerous on the unconsolidated bottom.

The most impressive feature on Alderdice Bank is the basalt outcrop. It is an elongated narrow ridge extending vertically upward from the 76 m surrounding depth to 55 m crest depth. Spires examined at the crest were two or so metres across at the top (Figures XVIII-16 and 17), with sheer cliffs extending downward to approximately 67 or 69 m, below which large blocks of bedrock talus were piled around the base of the outcrop (Figure XVIII-18).

The hard basalt is covered with millimetre-thin crusts of coralline algae, sponges, bryozoans and other epifauna. Near the top of the outcrop, these crusts are nearly total, up to 50% being coralline algae. At 69 m on the large blocks, coralline algal cover is 70-80%, but the cover decreases with increasing depth to small patches at 76 m.

Large Basket stars, Diadema urchins, and branching colonies of the bryozoan Holoporella are particularly abundant and visible on the outcrop and talus slope. Basket stars tend to accumulate at the very peak of the outcrop (Figure XVIII-17). Cirripathes, Antipathes, large comatulid crinoids, and small branching alcyonarians are numerous on the talus slope surrounding the outcrop (Figure XVIII-18).

Fishes swarm around the crests of the outcrops. Frequenting the outcrop crests are large schools of Creolefish, Paranthias furcifer; Vermilion snapper, Rhomboplites aurorubens; Greater amberjack, Seriola dumerili; and tuna, as well as large Red snapper, Lutjanus campechanus, and groupers, Mycteroperca. Creolefish and Vermilion snapper were the most numerous large fishes on the structure at all depths. Holanthias

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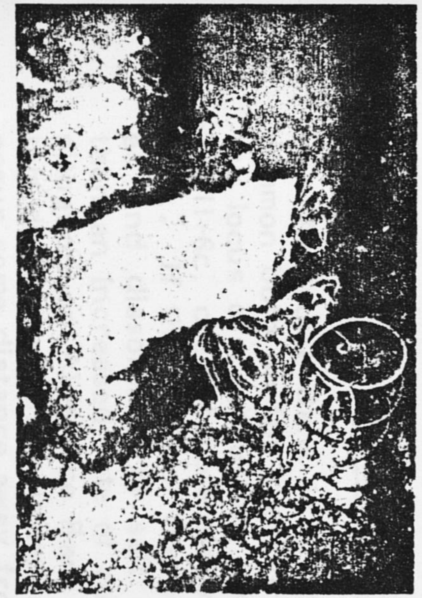
17



18

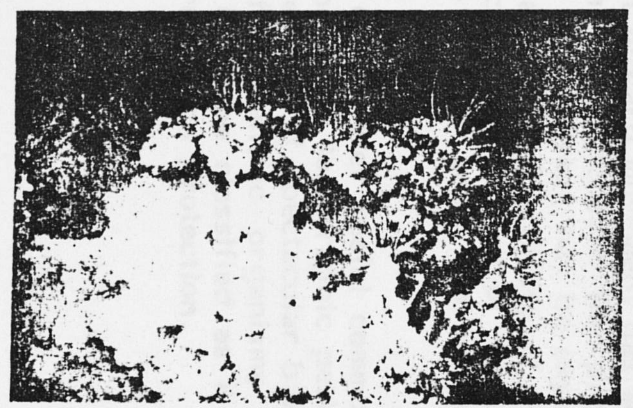


Figure XVIII-16 (UL). Alderdice: crest of basalt spire encrusted with coralline algae, sponges, bryozoans, and other epifauna at 55 m depth. Basket stars are numerous.

Figure XVIII-17 (UR). Alderdice: large basalt blocks at base of spire at 76 m depth. Cirripathes, crinoids, sponges, and other epifauna.

Figure XVIII-18 (L). Alderdice: drowned reef (carbonate rock) at 76 m depth. Crinoids are numerous. Dark area in center is hermatypic coral, Stephanocoenia sp.

martinicensis was abundant, particularly on the talus slope. Closely associated with the outcrop and talus blocks are the Wrasse bass, Liopropoma eukrines; Spotfin hogfish, Bodianus pulchellus; Bank butterflyfish, Chaetodon aya; Blue angelfish, Holacanthus bermudensis; Rock beauty, Holacanthus tricolor; and a damselfish which resembles Chromis scotti.

CONCLUSIONS AND RECOMMENDATIONS

Alderdice Bank is another tectonically active bank. Faulting is common both on the crest of the bank and on its flanks. The shift in the locus of upthrusting by the salt diapir, as illustrated by Figure XVIII-6c, creates potentially dangerous conditions on and around the bank. If the locus of the greatest upward movement has actually shifted and dissolution of salt is continuing beneath the present crest, then an increased rate of collapse of the crest may be expected. This situation on Alderdice Bank indicates that instability of the sea bottom due to tectonism is not restricted to the crest of the bank but may occur some distance away from the crest in areas that otherwise may appear stable.

Because of the existence of clear-water reefal communities on at least one, and probably all, of the major topographic peaks at Alderdice Bank, and because of the presence of spectacular basalt outcrops bearing a diverse assemblage of epibenthic organisms and fishes, **it is recommended that Alderdice Bank be classified as a top priority bank from the standpoint of environmental protection.**

APPENDIX C

A successful manager is a manager . . .

". . . whose face is marred by dust and sweat and blood, who strives valiantly, who errs and comes short again and again because there is not effort without error and shortcomings, but who does actually strive to do the deeds, who knows the great enthusiasms, the great devotions, who spends himself in a worthy cause, who at best knows in the end the triumphs of high achievements and who at the worst, if he fails, at least fails while daring greatly."

President Theodore Roosevelt

APPENDIX C

JOB DESCRIPTION
(Program Manager)

JOB SUMMARY

1. Responsible for the administrative, fiscal, logistical, managerial, contractual, and scientific efforts associated with work tasks on contracts and subcontracts.
2. Vested with sufficient authority and resources to insure timely and competent accomplishment of work tasks.
3. Accountable for results to the client or sponsor (i.e., Contracting Officer, Contracting Officer Authorized Representative, Contract Technical Inspector), the contractor (TAMRF), and the subcontractor (TAMU).
4. Concern for safeguarding the health, safety, and welfare of the human resources and the public.

JOB TASKS

1. Manages resources (i.e., manpower, materials, monies, methods, machinery, subcontracts, space, time, information) to discharge organizational and contractual work tasks.
2. Prepares and enforces operating procedures to satisfy organizational and contractual requirements.
3. Improves or recommends corrective actions to procedures, methods, equipment, systems, etc.
4. Develops contractual management plans to manage work tasks, precedence, interdependencies, timing, and costs.

5. Plans and schedules logistics to mobilize and deploy sea-going data/sample collection cruises.
6. Assists Principal Investigators (PIs) or coordinates logistics to analyze samples, to reduce, analyze, and synthesize data, and to report decision-making information.
7. Performs planning, engineering, and managerial functions to satisfy project requirements.
8. Delegates assignments with responsibility and authority to PIs and associates for accomplishing work tasks and organizational objectives.
9. Estimates, budgets, and allocates manpower and other resources to satisfy tasks.
10. Establishes and assigns priorities to optimally accomplish work tasks.
11. Communicates effectively with organizational superiors, associates, and subordinates, and industrial and governmental personnel to achieve predetermined goals.
12. Maintains liaison with contractors and subcontractors to improve human relations.
13. Assists PIs or performs job analysis to determine man-job-match mixes.
14. Prepares job notices to recruit and hire employees.
15. Interviews prospects, hires support personnel, assigns tasks, evaluates employees, and recommends promotions and/or merit increases to satisfy managerial functions.

16. Interprets results of tests, employment interviews, and evaluations to arrive at the "best" man-job-match for support personnel.
17. Coordinates requests for proposals with PIs and key administrators to determine acceptability and feasibility.
18. Prepares and submits with PIs solicited or unsolicited proposals to obtain research or other fundings.
19. Negotiates and executes contracts or subcontracts for funding or work.
20. Executes and manages subcontracts to assist (PIs) with contractual work tasks.
21. Performs methods engineering functions to improve, change, or modify analytical and systematic methods or techniques.
22. Designs and engineers changes or assists PIs in improving hardware, software, firmware, or integrated systems.
23. Supervises or assists with the testing and evaluation of components/equipment, subsystems or systems.
24. Controls inventories to safeguard fiscal commitments.
25. Authorizes and commits purchases of equipment and materials to support work tasks.
26. Promotes safety to enhance worker protection and to improve workman compensation ratings.
27. Provides expertise in labor relations and safety to management team.

28. Evaluates and critiques environmental impact statements, technical papers, and other documents to insure compliance with requirements.
29. Inspects and approves results to satisfy specified requirements.
30. Analyzes and computes data to arrive at synthesized decision-making information.
31. Researches and maintains state-of-the-art professional managerial know-how to accomplish predetermined goals and objectives.
32. Documents and reports with PIs findings and conclusions to client or sponsor.
33. Performs advisory and consulting work for associates and organizational personnel.
34. Maintains personal, technical, managerial, and human relations skills to maximize expected results.
35. Provides community services to school, city, church, etc.
36. Formulates and guides the solutions to management problems and selects and implements the "best" alternative according to selected criteria.
37. Performs cost engineering and economic analysis to determine optimal cost solutions.

JOB KNOWLEDGE

1. Working knowledge of Industrial Engineering and project management methods and techniques including, but not limited to:
   a. Engineering economic analysis
   b. Planning, estimating, and scheduling
   c. Negotiating and mediating
   d. Work measurements and methods engineering
   e. Data and word processing
   f. Engineering design and analysis
   g. Finanacial management
   h. Materials management
   i. Personnel management
   j. Contract administration.
2. Abilities including:
   a. Communication with personnel from varied socioeconomic and educational levels
   b. Establishment of rapport with managers, PIs, associates, sponsors, politicians, students, etc.
   c. Enforcement of rules, policies, and regulations
   d. Working in engineering design or scientific laboratories, on-the-job construction or mobilization, or executive level activities.

JOB STANDARDS

1. Satisfies timely requests.

2. Delivers timely contractual products or services on or ahead of schedule and at or below cost.
3. Applies cost-reduction approaches effectively.
4. Allocates funds and other resources for maximal efficiency and productivity.

APPENDIX D

"Build Me a Son, O Lord"

"Build me a son, O Lord, who will be strong enough to know when he is weak, and brave enough to face himself when he is afraid; one who will be proud and unbending in honest defeat, and humble and gentle in victory.

Build me a son whose wishes will not take the place of deeds; a son who will know Thee--and that to know himself is the foundation stone of knowledge.

Lead him, I pray, not in the path of ease and comfort, but under the stress and spur of difficulties and challenge. Here let him learn to stand up in the storm; here let him learn compassion for those who fail.

Build me a son whose heart will be clear, whose goal will be high, a son who will master himself before he seeks to master other men, one who will reach into the future, yet never forget the past.

And after all these things are his, add, I pray enough of a sense of humor, so that he may always be serious, yet never take himself too seriously. Give him humility, so that he may always remember the simplicity of true greatness, the open mind of true wisdom, and the meakness of true strength.

Then I, his father, will dare to whisper, 'I have not lived in vain'."

General Douglas McArthur

APPENDIX D

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APPENDIX E

"Whatever you cannot understand,

you cannot possess."

Johann Wolfgang Von Goethe

APPENDIX E

SAMPLE MEB PROFILE REPORT
Profile Review Report

ON Mr. John Doe POSITION Lead Engineer
FOR Dr. Jim Smith POSITION Project Engineer
BY Joseph U. LeBlanc DATE 17 March 1980

PROFILE

Description	R/S	STANINE 1	2	3	4	5	6	7	8	9	P	D	S +	W −	A +
MENTAL APTITUDES															
A1 MENTAL ALERTNESS ..	36								+		9	−1	x		
A2 BUSINESS TERMS	10							+			4	+3	x		
A3 MEMORY RECALL	11								+		8	+0	x		
A4 VOCABULARY	45									+	7	+2	x		
A5 PERCEPTION	20								+		5	+3	x		
A6 MECHANICAL INTEREST	13									+	9	+0	x		
PERSONALITY DIMENSIONS															
D1 NERVOUS TENSION ...	3	+									4	−3		x	x
D2 CHARACTER STRENGTH	5				+						9	−5	x		
D3 WORK HABITS	8				+						5	−1			x
D4 SOCIABILITY	2	+									4	−3		x	x
D5 EMOTIONAL MATURITY	3				+						5	−1			
D6 DOMINANCE	2								+		5	3	x		
D7 COMPETITIVENESS ...	6						+				7	−1	x		
D8 STAMINA	9		+								8	−6		x	x
D9 NAIVETE	8						+				8	−2	x		
D10 WORK MOTIVATION ..	6					+					7	−2			
VALIDITY SCALES															
V1 DISTORTION	0	+									3	+3	x		
V2 EQUIVOCATION	8					+									x

* R/S: raw score; P: self perception; D: (actual-perception);
S: strength; W: possible weakness; A: action item

INTRODUCTION

Some of the above results were obtained from the Manpower Evaluation Booklet, developed by the Communication Institute, and used to help individuals in identifying strengths and shortcomings or to assist managers in selecting the right person for the right job at the right time. Regardless, one must remember that the instrument is a tool that can help maximize profits, productivity, and performance.

The above profile is a picture of the aforementioned individual. Each dimension can be individually evaluated with short statements as given in the next section, but certain combinations are more important and should be carefully analyzed, e.g., Figures E-1 to E-13. Also, measurements are normally distributed with 1/3 of the population in the 1-3, 4-6, and 7-9 Stanines, respectively.

DESCRIPTION OF MENTAL APTITUDES

A1 MENTAL ALERTNESS measures the capacity to comprehend and solve problems quickly and accurately -- from "slow to learn" to "fast to learn."

The score of the aforementioned individual tends to demonstrate superior reading and learning speed requiring a continuous mental challenge or boredom results. This level is characteristic of superior technical and professional minds.

A2 BUSINESS TERMS measures command of the oral and written business vocabulary -- from poor vocabulary to "knowing."

The score of the aforementioned individual tends to indicate excellent ability as characterized by executive secretaries, bankers, and other financial professions.

A3 MEMORY RECALL measures capacity to recollect proper names, events, places, etc. -- from "slow" to "knowing."

The score of the aforementioned individual tends to indicate astuteness in keeping up with events and influences which affect the individual.

A4 VERBAL FLUENCY measures ability to comprehend and use plain English in the normal communication process -- from "low" to high" word knowledge.

The score of the aforementioned individual tends to indicate an excellent knowledge of normal vocabulary words for communicative purposes.

A5 PERCEPTION measures or refers to ability of assimilating numbers, symbols, or signs quickly and accurately -- from "low" to "high" scanning accuracy.

The score of the aforementioned individual tends to indicate exceptional ability to work with figures, invoices, and numerical records accurately and rapidly.

A6 MECHANICAL INTEREST measures level of interest in mechanical devices -- from "low" to "high" interest.

The score of the aforementioned individual tends to indicate excellent interest in learning about mechanical devices and explaining their operation, etc.

DESCRIPTION OF PERSONALITY DIMENSIONS

D1 NERVOUS TENSION is derived from the interrelationship of Genetic Background (which dictates such items as hair and eye color, body structure, etc.), Environment (constituting segment of economic strata the individual comes from, parental influence, segment of the country, etc.), and Biochemistry (which reflects those internal body functions such as uric acid flow speed, thyroid, how the thalmic brain region operates, etc.). These three factors create nervous tension drive or lack of drive and energy job fit.

The score of the aforementioned individual tends to indicate hypertensity, inability to concentrate or remain in one place for long periods of time, many times resulting in extreme emotional stress or strain which can then cause severe physical problems.

D2 CHARACTER STRENGTH measures the flexibility orientation of the person compared to rules, laws, etc.

The score of the aforementioned individual tends to indicate an ideal range, indicating ability to see and accept rules and responsibilities, and to carry them through as expected.

D3 WORK HABITS measure the person's attitude about working, planning, and work performance.

The score of the aforementioned individual tends to indicate a moderate or average planning orientation and is highly desirable where jobs or life dictate a need for organization and time effectiveness.

D4 SOCIABILITY measures the degree of introversion and extroversion.

The score of the aforementioned individual tends to indicate a detached, introverted, and withdrawn individual who prefers to work alone and does not like to waste time talking to other people.

D5 EMOTIONAL MATURITY measures emotional maturity in relation to chronological age.

The score of the aforementioned individual is normally expected of the age group 30-45. Individuals who are above this age chronologically become overly impatient and upset easily. People in this age group who score in this range have good emotional balance. Those lower in chronological age, scoring in this group, would be overly tolerant, and might not be sufficiently impatient to make things happen.

D6 DOMINANCE measures whether the individual is oriented to be a "chief" or an "Indian," whether he will be an order-taker or an order giver.

The score of the aforementioned individual tends to indicate a highly authoritative and dominant individual, one who is prone to take over, resist authority, and to take command.

D7 COMPETITIVENESS reflects concern about making and keeping friends as opposed to competing, winning, and achieving.

The score of the aforementioned individual tends to indicate a person who will want to keep people as friends but will not object to asking them to help him or to buy from him, etc.

D8 STAMINA distinguishes between tender minded and tough minded people.

The score of the aforementioned individual tends to reflect an acceptable level, indicating that basically the answers are accurate.

D9 NAIVETE measures the likelihood of the individual to accept and believe what is said to him without questioning.

The score of the aforementioned individual tends to indicate a reasonable receptiveness, but not overgullibility or naivete. This level will probe moderately.

D10 WORK MOTIVATION measures the security orientation to stay put in a given job or lifestyle situation that is opposed to changes, entrepreneurism, and innovation.

The score of the aforementioned individual tends to indicate a person who must have some security, but will be willing to take a moderate amount of chances in life and workstyle.

DESCRIPTION OF VALIDITY

V1 DISTORTION indicates a measurement of the different ways and times the aforementioned individual contradicted his answers. Scores of one through six are normal.

The score of the aforementioned individual tends to reflect highly frank and honest answers and is most desirable. Validity is estimated to be at least 90%.

V2 EQUIVOCATION measures the ability of the individual to choose or decide. When properly answered and interpreted, the validity of Manpower Evaluation Booklet has been rated at a 92% accuracy.

The score of the aforementioned individual tends to reflect an acceptable level, indicating that basically the answers are accurate.

This is a confidential report based on test results and other available data.

MENTAL APTITUDES									
	STANINE								
Description	1	2	3	4	5	6	7	8	9
PERSONALITY DIMENSIONS									
D1 NERVOUS TENSION	x	x							
D2 CHARACTER STRENGTH	x	x							
D5 EMOTIONAL MATURITY	x	x							

Figure E-1. High Turnover Pattern

MENTAL APTITUDES									
	STANINE								
Description	1	2	3	4	5	6	7	8	9
PERSONALITY DIMENSIONS									
D1 NERVOUS TENSION	x	x							
D5 EMOTIONAL MATURITY	x	x							
D6 DOMINANCE								x	x

Figure E-2. Hostility Pattern

MENTAL APTITUDES									
	STANINE								
Description	1	2	3	4	5	6	7	8	9
PERSONALITY DIMENSIONS									
D1 NERVOUS TENSION	x	x							
D5 EMOTIONAL MATURITY	x	x							

Figure E-3. Interpersonal Difficulties Pattern

MENTAL APTITUDES									
	STANINE								
Description	1	2	3	4	5	6	7	8	9
PERSONALITY DIMENSIONS									
D1 NERVOUS TENSION	x	x	x						
D5 EMOTIONAL MATURITY	x	x							
D10 WORK MOTIVATION.........								x	x

Figure E-4. Double Stress Patterns--Correlates With Early Heart Attacks

MENTAL APTITUDES									
	STANINE								
Description	1	2	3	4	5	6	7	8	9
PERSONALITY DIMENSIONS									
D5 EMOTIONAL MATURITY	x	x							
D6 DOMINANCE								x	x

Figure E-5. Temper Patterns

MENTAL APTITUDES									
	STANINE								
Description	1	2	3	4	5	6	7	8	9
PERSONALITY DIMENSIONS									
D7 COMPETITIVENESS	x	x	x						
D8 STAMINA	x	x	x						

Figure E-6. Pushover Pattern--Does Not Handle Discipline Well

MENTAL APTITUDES									
	STANINE								
Description	1	2	3	4	5	6	7	8	9
PERSONALITY DIMENSIONS									
D2 CHARACTER STRENGTH	x	x							
D3 WORK HABITS	x	x							

Figure E-7. Procrastinator Pattern

MENTAL APTITUDES									
	STANINE								
Description	1	2	3	4	5	6	7	8	9
PERSONALITY DIMENSIONS									
D2 CHARACTER STRENGTH	x	x							
D9 NAIVETE								x	x
D10 WORK MOTIVATION.........								x	x

Figure E-8. Ethics--"Shrewd" Pattern

MENTAL APTITUDES									
	STANINE								
Description	1	2	3	4	5	6	7	8	9
PERSONALITY DIMENSIONS									
D2 CHARACTER STRENGTH								x	x
D9 NAIVETE	x	x							
D10 WORK MOTIVATION.........	x	x							

Figure E-9. Ethics--"Company Man" Pattern

MENTAL APTITUDES									
	STANINE								
Description	1	2	3	4	5	6	7	8	9
PERSONALITY DIMENSIONS									
D1 NERVOUS TENSION	x	x							
D2 CHARACTER STRENGTH	x	x							
D4 SOCIABILITY								x	x
D6 DOMINANCE								x	x
D10 WORK MOTIVATION.........								x	x

Figure E-10. Con Artist Pattern

MENTAL APTITUDES									
	STANINE								
Description	1	2	3	4	5	6	7	8	9
PERSONALITY DIMENSIONS									
D2 CHARACTER STRENGTH								x	x
D3 WORK HABITS								x	x

Figure E-11. Perfectionist Pattern

MENTAL APTITUDES									
	STANINE								
Description	1	2	3	4	5	6	7	8	9
A1 MENTAL ALERTNESS							x	x	x
A2 BUSINESS TERMS							x	x	x
A3 MEMORY RECALL							x	x	x
A4 VOCABULARY							x	x	x
A5 PERCEPTION								x	x
A6 MECHANICAL INTEREST......			x	x	x				
PERSONALITY DIMENSIONS									
D1 NERVOUS TENSION					x	x	x		
D2 CHARACTER STRENGTH					x	x	x		
D3 WORK HABITS					x	x	x		
D4 SOCIABILITY					x	x	x		
D5 EMOTIONAL MATURITY				x	x	x			
D6 DOMINANCE							x	x	x
D7 COMPETITIVENESS						x	x	x	
D8 STAMINA						x	x	x	
D9 NAIVETE					x	x	x		
D10 WORK MOTIVATION.........							x	x	x

Figure E-12. Top Level Manager Pattern--Large Company

Description	STANINE 1	2	3	4	5	6	7	8	9
MENTAL APTITUDES									
A1 MENTAL ALERTNESS					x	x	x	x	x
A2 BUSINESS TERMS						x	x	x	x
A3 MEMORY RECALL							x	x	x
A4 VOCABULARY						x	x	x	x
A5 PERCEPTION							x	x	x
A6 MECHANICAL INTEREST......									
PERSONALITY DIMENSIONS									
D1 NERVOUS TENSION			x	x	x				
D2 CHARACTER STRENGTH					x	x	x		
D3 WORK HABITS			x	x	x				
D4 SOCIABILITY					x	x	x		
D5 EMOTIONAL MATURITY				x	x	x			
D6 DOMINANCE					x	x	x		
D7 COMPETITIVENESS						x	x		
D8 STAMINA			x	x	x				
D9 NAIVETE				x	x	x	x		
D10 WORK MOTIVATION.........					x	x	x		

Figure E-13. Top Insurance Salesman Pattern

APPENDIX F

"There are essentially three kinds of people
. . . those who make things happen,
those who watch things happen, and
those who wonder what happened."

John Newman

APPENDIX F

PERT EXAMPLE

Program Evaluation and Review Technique (PERT) using a precedence diagramming method (PDM) was used as a planning and controlling tool. Within the research environment, requirements were defined explicitly by contract, but timing and resource allocations were tailored to the environment. Examples of the requirements were:

> "Collect biological, geological, physical, and chemical oceanography data and samples on a quarterly basis...; use contractually approved methods and procedures to analyze the samples and data; reduce, analyze, integrate, and synthesize data into decision-making information; report same in performance reports, quarterly reports, and a final report....
>
> Samples shall be completely analyzed 90 days after collection and data analysis shall be completed 45 days after collection. Data synthesis shall be completed 120 days prior to the final report."

Hence, the tasks over a 12-month planning horizon were:

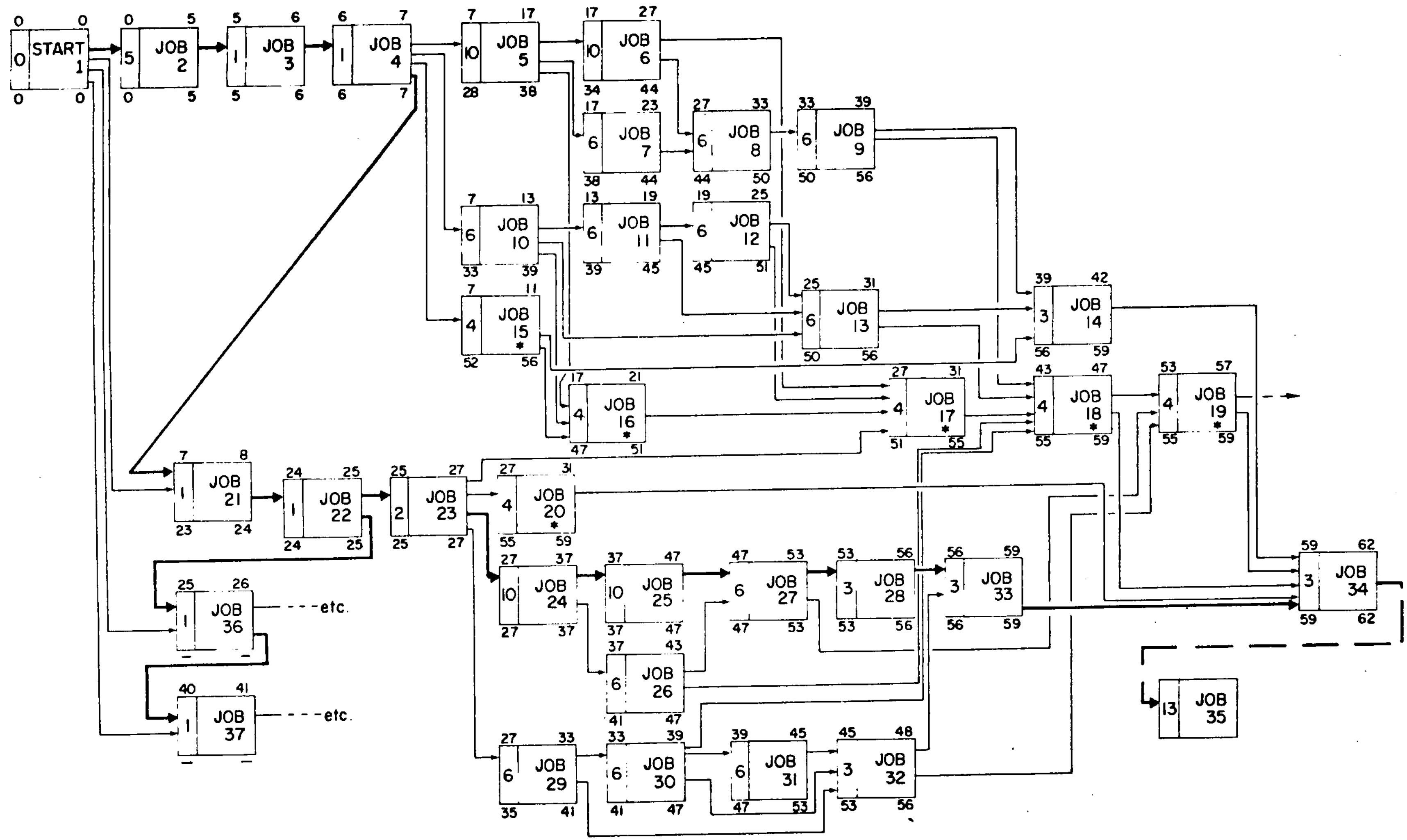
1. Plan and mobilize four cruises to collect samples/data at the Flower Garden Banks in the Gulf of Mexico.
2. Collect samples/data and prepare cruise reports to document accomplishments or deviations from expectations.
3. Analyze samples/data and report significant findings and schedule or cost deviations in Quarterly Prinicpal Investigator (PI) Reports.
4. Synthesize all data into meaningful decision-making information and report same in the final report.

The above is partly translated into Table F-1 and Figure F-1.

Table F-1. Job Samples (2 Cruises)

Job No.	Description	Duration	ES	EF	LS	LF
1	Start Project 4260	0	0	0	0	0
2	Plan Cruise No. 1	5	0	5	0	5
3	Mobilize Cruise No. 1	1	5	6	5	6
4	Collect Data/Samples	1	6	7	6	7
5	Analyze Samples (1st Batch)	10	7	17	28	38
6	Analyze Samples (2nd Batch)	10	17	27	34	44
7	Analyze Data (1st Batch)	6	17	23	38	44
8	Analyze Data (2nd Batch)	6	27	33	44	50
9	Synthesize Data (Biological)	6	33	39	50	56
10	Analyze Other Data (1st Set)	6	7	13	33	39
11	Analyze Other Data (2nd Set)	6	13	19	39	45
12	Analyze Other Data (3rd Set)	6	19	25	45	51
13	Synthesize Data (Physical)	6	25	31	50	56
14	Integrate Data (1st Cruise)	3	39	42	56	59
15	Prepare Cruise Report No. 1	4	7	11	7	11*
16	Prepare Quarterly PI Report No. 1	4	17	21	17	21*
17	Prepare Quarterly PI Report No. 2	4	27	31	27	31*
18	Prepare Quarterly PI Report No. 3	4	43	47	43	47*
19	Prepare Quarterly PI Report No. 4	4	53	57	53	57*
20	Prepare Cruise Report No. 2	4	27	31	27	31*
21	Plan Cruise No. 2	1	7	8	23	24
22	Mobilize Cruise No. 2	1	24	25	24	25
23	Collect Data Samples	2	25	27	25	27
24	Analyze Samples (3rd Batch)	10	27	37	27	37
25	Analyze Samples (4th Batch)	10	37	47	37	47
26	Analyze Data (3rd Batch)	6	37	43	41	47
27	Analyze Data (4th Batch)	6	47	53	47	53
28	Synthesize Data	3	53	56	53	56
29	Analyze Other Data (4th set)	6	27	33	35	41
30	Analyze Other Data (5th set)	6	33	39	41	47
31	Analyze Other Data (6th set)	6	39	45	47	53
32	Synthesize Data (2nd Cruise)	3	45	48	53	56
33	Integrate Data (2nd Cruise)	3	56	59	56	59
34	Integrate Data	3	59	62	59	62
35	Prepare, deliver, update final report	13	--	--	--	--
36	Plan Cruise No. 3	1	25	26	25	26
37	Plan Cruise No. 4	1	40	41	40	41

*Required delivery.



*See Note in Table F-1.

Figure F-1. PERT Example with PDM

VITA

Joseph Urlan Le Blanc
902 Holik Drive South
College Station, TX 77840

January 1981

Birth	Couteaux, LA, USA	17 Mar 37
Parents	Bernard (deceased) and Levie B. Le Blanc	
Family	Elizabeth Holder Le Blanc (wife) Mark J. Le Blanc (son) Kathleen A. Le Blanc (daughter)	
Education	Southwestern Louisiana Institute B S (Mathematics, General Engineering), 1959 Air University, S O S, 1963 Texas A&M University M C S (Computing Science), 1969 M B A (Finance, Management), 1972 M E (Industrial Engineering), 1972 **Doctor of Engineering, 1981 (Planned).**	
Experience	**Registered Professional Engineer** AAA Arbitrator Certified Data Processor	

Civilian

1978-Present	**Program Manager** Texas A&M University
1977-1978	**Project Manager** Brown and Root, Inc.
1972-1977	**Executive Director** Master Planning Assoc.
1971-1972	**Operations Manager** Texas Data Center
1970-1971	**Fellow** Texas A&M University
1968-1970	**EDP Consultant** Texas A&M University
1966-1968	**Lead Systems Analyst** Humble Oil & Refining

Military

Reserve Duty

1974-Present	**Chief**, Requirements Div. AF Manpower/Personnel Ctr.
1972-1974	**Comptroller**, 4th AMA Sqd. AF Logistics Command
1968-1972	**Production Officer**, 67th CSG AF Tactical Air Command

Active Duty

1964-1967	**Chief**, Programming Div. AF Electronics Systems Div.
1963-1964	**T & E Specialist**, 465L SPO AF Systems Command
1960-1963	**Programmer-Analyst** Defense Mapping Agency

This report was typed by Mrs. Judy Pate.